WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR SYNOPTIC METEOROLOGY

ABRIDGED FINAL REPORT
OF THE
FIFTH SESSION

Geneva, 15 June - 3 July 1970

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Secretariat of the World Meteorological Organization - Geneva - Switzerland
1970

NOTE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

CONTENTS

Recommendations (contd.)

Recommendations (contd.)

Annexes

Annexes (contd.)

Annexes (contd.)

Annexes (contd.)

LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

N. G. Leonov	president
O. Lönnqvist	vice-president

2. Representatives of Members of WMO

G. D. Safi	principal delegate	Afghanistan
Hamit Kotoni	principal delegate	Albania
Safet Golemi	delegate	
S. Daoud	principal delegate (until 23.6)	Algeria
R. Amrani	principal delegate (from 24.6)	
M. Belbachir	delegate	
R. Damerdji	delegate	
M. Yermeche	delegate	
E. R. Lichtenstein	principal delegate	Argentina
V. H. Ordóñez	delegate	
J. W. Lillywhite	principal delegate	Australia
E. Phillips	delegate	
L. Kletter	principal delegate (until 25.6)	Austria
B. Knirsch	principal delegate (from 25.6)	
L. Dufour	principal delegate	Belgium
G. Doumont	delegate	
R. Waegeneer	delegate (until 23.6)	
E. De Dycker	delegate	
F. Alcántara	principal delegate	Brazil
H. van der Broocke	delegate	
I. D. Kančev	principal delegate	Bulgaria
S. G. Milušev	delegate	
K. Gelev	delegate	
A. A. Glomozda	principal delegate	Byelorussian S.S.R.
D. B. A. Mandengue	principal delegate	Cameroon

2. Representatives of Members of WMO (contd.)

H. Cameron	principal delegate	Canada
E. Elsley	delegate	
G. Fozard	delegate	
S. Monsalve		Chile
Liu Ta-nien	principal delegate	China
Lu Shih-chong	delegate	
J. González Montoto	principal delegate	Cuba
T. Gutiérrez Pérez	delegate	
S. Slabý	principal delegate	Czechoslovakia
F. Molnar	delegate	
J. Mášl	delegate	
E. Carlsen	principal delegate	Denmark
B. Jensen	delegate	
S. N. Venho	principal delegate	Finland
H. Santala	delegate	
R. Mittner	principal delegate	France
A. Durget	delegate	
J. Labrousse	delegate	
A. Perlat	delegate	
A. M. Sonnet	delegate	
J. Brinkmann	principal delegate	Germany, Federal Republic of
P. Wüsthoff	delegate	
M. Kurz	delegate	
H. Harries	delegate	
A. Y. Dagbovie	principal delegate	Ghana
C. Baltassis	principal delegate	Greece
C. Velmachos	delegate	
F. Dési	principal delegate	Hungary
Miss I. Lepp	delegate	
I. Bodolai	delegate	
H. Sigtryggsson	principal delegate	Iceland
Y. P. Rao	principal delegate	India
S. K. Das	delegate	
P. M. Austin Bourke	principal delegate	Ireland
P. K. Rohan	delegate	

2. Representatives of Members of WMO (contd.)

M. Lévi	principal delegate	Israel
M. Montalto	principal delegate (until 30.6)	Italy
V. Mastino	principal delegate (from 1.7)	
C. Giallombardo	delegate	
J. Djigbenou	principal delegate	Ivory Coast
K. Takahashi	principal delegate	Japan
K. Agematsu	delegate	
A. L. Huneidi	principal delegate	Jordan
M. E. Mlaki	principal delegate	Kenya
E. Spencer	delegate	
D. Bargman	delegate	
H. Abughalya	principal delegate	Libyan Arab Republic
D. Tuvdendorj	principal delegate	Mongolia
G. Dembereldorj	delegate	
E. Naidan	delegate	
K. R. Postma	principal delegate	Netherlands
E. A. Mehlbaum	delegate	
A. C. Bakker	delegate	
J. H. Keizer	delegate	
I. S. Kerr	principal delegate	New Zealand
P. Thrane	principal delegate	Norway
M. U. Khan	principal delegate	Pakistan
F. G. Castilla Zúñiga	principal delegate	Peru
J. Alarcón	delegate	
S. Rafalowski	principal delegate	Poland
A. Silva de Sousa	principal delegate (until 21.6)	Portugal
M. T. Ferreira Cabrita	principal delegate (from 22.6)	
T. R. do Espirito-Santo	delegate	
J. S. Medeiros Marques	delegate	
Mrs. E. Milea	principal delegate	Romania
F. Jondot	principal delegate	Senegal

2. Representatives of Members of WMO (contd.)

J. J. Le Roux	principal delegate	South Africa
L. Q. Hayward	delegate	
F. Huerta	principal delegate	Spain
M. Huerta-Laborda	delegate	
O. Lönnqvist	principal delegate	Sweden
Mrs. R. Schäffer	delegate	
L. Moen	delegate	
J. Haefelin	principal delegate	Switzerland
A. Jeannet	delegate	
M. E. Mlaki	principal delegate	Tanzania, United Republic of
E. Spencer	delegate	
D. Bargman	delegate	
S. Vesa-Rajananda	principal delegate	Thailand
P. Soontarotok	delegate	
M. M. Guettari	principal delegate	Tunisia
U. E. Çölaşan	principal delegate	Turkey
M. Inan	delegate	
T. Uluçevik	delegate	
M. E. Mlaki	principal delegate	Uganda
E. Spencer	delegate	
D. Bargman	delegate	
E. M. Dobryšman	principal delegate	Union of Soviet Socialist Republics
I. A. Ravdin	delegate	
A. D. Čistjakov	delegate	
V. M. Potapov	delegate	
A. V. Kostjučenko	delegate	
N. G. Leonov	delegate	
A. M. El Masry	principal delegate	United Arab Republic
M. H. El Nagdy	delegate	
R. F. Zobel	principal delegate (until 20.6)	United Kingdom of Great Britain and Northern Ireland
A. A. Worthington	principal delegate (from 21.6)	
N. E. Davis	delegate	
R. R. Fotheringham	delegate	
F. H. Bushby	delegate (from 29.6)	
R. A. Buchanan	delegate	

2. Representatives of Members of WMO (contd.)

F. W. Burnett	principal delegate	United States of America
K. R. Johannessen	delegate	
J. V. Bassett	delegate	
E. Diemer	delegate	
D. F. Moore	delegate	
C. G. Reeves	delegate	
B. Thompson	delegate	
G. D. Cartwright	delegate	
J. R. Neilon	delegate	
O. Ruiz Rodríguez	principal delegate	Venezuela
Mrs. M. P. de Mata	delegate	
P. Pacheco	delegate	
L. Salas	delegate	
Hoa-Van-Mui	principal delegate	Viet-Nam, Republic of
Dang-Phuc-Dinh	delegate	
Pham-Van-Trinh	delegate	
M. Simić	principal delegate	Yugoslavia
P. Gburčik	delegate	

3. Representatives of other technical commissions

N. A. Lieurance	president, CAeM

4. International organizations

H. Dreyling	International Air Transport Association (IATA)
U. Rath	International Civil Aviation Organization (ICAO)
R. R. Cubero	International Federation of Air Line Pilots Associations (IFALPA)
V. Quintas	International Telecommunication Union
T. Okabe	
W. Boyle	
H. Cameron	International Union of Geodesy and Geophysics (IUGG)

5. Invited experts

W. Böer
K. H. Hartmann

6. Representatives of WMO Secretariat

K. Langlo	Representative of the Secretary-General
G. Weiss	Chief, Networks and Telecommunications Division
C. R. Dale	Permanent secretary of CSM
H. Bari	Chief, Telecommunications Section
A. Mastrangeli	Chief, Aeronautical Meteorology Section
H. Tabatabay	Chief, Education and Training Co-ordination Office
G. Verploegh	Technical officer
R. H. Foote	Technical officer
S. Mizuno	Technical officer
R. Chacun	Technical assistant
R. Mathieu	Technical assistant
J. Van Egmond	Technical assistant

AGENDA

Agenda item No.		Relevant documents	Res.	Rec.
1.	Opening of the session	PINK 1		
2.	Organization of the session	1; 2; PINK 3		
3.	Report by the President of the Commission	26; PINK 33	1	
4.	Co-ordination of data needs and proposals for codes	3; 7; 9; 15; 17; 18; 20; 22; 29; 30; 36; 41; 42; 45; 46; 47; 52; 58; 59; 61; 63; 64; 65; 66; PINK 2; PINK 6; PINK 18; PINK 21; PINK 22; PINK 28; PINK 28, ADD.1; PINK 30; PINK 34; PINK 35; PINK 40; PINK 41; PINK 45; PINK 46; PINK 47; PINK 49; PINK 50	2	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25
5.	Global Observing System - Co-ordination of matters relating to the GOS	11; 13; 14; 19; 19 CORR. 1; 24; 28; 31; 35; 44; 48; 51; 54; 55; 59; PINK 20; PINK 31; PINK 26	3	26; 27
6.	Global Data-Processing System	13; 44; 54; 60; PINK 19; PINK 25; PINK 37		
6.1	Co-ordination of requirements expressed by Technical Commissions	27		
6.2	Rationalization of the type of output products of the GDPS	27; 49	5	28; 29

Agenda item No.		Relevant documents	Res.	Rec.
6.3	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting	33; 34; 40; 43; 50; 53; 56	4	
6.4	Review of the Guide to the Preparation of Synoptic Weather Charts and Diagrams	6		30
7.	Global Telecommunication System			
7.1	Organization of the Global Telecommunication System	4; 12; 12, ADD.1; 12 APP. A, ADD.1; 12, ADD.2; 21; 25; 37; 44; 47; 54; 57; 62; PINK 7; PINK 8; PINK 9; PINK 10; PINK 11; PINK 12; PINK 12, CORR.1; PINK 13; PINK 14; PINK 15; PINK 15, CORR.1; PINK 16; PINK 17; PINK 29; PINK 32, ADD.1; PINK 38; PINK 39; PINK 42; PINK 43; PINK 44; PINK 48	6	31; 32; 33; 34; 35; 36; 37; 38; 39; 40
7.2	Telecommunication procedures			
7.3	Technical problems including introduction of new telecommunication techniques in the GTS			
8.	Definitions of meteorological phenomena	5; 38; PINK 23	41	
9.	Organization of meteorological activities in the field of synoptic meteorology	13; PINK 5		
10.	Education and Training in Synoptic Meteorology	13; 39; PINK 4	7	
11.	General review of Technical Regulations	10; 16; 16, ADD.1; 16, ADD.2; PINK 32; PINK 32, ADD.1		42

Agenda item No.		Relevant documents	Res.	Rec.
12.	Review of previous Resolutions and Recommendations of the Commission and relevant Executive Committee decisions	8; PINK 26	8	43
13.	Scientific lectures and discussions	32; PINK 24, REV.1		
14.	Composition of working groups	23; 60; PINK 52		
15.	Election of officers	PINK 27; PINK 27, REV.1 (English only); PINK 51		
16.	Date and place of the sixth session			
17.	Closure of the session			

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (Agenda item 1)

1.1 The fifth session of the Commission for Synoptic Meteorology was held at the "Palais des Expositions" in Geneva, from 15 June to 3 July 1970. All documents were produced in the four working languages of WMO (English, French, Russian and Spanish) and simultaneous interpretation in these languages was provided in all plenary sessions and the working committees.

1.2 The session was opened by the acting president of the Commission, Dr. N. G. Leonov (U.S.S.R.) at 10.30 a.m. on 15 June 1970.

1.3 Mr. D.A. Davies, Secretary-General of the World Meteorological Organization greeted the participants and extended a warm personal welcome to them as well as to the representatives of the international organizations and others who were present. He emphasized that the whole complex of meteorology is changing. With the introduction of new techniques which place great emphasis on both the satellite and the computer, CSM will be called upon to make many decisions, especially in those areas covered by the WWW, which will have significant influence on Congress. Mr. Davies then referred to the agenda and explained the great significance of particular items. He introduced the various Secretariat members and expressed complete confidence that the meeting would be a success and a great step forward for both science and WMO.

1.4 Dr. Leonov, the acting president of CSM, before giving his presidential address, explained the circumstances under which he had assumed his post and congratulated Dr. Sen of India for the splendid job he had done before leaving the Presidency. Dr. Leonov then stated that the Commission was indeed grateful to Mr. Davies, the Secretary-General, for making the necessary arrangements to hold the fifth session of the Commission here in Geneva and thanked him for his kind words for a successful and pleasant meeting. He then reviewed the developments in the field of synoptic meteorology over the past four years and, while doing so, emphasized the fact that the importance of the Commission and its work is growing. A good example of this fact is that several more countries who were not represented at the previous session have sent delegations to the present session of the Commission. Dr. Leonov stressed that the Commission had most serious problems to solve, and agreed with Mr. Davies that these problems related mostly to the three components of the WWW. He then thanked everyone involved in the preparation of the great amount of material on which the Commission's decisions will be based. These decisions, though involved, complex and varied, will be possible through a common effort and a spirit of wholehearted co-operation.

1.5 There were 144 participants at the session. These included representatives from 59 countries, 5 international organizations, the president of CAeM and two invited experts. The WMO Secretariat was represented, among others, by Dr. Langlo, Dr. Weiss, Mr. Dale, Mr. Bari and Mr. Verploegh, A complete list of delegates, experts and observers is given in the beginning of this report.

2. ORGANIZATION OF THE SESSION (Agenda item 2)

2.1 Consideration of the report on credentials

A provisional list of persons present, and the capacities in which they were attending the session, was presented by the representative of the Secretary-General. The list was accepted as the report on credentials and the Commission decided not to set up a credentials committee.

2.2 Adoption of the agenda

The provisional agenda was adopted at the first plenary meeting without amendment. The final agenda is reproduced at the beginning of this report, together with a list of relevant documents and numbers of resolutions and recommendations.

2.3 Establishment of committees

2.3.1 Working committees

Three working committees were set up to examine in detail the various agenda items:

(a) Committee A - to deal mainly with questions relating to data needs and proposals for codes. Mr. G. Doumont (Belgium) was elected chairman; the Committee was assisted by Mr. G. Verploegh of the Secretariat.

(b) Committee B - to deal mainly with telecommunication matters. Dr. C. Giallombardo (Italy) was elected chairman; the Committee was assisted by Mr. H. Bari of the Secretariat.

(c) Committee C - to deal with any remaining questions. Dr. O. Lönnqvist (Sweden), vice-president of the Commission, was elected chairman; the Committee was assisted by Mr. C. Dale of the Secretariat.

2.3.2 Co-ordination Committee

In accordance with General Regulation 26, a Co-ordination Committee was set up consisting of the president, the vice-president, the chairmen of the three working committees, the representative of the Secretary-General and, as required, the Technical Secretaries of the working committees.

2.3.3 Nomination Committee

A Nomination Committee was established consisting of the principal delegates of the following countries: Cameroon, U.S.S.R., Peru, U.S.A., Australia and France. Mr. R. Mittner (France) was elected chairman.

2.4 Other organizational questions

2.4.1 Under this item the Commission fixed its working time-table for the duration of the session. It also decided that the minutes of the plenary meetings, which cannot be approved during the session, could be approved by the president, Dr. N.G. Leonov, on behalf of the Commission.

2.4.2 Furthermore, the question of the availability of working documents before the session was discussed. It was stated that several documents, including very important and/or voluminous ones, were received too late, namely either at the beginning of the session or only a few weeks before. It was emphasized that, for a meeting such as CSM, many documents require considerable study as well as co-ordination within each country before the session. It was agreed that the work of the session would be facilitated considerably if documents were distributed well in advance and that at least those documents which need considerable study before the session should be received by Members not later than approximately three months before the opening of the session. This should apply not only to documents prepared by the Secretariat but also to documents submitted by Members. The Commission invited the Secretary-General to study this matter and to make suitable proposals to the Executive Committee or Congress.

3. REPORT BY THE PRESIDENT OF THE COMMISSION (Agenda item 3)

3.1 The Commission noted with appreciation the report submitted by the president on the activities of CSM since its fourth session. All items in the report requiring action by the Commission were considered under the relevant parts of the agenda.

3.2 The Commission also noted with great sadness the statement by the president regarding the untimely death in early March 1970 of Dr. P.I. Miljukov who served the Commission as Rapporteur on Meteorological Forecasts of Importance to Hydrological Forecasting.

3.3 The Commission noted a statement by Fifth Congress regarding the desirability of establishing advisory working groups and, in this regard, considered the desirability of re-establishing such a group within the Commission. Since there is a need from time to time for consideration of matters of broad concern to the Commission which cannot be adequately dealt with by other working groups, and because of the need by the president for advice in planning and co-ordinating the work of the Commission and its working groups, the Commission adopted Resolution 1 (CSM-V).

4. CO-ORDINATION OF DATA NEEDS AND PROPOSALS FOR CODES (Agenda item 4)

4.1 Report of the Chairman of the Working Group on Data Needs and Codes (WGDNC)

4.1.1. The Commission noted with appreciation from the report of the Chairman of the Working Group on Data Needs and Codes that the working group has taken action on the many problems referred to it by CSM-IV and that consequently almost the entire system of international codes has been the subject of a careful revision. It also appreciated that the many proposals and suggestions of the working group contained in the report of its second session had been circulated amongst Members of WMO at a time sufficiently in advance of the session to enable the Commission to take comments of Members into account when considering these proposals. The Commission decided to record its views and conclusions on these matters under the appropriate sections of its report and to take up a few isolated questions under this sub-item.

4.1.2. Reporting of tenth unit figure of air temperature in FM 21.D SHIP

As the present practice that air temperatures in SHIP reports are rounded off only when the group ($1T_wT_wT_wt_T$) is not reported had given rise to some confusion and since it has been found impossible both by CSM and CMM to reach a uniform rounding-off procedure unanimously, CMM-V suggested that making the group mandatory would solve the problem. With a view to avoiding the situation whereby groups consisting of only solidi would have to be included in the report, the Commission agreed with the alternative measure suggested by WGDNC, i.e. that ships using FM 21.D be encouraged to include the sea-surface temperature group in the report, the group remaining optional.

4.1.3. Extension of the Marsden numbering system of ten-degree squares

With a view to enabling moving stations using FM 36.D TEMP SHIP to encode the Marsden number MMM at positions north of 80°N and south of 70°S, the Commission agreed with CMM-V, where this question was also discussed, that the Marsden numbering system should be extended beyond these latitudes. Recommendation 1 (CSM-V) was adopted.

4.1.4 Uniform procedure for the reporting of position

The Commission agreed with the conclusion of the working group that the use, side by side, of the codes Q_c and Q has advantages and that Code 3300, Q - Octant of the globe, should be retained in groups of the form $QL_aL_aL_oL_o$ wherever they occur, whereas Code 333, Q_c - Quadrant of the globe, should be used wherever positions are given to a tenth of a degree or in degrees and minutes. With a view to also introducing this procedure in FM 40.C ROCOB SHIP, Recommendation 2 (CSM-V) was adopted.

4.2 Evaluation and determination of data needs

4.2.1 Reporting of state of sky

4.2.1.1 The Commission noted the proposal of the Working Group on Data Needs and Codes to provide in Section 1 of the proposed SYNOP for the reporting of a special tropical cloud group, instead of or in addition to, as required, the cloud group containing the conventional codes C_L, C_M and C_H. One of the new features of the proposed tropical cloud group was the combination of type and amount of clouds in the specifications of the new tables. It has been suggested by some Members that this feature should also be introduced in the conventional cloud codes C_L, C_M and C_H.

4.2.1.2 The Commission felt that there was as yet not sufficient evidence to justify any change in the current method of reporting clouds. These codes were developed a long time ago and, apart from some refinements, they have stood the test of time. The Commission stressed that the conventional codes were developed in the first instance to enable an observer to report what he actually sees and, since observers at many stations are not always in a position to watch the sky continually, a more static description is more appropriate than one directed at structural changes of observed clouds. However, taking into consideration the rapid development of meteorological satellite observational techniques, particularly in very recent times, the Commission felt that new knowledge gained from this source may well point the way to desirable modifications of the existing code specifications; the question should therefore be kept under review by an appropriate working group.

4.2.1.3 The Commission discussed the tropical cloud group proposed by the Working Group on Data Needs and Codes in the light of requirements expressed at the session for cloud reporting in the tropics. It noted that the requirements varied from one region to another and that the proposed codes did not satisfy all requirements. Doubts were also expressed as to the need for the type of information suggested by the working group to be included in Section 1 of the future SYNOP messages. The Commission concluded that the solution should be sought in the first instance on a regional rather than a global basis and that, consequently, the codes C_L, C_M and C_H should be used universally in Section 1 of the future SYNOP. Nevertheless, it emphasized that the general review of the current code system must take into account the conditions encountered in the tropics.

4.2.1.4 The Commission agreed with the suggestion that photographs of tropical clouds, annotated with a description of the prevailing weather situation in a similar way as is shown in the International Cloud Atlas, would help considerably in further determining detailed requirements for the reporting of clouds in the tropics. It therefore requested the Secretary-General to arrange for the collection of such photographs which should cover the widest possible range of cloud types significant for tropical conditions and invited the president of CSM to consider, in due time, the appointment of a rapporteur who should select a suitable set of annotated cloud pictures for circulation to interested Members and working groups.

4.2.2 Reporting of present and past weather

4.2.2.1 The Commission reviewed the list of phenomena required to be reported as present weather in the SYNOP form. The list had been developed by the Working Group on Data Needs and Codes on the basis of material contained in the report of CSM-IV. The Commission agreed that it was necessary to provide for the reporting of certain phenomena occurring simultaneously (e.g. fog and drizzle, rain and snow or hail and thunder) as indicated by CSM-IV, and which were not provided for in the ww-code currently in use. It also agreed that provision be made for the more detailed reporting of some of these combined phenomena and more extensive range of intensity in some cases than are provided for in the ww-code now in use. New requirements had been put forward since the time of CSM-IV and it was considered that some of these should be accommodated also in the present weather code (i.e. whiteout, condensation trails and heavy precipitation in sight). The Commission considered that it was desirable to retain the present practice of having two figures for reporting present weather as Type I, Type II and Type III phenomena. It was agreed that, to accommodate the newly accepted requirements, certain existing specifications in the ww-table could be eliminated either because they were of more limited synoptic value or were not strictly in the category of present weather. Thus, it was decided to eliminate specifications currently listed to describe the evolution of the sky (ww = 00, 01, 02, 03), phenomena in the past hour (decade 20 to 29), certain specifications of fog and the character of precipitation (continuous or intermittent). The new $RRRt_R$ group would provide the possibility of reporting past-hour phenomena as far as the important element precipitation was concerned, but it seemed that there was still a need for the simple indication that a thunderstorm, a sand storm, precipitation or fog had occurred in the past hour. The Commission decided, however, not to make provision for these phenomena in the new present weather code, but left the possibility open for their insertion in the past weather code if tests would indicate a real need for this. The need for allocating a figure (05) for "haze" was also the subject of some comment in view of the possibility provided for in the new SYNOP to omit the present and past weather group from the report under certain conditions. There was some support for the view that the phenomenon "snow storm" (combination of precipitating snow and blowing snow) should be added to the list. The definition of the phenomenon and the allocation of a proper name gave rise, however, to some difficulties. Further, the criteria for reporting "heavy squall" needed further clarification. The Commission finally agreed to a revised list of phenomena which should be provided for in the SYNOP code form. This list is attached as Annex I.

4.2.2.2 The Commission studied the possibility of amending the ww-code table now in use in such a way as to satisfy the requirements to the greatest extent possible without introducing extensive changes into the structure of the table. This was found to be impracticable. The Commission therefore agreed that the code table appearing in Annex II, should be adopted in principle for use in the testing of the proposed SYNOP code form.

The structure of the new code table is substantially different from that in use at present. It does however provide an orderly arrangement. In addition, phenomena listed under Groups II, III and IV show a general increase in intensity of each phenomena described as one goes from decade to decade. Because combinations of phenomena are included, priority rules for selecting a code figure are not needed, except in the first two decades; the arrangement in groups serves to facilitate the choice, but is not essential. However, it was recognized that a consequence of this arrangement is that some figures in the code have no associated specifications and the resulting blank spaces are not readily available for allocation within the framework of the code. Tables of plotting symbols for use in association with the new tables for present and past weather are given as appendices to Annex II. The symbols are meant as an aid in the tests of the codes.

4.2.2.3 A similar review of the list of phenomena required to be reported as past weather was conducted by the Commission. The Commission confirmed the view held by the Working Group on Data Needs and Codes that a two-figure code was needed and that it should have a structure compatible with the ww-code table. It was agreed that the past weather table contained in Annex II contains the list of phenomena required to be reported as past weather in Section 1 of the proposed SYNOP code form.

The view was also expressed that in reporting past weather in the SYNOP code, there was merit in a simple classification to enable the essential character of past weather to be indicated by a single code figure. An alternate proposal for a single digit code for past weather including the use of a slant was also examined. This proposal, although it had definite merits with regard to a more detailed description of the sequence of past weather was not recommended for the tests because it did not fully satisfy the requirements set forth by the Commission. Furthermore, some Members raised the possibility of using the two figures WW, either to indicate past weather by means of the first figure and the time of the event by means of the second, or to indicate two successive events of the past weather. The Commission was of the opinion that these suggestions could not be ignored, and that the period of trials could be used by the Members who desire to study all these possibilities.

4.2.3 Other parameters to be included in synoptic reports of surface observations

4.2.3.1 The Commission noted that the Working Group on Data Needs and Codes had made a careful study of the lists of phenomena and non-meteorological parameters to be included in Sections 1 and 2 of SYNOP messages as given in Annexes IV and XI of the final report of CSM-IV. The working group had obtained additional information from Members through the regional representatives in the group. On the basis of this information, revised lists of phenomena and non-meteorological parameters were developed by the working group for inclusion in the two sections of SYNOP (and SHIP) messages, together with the required resolution. The revised lists were not substantially different from those developed by CSM-IV.

4.2.3.2 The Commission reviewed these lists once more in considerable detail. It agreed that the tablulation in Annex III was a reasonable assessment of the needs of synoptic meteorologists now and for some years to come. However, it recognized that there will probably always be some differences of opinion as to the relative value or importance of some of the items in the list, and also as to some of the statements concerning reporting resolution and criteria. For example, there was not complete agreement that air temperatures and dew-point temperatures needed to be reported by land stations to one tenth of a degree Celcius. It also recognized that advances in technology and in knowledge might lead to the need to add to or modify the lists in Annex III in the years to come. It was agreed therefore that the Commission should keep this list under constant review.

4.2.3.3 The fourth session of CSM considered the elements to be reported and the precision with which they should be reported for macro- or global-scale analyses and for synoptic-scale analysis separately. In principle, therefore, Section 1 of SYNOP should contain only data required for macro-scale analyses on a hemispheric or global scale but, valuable as this approach had been, the Commission had now to take into account practical coding and processing considerations which would prevent strict adherence to this principle. The Commission therefore drew up the lists in Annex III in a slightly different form, i.e. lists of elements with the reporting precision needed, to be included in Section 1 of SYNOP, and in Section 2 by regional or inter-regional decision. This means that some elements may be reported in Section 1 with greater precision than is strictly necessary for macro-scale analysis but it was felt that this procedure would be far more convenient for personnel coding observations and for synopticians at the national and regional levels, than the procedure implied by the earlier approach.

4.2.3.4 In establishing these lists the Commission considered the following:

(a) Geographical co-ordinates of ships' positions

A new requirement stated by oceanographers was that ships' positions should be given in degrees and minutes instead of degrees and tenths of a degree, as in the current codes. While the Session did not consider such precision in reporting the position of a ship was necessary for meteorological purposes, some felt that the procedure would be an improvement from the point of view of ships' officers. It was agreed, however, that no difficulty should arise if ships' positions were to be given in degrees and tenths in meteorological and in degrees and minutes in oceanographic reports.

(b) Type of message indicator

It was generally agreed that two letter indicators (M_iM_i) should, in transmitted messages, replace code names such as SYNOP, SHIP, etc. As a number of new code forms for reporting satellite information, radar and oceanographic data have been developed, the limited number of letters available would probably not be sufficient. Moreover, it became apparent that the use of separate letters to indicate whether a report was from a land station or a ship station would be desirable. At the present time the figure 99 preceding the latitude serves to indicate that a report is from a ship station. It was felt, however, that these two code figures could be used to better advantage for the course of the ship in the three hours preceding the time of observation.

These considerations led to the proposal that four letters should be used rather than two. The first two letters should indicate the message type, and the last two the part of the message. Indication of the part of a SYNOP or SHIP report is not necessary and consideration was given to the possibility of using only two letters for reports of this type, but it was felt that the message-type indicator should be of the same form for all codes.

An additional requirement for data-processing is that the beginning of each message must be indicated. The proposed letter-group indicating the type of message could serve this purpose if it is transmitted at the beginning of every message. However, it was recognized that the length of bulletins of SYNOP and SHIP reports would thereby be considerably increased, and it was agreed that for the time being the type of message indicator should be given only in the first line of the text of each bulletin of SYNOP and SHIP reports (see also paragraph 4.3.5.1).

(c) Date and time of observation

The session considered that these parameters should be included in every SYNOP report, as well as SHIP reports to meet the requirements for archiving data, and to provide a safeguard in the event of the bulletin heading being lost. However, it was agreed that, until telecommunications facilities are adequate everywhere, the date and time of SYNOP reports could be given in the bulletin heading only.

For oceanographic purposes a requirement that the time of observation should be given in hours and minutes exists. It was agreed that provision may be made accordingly in special oceanographic code forms only.

(d) Type of station indicator

An indication in the report as to whether the observations originated from a conventional station or an automatic station was considered indispensable in order to avoid errors in the interpretation of transmitted data. Though a similar indication is contained in Volume A of WMO Publication No. 9.TP.4, it may happen that some stations are automatic at certain hours of the day and manned at other hours. Further, an indication in SHIP reports as to whether the observations were made with certified or uncertified instruments was considered of great importance by CMM.

(e) Wind

The session agreed that it would be desirable to indicate whether the reported wind was measured or estimated, and that this could be combined with the type of station indicator. The Commission agreed that as long as the problem of reporting the wind speed in m/sec or knots is not solved with other international organizations (see Resolution 30 (Cg-V)) it is necessary to indicate which unit is used for coding the wind speed.

The session discussed the rules governing the observation of wind to be reported in code forms for synoptic, as distinct from aeronautical purposes. It was decided that, pending the outcome of studies being carried out in other Commissions concerning the averaging period, the requirement to average the wind direction and speed over ten minutes should be retained. It was agreed, also, that the rule used in reporting wind for aeronautical purposes (i.e. if the wind changes markedly in the ten-minute period, the wind reported should be that averaged over the period after the change) should be applied to the reporting of wind for synoptic purposes also.

(f) Unusually gusty wind

The difficulty of defining this requirement more explicitly was not resolved. Moreover, it was felt that this information is needed for a number of different purposes which might call for different criteria. In any case it is not likely to be required on a regional basis and would not, therefore, be included in Section 2 of SYNOP reports.

(g) Pressure and geopotential

The requirement that stations unable to report mean sea-level pressure with reasonable accuracy should report the geopotential of the 850 mb or 700 mb isobaric surface was examined. This had been listed by CSM-IV as a parameter to be reported in Part 2 but the session felt that it would be of more value for macro-scale analysis than mean sea-level pressure especially in areas such as parts of Africa where there are few upper-air observations. It was therefore considered that, by regional agreement, it should replace the latter in Section 1 of SYNOP where appropriate.

It was noted also that the CAS/CSM Working Group on Numerical Weather Prediction at its meeting in Tokyo, 1968, expressed the requirement for station pressure to be reported in all SYNOP messages from stations included in global exchanges. At the same time, it was recognized that for manual (conventional) analyses the mean-sea level pressure (or geopotential of nearest standard level, as the case may be) is needed. In order not to lengthen a considerable number of SYNOP messages by the inclusion of both these groups, it was agreed, as a practical compromise between the CAS/CSM working group's proposal and the present practice that for stations included in the global network, the criteria given in Volume B, Note 3 under FM 11.D, should be changed to apply to station elevations exceeding 200 metres rather than 500 m, from the level to which pressure is reduced.

(h) Temperatures (air, dew-point, sea surface)

A need expressed by CMM for sea temperature to be reported in tenths of a degree Celsius was taken into account. It was also noted that though CSM-IV had deemed it sufficient to indicate air temperature as well as dew-point temperature in whole degrees Celsius, it had also agreed that it was necessary to indicate with more accuracy ($0.1^{\circ}C$) the difference between air temperature and dew-point temperature as well as the differences between sea temperature and air temperature, especially when such differences are small. The views expressed in WWW Planning Report No. 28 concerning coding accuracy were also noted. In order to take these various considerations into account and with a view to eliminating coding artificialities, it was agreed that all temperatures should be reported in tenths of a degree Celsius.

While dew-point temperature remains the favoured humidity parameter, it was agreed that provision should be made in code forms for reporting relative humidity, to the nearest one per cent, in place of the dew-point temperature when the report comes from an automatic station.

(i) Maximum and minimum temperatures

The session considered that maximum and minimum temperatures should be reported only in Section 2 of SYNOP messages, not in Section 1 as proposed by CSM-IV. The times at which these temperatures should be read were discussed and it was agreed that both maximum and minimum temperatures over the preceding twelve hours should be read twice daily as close as possible to 0900 and 2100 local time; and that the data should be included in the next SYNOP report.

(j) Duration of precipitation

A single-figure code table was considered sufficient in Section 1, and it was agreed that a very approximate indication of the time at which the precipitation ended should also be included.

(k) Visibility

The session agreed that a single-figure scale for reporting visibility is sufficient in Section 1, and that a logarithmic scale would be most suitable.

(l) Depth of snow

CSM-IV considered this element to be of only national or local interest, but the present session noted that this parameter is at present included in regional exchanges and should therefore be included in Section 2.

4.2.3.5 The Commission noted a proposal of the U.S.S.R. regarding the coding of sea surface temperature, ocean waves, ice accretion and sea ice in SHIP messages. The proposal included an extension of information to be provided on ice accretion and sea ice. The Commission considered that this constituted a new requirement which should be reviewed by CMM as to the question whether it received sufficient support for its inclusion in an international section of the report. As regards the coding aspects of the proposal, the Commission agreed that the proposed codes might usefully be tested parallel with the CSM codes and it requested the Secretary-General to include them in the testing material to be sent to Members.

4.2.4 Standard format for the exchange of aircraft reports for synoptic purposes

4.2.4.1 Further to the decision recorded in paragraph 5.7 of the general summary regarding the exchange of aircraft reports for synoptic purposes , the Commission considered the standardized format under which the aircraft reports should be exchanged when the FM 41.D CODAR code form is not used. It felt that a standardized format following as closely as possible the AIREP form specified in Technical Regulations, Chapter 12/ICAO, Annex 3 would facilitate the editing of the weather message received from aircraft. In particular, the order of the elements and the abbreviations used should be the same as in this form.

4.2.4.2 The Commission was informed that as a result of Recommendation 5.1/2 of the ICAO Sixth Air Navigation Conference, ICAO was studying the possibility of introducing a standardized format of AIREP messages for ground-to-ground exchanges. The Commission welcomed this development and, accordingly, requested that the standardized format given in Annex X be brought to the attention of ICAO as representing the requirements of meteorologists for facilitating the direct exchange of aircraft reports for synoptic use. It suggested that ICAO be invited to take this format into consideration in its follow-up action on Recommendation 5.1/2 of the Sixth Air Navigation Conference.

4.2.4.3 The Commission felt that, until the results of the studies were known, it was not possible to recommend the proposed standardized format for the exchange of AIREPs for synoptic purposes. Nevertheless the Commission stressed that the standardized format referred to above should be introduced as early as possible, and invited the president of the Commission to follow this matter in co-ordination with the Secretary-General. Recommendation 6 (CSM-V) was adopted.

4.3 Revision of code forms in Chapter I of Volume B

4.3.1 Code form FM 17 - MONT

The Commission noted that, while some use was being made of code form FM 17 - MONT, there seemed little need for it to exist independently since the data which it contains are an integral part of the surface synoptic observation. During the investigation of the usefulness of this code form, a discrepancy was discovered between Note 2 under the specification of symbolic letter H'H' and Note 6 under code form FM 17. The Commission adopted Recommendations 3 (CSM-V) and 4 (CSM-V).

4.3.2 Code form FM 31 - NEPH

In view of the results of an inquiry with Members on the extent of the use of various code forms the Commission agreed that code form FM 31 - NEPH be deleted from Chapter I of Volume B and registered as national practice in Chapter III by those Members using it. Recommendation 5 (CSM-V) was adopted.

4.3.3 Code form FM 73 - NACLI

Despite the small number of Members using this code form, the Commission agreed that there existed a definite requirement for FM 73 to remain an international code form.

4.3.4 Amendment to FM 82.A-SFLOC

4.3.4.1 With regard to the reporting of atmospherics, the question was raised that, with limited sferics networks and especially in the case where one or more of the stations become unserviceable, it is not always possible to accurately position a fix. The Commission agreed that code table (0139 A_i - repetition rate of atmospherics) should be modified to also indicate the assessment of a fix and adopted Recommendation 7 (CSM-V).

4.3.5 General introduction of the type of message indicator group

4.3.5.1 The Commission noted that there were at present no uniform rules for the inclusion, in the text of a meteorological message, of an indication of the type of message. In some code forms, the code name should be transmitted, in others, the indicator group M_iM_i and, in still other cases, no pertinent rules have been given. The need for the inclusion of a type of message indicator group was considered under item 4 for SYNOP (see paragraph 4.2.3.4(b)). However, the Commission felt that the requirement for identifying each individual message (SYNOP, SHIP) could not be implemented for the time being due to limitation of the present telecommunication system. Therefore, the Commission requested its Working groups on GDPS and GTS to study this matter and formulate appropriate suggestions for future action. The Commission concluded that the requirement also existed in relation to other types of coded reports which are likely to be processed by automated equipment. It therefore decided that the group $M_iM_iM_jM_j$ should be included in a number of code forms and transmitted at the beginning of each individual report or at the beginning of the text of a bulletin of such reports. For uniformity, groups of four letters should replace the groups of two letters that already exist in some code forms.

4.3.5.2 In was also noted that no indication of the date and time of observation is included in the SYNOP code form FM 11.D. The Commission agreed that this indication should be provided, for the time being, and with the same provision as made in paragraph 4.3.5.1 with regard to $M_iM_iM_jM_j$, at least at the beginning of the text of a bulletin of SYNOP reports, in the form of a four-figure group YYGG. These procedures should be introduced as from 1 January 1972 and, consequently, Recommendation 8 (CSM-V) was adopted.

4.4 Code forms for upper-air observations (Item 4)

4.4.1 Vertical wind shear in zones of maximum wind

4.4.1.1 The Commission was informed that the transmission of data relating to vertical wind shear in zones of maximum wind has been undertaken at all upper-air stations in the U.S.S.R. since 1968. Further, at the fifth session of Regional Association VI, "it was generally agreed that the reporting of these data might be very useful, especially for aeronautical meteorologists, for the forecasting of turbulence". This was considered to be not only of regional but also of world-wide interest, and the Association suggested that it be referred to CSM for detailed study.

4.4.1.2 The Commission recognized the importance of vertical wind shear in the forecasting of clear air turbulence. As other parameters seem also to have an important effect on the generation of clear air turbulence and the requirement for the reporting of vertical wind shear has not yet been widely expressed, the Commission considered that the reporting of this information should be optional and that, to gain experience, Members should be encouraged to include this information as much as possible in upper-air reports. Recommendation 9 (CSM-V) was adopted.

4.4.2 Standard levels in the high atmosphere

4.4.2.1 The Commission considered the results of the consultation between the Presidents of CAS and CSM on a satisfactory single method for the reporting of upper-air data above 10 mb. It was explained that the difficulty of obtaining a single method was that during rocket soundings it is the height of the sonde which is measured (by radar) and that pressure cannot be calculated unless temperatures are available to ground level. Nevertheless, it seemed that research groups carrying out mapping of rocket observations in the stratosphere and mesosphere prefer to perform analyses on isobaric rather than horizontal surfaces. The Commission agreed with the understanding reached between the two Presidents that the code for rocket observations should continue to provide for reporting heights but that this does not necessarily preclude the designation of standard levels in terms of pressure, nor the reporting of winds and temperatures at standard and significant pressure levels. Since the number of rocket soundings is small, it was felt that a certain amount of duplication in the ROCOB code form could be tolerated. Recommendation 10 (CSM-V) was adopted.

4.4.2.2 In view of the above considerations, the Commission felt that there were now no objections to the adoption of pressure levels above 10 mb as standard, as recommended at its previous session.

4.4.3 Adoption of the 250 mb level as a standard isobaric level

4.4.3.1 The Commission noted the increased need for meteorological information pertaining to the 250 mb level in pre-flight documentation for pilots. In particular, it was informed of the present tendency of the 250 mb chart becoming one of the more important charts for flight-planning, other upper-air charts becoming gradually phased out as the result of the spreading use of computerized upper-air information for grid-points prepared for flight planning purposes.

4.4.3.2 The Commission considered that the transfer of 250 mb level data from Part B to Part A of TEMP would facilitate the supply of the required information for aeronautical purposes. This would automatically make the 250 mb level a standard isobaric surface. The use of the 250 mb level chart for synoptic purposes was therefore discussed with a view to finding out whether it was possible to arrive at a reduction in the present number of standard levels to counterbalance the proposed addition of the 250 mb level. It was pointed out in this regard that the structure of the atmosphere between 300 and 200 mb required detailed analysis and that the 250 mb chart was used in conjunction with the 300 mb and 200 mb charts. The Commission concluded, therefore, that a reduction in the number of standard levels was, at the present time, not desirable from the synoptic point of view. The Commission considered the opinion of CAS on this matter and, in particular, the caution expressed by its President that, if the number of standard levels becomes large there is a danger that analysis centres will select only some of the levels for analysis and the choice at each centre may not be the same. The Commission felt, however, that with regard to charts at the 300, 250 and 200 mb levels, analysis centres were not expected to drop any one of these. Since, furthermore, CCl-V had no serious objections to designating the 250-mb surface as a standard surface, Recommendation 11 (CSM-V) was adopted.

4.4.4 Abbreviation of TEMP SHIP reports

The Commission noted the question raised at the fifth session of CMM regarding the possibility of shortening TEMP SHIP in view of continuing efforts to recruit more voluntary ships making upper-air observations and of the consequent load on marine communications. It considered that leaving out Parts B and D of FM 36.D, when telecommunication difficulties are encountered, would provide this possibility. Recommendation 12 (CSM-V) was adopted.

4.4.5 Inclusion of new sections in upper-air reports

The requirement was expressed for the code forms PILOT and PILOT SHIP to have sections for code groups to be developed regionally and groups to be developed nationally. The latter provision was also required in TEMP and TEMP SHIP. Accordingly, the Commission adopted Recommendation 13 (CSM-V).

4.4.6 Provision for reporting heights above 29,700 m in PILOT and PILOT SHIP

The Commission noted that when using the group $9t_nu_1u_2u_3$, the highest level coded by t_n and u_1, u_2 or u_3 is 29,700 m. Since the balloon often attains heights above this level, the Commission considered it necessary to develop a method for reporting data higher than 29,700 m not using the group $8t_nu_1u_2u_3$. Recommendation 14 (CSM-V) was adopted.

4.4.7 Reconstruction of the actual soundings from Parts B and D of TEMP

4.4.7.1 When adopting the new code forms TEMP and TEMP SHIP for upper-air observations, CSM-IV decided that the feasibility of a new reporting method should be studied, by which only Parts B and D of TEMP would be transmitted by observing stations. The reports should permit the reconstruction of the actual sounding by automated processing equipment, and also the computation of data relevant to standard levels. The problem was referred to the Working Group on Data Needs and Codes which, at its first (restricted) session (Brussels 1967) discussed it in great detail to determine the best course of action. The group concluded that tests should be conducted to investigate the various aspects of the problem and accepted gratefully the offer of the representative of Region II to arrange for these tests.

4.4.7.2 The Commission noted with appreciation the tests carried out by the U.S.S.R. and the results of the calculation, by computer, of geopotential, temperature, dew-point deficit and wind direction and speed at standard isobaric surfaces, using data at significant points. It also noted with great interest the positive results of the tests, i.e. that the present definitions of significant points are necessary and sufficient for the reconstruction of the actual sounding and for the computation of data relevant to the standard isobaric surfaces; also that the results of the reconstruction can be improved:

(a) When significant points were defined in such a way that they are not too far apart, and

(b) When all observing stations strictly adhered to the procedures for coding Parts B and D.

4.4.7.3 Since, in the new plan for GDPS, only Parts A and C of TEMP and TEMP SHIP are required for global exchange (see paragraph 6), the Commission decided that further study of the reconstruction problem should be held in abeyance until requirements change. In the meantime, it was considered highly useful if the report of the tests which had been made were circulated to all Members for information and, consequently, the Commission requested the Secretary-General to arrange for the distribution of the relevant document, after appropriate correction of the translation from the original language.

4.5 Code forms for reporting ocean parameters

4.5.1 Following a suggestion of the Joint WMO/IOC Panel of Experts on Co-ordination of Requirements, code forms for ocean parameters have been developed by the Working Group on Data Needs and Codes with suitable representation of IOC and CMM.

4.5.2 The Commission's discussion on this item was mainly based on the final report of the second session of the working group, supplemented, as appropriate, by comments received from WMO Members, IOC Member States, the CMM Advisory Working Group and the Joint WMO/IOC Panel of Experts on Co-ordination of Requirements. It appreciated the conclusion of the WGDNC that reports of subsurface observations should not be coupled with the normal reports of surface meteorological observations and that there is a need to develop separate code forms for reports of bathythermal observations (BATHY code) and reports containing data of temperature, salinity and other elements at different depths (TESAC code). Regarding the general concept for designing these code forms, the Commission reviewed the one developed by the working group in the light of the comments provided by the Joint WMO/IOC Panel of Experts on Co-ordination of Requirements and agreed to the following guidelines:

(i) In general, the structure of oceanographic code forms should be similar to that of meteorological code forms; further, both should be as short as possible. As the proposed BATHY and TESAC code forms will be used during the development stage of the Integrated Global Ocean Station System (IGOSS), provision should be made to include information which may not necessarily be considered as of immediate operational value, but which would be extremely useful during the development period.

(ii) Codes should be self-contained to facilitate the handling of data, e.g. collection, editing, distribution and exchange.

With regard to (i), some doubt was expressed as to the necessity of including month and year in the code forms.

4.5.3 Further, the Commission noted the two distinct ways of data sampling for subsurface temperatures, which to a large extent affected the design of the proposed BATHY and TESAC code forms:

(a) Soundings of the upper surface layers taken for the main purpose of detecting the structure and depth of the thermocline and the adjacent underlying water conditions. Such soundings can be taken from almost any ship; several types of measuring devices are used. Often a series of these soundings are taken at frequent intervals and transmitted to shore for research purposes. These data are hardly used for analysis at standard levels, their operational value lies in the shape of the temperature profile.

(b) Soundings taken by ocean research vessels specially equipped for precise measurement of temperatures and other subsurface data. Such soundings are usually taken at fixed stations, by special personnel, and often intended for analysis at standard levels.

4.5.4 The code form TESAC is meant for the high accuracy soundings mentioned under (b) above. The data in TESAC form will not normally be exchanged routinely on telecommunication circuits. They might, however, be used for real-time exchange to supplement the soundings of type (a) as far as the upper portion of the temperature profile is concerned. The high accuracy of temperature and other data requires similar accuracy in station position and time of observation, especially for soundings taken in areas where sharp gradients exist, e.g. at the rise of the continental shelf. The code form BATHY on the other hand is intended for soundings of type (a) and will consequently be used universally, by professional as well as voluntary observers.

4.5.5 The above considerations have led to some detailed requirements for the contents of the code forms. These are summarized in the Annex IV. The Commission accepted these requirements as a basis for the development of the required code forms and adopted Recommendations 15 (CSM-V) and 16 (CSM-V).

4.6 Codes for aeronautical purposes

4.6.1 In addition to being sent to Members, the proposed amendments to aeronautical meteorological figure codes developed by the Working Group on Data Needs and Codes were sent to ICAO and IATA for comments. ICAO carried out a consultation of Contracting States and International Organizations concerned on the effects of the proposed changes on the direct reading qualities of the messages, especially for non-meteorological aeronautical users (primarily air traffic services, communications and airline operations personnel). This consultation had confirmed that the codes introduced in 1968 were well received and considered as constituting a marked improvement towards making the messages transmitted in figure codes more readily comprehensible and more direct reading. The improvements suggested as a result of this consultation referred to points of details of the specifications or of coding procedures and not to the structure of the codes. The proposed amendments are embodied in Recommendation 17 (CSM-V). The main aspects discussed in this respect are recorded hereafter.

4.6.2 Reporting of heights

4.6.2.1 Mention had been made that the present method of reporting cloud heights through Code 1677 was somewhat cumbersome and that it would be easier from an operational viewpoint if the whole code could be in uniform steps throughout. However, if two figures only were used this would limit the reportable heights to about 3,000 metres, thus preventing the use of the same procedure for reporting heights in forecast flight conditions. The Commission therefore recommended that heights be reported in three figures in intervals of 30 metres throughout the whole range. Such a code would meet ICAO requirements for reporting heights, and would have the additional advantage of being directly related to flight levels. Certain Members, nevertheless, pointed out that the intervals of 30 metres were inconvenient and that a code with intervals of 10 metres up to 1,000 metres and of 100 metres above, would be preferable and would give the opportunity for more accurate reporting on the lowest layers.

4.6.2.2. Consideration was also given to amending the h_sh_s table (code 1677) by extending the use of 30 metres intervals up to figure code 88 (2,640 m). In this case, code figures 89 to 99 could be given new values to report heights between 3,000 and 10,000 m since the present 90-99 decade seems no longer in use. This proposal had definite merits but it was not considered advisable to propose a change at a time when the introduction of a revised SYNOP code is envisaged.

4.6.3 Reporting of variable wind

No provision existed so far in FM 51.D.TAF for the reporting of variable wind. The Commission considered whether variable wind should be reported by means of figures 999 as is done at present in METAR and SPECI or by letter abbreviations. On the one hand difficulties were expressed with the use of letters for this purpose and on the other hand non-meteorological users would favour the use of letters. Furthermore, most groups in the TAF code could begin with one or more nines and it was considered that clarity in the messages would be improved by avoiding the possibility of the wind group beginning with several nines. It was finally decided to recommend the use of letter abbreviations in METAR, SPECI and TAF. The abbreviation "VRB" was proposed since VAR has other meanings in ICAO abbreviations and that "VRBL" is used in plain language for variable. The Commission also suggested that ICAO be invited to consider the possibility of replacing "VRBL" by "VRB" in its abbreviations.

4.6.4 Code 4678 w'w

The suggestions made concerning letter abbreviations in Code 4678 w'w concerned both the structure of the system of 2 and 4 letter abbreviations in itself and some individual abbreviations. With respect to the first aspect it was realized that, within the present system, a complete description of all the elements and modifiers appearing in Code 4678 would require the use of groups of up to 8 letters. The Commission felt that, for various reasons, it was not possible and perhaps not even necessary to propose such a general increase. However, comments received showed that the use of three pairs of letters could be acceptable and would cover most of the foreseeable circumstances. The Commission therefore recommended the use of six letter abbreviations in a limited number of cases. As regards individual abbrevations the Commission recommended the inclusion of low drifting snow for which there is an internationally agreed requirement. The addition of SH to indicate showers (for instance for code figures 83 and 84) was not supported because SH could not be added consistently in the whole code by using only six letters. A suggestion was presented to make provision for the reporting of some other elements, namely, mist and precipitation, dust-storm or sandstorm in sight (adjacent phenomena). The Commission felt that it should not introduce these elements in code 4678 unless their reporting is recognized as an agreed requirement. The Commission also suggested that arrangements be made, in co-ordination with ICAO, for the introduction in Table III of WMO Technical Regulations, Chapter 12/ICAO PANS-MET of the same abbreviations as are recommended for insertion in Code 4678 w'w'.

4.6.5 Trend-type landing forecasts

Although trend-type landing forecasts may be appended to routine or special reports, in accordance with regional air navigation agreement, no provision exists in Volume B, Chapter I for the coding of such forecasts when appended to METAR or SPECI reports. The addition of plain language trend-type landing forecasts to METAR and SPECI messages increases communications load; the Commission therefore developed a coded form for these forecasts using the same groups as are at present included in METAR and SPECI. It recommended that, in conformity with Technical Regulations only those groups referring to elements for which a significant change is forecast should be included.

4.6.6 Use of change groups and WX NIL in TAF

It appeared that the present procedure used in TAF reports to include change groups after any group to indicate that a change is forecast for the relevant element is somewhat confusing since it is not clear whether the subsequent groups refer to conditions during the whole period of the forecast or to the period indicated in the change group only. The Commission therefore recommended that the group(s) 9i3nnn be included only after the part of the message completely describing weather conditions before the change indicated, and made provision for clear indication of improvement of present weather conditions through the possible use of WX NIL after change groups. The addition of a complementary note describing the general structure of the code and the concept of change groups was accepted.

4.6.7 Other proposals

A number of detailed improvements covering special cases were also proposed, for instance, the indication DENEB that fog dispersal operations are being carried out or the reporting of RVR values below or above the measuring range of the equipment. The replacement of ICAO location indicators by more self evident identification of location such as IATA indicators was suggested. Although the importance of an easy identification of the origin of a message was fully recognized, it was not felt possible to propose specific action since this matter is normally dealt with by States through ICAO.

4.6.8 Location of period-of-validity and time groups in TAF, METAR and SPECI

The request expressed by Recommendation 7.3/4 of the ICAO Limited EUM(RAC/COM) RAN meeting was submitted to the session. It was noted that the interchanging of GGgg and CCCC in METAR and SPECI would imply that time groups can no longer be omitted from reports included in a collective. In view of the telecommunication implications and since the difficulties in automatic selection seem, for the time being, concerned mainly with the routeing of TAF messages, the Commission recommended that the suggested interchanging of groups be made in TAF messages only. Recommendation 18 (CSM-V) was adopted. In view of the urgency attached to this change by ICAO the Commission suggested that this recommendation be submitted to the President of WMO, for approval on behalf of the Executive Committee and implementation on 1 January 1971.

4.6.9 Code form for forecast upper wind and temperature at specific points

The Commission was informed that there was an increasing requirement for the exchange of area forecasts (wind, temperature data) in coded form in regions where dissemination of such forecasts in pictorial form is not possible for the time being. The development of an international code form for this purpose was felt to be desirable to avoid divergent coding practices in different regions. The Commission concluded that, pending the development of a general code form for grid-point values to meet the requirements of various categories of users, an international code form intended to meet the immediate aeronautical requirements should be adopted. As apparently two methods are at present in use to report positions and temperatures the Commission made provision for regional option in the use of position and temperature groups. Recommendation 19 (CSM-V) was adopted.

4.7 Code form for reporting synoptic interpretation of cloud data obtained by meteorological satellites

4.7.1 The Commission noted the requirement of several Members to exchange the synoptic interpretation of the cloud pictures obtained by meteorological satellites, especially in those areas from which no other information is available. Also the Commission recognized the superior performance of the meteorological satellites in detecting and tracking tropical cyclones. Accordingly, the Commission concluded that a new code for reporting information derived from the cloud information of meteorological satellites should be developed now, and that this code, for flexibility purposes should comprise two separate parts as follows:

(a) Tropical Cyclone Part;

(b) Significant Feature Part.

4.7.2 The Commission was aware of the rapidly increasing capabilities of meteorological satellites to provide other detailed information, such as surface temperatures, cloud top temperature, vertical temperature profile and humidity measurement. As for the processed satellite data, the Commission considered that they should be exchanged by means of FM 45.D and/or by means of the code form for the exchange of grid-point values.

4.7.3 The Commission noted that the working group on Data Needs and Codes had included in its proposed code form information of the main synoptic features as well as descriptions of corresponding cloud configurations and that, according to Members' comments, more detailed description of cloud configuration was required. The recent U.S.A. publication on Application of Meteorological Satellite Data in Analysis and Forecasting (see paragraph 6.3) showed, however, that a report containing a detailed description of the various cloud configurations which accompany one synoptic feature would often become quite complicated and would lengthen the message considerably. The Commission therefore decided that the new code form should contain, in the sections for international exchange, only information of the main synoptic features or cloud masses, whereas detailed cloud descriptions should be reserved for regional exchange. The possibility was thus provided for the use, on a regional basis, of Part B for the exchange of information of cloud configuration, with or without an interpretation of the corresponding synoptic features.

4.7.4 When adopting Recommendation 20 (CSM-V) the Commission noted with appreciation the information provided by some Members which enabled the development of this new code form.

4.7.5 The Commission felt that pictorial illustrations of the specifications of the synoptic feature code S_fS_f would be very useful and that in this code table reference should be made to relevant existing publications.

4.8 Code form for radar observations

4.8.1 The desirability of developing an international code form for radar observations was discussed. Special codes are already being used in a number of countries to transmit radar observations on a national or multilateral basis. Note was also taken by the Commission of paragraph 3.2.7 of the "Report of the ECAFE/WMO Preparatory Mission on Typhoons" (May 1967) which states that there are at present no arrangements for the exchange of radar observations between countries and that this problem requires urgent consideration. Considering other significant uses for radar data, the Commission felt that such information could be most useful to complement other weather data. The Commission concluded that a code form for radar observations should be developed in two parts as follows:

Part A - Tropical Cyclone Part

Part B - Significant Feature Part.

Recommendation 21 (CSM-V) was adopted.

4.9 Code form for the transmission of grid-point values

4.9.1 The Commission reviewed the principles which should be used as a basis for the design of a code form for the transmission of grid-point values (GRID code). It recognized that there are two requirements for processed data in digital form. The first involves further automated processing by the user, the second involves no further processing. The Commission, when agreeing that a code form for computer-to-computer exchange was urgently needed (see paragraph 6) noted that World Weather Watch Planning Report No. 29 - Standards and Procedures for the Presentation of Processed Data in Digital Form - was mainly concerned with this type of exchange. On the other hand, it was stressed that there was also an urgent need for a code form to be decoded manually, to enable an exchange of processed data from one centre to another without using facsimile. As a message in GRID code takes up much less communication time than an analogue facsimile transmission the use of GRID code would help to lessen the load on telecommunication circuits considerably. The Commission agreed, therefore, that the future GRID code should serve two purposes:

(a) For the exchange of processed data in digital form from computer to computer;

(b) For the transmission of such data to users which either do not process these data any further or process them manually.

4.9.2 In view of (b), the Commission concluded that the GRID code to be developed should be sufficiently general and not only accommodate the two types of uses but also permit the derivation of simpler versions from it, for operational use by non-computerized centres.

4.9.3 The Commission considered that the experimental code form, of which a number of tests had been organized by the Working Group on Data Needs and Codes, did in principle meet the requirements for a general form as mentioned above but needed refinements. This code form which was originally proposed by the U.S.S.R. had been revised, but the working group had not yet been able to finalize the proposals. In view of the results of the last year, the Commission considered that another test was probably needed before the code could be put into its definite form. Further, the Commission considered it of importance that all processing and receiving centres should be informed of this possibility of transmitting processed data to users without using facsimile. The code form as it stood now, should therefore be circulated to all Members together with a coded bulletin and a chart showing the grid used as an example. Comments, thus received from Members, should be useful in finalizing the proposed code form.

4.9.4 The Commission considered that it would be desirable if the group of experts, which until very recently had participated in the tests, be invited to assist in the final test which should take place as soon as possible. A meeting of experts was considered necessary to finalize the proposals in a form ready for submission to the Commission for adoption.

4.9.5 In view of the urgency which was attached to the completion of this work, the Commission agreed that the chairman of the Working Group on Codes should, in consultation with the president of CSM, invite as soon as possible a small group of experts:

(a) To study and develop further the GRID code form as given in Annex V, taking into account comments from interested Members and working groups;

(b) To arrange tests as necessary of the code form, and co-ordinate the evaluation of the results;

(c) To report to the chairman of the Working Group on Codes not later than 1 April 1971, so that appropriate action can be initiated for the early adoption of the GRID code form.

The Commission agreed these actions should be taken in time for implementation of the code form, if possible, early in 1972.

4.9.6 The Commission was of the opinion that ICAO should be invited to assist in the work of the group of experts so that maximum co-ordination is achieved. Furthermore, the Commission noted that the code used at present by U.S.A. was in packed decimal form and was not suitable for manual processing. However, it considered that the group of experts should also examine the possibilities of this type of transmission.

4.10 Code form for synoptic surface observations

4.10.1 The Commission gave very careful consideration to the proposals made by the Working Group on Data Needs and Codes for a new code form for reports of surface synoptic observations. It agreed with the principles used as guidelines by the working group, which are given in Annex VI. It was clear, however, that the principles could not all be applied simultaneously in the development of a particular code form. For example, the provision of more detailed information and the removal of artificialities and sources of ambiguity are not always compatible with the principle that messages should be as concise as possible. It is a question therefore, of weighing the advantages and benefits of any form developed, as compared with the existing corresponding code form, against the extra cost and communications system loading that might result from any increase in the length of the messages. For this reason the Commission agreed that new SYNOP and SHIP code forms should be adopted in principle, only for implementation after Members had had an opportunity to test and evaluate them over a period of at least two years, but not later than 1 January 1975.

4.10.2 It was agreed that there would be considerable advantages in adopting one basic code form for all surface synoptic observations from manned land stations, ships and automatic stations. The code form proposed is considered to be sufficiently flexible to serve a great variety of purposes: by using groups beginning with indicator figures, actual messages will consist of only those groups which a particular station is equipped or required to report. Furthermore, when certain meteorological conditions exist the group or groups in which the relevant information would otherwise be reported may be omitted. The fact of, and reason for, an omission is given by an indicator code figure in a mandatory group. The elements (and groups) that may be omitted in certain meteorological conditions are: wind when it is calm; present and past weather when, in the present case ww is coded as 00, 01, 02 or 03 and when simultaneously W is coded as 0, 1 or 2; rainfall in the six hours preceding the observation time when there has been none; type of clouds when there are no clouds.

4.10.3 Using this principle, messages in the new code form will be easy to decode and plot, will contain more detailed information but no ambiguities or artificialities, and yet, they will be, on a great many occasions, shorter than corresponding messages in FM 11.D. Tests carried out in the U.S.S.R. showed that the above criteria, applied to about 11,000 SYNOP reports and 1,000 SHIP reports, enabled:

- The wind group to be omitted from about 20 per cent of the reports (land stations only; seldom ships);
- The weather group to be omitted from more than 65 per cent of the reports (land and ship stations both);
- The rainfall group to be omitted from more than 90 per cent of the reports (land and ship stations both);
- The cloud group to be omitted from more than 30 per cent of the reports (land stations only; seldom ships).

While similar tests in other parts of the world will not necessarily give the same results there can be little doubt that adoption of the procedure will, to a large extent, offset the effects of the increased length of the complete code form. During the proposed tests of the new code form the effects of the procedure should be further studied.

4.10.4 There was some support for the view that an alternative group in the form $9TTT_dT_d$ should be included in the code form for testing purposes. The Commission felt, however, that this would not be necessary since the new code form will be tested against the present one which already contains the codes TT and T_dT_d.

4.10.5 With regard to the proposed tests the Commission agreed that the general aims of the tests should be as given in Part D of Annex XX.

4.10.6 The Commission adopted Recommendation 22 (CSM-V).

4.10.7 Code form for the exchange of synoptic surface observations originating from automatic weather stations

4.10.7.1 The Commission noted that the Working Group on Data Needs and Codes had considered the need for a code form suitable for reporting observations made by automatic weather stations, and that the president of CIMO had submitted to the session a document setting out the principles which CIMO believed should be followed when developing such a code form. The SYNOP and SHIP code forms recommended for general introduction in 1975 (see Recommendation 22 (CSM-V)) were considered by the Commission to be consistent with the principles expressed by the president of CIMO, and to be suitable for reports from automatic weather stations as well as manned stations.

4.10.7.2 It was agreed that there was a need for the introduction of a code form suitable for the exchange of observations from automatic weather stations at the earliest possible date. The Commission therefore concluded that section 1 of the new code forms given in Annex XX (Parts A and B) should be used for this purpose as from 1 January 1972 and adopted Recommendation 23 (CSM-V). Any changes which may be made in the code forms concerned will be applied to the code form for the exchange of observations originating from automatic weather stations.

4.11 Revision of Notes in Chapter I of Volume B

4.11.1 The Commission reviewed the progress made by the Working Group on Data Needs and Codes in the revision of Notes in Chapter 1 of Volume B. It agreed with the conclusions of the working group that the Notes in Chapter I of Volume B should be rewritten in the form of STANDARD Practices and Procedures of the Technical Regulations and Notes. Upon applying these principles it became apparent to the Commission that the notes under the code forms could not be converted to Technical Regulation form without converting at the same time the notes under the specifications of symbolic letters in Section I-A-3. As another consequence, the Commission decided that the Introduction to Chapter 1, Part A of Volume B, should be expanded to include explanatory material common to all code forms.

4.11.2 It was noted that in a number of cases a note, or portion of a note, contains specific coding instructions regarding a parameter, or instructions to the observer for determining the data to be reported. Those instructions are not directly related to the coding of a group, or groups, of the code form. The Commission agreed, therefore, that those instructions dealing exclusively with a parameter should be deleted from Section I-A-1 and included in Section I-A-3 under the Specifications for the Symbolic letter(s), as appropriate. As Sections I-A-1 and I-A-3 have the same status, the Commission decided that they should be revised in the same manner as the Regulations.

4.11.3 A numbering system was devised for the Regulations of the code forms which consists of the FM number of the code form, the serial number of the Regulation and for informational purposes the indicator for the session of CSM at which the Regulation was proposed for adoption, or modification of substance, plus the year of implementation, the two latter items being enclosed in brackets. During development of the numbering system, the present practice of indicating successive sessions of CSM by means of letters (i.e. A, B, C, D, etc.) in Volume B was examined. Considering that different alphabets are used in the world the Commission agreed that the continued use of letters for this purpose would cause difficulties in time. Therefore, the Commission decided that the Roman numerals now used to identify sessions of CSM should replace the letters and that appropriate changes should be made when revising the text of Volume B.

4.11.4 When adopting the principles and guidelines for the revision of the Notes by its Recommendation 24 (CSM-V), the Commission also agreed that the formats of the new notes as given in Annex VII should be followed to the maximum extent possible. Further, the Commission agreed that the drafting of the actual text should be undertaken by use of a consultant, if necessary. In this connexion it noted that the system of symbolic code letters also needed some revision. The Commission therefore requested the Secretary-General to arrange for the preparation of a list of suitable symbolic code letters. Furthermore, it stressed that any change of symbolic letters should be co-ordinated with a major change of code forms and codes.

4.11.5 The Commission considered under this item also a question raised at Fourth Congress, whether notes in Volume D regarding the composition of a weather bulletin for shipping should also appear in Volume B. It agreed with the conclusion reached by the Working Group on Data Needs and Codes, that a reference in the Introduction of Chapter 1 of Part B to these notes in Volume D would be appropriate and sufficient. Recommendation 25 (CSM-V) was adopted.

4.12 Establishment of the Working Group on Codes

4.12.1 The Commission noted that a number of code questions needed further study after its fifth session. Further, it considered that there will remain a need for revising details of coding procedures in general, both as the result of changing requirements and of experience gained with existing coding practices. The need for the development of new code forms may also become apparent in the coming years. In view of this, the Commission concluded that there was a clear need for the re-establishment of a Working Group on Codes.

4.12.2 When reviewing the relation which this new working group would have with the programme of World Weather Watch, in particular as regards the evaluation of data needs, the Commission noted the distinction made by the Executive Committee in its Resolution 5 (EC-XXI) between the four programmes of WMO. It recognized that data requirements of GDPS would most directly affect basic meteorological code forms such as TEMP, PILOT and Section 1 of the new SYNOP, but that most of the other existing international code forms are used in connexion with the application of meteorological knowledge to various human activities. The Commission felt that requirements originating from the various specialized fields in the latter area should be passed directly to the Working Group on Codes and that experts of these various specialized fields should assist in developing coding procedures which are of particular interest to their work.

4.12.3 The Commission therefore decided that the new Working Group on Codes should be composed of representatives from each regional association, experts nominated by the presidents of the Technical Commissions concerned and other experts nominated by any Member wishing to participate actively in the work of the group. The Commission considered that it would be most appropriate if the regional representative were at the same time chairman of the regional working group on codes, if any such group had been established by the Region. With regard to the second category of experts, the Commission wished to stipulate that the idea was not in the first place to have a representative of a technical commission on the group, but to acquire the necessary expertise in a given field whenever a substantial code problem in that field had to be solved. It would therefore be conceivable that the president of a technical commission nominated different experts, at different occasions, to assist in specific coding problems. As some code questions have a direct bearing on problems related to the Global Observing System, Telecommunications and the Global Data Processing System, the Commission agreed that arrangements should be made for the presence of the chairmen of the CSM working groups concerned at sessions of the Working Group on Codes, when necessary. It also agreed that codes used for transmission of data in the Integrated Global Ocean Station System (IGOSS) should continue to be developed by the CSM working group with suitable representation of the Intergovernmental Oceanographic Commission.

4.12.4 The Commission noted the system followed by the previous Working Group on Data Needs and Codes, by which specific code problems had been worked out initially by small groups of experts selected from amongst the members of the group. It considered that such a system was appropriate in particular with regard to codes which are covering a gradually extending field of application of meteorology. The Commission agreed, therefore, that such a working system would have merits also in the future. However, it was noted that problems which involve a considerable amount of study on a particular subject could be solved more efficiently and more quickly if a consultant or expert could be entrusted with the detailed study before reporting to the working group. In cases where financial obligations are involved in following the above procedure, prior approval of the president of CSM and the Secretary-General should be obtained. The Commission, in adopting Resolution 2 (CSM-V), decided that the considerations mentioned in this paragraph should be passed as guide-lines to the chairman of the future Working Group on Codes.

4.12.5 The Commission considered that, in view of the contemplated tests of the new SYNOP code form, a session of the Working Group on Codes might be necessary before 1973.

5. GLOBAL OBSERVING SYSTEM - CO-ORDINATION OF MATTERS RELATING TO THE GOS (Agenda item 5)

5.1 Review of the implementation of the GOS

The Commission examined with interest a summary provided by the Secretariat of the most important aspects of the implementation of the GOS. The Commission observed with satisfaction that substantial progress has been made in meeting the requirements of the regional basic networks. There was general agreement that the major problem area continues to be the attainment of a satisfactory upper-air observational network, particularly in the tropics and in the southern hemisphere. The Commission expressed the hope that this problem might be partially solved by the increasing amount of information becoming available from meteorological satellites and by the installation of additional APT stations in appropriate areas.

5.2 Observations from meteorological satellites

5.2.1 The Commission listened with great interest to scientific discussions presented by representatives of the U.S.S.R. and the U.S.A. on the use of information obtained from meteorological satellites. These discussions, clearly brought out the wealth of observational data that can be obtained either directly or indirectly from satellite observations. In this regard the Commission noted with interest the statement by the representative of ICAO that international civil aviation has benefited very greatly from the information obtained from meteorological satellites.

5.2.2 The Commission noted that a comprehensive analysis of satellite capabilities for the coming years is contained in WWW Planning Report No. 30, "Scope of the 1972-1975 Plan with particular reference to the Meteorological Satellite Sub-System". It agreed that two highly significant and promising developments which hold great promise for augmenting the GOS are the successful launching of experimental satellites by the U.S.A. and U.S.S.R. which are respectively capable of providing vertical temperature profiles from infra-red spectrometers measuring radiation admitted from the CO_2 bands of the atmosphere and for obtaining sea-surface temperature and humidity data by micro-wave equipment.

5.2.3 Operational uses of satellite-derived information

The Commission was pleased to observe that much satellite-derived information is being used operationally by Meteorological Services of Members launching satellites. Some examples of the products and operational uses of such information are: (i) the integration of vertical temperature and height sounding information into daily WMC analysis and forecasts; (ii) the routine application of satellite information for synoptic estimation and specification of meteorological parameters such as intensity and state of development of both tropical and extra tropical cyclones, wind direction and velocity and the vertical motions in the atmosphere, the estimation of atmospheric stratification according to internal cloud systems, and the evaluation of the relative humidity and probability of precipitation according to cloud data. The Commission also noted with satisfaction that the number of APT receiving stations has increased significantly since its last session, thus enabling many countries to benefit directly from developments in space technology.

5.2.4 Availability of satellite-derived data for general distribution

The Commission was particularly gratified to learn that both the U.S.A. and the U.S.S.R. are not only incorporating observational data from meteorological satellites in the analyses and prognoses of their WMCs, but that they are now making, or are preparing to make, bulletins or products containing summaries of meteorological parameters converted from satellite-sensed data available on the GTS as far as possible. The Commission requested the Secretary-General, in co-ordination with the satellite launching Members and appropriate working groups of the Commission to prepare information and plans for distribution to all Members concerning the arrangements for dissemination of satellite-derived meteorological parameters over the GTS.

5.2.5 Role of meteorological satellite observations in the future of GOS

5.2.5.1 In considering the role that observations from meteorological satellites, and in particular vertical satellite sounding information, will play in the GOS of the 1970s, the Commission agreed that much of the observational capability of satellites was still experimental in nature and that it was too early to draw firm conclusions. It was also agreed that, before present experimental satellite observational systems become fully operational, an overall system study should be made on the role of satellite soundings and other satellite-derived information in the GOS with priority given to areas where conventional data are sparse. The Commission expected the Working Group on the Global Observing System to take part in this study. The Commission was in general agreement that, in view of the experimental nature of many meteorological satellite data and the fact that much of this information seemed destined during the next WWW planning period 1972-1975 to augment rather than supplant that obtained from the earth-based observing system of the GOS, Members should continue their efforts to fully implement the GOS under the guidelines of the WWW and the regional basic network requirements. Reference was also made to the decision recorded under paragraph 6.3.2.2 which provided for the appointment of a Rapporteur on Synoptic Meteorology in the Tropics.

5.2.5.2 Nevertheless, during further consideration of the uses of satellite-derived vertical soundings, the Commission took particular note of studies requested from WMO by ICAO (Recommendations 1 and 7, Sixth ICAO Conference on NAOS, March 1968), concerning "the most economical and efficient means by which meteorological data, indispensible to civil aviation over the North Atlantic, could be obtained by 30 June 1973". The Commission observed that such studies should be completed before a decision is made to reduce or curtail the meteorological portion of the NAOS scheme.

5.2.6 Synoptic use of meteorological satellite data

5.2.6.1 The Commission based its consideration of this subject on the report of the chairman of the Working Group on the use of Satellite Data, various documents presented to the session, WWW Planning Report No. 30, "Scope of the 1972-1975 Plan with Particular Reference to the Meteorological Satellite Sub-System" and information presented orally to the session. The Commission noted that since CSM-IV, many important advances have occurred in the acquisition and use of satellite data as discussed in paragraphs 5.2.1 through 5.2.3. The Commission agreed that synoptic meteorologists had also greatly gained by having meteorological satellite data available and expressed its gratitude to those Members providing such information.

5.2.6.2 As more types of satellite information become available, the need for an up-to-date guide for the use of such information to ensure proper and maximum utilization is readily apparent. At the present time, Technical Note No. 75 is being used for this purpose. However, this Technical Note is rapidly becoming out of date and should be replaced. The Commission therefore invited the Secretary-General to arrange, as a matter of urgency, for two or three experts to come together and prepare an updated publication for distribution in loose-leaf form at the earliest possible time. Arrangements should then be made for keeping the publication current; such arrangements must include provisions whereby all countries operating meteorological satellites will have a direct and continuing input into the publication in order to ensure that it is representative and complete.

5.2.6.3 Finally, a recommendation by the chairman (Mr. V.J. Oliver, U.S.A.) that his working group not be re-established was considered. The Commission thanked the chairman for the fine work of his group during the preceding four years while agreeing with his recommendation since the primary functions that had been performed could now be undertaken by the newly-established Working Group on the GOS.

5.3 Network density

5.3.1 The Commission reviewed with considerable interest the report prepared by Dr. M.A. Alaka, the Rapporteur on Network Density Criteria. The Commission observed that this report in conjunction with WWW Planning Report No. 21, "Design of Optimum Networks for Aerological Observing Stations", represented an excellent summary of all that had been accomplished in this field since CSM-IV. The Commission then expressed its gratitude for the fine work that Dr. Alaka had done in preparing the report.

5.3.2 In considering conclusions that could be drawn from the reports mentioned above, as well as future studies that might be needed, the Commission was aware of the objectives of the Global Atmospheric Research Programme (GARP) in this respect and of the many studies and modelling experiments planned under the auspices of GARP to determine optimum network criteria for various purposes. The Commission consequently believed that no attempt should be made to initiate further studies on network density requirements until the results of GARP are available. The statements of GARP requirements contained in GARP Publication Series No. 3, as amended in GARP Planning Conference Document No. 6 concerning the data density requirements for basic large and planetary scale analyses was noted by the Commission. In this connexion the Commission expressed its hopes that these goals might be achieved through satellite data acquisition systems. The Commission also agreed that, in light of the potential GARP results, no changes in current observational network criteria should be made for the present. It was felt that the newly established Working Group on the Global Data Processing System should monitor the results of studies and experiments concerning network density and that the Working Group on the Global Observing System should make recommendations concerning the optimum use of various observational techniques in order to achieve densities recommended for the GOS.

5.4 Frequency of upper-air observations

5.4.1 The Commission held extended discussion on the desirable frequency of upper-air observations, both radiosonde and radiowind. The discussions were particularly concerned with establishing clear guidelines for the priority, with respect to synoptic time, for taking upper-air observations when the complete programme recommended by the Technical Regulations and regional associations could not be achieved. During these discussions it was observed that paragraph 4.3.1.2 of the Technical Regulations needed a slight revision in order to clarify its meaning. The recommended revision is described under agenda item 11.

5.4.2 The Commission then noted there was a lack of uniformity in the instructions of regional associations as to which standard synoptic time has preference when only one upper-air observation per day is made. Considerable and lively discussion then ensued over the merits of observations at either 0000 or 1200 GMT. The Commission reached general agreement that when only one upper-air observation is made, choice of preferred time between 0000 and 1200 GMT should be left for the decision of regional associations. When there are no compelling regional reasons to the contrary, the 0000 GMT observation should be given preference. Recommendation 26 (CSM-V) was adopted.

5.5 Heights to be reached by radiosonde and radiowind

The Commission observed that some studies of the variability of winds and temperatures above 50 mb might suggest that a less dense network of upper-air observations is required to reach above that level, i.e. to the presently recommended height of 10 mb (Resolution 33 (EC-XVIII)). Furthermore, several Members indicated that they were planning to have only selected stations in their national networks operate so as to achieve 10 mb ascents. However, the Commission was in general agreement that no recommendations should be made for changes in this requirement until the full operational impact of satellite vertical soundings is determined. The Commission therefore asked that the Secretary-General collect information from Members as to which of their stations were planned to regularly achieve 10-mb heights and to provide this information to the Working Groups on the Global Observing System and the Global Data-Processing System to further their co-ordination and monitoring of network density requirements. In this regard, it was pointed out that any investigations into desirable upper-air observational height requirements should be co-ordinated with the CAS.

5.6 Buoys and platforms at sea

In discussing the development and use of buoys and platforms at sea, the Commission noted with interest the information contained in WWW Planning Report No. 31, "Development of the WWW Oceanic Observing Sub-System for 1972-1975". It was agreed that this report contains an excellent summary of the current plans of Members in this regard. The Commission also noted with appreciation that close co-ordination with the plans of IOC/IGOSS is being accomplished through the EC Panel of Experts on Meteorological Aspects of Ocean Affairs. The Commission then decided as a matter of principle that whenever observations of interest to meteorologists are made over oceans, such observations should be disseminated over the GTS.

5.7 Aircraft reports for synoptic purposes

The Commission was informed that the results of using the CODAR format for the transmission of aircraft reports selected for hemispheric exchange (see Recommendations 21 (CSM-IV) and 27 (CSM-IV)) have not been entirely satisfactory. In the light of the increasing capabilities of meteorological centres to process aircraft reports in any standard format, and the need for simplicity and widespread use of selected aircraft reports, the Commission agreed that Members should be permitted the choice of exchanging aircraft reports in either the CODAR code (FM 41.D) or the AIREP format. The Commission further agreed that a single standard version of the AIREP format should be used for the global exchange of selected aircraft reports for basic meteorological data. Further discussion of this matter is contained under agenda items 4 and 7.

5.8 Automatic weather stations on land

5.8.1 The Commission reviewed developments since its last session in the field of automatic weather stations on land, and noted in particular that the Executive Committee had adopted Resolution 11 (EC-XX) which invited Members "to take full advantage of automatic weather station techniques in their efforts to implement the World Weather Watch". The Commission also noted that CIMO had established a working group to study such stations as operational systems.

5.8.2 The Commission was informed of some data acquisition problems which are becoming evident as automation of surface observations develops. It was observed that while the number of parameters observed and their accuracy may be limited, these observations may be very useful in data-sparse areas. The Commission felt that since automation will probably play an increasingly large role in meteorological observations, it is important that extra and better sensors be developed. The Commission agreed that automatic surface observing stations are most urgently needed in data sparse areas.

5.8.3 The decisions taken concerning provision for the inclusion of data from automatic weather stations in the synoptic code are described under agenda item 4. In this connexion the Commission requested the Secretary-General to take the necessary action to aid Members who operate automatic weather stations for national uses in sparse data areas to make these data available for international exchange.

5.9 Ground-based observations of turbulence

The Commission was informed by the representative of ICAO that reports of turbulence are of particular importance to aviation, as reflected in Recommendation 8.1/1 (Sixth ANC/Ext. 1969 session of CAeM) which asks WMO to encourage Members to make further studies of ground-based methods of detecting clear air and convective turbulence and the feasibility of introducing new systems for routine use. The Commission noted that the newly established Working Group on the Global Observing System (see paragraph 5.11) would be the logical place where this problem should be considered and asked the chairman of the working group to place this subject on the agenda for the first session of the working group.

5.10 Updating of Volume A of WMO Publication No. 9.TP.4

The Commission reviewed the present supplement service for Volume A of WMO Publication No. 9.TP.4 and noted that the volume is prepared by computer and that printing is done by offset methods in the WMO Secretariat. The Commission agreed that, in the light of widespread approval of Members, a half-yearly updating of the volume in the form of a complete Volume A, supplemented by advance notification of important changes (METNO messages), would be desirable. It was pointed out that a list of all stations for which changes had intervened between two consecutive updatings would be supplied. Recommendation 27 (CSM-V) was adopted.

5.11 Establishment of the Working Group on the Global Observing System

5.11.1 The Commission considered the suggestion of the president that a Working Group on the Global Observing System might be established in order to help discharge the duties given to the Commission by Fifth Congress in regard to the GOS. The Commission expressed its appreciation for the considerable work that had been accomplished in relation to the GOS since its last session by other technical commissions, particularly CIMO and CMM, by the Secretariat and by various informal planning meetings. However, it was observed that there were no arrangements within the Commission to review and co-ordinate matters relating to the GOS. The Commission was in general agreement that, in order to properly meet its responsibilities in this area as requested by Fifth Congress, a Working Group on the GOS was required. Considering the special interests of the Commission for Maritime Meteorology in networks over the ocean and the observational interests of the Commission for Instruments and Methods of Observation, it was agreed that representatives from these Commissions should be members of the working group.

5.11.2 The Commission therefore decided to establish a Working Group on the Global Observing System which should be composed of representatives from each regional association, a representative from the Commission for Instruments and Methods of Observation, a representative from the Commission for Maritime Meteorology, experts nominated by Members operating or planning to operate significant parts of the Global Observing System and experts nominated by other Members wishing to participate actively in the work of the group. Resolution 3 (CSM-V) was adopted.

5.11.3 The Commission took into account that it had decided not to re-establish the Working Group on Satellite Data (see paragraph 5.2.6.3) with the understanding that the primary functions of that group would now be undertaken by the Working Group on the Global Observing System. Although the Commission felt that the terms of reference of the Working Group on the Global Observing System were broad enough to include studies of satellite data, it did stress the need for the Working Group to give proper attention to this very important field of endeavour.

5.11.4 The Commission noted that the Working Group on the Global Observing System will frequently consider matters of interest to the Working Groups on the Global Telecommunication System, on Codes, and on the Global Data-Processing System which implies the attendance of the chairmen of these groups at sessions of the Working Group on the Global Observing System. However, taking into account the cost in time and money of working groups sessions and the heavy workload of working group chairmen, the Commission consequently agreed that arrangments should be made for the presence of the chairmen of these working groups at sessions of the Working Group on the Global Observing System only when necessary.

5.12 Consideration of draft WWW Plan 1972-1975

5.12.1 The Commission had an opportunity to look at the draft WWW Plan for the period 1972-1975 as presented by the Secretary-General in a document to EC-XXII.

5.12.2 It was mentioned that the draft WWW plan has the appearance of being regulatory in nature in many instances. It was felt that both the substance and the presentation of the plan should be less categorical. It was also felt that the plan should attach more emphasis on the necessity for co-ordination between the various parts of the WWW. Finally, the Commission suggested that a very careful comparison of the presentation of the plan, in all four official languages, should be carried out.

5.12.3 During the session, the Commission devoted considerable time to discussing the GOS, GDPS and GTS and formulated appropriate recommendations and conclusions. It was felt that these recommendations and conclusions should be taken into account when formulating the WWW plan for the period 1972-1975.

5.12.4 As regards the participation of CSM in the development of the WWW, attention was drawn to the fact that the Commission set up working groups dealing with GOS, GDPS and GTS which will undoubtedly contribute to the further development of the WWW plan and also ensure appropriate co-ordination of the implementation of the WWW.

6. GLOBAL DATA-PROCESSING SYSTEM (Agenda item 6)

6.1 Co-ordination of requirements expressed by technical commissions (Agenda item 6.1)

6.1.1 The Commission noted the requirements for output products of world and regional meteorological centres stated by the technical commissions, in particular CAeM, CHy, CMM, CAgM and CCl. These requirements were included in the list of possible output products of WMCs and RMCs (see paragraph 6.2.2 below).

6.1.2 The ICAO observer presented the requirements from an ICAO viewpoint. He emphasized the already important use being made of satellite photographs in flight planning and documentation and pointed out the new use of digital data by air traffic services and the importance of meteorological support as envisaged by the WWW programme. Mr. N.A. Lieurance, president of the Commission for Aeronautical Meteorology, who attended the session, then discussed the aeronautical meteorological requirements. The president of CAeM pointed out that the requirements of aeronautical meteorology are essentially the same as the requirements for synoptic purposes as related to the WMC products. However, it is foreseen that the RMCs will be required to produce some specialized products for aeronautical operation. Mr. Lieurance also indicated that there probably will be a requirement for the WMCs to produce digital data that can be used directly for computer flight planning on a global basis.

6.1.3 The Commission considered that the technical commissions concerned should review periodically their requirements for the output products of WMCs and RMCs needed for the various applications such as agriculture, industry, water resources development, etc. In stating the requirements, technical commissions should give details concerning the elements and parameters to be calculated on the basis of past and current weather data, as well as on the desired form of presentation of the products.

6.2 Rationalization of the type of output products of the GDPS (Agenda item 6.2)

6.2.1 State of implementation of the output product programmes of the WWW data-processing centres

The Commission examined the information on the present and planned output products of WMCs which was presented to it in the form of extracts from a WMO publication under preparation entitled "World Weather Watch - Third Status Report on Implementation". The Commission noted with satisfaction the progress made in the implementation of the output products. With respect to the form of presentation of the information on the output product programme in the above-mentioned publication (see Annexes I and III to Part II - GDPS of the Third Status Report), the Commission commented that it would be useful to include a note explaining that the absence of an entry for a given output product in the tables does not imply that there exists an unfulfilled requirement for that product. This comment was noted by the Secretariat.

6.2.2 General list of output products of WMCs and RMCs

The WWW plan for the implementation period 1968-1971 contains a general list of output products of WMCs. The plan also includes a more detailed list of RMC products, "as a basis for the further planning of the products to be issued by individual RMCs in the light of the requirements of the recipient Members" (see Attachments I and V to Appendix II to the WWW plan). On the basis of these indications of the plan and taking into account the requirements stated by the recipient Members and by the technical commissions, the Commission drew up an overall list of WMC and RMC products, with a view to giving general guidance to those concerned with the establishment of output product programmes of WMCs and RMCs. It was accepted that this must be a most detailed and comprehensive list and recognized that, on the one hand, many of these products may not be needed by countries whereas, on the other hand, some of the centres may not have the capability to produce a number of them. It was also recognized that the Global Telecommunication System may not be capable of accommodating all the stated requirements within the time available. Therefore a co-ordinated programme should be established between the data processing centres and the users of the output products in those cases where the capability of the GTS and/or the capability of the data processing centres do not allow the preparation and/or the transmission of all the products requested. Recommendations 28 and 29 (CSM-V) were adopted.

6.2.3 Format and presentation of processed information for exchange between centres

6.2.3.1 The Commission considered that the two principal forms of presentation of processed information which are likely to be used in the years to come are pictorial (facsimile) and alpha-numerical (mainly grid-point values).

6.2.3.2 In connexion with the pictorial presentation of processed information through facsimile, the Commission considered that the present WMO standards for the projections and scales of charts and for the facsimile transmissions were, on the whole, satisfactory. In view of the particular suitability of the scale 1:60 million for maps covering the world or a hemisphere, the Commission recommended that this scale be included in the standards listed in present paragraph 7.2.1.2 of the Technical Regulations (see Recommendation 42 (CSM-V)).

6.2.3.3 As regards the exchange of processed information in grid-point form, the Commission recognized that the use of this method would undoubtedly result in a significant reduction of the transmission time, and that this form of exchange is particularly suitable for computer-equipped centres. On the other hand, it was also unanimously recognized that manual methods of preparation of processed information would continue to be widely used in all parts of the world. It was therefore essential that the code form to be used for the exchange of grid-point values be equally suitable for both machine and manual processing. The decisions of the Commission on the details of the grid-point code are recorded under agenda item 4.

6.2.4 Checking of observational data

An important operation which may be regarded as an initial phase of data-processing is the checking of observational data from the meteorological point of view before they are used in the synoptic operational work. This subject was considered at the Informal Planning Meeting on Collection, Storage and Retrieval of Meteorological Data (Geneva, April 1970), which drew up suggested standard message formats and procedures for use in the correction of suspect values in telecommunication messages. The Commission examined the relevant suggestions of the informal planning meeting but came to the conclusion that the suggested method for such checking and correction of observational data was not workable on the present data-processing and telecommunication system because the transmission of query messages would upset the transmission schedules. The Commission emphasized, however, that every effort should be made at the national level to ensure that observational data are subjected to checking as near to the data source as possible, prior to their inclusion in the telecommunication system.

6.2.5 Statement of requirements of individual NMCs for observational data and processed information

6.2.5.1 The Commission agreed that for the efficient operation of the GDPS, the requirements of the various centres for both observational data and processed information have to be ascertained periodically so that appropriate arrangements may be made from time to time for meeting the actual requirements.

6.2.5.2 The Commission noted the information provided by the Secretariat on the manner in which relevant inquiries were conducted, and concluded that the procedure followed by the Secretariat in ascertaining requirements should continue to be followed.

6.2.6 Priorities of types of message to be transmitted on the Main Trunk Circuit

The Committee considered the required level of priorities of types of messages to be transmitted on the Main Trunk Circuit. It felt that the complexity of this problem was too great to be considered without considerable background information and preparation. In lieu thereof, however, it noted that this question would be a task of the newly established working groups on GDPS and GOS.

6.2.7 Priorities for the inclusion of products on the Main Trunk Circuit and its branches

The Commission recognized that until such a time as the Global Telecommunication System is capable of transmitting all the processed information required, there is a need for establishing some general principles on the basis of which priority is given to certain types of products for inclusion on the Main Trunk Circuit and its branches. The Commission agreed on the following provisional classes of priorities, on the understanding that in the establishment of the transmission schedules, due account is taken also of the specific requirements stated by countries.

PRIORITY I : Selected products in support of AFCs requiring inter-regional exchanges and selected WMC products. The selection of those products in support of AFCs should be made on the basis that no other reliable channel of communication is available for their transmission.

PRIORITY II : Other WMC products.

PRIORITY III : Remaining products.

The Commission agreed, however, that it is desirable to establish a more detailed list of priorities. Accordingly, it entrusted the Working Group on the GDPS to deal with this matter (see paragraph 6.2.9 and Resolution 5 (CSM-V)).

6.2.8 Need for the exchange of data obtained from satellites

The Commission noted that with the development of satellite observing techniques the amount of data obtained from satellites is constantly increasing and that there is also an increasing demand for the global exchange of these data in both pictorial form (cloud pictures) and coded form (surface temperature, radiation, upper-air temperature and perhaps humidity data). In the absence of sufficient information on the future availability of and requirements for such data, the Commission was not in a position to determine the amount of data and the frequency with which it would be necessary to exchange these data on a regular basis, but it envisaged that in the next few years a considerable amount of coded data would be required to be transmitted.

6.2.9 Establishment of the Working Group on the Global Data-Processing System

6.2.9.1 The Commission noted that much work has been done on planning the various activities of the WMCs, RMCs and NMCs, but that no arrangements existed within the Commission for ordinating matters relating to the GDPS so that WMCs, RMCs and NMCs could arrange their activities to achieve maximum efficiency. The Commission was aware of many questions that have arisen regarding such matters as the output products of WMCs and RMCs, the need for priorities for the transmission of these products over the GTS and technical problems concerning preparation and format of such products.

6.2.9.2 The Commission therefore decided to establish a Working Group on the Global Data-Processing System which should be composed of representatives from each Regional Association, experts nominated by Members responsible for the operation of WMCs and RMCs and other experts nominated by any Members of the Organization wishing to participate actively in the work of the group. Resolution 5 (CSM-V) was accordingly adopted.

6.2.9.3 The Commission observed that a WMC is located in each of three Regional Associations. In the interests of economy and of keeping the Working Group as compact and efficient as possible, the Commission therefore suggested that each of these Regional Associations consider designating the expert nominated by the Member responsible for the operation of the WMC located in its Region as the Regional Association representative also.

6.2.9.4 The Commission noted that the terms of reference of the Working Group on the Global Data-Processing System will frequently require it to consider matters of interest to the Working Groups on the Global Telecommunication System, on Codes, and on the Global Observing System which implies the attendance of the chairmen of these groups at sessions of the Working Group on the Global Data-Processing System. However, taking into account the cost in time and money of working group sessions and the heavy work-load of working group chairmen, the Commission consequently agreed that arrangements should be made for the presence of the chairmen of these working groups at sessions of the Working Group on the Global Data-Processing System only when necessary.

6.2.10 Consideration of draft WWW plan for 1972-1975

For the views of the Commission on this item, see paragraph 5.12.

6.3 Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) (Agenda item 6.3)

6.3.1 Numerical weather prediction

6.3.1.1 The Commission expressed its appreciation for the general information that was made available by the chairman of the Joint CAS/CSM Working Group on Numerical Weather Prediction (Dr. Döös of Sweden) as well as others on the consequential and noteworthy achievements and related problems regarding numerical weather prediction. It was agreed that this is a field that requires continuous monitoring and possible action in view of (a) and (b) of the terms of reference of the Commission (see WMO General Regulations, Annex II).

6.3.1.2 The Commission then considered in more detail the report of the chairman of the Joint CAS/CSM Working Group on Numerical Weather Prediction while also keeping in mind the need to determine the optimum procedure for keeping abreast and reacting to developments in this field. It noted that the chairman of the working group invited the Commission to consider the need for a Symposium on Numerical Weather Prediction. The Commission then recalled that when discussing a similar problem under another agenda item, it had decided that the optimum procedure for keeping Members informed would be through a symposium considering both numerical weather prediction and long-range weather forecasting. It therefore agreed that the Secretary-General should make arrangements for such a symposium. It further felt that the symposium should be held before the end of 1972 and that the Secretary-General should examine the possibility of publishing, as soon as possible, the papers presented at the symposium of interest to CSM. The Commission emphasized that the topics to be considered should be ones that are of direct relation to the work of the Commission namely numerical techniques, operational models, initial state problems, long-range predictions and predictability and scale. Even so, the Commission was of the opinion that CAS would be interested in such a symposium. Therefore, the president of CSM was requested to invite the president of CAS to participate in the necessary arrangements.

6.3.1.3 The Commission noted that several Meteorological Services were interested in developing methods of numerical weather prediction for their areas and needed to train their personnel in the subject. Regional training seminars are therefore required for the purpose of training staff in NWP. Accordingly, the Commission requests the Secretary-General to arrange a number of such training seminars in the next few years.

6.3.2 Synoptic meteorology in the tropics

6.3.2.1 The Commission was advised that the report of the Working Group on Methods of Analysis and Prognosis in the Tropics (see paragraph 9.2 (CSM-IV)) had not been published as a Technical Note as recommended by CSM-IV. The reason for the delay had recently been explained to the acting-president by Dr. H.T. Mörth who is actively involved in making the editorial amendments and additions necessary to put the report in a form suitable for publication. Dr. Mörth's portion of the report has been completed for some time. However, since it deals only with techniques that pertain to analysis of the pressure field, Dr. Mörth felt that the report would be unbalanced without some reference to stream-line procedures. Mr. R.L. Southern of Australia has consented to prepare this portion of the report and has advised Dr. Mörth that it should be completed by 30 September 1970. The Commission was most encouraged by this information and requested its president to consider the final report, when available, for publication as a Technical Note.

6.3.2.2 The Commission then considered the report of the Rapporteur on Synoptic Meteorology in the Tropics and expressed its appreciation to Dr. Mörth for an interesting and informative presentation. Although the report emphasized that there has been no real breakthrough in solving the problems of tropical analysis and forecasting, it did present considerable encouragement for future developments. The development of satellite sensing techniques are providing reports of weather parameters from tropical areas where few, or none, had previously been available. Also new and different theoretical considerations, some of which make use of the computer, are being used with increasing frequency. Therefore, the Commission felt that it must keep abreast of changes in this field and decided to re-appoint a rapporteur. While doing so, the Commission expressed the feeling that such a rapporteur, in order to be successful in his endeavours, must have the complete co-operation and help of Members who are interested in this field. It further felt assured that such co-operation and help would be forthcoming and Resolution 4 (CSM-V) was adopted.

6.3.3 Verification of forecasts

6.3.3.1 The Commission noted that four inquiries had been made on methods of verification of forecasts. The first two inquiries had been conducted prior to CSM-III, the third prior to CSM-IV, and the fourth, one year prior to the present session. The Commission recalled that the last inquiry had been made at the specific request of CSM-IV since it was felt that the earlier inquiries did not produce sufficient information for a WMO Technical Note. This last inquiry requested Members to produce information on any verification methods used in their service additional to those already submitted in response to the three earlier inquiries. The Commission further recalled that it had requested the Secretary-General to summarize this new information in a suitable form for presentation to CSM-V.

6.3.3.2 The Commission was then informed that due to the complex nature of this question, the acting-president of CSM, through the Permanent Representative of the U.S.S.R., had arranged for an expert in this field (Dr. E.M. Dobryšman) to prepare a report based upon all of the information available. Since the report, by necessity, is quite lengthy, the acting-president felt that in the interest of economy of time at the session, only a summary of the report should be presented in document form for consideration.

6.3.3.3 The Commission listened with considerable interest to Dr. Dobryšman while he presented an abridged version of his report. It was noted that his treatment of the problem was quite complete and included, among other things, a discussion of different aspects associated with the verification of forecasts, an analysis of the techniques for verification of forecasts and a discussion of various specific types of forecasts and possible methods for their verification. Dr. Dobryšman concluded that the forms of estimating the quality of forecasts are still highly diverse and it is difficult to put forward a distinct classification. However, there were certain trends which he explained. Also, in most cases, the terminology and definitions given in synoptic codes are used for both forecasting and verification purposes.

6.3.3.4 A lively discussion followed the presentation which included many aspects of the problem and consideration of factors such as psychological, economic, and others. However, taking into account the importance of verification of forecasts, it was recommended that Dr. Dobryšman's unabridged report should be published as soon as possible in English in the form of a Technical Note. The Commission recognized that the original report should also be made available in other languages on request.

6.3.4 Long-range weather forecasting

6.3.4.1 The Commission reviewed the various implementing actions that have been taken on its suggestions and recommendations made at the fourth session. It was gratified with the initiative that had been taken by the president for the adoption of Recommendation 60 (68-CSM) "Division of the year into 73 pentads for international exchange of five-day mean data" which was then approved by EC-XX for entry into force on 1 January 1969.

6.3.4.2 It was then recalled that at CSM-IV, the Commission had decided that the president should consult with the president of CCI concerning a suggestion from the working group that all Members should be encouraged to publish their climatological records of long homogeneous series of pressure, temperature, precipitation and upper-air data for five-day periods after the action described in paragraph 6.3.4.1 had been completed. The Commission was informed by the president (through his report) that such consultation had taken place. As a result, the proposal was referred to the fifth session of CCl (Geneva, 1969) which took note of the request and suggested that the proposal would possibly be more acceptable if it were phrased ".... to publish or furnish on request ...." etc.; it was also suggested that the meaning of the request "to publish" be explained in some detail as the present wording might be interpreted as applying only to the publication of the long-term means.

6.3.4.3 The Commission, after a thorough discussion of the CCl proposals, concluded that there now exists no general requirement for mean data and that it should not be exchanged routinely. However, since it still may be used by some services, the Commission decided that Members should be encouraged to furnish on request their climatological records for five-day periods in accordance with the needs of the requesting service.

6.3.4.4 The report of the Rapporteur (Mr. K.N. Rao, of India) on Long-Range Weather Forecasting was then examined with appreciation. It contained a summary of progress achieved by eleven countries in long-range forecasting since 1964. The report emphasized the increasing use that is being made of theoretical models and the fast accumulating upper-air data. These are encouraging features, although much work remains to be done before satisfactory solutions are found to this important question.

6.3.4.5 While considering this report, the Commission was well aware that the achievements of eleven countries do not accurately show the true state of affairs in long-range weather forecasting. However, it was sympathetic with the problems of a rapporteur in accumulating complete information in this field and expressed the view that perhaps the most direct and simplest procedure to insure a complete report would be to publish the results of a well-planned symposium. Nevertheless, due to the close tie between long-range weather forecasting and numerical weather prediction, the Commission felt that the two subjects should be discussed and considered simultaneously and decided to consider the matter of a symposium under another agenda item. The Commission also expressed the view that in addition to a symposium, the Secretary-General is requested to provide for the services of an expert in this field to summarize the present position on "new developments in long-range forecasting" six months prior to CSM-VI.

6.3.5 Meteorological forecasts of importance to hydrology.

6.3.5.1 At the fourth session, the Commission for Synoptic Meteorology noted the proposals of the Commission for Hydrometeorology to consider the importance of certain meteorological forecasts for hydrological forecasting, particularly for quantitative precipitation forecasts and long-range meteorological forecasts, and to consider ways of preparing guidance material on the operational aspects of this problem. Due to the increasing importance of hydrological forecasting, the Commission appointed Dr. P. I. Miljukov as rapporteur.

6.3.5.2 The Commission expressed its appreciation for the late Dr. Miljukov's report. It noted that the first draft of this report had been presented to the third session of CHy and that CHy expressed the view that publication of the expanded version of the report, as planned by CSM, would be of great value to hydrologists as well as to meteorologists. CHy also suggested that CSM should establish a small group to study further the question of the availability and accuracy of long-range forecasts as an aid in hydrological forecasting.

6.3.5.3 The Commission examined the expanded report which was based on information collected in response to a questionnaire regarding the current status of activities of Members on meteorological forecasts of importance to hydrology. When examining this report it kept the two points referred to in paragraph 6.3.5.2 in mind. With regard to the first point, it was of the opinion that procedures in individual countries are currently changing rapidly and any report on this subject would have limited value. The Commission further felt that a Symposium on Long-Range Weather Forecasting and Numerical Weather Prediction would be the best means of keeping abreast of developments in this field. It was of the opinion that such a symposium would adequately replace the need for a small working party to consider the accuracy of long-range forecasts as an aid in hydrological forecasting (see paragraph 6.3.1.2).

6.3.5.4 The Commission was most interested in the information collected by Dr. Miljukov regarding the reliability of meteorological forecasting for hydrological purposes. He pointed out that forecasting is not fully comparable from one country to another owing to the diversity of methods and criteria employed. The Commission noted that quantitative precipitation forecasts are included in many countries as ingredients of forecasts of river stage and river discharge and appreciated the points made by Dr. Miljukov that further improvement of hydrological forecasts are closely tied to the improvements that can be made in quantitative precipitation forecasting. These considerations apply equally to the short and intermediate range (1-5 days) and to the long-range (30 days or more) forecasts. For the long range, improved forecasts of mean temperature would also be of benefit to hydrological forecasts. The Commission was of the opinion that these points would be of considerable interest to most meteorological services and requested that the Secretary-General bring them to the attention of Members.

6.4 Review of the Guide to the Preparation of Synoptic Weather Charts and Diagrams (Agenda item 6.4)

6.4.1 Consideration of the future re-arrangement of the Guide

On the basis of a suggestion made by the Informal Meeting of Experts on the Revision of the Technical Regulations in the Light of the World Weather Watch (Geneva, February 1970), the Commission considered the need for the publication of a WMO Guide which would contain a detailed description of the organization and operation of the Global Data-Processing System. It was agreed that such a Guide would be very valuable to Meteorological Services, and that it could be combined with the appropriately amended version of the present Guide to the Preparation of Synoptic Weather Charts and Diagrams (see also paragraph 6.4.2 below). Since, however, the various parts of the suggested combined Guide on the Global Data-Processing System may not be directed to the same users, the Commission considered that this Guide should be issued in two separate volumes, preferably in loose-leaf form. The broad outline of the new Guide is given in the annex to Recommendation 30 (CSM-V) which was adopted. The Commission agreed, however, that in view of the rapid development of data-processing methods, further sections may need to be included soon in the Guide. The subjects listed in Annex XXIII should therefore not be regarded as definitive.

6.4.2 Consideration of proposed amendment to the Guide

6.4.2.1 The Commission recalled that it had requested the Secretary-General to prepare proposals for the amendment of the Guide to the Preparation of Synoptic Weather Charts and Diagrams as a consequence of the changes introduced in the international meteorological codes in January 1968. The Commission was informed that in order to comply with this request, an inquiry had been conducted among members of the CSM Working Group on Data Needs and Codes regarding the necessary changes and that Mr. A. Jeannet (Switzerland) had agreed to undertake the revision of the Guide based upon the information received from Members.

6.4.2.2 The Commission expressed its appreciation to Mr. Jeannet for a most comprehensive and well-presented report which it examined in great detail. The Commission requested the Secretary-General to publish the updated Guide to the Preparation of Synoptic Weather Charts and Diagrams in a loose-leaf form incorporating the amendments contained in Annex VIII. It further requested that it be published as soon as possible and preferably not later than 1 July 1971.

7. GLOBAL TELECOMMUNICATION SYSTEM (Agenda item 7) *

7.1 Report of the chairman of the Working Group on Telecommunications

The Commission noted with appreciation the report by the chairman of the Working Group on Telecommunications. The details of the chairman's report were discussed under the various paragraphs of this agenda item as appropriate.

7.2 Review and follow-up of decisions of the fifth session of the CSM Working Group on Telecommunications

7.2.1 The Commission reviewed the recommendations stemming from the fifth session of the Working Group on Telecommunications and the replies of Members on these recommendations when they were circulated for comments prior to voting by correspondence. The texts of these draft recommendations, as reviewed, are incorporated in the recommendations adopted by this session. The review and follow-up of the requests, in the general summary of the report of the fifth session of the CSM Working Group on Telecommunications, for action to be taken by CSM and/or the Secretary-General are discussed in the following paragraphs, as well as under agenda item 6.

7.2.2 The Commission was of the opinion that, at this stage of implementation of the WWW Global Telecommunication System which is expected to become operational in its main features in the near future, there is a need for regulatory material - rather than guidelines - to ensure compatibility and efficient working of the system as a whole. The Commission noted that such information is partly contained

* The General Summary of item 7 does not follow the division of the sub-items given in the agenda.

in different parts of WMO Publication No. 9.TP. 4, Volume C, and in various recommendations of CSM and Regional Associations as well as decisions taken by Fifth Congress and the Executive Committee. It was stressed that there is a need for all the regulatory material for both the global and regional aspects of the WWW Global Telecommunication System to be assembled in one concise publication in order to assist Members in assuming their responsibilities for implementing their contribution to the WWW. Recommendation 31 (CSM-V) was adopted.

7.2.3 The Commission noted the results of the survey conducted by the Secretary-General on the present global collection and distribution of observational data. This survey was carried out within the inquiry for preparation of the WWW Third Status Report on Implementation and this matter is further discussed in paragraph 7.9 below.

7.2.4 The Commission noted that draft Recommendation J (68-CSM) "Facsimile Test Chart" was circulated to Members for comments and then for voting by postal ballot. It was informed of the progress in the voting procedures and that some comments were made concerning the printing quality and accuracy of dimensions of the specimen of the test chart that was attached to the voting form. It was also informed that these comments will be taken care of in the final printing of the test chart.

7.2.5 As regards the detailed study, requested by the fifth session of the CSM Working Group on Telecommunications, of the total requirements which are expected to be met by the Global Telecommunication System in the periods 1972-1975 and 1975-1980, the Commission was informed that it was not advisable to carry out this study at this time in order to take into consideration the conclusions of the fifth session of the CSM in the field of GOS, GDPS and GTS. The Commission requested the Secretary-General to take the necessary steps towards the completion of this study by the end of December 1970 and make the results available for study by the CSM Working Group on the Global Telecommunication System.

7.2.6 The Commission noted with interest that the Secretary-General, in compliance with the request of the fifth session of the CSM Working Group on Telecommunications, took the necessary action to convene meetings of experts responsible for the operation of WMCs and RTHs on the Main Trunk Circuit and its branches to discuss operational, technical and procedural matters requiring a solution prior to implementation of the centres and circuits. A meeting of experts of the WMCs and the RTHs on the Moscow-Washington portion of the Main Trunk Circuit was convened in Moscow from 9 to 13 March 1970 and a meeting of experts of the WMC Moscow and the RTHs Cairo, Nairobi and New Delhi was convened in Cairo from 13 to 18 May 1970. The Commission took into consideration the relevant decisions of these meetings in its discussions. It was agreed that a meeting of experts of the centres Offenbach, Prague and Moscow should be held for the clarification of technical characteristics, in particular compatibility between the software and hardware systems, and to prepare the test programmes to be carried out between the centres concerned. The Commission noted with appreciation that the Permanent Representative of Czechoslovakia will make the necessary arrangements to convene this meeting in Prague during the period 31 August - 4 September 1970.

7.2.7 As regards the role of WMO in the World Administrative Radio Conference (WARC) dealing with radio frequency band allocations for space radio services which will be convened in 1971 by the ITU, the Commission was informed that, in order to ensure that the frequency requirements of Meteorological Services are presented to the ITU Conference, the Secretary-General informed all Meteorological Services of the Conference and requested that he be informed of their radio frequency requirements for meteorological satellites and other space radio communication services. Proposals for radio frequency requirements were received from only one Member and were circulated by the Secretary-General, to all WMO Members, for comments and additional proposals, if any. So far very few comments have been received by Members on this subject. Since meteorological satellites will mainly be operated on a national basis, Members concerned have already taken action through their telecommunication authorities to prepare their positions for the forthcoming ITU meeting. The Commission therefore felt that the role of WMO will be to support frequency band requests for meteorological satellites and other space radio systems relating to meteorology presented by Members to the ITU Conference.

7.3 Organization of the GTS

7.3.1 The Commission discussed the organization of the Global Telecommunication System as contained in Recommendation 2 (CSM/WGT-V) and circulated for comments by Members as draft Recommendation A (70-CSM). In so doing, the comments made by Members were taken into consideration for the review of the text for inclusion in the WWW Global Telecommunication System Manual (see paragraph 7.2.2 above).

7.3.2 With regard to radio broadcasts, the Commission felt that radio broadcasts would have to be used until integrated systems of point-to-point circuits are established in all parts of the world meeting the requirements for the collection and distribution of meteorological information. In this connexion the Commission considered the necessity of reviewing the existing system of radio broadcasts in the light of the plan for the Global Telecommunication System, in order that the requirements of WWW may be met more completely. The Commission came to the conclusion that it would not be possible to undertake this review during the present session, since this requires a detailed study of the question and development of a new plan for radio broadcasts, taking into account technical, operational and financial problems. The Commission agreed that a review of the existing system of radio broadcasts in accordance with the plan for the Global Telecommunication System should be one of the next tasks of the CSM Working Group on the Global telecommunication System.

7.3.3 The Commission noted that meteorological satellite techniques are progressing and it is not possible, at this stage, to assess either the volume or the time of availability of such asynoptic data. Therefore, the frequency of exchange of such data was not specified. Such information will be made available by the satellite launching countries during the development of a fully operational system and at that time the requirements of Members requested accordingly.

7.3.4 The Committee adopted Recommendation 32 (CSM-V).

7.3.5 The Commission developed a series of principles for the establishment of the exchange programmes for observational data on the Main Trunk Circuit and its branches and then drew up a detailed list of individual stations from which reports are to be included in this exchange. The list contains the surface and upper-air stations for the construction of both the northern and southern hemisphere synoptic charts. Since adjustments may be required to the list of stations between sessions of CSM, the Commission authorized its president to approve such amendments on behalf of the Commission. Furthermore, in order to give an indication to Members on the state of implementation of this list, the Commission requested the Secretary-General to publish the actual situation on the implementation of this list as at 1 August 1970. Recommendation 33 (CSM-V) was adopted.

7.3.6 Seismic data

7.3.4.1. The Commission discussed the documents submitted concerning the transmission of seismic data. In particular, it noted the resolution transmitted to the Secretary-General of WMO from the Secretary-General of IUGG which urges the WMO to facilitate arrangements for the utilization of meteorological circuits for the transmission of seismic data. The Commission noted that transmission of seismic data over international meteorological circuits is now taking place on the basis of multilateral arrangements. At the present time about ten stations are using the GTS to report seismic data with a daily volume not exceeding 800 characters.

7.3.6.2. The Commission felt that it was not in a position to decide upon the routine use of the GTS for transmission of seismic data. It agreed that an opinion on the request of the IUGG from the Executive Committee was required before any further action could be taken.

7.3.7 Bathythermograph data

The Commission noted a recommendation of the joint meeting of the EC Panel of Experts on Meteorological Aspects of Ocean Affairs and the IGOSS Committee concerning the exchange of bythythermograph data and requesting CSM to examine the extent to which such data could be exchanged on meteorological circuits. The Commission noted, from the inquiry carried out by the Secretary-General, that a relatively small amount of bathythermograph data is available for exchange at present and that the number of countries wishing to receive some of these data is also limited. This inquiry indicated that there are no requirements for global exchange of such data but only for regional and inter-regional exchanges. Therefore, the Commission requested Regional Associations to make suitable arrangements in their Regions for the exchange of such data. As regards inter-regional exchanges, it also requested the CSM Working Group on the Global Telecommunication System to study this matter within the overall study of ocean data transmission envisaged by the fifth session of the CSM Working Group on Telecommunications.

7.4 Meteorological telecommunication procedures

7.4.1 The Commission based its discussion on this item on a document presented by the Secretary-General, which incorporated draft Recommendation E (70-CSM) and the comments of Members on the recommendation as well as relevant decisions on telecommunication procedures adopted by Regional Associations. The Commission reviewed the above-mentioned draft recommendation and decisions and formulated detailed procedures for the Global Telecommunication System.

7.4.2 In reviewing the operational principles for the Global Telecommunication System as contained in draft Recommendation E (70-CSM), the Commission amended Principle 6. It agreed that the principle should relate to preference in the time scheduling of transmissions of observational alphanumeric data over transmissions of pictorial information. The need for scheduled transmissions of pictorial information in relation to time was recognized. It was however agreed that at the end of a facsimile (analogue) transmission (defined as including the start and stop signal), transmission shall be switched back to the data transmission mode regardless of any other pictorial information waiting in the facsimile (analogue) transmission queue.

7.4.3 Message format relating to routine transmission of alphanumeric data

7.4.3.1 The session reviewed the message format contained in draft Recommendation E (70-CSM).

7.4.3.2 Starting line

7.4.3.2.1 The question arose as to whether the transmission sequence number group nnn was necessary. Views were expressed that the group facilitates requests for the repetition of messages and also gives an effective means of message control at receiving centres since it is important to know that all transmitted messages are received. Another view was expressed that this group, although useful in some cases, is redundant for the global exchange of data. It was agreed that it was necessary that the format of the starting line in International Alphabet No. 5 contains no optional groups. The Commission agreed to maintain the group, optionally in International Telegraph Alphabet No. 2 and mandatory in International Alphabet No. 5 and, furthermore, that centres should utilize the group in accordance with bilateral agreement as regards centre-to-centre working.

7.4.3.2.2 The Commission discussed the documents submitted on the catalogue for CLLLL. The need for a decision on the formulation of the CLLLL group at the present session was stressed.

7.4.3.2.3 The Commission agreed on the following definition of the CLLLL group:

CLLLL is a group which defines the content of a message (data) so that the distribution can be accomplished on different levels (global, inter-regional, regional and, if possible, national).

7.4.3.2.4 As regards the formulation of the CLLLL group, the Commission agreed on the following principles:

Principle 1

The CLLLL group shall consist of five numeric characters; C, L_1, L_2, L_3, L_4.

Principle 2

The CLLLL group shall be formulated in such a way that:

(a) All existing bulletins which are exchanged internationally may be represented;

(b) Bulletins which are exchanged only on a national basis may be possibly accommodated;

(c) A one-to-one correspondence in both directions exists between the CLLLL group and the abbreviated heading (except for the YYGGgg group and the BBB group);

(d) The main types of meteorological data (cf. Table A, of the WWW Global Telecommunication System Manual) can be distinguished;

(e) Each element of the CLLLL group has a specific meaning. In particular that the element C should express, in a general way, the type and distribution of a message (i.e., in the context of Principle 3 and sub-paragraph (d) above).

Principle 3

Provisions shall be made in the CLLLL group to distinguish between messages relating to pictorial information from those relating to information in alpha-numeric form. Provision shall also be made to distinguish between routine meteorological messages and non-routine (addressed) messages.

7.4.3.2.5 As regards specifications for CLLLL, it was considered:

(a) That, in implementing new procedures for the CLLLL group, the allocation of the classification element (C) for identifying delayed or changed messages (COR, AMD, RTD) would be expensive;

(b) That sufficient numbers of CL_3 should be reserved for future use (e.g., satellite data).

7.4.3.2.6 The Commission requested the Secretary-General to prepare and publish the CLLLL catalogue as soon as possible and not later than 31 October 1970, taking into account Table H of the annex XXVI, "Specifications of the CLLLL group for classification and identification of bulletins".

7.4.3.3 Abbreviated heading

7.4.3.3.1 The Commission noted that in some Regions the number of bulletins with the same TTAA exceeds 9. In such cases a two-digit (or even three-digit) number "i" was used to differentiate bulletins from the same geographical area and similar type content. The Commission concluded that at the maximum two digits shall be used for identifying bulletins with the same TTAA. In this connexion it was felt that centres, in allocating numbers "ii", should bear in mind the data distribution and preferably allocate numbers to the bulletins in the order global, inter-regional, regional and national. It was agreed that the groups TTAA(ii) CCCC shall be used to indicate a particular bulletin with a fixed predetermined content. In the case of bulletins containing meteorological reports, ii is mandatory in both International Telegraph Alphabet No. 2 and International Alphabet No. 5.

Note: For bulletins containing processed information (e.g. forecasts, analyses) the use of ii is not mandatory in both alphabets.

7.4.3.3.2 The usefulness of "k" in the abbreviated heading was discussed. It was agreed to maintain it in the interest of manual operations and the identification of bulletins determined by CSM for global data exchange and by regional associations for inter-regional exchanges. The Commission agreed that the need for maintaining "k" should be reviewed after experience has been gained in the use of the group CLLLL and in the light of further study of the abbreviated heading. It was agreed that "k" shall be used in parallel with "ii" and that under no circumstances should the same TTAA(ii) group have more than one "k". In other words, the identification of a bulletin is primarily by TTAA(ii) CCCC.

7.4.3.3.3 To complete the format of the abbreviated heading, the Commission agreed that the symbolic identifiers for bulletins containing delayed routine weather reports, corrections and amendments should be inserted immediately after the date-time group with one space between. It was also agreed that such identifiers should not be included in the text. It was agreed that there is no requirement for the symbolic identifier "PDW" for delayed priority meteorological reports.

7.4.3.3.4 The Commission also discussed the need for indicating missing reports in bulletins. Appropriate procedures were incorporated in the meteorological telecommunication procedures.

7.4.3.3.5 The Commission stated that Table A "Data Designators", as published in Chapter I, Part III of WMO Publication No. 9.TP.4, Volume C, is not complete. It also noted with interest a proposal submitted by the Secretary-General for a new layout of this table. The Commission agreed that at this session it should only review and update the present table and that a major change in the layout of Table A should be a matter for further study in the light of experience in the utilization of the CLLLL group and further study of the abbreviated heading. The Commission deleted certain designators which, for different reasons, became obsolete (e.g., code abolished, no special code). The Commission considered the introduction of a new set of data designators with the initial letter G for data in grid-point format. It decided, however, that two additional designators, AG and FG, would be sufficient until the exchange of processed data in grid point format became more widespread. The Commission requested the Secretary-General to update Table A as necessary.

7.4.3.3.6 The Commission noted that Table B "Geographical Designators", as published in Chapter I, Part III of WMO Publication No. 9.TP.4, Volume C, is derived in some cases according to countries and in others according to Regions. It was of the opinion that a new approach should be investigated to derive a more rational and appropriate table with a close link to the catalogue bulletin group CLLLL. In this respect the Commission discussed a proposal submitted by the Secretary-General but agreed that at this session the Commission should only review and update the present table and that the derivation of a more rational table should be a matter for further study. Accordingly, Table B was reviewed, deleting obsolete indicators and adding new indicators. It further requested the Secretary-General to update Table B as necessary.

7.4.3.3.7 The Commission stressed the desirability of having co-ordination and unification of the data designators for the different types of data as applied in the abbreviated heading and also in the text of the meteorological messages (meteorological codes). It requested the Working Groups on the Global Telecommunication System and Codes to take this matter into consideration in their study programmes. It also requested the president of CSM and the Secretary-General to undertake corresponding measures to ensure co-ordination between the work of the two groups.

7.4.4 Message format for addressed messages

The Commission agreed that a new indicator in the group CLLLL should be used for identifying addressed messages. The Commission adopted a format for the starting line of the addressed messages and agreed that the remaining part of the format is a matter for further study. Pending completion of this study, the Commission agreed that the AFTN format shall be used after the starting line.

7.4.5 Optimum length of message

The Commission agreed that the optimum length of message should be between 200 and 300 groups. However, the Commission was of the opinion that the optimum length of message should be reviewed in the light of more experience gained in the operation of medium/high-speed circuits and automated centres and future development in the utilization of grid-point traffic.

7.4.6 Priority messages

7.4.6.1 The question of transmission of priority messages in an automated telecommunication system was discussed. It was agreed that for normal transmission under store and forward operation, messages should be forwarded on the principle "first in, first out". It was agreed that priority messages should be treated as addressed messages but that there should be only one level of priority other than normal to indicate special handling. It was further agreed that priority messages, on reception, should go to the head of the queue but their onward transmission shall not interrupt the transmission of a message already started or a transmission by facsimile (analogue) already started.

7.4.6.2 On the question of handling of accumulated traffic after an outage of telecommunication facilities and the order in which such traffic should be forwarded on resumption of facilities, it was considered that this required further study and was a matter for liaison between the GTS and the GDPS. The Commission therefore requested the Working Groups on the Global Telecommunication System and the GDPS to look into this matter and report to the Commission.

7.4.7 The Commission discussed the question of the correction, by automated WMCs and RTHs, of format of messages and, in particular, the removal of redundant groups and of error indicators. Suggestions were made to adjust the error-correction procedures in respect of tape preparation at manually operated centres in order to ease software problems at automated centres. It was agreed, however, that the subject was a very difficult one to resolve during the session and that it was a matter for further study by the Working Group on the Global Telecommunication System.

7.4.8 Meteorological information in pictorial form

7.4.8.1 Message format

The Commission agreed that the panel for identification of pictorial information should comprise:

(i) The originating centre;

(ii) The number of the chart;

(iii) Details regarding the information shown on the chart.

The format, however, was left for further study by the Working Group on the Global Telecommunication System in consultation with the Working Group on the GDPS.

7.4.8.2 Storage of pictorial information

As regards storage of pictorial information by WMCs and RTHs to meet requirements for such information, it was considered that the question of minimum storage requirements at such centres was a matter for further study by the Working Group on the Global Telecommunication System.

7.4.9 The Commission adopted Recommendation 34 (CSM-V) However, in so doing, the Commission stressed the need for further studies on the message format with a view to arriving at a fixed format. It decided to request the CSM Working Group on the Global Telecommunication System to carry out these studies, in particular on the following points:

(a) Development of a fixed format for the starting line;

(b) Review of the present abbreviated heading with a view to achieving rationalization, including Table A "Data Designators" and Table B "Geographical Designators";

(c) Development of message format for addressed messages.

The Commission also requested the Secretary-General to provide, to the CSM Working Group on the Global Telecommunication System, all available information and proposals which would facilitate the study of the above-mentioned points.

7.4.10 Reorganization of WMO Publication No. 9.TP.4, Volume C

The Commission felt that the bulletin catalogue should be included in Volume C. It also felt that this catalogue should be published in numerical sequence of CLLLL as well as in alphabetical order of the abbreviated heading TTaa (ii) CCCC as a separate section. The listing of this catalogue should also contain an indication on the type of messages included in the bulletin as well as the index number of the station whose report is included. The Secretary-General is requested to make subsequent changes in Volume C.

7.4.11 Error-control procedures

7.4.11.1 The Commission noted that development of error-control procedures in respect of the GTS had largely moved in two ways, one in terms of a "hardware system" and the other in terms of a "software system". It also noted that the CCITT had adopted Recommendation V.41 which defines a "hardware system" but that as regards definition of a "software system" neither the CCITT nor ISO had yet reached a firm decision.

7.4.11.2 The need for world-wide standardization in error-control procedures of the GTS was stressed by the Commission. It was appreciated, however, that the question of utilization of a single system throughout the GTS could not be answered at the present time and was a matter for further study.

7.4.11.3 In particular, it was recognized that there was a need for further study of software error control procedures. However, pending completion of such further study and of CCITT/ISO decision on a software system, the Commission agreed that, in the interest of implementation of the GTS, an interim software system should be adopted. In deriving the interim software system, the Commission took account of the development of software error control procedures by Regional Associations and of recent comments by Members. Differences in the software error-control procedures for some segments of the GTS from the procedures of the interim software system were considered acceptable provided they did not prejudice or jeopardize the GTS or lower the GTS standards of error control.

7.4.11.4 The Commission also considered the question of error control in respect of HF radio transmissions. It was agreed that ARQ error-control system conforming to CCIR Recommendation 342-1 should be used.

7.4.11.5 In concluding its discussion on the subject, the Commission pointed to the need for WMO/ICAO liaison on error-control procedures to be adopted by the two Organizations so as to ensure, where necessary, compatibility and feasible interface between the WMO and ICAO telecommunication systems in regard to those procedures (see also paragraph 7.8).

7.4.11.6 The Commission adopted Recommendation 35 (CSM-V).

7.4.12 Transmission and relay of pictorial information over circuits operated on a shared data/facsimile (analogue) transmission basis

7.4.12.1 The Commission adopted Recommendation 36 (CSM-V). In so doing, it pointed out that in the case of transmission and relay of pictorial information on a shared data/facsimile (analogue) transmission basis over circuits using software error-control procedures, the switching arrangements should be studied further in parallel with the further study of software error-control procedures. It also recognized the need for compatibility procedures in respect of "pivot" centres operating between centres operating on a software basis and centres operating on a hardware basis.

7.4.12.2 The Commission discussed the documents submitted on the catalogue for the CFFFF group in the data/facsimile (analogue) switching messages.

7.4.12.3 It was agreed that the CFFFF group shall consist of five numeric characters; C, F_1, F_2, F_3, F_4 and include identification of:

(i) Classification indicating that an analogue facsimile transmission will follow (C=9 - see specifications of CLLLL);

(ii) The originating centre (the first two digits of FFFF);

(iii) The serial number in the series of charts distributed by a given centre (the last two digits of FFFF).

7.4.12.4 The Commission agreed that the FFFF shall be included in the schedules of facsimile point-to-point transmissions or broadcasts published in WMO Publication No. 9.TP.4, Volume C. The Commission urged Members to provide the Secretary-General with this information as soon as possible. It also requested the Secretary-General to publish the complete table of FFFF not later than 31 October 1970.

7.5 Technical characteristics and specifications of meteorological transmissions

7.5.1 The Commission was guided in its discussions on this item by Resolution 16 (Cg-V) by which the Fifth World Meteorological Congress adopted the World Weather Watch for the period 1968-1971. In particular, the Commission noted the decision of Cg-V on the Global Telecommunication System.

7.5.2 The Commission also took into consideration the decisions of the Executive Committee contained in Resolution 5 (EC-XX) "Configuration and routeing of the Main Trunk Circuit and its branches" and Resolution 6 (EC-XXI) "Modems for signalling rates of 2,400 bits per second".

7.5.3 The Commission reviewed the relevant conclusions and recommendations of the fifth session of the Working Group on Telecommunications and the comments made by Members. In particular, the Commission considered the technical characteristics and specifications of telephone-type circuits and HF radio circuits; thus, taking into account the fact that there will be a necessity for certain segments of the Main Trunk Circuit and its branches to utilize HF radio links.

7.5.4 Recommendation 37 (CSM-V) was adopted.

7.5.5 The Commission noted that the technical characteristics and specifications for telegraph transmissions, radioteleprinter transmissions and facsimile transmissions have already been established by WMO as published in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V. The Commission requested the Secretary-General to include these characteristics and specifications in the appropriate part of the technical characteristics and specifications of meteorological transmissions in the WWW Global Telecommunication System Manual.

7.5.6 Transmission of processed information

7.5.6.1 The Commission, in noting the requirements of Members for the receipt of processed information (output products of WMCs, RMCs, AFCs and NMCs), discussed the various ways by which the transmission and distribution of such information could be improved, particularly in the direction of increased speed.

7.5.6.2 It was agreed that processed information in grid-point code and alphanumeric format would present no particular transmission problem although the WMCs/RTHs store capacity may have to be adjusted to accommodate. There would, however, be a necessity that WMCs/RTHs prepare or re-constitute charts in pictorial format from received grid-point data to meet requirements for processed information by onward transmission using analogue facsimile.

7.5.6.3 Analogue facsimile is at present the main mode of transmission used in the dissemination of processed information in pictorial form and, in most cases a drum speed of 120 rpm is used. Studies (for example WWW Planning Report No. 20) have, however, demonstrated the feasibility of transmitting pictorial information over telephone-type circuits using a scanning rate of 240 rpm. This represents a significant improvement of transmission speed. Opinions were expressed that further studies should be carried out on increasing the speeds of transmission by analogue facsimile. It was recognized, however, that some Members were already using or were contemplating introducing 240 rpm operation and it was agreed that, provided such operation was not to the detriment of the GTS, it could be used on segments of the GTS in accordance with bilateral or multilateral agreement.

7.5.6.4 On coded digital facsimile mode of operation, the Commission noted the excellent work done by a study group established by the CSM Working Group on Telecommunications to look into coded digital facsimile transmission. This study group had reported that there had been two coding systems available for study; one (A) backed by experimental evidence using prototype hardware and the other (B) existing in an experimental computer programme. It was noted that the study group recommended code A with some modifications. In discussion, opinions were expressed stressing the need for further study on the grounds that there could well be other codes or even other ways of digital facsimile transmission. Opinions were also expressed that to promote the early and much needed introduction of coded digital facsimile transmission, it was advisable to accept code A now, as an interim measure. Such an introduction, it was said, was within the concept of the GTS as a dynamic system and could be made without prejudice to further study of the subject and further planning of the GTS. The Commission agreed that, provided it was not to the detriment of the GTS and its future planning, those Members who wished to pursue the operational introduction of coded digital facsimile transmission over segments of the GTS could do so in accordance with bilateral or multilateral agreements. Code A, which is reproduced in the Annex IX, is to be used.

7.5.6.5 The Commission emphasized the urgent need for progress in the speeding up of the transmission of processed information and requested its Working Group on the Global Telecommunication System to give further special attention to this matter both in respect of analogue facsimile transmission and coded digital facsimile transmission, in particular, the development of the appropriate WMO standards for 240 rpm and coded digital facsimile transmissions.

7.6 Reports of reception of radio transmissions

7.6.1 The Commission considered the procedures for reporting on reception conditions of meteorological radio transmissions and the need for a uniform format for this purpose. The Commission developed a standard code form for world-wide use in meteorological telecommunications and adopted Recommendation 38 (CSM-V) in this respect.

7.7 Draft of the WWW Plan for the period 1972-1975

7.7.1 The Commission noted a document submitted by the Secretary-General, in preparation for EC XXII, presenting a draft of the WWW Global Telecommunication System Plan for the period 1972-1975. The Commission felt that its views on this matter are expressed in the conclusions and recommendations made at this session concerning the GTS and that they will be taken into consideration in preparing the final draft plan (see also paragraph 5.12).

7.8 WMO/ICAO liaison on telecommunication matters

7.8.1 The Commission expressed the need for the fixed aeronautical telecommunication service (AFS) and the GTS to have interface capability in order to ensure efficient exchange of meteorological information, particularly since at present both organizations are introducing automated techniques. This aim could only be achieved by appropriate alignment of ICAO and WMO telecommunication procedures (e.g., message format and error control) and compatibility of technical specifications adopted for the two systems. The Commission took a positive step during the session in this respect to align the bulletin formats and headings for operational meteorological messages exchanged on the MOTNE system with the WMO standard headings. The Commission modified three data designators as follows:

- SA "Hourly and half-hourly (METAR) - including trend forecasts and other information, if appended"
- FC "Aerodrome Forecasts (TAF) - period of validity 12 hours or less"
- FT "Aerodrome Forecasts (TAF) - period of validity greater than 12 hours"

(see Table A in the Annex XXVI).

7.8.2 The Commission noted the active participation of WMO in the different ICAO Panels such as ASTRA, ADIS and MOTNE Panels. It also noted the conclusions of the LIM EUM (RAC/COM) RAN meeting (1969) and the NAT V RAN meeting (1970), in particular that the meteorological telecommunication procedures, technical characteristics and operational aspects be considered by the appropriate bodies of the two organizations, if necessary in joint meetings, with a view to achieving the maximum degree of standardization or compatibility at the earliest possible time. The Commission endorsed this view and requested the Secretary-General to liaise with ICAO on the possibility of a meeting between ICAO and WMO to discuss these matters and matters relating to the exchange of operational (aviation) meteorological information. It was suggested that the meeting be held before the third meeting of the ICAO ADIS Panel, scheduled for 1971. In any case, ICAO should be informed about the relevant CSM recommendations concerning the GTS before the third meeting of the ICAO ADIS Panel.

7.9 Implementation dates

7.9.1 The Commission noted the document submitted by the Secretary-General giving summarized information on the implementation of the GTS. This information indicated that there are areas where difficulties occur at present in the transmission of data due to lack of implementation of circuits and facilities. This seems mainly to be due to financial implications to implement those parts of the GTS in accordance with the standards recommended by CSM. In general these areas fall within Regions I, II and III. The Commission expressed the hope that it would be possible for WMO to assist in the elimination of these difficulties in implementing the GTS through the different assistance programmes.

7.9.2 The Commission, considering the need for uniformity in meteorological telecommunication procedures for world-wide application, agreed that a date should be fixed for these procedures to come into force. However, it was considered necessary that some of these procedures be in use at an earlier stage in order that necessary programming and operational tests at the automated centres can be made in time. The experience gained therefrom will enable efficient operation of the system by the implementation date and facilitate the changeover from the present system. Recommendation 39 (CSM-V) was adopted accordingly.

7.9.3 As regards the implementation of the different segments and centres of the Main Trunk Circuit and its branches, and in the light of the information available to the session concerning the state of implementation and future plans of Members, the Commission agreed that a realistic date for the complete implementation of the Main Trunk Circuit and its branches in 15 January 1973. Recommendation 40 (CSM-V) was adopted.

7.9.4 The Commission stressed that implementation dates do not only relate to establishment and operation of planned new telecommunication facilities and services but also imply changeover from one system to another and from one procedure to another. It emphasized that such changeover has to be planned in order to maintai the integrity of international meteorological telecommunications. It requested Regional Associations to take account of changeover aspects in order to ensure smooth transition and full operation of the entire system by the date specified.

7.10 Establishment of the Working Group on the Global Telecommunication System

7.10.1 In view of the developments in the field of telecommunications which are progressing at an accelerated rate, the Commission agreed to establish the Working Group on the Global Telecommunication System. It was agreed that the working group should be composed of the chairmen of all the Regional Working Groups on Telecommunications, experts designated by Members responsible for the operation of World Meteorological Cemtres and Regional Telecommunication Hubs on the Main Trunk Circuit and its branches, and other experts nominated by any Member wishing to participate actively in the work of the Group. Accordingly, Resolution 6 (CSM-V) was adopted.

7.10.2 The Commission noted that the terms of reference of the Working Group on the Global Telecommunication System will frequently require it to consider matters of interest to the Working Groups on the Global Data-Processing System, on Codes and on the Global Observing System, which implies the attendance of the chairmen of these groups at sessions of the Working Group on the Global Telecommunication System. However, taking into account the cost in time and money of working group sessions and the heavy work-load of working group chairmen, the Commission consequently agreed that arrangements should be made for the presence of the chairmen of these working groups at sessions of the Working Group on the Global Telecommunication System only when necessary.

8. DEFINITIONS OF METEOROLOGICAL PHENOMENA (Agenda item 8)

8.1 Review of definitions and descriptions of hydrometeors

8.1.1 The Commission reviewed the proposals of the Working Group on Description of Hydrometeors for revised definitions and descriptions of hydrometeors published in the International Cloud Atlas. It noted with appreciation that the working group had succeeded in preparing a revised text which was considered superior to the existing one, since it took into account modern concepts arising from advances in the physics of hydrometeors without losing sight of traditional concepts which have stood the test of time. The Commission decided that the revised text should replace the corresponding existing text of the International Cloud Atlas and adopted Recommendation 41 (CSM-V).

8.2 Definition of "convergence line"

8.2.1 At the request of EC-XVIII, the Commission had reconsidered the definition of "convergence line" which it had developed at its fourth session. After an exchange of views with CAS, a modified version of the definition had been circulated amongst the members of the Commission for comment. Based on these comments, the CSM rapporteur on Synoptic Meteorology in the Tropics prepared a set of definitions which was adopted by the Commission with minor changes:

"Convergence zone

Elongated area (band) of horizontal wind convergence.

Note: Extensive low-level convergence zones form mainly in the tropics. When the zones belong to the Inter-Tropical Convergence Zone, the corresponding symbol shall be used in chart analysis.

Convergence line

Relatively narrow non-frontal convergence zone which is best represented by a single line on the weather chart."

8.2.2 The Commission felt that, as this definition is intended for use in synoptic meteorology, it should therefore be included as a note in Chapter II of the "Guide to Preparation of Synoptic Weather Charts and Diagrams".

9. ORGANIZATION OF METEOROLOGICAL ACTIVITIES IN THE FIELD OF SYNOPTIC METEOROLOGY (Agenda item 9)

9.1 The Commission at its fourth session recognized the need for guidance material, particularly in developing countries, on how to organize synoptic meteorological services. It considered that this material could best be obtained through inquiries made to Members, and for this purpose Dr. Hirst (Zambia) was invited to act as a rapporteur for the purpose of preparing the inquiry, examining the replies, and deciding, in consultation with the president of CSM, on a further course of action.

9.2 The report submitted by the rapporteur was examined by the Commission. The Commission expressed its deep appreciation for the useful information that had been made available on the difficult problems which exist in this field as well as of the many prudent and thoughtful suggestions.

9.3 The Commission noted that the situation had changed to some extent since the report was written and that the solutions to many of the problems which were emphasized are being dealt with. Technical Note No. 50 has been re-written in the form of guidance material to education and training which should be considered as advising on a target rather than setting up a rigid requirement. More training material has become available through the WMO Secretariat, although there is still a real lack of text-books and training aids for tropical areas. Furthermore, the Commission was aware that the Executive Committee is vigorously pushing studies, has supported various publications, and made arrangements in order to better publicise the economic benefits of meteorology. It recalled Resolution 8 (EC-XX) and noted Resolution 19 (EC-XXI) which culminated, in the establishment of a Panel of Experts on Meteorology and Economic Development. It further noted that the Organization, in reacting to the great interest in this field, had made considerable material available (The Role of Meterological Services in Economic Development in Africa, WWW Planning Report No. 27 on the Economic Benefits of National Meteorological Services, Weather and Man, and Meteorology, a Key to Economic Progress) and that the theme of the World Meteorological Day in 1969 was "The Economic Value of Meteorological Services". In conclusion, the Commission agreed that although active attention is being given to these matters by various WMO bodies, there is still a need to continue and if possible intensify the activities in these fields.

9.4 With regard to lack of money and experienced personnel, the Commission again emphasized the importance to meteorological services to arrange for appropriate staff members to visit other weather services and to obtain expert advice as well as material utilizing resources available under the United Nations Technical Co-operation Programme. Further, it was felt that assistance to Members could be provided through direct contact by the regional representatives of the Organization and other personnel of the Secretariat as requested by Members.

9.5 As regards instructional aids, it was mentioned that movies made from pictures obtained from satellites were being recognized as unique training material especially for demonstrating the developments of weather systems for an area. The Secretary-General was requested to determine the availability of such films for use by developing countries.

9.6 During the discussion it was pointed out that one Member does extensive testing and evaluation of new equipment used by meteorological services and it would make such information available to others. This encouraging statement may indicate that other services are doing similar testing. The Commission then expressed the wish that the Secretary-General inform Members that the results of such tests might be of interest to them. It further requested that the Secretary-General invite those countries doing extensive testing to make their results available to others on request.

9.7 The Commission recognized the need which led to a call for an official list of outstanding text-books, but concluded that it would be very difficult to prepare a selection of this kind which would have world-wide validity. The informal advice of Members of wide experience might be sought in the case of particular areas and languages. Reviews of relevant books in the WMO Bulletin could also contribute towards meeting this requirement. To this end, it was suggested that the Editor of the Bulletin might, from time to time, seek reviews written from the practical viewpoint of those actually engaged in meteorological instruction.

9.8 The Commission then noted that most of the other questions referred to in Dr. Hirst's report deal with such problems as education and training and the WWW. Since these questions were dealt with under other agenda items, it was considered that no further action on this item was required.

10. EDUCATION AND TRAINING IN SYNOPTIC METEOROLOGY (Agenda item 10)

10.1 The Commission noted with satisfaction the report of its Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology. The main tasks of the group were: to define the various categories of personnel working in synoptic meteorology, to indicate the minimum basic qualifications considered as pre-requisite for the training of each category, and to draw up relevant syllabi for basic and specialized training in synoptic meteorology.

10.2 The Committee further noted that comprehensive syllabi for the education and training of all meteorological personnel have since been published by the Organization. These syllabi were drawn up by the Executive Committee Panel of Experts on Meteorological Education and Training and subsequently approved for publication by the twenty-first session of the Executive Committee under the title "Guidelines for the Education and Training of Meteorological Personnel. To ensure that the views of the Working Group on Education and Training in Synoptic Meteorology were fully reflected in this publication, Dr. Montalto, chairman of the group, participated in the third session of the Panel (Cairo, 1968).

10.3 The Commission, however, considered that some points still remained to be clarified and decided to appoint a Rapporteur on Training in Synoptic Meteorology to meet these needs. The terms of reference of the Rapporteur are given in Resolution 7 (CSM-V) which was adopted.

10.4 The Commission also studied the report of Dr. Hirst, its Rapporteur, on the organization of meteorological activities in the field of synoptic meteorology. The Commission's views on the recommendations related to education and training are reflected in the following paragraphs.

10.5 The Commission recognized the real problem which at present exists in a number of countries in recruiting staff with the level of basic education desirable for direct entry to meteorological courses. It was noted that the syllabi, as outlined in WMO publication "Guidelines for the Education and Training of Meteorological Personnel", had been constructed in such a way to help meet this difficulty. Furthermore, a measure of adjustment had been introduced in the syllabi contained in the publication "Guidelines for Education and Training". To the same end, lengthier courses had been introduced in some regional Training Centres established with the assistance of WMO.

10.6 On the question of training material the Commission noted that in addition to the preparation of suitable Compendia of lecture notes, and problem workbooks, the WMO Secretariat is building up a library of training material, including text-books, films, overhead transparencies, models, and synoptic chart sequences with a view to meeting Members' requests in this respect.

10.7 The Commission also noted that the WMO Secretariat was engaged in drawing up a list of meteorological text-books used in Universities and Training Institutions throughout the world. It expressed the hope that this information would be made available to Members in the near future.

10.8 Regarding the maintenance of a list of meteorological text-books the Commission suggested that the WMO system of reviewing new publications on meteorology should be expanded. It agreed that WMO should encourage publishers and meteorological services to keep the WMO Secretariat informed of new and forthcoming text-books in meteorology. This information could then be communicated to Members.

11. GENERAL REVIEW OF TECHNICAL REGULATIONS (Agenda item 11)

11.1 The Commission noted with appreciation the following reports dealing with suggested amendments to the Technical Regulations:

(a) Report of the CSM Working Group on Technical Regulations, submitted by Dr. O. Lönnqvist, chairman of the working group;

(b) Report of the fifth session of the CSM Working Group on Telecommunications (Rome, November 1969), submitted by Mr. C. Giallombardo, chairman of the working group;

(c) Report of the Informal Meeting of Experts on the Revision of the Technical Regulations in the Light of the World Weather Watch (Geneva, February 1970), submitted by Dr. O. Lönnqvist, chairman of the informal meeting.

These reports provided a basis for the discussion of the amendments to be made to the Technical Regulations within the field of responsibility of CSM. The first report mentioned above referred to a set of new or amended draft regulations concerning automatic weather stations. These regulations were formulated by the Working Group on Technical Regulations, in consultation with the Commission for Maritime Meteorology. The second report contained the draft of a new chapter dealing with the Global Telecommunication System. The report referred to under (c) above comprised new or amended draft regulations in the fields of GOS and GDPS which were formulated by the meeting of experts to meet the request of Fifth Congress that the Technical Regulations should reflect the World Weather Watch concept (see paragraph 7.4.13 of the general summary of the Fifth Congress.

It also contained a proposed new layout of the Technical Regulations reflecting the World Weather Watch as well as the other WMO programmes listed in Resolution 5 (EC-XXI), in particular the WMO Research Programme and the WMO Programme on the Interaction of Man and his Environment. In considering this report, the Commission also took into account the relevant comments made by the presidents of Technical Commissions.

11.2 Having reviewed these proposals for amendments and having made some changes to them, the Commission incorporated in Recommendation 42 (CSM-V) those amendments which it considered appropriate for adoption by Sixth Congress. Recommendation 42 (CSM-V) was adopted.

11.3 The Commission recognized that the text of the proposed amended version of the Technical Regulations was somewhat heterogeneous in view of the fact that the text is a result of manifold amendments, coming from various sources during a long period of time, to the original Technical Regulations adopted in 1955. This heterogeneity exists between the various chapters on the one hand, and in some cases between the terms used in the English, French, Russian and Spanish versions, on the other. The Commission considered, therefore, that it would be useful to arrange for a re-editing of the Technical Regulations with a view to achieving a well-edited text and consistency between the editions in the different languages.

11.4 As regards the new layout of the Technical Regulations, the Commission recognized that the proposed form given in Recommendation 42 (CSM-V) might be amended later when new chapters are included in the Technical Regulations. In this connexion, the Commission reached the conclusion that it was desirable to provide for an additional chapter under Section A.1 "The Global Observing System" to accommodate such observations as may be available from satellites, rocketsonde, weather radar, etc. The chapter could be entitled "Miscellaneous meteorological observations". In order to provide for an increase in the number of chapters in Section A and Section B, and still allow for the chapter on meteorological services for International Air Navigation to retain the present status of a separate Volume II, the Commission suggested that Section C "Application of meteorology to various human activities" might commence with the present Chapter 12, and that other chapters on applications to human activities might be placed in a later volume or volumes. In this regard, the Commission took into account the likelihood of a separate volume for the Technical Regulations on hydrometeorology. One possible method of dealing with the problem would be to number the chapters of the Technical Regulations by the decimal system, under which, for example, "Meteorological surface observations" would become Chapter A.1.2, etc.

11.5 The Commission felt that the proposed incorporation of important parts of the description of the WWW in the WMO Technical Regulations, might affect the presentation of the WWW plan for the period 1972-1975.

12. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COMMITTEE DECISIONS (Agenda item 12)

12.1 In accordance with current practice, the Commission examined those resolutions and recommendations of CSM which were still in force. It decided to keep Recommendations 63 to 66 (70-CSM) in force since these recommendations have only been recently adopted as inter-session recommendations and consequently have not been completely implemented. Resolution 8 (CSM-V) was adopted.

12.2 The Commission then examined the Executive Committee's resolutions within CSM's field of activity and agreed that Resolutions 10 (EC-XVI) and 11 (EC-XX) should be kept in force. Recommendation 43 (CSM-V) was adopted.

13. SCIENTIFIC LECTURES AND DISCUSSIONS (Agenda item 13)

Two afternoon meetings were devoted to the scientific lectures and discussions on two outstanding new techniques now being employed in weather services, namely satellite and computer application to synoptic meteorology. The meetings were presided over by Dr. O. Lönnqvist, vice-president of CSM. The papers presented were as follows:

(1) The use of satellite cloud pictures for analysis and weather forecasting, by Dr. A.I. Burtsev and Dr. A.D. Čistjakov (U.S.S.R.), (presented by Dr. A.D. Čistjakov).

(2) The use of vertical temperature profiles obtained by satellites for the analysis of upper-air charts, by Dr. W.L. Smith and Dr. E.B. Fawcett (U.S.A.) (presented by Dr. K.R. Johannessen).

(3) An operational system for numerical weather prediction, by Dr. L. Bengtsson and Dr. L. Moen (Sweden) (presented by Dr. L. Moen).

(4) Weather forecasting with the primitive equations, by Dr. F.H. Bushby (U.K.).

13.2 The Commission requested the Secretary-General to publish these papers after appropriate consultation with the authors.

13.3 A film was shown illustrating the use of movies based on geostationary satellite pictures for the purposes of meteorological training. The film was produced by ESSA, U.S.A. and comments were provided by Dr. K.R. Johannessen.

14. COMPOSITION OF WORKING GROUPS (Agenda item 14)

The Commission established five working groups and confirmed the need for two rapporteurs to carry out the technical programme of the Commission between the fifth and sixth sessions:

Advisory Working Group
Working Group on the Global Observing System
Working Group on the Global Data-Processing System
Working Group on Codes
Working Group on the Global Telecommunication System

Rapporteur on Training in Synoptic Meteorology
Rapporteur on Synoptic Meteorology in the Tropics

The Commission determined the composition of the Advisory Working Group, and designated the chairmen of the other working groups and the rapporteurs, as indicated in Resolutions 1 to 7 (CSM-V).

15. ELECTION OF OFFICERS (Agenda item 15)

Dr. N.G. Leonov (Union of Soviet Socialist Republics) was unanimously elected president of CSM, and Dr. O. Lönnqvist (Sweden) was unanimously elected vice-president.

16. DATE AND PLACE OF THE SIXTH SESSION (Agenda item 16)

In the absence of any formal invitation from Members represented at the session, the Commission decided that the date and place of its sixth session should be fixed at a later date and requested its president to make the necessary arrangements in consultation with the Secretary-General.

17. CLOSURE OF THE SESSION (Agenda item 17)

In his closing address, the acting president expressed deep appreciation and gratitude to all the delegates and observers from other international organizations and representatives of other commissions. Dr. Leonov also expressed his thanks to the working groups and all those responsible for the production of documents. Dr. Langlo was asked to convey the appreciation of the Commission to the Secretary-General for organizing the session in Geneva. The acting president also thanked Dr. Langlo and his staff and also the interpreters, the joint efforts of whom had concluded the work of the session in a satisfactory fashion and on time.

Mr. Burnett (U.S.A.), speaking on behalf of all delegates, expressed thanks to the acting president for his guidance during the session. He also thanked the vice-president, the chairmen of Committees A and B, and expressed appreciation to his fellow delegates, the Secretariat and the translators. Dr. Langlo congratulated the acting president on his change of status and expressed his thanks to the Commission for the work accomplished in the short time available. He also expressed his appreciation to the chairmen of the committees and to all the staff involved for their assistance and collaboration.

The session was closed at 6.05 p.m., 3 July 1970.

RESOLUTIONS ADOPTED BY THE SESSION

Res. 1 (CSM-V) - ADVISORY WORKING GROUP OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING General Summary, paragraph 7.13.5 of Fifth Congress,

CONSIDERING that a working group would be of value in advising the president of the Commission and in assisting him in his duties of co-ordination and planning,

DECIDES:

(1) To establish an Advisory Working Group of CSM with the following terms of reference:

(a) To advise the president of the Commission, as necessary, in his functions of expressing opinions or taking action on urgent matters referred to the Commission which cannot be adequately dealt with by the other working groups or by correspondence;

(b) To assist the president in planning the work of the Commission and of its working groups;

(c) To assist the President in the co-ordination of the activities of the four major working groups in CSM (GOS, GDPS, GTS, and Codes);

(2) That the composition of the advisory working group should be as follows:

President of CSM
Vice-president of CSM
Chairmen of the CSM Working Groups on GOS, GDPS, GTS, and Codes.

Res. 2 (CSM-V) - WORKING GROUP ON CODES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The report of the chairman of the Working Group on Data Needs and Codes,

(2) Recomendation 22 (CSM-V) - Code form for synoptic surface observations,

(3) The urgent need for a code form for the exchange of grid-point values in digital form,

(4) *Resolution 5 (EC-XXI)* distinguishing the four programmes of WMO,

CONSIDERING:

(1) That there is a continuing need for the review of international codes,

(2) That the evaluation of observational data needs for the WWW Global Data-Processing System has become the task of the CSM Working Group on the Global Data-Processing System,

(3) That the evaluation of other data needs relating to codes, in particular those arising from specialized fields in or relating to the application of meteorology, should be secured from other technical commissions and international bodies concerned,

(4) That the extending field in which codes are needed requires a wide range of expertise,

DECIDES:

(1) To establish a Working Group on Codes with the following terms of reference:

(a) To review the results of tests of the new code forms FM 14.E and FM 24.E and the SAREP code and make proposals for possible modifications to these forms;

(b) To finalize proposals of the code form for the exchange of grid-point values, given in the annex* to paragraph 4.9.5 of the General Summary of the present report;

(c) To consolidate and co-ordinate the statements received from Members, regional associations, technical commissions and other international bodies, on the need for developing new code forms, taking requirements of GOS, GTS and GDPS into account where necessary;

(d) To keep under review, in particular, the requirementsfor the reporting of cloud both in tropical and extra-tropical areas;

(e) To review the existing international meteorological codes and to develop new codes or recommend changes to existing codes, as required;

(f) To take action on problems assigned to the working group by the president;

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* See Annex V.

(2) To give the working group the following composition:

(a) A designated regional representative of each regional association;

(b) Experts to be designated by the presidents of the technical commissions concerned, as required;

(c) Experts designated by Members wishing to participate actively in the work of the group;

(3) To select, in accordance with Regulation 30 of the General Regulations, Mr. G. Doumont (Belgium) as chairman of the working group.

Res. 3 (CSM-V) - WORKING GROUP ON THE GLOBAL OBSERVING SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 16 (Cg-V),

CONSIDERING:

(1) That the ever-changing character of meteorological requirements entails the need for keeping the Global Observing System constantly under review,

(2) That it is appropriate to co-ordinate all aspects of the Global Observing System in order to ensure its further improvement and increased efficiency in its application for practical purposes,

DECIDES:

(1) To establish a Working Group on the Global Observing System with the following terms of reference:

(a) To keep under active review the implementation of the GOS, providing guidance and co-ordination as necessary;

(b) To make recommendations as necessary on the following items:

(i) Achieving the density and frequency of observations required from the GOS as expressed by the Working Group on the Global Data-Processing System;

(ii) The best mixture of the various observing techniques in the GOS in order to ensure a viable and economic system;

(iii) The inclusion of new observing technology and methods in the GOS when they are sufficiently proven and when they can be expected to make a contribution to the total system;

(c) To assist as required in the formulation of recommendations for observational data for other programmes such as GARP in the light of the capabilities of WWW;

(d) To take action on matters as requested by the president;

(2) To give the working group the following composition:

(a) A designated regional representative of each regional association;

(b) A representative designated by the president of the Commission for Instruments and Methods of Observation, and a representative designated by the president of the Commission for Maritime Meteorology;

(c) Experts nominated by Members operating, or planning to operate significant parts of the Global Observing System, and experts nominated by other Members wishing to participate actively in the work of the group;

(3) To select, in accordance with Regulation 30 of the General Regulations, Dr. N. K. Vinničenko (U.S.S.R.) as chairman of the working group.

Res. 4 (CSM-V) - RAPPORTEUR ON SYNOPTIC METEOROLOGY IN THE TROPICS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The great potential of weather satellites in providing data on tropical weather patterns,

(2) That recent developments point to the likelihood of significant advances in the field of tropical meteorology through the use of satellites as an observing tool and through the use of the application of new and different theoretical considerations, some of which make use of the computer,

CONSIDERING that there is a need for the Commission to be kept informed of the developments of synoptic meteorology in the tropics, DECIDES:

(1) To appoint a Rapporteur on Synoptic Meteorology in the Tropics with the following tasks:

(a) To keep abreast of all important developments in methods of analysis and forecasting in the tropics;

(b) To report to the Commission with appropriate recommendations six months prior to the sixth session of CSM;

(2) To invite Mr. Y. P. Rao (India) to serve as Rapporteur on Synoptic Meteorology in the Tropics.

Res. 5 (CSM-V) - WORKING GROUP ON THE GLOBAL DATA-PROCESSING SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V),

(2) That the implementation of the Global Data-Processing System of the World Weather Watch and developments in the field of meteorological data-processing are proceeding at an accelerated rate,

CONSIDERING:

(1) That many questions have arisen regarding the products and meteorological information to be issued by WMCs and RMCs,

(2) That studies and recommendations are required on such Global Data-Processing System matters as: priorities for the transmission of products; exchange of information on techniques and algorithms used by various centres, and rationalization of output products of the WMCs and RMCs,

DECIDES:

(1) To establish a Working Group on the Global Data-Processing System with the following terms of reference:

(a) In order to achieve the most rational and economical GDPS possible, make recommendations on, and keep under continuous study, the following items:

(i) Principles for the co-ordination of technical operational matters of the GDPS;

(ii) Observational data needs of the GDPS;

(iii) Organization of the GDPS to determine whether changes are desirable and possible;

(iv) All statements of requirements for the products of the GDPS from all users of the system;

(v) Co-ordination of the input and output products of the WMCs and the RMCs and the time schedules for their processing, computing, frequency of issue and distribution;

(vi) Transmission priorities of WMC and RMC products on the Main Trunk Circuit and its branches, including priorities for resumption of service after outages;

(vii) Regular exchange among WMCs, RMCs and NMCs of information on the techniques and procedures used within the GDPS and the results achieved from these techniques;

(viii) Co-ordination of matters relating to the storage and archiving of data and products within the GDPS taking into account the views expressed by other technical commissions;

(b) To prepare appropriate parts of the Guide on the GDPS;

(c) To act upon matters referred to the working group by the president;

(2) To give the working group the following composition:

(a) A designated regional representative of each regional association;

(b) An expert to be nominated by each of the Members responsible for the operation of the world meteorological centres;

(c) Experts nominated by Members responsible for the operation of regional meteorological centres and other Members wishing to participate actively in the work of the group;

(3) To select, in accordance with Regulation 30 of the General Regulations, Mr. E. B. Fawcett (U.S.A) as chairman of the working group.

Res. 6 (CSM-V) - WORKING GROUP ON THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that the developments in the field of telecommunications are progressing at an accelerated rate, and

CONSIDERING:

(1) That the concept of the World Weather Watch, in the implementation period 1972-1975, will require a series of technical studies,

(2) That changes in meteorological requirements entail a constant review of the world-wide telecommunication system,

DECIDES:

(1) To establish a Working Group on the Global Telecommunication System with the following terms of reference:

(a) To study and to promote organizational, technical and procedural aspects of the meteorological telecommunication systems in the framework of the World Weather Watch planning;

(b) To keep under constant review developments in telecommunication techniques and equipment and their adaptation to the requirements of an efficient, world-wide system of meteorological telecommunications;

(c) To formulate for meteorological transmissions, proposals on international standardization of operating practices, procedures, equipment and related questions, including format and schedules;

(d) To keep under constant review the operation of the meteorological telecommunication systems and, as necessary, initiate action to remedy shortcomings and effect improvements;

(e) To keep in touch with the activities of the Working Groups on Meteorological Telecommunications of all regional associations;

(f) To keep in touch with the activities of those other working groups of CSM which may have implications on meteorological telecommunications;

(g) To keep abreast of the activities of the International Telecommunication Union, the International Civil Aviation Organization, and other international organizations concerned on matters pertaining to meteorological telecommunications;

(h) To establish, as necessary, study groups or panels composed of experts for consideration of special problems of a technical or operational nature;

(i) To undertake any appropriate task in accordance with the directives given by the Commission for Synoptic Meteorology;

(j) To advise the president of the Commission for Synoptic Meteorology on meteorological telecommunication problems as necessary;

(2) To give the following composition to the working group:

(a) The chairmen of the Working Groups on Meteorological Telecommunications of all regional associations (or the designated regional representatives);

(b) Experts to be nominated by each of the Members responsible for the operation of World Meteorological Centres and the Regional Telecommunication Hubs on the Main Trunk Circuit and its branches;

(c) Experts nominated by other Members wishing to participate actively in the work of the group;

(3) To select, in accordance with Regulation 30 of the General Regulations, Dr. C. Giallombardo as chairman of the working group.

Res. 7 (CSM-V) - RAPPORTEUR ON TRAINING IN SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The Report of the Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology,

(2) WMO Publication No. 258.TP.144 - Guidelines for the Education and Training of Meteorological Personnel,

CONSIDERING:

(1) The rapid developments now taking place in synoptic meteorology,

(2) The need to reflect these developments in the provisions for training personnel in synoptic meteorology,

DECIDES:

(1) To appoint a Rapporteur on Training in Synoptic Meteorology with the following terms of reference:

(a) To keep abreast of new developments in synoptic meteorology which might have repercussions on the provisions of education and training in this field;

(b) To recommend any consequent changes which he finds desirable in such matters as categories of personnel, syllabi, training aids, etc.;

(c) To keep informed on other training aspects relating to synoptic meteorology;

(d) To report his findings to the president of CSM;

(2) To invite Mr. D. B. A. Mandengue (Cameroon) to serve as Rapporteur on Training in Synoptic Meteorology.

Res. 8 (CSM-V) - REVISION OF THE RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the action taken on the recommendations adopted prior to its fifth session,

CONSIDERING that all the resolutions adopted prior to its fifth session are now obsolete,

DECIDES:

(1) To keep in force Recommendations 63, 64, 65 and 66 (70-CSM) and to publish their texts in the report of the fifth session;

(2) Not to keep in force Resolutions 1 to 12 (CSM-IV);

(3) To note with satisfaction the action taken by the competent bodies or Members on Recommendations 73 (CSM-II), 1 to 53 (CSM-IV), 54 to 60 (68-CSM), and 62 (69-CSM) which are now redundant.

RECOMMANDATIONS ADOPTED BY THE SESSION

Rec. 1 (CMS-V) - EXTENSION OF MARSDEN NUMBERING SYSTEM OF TEN-DEGREE SQUARES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the requirement of moving stations using FM 33.D-PILOT SHIP and FM 36.D-TEMP SHIP to encode the Marsden number MMM at positions north of 80°N and south of 70°S,

CONSIDERING that this requirement can be satisfied in the simplest manner by an appropriate extension of the Marsden numbering system beyond these latitudes,

RECOMMENDS:

(1) That Code 2590 - MMM be extended as follows:

(a) Ten-degree triangles north of 80°N shall be numbered from 901 to 936, starting with the triangle west of the Greenwich meridian, progressing westwards;

(b) Ten-degree squares south of 70°S shall be numbered from 552 to 587, starting with the square west of the Greenwich meridian, progressing westwards;

(c) Likewise the ten-degree triangles south of 80°S shall be numbered from 588 to 623, starting with the triangle west of the Greenwich meridian, progressing westwards;

(2) That this extension be implemented as from 1 January 1972.

Rec. 2 (CSM-V) - CODE FORM FM 40.C - ROCOB SHIP

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 24 (CSM-IV),

CONSIDERING that groups giving time of observation and position of ship in reports of various types from ships should be, as far as possible, in the same form in all international codes, RECOMMENDS that the first five groups of the symbolic form FM 40.C - ROCOB SHIP be changed, as from 1 January 1972, to the following:

$M_iM_iM_jM_j$ YYGGgg $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

$r_m a_1 e_s m_r G_d$

Rec. 3 (CSM-V) - DELETION OF CODE FORM FM 17 - MONT

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Note (1) under FM 17 - MONT specifying that MONT is to be added at the end of a SYNOP report,

CONSIDERING:

(1) That FM code forms are intended to be used as separate reports,

(2) That a substantial number of countries use MONT, mostly in national exchanges,

RECOMMENDS:

(1) That FM 17 - MONT be deleted from Chapter I, Part A, of Volume B, WMO Publication No. 9.TP.4;

(2) That the following groups be added to FM 11.D - SYNOP:

(MONT $N'C'H'H'C_t$);

(3) That all the notes now given under FM 17 - MONT be changed as appropriate and appended to the notes under FM 11.D - SYNOP except Notes (2), (3) and (7), which should be deleted;

(4) That the following addition be added to Note (5) (i) so that it will now read as follows:

> ".... be coded as /, and H'H' be coded as //, only when the upper surface of the clouds cannot be observed."

Rec. 4 (CSM-V) - CORRECTION OF THE SPECIFICATION DE H'H'

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that a discrepancy exists in Chapter I, Part A, of Volume B, WMO Publication No. 9.TP.4, between Note 2 under H'H' and Note 6 under FM 17 - MONT,

CONSIDERING that this discrepancy may cause a misunderstanding when coding H'H',

RECOMMENDS:

(1) That the Notes under H'H' be corrected as follows:

"(1) H'H' = 99 - the upper surface of clouds is at altitude of 9 900 m or higher;

(2) H'H' = // - the bases of clouds are below the station level and the tops are above the station level; however, if the upper surface of the clouds can be observed, it shall be reported by means of H'H';

(3) The MONT code group must not be used for clouds of which the bases are above the level of the land station."

(2) That this correction be implemented on 1 January 1972.

Rec. 5 (CSM-V) - DELETION OF CODE FORM FM 31 - NEPH

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the results of an inquiry with Members which indicated that code form FM 31 - NEPH is rarely used,

CONSIDERING that there is no longer an international use of this code form,

RECOMMENDS that FM 31-NEPH be deleted, as from 1 January 1972, from the set of international meteorological codes;

REQUESTS the Secretary-General to arrange for the inclusion in Chapter III of WMO Publication No. 9.TP.4, Volume B, of the information received from Members who indicate their intention to use this code form for national purposes.

Rec. 6 (CSM-V) - STANDARDIZED FORMAT FOR THE EXCHANGE OF AIRCRAFT REPORTS FOR SYNOPTIC PURPOSES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) which points out that aircraft reports constitute a valuable source of upper-air data and that their selection and distribution should be developed as an integral part of the WWW Plan,

(2) That ICAO is studying the possibility of introducing a standardized format for AIREP messages, in particular in ground-to-ground exchanges,

CONSIDERING that in addition to the CODAR code form there is a requirement for a standardized format of aircraft reports to facilitate their use, especially for computer processing,

RECOMMENDS:

(1) That ICAO:

(a) Be informed that the standardized format for the synoptic exchanges of aircraft reports based on the AIREP form given in the annex* to this recommendation represents the meteorological requirements for such exchanges;

(b) Be invited to take this standardized format into consideration in the follow-up action on Recommendation 5.1/2 of the ICAO Sixth Air Navigation Conference;

(2) That aircraft reports, when exchanged for synoptic purposes, be in either the standardized format of AIREP messages given in the annex* to this recommendation when finally approved by ICAO or in FM 41.D CODAR;

INVITES the President of CSM, in consultation with the Secretary-General, to take any further measure which might be required for the early introduction of the standardized format of aircraft reports, taking into account the action now being taken by ICAO on the overall standardization of AIREP messages.

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* See Annex X.

Rec. 7 (CSM-V) - ACCURACY OF THE FIX AND REPETITION RATE OF ATMOSPHERICS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that it is not always possible to accurately position a sferics fix,

CONSIDERING:

(1) That it is desirable to have an indication of the accuracy of a sferics fix,

(2) That it is feasible to modify code table 0139 (A_i - Repetition rate of atmospherics) to provide this information without unduly sacrificing the original usefulness of the table,

RECOMMENDS that the code table in the Annex* to this Recommendation replace the present code table 0139 (A_i - Repetition rate of atmospherics), as from 1 January 1972.

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* See Annex XI.

Rec. 8 (CSM-V) - TIME AND TYPE OF MESSAGE INDICATOR GROUP

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) That no uniform rules exist at present regarding the inclusion of an indication of the type of message in the text of a coded meteorological report,

(2) The increase of the number of code forms for international use, as a result of new requirements regarding the exchange of meteorological and related information,

CONSIDERING:

(1) That there would be advantages in using four-letter indicators, allowing the type of message to be given by the first pair of letters and the part of the message by the second pair,

(2) That the system of identification should be applied to all code forms for synoptic observations,

(3) That the type of message indicator group should be included in each message except, for the time being, in the case of SYNOP and SHIP reports where it should be given only in the first line of the text of a bulletin of such reports,

(4) That the date and time of SYNOP reports should be indicated in the first line of the text of a bulletin of SYNOP's,

RECOMMENDS:

(1) That the table of Code 2582 be replaced by the table given in Part A of the Annex* to this recommendation;

(2) That the code forms FM 11.D, FM 21.D, FM 22.D, FM 23.D, FM 32.D, FM 33.D, FM 35.D, FM 36.D and FM 41.D and the relevant notes under these code forms be amended to provide for the introduction of the group $M_iM_iM_jM_j$ and, in the case of SYNOP, of the group YYGG;

(3) That these code changes come into force on 1 January 1972;

REQUESTS the Secretary-General to arrange for the necessary amendments as given in Part B of the Annex* to this Recommendation, for SYNOP and PILOT by way of example, to be made to Chapter I, Part A, of Volume B, WMO Publication No. 9.TP.4.

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* See Annex XII.

Rec. 9 (CSM-V) - EXCHANGE OF DATA RELATING TO VERTICAL WIND SHEAR IN ZONE OF MAXIMUM WIND

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that the fifth session of the Regional Association VI considered data relating to vertical wind shear useful to all countries and that their international exchange should be encouraged,

CONSIDERING:

(1) That the transmission of data relating to vertical wind shear undertaken at all upper-air stations in the U.S.S.R. since 1968 had proven useful for aviation forecasting,

(2) That mandatory transmission of these data should be held in abeyance until more experience is gained regarding their use,

RECOMMENDS:

(1) That the following changes be made to Chapter I of Volume B, WMO Publication No. 9.TP.4:

(a) In Section 3 of Parts A and C of FM 32.D and FM 33.D and in Section 4 of Parts A and C of FM 35.D and FM 36.D, after "$d_md_mf_mf_mf_m$", add "($4v_bv_bv_av_a$)";

(b) In Note 2, Section 3, under FM 32.D, add "and data for vertical wind shear" at the end of the contents immediately after "decametres";

(c) In Note 2, Section 4, under FM 35.D, add "and data for vertical wind shear" at the end of the contents immediately after "level (s)";

(d) In Note 4 and Note 6, under FM 32.D, add:

"(iii) Data for vertical wind shear are included in Section 3 on an optional basis";

(e) In Note 4 and Note 6, under FM 35.D, add:

"(iii) Data for vertical wind shear are included in Section 4 on an optional basis";

(f) On page 1-A-3-34, add:

"$v_a v_a$ - absolute value of the vector difference between the maximum wind and the wind blowing at 1 km above the level of maximum wind, in units indicated by YY (FM 32.D, FM 33.D, FM 35.D, FM 36.D)";

"$v_b v_b$ - absolute value of the vector difference between the maximum wind and the wind blowing at 1 km below the level of maximum wind, in units indicated by YY (FM 32.D, FM 33.D, FM 35.D, FM 36.D)";

(2) That these amendments become effective on 1 January 1972;

(3) That Members be encouraged to include these data as often as possible in upper-air reports.

Rec. 10 (CSM-V) - STANDARD LEVELS IN THE HIGH ATMOSPHERE

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 2 (CSM-IV) and the relevant part of Resolution 2 (EC-XVIII),

CONSIDERING:

(1) That there is a need for the designation of pressure levels above 10 mb as standard,

(2) That during rocket soundings it is the height of the sonde which is measured, although the mapping of these observations is usually carried out with regard to isobaric surfaces,

(3) That during an interim period provision should be made in ROCOB messages for the reporting of data both with regard to isobaric and horizontal surfaces,

RECOMMENDS:

(1) That the pressure levels of 7 mb, 5 mb, 3 mb, 2 mb and 1 mb should be adopted as standard;

(2) That FM 39.C-ROCOB and FM 40.C-ROCOB SHIP be amended as indicated in the annex* to this recommendation;

(3) That the recommended code changes become effective as from 1 January 1972;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in WMO Publication No. 9.TP.4, Volume B.

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* See Annex XIII.

Rec. 11 (CSM-V) - ADOPTION OF THE 250-mb LEVEL AS A STANDARD ISOBARIC LEVEL

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Recommendation 9.3/4 (CAeM-Ext. (69)/AN Conf. 6) and relevant part of Resolution 24 (EC-XXI),

(2) Recommendations 12/1, 12/2 and 18/4 of the ICAO Fifth North Atlantic Regional Air Navigation Meeting,

(3) Abridged Final Report of CCl-V, paragraph 4.4 of the general summary,

CONSIDERING:

(1) That there is an aeronautical requirement for the hemispheric exchange of data pertaining to the 250-mb level,

(2) That there is a need for the preparation of charts of 300, 250 and 200 mb for combined use in synoptic meteorology,

RECOMMENDS:

(1) That the 250-mb level should be designated as a standard isobaric level;

(2) That the reporting of data pertaining to the 250-mb level be transferred from Part B to Part A of Code Forms FM 32.D-PILOT, FM 33.D-PILOT SHIP, FM 35.D-TEMP and FM 36.D-TEMP SHIP;

(3) That this code change be implemented as from 1 January 1972;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in WMO Publication No. 9.TP.4, Volume B.

Rec. 12 (CSM-V) - REPORTING OF PARTS B AND D OF FM 36.D-TEMP SHIP BY VOLUNTARY OBSERVING SHIPS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING paragraph 12.12 of the General Summary of the Fifth Session of CMM,

CONSIDERING:

(1) That Parts A and C are most readily used by meteorological centres for processing,

(2) That information contained in Parts A and C allows a check of the data,

RECOMMENDS that voluntary observing ships making upper-air observations be permitted to delete Parts B and D of code form FM 36.D when operational difficulties are encountered in transmitting the full upper-air message to coastal radio stations.

Rec. 13 (CSM-V) - INCLUSION OF NEW SECTIONS IN FM 32.D, FM 33.D, FM 35.D, AND FM 36.D

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) That certain Members have expressed a requirement for transmitting national and/or regional information in upper-level reports,

(2) That code forms FM 35.D-TEMP and FM 36.D-TEMP SHIP include provision for the inclusion of code groups to be developed regionally,

CONSIDERING that the need for regional and national code groups in upper-level reports will undoubtedly expand in the future,

RECOMMENDS:

(1) That the following be added, as from 1 January 1972, to Parts B and D of code forms FM 32.D-PILOT and FM 33.D-PILOT SHIP:

"Section 5 51515 Code groups to be developed regionally",
52525
.....
59595

"Section 6 61616 Code groups to be developed nationally",
62626
.....
69696

(2) That "Section 9 51515 Code groups to be developed regionally" in Parts B and D of FM 35.D and FM 36.D be changed to read:

"Section 9 51515 Code groups to be developed regionally",
52525
.....
59595

"Section 10 61616 Code groups to be developed nationally".
62626
.....
69696

Rec. 14 (CSM-V) - PROVISION FOR REPORTING HEIGHTS ABOVE 29 700 m IN CODE FORMS FM 32.D AND FM 33.D

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that the highest level that can be reported using the indicator 9 in Section 4 of Part D in code forms FM 32.D and FM 33.D is 29 700 m,

CONSIDERING:

(1) That there is a need for the reporting of wind data above 29 700 m,

(2) That the balloon often attains heights above this level,

RECOMMENDS:

(1) That the following changes be made to Chapter I, Part A, of Volume B, WMO Publication No. 9.TP.4:

(a) Under Section 4 of Part D of FM 32.D and FM 33.D replace "9" by: "9(or 1)";
or or
8 8

(b) In Note 2 under FM 32.D replace "8,9 or 21212" by "8, 9 (or 1) or 21212";

(c) In Note 14 under FM 32.D replace the present text by the following:

"When the altitudes of regional fixed levels and/or significant levels are given in units of 300 metres, the indicator figure 9 is used in Section 4 up to the height of 29 700 m; above this level the indicator figure 1 is used instead of 9. When the altitudes of regional fixed levels and/or significant levels are given in units of 500 m, the indicator figure 8 is used in Section 4. The indicator 1 specifies that 30 000 m be added to the heights indicated by $t_n u_1 u_2 u_3$";

(2) That these changes be introduced on 1 January 1972.

Rec. 15 (CSM-V) - CODE FORM FOR REPORTING SUBSURFACE BATHYTHERMAL OBSERVATIONS (BATHY)

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The final report of the second session of the CSM Working Group on Data Needs and Codes,

(2) The summary report of the third session of the Joint WMO/IOC Group of Experts on Co-ordination of Requirements,

(3) The General Plan and Implementation Programme of IGOSS for Phase I as approved by IOC and WMO,

CONSIDERING that there is a need for a code form to be used in the synoptic reporting of subsurface bathythermal observations,

RECOMMENDS:

(1) That the code form for reporting subsurface bathythermal observations (BATHY) given in the annex* to this recommendation be used internationally as from 1 January 1972;

(2) That the code form be included in Chapter I of WMO Publication No. 9.TP.4, Volume B.

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* See Annex XIV.

Rec. 16 (CSM-V) - CODE FORM FOR REPORTING MULTIPLE OCEANOGRAPHIC OBSERVATIONS (TESAC)

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The final Report of the Second Session of the CSM Working Group on Data Needs and Codes,

(2) The Summary Report of the third session of the Joint WMO/IOC Group of Experts on Co-ordination of Requirements,

(3) The General Plan and Implementation Programme of IGOSS for Phase I as approved by IOC and WMO,

CONSIDERING:

(1) That there is a need for an open-ended code form for reporting multiple oceanographic observations which includes temperature, salinity and current, and possibly other elements at various depths,

(2) That the code form for reporting multiple oceanographic observations should allow for the required accuracy of observation with respect to certain parameters, and consequently to location and time of observation,

RECOMMENDS:

(1) That the code form for reporting multiple oceanographic observations (TESAC) given in the annex* to this recommendation be used internationally as from 1 January 1972;

(2) That the code form be included in Chapter I of WMO publication No. 9.TP.4, Volume B.

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* See Annex XV.

Rec. 17 (CSM-V) - AMENDMENTS TO THE AERONAUTICAL METEOROLOGICAL FIGURE CODES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The desirability for a review of the new aeronautical meteorological figure codes expressed by ICAO,

(2) The comments presented by WMO Members, ICAO and IATA on the new aeronautical meteorological figure codes which became applicable on 1 January 1968,

CONSIDERING that the experience gained in the use of these codes has revealed that they are generally considered as suitable to meet the aeronautical requirements, but that there is a need for a number of minor improvements to these codes,

RECOMMENDS:

(1) That the changes given in the annex* to this recommendation be made to the aeronautical meteorological figure codes as appearing in Chapter I, Part A, Volume B of Publication No. 9.TP.4;

T.R. Vol. II p 56 d

(2) That these changes come into force on 1 January 1972.

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* See Annex XVI.

Rec. 18 (CSM-V) - LOCATION OF PERIOD-OF-VALIDITY GROUP IN TAF

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 7.3/4 of the ICAO Limited EUM (RAC/COM) Regional Air Navigation meeting as approved by the ICAO Council,

CONSIDERING that the difficulties in the automatic selection of TAF messages do not appear to be encountered at present for METAR and SPECI reports,

RECOMMENDS:

(1) That the following amendment be made to WMO Publication No. 9.TP.4, Volume B:

- Interchange the position of the $G_1G_1G_2G_2$ and CCCC groups in code form FM 51.D - TAF;

(2) That this change comes into force on 1 January 1971.

Rec. 19 (CSM-V) - CODE FORM FOR FORECAST UPPER WIND AND TEMPERATURE AT SPECIFIED POINTS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the existing requirement for the dissemination of area forecasts in coded form when these forecasts cannot be exchanged in pictorial form,

CONSIDERING that there is an urgent need for a simple code form for this purpose,

RECOMMENDS that, pending the development of a general code form for the dissemination of grid-point values required by various categories of users, the code form given in the annex* to this recommendation be used internationally as from 1 January 1972.

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* See Annex XVII.

Rec. 20 (CSM-V) - CODE FORM FOR REPORTING SYNOPTIC INTERPRETATION OF CLOUD DATA OBTAINED BY METEOROLOGICAL SATELLITES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The requirement expressed by Members for the exchange of information, based on satellite cloud observations,

(2) The superior capabilities of the meteorological satellite in detecting and tracking tropical cyclones,

CONSIDERING:

(1) That comparatively few conventional meteorological observations are available over the large expanses of ocean areas, especially in the southern hemisphere,

(2) That there is a need for special messages of tropical cyclone data obtained from meteorological satellites,

(3) That the exchange of information of synoptic features derived from satellite observations should assist forecasting centres in this work,

RECOMMENDS:

(1) That the code form given in the annex* to this recommendation be introduced, on an experimental basis, for the reporting of the synoptic interpretation of cloud data obtained by meteorological satellites as from 1 January 1972;

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* See Annex XVIII.

(2) That Members be asked to comment on the code form not later than 1 October 1972, to enable its advantages and disadvantages to be analysed;

(3) That the code form, amended as necessary, be introduced for international use as from 1 January 1975.

Rec. 21 (CSM-V) - CODE FORM FOR REPORTING GROUND RADAR WEATHER OBSERVATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) That radar information is being exchanged between countries of different Regions,

(2) That present and past weather as well as cloud information is being exchanged on an international basis,

(3) Paragraph 3.2.7 of the Report of the ECAFE/WMO Preparatory Mission on Typhoons (May 1967),

CONSIDERING:

(1) That radar information can usefully supplement other meteorological data,

(2) That radar observations of tropical cyclones are of widespread international interest,

(3) That certain radar observations are in the same category as present and past weather cloud information,

(4) That a code form for the international exchange of radar data is needed,

RECOMMENDS that the code form given in the annex* to this recommendation be used for reporting ground radar observations, as from 1 January 1972.

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* See Annex XIX.

Rec. 22 (CSM-V) - CODE FORM FOR SYNOPTIC SURFACE OBSERVATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 6 (CSM-II), indicating the principle that no major code changes shall be recommended unless they provide substantial advantages which should clearly be demonstrated,

(2) Resolution 1 (CSM-IV), indicating principles for guidance in the determination of requirements and development of meteorological codes, and specific problems, all related to synoptic surface observations,

(3) Resolution 16 (Cg-V) - World Weather Watch, describing the extension of conventional observing networks with, inter alia, automatic weather stations, and the equipment of GDPS centres with the most modern facilities, including high-speed computers,

(4) GARP Special Report No. 1 - Report of Planning Conference on GARP (March 1970), describing plans for the First GARP Global Experiment in 1975/76,

CONSIDERING:

(1) That automated data processing requires, for greater efficiency and economy, the use of non-ambiguous code forms which also do not contain plain language additions,

(2) That the code forms should permit easy and economic coding of observations originating from automatic weather stations,

(3) That the present SYNOP and SHIP code forms cannot accommodate in an efficient way changes of the resolution of data or other modifications as the result of changes of requirements, unless the structure of the code form is entirely changed,

(4) That studies of a possible revision of the present SYNOP and SHIP code forms, carried out since CSM-II (1958), have led to a new proposed code form which has substantial advantages, as can clearly be demonstrated,

(5) That this new code form appears to be flexible enough to accomodate easily changes due to new requirements which may become evident in the next two decades or so,

(6) That the practical consequences of a major change of SYNOP and SHIP code forms necessitate extensive preparations by national meteorological services during a period of several years between the date of the decision and the date of implementation,

(7) That the period of preparation can be used for tests of the new code form with a view to making any necessary refinements before the implementation date,

(8) That implementation of the new code form, well before the First GARP Global Experiment starts, is highly desirable,

RECOMMENDS:

(1) That the code forms contained in Parts A, B and C of the annex* to this recommendation be introduced for international use as from 1 January 1975, subject to modifications to be applied, if necessary, before 1 July 1973;

(2) That Members be invited to test these code forms, using the points mentioned in Part D of the annex* to this recommendation for guidance, and inform the Secretary-General of any comments and suggestions they may have before 1 October 1972.

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* See Annex XX.

Rec. 23 (CSM-V) - CODE FORMS FOR THE EXCHANGE OF SYNOPTIC SURFACE OBSERVATIONS ORIGINATING FROM AUTOMATIC WEATHER STATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the increased use of automatic weather stations for the observation of meteorological data intended for international exchange,

CONSIDERING:

(1) That in a number of respects the present SYNOP and SHIP code forms are not satisfactory for encoding observations made by automatic weather stations;

(2) That there is a need for the early introduction of a suitable code form;

(3) That the code forms SYNOP-FM 14.E and SHIP FM 24.E given in Parts A B and C of the annex* to Recommendation 22 (CSM-V) and recommended for general introduction in 1975 are suitable for reporting observations made by automatic weather stations,

RECOMMENDS that the sections 1 of the code forms SYNOP-FM 14.E and SHIP-FM 24.E be used for the international exchange of reports containing observations of automatic weather stations, as from 1 January 1972.

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* See Annex XX.

Rec. 24 (CSM-V) - REVISION OF NOTES IN CHAPTER I OF VOLUME B

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) General summary, paragraph 5.8.1, Abridged Report of Third Congress,

(2) Recommendation 8 (CSM-III) and the relevant part of Resolution 33 (EC-XIV),

(3) Resolution 1 (CSM-IV),

(4) The report of the second session of the CSM Working Group on Data Needs and Codes,

CONSIDERING that as Chapter I of Volume B is Annex II of the Technical Regulations there is need of a revised text of the Notes in Volume B in Technical Regulation format,

RECOMMENDS the following principle for the revision of Notes in Chapter I of Volume B:

The Notes in Chapter I of Volume B shall be rewritten in the form of STANDARD Practices and Procedures of the Technical Regulations and Notes;

REQUESTS the Secretary-General, in consultation with the president of CSM, to arrange for the revision of the Notes in Chapter I of Volume B, making use, if necessary, of a consultant;

REQUESTS the president of CSM to arrange for the formal adoption of the revised text.

c. 25 (CSM-V) - REFERENCE IN VOLUME B TO THE SELECTION OF ELEMENTS FROM SYNOPTIC REPORTS FOR INCLUSION IN WEATHER BULLETINS FOR SHIPPING

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING general summary, paragraph 5.4.9 of Abridged Report of Fourth Congress,

CONSIDERING:

(1) That paragraphs 13.1.4.5.1 (a) and (b) (i.e. paragraph 11.1.3 of the previous edition) of Volume D of WMO Publication No. 9.TP.4 relate to the composition of a weather bulletin for shipping,

(2) That notes in Volume B of WMO Publication No. 9.TP.4, relating to code forms are primarily meant to give directives regarding the encoding of meteorological reports,

(3) That confusion is likely to arise for observers if the above-mentioned paragraphs of Volume D were to be inserted under the code forms SYNOP and SHIP in Volume B,

RECOMMENDS:

(1) That paragraphs 13.1.4.5.1 (a) and (b) of Volume D not be included under the code forms SYNOP and SHIP in Volume B;

(2) (That reference to information regarding standard procedures for selecting elements from synoptic reports for inclusion in weather bulletins for shipping be inserted in the Introduction to Part A of Chapter I of Volume B.

Rec. 26 (CSM-V) - PRIORITY OF SYNOPTIC TIME FOR UPPER-AIR OBSERVATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that there is a lack of uniformity of instructions and practices concerning which standard synoptic time has preference when only one upper-air observation per day is made,

CONSIDERING that when upper-air observing stations can only make one observation per day, it is desirable that they all make this observation at the same synoptic time,

RECOMMENDS:

(1) That when only one upper-air observation is made, the choice of the time of the observation, 0000 or 1200 GMT, should be a matter for regional association decision;

(2) That when there are no compelling regional reasons to the contrary, the 0000 GMT observation should be given preference.

Rec. 27 (CSM-V) - UPDATING OF VOLUME A OF WMO PUBLICATION No. 9.TP.4

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Recommendation 64 (CSM-II),

(2) Recommendation 46 (CSM-IV),

(3) The capability of the WMO Secretariat to produce and update Volume A of WMO Publication No. 9.TP.4 by computer and offset printing,

CONSIDERING:

(1) That one half-yearly updating of the volume in the form of a complete new Volume A is generally supported by Members as indicated in a survey carried out by the WMO Secretariat,

(2) That a list of all stations for which changes had intervened between two consecutive updatings could be supplied with each updating,

(3) That the system of advance notification of important changes (METNO messages) should be maintained,

RECOMMENDS:

(1) That Volume A of WMO Publication No. 9.TP.4 be updated at half-yearly intervals in the form of a complete new Volume A,

(2) That a list of all stations for which changes have occurred after the previous updatings be supplied with each new updating,

(3) That the system of advance notification of important change (METNO messages) be continued,

REQUESTS the Secretary-General to implement paragraphs (1) and (2) of RECOMMENDS as from March 1972.

Rec. 28 (CSM-V) - OUTPUT PRODUCTS OF WMCs

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The general list of output products of WMCs as given in Attachment I to Appendix II to the WWW Plan for the period 1968-1971,

(2) The requirements stated by Members and technical commissions for specific output products not mentioned in the list referred to above,

CONSIDERING that the primary purpose of the World Weather Watch is to ensure that all Members obtain the meteorological information they require,

RECOMMENDS that the list of products given in the annex* to this recommendation be used as a general basis for the establishment and periodic updating of the actual output product programmes of World Meteorological Centres, taking into account both the needs of the recipient Members and the capability of the WMCs and the GTS to meet them.

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* See Annex XXI.

Rec. 29 (CSM-V) - OUTPUT PRODUCTS OF RMCs

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) The list of output products of RMCs as given in Attachment V to Appendix II to the WWW Plan for the period 1968-1971,

(2) The requirements stated by Members and technical commissions for specific output products not mentioned in the list referred to above,

CONSIDERING that the primary purpose of the World Weather Watch is to ensure that all Members obtain the meteorological information they require,

RECOMMENDS that the list of products given in the annex* to this recommendation be used as a general basis for the establishment and periodic updating of the actual output product programmes of Regional Meteorological Centres, taking into account both the needs of the recipient Members and the capability of the RMCs and the GTS to meet them.

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* See Annex XXII.

Rec. 30 (CSM-V) - PUBLICATION OF A GUIDE ON THE GLOBAL DATA-PROCESSING SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the need for the publication of a Guide describing in detail the operational procedures of the Global Data-Processing System,

CONSIDERING that these procedures may require additions or modifications,

RECOMMENDS:

(1) That a Guide on the Global Data-Processing System, along the lines of the broad outline given in the Annex* to this Recommendation, be published in the four official languages of the Organization;

(2) That the Guide be kept regularly up to date.

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* See Annex XXIII.

Rec. 31 (CSM-V) - WWW GLOBAL TELECOMMUNICATION SYSTEM MANUAL

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) WMO Publication No. 9.TP.4, Volume C,

CONSIDERING the need for a concise publication containing all the regulatory material for the WWW Global Telecommunication System in order to assist Members in assuming their responsibilities for implementing their contribution to the WWW,

RECOMMENDS that the regulatory material for both the global and regional aspects of the Global Telecommunication System be assembled in one publication to be named "WWW Global Telecommunication System Manual",

REQUESTS the Secretary-General:

(1) To take the necessary steps for this manual to be prepared with due attention to editing and layout of material and to publish this manual in the four working languages of the WMO;

(2) To update this manual by supplements, as required.

Rec. 32 (CSM-V) - ORGANIZATION OF THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Resolution 3 (EC-XIX) - Planning studies for the WWW,

(3) Resolution 5 (EC-XX) - Configuration and routeing of the Main Trunk Circuit and its branches,

(4) Recommendation 31 (CSM-V) - WWW Global Telecommunication System Manual,

CONSIDERING:

(1) The need to develop further the details of the Plan of the Global Telecommunication System to meet the requirements of the countries and the WWW Plan as adopted by Resolution 16 (Cg-V),

(2) The need to provide regulatory material for the further planning and implementation of the Global Telecommunication System,

RECOMMENDS:

(1) That the text given in the annex* to this recommendation be included in the WWW Global Telecommunication System Manual;

(2) That countries do their utmost to implement the provisions made in this annex* as part of their contribution to the WWW.

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* See Annex XXIV.

Rec. 33 (CSM-V) - CONTENTS OF GLOBAL EXCHANGES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Recommendation 32 (CSM-V) - Organization of the Global Telecommunication System,

(2) That stations in the basic synoptic network are regularly reviewed by Regional Associations,

CONSIDERING that the exchange programmes need to be brought up to date,

RECOMMENDS:

(1) That reports from the individual stations contained in the annex* to this recommendation should be included in the bulletins that are to be exchanged on the Main Trunk Circuit and its branches,

(2) That countries do their utmost to implement the provisions made in the annex* to this recommandation as part of their contribution to the WWW,

REQUESTS the Secretary-General:

(1) To include the annex* to this recommendation in the WWW Global Telecommunication System Manual,

(2) To publish a list giving the state of implementation of the stations contained in the annex* to this recommendation as at 1 August 1970.

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* See Annex XXV.

Rec. 34 (CSM-V) - METEOROLOGICAL TELECOMMUNICATION PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Recommendation 31 (CSM-V) - WWW Global Telecommunication System Manual,

CONSIDERING that there is a need for uniformity in procedures as regards the transmission of meteorological information on the GTS,

RECOMMENDS:

(1) That all Meteorological Services adhere strictly to the procedures set forth in the annex* to this recommendation;

(2) That the annex* to this recommendation be included in the WWW Global Telecommunication System Manual.

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* See Annex XXVI.

Rec. 35 (CSM-V) - ERROR-CONTROL PROCEDURES IN RESPECT OF DATA TRANSMISSION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Resolution 16 (V-RA VI) - Error-control procedures in respect of data transmissions,

(3) Recommendation 31 (CSM-V) WWW Global Telecommunication System Manual,

CONSIDERING:

(1) That full compatibility of error-control procedures on the Global Telecommunication System is required,

(2) That the number of error-control procedures should be kept to a minimum,

RECOMMENDS:

(1) That the error-control procedures (software or hardware), given in the annex* to this recommendation, should be followed during the initial phase of the implementation of the Global Telecommunication System;

(2) That the text given in the annex* to this recommendation be included in the WWW Global Telecommunication System Manual;

REQUESTS the President of CSM to arrange for the CSM Working Group on the Global Telecommunication System to make further study of the error-control procedures with a view to promoting standardization and utilization, if possible, of a single system.

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* See Annex XXVII.

Rec. 36 (CSM-V) - TRANSMISSION AND RELAY OF PICTORIAL INFORMATION OVER CIRCUITS OPERATED ON A SHARED DATA/FACSIMILE (ANALOGUE) TRANSMISSION BASIS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 16 (Cg-V) - World Weather Watch,

CONSIDERING:

(1) That to ensure optimum usage of telephone-type circuits, both alpha-numeric data and facsimile (analogue) transmissions will be made on telephone-type circuits on a time sharing basis,

(2) That the Main Trunk Circuit will be operated in a segmented store and forward mode for both data and facsimile (analogue) transmissions,

(3) The need for standardized procedures covering identification and switching for data to facsimile (analogue) and facsimile (analogue) to data operations,

RECOMMENDS:

(1) That, during the initial phase of the implementation of the Global Telecommunication System, the procedures described in the annex*to this recommendation shall be used on telephone-type circuits (using software or hardware error-control procedures) operating on a shared data/facsimile (analogue) transmission basis,

(2) That the annex* to this recommendation be included in the WWW Global Telecommunication System Manual,

REQUESTS the President of CSM to arrange for the CSM Working Group on the Global Telecommunication System to make further study of the identification and switching procedures with a view to promoting standardization and utilization, if possible, of a single system.

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* See Annex XXVIII.

Rec. 37 (CSM-V) - TECHNICAL CHARACTERISTICS AND SPECIFICATIONS OF METEOROLOGICAL TRANSMISSIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Resolution 3 (EC-XIX) - Planning studies for the WWW,

(3) Resolution 5 (EC-XX) - Configuration and routeing of the Main Trunk Circuit and its branches,

(4) Resolution 6 (EC-XXI) - Modems for signalling rates of 2 400 bits per second,

(5) Recommendation 31 (CSM-V) - WWW Global Telecommunication System Manual,

CONSIDERING:

(1) The need to develop further the details of the technical characteristics of the different components of the Global Telecommunication System to meet the requirements of the WWW Plan as adopted by Resolution 16 (Cg-V),

(2) The need to provide regulatory material for the further planning and implementation of the Global Telecommunication System,

RECOMMENDS:

(1) That the text given in the annex* to this recommendation be included in the WWW Global Telecommunication System Manual;

(2) That countries do their utmost to implement the provisions made in this annex* as part of their contribution to the WWW.

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* See Annex XXIX.

Rec. 38 (CSM-V) - REPORTS OF RECEPTION CONDITIONS OF METEOROLOGICAL RADIO TRANSMISSIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

CONSIDERING that there is a need for a uniform format for reporting on reception conditions of meteorological radio transmissions and the exchange of such messages between centres concerned,

RECOMMENDS that the code form RECEP given in the annex* to this recommendation be adopted for the reporting of reception conditions of meteorological transmissions and be included in the WWW Global Telecommunication System Manual.

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* See Annex XXX.

Rec. 39 (CSM-V) - IMPLEMENTATION DATES OF METEOROLOGICAL TELECOMMUNICATION PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Recommendation 32 (CSM-V) - Organization of the Global Telecommunication System,

(3) Recommendation 35 (CSM-V) - Error-control procedures in respect of data transmissions,

(4) Recommendation 36 (CSM-V) - Transmission and relay of pictorial information over circuits operated on a shared data/facsimile (analogue) transmission basis,

(5) Recommendation 34 (CSM-V) - Meteorological telecommunication procedures for the Global Telecommunication System,

CONSIDERING the need for uniformity in meteorological telecommunication procedures for world-wide application,

RECOMMENDS:

(1) That the meteorological telecommunication procedures set forth in Recommendations 35 and 36 (CSM-V) should come into force on 15 January 1971,

(2) That the meteorological telecommunication procedures set forth in Recommendation 34 (CSM-V) should come into force on 15 April 1971.

Rec. 40 (CSM-V) - IMPLEMENTATION DATES OF THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) Recommendation 32 (CSM-V) - Organization of the Global Telecommunication System,

(3) Recommendation 37 (CSM-V) - Technical characteristics and specifications of meteorological transmissions,

(4) Recommendation 39 (CSM-V) - Implementation dates of meteorological telecommunication procedures for the Global Telecommunication System,

CONSIDERING the need for co-ordination of the full implementation of the different segments of the Main Trunk Circuit and its branches in the various parts of the world,

RECOMMENDS that Members concerned should do their utmost to implement the centres and segments of the Main Trunk Circuit and its branches as soon as possible so that the entire Main Trunk Circuit and its branches be fully operational on 15 January 1973;

REQUESTS the Secretary General to assist in the co-ordination of the implementation of the Main Trunk Circuit and its branches.

Rec. 41 (CSM-V) - AMENDMENTS TO VOLUME I OF THE WMO INTERNATIONAL CLOUD ATLAS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING paragraph 11.6 of the general summary of CSM-IV,

CONSIDERING that the revised definitions and descriptions of hydrometeors, prepared by the Working Group on Description of Hydrometeors, constitute an improvement on the existing text of the International Cloud Atlas,

RECOMMENDS that these revised definitions and descriptions of hydrometeors given in the annex* to this recommendation replace the corresponding definitions and descriptions now appearing in Volume I of the International Cloud Atlas,

REQUESTS the Secretary-General to arrange for the publication of the revised text in a suitable form.

* See Annex XXXI.

Rec. 42 (CSM-V) - AMENDMENTS TO THE TECHNICAL REGULATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING:

(1) Resolution 28 (Cg-V) - Technical Regulations of the World Meteorological Organization,

(2) General Summary, paragraph 7.4.13 of Fifth Congress,

(3) The suggested amendments to the Technical Regulations developed by the CSM Working Groups on Technical Regulations and on Telecommunications,

(4) The amendments to the Technical Regulations as suggested by the Informal Meeting of Experts on the Revision of the Technical Regulations in the Light of the World Weather Watch (Geneva, February 1970) and the comments of presidents of technical commissions on these amendments,

CONSIDERING the need for amending the Technical Regulations in the light of recent developments in meteorology,

RECOMMENDS that after appropriate editing and co-ordination the amendments given in the annex* to this recommendation be incorporated in the Technical Regulations of the World Meteorological Organization.

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* See Annex XXXII.

Rec. 43 (CSM-V) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING with satisfaction the action taken by the Executive Committee on the previous recommendations of the Commission for Synoptic Meteorology,

CONSIDERING that many of these recommendations have become redundant in the meantime,

RECOMMENDS:

(1) That the following Executive Committee resolutions be no longer considered necessary: Resolutions 12, 13 and 14 (EC-XVIII); 5, 9 and 10 (EC-XX);

(2) That the following Executive Committee resolutions be maintained in force: Resolutions 10 (EC-XVI) and 11 (EC-XX).

A N N E X I

Annex to paragraph 4.2.2.1 of the General Summary

LIST OF PHENOMENA REQUIRED TO BE REPORTED AS PRESENT WEATHER IN CODE FORMS FOR SYNOPTIC SURFACE OBSERVATIONS INTENDED FOR INTERNATIONAL EXCHANGE

- White out.
- Visibility reduced by smoke, e.g. veld or forest fires, industrial smoke or volcanic ashes.
- Condensation trails.
- Shallow fog or shallow ice fog at the station, not deeper than about 2 metres on land or 10 metres at sea.
- Haze.
- Dust haze.
- Mist.
- Slight or moderate precipitation within sight, but not at the station, reaching or not reaching the surface.
- Heavy precipitation within sight, but not at the station, reaching or not reaching the surface.
- Well-developed dust or sandwhirl(s) seen at or near the station.
- Drifting dust or sand
- Drifting snow.
- Blowing dust or sand.
- Blowing spray.
- Slight or moderate blowing snow.
- Heavy blowing snow.
- Duststorm or sandstorm within sight, but not at the station.
- Light or moderate duststorm or sandstorm at the station.
- Severe duststorm or sandstorm at the station.
- Spout, at or within sight of the station.

Precipitation	Intensity ranges *)
Drizzle: freezing/not freezing	three
Rain: freezing/not freezing	four
Rain shower	four
Snow	three
Snow shower	three
Rain and snow	three
Rain and snow shower	three
Shower of snow pellets or small hail with or without rain or rain and snow mixed	two
Shower of hail, with or without rain or rain and snow mixed, not associated with thunder	two
Diamond dust	
Snow grains (without fog)	
Ice pellets	
Fog or ice fog at the station	no precipitation
Fog or ice fog in patches	no precipitation
Fog or ice fog at a distance	no precipitation
Fog depositing rime	no precipitation
Fog in combination with:	
- drizzle, light/moderate or heavy	two
- freezing drizzle, light/moderate or heavy	two
- rain, light/moderate or heavy	two
- freezing rain, light/moderate or heavy	two
- snow, light/moderate or heavy	two
- diamond dust or snow grains	

*) Correspondence of these ranges with the ones specified in Annex II of the Final Report of CSM-III to be determined later.

Lightning visible, no thunder heard Thunderstorm at the station Thunderstorm and fog at the station	no precipitation
Thunderstorm with slight or moderate duststorm or sandstorm Thunderstorm with severe duststorm or sandstorm	with or without precipitation; electrical phenomena not very violent/very violent.
Thunderstorm with light/moderate/heavy/very heavy precipitation; no hail	electrical phenomena : not very violent/very violent
Thunderstorm with moderate hail *) (diameter $\leqslant$ 1cm)/ heavy hail (diameter $>$ 1cm)	electrical phenomena : not very violent/very violent.

Severe squall: sudden increase of wind by at least 8 m/s, the speed rising to 20 m/s or more and lasting for at least one minute.

(Note: Severe squalls which occurred at the distance should be reported only when there is a certainty that squalls are of an exceptional character.)

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*) Hail, small hail, snow pellets.

A N N E X II

Annex to paragraph 4.2.2.2 of the General Summary

PRESENT AND PAST WEATHER CODE TABLES MEETING CSM-V REQUIREMENTS

1. Present weather

The table of present weather phenomena has been constructed using the following principles:

(a) It contains synoptic phenomena exclusively, i.e. weather phenomena which occurred within the 10-minute period preceding the time of observation;

(b) It includes combinations of phenomena which may occur simultaneously;

(c) Each decade has been given a distinct meaning; types of precipitation are indicated with the second digit of the code figure, using the same arrangement in all relevant decades, thus permitting a simple programming of computers where distinction between precipitation intensities is not required;

(d) The code figures are arranged in four groups; their selection is made following the principle of successive determination:

Question 1 : Has a thunderstorm, lightning or severe squall been observed?
Yes - use Group IV
No - proceed with question 2;

Question 2 : Has fog been observed?
Yes - use Group III
No - proceed with question 3;

Question 3 : Has precipitation been observed?
Yes - use Group II
No - use Group I, in which the higher appropriate code figure should be selected. No selection rules are needed in Groups II, III and IV.

2. Past weather

(a) The code table contains a minimum set of 26 significant past weather phenomena, including combinations of such phenomena which may occur simultaneously;

(b) Elements are encoded with the same code figure as for "present weather" on the understanding that, for the purpose of reporting past weather, the ww-code figures indicating "moderate" or "severe" (thunderstorm) intensity are used in the sense "intensity not specified".

(c) **Notes (1) to (4) under the present specifications of the symbolic letter W (page I-A-3-34 of Volume B) apply in principle.**

PRESENT WEATHER CODE GROUP I

No precipitation at the station (no fog, no thunderstorm)			
ww		ww	
00	No phenomenon present	10	Well-developed dust or sandwhirls
01	White-out	11	Drifting dust or sand
02	Visibility reduced by smoke	12	Drifting snow
03	Condensation trails	13	Blowing dust, or sand, or spray
04	Shallow fog or shallow ice fog	14	Blowing snow, light or moderate
05	Haze	15	Blowing snow, heavy
06	Dust haze	16	Dust/sand storm, not at station
07	Mist	17	Light or moderate dust/sand storm
08	Slight or moderate precipitation within sight	18	Heavy dust/sand storm
09	Heavy precipitation within sight	19	Spout

PRESENT WEATHER CODE contd.

GROUP II

Precipitation at the station (no fog, no thunderstorm)			
ww	ww	ww	ww
20-29 Light precipitation	30-39 Moderate precipitation	40-49 Heavy precipitation	50-59 Very heavy liquid precipitation and particular solid precipitation
20 Light drizzle	30 Moderate drizzle	40 Heavy drizzle	50 -
21 Light drizzle, freezing	31 Moderate drizzle, freezing	41 Heavy drizzle, freezing	51 -
22 Light rain	32 Moderate rain	42 Heavy rain	52 Very heavy rain
23 Light rain, freezing	33 Moderate rain, freezing	43 Heavy rain, freezing	53 Very heavy rain, freezing
24 Light rain shower	34 Moderate rain shower	44 Heavy rain shower	54 Very heavy rain shower
25 Light snow	35 Moderate snow	45 Heavy snow	55 -
26 Light snow shower	36 Moderate snow shower	46 Heavy snow shower	56 Diamond dust
27 Light rain and snow	37 Moderate rain and snow	47 Heavy rain and snow	57 Snow grains
28 Light rain and snow shower	38 Moderate rain and snow shower	48 Heavy rain and snow shower	58 Ice pellets
29 Light/moderate shower of small hail or snow pellets	39 Moderate/light shower of hail	49 Heavy shower of small hail or snow pellets	59 Heavy shower of hail

PRESENT WEATHER CODE contd. GROUP III

Fog, with or without precipitation (no thunderstorm)			
ww		ww	
60	Fog and light drizzle	70	Fog and moderate or heavy drizzle
61	Fog and light drizzle, freezing	71	Fog and moderate or heavy drizzle, freezing
62	Fog and light rain	72	Fog and moderate rain
63	Fog and light rain, freezing	73	Fog and moderate rain, freezing
64	-	74	-
65	Fog and light snow	75	Fog and moderate snow
66	Ice fog*)	76	-
67	Fog in patches) no precipitation	77	Fog at a distance (no precipitation)
68	Fog) no precipitation	78	-
69	Fog depositing rime) no precipitation	79	-

*) Fog with diamond dust or snow grains.

GROUP IV

Thunderstorm, with or without other phenomena (also severe squall)			
ww		ww	
80	Lightning visible, no thunder heard) no precipitation	90	Severe squall
81	Thunderstorm) no precipitation	91	Thunderstorm and fog
82	Thunderstorm and light or moderate dust/sand storm	92	Severe thunderstorm and light or moderate dust/sand storm
83	Thunderstorm and heavy dust/sand storm	93	Severe thunderstorm and heavy dust/sand storm
84	Thunderstorm and slight precipitation) no hail	94	Severe thunderstorm and slight precipitation) no hail
85	Thunderstorm and moderate precipitation) no hail	95	Severe thunderstorm and moderate precipitation) no hail
86	Thunderstorm and heavy precipitation) no hail	96	Severe thunderstorm and heavy precipitation) no hail
87	Thunderstorm and very heavy precipitation) no hail	97	Severe thunderstorm and very heavy precipitation) no hail
88	Thunderstorm and moderate hail) *)	98	Severe thunderstorm and moderate hail
89	Thunderstorm and heavy hail) *)	99	Severe thunderstorm and heavy hail

*) Hail, small hail

PAST WEATHER CODE

Group	Past Weather Element	WW	Group	Past Weather Element	WW
I	No phenomenon present	00	III	Fog or ice fog	68
I	Blowing dust or sand	13	III	Fog and drizzle	70
I	Blowing snow	14	III	Fog and freezing drizzle	71
I	Dust/sand storm	17	III	Fog and rain	72
			III	Fog and freezing rain	73
II	Drizzle	30	III	Fog and snow	75
II	Drizzle, freezing	31			
II	Rain	32	IV	Thunderstorm (no precipitation)	81
II	Rain, freezing	33	IV	Severe squall	90
II	Rain shower(s)	34	IV	Thunderstorm and fog	91
II	Snow	35	IV	Thunderstorm and dust/sand storm	92
II	Snow shower(s)	36	IV	Thunderstorm and precipitation (no hail)	95
II	Rain and snow	37	IV	Thunderstorm and hail or small hail	98
II	Rain and snow shower(s)	38			
II	Hail, small hail or snow pellets	39			

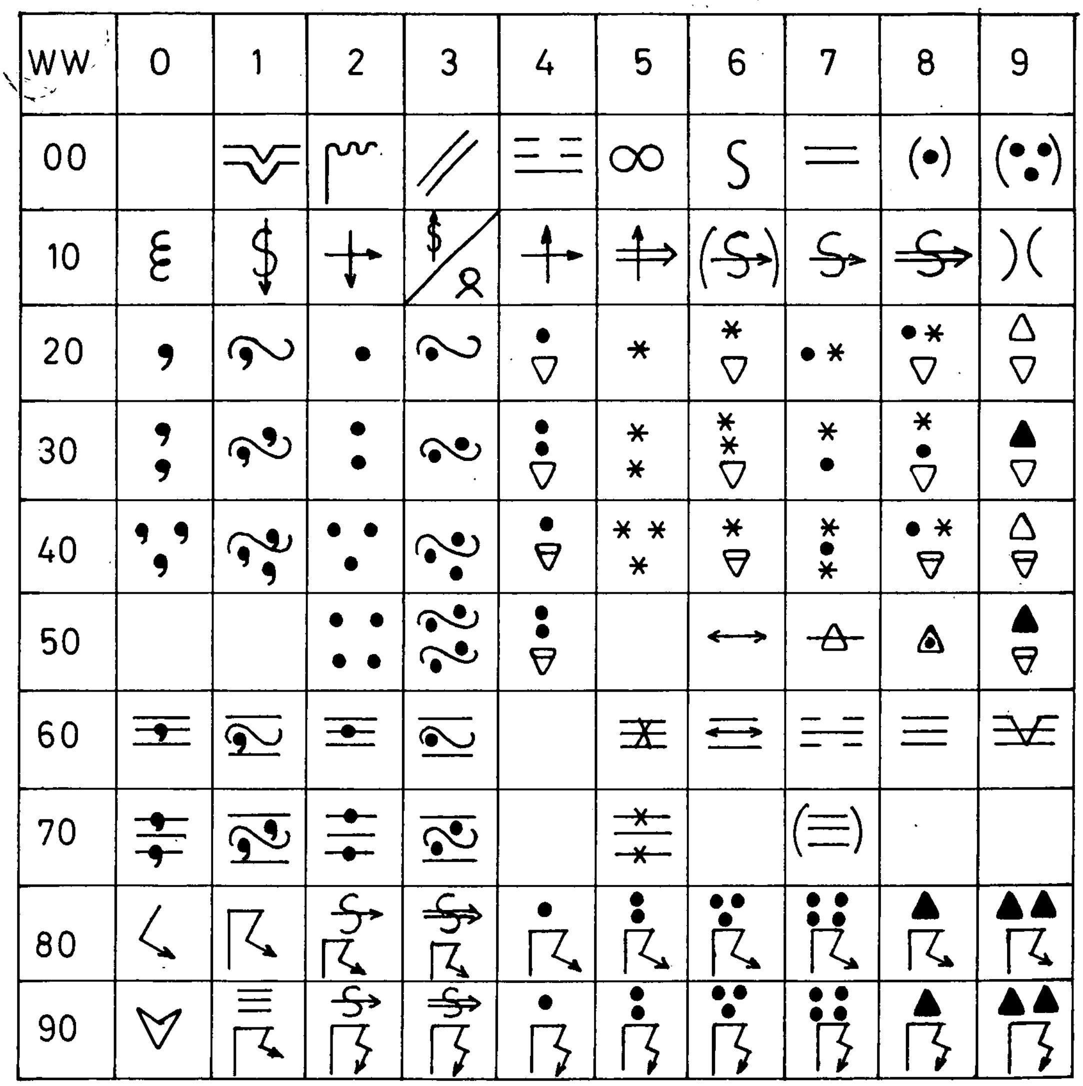
Elements are selected with preference for the higher applicable code figure

*

* *

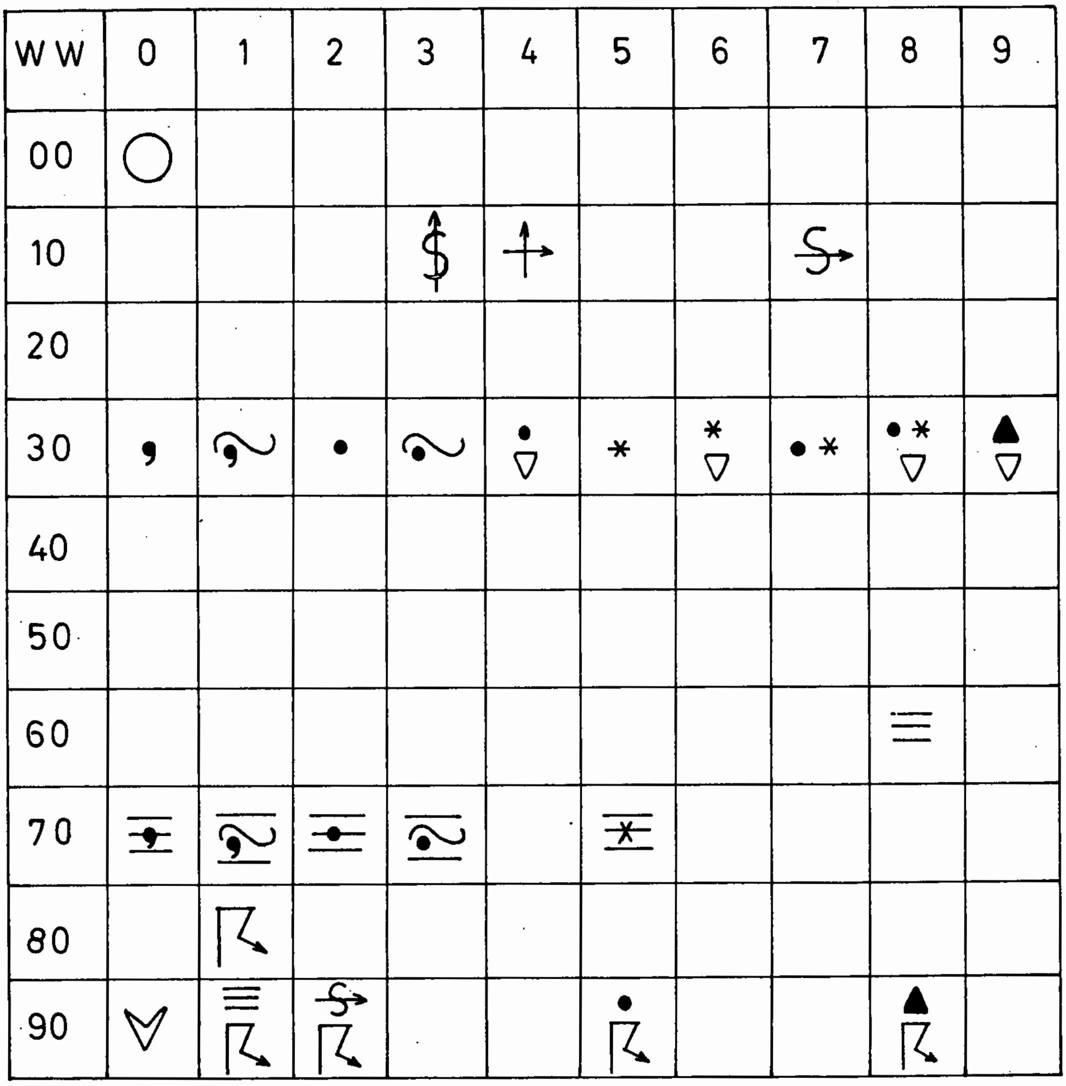
Appendix A

Example of new ww plotting symbols for testing purposes.



Appendix B

Example of new WW plotting symbols for testing purposes.



A N N E X III

Annex to paragraph 4.2.3.2 of the General Summary

PARAMETERS, WITH THEIR RESOLUTION, TO BE INCLUDED IN SYNOPTIC REPORTS OF SURFACE OBSERVATIONS

I - Non-meteorological parameters to be included in every message (even in the case of a collective of such messages)

Parameters and their resolution	SYNOP	SHIP
A - Indication of beginning and type of message:		
- use of $M_iM_iM_jM_j$ indicators different for SYNOP code form, SHIP code form, etc.	yes	yes
B - Date of observation:		
- day of the month (GMT)	yes	yes
C - Time of observation:		
- to the nearest whole hour GMT	yes	yes
- to the nearest minute		for oceanographic observation only
D - Localization of the observation:		
- block number and international station number	yes	
- latitude and longitude in degrees and tenths and quadrant of the globe		yes
- latitude and longitude in degrees and minutes and quadrant of the globe		for oceanographic observations only
E - Type of station:		
- indication whether automatic or conventional	yes	yes
- indication whether stations are equipped with certified or uncertified instruments		yes
F - Ship's call sign		yes
G - Ship's movement data		
- true direction of the displacement of the ship over the three hours preceding the time of observation, in tens of degrees		yes
- distance, in nautical miles and divided by three, of the displacement of the ship over the three hours preceding the time of observation		yes

II - Meteorological parameters to be included in the first part (section 1 of SYNOP or sections 1 or 2 of SHIP) or in the second part (section 2 of SYNOP or section 3 of SHIP) of the message

Parameter	Resolution 1st part	Resolution 2nd part
A. Surface wind		
(a) Mean wind direction	10°	
(b) Mean wind speed. However, when the 10-minute interval includes a discontinuity in the wind data, only data occurring after the discontinuity should be used for obtaining mean values and hence the time interval in these circumstances will correspondingly be reduced.	1 m/s	
(c) Wind indicator	indication whether reported winds are measured or estimated	
(d) Maximum mean wind speed of wind observed during the period covered by "past weather". (This parameter should be reported only when its value equals or exceeds 16 m/s)		1 m/s
(e) Windshift occurring in less than 30 min. during the period covered by "past weather". (Required from oceanic areas including island stations only)		
(i) Reporting criteria : A change in wind direction of 30° or more when the wind speed before or after the change is 8 m/s or more and/or a change in wind speed of 8 m/s or more		
(ii) Parameters to be reported :		
- Mean wind direction before and after the change		10°
- Mean wind speed before and after the change		1 m/s
- Time at which the change occurs before the time of observation		1 hour

Parameter	Resolution 1st part	Resolution 2nd part
B. <u>Pressure</u>		
(a) Pressure reduced to mean sea-level	0,1 mb	
(b) Station level pressure when it is not possible to recover this value from the report or with the information contained in WMO publications (and from automatic stations equipped to give station level pressure only)	0,1 mb	
(c) Geopotential of the isobaric surface 850 or 700 millibars for stations which cannot report MSL pressure with reasonable accuracy	1 gpm	
(d) Pressure tendency at station level over 3 hours (for ships and land stations in extratropical regions)		
- Amount	0,1 mb	
- Sign and characteristic	yes (sign only automatic stations)	
(e) 24 hours pressure change at station level (for tropical regions only)		
- Amount	0,1 mb	
- Sign	Indication whether positive or negative	

Parameter	Resolution 1st part	Resolution 2nd part
C. Temperature and humidity		
(a) Air temperature)	0,1°C	
(b) Dew-point temperature) - sign (direct indication)	+ or -	
(c) Sea-surface temperature)		
(d) Maximum temperatures for the period 0900-2100 and 2100-0900 local time) - sign (direct indication)		1°C + or -
(e) Minimum temperatures for the periods 0900-2100 and 2100-0900 local time) - indication of the type of extreme		max. and min.
(f) Relative humidity (for automatic stations)	1%	
(g) Changes in air temperature which are equal to or more than 5°C and which occur in less than 30 min. during the period covered by "past weather" (only required from oceans or other areas with widely separated stations)		
- Temperature variation		1°C
- Sign of variation		increase or decrease
- Time at which the change occurs before the time of observation		1 hour
D. Precipitation		
(a) Amount	- indication of a little precipitation, non-measurable - 0,1 mm for amounts from 0,1 mm to 0,6 mm - 1 mm for amounts of 0,7 mm or more	
(b) Duration	yes	
E. Horizontal visibility	logarithmic scale	

Parameter	Precipitation	
	1st part	2nd part
F. Cloud		
(a) Total amount of cloud	1 okta or $^{1}/10$	
(b) Genus of cloud	C_L, C_M and C_H codes	
(c) Description of clouds or state of the sky for tropical requirements		yes
(d) Azimuth and elevation of certain cloud phenomena (tropical areas)		yes
(e) Indication that all or part of clouds are persistent condensation trails	yes	
(f) Height of base of lowest cloud	yes	
(g) Amount of all the C_L cloud present and, if no C_L cloud is present, amount of all the C_M cloud present	1 okta or $^{1}/10$	
G. Weather phenomena		
(a) Present weather	see annex to paragraph 4.2.2.2	
(b) Past weather	see annex to paragraph 4.2.2.2	
H. Ground phenomena		
(a) State of the ground (reporting frequency required : once per day)		As in code 0900 supplemented in order to avoid the use of plain language such as SAND or DUST
(b) Total depth of snow		In centimeters

Parameter	Resolution 1st part	Resolution 2nd part
I. Sea phenomena		
(a) Wind waves		
(i) period	intervals of one second	
(ii) height	intervals of 0,5 m	
(b) Swell waves, predominant system		
(i) direction	10°	
(ii) period	see wind waves	
(iii) height	see wind waves	
(c) Swell waves, second system		
(i) direction	10°	
(ii) period	see wind waves	
(iii) height	see wind waves	
(d) Ice accretion on ship		
(i) origin	as in code 1751	
(ii) thickness of ice accretion	as revised by CMM	
(e) Sea ice	as presently reported except that the word ICE should be replaced by figures	
J. Other elements	To be determined as need arises	

ANNEX IV

Annex to paragraph 4.5.5 of the General Summary

PARAMETERS, WITH THEIR RESOLUTION, TO BE INCLUDED IN SYNOPTIC REPORTS OF OCEAN SUBSURFACE OBSERVATIONS

Date of observation	-	Day of the month (GMT) and the month itself because in real-time processing data are being averaged over several days. The inclusion of an extra digit indicating the year would make the report ready also for archiving.
Time of observation	-	To the nearest minute (GMT), to meet requirements of regional and national research using series of soundings at intervals of a few minutes (BATHY). Further, to correspond to the high accuracy of measurements in TESAC.
Location of observation	-	Latitude and longitude to the nearest minute.
Ship's call sign	-	Required.
Surface wind	-	Inclusion required as an optional feature in view of air-sea interaction studies.
Air temperature	-	Same as for surface wind.
Sea temperature	-	At standard depths as well as at significant depths. Resolution in BATHY to tenths of a degree Celsius, in TESAC to hundredths of a degree Celsius. Indication of type of instrument required.
Depth	-	Provision should be made in TESAC for the reporting of data at levels down to the ocean bottom, and in BATHY below 1000 m depth; significant depths to be indicated to the nearest metre.
Salinity	-	In TESAC, to the nearest hundredths of parts per thousand (°/oo), both with respect to standard levels and significant levels. Indication of method of measurement required.
Current	-	In TESAC, in centimetres per second. Indication of method of measurement required.

ANNEX V

Annex to paragraph 4.9.5 of the General Summary

PROPOSED CODES FOR TRANSMISSION OF PROCESSED DATA IN DIGITAL FORM

1. <u>Data field identification</u>

	laaa	pppp YYGG ittt mm
	1	indicator for data field identification section
	aaa	type of data (Table 2, Appendix B Planning Report No. 29)
	pppp	level at which data applies
*see note	YYGG	date and time of reference
	i	indicator of units of time (ttt)
	i = 1	unit of time is hour
	i = 2	unit of time is day
	i = 3	unit of time is month
	ttt	time after reference time for which data are valid
	mm	code figure to indicate the procedure or model used to generate the data field. A table will be established by each centre to indicate, for example, subjective analysis, barotropic forecast, primitive equation forecast, etc.

The four character identifier pppp has the following forms :-

Constant pressure surface - pressure value in mb with introductory zeros if necessary

e.g. 1000 mb : pppp = 1000
300 mb : pppp = 0300

Thickness between constant pressure surface - p_1p_2 are the hundreds and tens digits of the upper constant pressure surface, p_3p_4 are the hundreds and tens digits of the lower constant pressure surface,

e.g. 500 - 1000 mb : pppp = 5000
300 - 500 mb : pppp = 3050

Sea level : pppp = 0999

Tropopause level : pppp = 0998

Earth's surface : pppp = 0997

Data types for which concept of level is not applicable
pppp = 0000

*The format as set out here applies only to spot analyses and prognoses (i.e. when aaa < 050). In the case of mean values, and especially prognostic means, it will be necessary to expand this part on account of the complexities in specifying dates and periods which arise from the longer time intervals involved. This problem is being referred to code experts.

2. Grid identification

2201	$0kN_aN_a$	$(Q_cL_aL_aL_a)_1$	$(L_oL_oL_oL_o)_1$	$(Q_cL_aL_aL_a)_2$	$(L_oL_oL_oL_o)_2$
	nnnn				

2202 $0kN_aN_a$ $Q_cL_oL_oL_o$ $d_id_id_id_i$ $d_jd_jd_jd_j$ iiii jjjj nnnn

2203 as 2202

2204 $0kN_aN_a$ $(Q_cL_aL_aL_a)_1$ $(L_oL_oL_oL_o)_1$ $(Q_cL_aL_aL_a)_2$ $(L_oL_oL_oL_o)_2$

$d_id_id_id_i$ $d_jd_jd_jd_j$ nnnn

2201	-	Geographical grid
k	-	Data format section follows (k=1) or omitted (k=0)
N_aN_a	-	Number of data lines in the bulletin
nnnn	-	Total number of grid points in the bulletin
$(Q_cL_aL_aL_a)_1$	-	The coordinates of the northern and
$(L_oL_oL_oL_o)_1$	-	western borders of the grid (the latitude and longitude circles which envelop the whole area of the grid)
$(\ldots)_2$ $(\ldots)_2$	-	Same for the southern and eastern borders
2202	-	Cartesian grid on Polar Stereographic projection
$Q_cL_oL_oL_o$	-	Quadrant and longitude in degrees of the meridian which is parallel to the j-axis of the grid, the j-axis being positive in the direction from pole to equator
$d_id_id_id_i$	-	The grid spacing along the i-axis
$d_jd_jd_jd_j$	-	Same for j-axis
iiii jjjj	-	The i coordinate of the pole in grid units and tenths. The j coordinate of the pole in grid units and tenths. The first figure denotes the sign of coordinate (0 - positive, 1 - negative). The origin of the coordinate system i,j is placed at the corner of the "enveloping" rectangle
2203	-	Cartesian grid on Lambert Conformal projection
2204	-	Cartesian grid on Mercator projection

3. <u>Data format identification</u> (Optional)

If the standard, value, units and number of digits given in Planning Report No. 29, Appendix B, Table 2 are used, this section is not to be included.

$33S_n r$ rrrr ugnn

33	indicator for data format identification section
S_n	sign of r rrrr
r rrrr	user-specified reference value in same units as data field
u	scale-factor indicator. This factor multiplied by the standard unit given in Appendix B, Table 2 indicates the units in which the data are given

u = 0	the scale factor is 1
= 1	" " " 10
= 2	" " " 100
= 3	" " " 1000
= 4	" " " 10000
= 5	" " " 0.1
= 6	" " " 0.01
= 7	" " " 0.001
= 8	" " " 0.0001
= 9	" " " 0.00001

g indicator of inclusion of sign

g = 0 sign is not given (values are assumed to be all of one sign)

g = 1 sign of each value is given

nn number of digits, including sign, if any, for each grid point value

4. Data content

kkN_oN_o $i_ai_aj_aj_a$ IIIII IIIII .... (N_oN_o times)

(In case of geographical grid the first group of this section reads: kkN_oN_o11)

kk - Number of the data line. By data line is meant the set of values at grid points which have the same latitude in geographical grids or the same ordinate value in a square grid. To specify the pole point in a geographical grid a special procedure is needed:

kk = 99 for North Pole
kk = 98 for South Pole

N_oN_o - Number of groups with data in this line (the groups are divided by spacing)

ll - Grid spacing along the latitude circle

$i_ai_aj_aj_a$ - For geographical grids

i_ai_a - the distance between the western border of the the grid and the first gridpoint in units of half degrees

j_aj_a - the distance between this line and the preceding one (half degrees); for the first line j_aj_a = 00.

$i_ai_aj_aj_a$ - for Cartesian grids :

i and j coordinates of the first grid point in half grid units along the appropriate axes.

*

* *

Appendix

INDICATOR aaa FOR THE IIIII GROUPS WITH DATA FIELD INFORMATION

(Preliminary version)

aaa	Content	Reference to the code
	(a) Each IIIII group contains data for one grid point	
011 PPPTT	Pressure and temperature	Code SYNOP
012 $d_wd_wP_wH_wH_w$	Information on sea waves	Code SYNOP SHIP
013 $dfd_wH_wH_w$	d - wind direction in compass points f - wind force d_w - direction of waves H_wH_w - height of waves in half-metres	
014 TTT_aDD	Temperature and dew point deficit	Code TEMP
015 ddfff	Direction and velocity of wind	Code TEMP
	(b) Each IIIII group contains data for two adjacent grid points	
021 $P_1P_1P_2P_2P_x$	Pressure at odd (P_1P_1) and even points (P_2P_2) in whole mb (the last two figures). P_x indicator of pressure value. P_x = 0 - pressure at both points <1000 mb P_x = 1 - pressure at the second point >1000 mb P_x = 2 - pressure at the first point >1000 mb P_x = 3 - pressure at both points >1000 mb	
022 $h_1h_1h_1h_2h_2$	Isobaric surface height in decametres	
$h_1h_1h_1$	- for the first point	Code TEMP
h_2h_2	- for the second point (the two last figures)	Code TEMP

aaa	Content	Reference to the code
023 $T_1T_1T_2T_2T_s$	Temperature in °C. T_s sign indicator	
	T_s = 0 temperature at both points > 0	
	T_s = 1 temperature at the second point < 0	
	T_s = 2 temperature at the first point < 0	
	T_s = 3 temperature at both points < 0	
024 $w_1w_1w_2w_2w_s$	Vertical velocity in centibars for 12 hours	
	w_s sign indicator	
	(c) Each IIIIII group contains data <u>for three adjacent grid points</u>	
032 $h_1h_1h_2h_2h_3h_3$	Isobaric surface heights in decametres	
h_1h_1	- for the first point	Code TEMP
h_2h_2	- for the second point	
h_3h_3	- for the third point (the two last figures)	

A N N E X VI

Annex to paragraph 4.10/1 of the General Summary

PRINCIPLES FOLLOWED IN DEVELOPING NEW SYNOP AND SHIP CODE FORMS

(a) The SYNOP and SHIP code forms should be sub-divided into several parts to facilitate automatic editing and elimination of information not required beyond certain distances from the point of origin.

(b) Code forms should be adapted to numerical data processing:

(i) The code form should be identifiable, so that in the event of mutilation of the heading of a bulletin, it will be possible to recognize the type of code;

(ii) Uniform and clearly defined code forms and procedures should be established for international use. The use of optional parts should be authorized only for compelling reasons; these parts should be such as to permit ready identification and should constitute the last part of the message so that they can easily be deleted when the message is transmitted beyond the zone for which these optional parts are required;

(iii) The coding systems used to describe meteorological elements should not introduce any sort of ambiguity upon decoding; it is, for example, essential to include the figure for hundreds of a mb of pressure, to have an unambiguous procedure for coding the sign of temperatures, etc.;

(iv) Coding procedures necessitating the insertion of occasional code groups or words such as the groups 99ppp, HAIL, SANDSTORM, etc., should be avoided.

(c) Code forms should be adapted to coding observations from automatic stations. The need for the data generally measured by automatic stations to be grouped at the beginning of the message, in order to avoid the transmission of a large number of solidi, should be stressed.

(d) There is a need to avoid artificialities in coding. Coding systems should not introduce any difficulties either at the stage of coding the observation or at the stage of manual decoding. It should be possible to code the element to be transmitted as it was observed or measured.

(e) Length of messages

(i) Messages should be as concise as possible in order to reduce the time required for their transmission. For this purpose, elements should not be reported with a greater precision than is justified by the method of measurement or the requirement. It may eventually be necessary to make provision for a code resolution somewhat finer than the one corresponding to the precision of present measurements, with a view to taking into account improvements. However, codes should not be made so compact that they give rise to difficulty in extraction of the required data or to unduly complex code forms;

(ii) Every effort should be made to avoid increasing the length of messages used to transmit observations from ships. If possible it should be reduced.

(f) Length and structure of groups

(i) For the purpose of economy, and in order to increase the operational flexibility of communications, it is essential to avoid using groups that contain letters and figures, unless there is some definite advantage in doing so;

(ii) The use of groups containing more or less than five figures must be avoided for the time being.

(g) Order of data

The series of elements transmitted should occur in a logical order to simplify the work of the observer and to facilitate later utilization of messages.

A N N E X VII

Annex to paragraph 4.11.4 of the General Summary

PROPOSED FORMAT OF NEW REGULATIONS REPLACING THE NOTES UNDER FM 11.D SYNOP

FM 11.IV SYNOP - Surface Report from a Land Station

IIiii Nddff VVwwW PPPTT $N_hC_LhC_MC_H$ $T_dT_dj_aj_pj_p$ (99ppp)

$(6P_oP_oP_oP_o)$ (7RRjj) $(8N_sCh_sh_s)$ $(9S_pS_ps_ps_p)$

$(3P_wP_wH_wH_w$ $(d_wd_wP_wH_wH_w))$ $(6a_3hhh)$

SYNOP is the name for the code form for a surface report from a land station.

REGULATIONS

(I-54) 11.1 $T_dT_dj_aj_pj_p$ -- This group SHALL be reported as either $T_dT_d$app or T_dT_d9jj in accordance with regional decision. The elements and specifications reported for jj SHALL be determined by Regional decision.

(I-54) 11.2 (99ppp) -- When the group $T_dT_d$app is reported and the pressure tendency is 9.9 mbs or greater, the 99ppp group SHALL be reported.

(Rec.56-68) 11.3 $(6P_oP_oP_oP_o)$ -- The inclusion of this group SHALL be mandatory whenever the following conditions apply together:

(a) The station elevation exceeds 500 m from the level to which pressure is reduced;

(b) The reduction method in use does not permit the computation of station pressure from the actual SYNOP report and from information contained in WMO Publications.

(I-54) 11.4 (7RRjj) -- The inclusion of this group and the element(s) and specifications for jj SHALL be determined by Regional decision.

(II-60) 11.5 $(8N_sCH_sh_s)$ -- The inclusion of this group SHALL be determined by Regional or National decision. When the $8N_sCh_sh_s$ group is reported, the following minimum requirements SHALL be met:

(II-60) 11.5.1 This group SHALL be repeated, as necessary, to report a number of layers (or masses) of cloud. The number of groups SHALL not exceed three, except when cumulonimbus are observed, in which case the number of groups increases to four, if necessary, in order to report the cumulonimbus.

(II-60) 11.5.2 The selection of layers (or masses) SHALL be made in accordance with the following requirements:

(a) The lowest individual layer (mass) of any amount (N_s equals 1 or more);

(b) The next higher individual layer (mass) the amount of which is greater than $N_s = 2$ (N_s equals 3 or more);

(c) The next higher individual layer (mass) the amount of which is greater than $N_s = 4$ (N_s equals 5 or more) and;

(d) Cumulonimbus clouds, whenever observed and not reported under (a), (b) and (c) above, by means of a group referring exclusively to Cb.

(II-60) 11.5.3 -- The rules given below SHALL be followed in reporting the ($8N_sCh_sh_s$) groups:

(a) The order which the groups appear in the report SHALL be in ascending order with respect to altitude (i.e., from low to high levels).

(b) In determining the cloud amounts to be reported for individual layers or masses in the 8-group, the observer estimates them taking into consideration the evolution of the sky, the cloud amounts of each layer or mass at the different levels, as if no other clouds were existing. Unconsidered guessing SHALL be avoided.

(Note: This requires elaboration in national instructions.)

(c) When the sky is clear (N=0), the 8-group SHALL not be reported.

(d) When N_s=9, the 8-group SHALL be coded $89/h_sh_s$, where h_sh_s is the vertical visibility.

(e) If two or more types of cloud occur with their bases at the same level and this level is one to be reported in accordance with Regulation 11.5.2 above, the cloud type that represents the greater amount SHALL be reported for C, and N_s SHALL be the total amount of clouds of all types whose bases are the same as that of the type reported by C.

(I-54) 11.6 ($9S_pS_ps_ps_p$) -- The use of this group and its specifications SHALL be determined by Regional decision.

(IV-68) 11.7 ($3P_wP_wH_wH_w$ ($d_wd_wP_wH_wH_w$)) - Coastal stations and light-vessels reporting wave parameters SHALL include the wave group(s) in SYNOP in accordance with Regional or National instructions. Coastal stations and light vessels required to report the "tendency" of the waves SHALL replace the wave group(s) by "WATEN $0_wP_wP_wH_wH_w$" in accordance with Regional or National instructions.

(I-54) 11.8 ($6a_3hhh$) -- When required by Regional decision to report the geopotential of an agreed "standard isobaric surface," high level stations SHALL report that geopotential by means of the $6a_3hhh$ group.

(Note: See paragraph 2 of the Specifications for PPP.)

(I-54) 11.9 -- The use, form and specifications for the Supplementary Groups identified by the group indicator figures 1, 2, 4 and 5 SHALL be determined by Regional decision.

(I-54) 11.10 -- If a Member considers its light-vessels (or off-shore stationary platforms) to be in the same category as land stations; the light-vessels SHALL report in SYNOP.

(III-64) 11.11 -- When the weather conditions can not be completely described by the information given in SYNOP and conditions justify their inclusion, one or more of the following words SHALL be added at the end of the report:

HAIL -- When a shower or a thunderstorm, accompanied by hail, occurs in the period covered by ww;

PAST HAIL -- When a shower or a thunderstorm accompanied by hail, occurred in the period covered by W;

SNOW or SLEET -- When a snow shower or a shower of rain and snow mixed, with a temperature above 0°C has been observed during the period covered by W;

SANDSTORM -- When a sandstorm, with a temperature below 0°C, has occurred in the period covered by W;

COTRA -- When the cloud reported consists in whole or in part of condensation trails.

SYNOPTIC REPORTING REQUIREMENTS

(a) The reporting of the first eight groups (i.e. including 99ppp and $6P_oP_oP_oP_o$), when data are available, is required for the global exchange of meteorological data.

(b) The reporting of the Supplementary groups, when data are available, is required for the Regional exchange of meteorological data.

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Material for inclusion in the INTRODUCTION

The following material is proposed as being suitable for inclusion in the INTRODUCTION to Chapter I of Volume B with respect to SYNOP:

1. When datum is not available for an element that is to be reported, the appropriate missing indicator is reported for that element.

2. Groups in brackets are drop-out groups and they are included in the report in accord with specified conditions or in accord with Regional and/or National requirements. If the(se) group(s) is (are) identi fied by a unique group indicator figure it may be repeated in the report as required.

3. All groups must be inserted (or appear) in the report in the positions indicated in the form of message.

4. The rules relating to the telecommunications practices are contained in Part III of the Introduction to WMO Publication No. 9.TP.4, Volume C (TRANSMISSIONS.)

5. The rules relating to the inclusion of SYNOPs in bulletins distribution to ships at sea are contained in PARTS V and VI of Weather Bulletins for Shipping, WMO Publication No. 9, TP 4, Volume D (Information for Shipping.)

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PROPOSED NEW SPECIFICATIONS
FOR SYMBOL dd (Page I-A-3-6, Vol. B)

dd -- FM : 11, 21, 22, 23, 26, 39, 40, 45

True direction, in tens of degrees, from which wind is blowing (or will blow). (Code 0877)

-- FM : 32, 33, 35, 36

True direction of upper level wind (rounded off to the nearest 5°) at standard isobaric surfaces, at fixed regional levels, at levels of significant winds, or at 250 mb surface in hundreds and tens of degrees.

-- FM : 41

True direction of upper level wind (rounded off to the nearest 5°) in hundreds and tens of degrees at the pressure level specified by $P_aP_aP_a$.

-- FM : 31

True direction, in tens of degrees, from which the cloud is moving. (Code 0877)

1 -- FM : 11, 21, 22, 23, 26, 31, 32, 33, 35, 36, 39, 40, 41, 45
All directions SHALL refer to the true north and not the magnetic north. (III-64)

2 -- FM : 11
Stations within 1° of the North Pole SHALL use Code 0878 (in lieu of Code 0877) for reporting wind direction. (III-64)

3 -- FM : 11
Stations within 1° of the South Pole SHALL use Code 0877 for reporting wind direction. These stations SHALL orient their azimuth rings so that the ring's zero coincides with the Greenwich meridian (e.g., wind from 0° longitude is coded 36, from 90° E longitude is coded 09, from 180° longitude is coded 18, and from 90° W longitude is coded 27, etc.). (III-64)

4 -- FM : 32, 33, 35, 36, 41
When encoding upper level winds, the wind direction observed in whole degrees SHALL be rounded off to the nearest 5°. The hundreds and tens digits of the rounded off direction SHALL be reported for dd and

the units digit (i.e., a zero or 5) SHALL be added to the hundreds digit of the wind speed. (IV-68)

Examples: (a) 293°/162 knots is encoded:

$$\begin{array}{r} 295 \\ +\ 162 \\ \hline 29662 \end{array}$$

(b) 292°/162 knots is encoded:

$$\begin{array}{r} 290 \\ +\ 162 \\ \hline 29162 \end{array}$$

5 -- FM : 11, 21, 22, 23, 26, 39, 40, 45
Note (6) under ff applies equally to dd. (III-64)

Note (recommendation):

-- In plain-language reports or forecasts, the direction of the wind SHOULD be expressed by reference to the cardinal points of the compass; i.e., north-west, south, north-east, etc. (III-64)

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LIST OF ITEMS TO BE INCLUDED IN THE INTRODUCTION TO CHAPTER I, PART A OF VOLUME B

The following items are to be included in the Introduction to Chapter 1, Part A of Volume B:

(a) Explanation of the status of Chapter I, Part A, as Annex II of the Technical Regulations, and the status of Regulations for the use of FM code forms and specifications for the coding of parameters;

(b) Definition of various terms;

(c) Explanation of the meaning of brackets in code forms, the coding of missing data, etc.;

(d) Appropriate reference to material contained in Volume C and Volume D;

(e) Explanation of numbering system used for FM code forms, Regulations for code forms, code tables, and specifications for the coding of parameters;

(f) Explanation of the system of symbolic letters;

(g) List of code names and word groups;

(h) List of indicator groups.

A N N E X VIII

Annex to paragraph 6.4.2.2 of the General Summary

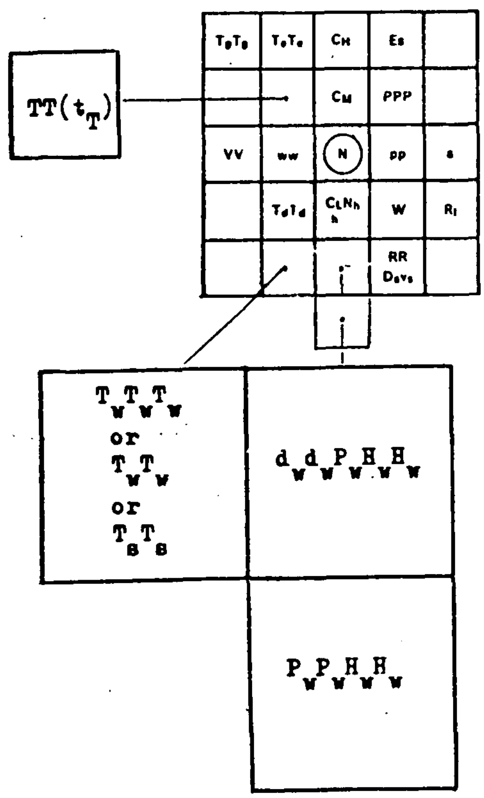
AMENDMENTS TO WMO PUBLICATION No. 151.TP.71

Chapter I - Preparation of meteorological charts and diagrams

Page I.5

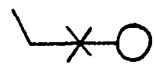
Paragraph 1.2.2.1

– Amend the plotting model as follows :



— Add to dd the following paragraph :

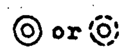
" When the direction of the wind is variable, this is represented by a cross placed on the shaft, as follows :



The indicated direction is always from west (270°), the speed being indicated in the normal way. "

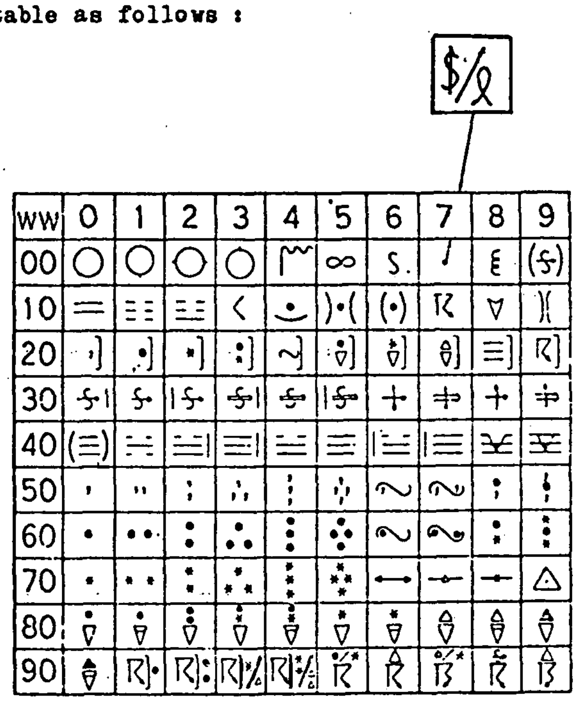
Page I.6

— Under ff, amend the first sentence after the table, as follows :

" A calm may be indicated by a circle drawn around the station circle :  "

Page I.7

— Under ww, amend the table as follows :



— Insert, before the paragraph starting by :" The bracket ... ... ", the following paragraph :

" When ww is coded 07, the symbol for blowing dust or blowing sand ( ) is used if the observation originates from a land station, the symbol for blowing spray ( ) is used if the observation originates from a sea station."

Page I.9

— Amend the text under TT to read as follows :

"TT or TT(t_T) Air temperature

The actual temperature is entered either in degrees Celsius or in tenths of a degree Celsius in the case of FM 21.D SHIP messages containing the group 1$T_wT_wT_wt_T$ (if tenths are entered, the figure for the tenths should be separated by a decimal point).

Negative values are preceded by a minus sign. "

Page I.11

— Amend the text under T_sT_s to read as follows :

" T_sT_s Difference between air temperature and sea temperature

This element may be plotted as an alternative to $T_wT_wT_w$.

The actual value is entered in degrees and tenths of a degree, the figure for the tenths being separated by a decimal point and negative values being preceded by a minus sign. This value is obtained :

- either from the element T_sT_s,
- or from the difference between the air temperature TTt_T and the sea temperature $T_wT_wT_w$.

N O T E :

For a given surface synoptic chart, it is possible, therefore, to plot <u>either</u> the sea temperature, <u>or</u> the difference between the air temperature and the sea temperature; but a single surface synoptic chart should not include both stations with $T_wT_wT_w$ and stations with T_sT_s. "

— Amend the text under T_wT_w to read as follows :

" $T_wT_wT_w$ Sea surface temperature

The actual value of this temperature is plotted in degrees and tenths of a degree, the figure for the tenths being separated by a decimal point and negative values being preceded by a minus sign. This value is obtained :

- either directly from the element $T_wT_wT_w$ when this is included in the message,
- or from the air temperature TT and the difference T_sT_s between the air temperature and the sea temperature when the element $T_wT_wT_w$ is not included in the message. "

Under $d_w d_w$,

- amend the definition of $d_w d_w$ to read as follows :

  " Direction of movement from which the swell waves come "

- delete the words " 49 or " at the 5th and 8th lines of the paragraph, and

- add the following note to the paragraph :

  " N O T E :

  When there is a second swell system, this is plotted below the first. "

— Amend the text under P_w to read as follows :

" P_w Period of swell waves

The code figure for P_w is plotted immediately to the right of the symbol for $d_w d_w$.

When there are no swell waves ($d_w d_w P_w H_w H_w$ = 00/00), P_w is not plotted. "

— Amend the text under H_w to read as follows :

" $H_w H_w$ Height of wind waves and swell waves, respectively

This code figure is plotted immediately to the right of the symbol for P_w or $P_w P_w$, respectively.

When there are no swell waves ($d_w d_w P_w H_w H_w$ = 00/00), $H_w H_w$ is not plotted. "

— Add the following definition :

" $P_w P_w$ Period of wind waves

The code figure for $P_w P_w$ is plotted under the symbol for low clouds."

Page I.12

Paragraph 1.2.2.3

— Amend this paragraph to read as follows :

"

Red is recommended for the plotting of C_H, W, $TT(t_T)$, T_dT_d, VV and of app when pp is negative.

Green is recommended for the plotting of RR, T_sT_s, $T_wT_wT_w$, P_wP_w, H_wH_w, d_wd_w, P_w and for ice data or any other elements referring to sea water. "

Page I.15

- Replace "$f_n f_n$" by "$f_n f_n f_n$".

- Under $d_{t_n} d_{t_n}$, amend the paragraph to read as follows :

" $d_{l_n} d_{l_n}$ Direction of thermal or derived wind which refers to the layer of thickness $h_{l_n} h_{l_n} h_{l_n}$

This is plotted with an arrow shaft in the same manner as for $d_n d_n$; second thermal or derived wind is plotted with a "dashed" shaft. "

- Under $f_{t_n} f_{t_n}$, amend the paragraph as follows :

" $f_{l_n} f_{l_n}$ Speed of thermal or derived wind which refers to the layer of thickness $h_{l_n} h_{l_n} h_{l_n}$

This is plotted as for $f_n f_n f_n$ but with ... "

- Replace "$h_{t_n} h_{t_n} h_{t_n}$" by "$h_{l_n} h_{l_n} h_{l_n}$".

- Under $T_n T_n$, amend the paragraph as follows :

" $T_n T_n T_{an}$ Air temperature at the level to which the chart refers

The actual temperature is plotted directly as reported, negative values (T_{an} odd) being preceded by a minus sign. "

- Under $T_{dn} T_{dn}$, amend the paragraph as follows :

" $T_{dn} T_{dn} T_{dn}$ Dew-point temperature at the level to which the chart refers

May be plotted in lieu of $D_n D_n$ and is obtained from the difference between $T_n T_n T_{an}$ and $D_n D_n$. "

- Insert the following definition after paragraph $T_{dn} T_{dn}$:

" $D_n D_n$ Dew-point depression at the level to which the chart refers

May be plotted as reported. "

- Replace "Δh_n, Δh_{t_n}, ΔT_n and ΔT_{dn}" by "Δh_n, Δh_{l_n}, ΔT_{dn} and ΔD_n".

Page I.16

- Paragraph 1.2.3.1.2.2

Delete "C_a" from the group of elements to be plotted, at the end of the paragraph

- Paragraph 1.2.3.1.5

Amend the paragraph as follows :

"
1.2.3.1.5 *Rules for plotting the individual elements — polychromatic system*

The same basic rules for plotting the individual elements as are used in the monochromatic system and given in paragraph 1.2.3.1.2 apply.

If two colours are used for plotting it is recommended that *red* be used for :

$d_{1_n} d_{1_n}$, $f_{1_n} f_{1_n}$, $h_{1_n} h_{1_n} h_{1_n}$, $T_n T_n T_{an}$, $T_{dn} T_{dn} T_{dn}$, Δh_{1_n}, ΔT_n, ΔT_{dn}, ΔD_n, for clouds of genera Ci, Cc and Cs and for GG and its parentheses.

Other entries should be in *blue* or *black*. "

Page I.17

- Paragraph 1.2.3.2.1

On the models 1 and 2, replace "ff" by "fff".

- Paragraph 1.2.3.2.2

Model 1

In the text relating to ff, replace ff by fff and $f_n f_n$ by $f_n f_n f_n$.

Model 2

- Add to the definition for dd the following sentence :

" In addition, whenever a 5° accuracy has to be plotted, a "plus" sign may be added to the figure in question. "

- Replace the text relating to ff by the following :

" fff Wind speed

This is entered ... ... "

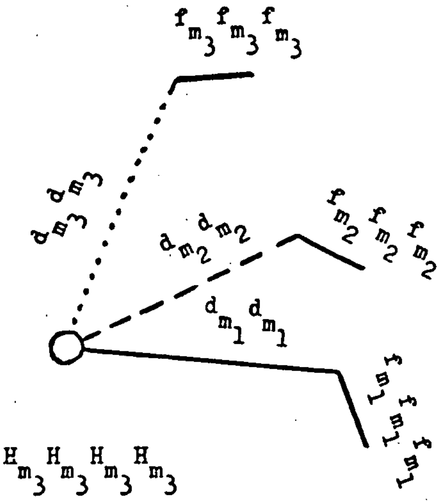
Page I.18

Paragraph 1.2.3.3.1

— Amend the paragraph as follows :

" The data concerning maximum winds are plotted in accordance with on of the following three models :

Model 1 :

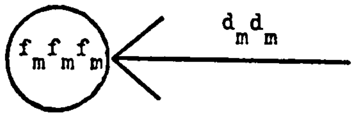


$P_{m_3} P_{m_3} P_{m_3}$ or $H_{m_3} H_{m_3} H_{m_3} H_{m_3}$

$P_{m_2} P_{m_2} P_{m_2}$ or $H_{m_2} H_{m_2} H_{m_2} H_{m_2}$

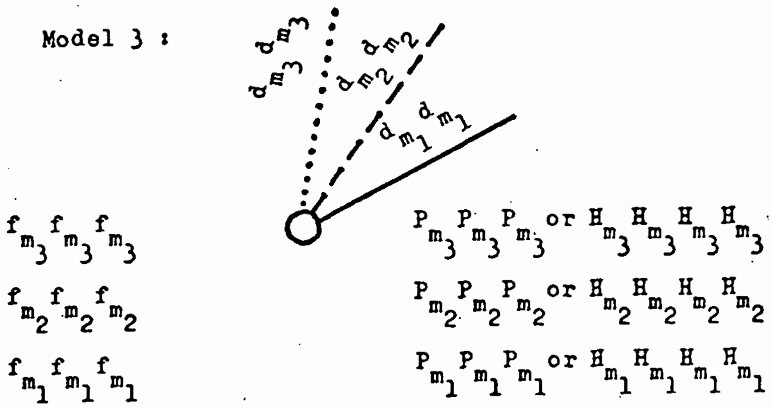
$P_{m_1} P_{m_1} P_{m_1}$ or $H_{m_1} H_{m_1} H_{m_1} H_{m_1}$

Model 2 :



$P_m P_m P_m$ or $H_m H_m H_m H_m$

Model 3 :



Models 1 and 3 provide for the plotting of several maximum winds on te same charts. //

- Paragraph 1.2.3.3.2

  Models 1 and 2

  Replace "$d_{a_n}d_{a_n}$" and "$f_nf_nf_n$" by "$d_{m_n}d_{m_n}$" and "$f_{m_n}f_{m_n}f_{m_n}$".

  Page I.19

- Under $H_{m_n}H_{m_n}H_{m_n}H_{m_n}$, amend the paragraph as follows :

" $H_{m_n}H_{m_n}H_{m_n}H_{m_n}$ — Altitude of maximum wind (FM 32.D, FM 33.D)

This element is plotted in 4 code figures.

N O T E S :

(1) If data for more than one level of maximum wind is plotted in Model 1, the various data $P_mP_mP_m$ or $H_mH_mH_mH_m$ are enetered one above the other according to their respective levels.

(2) A maximum wind occuring at the end of the sounding ($66P_mP_mP_m$ or $6H_mH_mH_mH_m$) is indicated by a line —— over $P_mP_mP_m$ or $H_mH_mH_mH_m$. "

- Delete all references to jn_n.

- Insert instead :

" $P_{m_n}P_{m_n}P_{m_n}$ — Pressure at the maximum wind level (FM 32.D, FM 33.D, FM 35.D, FM 36.D)

This element is plotted in millibars (3 digits) when the maximum wind level is situated above the 100 mb level; in this case, the figure of the tenths is separated by a decimal point.

(see notes under $H_{m_n}H_{m_n}H_{m_n}H_{m_n}$) //

Model 3

- Replace "$d_{a_n} d_{a_n}$" by "$d_{m_n} d_{m_n}$", and "$f_n f_n f_n$" by "$f_{m_n} f_{m_n} f_{m_n}$".

- Delete all references to jn_n

- Insert instead :

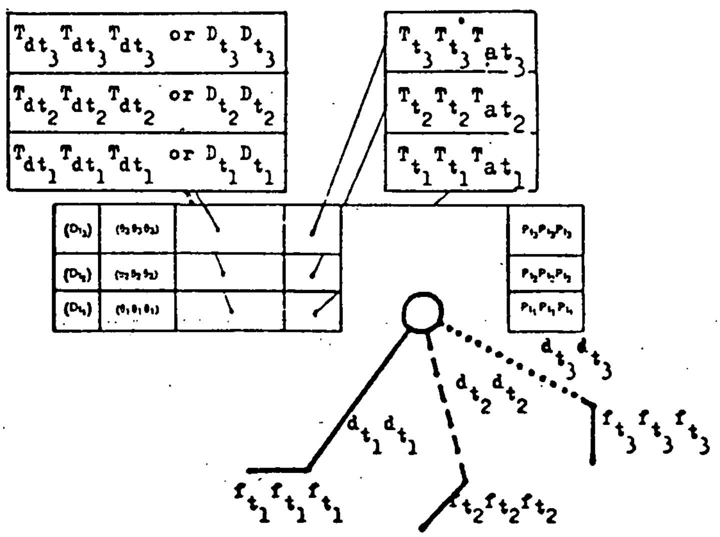
" $P_{m_n} P_{m_n} P_{m_n}$ — Pressure at the level of maximum wind

This element (altitude or pressure) is plotted following the same method as in Model 1 with the exception of its position which is to the right of the station. "

- Paragraph 1.2.3.4.1

Amend the paragraph as follows :

" The following plotting model is recommended for tropopause charts :



Page I.20

- Replace "$d_{b_n} d_{b_n}$" and "$f_n f_n$" by "$d_{t_n} d_{t_n}$" and "$f_{t_n} f_{t_n} f_{t_n}$".

- Delete all references to $H_{t_n} H_{t_n}$.

- Amend the paragraph under $P_{t_n} P_{t_n} P_{t_n}$ as follows :

Page I.13

Paragraph 1.2.3.1

Amend the text of the paragraph to read as follows :

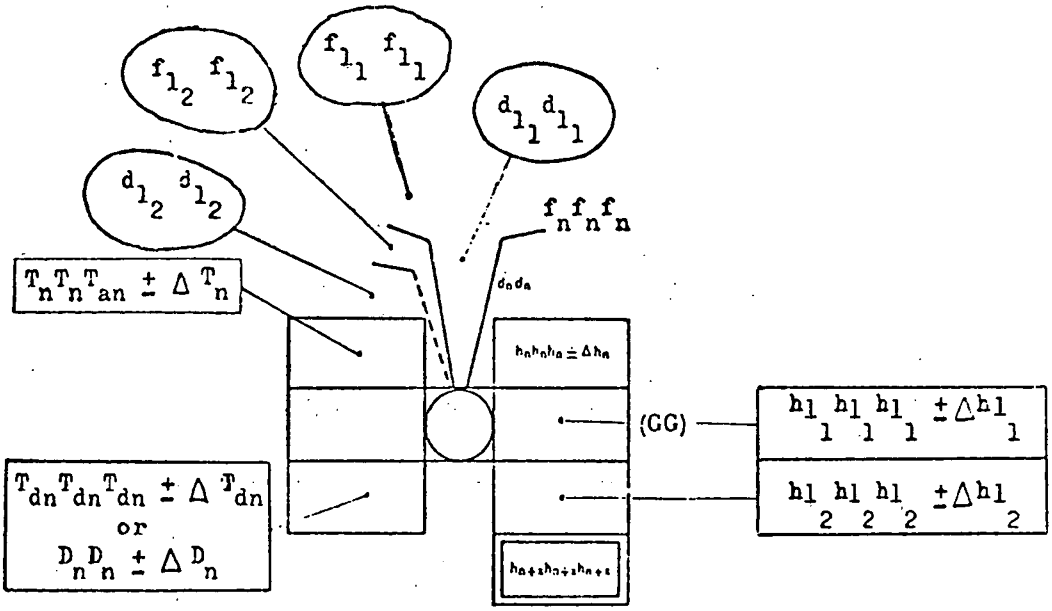
"1.2.3.1 Charts of isobaric surfaces

Charts of isobaric surfaces are recommended for representing the conditions of the free atmosphere. The standard isobaric surfaces are those at 1000, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30; 20, 10, 7, 5, 3, 2 and 1 mb.

If charts for standard isobaric surfaces above 100 mb are prepared, preference should be given to 50 mb and 30 mb."

Paragraph 1.2.3.1.1.1

Amend the model as follows :



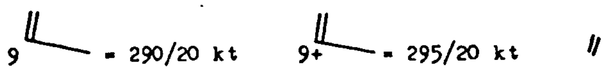
Page I.14

Paragraph 1.2.3.1.2.1

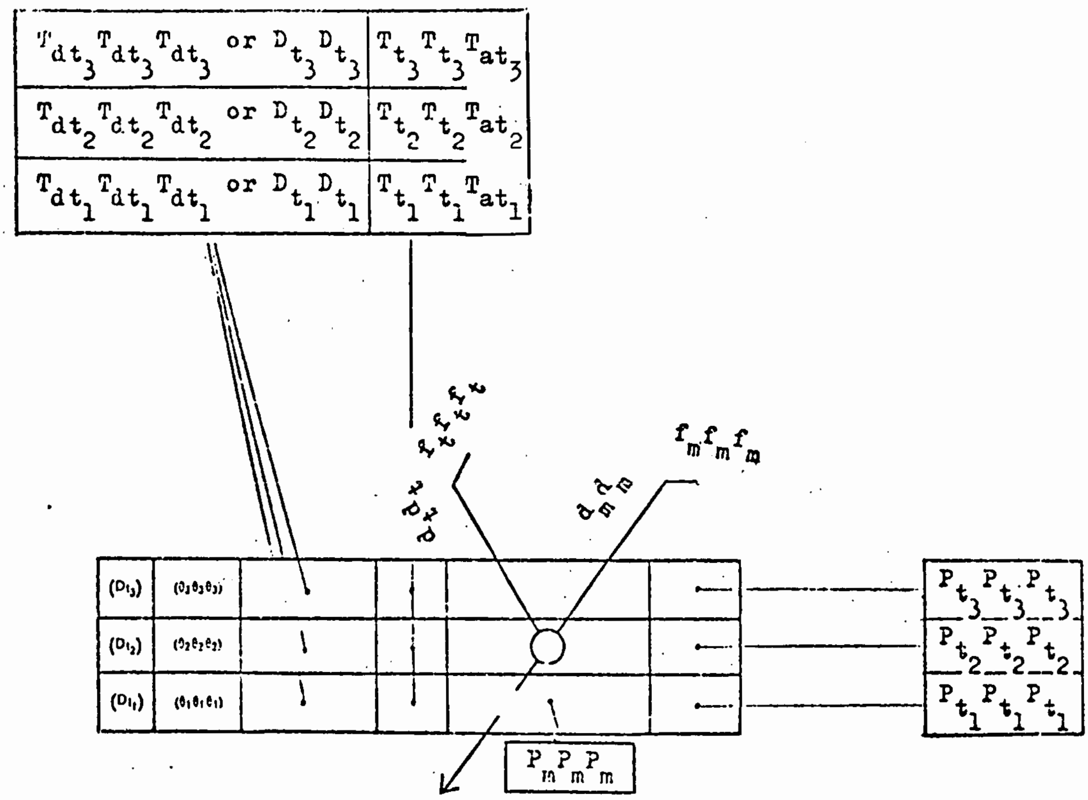
Under d_nd_n, amend the paragraph to read as follows :

" d_nd_n Wind direction at the level to which the chart refers

This is plotted using the shaft of an arrow which is drawn in the direction from which the wind is blowing toward the centre of the station circle and stops at its circumference. For greater precision, the figure of the tens of degrees of the direction may be plotted at the end of the shaft or, if the basic data only are plotted, below the station circle. Furthermore, a "plus" sign may be added to the right of the wind direction whenever a 5° accuracy has to be plotted, e.g.:



"



Page I.22

Paragraph 1.2.3.5.2

- Replace "$d_a d_a$" and "fff" by "$d_m d_m$" and "$f_m f_m f_m$".

- Amend the paragraph under $H_m H_m H_m H_m$ as follows :

" $P_m P_m P_m$ Pressure at the level at which the maximum wind occurs

This is plotted below the station circle, in millibars up to and including the 100 mb level, in tenths of millibars above the 100 mb level. In the latter case, a decimal point should be inserted between the tenths figure and the unit.

NOTES :

(1) The wind is plotted for the lowest tropopause and one wind maximum only.

(2) When the maximum wind plotted is the wind occurring at the end of the sounding (group $66P_m P_m P_m$), this is indicated by a line —— over $P_m P_m P_m$. "

Page I.26

Paragraph 1.6

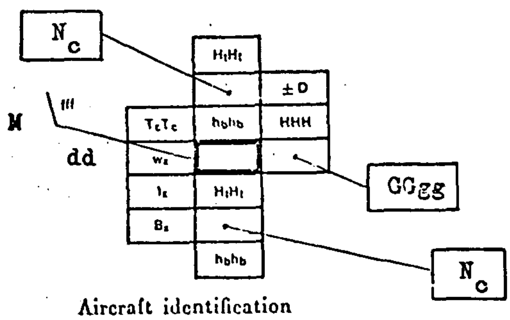
- Amend the beginning of this paragraph as follows :

" 1.6 Plotting of aircraft meteorological observation

1.6.1 AIREP Form

1.6.1.1 The plotting model

The elements given in an AIREP should be plotted according to the following model :



Aircraft identification

Page I.27

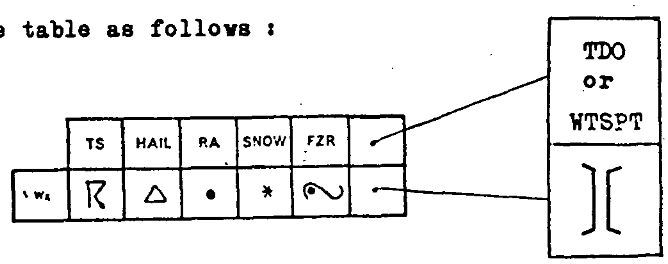
- Amend the beginning of paragraph 1.6.2 as follows :

" 1.6.1.2 Rules for plotting the individual elements

GGgg Time of observation

This is entered as reported. "

- Under w_x, amend the table as follows :



- Amend paragraph $d_m d_m$ as follows :

" dd Wind direction at flight level or altitude

This is shown by means of the shaft of an arrow drawn in the direction from which the wind is blowing. For mean wind observations the letter M is entered at the shaft. "

Amend the definition for fff as follows :

" fff Wind speed at flight level or altitude "

Page I.28

- Delete all references to "f_c" and "C_a".

- Amend paragraph N_c as follows :

" N_c Cloud amount

This is plotted using the appropriate symbol taken from the following table :

	SCT	BKN	CNS
N_c	◔	◑	●

NOTE :

When Cb is reported the symbol ⧗ is entered to the left of the corresponding N_c.

- Under I_x, amend the table as follows :

	~~ICE FBL~~	ICE MOD	ICE SEV
I_x	~~ψ~~	Ψ	Ψ̈

Page I.29

- Under B_x, amend the table as follows :

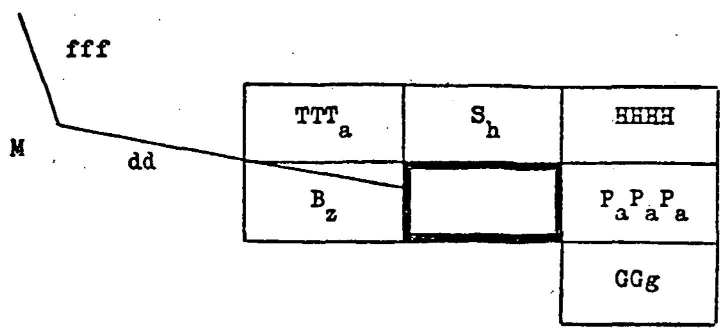
	~~TURB FBL~~	TURB MOD	TURB SEV
B_x	~~∧~~	_∧_	_⩓_

- Add a new paragraph 1.6.2 ;

" 1.6.2 CODAR Form

1.6.2.1 The plotting model

The elements given in a CODAR message should be plotted according to the following model :



The position at which the observation is made is marked by a square, shown in a heavier line in the model. The other "boxes" in the diagram fix the relative positions of the various elements and are not included in the actual plot.

1.6.2.2 Rules for plotting the individual elements

GGg Time of observation

This is entered as reported.

$P_aP_aP_a$ Pressure in millibars at the level at which the aircraft is flying

This element is entered as reported.

TTT_a Air temperature in tenths of degrees Celsius

This element is entered as reported, negative values being preceded by a minus sign.

dd Wind direction at pressure level $P_aP_aP_a$

This is shown by means of the shaft of an arrow drawn in the direction from which the wind is blowing. For the first spot wind reported, the point of the arrow terminates at the position " square ". For further spot winds and for mean winds, the point of the arrow terminates at the corresponding position reported in the message. For mean wind observations the letter M is entered at the shaft.

fff Wind speed at pressure level $P_aP_aP_a$

This is plotted using barbs and pennants as for ff on surface charts.

HHHH D-value or height reduced to the nearest standard pressure surface

This is entered as reported preceded by the reported plus or minus sign.

S_h Indicator of temperature or height type

To be plotted using the following symbols :

0	2	6
D(+)	D(-)	R

NOTE : When S_h = 4, no plotting is needed.

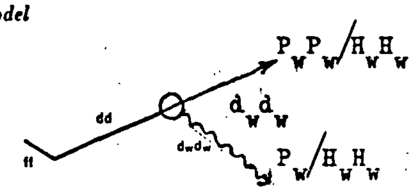
B_z Turbulence at pressure level $P_aP_aP_a$

This is plotted using the same symbols as for B_x in the AIREP Form.

- Amend the plotting model as follows :

" 1.7 **Plotting charts of wave conditions**

1.7.1 *The plotting model*



The "station" circle is drawn round the point of observation. "

Paragraph 1.7.2

- **Amend paragraph dd as follows :**

" **dd** Direction of the surface wind

This is plotted as on surface synoptic charts (see paragraph 1.2.2.2), but with the arrow extended through the station circle. "

- **Amend paragraph d_wd_w as follows :**

" d_wd_w Direction from which swell waves are coming

Swell waves are represented by an arrow with a wavy shaft drawn from the edge of the station circle in the direction towards which the swell is moving.

If d_wd_w is reported as 00, a wavy line without an arrow-head is drawn through the station circle in a north-south direction.

If d_wd_w is reported as 99, crossed arrows with wavy shafts are drawn through the station circle, one orientated from south-west to north-east and the other from south-east to north-west.

If d_wd_w is missing, it is plotted in the same way as for d_wd_w 99 but the arrow-heads are omitted. "

- **Insert after d_wd_w a new paragraph P_wP_w :**

" P_wP_w Period of wind waves

The code figure for P_wP_w is entered at the head of the wave arrow which is an extention of the surface wind arrow, except when no surface wind direction is reported (wind is calm or direction is missing) in which case it is entered to the right of the station circle. "

"$P_{t_n} P_{t_n} P_{t_n}$ Pressure at the tropopause

This is plotted in millibars up to and including the 1CO mb level, in tenths of millibars above the 100 mb level.

In this case, a comma should be inserted before the tenth value. "

- Amend paragraph under T_{p_n} T_{p_n} as follows :

" T_{t_n} T_{t_n} T_{at_n} Temperature at the tropopause

The actual temperature is plotted in tenths of degrees Celsius, preceded by a minus sign - to show a negative value."

- Add a new paragraph after $T_{t_n} T_{t_n} T_{at_n}$:

" $D_{t_n} D_{t_n}$ Dew-point depression at the level of the tropopause

The value given is entered directly as coded. "

- Amend the paragraph under T_{dp_n} T_{dp_n} as follows :

"T_{dt_n} T_{dt_n} T_{dt_n} Dew-point temperature at the tropopause

This value can be calculated from air temperature and dew-point depression."

- Delete all references to S_{t_n} .

Page I.21

- Delete all references to Z_{b_n} .

- Paragraph 1.2.3.5.1

Amend the paragraph as follows :

" The elements on this chart are plotted according to the following model :

- Amend paragraph P_w as follows :

" P_w Period of swell waves

The code figure for P_w is entered at each arrow-head except when $d_w d_w$ is 99 or is missing in which case it is entered above the station circle. "

- Amend paragraph H_w as follows :

"

$H_w H_w$ Height of the waves

The code figure for $H_w H_w$ is plotted to the right of P_w or $P_w P_w$ as appropriate and is separated from the period by a solidus. "

Chapter II - Representation of analyses

Page II.3

- In the table, make reference to the convergence line :

"17. Convergence line  Solid orange line"

- Renumber the other lines.

A N N E X IX

Annex to paragraph 7.5.6.4 of the General Summary

Part A

CODE ENABLING ACCELERATED TRANSMISSION OF GRAPHIC FACSIMILE DOCUMENTS

1. INTRODUCTION

Reproduction of pictorial documents is made on two levels only, "black" and "white".

For encoding purposes the document is analyzed line by line, each line being divided into quanta of length equal to a scanning step.

A pictorial document is made up of black strokes on a white background. Any black area of a document is therefore termed a "stroke".

A stroke is divided into "runs" by the scanning lines intersecting it, the number of runs being equal to the number of lines. After quantization the runs are rectangular in shape, each rectangular element being one quantum in height and a multiple of a quantum in length. In code, the location and length of the runs in each scanning line is expressed by a series of binary digits or "bits". The set of bits describing all the runs in a line gives a "sentence". The complete set of sentences gives a text which may be transmitted through any channel capable of handling data transmission or conventional facsimile. The transmission time of a given document depends on its complexity and the band width of the channel used.

2. DESCRIPTION OF THE CODE

2.1 Method of quantization

The usable part of the line (454 mm ± 0.5%) is divided into 1720 quanta for a co-operation index of 576, and 860 quanta for a co-operation index of 288.

Lines are numbered in their scanning order. Odd lines have the origin 0 of their abcissae placed one quantum before the start of the line and even lines half a quantum before the start of the line.

2.2 Description of a black run

There are two methods for describing a black run, the inscription method and the retouch method.

2.2.1 Inscription method

A black run is described by the abcissa of its starting point and by its length, both expressed in natural binary numeration with the digits taken in descending order. The abcissa is described by 11 binary digits and the length by 3, and together they form a "inscription word" consisting of:

- one 0 bit
- the 11 bits representing the abcissa
- the 3 bits representing the length
- one 0 bit.

The combination 000 indicates a length greater than 7 quanta. In such a case the word is followed immediately by a second word made up in the same way but whose abcissa bits describe the abcissa of the final portion of the run, and whose 3 following bits are 001. Such a pair of words is termed a "double word".

2.2.2 Retouch method

Here a black run is described by a retouch of the run in the preceding line belonging to the same stroke. Seven successive retouches may be made to a given run after it has been entered by the inscription method. This number is termed the "survival time". Runs derived from others by retouch are numbered in order of scanning line starting from 0. 0 corresponds to the run entered by the inscription method and the retouch number is termed the "age of the run".

A retouch is described by a 4-bit multiplet termed a "retouch multiplet". The displacement of the start and end positions of the given run from those of the run in the preceding line are described as in the table given below.

		Displacement of end of run (in quanta)			
		- 1,5	- 0,5	+ 0,5	+1,5
Displacement of start of run	- 1,5	0011	0010	0001	
	- 0,5	0111	0110	0101	0100
	+ 0,5	1011	1010	1001	1000
(in quanta)	+ 1,5		1110	1101	1100

The survival time rule is applied as a matter of course even if the stroke vanishes before the seventh line. Where such is the case the retouch byte "erase", given by 0000, is used in each sentence where needed.

The combination 1111 is not used.

2.3 Rules for using the inscription and retouch methods

The inscription method is used to describe a run in all cases where the retouch method is inapplicable, that is whenever it is not possible to derive the run from the preceding line.

Inscription runs are divided into two categories, "retouchable" and "non-retouchable", according to the rules given below.

Strokes consisting of more than eight runs are re-inscribed using the same method as for the first inscription.

Any given line is limited to a total of 32 retouchable inscription runs.

A line is limited to a total of 96 runs for retouch on the following line (this total includes fictitious runs below survival age but requiring emission of the erase byte).

Any inscription run is classified as non-retouchable as a matter of course when either of these limits has been reached.

Runs longer than 7 quanta, which are described by "double words", are classified as non-retouchable.

2.4 Classification of retouch bytes by the location of the run to which they correspond

Retouch multiplets are classified according to the following rules:

1. Bytes corresponding to retouchable inscription runs are emitted in order of "rank" of ascending abcissae from the start of the line.
2. Bytes corresponding to runs derived from successive retouches always keep the same "rank" as the initial run (inscription run) from which they are derived.
3. Retouch multiplets are emitted in groups of the same age in ascending order of age (1 to 7).

2.5 Make up of sentences and synchronization

Words and multiplets are divided into three categories: retouchable inscription words, retouch multiplets and non-retouchable inscription words. In any sentence all the words and bytes of the same category are grouped in a "series" as follows:

- Inscription words are placed in order of ascending abcissae
- Retouch multiplets are placed in the order given above (2.4)

A sentence is made up of:

- A sentence start word
- The series of retouchable inscription runs
- A retouch start word
- The series of retouch multiplets
- The series of non-retouchable inscription runs (no restriction as to their number)

The start word consists of 16 x 1 bits. The retouch start word consists of:

- 1 x 1 bit
- 14 x 0 bits
- 1 x 1 bit

The series of retouch words may if necessary be completed by 4-bit completion multiplets to bring the number of bits up to a multiple of 16.

Such multiplets, when used, are coded as follows:

1100 for odd lines

0000 for even lines

2.6 Minimum duration of sentences: completion words

The minimum duration of sentences should be set at 62.5 or 125 milliseconds (the figure used should be given in the transmission characteristics).

In transmission from one computer to another it is not necessary to have a minimum duration time for sentences.

Completion words enable minimum duration to be reached or exceeded in all cases. They consist of the co-operation index word emitted immediately prior to the start of the document as described in paragraph 2.7.1. When completion words are required they are added after the non-retouchable inscription runs.

In certain circumstances use may be made of the same completion words where the operation of coding or decoding apparatus so requires it. They may be placed at some point after the retouch multiplets.

2.7 Operating procedure

2.7.1 Start procedure

Before message transmission the coder will emit 40 minimum duration sentences. Where transmission is from one computer to another a single minimum duration sentence is sufficient. The sentences are made up as follows:

- The standard sentence start word, that is: 16 x 1
- One of the two 16-bit words given below, repeated throughout the rest of the sentence. The word used indicates the co-operation index.

  Co-operation index 576: 0111101010101010

  Co-operation index 288: 0111010101011010

2.7.2 End procedure

After the last effective sentence at least 40 minimum duration sentences will be emitted, or just one in the case of transmission from one computer to another. These sentences are to be made up in the same way as the start sentences with the exception of the repeat word indicating end of message, which is:

0111010110101010

2.7.3 Interruption and restart procedure

A set of so called interruption and restart sentences as defined below and made up of:

- At least one interruption sentence (two where minimum duration is 62.5 ms)
- Four restart sentences (eight in the case of 62.5 ms)

is used for temporary interruption of transmission of information by facsimile.

It may only be inserted in the coded message between sentences.

Interruption and restart sentences are made up in the same way as start sentences with the exception of the repeat word, which is:

- 0111101011111010 for interruption
- 0111111110101010 for restart.

This procedure is not to be used in case of computer to computer working.

*

* *

Part B

FORMATTING PROCEDURES FOR THE TRANSMISSION OF CODED DIGITAL FACSIMILE

1. Conversion of facsimile transmissions to alpha- numeric (International Alphabet n° 5) transmission

1.1 Software system

For the error control system to be transparent in relation to the coded digital facsimile, the facsimile data must be adapted to this system.

1.1.1 Division into 7-bits pseudo-characters

The string of bits forming the text of the facsimile is to be divided into pseudo-characters of 7 bits each. In the case of a text where the total number of bits is not a multiple of 7, the last pseudo-character is made up to 7 bits by the addition of the appropriate number of 0 bits.

1.1.2 Elimination of control pseudo-characters

All the pseudo-characters as thus constituted may contain configurations corresponding to control characters. These configurations must be eliminated in order to avoid possible errors of interpretation. For this purpose, any pseudo-character appearing in the left-hand column of the table hereunder is to be replaced by the corresponding pseudo-character in the right-hand column, preceded by the character ESC (1/11).

CONVERSION TABLE

Character appearing in the original message	Substitute Character end
NUL	A
SOH	B
STX	C
ETX	D
EOT	E
ENQ	F
DLE	G
SYN	H
ETB	I
ESC	J
FS	K
GS	L
RS	M
?	N

1.1.3 Parity of the pseudo-characters

Each 7-bits pseudo-character is to be completed by an 8th parity bit, in accordance with Recommendation 3 in Annex IV of the Final Report of the 5th Session of the CSM Working Group on Telecommunications.

Note : At the reception end of a text composed in this way, there is no difficulty in reverting to the original text. The original facsimile text is necessarily a multiple of 16, so that it is sufficient to divide the string of bits less the parity bits by 8 ; the remainder of the division gives the number of "parasite" bits added before transmission these will have to be eliminated if it is desired to decode the text.

1.2. Hardware

The hardware error control system, as in Recommendation V.41 CCITT, is transparent, but such systems are usually linked up with switching devices which are likely to suffer interference from the facsimile texts. If this is the case, the text can first be transformed according to the principle outlined in paragraph 1.1 above.

2. Facsimile data messages

2.1 After the transformations described above, the text obtained is of an alpha- numeric type. This text must then be converted into bulletin and message format to be in conformity with normal rules for meteorological bulletins and messages (Recommendation 6, Annex VII of the Final Report on the 5th Session of the CSM Working Group on Telecommunications). Since a meteorological message may comprize more than 500,000 pseudo-characters it is necessary, to conform both to the principle that messages may not exceed 300 groups (i.e. 1800 characters) and to the rule that the transmission of raw data has priority over facsimile transmission, to break down the total message into a number of sub-messages each containing 1,880 characters or pseudo-characters, with the exception of the last su -message of a series which may be of shorter length than 1,880 characters or pseudo-characters.

2.2 Composition of messages

The message will comprize a starting-line and an end-of-message.

2.2.1 Starting line : this line shall be composed as follows :

$$\begin{smallmatrix}S\\O\\H\end{smallmatrix}\ \begin{smallmatrix}C\\R\end{smallmatrix}\ \begin{smallmatrix}C\\R\end{smallmatrix}\ \begin{smallmatrix}L\\F\end{smallmatrix}\ \text{nnn}\quad \begin{smallmatrix}S\\P\end{smallmatrix}\ \text{CFFFF}\quad \begin{smallmatrix}S\\P\end{smallmatrix}\ \text{YYGG}\quad \begin{smallmatrix}S\\P\end{smallmatrix}\ \text{LLNN}$$

- where : $\begin{smallmatrix}S\\O\\H\end{smallmatrix}$, CFFFFand nnn have their standard meanings,

YY = day of month

GG = GMT time

LL = number of sub-messages

NN = serial n° of sub-messages, in this case NN = 01

2.2.2 End-of-message : this line shall be constituted by the signal :

$$\begin{smallmatrix}C\\R\end{smallmatrix}\ \begin{smallmatrix}C\\R\end{smallmatrix}\ \begin{smallmatrix}L\\F\end{smallmatrix}\ \begin{smallmatrix}G\\S\end{smallmatrix}$$

2.3 Sub-messages

As described above, the original message is to be divided into sub-messages. These sub-messages are to be composed as follows:

- insertion, after the starting line, as defined in 2.2.1, of 1853 pseudo-characters, followed by the 4 characters $\begin{smallmatrix}C\\R\end{smallmatrix}\begin{smallmatrix}C\\R\end{smallmatrix}\begin{smallmatrix}L\\F\end{smallmatrix}\begin{smallmatrix}R\\S\end{smallmatrix}$
- the part of the message starting by the character $\begin{smallmatrix}S\\0\\H\end{smallmatrix}$ and ending by the character $\begin{smallmatrix}R\\S\end{smallmatrix}$ then constitutes the first sub-message
- character $\begin{smallmatrix}R\\S\end{smallmatrix}$ is followed by a new starting line identical to the one described at 2.2.1 above, except that NN will now be 02.

After a further 1853 pseudo-characters, following the starting line of this sub-message, the separating signal $\begin{smallmatrix}C\\R\end{smallmatrix}\begin{smallmatrix}C\\R\end{smallmatrix}\begin{smallmatrix}L\\F\end{smallmatrix}$, $\begin{smallmatrix}R\\S\end{smallmatrix}$ is again inserted. This process is repeated until the last sub-message is reached. The last sub-message will end with the signal $\begin{smallmatrix}G\\S\end{smallmatrix}$, as stated at 2.2.2 above, instead of with $\begin{smallmatrix}R\\S\end{smallmatrix}$ and may comprize less than 1853 pseudo-characters.

3. Application of the error control system

The sub-messages composed as described above are in fact alphanumeric messages. The standard error control system, described in Recommendation 3, Annex IV of the Final Report on the 5th Session of the CSM Working Group on Telecommunications, will be applied to them.

A N N E X X

Annex to Recommendation 6 (CSM-V)

STANDARDIZED FORMAT FOR THE EXCHANGE OF AIRCRAFT REPORTS FOR SYNOPTIC PURPOSES

A. Elements to be reported and the order in which they are to appear:

1. Aircraft identification*
2. Position
3. Time
4. Flight level number
5. Air temperature
6. Wind (word "SPOT", if reported, follows wind) #
7. Position of wind (if different from element 2)
8. Turbulence (if reported)*
9. Aircraft icing (if reported)*
10. Second temperature (if reported)
11. Second wind (if reported)
12. Position of second temperature and/or wind (if elements 10 or 11 are reported)
13. Additional information (if reported)*

B. Specifications for reporting above elements:

Element	Specifications	Examples
1. Aircraft identification	Record as given.	PA155, AF51
2. Position	Latitude and longitude are preferred, in whole degrees or in degrees and minutes. Use indicators N or S and E or W for north or south and east or west, respectively. Position may be reported by a geographical name of the position, provided only one word is used.	24N 50W, 00N 00E, 3430S 180W, 0000S 0000E, 1224S 5335W, 70S 18000E, NIAMEY, MJSJ, CYUL, A140, JOS

*Elements 1, 8, 9 and 13 are optional in messages exchanged in order to satisfy the requirements of Recommendation 27 (CSM-IV).

As a result of an amendment to Technical Regulations Chapter 12/ICAO Annex 3 which is expected to come into force in February 1971, the word "MEAN" will be used for winds which are not spot winds, and the word "SPOT" will no longer be authorized for use.

p. 77 (CSM-IV)
selection for exchange

Element		Specifications	Examples
3.	Time	Report in Greenwich Civil Time.	2258, 1725
4.	Flight level number	Flight level is indicated by "FL" followed by the flight level number.	FL330, FL060, FL085
5.	Air temperature	Report negative values (minus) as "MS" and positive values (plus) as "PS", followed by the temperature in degrees Celsius.	MS33, PS04, MS50, PS00, MS00, MS09
6.	Wind	Report direction in degrees and speed in knots, with the direction and speed separated by a slant (/). Calm and light and variable winds may be reported as 000/00 or L/V. The direction of variable winds of a given speed is reported as 999.	240/120, L/V, 000/00, 070/15, 345/55, 310/70 SPOT # 999/10
7.	Position of wind	Report in whole degrees of latitude and longitude, followed by N, S, E, or W, as appropriate.	22N 180W, 00N 00W, 00S 00E, 44S 180E, 34N 120E, 26N 133W
8.	Turbulence	Report turbulence as "TURB" moderate as "MOD" and severe as "SEV".	TURB MOD, TURB SEV
9.	Aircraft	Report icing as "ICE" and moderate and severe as in element 8.	ICE MOD
10.	Second temperature	See element 5	
11.	Second wind	See element 6	
12.	Position as in 7		
13.	Additional information	Use abbreviations given in column 4 Technical Regulations, Chapter 12, Attachment A.	

? icing

Column 4 とは どれのことか

See Note on page 1.

C. Elements specifically excluded from edited version:

The following elements contained in the AIREP form (Attachment A, Technical Regulations/Annex 3) are not permitted in the edited version:

1. Information pertaining to next position and time over (item 5, Attachment A)
2. Information pertaining to estimated time of arrival (item 6, Attachment A)
3. Information pertaining to endurance or fuel remaining (item 7, Attachment A)

The following words, occasionally appearing in unedited AIREPs, are not included:

1. POSITION, POS, PX, etc.
2. AT, BY, OVER, ABM, ABEAM, etc.
3. GMT, Z, GCT, etc.
4. ASC, DES, ALT, FA ("FL" to be used)
5. TEMPERATURE, TEMP, T, TMP, TMS, etc.
6. WIND, WND, VENT, etc. 12 ?
7. Word contractions not recognized by WMO or ICAO
8. Word or contractions not provided for in elements 1 through 11 of paragraph B above. Geographical names may be used in element 2, however, latitude and longitude are preferred.
9. MINUS, PLUS, MOINS, M, -, etc.

D. Plain language positions

Members transmitting AIREPs containing meteorological information in which the aircraft position (element 2) is in plain language (not given in latitude and longitude) should convert plain language positions into latitude and longitude, in accordance with Technical Regulations, Chapter [12.1] 2.6.4 (b).

E. Use of spaces

If both letters and numbers appear in an element, spaces should not be used to separate the letters from the numbers. The following examples show what are and what are not permitted in the edited format:

	Are <u>not</u> permitted in edited format			<u>Are</u> permitted in edited format		
1.	PA 155	IB 983	LH 2	PA155	IB983	LH2
2.	24 N 50 W,	0000 S 35 E		24N 50W*	0000S 35E*	
3.	FL 370,	FL 085		FL370,	FL085	
4.	MS 41,	PS 00,	MS 07	MS41,	PS00,	MS07

* A space should separate the latitude from the longitude, even though both are contained in the same element.

ANNEX XI

Annex to Recommendation 7 (CSM-V)

A_i - Accuracy of the fix and repetition rate of atmospherics

Code figure	Accuracy of fix	Rate of atmospherics
0	No assessment	
1	Estimated error $<$ 50 km	$<$ 1 per second
2	Estimated error 50 - 200 km	$<$ 1 per second
3	Estimated error $>$ 200 km	$<$ 1 per second
4	Estimated error $<$ 50 km	1 or more countable flashes/sec
5	Estimated error 50 -200 km	1 or more countable flashes/sec
6	Estimated error $>$ 200 km	1 or more countable flashes/sec
7	Estimated error $<$ 50 km	Rate so rapid number cannot be counted
8	Estimated error 50 - 200 km	Rate so rapid number cannot be counted
9	Estimated error $>$ 200 km	Rate so rapid number cannot be counted

A N N E X XII

Annex to Recommendation 8 (CSM-V)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

Part A

$M_iM_iM_jM_j$ - Identification letters of the code form

Code Form	M_iM_i	Part of Message - M_jM_j Part A	Part B	Part C	Part D	No. distinction
SYNOP FM 11.E	MM					XX
SHIP FM 21.E, SHIP FM 22.E, SHRED FM 23.E	NN					XX
SYNOP FM.14.E	AA					XX
SHIP FM.24.E	BB					XX
SAREP	CC	AA	BB			-
SAREP SHIP	DD	AA	BB			-
RADOB	FF	AA	BB			-
RADOB SHIP	GG	AA	BB			-
BATHY	JJ					XX
TESAC	KK					XX
CODAR	LL					XX
PILOT	PP	AA	BB	CC	DD	-
PILOT SHIP	QQ	AA	BB	CC	DD	-
ROCOB	RR					XX
ROCOB SHIP	SS					XX
TEMP	TT	AA	BB	CC	DD	-
TEMP SHIP	UU	AA	BB	CC	DD	-

M_iM_i are two identical letters indicating the code form and M_jM_j are two identical letters indicating the Part of the message where necessary.

Notes (a) there shall be no space between M_iM_i and M_jM_j;

(b) the four letters shall always be followed by a space and not immediately by any figure or other letter;

(c) if it is not necessary to indicate the Part of the message, M_jM_j shall always be included in the group as XX.

* * *

Part B

Amendments to code forms FM 11.D and FM 32.D

1. Amend the beginning of FM 11.D SYNOP to read:

   $M_iM_iM_jM_j$ YYGG

   IIiii Nddff......(etc).....

2. Amend Note (1) under FM 11.D to read:

   "(1) SYNOP is the name of the code form for a surface report from a land station."

3. Insert new Note (2):

   "(2) In a bulletin of SYNOP reports the groups $M_iM_iM_jM_j$ YYGG shall be given only in the first line of the text of the bulletin."

4. Substitute in each Part of FM 32.D $M_iM_iM_jM_j$ for M_iM_i

A N N E X XIII

Annex to Recommendation 10 (CSM-V)

AMENDEMENTS TO WMO PUBLICATION No. 9.TP. 4, VOLUME B

FM 39.E Upper-level temperature and wind (possibly air density) report from land rocketsonde station.

ROCOB

SECTION 1	$M_iM_iM_jM_j$	YYGGgg	IIiii	$r_ma_1e_5m_rG_d$
SECTION 2	HHZ_TTT		$ddffj_n$	$(9d_pp_1p_1p_1)$
	HHZ_TTT		$ddffj_n$	$(9d_pp_1p_1p_1)$
	.....		.....	.....
SECTION 3	$(11Z_TT_1T_1$		$P_1P_1h_1h_1h_1$	$d_1d_1f_1f_1j_n$
	.....		.....	.....
	$11Z_TT_nT_n$		$P_nP_nh_nh_nh_n$	$d_nd_nf_nf_nj_n$
	$22Z_TT_1T_1$		$P_1P_1h_1h_1h_1$	$d_1d_1f_1f_1j_n$
	.....		.....	.....
	$22Z_TT_nT_n$		$P_nP_nh_nh_nh_n$	$d_nd_nf_nf_nj_n)$
	JJJ			

N O T E S :

(1) The code name ROCOB refers to an upper-level temperature and wind (possibly air density) report from a land rocketsonde station. The word ROCOB shall not be transmitted as part of the report.

(2) The code form is divided into three sections:

(i) Section 1 - identification and position data
(ii) Section 2 - Data for standard geometric heights
(iii) Section 3 - Data for isobaric surfaces

(3) Section 1

(i) When a firing is made but data are not obtained, the report consisting of Section 1 shall be transmitted; symbols a_1 and G_d are coded in accordance with the notes under Codes 0262 and 1334, respectively.

(4) Section 2

(i) This section is mandatory

(ii) Mandatory levels

(a) Data shall be reported for every 5 km vertical interval, beginning at 20 km, up till the top of the ascent, and for the lowest level of the ascent for which data are available, provided its altitude is higher than 20 km.

(b) If data are not available for one or more of the above specified altitudes, the code groups for those levels will be inserted in the report in their altitude sequence and solidi (/) should be reported for the missing elements.

(iii) Significant levels

All data shall be reported for those non-mandatory levels at which significant changes occur. The mandatory and significant levels are intermixed in the report in ascending order with respect to altitude. The criteria for significant changes are as follows:

(a) A departure of the wind speed of 10 or more knots from a linear interpolation between two consecutive mandatory levels;

(b) A departure of the wind direction from a linear interpolation between two consecutive mandatory levels, thus:

60° or more - when the average wind speed for the layer is 16 to 30 knots;

30° or more - when the average wind speed for the layer is 31 to 60 knots;

20° or more - when the average wind speed for the layer is 61 knots or more;

(c) A temperature change of $3^{\circ}C$ from a linear interpolation between two consecutive mandatory levels.

(iv) Use of bracketed groups

Groups $9d_pp_1p_1p_1$ are included in the report only when data are available.

(5) Section 3

This section is optional and should be included whenever data are available.

(i) Data for the isobaric surfaces of 70, 50, 30, 20, 10, 7, 5, 3, 2, 1, 0.7, 0.5, 0.3, 0.2 and 0.1 mb whenever available.

(ii) P_1P_1, P_2P_2, ..., P_nP_n shall be included in whole millibars up to and including the 1 mb surface and in tenths of a millibar above the 1 mb surface.

FM 40.E Upper-level temperature and wind (possibly air density) report from rocketsonde station on ship.

(To be amended accordingly)

<u>Specifications of new symbolic letters</u>

11 Indicator figures - standard isobaric surface data follow, P_1P_1 .... P_nP_n reported in whole millibars and $h_1h_1h_1$ .... $h_nh_nh_n$ reported in decameters.

22 Indicator figures - standard isobaric surface data follow, P_1P_1 .... P_nP_n reported in tenths of a millibar and $h_1h_1h_1$ .... $h_nh_nh_n$ reported in hundreds of metres.

ANNEX XIV

Annex to Recommendation 15 (CSM-V)

CODE FORM FOR REPORTING SUBSURFACE BATHYTHERMAL OBSERVATIONS (BATHY)

BATHY BATHYTHERMAL OBSERVATIONS REPORT

Section 1	$M_iM_iM_jM_j$	YYMMJ	GGgg/	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$		
		$(i_u ddff)$	$(2s_n TTT)$				
Section 2		88888	$z_oz_oT_oT_oT_o$	$z_1z_1T_1T_1T_1$	.....	$z_nz_nT_nT_nT_n$	
			999zz	$z_1z_1T_1T_1T_1$	.....	$z_nz_nT_nT_nT_n$	
Section 3		$(777i_zi_z$	$Z_oZ_oT_oT_oT_o$	$Z_1Z_1T_1T_1T_1$	.....	$Z_nZ_nT_nT_nT_n)$	
		CCCC					

NOTES:

(1) Section 1 (i) All groups, except those in brackets, are mandatory.

(ii) For reporting ff, knots may be used as a transient unit.

(2) Section 2 This section contains temperatures at significant depths.

(3) Section 3 (i) This section is optional and contains temperatures at IAPO standard depths.

(ii) When the measurement of temperature at the surface or at any particular standard depth is not available, that depth-temperature group may be omitted from the report.

SPECIFICATION OF SYMBOLIC LETTERS AND GROUPS

Section 1

$M_iM_iM_jM_j$ - Message identifier group (see code table).

YYMMJ

YY	-	Day of the month (GMT)
MM	-	Month of the year (GMT)
J	-	Units digit of year (GMT)

GGgg/

GGgg	-	Actual time of observation in hours and minutes (GMT)

$Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$

Q_c	-	Quadrant of the globe (Code 3333)
$L_aL_aL_aL_a$	-	Latitude in degrees and minutes
$L_oL_oL_oL_oL_o$	-	Longitude in degrees and minutes

$i_u$ddff

i_u	-	Indicator showing the units used for wind speed, i_u = 0 for m/s; i_u = 1 for knots
dd	-	True direction, in tens of degrees, from which wind is blowing
ff	-	Wind speed in m/s (see Note (1) (ii) under BATHY)

$2s_n$TTT

2	-	Indicator figure
s_nTTT	-	Sign and value of air temperature in tenths of a degree Celsius; s_n = 0 for positive values, s_n = 1 for negative.

Section 2

88888	-	Indicator group for Section 2
$z_oz_oT_oT_oT_o$ .... $z_nz_nT_nT_nT_n$	-	Significant depths in metres and corresponding temperature in tenths of a degree Celsius (**for negative temperatures, add 500 to TTT**)

999zz

999	-	Indicator group, indicating that a change in the hundred digit (zz) follows
zz	-	Hundreds of metres of depth; zz = 01:100m, zz = 02:200 m, etc.

Section 3

$777 i_z i_z$

777	-	Indicator group for Section 3
$i_z i_z$	-	Indicator for range and units of depth. $i_z i_z = 77$: $ZZ \angle 1000$ m, in tens of metres $i_z i_z = 55$: $1000 \leq ZZ$ 10000 m, in hundreds of metres
$Z_o Z_o T_o T_o T_o$ .... $Z_n Z_n T_n T_n T_n$	-	Depths of standard levels and corresponding temperatures (for standard levels, see code table). For negative temperatures add 500 to TTT.
CCCC	-	Ship's call sign

CODE TABLES

$M_i M_i M_j M_j$	-	Type of message indicator
JJXX	-	BATHY

ZZ - IAPO Standard Depths

with $i_z i_z = 77$:

code figure		code figure	
00	surface	15	150 m
01	10 m	20	200
02	20	30	300
03	30	40	400
05	50	50	500
07	75	60	600
10	100	80	800

with $i_z i_z = 55$:

code figure	
10	1000 m
12	1200
15	1500
20	2000
25	2500
30	3000
40	4000

etc.

A N N E X XV

Annex to Recommendation 16 (CSM-V)

CODE FORM FOR REPORTING MULTIPLE OCEANOGRAPHIC PARAMETERS (TESAC)

TESAC	TEMPERATURE, SALINITY AND CURRENT REPORT FROM SEA STATION				
Section 1	$M_iM_iM_jM_j$	YYMMJ	GGgg/	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$
		(i_uddff)	$(2s_nTTT)$		
Section 2		$8888k_2$	$2z_oz_oz_oz_o$	$3T_oT_oT_oT_o$	$4S_oS_oS_oS_o$
			$2z_1z_1z_1z_1$	$3T_1T_1T_1T_1$	$4S_1S_1S_1S_1$
			.....	.....	.....
			$2z_nz_nz_nz_n$	$3T_nT_nT_nT_n$	$4S_nS_nS_nS_n$
Section 3		$(7777k_2$	$2Z_oZ_oZ_oZ_o$	$3T_oT_oT_oT_o$	$4S_oS_oS_oS_o$
			$2Z_1Z_1Z_1Z_1$	$3T_1T_1T_1T_1$	$4S_1S_1S_1S_1$
			.....	.....	.....
			$2Z_nZ_nZ_nZ_n$	$3T_nT_nT_nT_n$	$4S_nS_nS_nS_n)$
Section 4		$(666k_4k_3$	$2z_oz_oz_oz_o$	$d_od_oc_oc_oc_o$	
			$2z_1z_1z_1z_1$	$d_1d_1c_1c_1c_1$	
			.....	.....	
			$2z_nz_nz_nz_n$	$d_nd_nc_nc_nc_n)$	
		CCCC			

NOTES

(1) Section 1

(2) Section 2 (i) This section contains data at significant depths. Both temperature and salinity should be reported for each significant depth selected. The criteria for selecting a significant depth may be based on the characteristics of the temperature profile or the characteristics of the salinity profile.

(ii) When the measurement of one of the elements at any particular depth is not available the corresponding group is omitted from the report.

(3) Section 3 (i) This section contains data at IAPO standard depths.

(ii) When the measurement of one of the elements at any particular depth is not available the corresponding group is omitted from the report.

(iii) When surface temperature is reported in Section 2, it may be omitted from Section 3.

(4) Section 4 This section contains current data at IAPO standard depths, and/or at significant depths.

(5) CCCC Same as under BATHY.

SPECIFICATION OF SYMBOLIC FIGURES AND GROUPS

Section 1 Same as in BATHY

Section 2

$8888k_2$

8888 - Indicator group, indicating that Section 2 follows.

k_2 - Method of salinity/depth measurement (see code table)

$2z_oz_oz_oz_o$
$2z_1z_1z_1z_1$
.....
$2z_nz_nz_nz_n$
- Group indicator figure and significant depths in metres

$3T_oT_oT_oT_o$
$3T_1T_1T_1T_1$
......
$3T_nT_nT_nT_n$
- Group indicator figure and temperatures, in hundredths of a a degree Celsius, at significant depths (for negative temperatures, add 5000 to TTTT)

$4S_oS_oS_oS_o$ $4S_1S_1S_1S_1$ ..... $4S_nS_nS_nS_n$	- Group indicator figure and salinities, in hundredths of parts per thousand (°/oo), at significant depths

Section 3

7777k_2

7777	- Indicator group, indicating that Section 3 follows
k_2	- Same as in Section 2
$2Z_oZ_oZ_oZ_o$ $2Z_1Z_1Z_1Z_1$ ..... $2Z_nZ_nZ_nZ_n$	- Group indicator figure and IAPO standard depths (see table)
$3T_oT_oT_oT_o$ $3T_1T_1T_1T_1$ ..... $3T_nT_nT_nT_n$	- Group indicator figure and temperatures, in hundredths of a degree Celsius at standard depths (for negative temperatures, add 5000 to TTTT)
$4S_oS_oS_oS_o$ $4S_1S_1S_1S_1$ ..... $4S_nS_nS_nS_n$	- Group indicator figure and salinities, in hundredths of parts per thousand (°/oo), at standard depths

Section 4

666k_4k_3

666	- Indicator group, indicating that Section 4 follows
k_4	- Period of current measurement (drift method) (see code table)
k_3	- Duration and time of vector current measurement (see code table)
$2z_oz_oz_oz_o$ $2z_1z_1z_1z_1$ ..... $2z_nz_nz_nz_n$	- Group indicator figure and depths in metres

$d_o d_o c_o c_o c_o$
$d_1 d_1 c_1 c_1 c_1$
.....
$d_n d_n c_n c_n c_n$ - Direction towards which the current is moving, in tens of degrees, and speed of the current, in centimetres per second, at standard depths

CCCC - Ship's call sign

CODE TABLES

$M_i M_i M_j M_j$ - Type of message indicator

KKXX - TESAC

k_2 - Method of salinity/depth measurement

Code figure		
0	-	No salinity measured
1	-	In situ sensor, accuracy better than 0,02 °/oo
2	-	In situ sensor, accuracy less than 0,02 °/oo
3	-	Sample analysis

k_3 - Duration and time of current measurement (vector method)

Code figure			
1	-	Instantaneous	Between H-1 and H
2	-	Averaged over 3 minutes or less	
3	-	> 3 and ≤ 6 minutes	
4	-	> 6 and ≤ 12 minutes	
5	-	Instantaneous	Between H-2 and H-1
6	-	Averaged over 3 minutes or less	
7	-	> 3 and ≤ 6 minutes	
8	-	> 6 and ≤ 12 minutes	
9	-	Vector method not used	

H = Time of observation

k_4 - Period of current measurement (drift method)

Code figure		
1	-	1 hour or less
2	-	> 1 hour and ≤ 2 hours
3	-	> 2 hours and ≤ 4 hours
4	-	> 4 hours and ≤ 8 hours
5	-	> 8 hours and ≤ 12 hours
6	-	> 12 hours and ≤ 18 hours
7	-	> 18 hours and ≤ 24 hours
8	-	-
9	-	Drift method not used

TABLE OF IAPO STANDARD DEPTHS (IN METRES)

Surface	100	1000
10	150	1200
20	200	1500
30	300	2000
50	400	2500
75	500	3000
	600	
	800	

After 3000 m by 1000 m intervals to the bottom.

A N N E X XVI

Annex to Recommendation 17 (CSM-V)

AMENDMENTS TO THE AERONAUTICAL METEOROLOGICAL FIGURE CODES

1. **Reporting of heights in aeronautical meteorological figure codes**

- In the code format for FM 15.D - METAR, FM 16.D - SPECI, FM 51.D - TAF, FM 53.D - ARFOR, FM 54.D - ROFOR and FM 55.D - FIFOR, replace the groups indicated below as follows :

$N_sCCh_sh_s$	by	$N_sCCh_sh_sh_s$
$6I_ch_ih_it_L$	by	$6I_ch_ih_ih_it_L$
$5Bh_Bh_Bt_L$	by	$5Bh_Bh_Bh_Bt_L$
$7h_th_th_fh_f$	by	$7h_th_th_th_fh_fh_f$
$4h_xh_xT_hT_h$	by	$4h_xh_xh_xT_hT_h$ ".

- Specification for h_sh_s
  - delete "or CC" and "FM 15.D, FM 16.D, FM 51.D, FM 53.D, FM 54.D, FM 55.D"
  - note (3) delete "the group $N_sCCh_sh_s$ is to be coded $9//h_sh_s$ and" plus the last but one sentence.
  - Insert the following new symbolic letter and the relevant specifications "$h_sh_sh_s$ - Height of base of cloud whose genus is indicated by CC (Code xxxx)

(1) If the height of the layer falls between two of the heights given in Code xxxx, the lower code figure is to be reported. (e.g., if $h_sh_sh_s$ = 740 m, it is reported as 024.)

(2) If, notwithstanding the existence of fog, sandstorm, duststorm, blowing snow or other obscuring phemomena, the sky is discernible the partially obscuring phenomena are disregarded. If, under the above conditions, the sky is not discernible, the group $N_sCCh_sh_sh_s$ is to be coded $9//h_sh_sh_s$ with appropriate vertical visibility value being coded for $h_sh_sh_s$. The vertical visibility is defined as the vertical visual range into an obscuring medium. Vertical visibility is recorded to the same limits of accuracy as specified for cloud heights (Code xxxx).

- Replace "h_Bh_B, h_fh_f, h_ih_i, h_th_t and h_xh_x" by "$h_Bh_Bh_B$, $h_fh_fh_f$, $h_ih_ih_i$, $h_th_th_t$ and $h_xh_xh_x$" respectively, with the same specification as at present, the indication (Code 1677) being replaced by (Code xxxx)

- Code 1677 - replace the whole heading by the following:
  "$h_s h_s$ Height of base of cloud layer or mass whose genus is indicated by C"

- Insert the following new code at the appropriate place:

Code xxxx

$h_s h_s h_s$ — Height of base of cloud whose genus is indicated by CC

$h_B h_B h_B$, $h_f h_f h_f$, $h_i h_i h_i$, $h_t h_t h_t$, $h_x h_x h_x$ — Same specifications as for $h_B h_B$, ... $h_x h_x$ in present code 1677

Code figure	Metres	Code figure	Metres
000	< 30	100	3000
001	30	110	3300
002	60	120	3600
003	90	.....	
004	120	.....	
005	150	990	29700
006	180	999	⩾ 30000
007	210		
008	240		
009	270		
010	300		
011	330		
.....			
099	2970 m		

Notes : (1) The code is direct reading in units of 30 m

(2) The code table is to be considered as a coding device in which certain code figures are assigned values. These are discrete values, not ranges. Any observation or forecast of values to be coded in the code table is to be made without regard to the code table. The coding is then accomplished according to the following rule:
If the observed or forecast value is between two of the reportable values as given in the table, the code figure for the lower reportable value is reported.

2. Reporting of variable wind

- Amend Note 5 (iii) under FM 15.D - METAR as follows:

  (iii) "Calm" shall be indicated by 00000; variable direction shall be indicated by the letters "VRB" followed by the speed.

- Insert the same text as above as new Note 6 (iii) under FM 51.D - TAF.

- Add the following note under the specification of symbolic letters ddd:

  (2) ddd = 000 is used in case of calm wind, ddd = VRB is used in case of variable wind.

3. Code 4678 - w'w'

- Amend code 4678 as follows :

19	FC	
23	RERASN	
24	REFZRA	
36	DRSN	Low-drifting snow
37	DRSN	Low-drifting snow
57	XXFZDZ	
67	XXFZRA	
69	XXRASN	
84	XXRASN	
99	XXTSGR	

- Add the following to the note at the end of the code :

  "The code figures may also be taken into consideration by meteorological personnel for the decoding of letter abbreviations which correspond to more than one code figure".

4. Reporting of runway visual range

- Insert the following note between Notes 7 (ii) and 7 (iii) under FM.15.D - METAR:

  "When actual RVR values are outside the measuring range of the observing system in use, the following procedure applies:

  (a) When the runway visual range, to be reported in accordance with the Technical Regulations, is greater than the maximum value which can be measured with the system in use, the group $RV_RV_RV_RV_R$ is reported as $RPV_RV_RV_RV_R$ in which $V_RV_RV_RV_R$ is the highest measurable value. For instance, RP2000 indicates that the runway visual range value is above 2000 metres.

(b) When the runway visual range is below the minimum value which can be measured with the system in use, the group $RV_RV_RV_RV_R$ is reported as $RMMV_RV_RV_RV_R$ in which $V_RV_RV_RV_R$ is the lowest measurable value. For instance, RMM0150 indicates that the runway visual range value is below 150 metres.

(c) The use of the form $RMMV_RV_RV_RV_R$ is exclusively limited to those cases where the RVR value is lower than 200 metres".

5. <u>Reporting of cloud base when lower than station level</u>

- Insert the following note under FM 15.D - METAR:

"9 vi) At mountain stations, when the cloud base is below station level the group $N_sCCh_sh_sh_s$ shall read $N_sCC///$."

6. <u>Trend type landing forecast</u>

- Add the following groups to the FM 15.D - METAR and FM 16.D - SPECI code forms:

TTTTT GGggHR dddff/f_mf_m	VVVV w'w' $N_sCCh_sh_sh_s$
	or
or	CAVOK
NOSIG	

- Add the following note to the present notes under FM 15.D - METAR and FM 16.D - SPECI:

"Instructions for tend type landing forecasts:

(i) When appended to METAR or SPECI reports the trend type landing forecasts shall be in coded form.

(ii) Only the group(s) referring to element(s) which are forecast to change significantly is (are) included.

(iii) The time group (GGgg followed by HR) is used only when appropriate. Depending on the change indicator used, this group indicates either the time of the significant change or the beginning of the period during which the reported change is expected to take place.

(iv) If necessary, WX NIL should be used for w'w' to indicate the expected end of occurrence of significant weather. SKC should be used for $N_sCCh_sh_sh_s$ to indicate the expected occurrence of clear sky following significant cloud conditions.

(v) When none of the elements is expected to change in such a way as to require the change to be indicated, this shall be indicated by the term "NOSIG".

(vi) The governing criteria for issuing trend type landing forecasts are specified in WMO Publication No.49.BD.3 - Technical Regulations, Volume II, Part 2 - Meteorological Service for International Air Navigation.

- Insert the following symbolic letters and the relevant specification at the appropriate place:

"GGgg Time, expressed in hours and minutes GMT, (followed by letters HR) of the significant change or of the beginning of the period during which the change is expected to take place (FM 15.D, FM 16.D)."

TTTTT Change indicators of trend type landing forecasts: GRADU, RAPID, INTER, TEMPO, TEND (FM 15.D, FM 16.D)

(1) Specifications for these change indicators are given in WMO Publication No. 49.BD. 3 - Technical Regulations, Volume II, Part 2 - Meteorological Service for International Air Navigation.

Indication of fog dispersal operations

- Insert the following Note 13 (iii) under FM 15.D - METAR:

"(iii) The word DENEB may be added, when appropriate, at the end of the message to indicate that fog dispersal operations are being carried out".

Use of change groups and WX NIL in TAF

- Insert the following note after Note 3 under FM 51.D - TAF:

"(i) A complete description of forecast conditions shall contain information about: wind, visibility, weather and cloud;

(ii) The description can be said to be complete even when one or several of the groups concerning these elements - apart from wind - is (are) omitted from the message;

(iii) A group may be omitted without affecting the completeness of the description, (a) to indicate either that the element contained in that group is expected to be absent or that its future value is expected to be non-significant; (b) to indicate that the element in question is not expected to depart significantly from the preceding value it possessed in the same validity period of the message;

(iv) When the omission of an element occurs after a change group, the message shall clearly indicate which of the two above cases applies. For this purpose use shall be made, as necessary, of approved letter abbreviations (e.g. SKC WX NIL, etc.)."

- AMEND Note 8 (iii) under FM 51.D - TAF to read:

"When conditions are forecast that cannot be expressed by means of Code 4678, the w'w' group is not used except when significant weather is forecast to change into non-significant weather; in the latter case the abbreviation WX NIL is used after the change group (see Note (14)(ii)) to indicate non-significant weather."

- Replace Note 14 (ii) under FM 51.D - TAF by the following:

"A TAF forecast shall cover the period extending from G_1G_1 to G_2G_2. A change group $96GGG_p$, $97GGG_p$, or $98GGG_p$ shall be introduced when a significant change in some or all of the elements forecast is expected to occur at some intermediate time GG. Such a change group <u>shall not</u> be introduced until <u>all</u> the data-groups necessary to describe the elements forecast in the period G_1G_1 to GG have been given. The change group shall be followed by a description of all of the elements for which a significant change is forecast during the period G_p beginning at GG. When an element is not described in the data-groups which follow the change group, the description of this element for the period between G_1G_1 and GG shall be considered to remain valid. When a group $96GGG_p$ is used the conditions described in the data-groups which follow shall be considered to remain valid after the expiration of the time G_p. When necessary a second change-group referring to conditions at a later time GG may be used."

- Code 1864 i_3nnn

  (i) Amend the specification for $96GGG_p$ to read as follows:

  "$96GGG_p$ Gradual change beginning at GG and continuing throughout the period indicated by G_p (when G_p = 1 to 9). Rapid change taking place during a period lasting less than half an hour when G_p = 0"

  (ii) Plain language alternative terminology:

  Replace the second sentence under $96GGG_p$ by the following:

  "The form RAPID GG should be used when the change(s) is (are) expected to take place during a period lasting less than half an hour, GG refers to the time at which the change begins."

9. Indication of midnight in change groups

- Add the following notes under the specifications of symbolic letters G_1G_1 and G_2G_2

  (a) under G_1G_1 :

  "(1) When the period of forecast commences at midnight, G_1G_1 is encoded 00."

  (b) under G_2G_2 :

  "(1) When the period of forecast ends at midnight, G_2G_2 is encoded 24."

- Renumber (2) the present note (1) under G_2G_2.

A N N E X XVII

Annex to Recommendation 19 (CSM-V)

FORECAST UPPER WIND AND TEMPERATURE AT SPECIFIED POINTS FOR AERONAUTICAL PURPOSES

ARMET	$P_sP_sP_s$	$P_sP_sP_s$	...	$YYG_1G_1G_2G_2$
$QL_aL_aL_oL_o$	ddfffTT	ddfffTT	....	
$QL_aL_aL_oL_o$	ddfffTT	ddfffTT	....	
.....	....	....	....	
$QL_aL_aL_oL_o$	ddfffTT	ddfffTT	....	
(JET	$QL_aL_aL_oL_o$	.....	$P_mP_mP_m$	ddfffTT
	.....	.....	...	....
	$QL_aL_aL_oL_o$	.....	$P_mP_mP_m$	ddfffTT)
(TROP	$P_tP_tP_t$	$QL_aL_aL_oL_o$	ddfffTT	$QL_aL_aL_oL_o$
	ddfffTT	.....	....	
	$P_tP_tP_t$	$QL_aL_aL_oL_o$	ddfffTT	$QL_aL_aL_oL_o$
	ddfffTT	.....	....	

(Significant weather in plain language).

NOTES :

(1) The code name **ARMET** designates a forecast in figure code of upper wind and temperatures at specified points for aeronautical purposes (area forecasts). **ARMET** shall always appear as a prefix to the message.

(2) This code form is used for dissemination of area forecasts when these forecasts cannot be disseminated in pictorial form. It is composed of

four parts containing the following forecast information respectively: wind and temperatures at standard isobaric levels, jet stream, tropopause and significant weather.

(3) Instructions concerning coding of upper wind and temperature forecast at standard isobaric levels:

(i) The number of $P_sP_sP_s$ groups given after the ARMET prefix corresponds to the number of standard isobaric levels for which wind and temperature data are transmitted.

(ii) For each point described by a $QL_aL_aL_oL_o$ group, the wind and temperature data for the level indicated by the first $P_sP_sP_s$ group is given in the first ddfffTT group. Data for the level indicated by the second $P_sP_sP_s$ group is given in the second ddfffTT group and so on.

(4) Instructions concerning coding of forecast jet-stream data:
This part, when included, describes the position of the forecast jet stream ($QL_aL_aL_oL_o$ group(s)), the pressure in millibars of the level of the jet stream ($P_mP_mP_m$) and the wind and temperature at the points described by $QL_aL_aL_oL_o$. If the pressure level, wind and temperature which are forecast are the same for consecutive points, the pressure and wind/temperature groups shall not be repeated after each position group.

(5) Instructions concerning coding of the forecast tropopause data:
This part, when included, describes the position of the tropopause and the relevant wind and temperature at levels given at 50 mb intervals. If at any one level, the same wind and temperature apply to more than one point, the wind/temperature groups shall not be repeated after each position group.

(6) Instruction concerning coding of the forecast significant weather:
When significant weather is included in the message, it should be in plain language, using where appropriate ICAO abbreviations.

(7) Instructions concerning the $QL_aL_aL_oL_o$ and ddfffTT groups:
The method to be used for reporting positions and temperatures is fixed regionally. Depending on regional decision the position group $QL_aL_aL_oL_o$ may be replaced by CCCC, and the ddfffTT group may be used in the form ddfffT'T'.

Insert the following new specification under $P_sP_sP_s$:

$P_sP_sP_s$ - Pressure in whole millibars of standard constant-pressure surface for which forecast upper wind and temperature at specified points are given.

A N N E X XVIII

Annex to Recommendation 20 (CSM-V)

CODE FORM FOR REPORTING SYNOPTIC INTERPRETATION OF CLOUD DATA OBTAINED BY METEOROLOGICAL SATELLITES

SAREP - Report of Synoptic Interpretation of Cloud Data obtained by Meteorological Satellite.

Part A - Tropical Cyclone Part

$M_iM_iM_jM_j$ YYGGg (IIiii or 99$L_aL_aL_a$) $Q_cL_oL_oL_oL_o$

$n_tn_tL_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $A_tS_tW_fa_tt_m$ ($9d_sd_sf_sf_s$)

CCCC

Part B - Significant Feature Part

SECTION 1 $M_iM_iM_jM_j$ $YYG_sG_sg_s$ (IIiii or 99$L_aL_aL_a$) $Q_cL_oL_oL_oL_o$

$QL_aL_aL_oL_o$ $QL_aL_aL_oL_o$ .....

SECTION 2 ($4S_fC_mW_fC_f$ or $95S_fS_fW_f$) $QL_aL_aL_oL_o$ ..... ($9d_sd_sf_sf_s$)

SECTION 3 96/// /Lddf $QL_aL_aL_oL_o$ /Lddf $QL_aL_aL_oL_o$ ....

SECTION 4 97//s_c $QL_aL_aL_oL_o$ $QL_aL_aL_oL_o$ .....

SECTION 5 51515 Code groups to be developed regionally

CCCC

NOTES

(1) The code name SAREP refers to a report of synoptic interpretation of cloud data obtained by meteorological satellites. The word SAREP shall not be transmitted as a part of the report.

(2) The code form is divided into two parts. Part A - Tropical Cyclone Part, and Part B - Significant Feature Part.

(3) In transmitting SAREP reports, the higher priority shall be given to Part A.

(4) Part A

(i) This part shall be used whenever a cloud mass is recognized as pertaining to a tropical cyclone.

(ii) The time given by GGg refers to the time of the picture of the cyclone(s).

(iii) The group ($9d_sd_sf_sf_s$) refers to the movement of the centre of the tropical cyclone. This optional group shall be used where possible.

(5) Part B

(i) Part B is divided into 5 sections:

Section number	Indicator figures of symbolic figure group	Contents
1	-	Identification and position data
2	4 or 95	Synoptic interpretation of cloud(s)
3	96	Wind information
4	97	Ice or snow information
5	51515	Regional codes

(ii) Section 1 - Identification and position data

(a) The second line shall be used to delineate the analyzed area.

(b) A clockwise sequence shall be used in the position data delineating the analyzed area. The first position group shall be repeated.

(iii) Section 2 - Synoptic interpretation of cloud information from meteorological satellites.

(a) Code groups beginning with the indicator figure 4 shall be used only if a more detailed description of the synoptic interpretation is not available, and also to inform about cloud patterns not directly associated with a given synoptic interpretation.

(b) Code groups beginning with the indicator figures 95 shall be used when the confidence in geographical position and synoptic interpretation is good.

(c) Position groups in Section 2 refer to the significant feature S_f or S_fS_f. When using indicator figure 4 and S_f = / the position groups refer to the cloud pattern designed by C_m.

(d) See note (ii) (b) for area delineations.

(e) The group ($9d_sd_sf_sf_s$) refers to the movement of the system under consideration and should be included whenever available.

(f) Section 2 shall only be used to delineate major synoptic scale significant features or cloud masses; mesoscale or more detailed description shall be left to the regional code forms.

(iv) Section 3 - Wind information derived from the movements of cloud elements.

(a) This section is optional. It should only be used by centres or stations having highly trained staff and computer facilities.

(v) Section 4 - Snow or ice information.

(a) This section is optional. It should be included only once a week or when major changes in snow cover or ice extension are experienced.

(b) See note (ii) (b) for area delineations.

(vi) Section 5 - Code groups to be developed regionally.

(a) This section may contain detailed or mesoscale description of the cloud information.

Specification of symbolic letters

$M_iM_iM_jM_j$ - Identification of message (amend code 2582)

CCCC - Call sign of ship on which satellite readout station is mounted.

n_tn_t - Identification of tropical cyclone

(1) Tropical cyclones are numbered by successive numerals (01, 02, ... 99; repeat numbers as appropriate) for the purpose of maintaining positive identification of each disturbance. Each cyclone maintains the assigned number as long as it exists or can be identified. If two or more cyclones are first detected on the same photograph (thereby given the same time) the first line beginning with $M_iM_iM_jM_j$ for these cyclones shall not be repeated.

$L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ - Position of the centre of the cloud mass or tropical cyclone or eye of the tropical cyclone as appropriate.

(1) For classification of these features, see code table for S_t.

A_t - Accuracy of the determination of the geographical position of the tropical cyclone (add new code table).

S_t - Classification of the tropical cyclone (add new code table).

W_f - Mean width or mean diameter of the feature specified by S_f or mean diameter of the overcast cloud of the tropical cyclone (add new code table).

a_t - Apparent 24-hour change in intensity of tropical cyclone (add new code table).

t_m - Time interval over which the movement of the tropical cyclone has been calculated (add new code table).

$G_sG_sg_s$ - Time in hours and tens of minutes (GMT) of the first satellite picture used for the analysis.

4 - Indicator for significant feature group in short form.

S_f - Synoptic interpretation of significant features (add new code table).

C_m - Major cloud configuration (add new code table).

C_f	-	Confidence in geographical location and synoptic interpretation of feature (add new code table).
95	-	Indicator for significant feature group in detailed form.
S_fS_f	-	Detailed synoptic interpretation of significant features (add new code table)
96		Indicator for wind group(s)..
L	-	Estimated level of wind data (add new code table).
f	-	Wind speed (add new code table).
97	-	Indicator for ice and snow information.
s_c	-	Nature of snow or ice interpreted from satellite information (add new code table).

Code Tables

A_t - Accuracy of the determination of the geographical position of the tropical cyclone.

Code figure

0	-	cyclone centre within 10 km of the transmitted position
1	-	" " " 20 km " " " "
2	-	" " " 50 km " " " "
3	-	" " " 100 km " " " "
4	-	" " " 200 km " " " "
5	-	" " " 300 km " " " "
/	-	undetermined

S_t - Classification of the tropical cyclone

Code figure	
1	Stage A
2	Stage B
3	Stage C -
4	Stage C
5	Stage C +
6	Stage X Category 1
7	Stage X " 2
8	Stage X " 3
9	Stage X " 4
0	decaying or becoming extra tropical
/	undetermined.

N O T E : Code figure specifications from 1 to 9 refer to the NESC (National Environmental Satellite Center) classification reproduced at the end of the present Annex (see Figure 1). This classification is to be used in determining S_t in the above table. S_t and the nomogram accompanying the NESC Classification can be used to estimate the maximum winds of the tropical disturbance (see Figure 2).

W_f - Mean width or mean diameter of the feature specified by S_f or mean diameter of the overcast cloud of the tropical cyclone

Code figure	
0	< 1° of latitude
1	1° to less than 2° of latitude
2	2° " " " 3° " "
3	3° " " " 4° " "
4	4° " " " 5° " "
5	5° " " " 6° " "
6	6° " " " 7° " "
7	7° " " " 8° " "
8	8° " " " 9° " "
9	> 9° of latitude
/	undetermined

a_t - Apparent 24-hour change in intensity of tropical cyclone

Code figure

0 - much apparent weakening
1 - apparent weakening
2 - no apparent change
3 - apparent intensification
4 - apparent strong intensification
5 -)
6 -) not used
7 -)
8 -)
9 - not observed previously
/ - undetermined

t_m - Time interval over which the movement of the tropical cyclone has been calculated

Code figure

0	less than 1 hour				
1	1 to	less	than	2	hours
2	2 to	"	"	3	"
3	3 to	"	"	6	"
4	6 to	"	"	9	"
5	9 to	"	"	12	"
6	12 to	"	"	15	"
7	15 to	"	"	18	"
8	18 to	"	"	21	"
9	21 to	"	"	30	"
/	Movement group is not included				

s_f - Synoptic interpretation of significant features

Code figure

0 - high pressure ridge
1 - frontal cloud band
2 - frontal wave
3 - vortex
4 - convergence zone (including ITC)
5 - jet stream
6 - positive vorticity advection maximum (comma formation, enhanced convection, etc.)
7 - upper level trough
8 - delineation of major cloud system
9 - area of widespread sand or dust storm

/ - not determined

C_m - Major cloud configuration

Code figure

1 cellular type open
2 " " closed
3 cloud bands
4 cloud streets
5 low stratus or fog
6 Cumuliform
7 Stratiform
8 Cirriform
9 Cumulonimbus (may be associated with other cloud types)
0 multi-layered
/ undetermined or unspecified.

C_f - Confidence in geographical location and synoptic interpretation of feature

Code figure	Confidence in geographical location *	Confidence in synoptic interpretation
0 - not used		
1	good	good
2	good	fair
3	good	poor
4	fair	good
5	fair	fair
6	fair	poor
7	poor	good
8	poor	fair
9	poor	poor
/	undetermined	-

* NOTE : good - less than 1° latitude
fair - 1° to 3° latitude
poor - greater than 3° latitude

S_fS_f - Detailed synoptic interpretation of significant features

Code figure

00 - Low level ridge
01 - Upper level ridge, sharp
02 - Upper level ridge, medium
03 - Upper level ridge, broad
10 - Quasi-stationary front, broken cloud pattern
11 - Quasi-stationary front, continuous cloud mass
12 - Cold front, broken cloud pattern
13 - Cold front, continuous cloud mass

14 - Warm front, broken cloud pattern
15 - Warm front, continuous cloud mass
16 - Occluded front
17 - Squall-line
18 - Non frontal extra-tropical cloud band
20 - Widening area in frontal cloud band
21 - Frontal wave
22 - Initial vortex associated to front
23 - Vortex occluding, cold air intrusion
24 - Mature vortex, fully occluded
25 - Decaying vortex
30 - Positive vorticity advection maximum, enhanced Cu or Cb
31 - Positive vorticity advection maximum, (solid) cloud mass
32 - Vorticity maximum, comma shape
33 - Vorticity maximum, comma shape with clear area downstream
34 - Cut-off vortex
35 - Secondary vorticity centre, spiraling Cu, no cirrus plumes
36 - Secondary vorticity centre, spiraling Cu or Cb, with cirrus plumes
40 - Upper level trough, determined through cold-frontal cloud mass
41 - Upper level trough, associated to major cloud mass
42 - Upper level trough, preceded by crescent cloud formation
43 - Upper level trough, determined by cirrus plumes
50 - Jet stream, determined by cirrus shadow or edge
51 - Same as 50, with transversal streaks
52 - Jet stream, determined through cirrus streaks
53 - Same as 52, with transversal streaks
54 - Jet stream, determined from a change in the cloud texture
55 - Jet stream, determined from a change in the cellular cloud pattern.
60 - Area of isolated Cb, Ci-plumes extend less than 1° latitude from the source.
61 - Same as 60, Ci-plumes extend more than 1° latitude from the source.
62 - Area of Cb clusters, Ci-plumes extend less than 1° latitude from the source.
63 - Same as 62, Ci-plumes extend more than 1° latitude from the source.
70 - Intertropical convergence zone
71 - Tropical cloud band without Cb
72 - Tropical cloud band with Cb
73 - Easterly wave

(Code figures not shown are not used.)

L - Estimated level of wind data

Code figure

0 Not used
1 Not used
2 Low-cloud level
3 Not used
4 Not used
5 Middle-cloud level
6 Not used
7 Not used
8 High-cloud level
9 Not used

f - Wind speed

Code figure

0 - 0 to 9 m/s
1 - 10 to 19 m/s
2 - 20 to 29 m/s
3 - 30 to 39 m/s
4 - 40 to 49 m/s
5 - 50 to 59 m/s
6 - 60 to 69 m/s
7 - 70 to 79 m/s
8 - 80 to 89 m/s
9 - $\geqslant$ 90 m/s
/ - undetermined

s_c - Nature of snow or ice interpreted from satellite information

Code figure

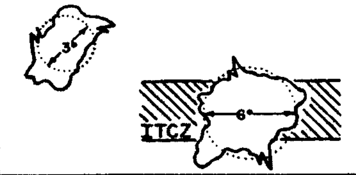
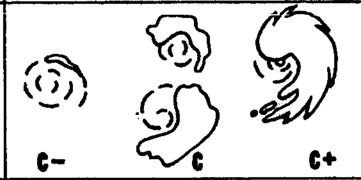
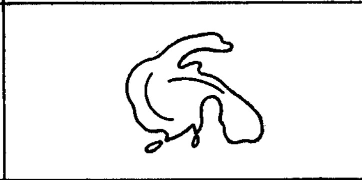
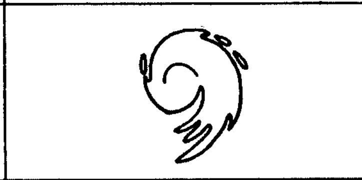
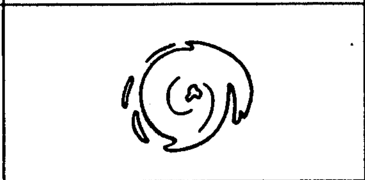
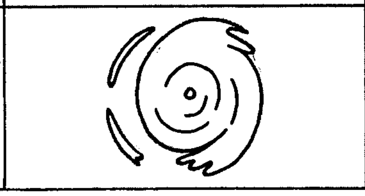
0 } snow cover { partial
1 } snow cover { continuous

3 - snow covered ice
4 - shelf ice

5 } sea ice { compact
6 } sea ice { broken
7 } sea ice { scattered

8 - channel in sea ice
9 - iceberg(s)
/ - nature of snow or ice undetermined

TROPICAL AND SUBTROPICAL DISTURBANCE CLASSIFICATION FROM SATELLITE DATA

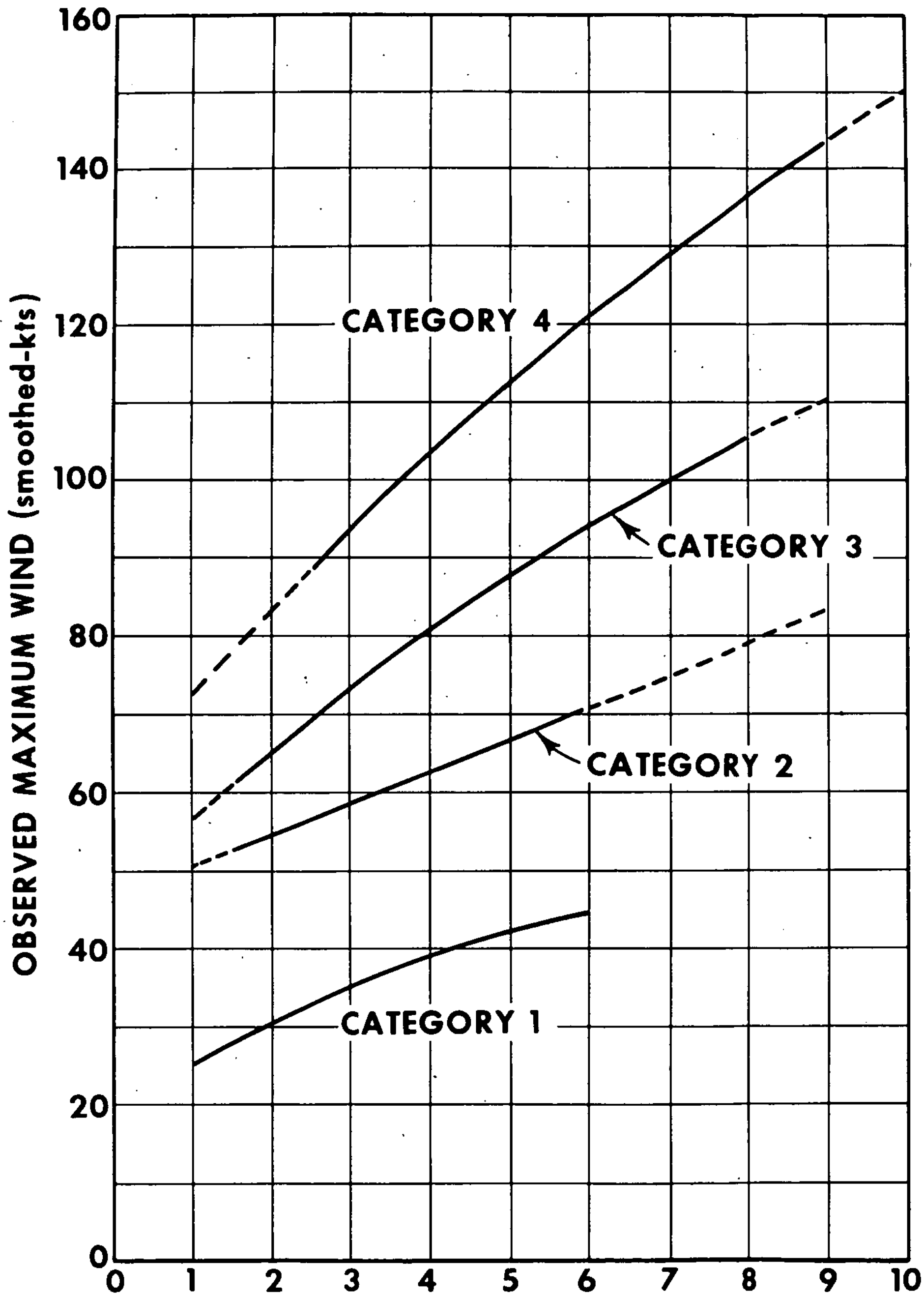
A NO CURVED CLOUD LINES OR BANDS		<u>Stage A</u> is a dense amorphous cloud mass composed of cumuliform, cirriform, and layered middle cloud in any combination. Some cirrus outflow is usually present. The cloud mass must have an average diameter of 3° latitude or more. Exceptions: (1) If the cloud mass is contiguous to or within the ITCZ in the Atlantic, Pacific, or south Indian Ocean, it must have an average diameter of 6° latitude or more and be partially isolated by breaks from the general cloudiness. (2) In the Arabian Sea and the Bay of Bengal, the cloud mass must be 8° latitude or more in diameter.
B POORLY ORGANIZED CURVED CLOUD LINES AND BANDS ILL-DEFINED CENTER		<u>Stage B</u> is a dense cloud mass with adjacent curved cumulus cloud lines and/or curved bands of middle cloud which are either detached from, or form part of, the major overcast area. The curved cloud lines and bands are often poorly organised. The pattern produced by the curved lines and bands is poorly defined--it does not appear to have one definite center. Along the ITCZ, the cloud mass and associated curved cumulus cloud lines and/or bands must be separated from the ITCZ cloudiness on at least one side and cirrus outflow must be evident.
C WELL ORGANIZED CURVED CLOUD LINES AND BANDS WELL DEFINED CENTER OUTSIDE DENSE CLOUD MASS		<u>Stage C</u> has well organised, curved cumulus cloud lines and/or broad curved bands of middle and high cloud. The pattern produced by the various curved lines and bands has a well defined single center. The center of the pattern generally lies outside but adjacent to an associated dense cloud mass, but it can be on the edge or as much as one-half degree latitude within the cloud mass. A <u>C-</u> has no associated dense cloud mass. A <u>C+</u> appears very well organised with a large amount of curved cirrus outflow.
X CAT. 1 POORLY ORGANIZED SPIRAL BANDS ILL-DEFINED CENTER OF ORGANIZATION WITHIN CENTRAL CLOUD MASS		<u>Category 1</u> has a bright generally circular central overcast which is cirriform in appearance. Curved cirrus outflow is often restricted to one quadrant. Poorly organized, slightly curved cumuliform cloud bands appear near the periphery of the central overcast and cross into it at a large angle. This banding remains close to the overcast edge; away from the overcast, organized curved bands are usually absent. An eye is not visible. The center of the spiral pattern can be located approximately by extrapolating inward along the curved peripheral bands. This estimated center must be more than one-half degree latitude within the central cloud mass.
X CAT. 2 WELL ORGANIZED BANDS SPIRAL BANDS DEFINE CENTER WITHIN CENTRAL CLOUD MASS		<u>Category 2</u> has a bright, often asymmetrical central overcast. Cirrus outflow is curved and more extensive. At least one long, major, well organised band spirals at a large angle into the central cloud mass. A linear curved break accompanies this band. Within the central cloud mass, the break is covered by thin cirrus but is readily detectable. Minor peripheral bands outside the overcast are poorly organised. An eye is not visible. The central tip of the major spiral band defines the center. This center must be more than one-half degree latitude within the central cloud mass.
X CAT. 3 MODERATE DEGREE OF CONCENTRICITY TO CLOUD BANDS IRREGULARLY SHAPED EYE WITHIN CENTRAL CLOUD MASS		<u>Category 3</u> has a bright central overcast that is compact and tends to be circular. There is considerable curved cirrus outflow visible at the edge of the central overcast. Curved striations within the central cloud mass define spiral cloud bands which are moderately concentric about a visible eye. Well organised peripheral bands, some with well developed cirrus, are present. A ragged and irregularly shaped eye is normally visible. This defines the storm center.
X CAT. 4 HIGH DEGREE OF CONCENTRICITY TO CLOUD BANDS ROUND EYE NEAR CENTER OF CENTRAL CLOUD MASS		<u>Category 4</u> has a very circular bright central overcast. The edge is often sharp and smooth over one or two quadrants, otherwise, it is striated cirrus. Highly concentric striations appear within the central overcast. Banding outside the central overcast is very well organised and circular. The entire cloud system is very symmetrical in appearance. A well defined eye appears as a small dark circular area surrounded by a bright ring. This defines the storm center.

NESC JUNE 1968

<u>Figure 1</u>

Note: Cloud configurations refer to the northern hemisphere

NOMOGRAM FOR OBTAINING MAXIMUM WINDS OF STAGE X TROPICAL DISTURBANCES



Diameter of central overcast

Units in deg. lat. = 60 n. miles

Figure 2

ANNEX XIX

Annex to Recommendation 21 (CSM-V)

CODE FORM FOR REPORTING GROUND RADAR WEATHER OBSERVATIONS

RADOB - Ground Radar Weather

Part A Tropical Cyclone Part

$M_iM_iM_jM_j$ YYGGg $\begin{cases} \text{IIiii} \\ \text{or} \\ 99L_aL_aL_a \quad Q_cL_oL_oL_oL_o \end{cases}$

$4R_wL_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $A_CS_CW_Ca_Cr_t$ $t_ed_sd_sf_sf_s$

CCCC

Part B Significant Feature Part

$M_iM_iM_jM_j$ YYGGg $\begin{cases} \text{IIiii} \\ \text{or} \\ 99L_aL_aL_a \quad Q_cL_oL_oL_oL_o \end{cases}$

$e_tW_eI_ea_eH_e$ bbbrr bbbrr ..... bbbrr $t_ed_sd_sf_sf_s$ /999/

....

51515 Code groups to be developed regionally

61616 Code groups to be developed nationally

CCCC

NOTES :

(1) The code name RADOB refers to a report of radar observations. The word RADOB shall not be transmitted as a part of the report.

(2) (i) The code form is divided into two parts:

Part A - Tropical Cyclone Part, and
Part B - Significant Feature Part.

(ii) Each of the two parts of RADOB shall be coded as a separate report in the format specified.

(3) Part A

(i) This part shall be used whenever the echo pattern observed is recognized as a part of or relating to a tropical cyclone.

(ii) 4 - indicator for position of cyclone centre or eye.

(iii) $d_s d_s f_s f_s$ refers to the movement of the centre or eye.

(4) Part B

(i) Data for only one system of echoes shall be reported by the groups $e_t W_e I_e a_e H_e$ through /999/. If data for more than one system of echoes are to be reported, the groups $e_t W_e I_e a_e H_e$ through /999/ shall be reported, as appropriate.

(ii) If no echo is visible on the radar scope, the group $e_t W_e I_e a_e H_e$ shall be replaced by 00000.

(iii) If an equipment failure has been experienced, the group $e_t W_e I_e a_e H_e$ shall be replaced by 0/0/0.

(iv) The movement given by the group $t_e d_s d_s f_s f_s$ refers to the echo pattern and not to individual echoes. If no information is available, ///// shall be included.

SPECIFICATION OF NEW SYMBOLIC LETTERS

$M_i M_i M_j M_j$	-	Identification of message (amend Code 2582)
CCCC	-	Call sign of ship on which radar is mounted
R_w	-	Wave length of the radar (insert new code table)
A_C	-	Accuracy in determining the position of the centre or the eye of the tropical cyclone(insert new codetable)
S_ϵ	-	Shape and definition of the eye (insert new code table)
W_C	-	Diameter or length of major axis of the eye, in km (insert new code table)

a_C - The character tendency of the eye, determined over a 30-minute period just prior to the time of observation (insert new code table)

r_t - The distance between the end of the observed outermost spiral band and the centre of the cyclone (insert new code table)

(1) / should be used whenever doubt exists as to the location of the eye or whether the outermost spiral band is indeed visible at the radar scope.

e_t - Characteristicsof the echo pattern (insert new code table)

W_e - Mean diameter of the echo or area of the echoes or mean width of line of echoes (insert new code table)

I_e - Intensity of echoes (insert new code table)

(1) The intensity reported should be that of the strongest echo given by e_t

a_t - Tendency of echo pattern (insert new code table)

H_e - Height of echo top (insert new code table)

(1) If an area or a line of echoes is observed, then the highest top available as given by e_t is reported.

t_e - Time interval over which the movement of the centre or eye of tropical cyclone or of system given by e_t has been calculated (add new code table)

bbb - Azimuth in degrees, true.

rr - Range in intervals of 5 km

(1) For reporting echoes at distances of 500 km or more, rr = 99 and bbbrr is followed by 99rrr in which rrr is reported also in units of 5 km.

NEW CODE TABLES

R_w - Wave length of the radar

Code Figure	
1	1 to less than 2 cm
3	2 to less than 4 cm
5	4 to less than 6 cm
7	6 to less than 9 cm
8	9 to less than 11 cm
9	11 cm and greater

A_C - Accuracy in determining the position of the centre or the eye of the tropical cyclone

Code Figure	
0	Not used
1	Eye visible on radar scope, accuracy good (within 10 km)
2	Eye visible on radar scope, accuracy fair (within 30 km)
3	Eye visible on radar scope, accuracy poor (within 50 km)
4	Position of the centre within the area covered by the radar scope, determination by means of the spiral-band overlay, accuracy good (within 10 km)
5	Position of the centre within the area covered by the radar scope, determination by means of the spiral-band overlay, accuracy fair (within 30 km)
6	Position of the centre within the area covered by the radar scope, determination by means of the spiral-band overlay, accuracy poor (within 50 km)
7	Position of the centre outside the area covered by the radar scope, extrapolation by means of the spiral-band overlay
8	Not used
9	Not used
/	Accuracy undetermined.

S_C - Shape and definition of the eye

Code Figure		
0	Circular	well defined
1	Elliptical - the minor axis at least $\frac{3}{4}$ the length of the major axis	well defined
2	Elliptical - the minor axis is less than $\frac{3}{4}$ the length of the major axis	well defined
3	Apparent double eye	well defined
4	Other shape	well defined
5	Ill defined	
6	Not used	
7	Not used	
8	Not used	
9	Not used	
/	Undetermined	

W_C - Diameter or length of major axis of the eye

Code Figure	
0	Less than 5 km
1	5 to less than 10 km
2	10 to less than 15 km
3	15 to less than 20 km
4	20 to less than 25 km
5	25 to less than 30 km
6	30 to less than 35 km
7	35 to less than 40 km
8	40 to less than 50 km
9	50 km and greater
/	Undetermined

a_C - The character tendency of the eye, determined over a 30-minute period just prior to the time of observation

Code Figure	
0	Eye has first become visible during the past 30 minutes
1	No significant change in the characteristics or size of the eye
2	Eye has become smaller with no other significant change in characteristics
3	Eye has become larger with no other significant change in characteristics
4	Eye has become less distinct with no significant change in size
5	Eye has become less distinct and decreased in size
6	" " " " " " increased in size
7	Eye has become more distinct with no significant change in size
8	" " " " " and decreased in size
9	" " " " " " increased in size
/	Change in character and size of eye cannot be determined

r_t - The distance between the end of the observed outer-most spiral band and the centre of the cyclone

Code Figure	
0	0 to < 100 km
1	100 " < 200 km
2	200 " < 300 km
3	300 " < 400 km
4	400 " < 500 km
5	500 " < 600 km
6	600 " < 800 km
7	Equal or more than 800 km
8	Not used
9	Not used
/	Doubtful or undetermined

e_t - Characteristics of the echo pattern

Code Figure	
0	Anomalous propagation or no echoes or equipment inoperative
1	Elevated echoes (precipitation aloft)
2	Area of scattered or broken stratiform echoes
3	Area of solid stratiform echoes
4	Area of scattered or broken convective echoes
5	Area of solid stratiform echoes with convective echoes
6	Line of scattered or broken echoes
7	Solid line of echoes
8	Isolated large convective echo
9	Spiral band(s)
/	Not used

Notes:

(1) When 0 is used for e_t in the sense of "anomalous propagation", then the group $e_tW_eI_ea_eH_e$ is replaced by 0//// which shall be followed by one or more locator groups "bbbrr".

(2) When 0 is used for e_t in the sense of "no echoes", then the group $e_tW_eI_ea_eH_e$ is replaced by 00000.

(3) When 0 is used for e_t in the sense "equipment inoperative", then the group $e_tW_eI_ea_eH_e$ is replaced by 0/0/0.

W_e - Mean diameter of the echo or area of the echoes or mean width of line of echoes

Code Figure		Code Figure	
0	0 to < 5 km	6	60 to < 100 km
1	5 to < 10 km	7	100 to < 150 km
2	10 to < 15 km	8	150 to < 250 km
3	15 to < 25 km	9	250 km and greater
4	25 to < 40 km	/	undetermined, or not applicable
5	40 to < 60 km		

I_e - Intensity of echoes

Code Figure	Specification	Reflectivity (m^6/m^3)
0	very weak	0 - 2.30 x 10
1	" " (estimated)	-
2	weak	2.31×10 to 9.40×10^2
3	weak (estimated)	-
4	moderate	9.41×10^2 to 3.70×10^4
5	moderate (estimated)	-
6	strong	3.71×10^4 to 5.00×10^5
7	strong (estimated)	-
8	very strong	5.00×10^5
9	very strong (estimated)	-
/	undertermined	

a_e - Tendency of echo pattern

Code Figure	Tendency of intensity	Tendency of the area
1	Decreasing	Decreasing
2	Decreasing	No appreciable change
3	Decreasing	Increasing
4	No appreciable change	Decreasing
5	No appreciable change	No appreciable change
6	No appreciable change	Increasing
7	Increasing	Decreasing
8	Increasing	No appreciable change
9	Increasing	Increasing
/	Undetermined	

NOTE: The tendency should be estimated over a period of approximately 1 hour. This period shall not be longer than 90 minutes and not shorter than 30.

H_e - Height of echo top

Code Figure	
0	0- <2 km
1	2- <4 km
2	4- <6 km
3	6- <8 km
4	8- <10 km
5	10- <12 km
6	12- <14 km
7	14- <16 km
8	16- <18 km
9	18 km and above
/	undetermined

t_e - Time interval over which the movement of the centre or eye of tropical cyclone or of system given by e_t has been calculated

Code Figure	
3	During the preceding 15 minutes
4	" " " 30 "
5	" " " 1 hour
6	" " " 2 hours
7	" " " 3 hours
8	" " " 6 hours
9	During a period more than 6 hours
/	Undetermined

A N N E X XX

Annex to Recommendation 22 (CSM-V)

RECOMMENDED CODE FORMS

Part A

Code form for surface reports from land stations

FM 14.E Surface report from land station

SYNOP

Section 1	$M_iM_iM_jM_j$	$YYGGi_u$				
	IIiii	s_ti_RNVh	Oddff	1wwWW	$2s_nTTT$	
	$3s_nT_dT_dT_d$	$4P_oP_oP_oP_o$	5PPPP	$6ap_vp_vp_v$	$7RRRt_R$	
	$8N_hC_LC_MC_H$					
Section 2	333	$(0N_sCh_sh_s)$	$(k_sT_xT_xT_nT_n)$	(4Esss)	$(5j_ij_sj_sj_s)$	
	$(6S_pS_ps_ps_p)$	(7....)	(8....)	(9....)		
Section 3	555	$N'C'H'H'C_t$				
Section 4	777	Code groups to be developed nationally				

SYNOP is the name of the code form for a surface report from a land station

The code form is divided into 4 Sections as follows :-

Section	Indicator Group	Information
1	-	Data for global exchange
2	333	Included by regional decision
3	555	Included by national decision
4	777	Included by national decision

(1) The identifier groups $M_iM_iM_jM_j$ $YYGGi_u$ are included as the first line of the text of a meteorological bulletin of reports of observations which were made at the same time.

(2) If a Member considers its fixed sea stations (except ocean weather stations) to be in the same category as land stations, the light-stations may report in SYNOP.

(3) Surface observations from automatic stations should, for international exchange, be in the SYNOP code form. The reports may be compiled automatically at the stations or, by any means, at the national collecting centre. In either case the groups with initial indicator figures to be included in Section 1 of the SYNOP are determined by the Member operating the station, except for the group Oddff which is always included

Section 1

(4) The use of groups in Section 1 :-

(i) s_ti_RNVh - This group is always included

(ii) Oddff - When the wind is calm (speed less than 0.5 m/sec or less than 1 knot) this group may be omitted. The code figure s_t then indicates the fact that the wind is calm and the group has been omitted. Oddff is always included in reports from automatic stations.

(iii) lwwWW - When both the present and past weather cannot be expressed by code figures other than 00, this group may be omitted. The code figure s_t then indicates the present and past weather and the fact that the group is omitted. In reports from automatic stations, the group lwwWW is included or omitted by national decision, and s_t is coded accordingly,

(iv) $3s_nT_dT_dT_d$ - In reports from automatic stations the group $39\overline{UUU}$ may replace the group $3s_nT_dT_dT_d$.

(v) $4P_oP_oP_oP_o$ - This group is included in messages for international exchange when the following conditions apply <u>together</u>:

(a) the station elevation exceeds 200 m from the level to which pressure is reduced;

(b) the reduction method in use does not permit the computation of station pressure from the actual SYNOP report and from information contained in WMO Publications.

(vi) 5PPPP - By Regional agreement, a high level station, which cannot give pressure at M.S.L. to a satisfactory degree of accuracy, reports the geopotential height of an agreed standard pressure level, using the group $5a_3hhh$ in place of the group 5PPPP.

(vii) $6ap_vp_vp_v$ - This group is used to report either three-hour pressure tendency or, in tropical areas by Regional decision, the twenty-four-hour pressure change. If required both three-hour tendency and twenty-four-hour pressure change may be reported by repeating the group.

(viii) $7RRRt_R$ - When there has been no precipitation in the preceding six hours, or when it has not been possible to measure the precipitation in the preceding six hours, the group is omitted. Reports from automatic stations may include the group even if there has been no precipitation. The reason for the omission is given by the code figure reported for i_R.

(ix) $8N_hC_LC_MC_H$ - When there are no clouds (i.e. N = 0), and in the case of an automatic station not equipped to report these data, this group is omitted.

Section 2 - Regional Section

(5) The inclusion of groups in Section 2 will be determined by Regional decision.

(i) $(0N_sCh_sh_s)$ - When this group is reported, the instructions given in Note (3) of FM 11.D, Volume B, apply.

(ii) $(k_sT_xT_xT_nT_n)$ - The period of time covered by the maximum and minimum temperature, and the synoptic hours at which they are reported will be determined by Regional decision.

(iii) (4Esss) - This group will be reported at the main synoptic hours determined by Regional decision.

(iv) $(5j_ij_sj_sj_s)$ - When this group is included, the following set of specifications are used:

j_i	$j_sj_sj_s$		Element	For inclusion by
(0-3) d'	d'f'f'	g_od"d"f"f"	wind change (in period covered by WW)	SHIP, SYNOP (island stations)
4	$g_os_nd_T$		temperature change (in period covered by WW)	SHIP, SYNOP (widely spaced stations)
5	$f_xf_xg_o$		mean max. wind speed (in period covered by WW)	SHIP, SYNOP
6	$D_LD_MD_H$		direction of cloud drift	SYNOP (tropics)
7	CD_ae_C		direction and elevation of cloud	SYNOP (tropics)

(v) $(6S_pS_ps_ps_p)$ - The specifications for the special phenomena code tables are determined by Regional decision.

(vi) (7....) (8....) (9....) - The data to be reported by the groups having indicator figures 7, 8 and 9 are determined by Regional decision. The group with indicator figure 7 should be reserved for reporting amount of precipitation.

Section 3 - National Section

(6) $N'C'H'H'C_t$ - This group is included by national decision. It is reported only by mountain stations when the base of the cloud is below the level of the station.

Section 4 - National Section

(7) - The groups to be included in Section 4 are determined nationally.

*

* *

Part B

Code form for surface reports from sea stations

FM 24.E Surface report from sea station

SHIP

Section 1	$M_iM_iM_jM_j$				
	$YYGGi_u$	$D_sv_sL_aL_aL_a$	$Q_cL_oL_oL_oL_o$	s_ti_RNVh	
	Oddff	1wwWW	$2s_nTTT$	$(3s_nT_dT_dT_d)$	
	5PPPP	$(6ap_vp_vp_v)$	$(7RRRt_R)$	$(8N_hC_LC_MC_H)$	
	$(s_nT_wT_wT_wn_w$	$P_wP_wH_wH_wP_w$	$P_wH_wH_wd_wd_w$	$(P_wP_wH_wd_wd_w))$	
	$(7I_sE_sE_sR_s)$				
Section 2	222	(c_2KD_ire)	or plain language		
Section 3	444	$(ON_sCh_sh_s)$	$(5j_ij_sj_sj_s)$	$(6S_pS_ps_ps_p)$	
Section 4	666	CCCC			

SHIP is the name of the code form for a surface report from a sea station. The code form is divided into 4 Sections as follows:-

Section	Indicator Groups	Information
1	-	Data for global exchange
2	222	Sea Ice
3	444	Supplementary data
4	666	Ship's call sign

NOTES:

(1) The group $M_iM_iM_jM_j$ shall be included as the first line of the text of a meteorological bulletin of SHIP reports. $M_iM_iM_jM_j$ is not included in each SHIP report.

(2) If a Member considers its fixed sea stations (except ocean weather stations) to be in the category of sea stations the reports shall be in SHIP.

(3) Use of bracketed groups :

The bracketed groups to be included in a ship's report will be determined by the Member who recruits the ship. Selected ships should include in Section 1, in addition to the groups that are not bracketed, the groups $3s_nT_dT_dT_d$ $6ap_vp_vp_v$ $8N_hC_LC_MC_H$ $s_nT_wT_wT_wn_w$, one or more wave groups and when appropriate the group $7I_sE_sE_sR_s$. For the use of bracketed groups in Sections 2 and 3 see Notes (5) and (6) below.

(4) Use of groups in Section 1

(i) s_ti_RNVh - This group is always included.

(ii) Oddff - See Note 4(ii) under SYNOP - FM 14.E

(iii) 1wwWW - See Note 4(iii) under SYNOP - FM 14.E

(iv) $(3s_nT_dT_dT_d)$ - See Note 4(iv) under SYNOP - FM 14.E

(v) $(6ap_vp_vp_v)$ - Mobile ships use this group to report the three hour pressure tendency. Fixed sea stations in tropical areas may, by Regional decision, use the group to report twenty-four hour pressure change. If required, both three-hour tendency and twenty-four hour pressure change may be reported by repeating the group.

(vi) ($7RRRt_R$) - Lightships reporting in the SHIP code form and fixed sea stations include this group when required by regional or national decision. Mobile ship stations which are able to measure precipitation should also include the group. If rainfall during the preceding six hours is measured and reported the Note 4(viii) under SYNOP applies.

(vii) ($8N_hC_LC_MC_H$) - See Note 4(ix) under SYNOP FM 14.E. This group is also omitted by mobile ship stations not required to report the amount of low clouds and the types of clouds.

(viii) ($s_nT_wT_wT_wn_w$ $P_wP_wH_wH_wP_w$ $P_wH_wH_wd_wd_w$ ($P_wP_wH_wd_wd_w$)) - These groups may or may not be included in the report in accordance with national instructions. They should be included by selected ships and are mandatory for ocean weather stations.

(a) The code figure for n_w indicates the number of wave groups that follow (0, 1, 2 or 3).

(b) The first four code figures of the first wave group are used to report wind waves. When swell cannot be detected the final P_w in this group is reported as "/".

(c) When swell can be distinguished from wind waves, the predominant swell system is reported by the six code figures following the figures for wind waves.

(d) When a second swell system is observed it is reported by the third wave group. This group is omitted if a second swell system cannot be detected or if reporting of this swell system is not required.

(e) If there is a swell with no wind waves the first wave group is to be reported as $0000P_w$.

(ix) $(7I_sE_sE_sR_s)$ - This group should be included in the report whenever ice accretion on the ship is observed.

Section 2 - Sea Ice

(5) Section 2, Sea Ice, is reported whenever ice and/or icebergs are visible, or have been observed at a point or points, within a distance of 50 or 60 km from the ship's position at time of observation. The reporting of sea ice in SHIP is not to supersede the reporting of sea ice and icebergs in accordance with the International Convention for the Safety of Life at Sea. (Note: Ice information for other special purposes may be given by means of the special ice codes in Part B of Chapter I, Volume B.)

Section 3 - Supplementary Data

(6) The uses of groups in Section 3:

(i) $(0N_sCh_sh_s)$ - When this group is included the instructions given in Note (3) of FM 11.D, Volume B apply.

(ii) $(5j_ij_sj_sj_s)$ - See Note 5(iv) under SYNOP.

(iii) $(6S_pS_ps_ps_p)$ - This group is normally reported only by ocean weather stations.

Section 4 - Ship's call sign

(7) The indicator group 666 and the Ship's call sign are not normally included in the SHIP report by the observer. Section 4 is added to the report by the coast radio station or national collecting centre when preparing the report for inclusion in bulletins.

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Part C

New or amended symbolic figure groups

222 Indicates that data on sea ice follow (FM 24.E)

333 Indicates that additional data for regional use follow (FM 14.E)

444 Indicates that data giving supplementary information follow (FM 24.E)

555 Indicates that data on clouds having bases below station level follow (FM 14.E)

666 Indicates that the ship's call sign follows (FM 24.E)

777 Indicates that additional data for national use follow (FM 14.E)

New or amended symbolic letters

a Characteristic of pressure tendency during the 3 hours preceding the time of observation or the sign of the pressure change in 24 hours (Code 0200 revised) (FM 14.E and FM 24.E)

a_3 Indicator giving the standard constant pressure level of which the geopotential is reported (Code 0264 revised) (FM 14.E)

D_a Direction in which orographic clouds or clouds of vertical development are seen (Code 0700) (5-group in section 333 of FM 14.E)

D_L, D_M, D_H Direction from which respectively C_L, C_M and C_H clouds are moving (Code 0700) (5-group in section 333 of FM 14.E)

d_T Change of temperature (see Code 0821) (5-group in Section 333 of FM 14.E and Section 444 of FM 24.E) d'd' } d"d" — Direction in tens of degrees of wind before (d'd') and after (d"d") a wind change(Code 0877) (5-group in section 333 of FM 14.E and section 444 in FM 24.E)

(1) For a change of wind to be reported the change in direction shall be 30 degrees or more in less than 30 minutes when the wind speed before or after the change is 8 m/s or more, and/or a change in wind speed of 8 m/s or more.

E — State of the ground (Code 0900) (FM 14.E) (present note (1) in Volume B to be deleted)

e_C — Elevation angle of the top of the cloud indicated by C (Code 1004) (5-group in section 333 of FM 14.E)

ff — Wind speed in units indicated by i_u (FM 14.E, FM 24.E)

Note: The present Note (2) under ff should be deleted and in Note (3) the words "for aeronautical purposes". The other Notes remain as they are.

f'f' } f"f" — Wind speed in units indicated by i_u before (f'f') and after (f"f") a wind change (5 group in section 333 of FM 14.E and section 444 in FM 24.E)

(1) See Note (1) under d'd' above.

f_xf_x — Maximum mean wind speed during 10 minutes, in units indicated by i_u (5-group in section 333 of FM 14.E and section 444 in FM 24.E)

(1) To be reported only when f_xf_x is equal to or greater than 16 m/s.

(2) If maximum mean wind speeds are reported in knots, and the value exceeds 99 knots, f_xf_x is reported 99 and the actual value is indicated in an additional 5-group in the form $55f_xf_xf_x$.

g_o	Period, in whole hours, between the time of observation and the time of the wind or temperature change or the occurrence of maximum mean wind speed (scale from 0 to 5) (5 group in section 333 of FM 14.E and section 444 in FM 24.E.)
i_u	Wind and instrumentation indicator (Code 1853) (FM 14.E, FM 24.E)
i_R	Indicator for inclusion of precipitation group (Code 1819) (FM 14.E, FM 24.E)
j_i	Supplementary information indicator (Code 2039) (FM 14.E, FM 24.E)
$j_s j_s j_s$	Specifications relating to supplementary information (Code 2039) (FM 14.E, FM 24.E)
k_s	Sign of extremes of temperature (Code 2251) (FM 14.E)
$M_i M_i$	Identification letters of the code form (Code 2582 revised) (FM 14.E, FM 24.E)
$M_j M_j$	Identification letters of the part of the report (Code 2582 revised) (FM 14.E, FM 24.E)
n_w	Number of wave groups (Code 2855) (FM 24.E)
PPPP	Pressure in tenths of a millibar (FM 14.E, FM 24.E) (1) Thousands of millibars of the pressure value are omitted (Note: Retain the following notes under PPP : notes 2(a), 2(c), 2(b) up to and including the words "constant pressure level", 2(e) and (3).)
$p_v p_v p_v$	Amount of pressure tendency in tenths of a millibar, at the station, during the 3 hours preceding the time of observation, or, when a = 4 or 9, the pressure change in tenths of a millibar at station level in the last 24 hours.

RRR — Amount of precipitation which has fallen during the 6 hours preceding the time of observation (Code 3590) (FM 14.E, FM 24.E)

(Note: The notes under RR do no longer apply).

R_s — Rate of ice accretion on ships (Code 3551 revised) (FM 24.E)

s_n — Sign of temperature (FM 14.E, FM 24.E)

(1) $s_n = 0$ for positive or zero temperatures; $s_n = 1$ for negative temperatures.

s_t — Type of station and wind/weather groups indicator (Code 3852) (FM 14.E, FM 24.E)

sss — Depth of snow in centimetres (FM 14.E)

t_R — Duration and time of occurrence of precipitation reported by RRR (Code 4019) (FM 14.E, FM 24.E)

T_nT_n — Minimum temperature in whole degrees Celsius (FM 14.E)

(1) The reporting of this element is fixed regionally.

T_xT_x — Maximum temperature in whole degress Celsius (FM 14.E)

(1) The reporting of this element is fixed regionally.

TTT — Air temperature in tenths of a degree Celsius, its sign being given by s_n (FM 14.E, FM 24.E)
(Note: The notes under the present TT do not apply)

$T_dT_dT_d$ — Dew-point temperature in tenths of a degree Celsius, its sign being given by s_n (FM 14.E, FM 24.E)

(Note: The note (1) under the present T_dT_d does not apply)

V — Horizontal visibility at surface (Code 4300 revised) (FM 14.E, FM 24.E)

(1) If the horizontal visibility is not the same in different directions, the shorter distance should be given for V.

ww Present weather (Code 4677* revised) (FM 14.E, FM 24.E)

(Note: Appropriate notes under the present ww code should be retained as regards their intent).

WW Past weather (Code 4675*) (FM 14.E, FM 24.E)

Notes (1), (2), (3) and (4): same as under present specification of the symbolic letter W.

$T_wT_wT_w$ Sea surface temperature in tenths of a degree Celsius, its sign being given by s_n (FM 24.E)
(Note: The present Note (1) under $T_wT_wT_w$ does not apply)

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* See Annex II.

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New or amended code tables

Code 0200 (revised)

a - Characteristic of pressure tendency during the 3 hours preceding the time of observation, or the sign of the pressure change in 24 hours

Code figure		
0	Rising then falling; atmospheric pressure the same or higher than 3 hours ago	Pressure tendency during 3 hours preceding the observation
1	Rising then steady; or rising then rising more slowly	
2	Rising (steadily or unsteadily) or steady (*)	
3	Falling or steady, then rising; or rising then rising more rapidly; atmospheric pressure higher than 3 hours ago	
5	Falling then rising; atmospheric pressure is the same or lower than 3 hours ago	
6	Falling, then steady; or falling then falling more slowly	
7	Falling (steadily or unsteadily) (*)	
8	Steady or rising then falling; or falling then falling more rapidly; atmospheric pressure lower than 3 hours ago	
4	Atmospheric pressure equal to or greater than 24 hours ago	Pressure change in 24 hours
9	Atmospheric pressure lower than 24 hours ago	

(*) In messages from automatic meteorological stations, a is coded as 2 when the tendency is positive or zero; a is coded as 7 when the tendency is negative.

Code 0264 (revised)

a_3 - Indicator giving the standard constant pressure level of which the geopotential is reported

Code figure	
8	850 mb
7	700 mb
5	500 mb

Code 0821

d_T - Change of temperature

Code figure		Code figure	
5	Δ T = 5°C	0	Δ T = 10°C
6	Δ T = 6°C	1	Δ T = 11°C
7	Δ T = 7°C	2	Δ T = 12°C
8	Δ T = 8°C	3	Δ T = 13°C
9	Δ T = 9°C	4	Δ T = 14°C or more

Code 1004

e_C - Elevation angle of the top of the cloud indicated by C

Code figure	
0	Tops of cloud not visible
1	45° or more
2	About 30°
3	About 20°
4	About 15°
5	About 12°
6	About 9°
7	About 7°
8	About 6°
9	Less than 5°

Note: Angular elevation may be estimated by a rough-and-ready method. A simple way is to hold a 30-cm rule (or any straight stick 30 cm long) with one end close to the eye and its length stretching out in front horizontally; if a span or forefinger of the other hand is then made to project upward from the other end of the rule to serve as a mark and the eye is directed towards the upper end of the span or finger, the line of sight will make a definite angle with the horizon.

Mark above horizontal at 30-cm distance	*Angle of elevation*
Top of span formed by thumb and finger	30°
Top of full length of forefinger	15°
Top of half length of forefinger	9°
Breadth of two fingers	6°

Code 1853

i_u - <u>Wind and instrumentation indicator</u>

Code figure	Units used	Instruments certified or otherwise
0	metres per second	Land stations,and ships with certified instruments
1	knots	
2	metres per second	Ships with uncertified instruments
3	knots	

Code 1819

i_R - <u>Indicator for inclusion of precipitation group</u>

Code figure

0 The group $7RRRt_R$ <u>is not</u> included in the message because there has been no precipitation during the preceding 6 hours.

1 The group $7RRRt_R$ <u>is</u> included in the message because there has been measurable precipitation in the preceding 6 hours (automatic weather stations may use this figure also when there has been no precipitation).

/ The group $7RRRt_R$ <u>is not</u> included in the message because it was not possible to measure the amount.

Code 2039

j_i - Supplementary information indicator

$j_s j_s j_s$ - Specifications relating to supplementary information

$5j_ij_sj_sj_s$	Element	For inclusion by
$5d'd'f'f'$ $g_od''d''f''f''$	Direction and speed of wind before ($d'd'f'f'$) and after ($d''d''f''f''$) a wind change, and period (g_o) between the time of observation and the time of the wind change. (1) These groups are used to describe a wind change observed during the period covered by WW. (2) These groups should only be sent when a sudden change of direction of 30° or more has been observed, the speed of the wind before or after the change being equal to or greater than 8 m/s, or if a change of wind speed of 8 m/s or more has been observed, either of these changes having occurred in a period of less than 30 minutes.	SHIP SYNOP (island stations)
$54g_os_nd_T$	Change of temperature (d_T) with its sign (s_n) and period (g_o) between the time of observation and the time of temperature change. (1) This group is used to describe a temperature change observed during the period covered by WW. (2) Only temperature changes equal to or greater than 5°C occurring in less than 30 minutes are to be given.	SHIP SYNOP (widely spaced stations)

$55f_xf_xg_o$	$(55f_xf_xf_x)$	Maximum mean wind speed during 10 minutes (f_xf_x or $f_xf_xf_x$) and period (g_o) between the time of observation and the time of the occurrence of maximum mean wind speed. (1) This (or these) group(s) is (are) used to give maximum mean wind speed observed during the period covered by WW (2) This value is only sent if the mean wind speed measured over 10 minutes is equal to or greater than 16 m/s. (3) If maximum mean wind speed is reported in knots and the value exceeds 99 knots f_xf_x is reported 99 and the actual value is indicated in an additional group: $55f_xf_xf_x$	SHIP SYNOP
$56D_LD_MD_H$		Direction from which respectively C_L, C_M, C_H clouds are moving	SYNOP (tropics)
$57CD_ae_C$		Direction (D_a) in which orographic clouds or clouds of vertical development indicated by C are seen, and elevation angle (e_C) of the top of the cloud indicated by C	SYNOP (tropics)

Code 2251

k_s – <u>Sign of extremes of temperature</u>

Code figure	T_nT_n	T_xT_x
1	+	+
2	–	+
3	–	–

Code 2855

n_w - <u>Number of wave groups</u>

Code figure	
0	No waves of sea due to wind, nor swell waves. The wave groups are omitted
1	A wave group for sea due to wind in which $H_wH_w \neq 00$. No swell waves
2	A wave group for sea due to wind and a group for swell waves in which $H_wH_w \neq 00$
3	Same specification as for $n_w = 2$, plus a second group for swell waves
6	Impossible to distinguish between sea due to wind and swell. One single wave group coded in the form $P_wP_wH_wH_w/$.
/	Observation or measurement of waves impossible. The wave groups are omitted.

Code 3590

RRR - <u>Amount of precipitation which has fallen during the 6 hours preceding the time of observation</u>

Code figure	mm	Code figure	mm
000	0	990	trace
001	1	991	0.1
002	2	992	0.2
.	.	993	0.3
.	.	994	0.4
.	.	995	0.5
.	.	996	0.6
.	.	997	0.7
988	988	998	0.8
989	989 or more	999	0.9

Code 3551 (revised)

R_s - <u>Rate of ice accretion on ships</u>

Code figure	
0	Ice not building up
1	Ice building up slowly
2	Ice building up moderately quickly
3	Ice building up rapidly
4	Ice melting or breaking up slowly
5	Ice melting or breaking up moderately quickly
6	Ice melting or breaking up rapidly

("slowly", "moderately quickly" and "rapidly" being described as below)

(i) Slowly - Growth of about 0.6 to 1.2 cm every 12 hours - no necessity for chopping. Deck machinery not frozen up and workable.

(ii) Moderately quickly - About 2.5 cm build-up during 4 hours necessitating chopping. Deck machinery must be kept in motion and ropes and wires constantly moved to prevent freezing.

(iii) Rapidly - Very rapid build-up of ice. Icing conditions may become critical. Chopping is necessary at frequent intervals; at least every two hours on trawlers, trawling comes to a standstill with nets, gear and fish freezing on deck.

Code 3852

s_t – Type of station and wind/weather groups indicator

Code figure	Type of station	Present and past weather group is	Wind group is	Wind determination
1 *	automatic	included	included	measured
2 *	automatic	not included (measured and not significant)	included	measured
3 *	automatic	not included - not measured	included	measured
4	manned	included	included	measured
5	manned	included	included	estimated
6	manned	omitted (wwWW = 0000)	included	measured
7	manned	omitted (wwWW = 0000)	included	estimated
8	manned	included	omitted (calm)	-
9	manned	omitted (wwWW = 0000)	omitted (calm)	-

* Notes:

1. Use of code s_t by automatic stations :

(a) Station is not equipped to observe wwWW : $s_t = 3$

(b) Station is equipped to observe wwWW, and there is significant weather to report : $s_t = 1$

(c) Station is equipped to observe wwWW and there is no significant weather to report : s_t = 1 or 2 according to national decision

(d) Station is equipped to observe wwWW but the equipment is unservicable : s_t = 1 and 1wwWW = 1////

2. A calm corresponds to a wind speed < 0.5 m/sec or < 1 knot.

Code 4019

$\underline{t_R}$ - Duration and time of occurrence of precipitation reported by RRR

0	No precipitation (automatic stations)
	Intermittent precipitation or showers (with breaks more than 30 minutes)
1	In period H-6 to H-3
2	In period H-3 to H
3	Throughout period H-6 to H
	Continuous precipitation, or breaks not more than 30 minutes
4	Duration up to 2 hours ended 0-2* hours before H
5	" " " " " " 2-4 " " "
6	" " " " " " 4-6 " " "
7	" 2-4 hours " 0-2* " " "
8	" " " " 2-4 " " "
9	" 4-6 " " 0-2* " " "
/	Not determined

* includes precipitation still falling at H, indicated by ww

Code 4300 (revised)

V - Horizontal visibility at surface

Code figure				
0	< 50 m			
1	≥ 50 m	to	< 200 m	*
2	≥ 200 m	to	< 500 m	
3	≥ 500 m	to	< 1000 m	
4	≥ 1 km	to	< 2 km	
5	≥ 2 km	to	< 5 km	
6	≥ 5 km	to	< 10 km	
7	≥ 10 km	to	< 20 km	*
8	≥ 20 km	to	< 50 km	
9	≥ 50 km			

* In the case of an automatic station, code figures 1 and 7 have respectively the following specifications :
1 : less than 200 m (and code figure 0 is not used)
7 : 10 km or over (and code figure 8 and 9 are not used)

*

* *

Part D

Guidelines for tests of new SYNOP and SHIP code forms

1. If possible, direct comparisons should be made between messages encoded in FM 11.D, FM 21.D, etc. and the same data encoded in FM 11.E and FM 21.E. Actual observations should be used wherever possible, but for some purposes hypothetical data may be more convenient.

2. Group-count comparisons between the present and the new code forms should be made to assess the impact on telecommunications at the national and international levels. The comparisons should be made in widely varying meteorological conditions.

3. Any difficulties encountered by observers should be noted, and the causes of the difficulties sought.

4. The suitability and convenience of the new code form for manual processing, and particularly for plotting, should be studied through the reaction and comments of the technical staff concerned, both experienced and junior.

5. Those Members processing data by computer, who are able to take part in the test programme, should assess the relative merits of the present and the new codes from the programming point of view, and from any other relevant points of view.

6. Throughout all phases of testing particular attention should be paid to the feature of the new code forms which permits various groups to be omitted from messages in certain circumstances. Counts of the number of occasions on which each of the several groups concerned is omitted would be useful. The total number of groups omitted in a complete collection of reports received at one time in NMCs and RMCs in extremes of weather conditions should be ascertained.

7. No fixed pattern of testing is suggested. Each Member should conduct the test to cover points of particular interest and concern in their own Services.

8. Tests should be completed and comments on them forwarded to the Secretary-General not later than 1 October 1972.

A N N E X XXI

Annex to Recommendation 28 (CSM-V)

OVERALL LIST OF OUTPUT PRODUCTS OF WMCs

I. Analyses

Surface
850 mb
700 mb
500 mb
300 mb
250 mb
200 mb
150 mb
100 mb
70 mb
50 mb
30 mb
20 mb
10 mb

Relative topography 500/1000 mb
Relative topography 300/1000 mb
Jet stream
Tropopause
Winds determined from satellite observations
Nephanalyses
Digitized mosaics
Mapped radiometric data
Satellite I.R. data
Field of temp of underlying surface
Snow and ice cover
Storm alerts (based on satellite pictures)

Area coverages: Northern hemisphere, southern hemisphere, tropical belt

Times of reference (H): 00 and 12 GMT, except for some special products such as nephanalyses.

II. Prognoses

Surface
850 mb
700 mb
500 mb
300 mb
250 mb
200 mb
150 mb
100 mb
70 mb
50 mb
30 mb
20 mb
10 mb

Relative topography 500/1000 mb
Relative topography 300/1000 mb
Precipitation/Temperature
5-day surface
5-day 500 mb
30-day surface
30-day 500 mb

Area coverages: northern hemisphere, southern hemisphere, tropical belt

Times of reference (H): 00 and 12 GMT

Times of validity: H+12, H+24, H+36, H+48, H+72 and H+96 hours (except for some special products such as 5-day and 30-day surface prognoses).

III. 5-day, 15-day and 30-day mean values

Surface
500 mb
Relative topography 500/1000 mb
Sea-surface temperature (preferably anomaly)

Area coverages: northern hemisphere, southern hemisphere, tropical belt.

A N N E X XXII

Annex to Recommendation 29 (CSM-V)

OVERALL LIST OF OUTPUT PRODUCTS OF RMCs

1. Analyses

Surface

Pressure changes 12 and/or 24 hours

850 mb

700 mb

500 mb

300 mb

250 mb

200 mb

150 mb

100 mb

Tropopause and maximum wind

Tropopause and vertical wind shear

Relative topography, 500/1000 mb

Stability

State of sea

Sea surge

Sea-surface temperature

Thermoclines

Superstructure icing

Freezing level

Precipitation areas - 6 hours

Precipitation areas - 24 hours

Nephanalyses

Spherics

Radar

Special phenomena

Sea ice

Precipitable water

Snow depth

400 mb

50 mb

30 mb

20 mb

Plotted surface data (3-hourly)

Plotted upper-air data (850, 700, ... 100 mb)

Tabulated winds

Temp diagrams

Tropospheric mean chart

Pressure changes 3 hours

Changes 500 mb

Thickness change 500/1000 mb, 24 hours

Top of Ekman layer

Transpiration and evaporation estimates

Water balance assessments involving estimates of soil moisture deficits or soil moisture contents

Estimates of potential photosynthesis (possible dry matter production)

Surface air trajectories

850 mb air trajectories

700 mb air trajectories

500 mb air trajectories

Times of reference (H): 00, 06, 12 and 18 GMT, as applicable.

II. Prognoses

Surface

850 mb

700 mb

500 mb

300 mb

250 mb

200 mb
150 mb
100 mb
Tropopause and maximum wind
Tropopause and vertical wind shear
Relative topography 500/1000 mb
Upper winds and temperatures
Significant weather above 400 mb
Significant weather below 400 mb
Precipitation (quantitative)
Maximum and minimum temperatures
Freezing level
State of sea
Sea surge
Sea-surface temperature
Thermoclines
Sea ice
Superstructure icing
5-day surface
5-day 500 mb
30-day surface
400 mb (12 hour, 24 hour)
500 mb (96 hour)
500 mb vorticity
500 mb vertical motion

Times of reference (H): 00, 06, 12 and 18 GMT as applicable

Times of validity: H+12, H+18, H+24, H+36, H+48 and H+72 hours, except for a few special products

A N N E X XXIII

Annex to Recommendation 30 (CSM-V)

BROAD OUTLINE OF THE FUTURE GUIDE ON THE GLOBAL DATA-PROCESSING SYSTEM

Volume I

(i) Description of the purpose and scope of the Global Data-Processing System;

(ii) Organization of the Global Data-Processing System;

(iii) Locations and detailed functions of WMCs and RMCs, including lists of output products which should be prepared and issued by WMCs and RMCs. Co-ordination of WMC and RMC output programmes. Detailed responsibilities for processing, storage and archiving of meteorological information for climatological and research purposes;

(iv) Description of programmes and methods (both numerical and manual) used in the preparation of analyses and prognoses;

(v) WWW requirements for receipt of various types of observational data at WMCs, RMCs and NMCs. Guidance for Members for developing statements of requirements;

(vi) WWW requirements concerning formats and times for processing, computation and distribution of WMC and RMC products. Guidance for Members for developing statements of requirements for the receipt of processed information;

(vii) Guidelines for the establishment of transmission schedules for the Main Trunk Circuit and its branches and for regional telecommunication networks, including proposed priorities for inclusion of various types of products in the transmissions, as well as the priorities for transmission of various types of information in the cases when more than one product is offered at the same time to the telecommunication system for transmission, and priorities of transmission on resumption of service after outages of centres or circuits;

(viii) Interchange of personnel engaged in data-processing activities.

Volume II

Updated "Guide to the preparation of synoptic weather charts and diagrams" with inclusion of information on format of exchange of processed information in alpha-numeric form (transmissions of grid-point values).

A N N E X XXIV

Annex to Recommendation 32 (CSM-V)

ORGANIZATION OF THE GLOBAL TELECOMMUNICATION SYSTEM (GTS)

1. FUNCTIONS AND ORGANIZATION OF THE GTS

1.1 Functions

The functions of the GTS are as follows:

(a) To collect observational data;

(b) To distribute the data to National, Regional and World Meteorological Centres (NMCs, RMCs and WMCs);

(c) To transmit the resulting processed information to other WMCs, RMCs and NMCs.

1.2 Organizational principles of the GTS

(1) The circuits to be provided in the GTS and the techniques to be employed on these circuits shall be adequate to accommodate the volume of meteorological information and its transmission within the required time limits, to meet the needs of World, Regional and National Meteorological Centres, resulting from the implementation of the WWW.

(2) The GTS is organized on a three-level basis, namely:

(a) The Main Trunk Circuit and its branches, to link together the WMCs as well as certain Regional Telecommunication Hubs (RTHs);

(b) The regional telecommunication networks; and

(c) The national telecommunication networks.

2. FUNCTIONS OF THE METEOROLOGICAL TELECOMMUNICATION CENTRES

2.1 Functions of WMCs relating to telecommunications

The functions relating to telecommunications are as follows:

(a) Collecting observational data provided by Regional Meteorological Centres, Regional Telecommunication Hubs and those National Meteorological Centres which they serve directly;

(b) Transmitting the data thus received, in the appropriate form, on the Main Trunk Circuit and its branches of the Global Telecommunication System;

(c) Relaying observational data available, at the appropriate alphabet and speed, to the Regional Meteorological Centres, Regional Telecommunication Hubs and National Meteorological Centres which ask for them;

(d) Distribution, at the appropriate alphabet and speed, of selected data to the Regional Meteorological Centres, Regional Telecommunication Hubs and National Meteorological Centres which ask for them;

(e) Ensuring the transmission and distribution in the appropriate form, of processed information to the World Meteorological Centres, Regional Meteorological Centres, Regional Telecommunication Hubs and National Meteorological Centres which ask for them;

(f) Checking and correction in order to maintain standard transmission procedures.

Note: Meteorological checking of bulletins shall be performed at the National Meteorological Centres.

2.2 Functions of RTHs

The functions are as follows:

(a) The collection of observational data within a specific zone of responsibility;

(b) The transmission of such data to the Main Trunk Circuit or its branches, either direct or through the appropriate WMCs or other RTHs;

(c) The reception of observational data and processed information from other RTHs, RMCs or from WMCs;

(d) The dissemination of observational data, at the appropriate alphabet and speed, and processed information in the appropriate form through point-to-point circuits or by radio broadcasts; to meet the requirements of all NMCs within their zone of responsibility;

(e) Checking and correction in order to maintain standard transmission procedures.

Note: Meteorological checking of bulletins shall be performed at the National Meteorological Centres.

2.3 The telecommunication functions of RMCs

RMCs, not combined with RTHs, should perform telecommunication functions as necessary in accordance with regional agreement.

2.4 The telecommunication functions of NMCs

The telecommunication functions of NMCs are as follows:

(i) Collection of observational data originating from stations within their territory or within the zone of responsibility of the Member, as well as observations from aircraft and ships received by the collecting centres located within the said territory and/or the said zone, as soon as possible and, in any event, within 15 minutes of the observing station's filing time;

Notes: 1. Definition of the observing station's filing time: the time when the coded meteorological report is first presented to the telecommunication system. For aircraft and ship weather reports, it is the time when they are received by the appropriate radio stations (land and coastal stations).

2. Under normal conditions, the coded message should be presented to the telecommunication system not later than five minutes after its completion.

(ii) Transmission of this collected information from their territories to the associated RTH;

(iii) Reception of the required observational data and processed information;

(iv) Distribution for their benefit and that of Members who request them, in accordance with bilateral agreements, of observational and processed meteorological information, to meet the requirements of the countries concerned;

(v) Checking and correction in order to maintain standard transmission procedures.

Note: Meteorological checking of bulletins is not a telecommunication function (see Technical Regulations, paragraph 8.1.6.2).

3. ENGINEERING PRINCIPLES OF THE GLOBAL TELECOMMUNICATION SYSTEM

3.1 The engineering principles for the planning of the Global Telecommunication System are as follows:

Principle 1

The Global Telecommunication System is engineered as an integrated network for the collection, exchange and distribution of both processed and unprocessed observational meteorological information on a world-wide basis, with a view to meeting, efficiently and effectively, the requirements of all National Meteorological Services and also the requirements of World and Regional Meteorological Centres.

Principle 2

The system makes the fullest possible use of cable and landline facilities and other telecommunication means with similar technical and operational characteristics. For medium and high-speed data transmission and also facsimile transmission (in digital and non-digital form), the standard telephone type circuit, as well as radio circuits having similar technical characteristics, is preferred for operational and financial reasons.

Principle 3

The circuits to be provided and the techniques to be employed shall be adequate to accommodate the volume of meteorological information and its transmission within the required time limits, to meet the needs of World, Regional and National Meteorological Centres.

Principle 4

In planning the circuits and transmission schedules, the volume of traffic to be passed over any one channel is not to exceed 80% of its ultimate capacity. The channels shall be engineered to ensure the highest possible reliability.

Principle 5

The system is based on the interconnexion of a number of centres, namely, NMCs, RMCs, RTHs and WMCs. The WMCs, RMCs and RTHs require suitable equipment for selection, switching and editing in order to provide NMCs with the data selected to meet their specified needs.

Principle 6

Provision is to be envisaged for alternative routeings, where necessary, to ensure the reliability and efficiency of the system, particularly the reliability and efficiency of the Main Trunk Circuit.

4. THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

4.1 The principle function of the Main Trunk Circuit and its branches is to ensure rapid and reliable exchange of the observational data required for analyses and prognoses on a global scale. The Main Trunk Circuit and its branches will also be used for the exchange of processed information between WMCs, including the data received from meteorological satellites. Additional processed information will be included in the transmission programme to supply to RTHs, RMCs and NMCs the data produced by the WMCs. Supplementary observational data and processed information, required for exchange between Regions, will also be transmitted, where feasible.

4.2 Centres performing telecommunication functions and located on the Main Trunk Circuit and its branches

4.2.1 The Main Trunk Circuit and its branches are to interconnect three WMCs and nine RTHs with receiving and transmitting capabilities, namely:

(i) WMCs

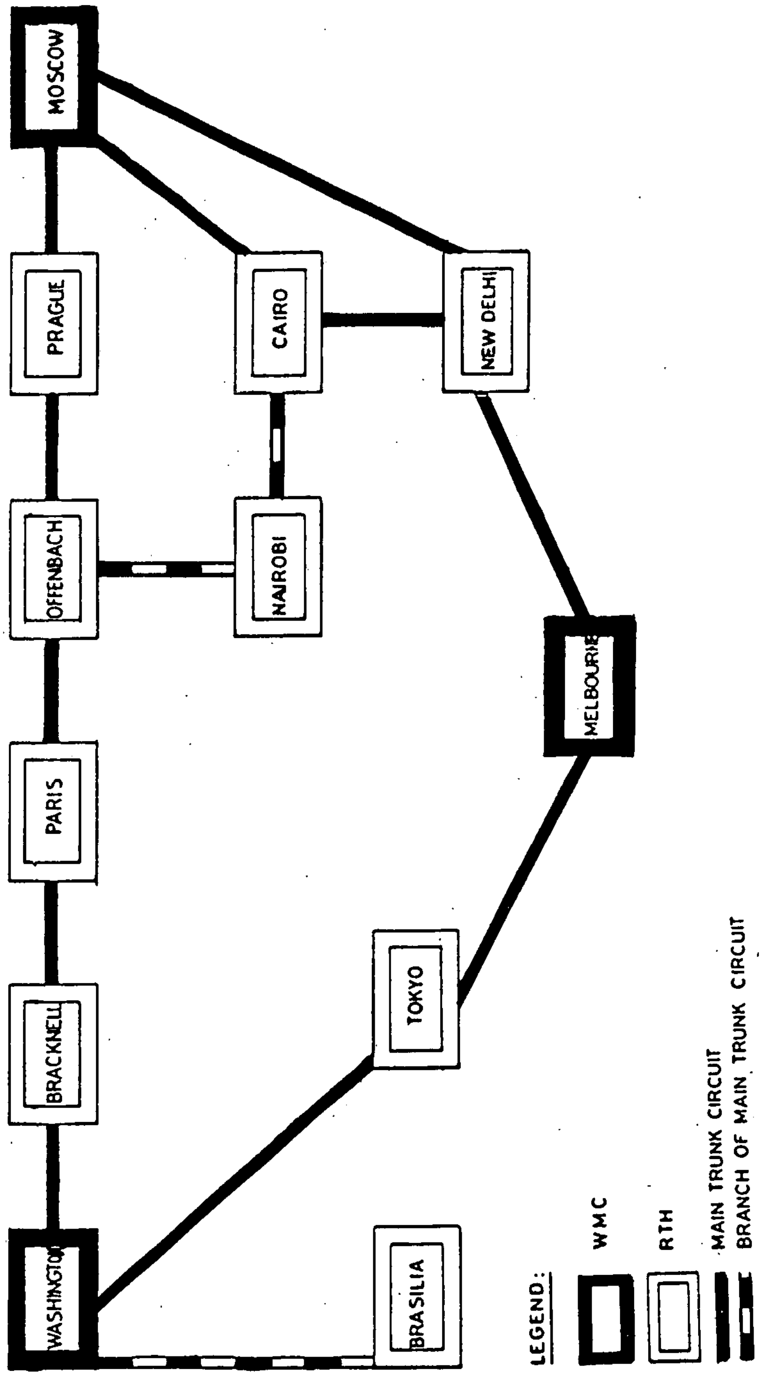
Melbourne, Moscow, Washington

(ii) RTHs

Bracknell	Offenbach
Brasilia	Paris
Cairo	Prague
Nairobi	Tokyo
New Delhi	

(iii) Interconnexions between the WMCs and the RTHs on the Main Trunk Circuit and its branches are shown in the diagram below:

ROUTEING OF THE MAIN TRUNK CIRCUIT AND ITS BRANCHES



4.3 Responsibilities of centres performing telecommunication functions and located on the Main Trunk Circuit and its branches, for the collection, exchange and distribution of observational data over this circuit

4.3.1 The responsibilities of centres on the Main Trunk Circuit and its branches for the transmission of observational data

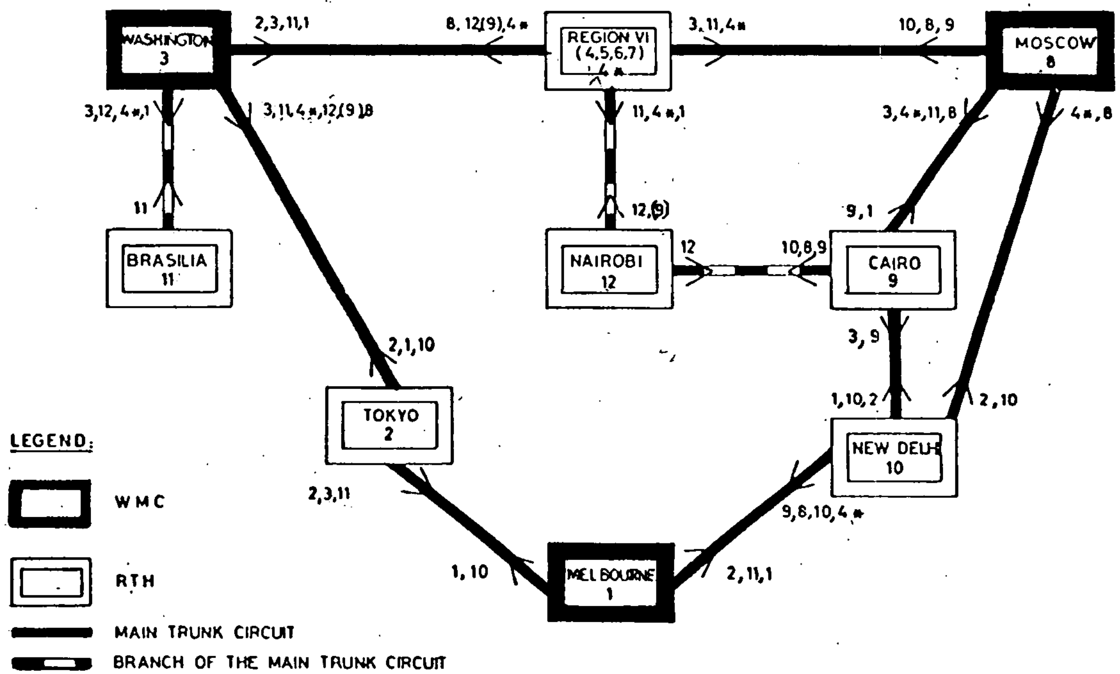
These are given in the following table and diagram.

WMC and RTH	Number of programmes	International blocknumbers
MELBOURNE	1	61, 89(P), 91(P), 93, 94, 95, 96(P), 97(P)
TOKYO	2	45, 46, 47, 48, 50, 51, 52, 53, 54 55, 56, 57, 58, 59, 91(P), 96(P), 97(P), 98
WASHINGTON	3	70, 72, 74, 76, 78, 91(P)
BRACKNELL	4	03, 04, 06(P), 08(P)
PARIS	5	06(P), 07, 08(P), 16, 17(P), 40(P)
OFFENBACH	6	01, 02, 06(P), 10(P), 11(P), 40(P)
PRAGUE	7	10(P), 11(P), 12
MOSCOW	8	01, 02, 06(P), 13, 15, 17(P), 20, 21, 22, 23, 24,25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40(P), 44 89(P)
CAIRO	9	40(P), 60(P), 61, 62, 63, 64, 65, 66, 67, 68
NEW DELHI	10	40(P), 41, 42, 43, 48
BRASILIA	11	80, 81, 82, 83, 84, 85, 86, 87, 88, 89(P)
NAIROBI	12	60(P), 61, 62, 63, 64, 65, 66, 67, 68

P = partially in terms of related zone of responsibility.

ROUTEING OF TRAFFIC ON THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

(Observational data)



Note: Programme 9 also contains the content of Programme 12

*Note: For the RTHs in Region VI, the details of the transmission programmes and relay responsibilities have been determined by RA VI (see Resolution 9 (V-RA VI).

4.3.2 Principles for the establishment of the exchange programme for observational data on the Main Trunk Circuit

4.3.2.1 The types of meteorological messages containing observational data to be exchanged on the Main Trunk Circuit and its branches, as well as the frequency of the exchanges of these data and the principles followed in the establishment of the lists of stations are given below:

(a) Types of messages

The types of messages are as follows:

(i) TEMP - Parts A and C;

(ii) PILOT - Parts A and C;

(iii) TEMP SHIP - Parts A and C;

(iv) PILOT SHIP - Parts A and C;

(v) SYNOP;

(vi) SHIP;

(vii) CODAR/AIREP;

(viii) Reports from automatic stations at land and sea;

(ix) Selected satellite data;

(x) CLIMAT, CLIMAT SHIP;

(xi) CLIMAT TEMP, CLIMAT TEMP SHIP.

Note: Figures (i) to (xi) do not indicate priorities.

(b) Frequency of exchanges

The frequency of exchanges is as follows:

(i) SYNOP, SHIP and reports from automatic stations at land and sea - 0000, 0600, 1200 and 1800 GMT;

(ii) TEMP, TEMP SHIP, PILOT, PILOT SHIP - for 0000 and 1200 GMT, and if available, 0600 and/or 1800 GMT;

(iii) CLIMAT, CLIMAT SHIP, CLIMAT TEMP and CLIMAT TEMP SHIP - once per month;

(iv) CODAR/AIREP reports for the periods: 2200-0200 GMT and 1000-1400 GMT;

(v) Selected satellite data: as frequent as possible

Note to (a) and (b) above: On certain sectors of the Main Trunk Circuit and its branches, additional information may be exchanged if necessary and possible, to meet inter-regional exchange requirements.

(c) <u>Stations from which reports should be included in the bulletins that are to be exchanged</u>

The lists of stations from which reports should be included in the bulletins that are to be exchanged are established as follows:

(i) TEMP and TEMP SHIP: all stations reporting TEMP/TEMP SHIP;

(ii) PILOT and PILOT SHIP: all stations reporting PILOT/PILOT SHIP excluding those stations:

(a) From which wind data are included in TEMP/TEMP SHIP reports of the same stations;

(b) Situated in areas with a dense upper-air network;

(iii) SYNOP:

(a) Stations comprising a sufficiently dense network of stations for broad-scale analysis and which are included in the recommended basic regional networks;

(b) From all TEMP/PILOT observing stations (or nearby stations);

(c) On the basis of requests of Members.

<u>Note</u>: The SYNOP stations chosen for exchange should be, in general, listed in WMO Publication No. 9.TP.4, Volume A.

(iv) SHIP reports ensuring adequate data coverage:

for example: SHIP reports from locations within 50-100 km of coastline could be excluded if land surface network is adequate. However, all SHIP reports from the Southern Hemisphere and tropical zones should be included;

(v) CLIMAT/CLIMAT TEMP and CLIMAT SHIP/CLIMAT TEMP SHIP reports from the networks of stations recommended by Regional Associations;

(vi) CODAR/AIREP reports over ocean areas and sparse data land areas;

(vii) Reports from automatic weather stations in data sparse areas.

The individual stations from which reports are to be exchanged are determined in sessions of the Commission for Synoptic Meteorology. Between sessions of that Commission, its President can approve changes. The lists of these stations are given in Annex XXV.

4.4 The responsibilities for centres on the Main Trunk Circuit and its branches for the transmission and relay of processed information

4.4.1 Processed information are routed on the Main Trunk Circuit and its branches in the same way as observational data (see paragraph 4.3.1, table and diagram).

4.4.2 If the capacity of the Main Trunk Circuit and its branches does not permit transmission of all processed information requested by countries, the priorities agreed to by CSM for inclusion of products on the Main Trunk Circuit and its branches are taken into account in establishing the transmission programmes.

5. REGIONAL TELECOMMUNICATION NETWORKS

5.1 Functions specified within the framework of the GTS of the WWW

In order to obtain rapid collection and distribution of observational data or processed information for all national Meteorological Services, the regional telecommunication networks shall be able to ensure:

(a) Exchange and distribution of observational data within the Region, as required to meet the needs of Members of the Region;

(b) Collection of observational data originating in, or being received by, radio stations located in the Region (e.g., reports from aircraft and ships);

(c) Collection of observational data from NMCs in adjacent Regions provided that this is found to be of use to the Global Telecommunication System and provided that this is agreed upon by the Members concerned and the corresponding Regional Associations;

(d) Exchange and distribution of processed (conventional and satellite) information as required to meet the needs of Members of the Region;

(e) Interchange of observational data and processed information with other Regions either by the Main Trunk Circuit and its branches or by other inter-regional and supplementary inter-regional circuits.

5.2 Regional telecommunication plans

(1) Regional telecommunication plans are established by the Regional Associations to perform the functions defined in paragraph 5.1 above;

(2) The regional telecommunication networks should consist of an integrated system of point-to-point circuits;

(3) The meteorological transmission systems and circuits of the regional telecommunication networks are as follows:

- (a) The segments of the Main Trunk Circuit and its branches which pass through the Region;
- (b) The main regional circuits, consisting of point-to-point circuits (either landline, cable or radio) interconnecting the RTHs in the Region;

(c) The regional circuits, consisting of point-to-point circuits (either landline, cable or radio) connecting the NMCs to the RTHs or other NMCs in the Region;

(d) The supplementary regional circuits, consisting of point-to-point circuits which have been included in the regional telecommunication plans in addition to those mentioned in (b) and (c) above to interconnect centres, as necessary.

(4) To the circuits given in paragraph 3 above should be added:

(a) Inter-regional circuits, consisting of point-to-point circuits (either landline, cable or radio) interconnecting RTHs or WMCs to RTHs in different Regions;

(b) Supplementary inter-regional circuits, consisting of point-to-point circuits (either landline, cable or radio) which connect WMCs, RTHs and NMCs to RMCs or NMCs located in other Regions.

5.3 Contents of meteorological transmissions by point-to-point circuits

(1) The contents of meteorological transmissions on main regional circuits, regional circuits and supplementary regional circuits are determined by the Regional Associations to meet the requirements of the Members of the Region concerned;

(2) The contents of meteorological transmission on inter-regional circuits and supplementary inter-regional circuits are approved by inter-regional agreements.

6. NATIONAL TELECOMMUNICATION NETWORKS

6.1 Functions assigned within the framework of the GTS of the WWW

(a) The national telecommunication networks shall be organized to ensure the rapid and reliable collection of observational data to meet the WWW requirements;

(b) Each Member shall designate a National Meteorological Centre, or other centres as appropriate, responsible for meteorological checking of national observational data before such data is presented for transmission on the Global Telecommunication System and performing the telecommunication functions indicated in paragraph 2.4 above;

(c) The choice of telecommunication networks and facilities for the collection of information from stations located within a territory or country is a matter for decision by the Member concerned. The arrangements should comply at least with the World Weather Watch requirements as regards maximum tolerable time delay and reliability of reception;

(d) To comply with paragraph (c) above, Members should establish exclusive meteorological telecommunication networks using as appropriate landline, radiotelephony (e.g., SSB) and radiotelegraphy (Morse or RTT);

(e) Where facilities mentioned in paragraph (d) above are not available or are not practicable, Members should arrange for the use of other facilities such as:

(i) Special purpose telecommunication system (e.g., aeronautical circuits);

(ii) Commercial telecommunication services available to public;

(f) Provisions should be made, whenever possible, so that a mutilated or erroneous report can be repeated by the observing station at the request of the NMC concerned;

(g) Adequate telecommunication arrangements should be made between coastal stations accepting ships' weather reports as well as between centres responsible for receiving aircraft weather reports and the NMCs concerned.

6.2 Programmes of transmissions from NMCs to RTHs

6.2.1 Transmission from NMCs to the appropriate RTH or RTHs shall include at least the following information:

(a) Surface and upper-air synoptic reports from land stations and fixed ship stations required by regional agreement for regional and inter-regional exchange;

(b) All reports from mobile ship stations and aircraft received either directly or from other collecting centres, within the area covered by the NMC transmission;

(c) Other information as required by regional agreement.

Note: In order that the observational data may reach the centres of the GTS in time, priority should first be given to:

(i) The collection of the required observational data on a national basis;

(ii) The transmission of the data so collected to the associated RTHs.

7. BROADCASTS OF METEOROLOGICAL DATA BY RADIOTELEPRINTER

7.1 General

7.1.1 Until integrated systems of point-to-point circuits are established in all parts of the world, radio broadcasts will have to be used in order to meet the requirements for the collection and reception of meteorological information.

7.2 Broadcasts of hemispheric meteorological data by radioteleprinter

7.2.1 Members providing hemispheric radioteleprinter broadcasts intended for reception in a specific zone should include a selection of meteorological information relating to a hemisphere.

7.2.2 Any Member accepting the responsibility of making a hemisphere broadcast shall ascertain that this broadcast includes at least the following information:

(i) A representative selection of surface synoptic observational reports;

(ii) A representative selection of upper-air synoptic observational summaries;

(iii) Other data, according to agreements.

7.2.3 Details concerning the contents and times of broadcasts of hemispheric meteorological data are given in WMO Publication No. 9.TP.4, Volume C, Chapter I (for the Northern and Southern Hemispheres, respectively).

7.3 Regional broadcasts by radioteleprinter

7.3.1 A Member which has accepted responsibility for making a regional broadcast shall ensure that this broadcast includes at least:

(a) An inter-regionally agreed selection of reports of surface and upper-air synoptic stations;

(b) Analyses and forecasts, as inter-regionally agreed;

(c) Other meteorological information as inter-regionally agreed.

7.3.2 Schedules

7.3.2.1 The times of regional broadcasts and the order in which the information contained therein is transmitted should conform to the overall plan prepared for this purpose.

7.3.2.2 The broadcasts should be made four times a day. The broadcasts should begin as soon as possible after each main standard hour for synoptic observations and should continue, if necessary, until the next following main standard hour.

7.3.3 Content

7.3.3.1 The broadcasts shall include:

(a) A representative selection of reports of surface and upper-air synoptic observations and surface and upper-air analyses;

(b) Other meteorological information.

7.3.3.2 The content of these broadcasts and the order in which the information is transmitted shall be co-ordinated by the Regional Associations.

7.3.3.3 These broadcasts should include the following data, the order of transmission and the contents to be co-ordinated by Regional Association decision:

1 - Synoptic surface reports including ships' reports.

2 - PILOT and PILOT SHIP reports.

3 - TEMP and TEMP SHIP reports including, where necessary, reports containing selected standard pressure surfaces.

4 - Analyses.

5 - Aircraft weather reports.

6 - Other reports including RETARD.

7.4 Sub-regional broadcasts by radioteleprinter

7.4.1 A Member which has accepted responsibility for making a sub-regional broadcast shall ensure that this broadcast includes at least the following information:

(a) Reports required by regional agreement for regional and inter-regional dissemination from surface and upper-air synoptic land stations and fixed ship stations;

(b) Reports required by regional agreement for regional and inter-regional dissemination from mobile ship stations and aircraft;

(c) Other information as required by regional agreement.

7.4.2 Times and contents of broadcasts

7.4.2.1 The contents and the general plan of sub-regional broadcasts are co-ordinated by the Regional Associations concerned.

7.4.2.2 Provisions concerning the collection and dissemination of meteorological data originating from the area of responsibility designated for the sub-regional broadcast should take into account exchange of information transmitted on the regional telecommunication network of the World Weather Watch.

8. TERRITORIAL TRANSMISSIONS BY RADIO

8.1 Territorial transmissions

8.1.1 A Member making territorial transmission by radio shall ensure that they can be received satisfactorily at the associated RTH.

8.2 Territorial broadcasts

8.2.1 Neighbouring countries or territories having a limited volume of data to broadcast are invited to combine their territorial broadcasts into a single broadcast.

8.2.2 In cases where such a combined broadcast cannot be arranged, Members should broadcast data on the same frequency (or frequencies) on a co-ordinated time schedule.

8.2.3 Provisions concerning the collection and dissemination of territorial data should take into account the provisions of the regional telecommunication networks.

9. RADIO FACSIMILE BROADCASTS

9.1 Existing radio facsimile broadcasts should be maintained.

9.2 Schedules and contents of facsimile broadcasts should be co-ordinated by Regional Associations.

10. RESPONSIBILITIES FOR TRANSMISSIONS

10.1 General responsibilities of Regional Associations

10.1.1 For the purpose of ensuring rapid and reliable collection of meteorological data from all observation stations, without which the Global Telecommunication System cannot attain its objective, Regional Associations should when adopting their telecommunication plans establish the technical characteristics and the operational methods with which regional networks of meteorological transmissions should conform.

10.1.2 Each Regional Association should assume responsibility for making arrangements leading to the establishment and maintenance of regional and sub-regional broadcasts (or an alternative telecommunication system) which are adequate to meet the requirements stipulated by the Commission for Synoptic Meteorology for the inter-change of meteorological information within its own Region and adjacent Regions.

10.1.3 Each Regional Association should assume responsibility for assigning to its centres the specific zone from which reports are collected for inclusion in the broadcasts.

10.1.4 The contents, schedules and other important co-ordinated aspects of regional and sub-regional broadcasts should be established by Regional Associations after consultation with known or probable recipients inside and outside the Region.

10.2 General responsibilities of Members

10.2.1 Principles

10.2.1.1 Members having accepted responsibility in the field of meteorological telecommunications shall ensure that all appropriate measures are taken for the installation and good functioning of WMCs, RTHs and NMCs in relation to their needs and the role which they have accepted in accordance with inter-regional and regional agreements and those between the Members concerned.

10.2.1.2 Members should ensure that their national collecting system for observational reports allows not only national but also international needs to be met.

10.2.1.3 When adopting inter-regional and regional telecommunication plans, Members should ensure that technical characteristics and operational methods are established in such a way that they conform to regional telecommunication networks.

10.2.1.4 A Member experiencing difficulties in receiving or observing any deficiencies in a transmission intended for its reception should first take corrective action of a local nature, and if unsuccessful, subsequently notify in detail the Member making this transmission and also keep the Presidents of the relevant Regional Associations informed, as necessary.

10.2.1.5 When it is necessary to discontinue a transmission intended primarily for reception by other Members, provision shall be made to continue to meet the requirements of all recipients of the transmission.

Note: Transmissions by a Member intended primarily for its own use are not affected by the above, even if they are used by other Members.

10.2.2 Notification of changes

10.2.2.1 Advance notice to recipients

10.2.2.1.1 When a Member establishes within its territory a routine meteorological transmission intended for use by other Members, the Member shall send the following information, as appropriate to the Secretariat:

(a) Name and call-sign, or other identification, of transmitting station;

(b) Power supplied to the antenna;

(c) Class of emission, necessary band width;

(d) Frequencies;

(e) Contents, detailed time schedules and WMO category of the transmissions;

(f) Index of co-operation and drum speed(s) of facsimile transmitter;

(g) Specific point(s) or area(s) in which the transmission is intended to be received.

10.2.2.1.2 A Member shall send necessary amendments to the information supplied under the foregoing paragraph 10.2.2.1.1 to the Secretariat.

10.2.2.1.3 Amendments to the information supplied under paragraph 10.2.2.1.2 above should be sent to the Secretariat at least two months before a routine meteorological transmission is established or a change made in an existing routine transmission.

10.2.2.1.4 In addition to the information supplied to the Secretariat under paragraph 10.2.2.1.2 above, notification of impending changes in frequencies or in the time schedules of any routine meteorological radio transmission shall be included within its transmission for main synoptic hours during at least 3 days immediately prior to the change.

10.2.2.1.5 When it is necessary or desirable to change the mode of a transmission intended primarily for reception by other Members, notice of a duration agreed regionally or multi-laterally shall be given to the recipients.

Notes: (1) On expiry of this notice, it will be assumed that the requirements of the recipients are met by the transmissions in the new mode.

(2) Transmissions by a Member intended primarily for its own use are not affected by the above, even if they are used by other Members.

10.2.3 METNO and WIFMA messages

10.2.3.1 To provide advanced notification of changes in WMO Publication No. 9.TP.4, Volume A (Stations), Volume C (Transmissions) and Volume D (Information for shipping), the Secretary-General issues at weekly intervals advance notifications in addition to the normal supplement service. The code name METNO is used to identify messages containing information relating to WMO Publication No. 9.TP.4, Volumes A and C; the code name WIFMA is used for identifying messages containing information relating to WMO Publication No. 9.TP.4, Volume D.

10.2.3.2 Distribution

10.2.3.2.1 These METNO and WIFMA messages are transmitted from Zurich to the associated RTH for inclusion in the Regional Telecommunication Network of Region VI and in the Main Trunk Circuit for global distribution.

10.2.3.3 Format

10.2.3.3.1 The METNO and WIFMA messages are compiled in the standard format for routine meteorological messages using the data designator and geographical designator (TTAA): "NOXX" in the abbreviated heading.

A N N E X XXV

Annex to Recommendation 33 (CSM-V)

CONTENTS OF GLOBAL EXCHANGES

List of stations

1. List of surface stations for the construction of northern hemisphere synoptic charts

99901 : 001, 005, 025, 028, 055, 062, 098, 105, 111, 152, 203, 241, 384, 415, 482.

02 : 052, 057, 062, 066, 069, 077, 084, 090, 095, 102, 159, 160, 836, 897, 911, 935, 963.

03 : 005, 026, 100, 171, 222, 302, 334, 395, 495, 715, 772, 797, 804, 809, 917, 953.

04 : 005, 018, 063, 077, 082, 202, 210, 218, 220, 230, 250, 260, 270, 272, 310, 320, 330, 340, 350, 360, 380, 390.

06 : 011, 089, 180, 230, 260, 447, 610.

07 : 110, 130, 149, 150, 180, 222, 240, 460, 480, 510, 630, 650, 690, 747, 761.

08 : 001, 023, 160, 181, 221, 261, 285, 306, 314, 391, 495, 503, 506, 509, 515, 521, 536, 538, 575, 583, 589, 594.

10 : 035, 147, 185, 202, 203, 338, 384, 385, 393, 410, 488, 546, 637, 738, 866.

11 : 036, 518, 782, 934.

12 : 105, 250, 295, 330, 375, 424, 839, 882, 982.

13 : 128, 274, 332, 353, 462, 483, 615.

15 : 120, 310, 420, 480, 552, 614, 730.

16 : 059, 044, 080, 105, 153, 158, 190, 242, 261, 310, 320, 350, 420, 429, 470, 560, 597, 622, 641, 682, 716, 734, 743, 749, 754.

17 : 022, 030, 038, 050, 060, 096, 124, 128, 170, 196, 200, 218, 240, 244, 280, 350, 606.

20 : 046, 069, 087, 107, 274, 292, 353, 357, 667, 674, 744, 891.

21 : 358, 432, 504, 647, 802, 824, 931, 946, 965, 982.

22 : 113, 217, 235, 271, 522, 550, 583, 768, 802, 820, 845, 887.

23 : 022, 032, 074, 146, 205, 219, 256, 274, 330, 383, 418, 472, 552, 631, 678, 711, 724, 734, 804, 849, 884, 891, 914, 921, 933, 955, 966.

24 : 105, 125, 143, 266, 329, 343, 382, 507, 561, 629, 641, 671, 688, 738, 817, 908, 944, 959, 966.

99925 : 123, 173, 248, 399, 400, 551, 563, 594, 621, 677, 703, 821, 913, 954, 956.
26 : 038, 063, 258, 298, 422, 477, 629, 702, 781, 850, 997.
27 : 037, 196, 271, 553, 595, 612, 731, 947, 962.
28 : 064, 225, 255, 275, 440, 493, 661, 679, 698, 722, 748, 838, 879, 900, 952.
29 : 231, 263, 282, 313, 356, 574, 612, 634, 698, 807, 838, 865.
30 : 054, 230, 309, 372, 393, 433, 521, 554, 555, 635, 636, 673, 692, 710, 758 802, 823, 879, 935, 949, 965.
31 : 004, 088, 137, 168, 300, 329, 369, 416, 484, 510, 538, 707, 735, 829, 873, 909, 960.
32 : 053, 061, 098, 150, 165, 186, 217, 389, 411, 540, 564, 611, 618.
33 : 008, 036, 041, 317, 345, 393, 587, 631, 658, 791, 815, 837, 910, 946.
34 : 009, 122, 172, 247, 300, 336, 391, 560, 691, 731, 824, 858, 866, 880.
35 : 078, 108, 121, 133, 188, 229, 358, 361, 394, 406, 416, 529, 576, 671, 700, 746, 796, 925.
36 : 003, 061, 177, 428, 498, 665, 729, 859, 870, 982.
37 : 018, 054, 235, 260, 395, 472, 549, 789, 985.
38 : 001, 062, 081, 198, 232, 262, 341, 353, 388, 392, 413, 457, 507, 545, 613, 656, 687, 696, 750, 763, 836, 880, 895, 927, 954, 974.
40 : 001, 007, 045, 061, 087, 091, 100, 165, 180, 191, 199, 230, 250, 270, 280 290, 310, 340, 356, 357, 362, 372, 375, 394, 395, 400, 416, 427, 430, 438, 439, 449, 450, 477, 560, 564, 572, 575, 586, 597, 608, 621, 642, 650 676, 689, 706, 712, 718, 736, 745, 743, 754, 766, 767, 769, 795, 800, 809, 821, 831, 841, 846, 848, 856, 875, 920, 941, 948, 966, 981.
41 : 350, 530, 571, 594, 620, 640, 661, 675, 710, 712, 715, 739, 749, 756, 765, 768, 780, 858, 915, 917, 941.
42 : 057, 103, 165, 182, 189, 273, 314, 339, 348, 361, 369, 379, 398, 410, 475, 591, 623, 634, 647, 675, 704, 754, 779, 809, 840, 867, 875, 886, 909, 971, 977.
43 : 003, 014, 041, 063, 117, 128, 149, 181, 185, 192, 201, 237, 279, 284, 295, 311, 333, 344, 347, 353, 368, 369, 371, 382, 395, 400, 413, 418, 466, 467, 497, 540.
44 : 214, 231, 259, 277, 288, 292, 304, 354, 373.
45 : 005.

99946 : 697, 749, 747, 766, 699, 810, 902.
47 : 058, 105, 108, 122, 129, 138, 159, 165, 184, 401, 412, 420, 582, 590, 600, 648, 662, 678, 744, 778, 807, 827, 898, 909, 918, 936, 945, 963, 971, 981, 991.
48 : 008, 018, 042, 053, 062, 078, 080, 094, 096, 108, 109, 110, 112, 303, 327, 331, 381, 400, 407, 431, 455, 462, 480, 500, 551, 564, 568, 601, 602, 615, 620, 647, 657, 665, 694, 855, 860, 866, 870, 877, 900, 907, 918, 930, 940, 948, 966, 972, 983, 991.
50 : 527, 557, 632, 727, 745, 756, 915, 949, 953, 963, 978.
51 : 156, 463, 644, 709, 777, 931.
52 : 203, 267, 418, 533, 681, 818, 836, 856, 866, 889.
53 : 068, 172, 276, 336, 391, 463, 502, 513, 543, 673, 698, 723, 845, 863, 915, 959.
54 : 014, 026, 094, 102, 135, 161, 208, 218, 292, 324, 342, 423, 471, 511, 534, 616, 662, 774, 823, 843, 857.
55 : 299, 591, 773.
56 : 046, 080, 096, 116, 137, 146, 294, 444, 462, 492, 571, 671, 691, 739, 964, 985, 989.
57 : 006, 036, 083, 127, 237, 265, 297, 328, 411, 447, 461, 494, 679, 745, 799, 816, 866, 902, 957, 972, 993.
58 : 027, 040, 102, 203, 221, 321, 238, 251, 314, 367, 457, 472, 477, 527, 606, 633, 659, 666, 715, 731, 847, 921.
59 : 023, 082, 134, 211, 265, 287, 293, 316, 431, 663, 758, 838, 948, 981.
60 : 020, 030, 060, 096, 115, 119, 155, 185, 190, 210, 230, 250, 275, 340, 360, 390, 402, 419, 425, 490, 525, 545, 566, 571, 580, 590, 611, 630, 656, 670, 678, 680, 715, 735, 760, 765, 769.
61 : 017, 024, 049, 052, 075, 090, 096, 202, 207, 214, 223, 226, 230, 240, 250, 257, 265, 272, 277, 285, 290, 296, 297, 293, 401, 403, 415, 421, 442, 450, 497, 498, 499, 40B, 600, 627, 630, 641, 687, 695, 701, 816, 766, 829, 832, 856, 881, 901, 931, 934.
62 : 002, 007, 010, 011, 016, 019, 053, 055, 056, 059, 063, 103, 120, 124, 131, 161, 176, 259, 271, 306, 318, 333, 338, 366, 378, 387, 405, 414, 417, 420, 432, 462, 640, 641, 650, 660, 680, 721, 730, 751, 752, 760, 770, 771, 772, 781, 790, 805, 840, 871, 880, 910, 940, 941.

63 : 021, 006, 043, 125, 170, 210, 225, 230, 240, 247, 250, 260, 330, 331, 334, 402, 403, 450, 453, 471, 472, 474, 475, 612, 619, 624, 630, 654, 661, 671, 674, 694, 705.

99964 : 005, 014, 006, 040, 062, 076, 458, 459, 500, 510, 556, 552, 600, 601, 961, 610, 650, 654, 656, 658, 659, 660, 661, 662, 700, 701, 705, 706, 720, 750, 751, 753, 754, 756, 810, 851, 860, 880, 870, 893, 890, 900, 910, 931, 950, 960, 971.

65 : 001, 019, 046, 015, 073, 064, 082, 101, 123, 134, 167, 201, 208, 229, 236, 243, 250, 257, 271, 306, 330, 335, 352, 361, 319, 387, 344, 418, 432, 442, 453, 467, 472, 475, 503, 510, 522, 528, 539, 548, 555, 557, 578, 592, 599, 660.

70 : 026, 086, 133, 200, 218, 219, 222, 231, 261, 273, 308, 316, 326, 350, 361, 381, 388, 398, 414, 454.

72 : 201, 202, 206, 208, 211, 219, 220, 221, 223, 226, 232, 235, 240, 248, 250, 255, 259, 261, 265, 270, 274, 278, 280, 290, 291, 304, 308, 311, 317, 326, 327, 334, 340, 344, 353, 355, 363, 365, 374, 385, 386, 394, 402, 403, 405, 425, 429, 445, 451, 456, 469, 476, 486, 488, 493, 503, 506, 518, 520, 528, 532, 537, 544, 553, 562, 572, 576, 578, 583, 597, 600, 601, 603, 606, 624, 627, 636, 637, 645, 654, 655, 662, 677, 681, 694, 705, 707, 712, 714, 716, 717, 722, 734, 738, 743, 747, 749, 753, 764, 768, 773, 775, 785, 793, 797, 800, 803, 807, 811, 815, 816, 818, 822, 826, 828, 831, 836, 840, 842, 848, 852, 853, 863, 867, 869, 870, 872, 877, 891, 893, 896, 900, 901, 903, 904, 905, 906, 907, 908, 909, 913, 914, 915, 916, 917, 918, 920, 921, 923, 924, 925, 926, 927, 932, 934, 936, 938, 940, 945, 946, 949, 950, 953, 957, 964, 965.

74 : 043, 051, 062, 072, 074, 081, 082, 090, 091, 093, 094, 109, 120, 123, 188, 486, 768, 794.

76 : 050, 151, 225, 255, 342, 382, 393, 394, 405, 412, 458, 499, 549, 556, 580 581, 644, 649, 654, 679, 680, 690, 692, 695, 723, 805, 840, 855, 904.

78 : 016, 063, 073, 076, 095, 118, 119, 310, 321, 325, 355, 367, 383, 384, 397 439, 486, 501, 526, 583, 663, 701, 724, 730, 741, 762, 765, 793, 806, 825 861, 866, 894, 897, 954, 967, 970, 988.

80 : 001, 009, 028, 062, 081, 089, 099, 110, 144, 213, 222, 259, 308, 336, 405, 407, 410, 413, 419, 423, 427, 428, 439, 444, 447, 450, 453, 457, 462, 463, 464.

81 : 002, 202, 225, 251, 405.

82 : 017, 029, 067.

91 : 066, 155, 165, 190, 217, 232, 245, 250, 275, 285, 317, 323, 334, 337, 338, 343, 348, 353, 356, 366, 369, 371, 376, 408, 410, 425, 442, 487, 490, 601, 610, 700, Pagan Island, Woleai Atoll.

99996 : 001, 035, 109, 145, 147, 163, 413, 421, 441, 465, 471, 491, 509.
97 : 014, 028, 048, 404.
98 : 135, 223, 232, 327, 336, 429, 439, 444, 526, 543, 618, 630, 645, 653, 748, 754, 755, 836, 830, 745, 851.

All stationary meteorological ships : A, B, C, D, E, H, I, J, K, M, N, P, V, T.
(T - during summer season only; H - winter storms and hurricane season only)

Arctic floating stations

Buoys

All ships' reports

*

* *

2. List of upper-air stations for the construction of northern hemisphere synoptic charts

99901 : 001, 028, 152, 241, 384, 415
02 : 057, 066, 077, 084, 102, 160, 836, 935, 963
03 : 005, 026, 170, 322, 496, 774, 808, 920, 953
04 : 018, 202, 220, 270, 310, 320, 340, 360
06 : 011, 181, 260, 447, 610
07 : 110, 145, 180, 480, 510, 645, 761
08 : 001, 159, 221, 302, 495, 509, 521, 536, 594
10 : 035, 184, 202, 338, 393, 410, 486, 548, 739, 866
11 : 035, 520, 934
12 : 105, 330, 374, 425, 843
13 : 130, 276, 615
15 : 120, 420, 480, 614, 730
16 : 044, 080, 242, 320, 429, 560, 596, 622, 641, 716, 734, 754
17 : 030, 062, 096, 130, 220, 240, 280, 603
20 : 107
22 : 113, 271, 522, 550, 802
26 : 038, 063, 258, 298, 422, 629, 702, 781, 850
27 : 037, 196, 553, 595, 612, 947
33 : 008, 036, 345, 393, 631, 658, 815, 837, 946
34 : 009, 122, 172, 300, 560, 731, 858, 880
37 : 018, 054, 260, 549, 789, 985
40 : 007, 100, 179, 265
20 : 046, 069, 274, 292, 353, 674, 744, 891
21 : 358, 432, 504, 647, 824, 965, 982
23 : 022, 146, 205, 274, 330, 418, 472, 552, 804, 884, 921, 933, 955
24 : 125, 266, 343, 507, 641, 688, 817, 908, 944, 959
25 : 123, 173, 399, 551, 563, 594, 677, 703, 913, 954
28 : 275, 440, 698, 722, 900, 952
29 : 231, 282, 574, 612, 634, 698
30 : 054, 230, 554, 636, 673, 692, 710, 758, 935, 965
31 : 004, 088, 168, 300, 329, 369, 510, 707, 735, 873, 909, 960
32 : 061, 150, 165, 186, 217, 389, 540, 618
35 : 108, 121, 229, 394, 700, 746, 796
36 : 177, 870
38 : 062, 392, 457, 507, 613, 687, 750, 836, 880, 954

999·40 : 373, 394, 400, 430, 438, 439, 450, 477, 372, 427, 449, 564, 572, 575, 586, 597, 608, 642, 650, 689, 706, 745, 754, 766, 795, 800, 809, 841, 848, 920, 941, 948, 981

41 : 350, 530, 594, 661, 675, 710, 715, 739, 756, 780, 915, 917, 940

42 : 057, 103, 182, 273, 314, 339, 361, 369, 398, 410, 475, 591, 623, 647, 754, 779, 809, 867, 909, 953, 971

43 : 003, 014, 128, 149, 185, 192, 279, 284, 295, 333, 347, 353, 368, 369, 371, 395, 466, 497, 540

44 : 277, 292, 354, 373

45 : 004

46 : 697, 747, 810, 902

47 : 058, 122, 138, 187, 401, 412, 420, 582, 590, 600, 646, 678, 744, 778, 807, 827, 898, 909, 918, 945, 963, 971, 981, 991

48 : 008, 025, 046, 053, 060, 062, 080, 096, 097, 108, 109, 112, 327, 407, 455, 480, 568, 602, 855, 860, 870, 900, 918, 940, 991

80 : 001, 081, 222, 413, 447, 453, 457, 462, 464

81 : 002, 405

70 : 026, 086, 133, 200, 219, 231, 261, 273, 308, 316, 326, 350, 361, 398, 414, 454

72 : 600, 722, 807, 811, 815, 816, 826, 836, 848, 867, 896, 906, 907 909, 913, 915, 917, 924, 926, 927, 934, 938, 945, 957, 964

74 : 043, 051, 072, 074, 081, 082, 090, 109, 119

72 : 202, 206, 208, 211, 221, 226, 232, 235, 240, 248, 250, 255, 259, 261, 265, 270, 274, 290, 291, 304, 311, 317, 327, 340, 354, 355, 363, 365, 374, 385, 393, 402, 403, 425, 429, 445, 451, 456, 469, 476, 486, 493, 506, 518, 520, 528, 532, 553, 562, 572, 576, 583, 597, 606, 637, 645, 655, 662, 694, 712, 734, 747, 764, 768, 775, 785, 797

74 : 486

76 : 151, 225, 255, 256, 394, 458, 549, 644, 654, 679, 692, 723, 805, 840, 855, 904

78 : 016, 063, 076, 118, 310, 325, 355, 367, 384, 397, 486, 501, 526, 583, 663, 701, 724, 730, 741, 762, 765, 793, 806, 861, 970, 988, 866, 897, 954, 967

60 : 020, 096, 119, 155, 210, 250, 340, 360, 390, 490, 571, 580, 611, 630, 656, 680, 715, 760, 769

99961 : 017, 024, 052, 202, 207, 223, 290, 401, 403, 408, 415, 499, 641, 687, 832

62 : 010, 053, 124, 271, 306, 378, 414, 641, 650, 721, 752, 790, 840, 941

63 : 021, 125, 260, 450, 475, 705

64 : 005, 076, 077, 458, 500, 650, 661, 700, 720, 750, 753, 810, 870, 910

65 : 046, 123, 202, 250, 361, 418, 472, 503, 548, 578, 660

950 : 527, 557, 953

51 : 076, 431, 463, 644, 709, 777, 828

52 : 203, 267, 323, 418, 533, 652, 681, 818, 836, 866, 889

53 : 068, 463, 513, 614, 772, 845, 915

54 : 102, 135, 161, 218, 292, 337, 342, 374, 497, 511, 662, 823, 857

55 : 299, 591

56 : 029, 080, 096, 137, 146, 294, 492, 571, 691, 739, 778, 964, 989

57 : 036, 083, 127, 328, 447, 461, 494, 515, 679, 745, 816, 957, 972, 993

58 : 027, 203, 238, 321, 367, 457, 606, 633, 666, 725, 847

59 : 134, 211, 265, 287, 316, 431, 758, 981

48 : 601, 602, 615, 694

91 : 066, 165, 217, 245, 250, 275, 285, 334, 337, 348, 356, 366, 376, 408, 413, 487, Pagan Island, Woleai Atoll, 610

96 : 001, 035, 147, 413, 471, 509

97 : 014

98 : 223, 327, 429, 618, 645, 754, 836, 851

PILOT stations

99940 : 001, 007, 022, 030, 039, 045, 080, 100, 102, 105, 165, 180, 191, 199

40 : 449, 564, 575, 597, 608, 642, 650, 676, 706

41 : 350, 506, 515, 530, 560, 571, 594, 620, 624, 640, 661, 675, 710, 712, 715, 718, 739, 744, 749, 756, 768, 780, 855, 858, 900, 915, 917, 932, 940, 950

42 : 103, 111, 165, 182, 189, 260, 273, 299, 314, 339, 348, 361, 379, 382, 398, 410, 416, 423, 475, 498, 543, 591, 623, 634, 647, 667, 675, 704, 724, 734, 798, 809, 840, 867, 875, 886, 909, 971

43 : 003, 014, 041, 063, 128, 149, 181, 193, 194, 201, 237, 279, 284, 295, 311, 333, 344, 347, 353, 368, 369, 371, 395, 413, 418, 466, 539, 604

99948 : 008, 042, 053, 060, 062, 080, 094, 096, 108, 109, 110, 112, 327, 354, 378, 379, 431, 455, 480, 500, 551, 565, 568, 855, 860, 866, 870, 877, 881, 900, 901, 907, 913, 918, 940, 948

80 : 407, 410, 415, 419, 425, 435, 444, 450

81 : 202, 209, 225, 251, 253, 401, 405, 408, 415

82 : 030

76 : 151, 255, 342, 382, 405, 491, 499, 649, 830,

78 : 063, 076, 118, 367, 439, 501, 526, 535, 583, 641, 720, 730, 741, 762, 861, 962, 894, 897, 925

60 : 030, 060, 096, 107, 115, 127, 150, 155, 160, 185, 190, 195, 220, 230, 250, 265, 360, 419, 425, 490, 525, 545, 559, 571, 580, 590, 607, 611, 620, 630, 640, 656, 670, 680, 714, 715, 725, 735, 745, 750, 760, 765, 769, 775

61 : 017, 024, 052, 075, 090, 202 214, 226, 257, 265, 272, 290, 401, 403, 415, 421, 442, 497, 499, 600, 641, 687, 695, 701, 809, 829, 831, 856

62 : 002, 007, 010, 016, 019, 053, 055, 056, 059, 103, 120, 124, 131, 161, 176, 259, 271, 300, 318, 333, 336, 338, 387, 393, 405, 417, 420, 423, 432, 435, 459, 462, 465, 640, 641, 650, 660, 680, 721, 730, 751, 752, 760, 770, 771, 772, 781, 795, 805, 840, 880, 941

63 : 125, 160, 170, 175, 210, 230, 260, 450, 451, 471, 475, 478, 630, 654, 674, 676, 684, 705, 612, 624, 661, 694

64 : 040, 062, 458. 459, 500, 510, 600, 601, 610, 650, 654, 656, 700, 750, 753, 756, 860, 870, 893, 900, 910, 931, 950

65 : 082, 123, 167, 201, 250, 271, 306, 330, 344, 361, 387, 416, 418, 442, 467, 472, 503, 510, 548, 555, 578, 592

48 : 601, 602, 615, 620, 647, 657, 687, 694, 698,

91 : 165, 178, 182, 190, 212, 217, 245, 250, 275, 285, 376, 610

96 : 073, 413, 441, 471, 491, 509, 533

98 : 135,223, 328, 426, 428, 444, 618, 630, 645, 646, 653, 754, 830, 851

All stationary meteorological ships : A, B, C, D, E, H, I, J, K, M, N, P, V, T.
(T - during summer season only; H - winter storms and hurricane season only)
ALL PILOT SHIP/TEMP SHIP reports
Coded AIREPs
Arctic floating stations
Selected satellite data

3. List of surface stations for the construction of southern hemisphere synoptic charts

99961 : 901, 902, 967, 968, 970, 972, 974, 976, 980, 986, 988, 990, 995, 996, 997, 998.

63 : 270, 702, 708, 714, 729, 740, 756, 766, 789, 793, 799, 801, 818, 820, 832, 862, 887, 894, 932, 962, 971, 980.

64 : 115, 126, 146, 155, 180, 184, 203, 207, 210, 222, 224, 235, 247, 282, 285, 302, 303, 315, 328, 360, 387, 390, 400, 401, 450, 452, 456, 501, 550, 551, 565

66 : 130, 136, 142, 152, 160, 215, 226, 240, 270, 285, 296, 305, 318, 390, 410, 422, 447.

67 : 001, 005, 009, 012, 017, 025, 027, 073, 083, 095, 113, 131, 117, 137, 143, 15 161, 197, 215, 217, 237, 241, 261, 283, 297, 305, 315, 323, 341, 475, 477, 541, 561, 581, 587, 633, 661, 663, 665, 693, 775, 867, 964, 965, 975, 983, 991.

68 : 006, 014, 018, 024, 026, 032, 054, 102, 104, 112, 116, 174, 226, 244, 262, 288, 300, 312, 328, 338, 368, 378, 406, 408, 424, 438, 442, 462, 478, 496, 524, 536, 588, 618, 648, 674, 712, 728, 742, 816, 842, 858, 906, 920, 928, 992, 994.

80 : 398.

82 : 106, 108, 113, 152, 191, 193, 198, 212, 240, 244, 281, 288, 332, 353, 392, 397, 398, 400, 410, 418, 425, 533, 562, 564, 571, 579, 583, 586, 594, 599, 598, 610, 640, 678, 704, 723, 741, 765, 784, 807, 825, 861, 900, 915, 930, 979, 983, 984, 986, 993.

83 : 063, 064, 096, 208, 220, 229, 236, 242, 248, 262, 289, 309, 339, 348, 361, 365, 377, 378, 386, 393, 405, 470, 483, 492, 497, 525, 526, 583, 592, 612, 618, 630, 649, 650, 687, 692, 698, 702, 721, 722, 738, 743, 746, 747, 766, 768, 780, 782, 827, 834, 840, 842, 844, 881, 887, 899, 907, 914, 927, 928, 936, 948, 964, 967, 971, 980, 981, 995, 997.

84 : 008, 045, 092, 111, 129, 139, 153, 235, 377, 390, 401, 425, 444, 452, 501, 515, 534, 605, 628, 658, 686, 691, 721, 735, 752, 782.

85 : 041, 043, 104, 141, 154, 196, 201, 203, 205, 223, 242, 245, 247, 289, 293, 315, 322, 365, 406, 418, 442, 460, 469, 470, 486, 488, 543, 574, 579, 585, 629, 640, 672, 683, 732, 743, 766, 799, 801, 834, 862, 874, 889, 892, 907, 915, 930, 934, 967, 972, 984, 986, 988.

86 : 017, 033, 062, 068, 086, 134, 218, 233, 260, 297, 350, 360, 460, 500, 560, 580, 595.

87 : 007, 016, 032, 047, 065, 071, 078, 120, 149, 155, 160, 178, 211, 217, 220, 244, 257, 270, 281, 305, 322, 344, 349, 374, 393, 395, 400, 418, 420, 436, 453, 467, 480, 497, 506, 520, 534, 544, 548, 563, 576, 596, 623, 645, 673, 679, 688, 692, 696, 715, 736, 748, 763, 774, 784, 791, 803, 807, 828, 860, 871, 880, 896, 903, 909, 925, 926, 934, 938.

99988 : 890, 903, 925, 938, 952, 958, 962, 963, 967, 968, 970.

89 : 001, 009, 022, 046, 050, 051, 125, 175, 512, 522, 532, 542, 571, 592, 606, 611, 663, 664, 665, 671, 974, 986.

91 : 487, 501, 503, 507, 517, 527, 530, 533, 543, 551, 554, 555, 558, 565, 568, 570, 574, 577, 582, 592, 601, 610, 623, 629, 631, 636, 643, 648, 650, 652, 659, 660, 680, 690, 691, 693, 697, 699, 700, 720, 724, 728, 735, 753, 762, 765, 776, 780, 784, 788, 800, 804, 811, 822, 826, 830, 840, 843, 902, 925, 928, 930, 931, 938, 943, 944, 945, 946, 948, 949, 951, 954, 958, 960, 995, 996, 997.

93 : 003, 011, 060, 119, 185, 198, 246, 291, 308, 337, 372, 401, 417, 434, 526, 545, 598, 614, 677, 708, 780, 806, 844, 890, 896, 944, 986, 995, 996, 997, 998.

94 : 001, 014, 027, 035, 044, 085, 087, 100, 102, 120, 132, 146, 171, 175, 185, 203, 205, 209, 212, 213, 214, 234, 240, 243, 255, 267, 277, 283, 287, 294, 299, 300, 302, 305, 312, 313, 317, 326, 333, 335, 340, 344, 346, 355, 363, 366, 367, 372, 374, 380, 388, 394. 400, 403, 428, 430, 448, 461, 464, 476, 480, 482, 488, 492, 500, 510, 515, 527, 530, 578, 601, 610, 637, 638, 640, 646, 649, 653, 659, 666, 672, 689, 693, 700, 703, 711, 719, 728, 750, 767, 776, 791, 800, 802, 804, 821, 827, 842, 851, 861, 864, 865, 893, 907, 910, 926, 933, 940, 953, 967, 968, 975, 983, 986, 995, 996, 998.

95 : 502.

96 : 163, 171, 179, 195, 221, 237, 249, 253, 581, 633, 645, 685, 743, 755, 781, 801, 805, 839, 845, 853, 881, 925, 933, 995, 996.

97 : 072, 146, 180, 230, 260, 290, 340, 372, 390, 502, 530, 560, 600, 686, 690, 724, 760, 796, 810, 876, 900, 980.

All stationary meteorological ships

All SHIPS' reports

Buoys

*

*   *

4. List of upper-air stations for the construction of southern hemisphere synoptic charts

4.1 TEMP (Radiosonde and Radiowind)

99961 : 901, 902, 967, 995, 996, 997, 998.

63 : 741, 832, 894, 980.

64 : 210, 220, 235, 360, 370, 387.

66 : 160, 285, 422.

67 : 009, 083, 197, 237, 241, 341, 475, 587, 633, 663, 774, 964.

68 : 014, 032, 112, 262, 406, 442, 588, 816, 842, 906, 992, 994.

82 : 193, 281, 332, 398, 400, 599, 678, 765, 825, 900, 930, 983, 984.

83 : 208, 229, 289, 378, 497, 612, 650, 746, 780, 840, 971.

84 : 008, 129, 377, 628.

85 : 203, 245, 289, 442, 469, 543, 585, 801, 934, 988.

86 : 218.

87 : 047, 155, 344, 349, 576, 623, 715, 748, 860, 926, 938.

88 : 890, 903, 952, 968.

89 : 022, 001, 009, 125, 664, 671, 512, 542, 606, 532, 571, 611, 986.

91 : 517, 554, 592, 643, 680, 700, 765, 843, 902, 925, 938, 946, 958, 960, 995*, 996**, 997.

93 : 119, 337, 780, 844, 944, 986, 995*, 996**, 997, 998***.

99994 : 027, 120, 212, 203, 294, 299, 300,
312, 326, 335, 461, 510, 527, 578,
610, 637, 638, 646, 659, 672, 711,
750, 776, 802, 821, 865, 910, 975,
995*, 996**, 998***.

96 : 645, 743, 933, 996.

97 : 180, 372, 560, 724.

* Appears under 91995, 93995, 94995.

** Appears under 91996, 93996, 94996.

*** Appears under 93998, 94998.

All stationary meteorological ships
All PILOT SHIP/TEMP SHIP REPORTS
Coded AIREPS

Selected satellite data

4.2 PILOT (Radiowind and Pilot balloon)

99961 : 967, 968, 970, 972, 974, 976,
980, 984, 986, 988, 995.

63 : 270, 702, 726, 708, 714, 723,
737, 739, 766, 793, 799, 820,
729, 756, 789, 801, 818, 832,
862, 887, 894, 932, 962, 971,
980.

64 : 146, 282, 315, 387, 390, 400,
401, 450, 453, 501, 565.

66 : 160, 285, 422.

67 : 001, 004, 005, 009, 012, 017,
019, 023, 025, 027, 037, 045,
072, 073, 083, 095, 107, 113,
117, 131, 137, 143, 152, 157,
161, 194, 197, 241, 297, 441, 475,
561, 633, 663, 665, 743, 485,
489, 587. 693, 763, 765, 774,
775, 781, 843, 867, 885, 964,
965, 975, 977, 991.

68 : 112, 174, 312, 368, 406, 424,
438, 442, 728, 816, 842, 858,
054, 244.

99982 : 244, 281, 398, 400, 579, 640,
930, 984, 993.

83 : 063, 248, 289, 361, 497, 525,
583, 649, 698, 721, 768, 780,
827, 899, 928, 981.

84 : 377, 390, 452, 515, 628, 691,
752.

85 : 041, 141, 154, 201, 223, 245,
406, 469, 574, 579, 672, 874,
984, 988.

86 : 218, 580.

87 : 046, 120, 155, 178, 257, 344,
349, 393, 436, 576, 596, 623,
692, 696, 715, 748.

88 : 890, 952, 958.

91 : 517, 530, 551, 554, 558, 568,
577, 582, 592, 610, 643, 650,
680, 690, 753, 762, 765, 788,
800, 822, 830, 843, 925, 928,
930, 931, 938, 943, 944, 945,
946, 948, 954, 958, 995, 996,
... (Ducie Island)

93 : 011, 119, 246, 291, 308, 401,
417, 434, 545, 614, 677, 780,
844, 890, 995, 996, 997, 998.

94 : 001, 027, 035, 044, 085, 120,
175, 203, 213, 234, 287, 294,
299, 300, 305, 312, 326, 335,
344, 346, 367, 374, 380, 403,
430, 461, 476, 510, 527, 578,
610, 637, 638, 640, 646, 653,
659, 672, 693, 711, 767, 776,
791, 802, 821, 864, 865, 907,
910, 926, 968, 975, 995, 996,
998, 986.

96 : 163, 237, 581, 633, 645, 685,
743, 755, 801, 845, 853, 881,
925, 995, 996.

97 : 072, 502, 900.

95 : 502.

A N N E X XXVI

Annex to Recommendation 34 (CSM-V)

METEOROLOGICAL TELECOMMUNICATION PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

EXPLANATIONS OF TERMS USED

Meteorological information - Information which may be in alphanumeric form or pictorial form.

Meteorological data - The term "meteorological data" is used in the restricted sense of meteorological information in alphanumeric form.

Data transmission - System of signalling using a set of digits and letters to convey information and/or service functions.

Meteorological message - A message comprising a single meteorological bulletin, preceded by a starting line and followed by the end of transmission signal.

Routine meteorological message - Meteorological message transmitted according to distribution plan.

Non-routine meteorological message - Meteorological message which is presented for transmission for which there is no pre-arranged distribution plan.

1. OPERATIONAL PRINCIPLES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

Principle 1

On the Main Trunk Circuit and the regional telecommunication networks of the Global Telecommunication System, routine meteorological data shall be collected, exchanged and distributed in the meteorological bulletin format.

Note: The meteorological bulletin format is independent of the transmission channels used and of meteorological message format.

Principle 2

The meteorological message format depends on the mode of operations and engineering of circuits and centres.

Principle 3

The format of messages shall meet the need of:

(a) Automatic switching, selection and editing processes;

(b) Manual operations at telecommunication centres;

and take account of the need of automatic processing of the content of bulletins.

Principle 4

Transmission of routine messages over the GTS shall be in accordance with agreed distribution plans.

Principle 5

Non-routine meteorological messages and service messages shall be transmitted as addressed messages.

Principle 6

Where it is necessary to operate data transmission and facsimile (analogue) transmission on a shared time division transmission basis, time-scheduling of transmissions should give preference to meteorological observational data. However, data transmission and facsimile analogue transmission shall not interrupt each other.

2. PROCEDURES APPLICABLE TO THE TRANSMISSION OF ALPHA-NUMERIC DATA ON THE GLOBAL TELECOMMUNICATION SYSTEM

2.1 Format of meteorological messages

(a) A routine meteorological message transmitted on the Global Telecommunication System shall comprise:

- A starting line
- An abbreviated heading
- A text
- End of message or transmission

Meteorological bulletin (abbreviated heading and text)

Meteorological message (starting line to end of message or transmission)

There shall be only one meteorological bulletin per meteorological message.

(b) A non-routine meteorological message shall have the format of an addressed message (see paragraph 2.4 below).

2.2 Alphabets used for transmissions

The two alphabets to be used on the GTS shall be:

(a) International Telegraph Alphabet No. 2 (see Table D);

(b) International Alphabet No. 5 (see Table E).

Only printed characters shall be used for which corresponding characters exist in both alphabets No. 2 and No. 5. The conversion shall be made in accordance with Table F, Part I. In addition to the characters given in Table F, only those control characters which are defined in Table F, Part II are to be used on the GTS.

2.3 Message format relating to routine transmission of alpha-numeric data

The procedures, outlined below, apply to transmissions of routine meteorological messages on the GTS.

2.3.1 Format of starting line

The starting line shall have the following format:

(a) International Telegraph Alphabet No. 2:

$\underline{\ll}\ \equiv\ \downarrow$ ZCZC ($\rightarrow\uparrow$ nnn) ($\rightarrow\uparrow^{(1)}$CLLLL) $\rightarrow\rightarrow\rightarrow\rightarrow\rightarrow$

(1) If there is an nnn group, since the figure shift signal should precede this group, there is no need to give it before the CLLLL group. If, on the other hand, there is no nnn group the figure shift signal should precede the CLLLL group.

(for an example and the meaning of the signals, see Table G)

(b) International Alphabet No. 5:

$\boxed{\mathrm{SOH}}$ $\boxed{\mathrm{CR}}$ $\boxed{\mathrm{CR}}$ $\boxed{\mathrm{LF}}$ nnn $\boxed{\mathrm{SP}}$ CLLLL

(for an example and the meaning of the signals, see Table G)

(c) Meaning of nnn and CLLLL:

nnn = transmission sequences number. It is a three-digit group giving the transmission sequence of messages from one centre over a particular channel to the receiving centre on that channel. Number 000 through 999 shall be used in a cyclic manner without renewing it at 0000 GMT each day.

In the International Alphabet No. 5 the group nnn may be a fixed combination of three characters if agreed between the centres concerned.

CLLLL = Classification and identification group in the general catalogue of bulletins. The group CLLLL is mandatory for International Alphabet No. 5. It facilitates the processing and switching operations at automated centres. It should preferably be inserted at the NMCs but, in any case, it shall be inserted before or at the first entry point of the automated parts of the Global Telecommunication System, regardless as to which alphabet is being used (see Functions of the RTHs, paragraph 2.2(e) of the Annex XXIV.

Note: For details see Table H.

2.3.2 **Format of abbreviated heading**

The abbreviated heading shall have the following format:

(a) International Telegraph Alphabet No. 2:

≪ ≡↓TTAA (↑ ii)→ ↓(1) CCCC (→k)→↑ YYGGgg (→↓BBB)

(1) When ii is not included in the abbreviated heading, there is no requirement for this signal.

(for an example and the meaning of signals, see Table G)

(b) International Alphabet No. 5:

$\boxed{\text{CR}}$ $\boxed{\text{CR}}$ $\boxed{\text{LF}}$ TTAA (ii) $\boxed{\text{SP}}$ CCCC($\boxed{\text{SP}}$ k) $\boxed{\text{SP}}$ YYGGgg($\boxed{\text{SP}}$ BBB)

(for an example and the meaning of signals, see Table G)

Meaning of TTAA (ii):

TT - Data designator (see Table A).

AA - Geographical designator (for land stations, see Table B, for ships see Table C).

(ii) - Number used to differentiate two or more bulletins which contain data in the same code and which originate from the same geographical area and have the same originating centre. It shall be a number with a maximum of two digits.

In the case of bulletins containing meteorological reports (surface and upper-air), ii is mandatory in both International Telegraph Alphabet No. 2 and International Alphabet No. 5. In the case of meteorological reports, it corresponds, except in the case of ships' or aircraft reports, to an agreed list of bulletin content in terms of station index numbers which shall be published in the schedule of WMO Publication No. 9.TP.4, Volume C. Bulletins containing meteorological reports for global exchanges should be given the first set of numbers starting with 1. The next set of numbers should be used to identify bulletins for inter-regional exchanges and the third set for regional exchanges.

For bulletins 1 to 9 inclusive, ii will contain a single digit only. When ii is mandatory, a single bulletin on its own should be given the number 1. In the case of ships' or aircraft reports, the figure representing the number ii should be limited and designated in advance for each country concerned (6 being a maximum). These reports, made by ships and aircraft in a network, which come in after transmission of the final bulletin would then be sent with the indicator RTD.

For bulletins containing processed information (e.g. forecasts, analyses) the use of ii is not mandatory in both alphabets.

CCCC – International 4-letter location indicator of the station originating or compiling the bulletin. (See WMO Publication No. 9.TP.4, Volume C)

Note: When a station is not included in the WMO list, the ICAO indicator for the station should be used. The Secretariat should be advised of the inadequacy of the list.

k - Letter used (in addition to ii) when required, for manual operations to indicate the content and distribution of the bulletin.

The following letters shall be used:

N - Northern Hemisphere data for global distribution as agreed by CSM

S - Southern Hemisphere data for global distribution as agreed by CSM

A - Region VI data for inter-regional exchange to Region IV.

The use of other letters is a matter for regional or inter-regional agreement.

YYGGgg - International date-time group

YY - Day of month

GGgg - For bulletins containing meteorological reports: standard time of observation in GMT;

- For forecasts and analyses: standard time of observation in GMT on which forecast or analysis is based;

- For other messages: time of origin in GMT.

Routine bulletins sent at unscheduled times shall be identified by a 3-letter indicator (BBB) which shall be added after the date-time group on the same line with only one intervening space.

The following indicators shall be used:

RTD - Delayed routine weather reports

COR - Correction bulletins

AMD - Amendment bulletins (only applicable to processed information).

2.3.3 Text

The following provisions apply to the compilation of the text of a meteorological bulletin:

(a) The text of a bulletin shall be in one code form only;

(b) The text of a bulletin shall be transmitted in consecutive lines and shall begin on the first line after the abbreviated heading;

(c) Each individual meteorological report shall start at the beginning of a new line. The procedures could apply also to other coded information such as TAF, CLIMAT, CLIMAT TEMP;

(d) Meteorological report separation signal: the signal No. 22 (figure case position) of the International Telegraph Alphabet No. 2 or the signal No. 3/13 of International Alphabet No. 5 shall be used as meteorological report separation signal. The signal shall follow the last figure of the last group of each report with no intervening space. In upper-air bulletins (TEMP and PILOT), each successive Parts A, B, C and D shall be immediately preceded by an alignment signal (see paragraph 2.3.5 below) and followed by a separation signal. In TEMP bulletins, each report relating to one station is separated from the preceding report by an additional line-feed signal. Additionally, whenever in an upper-air bulletin (TEMP or PILOT), Parts A and B or Parts C and D follow each other immediately, they shall be separated by 8-carriage return signals. The procedures could apply also to other coded information such as TAF, CLIMAT, CLIMAT TEMP;

(e) Whenever practicable, and unless special provisions exist to the contrary, the text of a meteorological bulletin shall be transmitted in such a manner that full use is made of the capacity of a teleprinter line (69 characters per line);

(f) In the case of routine messages containing meteorological reports, where reports are not available for inclusion in a routine message, NIL shall be inserted following the appropriate station index number if the compiling station expects that this report will become available for transmission later. The indicator MIS shall be used in bulletins where the compiling station is assured that this report is not expected to be transmitted. The above procedures apply also to other coded information such as TAF, CLIMAT, CLIMAT TEMP.

Note 1: "MIS" shall be used when the observing station is not making the observation at the indicated standard time of observation.

Note 2: The abbreviated heading of a bulletin should be used only once. Any subsequent "delayed", "corrected" or "amended" information relevant to that bulletin should follow procedures of paragraphs 2.3.6, 2.3.7 and 2.3.8.

(g) When the whole bulletin for a routine message is not available at the normal time for transmission but is expected to become available for transmission later, the text "NIL" shall be sent. If it is not expected to become available for transmission later, the text "MIS" shall be sent.

2.3.4 End of message

The format for the end of message shall be:

(a) International Telegraph Alphabet No. 2:

↓ ≪ ≡≡≡≡≡≡≡≡ NNNN ↓↓↓↓↓↓↓↓↓↓↓↓

(for an example and the meaning of the signals, see Table G).

<u>Note</u> : The end of message signals are used for ensuring page-feed and tape-feed. End of transmission signals consist of the sequence of the following telegraphic signals:

One	"Letter Shift"	(signal No. 29)
Two	"Carriage return"	(signal No. 27)
Eight	"Line feed"	(signal No. 28)
Four	"N"	(signal No. 14, letter case)
Twelve	"Letter shift"	(signal No. 29)

(b) International Alphabet No. 5:

CR	CR	LF	ETX

(for an example and the meaning of signals, see Table G).

2.3.5 <u>Alignment signals</u>

(a) Alignment function ensures correct placement in the page copy of teleprinters of the components of messages and consists of the following telegraphic signals:

Two "Carriage return"
One "Line feed"

The alignment signals shall be transmitted before each line of the text;

(b) When using International Telegraph Alphabet No. 2, in order to render ineffective any accidental shifts from figure to letter case on transmission of the alignment function, one figure shift (signal No. 30) shall begin any line of which the first character is a figure.

<u>Note</u>: A message model is shown in Table G.

2.3.6 <u>Procedures for correction</u>

The following procedures for correction are applicable for both International Telegraph Alphabet No. 2 and International Alphabet No. 5:

(i) Errors made and immediately detected during the preparation of a tape shall be corrected by back spacing the tape, where possible, and eliminating the error by overpunching the incorrect portion with the "letter shift" in International Telegraph Alphabet No. 2 and Signal 7/15 (DEL) in International Alphabet No. 5;

(ii) Where equipment is incapable of back spacing, corrections shall be made immediately by making the error sign: Letter "E" and "Space" repeated alternately three times, transmitting the last correct word or group, and then continuing with the tape preparation;

(iii) In actual or forecast analysis messages, errors detected after transmission of a message is completed shall not be corrected. In all other messages, errors detected during or after transmission shall be corrected by means of a new message. The abbreviated heading of the new message shall consist of the same abbreviated heading of the original bulletin containing the error but with the inclusion of the indicator "COR" on the same line. The text shall consist of the correct version of the bulletin. In the case of bulletins containing meteorological reports, only that report which needs to be corrected shall be included in the new message. The above procedures apply also to bulletins containing coded information such as TAF, CLIMAT, CLIMAT TEMP.

2.3.7 Procedures for amendments

2.3.7.1 The abbreviated heading of a message containing amended information shall consist of the abbreviated heading of the original bulletin containing the information but with the inclusion of the indicator AMD on the same line. The text shall consist of the amended version of the bulletin.

2.3.8 Procedures for RETARD

2.3.8.1 The abbreviated heading of a message containing routine delayed weather reports shall consist of the abbreviated heading of the original bulletin containing the information but with the inclusion of the indicator RTD on the same line.

2.3.9 Request for repetition

2.3.9.1 Requests for repetition shall be made by addressed messages and replied to by addressed messages; both messages should include, as part of the text, the abbreviated heading of the information which is to be repeated.

2.4 Message format for addressed messages

2.4.1 Starting line

The format of the starting line of an addressed message shall be:

(a) International Telegraph Alphabet No. 2:

$\lll \equiv\!\downarrow$ ZCZC ($\rightarrow \uparrow$ nnn) $\rightarrow (\uparrow)^{(1)}$ CLLLL $\rightarrow \rightarrow \rightarrow \rightarrow \rightarrow$

(i) If there is an nnn group, since the figure shift signal should precede this group, there is not need to give it before the CLLLL group. If, on the other hand, there is no nnn group, the figure shift signed should precede the CLLLL group.

(b) International Alphabet No. 5:

$\boxed{SOH}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ nnn $\boxed{SP}$ CLLLL

2.4.2 As an interim measure the rest of the format is identical with the ICAO/AFTN procedures (Annex 10 Volume II of the International Civil Aviation Convention). The end of message format shall be the same as for routine messages.

Note : The addressed message format shall be used for non-routine meteorological messages and service messages.

2.5 Optimum length of message

(a) The following factors are taken into account:

(i) Duration of message transmission;

(ii) Relationship between the information characters and procedure signals.

The optimum length of message should be between 200 and 300 groups, observational data messages should not exceed 300 groups (i.e., 1800 characters);

(b) It is to be noted that for messages that might possibly be transmitted in transit over the AFTN, the length of the text shall not exceed 200 groups.

2.6 Time delays for the transmission of meteorological messages for synoptic purposes and for the compilation and editing of meteorological bulletins

2.6.1 Time delays

(a) For the automatic switching of messages:

(i) No speed conversion. In this case, the acceptable time delay between completion of receipt of message and commencement of retransmission on outgoing circuit should not exceed 15 seconds provided the transmission channel is free;

(ii) Speed conversion. In this case in which a speed and, in many instances, also an alphabet conversion is required, the acceptable time delay between completion of receipt of message and commencement of retransmission on outgoing channels should not exceed 3 minutes provided the transmission channel is free;

(b) For procedure checking operation, composition and editing of bulletins, the time spent by the RTHs and the WMCs should be of the order of:

(i) Two minutes when there is speed conversion;

(ii) Fifteen seconds for high-speed transmissions.

2.7 Storage capabilities of meteorological data at World Meteorological Centres and Regional Telecommunication Hubs

2.7.1 As regards storage capabilities for retransmission purposes, the following procedures should be applied:

(a) WMCs and RTHs which are responsible for transmitting on the Main Trunk Circuit meteorological messages and which must meet regional requirements, should store the meteorological information until the transmission to the next centre is completed;

(b) For this purpose, they should have storage capabilities for transmission purposes to enable them to meet the following criteria:

(i) Circuits where acknowledgment of reception of data is transmitted automatically to the originating centre - it is not necessary to store the data on a short-time access memory after such acknowledgment is received;

(ii) Full duplex circuits where no automatic acknowledgment is effected - if the originating centre does not get a request for retransmission within 30 minutes after the end of transmission, this would be considered as acknowledgment of reception and no further need exists for storage of the data on a short-time access memory.

2.7.2 As regards storage for telecommunication purposes to meet requests for meteorological data, the following procedure shall be applied:

WMCs and RTHs should store their synoptic surface and upper-air data, which they directly inject on the Main Trunk Circuit and its branches, in appropriate memories for 12 hours and 24 hours respectively.

2.8 Store and forward data transmission: priority messages

2.8.1 For normal transmission under store and forward operation messages should be forwarded on the queueing principle "first in, first out".

2.8.2 Priority (urgent) messages for which priority transmission is required, as distinct from the transmission of messages which take their place in the queue, should be in addressed message format (paragraph 2.4 refers). In the ICAO format (paragraph 2.4.2 refers), they should be given the special handling priority indicator DD. Only one level of priority shall be used.

2.8.3 A priority message, on reception for onward transmission, should go to the head of the transmission queue. Its onward transmission shall, however, not interrupt the transmission of a message already started or a transmission by facsimile (analogue) already started.

Note: Addressed messages other than priority messages which carry the ICAO priority indicator GG or JJ should be treated as messages taking their place in the transmission queue.

2.9 Order of priority in collective transmissions

Note: The order of priorities in this paragraph relates to the existing collective transmission and not to transmissions on the new automated system.

2.9.1 In collective broadcasts the order of transmission of reports in each group should depend on the availability of data at the centre of collection and dissemination. The order should as far as possible be in accordance with the schedules given below except that priority in collective transmissions should be given to SHIP reports whenever they are received at the collection centre prior to SYNOP reports. The order of priority relates primarily to the order of items within the various groups and not to the order of the groups themselves.

Group 1 - Warnings

Group 2 - Surface reports, atmospherics reports

1 SYNOP
2 SHIP (ocean weather station)
3 SHIP (other than ocean weather station)
4 SFAZI/SFLOC
5 RETARD) of group 2
6 RECTIF)

Group 3 - Upper-air reports

1 TEMP
2 PILOT
3 AIREP and CODAR
4 RETARD) of group 3
5 RECTIF)

Group 4 - Analyses, forecasts

1 ANALYSES
2 PROGNOSES
3 FORECASTS (where normal channels are not adequate)
4 RECTIF of group 4

Group 5 - Miscellaneous, e.g. CLIMAT, SEISMO, SFAZU

NOTES:

1. In certain cases, subject to regional agreement, RETARD may be broadcast at the end of a collective transmission in a separate group instead of groups 2 and 3.

2. Atmospherics reports (groups 2 and 5) should be disseminated by the centres making broadcast issues of collective messages covering large areas, i.e. centres responsible for sub-regional broadcasts.

3. CLIMAT reports should be broadcast in territorial, sub-regional and regional transmissions and should be repeated once in the sub-regional broadcasts.

4. Types of meteorological information and associated traffic other than that normally exchanged may be transmitted over the Global Telecommunication System intended for the exchange of basic meteorological data, subject to the following conditions being fulfilled:

(a) The inclusion of the additional information does not involve the omission or delay of any reports which are normally transmitted and does not involve interference with the timetable of routine issues;

(b) The nature of the information is clearly identified in the heading; and

(c) Except in the case of emergency or bilateral agreements, prior approval is obtained from the Regional Association concerned or, in the case of regional broadcasts, the Commission for Synoptic Meteorology.

2.10 Characters for indicating missing information in meteorological bulletins

(a) In the case of International Telegraph Alphabet No. 2 to indicate missing figures or letters in meteorological bulletins, the solidus "/" (figure case position of signal No. 24 of the International Telegraph Alphabet No. 2) should be used.

(b) In the case of International Alphabet No. 5, the signal 2/15 of this Alphabet should be used.

2.11 Error control procedures for the Global Telecommunication System

2.11.1 The error-control procedures for the software/hardware systems and HF radio transmissions are as adopted by WMO.

2.12 Procedures applicable to radioteleprinter transmissions

2.12.1 The special procedures applicable to radioteleprinter transmissions are as follows:

(a) Identification - A radioteleprinter broadcast will be preceded by the transmission of call signals;

(b) Form of call signals - The call signals will comprise: the general call to all stations (transmitted three times), the conventional signal DE, the identification of the broadcasting station consisting of the radio call-sign followed by the frequency reference index or indices (transmitted three times) and the letters RY repeated without separation for one line (69 characters)

Example:

CQ CQ CQ DE WSY21/22 WSY21/22 WSY21/22

RYRY - RYRYRY

← 69 characters →

(c) Transmission of call signals - Call signals will be transmitted:

(i) Before broadcasts due to begin at a fixed time for at least the two minutes which precede the official time of starting;

(ii) Each time that the station has no traffic during assigned broadcast periods;

(iii) During the five minutes preceding the first broadcast following a change of frequency in which the broadcast will take place.

2.12.2 The special procedures for relay centres by radioteleprinter are as follows:

(a) In radioteleprinter exchanges where a communication centre is responsible for the relay of the bulletins originating from another centre, the abbreviated heading must not be altered whether the bulletin is retransmitted complete or incomplete;

(b) Where a message is received with some groups or some meteorological data garbled, the relay centre should retransmit the message as received and, if possible, obtain a retransmission from the orginating centre;

(c) National instructions should cover the case of the measures to be taken when complete garbling occurs in order to ensure that all usable data are relayed with a minimum delay with the elimination, where possible, of completely garbled portions. Whenever the elimination mentioned above is performed the abbreviation INC should be added at the end to indicate that the bulletin is incomplete; the relay centre should take all necessary steps to receive from the originating centre those parts of the bulletin which were garbled and retransmit them as soon as possible.

2.13 Procedures applicable to Morse broadcast

The special procedures applicable to Morse broadcasts are as follows:

(a) Commencement of transmissions

Transmitting stations should make marking transmissions over a period of two minutes before the scheduled time of beginning of each transmission. A marking transmission should also be sent by these transmitters each time they resume their traffic after an interruption of more than ten minutes. A station which is unable to commence its transmissions at the scheduled time should interrupt its marking transmission at the time scheduled and, after transmitting its call-sign, it should indicate the estimated duration of the delay or send the appropriate Q-code signal. The marking transmission will then be transmitted until the transmission can be effected normally. After an estimated duration of delay is stated, the scheduled transmission shall not be commenced until after the expiration of such a time interval;

(b) Automatic transmission

Telegraphic transmissions should be made by an automatic keying device to ensure correct speed and uniformity of transmission.

All automatic transmissions shall be made from perfectly perforated tape or from tape in which all errors detected have been removed;

(c) Speed of transmission

The speed of Morse transmissions should be between 18 and 20 5-figure groups per minutes (24-28 bauds) except that in areas where transmission and reception are still accomplished by hand, the average speed of transmission may be 15 5-figure groups per minute, if agreed regionally;

(d) Transmitting the digit 0

The internationally recognized abbreviated Morse character (one dash) should be used for the digit zero in preference to the long character (five dashes) whenever practicable;

(e) Errors during transmission

Errors detected during transmission should, when practicable, be corrected by transmitting the correction manually; when this is not practicable, the correction shall be sent at the end and as a continuation of the transmission preceded by the procedure signal "COR" (see also Part II, paragraphs 2.4.6 (vii) and (iv));

(f) Simultaneous transmissions on more than one frequency

When radio broadcasts are being transmitted on more than one frequency simultaneously, the call sign of each of the frequencies on which the transmission is being made shall be indicated. Stations should indicate the addition or deletion of a frequency if this occurs during a transmission.

2.14 Complementary information for the transmission of ships' reports and meteorological information from aircraft in flight

2.14.1 Inclusion of ship call-signs and addresses in ships' weather messages

The following measures should be applied:

(a) Members should arrange with their telecommunication services for the inclusion of four-letter call-signs of ships in the preamble of reports from selected and supplementary ship stations when transmitted from coastal stations to collecting centres;

(b) Reports from ships, when included in collective transmissions, should be prefaced by the four-letter call-sign of the ship;

(c) In messages from mobile ships the four-letter call-sign should begin the line containing each ship's report. If this four-letter call sign cannot be ascertained the word "SHIP" will begin the message. Messages from ocean weather vessels when on station will be preceded on a separate line by the 4Y-indicator for the ocean station concerned;

(d) Members should endeavour to employ "METEO" as the first word in the address of ships weather messages.

2.15 Quality of meteorological transmissions

2.15.1 Monitoring and control

All meteorological transmissions should be monitored in order that the recommended procedures may be ensured thereby permitting a satisfactory operation of the GTS.

2.15.2 Deficiencies in meteorological transmissions

The following provisions should be applied by Members:

A Member experiencing difficulties in receiving or observing any deficiencies in a transmission intended for its reception, should first take corrective action of a local nature and, if unsuccessful, subsequently notify in detail the Member making this transmission and also keep the Presidents of Regional Associations concerned informed as necessary.

Note: As regards the reports on the reception of radio transmissions, the code RECEP should be used.

3. PROCEDURES APPLICABLE TO TRANSMISSIONS OF METEOROLOGICAL INFORMATION IN PICTORIAL FORM OVER THE GTS

3.1 Format for meteorological information in pictorial form

The details which should appear in the panel for idenitification of pictorial information (to be placed in the lower left-hand corner of the card and also, if possible, in the upper right-hand corner) are determined nationally. They should be easy to identify, easily read and understood, and should comprise:

(i) The originating centre;
(ii) The number of the chart;
(iii) Details regarding the data shown on the chart.

3.2 Switching and identification procedures for the transmission of alpha-numeric data and meteorological information by facsimile on circuits operated on a time-sharing basis

The procedures for the software and hardware systems are as adopted by WMO.

3.3 Store and forward of facsimile transmissions

3.3.1 Facsimile transmissions made in analogue form, and which have to be relayed involving a store and forward system, should normally employ high quality magnetic tape recorders for the purpose. It is essential that the picture quality is maintained throughout the storage and retransmission process; the maintenance of synchronism as specified in WMO publication No. 9.TP.4, Volume C, Chapter I, Part V, Paragraph 3.8 must be ensured.

3.3.2 The store and forward process at a relay centre should be accomplished with a minimum loss of time; if practicable, retransmission should commence before a full frame has been received. All elements of the start and stop signals shall be retained throughout the relay process.

3.3.3 Centres not equipped for such simultaneous reception and relay should provide adequate magnetic tape storage to accommodate the facsimile (analogue) relay transmissions. The storage should be at least sufficient for one complete frame.

3.3.4 The use of chart recorders as receiving and transmitting facilities in store and forward mode operation using paper as the recording and storage medium, should be employed only as emergency back-up facilities.

3.4 Monitoring and control of transmissions of meteorological information in pictorial form

The general provisions indicated in paragraphs 2.15.1 and 2.15.2 are equally valid for these transmissions.

Note: A test chart for reception of facsimile (analogue) transmissions has been adopted by WMO.

*

*   *

TABLE A

DATA DESIGNATORS

Surface data	**S**
SYNOP/SHIP main hours	SM
SYNOP/SHIP intermediate hours	SI
SYNOP/SHIP non-standard hours	SN
Hourly and half-hourly (METAR) - including trend forecasts and other information, if appended	SA
SPESH/SPECI	SP
SFAZI/SFLOC/SFAZU	SF
Radar reports	~~SD~~
Seismograph earthquake reports	SE
Microseismograph reports	SG
Oceanographic data	SO
River and special service reports	SR
Snow depth/ice thickness reports	ST
Miscellaneous	SX

Upper-air data	**U**
PILOT/PILOT SHIP (Part A)	UP
PILOT/PILOT SHIP (Part B)	UG
PILOT/PILOT SHIP (Part C)	UH
PILOT/PILOT SHIP (Part D)	UQ
PILOT/PILOT SHIP (Parts A and B)	UI
PILOT/PILOT SHIP (Parts C and D)	UY
TEMP/TEMP SHIP (Part A)	US
TEMP/TEMP SHIP (Part B)	UK
TEMP/TEMP SHIP (Part C)	UL
TEMP/TEMP SHIP (Part D)	UE
TEMP/TEMP SHIP (Parts A and B)	UM
TEMP/TEMP SHIP (Parts C and D)	UF
CODAR	UT
Meteorological reconnaissance flight observations	UR
AIREP	UA
Rocket-sonde	UN
Maximum wind	UD
Tropopause	UO
Miscellaneous	UX

Climatic data	**C**
CLIMAT	CS
CLIMAT SHIP	CH
NACLI - CLINP - SPCLI - CLISA - INCLI	CO
CLIMAT TEMP	CU
CLIMAT TEMP SHIP	CE

TABLE A (continued)

Analyses	A	
IAC - IAC FLEET surface		AS
IAC - upper air		AU
Grid-point analyses		AG
Thickness analyses		AH
Miscellaneous		AX
Nephanalyses		AN
Radar analyses		AR
Forecasts	F	
IAC - IAC FLEET surface		FS
IAC - upper air		FU
Aerodrome forecasts (IAF) - period of validity greater than 12 hours		FT
Aerodrome forecasts (TAF) - period of validity 12 hours or less		FC
ARFOR		FA
ROFOR		FR
FIFOR		FI
PROAR - PRORO - PROFI		FH
MAFOR		FZ
Other aviation forecasts		FB
Extended forecasts		FE
Radio warning service (radio propogation forecasts)		FJ
Temperature extreme forecasts		FM
Public forecasts		FP
Miscellaneous		FX
Winter sports forecasts with data		FW
Grid-point forecasts		FG
Warnings	W	
Hurricane warnings		WH
SIGMET		WS
Tropical cyclone (typhoon) warnings		WT
Warnings (other)		WO
Satellite data	T	
Satellite location information		TB
Satellite vertical temperature soundings		TU
Notices	N	
Notices		NO

- PART I; II

TABLE B

GEOGRAPHICAL DESIGNATORS (AA) FOR USE IN ABBREVIATED HEADINGS

TTAA (ii) CCCC (k) YYGGgg

FOR BULLETINS CONTAINING MESSAGES FROM LAND STATIONS

AA Antarctica
AB Albania
AC Arctic Region
AD Southern Yemen
AE South East Asia
AF Africa
AG Argentina
AH Afghanistan
AI Ascension Island
AJ Austral Islands
AK Alaska
AL Algeria
AN Angola
AO West Africa
AR Arabian Sea
AS Asia
AT Antigua
AU Australia
AZ Azores

BA Bahamas
BC Botswana
BD Lesotho
BE Bermuda
BG Guyana
BH British Honduras
BI Burundi
BK Banks Islands
BM Burma
BN Bonaire
BO Bolivia
BQ Baltic Sea Area
BR Barbados
BS Bering Sea
BU Bulgaria
BX Belgium, Luxembourg
BY Byelorussian S.S.R.
BZ Brazil

CA Caribbean
CC Curacao
CD Cambodia
CE Central African Republic
CF Congo, Republic of
CH Chile
CI China
CL Ceylon
CM Cayman Islands
CN Canada
CO Colombia
CR Canary Islands
CS Costa Rica
CT Canton Island
CU Cuba
CV Cape Verde Islands
CY Cyprus
CZ Czechoslovakia

TABLE B (continued)

DD	German Democratic Republic
DG	Surinam
DH	Dahomey
DL	Federal Republic of Germany
DN	Denmark
DO	Dominica
DR	Dominican Republic
EA	East Africa
EC	East China Sea
EE	Eastern Europe
EJ	Fiji Islands
EL	Ellice Islands
EM	Middle Europe
EN	Northern Europe
EQ	Ecuador
ES	St. Eustatius
ET	Ethiopia
EU	Europe
EW	Western Europe
FA	Faeroes
FG	French Guiana
FI	Finland
FK	Falkland Islands
FM	Morocco
FN	Niger
FR	France
FS	Mali
FW	Wallis and Futuna Islands
GA	Gulf of Alaska
GB	Gambia
GC	Ghana
GH	Afghanistan
GI	Gibraltar
GL	Greenland
GM	Guam
GN	Gabon
GP	Guadeloupe
GR	Greece
GT	Gilbert Islands
GU	Guatemala
GX	Gulf of Mexico
GW	Guinea
HA	Haiti
HE	St. Helena
HK	Hong Kong
HO	Honduras
HU	Hungary
HV	Upper Volta
HW	Hawaiian Islands
ID	Indonesia
IE	Ireland
IL	Iceland
IN	India
IO	Indian Ocean
IQ	Iraq
IR	Iran
IS	Israel

TABLE B (continued)

IV	Ivory Coast
IY	Italy
JM	Jamaica
JN	Jan Mayen
JP	Japan
KA	Caroline Islands
KG	Kerguelen
KI	Christmas Island
KK	Cocos Island
KM	Cameroon
KN	Kenya
KO	Korea, Republic of
KT	St. Kitts
KU	Cook Islands
LA	Laos
LB	Lebanon
LC	St. Lucia
LI	Liberia
LN	Southern Line Islands
LU	Aleutian Islands
LY	Libya
MA	Mauritius
MC	Central Mediterranean
MD	Madeira
ME	Eastern Mediterranean Area
MF	St. Martin (French)
MG	Madagascar
MI	Marshall Islands
ML	Malta
MM	Mediterranean
MN	St. Maarten (Netherlands)
MO	Mongolia
MR	Martinique
MS	Malaysia
MT	Mauritania
MU	Macao
MV	Maldive Islands
MW	Western Mediterranean
MX	Mexico
MZ	Mozambique
NA	North America
NB	British North Borneo
NC	New Caledonia and Loyalty Island
NE	Near East
NG	New Guinea
NH	New Hebrides
NI	Nigeria
NK	Nicaragua
NL	Netherlands
NO	Norway
NR	Zambia
NS	Nassau
NT	North Atlantic
NV	Navassa

TABLE B (continued)

NZ New Zealand

OF French Polynesia
OM Oman
OR South Orkney Islands
OS Austria

PA Pacific
PE Persian Gulf
PG Portuguese Guinea
PH Philippines
PI Phoenix Islands
PK Pakistan
PL Poland
PM Panama
PN North Pacific
PO Portugal
PP Portuguese Timor
PR Peru
PS South Pacific
PT Pitcairn Island
PU Puerto Rico
PY Paraguay

RA U.S.S.R. (Asia)
RB Aruba
RC Congo, Democratic Republic of
RE Reunion
RH Southern Rhodesia
RI Rio de Oro
RM Equatorial Guinea
RN Malawi
RO Romania
RS U.S.S.R. (Europe)
RW Rwanda

SA South America
SC Seychelles Islands
SD Saudi Arabia
SF French Territory of the Afars and Issa
SG Senegal
SI Somalia
SJ Sea of Japan
SK Sarawak
SL Sierra Leone
SN Sweden
SO Solomon Islands
SP Spain
SR Singapore
SS South China Sea
ST South Atlantic
SU Sudan
SV El Salvador
SW Switzerland
SX Santa Cruz Islands
SY Syria
SZ Spitzbergen

TB Tibet
TC Tristan da Cunha

TABLE B (continued)

TD	Trinidad and Tobago
TE	Chad
TG	Togo
TH	Thailand
TI	Turks Islands
TJ	Jordan
TK	Tokelau Islands
TM	Timor
TN	Tanzania, United Republic of
TO	Tonga
TP	São Tomé, Principe Island
TS	Tunisia
TU	Turkey
UA	South Africa
UB	United Arab Republic
UG	Uganda
UK	United Kingdom of Great Britain and Northern Ireland
UR	Ukrainian S.S.R.
US	United States of America
UY	Uruguay
VI	Virgin Islands
VM	Viet-Nam, Republic of
VN	Venezuela
WK	Wake Island
WZ	Swaziland
XE	Eastern Hemisphere
XN	Northern Hemisphere
XS	Southern Hemisphere
XW	Western Hemisphere
XX	For use when other designators are not appropriate
YE	Yemen
YG	Yugoslavia
ZB	Saba
ZM	Western Samoa

*

*   *

TABLE C

GEOGRAPHICAL DESIGNATORS (AA) FOR USE IN ABBREVIATED HEADINGS

TTAA (ii) CCCC (k) YYGGgg
FOR BULLETINS CONTAINING MESSAGES FROM SHIPS

The first letter will denote the nature of the ship:

For stationary weather ships	:	W
For mobile ships	:	V

The second letter will denote the Regions from which the SHIP reports within the bulletins originate:

from Region I	A
from Region II	B
from Region III	C
from Region IV	D
from Region V	E
from Region VI	F
from south of 60°S	J
from more than one Region	X

NOTE: Whenever practicable, separate bulletins should be prepared to avoid the use of the letter "X".

*

* *

TABLE D

INTERNATIONAL TELEGRAPH ALPHABET No. 2

99 § 5. *Written characters which have a corresponding signal in International Telegraph Alphabet No. 2.*

100 *Letters*

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

101 *Figures*

1 2 3 4 5 6 7 8 9 0

102 *Punctuation marks and miscellaneous signs:*

Full stop	.
Comma	,
Colon or division sign	:
Question mark	?
Apostrophe	'
Cross or addition sign	+
Hyphen or dash or subtraction sign	—
Fraction bar or division sign	/
Multiplication sign	×
Double hyphen	=
Left-hand bracket (parenthesis)	(
Right-hand bracket (parenthesis)	)

103 The following table shows the current impulses for the transmission of letters, figures and signs, and indicates the polarity of the various impulses:

International Telegraph Alphabet No. 2

No. of signal	Letter case	Figure case	Start	1	2	3	4	5	Stop
1	A	—		O	O				O
2	B	?		O			O	O	O
3	C	:			O	O	O		O
4	D	4)		O			O		O
5	E	3		O					O
6	F	1)		O		O	O		O
7	G	1)			O		O	O	O
8	H	1)				O		O	O
9	I	8			O	O			O
10	J	*audible signal*		O	O		O		O
11	K	(		O	O	O	O		O
12	L	)			O			O	O
13	M	.				O	O	O	O
14	N	,				O	O		O
15	O	9					O	O	O
16	P	0			O	O		O	O
17	Q	1		O	O	O		O	O
18	R	4			O		O		O
19	S	'		O		O			O
20	T	5						O	O
21	U	7		O	O	O			O
22	V	=			O	O	O	O	O
23	W	2		O	O			O	O
24	X	/		O		O	O	O	O
25	Y	6		O		O		O	O
26	Z	+		O				O	O
27	*Carriage return 2)*						O		O
28	*Line feed 2)*				O				O
29	*Letters 3) 5)*			O	O	O	O	O	O
30	*Figures 5)*			O	O		O	O	O
31	*Space*					O			O
32	*Not used*								O

Sign	*Working with closed circuit*	*Working with double current*
	No current	*Negative current*
O	*Positive current*	*Positive current*

1) Available for the internal service of each Administration or recognized private operating agency.

2) For page printers.

3) Also used as "erasure" in case of automatic working.
In automatic working the perforated tape must contain the perforations indicated by O in columns 1 to 5.

4) a) To operate the answer-back unit of the corresponding instrument in the European international switched service by start-stop apparatus and for the Administrations or recognized private operating agencies of the extra-European system which use this facility;
b) available for the internal service of other Administrations or recognized private operating agencies of the extra-European system.

5) Signals Nos. 29 (letters) and 30 (figures) shall not affect the spacing movement.

104 Administrations or recognized private operating agencies desirous of confirming the reception or the transmission of signals " secondary of D " or " secondary of J " shall effect this confirmation by printing:

105 the symbol for the confirmation of the signal " secondary of D ";

106 the symbol for the confirmation of the signal " secondary of J ".

107 Administrations or recognized private operating agencies desirous of confirming on a tape machine the reception or transmission of the signals " carriage return " and " line feed " shall effect this confirmation by printing:

108 the symbol $<$ for the signal " carriage return ";

109 the symbol $\equiv$ for the signal " line feed ".

110 The provisions regarding the transmission of words, whole numbers, fractional numbers, texts within inverted commas (quotation marks), the accented letter E, and minute and second signs, which are applicable to instruments using International Telegraph Alphabet No. 1 (81 to 98), shall also be applicable to instruments using International Telegraph Alphabet No. 2.

111 On these instruments a group consisting of figures and letters shall be transmitted without a space between the figures and letters.

112 To indicate the sign $^0/_0$ or $^0/_{00}$, the figure 0, the fraction bar and the figures 0 or 00 shall be transmitted successively (i.e.: 0/0, 0/00).

113 A whole number, a fractional number, or a fraction, followed by a $^0/_{00}$ sign, shall be transmitted by joining up the whole number, the fractional number, or the fraction to the $^0/_{00}$ sign by a dash.

Examples: For 2% transmit 2—0/0 and not 20/0;
for $4\frac{1}{2}\,^0/_{00}$ transmit 4—1/2—0/00 and not 41/20/00.

114 To indicate a " blank ", the signal " space " shall be transmitted.

115 To indicate a transmission error, the letter E and the signal " space " shall be repeated alternately three times. Transmission shall be resumed beginning with the last word correctly sent. When transmitting with perforated tape and provision exists for eliminating incorrectly perforated characters, this means of correction shall be used.

116 To indicate " wait ", to show the end of a telegram, the end of a transmission or the end of work, the signals transmitted shall be the same as on instruments using the International Telegraph Alphabet No. 1 (81 to 98).

TABLE E

INTERNATIONAL ALPHABET No. 5

1. Code table of Alphabet No. 5

1.1 The recommended alphabet and the corresponding two-condition "naked" code is given by the following table:

b_7					0	0	0	0	1	1	1	1
b_6					0	0	1	1	0	0	1	1
b_5					0	1	0	1	0	1	0	1
b_4	b_3	b_2	b_1	Row \ Column	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	(TC_7)DLE	SP	0	(@) (5)	P	` (4)	p
0	0	0	1	1	(TC_1) SOH	DC_1	!	1	A	Q	a	q
0	0	1	0	2	(TC_2) STX	DC_2	" (6)	2	B	R	b	r
0	0	1	1	3	(TC_3) ETX	DC_3	£ (3) (7)	3	C	S	c	s
0	1	0	0	4	(TC_4) EOT	DC_4	$ (3) (7)	4	D	T	d	t
0	1	0	1	5	(TC_5) ENQ	(TC_8)NAK	%	5	E	U	e	u
0	1	1	0	6	(TC_6) ACK	(TC_9)SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	(TC_{10})ETB	' (6)	7	G	W	g	w
1	0	0	0	8	FE_0 (BS)	CAN	(	8	H	X	h	x
1	0	0	1	9	FE_1 (HT)	EM	)	9	I	Y	i	y
1	0	1	0	10	FE_2 (LF) (1)	SUB	*	: (8)	J	Z	j	z
1	0	1	1	11	FE_3 (VT)	ESC	+	; (8)	K	([) (5)	k	(5)
1	1	0	0	12	FE_4 (FF)	IS_4 (FS)	,	<	L	(5)	l	(5)
1	1	0	1	13	FE_5 (CR) (1)	IS_3 (GS)	–	=	M	(]) (5)	m	(5)
1	1	1	0	14	SO	IS_2 (RS)	.	>	N	^ (4) (6)	n	‾ (4) (5)
1	1	1	1	15	SI	IS_1 (US)	/	?	O	_	o	DEL

CCITT.2572

1.2 *Numbering of the positions in the code table*

Within any one character the bits (or units) are identified by $b_7, b_6 \ldots b_1$, where b_7 corresponds to the highest order, or most significant bit, and b_1 to the lowest order, or least significant bit.

Any one position in the code table may be identified either by its bit pattern, or by its column and row numbers. For instance, the position containing the figure 1 in the table may be identified:

— by its bit-pattern, e.g. 011 0001

— by its column and row numbers, e.g. 3/1.

1.3 *Controls designation*

ACK	Acknowledge	ENQ	Enquiry
BEL	Bell	EOT	End of transmission
BS	Backspace	ESC	Escape
CAN	Cancel	ETB	End of transmission block
CR	Carriage return	ETX	End of text
DC	Device control	F	Function
DEL	Delete	FE	Format effector
DLE	Data link escape	FF	Form feed
EM	End of medium	FS	File separator
GS	Group separator	SO	Shift-out
HT	Horizontal tabulation	SOH	Start of heading
IS	Information separator	SP	Space
LF	Line feed	STX	Start of text
NAK	Negative acknowledge	SUB	Substitute
NL	New line	SYN	Synchronous idle
NUL	Null	TC	Transmission control
RS	Record separator	US	Unit separator
SI	Shift-in	VT	Vertical tabulation

1.4 *Graphical symbols*

Graphical representation	Name	Position in the code table
(Space)	A normally non-printing graphic character	2/0
!	Exclamation mark	2/1
"	Quotation mark. Diaeresis (Note 6)	2/2
£	Currency symbol £ (Note 2) (Note 7)	2/3
$	Currency symbol $ (Note 2) (Note 7)	2/4
%	Per cent	2/5
&	Ampersand	2/6
'	Apostrophe, acute accent (Note 6)	2/7
(	Left parenthesis	2/8
)	Right parenthesis	2/9
*	Asterisk	2/10
+	Plus sign	2/11
,	Comma	2/12
–	Hyphen, minus sign	2/13
.	Full stop (period)	2/14
/	Solidus	2/15
:	Colon	3/10
;	Semi-colon	3/11
<	Less than	3/12
=	Equals	3/13
>	Greater than	3/14
?	Question mark	3/15
@	Commercial at	4/0
[	Left square bracket	5/11
]	Right square bracket	5/13
^	Upwards arrow, circumflex accent (Note 6)	5/14
_	Underline	5/15
`	Grave accent	6/0
‾	Overline (Note 5)	7/14

1.5 *Notes to the code table*

① The controls CR and LF are intended for printer equipment which requires separate combinations to return the carriage and to feed a line.

For equipment which uses a single control for a combined carriage return and line feed operation, the function FE_2 will have the meaning of "new line" (NL).

These substitutions require agreement between the sender and the recipient of the data.

The use of this function NL is not allowed for international transmission on general switched telecommunication networks (telegraph and telephone networks).

② For international information interchange, $ and £ symbols do not designate the currency of a given country. The use of these symbols combined with other graphic symbols to designate national currencies may be the subject of other Recommendations.

③ Reserved for national use. These positions are primarily intended for alphabetic extensions. If they are not required for that purpose, they may be used for symbols and a recommended choice is shown in parenthesis in some cases.

④ Positions 5/14, 6/0 and 7/14 of the seven-bit set table are normally provided for the diacritical signs " circumflex ", " grave accent " and " overline ". However, these positions may be used for other graphical symbols when it is necessary to have 8, 9 or 10 positions for national use.

⑤ For international information interchange, position 7/14 is used for the graphical symbol ‾ (overline), the graphical representation of which may vary according to national use to represent ∼ (tilde) or another diacritical sign provided that there is no risk of confusion with another graphical symbol included in the table.

⑥ The graphics in positions 2/2, 2/7, 5/14 have respectively the significance of " quotation mark ", " apostrophe " and " upwards arrow "; however, these characters take on the significance of the diacritical signs " diaeresis ", " acute accent " and " circumflex accent " when they precede or follow the " back-space " character.

⑦ For international information interchange, position 2/3 of the 7 bit-code table has the significance of the symbol £ and position 2/4 has the significance of the symbol $.

By agreement between the countries concerned where there is no requirement for the symbol £, the symbol "number sign" (#) may be used in position 2/3. Likewise, where there is no requirement for the symbol $, the symbol " currency sign " (¤) may be used in position 2/4.

⑧ If 10 and 11 as single characters are needed (for example, for Sterling currency subdivision), they should take the place of " colon " (:) and " semi-colon " (;) respectively. These substitutions require agreement between the sender and the recipient of the data. On the general telecommunication networks, the characters " colon " and " semi-colon " are the only ones authorized for international transmission.

1.6 Diacritical signs

In Alphabet No. 5, some printing symbols may be designed to permit their use for the composition of accented letters when necessary for general interchange of information. A sequence of three characters, comprising a letter, "back-space" and one of these symbols, is needed for this composition, and the symbol is then regarded as a diacritical sign. It should be noted that these symbols take on their diacritical significance only when they are preceded or followed by the "back-space" character; for example, the symbol corresponding to the code combination 2/7 (') normally has the significance of "apostrophe", but becomes the diacritical sign "acute accent" when it precedes or follows the "back-space" character.

In order to increase efficiency, it is possible to introduce accented letters (as single characters) in the positions marked by Note 3 in the code table. According to national requirements, these positions may contain special diacritical signs.

1.7 Interpretation of graphics

The meaning of the graphics is not limited by this recommendation. However, no interpretation may be chosen which is contradictory to the customary meaning. A graphical symbol can have more than one meaning, e.g. the graphical symbol – (minus) also can have the meaning of hyphen or separation mark.

1.8 Dual allocations

A character allocated to a position in the code table may not be placed elsewhere in the table. In the case of positions having two characters allocated to them (2/3, 2/4, 3/10 and 3/11), the character not used cannot be placed elsewhere. This applies also to positions showing a preferred graphic. If such a position is filled with a national character the preferred graphic cannot be placed in another code position.

2. FUNCTIONAL CHARACTERISTICS RELATED TO CONTROL CHARACTERS

Some definitions in this section are stated in general terms and more explicit definitions of use may be needed for specific implementation of the code tables on recording media or on transmission channels. These more explicit definitions may become the subject of other recommendations.

A control character may be identified by a general designation, by a specific designation or by a combination of both.

2.1 General designations of control characters

The general designations of control characters involve a specific name followed by a subscript number.

They are defined as follows:

TC - Transmission control - A functional character intended to control or facilitate transmission of information over telecommunication networks.

The use of the TC characters on the general telecommunication networks may be the subject of future recommendations.

FE - Format effector - A functional character which controls the layout or positioning of information in input/output media.

DC - Device control - A functional character for the control of an ancillary device associated with a data processing or telecommunication system, for example an "on" or "off" switching device.

The following is an example of how device-control characters could be used in a specific tape system employing two ancillary tape punches and one ancillary tape reader:

DC_1 - First punch "on"

DC_2 - Second punch "on"

DC_3 - Tape reader "on"

The DC_4 character has a specific function, defined in clause 2.2.

IS - Information separator - A functional character which is used to separate and qualify information blocks logically. There is a group of four such characters, which are intended to be used in a hierarchical order.

2.2 Specific designations of control characters

These are defined as follows:

ACK - Acknowledge - A transmission control character transmitted by a receiver as an affirmative response to the sender.

BEL - Bell - A character for use when there is a need to call for human attention; it may control alarm or attention devices.

BS - Back-space - A layout character which controls the movement of the printing position ore printing space backward on the same printing line.

CAN - Cancel - A character used to indicate that the information it accompanies is in error.

CR - Carriage return - A layout character which controls the movement of the printing position to the first printing position on the same printing line.

DC_4 - A device control character used to interrupt or turn off ancillary devices (STOP).

DEL - Delete - This character is used primarily to erase or obliterate erroneous or unwanted characters in punched tape. DEL characters may be inserted into or removed from a stream of data without affecting the information content of that stream. DEL characters may serve to accomplish media-fill or time-fill but then the addition or removal of these characters may affect the information layout and/or the control of equipment.

DLE - Data link escape - A transmission control character which will change the meaning of a limited number of contiguously following characters. It is used exclusively to provide supplementary data transmission control functions. Only graphics and transmission control characters can be used in DEL sequences.

EM - End of medium - A control character which may be used to identify the physical end of the medium, or the end of the used, or wanted, portion of information recorded on a medium. The position of this character does not necessarily correspond to the physical end of the medium.

ENQ - Enquiry - A transmission control character used as a request for a response from a remote station. The response may include station identification and/or station status. When a "who are you" function is required on the general switched transmission network, the first use of ENQ after the connection is established shall have the meaning "who are you" (station identification). Subsequent use of ENQ may, or may not, include the function "who are you", as determined by agreement by the users.

EOT - End of transmission - A transmission-control character used to indicate the conclusion of the transmission of one or more texts.

*ESC - Escape - A functional character which may be used to extend the standard character set of the code table. It is a warning or non-locking shift character which changes the meaning of the next single following code combination. The precise meaning of the character following "escape" requires prior agreement between the sender and the recipient of the data. Where required the character following "escape" may extend the "escape" sequence.
"Escape" sequences are used primarily to obtain additional control functions which may provide amongst other things graphics or graphic sets outside the standard set. Such control functions must not be used as additional transmission controls.

"Null" and "delete" and the ten transmission controls must not be used in defining "escape" sequences. Where they appear in an actual "escape" sequence they shall retain their standard meaning and be disregarded in the interpretation of the "escape" sequence.
The use of certain "escape" sequences will be the subject of further recommendations.

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* Still subject to special consideration by I.S.O.

ETB - End of transmission block - A transmission-control character used to indicate the end of a transmission block of data where data are divided into such blocks for transmission purposes.

ETX - End of text - A transmission-control character which terminates a text.

FF - Form feed - A layout character which controls the movement of the printing position to the first predetermined printing line on the next form.

FS - File separator - See unit separator (US) for definition.

GS - Group separator - See unit separator (US) for definition.

HT - Horizontal tabulation - A layout character which controls the movement of the printing position to the next in a series of predetermined position along the printing line.

LF - Line feed - A layout character which controls the movement of the printing position to the next printing line.

NAK - Negative acknowledge - A transmission-control character transmitted by a receiver as a negative response to the sender.

NL - New line - A layout character which controls the movement of the printing position to the first printing position of the next printing line (see Note 1 to the code table).

NUL - Null - A character whose sole purpose is to accomplish media-fill or time-fill. NUL characters may be inserted into or removed from a stream of data without affecting the information content but then the information layout and/or the control of equipment may be affected.

RS - Record separator - See unit separator (US) for definition.

*SI - Shift-in - The shift-in character means that the code combinations which follow shall be interpreted according to the standard code table.

*SO - Shift-out - The shift-out character means that the code combinations which follow shall be interpreted as outside of the standard code table until a shift-in character is reached. However, all the control characters (columns 0 and 1) and delete will retain their standard interpretation. The shift-out character is reserved primarily for extension to the graphics.

SOH - Start of heading - A transmission-control character used as the first character of a heading of an information message.

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* Still subject to special consideration by I.S.O.

SP - Space - A normally non-printing graphic character used to separate words. It is also a layout character which controls the movement of the printing position, one printing position forwards.

STX - Start of text - A transmission-control character which precedes a text and which is used to terminate a heading.

SUB - Substitute - A substitute character used to replace a character which is determined to be invalid or in error.

SYN - Synchronous idle - A transmission-control character used by a synchronous transmission system in the absence of any other character (idle condition) to provide a signal from which synchronism may be achieved or retained between data terminal equipments.

US - Unit separator - Terminates an information block called a "unit". Similarly, "record separator" (RS), "group separator" (GS), "file separator" (FS) terminate information blocks called "record", "group", "file", respectively.
The four information separators are in the hierarchical ascending order US, RS, GS, FS.
An information block must not be split by a higher order separator, e.g. a "record" may contain a number of complete "units", but may not contain a part of a "unit".

VT - Vertical tabulation - A layout character which controls the movement of the printing position to the next in a series of predetermined printing lines.

*

* *

TABLE F

Part I - CONVERSION TABLE BETWEEN INTERNATIONAL ALPHABETS No. 2 AND No. 5

Symbols or commands	Alphabet No. 2		Alphabet No. 5	
	Letter case	Figure case	Column	Row
A	1		4	1
B	2		4	2
C	3		4	3
D	4		4	4
E	5		4	5
F	6		4	6
G	7		4	7
H	8		4	8
I	9		4	9
J	10		4	10
K	11		4	11
L	12		4	12
M	13		4	13
N	14		4	14
O	15		4	15
P	16		5	0
Q	17		5	1
R	18		5	2
S	19		5	3
T	20		5	4
U	21		5	5
V	22		5	6
W	23		5	7
X	24		5	8
Y	25		5	9
Z	26		5	10
Carriage return	27	27	0	13
Line feed	28	28	0	10
Letters	29	29		
Figures	30	30		
Space	31	31	2	0
-		1	2	13
?		2	3	15

Symbols or commands	Alphabet No. 2		Alphabet No. 5	
	Letter case	Figure case	Column	Row
:		3	3	10
ENQ - WRU		4	0	5
3		5	3	3
8		9	3	8
Bell		10	0	7
(		11	2	8
)		12	2	9
.		13	2	14
,		14	2	12
9		15	3	9
0		16	3	0
1		17	3	1
4		18	3	4
'		19	2	7
5		20	3	5
7		21	3	7
=		22	3	13
2		23	3	2
/		24	2	15
6		25	3	6
+		26	2	11

NOTE: Signal No. 32 of Alphabet No. 2 has been omitted because it is not used.

PART II - CHARACTERS OF ALPHABET No. 5, NOT CONTAINED
IN THE FIRST PART OF THE TABLE, USED FOR METEOROLOGICAL TRANSMISSIONS

Symbols	Code of alphabet No. 5	
	Column	Line
NUL	0	0
SOH	0	1
STX	0	2
ETX	0	3
EOT	0	4
ACK	0	6
DLE	1	0
DC1	1	1
DC2	1	2
NAK	1	5
SYN	1	6
ETB	1	7
ESC	1	11
FS	1	12
GS	1	13
RS	1	14
DEL	7	15

*

* *

TABLE G

METEOROLOGICAL MESSAGE FORMAT FOR TRANSMISSION OF ALPHA-NUMERIC DATA

I. Surface observations (SYNOP)

1. Use of International Telegraph Alphabet No. 2

Starting line		<< ≡ ↓ ZCZC → ↑095 → 15101 → → → → →
Abbreviated heading		<< ≡ ↓ SMCN ↑ 1 → ↓ KWBC — N → ↑ 121200
Text		<< ≡ ↑ 72810 → . . . . → . . . . → . . . . → . . . . → . . . . =
		<< ≡ ↑ 72836 → . . . . → . . . . → . . . . → . . . . → . . . . =
	1)	<< ≡ ↑ 72890 → ↓ MIS ↑ =
	2)	<< ≡ ↑ 72895 → ↓ NIL ↑ =
Signals for end of transmission		↓ << ≡ ≡ ≡ ≡ ≡ ≡ ≡ ≡ NNNN ↓↓↓↓↓↓↓↓↓↓↓↓

(1) there is no observation at 1200 GMT for this station

(2) the observation for this station is not available and will normally be transmitted later

The groups in brackets are optional.

Legend:

< Carriage return (Signal No.27)

≡ Line feed (Signal No.28)

→ Space (Signal No.31)

↓ Letter shift (Signal No. 29)

↑ Figure shift (Signal No. 30)

= Signal 22 (figure case position) of the International Telegraph Alphabet No. 2

2. <u>Use of International Alphabet No. 5</u>

Starting line		[SOH]	[CR]	[CR]	[LF]	095	[SP]	15101								
Abbreviated heading		[CR]	[CR]	[LF]	SMCN 1	[SP]	KWBC	[SP]	N	[SP]	121200					
Text		[CR]	[CR]	[LF]	72810	[SP]	.....	[SP]	.....	[SP]	.....	[SP]	.....	[SP]	.....	=
		[CR]	[CR]	[LF]	72836	[SP]	.....	[SP]	.....	[SP]	.....	[SP]	.....	[SP]	.....	=
	1)	[CR]	[CR]	[LF]	72890	[SP]	MIS	=								
	2)	[CR]	[CR]	[LF]	72895	[SP]	NIL	=								
Signals for end of transmission		[CR]	[CR]	[LF]	[ETX]											

<u>Legend</u>:

[SOH] Commencement of heading (Signal 0/1)

[CR] Carriage return (Signal 0/13)

[LF] Line feed (Signal 0/10)

[SP] Space (Signal 2/0)

Legend: (contd.)	E T X	End of text (Signal 0/3)
	=	Separator (Signal 3/13)

II. Upper-air observations (TEMP)

1. Use of International Telegraph Alphabet No. 2

Starting line	≪ ≡ ↓ ZCZC → ↑ 132 → 38543 → → → → →
Abbreviated heading	≪ ≡ ↓ UMFR → LFPW → ↑ 011200
Part A	≪ ≡ ↓ TT → ↑ 51111 → 07145 → 99... → ..... → .....
	≪ ≡ ↑ 85... → ...etc → 88... → ..... → .....
	≪ ≡ ↑ 77... – ..... → .....=≪≪≪≪
Part B	≪ ≡ ↓ VV → ↑ 5111/ → 07145 → 00... → ..... → 11...
	≪ ≡ ↑ ..... → 22... → ...etc → 21212 → 00...
	≪ ≡ ↑ ..... → 11... → ...etc → 31313 → 25... → .....
	≪ ≡ ↑ ..... → 41414 → .....(→ 51515 → .....
	≪ ≡ ↑ ...etc)* =
Signals for end of transmission	↓≪ ≡≡≡≡≡≡≡≡ NNNN ↓↓↓↓↓↓↓↓↓↓↓↓

*Regional practices

2. Use of International Alphabet No. 5

Starting line	$\boxed{SOH}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ 132 $\boxed{SP}$ 38543
Abbreviated heading	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ UMFR $\boxed{SP}$ LFPW $\boxed{SP}$ 011200
PART A	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ TT $\boxed{SP}$ 51111 $\boxed{SP}$ 07145 $\boxed{SP}$ 99... $\boxed{SP}$ ..... $\boxed{SP}$ .....
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ 85... $\boxed{SP}$ ...etc $\boxed{SP}$ 88... $\boxed{SP}$ ..... $\boxed{SP}$ .....
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ 77... $\boxed{SP}$ ..... $\boxed{SP}$ .....= $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$ $\boxed{CR}$
PART B	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ VV $\boxed{SP}$ 5111/ $\boxed{SP}$ 07145 $\boxed{SP}$ 00... $\boxed{SP}$ ..... $\boxed{SP}$ 11...
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ ..... $\boxed{SP}$ 22... $\boxed{SP}$ ...etc $\boxed{SP}$ 21212 $\boxed{SP}$ 00...
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ ..... $\boxed{SP}$ 11... $\boxed{SP}$ ...etc $\boxed{SP}$ 31313 $\boxed{SP}$ 25... $\boxed{SP}$ .....
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ ..... $\boxed{SP}$ 41414 $\boxed{SP}$ .....($\boxed{SP}$ 51515 $\boxed{SP}$ .....
	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ ...etc)* =
Signals for end of transmission	$\boxed{CR}$ $\boxed{CR}$ $\boxed{LF}$ $\boxed{ETX}$

*Regional practices

TABLE H

SPECIFICATIONS OF THE CLLLL GROUP FOR CLASSIFICATION AND IDENTIFICATION OF BULLETINS

1. The following specifications shall be used for the establishment of the CLLLL group in the starting line of the message format to classify and identify the bulletins which are being exchanged on global basis or otherwise.

2. CLLLL numbers shall be determined as shown below.

(i) C indicates the main type of information as follows:

C=0	Addressed messages
C=1	Surface data for global exchange
C=2	Surface data for other exchange
C=3	Upper-air data
C=4	Analyses
C=5	Forecasts
C=6	Warnings
C=7	Satellite data
C=8	Grid point values messages
C=9	Pictorial information.

(ii) LLLL identifier numbers shall be composed as follows:

L_1L_2 indicating the bulletin originating centre, the allocation of the L_1L_2 shall be in accordance with the table given below:

Region I	:	from 01 to 19
Region II	:	from 20 to 39
Region III	:	from 40 to 49
Region IV	:	from 50 to 69
Region V	:	from 70 to 79
Region VI	:	from 80 to 98
Antarctic	:	99

The details of the assignment of these numbers within the Region should be worked out by the Secretary-General in such a way that appropriate numbers be allocated to all centres compiling bulletins.

(iii) L_3 combined with C shall identify the types of data contained in the bulletins (see attachment). The president of CSM, in consultation with the Secretary-General, is authorized to allocate the free blocks (CL_3) for future use in terms of information not yet provided for in the attachment.

(iv) L_4 is used in combination with L_1L_2 to identify individual bulletins and define the different bulletins. Details of the use of L_4 for each zone of responsibility of an RTH should be worked out by the RTH concerned, and the Secretary-General informed accordingly.

* Report of monthly means for an ocean area.

Attachment

CL_3

Main Classification of Data	DETAIL OF CLASSIFICATION OF BULLETIN CONTENT										
	$C \backslash L_3$	0	1	2	3	4	5	6	7	8	9
Addressed messages	0										
Surface data for global exchange	1	SM								CO*	CS/CH
Surface data for other exchange	2	SM	SI	SN	SA	SP	SD			CO*	CS/CH
Upper-air data	3	US	UK	UL	UE	UM	UF	UP/UG/UI	UH/UQ/UY	UT/UR/UA/ UN/UD/UO UX	CE/CU
Analyses	4	AS	AU	AH	AN	Other Analyses					
Forecasts	5	FS	FU	FT/FC	FP/FI/FA/ FH/FR/FZ	Other Forecasts					
Warnings	6	WH	WS	WT	WO						
Satellite data	7										
Grid point values messages	8										
Pictorial information	9										

A N N E X XXVII

Annex to Recommendation 35 (CSM-V)

ERROR-CONTROL PROCEDURES IN RESPECT OF DATA TRANSMISSIONS

1. The error-control systems used in respect of data transmissions should be such as to ensure a residual bit error rate not exceeding 10^{-7}.

Note : The expression "error control" relates only to errors produced by channel transmission deficiencies.

2. The error-control procedures shall be either those stated in paragraph 4 below or those stated in paragraph 5 below. The procedures stated in paragraph 4 are based on a software system which implies the use of telecommunication computers. The procedures stated in paragraph 5 are based on a hardware system.

3. The error-control procedures adopted for a particular segment shall be as agreed between the related RTHs or the related RTH/WMC as the case may be.

4. SOFTWARE SYSTEM

Note : As CCITT and ISO have not yet adopted standardized procedures in respect of a software system of error control, the following procedures have been accepted by WMO in respect of the Main Trunk Circuit as an interim measure.

4.1 Definitions

4.1.1 Start of transmission block

A start of transmission block is a block containing an inquiry message. The purpose of this block is to establish data transmission.

4.1.2 Data transmission block

A fixed length sequence of characters which is a subdivision of meteorological messages formed for the purpose of meeting transmission requirements.

4.1.3 Termination of data transmission block

A termination of data transmission block is a block, the purpose of which is to terminate synchronous data transmission and to set the line in a well-known condition.

4. 2 Backward supervisory channel

Transmission on the 75-baud backward error-control channel shall be in asynchronous mode. Each character shall comprise 10 unit elements in International Alphabet No. 5 including a "start" and a "stop" element. The duration of each "start" and "stop"element shall be one unit interval of the modulation.

4.3 Organization into blocks

4.3.1 The information to be transmitted shall be divided into data transmission blocks.

```
                                          S
4.3.2  Each block shall start with T as a unique start of block character.
                                          X

                                          S
4.3.3  The start of block character T shall be followed by n where n is the number
                                          X
```

of the block in a cyclic sequence 0 to 9. Each block shall be sequentially numbered in accordance with the sequence of transmission.

```
                                            E           B
4.3.4  Each block shall be terminated by T followed by C.
                                            B           C
```

4.3.5 The "start of transmission block" shall be:

```
      S        E  B
      T  n ? ?  T  C          ? = signal 3/15
      X        B  C
```

where n = 0

4.3.6 A "data transmission block" shall be of a fixed total length of 192 characters.

4.3.7 The "termination of data transmission block" shall be of a fixed length of 34 characters as follows:

```
  S   S                                      E B
                                           F
  T n 0 1616  ---------------------  1616    T C
                                           S
  X   H                                      B C
  <-------------- 34 characters -------------->
```

4.4 Parity

4.4.1 Character parity shall be in odd parity sense for operation in synchronous mode and even parity sense for operation in asynchronous mode.

4.4.2 The block check character shall be derived with even parity sense.

```
                                                                   S
Note:  The derivation of the block check character does not include T character.
                                                                   X
```

4.5 Start of data transmission procedures

```
4.5.1  Bit - synchronization shall be established by the modems.  A transmission
                                                         S
of information shall start with not less than three Y characters in order to
achieve character-synchronization.                       N
                                                 S
4.5.2  Immediately following the initial Y characters the "start of transmission
                                                 N          S
block" shall be transmitted, followed by a stream of Y characters.
                                                            N
```

The transmitter shall wait for a positive acknowledgement on the backward supervisory channel.

4.5.3 If there is a negative acknowledgement or no response within four seconds,
S
the transmitter shall retransmit the same "start" followed by a further stream Y
N
characters and again wait for positive acknowledgement. This procedure is to be repeated until a positive acknowledgement is received. If there is a negative acknowledgement after the block has been sent three times the operator shall be informed (see paragraph 7 below).

4.5.4 On receipt of the first positive acknowledgement of the "start of transmission block", the transmitter shall commence sending "data transmission blocks".

4.6 Data transmission procedures

4.6.1 The first "data transmission block" following a "start of transmission block" starts:

```
S   S
T n O . . . .
X   H
```

Where n = 1

4.6.2 Messages are divided into blocks for transmission purposes. The relationship of blocks to messages may be one of the following alternatives:

(a) Message - independent blocking
(b) Message - associated blocking

4.6.2.1 "Message - independent blocking" implies that messages in store waiting for transmission shall be transmitted in a continuous sense, the data stream being broken by the prescribed control characters at the start and end of each "data transmission block". When a message ends partly through a "data transmission block" and another
N
message is not on hand for transmission, the block shall be filled with U characters.
L

Example:

```
S                            N N                 N E B
T  n  ----  data  ----  G/S  U U  ---------      U T C
X                            L L                 L B C
<--------------- 192 characters --------------->
```

Note: The G/S character is substituted for the E/T/X character in a message as long as the information is under this system of error control.

4.6.2.2 "Message - associated blocking" implies that messages are blocked in the following manner:

(a) The first "data transmission block" of a message shall contain the SOH as the first character following the block control character;

(b) The last "data transmission block" of a message, i.e. the block which contains the end of a message, shall be filled with NUL characters in the same manner explained in 4.6.2.1.

Note: The GS character is substituted for the ETX character in a message as long as the information is under this system of error control.

4.6.3 When required for the operation of the data link on a segment a number of SYN characters may be inserted between "data transmission blocks".

4.7 <u>Termination of data procedures</u>

4.7.1 After the last block containing the end of a message and when there is no other message in store waiting for transmission the transmitter shall send a "termination of data transmission block". The transmission of the "termination of data transmission block" may be held up to, but not more than, four seconds after the time of transmission of the last data transmission block. Any holding period shall be filled with SYN characters.

4.7.2 After the "termination of data transmission block" has been transmitted, the transmitter shall wait for positive acknowledgement of that block and while waiting for acknowledgement shall maintain character-synchronism by transmitting a stream of SYN characters. After receipt of a positive acknowledgement for the "termination of data transmission block", there is no need to maintain character-synchronism. (See also paragraph 4.10).

4.7.3 If the transmitter receives a negative acknowledgement or no response within four seconds of sending the "termination of data transmission block", the transmitter shall retransmit the same "termination of data transmission block" followed by a further stream of SYN characters and again wait for positive acknowledgement. The procedure is to be repeated, if necessary, up to two times until a positive acknowledgement is received. If there is no positive acknowledgement after the third sending of the block, the operator shall be informed.

4.8 Acknowledgement procedures

4.8.1 The receiver shall check each block received over the forward transmission channel for parity in respect of check parity bits of each character in the block and in respect of each bit of the block check character. It shall also check that the block is next in the cyclic sequence 0 to 9. If there is agreement on all these accounts, the receiver shall send a positive acknowledgement as follows:

A
C n Where n = number of the block receipt which is being acknowledged
K

The acknowledgement shall be sent on the backward supervisory channel.

Note: The time for parity checking shall be such that the time from receipt of a block to the time of sending the acknowledgement shall be less than the transmission time of the block.

4.8.2 The transmitter on receipt of a positive acknowledgement shall check the block number in the acknowledgement against the block number of the previous positively acknowledged block to see whether it is next in the cycle sequence 0 to 9. If the sequence is correct, the block for which the check has been applied shall be considered as having been transmitted correctly. If the sequence is incorrect, the acknowledgement should be regarded as negative and the appropriate recovery procedure shall be brought into operation.

4.8.3 If on receipt of a block over the forward data channel, parity checks by the receiver do not give agreement on all the parity check accounts, then the receiver shall send a negative acknowledgement on the backward error-control channel as follows:

N
A n Where n = number of the block receipt which is being negatively
K acknowledged

On receipt of a negative acknowledgement, the transmitter shall bring the appropriate recovery procedure into operation.

4.8.4 If on receipt of a block over the forward channel the block number is not that which is expected next in the transmission sequence, the receiver shall respond as follows:-

(a) Where block number n is expected and block number n - 1, n - 2, n - 3 or n - 4 is received, the receiver shall send a positive acknowledgement for the block received. This situation will normally occur when there has been an error in transmission over the backward channel;

(b) Where block number n is expected and a block number other than n, n - 1, n - 2, n - 3 or n - 4 is received the receiver shall send a negative acknowledgement for the expected block. This situation will normally occur when a block (or blocks) has been omitted from the transmission.

4.8.5 Acknowledgement shall not be recognized by the transmitter as positive acknowledgement unless it is compiled as:

A
C n
K

Variations from the above shall, in all cases, be treated as negative acknowledgements; this includes missing responses on the backward channel.

Note: "n" is the block number as defined in paragraph 4.8.2.

4.9 Recovery procedures with reference to the transmission of data blocks

4.9.1 On receipt of a negative acknowledgement, the transmitter, on completion of the current block being transmitted on the forward channel, shall send not less than three SYN characters followed by the first block for which it is currently awaiting a positive acknowledgement (see block i). It shall follow this block with block i + 1, i + 2, irrespective of whether these blocks have been transmitted previously. During a retransmission, the transmitter shall ignore any acknowledgement on the backward supervisory channel which does not relate to the first block of the retransmission (see block i). If a positive acknowledgement for the first block of the retransmission is not received within four seconds from the start of the retransmission, the retransmission procedure shall be gone through a second time. After three consecutive unsuccessful retransmissions, the operator shall be informed and carrier frequency maintained on the line. To re-establish data transmission a start of data transmission procedure shall be initiated. Transmission shall be resumed from the beginning of the incomplete message.

4.9.2 No response on the backward error-control channel

If at any time during transmission of data (excepting the re-transmission procedures referred to in paragraph 4.9.1 and start of data transmission procedures referred to in paragraph 4.5 and termination of data procedures referred to in paragraph 4.7) the transmitter receives neither positive nor negative acknowledgement on the backward supervisory channel over a period of four seconds, the operator shall be informed.

4.10 At all times when the circuit is in the data mode and no characters are being transmitted, the MODEM carrier frequency will be maintained on the circuit.

5. HARDWARE SYSTEM

5.1 The hardware system and the associated error-control procedures, encoding (decoding) methods, the structure of the data transmission block and the phasing processes for initial and repeat transmissions shall conform to CCITT Recommendation V.41.

5.2 The data transmission block shall contain 260 bits: 240 information bits, 4 service bits and 16 error-detection (or check) bits. For checking the transmission of data, the "end of data transmission" block is used, consisting of 240 bits of "SYN" characters, 4 service bits and 16 check bits. Service combinations of 4 bits shall conform to CCITT Recommendation V.41. As an additional service combination not specified in Recommendation V.41, the combination "1000" - "end of transmission" - shall be used.

5.3 "SYN" blocks shall contain 80 bits and consist of a synchronizing sequence prefix, a synchronizing filler of 60 bits and a synchronizing pattern conforming to Recommendation V.41.

5.4 The input and output of information in the error-control equipment (UZO) is made by means of a parallel 8-unit code in International Telegraph Alphabet No. 5 (with the parity indicator as an additional element). If the information signal is not received at the receiving terminals of the error-control equipment (if there is no "ready for receiving" signal), a "SYN" character is written on the output register in International Telegraph Alphabet No. 5, together with the parity indicator - the combination 01101001. This combination is decoded at the receiving station and is not sent to the data terminal equipment. For example, after the input of all information prepared on the perforated tape into the error-control equipment, the operator may stop sending. Since the interruption of transmission may occur at any moment, the above-mentioned "SYN" character is used to fill up the block to 240 bits.

5.5 In order to ensure that the transmission of data is not ended until all the information received by the error-control equipment of the transmitting station has been transmitted to the receiving station, the "end of data transmission" block is used, being transmitted after the last data block. The receiving station stops working once it has received the "end of data transmission" block with the "end of transmission" prefix and once it has acknowledged its receipt on the backward error-control channel.

5.6 If the data transmission channel is interrupted for a period of about 10 seconds, the data transmission mode can be switched off.

5.7 When the same information is repeated four times over, the equipment switches over to the repeat phasing mode.

6. COMPATIBILITY PROCEDURES

6.1.1 Definition

A "pivot" centre is a computerized centre located between a centre with which it must work on a software control basis and a centre with which it must work on a hardware control basis.

6.1.2 A "pivot" centre shall extract the messages reaching it from the software centre, and compose blocks for transmission to the hardware centre in accordance with the agreed WMO procedures. Conversely, it shall extract the messages it receives from the hardware centre and compose blocks for transmission to the software centre on the basis of the procedures stated in paragraph 4 above.

7. OPERATOR ACTION

The procedures to be followed by the operator when informed of an anomalous situation shall be the subject of bi- or multilateral agreement between adjacent RTHs.

A N N E X XXVIII

Annex to Recommendation 36 (CSM-V)

TRANSMISSION AND RELAY OF PICTORIAL INFORMATION OVER CIRCUITS OPERATED ON A SHARED DATA/FACSIMILE (ANALOGUE) TRANSMISSION BASIS

A - SOFTWARE PROCEDURES

1. Telecommunication centres operating with other centres on a shared data/facsimile (analogue) basis should be engineered as described below in order to accomplish adequately:

(a) Store and forward operations in facsimile (analogue) relay transmissions;

(b) Identification and switching for:

(i) Data to facsimile (analogue) operations;
(ii) Facsimile (analogue) to data operations.

2. STORE AND FORWARD OF FACSIMILE TRANSMISSIONS

2.1 Facsimile transmissions made in analogue form, and which have to be relayed involving a store and forward system, should normally employ high-quality magnetic tape recorders for the purpose. It is essential that the picture quality is maintained throughout the storage and retransmission process; the maintenance of synchronism as specified in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V, paragraph 3.8 must be ensured.

2.2 The store and forward process at a relay centre should be accomplished with a minimum loss of time; if practicable, retransmission should commence before a full frame has been received. All elements of the start and stop signals shall be retained throughout the relay process.

2.3 Centres not equipped for such simultaneous reception and relay should provide adequate magnetic tape storage to accommodate the facsimile (analogue) relay transmissions. The storage should be at least sufficient for one complete frame.

2.4 The use of chart recorders as receiving and transmitting facilities in store and forward mode operation using paper as the recording and storage medium, should be employed only as emergency back-up facilities.

3. IDENTIFICATION AND SWITCHING ARRANGEMENTS AND PROCEDURES ASSOCIATED WITH SOFTWARE ERROR-CONTROL SYSTEMS

3.1 Where it is necessary to operate a circuit between two telecommunication centres on a shared data/facsimile (analogue) transmission basis and where the data transmissions are automated and subject to error control (software system), the following procedures for identification and switching of documents to be transmitted shall be followed.

3.2 A "data to facsimile switching message" is required from the transmitter in order to alert the receiver that a change from data transmission to facsimile (analogue) transmission is proposed. The format of the message shall be:

```
D  S
L  O  C  C  L        S
E  H  R  R  F  nnn   P  CFFFF

C  C  L        S      S        F
R  R  F  CCCC  P  DD  P  YYGG  S
```

where C - classification, indicating that facsimile transmission follows

FFFF - chart identifier

DD - duration of facsimile transmission in minutes.

Note: For details see table "Specifications of CFFFF".

3.3 To conform with the error-control (software) procedures, the "data to facsimile switching block" shall be the "data to facsimile switching message" preceded

```
   S                    E  B
by T n  and terminated by  T  C
   X                    B  C
```

Example:

```
S     D  S                        E  B
T  n  L  O  ------------------  F  T  C
X     E  H                      S  B  C
<----------- 34 characters ---------->
```

3.4 Data to facsimile switching procedure

Note: The following procedures are applicable for both human facsimile operators or when automatic equipment is used. For convenience reference is only made to "the facsimile operator" to cover both cases.

3.4.1 To initiate a facsimile transmission, the facsimile operator at the transmitting centre is required to send an appropriate request signal to the Automatic Data Switching Equipment (ADSE).

Note: Together with this request, the "data to facsimile switching message" could also be automatically passed to the ADSE.

3.4.2 If on receipt of the request for facsimile transmission, a data transmission is in progress, the ADSE shall hold the request until the conditions for "termination of data procedures" are satisfied. In this case the "data to facsimile switching message" shall be substituted for the "termination of data transmission block".

Note: Data transmission have priority over facsimile transmissions and facsimile transmissions shall not be attempted during a data transmission.

3.4.3 The "data to facsimile switching block" shall be transmitted immediately following the last "data transmission block" and error-control procedures for positive acknowledgement and continuity of communication shall be as for the "termination of data block".

3.4.4 If on receipt of the request for facsimile transmission, data transmission is not occurring, the ADSE shall initiate a "start of data transmission" procedure followed by transmission of the "data to facsimile switching block". Error-control procedures for positive acknowledgement of the "data to facsimile switching block" and for continuity of line communication shall be as for the "termination of data block".

3.4.5 When the receiver has positively acknowledged the "data to facsimile switching block" and it is evident that the transmitter has successfully received the positive acknowledgement (4 sec), the receiver ADSE shall send an appropriate signal to the facsimile operator at the receiving centre indicating that a facsimile transmission has been offered.

Note: The "data to facsimile switching message" could with advantage be printed out for the facsimile operator.

3.4.6 When the facsimile operator at the receiving centre is ready to receive the facsimile transmission, he shall inform (by appropriate signal) the ADSE at the receiving centre which shall then switch the line to the facsimile receive system. At the same time the receiver shall commence continuous transmission of the character DC1 on the backward supervisory channel.

Note: Transmission of DC1 characters should continue long enough to ensure proper recognition by the recipient.

3.4.7 The transmitter, on recognition of three consecutive DC1 characters on the backward supervisory channel, shall switch the line to the facsimile transmit system and inform by appropriate signal the facsimile operator at the transmitting centre that the line is available for facsimile transmission. The facsimile operator shall then start the facsimile transmission.

3.4.8 If the receiving centre does not wish to receive the facsimile transmission it shall commence continuous transmission of the signal DC2 on the backward supervisory channel. The transmitter on recognition of three consecutive DC2 characters shall initiate the "start of transmission procedures".

3.4.9 If the transmitting centre, after receipt of the acknowledgement of the "data to facsimile switching message" does not receive within 60 seconds of the time of receipt of that acknowledgement, DC1 signals indicating acceptance or DC2 signals indicating refusal of the offered facsimile transmission, it shall initiate the "start of data transmission procedures".

Note: The receiving centre should implement a time-out which must be shorter than 60 seconds (for example 55 seconds), so that in the event of the facsimile operator at a centre utilizing manual operation has not indicated within the time limit ability to receive a transmission, the ADSE may automatically begin transmission of DC2 signals.

3.5 Facsimile to data switching procedures

3.5.1 On completion of a facsimile transmission (including all the stop signals) or when the receiver wishes to terminate the facsimile transmission for any reason, the line shall be switched to the data transmission system. The receiver shall inform the transmitter that the receiving end has been switched by transmitting DC2 characters continuously on the backward supervisory channel.

Notes : 1. If the transmitter wishes to terminate prematurely a facsimile transmission the transmitter should send the proper stop signals and normal facsimile to data switching procedures should then follow;

2. Transmission of DC2 characters should continue long enough to ensure proper recognition by the recipient.

3.5.2 On recognition of three consecutive DC2 characters, the transmitter shall initiate "start of data transmission" procedures.

3.5.3 After the end of a facsimile frame the line is switched back to data regardless of other facsimile frames waiting in the queue. Before the next following facsimile frame can be started, data transmission shall take place. The content of data transmission could be the transmission of scheduled data and the announcement of the following facsimile frame or an announcement only. If there is no transmission to follow, this data transmission shall be terminated by the "termination of data transmission block".

*

* *

B - HARDWARE PROCEDURES

1. General

1.1 To ensure the effective utilization of telephone-type channels (300-3400 Hz), one should consider the application of modems with time sharing of both directions of a 4-wire channel comprising the following three sub-channels:

(a) The basic channel for the transmission of data or facsimile, transmitting on the 700-2700 Hz band;

(b) The backward error-control channel, transmitting on the 390-450 Hz band; and

(c) A supplementary low-speed (telegraph) channel for the transmission of data on the 3000-3400 Hz band.

1.2 For such a system of time sharing of a 4-wire telephone-type channel, two working modes could be applied in either direction:

(i) Mode 1 - data transmission on the "basic channel" (a) at a rate of 1200 baud, using a 75-baud "backward error-control channel" (b) and data transmission at a rate of 50-100 baud on the supplementary telegraphic channel (c).

(ii) Mode 2 - facsimile transmission up to 120 rpm on the "basic channel" (a) and data transmission at a rate of 50-100 baud on the supplementary telegraphic channel (c).

1.3 In addition, a mode 3 could be employed : facsimile transmission or telephone communications using the entire 300-3400 Hz band in both directions.

2. DATA TO FACSIMILE SWITCHING MESSAGE INCLUDING DOCUMENT IDENTIFICATION

2.1 Prior to switching from data to facsimile, the message "switching from data to facsimile" shall be sent. The format of the message shall be as follows:

S O H	C R	C R	L F	nnn	S P	CFFFF

C R	C R	L F	CCCC	S P	DD	S P	YYGG	D L E	E O T

Where in the group CFFFF, C indicates facsimile transmission to follow and FFFF gives identification of the pictorial information.

Note: For details see table "Specifications of CFFFF".

2.2 After the message "switching from data to facsimile" has been received, the swsitching procedures shall be carried out.

3. IDENTIFICATION AND MODE SWITCHING PROCEDURE

3.1 The diagram shows the basic equipment of the telecommunication centre, the circuits of the communication channel and its branches (thick lines) and also the mode switching control circuits.

3.2 The error-control equipment (ECE) and the data-processing equipment (DPE) should conform to the standardized interface between an ECE and a DPE in accordance with CCITT Recommendations V.24 and V.41.

3.3 Switching from Mode 1 (data transmission) to Mode 2 (facsimile)

3.3.1 For switching the outgoing channel from Mode 1 to Mode 2, the operator of the transmitting station sends the "switching signal" to the AMSE (automatic mode switching equipment). On receiving this signal, the AMSE waits for the end of transmission of the message (the sending of the character STX) and, after the end of message character (STX) has been transmitted in the channel, it sends the switching signal to the ECE. The ECE transmits the data blocks received from the DPE and then sends the "end of data transmission block" ("EDTB") over the basic data transmission channel to the ECE of the receiving station. On receiving acknowledgement of the "EDTB" over the backward error-control channel, the ECE of the transmitting station sends the "readiness for switching" signal to the AMSE. The AMSE then sends the switching signal to the ECE and thence to the modem. On receiving this signal, Switch 2 in the modem connects the channel (in the given direction) to the facsimile transmitter. When the modulator in the modem is disconnected from the communication channel, a "Mode 2 ready" signal is sent to the ECE and is thence passed on to the DPE. On receiving this signal, the AMSE gives the operator the "Mode 2 indication signal" and the operator can begin facsimile transmission.

3.3.2 The receiving station is switched in automatically. On receiving the "EDTB", the ECE of the receiving station sends an acknowledgement to the transmitting station over the backward error-control channel and sends the switching signal from the DPE to the ECE. The ECE passes this signal on to the modem in which Switch 3 switches the communication channel from the demodulator to the facsimile receiver. Thereupon, a "readiness for switching" signal is sent to the ECE which passes it on to the DPE, and the AMSE gives the operator of the receiving station the "Mode 2 indication signal".

3.3.3 By means of Switches 5 and 4, the operators of both stations can connect the appropriate microphone and telephone for service conversations to the communication channel.

3.3.4 A special service message may be used for organizing facsimile transmissions between a number of centres with automatic switching from data transmission to facsimile transmission. Such a message should have a standard format, accepted in the WMO, and should end with the characters DLE and EOT which, according to the ISO recommendation, indicate the end of data transmission and the breaking of the connexion.

3.3.5 When such a service message is transmitted, the AMSE disconnects the ECE transmitter from the communication channel in the manner described above. On receiving service messages indicating a switch from Mode 1 to Mode 2, the AMSE of the receiving station waits for the switching signals from the transmitting station, in accordance with the procedure set forth above. In this way, after receipt of the mode-switching service message, a signal is transmitted to each of the telecommunication centres indicating the switching to Mode 2 of one incoming channel and one or more outgoing channels.

3.4 Switching from Mode 2 to Mode 1

3.4.1 The switching to Mode 1 of all the directions of a duplex communication channel is also carried out on signals from the transmitting ends of opposite stations. The operator of the transmitting station sends the "switch to Mode 1" signal to the AMSE. The AMSE sends the signal to ECE, which passes it on to the modem. The modem disconnects the channel from the facsimile transmitter, connects the 1200-baud data transmitting modulator to the channel, signalling the fact to the ECE and thence to the DPE, and sends over the channel the tonal calling signal (2900 Hz). When the tonal calling signal is received at the receiving station, the modem switches the channel to the 1200-baud data transmitting demodulator, signalling the fact to the ECE and thence to the DPE. After this, there follows the procedure for establishing communication for the transmission of data in accordance with CCITT Recommendations V.24 and V.41.

3.5 Switching from Mode 1 to Mode 3

3.5.1 Switching to Mode 3 may be carried out by either station or by both stations simultaneously if the communication channel is damaged. The operator sends the "switch to Mode 3" signal to the AMSE, which passes it on to the ECE and to modem. The modem stops the transmission of the carrier frequency in the communication channel, and the receiving station, on detecting the outage of the carrier frequency, goes over to Mode 3.

3.6 Switching from Mode 3 to Mode 1

3.6.1 Switching from Mode 3 to Mode 1 is also carried out by sending a tonal calling signal, as described in paragraph 3.4 above.

4. The channel shall be switched back to data transmission after facsimile transmission. Data transmission should start before the possible next facsimile chart transmission. Data transmission may consist of data included into the schedule as well as of messages.for the next chart or of only one message. When no facsimile charts or data are transmitted, blocks consisting of "SYN" characters (260 bits blocks) shall be transmitted on the circuit.

C - COMPATIBILITY PROCEDURES

1. A "pivot" centre, located between a centre with which it must work on a software data/facsimile (analogue) switching basis and a centre with which it must work on a hardware data/facsimile (analogue) switching basis, shall in offering a facsimile (analogue) transmission to either centre use the appropriate data/ facsimile switching procedures.

*

* *

TABLE

SPECIFICATIONS OF CFFFF

C = classification indicating that an analogue facsimile transmission follows (C=9 - see specifications CLLLL)

FFFF = chart identifier, in two parts:

F_1F_2 identifying the originating centre (see below);

F_3F_4 giving the serial number in the series of charts distributed by the centre identified by F_1F_2.

F_1F_2 : Centre identifiers —

00	:	free		
01-09	:	WMCs	: 01) 02) 03)	Melbourne
			04) 05) 06)	Moscow
			07) 08) 09)	Washington
10-19	:	RMCs in Region I	: 10) 11)	Cairo
			12) 13)	Dakar
			14) 15)	Nairobi
			16) 17)	Pretoria
			18) 19)	Tunis/Casablanca

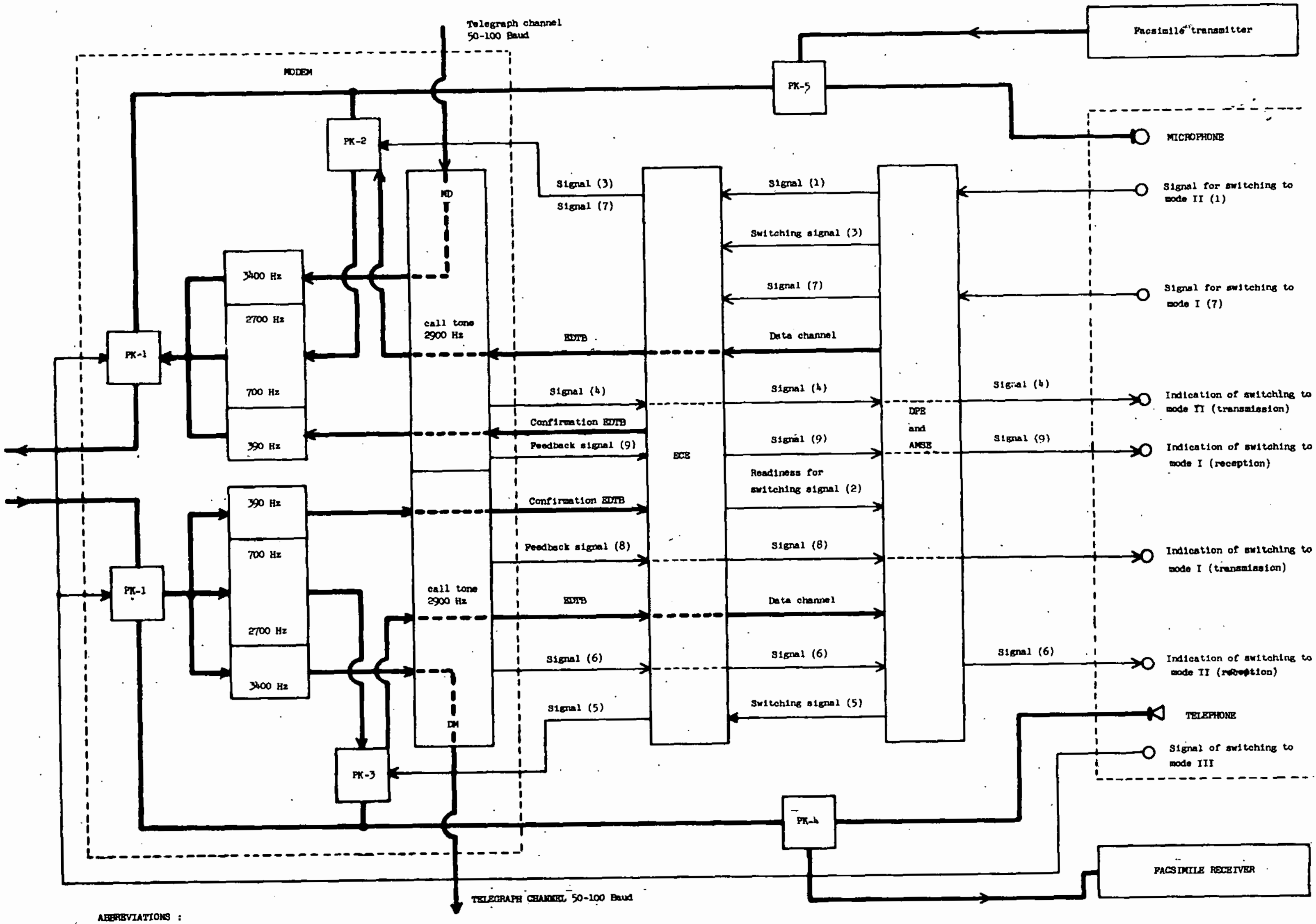
20-29	:	RMCs in Region II	: 20) 21)	Khabarovsk
			22) 23)	New Delhi
			24) 25)	Novosibirsk
			26) 27)	Tashkent
			28) 29)	Tokyo
30-31	:	RMC in Region III	: 30) 31)	Buenos Aires
32-36	:	reserved for other centres in Regions I and II		
37-39	:	reserved for other centres in Region III		
40-43	:	RMCs in Region IV	: 40) 41)	Miami
			42) 43)	Montreal
44-49	:	reserved for other centres in Region IV		
50-55	:	RMCs in Region V	: 50) 51)	Darwin
			52) 53)	Melbourne
			54) 55)	Wellington
56-59	:	reserved for other centres in Region V		
60-69	:	RMCs in Region VI	: 60) 61)	Bracknell
			62) 63)	Moscow
			64) 65)	Offenbach

60-69	:	RMCs in Region VI	:	66) 67) Rome
				68) 69) Stockholm
70	:	NMC Helsinki		
71-76	:	reserved for other centres in Region VI		
77-93	:	AFCs	:	77 Brasilia
				78 Buenos Aires
				79 Anchorage
				80 Canada
				81 Miami
				82 Cairo
				83 New York
				84 San Francisco
				85 Melbourne/Darwin
				86 Washington (Suitland)
				87 Honolulu
				88 Frankfurt/Main
				89 London
				90 Paris
				91 Rome
				92 New Delhi
				93 Tokyo
94-98	:	reserved for other AFCs		
99	:	free		

*

* *

BLOCK DIAGRAM FOR THE PROCEDURE OF SWITCHING THE WORKING REGIMES (I, II, III)



ABBREVIATIONS :

PK-1, 2, 3, 4, 5	– Switches	AMSE	– Automatic mode switching equipment
ECE	– Error control equipment	MD	– Modulator
DPE	– Data-processing equipment	EDTB	– End of data transmission block

Appendix

NOTES IN AMPLIFICATION OF THE SWITCHING OF THE WORKING MODES OF THE COMMUNICATION CHANNELS (HARDWARE SYSTEM)

1. Switching from Mode 1 to Mode 2

At the transmitting site

1.1 The AMSE puts "mode 2" into operation on the DPE.

1.2 The DPE waits for the output signal in the ECE combination "ETX" and switches circuit 105 into the position "OFF".

1.3 The ECE stops the transmission of data and puts the "end of data transmission block" into the communication channel.

1.4 The ECE receives, via the feedback channel, confirmation of the "end of data transmission block" and switches over the circuit "ETX" (end of transmission) in the DPE to the position "ON".

1.5 The DPE switches circuit 108_1 to the ECE transmitter, position "OFF".

1.6 The ECE switches circuit 108_1 to the modem to the position "OFF".

1.7 The modem switches circuit 107 to the ECE to the position "OFF", cuts the modulator of the main channel, connects it to the connecting telegraphic line and, with the help of switch "PK-2", prepares the connexion of the connecting line from the facsimile transmitter or from the microphone.

1.8 The ECE transfers circuit 107 to the DPE to the position "OFF".

1.9 The DPE switches indication circuit "mode 2" (transmission) in the AMSE.

1.10 An indicating light at the AMSE shows "mode 2" (transmission).

1.11 An operator of the AMSE connects, with switch "PK-5", the main channel with the facsimile transmitter or the microphone.

At the receiving site

1.12 The ECE receives the "end of data transmission block", transmits confirmation of the block via the feedback channel and transfers circuit "KP-2" (end of transmission) on to the DPE, into position "ON".

1.13 The DPE connects circuit 108_1^1 with the ECE receiver to the position "OFF".

1.14 The ECE switches circuit 108_1^1 to the modem, position "OFF".

1.15 The modem switches circuit 107^1 to the ECE, position "OFF", cuts the modulator of the feedback channel and, with switch "PK-3", prepares the connexion of the connecting line with the receiving facsimile equipment or telephone.

1.16 The ECE switches circuit 107^1 to the DPE, position "OFF".

1.17 The DPE switches the indication circuit "mode 2" (reception) to the AMSE.

1.18 The AMSE gives the "mode 2 indication signal" (reception).

1.19 The operator at the AMSE connects, with switch "PK-4", the main channel to the receiving facsimile equipment or telephone.

2. Switching from Mode 2 to Mode 1

At the transmitting site

2.1 The AMSE puts "mode 1" into operation on the DPE.

2.2 The DPE switches circuit 108_1 to the ECE transmitter, position "ON".

2.3 The ECE switches circuit 108_1 in the modem to the position "ON".

2.4 The modem connects the modulator of the main channel, switches circuit 107 into the ECE, position "ON", and transmits the tonal calling signal during 2-3 seconds on the communication channel.

2.5 The ECE switches circuit 107 to the DPE, position "ON".

2.6 The DPE switches circuit 105 to the ECE, position "ON".

2.7 The ECE switches circuit 105 into the modem, position "ON".

2.8 The modem switches on the modulator of the main channel.

2.9 After a temporary delay, the signal of the carrier comes from the feedback channel.

2.10 The modem switches circuit 122 to the ECE, position "ON".

2.11 The ECE puts circuit 122 into operation on the DPE and begins the synchronization process.

2.12 After confirmation from the feedback channel, the ECE switches circuit 106 to the DPE, position "ON".

2.13 The DPE switches indication circuit "mode 1" (transmission) to the AMSE.

2.14 The signal light of the AMSE shows "mode 1" (transmission).

At the receiving site

2.15 The modem receives the tonal calling signal and switches circuit 125 to the ECE, position "ON".

2.16 The ECE switches circuit 125 in the DPE to the position "ON".

2.17 The DPE switches circuit 108^1_1 in the ECE to the position "ON".

2.18 The ECE switches circuit 108^1_1 in the modem to the position "ON".

2.19 The modem connects the modulator of the feedback channel to the line and switches circuit 107^1 in the ECE to the position "ON".

2.20 The ECE switches circuit 107^1 in the DPE to the position "ON".

2.21. The modem receives the carrier of the direct channel, switches circuit 109 in the ECE to the position "ON", and puts the modulator of the feedback channel into operation.

2.22 The ECE switches circuit 109 in the DPE to the position "ON".

2.23 The DPE switches indication circuit "mode 1" (reception) to the AMSE.

2.24 The signal light at the AMSE shows "mode 1" (reception).

3. Switching from Mode 1 to Mode 3

At the transmitting site

3.1 The AMSE switches circuit "mode 3" in the DPE.

3.2 The DPE switches circuits 105 and 108_1 in the ECE to the position "OFF" and connects circuit "mode 3" with the modem.

3.3 The ECE switches circuits 105 and 108_1 into the position "ON".

3.4 The modem cuts the modulators of the main, backward and supplementary channels, the switch "PK-1" disconnects the communication channel from filters.

3.5 The modem converts circuits 107 and 107^1 in the ECE to the position "OFF".

3.6 The ECE converts circuits 107 and 107^1 in the DPE to the position "OFF".

3.7 The DPE puts indication circuit "mode 3" into the AMSE.

3.8 The signal light at the AMSE shows "mode 3".

3.9 An operator at the AMSE connects the communication channel with telephone or facsimile equipment with the help of switches "PK-4" and "PK-5".

At the receiving site

3.10 The modem records the outages of the carriers from the main, backward and supplementary channels, switches circuits 109 and 122 into the ECE, position "OFF", and switches on the circuit "failure of the communication channel" in the DPE.

3.11 The ECE switches off circuits 109 and 122 in the DPE.

3.12 The DPE switches off circuits 105 and 108_1^1 in the ECE and switches on circuit "mode 3" in the modem.

3.13 The modem cuts off the modulators of the main, backward and supplementary channels, switch "PK-1" disconnects the communication channel from the filter, circuits 107 and 107^1 in the ECE are transferred into the position "OFF".

3.14 The ECE switches circuits 107 and 107^1 in the DPE to the position "OFF".

3.15 The DPE switches on indication circuit "mode 3" in the AMSE.

3.16 The signal light at the AMSE shows "mode 3".

3.17 An operator at the AMSE connects with the help of switches "PK-4" and PK-5" the communication channel with telephone or facsimile equipment.

4. Switching from Mode 3 to Mode 1

At the transmitting site

4.1 The AMSE connects the circuit "mode 1" in the DPE.

4.2 The DPE switches circuit 108_1 to the ECE.

4.3 The ECE switches on circuit 108_1 in the modem. The modem connects the modulator of the main channel with a line, puts circuit 107 into the ECE and transmits during 2-3 seconds the tonal calling signal into the communication channel.

4.4 The ECE puts circuit 107 into the DPE.

4.5 The DPE puts circuit 105 into the ECE.

4.6 The ECE puts circuit 105 into the modem. The modem switches on the modulator of the main channel.

4.7 After a temporary delay, the signal carrier comes from the feedback channel.

4.8 The modem connects circuit 122 with the ECE.

4.9 The ECE puts circuit 122 into the DPE and makes the synchronization process.

4.10 After the reception of confirmation in the synchronizing block, the ECE puts circuit 106 into the DPE.

4.11 The DPE puts indication circuit "mode 1" (transmission) into the AMSE.

4.12 The signal light at the AMSE shows "mode 1" (transmission).

At the receiving site

4.13 The modem receives the tonal calling signal and puts circuit 125 into the ECE.

4.14 The ECE puts circuit 125 into the DPE.

4.15 The DPE switches circuit 108^1_1 to the ECE.

4.16 The ECE puts circuit 108^1_1 into the modem.

4.17 The modem connects the modulator of the feedback channel with the line and puts circuits 107^1 into the DPE.

4.18 The ECE puts circuit 107^1 into the DPE.

4.19 The modem receives the carrier of the direct channel and puts circuit 109 into the ECE and switches on the modulator of the backward channel.

4.20 The ECE switches on circuit 109 to the DPE.

4.21 The DPE puts indication circuit "mode 1" (reception) into the AMSE.

4.22 The signal light at the AMSE shows "mode 1" (reception).

A N N E X XXIX

Annex to Recommendation 37 (CSM-V)

TECHNICAL CHARACTERISTICS AND SPECIFICATIONS OF METEOROLOGICAL TRANSMISSIONS

1. CIRCUIT CHARACTERISTICS OF THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

1.1 The configuration of the Main Trunk Circuit shall be a segmented closed loop.

1.2 World Meteorological Centres and designated Regional Telecommunication Hubs on the Main Trunk Circuit and its branches shall form the terminal ends of adjoining segments.

1.3 The Main Trunk Circuit shall consist of four-wire telephone-type circuits or where necessary HF radio channels with a nominal band-width of 3 kHz. The circuits shall be operated on a full duplex basis.

1.4 Four-wire telephone-type circuits shall conform to CCITT Recommendation M.102. They should be routed over land-line systems or facilities with similar transmission characteristics.

1.5 In both directions of a full duplex four-wire telephone-type circuit a low speed backward supervisory channel should be provided for error control. It should be placed in the lower part of the frequency passband.

1.6 In both directions of a full duplex four-wire telephone-type circuit a second low-speed channel should be provided, if feasible. It should be placed in the upper part of the passband.

1.7 Where a segment of the Main Trunk Circuit or its branches is of necessity a HF radio circuit, separate 3 kHz channels for data and facsimile transmissions shall be provided.

1.8 The HF radio circuit shall be provided by the use of radio transmitters and receivers which operate in the ISB mode in accordance with the relevant CCIR recommendations.

1.9 The radio circuit shall be provided with at least two 3 kHz channels. Where required and technically practicable up to four 3 kHz channels may be used on HF radio circuits in accordance with CCIR recommendations.

1.10 The number of 3 kHz channels required in the radio circuit in order to transmit meteorological information in accordance with the required transit times and relevant times of transmission to meet agreed WMO requirements, shall be decided bilaterally by the related RTHs or related RTH and WMC.

2. CHARACTERISTICS OF TRANSMISSIONS OVER THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

2.1 The Main Trunk Circuit shall operate in a segmented "store and forward" mode. It shall operate continously 24 hours per day.

2.2 <u>Transmissions over four-wire telephone-type circuits</u>

2.2.1 When a four-wire telephone-type circuit is utilized for data transmission:

(i) A data signalling rate of 1200 bits/sec or 2400 bits/sec shall be used as agreed by the related RTHs or the related RTH and WMCs as the case may be;

(ii) The synchronous mode shall be used on the forward data transmission channel;

(iii) International Alphabet No. 5 shall be used;

(iv) Error detection and correction procedures shall be used;

(v) The backward supervisory channel shall be used exclusively for error control. The modulation rate shall be 75 baud, and the mode of operation asynchronous;

(vi) For data transmission at a data signalling rate of 1200 bits/sec, for the forward data transmission channel, and having provision of a backward channel for error control purposes, the characteristics of the modem shall be those specified in CCITT Recommendation V.23;

(vii) For data transmission at a data signalling rate of 2400 bits/sec using four-wire leased point-to-point circuits conforming to CCITT Recommendation M.102 and using a backward channel for error control purposes, the characteristics of the modem shall be those specified in CCITT Recommendation V.26 Alternative A;

(viii) The signals of the telegraph code using combinations of the International Alphabet No. 5 for data and message transmissions shall include an additional unit which may indicate "parity" and the rank of this unit and hence the chronological order of the transmissions in serial working shall be the eighth of the combinations thus completed;

(ix) Where a second low speed channel is provided on a segment, the Alphabet and modulation rate utilized shall be agreed between the related RTHs or related RTHs and WMCs taking account of the data signalling rate on the forward data channel. The frequency characteristics shall be in accordance with the relevant CCITT recommendations.

The centre frequency shall be chosen from the CCITT specification for division of a telephone-type circuit into channels and be as agreed between the related RTHs or related RTH and WMCs.

2.2.2 When a four-wire telephone-type circuit is utilized for facsimile (analogue) transmission, the transmission characteristics shall be in accordance with WMO standards.

2.3 Transmission over high capacity HF circuits

2.3.1 In a HF circuit:

(i) The telegraph channels should be provided in accordance with the relevant CCIR recommendations;

(ii) Provision shall be made so that at least one 3 kHz channel can be used for facsimile (analogue) transmission whilst telegraph signals are carried on at least one other 3 kHz sideband;

(iii) The characteristics in respect of facsimile (analogue) transmission shall be according to WMO standards;

(iv) In the case of HF radio transmissions, each telegraph channel shall be provided with error control. In particular ARQ error control system conforming to CCIR Recommendation 342-1 or other systems satisfying the requirements of the error control of the WWW Global Telecommunication System should be used. The ARQ equipment should be located at the WMC/RTH so as to include any related circuits between that WMC/RTH and the actual HF transmitter or receiver sites.

3. ENGINEERING OF WMCs AND RTHs ON THE MAIN TRUNK CIRCUIT AND ITS BRANCHES

3.1 WMCs and RTHs on the Main Trunk Circuit and its branches shall be capable of transmitting and receiving information over the Main Trunk Circuit and its branches, as well as over regional telecommunication networks. They shall be capable of performing the following functions:

(i) Automatic editing;

(ii) Automatic switching of messages;

(iii) Conversion of messages in International Telegraph Alphabet No. 2 to messages in International Alphabet No. 5 and vice versa;

(iv) Speed conversion as between high, medium and low transmission speeds;

Note: The transmission speeds are as defined by the CCITT.

(v) Recognition of addressed messages (including recognition of priorities);

(vi) Error control;

(vii) Relay facilities (for example facilities for store and forward or through-switch of facsimile (analogue) transmission);

(viii) Checking and correction in order to maintain standard transmission procedures;

Notes:

(1) It is the responsibility of NMCs (originating centres) to supply the RTHs with messages conforming to the WMO standardized transmission procedures and message format.

(2) Checking and correction at RTHs in order to maintain standardized telecommunication procedures and format should be performed bearing in mind the need to keep internal handling times to a minimum.

(ix) Maintain continuity of service (this includes provision for re-routeing of traffic in emergency);

(x) Facsimile (analogue) transmitting and receiving equipment in accordance with WMO standards.

4. REGIONAL NETWORKS

4.1 Regional networks should be developed by Regional Associations so that they are compatible with the system characteristics (engineering, circuit, transmission) of the Main Trunk Circuit and its branches. Compatibility is essential particularly to ensure efficient flow of traffic over the GTS.

5. NATIONAL NETWORKS

5.1 National networks should be developed so that they are compatible with the system characteristics (engineering, circuit, transmission) of the Main Trunk Circuit and its branches and regional telecommunication networks. Compatibility is essential particularly to ensure efficient flow of traffic over the GTS.

ANNEX XXX

Annex to Recommendation 38 (CSM-V)

REPORTS OF RECEPTION CONDITIONS OF METEOROLOGICAL RADIO TRANSMISSIONS

Code form:

RECEP	$Q_cL_aL_aL_a$ $L_oL_oL_oL_o$	YYG_1G_1g	$G_2G_2gm_km_k$	CCC(n)(n)	SINPO	.....
		YYG_1G_1g	$G_2G_2gm_km_k$	CCC(n)(n)	SINPO	.....

Meaning of symbolic words and letters:

RECEP - code form for reports of reception conditions of radio transmissions

Q_c - quadrant of the globe (WMO Publication No. 9.TP.4, Volume B, page I-A-4-49)

$L_aL_aL_a$ - latitude in tenths of a degree of the radio receiving station

$L_oL_oL_oL_o$ - longitude in tenths of a degree of the radio receiving station

YY - day of the month (GMT)

G_1G_1g - time of observation in hours and tens of minutes (GMT) of the beginning of the period covered by the report

G_2G_2g - time of observation in hours and tens of minutes (GMT) of the ending of the period covered by the report

m_km_k - band in megahertz of the frequency to which the report refers,

e.g., : 07 = 7 MHz or more, but under 8 MHz

resp. : 15 = 15 MHz or more, but under 16 MHz

CCC(n)(n)- international call sign of the intercepted frequency (mostly three letters or three letters followed by one or two figures)

SINPO - code indicator to be used and followed by five-figure group referring to the SINPO-Code as defined by Recommendation No. 251-CCIR, published in Appendix 14 of ITU-Radio Regulations, Geneva, 1968.

A N N E X XXXI

Annex to Recommendation 41 (CSM-V)

CHANGES TO BE MADE IN VOLUME I OF THE INTERNATIONAL CLOUD ATLAS

Page 3

1. Definition of a cloud

Following the group's recommendation that clouds be regarded as hydrometeors, a change has to be made in the definition of a cloud because the existing definition does not show this new relationship which has become fundamental. In other words, it it not possible to introduce clouds into the hydrometeor category without this showing one way or another in the definition.

The group therefore recommends the following definition:

"A cloud is a hydrometeor in suspension in the free air and usually not touching the ground.

A cloud is composed of minute particles of water or ice or of both. It may also include: larger particles of water or ice; non-aqueous liquid or solid particles, such as those present in fumes, smoke or dust."

The difficulty is that the term hydrometeor would then appear in the text of the Atlas before the definition, which is given on page 61. Since modification of the form of presentation of the Atlas - which will be necessary sooner or later - is not part of the group's terms of reference, the group recommends the insertion of a footnote on page 3 containing a page reference to the definitions of meteor and hydrometeor.

Page 61

1. Definition of a meteor

Following the group's recommendation that clouds be regarded as hydrometeors, the words "other than a cloud" should be deleted from the first line of the definition.

2.(1) Hydrometeors

To take into account the definitions and descriptions of hydrometeors recommended by the group for Chapter II, the text in parentheses in the fourth and fifth lines should be replaced by "(rain, drizzle, snow, snow grains, snow pellets, diamond dust, hail, small hail and ice pellets)".

Page 62

To take into account the definitions and descriptions recommended by the group for Chapter II, the table should be replaced by the following:

Hydrometeors \ General	As	Ns	Sc	St	Cu	Cb	No Cloud
Rain	+	+	+		+	+	
Drizzle				+			
Snow	+	+	+	+	+	+	
Snow pellets			+		+	+	
Diamond dust							+
Hail						+	
Small hail						+	
Ice pellets	+	+					
Snow grains				+			

Following the group's recomendation that clouds be regarded as hydrometeors, the paragraph immediately following the table should be replaced by:

"The hydrometeors consisting of ensembles of particles suspended in the air are clouds, fog and mist".

Delete notes 1 and 2.

Page 63

To take into account the definitions and descriptions of hydrometeors recommended by the group for Chapter II, the part of the table concerning hydrometeors should be replaced by the following :

Group	Designation of meteor	Symbol	Designation of meteor	Symbol
	Rain	•	Drifting and blowing snow	
	Supercooled rain		Drifting snow	
	Drizzle	,	Blowing snow	
	Supercooled drizzle		Spray	
	Snow		Dew	
HYDROMETEORS	Snow pellets		Dew proper	
	Diamond dust	⟷	Advection dew (French : Buée)	
	Hail	△	White dew	
	Small hail	△	Hoar frost	
	Ice pellets		Hoar frost proper	
	Snow grains		Advection hoar frost (French: Buée blanche)	
	Fog	and	Rime	V
	"Fog"	≡	Soft rime	
	"Mist"	=	Hard rime	
	Ice fog		Clear ice	
			Glaze	
			Deposit of fog droplets	

Pages 66 to 70

Definitions and descriptions of meteors

1. Hydrometeors

The group considered that the introduction of the concept of variety among hydrometeors would be desirable.

One member of the group suggested that it might even go further and add the concept of mode which relates, not to the morphology of the hydrometeor, but to the manner in which it is produced. Every combination of mode and variety must be possible, for maximum precision in the description of the hydrometeor.

Although this approach could be regarded as within the group's terms of reference, strictly speaking, the group did not take up the suggestion because the problem affects not only hydrometeors but also the other groups of meteors.

There is no doubt that this aspect of the question will have to be taken into account in the next revision of the *Atlas*: the group could not do otherwise than introduce - without stressing the meaning of the term - the concept of *sort* of hydrometeor which denotes a classification marked by some difference of aspect, size or quality.

The group recommends the following definitions and descriptions of hydrometeors:

RAIN (°) PLUIE

Precipitation of drops of water which falls from a cloud

The diameter and concentration of raindrops vary considerably according to the intensity of the precipitation and especially according to its nature (continuous rain, rain shower, storm rain, etc.)

Clouds may sometimes include an abnormally large number of fine particles, for example of dust or sand, lifted from the ground during a storm. These particles may be carried to the ground with the raindrops (mud rain), often after having been carried over great distances.

SUPERCOOLED RAIN ( ) PLUIE SURFONDUE

Rain with temperature of drops below 0°C

On impact with the ground, with objects on the ground surface and with aircraft in flight, drops of supercooled rain form a mixture of water and ice having a temperature of 0°C.

DRIZZLE (,) BRUINE

Fairly uniform precipitation in very fine drops of water very close to one another, which falls from a cloud

Drizzle is a sort of rain in which the diameter of the drops is usually less than 0.5 mm. The drops appear almost to float, thus making visible even slight movements of the air.

Drizzle falls from a continuous and fairly dense layer of cloud, usually low, sometimes touching the ground (fog), and only from a layer of stratus.

The amount of precipitation in the form of drizzle is sometimes considerable (up to 1 mm per hour), especially along coasts and in mountainous areas.

Note : The drops falling on the edge of a rain zone, or during a light rainfall, may be as small as drizzle drops, owing to partial evaporation; raindrops are then distinguished from drizzle drops in that they are more scattered. When the cloud from which the precipitation comes can be identified, there can be no mistake as drizzle can fall only from stratus.

SUPERCOOLED DRIZZLE ( ) BRUINE SURFONDUE

Drizzle with temperature of drops below 0°C

On impact with the ground, with objects on the ground surface and with aircraft in flight, drops of supercooled drizzle form a mixture of water and ice having a temperature of 0°C.

SNOW (*) NEIGE

Precipitation of ice crystals, singly or agglomerated, which falls from a cloud

The form, size and concentration of snow crystals differ considerably according to the temperature at which they form and the conditions in which they develop. A fall of snow usually includes various types of snow crystals and almost all types of crystal may be observed during a single fall of snow.

Small droplets of frozen water are often attached to snow crystals. When there are few of these droplets the crystalline structure is still very visible, when there are many, the structure is scarcely visible any more.

At temperatures higher than about -5°C, the crystals are generally agglomerated into snowflakes.

SNOW PELLETS ($\overset{\times}{\triangle}$) NEIGE ROULEE

Precipitation of white and opaque ice particles, which falls from a cloud. These particles are generally conical or rounded. Their diameter may attain 5 millimetres

These grains are brittle and easily crushed; when they fall on hard ground they bounce and often break up.

Precipitation of snow pellets in showers together with snowflakes, normally occur when temperatures near the surface are near 0°C.

Snow pellets are composed of a central nucleus covered with frozen cloud droplets. Owing to the interstices between the nucleus and the frozen droplets, the density of snow pellets is generally low, being less than 0.8 g cm^{-3}.

Snow pellets form when a particle of ice, usually a crystal, collects cloud droplets which rapidly freeze. Crystals have been observed which are not completely surrounded by droplets, being in the intermediate stage between the snow crystal and snow pellet.

DIAMOND DUST ($\longleftrightarrow$) POUDRIN DE GLACE

Precipitation which falls from a clear sky in very small ice crystals, often so tiny that they appear to be suspended in the air

Diamond dust can be observed in polar regions and continental interiors especially in clear, calm and cold weather.

It forms at temperatures less than -10°C in a rapidly cooling airmass; it is usually composed of well-developed crystals, plates especially, the diameter of which may be anywhere between about 30 and 200 microns, the commonest being about 100 microns.

These crystals, which are visible mainly when they sparkle in the sunlight, give rise to generally well-marked halo phenomena.

In diamond dust, visibility is very variable; the lower limit is over 1 km.

HAIL (▲) GRELE

Precipitation of transparent, or partly or completely opaque particles of ice (hailstones), usually spheroidal, conical or irregular in form and of diameter very generally between 5 and 50 millimetres, which fall either separately or agglomerated into irregular lumps.

Falls of hail always occur in the form of showers; they are generally observed during heavy thunderstorms.

Hailstones usually form around a nucleus which is not necessarily at their geometric centre. These nuclei, which may be anywhere between a few millimetres and one centimetre in diameter, are speroidal or conical in form; they are composed of transparent or opaque ice, the latter being the commoner.

It is difficult to classify hailstone structures owing to the large number of varieties which may occur, even among hailstones of the same form and dimensions collected during a single fall. Certain structures are however more common than others, for instance that of a nucleus surrounded by alternating layers of opaque and transparent ice. This "onion-skin" formation is not observed in all hailstones; some consist of transparent or opaque ice only. There are not usually more than five layers except in very large hailstones which have been known to have twenty or more.

Hailstones may be partly composed of spongy ice, which is a mixture of ice, water and air consisting of a framework of ice in which water and air bubbles are trapped; they sometimes contain large cavities filled with air.

Hailstones are mainly of a density between 0.85 g cm^{-3} and 0.92 g cm^{-3}; but may be of lower density than 0.85 g cm^{-3} if they have large cavities.

The hailstone forms when a nucleus collects cloud droplets or drops of rain. There is no general agreement on the nature of this nucleus; the tendency is however to admit that it is usually a particle of small hail which has formed round snow pellet.

SMALL HAIL (△) GRESIL

Precipitation of translucent ice particles, which falls from a cloud. These particles are almost always spherical and sometimes have conical tips. Their diameter may attain and even exceed five millimeters.

Usually, small hail is not easily crushable and when it falls on hard ground it bounces with an audible sound on impact.

Small hail always occurs in showers.

Small hail consists of snow pellets totally or partially encased in a layer of ice, the interstices being filled with ice, or ice and water; a thin shell only may be frozen. Small hail is of relatively high density, between 0.8 g cm^{-3} and exceptionally 0.99 g cm^{-3}.

Small hail forms by penetration of liquid water into the interstices of a snow pellet; this water may come from cloud drops or partial melting of a snow pellet.

Small hail is an intermediate stage between the snow pellet and the hailstone. It differs from the snow pellet in its partially smooth surface and its higher density. It differs from the hailstone particularly in its smaller size.

ICE PELLETS (△) GRANULES DE GLACE

Precipitation of transparent ice particles which falls from a cloud. These particles are usually spheroidal or irregular, rarely conical. Their diameter is less than five millimetres.

Usually ice pellets are not easily crushable; when they fall on hard ground they generally bounce with an audible sound on impact.

Precipitation in the form of ice pellets generally falls from altostratus or nimbostratus.

Ice pellets may be in part liquid; their density is usually near to, or above that of ice (0.92 g cm^{-3}).

SNOW GRAINS (—△—) NEIGE EN GRAINS

Precipitation of very small opaque white particles of ice. These particles are fairly flat or elongated; their diameter is generally less than 1 mm.

When the grains hit hard ground, they do not bounce. Except in the mountains, they usually fall in small quantities, mostly from stratus or from fog and never in the form of a shower. This precipitation corresponds as it were to drizzle and occurs when the temperature is between 0°C and -10°C approximately.

FOG (≡ and ═) BROUILLARD

A suspension of very small, usually microscopic water droplets in the air, reducing visibility at the earth's surface.

The reduction in visibility depends on the structure of the fog, especially on the number of droplets per unit volume and on the size distribution of the droplets. This structure is determined mainly by the nature of the atmospheric aerosol, the mode of fog formation and its age. It may vary a great deal in time and space.

The conditions resulting from the simultaneous occurrence of fog and heavy air pollution in urban and industrialized areas, with chemical reactions between fog droplets and various pollutants going on, are widely referred to as "smog" (e.g. smoke and fog).

In practice, the terms "fog" and "mist" are used to indicate the different intensities of the phenomenon, the term "mist" being synonymous with light fog.

The term "fog" is used when the hydrometeor fog reduces horizontal visibility at the earth's surface to less than one kilometre (≡).

When illuminated, individual fog droplets are frequently visible to the naked eye, they are then often seen to be moving in a somewhat turbulent manner. The air in "fog" usually feels raw, clammy and wet.

"Fog" forms a whitish veil which covers the landscape; it may, however, when mixed with dust or smoke, take on a faint coloration.

The term "mist" is used when the hydrometeor fog does not reduce horizontal visibility at the earth's surface to less than one kilometre (═).

"Mist" forms a generally fairly thin, greyish veil which covers the lanscape.

NOTE: In the interior of continents at temperatures below -10°C sometimes fog may form, usually from freezing of droplets, being composed of ice crystals, which like diamond dust gives rise to optical phenomena

ICE FOG (⇌) BROUILLARD GLACE

A suspension of numerous minute ice crystals in the air, reducing visibility at the earth's surface.

Ice fog is observed at high latitudes, usually in clear calm weather, when the temperature is below -30°C.

It forms when water vapour, mainly resulting from human activities, is introduced into the atmosphere. This vapour condenses forming droplets which freeze rapidly into ice particles having no well-defined crystalline form.

The diameter of these particles varies approximately between 2 and 30 microns; and the lower the temperature the smaller the diameter of the particles, which may sometimes be a few microns only when the temperature is between -40°C and -50°C.

Owing to their form, these particles do not produce halo phenomena. These phenomena are produced in ice fog only when it contains diamond dust.

Visibility is usually much reduced in ice fog, especially in inhabited areas where it is often less than 50 m.

DRIFTING SNOW AND BLOWING SNOW (⇾) CHASSE-NEIGE

An ensemble of snow particles raised from the ground by a sufficiently strong and turbulent wind.

The occurrence of this hydrometeor depends on the wind conditions (speed and gustiness) and the state and age of the surface snow.

There are two sorts of phenomenon: drifting snow and blowing snow.

Drifting snow (⇢) is an ensemble of snow particles raised by the wind to small heights above the ground.

Very low obstacles are veiled or hidden by the moving snow. The motion of the snow particles is more or less parallel to the ground.

Vertical visibility is not sensibly diminished, nor horizontal visibility at eye level.*

Blowing snow ( ) is an ensemble of snow particles raised by the wind to moderate or great heights above the ground.

The concentration of the snow particles may sometimes be sufficient to veil the sky and even the sun. The snow particles are nearly always violently stirred up by the wind.

Vertical visibility is diminished according to the intensity of the phenomenon; the horizontal visibility at eye level* is generally very poor.

When the phenomenon is severe it is difficult to appreciate that snow is also present at the same time.

SPRAY ( ) EMBRUNS

An ensemble of water droplets torn by the wind from the surface of an extensive body of water, generally from the crests of waves, and carried up a short distance into the air.

When the water surface is rough, the droplets may be accompanied by foam.

When strong gales blow down from the mountains (foehn gales) on to the surface of a lake, spray may locally take the form of moving vortices.

DEW ( ) ROSEE

Deposit on objects of water drops produced by the direct condensation of water vapour from the surrounding air.

There are two sorts of dew: dew proper and advection dew (French: buée).

Dew proper ( ) forms on exposed surfaces which are sufficiently cooled, generally by nocturnal radiation, to bring about the direct condensation of the water vapour from the surrounding air; it is deposited ordinarily on objects at or near the ground, mainly on their horizontal surfaces.

Dew is observed especially during the warm part of the year when the air is calm and the sky clear.

Dew should not be confused with the deposit of drops from low fog on exposed surfaces, nor in the case of plants, with the droplets of water they exude - a phenomenon known as guttation which often takes place at the same time as deposit of dew but which can also occur separately.

Advection dew ( ) forms on exposed surfaces which are sufficiently cold to bring about direct condensation of the water vapour contained in the air coming into contact with this surface, usually through a process of advection; advection dew is deposited mainly on vertical exposed surfaces.

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* Eye level is defined as 1.80 m above the ground.

Advection dew is observed especially during the cold part of the year when relatively warm damp air suddenly invades a region after a period of moderate frosts.

Advection dew must not be confused with the deposit of fog droplets nor with the pseudo-dew observed in humid weather on certain exposed surfaces covered by a thin film of hygroscopic substances.

WHITE DEW ( ) ROSEE BLANCHE

A deposit of white frozen dew drops.

White dew must not be confused with an amorphous form of hoar frost.

HOAR FROST ( ) GELEE BLANCHE

A deposit of ice on objects generally crystalling in appearance, and produced by the direct "sublimation"* of water vapour from the surrounding air.

There are two sorts of hoar frost : hoar frost proper and advection hoar frost (French : buée blanche).

Hoar frost proper ( ) which generally assumes the form of scales, needles, feathers of fans, forms on exposed surfaces which are sufficiently cooled, generally by nocturnal radiation, to bring about the direct "sublimation" of the water vapour contained in the ambient air; it is deposited ordinarily on objects at or near the ground, mainly on their horizontal surfaces.

Hoar frost is observed especially during the cold part of the year when the air is calm and the sky clear.

Advection hoar frost ( ) which generally assumes crystalline form is deposited on exposed surfaces which are sufficiently cold to bring about the direct "sublimation" of the water vapour contained in the air coming into contact with this surface usually through a process of advection; it is deposited mainly on vertical exposed surfaces.

Advection hoar frost is observed especially during the cold part of the year when relatively warm damp air suddenly invades a region after a long period of hard frosts.

RIME ( ) GIVRE

Deposit of ice generally formed by the freezing of supercooled fog or cloud droplets on objects the surface temperature of which is below or slightly above 0°C.

There are three sorts of rime: soft rime, hard rime and clear ice.

Soft rime (givre mou) ( ) is a fragile deposit consisting mainly of thin needles or scales.

* The term sublimation is used in the meaning of passage from the gaseous to the solid state; it is in inverted commas to call attention to the fact that this hydrometeor develops but does not form in this way.

At and near the ground it is deposited under calm or low wind conditions on all sides of exposed objects.

Soft rime easily drops on shaking the objects.

It mainly forms with temperatures of the ambiant air lower than -8°C. At temperatures well below - 8°C the formation of soft rime does not necessarily require the presence of fog.

Hard rime (givre dur) (🜄) is a granular deposit, usually white, adorned with crystalline branches of grains of ice more or less separated by entrapped air.

At and near the ground, it is deposited mainly on the surface of objects exposed to at least moderate wind. In the wind-ward direction, the deposit may increase to form a thick layer.

In the free atmosphere it may occur on the parts of aircraft exposed to the relative wind.

It is formed by the rapid freezing of the water remaining in the liquid state after cessation of supercooling so that the droplets freeze more or less individually, leaving interstices.

Hard rime is rather adhesive but can, however, still be scratched off the object.

Hard rime mainly forms with temperatures between -2°C and -10°C.

Clear ice (givre transparent) ($\underset{\blacktriangle}{\vee}$) is a smooth compact deposit usually transparent, fairly amorphous, with a ragged surface, and morphologically ressembling glaze.

At and near the ground clear ice is deposited mainly on the surface of objects exposed to the wind; it is observed specially in mountain regions.

In the free atmosphere, it occurs chiefly on the part of the aircraft exposed to the relative wind.

It is formed by the slow freezing of the water remaining in the liquid state after cessation of supercooling which is therefore able to penetrate the interstices between the grains of ice before freezing.

Clear ice is very adhesive and can only be removed from the objects by breaking or melting off.

Clear ice is formed in nearly any case with temperatures of the ambiant air between 0 and -3°C.

NOTE: The processes resulting in the formation of the different kinds of rime may on some occasions occur nearly simultaneously and, more frequently consecutively during a longer period and even repeatedly alternating. Thus on the exposed objects after a certain time very heterogenous "overall deposits" can be observed with various transitional states within the deposit.

GLAZE (∾) VERGLAS

A smooth compact deposit of ice, generally transparent, formed by the freezing of supercooled drizzle droplets or raindrops on objects the surface temperature of which is below or slightly above 0°C.

Glaze covers all the parts of surfaces exposed to precipitation; it is generally fairly homogeneous and morphologically resembles clear ice.

At and near the ground glaze is observed when drizzle droplets or raindrops fall through a layer of subfrost point temperature of sufficient depth.

In the free atmosphere, it is observed when aircraft are exposed to supercooled precipitation.

Glaze forms by the slow freezing of the water remaining in the liquid state after cessation of supercooling which is therefore able to penetrate the interstices between the particles of ice before freezing.

The deposit of ice formed by the freezing of fog or cloud droplets not supercooled at the time of impact with objects the temperature of which is well below 0°C, is also known as glaze.

Note : Glaze on the ground must not be confused with ground ice, which is formed when:

(a) Water from a precipitation of non-supercooled drizzle droplets or raindrops later freezes on the ground;

(b) Snow on the ground freezes again after having completely or partly melted; or

(c) Snow on the ground is made compact and hard by traffic.

DEPOSIT OF FOG DROPLETS (⊁) DEPOT DE GOUTTELETTES DE BROUILLARD

Deposit of non-supercooled fog (or cloud) droplets on objects the surface temperature of which is above 0°C.

This hydrometeor is observed especially in high areas where orographic clouds are frequent.

The intensity of the deposit depends on the duration and granulometry of the fog (or clouds) and on the speed of impact of the droplets. It is also a function of the wettability and interception coefficient of objects, this coefficient being particularly high for conifer leaves.

When the phenomenon is marked, the droplets collected run together and drip on to the ground. In certain regions, the amount of water falling from trees in this way during a single night may be the equivalent of the rainfall from a moderate shower.

SPOUT TROMBE

It is difficult to accept that a spout is a hydrometeor since it may raise dust or sand. The fact of deleting this phenomenon from the hydrometeors does not imply that it should not be included in the Atlas, but merely that it should appear in another place, as an unclassified meteor for instance.

Page 71

(1) Halo phenomena

Delete the words "ice fog" from line 2 of the definition.

A N N E X XXXII

Annex to Recommendation 42 (CSM-V)

SUGGESTED AMENDMENTS TO THE TECHNICAL REGULATIONS

PART A - Suggested new layout of the Technical Regulations

TABLE OF CONTENTS

Part B - Suggested textual amendments to the Technical Regulations

INTRODUCTION*

Part I - General

The Technical Regulations of the World Meteorological Organization are determined by the Congress in accordance with Article 8 (d) of the Convention. The first three editions were adopted by Second Congress (1955), Third Congress (1959) and Fifth Congress (1967) respectively. Fifth Congress endorsed the concept of the World Weather Watch and appealed also to Meteorological Services of non-Member countries to accept this concept within their territories. Following these decisions of Fifth Congress, a revision of the Technical Regulations was carried out with a view to incorporating in these Regulations the new obligations falling on Members from the above-mentioned long-term programme of WMO. In view of the permanent character of the World Weather Watch and in view of the fact that it plays a major role in international co-operation of Meteorological Services, it was decided to include in the Technical Regulations a description of the concept of the World Weather Watch (see Part II of the present Introduction). At the same time the various chapters of the Regulations were grouped together according to the relevant WMO programmes as formulated in Resolution 5 (EC-XXI) (1969). A brief description of these programmes is given in Part II of this introduction.

The present fourth edition of the Technical Regulations which was adopted by Sixth Congress (1971), follows therefore the layout described above. It is to be understood that in the same way as the various WMO programmes are closely inter-related, the regulations included under one programme may have a bearing on other programmes.

The material for Chapter 12 - Meteorological Service to International Air Navigation - is developed in close co-operation by the World Meteorological Organization and the International Civil Aviation Organization. Chapter 12 is published separately in Volume II.

These Regulations are designed :

(a) To facilitate meteorological co-operation between Members;

(b) To meet, in the most effective manner, specific needs, in the international sphere, of the various fields of application of meteorology; and

(c) To secure uniformity and standardization, as appropriate, in the practices and procedures employed in achieving (a) and (b).

*Suggested new text is indicated by continuous line along the margin.

The Technical Regulations comprise standard meteorological practices and procedures and recommended meteorological practices and procedures.

The definitions of these two types of Regulations are as follows.

The standard meteorological practices and procedures :

(a) Shall be the meteorological practices and procedures which it is necessary that Members follow or implement; and therefore

(b) Shall have the status of requirements in a technical resolution in respect of which Article 9 (b) of the Convention is applicable; and

(c) Shall invariably be distinguished by the use of the term shall in the English text, and by suitable equivalent terms in the French, Spanish and Russian texts.

The recommended meteorological practices and procedures :

(a) Shall be the meteorological practices and procedures which it is desirable that Members follow or implement; and therefore

(b) Shall have the status of recommendations to Members, to which Article 9 (b) of the Convention shall not be applied;

(c) Shall be distinguished by the use of the term should in the English text (except where specifically provided otherwise by decision of the Congress) and by suitable equivalent terms in the French, Russian and Spanish texts.

In accordance with the above definitions, Members shall do their utmost to implement the standard meteorological practices and procedures. Members shall formally notify the Secretary-General of their intention to apply the standards of Technical Regulations except those for which they have lodged a specific deviation in accordance with Article 9 (b) of the Convention.

With regard to recommended meteorological practices and procedures, Members are urged to comply with these, but it is not necessary to notify the Secretary-General of non-observance.

In order to clarify the status of the various Regulations, the standard practices and procedures are distinguished from the recommended practices and procedures by a difference in typographical practices, as indicated in the Editorial Note.

Certain N O T E S are included in the Technical Regulations for explanatory purposes; they may, for instance, refer to relevant WMO guides and manuals. These notes have no status as Technical Regulations. (The WMO guides describe practices, procedures and specifications which Members are invited to follow or implement in establishing and conducting their arrangements in compliance with the Technical Regulations and in otherwise developing meteorological services in their respective countries.)

WMO publications which have the status of a Technical Regulation but which are published separately from the Technical Regulations are called "annexes". As can be seen from the table of contents, specified parts of the International Cloud Atlas and of Volume B - Codes - of Publication No. 9, though not attached to the present publication, are parts of these Technical Regulations. These two annexes are considered as standard practices and procedures.

Texts which are appended to the Technical Regulations are called "appendices" and have the same status as the Technical Regulations to which they refer. Appendices A, B, C, D and G are therefore considered as standard practices and procedures. Appendices E and F are considered as recommended practices and procedures.

The words "shall" and "should" in annexes and appendices have their dictionary meanings and have not the regulatory character of "shall" and "should" in the Technical Regulations themselves.

Whenever a cross-reference to WMO publications appears in the text of a Technical Regulation the relevant portion of the publication has the same status as if that portion appeared as an integral part of the Technical Regulations.

Guiding principles

Certain principles which have been previously agreed upon by Congress and applied in the selection of material for inclusion in the Technical Regulations are reproduced hereafter. These principles constitute guidance material for constituent bodies, in particular technical commissions, when dealing with matters pertaining to Technical Regulations :

(i) Technical commissions should not recommend that a Regulation should be a standard practice unless it is supported by a strong majority;

(ii) Paragraphs of the Technical Regulations should contain appropriate instructions to Members regarding implementation of the provision;

(iii) No major changes should be made in Technical Regulations without special advice from the appropriate technical commissions.

Part II - WMO Programmes

The World Weather Watch

The World Weather Watch is a world-wide, co-ordinated, developing system of meteorological services provided by Members with the purpose of ensuring that all Members obtain the meteorological information they require both for operational work and for research. Its three principal elements for obtaining and exchanging observational and processed information are: The Global Observing System, the Global Data-Processing System and the Global Telecommunication System.

The Global Observing System provides observational data from all parts of the globe required for operational and research purposes. It consists of the regional basic synoptic networks and other networks of stations on land and at sea, aircraft meteorological observations, meteorological satellites and other observational devices.

The Global Data-Processing System consists of World, Regional and National Meteorological Centres and their functions. It is intended to serve Members and to assist them, when required. It makes available analyses and prognoses and also provides for archiving, storage and retrieval of meteorological information for climatological and research purposes. The functions of the various centres do not affect any international commitments of Members for support to shipping and aviation nor determine the manner in which Members execute these responsibilities.

The Global Telecommunication System provides for rapid collection, exchange and distribution of observational data to National Meteorological Centres, Regional Meteorological Centres and World Meteorological Centres, and the distribution of processed information to Members requiring it. The system is organized on three levels :

The Main Trunk Circuit and its branches,
The Regional Telecommunication Networks,
The National Telecommunication Networks.

The World Weather Watch is a dynamic system, flexible enough to be adapted to changing conditions. Therefore provision has been made for incorporation in the World Weather Watch Plan of new techniques of observations, data-processing and telecommunications as soon as they have been proved to be sufficiently reliable and economical.

The WMO Research Programme

This programme comprises the activities aimed at improving the scientific understanding of atmospheric processes.

The WMO Programme on the Interaction of Man and his Environment

This programme comprises the activities aimed at applying meteorological knowledge to various human activities.

The WMO Technical Co-operation Programme

This programme provides technical assistance to developing countries.

VOLUME I

DEFINITIONS

(Suggested additional or amended definitions
to present text of Chapter 1)

World Weather Watch (WWW)

The world-wide, co-ordinated, developing system of meteorological facilities and services provided by Members with the purpose of ensuring that all Members obtain the meteorological information they require both for operational work and for research. The essential elements of the World Weather Watch are :

The Global Observing System,

The Global Data-Processing System, and

The Global Telecommunication System.

Global Observing System (GOS)

The co-ordinated global system of meteorological observational networks and other facilities for making meteorological observations within the framework of the World Weather Watch.

Global Data-Processing System (GDPS)

The co-ordinated global system of meteorological centres and arrangements for the processing, storage and retrieval of meteorological information within the framework of the World Weather Watch.

Global Telecommunication System (GTS)

The co-ordinated global system of telecommunication facilities and arrangements for the rapid collection, exchange and distribution of observational and processed information within the framework of the World Weather Watch.

World Meteorological Centre (WMC)

A centre of the Global Data-Processing System which has the primary purpose of issuing meteorological analyses and prognoses on a global scale

Regional Meteorological Centre (RMC)

A centre of the Global Data-Processing System which has the primary purpose of issuing meteorological analyses and prognoses on a regional scale for a specified geographical area.

National Meteorological Centre (NMC)

A centre responsible for carrying out national functions including those under the World Weather Watch.

Regional Telecommunication Hub (RTH)

A centre of the Global Telecommunication System with international responsibilities for collection, exchange and distribution of observational and processed information.

Meteorological Satellite

An artificial earth satellite making meteorological observations and transmitting these observations to earth.

Meteorological Transmission

Communication of meteorological information by either of the following systems :

(a) point-to-point communications by landline or radio established between two specific stations;

(b) broadcast communication by radio intended for reception at any point within a specified area.

Regional Basic Synoptic Network

A network composed of synoptic stations with specified observational programmes within a WMO Region which is a minimum regional requirement to permit Members to fulfill their responsibilities within the WWW and in the application of meteorology.

Automatic Surface Synoptic Station

A surface synoptic station at which instruments make and transmit observations, the conversion to code form for international exchange being made either directly or at an editing station.

Automatic Climatological Station

A climatological station at which instruments make and record the observations automatically.

Principal Automatic Station

An automatic surface synoptic station on land or at sea which fulfils the minimum performance characteristics specified in paragraph 2.1.1.6 or paragraph 2.1.1.7 and normally reports its observations for international exchange.

Supplementary Automatic Station

An automatic surface synoptic station on land or at sea not fulfilling all the minimum performance characteristics specified for a principal automatic station.

Fixed Automatic Marine Station

A floating automatic surface synoptic station held at a fixed location by an anchorage system.

Drifting Automatic Marine Station

A floating automatic surface synoptic station that is free to drift under the influence of wind and current.

Synoptic observation

A surface or upper-air observation made at established standard

Synoptic stations

A station from which synoptic observations are obtained.

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* *

Section A - The World Weather Watch

A.1 - The Global Observing System

NOTE: Some of the regulations in this section concern WMO programmes other than the World Weather Watch.

Editorial note relating to the rest of the present annex:

Regulations representing standard meteorological practices and procedures are underlined.

CHAPTER 1

METEOROLOGICAL OBSERVING NETWORKS AND STATIONS

NOTE: Details of the Global Observing System are specified in the World Weather Watch Plan.

Numbering of the regulations in the amended version, with the amended or new text where applicable*	Reference to the existing Technical Regulations
1	2
1.1 The Global Observing System shall include observational networks of stations on land and at sea, aircraft stations, meteorological satellites and other observational devices, providing data from all parts of the globe.	-
1.2 Members should implement the regional basic synoptic networks.	-
1.3 Members accepting responsibility for collection of aircraft reports for synoptic purposes should make them promptly available to other Members in agreed code forms.	-
1.4 Members operating meteorological satellite programmes and willing to make the meteorological satellite data available to other Members should inform Members of the ways and means of obtaining these data.	-
1.5 to 1.5.1	2.1 to 2.1.1
1.5.2	2.1.2
Synoptic stations	
NOTE: Any synoptic station may fall under more than one of the categories listed below.	
Synoptic stations shall be classified as :	
1.5.2.1	2.1.2.1

* When the amendment to the text of a paragraph consists solely in changing a reference or references to other paragraphs, the text of the paragraph affected by the amendment is not given here.

1	2

Surface synoptic stations

A. Land stations

(a) Manned land stations

(i) Principal stations
(ii) Supplementary stations

(b) Automatic land stations

(i) Principal stations

(ii) Supplementary stations

B. Sea stations

(a) Manned sea stations

(i) Fixed sea stations

1. Stationary ship stations
1.1 Ocean weather stations (1)
1.2 Lightship stations (2)
2. Fixed platform stations (erected in shallow water)
3. Anchored platform stations

(ii) Mobile sea stations

1. Mobile ship stations
1.1 Selected ship stations
1.2 Supplementary ship stations
1.3 Auxiliary ship stations
2. Ice floe stations (3)

(b) Automatic marine stations (principal or supplementary)

(i) Fixed automatic marine stations

1. Fixed platform automatic stations (erected in shallow water) (3)
2. Anchored platform automatic stations (3)
3. Lightship automatic stations (2)

(ii) Mobile automatic marine stations

1. Drifting automatic buoy stations (4)
2. Ice floe automatic stations (4)
3. Mobile ship automatic stations.

Notes: (1) Stations aboard ships assigned to ocean weather station duty and sailing to and from their fixed maritime location are considered as selected ship stations;

1	2
(2) For reporting purposes, lightship stations may be considered as either land or sea stations;	
(3) For reporting purposes these stations are considered as mobile ship stations.	
(4) For reporting purposes these stations are considered as mobile ship stations, and must contain equipment permitting the determination of the geographical location of the station.	
1.5.2.2	2.1.2.2

Upper-air synoptic stations

A. Land stations

(a) Rawinsonde stations
(b) Radiosonde stations
(c) Radiowind stations
(d) Pilot-balloon stations

B. Sea stations

(a) Rawinsonde stations
(b) Radiosonde stations
(c) Radiowind stations
(d) Pilot-balloon stations

NOTE:
Observations made by synoptic stations are supplemented by aircraft observations, which are made in accordance with paragraph 3.4.3 or with the provisions of Chapter 12.

1.5.3 —

Meteorological satellites

1.5.4 2.1.3

Climatological stations

Climatological stations shall be classified as :

(a) Principal climatological stations
(b) Ordinary climatological stations
(c) Precipitation stations
(d) Climatological stations for specific purposes
(e) Automatic climatological stations

NOTE: Any of the above climatological stations may be a reference climatological station provided that the conditions given in the definition at the beginning of Volume I are fulfilled.

1	2
1.5.5 to 1.5.6	2.1.4 to 2.1.5
1.6 to 1.6.1.5.2	2.2. to 2.2.1.5.2
1.6.1.6	2.2.1.6

In its recruitment programme, each Member should aim at making the maximum possible contribution from mobile ship stations towards attaining an adequate density of surface and upper-air reports in all oceanic areas.

NOTES:

(1) An adequate density of surface reports in oceanic areas is at least one per 300 km for each main standard time of observation.

(2) An adequate density of upper-air reports in oceanic areas is at least one per 1000 km for each standard time of observation.

(3) The networks referred to in Notes (1) and (2) include observations from sea stations of all nationalities and from stations on appropriate islands.

(4) A map giving an indication of the density of ships' surface reports received from all oceans is included in Publication No. 9.TP.4, Volume D.

1.6.1.7	2.2.1.7
1.6.1.8	-

Members should establish, either individually or jointly, principal fixed automatic marine stations in such ocean areas where there are large gaps in the world network of surface synoptic stations.

NOTE:

Considerable benefit would result from supplementary stations with simple devices for reporting only atmospheric pressure and wind.

1.6.1.9	2.2.1.8

Members should organize, either individually or jointly, routine and special aircraft weather reconnaissance flights, especially over ocean areas.

NOTE:

The making and reporting of meteorological observations from commercial aircraft is dealt with in Chapter 12.

1	2
1.6.2 to 1.9.3.2	2.2.2. to 2.5.3.2
1.9.3.3 Each Member should arrange for its automatic climatological stations to be inspected at sufficiently close intervals to ensure correct functioning of the instruments.	-
1.9.4 to 1.10.1	2.5.4 to 2.6.1
1.10.1.1 When a Member establishes a synoptic land station or an ocean weather station, the Member shall send the following information to the Secretariat : (a) Name and, where appropriate, station index number (mention if station is automatic); (b) Geographical co-ordinates and, except for the ocean weather stations, elevation; (c) Geopotential of the datum level to which pressure is reduced, or the reference isobaric surface whose geopotential is reported; (d) Times at which synoptic observations are made and reported; (e) Topographical situation; (f) Any other information required for completion of the entries in Publication No. 9.TP.4 Volume A.	2.6.1.1
1.10.1.2 to 1.10.1.7	2.6.1.2 to 2.6.1.7
1.10.2 to 1.10.4.1	2.6.2 to 2.6.4.1

CHAPTER 2

METEOROLOGICAL SURFACE OBSERVATIONS

1	2
2.1 to 2.1.1.5	3.1 to 3.1.1.5
2.1.1.6 At a principal automatic land station, a surface synoptic observation shall consist of observations of the following elements : (a) Atmospheric pressure; (b) Wind direction and speed; (c) Temperature; (d) Precipitation, yes or no (at least in tropical areas).	-

1	2
2.1.1.7 In addition to the elements listed in 2.1.1.6, a surface synoptic observation made at a principal fixed automatic land station should include, if practicable, the following elements: (e) Precipitation amount; (f) Humidity; (g) Precipitation intensity; (h) Visibility; (i) Height of cloud base; (j) Special phenomena.	-
2.1.1.8 At a principal fixed automatic marine station, a surface synoptic observation shall consist of observations of the following elements: (a) Atmospheric pressure; (b) Wind direction and speed; (c) Temperature; (d) Sea temperature.	-
2.1.1.9 In addition to the elements listed in 2.1.1.8 a surface synoptic observation made at a principal fixed automatic marine station should include, if practicable, the following elements : (e) Precipitation, yes or no (especially in tropical areas); (f) Waves.	-
2.1.1.10 At a drifting automatic marine station, a surface synoptic observation should consist of as many as possible of the following elements : (a) Atmospheric pressure; (b) Wind direction and speed; (c) Temperature; (d) Sea temperature; (e) Waves.	-
2.1.1.11 At a manned platform station erected in shallow water and at a manned anchored platform station a surface synoptic observation should consist of observations of the elements listed under 2.1.1.3.	-

1	2
2.1.1.12 At a fixed platform automatic station erected in shallow water a surface synoptic observation should consist of observations of the elements listed under 2.1.1.8, and if practicable, those under 2.1.1.9.	-
2.1.2 to 2.1.2.3	3.1.2 to 3.1.2.3
2.1.2.4 At an automatic climatological station records should be made of elements selected from those in para. 2.1.2.1	-
2.1.3 to 2.3.1.7	3.1.3 to 3.3.1.7
2.3.1.8 At principal automatic stations, surface synoptic observations should be made and reported at least at main standard times.	-
2.3.1.9 At platform stations erected in shallow water, and at anchored platform stations, surface synoptic observations should be made and reported at least at main standard times.	-
2.3.2 to 2.4.10	3.3.2 to 3.4.10
2.4.10.1 The method used at manned sea stations for measuring sea surface temperature shall be entered in the relevant meteorological log.	3.4.10.1
2.4.11 to 2.5.1.5.1	3.4.11 to 3.5.1.5.1
2.5.1.6 Provision should be made to record the data obtained at principal automatic stations.	-

CHAPTER 3

METEOROLOGICAL UPPER-AIR OBSERVATIONS

1	2
3.1 to 3.3.1.1.1	4.1 to 4.3.1.1.1
3.3.1.2	4.3.1.2
When four upper-air synoptic observations are not made, upper-air observations should be made and reported at 0000 and 1200 GMT.	
3.3.1.3	4.3.1.3
The coded report containing data obtained from upper-air synoptic observations up to and including the 100 mb level should be presented to the telecommunication system within 75 minutes of the standard time of the observation.	
3.4 to 3.5.1.1	4.4 to 4.5.1.1

*

* *

A.2 - The Global Data-Processing System

CHAPTER 4

ORGANIZATION AND FUNCTIONS OF THE GLOBAL DATA-PROCESSING SYSTEM

Note : Details of the Global Data-Processing System are specified in the WWW Plan and in the Guide on the Global Data-Processing System.

4.1 The Global Data-Processing System shall include World Meteorological Centres, Regional Meteorological Centres and National Meteorological Centres.

4.2 Members which have accepted the responsibility to establish and operate World Meteorological Centres and Regional Meteorological Centres specified in the WWW Plan shall :

(a) prepare and make available to other Members processed meteorological information;

(b) archive and process data for climatological and research purposes.

4.3 Each Member should ensure that it has a National Meteorological Centre adequately manned and equipped to enable it to carry out its part in the World Weather Watch.

Notes :(1) It is for each Member to decide, in the light of its own capabilities and needs, the extent to which it will wish to receive and use products of World and Regional Meteorological Centres.

(2) The telecommunication functions of National Meteorological Centres are specified in paragraph 8.1.2.4.

4.4 Each Member responsible for a World Meteorological Centre should ensure that its centre performs the following functions :

(a) preparing meteorological analyses and prognoses for as much of the globe as practicable;

(b) making these analyses and prognoses available promptly to other World, Regional and National Meteorological Centres;

(c) providing opportunities for training;

(d) conducting research on large-scale weather problems;

(e) archiving of observational data and processed information and making these available for research and climatological purposes;

(f) exchanging regularly with other interested centres information on techniques and procedures used and the results achieved.

Note : Telecommunication functions of WMCs are specified in paragraph 8.1.2.2.

4.4.1 World Meteorological Centres should make optimum use of satellite information, numerical methods and computer techniques.

4.5 Members responsible for Regional Meteorological Centres should ensure that their centre(s) perform the following functions :

(a) issuing of analyses and prognoses on a regional scale for specified areas as required by National Meteorological Centres;

(b) archiving of observational data and processed information for a specified area and making these available for research and climatological purposes;

(c) providing opportunity for training;

(d) supporting research in atmospheric sciences;

(e) exchanging regularly with other interested centres information on techniques and procedures used and the results achieved.

Note : Telecommunication functions of RMCs are mentioned in paragraph 8.1.2.4.

4.5.1 Regional Meteorological Centres should make optimum use of satellite information and, where appropriate, of numerical methods and computer techniques.

CHAPTER 5

SYNOPTIC ANALYSIS AND FORECASTING PRACTICES

1	2
5.1 to 5.2.1.1	7.1 to 7.2.1.1
5.2.1.2	7.2.1.2
The scales along the standard parallels should be as follows for weather charts:	
(a) Covering the world ... 1:60 000 000 or 1:40 000 000	
(b) Covering a hemisphere ... 1:60 000 000 or 1:40 000 000 or 1:30 000 000	
(c) Covering a large part of the hemisphere ... 1:20 000 000	

1	2
(d) Covering a continent or an ocean or considerable parts of either or both ... 1: 7 500 000 or 1:10 000 000 or 1:12 500 000 or 1:15 000 000.	
5.2.1.3 to 5.3.1	7.2.1.3 to 7.3.1
5.3.1.1	7.3.1.1
Diagrams used for representation and analysis of upper-air observations of pressure, temperature, and humidity should : (a) be constructed on the basis of: (i) the values of the physical constants and parameters given in Appendix C; and (ii) the assumption of ideal gas properties, except for the values of both saturation vapour pressure and heats of transformation of phases of water, at specific temperatures; (b) contain a legend listing the principles used in their construction.	
5.3.1.2	7.3.1.2
5.4 to 5.4.1.1	7.4 to 7.4.1.1
5.4.1.2	7.4.1.2
The standard isobaric surfaces for representing and analyzing the conditions in the atmosphere shall be the 1000 mb, 850 mb, 700 mb, 500 mb, 400 mb, 300 mb, 250 mb, 200 mb, 150 mb and 100 mb surfaces.	
5.4.1.3	7.4.1.3
5.4.1.4	7.4.1.4
Members should either prepare or have available upper-air charts for at least four of the six following standard isobaric surfaces: 850 mb, 700 mb, 500 mb, 300 mb, 250 mb, and 200 mb.	
----	7.4.1.5, 7.4.1.6 (to be deleted)
5.5 and 5.5.1	7.5 and 7.5.1

1	2
5.5.1.1	7.5.1.1

Each Member should publish, with as little delay as possible, a daily or monthly bulletin consisting, if so desired, of reports in the international code form, including :

(a) reports made at main standard times by its surface land stations included in the regional basic synoptic network, or a selection of them if the network is dense;

(b) reports from its upper-air stations;

(c) reports from sea stations, or a selection of them if the network is dense.

CHAPTER 6

METEOROLOGICAL CODES

- See present Chapter 5.

CHAPTER 7

CLIMATOLOGICAL PRACTICES

- See present Chapter 8.

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A.3 - The Global Telecommunication System

CHAPTER 8

METEOROLOGICAL TELECOMMUNICATIONS

8.1
GENERAL

8.1.1
ORGANIZATION OF THE GLOBAL TELECOMMUNICATION SYSTEM

8.1.1.1
The Global Telecommunication System shall be organized on three levels:

(a) The Main Trunk Circuit and its branches;
(b) Regional Telecommunication Networks;
(c) National Telecommunication Networks.

8.1.1.2
The Global Telecommunication System should be so organized as to accommodate the volume of meteorological information and its transmission within the required time limits, to meet the needs of World, Regional and National Meteorological Centres, resulting from the implementation of the WWW.

8.1.2
TELECOMMUNICATION FUNCTIONS OF CENTRES

8.1.2.1
World Meteorological Centres, Regional Telecommunication Hubs (and Regional Meteorological Centres in specified cases) and National Meteorological Centres shall ensure the functioning of the Global Telecommunication System.

8.1.2.2
In regard to telecommunications, the World Meteorological Centres shall be responsible for:

(a) Collecting the observational data originating in their zone of responsibility and transmitting such data on the Main Trunk Circuit and its branches;

(b) Relaying as internationally agreed, on the Main Trunk Circuit and its branches, in the appropriate form and speed, the meteorological information which they receive from these circuits and/or from RTHs not situated on the Main Circuit;

(c) Ensuring the selective distribution, in the appropriate form and speed, of meteorological information to the NMCs and to the RTHs not situated on the Main Circuit which they serve;

(d) Checking and correction in order to maintain standard telecommunication procedures.

Note:
Meteorological checking of bulletins shall be performed at the National Meteorological Centre (see paragraph 8.1.6.2).

8.1.2.3
The Regional Telecommunication Hubs shall be responsible for:

(a) Collecting the observational data originating in their zone of responsibility and transmitting such data on the Main Trunk Circuit and its branches, either direct or through the appropriate WMC or RTH;

(b) Relaying as internationally agreed, on the Main Trunk Circuit and its branches, in the appropriate form and speed, the meteorological information which they receive from these circuits and/or from RTHs not situated on the Main Circuit;

(c) Ensuring the selective distribution, in the appropriate form and speed, of meteorological information to the NMCs and to the RTHs not situated on the Main Circuit which they serve;

(d) Checking and correction in order to maintain standard telecommunication procedures.

Note:
Meteorological checking of bulletins shall be performed at the National Meteorological Centre (see paragraph 8.1.6.2).

8.1.2.4
Telecommunication functions of Regional Meteorological Centres

RMCs, not combined with RTHs, should perform telecommunication functions as necessary, in accordance with regional agreement.

8.1.2.5
In regard to telecommunications, the National Meteorological Centres shall be responsible for:

(a) Collecting observational data from their own territory or that of one or more Members according to bilateral agreements and also from the appropriate maritime areas;

(b) Transmitting such data, to the associated Regional Telecommunication Hub and World Meteorological Centre;

(c) Checking and making corrections in order to ensure that standard telecommunication procedures are applied.

8.1.3
ENGINEERING PRINCIPLES OF THE GLOBAL TELECOMMUNICATION SYSTEM

8.1.3.1
The basic engineering principles adopted for the Global Telecommunication System shall provide for integration of global, regional and national telecommunication systems to ensure transmission of the required meteorological information within the specified acceptable time delays.

Note:
Detailed specifications for the engineering of the World Meteorological Centres and Regional Telecommunication Hubs are given in the WWW Global Telecommunication System Manual.

8.1.4
MAIN TRUNK CIRCUIT AND ITS BRANCHES

8.1.4.1
The Main Trunk Circuit and its branches shall link together the World Meteorological Centres as well as certain Regional Telecommunication Hubs.

8.1.4.2
The functions of the Main Trunk Circuit and its branches shall be the following:

(a) To ensure the rapid and reliable exchange of observational data required for making analyses and prognoses on a global scale;

(b) Ensuring the exchange of processed information between the World Meteorological Centres, including data received from meteorological satellites;

(c) Transmitting additional processed information for the purpose of providing Regional Telecommunication Hubs, Regional Meteorological Centres and National Meteorological Centres with the information provided by the WMCs;

(d) Transmitting, when feasible, other observational data and processed information required for inter-regional exchange.

8.1.4.3
The Main Trunk Circuit and its branches shall operate in a segmented "store and forward" mode.

Note:
Specifications of the Main Trunk Circuit are given in the WWW Global Telecommunication System Manual, and details of programmes are given in WMO Publication No. 9.TP.4 - Volume C.

8.1.5
REGIONAL TELECOMMUNICATION NETWORKS

8.1.5.1
The regional telecommunication networks shall allow the WMC and RTH to perform the functions defined in paragraphs 8.1.2.2 and 8.1.2.3 above.

Note:
Specifications of the regional telecommunication networks are given in the WWW Global Telecommunication System Manual, and details of programmes are given in WMO Publication No. 9.TP.4 - Volume C.

8.1.6
NATIONAL TELECOMMUNICATION NETWORKS

8.1.6.1
The national telecommunication networks shall allow the NMC to perform the functions defined in paragraph 8.1.2.5 above.

8.1.6.2
Each Member shall designate a National Meteorological Centre, or any other appropriate centre, responsible for meteorological checking of their collected information before transmission on the Global Telecommunication System and performing the functions mentioned in paragraph 8.1.2.5 above.

8.1.6.3
In order to meet the needs of the World Weather Watch for timely and reliable transmission and reception, Members should take appropriate measures to establish telecommunication networks intended solely for meteorological requirements.

8.2
COLLECTION OF METEOROLOGICAL REPORTS

8.2.1
GENERAL

8.2.1.1
Members shall operate collecting centres charged with the duty of assembling reports from individual land stations, as well as meteorological reports from stations at sea and aircraft.

8.2.2
METEOROLOGICAL REPORTS FROM SHIPS

8.2.2.1
Members responsible for the reception of meteorological reports from ships shall provide the Secretariat with a list of their coastal stations designated for this purpose, including information on location, call-signs, working transmission and reception frequencies.

8.2.2.2
A Member shall send necessary amendments to the information supplied under 8.2.2.1 to the Secretariat.

8.2.2.3
Each Member designating a coastal station for reception of meteorological reports from ships shall confirm to the Secretariat that it will be responsible for any transmission costs of such reports received at that station.

8.2.2.4
Members shall provide their mobile sea stations with details of the procedures for addressing and routeing meteorological reports in different sea areas.

Note:
Details of these procedures are given in the relevant paragraphs of WMO Publication No. 9.TP.4, Volume D.

8.2.2.5
Members responsible for the reception of meteorological reports from ships should arrange that adequate coastal stations are available to discharge this responsibility.

8.2.2.6
Meteorological reports from ships should be transmitted to a coastal station as soon as possible after the time of observation.

8.2.2.7
Each Member shall arrange with the services responsible for operating coastal stations designated to receive meteorological reports from ships so that those stations:

(a) Accept such reports with the least possible delay;

(b) Transmit them immediately to the appropriate collecting centres.

8.2.2.8
Members should not ask a ship to send the same meteorological report to more than one address.

8.2.2.9
Each Member shall arrange in consultation with its Telecommunication Administration that OBS is used in the original call from observing ships to the coastal stations in order to secure the appropriate priority of answer by the coastal station in addition to the inclusion of the present service indicator OBS in the preamble to the message.

8.2.2.10
The abbreviation OBS shall be included as a paid service indicator before the address in ships' weather messages transmitted from observing ships to coastal stations to secure appropriate priority handling of messages by coastal stations.

8.2.2.11
Members should arrange with their telecommunication services for the inclusion of call-signs of ships, when available in the preamble of meteorological reports from selected supplementary and auxiliary ship stations when transmitted from coastal stations to collecting centres.

8.2.2.12
Meteorological reports from ships, when included in collective transmissions, should include the call-sign of the ship.

8.2.2.13
Whenever meteorological reports from ships received at collecting centres are insufficient or unduly delayed, the Member responsible for the collection should first take local or regional action in an endeavour to correct the deficiency and, if such action is not effective, notify the Secretariat.

8.2.2.14
Members should make every effort to encourage ships in ocean areas where shipping is relatively sparse to relay weather messages through other ships when the reporting ship is out of radio contact with land or when communication conditions are difficult.

8.2.2.15
Members should encourage ships to exchange radio weather messages for the benefit of each other when in areas where shipping is sparse or where no regular weather bulletin is issued.

8.2.3
METEOROLOGICAL REPORTS FROM AUTOMATIC SURFACE SYNOPTIC STATIONS

8.2.3.1
Messages from automatic surface synoptic stations put in international code form by an editing station should be transmitted expeditiously to appropriate collection centres.

8.2.3.2
Messages directly transmitted by automatic surface synoptic stations in code form for international exchange should be transmitted with sufficient strength to ensure reception at appropriate collection centres.

8.2.3.3
Members should make every effort to inform other interested Members of radio frequencies and code forms used by drifting automatic stations which may drift beyond the range of the receiving stations of the Members which launched the station.

8.3
TRANSMISSION OF METEOROLOGICAL INFORMATION

8.3.1
GENERAL

8.3.1.1
Transmissions on the circuits of the Global Telecommunication System should adhere to the procedures contained in WWW Global Telecommunication System Manual.

8.3.1.2
Members should provide their meteorological centres responsible for telecommunications with the appropriate means for transmitting meteorological information as reliably, regularly and rapidly as possible as agreed.

8.3.2
POINT-TO-POINT TRANSMISSIONS

8.3.2.1
Members should make maximum use of cable and landline transmission facilities, as well as means of telecommunication with similar technical and operational characteristics.

8.3.3
RADIO BROADCASTS

Until integrated systems of point-to-point circuits are established, radio broadcasts will have to be used in order to meet the requirements for the collection and reception of meteorological information.

8.3.3.1
Radio-teleprinter broadcasts

8.3.3.1.1
Hemisphere broadcasts of meteorological data

8.3.3.1.1.1
A Member accepting the responsibility of making a hemisphere broadcast shall ascertain that this broadcast includes at least the following information:

(a) A representative selection of surface synoptic reports;

(b) A representative selection of upper-air synoptic reports;

(c) Other meteorological data, according to agreements.

8.3.3.1.2
Regional broadcasts

8.3.3.1.2.1
A Member which has accepted responsibility for making a regional broadcast shall ensure that this broadcast includes at least:

(a) An inter-regionally agreed selection of reports of surface and upper-air synoptic stations;

(b) Analyses and forecasts, as inter-regionally agreed;

(c) Other data and meteorological information, as inter-regionally agreed.

8.3.3.1.3
Sub-regional broadcasts

8.3.3.1.3.1
A Member which has accepted responsibility for making a sub-regional broadcast shall ensure that this broadcast includes at least the following information:

(a) Meteorological synoptic reports required by regional agreement for regional and inter-regional dissemination from surface and upper-air synoptic land stations and fixed ship stations;

(b) Meteorological synoptic reports required by regional agreement for regional and inter-regional dissemination from mobile ship stations and aircraft;

(c) Other data and meteorological information as required by regional agreement.

8.3.3.1.4
Territorial broadcasts

8.3.3.1.4.1
Territorial broadcasts shall comprise at least the following information for inclusion in the GTS:

(a) Synoptic surface and upper-air reports originating from land stations and fixed ship stations, which are required by regional agreement for regional and inter-regional exchange of data;

(b) All meteorological reports originating from mobile ship stations, received either directly or through other collecting centres located in the area covered by the territorial broadcasts;

(c) Other data and meteorological information as required by regional agreement.

8.3.3.1.4.2
A Member making territorial transmissions shall ensure that they can be received satisfactorily at the associated RTH.

8.3.3.2
Radio facsimile broadcasts

8.3.3.2.1
Members operating radio facsimile broadcasts should continue them at least until distribution of processed information over point-to-point circuits of the GTS can meet the requirements of Members.

Note:
Details concerning all radio broadcasts are given in the WWW Global Telecommunication System Manual and in the WMO Publication No. 9.TP.4, Volume C.

8.4
RESPONSIBILITIES OF MEMBERS IN THE FIELD OF METEOROLOGICAL TELECOMMUNICATIONS

8.4.1 GENERAL RESPONSIBILITIES

8.4.1.1
Members having accepted responsibility in the field of meteorological telecommunications shall ensure that all appropriate measures are taken for the installation and good functioning of their WMC, RTHs, RMCs and RMCs in relation to their needs and the role which they have accepted in accordance with inter-regional and regional agreements and those between the Members concerned.

8.4.1.2
Members should ensure that their national collecting system for meteorological reports allows not only national but also international needs to be met.

8.4.1.3
When adopting inter-regional and regional telecommunication plans, Members should ensure that technical characteristics and operational methods are established in such a way that they conform to regional meteorological transmission networks.

8.4.1.4
Members making meteorological transmissions should adhere to the practices and procedures supplementing the Technical Regulations which are contained in the WWW Global Telecommunication System Manual.

8.4.1.5
Members making meteorological transmissions shall provide the Secretariat with the contents and schedules of their transmission programmes.

8.4.2 SPECIAL RESPONSIBILITIES FOR RADIO TRANSMISSIONS

8.4.2.1
A Member experiencing difficulties in receiving or observing any deficiencies in a transmission intended for its reception as agreed should first take corrective action of a local nature and, if unsuccessful, subsequently notify in detail the Member making this transmission and also keep the presidents of the relevant regional associations informed as necessary.

8.4.2.2
When a Member estabishes within its territory a routine meteorological transmission intended for use by other Members, the Member shall send the following information, as appropriate, to the Secretariat:

(a) Name and call-sign, or other identification, of transmitting station;

(b) Power supplied to the antenna;

(c) Class of emission, necessary band width;

(d) Frequencies;

(e) Contents, detailed time schedules and WMO category of the transmission;

(f) Index of co-operation and drum speed(s) of facsimile transmitter;

(g) Specific point(s) or area(s) in which the transmission is intended to be received.

8.4.2.3
A Member shall send necessary amendments to the information supplied under 8.4.2.2 to the Secretariat.

8.4.2.4
Amendments to the information supplied under 8.4.2.2 should be sent to the Secretariat at least two months before a routine meteorological transmission is established or a change is made in an existing routine transmission.

8.4.2.5
In addition to the information supplied to the Secretariat under 8.4.2.3 notification of impending changes in frequencies or in time schedule of any routine meteorological radio transmission shall be included within its transmission for main synoptic hours during at least three days immediately prior to the change.

8.4.2.6
When it is necessary to discontinue a transmission intended primarily for reception by other Members provision shall be made to continue to meet the requirements of all recipients of the transmission.

Note:
Transmissions by a Member intended primarily for its own use are not affected by the above, even if they are used by other Members.

8.4.2.7
When it is necessary or desirable to change the mode of a transmission intended primarily for reception by other Members, notice of a duration agreed regionally or multilaterally shall be given to the recipients.

Notes:

(1) On expiry of this notice it will be assumed that the requirements of the recipients are met by the transmissions in the new mode.

(2) Transmissions by a Member intended primarily for its own use are not affected by the above, even if they are used by other Members.

Section B - Research Activities

CHAPTER 9

METEOROLOGICAL BIBLIOGRAPHY AND PUBLICATIONS

See present Chapter 9.

Section C - Applications of meteorology to various human activities

CHAPTER 10

METEOROLOGICAL SERVICE TO MARINE ACTIVITIES

See present Chapter 10 and amendments proposed by CMM-V.

CHAPTER 11

METEOROLOGICAL SERVICE FOR AGRICULTURE

See present Chapter 11.

ANNEXES I AND II

See present Annexes I and II.

APPENDICES A, B, C AND D

See present Appendices A, B, C and D.

APPENDICE E

In the table of symbols under I.A.(3) - Present weather, the symbol ww = 07 shall be . Otherwise, the present Appendix E remains unchanged.

VOLUME II

CHAPTER 12

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

See present Chapter 12.

RECOMMENDATIONS OF THE COMMISSION FOR SYNOPTIC METEOROLOGY ADOPTED PRIOR TO ITS FIFTH SESSION AND MAINTAINED IN FORCE

Rec. 63 (70-CSM) - INCLUSION OF SHIPS' REPORTS FROM THE SOUTHERN HEMISPHERE AND FROM TROPICAL ZONES IN BULLETINS EXCHANGED ON THE MAIN TRUNK CIRCUIT

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 21 (CMM-V) - Requirements for transmisssion of ships' weather reports,

CONSIDERING:

(1) That the recommendation referred to above expresses a requirement for all ships' weather reports from the southern Hemisphere and tropical zones to be included in global exchanges,

(2) That urgent measures should be taken to ensure that the GTS meets the above requirements,

RECOMMENDS that Members be requested to ensure that all ships' weather reports received at their coastal radio stations from the southern Hemisphere and from tropical zones be included in the global exchanges with the least possible delay.

Rec. 64 (70-CSM) - PRIORITIES IN THE IMPLEMENTATION OF THE WWW NATIONAL AND REGIONAL TELECOMMUNICATION NETWORKS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 16 (Cg-V) - World Weather Watch,

CONSIDERING:

(1) That the timely availability of observational data at centres of the Global Data-Processing System is an indispensable condition of the adequate functioning of the World Weather Watch,

(2) That, in many parts of the world, in particular in the southern Hemisphere and South Asia, this condition is far from being met, partly as a consequence of the inadequacy of the telecommunication networks at the national and regional levels,

RECOMMENDS that Members and Regional Associations concerned be invited to give highest priority in the implementation of the WWW Global Telecommunication Plan for:

(a) The collection of the observational data at the national level;

(b) The transmission of the collected data to WMCs and RTHs on the Main Trunk Circuit,

within the time limits specified by the WWW Plan (Appendix II, paragraph 17).

Rec. 65 (70-CSM) - ENGINEERING PRINCIPLES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 16 (Cg-V), WWW Plan, Appendix III, paragraph 8,

CONSIDERING the need for the transmission of non-routine meteorological messages and the exchange of service messages between meteorological telecommunication centres,

RECOMMENDS that the following engineering principles be adopted:

(1) That, in addition to catering for the transmission of routine meteorological messages, the Global Telecommunication System be engineered for the transmission of non-routine meteorological messages (including urgent messages); the non-routine messages to be transmitted as adressed messages to specific meteorological telecommunication centres;

(2) That, in the Global Telecommunication System, provision be made for the exchange of service messages beween meteorological telecommunication centres.

Rec. 66 (70-CSM) - AMENDMENTS TO CODE FORMS FM 71.D - CLIMAT AND FM 72.D - CLIMAT SHIP

THE COMMISSION FOR SYNOPTIC METEOROLOGY:

NOTING:

(1) Paragraph 9.6 of the General Summary of the Abridged Final Report of CCl-V,

(2) Recommendation 3 (CCl-V), as approved by the President of WMO on behalf of the Executive Committee,

CONSIDERING that the improvements in the data published on the basis of CLIMAT messages, as required by Recommendation 3 (CCl-V), necessitate changes of the code forms FM 71.D - CLIMAT and FM 72.D - CLIMAT SHIP,

RECOMMENDS:

(1) That the code forms FM 7.1D - CLIMAT and FM 72.D - CLIMAT SHIP as given in the annex to this recommendation be adopted for the international exchange of monthly mean surface data from land and ocean weather stations;

(2) That these new code forms become effective on 1 January 1971.

A n n e x

AMENDED CODE FORMS

FM 71.D - Report of monthly means from land station

CLIMAT IIiii $\overline{P_oP_oP_oP_o}$ $\overline{PPPP}$ $s_n\overline{TTT}$ $\overline{eee}n_rn_r$ $R_1R_1R_1R_1R_d$

(NORMAL $\overline{P_oP_oP_oP_o}$ $\overline{PPPP}$ $s_n\overline{TTT}$ $\overline{eee}n_rn_r$ $R_1R_1R_1R_1/$)

NOTES : Amend Note (2) accordingly and renumber Notes (2), (3) and (4) as (3), (4) and (5). Insert new Note (2) to read :

"When monthly total precipitation is not available, the last group $R_1R_1R_1R_1R_d$ shall be omitted from the report and n_rn_r shall be coded //."

FM 72.D - Report of monthly means from ocean weather station

CLIMAT SHIP $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$

$\overline{PPPP}$ $s_n\overline{TTT}$ $\left\{\begin{array}{lll} 9s_n\overline{T_wT_wT_w} & \overline{eee}n_rn_r & R_1R_1R_1R_1R_d \\ \text{or} & & \\ 8s_n\overline{T_wT_wT_w} & \overline{eee}// & \end{array}\right.$

(NORMAL $\overline{PPPP}$ $s_n\overline{TTT}$ $\left\{\begin{array}{lll} 9s_n\overline{T_wT_wT_w} & \overline{eee}n_rn_r & R_1R_1R_1R_1/ \\ \text{or} & & \\ 8s_n\overline{T_wT_wT_w} & \overline{eee}//) & \end{array}\right.$

NOTES : Amend Note (2) accordingly.

NEW OR AMENDED SYMBOLIC LETTERS

Delete : $\overline{PP}$, $R_1R_1R_1$ and their specifications.

Add : $\overline{PPPP}$ Monthly mean pressure, in tenths of a millibar, or monthly mean geopotential, in geopotential metres, for surface stations. (FM 71.D, FM 72.D)

(1) $\overline{PPPP}$ indicates the pressure reduced to an agreed datum level specified for PPP, or the geopotential of an agreed standard constant pressure level specified for PPP.

(2) When $\overline{PPPP}$ is given in the occasional broadcasts of normal data, following the code word NORMAL, it represents the normal value of the pressure or geopotential for the month, deduced from observations over a 30-year normal period.

$\overline{P_oP_oP_oP_o}$ Monthly mean pressure at station level in tenths of a millibar. (FM 71.D)

(1) If the monthly mean pressure at station level is 1000 mb or above, the first figure of $\overline{P_oP_oP_oP_o}$ shall be 0.

(2) See Note (2) under $\overline{PPPP}$.

$R_1R_1R_1R_1$ Total precipitation for the month. (Code 3596) (FM 71.D, FM 72.D)

s_n Sign of temperature. (Code 3845) (FM 71.D, FM 72.D)

NEW OR AMENDED CODE TABLES

Delete : Code 3591 $R_1R_1R_1$ - Total precipitation for the month.

Add :

Code 3596

$R_1R_1R_1R_1$ - Total precipitation for the month

Code figure	mm
0000	No precipitation
0001	1
0002	2
etc.	etc.
8898	8898
8899	8899 mm or more
9999	More than zero and less than 1 mm

Code 3845

s_n - Sign of temperature

Code figure	
0	Temperature positive or zero
1	Temperature negative

LIST OF DOCUMENTS

I. "DOC" series

Doc. No.	Title	Agenda item	Submitted by
1	Provisional agenda	2	-
2	Explanatory memorandum relating to the provisional agenda	2	-
3	Co-ordination of data needs and proposals for codes Requirement for consideration of special needs of automatic weather stations for surface synoptic codes	4	President of CIMO
4	Global Telecommunication System	7	Chairman of the working group
5	Definitions of meteorological phenomena Review of the definitions and descriptions of hydrometeors contained in the International Cloud Atlas, Volume I (WMO, 1956)	8	Chairman of the working group

Doc. No.	Title	Agenda item	Submitted by
6	Review of the Guide to the Preparation of Synoptic Weather Charts and Diagrams Proposed amendments to the Guide as a consequence of changes of the international codes introduced as from January 1968, and further proposals for the enlargement of the Guide	6.4	Secretary-General
7	Co-ordination of data needs and proposals for codes Standard levels in the high atmosphere	4	Secretary-General
8	Review of previous resolutions and recommendations of the Commission and relevant Executive Committee decisions	12	Secretary-General
9	Co-ordination of data needs and proposals for codes Adoption of the 250 mb level as a standard isobaric level CORR.1 (French and Spanish only)	4	Secretary-General

Doc. No.	Title	Agenda item	Submitted by
10	General review of Technical Regulations Report of the Chairman of the Working Group on Technical Regulations	11	Chairman of the working group
11	Global Observing System - Co-ordination of matters relating to GOS Report of the Chairman of the Working Group on Synoptic Use of Meteorological Satellite Data	5	Chairman of the working group
12	Global Telecommunication System Review and follow-up of decisions of the fifth session of the CSM Working Group on Telecommunications ADD.1; ADD.2 APP. A, ADD.1	7	Secretary-General
13	Organization of meteorological activities in the field of synoptic meteorology Report of the Rapporteur on the Organization of Meteorological Activities in the Field of Synoptic Meteorology	5; 6; 9; 10	Rapporteur

Doc. No.	Title	Agenda item	Submitted by
14	Global Observing System - Co-ordination of matters relating to GOS Frequency of upper-air observations in the tropics	5	United Kingdom
15	Co-ordination of data needs and proposals for codes Report of the Chairman of the Working Group on Data Needs and Codes	4	Chairman of the working group
16	General review of Technical Regulations Review of the Technical Regulations in the light of the World Weather Watch ADD.1 ADD.2	11	Dr. O. Lönnqvist
17	Co-ordination of data needs and proposals for codes Summary of comments received on the report of the second session of the Working Group on Data Needs and Codes, and revised proposals for codes	4	Chairman of the working group
18	Co-ordination of data needs and proposals for codes Report of the Rapporteur of the Data Needs and Codes Sub-Group to study codes for present and past weather to be reported in surface synoptic observations	4	Mr. I. S. Kerr

Doc. No.	Title	Agenda item	Submitted by
19	Global Observing System Co-ordination of matters relating to GOS CORR.1	5	Secretary-General
20	Co-ordination of data needs and proposals for codes Proposal for a code form intended for the exchange of data obtained by satellite	4	Secretariat
21	Global Telecommunication System Coded digital facsimile	7	Rapporteur of the study group
22	Co-ordination of data needs and proposals for codes Report of the Rapporteur of the Data Needs and Codes Sub-Group to recommend a code form for the transmission of grid-point values	4	Dr. B. R. Döös
23	Composition of working groups	14	Secretary-General

Doc. No.	Title	Agenda item	Submitted by
24	Global Observing System - Co-ordination of matters relating to GOS Report of the Rapporteur on Network Density Criteria	5	Rapporteur
25	Report of the Chairman of the CSM Working Group on Telecommunications	7	Chairman of the working group
26	Report of the President of the Commission	3	Acting President
27	Global Data-Processing System Implementation aspects of the Global Data-Processing System	6.1; 6.2	Secretary-General
28	Global Observing System - Co-ordination of matters relating to GOS Satellite sounding of the atmosphere	5	United States of America
29	Co-ordination of data needs and proposals for codes Code for transmission of grid-point values	4	United States of America

Doc. No.	Title	Agenda item	Submitted by
30	Co-ordination of data needs and proposals for codes Code group for coding state of sky in the tropics for use in synoptic surface observations	4	United States of America
31	Global Observing System - Co-ordination of matters relating to GOS Derivation of winds from geostationary satellite pictures	5	United States of America
32	Scientific lectures and discussions	13	Secretariat
33	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Review of forecast verification techniques	6.3	Professor E. M. Dobryshman
34	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Report of the Rapporteur on Long-Range Weather Forecasting	6.3	Rapporteur

Doc. No.	Title	Agenda item	Submitted by
35	Proposals for the up-dating of Volume A of WMO Publication No. 9.TP.4	5	Secretary-General
36	Co-ordination of data needs and proposals for codes Code forms for ocean parameters	4	Secretariat
37	Global Telecommunication System	7	Secretary-General
38	Definition of meteorological phenomena Suggested solution to the problem of defining a "convergence line"	8	Rapporteur on Synoptic Meteorology in the Tropics
39	Education and training in synoptic meteorology Report of the Chairman of the Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology	10	Chairman of the working group

Doc. No.	Title	Agenda item	Submitted by
40	Practical aspects of analysis and forecasting problems Report of the Chairman of the Joint CAS/CSM Working Group on Numerical Weather Prediction	6.3	Chairman of the working group
41	Co-ordination of data needs and proposals for codes Revision of the Notes in Part A, Chapter I of Volume B, WMO Publication No. 9.TP.4	4	Mr. C. G. Reeves
42	Co-ordination of data needs and proposals for action Review of aeronautical meteorological codes	4	ICAO Secretariat
43	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Report of the Rapporteur on Synoptic Meteorology in the Tropics	6.3	Rapporteur
44	Proposed WWW Plan 1972-1975	5; 6; 7	Secretary-General

Doc. No.	Title	Agenda item	Submitted by
45	A survey of studies of and proposals on the utilization of vertical wind shear data	4	Hydrometeorological Service of the U.S.S.R.
46	Co-ordination of data needs and proposals for codes Comments and suggestions of CMM on code forms for marine purposes	4	President of CMM
47	Co-ordination of data needs and proposals for codes - Global Telecommunication System Aeronautical requirements for 250 mb level data	4, 7	ICAO Secretariat
48	Global Observing System - Co-ordination of matters relating to GOS Weather observations from sparse oceanic areas	5	South Africa
49	Rationalization of the types of output products of the Global Data Processing System National Meteorological Centres in relation to WMCs and RMCs	6.2	South Africa

Doc. No.	Title	Agenda item	Submitted by
50	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Automation and weather prediction	6.3	United States of America
51	Global Observing System - Co-ordination of matters relating to GOS Data from automatic weather stations	5	United States of America
52	Co-ordination of data needs and proposals for codes Data needs for operational hydrology	4	President of CHy
53	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Report of the CSM Rapporteur, Dr. P. I. Miljukov, on Meteorological Forecasts of Importance to Hydrological Forecasting	6.3	Secretary-General

Doc. No.	Title	Agenda item	Submitted by
54	Global Observing System - Co-ordination of matters relating to GOS - Global Data-Processing System - Global Telecommunication System	5, 6, 7	Secretary-General
55	Global Observing System - Co-ordination of matters relating to GOS Potential meteorological observing systems during the 1970's	5	United States of America
56	Practical aspects of analysis and forecasting problems (including numerical weather prediction and tropical forecasting) Use of asynoptic data	6.3	United States of America
57	Global Telecommunication System Status and proposal for use of telecommunication facilities for seismological data	7	United States of America
58	Co-ordination of data needs and proposals for codes Report on the third and final test of the proposed code form for the transmission of grid-point values	4	Chairman of the Working Group on Data Needs and Codes

Doc. No.	Title	Agenda item	Submitted by
59	Co-ordination of data needs and proposals for codes and Global Observing System - Co-ordination of matters relating to GOS Formats of air reports used as basic meteorological data	4; 5	United States of America
60	Global Data-Processing System - Composition of working groups Proposal to establish a Working Group for Co-ordination of Technical Operational Matters of the Global Data-Processing System	6; 14	United States of America
61	Co-ordination of data needs and proposals for codes Re-location of time group in METAR/SPECI and period-of-validity group in TAF	4	Secretary-General
62	Global Telecommunication System Revision of data designators	7	France
63	Co-ordination of data needs and proposals for codes Proposal for a change in the SHIP code	4	U.S.S.R.
64	Co-ordination of data needs and proposals for codes Calculation by computer of geopotential, temperature, dew-point deficit, direction and wind velocity at standard isobaric surfaces using data at significant points	4	Hydrometeorological Service of the U.S.S.R.

Doc. No.	Title	Agenda item	Submitted by
65	Co-ordination of data needs and proposals for codes Results of tests of SYNOP and SHIP codes	4	Hydrometeorological Service of the U.S.S.R.
66	Co-ordination of data needs and proposals for codes The coding of wind speeds in the SYNOP and SHIP code forms	4	Hydrometeorological Service of the U.S.S.R.

II. "PINK" series

Doc. No.	Title	Agenda item	Submitted by
1	Opening of the session	1	President of CSM
2	Preliminary report of plenary on item 4 - Co-ordination of data needs and proposals for codes	4	Chairman of Committee A
3	Organization of the session	2	Acting President of CSM
4	Education and training in synoptic meteorology	10	Chairman of Committee C

Doc. No.	Title	Agenda item	Submitted by
5	Report to Plenary on item 9 - Organization of meteorological activities in the field of synoptic meteorology	9	Chairman of Committee C
6	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes	4	Chairman of Committee A
7	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
8	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
9	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
10	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
11	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
12	Report of Committee B to Plenary on item 7 - Global Telecommunication System CORR.1	7	Chairman of Committee B
13	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
14	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
15	Report of Committee B to Plenary on item 7 - Global Telecommunication System CORR.1	7	Chairman of Committee B
16	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
17	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
18	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code form for radar observations	4	Rapporteur of Ad-hoc Group A
19	Draft report to Plenary on item 6 - Global data processing system	6	Chairman of Committee C
20	Report to Plenary on item 5 - Global Observing System Co-ordination of matters relating to GOS	5	Chairman of Committee C
21	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code forms for upper-air observations	4	Chairman of Committee A
22	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code forms for reporting ocean parameters	4	Chairman of Committee A

Doc. No.	Title	Agenda item	Submitted by
23	Report to Plenary on item 8 - Definitions of meteorological phenomena	8	Chairman of Committee A
24 REV.1	Report to Plenary on item 13 - Scientific lectures and discussions	13	Vice-President
25	Report on item 6 - Global data processing system	6	Chairman of Committee C
26	Report to Plenary on item 12 - Review of previous resolutions and recommendations of the Commission and relevant Executive Committee decisions	12	Chairman of Committee C
27 REV.1	Election of officers	15	Chairman of the Nomination Committee
28	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Codes for aeronautical purposes ADD.1	4	Chairman of Committee A

Doc. No.	Title	Agenda item	Submitted by
29	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
30	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Evaluation and determination of data needs	4	Chairman of Committee A
31	Report to Plenary on item 5 - Global Observing System - Co-ordination of matters relating to the GOS Establishment of the Working Group on the Global Observing System	5	Chairman of Committee C
32	Report to Plenary on item 11 - General review of Technical Regulations	11	Chairman of Committee C
	ADD.1	11;7	Chairman of Committee B
33	Report to Plenary on item 3 - Report by the President of the Commission	3	Chairman of Committee C

Doc. No.	Title	Agenda item	Submitted by
34	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Revision of notes in chapter I of Volume B	4	Chairman of Committee A
35	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Reconstruction of the actual soundings from Parts B and D of TEMP	4	Chairman of Committee A
36	Report to Plenary on item 5 - Global Observing System - Co-ordination of matters relating to the GOS	5	Chairman of Committee C
37	Report to Plenary on item 6 - Global data-processing system	6	Chairman of Committee C
38	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
39	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
40	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Establishment of the Working Group on Codes	4	Chairman of Committee A
41	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code form for the transmission of grid-point values	4	Chairman of Committee A
42	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
43	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B
44	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
45	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Standard format for the exchange of aircraft reports for synoptic purposes	4	Chairman of Committee A
46	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code form for the exchange of synoptic surface observations originating from automatic weather stations	4	Chairman of Committee A
47	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Revision of code forms in Chapter 1 of Volume B CORR.1	4	Chairman of Committee A
48	Report of Committee B to Plenary on item 7 - Global Telecommunication System	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
49	Report to Plenary on item 4 - Co-ordination of data needs and proposals for codes Code form for synoptic surface observations	4	Chairman of Committee A
50	Report to Plenary on item 4 Co-ordination of data needs and proposals for codes Code form for reporting synoptic interpretation of cloud data obtained by meteorological satellites	4	Chairman of Committee A
51	Election of officers	15	Secretary-General's representative
52	Report of ad hoc Committee on the nomination of chairmen and members of working groups and of rapporteurs	14	Rapporteur of ad hoc Committee

W O R L D   M E T E O R O L O G I C A L   O R G A N I Z A T I O N

Supplement to WMO Publication No. 269.RP.86,

Abridged Final Report of

the Fifth Session of the Commission for Synoptic Meteorology

Decisions of the Executive Committee

on the Abridged Final Report

of the Fifth Session of the Commission for Synoptic Meteorology

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This document should be considered as a guide to the status of the decisions adopted at the fifth session of the Commission for Synoptic Meteorology.

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A. DECISIONS RECORDED IN THE GENERAL SUMMARY OF THE WORK OF EC-XXII (Relevant extracts)

2.1 Report of the President of the Organization (Agenda item 2.1)

2.1.4 The Executive Committee endorsed the President's approval of the following recommendations:

- Recommendation 3 (CCl-V) - CLIMAT Messages
- Recommendation 63 (70-CSM) - Inclusion of Ships' Reports from the Southern Hemisphere and from Tropical Zones in Bulletins exchanged on the Main Trunk Circuit
- Recommendation 64 (70-CSM) - Priorities in the Implementation of the WWW National and Regional Telecommunication Networks
- Recommendation 65 (70-CSM) - Engineering Principles for the Global Telecommunication System
- Recommendation 66 (70-CSM) - Amendments to Code forms FM 71.D - CLIMAT and FM 72.D - CLIMAT SHIP
- Recommendation 44 (70-CSM) - Facsimile Test Chart
- Recommendation 18 (CMS-V) - Location of Period-of-Validity Group in TAF.

4.10 <u>Synoptic Meteorology</u> (including the report of the president of CSM) (Agenda item 4.10)

4.10.1 The Executive Committee noted with appreciation the report of the president of CSM. It also noted the final report of the fifth session of CSM and recorded its decisions on the recommendations developed at this session in Resolutions 14 and 15 (EC-XXII);

4.10.2 With regard to Recommendations 15 and 16 (CSM-V) concerning the new code forms BATHY and TESAC for ocean parameters, the Executive Committee was informed that principles for criteria for the selection of significant depths, which are based on characteristics of the temperature and/or salinity profile, had recently been developed by the IOC Working Group on International Oceanographic Data Exchange, in consultation with the International Council for the Exploration of the Sea. It requested the president of CSM to arrange for the inclusion of this material, when approved, in the notes under the code forms concerned.

4.10.3 With regard to Recommendation 22 (CSM-V) - Code form for synoptic surface observations, one member of the Committee indicated that the increased length of SYNOP messages in bad weather conditions was likely to lead to a temporary reduction of the number of reports which could be transmitted, particularly in parts of the southern hemisphere. The Committee was, however, informed that the pros and cons of the new code had been thoroughly discussed by CSM-V and that these discussions had resulted in a general support of the new code form. Moreover, the Committee noted that provision was made for a trial period to test the new code, in preparation of its introduction on 1 January 1975. With these considerations in mind, the Committee approved Recommendation 22 (CSM-V).

4.10.4 The Committee, when approving the other code changes which were recommended for implementation as from 1 January 1972, noted with satisfaction that the Secretary-General had taken steps for advance copies of the code amendments, as approved by the Executive Committee, to be sent to Members of the Organization.

4.10.5 While the amendments to Volume I of the WMO International Cloud Atlas as proposed by Recommendation 41 (CSM-V), implied a change to an annex to the Technical Regulations, the Committee agreed that a decision could not be postponed until next Congress since the changes in the definitions and descriptions of hydrometeors corresponded to approved changes in the International Meteorological Code Tables.

4.10.6 In approving Recommendations 31 and 42 (CSM-V), the Committee agreed that there was a requirement for regulatory material of a type which could be more easily amended, in the light of new developments, than the material contained in the WMO Technical Regulations. Such material would find its place in the proposed manuals.

4.10.7 Finally, the Committee noted that CSM had asked for guidance from the Executive Committee regarding the use of the GTS for the transmission of seismic data as requested by IUGG. It considered that the IUGG request should be examined within the general framework of geophysical information as provided for in the WMO Convention. Already the GTS will be used to exchange data observed in IGOSS, the plan of which was jointly developed and approved by the IOC and WMO; indeed, many of these data which require undelayed exchange are of interest both to oceanographers and to meteorologists. The Committee further noted that the president of CAS had advised that the question is also likely to arise of the use of the GTS to exchange solar terrestrial data.

Some concern was therefore expressed that the exchange of increasing amounts of geophysical data of different types through the GTS might interfere with the transmission of those meteorological operational data where the value decreases rapidly with delay. On the other hand, it was noted that exchanges of seismic data are already being carried on a number of high speed GTS channels; such exchanges were found most useful and did not interfere with existing exchanges as they are carried out in off-peak periods and the volume of traffic is very small. The Committee agreed that, as more high speed GTS channels became available, the use of the GTS for the exchange of a variety of types of geophysical data would become increasingly practicable.

In conclusion, the Executive Committee agreed in principle that the GTS be used for the transmission of environmental geophysical information. It requested the Secretary-General to inform all concerned of this decision. The Committee further stipulated that when developing arrangements for the transmission of new types of environmental data, the CSM should apply the same criteria of relevance and of operational priorities with regard to the transmission of new environmental information as are applied to the data already planned for transmission on the GTS.

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B. RESOLUTIONS

Resolution 14 (EC-XXII)

REPORT OF THE FIFTH SESSION OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE EXECUTIVE COMMITTEE,

HAVING CONSIDERED the abridged final report of the fifth session of the Commission for Synoptic Meteorology,

DECIDES:

(1) To note the report;

(2) To note Resolutions 1-8 (CSM-V);

(3) To embody the substance of the following recommendations in a resolution of the Executive Committee as indicated:

Recommendations 1 to 5 inclusive, 7 to 19 inclusive, 21 and 23 (CSM-V) in Resolution 15 (EC-XXII);

(4) To take taction on the remaining recommendations as follows:

Recommendation 6 (CSM-V) - Standardized format for the exchange of aircraft reports for synoptic purposes

(a) Notes this recommendation;

(b) Requests the Secretary-General to inform ICAO in respect of Recommendation 5.1/2 of the ICAO Sixth Air Navigation Conference:

(i) Of the meteorological requirements, as expressed by the Commission, for a standardized format for the exchange of AIREP for synoptic purposes;

(ii) Of the need for the early introduction of a standardized format of aircraft reports which takes into account the meteorological requirements.

Recommendation 20 (CSM-V - Code form for reporting synoptic interpretation of cloud data obtained by meteorological satellites

Recommendation 22 (CSM-V) - Code form for synoptic surface observations

(a) Approves these recommendations;

(b) Invites Members to test the code forms and inform the Secretary-General, not later than 1 October 1972, of the results of the tests;

(c) Invites the president of CSM, with the assistance of the Secretary-General to take the necessary steps to ensure the timely incorporation of the results of the tests in the code forms for introduction for international use as from 1 January 1975;

(d) Invites the presidents of the regional associations with the assistance of the Secretary-General to co-ordinate the development of revised regional coding procedures, pertinent to the new code form for synoptic surface observations, with the actions taken by the president of CSM under (c) above.

Recommendation 24 (CSM-V) - Revision of Notes in Chapter I of Volume B

(a) Approves this recommendation;

(b) Directs the Secretary-General to take the necessary action in consultation with the president of CSM.

Recommendation 25 (CSM-V) - Reference in Volume B to the selection of elements from synoptic reports for inclusion in weather bulletins for shipping

(a) Approves this recommendation;

(b) Requests the Secretary-General to incorporate the information mentioned in Recommends (2) in the Introduction to Part A of Chapter I of Volume B at the time of the introduction of the revised Notes in this chapter.

Recommendation 26 (CSM-V) - Priority of synoptic time for upper-air observations

(a) Approves this recommendation;

(b) Requests the Secretary-General to bring the recommendation to the attention of the presidents of regional associations.

Recommendation 27 (CSM-V) - Up-dating of Volume A of WMO Publication No. 9.TP.4

(a) Approves this recommendation;

(b) Requests the Secretary-General to implement it as soon as possible.

Recommendation 28 (CSM-V) - Output products of WMCs

Recommendation 29 (CSM-V) - Output products of RMCs

(a) Approves these recommendations;

(b) Requests the Secretary-General to bring them to the attention of all concerned.

<u>Recommendation 30 (CSM-V) - Publication of a Guide on the Global Data Processing System</u>

(a) Approves this recommendation;

(b) Requests the president of CSM to arrange in consultation with the Secretary-General for the early preparation of the guide,

(c) Requests the Secretary-General to publish the guide, when prepared, in the four official languages of the Organization.

<u>Recommendation 31 (CSM-V) - WWW - Global Telecommunication Systems Manual</u>

(a) Approves this recommendation;

(b) Instructs the Secretary-General:

(i) To prepare, in consultation with the president of CSM, the manual which replaces the present Guide to Meteorological Telecommunications, included in the WMO Publication No. 9.TP.4, Volume C;

(ii) To make proposals to Cg-VI on the status of the Global Telecommunication System Manual and its relationship to the WMO Technical Regulations.

<u>Recommendation 32 (CSM-V) - Organization of the Global Telecommunication System</u>

<u>Recommendation 33 (CSM-V) - Contents of global exchanges</u>

<u>Recommendation 34 (CSM-V) - Meteorological telecommunication procedures for the Global Telecommunication System</u>

<u>Recommendation 35 (CSM-V) - Error-control procedures in respect of data transmission</u>

<u>Recommendation 36 (CSM-V) - Transmission and relay of pictorial information over circuits operated on a shared data/facsimile (analogue) transmission basis</u>

<u>Recommendation 37 (CSM-V) - Technical characteristics and specification of meteorological transmissions</u>

<u>Recommendation 38 (CSM-V) - Reports of reception conditions of meteorological radio transmission</u>

(a) Approves these recommendations;

(b) Authorizes the president of CSM, in consultation with the Secretary-General to approve such minor adjustments of the texts given in the annexes to the above recommendations as they are required;

(c) Directs the Secretary-General to bring them to the attention of all concerned.

Recommendation 39 (CSM-V) - Implementation dates of meteorological telecommunication procedures for the Global Telecommunication System

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring the implementation dates to the attention of all concerned.

Recommendation 40 (CSM-V) - Implementation dates of the Main Trunk Circuit and its branches

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring it to the attention of all concerned;

(c) Directs the Secretary-General to assist in the co-ordination of the implementation of the Main Trunk Circuit and its branches as necessary.

Recommendation 41 (CSM-V) - Amendments to Volume I of the WMO International Cloud Atlas

(a) Approves this recommendation;

(b) Requests the Secretary-General to arrange for the publication of the revised definitions of hydrometeors as a replacement of the relevant part of the definitions of Chapter II of Volume I, Part II, of the International Cloud Atlas.

Recommendation 42 (CSM-V) - Amendments to the Technical Regulations

(a) Notes this recommendations;

(b) Requests the Secretary-General:

(i) To arrange for the re-editing of the Technical Regulations, incorporating the amendments recommended by the technical commissions;

(ii) Prepare and submit to the Sixth Congress a re-edited version of the Technical Regulations (present chapters I-XI);

(iii) To make proposals to Sixth Congress on the status to be given to "Manuals" which imply obligations for Members in respect of WWW.

Recommendation 43 (CSM-V) - Revision of resolutions of the Executive Committee based on previous recommendations of the Commission for Synoptic Meteorology

(Action on this recommendation was taken under agenda item 5.8)

DIRECTS the Secretary-General to inform all concerned.

NOTE: This resolution replaces Resolution 12 (EC-XVIII) which is no longer in force.

Resolution 15 (EC-XXII)

MODIFICATIONS TO THE INTERNATIONAL METEOROLOGICAL CODES

THE EXECUTIVE COMMITTEE,

NOTING Recommendations 1 to 5 inclusive, 7 to 19 inclusive, 21 and 23 (CSM-V),

CONSIDERING the need for bringing the international meteorological forms of messages and codes up to date as proposed by the Commission for Synoptic Meteorology,

DECIDES:

(1) To approve Recommendations 1 to 5, 7 to 14, 19, 21 and 23 (CSM-V),

(2) To approve Recommendations 15 and 16 (CSM-V) with the understanding that the code forms and/or the date of applicability will be further considered in the event that IOC does not accept the same code forms with effect from the same date;

(3) To approve Recommendation 17 (CSM-V) on the understanding that the date of applicability will be further considered in the event that it is not found acceptable by ICAO;

(4) To confirm the approval of Recommendation 18 (CSM-V) by the President of WMO acting on behalf of the Executive Committee in accordance with Regulation 9(5) of the General Regulations;

(5) That the amendments and new code forms resulting from Recommendations 1 to 5, 7 to 17, 19, 21 and 23 (CSM-V) come into force on 1 January 1972;

REQUESTS the president of CSM to arrange, in consultation with the Secretary-General, for any necessary minor changes in the new and revised code forms approved by the Executive Committee to be made;

DIRECTS the Secretary-General to publish and distribute, before July 1971, the new code decisions in Volume B, WMO Publication No. 9.TP.4.