NAS Documentation and Configuration Identification Data Sheet

Date: 5 / 3 / 89

Project Lead: Gerald Taylor **Telephone:** (202) 267-8642

____ **Add New Record** X **Update Existing Record**

Configuration Identification Information

1. **NAS Element:** Weather
   (Air Traffic Control, Ground-to-Air, etc.)

2. **NAS Configuration Item/Project Name:** Meteorologist Weather Processor (MWP)

3. **End Item:** 6.12
   (per NAS-MD-001)

4. **NAS Plan ("Brown Book") Project No.:** 3-02B

5. **H/W Identifier (CA or FA Type No.):** N/A

6. **S/W Identifier (e.g., A3.05):** N/A

Document Identification Information

7. **Document Number (26):** FAA-S-2834

8. **Revision (2):** N/A

9. **Volume (1):** N/A

10. **Change (4):** 2, 3

11. **Change Type:** SCN
    (Amendment, Contract Mod, DCN, ECP, ECR, Modification Handbook, Notice, SCN)

12. **Chapter (4):** N/A

13. **Title (120):** Meteorologist Weather Processor (MWP) System Specification

14. **Version:** Final
    (Final, Draft, Preliminary)

15. **Sensitivity:** Unclassified
    (Unclassified, Secret, Top Secret, etc.)

16. **Author (50):** ASA-230
    (Corporation or Organization)

17. **OPI:** ASA-230
    (FAA Office of Primary Interest, ASM-nnn)

18. **Document Type:** System Specification
    (ICD, IRD, Spec, Sandard, Order, Instruction Manual, etc.)

19. **Baselined, Y or N?:** Y
    (Applicable to FAA NAS Configuration Control)

20. **Applicable Baseline:** Rqmt
    (RQMT, FUNC, ALLOC, DSGN, PROD, OPER)

21. **Release Date:** 5 / 13 / 88

22. **CCD Number:** NCP 11550, NCP 11690
    (Configuration Control Decision)

23. **CCD Approval Date:** 5 / 2 / 89

24. **Document Date:** 5 / 13 / 88
    (Date of publication, if different from "Release Date")

25. **Stock Point:** N/A
    (FAA Depot, Aero Center, Tech Center, etc.)

26. **Document Status:** Active
    (Active, Inactive, Obsolete, Cancelled):

27. **Change/Chapter Status:** Active
    (Active, Inactive, Obsolete, Cancelled):

Specification Change Notice (SCN)

1. Originator Name and Address	2.	3. Code Ident	4. Spec No.
FAA, ASA-230 800 Independence Ave. SW Washington, D.C. 20591	☐ Proposed ☒ Approved	N/A	FAA-S-2834
		5. Code Ident N/A	6. SCN No. 2, 3

7. System Designation	8. Related ECP/NCP No.	9. Contract No.	10. Procuring Activity
MWP	None	N/A	RFP-DTFA01-88-86813

11. Configuration Item Nomenclature	12. Effectivity
MWP System Specification	N/A

This notice informs recipients that the specification identified by the number (and revision letter) shown in block 4 has been changed. The pages changed by this SCN (being those furnished herewith) carry the same date as this SCN. The page numbers and dates listed below in the summary of changed pages, combined with nonlisted pages of the original issue of the revision shown in block 4, constitute the current version of this specification.

13. SCN No.	14. Pages Changed (Indicate Deletions)	S*	A*	15. Date
2	NCP 11550			May 2, 1989
	pages 3	S		
	3A-4		A	
	11-12	S		
	23-30	S		
	33	S		
	33A-34		A	
3	NCP 11690			May 2, 1989
	pages i-vi	S		
	5-6	S		
	23-29	S		
	37-44	S		

16. Technical Concurrence	17. Date

*"S" Indicates Supercedes Earlier Page; "A" Indicates Added Page

G7099-4

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2. APPLICABLE DOCUMENTS.

2.1 Government Documents.- The following documents form a part of this specification to the extent specified in the contract. In the event of conflict between the documents referenced in the contract and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.1.1 Federal Aviation Administration (FAA) Documents.

2.1.1.1 FAA Specification.

None

2.1.1.2 FAA Standards.

(a)	FAA-STD-020	Transient Protection Grounding, Bonding, and Shielding Requirements for Equipment.
(b)	FAA-G-2100e	Electronic Equipment, General Specification

2.1.1.3 Other FAA Publications.

(a)	NAS Plan	National Airspace System Plan
(b)	FAA Order 6950.2C	Electrical Power Policy Implementation at National Airspace System Facilities, January 5, 1987
(c)	FAA Order 6950.15B	ARTCC Critical Load Circuits and Configuration

2.1.2 Military Documents.

(a)	MIL-STD-461C	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.

2.1.3 Other Federal Documents.

(a)	US DoC, NOAA	The GOES User's Guide

(b)	US DoC, NOAA	National Weather Service Operations Manual
(c)	OSHA-29	CFR 1910 OSHA Safety and Health Standard

2.2 Non-government Document.- The following document form a part of this specification to the extent specified in the contract. In the event of conflict between the document referenced in the contract and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

(a)	WMO No. 485	Manual on the Global Data Processing System

3. REQUIREMENTS.

3.1 System Definition.- The MWP is one element of the Central Weather Processor program the FAA has identified in the NAS Plan [2.1.1.3(a)], which describes all programs planned for modernizing and improving air traffic control and airway facilities services by the year 2000. The Plan outlines a number of modernization programs designed to improve weather information collection, analysis, and dissemination, with the objective of enhancing the safety and efficiency of the NAS.

The MWP will be a computer-based interactive meteorological data processing service for use by CWSU/CFWSU meteorologists. The MWP will receive weather information from external sources and process, store, and display those data. The MWP will be capable of receiving radar weather data, weather satellite data, alphanumeric weather data, and graphical weather products. The MWP will also be capable of creating alphanumeric products, line graphics and/or annotations to graphical products. MWPs will be deployed at all CWSUs including Anchorage, AK, with two systems deployed at the CFWSU in the Central Flow Control Facility.

3.1.1 Missions.- The mission of the MWP will be to provide CWSU and CFWSU meteorologists with the capability to rapidly assimilate weather information, interactively perform analytical functions, and create weather products for use within the CWSU/CFWSU. Additionally the MWP shall provide for the display of weather products at briefing terminals located throughout the ARTCC/ACF and CFCF for use by Traffic Management personnel. To accomplish this mission, the MWP shall be capable of the processing necessary to perform the following functions:

(a) Simultaneous and continuous receipt of a specified set of weather products.

(b) Processing and storage of a specified set of weather products.

(c) The capability to display radar, satellite, or graphic products for the meteorologist's use with graphic display capabilities.

(d) The capability to produce or acquire selected meteorological analyses.

(e) The capability for the meteorologist to display, compose and manipulate alphanumeric weather products for display at briefing positions located in the Traffic Management Unit (TMU) and/or at other locations within the ARTCC/ACF and CFCF.

(f) The capability for the meteorologist to create graphics and/or annotations to existing graphics for display at briefing positions located in the TMU and/or at other locations within the ARTCC/ACF or CFCF.

3.1.2 Threat.- N/A

3.1.3 System Modes and States.- N/A

3.1.4 System Functions.- The MWP functional requirements stated in this section have been organized into 10 major areas. These are:

(a) Radar products.

(b) Satellite products.

(c) Alphanumeric products.

(d) NMC Graphic/Gridded products.

(e) Weather data analysis products.

(f) Alarm capabilities.

(g) MWP monitoring and control capabilities.

(h) Man-Machine interactive processing.

(i) Retention.

(j) Archiving.

3.1.4.1 RADAR Products.

3.1.4.1.1 Individual RADAR Products.

3.1.4.1.1.1 Individual Radar Products from RADARS Contributing to the Mosaic.

3.1.4.1.1.1.1 Site Specific List.- Each MWP shall be capable of continually receiving and retaining scans of radar reflectivity data from all of the RADARs (as defined in the Glossary) in a GFE site-specific list. These radars are designated the Mosaic RADARs. The MWP shall be capable of expansion to continually receive and retain scans of RADAR reflectivity data from up to sixteen (16) RADARs at any site to accommodate ARTCC/ACF boundary adjustments.

3.1.4.1.1.1.2 Mosaic Radar Update Interval.- The MWP shall be capable of receiving an updated scan from each Mosaic RADAR with a frequency of at least one scan in the Mosaic RADAR Update Interval (as defined in the glossary).

3.1.4.1.1.2 Individual Radar Products from RADARs Not Contributing to the Mosaic.

3.1.4.1.1.2.1 Acquisition of Non-Mosaic Radar Scans.- The MWP shall provide the capability to acquire and make available for display current scans of radar reflectivity data from any RADAR.

3.1.4.1.1.3 Individual Radar Scans Ready For Display.- The MWP shall have available for display any Individual RADAR Scan within the times specified in Table 3-2 from receipt by the MWP of the last bit of the scan.

3.1.4.1.1.4 RADAR Display Product Projection.

3.1.4.1.1.4.1 RADAR-Centered Projection. - The MWP shall be capable of displaying the individual RADAR display product in a radar-centered projection with the RADAR data registered with the orientation of the background map.

3.1.4.1.1.4.2 MWP System Projection. - The MWP shall be capable of displaying the individual RADAR display product in the MWP System projection (as defined in the glossary).

3.1.4.1.1.5 RADAR Display Product Resolution.- The MWP shall display Individual RADAR Scans with a resolution at least as fine as 2 by 2 kilometers.

3.1.4.1.1.6 RADAR Display Product Coverage.- The MWP shall be capable of displaying Individual RADAR Scans out to the maximum coverage area of the RADAR.

3.1.4.1.2 RADAR Mosaic Product.- The RADAR Mosaic Product shall be available only at ARTCC MWPs.

3.1.4.2.2.2.5.1 Default Enhancement Curves.- The MWP shall provide the NESDIS Infrared Enhancement curves for use in enhancing infrared image products, as specified in the GOES Users Guide (2.1.3(a)).

3.1.4.2.2.2.5.2 User-Specified Infrared Enhancement Curves.- The MWP shall allow the user to specify infrared enhancement curves, use the specified enhancement curves to enhance the infrared image products, and store the user-specified enhancement curves for retrieval when required.

Table 3-1a.
GOES Display Product Characteristics

Product Wavelength (um)	Resolution (km)	Area of Coverage	Radiometric Resolution
Visible - 0.65	14 x 14	NA	6 bits
IR - 11.17	14 x 14	NA	6 bits
IR - 6.725	14 x 14	NA	6 bits
IR - 3.945	14 x 14	NA	6 bits
Visible - 0.65	1 x 1	IA	6 bits
IR - 11.17	7 x 7	IA	6 bits
IR - 6.725	14 x 14	IA	6 bits
IR - 3.945	14 x 14	IA	6 bits

Note:

(a) North America (NA) - 75 deg latitude x 120 deg longitude

(b) Intermediate Area (IA) - 1600 x 1600 km

(c) Product Wavelength is the center frequency for the Visible and IR bands.

(d) For the Visible IA product, area coverage of a 1600 x 1600 km area at 1 km resolution does not imply nor intend the capability to display a total IA visible product, at 1 km resolution, at one time.

3.1.4.2.3 Polar Orbiter Satellite Display Products.

3.1.4.2.3.1 Polar Orbiter Display Products.- The MWP shall be capable of displaying satellite imagery from the Polar Orbiter (TIROS-N) satellite which is equivalent in projection, resolution, and geographic coverage to imagery available from the GOES-Tap.

3.1.4.2.3.2 Polar Orbiter Display Product Generation Time.- The MWP shall make available for display the Polar Orbiter display products within the times specified in Table 3-2 after the imagery are available on GOES-Tap.

3.1.4.2.4 Satellite Product Navigation.- The MWP shall use the orbit and attitude data received from the GOES (East and West) satellites to navigate the satellite product display data.

3.1.4.3 Alphanumeric Product Display.- The MWP shall be capable of displaying the alphanumeric products listed in Appendix I, Table 10-1 including all corrections and amendments for geographic areas including the United States, Mexico, Canada, the Caribbean, North Atlantic, and North Pacific locations.

3.1.4.4 NMC Graphic/Gridded Products.

3.1.4.4.1 NMC Graphic Display Product.

3.1.4.8.1.2.1.4 SAO Display Format.- The MWP shall display Surface Observations in a tabular form based on individual field contents.

3.1.4.8.1.2.1.5 Accumulate/Replace.- The MWP shall allow the user to both accumulate alphanumeric products on the display (add to the previously displayed products) and have the capability to have the display cleared for each alphanumeric product request (replace the previously displayed products).

3.1.4.8.1.2.1.6 Collectives Display.- The MWP shall be capable of displaying all available alphanumeric products on the same display grouped by product type, time, city, or state at the request of the user.

3.1.4.8.1.2.1.7 Alarm Display.- The MWP shall be capable of displaying alphanumeric alarm messages.

3.1.4.8.1.2.1.8 Alarm Set-up.- The MWP shall provide the following alarm set-up capabilities:

(a) to enable/disable audible and visual alarms.

(b) to set the threshold parameters specified in 3.1.4.6.

3.1.4.8.1.2.2 Graphic and Image Product, and Background Map Display Capabilities.- The MWP shall be capable of displaying any graphic and image product, and background map along with a label including, at a minimum, the product's date/time and identification string.

3.1.4.8.1.2.2.1 Overlay.- The MWP shall be capable of overlaying any combination of up to 6 products (graphic, each in a separate color, image, background maps) in the same projection with a maximum of 2 image products displayed at any one time.

3.1.4.8.1.2.2.2 Zoom.- The MWP shall be capable of zooming randomly any portion of a graphic product, using coordinate transformation, and image products along with the accompanying background maps up to a magnification of at least 16:1 with at least 4 intermediate steps. Image products may be zoomed using pixel replication.

3.1.4.8.1.2.2.3 Pan.- The MWP shall be capable of panning (i.e., moving the viewing window of) any zoomed product up to the non-zoomed product boundary.

3.1.4.8.1.2.2.4 Animation.- The MWP shall be capable of providing the user with the following capabilities:

(a) Displaying at least 24 versions of retained image products with background maps or at least 24 vector graphic and/or image products with background maps defined by the user in rapid sequence and in chronological order. The MWP shall display the image and graphic products at the resolutions specified in sections 3.1.4.1, 3.1.4.2, and 3.1.4.4 for RADAR, satellite, and NMC graphic/plot products during animation.

(b) To change the direction of the animation (forward and backward).

(c) To select the animation speed from 1 frame per second to at least 6 frames per second in discrete steps.

(d) To pause and restart the animation sequence.

(e) To remove/restore individual frames from the animation sequence.

3.1.4.8.1.2.2.5 Combined Capabilities.- The MWP shall be capable of performing pixel replication zoom, pan, and animation in any order and combination.

3.1.4.8.1.2.2.6 Color.- The MWP shall provide the user with the capability to select colors to be displayed from a minimum of 256 colors and to assign any of the selected colors to the following:

(a) Each radar reflectivity level.

(b) Each satellite enhancement curve segment.

(c) Each background map.

(d) Each vector graphic overlay.

(e) Each manually created graphic product/annotation (3.1.4.8.1.2).

(f) each thermodynamic diagram data element (i.e. temperature, dewpoint temperature, and wind speed/direction).

3.1.4.8.1.2.2.7 Product Capabilities.- The MWP shall provide the user with the capability to define default values, settings, and selections for the following capabilities:

(a) Creation, modification and execution of the satellite enhancement curves. If a satellite product is currently being displayed for which an enhancement curve is being modified, the results of the modification shall be indicated on the displayed product.

(b) Selection of parameters for station model plots, contour analyses, and vertical cross sections.

(c) Selection of contour intervals for display of horizontal objective analysis products, vertical cross section analysis products, and products specified in Appendix III.

(d) Selection of baselines for vertical cross sections.

(e) Selection of the stations to be plotted in station model plots.

(f) Automatic update of the display of individual RADAR images from the continuous Mosaic RADARs and Mosaic Updates.

3.1.4.8.1.2.2.8 Background Maps.

3.1.4.8.1.2.2.8.1 Display Of Background Maps.- The MWP shall be capable of displaying any of the following background maps at the meteorologist workstation:

(a) Geopolitical Boundaries for Northern Hemisphere.

(b) Geopolitical Boundaries for North America.

(c) Geopolitical Boundaries for the United States.

(d) Geopolitical Boundaries for States.

(e) ARTCC/ACF Sector boundaries, low.

(f) ARTCC/ACF Sector boundaries, high.

(g) Major jet routes.

(h) Major Victor airways.

(i) ARTCC/ACF boundaries.

(j) Navigational aids (NAVAIDs).

(k) Airports.

(l) Holding Pattern airspace.

(m) Special Use Airspace.

(n) Radar site locations.

(o) Surface observation stations.

(p) FT reporting stations.

(q) Upper air sounding stations.

(r) RADAR range rings.

3.1.4.8.1.2.2.8.2 Background Map Projections.- At a minimum, the MWP shall provide the following background maps for each of the following projections:

(a) MWP System Projection - 3.1.4.8.1.2.2.8 (a - t)

(b) Satellite Perspective Projection - 3.1.4.8.1.2.2.8 (a - d)

(c) Individual RADAR Projection - 3.1.4.8.1.2.2.8 (d, t)

3.1.4.8.1.2.2.8.3 Modification of Background Maps.- The MWP shall be capable of modifying and deleting existing maps, and adding new maps as well as updating information on existing maps.

3.1.4.8.1.3 Hardcopy.- The MWP shall be capable of producing color hardcopy of any product on any of the Meteorologist Workstation monitors within the times specified in Table 3-2.

3.1.4.8.1.4 Error Messages.- The MWP shall generate system as well as user input error messages containing English text which aid the user as much as possible without reference to a manual.

3.1.4.8.1.5 Deletion Recovery.- The MWP shall provide a mechanism that either cautions the user when deleting products or data, or allows the user to recover inadvertently deleted products or data.

3.1.4.8.1.6 Response Times.- The MWP shall perform all MMI functions and capabilities within the times specified in Table 3-2 and generate a textual message (e.g., "working"), indicating to the user that the MWP is working on the user's request, when any function or capability takes more than 5 seconds to complete.

3.1.4.8.1.7 Retention Control.

3.1.4.8.1.7.1 User Specified Retention Control.- The MWP shall provide the meteorologist user with the capability to specify the interval between versions retained for individual RADAR products, mosaic RADAR products, and satellite image products.

3.1.4.8.1.7.2 Default for Retention Control.- The MWP shall by default retain each sequential version of the product.

3.1.4.8.1.8 Retained Product Directory. - The MWP shall provide the capability for the user to view a directory (list) of all retained products, including those created by the meteorologist, available for display at the meteorologist workstation.

3.1.4.8.2 Briefing Terminal MMI.

3.1.4.8.2.1 Briefing Terminal Product Access.- The MWP shall allow the display of a limited set of retained products at any briefing terminal upon request from that briefing terminal including, at a minimum, the most recent version of all products within each category.

(a) RADAR Mosaic Product (ARTCCs only)
(b) Retained Individual Radar Site Scans
(c) National Radar Image Product
(d) Satellite Product
  (i) 7 km visible and infrared
  (ii) 14 km visible and infrared
(e) NMC Graphic Products
(f) Manually Created Products
(g) Alphanumeric Products

3.1.4.8.2.2 Retained Product Directory. - The MWP shall provide the user with the capability to view a directory (list) of all retained products, including those created by the meteorologist, available for display at the TMU briefing terminals.

3.1.4.8.2.3 Product Display Response Times.- The MWP shall display products at the briefing terminals within the same response times specified in Table 3-2 for the Meteorologist Workstation.

3.1.4.8.2.4 Briefing Terminal Background Maps. - The MWP shall be capable of displaying any of the background maps specified in section 3.1.4.8.1.2.2.8.1 in the map projections specified in section 3.1.4.8.1.2.2.8.2 when displaying any of the products specified in section 3.1.4.8.2.1 at any briefing terminal.

3.1.4.9 Retention.- At a minimum, the MWP shall be capable of retaining the following products for the specified time as well as those products listed in Appendices I, II, III Tables 10-1, 20-1, 30-1, and 30-2.

(a) PIREPs for a minimum of three hours after the time of phenomena or time of transmission if no time of phenomena is available,

(b) All hourly and special surface observations for a minimum of 12 hours after time of receipt,

(c) All terminal forecasts for a minimum of 30 hours after time of receipt,

(d) All area forecasts for a minimum of 30 hours after time of receipt,

(e) Wind and temperature forecasts (surface and aloft) for a minimum of 30 hours after time of receipt,

(f) Weather advisories, warnings, and impact statements for a minimum of 72 hours after time of receipt,

(g) Meteorologist generated products for a minimum of 72 hours after time of generation.

(h) A minimum of 48 updates of the RADAR mosaic maps.

(i) A minimum of 24 individual RADAR images from up to 5 RADAR sites.

(j) A minimum of 24 NA visible satellite images and 12 IA visible satellite images.

(k) A minimum of 24 NA infrared satellite images and 12 IA infrared satellite images.

(l) The most recent RADAR image from each of the Mosaic RADARs in a GFE site-specific list.

(m) A minimum of 24 updates of the National RADAR Product.

For the products described in h, i, j, and k above, the MWP shall have available for display the most recently received version of each product irrespective of the interval between retained versions of these products.

3.1.4.10 Archiving.

3.1.4.10.1 Product Archiving.- The MWP shall automatically archive all products generated, annotated, modified, or amended by the meteorologist user upon generation or modification of the product, without requiring user initiation of the archive capability.

3.1.4.10.2 Received Product Log.- The MWP shall automatically archive a log of all product IDs for those products received by the MWP including the header and date-time group .

3.1.4.10.3 Output of Archived Products and Logs.- The MWP shall be capable of making hardcopy reproductions of archived products and logs.

3.1.4.10.4 Meteorologist Interaction Archiving.- The MWP shall automatically archive all meteorologist user interactions with the system.

3.1.4.11 Concurrent Processing.- The MWP shall be capable of concurrently ingesting weather data including, but not limited to, radar, satellite, alphanumeric and graphic products while performing the processing required to support the meteorologist at an interactive workstation and providing display capabilities at the TMU briefing positions.

3.1.5 System Functional Relationships.- (N/A)

3.1.6 Configuration Allocation.- (N/A)

3.1.7 External Outputs.- (N/A)

3.1.8 Government Furnished Property List.- The Government Furnished Property List shall be as specified in the contract.

Table 3-2 MWP Performance Requirements

MWP Retrieval/Storage Times (1)

FUNCTIONS	AVERAGE	99.5 PERCENTILE	MAXIMUM
Display of all products and maps (2), (6)	3	5	10
Store manually created alphanumeric product	3	5	10
Store manually created annotated graphic product	5	10	20

MWP Product Generation Times (3)

FUNCTIONS	AVERAGE	99.5 PERCENTILE	MAXIMUM
Individual radar	5	10	20
Center Radar Mosaic	(See Section 3.1.4.1.2)		
National Radar	3 min	5 min	10 min
Satellite	15 min	20 min	30 min
NMC Graphic/Gridded	25	30	40
Station model plots	15	20	30
Thermodynamic	3	5	10
Contour Analyses	20	25	35
Vertical Cross Section	25	30	40

MWP MMI Functions

Alarm notif.(4)	3	5	10
Visual feedback of keyboard keystrokes or mouse entry (6)	0.1	.21	0.4
Zoom (pixel replication)	0.5	1	1.2
Zoom (coordinate trans.)	3.0	5	10.0
Pan (w/pixel replic.)	0.5	1	1.2
Pan (w/coord. trans. replication zoom)	3.0	5	10.0
Spool hardcopy (5)	3.0	5	10.0

Notes:

(1) All numbers are in seconds unless otherwise noted, and a normal distribution is assumed.

(d) Capable of producing a 7-1/2 by 10 inch hardcopy output of an image product within 3 minutes after the hardcopy output commences.

(e) Meet OSHA standard OSHA-29 with respect to acceptable noise levels.

3.2.1.4 Weight Limits.

3.2.1.4.1 Floor Loading.- Cabinets and frames shall be designed for an average weight distribution of floor loading not to exceed 610.3 kg/sq.m (125 lb/sq.ft).

3.2.1.4.2 Point Loads.- The MWP shall have no point load that exceeds 1000 lb/sq. inch over a 4 square foot area for each single cabinet and rack.

3.2.1.5 Sizes.

3.2.1.5.1 Dimensional Limits.- The MWP racks, cabinets, and frames shall have dimensions that do not exceed 1.9 m (76 in.) in height, 0.9 m (36 in.) in width, and 0.9 m (36 in.) in depth.

3.2.1.5.2 MWP Floor Space.- The MWP computer equipment shall require a clear floor space no larger than 50 square feet.

3.2.1.5.3 Workstation Floor Space.- The MWP workstation shall require a clear floor space no larger than 75 square feet.

3.2.1.5.4 Workstation to Equipment Distance.- The MWP shall be designed to accommodate a cable run of up to 300 ft from the work station to the supporting processors.

3.2.1.5.5 TMU Briefing Terminal Floor Space.- The TMU Briefing Terminal shall require a clear floor space no larger than 6 square feet.

3.2.1.6 Power Requirements.- The MWP shall connect to the Critical Power Supply at each ARTCC/ACF and CFCF in accordance with FAA Order 6950.15, ARTCC Critical Load Circuits and Configuration.

3.2.1.6.1 Protection.- The MWP shall have transient power protection, grounding, bonding and shielding in accordance with FAA-STD-020. (2.1.1.2(a))

3.2.1.6.2 Power Load. - The MWP shall present a load to the Critical Power Supply that meets the requirements of FAA-G-2100e, Electronic Equipment, General Specification, sections 3.3.2, 3.3.4, 3.3.7.

3.2.1.6.3 Electrical Implementation. - The installed MWP equipment at all FAA NAS Facilities shall comply with FAA Order 6950.2C, Electrical Power Policy Implementation at National Airspace System Facilities.

3.2.2 Environmental Requirements.- The MWP shall, at a minimum, be capable of operating in the ARTCC under the following environmental conditions:

a. Temperature: 75° F $\pm 15^{\circ}$
b. Relative Humidity: 10% - 80%

3.2.3 Electromagnetic Interference Requirements.- The MWP equipment shall meet the EMI requirements according to MIL-STD-461C, (Section 7. (2.1.2.(a))

3.3 Processing Requirements.- (N/A)

3.4 Quality Factors. - The MWP contractor shall establish and maintain a Quality Control Program in accordance with the Statement of Work. In addition the quality factors in the following sections apply.

3.4.1 Reliability.- The mean time between failures (MTBF) for each hardware component shall be such that the system availability specified in 3.4.3 can be met.

3.4.2 Modifiability.

3.4.2.1 Maintainability.- The System mean-down-time (MDT) per incident for all repair actions shall be limited to 4 hours with a maximum down time of 8 hours per incident. Down time consists of the time to localize the fault, travel and administrative time, and the time to certify correct operation of the repaired system, when correcting a malfunction within the system.

3.4.2.2 Flexibility and Expansion.- This section contains known areas of future expansion for the MWP.

3.4.2.2.1 NEXRAD.- As NEXRAD radars are commissioned, RRWDS equipped weather radars will be decommissioned. As NEXRAD radars become available, the MWP shall, at a minimum, provide NEXRAD reflectivity data in the RADAR Mosaic Product and Individual RADAR image products. Known differences between RRWDS and NEXRAD include the following:

(a) NEXRAD scans in a volume scan with scan period, depending on the scan mode, of from 5 to 10 minutes.

(b) NEXRAD data are available at higher data rates than RRWDS provides data.

(c) NEXRAD provides a request capability for weather radar products.

3.4.2.2.2 GOES-NEXT.- The MWP shall ingest and display GOES-NEXT data when the GOES-NEXT satellite series go into service. Known changes between GOES and GOES-NEXT include the following:

(a) Data Stream (Rates)

4.1.5 Test Levels.- The MWP system shall be tested at the system level.

4.1.6 Special Tests and Examinations.- N/A

4.2 Formal Tests.- Formal testing of the MWP system shall include Factory Acceptance Test (FAT) and Site Acceptance Test (SAT). The details of these formal tests shall be defined in the Statement of Work.

4.3 Formal Test Constraints.- There are no formal test constraints on the MWP system other than the fact that all MWP system-level requirements shall be verified.

4.4 Qualification Cross Reference Table.- Table 4-1 defines, for each system requirement stated in Section 3, the qualification method to be used to validate the requirement.

Table 4-1 Qualification Table

Paragraph Number	Paragraph Name	Method
3	REQUIREMENTS	N/A
3.1	System Definition	N/A
3.1.1	Missions	N/A
3.1.2	Threat	N/A
3.1.3	System Modes and States	N/A
3.1.4	System Functions	N/A
3.1.4.1	RADAR Products	N/A
3.1.4.1.1	Individual RADAR Products	N/A
3.1.4.1.1.1	Individual Radar Products from RADARS Contributing to the Mosaic	N/A
3.1.4.1.1.1.1	Site Specific List	D,A,I
3.1.4.1.1.1.2	Mosaic Radar Update Interval	A,T
3.1.4.1.1.2	Individual Radar Products from RADARs Not Contributing to the Mosaic	N/A
3.1.4.1.1.2.1	Acquisition of Non-Mosaic Radar Scans	D,A
3.1.4.1.1.3	Individual Radar Scans Ready For Display	T,A
3.1.4.1.1.4	RADAR Display Product Projection	N/A
3.1.4.1.1.4.1	RADAR-Centered Projection	D
3.1.4.1.1.4.2	MWP System Projection	D,A
3.1.4.1.1.5	RADAR Display Product Resolution	D,A
3.1.4.1.1.6	RADAR Display Product Coverage	D,A
3.1.4.1.2	RADAR Mosaic Product	D
3.1.4.1.2.1	RADAR Mosaic Product Update Frequency	D,T,A
3.1.4.1.2.2	Age of Data in RADAR Mosaic Product Updates	T,A
3.1.4.1.2.3	RADAR Mosaic Product Projection	D,A
3.1.4.1.2.4	RADAR Mosaic Product Resolution	D,A
3.1.4.1.2.5	RADAR Mosaic Product Coverage	D,A
3.1.4.1.2.6	Invalid Scans From Non-ARSR RRWDS Equipped RADAR	T,A
3.1.4.1.2.7	Mosaic Cell Determination	D,A
3.1.4.1.2.7.1	No Radar Coverage	D,T,A
3.1.4.1.2.7.2	Multiple Coverage	T,A
3.1.4.1.2.7.3	No Valid Data Coverage	D,T,A
3.1.4.1.2.8	Mosaic RADAR Utilization	T,A
3.1.4.1.2.9	Mosaic Product Reflectivity Levels	T,A
3.1.4.1.3	National Radar Product	D,A
3.1.4.1.3.1	National Radar Product Projection	D,A
3.1.4.1.3.2	National Radar Product Resolution	D,A
3.1.4.1.3.3	National Radar Product Update Frequency	D,T

Paragraph Number	Paragraph Name	Method
3.1.4.1.3.4	National Radar Product Available for Display	T,A
3.1.4.1.4	RADAR Product(s) Display	N/A
3.1.4.1.4.1	Image Display	D
3.1.4.1.4.2	Reflectivity Levels	D,A
3.1.4.1.5	Automatic Display Update	D,A
3.1.4.2	Satellite Products	D
3.1.4.2.1	Satellite Product Update	T,A
3.1.4.2.2	GOES Satellite Display Products	D
3.1.4.2.2.1	Visible Image Products	N/A
3.1.4.2.2.1.1	Satellite Display Product Resolution	D,A
3.1.4.2.2.1.2	Satellite Product Sectorization	D,A
3.1.4.2.2.1.3	Satellite Display Product Generation Time	T,A
3.1.4.2.2.1.4	Satellite Display Product Projections	D,A
3.1.4.2.2.1.5	Visible Image Enhancement	D,A
3.1.4.2.2.1.6	User Specified Visible Image Enhancement	D
3.1.4.2.2.2	Infrared Image Products	N/A
3.1.4.2.2.2.1	Satellite Display Product Resolution	D,A
3.1.4.2.2.2.2	Satellite Product Sectorization	D,A
3.1.4.2.2.2.3	Satellite Display Product Generation Time	T,A
3.1.4.2.2.2.4	Satellite Display Product Projections	D,A
3.1.4.2.2.2.5	Infrared Image Enhancement	D,A
3.1.4.2.2.2.5.1	Default Enhancement Curves	D,A
3.1.4.2.2.2.5.2	User-Specified Infrared Enhancement Curves	D
3.1.4.2.3	Polar Orbiter Satellite Products	N/A
3.1.4.2.3.1	Polar Orbiter Display Products	D,A
3.1.4.2.3.2	Polar Orbiter Display Product Generation Time	T,A
3.1.4.2.4	Satellite Product Navigation	D,T,A
3.1.4.3	Alphanumeric Product Display	D
3.1.4.4	NMC Graphic/Gridded Products	N/A
3.1.4.4.1	NMC Graphic Display Product	N/A
3.1.4.4.1.1	NMC Graphic Product Content	D,A
3.1.4.4.1.2	NMC Graphic Display Product Generation	T,A
3.1.4.4.1.3	NMC Plotted Product Content	D,A
3.1.4.4.1.4	NMC Plotted Display Product Generation	T,A
3.1.4.4.2	NMC Gridded Display Product	D,A
3.1.4.4.2.1	NMC Gridded Display Product Projection	D,A
3.1.4.4.2.2	NMC Gridded Display Product Area Coverage	D,A
3.1.4.4.2.3	NMC Gridded Display Product Generation	T,A
3.1.4.5	Weather Data Analyses Products	N/A
3.1.4.5.1	Station Model Plots	D,A

Paragraph Number	Paragraph Name	Method
3.1.4.5.1.1	Data Types	D,A
3.1.4.5.1.2	Station Model Plot Display Product Area of Coverage	D,A
3.1.4.5.1.3	Station Model Plot Request	D
3.1.4.5.1.3.1	Station Selection	D
3.1.4.5.1.3.2	Parameter Selection	D
3.1.4.5.1.3.3	Default Station Model Plot Parameters	D
3.1.4.5.1.4	Station Model Plot Display Product	D
3.1.4.5.1.4.1	Station Model Plot Display Product Generation	T,A
3.1.4.5.1.4.2	Station Model Plot Display Product Projections	D,A
3.1.4.5.1.4.3	Meteorological Symbols	D
3.1.4.5.2	Thermodynamic Diagrams and Sounding Analysis	D,A
3.1.4.5.2.1	Data Sources	D,T,A
3.1.4.5.2.2	Thermodynamic Diagrams	D
3.1.4.5.2.2.1	Thermodynamic Diagram Request	D
3.1.4.5.2.2.2	Thermodynamic Diagram Display Generation	D,A
3.1.4.5.2.2.3	Thermodynamic Diagram Display Format	D,A
3.1.4.5.2.3	Sounding Analyses	D,A
3.1.4.5.2.3.1	Sounding Analysis Request	D
3.1.4.5.2.3.2	Sounding Analysis Generation	T,A
3.1.4.5.3	Horizontal Objective Analyses	D,A
3.1.4.5.3.1	Surface Analyses	T,A
3.1.4.5.3.1.1	Observed Surface Parameters	D,A
3.1.4.5.3.1.2	Derived Surface Parameters	D,A
3.1.4.5.3.1.3	Surface Analysis Area	D,A
3.1.4.5.3.2	Upper Air Analyses	D,T,A
3.1.4.5.3.2.1	Observed Upper Air Parameters	D,A
3.1.4.5.3.2.2	Derived Upper Air Parameters	D,A
3.1.4.5.3.2.3	Additional Analysis Parameters	D,A
3.1.4.5.3.2.4	Upper Air Analysis Area	D
3.1.4.5.3.3	Horizontal Objective Analysis Display Products	N/A
3.1.4.5.3.3.1	Contouring or Streamlining	D,T
3.1.4.5.3.3.1.1	Labeling Contours	D
3.1.4.5.3.3.1.2	Labeling Maxima and Minima	D
3.1.4.5.3.3.1.3	Contour Interval	D
3.1.4.5.3.3.1.4	Contour Values	D,A
3.1.4.5.4	Vertical Cross Section Products	N/A
3.1.4.5.4.1	Cross Section Baselines	D,A

Paragraph Number	Paragraph Name	Method
3.1.4.5.4.2	Relationship to Upper Air Reporting Stations	D
3.1.4.5.4.3	Observed Upper Air Parameters	D,A
3.1.4.5.4.4	Derived Upper Air Parameters	D,A
3.1.4.5.4.5	Vertical Cross Section Display Products	D,A
3.1.4.5.4.5.1	Labeling Maxima and Minima	D
3.1.4.5.4.5.2	Labeling Contours	D
3.1.4.5.4.5.3	Contour Interval	D
3.1.4.6	Weather Alarm Capabilities	D,T,A
3.1.4.7	MWP Monitoring and Control Capabilities	D,T,A
3.1.4.8	Man-Machine Interface (MMI)	D
3.1.4.8.1	Meteorologist Workstation MMI	D
3.1.4.8.1.1	Manual Product Generation and Manipulation	D
3.1.4.8.1.1.1	Alphanumeric Products	N/A
3.1.4.8.1.1.1.1	Manually Created Alphanumeric Products	D
3.1.4.8.1.1.1.2	Tools	D
3.1.4.8.1.1.2	Graphic Products	N/A
3.1.4.8.1.1.2.1	Manually Created Graphic Products	D
3.1.4.8.1.1.2.2	Tools	D
3.1.4.8.1.1.2.3	Annotate Stored Graphic/Image Products	D
3.1.4.8.1.1.2.4	Storing Created/Annotated Products with a Unique ID	D,A
3.1.4.8.1.2	Data Display Request	D,A
3.1.4.8.1.2.1	Alphanumeric Display Capabilities	N/A
3.1.4.8.1.2.1.1	Alphanumeric Product Display	D,A
3.1.4.8.1.2.1.2	Multiple Version Product Display	D
3.1.4.8.1.2.1.3	Received Product Display	D,A
3.1.4.8.1.2.1.4	SAO Display Format	D
3.1.4.8.1.2.1.5	Accumulate/Replace	D
3.1.4.8.1.2.1.6	Collectives Display	D
3.1.4.8.1.2.1.7	Alarm Display	D,T
3.1.4.8.1.2.1.8	Alarm Set-up	D,A
3.1.4.8.1.2.2	Graphic and Image Product, and Background Map Display Capabilities	D
3.1.4.8.1.2.2.1	Overlay	D,A
3.1.4.8.1.2.2.2	Zoom	D,A
3.1.4.8.1.2.2.3	Pan	D
3.1.4.8.1.2.2.4	Animation	D,A
3.1.4.8.1.2.2.5	Combined Capabilities	D,A
3.1.4.8.1.2.2.6	Color	D
3.1.4.8.1.2.2.7	Product Capabilities	D
3.1.4.8.1.2.2.8	Background Maps	N/A
3.1.4.8.1.2.2.8.1	Display Of Background Maps	D,A

Paragraph Number	Paragraph Name	Method
3.1.4.8.1.2.2.8.2	Background Map Projections	D,A
3.1.4.8.1.2.2.8.3	Modification of Background Maps	D
3.1.4.8.1.3	Hardcopy	D,T
3.1.4.8.1.4	Error Messages	D
3.1.4.8.1.5	Deletion Recovery	D,A
3.1.4.8.1.6	Response Times	D,T,A
3.1.4.8.1.7	Retention Control	N/A
3.1.4.8.1.7.1	User Specified Retention Control	D,A
3.1.4.8.1.7.2	Default for Retention Control	D,A
3.1.4.8.1.8	Retained Product Directory	D
3.1.4.8.2	Briefing Terminal MMI	N/A
3.1.4.8.2.1	Briefing Terminal Product Access	D
3.1.4.8.2.2	Retained Product Directory	D
3.1.4.8.2.3	Product Display Response Times	D,T
3.1.4.8.2.4	Briefing Terminal Background Maps	D,A
3.1.4.9	Retention	D,A
3.1.4.10	Archiving	N/A
3.1.4.10.1	Product Archiving	D,I
3.1.4.10.2	Received Product Log	D,I
3.1.4.10.3	Output of Archived Products and Logs	D
3.1.4.10.4	Meteorologist Interactions Archiving	D,I
3.1.4.11	Concurrent Processing	D,T,A
3.1.5	System Functional Relationships	N/A
3.1.6	Configuration Allocation	N/A
3.1.7	External Outputs	N/A
3.1.8	Government Furnished Property List	I
3.2	System Characteristics	N/A
3.2.1	Physical Characteristics	N/A
3.2.1.1	Workstation Display Console	I,A
3.2.1.2	Briefing Terminals	I,A
3.2.1.3	Hardcopy Device	D,A,I
3.2.1.4	Weight Limits	N/A
3.2.1.4.1	Floor Loading	I
3.2.1.4.2	Point Loads	I
3.2.1.5	Sizes	N/A
3.2.1.5.1	Dimensional Limits	I
3.2.1.5.2	MWP Floor Space	I
3.2.1.5.3	Workstation Floor Space	I
3.2.1.5.4	Workstation to Equipment Distance	I
3.2.1.5.5	TMU Briefing Terminal Floor Space	I
3.2.1.6	Power Requirements	D,T
3.2.1.6.1	Protection	D,T
3.2.1.6.2	Power Load	D,T

Paragraph Number	Paragraph Name	Method
3.2.1.6.3	Electrical Implementation	D,T
3.2.2	Environmental Requirements	I
3.2.3	Electromagnetic Interference Requirements	I,A
3.3	Processing Requirements	N/A
3.4	Quality Factors	N/A
3.4.1	Reliability	A
3.4.2	Modifiability	N/A
3.4.2.1	Maintainability	A
3.4.2.2	Flexibility and Expansion	N/A
3.4.2.2.1	NEXRAD	N/A
3.4.2.2.2	GOES-NEXT	N/A
3.4.3	Availability	A
3.4.4	Portability	N/A
3.4.5	Additional Quality Factors	N/A
3.5	Logistics	N/A
3.5.1	Support Concept	I,A
3.5.2	Support Facilities	N/A
3.5.3	Supply	N/A
3.5.4	Personnel	N/A
3.5.5	Training	I

5. PREPARATION FOR DELIVERY.- N/A