WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

ABRIDGED FINAL REPORT OF THE EXTRAORDINARY SESSION

Hamburg, 21 October-1 November 1985

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C O N T E N T S

LIST OF RESOLUTIONS ADOPTED BY THE SESSION

LIST OF RECOMMENDATIONS ADOPTED BY THE SESSION

LIST OF PERSONS ATTENDING THE SESSION

1. Officiers of the session

J. R. Neilon	president	
A. Vasiliev	vice-president	

2. Representatives of Members of WMO

A. Kerbachi	principal delegate	Algeria
R. A. Sonzini	principal delegate	Argentina
R. B. Crowder	principal delegate	Australia
H. Maier	principal delegate	Austria
H. Gmoser	delegate	
B. Sekwati	principal delegate	Botswana
J. K. Leepile	delegate	
J. Arimatea	principal delegate	Brazil
H. P. A. Jaafar (Mrs.)	principal delegate	Brunei
J. Mills	principal delegate	Canada
J. Kruus	delegate	
B. W. Attfield	delegate	
F. Roll	principal delegate	Chile
J. Leyton	delegate	
Li Zechun	principal delegate	China
Sun Jinyuan	delegate	
E. Silva Vasquez	principal delegate	Colombia
C. Perdomo-Charry	delegate	
M. Ondras	principal delegate	Czechoslovakia
A. F. Elsabban	principal delegate	Egypt
M. A. M. Nour El-Din	delegate	
J. Riissanen	principal delegate	Finland
M. Alestalo	delegate	
F. Duvernet	principal delegate	France
J. P. Bourdette	delegate	
K. Richter	principal delegate	German Democratic Republic

2. Representatives of Members of WMO (contd.)

T. Mohr	principal delegate	Germany, Federal
M. Kurz	delegate	Republic of
W. Bopp	delegate	
D. Fickel	delegate	
C. Lemensieck	adviser	
H. R. Casasola Roldan	principal delegate	Guatemala
P. Li Chung-Sum	principal delegate	Hong Kong
B. Kozak	principal delegate	Hungary
A. Kapovits	delegate	
M. A. Einarsson	principal delegate	Iceland
N. Sen Roy	principal delegate	India
B. Dianati	principal delegate	Iran, Islamic
H. Basir Parsa	delegate	Republic of
W. H. Wann	principal delegate	Ireland
R. Sorani	principal delegate	Italy
Y. Sekiguchi	principal delegate	Japan
A. I. Abandah	principal delegate	Jordan
A. Saleh	delegate	
E. A. Mukolwe	principal delegate	Kenya
M. A. Issa	principal delegate	Libyan Arab Jamahiriya
A. A. Neale	principal delegate	New Zealand
A. T. F. Grooters	principal delegate	Netherlands
M. Boulama	principal delegate	Niger
G. A. Shomefun	principal delegate	Nigeria
O. Haug	principal delegate	Norway
O. Bremnes	delegate	
A. H. M. Al-Harthy	principal delegate	Oman
A. Ba-Omar	delegate	
H. A. A. Subhi	delegate	
J. Cristina	principal delegate	Portugal
R. G. El Kobaisi	principal delegate	Qatar

2. Representatives of Members of WMO (contd.)

S. O. Baazim	principal delegate	Saudi Arabia
N. Murshid	delegate	
A. B. Diop	principal delegate	Senegal
M. Navin	principal delegate	Solomon Islands
P. Rodriguez Franco	principal delegate	Spain
A. Labajo Salazar	delegate	
M. Sanz Vega	delegate	
J. Segovia de la Torre	delegate	
R. Berggren	principal delegate	Sweden
M. Haug	principal delegate	Switzerland
B. Saragganda	principal delegate	Thailand
M. Ormeci	principal delegate	Turkey
P. A. Byarugaba	principal delegate	Uganda
A. A. Vasiliev	principal delegate	Union of Soviet
N. P. Fakhrutdinova (Miss)	delegate	Socialist Republics
I. Gamaiounov	delegate	
D. N. Axford	principal delegate	United Kingdom
R. J. Sowden	delegate	
J. M. Nicholls	delegate	
M. J. Atkins (Miss)	delegate	
M. Dibben	delegate	
J. Young	delegate	
E. W. Friday	principal delegate	United States of
J. R. Lincoln	delegate	America
W. J. Hussey	delegate	
F. S. Zbar	delegate	
A. L. Hernhuter	delegate	
V. Piñeyro-Rodriguez	principal delegate	Uruguay
D. N. Araujo Agudo	principal delegate	Venezuela
A. A. Al-Hakimi	principal delegate	Yemen

3. Non-Member of WMO/Observer

F. Bertiau		Holy See

4. Observers from other international organizations

K. Huber	United Nations Educational and Scientific Organization (Unesco)
M. Diouf-Khebet (Mrs)	Agency for Air Safety in Africa and Madagascar (ASECNA)
D. Söderman J. K. Gibson F. Delsol H. Böttger	European Centre for Medium Range Weather Forecasts (ECMWF)
F. A. L. Oliveira	International Civil Aviation Organization (ICAO)

5. WMO Secretariat

G. K. Weiss S. Mildner L. Rannaleet K. Yamaguchi	Representative of the Secretary-General

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (agenda item 1)

1.1 At the kind invitation of the Government of the Federal Republic of Germany, the extraordinary session of the Commission for Basic Systems was held at the Congress Centrum in Hamburg, from 21 October to 1 November 1985. The session was opened by the president of the Commission, Mr. J. R. Neilon, at 10 a.m. on 21 October 1985.

1.2 State Secretary A. Bayer of the Ministry of Transport extended a warm welcome to the participants of the extraordinary session of CBS on behalf of the Federal Republic of Germany. In his opening speech he underlined the importance of international co-operation in meteorology and recalled that the World Weather Watch system formed the foundation for the efficient operation of national Meteorological Services. The State Secretary acknowledged in particular the leading role of the Commission for Basic Systems in providing the necessary basis for the further development of meteorological services. This included above all the task of evaluating new developments in science and technology with a view to incorporating them in the overall World Weather Watch Programme. Highlighting the continuous increase in demand for specialized meteorological products as a contribution to safety and efficiency in various fields of human activity, the State Secretary felt that the tremendous efforts made at the national and international level to improve the quality and reliability of meteorological services were fully justified. He expressed his belief that the extraordinary session of CBS in Hamburg would set another example of excellent international co-operation between meteorologists and concluded by wishing the meeting every success.

1.3 The Senator responsible for Science and Research, Dr. J. Meyer-Abich, welcomed the participants on behalf of the Senate of the Free and Hanseatic City of Hamburg. He recalled the town's long-standing tradition of meteorology, beginning with the foundation of the Norddeutsche Seewarte in 1868 which in 1873 became the Deutsche Seewarte, the starting point for operational meteorological services. At the present time no less than four important institutes dealing with various aspects of meteorological research and operations were located in Hamburg. Dr. Meyer-Abich highlighted the outstanding contributions of these institutes and, notably, the Seewetteramt in support of international research projects and operational systems particularly over the last two decades. He expressed his firm belief that the present session of CBS would join the list of successful WMO meetings held in Hamburg and wished all the participants a pleasant stay in this beautiful city.

1.4 Dr. G.O.P. Obasi, Secretary-General of WMO, expressed his pleasure at being accorded the opportunity to address the opening of the extraordinary session of the WMO Commission for Basic Systems which was privileged to meet in Hamburg at the kind invitation of the Government of the Federal Republic of Germany. Dr. Obasi extended a warm welcome to all the participants. He conveyed the appreciation of WMO to the Government of the Federal Republic of Germany and to Dr. H. Reiser, its Permanent Representative with WMO, for the invitation and particularly for the selection of the beautiful city of Hamburg as the venue. Dr. Obasi recalled that a number of WMO technical commissions had met there, in particular two sessions of the Commission for Marine Meteorology held in 1956 and 1981 and a session of the Commission for

Instruments and Methods of Observation in 1977. He also mentioned that the Commission for Synoptic Meteorology, the predecessor of the Commission for Basic Systems, had held its fourth session in 1966 in the country, at Wiesbaden. Dr. Obasi mentioned that the efficient organization of sessions of WMO bodies in the Federal Republic of Germany was greatly appreciated by WMO Members. He was convinced that the excellent facilities put at the disposal of the session would contribute greatly to its success. Dr. Obasi stressed that one of the most important items on the agenda of the session was the consideration of the World Weather Watch Plan up to the year 2000 and its associated Implementation Programme, which had become the highest priority programme of WMO. He said that through a major effort by CBS and its working groups, and with the assistance and co-operation of the regional associations and other technical commissions, the Integrated WWW System Study had been completed. He was confident that, with the implementation of the WWW Plan 2000, international co-operation would reach a new peak which would lend increased support to national Meteorological Services. In conclusion, Dr. Obasi thanked the Government of the Federal Republic of Germany and, in particular, the President of the Deutscher Wetterdienst, Dr. Reiser, and his staff for the excellent organizational arrangements provided for the meeting. He wished all the participants a pleasant stay in Hamburg and a successful conclusion to the session.

1.5 Dr. H. Reiser, Permanent Representative of the Federal Republic of Germany with WMO, in his welcome address highlighted the progress in science and technology which had taken place since the fourth session of the Commission for Synoptic Meteorology, which his country had hosted in Wiesbaden nineteen years previously. He pointed to the way in which his and other weather services had responded to the challenges in meteorology with a view to maintaining a high standard of performance. When mentioning the functions his meteorological centre in Offenbach had to fulfil within the framework of the World Weather Watch, Dr. Reiser emphasized the critical importance of modern telecommunication links for the development and operation of efficient meteorological services. In this context he stressed the responsibility of highly developed national weather services to assist developing countries in the introduction of modern technology in order to be able to profit fully from the World Weather Watch system. Welcoming again all the participants, Dr. Reiser gave his assurance that he and his staff would make every effort necessary to ensure the success of the session.

1.6 In his opening address, Mr. J. R. Neilon, the president of CBS, mentioned that this was the third time he had presided at a session of CBS and he expressed his appreciation for the kind invitation of the Federal Republic of Germany to host the extraordinary session. Mr. Neilon emphasized that the major task of CBS would be the development of the WWW Plan to the year 2000. He believed that the WWW Plan, together with its Implementation Programme, met the conditions that it should be realistic, forward-looking but achievable. Mr. Neilon recalled that since 1978, when the idea of an ISS had been put forward by the Commission, there had been considrable discussion about the impact and even the desirability of introducing new technology into the WWW. He said that, fortunately, agreement had been reached on an approach which retained the best of the current system, introduced proven new technology and, through the Implementation Support Activity component of the plan, addressed the valid concern of many developing countries with respect to implementation. Mr. Neilon underlined the need to develop meteorological services so that they were more responsive to the needs of users. He believed that the Commission should have a central role in assisting Members in the

implementation and operation of appropriate analysis and forecasting procedures to meet the needs of users. He expressed the hope and belief that, with the innovative and co-operative spirit that had always characterized its work, the Commission could accomplish great things, undeterred by the difficulties encountered. Finally, Mr. Neilon expressed his deep appreciation to the Deutscher Wetterdienst for the excellent facilities provided for the session.

1.7 There were 95 participants at the extraordinary session. These included 87 representatives from 52 Members of WMO, 1 observer from one non-Member country of WMO and 7 representatives from 4 international organizations. A complet list of participants is given at the beginning of this report.

2. ORGANIZATION OF THE SESSION (agenda item 2)

2.1 Consideration of the report on credentials (agenda item 2.1)

At the first plenary meeting the representative of the Secretary-General presented a list of countries, non-Member countries and international organizations represented at the extraordinary session. This list was accepted as the first report on credentials and further reports were to be submitted to the extraordinary session at ensuing plenary meetings. It was decided not to set up a Credentials Committee.

2.2 Adoption of the agenda (agenda item 2.2)

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

2.3 Establishment of committees (agenda item 2.3)

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

(a) Committee A to consider agenda items 5 and 8. Mr. R. B. Crowder (Australia) was elected chairman and Mr. A. Kapovits (Hungary) vice-chairman of the committee;

(b) Committee B to consider agenda items 6, 7, 9 and 10. Dr. D. N. Axford (UK) was elected chairman and Mr. E. A. Mukolwe (Kenya) vice-chairman of the committee.

Co-ordination Committee

2.3.2 In accordance with WMO General Regulation 27, a Co-ordination Committee was set up consisting of the president and vice-president of CBS, the chairmen of the two working committees and the representative of the Secretary-General.

2.4 Other organizational matters (agenda item 2.4)

Under this agenda item, the Commission agreed that, in accordance with WMO General Regulation 109, no minutes of the session would be prepared, but that statements by delegations would be reproduced and distributed as and when requested, in accordance with Regulation 110. The Commission agreed on the working hours for the duration of the session.

3. REPORT OF THE PRESIDENT OF THE COMMISSION, INCLUDING THE ISS ACTIVITIES (agenda item 3)

3.1 The Commission noted with appreciation the report of the president which contained extensive and precise information concerning the activities of CBS including the Integrated WWW System Study (ISS) during the period from the eighth session of the CBS in January/February 1983 until September 1985. It also noted that a more detailed analysis of the activities of the Commission was given in the report of the chairmen of the four working groups which was recorded under agenda item 4. The Commission expressed its satisfaction that the Commission for Basic Systems, as at 1st April 1985, had more than 200 members from more than 100 Members of WMO and the increase in membership of the Commission had continued since the eighth session when there had been 207 members from 85 Members.

3.2 The Commission noted further that the work of CBS since its eighth session in 1983 had been achieved satisfactorily and had focused on the following main activities:

(a) Preparation of the draft WWW Plan to the year 2000 and the draft WWW Implementation Programme through the Integrated WWW System Study (ISS):

(b) Follow-up of CBS-VIII decisions, particularly its resolutions and recommendations;

(c) Convening of the sessions of CBS Working Groups on the GDPS, GOS and GTS, all of which took place in 1984. The Study Group on Urgent Code Matters met in 1983;

(d) The overall co-ordination and guidance for CBS activities was given by the president of CBS and by sessions of the CBS Advisory Working Group.

3.3 The Commission expressed its satisfaction that the Integrated WWW System Study (ISS) had been accomplished. As requested by CBS-VIII and Cg-IX, the outcome of the ISS, namely the draft WWW Plan to the year 2000 and the draft WWW Implementation Programme 1986 to 1991 adopted to the format of the Second WMO Long-term Plan 1988-1997, was submitted to the session for review and consideration under agenda item 5. Further details in this respect were recorded under agenda item 5.

3.4 The Commission concurred with the opinion expressed by the eleventh session of the CBS Advisory Working Group (Buenos Aires, September 1985) that, besides the need to establish requirements for data from meteorological satellites, there would be an increasing need to co-ordinate other satellite services of importance to the WWW system on which the WWW depended heavily.

4. REPORTS BY THE CHAIRMEN OF CBS WORKING GROUPS AND RAPPORTEURS (agenda item 4)

Working Group on the GDPS

4.1 The Commission noted with appreciation the report of the chairman of the CBS Working Group on the Global Data-processing System, Mr. F. Duvernet (France). The Commission also noted that a Study Group on Monitoring Procedures on the GDPS had been established and its first session had been held in Geneva in March 1984 under the chairmanship of Miss M. J. Atkins (UK).

4.2 The Commission noted that the sixth session of the Working Group on the GDPS, Geneva, November 1984, had adopted a recommendation on monitoring procedures on the GDPS. The session had nominated Miss M. J. Atkins (UK) as Rapporteur on Monitoring Procedures on the GDPS, Mr. J. Pailleux (France) as Rapporteur on the Optimum Use of Observational Data in Data Assimilation Schemes at GDPS Centres and Dr. F. Mosco (Italy) as Rapporteur on Implementation Programmes for the GDPS 2000. Further details in this respect were recorded under agenda item 7.

Working Group on the GOS

4.3 The Commission noted with appreciation the report of the chairman of the Working Group on the Global Observing System, Dr. T. Mohr (Federal Republic of Germany). In his report, the chairman informed the Commission that, in view of the increasing importance of the space-based sub-system in the GOS, two satellite operators had designated two experts in the field to serve as members of the working group. The chairman informed the session that two study groups had been established in order to cope with the tasks allocated to his working group by the Commission at its eighth session, namely the Study Group on the Manual and the Guide on the GOS and the Study Group on Study Area 1 - Optimized Observing System. Furthermore, the working group had appointed a Rapporteur on Technical Assistance and Training of Personnel.

4.4 The Commission noted that the GOS Study Group on the Manual and the Guide on the GOS had held its second and third sessions in Geneva, in November 1983 and 1984 respectively. The main task carried out by the study group was to re-write the Guide on the GOS, the contents of which needed revision following the publication of the Manual on the GOS. The final version of the Guide should be ready by the end of 1986. The Commission noted further that the Study Group on Study Area 1 - Optimized Observing System had held its first session in Geneva, in September 1983. This session had considered the possibilities for improvement of the observing system by the year 2000. It was suggested that a first series of evaluations should be made of a possible new composite observing system known as the Composite Observing System for the North Atlantic (COSNA). An ad hoc Study Group on COSNA Evaluations had held a session in Geneva in November 1984, to develop a proposed set of configurations for COSNA. The COSNA concept became the foundation for the Operational WWW Systems Evaluations (OWSEs) concept endorsed by the thirty-sixth session of the Executive Council.

4.5 The Commission noted that the fourth session of the Working Group on the GOS had been held in Geneva in December 1984. This session had reviewed the reports of the above-mentioned study groups of the Working Group on the GOS that had taken place since the eighth session of CBS and developed the draft WWW Plan to the year 2000. Furthermore, the Commission noted that,

at the fourth session of the working group, the Study Group on Study Area 1 - Optimized Observing System had been dissolved, and a Study Group on OWSEs (GOS) established. Within the study group, two rapporteurs, one on OWSE - North Atlantic and one on OWSE - Africa, had been nominated. Further discussion concerning the activities of the working group and conclusions in this respect were recorded under agenda item 7.

Working Group on Codes

4.6 The Commission noted with appreciation the report of the chairman of the Working Group on Codes, Mr. G. Doumont (Belgium). In his report, he informed the Commission that the first session of the working group's Study Group on Code Matters had reviewed code problems referred to the Working Group on Codes by the eighth session of CBS, and had proposed amendments to several codes.

4.7 The Commission noted that the chairman of the Working Group on Codes had participated in the CBS ISS Expert Meeting on Exchange Formats, in particular Bit-oriented Code (May 1984), which had studied the need for improved exchange formats and had consequently developed the GRIB format for exchange of processed data in grid-point values between automated centres. This format had been approved for use as an experimental format since August 1984 pending its consideration at the present CBS extraordinary session. It also noted that the chairman had participated in the development and exchange of opinion on proposals for indication of units of wind speed used or expected to be used in aeronautical figure codes as requested by ICAO and endorsed by the Executive Council. Further details on code matters were recorded under agenda item 7.

Working Group on the GTS

4.8 The Commission noted with appreciation the report of the chairman of the Working Group on the GTS, Mr. J. Arimatea (Brazil). The Commission noted further that various activities had been carried out by this working group, namely:

(a) An Implementation Co-ordination Meeting on the Upgrading of the Operation of the Main Trunk Circuit (renamed the Main Telecommunication Network) had been held in Geneva in June 1983. This meeting had stressed the importance of several questions concerning telecommunication procedures, protocols and techniques for the Main Telecommunication Network. These questions had been entrusted to the Study Groups on Operational Matters and on Communication Techniques and Protocols, as appropriate, and included in their work programme;

(b) The Study Group on Communication Techniques and Protocols had held two sessions in Geneva, from 5 to 9 December 1983 and from 21 to 25 May 1984. The study group had developed further specifications of Layers 2, 3 and 4 for the GTS and procedures for the transmission of digital facsimile. Its conclusions had been considered by the eleventh session of the working group;

(c) The Ad Hoc Group of Experts on the Impact of INMARSAT on the GTS had worked by correspondence, on the basis of the outcome of the various meetings which had been held concerning the use of INMARSAT in the WWW (WMO/INMARSAT Consultative Meeting, meetings of experts on the use of INMARSAT);

(d) The eleventh session of the Working Group on the GTS had been held in Geneva from 22 October to 2 November 1984. The detailed conclusions and the recommendations adopted were presented in a separate document submitted by the Secretariat under agenda item 7;

(e) At its eleventh session, the working group referred several questions concerning the operation of the GTS to the Study Group on Operational Matters for consideration at its session held from 24 to 28 June 1985.

4.9 Further details on GTS matters were recorded under agenda item 7.

Reports of rapporteurs

4.10 The Commission noted with satisfaction the report of the Rapporteur on the Application of Improved Forecasting Methods and Required Technology for Operational Use, Dr. A. J. Gadd (UK), with contributions by Dr. W. A. McIlveen (UK), which contained various aspects of the results of the study on improved forecasting models.

4.11 The Commission noted the action taken by the president of CBS in respect of the progress made in the development of exchange formats through ISS efforts and expert meetings. Therefore, the Commission endorsed the decision of the president of CBS that the appointment of the CBS Rapporteur on Exchange Formats was no longer required (see Resolution 2 (CBS-VIII)).

5. WMO LONG-TERM PLAN, INCLUDING THE WWW PLAN AND THE WWW IMPLEMENTATION PROGRAMME (agenda item 5)

5.1 The Commission noted that the major CBS activity since CBS-VIII had been the conduct of the Integrated WWW System Study (ISS). CBS-VIII had requested, and Cg-IX had agreed, that by mid-1985 the ISS should be completed to allow CBS to consider in late 1985 the plan for an improved WWW to the year 2000 and an implementation programme for the period 1986-1991. Specific guidelines and terms of reference for the ISS and the preparation of the WWW Plan and Implementation Programme had been given by CBS, the Executive Council and Congress.

5.2 Furthermore, Cg-IX had also agreed to introduce long-term planning into the WMO system, covering all its programmes. The Second WMO Long-term Plan (SLTP) for the period 1988 to 1997 in its Part II, Volume I, would contain the WWW Plan and the WWW Implementation Programme both adjusted to the format of the SLTP. The SLTP would be submitted to Tenth Congress for consideration and final approval.

5.3 The president of the Commission gave an account of the conduct of the ISS and the work carried out in developing the draft WWW Plan and its Implementation Programme. The Commission noted with great appreciation the efforts carried out by the CBS Advisory Working Group under the chairmanship of the president of CBS, in its capacity as the steering committee for the ISS. It expressed great satisfaction with the contributions made to the ISS by all the working groups of the CBS, other WMO technical commissions, regional associations and by individual Members who had supported the ISS by providing seconded experts, consultant services or making available results of individual studies and technical reports. Particular recognition was paid to the support provided by the WMO Secretariat in the conduct of the ISS and in the preparation of the draft WWW Plan and Implementation Programme.

5.4 The Commission reaffirmed the principle that data and products available within the WWW system should be exchanged freely and without charge between Members in accordance with approved procedures and within the limits of the agreed WWW system. In the implementation of this important WWW principle of free exchange and in view of the large and increasing commercial value of meteorological information, the Commission considered it necessary to emphasize the principle of free exchange to be applied to WWW data and WWW processed information but not necessarily to all other non-real-time information.

5.5 The Commission recognized that the Long-term WWW Plan and Implementation Programme, when adopted by Congress, would become an important planning guide for CBS and WMO Members. Coming sessions of CBS would have to decide whether amendments were necessary in the Technical Regulations and in guidance material on the WWW, to bring them into agreement with the Plan.

5.6 The Commission agreed that the draft WWW Plan and its Implementation Programme together presented a sound basis and outline for the expected further development of the WWW system over the coming years. By combining current and proven WWW components with the opportunities offered by advances in meteorological science and new technology, the WWW Plan presented a balanced and evolutionary outlook for the WWW system for the late 1980s and the 1990s. The Plan gave Members overall long-term guidance for their own planning of the further development of their meteorological services and for the implementation as well as operation of the WWW elements at national levels. The Plan gave both to Members and to WMO bodies the opportunity to set up, in an overall co-ordinated and forward-looking way, their development objectives and implementation activities. By applying the concepts developed in the WWW Plan, Members would be able to harmonize their implementation efforts with similar efforts carried out in other parts of the WWW system and by other Members. In this respect, the Implementation Programme with its specific implementation objectives and time schedules would assist Members in defining their implementation actions and priorities.

5.7 While agreeing on the general concepts developed in the Plan and on its overall benefit and usefulness to Members, the Commission expressed concern at the feasibility of all the implementation objectives being met, particularly by developing countries. Great efforts to mobilize resources for implementation support would have to be undertaken. All the available resources, including VCP and UNDP, should be used in a closely co-ordinated way and according to priorities which were to be established regionally. In this further and detailed planning and implementation process, regional associations would have to play an increasingly important role. The WWW

Implementation Support Activity and WWW Implementation Co-ordination would have to be developed as efficient support instruments of the WWW in order to allow developing countries to achieve the objectives defined in the Implementation Programme. It was of the utmost importance to create increased government awareness of the importance of meteorology and of the usefulness of the WWW system in national development.

5.8 The results of the Commission's detailed examination of the draft WWW Plan and the Implementation Programme are summarized in the following paragraphs (5.9 to 5.33). In addition, the Commission agreed to a number of detailed amendments which were recorded and attached to the final report so that revised versions of the Plan and the Implementation Programme could be prepared after the session (see Annex I). In this regard, the Commission noted that it would be essential to maintain editorial consistency between the sections of Parts I and II of the Second Long-term Plan relating to the WWW Programme.

THE WWW PLAN

5.9 The Commission endorsed the general layout of the Plan and the order of presentation of the various chapters, in particular those relating to the GDPS, GOS and GTS.

The WWW system

5.10 The chapter describing the WWW system was shortened by eliminating repetitive material, and individual paragraphs were re-arranged to improve the presentation.

5.11 The Commission agreed that the following definitions of forecasting ranges should be used in the WWW Plan and Implementation Programme and included in the Manual on the GDPS and other relevant parts of the WMO Technical Regulations:

(a)	Short-range forecasting:	0 to 72 hours
	Within this range, two shorter periods may also be defined:	
	(i) Nowcasting:	a description of current weather and a 0-2 hour forecast
	(ii) Very-short-range forecasting:	0 to 12 hours
(b)	Medium-range forecasting:	more than 72 hours and up to 10 days
(c)	Long-range forecasting:	beyond 10 days.

5.12 The Commission adopted Recommendation 1 (CBS-Ext.(85)) relating to definitions of forecasting ranges.

5.13 The Commission noted that individual Members attached different levels of importance to various meteorological forecast ranges, and emphasized

that forecasting on all time-scales should receive adequate attention in the development of new techniques and methods.

The Global Data-processing System (GDPS)

5.14 The Commission agreed that a tabulation of information on end-user requirements for GDPS data and products contained very useful information for many Members, but decided that it would be more appropriate to include the table in the Guide on the GDPS rather than as an annex to the WWW Plan. Changes in the text of the GDPS chapter of the Plan, resulting from this decision, would be made by the Secretariat.

5.15 The Commission agreed on the inclusion in the Plan of material describing:

(a) Numerical prediction models and their relevant prediction periods applicable to various scales of tropical circulation (Table 1 in the draft Plan);

(b) Specifications of the upper-air and surface data needed to permit optimum results from NWP by the late 1990s (Table 3 in the draft Plan);

(c) Estimated volume of processed data from a centre producing global model output (paragraph 59 in the draft Plan).

The Commission also agreed that a statement on the requirements for observational data for subjective forecasting be included.

The Global Observing System (GOS)

5.16 The Commission accepted with minor amendments the draft text of the GOS chapter of the Plan. It decided that a tabulation "Main Systems providing the Global Data Set in 1988-1997" which had been suggested as an annex to the Plan should instead be incorporated, with appropriate amendments, in the Guide on the GOS.

The Global Telecommunication System (GTS)

5.17 The Commission noted that the draft Plan presented new concepts of communication techniques for inclusion in the GTS, i.e. computer-based nodes interconnected by a network of medium/high-speed data links, operated in a packet switching mode. It was the view of the Commission that the suitability of public data networks, in a packet switching mode, for meteorological telecommunications, should be carefully assessed in further studies. The transition from the present system should therefore be a gradual process over a number of years and this should be reflected in the Plan. The use and costs of satellite communications, particularly for point-to-multipoint transmission, should be investigated further.

WWW Data Management (WWWDM)

5.18 It was the opinion of the Commission that the title of this chapter of the Plan should be shortened to "WWW Data Management" (WWWDM).

5.19 The Commission expressed its full support for the inclusion of WWW Data Management concepts in the WWW Plan. The Commission also agreed on the essential need for effective and efficient data management functions in the WWW system. Such functions would include monitoring of the quality and flow of WWW data and products and of their availability, presentation formats, and the relevant quality control procedures, and it would probably be desirable to introduce more extensive data management functions. The Commission recognized that several of these functions would need to be defined and specified in more detail and that the consequences of their introduction into the WWW system, in respect of costs for hardware, software, data transmission and the impact on national practices and procedures, should be carefully investigated.

5.20 The Commission, when reviewing the text of the Plan relating to data management (WWWDM), agreed that a small expert meeting should be convened to study the matter and submit a report with specific recommendations by 1 May 1986 to the president of CBS. Experts from WMCs, WAFCs, an expert from ECMWF and the chairmen of the CBS Working Groups on the GDPS and GTS should be invited to participate.

5.21 The Commission agreed that the meeting should:

(a) Develop further the concept of WWW data management and define and specify management functions which could usefully be introduced into the WWW system;

(b) Recommend data management functions for phased implementation into the WWW system;

(c) Make assessments of the implication of the introduction of the data management functions, recommended under (b) above, in respect of:

(i) Costs of hardware, software and data transmissions;

(ii) The impact on regional and national procedures and practices.

WWW Implementation Support Activity (WWWISA)

5.22 The Commission noted the fundamental importance of this activity in meeting the objectives and goals of the WWW Plan and Implementation Programme. A strong and co-ordinated exchange of knowledge and methodology among Members was a pre-condition for the implementation of the Plan. In this respect, a strong training component and technical advisory and information service would have to be given high priority within the WWW system.

WWW Implementation Co-ordination (WWWIC)

5.23 The Commission recognized that WWW was rapidly developing into a composite, increasingly integrated system, where advanced technology and conventional facilities were operated side by side, and agreed that very strong co-ordination would be needed if the WWW was to develop its expected potential during 1988-1997. Through WWWIC, the required co-ordination should be achieved. Involvement of the Executive Council, CBS, regional associations and the Secretariat was required.

THE WWW IMPLEMENTATION PROGRAMME

5.24 The Commission noted that the draft WWW Implementation Programme was divided into three parts, namely:

Part A - Global objectives and activities;

Part B - Regional objectives and activities (including the Antartic);

Part C - Specific objectives and time-line charts for WWW projects.

5.25 Discussions focused on Part A - Global objectives and activities. The Commission noted that the regional implementation programmes given in Part B of the draft WWW Implementation Programme would be examined by the appropriate regional associations. There was therefore only a general discussion of the form and structure of Part B, apart from the Antarctic section, which was considered in more detail. The Commission stressed that regional implementation programmes would need to be considered in the context of Part A - Global objectives and activities, to ensure consistency of the complete implementation programme.

5.26 The Commission agreed that information on cost assessments of individual GOS components, which had been suggested for inclusion as an annex to Part A, would be more appropriately included in an updated version of the Guide on the GOS.

5.27 It was agreed that decisions taken by the Commission with regard to the proposed baseline upper-air observing network (see also paragraphs 7.3.4 to 7.3.7) would be incorporated in the revised Plan and Implementation Programme.

5.28 It was the opinion of the Commission that the objectives and activities presented in the Antarctic chapter of the Implementation Programme, particularly the need for one or more RSMCs in the Antarctic and the internal and external telecommunication problems, should be discussed in accordance with the guidelines established and accepted by the States signatory to the Antarctic Treaty and other interested countries.

5.29 The Commission noted that Part C contained very detailed information for the ten-year planning period 1988-1997. Part C was intended to consolidate implementation objectives and activities described in Parts A and B. It was presented in the form of time-line charts for projects and tasks with titles which would permit easy identification with the Secretary-General's Programme and Budget proposals for 1988-1991.

5.30 The Commission considered that it would be more beneficial if a high but realistic level of detail were presented for the first four-year period with more general outlooks for the rest of the period. The present draft contained some lack of balance between projects and some repetition which should be eliminated, at least for the period 1988-1991, during the preparation of the budget proposals for this period.

5.31 Some concern was expressed at the complexity of the presentation of Part C. It was considered that a shorter, less repetitious layout would be preferable for formal inclusion in the Implementation Programme (and the SLTP) to provide an overview of the Implementation Programme in diagrammatical form. A simpler layout would be more useful for Members and could assist them in their planning.

5.32 The Commission noted that some data management concepts in the WWW Plan and corresponding measures in the Implementation Programme were aimed at improving efficiency and effectiveness of the WWW system by facilitating access by Members to WWW data and processed information. In the implementation of these measures, the important WWW principle of free exchange would be retained. Considering the large and increasing commercial value of meteorological information, the Commission considered it necessary to emphasize that this principle of free exchange applied to WWW data and WWW processed information but not necessarily to all other non-real-time information.

5.33 The Commission agreed on the specific amendments to Parts A, B and C of the Implementation Programme, which are shown in Annex I. It was agreed that these amendments would be included by the Secretariat in a revised version of the Implementation Programme and it was recognized that, in so doing, an editorial review would be necessary to ensure consistency between all parts.

PART I OF THE SECOND LONG-TERM PLAN (SLTP)

5.34 The Commission reviewed an extract from the draft of Part I of the SLTP relevant to the WWW and agreed that it presented a good policy overview which could serve as an executive summary. It was stressed that a comprehensive editorial review would be necessary to ensure consistency between Parts I and II of the SLTP.

DEVELOPMENTS IN FORECASTING IN THE TROPICS

5.35 The Commission reviewed an ISS study report on Developments in Forecasting in the Tropics prepared by Professor T. N. Krishnamurti. The Commission expressed its great appreciation for the report but added a note of caution regarding the cost, in terms of staff and equipment, of establishing numerical weather analyses and prediction centres and providing sophisticated observing and data-processing communication facilities for short-range forecasting. It was considered that the report tended to underestimate these costs.

5.36 The Commission considered that the report would be very useful as background information when aspects of the Implementation Programme relevant to the tropics and sub-tropics were being considered, and in particular it should be useful for Members wishing to develop numerical weather prediction programmes. It noted that the concepts presented in the report depended on improvements in both the GOS and GTS in tropical and sub-tropical regions.

ADOPTION AND FINALISATION OF THE DRAFT WWW PLAN AND IMPLEMENTATION PROGRAMME

5.37 With the amendments that had been agreed, the Commission concurred that the draft WWW Plan and the Implementation Programme 1988-1997 be submitted to the Executive Council for inclusion in the WMO SLTP. It invited the Secretary-General to take the necessary steps:

(a) To prepare a consolidated version of the draft Plan and Implementation Programme as adopted by the Commission, with such editorial changes as were necessary to achieve internal consistency, and to make it available to the members of CBS, at least in English, by the end of January 1986;

(b) To finalize the draft Plan and Implementation Programme for submission to regional associations and the Executive Council. This would include any editorial review necessary to achieve consistency between individual sections within the Plan and Implementation Programme as well as between Parts I and II of the SLTP.

6. STATUS OF WWW IMPLEMENTATION AND OPERATION, INCLUDING MONITORING (agenda item 6)

General

6.1 The Commission noted that the Twelfth Status Report on the Implementation of the World Weather Watch had been issued in 1984 and submitted to the thirty-seventh session of the Executive Council. This report contained a comprehensive and exhaustive report on the development of the implementation of the GOS, GDPS and GTS, and also detailed information concerning problem areas which were revealed from the results of the monitoring of the operation of the WWW carried out in previous years. The Commission discussed problems related to the existing deficiencies in the operation of the WWW, based on the document submitted by the Secretary-General, which contained additional information concerning further developments in the implementation. The Commission agreed on the need to present, in such documents, information on the timeliness of receipt of all types of data, as well as on the availability of data. The Commission noted that information on the improvements to the WWW, as a result of remedial action, was also of value.

Global Observing System (GOS)

6.2 The Commission noted the progress in the implementation of the GOS, the surface-based sub-system and space-based sub-system:

(a) The surface-based sub-system of the GOS was composed of a large number of observing stations and platforms, namely 7 800 surface observing stations, 850 upper-air observing stations, 7 700 voluntary observing ships, 550 radar stations, 4 fixed ocean stations and many commercial aircraft. Owing to the uneven geographical distribution of these stations and platforms, large data-sparse areas continued to exist, in particular in the tropical belt and

southern hemisphere. Despite increasing efforts, the quality of observational data from some stations and platforms had not yet reached the required level;

(b) The space-based sub-system of the GOS comprised two meteorological satellite systems, polar-orbiting and geostationary. These two systems also had a capability for data collection and distribution;

(c) As regards automatic marine stations, an increasing number of fixed and drifting buoys were being deployed to take meteorological, oceanographic and other environmental observations. In 1984 the number of these stations reached 149. According to recent information available in the Secretariat in 1985, the Argos service was handling reports from 333 drifting buoys, 63 moored buoys, 2 balloons, 13 ships, 223 fixed stations and 23 miscellaneous platforms. However, not all reports were currently exchanged on the GTS on a real-time basis.

Global Data-processing System (GDPS)

6.3 The Commission noted that the three WMCs continued to improve the quality of their output products. The WMCs distributed daily more than 300 analyses and prognoses in grid-point or pictorial form through the GTS. As regards the implementation of 26 RMCs, information available from Members indicated that the daily output products exceeded 2 000 (about 800 analyses and 1 200 forecasts). Numerical weather prediction methods had been introduced increasingly by many RMCs. In addition, World Area Forecast Centres (WAFCs), Regional Area Forecast Centres (RAFCs) and the European Centre for Medium Range Weather Forecasts (ECMWF) were distributing products on the GTS for use by Members. NMCs continued to provide capabilities for storage and archiving of GOS data. Fifteen NMCs had introduced NWP operations.

6.4 The Commission felt that both computerized and manually operated centres required timely receipt through the GTS of comprehensive data sets of meteorological observations for producing global, hemispheric and regional analyses. The quality of the data was of paramount importance. Further details of improved quality control procedures are recorded under agenda item 7.

Global Telecommunication System (GTS)

6.5 The Commission noted that:

(a) Nine circuits of the Main Telecommunication Network and eight circuits of the regional meteorological telecommunication networks were operating with a data signalling rate of 9 600 bit/s using multiplexing techniques as specified in CCITT Recommendation V.29;

(b) Out of 271 point-to-point circuits called for in the GTS plan, 235 circuits (168 satellite/cable circuits, 59 HF radio circuits and eight UHF/VHF radio relay system circuits) were in operation;

(c) The three WMCs, 23 RTHs, three RMCs not associated with the RTH and 19 NMCs were automated. Three RTHs and 11 NMCs had plans to introduce automation in the very near future;

(d) Twenty circuits operating with 3 600/7 200/9 600 bit/s had the capacity to deliver non-coded digital facsimile (NCDF) products and 30 circuits had the capability to transmit pictorial information in facsimile form;

(e) In addition to the point-to-point circuits, 27 RTT broadcasts and 23 radio-facsimile broadcasts were operated by WMCs/RTHs in order to meet the requirements of Members for reception of meteorological information, in particular processed information.

6.6 The Commission felt that a difficulty related to the exchange of output products was one of the major shortcomings of the operation of the GTS. In some parts of the world, many centres still relied on radio broadcasts (RTT and FAX) for reception of these products. It noted that the operation of some radio broadcasts had already been discontinued and this would be a continuing tendency in the near future, owing to financial restrictions and operational difficulties. The Commission considered it necessary to study alternative solutions in this respect, namely the use of telecommunication capabilities of meteorological satellites (WEFAX services) and the use of satellite-based data distribution services (e.g. INTELNET).

6.7 The Commission was of the opinion that the satellite-based data distribution services would be used for direct dissemination of meteorological information to NMCs and remote offices in areas where the current GTS was not adequate. Furthermore, it felt that the possibility of using METEOSAT Meteorological Data Dissemination (MDD) missions, which would be available in mid-1987, should be studied. In view of the above, the Commission requested the Secretary-General to study these possibilities, including the financial implications, and issue the results of the study to WMO Members at the earliest possible date. The Commission was informed of similar investigations currently being undertaken by ICAO, the results of which could be made available to WMO.

6.8 The Commission discussed problems regarding the use of INMARSAT for the collection of ship's weather reports, particularly regarding the cost aspects of using this system. Thirteen coast earth stations were in operation as at March 1985 and ship earth stations were now operating on 664 voluntary observing ships (VOSs) which represented 8.6 per cent of the total number thereof. Further details in this respect are also recorded under agenda item 7.

Monitoring of the operation of the WWW

6.9 The Commission noted that seventy-six Members had participated in annual global monitoring in October 1984. The regional distribution of the participating centres was as follows:

	WMCs/RTHs	NMCs
Region I	4	16
Region II	5	5
Region III	2	7
Region IV	1	3
Region V	2	6
Region VI	7	18
Total	21	55

Automated centres had provided the Secretariat with monitoring results prepared by computer during the period 1-15 October 1984 and non-automated centres had provided monitoring results for the period 6-10 October 1984. It was further noted that annual global monitoring had been carried out in October 1985; however, results of this monitoring were not yet available in the Secretariat.

6.10 The Commission noted that the previous monitoring results in October 1981, 1982, 1983 and 1984 indicated that:

(a) The daily average number of SYNOP data for global exchange received at a centre ranged from about 1 800 to 2 000 for each main synoptic observation time. As regards upper-air observations, about 540 TEMP reports were exchanged on the Main Telecommunication Network for 0000 and 1200 GMT. These figures represented about 75 per cent of the number of reports of global exchange stations. In addition to TEMP reports, about 200-250 PILOT reports were also exchanged on the MTN daily;

(b) The total number of SHIP and AIREP reports received daily had exceeded 5 000 and 2 500, respectively. However, the number of SHIP and AIREP data available from Regions I and III was still very low. It should be noted that the use of INMARSAT for the collection of ships' weather reports had contributed to the increase in the number of SHIP reports received at MTN centres;

(c) As regards CLIMAT and CLIMAT TEMP reports, 60 to 80 per cent of the total expected number of such reports were exchanged on the MTN every month;

(d) The daily average number of DRIBU reports exchanged on the GTS was about 600 and that of BATHY/TESAC reports ranged from 100 to 120;

(e) About 2 000 bulletins containing SATOB (satellite cloud/wind data), SATEM (satellite remote upper-air sounding data) and SAREP (cloud data obtained by satellite) were exchanged on the GTS daily;

(f) The daily total number of GRID bulletins exchanged on the GTS reached 1 000. These bulletins were exchanged efficiently on some parts of the GTS, in particular on the Main Telecommunication Network. However, owing to the lack of capacity of some point-to-point circuits, not all of these bulletins could be exchanged in some other parts of the GTS.

6.11 The Commission expressed deep concern that, although the total number of global exchange reports available had not significantly altered over the last four years (1981-1984), a drastic decrease in the data available in some regions was recognized from the results of annual global monitoring. It was also noted that there was a need for monitoring on a regional level in order to evaluate the availability of data at National Meteorological Centres. It felt that some remedial action would have to be taken in order to increase the availability of data, in line with the proposals agreed by EC-XXXVII discussed in paragraph 6.13.

6.12 The Commission was of the opinion that real-time monitoring would be one of the most efficient mechanisms for overcoming the above-mentioned shortcomings. Therefore, the Commission urged Members to implement fully the monitoring plan as prescribed in the Manuals on the GOS, GDPS and GTS, in particular the real-time monitoring and follow-up action, at the earliest possible date.

6.13 The Commission was informed that the Executive Council at its thirty-seventh session (1985) had recognized that serious deficiencies in the operation of the WWW still existed in some areas in Regions I, II and III, and the southern parts of Regions IV and VI. It felt that, with a view to enabling Members to overcome them, the WWW implementation support activities should be intensified and at least some emergency action should be initiated in 1985/86. In this connection the Executive Council agreed on the following proposals for immediate action as a means of accelerating the implementation and improvement of the operation of the WWW:

(a) Improvement of the availability of the WMC, RMC and special products at NMC and meteorological offices through direct reception of satellite broadcasts;

(b) Strengthening of the GTS operation in Regions I and III through the introduction of automation, improved operating procedures at GTS centres and modernization of telecommunications, i.e. more extensive use of satellite circuits;

(c) Introduction of refresher courses for meteorologists and meteorological telecommunication personnel in Regions I, II (souther part), III, IV (southern part) and V (northern part);

(d) Establishment of co-operative projects for modernizing and maintaining WWW facilities and equipment;

(e) Arranging for advisory expert missions to elaborate action programmes for further development of the WWW on regional and national levels;

(f) Assisting Members in installing and connecting new equipment and in overcoming maintenance difficulties, in particular through co-ordinated VCP projects;

(g) Improvement of the quality of observational data through a mechanism for quality control of observational data in monitoring the operation of the WWW;

(h) Increased use of INMARSAT for the collection of ships' weather reports, and initiation of a study on a cost-sharing scheme on a global basis;

(i) Continuation of efforts to establish satellite point-to-point circuits to replace HF radio circuits;

(j) Introduction of procedures for evaluation and verification of NWP;

(k) Implementation of exchange of WAFS products on the GTS;

(l) Assistance through a regional expert to advise Members in Region I on the routeing and scheduling of WWW data on existing GTS circuits.

6.14 When discussing the action proposed by EC-XXXVII, the Commission felt that, in connection with paragraph 6.13 (c) above, maintenance personnel should be included and that appropriate action should also be taken in the south-eastern part of RA VI.

6.15 The Commission noted that some action agreed to by EC-XXXVII had been taken by the Members concerned and the Secretariat. In particular, the Commission noted with satisfaction that the RTHs Brasilia, Buenos Aires and Maracay would be automated in 1986.

6.16 Concern was expressed that, although constant efforts were made by Members, the increase in the availability of AIREPs in Region I had not been achieved. The Commission was of the opinion that the Members concerned should continue efforts in this respect.

6.17 The Commission discussed problems concerning improvement of the availability of observational data, in particular regularity of observations, completeness of observational data as laid down in the WMO Technical Regulations (e.g. upper-air data up to the 10 hPa level), quality of observational data and timeliness of collection of observational data. The Commission noted that these items were contained in the objectives given in the Manuals on the GOS, GDPS and GTS; however, detailed procedures should be developed further and implemented at the earliest possible date.

6.18 The Commission was of the opinion that the above-mentioned monitoring items were related to the GOS, GDPS and GTS as a whole and, in order to solve the problems, an integrated approach would be needed. The

Commission concluded that the integrated approach to the monitoring of the operation of the WWW should be incorporated into the WWW Data Management part of the WWW Plan for 1988-1997.

6.19 Concern was expressed by the Commission that there were no clear definitions of certain terms used in the monitoring plan, such as quality control of observational data. The Commission felt that terms such as quality control should be clarified and defined in the WWW Plan for 1988-1997. Further details concerning procedures for verification of NWP products and for quality control and quality evaluation of observational data are recorded under agenda item 7.

7. SPECIFIC GDPS, GOS, GTS AND CODE MATTERS, INCLUDING MATTERS ARISING FROM SESSIONS OF CBS WORKING GROUPS (agenda item 7)

7.1 Global Data-processing System (GDPS) (agenda item 7.1)

Standardized NWP verification procedures

7.1.1 The Commission reviewed the methods for monitoring GDPS products developed by the CBS Working Group on the GDPS and its Study Group on Monitoring Procedures of the GDPS. The Commission agreed that there was a requirement to establish standardized GDPS NWP verification procedures for monitoring the operation of the GDPS. In this connection, a question was raised as to whether or not a monthly exchange of the results of the NWP verification was appropriate. Several GDPS centres would prefer an exchange at three-monthly intervals so as to be able to make a preliminary evaluation before exchanging the verification results. The Commission felt, however, that shorter exchange intervals would be preferable in order to allow for a prompt elimination of problems in the numerical models.

7.1.2 The Commission noted that the CAS NWP Data Study/Intercomparison project had come to an end in 1983 but had been continued, at the request of the CBS Advisory Working Group, as a WWW monitoring activity in 1984 and 1985. The Commission felt that the intercomparison and verification of operational NWP products should be an integral part of the monitoring of the GDPS. Therefore, the Commission had developed a verification procedure for numerical weather prediction which should become effective from 1 November 1986. In order to avoid an interruption in the verification of NWP, the Commission invited the president of CBS, in consultation with the Secretary-General, to arrange for extension of the ongoing verification project up to the end of 1986.

7.1.3 The Commission agreed that the results of the NWP verification should be published at regular intervals. To facilitate the dissemination of this information it was agreed that the verification results should be prepared in a standardized form by the GDPS centres concerned and passed to the other participating centres and the WMO Secretariat on a monthly basis. The Commission requested the Secretary-General to disseminate the results of the NWP verification at half-yearly or yearly intervals, as appropriate, to all Members.

7.1.4 The Commission adopted Recommendation 2 (CBS-Ext.(85)).

Monitoring the quality of observational data

7.1.5 The Commission reviewed procedures for monitoring the quality of observational data as developed by its Working Group on the GDPS and its Study Group on Monitoring Procedures of the GDPS. The Commission agreed that there was a need to monitor the quality of observations received on the GTS by GDPS centres, in particular upper-air stations, surface land stations, ships and buoys. It noted that some monitoring procedures had been set up by some GDPS centres and that a number of techniques for monitoring the quality of observations had been developed.

7.1.6 With regard to the time intervals for the exchange of monitoring results, it was pointed out that, depending on the monitoring procedure used, considerable effort would be necessary to produce the lists. Therefore, a three-monthly interval was considered appropriate by the Working Group on the GDPS. The Commission felt, however, that a monthly exchange of monitoring results would be possible and desirable in order to identify problems quickly.

7.1.7 The Commission agreed that a consolidated list of stations, ships and buoys producing suspect data should be prepared by one GDPS centre from the contributions of the participating centres at six-monthly intervals. The consolidated monitoring results would then be issued to the participating centres and to the WMO Secretariat who should notify Members responsible for stations producing suspect data, inviting them to take the necessary action.

7.1.8 The Commission adopted Recommendation 3 (CBS-Ext.(85)).

7.1.9 The Commission expressed appreciation for the work done at the ECMWF in respect of monitoring. It requested the Secretary-General to invite the ECMWF to continue their efforts and to consider playing a leading role until the procedures given in Recommendation 3 (CBS-Ext.(85)) were implemented. The Commission acknowledged that the procedures for monitoring would need further development and evaluation during the next two years. It therefore requested the Working Groups on the GDPS and GOS, through their rapporteurs, to present an assessment of the monitoring activities at CBS-IX.

Expanded requirement of CCl for WWW data

7.1.10 The Commission reviewed expanded requirements by CCl for regular area coverage of 10 CLIMAT stations per 250 000 km^2 instead of the present criterion of one station per 250 000 km^2. It noted that this represented a horizontal resolution of 150 km and that the expanded CLIMAT data would be useful for various data-processing purposes as well as for the envisaged preparation, using all available rainfall data, of global precipitation maps for dissemination to Members. The Commission noted that exchange of expanded CLIMAT data would only be once a month in the first few days of the month and normally during times when traffic was off-peak and therefore should not cause overloading of the GTS.

7.1.11 The Commission was of the opinion that additional CLIMAT reports could be prepared from the data obtained from the existing synoptic stations and that there was therefore no need at that time to increase the climatological station network in most Regions. In this connection, several

delegates pointed out that CLIMAT reports could be prepared at data-processing centres on the basis of an averaging of SYNOP reports, which thus avoided additional loading of the GTS as well as expenditure on the preparation of CLIMAT reports at the stations and their transmission from the stations to the GTS centres.

7.1.12 The Commission adopted Recommendation 4 (CBS-Ext.(85)).

Possibility of exchanging meteorological software

7.1.13 The Commission, in reviewing the conclusions of CBS-VIII concerning the expansion and updating of the Catalogue of Computer Programs in Meteorology (WMO-No. 409) published in 1975, endorsed the feeling of the sixth session of the CBS Working Group on the GDPS that the publication was obsolete.

7.1.14 The Commission recognized that there was a problem of transportability of software developed for a specific hardware configuration. It was emphasized that, for the purpose of exchange, software packages should be properly designed and documented to allow for easy transfer to other computer systems.

7.1.15 With regard to the commercial value of software, the Commission felt that appropriate measures should be taken in order to prevent misuse.

7.1.16 The Commission emphasized the need for sharing software amongst Members, especially to help those Members who were developing their own computer systems. It was agreed that the main requirements of software to be exchanged should be that it was:

- Of general application;
- Well written;
- Well documented;
- Easy to transfer (in standard language, e.g. Fortran 77);
- Independent of the hardware and the operating system.

7.1.17 To facilitate this exchange of software the Commission considered that the present WMO Catalogue of Computer Programs in Meteorology should be replaced. A new publication should be issued as soon as possible in a loose-leaf format with provisions made for regular updating. The Commission felt that this publication should be updated, for example, every two years.

7.2 Codes (agenda item 7.2)

Updating of existing code forms, specifications and code tables to meet new requirements

7.2.1 In a general discussion on the updating of existing code forms a view was expressed that a point had been reached where fundamental changes to the WMO code system would be necessary because of the introduction of bit-oriented codes. In view of this, it was agreed to restrict amendments to existing codes to a minimum and concentrate efforts on the development of a new generation of codes and the necessary preparation for their implementation.

7.2.2 In this connection, the view was expressed that some of the proposed changes to the existing codes would require considerable efforts by Members during the implementation process and that these were not justified in all cases. Furthermore, it was remarked that the frequency of code changes should be minimized. In view of the impact on national systems, any proposal for changes of codes would have to be very carefully assessed.

7.2.3 The Commission was of the opinion that there was no doubt that the existing codes needed a certain amount of maintenance and updating in order to adapt them to meet new requirements stated by the various WMO programmes.

Amendments to FM 12-VII SYNOP and FM 13-VII SHIP

7.2.4 The Commission reviewed proposed amendments to FM 12-VII SYNOP and FM 13-VII SHIP developed by the CBS Working Group on Codes and its Study Group on Urgent Code Matters. It also considered additional proposals for the amendment of these codes relating to the reporting of present and past weather from automated observing stations, pressure reporting and the reporting of past weather by human observers. In accordance with the results of the above discussion on the updating of existing codes, the Commission considered in each case whether a modification of code or of regulations was required and justified. After lengthy discussion, the following amendments to the SYNOP and SHIP codes and relevant coding regulations were adopted by the Commission:

(a) Broadening the use of N = / to cover cases where the sky is indiscernable owing to artificial lights at night;

(b) Simplification of the coding procedures in cases of wind speeds in excess of 99 units;

(c) Inclusion of a Code table 4680 on the reporting of present weather from automatic observing stations;

(d) Replacement of the identifiers RIGG and PLAT by the group $A_1b_wn_bn_bn_b$.

7.2.5 Recommendation 5 (CBS-Ext.(85)) was adopted.

7.2.6 A suggestion to include wind indicator i_w in individual SYNOP reports in order to remove ambiguities encountered by some centres in compiling and decoding SYNOP bulletins was not accepted by the Commission on the understanding that this would imply major changes in software and regulations.

Requirements of CAgM for global and regional exchange of observational data

7.2.7 The Commission noted the requirements of CAgM for the global exchange of precipitation and snow-depth data and for the regional exchange of evaporation (evapotranspiration), net radiation and daily hours of bright sunshine data. The discussion focused on possible ways and means of meeting the requirements of CAgM and highlighted in some detail the impact of the proposed code changes.

7.2.8 With regard to the requirement for global exchange of precipitation and snow-depth data, the Commission noted that this coincided with a requirement expressed in the WWW Plan, since these data were needed as input for global and regional forecasting.

7.2.9 The Commission carefully considered the necessity of amending the present code or relevant regulations to guarantee the global exchange of precipitation and snow-depth data. In this context, it was argued that at present Section 3 of the SYNOP reports in which these data normally appeared was, in fact, exchanged globally, as GTS centres did not separate this section from Sections 1 and 2. The Commission noted that existing procedures of the Manual on the GTS did not exclude the global exchange of regional data and urged GTS centres to continue the inclusion of Section 3 in bulletins for global exchange. The Commission considered that, at such a time when Section 3 was no longer exchanged globally, appropriate changes should be made to Section 1.

7.2.10 It was also pointed out that the reporting procedures for precipitation and snow-depth data differed between the Regions. The possibilities for standardization in this field would have to be discussed both on regional and global levels before steps on further procedures were taken.

7.2.11 With regard to the requirement of CAgM for regional exchange of evaporation, net radiation and sunshine data, the Commission noted that not all regional associations had taken decisions on how to meet these requirements. Therefore the Commission refrained from taking further action on the subject.

7.2.12 The Commission requested the president of CBS to inform the president of CAgM of the results of this discussion.

Reporting present and past weather from automatic weather stations

7.2.13 With regard to a proposal to introduce new code tables for the reporting of present and past weather from automatic stations, the Commission agreed to the inclusion of Table 4680 - Present weather from automatic weather stations. Concerning a suggestion to introduce a similar table for past weather from automatic observing stations, the Commission felt that this matter was not yet mature and should, therefore, be referred to its Working Group on Codes.

Modification of Code form FM 64-VIII TESAC and regulations under FM 63-VIII BATHY and FM 86-VI Ext. SATEM

7.2.14 The Commission reviewed proposed modifications to Code form FM 64-VIII TESAC and regulations under FM 63-VIII BATHY and FM 86-VI Ext. SATEM. In this connection the Commission considered that there was a need to report in TESAC the method of removing ship's velocity and motion from current measurement (Doppler current profiling method) and standardize in BATHY the regulations for reporting wind observations to bring them in line with FM 13-VII SHIP.

7.2.15 The implementation date for the changes to the BATHY and TESAC codes would have to allow for the sufficient lead time needed for related changes in ship logbooks.

7.2.16 The Commission further agreed to the improvement of certain regulations in the SATEM code to provide for notification and publication of specifications of Code tables I_3 and I_4 in Volume II of the Manual on Codes.

7.2.17 Recommendation 6 (CBS-Ext.(85)).

ODAS code

7.2.18 The Commission recalled that it had at its eighth session considered a proposal by the eighth session of RA VI to introduce a new code for the transmission of data from Ocean Data Acquisition Systems (ODAS) and accepted the requirement for its global introduction. It noted that it had entrusted the Working Group on Codes with the study of coding aspects of this agreed requirement.

7.2.19 When discussing the proposal to adopt the new ODAS code as developed by the Working Group on Codes, the Commission felt that, in view of doubts expressed on the necessity for such a code, the benefits that might be expected from its introduction merited further study. It therefore passed the matter back for referral to Members by the Secretary-General and for consideration of the updated requirements, particularly in regard to spectral wave data, by its Working Group on Codes.

TRACKOB code

7.2.20 The Commission considered the introduction of a new code TRACKOB to report data along a ship's track. It noted that there was a requirement by the joint IOC/WMO IGOSS Programme for such a code and that the proposed code had been reviewed and agreed to by the CBS Working Group on Codes.

7.2.21 The Commission was informed that the TRACKOB code would be used for the collection of data primarily from research vessels and vessels of opportunity through geostationary satellites (e.g. meteorological geostationary satellites, INMARSAT etc.) preferably in a real-time mode. It was pointed out in the discussion that the adoption of this code would neither imply significant additional expenditure for Members nor would it greatly affect the traffic on the GTS.

7.2.22 The Commission adopted Recommendation 7 (CBS-Ext.(85)).

Exchange format FM 92-VIII Ext. GRIB (gridded binary)

7.2.23 The Commission considered the experimental GRIB format, developed by the CBS ISS Expert Meeting on Exchange Formats, in particular Bit-oriented Code (Geneva, 8-11 May 1984), and authorized for experimental use by the president of CBS since August 1984. The Commission noted that the sixth session of the Working Group on GDPS in reviewing this format was of the

opinion that it was satisfactory in all aspects, including arrangements and procedures for transformation to other codes as may be required by other non-automated centres or other users. The Commission further noted that the first session of the CBS Expert Meeting on Observational Data Representation, Geneva, 2-6 September 1985 had reviewed the format and proposed improvements and developed those parts and procedures which were to be expanded. The modifications proposed by the Meeting on Observational Data Representation had resulted in the reviewed format which was found acceptable.

7.2.24 Noting that there were different stages of automation existing at the various centres, it was pointed out that the implementation of the GRIB code would clearly depend on an agreement between the centres concerned. The Commission further agreed that centres using the GRIB code should convert GRIB into other code formats as agreed and necessary for the provision of data to other centres.

7.2.25 The Commission adopted Recommendation 8 (CBS-Ext.(85)).

Indication of units of wind speed in aeronautical codes

7.2.26 The Commission noted that, in accordance with a request by ICAO, the Executive Council had requested CBS to take appropriate action with a view to indicating wind speed units (KT or MPS or KMH) in use or expected to be used in aeronautical meteorological figure codes. Consequently two exchanges of opinion had taken place within the Commission on draft Recommendation A (84-CBS) dealing with this subject.

7.2.27 The Commission was informed that ICAO had adopted the unit kilometres per hour (KMH) as the primary unit for reporting wind speed in air/ground communications. The unit knot (KT) may be used as an alternative until a decision is taken on a termination date for its use. It was pointed out that the use of the unit metres per second (MPS) was not excluded in principle where used in aeronautical codes on a national basis; however, it should be reported to ICAO as a difference to existing ICAO regulatory material.

7.2.28 The Commission noted that the introduction of this change in aeronautical codes had considerable impact on various aspects of automated data processing. Therefore, sufficient lead time would be necessary to make appropriate software changes. It was also pointed out that for the benefit of the aeronautical users, the implementation date should preferably coincide with an AIRAC date and the changes should be made known to all concerned well in advance.

7.2.29 The Commission adopted Recommendation 9 (CBS-Ext.(85)).

Observational data representation

7.2.30 The Commission reviewed the principles, developed by the Expert Meeting on Observational Data Representation, on bit-oriented techniques for the representation, exchange and storage of observational data. It encouraged the further development of the BUFR code with a view to completing this work prior to the next session of the Commission.

Continuation of the study of the new structure of Volume I of the Manual on Codes

7.2.31 The Commission endorsed the Advisory Working Group's recommendation that, in view of the new bit-oriented formats now being developed which may have an impact on the structure of the Manual on Codes, implementation of Recommendation 8 (CBS-VIII) be deferred and that this matter be reconsidered by the Working Group on Codes.

Observations of wave height from automatic stations

7.2.32 The Commission discussed a proposal concerning the reporting of wave height from automatic stations taking into account the increased accuracy of instrumental devices as opposed to visual observations. It considered the improvement of accuracy to be of global significance and noted the particular value of accurate wave height data for satellite calibration and as a basis for the WMO wave programme.

7.2.33 The Commission agreed to introduce a new optional code group ($70H_{wa}H_{wa}H_{wa}$) in Section 2 of the SYNOP/SHIP code and requested the Secretary-General to arrange for the necessary amendments to the Manual on Codes, in conjunction with several other changes to the above code forms.

7.2.34 Recommendation 10 (CBS-Ext.(85)) was adopted.

Standardization of pressure reduction procedures and pressure reporting

7.2.35 The question of standardization of pressure reduction procedures was discussed in considerable detail. Whilst noting that at present the reduction formulae used by Members differed in a way that in some cases meant sea-level pressure values in SYNOP reports were not comparable, the Commission agreed that urgent action was necessary to standardize the procedure for pressure reduction. It decided to refer this task to a group of experts to develop a proposal for the solution of this problem, in co-operation with the Working Group on the GDPS and CIMO.

7.2.36 The Commission considered intermediate measures for improving the quality of pressure reports and concluded that, until the pressure reduction procedures were standardized, SYNOP reports could contain both pressure at station level and mean sea-level pressure, at least for stations above a given altitude agreed to by regional associations. The Commission considered that 500 m might be an appropriate altitude and urged regional associations to take the necessary action to adopt this altitude.

Seismic codes

7.2.37 The Commission was informed that the International Seismic Code, contained in the Manual on Codes as an attachment, had been revised by the International Seismic Commission. On the understanding that this material,

which was published on yellow pages, had only informative status, the Commission requested the Secretary-General to update this attachment to the Manual on Codes. The Commission requested the Secretary-General to draw the attention of the International Seismic Commission to the need for keeping seismic messages as short as possible in order to avoid overloading of the GTS.

ASDAR code

7.2.38 The Commission, noting the development of the new ASDAR system as part of the GOS, recognized an urgent need for the development of a suitable code for the transmission of ASDAR data. It noted the particular need for data from the ascent and descent phases. The Commission requested its Working Group on Codes to develop the ASDAR code further, in co-ordination with the satellite operators.

7.3 Global Observing System (GOS) (agenda item 7.3)

Working Group on the GOS

7.3.1 The Commission noted that the fourth session of the Working Group on the GOS (Geneva, 3-13 December 1984) had discussed matters relating to the activities under the following special issues:

- Consideration of the draft WWW Plan to the year 2000 with particular emphasis the part on the GOS and consideration of the draft WWW Implementation Programme for the period 1986-1991;
- Planning and operation of special observing systems forming part of the GOS, including a composite baseline upper-air network;
- Quality control and quality assurance procedures for observational data;
- Review of the Manual on the GOS and revision of the Guide on the GOS;
- Monitoring of the operation of the WWW, in particular of the GOS.

7.3.2 The Commission noted with satisfaction that WG/GOS-IV had reviewed the draft Plan for the GOS and Implementation Programme for the period 1986-1991. The essential conclusions of the working group, endorsed by the tenth session of the CBS Advisory Working Group, were incorporated in the GOS part of the draft WWW Plan and Implementation Programme for the period 1986-1991.

Regional basic synoptic network studies

7.3.3 The Commission noted the necessity for the further development of regional basic synoptic network studies. It also noted that the Expert Meeting on GOS/GDPS/GTS Integration and Implementation Co-ordination for

1986-1991 (Geneva, April 1985) had stressed that criteria for design of the regional basic synoptic network (RBSN), as part of the composite Global Observing System of the WWW, should be developed as guidance for regional associations in improving their surface and upper-air networks. In accordance with the requests of the presidents of RA I and RA III, a review of RBSN and the development of criteria for an improved design of RBSN were urgently needed first of all in these Regions. The final objective of such RBSN studies would be the design of an optimized network based on meteorological considerations relating to the quality of forecasts. The studies of the upper-air network would have the highest priority of investigation. In view of the experience of WMCs, some RMCs and ECMWF in this particular field, the WMO Secretariat requested their participation in the studies of the upper-air network in Regions I and III and the suggestion of criteria for the design of an optimized regional upper-air network for these Regions, taking into account the availability of satellite data and data from new observing systems, such as ASDAR and ASAP. The Commission felt that this material would be very useful for the further preparation of guidance for regional associations in improving their upper-air network.

Baseline upper-air network

7.3.4 The Commission reviewed the proposals by the Working Group on the GOS concerning the need for a baseline upper-air network to provide data for the improvement of satellite soundings.

7.3.5 The Commission noted the conclusion of EC-XXXVII "that an initial network should be established comprising at least 20 baseline stations globally distributed, emphasizing existing island, coastal and continental upper-air stations. In addition, suitably equipped ships (e.g. ASAP and fixed ocean-station vessels) should be considered for inclusion in the initial configuration of the baseline upper-air network." The Commission considered that the baseline upper-air network, observing programme and radiosonde system characteristics should not yet be defined in detail until investigation had been made of the impact of data from a "trial" network of operational radiosonde stations.

7.3.6 Furthermore, the Commission agreed on an evaluation effort prior to full-scale implementation of the baseline upper-air network which included the following steps:

1. The United States, as the producer of the global set of soundings derived from observed radiances, will be requested to generate a candidate list from existing upper-air stations to participate in a six- to twelve-month evaluation effort.

2. Subsequently the Secretary-General will be requested to enlist the co-operation of the Members operating the selected stations.

3. Periodically, those stations which agree to participate will be requested to make upper-air observations, preferably reaching a height of 10 hPa, coincident with satellite overpass, based on schedules supplied by the satellite operator.

4. The United States and any other interested Members will be asked to evaluate, at three-monthly intervals, the impact of these special observations on the quality of derived soundings.

5. The United States will be asked to prepare at the end of six months operation a more extensive report on the details of the experience gained, taking into account contributions from other Members concerned. This report will be submitted to the president of CBS for distribution to interested Members.

7.3.7 Additionally, the Commission requested that the extent to which synoptic soundings could be used for calibration purposes should also be examined as part of the above evaluation programme.

Quality control and quality assurance procedures for observational data

7.3.8 The Commission reviewed the matters relating to quality control and quality assurance procedures for observational data. The Commission stressed the urgent need for the translation of the fifth edition (1983) of the WMO Guide to Meteorological Instruments and Methods of Observation into the other official working languages of WMO. It welcomed the information that CIMO-IX had recommended that translation of the fifth edition of the Guide be completed in 1986. The Commission also noted the important efforts of CIMO in preparing standard algorithms for automatic weather stations for synoptic purposes, as well as automated upper-air measurements. The Commission supported Recommendation 13 (CIMO-IX) on the amendment to the regulation concerning comparisons of radiation instruments.

Review of the Manual on the GOS and revision of the Guide on the GOS

7.3.9 In considering matters related to the revision of the Manual on the GOS, the Commission reviewed three definitions, namely, planetary boundary layer, surface station, and upper-air station, as amended by both the Working Group on the GOS and the Advisory Working Group.

7.3.10 The Commission noted that revision of the Guide on the GOS had already been initiated and that portions of Parts III and IV had been finalized at the third session of the Study Group on the Manual and the Guide. A draft of the final version of the Guide on the GOS should be ready by the end of 1986 in time for submission to the ninth session of the Commission.

7.3.11 The Commission adopted Recommendation 11 (CBS-Ext.(85)).

Monitoring of the GOS

7.3.12 The Commission considered that, apart from the non-real-time monitoring presently carried out by Members and the Secretariat, emphasis should also be placed on real-time monitoring of observational data carried

out on a day-to-day basis by Members, first at the observation site itself, then at the level of the National Meteorological Centre and at the associated Regional Telecommunication Hub and/or Regional Meteorological Centre. The results of the real-time monitoring being carried out at these centres should be made known to the Members concerned as feed-back information for corrective action. The Commission was informed of a recommendation of CIMO-IX for the establishment of systems for monitoring the operation of automatic stations. The Commission stressed that real-time monitoring should also be dealt with by regional associations. The Commission requested the Secretary-General to urge each regional association to take the necessary action to implement real-time monitoring by its Members at the earliest possible date. In particular, documents emphasizing the merits of real-time monitoring for improving WWW daily operation and data quality should be submitted to all forthcoming sessions of regional associations (see also agenda item 6).

Meteorological satellites

7.3.13 The Commission re-affirmed and strongly emphasized that meteorological satellites constituted an important part of the WWW systems on which the WWW depended heavily, in particular the GOS. In this connection, the Commission endorsed the conclusions of the eleventh session of the Advisory Working Group (Buenos Aires, 16-20 September 1985) that, besides the need to establish requirements for data from meteorological satellites, there was an increasing need to co-ordinate other satellite services of great importance to the WWW. In particular there was a need for CBS to address such matters as:

(a) The study of new standards for transmission of pictorial information in digital form, in order to progressively improve the services currently offered by WEFAX and APT transmissions;

(b) Planning for a more effective use of the DCP capabilities for collection of data and for transmission of information by the satellite system to the originating area, e.g. through WEFAX-DCP channel or the future MDD mission of METEOSAT;

(c) Planning for the real-time monitoring of the availability and quality of satellite products or derived data.

7.3.14 The Commission was of the opinion that, with the great importance of meteorological satellites with regard to their observing, data collection, product distribution and platform location capacities, CBS needed to play an increasingly active role in co-ordinating and standardizing operational meteorological satellite activities. In particular, the Commission strongly emphasized that CBS was an important forum for expressing requirements from users of meteorological satellite systems, and also maintaining close co-operation concerning international regulatory aspects with other international organizations such as the ITU. The Commission agreed to invite the satellite operators to send their experts to the sessions of the Commission and its working groups with a view to expressing their views so that the satellite operators could follow up with reciprocal action, as necessary. The Commission requested the president of CBS to inform the EC Panel of Experts on Satellites of CBS views on this matter.

7.3.15 The Commission noted that there was a lack of coverage by geostationary meteorological satellites with regard to RA II. It therefore agreed to bring this fact to the attention of the EC Panel of Experts on Satellites at their next session inviting them to consider remedial action.

Automation of marine observational transmission of reports

7.3.16 The Commission noted that the president of CMM had requested CBS to examine the impact of changes in maritime traffic on the collection of data at sea. It was mentioned that the current stagnation as regards this traffic and the ship owners' plans to run ships with reduced crews (maximum of 5 people) would necessarily call for a questioning of the observation and transmission procedures and for an evolution towards increasingly automated techniques.

7.3.17 The Commission noted that recent results of the monitoring of the operation of the WWW indicated some increase in the number of ships' weather reports on the GTS. The Commission expressed the view that such increases were closely tied to automation of the transmission process. The Commission agreed that automated techniques of observation and transmission procedures should be studied jointly by CBS and CMM.

Study on volcanic ash clouds

7.3.18 The Commission was informed by the representative of ICAO that, although procedures had been established to disseminate warnings of volcanic ash eruptions, ICAO considered that there was an urgent need for WMO to develop guidelines to assist meteorologists in the early identification of volcanic ash clouds in satellite pictures, and in the forecasting of their development and movement.

7.3.19 The Commission noted that some Members had initiated a study on possible procedures of prompt identification of volcanic ash in the satellite cloud picture in cases of cloudy conditions. However, such analyses could only be made available if adequate equipment was installed in meteorological satellites. The Commission was of the opinion that Members operating meteorological satellites should study this matter at the earliest possible date and the results of this study should be distributed to WMO Members as appropriate.

ASDAR

7.3.20 The Commission noted that the company responsible for the manufacture and certification of pre-production ASDAR systems had announced that it would cease trading early in 1986, before the completion of its contract. The company was part of a group whose chairman had stated that arrangements would be made to complete and honour the contract. Formal negotiations to this end between the Consortium for ASDAR Development (CAD) and the group were to take place in November 1985. The Commission noted that although three aircraft would be ready to carry the ASDAR system by the end of

1985, it was expected that a lapse of one year would take place before certification was completed (see also paragraph 7.2.38).

7.4 Global Telecommunication System (GTS) (agenda item 7.4)

Working Group on the GTS

7.4.1 The Commission noted that the eleventh session of the Working Group on the GTS (Geneva, October/November 1984) had discussed matters relating to the organization of the GTS, telecommunication procedures for the GTS as well as technical specifications and characteristics of the GTS and reviewed the GTS part of WWW Plan 2000. It also noted that two sessions of the Study Group on Communication Techniques and Protocols as well as one session of the Study Group on Operation Matters had considered telecommunication matters in order to update and adjust the present text of the Manual on the GTS. Furthermore, the Ad Hoc Group of Experts on the Impact of INMARSAT on the GTS had worked by correspondence on the basis of the outcome of the various meetings concerning the use of INMARSAT in the WWW.

Organization of the GTS

7.4.2 The Commission endorsed the opinion of the working group that guidelines should be developed in order to bridge the present MTN and the GTS-2000 MTN. The Commission agreed on the following guidelines which would meet the requirements for the development of the MTN in the medium term, e.g. until the year 1990:

(a) Enhancement of the existing circuits of regional meteorological telecommunication networks and of RTHs on these networks may be used for the development of the MTN;

(b) If necessary, new circuits between centres on the MTN should be included in the Plan;

(c) Circuits of the MTN should be telephone-type links (land-line or satellite), with a data transmission capability for data signalling rates up to 9 600 bit/s and, if possible, should be equipped with V.29 CCITT modems.

The use of INMARSAT for the collection of ships' weather reports

7.4.3 The Commission noted that the use of INMARSAT for the collection of ships' weather reports had been introduced by some Members and a large number of ships' weather reports were presently received via the INMARSAT coast earth stations (CESs).

7.4.4 The Commission expressed its concern that the cost burden to those Members who collected ships' weather reports, through the use of INMARSAT, had increased recently owing to an increase in the number of voluntary observing ships equipped with ship earth stations (SESs). It was suggested that a

global cost-sharing scheme should be introduced depending upon the proportional contribution of Members to WMO, NAOS system, etc. at the earliest possible date. However, the Commission felt that further careful study in this respect should be made and the question should be kept under review by CBS, CMM, the WMO/INMARSAT consultative mechanism and the Executive Council (see also agenda item 6).

7.4.5 The Commission endorsed the recommendations of CMM-IX that all Members operating CESs should accept ships' reports transmitted through INMARSAT and should implement the Code 41 - Short code dialling procedures on INMARSAT - to facilitate transmission of reports, pending a global cost-sharing scheme.

Inclusion of Section 3 of the SYNOP code for global exchange

7.4.6 The Commission considered the existing procedures for transmission of the regional section of the SYNOP code for global exchange. The Commission agreed, as an interim measure, to continue the inclusion of Section 3 of SYNOP reports in global exchanges on the MTN. This interim measure should be reviewed by the ninth session of CBS with a view to taking decisions on the coding procedures for global exchange of precipitation data and snow-depth data.

7.4.7 The Commission adopted Recommendation 12 (CBS-Ext.(85)).

Dissemination of World Area Forecast System (WAFS) products

7.4.8 The Commission discussed problems concerning the dissemination of World Area Forecast System (WAFS) products on the GTS. It noted that some GTS centres had already started to disseminate WAFS products on the GTS in order to meet the requirements of users. It felt that further detailed arrangements for the dissemination of WAFS products on the GTS should be made with a view to enabling the GTS centres concerned to accommodate the large increase in volume of traffic.

7.4.9 The Commission noted that satellite-based dissemination systems which had recently become available would constitute important facilities for the dissemination of WAFS products. It was informed by the representative of ICAO that an ICAO Washington Informal World Area Forecast Centre Meeting (Washington, October 1985) had discussed the possibility of using a satellite-based dissemination system, and had endorsed its implementation in the ICAO Caribbean and South America Regions. In addition, investigation of the introduction of this system in the Pacific and Asia Regions would be carried out. The meeting had concluded that further study should be made with close co-ordination between ICAO and WMO in order to carry out the study more efficiently. The Commission welcomed and concurred with this conclusion.

Telecommunication procedures

Order of priority of observational data and processed information

7.4.10 The Commission considered that a priority system for routeing bulletins should be established in order to avoid delays in transmitting

urgent messages. In particular, owing to the large volume of processed information available at present on the GTS, delays in transmitting observational data would result. The Commission agreed that there should be four levels of priority allocated as follows:

Level 1: warnings, urgent operational service messages;

Level 2: observational data (including satellite data and radar data), request-reply messages for operational data, TAF;

Level 3: processed information;

Level 4: non-real-time data (CLIMAT, BATHY, TESAC), seismic data, administrative messages and other messages.

The Commission agreed to insert the above list of priorities in paragraph 2.11 of the Manual on the GTS, Volume I, Part II and amend Table A of Attachment II-6 by adding a fifth column to indicate the level of priority.

Use of CLLLL

7.4.11 The Commission recalled that CBS-Ext.(80) had noted that the catalogue number CLLLL was no longer adequate to meet all requirements for the distribution of meteorological bulletins. It noted that the Members operating WMCs and RTHs had been requested to cease the use of the CLLLL group for routeing meteorological messages when they replaced the equipment at their centres. It also noted that replies to a questionnaire concerning a possible date for the cessation of the use of CLLLL for routeing purposes indicated that 15 june 1987 would be a target date.

7.4.12 In this connection, the Commission noted that further allocation of CLLLL numbers to World Area Forecast System (WAFS) products would not be possible owing to insufficient numbers available; therefore a single CLLLL number would be allocated to one group of WAFS products.

7.4.13 The Commission considered that the catalogue of meteorological bulletins in alphabetical order of abbreviated headings should be published before the target date mentioned above (15 June 1987). It also considered that, although CLLLL would not be used for routeing purposes, CLLLL would still be used for other purposes, such as storage of bulletins, etc. Therefore, the Commission felt that the elimination of the group CLLLL from the starting line would be made at a later date, i.e. mid-1988.

7.4.14 The Commission noted that until such time as the CLLLL group had been eliminated from the starting line, allocation of CLLLL numbers to new messages would become extremely difficult owing to insufficient numbers available. The Commission felt that CLLLL numbers should be allocated to a group of one type of bulletins, notwithstanding the general principles. It agreed that such allocation could be co-ordinated by the president of CBS for global exchanges and be subject to multi-lateral agreements for regional exchange.

Procedures for the BBB group

7.4.15 The Commission noted that some centres had experienced difficulties in applying the procedures for the BBB group, in particular in maintaining the correct sequence for successive bulletins with the same abbreviated heading including BBB, especially in the case of bulletins delayed for more than 24 hours. It was agreed that, as a provisional procedure, the groups RRZ, CCZ or AAZ could be used for bulletins prepared or compiled more than 24 hours after the time of observation, when the centre concerned could not keep the former sequence.

7.4.16 The Commission felt that a special character of indicator BBB should be allocated for indicating restart after a major breakdown at a centre which had caused the loss of a sequence, and recommended indicators RRY, CCY and AAY for this purpose. The particular use of the characters X, Y and Z for the indicator BBB should be considered as a provisional procedure. The Commission agreed that each Regional Telecommunication Hub should verify the sequencing of bulletins containing indicator BBB which were received from their zones of responsibility and take appropriate measures to request missing bulletins thus identified through real-time monitoring. It also agreed to adopt the necessary amendment to the Manual on the GTS, Volume I, Part II, in order to improve the wording of the specifications concerning indicator BBB, as well as a new attachment to Part II describing the detailed ways of using the new forms of indicator BBB. Since this would require change in Technical Regulation C.3.1 (ICAO Annex 3), the Commission requested the Secretary-General to co-ordinate with ICAO to update the appropriate parts of the regulatory material.

Transmission of processed information in binary form (GRIB code) and generalization of the abbreviated heading

7.4.17 The Commission felt that the present procedures for delimiting meteorological messages, i.e. character-oriented "starting line" and "end-of-message" signals, did not provide an adequate mechanism for transmitting processed information in binary oriented code (GRIB). The identification procedure for the start and end of a message was normally provided by the transport layer, but the "more data mark" (binary element M) could be used for this purpose as provided for in Level 3 of CCITT Recommendation X.25. The Commission considered that implementation of the procedures of Recommendation X.25 was a minimum prior condition to enable the transmission of GRIB messages. In view of the needs and the efficiency of the GRIB code, the Commission invited all Members operating RTHs on the MTN to take the necessary steps to implement, as soon as possible, the procedures of Recommendation X.25 included in the Manual on the GTS, Volume I, Part II, paragraph 2.12.

7.4.18 The Commission agreed that the use of a message identifier common to all types of message (alphanumeric and binary) for the purposes of telecommunications had distinct advantages for operation. It therefore agreed to the use of the abbreviated heading for the identification of messages in GRIB code. The abbreviated heading would now have a vastly wider field of application than at present mentioned in the Manual on the GTS relating only to alphanumeric messages, and which would now also include data in binary

form, including graphical information and pictorial information. The Commission further agreed that the starting line, abbreviated heading and end-of-message signals should remain in strict conformity with the existing procedures to ensure the universal character of the message envelope, regardless of the form of content of the message.

7.4.19 The Commission noted that the procedures for the use of the group TTAAii to identify bulletins containing satellite data, processed information in grid-point format and pictorial information in digital form were laid down in the Manual on the GTS as examples. The Commission agreed that these procedures should be expanded as standard procedures, in order to guarantee co-ordination and uniformity in the application of those provisions at the various centres. It also agreed to assign for the designator T_1 the additional letters D and X to bulletins in GRID code, and the letter Y to bulletins in GRIB code.

7.4.20 In this connection, it was mentioned that GRIB messages could also be transmitted over circuits using the WMO protocol by employing "Pseudo ASCII" procedures. The Commission was of the opinion that transmission of GRIB messages using Pseudo ASCII procedures could be made on bilateral agreement between centres concerned.

Identification of bulletins containing ships' weather reports

7.4.21 The Commission noted that the introduction of satellite communication links for ships at sea (e.g. the INMARSAT system) now meant that certain centres collected reports from a wide area covering more than one WMO Region. These reports would be compiled into bulletins in accordance with the WMO Region in which the ship reported. This compilation was either a manually intensive task or called for some significant computer effort to examine the relatively complex geographic boundaries of the WMO Regions to decide which zone was appropriate to each report. It was agreed that simplified areas defined by latitude and longitude would be adequate.

7.4.22 The Commission felt that as regards reports from rigs and platforms, the alternative groups D...D or $A_1b_wn_bn_bn_b$ in Section 0 of Code FM 13-VII should be readily available to identify reports from specific marine sites, in order to allow easy access to reports from a specific rig or platform; however this was precluded by paragraph 2.8.4 of Part II of the Manual on the GTS, Volume I. It was recalled that the original reason for specifically identifying rigs and platforms as RIGG or PLAT was to draw attention to the unusual nature of the observing site, in particular the peculiarity of wind observations at the rigs or platforms. It also felt that the allocation of specific blocks of $n_bn_bn_b$ could overcome this problem whilst still permitting identification of a particular site. For instance, bearing in mind the small number of stationary buoys in operation, $n_bn_bn_b$ values between 100-299 could be allocated to rigs and 300-499 could be allocated to platforms. It was considered necessary that the allocation of identification numbers should be developed further in consultation with CMM. The Commission agreed to delete paragraph 2.8.4 mentioned above from the Manual on the GTS.

Technical matters relating to the Global Telecommunication System

Further specifications of the OSI Layers 2 and 3 (X.25)

7.4.23 The Commission recognized the desirability of maximum possible compatibility between the Layer 2 and 3 procedures applied in the GTS and those applied in public data networks providing a packet-switched data transmission service. The Commission also recognized the need to ensure compatibility of the Level 3 procedures adopted for the GTS with those used for access to the public data networks. Furthermore, in order not to risk inhibiting the use of the standard hardware offered by the manufacturers, the Commission was of the opinion that a single permanent virtual circuit (PVC) should be operated as an interim measure between adjacent centres, considering that the multiplexing needs should be met by the transport layer procedures. It was agreed that, while the transport layer procedures had still not yet been implemented, the use of at least two PVCs between two adjacent centres (on the basis of a bilateral agreement) would be very useful for logical multiplexing in the transfer of different types of information, and would improve the overall efficiency of the circuit.

7.4.24 The Commission noted that the format of the frame of the link layer (OSI Layer 2), based on a structure in octets, makes it necessary to increase to 8 the 7 bits representing a character, in conformity with International Alphabet No. 5 for the transmission of alphanumeric messages. It was agreed that it would be desirable to adopt a single rule concerning the nature of this 8th bit, in order to avoid certain RTHs having to operate links using different methods. In the light of replies to questionnaires distributed by the Secretariat, the Commission agreed upon the use of the 8th bit set at 0, in octets representing characters.

Additional specifications of the OSI Layer 4

7.4.25 The Commission considered that a transport protocol should be implemented on the GTS in order to meet new needs. The procedures applicable to the GTS would be in conformity with Class 3 and/or Class 4 procedures of the transport protocol adopted by CCITT and ISO. It also considered that further studies were still necessary to reach a detailed definition of the procedures applicable to the GTS, on the basis of the pertinent CCITT recommendations (in particular Recommendations X.214 and X.224).

Digital facsimile techniques

7.4.26 The Commission agreed to adopt two identification procedures for documents transmitted by digital facsimile, corresponding to different operational conditions. The first procedure, recommended as a standard procedure, consisted in arranging for an abbreviated heading in standard format to precede the document; this procedure was particularly adapted to transmission between centres controlling facsimile exchanges by automated equipment. The second procedure, recommended as provisional only, consisted in transmitting, if channels multiplexed by modem V.29 were used, addressed messages for identifying the document and for controlling transmission on Channel B for data exchange, the document being transmitted on Channel A. This second procedure was particularly adapted to digital facsimile exchanges between two centres, only one of which had automated equipment for facsimile transmission, while the second centre was only operating automated equipment for data reception and transmission.

7.4.27 The Commission was of the opinion that the data type designator T_1 = P should be used for bulletins containing information in pictorial form. A group of four characters indicating the characteristics of the pictorial information would be added, immediately after the group DFAX. Moreover, the Commission agreed on amendments to Attachment II-6, in order to meet requirements for data type designators T_2 concerning pictorial information.

7.4.28 The Commission adopted Recommendation 13 (CBS-Ext.(85)).

Future work programme related to the GTS

7.4.29 The Commission agreed on the following work programme concerning operational matters:

(a) Routeing of processed information and observational data:

- Dissemination of satellite data and GRID/GRIB code bulletins;
- Dissemination of area forecast products (volumes, allocation of CLLLL, etc.);
- Conversion in real-time of forms of information in co-ordination with CBS WG/GDPS;

(b) Re-routeing over the MTN:

- Development of re-routeing plans;
- Operational impact of circuit outage, centre outage;

(c) Further development of monitoring procedures:

- Non-real-time monitoring;
- Real-time monitoring - procedure for automatic request of information not received;

(d) Further development of various procedures:

- Simplified procedures for request-reply to data bank (in co-ordination with CBS WG/GDPS, in accordance with the proposal relative to WWW Data Management not yet agreed;
- Detection and cancellation of duplicated messages;
- Procedures for the BBB group;
- Implication of the introduction of GRIB code bulletins in the operation of the GTS;
- Up-dating of routeing directories;
- Implementation of transmission procedures for digital facsimile;

(e) Operational aspects of collection and dissemination by satellite.

7.4.30 The Commission agreed on the following work programme concerning technical matters of the GTS, in the following order of priority:

(a) Development of detailed procedures for Layer 4, in line with Class 3 and/or Class 4 transport protocol procedures;

(b) Study of satellite dissemination methods;

(c) Further study for application of CCITT techniques on facsimile (including Group 4) in the GTS, with due consideration to document format (A4, B4, A3);

(d) Study on installing dedicated packet-switched data networks within the GTS;

(e) Specifications of functions of Layers 5, 6 and 7 in the GTS and interface with the GDPS.

8. EDUCATION AND TRAINING RELATED TO CBS ACTIVITIES (agenda item 8)

8.1 The Commission noted that the WWW Plan and Implementation Programme for the period 1988-1997 emphasized the need for a strong training component which should provide for the specialized training of personnel engaged in the detailed planning, implementation and operation of WWW facilities. The WWW training activity, being planned and co-ordinated within the WWW Implementation Support Activity, would be carried out through the WMO Education and Training Programme. In order to enable a rational and needs-oriented approach, a comprehensive manpower development programme covering the period 1988 to 1997 was under preparation within the Education and Training Programme. WMO Members, as well as regional associations and technical commissions, were invited to identify main subject areas and specify their training requirements and priorities accordingly.

8.2 As outlined in the WWW Plan and its associated Implementation Programme, the WWW system would continue to develop into an increasingly complex system. This would comprise the increased use of satellite techniques for determining observational data and for data collection and exchange, further automation of all elements of the WWW, introduction of data management functions and a widespread use of computerized techniques at global, regional and national levels. The WWW system would make available to Members a variety of new observational data, with high horizontal and vertical resolution and a large amount of basic and special processed products for various applications.

8.3 These developments in the WWW would impose on Members, their national Meteorological Services and their WWW facilities new challenges which would require planning and decisions on possible new directions, as well as assessment of the implication on national Services, particularly in respect of requirements for changes in the educational level and specialization of meteorological personnel.

8.4 Taking into account the foreseen WWW evolution, the Commission expressed the opinion that WWW training requirements and needs should be formulated for three important groups of meteorological personnel within the WWW, namely:

(a) Personnel directly involved in WWW operations;

(b) Teachers and instructors engaged in various training activities of importance to WWW-related operations;

(c) Planners and managers engaged in the overall development, implementation and operation of improved WWW components and facilities.

8.5 The Commission agreed that for these three main groups of meteorological personnel, the major thrusts in training activities during 1988 to 1997 should focus on the following subject areas:

(a) Telecommunication procedures and monitoring of data flow and telecommunication systems design;

(b) Installation, operation, maintenance and calibration of meteorological instruments and instrument systems;

(c) Use of NWP products including objective methods for their interpretation;

(d) Operational objective analyses and NWP methods, particularly for use in tropical areas;

(e) New developments in forecasting techniques for all forecast ranges;

(f) Interpretation and use of satellite data, especially in very-short-range forecasting;

(g) Automation of WWW components and use of WWW data management and real-time monitoring procedures including quality control.

8.6 The Commission felt that within the outlined main subject areas, the individual training activities should concentrate on the improvement of WWW day-to-day operations, especially the key components, through the following training events and means:

(a) On-the-job training;

(b) Roving seminars;

(c) Workshops;

(d) Specialized training courses;

(e) Training at WWW centres, i.e. WMCs and RSMCs;

(f) Exchange of personnel between WWW centres;

(g) Training compendia;

(h) New training aids, i.e. video techniques.

8.7 The Commission stressed the importance of providing practical training for trainees in a realistic environment with facilities and infrastructure similar to conditions at the students' home Services.

8.8 It was also the opinion of the Commission that further and increased efforts were needed, especially at the national level, to provide the necessary meteorological training and operational instructions to personnel outside the national Meteorological Services engaged in meteorological activities. This could, for example, include personnel of other national organizations or agencies engaged in meteorological observing programmes.

8.9 Several delegates expressed their appreciation for the WMO training activities and the training support provided. While appreciating this assistance, the Commission expressed concern that few new training compendia had been published recently by WMO. It noted further that the translation into other languages took a long time, with the result that the compendia, when finally published, were no longer up to date. The Commission stressed that sufficient resources should be made available to the Secretariat in order to carry out the efficient publication of training material, in the languages required. WMO compendia and other training material should be made available to Members to the maximum extent possible. In order to facilitate Members' access to WMO training material, it was suggested that the Organization should consider the possibility of revising its procedures regarding procurement of and advance payment for such material.

8.10 The Commission noted with great pleasure the information provided by several delegates on new and/or expanded training facilities and courses made available at their training centres for students from other countries.

9. RELATIONSHIP OF THE WWW TO OTHER WMO AND INTERNATIONAL PROGRAMMES (agenda item 9)

9.1 The Commission recalled that Congress had decided that the WWW was the basic programme of the WMO and therefore WWW should support other international programmes, in accordance with the procedures laid down in the WWW Plan.

9.2 The Commission decided that requirements of other WMO programmes for support by the WWW should be scrutinized by the president of CBS and referred to appropriate CBS working groups for consideration.

9.3 The Commission was informed of the list of priority areas requiring inter-commission co-ordination developed by the meeting of presidents of technical commissions and agreed to by EC-XXXVII. The Commission agreed that, among the items listed in Annex II to this report, two required special attention. The first related to the co-ordination between operational and research aspects of weather forecasting. The Commission agreed to special efforts in this area by the Working Group on the GDPS and enthusiastically endorsed the suggestion of the CBS Advisory Working Group that a technical conference on forecasting should be organized prior to the

ninth session of CBS. The second item pertained to the definition of data requirements. The Commission requested the Secretary-General to update the requirements as necessary and keep CBS informed accordingly.

9.4 The Commission felt that much closer co-operation with other technical commissions was required in order to bring about better understanding of WWW opportunities in support of other WMO programmes. Therefore, the Commission invited its president to urge other presidents of technical commissions to be represented at sessions of CBS and nominate experts on CBS working groups for a direct flow of information between WMO programmes, thus avoiding duplication of activities.

10. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COUNCIL RESOLUTIONS (agenda item 10)

10.1 In accordance with current practice, the Commission examined those resolutions and recommendations adopted prior to the present extraordinary session which were still in force.

10.2 The Commission decided to cancel a number of recommendations relating to action already taken and completed. However, it agreed to maintain in force the intent of Resolutions 1, 3, 4, 5, 6 and 7 (CBS-VIII) and Recommendation 8 (CBS-VIII). Resolution 1 (CBS-Ext.(85)) was adopted.

10.3 The Commission emphasized the need for study on nowcasting and very-short-range forecasts. The Commission felt that this activity should be carried out by the Working Group on the GDPS. It also felt that further consideration of this matter should be undertaken by the next session of CBS, taking into account the conclusions of the Technical Conference on Forecasting planned to be held prior to the session.

10.4 The Commission agreed to maintain the Rapporteur on the Application of Improved Forecasting Methods and Required Technology for Operational Use. It invited the rapporteur to continue his work and to prepare for the next session of the Commission or for presentation at the planned Technical Conference on Forecasting a comprehensive report on the use of NWP products by NMCs, objective and subjective interpretation methods and the presentation of products to end users.

10.5 The Commission then examined the Executive Council's resolutions within the field of activity of CBS and agreed to maintain in force Resolution 4 (EC-XXXV), Resolutions 1, 2, 3 and 4 (EC-XXXVI) and Resolutions 2 and 3 (EC-XXXVII). Recommendation 14 (CBS-Ext.(85)) was adopted.

11. DATE AND PLACE OF THE NINTH SESSION (agenda item 11)

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

12. CLOSURE OF THE SESSION (agenda item 12)

12.1 The president of the Commission, Mr. J. R. Neilon, in his closing address, reviewed the work that had been accomplished by the extraordinary session. He expressed his deep appreciation to all the participants for their contributions and their spirit of friendly co-operation. Mr. Neilon highlighted the fact that the draft WWW Plan and Implementation Programme for 1988-1997 had been finalized by the CBS. He recalled that since the Integrated System Study had been initiated in 1979, in accordance with the decision of Cg-VIII, a great deal of work had been carried out by a great many people, and the tasks allocated to the Commission had been completed within the period set up by Cg-VIII. Mr. Neilon noted furthermore that the session had adopted one resolution and fourteen recommendations as well as many other decisions related to the GOS, GDPS, GTS and monitoring of the operation of the WWW, which indicated that the session had successfully concluded all the necessary tasks.

12.2 The president particularly thanked the authorities of the Government of the Federal Republic of Germany and the Deutscher Wetterdienst for the excellent facilities provided for the session and for the warm hospitality shown to all the participants. The president expressed his thanks to the vice-president of the Commission, Dr. A. A. Vasiliev and the chairmen and vice-chairmen of the working groups as well as the rapporteurs. He also extended his gratitude to the chairmen and vice-chairmen of the two working committees for their dedication and able work.

12.3 The president expressed his thanks to the Secretary-General of WMO and his representative, Dr. G. K. Weiss, as well as all other members of the WMO Secretariat and the local secretariat for the support they had provided. In conclusion, Mr. Neilon wished all the participants a safe journey home and success in their future work.

12.4 Mr. J. Mills (Canada), on behalf of all the participants, thanked the president for the excellent manner in which he had directed the session and wished him further success in leading the work of the Commission.

12.5 The session was closed at 11.40 a.m. on Friday, 1 November 1985.

RESOLUTIONS ADOPTED BY THE SESSION

Res. 1 (CBS-Ext(85)) - REVIEW OF THE PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR BASIC SYSTEMS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the action taken on the resolutions and recommendations adopted prior to its extraordinary session (85),

CONSIDERING that all the resolutions and recommendations adopted prior to its extraordinary session (85) and still in force have been reconsidered,

DECIDES:

(1) To keep in force Resolutions 1, 3, 4, 5, 6 and 7 (CBS-VIII);

(2) To keep in force Recommendation 8 (CBS-VIII);

(3) Not to keep in force the other recommendations adopted before its extraordinary session (85);

(4) To publish in the final report of the extraordinary session (85) the texts of the recommendation and resolutions which are kept in force*.

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* **The texts of the recommendation and resolutions which were kept in force are reproduced in the annex to this resolution.**

Annex to Resolution 1 (CBS-Ext.(85)

THE RESOLUTIONS AND RECOMMENDATION OF THE COMMISSION FOR BASIC SYSTEMS ADOPTED PRIOR TO ITS EXTRAORDINARY SESSION (1985) AND MAINTAINED IN FORCE

Res. 1 (CBS-VIII) - ADVISORY WORKING GROUP OF THE COMMISSION FOR BASIC SYSTEMS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 7.13.5 of the general summary of the abridged final report of Fifth Congress,

(2) Resolution 1 (CBS-II) - Advisory Working Group of the Commission for Basic Systems,

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 the Advisory Working Group of CBS 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 or non-controversial matters;

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

(c) To assist the president in the conduct and co-ordination of the Integrated WWW System Study;

(d) To review the internal structure and working methods of the Commission;

(e) To assist the president in the co-ordination of the activities of the CBS;

(f) To formulate specific plans for the specialized education and training activities in the field of responsibility of CBS;

(g) To keep under review the work of the Commission;

(2) That the composition of the Advisory Working Group should be as follows:

President of CBS (chairman)
Vice-president of CBS
Chairmen of the CBS Working Groups on the GOS, GDPS, GTS and Codes
Mr. S. Alaimo (Argentina)
Mr. R. B. Crowder (Australia)
Mr. E. A. Mukolwe (Kenya)

Res. 3 (CBS-VIII) - RAPPORTEUR ON THE APPLICATION OF IMPROVED FORECASTING METHODS AND REQUIRED TECHNOLOGY FOR OPERATIONAL USE

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the requirements for an intensified conduct of the Integrated WWW System Study,

CONSIDERING,

(1) The specific and urgent needs for upgrading the national and regional GDPS data-processing systems,

(2) The need to provide guidance on the application of advanced forecasting techniques and capabilities to meet Members' operational requirements under the WWW,

DECIDES:

(1) To appoint a Rapporteur on the Application of Improved Forecasting Methods and Required Technology for Operational Use with the following terms of reference:

(a) To review developments in forecasting techniques (numerical weather prediction, model interpretation, statistical methods, etc.) which have recently become available or may shortly become available for operational use;

(b) To assess the technological requirements for the implementation of the forecasting techniques reviewed under (a) and also to enable GDPS centres to interface with the GTS as foreseen in an integrated WWW;

(c) To assemble information on economic and technical aspects (procurement, implementation, operation, maintenance);

(d) To provide guidance on the application of the information assembled under (a), (b) and (c) above for determining how operational forecasting requirements may be met;

(e) To keep the chairmen of the Working Groups on the GDPS and GTS informed of his activities;

(f) To submit a report on this work to the president of CBS not later than 1 January 1984.

(2) To invite ..... to seve as the rapporteur.*

* CBS-VIII authorized the president of CBS to designate the rapporteur.

Res. 4 (CBS-VIII) - WORKING GROUP ON THE GLOBAL OBSERVING SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 2 (CBS-VII) - Working Group on the Global Observing System,

CONSIDERING that there is a need for the Working Group on the Global Observing System to be re-established to keep under constant review observational requirements of the WWW, IGOSS, as well as other international programmes,

DECIDES:

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

(a) To make studies in the field of Study Area 1 - Optimized Observing System in the framework of the Integrated WWW System Study;

(b) To take action on matters in the field of the monitoring of the operation of the WWW (GOS aspects);

(c) To follow developments in the fields of technical assistance and training of personnel for the maintenance and operation of observing networks;

(d) To keep the Manual and the Guide on the Global Observing System under review;

(e) To consider and, as necessary, make recommendations on observational data requirements for the GOS, as put forward by international programmes;

(f) To study functional specifications of software requirements in automatic observing systems;

(g) To take action on matters referred to the working group by the president of the Commission;

(h) To keep up to date relevant training syllabi, as required, and to suggest training materials and the holding of seminars and symposia.

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

(a) An expert designated by each regional association;

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

(c) An expert designated by the president of the Commission for Marine Meteorology;

(d) An expert designated by the president of the Commission for Instruments and Methods of Observation;

(e) Experts who may be designated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Dr. T. Mohr (Germany, Federal Republic of) as chairman of the working group.

Res. 5 (CBS-VIII) - WORKING GROUP ON THE GLOBAL DATA-PROCESSING SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 3 (CBS-VII) - Working Group on the Global Data-processing System,

CONSIDERING that there is a need for the continuation of the work of the working group established by Resolution 3 (CBS-VII),

DECIDES:

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

(a) To make studies and formulate recommendations on the following items, taking into account the Integrated WWW System Study and the views expressed by other technical commissions:

(i) Principles and guidance on methods for the co-ordination and monitoring of technical operational matters of the GDPS;

(ii) Co-ordination of observational data needs of the GDPS and provision of advice on the formulation of requirements to be met by the future observing system (in co-operation with the Working Group on the GOS);

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

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

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

(vi) Matters relating to real-time and non-real-time quality control, storage and retrieval of data and products within the GDPS, in particular in connection with storage and retrieval of climatological data;

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

(b) To provide co-ordination and guidance on the use of modern data-processing techniques, and to bring the resulting requirements to the attention of other CBS working groups, as necessary;

(c) To keep abreast of scientific and technical developments relating to methods and techniques of meteorological analysis and forecasting for general purposes, including the World Weather Watch, to formulate recommendations on the implementation of new techniques and/or to bring these developments to the attention of the president of CBS, with a view to referring them to other relevant constituent bodies, as required;

(d) To identify problems associated with meteorological analysis and forecasting requiring study and research and to bring them to the attention of the president of CBS, with a view to referring them to the relevant technical commissions, as required;

(e) To keep abreast of, and identify, problems which relate to the processing of basic data and the functions of GDPS centres for climatological, hydrological and other purposes and to bring specific proposals on these matters to the attention of the president of CBS;

(f) To propose additional parts of the Guide on the GDPS and to keep the Guide up to date;

(g) To complete the development of the Manual on the GDPS;

(h) To keep up to date relevant training syllabi, as required, and to suggest training materials and the holding of seminars and symposia;

(i) To establish, as necessary, study groups composed of experts, or to appoint rapporteurs, for consideration of specific problems of a technical or operational nature;

(j) To act upon matters referred to the working group by the president of CBS;

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

(a) An expert designated by each regional association;

(b) An expert to be nominated by each of the Members responsible for the operation of the World Meteorological Centres;

(c) Experts nominated by Members responsible for the operation of Regional Meteorological Centres and other Members wishing to participate actively in the work of the group;

(d) Experts who may be nominated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. F. Duvernet (France) as chairman of the working group.

Res. 6 (CBS-VIII) - WORKING GROUP ON CODES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 4 (CBS-VII) - Working Group on Codes,

CONSIDERING:

(1) That the rapid evolution of meteorological requirements and techniques gives rise to the necessity for frequent revision of the existing codes or to that of creating new ones,

(2) That the complexity of the problems relating to codes is constantly increasing and that, consequently, it is desirable to entrust their solution to a permanent group of experts on this subject,

DECIDES:

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

(a) To consolidate and co-ordinate statements received from other bodies, Members, regional associations, other technical commissions and appropriate international organizations on the need for new international code forms and tables of specifications;

(b) To develop codes to meet new requirements which have been so established;

(c) To keep under review the existing international codes and to recommend changes to these codes, as required;

(d) To keep up to date relevant training syllabi, as required, and suggest training materials and the holding of seminars and symposia;

(e) To establish, as necessary, study groups composed of experts, or to appoint rapporteurs for consideration of specific problems of a technical nature;

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

(g) To initiate the study and development of a unified code format (such as UNICODE) within the Integrated WWW System Study, suited to the automation of data acquisition, transmission and processing;

(h) To co-ordinate its work on the development of new codes and improvements of existing codes with the CBS Working Groups on the GOS, GDPS and GTS;

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

(a) An expert designated by each regional association;

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

(c) Experts who may be designated by the presidents of the technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. G. Doumont (Belgium) as chairman of the working group.

Res. 7 (CBS-VIII) - WORKING GROUP ON THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 5 (CBS-VII) - Working Group on the Global Telecommunication System,

(2) That the developments in the field of telecommunications are progressing at an accelerated rate, and

CONSIDERING:

(1) That the concept of the World Weather Watch, in the implementation period 1984-1987, will require a series of technical studies,

(2) That changes in meteorological requirements stemming from the World Weather Watch, other WMO programmes and joint programmes between WMO and other organizations entail a constant review of the world-wide telecommunications system,

DECIDES:

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

(a) To study and to formulate recommendations, within the framework of the Integrated WWW System Study, in respect to organizational, technical and procedural aspects of the meteorological telecommunication systems, in particular the Global Telecommunication System of the World Weather Watch, including the collection of weather reports from ships, as well as the collection and distribution of meteorological information through meteorological satellites;

(b) To keep under constant review developments in telecommunication techniques and equipment and their adaptation to the requirements of an efficient, world-wide system of meteorological telecommunications, in particular the advantages derived from space communication techniques, including meteorological satellites, and to formulate appropriate recommendations;

(c) To formulate for meteorological information exchange (observational data and processed information in alphanumeric and pictorial form) proposals on international standardization of operating practices, procedures, equipment and related questions, including format, as well as schedules;

(d) To follow closely the progress on the implementation, as well as the operation of the meteorological telecommunication systems and, as necessary, to formulate recommendations with a view to remedying shortcomings and effecting improvements;

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

(f) To co-ordinate, as necessary, its activities with the work of other working groups of CBS, in respect of meteorological telecommunications;

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

(h) To keep up to date relevant training syllabi, as required, and to suggest training materials and the holding of seminars and symposia;

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

(j) To act upon matters referred to the working group by the president of CBS.

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

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

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

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

(d) Experts who may be nominated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. A. Henaidi (Saudi Arabia)* as chairman of the working group.

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* Mr. A. Henaidi was replaced by Mr. J. Arimatea (Brazil)

Rec. 8 (CBS-VIII) - REVISION OF THE STRUCTURE OF THE MANUAL ON CODES, VOLUME I

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 11 (CBS-VII) - Editorial revision of the structure of the Manual on Codes, Volume I,

(2) The report of the sixth session of the CBS Working Group on Codes,

CONSIDERING that it is desirable to combine similar codes and, if necessary, to select new code names,

RECOMMENDS that the structure of Volume I of the Manual on Codes be revised, taking into account the revision plan given in the annex* to this recommendation;

REQUESTS the Secretary-General to assist the Working Group on Codes in its task of revising the structure of the Manual on Codes.

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* The annex is given in WMO Publication No. 611

RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CBS-Ext.(85)) - DEFINITIONS OF FORECASTING RANGES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The WWW Plan for 1984-1987 (WMO-No. 617),

(2) Paragraph 5.1.3 of the report of the eleventh session of the CBS Advisory Working Group,

CONSIDERING that there is an urgent need to specify within the WWW Plan and Implementation Programme, contained in WMO SLTP 1988-1997, Part II, Volume I, unified definitions for forecasting ranges within the WWW,

RECOMMENDS the adoption of definitions of forecasting ranges to be used in the WWW Plan and the Implementation Programme and the inclusion thereof in the Manual on the GDPS and other relevant parts of the WMO Technical Regulations, as follows:

(a)	Short-range forecasting	0 to 72 hours
	Within this range, two shorter periods may also be defined:	
	(i) Nowcasting	a description of current weather and a 0-2 hour forecast
	(ii) Very-short-range forecasting	0 to 12 hours
(b)	Medium-range forecasting	more than 72 hours and up to 10 days
(c)	Long-range forecasting	beyond 10 days

REQUESTS the Secretary-General to make the necessary arrangements to include the above definitions in the Manual on the GDPS, Volume I, and other relevants parts of the WMO Technical Regulations.

Rec. 2 (CBS-Ext.(85)) - AMENDMENTS TO THE MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM - STANDARDIZED GDPS NWP VERIFICATION PROCEDURES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Attachment II-14 of the Manual on the GDPS,

CONDIDERING:

(1) That there is a requirement to establish standardized GDPS NWP verification procedures for monitoring the operation of the GDPS,

(2) That sufficient work to establish standardized NWP verification procedures has been done by many GDPS centres,

RECOMMENDS that the amendments to the Plan for Monitoring the Operation of the WWW, Attachment II-14 of the Manual on the GDPS, given in the annex to this recommendation, be adopted for inclusion in the Manual on the GDPS as well as relevant parts of the Manual on the GOS and the Manual on the GTS with effect from 1 November 1986;

REQUESTS the Secretary-General to make the appropriate changes, as given in the annex to this recommendation, to the Manual on the Global Data-processing System;

AUTHORIZES the Secretary-General, in consultation with the president of CBS, to make any necessary editorial amendments as regards the Manual on the Global Data-processing System.

Annex to Recommendation 2 (CBS-Ext.(85))

AMENDMENTS TO THE MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM
STANDARDIZED GDPS NWP VERIFICATION PROCEDURES

The following paragraph should be included in the Plan for Monitoring the Operation of the WWW, Attachment II-14 of the Manual on the Global Data-processing System:

21. Statistical verification of numerical weather prediction

The accuracy of forecasts produced by numerical prediction models should be monitored by objective verification procedures.

(a) Centres operating global, hemispheric or near hemispheric models and regional models covering appropriate areas should compile verification statistics using the standard procedures described in Table F. The results together with any relevant information, such as improvements that have been made to their NWP systems, should be exchanged monthly between participating centres. Such information may enable centres to identify deficiencies or problems and make improvements in their NWP systems;

(b) Centres receiving GDPS products over the GTS may wish to verify appropriate areas using the standardized measures listed in Table F and send the results to the producing centres.

TABLE F

FACTORS AND METHODS USED IN STANDARDIZED VERIFICATION OF NWP PRODUCTS

Area	Northern hemisphere extratropics (90°N - 20°N) Tropics (20°N - 20°S) Southern hemisphere extratropics (20°S - 90°S)	Verification against the analysis of the centre
	Level: Extratropics msl, 500 hPa, 250 hPa Tropics 850 hPa, 250 hPa	
	GRID: 2.5° x 2.5° latitude/longitude origin at (0°, 0°)	
Area	North America Europe Asia Australia/New Zealand	Verification against fixed networks of radiosonde stations
	Level: 850 hPa, 500 hPa, 250 hPa	
Variables	Mean sea-level pressure, geopotential height, temperature, winds.	
Time	24 h, 48 h, 72 h, 96 h, 120 h	
Statistics	Mean error, root-mean-square error (rmse), correlation coefficient between observed and forecast changes, S_1 skill score, root-mean-square vector wind error ($rmse_v$)	
	72-hour forecast mean 1 000 and 500 hPa error maps (annual publication only)	

The following definitions should be used:

mean error

$$M_{fv} = \frac{1}{n} \Sigma(x_f - x_v)$$

rms error

$$rmse = \sqrt{\frac{1}{n} \Sigma(x_f - x_v)^2}$$

correlation coefficient between observed and forecast changes

$$r = \frac{\Sigma \left((x_f - x_o - M_{fo})(x_v - x_o M_{vo})\right)}{\sqrt{\Sigma(x_f - x_o - M_{fo})^2 \, \Sigma(x_v - x_o - M_{vo})^2}}$$

rms vector wind error

$$rmse_v = \sqrt{\frac{1}{n} \Sigma \left| \mathbf{v}_f - \mathbf{v}_v \right|^2}$$

S_1 skill score $s_1 = 100 \dfrac{\Sigma e_g}{\Sigma G_L}$ (mean sea-level pressure and geopotential height only)

where: x_f = The forecast value of the parameter in question

x_v = The corresponding observed (verifying) value

n = The number of (grid) points in the verification area (the sums are determined by using the values of the relevant parameter at all points of the verification areas)

x_o = The value of the initial analysis of the forecast parameter

M_{fo} = The mean value over the verification area of the forecast changes

M_{vo} = The mean value over the verification area of the observed changes

$\mathbb{V}_f$ = The forecast vector wind

$\mathbb{V}_v$ = The observed (verifying) vector wind

$$e_g = \left\{ \left| \frac{\partial (x_f - x_v)}{\partial x} \right| + \left| \frac{\partial (x_f - x_v)}{\partial y} \right| \right\}$$

$$G_L = \max \left(\left| \frac{\partial x_f}{\partial x} \right|, \left| \frac{\partial x_v}{\partial x} \right| \right) + \max \left(\left| \frac{\partial x_f}{\partial y} \right|, \left| \frac{\partial x_v}{\partial y} \right| \right)$$

where the differentiation is approximated by differences on a 2.5° x 2.5° latitude/longitude grid.

NOTE: Daily values of these parameters should be computed for each specified area. Monthly averages should then be computed. The variation in the number of grid points by latitude should be taken into account in a consistent way by using the cosine of latitude as a weighting factor, for verification against analyses. In addition, quarterly 72-hour mean 1 000 and 500 hPa error maps should be included with the annual published results.

Rec. 3 (CBS-Ext.(85)) - AMENDMENTS TO THE MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM - MONITORING THE QUALITY OF OBSERVATIONS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Attachment II-14 of the Manual on the GDPS,

CONSIDERING:

(1) That there is a need to monitor the quality of observations received on the GTS by GDPS centres, in particular from upper-air stations, surface land stations, ships and buoys,

(2) That some monitoring procedures have been set up by some GDPS centres and a number of techniques which may be used for monitoring the quality of observations have been developed,

RECOMMENDS that the amendments to the Plan for Monitoring the Operation of the WWW, Attachment II-14 of the Manual on the GDPS, given in the annex to this recommendation, be adopted for inclusion in the Manual on the GDPS as well as relevant parts in the Manual on the GOS and the Manual on the GTS with effect from 1 November 1987;

REQUESTS the Secretary-General to make the appropriate changes, as given in the annex to this recommendation, in the Manual on the Global Data-processing System;

AUTHORIZES the Secretary-General, in consultation with the president of CBS, to make any consequent purely editorial amendments as regards the Manual on the Global Data-processing System.

Annex to Recommendation 3 (CBS-Ext.(85))

AMENDMENTS TO THE MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM
MONITORING THE QUALITY OF OBSERVATIONS

The following paragraph should be included in the Plan for Monitoring the Operation of the WWW, Attachment II-14 of the Manual on the Global Data-processing System,

20. Quality of observational data

Centres with global, hemispheric or near-hemispheric models should monitor the quality of conventional observations, in particular upper-air stations (TEMPs and PILOTs), surface land stations (SYNOPs), surface ships (SHIPs) and buoys, using techniques such as those listed in Table E. Statistics should be compiled separately for each land station by station index number, for each ship by call sign and for each buoy by identifier.

The centres should analyse the results and produce lists in an agreed format of stations, ships and buoys believed to be persistently producing erroneous data together with information on which element of the observation (pressure, temperature, etc.) is thought to be in error and the evidence for considering it incorrect. These lists should be based on data received over one month and should be exchanged monthly between participating centres.

The lead centre* should co-ordinate all the results, inform the WMO Secretariat immediately of obvious problems and produce every six months a consolidated list of stations, ships and buoys producing suspect data with

similar information on which element is considered suspect and why. The list should be passed to the participating centres and the WMO Secretariat who should notify Members responsible for the stations, ships and buoys providing the data which appeared in error and ask them to make an investigation with a view to identifying and correcting any possible cause of error. The Members should be asked to reply within a fixed time period, reporting on any remedial action and stating if any assistance is required. Monitoring results including follow-up action should be made available to CBS, the Executive Council and Congress.

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* to be decided by CBS-IX

TABLE E

TECHNIQUES FOR MONITORING THE QUALITY OF OBSERVATIONS

(1) Compilation of statistics on the difference between observed values and the analysis and first guess field;

(2) Compilation of statistics on observations which fail the routine quality control checks;

(3) Examination of time series of observations from a particular station (particularly useful in sparse data areas);

(4) Compilation of statistics on the differences between reported values of geopotential height and geopotential height recalculated from significant level data for radiosonde stations, using common formulae for all stations;

(5) For surface stations which report both mean sea-level pressure and station-level pressure, compilation of statistics on differences between reported mean sea-level pressure and mean sea-level pressure recomputed from reported station-level pressure and temperature and published values of station elevation.

(6) Compilation of colocation statistics.

Rec. 4 (CBS-Ext.(85)) - EXPANDED WORLD CLIMATE PROGRAMME REQUIREMENT FOR CLIMAT DATA

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The report of the sixth session of the CCl Advisory Working Group, general summary, paragraphs 3.2.1.2 and 3.2.1.5 - 3.2.1.9,

(2) The report of the tenth session of the CBS Advisory Working Group, general summary, paragraphs 4.1.1 - 4.1.4,

(3) Abridged final report of EC-XXXVI, general summary, 3.1.3.1, 3.1.3.2 and 4.3.3,

(4) Abridged final report of EC-XXXVII, general summary, paragraphs 4.2.6 and 4.2.7,

CONSIDERING:

(1) That there is a need by the World Climate Programme for improved and expanded dissemination of CLIMAT reports on the GTS, with a regular coverage of about 10 stations per 250 000 km^2,

(2) That the current coverage of one station per 250 000 km^2 is inadequate and some Members revert to computation of SYNOP reports to partially meet their CLIMAT data requirements,

(3) That such exchange occurs only once a month during the first few days at times when traffic is off-peak and hence should not cause overloading of the GTS,

RECOMMENDS that Technical Regulation (B.1) 3.1.1.2 be amended to read as follows:

> "The distribution of stations from which monthly surface climatological data are transmitted should be such that every 250 000 km^2 is represented by at least one station and up to 10 stations where the density of the regional basic synoptic network permits."

INVITES Members to make the necessary arrangements to meet the requirements of the WCP either by preparation of CLIMAT reports at observing station level or centrally by an appropriate centre from SYNOP reports;

REQUESTS the president of CBS to bring this recommendation to the attention of the president of CCl.

Rec. 5 (CBS-Ext.(85)) - AMENDMENTS TO FM 12-VII SYNOP AND FM 13-VII SHIP

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The abridged final report of CBS-VIII, general summary, paragraphs 8.10 and 8.19,

(2) Resolution 6 (CBS-VIII) - Working Group on Codes,

(3) Report of the eleventh session of the CBS Working Group on the GTS, paragraph 3.4,

CONSIDERING:

(1) That there is a need to broaden the use of N = / to cover cases when the sky is indiscernable owing to many artificial lights at night,

(2) That surface observations of wind speeds in excess of 99 knots are rare events, but of great scientific and operational significance, and that the rarity of these events implies that only on very few occasions would such events be observed and therefore their reporting by an additional group would not constitute a burden on the GTS,

(3) That there is an urgent need to provide guidance for coding of present weather by automatic weather stations,

(4) That there is a requirement that the use of RIGG and PLAT by stations located at sea on a drilling rig or an oil- or gas-production platform be replaced by the group $A_1b_wn_bn_bn_b$,

RECOMMENDS that the amendments to FM 12-VII SYNOP and FM 13-VII SHIP, given in the annex to this recommendation, be adopted for use as from 1 November 1987;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes.

Annex to Recommendation 5 (CBS-Ext.(85))

AMENDMENTS TO CODE FORMS FM 12-VII SYNOP AND FM 13-VII SHIP

1. CODE FORM

Amend Section 1 of FM 12-VII and 13-VII to read:

SECTION 1	i_Ri_xhVV	Nddff	(00fff)	$1s_nTTT$	$3P_oP_oP_oP_o$	
	4PPPP or $4a_3hhh$	5appp	$6RRRt_R$	$7wwW_1W_2$ or $7w_aw_a//$	$8N_hC_LC_MC_H$	9hh//

2. REGULATIONS

2.1 Change Regulation 12.1.4 to read:

In reports from an automatic station, mandatory group elements specified by symbolic letters shall be coded with solidi (/) if the station is not equipped to report the relevant data, taking into account that i_R, i_x and N = 0, N = 9, N = / provide for omission of groups $6RRRt_R$, $7w_aw_a//$ and $8N_hC_LC_MC_H$ as the case may be.

2.2 Change Regulation 12.1.7 to read as follows:

(a) The identification of stations located at sea on a drilling rig or an oil- or gas-production platform shall be indicated by the group $A_1b_wn_bn_bn_b$;

(b) In reports of sea stations other than buoys, drilling rigs and oil- or gas-production platforms, and in the absence of a ship's call sign, the word SHIP shall be used for D...D.

2.3 Change Regulation 12.2.2.3.3 to read:

When the wind speed in units indicated by i_w is 99 units or more:

(a) ff in the group Nddff shall be encoded 99;

(b) The group 00fff shall be included immediately following the group Nddff.

2.4 Change Regulation 12.2.6.4 to read:

Present weather reported from a manned weather station: ww.

2.5 Insert the following new paragraphs 12.2.6.5 to 12.2.6.5.13 following 12.2.6.4.18, and renumber paragraphs on past weather 12.2.6.5 to 12.2.6.5.5 as 12.2.6.6 to 12.2.6.6.5

12.2.6.5

Present weather reported from an automatic weather station w_aw_a.

12.2.6.5.1

The highest applicable figure shall be selected.

12.2.6.5.2

In coding 01, 02 and 03, there is no limitation on the magnitude of the change of the cloud amount. w_aw_a = 00, 01 and 02 can each be used when the sky is clear at the time of observation. In this case, the following interpretation of the specifications shall apply:

00 is used when the preceding conditions are not known;
01 is used when the clouds have dissolved during the past hour;
02 is used when the sky has been continuously clear during the past hour.

12.2.6.5.3

When the phenomenon is not predominantly water droplets, the appropriate code figure shall be selected without regard to VV.

12.2.6.5.4

The code figure 05 shall be used when the obstruction to vision consists predominantly of lithometeors.

12.2.6.5.5

The visibility restriction on w_aw_a = 10 shall be 1 000 metres or more. The specification refers only to water droplets and ice crystals.

12.2.6.5.6

For w_aw_a = 18, the following criteria for reporting squalls shall be used:

A sudden increase of wind speed of at least eight metres per second (16 knots), the speed rising to 11 metres per second (22 knots) or more and lasting for at least one minute.

12.2.6.5.7

Figures 20-29 shall never be used when precipitation is observed at the time of observation.

12.2.6.5.8

For w_aw_a = 20 visibility shall have been less than 1 000 metres.

NOTE: The specification refers only to visibility restrictions which occurred as a result of water droplets or ice crystals.

12.2.6.5.9

For synoptic coding purposes, a thunderstorm shall be regarded as being at the station from the time thunder is first detected, whether or not lightning is detected or precipitation is occurring at the station. A thunderstorm shall be reported in present weather if thunder is detected within the normal observational period preceding the time of the report. A thunderstorm shall be regarded as having ceased at the time thunder is last detected and the cessation is confirmed if thunder is not detected for 10-15 minutes after this time.

12.2.6.5.10

A visibility restriction "less than 1 000 metres" shall be applied to w_aw_a = 30-35. w_aw_a = 30-34 shall be used when the obstructions to vision consist predominantly of water droplets or ice crystals, and 35 when the obstructions consist predominantly of water droplets.

12.2.6.5.11

The precipitation shall be encoded as intermittent if it has been discontinuous during the preceding hour, without presenting the character of a shower.

12.2.6.5.12

The intensity of precipitation shall be determined by the intensity at the time of observation.

12.2.6.5.13

Code figures 80-89 shall be used only when the precipitation is of the shower type and takes place at the time of observation.

NOTE: Showers are produced by convective clouds. They are characterized by their abrupt beginning and end and by the generally rapid and sometimes great variations in the intensity of the precipitation. Drops and solid particles falling in a shower are generally larger than those falling in non-showery precipitation. Between showers openings may be observed unless stratiform clouds fill the intervals between the cumuliform clouds.

2.6 Change Regulation 12.2.7.1 to read as follows:

This group shall be omitted in the following cases:

(a) When there are no clouds (N = 0);

(b) When the sky is obscured by fog and/or other meteorological phenomena (N = 9);

(c) When the cloud cover is indiscernible for reasons other than (b) above, or observation is not made (N = /);

2.7 Delete Regulation 12.2.7.2 and renumber Regulations 12.2.7.3 to 12.2.7.3.4 as 12.2.7.2 to 12.2.7.2.4 and Regulation 12.2.7.4 as 12.2.7.3

3. SYMBOLIC FIGURES AND FIGURE GROUPS

Add as the first new specification of:

00 Indicator for high speed wind group (99 units or more)
(FM 12-VIII Ext., FM 13-VIII Ext.).

4. SPECIFICATIONS OF SYMBOLIC LETTERS

4.1 Change specification for A_1 to read:

WMO Regional Association area in which buoy or rigg or platform has been deployed (1 - Region I, 2 - Region II, etc.) (Code table 0161).
(FM 13-VIII Ext., FM 14-VIII)

4.2 Under specification for ff (first specification)

Add the following Note:

(1) If wind speed is 99 units or more see Regulation 12.2.2.3.3.

Under specification for fff (insert as first specification).

fff Wind speed in units indicated by i_w, 99 units or more (FM 12-VIII Ext., FM 13-VIII Ext.)

(1) See Regulation 12.2.2.3.3.

4.3 Change the first line of the specification for ww to read:

Present weather reported from manned weather station (Code table 4677).

4.4 Insert after the specification for ww:

w_aw_a Present weather reported from an automatic weather station (Code table 4680).
(FM 12-VIII Ext., FM 13-VIII Ext.)

5. CODE TABLES

5.1 Change specification in Code table 2700, for code figure 9 and (/) as follows:

9 Sky obscured by fog and/or other meteorological phenomena

/ Cloud cover is indiscernible for reasons other than fog or other meteorological phenomena, or observation is not made.

5.2 Insert new Code table 4680.

w_aw_a Present weather reported from an automatic station

Code figure

00 No significant weather observed
01 Clouds generally dissolving or becoming less developed during the past hour
02 State of the sky generally unchanged during the past hour
03 Clouds generally forming or developing during the past hour
04 Haze or smoke, or dust in suspension in the air, visibility equal to or greater than 1 km
05 Haze or smoke, or dust in suspension in the air, visibility less than 1 km
06 reserved
07 reserved
08 reserved
09 reserved

10 Mist
11 Diamond dust
12 Distant lightning
13 reserved
14 reserved
15 reserved
16 reserved
17 reserved
18 squalls
19 reserved

Code figures 20-26 are used to report precipitation, fog (or ice fog) or thunderstorm at the station during the preceding hour but not at the time of the observation.

Code figure	
20	Fog
21	PRECIPITATION
22	Drizzle (not freezing) or snow grains
23	Rain (not freezing)
24	Snow
25	Freezing drizzle or freezing rain
26	Thunderstorm (with or without precipitation)
27	BLOWING OR DRIFTING SNOW OR SAND
28	Blowing or drifting snow or sand, visibility equal to or greater than 1 km
29	Blowing or drifting snow or sand, visibility less than 1 km
30	FOG
31	Fog or ice fog in patches
32	Fog or ice fog, has become thinner during the past hour
33	Fog or ice fog, no appreciable change during the past hour
34	Fog or ice fog, has begun or become thicker during the past hour
35	Fog, depositing rime
36	reserved
37	reserved
38	reserved
39	reserved
40	PRECIPITATION
41	PRECIPITATION, slight or moderate
42	PRECIPITATION, heavy
43	LIQUID PRECIPITATION, slight or moderate
44	LIQUID PRECIPITATION, heavy
45	SOLID PRECIPITATION, slight or moderate
46	SOLID PRECIPITATION, heavy
47	FREEZING PRECIPITATION, slight or moderate
48	FREEZING PRECIPITATION, heavy
49	reserved
50	DRIZZLE
51	Drizzle, not freezing, slight
52	Drizzle, not freezing, moderate
53	Drizzle, not freezing, heavy
54	Drizzle, freezing, slight
55	Drizzle, freezing, moderate
56	Drizzle, freezing, heavy
57	Drizzle and rain, slight
58	Drizzle and rain, moderate or heavy
59	reserved

Code figure	
60	RAIN
61	Rain, not freezing, slight
62	Rain, not freezing, moderate
63	Rain, not freezing, heavy
64	Rain, freezing, slight
65	Rain, freezing, moderate
66	Rain, freezing, heavy
67	Rain or drizzle and snow, slight
68	Rain or dirzzle and snow, moderate or heavy
69	reserved
70	SNOW
71	Snow, slight
72	Snow, moderate
73	Snow, heavy
74	Ice pellets, slight
75	Ice pellets, moderate
76	Ice pellets, heavy
77	reserved
78	reserved
79	reserved
80	SHOWER(S) or INTERMITTENT PRECIPITATION
81	Rain shower(s) or intermittent rain, slight
82	Rain shower(s) or intermittent rain, moderate
83	Rain shower(s) or intermittent rain, heavy
84	Rain shower(s) or intermittent rain, violent
85	Snow shower(s) or intermittent snow, slight
86	Snow shower(s) or intermittent snow, moderate
87	Snow shower(s) or intermittent snow, heavy
88	reserved
89	reserved
90	THUNDERSTORM
91	Thunderstorm, slight or moderate, with no precipitation
92	Thunderstorm, slight or moderate, with rain showers and/or snow showers
93	Thunderstorm, slight or moderate, with hail
94	Thunderstorm, heavy, with no precipitation
95	Thunderstorm, heavy, with rain showers and/or snow showers
96	Thunderstorm, heavy, with hail
97	reserved
98	reserved
99	Tornado

NOTES:

(1) This code table includes terms on several levels to cover simple and increasingly complex stations.

(2) Generic terms for weather (e.g. FOG, DRIZZLE) are intended for use at stations capable of determining types of weather but no other information. Generic terms are included in the code table using all capital letters.

(3) Code figures for generic precipitation (code figures 40-48) are arranged in order of increasing complexity. For example, a very simple station that can sense only the presence or absence of precipitation would use code figure 40 (PRECIPITATION). At the next level, a station capable of sensing amount but not type would use code figure 41 or 42. A station capable of sensing gross type (liquid, solid, freezing) and amount would use code figures 43-48. A station capable of reporting actual types of precipitation (e.g. drizzle or rain) but not amount, would use the appropriate whole decadal number (e.g. 50 for generic drizzle; 60 for generic rain).

Rec. 6 (CBS-Ext.(85)) - MODIFICATION OF CODE FORM FM 64-VIII TESAC AND REGULATIONS UNDER FM 63-VIII BATHY AND FM 86-VI Ext. SATEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The abridged final report of CBS-VIII, general summary, paragraph 8.19(d),

(2) Resolution 6 (CBS-VIII) - Working Group on Codes,

CONSIDERING:

(1) That there is a need to report in FM 64-VIII - TESAC the method of removing ship's velocity and motion from current measurement (Doppler current profiling method),

(2) That there is a need to standardize under FM 63-VIII - BATHY the regulations for reporting wind observations,

(3) That there is a need for the improvement of certain regulations under Code FM 86-VI Ext. SATEM,

RECOMMENDS:

(1) That the modifications to Code form FM 64-VIII TESAC and amendment to regulations under FM 63-VIII BATHY, given in the annex to this recommendation, be adopted for use as from 1 November 1987;

(2) That the amendment to regulations under FM 86-VII Ext. SATEM, as given in the annex to this recommendation, be adopted as of 1 November 1986;

REQUESTS the Secretary-General to arrange for the inclusion of the necessary amendments in Volume I of the Manual on Codes.

Annex to Recommendation 6 (CBS-Ext.(85))

MODIFICATION OF CODE FORM FM 64-VIII TESAC AND REGULATIONS UNDER FM 63-VIII BATHY AND FM 86-VI Ext. SATEM

1. CODE FORM

Change the first group of Section 3 of FM 64-VIII to read:

$(66k_6k_4k_3$ ...

2. REGULATIONS

2.1 Restructure Regulation 63.2 and add a new Regulation 63.2.2 under FM 63-VIII as follows:

63.2

Section 1

63.2.1

Each individual BATHY report, even if included in a bulletin of such reports, shall contain as the first group the identification group $M_iM_iM_jM_j$.

63.2.2

For the reporting of wind observations, Regulations for FM 13-VIII Ext. SHIP shall apply.

2.2 Change Regulation 86.2.1.3 under FM 86-VI Ext. SATEM to read as follows:

86.2.1.3

Satellite operators, where appropriate, shall therefore inform the WMO Secretariat, as early as possible before launch, of the proposed national coding procedures and code tables for I_3 and I_4 for each satellite to be launched. The Secretariat shall then inform all countries by suitable advance information of the specifications of the tables for I_3 and I_4, and shall include this information in Volume II of WMO-No. 306.

3. SPECIFICATION OF SYMBOLIC LETTERS

3.1 Under the specification for ff (third specification) delete Notes (1) and (2).

3.2 Under the specification for k_3, change the text to read:

k_3 Duration and time of current measurement (vector or Doppler current profiling method) (Code table 2264)
(FM 64-VIII)

3.3 Insert the new specification k_6:

k_6 Method of removing ship's velocity and motion from current measurement (Doppler current profiling method) (Code table 2267) (FM 64-VIII)

4. CODE TABLES

Amend Code table 2264 as follows:

k_3 Duration and time of current measurement (vector or Doppler current profiling method)

Code figure		
9	Vector or Doppler current profiling method not used	

Add a new Code table 2267 as follows

k_6 Method of removing ship's velocity and motion from current measurement (Doppler current profiling method)

Code figure		
0	Ship's motion removed by averaging)	
1	Ship's motion removed by motion compensation)	ship's velocity removed by bottom tracking
2	Ship's motion not removed)	
3	Ship's motion removed by averaging)	
4	Ship's motion removed by motion compensation)	ship's velocity removed by navigation
5	Ship's motion not removed)	
6	Doppler current profiling method not used	
7	reserved	
8	reserved	
9	reserved	

Rec. 7 (CBS-Ext.(85)) - CODE FM 62-VIII Ext. TRACKOB - REPORT OF MARINE SURFACE OBSERVATIONS ALONG A SHIP'S TRACK

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 6 (CBS-VIII) - Working Group on Codes,

CONSIDERING that there is a requirement by the Joint IOC/WMO IGOSS Programme for a code to report data along a ship's track,

RECOMMENDS that the Code form FM 62-VIII Ext. TRACKOB - Report of marine surface observations along a ship's track, given in the annex to this recommendation, be adopted for use as from 1 November 1987;

REQUESTS the Secretary-General to arrange for the inclusion of the necessary amendments in Volume I of the Manual on Codes.

Annex to Recommendation 7 (CBS-Ext.(85))

FM 62-VIII Ext. TRACKOB - REPORT OF MARINE SURFACE OBSERVATIONS ALONG A SHIP'S TRACK

1. CODE FORM

Insert Code form FM 62-VIII Ext. TRACKOB as follows:

SECTION 1 $M_iM_iM_jM_j$ YYMMJ

SECTION 2 GGgg/$Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$
$4m_Tm_Sm_ci_c$ $(6s_nT_wT_wT_w)$ $(8S_oS_oS_oS_o)$
$(9d_od_oc_oc_o)$

SECTION 3 D....D

NOTES:

(1) TRACKOB is the name of the code for reporting consecutive marine surface observations along a ship's track.

(2) A TRACKOB report containing observations taken on the same date along a ship's track during one day is identified by $M_iM_iM_jM_j$ = NNXX and the group YYMMJ, and terminated by the ship's call sign D....D.

(3) A bulletin may contain several TRACKOB reports.

(4) The code is divided into three sections:

Section number	Symbolic figure group	Contents
1	-	Data for reporting identification and date
2	-	Data for reporting time, location, averaging periods, and marine surface parameters
3	-	Ship's call sign

2. REGULATIONS:

Insert the following:

62.1

General

The code name TRACKOB shall not be included in the report.

62.2

Use of Section 1

Section 1 shall be included as the first line of the text in every individual report.

62.3

Use of Section 2

62.3.1

The groups GGgg/$Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ shall always be included in each individual observation within a report. The ship's position shall refer to its position at mid-point of beginning and end of observation.

62.3.2

In a TRACKOB report the group $4m_Tm_Sm_ci_c$ shall be included only for the first observation and omitted for subsequent observations for which the averaging procedures are the same. Whenever any subsequent change occurs in the averaging procedures, the first observation using the subsequent averaging procedures shall include this group.

62.3.3

When data are available, the group ($9d_od_oc_oc_o$) shall be encoded 90000 if the sea-surface current speed is less than 0.05 metres per second (0.1 knots).

62.3.4

Section 2 shall be repeated as often as observations are available for a given date.

62.4

Use of Section 3

The ship's call sign D....D shall be entered at the end of a TRACKOB report and shall terminate an individual report. In the absence of a ship's call sign, the word SHIP shall be used for D....D.

62.5

A bulletin of TRACKOB reports

In a bulletin of several TRACKOB reports from either the same ship or different ships, every individual TRACKOB report shall always include Sections 1, 2 and 3 and Section 2 shall conform to Regulation 62.3.4.

3. SPECIFICATION OF SYMBOLIC LETTERS

Insert the following:

m_T Averaging period for sea temperature (Code table 2604)
(FM 62-VIII Ext.)

m_S Averaging period for salinity (Code table 2604)
(FM 62-VIII Ext.)

m_c Averaging period for surface current direction and speed (Code table 2604)
(FM 62-VIII Ext.)

i_c Indicator of units of sea surface current speed (Code table 1804)
(FM 62-VIII Ext.)

c_oc_o Sea surface current speed in tenths of metres per second or tenths of knots (as indicated by i_c)
(FM 62-VIII Ext.)

(1) $d_od_oc_oc_o$ is encoded 0000 if the current speed is less than 0.05 metres per second (0.1 knots).

Modify the present presentation of salinity as follows:

$S_oS_oS_oS_o$ Salinity, in hundredths of parts per thousand (0/00) (practical salinity), at the surface
(FM 62-VIII Ext.)

$S_1S_1S_1S_1$)
...) (indicate surface salinity with a dash and maintain the present specification) (FM 64-VIII)
$S_nS_nS_nS_n$)

4. CODE TABLES

Insert the following:

2604

$m_T;m_S;m_c$ – Averaging period for sea temperature, salinity and sea surface current direction and speed.

Code figure	
0	Spot values
1	Less than 15 minutes
2	From 15 to 45 minutes
3	More than 45 minutes
4)	
5)	
6)	Not used
7)	
8)	
9	Data not available

1804

i_c - Indicator for the units of sea current speed

Code figure	
0	m s^{-1}
1	knots
2	
3)	
4)	
5)	
6)	Not used
7)	
8)	
9	No sea current data available.

Rec. 8 (CBS-Ext.(85)) - FORMAT FM 92-VIII Ext. GRIB (gridded binary) - PROCESSED DATA IN THE FORM OF GRID-POINT VALUES EXPRESSED IN BINARY FORM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 6 (CBS-VIII) - Working Group on Codes,

(2) Resolution 5 (CBS-VIII) - Working Group on the GDPS,

(3) Abridged final report of CBS-VIII, general summary, paragraph 8.19,

CONSIDERING:

(1) That there is an urgent need for the implementation of a WMO bit-oriented format,

(2) That Members using the experimental GRIB format have expressed their satisfaction in all aspects, including arrangements and procedures for transformation to other codes as may be required by non-automated centres or other users,

RECOMMENDS that the format FM 92-VIII Ext. GRIB - Processed data in the form of grid-point values expressed in binary form, given in the annex to this recommendation, be adopted for use between appropriately equipped automated centres as from 1 November 1987;

REQUESTS the Secretary-General to arrange for the inclusion of the format in Volume I of the Manual on Codes.

Annex to Recommendation 8 (CBS-Ext.(85))

FM 92-VIII Ext. GRIB (gridded binary) - PROCESSED DATA
IN THE FORM OF GRID-POINT VALUES EXPRESSED IN BINARY FORM

1. CODE FORM:

Block 0	GRIB
Block 1	(Product definition block)
Block 2	(Grid description block)
Block 3	(Bit map block)
Block 4	Data block
Block 5	7777

NOTES:

(1) GRIB is the name of the binary code for the exchange of processed data.

(2) The GRIB coded analysis or forecast consists of a continuous bit-stream made of a sequence of octets (1 octet = 8 bits).

(3) The octets of a GRIB message are grouped in blocks:

Block number	Name	Contents
0	Indicator block	GRIB
1	Product definition block	Length of block, identification of the coded analysis or forecast.
2	Grid description block (optional)	Length of block, grid geometry as necessary.
3	Bit map block (optional)	Length of block, the bit per grid point, placed in suitable sequence, indicates omission (bit 0) or inclusion (bit 1) of data at respective points.
4	Data block	Length of block and data values.
5	End block	7777

(4) It will be noted that the GRIB code is not suitable for visual data recognition without computer interpretation.

(5) The representation of data by means of series of bits is independent of any particular machine representation.

(6) Block length is expressed in octets. Block 0 and block 5 have a fixed length of 4 octets. Blocks 1, 2, 3 and 4 have a variable length which is included in the first 3 octets of each block.

2. REGULATIONS

92.1

General

92.1.1

The GRIB code shall be used for the exchange of processed data expressed in binary form.

92.1.2

The GRIB code shall always contain an even number of octets.

92.1.3

The beginning and the end of the code form shall be identified by 4 octets coded according to the International Telegraphic Alphabet No. 5 to represent, respectively, the indicators "GRIB" and "7777" in indicator Block 0 and end Block 5. All other octets included in the code shall represent data in binary form.

92.1.4

Each block included in the code shall always contain an even number of octets. This rule shall be applied by appending bits set to zero to the block where necessary.

92.2

Block 0 (Indicator block)

Block 0 shall always be 4 octets long, character-coded according to the International Telegraphic Alphabet No. 5 as GRIB.

92.3

Block 1 (Product definition block)

92.3.1

The length of the block, in units of octets, shall be expressed in binary form over the group of the first three octets of the block, that is, over 24 bits.

92.3.2

Octet number 8 of the block shall be used to indicate the inclusion or the omission of Blocks 2 or 3 or of both of them.

92.4

Block 2 (Grid description block)

92.4.1

Regulation 92.3.1 shall apply.

92.5

Block 3 (Bit map block)

92.5.1

Regulation 92.3.1 shall apply.

92.5.2

Octets number 5 and 6 shall be used to indicate that the bit map is either predetermined and not explicitly included or that the bit map follows.

92.6

Block 4 (Data block)

92.6.1

Regulation 92.3.1 shall apply.

92.6.2

Data shall be coded using the minimum number of bits necessary to provide for the accuracy required by international agreement.

92.6.3

Data shall be coded in the form of non-negative scaled differences from a reference value.

NOTES:

(1) The reference value is normally the minimum value of the data set which is represented.

(2) The actual value Y is linked to the coded value X, to the reference value R and to the scale factor E by means of the following formula:

$$Y = R + (X) \times 2^{E}$$

92.6.4

The reference value shall be represented over four octets as a single precision floating point number, consisting of a leading sign bit, a 7-bit characteristic and a 24-bit binary fraction.

NOTES:

(1) The characteristic is convertible to a power of 16 by subtracting 64 from its 7-bit representation.

(2) The reference value R is linked to the binary numbers s, A, B, representing the sign (1 bit) positive coded as "0", negative coded as "1", a biased exponent (exponent + 64) (7 bits), and the mantissa (24 bits) by means of the following formula:

$$R = (-1)^{s} \times 2^{(-24)} \times B \times 16^{(A-64)}$$

92.7

Block 5 (End block)

The end block shall always be 4 octets long, character-coded according to the International Telegraphic Alphabet No. 5 as 7777.

3. SPECIFICATION OF OCTETS CONTENTS

NOTES:

(1) Octets are numbered 1, 2, 3 ... etc., starting at the beginning of each block.

(2) In the following, bit positions within octets are referred to as bit 1 to bit 8, where bit 1 is the most significant and bit 8 is the least significant bit. Thus, an octet with only bit 8 set 1 would have the integer value 1.

Block 0 (Indicator block)

Octet No.	Contents
1 - 4	GRIB (Coded CCITT-ITA No. 5)

Block 1 (Product definition block)

Octet No.	Contents
1 - 3	Length of block
4	Set to zero (reserved)
5	Identification of centre (see F_1F_2 (FM 47-V, FM 49-VII) See WMO Publication No. 386 Volume I, Part II, Attachment II-9, Table A.)

Block 1 (Product definition block) (Contd.)

Octet No.	Contents
6	Model identification (allocated by originating centre)
7	Grid definition (see NNN .... Catalogue of grid used by centre F_1F_2 (FM 47-V, FM 49-VII), see Volume B of WMO Publication No. 9)
8	Flag (see Reg. 92.3.2 and Code table 1)
9	Indicator of parameter (see Code table 2)
10	Indicator of type of level (see Code table 3)
11 - 12	Height, pressure etc. of levels (see Code table 3)
13	Year of century)
14	Month)
15	Day) Reference time of data
16	Hour)
17	Minutes)
18	Indicator of unit of time range (see Code table 4)
19	Time 1)
	) (see Code table 5)
20	Time 2)
21	Time range flag (see Code table 5)
22-23	Number averaged, when octet 21 indicates an average, otherwise set to zero

NOTES:

(1) Octet 7 may be set to 255 to indicate a non-standard grid, in which case the grid will be defined in Block 2.

(2) Where octet 7 defines a standard grid, that grid may be defined in Block 2 provided the flag in octet 8 indicates inclusion of Block 2.

Block 2 (Grid description block)

Octet No.	Contents
1 - 3	Length of block

Block 2 (Grid description block) (Contd.)

Octet No.	Contents
4	Number of unused bits at end of Block 2
5	Set to zero (reserved)
6	Data representation type (see Code table 6)
7 - 32	Grid definition (according to data representation type - octet 6 above)
33 -	Vertical co-ordinate parameters

NOTES:

(1) Vertical co-ordinate parameters are used in association with hybrid vertical co-ordinate systems.

(2) The number of vertical co-ordinate parameters may be obtained by subtracting 32 from the length of the grid description block, and dividing the result by 4.

(3) Hybrid systems, in the context, employ a means of representing vertical co-ordinates in terms of a mathematical combination of pressure and sigma co-ordinates. When used in conjunction with a surface pressure field and an appropriate mathematical expression the vertical co-ordinate parameters may be used to interpret the hybrid vertical co-ordinate.

(4) Each vertical co-ordinate parameter is represented in 4 octets, using the scheme for representing floating point numbers described in Regulation 92.6.4.

Grid_definition - regular_latitude/longitude_grid

Octet No.	Contents
7 - 8	Ni - no. of points along a latitude
9 - 10	Nj - no. of points along a meridian
11 - 13	La_1 - latitude of origin
14 - 16	Lo_1 - longitude of origin
17	Resolution flag (see Code table 7)
18 - 20	La_2 - latitude of extreme point
21 - 23	Lo_2 - longitude of extreme point
24 - 25	Di - i direction increment

Grid_definition - regular_latitude/longitude_grid (Contd.)

Octet No.	Contents
26 - 27	Dj - j direction increment
28	Scanning mode (flags - see Code table 8)
29 - 32	Set to zero (reserved)

NOTES:

(1) Latitude, longitude, and increments are degrees x 1 000.

(2) Latitude values are limited to the range 0 - 90 000; bit 1 is set to indicate South latitude.

(3) Longitude values are limited to the range 0 - 360 000; bit 1 is set to indicate West longitude.

(4) Octet 28 (scanning mode) is composed as follows:

bit 1 - set to 0 to indicate West to East
bit 2 - set to 0 to indicate North to South
bit 3 - set to 0 to indicate the point scan first along lines of latitude and then along meridional lines.

The full significance of numeric values for the scanning mode is indicated in Code table 8.

The i direction refers to the direction along a latitude using the scanning mode indicated by octet 28.

The j direction refers to the direction along a meridian using the scanning mode indicated by octet 28.

(5) The latitude and longitude of the extreme point from the first data point should always be given.

(6) Where items are not given, the appropriate octet(s) should have all bits set to 1.

Grid_definition - Gaussian_latitude/longitude grid

Octet No.	Contents
7 - 8	Ni - no. of points along a latitude
9 - 10	Nj - no. of points along a meridian
11 - 13	La_1 - latitude of origin
14 - 16	Lo_1 - longitude of origin

Grid_definition - Gaussian_latitude/longitude grid (Contd.)

Octet No.	Contents
17	Resolution flag (see Code table 7)
18 - 20	La_2 - latitude of extreme point
21 - 23	Lo_2 - longitude of extreme point
24 - 25	Di - i direction increment
26 - 27	N - number of latitude lines between a Pole and the Equator
28	Scanning mode (flags - see Code table 8)
29 - 32	Set to zero (reserved)

NOTES:

(1) Latitude, longitude, and increments are degrees x 1 000.

(2) Latitude values are limited to the range 0 - 90 000; bit 1 is set to indicate South latitude.

(3) Longitude values are limited to the range 0 - 360 000; bit 1 is set to indicate West longitude.

(4) The number of latitude lines between a Pole and the Equator is used to establish the variable (Gaussian) spacing of the latitude lines; this value must always be given.

(5) Octet 28 (scanning mode) is composed as follows:

bit 1 - set to 0 to indicate West to East
bit 2 - set to 0 to indicate North to South
bit 3 - set to 0 to indicate the points scan first along lines of latitude, then along meridional lines,

The full significance of numeric values for the scanning mode is indicated in Code table 8.

The i direction refers to the direction along a latitude using the scanning mode indicated by octet 28.

The j direction refers to the direction along a meridian using the scanning mode indicated by octet 28.

(6) The latitude and longitude of the extreme point from the first data point should always be given.

(7) Where items are not given, the appropriate octet(s) should have all bits set to 1.

Grid_description_-_spherical_harmonic_coefficients

Octet No.	Contents
7 - 8	J - pentagonal resolution parameter
9 - 10	K - pentagonal resolution parameter
11 - 12	M - pentagonal resolution parameter
13	Representation type (see Code table 9)
14	Representation mode (see Code table 10)
15 - 32	Set to zero (reserved)

NOTES:

(1) The pentagonal representation of resolution is general. Some common truncations are special cases of the pentagonal one:

Triangular	M = J = K
Rhomboidal	K = J + M
Trapezoidal	K = J, K > M

(2) The representation type (octet 13) indicates the method used to define the norm.

(3) The representation mode (octet 14) indicates the order of the coefficients, whether global or hemispheric data are depicted, and the nature of the parameter stored (symmetric or antisymmetric)

Block 3 (Bit map block)

Octet No.	Contents
1 - 3	Length of block
4	Number of unused bits at end of Block 3
5 - 6	Table reference: if the octets contain zero, a bit map follows; if the octets contain a number, it refers to a pre-defined bit map provided by the centre.
7 -	The bit map. Contiguous bits with a bit to data point correspondence ordered as defined in the grid definition.

Block 4 (Binary data block)

Octet No.	Contents
1 - 3	Length of block
4	Flag (see table 11) (first 4 bits). Number of unused bits at end of Block 4 (last 4 bits)
5 - 6	Scale factor (E)
7 - 10	Reference value (minimum of packed values)
11	Number of bits containing each packed value
12 -	Variable, depending on the flag value in octet 4

Grid-point data

Octet No.	Contents
12 -	Binary data

Spherical harmonic coefficients

Octet No.	Contents
12 - 15	Real part of (0,0) coefficient (stored in the same manner as the reference value (octets 7-10))
16 -	Binary data.

NOTES:

(1) Removal of the real (0,0) coefficient reduces considerably the variability of the coefficients, and results in better packing.

(2) For some spherical harmonic representations the (0,0) coefficient represents the mean value of the parameter represented.

Block 5 (End block)

Octet No.	Contents
7777	End of message (Coded CCITT - ITA No. 5)

4. CODE TABLES RELATIVE TO BLOCK 1

TABLE 1 - Flag indication relative to Blocks 2 and 3

Bit	Value	Meaning
1	0	Block 2 omitted
	1	Block 2 included
2	0	Block 3 omitted
	1	Block 3 included
3 - 8	0	

NOTE: Bits enumerated from left to right.

*

* *

TABLE 2 - Indicator of parameter

Code figure	Field parameter(s)	Unit
00	—	—
01	Pressure	1 hPa
02	Geopotential height	10 m'
03	Geometrical height	10 m
04	Temperature	1 °C
05	Maximum temperature	1 °C
06	Minimum temperature	1 °C
07	Temperature deviation from normal	1 °C
08	Potential temperature	1 °C
09	Pseudo-adiabatic potential temperature	1 °C
10	Dew-point temperature	1 °C
11	Dew-point depression (or deficit)	1 °C
12	Specific humidity	0.1 g kg^{-1}
13	Relative humidity	1%
14	Humidity mixing ratio	0.1 g kg^{-1}
15	Stability index	1 °C
16	Saturation deficit	0.1 hPa
		10 m'
17		
18		
19		
20	Wind direction	10°
21	Wind speed	1 m s^{-1}
22	Wind direction and speed	5°, 1 m s^{-1}
23	Wind components	1 m s^{-1}
24		
25	Wind speed	1 kt
26	Wind direction and speed	5°, 1 kt
27	Wind components	1 kt
28		
29	Stream function	10^5 m^2 s^{-1}
30	Relative vorticity	10^{-5} s^{-1}
31	Absolute vorticity	10^{-5} s^{-1}
32	Relative vorticity advection	10^{-9} s^{-2}
33	Absolute vorticity advection	10^{-9} s^{-2}
34	Hor. velocity divergence	10^{-5} s^{-1}
35	Horizontal moisture divergence	0.1 g kg^{-1} s^{-1}
36	Geostrophic vorticity	10^{-5} s^{-1}
37	Geostrophic vorticity advection	10^{-9} s^{-2}
38		
39	Velocity potential	10^3 m^2 s^{-1}
40	Vertical velocity ($\dot{p}$)	10^{-1} cb/s
41	Vertical velocity ($\dot{p}$)	1 cb/12 h
42	Vertical velocity ($\dot{p}$)	1 hPa h^{-1}
43	Vertical velocity ($\dot{z}$)	1 mm s^{-1}
44	Vertical wind shear	1 m s^{-1}/1000 m
45	Vertical wind shear	1 kt/1000 m
46	Lapse rate	0.1 °C/100 m
47	Precipitable water	1 mm
48		
49	Precipitation rate	1 mm h^{-1}
50	Precipitation amount	1 mm
51	Snow depth	1 cm
52	Outgoing long-wave radiation	0.1 joule (1 joule = 10^7 ergs)
53	Outgoing short-wave radiation	0.1 joule
54	Incoming short-wave radiation	0.1 joule
55		
56		
57		
58		
59		
60	Deviation of sea-level from mean	1 cm
61	Sea temperature	0.1 °C
62	Salinity	
63	Density	
64	Significant height of combined wind waves and swell	0.5 m
65	Direction of swell	10°
66	Significant height of swell	0.5 m
67	Mean period of swell	1 s
68	Direction of wind waves	10°
69	Sig. height of wind waves	0.5 m
70	Mean period of wind waves	1 s
71	Direction of current	10°
72	Speed of current	1 cm s^{-1}
73	Current components	1 cm s^{-1}
74		
75		
76		
77		
78		
79	Cloud cover	0, 1, 2, 3, 4, 5, 6, 7, 8
80	Thunderstorm	
81	Tropical revolving storm	
82	Line squall	
83	Hail	
84	Turbulence (generally associated with cloud)	
85	Clear-air turbulence	
86	Icing	
87	Mountain waves	
88	Sandstorm/duststorm	
89	Freezing rain	
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		

TABLE 2 - Indicator of parameter (Contd.)

Code figure	Field parameter(s)	Unit
100		
101		
102	Geopotential height	1 m'
103	Geometrical height	1 m
104		
105		
106		
107		
108		
109		
110		
111		
112	Specific humidity	1 kg kg^{-1}
113		
114	Humidity mixing ratio	1 kg kg^{-1}
115		
116	Saturation deficit	1 hPa
		1 m'
117		
118		
119		
120	Wind direction	1 °
121		
122		
123		
124		
125		
126		
127		
128		
129	Stream function	1 m^2 s^{-1}
130	Relative vorticity	1 s^{-1}
131	Absolute vorticity	1 s^{-1}
132	Relative vorticity advection	1 s^{-2}
133	Absolute vorticity advection	1 s^{-2}
134	Hor. velocity divergence	1 s^{-1}
135	Horizontal moisture divergence	1 kg kg^{-1} s^{-1}
136	Geostrophic vorticity	1 s^{-1}
137	Geostrophic vorticity advection	1 s^{-2}
138		
139	Velocity potential	1 m^2 s^{-1}
140	Vertical velocity (↓)	1 hPa s^{-1}
141		
142		
143	Vertical velocity (↑)	1 m s^{-1}
144	Vertical wind shear	1 m s^{-1}/1
145		
146	Lapse rate	0.1 °C/1
147	Precipitable water	1 m
148		
149	Precipitation rate	1 m s^{-1}
150	Precipitation amount	1 m
151	Snow depth	1 m
152	Outgoing long-wave radiation	1 joule (1 joule = 10^7 ergs)
153	Outgoing short-wave radiation	1 joule
154	Incoming short-wave radiation	1 joule
155		
156		
157		
158		
159		
160	Deviation of sea-level from mean	1 m
161	Sea temperature	1 °C
162		
163		
164	Significant height of combined wind waves and swell	1 m
165	Direction of swell	1 °
166	Significant height of swell	1 m
167		
168	Direction of wind waves	1 °
169	Sig. height of wind waves	1 m
170	Mean period of wind waves	
171	Direction of current	1 °
172	Speed of current	1 m s^{-1}
173, 174	Current components	1 m s^{-1}
175		
176		
177		
178		
179		
180		
181		
182		
183		
184		
185		
186		
187		
188		
189		
190		
191		
192		
193		
194		
195		
196		
197		
198		
199		
200 to 254	Reserved for national use	

TABLE 3 - Fixed levels or layers for which the data are included

Code figs	Meaning	Octet number 10 Contents	Octet number 11 Contents	Octet number 12 Contents
00	-			
01	Ground surface			
02	Cloud base level			
03	Level of cloud tops		0	0
04	Level of 0°C isotherm			
05	Level of adiabatic condensation			
06	Maximum wind level			
07	Tropopause			
08) .) 99)	Reserved			
100	Isobaric level		pressure in hPa (2 octets)	
101	Layer between 2 isobaric levels	pressure of top kPa		pressure of bottom kPa
102	Mean sea-level		0	0
103	Fixed height level (above msl)		height above msl in metres (2 octets)	
104	Layer between 2 fixed height levels (above msl)	height of top (hm above msl)		height of bottom (hm above msl)
105	Fixed height level (above ground)		height in metres (2 octets)	
106	Layer between 2 fixed height levels (above ground)	height of top (hm above ground)		height of bottom (hm above ground)
107	Sigma level		sigma value in 1/10000 (2 octets)	
108	Layer between 2 sigma levels	sigma value of top in 1/100		sigma value of bottom in 1/100
109	Hybrid level		level number (2 octets)	
110	Layer between two hybrid levels	level no of top		level no of bottom
111) .) 254)	Reserved			

TABLE 4 - Unit of time

Code	Meaning
0	Minute
1	Hour
2	Day
3	Month
4	Year
5	Decade (10 years)
6	Normal (30 years)
7	Century (100 years)
8)	
.)	Reserved
253)	
254	Second

TABLE 5 - Time range indicator

Code	Meaning
0	Product valid for time T1
1	Initialized analysis product valid time T1
2	Range time between time T1 and time T2
3	Average (time T1 to time T2)
4	Accumulation (time T1 to time T2)
5	Difference (time T2 - time T1)
6)	
)	Reserved
9)	
10	Time 1 occupies 2 octets (octets 19 and 20) Product valid for time T1.
11)	
.)	Reserved
254)	

NOTES:

(1) Time T1 is obtained by adding time 1 to the reference time.

(2) Time T2 is obtained by adding time 2 to the reference time.

(3) For analysis products time 1 will be zero and the time range code will be zero.

(4) For initialized products time 1 will be zero and the time range code will be 1.

(5) For forecast products time 1 will indicate the forecast period; the reference time will be the valid time of the initial data on which the forecast was based.

NOTES: (Contd.)

(6) Provision is made to extend time 1 over two octets to assist with extended range forecasts.

(7) When time range code is 3 (i.e. average quantity) the number of quantities averaged will appear in octets 22 and 23 as a numerical value.

5. CODE TABLES RELATIVE TO BLOCK 2

TABLE 6 - Data representation type

Code	Meaning
0	Latitude/longitude grid
1	Mercator projection
2	Stereographic projection
3	Lambert conformal projection
4	Gaussian latitude/longitude grid
5)	
.)	Reserved
49)	
50	Spherical harmonic coefficients
51)	
.)	Reserved
254)	

Code tables relative to grid definition

TABLE 7 - Resolution flag

Bit	Value	Meaning
1	0	Direction increments not given
	1	Direction increments given
2 - 8	0	Reserved

TABLE 8 - Grid-point scanning mode (flags)

Bit pattern (1, 2, 3)	Meaning
000	Points scan from West to East Points scan from North to South Adjacent points on latitude circles are consecutive.
100	Points scan from East to West Points scan from North to South Adjacent points on latitude circles are consecutive.

TABLE 8 - Grid-point scanning mode (flags) (Contd.)

Bit pattern (1, 2, 3)	Meaning
010	Points scan from West to East Points scan from South to North Adjacent points on latitude circles are consecutive.
110	Points scan from East to West Points scan from South to North Adjacent points on latitude circles are consecutive.
001	Points scan from West to East Points scan from North to South Adjacent points on meridional circles are consecutive.
101	Points scan from East to West Points scan from North to South Adjacent points on meridional circles are consecutive.
011	Points scan from West to East Points scan from South to North Adjacent points on meridional circles are consecutive
111	Points scan from East to West Points scan from South to North Adjacent points on meridional circles are consecutive.

TABLE 9 - Spectral data representation type

code	Meaning
1	The Associated Legendre Functions of the first kind are defined by

$$P_n^m(\mu) = \sqrt{(2n+1)\frac{(n-m)!}{(n+m)!}}\ \frac{1}{2^n n!}(1-\mu^2)^{m/2}\ \frac{d^{n+m}}{d\mu^{n+m}}(\mu^2-1)^n,\ m \geq 0,$$

$$P_n^{-m}(\mu) = P_n^m(\mu)$$

A field $X(\lambda,\mu)$ is represented by

$$X(\lambda,\mu) = \sum_{m=-m}^{M} \sum_{n=|m|}^{N(m)} X_n^m \; P_n^m \; (\mu) e^{im\lambda}$$

where λ is longitude, μ = sin (latitude),

and X_n^{-m} = Complex conjugate of X_n^m

TABLE 10 - Spectral data representation mode

Code	Meaning
1	The complex numbers x_n^m (see Table 9 above) are stored for $m \geq 0$ as pairs of real numbers $Re(x_n^m)$, $Im(x_n^m)$ ordered with n increasing from m to N(m), first for m = 0 and then for m = 1, 2, ...M.. The real part of the (0,0) coefficient is stored in octets 12-15 of the binary data block. The imaginary part of the (0,0) coefficient is zero, and is not stored. The remaining coefficients are packed, and are stored in octets 16 onwards of the binary data block.

6. CODE TABLE RELATIVE TO BLOCK 4

TABLE 11 - Flag (first 4 bits only - bits 2-4 set to zero (reserved))

Bit	Value	Meaning
1	0	Grid point data packed binary data begins at octet 12
	1	Spherical harmonic coefficients packed binary data begins at octet 16.
2 - 4	0	Reserved

Rec. 9 (CBS-Ext.(85)) - REVISION OF AERONAUTICAL METEOROLOGICAL FIGURE CODES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the abridged final report of EC-XXXVI, general summary, paragraphs 3.1.4 through 3.1.4.3,

CONSIDERING:

(1) The need expressed by ICAO for the mandatory indication of units used in aeronautical meteorological figure codes to facilitate international air navigation safety,

(2) That Members currently use knots and metres per second as units of wind speed and in addition ICAO Annex 5 provides for Contracting States to use kilometres per hour,

RECOMMENDS:

(1) That the Code forms FM 15-VIII Ext. METAR - Aviation routine weather report (with or without trend forecast), FM 16-VIII Ext. SPECI - Aviation selected special weather report (with or without trend forecast), FM 51-VIII Ext. TAF - Aerodrome forecast, FM 53-VIII Ext. ARFOR - Area forecast for aviation, FM 54-VIII Ext. ROFOR - Route forecast for aviation, as given in the annex to this recommendation, be adopted in lieu of FM 15-V METAR, FM 16-V SPECI, FM 51-V TAF, FM 53-V ARFOR and FM 54-V ROFOR for use as from 1 November 1987;

(2) That the Code form FM 50-VIII WINTEM be modified, as given in the annex to this recommendation, with effect from 1 November 1987;

REQUESTS the Secretary-General to arrange for the inclusion of the necessary amendments in Volume I of the Manual on Codes.

Annex to Recommendation 9 (CBS-Ext.(85))

REVISION OF AERONAUTICAL METEOROLOGICAL FIGURE CODES

1. (a) Amend the code number and form of FM 15-V METAR as follows:

FM 15-VIII Ext. METAR - Aviation routine weather report (with or without trend forecast)

CODE FORM:

METAR CCCC (GGgg) dddff/f_mf_m {KMH or KT or MPS

{VVVV or CAVOK $RV_RV_RV_RV_R/D_RD_R$ w'w' $N_sCCh_sh_sh_s$

(T'T'/T'$_d$T'$_d$) ($P_HP_HP_HP_H$) (Supplementary information)

(TTTTT or NOSIG) GGggHR dddff/f_mf_m {KMH or KT or MPS {VVVV or CAVOK w'w' $N_sCCh_sh_sh_s$

(b) Delete the last phrase "if so required by the authorities concerned" of Regulation 15.1.

(c) Amend Regulations 15.4, 15.4.1, 15.4.3, 15.4.4, 15.6.1, 15.8.5 to read as follows:

15.4

Group dddff/f_mf_m {KMH or KT or MPS

15.4.1

The mean direction and speed of the wind over the ten-minute period immediately preceding the observation shall be reported for dddff immediately followed, without a space, by one of the letter code indicators KMH, KT or MPS as the case may be.

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 circonstances shall be correspondingly reduced.

NOTES:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second, respectively.

(2) The unit of wind speed used is determined by national decision. However, the primary unit prescribed in ICAO Annex 5 for wind speed is the kilometre per hour (KMH), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date (not yet established) which will not be before 31 December 1990.

15.4.3

If, during the ten-minute period preceding the observation, the maximum wind speed exceeds the mean speed by 10 knots (5 m s^{-1} or 18 km h^{-1}) or more, this maximum speed shall be reported as $/f_mf_m$ immediately after dddff. Otherwise the element $/f_mf_m$ shall not be included.

15.4.4

For wind speeds of 100 units or greater, the exact number of wind speed units shall be given in lieu of the two figure code ff or f_mf_m.

15.6

Group $RV_RV_RV_RV_R/D_RD_R$

15.6.1

Only during periods when either the horizontal visibility or the runway visual range is observd to be less than 1 500 metres shall one or more groups $RV_RV_RV_RV_R/D_RD_R$ 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. Parallel runways are in this case distinguished by appending to D_RD_R the letter L, C or R, indicating the left, central or right parallel runway, respectively. A suitable combination of these letters can be used for up to and including five parallel runways. The letter(s) shall be appended to D_RD_R as necessary in accordance with the standard practice for runway designation, as laid down by ICAO.

15.8.5

When the sky is obscured (N_s = 9) and information on vertical visibility is available, the cloud group shall read $9//h_sh_sh_s$ where $h_sh_sh_s$ is the vertical visibility. When information on vertical visibility is not available, the group shall read 9/////.

(d) Delete the phrase "or wind shear in the lower layers" in Regulation 15.12.1

(e) Add new Regulation 15.12.4 as follows:

15.12.4

Information on wind shear in the lower layers, when available, shall be added in plain language.

2. (a) Amend the code number and form of FM 16-V SPECI as follows:

FM 16-VIII Ext. SPECI - Aviation selected special weather report (with or without trend forecast)

CODE FORM:

SPECI CCCC GGgg dddff/f_mf_m {KMH or KT or MPS}

{VVVV or CAVOK} $RV_RV_RV_RV_R/D_RD_R$ w'w' $N_sCCh_sh_sh_s$

(Supplementary information)

(TTTTT GGggHR dddff/f_mf_m {KMH or KT or MPS} {VVVV or CAVOK} w'w' $N_sCCh_sh_sh_s$ or NOSIG)

(b) In Regulation 16.1.1 delete the last phrase "if so required by the authorities concerned".

3. (a) Amend Code number FM 51-V TAF and the first line of the text of the code form as follows:

FM 51-VIII Ext. TAF - AERODROME FORECAST

CODE FORM

TAF CCCC $G_1G_iG_2G_2$ dddff/f_mf_m { KMH or KT or MPS

(b) Delete the last phrase of Regulation 51.1.1 "if so required by the authorities concerned".

(c) Amend Regulations 51.3, 51.3.1, and 51.3.3 as follows:

51.3

Group dddff/f_mf_m { KMH or KT or MPS

51.3.1

The mean direction and speed of the forecast wind shall be indicated by dddff immediately followed, without a space, by one of the letter code indicators KMH, KT or MPS as the case may be.

NOTES:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second respectively.

(2) The unit of wind speed used is determined by national decision. However, the primary unit prescribed in ICAO Annex 5 for wind speed is the kilometre per hour (KMH), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date (not yet established) which will not be before 31 December 1990.

51.3.3

When it is forecast that the maximum wind speed will exceed the mean speed by 10 knots (5 m s^{-1} or 18 km h^{-1}) or more, the maximum wind speed shall be indicated by adding /f_mf_m immediately after dddff.

NOTE: If after a change group the wind is reported again, /f_mf_m should be included, or not, in accordance with these same criteria.

4. (a) Amend Code number FM 53-V ARFOR and the first line of the text of Section 1 of the code form as follows:

FM 53-VIII Ext. ARFOR - Area forecast for aviation

CODE FORM

SECTION 1 ARFOR $YYG_1G_1G_2G_2$ { KMH or KT or MPS

(b) Add a new Regulation 53.1.2 as follows:

53.1.2

The group $YYG_1G_1G_2G_2$ shall be immediately followed, with a space, by the unit of wind speed used and indicated by one of the letter code indicators KMH or KT or MPS as the case may be.

NOTES:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second respectively.

(2) The unit of wind speed used is determined by national decision. However, the primary unit prescribed in ICAO Annex 5 for wind speed is the kilometre per hour (KMH), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date (not yet established) which will not be before 31 December 1990.

(c) Change present Regulation 53.1.2 to read as follows:

53.1.3

Regulations 51.1.3 and 51.1.4 shall apply.

(d) Renumber current Regulations 53.1.3 to 53.1.11 as 53.1.4 to 53.1.12.

5. (a) Amend Code number FM 54-V ROFOR and the first line of the text of Section 1 as follows:

FM 54-VIII Ext. ROFOR - Route forecast for aviation

CODE FORM:

SECTION 1 ROFOR $YYG_1G_1G_2G_2$ { KMH KT or MPS

(b) Add a new Regulation 54.1.3 as follows:

54.1.3

The group $YYG_1G_1G_2G_2$ shall be immediately followed, with a space, by the unit of wind speed used and indicated by one of the letter code indicators KMH or KT or MPS as the case may be.

NOTES:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second respectively.

(2) The unit of wind speed used is determined by national decision. However, the primary unit prescribed in ICAO Annex 5 for wind speed is the kilometre per hour (KMH), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date (not yet established) which will not be before 31 December 1990.

(c) Change Regulation 54.1.3 to read as follows:

54.1.4

Regulations 51.1.3 and 51.1.4 shall apply.

(d) Renumber current Regulations 54.1.4 to 54.1.6 as 54.1.5 to 54.1.7.

(e) Amend Regulation 54.1.7 to read:

Forecast_elements

Regulations 51.2.1 and 53.1.5 to 53.1.12 inclusive shall apply.

6. (a) Modify Code form FM 50-VIII WINTEM - Forecast upper wind and temperature data for aviation as follows:

CODE FORM:

Amend Section 0 to read:

WINTEM $Y_FY_FG_FG_Fg_Fg_F$ { KMH or KT or MPS

(b) Revise Regulation 50.2 as follows:

50.2

Section 0

50.2.1

The groups of this section shall constitute the first line of the message.

50.2.2

The group $Y_FY_FG_FG_Fg_Fg_F$ shall be immediately followed, with a space, by the unit of wind speed used and indicated by one of the letter code indicators KMH or KT or MPS as the case may be.

NOTES:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second respectively;

(2) The unit of wind speed used is determined by national decision. However, the primary unit prescribed in ICAO Annex 5 for wind speed is the kilometre per hour (KMH), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date (not yet established) which will not be before 31 December 1990.

7. SPECIFICATIONS OF SYMBOLIC LETTERS

General: Replace FM 15-V, FM 16-V, FM 51-V, FM 53-V and FM 54-V:

- by FM 15-VIII Ext., FM 16-VIII Ext., FM 51-VIII Ext., FM 53-VIII Ext., FM 54-VIII Ext. wherever they occur in the specifications as appropriate.

ff second specification, change to read:

- Wind speed, in kilometres per hour or knots or metres per second.....

  (1) For wind speeds of 100 units or more, ... (delete Regulation 45.3.6.2)...

  Add a new specification:

- Wind speed, in knots (FM 45-IV)

  (1) For wind speed of 100 units or more, see Regulation 45.3.6.2

f_mf_m change specification to read:

- Maximum wind speed, in kilometres per hour or knots or metres per second

$f_hf_hf_h$ change specification to read:

- Wind speed inn kilometres per hour or knots or metres per econd at the level given by $h_xh_xh_x$

$f_jf_jf_j$ change second specification to read:

- Wind speed in kilometres per hour or knots or metres per second, in the jet core

$f_mf_mf_m$ change second specification to read:

- Maximum wind speed, in kilometres per hour or knots or metres per second, at the level given by $n_mn_mn_m$

change third specification to read:

- Wind speed in kilometres per hour, or knots or metres per second, at the level given by h_mh_m

YY Change list of code forms under (b) to read:

(FM 61-IV, FM 53-VIII Ext., FM 54-VIII Ext.)

8. Amend the appendix to the Manual on National Practices regarding the coding of certain elements in reports, analyses or forecasts for international exchange as follows:

Para 2 Units used for the reporting of horizontal speed (wind speed, speed of systems, etc.):

- Insert in first paragraph an asterisk (*) against international organizations*

- Insert footnote at bottom of page as follows:

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* ICAO Annex 5 contains specifications for use of kilometres per hour and, as alternative unit permitted for temporary use, the knot, in international civil aviation air and ground operations.

Rec. 10 (CBS-Ext.(85)) - WAVE HEIGHT IN REPORTS FROM AUTOMATIC SHIP STATIONS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the greater accuracy in measurement of wave height in reports from certain automatic ship stations,

CONSIDERING the loss of this increased accuracy due to the limitations of the present regulations for the Code form FM 12-VII SYNOP and FM 13-VII SHIP,

RECOMMENDS that the amendments to regulations for Code form FM 12-VII SYNOP and FM 13-VII SHIP, given in the annex to this recommendation, be adopted for use as from 1 November 1987;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes.

Annex to Recommendation 10 (CBS-Ext.(85))

WAVE HEIGHT IN REPORTS FROM AUTOMATIC SHIP STATIONS
(CODE FORM FM 12-VII SYNOP/FM 13-VII SHIP)

1. Change Section 2 of the Code form FM 12-VII/FM 13-VII as follows:

SECTION 2 $222D_sv_s$ $(0s_nT_wT_wT_w)$ $(1P_{wa}P_{wa}H_{wa}H_{wa})$ $(2P_wP_wH_wH_w)$
$((3d_{w1}d_{w1}d_{w2}d_{w2})$ $(4P_{w1}P_{w1}H_{w1}H_{w1})$ $(5P_{w2}P_{w2}H_{w2}H_{w2}))$

$$(\{6I_sE_sE_sR_s \text{ or ICING + plain language}\})(70H_{wa}H_{wa}H_{wa})(ICE + \{c_iS_ib_iD_iz_i \text{ or plain language}\})$$

2. Make the following changes under Regulation 12.3.3

12.3.3

Groups $(1P_{wa}P_{wa}H_{wa}H_{wa}$ $(2P_wP_wH_wH_w)$ and $(70H_{wa}H_{wa}H_{wa})$

12.3.3.2

The group $1P_{wa}P_{wa}H_{wa}H_{wa}$ shall be used to report instrumental wave data in units of 0.5 metres.

12.3.3.6

The group $70H_{wa}H_{wa}H_{wa}$ shall be reported in addition to the group $1P_{wa}P_{wa}H_{wa}H_{wa}$ when the following conditions have been met:

(a) The sea is not calm (e.g. $P_{wa}P_{wa}H_{wa}H_{wa}$ has not been reported as 0000);

(b) $H_{wa}H_{wa}$ has not been reported as //;

(c) The station has the capability of accurately measuring instrumental wave height in units of 0.1 metre.

3. Changes to symbolic figures and figure groups

Add the following symbolic figure group to Section B in Volume I of the WMO Manual on Codes:

70 Instrumental wave height, in units of 0.1 metre, follows. (FM 12-VIII Ext., FM 13-VIII Ext.)

4. Changes to specifications of symbolic letters

Add the following symbolic letters to Section C in Volume I of the WMO Manual on Codes:

$H_{wa}H_{wa}H_{wa}$ Height of waves, obtained by instrumental methods, in units of 0.1 metre.
(FM 12-VIII Ext., FM 13-VIII Ext.)

(1) See Regulation 12.3.3.6 for the use of $H_{wa}H_{wa}H_{wa}$.

(2) See Note (1) under H_wH_w.

Rec. 11 (CBS-Ext.(85)) - AMENDMENTS TO THE MANUAL ON THE GLOBAL OBSERVING SYSTEM, VOLUME I

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) WMO Publication No. 544 - Manual on the Global Observing System, Volume I,

(2) The final report of the fourth session of the Working Group on the Global Observing System and, in particular, paragraph 10.7 of the general summary,

(3) The final report of the tenth session of the CBS Advisory Working Group and, in particular, paragraph 3.9 of the general summary,

CONSIDERING that some of the definitions presently included in the Definitions section of the Manual on the Global Observing System need to be modified for the sake of consistency,

RECOMMENDS:

(1) That the amended definitions given in the annex to this recommendation be adopted and incorporated in the Definitions section of the Manual on the Global Observing System, Volume I, as a replacement of the corresponding existing definitions in the Manual;

(2) That these amended definitions come into force on 1 January 1987;

REQUESTS the Secretary-General to take the necessary steps for these amended definitions to be inserted in the Manual on the Global Observing System.

Annex to Recommendation 11 (CBS-Ext.(85))

AMENDMENTS TO THE MANUAL ON THE GLOBAL OBSERVING SYSTEM, VOLUME I

Definitions

In the Definitions section of the Manual on the Global Observing System, Volume I, amend the following definitions to read as follows:

- Planetary boundary layer: The lowest layer in the atmosphere, usually taken to be up to 1 500 m, in which meteorological conditions are affected significantly by the Earth's surface.

- Surface station: A surface location from which surface observations are made.

- Upper-air station: A surface location from which upper-air observations are made.

Rec. 12 (CBS-Ext.(85)) - AMENDMENTS TO THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I - GLOBAL ASPECTS, PART I - ORGANIZATION OF THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 7 (Cg-IX) - Systems and techniques for marine observation and data collection,

(2) Abridged final report of CBS-VIII, general summary, paragraphs 9.22 to 9.28,

CONSIDERING:

(1) The recent increase in the number of coast earth stations and ship earth stations for the collection of ships' weather reports,

(2) The urgent need to include a procedure, as an interim measure, to use INMARSAT for the collection of ships' weather reports,

RECOMMENDS the approval of the amendments to the Manual on the Global Telecommunication System, Volume I - Global aspects, Part I - Organization of the Global Telecommunication System, given in the annex to this recommendation, which should be applicable as from 1 November 1986;

REQUESTS the Secretary-General to make:

(1) The appropriate changes, as given in the annex to this recommendation, to the Manual on the Global Telecommunication System, Volume I - Global aspects, Part I - Organization of the Global Telecommunication System;

(2) In consultation with the president of CBS, any consequent, purely editorial amendments as regards Volume I of the Manual on the Global Telecommunication System.

Annex to Recommendation 12 (CBS-Ext.(85))

AMENDMENTS TO THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I, GLOBAL ASPECTS - PART I - ORGANIZATION OF THE GLOBAL TELECOMMUNICATION SYSTEM

2. FUNCTIONS AND RESPONSIBILITIES OF THE METEOROLOGICAL TELECOMMUNICATION CENTRES

The following changes should be made:

2.1 and 2.2 - No change.

"2.3 With regard to telecommunications, the National Meteorological Centres shall be responsible for:

(a) Collecting observational data from their own territory or that of one or more Members according to bilateral agreements, as well as observational data from aircraft and ships received by centres located within the area of responsibility. This collection shall take place as soon as possible and shall be completed within 15 minutes of the observing station's filing time;

NOTES: (1) The observing station's filing time is defined as the time at which the coded meteorological report is first presented to the telecommunication system. For an aircraft or ship weather report, it is the time when it is received by the appropriate communication station (land station/coast station).

(2) Under normal conditions, the report should be presented to the telecommunication system not later than five minutes after the completion of its coding".

2.3 (b), (c), (d), (e) and its NOTES - No change.

2.4 and 2.5 - No change.

"2.6 Responsibility for the collection of meteorological reports from stations at sea through coast stations and coast earth stations.

2.6.1 Members should make the necessary arrangements with telecommunication authorities or appropriate telecommunication administrations to establish procedures for the collection of meteorological reports from ships through coast stations and coast earth stations in order to ensure an effective transmission link between coast station/coast earth station and collecting centre.

2.6.2 Members should be encouraged to develop the use of automatic transmission from ships to the designated collecting centres without relay by operators.

2.6.3 Members responsible for the collection of meteorological reports from ships shall provide the Secretariat with a list of their coast stations and coast earth stations designated for this purpose, including information on location, call signs, working transmission and reception frequencies.

NOTE: The list of coast stations and coast earth stations accepting ships' weather reports is published in WMO Publication No. 9, Volume D, Part B.

2.6.4 Members shall send necessary amendments to the information supplied under 2.6.3 to the Secretariat.

2.6.5 Each Member designating a coast station for reception of meteorological reports from ships or designating a coast earth station for reception of meteorological reports from ships in a defined geographical area of interest to the Member shall confirm to the Secretariat that the Member will be responsible for any transmission cost of such reports being sent to his collecting centre.

2.6.6 Members shall provide their designated ship stations and ship earth stations with details of the procedures for addressing and routeing meteorological reports in different sea areas.

NOTE: Details of these procedures are given in Attachment I-1. Additional special procedures adopted by regional associations are given in Volume II of the Manual.

2.6.7 Members responsible for the insertion into the GTS of meteorological reports from ships shall ensure that the reports are in conformity with WMO standards and that they are transmitted under appropriate bulletin headings.

2.6.8 Members responsible for the reception of meteorological reports from ships should arrange that coast stations adequate in number, staffing and telecommunication capability are available to discharge this responsibility.

2.6.9 Members should request ships to transmit their meteorological reports to a coast station or a coast earth station as soon as possible after the time of observation.

2.6.10 Each Member shall arrange with the services responsible for operating coast stations designated to accept meteorological reports from ships so that those stations:

(a) Accept such reports with the least possible delay;

(b) Transmit them immediately to the designated collecting centres.

2.6.11 Members should ask ships not to send the same meteorological report to more than one address.

2.6.12 Each Member, in consultation with its telecommunication administration, shall arrange that the service indicator OBS is used in the original call from observing ships to the coast stations for securing the appropriate priority of answer by the coast station. The abbreviation OBS shall also be included as a paid service indicator in the preamble of ships' weather messages transmitted from observing ships to coast stations for securing appropriate priority handling of messages by coast stations. This does not apply in cases where automatic access codes over satellites or automatic radiotelex are employed.

2.6.13 Members should arrange for the word "METEO" to be employed as the first word in the address of ships' weather reports. This does not apply in cases where automatic access codes over satellites or automatic radiotelex are employed.

2.6.14 Members should arrange with their telecommunication administrations for the inclusion of call signs of ships, when available, in the preamble of meteorological reports from selected, supplementary, and auxiliary ship stations when transmitted from coast stations to collecting centres.

2.6.15 Meteorological reports from ships, when included in collective transmissions, should include the call sign of the ship.

2.6.16 Whenever meteorological reports from ships received at collecting centres are insufficient or unduly delayed, the Member responsible for the collection should first take local or regional action in an endeavour to correct the deficiency and, if such action is not effective, notify the Secretariat.

2.6.17 Members should make every effort to encourage ships in ocean areas where shipping is relatively sparse to relay weather messages through other ships when the reporting ship is unable to communicate with coast stations or coast earth stations or when communication conditions are difficult.

2.6.18 Members should encourage ships to exchange radio weather messages for the benefit of each other when in areas where shipping is sparse or where no regular weather bulletin is issued".

Remaining parts - Unchanged.

ATTACHMENT I-1

ARRANGEMENTS FOR THE COLLECTION OF SHIPS' WEATHER REPORTS AND OCEANOGRAPHIC REPORTS (BATHY/TESAC)

1. Zones for the collection of ships' weather reports

Oceanic and sea areas are divided first into WMO Regions and the Antarctic and then, within each Region, into a small number of zones determined by the regional associations concerned in accordance with the following principles:

(a) As a rule, zones should be linked to RTHs responsible for the international dissemination of the reports collected by coast stations and coast earth stations in the zone;

(b) By way of exception, zones pertaining to one Region may extend into the sea area of an adjacent Region, if so agreed between the two regional associations concerned;

(c) Along the border line between two Regions, zones pertaining to each Region may overlap each other, if so agreed between the two regional associations concerned.

The zones for the collection of ships' weather reports, as agreed by regional associations and the Executive Council, are shown in Figure 1.

2. Transmission of ships' weather reports to coast stations and coast earth stations

2.1 Weather reports from ship stations and ship earth stations should be transmitted to a coast station or a coast earth station as soon as possible after the time of observation.

2.2 Weather reports from ship stations should be compiled in 10-figure groups, where desirable and appropriate. The ship's call sign should appear alone at the beginning of the report. Thereafter, the groups are simply run together to form 10-figure groups. If a 5-figure group is left over, it is sent as a 5-figure group. If the identifier 333 appears, it will run together with the adjacent five figures to form an 8-figure group. The restoration to 5-figure groups should be carried out not later than at the point of insertion in the GTS - usually at the NMC involved. The above arrangements do not apply to the parts of ships' weather reports prepared in plain language.

Example:

WLGT 0518499568 7020141498 5231410083 2001640198 5301270282
8323222200 0010320303 3263040907 50805333 8381583360

2.3 Weather reports from ship stations and ship earth stations should (without special request) be transmitted to the nearest available coast station or appropriate coast earth station situated in the zone in which the ship is navigating.

2.4 In a case where no ship earth station is available or if it is difficult, owing to radio propagation conditions or other circumstances, to contact promptly the nearest coast station in the zone in which the ship is navigating, the weather messages should be cleared by applying the following procedures in the order given below:

(a) Transmission to any other coast station in the zone in which the ship is navigating;

(b) Transmission to any coast station in an adjacent zone within the same Region;

(c) Transmission to any coast station in any other zone within the same Region;

(d) Transmission to a coast station in an adjacent zone in a neighbouring Region or, failing that, to any other station in a neighbouring Region;

(e) Transmission to another ship or an ocean weather station with the function of or willing to act as a relay station.

2.5 In zones situated along the border line between two Regions, the order of procedures for the transmission of ships' weather reports to coast stations, as laid down in sub-paragraphs (a), (b), (c), (d) and (e) of paragraph 2.4 above, may be interchanged subject to agreement between the two regional associations involved. Any agreement reached on this matter should specify the limits of the area concerned.

2.6 Members may issue instructions to their ship stations to the effect that their weather reports may be transmitted via one of their home coast stations designated for the collection of reports from the zone, if the application of such procedures may facilitate efficient contact with coast stations and the clearing of weather messages. Members may also issue instructions to their ship stations to transmit weather reports via particular coast earth stations through which the Member will be responsible for the transmission costs.

3. Criteria and performance of coast stations and coast earth stations accepting ships' weather reports

3.1 Members should ensure that the coast stations designated to receive ships' weather messages satisfy the following criteria:

(a) Accept ships' weather reports free of charge to ships;

(b) For the purpose of receiving ships' weather reports:

(i) Keep a continous 24-hour watch; or

(ii) Keep a watch for at least 30 minutes beginning at 0000, 0600, 1200 and 1800 GMT daily; watch should also be kept for a similar minimum time at the beginning of the nearest "single-operator period" following those standard synoptic hours;*

*A table showing the international watchkeeping hours on board ships is given in Figure 2.

(iii) Keep watch for shorter periods (stations with limited hours of operation) than those mentioned under (ii) above when these stations are considered of particular value.

3.2 If any particular coast station is shown consistently to fail to accept promptly ships' weather reports or if the subsequent retransmission is deficient, the president of the regional association concerned should take steps with a view to improving the situation and, if such action does not succeed, action should be taken to remove that station from the list of designated coast stations.

3.3 Members, whose ships repeatedly encounter difficulties in clearing ships' weather reports with coast stations in certain reporting areas, should communicate promptly with the Members concerned giving full particulars as to dates and times; the presidents of the Commission for Basic Systems and the Commission for Marine Meteorology and the Secretary-General should also be informed.

3.4 Members should ensure that coast earth stations designated to receive ships' weather messages accept these reports free of charge to ships.

4. Additional procedures for single-operator ships

4.1 Owing to the difficulties resulting from fixed radio watch hours, single-operator ships, in making weather observations and in transmitting messages, should be guided by the procedures in the order given below.

4.2 When operational difficulties on board ship make it impracticable to make and/or transmit a surface synoptic observation at a main standard time (0000, 0600, 1200 and 1800 GMT), the actual time of observation should be as near as possible to the main standard time to ensure transmission of a message to a coast station before the radio officer goes off duty. Alternatively, in special cases, observations may be taken one full hour earlier than the main standard time and be timed accordingly (i.e. 2300, 0500, 1100 or 1700 GMT respectively). However, it is emphasized that these departures should be regarded only as an exception.

4.3 When an observation is made at 0300, 0900, 1500 or 2100 GMT, in order to ensure its transmission to a coast station, the observation at the next main standard synoptic time, i.e. 0600, 1200, 1800 or 0000 GMT should be made for climatological purposes and, if possible, transmitted as indicated in 4.4 below.

4.4 Observations made at any of the standard times 0000, 0600, 1200 and 1800 GMT should be transmitted even after a period of delay after the time of observation and:

(a) In most parts of the world they should be transmitted up to 12 hours after the time of observation if it is not possible to do so earlier;

(b) In the southern hemisphere and other areas where few ships' weather reports are available, they should be transmitted up to 24 hours after the time of observation.

It is important that this procedure be followed even if an observation for a more recent time is also being transmitted.

5. Collection of oceanographic reports (BATHY/TESAC)

5.1 BATHY and TESAC reports should be transmitted to METEO or METEOCEAN addresses through specified coast stations and coast earth stations.

NOTE: The list of coast stations and coast earth stations accepting BATHY and TESAC reports free of charge to ships together with their radio addresses is given in WMO Publication No. 9, Volume D, Part B and IOC Manuals and Guides Series No. 3 "Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC)".

5.2 When reports are relayed by operators to coast stations, the abbreviation OBS should be included as a paid service indicator before the address in BATHY and TESAC messages transmitted from observing ships to coast stations. This does not apply in cases where automatic access codes over satellites or automatic radio telex are employed.

5.3 BATHY and TESAC reports should be transmitted separately from meteorological (surface or upper-air) reports. They should be transmitted to a specified coast station at times which do not interfere with the transmission of meteorological reports, avoiding as far as possible the following periods:

2330 GMT - 0200 GMT
0530 GMT - 0800 GMT
1130 GMT - 1400 GMT
1730 GMT - 2000 GMT

5.4 BATHY and TESAC reports should be transmitted from ships to coast stations as soon as possible after the time of observation. However, the reports may be transmitted up to 30 days after the time of observation in cases where operational difficulties do not permit their earlier transmission. The international date-time group in the abbreviated heading of the bulletins should be the time of origin of these bulletins* in GMT (See Part II, paragraph 2.3.2.2).

*NOTE: The time of origin of bulletins refers to the time of compilation of bulletins by the GTS centres.

5.5 Geographical designators of the abbreviated heading of BATHY/TESAC bulletins should be in accordance with Table C of Attachment II-6.

NOTE: All BATHY/TESAC bulletins should be published in the "Catalogue of Meteorological Bulletins", WMO Publication No. 9, Volume C.

5.6 Specific monitoring of BATHY/TESAC exchange over the MTN should be carried out in conjunction with the internationally co-ordinated monitoring on a non-real-time basis as prescribed in Attachment I-5.

ATTACHMENT I-3

RESPONSIBILITIES OF CENTRES ON THE MAIN TELECOMMUNICATION NETWORK FOR THE TRANSMISSION OF OBSERVATIONAL DATA AND PROCESSED INFORMATION

Part II, 3, (d), (iii): Add the following sentence:

"As an interim measure, Section 3 of the SYNOP Code form shall also be included in the global exchange on the MTN."

Rec. 13 (CBS/Ext.(85)) - AMENDMENTS TO THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I - GLOBAL ASPECTS, PART II - METEOROLOGICAL TELECOMMUNICATION PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 3 (Cg-IX) - World Weather Watch implementation support,

(2) The WWW Plan for 1984-1987 (WMO Publication No. 617),

RECOMMENDS the adoption of the amendment to the Manual on the Global Telecommunication System - Volume I - Global Aspects, Part II - Meteorological Telecommunication Procedures for the Global Telecommunication System, given in the annex to this recommendation, which should be applicable as from 1 November 1986;

REQUESTS the Secretary-General to make the appropriate amendments, as given in the annex to this recommendation, to the Manual on the Global Telecommunication System - Volume I - Global Aspects, Part II - Meteorological Telecommunication Procedures for the Global Telecommunication System;

AUTHORIZES the Secretary-General to make any consequent purely editorial amendments as regards Volume I of the Manual on the Global Telecommunication System, in consultation with the president of CBS.

Annex to Recommendation 13 (CBS-Ext.(85))

AMENDMENTS TO THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I - GLOBAL ASPECTS, PART II - METEOROLOGICAL TELECOMMUNICATION PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

(1) Replace up to paragraph 2.3.5 inclusively by the following text:

PART II

OPERATIONAL PROCEDURES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

EXPLANATIONS OF TERMS USED

The terms listed below are used frequently throughout this section, and their meanings are given below for convenience.

Meteorological information - Meteorological information which may be in alphanumeric, binary or pictorial form

Meteorological data	-	Meteorological information represented in alphanumeric or binary form
Meteorological message	-	A message comprising a single meteorological bulletin, preceded by a starting line and followed by end-of-message signals
Routine meteorological message	-	A meteorological message transmitted according to a predetermined distribution plan
Non-routine meteorological message	-	A meteorological message for which there is no predetermined distribution plan

1. OPERATIONAL PRINCIPLES FOR THE GLOBAL TELECOMMUNICATION SYSTEM

Principle 1

On the Main Telecommunication Network and the regional telecommunication networks of the Global Telecommunication System meteorological data shall be collected, exchanged and distributed in the meteorological bulletin format.

Principle 2

The meteorological message format shall depend on the mode of operation and engineering of circuits and centres.

Principle 3

The formats of messages shall meet the requirement for automatic switching, selection and editing processes and for manual operations at telecommunication centres, and shall take account of the requirement for automatic processing of the contents of bulletins.

Principle 4

Transmission of meteorological information over the GTS shall be in accordance with agreed distribution plans.

Principle 5

Non-routine meteorological messages and service messages shall be transmitted as addressed messages.

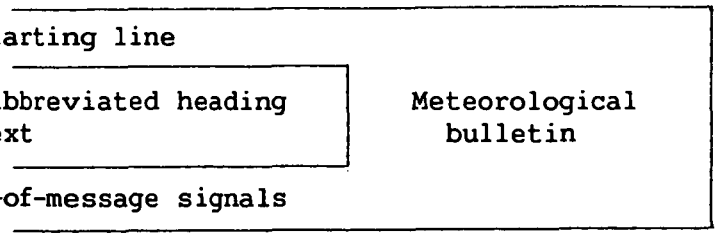
Principle 6

Scheduling of transmissions shall be made on the basis of four levels of priority.

2. OPERATIONAL PROCEDURES APPLICABLE TO THE TRANSMISSION OF METEOROLOGICAL DATA ON THE GLOBAL TELECOMMUNICATION SYSTEM

2.1 Format of meteorological messages

2.1.1 A routine meteorological message transmitted on the Global Telecommunication System shall comprise:



2.1.2 There shall be only one meteorological bulletin per meteorological message.

2.1.3 A non-routine meteorological message shall have the format of an addressed message (see 2.4 below).

2.1.4 The starting line, abbreviated heading and end-of-message signals shall be in alphanumeric form.

2.2 Alphanumeric character set used on the GTS

2.2.1 The alphabets to be used on the GTS shall be the following:

(a) International Telegraph Alphabet No. 2;

(b) International Alphabet No. 5.

NOTE: International Telegraph Alphabet No. 2 and International Alphabet No. 5 are reproduced in Attachments II-1 and II-2, respectively.

2.2.2 Only printed characters for which corresponding characters exist in both alphabets shall be used. The conversion shall be made in accordance with the conversion table approved for use on the GTS. The control characters from International Aphabet No. 5 which are approved for use on the GTS shall be used.

NOTE: The conversion table and the control characters from International Alphabet No. 5 which are approved for use on the GTS are given in Attachment II-3.

2.2.3 When it is required to convert characters of Alphabet No. 5 which do not appear in the conversion table (Attachment II-3) to Alphabet No. 2, the Signal No. 2(?) in the latter alphabet shall provisionally be used, pending CCITT/ISO decisions.

2.2.4 International Alphabet No. 5 shall be used for the starting line, abbreviated heading and end-of-message signals of a meteorological message containing information in binary representation.

2.3 Message format for routine meteorological messages

The procedures outlined below shall apply to transmission of routine meteorological messages on the GTS.

2.3.1 Starting line

2.3.1.1 The starting line shall have the following format:

(a) International Telegraph Alphabet No. 2:

<< ≡ ↓ ZCZC → ↑ nnn (→ CLLLL)→ → → → →

NOTE: The use of the CLLLL groups, enclosed in parentheses, is optional. The use of this group is a matter for regional or national decision.

(b) International Alphabet No. 5:

S						
O	C	C	L	nnn	S	CLLLL
H	R	R	F		P	

NOTE: An example of a routine meteorological message and the meaning of the symbols used for the signals in both International Telegraph Alphabet No. 2 and International Alphabet No. 5 are given in Attachment II-4.

2.3.1.2 The symbols have the following meanings:

nnn - Transmission sequence number. It is a three digit group giving the transmission sequence of messages from one centre over a particular channel to the receiving centre on that channel. Numbers 000 to 999 inclusive must be used in a cyclic manner. (When International Alphabet No. 5 is used, the group nnn may be a fixed combination of three characters, if agreed between the centres concerned.)

CLLLL - Classification and identification group in the general catalogue of bulletins. The group CLLLL is mandatory when International Alphabet No. 5 is used.

It should preferably be inserted at the NMCs but, in any case, CLLLL shall be used on all circuits of the Main Telecommunication Network, regardless of which alphabet is being used. It should also be used on the main regional circuits and the regional circuits as required by the RTHs concerned (see Functions of the RTHs, paragraph 2.2 of Part I).

NOTE: The specifications of CLLLL are given in Attachment II-5.

2.3.2 Abbreviated heading

2.3.2.1 The abbreviated heading shall have the following format:

(a) International Telegraph Alphabet No. 2:

<< ≡ ↓ $T_1T_2A_1A_2$ ↑ ii → ↓ CCCC → ↑ YYGGgg (→ ↓ BBB)

(b) International Alphabet No. 5:

C	C	L	$T_1T_2A_1A_2$ ii	S	CCCC	S	YYGGgg	(S	BBB)
R	R	F		P		P		(P	)

NOTE: An example of a routine meteorological message and the meaning of the symbols used for the signals in both International Telegraph Alphabet No. 2 and International Alphabet No. 5 are given in Attachment II-4.

2.3.2.2 The symbols shall have the following meanings:

$T_1T_2A_1A_2$ii - Data designator

NOTE: The WMO standard data designators are given in Attachment II-6.

T_1T_2- Data type and/or form designators

A_1A_2- Geographical and/or time designators

ii - Number used to differentiate between two or more bulletins which contain data in the same code and which originate from the same geographical area and have the same originating centre. It shall be a number with two digits.

The use of "ii" is mandatory in both International Telegraph Alphabet No. 2 and International Alphabet No. 5 for all bulletins using the data designators.

The following sets of "ii" numbers shall be used for indicating the bulletins for global, inter-regional, regional and national distribution. Special provisions apply to the use of "ii" in respect of bulletins containing satellite data, processed information and pictorial information in digital form. (See Tables A and D of Attachment II-6)

ii = 01-19 inclusive for global distribution;

ii = 20-39 inclusive for regional and inter-regional distribution;

ii = 40-89 inclusive for national and bilaterally agreed distribution;

ii = 90-99 reserved.

In the case of bulletins containing observational data and climatic data (surface and upper-air) from land stations, one "ii" number shall be allocated to one bulletin containing a fixed list of stations. This list may be different at different hours, provided it is known, and that it is given in the Catalogue of Meteorological Bulletins.

In the case of bulletins containing ships' weather reports and aircraft reports, the number "ii" should be used for facilitating the selective distribution of ships' weather reports and aircraft reports (surface and upper-air). Whenever practicable, a fixed number of "ii" should be allocated to the bulletins for those reports which are collected from a certain area within each Region (e.g. southern Indian Ocean in Region I, southern Atlantic in Region III, etc.), and separate bulletins should be prepared for northern and southern hemispheres, respectively.

All information concerning the number "ii" and the contents of bulletins shall be published in the Catalogue of Meteorological Bulletins.

NOTE: The Catalogue of Meteorological Bulletins is given in WMO Publication No. 9, Volume C.

CCCC - International four-letter location indicator of the station originating or compiling the bulletin, as agreed bilaterally or multilaterally, and published in WMO Publication No. 9, Volume C, Chapter I "Catalogue of meteorological bulletins". Once a bulletin has been originated or compiled, the CCCC must not be changed even if (because of inadequate reception, or for any other reason) the bulletin in question has to be re-compiled at another centre.

YYGGgg - International date-time group.

YY - Day of month.

GGgg - For bulletins containing meteorological reports the time shall be the standard time of observation in UTC;

- For aerodrome, route and area (aeronautical) forecasts: the full hour in UTC (the last two digits shall be 00) preceding the transmission time; for other forecasts and analyses: standard time of observation in UTC on which forecast or analysis is based;

- For other messages the time shall be the time of origin in GMT.

BBB - An abbreviated heading defined by $T_1T_2A_1A_2ii$ CCCC YYGGgg shall be used only once. Consequently, if this abbreviated heading has to be used again for an addition, a correction or an amendment, it shall be mandatory to add an appropriate BBB indicator, identified by a three-letter indicator which shall be added after the date-time group.

The indicator BBB shall have one of the following forms (a) or (b) as defined below :

(a) RR_X - for delayed routine meteorological reports;
CC_X - for corrections to previously relayed reports;
AA_X - for amendments to processed information;

where x is an alphabetic character of A through X;

(b) RTD - for delayed routine meteorological reports;
COR - for corrections to previously relayed reports;
AMD - for amendments to processed information;

This form should only be used by those centres not yet able to use form (a); at such centres, use of form (a) should be introduced as soon as possible.

NOTE: See Attachment II-14 for detailed explanation of (a) above.

2.3.3 Text of meteorological bulletins

The following procedures shall apply to the compilation of the text of a meteorological bulletin.

2.3.3.1 The text of a bulletin shall be in one code form only.

2.3.3.2 The text of a bulletin shall be in alphanumeric or binary representation. It shall start with the following sequence:

(a) When International Alphabet No. 5 is used:

C C L
R R F

(b) When International Alphabet No. 2 is used:

<< Ξ

2.3.3.3 Text of meteorological bulletins in alphanumeric representation.

2.3.3.3.1 Each individual meteorological report shall start at the beginning of a new line.

2.3.3.3.2 Signal No. 22 (figure case position) of the International Telegraph Alphabet No. 2 or Signal No. 3/13 of International Alphabet No. 5 shall be used as a meteorological report separation signal. The signal shall follow the last figure of the last group of each report, with no intervening space.

2.3.3.3.3 Format of SYNOP and SHIP bulletins

The presentation of bulletins containing SYNOP reports and SHIP reports, in the Code forms FM 12-VIII Ext. and FM 13-VIII Ext. respectively, should be in one of the formats (a or b) as given in Attachment II-4, paragraph 4.

When using format (a), all Sections 1, 2, 3 and 4 shall be transmitted consecutively without any insertion of spaces and solidi in the identifier groups of Sections 3 and 4. If format (b) is used, Sections 1, 2, 3 and 4 shall start at the beginning of a line but identifiers of Sections 3 and 4 shall start with two spaces at the beginning.

NOTE: For examples of formats (a) and (b), see Attachment II-4, paragraph 4 - Examples of presentation of formats for SYNOP bulletins.

2.3.3.3.4 In upper-air bulletins (TEMP and PILOT), each successive Part (A, B, C and D) shall be preceded immediately by an alignment function (see 2.6.1 below) and followed by a separation signal. In upper-air bulletins (TEMP and PILOT), each report relating to one station is separated from the preceding report by an additional line-feed signal. Additionally, whenever Parts A and B or Parts C and D are transmitted together, they shall be separated by eight carriage return signals.

2.3.3.3.5 Whenever practicable, and unless special provisions exist to the contrary, the text of a meteorological bulletin shall be transmitted in such a manner that full use is made of the capacity of a teleprinter line (69 characters per line).

2.3.3.3.6 NIL

(a) In the case of routine messages containing meteorological reports, NIL shall be inserted following the appropriate station index number (which should however retain its proper place in the coded message) when the report from that station is included in the published contents of the bulletin (in the "Catalogue of meteorological bulletins" and elsewhere) but is not available at the time of transmission. The same procedures also apply to other coded information (such as CLIMAT, CLIMAT TEMP)

(b) When the whole bulletin for a routine message is not available at the normal time of transmission, the text NIL shall be sent.

NOTE: For messages containing aerodrome forecasts in the TAF code, NIL should not be used.

2.3.3.3.7 The solidus (/) shall be used to indicate missing figures or letters in the text of meteorological bulletins. The solidus is represented in International Telegraph Alphabet No. 2 by the figure case position of Signal No. 24, and in International Alphabet No. 5 by Signal No. 2/15.

2.3.3.3.8 The procedures given above which refer to bulletins containing meteorological reports shall also apply to bulletins containing other coded information (such as TAF, CLIMAT, CLIMAT TEMP) from specified locations.

2.3.3.4 Text of meteorological bulletins in binary representation

The text of meteorological bulletins in binary representation shall start by the sequence "C C L" followed by the code indicator coded in
R R F
International Alphabet No. 5.

2.3.4 End-of-message signals

The format for the end-of-message signals shall be as follows:

(a) International Telegraph Alphabet No. 2:

↓<<≡≡≡≡≡≡≡≡ NNNN ↓↓↓↓↓↓↓↓↓↓↓↓

NOTE: The end of message signals are used for ensuring page-feed and tape-feed.

(b) International Alphabet No. 5:

C	C	L	E
R	R	F	T
			X

(2) Amend paragraph 2.5.2.3 as follows:

"Each line of the text of the message should begin with the indicator RQRPT. Each line will end with the meteorological report separation signal."

(3) Add the following sentence at the end of paragraph 2.5.3.3:

"If a request-for-repetition message is incorrect, an addressed data message should be sent to the originator of the request with the specification ERR."

(4) Amend the title of paragraph 2.6 as follows:

Additional procedures applicable to both routine and addressed messages in alphanumeric form."

(5) Delete paragraph 2.8.4.

(6) Replace the sub-paragraphs under paragraph 2.11 by the following text:

"2.11.1 The messages shall be forwarded on the basis of four levels of priority. The level of priority shall be allocated according to the data type (T_1T_2) and is indicated in Table A of Attachment II-6.

2.11.2 Within a level of priority, the messages shall be forwarded according to the "First in, First out" principle.

2.11.3 The messages of a higher level of priority shall be forwarded before those of a lower level of priority. However, the forwarding of a message of a higher level of priority shall not interrupt the transmission of a message already started."

(7) Amend paragraph 2.12.3.3 as follows:

(a) Delete the note;

(b) Add the following text at the end of the paragraph:

"A single permanent virtual circuit (PVC) should be established between two adjacent centres.

NOTE: When the transport layer procedures have not been implemented, several permanent virtual circuits may be established between two adjacent centres, by bilateral agreement.

A packet shall contain only data of a single message. Every message shall start with a new packet and the complete message shall be transmitted in a sequence of packets. The last packet is of variable length and shall contain the final part of the message.

When the transport layer procedures have not been implemented, "more data mark" (binary element M) shall be used to identify the sequence of packets containing the complete message."

(8) Replace the text of paragraph 2.12.3.4 by the following:

"A transport protocol should be employed in accordance with CCITT Recommendation X.224 providing multiplexing of transport connections, flow control, and effective end-to-end control of exchange. The complete definition of procedures for the GTS will be in line with class 3 and/or class 4 transport protocol procedures, and is still under study."

(9) Add a new paragraph 3.5:

"3.5 Coded and non-coded digital facsimile transmission procedures

Coded or non-coded digital facsimile transmission should be carried out by one of the following procedures:

(a) Alphanumeric data and digital facsimile information should be transmitted, on a time-sharing basis, on a single data link.

(b) Alphanumeric data and digital facsimile information should be transmitted on separate channels, multiplexed by a modem in accordance with Recommendation V.29.

NOTE: The procedures to be applied are given in Attachment II-11."

(10) Amend Attachment II-5 as follows:

Add the following sentences at the end of paragraph 1:

"The group CLLLL shall not be used as from 15 June 1987 for the purposes of routeing meteorological messages. As from that date, the fixed group 55555 may be used for the group CLLLL".

(11) Replace Attachment II-6 by the amended Attachment II-6.

(12) Insert a new Attachment II-11 entitled:

"Transmission of pictorial information by coded and non-coded digital facsimile".

(13) Present Attachments II-11 and II-12 will be re-numbered II-12 and II-13 respectively.

(14) Insert a new Attachment II-14 entitled:

"Instructions for the use of the indicator BBB".

ATTACHMENT II-6

Table A : Data designators $T_1T_2A_1A_2ii$

Table B1 : Data type designators T_1T_2

Table B2 : Date type designators T_2 (when T_1 = D, G, H, P, T, X or Y)

Table C1 : Geographical designators A_1A_2

Table C2 : Geographical designators A_1A_2

Table C3 : Geographical area designator A_1

Table C4 : Reference time designator A_2

Table C5 : Reference time designator A_2 (when T_1 = X or Y)

Table D : Level designator ii

Amendments to Attachment II-6

(1) New Table A.

(2) Table B1 is previous Table A with the following amendments:

(a) New title: "Data type designators T_1T_2 for alphanumeric information."

(b) New title of columns:

"Data type T_1 designator and data description	Code form (name)	$M_1M_1M_jM_j$	Data type designator" T_1T_2 CL_3

(c) On the last page, references concerning grid-point value messages (T_1 = G) and pictorial information (T_1 = P) to be deleted.

(3) New Table B2 (Part I of previous Table D amended).

(4) Table C1 is previous Table B.

(5) New Table C2.

(6) Table C3 is Part II of previous Table D.

(7) Table C4 is Part III of previous Table D.

(8) New Table C5.

(9) Table D is part IV of previous Table D, with the following additions:

"94 : level of 0°C isotherm"

*

* *

TABLE A

Data designators $T_1T_2A_1A_2ii$

T_1	Data type	Priority	T_2	A_1	A_2	ii
A	(Analyses	3	Table B1)	Table C1		Para. 2.3.2.2
	(Administrative (messages	4	A)	Table C1		L_1L_2
B	Service messages	1	B	Table C1		L_1L_2
C	Climatic data	4	Table B1	Table C1		Para. 2.3.2.2
D	Grid point information (GRID)	3	Table B2	Table C3	Table C4	Table D
E	-					
F	Forecasts	3	Table B1	Table C1		
G	Grid-point information (GRID)	3	Table B2	Table C3	Table C4	Table D
H	Binary grid-point information (GRIB)	3	Table B2	Table C3	Table C4	Table D
I	Binary data (to be defined)					
J	Binary data (to be defined)					
K	-					
L	-					
M	Data messages	2	M	Table C1		L_1L_2
N	METNO/WIFMA	4	O	Table C1		Para. 2.3.2.2
O	-					
P	Pictorial information	3	Table B2	Table C3	Table C4	Table D
Q	-					
R	Request for repetition	2	R	Table C1		L_1L_2
S	Surface data	2/4(1)	Table B1	Table C1/C2		Para. 2.3.2.2
T	Satellite data	2	Table B2	Table C3	Table C4	Table D
U	Upper-air data	2	Table B1	Table C1/C2		Para. 2.3.2.2
V	-					
W	Warnings	1	Table B1	Table C1		Para. 2.3.2.2
X	GRID for regional use	3	Table B2	Table C3	Table C5	Table D
Y	GRIB for regional use	3	Table B2	Table C3	Table C5	Table D
Z	-					

(1) level 4 is allocated to seismologic data (T_1T_2 = SE)

TABLE B2

Data designators (T_2)

Instructions for the proper application of the data designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the text of the bulletin.

2. Where more than one data type is contained in the text, the designators for only one of the data types should be used.

3. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be used.

Designator	Date type
A	Radar data
D	Thickness (relative topography)
E	Precipitation
G	Significant weather
H	Height
I	Ice flow
O	Vertical velocity
P	Pressure
R	Relative humidity
S	Snow cover
T	Temperature
U	Eastward wind component
V	Northward wind component
W	Wind
X	Lifted index

TABLE C2

Geographical designators (A_1A_2) for use in abbreviated headings

$T_1T_2A_1A_2ii$ CCCC YYGGgg

for bulletins containing ships' weather reports and oceanographic data including reports from automatic marine stations

Instructions for the proper use of geographical designators for bulletins containing ships' weather reports and oceanographic data including reports from automatic marine stations.

1. The first letter A_1 will denote the nature of the ship or automatic marine station:

For ocean weather stations: W
For mobile ships and other marine stations: V

2. The second letter A_2 will denote the area from which the reports contained in the bulletins originate:

Area between 30°N - 60°S, 35°W - 70°E	A
Area between 90°N - 05°N, 70°E - 180°E	B
Area between 05°N - 60°S, 120°W - 35°W	C
Area between 90°N - 05°N, 180°W - 35°W	D
Area between 05°N - 60°S, 70°E - 120°W	E
Area between 90°N - 30°N, 35°W - 70°E	F
Area south of 60°S	J
More than one area	X

Whenever practicable, separate bulletins should be prepared to avoid the use of the letter "X".

TABLE C5

Reference time designator A_2

to be used when T_1 = X or Y

Designator A_2	Reference time
A	Analysis (00 hours)
B	3 hours forecast
C	6 " "
D	9 " "
E	12 " "
F	15 " "
G	18 " "
H	21 " "
I	24 " "
J	27 " "
K	30 " "
L	33 " "
M	36 " "

*

* *

Attachment II-11

TRANSMISSION OF PICTORIAL INFORMATION BY CODED AND NON-CODED DIGITAL FACSIMILE

I. Coded or non-coded digital facsimile transmission procedures, between centres on a channel equipped for X.25 procedures

1. The structure of the message containing a bit-oriented product for transmission on links conforming to the provisions of Recommendation X.25, should be as follows:

Start	Identification	Data description	Facsimile product	End

This message should be transmitted according to the procedures conforming to Recommendation X.25, given in paragraph 2.12, Part II.

2. The starting line defined in Part II, paragraph 2.3.1.1(b) should be the start of the transmission envelope, the end of message signal should consist of the characters C C L E as defined in Part II, paragraph 2.3.4(b).
R R F T
X

```
S C C L    S                                                    C C L  E
O R R F nnn P   CLLLL (identification + data descriptor + product) R R F  T
H                                                                       X

(---------start------)                                                (end)
(---------------------WMO envelope-----------------------------------)
```

where:

nnn is the transmission sequence number of the message
CLLLL equals 99999.

3. The structure of the abbreviated heading defined in paragraph 2.3.2.2 of Part II should be used to identify the product.

i.e.

C C L		S		S		(S	)
R R F	$T_1T_2A_1A_2$ii	P	CCCC	P	YYGGgg	(P	BBB)

in which T_1 = P : pictorial information in digital form.

4. Attachment II-6 should be used to describe the products transmitted by facsimile. Table B2 defines T_2, while Table C3 and C4 completely define A_1 and A_2. Table D describes the ii level indicators.

5. The series of binary data representing the product in digital facsimile should be preceded by the data descriptor groups coded in International Alphabet No. 5.

C C L
R R F D F A X $S_1S_2S_3S_4$

where DFAX indicates pictorial data which are coded or uncoded digital facsimile; $S_1S_2S_3S_4$ are coded in accordance with Table A to describe the characteristics of the product transmitted.

6. Example of identification and description of a product

```
C C L                S                    S
R R F      PEDA98    P        KWBC        P      011200

C C L
R R F DFAX 0122----------------------------binary data----------------
```

where
- P indicates pictorial information in digital form
- E indicates precipitation
- D indicates northern hemisphere from 90°W to 0°
- A indicates an analysis (00 hours)
- 98 indicates surface of earth or ocean
- KWBC indicates NMC Washington
- 011200 indicates day one and time 1200 GMT
- DFAX indicates coded or uncoded digital facsimile
- 0 indicates uncoded digital facsimile
- 1 indicates control signals (for IOC, phasing, etc.) are included
- 2 indicates scanning frequency of 120 rpm
- 2 indicates 3.85 lines/mm IOC vertical resolution

Therefore the product would be formed as follows:

```
S C C L       S
O R R F  001  P  99999
H

C C L          S         S
R R F  PEDA98  P KWBC    P   011200

C C L
R R F  DFAX 0122  bbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbb

bbbbbbbbbbbbbbbbbbbbbbbbbbbbbb/      /bbbbbbbbbbbbbbbbbbbbbbbbbbbbbb
                                                              E
bbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbb C C L T
                                                    R R F X
```

where b represents binary data.

The length of the message is variable, depending on the product and data density.

NOTE

The envelope is used to recognize, store and retrieve data. The number of octets is only limited by the NMC transmitting or receiving the file (product). At present, the length of a chart transmitted by non-coded digital facsimile is less than 684 000 octets. NMCs should make sure that products of this length can in fact be transmitted by their systems. If products in digital facsimile were sent in coded form, the size of the file would be considerably reduced, enabling centres, at which possibilities for processing are at present limited, to implement more easily the new switching procedure for facsimile products.

TABLE A

DATA DESCRIPTOR $S_1S_2S_3S_4$

FOR IDENTIFICATION OF THE CHARACTERISTICS OF PICTORIAL INFORMATION IN DIGITAL FACSIMILE

S_1	S_2	S_3 Scanning Frequency:	S_4 Vertical resolution:
uncoded digital fax: 0	no control signals	60 rpm: 0	1.89 l/mm: 0
coded digital fax : 1	included: 0	90 rpm: 1	3.79 l/mm: 1
	control signals	120 rpm: 2	3.85 l/mm: 2
	included: 1	240 rpm: 3	7.58 l/mm: 3
		or	
		horizontal resolution:	
		1 728 p.el/ line: 6	
		3 456 p.el/ line: 7	

II. Procedure for digital facsimile transmission between centres when separate channels are used respectively for the transmission of the alphanumeric identifier and digital facsimile information

1. The coded or non-coded digital facsimile transmission procedure is intended for facsimile transmission on multiplexed channels by modems in conformity with CCITT Recommendation V.29. The procedure can be used by automated centres (for facsimile transmission) as well as by non-automated centres. The procedure is based on the transmission of addressed messages for identification on the alphanumeric channel and facsimile products on the other channel.

2. Description of procedure

2.1 In the multiplexing mode, alphanumeric and facsimile products are transmitted separately over different channels of the multiplexer.

2.2 Channel B is used for the transmission of alphanumeric information while Channel A is used for the transmission of facsimile information.

2.3 For data transmission over Channel B, any WMO recommended EDC procedure (WMO Software, WMO Hardware, X.25/LAPB) can be used.

NOTE : If WMO Software or Hardware procedures are used, the modem should have a backward channel.

2.4 The transmitting centre, after a facsimile document has been prepared for facsimile transmission, should send a message identifying the document over Channel B.

The format of the identifier message is as follows :

```
S C C L     S
O R R F nnn P CFFFF
H

C C L           S      S        (S    )
R R F T1T2A1A2ii P CCCC P YYGGgg (P BBB)

C C L
R R F FAX

C C L E
R R F T
      X
```

where :

CFFFF equals "99999", in order to maintain the standardized format;

T_1

designates the type of information

T_2

A_1	is the geographical designator;	Manual on the GTS,
A_2	is the reference time designator;	Attachment II-6,
ii	is the level designator;	Tables A and D
CCCC	is the identifier of the originating station;	
YY	is the day of month;	
GGgg	is the standard time of observation	
FAX	is the indication of transmission of facsimile information	

2.5 After receiving an identifier message, the receiving centre should send (over channel B) a reply in the following form :

S C C L S
0 R R F nnn P $CL_1L_2L_3L_4$
H

C C L S S
R R F $T_1T_2A_1A_2L_1L_2$ P CCCC P YYGGgg

C C L
R R F DDD

C C L E
R R F T
X

The reply message should be compiled in conformity with the rules for addressed messages (Manual on the GTS, Part II) with the following changes:

- Adoption of a new type of addressed message : a service message for facsimile exchange control (specific designator TT = BF and CL_3 = 04);
- Service messages for facsimile exchange control should have high priority;
- Group DDD, which defines the control instruction (reply), is introduced into service messages for facsimile exchange control;
- Group DDD in a service message sent in reply to an identifier message may have one of the following meanings :

RDY - READY	=	Ready to receive document
ABO - ABORT	=	Refusal to receive proposed document (this is sent if the receiving centre does not require this document)

RPT - REPEAT = Request to repeat identifier message (this is sent when an error is found in the identifier message by the receiving centre).

2.6 On receiving RDY, the transmitting centre starts sending the facsimile document over the multiplexed channel A.

2.7 After reception of the document has been completed, or during the course of reception, the receiving centre sends a service message for facsimile exchange control. The format of the message is specified in paragraph 2.5 above. Group DDD may then have one of the following meanings :

ACK - (ACKNOWLEDGEMENT) = Acknowledgement of reception of the facsimile document

NAK - (NEGATIVE ACKNOWLEDGEMENT) = Notification of the rejection of the facsimile document (or poor quality of reception)

3. Algorithm of operation of the transmitting centre

3.1 The algorithm of operation of the transmitting centre is shown in Figure 1.

3.2 Description of the algorithm

Phase B-1

After a facsimile document has been prepared for transmission, the transmitting centre enters the "start" phase, then goes into phase A-2.

Phase B-2

The transmitting centre sends an identifier message for the document, then waits for a reply (timer T01 is started).

Phases B-3, C-3, D-3, D-4

The transmitting centre is waiting for a reply to the identifier message. When timer T01 expires, the centre enters phase E-3.

On receiving one of the possible replies (RDY, RPT, ABO), the centre enters the respective phase (B-4, E-3, E-4).

Phase E-3

The number of attempts to send an identifier message is stored in counter n.

Phase E-2

When the number of attempts to send an identifier message becomes equal to N, the centre enters phase E-4.

If the number of attempts is less than N, the centre enters phase B-2.

Phase B-4

The transmitting centre starts sending the facsimile document over channel A, then waits for a reply (phases B-5, B-6).

Phase B-5

After receiving NAK during the course of sending a document, the transmitting centre goes into phase A-5.

Phase A-5

Automatic control signals of termination of facsimile transmission are sent and the number of attempts to send the document is stored in counter m.

Phase A-4

When the number of attempts to send the facsimile document becomes equal to M, the centre goes into phase E-4.

If the number of attempts to send a document is less than M, the centre enters phase A-5.

Phase B-6

After receiving ACK during the course of sending a document, the transmitting centre considers that the transmission may be completed and goes into phase A-6.

Phase A-6

Automatic control signals of termination of facsimile transmission are sent.

Phase B-7

When the transmission of the document is completed, the transmitting centre sends automatic control signals of termination of facsimile transmission, and waits for a reply (timer T02 is started).

Phases B-8, C-8, D-8

The transmitting centre is waiting for acknowledgement of reception of the document.

When timer T02 expires, the centre enters phase E-4.

On receiving one of the possible replies (ACK, NAK), the centre goes into the respective phase (A-8, D-7).

Phase D-7

The number of attempts to retransmit the document is stored in counter k.

Phase D-5

When the number of attempts to retransmit the document becomes equal to K, the centre goes into phase E-4.

If the number of attempts is less than K, the centre enters phase B-4.

Phase E-4

The operator of the system is notified of any abnormal situation.

Phase A-8

Transmission procedures have been completed.

3.3 The following values for the algorithm parameters are suggested :

N = 3)

M = 2)
For channels operating in non-coded facsimile mode
K = 2)

M = 5)

For channels operating in coded facsimile
K = 5)

T01 is equal to 40 seconds.

T02 is equal to 120 seconds.

*

* *

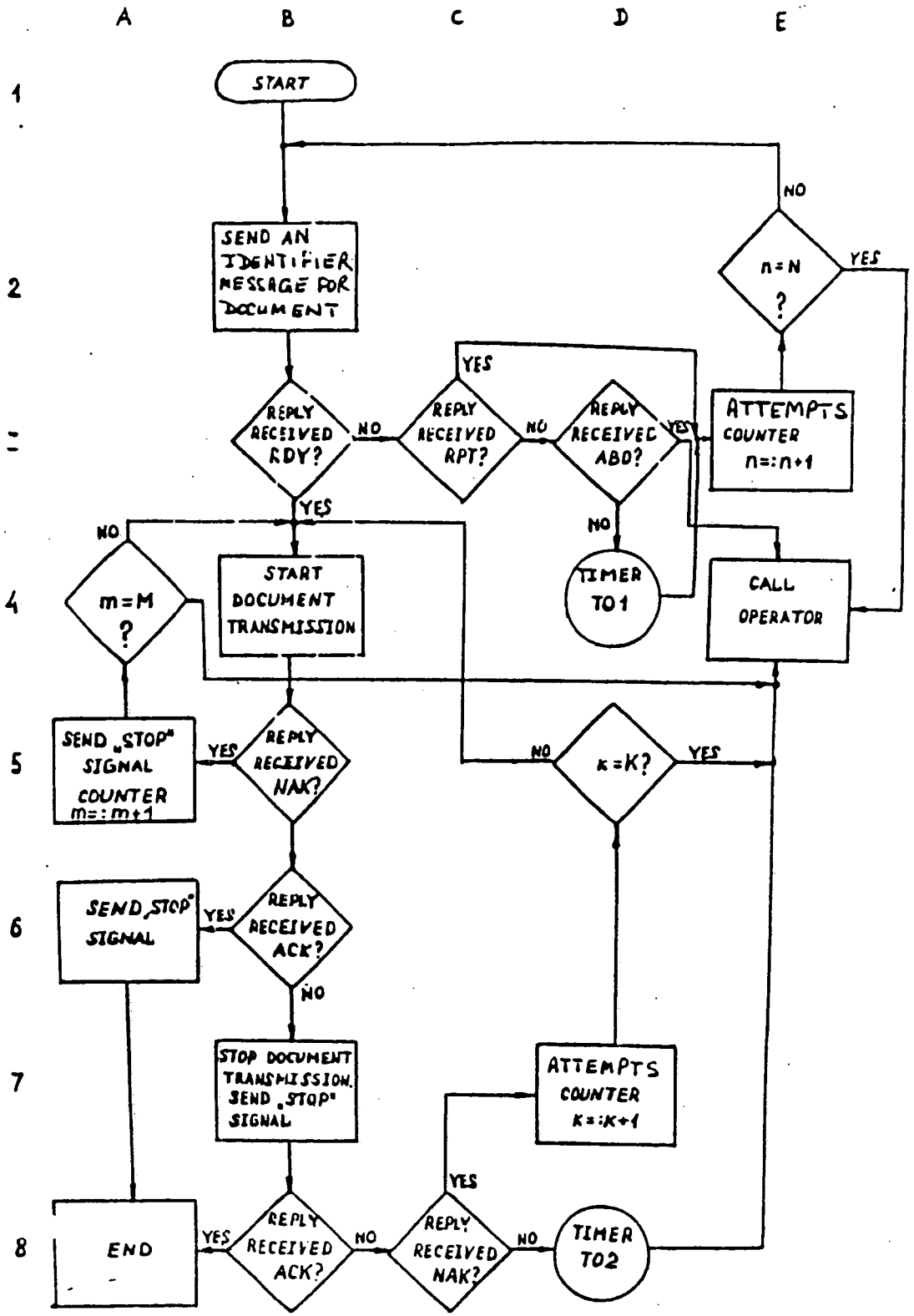


Figure 1 - The algorithm of operation of the transmitting centre

ATTACHMENT II-14

Instructions for the use of the indicator BBB

1. The indicator BBB should only be included in the abbreviated headings of delayed, corrected or amended bulletins by those centres which are responsible for preparing or compiling the bulletins concerned.

2. The indicator BBB should only be added when the abbreviated heading defined by $T_1T_2A_1A_2ii$ CCCC YYGGgg has already been used for the transmission of the corresponding initial bulletin. Once the initial bulletin has been transmitted, the centre responsible for preparing or compiling the bulletin uses the indicator BBB to transmit additional or corrected reports or amended information for the same abbreviated $T_1T_2A_1A_2ii$ CCCC YYGGgg, but completed with the appropriate form of indicator BBB, following these guidelines :

(a) To transmit weather reports which are normally contained in the initial bulletin but which were received after the initial bulletin has been transmitted. The form of the indicator BBB to be used is then RR_X, where x = :

- A, for the first bulletin containing delayed reports;
- B, if a second bulletin containing delayed reports is subsequently necessary;
- and so on up to and including x = X

(b) To transmit a bulletin containing corrections to reports that have already been included in a bulletin which has previously been transmitted. The form of indicator to be used is CC_X, where x = :

- A, for the first bulletin containing only corrected reports;
- B, if a second bulletin containing corrected reports is subsequently necessary;
- and so on up to and including x = X

(c) To transmit a bulletin containing amendments to the processed information included in a bulletin which has previously been sent. The form of indicator BBB to be used is AA_X, where x = :

- A, for the first bulletin containing amendments to processed information;
- B, for a second bulletin containing amended processed information;
- and so on up to and including x = X.

(d) If more than 24 BBB indicators will have to be used for the sequences detailed in (a), (b) and (c) above, then x = X should be used subsequently.

(e) For each of (a), (b) and (c) above, the characters x = Y and x = Z are to be used for special purposes indicated below :

(i)	x = Y	should be used for the encoding of BBB when a system failure causes loss of the record of the sequence of character values assigned to x.
(ii)	x = Z	should be used for the encoding of BBB when bulletins are prepared or compiled more than 24 hours after the time of observation.

3. Each centre should thus establish and update, for each bulletin which it is responsible for preparing or compiling, and therefore for each corresponding abbreviated heading defined by $T_1T_2A_1A_2ii$ CCCC YYGGgg, the sequence of the forms of indicator BBB used in accordance with the specifications above.

4. An RTH on the GTS should ensure the relay of the bulletins received in accordance with its routeing directories even if the bulletins containing indicator BBB have not been received in the correct sequence.

Rec. 14 (CBS-Ext(85)) - REVIEW OF RESOLUTIONS OF THE EXECUTIVE COUNCIL BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR BASIC SYSTEMS OR RELATED TO THE WWW

THE COMMISSION FOR BASIC SYSTEMS,

NOTING with satisfaction the action taken by the Executive Council on the previous recommendations of the Commission for Basic Systems or related to the WWW in general,

CONSIDERING that some resolutions of the Executive Council on WWW matters are still to be implemented,

RECOMMENDS:

That Resolution 4 (EC-XXXV), Resolutions 1, 2, 3 and 4 (EC-XXXVI) and Resolutions 2 and 3 (EC-XXXVII) should be kept in force.

LIST OF ANNEXES TO THE GENERAL SUMMARY

A N N E X I

Annex to paragraph 5.8 of the general summary

PART I - THE FIRST PART OF THE DRAFT WORLD WEATHER WATCH PLAN - THE WWW SYSTEM

INTRODUCTION

Purpose and scope of the WWW

1. The World Weather Watch (WWW) serves as the basic programme of the WMO. The purpose of the WWW is the provision of meteorological and related geophysical and environmental information to all Members in support of their services to users in real-time and non-real-time operations. WWW shall primarily provide Members with observational data and processed products for meteorological forecasting and warning purposes, but shall also support other WMO activities and relevant programmes of other international organizations in conformity with WMO policies.

2. The facilities of the WWW system are operated by Members according to principles and procedures laid down in the WMO Technical Regulations and in WWW manuals and guides.

Main long-term objective

3. The primary function of the WWW, i.e. the real-time provision of data and products to Members, will remain unaltered. The evolution of the WWW has to follow Members changing requirements for WWW data and products, taking into account the reasons for existing deficiencies and the opportunities which achievements in science and technology offer to master the incompleteness of the current WWW system.

4. The main long-term objectives of the WWW are:

(a) To prepare analyses and short-, medium- and long-range forecast products, for the use of Members. The products should be based on the best available operational techniques and tailored to the differing requirements in tropical regions and in extra-tropical areas;

(b) To provide quality controlled observational data sets with documented and consistent accuracy, with geographical distribution and with temporal and spatial resolutions required for the preparation of all time-ranges of meteorological forecasts and severe weather warnings;

(c) To ensure highly reliable WWW data and product collection, dissemination and exchange, satisfying Members needs for timely and appropriate services through the use of techniques and interfaces suitable to individual Members;

(d) To ensure Members' easy access to the required (agreed-on) WWW data and products in suitable formats and to perform a continuous monitoring on the status of the availability and quality of observational data and products within the WWW;

(e) To support other WMO programmes and relevant programmes of other international organizations, in accordance with procedures agreed within WMO through the provision of quality controlled data and the use of facilities for the collection, processing, management, dissemination and exchange of data as appropriate;

(f) To support Members in the implementation and operation of their WWW facilities and in the optimum use of WWW services, through development of appropriate forecast techniques and co-ordinated exchange of knowledge, proven methodology and developed means between Members;

(g) To co-ordinate Members' activities and efforts for the implementation and operation of WWW facilities, and to initiate proper action to remedy detected deficiencies.

Benefits to Members

5. Properly implemented, the improved WWW will provide Members with:

(a) Advanced high quality analysis, forecast and special purpose processed products for the preparation of more reliable national weather forecasts and severe weather warnings in the most cost-effective way;

(b) Increased amount of atmospheric and related observational and derived data sets with improved quality;

(c) Guidance for the further development of their national meteorological activities, to enable them to secure improved technological and operational capabilities and to introduce new methodology and techniques;

(d) Co-ordinated support for the implementation and orderly operation of their WWW facilities;

(e) Co-operative arrangements for establishing and maintaining WWW key components, especially in extra-territorial and data-sparse areas, where resource constraints are particularly critical.

The structure of the current WWW

6. The WWW functions on three levels, namely the global, regional and national levels. Largely as a matter of convenience, the WWW has been divided into three essential elements:

(a) The Global Observing System (GOS), consisting of facilities and arrangements for making observations at stations on land and at sea, from aircraft, meteorological satellites and other platforms;

(b) The Global Data-processing System (GDPS), consisting of meteorological centres with arrangements for the processing of observational data and preparation of analyses and forecast products (real-time uses) and for the storage and retrieval of data and processed products (non-real-time uses). The GDPS centre network comprises:

(i) World Meteorological Centres (WMCs);

(ii) Regional Meteorological Centres (RMCs);

(iii) National Meteorological Centres (NMCs) or centres with similar functions.

(c) The Global Telecommunication System (GTS), consisting of telecommunication facilities and arrangements necessary for the rapid and reliable collection and distribution of the required observational data and processed products. The GTS is organized into:

(i) The Main Telecommunication Network (MTN);

(ii) The regional meteorological telecommunication networks;

(iii) The national meteorological telecommunication networks.

7. The two support elements of the WWW are:

(a) The Monitoring and Operational Information Service, consisting of arrangements for real-time and non-real-time monitoring of the operation of the WWW and for informing Members of the operational status of the WWW;

(b) The WWW Implementation Support Activity (ISA), consisting of arrangements for the exchange of knowledge, methodology and means between Members, comprising a strong training component.

Details in the functions and operation of WWW elements and their current organizational structure are given in the Manuals on the GDPS, GOS, GTS and Codes.

Main deficiencies in the current WWW

8. The major deficiencies in the operation of the current WWW can be summarized as follows:

(a) Shortcomings in the surface-based observing sub-system in respect of data coverage over the oceans, polar regions and major land areas of the tropics and some parts of the southern hemisphere. Inadequate coverage and accuracy of data provided by the space-based observing sub-system;

(b) Considerable variations in the quality and quantity of output products to Members from GDPS centres, particularly in the tropical belt;

(c) Inadequacies in the availability, timeliness, reliability and distribution of GOS data and GDPS products to Members in many parts of the world;

(d) Limited efficiency and capacity in the dissemination of data and processed products resulting from limitations in current codes and exchange formats;

(e) Difficulties in monitoring in real-time the availability of data and products and in initiating recovery procedures.

9. The main causes for the current shortcomings can be summed up as problems concerned with the:

- Design of the present system;
- Implementation of the system;
- Management of the system.

Constraints in economic resources available to meteorology in Member countries, in many cases combined with insufficient awareness of the benefits of meteorological services for the safety of people or for the economic development of the country, have been outstanding reasons hampering the development of the WWW. Lack of experienced and well-trained staff in national Services, particularly in the tropical and sub-tropical regions, is another main reason for the shortcomings still existing in the WWW system. Detailed evaluations of deficiencies in the current WWW system are presented in the bi-annually issued WMO publication - Status Report on Implementation of the WWW.

MAJOR INFLUENCES 1988-1997

Principles governing the evolution of the WWW

10. The following basic principles were followed as guidance for planning and development of the WWW system:

(a) The WWW is to evolve from the current system whereby the awareness of existing operational deficiencies as well as foreseen changes in Members' requirements on WWW data and products should form the basis for the design of the improved system;

(b) The WWW components and facilities must emerge in accordance with Members' needs for improved WWW services as a cost-effective support to their services to national and international users;

(c) The evolution of the WWW system is to be guided by scientific achievements and technological advances, as far as their operational inclusion in the WWW improves the quality of services to Members;

(d) The introduction of new technology into the system must take into account the differing levels of development among WMO Members and it should be within the capability of Members to implement and operate their parts of the WWW system;

(e) The implementation and operation of the WWW is based on Members' voluntary contribution of their national facilities for the adequate functioning of the system. However, specific WWW key components, particularly over oceans and within remote land areas, might be implemented and, if necessary, operated through co-operative arrangements;

(f) Data and products available within the WWW system should be exchanged freely and without charge between Members in accordance with approved procedures and within the limits of the agreed WWW system;

(g) Priority is to be given to the improvement of WWW components on a global scale for weather prediction several days ahead, and to the development of WWW sub-systems required for improved short-range forecasting. Long-range weather outlooks will be incorporated when a level of useful skill is reached;

(h) Provision should be made to ensure that a failure of one sub-system or component would not eliminate completely a set of data or output products critical to the Members;

(i) Particular attention must be given to finding techniques and means of improving the WWW in the tropics and sub-tropics and to make the system more beneficial to Members in these regions.

(j) Members should be supported in their efforts to reach a more advanced operational level to make them able to benefit fully from the services of the WWW.

Challenges for national Meteorological Services

11. The world-wide and long-range socio-economic development outlook describes a number of overall global problem areas which are likely to affect users' requirements for national meteorological services. Three of these problem areas are of particular importance:

(a) Continued and increasing problems concerning food, water and energy in many parts of the world;

(b) Increased exploration and exploitation of resources in marine areas (oil, gas, minerals, fisheries, etc.); and

(c) Pollution of the environment on a global scale and other changes of anthropogenic origin in the state of the environment.

12. The national Meteorological Services will face new demands and will be called upon to carry out tasks in addition to those currently undertaken. The most widely recognized activity for a national Meteorological Service is likely to remain the supply of general and specialized weather forecasts, for various user sectors, for example, aviation, agriculture, water resources, but there will be changes within this area, which will place the bulk of efforts on the following types of prediction:

- Growing requirements for warnings of hazardous meteorological phenomena and very-short-range forecasts with increasing specification of time, location, intensity and duration;

- A widening variety of customers demanding tailored short- and medium-range forecasts particularly as regards the time, location, the phenomena and the form in which the forecast is presented;

- Demands for long-range weather forecasts or outlooks beyond ten days and up to a season;

- Growing demands for real-time or non-real-time specialized climate and other application services;

- Additional demands in the tropical and subtropical belts will increase for:

  (i) Increased accuracy in detecting and tracking of tropical cyclones and the timely issuance of associated warnings;

  (ii) Prediction of major shifts in tropical weather patterns of a seasonal nature, such as the onset and cessation of the rainy season and prediction of the variability and amount of rainfall;

  (iii) Alerting and early warning for drought.

Inclusion of scientific and technological advances in the WWW

13. The successful utilization of computer techniques, modern communication systems (including satellites) and remote sensing techniques in various WWW applications has been clearly demonstrated over the past years. The WWW, becoming an increasingly complex system where great volumes of observational and processed data have to be collected, processed and distributed within narrow time limits, is particularly suited for the adoption of computerized and automated components or facilities.

14. Members will have at their disposal:

- An increasing range of proven observing systems;

- Rapidly expanding computing power;

- Improved telecommunication systems;

- Advanced numerical weather prediction (NWP) models, with increasingly reliable and extended forecasting capability.

15. However the introduction of new technology, even though providing the means for eliminating certain current shortcomings in the WWW, will have to be treated with great care. The inclusion of automated components into the system might put additional requirements on national Services in respect of professional competence of the staff, maintenance and technical servicing of

facilities and in many cases the skilful programing of computer systems. Modern technology will continue to develop rapidly and new systems can become outdated in a short time once they become operational, meaning increased costs for Members.

16. The inclusion of modern technology into the WWW system has to take place in a closely co-ordinated manner, carefully adjusted to individual Member's overall capabilities. Not all Members will have the capacity to prepare NWP products for meeting national requirements. It will be through the WWW system that processed products with the highest possible quality can be made available to Members. High technology satellite systems, for example, can provide Members with data and products through suitable ground stations and terminals. Exchange of experience and knowledge on the operational use of modern technology and methodology within the WWW will become an important activity and there will be need for increased training at all levels of specialization.

17. The continued introduction of new techniques into the WWW system will be a gradual process, and differences in the implementation levels among national Meteorological Services will only slowly decrease. The main task of the WWW will be to bridge over these differences through improved services to Members by supporting them to make maximum use of these services and in promoting Members' efforts to raise the operational level of their national meteorological services to end-users.

MAIN DESIGN FEATURES OF THE IMPROVED WWW

WWW design features

18. The main features of the improved WWW will be:

(a) The three-level structure of the WWW, i.e. global, regional and national, will be maintained, but its components will become increasingly integrated. The quality assurance, retrieval, exchange, storage and monitoring of both observational data and processed products will be co-ordinated by the WWW Data Management function, the integrating function between all elements of the WWW;

(b) Members will provide observational data for the WWW system and will in return receive the data and processed products they require and which are available in the agreed-upon WWW system;

(c) The required analyses and forecast products will be prepared by designated GDPS centres, namely World Meteorological Centres, Regional/Specialized Meteorological Centres and National Meteorological Centres, which will function as follows:

(i) The designation of GDPS centres and the definition of their functions, especially on the regional level, will be based on the needs of Members and of each regional association;

(ii) Back-up facilities and the coverage of outages in critical parts of the GDPS will be included and duplication of GDPS products distributed on the GTS will be kept to a minimum;

(iii) The GDPS centres will apply advanced analysis and forecast methods;

(iv) Centres will have assigned responsibilities for areal coverage of products, meteorological content, forecast range and frequency;

(v) The conversion of the output products into end-user products and the preparation of very-short-range forecasts, increasingly through interactive systems, will normally be accomplished by the National Meteorological Centres;

(d) The data required by the GDPS centre network and by individual Members will be provided by the composite global observing system. The design of the composite observing system is based on the following concepts:

(i) The surface-based sub-system will be especially strengthened over ocean areas by such sub-systems as ASDAR (Aircraft to Satellite Data Relay), ASAP (Autmated Shipboard Aerological Programme) and drifting buoys. The implementation, operation and maintenace of these systems will be achieved through special arrangements between Members (similar to the NOAS agreement). Data from such sub-systems will be available to all Members;

(ii) The space-based sub-system is an effective system for providing the global data base for NWP models, especially over the oceans and in other data sparse areas, but will not replace the surface-based sub-system. Improved and compatible techniques for retrieving satellite profiles, especially for the lower troposphere, will be introduced.

(e) Data and product collection, exchange and distribution services will be designed to meet requirements for quality, exchange capacity and compatibility. Particular consideration will be given to the use of international telecommunication services where communications via satellites will play an increasingly important role in many parts of the world. The WWW will take maximum advantage of international standardization, especially the use of appropriate standard protocols;

(f) Quality control, monitoring, storage and management of regional and global data sets and products will be major functions of the WWW. Through the WWW Data Management functions it is intended, subject to resource considerations, that Members should have access to particular sub-sets of data and products according to their needs;

(g) The WWW Implementation Support Activity (ISA) will be of significant importance for the timely and co-ordinated implementation of the WWW. An essential and distinct support function of the WWW will be the WWW Operational Information Service. Furthermore, high priority will be given to support the planning, design, establishment, operation and maintenance of essential WWW components in Member countries. This includes exchange of knowledge and proven methodology between Members.

(h) The WWW Implementation Co-ordination function will assure the overall efficient establishment and operation of WWW components and advanced systems, especially in extra-territorial and some remote land areas.

It will also guide regional and global co-ordination of Members' facilities, and help initiate speedy remedial action on problems revealed by monitoring.

The structure of the integrated WWW

19. Elements and support functions of the improved WWW are:

(a) Essential elements of the WWW;

- The Global Data-processing System (GDPS);
- The Global Observing System (GOS);
- The Global Telecommunication System (GTS);

(b) Support functions of the WWW:

- WWW Data Management (WWWDM);
- The WWW Implementation Support Activity (ISA);
- WWW Implementation Co-ordination (WWWIC).

WWW RELATIONSHIP WITH OTHER PROGRAMMES

20. The WWW is intended to provide the common infrastructure to support a broad base of WMO programmes and relevant efforts of international organizations. Especially important are the World Climate Programme, the World Area Forecast System and the Integrated Global Ocean Services System (IGOSS), jointly co-ordinated by the Intergovernmental Oceanographic Commission (IOC) and WMO. It is therefore important that there be a continued dialogue between those responsible for these programmes to ensure that changes in requirements are properly incorporated into the WWW Plan. Part II of the Second WMO Long-term Plan contains information on other WMO programmes and their relations with the WWW.

21. The extent to which the WWW may support other WMO programmes will be determined in consultation with the appropriate technical commissions and regional associations. The use of WWW facilities for relevant programmes of other international organizations will require a policy decision by the WMO Congress. Of particular importance will be the co-ordination of relevant plans and activities between WWW and international organizations, in particular ICAO, ITU, IOC.

IMPLEMENTATION OF THE WWW

22. The levels of requirements for meteorological services will differ between regions. Financial and human resources available to meteorological services will vary widely as will technology, techniques and operational methods. The WWW is evolutionary in nature and will integrate advances in atmospheric sciences and technology in an orderly fashion, taking into account the ability of Members to establish and operate these new systems.

23. Implementation activities will be developed as an orderly transition from the present WWW to the improved WWW by the systematic creation of the new or improved WWW facilities. Operational WWW Systems Evaluations (OWSEs) will address such questions as the efficiency of field operations, services needed in support of integrated systems, procedures for maintenance and operational costs. The results will be needed to promote the orderly development of the WWW.

24. National requirements for cost-effectiveness will lead to expanded use of WWW services. The WWW has to develop into a closely integrated system in which duplication is minimized and cost-effectiveness strenuously pursued. It will become necessary for Members to seek closer international co-ordination and co-operative arrangements in developing and operating WWW centres and facilities. It is crucial to the success of the integrated WWW that each Member make a long-term commitment and play its part in achieving the objectives of the WWW Plan.

PART II - LIST OF AMENDMENTS TO THE DRAFT WWW PLAN

The major changes endorsed by CBS-Ext.(85) in the various chapters of the WWW Plan submitted to the session in Document 10 are given below:

The Global Data-processing System (GDPS)

Paragraph 36 should read:

The main purpose of the Global Data-processing System (GDPS) is to prepare and make available to Members, in the most cost-effective way, meteorological analyses and forecast products. The design, functions, organizational structure and operation of the GDPS shall be in accord with Members' needs and their ability to contribute to and benefit from the system.

Paragraph 40, last sentence should read:

These centres are to provide regional products which can be used for forecasting of meteorological systems by NMCs.

Paragraph 41, Spanish version only:

"should" is not to be translated in an imperative sense.

Paragraphs 44 and 45 should be combined and the text before (a) to (f) should read:

44. The requirements for meteorological services will vary considerably and, in particular, among climatic regions or sub-regions. Conclusions drawn from assessments of the foreseen requirements for data and products, mainly based on experience and studies in industrialized countries, are:

All subsequent paragraphs should be re-numbered

Paragraph 48:

Delete present text of (e) and insert new text:

(e) Monitoring of observational data quality.

Paragraph 49:

Replace present text of (a), (b) and (c) by:

(a) Preparation of products for non-real-time weather or climate-related diagnosis (i.e. 10 day or 30 day means, summaries, frequencies and anomalies) on a global or regional scale, as agreed within the WWW system;

(b) Intercomparison of analysis and forecast products, monitoring of observational data quality, verification of the accuracy of prepared forecast fields, diagnostic studies and NWP model development;

(c) Long-term storage of WWW/GOS data and GDPS products, as well as verification results on recommended media for operational and research use.

Paragraph 50 (a)

To be made in line with agreed definitions for forecasting ranges.

Paragraph 50 (c)

Delete "in the 1990s" from line 6.

Paragraph 50 (d)

Replace present Table 1 by the revised table attached.

Paragraph 53 (c)

To be deleted, and sub-paragraphs (d) to (h) renumbered (c) to (g).

Paragraph 55:

Delete 2nd and 3rd sentences and replace by:

Table 3 identifies the data needed to permit optimum benefit from NWP by the late 1990s.

Insert new paragraph 56

56. In addition to the NWP data needs cited in Table 3, there is a continuing requirement for observations taken in support of the subjective part of the forecast task, including nowcasting, very-short-range forecasting and the interpretation of numerical model output (global, limited-area and mesoscale models). The observations required include the conventional surface

and detailed upper-air observations from land stations and ships as well as information from radars, satellites (i.e. soundings and winds) and high resolution satellite imagery.

All subsequent paragraphs should be re-numbered

Tables 3 and 4 have been combined into one table. The revised Table 3 is attached.

Paragraph 58, delete 3rd sentence and replace by:

For very-short-range forecasting, there will be additional needs for exchange of digitized radar data on the GTS.

Table 5 (page 29)

Heading over the last two columns should read: Projected (1990).

Delete asterisk in last line of table and the footnote.

Paragraph 59

Delete text pertaining to Table 6 (last 4 lines of paragraph 59) and delete Table 6 (on page 31).

INSERT the following text after (b) at the end of the paragraph:

The volume of data provided from one global forecast centre is currently (1985) 6 million octets per day. Estimates for the medium term (1990) and long term (2000) are for the availability of 40 million octets and 200 million octets per day respectively, though much of this data may be exchanged only between the larger centres. Sets of short-range global forecast products are required to be available at NMCs within 5 1/2 hours after observation time.

Annex I (page 34)

DELETE Annex I contained in pages 34 to 40.

The Global Observing System (GOS)

Paragraph 70, last sentence should start:

It is desirable that ....

Paragraph 71, last sentence should start:

As indicated by Observing System Simulation Experiments, satellite ....

Paragraph 75 (a):

The text is to be confirmed by the WCP.

Paragraph 91, delete the second and third sentences and replace by:

The current system has become saturated in some areas owing to ground system limitations. However, features that increase capability (higher data rates, wider band width channels allowing simultaneous receipt from two or more DCPs and shorter time intervals between reports) will be added to some of the regional data collection systems and these could be incorporated in the DCS if required.

Paragraph 92 should read:

92. Several of the techniques mentioned in the previous paragraphs are already in operational service, others are expected to become operational in the late 1980s and in the 1990s.

Paragraph 94:

Change the first sentence to read: "Certain principles govern the development of the GOS. These are:"

Delete in (a) "global".

Paragraph 97 (a) should read:

(a) Additional rawinsonde stations in the tropical belt.

Paragraph 101 should read:

101. The space-based sub-system, composed of at least 2 polar-orbiting satellites and 5 geostationary meteorological satellites, is at the core of efforts involved to provide a global data set in a cost-effective manner. Considering such matters as the required horizontal and temporal resolution, the parameters to be obtained and the total system costs, no other observing system or combination of systems will be as effective. On the other hand, there are certain limitations in data accuracy and vertical resolution in the space-based sub-system which does not allow an unambiguous comparison with the surface-based observing system.

Paragraph 102

First part should read:

Global satellite data will include:

(a) Vertical profiles of temperature and humidity;

(b) Radiances;

(c) Temperature of sea, land and cloud-top surfaces;

(d) Wind fields;

(e) Cloud amount, type and height of cloud tops;

(f) Snow and ice cover;

(g) Radiation balance data;

(h) Estimates of liquid water content and precipitation;

(i) Imagery.

Second part:

On page 49, after "ice conditions", insert "quality of the environment."

In last sentence of paragraph 102 delete "an" and replace "system" by "functions".

Paragraph 104, replace (b) by:

"(b) To assess the impact on the quality of satellite data retrievals of a trial "baseline" network of upper-air stations, making soundings coincident with satellite overpasses, with a view to determining the requirement for an operational baseline network."

(c) Replace "systems" by "functions".

Paragraph 105, add to the end of the paragraph:

"Paragraph 55 and Table 3 refer to the data needed to permit optimum results from NWP by the late 1990s, and paragraph 56 deals with data required for subjective forecasting."

Table 7:

(iii) Upper-air relative humidity:

Observational error should be given as 10% and "but better near surface" should be deleted.

(v) Surface pressure temperature, wind vector:

Replace "0.2% press." by "± 1 hPa".

Footnote**: Table I should read Table 7.

Annex II should be deleted.

The Global Telecommunication System (GTS)

Paragraph 122 should read:

122. The national meteorological telecommunication networks enable the NMCs to collect observational data and to receive and distribute processed products on a national level. In addition to telecommunication satellites, data-collection and distribution missions of meteorological and environmental satellites play an important role within the GTS. Marine meteorological data are collected through the International Maritime Mobile Service and through INMARSAT. Argos and DCP capabilities of meteorological/environmental satellites are also used. Special arrangements are made with ICAO to collect AIREPS.

Paragraph 128 (a)

Replace "special" by "specific" in two places in the sentence.

Paragraph 130 should read:

130. In the light of the prospective evolution of the WWW system, it might be foreseen that interprocessing activities be developed among GDPS centres (WMCs, RSMCs, NMCs) and bi- or multi-lateral agreements between Members. Such applications may require support from appropriate services through the expansion of GTS capabilities.

Paragraph 134

(ii) In the second sentence delete "distributed".

(iii) Delete the text under (iii).

Paragraph 136: To be deleted

All subsequent paragraphs should be re-numbered.

Paragraph 137 (c) should read:

(c) Point-to-point transfer for some special routine exchange or for delivery of addressed messages, including transmission of status reports on automatic platforms and sensors.

Paragraph 146 should read:

146. The MTN will consist of a system of computer-based nodes interconnected by a network of medium/high speed data links, operated using, as far as is practicable, the techniques employed in packet-switching systems. This network will provide a data transport function between centres on the MTN. Implementation of communication procedures, compatible with the international standards developed in accordance with the Open System Interconnection model proposed by ISO, will ensure maximum effectiveness of transmission by efficient routeing, as well as flexible and transparent data transport means and, eventually, may provide automatic re-routeing and other facilities. In view of the nature of many GTS transmissions, full implementation of ISO procedures will not be practicable until standard procedures are developed which meet the broadcast requirements of the GTS.

Paragraph 147

In the first sentence delete "and switching nodes".

Paragraph 148

In the first sentence delete "to ensure optimum use of all available network resources, and the required quality of services".

Paragraph 150

In the first sentence delete "i.e. files exchange, remote job entries, access to non-real-time data bank."

Paragraph 152

Delete last two sentences from "Regional Distributed Data Base...." to end of paragraph.

Paragraph 154: To be deleted

The WWW Data Management including Monitoring (WWWDM)

General:

The title "The WWW Data Management including Monitoring" should be changed to "WWW Data Management (WWWDM)". This change is to be carried out throughout the WWW Plan and Implementation Programme.

Paragraph 162:

- First sentence: Replace "is" by "will be".
- End of first paragraph: Delete "It provides the framework for:"
- Delete in the second item, the second part of sentence from "as well as storage ...." to end.
- Move the rest of the text from paragraph 162 to become paragraph 164 under the heading "Main long-term objectives of WWWDM".

Paragraph 164:

Insert a first sentence: "The main long-term objectives of WWWDM should provide the framework for:"

All subsequent paragraphs should be re-numbered.

Paragraph 171:

In the second sentence, "first" should be delete.

Paragraph 172:

(c) should read:

(c) Quality control of data and products to achieve agreed quality assurance at appropriate WWW levels:

Insert (h) to read:

(h) Provision of information on instruments and sensors in the operational system.

Paragraph 176:

Delete the last sentence.

Paragraph 177:

Delete the sub-heading "Development of data base concept"

In the first sentence, replace "should" by "may".

(a) should read:

(a) The WWWDM functions may be based on the operation of WWW data bases at WWW centres performing storage of real-time observational data and processed products;

(b) Delete the last sentence.

Insert (f) to read:

(f) The data base should provide the background information for real-time and non-real-time monitoring of the WWW.

Paragraph 178:

The first sentence should read:

The WWWDM concept is expected to develop into an important integrating systems feature of the WWW.

Paragraph 179:

In (a), "Standard" should be deleted.

The WWW Implementation Support Activity (ISA)

Before MAJOR INFLUENCES 1988-1997, a new paragraph 185 should be inserted, to read:

The current ISA

185. Currently the implementation support activities are carried out through the WWW monthly operational letter, a number of WWW publications required for the operation of the WWW and, occasionally, publishing of WWW planning reports and GDPS reports. Training activities, and technical co-operation issues are handled mainly together with other WMO programmes.

All subsequent paragraphs should be re-numbered.

TABLE 1 - TROPICAL SYSTEMS AND RELEVANT PREDICTION MODELS (IN THE 1990s)

Scale	System	Prediction model	Prediction period
Planetary-scale (>5 000 km)	Monsoon Hadley cell Walker cell ITCZ	Global	Long-range Medium-range
Large-scale (1 000-5 000 km)	Monsoon depression Easterly wave	Global Fine-mesh, Limited area	Medium-range Short-range
Mesoscale (100-1 000 km)	Tropical cyclone Squall lines cloud cluster	Fine-mesh, Limited area (movable area)	Short-range Very-short-range
Small-scale (<100 km)	Thunderstorm See breeze	Boundary layer and mesoscale models	Very-short-range Nowcasting

*

* *

TABLE 3 - DATA NEEDED TO PERMIT OPTIMUM RESULTS FROM NWP BY THE LATE 1990s

Element	Resolution Horizontal	Vertical Interval	Observational Error (rms)	Minimum Frequency of Observation
Upper-air observations				
(1) Temperature and wind	(2) 100 km ------ 50 km	(3) 500 m to 2 km 1 km to 15 km 3 km to 30 km	TEMP: ± 0.5-1.0°C tropo ± 1.0-2.0°C strato WIND: ± 1-2 m s^{-1} tropo ± 2-3 m s^{-1} strato	4 per day
Relative humidity	(2) 100 km ------ 50 km	5 layers to 10 km ---------- 500 m to 2 km 4 layers to 10 km	± 10%	4 per day
Surface observation				
(4) p , T, T_D	100 km		P: + 1 hPa	8 per day
(5) State of surface Wind	------ 50 km		T: ± 0.5°C V: ± 1 m s^{-1}	
Soil temperature to 1 m	300 km		± 1.0°C	1 per day
Sea-surface temperature (SST)	(6) 100 km		± 0.5°C	Instantaneous measurements averaged over three days
Ocean mixed layer: T and salinity (for ocean/atmosphere coupled models)	(6) 100 km		± 0.5°C	Instantaneous measurements averaged over three days
-------	global ------- regional			

NOTES:

(1) Radiance measurements are possible alternatives to the retrieved temperatures.
(2) Satellite measurements will supply the 50 to 100 km resolution data. Global coverage required on the GTS; additional observations for regional needs obtained by direct read-out from satellite.
(3) Satellite radiance measurements are not capable of such resolution. The stated numbers are couched in terms of what is desirable for the models. Satellites are expected to be able to produce 10 to 15 real layers. Radiosonde observations should be transmitted in sufficient detail to completely describe the temperature/humidity structure of the atmosphere in the vertical. Geopotentials at standard levels should also be computed and transmitted from radiosonde observations for use in quality control procedures.
(4) In addition to the exchange of mean sea-level pressure, pressure measured at station level should be exchanged globally.
(5) State of surface includes precipitation, soil moisture, soil temperature, emissivity, albedo and snow and ice coverage with a resolution, accuracy and frequency based on common requirements determined by WMO commissions. One observation per day is probably sufficient.

(6) Mostly via satellite measurement. 50 km desirable in areas of boundary currents, upwelling and near the Equator.

PART III - LIST OF AMENDMENTS TO THE DRAFT WWW IMPLEMENTATION PROGRAMME

The major changes endorsed by CBS/Ext.(85) to PART A, PART B and PART C of the WWW Implementation Programme, as submitted to the session in Document 12, are given below:

INTRODUCTION

Paragraph 1.3 (a)

In the second line, insert "real-time" between "to" and "meteorological".

Paragraph 2.3 (a)

AMEND the first part of (i) to read:

(i) For middle latitudes and sub-tropical areas,

Surface and upper-air analyses,

Prognoses 4 to 10 days in advance:

- Surface and upper-air prognoses of pressure, temperature, humidity and wind,
- Outlooks of temperature, precipitation, humidity and wind in map or other form.

Prognoses 1 to 3 days in advance

DELETE "analyses and" in first line after "1 to 3 days in advance"

ADD to the third line on page 4, after "humidity etc.":

"subject to agreements between Members, where appropriate."

INSERT "temperature/thickness advection," on page 4, fourth line, between "advection," and "stability".

INSERT after "(ii) For tropical areas,":

"Surface and upper-air analyses," and include "Prognoses" in the following sub-headings as for (i) above.

DELETE "analyses and" in lines 18 and 24 on page 4.

In both (i) and (ii) the section dealing with "Interpretation of numerical products ..." should relate to both 1 to 3 and 4 to 5 day forecasts.

In both (i) and (ii), the section dealing with prognoses for 1 to 3 days should precede the section for 4 to 5/10 day prognoses.

Paragraph 2.4

First sentence, ADD after "250 km": "and with a vertical resolution of at least 10 layers in the troposphere and 5 in the stratosphere",

INSERT after the first sentence:

The horizontal resolution of networks will depend on and vary with the amount and quality of the total mix of data from the surface- and space-based observing systems. The optimum composition of the network will vary from Region to Region and will be assessed and evaluated by Observing System Experiments, networks studies and OWSEs.

(a) The last part should read:

"with a desirable horizontal resolution better than 250 km (in sparsely populated areas 300 km);"

(b) The last part should read:

"with a desirable horizontal resolution better than 250 km (in sparsely populated areas 500-1 000 km);"

(c) REPLACE line 3 by: "total number of ships"

CHANGE (v) to: "North Indian Ocean - 5 ships" and

ADD: "(vi) South Indian Ocean - 5 ships".

REPLACE "10 ships" by "15 ships" under (c) (i).

DELETE paragraph 2.4 (d) and renumber subsequent paragraphs.

DELETE "up to" in first line of (e).

DELETE "mainly in the tropical oceans," in third line of (f).

DELETE the footnote on page 6.

Paragraph 2.5

REPLACE in line 3 under (a) "13 million" by "40-200 million".

REPLACE in line 1 under (c) "e.g." by "for example".

Paragraph 2.7

AMEND the title to read: "Objectives of WWW Data Management (WWWDM).

AMEND the first sentence of (a) to read:

"Design of WWW data base functions ...."

DELETE in the first line of (b) "Standardized".

DELETE in (c), first line "control" and change "system" to "functions".

DELETE in the first line of (d) "all".

ADD new paragraph 2.7 (e):

"(e) To arrange that access to WWW data and WWW products is possible only by direct agreement of Members concerned.

Paragraph 3.1

INSERT under GOS (c) (i) (page 10):

"Further" at the beginning of the sentence.

ADD a new sub-paragraph under (e), after (iii) (page 11):

"(iv) Members should improve the relay of data from mobile stations via geostationary meteorological satellites,"

Paragraph 3.2

In GDPS (a) add: "WWW" after "non-real-time".

AMEND the first two lines under GOS (a) (i) to read:

"Move towards establishment and implementation by satelite operators and by some GDPS centres of"

ADD to the last line, after "WWW Plan": "(GOS part)"

DELETE at the bottom of page 12: "End" (before "1988")

(iii) should read: Given approval by CBS, implementation by Members of baseline upper-air stations for satellite data calibration.

AMEND date after (c) (ii) to read: "By 1989"

CORRECT paragraph numbering after (c)

DELETE under (e), third line, "In" from title

CHANGE the order of sub-paragraphs under (e):
(i) becomes (ii) and (ii) becomes (i).

REPLACE under (e) the title "In southern hemisphere" by:
"South Atlantic, South Pacific and Indian Ocean"

Under GTS (a) (i), third line of sub-paragraph:

- REPLACE "updating" by "upgrading" and DELETE "the structure of".

- INSERT "upgraded" before "structure" in last line.

Under GTS (a) (ii):

- ADD in second item after "X25 protocols": "and higher OSI layers".

- DELETE from fourth item: "high quality".

- INSERT in fifth item, first line: "data" before "product".

- REPLACE in sixth item "maximum" by "medium".

- ADD NEW ITEM after sixth item:

  ". Use of satellite communication means for collection of data;"

Under GTS (b)

- INSERT in the second line, after RMTN: "*"

- INSERT a FOOTNOTE at the bottom of page 17:

  "*Note: RMTN - Regional meteorological telecommunication network

Under GTS (b) (ii)

- INSERT in the first line, after "Automation": "and upgrading".

- REPLACE a "formats and analogue codes." at the end of the sentence by: "digital codes and analogue formats."

- REPLACE the date in the last line by: "1989".

Under GTS (d)

REPLACE sub-paragraph (i) (page 18) by:

"(i) . Collection via Argos of data from 250 drifting buoys. 10 Local User Terminals (LUT);

By 1991

. Collection via geostationary satellites of at least 30 automated surface observation (ship) stations (DCPs) and 30 ASAP ships

By 1991

Under EXCHANGE FORMATS

AMEND the end of (a) to read:

".... in use at and between automated centres having the required data rocessing/data communication capacity."

Under WWW DATA MANAGEMENT WWWDM

In the first sentence delete "and Monitoring".

REPLACE in (iii), second line, "other centres" by Members".

DELETE from (iv), second line, "and other centres".

REPLACE sentence preceding GDPS (page 19, lines 16 and 17) by:
"The following activities are related to the achievement of the implementation objectives of the WWW Plan and Implementation Programme in respect of the global level of the WWW:"

REPLACE in the first item under GOS, first line, "introduce improved" by: "further develop"

AMEND second item under GOS to read:
"GDPS centres concerned introduce compatible and improved methods for conversion of radiances, as required;"

DELETE under GTS (page 20), first line, "Complete plans and implementation of" and ADD to end of paragraph:
"...achieved according to defined implementation objectives."

Paragraph 4.2

REPLACE in the first line "costs and benefits" by "costs and effectiveness".

Paragraph 4.3

AMEND "WWW systems" in third line to read: "WWW sub-systems".

Paragraph 4.4 should be REPLACED by:

4.4 The OWSEs, required for the implementation of both the global and regional levels of the WWW are given in the regional parts of the Implementation Programme. It is envisaged that OWSEs will be conducted in each Region, with particular efforts in data-sparse areas, i.e. the ocean and sparsely populated land areas. OWSEs will also include GDPS, GTS and Data Management components as appropriate.

DELETE the Annex to Part A.

General

Throughout Part A, change in several paragraphs
"satellite retrieval centres" to "by some GDPS centres"

DELETE all references to support resources (i.e. VCP) under GDPS, GOS, GTS, except in the ISA section.

PART B

Paragraph 8.3 (b) on page 107, the end of penultimate sentence should read:

"in order to provide data sets needed for short-range weather forecasting and warning services."

NOTE: In respect of reference to the baseline upper-air network, consistency with Part A should be checked and amendments made where required.

PART C

In the TIME-LINE CHART, on page 112, DELETE:

"(a) - Overall structure" and "(b) - WMCs" under Project 3.11.1 - Structure of the GDPS

RE-NUMBER (c) and (d) as "(a) and "(b)" .

A N N E X II

Annex to paragraph 9.3 of the general summary

LIST OF PRIORITY AREAS REQUIRING CO-ORDINATION

(a)	Definition of data requirements taking into account available facilities (including communications)	All technical commissions with CBS as organizer
(b)	Data collection and exchange (communications)	All technical commissions with CBS as organizer
(c)	Processing, storage and retrieval of data	CBS and CCl (mainly), CMM
(d)	WWW support to the World Area Forecast System	CAeM as organizer, CBS
(e)	Marine data for forecasting and climatological purposes	CMM, CBS, CCl with all technical commissions
(f)	Environmental pollution, atmospheric chemistry, and long-range transport of pollutants, marine pollution and pollution of other media (including surface and underground waters, etc.), integrated monitoring	CAS, CIMO, CCl, CAgM, CHy and CMM
(g)	Observations, particularly as regards automation and low-cost meteorological instruments	All technical commissions with CIMO as organizer for meteorological instruments
(h)	Very-short-range weather prediction including nowcasting, with emphasis on prediction and warning of hazardous local phenomena (e.g. local severe storm warnings) (operational and research aspects)	CBS, CAS and CIMO in collaboration with all other commissions
(i)	short- and medium-range weather prediction (operational and research aspects)	CAS and CBS in collaboration with CMM, CAgM, CHy, CAeM and CCl
(j)	Long-range weather forecasting (operational and research aspects)	CAS and CBS in collaboration with CAgM, CHy and CCl
(k)	Procedures for quality control of data	CAS, CBS, CCl
(l)	Tropical meteorology	CAS as organizer, CBS, CCl and CAgM

(m)	Applications of meteorology	All technical commissions
(n)	Climatological information for marine, hydrological, agrometeorological and aeronautical purposes	CCl and CBS with CMM, CHy, CAgM and CAeM
(o)	Transfer of knowledge and proven methodology	All technical commissions

LIST OF DOCUMENTS

I. "DOC" series

Doc. No.	Title	Agenda item	Submitted by
1	Provisional agenda	2.2	
2	Explanatory memorandum relating to the provisional agenda ADD. 1	2.2	
3	Reports by the chairmen of CBS working groups and rapporteurs The application of improved forecasting methods and required technology for operational use	4	Rapporteur
4	Reports by the chairmen of CBS working groups and rapporteurs Report of the chairman of the CBS Working Group on Codes	4	Chairman of the Working Group
5	Reports by the chairmen of CBS working groups and rapporteurs Reports of the chairman of the Working Group on the Global Observing System	4	Chairman of the Working Group
6	WMO Long-term Plan, including the WWW Plan and the WWW Implementation Programme Developments in forecasting in the tropics	5	Secretary-General
7	Reports by the chairmen of CBS Working groups and rapporteurs Report of the chairman of the CBS Working Group on the GDPS	4	Chairman of the Working Group

Doc. No.	Title	Agenda item	Submitted by
8	Specific GDPS, GOS, GTS and code matters including matters arising from sessions of CBS working groups Global Data-processing System and Codes ADD. 1 ADD. 2 ADD. 3 ADD. 3, CORR. 1 (English only) ADD. 4	7.1, 7.2	Secretary-General
9	Reports by chairmen of CBS working groups and rapporteurs Report of the chairman of the CBS Working Group on the Global Telecommunication System	4	Chairman of the Working Group
10	WMO Long-term Plan, including the WWW Plan and the WWW Implementation Programme The WWW Plan (draft) CORR. 1 (Russian only) ADD. 1	5	President of CBS
11	Specific GDPS, GOS, GTS and code matters, including matters arising from sessions of CBS working groups Global Observing System ADD. 1	7.3	Secretary-General
12	WMO Long-term Plan, including the WWW Plan and the WWW Implementation Programme The WWW Implementation Programme	5	President of CBS
13	Status of WWW implementation and operation, including monitoring	6	Secretary-General

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14	Specific GDPS, GOS, GTS and code matters, including matters arising from sessions of CBS working groups Global Data-processing System and codes	7.2	USA
15	Specific GDPS, GOS, GTS and code matters, including matters arising from sessions of CBS working groups Global Telecommunication System	7.4	Secretary-General
16	Report of the president of the Commission including the ISS activities ADD. 1 ADD. 2	3	President of CBS
17	Review of previous resolutions and recommendations of the Commission and relevant Executive Council resolutions	10	Secretary-General
18	Relationship of the WWW to other WMO and international programmes	9	Secretary-General
19	Education and training related to CBS activities	8	Secretary-General
20	WMO Long-term Plan, including the WWW Plan and the WWW Implementation Programme Extract from draft of Part I of the Second WMO Long-term Plan - World Weather Watch Programme	5	Secretary-General
21	Modification to coding procedure of FM 12-VII SYNOP	7.2	Czechoslovakia
22	Amendment of the SYNOP code to meet CAgM requirements for additional observational data	7	USSR

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	II. "PINK" series		
1	Opening of the session	1, 2, 3	President of CBS
	Organization of the session		
	Report of the president of the Commission, including the ISS activities		
2	Reports by the chairmen of CBS working groups and rapporteurs	4	Committee of the whole
3	Date and place of the ninth session	11	President of CBS
4	Status of WWW implementation and operation, including monitoring	6	Chairman of Committee B
5	WWW Long-term Plan, including the WWW Plan and the WWW Implementation Programme	5	Chairman of Committee A
6	Education and training related to CBS activities	8	Vice-chairman Committee A
7	Review of previous resolutions and recommendations of the Commission and relevant Executive Council resolutions	10	Vice-chairman Committee B
8	Specific GDPS, GOS, GTS and code matters arising from sessions of CBS Working groups (Global Data-processing System)	7	Chairman of Committee B
	REV. 1		
9	WMO Long-term Plan, including the WWW Plan and the WWW Implementation Programme	5	Chairman of Committee A
10	Relationship of the WWW to other WMO and international programmes	9	Vice-chairman of Committee B

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11	Specific GDPS, GOS, GTS and code matters, including matters arising from sessions of CBS working groups (Global Observing System)	7.3	Chairman of Committee B
12	Specific GDPS, GOS, GTS and code matters including matters arising from sessions of CBS working groups (codes)	7.2	Chairman of Committee B
13	Specific GDPS, GOS, GTS and code matters, including matters arising from sessions of CBS working groups (Global Telecommunication System)	7.4	Chairman of Committee B