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COMMISSION FOR SYNOPTIC METEOROLOGY

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OF THE
FOURTH SESSION

Wiesbaden, 8 March - 2 April 1966

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NOTE

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CSM

Working Group on Data Needs and Codes

Mr. G. Doumont (Chairman) (Belgium)	Mr.G. Doumont
M. Allouche (Tunisia)	Chairman, CSM Working Group
E. Carlsen (Denmark)	on Data Needs and Codes
A. Durget (France)	Régie des Votes Aériennes
W.M. Levi (Israel)	Bureau des Prévisions
V. Mastino (Italy)	Météorologiques
J.A. Oyebode (Nigeria)	Aéroport des Bruxelles-National
C.G. Reeves (U.S.A.)	Belgique
Miss F. Feutt (Poland)	
K. Agematsu (Japan	

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LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

S. N. Sen	president
K. T. Logvinov	vice-president

2. Representatives of Members of WMO

H. T. Ashton	principal delegate	Australia
L. Kletter	principal delegate	Austria
B. Knirsch	delegate	
L. Dufour	principal delegate	Belgium
G. Doumont	delegate	
L. R. Ratisbona	principal delegate	Brazil
I. S. Bustamente	delegate	
A. A. Glomozda	principal delegate	Byelorussian S.S.R.
L. Skripko	delegate	
G. Amjouzoa	principal delegate	Cameroon
F. W. Benum	principal delegate	Canada
H. Cameron	delegate	
G. A. Fozard	delegate	
Kenneth T. C. Cheng	principal delegate	China, Republic of
Lai-chao Ying	delegate	
I. Mandiangu	principal delegate	Congo, Democratic Republic of
G. Golbert	delegate	
M. E. Rodriguez Ramirez	principal delegate	Cuba
L. Lysgaard	principal delegate	Denmark
E. Carlsen	delegate	
B. Jensen	delegate	
S. N. Venho	principal delegate	Finland
T. Peltonen	delegate	
P. Leclercq	principal delegate	France
R. Pône	delegate	
J. Combe	delegate	
A. Durget	delegate	
M. Sonnet	delegate	
H. K. Meyer	principal delegate	Germany, Federal Republic of
P. Wüsthoff	delegate	
H. Baumgärtner	delegate	
J. Grunenberg	delegate	
J. Mollwo	delegate	
H. Piper	delegate	
A. Bahling	delegate	

2. Representatives of Members of WMO (continued)

G. Georgoutsos	principal delegate	Greece
F. Dési	principal delegate	Hungary
Z. Ozorai	delegate	
L. Adamy	delegate	
H. Sigtryggsson	principal delegate	Iceland
C. Ramaswamy	principal delegate	India
S. N. Sen	delegate	
P. M. A. Bourke	principal delegate	Ireland
P. K. Rohan	delegate	
M. W. Levi	principal delegate	Israel
M. Montalto	principal delegate	Italy
G. Giallombardo	delegate	
V. Mastino	delegate	
A. Fàntoli	delegate	
A. Imazato	principal delegate	Japan
K. Agematsu	delegate	
A. L. Huneidi	principal delegate	Jordan
H. T. Mörth	principal delegate	Kenya
S. M. Seo	principal delegate	Korea, Republic of
R. Saadeldin	principal delegate	Kuwait
A. Saadoun Al-Badri	delegate	
R. Attar	principal delegate	Lebanon
I. Harmouche	delegate	
T. J. Tanner	principal delegate	Malawi
P. C. Idi	delegate	
D. Tuvdendorj	principal delegate	Mongolia
S. Gadamba	delegate	
J. Purevjav	delegate	
F. Raissouni	principal delegate	Morocco
W. Bleeker	principal delegate	Netherlands
K. R. Postma	delegate	
E. A. Mehlbaum	delegate	
H. Timmerman	delegate	
C. J. E. Schuurmans	delegate	
W. J. H. van Dordrecht	delegate	
I. S. Kerr	principal delegate	New Zealand
J. A. Oyebode	principal delegate	Nigeria
R. Thrane	principal delegate	Norway
E. Grytøyr	delegate	
S. Rafalowski	principal delegate	Poland
T. R. do Espírito Santo	principal delegate	Portugal
D. Xavier de Queirós	delegate	

2. Representatives of Members of WMO (continued)

J. J. le Roux	principal delegate	South Africa
L. Q. Hayward	delegate	
F. Huerta	principal delegate	Spain
M. Huerta	delegate	
A. A. Wahab	principal delegate	Sudan
O. Lönnqvist	principal delegate	Sweden
T. Thompson	delegate	
Mrs. R. Schäffer	delegate	
R. Schneider	principal delegate	Switzerland
J. Häfelin	delegate	
B. Beck	delegate	
A. Jeannet	delegate	
B. Mahmandar	principal delegate	Syria
S. Kaddourah	delegate	
P. Soontarotok	principal delegate	Thailand
K. Sukhapinda	delegate	
M. Ayadi	principal delegate	Tunisia
M. Allouche	delegate	
U. E. Çölaşan	principal delegate	Turkey
M. Inan	delegate	
T. K. Bogatyr	principal delegate	Ukrainian S.S.R.
E. I. Tolstikov	principal delegate	Union of Soviet Socialist
K. T. Logvinov	delegate	Republics
N. G. Leonov	delegate	
J. A. Ravdin	delegate	
V. D. Maslov	delegate	
M. K. H. Khairy	principal delegate	United Arab Republic
V. R. Coles	principal delegate	United Kingdom of Great
J. R. Thorp	delegate	Britain and Northern Ireland
L. H. Starr	delegate	
C. J. M. Aanensen	delegate	
P. H. Kutschenreuter	principal delegate	United States of America
G. N. Gosewisch	delegate	
C. G. Reeves	delegate	
G. D. Cartwright	delegate	
W. J. Kotsch	delegate	
E. M. Vernon	delegate	
S. R. Barbagallo	delegate	
F. W. Burnett	delegate	
D. M. Hanson	delegate	
J. Renard	principal delegate	Upper Volta
O. Coronel	principal delegate	Venezuela
M. Simić	principal delegate	Yugoslavia
K. A. Hirst	principal delegate	Zambia

3. Observers from international organizations

Y. Takenouti	United Nations Educational, Scientific and Cultural Organization/Inter-governmental Oceanographic Commission
H. Dreyling	International Air Transport Association
U.C. Rath	International Civil Aviation Organization
T. Okabe	International Telecommunication Union
W. Bleeker K. R. Postma	International Union of Geodesy and Geophysics

4. Representatives of WMO Technical Commissions

P. H. Kutschenreuter	Commission for Maritime Meteorology
K. R. Postma	Commission for Aeronautical Meteorology

5. Other participants

R. W. Ziemann	invited expert

6. WMO Secretariat

K. Langlo	representative of the Secretary-General
G. Weiss	chief, Telecommunications and Networks Section
C. Morales	permanent secretary of CSM
A. Drevikovsky	codes officer
H. Marx	chief, Planning Unit (14 - 17 March)
W. R. Dyer	project manager, GOS (14 - 18 March)

7. Local Secretariat

M. Hinzpeter	conference officer
M. Schlegel	press officer
L. Weickmann	administrative officer
E. Mohr	special events and exhibits officer
H. Panzram	language services officer
E. Fiedler	documents officer
J. Schmidt	documents officer

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7	Telecommunications (including consideration of the report of the third session of the Working Group on Telecommunications)	4; 11; 13, Add. 1; 16; 18, Corr.1; 36, Add.1; 42, Corr.1; 43; 44; 50; 51; 53; 56; 60/P; 61/P; 62/P; 63/P; 64/P; 65/P; 66/P, Rev. 1; 68/P, Rev. 1; 70/P; 71/P; 76/P; 78/P; 84/P; 92/P; 94/P; 104/P; 107/P; 113/P	3	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47
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GENERAL SUMMARY OF THE WORK OF THE SESSION

At the invitation of the Government of the Federal Republic of Germany, the fourth session of the Commission for Synoptic Meteorology was held in Wiesbaden from 8 March to 1 April 1966. The meeting took place in the Kurhaus where excellent facilities were at the disposal of the Commission. Simultaneous interpretation into English, French, Russian, Spanish and German was provided during the plenary meetings and during meetings of two of the working committees, and into English and French for the third committee.

The president of the commission, Dr. S. N. Sen, was chairman of the session, while the vice-president, Dr. K. T. Logvinov, took the chair at the scientific discussions.

Altogether there were 126 persons at the session, including representatives of 54 Members and observers from 5 international organizations. At the invitation of the president of CSM, Mr. R. Ziemann attended as an invited expert. Dr. K. Langlo was the representative of the Secretary-General and the WMO Secretariat was further represented by Dr. G. Weiss, Dr. C. Morales and Mr. A. Drevikovsky. Mr. H. Marx and Mr. W. E. Dyer attended for a brief period. A complete list of those who were present is given at the beginning of this report.

1. ORGANIZATION OF THE SESSION (Agenda item 1)

1.1 Opening of the session (Agenda item 1.1)

The president declared the fourth session of the Commission open at 10.30 a.m. on 8 March 1966. Welcoming the participants and guests, Dr. Seiermann, representing the Federal Government, said that it gave the Government of the Federal Republic of Germany great pleasure that a session of such an important Commission of WMO should take place in Germany. He recalled that as early as 1962 he had extended to the Secretary-General an invitation for this session to be held in Wiesbaden. He expressed the sincere wish of his Government that this meeting of CSM would contribute to a world-wide co-operation for the benefit of mankind, as set forth in the WMO Convention.

Mr. Arndt, Minister of Transport of Hessen, welcomed the participants on behalf of the Government of Hessen. He recalled that much attention and effort had been recently devoted to meteorological problems on a world-wide scale and emphasized the importance of weather forecasting.

Mr. Buch, Oberbürgermeister of Wiesbaden, welcomed the guests on behalf of the Town Council and the inhabitants of Wiesbaden. He described the development of Wiesbaden since the war, and then wished the session every success.

Dr. Bell, President of the Deutscher Wetterdienst, said that he was very happy that this session of such an important commission of the WMO was taking place in the Federal Republic of Germany. He referred to the recent development of meteorological rockets, weather satellites, and the meteorological telecommunication system. He concluded that the age of romanticism had passed and that our times called for new methods of international co-operation. He expressed the hope that the present meeting would contribute to this end and wished it every success.

Mr. Davies, Secretary-General of WMO, thanked the preceding speakers for their warm welcome. He expressed his appreciation of the arrangements made for the preparation of the Conference and thanked, in particular, Dr. Bell. He also expressed to the representatives of the host country the appreciation and gratitude of the Organization. The Secretary-General recalled the important resolutions of the United Nations that had led to the planning of the World Weather Watch, and stressed the importance of the CSM session in this connection. He particularly welcomed the representatives of the newly independent countries who were attending a CSM session for the first time and concluded by reiterating the thanks of the WMO to the authorities of the host country.

Finally, Dr. Sen, president of CSM, briefly reviewed the history of WMO and the Commission for Synoptic Meteorology. He mentioned some of the latest developments which were of special importance to CSM and referred to the successful launching of weather satellites and to the automatic picture transmission system. He said that all the recent technical developments of special importance to the Commission would be reviewed by the session under the respective agenda items. He also referred to the substantial contributions made by German scientists since the earliest days of the atmospheric sciences and recalled that, as an active Member of WMO, the Federal Republic of Germany had rendered valuable support to international meteorology. In conclusion, he welcomed the members of CSM and other participants to the session and said that with mutual understanding and co-operation the session would be an outstanding success.

1.2 Report on credentials (Agenda item 1.2)

At the second plenary meeting the representative of the Secretary-General presented a provisional list of participants and the capacities in which they were attending the session. This list was accepted as the first report on credentials and it was consequently decided not to set up a credentials committee.

1.3 Adoption of the Agenda (Agenda item 1.3)

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

1.4 Establishment of committees for the duration of the session (Agenda item 1.4)

1.4.1 Working Committees

The following three working committees were set up to examine in detail the various items on the agenda:

(a) Committee A - to deal mainly with code questions.
Mr. F. W. Benum (Canada) served as chairman, Mr. C. J. M. Aanensen (U.K.) as vice-chairman, and Mr. A. Drevikovsky as technical secretary to this committee.

(b) Committee B - to deal with telecommunication questions.
Mr. S. R. Barbagallo (U.S.A.) served as chairman, Dr. P. Wüsthoff (Federal Republic of Germany) as vice-chairman, and Dr. G. Weiss as technical secretary to this committee.

(c) Committee C - to deal with the remaining questions (general).
Dr. O. Lönnqvist (Sweden) served as chairman, Mr. V. R. Coles (U.K.) as vice-chairman, and Dr. C. Morales as technical secretary to this committee.

1.4.2 Nomination Committee

In accordance with General Regulation 22 a Nomination Committee was established, composed of the principal delegates of the following countries:

Sudan, U.S.S.R., Brazil, U.S.A., New Zealand, Belgium.

1.4.3 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 and representatives of the WMO Secretariat.

1.4.4 Other Committees

A number of ad hoc committees were established during the session both by the Commission itself and by the working committees. In particular an ad hoc committee was established for the purpose of considering the composition of the various working groups to be established by the Commission. A drafting committee was not established, but each working committee was requested to present its findings in final form for adoption by plenary.

1.5 Approval of the minutes (Agenda item 1.5)

The minutes of the first four plenary meetings were approved during the session. The Commission authorized the president of CSM to approve the minutes of the remaining meetings on its behalf.

2. REPORTS BY THE PRESIDENT OF THE COMMISSION AND THE CHAIRMEN OF THE CSM WORKING GROUPS (Agenda item 2)

2.1 Report by the president of the Commission

The Commission noted with appreciation the report submitted by the president. Any items in the report requiring action by the Commission were considered under the relevant items of the agenda.

2.2 Report of the Working Group on Definition of Terms Used to Describe the Intensity of Meteorological Phenomena

The chairman of this group, Mr. R. R. Dodds (Canada), was not present at the meeting. The Commission noted with appreciation the work carried out by the group and the report was further discussed under Agenda item 11.1.

2.3 Report by the chairman of the Working Group on the Synoptic Use of Meteorological Data from Artificial Satellites

The report was presented by the chairman, Mr. D. M. Hanson (U.S.A.), who gave a brief review of the progress made in meteorological satellites since CSM-III. The series of Tiros and Nimbus experimental satellites had recently led to the establishment of the operational TOS satellite system. Much progress had also been made in developing techniques for the synoptic application of satellite data, and in training of synopticians in its application. The chairman expressed his appreciation of the efforts and interest of the working group members, the President of CSM, and the Secretary-General and his staff.

The Commission noted with appreciation the work of the group and agreed that the report should be considered under Agenda item 8.

2.4 Report by the chairman of the Working Group on Codes

The report was presented by the chairman, Mr. F. W. Benum (Canada), who pointed out that it covered all major fields included in the terms of reference. He stressed that in spite of intensive endeavours the work of the group could not be completed. The comprehensive document highlighted a number of very difficult problems.

The chairman thanked the members of the working group, the Secretary-General and his staff. Special mention was made of Mr. Drevikovsky's work on codes during the last three years.

The Commission expressed appreciation of the special effort made by the group in establishing fundamental requirements for codes and in tackling other difficult code problems. This report was considered under Agenda item 5.

2.5 Report of the Working Group on Networks

The chairman of the group, Mr. A. H. Nagle (U.S.A.), was not present at the meeting.

The Commission noted with appreciation the report of the group and the matter was discussed in detail under Agenda item 6.

2.6 Report by the chairman of the CSM Working Group on Telecommunications

The report was presented by the chairman, Mr. S. R. Barbagallo (U.S.A.), who stressed the activities of the group in completing the arrangements for the establishment of the northern hemisphere exchange system, which was already operating with a high degree of efficiency. However, the possibility of expediting collection in certain parts of the northern hemisphere should be explored.

The Commission expressed appreciation of the important work done by the group in the field of telecommunications. The report was considered in detail under Agenda item 7.

2.7 Report of the Working Group on Facsimile Equipment Standardization

As the chairman of the group, Mr. E. M. Vernon (U.S.A.), was not present, Mr. S. R. Barbagallo gave some comments on the report of the group.

The Commission noted with appreciation the work of the group. The report was considered under Agenda item 7.

2.8 Report of the Working Group on Long-Range Weather Forecasting

The Commission noted with appreciation the report of the chairman of the group, Mr. K. N. Rao (India), who could not join the present session.

The report was considered in detail under Agenda item 9.

2.9 Report by the chairman of the Working Group on Methods of Analysis and Prognosis in the Tropics

The report was presented by the chairman, Dr. H. T. Mörth (Kenya), who stated that no essentially new method of analysis had become apparent during the lifetime of this working group. There had occurred, however, some significant developments in the techniques and practical applications of analysis in the tropics.

The chairman thanked the members of the working group and stated that methods of weather forecasting in the tropics had not reached the development and successes achieved in higher latitudes.

The Commission noted with appreciation the work of the group and the report was considered in detail under Agenda item 9.

2.10 Report by the chairman of the Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology

The report of the working group was presented by the chairman of the group, Dr. M. Montalto (Italy). The group had agreed to the principle that the personnel to be

employed in the specialized functions of synoptic meteorology should be grouped in four classes and that each class should possess the basic knowledge of the corresponding class in WMO Technical Note No. 50. The working group had prepared the requested syllabi for the above-mentioned classes of synoptic meteorologists.

The chairman thanked all the members of the group for their contribution.

The Commission noted with appreciation the work of the group and the report was considered in detail under Agenda item 10.

2.11 Report by the chairman of the Working Group on Minimum Performance Characteristics of Automatic Weather Stations

The report of the group was presented by the chairman, Dr. O. Lönnqvist (Sweden). The group had been established after CMS-III and included representatives of CIMO, CCl and CMM. Its first task had been to establish minimum performance characteristics of automatic weather stations suitable for the world-wide network, and to study which elements should be observed and the minimum accuracy required. Coding and telecommunications questions had also been involved. Its second task had been to recommend new texts for the Technical Regulations.

The chairman thanked the other members of the group for their readiness to contribute to the work.

The Commission noted with appreciation the work of the group. The report was considered in detail under Agenda item 6.

2.12 Report of the Joint CAe/CSM Working Group on Numerical Prediction

The chairman of the group, Dr. Döös (Sweden), was not present at the session. The Commission noted that the main part had already been considered by CAe-IV, and also that a Technical Note on this subject had been published which efficiently summarized the latest developments in numerical weather prediction around the world. The Commission expressed its appreciation of the work done by the group.

The report was considered under Agenda item 9.

3. EXCHANGE OF VIEWS ON WORLD WEATHER WATCH WITH SPECIAL REFERENCE TO ASPECTS OF DIRECT CONCERN TO CSM (Agenda item 3)

General comments

3.1 The Commission considered this item on the basis of a comprehensive document presented by the Secretary-General. Mr. Marx, Chief of the Planning Unit of the Secretariat, gave a brief introduction to the subject and stressed that the WWW was not only concerned with satellites, computers, long-range prediction and general circulation research, but was a complex and variable system dealing with observations, communications and various ways of processing meteorological data, its components being a global data-processing system, a global observational system and a global telecommunications system. The WWW plan would be based on a detailed study of the requirements for improving the systems already existing. He also stressed that plans for the period 1968-1971 would be based on proven techniques, and would include provision for data from meteorological satellites. It was pointed out, however, that meteorological satellites could not be expected to meet all observational requirements. The global observational system would, therefore, necessarily be based on a variety of observing techniques. Some of the elements of the global observational system might be of a temporary nature, since some of the data-gathering experiments mentioned in the document of the Secretary-General might lead to the introduction of new techniques at some time in the future. Finally, Mr. Marx referred to the problems of implementing the WWW plan and informed the session of the Secretary-General's intention to make detailed

proposals on this subject to Fifth Congress. There would be many ways in which Members of WMO could contribute to the plan, either by individual or multilateral efforts; in other cases, it might be necessary to draw upon appropriate international funds. The ultimate aim should be to develop a system which would satisfy all the requirements of all the Members of the Organization.

3.2 The Commission strongly endorsed the action already taken by the Executive Committee on planning the WWW and expressed its support in principle of the general lines of the planning effort described in the Secretary-General's document. Several delegations expressed their particular interest in implementing the global observational system and the global telecommunications system and considered that these parts of the scheme should have priority. One of the major objectives of the WWW should be to aim at a more uniform world-wide network. Particular attention should be given to the enormous ocean areas in the southern hemisphere where the observational network was very deficient. Special mention was also made of the need to improve the availability of southern-hemisphere data in the three world meteorological centres (WMC) as soon as possible.

3.3 The Commission noted that a large number of study projects had been undertaken in connexion with the WWW and that the number of such projects was increasing. It was felt that an effort should be made to implement a limited number of the more important projects first.

3.4 The Commission considered that increased attention should be given to the establishment of data archives at appropriate centres for the benefit of research workers.

3.5 With regard to the establishment of regional meteorological centres (RMC), the Commission considered that the output of such centres would depend on the requirements of the national centres with which a regional centre would be associated and would necessarily differ from centre to centre. Some members pointed out that, although the establishment of world and regional centres would be of great help to many countries, WMO should continue to encourage important research and developments at national centres. The Commission felt that greater attention should be given to the need for a continuing contribution by National Services to the development of meteorology.

3.6 Several members pointed out that the term "regional meteorological centre" had caused considerable confusion because the word "regional" already had a well-defined meaning in WMO terminology in the expression "regional association". The Commission therefore requested the Executive Committee to find a substitute for "regional meteorological centre" that would avoid such confusion.

3.7 It was pointed out that the WWW would be of great importance to the developing countries. It would be particularly welcome to many of them if WWW were able to contribute to an increase of meteorological activity in their territory both in research and in operations.

3.8 The Commission noted with appreciation the launching of the meteorological satellites ESSA I and ESSA II as part of the U.S. meteorological operational satellite (TOS) system. It agreed that the observations from these satellites already made a valuable contribution to the WWW. The next task should be to make the maximum use of this and other technological developments for the benefit of all countries.

3.9 In summing up, the Commission demonstrated its overwhelming support for the WWW planning effort.

Global data-processing system

3.10 The Commission expressed some difficulties in accepting, in their present form, those appendices of the Secretary-General's document which contained tentative lists of the output of the three WMCs. It was noted that there were great differences between the output listed for each of the centres and that of the other two. The Commission felt that efforts should be made to reach a higher degree of standardization both as to content and as to presentation. Some doubts were expressed about whether the regional and national meteorological centres would really need all the products listed. Was it necessary, for example, for the WMCs to disseminate global 850 mb maps? The Commission agreed that further efforts should be made to establish the requirements of all Members for the products of WMCs. It was explained that the Secretariat intended to send a questionnaire on the subject to Members and that it was also planned to organize meetings between representatives of WMCs and potential RMCs. The Commission was of the opinion that representatives of potential regional telecommunication hubs should also be invited to such meetings, and that national centres which wanted to be represented at such meetings should be given the opportunity to do so.

3.11 There was considerable discussion on the role of RMCs in the future WWW. Several members felt that the role of RMCs needed clarification. Particular emphasis should be placed on specifically relating the functions of RMCs to the operational needs of Meteorological Services. It was consequently suggested that it might be prudent to delay the decision to establish RMCs in some parts of the world. Several Members felt that the RMCs should be designated at once for regions of the world where their establishment presented no major difficulties, so as to allow the interested countries to proceed with arrangements for equipment and training. It was explained that some RMCs might have responsibility for only one or two of the various possible functions listed in the Secretary-General's document. It might also be possible for two or more RMCs to be associated with approximately the same group of countries, and in such a case each would have different functions, duplication of effort being avoided as far as possible. The Commission supported the idea that at least one of the RMCs in the tropics should serve as a centre for equatorial analysis over extended areas. In reply to a question, the session was informed that no final decision on the location of RMCs would be taken before Fifth Congress, but that continued efforts would be made to arrive at agreement on their possible locations and functions.

3.12 Some members felt that much of the discussion under this heading seemed far removed from the needs and aspirations of any but the major Meteorological Services. They considered that the success or failure of the WWW would be judged primarily on the service it rendered to small countries, particularly the emerging ones. It was stated that the emerging nations had neither the technical facilities nor enough staff of the requisite calibre to provide the forecasting services to meet even current demands, and a representative of one of these countries outlined what the minimum requirements of his country were likely to be. The Commission agreed that this and similar statements of requirements were to be welcomed and should be taken into account in planning the WWW.

3.13 The Commission noted with great interest that even in the form contemplated at present the output of world and regional meteorological centres would give considerable help to Services providing information for international aviation and shipping. It was pointed out that the output of the area forecast centres established at ICAO regional meetings might not correspond to the proposed output of the WMO world and regional centres. The Commission invited the Secretary-General to study this question further in order that the output of the world and regional meteorological centres should be of maximum assistance to the area forecast centres for international aviation. The Commission further noted that according to Recommendation 9/3 (CAeM-III - MET/OPS) the establishment of a broad framework for an area forecast system was a joint responsibility of WMO and ICAO, and it therefore requested the Secretary-General to ensure that the preparation of this broad framework be fully co-ordinated with the WWW planning.

Global observational system

3.14 The Commission showed considerable interest in finding the best way of carrying out further network-density studies. It was informed that some Members were studying the problem and that the Secretary-General would endeavour to bring together the experts most familiar with it in order to obtain an over-all view of the present state of the work. Further information on the action taken by the Commission on this subject can be found under Agenda item 6.

3.15 With regard to the question of filling the gaps in observations from ocean areas the Commission agreed that high priority should be given to the use of merchant ships. Such ships should be used more often for making surface and, especially, upper-air observations. The Commission noted that in the course of a recent one-day check carried out by the Secretariat the mobile-ship fleet had produced only about 700 surface reports over the whole world; this from a fleet totalling some 4,000 ships, of which at least 2,500 could be expected to be at sea at any one time. The shortcoming was due partly to communication problems, but the over-all position was unsatisfactory and called for remedial measures.

3.16 The Commission was informed of a preliminary survey carried out by the Secretariat, with the help of a Member and of a maritime consultant, of the availability of merchant shipping throughout the world to act as platforms for complete upper-air observations. The density figures revealed by the survey had been most encouraging and indicated that, if suitable management and instrumental procedures were possible, many of the world's ocean areas could be covered by upper-air observations taken from merchant vessels. The Commission noted that, where merchant ship densities were adequate, this observational technique was considerably cheaper than a corresponding fixed ship scheme. The Commission was informed of the development by several Services of radio-wind equipment, for use on merchant ships, which was expected to be fully satisfactory by 1968/1971. It was also noted that the work so far done in the Secretariat established the availability of an adequate quantity of merchant shipping only in certain areas, and that much study was still required on the many problems of implementing a large merchant-ship upper-air observing programme, particularly if duplication of effort were to be avoided. Among the major problems were staff recruitment and training, equipment, cost, the use of hydrogen on merchant ships, communications, logistics, and base support. The Commission was told of the problems that had been encountered by one Member in attempts to recruit its merchant fleet for upper-air soundings, and expressed the opinion that very close international co-ordination was necessary in developing a suitable merchant-ship observing programme. The Commission was informed of proposals to call meetings of Members and organizations interested in the merchant-ship programme in order to discuss the various problems facing the scheme, and agreed that this seemed the only way of reaching acceptable decisions.

3.17 The Commission noted that expedition vessels did not always make weather observations, and that further steps should be taken, particularly through the Inter-Governmental Oceanographic Commission (IOC), to obtain meteorological observations from such ships. It also noted that the IOC was very interested in co-operating closely with WMO in all matters pertaining to meteorological observations from ocean areas, and considered that it would be desirable to maintain this close contact and to collaborate with IOC in devising a scheme for observations from automatic stations at sea.

3.18 It was noted that large ocean areas could not be served by merchant ships for either surface or upper-air observations owing to the existing shipping lanes.

3.19 The view was expressed that very much greater use could be made of commercial aircraft as a source of upper-air information, particularly in data-sparse areas. These observations could not wholly fill the observational gaps either in horizontal (geographical) or vertical sampling, but it was essential that maximum use should be made of the observing

potential of commercial aircraft. The Commission was strongly of the opinion that further efforts should be made to obtain regular aircraft reports, particularly in areas where there was a shortage of surface-based observations.

Global telecommunication system

3.20 The Commission supported the views expressed by EC-XVII on the planning of the WWW global telecommunication system (GTS) (see abridged report of EC-XVII, General Summary, paragraph 5.1).

3.21 There was considerable discussion on the engineering and organizational aspects of the GTS. The Commission paid particular attention to the problems associated with the planning of the main trunk circuit. It was agreed that the main trunk circuit was one of the most important components of the GTS and therefore deserved full attention in the planning of the over-all system. During the review it was mentioned that proper planning of the main trunk circuit required a number of specialized studies. Some of these had been completed very recently, while others were due to be completed during 1966. Turning to practical aspects, the Commission was aware that, initially at least, some segments of the main trunk circuit would be composed of HF radio circuits because of the lack of adequate cable circuits in some parts of the world. It therefore felt that the technical problems associated with the use of HF radio circuits for medium-speed data transmission would make feasibility studies necessary and, later, the testing of equipment. The Commission proposed that the Secretary-General should arrange conferences with Members directly interested in the planning, and possibly later in the implementation of the main trunk circuit, in order to discuss organizational and engineering problems. The Commission understood that these meetings would take into consideration the views expressed by the Executive Committee, regional associations, CSM and individual Members, as well as studies of experts on various telecommunication aspects of the WWW.

3.22 The Commission stressed the need for adequate regional telecommunication networks to meet the objectives of the WWW. It was agreed that the regional telecommunication networks should be planned to ensure rapid and reliable reception of the required observational data at WMCs and regional telecommunication hubs (RTHs) connected with the main trunk.

3.23 When reviewing the Secretary-General's résumé on RTHs, the Commission felt that their function should be clarified. More particularly, the Commission referred to the need to make it clear that each Member might obtain any data it required which had been exchanged on the principal circuit. With this in view, the regional associations would have to examine their meteorological telecommunication systems so that they could meet the requirements of Members. The Commission stressed again that the word "regional" in the context of regional telecommunication hubs had a different meaning from that used at present in meteorological telecommunications (regional broadcasts, sub-regional broadcasts, and so on).

CSM and the planning of the WWW

3.24 It was pointed out that the activities of some of the working groups of the Commission might have an impact on the WWW planning. Noting the very useful work done by the Secretary-General and his planning staff, the Commission agreed that it did not itself need to establish any machinery other than the working groups of its fourth session. The question of co-ordination between the planning work in the Secretariat and the work of CSM was raised, but it was agreed that the existing arrangements were adequate. It was also considered that Fifth Congress might, if necessary, give further directions for such co-ordination. In conclusion, the Commission expressed its complete satisfaction with the planning work of the Secretariat under the leadership of the Secretary-General.

4. REQUIREMENTS FOR SYNOPTIC METEOROLOGY (Agenda item 4)

4.1 General questions

4.1.1 The Commission discussed at length the general question of requirements in the field of synoptic meteorology, on the basis of a document presented by the Secretary-General.

4.1.2 The Commission considered various possible procedures for dealing with this problem in the future. One possibility would be to continue to deal with requirements in the same way as before. An alternative would be to set up a new working group which could take care of all the different kinds of requirements relating to synoptic meteorology.

4.1.3 It was agreed that the old procedure for dealing with requirements had not been entirely satisfactory, but on the other hand it was felt that it would not be possible for one working group to deal with all aspects of requirements in the field of synoptic meteorology, which would be an enormous task.

4.1.4 The Commission considered that the requirements of the different working groups of CSM must be dealt with by the groups themselves or, if necessary, by suitable sub-groups within them.

4.1.5 In addition to individual working groups paying more attention to the problems of their own requirements, it was considered that there was a need for co-ordinating the requirements over the whole field of synoptic meteorology. The Commission agreed that this task could best be carried out by the advisory working group which it had established at its present session. A paragraph to this effect was therefore included in the terms of reference of the working group (see Resolution 12 (CSM-IV)).

4.2 Priority in transmission of the various types of meteorological data

4.2.1 The Commission considered the information received from Members in response to a request from the president of RA VI to examine questions relating to the order of transmission of the various types of meteorological data, in other words the priority to be given to each category of meteorological data in establishing transmission schedules. It was agreed that no changes were required in the order of transmission during normal operating conditions since this was in any case very largely determined by the order of availability of the data. The question of priority arose under abnormal operating conditions, when traffic accumulated owing to a circuit disruption and several different types of data were available for transmission when normal operations resumed.

4.2.2 From the global point of view, the Commission agreed that the prime requirement in dealing with meteorological data which had accumulated due to a circuit disruption was to ensure that the following categories of hemispheric data should be transmitted with the least possible delay:

TEMP and TEMP SHIP, part A SYNOP and SHIP	not more than twelve hours after the time of observation

4.2.3 With regard to other types of retarded meteorological data, the Commission found it impossible to agree upon an order of priority which would have world-wide validity. The adoption of an extended priority list on a regional basis might usefully be considered by regional associations.

4.2.4 The Commission considered it most desirable that the procedures for the transmission of accumulated meteorological data should not interfere with the immediate resumption of normal transmission schedules. This might be achieved either by transmitting the specified retarded data on telecommunication channels other than those used for the normal

schedules, or by accommodating the retarded data in gaps in the normal schedules. However, where neither of these preferred procedures was practicable the data listed in paragraph 4.2.2 might be transmitted immediately after a circuit was restored, before normal schedules were resumed.

4.2.5 The Commission adopted Recommendation 1 (CSM-IV).

4.3 Standard levels in the high atmosphere

4.3.1 At the request of the Executive Committee (Resolution 11 (EC-XIV)), the Commission considered Recommendations 4 and 5 (CAe-IV).

4.3.2 It was noted that balloon-borne radiosondes were attaining levels above 30 km with increasing frequency, and that pressure was recorded as a primary parameter by these instruments. The Commission was further advised that rocket-borne sondes could in the near future include a form of hypsometer which would make possible a more accurate determination of geopotential from such soundings.

4.3.3 From the synoptic point of view a better delineation of the quasi-horizontal field was obtainable by additive "thickness analysis" techniques, which eliminated or minimized cumulative errors arising from inhomogeneity of data, than by calculation of pressures in horizontal geometric surfaces. Strong preferences were expressed for standard levels of 10 mb, 7 mb, 5 mb, 3 mb, 2 mb and 1 mb, these being at approximately linear intervals on a logarithmic scale and corresponding to geometric altitudes approximating to geopotentials of 31, 34, 36, 40, 43 and 48 km respectively.

4.3.4 The Commission was therefore of the opinion that the above-mentioned pressure levels should be designated as standard levels instead of 30, 40, 50, ... km as recommended by CAe-IV.

4.3.5 The Commission adopted Recommendation 2 (CSM-IV) and requested the Secretary-General to bring the decisions to the notice of the president of CAe.

5. CODES (Agenda item 5)

5.1 Establishment of the Working Group on Data Needs and Codes

5.1.1 General

5.1.1.1 The Commission noted that although the Working Group on Codes had made some progress in carrying out the objectives set out in Resolution 3 (CSM-III) several major problems remained unsolved.

5.1.1.2 The Commission discussed various courses of action which would make it possible to complete the determination of data needs, to solve a number of specific problems and to recommend new or revised codes to Members at least nine months prior to CSM-V. Members would then have ample time to study the recommendations.

5.1.2 Problem areas

5.1.2.1 The Working Group on Codes developed an approach to the problem of determining requirements. This was based on the concept of using the scales of meteorological phenomena, (macroscale, synoptic scale and mesoscale) to categorize data needs. A broad outline of this concept and its method of application are given in Part C of the annex to Resolution 1 (CSM-IV).*

5.1.2.2 The Commission adopted this concept as the basis for the work done during the session.

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* See Annex XIV.

5.1.2.3 It was recognized that the Working Group on Codes was hampered in its work because the concept was not completely developed and was neither fully understood nor fully acceptable to everyone. The surveys and studies were restricted to parameters and precision only and did not take account of the total data-requirement problem. To do this would necessitate taking account of time and space resolutions of observations as well as parameters and precision.

5.1.2.4 The Commission felt that a large amount of work would still be needed to develop the concept to the stage where it would provide an adequate framework for the determination and evaluation of data needs.

5.1.2.5 Although the Working Group on Codes and the Commission itself had expended a great deal of effort in formulating statements of requirements for surface data, it was clear that these statements were not yet complete enough to use as the basis for any major changes to the SYNOP and SHIP Code forms. It was not possible to reach agreement on the real minimum requirements and further work was needed. There was a feeling that the Types II and III lists contained more than the minimum requirements and that the listing of Type I needs was incomplete.

5.1.2.6 Some effort had been made to determine the requirements for tropical surface data but very little progress had been achieved. In particular, the entire problem of reporting the state of sky and clouds for tropical areas needed considerably more study.

5.1.2.7 In general the present method of reporting clouds worked well in temperate latitudes. However, some members expressed the opinion that the description of clouds in the Cloud Atlas was based too much on a static view, so that it did not permit a description of the dynamical aspects of atmospheric processes. In addition, the rapidly increasing availability of cloud information from meteorological satellites and weather radar could revolutionize the present concept of cloud reporting in the near future.

5.1.2.8 The Commission was informed of several studies being made in connexion with the planning of the World Weather Watch which might have a considerable effect on data needs and thus necessitate major code changes.

5.1.2.9 Although the Commission had been provided with clear statements of requirements for computer operations, it was evident that the latter were in a state of rapid development and that changes in the requirements were therefore inevitable. For coding purposes, the long-term requirements for numerical weather prediction, meteorological and non-meteorological parameters, must be stated firmly.

5.1.2.10 The recommendations made by the Commission to separate the aeronautical codes from the SYNOP family of codes could have very important implications for the requirements to be met by the SYNOP and SHIP codes. It would have been premature to make any estimate of what these implications might be.

5.1.2.11 The increasing use of weather radar, and the increasing need for information on the area coverage, duration, intensities and amounts of precipitation, created complications in trying to decide what data were needed and how these needs could best be met.

5.1.2.12 The following detailed problems were typical of those encountered by the Working Group on Codes:

(a) What should be the criteria for reporting of "unusually gusty wind" as being indicative of air mass stability?

(b) What should the specifications be for day-time maximum and night-time minimum temperatures for energy budget computations?

(c) What should be the specifications for reporting snow cover and ice cover for albedo determination?

(d) What intensities of precipitation were needed respectively as Type I, Type II and Type III data?

(e) What were the needs for both present and past weather for Type I, Type II and Type III data respectively?

5.1.3 Conclusions

5.1.3.1 From the facts indicated above the Commission was forced to conclude that:

(a) The conditions and requirements on which a major code change should be based were not yet available;

(b) A major change in codes might be urgently needed within the next few years;

(c) Only restricted and urgent changes in SYNOP and SHIP code forms should be made during CSM-IV;

(d) Unless enough effort were made to provide the leadership, skills and knowledge needed to complete the tasks in time for CSM-V, the unsolved code problems might well hamper the full implementation of the World Weather Watch severely and also restrict the development of synoptic meteorology, particularly in the field of numerical data processing and weather prediction;

(e) The working group should be re-established with broader terms of reference and stronger financial and staff support to ensure that it would have a chance of accomplishing the massive task with which it was faced.

5.1.3.2 It was decided that the new working group should be responsible for the determination of the total requirements for data (parameters and precision, time and space resolutions) and codes, and that it should be called the Working Group on Data Needs and Codes.

5.1.3.3 To carry out its large task the working group would need two full-scale meetings and up to six meetings of specialist sub-groups during the period 1966-1970. It would also need the assistance of at least two full-time employees at the WMO Secretariat and up to one more year of assistance from other WMO specialists or consultants to work on special projects and participate in meetings.

5.1.3.4 The two full-time employees should consist of one officer with wide experience in operations and planning systems, and an assistant with considerable experience in codes.

5.1.3.5 The Commission adopted Recommendation 3 (CSM-IV) and Resolution 1 (CSM-IV).

5.2 Principles for determining requirements for both present and past weather

5.2.1 General

5.2.1.1 The Commission, in considering the conclusions reached by the Working Group on Codes on this problem, discussed the following questions of principle first:

(a) Is information on present weather and past weather needed at all for the solution of Type III problems?

(b) If needed, then to what extent should this information on past weather and present weather be reported?

5.2.1.2 The Commission noted that the information on present and past weather was not currently required as Type III data for numerical weather prediction purposes. However, manual methods for large-scale weather analysis were still in extensive use. It would have been premature to decide to what extent this kind of information could be replaced by the data obtained from meteorological satellites. The Commission was also uncertain of the importance of present weather and past weather information for statistical forecasting methods.

5.2.1.3 With regard to the second question, it was felt that more information on past weather could be helpful, in particular from those areas where the network of observing stations was sparse. The general feeling was, however, that it was not desirable from the practical point of view to place too much emphasis on past weather information.

5.2.1.4 The session finally decided that the existing system of reporting present weather and past weather had been successful for many years and that it should be continued until the requirements were more clearly identified.

5.2.2 Requirements for Type III data

The Commission agreed that the list of phenomena proposed by the Working Group on Codes as requirements for present weather and past weather Type III data as given in Annex 1 should be used as a basis for further study.

5.2.3 Requirements for Type II data

5.2.3.1 The Commission reviewed the list of requirements established by the Working Group on Codes. It was felt that the stated requirements for past weather were excessive. With respect to the question whether information on the state of sky were to be included in the list, the Commission was unable to make a decision before the requirements for this parameter were known exactly.

5.2.3.2 It was therefore decided that the list of requirements proposed by the Working Group on Codes should be used as the basis for further study. The opinion was expressed that the regional associations should be requested to provide assistance by co-ordinating the data requirements for their regions. The list is given in Annex II.

5.2.4 Requirements for Type I data

The Commission carried out a cursory review of this kind of requirement. It was agreed that the list given in Annex III, combined with the requirements for Type II data, should constitute the proposed list of requirements for Type I data. It was considered that this list of both present and past weather phenomena should be used as the basis of a survey to determine the needs of Members for Type I data.

5.3 Requirements for surface observations other than present weather and past weather

5.3.1 On the basis of the proposals contained in the report of the Working Group on Codes, the Commission established a list of requirements for the reporting of surface observations. The Commission agreed that the minimum requirements for the reporting of surface information for international exchanges listed in Annex IV represented a provisional set of requirements for Type III and Type II data, but that this list would require further study before it constituted a firm basis for developing new code forms.

5.3.2 The Commission agreed that further studies on the following specific points were necessary:

(a) Criteria for reporting unusually gusty surface wind

This type of information was considered necessary for the identification of air-mass characteristics. The Commission, however, was unable to specify the limits of wind parameters which should be used for this purpose.

(b) Periods of time for observation of maximum and minimum temperatures and hours at which these data should be reported

The session recognized the need for this type of information for energy budget calculations and inputs into complex atmospheric models. In view of the variability of time periods suitable for the observation of these data in the various parts of the world and also in different seasons, the Commission decided that further study should be devoted to this problem.

(c) Reporting of various states of sky which are associated with frequently recurring weather situations in the tropics

The Commission was aware that the present reporting of the state of the sky was not satisfactory in tropical areas. It was therefore agreed to study the question of coding and reporting the state of sky, taking into account the special conditions in the tropics.

(d) System of the reporting of cloud

The Commission agreed that a broad study was desirable to determine the changes required to take account of present scientific thinking and technology (for example the meteorological satellite and weather radar) in the reporting of clouds.

5.3.3 Requirements for Type I data

The Commission was not able to consider this matter in detail. A review was made, however, to determine to what extent Type I data might differ from Type II data. The list of stated requirements is given in Annex V. The requirements contained in this annex, combined with those listed for Type II data in Annex IV, should be considered as a provisional list of requirements for Type I data.

5.4 Requirements for upper-air observations

5.4.1 Upper-air pressure, temperature, humidity and wind reports

5.4.1.1 Reporting method

5.4.1.1.1 The Commission reviewed two methods developed by the Working Group on Codes (hereafter referred to as Plan I and Plan II). Plan I was based on the present system and Plan II was designed mainly to meet future requirements. Plan II provided for the international exchange of data for all significant levels only (temperature, humidity and wind) so that the recipients might reconstruct the actual soundings within the limits of the specified criteria. These recipients would then be in a position to extract the data required for the preparation of standard isobaric surfaces, and a host of supplementary charts, in an appropriate form for other users. In this case, the mandatory reporting by observing stations of standard isobaric surfaces might perhaps be discontinued in international exchanges.

5.4.1.1.2 The Commission was conscious of the great interest of Plan II and of its potentialities, particularly in relation to the implementation of the World Weather Watch. However, it was felt that the implementation of this plan might require the availability of more computers, and perhaps telecommunication facilities, throughout the world. Since, therefore, the adoption of Plan II might not be possible for at least 6 years, the present system should be continued.

5.4.1.1.3 In view of the great potential advantages of Plan II the Commission decided that further study should be devoted to it so that it might be adopted as soon as circumstances permitted. It was noted that Part B of the TEMP code form adopted by the session could be used as a basis for such a study. A broad outline of this plan is given in Annex VI.

5.4.1.2 Selection of specified levels to be reported

The 900 mb and 800 mb levels were adopted as Type III data in place of the 850 mb level, and the 600 mb level was added mainly to meet the requirements of numerical weather prediction. Some delegates were of the opinion that 250 mb and 850 mb levels were also required in certain regions. They pointed out that these data were also of importance for research into the circulation in the tropics, and that such data should be exchanged to the greatest possible extent. It was therefore agreed to include both these levels in the requirements for Type II data and to consider this question as soon as telecommunications capacity permitted the hemispheric exchanges of such data.

5.4.1.3 Resolution of the wind parameter

The Commission noted the comments presented by the Working Group on Codes and considered that the two resolutions for direction and speed were in fact dependent upon each other. It was agreed that the existing angular resolution was too coarse, as it corresponded to about 17 per cent of the speed value. A resolution slightly less than 10 per cent was considered more realistic, and this led to the conclusion that a practical resolution of wind direction would amount to 5°, which corresponds to 8.5 per cent of the wind speed. The resolution of wind being conditioned essentially by this accepted value, and being variable through the different ranges of speeds, the Commission decided to accept the resolution for speed to the nearest metre per second (m/sec^{-1}).

5.4.1.4 Humidity parameter

In view of the advantages for routine synoptic work, for the forecasting of clouds and for coding purposes, dew-point depression was accepted as the most suitable parameter for reporting humidity. A resolution of 1°C was agreed for Type III data. The desirability was expressed of a finer resolution when the difference between air and dew-point temperature was small.

5.4.1.5 Criteria for determining significant levels for wind

After having recognized the need for such criteria the Commission carefully considered various possible ways of formulating this requirement, finally agreeing to a set of criteria which are reproduced as Annex VII.

5.4.1.6 Criteria for determining maximum wind level(s)

The Commission agreed to adopt a single set of criteria for international use. These criteria are given in Annex VIII.

5.4.1.7 Detailed requirements

The Commission reviewed the requirements proposed by the Working Group on Codes. The list of requirements adopted is given in Part A of Annex IX.

5.4.2 Upper-wind reports

5.4.2.1 Method of reporting

The reasoning and conclusions given in paragraph 5.4.1.1 regarding the method of reporting upper-air pressure, temperature, humidity and wind reports, also apply here.

5.4.2.2 Detailed requirements

5.4.2.2.1 The remarks concerning the specified levels to be reported, the resolution for wind parameters and the criteria for determining significant levels for wind referred to in paragraphs 5.4.1.2, 5.4.1.3 and 5.4.1.5, also apply to upper-wind reports.

5.4.2.2.2 Having considered the question of the units by which the levels of reported wind data should be identified, the Commission expressed a requirement for pressure units. In stating this requirement the Commission was aware that, at present, upper-wind measuring instruments not associated with a radiosonde or a baroswitch did not provide pressure measurements.

5.4.2.2.3 It therefore concluded:

(a) That pressure units were to be preferred, when available, for the reporting of wind data; and

(b) That when pressure measurements were not available, the altitudes constituting the best approximations to the isobaric surfaces for reporting wind data specified in Annex IX, Part B, paragraph 1 (a), should be decided regionally.

5.4.2.2.4 The conclusions of the Commission about requirements for upper-wind reports are embodied in Part B of Annex IX.

5.4.3 Requirements for aircraft observational data*

5.4.3.1 The Commission examined the requirements established by the Working Group on Codes. It agreed to introduce the following changes:

(a) Information on weather is required as Type II data;

(b) Indication is required whether the turbulence observed was high-level or low-level;

(c) Information on high-level turbulence is considered to be Type II and Type III data, information on low-level turbulence being Type II data only;

(d) Information on amount, genus and height of cloud is required as Type II data.

5.4.3.2 The list of requirements adopted by the session is given in Annex X.

5.5 Requirements for non-meteorological data contained in messages

5.5.1 The Commission examined the requirements established by the Working Group on Codes. It was agreed that the use of the M_1M_1 indicator for the various upper-air reports was justified. In the case of surface synoptic reports the present system for the identification of messages was found satisfactory.

5.5.2 After discussing the most suitable method for indicating the station position, the Commission agreed that the block number should be included in each synoptic surface report from land stations.

5.5.3 Position checks of ship stations making upper-air observations were considered essential. In the case of sea stations reporting the surface data, the inclusion of 4-letter call signs of ships was found satisfactory for checking the continuity of the ship's position at successive observations. The problem of ship's movement data for estimating the influence of the pressure field on the reported pressure tendency was studied.

The agreed requirements are given in Annex XI.

5.6 Amendments to the Technical Regulations resulting from code changes

5.6.1 The Commission noted that, although the code form for the reporting of data obtained from meteorological reconnaissance aircraft was deleted from Part A of Volume B, in accordance with Recommendation 20 (CSM-III) as adopted by Resolution 34 (EC-XIV), a reference to this code form had remained in the Technical Regulations, paragraph 4.4.3.2. The session agreed to recommend the deletion of this paragraph from the Technical Regulations.

5.6.2 As a consequence of the adoption of Recommendations 17 and 19 (CSM-IV) the Commission noted that changes would have to be made in Chapter 12 of Technical Regulations such as in paragraphs /12.1./ 2.6.4 and /12.2./ 2.6.

5.6.3 Cg-IV requested that CSM consider the possibility of also including notes in Volume B, relating to the use of abridged reports in SYNOP and SHIP code forms, which now appear in paragraph 11.1.3 (Part D, Chapter 1) of Volume D (Cg-IV, General Summary 5.4.9). The notes referred to are 18 (a) and (b) on page D-D-I-61 of Volume D. These make provision for the truncation of coded weather reports from sea and land stations. The Commission agreed to refer the question to the Working Group on Data Needs and Codes for further study. Recommendation 4 (CSM-IV) was adopted.

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* NOTE : The requirements for the reporting of meteorological reconnaissance flight observations are not included.

5.7 Implementation of the code changes recommended by the fourth session of CSM

5.7.1 The Commission reviewed the current codes and recommended a number of changes. The requests for such code changes from other technical commissions such as CMM and CAeM were taken into consideration. The changes recommended were:

(a) minor amendments to present codes;
(b) changes of the code forms;
(c) inclusion of additional information, such as additional isobaric surfaces.

5.7.2 The Commission studied the impact of the above-mentioned code changes on the meteorological telecommunication system and decided to propose the implementation of such changes as did not result in a substantial increase in the loading of the meteorological telecommunication systems. Consequently it was agreed to implement the change in codes and the new code forms on 1 January 1968. Recommendation 5 (CSM-IV) was adopted. The Commission agreed that the inclusion of additional data in Part A of upper-air reports would have to await further studies of the capacity of the telecommunication system (see Recommendation 47 (CSM-IV)). Recommendation 6 (CSM-IV) was adopted.

5.8 Units of wind speed in meteorological messages for international exchange

After discussion of the problem of units of wind speed, the Commission adopted Recommendation 7 (CSM-IV).

5.9 Amendments to current surface codes

5.9.1 Reporting of blowing spray at sea stations

The Commission noted CMM's requirement that provision should be made for reporting blowing spray so that the cause of the reduction of visibility associated with this phenomenon could be shown in reports from ships. It was agreed to amend the specification of code figure 07 of Code 4677 to that given in Recommendation 8 (CSM-IV).

5.9.2 Discrepancy in WMO Publication No. 9.TP.4, Volume B

The attention of the Commission was drawn to the inconsistent use of time data in specifications of present weather. In some specifications the time at which the phenomenon observed occurred was given, while in others these data were not included. The Commission agreed to amend Note (2) under the specification of ww -- Present weather -- in Volume B as indicated in Recommendation 8 (CSM-IV).

5.9.3 Rounding off the temperature

During discussions on the reporting of temperature by TT in FM 11.C - SYNOP code form, it became evident that it would be highly desirable to provide instructions for rounding off the temperature data in the particular case of the observed temperature being exactly midway between the whole degrees, that is when the tenths figure is 5. It was thought desirable to have a single procedure for rounding off all elements in all meteorological fields. The Commission agreed that this matter would require more study before a decision could be reached.

5.9.4 Urgent amendments to current codes for surface observations

5.9.4.1 Reporting of sea surface temperature

The Commission examined the requirement raised by CMM for the sea-surface temperature to be reported to the nearest 0.1°C. It came to the conclusion that the method of doing so proposed by the Working Group on Codes was unacceptable because no provision was made in it for reporting the air-sea temperature difference with sufficient accuracy. It was also decided not to make any alteration to the mandatory groups, but to provide an extra optional group reporting the sea-surface temperature and giving at the same time the tenths figure for temperature. Provision is made for this in Recommendation 9 (CSM-IV).

5.9.4.2 Reporting of wind waves and swell waves

The Commission examined the various proposals and came to the conclusion that the urgent requirement raised by CMM was best met by a solution employing only five-figure groups with a relaxation of the requirement for period of swell waves. Provision for this is made in Recommendation 9 (CSM-IV).

5.9.4.3 Reporting of precipitation

5.9.4.3.1 Following a general discussion on the advisability of altering the reporting of rainfall, the Commission agreed not to alter the group 7RRjj because of doubt about the present requirement for international exchange of the amount of precipitation and also because of the considerable effects any change in the code form would have on regional and national practices.

5.9.4.3.2 The Commission considered whether provision should be made for a special message in the case of measurement of precipitation being delayed but not impossible. It agreed that such provision should not be made, emphasis being laid on the necessity for all measurements to be made so that they could be transmitted at the proper time.

5.9.4.3.3 The Commission considered that no useful purpose was served by the remark that a measurement of precipitation was inaccurate, and therefore recommended that it should be deleted. This decision is embodied in Recommendation 10 (CSM-IV).

5.9.4.4 Duration of precipitation

Code 4080 was criticized by the Commission on the grounds that it did not permit the reporting of both the duration of precipitation and the period of observation to which the report RR referred. At the expense of a slight relaxing of the duration of precipitation both the duration and the period could be reported. The amendment making it possible to do this is given in Recommendation 11 (CSM-IV).

5.9.4.5 Time interval for computing mean surface wind for aeronautical purposes

The Commission noted Recommendation 2/1 (CAeM-III), approved by Resolution 16 (EC-XVI), calling for the amendment of the procedure for the reporting of surface wind when used for aeronautical pruposes, and the action accordingly taken by CIMO. The session agreed to amend the notes under the symbolic letters "ff" given in Volume B. Recommendation 12 (CSM-IV) was therefore adopted.

5.9.4.6 Reporting of ship's average speed

The Commission considered the urgent request of CMM-IV for an extension of the present code 4451 to permit the reporting of ships' average speed up to at least 34 knots during the three hours preceding the time of observation. Recommendation 13 (CSM-IV) was adopted accordingly.

5.10 Codes for upper-air observations

5.10.1 TEMP and TEMP SHIP code forms

The Commission examined the two alternative code forms (i.e. a revised TEMP code form using five-figure groups, and an alternative TEMP code form of similar construction using groups of variable length) for TEMP reports proposed by the Working Group on Codes. A marked preference was expressed for code form composed only of five-figure groups. The Commission studied in detail various possible ways of indicating the sign for temperature without adding 50 to the negative values. A proposal was presented which would permit the reporting of the temperature sign and number of tenths of a degree Celsius (to the resolution 0.2°C) with the same economy of figures as in the proposal of the working group, and the corresponding provision was incorporated in the code form. The identification groups (localization in space and time) were slightly re-arranged in all parts of the message. In accordance with the discussion about the required resolution of wind parameters, the wind groups provide for the reporting of

direction to the nearest 5°, and for the reporting of speed to the nearest metre per second or to the nearest knot. The revision of the position-verifying group in TEMP SHIP, proposed by the Working Group on Codes, was not found acceptable, and it was agreed that the present procedure should be retained. Provision was made for the reporting of 250 mb level data in Part B of the code form. In addition provision was made to indicate the unit for wind speed used throughout the report. Certain minor changes were also agreed to and included in the code form, after which Recommendation 14 (CSM-IV) was adopted.

5.10.2 PILOT and PILOT SHIP code forms

5.10.2.1 The Commission examined the two forms of PILOT and PILOT SHIP submitted by the Working Group on Codes. The first of these code forms was a revised edition of FM 32.C and FM 33.C currently in use. The revisions proposed were directed toward standardization. It was noted that the code form provided for the reporting of wind direction and speed in four figures (i.e. ddff). The second code form was a new approach to the reporting of upper-wind data in that it provided for the insertion of indicators throughout the report, which specified the use of pressure, geopotential units, and the increments of altitude being used. In addition, it provided for reporting wind speed and direction in five figures (i.e. ddfff).

5.10.2.2 The Commission's newly adopted resolution for upper-level winds of 5° in direction and 1 metre per second in speed requires a five-figure group to express it. The first code form was therefore automatically rejected, as it provided only four figures. The Commission decided to combine the best features of both forms into a single code form that would meet the requirements.

5.10.2.3 In brief, the new code form provided improvements in the localization of the report in time and space. In addition it provided for the indication of whether pressure or geopotential height were being used for the pressure surfaces, maximum winds and significant winds. It also provided for the reporting of the measuring instrument used and for the indication of the units (metres per second or knots) in which the wind speed was expressed; and it provided five figures for reporting direction and speed. The Commission concluded that the developed code form would meet requirements. Recommendation 15 (CSM-IV) was adopted accordingly.

5.10.3 Report from rocketsonde stations

The Commission considered a request for the extension of code table e_s -- Type of data sensing equipment, and code table r_m -- Type of rocket motor, in the ROCOB code form. The session agreed to some changes in the above code tables and adopted Recommendation 16 (CSM-IV).

5.10.4 Upper-air report from aircraft

The Commission devoted considerable attention to the code form FM 41.D, developed by the Working Group on Codes, and to a proposal made by the United Kingdom. It decided to modify the figure form submitted by the Working Group on Codes in order to take into account the requirements expressed during the session. It was recognized that this code form would be used primarily in the hemispheric exchange of data, and no Type I or Type II data were included. Recommendation 17 (CSM-IV) was consequently adopted.

5.11 Codes for analysis and prognosis

5.11.1 Amendments to satisfy aeronautical requirements

The Commission considered the requests contained in Recommendations 13/5 and 13/6 (CAeM-III), the former requiring that provision should be made to permit coding of vertical wind shear in knots per 300 metres in addition to knots per 1000 metres, and the latter that provision should be made for describing the existence and location of clear-air turbulence and also the amount of cloud in significant weather charts disseminated in figure code form. The request contained in the latter recommendation could be met by deleting the symbol J

(aircraft icing and turbulence) in the cloud section N -- amount of cloud -- and by indicating icing and/or turbulence in the weather-area section by using group(s) 989 $w_e i$ as necessary. These proposals were embodied in Recommendation 18 (CSM-IV). A further requirement expressed by CAeM-III in Recommendation 13/6 was provision for encoding "convergence line." Since this term was in current use, and since CSM-IV was recommending the inclusion of the term and a symbol in Appendix E of Volume 1 of the Technical Regulations (see Recommendation 52 (CSM-IV)), it was considered necessary to make provision for encoding it. This could be done by amending code table 1152-F_t -- Type of front -- to eliminate the specifications "warm occlusion" and "cold occlusion" and to include "quasi-stationary front above the surface" and "convergence line". The table, amended in this way, re-arranged, and with some minor changes in the wording of other specifications, would conform more closely with the list of fronts given in Appendix E of Volume 1 of the Technical Regulations. These changes are also embodied in Recommendation 18 (CSM-IV).

5.11.2 Amendments to satisfy shipping requirements

The Commission noted the request of CMM for a re-arrangement of the IAC Fleet FM 46.C with respect to the provision of information on past and future positions of pressure systems, fronts and wave isopleths. Suitable arrangements for this purpose, recommending their introduction in both FM 45.C and FM 46.C code forms, were developed and incorporated in Recommendation 18 (CSM-IV).

5.12 Specialized codes

5.12.1 Aviation weather reports

5.12.1.1 The Commission reviewed the codes for aerodrome meteorological reports and concluded that it would be desirable:

(a) to align the contents of these reports more closely with the latest aeronautical requirements; and

(b) to improve the direct-reading qualities of the code as far as possible to eliminate, or at least to reduce, the need for time-consuming conversions by pilots, air-traffic controllers and other aeronautical personnel.

It was recognized that, in order to achieve these purposes, a comprehensive revision of the present aeronautical codes would be necessary. In the opinion of the Commission the time for such action, which had been considered already by earlier WMO and ICAO meetings, had now arrived. It would permit a more accurate reporting for aeronautical purposes which, the Commission was advised, was required to meet needs arising from lower aerodrome meteorological minima. This advantage, together with the potential saving in time and effort for both meteorological offices and aeronautical users, was thought to outweigh the relatively small disadvantage of the consequent need for training in the use of the new codes.

5.12.1.2 With regard to the contents of the reports, the Commission studied the statement on operational requirements for aerodrome meteorological reports to be exchanged ground-to-ground, developed by ICAO in accordance with Recommendations 13/10 and 13/11 (CAeM-III). It was agreed that the requirements stated could be satisfied by developing a new code form to replace the present FM 15.C -- AERO and FM 16.A -- MMMM/BBBBB.

5.12.1.3 Considering the form of the reports, the Commission took it to be essential that meteorological observations coded for aeronautical purposes should be adequate for both meteorological and non-meteorological users, and that they should be easy to understand.

It was therefore agreed:

(a) that the order of the elements should be the same as in the corresponding plain language form (Technical Regulation /12.2/ 2.7.2.6); and

(b) that each element should be given in terms as near to those of the direct reading as possible, using the format recommended by the CAeM-III/MET/OPS Meeting (Report on Item 13, paragraphs 13.27 to 13.35 and Recommendation 13/10).

5.12.1.4 In the course of the development of the above-mentioned code forms the following points were decided on or taken into account:

(a) in order to allow for easy identification of groups and to facilitate the detection of errors, a number of "identifier letters" (rather than figures) were included, for example the identifier "R" for runway visual range;

(b) to cater for the direct-reading quality, wind direction was given in degrees, the last figure always being "0". For the reporting of maximum winds, "/$f_m f_m$" was considered to be a suitable coding device as intended by Recommendation 13/8 (CAeM-III), and to be economical;

(c) visibility was given in metres; the increments to be used fulfilled the ICAO requirements and were in conformity with present coding practices;

(d) with regard to the reporting of Runway Visual Range the letter "R" was to be used as the indicator in conformity with Recommendation 13/3 (CAeM-III), which called for a suitable coding device. It served economy at the same time. The increments reported fulfilled the ICAO requirements;

(e) with regard to the reporting of present weather, the Commission noted that ICAO, which had conducted extensive trials during 1965 in co-operation with some of its Contracting States, had expressed a preference for the use of letters instead of figures. The Commission also noted that several States had been using letters for the reporting of present weather for many years. However, in view of the difficulties expressed by Members using non-latin alphabets and/or languages other than French, Spanish and English, the Commission decided to recommend the use of a figure-code, supplemented in accordance with regional air navigation agreements by abbreviated letter equivalents. This solution was recognized to be satisfactory to all for the moment;

(f) it was also noted that in certain cases a phenomenon could be indicated by abbreviations with different letters in the various meteorological messages for aviation. The Commission therefore considered that ICAO and CAeM should be asked to consider this problem with a view to bringing about the required uniformity;

(g) with respect to reporting of clouds, it was decided to follow the rule contained in the AERO-Code. However it was also felt that further study should be made of the desirability of reporting all cloud layers, irrespective of the number of oktas;

(h) the accuracy currently attainable in measuring the height of clouds and the variability of this element in space and time did not favour the introduction of the reporting of cloud-base height in 15 m increments near the ground, as stated in Appendix I of the report on Agenda item 5 (CAeM-III). This form of report was therefore not implemented;

(i) the genus "cloud" was introduced for monitoring weather developments and for forecasting for general aviation;

(j) negative values of air temperature and dew-point temperature were to be indicated by placing the letter M before the elements in order to avoid the adding of 50 which had given rise to erroneous interpretation by non-meteorological personnel;

(k) instructions for giving supplementary information were not finalized. The examples given in Note (13)* were not intended to be restrictive. The list of significant phenomena used for SIGMET-information could serve as a guide for expanding the list of phenomena to be reported in the METAR.

(l) some members had reservations about the decision not to use an indicator for reporting the deterioration or improvement of weather conditions in the new code for aviation selected special weather reports (SPECI).

5.12.1.5 When reviewing the new code forms (METAR and SPECI), which had been proposed by the Working Group on Codes, the Commission gave careful consideration to the comments received from CAeM and ICAO.

5.12.1.6 When the new METAR and SPECI code forms were introduced, there would still be a widespread need for codes similar to the AERO and MMMMM/BBBBB code forms for national use for synoptic purposes. Hence it was decided to recommend that the AERO and MMMMM/BBBBB code forms be retained in Volume B without any change in form and content, but with new FM numbers, until such time as new codes were developed to meet the national or Type I requirements. An introductory note should be given to these obsolete code forms to indicate clearly that they had been retained in Volume B for the convenience of those who might wish to use them for national non-aeronautical purposes only.

5.12.1.7 The Commission was aware of the decision of the seventeenth session of the Executive Committee that consideration should be given to Recommendations 13/3 (CAeM-III) -- Reporting of runway visual range in FM 15.C (AERO), and 13/8 (CAeM-III) -- Indication of maximum wind speed, both of which required urgent action. It was felt that, if new METAR and SPECI code forms meeting the above requirements were introduced as from 1 January 1968, amendments to the present AERO and MMMMM/BBBBB code forms for a relatively short period of time would not be desirable. Accordingly Recommendation 19 (CSM-IV) was adopted.

5.12.2 Aerodrome Forecasts

5.12.2.1 The Commission, having

(a) reviewed the aeronautical meteorological codes on the basis of the latest stated aeronautical requirements, and

(b) recommended under 5.12.1 that Code forms FM 15.C and FM 16.A relating to aerodrome meteorological reports be replaced,

concluded that it was desirable to meet these requirements further by revising the present TAFOR FM 51.C and TAF FM 52.C code forms concurrently.

5.12.2.2 The justification for introducing runway visual range into the aerodrome forecast even as a drop-out element was strongly questioned, as the session was fully aware that, although some countries had undertaken research in this field, there existed as yet no method of forecasting it on a sound scientific basis. The nature of the parameter itself, involving non-meteorological elements, might well be an insurmountable obstacle to success. The Commission therefore decided to make provision for the inclusion of runway visual range as supplementary information in plain language only because ICAO and the president of CAeM had requested its inclusion.

5.12.2.3 It was considered premature to introduce a group for indicating vertical wind shear in the lower layers, since these phenomena and their effects on aircraft operations were still under study. Recommendation 20 (CSM-IV) was thereupon adopted.

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* See Annex XXIV.

5.12.3 Area forecast for aviation, route forecast for aviation, flight forecast for aviation

5.12.3.1 The Commission, having recommended new code forms for aviation weather reports and aerodrome forecasts in Recommendations 19 (CSM-IV) and 20 (CSM-IV), also reviewed the requirements for area, route and flight forecasts and decided to revise the existing code forms FM 53.B, FM 54.B, FM 55.B, FM 56.C, FM 57.C, FM 58.C.

5.12.3.2 The most important modification was the inclusion of optional additional groups for maximum wind and/or vertical wind-shear data.

5.12.3.3 It was considered useful to follow the code instructions of FM 15.D and FM 51.D in relation to visibility and clouds. Recommendation 21 (CSM-IV) was therefore adopted.

5.12.4 Reports of monthly means

5.12.4.1 The Commission considered the requirements expressed by CCl-IV regarding the data to be reported in CLIMAT, CLIMAT SHIP, CLIMAT TEMP and CLIMAT TEMP SHIP messages. These call for the reporting of:

(a) in CLIMAT and CLIMAT SHIP:

(i) The mean vapour pressure instead of the mean relative humidity;
(ii) The total amount of precipitation for the month to the nearest whole millimetre (up to 500 mm);
(iii) The number of days with rainfall 1 mm or more; and

(b) in CLIMAT TEMP and CLIMAT TEMP SHIP:

(i) The direction of the mean vector wind to the nearest degree;
(ii) The wind speed exceeding 99 knots by adding 500 to the wind direction;
(iii) Indication of the number of days of missing temperature and wind data;
(iv) The steadiness factor in two figures.

CCl-IV also recommended that the mean vector wind at the surface should not be reported.

5.12.4.2 It was also agreed that the instructions relating to the computation of the required means should be deleted from Volume B, and that the president of CCl should be requested to include this material in the "Guide to Climatological Practices".

5.12.4.3 The desirability of including tropopause data in CLIMAT TEMP messages was also discussed, but it was decided not to make such provision for the time being.

5.12.4.4 The opinion was expressed that the number of days with observations should be reported rather than the number of days with missing data. For reasons of economy in coding, however, the latter alternative was preferred.

5.12.4.5 Attention was drawn to the fact that, in the code forms for upper-air observations adopted by the session, dew-point depression was introduced as a parameter for humidity. It was felt that it might be desirable to adopt the same procedure for CLIMAT TEMP and CLIMAT TEMP SHIP, and it was agreed to request the president of CSM to ask the president of CCl to consider this question so that a final decision could be reached before the new code forms were introduced. Recommendation 22 (CSM-IV) was adopted.

5.12.5 Forecast for shipping

5.12.5.1 The Commission noted that CMM-IV had pointed out that some difficulty was experienced in the use of the group $1GDF_mW_1$ to indicate "occasional" conditions (G = 9). It was considered that rewording of the instructions relating to the use of this group would remove the difficulty.

5.12.5.2 The fact that there is no indication (FM 61.C) of the beginning of the forecast period in the MAFOR code form was also discussed. It was agreed that the inclusion of this information was necessary. To make provision for this and also to overcome the difficulty raised by CMM-IV, Recommendation 23 (CSM-IV) was adopted.

5.12.5.3 The Commission also noted that messages in the MAFOR code form can be undesirably long when changes in prevailing weather conditions are expected to occur. However, no fully satisfactory solution to this problem was found.

5.12.5.4 The Commission considered a suggestion that the code symbol S in the optional group ($2VST_xT_n$) should be used exclusively for indicating waves generated by local wind. Since, however, the definition of the term "state of sea" was still under consideration within CMM, it was agreed to defer action on this matter until CMM clarified the position.

5.13 Reporting of ship's position

5.13.1 In its review of non-meteorological parameters appearing in meteorological reports, the Commission devoted particular attention to the groups at present used to report the position of ship stations. To simplify the procedure and thereby minimize confusion and errors, the session agreed that the new system proposed by the Working Group on Codes, in which each quadrant of the globe is identified by one figure, should be introduced. It was also felt that, to get around the artificiality introduced by Code 3300, it would be worthwhile to add one more figure for the reporting of the longitude.

5.13.2 It was considered that it would be highly undesirable to have two forms for reporting ship position in existence at the same time; hence the adoption of the new system would be dependent upon its acceptability for use in all forms of ship report, surface and upper-air, and for implementation in all forms of reports at the same time. Recommendation 24 (CSM-IV) was adopted.

5.14 Identification of ship report and position

5.14.1 The Commission considered that there would be a definite advantage in changing the initial groups of the following reports from ships: FM 21.C, FM 22.C and FM 23.C. This would facilitate identification of these reports by computers, ensure fewer errors in position reporting, and bring the method of reporting into line with that used in the recommended code form for upper-air information from ships.

5.14.2 It was found advantageous for ease of recognition to use the two indicator figures 99 at the beginning of the position groups to indicate that the report which followed was from a mobile station.

5.14.3 In addition it was decided to alter the SPESH (FM 26.B) code, though not used in computers, to bring it into line with the other ship reports. In this code it was found necessary to restrict the specification of time to the nearest quarter of an hour.

5.14.4 These changes in the SHIP codes allowed the introduction of a figure to indicate whether the wind strength was measured or estimated, and whether the wind speed was reported in metres per second or knots. These changes were provided for in Recommendation 25 (CSM-IV).

5.14.5 The Commission noted that in some other code forms (for example those for analysis and prognosis and for aviation forecasts) the procedure for reporting position remained unchanged. It decided to draw the attention of the Working Group on Data Needs and Codes to this fact in order that the group might devote further study to the possibility of reaching uniformity in reporting position in all international codes at the same time.

5.15 Changes in the Guide to the Preparation of Synoptic Weather Charts and Diagrams

The Commission felt that some amendments to the guide might be necessary in order to incorporate the decisions of the fourth session, particularly with respect to some recommendations concerning codes. The Commission requested the Secretary-General to prepare proposals for the amendment of the guide for approval by the president of the Commission.

6. NETWORKS AND TIMES OF OBSERVATION FOR SYNOPTIC PURPOSES (Agenda item 6)

6.1 Network density

6.1.1 The Commission examined the report of the Working Group on Networks and the appropriate paragraphs of the joint CAe/CSM Working Group on Numerical Weather Prediction. It took note of the fact that, although various CSM Working Groups had been working on the problem during the last twelve years, they had not been able to reach the desired results. The report of the Working Group on Networks called for action on three points. In studying these proposals for action the Commission came to the conclusions given below.

6.1.2 The Working Group had been asked in its terms of reference to review the criteria for surface and upper-air networks specified in the Technical Regulations. In its report the Group had neither suggested modifying any criteria nor presented any convincing reasons for changing the text of paragraphs 2.2.1.2 and 2.2.1.3 of the Technical Regulations. In view of this, the Commission decided not to make any recommendations for such changes.

6.1.3 CSM-III had recommended that the report of the Working Group on Networks submitted to that session should be published as a WMO Technical Note after certain editing and after the addition of a suitable introduction. So far it had not been possible to complete this work. The session, however, felt strongly that there was still a need for such a Technical Note, as it might facilitate further study of network problems. It should contain summaries of useful studies which had been published on the subject, and a complete bibliography. The Commission was of the opinion that the preparation of this Technical Note could be undertaken by one Member, and it noted with gratitude the offer made by the Russian delegation to carry out this work in the U.S.S.R.

6.1.4 With regard to further studies of the network problem, the Commission noted the comments of EC-XVII (paragraph 5.3.2.3 of the General Summary) to the effect that such studies might more appropriately be handled by an expert or a scientific institution, and that similar studies were also planned within the framework of the World Weather Watch. The Commission also noted the recommendation made by the joint CAe/CSM Working Group on Numerical Weather Prediction that numerical experiments should be carried out to get information on network requirements (such as the investigation by S. A. Mashkovich entitled: "An investigation of aerological observations and the requirements for the distribution of a network of stations", Izvestia, Academy of Sciences, Geophysics Series, No. 2).

6.1.5 The Commission recognized the need for specifying the desired degree of accuracy in analysis and forecasting to facilitate studies on network requirements. It noted that the accuracy requirements for forecasts to international aviation being developed by ICAO might provide a basis for this.

6.1.6 The Commission agreed to recommend that Members be encouraged to undertake research projects on network problems and accordingly approved Recommendation 26 (CSM-IV). It also decided in Resolution 2 (CSM-IV) to nominate a Rapporteur on Networks, who would report on network studies carried out since CSM-IV to the president of CSM in good time for circulation to be possible among Members before CSM-V.

6.2 Minimum performance characteristics of automatic weather stations

6.2.1 The Commission examined the report presented by the Working Group on Minimum Performance Characteristics of Automatic Weather Stations. It first considered the first part of the report, which dealt with the establishment of minimum performance characteristics, i.e. the elements to be observed and transmitted, the frequency of observations, the minimum accuracy required, the coding system, the means of transmission, and schedules for maintenance and inspection. The Commission accepted this part of the report and asked the Secretary-General to distribute it to Members and interested organizations for information.

6.2.2 Some delegates disagreed with the form used by the Working Group for specifying minimum accuracies on the grounds that it was necessary to lay down separate tolerances (a) for random instrumental errors, and (b) for errors due to instability of calibration. It was noted that the group had used the form recommended by CIMO and used by CSM-III for the accuracies of observations made at ordinary stations.

6.2.3 The second part of the report of the Working Group contained texts for possible inclusion in the WMO Technical Regulations. This part of the report was therefore considered under item 12 of the CSM-IV Agenda (see paragraph 12 of the present report).

6.3 Procedures for selection of aircraft reports for hemispheric exchange

6.3.1 The Commission was informed that the U.S.A. had been able to increase the utility of AIREPS, for manual and computer use, by having the reports screened and compiled by the main meteorological offices at New York, San Francisco, San Juan, Anchorage and Honolulu. These stations selected, edited, coded and compiled the reports into bulletins for exchange within North America, and it was particularly noted that the process was carried out at MMOs. The reports judged to be accurate and non-redundant were sent to the National Meteorological Centre in Washington, D.C., where they were used in objective analyses. This programme was expanded during a trial period during July and August 1965 under WMO guidance.

6.3.2 All Members in Regional Associations II, IV and VI were invited to participate in this expanded WMO trial and to exchange the selected reports over the Northern Hemisphere Exchange System (NHES). It appeared from the experience of a number of countries that the results of the test were favourable in that the data obtained by these methods were useful for analyses.

6.3.3 In view of the usefulness of aircraft reports and the need for guidance as to how such reports should be selected, the Commission adopted Recommendation 27 (CSM-IV).

6.3.4 The Commission agreed that centres accepting the responsibility of archiving the data within WWW should keep all aircraft reports for research purposes.

7. TELECOMMUNICATIONS (Agenda item 7)

7.1 Review of the Technical Regulations, Chapter 1 - Definitions, and Chapter 6 - Meteorological telecommunications

7.1.1 On the basis of the result of a study conducted by correspondence by the Working Group on Telecommunications, the Commission discussed the request of Cg-IV to examine the definition of "territorial broadcast" and Technical Regulation 6.3.1.2, as at present contained in the Technical Regulations.

7.1.2 The Commission agreed that it would be desirable to amend the present definition of "territorial broadcasts" so as to provide for the earlier reception of meteorological data, if national data requirements could not be met through sub-regional, regional or hemisphere broadcasts. It therefore adopted Recommendation 28 (CSM-IV).

7.1.3 In considering the comments of Cg-IV concerning the drafting of Technical Regulations, the Commission felt that a rewording of Technical Regulation 6.3.1.2 would be desirable. Consequently Recommendation 29 (CSM-IV) was adopted.

7.1.4 The Commission reviewed the WMO telecommunication procedures with a view to bringing them up to date. It felt that a revised definition of "meteorological message" was essential for the understanding and application of the WMO meteorological telecommunication procedures. The session accordingly drew up a proposal for amending the Technical Regulations. Recommendation 30 (CSM-IV) was adopted.

7.1.5 When reviewing the Technical Regulations dealing with telecommunications as at present contained in the Technical Regulations (WMO Publication No. 49.BD.2/3), the Commission

agreed that a number of changes might be required if the concept of the World Weather Watch were approved by Cg-V.

7.2 Improvement of collection and distribution of observational information

7.2.1 The Commission expressed particular concern about the shortcomings in the collection of observational reports at national meteorological communication centres or territorial broadcast centres in some parts of the world. The need was stressed for regular and speedy collection of those observational reports intended for international distribution. The Commission agreed to remind Members of the provisions set forth in paragraph 1 of Part III, Chapter I of WMO Publication No. 9.TP.4, Volume C, which stipulated that "Messages for synoptic purposes should normally have a transit time of not more than 10 minutes from the time of filing at the observing station to the time of delivery at the designated meteorological communication centre, and in no case should such a time exceed 30 minutes". The Commission agreed to urge Members to do their utmost to improve their national collection systems to ensure reliable and timely reception, and prompt regional distribution, of observational reports at meteorological telecommunication centres. Recommendation 31 (CSM-IV) was adopted accordingly.

7.2.2 The Commission noted that all regional associations had already developed, or were actively engaged in developing, appropriate regional telecommunication plans, and urged them to continue their efforts to plan regional telecommunication systems which would permit rapid collection and exchange of global data.

7.2.3 The Commission noted that certain deficiencies in the present exchange between hemisphere exchange centres were caused by inadequate regional telecommunications arrangements. While deficiencies existed in the collection of SYNOP SHIP and upper-air reports in both hemispheres, the Commission particularly noted the major deficiencies at the centres at Nairobi, New Delhi, Brasilia and Melbourne in the collection of data from Regions I, II and III and parts of Region V respectively, and also the late reception in Region VI of observational data from weather ships stationed in the western Atlantic. Recommendation 32 (CSM-IV) was adopted.

7.2.4 In searching for possible means to improve the collection of observational data in some areas, the Commission reached the conclusion that such improvements would be made only very slowly without either technical or financial assistance. Recommendation 33 (CSM-IV) was adopted.

7.3 Review of the existing and at present recommended systems

7.3.1 Contents of the northern hemisphere exchanges

The Commission examined the results of the Secretary-General's inquiry on desirable contents of the exchange programme. The Commission first established a number of principles as to the type of data, selection of stations and final frequency of transmissions, and then drew up a detailed list of stations whose reports should be included. During the discussions it was stressed that Members responsible for the operation of these stations should be invited to express their views as to whether the reports of the stations selected were of the desired high standard and whether the telecommunications available permitted the speedy collection of the reports by the national communication centre. Since adjustments may be required to the list of stations between sessions of CSM both for the above-mentioned reasons and others, the Commission authorized its president to approve such amendments on behalf of the Commission (see Recommendation 37 (CSM-IV)). Recommendation 34 (CSM-IV) was adopted.

7.3.2 Improvements in the exchange of northern hemisphere data

7.3.2.1 The Commission reviewed the present state of implementation of Recommendation 51 (CSM-III). In particular the Commission wished to place on record its appreciation of the improvements achieved by bringing a 75-baud teleprinter cable circuit into operation between Offenbach and New York, and of the resulting increase in the reliability of this portion of the system.

7.3.2.2 The Commission noted with satisfaction the efforts of India to improve the collection of RA II data.

7.3.2.3 The Commission noted with satisfaction the introduction of hemisphere broadcasts in Moscow and Tokyo for distribution of northern hemisphere data.

7.3.2.4 However, the Commission felt that further steps should be taken to improve the operation of the Northern Hemisphere Exchange System. The speeding up of collection by NHECs and the proper editing of reports included in bulletins exchanged through the system were both mentioned as desirable means of expediting the transmission of data. It was mentioned that in some cases the use of circuits included in regional telecommunication networks could alleviate existing difficulties and shortcomings in the northern hemisphere network.

7.3.2.5 A number of statements were made concerning future improvements and these are reproduced in Annex XII.

7.3.3 Exchange of southern hemisphere data

7.3.3.1 The Commission reviewed the present state of implementation of Recommendation 52 (CSM-III). The Commission noted with appreciation the efforts of Members responsible for the operation of the Nairobi, Brazilia and Melbourne centres to improve the collection of meteorological data in their respective areas of responsibility.

7.3.3.2 The Commission discussed at great length ways and means of exchanging southern hemisphere data in the southern hemisphere. Some experts felt that a separate southern hemisphere ring (as recommended by Recommendation 52 (CSM-III) would be the best solution. The Commission, however, noted the financial implications of such a separate network. The restricted session of the Working Group on Telecommunications of CSM (Melbourne 1964) had assessed the capital and annual operating costs and found them prohibitively high.

7.3.3.3 The Commission felt that the full implementation of Recommendation 52 (CSM-III) could not be expected in the next two years. However, the Commission noted with appreciation the offer of Spain to establish and operate two relay stations (Las Palmas and Santa Isabel) for the link between Brasilia and Nairobi. The Commission was informed that the SHECs at Nairobi and Brasilia intended to conduct trials for the exchange of data between them, either directly or via the relay centres mentioned above. The circuit might also in future serve the requirements for the exchange of information in the southern hemisphere for the WWW.

7.3.3.4 The delegation of Brazil informed the Commission that the possibility of transmitting data directly to Nairobi or via the relay points mentioned above was under study.

7.3.4 Exchange of data between NHECs and SHECs

7.3.4.1 The Commission noted the progress made in interconnecting northern hemisphere exchange centres and southern hemisphere exchange centres. In 1962, the RTT and facsimile circuit Nairobi - Offenbach had been put into operation in accordance with Recommendation 57 (CSM-III) and Resolution 33 (EC-XIV). At the beginning of 1965, an RTT connexion had been established between Cairo and Moscow which had since been extended to Nairobi. Very recently interim arrangements had been made for the transmission of Region III data from Brasilia to Washington. It was expected that the exchange on the latter circuit could be further improved in the near future. The Commission was also informed that further improvements would come about during the next 18 months due to the implementation of WMO New Development Fund projects to provide telecommunication equipment at Nairobi and Brasilia. These telecommunication circuits were providing data from the southern hemisphere to the northern hemisphere, Region III data at Washington and Region I data at Moscow and Offenbach. There were arrangements for Region I data to be made available to all countries connected to the IMTNE. The Commission also noted with satisfaction that the Nairobi-Cairo-Moscow link would make it possible to receive Region I data earlier at New Delhi, via Moscow.

7.3.4.2 The Commission recognized the urgency of making adequate telecommunication arrangements to satisfy the data requirements of the WMC at Melbourne (see Resolution 1 (IV-RA V)) and also for the transmission of data from Regions III and V to the world meteorological centres at Moscow and Washington and to other countries. In this connexion it noted the efforts being made to implement the recommended RTT circuit New Delhi - Singapore - Melbourne (see Recommendation 57 (CSM-III) approved by Resolution 33 (EC-XIV)). The Commission was informed of the approval of the WMO New Development Fund project to provide financial assistance to Singapore (see the Abridged Report of EC-XVII, General Summary, paragraph 4.5.4).

7.3.4.3 Interim arrangements for the exchange of southern hemisphere data

7.3.4.3.1 The Commission was informed that arrangements had recently been made to transmit southern hemisphere data from Region III on the 75 baud teleprinter channel New York - Offenbach as well as the radioteleprinter circuit New York - Santa Maria - Paris. It was also informed that Moscow was not receiving data from Region III, and that due to the overloading of the existing channels in Europe it was impossible to ensure the speedy transmission of these data to Moscow from Paris and Offenbach. The Commission therefore considered that the problem of rapid and regular transmission of data from Region III via Washington to Moscow and thence to New Delhi and Melbourne must be solved in the immediate future.

7.3.4.3.2 The Commission recognized the requirement of the world meteorological centres at Melbourne (see Resolution 1 (IV-RA V)), Moscow and Washington, as well as of other centres, for regular and timely reception of a sufficient number of observational reports from the whole of the southern hemisphere. The Commission therefore agreed:

(a) To invite the Members concerned to implement the recommended New Delhi - Singapore - Melbourne RTT link as soon as possible;

(b) To urge the Members concerned to make arrangements adequate to ensure that southern hemisphere data from Region III might be available at Moscow for transmission to Melbourne (via New Delhi) and to other centres; and

(c) To invite Australia to transmit southern hemisphere data from Region V via New Delhi to the world meteorological centres at Moscow and Washington, and to other centres as required.

Recommendation 35 (CSM-IV) was therefore adopted.

7.4 Telecommunication arrangements - practices and procedures

7.4.1 Review of Publication No. 9.TP.4, Volume C, Chapter I - Guide to meteorological telecommunications

7.4.1.1 The Commission reviewed the text at present published in WMO Publication No. 9.TP.4, Volume C, Chapter I.

Regarding the Northern Hemisphere Exchange Scheme, the Commission was informed that the link San Francisco - Honolulu had recently been improved, and that plans existed to upgrade the Tokyo - Honolulu segment of the NHE link Tokyo - New York. Recommendation 36 (CSM-IV) was consequently adopted. It was understood that although the bulletins from the Offenbach area had for some time been transmitted to Tokyo via New York, the Honolulu - Tokyo portion of the circuit was already very heavily loaded, making it very difficult for that circuit to transmit all the Offenbach data to Tokyo. It was consequently agreed that the interim arrangement of transmitting the Offenbach data to Tokyo via New Delhi might continue until such time as the Tokyo - Honolulu circuit was able to handle them. In the light of past experience in the application of WMO uniform teleprinter procedures, the Commission recommended some amendments to the present practices, adopting Recommendation 37 (CSM-IV).

7.4.1.2 The Commission reviewed the application of WMO teleprinter procedures in the past. The importance of strict adherence to WMO telecommunication procedures was emphasized during the discussions. Without strict adherence, great difficulties would occur in automatic processing and switching of meteorological bulletins and messages. The Commission felt that the attention of Members should again be drawn to this important problem, and recommended that before ships' reports were broadcast or relayed the ships' four-letter call-signs (see ITU Radio Regulations) should replace all other identifiers such as ships' names. If a four-letter call sign could not be ascertained, the word "SHIP" was to begin the message. Recommendation 38 (CSM-IV) was adopted.

7.4.1.3 The Commission noted paragraph 6.11.2 of the General Summary of the work of the fourth session of the Commission for Maritime Meteorology, in which it was stated that difficulties were experienced particularly when entering weather data in ships' meteorological log-books, where the solidus could frequently be mistaken for the figure 1. The Commission discussed the question and felt that this was mainly a matter of recording in log-books or other records, and not a telecommunication matter. It was therefore agreed not to propose any change in the present use of the solidus in meteorological telecommunication procedures, recognizing that this in no way restricted the use of an "X" or other symbol as an entry in log-books.

7.4.2 Data designators adopted by WMO vis-à-vis "bulletin category identifiers" adopted by ICAO MOTNE panel

The Commission discussed at great length the problems occurring at meteorological telecommunication stations as a result of divergence between ICAO and WMO telecommunication procedures. The particular case brought to the attention of the Commission was the adoption of bulletin category identifiers by ICAO for operational meteorological messages transmitted on the MOTNE system. Some Meteorological Services connected to the WMO telecommunication system and to the ICAO/MOTNE system experienced difficulties in the preparation of messages. The consensus of opinion in the Commission was that there should be uniform telecommunication procedures for all types of meteorological messages transmitted either on WMO or ICAO networks. The Commission therefore felt that WMO and ICAO should endeavour to adopt common telecommunication procedures for meteorological bulletins. To this end, Recommendation 39 (CSM-IV) was adopted.

7.4.3 Standard headings for facsimile charts

The Commission discussed the desirability of adopting standard WMO headings for facsimile charts. It was felt that the present practice of identifying charts in plain language and some self-evident abbreviations was quite satisfactory, and that there was for the time being no need for standard headings for identification of facsimile weather charts.

7.5 Use of AFTN circuits for the transmission of basic meteorological information

The Commission noted that in some parts of the globe AFTN circuits were extensively used for the exchange of basic meteorological data. It recognized that this was only an interim measure until such time as WMO telecommunication arrangements became adequate to satisfy the requirements of Members in any particular area. In order to allow AFTN and WMO circuits best to fulfil the functions for which they are designed, the Commission urged Members to cease using the AFTN when WMO telecommunication arrangements were adequate. In cases of breakdown or outages of circuits on which basic meteorological information was normally transmitted, however, other available circuits, including AFTN, should be used to the maximum possible extent. Recommendation 40 (CSM-IV) was adopted.

7.6 Planning of the WWW global telecommunication system

7.6.1 Under this agenda item the session examined questions relating to the planning of the World Weather Watch global telecommunication system. The discussions of the Commission were guided by the decisions of EC-XVII (General Summary of the work of the session, paragraph 5.1).

7.6.2 The Commission deliberated on global aspects of meteorological telecommunications, paying particular attention to the organization and engineering of the main trunk circuit and global procedures and practices. It kept in mind that the regional telecommunication networks and the centres serving these networks would have to be determined by the regional associations concerned. Recommendation 41 (CSM-IV) was adopted.

7.6.3 Regarding the organization of the main trunk circuit, EC-XVII had given clear instructions as to the inclusion of regional telecommunication hubs, RMCs and NMCs on the main trunk circuit. The relevant decision of EC-XVII reads as follows:

"Organization of the global telecommunication network

5.1.23 It has been agreed that the global telecommunication network should be organized on a two-level basis, namely:

(i) A main trunk circuit will interconnect world meteorological centres and appropriate regional telecommunication hubs and regional meteorological centres. In principle all RTHs, RMCs and NMCs should have equal possibility to be connected to the main trunk circuit. In practical implementation of this principle and planning the main trunk circuit, the views of regional associations and other competent WMO bodies, such as CSM, should be taken into account in selecting these centres and telecommunication hubs.

(ii) The regional telecommunication networks for the collection of observational data in a given part of the world and their transmission to centres and hubs on the trunk circuits. This circuitry may also provide for the distribution of observational data output products of world and regional meteorological centres to national centres as required. The telecommunication functions of regional meteorological centres (RMC) are given in paragraph 5.1.25 below."*

7.6.4 During the discussions on the planning of the main trunk circuit it was found that a definition of the main trunk circuit would be useful, and the Commission therefore decided to define the main trunk circuit, for planning purposes, as follows:

"The circuit should consist of a series of standard telephone-type channels and appropriate terminal facilities including switching and relay equipment which would permit of rapid exchange of observational and processed data between WMCs and appropriate RTHs and RMCs. For operational and practical reasons a number of RTHs or RMCs are required to be connected to the main trunk circuit with direct transmitting and receiving capabilities. Other RTHs, RMCs and NMCs may be connected to the main circuit for reception of data only. The data collected by these RTHs, RMCs and NMCs will be included in the main trunk circuit through WMCs or RTHs having transmitting capabilities on the main trunk."

7.6.5 Regarding the technical characteristics of the circuits, it was stressed that CCITT standards should, where relevant, be fully applied. Wherever practicable, cable facilities should be used.

7.6.6 The terminal equipment installed should permit the most efficient handling of the traffic.

7.6.7 World meteorological centres and RTHs or RMCs connected to the main trunk circuit, and having transmission and receiving capabilities, should possess facilities to permit immediate retransmission of observational and processed information received from the main trunk or feeder circuits.

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* Paragraph 5.1.25 of the General Summary of EC-XVII is not reproduced.

7.6.8 There was agreement that the main trunk circuit should be operated as a point-to-point full duplex system between terminals. However, the possibility of a continuous loop operation should be studied with a view to its application, if the study shows it to be technically and operationally feasible.

7.6.9 The Commission discussed at great length ways and means to improve the collection of observational data. It found that the existing situation called for considerable improvement, at least in some Regions. In order to facilitate the planning of the regional telecommunication networks, the Commission felt that regional associations should be guided in the planning of regional telecommunication networks by the following principle:

> World meteorological centres or regional telecommunication hubs with transmitting capabilities on the trunk circuit should receive observational information (surface and upper-air) as soon as possible, but not later than 45 minutes (for Regions I, III and V and the southern part of Region II, not later than 60 minutes) after the observing station's filing time. The above time-limits indicate the completion of the transmission to the centres mentioned above.
>
> NOTE : The observing station's filing time is the time when the coded meteorological report is first presented to the telecommunication system.

7.7 International distribution of meteorological information obtained by artificial satellites

7.7.1 The Commission reviewed the present arrangements for the distribution of meteorological information obtained by satellites. It noted that four different methods for the distribution of the results of satellite observations were at present in use, namely:

(a) Distribution of nephanalyses in coded form;

(b) Distribution of nephanalyses in graphic form (facsimile);

(c) Transmission of APT cloud pictures direct from meteorological satellites;

(d) Distribution by special messages over commercial channels.

7.7.2 Distribution of coded satellite information

During the discussion of this item the Commission reviewed the existing arrangements for the global distribution of nephanalysis data. These arrangements had been incorporated in Recommendation 91 (61-CSM) and approved by Resolution 14 (EC-XIII) and it was found that they were in general satisfactory. On being informed that in the near future an increased amount of satellite information would be offered to the telecommunication system for distribution, the Commission felt that a considerable increase of the volume of satellite data on the northern hemisphere exchange circuits might easily exceed existing channel capacity. It therefore decided that the increase in the volume of satellite data to be transmitted on the northern hemisphere circuits should be studied further. The Commission requested its Working Group on Telecommunications to continue the study of international distribution arrangements for the increasing amount of meteorological satellite data which would become available from satellites launched by the U.S.A. and U.S.S.R. The decisions on requirements for the international distribution of satellite data were discussed under item 8 of the agenda of this session.

7.7.3 Distribution of meteorological satellite information by facsimile

7.7.3.1 The Commission noted with appreciation the arrangements made by the U.S.A. for international distribution of meteorological satellite data by facsimile. It also noted with appreciation the arrangements made by the U.S.S.R. to rebroadcast meteorological satellite data.

7.7.3.2 The Commission also noted the efforts of regional associations to organize the regional distribution of nephanalysis data in pictorial form by facsimile. Regarding further action on the distribution of meteorological satellite data by facsimile, the Commission felt that no specific action on a global basis was necessary, but that the future global telecommunication system to be developed for the World Weather Watch should be capable of accommodating the meteorological satellite data required by world, regional and national meteorological centres.

7.7.4 Reception of APT cloud pictures from meteorological satellites

The Commission noted the great potentialities of the quick reception of cloud pictures by means of the APT system. It noted with pleasure the successful exchanges that had been made between neighbouring countries of cloud pictures received by APT. The Commission felt that this possibility should be explored further by Members using bilateral or multilateral arrangements.

7.7.5 Dissemination of special messages

The Commission noted with appreciation the arrangements made by the United States of America to notify Members by special message over commercial channels of significant cloud patterns when they indicated a major hazard. The Commission agreed that this procedure should be continued.

7.7.6 Preferred characteristics of radio transmission from meteorological satellites to ground stations (APT)

7.7.6.1 The Commission noted the decision of the seventeenth session of the Executive Committee requesting the president of the Commission for Synoptic Meteorology to study the question of standardizing APT characteristics, and it was informed of the latest developments and progress achieved on the programmes being carried out by Members.

7.7.6.2 In view of the fact that the programme for the APT was not in itself fully developed, and that changes in the transmission characteristics might be required as the programme progressed, the session was of the opinion that it would be premature as yet to endeavour to establish APT transmission standards. The session noted that the ITU Extraordinary Administrative Radio Conference had allocated for this purpose two frequency bands, namely 136-137 Mc/s for experimental work, and 137-138 Mc/s for operational systems.

7.7.6.3 The Commission felt that the Secretary-General should continue to maintain contact with those Members providing APT satellite vehicles about new developments in APT transmission characteristics, so that all Members and the chairmen of CSM and regional working groups on telecommunications might be kept informed with a view to achieving standardization of the characteristics when required.

7.8 Collaboration between the Intergovernmental Oceanographic Commission (IOC) and WMO in the field of telecommunications

7.8.1 The Commission noted the decision of Cg-IV recorded in paragraph 5.3.6.2 of the General Summary of the Abridged Report of its work, by which CSM was requested to arrange for a study of telecommunication problems of mutual interest to IOC and WMO. In particular, Cg-IV had decided to give sympathetic consideration to IOC's request for assistance by WMO in the study of telecommunication arrangements for the transmission of oceanographic data from ocean stations to coastal stations and from there to interested countries.

7.8.2 The Commission noted with great interest the steps being taken by IOC to obtain the exclusive allocation of a family of frequencies in the HF band, and possibly also in the MF band, for the collection of oceanographic data from platforms at sea.

7.8.3 The radio-frequency needs of Members operating automatic weather stations have not yet been established by WMO. While wishing to support the radio-frequency request of IOC, the CSM felt that further study was necessary to determine the meteorological requirements

for radio-frequencies and other transmission characteristics of these stations. It was known, for example, that some automatic weather stations were currently transmitting on frequencies according to ITU Radio Regulations in the Fixed Service Bands, and using much higher power than that proposed by IOC. Nevertheless, the CSM considered that close co-operation with IOC in planning ocean-data stations was imperative, and, in particular, co-ordinated action on radio-frequency requests.

7.8.4 The Commission was informed that a technical conference on automatic weather stations would be held in Geneva in September 1966. This conference was expected to study, amongst other matters, the telecommunication aspects of automatic weather stations. Once the radio-frequency requirements for the operation of automatic weather stations were known, the degree of common action with IOC in this matter could be determined. The Commission therefore agreed that WMO should study this question as a matter of urgency and accordingly adopted Recommendation 42 (CSM-IV).

7.9 Technical characteristics of meteorological transmissions and equipment characteristics

7.9.1 Technical characteristics of teleprinter and radio-teleprinter transmissions

7.9.1.1 In examining this item, the Commission noted that although there were specifications for radio-teleprinter equipment (Recommendation 50 (CSM-III)) they were offered only as guidance, and that no world-wide specifications existed for normal landline (and cable) operation. It considered that the appropriate characteristics should be specified for all telegraph-type transmissions, whether by line or radio, and that they should apply throughout all Regions so as to ensure optimum compatibility. It was recognized that 75 baud (and perhaps 100 baud) operation was now (or soon would be) readily available to many Members, which meant that in some cases Members might find themselves having to operate at any of the modulation rates of 50, 75 and 100 bauds, although all the other characteristics for telegraph operation would conform to single standards. The Commission adopted Recommendation 43 (CSM-IV).

7.9.1.2 Considering radio-teleprinter operation, the session noted that when using frequency-shift keying on radio transmitters working in the band from about 3 Mc/s to 30 Mc/s, CCIR Recommendation 246 was still applicable. In discussion it was stated that with an F.1 emission frequency-shift keying, a frequency shift of 400 c/s should accommodate modulation rates of 75 or 100 bauds, or higher, as well as the rate of 50 bauds currently used by Members, though apparently little information was available about the use of the two higher rates. It was felt that it would be of considerable value if some Members could conduct trials of transmissions in the HF spectrum at modulation rates of 75 bauds before any general move was made to introduce rates higher than 50 bauds. The Commission therefore adopted Recommendation 44 (CSM-IV).

7.9.1.3 The Commission agreed that there was an urgent need for the establishment and reliable operation of medium/high-speed data transmissions over HF radio circuits in those parts of the world where no cable facilities existed. It was informed that a number of countries had been invited by the Secretary-General to study the technical aspects of establishing medium/high-speed data links over HF radio circuits and, if possible, to conduct trials at the same time. The Commission noted that the problem of medium and high-speed data transmission over HF radio circuits was also under consideration by the CCIR (International Radio Consultative Committee). The successful completion of the studies and tests was of great importance for the future planning of the World Weather Watch.

7.9.1.4 The Commission agreed that the introduction of error-detection and correction devices on radio circuits used for the exchange of meteorological information would become increasingly necessary in the future, particularly when automatic data processing and switching devices were installed. While for point-to-point circuits the standard CCITT automatic error-control devices should be installed, the Commission felt that there was a need for further studies of the error-control devices used in RTT broadcast systems. In this connexion

the Commission was informed that a quantity of suitable equipment for the above purpose was now available but tests had been made only on a limited basis.

7.10 Problems relating to radio frequencies

7.10.1 The Commission reviewed the present allocation of radio frequency bands to meteorological aids services in the light of the stated requirements of the fourth session of the Commission for Instruments and Methods of Observation. It noted that CIMO-IV had considered that the existing allocation of radio frequency bands to meteorological aids services was inadequate, and it stated a requirement for the allocation of two additional frequency bands.

7.10.2 As requested by the third session of the Commission, the CSM Working Group had conducted a study of the need for allocating a 1 kc/s band, in the portion of the radio spectrum below 10 kc/s, for observations of atmospherics. The Commission therefore warmly supported Recommendation 5 (CIMO-IV) expressing the need for the allocation of the 8.5 - 9.5 kc/s band for observation of atmospherics.

7.10.3 The Commission noted, however, that at present a number of Members were operating equipment for the observation of atmospherics on frequencies other than 8.5 - 9.5 kc/s. It was particularly mentioned that a number of stations were operating in the 27 kc/s band. In this connexion it was stated that some Members had taken steps with the national telecommunication authorities to ensure the protection of bands used for the observation of atmospherics. However, the Commission felt that once the 8.5 - 9.5 kc/s frequency band was allocated exclusively for the observation of atmospherics, Members would gradually change to it.

7.10.4 The session noted with satisfaction that WMO had decided to organize a technical conference in 1966 on automatic weather stations for use on land and at sea. It stressed the need for the president of CSM to have full information of the telecommunication aspects of the conference, including any radio frequency requirements co-ordinated with the Intergovernmental Oceanographic Commission (IOC), in order to permit appropriate action to be taken by the CSM (see Recommendation 42 (CSM-IV)).

7.11 Examination of the results of various meetings of the International Telegraph and Telephone Consultative Committee (CCITT) and the International Radio Consultative Committee (CCIR) of the International Telecommunications Union (ITU)

7.11.1 The Commission examined the results of the various meetings of the International Telegraph and Telephone Consultative Committee (CCITT) and the International Radio Consultative Committee (CCIR) of the ITU during the period 1963-1965, which were of direct interest to the work of CSM. It noted with appreciation that WMO was actively participating in the work of some CCITT and CCIR study groups, and closely following up the work of others. Such action was both necessary and valuable, and should be continued.

7.11.2 The Commission considered the tariffs recommended by the CCITT for telephone and telegraph operation, and especially how the tariffs might affect the cost of data and facsimile transmissions of meteorological information on an international basis. These CCITT recommendations were considered, viz. D.1, D.2 and D.5, but attention was mainly centred on Recommendation D.1. It was noted that the contents of Recommendation D.1 were intended as guidance to national telecommunication administrations, though evidence was available that some administrations were applying the recommended tariffs.

7.11.3 The Commission noted that a surcharge of 33.3 per cent on the basic rental might be levied for the lease of a standardized telephone-type circuit for data transmission regardless of the modulation rate employed, whereas a similar type of circuit for picture transmission, with the equipment provided and maintained by the user, attracted no surcharge at all. It was felt that clarification was very desirable in the case of leasing circuits for data transmission, because it would appear that even with MODEMS and similar terminal equipment provided by the users the surcharge could still be levied. With

the advance into medium- and high-speed data transmission as part of the global telecommunication system of the World Weather Watch, circuits for inter-regional exchanges, and any other international connexions, this surcharge of 33.3 per cent would inflate the cost of meteorological data exchanges unreasonably. The Secretary-General was requested to make the views of the Commission on this matter known to the CCITT.

7.11.4 Considerable concern was also expressed about the general principle of charging stated in Recommendation D.1, Part II, paragraph 1.1. The main point to be noted was that an international circuit passing through a transit country, with a single user at each end, would be charged for as if it were one circuit if no intermediate meteorological station were connected to it in the transit country; whereas if a meteorological station were connected to the circuit in the transit country, it would be divided into two sections for charging purposes, each section being charged as one circuit. These charging principles had a bearing on "leak" circuits (or "drops") which might be envisaged by a Meteorological Service having international meteorological circuits passing through its country.

7.11.5 The relevant recommendations of the International Telecommunications Union and its consultative committees (CCIR and CCITT) were taken into account when formulating WMO telecommunication practices and procedures under the appropriate items of the agenda.

7.12 Training of personnel engaged in meteorological telecommunications

At the request of the third session of CSM, the CSM Working Group on Telecommunications had studied the preparation of a training syllabus for personnel engaged in meteorological telecommunications. Since insufficient information had been available on national practices in training such personnel, the Secretary-General had been requested to conduct an inquiry among Members of the Organization. The Commission examined the replies thus far received and found that a large number of Members had already established their own training syllabi. It therefore agreed that there was no requirement at present for developing a training syllabus as guidance material. However, it requested the Secretary-General to circulate to all Members of the Organization for information the data provided by Members on their national practices in the training and function of telecommunications personnel in meteorology.

7.13 Telecommunication problems arising from the use of electronic computers and automatic plotting devices

7.13.1 Under this item the Commission examined the relevant parts of the report of the third session of the CSM Working Group on Telecommunications (Geneva, September 1965). It noted that a number of studies on problems associated with high-speed data transmission over cable or radio circuits, and on telecommunication problems arising from the use of electronic computers, had been or were being carried out by consultants or by Members within the framework of the WWW planning.

7.13.2 The Commission agreed that it was not possible for significant progress to be made during its fourth session, owing to the particular complexity of the problem.

7.13.3 The Commission also agreed that studies of problems associated with high-speed data transmissions over cable and radio circuits should be continued. In order to conform with the World Weather Watch planning schedule the Commission agreed to request the Secretary-General, as a matter of urgency, to convene limited planning meetings to be attended by experts from Members directly interested in this problem of Resolution 3 (EC-XVII). In particular these meetings should:

(a) Study technical characteristics of high-speed data transmission, in particular computer-to-computer data exchanges;

(b) Develop appropriate operating procedures;

(c) Study telecommunication problems arising from the use of automatic read-out devices;

(d) Study telecommunications problems arising from the use of automatic plotting devices, curve drawers and similar devices;

(e) Study the question of interface between telecommunications and data processing;

(f) Prepare a consolidated report on this subject.

The Commission requested that the consolidated report on this subject be completed by November 1966. The report should be distributed for comment to Members of the Organization, the president of CSM and the chairman of the CSM Working Group on Telecommunications prior to the incorporation of its conclusions in the WWW plan which is to be submitted to Cg-V.

7.14 Re-establishment of the Working Group on Telecommunications

7.14.1 The Commission agreed that the closest co-ordination should be maintained among the following:

(a) Members actively engaged in the planning of the WWW global telecommunication system;

(b) Members responsible for the implementation of major components of the WWW global telecommunication system;

(c) Experts working in fields relating to meteorological telecommunications and automatic data-processing; and

(d) The CSM Working Group on Telecommunications during the WWW planning and implementation phase.

In particular, the Commission requested the Secretary-General to keep the president of CSM informed on all planning activities in the field of telecommunications. The Commission felt that the terms of reference of the Working Group on Telecommunications set forth in Resolution 3 (CSM-IV) would enable the group to participate in the development of the global telecommunication system.

7.14.2 The Commission 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 centres and hemisphere exchange centres, and other experts nominated by any Members of the Organization. Resolution 3 (CSM-IV) was accordingly adopted.

7.15 Establishment of special practices for transmission of weather charts intended for reception by ships

7.15.1 The Commission noted that the International Radio Consultative Committee (CCIR) included in its study programme Question 274 (XIII), which reads as follows:

"What steps should be taken to establish a uniform practice for facsimile transmission of meteorological charts intended for reception by ships?"

The Commission supported the view of the fourth session of the Commission for Maritime Meteorology that, in general:

(a) The standards for international facsimile transmission characteristics (facsimile equipment and radio transmission) contained in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V, were adequate for transmissions intended for reception by ships; and that

(b) Technical Regulations 7.2.1.1 and 7.2.1.2 already defined the projections and scales which should be used for weather charts intended for reception by ships, so that no further procedures were required.

7.15.2 In September 1965 the CCIR Study Group XIII had formulated a draft opinion in which clear preference was given to one drum speed (120 rpm) coupled with one index of co-operation (576 with alternate line scanning). The Commission felt that, in giving preference to one drum speed and one index of co-operation, the CCIR Study Group proposal was too restrictive. If the object of this restriction were to obtain for ships a facsimile recorder which would be smaller in size and less costly than the machine built to meet the full WMO standard, the Commission felt that, at least in the case of ships likely to operate at great distances from their home port, it would be better for the recorders to have full flexibility of drum speed and index of co-operation. The Commission attached importance to the fact that, if the standards established by WMO were used, no restriction would be necessary either by the Meteorological Service providing the facsimile transmissions or by the ships wishing to receive meteorological facsimile broadcasts.

7.16 Exchange of meteorological information by facsimile

7.16.1 Organization of international facsimile exchanges

Under this item the Commission considered organizational aspects of the exchange of processed meteorological data by facsimile. The Commission agreed that the international exchange of meteorological data in graphical form was very closely related to the WWW and that the establishment of an international plan should therefore be taken into consideration in the planning of the WWW.

7.16.2 Standardization of international meteorological transmission by facsimile - Equipment characteristics

7.16.2.1 Considering the technical characteristics of facsimile equipment, the Commission noted the report of the CSM Working Group on Facsimile Equipment Standardization. The Commission agreed to include in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V, a paragraph specifying the precision of signals. Regarding a suitable unique phasing signal, the Commission was unable, during the fourth session, to give preference to either of the two standards currently in use. Certain Members felt that when either of the two standards was used properly phasing could be accurately effected. However, the Commission expressed a strong desire to obtain a unique phasing standard in the near future because of the growing use of facsimile for the transmission of meteorological data on an international basis. The existing double standard increased the complexity of facsimile recorders (and therefore their cost) as well as causing some confusion to telecommunication staff. In this connexion the Commission was informed of the WWW Study T.5, whereby certain Members had been invited to conduct studies for further technical development in the field of facsimile. The Commission endorsed the aims of Study T.5, which were to determine whether or not the performance of the present equipment (standardized in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V) could be improved, particularly as regarded speeding up the transmission process. The Commission agreed to request the Secretary-General to invite the Members executing Study T.5 to co-operate in studies and tests aimed at determining the most suitable phasing signal. Recommendation 45 (CSM-IV) was adopted.

7.16.2.2 During the discussions, the idea was expressed that reduced transmission times might be obtained in relevant cases by the modification of facsimile apparatus used for the transmission of meteorological charts. For example drum speeds higher than 120 rpm might be achieved over telephone-type-channels if different forms of modulation, such as vestigal sideband or digital transformation of originals, were introduced.

7.16.3 Facsimile test chart for meteorological data

7.16.3.1 The Commission discussed the suitability of the CCITT Facsimile Test Chart contained in Recommendation T.20, New Delhi 1960, as amended at Geneva 1964. It was noted that the report of the CCITT Working Party XIV/2 meeting with regard to the application of the CCITT test chart for meteorological facsimile transmissions (held in Geneva from 28 June to 2 July 1965) stated that, should WMO wish to standardize a test chart suitable for meteorological

facsimile apparatus, it would be ready to co-operate if requested. The Commission decided that it would be desirable to develop a test chart for meteorological use.

7.16.3.2 The Commission decided that the most effective method of making the desired progress would be to form a small study group within the Working Group on Telecommunications of CSM, composed of experts in the field of facsimile transmission, to carry out studies in accordance with the terms of reference given below:

(a) To design a test chart or charts for use in evaluating the performance of international meteorological facsimile transmissions, taking into account the guidance given in Annex XIII of the present report;

(b) To prepare instructions explaining the design of the charts and specifying procedures for their use;

(c) To recommend procedures and technical standards to be applied in the subsequent reproduction and issue of the charts;

(d) To report to the Chairman of the CSM Working Group on Telecommunications not later than July 1967.

7.17 Telegraphic notifications of changes to Volumes A and C of WMO Publication No. 9.TP.4

7.17.1 Discussing this matter, the Commission noted the request of the fourth session of RA VI that changes in observation networks and in meteorological transmissions should be brought to the attention of Members as early as possible. The Commission was informed that the Secretary-General, assisted by Switzerland, had established a scheme by which advance notification of changes to Volumes A and C was being issued and distributed weekly on the IMTNE during low traffic periods.

7.17.2 The Commission felt that the current trials should become a permanent feature of the amendment service to Volumes A and C of WMO Publication No. 9.TP.4. It agreed that advance notifications should be distributed on available meteorological circuits on a world-wide basis. While it was agreed that the content of the advance notification was satisfactory, the Commission felt that the word "METNO" should be used as identification instead of "VOLCANO". Recommendation 46 was adopted.

7.18 Reception reports of radio transmissions

The Commission was informed that Regional Association I had experienced difficulties in the use of the SINPO code adopted by the International Telecommunications Union (ITU) for reporting the reception of radio transmissions. Regional Association I had adopted Resolution 22 (66-RA I), in which the Commission for Synoptic Meteorology was requested to study the possibility of using a code suitable for reporting the reception condition and quality of all types of meteorological radio transmissions including facsimile, and to take appropriate action with ITU if this seemed necessary. Owing to lack of sufficient time to make a thorough study of the problem, the Commission referred this matter for study to its Working Group on Telecommunications.

7.19 Implementation aspects

7.19.1 Under this item the Commission considered the practical aspects of implementing the decisions of the fourth session about the exchange of observational data on global, hemispheric, inter-regional and regional bases. The Commission expressed some concern about the increase in the volume of traffic which might occur if:

(a) The new code forms,

(b) The additional isobaric surfaces which would be added to Part A of upper-air codes, and

(c) The increased number of stations whose reports were to be included in the hemispheric/global exchange system,

were to be implemented, without awaiting an appreciable increase in telecommunications facilities. The Commission agreed to implement the new code forms on 1 January 1968 (see Recommendation 5 (CSM-IV)).

7.19.2 The Commission noted that efforts were being made to improve existing meteorological telecommunications in order to provide greater capacity for the exchange of meteorological information. However, it was felt that the plans in hand or in the course of development would not be fully implemented within the next 2 or 3 years. Consequently the Commission discussed the possibility of phasing the implementation of the decisions on (a), (b) and (c) above with improvements in meteorological telecommunications.

7.19.3 After a lengthy discussion, the Commission agreed that the implementation of the decisions which had a direct effect on the loading of the present hemisphere exchange system should be effected in the following order:

(a) Inclusion of southern hemisphere data as required;

(b) Inclusion of a limited number of additional upper-air reports selected from the list of stations in Annex XXX to the present report and from newly-established upper-air stations located in data-sparse areas, particularly in central Asia, including Mongolia, the Arabian peninsula, Central and South America, and Africa. An adequate number of coded aircraft reports (CODAR) should also be included in hemisphere exchanges;

(c) Reporting of additional isobaric surfaces in Part A of upper-air reports;

(d) Full implementation of the list of stations in Annex XXX.

Recommendation 47 (CSM-IV) was accordingly adopted.

8. SYNOPTIC USE OF METEOROLOGICAL SATELLITE DATA (Agenda item 8)

8.1 The Commission based its consideration of this subject on the report of the CSM Working Group on the Synoptic Use of Meteorological Data from Artificial Satellites and on the detailed explanations given orally by the chairman of the group.

8.2 During the discussion several delegations expressed their appreciation to the United States of America for its great and continuing efforts to advance the science of meteorology by means of meteorological satellites. The Commission warmly endorsed these appreciations.

8.3 With regard to the requirements for exchange of satellite data, the Commission considered that, for international exchanges, the most desirable method of transmission of cloud data was by nephanalysis (facsimile or coded form). It was agreed that it was in general not necessary for any individual country to receive these nephanalyses on a hemispherical scale, but that the area covered should normally correspond to the area of the synoptic weather charts used for short-term forecasts (maximum 24 hours).

8.4 The Commission further considered that the installation of APT receiving equipment by Members would be the best method of meeting local requirements for satellite cloud photographs, and that bilateral or multilateral arrangements might be made for the exchange of these data.

8.5 The Commission noted that a number of regional seminars on synoptic uses of satellite data had been held since CSM-III, and considered that similar seminars should be organized in the future.

8.6 In addition to the satellite data already available to Members, the Commission expressed great interest in the possibility of obtaining data on the vertical and horizontal distribution of temperature and humidity by means of satellite measurements.

8.7 Finally, the Commission decided to re-establish the Working Group on the Synoptic Use of Meteorological Satellite Data for the purpose of studying and preparing advice on the various requirements of synoptic meteorology for present and expected satellite data. Resolution 4 (CSM-IV) was adopted accordingly.

9. ANALYSES AND FORECASTS (Agenda item 9)

9.1 Guidance material required for hydrological forecasting

9.1.1 A proposal was submitted to the Commission by the Commission for Hydrometeorology to consider the importance of certain meteorological forecasts for hydrological forecasting, particularly quantitative precipitation forecasts and long-range meteorological forecasts. The Commission was also invited to consider means to prepare guidance material on the operational aspects of this question.

9.1.2 The Commission recognized that hydrological forecasts were becoming increasingly important, and that they were necessary for the rational utilization of water resources as in the regulation of river flow for hydro-electric power production, for irrigation, and for domestic and industrial uses. They were also needed for advance flood warnings and in designing hydraulic structures such as dams and hydro-electric power stations.

9.1.3 It was agreed that the best way to meet the requirements of the Commission for Hydrometeorology was to prepare guidance material on the availability and reliability in different countries of the following meteorological forecasts:

(a) Quantitative precipitation forecasts for 24 to 48 hours;

(b) Forecasts of maximum and minimum air temperature, dew-point temperature and wind and sky conditions for 3 to 5 days;

(c) Long-range forecasts of precipitation and temperature for 30 days and more;

(d) Forecasts of the height of the freezing point in mountainous regions; and

(e) Predictions of hourly wind speed and direction for 24 hours or more.

Information should also be given on how these forecasts could be made available to the hydrologists. The Secretary-General was requested to collect the necessary material, particularly from Members having considerable experience in hydrological forecasting, and to prepare the collected material in a suitable form.

The Commission further agreed that a rapporteur should be appointed to assist the Secretary-General in carrying out the above work and to maintain liaison with the Commission for Hydrometeorology in this matter. The Commission adopted Resolution 5 (CSM-IV).

9.2 Methods of analysis and prognosis in the tropics

9.2.1 The Commission considered the report of the Working Group on Methods of Analysis and Prognosis in the Tropics. Although the working group was not in a position to recommend one or more methods for trial, as required by its terms of reference, it had in fact made a substantial contribution to the subject by concluding that it was not possible at present to recommend any particular method of analysis and prognosis in preference to another. The Commission agreed that a considerable amount of work would still be required before such a recommendation were feasible.

9.2.2 Two questions were then particularly discussed by the Commission; namely, the possibility of publishing the working group's report as a WMO Technical Note, and the question of re-establishing the working group.

9.2.3 Regarding the first question, it was felt that there did not exist any up-to-date publication suitable for guiding forecasters in tropical regions, and that the report prepared by the working group seemed to provide suitable basic material for this purpose. The Commission also agreed that certain editorial amendments and additions should be made before the report could be transformed into a Technical Note. Certain parts of the report which had already been published in other contexts could be excluded and referred to instead in the list of references of the Technical Note. The task of carrying out this work could advantageously be given to one or more individuals, and the Commission noted with gratitude that the chairman of the working group, Dr. H. T. Mörth, would be willing to take part in it. The Secretary-General was requested by the Commission to publish the Technical Note as soon as it had been approved by the president of CSM.

9.2.4 While considering the second question -- on the possible need for re-establishing the working group -- the Commission recognized that the Commission for Aerology at its fourth session had established a Working Group on Tropical Meteorology (Resolution 9 (CAe-IV)) and that the terms of reference given to that group covered to some extent the recommendations made by the CSM working group. It was therefore decided not to re-establish the CSM working group but, so that the Commission might follow developments, to appoint a rapporteur with the task of keeping abreast of developments in the field of synoptic meteorology in the tropics and of reporting on it to the Commission. Resolution 6 (CSM-IV) was therefore adopted.

9.2.5 As the terms of reference of the recently established CAe Working Group on Tropical Meteorology had certain operational aspects, the Commission found it appropriate to request the president of CSM to arrange that one member nominated by CSM should be included in the CAe working group. The Commission considered that this member could advantageously be the rapporteur mentioned in paragraph 9.2.4 above.

9.3 Numerical weather prediction

9.3.1 The Commission considered the report of the joint CAe/CSM Working Group on Numerical Prediction. It was noted that the working group had already reported to the fourth session of the Commission for Aerology according to the terms of reference initially given by CAe-III. The Commission therefore examined the report on the two remaining items in its terms of reference, which had been added by CSM-III.

9.3.2 It was agreed that no action should be taken on the report itself other than that taken by the Commission under agenda items 5, 6 and 7. The discussion concentrated on possible future co-operation with CAe in this field and on how this could be carried out. There seemed to be three possibilities: to have a CSM representative in the re-established CAe working group; to have a joint CAe/CSM working group similar to the previous one; or to establish a pure CSM working group on numerical weather prediction.

9.3.3 The Commission considered that a joint CAe/CSM working group was the best solution and that the number of members in the re-established CAe working group (six members) was satisfactory. It also considered that the joint CAe/CSM working group should report to the Commission for Aerology at its fifth session.

9.3.4 The Commission recommended that two more terms of reference should be added to those decided by CAe-IV, covering operational aspects of numerical weather prediction of importance to CSM. It then adopted Recommendation 48 (CSM-IV).

9.4 Verification of forecasts

9.4.1 The Commission examined the summary of replies from Members to three inquiries on methods of verification of forecasts used in different countries. The first two inquiries

had been conducted prior to CSM-III; the third prior to CSM-IV. Whereas in the first two inquiries no distinction had been made in regard to any particular meteorological parameter to be verified, Members had been requested in the third inquiry to give information about their methods of verification, particularly of the following parameters: prognostic surface and upper-air charts; precipitation; temperature; wind direction and speed; and visibility.

9.4.2 The Commission was in general agreement that the requirement for the verification of forecasts was still important, and that there could be no clear assessment of improvements in weather forecasting without verification systems. It felt,however,that there was as yet no possibility of introducing a universal method of verification.

9.4.3 The Commission then discussed the question of publishing the document with the summary of replies from Members prepared by the WMO Secretariat. It was felt that the information received from Members and reflected in the document was still insufficient, and that the document should therefore not be published as a WMO Technical Note. The Commission agreed instead to request the Secretary-General to distribute the document to Members one year prior to CSM-V, and at the same time ask Members to send him information on any verification methods in use in their Services additional to those already submitted in response to the three earlier inquiries. The Secretary-General was further requested to summarize this new information in a suitable form and to present it to CSM-V.

9.5 Long-range weather forecasting

9.5.1 The report of the Working Group on Long-Range Weather Forecasting was examined by the Commission. It was noted that members of the group had participated in the Symposium on Research and Development Aspects of Long-Range Forecasting organized jointly by WMO and IUGG at Boulder, U.S.A., in June 1964. It was further noted that the papers read at this symposium had been published together as WMO Technical Note No. 66 under the title "WMO-IUGG Symposium on Research Development Aspects of Long-Range Forecasting". The Commission agreed that the content of the Technical Note was important and that there was no need for any additional information on this subject for the present. It was further agreed that it would still be difficult, from the operational point of view, to recommend any method of long-range forecasting for general use.

9.5.2 The Commission noted that the transmission of five-day-mean data had started from the U.S.A. in 1963. It examined the replies from Members, summarized by the working group, on the value of the transmission of these data from the U.S.A., and agreed that the present transmission of five-day-mean data should be continued as the working group had suggested.

9.5.3 The Commission discussed in detail a recommendation by the working group to introduce the division of the year into 73 pentads. It was agreed to request the Secretary-General to ascertain the views of Members on this question, and also those of the presidents of CCl, CHy and CAgM. The Secretary-General was further requested to submit this information to the president of CSM for consideration at CSM-V.

9.5.4 The Commission considered 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. It was agreed that such action should not be taken before agreement had been reached on the choice of five-day period or pentad values. The president of CSM should consult the president of CCl on this matter when the result of the above inquiry became available.

9.5.5 The Commission felt that there was no need to re-establish the working group at present. However, in order to keep the Commission informed on further developments in this field, it was decided to appoint a Rapporteur on Long-Range Weather Forecasting, and Resolution 7 (CSM-IV) was adopted accordingly.

9.5.6 The Commission considered the suggestion of the working group that a symposium should be organized after two years to review developments in long-range weather forecasting. The Commission agreed to this suggestion and expressed its desire for such a symposium in 1968.

9.6 Analyses and forecasts of interest to CMM

The CMM representative at the session explained that the CMM's intention in commenting on this item was to emphasize that the adequacy of the marine weather forecasts and warnings was directly dependent upon the efficiency of systems which came under the cognizance of the CSM. The CMM therefore had a great interest in any action of the CSM which might ultimately improve the accuracy of all forecasts and warnings. At the same time, however, the CMM was aware that marine forecasts and warnings depended in many instances upon the ship reporting arrangements under the cognizance of the CMM. This was always emphasized by port liaison officers when responding to complaints by mariners. The Commission agreed that no further action was necessary other than to keep in mind the CMM's requirements.

10. QUALIFICATIONS AND TRAINING (Agenda item 10)

10.1 The chairman of the Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology reported on the progress of work. He described the various difficulties that had confronted the group, preventing it from completing all its tasks in time for the fourth session of the Commission. Chief among these was the fact that the group's terms of reference had involved it in considerable correspondence before agreement had been reached on the scope of its tasks and on the emphasis that should be given to different aspects of the subject.

10.2 Some members of the Commission doubted if there was any need for training guides and standard syllabi in the field of synoptic meteorology. They felt that these could be left to the universities and educational institutions. Practical training for particular functions such as observing, plotting synoptic charts, or preparing analyses and forecasts for particular regions and for different uses was a question for each service to decide for itself.

10.3 It was noted that the Executive Committee Panel of Experts on Education and Training had this subject on the agenda for its first meeting (March 1966). Some delegates felt that the work done by the CSM working group would provide information which the Panel of Experts could use in drawing up its own recommendations. The whole question of establishing qualifications and developing curricula in each of the restricted fields of the eight technical commissions appeared to deserve more study. The Commission agreed that the president of CSM should bring these views to the attention of the next meeting of presidents of technical commissions, to be held in May 1966. Account should be taken of possible overlapping between the fields of the different commissions.

10.4 The Commission felt that the preparation of material on training guides and syllabi should be completed, and expressed views in favour of re-establishing the Working Group for this purpose. Considering, however, that important discussions on this subject would be taking place shortly, it decided not to re-establish the working group at this time but to authorize the president to do so if the conclusions reached by the Executive Committee Panel of Experts on Education and Training and the meeting of the presidents of technical commissions made such a course of action desirable. The terms of reference of the group could then be drawn up, taking cognizance of the results of discussions in these meetings.

11. OTHER TECHNICAL QUESTIONS (Agenda item 11)

11.1 Definition of terms used to describe the intensity of meteorological phenomena (Agenda item 11.1)

11.1.1 The Commission considered the report of the Working Group on Definition of Terms used to Describe the Intensity of Meteorological Phenomena. It was noted that the working

group had not been able to reach agreement on the intensity criteria and intensity ranges for many of the reviewed meteorological phenomena listed in code table 4677 - ww - present weather - of Volume B, WMO Publication No. 9. It was further recognized that the whole subject was being examined from other angles by the Working Group on Codes and that the report should preferably be studied in the context of data requirements.

11.1.2 Taking all these facts into account the Commission decided to use the findings of the working group as guidance material for the new Working Group on Data Needs and Codes.

11.2 Pressure reduction methods (Agenda item 11.2)

11.2.1 The Commission examined the replies received from Members to an inquiry asking for comments on WMO Technical Note No. 61, prepared by the Working Group on Pressure Reduction Methods, and particularly on pages 22-26 of this Note. The inquiry had also requested Members to inform the Secretariat of the results of their further studies on pressure reduction methods.

11.2.2 The Commission considered that the replies did not represent a clear consensus in favour of a uniform method of reduction of pressure at sea-level, and therefore concluded that a standard method for reducing pressure was not yet acceptable for adoption on a world-wide basis. However, the Commission did re-state its view that the ideal solution would be the world-wide use of a standard method for reducing pressures that met all of the requirements for synoptic meteorology, including numerical weather prediction.

11.2.3 The Commission discussed the requirement for station pressure reports expressed by CAe-IV and reproduced in the document presented by the Secretary-General. The Commission agreed that there existed a new requirement to enable the value of station-level pressure to be reported from certain stations. This requirement was referred to the Working Group on Data Needs and Codes (see Resolution 1 (CSM-IV)). However, an alternative method would be for Members to utilize pressure reduction methods which did not include variable parameters other than those reported currently in the SYNOP report. Recommendation 49 (CSM-IV) was adopted accordingly.

11.3 Definition and reporting of visibility (Agenda item 11.3)

11.3.1 The Commission studied the request contained in Resolution 16 (EC-XVI) concerning Recommendations 5/8 and 5/9 of the simultaneous session of the CAeM and MET/OPS of ICAO. It noted that the correspondence between the presidents of CIMO, CAeM and CSM had not led to the desired results, and that CIMO-IV had not prepared any formal proposals for solving the problems outlined in the above-mentioned recommendations.

11.3.2 The Commission understood that, in the opinion of CAeM and MET/OPS of ICAO, the definition of visibility now given in paragraph 8.1.1 of the Guide to Instruments and Observing Practice was too theoretical for operational use. The Commission debated at length the tentative definition suggested in Recommendation 5/8 of the CAeM-III and MET/OPS session, and also a number of alternative proposals. It decided to recommend the adoption of the explanation of the concept of visibility which is contained in Recommendation 50 (CSM-IV). It was conscious of the fact that the recommended explanation was not a substitute for a precise physical definition, but considered that it would be of value for practical purposes in general meteorology as well as in aviation. The Commission considered that the development of a precise physical definition of visibility fell within the ambit of CIMO.

11.3.3 Arising out of its study of Recommendation 5/9 of the CAeM-III and MET/OPS session, the Commission considered that the use of the term "ground visibility" could lead to misunderstanding. In accordance with its proposed explanation, the use of the unqualified word "visibility" would indicate that the observer was at ground level. Where this was not so, the level at which the observation was made should be explicitly mentioned, for example "visibility at control-tower level", or "visibility at a height of ... metres".

11.3.4 The Commission adopted Recommendation 50 (CSM-IV).

11.3.5 The Commission noted paragraph 5/12 of the Report of CAeM-III and MET/OPS, which stated that differences in the reporting of visibility had not given rise to confusion and that no urgent measures were required in this respect. Accordingly, the Commission took no action on the matter.

11.4 Definition and reporting of mist and fog (Agenda item 11.4)

11.4.1 The Commission examined replies from Members containing their views on the visibility criteria used for reporting mist and fog and also their views on the question of whether mist and fog should be considered as one and the same hydrometeor.

11.4.2 A report on the results of the above-mentioned inquiry had been submitted to Dr. Dufour (Belgium) for his remarks and suggestions, and the Commission also examined his comments. Furthermore, the fourth session of CAe had been requested to consider physical aspects of the question of definitions of mist and fog, and the views of CAe were also examined by the Commission.

11.4.3 After lengthy discussion a majority of the Commission agreed that fog and mist are produced by the same physical processes. The Commission also expressed the following views on the problem of mist and fog:

(a) For practical purposes, the terms fog and mist might be retained to denote different intensities of the phenomenon.

(b) The existing conventional dividing line at 1,000 m was convenient and should be retained.

(c) The upper limit for the reporting of mist was of little synoptic significance and might, if desired, be determined Regionally.

(d) There was no necessity to lay down humidity criteria to distinguish mist and fog from other factors reducing visibility, but Regions might do so if they so wished.

11.4.4 The question of revising the International Cloud Atlas definitions and descriptions of hydrometeors was referred to the Working Group on Hydrometeors (see Resolution 8 (CSM-IV) and paragraph 11.6 of the General Summary).

11.5 Equivalent wind speeds for the Beaufort Numbers (Agenda item 11.5)

11.5.1 The Commission considered Recommendation 5 (CMM-IV), which recommended a new scale for the Beaufort numbers, and the decision of the seventeenth session of the Executive Committee to postpone final consideration of this CMM recommendation until its eighteenth session, pending the results of the examination by CCl and CSM of the procedural and other repercussions of the proposed change-over to the new scale without entering into the study of the proposed scale itself. The conclusions of CCl-IV on the possible repercussions to CCl in case of the adoption of the new scale were noted.

11.5.2 It was recognized that the possible change to the new scale involved no code problems. However, the Commission considered that it would be advantageous if it could be indicated in the SHIP code whether the wind had been estimated according to the Beaufort scale or measured with an instrument. Relevant action was taken under Agenda item 5 (see paragraph 5.14.4 of the General Summary).

11.5.3 The Commission discussed possible repercussions in synoptic meteorology if the scale recommended by CMM-IV were adopted. It was found that warnings of gales and hurricanes would be more frequent, though such a change might be justified if the new scale gave better equivalents. It was also found that a change to a more accurate scale would eliminate certain operational difficulties in connexion with ship routing and wave forecasting.

11.5.4 It was pointed out to the Commission that since CMM-IV new studies relating to the equivalent speeds for the Beaufort numbers had become available and it was, therefore, agreed that CMM should be asked as a matter of urgency to assess whether there might be a need for reconsidering the proposal originally recommended by CMM-IV. The Commission considered that, since a number of amendments to the SHIP code form would be introduced on 1 January 1968, it would be advantageous if any revised equivalent speeds for the Beaufort numbers, agreed internationally to be necessary, were introduced on the same date.

11.5.5 It was pointed out that the proposed equivalent speeds would lower the maximum Beaufort equivalent from 64 knots to 58 knots. The Commission therefore agreed to request CMM also to consider the feasibility of estimating speeds in the range from 59 to at least 64 knots, with appropriate expansion of the Beaufort scale, in the event of a revision of the Beaufort equivalents being agreed internationally.

11.6 Description of hydrometeors (Agenda item 11.6)

11.6.1 The Commission examined a proposal by Belgium to establish a working group to revise the description of hydrometeors adopted by WMO and published in the International Cloud Atlas (WMO, 1956, Vol. 1). The reason for this proposal was that, since 1953, when the Commission for Synoptic Meteorology had recommended the use of the present descriptions, there had been important advances in the physics of hydrometeors; and that these advances were such that the definitions and descriptions adopted by WMO for this category of meteors should be revised.

11.6.2 It was agreed by the Commission that such a review was needed, particularly regarding hydrometeors appearing in polar and mountainous areas, and that a working group on the description of hydrometeors should be established to carry out this work. The review should consider only hydrometeors. Thus, descriptions of clouds should not be reviewed in this connexion.

11.6.3 In order to ensure that the interest of CAe in this subject would be taken fully into account it was decided to invite an expert, to be designated by the president of CAe, to take part in the work of the working group. Resolution 8 was adopted.

11.6.4 The Commission also discussed the status of the descriptions of the hydrometeors. It was confirmed that only the definitions (in italics) had the status of "standard practices" while the descriptions were guidance material with no specific status.

12. TECHNICAL REGULATIONS (Agenda item 12)

12.1 Additions and amendments to the Technical Regulations

12.1.1 Under this item the Commission considered the second part of the report of the Working Group on Minimum Performance Characteristics of Automatic Weather Stations (for the first part of the report see paragraph 6.2 of the General Summary). The views of CCl-IV and CIMO-IV were also considered.

12.1.2 Examining the texts recommended by the working group for incorporation in the Technical Regulations, the Commission considered the guiding principles for inclusion. In conformity with the principle that recommended practices should be considered sufficiently mature to be distinguished from purely guidance material, the Commission realized that it would not as yet be desirable, without further studies, to recommend the inclusion of the texts proposed by the working group in the Technical Regulations. It was agreed that the subject should be given consideration to enable CSM to present its recommendation on this matter to Cg-V.

12.1.3 In the course of the discussion of this item the Commission recognized the need for a general review of the Technical Regulations from the point of view of CSM, and that this could not be carried out during the session. The Commission therefore adopted

Resolution 9 (CSM-IV) establishing a working group with the dual task of urgently examining the proposals made by the CSM working group mentioned above, and of undertaking a general review of the Technical Regulations relating to synoptic meteorology.

12.2 The use of the term Greenwich Mean Time (GMT) as a synonym for Universal Time (UT) or Greenwich Civil Time (GCT)

12.2.1 The Commission considered the information received from Members in response to an inquiry on the use of the terms GMT, UT and GCT. It was noted that a majority of Members were of the opinion that the term GMT could be used as a synonym for UT, and that all Members were of the opinion that the term GCT should not be used.

12.2.2 During the discussion some delegates supported the use of the term UT on the grounds that it was used by astronomers and that it was appropriate for international use.

12.2.3 The majority of delegates in the discussion felt, however, that the term GMT should be retained by WMO and not replaced by UT for the following reasons:

(a) GMT was currently used within WMO as a synonym for UT;

(b) A change to UT would involve a change in the WMO Technical Regulations and consequently in PANS-MET. As ICAO, in its reply to the inquiry mentioned in paragraph 12.2.1, had confirmed its previous position that the term GMT was adequate and satisfactory for use in international civil aviation and that no change in ICAO was desirable, a change in PANS-MET/Technical Regulations would not be agreed by ICAO. ITU might take a similar position to ICAO in the matter.

12.2.4 Finally, it was decided to recommend the retention of the term GMT in the WMO Technical Regulations. To avoid any further confusion, however, it was also recommended to include in an appropriate place in the WMO Technical Regulations (for example in the list of definitions) an explanation that the term GMT was used synonymously with the term UT. Recommendation 51 (CSM-IV) was adopted.

12.3 Definitio: and symbol for "convergence line"

12.3.1 The Commission discussed the replies from Members on the definition and symbol for "convergence line". The inclusion of a symbol for convergence line in Volume I of the Technical Regulations and in the Guide to the Preparation of Synoptic Weather Charts and Diagrams was considered. The fact that the phenomenon of a convergence line had been used in flight documentation for several years without difficulty was thought decisive enough to suggest no change in the nomenclature and symbol. As the replies from Members showed, there was a general need for an analytical symbol for convergence line in synoptic meteorology. The Commission recommended that the symbol for convergence line contained in the Technical Regulation (12.3) 2.4.2 be included in Volume I of the Technical Regulations in Appendix E and in the Guide to Preparation of Synoptic Weather Charts and Diagrams. Recommendation 52 (CSM-IV) was adopted.

12.3.2 Finally, the Commission considered the following definition appropriate for a convergence line:

"A convergence line is a horizontal non-frontal line along which horizontal airflow has a maximum of convergence. If such convergence is taking place in a plane near the surface of the Earth the incoming air must be rising at the convergence line. Hence, such a line is often associated with convective clouds and precipitation. On occasions convergence may arise over a broad zone and a convergence line may be the asymptote of the streamlines within this zone."

13. ORGANIZATION OF METEOROLOGICAL ACTIVITIES IN THE FIELD OF SYNOPTIC METEOROLOGY (Agenda item 13)

13.1 The Commission considered the information submitted by the WMO Secretariat on this subject. It was felt that there was a need for guidance material, particularly in developing countries, on how to organize synoptic meteorological services. The question arose of how this guidance material should be collected and published. After a lengthy discussion the Commission agreed on the course of action set out in the following paragraphs.

13.2 In order to get a better understanding of the kind of guidance material most desired by the developing countries, the Commission decided that an inquiry should be undertaken among the Members concerned. A suitable questionnaire should be prepared by a rapporteur nominated by the Commission. After having examined the replies received by the Secretary-General, the rapporteur, in consultation with the president of CSM, should decide what further action to take. The Commission adopted Resolution 10 (CSM-IV).

13.3 In addition to the above action the Commission stressed how important it was for Meteorological Services to arrange bilaterally for appropriate staff members to visit other weather services, or to obtain expert advice under the United Nations technical co-operation programmes to assist them in developing their services in synoptic meteorology.

14. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COMMITTEE DECISIONS (Agenda item 14)

14.1 In accordance with current practice the Commission examined those resolutions and recommendations of CSM which were still in force, and adopted Resolution 11 (CSM-IV).

14.2 When deciding to keep in force Recommendation 73 (CSM-II) - World Climatic Atlas - the Commission confirmed the provisional generalized list of parameters for maps of the free atmosphere referred to in this recommendation, and considered that these requirements should be taken into account by the appropriate working group of the Commission for Climatology when possible.

14.3 In deciding not to keep in force Recommendation 1 (CSM-III) - Criteria for reporting squalls - the Commission decided to request the Secretary-General to include these criteria under the specification of the symbolic letters ww in WMO Publication No. 9.TP.4, Volume B.

14.4 The Commission further examined the Executive Committee resolutions in the field of synoptic meteorology and agreed on Recommendation 53 (CSM-IV).

14.5 When recommending that Resolution 34 (EC-XIV) - Modifications to the International Meteorological Codes, Specifications and Descriptive Terms and Instructions Concerning Methods of Coding - should not be kept in force, the Commission decided to request the Secretary-General to insert the substance of paragraph (4) under DECIDES in an appropriate introductory part of WMO Publication No. 9.TP.4, Volume B.

15. ESTABLISHMENT OF WORKING GROUPS (Agenda item 15)

15.1 Advisory Working Group of CSM

In accordance with suggestions made by the Executive Committee at its seventeenth session as to methods by which the efficiency of the technical commissions might be improved (EC-XVII), General Summary, paragraph 5.3.1.1), the Commission decided to set up an Advisory Working Group to advise and assist the president of the Commission in dealing with urgent

matters, and to help in co-ordinating the Commission's work, particularly with regard to requirements in the field of synoptic meteorology. Resolution 12 (CSM-IV) was adopted.

15.2 Establishment of working groups

15.2.1 The Commission established or re-established the following working groups to carry out the programme of the Commission between the fourth and fifth sessions:

Advisory Working Group on CSM
Working Group on Data Needs and Codes
Working Group on Telecommunications
Working Group on Synoptic Use of Meteorological Satellite Data
Working Group on Description of Hydrometeors
Working Group on Technical Regulations

15.2.2 The Commission decided to nominate rapporteurs on the following subjects:

Network density criteria
Meteorological forecasts of importance to hydrological forecasting
Synoptic meteorology in the tropics
Long-range weather forecasting

15.2.3 In most cases the rapporteurs and chairmen of the working groups were designated during the session. Individual members of working groups were also nominated where possible. In case a rapporteur nominated by the Commission should be unable to serve, the president of CSM was authorized to arrange for another to be invited.

15.2.4 The terms of reference and the composition of the working groups are given in Resolutions 1, 3, 4, 8, 9 and 12 (CSM-IV).

16. ELECTION OF OFFICERS (Agenda item 16)

Upon the proposal of the Nomination Committee, which presented only one name for each of the offices of president and vice-president of the Commission, Dr. S. N. Sen (India) was unanimously elected president of CSM, and Dr. N. G. Leonov (U.S.S.R.) was unanimously elected vice-president.

17. DATE AND PLACE OF THE FIFTH SESSION (Agenda item 17)

During the last plenary session the principal delegate of India, on behalf of his government, extended an invitation to the Commission to hold its fifth session in New Delhi in 1970. The Commission accepted the invitation with appreciation and asked its president to decide on the exact date of the fifth session in consultation with the Secretary-General.

18. SCIENTIFIC LECTURES AND DISCUSSIONS (Agenda item 18)

One afternoon meeting was devoted to scientific lectures and discussions under the chairmanship of the vice-president of the Commission, Dr. K. T. Logvinov. The following lectures were presented:

(a) "Objective interpretation of forecast charts" by Dr. O. Lönnqvist;

(b) "Numerical studies leading to the design of an optimum global network" prepared jointly by Dr. M. Alaka and Mr. F. Lewis (the paper was delivered by Mr. D. M. Hanson, U.S.A.);

(c) "NMC numerical programme for the tropics" by Mr. L. W. Vanderman (the paper was delivered by Mr. F. W. Burnett, U.S.A.);

(d) "Meteorological activities on board fishing-protection vessels" by Dr. H. F. Walden, Federal Republic of Germany.

19. CLOSURE OF THE SESSION (Agenda item 19)

19.1 In his closing address, the president reiterated the thanks of the Commission to the Federal Republic of Germany for having acted as host and for having provided excellent facilities which had contributed to the success of the session. The Commission wished to express its gratitude to the Deutscher Wetterdienst for its assistance. The efforts of the local secretariat, under the competent guidance of Dr. Hinzpeter, had been greatly appreciated, as well as the high quality of the work of the interpreters, the translators, and the whole team responsible for the preparation and distribution of documents in the four official languages of the Organization. The president also thanked Mr. F. W. Benum, Mr. S. R. Barbagallo and Dr. O. Lönnqvist, chairmen of Committees A, B and C, and Dr. K. Langlo, representative of the Secretary-General, and Dr. G. K. Weiss, Dr. C. Morales and Mr. A. Drevikovsky, of the WMO Secretariat, for the enthusiastic and efficient way in which they had carried out their tasks.

19.2 A number of delegations expressed their sincere thanks to the president of the Commission for its activity and devotion both in the period between the third and fourth sessions of the Commission and during the fourth session. They stressed the friendly and impartial manner in which the president directed the work of the session. The speakers also expressed their appreciation to the committee chairmen, the conference secretariat and WMO Secretariat for the services rendered during the session.

19.3 The session was closed on the evening of 1 April 1966.

RESOLUTIONS ADOPTED BY THE SESSION

Res. 1 (CSM-IV) - WORKING GROUP ON DATA NEEDS AND CODES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 3 (CSM-III),

(2) Recommendation 3 (CSM-IV) - Assistance to the Working Group on Data Needs and Codes,

CONSIDERING

(1) The decision of the Commission that each working group should be responsible for the determination of requirements within its own sphere of activity,

(2) That there is a need for further study in developing a concept and guiding principles to serve as a framework for the determination and evaluation of data requirements,

(3) That the lists of surface data requirements are not yet firm,

(4) That the most economic means of meeting the many and diverse needs for upper-air data have not yet been determined,

(5) That there is a large number of problems to be solved before new codes can be developed,

DECIDES

(1) To establish a Working Group on Data Needs and Codes along the following lines:

(a) That each Regional Association be invited to select a representative;

(b) That the president of each of the following technical commissions be invited to nominate an expert:

Commission for Maritime Meteorology
Commission for Aeronautical Meteorology
Commission for Climatology
Commission for Instruments and Methods of Observation
Commission for Aerology;

(c) That experts may be nominated by a Member wishing to participate actively in the work of the group; during the session the following experts were nominated by Members:

M. Allouche	(Tunisia)
E. Carlsen	(Denmark)
A. Durget	(France)
W.M. Levi	(Israel)

V. Mastino (Italy)
J.A. Oyebode (Nigeria)
C.G. Reeves (U.S.A.)
Miss F. Reutt (Poland)

One expert to be designated by each of the following Members:

Canada
Federal Republic of Germany
India
Netherlands
Portugal
United Kingdom
U.S.A.

(d) That, in accordance with Regulation 30 of the General Regulations, G. Doumont(Belgium) be selected as chairman of the working group;

N O T E : This composition has been planned to provide expert assistance in the following areas:

1. Numerical weather prediction
2. Meteorological telecommunications
3. Meteorology in the tropics
4. Use of satellite data
5. Maritime meteorology
6. Aeronautical meteorology
7. Climatology
8. Instruments and observations
9. Coding
10. Regional requirements

(2) To urge Members, Technical Commissions and Regional Associations to give consideration, when nominating their experts, to the major problem areas in which expert assistance is required by the working group;

(3) To authorize the chairman to establish sub-working-groups as soon as possible to work on the problem assigned to the working group and to distribute to all Members as soon as possible questionnaires on surface data needs, together with the necessary guidance material on data types;

(4) That the working group shall hold two meetings: the first prior to 1 June 1967 and the second prior to 1 April 1969;

(5) That the working group shall be given the terms of reference set out in Part A of the annex to this Resolution;*

(6) That the work of the working group shall be guided by the coding principles enumerated in Part B of the annex to this Resolution;*

(7) That the final report of the working group shall be in the hands of all Members not later than 9 months prior to the fifth session of the Commission;

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* See Annex XIV

REQUESTS the president

(1) To take steps to establish and activate the Working Group on Data Needs and Codes as quickly as possible;

(2) To invite the attention of Members, Regional Associations and Technical Commissions to the need for urgency in nominating experts to the Working Group on Data Needs and Codes and to give special attention to the need for experts in solving specific problem areas.

Res. 2 (CSM-IV) - RAPPORTEUR ON NETWORK DENSITY CRITERIA

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING EC-XVII, General Summary, paragraph 5.3.2.3,

CONSIDERING that there is a need for Members to be informed of the latest studies carried out by Members on Network Density Criteria,

DECIDES

(1) To appoint a Rapporteur on Network Density Criteria with the following tasks:

(a) To maintain a continuing review of activities in the field of research work on network density criteria;

(b) To present a report to the president of CSM sufficiently in advance that it may be circulated to the Members six months before the fifth session of the Commission;

(2) To invite C. F. Roberts (U.S.A.) to act as Rapporteur on Network Density Criteria.

Res. 3 (CSM-IV) - WORKING GROUP ON TELECOMMUNICATIONS

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, which is now under study, 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 re-establish the Working Group on Telecommunications 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 telecommunications 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 telecommunications system 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 abreast of the activities relating to meteorological telecommunications of the International Telecommunication Union, the International Civil Aviation Organization, and other international organizations concerned;

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

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

(i) 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 telecommunications of all Regional Associations;

(b) One expert to be nominated by each of the Members responsible for the operation of world meteorological centres or the northern and southern hemisphere exchange centres:

I.S. Bustamente	(Brazil)
P.K. Das	(India)
S.R. Barbagallo	(U.S.A.)
I.A. Ravdin	(U.S.S.R.)

One expert to be designated by each of the following Members :

Australia
Federal Republic of Germany
Japan
Kenya

(c) Experts who may be nominated by a Member wishing to participate actively in the work of the group; during the session the following experts were nominated by Members :

G. Crone-Levin	(Denmark)
W. Cudny	(Poland)
L. Dufour	(Belgium)
L.J. García-Navarro	(Spain)

M. Huerta	(Spain)
T.S. Kelly	(Ireland)
B.E. Knirsch	(Austria)
P. Leclercq	(France)
M. Quoilin	(Belgium)
T.R. do Espírito-Santo	(Portugal)
M. Sonnet	(France)
C.H. Starr	(U.K.)

One expert to be designated by each of the following Members:

Israel
Netherlands
Nigeria
Norway
U.A.R.

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

Res. 4 (CSM-IV) - RE-ESTABLISHMENT OF THE WORKING GROUP ON THE SYNOPTIC USE OF METEOROLOGICAL SATELLITE DATA

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the report of the Working Group on the Synoptic Use of Meteorological Satellite Data,

CONSIDERING the developments in the field of meteorological satellites and that information from such satellites is being increasingly used for operational meteorological purposes,

DECIDES

(1) To re-establish the Working Group on the Synoptic Use of Meteorological Satellite Data with the following terms of reference :

(a) To examine the types of data, appropriate for synoptic use, which are and can be expected to be received from meteorological satellites;

(b) To advise on the requirements for regular international exchange of satellite data for synoptic purposes and to recommend the most suitable form for such exchanges;

(c) To present a progress report to the president of CSM at the beginning of each year;

(2) To invite the following individuals to serve on the working group:

V.J. Oliver	(U.S.A.) (chairman)
R. Ananthakrishnan	(India)
I.K. Ebbesen	(Denmark)
T.H. Kirk	(U.K.)
I.P. Vetlov	(U.S.S.R.)

One expert to be designated by each of the following Members :

France
Japan.

Res. 5 (CSM-IV) - RAPPORTEUR ON METEOROLOGICAL FORECASTS OF IMPORTANCE TO HYDROLOGICAL FORECASTING

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the request from the Commission for Hydrometeorology for guidance material on certain meteorological forecasts of importance to hydrological forecasting,

CONSIDERING

(1) That hydrological forecasting is becoming increasingly important for the rational utilization of water resources,

(2) That the Commission for Synoptic Meteorology may contribute to such forecasting by providing suitable guidance material,

DECIDES

(1) To appoint a Rapporteur on Meteorological Forecasts of Importance to Hydrological Forecasting with the following tasks:

(a) To assist in collecting and preparing guidance material for this purpose;

(b) To maintain liaison with the Commission for Hydrometeorology with regard to problems of hydrological forecasting; and

(c) To submit a report to the president of CSM, with appropriate recommendations for consideration by CSM, six months prior to its fifth session;

(2) To invite P.I. Miljukov (U.S.S.R.) to serve as Rapporteur on Meteorological Forecasts of Importance to Hydrological Forecasting.

Res. 6 (CSM-IV) - RAPPORTEUR ON SYNOPTIC METEOROLOGY IN THE TROPICS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) The report of the Working Group on Methods of Analysis and Prognosis in the Tropics,

(2) Resolution 9 (CAe-IV),

CONSIDERING the 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 prognosis in the tropics;

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

(2) To invite H.T. Mörth (Kenya) to serve as Rapporteur on Synoptic Meteorology in the Tropics;

REQUESTS the president of CSM to seek the agreement of the president of CAe for the above CSM rapporteur to be included as a member of the CAe Working Group on Tropical Meteorology.

Res. 7 (CSM-IV) - RAPPORTEUR ON LONG-RANGE WEATHER FORECASTING

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the report of the Working Group on Long-Range Weather Forecasting,

CONSIDERING the need for CSM to be kept informed on all important developments in the field of long-range weather forecasting,

DECIDES

(1) To appoint a Rapporteur on Long-Range Weather Forecasting with the following terms of reference:

(a) To review the progress made in the field of long-Range weather forecasting;

(b) To report to the president of CSM with appropriate recommendations six months prior to CSM-V;

(2) To invite K.N. Rao (India) to serve as Rapporteur on Long-Range Weather Forecasting.

Res. 8 (CSM-IV) - WORKING GROUP ON DESCRIPTION OF HYDROMETEORS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the definitions and descriptions of hydrometeors in the International Cloud Atlas, 1956,

CONSIDERING

(1) The advances in the physics of hydrometeors since the adoption of the definitions and descriptions in 1953,

(2) The need of a review of the descriptions of hydrometeors, particularly regarding those occurring in polar and mountainous regions,

DECIDES

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

(a) To review the definitions and descriptions of hydrometeors in the International Cloud Atlas, Vol. 1, (WMO, 1956);

(b) To report to the president of CSM with appropriate recommendations, not later than six months prior to CSM-V;

(2) To invite the following persons to serve on the working group:

L. Dufour	(Belgium)	(chairman)
E. Hesstvedt	(Norway)	
H.D. Parry	(U.S.A.)	
Ramanamurthy	(India)	

One expert to be designated by each of the following Members:

France
Switzerland

(3) To invite the president of CAe to designate an expert to serve on the working group.

Res. 9 (CSM-IV) - WORKING GROUP ON TECHNICAL REGULATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) The report of the Working Group on Minimum Performance Characteristics of Automatic Weather Stations, second part,

(2) Recommendation 27 (CMM-IV),

(3) Resolution 14 (EC-XVII),

CONSIDERING

(1) That there is a need for texts relating to automatic weather stations in the Technical Regulations,

(2) That there is a need for a general review of the Technical Regulations from the point of view of synoptic meteorology,

DECIDES

(1) To set up a Working Group on Technical Regulations with the following terms of reference:

(a) To review the proposal by the Working Group on Minimum Performance Characteristics of Automatic Weather Stations, second part, and the amended text discussed at CSM-IV (see the annex to this resolution);*

(b) To carry out a general review of the Technical Regulations concerning synoptic meteorology;

* See Annex XV

(c) To submit a report to the president of CSM on item (a) above not later than 1 January 1967;

(d) To present its final report to the president of CSM not later than six months prior to CSM-V;

(2) To invite the following individuals to serve on the group:

An expert to be designated by U.S.A.
An expert to be designated by U.S.S.R.

Res. 10 (CSM-IV) - RAPPORTEUR ON THE ORGANIZATION OF METEOROLOGICAL ACTIVITIES IN THE FIELD OF SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING EC-XVI, General Summary, Item 5.1.11,

CONSIDERING that before any guidance material be prepared on how to organize synoptic meteorological services in developing countries, information should be collected on what kind of guidance material is most desired by these countries,

DECIDES

(1) To appoint a Rapporteur on Organization of Meteorological Activities in the Field of Synoptic Meteorology with the following tasks:

(a) To prepare a questionnaire for submission to developing countries requesting information on what kind of guidance material is most desired when organizing their synoptic meteorological services;

(b) To consider, after having examined the replies from Members, what further action should be taken and to make suggestions to the president of CSM;

(2) To invite K.A. Hirst (Zambia) to serve as Rapporteur on the Organization of Meteorological Activities in the Field of Synoptic Meteorology.

Res. 11 (CSM-IV) - 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 fourth session,

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

DECIDES

(1) To keep in force Recommendation 73 (CSM-II) and to publish its texts in the report of the fourth session;

(2) Not to keep in force Resolutions 1 - 10 (CSM-III);

(3) To note with satisfaction the action taken by the competent bodies on the following Recommendations: 30, 35, 36, 37, 53, 74, 84, 88 (CSM-II), 90 and 91 (61-CSM) and 1 - 74 (CSM-III), which are now redundant.

Res. 12 (CSM-IV) - ADVISORY WORKING GROUP OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING EC-XVII, General Summary, paragraph 5.3.1.1,

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 examine the requirements in the field of synoptic meteorology as developed by the various working groups and rapporteurs of the Commission, and to assist the president in the harmonization of these requirements where conflict, inadequacies or inconsistencies arise; and

(c) To assist the president in co-ordinating and planning the work of the Commission;

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

President CSM
Vice-President CSM
Chairman, Working Group on Data Needs and Codes
Chairman, Working Group on Telecommunications
W. Bleeker (Netherlands)
H. Kutschenreuter (U.S.A.).

RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CSM-IV) - PRIORITY IN TRANSMISSION OF THE VARIOUS TYPES OF METEOROLOGICAL DATA AFTER AN INTERRUPTION OF TRANSMISSION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) That a problem of priority in the transmission of accumulated weather data arises when normal operation is resumed after a circuit disruption,

(2) The request from the president of RA-VI for guidance on priority in transmission on various types of meteorological data,

CONSIDERING that it is desirable to develop uniform procedures in this matter,

RECOMMENDS

(1) That, in dealing with the meteorological data accumulated due to a circuit disruption, the following categories of hemispheric data should be selected for transmission with the least possible delay:

TEMP and TEMP SHIP, Part A SYNOP and SHIP	not more than twelve hours after the time of observation

(2) That the steps taken for the transmission of accumulated meteorological data should not in general interfere with the immediate resumption of normal transmission schedules when a circuit is restored.

Rec. 2 (CSM-IV) - STANDARD LEVELS IN THE HIGH ATMOSPHERE

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 11 (EC-XIV),

(2) Recommendation 4 (CAe-IV),

(3) Recommendation 5 (CAe-IV),

CONSIDERING

(1) That balloon-borne soundings are reaching levels above 30 km with increasing frequency,

(2) That pressure is reported directly as an independent parameter at heights below 30 km,

(3) That from the synoptic viewpoint, additive thickness analysis techniques minimize errors arising from inhomogeneity of data at these higher altitudes,

RECOMMENDS that for data from balloon-borne soundings, the pressure levels of 7 mb, 5 mb, 3 mb, 2 mb and 1 mb should be adopted as standard;

REQUESTS the president of CSM to consult the president of CAe with a view to obtaining a satisfactory single method for the reporting of upper-air data above 10 mb.

Rec. 3 (CSM-IV) - ASSISTANCE TO THE WORKING GROUP ON DATA NEEDS AND CODES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 1 (CSM-IV),

CONSIDERING

(1) That a solution to the coding problems related to the reporting of both surface and upper-air data is becoming increasingly urgent,

(2) That there are a large number of very difficult problems which must be solved before the coding problems can be solved,

(3) That the work of the Working Group on Data Needs and Codes must be closely co-ordinated with the work on the World Weather Watch at the WMO Secretariat,

(4) That two experts, one on data needs and system planning and another on codes, will be essential from the time of establishment of the group until the presentation of its final report to the fifth session of the Commission,

(5) That two full-scale meetings of the basic working group and up to six meetings of sub-groups (three people each) will be necessary before the fifth session of the Commission,

(6) That assistance from WMO Secretariat specialists and outside consultants (equivalent to one year of a man's employment, including travel expenses) will be needed,

(7) That the objectives of the working group could not be met unless all costs incurred under (4), (5) and (6) are met by the Organization,

RECOMMENDS

(1) That WMO appropriate funds to meet the travel and subsistence costs of the chairman, six representatives of the regional associations, five experts nominated by the presidents of technical commissions and other experts if required, to attend the two full-scale meetings of the working group and up to six meetings of sub-groups (three persons each);

(2) That WMO provide two experts, one on data needs and system planning and the other on codes, to work full time on the Working Group on Data Needs and Codes from the fourth session until the fifth session of the Commission;

(3) That WMO provide other expert assistance by WMO full-time staff and outside consultants to assist the working group for the equivalent of one year of a man's employment, from the fourth session until the fifth session of the Commission.

Rec. 4 (CSM-IV) - AMENDMENTS TO THE TECHNICAL REGULATIONS RESULTING FROM CODE CHANGES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 20 (CSM-III) as approved by Resolution 34 (EC-XIV),

(2) Recommendation 17 (CSM-IV),

(3) Recommendation 19 (CSM-IV),

CONSIDERING

(1) That the code form FM 41.B RECCO was deleted from Part A of Volume B,

(2) That the figure code form FM 41.D CODAR for the exchange of air-reports between meteorological offices and the code forms METAR and SPECI were adopted to be introduced as from 1 January 1968,

RECOMMENDS

(1) That paragraph 4.4.3.2 be deleted from the Technical Regulations;

(2) That appropriate steps be taken for the introduction of consequential changes in Chapter 12 of the Technical Regulations in accordance with the normal procedures laid down for making such changes.

Rec. 5 (CSM-IV) - DATE OF IMPLEMENTATION OF THE CODE CHANGES REVISED BY CSM AT ITS FOURTH SESSION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendations 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 (CSM-IV), and Resolution 34 (EC-XIV),

CONSIDERING that it would be desirable to introduce all code changes adopted at the session on the same date,

RECOMMENDS that the new code forms, introductions and specifications adopted by the fourth session should be implemented on 1 January 1968 except those parts which require further studies (see Recommendation 6 and Recommendation 47 (CSM-IV)).

Rec. 6 (CSM-IV) - INTRODUCTION OF THE NEW ISOBARIC SURFACES IN UPPER-AIR REPORTS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 14 (CSM-IV),

(2) Recommendation 15 (CSM-IV),

CONSIDERING that the introduction of all proposed isobaric surfaces in the revised code forms for upper-air observations would result in an increase of traffic in meteorological telecommunications,

RECOMMENDS

(1) That the new code forms set forth in Recommendation 14 (CSM-IV) and Recommendation 15 (CSM-IV) should be implemented on 1 January 1968;

(2) That the isobaric surface in the code forms TEMP and PILOT as follows:

TEMP and TEMP SHIP, Part A : 1000, 900, 800, 700, 600, 500, 400, 300, 200, 150 and 100 mb

TEMP and TEMP SHIP, Part B : 850 and 250 mb

PILOT and PILOT SHIP, Part A : 900, 800, 700, 600, 500, 400, 300, 200, 150 and 100 mb

PILOT, and PILOT SHIP, Part B : 850 and 250 mb

be introduced as soon as telecommunications permit in accordance with the priorities established in Recommendation 47 (CSM-IV);

(3) That the provisions mentioned in paragraph (2) above should be implemented on the first of January of the earliest possible year provided that one year's advance notice has been given to Members.

Rec. 7 (CSM-IV) - UNITS FOR WIND SPEED IN METEOROLOGICAL MESSAGES FOR INTERNATIONAL EXCHANGES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 30 (Cg-III),

(2) Resolution 30 (Cg-IV),

(3) Resolution 31 (Cg-IV),

(4) Paragraph 2.2.10 of the general summary of the Abridged Report of EC-XVI,

CONSIDERING

(1) That the disparity in the two systems at present used for the transmission of wind speed seriously hinders the exchange of information, leads to mistakes of analysis in the wind field and raises difficulties in the further development of meteorology, especially the implementation of the World Weather Watch and the extension of the use of data processing,

(2) That the instruments at present used for wind measurement and the present methods for making observations do not provide any genuine guarantee that wind measurement will be correct to within 1 knot,

(3) The requirements adopted at CSM-IV for code resolution for wind speed for synoptic purposes (one metre per second),

(4) That the use of metres per second in the reporting of wind speed in meteorological messages for international exchanges considerably simplifies the processing, analysis and prognosis of data, both those done by hand and those made with the help of electronic computers,

(5) That in the past four years since the third session of CSM no real progress has been made in the introduction of a unified system for the reporting of wind speed in international exchanges,

(6) The need to implement the decision in Resolution 31 of Fourth Congress,

RECOMMENDS that that the Executive Committee take the necessary action to speed up the implementation of metres per second as the sole unit of wind speed for international exchanges, and that the result of this action be reported to the fifth session of Congress.

Rec. 8 (CSM-IV) - AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B, CONCERNING CODE 4677

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 3 (CSM-III), Annex, Part A, paragraph (g),

(2) CMM-IV Abridged Final Report, Annex III,

CONSIDERING

(1) That some inconsistencies in Code 4677 call for minor changes which could be made before the table is reviewed as a whole without involving difficulties in the climatological use of present weather data,

(2) That CMM-IV needs provision for reporting the cause of the reduction of visibility when this is by blowing spray,

RECOMMENDS that the amendments be made to WMO Publication No. 9.TP.4, Volume B, as contained in the annex to this recommendation.*

* See Annex XVI.

Rec. 9 (CSM-IV) - REPORTING OF SEA-SURFACE TEMPERATURE AND WIND WAVES AND SWELL WAVES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING CMM-IV Abridged Final Report, general summary, paragraphs 6.1 and 6.4,

CONSIDERING

(1) That the present procedure for reporting sea-surface temperature is no longer acceptable due to the excessively high percentage of errors which result from it,

(2) That reports in tenths of degrees Celsius meet the requirements of maritime meteorology and that the accuracy of measurement warrants it, in particular for the near future,

(3) That CMM attaches great importance to urgently required amendments to current codes to improve the reporting of the state of sea and to reduce errors arising from artificial coding procedures,

RECOMMENDS that the amendments be made to Publication No. 9.TP.4, Volume B, as contained in the annex to this recommendation.*

* See Annex XVII.

Rec. 10 (CSM-IV) - REPORTING OF PRECIPITATION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that in WMO Publication No. 9.TP.4, Volume B, provision is made for reporting that the measurement of precipitation is inaccurate,

CONSIDERING that it is necessary that all measurements be made carefully and at least to the accuracy needed for reporting purposes,

RECOMMENDS that WMO Publication No. 9.TP.4, Volume B, be amended as follows:

Page I-A-4-50, Code 3577

Delete from the specification of the code figure 99 the words "or inaccurate".

Rec. 11 (CSM-IV) - CODING OF THE DURATION OF PRECIPITATION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 2 (CMM-IV),

CONSIDERING that the present code for the duration of precipitation does not allow completely independent reporting of the duration of precipitation nor the period to which the reported precipitation refers,

RECOMMENDS that the WMO Publication No. 9.TP.4, Volume B, be amended as given in the annex to this recommendation.*

* See Annex XVIII.

Rec. 12 (CSM-IV) - TIME INTERVAL FOR COMPUTING MEAN SURFACE WIND FOR AERONAUTICAL PURPOSES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 2/1 (CAeM-III),

(2) Resolution 16 (EC-XVI),

CONSIDERING that the aeronautical operational requirements for mean wind data call for wind to be measured over the time interval most likely to provide data which will correlate well with those values which will be encountered in the operation,

RECOMMENDS that the following amendments be made to WMO Publication No. 9.TP.4, Volume B:

Page I-A-3-9

(i) Insert after Note (2) the following:

"(3) For aeronautical purposes a satisfactory time interval for obtaining mean wind is 10 minutes. 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 be correspondingly reduced."

(ii) Renumber Notes (3) to (8) to read (4) to (9).

Rec. 13 (CSM-IV) - REPORTING OF SHIP'S AVERAGE SPEED

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING CMM-IV Abridged Final Report, Annex III,

CONSIDERING

(1) That the number of ships moving at higher speeds is steadily increasing, some already obtaining speeds of over 30 knots,

(2) That there is an urgent requirement for extending the range of speeds to be reported to at least 34 knots,

RECOMMENDS that the amendments be made to WMO Publication No. 9.TP.4, Volume B, as contained in the annex to this recommendation.*

* See Annex XIX.

Rec. 14 (CSM-IV) - TEMP AND TEMP SHIP REPORTS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 3 (CSM-III), part A of the annex, paragraph (c),

(2) The various comments and suggestions submitted by regional associations, technical commissions and Members,

CONSIDERING

(1) That there is a strong requirement for a greater uniformity in upper-air reporting procedures both for manual operation of reports and automatic data-processing,

(2) That the adoption of the new TEMP code form is a positive step towards standardizing present reporting procedures,

RECOMMENDS

(1) That the code forms FM 35.D TEMP and FM 36.D TEMP SHIP and relating instructions and specifications, as given in part A of the annex to this recommendation,* should replace the present code forms FM 35.C and FM 36.C for the international exchange of upper-level pressure, temperature, humidity and wind data;

(2) That the president of CSM be authorized to approve the notes for inclusion in Volume B as prepared by the Secretary-General using the draft notes given in part B of the annex to this recommendation* as guidance.

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* See Annex XX.

Rec. 15 (CSM-IV) - PILOT AND PILOT SHIP CODE FORMS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 22 (CSM-III) approved by Resolution 34 (EC-XIV),

CONSIDERING that for automatic data processing a number of adjustments to current upper-air code forms are required,

RECOMMENDS

(1) That the current code forms FM 32.C PILOT and FM 33.C PILOT SHIP be replaced by the code forms FM 32.D PILOT and FM 33.D PILOT SHIP respectively as given in part A of the annex to this recommendation;*

(2) That the president of CSM be authorized to approve the notes for inclusion in Volume B as prepared by the Secretary-General using the draft notes given in part B of the annex to this recommendation* as guidance.

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* See Annex XXI.

Rec. 16 (CSM-IV) - AMENDMENTS TO THE CODES 1051 AND 3644 (ROCOB code form)

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING a request for the extension for code tables e_s and r_m in ROCOB code form,

RECOMMENDS that the code tables 1051-e_s and 3644-r_m be amended as follows:

Code 1051

e_s Type of data-sensing equipment

Code figure

0	Falling sphere
1	Chaff
2	Immersion thermometry with hypsometer
3	Immersion thermometry without hypsometer
4	Pressure or density gauge
5	Temperature sensing element
9	Other type

Code 3644

r_m Type of rocket motor

Code figure

0	114 mm (4.5 inch), end burning
1	76 mm (3.0 inch), internal burning
2	Boosted, 114 mm (4.5 inch), end burning
3	Boosted, 76 mm (3.0 inch), internal burning
4	140 mm (5.5 inch), internal burning.

Rec. 17 (CSM-IV) - UPPER-AIR REPORT FROM AIRCRAFT

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 13 (EC-XVI),

CONSIDERING the requirements for this type of report as discussed and approved at the session,

RECOMMENDS

(1) The adoption of the figure code form given in the annex to this recommendation* for the hemispheric exchange of meteorological data from aircraft;

(2) That the president of CSM be authorized to approve the notes as prepared by the Secretary-General for inclusion in Volume B.

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* See Annex XXII.

Rec. 18 (CSM-IV) - AMENDMENTS TO ANALYSIS CODES FM 45.C AND FM 46.C

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendations 13/5 and 13/6 (CAeM-III),

(2) Paragraph 9.6.2 of the general summary of the Abridged Final Report of CMM-IV,

CONSIDERING

(1) That the specifications for fronts in code table 1152 should follow more closely the list of fronts and allied phenomena contained in the WMO Technical Regulations, Volumes I and II,

(2) That provisions for indicating past and future positions and characteristics of pressure systems, fronts and wave systems should be incorporated in code forms FM 45.C and FM 46.C,

RECOMMENDS that WMO Publication No. 9.TP.4, Volume B, be amended as indicated in the annex to this recommendation.*

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* See Annex XXIII.

Rec. 19 (CSM-IV) - AVIATION WEATHER REPORTS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendations 13/10 and 13/11 (CAeM-III),

(2) The statement of operational requirements for aerodrome meteorological reports to be exchanged ground-to-ground developed by ICAO in accordance with the above-mentioned recommendations,

CONSIDERING

(1) That the code form for aviation routine weather reports should, as far as possible, meet all the recognized operational requirements and cater for these requirements only,

(2) That it is advisable that in this code form the order of elements be the same as in the corresponding plain language form,

(3) That the reported values should be given in such a form that they allow easy understanding by non-meteorological personnel,

RECOMMENDS

(1) That the code forms and specifications given in the annex to this recommendation* should replace the present code forms FM 15.C AERO (Aviation routine weather report)

and FM 16.A MMMM/BBBBB (Selected special weather report (sudden changes) from land station);

(2) That the new code forms FM 15.D and FM 16.D be introduced on 1st January 1968;

(3) That the present code forms FM 15.C AERO (Aviation routine weather report) and FM 16.A MMMM/BBBBB (Selected special weather report (sudden changes) from land station) be retained in Volume B under the new FM numbers FM 12.A and FM 13.A respectively, with an introductory note that these code forms may be used for national non-aeronautical purposes only;

REQUESTS that ICAO be invited to submit its comments on this recommendation as soon as possible and that the approval of the recommendation be arranged in accordance with WMO procedures laid down for questions of urgency.

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* See Annex XXIV.

Rec. 20 (CSM-IV) - AERODROME FORECASTS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 13/11 (CAeM-III),

(2) The statement of operational requirements for aerodrome forecasts to be exchanged ground-to-ground, developed by ICAO in accordance with the above-mentioned recommendation,

(3) Recommendation 19 (CSM-IV),

CONSIDERING

(1) That the code form for aerodrome forecasts should as far as possible meet all the recognized operational requirements,

(2) That where practicable the reported values should be given in such a form that they allow easy understanding by non-meteorological personnel,

(3) That the need for distinction between aerodrome forecasts in full form and aerodrome forecasts in abbreviated form no longer exists,

RECOMMENDS that the code form given in the annex to this recommendation* should replace the present code forms FM 51.C - Aerodrome (terminal or alternate) forecast in full form and FM 52.C - Aerodrome (terminal or alternate) forecast in abbreviated form;

REQUESTS that ICAO be invited to submit its comments on this recommendation as soon as possible and that the approval of the recommendation be arranged in accordance with WMO procedures laid down for questions of urgency.

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* See Annex XXV.

Rec. 21 (CSM-IV) - AREA, ROUTE AND FLIGHT FORECAST FOR AVIATION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 13/11 (CAeM-III),

(2) The statement of operational requirements for area, route and flight forecast for aviation developed by ICAO in accordance with the above-mentioned recommendation,

(3) Recommendations 19 and 20 (CSM-IV),

CONSIDERING

(1) That the code forms for area, route, and flight forecast for aviation needed to be adapted to the code forms FM 15.D and FM 51.D,

(2) That some other changes within the present code forms were practicable,

RECOMMENDS

(1) That the new code forms:

FM 53.D - Area forecast for aviation
FM 54.D - Route forecast for aviation
FM 55.D - Flight forecast for aviation

given in the annex to this recommendation* should replace the present code forms FM 53.B, FM 54.B, FM 55.B;

(2) That the code forms FM 56.C, FM 57.C, and FM 58.C be amended accordingly;

REQUESTS that ICAO be invited to submit its comments on this recommendation as soon as possible and that the approval of the recommendation be arranged in accordance with WMO procedures laid down for questions of urgency.

* See Annex XXVI.

Rec. 22 (CSM-IV) - REPORT OF MONTHLY MEANS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING paragraphs 23.1 to 23.11 of the general summary of the Abridged Final Report of CCl-IV,

CONSIDERING that the inclusion of some notes in WMO Publication No. 9.TP.4, Volume B, which relate to rules and procedures for computing the monthly means, has led to discrepancies and inconsistencies between Volume B, Technical Regulations and the Guide to Climatological Practices,

RECOMMENDS that the code forms FM 71.D CLIMAT, FM 72.D CLIMAT SHIP, FM 75.D CLIMAT TEMP and FM 76.D CLIMAT TEMP SHIP as given in the annex to this recommendation* be adopted for the international exchange of monthly mean surface and aerological data from land and ocean weather stations.

* See Annex XXVII.

Rec. 23 (CSM-IV) - AMENDMENTS TO FM 61.C MAFOR CODE FORM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING paragraph 9.4.3 of the general summary of the Abridged Final Report of CMM-IV,

CONSIDERING

(1) That the instructions regarding the use of the group $1GDF_mW_1$ to describe phenomena forecast to occur occasionally need to be clarified,

(2) That the beginning of the forecast period needs to be indicated in the message,

RECOMMENDS that the amendment to the MAFOR code form given in the annex to this recommendation* be approved for inclusion in WMO Publication No. 9.TP.4, Volume B.

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* See Annex XXVIII.

Rec. 24 (CSM-IV) - REPORTING OF SHIP'S POSITION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the favourable reaction of CMM to the procedure for reporting of ship's position in meteorological messages indicated below,

CONSIDERING that the use of Code 3300 Q for indicating the octant of the globe has undesirable features,

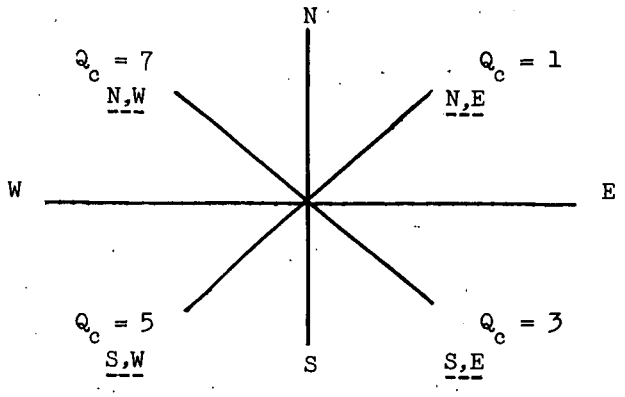
RECOMMENDS

(1) That in the code forms listed in paragraph (2) below the present groups for reporting ship's position $QL_aL_aL_a\ L_oL_oL_o$ be replaced by the groups

$99L_aL_aL_a\ Q_cL_oL_oL_oL_o$ the meaning of which is given hereafter:

99	: Indicator for recognition of SHIP message
$L_aL_aL_a$	: Latitude in tenths of a degree
$L_oL_oL_oL_o$	: Longitude in tenths of a degree (figure for hundreds included)
Q_c	: Quadrant of the globe (code 3333)

Code figure	Latitude	Longitude
1	North	East
3	South	East
5	South	West
7	North	West



The choice is left to the observer in the following cases:

- When the ship is on the Greenwich meridian ($L_oL_oL_oL_o$ = 0000)

  or on the meridian 180° ($L_oL_oL_oL_o$ = 1800)

  Q_c = 1 or 7 (northern hemisphere) or

  Q_c = 3 or 5 (southern hemisphere)

- When the ship is on the Equator ($L_aL_aL_a$ = 000)

  Q_c = 1 or 3 (eastern longitude) or

  Q_c = 5 or 7 (western longitude)

(2) That the change recommended in paragraph (1) above be made in all code forms for ships and implemented in all code forms on the same date.

Rec. 25 (CSM-IV) - IDENTIFICATION OF SHIP REPORT AND POSITION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 14 (CSM-IV),

(2) Recommendation 24 (CSM-IV),

CONSIDERING

(1) That a simple uniform method of identifying ship reports would be advantageous,

(2) That a simple reporting of ship's position would bring a decrease in the number of errors,

(3) That it would be an advantage to have an indication whether reported winds are measured or estimated,

RECOMMENDS that WMO Publication No. 9.TP.4, Volume B, be amended as given in the annex to this recommendation.*

* See Annex XXIX.

Rec. 26 (CSM-IV) - RESEARCH PROJECTS ON NETWORKS DENSITY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the present lack of theoretical quantitative criteria for the density of network of observations, and the need for further studies in this respect,

CONSIDERING the importance of research work on this subject in the context of the World Weather Watch,

RECOMMENDS that Members be encouraged to undertake research projects for determining the optimum network density of observing stations required to ensure a high level of accuracy of analysis and forecasting.

Rec. 27 (CSM-IV) - PROCEDURES FOR SELECTION OF AIRCRAFT REPORTS FOR HEMISPHERIC EXCHANGE

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 13 (EC-XVI),

(2) The favourable experience gained by countries in the exchange and use of aircraft reports during the test programme of 1965,

CONSIDERING

(1) The usefulness of aircraft reports in synoptic meteorology,

(2) The necessity for selecting and editing aircraft reports before they are included in hemispheric exchanges of basic meteorological data,

RECOMMENDS

(1) That Members concerned be invited to select aircraft reports for the purpose of including them as basic meteorological data in hemispheric exchange;

(2) That Members in doing so should be guided by the following principles:

(a) Time periods of selected reports should be within 2 hours of the synoptic hours 0000 and 1200 GMT; that is 2200 to 0200, and 1000 to 1400 GMT. Reporting levels should be limited to 500 mb and above;

(b) Reports within 500 km of a fixed rawinsonde station should not in general be included;

(c) Minimum spacing of selected reports should be 500 km except in situations when it is considered that additional data would be helpful in delineating important weather situations;

(d) Only those reports considered accurate should be selected. Judgement of the accuracy of the report should be made by qualified meteorologists;

(e) Coding should be in accordance with approved WMO codes;

(f) Reports should be compiled in bulletins and inserted on the international exchange networks as soon as possible after 0200 and 1400 GMT as the transmission schedules permit.

Rec. 28 (CSM-IV) - AMENDMENTS TO TECHNICAL REGULATIONS -- DEFINITIONS -- TERRITORIAL BROADCAST

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Technical Regulations - Definitions as adopted by Cg-IV,

(2) Paragraph 5.4.2 of the general summary of the work of Fourth Congress,

CONSIDERING that in some cases Members need more information or earlier reception of information from adjacent countries than is available in subregional, regional or hemisphere broadcasts, and that in some cases this may only be achieved by intercepting the respective territorial broadcasts,

RECOMMENDS that the definition "Territorial broadcast" appearing in the Technical Regulations be amended to read as follows:

"A broadcast containing the meteorological information from the territory or territories of one or more Members and appropriate sea areas, and intended for reception:

(a) Within the area of origin of the information;

(b) In adjacent countries, as regionally or inter-regionally agreed;

(c) At one or more designated centres responsible for subregional broadcasts; and

(d) If possible, at the designated centre responsible for the regional broadcast."

Rec. 29 (CSM-IV) - AMENDMENT TO TECHNICAL REGULATION 6.3.1.2

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Technical Regulation 6.3.1.2,

(2) Paragraph 5.4.8 of the general summary of the work of Fourth Congress,

CONSIDERING that the Technical Regulations contain directives to Members and that this principle should also apply to paragraph 6.3.1.2 of the Technical Regulations,

RECOMMENDS that paragraph 6.3.1.2 of the Technical Regulations be amended to read as follows:

"6.3.1.2
Appropriate arrangements should be made by Members concerned so that, in conformity with the general plan:

(a) Five hemisphere exchange centres are established in the northern hemisphere;

(b) Three hemisphere exchange centres are established in the southern hemisphere."

Rec. 30 (CSM-IV) - TECHNICAL REGULATIONS - DEFINITION OF "METEOROLOGICAL MESSAGE"

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

CONSIDERING that a re-definition of the term "meteorological message" is needed,

RECOMMENDS that the definition found in Chapter I of the Technical Regulations of a meteorological message should be amended to read as follows:

"Meteorological message:

A meteorological message is a single meteorological report, analysis, or forecast."

Rec. 31 (CSM-IV) - COLLECTION AND DISTRIBUTION OF OBSERVATIONAL DATA

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) WMO Publication No. 9.TP.4, Volume C, Chapter I, Part III, paragraph 1, concerning maximum acceptable time delay in the reception of observational reports at national meteorological telecommunication centres,

(2) The regional telecommunication plans developed by Regional Associations,

CONSIDERING

(1) That progress in implementing appropriate national collection systems has not kept pace with the development in the international meteorological exchange system,

(2) That the establishment and operation of a national collection system, adequate to ensure the timely transmission of observational data to the appropriate exchange centres, constitute one of the most important responsibilities of Members,

RECOMMENDS that Members be urged

(1) To spare no effort in their endeavour to implement national collection systems which meet the requirements set out in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part III, paragraph 1;

(2) To aim at the full implementation of the regional telecommunication plan developed by their respective Regional Associations as soon as possible;

REQUESTS the Secretary General

(1) To collect information on the state of implementation of this recommendation;

(2) To assist, as far as possible, Members in their efforts to improve meteorological telecommunications in their countries.

Rec. 32 (CSM-IV) - IMPROVEMENT OF THE COLLECTION AND EXCHANGE OF GLOBAL DATA

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 51 (CSM-III) adopted by Resolution 35 (EC-XIV),

CONSIDERING that there is an urgent need for better reception of global data with a minimum time delay at hemisphere exchange centres, in particular from Regions I, II, III and V,

RECOMMENDS that Regional Associations I, II, III and V do their utmost to ensure the speedy and regular reception at designated exchange centres of all observational data needed for hemisphere exchange programmes,

REQUESTS the Secretary-General to give urgent consideration to assisting Regional Associations in implementing this recommendation.

Rec. 33 (CSM-IV) - TECHNICAL AND FINANCIAL ASSISTANCE FOR IMPLEMENTATION OF TELECOMMUNICATION FACILITIES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 22 (Cg-IV),

(2) Recommendation 31 (CSM-IV) - Collection and distribution of observational data,

(3) That some telecommunication projects were selected to be financed from the WMO New Development Fund,

CONSIDERING that there is an urgent need for further improvements in meteorological telecommunications,

REQUESTS the Executive Committee to study ways and means of providing increased financial and technical assistance to developing countries for implementing adequate meteorological telecommunication facilities.

Rec. 34 (CSM-IV) - CONTENTS OF NORTHERN HEMISPHERE EXCHANGES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) WMO Publication No. 9 TP.4, Volume C, Chapter I, Part II, paragraph 1.1.5,

(2) That since the adoption of Recommendation 51 (CSM-III), to which a list of individual stations from which reports should be included in the Northern Hemisphere Exchange is attached, changes have occurred in the observing network,

(3) That the requirements of Members have changed to some extent in recent years,

CONSIDERING that the exchange programme needs to be brought up to date,

RECOMMENDS

(1) *That the following types of meteorological information be included in the exchanges:

(a) TEMP Parts A and C

(b) PILOT Parts A and C

(c) TEMP SHIP Parts A and C

(d) PILOT SHIP Parts A and C

(e) CLIMAT

(f) CLIMAT TEMP

(g) SYNOP

(h) SHIP

(i) coded AIREPS

(j) selected satellite data

(2) The frequency of exchanges for the types of reports listed above should be:

(a) SYNOP, SHIP, TEMP, TEMP SHIP, PILOT, PILOT SHIP: twice per day, namely, for 0000 and 1200 GMT;

(b) CLIMAT and CLIMAT TEMP: once per month;

(c) Coded AIREPS. Only selected reports made at specified periods (2200-0200 and 1000-1400 GMT) should be exchanged;

(3) Guidelines for the establishment of the list of individual stations from which reports should be included in NH bulletins:

(a) TEMP and TEMP SHIP: all stations reporting TEMP/TEMP SHIP

(b) PILOT AND PILOT SHIP: all stations reporting PILOT/PILOT SHIP, excluding stations:

(i) From which wind data are included in TEMP/TEMP SHIP reports of the same station;

(ii) Situated in areas with a dense upper-air network;

(c) SYNOP: selection of stations

Selection criteria:

(i) Sufficiently dense network of stations for broad-scale analysis;

(ii) From all TEMP/PILOT observing stations or a nearby station;

(iii) The SYNOP station chosen for exchange should be, in general, listed in WMO Publication No. 9 TP.4, Volume A and included in the recommended basic regional network;

(iv) On the basis of the requests of Members;

(d) 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;

(e) CLIMAT/CLIMAT TEMP reports from the networks of stations recommended by Regional Associations;

(f) Coded AIREP over ocean areas and over land areas where data are sparse;

URGES Members to provide information to WMO promptly, in order that the lists of stations published in WMO Publication No. 9 TP 4, Volume A can be kept up to date;

REQUESTS the Secretary-General

(1) To ascertain from Members whether the stations for which they are responsible are the best possible choice as regards quality and representativeness of observation, regularity and promptness of transmission of their reports; and if not, to request that Members recommend alternative stations for inclusion in the annex to this recommendation;**

(2) To include the substance of this recommendation in WMO Publication No. 9 TP.4, Volume C, Chapter I, Part II.

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* N O T E : Letters (a) to (j) do not indicate priorities.

** See Annex XXX.

Rec. 35 (CSM-IV) - INTERIM ARRANGEMENTS FOR THE EXCHANGE OF SOUTHERN HEMISPHERE DATA

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) WMO Publication No. 9.TP.4, Volume C, Chapter I, Part II,

(2) Resolution 1 (IV-RA V),

CONSIDERING

(1) That there is a requirement for the reception of a sufficient number of observational reports from the southern hemisphere at the World Meteorological Centres -- Melbourne, Moscow and Washington -- and at other centres,

(2) That Region V data are urgently needed by the World Meteorological Centres at Moscow and Washington, and by other Centres,

RECOMMENDS

(1) That Members concerned be invited to implement the recommended New Delhi - Singapore - Melbourne RTT circuit as soon as possible;

(2) That Members concerned be urged to make adequate arrangements in order that southern hemisphere data from Region III are available at Moscow for transmission to Melbourne (via New Delhi) and to other Centres;

(3) That Australia be invited to transmit southern hemisphere data from Region V via New Delhi to the World Meteorological Centres at Moscow and Washington and to other Centres as required.

Rec. 36 (CSM-IV) - IMPROVEMENT OF THE TOKYO-HONOLULU SEGMENT OF THE NORTHERN HEMISPHERE EXCHANGE SYSTEM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Recommendation 37 (CSM-IV),

CONSIDERING the need for improving the Tokyo-Honolulu portion of the link between NHEC's Tokyo and New York,

RECOMMENDS that Members concerned be invited

(1) To convert the existing radio teleprinter circuit Honolulu-Tokyo to a cable circuit;

(2) To increase the modulation rate of the Honolulu-Tokyo link from 50 bauds to 75 bauds.

Rec. 37 (CSM-IV) - AMENDMENTS TO CHAPTER I, VOLUME C, WMO PUBLICATION No. 9.TP.4

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 35 (EC-XIV),

(2) That certain difficulties have occurred in the application of meteorological practices prescribed in that resolution,

(3) That certain editorial changes are necessary to bring Chapter I of Volume C of WMO Publication No. 9.TP.4 up to date,

RECOMMENDS that the changes listed in the annex to this recommendation* should be made to Chapter I, Volume C of WMO Publication No. 9.

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* See Annex XXXI.

Rec. 38 (CSM-IV) - TELECOMMUNICATIONS PROCEDURES AND PRACTICES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING that some Members have not strictly adhered to the practices mentioned below,

CONSIDERING that all departures from telecommunication procedures and practices prescribed in Chapter I of Volume C, WMO Publication No. 9.TP.4 create difficulties in the automatic processing and switching of meteorological messages transmitted on meteorological telecommunication network,

RECOMMENDS that all Members enforce procedures and practices prescribed in Chapter I, Volume C, WMO Publication No. 9.TP.4 to the maximum possible extent, and particularly regarding the correct use of the message separation signal - Signal No. 22 (figure case position) of the International Telegraph Alphabet No. 2 -- and also the use of 4 letter call signs for ships' reports, replacing other identifiers such as ships' names by 4 letter call signs (cf. ITU Radio Regulations) when these can be appropriately ascertained or the word "SHIP" if this is not possible, before relaying or broadcasting such reports to other Members.

Rec. 39 (CSM-IV) - UNIFORM TELEPRINTER PROCEDURES FOR METEOROLOGICAL BULLETINS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) WMO Publication No. 9, Volume C, Chapter I, Part III, paragraph 7,

(2) ICAO Regional Supplementary Procedures - MOTNE procedures,

CONSIDERING that some Members experience difficulties in the preparation of meteorological bulletins for transmissions on both WMO and ICAO telecommunication networks due to differences between the procedures prescribed by these organizations,

RECOMMENDS that ICAO be invited to co-operate with WMO in a study to develop, as far as possible, telecommunications procedures for meteorological bulletins which are equally applicable to the telecommunication networks of both organizations.

Rec. 40 (CSM-IV) - USE OF AFTN CIRCUITS FOR TRANSMISSION OF BASIC METEOROLOGICAL INFORMATION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) That in some parts of the world where the meteorological telecommunication networks were not adequate, extensive use of the AFTN for the exchange of basic meteorological data is made in order to satisfy data requirements of Members,

(2) The efforts made to improve telecommunication systems promulgated by WMO,

(3) That in some cases the basic meteorological information is exchanged on the AFTN, although exclusive meteorological circuits exist for the exchange of this information,

RECOMMENDS

(1) That as soon as adequate meteorological channels are established the exchange of basic meteorological information on the AFTN should be discontinued;

(2) That each Regional Association be requested:

(a) To keep under constant review the telecommunication arrangements for regional distribution of basic meteorological data; and

(b) To recommend to its Members to discontinue exchanges of basic meteorological data on the AFTN when the data requirements of Members can be met through exclusive meteorological telecommunication channels;

(3) That in cases of outages of meteorological channels normally used for the exchange of basic data, other suitable circuits, including AFTN circuits, should be used to the maximum possible extent;

(4) That ICAO be informed of this recommendation.

Rec. 41 (CSM-IV) - PROPOSED PLAN FOR THE MAIN TRUNK CIRCUIT OF THE WWW GLOBAL TELECOMMUNICATION SYSTEM INTERCONNECTING WORLD METEOROLOGICAL CENTRES AND REGIONAL TELECOMMUNICATION HUBS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Paragraphs 5.1.20 to 5.1.25, of the general summary of the Abridged Report of EC-XVII,

(2) Paragraphs 5.6.1 - 5.6.9 of the Final Report of the third session of the CSM Working Group on Telecommunications, Geneva, 6 - 17 September 1965,

CONSIDERING

(1) That for further planning of WWW Global Telecommunication System it is urgent that Regional Telecommunication Hubs, to be directly connected to the main trunk circuit, be designated,

(2) That the views of Regional Associations should be taken into account in designating the RTHs,

(3) That in planning the future Global Telecommunication System it is necessary to take into account the existing Northern Hemisphere System, the planned Southern Hemisphere System and the present regional networks as well as the offers of Members who had expressed their willingness to establish Regional Meteorological Centres,

(4) That the system mentioned in (3) should be further developed to meet the requirements of all Members to the maximum possible extent,

RECOMMENDS

(1) That the main trunk circuit should consist of a duplex telephone-type channel interconnecting the World Meteorological Centres at Melbourne, Moscow and Washington;

(2) That a certain number of Regional Telecommunication Hubs and Regional Meteorological Centres should be directly connected to the main trunk;

(3) That the Regional Associations, in the shortest possible time, should consider the telecommunication plans in their respective Region taking into account the concept of WWW and work out proposals for the establishment of RTHs which best meet the requirements of the Members of the Region;

(4) That in planning the Global Telecommunication System consideration be given to the utilization of the existing systems and telecommunication centres located in the Regions, including existing and designated Exchange Centres of the Northern and Southern Hemispheres at New Delhi, Offenbach, Tokyo, Brasilia and Nairobi, and also regional and sub-regional broadcast centres and others in order to decide which of these centres can be designated as Regional Telecommunication Hubs of the Global Telecommunications System.

REQUESTS THE SECRETARY-GENERAL to take urgent action in order to present a co-ordinated global telecommunication plan to Fifth Congress.

Rec. 42 (CSM-IV) - STUDY OF RADIO TRANSMISSION CHARACTERISTICS OF AUTOMATIC WEATHER STATIONS AND THEIR CO-ORDINATION WITH THOSE REQUIRED FOR OCEAN DATA STATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) That a technical conference on automatic weather stations will be convened by WMO in September 1966, during which the transmission characteristics of these stations, including frequency requirements, will be studied,

(2) That the allocation of radio frequencies for oceanographic purposes is now under consideration by ITU,

RECOGNIZING that automatic weather stations are already in operation, both on land and at sea,

CONSIDERING the desirability of co-ordinated action on ocean data stations (both meteorological and oceanographic) by WMO and IOC, especially with respect to selection of radio frequencies and other transmission characteristics,

RECOMMENDS that Members support the general radio frequency requirements for oceanographic purposes as put forward by IOC,

REQUESTS the Secretary-General

(1) To inform Members of the IOC's position on radio-frequency requirements for ocean data stations as supplied by the IOC secretariat;

(2) To prepare a resume for study by the forthcoming technical conference on automatic weather stations on the transmission characteristics of automatic weather stations now in use, and those being developed;

(3) To inform IOC ofthis recommendation and invite it to present to the technical conference (see NOTING (1) above) further information on oceanographic radio frequency needs with a view to ensuring closer co-ordination between meteorological and oceanographic requirements.

Rec. 43 (CSM-IV) - TECHNICAL CHARACTERISTICS OF TELEGRAPH TRANSMISSIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 50 (CSM-III) and Resolution 35 (EC-XIV),

(2) CCITT Recommendations S-3 and S-3 bis,

(3) CCIR Recommendation 246 (Geneva 1963),

(4) ICAO Annex 10,

CONSIDERING

(1) That in order to facilitate the efficient and economical exchange of data by normal telegraph systems it is necessary to standardize certain technical characteristics,

(2) That at present technical characteristics have been standardized on a world-wide basis only for radioteleprinter operation,

RECOMMENDS that the specifications given in the annex to this recommendation* be adopted for landline and radioteleprinter facilities used for the international exchange of meteorological data.

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* See Annex XXXII.

Rec. 44 (CSM-IV) - TECHNICAL CHARACTERISTICS OF RADIO-TELEPRINTER TRANSMISSIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 50 (CSM-III) and Resolution 35 (EC-XIV),

(2) CCIR Recommendation 246 (Geneva, 1963),

(3) That considerable use is made of radioteleprinter broadcasts and point-to-point transmissions in the H.F. spectrum for the transmission of meteorological data,

CONSIDERING that in order to facilitate the efficient exchange of meteorological data by radioteleprinter on a world-wide basis it is necessary to standardize certain technical characteristics,

RECOMMENDS

(1) That the characteristics defined in the annex to Recommendation 43 (CSM-IV)* be equally applicable to radioteleprinter transmissions in the H.F. spectrum;

(2) That frequency shift keying working on two conditions be employed, using a shift of the lowest order compatible with the service to be provided, and taking note of the CCIR preferred values of shift of 200 c/s, 400 c/s and 500 c/s;

(3) That for circuits using the International Telegraph Alphabet No. 2 with start-stop apparatus, the higher frequency should correspond to the start signal (position A) and the lower frequency should correspond to the stop signal (position Z).

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* See Annex XXXII.

Rec. 45 (CSM-IV) - STANDARDIZATION OF INTERNATIONAL METEOROLOGICAL TRANSMISSION BY FACSIMILE - EQUIPMENT CHARACTERISTICS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V, paragraph 3,

CONSIDERING that there is a need to define engineering and technical standards for facsimile equipment used for meteorological purposes,

RECOMMENDS that the standards for facsimile equipment used for international meteorological transmissions as set forth in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V, should be amended as follows:

(1) Paragraph 3.9.7 to read:
"3.9.7 Precision of signals

The tolerance of values indicated in paragraph 3.9.1 and in paragraph 3.9.6 should be:

for time intervals, $\pm$ 5%

for frequencies, $\pm$ 1%."

(2) the heading of paragraph 3.9.4 to read:
"3.9.4 Phasing (accepted as an interim measure)"

Rec. 46 (CSM-IV) - ADVANCED NOTIFICATIONS OF CHANGES IN VOLUMES A AND C OF WMO PUBLICATION No. 9.TP.4

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING paragraph 7.1.4 of the general summary of the work of the fourth session of RA VI,

CONSIDERING that there is a need to notify centres equipped with electronic computers as early as possible of changes in the observing networks and in meteorological transmissions,

RECOMMENDS

(1) That advance notification of changes in Volumes A and C of WMO Publication No. 9.TP.4 should be issued at weekly intervals in addition to the normal supplement service;

(2) That the above advance notification should be included in the hemisphere exchanges during low traffic periods;

INVITES Regional Associations to arrange for the regional distribution of these advance notifications as required;

REQUESTS the Secretary General to implement paragraph (1) of RECOMMENDS as soon as possible.

Rec. 47 (CSM-IV) - IMPLEMENTATION OF CODE AND TELECOMMUNICATIONS DECISIONS ADOPTED BY THE FOURTH SESSION OF CSM

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 14 (CSM-IV),

(2) Recommendation 15 (CSM-IV),

(3) Recommendation 34 (CSM-IV),

CONSIDERING

(1) That the full implementation of the decisions of CSM-IV would result in a considerable increase of traffic on hemisphere and regional exchange systems and that some parts of the present meteorological telecommunication system cannot contain such an increase,

(2) That the increase of traffic, without an increase of the capacity of the channels used, would result in further delays in the receipt of meteorological data at the centres needing them,

(3) That there is an urgent need to implement new code forms, better suited for automatic processing,

(4) That there is a meteorological requirement to receive, on a global basis, meteorological information from an increased number of isobaric surfaces,

(5) That reports from a network denser than now used of surface and upper-air stations are required for the construction of hemisphere maps,

(6) That the orderly implementation of the recommendation listed in "Noting" (1), (2) and (3) will depend on the improvement of the hemisphere and regional telecommunication system,

(7) That improvements in the telecommunication systems are being planned,

RECOMMENDS

(1) That the decisions on codes and telecommunications listed under "Noting" (1), (2) and (3) above should be implemented in accordance with the following order of priority and under the conditions set forth below:

(a) Inclusion of southern hemisphere data as soon as possible;

(b) Inclusion of a limited number of additional upper-air reports from

stations listed in the annex to Recommendation 34 (CSM-IV)* and from newly-established upper-air stations in sparse data areas, particularly from central Asia, including Mongolia, the Arabian Peninsula, Central and South America, Africa, as well as a sufficient number of coded aircraft reports (CODAR);

(c) Implementation, as soon as practicable, of additional isobaric surfaces in Part A of upper-air reports after ensuring one year's advance notification to Members;

(d) Full implementation of the annex to Recommendation 34 (CSM-IV)* --list of stations, for which reports are to be included in the northern hemisphere exchanges as soon as loading of the telecommunication system permits;

(2) That the implementation of Recommends (1) (a)- (d) should not result in delays in excess of 6 hours in the reception of surface and upper-air data required for the construction of hemisphere charts;

INVITES Regional Associations and Members responsible for the operations of Hemisphere Exchange Centres:

(1) To inform the Secretary-General, not later than 1 November 1966, of the results of their studies on possible implementation dates of RECOMMENDS (1) (b), (c) and (d);

(2) To keep under continuous review the requirement for increased volume of meteorological traffic arising from RECOMMENDS (a) - (d) and to inform the Secretary-General as soon as any portion of this increase can be undertaken;

REQUESTS the president of CSM, in consultation with the Secretary-General, to co-ordinate the implementation of the recommendation.

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* See Annex XXX.

Rec. 48 (CSM-IV) - PARTICIPATION OF THE COMMISSION IN A JOINT CAe/CSM WORKING GROUP ON NUMERICAL WEATHER PREDICTION

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Resolution 2 (CAe-IV),

(2) General Regulations 34 and 35,

(3) Paragraph (h) of the terms of reference of CSM,

CONSIDERING the importance to CSM of having a current review of and of formulating requirements in regard to the operational aspects of numerical weather prediction,

RECOMMENDS

(1) That a joint Working Group on Numerical Weather Prediction be established between CAe and CSM;

(2) That the terms of reference of the joint working group shall include those given to the CAe Working Group on Numerical Weather Prediction and that the following items be added to the list:

"(f) To formulate requirements regarding:

(i) The use of codes, telecommunications and telecommunications procedures for numerical prediction purposes;

(ii) The acceptable time delays for reception of the various categories of information used for numerical prediction purposes;

(iii) Forms of presentation of output data suitable for use by forecasters on duty;

"(g) To keep the president of CSM informed of important developments regarding (f) above and to present a final report on (f) above not later than 1 January 1969."

(3) That the members of the joint working group be the same as nominated by CAe;

(4) That CAe be designated the constituent body to which the joint working group shall report;

(5) That the joint working group shall serve until the fifth session of CSM.

Rec. 49 (CSM-IV) - PRESSURE REDUCTION METHODS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Paragraph 18 of the general summary of the Abridged Final Report of CAe-IV,

(2) Comments from Members on WMO Technical Note No. 61,

CONSIDERING

(1) That not all methods of reducing pressure to sea-level now in use allow for the recomputation of station pressure from the information contained in the SYNOP report or available in WMO publications,

(2) That the different methods in use for reducing pressure through a layer equal to or less than 500 m do not present any significant difficulties for numerical weather prediction,

(3) That the requirements of numerical weather prediction will be largely met if stations reducing pressure through layers greater than 500 m could utilize pressure reduction methods which do not include other parameters than those currently reported in the SYNOP code,

(4) That meeting the new requirement directly by adding a new group to all of the synoptic reports may be impracticable from a data exchange viewpoint,

RECOMMENDS

(1) That as soon as a coding procedure be developed and implemented the value of the pressure at station level be added to SYNOP reports from stations except under the following two conditions:

(a) Stations within 500 m of the level to which the pressure is reduced -- regardless of methods of reduction;

(b) Stations that use reduction methods which permit the computation of station pressure from the actual SYNOP report and information in WMO publications -- regardless of their elevation;

(2) That Members concerned should endeavour to develop and introduce pressure reduction methods which do not require other parameters than those reported in the actual SYNOP report and other information available in WMO publications from all stations that reduce the pressure through a layer of more than 500 m;

(3) That Members make further studies of pressure reduction methods which would facilitate introduction of a world-wide standard method that would meet requirements of synoptic meteorology including numerical weather prediction;

REQUESTS the Secretary-General to obtain from Members complete mathematical descriptions of pressure reduction methods now being applied and to advise Members of this information in a suitable publication.

Rec. 50 (CSM-IV) - DEFINITION AND REPORTING OF VISIBILITY

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING Resolution 16 (EC-XVI) and in particular the action suggested with respect to Recommendations 5/8 and 5/9 of the MET/OPS/CAeM-III session,

CONSIDERING the views expressed by the presidents of CAeM, CIMO and CSM in this connexion,

RECOMMENDS

(1) The adoption of the following explanation, in broad practical terms of the concept of "visibility":

> Visibility is a measure of the transparency of the atmosphere in the meteorological conditions prevailing at the place and time of observation. In practice, it is expressed as the greatest distance at which, in the judgement of the observer, a prominent object on the Earth's surface could be seen and recognized.
>
> N O T E : Visibility indicates how far the observer, standing outdoors on the Earth's surface and looking in a particular horizontal direction, could see clearly in the following conditions: day-time lighting and extensive unobstructed surroundings in all directions.
>
> By night, and at stations in obstructed surroundings, the observer assesses, in the light of his training and experience, how far he would be able to see clearly if the conditions specified above existed.

He may make use of instrumental and other aids to assist him in his judgement.

(2) That the Secretary-General should invite ICAO to consider for purposes of clarity:

(a) The discontinuation of the use of the term "ground visibility";

(b) The use of the unqualified word "visibility" where, and only where, the observation refers to ground level;

(c) The use of terms such as "visibility at control tower level", "visibility at a height of ... metres", etc., where the observation does not refer to ground level;

REQUESTS the Secretary-General to bring this recommendation to the attention of the presidents of CIMO and CAeM and to ICAO for consideration.

Rec. 51 (CSM-IV) - THE USE OF THE TERM "GREENWICH MEAN TIME (GMT)" AS A SYNONYM FOR UNIVERSAL TIME (UT) OR GREENWICH CIVIL TIME (GCT)

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) The decision of Fourth Congress in paragraph 5.4.7 of the general summary of its Abridged Report,

(2) The information received from Members in response to an inquiry on the use of the term GMT, UT and GCT,

(3) That no Member supported the use of the term GCT,

(4) That a majority of Members expressed the opinion that the term GMT can be used as a synonym for the term UT,

(5) That the term GMT is used by ICAO and by ITU and that ICAO has confirmed that the term GMT is adequate and satisfactory for use in international civil aviation and that no change in ICAO usage is desirable,

CONSIDERING

(1) That a change to the term UT would involve a change of the WMO Technical Regulations and consequently in PANS-MET,

(2) That an inclusion of an explanation of the use of the term GMT in the WMO Technical Regulations will avoid possible confusion,

RECOMMENDS

(1) That the term Greenwich Mean Time (GMT) be retained in the WMO Technical Regulations and

(2) That an explanation that the term GMT is used in the WMO Technical Regulations synonymously with the term UT be included in an appropriate place in these Regulations.

Rec. 52 (CSM-IV) - INCLUSION OF THE TERM "CONVERGENCE LINE" IN VOLUME I OF THE TECHNICAL REGULATIONS

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING

(1) Recommendation 8/5 (MET/OPS/CAeM-III),

(2) Resolution 16 (EC-XVI),

CONSIDERING that there is a general need for the use of an analytical symbol for convergence line in synoptic meteorology;

RECOMMENDS that the nomenclature and symbol given in Technical Regulation /12.3/ 2.4.2 be also included in Technical Regulations, Volume I, Appendix E.

Rec. 53 (CSM-IV) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON THE 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 that the following Executive Committee resolutions be no longer considered necessary: Resolutions 14 (EC-XIII), 33, 34, 37 and 38 (EC-XIV) and 20 (EC-XVI).

ANNEX I

Annex to paragraph 5.2.2 of the General Summary

LIST OF PHENOMENA TO BE STUDIED FOR THE REPORTING OF BOTH PRESENT AND PAST WEATHER FOR THE INTERNATIONAL EXCHANGE OF METEOROLOGICAL DATA TYPE III

Phenomenon	Supplementary information
Drizzle	
Rain	
Snow	
Shower(s)	No distinction between rain showers and snow showers was found necessary
Thunderstorm	
Blowing dust or blowing sand	
Sandstorm or duststorm	
Blowing snow	
Severe squalls	Severe squall(s) should be reported when the following conditions are observed: A 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 a distance should be reported only when there is a certainty that squalls are of an exceptional character

ANNEX II

Annex to paragraph 5.2.3.2 of the General Summary

LIST OF PHENOMENA TO BE STUDIED FOR THE REPORTING OF BOTH PRESENT AND PAST WEATHER FOR INTERNATIONAL EXCHANGE OF METEOROLOGICAL DATA TYPE II

Phenomenon	Supplementary information
Widespread dust in suspension in the air not raised by wind at or near the station.	
Well-developed dust whirl(s) or sand whirl(s) at or near the station	
Blowing dust or blowing sand at or near the station	
Slight or moderate duststorm or sandstorm	Two intensity ranges were found satisfactory
Severe duststorm or sandstorm	
Duststorm or sandstorm within sight but not at the station	
Lightning visible, no thunder heard	
Precipitation within sight, reaching or not reaching the surface, slight or moderate	
Precipitation within sight, reaching or not reaching the surface, heavy	
Thunderstorm but no precipitation at the station	This description refers to the case of no precipitation occurring at all and to the case when there is no precipitation falling at the station
Severe squall(s)	Severe squall(s) should be reported when the following conditions are observed: A 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

Phenomenon	Supplementary information
Waterspout not associated with cloud at or near the station	
Funnel cloud(s) at or within sight of the station	
Heavy drifting snow	The intensity ranges were considered as satisfactory
Slight or moderate blowing snow	
Heavy blowing snow	
Fog or ice fog at a distance or in patches	All fogs or ice fogs are to be reported whether shallow or deep
Fog or ice fog at the station	
Fog or ice fog depositing rime	
Fog with drizzle or rain	
Fog with snow	
Drizzle, not freezing	NOTE: When precipitation exceeds 1 mm per hour, there is a strong presumption that the precipitation is rain
(i) Intensity ranges one and two (trace to 0.5 mm per hour)	
(ii) Intensity range three (more than 0.5 mm per hr)	
Drizzle, freezing	A limited number of intensity ranges for reporting precipitation was found satisfactory for Type II data. These intensity ranges were established by grouping the ranges specified in Annex II of the Final Report of CSM-III
(i) Intensity ranges one and two (trace to 0.5 mm per hour of equivalent drizzle)	
(ii) Intensity range three (more than 0.5 mm per hour of equivalent drizzle)	
Rain, not freezing	
(i) Intensity range one (trace to 1 mm per hour)	
(ii) Intensity range two (more than 1 mm per hour to 5 mm per hour)	
(iii) Intensity range three (more than 5 mm per hour to 25 mm per hour)	
(iv) Intensity ranges four and five (more than 25 mm per hour)	
Rain, freezing	
(i) Intensity range one (trace to 1 mm per hour of equivalent rain)	
(ii) Intensity ranges two, three four and five (more than 1 mm per hour of equivalent rain)	

Phenomenon	Supplementary information
Fall of snow flakes	
(i) Intensity range one (trace to 0.5 mm per hour of equivalent rain)	
(ii) Intensity range two (more than 0.5 mm per hour to 5 mm per hour of equivalent rain)	
(iii) Intensity ranges three and four (more than 5 mm per hour of equivalent rain)	
Rain or drizzle and snow mixed	No numbers for intensity ranges have yet been specified
(i) Intensity range ... (trace to 1 mm per hour of equivalent rain)	
(ii) Intensity range ... (more than 1 mm per hour to 5 mm per hour of equivalent rain)	
(iii) Intensity range ... (more than 5 mm per hour of equivalent rain)	
Ice prisms or isolated starlike snow crystals (with or without fog)	
Snow grains (with or without fog)	
Ice pellets, type (a)	
Rain showers	
Intensity range one (trace to 1 mm per hour)	
Intensity range two (more than 1 mm per hour to 5 mm per hour)	
Intensity range three (more than 5 mm per hour to 25 mm per hour)	
Intensity ranges four and five (more than 25 mm per hour)	
Showers of rain and snow mixed	
Intensity range ... (trace to 1 mm per hour of equivalent rain)	
Intensity range ... (more than 1 mm per hour to 5 mm per hour of equivalent rain)	No numbers for intensity ranges have yet been specified
Intensity range ... (more than 5 mm per hour of equivalent rain)	
Snow showers	
Intensity range one (trace to 0.5 mm per hour of equivalent rain)	
Intensity range two (more than 0.5 mm per hour to 5 mm per hour of equivalent rain)	
Intensity ranges three and four (more than 5 mm per hour of equivalent rain)	

Phenomenon	Supplementary information
Shower(s) of snow pellets or of ice pellets, type (b), with or without rain or rain and snow mixed	
Intensity range ... (trace to 5 mm per hour of equivalent rain)	No numbers for intensity ranges have yet been specified
Intensity range ... (more than 5 mm per hour of equivalent rain)	
Showers of hail,* with or without rain or rain and snow mixed, not associated with thunder	
Intensity range ... (trace to 5 mm per hour of equivalent rain)	No numbers for intensity ranges have yet been specified. Indication of the size of hail, as specified under Thunderstorm paragraph (iii) below, is also required
Intensity range ... (more than 5 mm per hour of equivalent rain)	
Thunderstorm	
(i) Intensity of electrical phenomena -not very violent -very violent	It was felt that three different characteristics of thunderstorms should be described, i.e. intensity of electrical phenomena, intensity of precipitation other than hail and intensity of hail, when hail is observed. By intensity of electrical phenomena, the Commission had in mind a combination of severity and frequency of electrical discharges
(ii) Intensity of precipitation -four categories as for rain showers (see above)	It was agreed to use only 2 ranges for describing intensity of electrical phenomena, in the absence of adequate methods of judging the intensity, to use the same number of categories for precipitation as for rain showers and 2 ranges (depending on size) for the hail
(iii) Indication whether with hail* or without hail*, but with rain or snow, and when with hail*, then indication whether -Hail* of mean diameter to less than or equal to 1 cm -Hail* of mean diameter above 1 cm	
Thunderstorm combined with duststorm or sandstorm with or without precipitation	
(i) Intensity categories for electrical phenomena: One: other than very violent Two: very violent	
(ii) Intensity categories for sandstorm or duststorm: One: slight or moderate two: severe	

* Hail, ice pellets type (b), snow pellets

Phenomenon	Supplementary information
Severe squall(s) during a thunderstorm	Provision is to be made for reporting both the severe squall and the thunderstorm. (For the definition of severe squalls, see "Severe squalls" above)
Thunderstorm with fog	If a thunderstorm occurs with fog, provision should be made for reporting both phenomena
Shower(s) within sight but not at the station Intensity categories: One: slight or moderate Two: heavy	
Blowing spray	See CMM-IV, Abridged Final Report, Annex III, Part B

N O T E : Provision should be made for reporting intermittent character of precipitation when observed.

ANNEX III

Annex to paragraph 5.2.4 of the General Summary

LIST OF PHENOMENA WHICH, TOGETHER WITH THOSE PROPOSED FOR TYPE II DATA, ARE TO BE STUDIED FOR THE PURPOSE OF REPORTING BOTH PRESENT AND PAST WEATHER FOR THE INTERNATIONAL EXCHANGE OF METEOROLOGICAL DATA TYPE I

Parameter	Remarks
Visibility reduced by smoke	
Mist	
Drifting snow, light or moderate	
Showers	For past weather only
Thunderstorm and fog, no precipitation	
Very slight precipitation	For Type I it is required to distinguish between very slight precipitation (few drops of rain or few snow flakes) and rain or snow of intensity range one, as specified in Annex II to the Abridged Final Report of CSM-III
Sandstorm associated with precipitation	
Drifting sand	
Radar observations	

ANNEX IV

Annex to paragraph 5.3.1 of the General Summary

PROVISIONAL LIST OF REQUIREMENTS FOR THE REPORTING OF TYPE II AND TYPE III SURFACE DATA OTHER THAN PRESENT AND PAST WEATHER

Parameter	Resolution required for Type II data	Resolution required for Type III data	Supplementary information
1. Surface wind			
Wind direction	10°	10°	
Wind speed	1 m/s	1 m/s	
Structure of wind	Unusually gusty	-	Criteria for "unusually gusty" are required to be developed.
Speed of maximum wind observed during period covered by W	1 m/s	-	This parameter should be reported if wind speed equals or exceeds 16 m/s over a 10-minute period
Windshift during period covered by W		-	Required from oceanic areas including island stations only. Reporting criteria: sudden 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 when a change in wind speed of 8 m/s or more occurs in a period less than 30 minutes
Time at which the change occurred	1 hour		
The mean wind direction before and after the change	10°		
The mean wind speed before and after the change	1 m/s		
2. Horizontal visibility	Resolution as in code 4300	Resolution as in code 4300	

Parameter	Resolution required for Type II data	Resolution required for Type III data	Supplementary information
3. Pressure			
Pressure reduced to mean sea-level	1/2 mb*	1 mb	
Geopotential of the isobaric surface 850 or 700 mb for stations which cannot report MSL with reasonable accuracy	1 gpm		
Station pressure level		1 mb	Required for numerical weather prediction purposes if it is not possible to recover this value from the report
Indication of hundreds figure 0 or 9	Required for computers	Required for computers	
Pressure tendency (3 hours) characteristics	Code table 0200 with the indication whether positive or negative	Indication whether positive or negative only	Required for automatic weather stations
Pressure tendency (3 hours) amount	0.1 mb if pp $\leqslant$ 5 mb 1 mb if pp $>$ 5 mb	0.1 mb if pp $\leqslant$ 5 mb 1 mb if pp $>$ 5 mb	
24 hours pressure tendency			This is required for tropical areas only but not from moving stations
Pressure tendency characteristics	Indication whether positive or negative only	-	
Pressure tendency amount	0.1 mb if pp $\leqslant$ 5 mb 1 mb if pp $>$ 5 mb		
4. Temperature			
Air temperature	1°C	1°C	It is noted that on occasions of high humidity the reporting resolution would depend on the ways in which humidity is reported

* Resolution of 0.1 mb is required for tropical areas

Parameter	Resolution required for Type II data	Resolution required for Type III data	Supplementary information
4. Temperature (cont'd)			
Difference between air-temperature and sea-surface temperature	0.1°C	0.1°C	
Sea surface temperature	0.1°C	0.1°C	Required by CMM-IV
Maximum day-time and minimum night-time temperature	1°C	1°C	The instruction relating to the time of reporting of these data should be developed
Changes in temperature	1°C	-	Only those changes of temperature which are equal to or more than 5°C in a 30-min past weather period are to be reported. These data are mainly required from oceans or other areas with widely separated stations
5. Humidity			
Dew-point temperature	1°C	1°C	In the conditions when the difference between air temperature and dew-point temperature is small, provision should be made for fine resolution of this difference for Type II data
6. Cloud			
C_L clouds of the general Sc, St, Cu and Cb			
(i) Genus of cloud	As in Code 0513	As in Code 0513	A broad study of the problem of reporting of cloud is required
(ii) Amount of cloud	1 okta*	1 okta*	
(iii) Height of base of lowest cloud	As in Code 1600	As in Code 1600	
C_M clouds of the general Ac, As,Nb			
(i) Genus of cloud	As in Code 0515	As in Code 0515	

* or, if tenths of sky were being used, 1/10

Parameter	Resolution required for Type II data	Resolution required for Type III data	Supplementary information
6. Cloud (cont'd)			
(ii) Amount of cloud if no C_L cloud present	1 okta*	1 okta*	
(iii) Height of cloud base if no C_L cloud and height of C_M cloud is below 2500 m	One figure code to 2500 m	One figure code to 2500 m	
C_H clouds of the general Ci, Cc, Cs			
(i) Genus of cloud	As in Code 0509	As in Code 0509	
Total amount of cloud	1 okta*	1 okta*	
Indication that all or part of clouds are persistent condensation trails	Required	Required	
Azimuth and elevation of certain cloud phenomena	Required for tropical areas		
7. Ground phenomena			
Snow and ice cover	To the nearest quarter of the ground	To the nearest quarter of the ground	Reporting frequency required: once per day
8. Sea phenomena			
Sea and swell waves			
Direction	10°	10°	
Period	Intervals of one second of a scale ranging from 0 to above 20 seconds	Intervals of one second of a scale ranging from 0 to above 20 seconds	

* or, if tenths of sky were being used, 1/10

ANNEX IV

Parameter	Resolution required for Type II data	Resolution required for Type III data	Supplementary information
8. Sea phenomena (cont'd)			
Height	Intervals of 1/2 metre of a scale ranging from 0 to above 20 metres	Intervals of 1/2 metre of a scale ranging from 0 to above 20 metres	
Sea ice	Required	Required	
Ice accretion on ships	Required	Required	
9. Amount of precipitation	As in Code 3577	As in Code 3577	Six-hour reporting frequency is required

ANNEX V

Annex to paragraph 5.3.3 of the General Summary

PROVISIONAL LIST OF REQUIREMENTS TO BE ADDED TO THOSE FOR TYPE II DATA (SEE ANNEX IV) FOR THE REPORTING OF TYPE I SURFACE DATA OTHER THAN PRESENT AND PAST WEATHER

Parameter	Resolution	Remark
Air temperature	0.1°C	
Dew-point temperature	0.1°C	
Ground grass minimum temperature or		
Soil surface minimum temperature or	0.1°C	CAgM requirement
Concrete surface minimum temperature		
Relative humidity	1%	CAgM requirement
Pressure	0.1 mb	
Visibility	As in Code 4377	
Cloud	Greater precision and more detailed data should be reported	Finer resolution may be required when visibility is below 200 metres
Azimuth and elevation of certain cloud phenomena		
Ground phenomena	More details such as whether the ground is wet or dry, depth of snow, etc.	
Amount of precipitation	Same accuracy as for Type II but with the reporting frequency 3 hours	

ANNEX VI

Annex to paragraph 5.4.1.1.3 of the General Summary

BROAD OUTLINE OF A POSSIBLE NEW REPORTING METHOD FOR UPPER-AIR PRESSURE, TEMPERATURE, HUMIDITY AND WIND DATA

1. Under this method, the contents of upper-air pressure, temperature, humidity and wind reports would be as follows:

(a) Data for significant levels with respect to temperature, humidity and wind;

(b) Data for a selection of specified levels (possibly standard levels) which should be decided upon by multilateral or regional agreements;

(c) Sufficient additional data to provide for error detection and correction procedures.

2. The aim would be that data (a) and (c) be recognized as Type III data.* It should, however, be noted that the change from the present reporting concept to this new one might be sufficiently disrupting to make it necessary to transmit internationally data under (a), (b) and (c) for a period of time. After that, only data under (a) and (c) would be exchanged internationally.

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* See definition in Annex XIV, Part C.

ANNEX VII

Annex to paragraph 5.4.1.5 of the General Summary

CRITERIA FOR THE DETERMINATION OF SIGNIFICANT LEVELS FOR THE WIND

1. Criteria should be based on the following principle:

The significant levels with respect to wind shall be determined in such a way as to ensure that a wind hodograph could be reproduced with sufficient accuracy.

2. For practical use the above-mentioned principle can be translated into the following:

The significant levels with respect to wind shall be determined in such a way as to ensure that:

(a) The direction and speed curves (in function of the log of pressure or altitude) can be reproduced with their prominent characteristics ;

(b) These curves can be reproduced with an accuracy of at least 10° for direction and 5 m/sec for speed;

(c) The number of significant levels be kept strictly to a necessary minimum.

3. To satisfy these requirements, the following method of successive approximations is recommended, but other methods of attaining equivalent results may suit some national practices better and may be used:

(a) The surface level and the highest level attained by the sounding constitute the first and the last significant levels;

(b) The deviation from the linearly interpolated values between these two levels is then considered.

If no direction deviates by more than 10° and no speed by more than 5 m/s, no other significant level need be reported.

Whenever one parameter deviates by more than the limit specified in paragraph 2.(b), the level of greatest deviation becomes a supplementary significant level for both parameters. Whenever possible, the level of greatest deviation shall always be taken amongst the extremes of the curves.

NOTE: An extreme is to be understood as a point where the vertical gradient of the parameter changes its sign.

(c) The additional significant levels so introduced divide the sounding into several layers. In each separate layer, the deviations from the linearly interpolated values between the base and the top are then considered.

The process used in paragraph (b) above is repeated and yields other significant levels:

(d) These additional levels in turn modify the layer distribution, and the method is applied again until any level is approximated to the above-mentioned specified values.

4. For the purpose of computational work, one should note that the coded values of a wind sounding present two different resolutions:

(a) Winds at significant levels are reported to the resolution of 5° in direction and 1 m/sec^{-1} in speed;

(b) Any interpolated wind at a level between two significant levels is implicitly reported to the resolution of ± 10° in direction and ± 5 m/s in speed.

ANNEX VIII

Annex to paragraph 5.4.1.6 of the General Summary

CRITERIA FOR DETERMINING THE MAXIMUM WIND LEVEL(S)

1. A maximum wind level is a level at which the wind speed is greater than that observed immediately above and below that level.

2. For coding purposes, a maximum wind level:

(a) Is to be determined by consideration of the list of significant levels for wind speed, as obtained by means of the relevant recommended or equivalent national method, and not by consideration of the original wind speed curve;

(b) Shall be situated above the 500 mb isobaric surface and shall correspond to a speed of more than 30 m/s.

3. Whenever more than one maximum wind level exists, the levels shall be selected as follows:

(a) The level of greatest maximum shall first be transmitted;

(b) The other levels shall be classified in descending order of speed, and be transmitted only if their speed exceeds those of the two adjacent minimals by at least 10 m/s;

(c) Furthermore, the highest level attained by the sounding shall be transmitted, provided:

(i) It satisfies the criteria set forth in para. 2(b) above;

(ii) It constitutes the greatest speed of the whole sounding.

ANNEX IX

Annex to paragraph 5.4.1.7 of the General Summary

MINIMUM REQUIREMENTS FOR THE EXCHANGE OF BASIC UPPER-AIR DATA

Part A

Pressure, temperature, humidity and wind reports

1. Required contents of the report

(a) Data for:

Surface level
Isobaric surfaces 1000, 900, 800, 700, 600, 500, 400, 300, 200, 150, 100, 70, 50, 30, 20 and 10 mb

Tropopause level(s)

Maximum wind level(s)

(b) Data for:

Significant levels with respect to temperature and humidity

Significant levels with respect to wind

Isobaric surfaces 850 and 250 mb

Cloud observations at the time of observation

NOTES: For the present:

Data (a) are required for Type III
Data (a) and (b) are required for Type II

2. Required meteorological parameters and their resolution

(i) Surface level

Isobaric surfaces 1000, 900, 800, 700, 600, 500, 400, 300, 200, 150, 100, 70, 50, 30, 20, 10 mb, and 850 and 250 mb

Parameter	Resolution
Surface pressure	1 mb
Geopotential	1 geopotential metre up to but not including 500 mb 1 geopotential decameter at 500 mb and above
Air temperature	1°C

Parameter	Resolution
Dew-point depression	0.1°C if DD < 5°C 1°C if DD ≥ 5°C
Wind direction	5°
Wind speed	1 m/s

(ii) Tropopause level

Parameter	Resolution
Pressure	1 mb
Temperature	1°C
Dew-point depression	0.1°C if DD < 5°C 1°C if DD ≥ 5°C
Wind direction	5°
Wind speed	1 m/s

(iii) Maximum wind level

Parameter	Resolution
Pressure	1 mb
Wind direction	5°
Wind speed	1 m/s
Indication whether maximum wind occurs at the end of the sounding	

N O T E : For criteria for determining the maximum wind level, see Annex VIII.

(iv) Significant levels with respect to temperature, humidity and wind

Parameter	Resolution
Pressure	1 mb
Air temperature	0.5°C
Dew-point depression	0.1°C if DD < 5°C 1°C if DD ≥ 5°C
Wind direction	5°
Wind speed	1 m/s

NOTES:(1) Both air temperature and the value of humidity parameter are required for each of the significant levels relating to either of these two parameters. For such significant levels, wind data are not required.

(2) There is no requirement for reporting air temperature and humidity for significant levels relating to wind data.

(3) The criteria now in use for determining the significant levels relating to temperature and/or humidity adequately reflect the requirements in this field.

(4) Criteria for determining significant levels with respect to wind are given in Annex VII.

(v) Cloud observations at the time of observation

Parameter	Specification
Genera C_L, C_M, C_H	as in Codes 0513, 0515, 0509 respectively
Height of the base of the lowest cloud seen	as in Code 1600
Amount of the C_L cloud(s) present, and if no C_L cloud is present, amount of C_M cloud(s)	as in Code 2700

*

* *

Part B

Upper-wind reports

1. Required contents of the report

(a) Data for the following isobaric surfaces:
900, 800, 700, 600, 500, 400, 300, 200, 150, 100, 70, 50, 30, 20 and 10 mb

(b) Data for significant levels and regionally fixed levels
Data for 850 and 250 mb isobaric surfaces

NOTES: (1) For the present:

Data (a) are required for Type III data
Data (a) and (b) are required for Type II

(2) When pressure measurements are not available, data at altitudes constituting the best approximations to the isobaric surfaces determined regionally should be reported.

(3) Fixed levels referred to in paragraph (b) and the inclusion of 850 and 250 mb isobaric surfaces should be decided regionally.

(4) The reporting of either significant levels or both significant and fixed levels as well as the inclusion of 850 and 250 mb isobaric surfaces should be decided regionally.

2. Required meteorological parameters and their resolution

(1) Isobaric surfaces

900, 800, 700, 600, 500, 400, 300, 200, 150, 100, 70, 50, 30, 20 and 10 mb and 850 and 250 mb.

Parameter	Resolution
Wind direction	5°
Wind speed	1 m/s

(ii) Maximum wind level

Parameter	Resolution
Pressure or	1 mb
Geopotential height	1 geopotential decameter
Wind direction	5°
Wind speed	1 m/s
Indication whether maximum wind occurs at the end of the sounding	

N O T E : Geopotential heights are required only when pressure measurements are not available.

(iii) Significant levels and regionally fixed levels (Type II data)

Parameter	Resolution
Wind direction	5°
Wind speed	1 m/s
Pressure or	1 mb
Geopotential height	1 geopotential decameter

N O T E S : (1) See note under paragraph (ii) above
(2) See Part A of this annex, paragraph 2 (iv), Note (4).

ANNEX X

Annex to paragraph 5.4.3 of the General Summary

REQUIREMENTS FOR AIRCRAFT OBSERVATIONAL DATA*

	Parameter	Resolution for	
		Type II data	Type III data
1.	Message identifier	Message identifier letters M_iM_i	Message identifier letters M_iM_i
2.	Time of observation	Quarter of an hour	Quarter of an hour
3.	Latitude and longitude of aircraft position	0.1°	0.1°
4.	Altitude of aircraft	1 mb	1 mb
5.	Wind data		
	Speed	1 m/s	1 m/s
	Direction	5°	5°
	Type of wind (spot wind or mean wind)	Required	Required
	Position to which wind data refer**	0.1°	0.1°

N O T E S: (1) There is a strong preference for spot winds.
(2) There is a requirement for keeping the distance over which mean wind is computed to less than 2.5° of latitude.

6.	Temperature	1°C	1°C
7.	D-value	1 geopotential decameter	1 geopotential decameter
8.	Turbulence		
	Indication whether turbulence observed is:		
	High level	required	required
	Low level	required	not required
	Height at which high-level turbulence is observed	1 geopotential decameter	1 geopotential decameter
	Intensity of high-level turbulence	Moderate or severe	Moderate or severe

* N O T E : The requirements for the reporting of meteorological reconnaissance flight observations are not included herewith.

** Position of the mid-point of the sector over which the mean wind was calculated; or in the case of spot wind, position of the observation if it differs from that reported under paragraph 3 above.

Parameter	Resolution for	
	Type II data	Type III data
Height at which low-level turbulence is observed	1 geopotential decameter	not required
Intensity of low-level turbulence	Moderate or severe	not required
9. Aircraft icing		
Intensity of icing	Moderate or severe	not required
10. Weather	Reports of all weather phenomena received from aircraft, such as: rain, snow, freezing rain, waterspout, tornado, thunderstorm, etc.	not required
11. Cloud		
Genera	As in Code 0500	not required
Amount	In the following terms: scattered cloud (clear interval predominant), broken cloud (cloud masses predominant) continuous cloud	not required
Height of base	Code 1577	not required

ANNEX XI

Annex to paragraph 5.5 of the General Summary

REQUIREMENTS FOR NON-METEOROLOGICAL PARAMETERS CONTAINED IN MESSAGES

1. Message identification

(i) To distinguish between the various upper-air reports, the message identifier letters should be included in each message. These letters would also identify the beginning of the message.

(ii) The indicator letter M_iM_i should always be used as a two-letter group followed by one space for easy recognition.

2. Localization of observations in space

(i) Land meteorological stations and lightships using land code forms shall be identified and their position determined by means of the WMO index number system. The position group should always consist of the block number and station index number.

(ii) The position of ship stations shall be reported by means of geographical co-ordinates (resolution of 0.1° in latitude, 0.1° in longitude).

3. Position checks

(i) Upper-air messages

Checks on positions of sea stations are required.

(ii) Surface messages

Checks on positions of sea stations by means of a position verifying group are not required for surface data since the mandatory inclusion of call-signs of ships in the message would, in a great number of cases, provide a certain possibility of checking the position by referring to the location of previous observations.

4. Ship's movement data

The inclusion, in surface reports from sea stations, of data enabling the recipient to calculate the position of the station three hours before the time of observation is required. These data would permit the estimation of the influence of the pressure field on the reported pressure tendency. The ship's course (true) made good during the three previous hours expressed in tens of degrees and the distance covered during this period in steps of tenths of a degree of latitude (six nautical miles) would constitute an acceptable resolution.

5. Inclusion of 4-letter call signs of ships in meteorological reports from ships

International four-letter call signs of ships are required for checks on the continuity with respect to the position of the ship at successive observations and with respect to weather conditions reported.

6. Localization of observations in time

It is required to indicate the time of observation either in the individual report or at the abbreviated heading of the bulletin.

ANNEX XII

Annex to paragraph 7.3.2 of the General Summary

STATEMENTS OF DELEGATIONS ON IMPROVEMENTS OF THE EXCHANGE OF NORTHERN HEMISPHERE DATA

(i) Statement regarding a plan to upgrade the present direct cable connexion (75 baud) between the NHEC New York and Offenbach

(Submitted by the Delegations of the Federal Republic of Germany and the United States of America)

"The United States of America and the Federal Republic of Germany, in carrying out their responsibilities as hemispheric exchange centres, intend, early in 1967, to upgrade the existing cable circuit New York-Offenbach (now operating with a modulation rate of 75 bauds) to a full duplex telephone-type link (3 Kc/s) between Washington and Offenbach:

(1) To accommodate the transmission of meteorological information in digital and non-digital form,

(2) To provide capability for:

2.1 high-speed transmission (2400 baud) for the exchange of data of the northern and southern hemisphere as well as regional data in alpha-numeric form, and

2.2 the transmission of meteorological information in graphic form.

The upgrading of the circuit between the centres Washington and Offenbach to a telephone-type link will be a significant improvement of the existing WMO hemisphere telecommunications system and constitutes a contribution to the World Weather Watch.

Provision can be made for extension of the channel

(a) to Paris to meet inter-regional exchange requirements and

(b) to other European centres, as required."

(ii) Statement of the Delegation of France

"In connection with the proposed transformation of the existing 75 baud high-speed duplex telephone link between New York and Offenbach, the French delegate recalled the present role of the Paris Centre in exchanges between Region IV and Region VI, using an extension of the 75 baud link between Offenbach and Paris. He noted with interest the possible similar extension of the high-speed telephone circuit and said that such an extension would be considered, in order to enable the Paris Centre to continue to perform its present role in exchanges between Region IV and Region VI."

(iii) Statement regarding planning improvements of the telecommunication circuit Moscow-Cairo

(Submitted by the Delegations of the U.A.R and U.S.S.R)

"The Union of Soviet Socialist Republics and the United Arab Republic, aiming for extension and improving of the existing telecommunication circuit Moscow-Cairo in 1967-1968, have planned to establish at Moscow high-powered short-wave radio-transmitters and appropriate transmitting antenna, to be capable of independent side band (ISB) operation and of point-to-point exchange of meteorological information between the two centres in both coded and pictorial forms.

The implementation of these arrangements will permit to operate two (3Kc/s) duplex radio channels; one of which will be designated for exchanging an increased amount of coded data with a higher transmission speed than that used at present. The other channel will be used for facsimile transmissions.

This plan will promote to a considerable extent the improvement of the Global Telecommunication System to meet the World Weather Watch requirements. It enables Africa to be connected to the WMC situated at Moscow and enables Cairo to meet the future developments of the responsibilities imposed upon her in the framework of the plan of Meteorological Telecommunications in Africa, laid down by the Technical Conference of Meteorological Telecommunications of RA I (Tunis, November 1965).

Furthermore, it should be noted here that the United Arab Republic is planning to establish, in addition to the Cairo-Nairobi circuit, new meteorological telecommunication circuits connecting Cairo to Kano and Algiers. This is mainly to implement the plan laid down by the above-mentioned Tunis Conference."

ANNEX XIII

Annex to paragraph 7.16.3.2 of the General Summary

GUIDE LINES FOR THE CSM WORKING GROUP ON TELECOMMUNICATIONS FOR TEST CHARTS FOR FACSIMILE TRANSMISSION

1. Function of test charts

The test chart is normally intended to facilitate the evaluation of the technical performance of international meteorological facsimile services. This chart should permit examination as described in the ITU publication "Use of the standard test chart for facsimile transmission of the picture received".

2. Services on which test charts will be used

The test charts will be used on all services covered by WMO Standards and also facsimile services not necessarily covered by WMO Standards, but which are operated to the mutual benefit of two or more Members.

3. Persons likely to use the chart

Consideration should be given to the probability that staff other than facsimile specialists will be required to evaluate and comment on the quality of the received charts.

4. Size of basic charts

One dimension of the scanned area of the basic chart will be 45 cm, the other being determined by the working group taking due account of the desirability of reducing testing time. This scanning area shall be surrounded by a blank area sufficiently large to permit mounting the chart in transmitters generally in use by Members.

5. Size of small charts

The working group shall decide the method to be used to provide test charts for facsimile systems using original charts smaller or of a different aspect ratio from that of the basic chart. If other charts are required the study group shall design such charts.

6. Scanning direction

The direction of scan of the basic chart will be along the 45 cm dimension. An indication, such as an arrow, suitably labelled, should be included in the body of all charts to indicate the scanning direction.

7. Chart content contrast

The working group shall decide on the desirability of having both black and white test patterns and grey scale test patterns in the one chart, considering the possibility of confusion arising from the poor reception of grey scales on black-white systems.

8. Inclusion of weather chart

To facilitate evaluation, it is strongly recommended that a portion of a typical weather chart, including plotted characters, should be included.

9. Designation panel

A portion of the chart should allow for the inclusion of the location or call sign of the transmitter and also the location, service and date/time group at the receiving point.

ANNEX XIV

Annex to Resolution 1 (CSM-IV)

WORKING GROUP ON DATA NEEDS AND CODES

Part A

Terms of Reference

1. To develop a concept and principles for use in the determination and evaluation of data needs taking into account the approach developed by the previous Working Group on Codes (see Part C of this annex).

2. To study the implications of the introduction of reporting upper-air data (Plan II) as outlined in Annex VI to this publication.

3. To carry out the studies listed in Part D of this annex and in paragraph 5.3.2 of the general summary.

4. To obtain by means of surveys, requests and studies, listings of data inputs (parameters and precision, time and space resolutions) needed by Members and WWW centres.

5. To evaluate and co-ordinate the statements received from Members, Technical Commissions, Regional Associations and other working groups on needs for data inputs.

6. To review the existing international meteorological codes and to develop new codes or recommend changes to existing codes, as required.

7. To develop by 1 January 1968 a coding procedure for the mandatory reporting of pressure at station level in reports from selected stations (See Rec. 49 (CSM-IV)).

8. To revise the notes in Volume B in accordance with the request of Third Congress (see paragraph 5.8.1.9 of the general summary of the work of Cg-III).

9. To take action on problems assigned to the working group by the President.

Part B

Principles for guidance of the working group in developing meteorological codes*

1. No changes shall be recommended unless they provide substantial advantages which are clearly demonstrated. Severe restriction in the frequency of code changes is necessary in order to minimize the need to re-programme computers and instruct observers.

* These principles are not meant to apply to codes developed jointly with other authorities (e.g. aeronautical codes).

2. The messages should be as compact as possible in order to reduce the time required for their transmission. To aid in this objective the elements should not be reported with a greater precision than is justified by the method of measurement or the requirement. It might be necessary, however, to make provision for a code resolution somewhat finer than the one practically measurable at present with a view to taking into account foreseeable improvements. On the other hand codes should not be made so compact that they give rise to difficulty in extraction of required data or to unduly complex code forms.

3. In the interest of economy, and for greater smoothness in communications, mixed figure and letter code groups should not be used unless there is a very marked advantage in doing so.

4. Groups of more or less than five figures should not be used unless some marked advantage is attained thereby.

5. Due regard shall be given to the needs of synoptic meteorology and of other branches of pure and applied meteorology, including in particular aeronautical, marine and agricultural interests and the needs of automatic data-processing.

6. The code form should be distinctive, enabling recognition of the code type in the case of lost bulletin headings. The use in each report of a unique identifier for the type of report will aid substantially in reaching the objective.

7. It should be possible to obtain an easy and unambiguous identification of the station that took the observation. Furthermore, the station identifier should be complete in itself.

8. Unique, unambiguous code forms and procedures should be developed for international use. Optional parts should be allowed only for the most compelling reasons; should be clearly identifiable and should come as the last part of the message to allow easy deletion when the message is transmitted beyond the area for which the optional parts are required.

9. The order of groups in a report should be arranged, bearing in mind the following:

(i) The requirement of numerical weather prediction and automatic stations for measured observed parameters to appear before visual observations.

(ii) The need for rapid plotting in the approved pattern.

(iii) The need for visual observations to have priority over instrumental observations in certain reports. This applies particularly to ship reports.

10. Uniformity of units is required.

11. Features which enable checking of essential data should be included, such as check information on the location of moving stations. However, check digits which have to be inserted by relatively inexperienced observers should be as simple as possible lest the check information itself prove a source of error and confusion.

12. The principle of the "family" system of code-making should not be carried to the extent of violating the above principles, since the different codes in a family serve a variety of purposes and users with different requirements.

13. Any code names required should be brief, pronounceable and, if possible, self-evident.

ANNEX XIV

Part C

Approach to the problem of the determination of requirements

1. The group considered that meteorological data are required for two major areas:

(i) Basic meteorological problems (movement of major synoptic systems, planetary wave forecasting, etc.);

(ii) Operational meteorological problems (aviation route forecasts, ship routing forecasts, etc.).

The data needed to satisfy requirements in each of these areas differs not only in type of data but also with respect to data resolution.

2. Operational meteorological considerations, for example, may require that detailed data be exchanged over great distances. In view of paragraph (a) of the terms of reference of the Working Group on Codes established by CSM-III, it was felt that in attempting to determine the fundamental data requirements, operational meteorological problems should only be taken into account when there is evidence that a general requirement for obtaining these data on a very large scale exists, and that its exchange would need more than local or multilateral arrangements.

3. With respect to point 1 (i) above, it was considered that the data required to solve a given basic meteorological problem depended, to a large extent, on the nature and scale of the associated meteorological phenomena.

These phenomena may be categorized as follows:

a. Mesoscale (sub-synoptic)

b. Synoptic scale

c. Macroscale.

4. It was decided to use the problems associated with each of these scales to define data requirements. The three following basic data types evolved:

Type I data

Data required to analyse and predict (for periods up to 12 hours) the influence of small-scale phenomena of short duration upon the local area (lieu) being considered.

These phenomena may be tornadoes, squall lines, local effects of synoptic scale systems (frontal passage, height of low clouds, etc.), localized phenomena caused by the influence of natural or man-made features, etc. The area for which Type I data are required would be approximately the size of part of a large country or a group of smaller countries.

Type II data

Data required to analyse and predict the behaviour of synoptic scale systems and to forecast the weather associated with these systems. These data would be used, for example, to identify air masses, to forecast movement of cyclones, anticyclones and short-wave phenomena in the atmosphere.
The area for which Type II data are required would be approximately the size of a WMO Region.

Type III data

Data required to analyse and predict the behaviour of macro-meteorological and synoptic scale systems in the atmosphere. These data would be used, for example, to define general circulation, to forecast large amplitude waves.

The area for which Type III data are required could vary in range from a hemisphere to the entire globe.

5. In general, data requirements should be stated in terms of:

(i) Elements to be reported;

(ii) Reporting resolution;

(iii) Reporting frequency;

(iv) Density of reporting stations.

The survey covers only items (i) and (ii) above, since questions (iii) and (iv) are being dealt with by other constituent bodies of WMO.

6. The main concept of code format that the group had in mind in preparing the survey was that the code form which would have to be developed as a consequence of these studies, should be sub-divided into three parts, each of them containing provision for reporting of data of Types III, II and I respectively.

Remarks

(a) Initial examination of the data requirements in the Type I category indicated that these would be extremely variable and highly dependent upon geographical location. This type of data would normally be exchanged on a local, national or multilateral basis.

Consequently, rather than allow these requirements to cloud the over-all picture, the working group decided to eliminate them from the survey.

(b) Special data required for aviation operations (RVR, runway temperature, detailed visibility reporting) are of the Type I category, even though they may have to be exchanged over long distances. The basic meteorological data required to satisfy general forecasting requirements are considered to be in the Type II or Type III category.

Part D

Specific problems assigned to the Working Group on Data Needs and Codes

1. To study the impact of the increasing availability of satellite data and radar weather information on the present cloud reporting system. To review the present cloud reporting system in the light of this study, taking into account the requirements of the tropical areas for cloud and state of the sky information. (See also paragraphs 5.3.2 (c) and (d) of the general summary).

2. To study the need for reporting of present and past weather as Types I, II and III data. The study should include the requirements for area coverage, duration, intensities and amounts of precipitation, the inclusion of electrical intensities and of hail with thunderstorms.

3. To study the requirements for identification of individual messages, of surface synoptic reports of land stations and sea stations, including the times of observation and ship call signs.

4. To study the list of parameters and resolutions given in Annex IV of this publication and make recommendations on:

(a) The resolution needed for reporting visibility;

(b) The resolution needed for reporting air temperature over land and sea and for air-sea temperature difference;

(c) The need and specifications for the reporting of changes in temperature and windshifts from land and sea stations;

(d) The need and specifications for reporting humidity, taking into account the need expressed by CAgM for a resolution of 1 per cent relative humidity;

(e) The need and specifications for reporting snow and ice cover and state of the ground;

(f) The need and specifications for the reporting of surface wind direction and speed, structure of wind, maximum winds and severe squalls;

(g) Other problems as contained in this abridged Final Report of CSM-IV and in the Final Report of the second session of the Working Group on Codes.

ANNEX XV

Annex to Resolution 9 (CSM-IV)

ADDITIONS AND AMENDMENTS TO THE TECHNICAL REGULATIONS

Chapter 1

Insert the following new definitions:

Automatic synoptic station -- Station at which instruments make and transmit meteorological surface observations at specified times or upon interrogation, the conversion to code form for international exchange being made at an editing station.

Automatic climatological station -- An unattended station which makes and records meteorological surface observations.

Ordinary automatic synoptic station -- An automatic synoptic station fulfilling specified minimum performance characteristics for the world-wide network.

Supplementary automatic synoptic station -- An automatic synoptic station not fulfilling all the minimum performance characteristics specified for the world-wide network.

Chapter 2

Paragraph 2.1.2.1 should read:

Surface synoptic stations

A. Land stations:

(a) Manned stations:
  (i) Principal stations;
  (ii) Supplementary stations.

(b) Automatic stations:
  (i) Ordinary stations;
  (ii) Supplementary stations.

B. Sea stations:

(a) Mobile ship stations:
  (i) Selected ship stations;
  (ii) Supplementary ship stations;
  (iii) Auxiliary ship stations.

(b) Fixed ship stations:
  (i) Lightship stations;
  (ii) Ocean weather stations.

(c) Fixed automatic marine stations:
(i) Ordinary stations;
(ii) Supplementary stations.

(d) Drifting automatic marine stations.

paragraph 2.1.3, after (d) add:

(e) Automatic climatological stations.

new paragraph 2.2.1.9 — Members should establish, either individually or jointly, ordinary automatic marine stations in such ocean areas where there are large gaps in the world network of surface synoptic stations.

new paragraph 2.5.3.3 — Each Member should arrange for its automatic climatological stations to be inspected at sufficiently close intervals to ensure correct functioning of the instruments.

paragraph 2.6.1.1 — Sub-paragraph (a) should read (the addition is underlined):
(a) Name and, where appropriate, station index number (<u>mention if station is automatic</u>);

new paragraph 2.6.1.8 — Each Member concerned should send to the Secretariat not later than 1 March each year a complete list of its automatic marine stations in operation at the beginning of the year, or amendments to the previous list, giving the following information for each station:

(a) Location of fixed station; site of launching and approximate operation area of drifting stations;

(b) Radio call-sign in case station issues reports in international code form;

(c) Name and location of editing station;

(d) Description of the instrumentation including range and accuracy for each element measured;

(e) Schedule of inspection.

new paragraph 2.6.1.9 — Members launching drifting stations should notify other Members concerned within the week after the launching of each station.

<u>Chapter 3</u>

new paragraph 3.1.1.6 — At an ordinary automatic land station, a surface synoptic observation <u>should</u> consist of observations of at least the following elements:

(a) Atmospheric pressure;

(b) Wind direction and speed;

(c) Air temperature;

(d) Precipitation, yes or no (at least in tropical areas).

new paragraph 3.1.1.7 — At an ordinary fixed automatic marine station, a surface synoptic observation <u>should</u> consist of observations of at least the following elements:

(a) Atmospheric pressure;

(b) Wind direction and speed;

(c) Air temperature;

(d) Sea temperature;

(e) Precipitation, yes or no (at least in tropical areas).

new paragraph 3.1.1.8 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) Air temperature;

(d) Sea temperature;

(e) Waves;

(f) Precipitation, yes or no;

(g) Humidity.

NOTE: It must be possible to determine the geographical location of the station.

new paragraph 3.1.2.4 At an automatic climatological station records should be made of elements selected from those in paragraph 3.1.2.1.

new paragraph 3.3.1.8 At ordinary automatic synoptic stations, surface synoptic observations <u>should</u> be made and reported at least at main standard times.

paragraph 3.4.10.1 should read (the addition is underlined):
Sea surface temperature <u>observed at ships</u> should be measured by either the "bucket" method or the condenser intake method.

paragraph 3.4.10.2 should read (the addition is underlined):
The method used <u>at ships</u> for measuring sea surface temperature shall be entered in the relevant meteorological log.

new paragraph 3.5.1.5 At ordinary automatic synoptic stations a means of on-site recording of the observed data should be provided.

<u>Chapter 6</u>

new paragraph 6.2.3 <u>Meteorological reports from automatic stations</u>

6.2.3.1 Messages transmitted by an automatic station for international exchange should be capable of reception at the centre responsible for the collection of synoptic reports in the area.

6.2.3.2 Members should make every effort to inform other interested Members of radio frequencies and code forms used by drifting automatic synoptic stations which may drift beyond the range of the receiving stations of the Member which launched the station.

ANNEX XVI

Annex to Recommendation 8 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

Page I-A-3-32

Amend the sixth line of Note (2) under ww - Present weather - to read:

". . . or (where specifically mentioned in the code) during the period of one hour immediately preceding it. In making the . . . ."

Page I-A-4-66

Add at the end of the specification of code figure 07 the following:

"; or, in the case of ships, blowing spray at the station "

ANNEX XVII

Annex to Recommendation 9 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

Pages I-A-1-5 and I-A-1-27

Amend the groups $(1d_{w}d_{w}P_{w}H_{w}H_{w})$ $(2I_{s}E_{s}E_{s}R_{s})$ to read:

$(1T_{w}T_{w}T_{w}t_{T})$ $(2I_{s}E_{s}E_{s}R_{s})$ $(3P_{w}P_{w}H_{w}H_{w}(d_{w}d_{w}P_{w}H_{w}H_{w}))$

Page I-A-1-21

Amend Note (5) (i) to read:

(i) Coastal stations and light-vessels may add in their report the wave group(s) $(3P_{w}P_{w}H_{w}H_{w}(d_{w}d_{w}P_{w}H_{w}H_{w}))$ in accordance with national or regional instructions. Coastal stations desiring to report "tendency" of the waves replace these wave groups by WATEN $O_{w}P_{w}P_{w}H_{w}H_{w}$.

Page I-A-1-25

Amend Note (7) (ii) and (iii) to read:

(ii) Coastal stations may add in their reports the wave group(s) $3P_{w}P_{w}H_{w}H_{w}$ $(d_{w}d_{w}P_{w}H_{w}H_{w})$ if required.

(iii) Coastal stations desiring to report "tendency" of the waves replace these wave groups by the groups WATEN $O_{w}P_{w}P_{w}H_{w}H_{w}$.

Page I-A-1-28

Insert after Note 7 (iv) the following:

(v) $(1T_{w}T_{w}T_{w}t_{T})$ - This group is optional for merchant ships but mandatory for ocean weather ships.

Amend Note 7 (v) to read:

(vi) $(3P_{w}P_{w}H_{w}H_{w}$ $(d_{w}d_{w}P_{w}H_{w}H_{w}))$ - These groups should be included in the report. They are mandatory for ocean weather stations. The group $3P_{w}P_{w}H_{w}H_{w}$ is to be used to report wind waves. When swell can be distinguished from wind waves the swell should be reported by the group $d_{w}d_{w}P_{w}H_{w}H_{w}$, and this group should be repeated to report a second swell system if such can be distinguished. If there is a swell with no wind waves the first group is to be reported as 3//00.

Renumber (vi) and (vii) as (vii) and (viii) respectively. Delete Note 8 (i) and renumber subsequent paragraphs as (i), (ii) and (iii).

Page I-A-3-12

Under H_w delete FM 11.C, FM 16.A, FM 21.C

Page I-A-3-13

Under H_wH_w add FM 11.C, FM 16.A, FM 21.C

Page I-A-3-21

Amend the specification under P_w to read:

Period of waves (Code 3155)
(FM 11.C, FM 16.A, FM 21.D, FM 51.D, FM 61.D)

(1) Coastal stations equipped with instruments for measuring accurately the period and height of waves, i.e. instruments for recording waves and for harmonic analysis of the records, should send one or more groups of the form $3P_wP_wH_wH_w$ ($d_wd_wP_wH_wH_w$), each group denoting a separate system of waves, distinguished by a significant difference of period.

(2) Coastal stations not equipped with suitable instruments for recording the characteristics of waves, but desiring to report "tendency" in addition, instead of the group(s) $3P_wP_wH_wH_w$ ($d_wd_wP_wH_wH_w$), send the group $0_wP_wP_wH_wH_w$, preceded by the word WATEN.

Page I-A-3-22

Add to the reference under the specification of the synoptic letters P_wP_w the following: FM 11.C, FM 16.A, FM 21.C.

Page I-A-3-29

Insert before $\overline{T_dT_dT_d}$ the following:

$T_wT_wT_w$ Sea surface temperature in tenths of a degree Celsius (FM 21.C). For negative temperatures 500 is added to the absolute value of the temperature in tenths of a degree Celsius. Thus a temperature of $-T_wT_wT_w$ tenths of a degree Celsius is reported by $500 + T_wT_wT_w$

Page I-A-3-30

Insert before t_Rt_R the following:

t_T The tenths figure of the air temperature (FM 21.C)

Page I-A-4-48

Amend Code 3155 to read:

Code 3155

P_w - Period of waves

Code figure	
0	10 seconds
1	11 seconds
2	12 seconds
3	13 seconds
4	14 seconds or more
5	5 seconds or less
6	6 seconds
7	7 seconds
8	8 seconds
9	9 seconds

Page I-A-4-59

Amend Code 4080 ($t_R t_R$ --Duration of precipitation) to read:

Code 4080

$t_R t_R$ -- Observational period for RR and duration of precipitation

Observational period							
6 hours		12 hours		18 hours		24 hours	
Code figure	Total precipitation	Code figure	Total precipitation	Code figure	Total precipitation	Code figure	Total precipitation
00	None	20	None	50	None	70	None
01	Less than 15 min.	21	Less than 15 min.	51	Less than 1 h	71	Less than 1 h
02	15 to 30 min.	22		52	1 to 2 h	72	1 to 2 h
03	30 to 45 min.	23	Same code	53	2 to 3 h	73	2 to 3 h
04	45 min. to 1 h	24	as for	54	3 to 4 h	74	3 to 4 h
05	1 h to 1 h 15	25	6 h		etc.		etc.
	etc.			67	16 to 17 h	87	16 to 17 h
12	2 h 45 to 3 h	32		68	17 to 18 h	88	17 to 18 h
13	3 h to 3 h 30	33		69	Duration not		etc.
14	3 h 30 to 4 h	34	Same code		specified		
	etc.	-	as for			94	23 to 24 h
			6 h				
18	5 h 30 to 6 h	38				99	Duration not specified
19	Duration not specified	41	6 to 7 h				
		42	7 to 8 h				
			etc.				
		49	Duration not specified				

ANNEX XIX

Annex to Recommendation 13 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B
REPORTING OF SHIP'S AVERAGE SPEED

Page I-A-4-62

Amend Code 4451 to read:

v_s - Ship's average speed made good during the three hours preceding the time of observation

Code figure				
0	0	knot	0	kilometre per hour
1	1 - 5	knots	1 - 10	kilometres per hour
2	6 - 10	knots	11 - 19	kilometres per hour
3	11 - 15	knots	20 - 28	kilometres per hour
4	16 - 20	knots	29 - 37	kilometres per hour
5	21 - 25	knots	38 - 47	kilometres per hour
6	26 - 30	knots	48 - 56	kilometres per hour
7	31 - 35	knots	57 - 65	kilometres per hour
8	36 - 40	knots	66 - 75	kilometres per hour
9	Over 40	knots	Over 75	kilometres per hour

ANNEX XX

Annex to Recommendation 14 (CSM-IV)

Part A

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 35.D TEMP - UPPER-LEVEL PRESSURE, TEMPERATURE, HUMIDITY AND WIND REPORT FROM LAND STATION

		Code format		Contents
Part A				Data up to and including 100 mb
	M_iM_i	$YYGGI_d$	IIiii	Identification groups
	$99P_oP_oP_o$	$T_oT_oT_{ao}D_oD_o$	$d_od_of_of_of_o$	Surface data
	$P_1P_1h_1h_1h_1$	$T_1T_1T_{a1}D_1D_1$	$d_1d_1f_1f_1f_1$	Data for standard isobaric surfaces
	. . . . .	. . . . .	. . . . .	
	$P_nP_nh_nh_nh_n$	$T_nT_nT_{an}D_nD_n$	$d_nd_nf_nf_nf_n$	
	$88P_tP_tP_t$	$T_tT_tT_{at}D_tD_t$	$d_td_tf_tf_tf_t$	Tropopause(s) data
	$77)P_mP_mP_m$ $66)$	$d_md_mf_mf_mf_m$	. . . . .	Maximum wind(s) data
Part B				Data up to and including 100 mb (also for regional codes)
	M_iM_i	YYGG/	IIiii	Identification groups
	$n_on_oP_oP_oP_o$	$T_oT_oT_{ao}D_oD_o$		Surface data
	$n_1n_1P_1P_1P_1$	$T_1T_1T_{a1}D_1D_1$		Data for significant level(s) with respect to temperature and/or humidity
	. . . . .	. . . . .		
	$n_nn_nP_nP_nP_n$	$T_nT_nT_{an}D_nD_n$		
21212	$n_on_oP_oP_oP_o$	$d_od_of_of_of_o$		Data for significant level(s) with respect to wind
	$n_1n_1P_1P_1P_1$	$d_1d_1f_1f_1f_1$		
	. . . . .	. . . . .		
	$n_nn_nP_nP_nP_n$	$d_nd_nf_nf_nf_n$		
31313	25hhh	TTT_aDD	ddfff	

Part B (cont'd)	Code format				Contents
41414	$N_hC_LhC_MC_H$				Cloud data
51515	Code groups to be developed regionally				Data in regional code(s)
Part C					Data above 100 mb
	M_1M_1	$YYGGI_d$	IIiii		Identification groups
	$P_1P_1h_1h_1h_1$	$T_1T_1T_{a1}D_1D_1$	$d_1d_1f_1f_1f_1$		Data for standard isobaric surfaces
	. . . . .	. . . . .	. . . . .		
	$P_nP_nh_nh_nh_n$	$T_nT_nT_{an}D_nD_n$	$d_nd_nf_nf_nf_n$		
	$88P_tP_tP_t$	$T_tT_tT_{at}D_tD_t$	$d_td_tf_tf_tf_t$		Tropopause(s) data
	$77)P_mP_mP_m$ 66)	$d_md_mf_mf_mf_m$	. . . . .		Maximum wind(s) data
Part D					Data above 100 mb (also for regional codes)
	M_1M_1	YYGG/	IIiii		Identification groups
	$n_1n_1P_1P_1P_1$	$T_1T_1T_{a1}D_1D_1$			Data for significant level(s) with respect to temperature and/or humidity
	. . . . .	. . . . .			
	$n_nn_nP_nP_nP_n$	$T_nT_nT_{an}D_nD_n$			
21212	$n_1n_1P_1P_1P_1$	$d_1d_1f_1f_1f_1$			Data for significant level(s) with respect to wind
	. . . . .	. . . . .			
	$n_nn_nP_nP_nP_n$	$d_nd_nf_nf_nf_n$			
51515	Code groups to be developed regionally				Data in regional codes

FM 36.D TEMP SHIP - UPPER-LEVEL PRESSURE. TEMPERATURE, HUMIDITY AND WIND REPORT FROM SEA STATION

Part A					
	M_1M_1	$YYGGI_d$	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	$MMMU_{La}U_{Lo}$
	Same contents and format as FM 35.D				
Part B					
	M_1M_1	YYGG/	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	$MMMU_{La}U_{Lo}$
	Same contents and format as FM 35.D				
Part C					
	M_1M_1	$YYGGI_d$	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	$MMMU_{La}U_{Lo}$
	Same contents and format as FM 35.D				

Part D

$M_i M_i$ YYGG/ $99 L_a L_a L_a$ $Q_c L_o L_o L_o L_o$ $MMMU_{La} U_{Lo}$

Same contents and format as FM 35.D

New or amended symbolic letters

I_d - Indicator of the last isobaric surface for which the wind group is included in Part A or in Part C of TEMP and TEMP SHIP reports (Code 1734), (FM 35.D, FM 36.D).

N O T E S :

(1) When wind data are missing for one or more of the isobaric surfaces but are available for other isobaric surfaces below and above, a group (or groups) of solidi shall be included in place of the missing data.

(2) The wind group shall be omitted in the case of those isobaric surfaces above 1000 mb for which no data are available, provided wind data are not available for any still higher surface.

(3) A wind group shall always be included for the surface level and the 1,000 mb level. If no wind data are available for these surfaces, groups of solidi shall be included at the appropriate places.

T_{ao}, T_a, T_{al}

...T_{an}, T_{at} Approximate tenths value and sign (plus or minus) of the air temperature at isobaric surfaces, at significant levels or at tropopause level.

N O T E S : (1) T_a even means temperature positive

T_a odd means temperature negative

(2) Method of coding:

Tenths figure of observed air temperature	T_a code figure	
	Temperature positive	Temperature negative
0) 1)	0	1
2) 3)	2	3
4) 5)	4	5
6) 7)	6	7
8) 9)	8	9

TT, T_oT_o, T_1T_1, ..T_nT_n, T_tT_t = Air temperature in whole degrees Celsius, at isobaric surfaces, at significant levels or at tropopause level.

N O T E : This temperature, measured in degrees and tenths, is not rounded off to the next whole degree; only the whole degrees are indicated by TT, T_oT_o, T_1T_1 .... T_nT_n, T_tT_t. The tenths of this temperature are indicated by means of T_a, T_{ao}, T_{al} ... T_{an}, T_{at}.

D_oD_o)
)
D_1D_1) Dew-point depression at the surface, at the isobaric surfaces, at the significant
) levels and at the tropopause level
. . .) (Code 0 777) (FM 35.D, FM 36.D)
)
D_nD_n) N O T E : When no humidity data are available the corresponding symbols shall be
) replaced by // in the relevant group.
D_tD_t)

d d)
)
d_od_o) Hundreds and tens of degrees of the observed wind direction rounded off to the
) nearest 5°
d_1d_1) N O T E : When encoding, the units figure of the wind direction after it has been
) rounded off as above is added to the hundreds figure of the wind speed.
. . .) Ex. (a) 293° / 162 knots is encoded:
d_nd_n)
)
d_td_t) 295
) + 162
d_md_m) 29662
)

(b) 292° / 162 knots is encoded:

290
+ 162
29162

fff, $f_of_of_o$, $f_1f_1f_1$ ...)
) Wind speed expressed in knots or in knots increased by 500
$f_nf_nf_n$, $f_mf_mf_m$)
) See note under d_od_o, d_1d_1... d_nd_n
$f_tf_tf_t$)

$L_oL_oL_oL_o$ Longitude in tenths of a degree (Figure for hundreds included)

$P_1P_1P_1$)
. . .) Pressure at levels numbered n_1n_1, ..., n_nn_n in whole millibars up to and
$P_nP_nP_n$) including 100 mb and in tenths of millibars above 100 mb (FM 35.D, FM 36.D)

$P_tP_tP_t$ Pressure at the tropopause level in whole millibars when this level occurs up to or at 100 mb level and in tenths of millibars above 100 mb (FM 35.D, FM 36.D)

$P_m P_m P_m$ Pressure at the maximum wind level in whole millibars when this level occurs up to and at 100 mb level and in tenths of millibars above 100 mb (FM 35.D, FM 36.D)

YY Day of month (GMT), as on page I-A-3-35 Volume B, Publication No. 9. Add Note (4): In FM 32.D, 33.D, 35.D, 36.D, 41.D use of YY is made to indicate the unit of wind speed in addition to indicating the day of the month. When wind speeds are given in knots 50 is added to YY. When the speed is given in m/s YY is not modified.

New symbolic groups

88 Indicator for tropopause data (Parts A and C).(FM 35.D, FM 36.D)

77)
66) Indicators for maximum wind data (Parts A and C).(FM 35.D, FM 36.D)

-66 is used when maximum wind data which follow are observed at the top of the sounding and the wind speed at that level is the highest observed throughout the sounding.

21212 Indicator group. Data for significant levels relating to wind (Parts B and D). (FM 35.D, FM 36.D)

31313 Indicator group. Data for 250 mb surface follow (Part B).(FM 35.D, FM 36.D)

41414 Indicator group. Cloud information (Part B). (FM 35.D, FM 36.D)

99 Indicator for recognition of mobile station report (Parts A,B,C and D). (FM 36.D, FM 41.D)

51515 Indicator group. Additional data in regional code follow (Parts B and D).(FM 35.D, FM 36.D)

New or amended code tables

Code 0777

DD -- Dew-point depression

Code figure	Dew-point depression (degrees Celsius)	Code figure	Dew-point depression (degrees Cel.)
00	0.0	48	4.8
01	0.1	49	4.9
02	0.2	50	5
03	0.3	51)	
04	0.4	52)	
05	0.5	53)	Not used
06	0.6	54)	
07	0.7	55)	
08	0.8	56	6
09	0.9	57	7
10	1.0	.	.
11	1.1	70	20
12	1.2	.	.
.	.	.	.
.	.	99	49

Code 1734

I_d -- Indicator of the last isobaric standard surface for which the wind group is included in Part A or in Part C of TEMP and TEMP SHIP reports

Wind group included up to and including the following standard isobaric surfaces:

Code figure	Part A	Part C
1	100 mb	10 mb
2	150 mb	20 mb
3	200 mb	30 mb
4	300 mb	-
5	400 mb	50 mb
6	500 mb	-
7	700 mb	70 mb
8	850 mb	-
9	1000 mb	-

No wind group is included for any isobaric surface.

Code 2582

M_iM_i -- Message indentifier letters

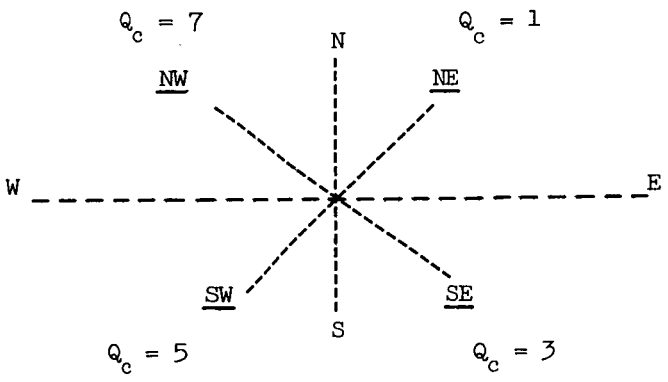
Part relating to TEMP and TEMP SHIP to be amended as follows :

Code letters	Report
TT	TEMP or TEMP SHIP, Part A
VV	TEMP or TEMP SHIP, Part B
WW	TEMP or TEMP SHIP, Part C
YY	TEMP or TEMP SHIP, Part D

Code 3333

Q_c Quadrant of the globe

Code figure	Latitude	Longitude
1	North	East
3	South	East
5	South	West
7	North	West



The choice is left to the observer in the following cases:

When the ship is on the Greenwich meridian or the 180th meridian ($L_oL_oL_oL_o$ = 0000 or 1800 respectively):

Q_c = 1 or 7 (northern hemisphere) or

Q_c = 3 or 5 (southern hemisphere);

When the ship is on the Equator ($L_aL_aL_a$ = 000);

Q_c = 1 or 3 (eastern longitude) or

Q_c = 5 or 7 (western longitude).

Part B

NOTES DEVELOPED AS GUIDANCE FOR THE SECRETARIAT IN PREPARING THE FINAL TEXT FOR INCLUSION IN WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 35.D (TEMP)

(1) The code name TEMP refers to an upper-air report (i.e. upper-level pressure, temperature, humidity and wind) from a land station. The word TEMP shall not be transmitted as part of the report.

(2) The code form is divided into a number of sections for reference purposes. The sections are:

Section number	Indicator groups	Contents
1	--------	Identification - position
2	--------	Data for standard isobaric surfaces
3	88	Data for the tropopause level
4	77 or 66	Data for the maximum wind level
5	--------	Data for significant levels with respect to temperature and/or relative humidity
6	21212	Data for significant levels with respect to wind
7	31313	Data for 250 mb surface
8	41414	Cloud data
9	51515	Regional codes

(3) Parts of TEMP

(i) TEMP data shall be divided into four parts for transmission purposes (i.e., Parts A, B, C, and D);

(ii) Each of the four parts of TEMP shall be coded as a separate report in the format specified in the symbolic form.

(4) Part A

(i) TEMP reports exchanged hemispherically shall always include Part A;

(ii) Part A shall contain data, in so far as available, only for levels up to and including the 100 mb level as follows:

(a) Identification section;
(b) Surface data;
(c) Data for the standard isobaric surfaces of 1000, 850, 700, 500, 400, 300, 200, 150, and 100 mb

(d) Data for the level(s) of the tropopause(s); and
(e) Data for the level(s) of the maximum wind(s).

(5) Part B

(i) Part B shall contain data, in so far as available, only for levels up to and including the 100 mb level as follows:

(a) Identification section;
(b) Surface data;
(c) Data for significant levels, with respect to temperature and/or relative humidity;
(d) Data for significant levels with respect to wind;
(e) Data for the 250 mb surface;
(f) Cloud data observed at the moment of release of the balloon; and
(g) Data determined by regional agreement and regionally developed code forms.

(6) Part C

(i) TEMP report exchanged hemispherically shall always include Part C;

(ii) Part C shall contain data, in so far as available, only for levels above the 100 mb level as follows:

(a) Identification section;
(b) Data for the isobaric surfaces of 70, 50, 30, 20, and 10 mb;
(c) Data for the level(s) of the tropopause(s); and
(d) Data for the level(s) of the maximum wind(s).

(7) Part D

(i) Part D shall contain data, in so far as available, only for levels above the 100 mb level as follows:

(a) Identification section;
(b) Data for significant levels, with respect to temperature and/or relative humidity;
(c) Data for significant levels with respect to wind; and
(d) Data determined by regional agreement and regionally developed code forms.

(8) The isobaric surfaces are sometimes referred to as MANDATORY levels. The levels determined with respect to specified criteria for changes in air temperature and/or relative humidity are sometimes referred to as SIGNIFICANT levels. The levels determined with respect to specified criteria for changes in wind speed and direction are sometimes referred to as SIGNIFICANT levels also.

(9) When the geopotential of a standard isobaric surface is lower than the altitude of the reporting station, the air temperature-humidity group for that surface shall be included in the report. Solidi (/////) shall be reported for these groups (i.e. in Section 2 of Part A). The wind groups for these levels shall be included in the report as specified by the value reported for symbol I_d.

(10) Whenever it is desired to extrapolate a sounding for the computation of the geopotential at a standard isobaric surface the following rules shall apply:

(i) Extrapolation is permissible if, and only if, the pressure difference between the minimum pressure of the sounding and the isobaric surface for which the extrapolated value is being computed does not exceed 1/4 of the pressure to which extrapolated value is desired, provided the extrapolation does not extend through a pressure interval exceeding 25 mb;

(ii) For the purpose of geopotential calculation and for this purpose only, the sounding will be extrapolated, using two points only of the sounding curve on a log p T-diagram, namely that at the minimum pressure reached by the sounding and that at the pressure given by the sum of this minimum pressure and the pressure difference, mentioned in (1) above.

(11) When a SIGNIFICANT level (with respect to air temperature and/or relative humidity) and a standard isobaric surface coincide, data for that level shall be reported in both forms in Parts A and B (or C and D, as appropriate).

(12) If in the determination of SIGNIFICANT levels with respect to air temperature and/or relative humidity the criteria for either parameter are satisfied at a particular point in altitude, data for both parameters shall be reported for that level.

(13) The SIGNIFICANT levels, with respect to air temperature and relative humidity, included in Parts B and D shall be in sufficient number to provide for the reconstruction of the sounding in such detail as might be required to meet local forecast requirements.

(14) The criteria for determining SIGNIFICANT levels for international exchange are based on the premise that the SIGNIFICANT data "alone" shall make it possible to reconstruct the air-temperature and relative humidity curves within the limits of the criteria specified. SIGNIFICANT levels are selected as follows:

(a) Surface level and highest level of sounding;

(b) Bases and tops of inversions and isothermal layers which are at least 20 mb thick or are characterized by a substantial change in relative humidity provided that the base of the layer occurs below the 300 mb level or below the first tropopause; whichever is higher.

(c) Levels which are necessary to ensure that the temperature obtained by linear interpolation (on a T-log p or essentially similar diagram) between adjacent significant levels shall not depart from the observed temperature by more than 1°C below the 300 mb level or the first tropopause, whichever is reached first, and by more than 2°C above that level;

(d) Levels which are necessary to ensure that relative humidity obtained by linear interpolation between adjacent significant levels shall not depart by more than 15 per cent from the observed value. (The criterion of 15 per cent refers to an amount of relative humidity and NOT to a percentage of the observed value, e.g. if the observed value is 50 per cent the interpolated value would lie between 35 per cent and 65 per cent.)

(15) SIGNIFICANT levels determined according to the criteria given in notes 14(c) and (d) shall, in so far as possible, be the actual levels at which the prominent changes in the lapse rates of air temperature or relative humidity occur.

(16) The code figure 00 for symbol $n_o n_o$ refers to surface data only and it shall never be used to indicate any other level. In Part B the successive SIGNIFICANT levels are numbered 00 (surface), the first level 11, 22, ... etc. ..., 99, 11, 22 ...etc. In Part D the first level above 100 mb is numbered 11, the second 22, ... etc. ... 99, 11, 22, ... etc.

(17) In Parts B and D a layer for which data are missing shall be indicated by reporting the boundary levels of the layer and a level of solidi (/////) to indicate the layer of missing data. The boundary levels are the levels closest to the bottom and top of the layer for which observed data are available. The boundary levels are not required to meet SIGNIFICANT level criteria. The boundary levels and the missing data level groups will be identified by appropriate nn numbers. For example:

33PPP	TTT_aDD
44///	/////
55PPP	TTT_aDD

Where the levels 33 and 55 are the boundary levels and 44 indicates the layer for which data are missing.

(18) Only wind data obtained, either by visual or electronic means, from the radiosonde ascent shall be included in the TEMP report. Wind data obtained by means other than a radiosonde type ascent shall not be included in a TEMP report.

(19) When during an ascent the pressure can no longer be obtained but wind can be obtained, the wind data so obtained may be reported in PILOT but shall not be reported in TEMP.

(20) The term "surface" refers to a horizontal plane whose height above MSL is the same as the floor of the instrument shelter. All data referred to as "surface data" are observed with reference to this plane.

(21) Criteria for determining maximum and significant winds are given in Annexes VII and VIII.

(22) When more than one tropopause is observed, they are reported by repeating the tropopause section. When the tropopause data are not observed the group 88999 shall be reported instead of the tropopause section.

(23) When more than one maximum wind is observed, they may be reported by repeating the maximum wind section. When a maximum wind is not observed or reported, the group 77999 is reported in lieu of the maximum wind section.

(24) When wind data are available for all levels, the wind group shall always be included in the report for each level as indicated in the symbolic form. If wind data are not available for all levels the procedures given below shall be followed:

(i) See Note 9:

(ii) When wind data are missing for one or more standard isobaric surfaces but are available for other standard isobaric surfaces below and above, the wind group(s) (i.e. $d_n d_n f_n f_n f_n$) shall be coded by means of solidi (i.e., /////);

(iii) When wind data are missing for a standard isobaric surface and are also missing for all succeeding standard isobaric surfaces to the termination of the ascent, the wind group shall be omitted for all these levels and the symbol I_d reported accordingly.

(25) The five-figure character of the groups shall be maintained. When data are missing, the appropriate number of solidi shall be coded to indicate that datum for a particular parameter is missing.

(26) The instructions regarding Parts A and B of the report with respect to the inclusion of "data up to and including 100 mb", and regarding Parts C and D with respect to the inclusion of "data above 100 mb" must not be contravened. For example: If data at or below 100 mb are not included in either Parts A or B, as appropriate, they must not be included in Parts C or D. In this instance the non-included data shall be transmitted separately in the form of a correction message.

FM 36.D (TEMP SHIP)

1. The code name TEMP SHIP refers to an upper-air report (i.e., upper-level pressure, temperature, humidity and wind) from a sea station. The words TEMP SHIP shall not be transmitted as part of the report.

2. The Notes (2) to (26) inclusive, given under FM 35.D, apply equally to FM 36.D.

*

* *

Identification of TEMP, TEMP SHIP, PILOT, and PILOT SHIP reports

Level	Part	TEMP		PILOT	
		Land	Ship	Land	Ship
At and below 100 mb	Part A Mandatory (Type III data)	TT $YYGGI_d$ IIiii	TT $YYGGI_d$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$	PP $YYGGa_4$ IIiii	PP $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$
	Part B Regionally optional (Type II data)	VV YYGG/ IIiii	VV YYGG/ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$	QQ $YYGGa_4$ IIiii	QQ $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$
Above 100 mb	Part C Mandatory (Type III data)	WW $YYGGI_d$ IIiii	WW $YYGGI_d$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$	MM $YYGGa_4$ IIiii	MM $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$
	Part D Regionally optional (Type II data)	YY YYGG/ IIiii	YY YYGG/ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$	L L $YYGGa_4$ IIiii	LL $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

ANNEX XXI

Annex to Recommendation 15 (CSM-IV)

Part A

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 32.D (PILOT)

Part A			Data up to and including 100 mb
M_iM_i	$YYGGa_4$	IIiii	Identification - Position (Section 1)
$44nP_1P_1$ or $55nP_1P_1$	ddfff	ddfff .....etc.	Standard isobaric surfaces (Section 2)
$77P_mP_mP_m$ or $66P_mP_mP_m$	$d_md_mf_mf_mf_m$		Maximum wind(s) (Section 3)
or			
$7H_mH_mH_mH_m$ or $6H_mH_mH_mH_m$	$d_md_mf_mf_mf_m$		
or			
77999			

Part B			Data up to and including 100 mb
M_iM_i	$YYGGa_4$	IIiii	Identification - position (Section 1)

9 or 8	$t_n u_1 u_2 u_3$	ddfff	ddfff	ddfff	
	.....	.....	.....	.....	Fixed regional and/or significant levels (Section 4)
9 or 8	$t_n u_1 u_2 u_3$	ddfff	ddfff	ddfff	

and/or

21212	$n_o n_o P_o P_o P_o$	$d_o d_o f_o f_o f_o$
	$n_1 n_1 P_1 P_1 P_1$	$d_1 d_1 f_1 f_1 f_1$
	. . . . .	. . . . .
	$n_n n_n P_n P_n P_n$	$d_n d_n f_n f_n f_n$

Part C — Data above 100 mb

$M_i M_i$ YYGGa_4	IIiii	Identification - position (Section 1)
$44nP_1P_1$ or $55nP_1P_1$	ddfff ddfff.....etc.	Standard isobaric surfaces (Section 2)
$77P_mP_mP_m$ or $66P_mP_mP_m$	$d_m d_m f_m f_m f_m$	Maximum wind(s) (Section 3)
or		
$7H_mH_mH_mH_m$ or $6H_mH_mH_mH_m$	$d_m d_m f_m f_m f_m$	
or		
77999		

Part D					Data above 100 mb
$M_i M_i$	$YYGGa_4$	IIiii			Identification - position (Section 1)
9 or 8	$t_n u_1 u_2 u_3$	ddfff	ddfff	ddfff	
	. . . . .	.....	.....	.....	Fixed regional and/or significant levels (Section 4)
9 or 8	$t_n u_1 u_2 u_3$	ddfff	ddfff	ddfff	
	and/or				
21212	$n_1 n_1 P_1 P_1 P_1$	$d_1 d_1 f_1 f_1 f_1$			
	. . . . .	. . . . .			
	$n_n n_n P_n P_n P_n$	$d_n d_n f_n f_n f_n$			

Explanation of symbolic letters and indicator figures

a_4 = Indicator specifying the types of measuring equipment used. (Code 0265)

44 = Indicator figures. Specify that the standard isobaric surfaces have been located by means of pressure equipment.

55 = Indicator figures. Specify that the winds are reported at altitudes approximating the isobaric surfaces.

n = Specifies the number of consecutive isobaric surfaces for which wind data are reported, starting with the surface specified by $P_1 P_1$.

N O T E : The figure n should not exceed 3.

$P_1 P_1$ = Indicator for the pressure of the lowest isobaric surface, with respect to altitude, for which wind data are reported.
(In Part A these pressures are reported in units of 10 mb.
In Part C they are reported in whole millibars.)

dd
$d_o d_o$
$d_1 d_1$
...
$d_n d_n$
$d_m d_m$

For specifications see Annex XX of this publication.

$f_o f_o f_o$

$f_1 f_1 f_1$

. . .

$f_n f_n f_n$

$f_m f_m f_m$

} For specifications see Annex XX of this publication.

77 = Indicator figures. Specify that a maximum wind occurred within the sounding and that the level of the maximum wind was determined by means of pressure.

66 = Indicator figures. Specify that the greatest wind observed throughout the sounding occurred at the top of the sounding. Maximum criteria not satisfied. Level of the maximum wind determined by means of pressure.

$P_m P_m P_m$ = Pressure at the level of maximum wind. (N O T E : In Part A these pressures given in whole millibars. In Part C these pressures given in tenths of millibars.

7 = Indicator figure. Specifies that the maximum wind occurred within the sounding and that its altitude was expressed in geopotential metres. Altitudes are reported in geopotential decametres in both Parts A and C.

6 = Indicator figure. Specifies that the greatest wind speed observed throughout the sounding occurred at the top of the sounding. Altitudes are reported in geopotential decametres in both Parts A and C.

$H_m H_m H_m H_m$ = Altitude of the level of maximum wind given in geopotential decametres which are so reported in both Parts A and C.

77999 = Indicator group. Specifies that maximum wind was not observed or was not transmitted.

9 = Indicator figure. Specifies that wind data for regional fixed levels and/or significant levels with altitudes given in units of 300 m follow.

8 = Indicator figure. Specifies that wind data for regional fixed levels and/or significant levels with altitudes given in units of 500 m follow.

t_n = The tens digit of the altitude, expressed in units of 300 m or 500 m, which apply to the following data groups.

u_1 = Units digit of the altitude, expressed in units of 300 m or 500 m for the first data group following.

u_2 = The units digit of the altitude, expressed in units of 300 m or 500 m for the second data group following.

u_3 = The units digit of the altitude, expressed in units of 300 m or 500 m for the third data group following.

21212 = Indicator group. Specifies that data for significant levels with respect to wind follow.

(N O T E : The symbols $n_o n_o P_o P_o P_o$ ...etc. of the data groups have the same meaning as in FM 35.D (see Annex XX of this publication TEMP code form).

YY = See specification in Annex XX of this publication.

Code 0265 (a_4)

a_4 = Indicator specifying types of measuring equipment used

Code figure	Equipment
0	Pressure instrument associated with wind-measuring equipment
1	Optical theodolite
2	Radio theodolite
3	Radar
4	Pressure instrument associated with wind-measuring equipment but pressure element failed during ascent.*

* N O T E : In this case the group $55nP_1P_1$ will be inserted in the report and the levels which follow will be geopotential approximations of the standard surfaces. This Note applies to Parts A and C (Section 1).

M_1M_1 = Message identifier letters

Code letters	Report
PP	PILOT and PILOT SHIP, Part A
QQ	PILOT and PILOT SHIP, Part B
MM	PILOT and PILOT SHIP, Part C
LL	PILOT and PILOT SHIP, Part D

N O T E : Those symbols given in PILOT, preceding, which are not included in the above list have the standard meanings given in Volume B.

FM 33.D (PILOT SHIP)

Part A

M_1M_1	$YYGGa_4$	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	$MMMU_{La}U_{Lo}$

(Same content and format as in FM 32.D)

Part B

M_1M_1	$YYGGa_4$	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	$MMMU_{La}U_{Lo}$

(Same content and format as in FM 32.D)

Part C

M_1M_1 $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

(Same content and format as in FM 32.D)

Part D

M_1M_1 $YYGGa_4$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

(Same content and format as in FM 32.D)

Part B

NOTES DEVELOPED AS GUIDANCE FOR THE SECRETARIAT IN PREPARATION OF THE FINAL TEXT FOR INCLUSION IN WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 32.D (PILOT)

1. The code name PILOT refers to an upper-wind report from a land station. The word PILOT shall not be transmitted as part of the report.

2. The code form is divided into a number of sections for reference purposes. The sections are:

Section number	Indicator or Indicator groups	Contents
1	-------	Identification - position
2	44 or 55	Standard isobaric surfaces
3	6, 7, 66 or 77	Maximum wind(s); altitudes given in pressure units or units of geopotential decametres.
4	8, 9 or 21212	Fixed regional levels and/or significant levels; altitudes given in geometric units or pressure units.

3. Parts OF PILOT

(i) PILOT data shall be divided into four parts for transmission purposes (i.e. Parts A, B, C and D).

(ii) Each of the four parts of PILOT shall be coded as a separate report in the format specified in the symbolic form.

4. Part A

(i) PILOT reports exchanged hemispherically shall always include Part A;

(ii) Part A shall contain data, in so far as available, only for levels up to and including the 100 mb level as follows:

(a) Identification - position section (Section 1);

(b) Data for the standard isobaric surfaces of 850, 700, 500, 400, 300, 200, 150, and 100 mb when pressure measurements and wind data are obtained simultaneously from the sounding,* (Section 2);

* See Recommendation 6 (CSM-IV).

(c) When no pressure measurements are available wind data shall be reported using geopotential approximations to the isobaric surface;

(d) Data for the level(s) of the maximum wind(s), with altitudes given in pressure in units of 1 mb or in units of geopotential decametres (Section 3).

5. Part B

(i) Part B shall contain data, in so far as available, only for levels up to and including the 100 mb level as follows:

(a) Identification - position section. (Section 1);

(b) Fixed regional and/or significant levels with altitudes given in units of 300 metres or in units of 500 m or significant levels with altitudes given in pressure to whole mb when pressure measurements and wind data are obtained simultaneously from the sounding. (Section 4);

(c) When significant levels with altitudes given in pressure are reported, data for the 250 mb surfaces shall be included in Part B.

6. Part C

(i) PILOT reports exchanged hemispherically shall always include Part C.

(ii) Part C shall contain data, in so far as available, only for levels above 100 mb as follows:

(a) Identification - position section. (Section 1);

(b) Data for the standard isobaric surfaces of 70, 50, 30, 20 and 10 mb when pressure measurements and wind data are obtained simultaneously from the sounding. (Section 2);

(c) When no pressure measurements are available wind data shall be reported using geopotential approximations to the isobaric surfaces;

(d) Data for the level(s) of the maximum wind with altitudes given in pressure in units of 1/10 mb or in units of geopotential decametres, (Section 3).

7. Part D

(i) Part D shall contain data, in so far as available, only for levels above the 100 mb level as follows:

(a) Identification - position section. (Section 1);

(b) Fixed regional and/or significant levels with altitudes given in units of 300 metres or in units of 500 m or significant levels with altitudes given in pressure when pressure measurements and wind data are obtained simultaneously from the sounding. (Section 4);

8. When a maximum wind is not observed or not transmitted, the group 77999 is reported in lieu of the maximum wind section (i.e. Section 3).

9. More than one maximum wind may be reported by repeating the maximum wind section (i.e. Section 3).

10. When reporting standard isobaric surfaces (Section 2) in Parts A and C, all standard surfaces within the sounding shall be represented by either a data group or a group of solidi (/////).

11. In Section 2 of Parts A and C, the data groups for the standard isobaric surfaces will appear in the coded report in ascending order with respect to altitude. The groups $44nP_1P_1$ or $55nP_1P_1$ may be repeated as necessary.

12. The fixed levels (i.e. Section 4) reported in Parts B and D are determined by regional decision.

13. In Parts B and D (i.e. Section 4), the fixed regional and significant levels whose altitudes are given in geopotential units shall be reported or the significant levels, the altitudes of which are given in pressure units, shall be reported. Either of these methods (i.e. geopotential or pressure) of determining altitudes may be used but not both of them may be used in the same coded report.

14. The instructions regarding Parts A and B of the report with respect to the inclusion of "data up to and including 100 mb" must not be contravened. For example: If data at or below 100 mb are not included in either Part A or B, as appropriate, they must not be included in Parts C or D. In this instance the non-included data shall be transmitted separately in the form of a correction message.

FM 33.D (PILOT SHIP)

1. The code name PILOT SHIP refers to an upper-wind report from a sea station. The words PILOT SHIP shall not be transmitted as part of the report.

2. The Notes 2 to 14 inclusive under PILOT (FM 32.D) apply equally to PILOT SHIP.

ANNEX XXII

Annex to Recommendation 17 (CSM-IV)

FIGURE CODE FORM FOR THE HEMISPHERIC EXCHANGE OF METEOROLOGICAL DATA FROM AIRCRAFT

FM 41.D UPPER-AIR REPORT FROM AIRCRAFT
(other than weather reconnaissance aircraft)

CODAR

M_iM_i	YYGGg	$99L_aL_aL_a$	$Q_cL_oL_oL_oL_o$
	$P_aP_aP_aB_zS_h$	$TTT_an_sn_m$	
	$(40L_aL_aL_a$	$Q_cL_oL_oL_oL_o)$	ddfff
	$(41L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	ddfff)
	.....	.....	.....
	$(49L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	ddfff)
	(6HHHH)		

SPECIFICATIONS OF SYMBOLIC LETTERS (AND RELEVANT NOTES)

M_iM_i Message identifier letters (code 2582)
(CC will be used to identify aircraft reports)

YY Day of the month (See Annex XX of this publication)

GGg Time of observation in hours and tens of minutes GMT

(1) The time to be reported is the time of observation in hours and minutes GMT expressed in the report received from the aircraft with the last figure omitted

99 Indicator for recognition of mobile station report

Q_c Quadrant of the globe (code 3333) (See Annex XX to this publication)

$L_aL_aL_a$ Latitude in tenths of degrees

$L_oL_oL_oL_o$ Longitude in tenths of degrees (figure for hundreds included)

$P_aP_aP_a$ Pressure at which the aircraft is flying in millibars,

N O T E : This pressure is the one which corresponds, in the ICAO standard atmosphere, to the ICAO flight level indicated in the report received from the aircraft. It is the actual pressure at which the aircraft is flying.

n_s Number of spot wind(s) reported

n_m Number of mean wind(s) reported

dd Wind direction (see Annex XX of this publication)

fff Wind speed (see Annex XX of this publication)

N O T E S : (1) If both spot and mean winds are available, spot wind(s) shall always be reported first;

(2) If one spot wind only is reported, it refers to the position given at the beginning of the report. If more than one spot wind is reported, the position of the point(s) where the second wind(s) spot (and the following) was (were) measured shall be included in the report immediately before the relevant ddfff group(s);

(3) In case of mean wind, the position of the midpoint of the sector over which it was calculated shall always be included in the report immediately before the relevant ddfff group.

T_a Temperature indicator (see Annex XX of this publication)

TT Absolute value of the temperature of the free air or absolute value of temperature reduced to the nearest standard isobaric surface in whole degrees Celsius (see Annex XX of this publication)

B_z High level turbulence (Code 0359)

N O T E : High-level turbulence refers to the type of aircraft turbulence which is normally found above about 6 km, exclusive of turbulence in cumulonimbus cloud. High-level turbulence is sometimes referred to as clear-air turbulence but does not exclude turbulence in cirrus cloud.

S_h Indicator showing type of temperature and height data (Code 3738)

HHHH D-value or height reduced to the nearest standard isobaric surface in decametres.

CODE TABLES

Code 0359

B_z High-level turbulence

0 None

1 Moderate

2 Severe

Code 3738

S_h Indicator showing type of temperature and height data

0 Observed air temperature -- D-value positive
2 Observed air temperature -- D-value negative
4 Observed air temperature -- no D-value reported
6 Air temperature reduced to the nearest standard isobaric surface -- height reduced to the nearest standard isobaric surface.

ANNEX XXIII

Annex to Recommendation 18 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 45.C Analysis in full form (IAC)

Section of pressure systems or topography systems 99900

Amend to read:

99900

(9NNSS) $8P_tP_cPP$ or $8h_th_ch_ah_a$ yyyyy (.....) $(md_sd_sf_sf_s)$

($00C_l00$) ....

[

$000g_pg_p$ $9P_tP_cPP$ or $9h_th_ch_ah_a$ yyyyy (.....)

($00C_l00$) ....

and/or

$000g_pg_p$ $7P_tP_cPP$ or $7h_th_ch_ah_a$ yyyyy (.....) $(md_sd_sf_sf_s)$

($00C_l00$) ....

]

Section of frontal systems 99911

Amend to read:

99911

(9NNSS) $66F_tF_iF_c$ yyyyy yyyyy ..... $(md_sd_sf_sf_s)$

($00C_l00$) ....

[

$000g_pg_p$ $69F_tF_iF_c$ yyyyy yyyyy .....

($00C_l00$) ....

and/or

$000g_pg_p$ $67F_tF_iF_c$ yyyyy yyyyy ..... $(md_sd_sf_sf_s)$

($00C_l00$) ....

]

Cloud section 99966

In the groups with indicator figures 8 and 6 replace the symbolic letter J by the new letter N.

Wave or sea temperature section 88800

Amend to read:

88800

$77e_2uu$ $(9d_wd_wP_wP_w)$ yyyyy $(9d_wd_wP_wP_w)$ yyyyy .....

.... $(9d_wd_wP_wP_w)$ yyyyy $(00C_100)$

$000g_pg_p$ $79e_2uu$ $(9d_wd_wP_wP_w)$ yyyyy $(9d_wd_wP_wP_w)$ yyyyy .....

.... $(9d_wd_wP_wP_w)$ yyyyy $(00C_100)$

and/or

$000g_pg_p$ $76e_2uu$ $(9d_wd_wP_wP_w)$ yyyyy $(9d_wd_wP_wP_w)$ yyyyy .....

.... $(9d_wd_wP_wP_w)$ yyyyy $(00C_100)$

Vertical wind shear section 88822

Amend to read:

88822

44vvv yyyyy yyyyy .....

or

444vv yyyyy yyyyy .....

N O T E S :

- Amend Note 7 to read:

In sections 99900, 99911 and 88800 the basic code forms give the details of pressure systems, fronts and wave or sea temperature isopleths for the time of the chart in analysis messages and for the time of the forecast chart in prognosis messages. One or more additional sets of groups, introduced by a time group $000g_pg_p$, can be used when greater detail is required about past and future positions and characteristics of any pressure system, front system, wave system or sea temperature configuration. In section 99900 of an analysis message when $9P_tP_cPP$ is used after the time group $000g_pg_p$ the group $9P_tP_cPP$ and the position group yyyyy refer to the details of the pressure system and its position at g_pg_p hours prior to G_cG_c. In section 99900 of an analysis message when $7P_tP_cPP$ is used after the time group $000g_pg_p$ the group $7P_tP_cPP$ and the position group yyyyy refer to the details of the pressure system and its position at g_pg_p hours after G_cG_c. Information about the pressure system at various times prior to or after G_cG_c can thus be given. The group $md_sd_sf_sf_s$ always refers to the movement of the system when it is at the position last indicated. Frontal systems, wave systems and sea temperature configuration can be treated similarly in analysis messages. The same principle applies to prognosis messages. In these, the period indicated by g_pg_p is to be added or subtracted to the time $G_cG_c + G_pG_p$.

- Introduce the following new note and renumber present Notes (13) to (17) as (14) to (18):

(13) In section 88822 the group 44vvv is used when it is wished to specify the vertical wind shear in knots per 1,000 metres and the group 444vv when in knots per 300 metres.

- Amend the Note renumbered (16) to read:

Use of bracketed groups

The groups in brackets are optional groups to be used at the discretion of each service. The sets of groups in square brackets are also optional, to be used at the discretion of each service.

FM 46.C - Analysis in abbreviated form (IAC FLEET)

Section of pressure systems 99900

Amend to read:

99900

$8P_tP_cPP$ $QL_aL_aL_oL_o$ $(QL_aL_aL_oL_o)$ $md_sd_sf_sf_s$

[

$000g_pg_p$ $9P_tP_cPP$ $QL_aL_aL_oL_o$ $(QL_aL_aL_oL_o)$

and/or

$000g_pg_p$ $7P_tP_cPP$ $QL_aL_aL_oL_o$ $(QL_aL_aL_oL_o)$ $md_sd_sf_sf_s$

]

Section of frontal systems 99911

Amend to read:

99911

$66F_tF_iF_c$ $QL_aL_aL_oL_o$ $QL_aL_aL_oL_o$ ..... $md_sd_sf_sf_s$

[

$000g_pg_p$ $69F_tF_iF_c$ $QL_aL_aL_oL_o$ .....

and/or

$000g_pg_p$ $67F_tF_iF_c$ $QL_aL_aL_oL_o$ ..... $md_sd_sf_sf_s$

]

Wave or sea temperature section 88800

Amend to read:

88800

$77e_2uu$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ .....

.... $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(00C_100)$

[

$000g_pg_p$ $79e_2uu$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ .....

.... $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(00C_100)$

and/or

$000g_pg_p$ $76e_2uu$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ .....

.... $(9d_wd_wP_wP_w)$ $QL_aL_aL_oL_o$ $(00C_100)$

]

N O T E S :

- Amend Note 7 to read:

In sections 99900, 99911 and 88800 the basic code forms give the details of pressure systems, fronts and wave or sea temperature isopleths for the time of the chart in analysis messages and for the time of the forecast chart in prognosis messages. One or more additional sets of groups, introduced by a time group $000g_pg_p$, can be used when greater detail is required about past and future positions and characteristics of any pressure system, front system, wave system or sea temperature configuration. In section 99900 of an analysis message when $9P_tP_cPP$ is used after the time group $000g_pg_p$ the group $9P_tP_cPP$ and the position group $QL_aL_aL_oL_o$ refer to the details of the pressure system and its position at g_pg_p hours prior to G_cG_c. In section 99900 of an analysis message when $7P_tP_cPP$ is used after the time group $000g_pg_p$ the group $7P_tP_cPP$ and the position group $QL_aL_aL_oL_o$ refer to the details of the pressure system and its position at g_pg_p hours after G_cG_c. Information about the pressure system at various times prior to or after G_cG_c can thus be given. The group $md_sd_sf_sf_s$ always refers to the movement of the system when it is at the position last indicated.

Frontal systems, wave systems and sea temperature configuration can be treated similarly in analysis messages. The same principle applies to prognosis messages. In these the period indicated by g_pg_p is to be added or subtracted to the time $G_cG_c + G_pG_p$.

- Amend Note (15) to read:

Use of bracketed groups
See Note (16) under FM 45.C IAC

- Amend Note (16) to read:

Additional groups or supplementary information
See Note (17) under FM 45.C IAC

SPECIFICATIONS OF SYMBOLIC LETTERS (OR GROUPS OF LETTERS)

J -. Delete this symbolic letter and its specification.

Introduce the following new symbolic letter:

vv - Vertical wind shear in knots per 300 metres (FM 45.C)

CODE TABLES

Code 1152 F_t -- Type of front, amend to read:

0 Quasi stationary front at the surface

1 Quasi stationary front above the surface

2 Warm front at the surface

3 Warm front above the surface

4 Cold front at the surface

5 Cold front above the surface

6 Occlusion

7 Instability line

8 Intertropical front*

9 Convergence line

---

* Preferable to use tropical section of the message in FM 45.C and FM 46.C

Code 1800 i -- Intensity or character of the weather element w_e, amend the entries under icing and turbulence as follows:

	Icing		Turbulence	
0	No specification	in cloud	Not specified	in cloud
1	Light		Light	
2	Moderate		Moderate	
3	Severe		Severe	
4	Light	in precipitation	Light	in clear air
5	Moderate		Moderate	
6	Severe		Severe	

Code 1900 J, delete this code table.

ANNEX XXIV

Annex to Recommendation 19 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No 9.TP.4, VOLUME B

FM 15.D - AVIATION ROUTINE WEATHER REPORT

METAR

(GGgg) CCCC dddff(/$f_m f_m$) (VVVV) (RV$_R$V$_R$V$_R$V$_R$(/D$_R$D$_R$)) (w'w')

(N$_s$CCh$_s$h$_s$) (CAVOK) ((M)T'T'/(M)T'$_d$T'$_d$) (P$_H$P$_H$P$_H$P$_H$)

N O T E S:

(1) The code name METAR designates an aviation routine weather report. METAR shall appear as a prefix to individual reports but in the case of a collective of such reports it shall appear in the heading of the collective only.

(2) The elements or groups enclosed in brackets are included in the code form in accordance with regional agreements unless otherwise specified in the following notes.

(3) Groups may have to be repeated in accordance with the detailed instructions for each group.

(4) Instruction for the group GGgg:

The group GGgg is always placed in the heading of a collective, indicating the time of observation of the report placed first in the collective. If the time of observation of any following report in the collective differs not more than ten minutes from the time given by GGgg in the heading, it is not necessary to use GGgg in any such report. If the time of observation of any following report in the collective differs more than ten minutes from the time given by GGgg in the heading, it is necessary to use GGgg in any such report.

(5) Instructions for the group dddff(/$f_m f_m$):

(i) The mean direction and speed of the wind over the ten minute period immediately preceding the observation shall be reported under dddff. However, when the ten minute period includes a discontinuity in the wind characteristics, only data occurring since the discontinuity shall be used for obtaining mean values, hence the time interval in these circumstances will be correspondingly reduced. The direction of wind shall be reported in tens of degrees, thus the third figure of ddd will always be "0".

(ii) If during the ten minute period preceding the observation the maximum wind speed exceeds the mean speed by 10 knots or more this maximum speed shall be reported as /$f_m f_m$ immediately after dddff. Otherwise the element /$f_m f_m$ shall not be included in the report.

(iii) "Calm" shall be reported "ooooo"; variable direction shall be reported "999" followed by the speed.

(6) Instructions for the group (VVVV):

(i) The visibility (VVVV) is given in metres in increments of hundred metres up to 5 km, in steps of km up to 9 km. "9000" indicates a visibility of 9 km and above.

(ii) See Note 10 below.

(7) Instructions for the group ($RV_RV_RV_RV_R(/D_RD_R)$):

(i) When runway visual range is being observed during a period of reduced visibility one or more groups $RV_RV_RV_RV_R/D_RD_R$ shall be included in the report in the following manner:

(a) If runway visual range is observed over one runway the value shall be reported as $V_RV_RV_RV_R$ preceded by the letter indicator R, the drop-out element/D_RD_R being omitted;

(b) If runway visual range is observed over two or more runways simultaneously and there are no significant differences in runway visual range between runways its value shall be reported as indicated in (a) above;

(c) If runway visual range is observed over two or more runways simultaneously and there are significant differences in runway visual range between runways, the value obtained for each runway shall be reported if required, as many $RV_RV_RV_RV_R/D_RD_R$ groups being included in the report as necessary, the number of each runway being indicated by D_RD_R;

(ii) Observed runway visual range is given in metres; the values up to 500 metres should be reported in steps not greater than 50 metres; those from 500 to 1000 metres in steps not greater than 100 metres, and those above 1000 metres in steps not greater than 200 metres.

(iii) See Note (10) below.

(8) Instructions for the group (w'w'):

(i) This group contains the reporting of present weather as specified at the end of this annex.

(ii) See Note (10) below.

(9) Instructions for the group ($N_sCCh_sh_s$):

(i) This group may be repeated to report a number of layers or masses of cloud. The normal number of groups should not exceed three; it may, however, be four in cases when Cumulonimbus clouds are observed. The selection of layers (masses) to be reported 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);

(d) Cumulonimbus clouds, whenever observed and not reported under (a), (b) and (c) above by means of a group referring exclusively to Cb.

R e m a r k s :

(a) The order of reporting of the groups is always from low to high levels;

(b) In determining the cloud amounts to be reported for individual layers or masses in the cloud-group, the observer estimates by 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. Caution should be taken, however, to avoid unconsidered guessing (this requires elaboration in national instructions.)

(ii) When the sky is clear, the cloud-group is not used.

(iii) When the sky is obscured ($N_s = 9$) the cloud-group shall read $9//h_sh_s$ where h_sh_s is the vertical visibility;

(iv) See Note (10) below.

(10) Instructions for the group CAVOK:

The code word CAVOK shall be included in the report in place of the groups (VVVV), (w'w') and ($N_sCCh_sh_s$), whenever the following conditions occur simultaneously at the time of observation:

(a) Visibility: 10 km or more;

(b) Cloud: amount of the lowest layer 4/8 or less and height of base 3000 metres or more, and no cumulonimbus present;

(c) Weather: no precipitation and no thunderstorm.

(11) Instructions for the group ((M)T'T'/(M)T'$_d$T'$_d$):

(i) The air temperature and dew-point temperature are given in whole degrees Celsius. Values less than 10 degrees have to be preceded by "0", e.g. +9°C is to be reported by "09".

(ii) Temperatures below 0°C are indicated by "M" (i.e. minus), e.g. -9°C is to be reported by "M09".

(12) Instructions for the group $P_HP_HP_HP_H$:

(i) QNH is always rounded off to the nearest millibar (0.5 is always rounded downwards).

(ii) If the value of QNH is less than 1000 mb, it shall be given in three figures only.

(13) Supplementary information:

(i) Other significant information (for example regarding turbulence, aircraft icing, other significant phenomena in sight not occurring at the station, or wind shear) in the lower layers should be added in plain language in accordance with regional agreements;

(ii) When there are significant directional variations in visibility, additional values should be given at the end of the report with indications of the direction of observation in plain language using recognized abbreviations.

FM 16.D - AVIATION SELECTED SPECIAL WEATHER REPORT

SPECI

GGgg CCCC dddff(/$f_m f_m$) (VVVV) ($RV_R V_R V_R V_R$(/$D_R D_R$)) (w'w')

(N_sC$C h_s h_s$) (CAVOK)

N O T E S :

(1) SPECI designates an aviation selected special report.

(2) When a deterioration of one weather element is accompanied by an improvement in another element (for example lowering of clouds and an improvement in visibility) a single SPECI report shall be issued.

(3) See Notes (2) and (3) under METAR FM 15.D.

(4) Instructions for the group GGgg:

The governing criteria for issuing SPECI reports are specified in WMO Publication No. 49 BD.3, Technical Regulations, Volume II, Part 2 -- Meteorological Service for International Air Navigation (paragraph /12.2./ 2.2.3).

(5) See Notes (5), (7), (9) and (10) under METAR.

(6) Additional groups or supplementary information:

See Note (13) under METAR FM 15.D.

SPECIFICATIONS OF SYMBOLIC LETTERS

Introduce the following symbolic letters (or groups of letters) with their specifications:

CC Genus of cloud in two letters according to the abbreviations in Code 0500 (FM 15.D, FM 16.D)

CCCC International four letter location indicator (FM 15.D, FM 16.D)

(1) ICAO indicators should be used whenever possible.

$D_R D_R$ Number of the runway to which the runway visual range given by $V_R V_R V_R V_R$ refers. (FM 15.D, FM 16.D)

ddd — Direction in degrees from which wind is blowing (FM 15.D, FM 16.D), rounded to the nearest ten degrees.

(1) The direction is to be referred to the true and not to the magnetic north.

$f_m f_m$ — Maximum wind speed, in knots, at surface. (FM 15.D, FM 16.D)

(1) Speeds of 100 knots or more are given in 3 figures.

T'T'
$T'_dT'_d$ — Air temperature/dew-point temperature in whole degrees Celsius. For negative values T'T' and $T'_dT'_d$ are preceded by M. (FM 15.D, FM 16.D)

VVVV — Horizontal visibility at surface in metres up to 9000 metres. (FM 15.D, FM 16.D)

$V_RV_RV_RV_R$ — Runway visual range in metres. (FM 15.D, FM 16.D)

w'w' — Present weather in code figures and optional abbreviations. (FM 15.D, FM 16.D) (Code 4698)

N O T E : In accordance with regional air navigation agreements, the corresponding equivalents, in the form of letter abbreviations (Code 4698) may be added immediately, following the w'w' figures.

NEW CODE TABLE:

CODE 4698

w'w' — Present weather in code figures and optional abbreviations*

Code	Decode	Code	Decode
04 (FU)	Smoke	23 (RESN)	Recent rain and snow**
06 (HZ)	Dust haze	24 (RERA)	Recent freezing rain**
08 (PO)	Dust devils	25 (RESH)	Recent showers**
11 (MIFG)	Shallow fog	26 (RESH)	Recent snow showers**
12 (MIFG)		27 (REGR)	Recent hail**
17 (TS)	Thunderstorm	29 (RETS)	Recent thunderstorms**
18 (SQ)	Squall	30 (SA)	Dust- or sandstorm
19 (FL)	Funnel cloud	31 (SA)	
20 (REDZ)	Recent drizzle**	32 (SA)	
21 (RERA)	Recent rain**	33 (XXSA)	Heavy dust- or sandstorm
22 (RESN)	Recent snow**	34 (XXSA)	
		35 (XXSA)	

N O T E : * Table III (see the Technical Regulations, Volume II, Part 2, pp. 51 to 53) for abbreviated decode of present weather and forecast weather was used as a basis for this table.

** "Recent" applies if the phenomenon was observed during the hour preceding the time of observation.

Code	Decode
38 (BLSN)	Blowing snow
39 (BLSN)	
40 (BCFG)	Fog patches
41 (BCFG)	
42 (FG)	Fog
43 (FG)	
44 (FG)	
45 (FG)	
46 (FG)	
47 (FG)	
48 (FZFG)	Freezing fog
49 (FZFG)	
50 (DZ)	Drizzle
51 (DZ)	
52 (DZ)	
53 (DZ)	
54 (XXDZ)	Heavy drizzle
55 (XXDZ)	
56 (FZDZ)	Freezing drizzle
57 (FZDZ)	
58 (RA)	Rain
59 (RA)	
60 (RA)	
61 (RA)	
62 (RA)	
63 (RA)	
64 (XXRA)	Heavy rain
65 (XXRA)	
66 (FZRA)	Freezing rain
67 (FZRA)	Heavy freezing rain
68 (RASN)	Rain and snow
69 (RASN)	Heavy rain and snow
70 (SN)	Snow
71 (SN)	
72 (SN)	
73 (SN)	
74 (XXSN)	Heavy snow
75 (XXSN)	
77 (SN)	Snow
79 (PE)	Ice pellets
80 (RASH)	Showers
81 (XXSH)	Heavy showers
82 (XXSH)	
83 (RASN)	Showers of rain and snow
84 (RASN)	Heavy showers of rain and snow
85 (SNSH)	Snow showers
86 (XXSN)	Heavy snow showers
87 (GR)	Soft hail
88 (GR)	
89 (GR)	Hail
90 (XXGR)	Heavy hail
91 (RA)	Rain
92 (XXRA)	Heavy rain
93 (GR)	Hail
94 (XXGR)	Heavy hail
95 (TS)	Thunderstorm
96 (TSGR)	Thunderstorm with hail
97 (XXTS)	Heavy thunderstorm
98 (TSSA)	Thunderstorm with dust- or sandstorm
99 (XXTS)	Heavy thunderstorm with hail

ANNEX XXV

Annex to Recommendation 20 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 51.D AERODROME FORECAST

TAF

$G_1G_1G_2G_2$ CCCC dddff(/f_mf_m) (VVVV) (w'w') ($N_sCCh_sh_s$) (CAVOK)

(0$G_FG_FT_FT_F$) (6$I_ch_ih_it_L$) (5$Bh_Bh_Bt_L$) 9$i_3$nnn

N O T E S :.

(1) The code name TAF is used as a prefix to the message, indicating that it is an aerodrome forecast, but in the case of a collective of such forecasts, it should only be used in the heading of the collective.

(2) Groups or elements enclosed in brackets and groups with an indicator figure may, unless otherwise specified, be omitted from a particular message whenever the elements specified in the group are forecast not to occur, or are not required.

(3) Groups may have to be repeated in accordance with the detailed instructions for each group.

(4) Owing to

(i) The unavoidable limitations in the definition of some of the elements, for example, VVVV, h_sh_s, h_ih_i, h_Bh_B, t_L, ff and f_mf_m,

(ii) The variability of these elements over very short intervals of time and space, and

(iii) The present inadequacies of forecast techniques,

the specific value of any of the above elements given in forecasts should be understood to be necessarily approximate, and the value of the element in question should accordingly be interpreted as representing the most probable mean of a range of values which the element may assume during the period of the forecast concerned and over the area or in the airspace concerned.

Similarly, when the time of occurrence or of change of an element is given in a forecast (as indicated by GG and G_p), this time should be interpreted as representing the most probable mean of a range of times.

(5) Instructions for the group CCCC:

When the same forecast applies to several aerodromes, more than one CCCC group may be inserted in the message.

(6) Instructions for the group dddff(/$f_m f_m$):

(i) The mean direction and speed of the forecast wind shall be indicated by dddff.

(ii) When it is forecast that the maximum wind speed will exceed the mean speed by more than 10 knots the maximum wind speed shall then be indicated by adding /$f_m f_m$ immediately after dddff.

(7) Instructions for the group VVVV (See Note 6 FM 15.D - Annex XXIV of this publication).

(8) Instructions for the group w'w' (See Note 8 FM 15.D - Annex XXIV of this publication).

(9) Instructions for the group N_sCC$h_s h_s$:

(i) The group is repeated as often as necessary to forecast the general cloud distribution. The order of the cloud-groups is such that the lowest base is given first, the next higher base second, etc.

(ii) In any cloud-group, the N_s is the total amount of cloud that the forecaster expects to be at the level given by $h_s h_s$.

(iii) When clear sky is forecast, the cloud-group is not used. Cloud-groups are used whenever N_s = 1 to 9.

(iv) When in the first cloud-group N_s = 9 is forecast, that cloud-group should read 9//$h_s h_s$ where $h_s h_s$ is the vertical visibility.

(10) Instructions for the group CAVOK:

When it is expected that the following conditions will apply simultaneously, the code word CAVOK shall be included in the report in place of the groups (VVVV), (w'w') and (N_sCC$h_s h_s$):

(a) Visibility: 10 km or more;

(b) Cloud: amount of the lowest layer 4/8 or less and height of base 3,000 metres or more, and no cumulonimbus present;

(c) Weather: no precipitation and no thunderstorm.

(11) Instructions for the group O$G_F G_F T_F T_F$:

One or more groups O$G_F G_F T_F T_F$ may be used to give the forecast temperature(s) at the time(s) indicated by $G_F G_F$, when this information is required.

(12) Instructions for the group 6I$_c$ $h_i h_i$ t_L:

(1) The group is repeated if more than one type or more than one layer of icing is forecast;

(ii) If the thickness of the layer for any one type of icing is greater than 2,700 m, the group is repeated and the base indicated in the second group coincides with the top of the layer as given in the preceding group;

(iii) The 90-99 decade in the code for $h_i h_i$ shall not be used for aeronautical purposes.

(13) Instructions for the group 5 B$h_B h_B t_L$:

The rules in Note (12) applying to icing are equally applicable to turbulence.

(14) Instructions for the group $9i_3nnn$:

(i) The group $90DP_wH_w$, when applicable, is always placed at the end of the relevant part of the message.

(ii) The change groups $96GGG_p$, $97GGG_p$, $98GGG_p$ may appear after any group in the forecast to indicate that the group(s) following give changed values of the elements given in some or all of the groups preceding. When change groups refer to clouds, the state of sky shall always be completely reflected before and after the change group.

(iii) The group $96GGG_p$ indicates a change beginning at GG and continuing throughout the period indicated by G_p.

(iv) The group $97GGG_p$ (temporary variation(s)) is used:

When the condition is not expected in each instance to last more than one hour. (If the condition is expected to last more than one hour, the group $96GGG_p$ is used or the forecast is divided into periods);

When the condition, if expected to recur, will not, in the aggregate, cover more than half of the forecast period during which the phenomenon is expected to occur, i.e. the time indicated by G_p.

(v) The group $98GGG_p$ (intermittent variations) is used:

If the variations from the main forecast conditions are expected to be more frequent than those which would be indicated by a $97GGG_p$ group.

(vi) If there is a requirement for G_p greater than GG plus nine hours, then the forecast period should be divided.

(vii) The group $9999C_2$ may appear after any group in the forecast. It may be used alone or in combination with a change group. The group indicates the probability of the occurrence of phenomena described in the group(s) which follow, in accordance with the above rules for the change groups.

(viii) For the change group $9i_3nnn$ the plain language equivalents specified in Code 1864, as contained in WMO Publication No. 9.TP.4, Volume B, may be used in accordance with regional agreements.

(15) Additional groups or supplementary information:

(i) Appropriate abbreviations or plain language may be added at the end of the message when directional differences in visibility can be foreseen, and when it is desired to indicate these specific direction(s) and expected visibility in the forecast.

(ii) The forecast of runway visual range should only be given after agreement between the meteorological authority and the operators concerned; in that case this information is added in plain language by using the recognized abbreviations.

(16) An amended aerodrome forecast in code form shall be identified by the use of the prefix TAF AMD in place of TAF and it should cover the whole remaining validity period of the original TAF.

ANNEX XXVI

Annex to Recommendation 21 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No 9.TP.4, VOLUME B

FM 53.D - AREA FORECAST FOR AVIATION

ARFOR

$G_1G_1G_2G_2$ AAAAA (VVVV) ($w_1w_1w_1$) ($N_sCCh_sh_s$)

$7h_th_th_fh_f$ $6I_ch_ih_it_L$ $5Bh_Bh_Bt_L$

($4h_xh_xT_hT_h$ $d_hd_hf_hf_hf_h$) ($2h'_Ph'_PT_PT_P$)

(11111 $QL_aL_aL_oL_o$ $h'_Jh'_Jf_Jf_Jf_J$)

(22222 $h'_Wh'_Wf_Wf_Wf_W$ (d_md_mvv))

$9i_3nnn$

N O T E S :

(1) The code name ARFOR designates an aviation forecast in figure code prepared for a specific area. ARFOR shall always appear as a prefix to the message.

(2) See Notes (2) and (3) under TAF FM 51.D.

(3) Owing to:

(i) The unavoidable limitations in the definition of some of the elements, e.g. VVVV, h_sh_s, h_th_t, h_fh_f, h_ih_i, h_Bh_B, t_L, $f_hf_hf_h$ and T_hT_h ,

(ii) The variability of these elements over very short intervals of time and space, and

(iii) The present inadequacies of forecast techniques, the specific value of any of the above elements given in forecasts should be understood to be necessarily approximate, and the value of the element in question should accordingly be interpreted as representing the most probable mean of a range of values which the element may assume during the period of the forecast concerned and over the area or in the airspace concerned.

Similarly, when the time of occurrence or of change of an element is given in a forecast (as indicated by GG and G_p), this time should be interpreted as representing the most probable mean of a range of times.

(4) The code to be used for AAAAA is subject to regional agreements. Alternatively, plain language may be used.

(5) The 90-99 decade in the code 1577 shall not be used for h_Bh_B, h_fh_f, h_ih_i, h_sh_s, h_th_t, h_xh_x.

(6) Instructions for the group $N_sCCh_sh_s$:

See Note (9) TAF, FM 51.D.

(7) Instructions for the group $7h_th_th_fh_f$:

(i) When it is desired to forecast a number of layers giving both bases and tops for the layers, the cloud- and 7-groups are used in pairs for each layer;

(ii) When the 0°C isotherm is forecast, but no forecast is made for top of clouds, the 7-group has the form $7//h_fh_f$. If two cloud-groups are given but only one 0°C isotherm is forecast, the order of the groups is cloud-group, 7-group, cloud-group, 7-group, as indicated in (i) and the second 7-group is given as $7h_th_t//$.

If one cloud-group is forecast and two 0°C isotherms, the groups are given as cloud-group, 7-group, 7-group with the second 7-group given as $7//h_fh_f$.

(8) See Notes (12) and (13) under TAF FM 51.D.

(9) Instructions for the groups $4h_xh_xT_hT_h$ $d_hd_hf_hf_hf_h$:

These groups shall always be used together and repeated for each level for which temperature and wind are forecast.

(10) Instructions for the jet-stream section:

The group combination 11111 $QL_aL_aL_oL_o$ $h'_jh'_jf_jf_jf_j$, which specifies the position of the jet core and the wind to be encountered in the jet core, may be combined at the end of the message in the form:

11111 $QL_aL_aL_oL_o$ $h'_jh'_jf_jf_jf_j$

$QL_aL_aL_oL_o$ $h'_jh'_jf_jf_jf_j$ $QL_aL_aL_oL_o$ $h'_jh'_jf_jf_jf_j$ etc.

in case the jet extends through a large portion of the area or through several zones.

(11) Instructions for the maximum wind/vertical wind-shear section:

(i) When the maximum wind is forecast but no forecast is made for the vertical wind shear, the last group of the section should have the form $d_md_m//$;

(ii) When only information for vertical wind shear is to be provided the group $h'_wh'_wf_wf_wf_w$ is omitted from the message and the group $d_md_m$vv should have the form //vv.

(12) Instructions for the group $9i_3nnn$:

(i) The groups $90DP_wH_w$, $91P_2P_2P_2$, $92F_tL_aL_a$, $93F_tL_oL_o$, $94F_tGG$ if required, shall always be placed at the end of the relevant part of the message. The groups

$92F_tL_aL_a$, $93F_tL_oL_o$, $94F_tGG$ are only used to indicate the type of front, together with the position or time of passage. The type of weather during the frontal passage is indicated separately, e.g. by separating the forecasts into different periods, or by using the groups $96GGG_p$, $97GGG_p$ and $98GGG_p$ or by a combination of both methods;

(ii) The change groups $96GGG_p$, $97GGG_p$, $98GGG_p$ may appear after any group in the forecast to indicate that the group(s) following give changed values of the elements given in some or all of the groups preceding. When change groups refer to clouds, the state of sky shall always be completely reflected before and after the change group;

(iii) The group $96GGG_p$ indicates a change beginning at GG and continuing throughout the period indicated by G_p;

(iv) The group $97GGG_p$ (temporary variation(s)) is used:

- When the condition is not expected in each instance to last more than one hour. (If the condition is expected to last more than one hour, the group $96GGG_p$ is used or the forecast is divided into periods);
- When the condition, if expected to recur, will not, in the aggregate, cover more than half of the forecast period during which the phenomenon is expected to occur, i.e. the time indicated by G_p;

(v) The group $98GGG_p$ (intermittent variations) is used:

- If the variations from the main forecast conditions are expected to be more frequent than those which would be indicated by a $97GGG_p$ group;

(vi) If there is a requirement for G_p greater than GG plus nine hours, then the forecast period should be divided;

(vii) The group $9999C_2$ may appear after any group in the forecast. It may be used alone or in combination with a change group. If the latter, the $9999C_2$ group precedes the change group. The group indicates the probability of the occurrence of phenomena described in the group(s) which follow, in accordance with the above rules for the change groups;

(viii) For the use of any change group $9i_3nnn$ in coded aeronautical meteorological forecast messages, Meteorological Services have the choice between the coded form of the change group and its plain language equivalent.

(13) An amended area forecast in code form shall be identified by the use of the prefix ARFOR AMD in place of ARFOR, and it should cover the whole remaining validity period of the original ARFOR.

FM 54.D - ROUTE FORECAST FOR AVIATION

ROFOR

$G_1G_1G_2G_2$ CCCC $(QL_aL_aL_oL_o)$ CCCC $0i_2zzz$

(VVVV) $(w_1w_1w_1)$ $(N_sCCh_sh_s)$ $7h_th_th_fh_f$ $6I_ch_ih_it_L$

$5Bh_Bh_Bt_L$ $(4h_xh_xT_hT_h$ $d_hd_hf_hf_hf_h)$ $(2h'_Ph'_PT_PT_P)$

(11111 $QL_aL_aL_oL_o$ $h'_Jh'_Jf_Jf_Jf_J$)

(22222 $h'_Wh'_Wf_Wf_Wf_W$ $(d_md_mvv))$

$9i_3nnn$

NOTES:

(1) The code name ROFOR designates an aviation forecast in figure code prepared for a route between two specified aerodromes. ROFOR shall always appear as a prefix to the message.

(2) See Notes (2) and (3) under TAF FM 51.D.

(3) See Note (3) under ARFOR FM 53.D.

(4) The forecast conditions may be described by one of two methods:

(i) By dividing the route into sections (i_2 = 0 to 5 inclusive) and giving the detail of conditions expected during the period over the extent of each section. Five-degree zones (i_2 = 5) may be combined if weather elements are sufficiently uniform;

(ii) By selecting series of points along the route (i_2 = 6 to 9 inclusive) and forecasting the conditions at these points. Sufficient points must be selected to provide an adequate sampling of the various weather and wind conditions expected along the route.

(5) Instructions for the group $G_1G_1G_2G_2$:

The forecast is considered as valid between the hours G_1G_1 and G_2G_2 at all points or in all sections along the route.

(6) Instructions for route designation - groups CCCC $(Q\ L_aL_aL_oL_o)$ CCCC:

(i) The route to which the forecast applies is given by the international four-letter location indicators CCCC of the aerodromes at either end of the route. Where it is desirable to specify the route in greater detail, group(s) $QL_aL_aL_oL_o$ is (are) included between the CCCC groups to identify a sufficient number of additional points;

(ii) The forecast detail is given starting from the aerodrome of departure indicated by the first CCCC group.

(7) Indications for the $0i_2zzz$ group. This group is used at the start of the forecast for each section or point.

(8) See Notes (5), (6), (7) under ARFOR FM 53.D.

(9) See Notes (12) and (13) under TAF FM 51.D.

(10) See Notes (9), (10), (11), (12) under ARFOR FM 53.D.

(i) In addition to instructions for the group $9i_3nnn$ given in Note (12) under ARFOR FM 53.D the groups 951//, $952L_aL_a$, $953L_aL_a$, $954L_oL_o$, $955L_oL_o$, or the

corresponding plain language alternative terminology shall be used if it is necessary to indicate changes along the route.

(11) An amended route forecast in code form shall be identified by the use of the prefix ROFOR AMD in place of ROFOR and it should cover the whole remaining validity period of the original ROFOR.

FM 55.D - FLIGHT FORECAST FOR AVIATION

FIFOR

$G_dG_dG_aG_a$ CCCC $(QL_aL_aL_oL_o)$ CCCC $0i_2zzz$

(VVVV) $(w_1w_1w_1)$ $(N_sCCh_sh_s)$ $7h_th_th_fh_f$ $6I_ch_ih_tL$

$5Bh_Bh_tL$ $(4h_xh_xT_hT_h$ $d_hd_hf_hf_hf_h)$ $(2h_P'h_P'T_PT_P)$

(11111 $QL_aL_aL_oL_o$ $h_j'h_j'f_jf_jf_j)$

(22222 $h_w'h_w'f_wf_wf_w$ $(d_md_mvv))$

$9i_3nnn$

N O T E S :

(1) The code name FIFOR designates an aviation forecast in figure code prepared for a specified flight. FIFOR shall always appear as a prefix to the message.

(2) See Notes (2) and (3) under TAF FM 51.D.

(3) See Note (3) under ARFOR FM 53.D.

(4) Instructions for route designation:

(i) The aerodrome of departure is indicated by the first international four-letter location indicator CCCC and the aerodrome of arrival by the second indicator CCCC. Where it is desirable to specify the route in greater detail, group(s) $QL_aL_aL_oL_o$ shall be included between these two CCCC groups to identify a sufficient number of additional points;

(ii) The forecast detail is given starting from the aerodrome of departure.

(5) Instructions for the $0i_2zzz$ group. This group is used at the start of the forecast for each section of the route.

(6) See Notes (5), (6), and (7) under ARFOR FM 53.D.

(7) See Notes (12) and (13) under TAF FM 51.D.

(8) See Notes (9), (10), (11), and (12) under ARFOR FM 53.D and Note (10) (i) under ROFOR FM 54.D.

(9) An amended flight forecast in code form shall be identified by the use of the prefix FIFOR AMD, in place of FIFOR, and it should cover the whole remaining validity period of the original FIFOR.

SPECIFICATIONS OF SYMBOLIC LETTERS

Introduce the following symbolic letters (or groups of letters with their specifications):

$d_m d_m$ Direction, in tens of degrees, from which maximum wind will blow at the level given by $h'_w h'_w$ (Code 0877)

$f_h f_h f_h$ Wind speed, in knots, at the level given by $h_x h_x$

$f_w f_w f_w$ Wind speed, in knots, at the level given by $h'_w h'_w$

$h'_w h'_w$ Height of the maximum wind level in ICAO flight level numbers, last figure omitted

vv Vertical wind shear in knots per 300 metres

$w_1 w_1 w_1$ Forecast weather (Code 4691)

(1) Whenever any of the following phenomena are forecast: tropical revolving storm, severe line squall, hail, thunderstorm, marked mountain waves, widespread sandstorm or duststorm, freezing rain; it should be indicated under $w_1 w_1 w_1$;

(2) According to the regional air navigation agreements the corresponding equivalents in the form of letter abbreviations (Code 4691) may be added, following immediately the $w_1 w_1 w_1$ figures.

Code 4691

$w_1 w_1 w_1$ - Forecast weather	Code figures	Abbreviations
Thunderstorm	111	TS
Tropical revolving storm	222	TRS
Severe line squall	333	LSQ
Hail	444	HAIL
Marked mountain waves	555	MTW
Widespread sandstorm	666	SAND
Widespread duststorm	777	DUST
Freezing rain	888	FZR

ANNEX XXVII

Annex to Recommendation 22 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No 9.TP.4, VOLUME B

FM 71.D - Report of monthly means from land station

CLIMAT IIiii $\overline{\text{PPTTT}}$ $\overline{\text{e'e'e'n}_r\text{n}_r}$ $\text{R}_1\text{R}_1\text{R}_1\text{R}_d$/

(NORMAL $\overline{\text{PPTTT}}$ $\overline{\text{e'e'e'n}_r\text{n}_r}$ $\text{R}_1\text{R}_1\text{R}_1$//)

N O T E S : Delete Notes (2) and (4) and renumber Notes (3) and (5) respectively (2) and (3).

FM 72.D - Report of monthly means from ocean weather station

CLIMAT SHIP $99\text{L}_a\text{L}_a\text{L}_a$ $\text{Q}_c\text{L}_o\text{L}_o\text{L}_o\text{L}_o$

$\overline{\text{PPTTT}}$ $\overline{\text{e'e'e'}}$// $\overline{\text{T}_s\text{T}_s\text{T}_s\text{n}_r\text{n}_r}$ $\text{R}_1\text{R}_1\text{R}_1\text{R}_d$/

or

$\overline{\text{T}_s\text{T}_s\text{T}_s}$//

(NORMAL $\overline{\text{PPTTT}}$ $\overline{\text{e'e'e'}}$// $\overline{\text{T}_s\text{T}_s\text{T}_s\text{n}_r\text{n}_r}$ $\text{R}_1\text{R}_1\text{R}_1$//

or

$\overline{\text{T}_s\text{T}_s\text{T}_s}$//)

N O T E S : Delete Notes (2) and (4) and renumber Note (3) to read (2).

FM 75.D - Report of monthly aerological means from land station

CLIMAT TEMP IIiii $\overline{\text{P}_o\text{P}_o\text{P}_o\text{P}_o\text{T}_o}$ $\overline{\text{T}_o\text{T}_o\text{T}_{do}\text{T}_{do}\text{T}_{do}}$

$\overline{\text{HHHHn}_T}$ $\text{n}_T\overline{\text{TTTT}_d}$ $\overline{\text{T}_d\text{T}_d\text{n}_v\text{r}_f\text{r}_f}$ $\overline{\text{d}_v\text{d}_v\text{d}_v\text{f}_v\text{f}_v}$

$\overline{\text{HHHHn}_T}$ $\text{n}_T\overline{\text{TTTT}_d}$ $\overline{\text{T}_d\text{T}_d\text{n}_v\text{r}_f\text{r}_f}$ $\overline{\text{d}_v\text{d}_v\text{d}_v\text{f}_v\text{f}_v}$

....

....

etc.

N O T E S: Delete Note (4) and renumber Note (5) to read (4).

FM 76.D - Report of monthly aerological means from ocean weather station

CLIMAT TEMP SHIP

$99L_aL_aL_a \; Q_cL_oL_oL_o \; \overline{P_oP_oP_oP_oT_o} \; \overline{T_oT_oT_{do}T_{do}T_{do}}$

$\overline{HHHHn_T}$	$n_T\overline{TTTT_d}$	$\overline{T_dT_dn_vr_fr_f}$	$\overline{d_vd_vd_vf_vf_v}$
$\overline{HHHHn_T}$	$n_T\overline{TTTT_d}$	$\overline{T_dT_dn_vr_fr_f}$	$\overline{d_vd_vd_vf_vf_v}$
.....	.....	.....	.....
.....	.....	.....	.....
			etc.

N O T E S : Amend Note (2) to read:
See Notes (2), (3) and (4) under CLIMAT TEMP, FM 75.D.

NEW OR AMENDED SYMBOLIC LETTERS

Delete $\overline{d_vd_v}$ and its specification.

Add :

$\overline{d_vd_vd_v}$ Direction, in degrees, of the monthly mean vector wind at specified isobaric surfaces.(FM 75.D, FM 76.D)

N O T E : 500 is added to $\overline{d_vd_vd_v}$ when the speed of the monthly mean vector wind is 100 knots or more up to 199 knots (see Note (1) under $\overline{f_vf_v}$).

Delete $\overline{UU}$ and its specification.

Add :

$\overline{e'e'e'}$ Mean vapour pressure for the month in tenths of a millibar.(FM 71.D, FM 72.D)

n_v Number of days for which the wind observations are missing for the standard isobaric surface concerned (n_v = 9 if observations are missing on nine, ten or eleven days).
(FM 75.D, FM 76.D)

n_rn_r Number of days in the month with precipitation equal to or greater than 1 mm.
(FM 71.D, FM 72.D)

Amend $\overline{f_vf_v}$ to read:

$\overline{f_vf_v}$ Speed, in knots, of the monthly mean vector wind at specified isobaric surfaces.
(FM 75.D, FM 76.D)

(1) By $\overline{f_vf_v}$ the speed, in knots, is reported up to 99 knots. Greater speeds are reported as follows:

For speeds of 100-199 knots inclusive, 500 is added to $\overline{d_vd_vd_v}$. This

means that when decoding, 100 knots are to be added to the number of knots shown by $f_v f_v$.

$n_T n_T$ Number of days in the month for which temperature observations are missing for the standard isobaric surface concerned. (FM 75.D, FM 76.D)

Delete $R_1 R_1$ and its specification.

Add:

$R_1 R_1 R_1$ Total precipitation for the month (Code 3591) (FM 71.D, FM 72.D)

(1) $R_1 R_1 R_1$ equals precipitation in millimetres if the total for the month is 550 mm or less. If the total precipitation for the month is more than 550 mm and not more than 4960 mm, $R_1 R_1 R_1$ equals the precipitation to the nearest centimetre plus 500; e.g. if total precipitation for the month is 3348 mm, then $R_1 R_1 R_1$ = 835.

Code figures 551 to 554 are not used.

000 = no precipitation
997 = less than 1 mm
998 = more than 4960 mm
999 = measurement impossible

Delete r_f and its specification.

Add:

$r_f r_f$ Steadiness of wind at a specified isobaric surface (FM 75.D, FM 76.D)

(1) The steadiness factor is the ratio of speed of the monthly mean vector wind to the speed of the monthly mean scalar wind expressed as a percentage. It is reported to the nearest one per cent.

ANNEX XXVIII

Annex to Recommendation 23 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

FM 61.D - Forecast for shipping

MAFOR $YYG_1G_1/$ $OAAA_m$ $1GDF_mW_1$ $(2VST_xT_n)$ $(3D_KP_wH_wH_w)$

NEW OR AMENDED NOTES

Renumber Note (2) to read (3).

Add new note:

(2) The group $YYG_1G_1/$ shall be used to give the time (GMT) and date of the beginning of the period for which the whole forecast or set of forecasts is valid. It need not be repeated if forecasts for several areas (AAA) are given in the one message.

Delete the present Note (3) and replace by the following:

(4) The set of groups $1GDF_mW_1$ $(2VST_xT_n)$ $(3D_KP_wH_wH_w)$ can be repeated as many times as necessary to describe the changes in the meteorological conditions forecast in a given area, due attention being given to the need for strict economy in the number of groups used. The first group $1GDF_mW_1$ in which G = 1-8, and the following optional group(s), if used, then refer to the forecast weather commencing at the time given in the group $YYG_1G_1/$ and continuing through the period indicated by G. Subsequent groups $1GDF_mW_1$ (G = 1-8) give the period of time that the described weather is forecast to persist commencing at the end of the period covered by the preceding group $1GDF_mW_1$ (G = 1-8). Any set $1GDF_mW_1$ $(2VST_xT_n)$ $(3D_KP_wH_wH_w)$ (G = 1-8) may be followed by a group $1GDF_mW_1$ (G = 9) describing a phenomenon which is forecast to occur occasionally in the same period.

Renumber the present Notes (4) and (5) to read (5) and (6) respectively.

AMENDED CODE TABLE

Code 1300

G - Period of time covered by forecast

Amend specification of Code figure - 0 to read:

0 Synopsis of meteorological conditions in the forecast area at the time of the beginning of the forecast period.

ANNEX XXIX

Annex to Recommendation 25 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No. 9.TP.4, VOLUME B

Pages I-A-1-5 and I-A-1-27

In FM 21.C amend $YQL_aL_aL_a\ L_oL_oL_oGG$ to read:

$99L_aL_aL_a\ Q_cL_oL_oL_oL_o\ YYGGi_w$

Pages I-A-1-6, I-A-1-29, I-A-1-30 and I-A-1-31

In FM 22.C and FM 23.C amend $YQL_aL_aL_a\ L_oL_oL_oGG$ to read:

$99L_aL_aL_a\ Q_cL_oL_oL_oL_o\ YYGGi_w$

In FM 26.B amend $GGggw_2\ \ YQL_aL_aL_a\ L_oL_oL_o$ to read:

$99L_aL_aL_a\ Q_cL_oL_oL_oL_o\ YYG'G'w_2$

Page I-A-3-11

Before G_FG_F insert:

G'G' Time to the nearest quarter hour GMT (FM 26.B)

(1) The time recorded is that relating to the phenomena reported by w_2

(2) The value of G'G' reported is GG if the time to the nearest quarter hour is GG,
GG+25 if the nearest quarter hour is GG+15 minutes,
GG+50 if the nearest quarter hour is GG+30 minutes, and
GG+75 if the nearest quarter hour is GG+45 minutes.

Page I-A-3-16

After the entry for i_j enter:

i_w Wind indicator (Code 1855)
(FM 21.C, FM 22.C, FM 23.C)

Page I-A-3-19

Add under $L_oL_oL_o$ the following:

$L_oL_oL_oL_o$ Longitude in tenths of a degree (FM 21.C, FM 22.C, FM 23.C and FM 26.B)

(1) See Note (1) under $L_aL_aL_a$

Page I-A-3-25

Add under Q the following:

Q_c Quadrant of globe (Code 3333)* (FM 21.C, FM 22.C, FM 23.C, FM 26.C, FM 33.D and FM 36.D)

Page I-A-3-35

For YY add the references FM 21.C, FM 22.C, FM 23.C, FM 26.B, FM 32.D, FM 33.D, FM 35.D and FM 36.D

Page I-A-4-33

Insert new code as follows:

Code 1855

i_w - Wind indicator

Code figure

0	Wind speed estimated	Wind speed in metres
1	Wind speed obtained from anemometer	
3	Wind speed estimated	Wind speed in knots
4	Wind speed obtained from anemometer	

* See Annex XX of this publication.

ANNEX XXX

Annex to Recommendation 34 (CSM-IV)
Annexe à la recommandation 34 (CMS-IV)

LIST OF STATIONS WHOSE DATA ARE TO BE INCLUDED IN THE NORTHERN HEMISPHERE EXCHANGES

LISTE DES STATIONS DONT LES DONNEES DOIVENT ETRE INCLUSES DANS LES ECHANGES DE L'HEMISPHERE NORD

1. List of surface stations for the construction of northern hemisphere synoptic charts.

1. Liste des stations en surface pour l'établissement des cartes synoptiques de l'hémisphere Nord.

99901: 001 005 025 028 055 062 098 105 152 203 241 262 384 415 482
02: 052 057 062 066 069 077 084 090 095 836 897 911 935 963
03: 005 026 100 171 222 302 334 395 628 772 797 804 917 953
04: 005 018 063 077 082 202 210 212**220 230 250 260 270 280 310 320 330 340 350 360 380 390
06: 011 081 180 230 447 610
07: 110 130 149 150 180 222 240 460 480 510 630 650 690 747 761
08: 001 023 160 181 221 261 (284) 285 306 314 391 495 503 506 509 515 521 536 538 575 583 589 594
10: 035 147 185 203 (202) 338 384 385 393 410 438 738 866
11: 036 518 782 934
12: 105 250 295 330 375 424 577 839 882 982
13: 128 274 333 462 483 615
15: 120 310 420 552 614
16: 059 080 105 158 190 242 261 310 320 350 420 470 560 597 622 641 687 716 743 749 754
17: 022 026 038 050 060 096 124 128 170 196 200 219 240 244 280 350 606
20: 046 069 087 107 274 292 353 667 674 744 891
21: 358 432 504 647 802 824 946 965 982
22: 113 165 217 235 271 522 550 583 657 768 802 820 887

99923: 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

25: 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

99927: 037 196 271 553 595 612 703 731 906 947

28: 064 225 255 275 434 440 493 642 661 679 698
722 748 825 838 879 900 952

29: 231 263 282 313 356 574 612 634 698 807 838 865 894

30: 028 054 230 309 372 393 433 521 554 636 673 692 710
758 802 823 862 879 935 949 965

31: 004 088 123 137 168 300 329 369 388 416 484 510 532
538 707 735 770 829 873 909 960

32: 053 061 098 150 165 186 195 217 252 389 411 509 540
564 611 618

33: 008 036 041 317 345 393 631 658 791 815 837 910 946

34: 009 122 172 247 300 336 391 500 560 691 731 824 858
866 880

35: 078 108 121 133 229 358 361 394 406 416 529 542 576
663 700 746 796 925 953

36: 003 061 177 428 498 665 729 859 870 982

37: 018 054 235 260 395 472 549 575 789 985

38: 001 062 081 178 198 232 262 341 353 388 392 457 507
545 613 656 687 696 750 763 836 880 895 927 954 974

40: 001 007 039 045 091 100 180 191 199 230 270 290
310 356 357 362 372 375 395 416 427 430 438 449
477 560 564 572 575 586 597 621 642 650 676 689
706 712 718 736 745 743 754 766 767 769 800 809
821 831 841 846 848 856 875 941 948 966 981

41: 350 530 598 620 624 640 661 675 712 715 756 765 768
780 858 917 941

42: 103 131 165 182 189 314 339 348 361 379 398 410 475
559 591 623 634 647 704 754 779 809 840 867 875 886
909 971 977

43: 003 014 041 063 117 128 149 181 192 201 237 279 284
295 314 329 333 344 353 368 369 371 400 418 467 497
540

44: 214 231 259 277 288 292 304 354 373

45: 005

46: 692 749 (766) 699 810 902

47: 008 058 105 108 146 159 165 184 401 412 420 426 430
582 585 590 598 600 602 636 662 673 744 778 807 827
843 891 898 909 927 936 945 963

```
                                                                    094
99948:  008 018 042 053 062 069 074 078 080/096 108 110 112 303
        327 331 381 400 407 431 455 462 480 500 564 568 601 615
        620 647 657 665 694 820 838 848 855 860 866 870 877 900
        918 930 940 948 966 972 983 991

   50:  527 557 632 727 745 756 915 949 953 963 978

   51:  076 156 463 567 644 709 777 828 855 895 931

   52:  203 256 267 418 533 681 818 856 889

   53:  068 276 336 463 502 543 673 698 723 845 863

   54:  102 135 161 208 292 324 342 423 471 511 534 616 662 774
        823 857

   55:  299 472 591 773

   56:  029 046 116 146 182 294 312 444 462 671 739 778 964 985

   57:  006 036 083 237 265 297 447 461 494 515 662 679 745 816
        902 957 993

   58:  027 040 102 238 251 367 424 457 477 527 633 666 715 847
        921

   59:  023 082 134 265 293 316 431 663 758 838 948 981

   60:  020   030   096   115   120** 155   185   190   230
        250   275   360   390   425** 490   525** 545** 571
        580   590   606** 611   630** 670** 678   680** 715
        735   760 765**

   61:  017** 024** 049** 052  (036**)075**(043**)090   096**
        202** 214** 223** 226   230** 240** 250** 257   265
        272  (277)  285** 290  (296**)297**(293**)401** 403**
        415   415   442   450** 497**(499**)600  (627**)630**
       (498**)641  (679)  687   695  (701)  816**(766)  829**
        832  (856)  866** 881   902   931   934**

   62:  002   010   016   019   053   055   063   103   124
        131   161   259** 271   306   318   333   338   366  387
        405   414   417   420   432   462   640   641   660
        680   721   730   751   752** 760   770   771   772
        781** 820** 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**)676** 694** 705

   64:  005** 014** 006** 040   062   458** 459** 460** 500
       (501**)510** 556**(552**)600  (961**)610** (605**)650
        654   656   658** 659** 660** 661**(655**)662** 700
        701** 705** 706** 750   751**(708**)(7[illegible]**)753** 754**
        756** 853  (851**)860  (880**)870   893  (890**)900
        901** 910   931   950   960** 971**

99965:  001** 019   046  (015**)073  (064**)082   101   123
       (112**)134   167   201  (208)  229  (236)  243   250
        257   271   306   330  (361)  335** 352  (319**)387
       (344)  418   432   442   467  (465)  472  (475)  503
       (545**)510  (522**)528** 539** 548   555  (557**)578
       (585**)592**(599**)660
```

99970: 027 086 133 200 218 219 222 231 261 273 279 308 316
326 350 361 381 388 398 414 454

72: 202 206 208 211 219 220 222 226 232 235 240 242 248
250 251 259 265 270 274 278 280 290 304 308 311 317
326 327 334 340 344 353 363 365 374 386 394 405 413
423 429 440 445 451 454 469 476 486 488 493 503 506
518 520 528 532 534 537 544 553 562 572 576 578 583
597 600 601 603 606 624 627 636 645 654 662 677 681
694 705 707 712 716 717 726 734 735 738 743 747 749
753 764 768 773 775 785 793 800 803 809 811 813 815
816 818 819 822 825 826 828 831 836 840 841 846 848
852 860 863 867 869 870 872 877 891 893 896 900 903
904 905 906 907 908 909 910 913 914 915 916 917 918
920 921 923 924 925 926 932 934 936 938 940 945 946
949 953 964 965

74: 043 051 062 072 074 081 082 090 091 093 094 098 120 188 189

76: 050 151 160 225 255 342 382 405 412 458 499 549 556
573 581 644 649 680 692 695 741 805 833 904

78: 016 073 095 119 325 355 367 383 397 439 486 501 526
584 663 730 741 762 806 894 897 954 970 988

80: 001 009 022 062 089 097 099 110 144 156 308 336 401
407 410 413 419 423 444 447 450 453 457 462 463

81: 002 202 225 251 276 405

82: 017 029 067

91: 066 115 131 155*165 190 212 218 232*245 250 275 285
334 337 348 356*366 371 376 408 413 487 490*601 610
700

96: 001 035 109 145 147 163 413 421 441 465 491 509

97: 008 014 028 048 404 450

98: 135 223(232)327 328 429 439 444(526)550(543)618,630
642 645 653 748 755 836(830)754

Stationary meteorological ships A B C D E I J K M N P V T
Navires météorologiques stationnaires A B C D E I J K M N P V T

Arctic floating stations
Stations flottantes arctiques

Ships' reports
Messages de navire

Notes: * Observations are at present only made at 0000 GMT
* Observations effectuées uniquement à 0000 TMG

** Observations are at present only made at 1200 GMT
** Observations effectuées uniquement à 1200 TMG

List of upper-air stations for the construction of northern hemisphere synoptic charts.

Liste des stations en altitude pour l'établissement des cartes synoptiques de l'hémisphère Nord.

99901: 001 028 152 241 384 415
02: 057 066 077 084 160 836 935 963
03: 005 026 170 322 496 774 808 920 953
04: 018 202 220 270 310 320 340 360
06: 011 030 181 260 447 476 610
07: 110 145 180 480 510 645 761
08: 001 221 302 495 509 521**536 594**
10: 035 184 202 338 393 410 739 866
11: 035 518 934
12: 105**330 374 425 577 843 982
13: 130 276
15: 120 420 614
16: 044 080 242 320 420 560 596 622 716 754
17: 030 062 130 220 280 606
20: 046 069 107 274 292 353 674 744 891
21: 358 432 504 647 824 965 982
22: 113 271 522 550 802
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
26: 038 063 258 298 422 629 702 781 850
27: 037 196 553 595 612 947
28: 275 440 698 722 900 952
29: 231 282 574 612 634 698
30: 054 230 521 554 636 673 692 710 758 935 965
31: 004 088 168 300 329 369 510 707 735 873 909 960
32: 061 150 165 186 217 389 540 618
33: 008 036 345 393 631 658 815 837 946
34: 009 122 172 300 560 731 858 880

99935:	108	121	229	394	700	746	796	
36:	177	870						
37:	018	054	260	549	789	985		
38:	062	081	392	457	507	545	613	
	687	750	763	836	880	954		
40:	007	100	179	265*	372	427	449	477**
	564	575	586	597	650	689**	754	
	841**	948						
41:	350	530*	640*	661*	675**	756*	780*	
	917*							
42:	182	339	410	475	647	809	867	
43:	003	149	279	295	333	369*	371	
	466**	540						
44:	292	354	373					
45:	004*							
46:	692*	(697)	747					
47:	058	122	187	401	412	420	582	
	590	600	646	678	744	778		
	807	827	909	918	931	945	963	
48:	053	097	(096)	327	407	455	568	
	601*	694*	819	838	848	855	900	
50:	527	557	953					
51:	076	431*	463	644	709	777	828	
52:	203*	267	323	418	533	681	(652*)	
	818	836	866	889				
53:	068	463	513	641	(915*)	772	845	
54:	102	135	161	218	292	337*	342	
	374	497*	511	662*	823	857		
55:	299	591						
56:	096	(080*)	137*	146	(029*)	294	492	
	571	691	739	778	964	989		
57:	036	083	127	447	(328*)	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	
	987							
60:	020	060	096	115	119*	127	155**	
	390**	571**	580**	630**	678*	680**	715*	760*
61:	017**	024**	052	090	(075**)	202	214**	
	226	257	(265)	272	290	401	403**	
	415	421	(442)	641	(800)	766**	(695**)	
	829	832**	(856)	902				

99962:	011	062	131	161	271	306	378
	414	641**	660	721**	760	771	840**
	880	941					
63:	021**	125**	210	230	260**	450*	(451*)
	612	684	705**	(654**)			
64:	005**	458	(459)	500**	600	(931)	650
	(610**)	656	700	750	(654)	753	756
	870	(860)	910	(893)			
65:	046	201**	(202)	306	330	(361**)	387
	503	510	548	(555)	578	(592**)	
70:	026	086	133	200	219	231	261
	273	308	316	326	350	361	398
	414	454					

99972:	201 202 206 208 211 221 224** 226 232 25[illegible] 24[illegible] 250
	251 253 259 261 265 270 274 290 304 311 317 327 340
	353 363 365 374 386 393 403 [illegible]25 429 445 451 456 469
	476 486 493 506 518 520 528 532 553 562 572 576 583
	597 600 606 637 645 655 662 681 694 712 722 734 747
	764 768 775 785 793 798 807 811 81[illegible] 816 8[illegible]6 8[illegible]6 848
	867 879 896 906 907 909 913 915 917 918 924 926 934
	938 945 957 964 968
74:	043 051 072 074 081 082 090 109 486
76:	225 255 394 458 644 679 692 749 904
78:	016 063 076 089 118 325 355 367 384 397 439 486 501
	526 806 866 897 954 967 988
80:	001 028 222 259 413 444 447**
81:	200 251 405
91:	066 115 131 165 217 245 250 275 285 334*337 348*366
	376*408*413*610 700
96:	001 035*145 163 413 465 509
97:	014 404 450
98:	223**327 444 618 653 754 836**

*

* *

Stationary meteorological ships A B C D E I J K M N P V T
(T- during summer season only)

Navires météorologiques stationnaires A B C D E I J K M N P V T
(T- en été seulement)

CODED AIREPS
MESSAGES AIREP CHIFFREES

Arctic floating stations
Stations flottantes arctiques

PILOT TEMP SHIP PILOT SHIP reports
Messages PILOT TEMP SHIP PILOT SHIP

Selected satellite data

Note: * Observations are at present only made at 0000 GMT
* Observations effectuées uniquement à 0000 TMG
** Observations are at present only made at 1200 GMT
** Observations effectuées uniquement à 1200 TMG

ANNEX XXXI

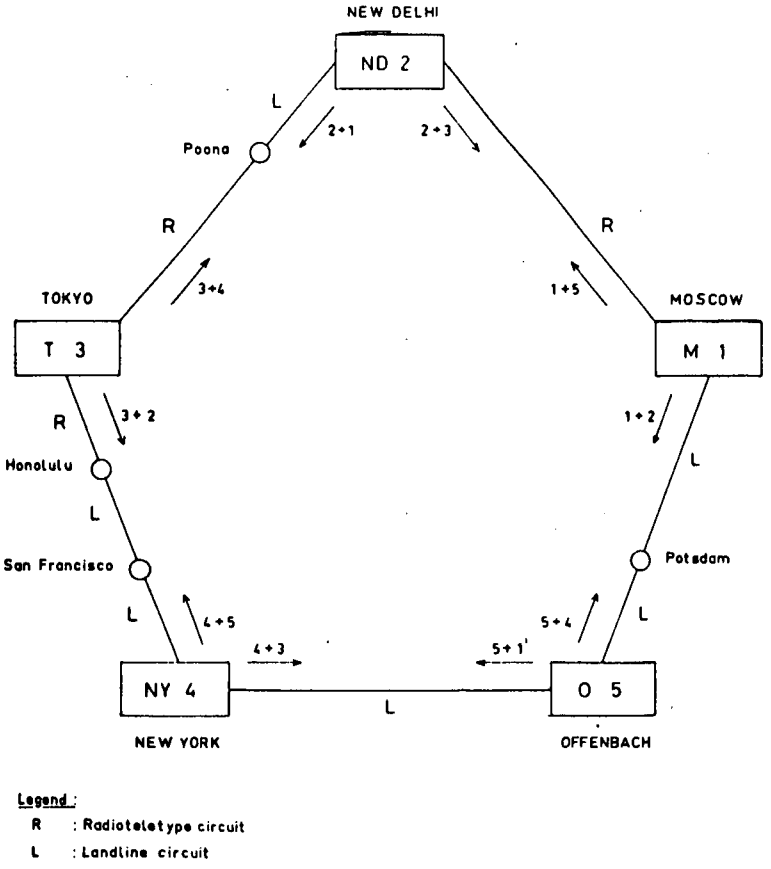
Annex to Recommendation 37 (CSM-IV)

AMENDMENTS TO WMO PUBLICATION No 9.TP.4, VOLUME C, CHAPTER I

Part II

The diagram of the Northern Hemisphere Exchange System in paragraph 1.1.4 should be changed as shown below:

PLAN OF THE NORTHERN HEMISPHERE EXCHANGE SYSTEM



NOTES: (1) The programme from Offenbach is obtained at Moscow through IMTNE channels.

(2) As an interim arrangement the Offenbach data will be transmitted to Tokyo via Moscow and New Delhi instead of via New York, San Francisco and Honolulu.

Paragraph 1.1.5

In the first sentence, omit "(TEMP, PART A)".
Replace the second sentence (lines 2 and 3) by the following:

The individual stations from which reports are to be included are determined in sessions of the Commission for Synoptic Meteorology. Between sessions of that Commission, its president can approve changes.

Paragraph 2.1.1.2(b)

At the end of sub-paragraph, omit * and corresponding footnote.

Paragraph 2.1.1.2(c)

Insert (d) before "The above transmissions, etc.".

Paragraph 2.3

Omit the final section from "Coded data, plotted, etc." to end of footnote.

Part III

Paragraph 2, Note 2

Omit "4" in "(groups 2, 4 and 5)".

Paragraph 3

Add after Ref. Res. 24 (EC-IV):

In messages from mobile ships the 4-letter call sign should begin the line containing each ship's report. If this 4-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.

Paragraph 7

Add: Since procedural signals listed below are numerous, short bulletins should be avoided as far as possible.

Paragraph 7.3.1

After "TT : Data designator (see Table A)" under "AA" replace present text by:
AA: Geographical designator (for land stations see Table B)
(for ships see Table C)

(N O T E : A new Table C is inserted later and present Table C renamed Table D).

In Note 1, change second sentence to read:

It corresponds, except in the case of bulletins of ship reports, to an agreed list of station reports etc.

Paragraph 7.4

Replace by:

The text of a bulletin should consist of messages in one code form only, e.g. SYNOP, TAFOR, etc.

Paragraph 7.4.3

Replace "report" by "message".

Paragraph 7.4.4

Replace by:

Message separation signal: Each individual message and successive parts A, B and C of current aerological messages shall be terminated by one Signal No. 22 (figure case position) of the International Telegraph Alphabet No. 2. This will follow the last figure of the last group of each message with no intervening space. In upper-air bulletins individual station reports and successive sections of current aerological messages will be immediately preceded by the alignment function (see paragraph 7.6 below) and an additional Signal No. 28 ("Line feed"). Additionally, parts A and B of an aerological report when one immediately follows the other shall be separated by 8-letter shift signals.

Paragraph 7.7

Insert new paragraph, reading:

To render non-effective 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. The full bulletin format is illustrated in Table D.

Paragraph 7.7

Renumber to read: 7.8

Paragraph 7.7.1

Renumber to read: 7.8.1

Paragraph 7.7.2

Renumber to read: 7.8.2

Paragraph 7.7.3

Replace in toto by the following:

7.8.3 When an error is detected during and before completing a transmission but too late for an immediate correction the full message corrected and preceded on the same line by "COR" will be transmitted at the end of the text of the bulletin and prior to end of transmission signals. If more than one message requires correction, "COR" will be inserted before each corrected message.

Paragraph 7.7.4

Replace in toto by:

7.8.4 In actual or forecast analysis bulletins, errors detected after transmission of a bulletin is completed will not be corrected.

In all other bulletins, errors detected after transmission shall be corrected by means of a new bulletin. The abbreviated heading of the new bulletin will consist of the abbreviated heading of the bulletin containing the error followed by the indicator "COR" on the same line. The text will consist of the correct and full version of all messages in which errors have been detected. In TEMP and PILOT messages, Parts A, B, C, with appropriate MiMi indicators, may be treated as separate messages.

Add the new paragraph;

7.9 Procedure for repetition

When for a particular reason it is necessary to repeat a bulletin which has already been transmitted correctly, it shall be preceded by the indicator DUPE written on a separate line between the preliminary line and the line containing the abbreviated heading - the addressee being stated after the indicator DUPE.

Example:
ZCZC
DUPE EBBR
SMFRI LFPW 020600

PAGE C - CHAPTER I - 23 E

Add to heading of Table B under TTAA(i) etc. "for bulletins containing messages from land stations".
After Page C - Chapter I - 28 E - insert new Table as follows:

TABLE C

GEOGRAPHICAL DESIGNATORS (AA) FOR USE IN ABBREVIATED HEADINGS

TTAA(i) CCCC(k) YYGGgg in 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	G
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".

PAGE C - CHAPTER I - 28 E

Replace "C" by "D" in table heading.
In lines 5 and 6 insert before 810 and 836 the figure shift symbol.

PAGE C - CHAPTER I - 31 E

In the Indian Ocean section of chart, for "West" read "East" and vice versa.
The French text on the right-hand side of the map should read "occidentale".

ANNEX XXXII

Annex to Recommendation 43 (CSM-IV)

SPECIFICATIONS FOR TELEGRAPH TRANSMISSIONS (LINE AND H.F. RADIO)

1. The nominal basic modulation rate for telegraph type transmission shall be 50 bauds.

2. For telegraph type transmissions where a modulation rate higher than 50 bauds is required, the preferred alternative is 75 bauds.

3. The nominal duration of the tansmitting cycle should be at least 7.4 units (preferably 7.5), the stop element lasting for at least 1.4 units (preferably 1.5).

4. The International Telegraph Alphabet No. 2 should be used.

5. The maximum number of characters which the textual line of page printing apparatus may contain should be 69.

6. The over-all distortion of the teleprinter signal, as checked on leaving the transmitting terminal, should not exceed 10 per cent.

7. The definitions of "marking" and "spacing" are those contained in the ITU List of Definitions of Essential Telecommunications Terms (Yellow-Book - paragraphs 31.05, 31.06, 31.36 and 31.37). The "marking" signal corresponds to the "stop" element.

RECOMMENDATIONS OF THE COMMISSION FOR SYNOPTIC METEOROLOGY
ADOPTED PRIOR TO ITS FOURTH SESSION AND MAINTAINED IN FORCE

Rec. 73 (CSM-II) - WORLD CLIMATIC ATLASES

THE COMMISSION FOR SYNOPTIC METEOROLOGY,

NOTING the provisional generalized list of parameters for maps of the free atmosphere prepared by the Working Group of the Executive Committee on Climatic Atlases;

CONSIDERING that until the map scales, projections, etc. are finalized detailed comment is inappropriate;

RECOMMENDS

(1) That the provisional generalized list of parameters for maps of the free atmosphere be regarded as satisfactory for synoptic purposes with the addition of one item to Group III to read:

(iv) Extreme positions of the thickness lines by months;

(2) That if all the maps are not produced simultaneously the priority be:

(i) Group I;

(ii) Item (iv) of Group III;

(iii) Group II;

(iv) Items (i), (ii) and (iii) of Group III.

LIST OF DOCUMENTS

Doc. No.*	Title	Agenda item	Submitted by
1	Provisional agenda Rev. 1, Second provisional agenda Rev. 1, Add. 1 Rev. 2/P, Final agenda Rev. 2, Corr. 1/P	1.3	-
2	Explanatory memorandum concerning the provisional agenda Rev. 1, Explanatory memorandum concerning the second provisional agenda Rev. 1, Add. 1	1.3	-
3	Report of the Chairman of the CSM Working Group on Codes Add. 1, Add. 2, Add. 3, Add. 4	5	Chairman of the working group
4	Telecommunications	7	Chairman of the working group
5	Guidance material required for hydrological forecasting	9	Secretary-General
6	Establishment of working groups	15	Secretary-General
7	Definition and reporting of mist and fog	11.4	Secretary-General
8	Equivalent speed for Beaufort numbers	11.5	Secretary-General
9	Preparation of a text on the organization of meteorological activities in the field of synoptic meteorology	13	Secretary-General
10	Review of Technical Regulations – The use of the term GMT as a synonym for Universal Time (UT) or Greenwich Civil Time (GCT)	12	Secretary-General
11	Report by the chairman of the CSM Working Group on Telecommunications	2, 7	Chairman of the working group
12	Report by the chairman of the Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology Add. 1	2, 10	Chairman of the working group

* The documents of which the number is followed by "/P" are those that were considered in Plenary meetings.

Doc. No.	Title	Agenda item	Submitted by
13	Coding, selection, editing and exchange of aircraft reports on a global or hemispheric scale Add. 1	5, 6, 7	Secretary-General
14	Requirements for synoptic meteorology — Priority in transmissions of the various types of meteorological data	4	Secretary-General
15	Report by the chairman of the Working Group on Minimum Performance Characteristics of Automatic Weather Stations	2, 6	Chairman of the working group
16	Telecommunications — Problems relating to radio frequencies	7	Secretary-General
17	Networks — Special codes for automatic weather stations	6, 5	Secretary-General
18	Report by the chairman of the Working Group on Facsimile Equipment Standardization Corr.1	2, 7	Chairman of the working group
19	Report by the Chairman of the CSM Working Group on the Synoptic Use of Meteorological Data from Artificial Satellites.	2, 8	Chairman of the working group
20	Description of hydrometeors	11.6	Belgium
21	Report by the chairman of the Working Group on Methods of Analysis and Prognosis in the Tropics	2, 9	Chairman of the working group
22	Pressure reduction methods	11.2	Secretary-General
23	Review of Technical Regulations	12	Secretary-General
24	Definition and reporting of visibility — Visibility terminology	11.3	Secretary-General
25	Report of the Working Group on Definition of Terms Used to Describe the Intensity of Meteorological Phenomena	2, 11.1	Chairman of the working group
26	Numerical Weather Prediction — Report of the Joint CAe/CSM Working Group on Numerical Prediction Add. 1, Corr. 1	2, 9	Chairman of the working group

Doc. No.	Title	Agenda item	Submitted by
27	Consideration of the report of the chairman of the Working Group on Codes — Code resolution of upper-wind parameters — Criteria for determining significant levels with respect to wind	5	Netherlands
28	Codes — Reporting of surface wind data for aeronautical purposes	5	Secretary-General
29	Requirements for synoptic meteorology	4	Secretary-General
30	Exchange of views on World Weather Watch with special reference to aspects of direct concern to CSM	3	Secretary-General
31	Technical Regulations — Definition and symbol for Convergence Line	12	Secretary-General
32	Review of previous resolutions and recommendations of the Commission and relevant Executive Committee decisions	14	Secretary-General
33	Analysis and forecasts — Verification of forecasts	9	Secretary-General
34	Report of the Working Group on Networks	2, 6	Chairman of the working group
35	Report by the President of the Commission	2	President, CSM
36	Consideration of the Report of the Third Session of the Working Group on Telecommunications — A plan for a global telecommunications system to meet the requirements of the World Weather Watch Add. 1	7	U.S.A.
37	Codes — Requirements of CCl for CLIMAT and CLIMAT TEMP reports	5	President, CCl
38	Codes — FM 41.D — Upper-air report from aircraft	5	United Kingdom
39	Requirements for synoptic meteorology — Requirements as to the content of northern hemisphere exchange Add. 1	4	Secretary-General
40	Report of the chairman of the Working Group on Long-Range Weather Forecasting	2, 9	Chairman of the working group
41	The relation between Beaufort force wind speed and wave height Corr. 1	11.5	United Kingdom

Doc. No.	Title	Agenda item	Submitted by
42	Telecommunications — Comments suggested by the Secretary-General on the report of the third session of the Working Group on Telecommunications Corr. 1	7	Secretary-General
43	Telecommunications — Contribution to the study of the standardization of high-speed data transmission	7	France
44	Northern hemisphere observation network	4, 7	France
45	Reporting of positive and negative temperatures	5	South Africa
46	Arrangement of indicators in SYNOP and SHIP code forms	5	South Africa
47	Position of present and past weather groups	5	South Africa
48	Suggested modifications to the proposed SHIP code form	5	South Africa
49	Reporting of wind waves and swell waves	5	South Africa
50	Distribution of meteorological information from Regions I, II, III, and V	7	U.S.S.R.
51	Standard WMO headings for facsimile charts	7	U.S.A.
52	Improvement of "Direct Reading" features of aeronautical meteorological messages	5	ICAO
53	A note on the automatic data input system applied at the Norwegian meteorological institute	5, 7	Norway
54	Reporting of present and past weather phenomena (Type II data)	5	Upper Volta
55	Cloud variations in aeronautical forecasting reports	5	Italy
56	Comments by the president of CMM on the CSM-IV agenda	5, 6, 7, 8, 9, 10, 11, 13	President of CMM
57	Requirements for synoptic meteorology — standard levels in the high atmosphere	4	Secretary-General

Doc. No.	Title	Agenda item	Submitted by
58	Exchange of views on global data processing system	3	Zambia
59/P	Synoptic use of meteorological satellite data	8	Chairman of Committee C
60/P	Use of AFTN circuits for the transmission of basic meteorological information	7	Chairman of Committee B
61/P	Technical characteristics of meteorological transmissions and equipment characteristics	7	Chairman of Committee B
62/P	Problems relating to radio frequencies	7	Chairman of Committee B
63/P	Examination of the results of various meetings of the International Telegraph and Telephone Consultative Committee (CCITT) and the International Radio Consultative Committee (CCIR) of the International Telecommunication Union (ITU) - Training of personnel engaged in meteorological telecommunications	7	Chairman of Committee B
64/P	Data designators as adopted by WMO vis-à-vis "Bulletin Category Identifiers" as adopted by ICAO MOTNE Panel - Standard headings for facsimile charts	7	Chairman of Committee B
65/P	Establishment of special practices for transmission of weather charts intended for reception by ships	7	Chairman of Committee B
66/P	Review of the Technical Regulations, Chapter I - Definitions, and Chapter 6 - Meteorological Telecommunications Rev. 1	7	Chairman of Committee B
67/P	Minimum performance characteristics of automatic weather stations Corr. 1	6	Chairman of Committee C
68/P	Review of WMO publication No. 9.TP.4, Volume C, Chapter I - Guide to meteorological telecommunications Rev. 1	7	Chairman of Committee B
69	Code $t_R t_R$	5	France

Doc. No.	Title	Agenda item	Submitted by
70/P	Preferred characteristics of radio transmissions from meteorological satellites to ground stations (APT) Collaboration between the Intergovernmental Oceanographic Commission (IOC) and WMO in the field of telecommunications	7	Chairman of Committee B
71/P	Telegraphic notifications of changes to Volumes A and C of WMO Publication No. 9.TP.4	7	Chairman of Committee B
72/P	Reporting of aircraft observations	5	Chairman of Committee A
73/P	Reporting of ship's average speed	5	Chairman of Committee A
74/P	Procedures for selection of aircraft reports for international exchange	6	Chairman of Committee C
75/P	Priority in transmissions of various types of meteorological data	4	Chairman of Committee C
76/P	Improvement of collection and distribution of observational information	7	Chairman of Committee B
77/P	Network density	6	Chairman of Committee C
78/P	International distribution of meteorological information obtained by artificial satellites	7	Chairman of Committee B
79/P	Symbol and definition for Convergence Line	12	Chairman of Committee C
80/P	Equivalent wind speeds for Beaufort numbers Rev. 1	11.5	Chairman of Committee C
81/P	Reporting of ship's position Add. 1,Add. 1, Corr. 1, Add. 2	5	Chairman of Committee A
82/P	Report from rocket-sonde stations Corr. 1	5	Chairman of Committee A
83/P	General Summary of the work of the session	1, 2	Representative of Secretary-General
84/P	Telecommunication problems arising from the use of electronic computers and automatic plotting devices - Re-establishment of the Working Group on Telecommunications	7	Chairman of Committee B

Doc. No.	Title	Agenda item	Submitted by
85/P	The use of the term Greenwich Mean Time (GMT) as a synonym for Universal Time (UT) or Greenwich Civil Time (GCT) Rev. 1	12	Chairman of Committee C
86/P	General questions	4	Chairman of Committee C
87/P	Descriptions of hydrometeors	11.6	Chairman of Committee C
88/P	Methods of analysis and prognosis in the tropics Rev. 1	9	Chairman of Committee C
89/P	Pressure reduction methods Rev. 1	11.2	Chairman of Committee C
90/P	Requirements for upper-air data Corr. 1	5	Chairman of Committee A
91/P	Guidance material required for hydrological forecasting	9	Chairman of Committee C
92/P	Exchange of meteorological information by facsimile	7	Chairman of Committee B
93/P	Definition and reporting of mist and fog	11.4	Chairman of Committee C
94/P	Reception reports of radio transmissions	7	Chairman of Committee B
95/P	Numerical weather prediction	9	Chairman of Committee C
96/P	Standard levels in the high atmosphere Rev. 1	4	Chairman of Committee C
97/P	Verification of forecasts	9	Chairman of Committee C
98/P	Changes in the Guide to the preparation of synoptic weather charts and diagrams	5	Chairman of Committee A
99/P	Aviation weather reports Corr. 1, Corr. 2, Add. 1	5	Chairman of Committee A
100/P	Analysis and forecasts of interest to CMM	9	Chairman of Committee C

Doc. No.	Title	Agenda item	Submitted by
101/P	Codes for analyses and prognosis Corr. 1	5	Chairman of Committee A
102/P	Units for wind speed in meteorological messages for international exchange	5	Chairman of Committee A
103/P	Long-range weather forecasting	9	Chairman of Committee C
104/P	Review of the existing and at present recommended systems	7	Chairman of Committee B
105/P	Exchange of views on World Weather Watch with special reference to aspects of direct concern to CSM	3	Chairman of Committee C
106/P	Qualifications and training	10	Chairman of Committee C
107/P	Planning of the WWW global telecommunication system	7	Chairman of Committee B
108/P	Principles for determining requirements for present and past weather	5	Chairman of Committee A
109/P	Establishment of Working Group on Data Needs and Codes Add. 1	5	Chairman of Committee A
110/P	PILOT and PILOT SHIP code forms Corr. 1, Corr. 2	5	Chairman of Committee A
111/P	Requirements for non-meteorological data contained in messages	5	Chairman of Committee A
112/P	Report of the Nomination Committee for the election of president and vice-president of the Commission for Synoptic Meteorology	16	Chairman of the Nomination Committee
113/P	Implementation of code and telecommunication decisions adopted by the fourth session of CSM	5, 7	Chairmen of Committees A and B
114/P	Identification of ship report and position	5	Chairman of Committee A
115/P	Upper-air report from aircraft Corr. 1	5	Chairman of Committee A
116/P	Reports of monthly means	5	Chairman of Committee A

Doc. No.	Title	Agenda item	Submitted by
117/P	TEMP and TEMP SHIP code forms Corr. 1	5	Chairman of Committee A
118/P	Requirements for surface observations other than present and past weather	5	Chairman of Committee A
119/P	Preparation of a text on the organization of meteorological activities in the field of synoptic meteorology	13	Chairman of Committee C
120/P	Additions and amendments to the Technical Regulations	12	Chairman of Committee C
121/P	Definition of terms used to describe the intensity of meteorological phenomena	11.1	Chairman of Committee C
122/P	Review of previous resolutions and recommendations of the Commission and relevant Executive Committee decisions	14	Chairman of Committee C
123/P	Definition and reporting of visibility	11.3	Chairman of Committee C
124/P	Time interval for computing mean surface wind for aeronautical purposes	5	Chairman of Committee A
125/P	Advisory Working Group of CSM	15	Chairman of Committee A
126/P	Amendments to the Technical Regulations	5	Chairman of Committee A
127/P	Report of the ad hoc Committee on Composition of CSM Working Groups	15	President of CSM
128/P	Amendments to current surface codes	5	Chairman of Committee A
129/P	Implementation of code changes recommended by the fourth session of CSM Corr. 1, Corr. 2	5	Chairman of Committee A
130/P	Aerodrome forecasts	5	Chairman of Committee A
131/P	Forecast for shipping	5	Chairman of Committee A
132/P	Area, route and flight forecast for aviation	5	Chairman of Committee A
133/P	Election of officers	16	-
134/P	Scientific lectures and discussions	18	-

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. 198.RP.70

Decisions of the Executive Committee on the Abridged Final Report of the Fourth Session of the Commission for Synoptic Meteorology

This document is a supplement to WMO Publication No. 198.RP.70 - Abridged Final Report of the Fourth Session of the Commission for Synoptic Meteorology - and should be considered as a guide to the status of the decisions adopted at that session.

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A. DECISIONS RECORDED IN THE GENERAL SUMMARY OF THE WORK OF EC-XVIII

5.5.2 Synoptic meteorology (including the report of the president of CSM) (Agenda item 5.5.2)

5.5.2.1 The Executive Committee noted with approval the report of the president of CSM. The conclusions of the Executive Committee on the recommendations and resolutions developed by the fourth session are contained in Resolutions 12, 13 and 14 (EC-XVIII).

5.5.2.2 The Committee noted with appreciation the decision of CSM to keep the number of working groups to a minimum and to allocate certain problems for study to rapporteurs.

5.5.2.3 With regard to Recommendation 3 (CSM-IV) - Assistance to the Working Group on Data Needs and Codes - the Committee did not support the need for a full meeting of the CSM Working Group on Data Needs and Codes during 1967, but agreed that there might be a need for a restricted meeting of experts (about five persons) to be financed by WMO in 1967. It approved the need for one full-scale meeting of the CSM Working Group approximately one year before the fifth session of CSM, and for up to six meetings of sub-groups (duration one week each) during the fifth financial period. The financial participation of WMO in such meetings would amount to providing the travel and subsistance costs of fifteen participants for the full-scale meeting, of about five persons for the restricted meeting, and of three participants for each sub-group meeting. It was realized that the latter proposal affected the next financial period and would have to be put before next Congress.

5.5.2.4 Certain members expressed concern about the fact that certain of the new codes proposed by CSM-IV provided for the use of two different units for wind speed. This, they felt, might cause confusion and difficulty, particularly in machine data processing. It was pointed out, however, that the negotiations with ICAO and IMCO requested in Resolution 31 (Cg-IV) were still in progress and that the new upper-air reporting codes constituted a substantial improvement on the existing ones. The Committee therefore finally agreed to approve Recommendation 15 (CSM-IV).

5.5.2.5 The Committee had some doubts regarding the definition of "convergence line" as proposed in paragraph 12.3.2 of the General Summary of the fourth session of the CSM. It decided that the development of the requested definition should be examined further by the CSM in consultation with the CAe.

5.5.2.6 It was regretted that no provision had been made in the new CLIMAT codes proposed in Recommendation 22 (CSM-IV) for the inclusion of times of observation. This resulted from the fact that no such requirement had been expressed by CCl at the time of CSM-IV. It was agreed however that the new codes constituted a marked improvement on existing procedures and that their approval should not be unnecessarily delayed. Recommendation 22 (CSM-IV) was therefore approved on the understanding that the president of CCl would give consideration to the requirement for the inclusion of time of observation in the meetings and would inform the president of CSM with a view to further improvement of the codes.

5.5.2.7 While approving Recommendation 27 (CSM-IV) - Procedures for selection of aircraft reports for hemispheric exchange - the Committee agreed that there was room for improvement in the suggested procedures. In particular it was thought that in specifying criteria for horizontal spacing of selected reports, account should be taken of the vertical spacing of aircraft. The president of CSM was requested to examine the matter further.

5.5.2.8 During the examination of Recommendation 35 (CSM-IV) one member of the Committee submitted a draft resolution calling for use of the existing Washington-Moscow telephone-type channel for the transmission of Region III data. Another member however explained to the Committee that this channel had been established by a bilateral agreement between the Governments of the U.S.A. and U.S.S.R. In adopting Recommendation 35 (CSM-IV) the Committee considered that decisions on the WWW Global Telecommunication System would be recorded under Agenda item 5.1.

5.5.2.9 The Committee also reviewed the General Summary of the work of the fourth session of CSM and recorded the following decisions:

Paragraphs 3, 7.6 and 7.13.3 - Exchange of views on the World Weather Watch with special reference to aspects of direct concern to CSM

The Committee decided to take these views into account when considering Agenda item 5.1.

Paragraphs 5.4.1.5 and 5.4.1.6*-Criteria for determining certain wind levels

The Committee decided to note these criteria and to direct the Secretary-General, in consultation with the president of CSM, to include these criteria in the appropriate notes in WMO Publication No. 9.TP.4, Volume B.

Paragraph 6.3 (partially) - Archiving of aircraft reports for research purposes within the World Weather Watch

The Committee decided to take these views into account when considering Agenda item 5.1.

Paragraph 11.5 - Equivalent speed for Beaufort numbers

The Committee decision on this matter is recorded under Agenda item 5.5.9.**

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* These numbers correspond to numbers 5.8.1.5 and 5.8.1.6 in the provisional report of CMS-IV.

** See paragraph 5.5.9.3 of item 5.5.9 - Maritime meteorology - which is attached (Attachment I).

B. RESOLUTIONS

Resolution 12 (EC-XVIII) - REPORT OF THE FOURTH SESSION OF THE COMMISSION FOR SYNOPTIC METEOROLOGY

THE EXECUTIVE COMMITTEE,

HAVING CONSIDERED the report of the fourth session of the Commission for Synoptic Meteorology,

DECIDES

(1) To note the report;

(2) To note without comments the resolutions adopted by the fourth session for Synoptic Meteorology;

(3) To embody the decisions on the following recommendations in resolutions of the Executive Committee as indicated:

(a) Recommendations 5 and 8 to 25 inclusive (CSM-IV) in Resolution 13 (EC-XVIII);

(b) Recommendation 48 (CSM-IV) in Resolution 14 (EC-XVIII);

(4) To take action as follows on the remaining recommendations:

Recommendation 1 (CSM-IV) - Priority in transmission of various types of meteorological data after an interruption of transmission

(a) Approves this recommendation,

(b) Directs the Secretary-General to bring it to the attention of Members, indicating that this priority is applied when transmissions are resumed after a circuit disruption;

Recommendation 2 (CSM-IV) - Standard levels in the high atmosphere

(a) Notes this recommendation;

(b) Requests the president of CSM:

(i) To consult the president of CAe with a view to obtaining a satisfactory single method for the reporting of upper-air data above 10 mb,

(ii) To report to the Executive Committee on the result of this consultation to enable it to take a decision on the relevant recommendations of CAe-IV and CSM-IV ;

Recommendation 3 (CSM-IV) - Assistance to the Working Group on Data Needs and Codes

(a) Supports the requirements expressed by CSM on specialized WMO staff and/or consultants to assist in the study of data needs and codes, and authorizes the Secretary-General to make the necessary arrangement;

(b) Records its decision regarding meetings of the Working Group on Data Needs and Codes and its subgroup in paragraph 5.5.2.3 of the General Summary;

Recommendation 4 (CSM-IV) - Amendments to the Technical Regulations resulting from code changes

Notes this recommendation and directs the Secretary-General to include the substance of this recommendation in the consolidated document on amendments to the Technical Regulations to be submitted to Fifth Congress;

Recommendation 6 (CSM-IV) - Introduction of the new isobaric surfaces in upper-air reports

(a) Approves this recommendation;

(b) Requests the president of CSM to take necessary measures in consultation with the Secretary-General for the implementation of this recommendation in conformity with the Committee's decision on Recommendation 47 (CSM-IV) below;

Recommendation 7 (CSM-IV) - Units for wind speed in meteorological messages for international exchange

Notes this recommendation and directs the Secretary-General:

(a) To pursue the negotiations with ICAO and IMCO in accordance with Resolution 31 (Cg-IV);

(b) To prepare a consolidated report on the result of this action for submission to Fifth Congress;

Recommendation 26 (CSM-IV) - Research projects on network density

Approves this recommendation and directs the Secretary-General to bring it to the attention of Members, inviting them to undertake research projects on optimum network density criteria;

Recommendation 27 (CSM-IV) - Procedures for selection of aircraft reports for hemispheric exchange

(a) Approves this recommendation considering that the guidance material provided by the recommendation constitutes a first approach to an important new scheme, and on the understanding that the CSM will keep the matter under review in the light of further experience;

(b) Directs the Secretary-General to bring it to the attention of Members concerned;

Recommendation 28 (CSM-IV) - Amendments to Technical Regulations - Definitions - Territorial broadcast"

Recommendation 29 (CSM-IV) - Amendment to Technical Regulation 6.3.1.2

Recommendation 30 (CSM-IV) - Amendments to Technical Regulations - Definitions - "Meteorological messages"

Notes these recommendations and directs the Secretary-General to incorporate the substance of these recommendations in his consolidated document on amendments to the Technical Regulations to be submitted to Fifth Congress;

Recommendation 31 (CSM-IV) - Collection and distribution of observational data

Recommendation 32 (CSM-IV) - Improvement of the collection and exchange of global data

(a) Approves these recommendations;

(b) Directs the Secretary-General:

(i) To bring them to the attention of the Members and regional associations respectively concerned,

(ii) To assist Members and regional associations in the field of telecommunications as far as possible;

Recommendation 33 (CSM-IV) - Technical and financial assistance for implementation of telecommunication facilities

Notes this recommendation and records its conclusions on the request of CSM under item 4.1. *

Recommendation 34 (CSM-IV) - Contents of northern hemisphere exchanges

(a) Approves this recommendation;

(b) Requests the president of CSM in consultation with the Secretary-General to take the necessary measures for the implementation of this recommendation, taking into account the priorities laid down in Recommendation 47 (CSM-IV);

Recommendation 35 (CSM-IV) - Interim arrangements for the exchange of Southern Hemisphere data

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring it to the attention of Members concerned and to assist in its implementation as required.

Recommendation 36 (CSM-IV) - Improvement of the Tokyo-Honolulu segment of the Northern Hemisphere Exchange System

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring it to the attention of Members concerned;

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* See paragraph 4.1.2 of item 4.1 - Review of WMO technical assistance activities - which is attached (Attachment II).

Recommendation 37 (CSM-IV) - Amendments to Chapter I, Volume C, Publication No. 9.TP.4

(a) Approves the recommendation for implementation on 1 January 1967;

(b) Directs the Secretary-General:

(i) To embody the substance of the approved decision on telecommunications of CSM-IV in WMO Publication No. 9.TP.4, Volume C, Chapter I - Guide to Meteorological Telecommunications,

(ii) To publish and distribute the amended version of Chapter I of Volume C not later than 30 October 1966;

(c) Authorizes the president of CSM to approve between sessions of CSM such minor changes in the text of the WMO Publication No. 9.TP.4, Volume C, Chapter I, as might be operationally required;

Recommendation 38 (CSM-IV) - Telecommunication procedures and practices

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring this recommendation to the attention of Members;

Recommendation 39 (CSM-IV) - Uniform teleprinter procedures for meteorological bulletins

(a) Approves this recommendation;

(b) Directs the Secretary-General to bring this recommendation to the attention of ICAO;

Recommendation 40 (CSM-IV) - Use of AFTN circuits for transmission of basic meteorological data

Refers this recommendation back to CSM for further study in the light of EC-XVIII comments;

Recommendation 41 (CSM-IV) - Proposed plan for the main trunk circuit of the WWW Global Telecommunications System interconnecting world meteorological centres and regional telecommunication hubs

(a) Approves this recommendation for action by regional associations and the Secretary-General in conformity with the EC decisions on the planning of the WWW Global Telecommunications System;

(b) Directs the Secretary-General to assist regional associations in the consideration of the telecommunication plans in their respective Regions;

Recommendation 42(CSM -IV) - Study of radio transmission characteristics of automatic weather stations and their co-ordination with ocean data station requirements

(a) Approves this recommendation;

(b) Directs the Secretary-General:

(i) To prepare a resumé on radio transmission characteristics of automatic weather stations for presentation to the forthcoming technical conference on automatic weather stations,

(ii) To bring this recommendation to the attention of Members of the Organization,

(iii) To inform IOC of this recommendation and request it to supply the information required in order that the support of Members can be solicited;

Recommendation 43 (CSM-IV) - Technical characteristics of telegraph transmissions

Recommendation 44 (CSM-IV) - Technical characteristics for radio teleprinter transmissions

Recommendation 45 (CSM-IV) - Standardization of international meteorological transmissions by facsimile - Equipment characteristics

(a) Approves these recommendations;

(b) Directs the Secretary-General:

(i) To embody the substance of the above decisions in WMO Publication No. 9.TP.4, Volume C, Chapter I - Guide to Meteorological Telecommunications,

(ii) To publish and distribute the amended version of Chapter I of Volume C not later than 30 October 1966;

Recommendation 46 (CSM-IV) - Advance notification of changes in Volumes A and C of WMO Publication No. 9.TP.4,

(a) Approves this recommendation;

(b) Directs the Secretary-General:

(i) To bring it to the attention of regional associations,

(ii) To issue in abbreviated form advance notification of important changes in Volumes A and C of WMO Publication No. 9.TP.4 at weekly intervals for distribution over meteorological telecommunication channels in addition to the normal supplement service;

Recommendation 47 (CSM-IV) - Implementation of code and telecommunication decisions adopted by the fourth session of CSM

(a) Approves this recommendation and urges the regional associations and Members concerned, as a matter of urgency, to take the action requested in the operative part of the recommendation under INVITES ;

(b) Directs the Secretary-General:

(i) To bring this recommendation to the attention of the regional associations and Members concerned,

(ii) To assist the president of CSM in the co-ordination of the implementation of the recommendation, as required;

Recommendation 49 (CSM IV) - Pressure reduction methods

(a) Approves this recommendation;

(b) Directs the Secretary-General:

(i) To bring it to the attention of Members,

(ii) To obtain from Members complete mathematical descriptions of pressure reduction methods now being applied and to advise Members of this information;

(c) Requests the president of CSM to arrange for the development and implementation of a coding procedure for adding the value of the pressure at station level to the SYNOP reports for those stations that do not belong to the categories specified in (a) and (b) under RECOMMENDS (1);

Recommendation 50 (CSM-IV) - Definition and reporting of visibility

(a) Notes this recommendation;

(b) Refers the question of developing the practical definition requested by Recommendation 5/8 of the MET/OPS/CAeM-III session to the president of CAeM for action taking into account the views of ICAO;

(c) Directs the Secretary-General to invite the attention of ICAO to the suggestion contained in paragraph 2 under RECOMMENDS of the recommendation;

Recommendation 51 (CSM-IV) - The use of the term "Greenwich Mean Time" (GMT) as a synonym for Universal Time (UT) or Greenwich Civil Time (GCT)

Approves this recommendation;

Recommendation 52 (CSM-IV) - Inclusion of the term "Convergence Line" in Volume I of Technical Regulations

Approves this recommendation;

Recommendation 53 (CSM-IV) - Revision of resolutions of the Executive Committee based on the previous recommendations of the Commission for Synoptic Meteorology

Taken into consideration under agenda item 3.3. *

DIRECTS the Secretary-General to inform all concerned.

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* See paragraphs 3.3.1 and 3.3.2 of item 3.3 - Consideration of past resolutions of the Executive Committee - and Resolution 44 (EC-XVIII) which are attached (Attachment III).

Resolution 13 (EC-XVIII) - MODIFICATIONS TO THE INTERNATIONAL METEOROLOGICAL CODES AND SPECIFICATIONS AND INSTRUCTIONS CONCERNING METHODS OF CODING

THE EXECUTIVE COMMITTEE,

NOTING

(1) Recommendations 5 and 8 to 25 inclusive (CSM-IV),

(2) The comments developed by the second session (May 1966) of the RA IV Working Group on Tropical Meteorology for the Caribbean, Central America and Mexico, on the structure of meteorological surface reporting codes for use in tropical areas,

CONSIDERING the need for bringing the universal meteorological forms of messages and codes up to date as proposed by the Commission for Synoptic Meteorology,

DECIDES

(1) To approve Recommendations 8 to 18 and 23, 24, 25 (CSM-IV);

(2) To approve Recommendation 22 (CSM-IV) as constituting an improvement on existing procedures but with the request that the president of CCl should give consideration to the requirement regarding the inclusion of time of observation in the message and inform the president of CSM with a view to further improvement of the code;

(3) To note Recommendations 19, 20, 21 (CSM-IV) and to authorize the President of WMO to approve the recommendations in order that they may come into force as early as possible before 1 January 1968, providing favourable comments are received from ICAO. In the case of adverse comment the president of CMS is requested to arrange for the urgent reconsideration of the recommendations;

(4) To refer the "Comments developed by the second session (May 1966) of the RA IV Working Group on Tropical Meteorology for the Caribbean, Central America and Mexico, on the structure of meteorological surface reporting codes for use in tropical areas", to the president of CSM for action;

(5) That the amendments resulting from Recommendations 8 to 18 and 22 to 25 (CSM-IV) come into force on 1 January 1968;

DIRECTS the Secretary-General

(1) To make any necessary minor changes in the new and revised code forms approved by the Executive Committee in consultation with the president of the Commission for Synoptic Meteorology;

(2) To publish and distribute, in July 1967, the new code decisions in Volume B, WMO Publication No. 9.TP.4;

(3) To inform all concerned of this resolution at an early date and, in doing so, to send a circular letter with advance copies of the amendments as approved by the Executive Committee.

Resolution 14 (EC-XVIII) - JOINT WORKING GROUP ON NUMERICAL WEATHER PREDICTION

THE EXECUTIVE COMMITTEE,

NOTING

(1) Resolution 2 (CAe-IV) and Recommendation 48 (CSM-IV),

(2) Regulations 34, 35, and 39 of the General Regulations,

DECIDES

(1) To establish a Joint Working Group on Numerical Weather Prediction between CAe and CSM with the following terms of reference:

(a) To keep under review the development of methods of numerical weather prediction and recommend to the next session of the Commission any action by WMO necessary to facilitate such research;

(b) To continue to select periods suitable for use as reference situations for testing prediction models so far as the group considers this necessary;

(c) To co-ordinate details of the preparation and exchange of data and analysis of the test cases;

(d) To review the scientific basis for determining the spatial and temporal aspects of networks and data resolution required for dynamical prediction methods;

(e) To recommend what action is needed by WMO to stimulate research into the application of numerical methods of prediction to smaller-scale systems than at present treated, to topographic effects and to meteorological features of the tropical belt;

(f) To formulate requirements regarding:

(i) The use of codes, telecommunications and telecommunications procedures for numerical prediction purposes;

(ii) The acceptable time delays for reception of the various categories of information used for numerical prediction purposes;

(iii) The forms of presentation of output data suitable for use by forecasters on duty;

(2) To invite the following experts to serve on the Group:

B. R. Döös	(Sweden) (chairman)
E. M. Dobrishman	(U.S.S.R.)
A. Eliassen	(Norway)
K. H. Hinkelmann	(Germany, Federal Republic of)
K. Mohri	(Japan)
F. G. Shuman	(U.S.A.)

(3) That the joint working group shall report on its activities to the CAe not later than six months before the next session of the Commission;

(4) That it shall keep the president of CSM informed of important developments regarding paragraph (f) of its terms of reference and present its final findings on this subject not later than 1 January 1969;

(5) That the joint working group shall serve until the fifth session of both the Commission for Aerology and the Commission for Synoptic Meteorology.

Attachments : 3

Attachment I

General Summary of the work of EC-XVIII, paragraph 5.5.9 - Maritime meteorology

5.5.9.3 In accordance with the decision taken at its seventeenth session, the Executive Committee gave consideration to Recommendation 5 (CMM-IV) - Equivalent speed for Beaufort numbers - in the light of the comments of CCl and CSM. The Committee noted that both the CSM and the CCl had, as requested by the seventeenth session of the Executive Committee, examined the procedural and other repercussions of the introduction of the new scale, and that both these Commissions had expressed doubts as to the advisability of introducing it. The Committee was also informed by the president of CAe that the research community was concerned about the proposal that the present scale should be changed, making it necessary to consider large amounts of data processed in two different forms of equivalents. The president of CMM supported the proposal given in Recommendation 5 (CMM-IV) and emphasized the growing importance of weather-routing of ships and the consequent need for an accurate wind-reporting scale. Some members of the Executive Committee were however of the opinion that, while the CMM had carried out an extensive study, additional information made available since the fourth session of the CMM had suggested that there was still doubt about the scientific merit of the proposed new table of equivalents. Consequently the Committee decided not to approve Recommendation 5 (CMM-IV).

Attachment II

General Summary of the work of EC-XVIII, paragraph 4.1 - Review of WMO technical assistance activities

4.1.2 The Executive Committee noted that although the possibilities of obtaining UNDP assistance for projects connected with the World Weather Watch (WWW) are limited, certain phases of the WWW which can be combined with development programmes in the same countries can receive assistance from the UNDP. It requested the Secretary-General to continue his efforts with the Administration of the UNDP to obtain as much assistance as possible under its various programmes in connexion with the implementation of WWW.

Attachment III

General Summary of the work of EC-XVIII, paragraph 3.3 - Consideration of past resolutions of the Executive Committee

3.3.1 In accordance with Rule 26 of its Rules of Procedure laid down by Resolution 1 (EC-XVI) the Executive Committee revised those of its past resolutions which were still in force at the time of its present session and adopted Resolution 44 (EC-XVIII) on the subject.

3.3.2 In deciding not to keep in force Resolution 34 (EC-XIV) - Modifications to the international meteorological codes, specifications and descriptive terms and instructions concerning methods of coding - the Executive Committee noted that the decisions in this resolution were all incorporated in Volume B of Publication No. 9. In addition, the Committee requested the Secretary-General to insert the substance of paragraph (4) under DECIDES in an appropriate introductory part of WMO Publication No. 9.TP.4, Volume B.

Resolution 44 (EC-XVIII) - REVISION OF PREVIOUS EXECUTIVE COMMITTEE RESOLUTIONS

THE EXECUTIVE COMMITTEE,

NOTING

(1) Regulation 128 of the General Regulations, concerning the revision of the Executive Committee resolutions,

(2) Rule 26 of the Rules of Procedure of the Executive Committee on the same subject,

(3) Recommendations 12 (CCl-IV), 11 (CIMO-IV), 20 (CAe-IV) and 53 (CSM-IV),

HAVING EXAMINED its previous resolutions still in force,

DECIDES

(1) To keep in force the following resolutions:

(EC-II)	7
(EC-III)	19
(EC-VIII)	2, 3, 28
(EC-IX)	21, 22, 23, 45
(EC-X)	2, 29, 31
(EC-XI)	1, 8, 12
(EC-XII)	6, 12, 13, 25, 30
(EC-XIII)	6, 28
(EC-XIV)	3, 22, 23, 24
(EC-XV)	5, 6, 9, 10, 11, 12, 13, 14 17
(EC-XVI)	1, 7, 8, 10, 11, 12, 13, 14 16, 17, 18, 23, 24, 25, 26, 31
(EC-XVII)	1, 2, 3, 4, 9, 10, 11, 12 13, 14, 15, 16, 23, 24, 25

(2) To keep in force, but only until 31 December 1966, Resolutions 29 and 30 (EC-XVI), 22 (EC-XVII);

(3) Not to keep in force the other resolutions adopted before its eighteenth session.

NOTE : This resolution replaces Resolution 26 (EC-XVII) which is no longer in force.