ORDER

6560.26

PROJECT IMPLEMENTATION PLAN
FOR THE TERMINAL DOPPLER WEATHER RADAR (TDWR)

July 6, 1990

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: A-W(ND/AD/AS/AT/VS/PI)-1; A-W(FS/GC/HD/BU/CS/PO/VN/PR/PN)-2; A-W(NS/LG/TR/SM/NR)-3; A-X(AF)-3; A-Y(FA)-3; A-Z(ES)-3; FAT-0(LTD); FAF-0(LTD)

Initiated By: ANR-150

FOREWORD

This order describes the management structure and direction for the implementation and integration of the Terminal Doppler Weather Radar (TDWR) into the National Airspace System (NAS). It defines the responsibilities of program management in directing the field deployment of the TDWR and describes the overall management functions with emphasis on the supporting roles of the related organizations of the Federal Aviation Administration (FAA) for this program. This order also provides definition to the role of the System Engineering and Integration (SEI) contractor as the Technical Officer (TO) of this program.

Chapters 1 and 2 summarize the TDWR Program and describe the TDWR hardware. Chapters 3 through 7 address program requirements, management responsibilities, and field deployment aspects of the system. Chapters 8 through 10 outline the test verification requirements, logistics support functions, and addresses the environmental and energy issues of this program. The appendices support these chapters and provide more information where appropriate.

Carey Weigel
Program Director for Surveillance

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CHAPTER 1. GENERAL

1. PURPOSE. This order establishes a Terminal Doppler Weather Radar (TDWR) Project Implementation Plan (PIP) which defines management direction and responsibilities for implementation of the TDWR into the National Airspace System (NAS). This plan provides the background, system description, installation schedule, and all the necessary actions and functional responsibilities to install, test, and integrate the TDWR into the NAS.

2. DISTRIBUTION. This order is distributed to director level to the offices of the Associate Administrator for NAS Development, Administration, Airport Safety and Standards, Air Traffic, Aviation Standards, and the Assistant Administrator for Policy and International Aviation; division level to the offices of Flight Standards, Chief Counsel, Human Resources Development, Budget, Civil Aviation Security, Aviation Policy and Plans, Aviation Standards National Field Office, Program and Resource Management, and Personnel; branch level to the NAS Transition and Implementation Service, Logistics Service, Air Traffic Plans and Requirements Service, Systems Maintenance Service, and the Program Director for Surveillance; branch level to regional Airway Facilities Division; branch level to the Facility Support Division at the Aeronautical Center and the Evaluation Staff at the FAA Technical Center; limited distribution to the Air Traffic and Airway Facilities field and sector offices.

3. BACKGROUND. FAA has the responsibility to provide weather information to all users of the NAS. As new and better methods of detecting hazardous weather are developed they need to be incorporated into the air traffic control (ATC) system. The Doppler weather radar, with its unique capability to discern relative motion of storm cells, offers to significantly improve the detection and reporting of hazardous weather conditions within the flight critical area of the terminal. In keeping with its responsibility to improve weather service and increase safety to the flying public, the FAA has established the TDWR Program.

4. DEFINITIONS. See Appendices 1 and 2 for acronyms and definitions, respectively.

5. AUTHORITY TO CHANGE THIS ORDER. This order may be changed by the Program Director for Surveillance. Requests for changes to this document should be directed to:

Program Director for Surveillance, ANR-1
FAA Headquarters
800 Independence Avenue, S.W.
Washington, D.C. 20591,

6.-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS.

a. Mission. The primary mission of the TDWR is to enhance the safety of air travel through the timely detection and reporting of hazardous wind shear in and near the approach and departure zones of an airport. Specific sources of the hazardous wind shear which are to be detected are microbursts and gust fronts. The secondary mission of the TDWR is to improve the management of air traffic in the terminal area through the forecast of wind shifts, detection of precipitation intensity, and ultimately the detection of other hazardous weather phenomena including turbulence and tornadoes.

b. System Concept. The TDWR project combines advanced radar technology, improved weather processing techniques, and enhanced meteorological algorithms to detect hazardous weather within the terminal volume. Information on hazardous weather will be made available to controllers and pilots on a real-time basis. This new system will have high-level accuracy, reliability, maintainability, and be an integral part of the NAS. Digital circuits, fast parallel processing, built-in-test equipment (BITE), and mature software will provide a highly reliable system that meets FAA's hazardous weather coverage requirements for the terminal area. Further, new technology that combines analysis of hazardous weather phenomena with a written message format will improve ATC operation.

c. Acquisition Concept. The acquisition of the TDWR Program is being accomplished by the Federal Aviation Administration (FAA). The program is a major system acquisition and is being procured under the Department of Transportation (DOT) implementation of the Office of Management and Budget (OMB) Circular A-109, Major System Acquisition. The FAA-managed contract requires the contractor to provide all services, materials and data necessary to design, develop, fabricate, test, deliver, install, and checkout the TDWR equipment on a turnkey basis. The Government is responsible for meteorological algorithm development and for procurement of the sites.

d. Contract Award. The TDWR's are being procured under a competitive fixed-price with incentives, multiyear, turnkey with options contract.

21. PURPOSE. The primary purpose of this system is to diminish accidents and flight delays from hazardous weather related causes. Implementation of the TDWR systems will provide real-time hazardous weather information within the terminal area to air traffic controllers and pilots.

22. HISTORY.

a. Research Activities. The research community has contributed greatly in determining detection requirements of hazardous weather phenomena. The research organizations and projects that have contributed or will contribute to the development of the TDWR are summarized in table 2-1. This table provides an overview of the key research and test activities as well as a chronological summary.

TABLE 2-1. GENESIS AND CHRONOLOGICAL SUMMARY OF THE TDWR

DATE	ACTION
1975-76	Scientific community investigates role of wind shear in Eastern, Continental, and Allegheny crashes.
1975-77	National Severe Storms Laboratory (NSSL) investigates thunderstorm turbulence using Doppler radar and instrumented research aircraft penetration and explores the possibility of providing automatically generated warnings to air traffic controllers.
1976	FAA supports Low Level Wind Shear Alert System (LLWAS) development and shows interest in wind-shear detection with Doppler radar.
1978	First authenticated measurement and identification of a microburst by atmospheric scientists using Doppler radar in Northern Illinois Meteorological Research on Downbursts (NIMROD) project.
1979	Doppler radar used to try to measure wind shear in glide path during Severe Environmental Storms and Mesoscale Experiment (SESAME)
1982	Joint Airport Weather Studies (JAWS) conducted to develop a physical description of microbursts, examine detection and warning systems, and study aircraft performance in microbursts. JAWS field work demonstrates technical feasibility of using Doppler radar to detect wind shear.
1982	FAA construction of transportable test-bed Doppler radar begins.
1983	Lincoln Lab conducts Doppler radar data collection program in conjunction with Boston Area NEXRAD Demonstration (BAND).
1984	Classify, Locate, and Avoid Wind Shear (CLAWS) field work at Denver demonstrates feasibility of real-time operational use of Doppler radar for wind-shear detection and warning.
1985	TDWR development program begins with collection of wind-shear data for algorithm development and TDWR performance assessment in summer field project at Memphis, Tennessee, using test-bed Doppler radar, ground-based instruments, and an instrumented aircraft.
1986	First real-time testing of initial wind-shear detection algorithms at Huntsville, Alabama, as part of Cooperative Huntsville Meteorological Experiment (COHMEX).
1987-88	Real-time assessment of TDWR initial wind-shear detection algorithms and display concepts conducted at Denver, Colorado.

b. Existing Facilities and Equipment. Subparagraphs (1) and (2) describe the sources of hazardous wind shear information currently available at airports.

(1) Low Level Wind Shear Alert System (LLWAS). Currently, the only operational ground-based hazardous wind shear detection system in use by the FAA is the LLWAS. This system was designed originally to detect thunderstorm gust fronts and other frontal types of wind shear although recent enhancements have improved the detection of microbursts. The system now detects wind shears and microbursts by using mathematical divergence techniques as well as by calculating the wind difference between individual sensor stations and the network mean. The system consists of five or more anemometers placed in the terminal area to measure the difference of wind speeds between anemometers. Infield windspeeds are calculated to provide detection of ground level wind shear. Studies are currently underway to better define the roles of LLWAS and TDWR in the interim and end-state configurations. The results of these studies will be incorporated in the final TDWR system for field installation.

(2) Pilot Reports (PIREP). The PIREP consist of reports of observed weather conditions by pilots.

c. System Engineering and Integration (SEI) Contractor Study. Although the currently defined NAS weather sensing projects satisfy most FAA hazardous weather detection requirements, there remain hazardous weather conditions that will continue to go undetected in the terminal environment. The most significant of these are low-level wind shears due to microbursts and gust fronts. In addition, more timely data is needed regarding the severity and movement of strong convective activity, tornadoes, precipitation, and turbulence. For this reason a study was conducted by the SEI contractor to better understand these phenomena and to search for cost effective ways to detect and measure them. The results of this study were included in the Terminal Doppler Weather Radar Report (ATC-85-1004). As a result of the SEI contractor study it was concluded that current Doppler radar technology is adequate to meet the terminal area hazardous weather detection requirements and that a TDWR Program is justifiable based on technical, cost, schedule, and benefits considerations. It was determined that a TDWR would be needed to meet the requirements for detecting low-level wind shear due to down drafts, microbursts, and gust fronts. The study determined automation is needed in the TDWR to meet the FAA's requirements of timely weather detection in the terminal area. The technology to meet these "automatic" requirements exists primarily as techniques within the research community. The following systems were considered in the analysis:

(1) Airport Surveillance Radar - Model 9 (ASR-9).

(2) Airport Surface Detection Equipment - Model 3 (ASDE-3).

(3) Next Generation Weather Radar (NEXRAD).

(4) Acoustical Radar.

(5) Sounding Radar.

(6) Light Detection and Ranging.

(7) Anemometers.

(8) Aircraft Mounted Devices.

23. AUTHORIZATION. The development and acquisition of the TDWR Program was promulgated in NAS-SS-1000, NAS System Specification. The TDWR Program has been designated a major system acquisition and is being procured under DOT's implementation of OMB Circular A-109. The authorization rationale for this project is supported by the NAS Plan, NAS System Specification (NAS-SS-1000), the Systems Requirement Statement (SRS), Key Decision Memorandum Number 4 (KDM-4), and the Project Master Plan (PMP).

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CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The TDWR will provide capability that significantly enhances the NAS's ability to provide weather information to the controllers and pilots. It fulfills a requirement for more accurate and timely weather information in the critical area of flight in the terminal area. The key operational functions and control are outlined in table 3-1. Figure 3-1 provides the system functional relationships, and figure 3-2 outlines the four functional units and their interfaces.

a. Improved system characteristics are as follows:

(1) System inherent availability of 99.967 percent.

(2) System reliability.

(a) A system with a Mean Time Between Critical Failures (MTBCF) in excess of 1500 hours.

(b) A system with a mean time between failure (MTBF) of 550 hours.

(3) System maintainability.

(a) A system Mean Time To Repair (MTTR) of 0.5 hours.

(b) BITE to isolate 95 percent of the failures to a single line replaceable unit (LRU) and 100 percent to not more than two (2) LRU's at a 95 percent confidence level.

b. TDWR Configurations. The TDWR system will be delivered in a single configuration and is composed of four functional areas.

(1) Radar Data Acquisition (RDA). The RDA is composed of the antenna, tower, transmitter, receiver/exciter, digital signal processor, base data collection, moving target simulator, and the time series port. The functions of the RDA are to perform the radar detection, signal processing, clutter suppression, control, monitoring, and fault detection/isolation for the TDWR system.

(2) Radar Product Generator (RPG). The RPG is composed of the main computer, meteorological algorithms, data storage devices, control, interface modems, and base data ports. The functions of the RPG include all hardware and software required for control command generation, real-time product generation, product and data storage, product distribution, data archiving, and interface to all external users.

(3) Display Functional Unit (DFU). The display function will display the TDWR output to controllers and supervisors. The interim TDWR display function consists of alphanumeric (ribbon) and situation displays (SD)

and will be superseded by other displays, not part of the TDWR project, in the end-state NAS. The display function will communicate with the RPG via Government furnished communications circuits. The controller's ribbon display will be an alphanumeric display with audible and visual alarms for use at the Air Traffic Control Tower (ATCT) and the Terminal Radar Approach Control (TRACON) facility. The controller display will present hazardous warnings which are to be read to affected pilots. The SD will supply area wide graphic and alphanumeric TDWR weather information to assist the ATCT and TRACON supervisors in making strategic decisions as to airport configuration, traffic flow, etc.

(4) Remote Monitoring System (RMS) Function. The RMS function is provided for automatic fault detection and isolation. The RMS is also the entry port Maintenance Data Terminal (MDT) for maintenance commands and control and for entering some site adaptable data. The RMS will provide maintenance related data and control functions to FAA maintenance specialists. The RMS is functionally independent of the major TDWR system functions.

31. PHYSICAL DESCRIPTION. The TDWR system is described in four principle areas: (1) the typical TDWR siting criteria as outlined in figure 3-1, On-Airport/Off-Airport Siting Comparison; (2) a typical site configuration as shown in figure 3-2, Perspective - Typical TDWR Site; (3) a typical TDWR building with the electronic equipment, engine generator, air conditioners, and Telco room as in figure 3-3, TDWR Equipment Layout; and (4) table 3-1, Physical Description, provides a breakdown of system size and location.

a. Figure 3-1. The preferred siting is Off-Airport, 8 to 12nm from the principle coverage region. In addition, the TDWR should be located within a 30-degree aspect angle of the principle runways for the predominant adverse weather conditions on the airport.

b. Figure 3-2. This figure provides a good perspective of a typical TDWR site for any location throughout the NAS. The tower height will vary from 5 to 30 meters, depending upon the siting requirements.

c. Figure 3-3. This figure provides an overview of the proposed equipment layout. The equipment is shown in approximate scale for clarity.

d. Table 3-1. This table provides the physical size and location of the equipment comprising the TDWR system. The information should provide the necessary data for regional personnel to refine plans for the TDWR installation. As an example, the SD is to be located at the supervisors position in the ATCT and TRACON facilities. However, the SD is composed of a central processing unit (CPU) and a display, much as a conventional personal computer (PC) work station. It may be necessary to separate the two because of space limitations in the ATCT and TRACON supervisors positions. This separation option is available (within 50 ft. limitation) for final installation. The ribbon displays will be mounted in the local positions for arrival and departure within the ATCT and at the arrival and departure controller positions in the TRACON.

FIGURE 3-1. ON-AIRPORT/OFF-AIRPORT SITING COMPARISON

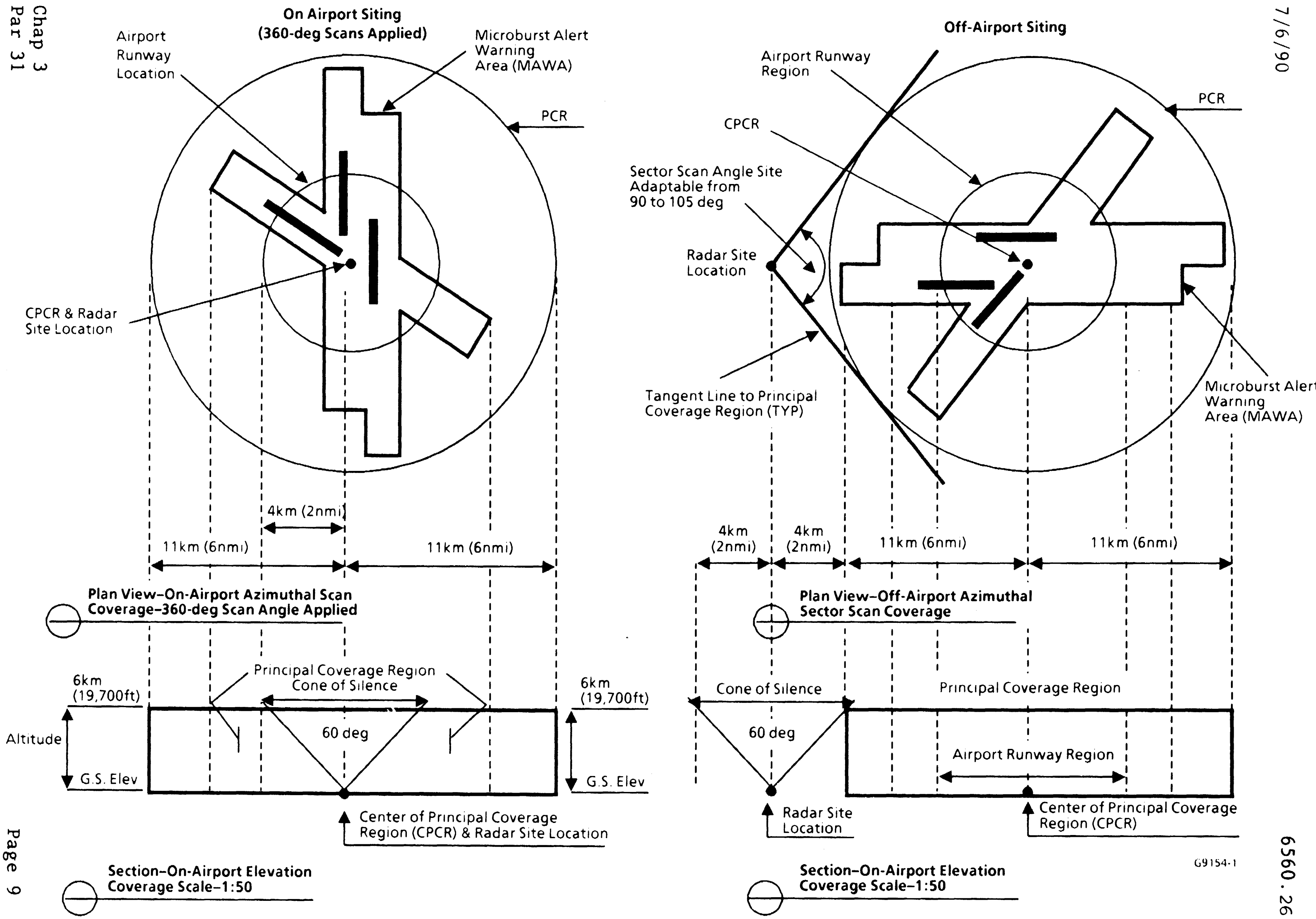


FIGURE 3-2. PERSPECTIVE - TYPICAL TDWR SITE

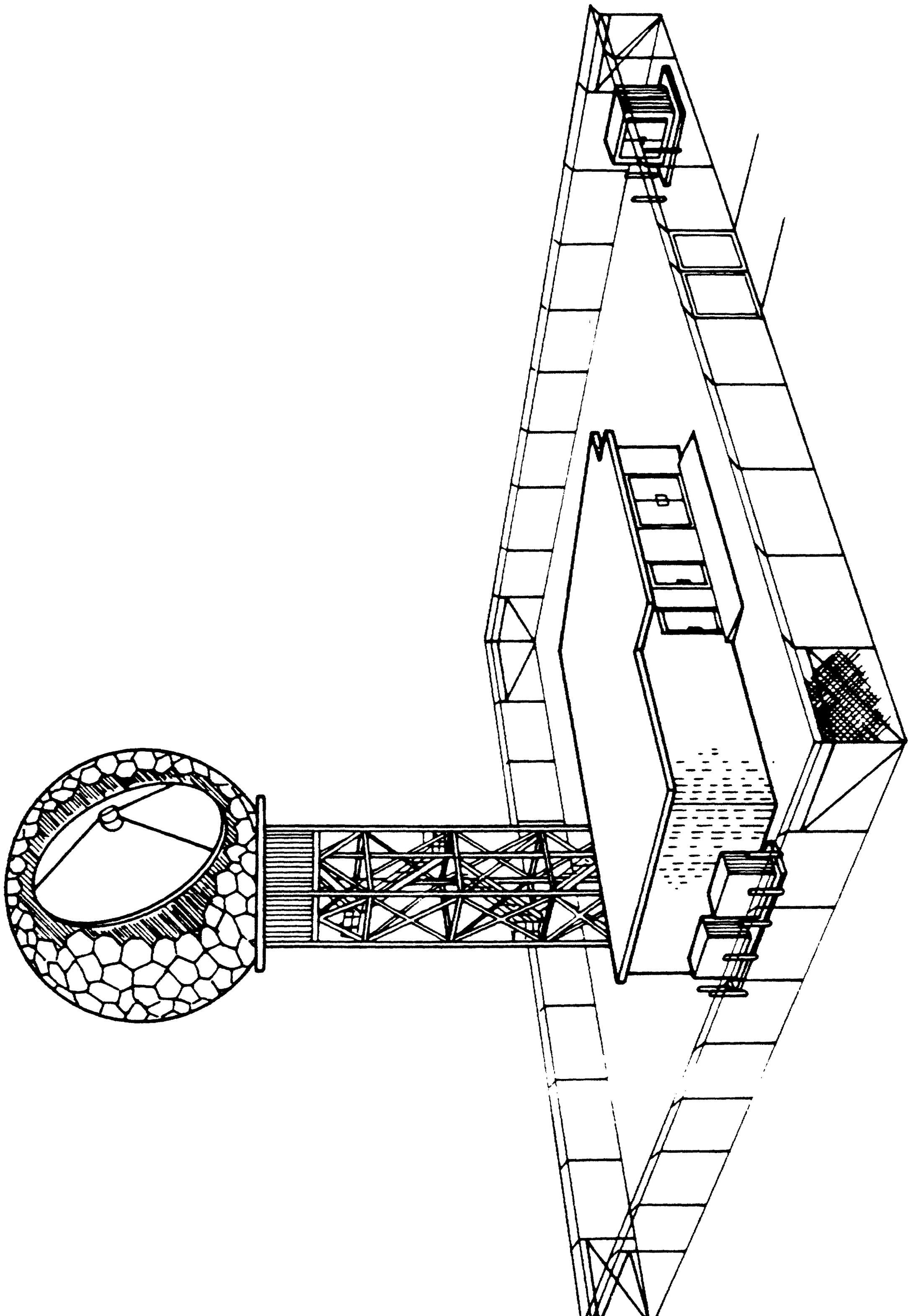


FIGURE 3-3. TDWR EQUIPMENT LAYOUT

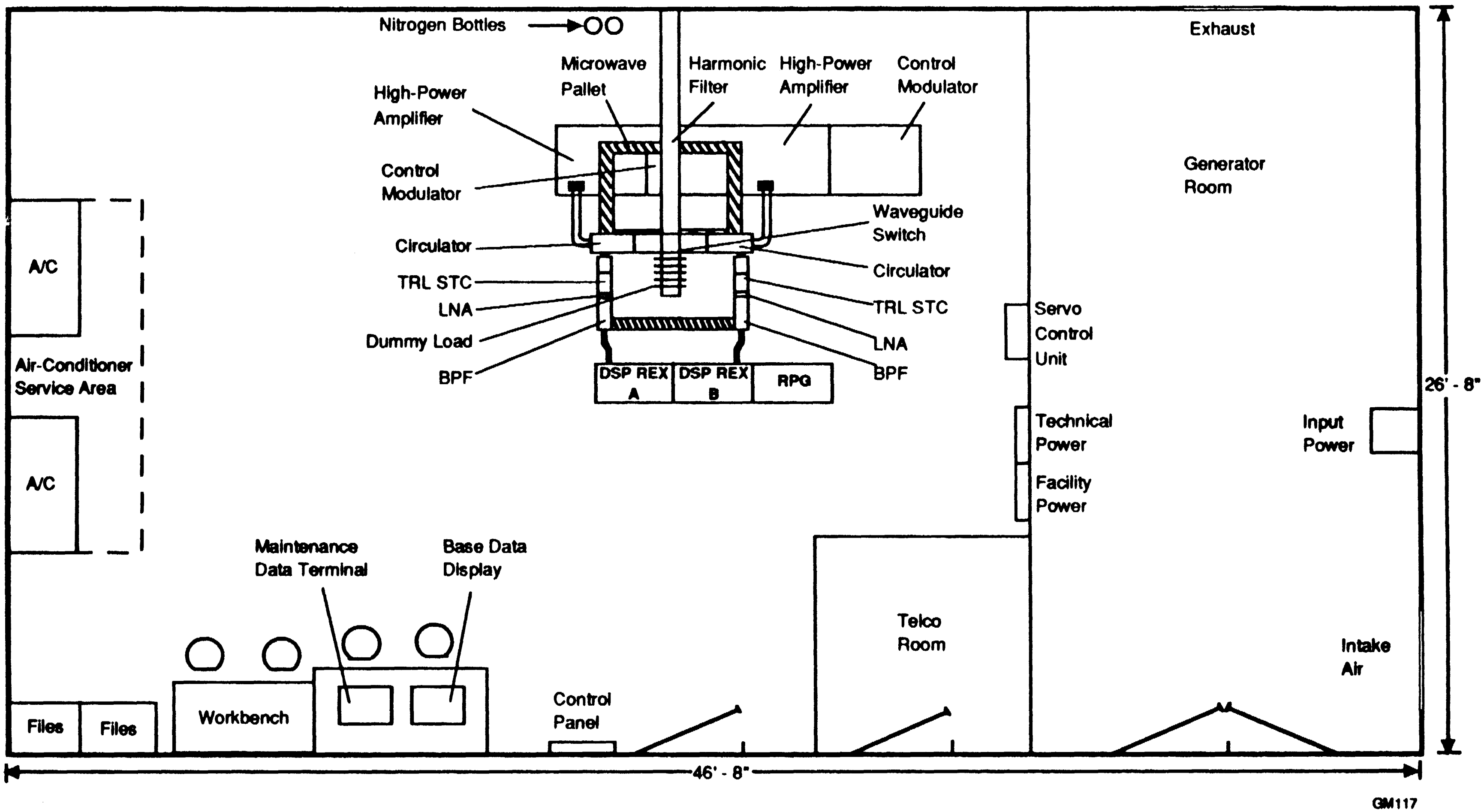


TABLE 3-1. PHYSICAL DESCRIPTION

FACILITY	EQUIPMENT	SIZE	LOCATION	NOTES
TDWR	Antenna	25'dish	TDWR Site	See fig. 3-2
	Radome	38'Dia.	TDWR Site	33' High
	Tower	5-30 Meter	TDWR Site	Site Dependent
	Bldg.	27'x47'	TDWR Site	See fig. 3-3
	Tx.Asmbly	58x78x35	Four Units	See fig. 3-2
	DSP/REX	48x78x35	Two Units	See fig. 3-2
	RPG/RMS	24x76x35	One Unit	See fig. 3-2
ATCT	SD	(Inches)	Measure: WxHxD	Sun Wk. Stat.
	CPU	16x7.5x20	ATCT/Eq.Rm.	Prefer: ATCT
	Display	16x16x19	ATCT	Supv. Pos.
	Ribbon Display	16x16x4	ATCT (up to 8 units)	Local App/Dep
TRACON	SD	(Inches)	Measure: WxHxD	Sun Wk. Stat.
	CPU	16x7.5x20	TRACON/Eq.Rm.	Prefer: TRACON
	Display	16x16x19	TRACON	Supv. Pos.
	Ribbon Display	16x16x4	TRACON (up to 8 units)	Approach/Departure
MTS	MTS (Box) (Antenna)	16x16x4 3' Dish	2-20Km to TDWR 2-20Km to TDWR	Prefer mount on wooden pole
PSF	PSF			
	CPU	24x76x35	AAC	Harris Nighthawk
	Wk.Stat.	16x23.5x20	AAC (4 Units)	Sun Wk. Stat.
Modems	Paradyne	TBD	TDWR Site	Three Units
	Paradyne	TBD	ATCT/TRACON	Two Units
	Paradyne	TBD	MPS/RMMS	One Unit

32. SYSTEM REQUIREMENTS. The TDWR equipment will be designed to acquire meteorological data within the terminal volume. This data will be composed of three parameters: (1) reflectivity, (2) radial velocity, and (3) spectrum width. This data will be processed utilizing Government furnished meteorological algorithms which will identify hazardous weather parameters such as wind shear and gust fronts emanating from any convective storm source. The radar is designed to detect and provide information, with one minute update rates, for hazardous weather phenomena in the immediate area around the terminal and on the extended ends of the active runways. This information will then be used to alert pilots and to provide the controllers with weather data for more efficient management of the terminal area.

a. Coverage. Basic TDWR coverage is required from ground level to 19,700 feet above ground level (AGL) over the principle coverage region (PCR) and up to 70,000 feet out to 48 nmi from the system. The required minimum range is 0.25 nmi. Exceptions to these requirements are that 1) no coverage is required which would require an antenna elevation angle above 60 degrees, and 2) reflectivity measurements are required, when demanded by Pulse Repetition Frequency (PRF)/Range dealiasing algorithms, out to 248 nmi. The requirements are derived from operational coverage requirements for 1) hazardous wind shear detection from ground level to 1,500 feet for all areas within 6 nmi of the airport reference point (ARP), which is nominally the center of the airport, and 2) detection of gust fronts within 40 nmi of the ARP. These operational requirements cannot be directly converted to the TDWR coverage requirements because: (1) the TDWR will generally be located off-the-airport; and (2) weather features outside the operational coverage region are used in the weather algorithms. Accordingly, the TDWR coverage requirements are greater than the corresponding operational requirements.

b. Modes. The TDWR will operate in one of two operational modes or a maintenance mode. The operational modes consist of a "Monitor" mode and a "Hazardous Weather" mode. In the Monitor mode the TDWR will use 360 degree azimuth scans at various elevation angles. This mode is used when algorithms determine that hazardous weather is not present. This mode reduces wear on the pedestal gears and will improve reliability. In the "Hazardous Weather" mode the TDWR will use a combination of sector scans over the protected airports and 360 degree horizontal scans. The "Hazardous Weather" mode will automatically be selected when Government-supplied algorithms determine that hazardous weather is within the coverage volume. The system will automatically revert to "Monitor" mode when the algorithms determine that hazardous weather no longer exists. The "Maintenance" mode, a nonoperational mode, is selected when a maintenance action is required that may cause system performance to be outside of specified tolerances. The "Maintenance" mode may be selected onsite by a maintenance specialist or remotely through the FAA RMMS. Use of this mode will be coordinated with Air Traffic personnel.

33. INTERFACES. Interfaces for the TDWR system includes both internal and external as shown in figure 3-5. The internal interfaces are shown within the dashed box and all external interfaces are outside the box. A breakdown of the interfaces are outlined in subparagraphs 33a. and b.

FIGURE 3-4. SYSTEM FUNCTIONAL RELATIONSHIPS

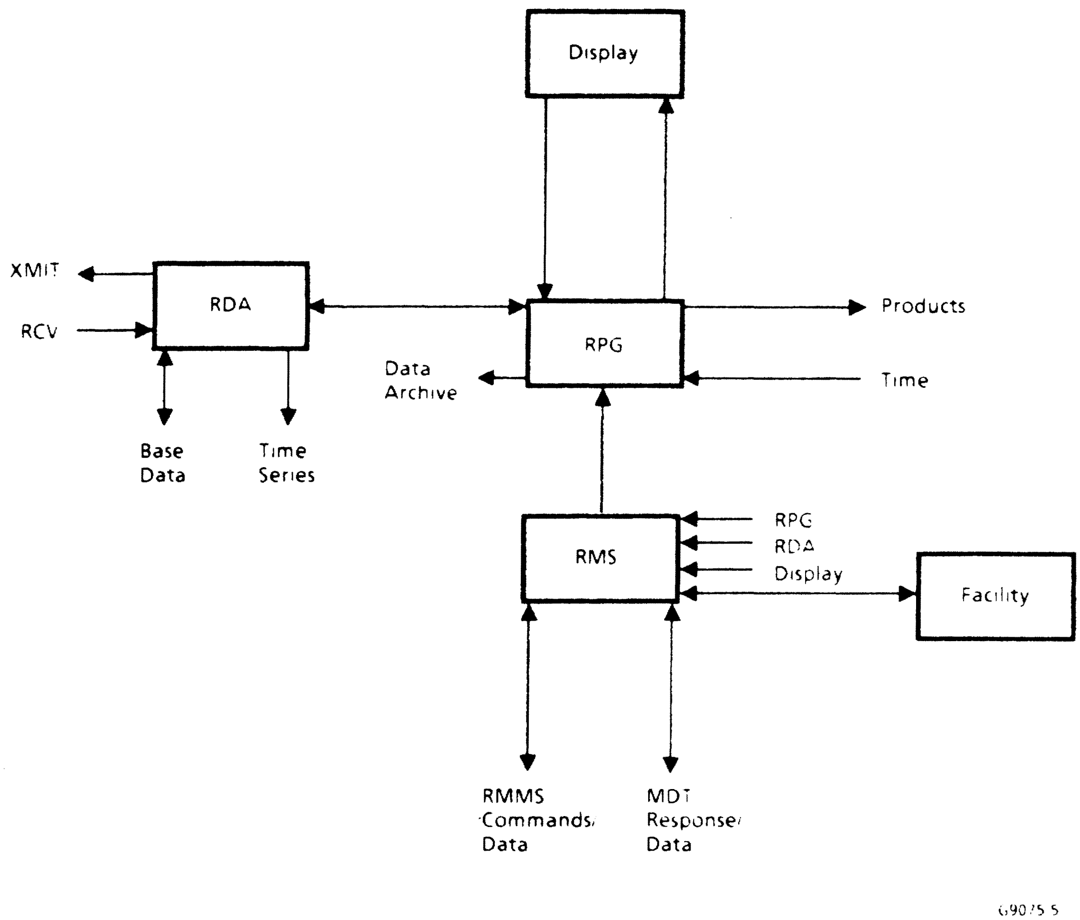


TABLE 3-2. KEY SYSTEM FUNCTIONS AND CONTROL

	KEY FUNCTION		CONTROL SOFTWARE
	RDA		
1.	Antenna Group (ANT) Tower Pedestal Reflector Radome Microwave Moving Target Simulator	a.	Antenna Control Function
2.	Transmitter (XMT) High Power Pulsed RF	a.	Transmitter Control Function
3.	Receiver-Exciter (REX) Process RF Energy	a.	Receiver Control Function
4.	Digital Signal Processor (DSP) Clutter Filtering Pulse Pair Processing Central Timing and Control Diagnostic Routines Trigger Generation System Synchronization	a.	Digital Signal Processor Control Function
	RPG		
1.	Algorithm Processing	a.	RPG Control Function
2.	Base Data Processing	b.	Base Data Processing Function
3.	Data Processing Operating System	c.	Data Processing Operating System Control Function
4.	Product Distribution/Interface ATCT (Interim) TRACON (Interim) Tower Central Computer Complex (TCCC)		
5.	Product Archive		
6.	Base Data Recorder Input		

TABLE 3-2. KEY SYSTEM FUNCTIONS AND CONTROL (Cont.)

	KEY FUNCTION		CONTROL SOFTWARE
	DFU		
1.	Situation (Graphic) Control/Status Monitor Operational Data Entry Archive Control	a. b.	Display Function UNIX Operating System
2.	Ribbon (alphanumeric) Alarm Messages	a. b.	Display Function UNIX Operating System
	RMS		
1.	Monitor	a.	Remote Monitoring Subsystem
2.	Control		
3.	Interface Remote Maintenance Monitor System (RMMS) MDT		
	Special Test Equipment (STE)		
1.	Base Data and Product Display	a. b.	Display Function UNIX Operating System
2.	Base Data Recorder Test Data Input		
	Program Support Facility (PSF)		
1.	Development of Programs	a.	Development Tools
2.	Testing of Programs	b.	Test Tools
3.	Analysis of Programs and Data		
4.	Debugging Functional Programs		
5.	Systems Maintenance Support		

a. Internal:

(1) System

(a) RDA. The RDA to RPG interface transfers all preconditioned base data for product development. The RDA to RMS interface provides alarm and status messages as well as built-in-test/fault-isolation-test (BIT/FIT) data for diagnostics tests and certification. Internally, the moving target simulator (MTS) interfaces with the RDA to provide a figure of merit for system reflectivity and Doppler processing capabilities. The MTS will be located from 2 to 20 km from the TDWR system.

(b) RPG. This interface is the most important since it interacts with all other system functions as well as being the primary point for external interfaces. The RPG provides the internal interface for all control functions within the system; provides the method for system change and operation; and provides the status update capability for the system. The RPG is the direct access for the interim archive recorder. The end state NAS interface includes the LLWAS, TCCC, and provides nine other spare ports for future expansion.

(c) RMS. The RMS interfaces internally with the three other major functions for monitor and control purposes. There is an external interface with the RMMS and the maintenance data terminal (MDT).

(d) DFU. The DFU to RPG interface provides the graphical and alphanumeric weather data as well as information on critical runway use and other operational parameters. Also provides requests for archiving data.

(2) Auxiliary.

(a) Archive Recorder - interfaces with the RPG.

(b) Base Data Recorder - interfaces with the RDA.

(c) Base Data and Product Display - interfaces with RPG.

b. External.

(1) RMMS - receives and transmits monitor/control data from the RMS/MDT.

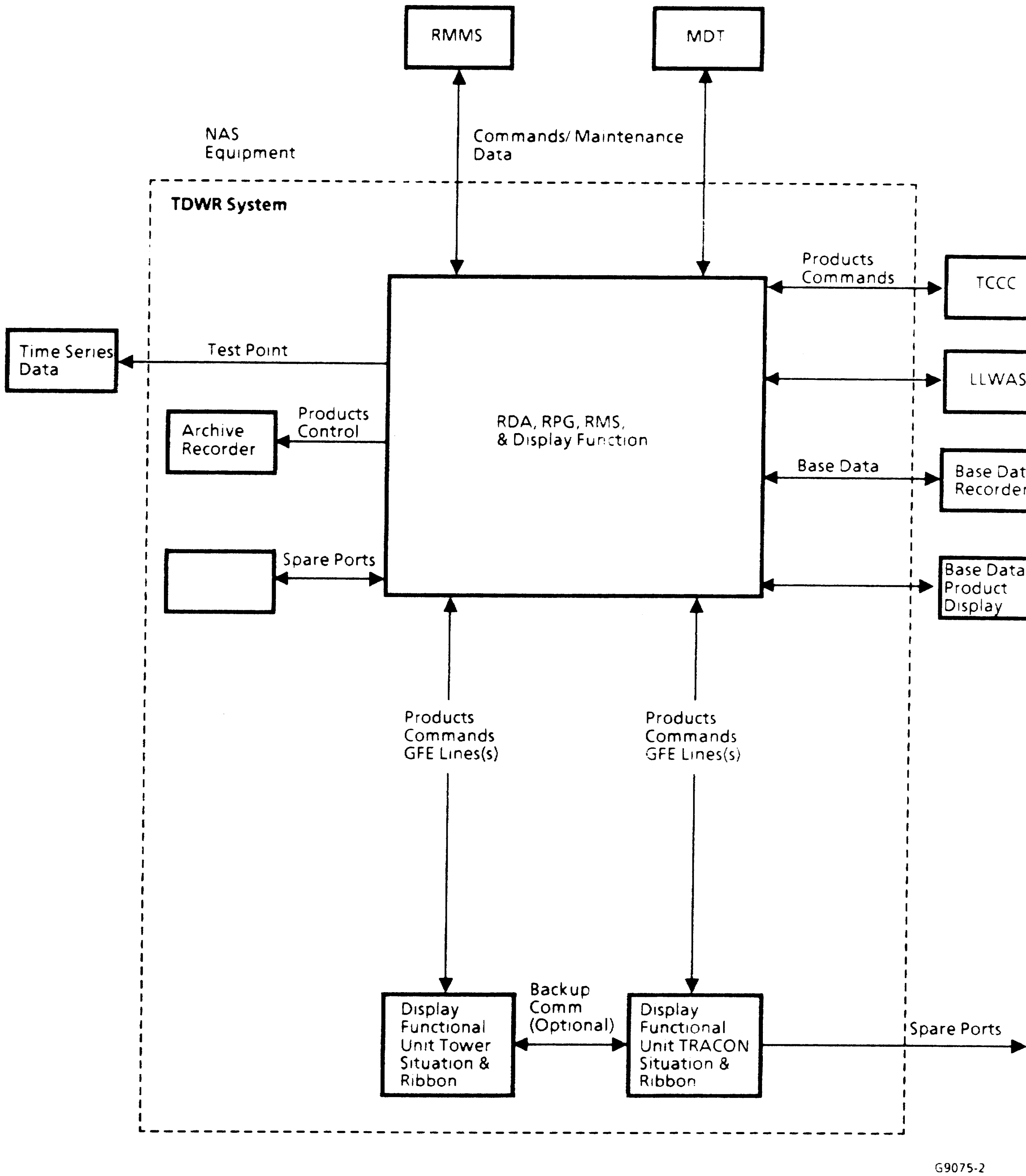
(2) TCCC - receives weather products from the RPG.

(3) LLWAS - method of interface is under study.

(4) Spare Ports - provided for future use (nine).

34.-39. RESERVED.

FIGURE 3-5. SYSTEM INTERFACES



CHAPTER 4. PROJECT SCHEDULES AND STATUS

40. PROJECT SCHEDULES AND STATUS. The TDWR Program schedules and status are shown in figure 4-1. The major functional areas of the project are shown in the left-hand column and include: (a) acquisition; (b) design; (c) production; (d) testing; and (e) implementation.

41. MILESTONE/IMPLEMENTATION SCHEDULE SUMMARY. The TDWR equipment delivery and installation sequence schedule is shown in table 4-1. A listing of the optional sites by alphabetical order is shown in table 4-2. This is the latest sequence schedule and may change with operational needs of the NAS users. In addition, a reprogramming action is underway to provide another system for the Aeronautical Center to be shared as a hot test bed and for maintenance support of the TDWR. This action will enhance the life cycle cost/performance of the TDWR program.

42. INTERDEPENDENCIES AND SEQUENCE. A turnkey concept has been employed to develop, build, and install the TDWR system. The contractor is responsible for the equipment design, system production, test and evaluation, construction of facilities, and the final installation, test, and checkout of systems prior to commissioning as part of the NAS. The system will be developed to meet the requirements of specification FAA-E-2806a, Terminal Doppler Weather Radar. The algorithms necessary for the final products and the weather test cases for system validations are to be developed and provided by the Government. The resulting interdependency between the contractor and the Government is thus critical to the installation and integration of the TDWR into the NAS. The Government has assigned the development tasks for algorithm and weather test cases for system validation to the research community as shown in table 5-2. The Government and the contractor therefore share responsibility for the development of the final products of hazardous weather information.

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FIGURE 4-1. TDWR PROGRAM SCHEDULE AND STATUS.

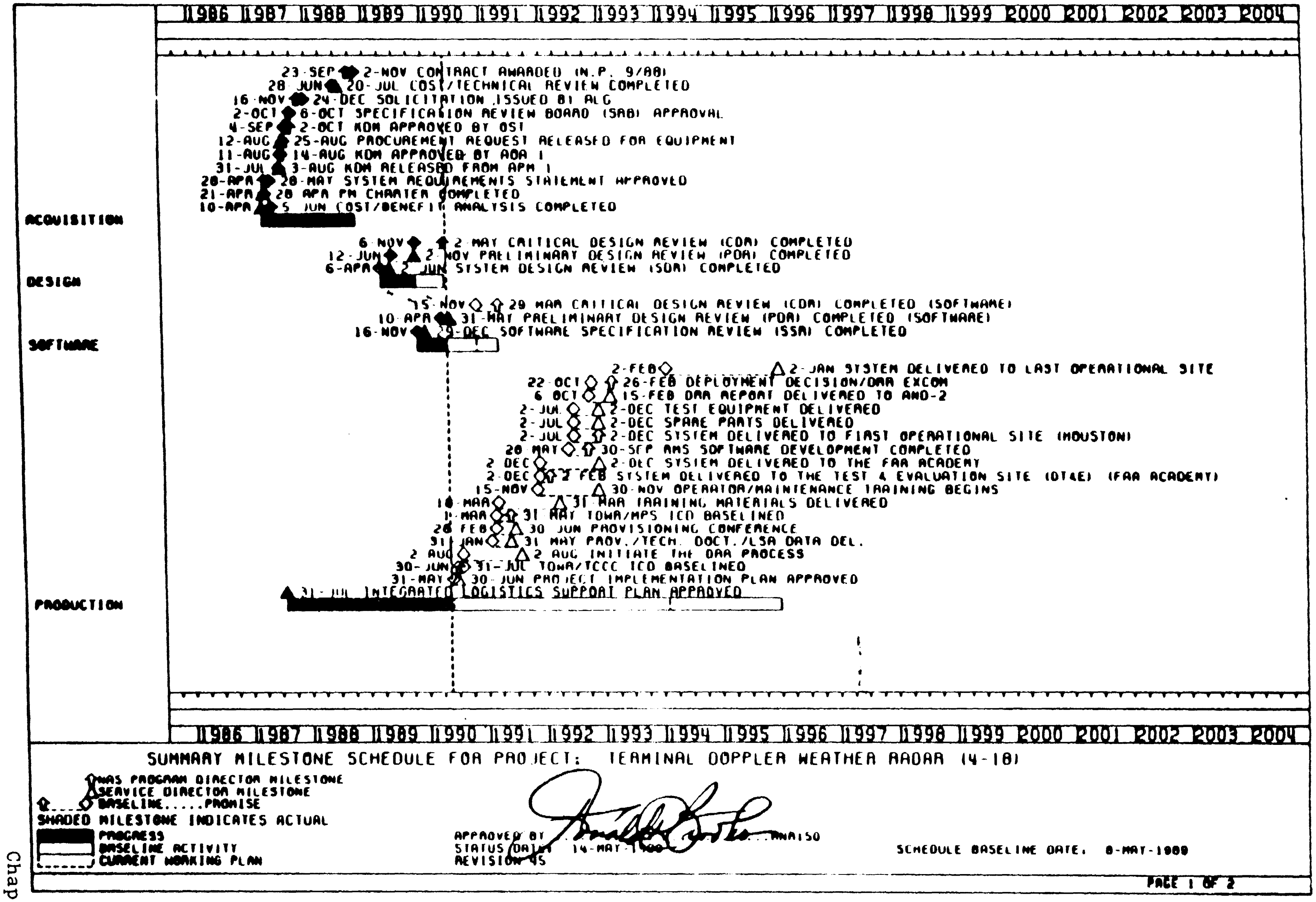


FIGURE 4-1. TDWR PROGRAM SCHEDULE AND STATUS (CONT'D)

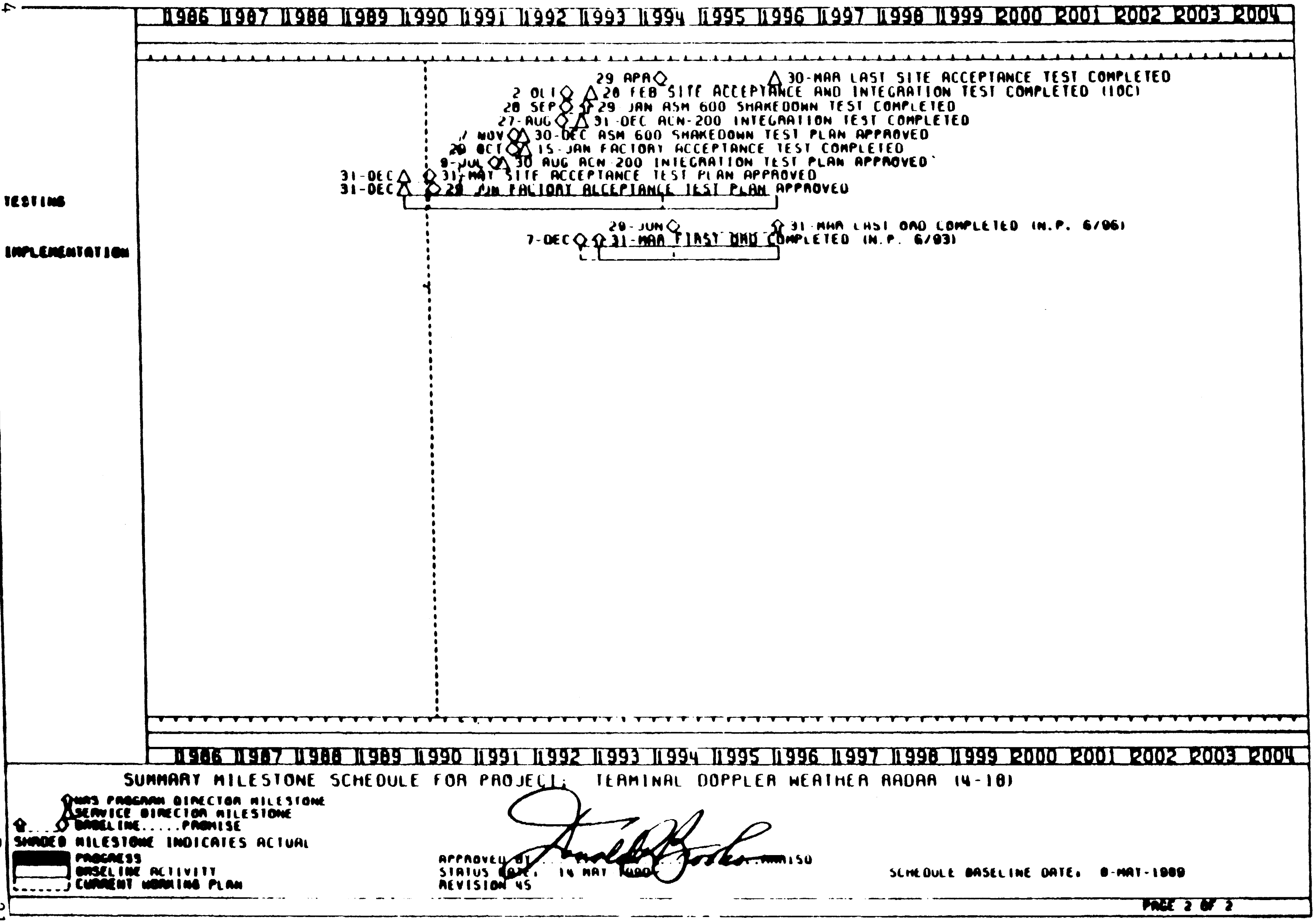


TABLE 4-1. TERMINAL DOPPLER WEATHER RADAR (TDWR)
EQUIPMENT DELIVERY AND INSTALLATION SCHEDULE

DELIVERY SEQUENCE NUMBER	FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION	DEL DATE	CAI DATE
			First Program Year				
1	OEX	AERO CENTER	OKLAHOMA	OK	AC	01/92	11/92
2	MEM	MEMPHIS	SHELBY	TN	SO	10/92	01/93
#3	IAH	HOUSTON	HARRIS	TX	SW	10/92	01/93
4	FLL	FORT LAUDERDALE	BROWARD	FL	SO	03/93	06/93
5	DVX	DENVER	DENVER	CO	NM	03/93	06/93
6	ATL	ATLANTA	FULTON	GA	SO	03/93	06/93
7	ORD	CHICAGO (O'HARE)	COOK	IL	GL	04/93	07/93
8	JFK	NEW YORK (JFK)	QUEENS	NY	EA	04/93	07/93
9	MIA	MIAMI	DADE	FL	SO	04/93	07/93
10	DFW	DALLAS-FT WORTH	DALLAS	TX	SW	05/93	08/93
11	EWR	NEWARK	ESSEX	NJ	EA	05/93	08/93
12	MCO	ORLANDO	ORANGE	FL	SO	05/93	08/93
13	STL	SAINT LOUIS	ST. LOUIS	MO	CE	06/93	09/93
14	PIT	PITTSBURGH	ALLEGHENY	PA	EA	06/93	09/93
15	TPA	TAMPA	HILLSBOROUGH	FL	SO	06/93	09/93
16	ADW	ANDREWS AFB	PRINCE GEORGES	MD	EA	07/93	10/93
17	MSY	NEW ORLEANS	JEFFERSON	LA	SW	07/93	10/93
18	LGA	NEW YORK (LA GUARDIA)	QUEENS	NY	EA	07/93	10/93

HEADING KEY:

LID = FAA LOCATION IDENTIFIER
DEL = DELIVERY DATE - ARRIVAL OF EQUIPMENT ON SITE DOES NOT CONSTITUTE DELIVERY UNDER THE DEFAULT CLAUSE.
CAI = CONTRACT ACCEPTANCE INSPECTION COMPLETED DATE.
\# = KEY SITE.
NOTE: DELIVERY SEQUENCE NOs. 1 AND 2 ARE SUPPORT SITES, DELIVERY SEQUENCE NOs. 3 THROUGH 47 ARE OPERATIONAL SITES.

TABLE 4-1. TERMINAL DOPPLER WEATHER RADAR (TDWR)
EQUIPMENT DELIVERY AND INSTALLATION SCHEDULE (Cont'd)

DELIVERY SEQUENCE NUMBER	FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION	DEL DATE	CAI date
			Second Program Year				
19	MSP	MINNEAPOLIS	HENNEPIN	MN	GL	08/93	11/93
20	DCA	WASHINGTON D.C. (NATIONAL)	ARLINGTON	VA	EA	08/93	11/93
21	ACYT	FAA TECH CENTER	ATLANTIC	NJ	CT	08/93	11/93
22	DTW	DETROIT	WAYNE	MI	GL	09/93	12/93
23	CLT	CHARLOTTE	MECKLENBERG	NC	SO	09/93	12/93
24	HOU	HOUSTON (HOBBY)	HARRIS	TX	SW	09/93	12/93
25	CVG	CINCINNATI	BOONE	KY	SO	10/93	01/94
26	MCI	KANSAS CITY	PLATTE	MO	CE	10/93	01/94
27	PHL	PHILADELPHIA	PHILADELPHIA	PA	EA	10/93	01/94
28	PBI	WEST PALM BEACH	PALM BEACH	FL	SO	11/93	02/94
29	PHX	PHOENIX	MARICOPA	AZ	WP	11/93	02/94
30	DAL	DALLAS (LOVE)	DALLAS	TX	SW	11/93	02/94
31	RDU	RALEIGH-DURHAM	WAKE	NC	SO	12/93	03/94
32	SLC	SALT LAKE CITY	SALT LAKE	UT	NM	12/93	03/94
33	CLE	CLEVELAND	CUYAHOGA	OH	GL	12/93	03/94
34	IAD	WASHINGTON D.C. (DULLES)	LOUDOUN	VA	EA	01/94	04/94
35	SDF	LOUISVILLE	JEFFERSON	KY	SO	01/94	04/94
36	DAY	DAYTON	MONTGOMERY	OH	GL	01/94	04/94
37	BWI	BALTIMORE	ANNE ARUNDEL	MD	EA	02/94	05/94
38	BOS	BOSTON	SUFFOLK	MA	NE	02/94	05/94

HEADING KEY:

LID = FAA LOCATION IDENTIFIER
DEL = DELIVERY DATE - ARRIVAL OF EQUIPMENT ON THE SITE DOES NOT CONSTITUTE DELIVERY UNDER THE DEFAULT CLAUSE
CAI = CONTRACT ACCEPTANCE INSPECTION COMPLETED DATE

TABLE 4-1. TERMINAL DOPPLER WEATHER RADAR (TDWR)
EQUIPMENT DELIVERY AND INSTALLATION SCHEDULE (Cont'd)

DELIVERY SEQUENCE NUMBER	FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION	DEL DATE	CAI DATE
			Third Program Year				
39	IND	INDIANAPOLIS	MARION	IN	GL	02/94	05/94
40	BNA	NASHVILLE	DAVIDSON	TN	SO	03/94	06/94
41	CMH	COLUMBUS	FRANKLIN	OH	GL	03/94	06/94
42	TUL	TULSA	TULSA	OK	SW	03/94	06/94
43	SJU	SAN JUAN (PUERTO RICO)		--	SO	04/94	07/94
44	MKE	MILWAUKEE	MILWAUKEE	WI	GL	04/94	07/94
45	OKC	OKLAHOMA CITY	OKLAHOMA	OK	SW	04/94	07/94
46	ICT	WICHITA	SEDGWICK	KS	CE	05/94	08/94
47	MDW	CHICAGO (MIDWAY)	COOK	IL	GL	05/94	08/94

HEADING KEY:

LID = FAA LOCATION IDENTIFIER
DEL = DELIVERY DATE - ARRIVAL OF EQUIPMENT ON THE SITE DOES NOT CONSTITUTE DELIVERY UNDER THE DEFAULT CLAUSE
CAI = CONTRACT ACCEPTANCE INSPECTION COMPLETED DATE

TABLE 4-2. TERMINAL DOPPLER WEATHER RADAR (TDWR)
OPTIONAL SITES IN ALPHABETICAL ORDER

FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION
ALB	ALBANY	ALBANY	NY	EA
ABQ	ALBUQUERQUE	BERNALILLO	NM	SW
AMA	AMARILLO	POTTER	TX	SW
AUS	AUSTIN	TRAVIS	TX	SW
BTR	BATON ROUGE	EAST BATON ROUGE	LA	SW
BHM	BIRMINGHAM	JEFFERSON	AL	SO
BUF	BUFFALO	ERIE	NY	EA
CID	CEDAR RAPIDS	LINN	IA	CE
CHS	CHARLESTON	CHARLESTON	SC	SO
STT	CHARLOTTE AMALIE	VIRGIN ISLANDS	--	SO
CHA	CHATTANOOGA	HAMILTON	TN	SO
COS	COLORADO SPRINGS	EL PASO	CO	NM
CAE	COLUMBIA	LEXINGTON	SC	SO
DAB	DAYTONA BEACH	VOLUSIA	FL	SO
DSM	DES MOINES	POLK	IA	CE
ELP	EL PASO	EL PASO	TX	SW
FWA	FORT WAYNE	ALLEN	IN	GL
GRR	GRAND RAPIDS	KENT	MI	GL
GSO	GREENSBORO	GUILFORD	NC	SO

TABLE 4-2. TERMINAL DOPPLER WEATHER RADAR (TDWR) OPTIONAL SITES IN ALPHABETICAL ORDER (Cont'd)

FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION
GSP	GREER (GREENVILLE/ SPARTANBURG)	GREENVILLE	SC	SO
HTS	HUNTINGTON	WAYNE	WV	EA
HSV	HUNTSVILLE	MADISON	AL	SO
JAN	JACKSON	RANKIN	MS	SO
JAX	JACKSONVILLE	RANKIN	FL	SO
LAS	LAS VEGAS	CLARK	NV	WP
LEX	LEXINGTON	FAYETTE	KY	SO
LNK	LINCOLN	LANCASTER	NE	CE
LIT	LITTLE ROCK	PULASKI	AR	SW
LAX	LOS ANGELES	LOS ANGELES	CA	WP
LBB	LUBBOCK	LUBBOCK	TX	SW
MSN	MADISON	DANE	WI	GL
MLB	MELBOURNE	BREVARD	FL	SO
MAF	MIDLAND	MIDLAND	TX	SW
MOB	MOBILE	MOBILE	AL	SO
MLI	MOLINE	ROCK ISLAND	IL	GL
ORF	NORFOLK	NORFOLK	VA	EA
OMA	OMAHA	DOUGLAS	NE	CE

TABLE 4-1. TERMINAL DOPPLER WEATHER RADAR (TDWR)
OPTIONAL SITES IN ALPHABETICAL ORDER (Cont'd)

FAA LID	SITE LOCATION	COUNTY	STATE	FAA REGION
PNS	PENSACOLA	ESCAMBIA	FL	SO
PIA	PEORIA	PEORIA	IL	GL
PDX	PORTLAND	MULTNOMAH	OR	NM
RIC	RICHMOND	HENRICO	VA	EA
ROC	ROCHESTER	MONROE	NY	EA
PIE	ST PETERSBURG	PINELLAS	FL	SO
SAT	SAN ANTONIO	BEXAR	TX	SW
SFO	SAN FRANCISCO	SAN MATEO	CA	WP
SRQ	SARASOTA	SARASOTA	FL	SO
SAV	SAVANNAH	CHATHAM	GA	SO
SEA	SEATTLE	KING	WA	NM
SHV	SHREVEPORT	CADDO	LA	SW
SBN	SOUTH BEND	ST. JOSEPH	IN	GL
SYR	SYRACUSE	ONONDAGE	NY	EA
TLH	TALLAHASSEE	LEON	FL	SO
TOL	TOLEDO	LUCAS	OH	GL
TUS	TUCSON	PIMA	AZ	WP
BDL	WINDSOR LOCKS	HARTFORD	CT	NE

CHAPTER 5. PROJECT MANAGEMENT

50. TDWR PROGRAM MANAGEMENT, GENERAL. The TDWR Program is an approved part of the NAS Plan with the special assignment of the SEI contractor as Technical Officer (TO). The procedures of procurement are as outlined in OMB Circular A-109 for major system acquisition. All FAA program responsibilities, from preliminary planning to NAS integration, rests with the FAA program manager who resides in the Weather Radar Branch, ANR-150. A diagram of the program management structure is shown in figure 5-1 with the functional responsibilities summarized in table 5-2. An overview of functional responsibilities is as follows:

a. TDWR Program Manager. The functions and responsibilities of the TDWR Program Manager, as outlined in Appendix 1 of the PMP, are to manage and direct all FAA activities necessary to implement the TDWR successfully. In this regard, the program manager, using the matrix management process, is responsible for the design, development, test, evaluation, production, installation, and integration of the TDWR into the NAS.

b. TDWR Support Staff. The support staff is functionally divided into two principle areas:

(1) FAA headquarters organizations that address national ATC issues. These organizations include:

(a) Air Traffic

(b) Logistics

(c) Training

(d) Operations

(2) Non-FAA organizations that are responsible for algorithm development, verification tests on associated weather systems, development of the display characteristics to be used in the ATC system, and tests of hazardous weather phenomena. These organizations include:

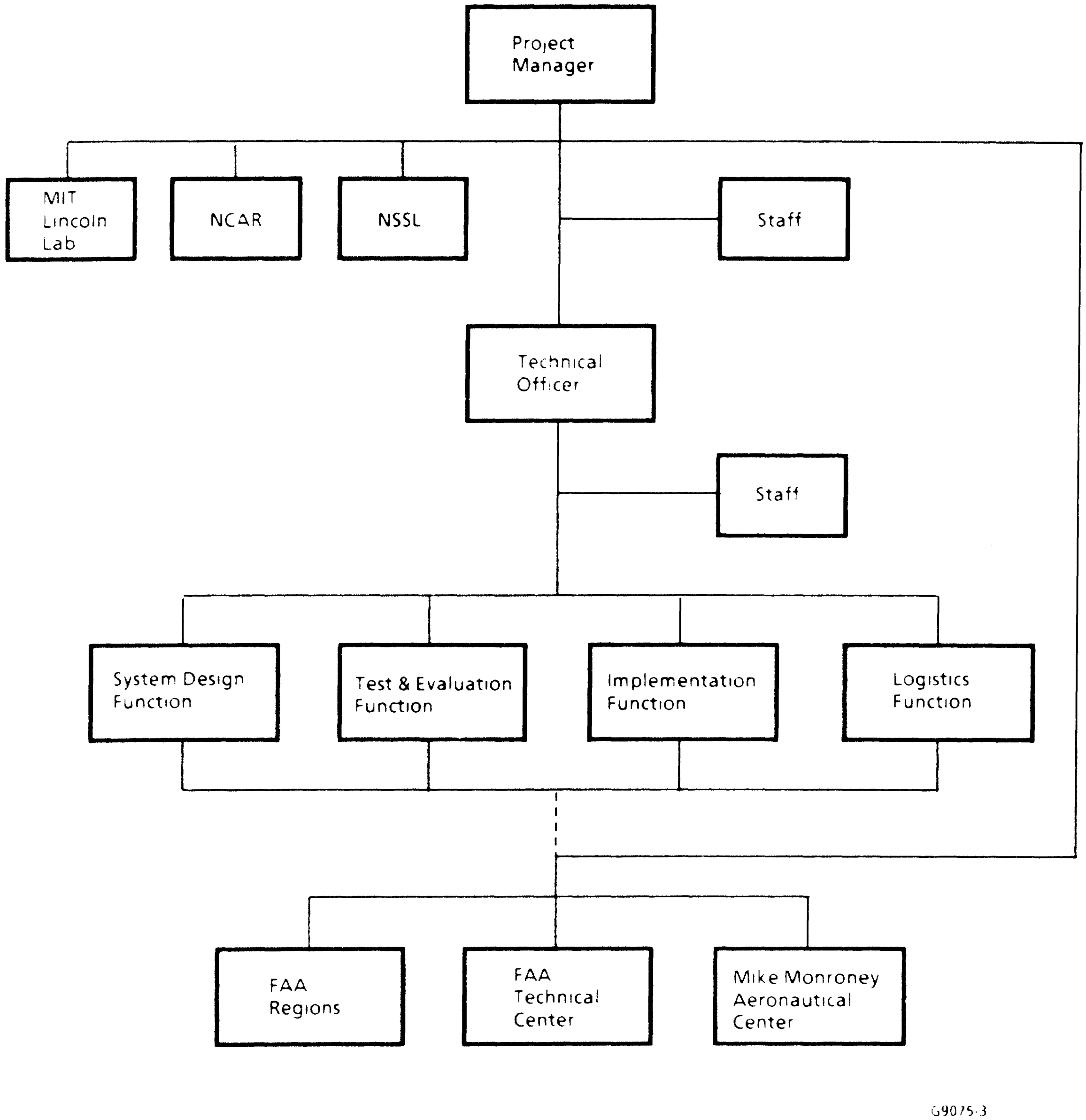
(a) MIT Lincoln Laboratory of Lexington, Massachusetts.

(b) National Center for Atmospheric Research (NCAR) located in Boulder, Colorado.

(c) National Severe Storm Laboratory (NSSL) located in Norman, Oklahoma.

c. TDWR Technical Officer. The SEI contractor is responsible for the overall technical direction of the TDWR program. A TO has been assigned and will act as the contracting officers technical representative.

FIGURE 5-1. TDWR PROJECT MANAGEMENT



The functions of the TO are:

(1) System Design. This function is responsible for ensuring the system is designed and manufactured to meet the specification requirements of FAA-E-2806 with respect to: (1) hardware design for the four major functional areas; (2) software requirements for product generation through use of the Government supplied algorithms and internal system operation; and (3) integration of the system into the NAS.

(2) Test and Evaluation. This function is responsible for all the tests and evaluation activities of the contractor from the production at the factory to the final system installation. This is the focal point for all test and evaluation functions in regard to specification and contract compliance by the contractor. In addition, this position provides technical interface and coordination with the Surveillance and Weather Systems Branch, ACN-230 and the Radar Engineering Branch, ASM-630 in the development and conduct of the independent tests of overall system performance. The independent tests include the integration and shakedown test for the TDWR system.

(3) Implementation. This function is responsible for developing site selection criteria, the Project Implementation Plan, and for ensuring the systems are constructed, installed, tested, and satisfy all operational requirements before integration into the NAS.

(4) Logistics Support. Provides the NAILS, maintenance and training plans for the TDWR Program. Acts as an interface for all support functions in the program.

d. Regional Management. The regions will be responsible for : (1) supporting site selection of the TDWR and associated MTS; (2) supporting the Environmental Impact Study for the site; (3) acquisition of the sites for the TDWR and the MTS; (4) providing a Technical Onsite Representative (TOR) and resident engineer for system construction and installation; and (5) final integration and commissioning of the TDWR systems to satisfy the operational requirement of the NAS.

e. FAA Technical Center Management. The FAA Technical Center has responsibility for: (1) acts as the FAA independent test organization to ensure the NAS integration requirements have been met; (2) providing technical review and guidance on the TDWR test program plans; (3) providing space for the construction and installation of the first TDWR; (4) development of the Integration Test Plan; (5) providing review and guidance on the contractors development of the procedures for the construction (CAI, Phase I) and the installation, checkout and acceptance (CAI, Phase II) for the TDWR system; and (6) support of the test program at the key site and operational sites as required.

f. Aeronautical Center. There are four organizations that provide management support functions to the TDWR:

(1) The FAA Depot which provides the initial and sustaining logistics support for the field facilities.

(2) The FAA Academy which provides training for maintenance and ATC operation.

(3) ASM-630 which provides: (a) the Shakedown Test Plan and Procedures; (b) the manpower to support the PSF; and (c) support for the TDWR test program through membership on the working groups.

(4) AAC-50 which provides the physical space for the PSF.

51. PROJECT CONTACTS. Individual responsibilities and points of contact are as outlined in table 5-1.

52. PROJECT COORDINATION. The TDWR Program Manager is responsible for overall program coordination, while technical coordination requirements are the responsibility of the SEI contractor.

53. PROJECT RESPONSIBILITY MATRIX. Table 5-2 summarizes the various functions of the TDWR project and the primary and support responsibilities.

a. FAA Headquarters Responsibilities.

(1) Surveillance Engineering Division (ANR-100).

(a) Provide program guidance to all FAA offices, services, centers and regions.

(b) Provide planning and guidance information to all FAA activities which interface with TDWR to aid in the timely implementation of support activity.

(c) Provide, in conjunction with the Office of Budget, for all funds necessary to integrate TDWR into the NAS.

(d) Assist in and ensure the development of system operations changeover plans with air traffic and the regions.

(e) Development of the algorithms and their test procedures for the TDWR system.

(f) Site survey and selection of the TDWR and MTS.

(g) Provide in-plant project office representative.

(h) Provide regions with a radiation hazard report on the TDWR system.

TABLE 5-1. TDWR PROJECT CONTACTS

Headquarters

Project Area	Office	Individual	Telephone	PROFS WSCM-
Project Manager	ANR-150	Don Turnbull	202-267-9743 FTS 267-9743	
Contractor Admin.	ALG-320	Joyce Eaton	202-267-3660 FTS 267-3660	
Qual. Rel. Offic.	ALG-420	O. Johnson	508-440-2302	
Technical Officer	SEI	Lamar Thomas	202-646-2050 FTS 967-2050	
System Design	SEI	Quang Trinh	202-646-5362 FTS 967-5362	
Test & Evaluation	SEI	Dave Neal	202-646-4734 FTS 967-4734	
Implementation	SEI	Jim Combs	202-646-6928 FTS 967-6928	778
Logistics Support	SEI	George Morrison	202-646-5885 FTS 967-5885	

Regional FAA and SEI Representatives

Region	Office	Individual	Telephone	PROFS WSCM-
Alaska	No TDWR systems scheduled for installation.			
Central	ACE-453	Gregg Ball	816-426-3261 FTS 867-3261	
Eastern	AEA-431	John O'Connor	718-917-1201 FTS 667-1201	076
	SEI	Mike Ceglia	718-917-0906 FTS 667-0906	214
Great Lakes	AGL-422.2	Barry Cooper	312-694-7586 FTS 384-7586	
	SEI	Alex Morgan	312-694-7864 FTS 384-7864	079

TABLE 5-1. TDWR PROJECT CONTACTS (CONT.)

Regional FAA and SEI Representatives

Region	Office	Individual	Telephone	PROFS WSCM-
New England	ANE-420T	Bill Tretter	617-273-7211 FTS 836-7211	
	SEI	Bill Minerick	617-273-7294 FTS 836-7294	080
Northwest Mountain	ANM-422	Darby Curran	206-431-2422 FTS 446-2422	
	SEI	Bob Dorney	206-431-2729 FTS 446-2729	151
Southern	ASO-420	Jim Garrett	404-763-7371 FTS 246-7371	
	SEI	Bob Potter	404-763-7995 FTS-246-7995	078
Southwest	ASW-421.3	Ron Clark	817-624-5425 FTS 734-5425	
	SEI	Joe Crees	817-624-5635 FTS 734-5635	075
Western Pacific	AWP-422	Randall Gustin	213-297-1076 FTS 984-1076	
	SEI	John Hesla	213-297-0427 FTS 984-0427	152

FAA Technical Center Representatives

	Office	Individual	Telephone	
	ACN-230	Eric Hess	609-484-4123 FTS-482-4123	
	ACN-230	Pat Martin	609-484-6266 FTS-482-6266	
	ACN-230	Tai Lee	609-484-5300 FTS-482-5300	
	ACN-230	B. Stretcher	609-484-6870 FTS-482-6870	

TABLE 5-1. TDWR PROJECT CONTACTS (CONT.)

Regional FAA and SEI Representatives

Region	Office	Individual	Telephone	PROFS WSCM-
FAA Technical Center Representatives (Cont.)				
	ACM-420	Robert Hull	609-484-5561 FTS-482-5561	
	ACM-430	Michael Beres	609-484-6176 FTS-482-6176	
	SEI(SCT)	R. Lockhart	609-484-5134 FTS 482-5134	
	SEI(EER)	P. Guthlein	609-484-6430 FTS 482-6430	
Mike Monroney Aeronautical Center Representatives				
Training Center	AAC-944	Al Weidner	405-680-5264 FTS 747-5264	
	AAC-934c	Dave Settle	405-680-5970 FTS 747-5970	
FAA Depot	AAC-445	Rick Castaldo	405-680-5233 FTS 747-5233	
	AAC-485A	Dennis Behrens	405-680-5630 FTS 747-5630	
ASM-630	ASM-630	Bob Garnett	405-680-5181 FTS 747-5181	
	ASM-630	B. Loudenslager	405-680-5186 FTS-747-5186	
SEI	SEI	Vern Wall	405-680-2268/9 FTS 747-2268/9	276

TABLE 5-2. TDWR RESPONSIBILITIES SUMMARY

Function/Event	Primary	Support
Program Management and Control	FAA Program Manager	All
Algorithm Development/ Weather Test Cases	FAA Program Manager	MIT Lincoln Lab NCAR NSSL
Technical Management	SEI	Region SEI
System Design	SEI	MIT LL TSC NCAR
Test & Evaluation	SEI	ACN-230 ASM-630
Factory	SEI	ACN-230
First Site	SEI	ACN-230 ASM-630
Key Site	SEI	ACN-230 ASM-630 Regions
Implementation	SEI	Region
Test Director		
Integration Test	ACN-230	ASM-630 SEI ANA-160
Test Director		
Shakedown Test	ASM-630	ATR-120 ACN-230 ANA-160
Commissioning	Region	Region (AF) Region (AT)
Site Selection	FAA Program Manager	Lincoln Lab
Environmental Impact (Site)	FAA Program Manager	Region

TABLE 5-2. TDWR RESPONSIBILITIES SUMMARY (CONTINUED)

Function/Event	Primary	Support
Logistic Support	SEI	ASM-100 AAC
NAILS Plan	SEI	AAC ASM-100 ASM-200
Maintenance Concept	ASM-100	SEI AAC
Maintenance Staffing	ASM-200	SEI
Maintenance Training	AAC-900	AHT-400 ASM-200 SEI
Operations Training	AAC-900	AHT-300 AAT-10 SEI
System Integration	Region (AF) Region (AT)	TOR ATCT
Operational Integration	Region (AT) Region (AF)	ATCT AF Sector
RMS/MDT/RMMS Integration	SEI	ANA-100
Frequency Management	ASM-500	SEI
Financial Management (FAA)	Project Manager	Regions
Configuration Management	FAA Project Manager	SEI ASE-600 ASM-100
Contract Administration	ALG-300	ANR-150 TOR

(i) Ensure the baseline configuration for all hardware and software items that make up the TDWR provide suitable documentation to appropriate services upon transition and turnover to the users of the TDWR.

(2) System Maintenance Service (ASM).

(a) Organize and develop a National Airspace Integrated Logistics Support (NAILS) Program in accordance with the policy of Order 1800.58, NAILS Policy.

(b) Develop the FAA TDWR maintenance concept in accordance with Order 6000.30A, Policy for Maintenance of the National Airspace System (NAS).

(c) Development staffing standards in accordance with FAA Order 1380.40B, Airway Facilities Sector Level Staffing Standard System.

(d) Establish training requirements in accordance with FAA Order 3000.10A, Airway Facilities Maintenance Technical Training Program, and advise regions on training programs, schedules, and personnel assignments.

(e) Provide spectrum engineering support in accordance with FAA Order 6050.32, Manual of Regulations and Procedures for FAA Spectrum Management.

(3) Air Traffic Plans and Requirements Service (ATR).

(a) Identify and document any additional operational requirements for TDWR and coordinate with ASM-630 for shakedown.

(b) Ensure that all operational aspects of system implementation are satisfactorily resolved by the regions prior to operational changeover.

(c) Establish training requirements in accordance with Order 3120.4, ATC On-the-Job Training and Position Certification, and advise regions on training programs, schedules, and personnel assignments.

(4) Office of Air Traffic Systems Management (ATM).

(a) Establish commissioning criteria for the TDWR for integration into the NAS.

(b) Establish operational procedures for the TDWR for use in the terminal airspace.

(5) Office of Training and Higher Education (AHT).

(a) Analyze FAA training requirements; prepare inputs to the TDWR program manager, approve training program/materials; assign training responsibility; review and approve all associated TDWR training schedules, assignments, and programs.

(b) Coordinate with ASM and AAT to ensure an adequate training program is established for maintenance and operations personnel.

(6) Logistics Service (ALG).

(a) Provide all procurement actions necessary to enter into contract(s) for the acquisition of TDWR and related items.

(b) Provide contract administration at FAA headquarters, in-plant, and onsite.

(c) Provide in-plant quality reliability officer (QRO) and administrative contracting officer (ACO), as appropriate, to assure adequacy of the quality programs and inspection systems.

(d) Provide industrial engineering support and production surveillance of program management and contract administration.

(e) Provide policy and procedural guidance to airway facilities (AF) personnel in the regions and the Aeronautical Center for appropriate TDWR property controls and maintenance records prior to certification.

(f) Provide procedures for the disposal or utilization of surplus material.

(g) Develop, in conjunction with AAC and ASM, logistics policies and plans for support of the system.

b. SEI Contractor Responsibilities. The SEI contractor has the overall technical responsibility for the TDWR program which includes: (1) all aspects of system design; (2) monitor and control of all the test and evaluation activities of the system; (3) overview and direction of all implementation plans and actions; (4) developing plans and providing guidance for logistics support of the systems. The major functions and principal activities involved in these responsibilities are as outlined in subparagraphs (1) through (4):

(1) System Design Function.

(a) Review all technical plans, procedures, and methods proposed by the contractor during development.

(b) Participate in all technical reviews, conferences, or work group sessions involving the TDWR contractor.

(c) Analyze all technical data and plans provided by the contractor.

(d) Recommend technical changes for system improvement.

(e) Approve technical plans, procedures, and methods proposed by the contractor to accomplish the TDWR mission.

(2) Test and Evaluation Function.

(a) Review and recommend approval/disapproval of the Contractors Master Test Plan (CMTP) for the TDWR.

(b) Ensure all tests are completed as required in the Verification Requirements Traceability Matrix (VRTM) for the TDWR Program.

(c) Organize and chair the Test Plan Working Group (TPWG) as outlined in the TDWR PMP.

(d) Organize and chair the Test Support Group (TSG) as outlined the TDWR PMP.

(e) Develop installation and OT&E procedures.

(f) Assist in the development of the shakedown plans and procedures.

(3) Implementation Function.

(a) Ensure the timely implementation of the TDWR into the operational environment in a manner that minimizes costs and optimize system performance.

(b) Prepare, analyze, and distribute scheduling information to all FAA organizations.

(c) Develop PIP to ensure the orderly deployment of the systems.

(d) Provide site preparation and construction standards to the proper FAA organizations.

(e) Provide technical surveillance of the contractor in the installation, integration, and documentation of hardware and software for the TDWR.

(f) Coordinate with the region(s) in scheduling and monitoring installation.

(g) Organize and chair the Implementation Working Group (IWG).

(h) Serve as focal point for the RMS/MPS/RMMS integration.

(4) Logistics Support Function.

(a) Ensure that logistic support requirements, in coordination with ASM, are planned and delivered in time to permit effective operational use of TDWR.

(b) Provide input and assistance to the Office of Higher Education and Training (AHT) for training of the AF, F&E, and/or maintenance personnel.

(c) In conjunction with ASM-200, develop performance, maintenance, calibration standards, and procedures for TDWR.

(d) Form an FAA National Airspace Integrated Logistics Support Management Team (NAILSMT).

c. Region Responsibilities.

(1) All Regions. Each region is responsible for procuring the TDWR site as selected by the program office with the concurrence of the respective region; providing space and power for the moving target simulator; and providing space and power for the displays at the ATCT and TRACON facilities. All regions are also responsible for submitting telecommunication service requests (TSR) for communications between the TDWR RPG and the displays.

(2) Technical Onsite Representative (TOR). The TOR's serve as focal point in the respective regions for TDWR activities. As the program manager's regional representatives, they work closely with the program manager, the SEI contractor TO, and the SEI contractor regional representative. They are designated by the AF Division and are accountable for ensuring that the TDWR is implemented in an orderly manner. The TDWR TOR remains responsible to his/her immediate supervisor and, therefore, keeps that authority informed as to the current status of the project. The TDWR TOR will submit to the Program Manager a periodic technical and financial report describing progress in each FAA TDWR site within the region. Tasks include, but are not limited to:

(a) Coordinate Regional acquisition of property selected for TDWR sites including temporary easements for construction equipment, office trailer space, etc., during the construction period.

(b) Initiate the Environmental Impact Study for each site in accordance with FAA Order 1051.1. Ensure completion in a timely manner to meet program objectives.

(c) Arrange electrical power connection by the local utility company, including power line and transformer requirements.

(d) Coordinate installation and connection of communication lines and equipment with the local telephone company.

(e) Identify property location and arrange access for TDWR contractor turnkey personnel and construction equipment.

(f) Monitor the contractor's performance during the site survey, construction, installation, checkout, and acceptance phases to ensure compliance with approved TDWR plans and test procedures.

(g) Coordinate and resolve issues between the TDWR contractor and local authorities, inspectors, and community officials.

(h) Maintain the site data file.

(i) Review and approve/disapprove construction "shop drawings".

(j) Identify the location of equipment in the Control Tower and the TRACON

(k) Locate and provide any needed and available drawings to the TDWR contractor, ie., ATCT, TRACON, etc., for installation of equipment.

(l) Coordinate resolution of technical issues which arise during the turnkey activities with the TDWR program office. Recommend approval/disapproval of deviations/waivers to specified requirements. (Note: only the contracting officer can approve/disapprove deviations/waivers to TDWR contractural requirements.)

(m) Conduct the contractor acceptance inspection (CAI) including execution of approved test procedures, and site clean-up inspection.

(n) Conduct joint acceptance inspection (JAI) and complete the FAA Form 256 for the TDWR equipment and submit to the TO.

(o) Complete certification and commissioning procedures for the TDWR system to ensure complete integration into the NAS.

(p) Provide a weekly report to the TDWR program office in accordance with the approved Project Implementation Plan.

(3) Resident Engineer. The FAA Resident Engineer will be assigned by the AF Division. This position is the interface between the contractor and the TOR during the site preparation and construction phase of

the project. The Resident Engineer may function as the TOR during Phase I of the project.

d. FAA Technical Center (ACT) Responsibilities. The ACT is responsible for:

(1) Completion of Design Qualification Test and Evaluation (DQT&E) and Technical Field Test & Evaluation (TFT&E).

(2) Development of TDWR Integration Test Plan and Procedures.

(3) Appointment of Test Director for Operational Testing.

(4) Review and approval of criteria for CAI for Phases I and II.

(5) Validation of testing criteria for CAI Phases I and II at the key site.

e. Mike Monroney Aeronautical Center (AAC) Responsibilities. The AAC is responsible for:

(1) FAA Academy, AAC-900. The responsibility for training is as follows:

(a) Technical Training. The FAA Academy has the responsibility to review and approve the Contractor developed training courses for the instructors, field technicians/engineers, and FAA Depot technicians/engineers. They will review and approve the development and conduct of the special indepth analysis course for FAA Depot/ASM-630 engineers. In addition, they may assist in the development and conduct of a special training course for the regional TOR's.

(b) Operations Training. The FAA Academy has the responsibility to develop and conduct operations training for the air traffic controllers and supervisors. This training is to be provided to TRACON and ATCT personnel. Guidelines for training by the Air Traffic Training Officers at the facility level will be developed.

(2) System Maintenance Service (ASM-630).

(a) Appointment of representative to Test Plan Working Group.

(b) Completion of Operational Test & Evaluation (OT&E)

(c) Development of Shakedown Plan and Procedures for the TDWR.

(d) Providing manpower support for the PSF.

(f) Providing representation to the TDWR Training Working Group.

(g) Developing certification parameters and requirements.

(3) FAA Depot (AAC-400). The FAA Depot has the responsibility as follows:

(a) Assist in the development and validation of NAILS for the TDWR.

(b) Review and validate the maintenance concept for TDWR.

(c) Provide guidelines for the initial provisioning of supply support for the TDWR.

(d) Establish a supply support concept for the life of the TDWR.

(e) Provide facilities and manpower for the FAA Depot level test and repair of components for the TDWR.

(4) Facility Support Division (AAC-50). Provides physical building space for the PSF

54. PROJECT MANAGERIAL COMMUNICATIONS. The primary methods of communications will be through reviews and conferences as outlined in subparagraphs a-d:

a. Program Reviews. These monthly reviews provide the necessary communications tools for top-level management of the program. Periodically, the program manager will brief higher management on the status of project schedules and current topics. In preparation, the program manager may request the support of functional or contractor organizations in providing status and information on specific program topics. Copies of the reviews and all supporting information will be provided to all interested groups.

b. Design/Milestone Reviews. The SEI contractor TO, TDWR Program Manager and the TDWR contractor will conduct design reviews on a scheduled basis as shown in figure 4-1. These reviews include a Preliminary Design Review and a Critical Design Review as required by the TDWR contract. Other project reviews addressing specific TDWR activities will be convened on an as-required basis and participating TDWR organizations will be notified in advance of the date, time, and location. Minutes of these meetings and action items assignments will be provided to all interested groups.

c. Program Conferences. These meetings will be convened as required by program management. An agenda will be prepared and minutes of the conference published.

d. TOR Conferences. These conferences will be scheduled as necessary. These meetings are attended by TOR's from each region, the program manager, implementation manager, and representatives from headquarters organizations. They provide a forum to discuss and resolve project issues of special interest to the regions. Action items generated at these conferences focus on regional concerns and are resolved by the program manager and designated TOR's or representatives from the appropriate functional areas.

55. IMPLEMENTATION STAFFING. The following organizations are responsible for the implementation of the FAA TDWR equipment.

a. Program Manager. The Division Manager (ANR-100) has designated ANR-150, to serve as program manager for the TDWR contract.

b. Technical Officer. The FAA has designated the SEI contractor as TO for the TDWR contract. The TO will be responsible to input to the TDWR Program Manager all aspects of FAA requirements of design, production, testing, delivery, installation, NAS integration, and management of the TDWR turnkey contract.

c. Technical Onsite Representative (TOR). A TOR is designated by the regional AF Division and is accountable for ensuring that all items required in support of the installation of the FAA TDWR equipment are accomplished in an orderly manner. The TOR is responsible for communications, coordination, and integration of the system into the NAS. The TOR will submit to the TO all technical reports describing progress at each site within the region.

56. PLANNING and REPORTS. The planning activity is an integral part of the TDWR project, which began with the contractor's proposal. As the contractor finishes the required plans for specific tasks they will be reviewed and approved by FAA. In addition to the plans developed by the contractor there will be planning activities by groups as outlined in subparagraphs a thru f:

a. Test and Evaluation Working Group. This group will be chaired by the Technical Evaluation Function leader and include the functions of the TPWG, and the TSG as outlined in the PMP. Membership, duties, and responsibilities will be as provided in the PMP. Other members from the TDWR program office or groups may be asked to join as required. Primary focus of the group will be on contractor performed tests to validate system requirements of specification FAA-E-2806 and to develop test procedures for a smooth transition into the NAS. Action items identified in the meetings will be assigned to the appropriate function for resolution. Minutes of the meetings will be provided to all interested parties.

b. Implementation Working Group. The implementation function leader will serve as chairman of the group and will meet periodically to address both project issues and specific implementation activities. Membership consists of the implementation function leader, plus regional, FAA Technical Center and Aeronautical Center representatives. Other offices will be asked to participate as required. Action items generated at these meetings will be resolved by the TDWR TO or representatives from the appropriate functional areas. Minutes of each meeting will be distributed to attendees as well as all interested parties and include a summation of the topics discussed and description of all action item resolutions.

c. Logistics Support Working Group. The group will be chaired by the Logistics Support Function leader. This group will form an FAA NAILSMT and act to finalize the Integrated Logistics Support Plan (ILSP). The NAILSMT will be formed in compliance with NAILS, the Statement of Work (SOW), and consist of representatives from headquarters staff, field organizations, the SEI contractor, and the FAA TDWR Program Manager. This group will review and approve the contractor Integrated Support Plan (ISP) as required by contract data requirement list (CDRL) F001. The assignment to the NAILSMT will be an additional duty for FAA personnel. The NAILSMT will meet as required by the SOW and will provide input to the program manager on all aspects of FAA logistics support requirements for the project.

d. Regional Status Reporting. Weekly status reports regarding technical progress will be submitted to the implementation function leader by each TOR. Routine reporting as well as responses to specific requests will be covered in these reports. The implementation function leader will be responsible for reporting to the TO on significant items.

e. Quality and Reliability Report. The plant QRO will make weekly reports to the contracting officer. Copies of these reports will be provided to the TDWR Program Manager and the TO.

f. Installation Phase Documentation. The basic documentation required is the Installation Log and Weekly Installation Status Report as outlined in appendix 3. These are functionally described subparagraphs (1) and (2):

(1) Installation Log. The FAA site representative will maintain a project log and make entries documenting the installation status, activities, and events for each TDWR site. Entries will be made for every visit to the job site and for telephone conversations with the contractor's onsite representative that have an impact on the contract. Items of consequence not adequately covered by written documents shall be included in the log, such as unusual physical conditions encountered, oral protests, design deficiencies noted and actions taken, and the cause and extent of delays. Complete and factual entries will be made at time of occurrence. Upon completion of the contract work, the site coordinator will forward the log to the TO.

(2) Weekly Construction Status Report. This report is designed to ensure that the regional division, and the program manager are abreast of the progress and problems that take place each week at each location. The weekly status report will be prepared and mailed every Friday by the TOR. The completed weekly status report will be furnished to the contractor site representative with copies to the regional AF Division and AF Sector Managers.

57. <u>APPLICABLE DOCUMENTS</u>. The following documents are applicable to this order:

a. Order 1800.58, National Airspace Integrated Logistics Support (NAILS) Policy.

b. Order 4560.1B, Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Materiel.

c. FAA-E-1375C, Spare Parts Peculiar for Electronic, Electrical and Mechanical Equipment.

d. MIL-STD-1388-1, Logistics Support Analysis.

e. MIL-STD-1388-2, DOD Requirements for a Logistic Support Analysis Record.

f. MIL-STD-1561, Provisioning Procedures, Uniform DOD.

58.-59. <u>RESERVED</u>.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL.

a. Financial Aspects.

(1) Scope. FAA offices, services, and regions must use the budgeting process to obtain funding for staffing, training, equipment, and associated development.

(2) Financial Allocation. ANR-150 is the sole source of funding for the TDWR Program. The program is being funded over a 5 year period with the number of systems procured, by program year, as outlined in table 4-1.

b. Regional Contract Authority. The regions will be given contract authority to acquire the TDWR sites.

61.-69. RESERVED.

CHAPTER 7. FIELD DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS.

a. General. The TDWR system is a turnkey installation by the TDWR contractor. The contractor project manager will schedule, coordinate, and staff the efforts required for the expeditious completion of the installation with absolute minimum disruption to the ongoing NAS operations and the surrounding neighborhood. Once off loading of equipment has started, installation work will proceed on a regularly scheduled basis, normally 5 days per week, without lapse, through completion. All activities of the contractor from site preparation, construction and delivery of components, through installation, checkout and acceptance will be coordinated with the regional TOR and by the implementation function leader. The Deployment Readiness Review (DRR) process has been incorporated in the contract and is scheduled to be initiated prior to installation of the key site.

b. First System Test Facility. The first system will be constructed and equipment installed at the FAA Technical Center. Testing will be conducted on the total turnkey project and preliminary CAI's developed for Phase I and Phase II.

c. Key Site Facility. This will be the first operational site. The CAI's for Phase I and II will be validated at this site and serve as criteria for all other installations. The operational procedures tests will also be validated at this site and the joint acceptance inspection (JAI) criteria will be established. Shakedown procedures will be validated and the final shakedown plan will be developed for all subsequent installations.

d. Program Support Facility (PSF). The TDWR PSF includes all of the equipment, supporting software, firmware, and documentation (including revisions and upgrades) required for the generation, maintenance, testing, analysis, and debugging of all the TDWR functional software. Operation, maintenance and vendor data manuals for PSF equipment shall also be provided by the contractor in accordance with FAA-D-2494 concurrent with the PSF delivery. The PSF executes the TDWR operational programs for test and debugging purposes. The physical facility will be provided by AAC-50 to ASM-630 at the Mike Monroney Aeronautical Center.

e. Hot test bed/Support Facility. A reprogramming action has been initiated by the TDWR program office to install a system at the Aeronautical Center for the shared use as a hot test bed by the Depot and as a support facility by ASM-630. This action will provide a live system for testing repaired units as well as for developing and testing modifications for system improvements over the life of the program. The reprogramming action will provide guidance for the sharing of the system between the two Aeronautical Center groups.

f. FAA General. All technical information furnished the contractor will be through the TO as coordinated through the TDWR Program Manager. The program manager has the responsibility to establish what data is required and when it is needed. All contractual information will be forwarded through the contracting officer.

g. FAA Headquarters Furnished Information. The Weather Radar Program Office, ANR-150, will be the single focal point in FAA to collect the FAA furnished information in support of TDWR.

g. Region Furnished Information. The regions will furnish the program manager the supporting data for site surveys, site layouts for the TDWR equipment, communication connectivity terminal point drawings and preferred drawings for the ATCT and TRACON installations.

71. SITE PREPARATION. The contractor shall be responsible for all site preparations including access roads, utilities, security fences and foundations and construction of the building. This will complete Phase I of the CAI.

72. DELIVERY. The contractor is required to pack and ship all TDWR equipment. Packing and shipment will be in accordance to Government-approved procedures.

73. INSTALLATION PLAN. The contractor will develop a plan for installation that meets with FAA approval. The contractor will install and checkout all TDWR and related equipment at the TDWR site. In addition the contractor will install and checkout the situation and ribbon displays in the ATCT and TRACON facilities. The installation, checkout, and acceptance of the total system will complete Phase II of the CAI.

74.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. OVERVIEW OF VERIFICATION AND TESTING. All NAS projects shall complete a Test and Evaluation (T&E) process to assure the system/subsystems requirements of the NAS, including operational effectiveness and operational suitability, are verified prior to commissioning. As much of this testing as possible shall be accomplished prior to installation at field facilities. It is the intent that all interfaces necessary to establish a system test environment for the NAS be available, physically or by electronics means, at the Mike Monroney Aeronautical Center to support required T&E prior to field implementation and to sustain the test environment for the future. The MTP shall adhere to this policy and NAS-MD-110, Test Terms and Definitions for the NAS, will address the required testing for each phase of the project's life cycle from design through deployment. The MTP shall show how all test requirements are to be satisfied. A Test Policy and Planning Review Board (TPRB) and a test directors function will be established to satisfy the requirements of the T&E Program. The organization and responsibilities of the TPRB, Test Directors, and all support organizations are outlined in Order 1810.4A, FAA NAS Test and Evaluation Program. The verification and testing of the TDWR system from the contractor is the responsibility of the TDWR TO. The TDWR TO will ensure that the contractor plans and conducts the necessary analysis, tests, demonstrations, and inspections to ensure all requirements stated in FAA-E-2806a have been satisfied. Paragraphs 81 through 86 define the TDWR test program within the guidelines established by FAA-STD-036, the TDWR Master Test Plan, and Order 1810.4A.

81. FACTORY VERIFICATION. The objective of factory verification is to verify that the contractor has fulfilled the requirements and specifications of the contract. Factory verification testing will be performed in accordance with the Government-approved CMTP which satisfies the requirements specified in FAA-E-2806a. This testing will be performed at the TDWR contractors facility and consists of the following tests/demonstrations:

a. Contractors Preliminary Tests (CPT). This testing is conducted by the manufacturer to assess the readiness of the component or assembly to proceed to formally witnessed tests specified in section 4 of specification FAA-E-2806a.

b. Design Qualification Testing (DQT). DQT will be performed by the TDWR contractor to verify the adequacy of the design to meet the specification. DQT will be conducted in accordance with FAA-G-2100, Electronic Equipment, General Requirements. Paragraph 4.2.1 (DQT) of FAA-E-2806a specifies the tests to be conducted.

c. Production Acceptance Testing (PAT&E). PAT&E is testing designed to demonstrate that the production articles meet the specification. PAT&E is performed on all production equipment to ensure manufacturing consistency. PAT&E testing will be conducted as specified in the TDWR MTP.

d. Reliability Demonstration. This demonstration will be conducted by the contractor in accordance with the Government-approved demonstration plan. A reliability demonstration will be conducted on specified equipment units to demonstrate compliance with the requirements.

e. Maintainability Demonstration. A Maintainability Demonstration will be conducted by the contractor in accordance with the Government approved demonstration plan. The demonstration will be conducted at the contractor's plant and will include failures generated by fault simulation as well as the insertion of hardware "bugs." These failures will be chosen by the Government from a list supplied by the contractor.

f. FCC Type Acceptance Testing. This testing will be performed in accordance with the conditions of FAA-G-2100 and will verify the requirements listed in the VRTM Table III of FAA-E-2806a.

82. CHECKOUT. Checkout includes the testing of the TDWR system's mechanical, electrical, and digital interfaces after installation. Checkout will provide the basis for a readiness assessment that the system is qualified for follow-on testing. Selected DQT's as well as installation, checkout, and acceptance testing will be conducted at the first site and the FAA Technical Center, in order to establish checkout procedures to be used in CAI's at the key and subsequent sites. CAI will consist of a site preparation and construction phase and installation, checkout and acceptance.

83. CONTRACTOR INTEGRATION TESTING. This testing will be conducted at ACT during the DQT phase whereby all system internal and external interfaces will be checked for designed data flow and performance.

84. CONTRACTOR ACCEPTANCE INSPECTION (CAI). The CAI is defined by Order 6030.45 as the formal acceptance by the agency of a constructed facility from the construction contractor or an installed system or equipment from the installation contractor. The CAI's for the TDWR will be conducted in two phases.

a. Site Preparation and Construction (Phase I). All tests necessary to ensure compliance with FAA-E-2806 in the areas of site preparation and construction of the facility will be conducted by the Contractor. Criteria and method of conduct of the tests for Phase I will be established and verified during the technical field test and evaluation (TFT&E) of the system at the FAA Technical Center. These tests will then be validated at the key site and serve as site preparation and construction guidelines for all subsequent sites.

b. Installation, Checkout, and Acceptance (Phase II). Upon completion of the installation the contractor will conduct all the tests necessary to demonstrate that the TDWR system meets the performance requirements specified in FAA-E-2806a.

85. FAA INTEGRATION TESTING. The FAA will conduct integration testing by the ACT at the completion of onsite DQT. This integration testing will be

designed to assess the systems ability to successfully be incorporated into the NAS and will be validated at the key site. Responsibility for developing the integration test plans and procedures has been assigned to the FAA Technical Center (ACN-230).

86. SHAKEDOWN AND CHANGEOVER. System shakedown is testing that is performed after the FAA takes responsibility for the TDWR system (including software) from the turnkey contractor. ASM-630 is responsible for the development of the test plans and procedures to support shakedown testing. ACN-230 will provide testing support during shakedown testing. Shakedown testing will begin after site acceptance testing by the turnkey contractor and will end with the Joint Acceptance Inspection (JAI). During system shakedown, operational effectiveness and suitability tests will be conducted on the TDWR system to verify that it functions properly, meets Air Traffic operational requirements, and is maintainable. System shakedown will permit facility personnel to become familiar with the TDWR system, learn its limitations, and become proficient in diagnosing problems and effecting repairs. It will reflect the integrated readiness of personnel, procedures, and the TDWR system to assume field operational status. A preliminary shakedown will be conducted at the AAC and will include verification of the following activities:

a. Operational and maintenance proficiency evaluation and hands-on training.

b. Evaluation to determine the adequacy of system failure detection and recovery procedures.

c. Testing of operational functions, including site specific adaptation data, for any adverse weather conditions for which the system is designed.

d. Evaluation to determine the suitability of displayed operational data.

87. JOINT ACCEPTANCE INSPECTION (JAI). Order 6030.45 specifies organizational responsibilities during conduct of the JAI. The members of the JAI shall determine, within their individual areas of responsibility, if the TDWR system operation is satisfactory and will provide its advertised service. This inspection is the culmination of the TDWR Program on a site-by-site basis which results in the system being an integral part of the NAS. The JAI and CAI, particularly in the acceptance testing phase, may be run concurrently to ensure the contractor delivers a system that meets operational requirements.

88.-89. RESERVED.

CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. GENERAL LOGISTICS SUPPORT REQUIREMENTS. Logistics support is a fundamental requirement, beginning with development of the maintenance/support concept for the TDWR system in the preparation of a Procurement Request (PR) and continuing throughout the life of the system. The ILSP requirements are to be predicated on a maintenance/support concept based on operational considerations, equipment redundancy, and reliability factors derived from the baselined system design and logistics support analysis (LSA).

91. MAINTENANCE CONCEPT. Maintenance of the TDWR system will at two levels of maintenance: (1) the general NAS sector (GNAS) which will combine the functions of site and intermediate maintenance and; (2) the FAA Depot. The LRU replacement will take place at the equipment site with authorized repair taking place in the GNAS work center. The FAA Depot will manage the repair, alignment, and calibration of TDWR equipment and LRU's requiring specialized equipment and procedures. FAA Depot level repair is a management and control function that does not require actual repairs be performed by FAA personnel. The best and most cost-effective repair source will be determined using cost/benefit analysis. FAA Depot level repair will provide the maintenance program with the capability of completely overhauling and rebuilding equipment as well as providing back-up support in the form of complex repair actions that are beyond the resources of the intermediate level work center. All items repaired at the FAA Depot level will be placed in the supply system to fill support requirements. Non-repairable LRU's will be cannibalized or scrapped as authorized by existing orders. All maintenance functions performed at the GNAS or at the FAA Depot will be independent of whether contractor or FAA maintenance personnel perform the maintenance. The only differences will be which organization actually performs the maintenance tasks and, if applicable, how the interfaces between the FAA and contractor are implemented.

92. TRAINING.

a. AT Operations and AF Maintenance. The TDWR contractor is required to develop, prepare, and validate an operational and a maintenance training course for FAA Academy instructors and field personnel for air traffic and airway facilities. The operational tryout and prototype classes will be conducted at the contractor's plant. Further, the contractor is required to provide a job task analysis to allow the Government to tailor the training to the level of the students attending the follow-on classes.

(1) Follow-on Operational Training. The AT personnel may receive training at the parent facility through the local training officer or through the FAA Academy at Oklahoma City, Oklahoma.

(2) Follow-on Maintenance Training. The AF maintenance training will be conducted by the Airway Facilities technical organization at the sector level through Computer Based Instruction (CBI) and/or the FAA Academy in Oklahoma City, Oklahoma.

(3) Lead Time. The Air Traffic Systems Management (ATM-14) and Systems Maintenance Service (ASM-260) should ensure that personnel are identified for training in sufficient time to support the operational requirements of each TDWR site.

b. Special Courses by Contractor. There are two special courses to be taught by the contractor at their facilities.

(1) Indepth Circuit Analysis and Repair. The contractor is required to provide training along with associated documentation for a course with two primary objectives:

(a) To provide indepth theory and diagnostic training to the chip and component level. This part of the training will satisfy the requirements for engineers/technicians to do comprehensive engineering analysis and develop modifications to enhance support of the TDWR system.

(b) To provide indepth repair training to the circuit board and component level. This part of the training should emphasize unique methods, specialized techniques, and advanced repair technology used in developing the TDWR system. This training will be conducted in two classes to meet both objectives in each class. Space is required to be provided for 6-12 personnel. Personnel receiving this training will be from the FAA Academy, FAA Depot, and ASM-630. The supporting documentation is required to detail circuits to the schematic level. It shall also provide theory in sufficient detail to permit training course development to meet both objectives.

(2) Test Team Training. Before technical test and evaluation begins, the contractor is required to provide a TDWR engineer to conduct a one-time course to familiarize Government test-team personnel with the TDWR equipment including hands-on instruction. This course will enable test-team personnel to properly observe and assist in the conduct of TFT&E testing. This course is required to be held onsite prior to start of the TFT&E testing. The course shall be provided for up to 15 personnel for a 5 day period including one (1) day of hands-on training as a minimum. The supporting documentation shall discuss tests to be performed, identify theory of operation, system concepts, operational interfaces and human interfaces to the LRU level as a minimum.

c. TOR Training Course. A special training course is being developed through the TDWR program office to provide the TOR with the skills necessary to carry out their responsibilities. The course will cover all aspects from the site selection process to the final commissioning of the system into the NAS. Special emphasis will be given to the contractor test plans and procedures as part of the CAI, the operational tests for integration and JAI, and the final certification and commissioning of the system.

93. SUPPORT TOOLS AND TEST EQUIPMENT. All support tools and test equipment necessary for the installation, repair, adjustment, test, and maintenance of the TDWR system are to be identified or supplied by the contractor with the equipment.

a. Common Tools and Test Equipment. The contractor will identify requirements for the common tools, test/support equipment, interface devices and connectors for maintaining the TDWR at all levels of maintenance. The contractors recommended listings of equipment will be forwarded to FAA for review, approval, and acquisition as required.

b. Special Tools and Test Equipment. Special tools, special test/support equipment, and interface devices required to support the TDWR will be held to a minimum. When special tools or test equipment are required for initial adjustments, testing and/or maintenance of the TDWR they will be provided by the contractor. Special tools, test/support equipment and interface devices that are required for routine and special maintenance of the TDWR will be detailed in the contractor's LSA, and approved by the Government prior to acquisition.

94. SUPPLY SUPPORT. Plans for initial spare parts provisioning and follow-on supply support are to be based on the maintenance concept.

a. Long Lead-Time Items List. In order to obtain timely delivery of items having a long procurement lead-time, the TDWR Program Manager has requested that the contractor furnish the data necessary to develop a long lead-time items list. The FAA Depot is to use the list to identify those long lead-time items that should be placed on order prior to receipt of the provisioning parts list (PPL).

b. Provisioning Parts List. A top-down breakdown of all parts and assemblies used in the end article subject to electrical or mechanical failure is to be furnished by the contractor in accordance with the TDWR contract.

(1) Provisioning Conference. A provisioning conference is to be held approximately 30 days after receipt of the PPL.

(2) Initial Stock Requirements. Approximately 60 days after the provisioning conference, the FAA Depot, in conjunction with the FAA program office, is to determine initial stock requirements and initiate appropriate acquisition action.

(3) Onsite/Work Center Spares. The contractor will furnish one set of spares, as established in the provisioning process, to be delivered concurrently with each TDWR system in accordance with the recommended list approved by the program manager.

(4) FAA Depot Spares. The contractor will furnish quantities of peculiar parts as FAA Depot level spares as established in the provisioning process.

95. VENDOR DATA AND TECHNICAL MANUALS. The TDWR System Project Office will have prime responsibility for supplying all agency elements with technical information on the TDWR system. ASM-600 will be responsible for supplying this information to the FAA agency elements consistent with the need to

develop support plans, training programs, publications, and other uses. Technical data will be as required in the contract. Technical data, after the initial issue, will be managed and disseminated by the ASM-630.

96. EQUIPMENT REMOVAL AND DISPOSITION. This is a new system. No equipment will be removed and, therefore, there is no disposition of equipment.

97. FACILITIES/STAFFING. The TDWR facility will be a stand-alone structure that houses all the equipment necessary to detect, process, and report all hazardous wind shear within the critical runway area. The structure will be supported by fences, roadways, parking, and utilities as necessary. An environmental impact study will be completed at each site to ensure compliance with applicable Federal and local standards. AF maintenance staffing for weather radar equipment will be commensurate with workload requirements. It will be in compliance with directives provided in the latest edition of Order 1380.40B, Airway Facilities Sector-Level Staffing Standard System.

98.-99. RESERVED.

CHAPTER 10. ENVIRONMENT AND ENERGY

100. GENERAL. This new weather radar system, with its high radiofrequency (RF) radiated power, concentrated RF beam, and low elevation angle coverage, will require a thorough analysis to determine the environmental impact in and around the site. While no significant environmental objections to the TDWR system are anticipated, the regions, on a site-by-site basis, have the responsibility for resolving any environmental objections.

101. ENVIRONMENTAL IMPACT ASSESSMENT. A separate environmental impact assessment for each location will be required. This assessment will be completed concurrently with the site selection analysis and will involve the regions as necessary.

102. LAND ACQUISITION. Any land acquisition required to support this TDWR system and the Moving Target Simulator will be the responsibility of the regions.

103. ELECTRONIC EMISSIONS. A thorough analysis of potential electromagnetic frequency interference (EFI) problems will be conducted at each site to ensure system capability with other systems in the NAS. This analysis will include an electromagnetic compatability analysis center (ECAC) study to determine optimum transmitting frequency. Coupling to other equipment will be prevented by electromagnetic interference filtering and shielding in the contractors design. A study to ensure there will be no hazardous levels of radiation emitted from the TDWR has already been completed and the system cleared for deployment. Each site will be provided a copy of this study and the guidelines used in the analysis.

104. SAFETY. All safety aspects with regard to personnel and facilities will be incorporated into the system design. Interlocks to protect personnel working on the equipment will be an integral part of the system.

105.-109. RESERVED.

APPENDIX 1. ACRONYMS

ACO	Administrative Contracting Officer
AF	Airway Facilities
AGL	Above Ground Level
AHT	Office of Higher Education and Training
ALG	Logistics Service
ANR	Program Director for Surveillance
ARP	Airport Reference Point
ARTS	Automated Radar Terminal System
ASDE-3	Airport Surface Detection Equipment-Model 3
ASM	Systems Maintenance Service
ASR-9	Airport Surveillance Radar-Model 9
AT	Air Traffic
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATM	Air Traffic Systems Management
ATR	Air Traffic Plans and Requirements Service
AVS	Aviation Standards
BAND	Boston Area NEXRAD Demonstration
BIT/FIT	Built-In-Test/Fault Isolation Test
BITE	Built-In-Test Equipment
CAI	Contractors Acceptance Inspection
CBI	Computer Based Instruction
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CLAWS	Classify, Locate, and Avoid Wind Shear
CMDT	Contractors Master Test Plan
COAR	Contract Administrators Representative
COHMEX	Cooperative Huntsville Meteorological Experiment
COTR	Contracting Officer Technical Representative
CPT	Contractors Preliminary Test
CPU	Central Processing Unit
CSCI	Computer Software Configuration Item
CSER	Contractors Site Engineering Report
DFU	Display Function Unit
DQT&E	Design Qualification Test and Evaluation
DOD	Department of Defense
DOT	Department of Transportation
DRR	Deployment Readiness Review
DSP	Digital Signal Processor
ECAC	Electromagnetic Compatibility Analysis Center
EFI	Electromagnetic Frequency Interference
EIS	Environmental Impact Study
EMC	Electromagnetic Compatibility
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FY	Fiscal Year

APPENDIX 1. ACRONYMS (CONTINUED)

GFE	Government Furnished Equipment
GNAS	General NAS Sector
ICWG	Interface Control Working Group
ILSMT	Integrated Logistics Support Management Team
ILSP	Integrated Logistics Support Program
IOC	Initial Operational Capability
IRD	Interface Requirements Document
ISP	Integrated Support Plan
IWG	Implementation Working Group
JAI	Joint Acceptance Inspection
JAWS	Joint Airport Weather Studies
JSPO	Joint System Program Office
KDM	Key Decision Memorandum
KDP	Key Decision Point
LLWAS	Low Level Wind Shear Alert System
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
MACA	Months After Contract Award
MESONET	Meso-meteorological Network
MDT	Maintanance Data Terminal
mi	Mile
MIT	Massachusetts Institute of Technology
MTBCF	Mean Time Between Critical Failure
MTBF	Mean Time Between Failure
MTS	Moving Target Simulator
MTTR	Mean Time To Repair
NAILS	National Airspace Integrated Logistics Support
NAILSMT	National Airspace Integrated Logistics Support Management Team
NAS	National Airspace System
NCAR	National Center for Atmospheric Research
NEXRAD	Next Generation Weather Radar
NIMROD	Northern Illinois Meteorological Research on Downburst
nmi	Nautical Mile
NSSL	National Severe Storms Laboratory
OMB	Office of Management and Budget
OT&E	Operational Test and Evaluation
ORD	Operational Readiness Demonstration
PAT&E	Production Acceptance Test and Evaluation
PC	Personal Computer
PDR	Preliminary Design Review

APPENDIX 1. ACRONYMS (CONTINUED)

PIP	Project Implementation Plan
PIREP	Pilot Weather Report
PMP	Project Master Plan
PPL	Provisioning Parts List
PR	Purchase Request
PRF	Pulse Repetition Frequency
PSF	Program Support Facility
QRO	Quality/Reliability Officer
RCV	Receiver
RDA	Radar Data Acquisition
REX	Receiver/Exciter
RF	Radio Frequency
RFP	Request for Proposal
RMM	Remote Maintenance Monitoring
RMMS	RMM System
RMS	Remote Monitoring System
RPG	Radar Product Generator
SD	Situation Display
SEI	Systems Engineering and Integration
SESAME	Severe Environmental Storms and Mesoscale Experiment
SOW	Statement of Work
SRR	System Requirements Review
SRS	System Requirement Statement
STE	Special Test Equipment
T&E	Test and Evaluation
TBD	To Be Determined
TCCC	Tower Control Computer Complex
TDWR	Terminal Doppler Weather Radar
TFT&E	Technical Field Test and Evaluation
TO	Technical Officer
TOR	Technical On-Site Representative
TPRB	Test Policy and Planning Review Board
TPWG	Test Plan Working Group
TRACON	Terminal Radar Approach Control
TSG	Test Support Group
TSR	Telecommunications Service Request
VRTM	Verification Requirements Traceability Matrix
XMT	Transmitter

APPENDIX 2. DEFINITIONS

1. MICROBURST. A small scale (2.5 mi diameter or less) wind event associated with convective activity, characterized by a narrow downdraft creating (when it nears the ground) an outflow spreading horizontally in all directions or in a preferred direction depending upon the horizontal translation of the downward-directed shaft of air. The leading edge of a microburst outflow is a wind shift zone (gust front) having a small horizontal radius of curvature and whose boundary is closed. Wet or dry microbursts are distinguished by whether or not rainfall is observed at the ground level in association with the microburst.

2. OUTFLOW (ground level). The primarily horizontal rush of air near the ground originating as a thunderstorm downdraft but turning into the horizontal direction as the downdraft approaches the ground. Outflows from a microburst are confined to a small area and have a closed gust front (circle or ellipse), in contrast to outflows from a squall line which cover a relatively large area and whose gust front is an open surface described by either a nearly straight line or a curve with a large horizontal radius of curvature. Outflows are typically 500 to 3,000 feet in depth.

3. GUST FRONT. A moving wind shift zone separating ambient air from a thunderstorm outflow. Associated with gust fronts are strong updrafts ahead of the front, wind shear in the frontal (wind shift) zone, and strong turbulence in the frontal zone and above the outflow directly behind the frontal zone. The wind shift zone associated with a gust front is typically 0.5 mi in width.

4. WIND SHEAR (aviation context). Any change in the horizontal wind speed and/or direction between two points in space. Hazardous Wind Shear (with respect to a moving aircraft) is any sustained (greater than 10 sec) change of true airspeed in excess of 1 knot per second of flight occurring below 1500 feet agl (above ground level).

5. WIND SHIFT (aviation context). A moving boundary, straight or curved, representing a transition zone of a sustained change in the horizontal wind speed and/or direction, but primarily the wind direction, often resulting in the need to change active runways. The boundary usually separates air masses of different temperatures. Wind shifts are associated with thunderstorm gust fronts (microburst and straight wind), cold fronts, warm fronts, and sea breeze fronts. The transition zone widths vary from 0.5 mi (gust fronts and some cold fronts) to tens of miles (warm fronts and some cold fronts). All wind shifts are characterized by wind shear.

6. LOW LEVEL WIND SHEAR. Wind shear occurring below 1,500 feet AGL along the final approach or along the takeoff and initial climb-out flight path.

7. THUNDERSTORM. An atmospheric phenomenon whose existence is determined solely by the presence of lightning or the sound of thunder. In addition to lightning, thunderstorms may produce the following hazards to aviation: strong

updrafts and downdrafts, hail, turbulence, restrictions to visibility, microbursts (wet and dry), outflows, gust fronts, wind shifts, wind shear, tornadoes, and heavy rain.

APPENDIX 3. INSTALLATION LOG AND WEEKLY INSTALLATION STATUS REPORT

1. INSTALLATION LOG. Entries to be made in the Installation Log should typically include, but not be limited to the following format:

a. Description of specific location of the work, such as building site, ATCT, etc.

b. Contractor employees on job, by name and title.

c. Description of work being done, its progress, and status of work on which operations have been suspended.

d. Weather and ground conditions, and their effect upon the work.

e. Description and condition of equipment delivered to site, including Government furnished equipment (GFE).

f. Deviations from contract plans and specifications and corrective or other actions taken. Description of conditions differing in any respect from those contained in the contract or allegations from contractor concerning such conditions.

g. Description of any damage to underground utilities, including cause and circumstances, precautions taken by the contractor, extent of damage, and how repairs were accomplished.

h. Description of any acts of the contractor or subcontractors which damage Government property or the property of others, and confirmation of oral notification of such damage when reported.

i. Description of any components or subsystems rejected and the reasons.

j. Summary of telephone conversations referencing the TDWR installation.

k. A complete labor and material record in connection with any item of extra work or any other work for which there is any reason to believe a claim may be made.

l. Summary of any union problems, employee grievances, etc.

m. Summary of accidents and personnel injuries.

n. Change orders as issued.

2. WEEKLY INSTALLATION STATUS REPORT. Entries to be made in the Weekly Installation Status Report should typically include, but not be limited to the following format:

a. Part A. Weekly Progress. Describe the work accomplished during the week.

b. Part B.

(1) Change Orders. Describe change orders issued during the week.

(2) Progress. Describe on-site preparation/installation, deviations from the plan and other items adversely affecting implementation.

c. Part C. Problem Areas. Describe current and possible problems that might affect the completion of the contract work.

☆U.S. Government Printing Office : 1990 - 724-532/20470