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DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration

# FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH



## **Federal Plans for Cooperative Backup Among Operational Processing Centers**

FCM 76-4

Washington, D.C.  
December 1976



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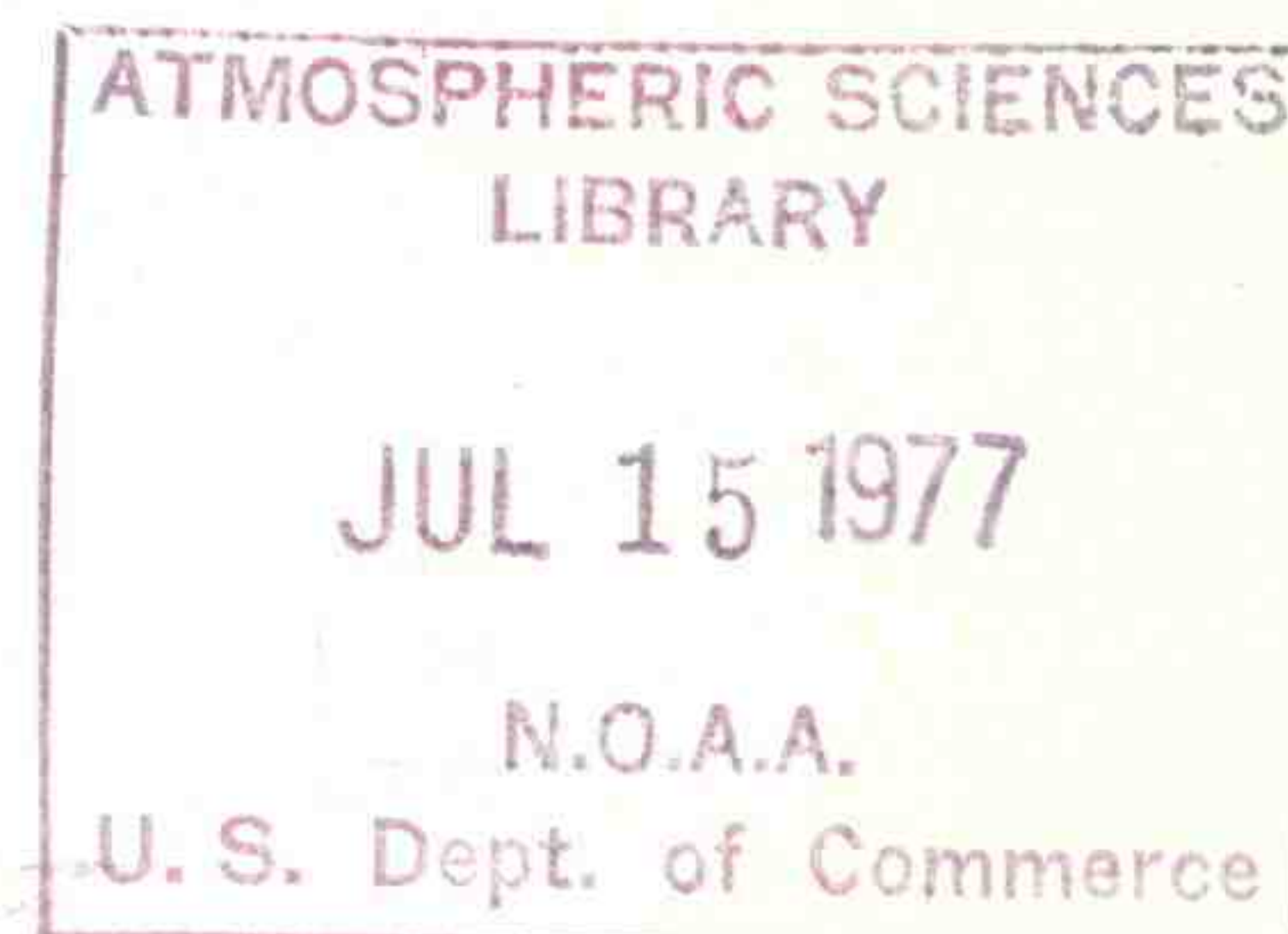
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U.S. DEPARTMENT OF COMMERCE  
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FEDERAL PLANS FOR COOPERATIVE BACKUP  
AMONG OPERATIONAL PROCESSING CENTERS

FCM 76-4

Washington, D.C.  
December 1976



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## FOREWORD

The Federal Plans for Cooperative Backup Among Operational Processing Centers included in this document describe and update long-standing cooperative arrangements involving the civil and military meteorological services.

These plans specifically identify emergency backup procedures for high-priority user products prepared by the Department of Commerce's National Meteorological Center and National Severe Storms Forecast Center by the Department of Defense's Air Force Global Weather Central and Fleet Numerical Weather Central in the event of extended power or computer outages at the National Centers. The importance of the continuity of these services should be self evident. The users who depend directly on these products are not only the nationwide network of Weather Forecast Offices and Weather Service Offices, but also over 200 offices of other Federal agencies and private meteorologists, whose collective services satisfy the Nation's demands for weather services and warnings.

This document is one of a series of plans prepared by the Federal Coordinator for Meteorological Services and Supporting Research to describe present and planned services and is issued in response to the Office of Management and Budget Circular A-62.



Edward S. Epstein  
Federal Coordinator for Meteorological  
Services and Supporting Research



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# FEDERAL PLANS FOR COOPERATIVE BACKUP AMONG OPERATIONAL PROCESSING CENTERS

## INTRODUCTION

These Federal Plans describe cooperation among civil and military meteorological services. The meteorological services over the years have become increasingly dependent on centralized computer facilities and automated telecommunication facilities. These processing centers collect and relay a high percentage of meteorological data and are the major source for both analysis and forecast products. Any prolonged disruption in a processing center service will have a profound effect on all users. The Federal Plans describe emergency backup procedures for the National Meteorological Center (NMC) at Suitland Md., and the National Severe Storms Forecast Center (NSSFC) at Kanasa City, Mo.

The NOAA National Weather Service's NMC prepares meteorological analyses and forecasts disseminated to a large number of users primarily by facsimile and teletypewriter. In addition, large volumes of raw data are received and relayed to other processing centers. An extended power outage or computer failure could cause a serious disruption in NMC operations. If failures occur, facsimile and other products emanating from NMC will not reach users, including National Weather Service and Department of Defense (DOD) field facilities located throughout the country.

Backup Plan I for Processing Centers employs the Air Force Global Weather Central (AFGWC) and the Navy's Fleet Numerical Weather Central (FNWC) as backup for NMC. Backup Plan II covers the Severe Local Storms (SELS) Unit of the NSSFC. When SELS backup is needed, support will be provided by the AFGWC. Backup Plan III provides AFGWC backup for the NMC aviation flight level wind and temperature forecasts over the Northern Hemisphere.

The DOD depends entirely on NMC for observed ("raw") data from Canada, Alaska, parts of South America, and most ocean vessels other than those of the U.S. Navy. This raw data is handled by communications computers at NMC. Details of NMC's communications backup to the Air Force and Navy weather computers are given at the end of Appendix A.

Backup support from the AFGWC or the FNWC will not interfere with DOD support and, in cases of conflict, DOD requirements will take precedence.

These plans are provided as separate sections within this document. The sections may be revised either jointly or separately on an as needed basis.



## I. FEDERAL PLAN FOR BACKUP OF THE NATIONAL METEOROLOGICAL CENTER

This plan has been designed to achieve some measure of backup to the National Meteorological Center (NMC) and yet stay within resource constraints. The objective of the plan is to provide reasonable continuity of facsimile guidance products for field facilities in the event of computer or power outages affecting NMC. The main feature of the plan provides for use of those products generated by the Air Force Global Weather Central (AFGWC) at Offutt Air Force Base, Nebr., and by the Navy Fleet Numerical Weather Central (FNWC), Monterey, Calif., that come closest to satisfying high-priority requirements of the National Weather Service (NWS) and the DOD. The AFGWC will transmit these charts over the National Facsimile System (NAFAX) and the National and Aviation Meteorological Facsimile System (NAMFAX) via Kansas City, Mo. The FNWC will transmit charts from Monterey to Suitland, Md., where they will be used by the NWS as described later.

The most probable outage problem at NMC would be a partial one, Stage 1, (see below) wherein the large NOAA processing computers were down for an extended period, but the communications computers were still functioning. In the event of Stage 1 outage at NMC, selected upper air analyses and forecasts from FNWC will be transmitted to NMC by FNWC as shown in the Appendix C to this plan.

NMC would rely on numerical guidance from FNWC as internal backup for upper level analyses and prognoses because the Navy's prediction model is similar to NMC's model. With this guidance, NMC would still supply manually prepared charts including the surface analyses (except northern hemisphere now done by computer) to the facsimile circuits. Radar summaries and severe weather outlooks would originate from the National Severe Storms Forecast Center (NSSFC) at Kansas City. While communications computers at Suitland are operative, NMC may choose to relay some Navy charts on the facsimile circuits.

In the event of a partial outage at NMC in which the large computers are down, there would be no backup for high priority teletypewriter guidance (LFM 6-hrly detailed values at stations, or model output statistical forecast products such as probability of precipitation and maximum/minimum temperatures) since the military centers do not produce this type of guidance.

In the event of a total (Stage 2) outage of all NMC operations, hand analyses and forecasts would be unavailable from Forecast Division. High-level analyses and prognoses, as well as the surface analyses and manually prepared 12- and 24-hr. prognoses, including horizontal cloud and weather depiction, will be entered on the NAFAX and NAMFAX circuits by AFGWC, as shown in Appendix B to this plan.



Selected numerical upper air analyses and forecasts, as shown in Appendix D to this plan will also be transmitted to Washington by FNWC for entry on FOFAX. NSSFC will enter the radar summaries and severe weather outlooks as at present.

The Automation of Field Operations and Services (AFOS) Program being implemented by NWS is being taken into account in planning future backup. A joint NWS/AWS effort is underway to develop an interface between AFOS and AFGWC. Arrangements are being made for installation of the interface equipment in 1978.

Appendix B gives the NAFAX/NAMFAX Backup Schedules for providing high-priority charts to users of NMC products. Appendices C and D give the FNWC schedules for Stage 1 and Stage 2 backup.

#### DEFINITION OF EXTENDED OUTAGE

For the purposes of this plan, an extended outage is defined as a power outage or computer failure affecting NMC operations that lasts, or is expected to last, 12 hours or longer. Two stages of outage at NMC are possible. In Stage 1 only the large NOAA computers at Suitland, Md., would be down. In Stage 2 NMC would be completely off the transmission circuits.

#### EMERGENCY BACKUP PROCESSING CENTERS

Should a Stage 1 extended outage occur, FNWC only would supply automated guidance to NMC and some automated guidance might be relayed to FOFAX, NAFAX, and NAMFAX. NMC would continue to put manually-prepared charts onto the circuits.

AFGWC would provide Aviation Digital Forecasts as specified in Plan III. Chart lists are shown in Appendices, B, C, and D.

If an extended Stage 2 outage should occur,

- (a) FNWC will provide computer product support to FOFAX, and
- (b) AFGWC will drive NAFAX and NAMFAX with both manual and computer products.

Transmission schedules of high-priority facsimile products as shown in the Appendices will continue for the duration of the outage. NSSFC will continue to provide Radar Summaries and the graphical Severe Weather Outlook.



## FACSIMILE CIRCUIT AND BACKUP SCHEDULES

The NAFAX circuit WFX-1234/GD-60144 and the NAMFAX circuit GF-10201 will serve for the transmission of backup charts from AFGWC and NSSFC during the period of a Stage 2 outage. FOFAX circuits GF-10206, GF-10207, and GF-10208 will serve for transmission of backup charts from FNWC during the period of the outage. Emergency schedules of facsimile charts to be prepared and transmitted on these circuits are contained in the Appendices. They will be printed and distributed to all NAFAX, NAMFAX, and FOFAX users. Further information on communications procedures is contained in Appendix A.

### Transmission Points

The AFGWC and the FNWC will serve as the transmission points for backup facsimile charts during an extended outage.

### Transmission Procedures

The NSSFC provides the control for the AFGWC entry of facsimile products into both the NAFAX and NAMFAX systems. Under Stage 2 outage, the NSSFC, Kansas City, Mo., can interconnect GF-10602, (a link between NSSFC and AFGWC) and GF-10202 (a link between NSSFC and Washington, D.C.) to provide a through circuit from Offutt AFB to Washington, D.C. Connections can be made in Washington at commercial switching points to NAFAX and NAMFAX circuits as described in Appendix A.

The NWS Communications Unit at Suitland, Md., provides the control for the FNWC entry of facsimile products into the FOFAX system. Under Stage 2 outage the Fleet Weather Facility (FWF), Suitland, Md., can connect with a voice/data circuit from FNWC to provide a circuit to the NWS communications station for relay to the FOFAX system. (See page A-2 ).

## NMC RESPONSIBILITY

In the event of an outage affecting NMC operations, the Director, NMC, or his designee shall be responsible for the following actions:

### Estimate of Duration of Outage

Estimates of the duration of a Stage 1 outage will be obtained from the Facility Operations Division (FOD), Office of Management and Computer Systems, NOAA.

Estimates of the duration of a Stage 2 outage will be provided by the Director, NMC, or his designee.

### Decision to Implement Backup Plan

Based on information from FOD, the Director, NMC, or his designee, will make the decision on implementation of either the Stage 1 or the Stage 2



backup plan. Telephone is used to invoke the plan. If NMC is incommunicado, the National Weather Service Headquarters at Silver Spring, Md., will invoke the plan. As a guideline, the backup plan should be implemented if:

- (1) the outage is expected to last 12 hours or longer, or
- (2) the outage has already lasted 12 hours and resumption of normal capability is not imminent.

#### Notification of AFGWC and FNWC

If the decision is made to implement the backup Plan, telephone contacts\* will be made with the designated focal points at AFGWC and FNWC requesting them to begin emergency transmission on the circuits and to assume their assigned role in the Plan (see AFGWC Responsibility and FNWC Responsibility below). The NMC will also provide AFGWC and FNWC with a forecast of the duration of the outage and subsequent updated information when available.

If a Stage 1 outage occurs, NMC will notify FNWC that backup is required in support of the Forecast Division at NMC as described in Appendix E. NMC will notify AFGWC that backup is required for Aviation Digital Forecasts as specified in Plan III.

If a Stage 2 outage occurs, NMC or NWSH will notify AFGWC and FNWC that full backup is required.

#### Notification of NSSFC

Prompt telephone contact will also be made to the designated focal point\* at NSSFC requesting NSSFC to perform its backup functions as defined on page 1-6. Similar information on forecasts and updates concerning the expected duration of the outage, as provided to AFGWC and FNWC by NMC, will be given to NSSFC.

#### Resumption of Normal Operations

Upon reinstatement of normal capability at NMC, notifications will be given to AFGWC, FNWC, and NSSFC of this fact and also the time that NMC will resume normal operations.

### AFGWC RESPONSIBILITY

Upon notification from the Director, NMC, or his designee, that the backup Plan is to be implemented and of the stage of backup needed, AFGWC will begin transmitting the required charts on the NAFAX and/or the NAMFAX systems according to the backup schedules no later than 4 hours after receipt of the notification. Aviation Digital information will be transmitted as required by Plan III. AFGWC will coordinate communications procedures with their local Air Force Communications System (AFCS) unit.

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\*The telephone numbers of all key individuals and installation involved have been distributed separately. The telephone numbers and names of key individuals will be updated as required.



### Initiation

The initial AFGWC transmission will be made according to the backup schedules contained in the Appendix and will correspond to the approximate time of notification plus 4 hours if possible.

### Annotation

The AFGWC will annotate or precede its first transmission with a suitable message indicating that emergency backup procedures are in effect and that transmission on the NAFAX and/or NAMFAX schedule are originating from AFGWC. An indication should also be given, if possible, of the time normal operations will resume.

### Termination of Backup Responsibility

The AFGWC will continue transmissions for NAFAX and NAMFAX and digital data according to the backup schedules until such time as notification is received from NMC that it is ready to resume normal operations at a specifically agreed upon time.

## FNWC RESPONSIBILITY

Upon notification from the Director, NMC, or his designee that the backup Plan is to be implemented, FNWC will begin transmitting charts for the FOFAX system no later than 4 hours after receipt of the notification.

### Initiation

The initial FNWC transmission will be made according to the backup schedule contained in the Appendices D and E, and will correspond to the approximate time of notification plus 4 hours if possible.

### Annotation of First Transmission

The FNWC will annotate or precede its first transmission with a suitable message indicating that emergency backup procedures are in effect and that transmissions on the FOFAX schedule are originating from FNWC. An indication should also be given, if possible, of the time normal operations will resume.

### Termination of Backup Responsibility

The FNWC will continue transmissions to NMC or for FOFAX according to the backup schedules until such time as notification is received from NMC that it is ready to resume normal operations at a specifically agreed upon time.



## NSSFC RESPONSIBILITY

Upon notification by NMC that the Stage 2 backup plan is being implemented, the NSSFC will do the following:

### Link AFGWC to NAFAX and NAMFAX

The NSSFC will operate the necessary switches to permit AFGWC to enter NAFAX and NAMFAX with its initial backup transmissions.

### NSSFC Products

The NSSFC will transmit Radar Summaries and the Severe Weather Outlook (graphic) over NAFAX and NAMFAX according to the backup schedule.

### Termination of Backup Responsibility

The NSSFC will continue transmissions on NAFAX and NAMFAX according to the backup schedule until such time as notification is received that NMC is ready to resume normal operations. The NSSFC will then terminate AFGWC's communication links at the appropriate time and will revert to the normal NAFAX and NAMFAX schedules for its own transmission responsibilities.

### Secondary Backup

Because of its unique capability to transmit over NAFAX and NAMFAX, NSSFC is in a favorable position to provide some secondary backup to the system. While recognizing this capability, the Plan does not call for its employment at this time. As experience is gained, however, revised versions of the Plan may take advantage of some of this capability.

## TESTING OF THE BACKUP SYSTEM

Testing of the backup system once every 6 months is recommended. The duration of these tests will be agreed upon by the parties involved. Advance notification will be given to facsimile subscribers whenever such tests take place.

Weekly tests of the transmission facilities between Offutt AFB and WBC Suitland will be conducted by the Air Force Communications Services (AFCS) Unit at AFGWC. These tests will alternate between NAFAX and NAMFAX. The supervisor of the NWS communication unit at Suitland will be the manager for these tests and will arrange detail with the Offutt AFCS unit.

Circuit tests will be conducted by the FNWC on the first and third Wednesdays of each month. The supervisor of the NWS communication unit at Suitland will be the manager for these tests and will arrange details with the FNWC communication unit.



Emergency power at all switches, nodal points, terminals, and processing centers should be tested to determine the operational readiness of the power backup system for adverse real-time situations. National Communication System Instructions (NCSI) 195-1 provides for the concept of an effective emergency power test and evaluation procedure program and adherence to this instruction is recommended at all participating facilities.

#### ADDITIONAL INSTRUCTIONS

Special instructions for National Weather Service offices will be contained in a future issuance of a National Weather Service Operations Manual chapter entitled, "Cooperative Backup Among Operational Processing Centers."

Also, a description of the AFGWC and FNWC charts to be transmitted in an emergency situation will be prepared and distributed as a numbered revision to the National Weather Service Forecasting Handbook No. 1 - Facsimile Products.

Appendix A of this document contains a description of the communications facilities and operational communications procedures for backup. Appendix B gives the NAFAX and NAMFAX Backup Schedules. Appendix C describes the FNWC backup for the NMC Forecast Division. Appendix D gives the FOFAX Backup Schedule.



## II. BACKUP PLAN FOR SEVERE LOCAL STORMS FORECASTS

The National Severe Storms Forecast Center (NSSFC), Kansas City, Mo., through its Severe Local Storms (SELS) Unit, has the responsibility for issuing and cancelling severe local storm watches and preparing other appropriate material which is essential to the National Weather Service Severe Local Storms Warning Service. In the event that NSSFC should be unable to discharge its functions, there must be another unit capable of stepping in, at short notice, and operating the severe local storms forecasting program until NSSFC can resume operations.

The Air Force Global Weather Central (AFGWC) is in a unique position to provide backup for SELS. Presently, AFGWC provides area and point warnings of tornadoes and severe thunderstorms for military operations within the conterminous United States, and in the process, frequently coordinates with SELS during severe weather situations. Also, AFGWC can distribute the NSSFC products on the Radar Reporting and Warning Coordination teletypewriter circuit (RAWARC) and the Service A teletypewriter circuit via Carswell AFB, Tex.; Suitland, Md.; and the Kansas City Switch (FAA's Weather Message Switching Center).

The NWS Automation of Field Operations and Services (AFOS) Program being implemented is being taken into account in planning future backup. A joint NWS/AWS effort is underway to develop an interface between AFOS and AFGWC. Arrangements are being made for installation of the interface equipment in 1978.

### SELS RESPONSIBILITY

In the event of a power outage or other major disruption of operations, the SELS forecaster will make telephone contact\* with the designated AFGWC focal point and request backup (unless normal operations are expected to be resumed in a short time interval during which the likelihood of severe weather is slight). The SELS forecaster will provide AFGWC with an estimate of the duration of the outage, the number of the last valid watch, and subsequent updated information (when available).

### AFGWC RESPONSIBILITY

Upon notification from SELS that the Backup Plan is to be implemented, AFGWC will prepare and transmit watches, outlooks, and other advices regarding severe local storm activity as prescribed in National Weather Service Operations Manual (NWSOM) Chapter C-40. In addition, AFGWC will, as soon as practical, prepare and transmit the NSSFC graphic National

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\*The telephone numbers of all key individuals and installations involved have been distributed separately.



Facsimile Network (NAFAX) and National and Aviation Meteorological Facsimile Network (NAMFAX) products (radar summary charts and severe weather outlook graphic). Specifically, AFGWC will:

- Initiate a suitably worded message for RAWARC and Service A indicating that emergency backup procedures are in effect and that subsequent severe weather watches, etc., will be issued by AFGWC as required.
- Issue, for the duration of the backup, the following SELS products for transmission on RAWARC and Service A as required and described by NWSOM Chapter C-40:
  1. Severe Weather Outlook Narrative (C-40, Sec. 5.1) transmitted daily at 0900Z and 1500Z and between February 1 and August 31 at 2100Z
  2. Advance Information on Forthcoming Watch Areas (C-40, Sec. 5.3.3)
  3. Aviation and Combined Severe Weather Watches (C-40, Sec. 5.3)
  4. Severe Weather Watch Cancellations (C-40, Sec. 5.4)
  5. Status Reports (C-40, Sec. 5.5)
  6. All Clear Information (C-40, Sec. 5.6)

In addition, AFGWC will:

- Prepare and transmit on NAFAX the Severe Weather Outlook Graphic at 1105Z as specified in Section 5.2 of NWSOM Chapter C-40. This Graphic will also be transmitted on NAMFAX at 1116Z. In addition, radar summary charts will be prepared and transmitted as required by the NAFAX and NAMFAX Schedules. Descriptions of these two products may be found in Forecasting Handbook No. 1 (1976), pages 7-39 and 5-17, respectively. These charts should be suitably annotated to indicate that they are backup charts.
- Coordinate with the affected WSFOs by telephone, prior to watch issuance or cancellation, if time permits. Likewise, WSFOs should contact AFGWC directly, if necessary.

The AFGWC should coordinate with the National Hurricane Center, Coral Gables, Fla., when tropical cyclones are affecting the conterminous United States.

Part A of all AFGWC backup watches will begin as follows: "A....THE USAF AIR WEATHER SERVICE, ACTING IN A BACKUP CAPACITY FOR THE NATIONAL SEVERE STORMS FORECAST CENTER, HAS ISSUED A....ETC."



## COMMUNICATIONS

In case of an inoperative NSSFC communications unit, AFGWC will transmit:

- Appropriate charts on NAFAX and NAMFAX
- Teletypewriter bulletins to the Carswell Automated Weather Switch for further dissemination (by AFCS and FAA) on RAWARC and Service A circuits. AFGWC has a drop on the FTS which permits reliable coordination to be carried out.

## MATERIALS

NSSFC will provide AFGWC with a copy of NWSOM Chapter C-40 (and other pertinent directives) and an ample supply of necessary blank forms, charts, etc.

## TESTING OF THE BACKUP SYSTEM

Periodic testing of the product backup system is recommended. The frequency and duration of these tests will be agreed upon by the parties involved. Advance notification will be given to circuit subscribers whenever such tests take place.

## ADDITIONAL INSTRUCTIONS

Future issuances of NWSOM Chapter C-40, the National Severe Local Storms Operations Plan, and this Backup Plan will all be in agreement with one another.



### III. BACKUP PLAN FOR AVIATION WIND FORECASTS

The National Meteorological Center (NMC) Suitland, Md., has the responsibility for issuing a number of meteorological end products, such as wind and temperature forecasts for aviation. The areal coverage of NMC products currently includes the Northern Hemisphere and the tropical regions of the Southern Hemisphere. The World Meteorological Organization has designated NMC as the analysis and forecast arm of the Washington World Meteorological Center which includes global responsibilities as part of international cooperative efforts. In the event that NMC should be incapacitated or otherwise unable to discharge its functions, another unit capable of continuing the service at short notice must provide the aviation wind forecasts until such time as NMC is able to resume normal operations. This Plan is based on the assumption that NMC's communications computer will remain operational during the time when its main processing computers are down.

The Air Force Global Weather Central (AFGWC) currently provides digital aviation wind and temperature forecast data for military operations that are similar to those produced by the NMC. With a slight modification of the data, NMC can process the AFGWC aviation digital forecasts on the NMC communications computers for distribution. The AFGWC backup will initially be limited to Northern Hemisphere data for selected pressure levels and forecast periods and will be initiated by NMC after experiencing or when expecting significant outages at the NMC computational center. Significant outages would normally be those of 12 hours or more duration.

The Automation of Field Operations and Services (AFOS) Program being implemented by NWS is being taken into account in planning future backup. A joint NWS/AWS effort is underway to develop an interface between AFOS and AFGWC. Arrangements are being made for installation of the interface equipment in 1978.

#### PROCEDURES

1. The Aviation Weather Senior Duty Meteorologist (SDM) at NMC will request AFGWC backup when, in his judgment, a significant computer outage is being experienced by NMC with a high risk that the outage will be continued. The SDM will contact the AFGWC Duty Officer and will request that the backup package be sent. Normally, the SDM will not request a 12-hour forecast because a "significant outage" determination is not likely to occur until 12 hours or more after 0000Z and 1200Z. However, should a computer outage extend beyond one data processing cycle, subsequent requests should be for all four forecast periods.

2. Upon receipt of the forecasts, NMC will process the data on the communications computer to produce the necessary output, in grid point form, for insertion into the flight planning and air traffic control computers. For the data bulletins required for subsonic jet flight planning and air traffic control, NMC will add the tropopause height information derived from the preceding NMC computer run. (Note: The tropopause height is not included in the AFGWC model.)



## DIGITAL AVIATION WIND FORECAST FORMAT AND CONTENT

Data time.

Data base time.

Forecast period.

U & V wind components (U/2 & V/2 kts.).

Temperatures (Degrees C, see sign convention, Attachment 2).

Grid: As described by Attachment 1.

Message Format: As described by Attachment 2.

Bulletin Headings: As described by Attachment 3.

Transmission Method: High speed NWS circuit between NMC and the DOD Automated Weather Network Management Center (AWNMC), Carswell AFB, and DOD circuitry between the AWNMC and AFGWC.

Volume: Approximately 8,700 bits per sector record or approximately 78,000 bits per data field (one level for one forecast period).

### TESTING OF THE BACKUP SYSTEM

Periodic testing of the product backup system is recommended. The frequency and duration of these tests will be agreed upon by the parties involved. Advance notification will be given to circuit subscribers whenever such tests take place.

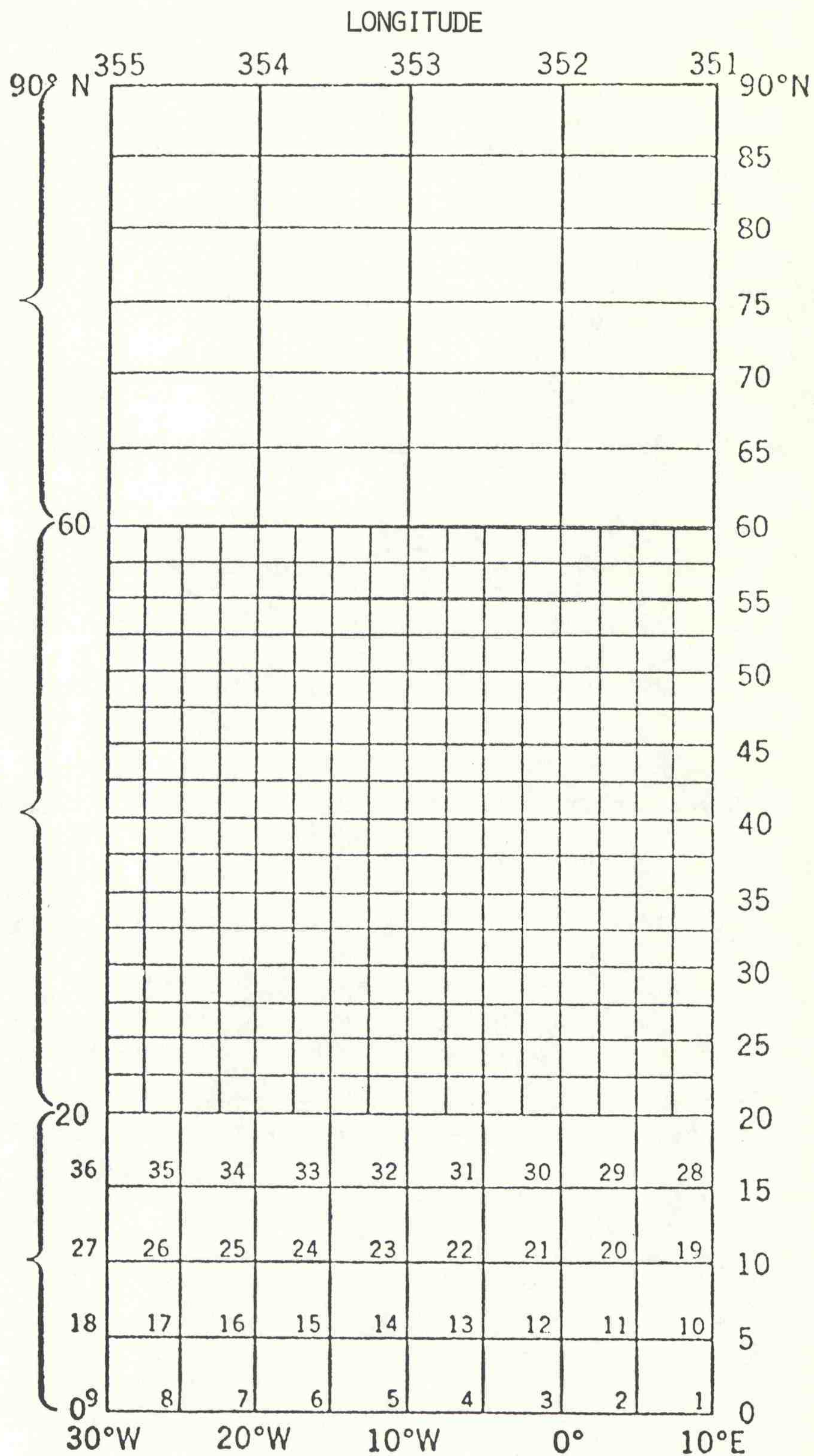


GRID SPACING

5° LAT. X 10° LONG.

2.5° LAT. X 2.5° LONG.

5° LAT. X 5° LONG.



SECTOR #1

NOTE: Nine sectors per hemisphere, 355 points per sector. Point #1 is lower right and Point #355 is upper left.

Attachment 1



# Sample Message Breakdown

7 4 1 7 3 7 6 0 7 4 1 7

111 100 00/1 111 011 1/11 110 000/ 111 100 00/1 111

0 7 0 0

FCST VALID DATA/TIME 07/00Z

0 7 6 2 7 4 1 7 1 1 2 0

000 1/11 110 010/ 111 100 00/1 111 001 0/01 010 000

1 2 0 2 Spcl Chr.

FCST PERIOD Sector Number

7 4 3 7 4 3 6 5 7 7 1 7

111 100 01/1 111 100 0/11 110 101/ 111 111 00/1 111

1 8 5 u'=-4

Level Number Level (MB) U component

6 7 7 3 7 6 4 0 0 0 0 2

110 1/11 111 011/ 111 110 10/0 000 000 0/00 000 010/

v'=-3 t'=-5 u'=-6 v'=0 t'=2

V comp Temp U comp V comp Temperature

v=v'\*2  
u=u'\*2  
t=|t'| when t' negative  
t=-t' when t' positive

Attachment 2



## BULLETIN HEADINGS

Messages will be transmitted under bulletin headings as follows:

<u>Bulletin Heading</u>		<u>Contents</u>
FDXN851/2/3/4	KGWC	850-mb forecast for all required sectors (first 2 digits). The third digit (1, 2, 3 or 4) identifies the forecast period as being 1, 18, 24 or 30 hours.
FDXN701/2/3/4	KGWC	700-mb forecast for all required sectors, and so forth, as before.
FDXN501/2/3/4	KGWC	500-mb forecast, etc.
FDXN401/2/3/4	KGWC	400-mb forecast, etc.
FDXN301/2/3/4	KGWC	300-mb forecast, etc.
FDXN251/2/3/4	KGWC	250-mb forecast, etc.
FDXN201/2/3/4	KGWC	200-mb forecast, etc.
FDXN151/2/3/4	KGWC	150-mb forecast, etc.

Attachment 3



## APPENDIX A

### COMMUNICATIONS FACILITIES AND OPERATIONAL COMMUNICATIONS PROCEDURES FOR BACKUP

The communications facilities and the operational procedures for the backup of the NMC operational processing center and the NSSFC are described herein.

#### FACSIMILE

The National Facsimile System (NAFAX) is the largest of the National Weather Service (NWS) facsimile systems, with many Department of Defense (DOD) and NWS connections. Those NWS offices that do not have NAFAX generally have the National and Aviation Meteorological System (NAMFAX), and there are also many DOD connections to NAMFAX. In addition NAMFAX is extended to Alaska for the Intra-Alaska Facsimile System, to San Juan, P.R., to Canada, and to Mexico, whereas NAFAX is not.

Any facsimile backup arrangement therefore, which involves NAFAX must also include NAMFAX for distribution purposes.

The FOFAX system serves all NWS Forecast Offices within the 48 conterminous states. The system distributes meteorological products prepared at the National Meteorological Center (NMC) as well as satellite products from the National Environmental Satellite Service (NESS). There are also numerous DOD connections on FOFAX.

#### NAFAX

The National Facsimile circuit, WFX-1234, is a one-way only transmission system, with the entry point for the entire system being the Western Union plant (WU) in Washington, D.C. Transmissions originating at Suitland are entered on a local loop feeding through the test board at Western Union and thence out to the system. Transmissions originating at the NSSFC Kansas City for NAFAX are brought into the Washington WU plant test board (via a Kansas City test board) for entry into the system on a circuit provided by WU. The NAFAX WFX-1234 circuit transmissions are then fed into NAFAX circuit GD-60144 at Suitland.

The Air Force Global Weather Central has a WU WFX-1234 send/receive capability in their communications center operated by the AFCS. WU has provided a circuit from Offutt into the WU Kansas City test board. This circuit can be linked up by the NSSFC to the Washington circuit by switch operation in the NSSFC communications room. The AFGWC, therefore, has available communications circuitry which can be used to back up the NSSFC-prepared charts as well as the NMC for NAFAX.



## NAMFAX

NAMFAX is also a one-way only transmission system, with the entry point for the entire system on the AT&T test board at "Wash" 3. Transmissions originating at Suitland are entered on a local loop feeding through the test board and thence out to the system. Transmissions originating at the NSSFC Kansas City for NAMFAX are brought into AT&T (Wash 3) via an AT&T test board in Kansas City and thence to Suitland on circuit GF-10202. By interexchange channel (IXC) switching under the control of Suitland, the signal is passed on to the NAMFAX circuit GF-10201.

The Air Force Global Weather Central has a send capability on circuit GF-10602 between Offutt AFB and Kansas City NSSFC, via the AT&T test board. The GF-10602 circuit can be linked up to GF-10202 by switch operation in the NSSFC communications room. GF-10202 can then be linked to GF-10201 (NAMFAX) by Suitland. As long as the NAFAX and NAMFAX schedules are the same the AFGWC transmissions can be made:

1. Simultaneously to WFX-1234 for NAFAX and GF-10602 for NAMFAX.
2. To WFX-1234 with relay to NAMFAX by Suitland Communications.
3. To GF-10602 for NAMFAX and relay to WFX-1234 by Suitland Communications.

If, at any time, separate schedules (additional charts for NAMFAX or 240 scan per minute operation) are implemented, then NAFAX charts would be on one path and NAMFAX on the other.

The NSSFC Kansas City can also use its jack field and patch cords to interconnect GF-10602 and GF-10202 to provide a through circuit, Offutt AFB-Suitland or Offutt AFB-Washington. Suitland Communications (WBC) also has jack fields permitting patch cord interconnection of circuits. The use of patch cords at end points such as NSSFC may result in some loss of signal quality.

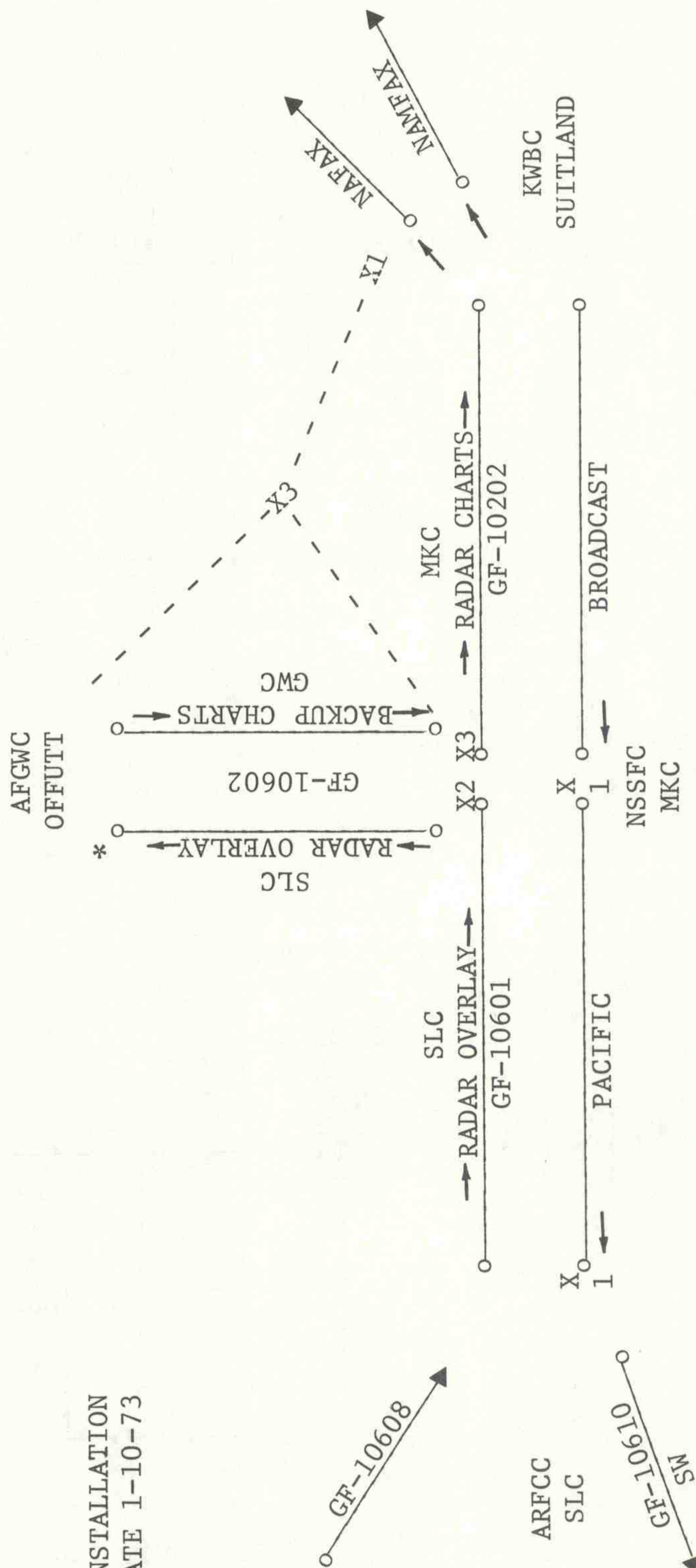
See Figures 1, 2, and 3, for circuit arrangements.

## FOFAX

The FOFAX system is composed of three circuits. These circuits, GF-10206, GF-10207, and GF-10208, are all one-way only circuits in the system with the entry point for each circuit in the system in the AT&T "Wash 3" test board. Transmissions originating at the World Weather Building, Camp Springs, Md., are transmitted over local tie lines to the main facsimile communications center at Suitland where they are patched through to the long lines circuits, along with charts originating at Suitland.



INSTALLATION  
DATE 1-10-73

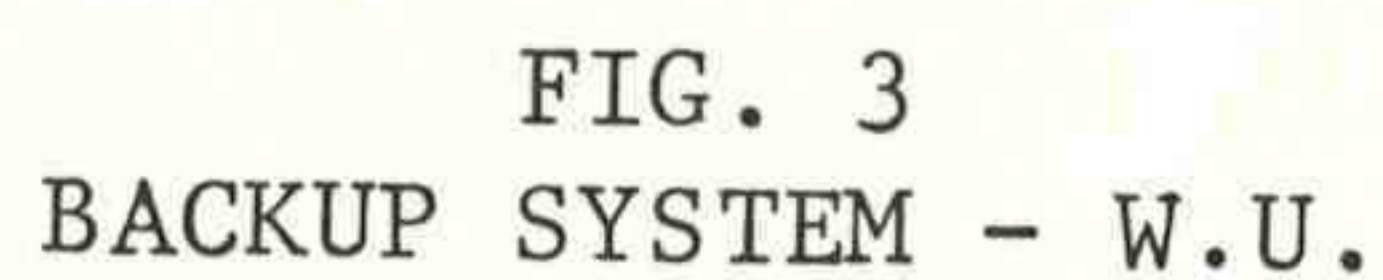


- WSFO SFO  
ITT SFO
- ALL CKTS TYPE 4002 WITH SPL COND.
  - X INTEREXCHANGE CHANNEL SWITCHES
  - X
  - 1 NORMALLY CLOSED
  - X2 NORMALLY CLOSED
  - X3 NORMALLY Open
  - ALL SEND/RECEIVE TERMINALS SIGNAL LEVEL OdBm EXCEPT \* -12dBm
  - - - - EXISTING CIRCUITRY (TO REMAIN)

FIG. 1



AFGWC  
OFFUTT AFB





NOTES:

SW - Interexchange channel switch. Used to connect two circuits together within Telco plant.

R - Receive side of circuit

S - Send side of circuit

▷ - Bridging amplifiers within emergency power arrangement.

N.O. - Switching path normally open

N.C. - Switching path normally closed

Note - Bridging can be accomplished by direct patch cord if necessary. Also inter-exchange switching can be performed by test board personnel if necessary.



The Fleet Numerical Weather Central (FNWC), Monterey, Calif., has an alternate voice/data circuit which can be used for the transmission of NWS compatible facsimile of 120 scans per minute to the Fleet Weather Facility (FWF) Suitland, Md. The FWF can switch these transmissions through in-house pairs to the NWS communications station for relay to the FOFAX system. See Figure 4 for circuit arrangements.

#### EMERGENCY POWER

The NMC has emergency power for all essential communications oriented facilities: the communications computers and associated peripheral equipment (e.g., the Varian plotter, Interdata 50's, etc.) Emergency power is also provided to WBC to operate facsimile scanner, amplifiers, switches, relays, etc. The Air Force Global Weather Central (AFGWC) has uninterruptible power for its computers and emergency power for the operational facilities. The NSSFC does not have emergency power generating capability available.

#### MISCELLANEOUS

The AFCS unit supporting AFGWC has two Inter-Data 50 (ID50) computers on the Air Force facsimile circuits. These ID50 systems can also transmit charts on the NAFAX and NAMFAX circuits. These would be used in a backup situation for NAFAX/NAMFAX. AFGWC has one spare scanner as backup to Air Force facsimile circuits and also for NAFAX/NAMFAX as well as a recorder to monitor transmissions in a backup situation. However, the Air Force is in the process of replacing the COMPIX unit with mini-computers/converters.

#### COMMUNICATIONS PROCEDURES

1. Upon notification that backup of NSSFC by AFGWC is required, NSSFC communications will operate the switches to close the paths from AFGWC through Kansas City to Washington. WBC Suitland should be notified so that switches are closed there. AFGWC would then make transmissions in lieu of NSSFC in the scheduled time slots at 120 scans per minute (spm) on the WU circuit and on circuit GF-10602 at the scheduled times for NAMFAX. (At the time of writing AFGWC will transmit simultaneously on NAFAX and NAMFAX at 120 spm. See below.)

In the event of a malfunction of the switch, NSSFC will notify the appropriate test board to close the switch or to make the path good via their jack field. If the Western Union circuit is out of service, both the 120 spm and the 240 spm transmissions can be made via GF-10602. If GF-10602 or GF-10202 is out of service then AFGWC can only transmit the 120 spm NAFAX chart.



# COMMUNICATIONS CIRCUITRY FOR BACKUP PURPOSES

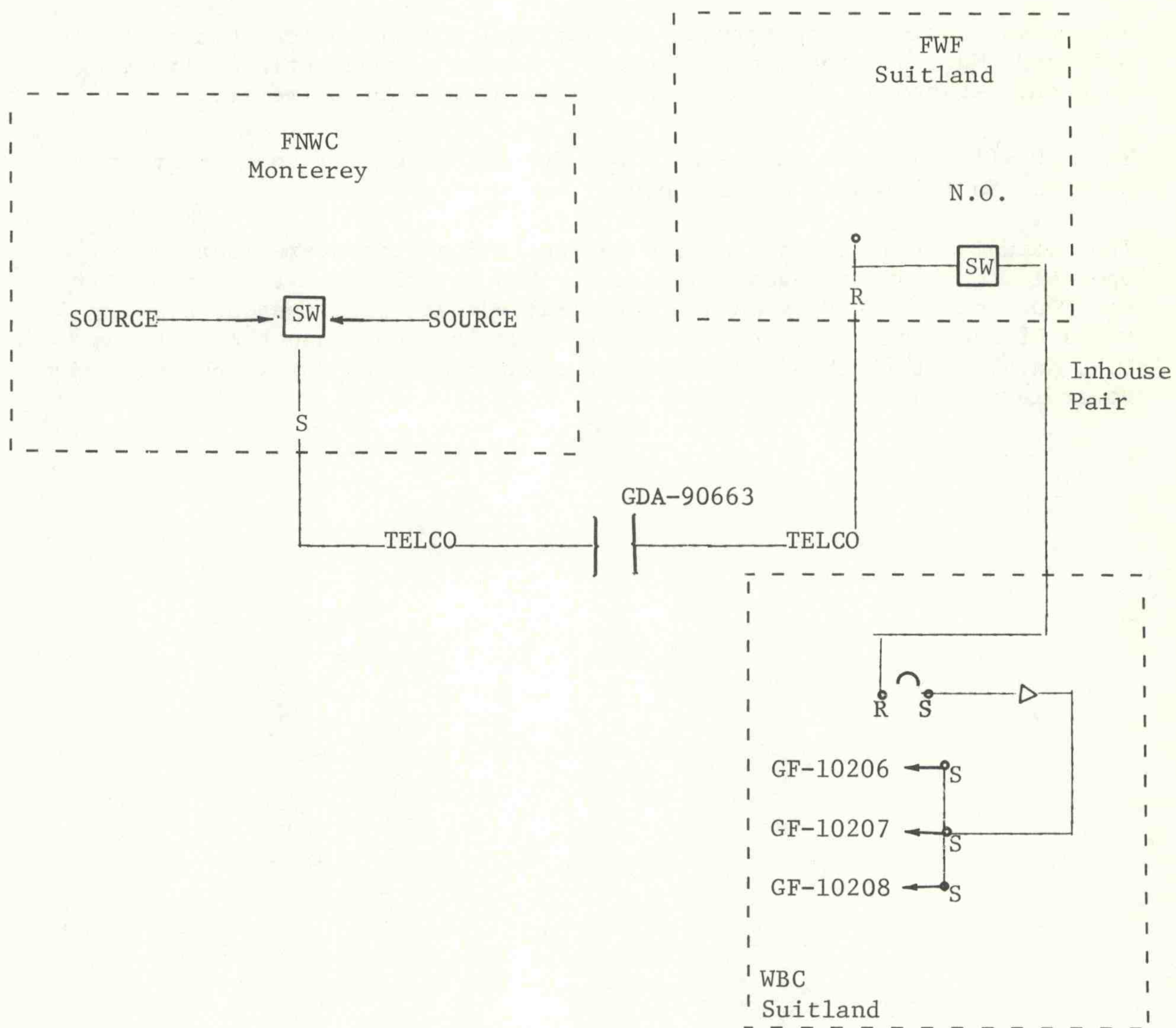


FIG. 4

NAVY BACKUP SYSTEM



2. Upon notification that backup of NMC is required, the backup schedule will be in effect. As in 1. above, NSSFC will perform the switching functions required at Kansas City. Until such time as a full 240 spm capability exists at AFGWC, backup transmissions for NAFAX and NAMFAX should be run simultaneously on WFX-1234 and GF-10602 by Offutt. If for some reason this cannot be accomplished by Offutt, the transmission should be made to GF-10602 with relay by WBC switches and patches.

#### BACKUP FOR NMC COMMUNICATIONS COMPUTERS

The communications computers at the National Meteorological Center (NMC), Suitland, Md., are required to support weather communications affecting both the Department of Defense and the Department of Commerce.

The NMC will maintain emergency power for all essential communications-oriented facilities as noted above.

The communications center and the communications computers must remain operable to relay messages and data for NWS installations. In addition, the DOD depends entirely on NMC for observed data from Canada, Alaska, parts of South America, and most ocean vessels other than those of the U.S. Navy. All of these data enter the NMC computers for which emergency power is provided.



## APPENDIX B

## NAFAX/NAMFAX BACKUP SCHEDULE

<u>Heading (Type/Area)</u>	<u>XMTD By</u>	<u>Start Time (Z)</u>	<u>Chart Time</u>	<u>Chart Description</u>	<u>Chart Time/VT</u>
ADUS	KMKC	0034	10 Min	Radar Summary	23Z
FUNH	KGWC	0110	24	72-Hr 200-MB Prog	VT 12Z
FANA	KGWC	0140	10	Sig Wea Prog	VT 01-18Z
ASUS	KGWC	0200	20	SFC Anal	00Z
ASUS 50	KGWC	0221	10	500-MB Anal	00Z
ADUS	KMKC	0232	10	Radar Summary	01Z
UXUS 85	KGWC	0242	10	850-MB Wind Plot	00Z
UXUS 70	KGWC	0252	10	700-MB Wind Plot	00Z
ADUS	KMKC	0322	10	Radar Summary	02Z
ASNH	KGWC	0400	13	SFC Anal	00Z
FXUS 1	KGWC	0430	20	12/24 Hr SFC/Sig Wx	VT 12/00Z
ASUS	KGWC	0455	20	SFC Anal	03Z
ADUS	KMKC	0524	10	Radar Summary	04Z
FVWH	KGWC	0600	23	Vertical Velocity 0/12/24/36/42 Hrs	--
ADUS	KMKC	0631	10	Radar Summary	05Z
FUNH 38	KGWC	0642	19	18-Hr 300-MB Prog	VT 18Z
FUWH 85	KGWC	0703	10	24-Hr 850-MB Prog	VT 00Z
FUWH 70	KGWC	0713	10	24-Hr 700-MB Prog	VT 00Z
FUXW 2	KGWC	0723	23	500-MB Vort. Anal	VT 00Z
FXUS 2	KGWC	0746	11	36-Hr SFC/Sig Wx Prog	VT 12Z
FANA	KGWC	0757	10	Sig Wx Prog	VT 07-00Z
ASUS	KGWC	0809	20	SFC Anal	06Z
ADUS	KMKC	0833	10	Radar Summary	07Z
FUNH 30	KGWC	0856	24	36-Hr 300-MB Prog	VT 12Z
FAPA	KGWC	0925	7	Sig Wx Prog	VT 09-24Z
ADUS	KMKC	0936	10	Radar Summary	18Z
ASNH	KGWC	1000	13	SFC Anal	06Z
ADUS	KMKC	1027	10	Radar Summary	09Z
WWUS	KMWC	1105	5	Svr Wx Outlook	VT 12Z
ASUS	KGWC	1110	20	SFC Anal	09Z
ADUS	KMKC	1129	10	Radar Summary	10Z
--	KMKC	1210	10	GENOTS	--
ADUS	KMKC	1230	10	Radar Summary	11Z
FANA	KGWC	1330	10	Sig Wx Prog	VT 13-06Z
ASUS	KGWC	1400	20	SFC Anal	12Z
ASUS 50	KGWC	1422	10	500-MB Anal	12Z
UXUS 85	KGWC	1457	11	850-MB Wind Plot	12Z
UXUS 70	KGWC	1510	11	700-MB Wind Plot	12Z
ADUS	KGWC	1526	10	Radar Summary	14Z
ASNH	KGWC	1600	13	SFC Anal	12Z
FXUS 1	KGWC	1630	20	12/24 Hr SFC/Sig Wx	VT 00/12Z



<u>Heading (Type/Area)</u>	<u>XMTD By</u>	<u>Start Time (Z)</u>	<u>Chart Time</u>	<u>Chart Description</u>	<u>Chart Time/VT</u>
ASUS	KGWC	1700	20	SFC Anal	15Z
FUXW 2	KGWC	1720	23	500-MB Vort 0/12/24/36 Hr	--
CIRCUIT	--	1755	--	LINEUP	--
ADUS	KMKC	1832	10	Radar Summary	18Z
FUNH 38	KGWC	1842	19	18-Hr 300-MB Prog	VT 06Z
FUWH 85	KGWC	1902	10	24-Hr 850-MB Prog	VT 12Z
FUWH 70	KGWC	1912	10	24-Hr 700-MB Prog	VT 12Z
FXUS 2	KGWC	1940	11	36-Hr SFC/Sig Wx Prog	VT 00Z
FVWH 23	KGWC	1951	23	Vertical Velocity 0/12/24/36 Hr	--
ASUS	KGWC	2014	20	SFC Anal	16Z
ADUS	KMKC	2033	10	Radar Summary	19Z
FANA	KGWC	2052	10	Sig Wx Prog	VT 19-12Z
FUNH 30	KGWC	2102	24	36-Hr 300-MB Prog	VT 00Z
ADUS	KMKC	2128	10	Radar Summary	20Z
FAPA	KGWC	2147	7	Sig Wx Prog	VT 21-12Z
ASNH	KGWC	2200	13	SFC Anal	18Z
ADUS	KMKC	2232	10	Radar Summary	21Z
ASUS	KGWC	2300	20	SFC Anal	21Z
ADUS	KMKC	2329	10	Radar Summary	22Z

NOTES: 1. KGWC transmissions by Air Force Communications Squadron,  
Bldg. 301(D), Offutt AFB, Nebr.

2. FH - Front (N. American) Half. N.H.

3. NH - Northern Hemisphere

4. PA - Pacific

5. US - United States

6. WH - Western (Eurasian) Half, N.H.

7. XW - Special North American Section  
(NWS Chart)

8. Transmissions of prepared charts at 120 scans



## APPENDIX C

### PLAN FOR STAGE 1 BACKUP OF NMC BY FNWC, MONTEREY

When the Stage 1 backup requirement for NMC is invoked, FNWC will provide 0-72 hr. output for use by the NMC Forecast Division. The list of charts to be produced is attached with a schedule for their delivery. The following nomenclature is used:

PS - Surface

D500 - 500 mb

H5-10 - 1000-500 thickness

D300 - 300 mb

Pcpn - 12-hr. precipitation amounts

The plan can be invoked at anytime by calling both of the following numbers:

Monterey/Forecast Duty Officer - Commercial 408-646 ext. 2137

Suitland Fleet Weather Facility/Forecast Duty Officer -  
ext. 35972, 35973, or Commercial 735-8393

If the call is placed prior to data time +1 hour (0100Z/1300Z), NMC will receive the run from that data using a 2+25 data dump.



Schedule based on 2:25 data cut

<u>Product</u>		<u>Produced at FNWC</u>	<u>Est. Chart Avail. FWF Suitland</u>
PS	Analysis	2:50/14:50	3:05/15:05
D500	"	3:15	3:40
H5-10	"	"	"
D300	"	"	"
PCPN	12-Hr Prog	3:35	3:55
D300	"	"	"
PS	24-Hr Prog	3:50	4:20-4:30*
D500	"	"	"
H5-10	"	"	"
PCPN	"	"	"
D300	"	"	"
PS	36-Hr Prog	4:05	4:40-5:00*
D500	"	"	"
H5-10	"	"	"
PCPN	"	"	"
D300	"	"	"
PS	48-Hr Prog	4:20	5:10-5:20*
D500	"	"	"
H5-10	"	"	"
PCPN	"	"	"
PS	72-Hr Prog	4:45	5:30
D500	"	"	"

\*First time listed is for time of availability of 3 charts, remaining 1 or 2 charts available at second time listed.

- Assumptions:
1. Transmissions to FWF Suitland well coordinated and efficient.
  2. Suitland has 3 auto-plotters available, can receive and process data onto 3 tapes so that all auto-plotters can be going at once.
  3. Times based on average of:
    - 1 min/chart at FNWC to produce pen commands
    - 1-1/2 min/chart to transmit
    - 1-1/2 min/chart at Suitland to unpack pen commands
    - 6 min/chart to plot
  4. Plotted charts are northern hemispheric 1/60 million scale.

Note: This schedule will continue on each operational cycle until FNWC is informed that backup is no longer needed.



# APPENDIX D

## FNWC BACKUP OF FOFAX

<u>START</u> <u>GMT</u>	<u>PRODUCT</u>	<u>END</u> <u>GMT</u>
0243 (1443)	PS Analysis (Atlantic and Pacific)	0326 (1526)
0637 (1837)	PS 12-, 24-, 36-, 48-hr Progs H5-10, 12-, 24-, 36-, 48-hr Progs	0704 (1904)
0730 (1930)	D500 24-, 36-hr Progs PCPN 24-, 36-hr Progs of 12-hr Amounts (in.)	0825 (2025)
0828 (2028)	SOWM Wave Height Analysis and 24-hr Progs (Atlantic and Pacific) Wave Heights, 36-, & 48-hr Progs	0936 (2136)