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FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

ORDER
JO 6100.1H

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SUBJ: 6100.1H, Maintenance of NAS En Route Stage A — Air Traffic Control System

This order prescribes technical standards, tolerances, maintenance, and certification requirements for the National Airspace System (NAS) En Route Air Traffic (AT) Control (ATC) system. This Order provides the necessary guidance, to be used in conjunction with information available in instruction books and other handbooks, for the proper maintenance and certification of the NAS.

This revision of Order 6100.1 incorporates the latest substantial changes to the following orders:

1. Order 6000.15, General Maintenance Handbook For National Airspace System Facilities, regarding Reliability Centered Maintenance (RCM) activities. The RCM program implements a mix of maintenance methods (periodic, condition based, and Run-to-Fault (RTF) approaches) with the goal of achieving the required level of safety, reliability, and availability at the lowest cost.

2. Order 1320.1, FAA Directives Management, regarding Federal Aviation Administration (FAA) Directives management. The revision to Order 1320.1 included changes to accomplish the goal of transitioning from a printed directives system to an electronic directives system, accessed on an official, agency-level website. Order 1320.1 also provides direction for substantial formatting changes.

Finally, this revision of Order 6100.1H includes the new system names associated with the implementation of En Route Automation Modernization (ERAM), as well as the associated maintenance and certification requirements.

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CHAPTER 1. GENERAL REQUIREMENTS

1–1. PURPOSE.

This handbook provides guidance and prescribes technical standards, tolerances, and procedures applicable to the maintenance and inspection of the National Airspace System (NAS) En Route Air Traffic (AT) Control (ATC) system. It also provides information on special methods and techniques that will enable maintenance personnel to achieve optimum performance from the equipment. This information augments information available in instruction books and other handbooks, and complements the latest edition of Order 6000.15, General Maintenance Handbook for National Airspace System (NAS) Facilities. Detailed guidelines requirements concerning the content requirements, preparation, and formatting of this handbook are provided in the latest edition of Order 1320.58, Instructions for Writing Notices, Maintenance Technical Handbooks, and System Support Directives. Distribution of this handbook is guided by the requirements set forth in the latest edition of Order 1720.30, Distribution of National Airspace System Technical Directives.

1–2. AUDIENCE.

This directive applies to selected Technical Operations Services (AJW) offices with the following facilities/equipment: Central Computer Complex Host (CCCH), Display System Replacement (DSR), User Request Evaluation Tool (URET), En Route Information Display System (ERIDS), En Route Communications Gateway (ECG), En Route Automation Display System (EADS), En Route Automation Support (EAS), En Route Automation Support Network (EASN), and En Route Data Distribution System (EDDS).

1–3. WHERE CAN I FIND THIS ORDER.

You can find this order on the My FAA website at: https://employees.faa.gov/tools_resources/orders_notices/

1–4. WHAT THIS ORDER CANCELS.

This order cancels Order 6100.1G, CHG2, Maintenance of the NAS En Route Stage A — Air Traffic Control System, dated November 13, 2006.

1–5. EXPLANATION OF CHANGES.

The following Configuration Control Decisions (CCD) authorize the changes to this handbook:

a. CCD N31372, Update Maintenance of NAS En Route Stage A — Air Traffic Control System (FAA Order 6100.1G) for EADS/ERIDS

b. CCD N31357, Hardware Change for FDIO/CCU Sustainment Project

c. CCD N31441, Update 6100.1G CHG 2 to Reflect DARC Removal and Addition of ERAM System Names

d. CCD N31485, Host Tech Refresh of 3274 Terminal Control Units and 3814 Switches

e. CCD N32021, Implementing Policy for Event Based certification of Terminal Systems and Subsystems in paragraph 503 per Updates for FAA Order 6000.15E

f. CCD N31958, Add Host ATM Data Distribution System (HADDS) as an element of EAS.

1–6. MAINTENANCE AND MODIFICATION PROCEDURE.

a. Order 6000.15, this handbook, the applicable equipment instruction books, and other applicable handbooks shall be consulted and used together by the maintenance technician in all duties and activities for the maintenance of NAS En Route ATC systems. These documents shall be considered collectively as the single official source of maintenance policy and direction authorized by the Air Traffic Organization (ATO). References located in the appropriate paragraphs of this handbook entitled: Chapter 3, Standards and Tolerances; Chapter 4, Reliability Centered Maintenance; and Chapter 5, System Maintenance Procedures, shall indicate to the user whether this handbook and/or the equipment instruction book shall be consulted for a particular standard, key inspection element or performance parameter, performance check, maintenance task, or maintenance procedure.

b. The latest edition of Order 6032.1, National Airspace System Modification Program, contains comprehensive policy and direction concerning the development, authorization, implementation, and recording of modifications to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical handbooks and related directives.

c. Modifications to equipment that is baselined under configuration management shall be in accordance with the latest edition of Order 1800.66, Configuration Management Policy.

1–7. COORDINATION.

a. Maintenance Activities. Maintenance activities on the NAS En Route ATC system shall be closely coordinated at all times with AT operations personnel to preclude unanticipated interruption of service. Certified electronic technicians, assigned to the facility where the NAS En Route ATC system has been installed, shall be responsible for maintaining the equipment in an operational condition within the tolerance specified in chapter 3 of this directive. Cognizant AT operations personnel shall be advised immediately of equipment failure, restoration to service, and whenever the established tolerances are exceeded or are expected to be exceeded. This is especially important where standby or spare equipment is not immediately available. In any case in which equipment operation may be adversely affected, sufficient advance notice shall be given to AT operations personnel, since air traffic control procedures are based on the assumption that all equipment is available. It is also expected that AT personnel will recognize the need for releasing equipment at the scheduled time for routine maintenance tasks and will offer cooperation in the furtherance of practices that assure continuous and reliable operation.

Coordination is also required with Automated Radar Terminal System (ARTS) facilities, in case of Air Route Traffic Control Center (ARTCC) radar interruptions or coverage changes that may interfere with the Center Radar ARTS Presentation (CENRAP) capability. The CENRAP is used at some facilities to route long range radar data to ARTS facilities, to be used as backup for short range radar facilities.

b. Delegation of Authority. The NAS Operations Manager (NOM) has the delegated authority to coordinate the proposed shutdown of En Route Navigational Aids (NAVAIDS) with adjacent ARTCCs, and flight service stations. Approval or disapproval will be the decision of the AT area manager.

1–8. RELIABILITY CENTERED MAINTENANCE (RCM).

Maintenance personnel shall follow the tasks and schedules provided in chapter 4, which include the minimum essential RCM activities and the frequency with which they shall be performed so as to meet the minimum performance standards for the NAS En Route ATC systems.

The RCM program implements a mix of maintenance methods (periodic, condition based, and RTF approaches) with the goal of achieving the required level of safety, reliability, and availability at the lowest cost.

1–9. CERTIFICATION REQUIREMENTS.

a. References. Refer to the latest edition of Order 6000.15 for general guidance on the certification of systems, subsystems, and equipment. Refer to Appendix 1, Certification Requirements, of this handbook for the specific requirements applicable to the certification of the En Route ATC automation services, systems, and equipment; the associated certification parameters; references to the governing standards and tolerance/limit; the normal and maximum certification intervals; the identity of recommended personnel responsible for certification; the prescribed certification statement to be entered in FAA Form 6030–2, Facility Maintenance Log, and other needed reference information.

b. Required Certification. Certification is required for the following services and systems:

(1) Composite Flight Data Processing (CFAD) service;

(2) Composite Radar Data Processing (CRAD) service;

(3) CCCH Surveillance Processing system;

(4) Display System Replacement (DSR) Surveillance Display system;

(5) User Request Evaluation Tool (URET) Surveillance Flight Planning system;

(6) En Route Communications Gateway (ECG) Surveillance Processing system;

(7) En Route Automation Display System (EADS);

(8) En Route Automation System (EAS).

1–10. AUTOMATION SERVICE REPORTING TERMINOLOGY.

General. This paragraph conveys common definitions for use by TOS headquarters and field personnel in reporting facility performance. Computer service interruptions have not been uniformly reported, and local data has not consistently agreed with national performance reports. Different reports have sometimes used the same reporting term in different ways. Some facilities have reported scheduled startovers or outages that others would have reported as unscheduled. Therefore, to assure that all automation service interruptions are reported and that interruption data can be correlated, definitions in the latest edition of Order 6040.15, National Airspace Performance Reporting System (NAPRS), shall apply to all NAS En Route Automation System performance status reporting requirements.

1–11. AIRCRAFT ACCIDENT.

When aircraft accidents or incidents occur, Air Traffic Organization Technical Operations personnel are responsible, when requested by the Technical Operations Aircraft Accident Representative (AFAAR) through the appropriate control center, to evaluate and document the technical performance of the facilities which may have been involved (for some facilities, it may also be necessary to remove them from service, and to conduct flight inspections). This requires that facility operational data be obtained and recorded in the maintenance log and on technical performance records. These records are official documents, and may be used by an aircraft accident investigation board in the determination of facility operational status at the time of the accident. See the latest edition of Order 8020.16, Air Traffic Organization Aircraft Accident and Incident Notification, Investigation, and Reporting, for detailed guidance on requirements and activities following an aircraft accident/incident.

1–12. REFERENCES.

a. The nature of this document requires reference to numerous publications. To avoid frequent revision for the purpose of changing references to the latest issue, personnel shall consider all references to refer to the most recent edition.

b. A listing of related publications useful to technical personnel may be found in appendix 1 of Order 6000.15.

c. A listing of documents useful to computer operations, programmers, and other NAS system personnel may be found in the catalog of documentation maintained by the National Airspace System Documentation (NASDOC) facility.

1-13. RECOMMENDATIONS FOR IMPROVEMENT.

This handbook is under configuration management control as defined in Order 1800.66, and NAS–MD–001, National Airspace Configuration Management Document. Any changes to the baseline document or requests for deviation from national standards shall be processed through the NAS Change Proposal (NCP) process. Copies of FAA Form 1800–2, NAS Change Proposal, are provided in the back of this handbook for the convenience of handbook users.

1–14. – 1–100. RESERVED.

CHAPTER 2. TECHNICAL CHARACTERISTICS

2–1. GENERAL.

In NAS Stage A (depicted in Figure 2–1, NAS En Route Stage A Overall Block Diagram), new concepts are introduced into the ATC system. The objective is to provide a balanced system designed to cope with the predicted growth of aviation, while maintaining an improved level of safety and more efficient use of airspace.

a. This objective is attained by the following automated operational features within the system:

(1) automatically and manually initiated computer program tracking;

(2) bright display of alphanumeric and radar data;

(3) entry and processing of flight plan information;

(4) flight progress strip printing at the appropriate sector position;

(5) provision for entering and receiving new and revised flight data (updates) at all operating positions;

(6) intersector coordination through computer generated alphanumeric displays, both plan view and tabular;

(7) interfacility coordination through the use of computer transmitted data;

(8) computer generated displays of geographic and weather data;

(9) automatic computer initiated handoff capability with provision for manual handoff interrupt.

b. The display of radar data in the ARTCC is a processed (digitized) display. All radar data is converted into digitized data at the radar site. The digital data is then transmitted as radar messages via land lines or microwave link to the Modem Splitter Unit (MSU) at the ARTCC. These messages are then routed to the 9672 RA4 and to the ECG with Enhanced Back Up System (EBUS) simultaneously. After the messages have been processed, the target information is presented in symbolic form to the radar controller on the R-console. The radar controller selects either data from the primary channel or the backup channel to be presented on the situation display.

c. The normal flow of data is frequently via multiple paths. From this design concept, along with the modular concept, comes a new version of a backup system. In other words, the built-in redundancy provides ample support for normal operations, and will continue to provide a high degree of support in case of failure of data flow path or a particular equipment element.

d. The ERAM project is an effort to modernize the current NAS En Route architecture by replacing the CCCH, URET, and DSR systems. The result of the ERAM project is the implementation of the EAS with its two subsystems, EADS and EASN.

2–2. NAS EN ROUTE STAGE A MODEL 4.

This chapter describes, in terms of hardware and computer program elements, those subsystems that comprise NAS En Route Stage A, Model 4. This model is characterized by the International Business Machines (IBM) 9672 RA4. The major equipment configuration of the Model 4 system is shown in figure 2–1.

a. Characteristics of Model 4. The following are distinguishing characteristics of the equipment and operation of Model 4:

(1) The 9672 RA4 equipment is used as the CCCH.

(2) DSR equipment is used for the generation of displays at the radar controllers' positions.

(3) The ECG interfaces with the DSR Backup Communications Network (BCN) to function as a backup to the prime radar channel, bypassing the CCCH, and generating radar target information for display on the DSR consoles.

(4) Interfacility data channels are provided for the transfer of track and flight data between adjacent ARTCCs and between ARTCCs and ARTS facilities.

(5) All radar sites feeding data to the Radar Data Acquisition and Transfer (RDAT) subsystem shall use a digitizer capable of transmitting data in FAA standard format.

(6) Automatic radar-handoff initiation is provided between sectors.

(7) Radar data may be recorded to allow the environment to be recreated.

b. System Functions. The following system functions are provided by the NAS En Route Stage A, Model 4:

(1) Input.

(a) Route and accept flight data from operating positions, adjacent centers, automated radar terminal system (ARTS II and III) facilities and remote sources.

(b) Detect targets, digitize resulting analog signals, identify target type (aircraft weather, etc.), and transmit to computer and/or air defense sector as required.

(c) Accept digitized search/beacon radar data.

(d) Accept track data from computers in adjacent facilities.

(e) Route and accept test messages that are used to evaluate equipment and/or interface performance.

(f) Accept supervisory messages for adjusting the resources of the ARTCC, disposing of Input/Output (I/O) problems, entering correction factors, etc.

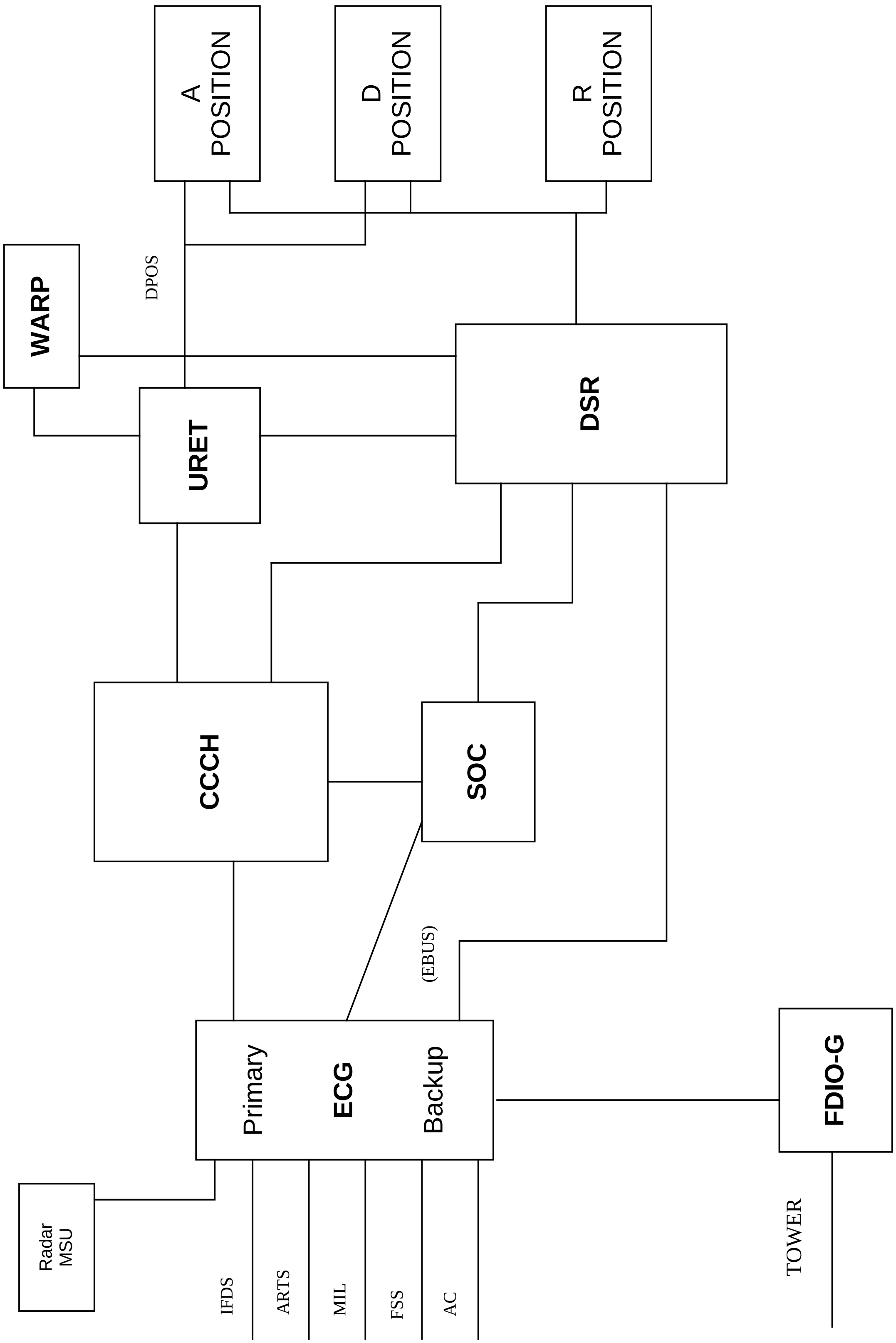

FIGURE 2–1. NAS EN ROUTE STAGE A OVERALL BLOCK DIAGRAM

(2) Output.

(a) Output flight progress strips at appropriate operating positions.

(b) Output messages to appropriate operating positions for display or printing.

(c) Output messages for printing at appropriate supervisory positions.

(d) Generate appropriate outputs in response to flight data information requests.

(e) Provide flight data outputs to adjacent facilities including ARTCCs, ARTS II and III facilities, approach control facilities, etc.

(f) Acknowledge input messages from all adapted sources except radar sites.

(g) Provide outputs which are to be used to adjust the resources of the ARTCC to the load.

(h) Display and selectively identify search/beacon data at appropriate operating positions.

(i) Provide digitized output messages meeting military selection criteria to Air Defense Center (ADC).

(j) Transmit track data to computers in adjacent facilities.

(k) Restore ARTS III database by reloading all appropriate flight plans, when required.

(l) Reconstitute the display channel database.

(3) Data Processing.

(a) Process and store flight data.

(b) Process and store digitized radar data.

(c) Maintain proper data exchange between control facilities.

(d) Periodically calculate the position and velocity of all tracks within the system.

(e) Provide control of the real time operational program.

(f) Utilize adaptation information for general environment.

(g) Periodically calculate registration and collimation errors from all radar sites.

c. Subsystems. Presented below is a list of the subsystems comprising NAS En Route Stage A Model 4, with a brief description of the purpose of each subsystem:

(1) RDAT Subsystem. The RDAT subsystem provides separate outputs to fulfill the requirements of both the NAS and air defense systems. This subsystem consists of search radars, beacon radars, common digitizers, and data transmission and receiving equipment.

(2) CCCH Hardware. The CCCH is the central point for the collection, processing, and distribution of data. It accepts and error-checks inputs; processes the inputs using stored programs and database; and formats and distributes outputs for printing or display locally or at remote locations.

(3) CCCH Software. The CCCH computer program subsystem is composed of all the instructions required to execute the ATC operational and system support functions.

(4) Radar Display Channel. This subsystem processes and displays flight data update messages at the radar controllers; processes data generated by the radar controller through R-controls; and processes, stores, and transmits all detected data processing errors to CCCH and the Systems Operations Center (SOC).

(5) Communications Subsystem. A digital communications capability is provided for transfer of flight data and/or track data between computers of adjacent facilities. These include ARTCC to adjacent ARTCCs and ARTCC to Flight Service Stations (FSS), airline offices, military operations, towers, and approach control facilities.

(6) Systems Operations Center (SOC). Overall system monitoring of the NAS equipment is provided by the SOC located at a central location in the ATC operating area. Data presented at this location is available to personnel for coordinated decisions or routine advisory actions. At this location, personnel are alerted to equipment failure in the system and are provided with printed error and quality control analyses for subsystems. System reconfiguration for recovering from an equipment failure, for accommodating a change of workload, or for routing/resectoring is controlled and monitored at the SOC by interphone or direct equipment monitoring.

(7) ECG Hardware. ECG Backup Interface Processors (BIP) provide a backup system for the Radar Data Processing (RDP) channel. The primary purpose is to provide En Route AT controllers with a digital radar data processing and display function, normally carried out by the DSR.

(8) ECG Software. The EBUS software module consists of all the instructions used by the ECG BIPs to execute the ATC operational and support functions.

2–3. RADAR DATA ACQUISITION AND TRANSFER SUBSYSTEM.

a. General. The RDAT subsystem consists of certain equipment located at the radar sites and at the ARTCC (see Figure 2–2, Radar Data Acquisition and Transfer (RDAT) Subsystem). The principal equipment in this subsystem are the search (Primary) radars, beacon (Secondary) radars, digitizers, certain military equipment, modems, and telco lines or microwave links.

b. Search Radar. The search (Primary) radar inputs are provided by Air Route Surveillance Radar (ARSR), Airport Surveillance Radar (ASR), and from a variety of military surveillance radars that are a part of the air defense systems.

c. Beacon Radar. The beacon (Secondary) radar inputs are from existing types of equipment used by the FAA and Department of Defense (DOD). This ground equipment includes Mode C altitude interrogation and reply, and 4096 code mode 3/A reply. Certain military modes are provided to satisfy other DOD requirements.

d. Digitizer. The digitizer is a data processing system capable of receiving inputs from search and beacon equipment. Signals are quantized, and targets are detected by a variety of methods, dependent upon the digitizer type. Validated beacon targets are reinforced with detected search targets. Messages containing target data are then transmitted to FAA users, military users, or both.

e. Modems. See the latest edition of Order 6170.10, Maintenance of Data Multiplexing Network Equipment.

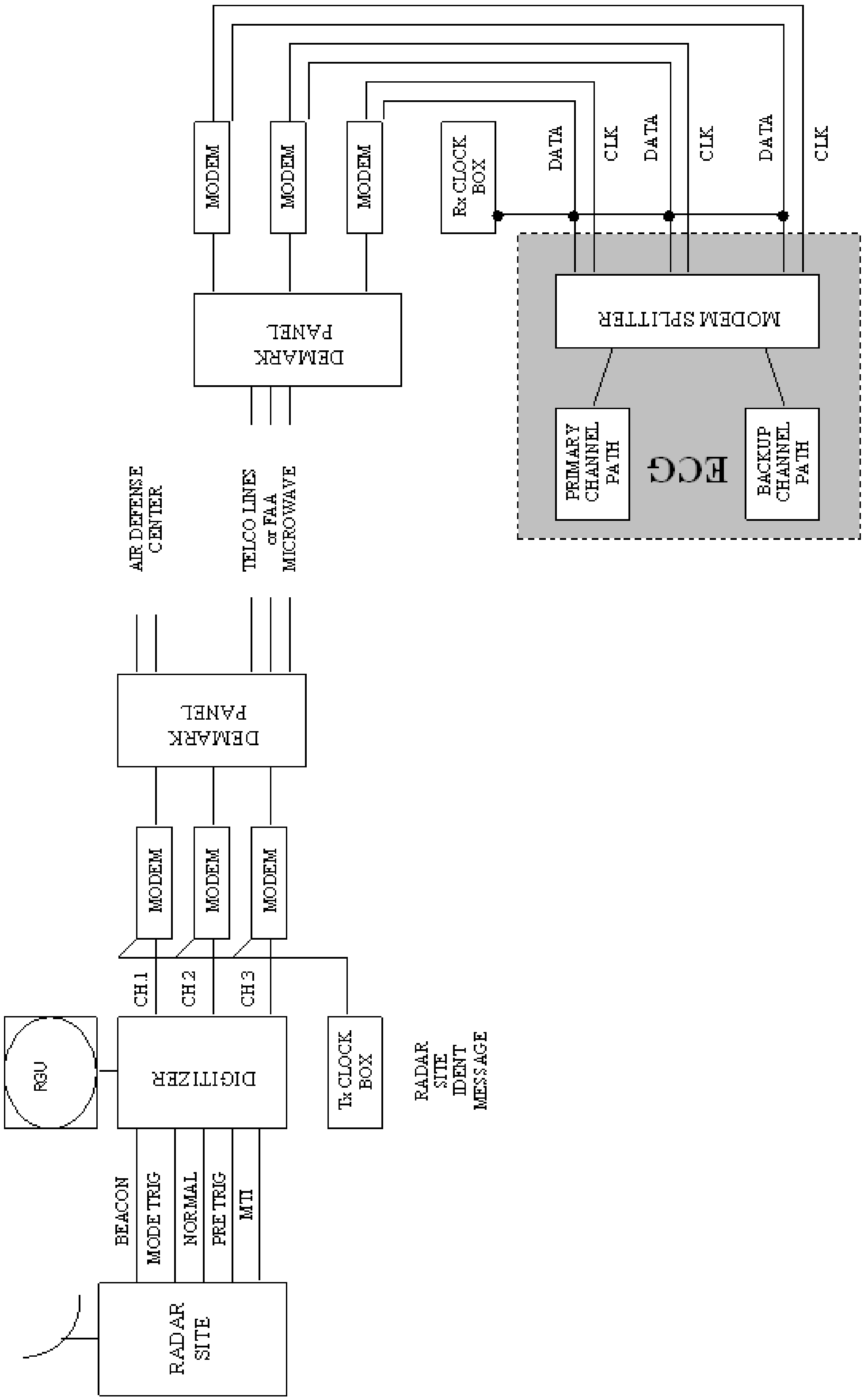

FIGURE 2–2. RADAR DATA ACQUISITION AND TRANSFER (RDAT) SUBSYSTEM

2–4. CENTRAL COMPUTER COMPLEX HOST (CCCH) SUBSYSTEM.

a. Introduction. The CCCH is a 9672 RA4 in the NAS En Route Stage A system. This computer is a large-scale, modular, data processing subsystem. The CCCH subsystem is controlled by the NAS monitor program, while NAS operations are handled by the operational and non-operational computer program components. The relationship between the subsystem elements and system functions is shown in Figure 2–3, Central Computer Complex Host (CCCH) — 390 Mode, Figure 2–3(a), Central Computer Complex Host (CCCH) 390 Mode with Visara 1174, and Figure 2–3(b), Central Computer Complex Host (CCCH) — 390 Mode with 3274s/3814s.

In order to meet the demanding performance of the NAS environment, the CCCH incorporates design features that promote high reliability, allowing subsystem tailoring to the needs of different facilities, and includes providing for expansion. Primary to these ends is the modular design. In a modular design of this type, a failed element is automatically disassociated from the system while the remaining elements continue to function, and a redundant spare is brought into the operational system configuration.

b. Central Computer Complex Host. The CCCH consists of two identical processors, each of which have direct access to all elements including tape, disk, printer, or ECG equipment, and the display channel equipment. The system configuration enables either processor to be selected as the primary processor with the other as the support processor. The primary processor will support the NAS operational software and meet the response time and workload requirements. The support processor will be available to process support and maintenance software, which includes data reduction and analysis, interactive database maintenance, and hardware maintenance programs, in addition to running the NAS in standby mode. The Host computer complex consists of the following major elements:

- two processors (9672 RA4);
- two direct access storage subsystems;
- two switching management subsystems;
- one communication subsystem;
- two high-speed printers;
- two magnetic tape storage subsystems;
- Keyboard Video Display Terminal (KVDT) and console printer subsystem.

(1) Processor 9672 RA4 G3.

(a) The S/390 Parallel Enterprise Server 9672 Model RA4, Generation 3 (G3), is the Central Processing Unit (CPU) of the CCCH system. Each 9672 can be divided into four functional subsystems: processor, storage, channel, and power.

(b) Each processor subsystem consists of four Processing Units (PU). A PU is the hardware-computing element of the computer. The three possible functions of the PU are determined by the Licensed Internal Code (LIC), which is loaded on it. The first is Central

Processor (CP) LIC, which gives the PU the S/390 functionality. The second is the System Assist Processor (SAP) LIC that gives the PU internal system and I/O control functions. The third function is that of spare. In this state, the PU performs an idle loop program LIC. The 9672 RA4 uses the CP and SAP functions and maintains one spare for each. The SAP spare, if needed, will be switched in automatically, where the CP spare requires a Power On Reset (POR) to activate. The 9672 RA4 is a Complimentary Metal Oxide Semiconductor (CMOS) processor running at approximately 32 Million Instructions per Second (MIPS), expandable to 45 MIPS within the same processor family.

(c) The storage subsystem is distributed across the Multiple Chip Module (MCM) and four memory cards of 128 megabytes (MB) each. The 9672 RA4 can be configured from a minimum of 512 MB up to 8 gigabytes (GB).

(d) The channel subsystem consists of six parallel channel cards, each controlling three channels (18 currently used), and eight Enterprise System Connection (ESCON) fiber optic channels. The parallel channels connect to the existing I/O interfaces. The ESCON channel is used as a Channel to Channel (CTC) device allowing the two 9672 processors to perform health checking operations. The 9672 RA4 is expandable to 96 parallel channels (increments of three), and 256 ESCON channels (increments of four).

(e) The power subsystem is designed with the use of redundant hardware, whereby a single power failure will not result in an outage. This also allows for replacement of a failed part without affecting system operation. The 9672 RA4 frame accepts dual power feeds, allowing separate critical bus input voltage sources.

(f) The 9672 RA4 frame also contains an IBM ThinkPad Personal Computer (PC), which is the Support Element (SE). It's purpose during normal operations is to maintain the Central Processing Complex (CPC), collecting and sending CPC status, hardware messages, and operating system messages to the Hardware Management Console (HMC). The SE will be used during periods of 9672 RA4 problem determination, service or repair maintenance, and also for running diagnostic tests for certification. The SE connects via the ThinkPad parallel port to the CPC's Universal Processor Controller (UPC) card.

(g) The HMC workstation is an IBM PC using Operating System/2 (OS/2) LIC, and is designed to be the main operator console, in order to activate, operate, monitor, and perform recovery tasks of the 9672 RA4. The application software is an object-oriented design, using a Graphical Users Interface (GUI) platform. The HMC contains a 21–inch color display monitor; a 3.5–inch Read/Write Optical Cartridge (ROC) drive for backups and microcode patch upgrades; a Compact Disc-Read Only Memory (CD-ROM) drive for system software and microcode driver loading; and a modem for the reporting of service calls if necessary. The HMC and SE communicate via a Token Ring Local Area Network (LAN). The HMC modem features allow for either a manual or automatic callout to the IBM service center from the HMC, and an optional call in from the IBM service center to the HMC for downloading new patches to the microcode. The use of these features will be strictly controlled. Only the manual call out function will be utilized to report a service call. This leaves control of the system to local Host operational personnel. Refer to Chapter 5, System Maintenance Procedures, paragraph 5–39, of this document for further information and FAA policy concerning this feature.

(2) Symmetrix 5630 DASD Subsystem.

(a) The EMC Symmetrix 5630 Direct Access Storage Device (DASD) subsystem is the replacement for the IBM 3880 Disk Storage Director/3380 DASD elements. It is comprised of two identical units: Disk Subsystem 1 and Disk Subsystem 2, each containing the functions of the Director and DASD in one cabinet.

(b) The 5630 DASD configurations for ARTCCs contain two ESCON channel cards to connect to the CCCH 9672 central processors with data transfer rates up to 17 MB per second; two fibre channel cards; four disk directors on two board assemblies control the eight 36 (GB) disk device arrays. The physical disk device arrays are partitioned by defining logical 3380 Count Key Data (CKD) type disk volumes, or Fixed-Block Architecture (FBA) open systems format volumes. Some open systems FBA volumes will be defined on each Symmetrix, but such volumes are reserved for future use. Two 512 MB cache memory boards provide the hardware necessary to interface between the Host processor, disk directors, and disk arrays. This feature of the Symmetrix is known as Integrated Cached Disk Array (ICDA) technology, and allows for faster data transfer. Each Symmetrix implements Redundant Array of Independent Disks (RAID) technology. As a result, all data stored in Symmetrix will be mirrored using RAID–1 (mirroring).

(c) Each Symmetrix 5630 presents the appearance of an IBM 3990 Storage Director and multiple 3380–D/E–disk devices to the channel/Host processor. It provides the necessary low-level transformation of the requested functions from Channel Command Word (CCW) program directives to the actual directives known by Symmetrix. The emulation process within each Symmetrix insulates the channel/Host processor from the actual physical implementation semantics of the DASD.

(d) The 5630 battery subsystem maintains power to the entire subsystem for approximately three minutes if alternating current (AC) power fails. The main power subsystem operates on 208 volts (V) AC single-phase input power at frequencies of 50 or 60 Hertz (Hz). Two power supplies provide +5V, +12V, and +24V power to the Symmetrix components.

(e) The Service processor is a laptop computer in each Symmetrix 5630 that provides the ability to manage various aspects, including the downloading of configuration data, to the directors and provides diagnostic and maintenance utilities for the Symmetrix. The Service Processor will primarily be used by EMC Customer Engineers (CE). It is located on the inside of the front door of each Symmetrix 5630. The service processor interfaces with Symmetrix components via an RS–232 interface and/or an Ethernet hub, and has an attached 33.6 Kilobits per Second (Kbps) external modem for communicating with the EMC Customer Support Center when Symmetrix detects an error condition. The external modem is generally placed in the space on the lower left inside the front of the cabinet and uses a separate 110 V AC single-phase power feed. This modem will be used with a dial out only configuration, and only when required by EMC to render a repair to the 5630.

c. Switching Management Subsystems. The switching management subsystem consists of two configurations: the legacy 3814 configuration, and a new Visara 1174 configuration.

(1) 3814 Configuration. There are two 3814 switches in the internal 9672 system configuration. These switches are installed in pairs and controlled as a unit. They are used to control the reconfiguration of the peripherals. Both switches are controlled from an 1883 console Keyboard Video Display Terminal (KVDT) via a 3274 Terminal Control Unit (TCU).

(2) Visara 1174 Configuration. There are two Visara 1174-25S communication servers and four 32–port multiplexers that replace the old 3814s, as well as the eight TCUs, in some ARTCCs. These servers are installed in pairs and are fully redundant. Performing like the 3814s, these servers control the configuration of the peripherals while also providing the interfacing, via the same coaxial cables, to all of the devices within the peripheral subsystem.

d. Communications Subsystem. The communications subsystem provides communication between the ARTCC support processor and central support facility processor for the transfer of files, and interaction of database and diagnostic functions. The subsystem is also capable of transferring large volumes of data or large software programs between the ARTCC and the central support facility processors, remote execution of system diagnostics, and communications from one ARTCC support processor to another.

e. Magnetic Tape Storage Subsystems. Two cartridge magnetic tape storage subsystems are provided for the CCCH system configuration. Each cartridge tape storage subsystem consists of one 3480 model A22 tape control unit and six 3480 model B22 tape units. The 3480 model B22 tape units will record 18 tracks longitudinally, and has a recording density of 38,000 bits per inch (bpi). The 3480 model A22 tape control units are equipped with two channel switches to allow access by both processor complexes.

f. Peripheral Subsystem. The peripheral subsystem provides the I/O capability for the high-speed, medium-speed, and console printouts. The printers provide outputs for both the operational and support environment. The printer subsystem consists of High-Speed Printers (HSP), maintenance printers, and console printers, where the console printers are made up of operational printers (KVDT Printer (KPR)) and support printers (SKR). All printers are now attached to either the 3274 TCUs or the 1174s via coaxial cable.

(1) High-Speed Printers. Two IBM 6400-015 HSPs are provided in the CCCH system configuration. Each 6400-015 HSP is a self-contained subsystem, communicating with a 3274 controller via coax. Each 6400-015 contains microcode to control functions and configuration, as well as the FAA special character set. Each printer is a cabinet model capable of printing 132 characters per line with either 6 or 8 lines per inch vertical spacing with a print speed of 1500 lines per minute with a data controller clock speed of 40 megahertz (MHz). Both printers can be manually switched to the primary or secondary processor via coax switch. An operator panel on each printer is used to perform routine operations, indicate operating states, show status indicator, and is menu driven for setting configuration.

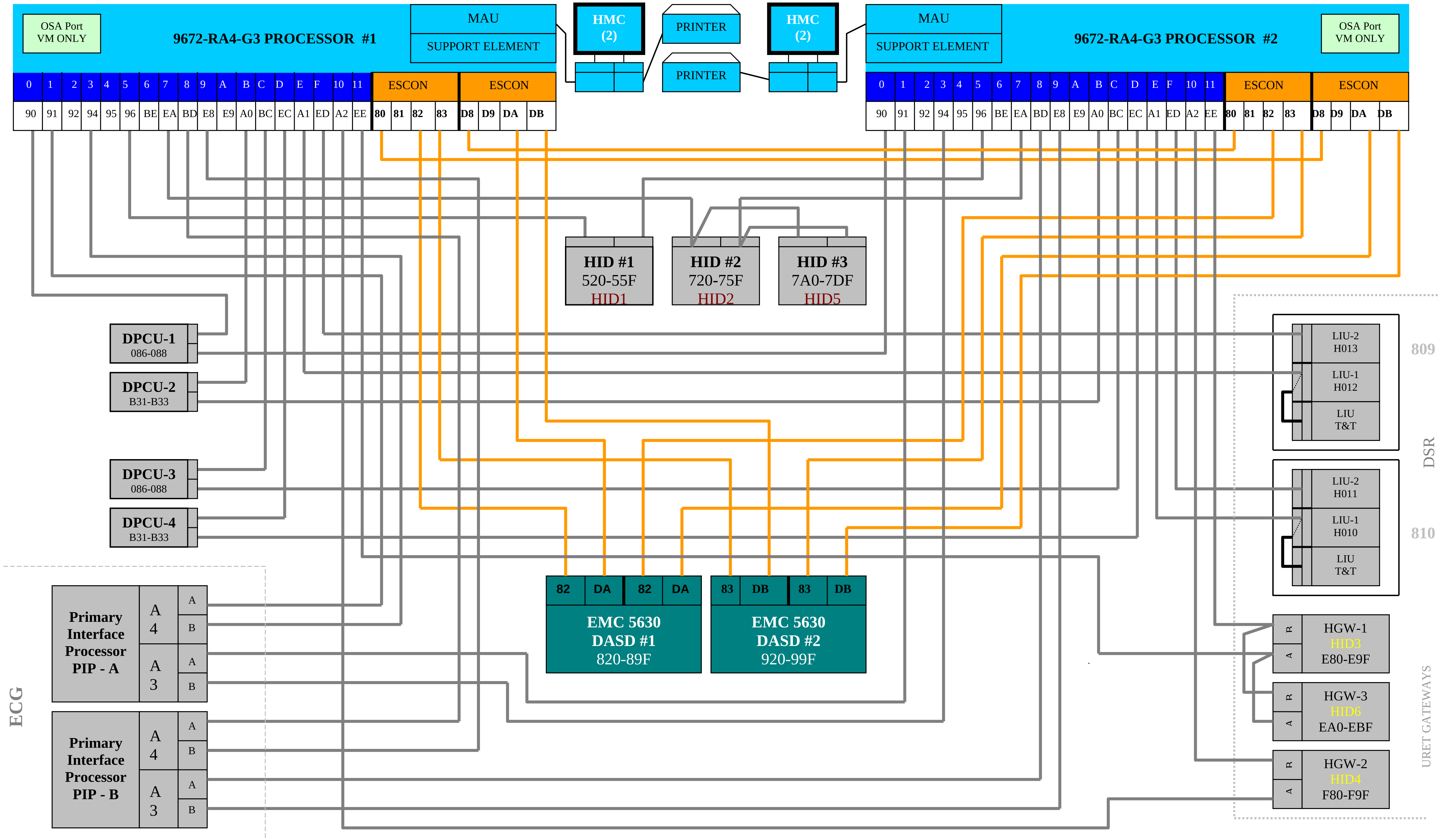

FIGURE 2–3. CENTRAL COMPUTER COMPLEX HOST (CCCH) 390 MODE

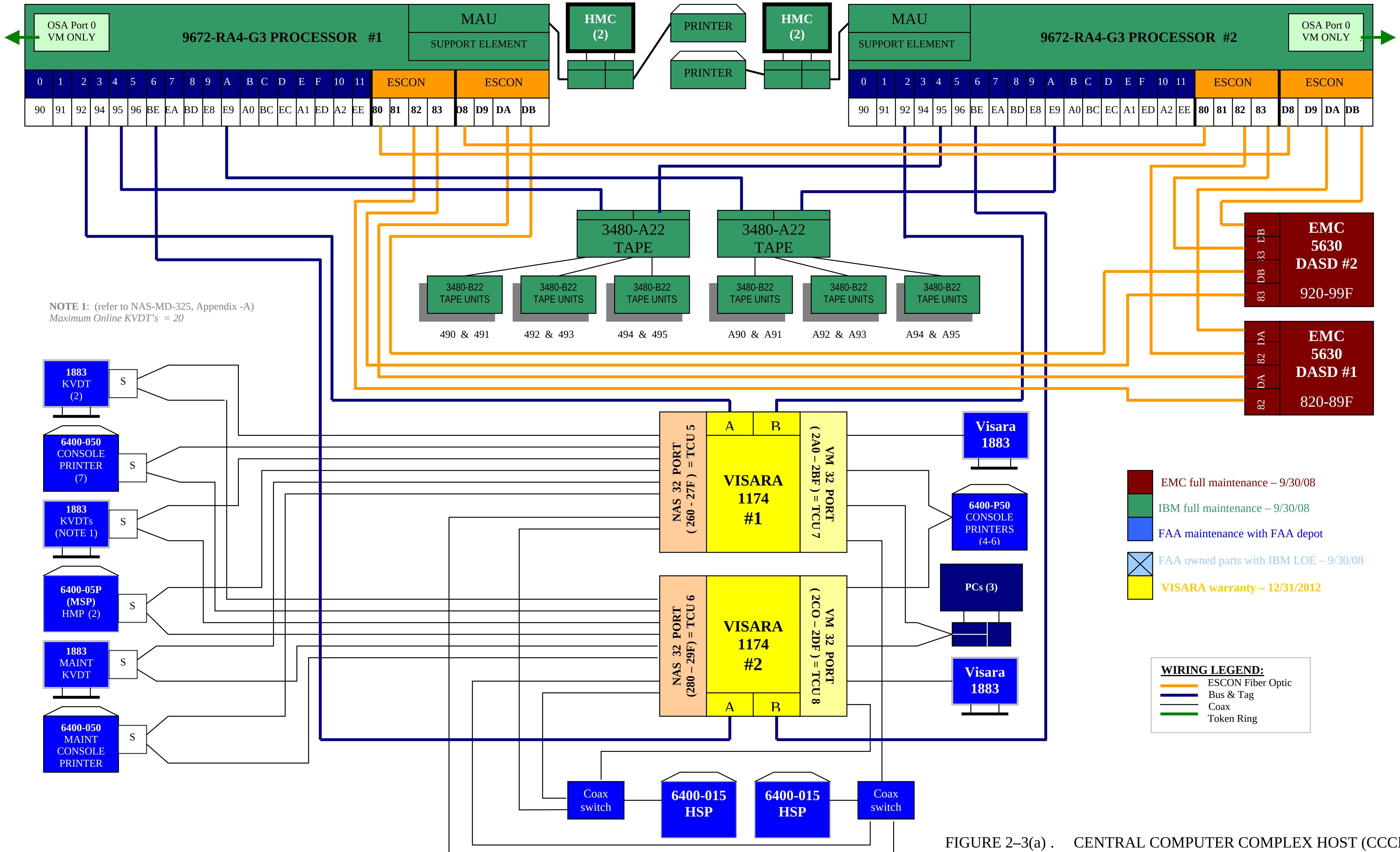

FIGURE 2–3(a) . CENTRAL COMPUTER COMPLEX HOST (CCCH) 390 MODE WITH VISARA 1174

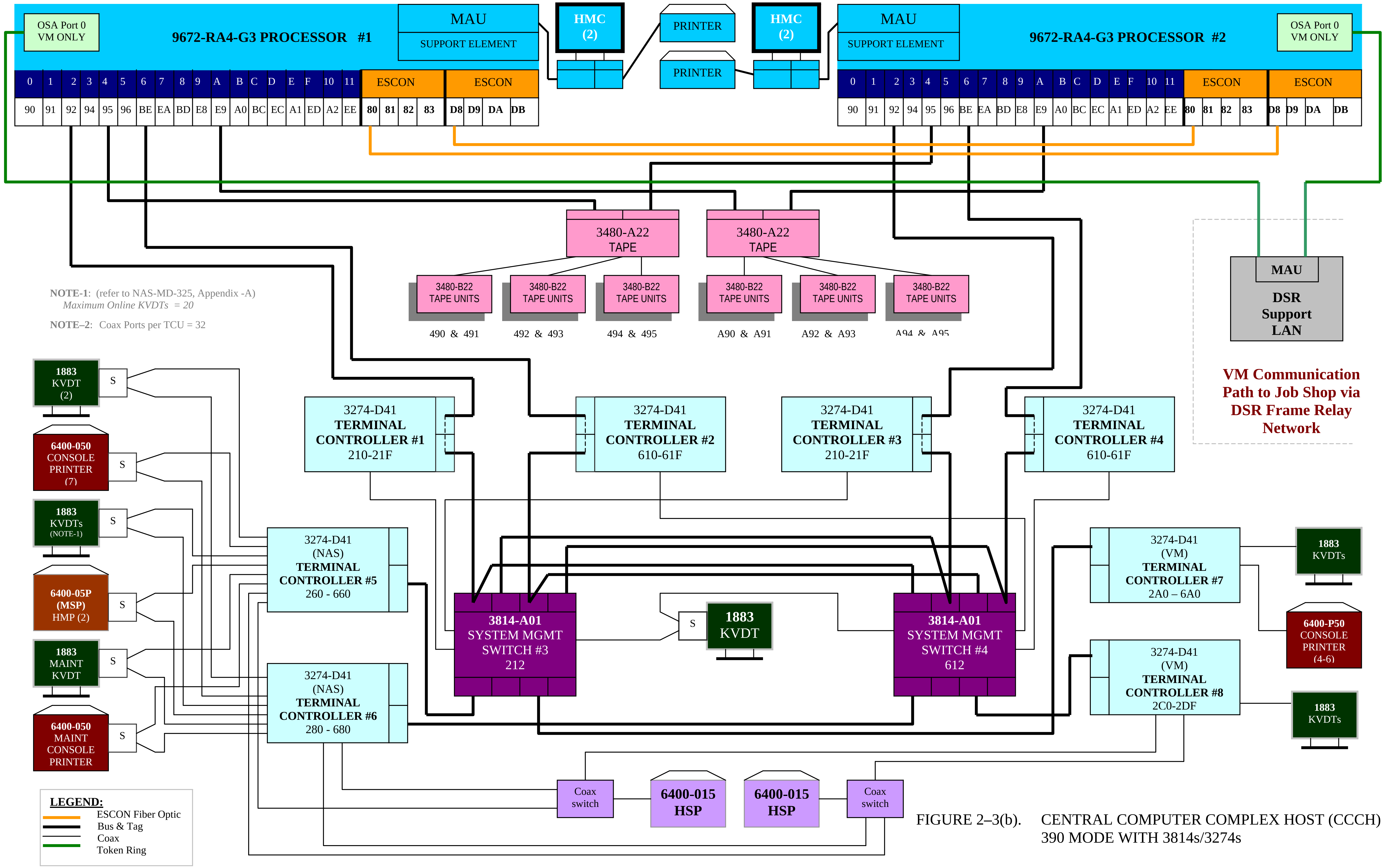

FIGURE 2–3(b). CENTRAL COMPUTER COMPLEX HOST (CCCH) 390 MODE WITH 3814s/3274s

(2) KVDT and Console Printers.

(a) The KVDT and console printer subsystem provide the I/O capabilities for the CCCH. This subsystem consists of either the 3274 TCUs or the 1174s, 1883 KVDT, and Model 6400 console printers. The CCCH will detect errors in the subsystem and provide visual and audible error indications on selected KVDTs and printers.

(b) The configuration of the KVDTs and console printer are under software control so that devices that are configured to the primary processor will be reconfigured to the new primary processor after a processor switchover. Devices that are configured to the support processor also will be reconfigured under software control after a processor switchover to the new support processor.

(c) Each 1883 KVDT includes a monochrome display screen; a moveable, detachable keyboard; and an audible alarm to alert the operator of abnormal conditions.

(d) Two KVDTs, one configured to each processor complex, provide dedicated support for system software load purposes. Another KVDT is located at a remote maintenance position and will be manually switchable to either processor complex.

(e) A maximum of 20 KVDTs will be individually, manually switchable to the primary processor. At least two of these KVDTs are located at the computer operator position to support NAS, while the location of the remainder is based on each ARTCC's particular operational requirements.

(f) Ten KVDTs are configured to the support processor only. At least one of these KVDTs is located at the computer operator position to support the Virtual Machine (VM) control program, while the location of the remainder are based on each ARTCC's particular support requirements.

(g) Two KVDTs, one located at the SOC and the other at the computer operator position, will interface with the primary processor only. They are dedicated to the display of the operational status of system elements (primary and support) including processors, tape drives, disk units, cluster controllers, and Adapter Units (AU).

(h) NAS operational console printers have been replaced with IBM 6400-050 cabinet model printers capable of printing 500 lines per minute with a data controller clock speed of 40 MHz. This printer provides the same functionality as the original 3268 KVDT printer KPR and utilizes the same coax cables and switches going to NAS TCU numbers 5 and 6.

(i) One console printer is co-located with the maintenance position KVDT.

(j) Seven console printers are paired, via adaptation, with the NAS operational KVDTs and will be individually, manually switchable to either NAS TCU number 5 or 6.

(k) Four console printers are configured to the support processor. At least one of these is located at the computer operation position, while the location of the remainder is based on each ARTCC's particular support requirements.

(l) VM support processor KPRs have been replaced by an IBM 6400–P50 pedestal model printer. This printer provides the same functionality as the original 3268 KPR, and is capable of printing up to 500 lines per minute. It utilizes the same coax cables going to VM TCU number 7 or 8 as the 3268 printer it replaces.

(3) Host Maintenance Printer. The Host Maintenance Printer (HMP) replaces the Maintenance Systems Printer (MSP) located in the SOC area. Two IBM 6400–05P pedestal model printers are provided, and are adapted in Host software. This model is capable of printing up to 500 lines per minute, and connects to Host via coax cables going to Host TCU numbers 5 and 6.

g. HID/NAS/LAN (HNL) System. The Host Interface Device (HID)/NAS/LAN (HNL) system is a Fiber-Distributed Data Interface (FDDI) LAN providing a communication exchange environment between nodes attached to the HNL via the FDDI Concentrator. This HID computer system interfaces with the NAS Host Computer System (HCS) and is designed to provide a gateway from the HCS to the FDDI LAN. The Network System Manager (NSM) computer system contains the network management software used to monitor and manage the hardware and software applications resident on the HNL. For more information including maintenance and certification requirements for the entire system, refer to the latest edition of Order 6131.1, Maintenance of Host Interface Device (HID)/National Airspace System (NAS)/Local Area Network (LAN) (HNL).

h. DSR Printer Control Unit Rack. The Printer Control Unit (PCU) rack houses the electronics that manage and control the routing of flight strip data to be printed on the Flight Strip Printers (FSP). Each rack houses a Reduced Instruction Set Computer (RISC) System/6000 processor identified as PCU1 through PCU4. These processors are physically attached to DSR consoles in a way that provides a redundant path for the processing of flight strip data for both the operational HCS and the support HCS. The processed data that is printed on FSPs is based on information that is provided by the HCS. Signals received from the PCU processors have to be converted from RS–232 signals to RS–422 signals that can be understood by the FSPs. This function is provided by the Converter/Splitter assemblies mounted within the PCU racks.

i. Host Gateways. The Host computer system communicates with the URET Conflict Probe (CP) processor via redundant Host Gateways (HGW). The HGWs are connected to the Host through block multiplex Channel Path Identifiers (ChpID) EE and A2, respectively. Operational HGW1 plus the Test and Training (T&T) HGW are connected via ChpID EE and Operational HGW2 is connected via ChpID A2. A special adapter connects the Host channel to the Peripheral Component Interconnect (PCI) bus in the HGW processor. Each HGW is connected to both Host computers for full redundancy. Only one HGW is operational at a time. For a more detailed description of the URET system, see paragraph 2–12 of this chapter.

2–5. COMPUTER PROGRAM SUBSYSTEM.

a. General. The program provides the full surveillance capability of NAS. Aircraft under surveillance are tracked in the flight-plan-aided mode as well as in the free mode. Programs required for the ATC operations consist of the operational program and the support program components.

b. Operational Program Component. The operational program component is the set of computer subprograms that provide the selected operational functions for NAS. Entry, processing, and dissemination of radar-derived data and flight data information are achieved through these functions.

(1) Message Entry and Checking. The message entry and checking function includes the acceptance and checking of all flight data, track and display control actions, supervisory messages, and interfacility response messages. This function includes the acceptance and error processing, the storage, and the response message generation for the messages it processes. All input messages are acceptance checked by the CCCH. Each message must conform to the requirements for that type of message in terms of format, logic, and source. Format checking determines if entered data are in an acceptable format and in the proper sequence. Logic checking determines whether different items of data are compatible with each other, with adaptation data, and with field flight plan data, if applicable. Responses to input messages include the acceptance message (used when the input message passes all checks), the error message (used when the input message contains a correctable error), and the rejection message (used when the input message contains a non-correctable error).

(a) Flight Data Messages. Flight data messages pertain to the flight plan and its related messages. These include flight plans, amendments, hold messages, beacon code, and altitude-related messages. Flight data messages can be entered from the sector controller positions.

(b) Track Control Actions. Track control input actions can be entered at the radar console. Typical track control input actions are track message, drop track, coast track, initiate handoff, and select automatic handoff.

(c) Display Control Actions. Display control actions control the arrangement, presence, or the lack of data on the DSR R-console. Typical display control actions are: beacon code, readout, code delete, code insert, data block offset, flight plan position, forced data block, and route display.

(d) Supervisory Messages. Supervisory messages are used to adjust the resources of the ARTCC to the ATC load, control bulk store processing, correct radar data, and dispose of I/O problems referred to supervisory positions. They include messages pertaining to radar, radar quality control, and resectorization. Supervisory messages can also request resectorization and sector assignment printouts, start shutdown, inhibit bulk processing, initiate the system, restore the ARTS database, request radar/beacon parameter modifications, registration/collimation analyses, etc. These messages can be entered only from adapted KVDT positions.

(2) Route Conversion and Posting. The route conversion and posting checks the filed route of flight for format, logic, and adapted route elements. This function transforms the filed route-of-flight into the converted route-of-flight.

(3) Flight Plan Position Extrapolation, Association Checking and Beacon Code Allocation. These functions calculate initial flight plan fix times, update these fix times, determine the flight plan position and extrapolation status, perform association checking, and allocate Discrete Beacon Codes (DBC).

(a) Fix-Time Calculation and Updating. The fix-time calculation function calculates the expected time of arrival over all converted fixes from true airspeed, altitude, aircraft characteristics, airport adaptation, stored winds aloft data, route distances, and the inserted proposed estimated or actual time.

(b) Flight Plan Position Extrapolation. Based on a parameter time interval, the expected position of the aircraft is calculated from stored flight plan data and calculated fix times. The calculated present flight plan position is displayed to the controller on request.

(c) Association Checking. The association checking function compares the flight plan position with the track position of an active flight. Only those flights for which a “paired track” exists, and a “matched track” is maintained, qualify for association checking.

(d) Beacon Code Allocation. The computer program assigns DBCs. DBCs are assigned in code sets depending on whether the aircraft is in a climb, descent, or en route status. Within any code set, subsets of codes are assigned based on the aircraft’s vertical position in a block of altitudes. Discrete beacon transponder-equipped aircraft that penetrate the airspace of a non-NAS ARTCC are assigned codes from a special code set.

(4) Local Outputs. This function provides for the output to all devices local to the ARTCC. This includes outputs at displays, typewriters, printers, and indicator lamps.

(a) Situation Display Outputs. Alphanumeric and radar data are selected, formatted, and transmitted for display on radar controller’s display. The computer-generated displays may be divided into four groups for description convenience: radar data displays, flight position displays, list displays, and requested displays.

1 Radar Data Displays. The following categories of computer–processed radar data are selectable for display at all radar sector positions: all mode 3/A beacon data, all search radar data, selected mode 3/A beacon data, and Mode C beacon data. Mode C beacon data is selectable by altitude block. In addition, 7700, 7600, and other selected alert beacon codes will be routed to all sectors.

2 Flight Position Displays. This group of computer-generated information contains alphanumeric track and flight plan displays associated with an aircraft track, which are periodically updated to indicate the positions of flights under control. The flight display includes a position symbol, a maximum of three lines of alphanumeric data (i.e., a data block), a leader, and a vector.

3 List Displays. The computer program generates flight plan information and controller entered information to be displayed in tabular form on the radar display. The three lists that are displayed are: the departure list, the inbound list, and the hold list.

4 Requested Displays. In addition to the flight plan and list displays, the computer generates other requested displays as a result of various radar-controller input actions. These displays include Limited Data Blocks (LDB), map data, weather data, strobe lines, and selected beacon data. The display is dependent on controller selection of range, off centering, trackball position, etc.

(b) FSP Outputs. Sector FSPs output both flight plan related and nonflight plan related messages. Nonflight plan related messages output at the FSP are either those messages that are too lengthy to be output at the Computer Readout Device (CRD) or are hard copy output. Such messages include CRD display overflow, general information, program-initiated messages (e.g., planned shutdown messages), and other FSP routed messages.

(c) Printer Outputs. Hard copy computer outputs at the HSPs and MSPs are normally required data for analysis, advanced flow control, data entry error correction, backup of intercenter transfers, and for system performance monitoring, etc. Supervisory outputs can be program-initiated or requested printouts.

(d) Beacon Code Selection and Deletion. Each display console has a capability to select up to a maximum of 60 active beacon codes and 10 beacon codes awaiting active status. A beacon code selection list is maintained and may be reused or updated using certain controller actions and I/O Typewriter (IOT) messages.

(5) Remote Outputs. The remote outputs function transfers flight and track data between an ARTCC and its adjacent ARTCCs, and between an ARTCC and the ARTS facilities within its boundaries.

(a) Flight Data Transfer. A flight plan for an aircraft departing the ARTCC’s airspace is forwarded to the adjacent facility when the flight is within a time parameter of reaching the boundary. Revised flight plan information is forwarded if the flight plan is modified after it has been forwarded to the adjacent facility.

(b) Track Data Transfer. Track data are transmitted between adjacent ARTCCs and between ARTCCs and their ARTS facility. As a tracked flight approaches the boundary of an ARTS facility or another ARTCC, a radar transfer of control actions is initiated.

(6) Adaptation. The scope of operations can be modified by the addition and/or changes of certain parameters and environmental data used by the program subsystem. This flexibility is accomplished by centralizing all such data in a separate area of the program subsystem so that modification of this data becomes a relatively simple task. These data are referred to as adaptation data.

(7) System Monitoring and Control. The system monitoring and control function provides for the monitoring and control of all CCCH hardware elements and the control of the real time operational program. The subfunctions of system monitoring and control are resource management, error analysis and reconfiguration, startup and startover, System Analysis Recording (SAR), and recovery data recording.

(a) Resource Management. The resource management subfunction includes the management of storage and I/O.

(b) Error Analysis. This subfunction analyzes errors that occur in I/O operations, CCCH elements, and peripheral equipment. It detects and reports on I/O errors and operational recovery from I/O device failures. The subfunction also isolates and reports upon CCCH element errors and programmed recovery of element failures.

(c) Reconfiguration. In order to maintain a fail-safe system, the computer program manages the configuration of CCCH elements. The CCCH is reconfigured by exchanging an operational element with a redundant element.

(d) Startup and Startover. The startup and startover subfunction provides the capability for the initiation of the NAS at startup, the reinitiation of the system following a system shutdown, and system recovery following CCCH element errors.

(e) System Analysis Recording (SAR). The SAR subfunction transfers data from the CCCH main memory to auxiliary storage while the system is being used operationally. The data is used to provide source data for system analysis and evaluation.

(f) Recovery Data Recording. This subfunction records certain critical data from main memory onto auxiliary storage. This data allows the startover function to restart the system after a shutdown. The recovery data recording subfunction is operated periodically to produce updated versions of the recovery data information.

(8) Multiple Radar Data Processing (MRDP). MRDP permits the system to receive online data and system status from a number of individual radar sites, converts the positional data to a common system reference so that radar sector displays are no longer restricted to a single radar site reference, and selectively filters out redundant radar returns (where overlap coverage exists) to provide effective single coverage over the center's area.

(a) Radar Data Acceptance. Radar data from the RDAT system are accepted into the computer storage for multiple radar data processing. Any radar data messages containing transmission parity errors will be rejected.

(b) Coordinate Conversion. The search and beacon radar positional data are supplied to the CCCH in the form of range and azimuth. The computer program transforms this data from polar (Rho/Theta) to system coordinates.

(c) Data Selection. Each area has an assigned radar site from which the preferred coverage is obtained. In each area, the site providing the best overlap coverage is designated the supplementary site for that area. All other redundant radar data are rejected. Hence, all accepted radar data are either preferred or supplementary.

(d) Pressure Correction of Mode C Altitude Data. Mode C returns are pressure corrected based on the barometric pressure in the vicinity of the aircraft for those aircraft below the minimum assignable flight level for that sector.

(e) Radar Data Correlation. The correlation process examines each radar message that has passed selective rejection and selects the radar datum most likely to represent the present aircraft position.

(f) Slant Range Correction. Prior to being displayed, all radar data are slant-range corrected.

(g) Radar Data Routing for Display. The path for the display of radar data is from the CCCH through the display system. The MRDP function generates the radar data messages, including available map data, and routes these to the display system for display. Only those returns that have been accepted by the selection process for effective single radar coverage are eligible for display. The accepted radar data are tagged as correlated or uncorrelated by the radar correlation process prior to transmission to the display system.

(h) Radar Weather Data Processing. The computer program will handle the processing of digitized radar weather messages and display formatting. The map messages are converted to display messages with X, Y coordinates and transmitted to the display system, along with the radar flight target data for display.

(i) Radar Weather Data Display. The display channel accepts radar weather messages from CCCH through the Radar Console Channel (RCC) and generates appropriate displays.

(9) Automatic Tracking. The tracking function computes the position and velocity of all tracked aircraft within the ARTCC's radar coverage, and provides the means for maintaining identity information (in alphanumeric form) with the appropriate search and beacon radar targets on the radar controller's display. Because of the cooperative nature of ATC, flight plan information concerning the planned route of flight, aircraft speed, altitude, and assigned beacon identity code are used in the processing by this function. The acquisition of tracks on search and nondiscrete code beacon targets requires manual action by the controller. The computer performs track acquisition on discrete code beacon targets automatically. Three basic modes are employed for both search and beacon radar tracking:

(a) Flight-Plan-Aided Tracking. Where a track is successfully matched to a flight plan, the stored flight plan route and speed information are used in the prediction process involved in calculating the track position. Schedule changes in course, as indicated in the flight plan route, bias the prediction of track position in the direction of turn.

(b) Free Tracking. This tracking mode utilizes the velocity data derived from previously correlated radar data. The free-tracking mode is employed when the computer program determines that the track cannot be matched properly to the flight plan, when a manual override action is taken by the controller to change the tracking mode to free, or when the track is outside the acceptable lateral deviation determined by the associated checking task.

(c) Coast. Coast mode is used when tracking difficulties are encountered due to lack of radar data, clutter situations, or a manual action. If a flight is tracked in the flight-plan-aided mode, the track position is then maintained with flight-plan-aided coast using the flight plan speed and route information. If, however, a flight is tracked in the free-tracking mode, it reverts to free coast using previous radar-derived velocity. In both cases, the coast tracking does not revert to its original mode until the controller manually reacquires the target, except in the case of targets with a DBC.

(10) Real-Time Quality Control (RTQC) of Radar Data. This function monitors the RTQC of radar data by performing tasks that include:

Task 1. Status Message Monitoring

Task 2. Test Message Monitoring

Task 3. Radar Data Counts

Task 4. Registration Analysis

Task 5. Collimation Analysis

The RTQC function operates on a programmed basis and provides the data associated with Tasks 1 through 3. The last two tasks are supported by data that must be requested.

(11) Dynamic Radar Data Simulation. The purpose of this function is to generate search and beacon radar messages to simulate active flights in the system or to generate radar targets for training and testing purposes.

c. Support Program Components. The operational support program components of the NAS computer program subsystem are referred to as the utility program components. The utility component facilitates the preparation, management, and maintenance of all NAS operational components, support components, data reduction and analysis, and other related software.

(1) Monitor. The utility program component includes monitor services, which assure continuity of software execution and include a compiler, assembler, loader, library edit, symbolic program tape edit, support system edit, compool edit and documentation, chart processor, and cross–reference processor.

(2) Support Programs. The support program components are subprograms that support the preparation of the database, the generation of the system, and system operation.

(3) Data Reduction and Analysis. These programs are for use during program shakedown and operations changeover, as well as normal operations.

(4) Maintenance, Testing, and Checkout. This component consists of the programs used for system integration, maintenance, and diagnostic support. These programs include equipment checkout programs, maintenance programs, and special-purpose (e.g., simulation and test input preparation) programs.

2–6. COMMUNICATIONS SUBSYSTEM.

The communications subsystem consists of equipment and transmission media for the transfer of flight data and track data (if appropriate) between an ARTCC and selected facilities (see figures 2–1 and 2–2). In addition, the subsystem's equipment provides electronic switching for voice communications. Transfer of both flight data and track data between the ARTCC and adjacent facilities is accomplished via modems and interfacility data channels.

a. National Interfacility Communications System. This system consists of the national and area interfacility transmission networks provided through leased lines, the FAA radio communications link, redundant channel, and alternate route capability. Monitoring and controlling of the networks for efficient management is provided. Multiplexing modems are used throughout this network.

b. The National Transmission Network. This network is known as the backbone and has two main functions. It provides inter-ARTCC communication and services as a trunking medium for the area networks. The national transmission network will ultimately use the FAA radio communications link as the transmission medium where it is economically feasible. Leased lines are used in areas not served by the FAA radio communications link. Telephone dial backup is also available, but normally at reduced data rates.

c. The Area Transmission Network. The area transmission network forms a communications link between the ARTCC and remote facilities. These facilities consist of radars, towers, and approach control. The media for the area networks consist of FAA radio communication links, leased lines, telephone dial lines, and limited satellite use.

d. Monitoring and Control. Monitoring and control is performed at the ARTCC. The system is monitored and controlled end-to-end from the remote facility to the ARTCC. The monitoring and control subsystem is located at the ARTCC. Redundant channel selection and alternate route selection are performed as part of the monitoring and control function.

2–7. SYSTEM OPERATIONS CENTER.

a. General. The system performance and status monitoring functions are performed at the SOC. The SOC provides a centralized monitoring and control position for the NOM of the ARTCC. The SOC provides a continual display of status for all major equipment of the system. The SOC's output includes the elements in the major subsystems, where information is available. The system maintenance and monitoring subsystem includes the ability to display inputs from ARTCC radars and selectively display the outputs of the display channel.

b. System Monitoring. The overall monitoring of the ARTCC is performed at the NOM position. The SOC is located in a convenient position in the ARTCC to allow the NOM to easily provide system status and performance information to other ARTCC supervisory personnel, as appropriate.

c. Digitized Radar Input Monitoring. Search and beacon radar data are digitized at a remote site and transmitted over digital narrowband transmission media to the ARTCC. This data is sent to the ECG. A secondary output goes to the SOC display indicator for the monitoring of selected categories of digital messages and monitoring radar alarms.

d. Central Computer Complex Host Monitoring. The KVDT Configuration Notification Facility (KCNF) provides monitoring capabilities by displaying the hardware configuration status for each CCCH element. It displays mode of operation of the computer, and the configuration of the CCCH modules. These monitoring functions are available at the CCCH system console, as well as the SOC. The CCCH monitoring includes the monitoring of CP, Logical Disk Devices Addresses (LDDA), Disk Control Units (DCU), AUs, TCUs, HSPs, etc.

e. Radar Air/Ground Communications Status Monitoring. The SOC provides status display of air/ground radio communications circuits and facilities. Any change of status, such as outage or return to service of the radio equipment, is reported to the NOM at the SOC.

f. Navigational Aids Monitoring. These NAVAIDS are monitored by facilities, convenient to their locations, such as flight service stations and control towers. Changes in status of the NAVAIDs are reported to the NOM at the SOC.

g. Communication Equipment Monitoring. The SOC monitors all interfacility and radar data sets, and incoming data channels. Appropriate alarms are provided to the NOM to identify a deteriorating or open-line circuit.

h. Real-Time Quality Control. The operational computer program performs error analysis and RTQC analysis for various equipment in the system and provides a printout of the results at the SOC. These printouts are automatically generated by the CCCH but may also be requested by the NOM.

2–8. ENHANCED BACK UP SYSTEM (EBUS) ACCESS RADAR SOFTWARE.

The EBUS operational software provides command control and status reporting for the system, process radar target, weather, and map data for display on the radar displays. This computer program performs the following major functions: message entry and checking, local outputs, multiple radar data processing, automatic tracking, RTQC of radar data, and adaptation.

a. Message Entry and Checking.

(1) The EBUS program uses several types of input messages to initiate, maintain, and terminate processing of data that are required in providing effective air traffic control. The acceptability and disposition of these input messages are dependent on the operating mode and interface level. The input messages are entered into the computer from various positions within the ARTCC. Additionally, several other types of messages are utilized to establish, modify, and control the functional operation and environment of ECG/EBUS.

(2) Each input message is subjected to various program checks for message completeness and coherency. Each unacceptable message is diagnosed and an indication of the problem area is output to assist personnel in correcting any errors. Input messages are discarded if they are unacceptable. This allows the message source, normally the radar controller’s data entry controls, to be unlocked (i.e., freed for entry of another message) rapidly.

b. Local Output. Local outputs consist of messages sent to the radar controller’s display, the IOT, and the MSP. The R-console is used to display radar data, Full Data Blocks (FDB), flight, hold, and beacon code lists, current time, mode indicator, altitude filter limits, and preview area. The IOTs display acceptance, rejection, requested data, program initiated, and examine parameters messages.

c. Multiple Radar Data Processing.

(1) The MRDP function will process, at least once every second, the digitized radar received from the common digitizers. A hierarchy for processing radar data is used. The intent of the processing hierarchy is to prevent the loss of target data due to the processing on non-target (e.g., map and weather) data at times when radar data load exceeds specified design requirements.

(2) The processing hierarchy is such that target data will be of higher priority than non-target data.

(3) The MRDP function will attempt to correlate the beacon and primary data with established tracks. If a track does not exist, the MRDP function will attempt to automatically initiate tracks on selected discrete beacon returns only. Test target messages and system status messages are stored for the real-time control of radar data function. Electronic counter measure strobe messages are stored for the local outputs function. Weather messages are received in the form of azimuth and range start and stop coordinates for two levels of outlines (weather maps). These two levels are designated low intensity and high intensity. The MRDP function performs Rho-Theta filtering and coordinates conversation on weather messages prior to storing the data in the appropriate output buffers.

(4) The major tasks of the MRDP function are:

(a) conversion of radar site reference data (Rho-Theta) to system (X, Y) coordinates;

(b) to reject radar returns which lie outside the radar sort box grid or which lie within areas in which other radar(s) is (are) designated as preferential;

(c) pressure correction of Mode C altitude data;

(d) correlation of radar returns with established tracks. Correlation is that process of determining the best track-datum pairing;

(e) automatic track initiation on qualified discrete beacon flights;

(f) selection and storage of radar data for registration and collimation analysis.

d. Automatic Tracking. The primary objective of the automatic tracking function is to maintain identification of aircraft through selected primary and beacon radar position data. In doing so, the automatic tracking function periodically calculates aircraft position and velocity using radar data supplied by the MRDP function. From the track, the automatic tracking function predicts a new aircraft position to be used with the radar data in the next track calculation.

e. RTQC of Radar Data. The RTQC of radar data function provides quality control features for the software monitoring of radar data. The function performs detection and analysis of the digitized radar data and supplies printed reports as to the quality of the data (status, quantity, and accuracy). The data of concern are those transmitted by the radar data processing equipment through the common digitizer. The MRDP function stores the data dynamically for subsequent processing by the RTQC of radar data function.

f. Adaptation Data. Operational program processing must be adjusted to various conditions. These adjustments are most expediently accomplished through the adaptation function. This function provides the operational programs with changeable data that can be readily altered as needed. Alterations are required to:

(1) Adjust the program to each specific location. The same ECG/EBUS operational computer program is used at all ARTCCs, yet each ARTCC has its own unique parameters. The adaptation function provides means by which the program can be adjusted to each site.

(2) Optimize the performance of the system. Optimization of the system performance is aided by the adaptation function's ability to define and alter system performance.

(3) Adjust the system to changes that occur as time passes.

2–9. FLIGHT DATA INPUT/OUTPUT.

a. General. The Flight Data Input/Output (FDIO) system distributes flight plan data, weather information, and general information within the ARTCC and to remote sites. The system also receives flight plan data from the remote sites and sends it to the CCCH. Refer to Figure 2–4, FDIO CFAD System Functional Block Diagram, or Figure 2–5, FDIO CFAD Block Diagram, for FDIO-G.

NOTE: FDIO is a part of the CFAD service, and therefore included in this order as such. All maintenance activities for the FDIO subsystem are detailed in Order JO 6130.3, Maintenance of FDIO Equipment.

b. Central Control Unit (CCU). The CCUs are located at the ARTCC. Each CCU controls and routes data to and from a maximum of 28 remote sites via modems using an RS–232C interface. Each CCU is made up of two sets of redundant equipment assemblies. The processor programs are included within the equipment in read only memory (firmware). One set of equipment is online and one standby, and has automatic and manual reconfiguration capability. The CCUs are interfaced to the CCCH by a General Purpose Input/General Purpose Output (GPI/GPO) adapter pair in ECG.

c. Remote Control Unit (RCU). The RCU is located at the remote sites. Each RCU controls and routes data to a maximum of ten FSPs, five Alphanumeric Keyboards (ANK), and five Cathode Ray Tubes (CRT). The RCU consists of a single set of equipment made up of a multibus processor and bus connector assemblies. The processor programs are included within the equipment in read only memory (firmware). There is no redundancy for the RCU equipment. The RCU equipment is interfaced via modems and telephone lines or Remote Microwave Link (RML) to the CCUs at the ARTCC.

d. Flight Strip Printer. The FSP is used in the ARTCC and at the remote sites to print flight plan data. The printer is also used at the remote sites to print error messages.

e. Alphanumeric Keyboard. This device is used to provide an operator interface for entering flight plan data into the system.

f. Cathode-Ray Tube. The CRT is a peripheral element used to display flight strip messages, general information messages, and weather data, and it provides an area for composition and editing of input messages. This device is only located at remote sites.

g. Tower Data Link Services (TDLS). The TDLS implements emulation of FDIO Replaceable Alphanumeric Keyboard (RANK) and CRT to reduce the number of keyboards and displays in the tower cabs. The FDIO RANK and CRT are emulated on the pre-departure clearance terminal. The TDLS terminal shares the FDIO CRT and RANK functions with the pre-departure clearance functions.

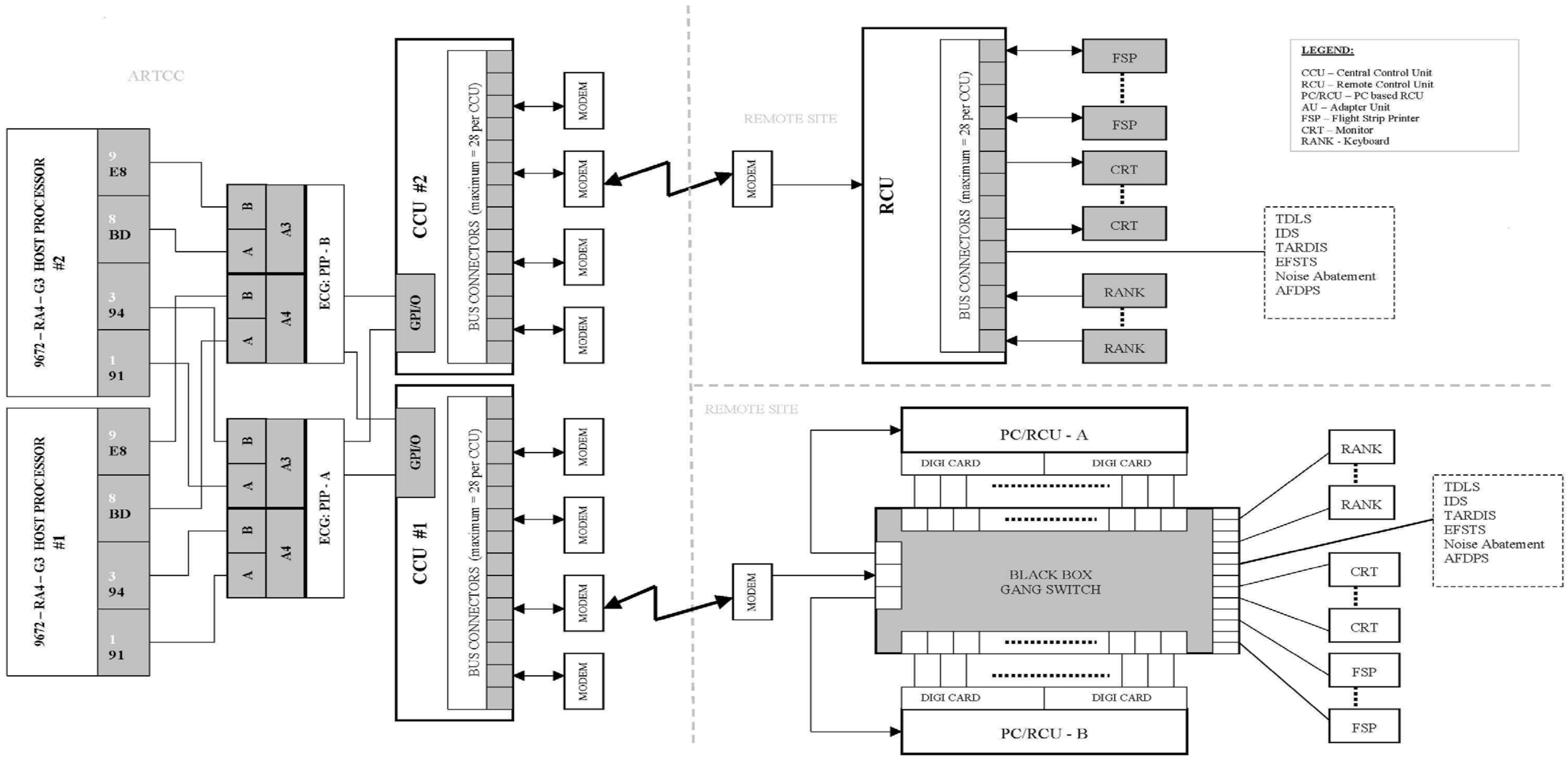

FIGURE 2–4. ARTCC – FDIO CFAD FUNCTIONAL BLOCK DIAGRAM

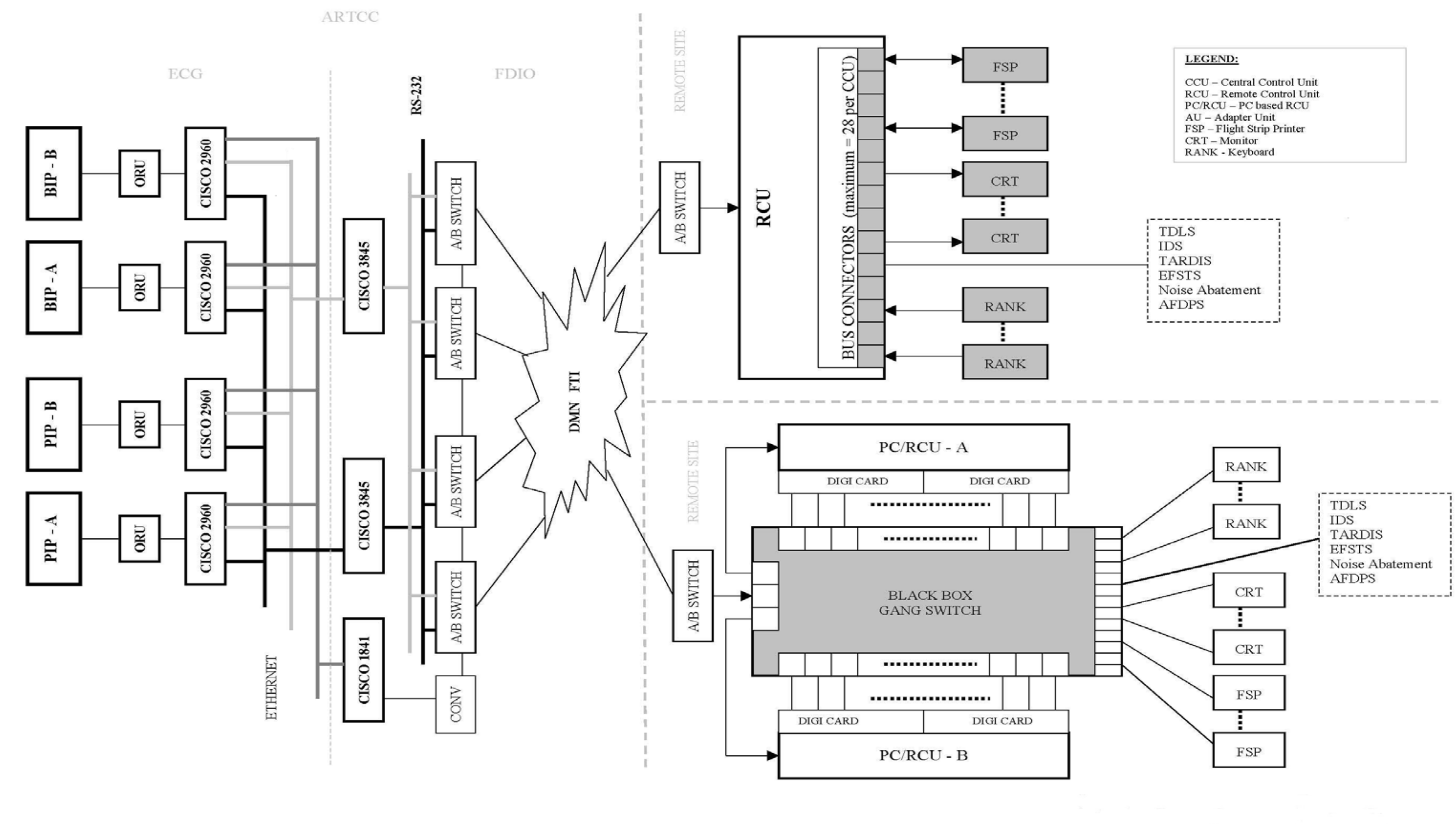

FIGURE 2–5. SELECTED ARTCC – FDIO CFAD BLOCK DIAGRAM

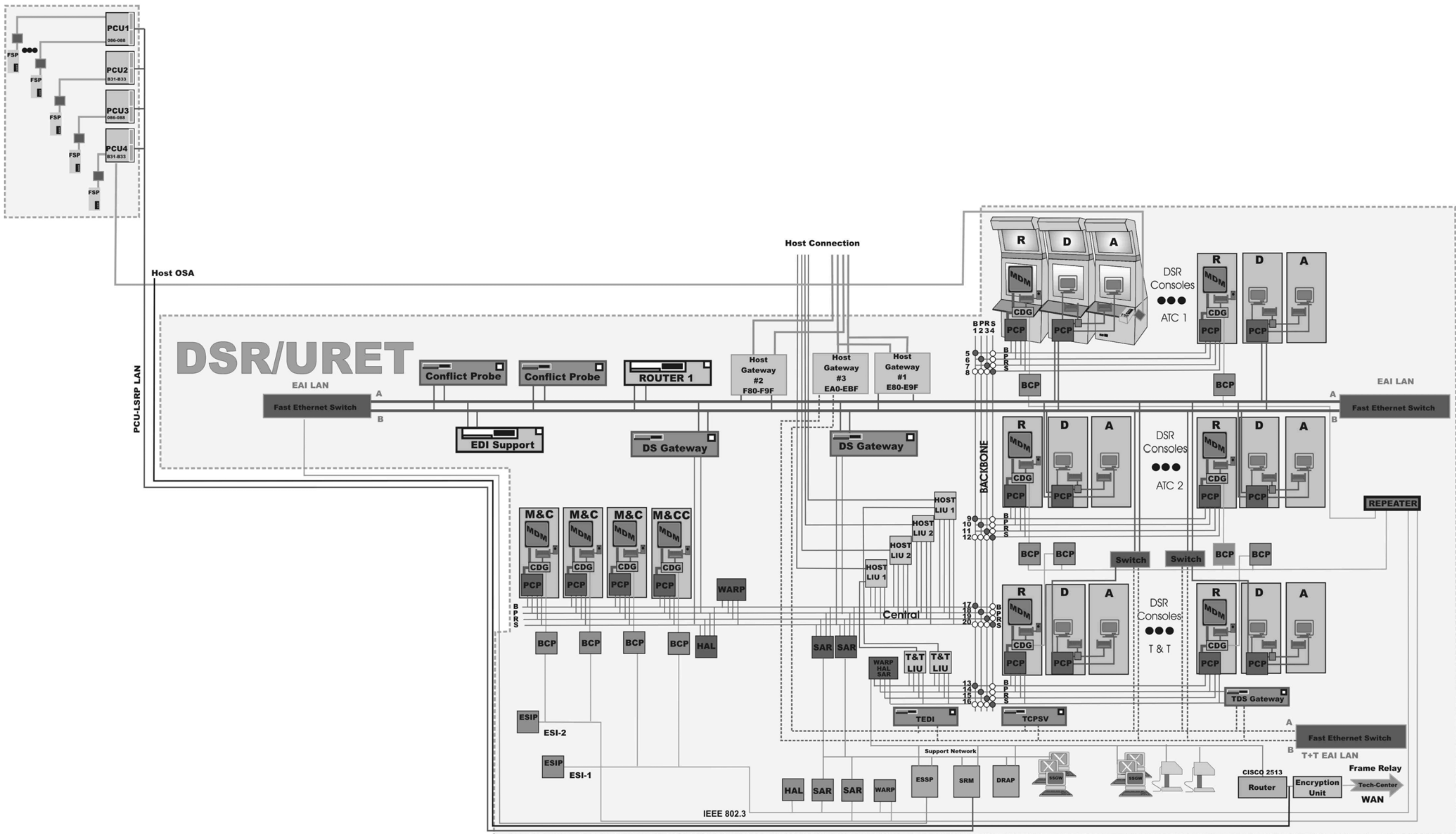

FIGURE 2–6. DISPLAY SYSTEM REPLACEMENT HARDWARE ARCHITECTURE

2–10. DISPLAY SYSTEM REPLACEMENT (DSR) SUBSYSTEM LOCAL AREA NETWORK ARCHITECTURE.

The DSR hardware architecture is based on multiple use of RISC–6000 processors on a distributed network connected to Token Rings for the Local Communications Network (LCN)/Host and an Institute of Electricians and Electrical Engineers (IEEE) 802.3/Ethernet distribution for the BCN. There are five sets of Token Rings, with four rings in each set. There are four sets of 10 Bridges at the intersection of the five sets of Token Rings to route data to the appropriate rings. The Ethernet carries radar and track data to the Backup Control Processor (BCP) through a daisy chain network. See Figure 2–6, Display System Replacement Hardware Architecture.

a. Token Rings. The five rings are Backbone, Central Access, Test and Training, and two ATC Access. The four sets of Bridges are at the junction of the Central Access and Backbone, Test and Training Access and Backbone, and at the two ATC Access rings.

The Broadcast ring (B) carries transmission of radar surveillance data from the Host to all R-consoles. The Recording ring (R) is dedicated to SAR data. The Point-to-Point ring (P) carries Flight Data, time, etc. The Spare ring (S) is used to back up any other ring upon failure by switching the Bridges.

b. Back-up Channel. The Ethernet carries Radar and Track data from the ECG to the R-consoles.

2–11. DISPLAY SYSTEM REPLACEMENT (DSR) SUBSYSTEM HARDWARE.

a. General. The Radar Display Subsystem (RDS) provides for the interchange of data between the radar controller position and the CCCH. The radar display system consists of the DSR. There are essentially three types of consoles: R, D, and A (see figure 2–6).

(1) R-console. The views supported are Situation Display, R-position CRD (R–CRD) view, Display Control and Status view, and the Time view. The Time view displays Host-provided time and sector number. A version of these same views will be supported for Enhanced Direct Access Radar Channel (DARC) (EDARC) as well. The switch between Host and EDARC displays is accomplished through the keyboard. The Quick Action keys are located on the R-keyboard.

(2) D-console. The views are the D-position CRD (D–CRD) view, Display Control view, and the Time view.

The URET D-console provides the controller interface to CP. The D-console interfaces to the CP via the DSR LCN to the DSR Gateway (DSGW) to the Enhanced Application Infrastructure (EAI) LAN, then to CP. The D-console display has been upgraded for CP. The new display is a 20.1–inch flat panel mounted on an adjustable arm. A trackball is provided to support the graphic user interface required for CP operation. D-console views are X–Windows based. The D-console continues to support the legacy D–CRD functions. The D-console is logically switchable from D–CRD operation to CP operation and back by controller command.

(3) A-Console. The A-position will support the printing and stuffing of flight progress strips, flight plan entry, flight data amendment, and the composition and distribution of General

Information (GI) messages. One single A-position will be capable of supporting multiple sectors. The views supported on the A-console display are the A-position CRD (A–CRD) view, Display Control view, and the Time view.

b. Air Traffic Common Equipment. The DSR is made up primarily of RISC–6000 equipment, and is configured to provide the R, D, and A consoles using a primary and backup computer processor for the R-console and a primary computer processor for the D and A console.

(1) Radar Controller. The R-display has a 20–inch by 20–inch raster scan color CRT. The radar controller's display contains the DSR devices provided to the R-controller for use in controlling air traffic (see figure 2–6). Three types of data are displayed on the CRT.

(a) R Situation Display. The DSR Situation Display provides a geographic area of concern containing target symbols, track data, and weather data. The R-display has a 20–inch by 20–inch raster scan color CRT. Data relating to aircraft in the airspace assigned to a control sector are presented to the radar controller on the R-display via the Token Rings and the Primary Channel Processor (PCP). The display of data is controlled automatically by the computer program and manually by the controller through manual entry devices.

(b) Radar Computer Readout View. The DSR R–CRD view provides for the display of Host messages, entry and display of input messages, the display of message status indicators, and the display and selection of category functions. In response to CCCH program actions or controller requests, the CCCH sends messages via the Token Rings to the PCP, which in turn causes these messages to be displayed in the R–CRD view made up of the Pick Area, Category Selection Area, Text Area, Response Area, and Message Composition Area of the proper R-display. Such messages include flight plan updates, altimeter settings, and error messages.

(c) Display Control and Status Logical Display. The Display Control and Status view provides for controlling various display settings such as filters, brightness, trackball cursor speed and size, and audible alarm volume settings. The Display Control and Status view consists of a Panel Control Area and six panels as follows:

1 System Status Panel. This panel consists of four Strobe indicators, four Radar indicators, Display Overload indicator, Display Mode indicator, Load Shed indicator, and Host/EDARC Synchronous indicator. Except for the Display Mode indicator, if an indicator is active, it will be emphasized. The Display Mode indicator is always emphasized displaying Host or EDARC, whichever is selected.

2 Field Selection Panel. Field select pick areas are used to select or inhibit the FDB leader, the FDB position symbols, or any of the five fields in the alphanumeric character array.

3 Display Instrumentation Panel. This pick area is used to select range, vector length, leader length, and history.

a The Range Pick Area is used to select range and also is used to permit positioning of the display off-center, in conjunction with the trackball.

b The Radar History Pick Area is used to select from zero to five scans of radar history.

c The FDB Leader Length Pick Area is used to select one of three available lengths (plus an off position) for the leader between the position symbol and the FDB array.

d The FDB Velocity Vector Length Pick Area is used to select one of four lengths (plus an off position), (in terms of flying time) for the velocity vector.

4 Display Filter Selection Panel. Twenty-eight pick areas are provided to enable the radar controller to select or inhibit the class/type of data that are displayed on their R-console.

5 Brightness Control Panel. This panel provides brightness control for Map, FDB, LDB, Target, Weather (WX), CRD, Time, DC and Master.

6 Audible Alarm Volume Control Panel. This panel provides alarm level control.

(d) Trackball. The trackball and its pick, enter, and home keys are used by the R-display controller in communicating with the computer program and for selecting the display's operating condition and coordinates. The trackball allows the controller to: request the identification of any piece of displayed data to the CCCH by specifying its position (for example, the identification of an aircraft); transmit the location of any arbitrary point on the display surface to the CCCH (for example, when vectoring an aircraft); and to off-center the display from a present geographic reference point to an arbitrary geographic reference point.

1 Pick Key. Allows the user to specify points and objects without entering a command. The pick key is also used as a decrement (-) feature on the DSR, DC view instrumentation panel, brightness control panel, and audible alarm panel.

2 Enter Key. Allows the user to select an object under the trackball cursor and close the command. The enter key is also used as an increment (+) feature on the DSR, DC view instrumentation panel, brightness control panel, and audible alarm panel.

3 Home Key. Allows the user to reposition the cursor at a facility adapted Home location on the R-position display.

(e) R-Keyboard. The R-position keyboard is a QWERTY array augmented with three special-purpose keypad areas.

1 QWERTY Area. This area includes the keyboard, plus basic computer function keys such as Enter and Clear.

2 Numeric Area. This area includes 10 numeric keys set up similar to a standard telephone and Insert, Delete, and Space keys.

3 Fixed Function Area. There are 24 fixed function keys used for initiating frequently referenced functions with one keystroke.

__4__ Category/Function Area. There are 12 keys (F1 through F12) associated with six category keys on the keyboard and with the category pick areas in the R–CRD view. A particular category or function can be displayed by pressing one of the hard-labeled keys on the keyboard or by selecting a category in the R–CRD view with the trackball. The functions that are associated with a particular category will be displayed in the Text Area on the R–CRD view.

(2) Data Controller. The D-display has a 15–inch raster scan color CRT. The data controller's display contains the DSR devices provided for use in AT control (see figure 2–6). Three types of data are displayed on the CRT. These views cannot be moved or resized. An FSP may also be installed at the D-position.

(a) D-Display Views.

__1__ D-Position Computer Readout Device (D–CRD) View. The D–CRD provides for the display of Host messages, entry and display of input messages, and the display of message status indicators.

__2__ Display Control View. This view provides for the display of audible alarm volume settings (brightness control is provided via hardware).

__3__ Time View. This view displays Host provided time and the sector number.

(b) D-Keyboard. The D-position keyboard is a QWERTY array augmented with two special-purpose keypad areas.

__1__ QWERTY Area. This area includes the keyboard, plus basic computer function keys such as Enter and Clear.

__2__ Numeric Area. This area includes 10 numeric keys set up similar to a standard telephone plus Insert, Delete, and Space keys.

__3__ Fixed Function Area. There are 24 fixed function keys used for initiating frequently referenced functions with one keystroke. The Quick Action Keys are located on the D-keyboard.

(c) Flight Strip Printer. The flight data on flight progress strips is provided via a thermal printer, which dispenses the flight progress strips one at a time. Tearing the strips is not required, as the printer cuts them.

(3) Assistant Controller. The A-display has a 15–inch raster scan color CRT. The assistant controller's display contains the DSR devices provided for use in AT control (see figure 2–6). Three types of data are displayed on the CRT. These views cannot be moved or resized. Two flight strip printers may also be installed at the D-position.

(a) A–Display Views.

__1__ A–CRD View. The D–CRD provides for the display of Host messages, entry and display of input messages, and the display of message status indicators.

__2__ Display Control View. This view provides for the display of audible alarm volume settings (brightness control is provided via hardware).

3 Time View. The Time view displays Host provided time.

(b) A-Keyboard. The A-position keyboard is a QWERTY array augmented with two special-purpose keypad areas.

1 QWERTY Area. This area includes the keyboard, plus basic computer function keys such as Enter and Clear.

2 Numeric Area. This area includes 10 numeric keys set up similar to a standard telephone, plus Insert, Delete, and Space keys.

3 Fixed Function Area. There are 24 fixed function keys used for initiating frequently referenced functions with one keystroke. The Quick Action Keys are located on the A keyboard.

(c) Flight Strip Printer. The flight data on flight progress strips is provided via a thermal printer, which dispenses the flight progress strips one at a time. Tearing the strips is not required, as the printer cuts them. Two FSPs can be installed at the A-position.

(4) AT Support Equipment. The DSR is made up primarily of RISC–6000 equipment and is configured to provide support consoles using primary and backup computer processors. The H (Handoff) or Tracker position and the Area Manager in Charge (AMIC) are provided with an R-position. The Traffic Management Unit (TMU) is provided with both R- and D-positions. The Central Weather Service Unit (CWSU) is provided with an R-position.

(a) Handoff Position. The H of Tracker position utilizes an existing R-position console and is provided with a second set of Voice Switching and Control System (VSCS) communications equipment.

(b) Area Manager in Charge. The AMIC position is provided with an R-position that has all the functionality of the R-controller with the addition of SEE ALL, which displays a copy of the displays at a specific sector. This position will also provide the security administration for AT personnel.

(c) Traffic Management Unit. The TMU position is provided with R- and D-positions to provide AT management and flow control functions.

(d) Central Weather Service Unit. The CWSU is provided with an R-position console to evaluate and coordinate the dissemination of weather information for AT control.

(5) NAS Maintenance Equipment. The DSR is made up primarily of RISC–6000 equipment and is configured to provide Monitor and Control (M&C) functions for the DSR using R-consoles, History Alert Log (HAL) processors, and printers. This equipment supports tasks on both the Host–LCN and the EDARC–BCN.

(a) M&C Consoles. The NOM is provided with four R-consoles that are configured to perform three major system management tasks. These are identified as M&C Host (M&C–H), M&C EDARC (M&C–E), and M&C Configuration (M&C–C).

<u>**1.**</u> M&C–H Console. This R-console is configured to monitor the Host path situation display, typically two consoles, but can be hot-keyed to monitor the EDARC Path Situation Display.

<u>**2.**</u> M&C–E Console. This R-console is configured to monitor the EDARC path situation display, typically one console, but can be hot-keyed to monitor the Host path situation display.

<u>**3.**</u> M&C–C Console. This is functionally equivalent to the R-console plus SEE ALL provides radar RTQC and Service Level Certification tasks of the NAS for LCN/Host. This console can be hot-keyed switched to provide the same functions for the BCN/EDARC.

(b) History Alert Log Processor. This RISC–6000 processor provides a 24-hour log and supports the printers for system certification detail reports, rack location records, facility alerts as they occur and diagnostic results reports. One HAL is connected to the LCN and one is connected to the BCN.

(c) M&C Printers. The HAL processor supports the M&C printers. These printers are 600 characters per second (cps) dot matrix.

(6) NAS Maintenance Support Equipment. The DSR is made up primarily of RISC–6000 equipment and is configured to provide M&C functions for the DSR using R-consoles, HAL processors, and printers. This equipment supports tasks on both the Host–LCN and the EDARC–BCN.

2–12. USER REQUEST EVALUATION TOOL SUBSYSTEM.

As shown in Figure 2–7, User Request Evaluation Tool (URET) Subsystem, URET consists of the following major equipment:

- HGW processors;
- Conflict Probe processor;
- router;
- Enhanced Display System Infrastructure (EDI) support processor;
- Enhanced Site Support Processor (ESSP);
- Fast Ethernet (FE) switch;
- DSGW;
- DSR D-console.

a. Host Gateway (HGW) Processors.

(1) Hardware Overview. The HGW processor is a Sun Microsystems F280R, 1x900 MHz processor. The redundant HGWs communicate with the CP processor, and each HGW is connected to the Host through Block Multiplex Channels. The HGW has the following four external interfaces:

(a) Host System 390 interface adapter connection to CCCH #1, ChpID EE. Provides Host data to/from HGW;

(b) Host System 390 interface adapter connection to CCCH #2, ChpID A2. Provides host data to/from HGW;

(c) FE connection to FE Switch #1. Provides Host data to/from the CP;

(d) FE connection to FE Switch #2. Provides Host data to/from the CP.

(2) Software Overview. The HGW contains two CP applications:

(a) Host Interface Device Software (HIDS). Data from Host is received by HIDS via the System 390 interface and passed to the Host Gateway Software (GWH). Health checking is performed by HIDS and the results are passed to GWH. Absence of health checking messages causes GWH to report loss of Host communications.

(b) Host Gateway Software. GWH receives Host data from HIDS and passes the data to the CP processor via the FE EAI LAN interface. This data is used by two CP processor nodes: Flight Plan Manager (FPM), and Track Manager (TKM). Data received from HIDS that is not used by the CP application is discarded by GWH.

b. Conflict Probe (CP) Processors. The Conflict Probe Server (CPSV) processor supports the Flight Plan Management (FPM), Trial Plan Management (TPM), Trajectory Modeling (TJM), Track Management (TKM), Weather Processing (WP) and CP processing functions. There are three CPSV processors; two support the ATC operational system, with one operational and the other in "warm" standby, and the third supports the T&T Dynamic Simulation (DySim) system.

(1) Hardware Overview. Each operational CPSV consists of the following: Sun Microsystems V1280R 8x1200 MHz processor, one 4–port FE adapter, two native I/O ports, 16 GB Dynamic Random Access Memory (DRAM), 1 GB memory expansion (4x256 MB) Dual In-Line Memory Module (DIMM), 2x36 GB hard drive (hot swappable), six PCI slots, and a Small Computer System Interface (SCSI).

The T&T CPSV consists of a Sun Microsystems V1280R 4x900 MHz processor, one 4–port FE adapter, two native I/O ports, 8 GB DRAM, 1 GB memory expansion (4x256 MB) DIMMS, 2x36 GB hard drive, six PCI slots, and a SCSI interface.

The CPSV processor has the following external interfaces:

(a) CP interface to D-controller positions provides CP functions to the ATC. The CP to D-position interface is provided via the Switched FE EAI LAN to the DSGW DSR LCN, where the DSR LCN provides the interface to the D-positions.

(b) CP interface to CCCH provides data required for CP functions. The data required from the HCS are track data, flight plan data, sectorization data, preferential route status data, and training data. Training data is for DySim training.

(c) CP interface to EDI Support (EDIS) processor provides Weather and Radar Processing (WARP) Weather Information Network Server (WINS) weather data required for CP functions. Data provided is grid-based wind and temperature at 37 isobaric levels and surface pressure at sea level for use in trajectory modeling. Weather data is also used for the Wind Grid Display (WGD) at the D-position. WARP WINS weather data is a separate National Weather Service (NWS) product other than the Next Generation Radar (NEXRAD) data provided for R-positions.

(d) CP interface to adjacent ARTCC CP provides the data allowing probing beyond the host ARTCC boundaries for possible conflicts. The host CP to adjacent CP interface is provided via the Switched FE EAI LAN to the router.

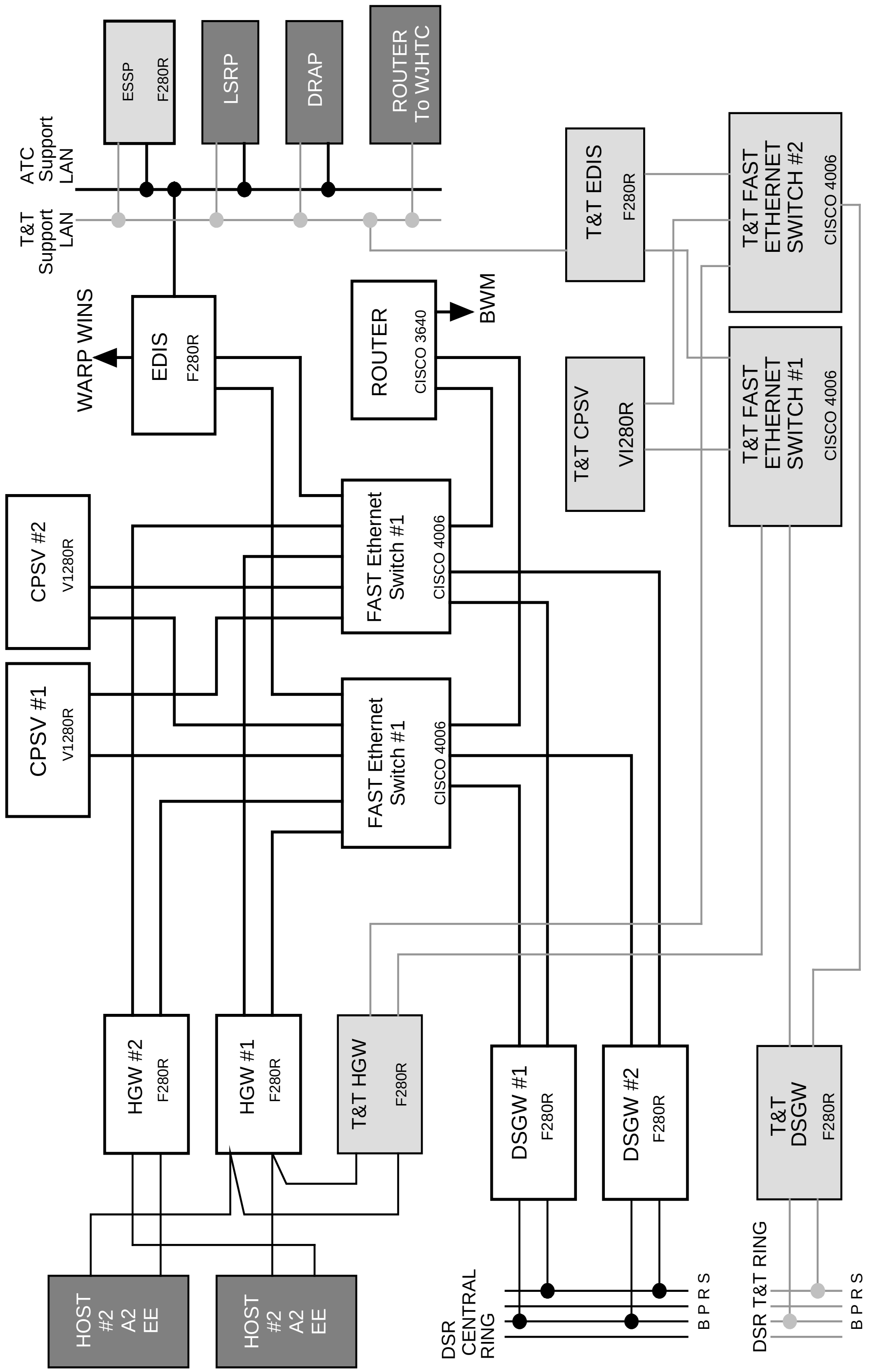

FIGURE 2–7. USER REQUEST EVALUATION TOOL (URET) SUBSYSTEM

(2) Software Overview. Each CPSV processor runs the Sun Solaris 9 operating system. The CP software contains the following four applications:

(a) Plan Management (PLMG) provides CP two major functions:

1 Flight Plan Management (FPM). FPM is the single interface to Host for CP (except for track data which is multicast). FPM manages all flight plan data received from Host and from FPM adjacent ARTCCs. FPM determines which flight plan to use for the current plan and provides that data for other CP functions. FPM provides this data to FPM in adjacent ARTCCs.

2 Trial Plan Management (TPM). TPM creates and maintains trial plans. Trial plans include single trial plans, automated replans, and coordination plans. TPM may amend assigned altitude, route, or altitude or speed restrictions for existing current plans or other trial plans. TPM allows trial plans for preferred routes for eligible aircraft. Speed changes can be trial planned but not sent to the Host.

(b) Trajectory Modeling (TJMD) provides CP with the following three major functions:

1 Trajectory Modeling computes the converted route and trajectory for all current, proposed, and trial plans. Trajectories are computed in spherical coordinates for better accuracy over stereographic coordinates. TJM manages altitude and speed restrictions, Special Activities Airspace (SAA) and airspace definition adaptation.

2 Track Management consists of two main functions: manages active and proposed flights to provide orderly flow through CP application, and manages track data received from Host. TKM determines if flights are in conformance using data received from TJM and FPM.

3 Weather Processing receives weather data from WARP every hour. Weather data received is for the current hour and four forecast hours. This data has been geographically filtered by WARP for the ARTCC area. The four forecast hours are received to protect against WARP system outages.

(c) Conflict Probe Processing (CPP) probes current plan trajectories for all other aircraft and trial plans for conflicts for an adapted look-ahead period of time. CPP probes trajectories against SAAs for conflicts. CPP probes trial plan trajectories against current plan trajectories and SAAs request by TKM.

(d) Conflict Probe Displays (CPD) provide display and command entry functions for the D-position controller including weather, current flight plan, trial plan, environmental, restrictions, arrival stream filter, CP status, and CP results data. CPD also accepts controller inputs via menus and displays.

c. Router. The Cisco router provides the interface via Bandwidth Manager (BWM) to adjacent ARTCC CPSV. Router security features will be used to meet security requirements, including data encryption, port filtering to control connections and privileges, and authentication.

(1) Hardware Overview. The router is a Cisco 3640, 100 MHz Integrated Device Technology (IDT) R4700 RISC with one 4–port FE adapter, two Ethernet to Wide Area Network (WAN) card slot network modules, 32 MB DRAM, four network module slots, and 8 MB Flash memory.

The router has the following four external interfaces:

(a) FE TX connection to FE Switch 1;

(b) FE TX connection to FE Switch 2;

(c) FE FX connection to BWM (up to seven neighbor ARTCCs);

(d) FE FX connection to Enhanced Traffic Management System (ETMS).

(2) Software Overview. The 3640 Cisco router supports Cisco Input/Output Supervisor (IOS) software. The Communications Service Software (COMM) resident in the router is used for communications with up to seven other ARTCCs. The COMM software also supports EAI LAN communications.

The router contains the portions of Operational System Management Software (SMGT) for M&C status and control functions, and network security. The portion of SMGT resident in the router supports gathering and reporting performance data, and status monitoring data.

The network security portion of SMGT resident in the router is configured to accept data only from the specific addresses of neighboring ARTCC CPSVs. This software has integral security data management and security event reporting. It performs port filtering and reports any security violations to the M&C SMGT. These security events are recorded.

The router can be commanded from the M&C. The M&C Router Activate/Deactivate command (ROUT ACT/INA) will enable/disable communications to all neighboring CPSVs. The M&C command CPCP ACT/INA XXX will enable/disable communications to a single neighbor CPSV (XXX).

d. EDI Support (EDIS) Processor. The EDIS processor supports the system release distribution function. The EDIS hosts the required software Central Services (CS) and provides the path to the DSR Support LAN for distribution of new software releases to processors on the EAI LAN. This path is separate from the DSR software distribution path, which is done via the DSR SAR processors. DSR and EAI/CP distributions may be completed in parallel via the separate paths. DSR and EAI/CP distributions are done under M&C control.

The EDIS processor hosts the WPWP function. It provides the interface to WARP to receive grid-based wind, temperature, and pressure data required by CP. The EDIS processor receives and preprocesses this weather data via a separate Ethernet LAN from WARP. EDIS provides this data to the DSR D-console via the DSGW/LCN for display, and to CP via the EAI LAN for trajectory modeling.

The EDIS processor provides the Simulate Weather Interfacility (SWI) software for WARP weather and neighboring CP facility simulations. SWI also provides weather simulation.

(1) Hardware Overview. The EDIS consists of a Sun Microsystems F280R 1x900 MHz processor, one 4–port FE adapter, one Token Ring adapter, one Native FE port, 2 GB DRAM, 1 GB memory expansion (4x256 MB) DIMM, and one 36 GB hard drive (hot swappable).

The EDIS has the following external interfaces:

(a) The EDIS processor interfaces to the ATC Support LAN to provide the path for distribution of new software releases to processors on the EAI LAN. The EDIS processor to ATC Support LAN interface is provided via Token Ring (T/R) IEEE 802.5 adapter to ATC Support LAN.

(b) The EDIS processor interfaces to the external WARP WINS processor to collect grid-based wind, temperature, and pressure weather data needed by CP. The EDIS processor to external WARP WINS processor interface is provided via 802.3 FE to WARP WINS processor.

(c) The EDIS processor interfaces to the CP processor to provide weather data needed for CP functions. The EDIS processor interfaces to the CP processor via FE connection to FE switch.

(2) Software Overview. The EDIS processor contains the following components:

(a) Weather Processing. WP receives weather data from the external WARP system. Although multiple hours of data are received (current hour plus four (4) forecast hours) only the current hours data is processed. Weather data is converted to spherical coordinates and sent to TJM. Weather data is also converted to stereographic coordinates and sent to CPDs.

(b) Simulate Weather, Interfacility. SWI has two main functions: simulating weather data and simulating external facilities.

(c) Central Services (CS). CS distributes software releases on the EAI LAN. Software distributions are done under M&C control.

e. Enhanced Site Support Processor (ESSP). The ESSP, with the DR&A Processor (DRAP) and Local System Release Processor (LSRP) provide support services at each ARTCC for local system release management, local adaptation management, offline system analysis, and CP simulation scenario development.

The simulation scenarios include WARP gridded weather, CP interfacility interfaces, and high fidelity target data. These scenarios are separate from the ATC operational system and do not interfere with ATC operations.

The ESSP, LSRP, and DRAP are connected to the ATC operational LCN and the T&T LCN via their respective SAR processors. In addition, the ESSP, LSRP, and DRAP are connected to the ATC operational EAI LAN and the T&T EAI LAN via their respective EDIS processors. There are no direct links from support workstations to the ATC operational system. Access to the operational ATC system to perform support services (downloads, etc.) is under M&C control. The ESSP Central Services Release Depository (CSRD) is used for storage of DSR and URET Core Capabilities Limited Deployment (CCLD) releases, the DSR SAR Volume Catalog, and both Operating System (OS) and Solaris dump and debug data files.

(1) Hardware Overview. The ESSP consists of a Sun Microsystems F280R 1x900 MHz processor, two Token Ring adapters, 2 GB DRAM, 1 GB memory expansion (4x256 MB) and one 36 GB hard drive (hot swappable). External devices consist of Sun D2 Disk Array 6x36 GB (hot swappable), Sun L9 Auto Loader Cartridge tape drive (900 GB), 3480 XCERTA tape drive, and DDS–4 Cartridge tape drive.

The ESSP has the following external interfaces:

(a) Token Ring interface to ATC Support LAN, provides path for local CP adaptation, data collection, and CP build;

(b) Token Ring interface to T&T Support LAN, provides path for CP simulation and scenario generation;

(c) SCSI interface to L9 tape drive;

(d) SCCI interface to D2 disk array;

(e) SCSI interface to DDS–4 tape drive and 3480 XCERTA tape drive (daisy chained);

(f) laptop.

(2) Software Overview. The ESSP contains the Sun Solaris 9 operating system.

f. FE Switch EAI LAN. The EAI LAN provides the communications path needed by CP to interface with Host, DSR, WARP, and CPSVs at other ARTCCs.

The network used by the EAI LAN is a Switched FE (IEEE 802.3u) 100 Mbit/sec 100BASE–TX, copper network. Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol is used. A full duplex point-to-point interface, 100Mbit/sec send data and 100Mbit/sec receive data is also used. In full duplex mode, collisions are avoided.

There are two independent redundant Switched FE networks comprising the EAI LAN. Each EAI processor will have a separate port connection to the redundant Switched FE networks. This connection is made with a Network Interface Controller (NIC); each NIC will have its own Internet Protocol (IP) address.

One of the redundant switched FE networks will be designated primary LAN (the lowest numbered Ethernet interface), the other secondary LAN.

In general, EAI communication (data, commands, status) will be sent on both Switched FE networks. DSR/EAI processors use DSR LCN multicast communications, and the Commercial-Off-the-Shelf (COTS) hardware (router, FE switches) use Simple Network Manager Protocol/User Datagram Protocol (SNMP/UDP) communications.

There are two cases where a single send will be used, CP-to-CP Interfacility communications, and Point-to-Point Host to/from CP communications. These two use Transmission Control Protocol (TCP)/IP.

A TCP session connection will be established for each of the processor NICs for sessions across the two independent redundant LAN networks. In case of a TCP connection failure on one

LAN the TCP connection would already be established on the redundant LAN. Thus TCP reconnection time would be saved in case of TCP connection failures.

Although TCP connections are established across both redundant LANs data is only sent across one LAN. The primary LAN is the preferred LAN for sending and receiving data.

(1) Hardware Overview. The FE switch consists of a Cisco Catalyst 4006 Supervisor Engine III, 48 port 10/100 megabits per second (Mbps) Ethernet RJ–45 (nine ports used), SNMP, five hot swappable switching modules, three power supply bays (two used), 512 kb non-volatile RAM (NVRAM), and 256 Mb Synchronous Dynamic Random Access Memory (SDRAM).

The EAI LAN FE switch has the following interfaces:

(a) J1 DB9 laptop;

(b) J2 RJ–45 HGW1;

(c) J3 RJ–45 HGW2;

(d) J4 RJ–45 CPSV1 (operational);

(e) J5 RJ–45 CPSV2 (warm standby);

(f) J6 RJ–45 EDIS;

(g) J7 RJ–45 DSGW1;

(h) J8 RJ–45 DSGW2;

(i) J9 RJ–45 router.

(2) EAI LAN Communications Software Overview. The FE switch runs under the Cisco IOS software (S/W) operating system. The EAI LAN provides the CP portion of the required hardware and infrastructure communications software to support the following four interfaces:

(a) D-controller interface provides the D-controller the CP views, and allows communications between the D-controller and CP.

(b) EAI/CP Host interface provides a separate interface to Host from the Local Interface Unit (LIU)/Host interface. This allows CP to receive Host data. Host time is received on this interface but is not used. The time DSR receives from Host is used.

(c) CP WARP interface provides the WARP interface, which allows CP to receive grid-based wind and temperature data at 37 isobaric levels and surface pressure at sea level for use in trajectory modeling and display.

(d) External Facility interface provides the interface to other ARTCCs via BWM for exchange of data between CPs. This allows for conflict probing beyond ARTCC boundaries.

g. DSR Gateway (DSGW) Processors. The redundant DSGW processors provide the CP interface to DSR. The DSGWs manage message exchange between CP and the D-consoles to support CP display views and commands, between CP and DSR SAR/HAL processors for CP

SAR data. The DSGW provides the interface to the M&C–H processors for sending CP M&C status and performance data, and for receiving M&C–H commands to CP.

(1) Hardware Overview. The DSGW processor consists of a Sun Microsystems F280R, 1x900 MHz processor, one 4–port FE adapter, two Token Ring adapters, 2 GB DRAM, 1 GB memory expansion (4x256 MB) and one 36 GB hard drive (hot swappable).

The DSGW has the following interfaces:

(a) FE connection to FE Switch 1 provides CP data to DSGW;

(b) FE connection to FE Switch 2 provides CP data to DSGW;

(c) Token Ring interface to DSR LCN P ring provides CP data to D-console. Provides D-console inputs to CP processor;

(d) Token Ring interface to DSR LCN S ring provides CP data to D-console. Provides D-console inputs to CP processor.

(2) Software Overview. The DSGW runs the Sun Solaris 9 operating system and contains two CP applications:

(a) Operational System Management Data Transfer (SMDT). There is a component of the SMGT that is executed in the DSGW. This component SMDT acts as a middle manager for EAI/LAN components. SMDT formats and forwards EAI/LAN status and performance data to the M&C–H. SNMP is used by SMDT to gather status and performance data on the ring concentrators and the router. SMDT formats and forwards this data to the M&C–H. EAI LAN HAL/SAR data is formatted and forwarded to DSR by SMDT. M&C–H commands to EAI LAN components are formatted and forwarded by SMDT. SMDT maintains backup data capability for restoration of function following failure of the primary software. This avoids loss of data during recovery.

(b) Conflict Probe Data Transfer (CPDT). CPDS has a component (CPDT) resident in the DSGW that manages CP data and commands. This allows for the two-way communications between CP and the D-consoles. CPDT maintains data backup capability for restoration of function following failure of the primary software. This avoids loss of data during failure recovery.

2–13. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS).

The ERIDS is a browser-based information display system providing electronic access to FAA data within the ARTCC, including facility information, aeronautical data, and ATC documentation. This data is currently available only in paper form or on computers that are not located in the controllers' primary work area. ERIDS offers a method to disseminate facility and NAS-wide information to local sector positions without relying on manual methods such as pen and paper. In addition to the cyclic update capability of national data products, ERIDS also provides individual centers the flexibility to integrate local data products into the system. ERIDS uses a direct interface to the FAA Telecommunications Infrastructure (FTI), which is the medium through which Notices to Airman (NOTAM) are received from the NOTAM Distribution System (NDS).

As shown in Figure 2–8, ERIDS Block Diagram, ERIDS consists of the following equipment:

- control room touch screens and display processors;
- system M&C Workstations;
- support workstations;
- routers;
- Ethernet switches;
- printers;
- scanner;
- load balancers;
- tape drive;
- Rosetta Stone RS–432/RS–232 converter;
- network attached storage disc array;
- database servers;
- application servers.

a. Control Room Touch Screens and Display Processors. Controller DSR positions are equipped with 15–inch flat panel touch screen displays on single or double extension articulating arms mounted onto the front frame of the DSR console. Small format PCs are mounted on a custom made chassis in the rear of the DSR console.

(1) Hardware Overview. The DSR Console workstation is an IBM ThinkCentre M51/M55 computer with the following features:

- 3.0 Gigahertz (GHz) Pentium processor;
- 4 GB maximum memory;
- 40 GB DASD;
- Gigabit Ethernet interface that connects the workstation to the internal LAN;
- Datalux 15–inch touch screen Liquid Crystal Display (LCD) display configured for message request and output display.

(2) Software Overview. The DSR Console workstation contains the following features:

- Windows XP;
- Internet Explorer;
- Pivot;
- MicroTouch;

- Adobe Acrobat Reader;
- SNMP CIAgent;
- Symantec AntiVirus;
- Symantec Ghost Client.

Controller requests for information are processed by the Internet Explorer and relayed to Apache Web Server software in the application servers via the LAN. Adobe Reader displays the returned Portable Document Format (PDF) files. SNMP CIAgent provides processor status to the Openview software in the M&C server.

b. System Monitoring and Control Workstations. The System M&C cluster consists of three pairs of workstations – the M&C workstation, the Unix workstation and the Windows Administration workstation.

(1) Hardware Overview.

(a) The UNIX workstations are Sun Blade 150 workstations with the following features:

- 550 MHz processor;
- 1.5 GB RAM;
- 2 80 GB hard disk drives;
- 10/100/1000 BaseT Ethernet interface;
- Samsung 21.3–inch LCD monitor.

(b) Windows Administration positions are equipped with IBM IntelliStation M Pro Windows workstations with the following features:

- Intel Pentium 3.4 GHz processor;
- 2 GB RAM;
- IBM ServeRAID–7t S–ATA controller;
- Adaptec SATA controller (SA1210) ;
- Two 250 GB 7200 Revolutions per Minute (RPM) SATA hard disk drives;
- Digital Video Disk/Read/Write (DVD/RW);
- Samsung 21.3–inch LCD monitor, keyboard, and mouse.

(c) The M&C workstations are IBM ThinkCentre M51/M55 small form factor computers with Intel Pentium processors, each equipped with a Samsung 21.3–inch LCD monitor and a pair of speakers.

Each of the workstations has a single Ethernet interface to the LAN.

(2) Software Overview.

(a) The UNIX maintenance workstations aid in maintaining the rack-mounted Unix-based servers. They provide database maintenance (loading 28/56 day cycle updates). The following software is loaded onto the processors for performing these tasks:

- Hewlett Packard (HP) Jetadmin;
- Mozilla;
- Firefox;
- OpenOffice;
- Solaris Unix OS software.

(b) The Windows Administration workstations are used to administrate the Windows-based client PCs. While they are classified as workstations, they will function as servers, primarily for imaging all other Windows-based clients (all UNIX-based clients are excluded), file updates, activation/deactivation, etc. The following software is loaded onto the processors for performing these tasks:

- Adobe Acrobat Reader;
- M&C SNMP scripts;
- Microsoft Internet Explorer ;
- Microsoft Paint;
- Plug-in Graphical Identification aNd Authentication (pGINA);
- SNMP CIAgent suite ;
- Symantec AntiVirus;
- Veritas NetBackup Client;
- Windows XP;
- Microsoft Office Professional.

(c) The M&C workstations are used for monitoring and controlling ERIDS. They will interface with the M&C servers via X–Windows terminal emulation software to access Openview. Hence, the screens will appear just like the server's console. The following software is resident to allow the M&C Workstation to perform its intended function:

- Symantec Ghost Client;
- Adobe Acrobat Reader;
- M&C SNMP scripts;
- Microsoft Internet Explorer ;
- Microsoft Paint;

- pGINA;
- SNMP;
- CIAgent;
- Reflections;
- X–Windows suite;
- Symantec AntiVirus;
- Veritas NetBackup Client;
- Windows XP to allow the M&C workstation to perform its intended function.

c. Support Locations. Support locations workstations will be located in offices, primarily in the administrative wing and used by Air Traffic Procedures (520/530) personnel to input and maintain local center data.

(1) Hardware Overview. The 520/530 workstation is an IBM ThinkCentre M51 small form factor computer with Intel Pentium processor, and equipped with a Samsung 17–inch LCD monitor, a pair of speakers, keyboard, mouse, and Digital Video Disk (DVD)/Read/Write (RW) (DVD/RW) drive. One designated workstation will be configured with an HP scanner. Each workstation has a single Ethernet interface for connection to the LAN.

(2) Software Overview. The following software is loaded on the support workstation PCs:

- Adobe Acrobat Professional;
- Symantec Ghost Client;
- Adobe Acrobat Reader;
- M&C SNMP scripts;
- Microsoft Internet Explorer;
- Microsoft Paint;
- GINA;
- SNMP;
- CIAgent;
- Reflections X–Windows suite;
- Symantec AntiVirus;
- Windows XP;
- HP 8250 Scanner software.

In addition, Microsoft Office Professional is resident on the PC.

d. Routers. Two redundant Cisco routers provide the interface to the NDS via FTI for the receiving of NOTAMs.

(1) Hardware Overview. The router is a Cisco 2821 and features two 10/100/1000 Ethernet interfaces, one 4–port 10/100 Ethernet interface card, 64 MB Flash memory and 256 MB of RAM. The router has one external interface to the FTI node at the ARTCC.

(2) Software Overview. Cisco 2821 routers support Cisco IOS software. The router software is responsible for protocol conversion from the internal LAN to the FTI network. Security features implemented in the router prevent unauthorized access.

e. Ethernet Switches. Three sets of Cisco switches provide the ERIDS network infrastructure. Two redundant Cisco 3750G switches link the application servers, the database server and the Network Attached Storage Disk Array (NASDA) over the gigabit network. Two redundant Cisco 3750 switches provide a 100 megabit backbone network connecting the servers, the Coyote Point Load Balancer, routers and the switches connected to the workstations. A series of Cisco Catalyst 2950 switches connect the individual workstations to the backbone network.

(1) Hardware Overview.

(a) Cisco Catalyst 3750G–24T–E switch — 24 Ethernet 10/100/1000 ports, 32 Gbps, high-speed stacking bus, full dynamic IP routing

(b) Cisco Catalyst 3750 – 24 port (backbone) switch — 24 Ethernet 10/100 ports, 32 Gbps, high-speed stacking bus, full dynamic IP routing

(c) Cisco Catalyst 2950T 24 switch — 24 Ethernet 10/100 ports and 2 1000BaseT ports

(d) Cisco Catalyst 2950C 24 switch — 24 Ethernet 10/100 ports and 2 1000Base FX ports

(2) Software Overview. Cisco IOS commercial software resides in the switches and classifies and prioritizes incoming data from the network. After the packet goes through classification, policing, and marking, it is then assigned to the appropriate queue before exiting the switch.

f. Printers. An HP 2430LN LaserJet black and white printer is attached to the network for the use of M&C operators. It is attached to the network by a single Ethernet connection.

A Lexmark C510n Color LaserJet printer is connected to the network for the use of the 520/530 operators. It is attached to the network by a single Ethernet connection.

g. Load Balancers. Two Coyote Point Equalizer E350si load balancers monitor the work being performed by the application servers and allocate new tasks to the server with the lightest task load. The load balancer will automatically shift the processing load to a single application server in the event that one of the two fails. Each is attached to the network by a single Ethernet connection.

h. Network Attached Storage Disk Array (NASDA). A Network Appliance (NetApp) Fabric Attached Storage (FAS) 270C Storage Disk Array (SDA) is mounted in the server rack. This device contains fourteen 10,000 revolutions per minute (RPM) 72 GB hard disk drives. It is used to provide fast access data storage for the system. This unit has redundant hot swappable power supplies, controller heads, and disk drives. In ERIDS the FAS 270C is configured to have two sets of seven drives each, with each set capable of continuing to supply data even if two of its seven hard disk drives fail at the same time. ERIDS data sets, both that set maintained through the Oracle database and that set maintained in documents files, are stored on the FAS 270C.

i. Monitor & Control Servers. Two Sun V210 computers are configured as M&C servers to provide M&C functionality to the SOC.

(1) Hardware Overview. Each Sun Fire V210 server consists of a 1.06 GHz processor, 2 GB RAM, a CPU, and 2x73 GB drives. Each is connected to the backbone network and the gigabit network by a dual Ethernet connection. There is a single RS–232 external interface to the ARTCC's Coded Time Source (CTS).

(2) Software Overview. The HP Open View Network Node Manager, Solaris, SMUX for Solaris, and CIAgent commercial software are all resident on the processor, and allow the server to monitor system status and control the states of the individual processors.

j. Database Servers. Two Sun V240 computers are used as database servers to store and manage the data sets.

(1) Hardware Overview. Each Sun Fire V240 server consists of two 1.28 GHz processors, 2 GB RAM, and 2x73 GB drives. Each is connected to the backbone network and the gigabit network by a dual Ethernet connection.

(2) Software Overview. Oracle Enterprise Manager and Solaris are resident on the processors. The database servers use the Oracle Relational Database Management System (RDBMS) software package and Oracle Real Application Cluster (RAC) software. The data is stored on the network storage device. When an operator requests data stored in the database, the request is passed from the Apache software on the application servers to the database software on the database servers, one of which then returns the data to the application servers to be forwarded to the browser software on the PC.

k. Application Servers. Two Sun V240 computers are used as application servers to operate the display software.

(1) Hardware Overview. Each Sun Fire V240 server consists of two 1.28 GHz processors, 2 GB RAM, and 2x73 GB drives. Each is connected to the backbone network and the gigabit network by a dual Ethernet connection.

(2) Software Overview. Solaris, Ultraseek, ColdFusion MX, Jetadmin, Apache, Firefox, and Perl software packages are resident on the server. Primarily, they run the Apache Web hosting software that the browser software on the PC uses to acquire the information to be displayed, and Cold Fusion, which is used in creating documents to be added to the available ERIDS document sets. The application servers share the processing workload between them but are configured such that if one fails, the other will assume the entire load. The application servers provide the Web pages requested by system users and also store documents that have been published in Hypertext Markup Language (HTML) (Web) format and Adobe PDF files. When a request for a document is received from an ERIDS workstation, the Ultraseek software on an application server fetches the document from the network storage device and feeds it to the workstation.

l. Quantum SuperDLT (SDLT) 600 SuperLoader3 Tape Backup Unit. A Quantum SDLT 600 SuperLoader3 mounted in the server rack provides backup capability for the system. Tape backups are made daily beginning at midnight. The tape drive contains two magazines, each capable of holding eight SDLT tape cartridges or cleaning cartridges. The SDLT tape cartridges provide a storage capacity of up to 300 GB (native) per cartridge in the SDLT 600.

m. Rosetta Stone Adapter. The Rosetta Stone adapter converts the RS–422 connection from the CTS device to RS–232 for connection to ERIDS devices. There are two independent CTS lines, each with it's own converter. One RS–232 serial CTS line connects to each of the two M&C servers.

n. HP Scanner. An HP 8250 auto feed color ScanJet scanner is interfaced via the Universal Serial Bus (USB) port on one of the support workstations to allow the site to input information only existing in paper form.

2–14. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SUBSYSTEM.

The ECG subsystem is shown in Figure 2–9, En Route Communications Gateway (ECG) Subsystem. The ECG replaces the Peripheral Adapter Module Replacement Item (PAMRI) subsystem, and consists of the following major equipment:

- Primary Interface Processors (PIP);
- Backup Interface Processors (BIP);
- ECG Modem Splitters;
- Maintenance Workstation (MWS);
- Support Workstation (SWS);
- LAN switches and ECG LANs;
- LAN routers;
- LAN terminal servers.

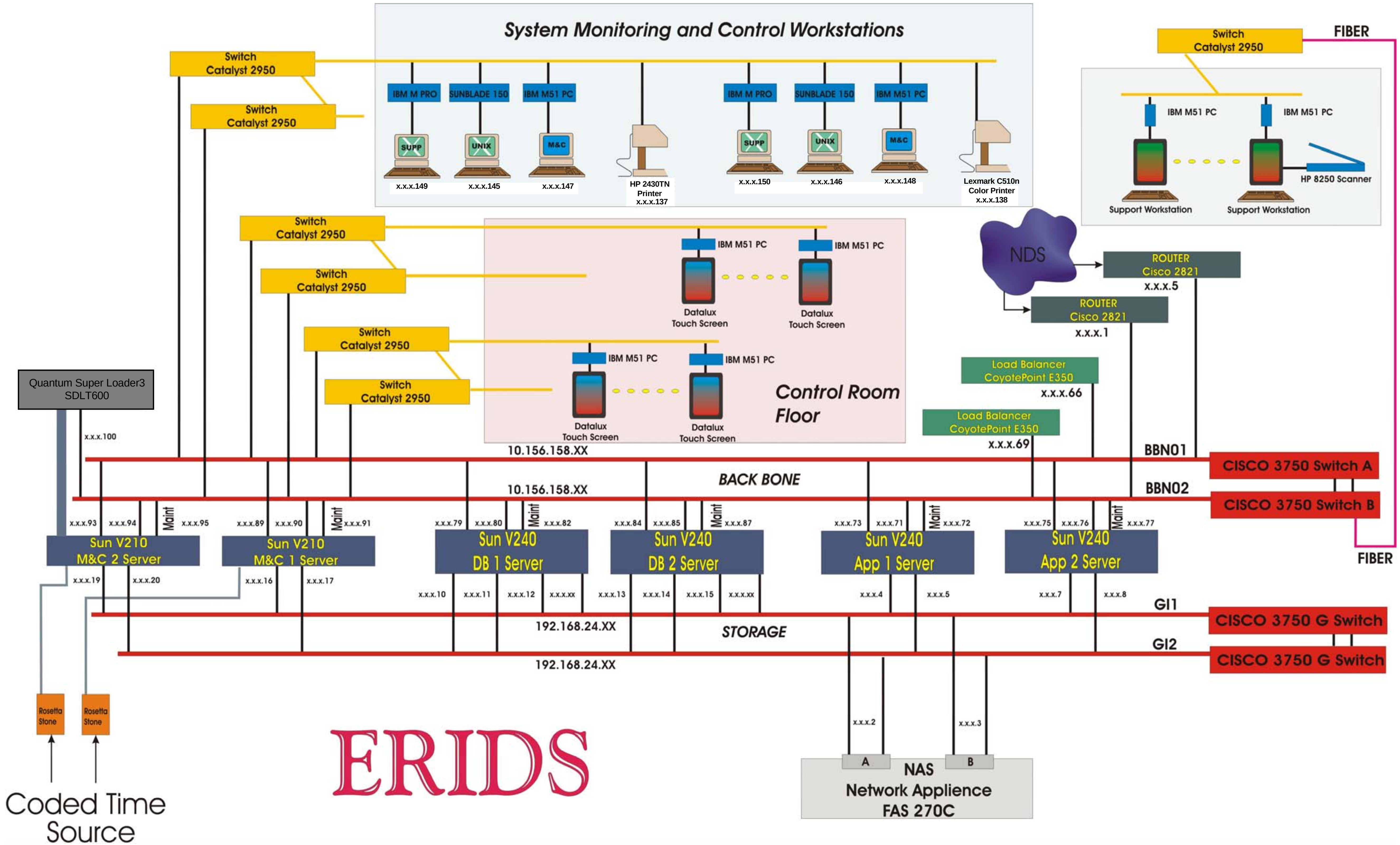

FIGURE 2–8. ERIDS BLOCK DIAGRAM

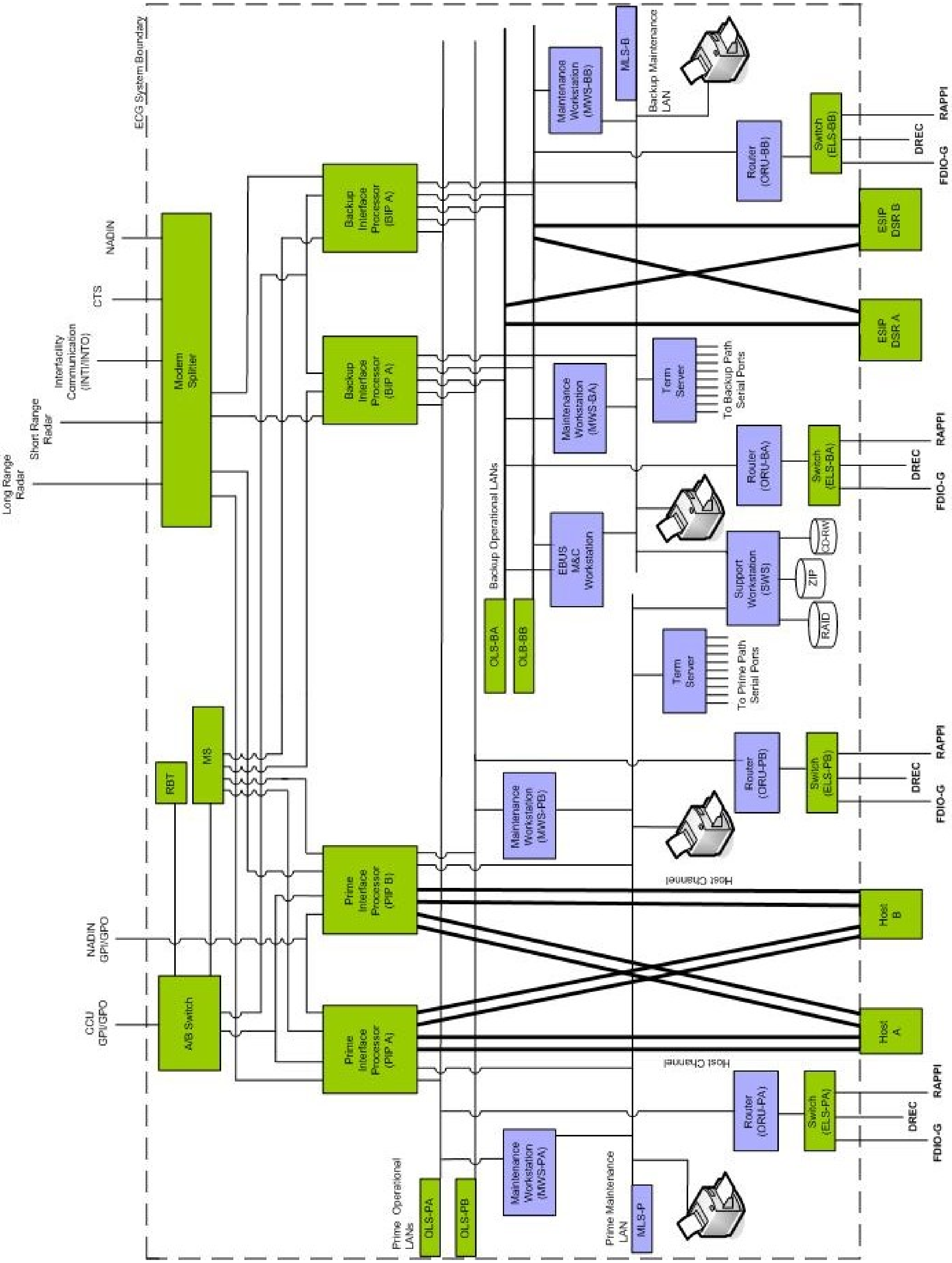

FIGURE 2–9. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SUBSYSTEM

a. Primary Interface Processors (PIP).

(1) Hardware Overview. The PIP processor is a Sun Microsystems 280R 2x900 MHz processor. Each PIP is connected to the Host through byte multiplex channels. The PIP has the following external interfaces:

(a) Host System 390 interface adapter connection to CCCH #1, ChpIDs 91 and 94 provides Host data to/from PIP A;

(b) Host System 390 interface adapter connection to CCCH #2, ChpIDs 91 and 94 provides Host data to/from PIP A;

(c) Host System 390 interface adapter connection to CCCH #1, ChpIDs BD and E8 provides Host data to/from PIP B;

(d) Host System 390 interface adapter connection to CCCH #2, ChpIDs BD and E8 provides Host data to/from PIP B;

(e) IP interface adapter Ethernet connection to the ECG BIP External LAN Switch (ELS) provides for surveillance data transfer to the Random Access Plan Position Indicator (RAPPI) processors, National Defense Program (NDP), and flight plan data transfer via the Flight Data Input Output Gateway (FDIO–G). For specifics of the FDIO–G system, reference Order JO 6130.3;

(f) serial interface adapter connection to interfacility devices;

(g) serial interface RS–422 adapter connection to CTS equipment provides coded time data for input to the Host;

(h) serial interface RS–232 adapter connection to CTS equipment provides for input of standard time to PIP processor;

(i) parallel interface adapter connection to various parallel input and/or output devices;

(j) IP interface adapter Ethernet connection to the ECG PIP ELS provides for surveillance data transfer to the RAPPI processors, NDP, and flight plan data transfer via the FDIO–G. For specifics of the FDIO–G system, reference Order JO 6130.3.

(2) Software Overview. The PIP has only one application: the ECG communication and surveillance interface software. This software provides the capabilities necessary to exchange surveillance and flight data between the Host and the radar, interfacilities and local devices for AT operations.

b. Backup Interface Processors (BIP).

(1) Hardware Overview. The BIP processor is a Sun Microsystems 280R 2x900 MHz processor. The BIP has the following external interfaces:

(a) serial interface adapter connection to radar input channels;

(b) serial interface RS–232 adapter connection to CTS equipment provides for input of standard time to BIP processor;

(c) IP interface adapter connection to the ECG (BIP) ELS provides for surveillance data transfer to the RAPPI processors and NDP.

(2) Software Overview. When the BIP is operating as ECG and ECG/DARC, it has four applications running.

(a) ECG communication interface software;

(b) ECG/DARC software;

(c) DARC Radar Ethernet Converter (DREC) software application;

(d) Weather Message Switching Unit (WMSU) software application.

The ECG software provides the capabilities necessary to exchange surveillance data between the ECG/DARC and the radar, for AT operations. The ECG/DARC software provides the capabilities necessary to provide DSR with the same display data as the original DARC. The DREC software provides the capabilities to provide the radar date, stripped of weather information, to the NDP via ECG format IP. The WMSU software provides the capabilities to provide altimeter date to the ECG/DARC software.

c. ECG Modem Splitters.

(1) Hardware Overview. A Sunhillo 8–port modem splitter replicates and re-drives the input of serial data from radar, CTS, and interfacility interfaces. The ECG modem splitter provides:

(a) RS–232 and RS–422 connectivity;

(b) up to 56 Kbps capability;

(c) dual power source;

(d) one switchable RS–232/RS–422 input port;

(e) RS–232/RS–422 monitor port;

(f) four bi-directional RS–422 ports;

(g) two switchable RS–232/RS–422 output only ports.

(2) Software Overview. There is no software in the ECG modem splitters.

d. ECG Maintenance Workstation (MWS).

(1) Hardware Overview. The MWS processor is a Sun Blade 150 workstation 650 MHz UltraSPARC–IIi processor. The MWS has no external connections. The MWS is only connected to an ECG operational LAN and an ECG maintenance LAN.

(2) Software Overview.

Operational System Management (OSM)

e. ECG Support Workstation (SWS).

(1) Hardware Overview. The SWS processor is a Sun Blade 150 workstation 650 MHz UltraSPARC–IIi processor. The SWS has no external connections. The MWS is only connected to ECG maintenance LANs.

(2) Software Overview.

(a) Operational System Management (OSM)

(b) Local Adaptation Management (LADM)

(c) Offline Data Reduction (ODR)

f. ECG LANs and ECG LAN Switches. The ECG LAN is a 10/100 Mbps Ethernet LAN that provides the communications paths needed by the ECG system for the RAPPI, for maintenance of the ECG, and for future connectivity. There are four separate operational LANs and two maintenance LANs. Each of the four ECG processors uses it's own operational LAN. All data transferred across the ECG LAN will be in ECG protocol (ECGP). ECGP uses TCP and UDP transport protocols to transmit data across the LANs.

(1) Hardware Overview.

(a) The Cisco model Catalyst 2950T switch provides:

- Layer–2 OSI protocols
- 24 dedicated 10/100 (Ethernet/Fast Ethernet) autosensing ports
- 8.8 Gbps backplane switching capacity
- non-blocking
- Cisco Visual Switch Manager software (part of IOS)
- two built-in gigabit Ethernet ports
- SNMP support
- Network Time Protocol (NTP) support
- multi-function Light Emitting Diode (LED) per each port.

1 The following maps the switch port usage for the Operational LAN (OLS) –PA switch:

- Port–3 — PIP A
- Port–5 — MWS PA
- Port–13 — Operational Router (ORU) PA
- Console port — Primary Maintenance LAN Terminal server.

2 The following maps the switch port usage for the OLS–PB switch:

- Port–4 — PIP B
- Port–6 — MWS PB
- Port–14 — ORU PB
- Console port — Primary Maintenance LAN Terminal server.

3 The following maps the switch port usage for the OLS–BA switch:

- Port–5 — MWS BA
- Port–7 — BIP A
- Port–13 — ORU BA
- Console port — Backup Maintenance LAN Terminal server.

4 The following maps the switch port usage for the OLS–BB switch:

- Port–6 — MWS BB
- Port–8 — BIP B
- Port–14 — ORU BB
- Console port — Backup Maintenance LAN Terminal server.

(b) The Cisco model Catalyst 2960 switch provides:

- Layer–2 OSI protocols
- 24 dedicated 10/100 (Ethernet/Fast Ethernet) auto sensing ports
- 8.8 Gbps backplane switching capacity
- non-blocking
- Cisco Visual Switch Manager software (part of IOS)
- two built-in gigabit Ethernet ports
- SNMP support
- NTP support
- multi-function LED per each port.

1 The following maps the switch port usage for the ELS–PA switch:

- Port–1 — RAPPI 1
- Port–2 — RAPPI 2

- Port–3 — ELS BA (DREC FEED)
- Port–5 — FDIO A (FDIO 1/FRDA)
- Port–6 — FDIO B (FDIO 2/FRDB)
- Port–7 — FDIO R (FDIO 3/RSR)
- Port–24 — ORU PA 1/1
- ELS–PA Console Port — Terminal Server A.

2 The following maps the switch port usage for the ELS–PB switch:

- Port–1 — RAPPI 1
- Port–2 — RAPPI 2
- Port–3 — ELS BB (DREC FEED)
- Port–4 — ELS PA (DREC FEED)
- Port–5 — FDIO A (FDIO 1/FRDA)
- Port–6 — FDIO B (FDIO 2/FRDB)
- Port–7 — FDIO R A/B Switch (FDIO 3/RSR)
- Port–24 — ORU PB 1/1
- ELS–PB Console Port — Terminal Server A.

3 The following maps the switch port usage for the ELS–BA switch:

- Port–1 — RAPPI 1
- Port–2 — RAPPI 2
- Port–3 — DREC (FTI)
- Port–4 — ELS PB (DREC FEED)
- Port–5 — FDIO A (FDIO 1/FRDA)
- Port–6 — FDIO B (FDIO 2/FRDB)
- Port–7 — FDIO R A/B Switch (FDIO 3/RSR)
- Port–24 — ORU BA 1/1.
- ELS–BA Console Port — Terminal Server B

4 The following maps the switch port usage for the ELS–BB switch:

- Port–1 — RAPPI 1
- Port–2 — RAPPI 2

- Port–3 — DREC (FTI)
- Port–5 — FDIO A (FDIO 1/FRDA)
- Port–6 — FDIO B (FDIO 2/FRDB)
- Port–7 — FDIO R A/B Switch (FDIO 3/RSR)
- Port–24 — ORU BB 1/1
- ELS–BB Console Port — Terminal Server B.

(2) Software Overview. The software in the ECG LAN switches is the Cisco IOS for switches.

g. ECG LAN Routers.

(1) Hardware Overview. The Cisco model 3725 router provides:

(a) 100 Kbps throughput capacity;

(b) support for all major network interface types;

(c) memory configuration;

(d) front panel and rear panel LEDs;

(e) support for SNMP, NTP protocols;

(f) IP multicast support to LAN switches;

(g) Cisco firewall feature set.

(2) Software Overview. The software in the ECG routers is the Cisco IOS for routers. Access control policy for external IP interfaces is enforced using Cisco router firewall functionality. The firewall will provide both packet filtering based on access lists and connection-oriented checks to provide protection from flooding of data. The router is configured with the appropriate packet filtering firewall rules to deny all inbound traffic that is not explicitly permitted. At the time of ECG deployment, no inbound traffic to the ECG routers is anticipated. Firewall rules are configured to allow only communication to trusted IP addresses using specified communication protocols.

(a) TCP/IP suite;

(b) Routing Protocols support;

(c) security services;

(d) IP Multicast support;

(e) IP Address Management services.

h. ECG LAN Terminal Servers. The Avocent Terminal Server connects to the 10/100 Mbps Ethernet maintenance LANs and provides remote management of all network devices that have a console port. In ECG this includes all processors, routers, and switches.

(1) Hardware Overview. The Avocent Corporation CPS1610 is the ECG Terminal Server (TS), and it provides:

(a) connections to the 10/100 Mbps Ethernet LAN;

(b) 16 digital serial ports;

(c) operating code in firmware;

(d) remote management of all network devices with a console port;

(e) SNMP support.

(2) Software Overview. Not applicable.

2–15. EN ROUTE AUTOMATION SYSTEM (EAS).

a. Introduction. The EAS is a large-scale system based on a distributed architecture. This system provides automated services for the En Route domain with full functionality, and is the main component of the operational environment, providing Surveillance Data Processing (SDP), Flight Data Processing (FDP), General Information and Weather Processing (GPWXP), CP, and M&C capabilities. The relationship between subsystem elements and functions are shown in Figure 2–10, EAS Functional Relationships.

b. En Route Automation System. The EAS consists of two equivalent and fully redundant channels comprised of rack-mounted equipment plus the operational M&C equipment. The architecture is a dual channel design, with each channel designed as a mirror image of the other channel. Each channel is designed to operate independently from the other channel with the Data Sync processors supporting synchronization between the two channels. Within each channel, there is full redundancy of all critical resources. Any failure of a critical resource automatically causes a switchover to the redundant resource within the same channel. The EAS consists of the following operational major elements:

- processors;
- workstations;
- switches;
- router firewall;
- printers;
- displays;
- power supply elements;
- servers.

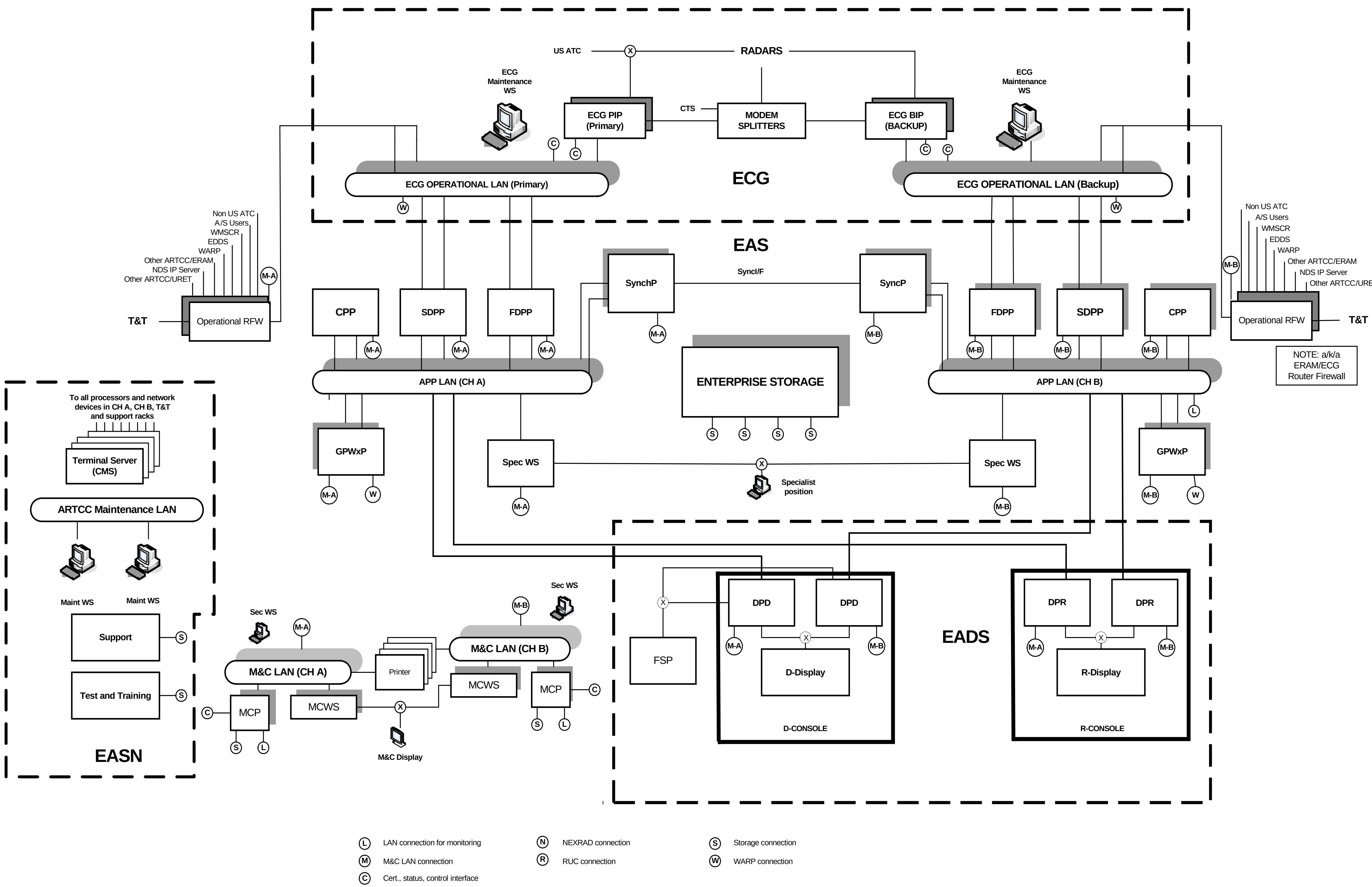

FIGURE 2–10. EAS FUNCTIONAL RELATIONSHIPS

(1) EAS Processors. The EAS processors are an element of the ATC hardware architecture that are rack-mounted IBM p55++ 55A and IBM p55++ 52A processors. These processors are mission critical, directly supporting AT operations as well as supporting the M&C operations. The processors are defined as follows:

(a) Surveillance Data Processors (SDP). The SDPs consist of four P55A rack-mounted processors (two for each channel). Their purpose is to provide target and track processing, Real-Time Quality Control (RTQC) and surveillance source monitoring, radar weather processing, and safety functions.

(b) Flight Data Processors (FDP). The FDPs consist of four P55A rack-mounted processors (two for each channel). Their purpose is to provide air route traffic management and airspace definition, airspace to sector position allocation, flight plan processing, route conversion and trajectory modeling, flight object data management, track to flight plan pairing, beacon code allocation, and track conformance monitoring.

(c) Conflict Probe Processors (CPP). The CPPs consist of four P55A rack-mounted processors (two for each channel). Their purpose is to provide conflict probe and trial plan processing, trial request processing, and strategic alert and trial plan notification.

(d) Synchronization Processors (SYNCP). The SYNCPs consist of four P55A rack-mounted processors (two for each channel). Their purpose is to conduct program state data communications between active channel applications and their corresponding backup channel, and enable switching operations to backup channels without disruption.

(e) General Information and Weather Processors (GPWXP). The GPWXP consists of four P52A rack-mounted processors (two for each channel). Their purpose is to update and distribute NOTAM data, update and distribute General Information (GI) messages, and provide weather data functions.

(f) Monitor and Control Processors (MCP). The MCP consists of four operational P55A rack-mounted processors, (two for each channel). Their purpose is to provide data recording and storage, ATC login, system release distribution, and simulation engine functions.

(2) EAS Workstations. The EAS workstations (WS) are another element of the ATC hardware architecture as well as an element of the M&C architecture. These workstations include IBM p5 52A and IBM IntelliStation M Pro 6218 processors and are defined as follows:

(a) AT Specialist WS. This workstation consists of an AIX-based P5 52A processor, and supports AT supervisors, area managers, flight data specialists, traffic management specialists, military specialists and the SOC Airway Transportation System Specialist (ATSS).

(b) M&C WS. This workstation consists of two AIX based P5 52A processors, and serves as the primary user-interface for system monitoring and control functions.

(c) Security WS. This workstation consists of two Windows-based M Pro 6218 processors, one for each channel, and is used to manage perimeter security and to perform analysis and correction of security problems.

(3) EAS Switches. The EAS switches make up the data communication architecture in the EAS, and consist of three redundant LANs that provide the switching capability for peripherals between active and backup channels, and redundant switching capability to the Enterprise Storage (ES).

(a) The Application LAN (APPLAN) switch consists of rack-mounted Cisco Catalyst 4506/4006 switches that are 100 base-T standard compatible and provide a 100 Mbs signaling rate. This LAN conducts communication among all ATC application servers and display processors. Each node on the LAN is dual-attached, and provides automatic recovery from any single failure or many dual failures.

(b) The M&C LAN (M&C LAN) switch consists of rack-mounted Cisco Catalyst 4506 switches that are 100 base-T standard compatible and provide a 100 Mbs signaling rate. This LAN separates ATC from M&C data communications, connects to each processor in the operational environment, collects status data, and sends control directives from the M&C workstation to the processors. It is used for SAR recording and software release distribution, and connects to the ECG LAN to allow monitoring of the router firewall and Intrusion Detection System (IDS) on the ECG LAN.

(c) The Console Maintenance Switch (CMS) consists of a rack-mounted Western Telematic Inc. CMS–32 Console Maintenance Switch. The CMS functions as the ARTCC maintenance terminal server by providing the maintenance workstation connectivity to all rack-mounted devices. As a result, the CMS is part of the EAS and EASN contained in the operational, support, and T&T racks.

(d) The SAN switch, located in an operational rack, consists of a rack-mounted IBM Total Storage 2109 SAN32B–2 switch. The SAN switch provides a fiber channel switch between the ES servers and connected processors.

(e) Keyboard Video Monitor (KVM) switches are used in workstations with dual processors, one for channel A and one for channel B, to switch connected devices, such as the workstation display, keyboard, audio, and mouse, between the two processors. Two types of StarTech KVM switches are used; one for low resolution graphics and one for high. The StarTech SV21LR KVM switch is used with the low resolution (1280k x 1024k) displays in the AT Specialist WS. The StarTech SV31HR KVM switch is used with the high resolution (2k x 2k) display in the M&C WS.

(4) EAS Router Firewall. The router firewall consists of a Cisco 3825 router used for communications with external facilities. This router houses the firewall and intrusion detection used as perimeter security mechanisms.

(5) EAS Printer. The EAS printer used in the operational environment consists of four IBM InfoPrint 1654 color laser printers used to support printing of M&C and AT Specialist reports. Each printer is dual attached via an Ethernet interface to both the channel A and B

M&C LANs. Two printers are dual attached to channel A M&C LAN 1 and channel B M&C LAN 1. The other two printers are dual attached to channel A M&C LAN 2 and channel B M&C LAN 2.

(6) Displays. EAS, in the operational environment, uses three different displays: the Flat Panel Main Display Monitor (FPMDM) Barco ISIS MDP 471, the FPD19 NEC MultiSync LCD 1970NX Flat Panel display, and the FPD20 NEC MultiSync LCD 2070NX Flat Panel display. These displays are used in the workstations as follows:

(a) The AT Specialist WS uses the 19–inch flat panel display, FPD19.

(b) The M&C WS consists of two different configurations. The M&C – R workstation uses two displays, the FPMDM Barco 28–inch x 28–inch display and an upper 20–inch FPD20 flat panel display; and the M&C – D workstation uses just the 19–inch FPD19 flat panel display.

(c) The Security WS uses the 19–inch flat panel display, FPD19.

(7) Power Supply Elements. The power supply elements consist of the following:

(a) Power Sequencer. The power sequencer is a Spectrum Control AC SMARTstart Jr. Power Sequencer and is used as the Power Distribution Unit (PDU) in each rack, distributing AC power to the attached devices sequentially.

(b) PDU. The PDU is a Pulizzi Z–Line T982B2, and is used in certain racks.

(c) Uninterruptible Power Supply (UPS). The UPS is an Eaton Powerware 9125 with an Extended Battery Module (EBM). The power supply is located at the top of the unit, and the EBM is at the bottom of the unit.

(8) Servers. EAS uses two types of servers, the Enterprise Storage (ES) server and the Print server.

(a) The ES server consists of two rack-mounted IBM DS4700 servers interfacing via SAN switches to all connected processors. The storage servers are 2 Gbps high performance storage servers and are located in the operational racks but are used by all environments. ES is the centralized disk storage facility providing two terabytes (TB) of storage.

(b) The Print server consists of the Lexmark N7000e and is used for network printing support for the IBM 1654 Color Laser printer. This print server provides the dual attach feature for each 1654 Color Laser printer via Ethernet to both M&C LANs.

2–16. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS).

a. Introduction. The EADS is a subsystem of the EAS, and the display system that presents air traffic situation information to the controllers. EADS consists of the R-, D-, and A-positions that make up the ATC consoles. The R-position is essentially the same as its predecessor, providing the radar display, while the D- and D/A-positions are essentially the same as their predecessor, supporting electronic flight data and CP. The relationship between subsystem elements and functions is shown in figure 2–10.

b. En Route Automation Display System. The EADS consists of the R-, D-, and A-positions. The major assemblies are the channel A and channel B processors, FPMDM, KVM switch, FSP, and the D- and A-position monitors. Additional equipment, such as keyboards, trackballs, keypads and power supplies also make up the EADS. The EADS consists of the following elements:

- display processors;
- switches;
- printer;
- displays;
- power supplies (including PDUs and UPS);
- peripherals (including keyboards, trackballs, and keypad).

(1) Display Processors. The display processors provide the link to EAS through two active, and also redundant, Ethernet channels. The display processors are used in the R-, D- and D/A-positions and consist of two models: the IBM p615 and the IBM P5++ 52a.

(a) R-console. The R-console consists of two P5++ 52a display processors (one for each channel).

(b) D-, D/A-console. The D-, D/A-console consists of two processors (one for each channel): the IBM p615 processor is used on channel A and the IBM P5++52a processor is used on channel B.

(2) Switches. The EADS switches consist of two model KVM switches. The first model is the StarTech SV31HR (KVMHR), and it is used in the R-console to support the FPMDM using high-resolution video connections. The second model is the StarTech SV21LR (KVMLR), and it is used in the D-console for low-resolution video connections. Both of these KVM switches enable the switching between the display processors, provide additional USB ports, substitute for the mouse eliminator, and provide power for the keyboards.

(3) Printer. The EADS printer is the FSP model BOCA Systems FSP 42. Located at the D-position, the FSP connects via the KVM switch (KVMLR) to receive flight strip data from both display processors.

(4) Displays. EADS uses two different displays. The R-console uses the FPMDM Barco ISIS MDP 471 display, and the D- and D/A-consoles use the FPD20 NEC MultiSync LCD2010NX Flat Panel display.

(a) The FPMDM is an Active Matrix Liquid Crystal Display (AMLCD) MDP 471 Flat Panel display. This display is mounted using an articulating arm, which allows the sector team to position the flat panel display for viewing from the adjacent D-position.

(b) The FPD20 NEC LCD2010X Flat Panel display is a later version of this type of flat panel display, and it has an integrated power supply. The display is mounted using an articulating arm, which allows the sector team to position the flat panel display for either one-person or two-person sector operation.

(5) Power Supply Elements. The power supply elements used at the ATC consoles are the following:

(a) PDU. The PDU is a Pulizzi Z–Line T982B2. Each ATC console contains one PDU that distributes AC power to the ATC console, FPMDM, display processors, UPS, printers, breakout box, and lighting. The major units of the ATC console operate directly from a 208V AC, 60 Hz power source. A PDU provides voltage step-up from 208V AC to 240V AC, filtering, and distribution of this voltage.

(b) UPS. The UPS is a Tripp-Lite Unison SU1000RT2UHLV. The D-position consoles in the operational environment include a UPS that keeps the D-position processor, keyboard, trackball, and display powered on for a minimum of 30 minutes in the event of a critical facility power failure.

(6) Peripherals. The peripherals associated with EADS consist of the following:

(a) Keyboards. The keyboards used are Cortron alphanumeric keyboards and consist of two styles, an R-position keyboard and a D/A-position keyboard. Each keyboard interfaces through the KVM switch via a bi-directional RS–422A asynchronous, 9600 baud, 8 bit, odd parity, with one start and one stop bit serial link to the active display processor.

(b) Trackballs. There are two different trackballs used, one for the R-position and one for the D-position.

1. Cursor Position Selection Device (CPSD). The CPSD is a free-rolling trackball with three independent pushbuttons, and serves as the primary cursor positioning and selection device for the R-console. The CPSD interfaces with the keyboard, which processes the inputs and converts the data for transmission to the KVM switch.

2. Trackball. The D-position trackball is a MicroSpeed, S-Trac trackball consisting of a free-rolling trackball and three independent pushbuttons. This trackball is used for the CP functions and interfaces through the KVM switch to the processor.

(c) Keypad. The keypad is a Cortron keypad, an input device connected to the R-position that provides the D-position controller the capability to change filter, range, and vector settings concurrent with functions being performed by the R-position controller.

2–17. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN).

a. Introduction. The EASN, a subsystem of the EAS, consists of two environments– the support environment and the T&T environment, which are completely isolated from the operational environment (EAS and EADS). The support environment is used by local system/software maintainers to receive national software releases, collect local adaptation, and to build local system releases for the ARTCC. In addition, problem determination tools are provided as part of the support environment. The T&T environment is used by AT personnel to train controllers, and by TOS personnel for training on equipment and testing capabilities needed to maintain the current system.

b. **En Route Automation Support Network.** The EASN is made up of two environments– the support environment and the T&T environment. Each environment is identified and separated in the racks, isolating EASN from the operational system. Therefore, the EASN is not used to control operational air traffic and certification of the system is not required.

(1) The support environment, shown in Figure 2–11, EASN Support Environment, is a single Fast Ethernet LAN connecting processors, workstations, and printers with a communications interface to the En Route System Support Complex (ESSC). The support environment consists of the following:

(a) Processors:

1. Data Reduction and Analysis (DRAP)

2. Enhanced Site Support (ESSP)

3. Support Test (STP)

(b) Workstations:

1. Playback WS (PBWS)

2. Support User WS (SUPWS) (maximum of 30)

3. Support M&C WS (SUPMCWS) (3 SUPWS used as SUPMCWS)

4. Support Security WS (SSEC)

5. Maintenance WS (MNTWS)

(c) Switches:

1. Support LAN (SUPLAN)

2. Maintenance Terminal switch (MTNLAN)

(d) Printers:

1. Support Printer (SUPPTR)

2. plotter

(e) Router:

Support Router Firewall (SUPRFW)

(f) Server:

System Management (SMS)

(g) Tape library (TAPELIB)

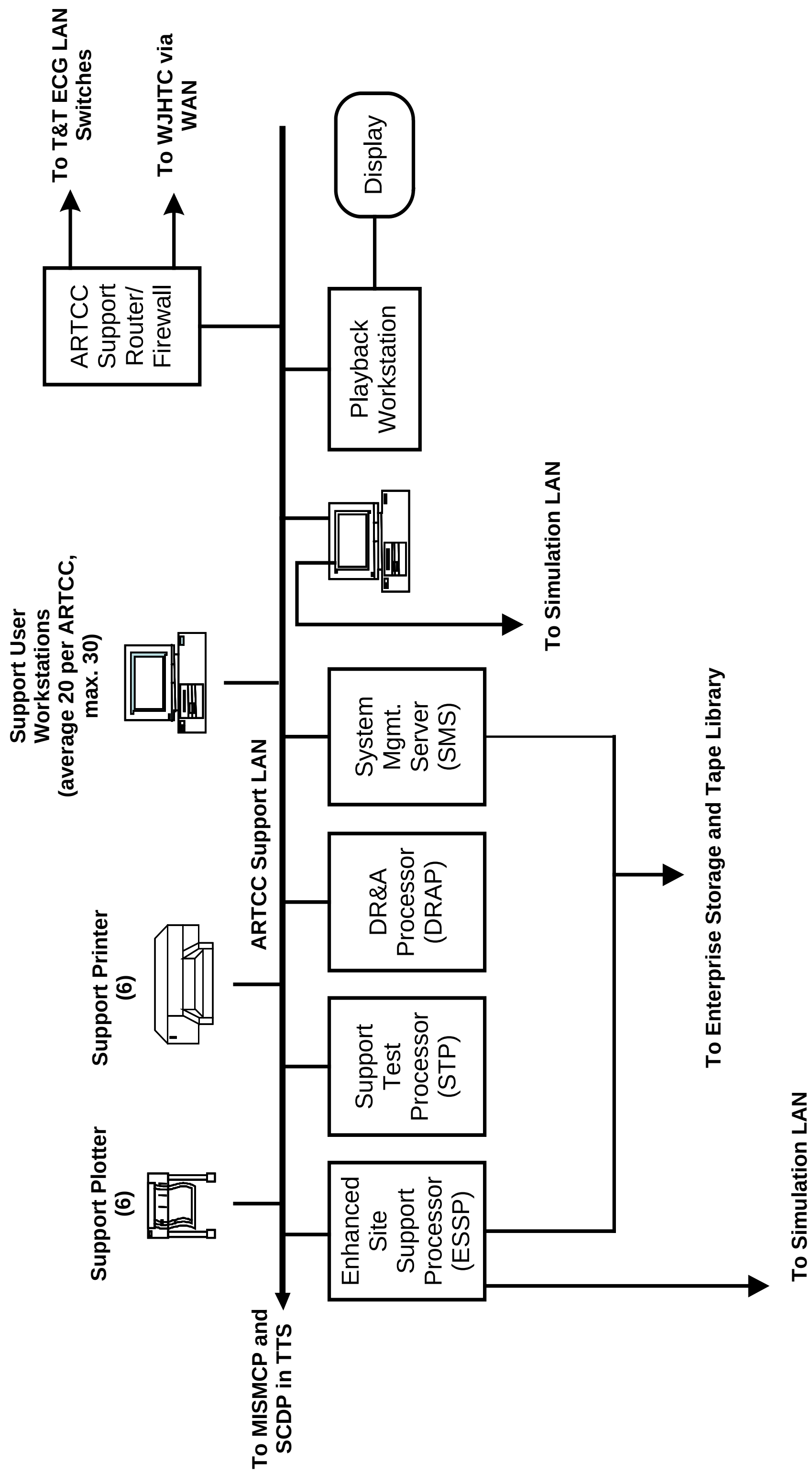

FIGURE 2–11. EASN SUPPORT ENVIRONMENT

(2) The T&T environment, shown in Figure 2–12, EASN Test and Training Environment, consists of operational replicas and simulation resources. The T&T operational replicas are isolated from the operational environment, and include a set of dedicated replica of operational resources (i.e., EAS and EADS) including an equivalent T&T ECG LAN, T&T Application LAN, T&T M&C LAN, application servers, DPDs, DPRs, and T&T M&C processors and workstations.

The simulation resources allow for developing and executing scenarios used in testing and training. The T&T environment consists of the following:

(a) Processors:

- Simulation Driver (SIMP)
- Scenario Development (SCDP)
- Master Instructor/Support M&C (MISMCP)
- T&T Surveillance Data Processor (SDPP)
- T&T Flight Data Processor (FDPP)
- T&T (Conflict Probe Processor (CPP)
- T&T General Processor and Weather Processor (GPWXP)
- T&T Synchronization Processor (SYNCP)
- T&T M&C Processor (MCP)
- T&T R-console processor
- T&T D/A-console processor

(b) Workstations:

- Ghost Pilot WS (GPWS)
- AT Specialist WS (SPECWS)

(c) Switches:

- T&T ECG LAN
- T&T M&C LAN
- T&T Application LAN
- Maintenance LAN
- Terminal switch

(d) Printers:

- T&T M&C printers

(e) Displays:

- T&T FPMDM
- T&T FPD19
- T&T FPD20.

(f) Power Supply Elements:

- Power Sequencer
- UPS
- PDU

(g) Media Converter.

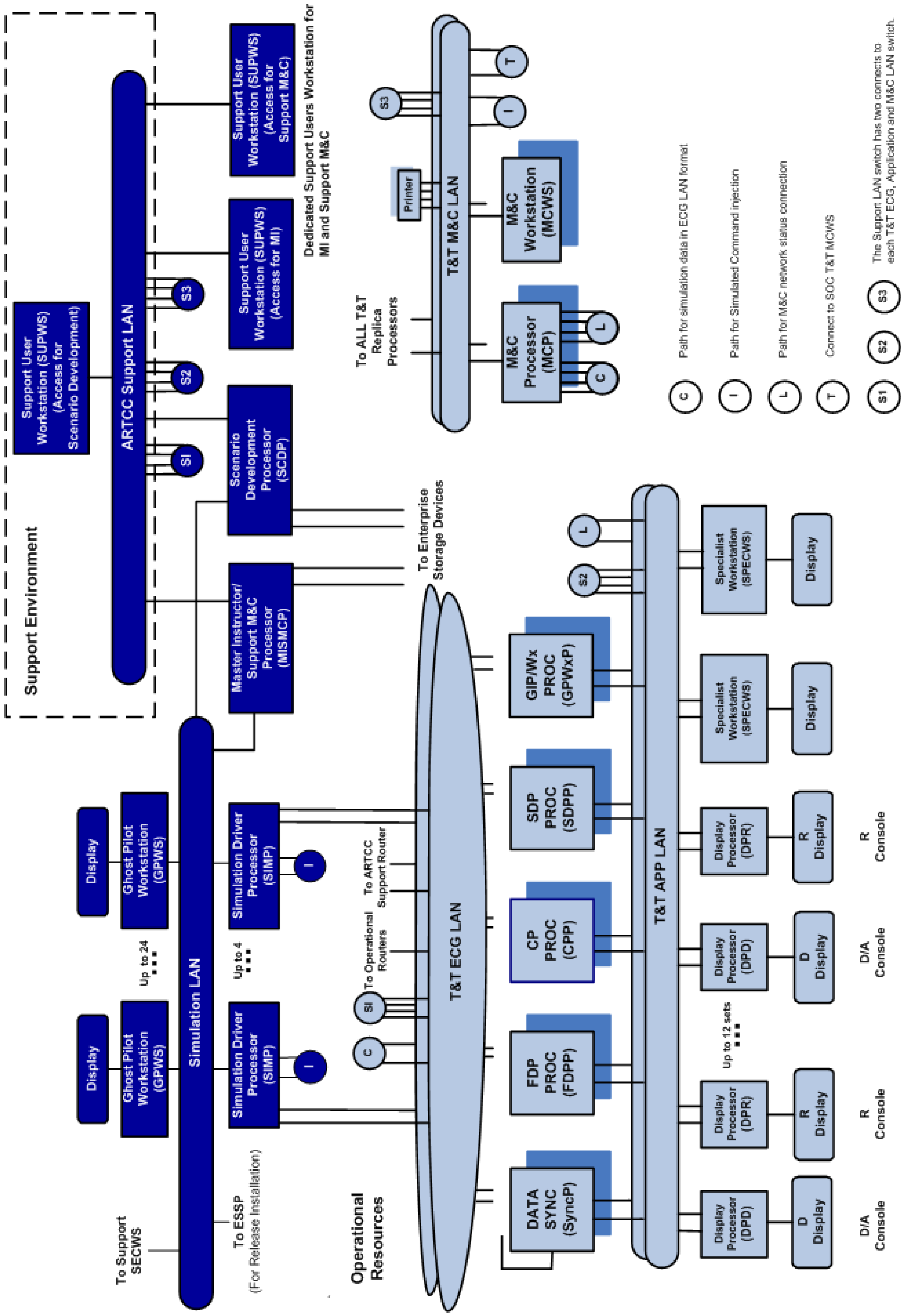

FIGURE 2–12. EASN TEST AND TRAINING ENVIRONMENT

2–18. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS).

a. General. The EDDS is a LAN-based system that provides an interface between the EAS and various end-user systems that require flight plan and track data. EDDS replaces the HNL system when EAS/EADS are operational. EDDS is comprised of the following components:

1. The Host Air Traffic Management (ATM) Data Distribution System (HADDS) software receives, sends and maintains the latest data (such as flight plans, tracks and air space utilization information) and is designed to send this data to multiple clients (e.g., Traffic Management Advisor (TMA), ETMS) through a HADDS Application Programming Interface (API).

2. The NSM server contains the management software used to monitor and manage the hardware and software applications resident on the EDDS LAN.

3. The Store and Forward Application (SAFA) software provides a reliable delivery mechanism for messages generated by NAS for clients that do not require "real-time" delivery, but require guaranteed delivery of messages, even in the event of a client failure.

4. The E-Complex (ECOM) provides hardware level remote access to the NSM.

For more information including maintenance requirements for the entire system, refer to the latest edition of TI 6131.13, Host Interface Device (HID) National Airspace System (NAS) Local Area Network (LAN) (HID/NAS–LAN) System Administrators Manual.

b. EDDS Configuration. The EDDS, as shown in Figure 2–13, EDDS Configuration, consists of the following components:

- HADDS server;
- NSM server;
- NSM monitor;
- Linksys switches;
- Cisco switches;
- SAFA server;
- ECOM;
- KVM switch.

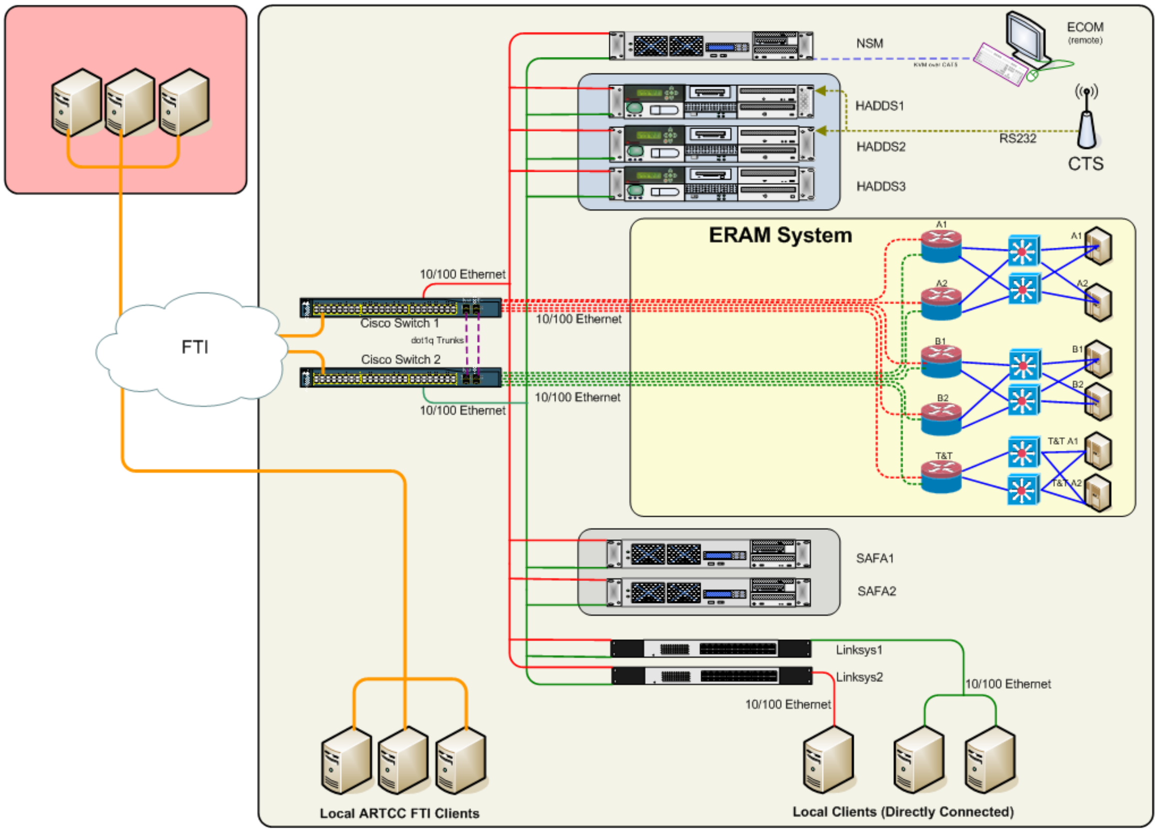

FIGURE 2–13. EDDS CONFIGURATION

1. HADDS. The function of the HADDS is to provide a reliable delivery mechanism for messages generated by NAS to ATM applications and vise versa. HADDS maintains a database of the latest information available from NAS (such as flight-plan related and airspace utilization information) via the Common Message Set (CMS). This data can then be sent to multiple client applications. HADDS keeps clients up to date with the latest available CMS data, and will provide clients with a download of the latest information whenever they connect. HADDS provides an Offline Application Registration System (OARS) that customizes the CMS information for each HADDS client. Each client is configured with an OARS identifier (ID). For each OARS ID, HADDS maintains an OARS table. The OARS tables permit users to specify the format of CMS messages, which CMS messages each client is to receive, and can also permit clients to send messages back to the Host (if they are configured as an authorized two way client) in their application-specific form.

The HADDS servers are Sun Fire X2200 M2 x86–64 servers running the Linux OS, with the following features:

- single Advanced Micro Devices (AMD) Opteron 2210 1.8 GHz Dual-Core processor;
- 2 GB RAM;
- 10/100/1000 (4) Ethernet ports;
- 250 GB SATA drive 7200 RPM;

- DVD+/-RW dual layer optical drive;
- RS–232 serial port.

2. NSM. The NSM provides hardware and software monitoring using SNMP. Additionally, the NSM provides hardware and software control for other system components. This includes stopping and starting software, rebooting hardware, Cisco switch configuration management, and software update and release.

The NSM server is a Sun Fire X2200 M2 x86–64 server running the Linux OS, with the following features:

- single AMD Opteron 2210 1.8 GHz Dual-Core processor;
- 2 GB RAM;
- 10/100/1000 (4) Ethernet ports;
- 250 GB SATA drive 7200 RPM;
- DVD+/-RW dual layer optical drive;
- RS–232 serial port;
- USB audio adapter.

3. SAFA. The SAFA software stores all messages from NAS received via the operational HADDS. These messages are made available to configured SAFA clients. The SAFA stores CMS messages and forwards them as need to any client that has disconnected from the SAFA if and when that client becomes available. Once all stored messages have been received by the client, SAFA will forward messages to the client in “near real time”.

The SAFA server is a 2U rack-mounted Kontron ePCI–200 x86–32 processor running the Linux OS, with the following features:

- 2.80 GHz Intel Pentium 4 processor;
- 1 GB SDRAM;
- 10/100 (2) Ethernet ports;
- RS–232 serial ports (2);
- 40 GB internal Integrated Drive Electronics (IDE) hard drive;
- CD-ROM drive/3.5–inch Floppy Disk Drive (FDD) combination drive;
- CD-RW drive;
- Crystal Fonts LCD.

4. Cisco Switches. The Cisco switches provide physical interconnection points of the Ethernet LAN within the EDDS. Two switches provide fault tolerant, 100 Mbps connections between the HADDS servers, NSM server, and SAFA servers, and also provide connectivity and routing services between end user systems via direct connection to the FAA WAN and connections to the Linksys switches. The Cisco switches provide the first layer of HNL security by strictly limiting the processors and protocols that are allowed to communicate on the EDDS.

The Cisco Catalyst 3560 is a layer 3 Ethernet EF4124 switch providing Ethernet connectivity between the nodes on the EDDS and HADDS clients. The Cisco switches have the following features:

- 48 100BaseT Ethernet ports;
- 128 MB DRAM memory;
- 32 MB flash memory.

5. Linksys Switches. The Linksys switches provide physical interconnection points of the Ethernet LAN within the EDDS. The Linksys switches provide the connection point for local EDDS clients.

The Linksys switches have 24 10/100 BaseT Ethernet ports.

6. E-Complex (ECOM). The ECOM provides hardware level remote access to the NSM. It is provided by a Network Technologies, Inc. (NTI) Keyboard Video and Mouse (KVM) Extender directly connected to the NSM. The KVM extender consists of two units connected via a CAT5 twisted pair cable. The “local unit” connects directly to the NSM sound, video, keyboard and mouse ports, and provides connectivity for the co-located monitor, keyboard, and mouse. The local unit splits the signals between the locally connected equipment and the “remote unit,” which is connected via the CAT5 twisted pair cable. The remote unit is in the SOC area of an ARTCC, and provides connectivity for an attached monitor, speakers, keyboard, and mouse. This provides for a remote display that is an exact mirror of the local display. Anything displayed on the NSM is also displayed on the ECOM (and vice versa) and any actions taken at one position are visible at the other.

The ECOM consists of a NTI KVM Extender and a NEC LCD1770 NXM–BK–2 17–inch monitor located at the SOC position.

7. Keyboard Video Monitor (KVM) Switch. The KVM switch provides a way to control all of the EDDS servers via a single monitor, keyboard, and mouse. It is an 8–port KVM switching unit that supports either USB and PS/2 keyboards and mice for each server.

2–19 – 2–99. RESERVED.

CHAPTER 3. STANDARDS AND TOLERANCES

3–0. GENERAL

a. This chapter prescribes the standards and tolerances for NAS En Route Stage A, Air Traffic Control System, as defined and described in the latest edition of Order 6000.15. All key performance parameters and/or key inspection elements are clearly identified by an arrow ($\rightarrow$) placed to the left of the applicable item.

b. Definitions of standard, initial tolerance, and operating tolerance for the purpose of this handbook are as follows:

(1) Standard: the optimum value assigned to an essential parameter of the system.

(2) Initial tolerance: the maximum deviation, from the standard value of the parameter, beyond which is permissible at the time of initial tune up or a major readjustment.

(3) Operating tolerance: the maximum deviation, from the standard value of the parameter, beyond which remedial action by maintenance personnel is mandatory.

NOTES: Regarding Radar Tolerances:

Collimation of search to beacon data requires that the beacon offset (1/2 mile delay) be active, or the digitizer type be a CD–1.

Search data is no longer separated into Log/Normal and Moving Target Indicator (MTI) categories. If a search problem is evident, further analysis with the HCS off-line radar programs is required.

Certain radar/digitizer combinations require special adaptation in order for the Quick Analysis of Radar Sites (QARS) program to correctly calculate failures. See FAA–2000, Multiprogramming Diagnostic Monitor (MDM) Monitor Handbook and NAS–MD–326, Adaptation Collection Guidelines, for assistance in properly adapting radar sites for QARS.

3–1. LIST OF CHAPTER REFERENCES.

The following documents and/or orders are referenced in the tables in chapter 3.

NAS–MD–310, Computer Program Functional Specification, Introduction to Specifications Series

NAS–MD–311, Computer Program Functional Specification, Message Entry and Checking

NAS–MD–320, Computer Program Functional Specification, Multiple Radar Data Processing

NAS–MD–325, Computer Program Functional Specification, Software Design Requirements

NAS–MD–672, Computer Program Functional Specification, Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) Track Processing

NAS–MD–673, Microprocessor En Route Automated Radar Tracking System (Micro-EARTS), Real-Time Quality Control (RTQC)

NAS–MD–675, Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) Minimum Safe Altitude Warning (MSAW)

NAS–MD–680, Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) system Monitoring Keyboard Processing

NASP–5201, Volume II, Monitor Handbook, Operator’s Manual

FAA–4303, NAS En Route Test and Maintenance Program User’s Manual, Computer Display Channel Subsystem

FAA–4306M, NAS En Route User’s Manual, Range, Azimuth, Radar Reinforced Evaluator (RARRE) Program

FAA–4306N, NAS En Route A User’s Manual Quick Analysis of Radar Sites (QARS) Program

FAA–4306R, NAS En Route User’s Manual, Positional Error Analysis Summary (PEAS) Program

FAA–4306U, NAS En Route User’s Manual, Radar Statistical Coverage Analysis System (RSCANS)

FAA–4313, NAS En Route Maintenance Program Manual, Coded Time Source

FAA–4319, NAS En Route Maintenance Program Manual, DSR Printer Control Unit Subsystem

FAA–4320, NAS En Route User’s Manual, DSR LIU Interface Test Control Program User’s Guide

FAA–4321, NAS En Route User’s Manual, Test and Maintenance Program Manual Host Interface Device (HID)

TI Documents

TI 6110.16, Equipment Maintenance Manual, Air Route Traffic Control Center (ARTCC) Central Computer Complex Host (CCCH) Keyboard Video Display Terminal and IBM 6400 Printer Subsystem

TI 6100.18, ECG System Problem Determination and Maintenance Manual

TI 6110.29, Central Computer Complex Host (CCCH) User's Manual, Visara 1174–25S Communications Server

TI 6110.100, En Route Modernization (ERAM) R–Position User Manual

TI 6110.101, En Route Modernization (ERAM) D–Position User Manual

TI 6110.110, En Route Modernization (ERAM) System Management Manual (SMM) Manual, Operational Monitor and Control

TI 6110.120, En Route Modernization (ERAM) Hardware Maintenance Manual, Air Traffic Console

TI 6110.121, En Route Modernization (ERAM) Hardware Maintenance Manual, Workstations and Printers

TI 6110.122, En Route Modernization (ERAM) Hardware Maintenance Manual, Rack-Mounted Hardware

TI 6160.46, DSR/DSSC ARTCC Site Support Management Manual

TI 6160.47, DSR/DSSC ARTCC Site Support Management Manual

TI 6160.50, DSR/DSSC Air Traffic Controller User Manual

TI 6160.51, DSR/DSSC DSR Console Hardware Technical Manual

TI 6160.53, DSR/DSSC Rack-Mounted Components Hardware Technical Manual

TI 6160.55, DSR/DSSC Software Maintenance Overview Manual

TI 6160.55, DSR/DSSC Software Maintenance Overview Manual

TI 6160.56, DSR/DSSC System Release Receipt and Tailoring Manual

TI 6160.57, DSR/DSSC Adaptation Data Reference Manual

TI 6160.66, URET Rack-Mounted Components Hardware Technical Manual

TI 6160.67, ERIDS System Maintenance Manual

TI 6160.68, ERIDS Monitor and Control (M&C) Operator's Manual

TI 6160.69, ERIDS System Administration Manual

TI 6340.13C, Maintenance of Air Route Surveillance Radar, ARSR–3 Facilities ARSR–1E and ARSR–2 Amplitron Safety Precautions

TI 6340.21, Maintenance of Air Route Surveillance Radar 1, 2 Facilities with SSR/DMTI

TI 6340.22, Maintenance of AN/FPS–20 Family of Radars with Solid State Receiver/Digital Moving-Target Indicators

Commercial-Off-the-Shelf (COTS) technical manuals:

BOCA Systems FSP 42 (Flight Strip Printer) Technical Manual

Visara SCON–25L//8L/3074 Console Concentrator 1174–25S Communications Server, Hardware Reference Manual

Section 1. COMPOSITE FLIGHT DATA PROCESSING (CFAD) SERVICE

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–1. CFAD PROCESSING.	TI 6110.110, TI 6110.111, TI 6110.112			
→ **a.** Flight Data ……….……………….. Processing (FDP) Capability.	5–15 and 5–31	Satisfactory overall FDP automation system operation including: FDP and storage using online or offline certification programs or manual entry checking techniques	Same as standard	Same as standard
→ **b.** FDP ………………………………. Input/Output.	5–15 and … 5–31	Satisfactory system displays and printouts using online or offline certification programs or manual entry alternate techniques as necessary	Same as standard	Same as standard
→ **c.** SYNC Processing Capability …..		Satisfactory data synchronization standard between channels using display views, printouts, online or offline tests, or manual techniques as necessary.	Same as standard	Same as standard
3–2. – 3–4. RESERVED.				

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–5. CRAD PROCESSING.	TI 6110.110, TI 6110.111, TI 6110.112			
a. Primary Channel Radar Data Surveillance Processing.				
(1) Narrowband ……………….. Site Coverage.	5–14d, 5–15, 5–21, 5–31, FAA–4306M, FAA–4306U, and NASP–5201, Vol. II	Satisfactory cover-age as determined using the operational program or offline support program(s) such as RARRE and QARS as needed	Same as standard	Same as standard
(2) Range ……………...……… and Azimuth Accuracy.	5–14d, 5–15, 5–22, 5–26, 5–27, and 5–31	Site registration with no correct-ions applied to either site OR Search and bea-con PE coordin-ates within ± 1/8 nmi and ± 2 ACPs. This may be verified by the target symbol appearing within the adapted GMLSDA map box for the PE OR Radar system with no available search PEs, util-izes beacon PEs with same toler-ance as stated above and a search reinforce value greater than 80%	±1/8 nmi and 2 ACPs	±1/8 nmi and ±2 ACPs

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **(3)** Display Accuracy ………..	5–14d, 5–15, 5–19, and 5–31	Digitizer RTQCs or PE appear within ± 1/8 nmi and ± 2 ACP of their proper locations. This may be verified by their appearance within their respective GMLSDA maps boxes.		
→ **(4)** RDP and Tracking ……….	5–14d, 5–15, 5–28, and 5–31	Successful RDP tracking as verified using online or offline certification programs or manual entry alternate techniques as necessary	Same as standard	Same as standard
→ **(5)** Data Display ………………. and Entry.	5–14d, 5–15, 5–28, and 5–31	Satisfactory display of all class types of data and normal entry and control from the radar console using applicable test pattern(s)	Same as standard	Same as standard
→ **(6)** Video ……………………….. Presentation.	5–14d, 5–15, 5–19, 5–28, and 5–31	Operationally satisfactory symbology, data blocks, lists, and general presentation quality	Same as standard	Same as standard
→ **(7)** System Error ……………….. Detection Analysis, and Correction Capability.	5–14d, 5–15 and 5–31	Successful system error detection, analysis and correction as verified using online or offline certification programs or manual checking techniques	Same as standard	Same as standard

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit Initial	Tolerance/Limit Operating
→ **(8)** Radar Data Transfer.	5–14d, 5–15, 5–30, and 5–31	Satisfactory system operation (absence of RTQC error printouts during program operation)	Same as standard	Same as standard
(9) ARTS–NAS Registration.	5–32 and FAA–4306R			
(a) Total environment mean position error (Z).		Within 0.40 nmi	Same as standard	Same as standard
(b) Hemisphere mean position error.		Within 0.50 nmi	Same as standard	Same as standard
(c) Total environment 5–percentile class interval (95% Z).		Within 0.75 nmi	Same as standard	Same as standard
(10) Quick Analysis of Radar Sites (QARS).				
(a) Offline QARS.	5–27, FAA–4303 and NASP–5201, Vol. II			
1 BEACON.				
BLIP/SCAN		99%	99% minimum	96% minimum
SCH–REINFOR.				
ARSR–4		85%	85% minimum	80% minimum
ARSR 1/2/3		70%	70% minimum	60% minimum
Other		60%	60% minimum	50% minimum

NOTE: Those systems using longer Beacon range than Search range shall be computed using the Search range as maximum range.

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
COLLIM PCT.				
ARSR–4 …		95%	95% minimum	90% minimum
ARSR–4 …		95%	95% minimum	90% minimum
ARSR 1/2/3 …….		85%	85% minimum	80% minimum
Other …….		75%	75% minimum	70% minimum
Azimuth (AZ)–SPLIT.				
Other …….		0.1%	0.1% maximum	0.2% maximum
RNG–SPLIT.				
ARSR–1/2/3/4 …...		0.1%	0.1% maximum	0.2% maximum
Other ……		0.2%	0.2% maximum	0.4% maximum
RING–AROUND. ………		0.0%	0.0% maximum	0.5% maximum
REFLEC-TIONS. ……...		0.0%	0.0% maximum	0.2% maximum
CODE ZEROS. ………		0.1%	0.1% maximum	0.5% maximum
Mode 3/A REL. ………		99%	99% minimum	98% minimum
Mode 3/A VAL. …….		99%	99% minimum	98% minimum
Mode–C REL.				
3,2,3,C …..		98%	98% minimum	97% minimum

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
Other		99%	99% minimum	98% minimum
Mode–C VAL.				
3,2,3,C		96%	96% minimum	95% minimum
Other		98%	98% minimum	97% minimum
RNG DEV		0 nmi	0 nmi	1/8 nmi
AZ DEV.				
ARSR–3 on RIVDIF. ...		2.5 ACPs	2.5 ACPs	2.5 ACPs
ASR reform-atted.		3 ACPs	3 ACPs	3 ACPs
Other		2 ACPs	2 ACPs	2 ACPs
2 SEARCH.				
BLIP/SCAN.				
ARSR–4 ...		95%	95% minimum	92% minimum
Other		80%	80% minimum	75% minimum
AZ–SPLIT		0.1%	0.1% maximum	0.2% maximum
RNG–SPLIT.				
ARSR–1/2/3/4		1%	1% maximum	2% maximum
Other		3%	3% maximum	6% maximum

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3 COLLIM-ATION.				
RNG ERR		0.2 microseconds (µs)	0.4 µs maximum	0.4 µs maximum
AZ ERR		1 ACP	2 ACPs maximum	2 ACPs maximum
4 BEACON PE VERIFICATION (#1 thru #4 as adapted).				
RNG ERROR		0 nmi	0 nmi	1/8 nmi
AZ ERROR		0 ACP	0 ACP maximum	2 ACP maximum
PCT REL		95%	95% minimum	90% minimum
(b) Online QARS	NASP–9291			

NOTE: The online QARS function remains a viable tool for use in obtaining a "quick-look" of how a site is performing. The intent of removing the standards and tolerances is because online QARS only looks at a maximum of 10 scans of data — this is an insufficient sample size upon which to base the certification or decertification of a radar site.

Parameter	Reference Paragraph	Standard	Initial	Operating
b. Secondary Channel Radar Data Surveillance Processing.				
→ **(1)** Narrowband Site Coverage	5–14e, 5–15, 5–16	Satisfactory coverage as determined using operational program or offline support programs such as ECG QARS (EQARS) as needed	Same as standard	Same as standard

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ (2) Range and Azimuth …..… Accuracy.	5–14e, 5–15, 5–16	Search and beacon PE coordinates at their listed mean values verified using geographical map and PE symbology, or registration and collimation	±1/8 nmi and ±2 ACPs	±1/8 nmi and ±2 ACPs
→ (3) Display Accuracy ……..….	5–14e, 5–15, 5–16	PE and RTQC test target symbols within appropriate geographical map symbols	Same as standard	Same as standard
→ (4) RDP and Tracking ……….	5–14e, 5–15, 5–16	Successful RDP and tracking as verified using Simulator (SIM) or manual entry techniques as necessary	Same as standard	Same as standard
→ (5) Data Display and Entry	5–14e, 5–15, 5–16	Satisfactory display of all class types of data and normal entry and control from the radar console using keyboard entries as necessary	Same as standard	Same as standard
→ (6) Video Presentation ………	5–14e, 5–15, 5–16	Operationally satisfactory symbology, data blocks, lists, and general presentation quality	Same as standard	Same as standard
→ (7) System Error …………….. Detection Analysis, and Correction Capability.	5–14e, 5–15, 5–16	Successful system error detection, analysis and correction as verified using manual checking techniques	Same as standard	Same as standard

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **(8)** Radar Data Transfer …….	5–14e, 5–15, 5–16 and 5–21	Satisfactory system operation (absence of RTQC error printouts during program operation, or from offline EQARS CD quality pre-check analysis)	Same as standard	Same as standard
(9) ARTS–NAS………………. Registration.	5–32 and FAA–4306R			
(a) Total environment … mean position error (Z).		Within 0.40 nmi	Same as standard	Same as standard
(b) Hemisphere mean … position error.		Within 0.50 nmi	Same as standard	Same as standard
(c) Total environment … 95-percentile class interval (95% Z).		Within 0.75 nmi	Same as standard	Same as standard
(10) EQARS.				
(a) Offline EQARS …..….	5–27			
1 BEACON.				
BLIP/SCAN …..		99%	99% minimum	96% minimum
SCH–REINFOR.				
ARSR–4 …		85%	85% minimum	80% minimum

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
ARSR– ….. 1/2/3.		70%	70% minimum	60% minimum
Other …………		60%	60% minimum	50% minimum
NOTE: Those systems using longer Beacon range than Search range shall be computed using the Search range as maximum range.				
COLLIM PCT.				
ARSR–4 …		95%	95% minimum	90% minimum
ARSR–….. 1/2/3/4.		85%	85% minimum	80% minimum
Other …….		75%	75% minimum	70% minimum
AZ–SPLIT.				
Other …….		0.1%	0.1% maximum	0.2% maximum
RNG–SPLIT.				
ARSR– ….. 1/2/3/4.		0.1%	0.1% maximum	0.2% maximum
Other …….		0.2%	0.2% maximum	0.4% maximum
RING– ……….. AROUND.		0.0%	0.0% maximum	0.5% maximum
REFLECTION.		0.0%	0.0% maximum	0.2% maximum
CODE ZEROS.		0.1%	0.1% maximum	0.5% maximum
Mode 3/A …… REL.		99%	99% minimum	98% minimum
Mode 3/A …… VAL.		99%	99% minimum	98% minimum

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter			Reference Paragraph	Standard	Tolerance/Limit	
					Initial	Operating
	Mode C REL.					
		3,2,3,C ..…		98%	98% minimum	97% minimum
		Other ..…..		99%	99% minimum	98% minimum
	Mode C VAL.					
		3,2,3,C ..…		96%	96% minimum	95% minimum
		Other …….		98%	98% minimum	97% minimum
	RNG DEV …….			0 nmi	0 nmi	1/8 nmi
	AZ DEV ………					
		ARSR–3 … Non RIVDIF.		2.5 ACPs	2.5 ACPs	2.5 ACPs
		ASR …….. reformatted		3 ACPs	3 ACPs	3 ACPs
		Other …….		2 ACPs	2 ACPs	2 ACPs
<u>2</u>	SEARCH.					
	BLIP/SCAN.					
		ARSR–4 …		95%	95% minimum	92% minimum
		Other ..…..		80%	80% minimum	75% minimum
	AZ–SPLIT…….			0.1%	0.1% maximum	0.2% maximum
	RNG–SPLIT.					
		ARSR–…... 1/2/3/4.		1%	1% maximum	2% maximum
		Other …….		3%	3% maximum	6% maximum

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
3 COLLIMATION.				
RNG ERR ……		0.2 μs	0.4 (μs) maximum	0.4 μs) maximum
AZ ERR ………		1 ACP	2 ACPs maximum	2 ACPs maximum
4 BEACON PE VERIFICATION (#1 through #4 as adapted).				
RNG ERROR ..		0 nmi	0 nmi	1/8 nmi
AZ ERROR …..		0 ACP	0 ACPs maximum	2 ACPs maximum
PCT REL …..…		95%	95% minimum	90% minimum
(b) Online EQARS.				

NOTE: The online EQARS function remains a viable tool for use in obtaining a “quick-look” of how a site is performing. The intent of removing the standards and tolerances is because online EQARS only looks at a maximum of 10 scans of data — this is an insufficient sample size upon which to base the certification or decertification of a radar site.

3–6. – 3–10. RESERVED.

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–11. CCCH PROCESSING.				
→ **a.** Flight Data Processing and Transfer of Data.				
(1) FDIO ……………………..	5–17c, FAA–4002, and NASP–5201, Vol. II.	Satisfactory input/output, and transfer of flight data between remote site and ARTCC controller position, including correct device response, Registration and print quality, as verified using online or off-line certification programs, manual techniques, NAS Test Device (TD) messages, or System Checkout of Peripheral (SCOPE), or Host Online Test Tool DIAG CCU		
(2) IFDS …………………….. (Center to Center and Center to ARTS).	5–17c, FEMM MDM Manual, and NASP–5201, Vol. II.	Satisfactory transfer of data using online or offline certification programs, manual techniques, TR/TD messages or SCOPE (internal loop-around), or Host Online Test Tool DIAG INTFAC (internal loop-around)		
Host Online Test Tool .... DIAG INTFC.	5–17c	Error free operation	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **b.** Radar Data Processing And Transfer of Data.				
(1) CD/Radar Site …………..	NASP–5201, Vol. II, QARS User Manual, IFDS Instruction Book, Par. 304a(10), 5–22	Satisfactory transfer of digital data from CD/radar site to CCCH as determined from QARS CD Quality Pre-check or 5–minute run of the SCOPE CD subsystem module		
(2) CCCH ……………………….	5–17c, 5–22, 5–26, and 5–27	Satisfactory radar data processing and operations using online certificates programs, targets of opportunity, RTQC printouts	Same as standard	Same as standard
3–12. CONNECTIVITY.	5–17c			
→ **a.** ECG ………………………………	Par. 5–18b	Successful connectivity to ECG PIP using online certification programs, Host Online Test Tools or manual techniques	Same as standard	Same as standard
Host Online Test ………………. Tool DIAG GROUP.	NASP–5201, Vol. II section 7	Error free operation	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **b.** DSR ………………………………	Par. 5–18b(3)			
(1) DSR Printer ………..…….. Control Unit (DPCU).		Successful connectivity to DPCUs using on-line certification programs, Host Online Test Tools or manual techniques	Same as standard	Same as standard
(a) MDM D7951 ………..	FAA–4319	Error free	Same as standard	Same as standard
OR:				
(b) Host Online …........… Test Tool DIAG GROUP.	NASP–5201	Error free	Same as standard	Same as standard
(2) LIU …………..………….		Successful connectivity to LIUs using online certification programs, Host Online Test Tools or manual techniques	Same as standard	Same as standard
(a) MDM D7C51 ………	FAA–4320	Error free operation	Same as standard	Same as standard
OR				
(b) Host Online Test … Tool DIAG LIU.	NASP–5201	Error free operation	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
c. URET ……………….……….….	Par. 5–18b(3)	Successful connectivity to HGW using online certification programs, Host Online Test Tools or manual techniques		
(1) MDM D7851 D7852 ……..	FAA–4321	Error free operation	Same as standard	Same as initial
OR				
(2) Host Online Test ………… Tool DIAG HID.	NASP–5201	Error free operation	Same as standard	Same as standard
3–13. INPUT/OUTPUT.				
a. Data Entry Operations ……..…	5–17c	Satisfactory message entry of flight data as verified using online or offline certification programs, manual techniques, NAS TD messages, or SCOPE	Same as standard	Same as standard
b. Data Transfer to Printers ……..	5–17c	Satisfactory printing of flight data as verified using online or offline certification programs, manual techniques NAS TD messages, or SCOPE	Same as standard	Same as standard
c. Peripheral Devices …………….	5–17c	Satisfactory message entry of flight data as verified using online or offline certification programs, manual techniques, NAS TD messages, or SCOPE	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
d. Time of Day (CTS) ……………..	5–17c, FAA–4313	Satisfactory time information provided to the CCCH by the CTS as verified using SCOPE, or MDM routine D7A52, Host Online Test Tool DIAG CTS or manual techniques	Same as standard	Same as standard
(1) Run D7A52 CTS ………… command.		Error free operation	Same as standard	Same as standard
OR:				
(2) Run Host Online ……..….. Test Tool DIAG CTS.		Error free operation	Same as standard	Same as standard
→ **3–14. FAULT SENSING, STATUS REPORTING, AND RECONFIGURATIONS.**				
	5–17c	Successful reconfigurations resulting in switching of all redundant elements with satisfactory status reporting using online certification programs or manual techniques	Same as standard	Same as standard
3–15. STORAGE DATA TRANSFER AND RETRIEVAL.				
	5–17c	Satisfactory data storage and retrieval using online certification programs, DASD/tape diagnostics, or manual techniques	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–16. ELEMENTS.	5–15, 5–18b(3)			
	Equipment instruction books and Online Tests (OLTS) users manuals for systems and elements	Satisfactory operation within the support processor system, with standby NAS, following satisfactory diagnostic testing below	Same as standard	Same as standard
→ **a.** Processor 9672 RA4 G3.				
(1) 9672 Frame ……………...	IBM S/390 Support Element Operations Guide, IBM S/390 Installation Manual, IBM S/390 Service Guide	Successful completion of Power On Self-Test (POST) and the Checkout tests		
(a) Central ……..………Processor (CP).		4	2	2
(b) Memory ……………..…		512M	256M	256M
(c) Parallel Channels ….		18	16	16
(d) ESCON Channels …		8	6	6

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(2) 9672 ………………………..….. Support Element (SE).	IBM S/390 Support Element Operations Guide, IBM S/390 Installation Manual	Successful completion of POST	Same as standard	Same as standard
(3) Hardware Management .... Console (HMC).	IBM S/390 Hardware Management Console Operations Guide, IBM S/390 Installation Manual	Successful completion of POST	Same as standard	Same as standard
→ **b.** Symmetrix 5630 DASD Subsystem.				
(1) Entire unit or any ……...….. component except disk device or power supply.	Contract Data Requirements List (CDRL) D038, section 3, or Symmetrix Model 3630/5630 Product Manual, appendix C	Successful completion of Initial Microcode Load (IML) POST	Same as standard	Same as standard
		AND:		
	Device Support Facilities User's Guide, GC35–0033, chapter 11	Error free completion running ICKDSF using Analyze command with SCAN and DRIVE TEST options on any logical volume	Same as standard	Same as standard

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(2) Disk Device ……………...	Par. 5–38	Successful completion of replacement drive diagnostics, and resynchronization of logical volumes	Same as standard	Same as standard
(3) Power Supply …………..….	Par. 5–38	No environmental power faults or alarms	Same as standard	Temporary charge state alarm
→ **c.** 3480 Cartridge Tape Control Unit.				
(1) Hardware diagnostics …...		Successful completion of IML		
(2) Software diagnostics ….....		OLTS T3480A, OLTS T3480C		
→ **d.** 3274 Terminal Control Unit.				
(1) Hardware diagnostics …...		Successful completion of IML		
(2) Software diagnostics …....		OLTS T3274A		
→ **e.** 3814 Switching Unit …………….		OLTS T3274A		
f. 6400 Model Printers …………... (P50, 050, 05P, 015).	IBM 6400 Setup Guide, S544–5640–00	Successful completion of POST	Same as standard	Same as standard
g. 1883 KVDTs ……….……………		Successful completion of POST	Same as standard	Same as standard
→ **h.** 1174 Communications Server .	TI 6110.29, Visara Hardware Maintenance Manual	Successful completion of POST	Same as standard	Same as standard
3–17. – 3–32. RESERVED.				

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–33. DSR PROCESSING.				
→ **a.** LCN Entry, Processing ………… and Display of Radar Data.	5–17e and TI 6160.50	Satisfactory entry, processing, and display of radar data on each DSR R-console and R-Position Computer Readout Device (R–CRD) via LCN using the online certification program, manual techniques, or the enhanced online test pattern	Same as standard	Same as standard
→ **b.** BCN Entry, Processing ……….. and Display Of Radar Data.	5–17e and TI 6160.50	Satisfactory entry, processing, and display of radar data on each DSR R-console and R-CRD via BCN using the online certification program, manual techniques, or the enhanced online test pattern	Same as standard	Same as standard
→ **c.** Entry, Processing and …..…..…. Display of Data of Flight Data on A and D Positions.	5–17e, CDRL DPU 07, and TI 6160.50	Satisfactory entry, processing, and display of flight data at A and D positions using online certification program or manual entry	Same as standard	Same as standard

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
d. Processing, Transfer and …….. Printing of Flight Strips. (DSR FSP).	5–17c, FAA–4319, and NASP–5201	Satisfactory print-out of flight strips with correct device response, Registration and print quality as verified using the online or offline certification programs, manual techniques, NAS TD messages, or SCOPE, or Host Online Test Tool DIAG DPCU		
3–34. CONNECTIVITY.				
	TI 6160.58, appendix A	Successful connectivity using online/offline certification programs, diagnostics, or manual techniques as per SUM View		
→ **a.** CCCH ……………………………	5–18		Same as standard	Same as standard
b. URET …………………...………	5–18		Same as standard	Same as standard
→ **c.** ECG ………………………………	5–18		Same as standard	Same as standard

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–35. INPUT/OUTPUT.				
M&C Operations and .... Data Entry.	TI 6160.58, appendix A and B	Satisfactory operations and message entry using online/offline certification programs or manual techniques resulting in no degrade conditions displayed	Same as standard	Same as standard
3–36. FAULT SENSING, STATUS REPORTING, AND RECONFIGURATIONS.				
→ **a.** LCN System .... Reconfiguration.	TI 6160.58, ref: 4.2.3	Successful reconfigurations resulting in Primary Address Space/Secondary Address Space (PAS/SAS) switching of LCN Operational Units (OU)	Same as standard	Same as standard
→ **b.** BCN System .... Reconfiguration.	TI 6160.58, ref: 4.2.3	Successful reconfigurations resulting in PAS/SAS switching of BCN OUs	Same as standard	Same as standard
3–37. STORAGE DATA TRANSFER AND RETRIEVAL.				
	TI 6160.58, appendix A	Satisfactory data storage and retrieval using diagnostics or manual techniques to verify recording status	Same as standard	Same as standard

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–38. DSR ELEMENTS.				
a. Local Communication Network (LCN) Elements.				
→ **(1)** Primary Channel Processor (PCP) RISC/6000, Model 7018–770.				
(a) Processor ……….…. embedded diagnostics, including Built-in Self Test (BIST) and POST.	TI 6160.53, section 7, TI 6160.51, section 6	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL …...…………... command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **(2)** LCN Bridge Processor PS/2, Model 55 SX.				
(a) Processor ……….…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 6	Successful completion of the bridge Verification diagnostics AND	Same as standard	Same as standard
(b) BRDG command ….. executed at the M&C position enables bridge to forward data and updates network topology.	TI 6160.58, appendix B	Successful acceptance of the bridge into its role at the M&C console		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit Initial	Tolerance/Limit Operating
→ **(3)** System Analysis Recording Processor (SAR–H) RISC/6000, Model 7018–771.				
(a) Processor …………... embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics	Same as standard	Same as standard
(b) APRL …………….…. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **(4)** History Alert Log Processor (HAL–H) RISC/6000, Model 7018–771.				
(a) Processor …………..…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ……………….. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **(5)** LIU Processor RISC/6000, Model 7018–771.				
(a) Processor ………..…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ……………..…… command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **(6)** WARP System Interface Processor RISC/6000, Model 7018–771.				
(a) Processor ………..…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL command …… executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
b. Backup Communication Network (BCN) Elements.				
→ **(1)** Backup Channel Processor (BCP) RISC/6000, Model 7018–771.				
(a) Processor ……….…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ………..…….. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **(2)** EDARC System Interface Processor (ESIP) RISC/6000, Model 7018–771.				
(a) Processor …….….…. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL command …... executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **(3)** System Analysis Recording Processor (SAR–E) RISC/6000, Model 7018–771.				
(a) Processor …………… embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ……………… command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **(4)** History Alert Log Processor (HAL–E) RISC/6000, Model 7018–771.				
(a) Processor …………… embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ……………… command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit Initial	Tolerance/Limit Operating
→ **(5)** WARP System Interface Processor RISC/6000, Model 7018–771.				
(a) Processor ………….. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(b) APRL ………………… command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console.		
3–39. FDP ELEMENTS.				
→ **a.** DSR Printer Control Unit (DPCU).				
(1) Processor ………………….. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics	Same as standard	Same as standard
(2) Host Online Test Tool …… DIAG DPCU.	NASP–5201	Error free operation	Same as standard	Same as standard
→ **b.** D/A-Position Processor RISC/6000, Model 7018–770.				
(1) Processor ……………….. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7, TI 6160.51, section 6	Successful completion of POST diagnostics AND	Same as standard	Same as standard

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(2) APRL …………..………… command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
3–40. SUPPORT ELEMENTS.				
a. System Release Manager (SRM) Processor RISC/6000, Model 7018–771.				
Processor …………..……..……. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics	Same as standard	Same as standard
b. Data Reduction and Analysis Processor (DR&A) RISC/6000, Model 7018–771.				
Processor ……………………….. embedded diagnostics, including BIST and POST.	TI 6160.53, section 7	Successful completion of POST diagnostics	Same as standard	Same as standard
c. Enhanced Site Support Processor (ESSP) Sun Micro F280R.				
POST ……………………………	TI 6160.66, section 5	Successful completion of POST diagnostics	Same as standard	Same as standard
d. Magnetic Tape Subsystem.				
Good Machine Path (GMP) …… diagnostics.	IBM 3490 Maintenance Information Manual, SA37–0299–00, chapter 2	Successful completion	Same as standard	Same as standard
3–41. – 3–50. RESERVED.				

Section 5. USER REQUEST EVALUATION TOOL (URET) SURVEILLANCE FLIGHT PLANNING SYSTEM

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **3–51. URET PROCESSING.**				
	5–17c and TI 6160.50	Satisfactory operations and processing of flight data using online certification programs, diagnostic tools, or manual techniques	Same as standard	Same as standard
3–52. CONNECTIVITY.				
→ **a.** CCCH	5–17c, TI 6160.58, and TI 6160.50	Successful connectivity to CCCH using online certification programs, Host Online Test Tools, or manual techniques to verify EAI Host status	Same as standard	Same as standard
→ **b.** DSR	5–17c, TI 6160.58, and TI 6160.50	Successful connectivity to DSR using online certification programs, diagnostic tools, or manual techniques to verify status of DSGW	Same as standard	Same as standard
→ **c.** Adjacent ARTCCs	TI 6160.58, and TI 6160.50	Successful connectivity to adjacent ARTCCs using online certification programs or manual techniques to verify status of adjacent facilities via EAI LAN View	Same as standard	Same as standard

Section 5. USER REQUEST EVALUATION TOOL (URET) SURVEILLANCE FLIGHT PLANNING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–53. INPUT/OUTPUT.				
→ **a.** Entry and Display ……………… of Flight Plan Data.	5–17c and TI 6160.50	Satisfactory entry and display of flight data on each A and D Controller position	Same as standard	Same as standard
b. Editing of ……………………….. Flight Plan Data.	5–17c and TI 6160.50	Satisfactory editing of flight data on each A and D Controller position	Same as standard	Same as standard
3–54. FAULT SENSING, STATUS REPORTING, AND RECONFIGURATIONS.				
	TI 6160.58, section 4	Successful reconfigurations resulting in PAS /SAS switching of OUs with satisfactory status reporting	Same as standard	Same as standard
3–55. URET ELEMENTS.				
→ **a.** Host Gateway (HGW) …………..	Par. 5–18b(3)			
(1) POST ……………………..	TI 6160.66, section 5	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(2) APRL ……………..………. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		

Section 5. USER REQUEST EVALUATION TOOL (URET) SURVEILLANCE FLIGHT PLANNING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **b.** DSR Gateway (DSGW) ………..	Par. 5–18b(3)			
(1) POST ………………..…….	TI 6160.66, section 5	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(2) APRL command ………..... executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **c.** Conflict Probe Processor (CP).				
(1) POST ……………………..	TI 6160.66, section 5	Successful completion of POST diagnostics AND	Same as standard	Same as standard
(2) APRL command ..……….. executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **d.** EDI Support Processor (EDIS).				
(1) POST………………………	TI 6160.66, section 5	Successful completion of POST diagnostics AND	Same as standard	Same as standard

Section 5. USER REQUEST EVALUATION TOOL (URET) SURVEILLANCE FLIGHT PLANNING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(2) APRL. …………………….. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
→ **e.** Fast Ethernet Switch.				
POST ……………………………	TI 6160.66, section 5	Successful completion of POST diagnostics	Same as standard	Same as standard
→ **f.** Router.				
POST ……………………………	TI 6160.66, section 5	Successful completion of POST diagnostics	Same as standard	Same as standard
→ **g.** D/A-Position Processor (DPOS), Model 7029, Type P615.				
(1) Processor ……………….. embedded diagnostics, including BIST and POST.	TI 6160.51, DSR Console Hardware Technical Manual, MAP 900	Successful completion of DPD headless diagnostics	Same as standard	Same as standard
		AND		
(2) APRL …………………….. command executed at the M&C position performs a hardware /software verification to the targeted processor prior to obtaining operational status.	TI 6160.58, appendix B	Successful acceptance of the processor into its assigned role at the M&C console		
3–56. – 3–60. RESERVED.				

Section 6. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–61. ECG PROCESSING.				
→ **a.** Primary ……….………………….. Channel Data Processing and Transfer.		Satisfactory radar and FDP and operations using Online Certification (OLC) targets of opportunity, RTQC printouts, manual techniques or Host Online Test Tools	Same as standard	Same as standard
→ **b.** Secondary Channel (EBUS).				
(1) Conflict ………….....……... Awareness.	NAS–MD–675, and MEARTS Operator Manual	Satisfactory Conflict Awareness processing using offline target generator programs or targets of opportunity	Same as standard	Same as standard
(2) Data ………………..………... processing and transfer.	NAS–MD–672, NAS–MD–680, and MEARTS Operator Manual	Satisfactory radar and FDP and operations using offline target generator programs, targets of opportunity, RTQC printouts, or Host Online Test Tools	Same as standard	Same as standard
(3) CD/Radar Site ….…………..	EQARS User Manual, Par. 304b(10)	Satisfactory transfer of digital data from CD/radar site to ECG	Same as standard	Same as standard

Section 6. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **3–62. CONNECTIVITY.**				
a. CCCH — ………………….….….. Primary channel path.		Successful connectivity to CCCH using online certification programs, Host Online Test Tools, Monitor and Control, manual techniques, or interface printouts	Same as standard	Same as standard
b. DSR BCN — ………………….. Secondary channel path.		Successful connectivity to DSR using offline target generator programs, diagnostic test tools, manual techniques, System Monitor Console (SMC) or interface printouts	Same as standard	Same as standard
→ **3–63. DATA ENTRY AND PERIPHERAL RESPONSE.**		Satisfactory SMC control, message entry, and response as verified using offline target generator programs or manual techniques	Same as standard	Same as standard
→ **3–64. FAULT SENSING,STATUS REPORTING AND RECONFIGURATIONS.**		Successful fault sensing, status reporting, and reconfigurations resulting in PAS/SAS switching of OUs	Same as standard	Same as standard
3–65. STORAGE DATA TRANSFER AND RETRIEVAL.		Successful data storage and retrieval of data for Card Data Recorder (CDR) services and RAID	Same as standard	Same as standard

Section 6. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–66. ECG ELEMENTS.				
→ **a.** Sun Fire 280R Processor. Primary Interface Processor (PIP). Backup Interface Processor (BIP).	TI 6100.18, Sun Fire 280R Server Mainten-ance Manual, and Sun Fire 280R Server Service Manual			
(1) POST		Error free completion	Same as standard	Same as initial
(2) Open Boot Diagnostics tests.		Error free completion	Same as standard	Same as initial
(3) ECG Validation Test Suite (ECGVTS).		Error free completion	Same as standard	Same as initial
→ **b.** Magna Expansion Chassis	TI 6100.18			
(1) BIST		Error free completion	Same as standard	Same as initial
(2) Sunhillo SEP Diagnostics.				
(a) SCA, PCCA, and PCA cards.		Error free completion	Same as standard	Same as standard
(b) GPI/O (PIP only).		Error free completion	Same as standard	Same as standard
(3) Tailgate assembly (PIP rack only).		Error free completion	Same as standard	Same as standard
→ **c.** Cisco 2950T Switch	TI 6100.18			
POST		Error free completion	Same as standard	Same as initial

Section 6. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **d.** Cisco 3725 Router ……………...	TI 6100.18			
POST ………………….………..		Error free completion	Same as standard	Same as initial
→ **e.** Terminal Server Avocent ……... 1610CPS.	TI 6100.18			
POST ……………………………		Error free completion	Same as standard	Same as initial
→ **f.** Sun Blade 150 Processor …….. (Maintenance Work Station (MWS), Support Work Station (SWS))	TI 6100.18			
(1) POST ……………………..	Par. 6.1.3.1	Error free completion	Same as standard	Same as initial
(2) Open Boot ……………..…. Diagnostics tests.	Par. 6.1.3.2	Error free completion	Same as standard	Same as initial
(3) ECGVTS …………………	Par. 6.1.3.3	Error free completion	Same as standard	Same as initial
(a) Iomega ZIP drive …..		Error free completion	Same as standard	Same as standard
(b) External CD–RW ….. drive (SWS only).		Error free completion	Same as standard	Same as standard
(c) External Speakers … (MWS only).		Error free completion	Same as standard	Same as standard
(d) AC & NC RAID ……. Unit.		Error free completion	Same as standard	Same as standard
(4) External CD–RW POST ...	Par. 6.1.5	Error free completion	Same as standard	Same as initial
(5) AC NC RAID Unit POST ..	Par. 6.1.14	Error free completion	Same as standard	Same as initial

Section 6. EN ROUTE COMMUNICATIONS GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
g. Viewsonic ……………………..…... VE800 Monitor.	TI 6100.18			
POST ……………………………..		Error free completion	Same as standard	Same as initial
h. Lexmark T520 Printer ………….	TI 6100.18			
(1) POST ……………………..		Error free completion	Same as standard	Same as initial
(2) LAN Connection test ……..		Error free completion	Same as standard	Same as initial
→ **i.** Sunhillo Modem Splitter ………..	TI 6100.18			
8–Port Module Test ……...……..		Error free completion	Same as standard	Same as initial
3–67. RAPPI.				
a. LKA 981170 Processor.				
(1) POST ……………………..	TI 6100.27, par. 6.2.1	Error free completion	Same as standard	Same as initial
(2) TuffTest Diagnostics ……..	TI 6100.27, par. 6.2.2	Error free completion	Same as standard	Same as initial
b. Monitor.				
(1) NEC LCD 1760V.				
POST ……………………...	TI 6100.27, par. 6.2.3	Error free completion	Same as standard	Same as initial
(2) NEC LCD 1860NX–BK.				
POST ……………………...	TI 6100.27, par. 6.2.3	Error free completion	Same as standard	Same as initial
3–68. – 3–99. RESERVED.				

Section 7. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–100. ERIDS.				
a. Sun Fire V240 Servers.				
(1) Perform POST ……………. diagnostics.	TI 6160.67, par. 6.10.1	Error free completion	Same as standard	Same as initial
(2) Perform Open Boot ……... Diagnostics tests.	TI 6160.67, par. 7.2.2.4.1	Error free completion	Same as standard	Same as initial
b. Sun Fire V210 Servers.				
(1) Perform POST ……………. diagnostics.	TI 6160.67, par. 6.10.2	Error free completion	Same as standard	Same as initial
(2) Perform Open Boot ……... Diagnostics tests.	TI 6160.67, par. 7.2.2.4.1	Error free completion	Same as standard	Same as initial
c. Sun Blade 150.				
(1) Perform POST …………..... diagnostics.	TI 6160.67, par. 6.10.3	Error free completion	Same as standard	Same as initial
(2) Perform Open Boot ……… Diagnostics tests.	TI 6160.67, par. 7.2.2.4.2	Error free completion	Same as standard	Same as initial
d. IBM ThinkCentre M51/M55 PC.				
(1) Perform POST ……………. diagnostics.	TI 6160.67, par. 6.11.1	Error free completion	Same as standard	Same as initial
(2) Perform reboot ……………	TI 6160.68, par. 5.9.2.	Error free completion	Same as standard	Same as initial
e. IBM IntelliStation M Pro.				
(1) Perform POST ……………. diagnostics.	TI 6160.67, par. 6.11.2	Error free completion	Same as standard	Same as initial
(2) Perform reboot …………..	TI 6160.68, par. 5.9.2.	Error free completion	Same as standard	Same as initial

Section 7. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
f. Cisco 2821 Router.				
Perform POST …………………..… diagnostics.	TI 6160.67, par. 6.12	Error free completion	Same as standard	Same as initial
g. Cisco Catalyst 3750G–24T–E Switch.				
Perform POST diagnostics.	TI 6160.67, par. 6.13.1	Error free completion	Same as standard	Same as initial
h. Cisco Catalyst 3750–24 Switch.				
Perform POST …………..……… diagnostics.	TI 6160.67, par. 6.13.2	Error free completion	Same as standard	Same as initial
i. Cisco Catalyst 2950T–24 Switch.				
Perform POST …………………… diagnostics.	TI 6160.67, par. 6.14.1	Error free completion	Same as standard	Same as initial
j. Cisco Catalyst 2950C–24 Switch.				
Perform POST diagnostics …….	TI 6160.67, par. 6.14.2	Error free completion	Same as standard	Same as initial
k. Network Attached Storage Disk Array (NASDA).				
Perform POST diagnostics …….	TI 6160.67, par. 6.15	Error free completion	Same as standard	Same as initial
l. Quantum SDLT 600 …………… SuperLoader3 Tape Backup Unit.	TI 6160.67, par. 6.16			
Perform POST diagnostics …….		Error free completion	Same as standard	Same as initial
m. Coyote Point Equalizer………… E350si Load Balancer.	TI 6160.67, par. 6.17			

Section 7. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
n. HP 2430TN LaserJet Printer …..	TI 6160.67, par. 6.19			
Perform POST diagnostics …….		Error free completion	Same as standard	Same as initial
o. Lexmark C510n Color LaserJet Printer.				
Perform POST diagnostics …….	TI 6160.67, par. 6.20	Error free completion	Same as standard	Same as initial
p. SMARTstart Power ………..…… Sequencer.	TI 6160.67, par. 6.18	Display of correct status of LEDs	Same as standard	Same as initial

Section 7. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–101. – 3–199. RESERVED.				

Section 8. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
3–200. PROCESSING CAPABLITY.				
→ **a.** R-Console ………………………	Par. 5-17h, TI 6110.100, par. 8.2	Satisfactory processing, entry, and display of data on each R-console via primary and backup channels using the online certification program, manual techniques, M&C views, or diagnostic tests	Same as standard	Same as standard
R-console verification test ……..	TI 6110.120, par. 6.18	Successful completion	Pass	Up
→ **b.** D, D/A-Console ………..…..….	TI 6110.101, par. 3.4, TI 6110.110, par. 2.6	Satisfactory processing, entry, and display of data on each D and A Consoles via primary and backup channels using the online certification program, manual techniques, M&C views, or diagnostic tests	Same as standard	Same as standard
D, D/A-console ……………….. verification test.	TI 6110.120, par. 6.18	Successful completion	Pass	Up

Section 8. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
→ **c.** Flight Strip Data …………….....	TI 6110.111, par. 3.4.1	Satisfactory printing of flight strips with correct device response, regis-tration, and print quality using the online certification program, manual techniques (TD_P message), M&C information, or diagnostic tests	Same as standard	Same as standard
FSP verification test ……………	TI 6110.120, par. 6.19	Successful completion	Pass	Up
→ **3–201. CONNECTIVITY CAPABILITY.**	TI 6110.110, app. A.2.34			
		Successful con-nectivity using the online certification program, manual techniques, M&C views, or diagnostic tests	Same as standard	Same as standard
LAN communication …………………. verification tests.	TI 6110.120. par. 6.16	Successful estab-lishment of comm-unications	Pass	Up
→ **3–202. CONTROL CAPABILITY.**				
	TI 6110.110, chapter 4	Successful recon-figurations between primary and backup channels at the positions using the online certification program or manual techniques result-ing in no degraded conditions	Same as standard	Same as standard

Section 8. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **3–203. CONFIGURATION CAPABILITY.**	TI 6110.110, appendix A, Processor Details window	Successful validation of new software version level and/or adaptation level using status of M&C views, reports, messages, or observations.	Same as standard	Same as standard
3–204. – 3–209. RESERVED.				
3–210. CONSOLE PROCESSORS.				
a. R-Console.				
Model: IBM p5++55A				
→ Processor extended .... diagnostics failure.	TI 6110.120, par. 6.17	Diagnostics complete	DIAGS Pass OC99	Up
b. D, D/A-Console.				
Model: IBM p5++52A or p615				
→ Processor extended …….. diagnostics failure.	TI 6110.120, par. 6.18	Diagnostics complete	DIAGS Pass OC99	Up
3–211. SWITCHES.				
a. KVMHR.				
Model: StarTech SV31HR				
Power on ……………………….	TI 6110.121, par. 3.4.1	Successful completion	Error free	Up

Section 8. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
b. KVMLR.				
Model: StarTech SV21LR				
Power on …………………………	TI 6110.121, par. 3.4.1	Successful completion	Error free	Up
3–212. DISPLAYS.				
a. FPMDM.				
Model: Barco ISIS MD 471				
1. Power on …………………..	TI 6110.121, par. 3.7.1	Successful completion	Error free	Up
→ **2.** Automatic phase adjustment. …………	TI 6110.123, par. 3.1.1	Successful completion	Calibration complete	Error free
b. FPD20.				
Model: NEC MultiSync LCD 2010NX				
Power on …………………………	TI 6110.121, par. 3.6.1	Successful completion	Error free	Up
3–213. FLIGHT STRIP PRINTER.				
FSP.				
Model: BOCA Systems FSP 42				
a. POST ……………………………	TI 6110.120, chapter 4	Successful completion	Error free	Up
→ **b.** Diagnostic Strip test ……………	TI 6110.120, par. 6.19	Successful printing of diagnostic strip	Error free	Error free

Section 8. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–214. POWER DISTRIBUTION UNIT.				
PDU.				
Power on ……………….………..	TI 6110.122, par. 3.13.1	Successful power on	Error free	Green
3–215. UNINTERRUPTABLE POWER SUPPLY.				
UPS.				
Model: Tripp-Lite Unison SU 1000RT2UHLV				
→ **a.** Operation battery test ……	TI 6110.120, par. 5.6.2	100%	100%	100%
b. Spare battery test ………..	TI 6110.120, par. 7.8.2	35 volts	35 volts	
→ **c.** Power on …………………	TI 6110.120, par. 3.5.3	Successful power on	Error free	Online with full charge
3–216. – 3–299. RESERVED.				

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→ **3–300. FDP CAPABILITY.**	TI 6110.110, TI 6110.111	Satisfactory processing and transfer of flight data via the primary channel using the online certification program, manual techniques (e.g., TD messages), M&C views, or diagnostic tests.	Same as standard	Same as standard
→ **3–301. SDP CAPABILITY.**	TI 6110.110, chapter 7, TI 6110.111	Satisfactory processing and transfer of surveillance (radar) data via the primary and backup channels using the online certification program, manual techniques, M&C views, or diagnostic tests.	Same as standard	Same as standard
3–302. GIP CAPABILITY.	TI 6110.110, TI 6110.111	Satisfactory processing and transfer of general information data via the primary and backup channels using the online certification program, manual techniques, M&C views, or diagnostic tests.	Same as standard	Same as standard

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–303. CONNECTIVITY CAPABILITY.		Successful connectivity to EADS and ECG using the online certification program, manual techniques, M&C views, or diagnostic tests.		
→ **a.** EADS			Same as standard	Same as standard
→ **b.** ECG			Same as standard	Same as standard
→ **3–304. INPUT/OUTPUT CAPABILITY.**				
	TI 6110.110	Satisfactory operations and message entry using the online certification program or manual techniques resulting in no degraded conditions displayed.	Same as standard	Same as standard
→ **3–305. CONTROL CAPABILITY.**	TI 6110.110, chapter 4	Successful fault sensing and status reporting with satisfactory reconfigurations between primary and backup channels using the online certification program or manual techniques resulting in no degraded conditions.	Same as standard	Same as standard
→ **3–306. CONFIGURATION CAPABILITY.**	TI 6110.110, appendix A, Processor Details window	Successful validation of new software version level and/or adaptation level using the status of M&C views, reports, messages, or observations.	Same as standard	Same as standard

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–307. – 3–309. RESERVED.				
3–310. RACK PROCESSORS.				
a. CPP, SDPP, FDPP, SYNCP, MCP (OPS).				
Model: IBM p55++ 55A				
→ Hardware diagnostics ……..….	TI 6110.122, chapter 4	Successful completion	Pass	Up
b. GPWXP.				
Model: IBM p55++ 52A				
→ Hardware diagnostics …..…….	TI 6110.122, chapter 4	Successful completion	Pass	Up
3–311. WORKSTATIONS.				
a. MCWS, SPECWS.				
Model: IBM p5 52A				
→ Hardware diagnostics …..…….	TI 6110.122, par. 3.3.1	Successful completion	Pass	Up
b. SECWS.				
Model: IBM IntelliStation M Pro 6218				
POST …………………………..	TI 6110.121, chapter 4	Successful completion	Error free	Up
3–312. ROUTER.				
RFW.				
Model: Cisco 3825				
→ Power on ………………………	TI 6110.122, par. 3.3.1	Successful completion	Error free	Up

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
3–313. SWITCHES.				
a. KVM Switches.				
(1) KVMHR.				
Model: StarTech SV31HR				
Power on …………………	TI 6110.121, par. 3.4.1	Successful completion	Error free	Up
(2) KVMLR.				
Model: StarTech SV21LR				
Power on ………….…….	TI 6110.121, par. 3.4.1	Successful completion	Error free	Up
b. M&C LAN, APPLAN.				
Model: Cisco Catalyst 4506/4006				
Power on ………………………	TI 6110.122, par. 3.5.1	Successful completion	Error free	Up
c. CMS.				
Model: Western Telematic Inc. CMS–32				
Power on ………………………	TI 6110.122, par. 3.6.1	Successful completion	Error free	Up
d. SAN.				
Model: IBM Total Storage 2109 SAN32B–2				
Power on ……………...……….	TI 6110.122, par. 3.7.1	Successful completion	Error free	Up

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–314. PRINTER.				
COLOR.				
Model: IBM InfoPrint 1654 Color Laser				
Power on ………………………	TI 6110.121, par. 3.9.1	Successful completion	Error free	Up
3–315. DISPLAYS.				
a. FPMDM.				
Model: Barco ISIS MD 471				
Power on ………………………	TI 6110.121, par. 3.7.1	Successful completion	Error free	Up
b. FPD19.				
Model: NEC MultiSync LCD 1970NX				
Power on ………………………	TI 6110.121, par. 3.6.1	Successful completion	Error free	Up
c. FPD20.				
Model: NEC MultiSync LCD 2070NX				
Power on ………………………	TI 6110.121, par. 3.6.1	Successful completion	Error free	Up
3–316. POWER SEQUENCER.				
PWRSEQ.				
Model: Spectrum Control AC SMARTstart Jr.				
→ Power on ……………….……...	TI 6110.121, par. 3.5.1	Successful power on	Error free	Green

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	*Operating*
3–317. POWER DISTRIBUTION UNIT.				
PDU.				
Model: Pulizzi Z–Line T98B2				
Power on ……………….……...	TI 6110.122, par. 3.13.1	Successful power on	Error free	Green
3–318. UNINTERRUPTABLE POWER SUPPLY.				
UPS.				
Model: Eaton Powerware 9125				
→ Power on ……………………..…..	TI 6110.122, par. 3.12.1	Successful power on	Error free	Green
3–319. SERVER.				
PRNTSERV.				
Model: Lexmark N7000e				
Power on ……..……………….…	TI 6110.121, par. 3.10.1	LCD illuminated	Same as standard	Same as standard
3–320. STORAGE.				
ES.				
Model: IBM DS4700				
POST ……………………….…..	TI 6110.122, par. 3.8.1	Successful completion	Error free	Up

Section 9. EN ROUTE AUTOMATION SYSTEM (EAS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–321. – 3–399. RESERVED.				

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–400. – 3–409. RESERVED.				
3–410. PROCESSORS.				
a. SCDP, ESSP, STP, DRAP.				
Model: IBM p55++ 55A				
Hardware diagnostics …………..	TI 6110.122, par. 6.1.5	Successful completion of diagnostic tests	Pass	Up
b. MISMCP, SIMP.				
Model: IBM p55++ 52A				
Hardware diagnostics …………..	TI 6110.122, par. 6.1.5	Successful completion of diagnostic tests	Pass	Up
c. TEST AND TRAINING (T&T)				
1. CPP, SDPP, FDPP, SYNCP.				
Model: IBM p55++ 55A				
Hardware diagnostics …...	TI 6110.122, par. 6.1.5	Successful completion	Pass	Up
2. GPWXP, MCP.				
Model: IBM p55++ 52A				
Hardware diagnostics ...….	TI 6110.122, par. 6.1.5	Successful completion	Pass	Up

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–411. WORKSTATIONS.				
a. PBWS.				
Model: IBM p5 52A				
Hardware diagnostics …………..	TI 6110.122, par. 6.1.5	Successful completion of diagnostic tests	Pass	Up
b. SUPWS, SSEC, SUPMC, MAINTWS.				
Model: IBM IntelliStation M Pro 6218				
Power on …….…………………	TI 6110.121, par. 3.3.1	Successful completion	Error free	Up
c. GPWS.				
Model: IBM IntelliStation Power 285				
Power on ……………..……….	TI 6110.121, par. 3.2.1	Successful completion	Error free	Up
3–412. ROUTER.				
SUPRFW.				
Model: Cisco 3825				
Power on …….…………………	TI 6110.122, par. 3.3.1	Successful completion	Error free	Up

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–413. SERVERS.				
a. SMS.				
Model: IBM System x3250				
POST ………………………………	TI 6110.122, par. 3.2.1	Successful completion	Error free	Up
b. PRNTSERV.				
Model: Lexmark N7000e				
Power on …………………………..	TI 6110.121, par. 3.10.1	LCD illuminated	Same as standard	Same as standard
3–414. TAPE.				
TAPELIB.				
Model: IBM T3310 Tape Library Unit				
Power on …………………….…….	TI 6110.122, par. 3.9.1	Successful completion	Error free	Up
3–415. SWITCHES.				
a. SUPLAN, T&T M&CLAN, T&T APPLAN.				
Model: Cisco Catalyst 4506				
Power on …………………………….	TI 6110.122, par. 3.5.1	Successful completion	Error free	Up

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
b. MNTLAN, ECG LAN.				
Model: Cisco Catalyst 2960–24TT				
Power on ……………..………	TI 6110.122, par. 3.4.1	Successful completion	Error free	Up
c. CMS.				
Model: Western Telematic Inc. CMS–32				
Power on ……………..…………	TI 6110.122, par. 3.6.1	Successful completion	Error free	Up
3–416. PRINTERS.				
a. COLOR.				
Model: IBM InfoPrint 1654 Color Laser				
Power on ……………..………	TI 6110.121, par. 3.9.1	Successful completion	Error free	Up
b. SUPPTR.				
Model: IBM InfoPrint 1585 Laser				
Power on ……………..…………	TI 6110.121, par. 3.9.1	Successful completion	Error free	Up

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
c. PLOTTER.				
Model: HP DesignJet 800ps				
Power on ……………………..….	TI 6110.121, par. 3.8.1	Successful completion	Error free	Up
3–417. DISPLAYS.				
a. FPMDM.				
Model: Barco ISIS MDP 471				
POST …………………………….	TI 6110.120, chapter 4	Successful completion	Error free	Up
b. FPD19.				
Model: NEC MultiSync LCD 1970NX				
POST …………………………….	TI 6110.120, chapter 4	Successful completion	Error free	Up
c. FPD20.				
Model: NEC MultiSync LCD 2070NX				
POST ……………….…………..	TI 6110.120, chapter 4	Successful completion	Error free	Up
3–418. POWER SEQUENCER.				
PWRSEQ.				
Model: Spectrum Control AC SMARTstart Jr.				
Power on ………………………..	TI 6110.122, par. 3.11.1	Successful power on	Error free	Green

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
3–419. POWER DISTRIBUTION UNIT.				
PDU.				
Model: Pulizzi Z–Line T982B2				
Power on ……………………..……	TI 6110.122, par. 3.13.1	Successful power on	Error free	Green
3–420. UNINTERRUPTABLE POWER SUPPLY.				
UPS.				
Model: Eaton Powerware 9125				
Power on ………..………………	TI 6110.122, par. 3.12.1	Successful power on	Error free	Green
3–421. MEDIA CONVERTER.				
MEDCONV.				
Model: Transition Networks E–100 BTX–FX–05(LC)				
Power on ………………………..	TI 6110.122, par. 3.10	LED illuminated	Same as standard	Same as standard

Section 10. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–422. – 3–499. RESERVED.				

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Section 10. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
3–500. SERVERS.				
a. NSM, HADDS.				
Model: Sunfire X2200 M2				
POST ……………………..…….	TI 6131.13, chapter 6	Successful completion	Error free	Up
b. SAFA, NSM, HADDS.				
Model: Kontron ePCI–200				
POST ……………………..…….	TI 6131.13, chapter 6	Successful completion	Error free	Up
3–501. SWITCHES.				
a. Cisco 3560.				
POST ……………………………	TI 6131.13, chapter 7	Successful completion	Error free	Up
b. Linksys.				
POST ……………..……………	TI 6131.13, chapter 7	Successful completion	Error free	Up
c. Belkin OmniView Pro2 KVM.				
Power on …………………….….	TI 6131.13, chapter 6	Successful completion	Error free	Up
d. Network Technologies, Inc. (NTI) KVM Extender.				
Power on ……………………….	TI 6131.13, chapter 6	Successful completion	Error free	Up
3–502. DISPLAYS.				
a. NEC LCD 1970.				
Power on ………………………..	TI 6131.13, chapter 7	Successful completion	Error free	Up
b. Scanport 1724.				
Power on ………………………..	TI 6131.13, chapter 7	Successful completion	Error free	Up

Section 10. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS) (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
OR				
c. NEC LCD1770 NXM–BK–2				
Power on ………………………..	TI 6131.13, chapter 7	Successful completion	Error free	Up
3–503. POWER DISTRIBUTION UNIT (PDU).				
Model: Geist BR060–10TL–DP				
Power on ………………………	TI 6131.13	Successful power on	Error free	Green
3–504. –3–999. RESERVED.				

CHAPTER 4. RELIABILITY CENTERED MAINTENANCE

4–0. GENERAL.

a. This chapter establishes all of the maintenance activities required for the NAS En Route Stage A — Air Route Traffic Control System, via a mix of maintenance methods, to achieve an RCM program. The goal is to maintain each facility, with the required reliability and availability, using the most efficient approach to maintenance. RCM seeks an optimal mix of periodic, condition based, reactive, and run-to-fault approaches. Therefore, this chapter is divided into the following four sections. The first section, Periodic Maintenance (PM), consists of actions performed periodically prior to failure to achieve the desired level of availability and reliability for a system. PM consists of preventative maintenance inspections, performance checks, and routine maintenance. The second section, Condition Based Maintenance (CBM), consists of pro-active maintenance tasks to predict or prevent equipment failures. CBM includes time-based actions, cycle-based actions, situational-based actions, and Corrective Maintenance (CM) actions. The third section, Run-to-Fault (RTF) Maintenance, is an approach that accepts the risk of a facility problem or failure. This approach is normally applied when other types of maintenance actions will not reduce the probability of failure or extend equipment lifetime. Refer to the latest edition of Order 6000.15 for additional general guidance.

b. All reference paragraphs pertaining to standards and tolerance/limits are found in chapter 3 of this order, unless otherwise stated.

c. This chapter will reference specific paragraphs for the maintenance activities listed in the individual equipment instructions books and their frequency of accomplishment.

d. Additional maintenance activities, not listed in the instruction books, will refer the user to chapter 5 of this handbook for the appropriate maintenance procedures.

Section 1. CENTRAL COMPUTER COMPLEX HOST (CCCH)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. CCCH PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–1. CCCH SYSTEM (FEQ = SYS).		
a. System Administration.		
(1) Daily.		
Print and analyze Environmental Record Editing and Printing (EREP) system summary report.		IBM GC28–1378
(2) Monthly.		
Print and analyze EREP trends report		IBM GC28–1378
b. System Interface Test.		
Quarterly.		
Run connectivity tests using MDM or Host Online Test Tool diagnostics.		
<u>1</u> DSR Printer Control Unit (DPCU).	Par. 3–12b(1)	
<u>2</u> DSR LIU	Par. 3–12b(2)	
<u>3</u> URET Host Gateway	Par. 3–12c	
<u>4</u> ECG PIP	Par. 3–12a	
<u>5</u> Interfacility Data Communications.	Par. 3–11(a)(2)	NASP–5201
<u>6</u> CTS.	Par. 3–13d	FAA–4313, NASP–5201

Subsection 1. CCCH PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	*Maintenance Procedures*
c. Radar Data Analysis.		
(1) Weekly.		
Primary Channel: ………………………..…. Perform operational analysis using the QARS program. Verify that the parameters meet the specified criteria. (It is assumed that a site encountering problems will be analyzed on a daily basis until the problem is resolved.)	Par. 3–5a(10)	Par. 530, NASP–5201
(2) Quarterly.		
Using recorded radar data from either the NAS ORR function or the CD RECORD program, D74B3, execute the following CCCH offline analysis programs: Common Digitizer Data Reduction (COMDIG), Beacon False Target Analysis (BFTA) and RARRE. Utilizing the resultant output, accomplish an analysis of the radar subsystem's operational performance.		
4–2. DASD SUBSYSTEM (FEQ = STORAGE).		
EMC Symmetrix 5630.		
a. Quarterly.		
(1) Run POST diagnostics ……………………..	Par. 3–16b(1)	CDRL D038, section 3, or Symmetrix Model 3630/5630 Product Manual, appendix C
(2) Run ICKDS using Analyze ………………. command with SCAN and DRIVE TEST options on any logical volume.	Par. 3–16b(1)	Device Support Facilities User's Guide, GC–35–0033, chapter 11

Subsection 1. CCCH PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. Annually.		
Symmetrix 5630 noise baffle cleaning…………..	N/A	CDRL D038, par. 6.2.2
c. Every 4 years.		
Symmetrix 5630 battery replacement …………..	N/A	CDRL D038, par. 6.2.1
4–3. HOST PROCESSOR (FEQ = PROC).		
a. Quarterly.		
(1) Run POST diagnostics and ……………….. Checkout tests.	Par. 3–16a(1)	IBM S/390 Hardware Management Console Operations Guide
(2) Run SE POST ………………………………	Par. 3–16a(2)	
(3) Run HMC POST ……………………………	Par. 3–16a(3)	
b. Annually.		
Clean or exchange filters (3) as ………………..…. required in the 9672 frame.	IBM S/390 Service Guide	IBM S/390 Parts Catalog
4–4. KEYBOARD VIDEO DISPLAY TERMINALS (FEQ = DSPLY).	TI 6110.16	TI 6110.16
Visara 1883 KVDT.		
Run POST …………………………………………	Par. 3-16g	
4–5. HIGH-SPEED AND CONSOLE PRINTERS. (FEQ = PRINTER).	TI 6110.16	TI 6110.16 and IBM 6400 Setup Guide S544–5640–00, 6400 Line Matrix Printers, Maintenance Information Manual, S246–0117–06

Subsection 1. CCCH PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
6400 Model Printers (P50, 050, 05P, 015).		
a. Weekly.		
Check and replace the ribbon as required	Visual	
b. Monthly.		
(1) Print error log		Chapter 6
(2) Run POST	Par. 3–16f	
(3) Clean printer interior and exterior	Visual	Chapter 3
(4) Align ribbon guide	Visual	Chapter 6
(5) Clean End–of–Tape (EOT) sensor	Visual	Chapter 6
4–6. MAGNETIC TAPE STORAGE SUBSYSTEM (FEQ = TAPE).		IBM D99–3480A
IBM 3480 Tape Control Units.		
a. Weekly.		
Run cleaner cartridge per each drive.		
b. Quarterly.		
Run OLTS T3480A, C	Par. 3–16c(2)	
c. Semiannually.		
IML Tape Control Unit	Par. 3–16c(1)	
4–7. SWITCHING MANAGEMENT SUBSYSTEM (FEQ = SWITCH).	3814 Maintenance Information Manual (MIM), vol. 04, chapter 10, page 10–1.	3814 MIM, vol. 04, chapter 10, page 10–1.
a. IBM 3814 Switching Unit.		
Annually.		
(1) Clean turbine filter — 01P filter.		
(2) Clean gate fan — 01C filter.		

Subsection 1. CCCH PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	*Maintenance Procedures*
(3) Clean gate fan — 1H filter.		
AND		
b. 3274 Terminal Control Unit ………………………		IBM 3274 Control Unit Maintenance Concepts and Maintenance Information Manuals.
(1) Weekly.		
Check muffin fans (2) ………………………	Visual	
(2) Quarterly.		
Run OLTS T3274A ……………………..…..	Par. 3–16d(2), par. 3–16e	
(3) Semiannually.		
IML 3274 Terminal Control Unit …………...	Par. 3–16d(1)	
OR		
c. Visara 1174–25S Communications Server.		TI 6110.29, Visara Hardware Maintenance Manual
(1) Weekly.		
Check front panel fans (3) ………………...	Visual	
(2) Quarterly.		
Run OLTS T3274A ………………………...	Par. 3–16d(2)	
(3) Semiannually.		
IML (POST) 1174–25S …………………….. Communications Server.	Par. 3–16h	
4–8. – 4–19. RESERVED.		

Section 1. CENTRAL COMPUTER COMPLEX HOST (CCCH)

Subsection 2. CCCH CONDITION BASED MAINTENANCE (CBM)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–20. MAGNETIC TAPE STORAGE SUBSYSTEM (FEQ = TAPE).		
IBM 3480 Tape Control Units.		
a. 250 Passes.		
Replace cleaner cartridge.		
b. Following all IBM maintenance actions:		
Run cleaner cartridge ………………………	Visual	IBM 3480 Magnetic Tape Subsystem Operator’s Guide (GA32–0066), chapter 4.
c. As Required.		
(1) Wet clean all drives ……………………..	Par. 3–16c	Contact IBM.
(2) Retention of approved 3480 tape cartridges.		
4–21. SWITCHING MANAGEMENT SUBSYSTEM (FEQ = SWITCH).		
a. IBM 3814 Switching Unit ……………..……………	Visual	IBM 3814 Maintenance Information Manual. Call ATO–E Second Level Support for replacement diskettes.
Diskette/disk drive errors:		
Replace diskettes.		

Subsection 2. CCCH CONDITION BASED MAINTENANCE (CBM) (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. IBM 3274 Terminal Control Unit …………………..	Visual or Fault Protection	IBM 3274 Control Unit Maintenance Concepts and Maintenance Information Manuals.
Diskette/disk drive errors:		
Replace diskettes.		
4–22. HOST PROCESSOR (FEQ = PROC).		
IBM 9672 RA4 G3 Processor.		
a. VM Communications Subsystem not in use:		
Disable OSA interface ………………………………	Verify “Attached” for enabled and “Free” for disabled; or “Active” for connected and “Inactive” for disabled.	STR–CCCH–014; Run DISP through EXEC to disable. Run ENAP through EXEC to enable.
b. Backup critical console data ……………………… (HMC) and backup critical data (SE).		IBM S/390 Hardware Management Console Operations Guide
4–23. HIGH-SPEED AND CONSOLE PRINTERS (FEQ = PRINTER).		
6400 Model Printers (P50, 050, 05P, 015).		
As Required.		
Replace diskettes.		
4–24. – 4–49. RESERVED.		

Section 1. CENTRAL COMPUTER COMPLEX HOST(CCCH)

Subsection 3. CCCH RUN-TO-FAULT (RTF)

Task	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
4–50. – 4–99. RESERVED.		

Section 2. DISPLAY SYSTEM REPLACEMENT (DSR)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. DSR PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–100. SYSTEM ADMINISTRATION.		
As Required.		
(1) Perform Manage Backup and Restore of Operational Processors.		TI 6160.46, section 4
(2) Perform Update Software Releases		TI 6160.56, section 6
(3) Perform Update Site Adaptation		TI 6160.57, TI 6160.56, sections 7 and 8
4–101. MAIN DISPLAY MONITOR.		
Barco Flat Panel MDM (FPMDM).		
As Required.		
Perform MDM alignment procedure		TI 6160.51 (MDM Alignment Procedure)
4–102. DSR LOCAL COMMUNICATIONS NETWORK.		
a. LCN Data Path.		
Quarterly.		
Perform Cold Starting a Data Path		TI 6160.58, par. 4.1.3, procedure H

Subsection 1. DSR PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. Primary Channel Processor (PCP) RISC/6000, Model 7018–770.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–38a(1)	TI 6160.51, section 6, TI 6160.53, section 7
c. LCN Bridge Processor PS/2 Model 55 SX.		
Annually.		
Perform Bridge Verification diagnostics ….	Par. 3–38a(2)	TI 6160.53, section 6
d. System Analysis Recording Processor (SAR–H) RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–38a(3)	TI 6160.53, section 7
e. History Alert Log Processor (HAL–H) RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–38a(4)	TI 6160.53, section 7
f. LIU RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics …………………	Par. 3–38a(5)	TI 6160.53, section 7
g. WARP System Interface Processor RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–38a(6)	TI 6160.53, section 7

Subsection 1. DSR PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
4–103. DSR BACKUP COMMUNICATIONS NETWORK.		
a. BCN Data Path.		
Quarterly.		
Perform Cold Starting a Data Path. ……….		TI 6160.58, par. 4.1.3, procedure H
b. BCP RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………….	Par. 3–38b(1)	TI 6160.53, section 7
c. EDARC System Interface Processor (ESIP) RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………….	Par. 3-38b(2)	TI 6160.53, section 7
d. System Analysis Recording Processor (SAR–E) RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………….	Par. 3–38b(3)	TI 6160.53, section 7
e. History Alert Log Processor (HAL–E) ……..…….. RISC/6000, Model 7018–771.	Par. 3–38	
Annually.		
Perform POST diagnostics …………………	Par. 3–38b(4)	TI 6160.53, section 7
f. WARP System Interface Processor …… RISC/6000, Model 7018–771.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–38a(6)	TI 6160.53, section 7

Subsection 1. DSR PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–104. SUPPORT NETWORK.		
a. SRM Processor RISC/6000, Model 7018–771.		
(1) Annually.		
Perform POST diagnostics …………………	Par. 3–40(a)	TI 6160.53, section 7
(2) As Required.		
Create Backup Image ……………………..		TI 6160.46, section 4
b. Data Reduction and Analysis (DR&A) Processor RISC/6000, Model 7018–771.		
(1) Annually.		
Perform POST diagnostics …………………	Par. 3–40(b)	TI 6160.53, section 7
(2) As Required.		
Create Backup Image ………………………		TI 6160.46, section 4
c. ESSP.		
Annually.		
Perform POST diagnostics …………………	Par. 3–40c	TI 6160.66, section 5
4–105. FDP ELEMENTS.		
DSR Printer Control Unit.		
Annually.		
(a) Perform POST diagnostics ……………	Par. 3–39a(1)	TI 6160.51, section 6, TI 6160.53, section 7
(b) Run MDM routine D7951, ……..…….. with output to a minimum of one FSP.	Par. 3–12b(1)(a)	FAA–4319
OR		

Subsection 1. DSR PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(c) Run Host Online Test Tool DIAG ….. DPCU with output to a minimum of one FSP.	Par. 3–39a(2)	NASP–5201
4–106. IBM 3490 MAGNETIC TAPE SUBSYSTEM.		
Common in the following DSR racks:		
• SAR Processor Tape		
• SRM		
• DR&A		
a. Semiannually.		
Clean tape heads …………………………………		IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22 Maintenance Information Manual.
b. As Required.		
Perform maintenance ………………….………… on tape subsystem as requested by the LED message displayed on each drive.		IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22 Maintenance Information Manual.
4–107. SEMAPHORE ST–3013 NETWORK ENCRYPTION UNIT (NEU).		
The NEU is housed in the SRM rack.		
As Required.		
Replace battery ……………………………..		TI 6160.53, par. 5.10

Subsection 1. DSR PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–108. MAIN DISPLAY MONITOR.		
a. As Required.		
(1) Clean monitor surface (exterior) …………..	Visual	TI 6160.51, section 5 (surface cleaning) FDMDM
(2) DSR trackball maintenance ……………..… and cleaning.	Visual	TI 6160.47, section 10
b. Quarterly.		
Perform periodic inspections of the …………….. FPMDM filter.	Visual	TI 6160.51, section 5 (periodic inspection of the FDMDM filter)
c. Every Two (2) Years.		
Perform Spares conditioning ………………..…… (electrolytic capacitors) on FPMDM.		TI 6160.51, section 5 (FPMDM spares conditioning)
4–109. DSR PRINTER CONTROL UNIT (DPCU).		
Monthly.		
Flight Strip Printer ………………………………...		Flight Strip Printer, Maintenance and Users Manual, FSP 960–300B Document No. A422632 Revised 08.10.99 (or later), BOCA Systems.
(a) Clean thermal print head ……………	None	.
(b) Clean rubber drive roller (platen)		
(c) Clean optical device		
(d) Vacuum interior (general cleaning)		
4–110. – 4–149. RESERVED.		

Section 2. DISPLAY SYSTEM REPLACEMENT (DSR)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. DSR CONDITION BASED MAINTENANCE (CBM)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–150. – 4–174. RESERVED.		

Section 2. DISPLAY SYSTEM REPLACEMENT (DSR)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. DSR RUN-TO-FAULT (RTF)

Task	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–175. – 4–199. RESERVED.		

Section 3. USER REQUEST EVALUATION TOOL (URET)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. URET PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–200. URET NETWORK.		
a. URET DSGW.		
Annually.		
(1) Perform reset of system controller on CP server. …………….		TI 6160.66, section 7
(2) Perform POST diagnostics …………	Par. 3–55a	TI 6160.66, section 5
b. URET HGW.		
(1) Annually.		
Perform POST diagnostics ………………..	Par. 3–55b	TI 6160.66, section 5
(2) Quarterly.		
Multiprogramming Diagnostic Monitor (MDM). …………….	Par. 3–12c(1)	FAA–4321–H, section 5.0
OR:		
Run Host Online Test Tool diagnostics ….	Par. 3–12c(2)	NASP–5201
c. Conflict Probe Processor (CP).		
Annually.		
Perform POST diagnostics ………………..	Par. 3–55c	TI 6160.66, section 5

Subsection 1. URET PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
d. EDI Support Processor.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–55d(1)	TI 6160.66, section 5
e. Fast Ethernet Switch.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–55e	TI 6160.66, section 5
f. Router.		
Annually.		
Perform POST diagnostics ………………..	Par. 3–55f	TI 6160.66, section 5
g. D/A Processor (DPOS) Model 7029, Type P615.		
Annually.		
Perform console verification (DPD) ………	Par. 3–55g(1)	TI 6160.51, MAP 900
4–201. – 4–205. RESERVED.		
4–206. D/A DPOS CONSOLE.		
a. Monthly.		
Uninterruptable Power Supply ………………….. (UPS) check.	Error free	TI 6160.51, section 5
b. As Required.		
(1) Clean monitor surface (exterior) …………..	Visual	TI 6160.51, section 5
(2) URET trackball maintenance …………….. and cleaning	Visual	TI 6160.47, section 13

Section 3. USER REQUEST EVALUATION TOOL (URET)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. URET CONDITION BASED MAINTENANCE (CBM)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–207. SUN STORAGE L9 TAPE AUTOLOADER (ESSP RACK).		
As Indicated.		
Clean tape heads as indicated on …………..…… LCD screen for L9 tape drive.		TI 6160.55, table 5–1
4–208. DDS-4 ETERNAL TAPE DRIVE (ESSP RACK).		
Semiannually.		
Clean tape heads …………………………………		Sun StorEdge DDS–4 User's Guide, Section: Cleaning the Tape Drive
4–209. X–CERTA 3480 TAPE DRIVE (ESSP RACK)		
As Indicated.		
Clean tape heads as indicated on ……………….. Operator's Panel.		TI 6160.66, table 5–1
4–210. – 4–250. RESERVED.		

Section 3. USER REQUEST EVALUATION TOOL (URET)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. URET RUN-TO-FAULT (RTF)

Task	Reference Paragraph	
	Standards & Tolerances	*Maintenance Procedures*
4–251. – 4–299. RESERVED.		

Section 4. EN ROUTE COMMUNICATIONS GATEWAY (ECG)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. ECG PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–300. PRIMARY INTERFACE PROCESSOR (PIP) (FEQ = PIP A, PIP B).		
a. Sun Fire 280R ……………………………..…………..		TI 6100.18, section 6
(1) Quarterly.		
(a) POST …………………………………....	Par. 3–66a(1)	Par. 6.1.1.1
(b) Open Boot Diagnostics test …………	Par. 3–66a(2)	Par. 6.1.1.2
(c) ECG VTS ………………………………	Par. 3–66a(3)	Par. 6.1.1.3
(2) Every four (4) years.		
Replace lithium battery ……………………..		Section 6.2.2
b. Expansion Chassis …………………………………		Section 6
Quarterly.		
(1) Magma Expansion Chassis BIST ..….	Par. 3–66b(1)	Par. 6.1.2
(2) Sunhillo SEP diagnostics		
(a) SCA, PCCA, and PCA cards …..	Par. 3–66b(2)(a)	Par. 6.1.2.1
(b) GPI/O ……………………………..	Par. 3–66b(2)(b)	Par. 6.1.2.2
(3) Tailgate assembly ……………………..	Par. 3–66b(3)	Par. 6.1.2.3

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–301. BACKUP INTERFACE PROCESSOR (BIP) (FEQ = BIP A, BIP B).		
a. Sun Fire 280R ………………………………………		TI 6100.18, section 6
(1) Quarterly.		
(a) POST ……………………………………	Par. 3–66a(1)	Par. 6.1.1.1
Open Boot Diagnostics test ………….	Par. 3–66a(2)	Par. 6.1.1.2
(b) ECG VTS ………………………………	Par. 3–66a(3)	Par. 6.1.1.3
(2) Every four (4) years.		
Replace lithium battery ……………………..		Section 6.2.2
b. Expansion Chassis …………………………………	Par. 3–66b(1)	TI 6100.18, section 6.
Quarterly.		
(1) Magma Expansion Chassis BIST ……	Par. 3–66b(2)	Par. 6.1.2
(2) Sunhillo SEP diagnostics ……………..	Par. 3–66b(2)	
SCA and PCA cards …………………..	Par. 3–66b(2)(a)	Par. 6.1.2.1
4–302. MAINTENANCE LAN SWITCH (FEQ = MLAN BIP, MLAN PIP).		
Cisco Catalyst 2950T Switch …………………………..		TI 6100.18, section 6.
Quarterly.		
Perform POST diagnostics …………………	Par. 3–66c	

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–303. MAINTENANCE WORKSTATION (FEQ = MWS–PB, MWS–PB, MWS–BA, MWS–BB).		
(Common to MWS and SWS) …………………………		TI 6100.18, section 6.
a. Sun Blade 150 ……………………………………..		Par. 6.1.3
(1) Quarterly.		
(a) POST ……………………………………..	Par. 3–66f(1)	Par. 6.1.3.1
(b) Open Boot diagnostic tests …………..	Par. 3–66f(2)	Par. 6.1.3.2
(c) ECG VTS Iomega zip drive …………..	Par. 3–66f(3), Par. 3–66f(3)(a)	Par. 6.1.3.3
(2) Every four (4) years.		
Replace lithium battery ……………………..		Par. 6.2.2
b. ViewSonic VE800 Monitor.		
Quarterly.		
POST ………………………………………….	Par. 3–66g	Par. 6.1.4
c. External Speakers (MWS only).		
Quarterly.		
Sun Blade 150 ECG VTS …………………..	Par. 3–66f(3)(c)	Par. 6.1.6
d. Lexmark T520 Printer ……………………………...		TI 6100.18, section 6.
(1) Quarterly.		
(a) Perform POST diagnostics ……………	Par. 3–66h(1)	Par. 6.1.13
(b) LAN connection ………………………..	Par. 3–66h(2)	Par. 6.1.13.1
(2) As Required.		
Clean printer ………………………………….	Visual	Par. 6.2.1

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–304. OPERATIONAL LAN SWITCH (FEQ = OLS–PA, OLS–PB, OLS–BA, OLS–BB).		
Cisco Catalyst 2950T Switch ………………………..……		TI 6100.18, section 6.
Quarterly.		
Perform POST diagnostics …………………	Par. 3–66c	
4–305. OPERATIONAL ROUTER UNIT (FEQ = ORU–PA, ORU–PB, ORU–BA, ORU–BB)		
Cisco 3725 Router ………………………………………		TI 6100.18, section 6.
Quarterly.		
Perform POST diagnostics …………………	Par. 3–66d	
4–306. REMOTE ALARM PANEL (FEQ = PS/MS 1, PS/MS 2).		
Quarterly.		
Check LED indicator lights ………………………...	Visual	
4–307. SUPPORT WORKSTATION (FEQ = SWS).		
a. Sun Blade 150 ……………………………………...		Par. 6.1.3
(1) Quarterly.		
(a) POST …………………………………..	Par. 3–66f(1)	Par. 6.1.3.1
(b) Open Boot diagnostic tests …………..	Par. 3–66f(2)	Par. 6.1.3.2
(c) ECG VTS Iomega zip drive …………..	Par. 3–66f(3), Par. 3–66f(3)(a)	Par. 6.1.3.3
(2) Every four (4) years.		
Replace lithium battery ……………………..		Par. 6.2.2
b. ViewSonic VE800 Monitor.		
Quarterly.		
POST …………………………………………	Par. 3–66g	Par. 6.1.4

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
c. External CD–RW Drive (SWS only).		
Quarterly.		
(1) CD–RW POST	Par. 3–66f(4)	
(2) ECG VTS	Par. 3–66f(3)(b)	Par. 6.1.5
d. Raid Unit.		
Quarterly		TI 6100.18, section 6.
(1) POST diagnostics	Par. 3–66f(5)	Par. 6.1.14
(2) ECG VTS	Par. 3–66f(3)(d)	
4–308. TERMINAL SERVER (FEQ = TS–P, TS–B).		TI 6100.18, section 6.
Avocent 1610CPS.		
Quarterly.		
Perform POST diagnostics	Par. 3–66e	
4–309. RAPPI (FEQ = RAPPI 1, RAPPI 2).		TI 6100.27
a. Processor.		
(1) Quarterly.		
(a) POST	Par. 3–67a(1)	Par. 6.2.1
(b) Perform TuffTest diagnostics	Par. 3–67a(2)	Par. 6.2.2
(c) Vacuum air inlets	Visual	Par. 6.3.1
(2) Annually.		
Check and tighten all cable connections ...	Visual	Par. 6.3.1

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
b. Monitor.		
(1) Quarterly.		
POST ……………………………………….	Par. 3–67b(1) and 3–67b(2)	Par. 6.2.3
(2) Annually.		
Check and tighten all cable connections …	Successful completion	Par. 6.3.1
4–310. EBUS M&C (FEQ = EBUS M&C) (A.K.A. DARC M&C WORKSTATION).		TI 6100.18, section 6.
a. Sun Blade 150 ………………………………....		Par. 6.1.3
(1) Quarterly.		
(a) POST …………………………………..	Par. 3–66f(1)	Par. 6.1.3.1
(b) Open Boot diagnostic tests …………..	Par. 3–66f(2)	Par. 6.1.3.2
(c) ECG VTS Iomega zip drive …………..	Par. 3–66f(3). Par. 3–66f(3)(a)	Par. 6.1.3.3
(2) Every four (4) years.		
Replace lithium battery ……………………..		Par. 6.2.2
b. ViewSonic VE800 Monitor.		
Quarterly.		
POST ……………..………………………….	Par. 3–66g	Par. 6.1.4
c. External CD–RW Drive (SWS only).		
Quarterly.		
(1) CD–RW POST ………………………	Par. 3–66f(4)	
(2) ECG VTS ………………………………	Par. 3–66f(3)(b)	Par. 6.1.5

Subsection 1. ECG PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–311. MODEM SPLITTER (FEQ = MS1, MS2, MS3, MS4).		
Sunhillo Modem Splitter ………………………………..		TI 6100.18, section 6.
a. Quarterly.		
8–port module test ………………...……….	Visual	Par. 6.1.10
b. Semiannually.		
Check Power Distribution panel …………..	Visual	Par. 6.1.10
4–312. RADAR DATA ANALYSIS (FEQ = SYS).		
Weekly.		
Secondary (Backup) Channel: ………………….. Perform operational analysis using the EQARS program. Verify that the parameters meet the specified criteria. (It is assumed that a site encountering problems will be analyzed on a daily basis until the problem can be solved.	Par. 3–5(b)10)	
4–313. RAPPI PERIPHERALS.		
a. Mouse …………………………………………….		TI 6100.27
As Required.		
Clean trackball …………..…………..……..	Visual	Par. 6.3.1
b. Keyboard.		
As Required.		
Clean keyboard ……………………………..	Visual	Par. 6.3.1
c. Monitor.		
As Required.		
Clean display screen ……………………….	Visual	
4–314. – 4–330. RESERVED.		

Section 4. EN ROUTE COMMUNICATIONS GATEWAY (ECG)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. ECG CONDITION BASED MAINTENANCE (CBM) TASKS

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–331. – 4–360. RESERVED.		

Section 4. EN ROUTE COMMUNICATIONS GATEWAY (ECG)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. ECG RUN-TO-FAULT (RTF)

Task	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–361. LEXMARK T520 LASER PRINTER		TI 6100.18, section 7
a. Cartridge.		
Remove and replace ……………………...……		Par. 7.3.9.6
b. Fuse assembly.		
Remove and replace ……………………………..		Par. 7.3.9.7
c. Transfer roll.		
Remove and replace …………………………...		Par. 7.3.9.8
d. Charge roll.		
Remove and replace …………………………...		Par. 7.3.9.9
e. Auto-compensator pick roller.		
Remove and replace …………………………...		Par. 7.3.9.10
4–362. – 4–399. RESERVED.		

Section 5. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. ERIDS PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–400. ERIDS SYSTEM (FEQ = SYS).		
System Administration.		
a. Daily.		
Review system and security log files …….		TI 6160.69, Par. 6.2.2
b. Weekly.		
Manage ERIDS backups ………………….		TI 6160.69, Par. 6.2.1
c. Monthly.		
Update anti–virus signature files ………..		TI 6160.69, Par. 4.7
Update version ID for chart update ………		TI 6160.69, Par. 8.4
4–401. ERIDS SERVERS (FEQ = SERV).		
a. Sun Fire V240.		
Annually.		
POST ……………………………………….	Par. 3–100a	TI 6160.67, Par. 6.10.1
b. Sun Fire V210.		
Annually.		
POST …………...…………………………..	Par. 3–100b	TI 6160.67, Par. 6.10.2

Subsection 1. ERIDS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–402. ERIDS WORKSTATIONS (FEQ = WRKSTN).		
a. Sun Blade 150.		
Annually.		
POST ……………………………………….	Par. 3–100c	TI 6160.67, par. 6.10.3
b. IBM ThinkCentre M51/M55 Personal Computer.		
(1) Semiannually.		
Perform POST diagnostics ………………	Par. 3–100d	TI 6160.67, par. 6.11.1
(2) Monthly.		
Perform reboot ……………………………..	Par. 3–100d	TI 6160.68, par. 5.9.2
c. IBM IntelliStation M Pro.		
(1) Semiannually.		
Perform POST diagnostics ………………	Par. 3–100e	TI 6160.67, par. 6.11.2
(2) Monthly.		
Perform reboot ……………………………..	Par. 3–100e	TI 6160.68, par. 5.9.2
4–403. ERIDS ROUTER (FEQ = ROUTER).		
Annually.		
Perform POST diagnostics ……………………..	Par. 3–100f	TI 6160.67, par. 6.12

Subsection 1. ERIDS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
4–404. ERIDS SWITCH (FEQ = SWITCH).		
a. Cisco Catalyst 3750G–24T–E.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100g	TI 6160.67, par. 6.13.1
b. Cisco Catalyst 3750–24 Switch.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100h	TI 6160.67, par. 6.13.2
c. Cisco Catalyst 2950T–24 Switch.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100i	TI 6160.67, par.14.1
d. Cisco Catalyst 2950C–24 Switch.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100j	TI 6160.67, par. 6.14.2
4–405. NETWORK ATTACHED STORAGE DISK ARRAY (FEQ = NASDAM).		
Network Attached Storage Disk Array.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100k	TI 6160.67, par. 6.15

Subsection 1. ERIDS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–406. ERIDS TAPE BACKUP UNIT (FEQ = BUTAPE).		
Quantum SDLT 600 SuperLoader3 Tape Backup Unit.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100l	TI 6160.67, par. 6.16
4–407. ERIDS LOAD BALANCER (FEQ = LDBAL).		
Annually.		
Perform POST diagnostics ………………………	Par. 3–100m	TI 6160.67, par. 6.17
4–408. ERIDS PRINTERS (FEQ = PRNTR).		
a. HP 2430TN LaserJet Printer		
Annually.		
Perform POST diagnostics ………………	Par. 3–100n	TI 6160.67, par. 6.19
b. Lexmark C510n Color LaserJet Printer.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100o	TI 6160.67, par. 6.20
4–409. ERIDS POWER SEQUENCER (FEQ = PWRSEQ).		
SMARTstart Jr. Power Sequencer.		
Annually.		
Perform POST diagnostics ………………	Par. 3–100q	TI 6160.67, par. 6.18

Subsection 1. ERIDS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–410 ERIDS DISPLAY (FEQ = DSPLY).		
Datalux 15–inch Touch Screen LCD Display.		
Quarterly.		
(1) Calibrate touch screen ……………...	Visual	TI 6160.67, par. 6.5.2
(2) Inspect attaching screws …………...	Visual	TI 6160.67, par. 6.21.1
(3) Adjust articulating arm ………………	Visual	TI 6160.67, par. 6.21.2
4–411. – 4–499. RESERVED.		

Section 5. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. ERIDS CONDITION BASED MAINTENANCE (CBM) TASKS

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–500. ERIDS SYSTEM (FEQ = SYS).		
a. System Administration.		
As Required.		
(1) Perform Manage Backup and ………. Restore of operational processors.		TI 6160.69, par. 6.2.1
(2) Perform Update Software ………….. Releases.		TI 6160.69, par. 8.2
(3) Perform Update Site Adaptation ……		TI 6160.69, section 7
(4) Manage User accounts ………………		TI 6160.69, appendix B
b. ERIDS Equipment.		
As Required.		
Clean air intakes and exhaust vents ……..	Visual	TI 6160.67, par. 6.4
4–501. ERIDS SERVERS (FEQ = SERV)		
a. Sun Fire V240.		
POST failure.		
Perform Open Boot Diagnostics tests ……..	3–100a(2)	TI 6160.67, par. 7.2.2.4.1

Subsection 2. ERIDS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. Sun Fire V210 Servers.		
POST failure.		
Perform Open Boot Diagnostics tests ……..	3–100b(2)	TI 6160.67, par. 7.2.2.4.1
4–502. ERIDS WORKSTATIONS (FEQ = WRKSTN).		
Sun Blade 150.		
POST failure.		
Perform Open Boot diagnostics tests ……..	3–100a(2)	TI 6160.67. par. 7.2.2.4.2
4–503. ERIDS PRINTERS (FEQ = PRNTR).		
a. HP 2430TN LaserJet Printer.		
As Required.		
Clean printer ………………………………….	Par. 3–100n	TI 6160.67, par. 6.8.2
b. Lexmark C510n Color LaserJet Printer.		
As Required.		
Clean printer ………………………………..	None	TI 6160.67, par. 6.8.1
4–504. ERIDS DISPLAY (FEQ = DSPLY).		
Datalux 15–inch Touch Screen LCD display.		
As Required.		
Clean display surfaces …………………….	Visual	TI 6160.67, par. 6.6
4–505. – 4–549. RESERVED.		

Section 5. EN ROUTE INFORMATION DISPLAY SYSTEM (ERIDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. ERIDS RUN-TO-FAULT (RTF) TASKS

Task	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–550. – 4–599. RESERVED.		

Section 6. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. EADS PERIODIC MAINTENANCE

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–600. EADS SYSTEM (FEQ = SYS).		
RESERVED.		
4–601. EADS PRINTERS (FEQ = PRNTR).		
FSP.		
Model: BOCA Systems FSP 42		
Monthly.		
(1) Clean print head …………………………….	Visual	TI 6110.121, , par. 5.1
(2) Print diagnostic strip ………………………….	Par. 3–214b	
(3) Clean rubber drive roller …………………….	Visual	FSP 42 Technical Manual
4–602. EADS DISPLAY (FEQ = DSPLY).		
a. FPMDM.		
Model: Barco ISIS MD 471 2K x 2K		
(1) Quarterly.		
(a) Inspect fan filter for …………………… replacement	Visual	TI 6110.120, par. 5.2
(b) Clean surface …………………………	Visual	TI 6110.120, par. 5.1
(2) Annually.		
Inspect and adjust …………………………… articulating arm screws.	Visual	TI 6110.120, par. 7.4.2.1

Subsection 1. EADS PERIODIC MAINTENANCE (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(3) Every two (2) years.		
Spares conditioning …………………………	Par. 3–212(a)	TI 6110.120, par. 5.3
b. FPD20.		
Model: NEC MultiSync LCD 2010X		
Biannually.		
Clean surface …………………………………	Visual	TI 6110.120, par. 5.4
4–603. EADS POWER SUPPLY (FEQ = PWRSUP).		
UPS (Uninterruptable Power Supply).		
Model: Tripp–Lite Unison SU1000RT2UHLV		
(1) Monthly.		
Inspect indicators and test …………………. battery unit.	Par. 3–216a	TI 6110.120, par. 5.6.2
(2) Quarterly.		
Test UPS spare battery …………………….	Par. 3–216b	TI 6110.120, par. 7.8.2
4–604. EADS CONSOLE PROCESSORS (FEQ = PROC).		
R, D, and D/A-Consoles.		
Annually.		
Remove and clean, blow out with ………….. compressed air.	Visual	

Subsection 1. EADS PERIODIC MAINTENANCE (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
4–605. – 4–629. RESERVED.		

Section 6. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–630. EADS SYSTEM (FEQ = SYS).		
a. System Administration.		
As Required.		
(1) Distribute Application release.		
(2) Distribute OS release …………………..		TI 6110.120, chapter 5
(3) Swap alternate and fallback application releases.		
(4) Cutover to an Application release.		
b. Security Administration.		
4–631. EADS CONSOLE PROCESSORS (FEQ = PROC).		
a. R-Console ……………………………………………	Par. 3–210a	
Model: IBM P5++ 52a		
(1) Any repair action performed:		
Perform R-console ……………………. verification using the serial wrap plug.	Par. 3–200a	TI 6110.120, par. 6.18, MAP 900
(2) Loss of communication across EAI LAN to DPD:		
Perform communication ……………... path verification tests.	Par. 3–201	TI 6110.120, par. 6.16, MAP 701
(3) R-console extended diagnostic failure:		
Perform console ……………………….. peripheral test.	Par. 3–210a	TI 6110.120, par. 6.17, MAP 800

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. D-Console and D/A-Console.		
Models: IBM p5++ 52A (Chan B) or IBM p615 (Chan A)		
(1) Any repair action performed:		
Perform D-console or ……….………. D/A-console verification using the serial wrap plug.	Par. 3–200b	TI 6110.120, par. 6.18, MAP 900
(2) Loss of communication across EAI LAN to DPD:		
Perform communication ……………... path verification tests.	Par. 3–201	TI 6110.120, par. 6.16, MAP 701
(3) D, D/A-console extended diagnostic failure:		
Perform console ……………………… peripheral test.	Par. 3–210b	TI 6110.120, par. 6.17, MAP 800
4–632. EADS SWITCH (FEQ = SWITCH).		
KVM.		
(a) KVMHR (R-console).		
Model: StarTech SV31HR		
KVM replacement:		
(1) POST ……………………………..	Par. 3–211a	
(2) Verify correct firmware ……...…. revision level.	Successful load	TI 6110.120, par. 7.7

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(b) KVMLR (D, D/A-console).		
Model: StarTech SV21LR		
KVM replacement:		
(1) POST ……………………………..	Par. 3–211b	
(2) Verify correct firmware ………… revision level.	Successful load	TI 6110.120, par. 7.7
4–633. EADS PRINTERS (FEQ = PRNTR).		
FSP.		
Model: BOCA Systems FSP 42		
(1) FSP not printing flight strips:		
Perform FSP tests to ……………………..…. determine cause.	Par. 3–213	TI 6110.120, par. 6.15, MAP 700
(2) Any maintenance action performed:		
Perform FSP verification ……………………	Par. 3–200c	TI 6110.120, par. 6.19, MAP 950
4–634. EADS DISPLAY (FEQ = DSPLY).		
a. R-console.		
FPMDM.		
Model: Barco ISIS MD 471 2K x 2K		
(1) As Required.		
Clean surface ……………………………….	Visual	TI 6110.120, par. 5.1
(2) FPMDM problem:		
Perform FPMDM test ……………..………… to determine cause.	Successful completion, par. 3–212a	TI 6110.120, par. 6.7, MAP 220

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. D and D/A-console.		
FPD20.		
Model: NEC MultiSync LCD 2010NX		
(1) Display performance problem:		
Perform display tests to determine cause.	Par. 3–212b	TI 6110.120, par. 6.8, MAP 260
(2) Blank display:		
Perform display power tests to determine cause.	Par. 3–212b	TI 6110.120, par. 6.5, MAP 170
4–635. EADS PERIPHERALS (FEQ = PERIPH).		
a. Keyboard.		
Model: Cortron		
(1) R-console keyboard problem:		
Perform keyboard tests to determine cause.	Error free	TI 6110.120, par. 6.10, MAP 500
(2) D or D/A-console keyboard problem:		
Perform keyboard tests to determine cause.	Error free	TI 6110.120, par. 6.12, MAP 600
b. Trackball.		
Model: CPSD (XCL)		
(1) R-console trackball problem:		
Perform trackball tests to determine cause.	Error free	TI 6110.120, par. 6.11, MAP 510
(2) D-console trackball problem:		
Perform keypad tests to determine cause.	Error free	TI 6110.120, par. 6.13, MAP 610

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
c. Keypad.		
Model: Cortron		
Keypad problem:		
Perform keypad tests to …………………….. determine cause.	Error free	TI 6110.120, par. 6.14, MAP 650
4–636. EADS POWER SUPPLY (FEQ = PWRSUP).		
a. PDU.		
Model: Pulizzi Z–Line T982B2		
No power at ATC console:		
Perform console power ……………..………. failure tests.	Par. 3–214	TI 6110.120, par. 6.3, MAP 100
b. UPS.		
Model: Tripp–Lite Unison SU1000RT2UHLV		
Non-normal UPS indicator lit:		
Perform UPS tests to ……………………..……. determine cause.	Par. 3–215	TI 6110.120, par. 6.6, MAP 180

Subsection 2. EADS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–637. – 4–674. RESERVED.		

Section 6. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. EADS RUN-TO-FAULT (RTF) TASKS

Task	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–675. – 4–699. RESERVED.		

Section 7. EN ROUTE AUTOMATION SYSTEM (EAS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. EAS PERIODIC MAINTENANCE (PM)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–700. EAS SYSTEM (FEQ = SYS).		
a. System Administration.		
(1) Daily.		
(2) Weekly.		
(3) Monthly.		
(4) 56 Days.		
Update and verify version level for national chart update.		
b. Security Administration.		
(1) Daily.		
Save and transfer UNIX VirusScan logs		
(2) Weekly.		
Perform On-Demand scanning		
(3) Monthly.		
(a) Update UNIX VirusScan engine		
(b) Update UNIX VirusScan signature		

Subsection 1. EAS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–701. EAS SWITCH (FEQ = SWITCH).		
a. M&C LAN (Monitor & Control LAN).		
Model: Cisco Catalyst 4506		
Biannually.		
Check indicators and fan intakes …….	Visual	TI 6110.122, par. 5.3
b. APPLAN (Application LAN Switch).		
Models: Cisco Catalyst 4006 (Chan A) or Cisco Catalyst 4506 (Chan B, T&T)		
Biannually.		
Check indicators and fan intakes …….	Visual	TI 6110.122, par. 5.3
c. CMS (Maintenance Terminal Server).		
Model: Western Telematic Inc. CMS–32, Console Maintenance Switch		
Biannually.		
Check indicators ……………………….	Visual	TI 6110.122, par. 3.6.2
4–702. EAS NETWORK PRINTERS (FEQ = PRNTR).		
Color.		
Model: IBM InfoPrint 1654 Color Laser		
Biannually.		
Clean printer ……………….………………...	Visual	TI 6110.121, par. 5.1

Subsection 1. EAS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–703. EAS WORKSTATION DISPLAYS (FEQ = DSPLY).		
a. FPMDM.		
Model: Barco ISIS MD 471 2K x 2K		
(1) Quarterly.		
(a) Inspect fan filter for replacement ……………………	Visual	TI 6110.120, par. 5.2
(b) Clean surface …………………………	Visual	TI 6110.120, par. 5.1.1
(2) Annually.		
Inspect and adjust articulating arm screws ……………………………	Visual	TI 6110.120, par. 7.4.2.1
b. FPD19.		
Model: NEC MultiSync LCD 1970NX		
Biannually.		
Clean surface ………………………………..	Visual	TI 6110.120, par. 5.4
c. FPD20.		
Model: NEC MultiSync LCD 2070X		
Biannually.		
Clean surface ……………………………….	Visual	TI 6110.120, par. 5.4
4–704. EAS POWER SUPPLY (FEQ = PWRSUP).		
UPS (Uninterruptable Power Supply).		
Model: Eaton Powerware 9125		
Monthly.		
Check UPS indicators ………………………	Visual	TI 6110.122, par. 5.2

Subsection 1. EAS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–705. EAS WORKSTATIONS (FEQ = WRKSTN).		
SECWS.		
Model: IBM IntelliStation M Pro 6218		
Monthly.		
Reboot Windows workstation (POST) ……..	Par. 3–311b	TI 6110.121, chapter 4

Subsection 1. EAS PERIODIC MAINTENANCE (PM) (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–706. – 4–729. RESERVED.		

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Section 7. EN ROUTE AUTOMATION SYSTEM (EAS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–730. EAS SYSTEM (FEQ = SYS).		
a. System Administration.		TI 6110.120
As Required.		
(1) Distribute Application release.		
(2) Distribute OS release.		
(3) Swap alternate and fallback application releases.		
(4) Cutover to an application release.		
b. Security Administration.		
4–731. EAS RACK PROCESSORS (FEQ = PROC).		
a. CPP, SDPP, FDPP, SYNCP, MCP.		
Model: IBM p5++ 55A		
(1) Processor failure indicated:		
Run rack-mounted processor diagnostics. ………………	Par. 3–310a	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ……………....	Par. 3–310a	TI 6110.122, par. 6.15, MAP 920

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. GPWXP.		
Model: IBM p5++ 52A		
(1) Processor failure indicated:		
Run rack-mounted ……………………… processor diagnostics.	Par. 3–310b	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor ……….. verification.	Par. 3–310b	TI 6110.122, par. 6.15, MAP 920
4–732. EAS WORKSTATIONS (FEQ = WRKSTN).		
a. MCWS (Monitor and Control Workstation).		
(1) AIX Workstation failure:		
Perform AIX workstation tests ……………..	Par. 3–311a	TI 6110.121, par. 6.8, MAP 231
(2) After any maintenance action performed:		
Run AIX workstation diagnostics …………..	Par. 3–311a	TI 6110.121, par. 6.12, MAP 931
b. SPECWS (AT Specialist Workstation).		
(1) AIX Workstation failure:		
Perform AIX workstation tests ……………..	Par. 3–311a	TI 6110.121, par. 6.8, MAP 231
(2) After any maintenance action performed:		
Run AIX workstation diagnostics …………....	Par. 3–311a	TI 6110.121, par. 6.12, MAP 931
c. SECWS (Security Workstation).		
(1) Windows Workstation failure:		
Perform Windows workstation tests ……….	Par. 3–311b	TI 6110.121, par. 6.2, MAP 210

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Windows keyboard failure:		
Perform Windows keyboard tests ………….		TI 6110.121, par. 6.3, MAP 211
(3) Windows mouse failure:		
Perform Windows mouse tests ……………..		TI 6110.121, par. 6.4, MAP 212
(4) After any maintenance action performed:		
Run Windows workstation diagnostics …….	Par. 3–311b	TI 6110.121, par. 6.11, MAP 910
4–733. EAS SWITCH (FEQ = SWITCH).		
a. SAN.		
Model: IBM TotalStorage SAN32B–2		
(1) SAN32B–2 failure:		
Perform SAN32B–2 tests …………………...	Par. 3–313d	TI 6110.122, par. 6.12, MAP 450
(2) After any maintenance action:		
Run SAN32B–2 diagnostics ………………..	Visual	TI 6110.122, par. 6.17, MAP 950
b. KVM.		
(1) KVMHR.		
Model: StarTech SV31		
After any KVM maintenance action performed:		
Verify correct firmware ………..……… revision level.		TI 6110.120, par. 7.7

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) KVMLR.		
Model: StarTech SV11 LR		
After any KVM maintenance action performed:		
Verify correct firmware ……………..…. revision level.		TI 6110.120, par. 7.7
c. M&C LAN.		
Model: Cisco Catalyst 4506		
4506 switch failure indicated:		
Run switch tests ……………….……….	Par. 3–313b	TI 6110.122, par. 6.8, MAP 400
d. APPLAN (Application LAN).		
Models: Cisco Catalyst 4006 (Chan A) or Cisco Catalyst 4506 (Chan B)		
Switch failure indicated:		
Run switch tests ……………………….	Par. 3–313b	TI 6110.122, par. 6.8, MAP 400
e. CMS.		
Model: Western Telematic Inc. CMS–32		
CMS–32 switch failure:		
Run switch tests …………..………..	Par. 3–313c	TI 6110.122, par. 6.10, MAP 420

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–734. EAS STORAGE (FEQ = STORAGE).		
ES (Enterprise Storage).		
Model: IBM System Storage DS4700 Express Storage		
(1) Disk storage failure:		
Perform disc storage tests …………………..	Par. 3–320	TI 6110.122, par. 6.13, MAP 600
(2) After any maintenance action:		
Perform disk storage verification …………..	All green LEDs	TI 6110.122, par. 6.16, MAP 940
4–735. EAS NETWORK PRINTERS (FEQ = PRNTR).		
Color.		
Model: IBM InfoPrint 1654 Color Laser		
Network printer failure:		
Perform network printer tests ………………	Par. 3–314	TI 6110.121, par. 6.9, MAP 710
4–736. EAS WORKSTATION DISPLAYS (FEQ = DSPLY).		
a. FPMDM.		
Model Barco ISIS MD 471 2K x 2K		
FPMDM problem:		
Perform FPMDM tests to ………..…………. determine cause.	Par. 3–315a	TI 6110.120, par. 6.7, MAP 220
b. FPD19.		
Model: NEC MultiSync LCD 1970NX		
(1) Display out of alignment:		
Adjust alignment ……………………………..		TI 6110.120, par. 7.6

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Display performance problems:		
Perform display tests to …………………….. determine cause.	Par. 3–315b	TI 6110.120, par. 6.8, MAP 260
(3) Blank display:		
Perform display power tests ………………... to determine cause.	Par. 3–315b	TI 6110.120, par. 6.5, MAP 170
c. FPD20.		
Model: NEC MultiSync LCD 2070NX		
(1) Display out of alignment:		
Adjust alignment …………………..………....		TI 6110.120, par. 7.6
(2) Display performance problems:		
Perform display tests to ……………………. determine cause.	Par. 3–315c	TI 6110.120, par. 6.8, MAP 260
(3) Blank display:		
Perform display power tests to …………….. determine cause.	Par. 3–315c	TI 6110.120, par. 6.5, MAP 170
4–737. EAS POWER SUPPLY (FEQ = PWRSUP).		
a. PWRSEQ (Power Sequencer).		
Model: Spectrum Control Inc AC SMARTstart Jr.		
Power Sequencer failure:		
Perform power sequencer tests …..….	Par. 3–316	TI 6110.122, par. 6.2, MAP 110
b. PDU (Power Distribution Unit).		
Model: Pulizzi Z–Line T982B2		
PDU failure:		
Perform PDU tests ……………….………….	Par. 3–317	TI 6110.122, par. 6.4, MAP 130

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
c. UPS.		
Model: Eaton Powerware 9125		
Non-normal UPS indicator lit:		
Perform UPS tests to determine cause ……	Par. 3–318	TI 6110.122, par. 6.3, MAP 120
4–738. EAS ROUTER (FEQ = ROUTER).		
RFW.		
Model: Cisco 3825		
Router failure indicated:		
Perform router tests …………………………	Par. 3–312	TI 6110.122, par. 6.9, MAP 410
4–739. EAS SERVER (FEQ = SERV).		
Model: Lexmark N7000e		
Network printer failure:		
Perform server tests ……………………..………….	Par. 3–413b	TI 6110.121, par. 6.9, MAP 710

Subsection 2. EAS CONDITION BASED MAINTENANCE (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–740. – 4–775. RESERVED.		

Section 7. EN ROUTE AUTOMATION SYSTEM (EAS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. EAS RUN-TO-FAULT (RTF) TASKS

Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–776. – 4–799. RESERVED.		

Section 8. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. EASN PERIODIC MAINTENANCE (PM) TASKS

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–800. EASN SYSTEM (FEQ = SYS).		
a. System Administration.		
(1) Daily.		
(2) Weekly.		
(3) Monthly.		
b. Security Administration.		
(1) Daily..		
Save and transfer UNIX VirusScan logs.		
(2) Weekly.		
Perform On-Demand scanning.		
(3) Monthly.		
(a) Update UNIX VirusScan engine.		
(b) Update UNIX VirusScan signature.		
4–801. EASN WORKSTATIONS (FEQ = WRKSTN).		
a. SUPWS (Support User Workstation),		
SUPMCWS (Support M&C Workstation)		
Model: IBM IntelliStation M Pro 6218		
Monthly.		
Reboot Windows workstation (POST) ……..	Par. 3–411b	TI 6110.121, chapter 4

Subsection 1. EASN PERIODIC (PM) TASKS (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. SSEC (Support Security Workstation).		
Model: IBM IntelliStation M Pro 6218		
Monthly.		
Reboot Windows workstation (POST) ……..	Par. 3–411b	TI 6110.121, chapter 4
c. MNTWS (Maintenance Workstation).		
Model: IBM IntelliStation M Pro 6218		
Reboot Windows workstation (POST) ……..	Par. 3–411b	TI 6110.121, chapter 4
4–802. EASN PRINTERS (FEQ = PRNTR).		
a. Plotter.		
Model: HP DesignJet 800ps		
Biannually.		
Clean plotter ………………………………….	Visual	TI 6110.121, par. 5.2
b. SUPPTR (Support Printer).		
Model: IBM InfoPrint 1585 Laser		
Biannually.		
Clean printer ………………………………….	Visual	TI 6110.121, par. 5.1
c. Color (Color Laser Printer).		
Model: IBM InfoPrint 1654 Color Laser		
Biannually.		
Clean printer ………………………………….	Visual	TI 6110.121, par. 5.1

Subsection 1. EASN PERIODIC (PM) TASKS (Continued)

Performance Checks and Preventative Maintenance Tasks	Reference Paragraph	
	Standards & Tolerances	Maintenance Procedures
4–803. EASN SWITCH (FEQ = SWITCH).		
a. SUPLAN (Support LAN).		
Model: Cisco Catalyst 4506		
Biannually.		
Check indicators and fan intakes …………..	Visual	TI 6110.122, par. 5.3
b. MNTLAN (Maintenance LAN), T&T ECG LAN.		
Model: Cisco Catalyst 2960–24TT		
Biannually.		
Check indicators and fan intakes …..……...	Visual	TI 6110.122, par. 2.2.5.2
c. T&T CMS (Maintenance Terminal Server).		
Model: Western Telematic Inc. CMS–32 Console Maintenance Switch		
Biannually.		
Check indicators ……………………………..	Visual	TI 6110.122, par. 3.6.2
d. T&T M&C LAN.		
Model: Cisco Catalyst 4506		
Biannually.		
Check indicators and fan intakes ………..….	Visual	TI 6110.122, par. 5.3

Subsection 1. EASN PERIODIC (PM) TASKS (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–804. EASN DISPLAY (FEQ = DSPLY).		
a. FPMDM.		
Model: Barco ISIS MD 471 2K x 2K		
Monthly.		
(1) Clean surface …………………………..	Visual	TI 6110.120, par. 5.1
(2) Inspect fan filter for replacement …..…	Visual	TI 6110.121, par. 5.2
b. FPD19.		
Model: NEC MultiSync LCD 1970NX		
Monthly.		
Clean surface …………………………………	Visual	TI 6110.120, par. 5.4
c. FPD20.		
Model: NEC MultiSync LCD 2070NX		
Monthly.		
Clean surface …………………………………	Visual	TI 6110.120, par. 5.4

Subsection 1. EASN PERIODIC (PM) TASKS (Continued)

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–805. – 4–829. RESERVED.		

Section 8. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. EASN CONDITION BASED MAINTENANCE (CBM) TASKS

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–830. EASN SYSTEM (FEQ = SYS).		
a. System Administration.		
As Required.		
(1) Distribute Application release.		
(2) Distribute OS release.		
(3) Swap alternate and fallback application releases.		
(4) Cutover to an application release.		
b. Security Administration.		
4–831. EASN RACK PROCESSORS (FEQ = PROC).		
a. MISMCP.		
Model: IBM p5++52A		
(1) Processor failure indicted:		
Run rack-mounted processor ……………… diagnostics.	Par. 3–410b	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor …………….... verification.	Par. 3–410b	TI 6110.122, par. 6.15, MAP 920

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. SIMP.		
Model: IBM p5++52A		
(1) Processor failure indicted:		
Run rack-mounted processor diagnostics. ………………	Par. 3–410b	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ………………	Par. 3–410b	TI 6110.122, par. 6.15, MAP 920
c. SCDP.		
Model: IBM p5++55A		
(1) Processor failure indicted:		
Run rack-mounted processor diagnostics. ………………	Par. 3–410a	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ………………	Par. 3–410a	TI 6110.122, par. 6.15, MAP 920
d. ESSP.		
Model: IBM p5++55A		
(1) Processor failure indicted:		
Run rack-mounted processor diagnostics. ………………	Par. 3–410a	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ………………	Par. 3–410a	TI 6110.122, par. 6.15, MAP 920

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
e. STP.		
Model: IBM p5++55A		
(1) Processor failure indicted:		
Run rack-mounted processor diagnostics. ………………	Par. 3–410a	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ………………	Par. 3–410a	TI 6110.122, par. 6.15, MAP 920
f. DRAP.		
Model: IBM p5++55A		
(1) Processor failure indicted:		
Run rack-mounted processor diagnostics. ………………	Par. 3–410a	TI 6110.122, par. 6.5, MAP 200
(2) After any maintenance action:		
Run rack-mounted processor verification. ………………	Par. 3–410a	TI 6110.122, par. 6.15, MAP 920
g. T&T (Test & Training).		
(1) CPP, SDPP, FDMP, SYNCP.		
Model: IBM p5++ 55A		
(a) Processor failure indicated:		
Run rack-mounted processor diagnostics. …………	Par. 3–310a	TI 6110.122, par. 6.5, MAP 200
(b) After any maintenance action:		
Run rack-mounted processor verification. ……….	Par. 3–310a	TI 6110.122, par. 6.15, MAP 920

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) GPWXP, MCP.		
Model: IBM p5++ 52A		
(a) Processor failure indicated:		
Run rack-mounted processor diagnostics. ……………………	Par. 3–310b	TI 6110.122, par. 6.5, MAP 200
(b) After any maintenance action:		
Run rack-mounted processor verification. ………..	Par. 3–310b	TI 6110.122, par. 6.15, MAP 920
4–832. EASN SERVERS (FEQ = SERV).		
a. SMS (System Management Server).		
Model: IBM System x3250		
3250 server failure:		
Perform server tests ………………………..	Par. 3–413a	TI 6110.122, par. 6.6, MAP 280
b. PRNTSERV (Print Server).		
Model: Lexmark N7000e		
Network printer failure:		
Perform server tests ………………………..	Par. 3–413b	TI 6110.121, par. 6.9, MAP 710
4–833. EASN TAPE (FEQ = TAPE).		
TAPELIB.		
Model: IBM T3310 Tape Library 3576		
(1) Tape head cleaning indicated:		
Run cleaning cartridge ………………………	Visual	TI 6110.122, par. 5.1

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Tape library failure:		
Perform tape library tests ……………………	Par. 3–414	TI 6110.122, par. 6.14, MAP 610
4–834. EASN WORKSTATIONS (FEQ = WRKSTN).		
a. PBWS (Playback Workstation).		
Model: IBM p5 52A		
(1) AIX Workstation failure:		
Perform Playback workstation tests ……….	Par. 3–411a	TI 6110.121, par. 6.8, MAP 231
(2) After any maintenance action:		
Run Playback workstation diagnostics …….		TI 6110.121, section 6.12, MAP 931
b. GPWS (Ghost Pilot Workstation).		
Model: IBM IntelliStation POWER 285		
(1) AIX Workstation failure:		
Perform GP workstation tests ……………..	Par. 3–411c	TI 6110.121, par. 6.8, MAP 231
(2) After any maintenance action:		
Run GP workstation diagnostics …………..		TI 6110.121, par. 6.12, MAP 931
c. SUPWS (Support User Workstation).		
SUPMCWS, SSEC.		
Model: IBM IntelliStation M Pro 6218		
(1) Windows Workstation failure:		
Perform Windows workstation tests ……….	Par. 3–411b	TI 6110.121, par. 6.1, MAP 210

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Windows keyboard failure:		
Perform Windows keyboard tests …………..		TI 6110.121, par. 6.1, MAP 211
(3) Windows mouse failure:		
Perform Windows mouse tests ……………..		TI 6110.121, par. 6.3, MAP 212
(4) After any maintenance action:		
Run Windows workstation diagnostics …….	Par. 3–411b	TI 6110.121, par. 6.8, MAP 910
d. MAINTWS (Maintenance Workstation).		
(1) IBM IntelliStation M Pro 6218.		
(a) Windows Workstation failure:		
Perform Windows …………………..…. workstation tests …	Par. 3–411b	TI 6110.121, par. 6.1, MAP 210
(b) Windows keyboard failure:		
Perform Windows keyboard tests ……		TI 6110.121, par. 6.1, MAP 211
(c) Windows mouse failure:		
Perform Windows mouse tests ………		TI 6110.121, par. 6.3, MAP 212
(d) After any maintenance action:		
Run Windows workstation …………... diagnostics.	Par. 3–411b	TI 6110.121, par. 6.11, MAP 910
(2) Dell Latitude Laptop.		

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–835. EASN PRINTERS (FEQ = PRNTR).		
a. Plotter.		
Model: HP DesignJet 800ps		
Plotter failure:		
Perform network printer tests ………………	Par. 3–416c	TI 6110.121, par. 6.10, MAP 715
b. Printers.		
(1) SUPPTR (Support Printer).		
Model: IBM InfoPrint 1585 Laser		
Network printer failure:		
Perform network printer tests…………	Par. 3–416b	TI 6110.121, par. 6.10, MAP 715
(2) Color.		
Model: IBM InfoPrint 1654 Color Laser		
Network printer failure.		
Perform network printer tests ………..	Par. 3–416a	TI 6110.121, par. 6.7, MAP 710
4–836. EASN SWITCH (FEQ = SWITCH).		
a. SUPLAN (Support LAN, T&T M&C LAN, T&T APPLAN).		
Model: Cisco Catalyst 4506		
4506 switch failure indicated:		
Run switch tests ………………………………	Par. 3–415a	TI 6110.122, par. 6.8, MAP 400

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. MNTLAN (Maintenance LAN, T&T ECG LAN).		
Model: Cisco Catalyst 2960–24TT		
2960 switch failure:		
Run 2960 switch tests………………………..	Par. 3–415b	TI 6110.122, par. 6.11, MAP 430
c. CMS (Maintenance Terminal Server).		
Model: Western Telematic Inc CMS–32 Console		
(1) CMS–32 switch failure:		
Perform tests …………………………..	Par. 3–415c	TI 6110.122, par. 6.10, MAP 420
(2) Backup configuration file.		
(3) Restore configuration file.		
4–837. EASN ROUTER (FEQ = ROUTER).		
SUPRFW (WJHTC Support Router).		
Model: Cisco 3825		
Router failure indicated:		
Perform router tests …………………………	Par. 3–412	TI 6110.122, par. 6.9, MAP 410
4–838. EASN DISPLAY (FEQ = DSPLY).		
a. FPMDM.		
Model: Barco ISIS MD 471 2K x 2K		
FPMDM problem:		
Perform FPMDM tests to ……………..……. determine cause.	Par. 3–417a	TI 6110.120, par. 6.7, MAP 220

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. FPD19.		
Model: NEC MultiSync LCD 1970NX		
(1) Display out of alignment:		
Adjust alignment		TI 6110.120, par. 7.6
(2) Display performance problem:		
Perform display tests to determine cause.	Par. 3–417b	TI 6110.120, par. 6.8, MAP 260
(3) Blank display:		
Perform display power tests to determine cause.	Par. 3–417b	TI 6110.120, par. 6.5, MAP 170
c. FPD20.		
Model: NEC MultiSync LCD 2070NX		
(1) Display out of alignment:		
Adjust alignment		TI 6110.120, par. 7.6
(2) Display performance problem:		
Perform display tests to determine cause.	Par. 3–417c	TI 6110.120, par. 6.8, MAP 260
(3) Blank display:		
Perform display power tests to determine cause.	Par. 3–417c	TI 6110.120, par. 6.5, MAP 170
4–839. EASN POWER SUPPLY (FEQ = PWRSUP).		
a. PWRSEQ (Power Sequencer).		
Model: Spectrum Control Inc AC SMARTstart Jr.		
Power Sequencer failure:		
Perform power sequencer tests	Par. 3–418	TI 6110.122, par. 6.2, MAP 110

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. PDU (Power Distribution Unit).		
Model: Pulizzi Z–Line T982B2		
PDU failure:		
Perform PDU tests …………………………..	Par. 3–419	TI 6110.122, par. 6.4, MAP 130
c. UPS (Uninterruptible Power Supply).		
Model: Eaton Powerware 9125		
Non-normal UPS indicator lit:		
Perform UPS tests to ………………………..… determine cause.	Par. 3–420	TI 6110.122, par. 6.3, MAP 120
4–840. MEDIA CONVERTER.		
Model: Transition Networks E–100 BTX–FX–05 (LC)		
(1) Media converter failure:		
Perform tests …………………………..	Par. 3–421	TI 6110.122, par. 6.7, MAP 285
(2) After any maintenance action:		
Perform verification ……………………	Visual.	TI 6110.122, par. 6.18, MAP 985

Subsection 2. EASN CONDITION BASED (CBM) TASKS (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–841. – 4–849. RESERVED.		

Section 8. EN ROUTE AUTOMATION SUPPORT NETWORK (EASN)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. EASN RUN-TO-FAULT (RTF) TASKS

Task	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–850. – 4–899. RESERVED.		

Section 9. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 1. EDDS PERIODIC MAINTENANCE

Performance Checks and Preventative Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–900. EDDS SYSTEM (FEQ = SYS).		
System Administration.		
a. Daily.		
Verify system status and operations	Visual	TI 6131.13, chapter 4
b. Biannually.		
Change all passwords		TI 6131.13, chapter 5
4–901. EDDS SWITCH (FEQ = SWITCH).		
Model: Cisco 3560		
Monthly.		
Check fans	Visual	TI 6131.13, chapter 5
4–902. – 4–910. RESERVED.		

Section 9. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 2. EDDS CONDITION BASED MAINTENANCE (CBM)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–911. EDDS SYSTEM (FEQ = SYS).		
System Administration.		
As Required.		
a. Perform software installation ………..		TI 6131.13, chapter 4
b. Update Cisco 3560 configuration …….		TI 6131.13, chapter 3
4–912. EDDS SERVERS (FEQ = SERV).		
a. NSM.		
NSM failure indicated.		
Perform maintenance tests …………………	Par. 3–500	TI 6131.13, chapter 6
b. HADDS.		
HADDS failure indicated.		
Perform maintenance tests …………………	Par. 3–500	TI 6131.13, chapter 6
c. SAFA.		
SAFA failure indicated.		
Perform maintenance tests …………………	Par. 3–500	TI 6131.13, chapter 6

Subsection 2. EDDS CONDITION BASED MAINTENANCE (CBM) (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–913. EDDS SWITCHES (FEQ = SWITCH).		
a. Cisco 3560.		
Failure indicated.		
Perform maintenance tests …………………	Par. 3–501a	TI 6131.13, chapter 6
b. Linksys.		
Failure indicated.		
Perform maintenance tests …………………	Par. 3–501b	TI 6131.13, chapter 7
c. KVM.		
Failure indicated.		
Perform maintenance tests …………………	Par. 3–501c	TI 6131.13, chapter 7
d. KVM Extender.		
ECOM failure indicated.		
Perform maintenance tests …………………	Par. 3–501d	TI 6131.13, chapter 7
4–914. EDDS DISPLAYS (FEQ = DSPLY).		
a. ECOM monitor.		
(1) Failure indicated.		
Perform maintenance tests ……..…………..	Par. 3–502b or par. 3–502c	TI 6131.13, chapter 7
(2) As Required.		
Clean display surfaces ………..…………..	Visual	TI 6131.13, chapter 5

Subsection 2. EDDS CONDITION BASED MAINTENANCE (CBM) (Continued)

Time-Based and Cycle-Based Tasks, Situational-Based Actions, and Corrective Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
b. NSM monitor.		
(1) Failure indicated.		
Perform maintenance tests ……………..……..	Par. 3–502a	TI 6131.13, chapter 7
(2) As Required.		
Clean display surfaces ……………………..…..	Visual	TI 6131.13, chapter 5
4–915. EDDS POWER (FEQ = PDU).		
Power rack failure.		
Perform power checks ……………………..…………	Par. 3–503	TI 6131.13, chapter 6

Section 9. EN ROUTE DATA DISTRIBUTION SYSTEM (EDDS)

(Refer to equipment instruction books for all reference paragraphs, figures and tables, unless otherwise indicated).

Subsection 3. EDDS RUN-TO-FAULT (RFT) TASKS

Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
4–916. – 4–999. RESERVED.		

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CHAPTER 5. SYSTEM MAINTENANCE PROCEDURES

5–1. GENERAL.

This chapter establishes the procedures for accomplishing the various certification and essential maintenance activities that are required for the NAS En Route Stage A — Air Traffic Control System, on either a periodic or a conditional basis. The chapter is divided into three sections. The first section describes the procedures to be used in making the performance checks listed in chapter 4, section 1. The second section describes the procedures for doing the tasks listed in chapter 4, section 2. The third section describes the procedures for doing special tasks, usually non-scheduled and not listed in chapter 4. Refer to the latest edition of Order 6000.15 for additional general guidance.

5–2. ONLINE CERTIFICATION (OLC).

For the purpose of clarification, the term OLC will be used as a generic term to be applied to both the Host and ERAM Simulator (SIM) capabilities used for certification. While the procedures to build and run OLC for each system will be different, the term OLC will apply to both. When tasks or terms within OLC are system specific, they will be listed and addressed separately for both the Host and ERAM systems (EAS, EADS).

5–3. – 5–9. RESERVED.

Section 1. PERFORMANCE CHECK PROCEDURES

5–10. GENERAL.

a. Objective. This section conveys basic rationale, performance checking procedures, and other guidance essential to the technical certification of the services, systems, and equipment provided by the NAS En Route Stage A — Air Traffic Control system, a large-scale, complex system providing automation capability in support of the FAA ATC mission.

b. Certification Rationale.

(1) The rationale is based on the criteria published in Order 6000.15, which specifies that systems and services providing moment-by-moment positional information, or providing decision support information that directly affects aircraft heading, altitude, routing, control, or conflict awareness, will require certification.

(2) Certification of the automation systems and services shall be accomplished using one or any combination of the methods described in Order 6000.15. The nationally approved procedures in this order are intended to provide guidance in support of making certification determinations.

(3) Additional actions may be taken at the discretion of the certifier and should consider potential impacts on ATC operations. All online performance checking should be fully coordinated with the Air Traffic Watch Supervisor (ATWS).

(4) Complete, comprehensive validation of the total functional capability of this large-scale, complex system would require many hours of rigidly structured and scripted testing procedures. For this reason, certification and performance checking is performed at several levels in the total system hierarchy.

(5) The real-time, automation-assisted ATC environment at the ARTCCs imposes severe time constraints on the certification activities that might be utilized by maintenance personnel. However, the requirement still exists for the technical experts to provide assurance to the user that the automation system is capable of providing its advertised service.

(6) In the vast, complex NAS, the physical separation of the major systems imposes a responsibility on the certifier to make determinations about the capability of multiple systems working together to provide an advertised service.

c. En Route Architecture.

(1) The automated NAS ARTCC system is composed of several functionally different systems. Together, they support the large number of FDP and RDP tasks required to accomplish the ATC function at the NAS ARTCC.

(2) The major services include CRAD and CFAD.

(3) The major systems include the Host (CCCH), ECG, DSR, URET, EAS, and EADS.

(4) The En Route system automation architecture is being updated through the ERAM modernization effort and will consist of two separate architectures. The two architectures listed below include the systems in each that only require certification. Additional systems not listed, such as ERIDS, HNL, HADDS, and EASN, do not require certification at this time but are also part of the En Route architectures.

(a) The existing architecture is comprised of a primary channel and a backup channel containing intrinsic redundancies designed into each of the major systems to provide high availability operation. The systems making up this architecture are Host (CCCH), ECG, DSR, and URET. The backup channel is designed to permit operation during primary channel outages or when a display is out of service.

(b) The new architecture, under ERAM, is a dual channel architecture designed with each channel as a mirror image of the other channel. Each channel contains full redundancy of all critical resources and is designed to operate independently from the other channel, with Data Sync processors supporting synchronization between the two channels. The systems that make up this new architecture are ECG, EAS, and EADS.

(5) Physically, the En Route domain is typified by large distances separating its external sensors from the human interfaces within the ARTCC. There are hundreds of interface devices and equipment within the ARTCC, in addition to the radar and terminal equipment external to the ARTCC.

(6) The NAS must be viewed as more than a large hardware/software system. It also includes hundreds of controllers at their sector displays and operating positions, the live air traffic being controlled, and the personnel that monitor system operations and restore systems or equipment that fail.

d. Levels of Certification.

(1) Service Level.

(a) Surveillance services provide a means for ATC personnel to determine aircraft position, course, and identification during aircraft operations. These services are certified as CFAD and CRAD in accordance with tables published in appendix 1.

(b) Order 6000.15 established the naming conventions for the NAS infrastructure services, the CRAD service and CFAD services.

(c) Service level certification is the highest level in the certification hierarchy and is based on the system level of certification being current.

(2) System Level. System level certification provides the basis for the service level certification. System certification is based on the provision of advertised services. Advertised services are the functional capabilities of a system, such as processing capability or storage capability. They are the primary focus of subjective certification judgments. Measurement of the certification parameters is one method used to determine the quality and scope of the advertised services. The following require system level certification:

(a) CCCH

(b) ECG

(c) DSR

(d) URET

(e) EADS

(f) EAS.

(g) External Systems. En Route ARTCC radar and beacon systems, as well as the ARTCC communication systems, are certified in accordance with provisions of the applicable technical handbook.

(3) Element level certification is no longer necessary and element performance checks are included within the system certification.

e. Certification Responsibility. The certification entry to be made in the facility maintenance log is published in appendix 1 of this order.

(1) General. Certification responsibility will be assigned to appropriate technical personnel in accordance with the requirement in the latest edition of Order 3400.3, Airway Facilities Maintenance Personnel Certification Program.

(2) Certification Responsibilities. Certification responsibility designations included in the certification requirement tables are for general guidance only. It is recognized that circumstances will arise that will necessitate special designations by the manager of other personnel having sufficient and appropriate expertise to perform technical certification of service and system performance. Special designees must comply with the requirements in the latest edition or Order 3400.3.

f. Basic Guidelines.

(1) Service Level Certification.

(a) A complete shutdown of the operational system resulting in the loss of the CRAD or CFAD automation services should be considered to affect the service certification parameters. If system patches or other conditions prevent the use of the OLC capability available (Online Certification Tape (OLCT) or OLC), service certification should be attempted using manual alternate techniques described herein. Every effort should be made to correct the condition. Sufficient details should be documented to support further investigation and early correction. When CRAD and CFAD operation is scheduled to continue for more than one 24-hour operational period, the daily certification requirements shall be met using the most efficient techniques available on site, and selecting from the entire repertoire, ranging from OLC through the manual online procedures, as dictated by the real-time situation at the ARTCC.

(b) Situations may arise in which the diagnostics used to verify element or system operation do not cycle completely error-free, and the element/system appears to be accepted by the NOM. In such cases, the NOM using such technical expertise as necessary, will determine the performance/certification status of the services involved. As soon as practicable, the affected elements/systems shall be removed from operation for corrective action, if appropriate. If other fault conditions are found which, in the judgment of the NOM and the technical staff, do not derogate the service provided to the users, then the service/system may remain certified. The conditions found and actions taken shall be fully documented in the facility maintenance log for future analysis.

(2) System Level Certification.

(a) CCCH, ECG, DSR, URET, EADS, EAS.

1 Use of OLC, including the reconfiguration module, will provide a rapid check of the primary channel.

2 Loop-around patching can be utilized for checkout of the adjacent centers and ARTS interfacility data systems to avoid undue coordination delays.

3 Realistic evaluation of the input capability from internal ARTCC or remote site devices requires human intervention at the input device when the NAS operational program is cycling.

4 The functional checkout of the I/O capability at remote locations that are not staffed during ARTCC certification activities can be accomplished by a remote site technician during the next scheduled shift. Verifying the I/O capability can be accomplished using the TD message or system equivalent in the NAS operational program. In this situation, the remote site technician should advise the NOM concerning the results of site certification actions taken. Remote En Route personnel should notify the NOM whenever the remote facility equipment operational or certification status changes.

5 RDP RTQC of the radar input data from all serving radar facilities is a very important functional capability required for system performance analyses on a real-time basis. Data counts, status messages, RTQC test target messages (beacon and search), missing data conditions, registration and collimation analysis, as well as bias error correction are some of the most significant front-end input data processing capabilities that should be verified for the general RDP functional area of the NAS automation system.

6 At the controller interface, it is important to verify that each surveillance processing channel to the situation display will provide operationally satisfactory display of all class types of data, along with acceptable video presentation quality, properly aligned and formatted, as well as satisfactory radar console control operation for controller system use. Verification of RDP functions, such as tracking and conflict awareness, are key performance indicators of the system's functional capabilities in the NAS En Route automation domain.

5–11. PERFORMANCE CHECKING.

a. General. A substantial portion of the maintenance mission is dedicated to the determination of the performance status of the overall functional capability or service being provided to the user. In a large-scale complex system, performance checking can be accomplished at several levels in the total system hierarchy. Some performance checking is accomplished online by the operational software, and some must be accomplished offline using subsystem maintenance programs, equipment diagnostic programs and tools, or structured maintenance procedures. Predefined performance tests were developed during the integration phase of automation deployment. A subset of these tests was selected for periodic or condition based performance checks of the automation system. Periodic or condition based use of these procedures sets the desired confidence level in system performance, allowing faster, more limited tests to be used to meet certification responsibilities of the maintenance staff of the ARTCC facility. Performance checks also reinforce the specialist's understanding of the system, which helps reduce the time to repair and restore the system to full operational capability.

b. Procedures. Procedures for performing various levels of performance checks are available in other NAS system documentation, such as the FAA–4000 series of maintenance operating manuals. It is not the purpose of a maintenance technical handbook to issue duplications of system, subsystem, or equipment level documentation. It is the responsibility of the entire ATO staff to utilize these documents to support hardware performance checking as required in this directive. Unique, specialized procedures not suitable for inclusion in lower level documentation are included to standardize performance checking actions, promote better repeatability, and facilitate trend analysis, as well as support certification.

c. Performance Check Procedures.

(1) The use of predefined procedures will allow validation of key performance parameters. These procedures are designed to minimize the time required for completion of performance checking.

(2) The procedures in this section emphasize verification of hardware and software system error detection and reporting capability. They also provide sufficient indications of normal system responses to system input data so that a certification decision can be readily achieved. The procedures encompass various methods of:

(a) Accuracy checking of aircraft position data from radar data acquisition systems serving each center and the displayed symbology at the controller's display

(b) Checking the tracking functions, including hazard warning capabilities

(c) Checking the RTQC functions

(d) Checking the error detection and reporting capabilities and the normal system printouts provided during system operation. System reconfiguration and control capabilities are also fully exercised.

(3) Procedures are included for use with offline system performance verification. They utilize diagnostic software and tools provided for each system. The performance of separate elements of the hardware systems can be verified offline using these basic procedures.

(4) OLC will permit functional verification that the operational hardware and software can process and display flight and radar data as required to support the real-time ATC mission. OLC permits certification of the automation system while being used to control air traffic. OLC is a special purpose module added to the NAS operational program. A functional description and some general procedural guidance for operational use of the OLC program are included in this order.

5–12. RECERTIFICATION REQUIREMENTS RELATED TO OPERATIONAL PROGRAM PATCHES.

a. General. Where ATC has determined that a patch (or patches) must be made to the adaptation data to meet their immediate operational requirements, the NOM shall determine the need for and initiate overall service or partial recertification actions, if needed. ATC shall be advised of certification status changes, if any changes are made. Where ATC has determined that a functional change or functional addition patch must be introduced into the system as an emergency "fix" or to meet immediate operational requirements, the NOM shall determine the need for overall service or partial recertification of the NAS automation system, and initiate action as appropriate to the decision. The circumstances surrounding the use of patches not included in a system build shall be fully documented in the facility maintenance log.

b. Limitations. Successful certification of the automation services, after loading of a patch in the operational program or the adaptation database, shall not be considered to be a validation of the patch itself. Recertification of the NAS automation system cannot be expected to serve as a substitute for thorough functional testing of the patch(es), nor can it be expected to verify the changes expected from use of the patch(es).

5–13. CERTIFICATION FOLLOWING RESTORATION ACTIONS.

a. Service. Service recertification is required before resumption of ATC operation following total functional lapse of operational processing, i.e., when attempted startovers, startups with rescue, and startups without rescue (cold starts) all fail to restore functional processing. In the event that recovery was achieved after the trouble has been positively identified and isolated, the NOM, with the support of the ATC system user and technical staff, shall determine the need for partial or complete service recertification. Recertification, if required, may be accomplished using selected manual procedures or modules of OLC.

b. Systems. As per the latest version of Order 6000.15, system certifications are event based and no longer periodic. Therefore, a system failure that affects a certification parameter requires certification of the affected system before restoration to operational use. Recertification of the system is not required in those cases where recovery is accomplished by reconfiguration or isolation of failed elements or equipment from the system, nor will an IPL (with or without rescue) of the software having been in use of ATC, require recertification of the system.

5–14. ONLINE CERTIFICATION (OLC) DATA REQUIREMENTS.

a. Objective. To define the minimum data requirements for the OLC program simulation files needed to verify the performance of the NAS services and systems.

b. General. The OLC program provides the NOM with highly flexible and online means of verifying the certification parameters of the services and systems, on a selectable basis.

(1) For the Host, the certification files used for OLC are generated using the SIM program followed by use of the Verification Post Processor (VPP) program. These files are identical to the files generated by the SIM program except for the block of data added to the end of the header record. These files include the data necessary to assist the NOM in verification of the CFAD and CRAD service certification parameters, and CCCH, DSR, URET, and ECG system certification parameters specified in appendix 1 of this order.

(2) For ERAM, the certification files used for OLC are generated using the Simulation Generation Tool (SGET). These files include the data necessary to assist the NOM in verification of CFAD and CRAD service certification parameters and EAS, EADS, and ECG system certification parameters specified in appendix 1 of this order.

c. CFAD Service. The data file requirements for the CFAD certification consists of the input messages necessary to verify the flight data processing and the I/O capability of the systems. The minimum requirements are listed below.

(1) Start Notification: send a message to all devices stating that CFAD certification has started.

(a) Host: input a GI message.

(b) ERAM: input a GI message; this is verified via an EOPD Command Syntax report.

(2) Device Response: verify that all required devices are available.

(a) Host: input an ISGN message from the NOM KVDT.

(b) ERAM: use a combination of online (M&C) window captures (print and/or save) for the following: Processors window, External Communications window, External Interfaces window, and Networks window.

(3) FDP Input Flight Plans: these should be input to the system from ARTS, center A, D, and URET positions, and peripherals (KVDTs or workstations). These flights should represent traffic originating or landing within a sector's airspace; overflights; and flights originating or landing at ARTS sites. The simulated flight plans should be such to initiate printing on ARTCC FSPs and/or displayed at URET D-Positions Aircraft List (AL).

(4) Peripherals:

(a) Host: test all KVDTs using the GI and TD messages addressed to each KVDT. The GI messages should include the position identification (C1, E1, etc.), Logical Device Number (LDN) (200, 204, etc.), and device address (8D, 3F, etc.).

(b) ERAM: test all operational AT Specialist positions using the GI message addressed to each AT Specialist position. The GI message should include the position ID (C1, E1, etc.) and device addresses.

(5) FSP: exercise selected remote FDIO and ARTCC FSPs. The selected FSPs should be located at sectors that are normally active during low traffic periods.

(a) Host: TD messages.

(b) ERAM: TD P messages. TD messages injected at the AT Specialist position are recorded in the EOPD Command Syntax report. If ERAM determines it cannot send the TD message to the target FDIO, then an error message is recorded as an M&C event and is included in the M&C Event History report.

(6) Interfacility Data Set (IFDS): test messages should be included to elicit response from adjacent facilitates.

(a) Host (ARTS, URET, NAS TO NAS): the TR message with CP option should be included to elicit response from URET. If certification is performed when the adjacent facility is not operational, a normal response will not be received from that facility. Certification should be performed by manual entry of the TR message as soon as practicable after the adjacent facility becomes operational.

For URET Interfacility (IFA), test interface to neighboring ARTCCs with test flight plans posted to neighboring ARTCC URET position display AL. Observe DSR M&C position SUM, CRL, and PRS views for good status conditions. If certification is performed when the neighboring facility is not operational, test flight plans cannot be posted to URET displays. Verify good DSR M&C status on the SUM, CRL, and PRS views and error free URET ATC operations.

(b) ERAM: use the TR message, TD message, or test flight plans to elicit responses from adjacent facilities. The TR messages injected at the AT Specialist position are recorded in the EOPD Command Syntax report. Acknowledgments of receipt of TR messages at the target facilities is reported to the originating AT Specialist position and included in the I/O Log report.

(7) A and D Positions:

(a) Host: include TD messages to cause display of the CRD test pattern at the A and D sector positions. Also include invalid messages that cause the sector number, LDN, and CRD number to be written on the A and D position CRD. If the NAS monitor DBUG bit to cause automatic message acknowledgment is used, it should be set for the shortest possible time interval. This should be coordinated with the AT user, because real messages will automatically be acknowledged.

(b) ERAM: include the message: TTTCERT, (a valid ACID) at all R, D, and A positions. This will generate FP for TTTCERT, (QF message from the R-position and FR from each D- and A-position.

(8) Reconfiguration: the required reconfigurations may be performed manually if desired.

(a) Host:

<u>1</u> Reconfigure at least one major element in the CCCH system to allow verification of this function.

<u>2</u> Reconfigure processors in CCUs and/or DSR PCUs.

<u>3</u> Reconfigure at least one processor in URET.

(b) ERAM: Perform at least one PAS/SAS swap.

(9) End Notification: send a message to all devices stating that CFAD certification has been completed.

(a) Host: input a GI message.

(b) ERAM: input a GI message; this is verified via an EOPD Command Syntax report.

d. CRAD Service — Primary Channel. The data file requirements for the CRAD certification of the primary channel consist of the input messages necessary to verify the radar data processing and tracking; data display and entry; video presentation; system error detection, analysis, and correction capability. Simulated radar, beacon, weather, and symbol data is displayed on situation displays to verify that data can be processed and displayed correctly. Also, the RTQC, conflict alert, minimum safe altitude warning, and tracking features of the operational program are verified.

(1) Start Notification: input a message to all devices stating that CRAD Primary Channel certification has been started.

(a) Host**:** input a GI message.

(b) ERAM: input a GI message; this is verified via an EOPD Command Syntax report.

(2) RTQC Program Verification:

(a) Data Count Parameter: include verification of each of the following data count parameters:

Type of Control	*Host/EAS Parameter*	*Description*
SD[1]	BERC	Beacon Returns
CD[2]	EICM	Incomplete Messages
CD	EIVB	Invalid Messages
CD	EIVM	Nonbeacon Messages w/Invalid Labels
SD	NCRC	Nonvalidated Mode–C Checking Returns
SD	NRRC	Nonreinforced Beacon Returns
SD	NVRC	Nonvalidated Mode 3/A Beacon Returns
SD	PRRC	Primary Returns
CD	TRPC	Transmission Parity Error Count

[1]SD = a special parameter (dynamic)

[2]CD = a center parameter (dynamic)

(Host reference NAS–MD–310, section 4.0, ERAM reference TI 6110.110, appendix D)

1 Host: checking is accomplished by forcing data count printouts and/or inducing error conditions. Printout is forced by lowering the parameter to a value near the lower limit of its range. Errors can be induced by using the message card specifying overlap conditions.

2 ERAM: checking is accomplished by forcing data count printouts and/or inducing error conditions. Printout is forced by the QXX/QYY parameters being adapted to a value near the lower limit of its range.

(b) Status Message: include capability to verify that change in status will produce an appropriate status message.

1 Host: the message card can be used to induce a status change.

2 ERAM: the SGET can be used to induce status change.

(c) RTQC Test Target (Beacon): include capability to verify that out-of-tolerance beacon RTQC test target parameters will produce an appropriate error message printout. The message card should be used to introduce out-of-tolerance conditions in the mode 3/A code, altitude, range, and azimuth fields of the RTQC test message. After checking for proper response to error conditions, introduce RQTC test messages with in-tolerance conditions to verify normal operation.

1 Host: the message card should be used to introduce out-of-tolerance conditions in the mode 3/A code, altitude, range, and azimuth fields of the RTQC test message.

2 ERAM: SGET should be used to introduce out-of-tolerance conditions in mode 3/A code, altitude, range, and azimuth fields of the RTQC test message.

(d) RTQC Test Target (Search): include capability to verify that out-of-tolerance search RTQC test target parameters will produce an appropriate error message printout. The message card can be used to introduce out-of-tolerance conditions in the run-length, range, and azimuth fields of the RTQC test message. After checking for proper response to error conditions, introduce RTQC test messages with in-tolerance conditions to verify normal operation.

1 Host: the message card can be used to introduce out-of-tolerance conditions in the run-length, range, and azimuth fields of the RTQC test message.

2 ERAM: SGET should be used to introduce out-of-tolerance conditions in run-length, range, and azimuth fields of the RTQC test message.

(e) Missing Data Conditions: include capability to verify that missing beacon and search data, status messages, and beacon/search RTQC test messages will generate the appropriate NAS operational program error printouts. Correct the error conditions and verify that error printouts are no longer output.

(f) Registration: include capability to verify that this portion of the RTQC program will correctly calculate registration errors, and provide an accurate indication of the magnitude of the error in the printout to the NOM.

1 Host: using CSITE cards, introduce a range error of 0.5 nmi and an azimuth error of 9 Azimuth Change Pulses (ACP) to verify proper calculation and printout. Apply correction to the registration errors and verify calculated values are the same as the applied values.

2 ERAM: using SGET, introduce a range error of 0.5 nmi and an azimuth error of 9 ACPs to verify proper calculation and printout. Apply correction to the registration errors and verify calculated values are the same as applied.

(g) Collimation: include capability to verify that this portion of the RTQC program will correctly calculate collimation errors and provide an accurate indication of the magnitude of the error in the printout to the NOM.

1 Host: using PLANE and CSITE cards, introduce a range error of 3/8 nmi and 11 ACPs to verify proper calculation and printout. Apply correction to the collimation errors and verify calculated values are the same as the applied values.

2 ERAM: using SGET, introduce a range error of 3/8 nmi and an azimuth error of 11 ACPs to verify proper calculation and printout. Apply correction to the collimation errors and verify calculated values are the same as applied.

(3) RDP and Tracking: include the capability to check the RDP and tracking capabilities. This data includes search only targets, beacon only targets, beacon reinforced targets, LDBs, FDBs, flight plan aided tracks, free tracks, Mode C Intruder, weather data, automatic handoff, manual handoff, and accept. The simulated requirements are illustrated, by display area designation, in figures 5–1 through 5–5 and as described in the following subparagraphs.

(a) Display Area 1. Display Area 1, shown in figure 5–1, will make use of search (uncorrelated (.), uncorrelated (+), and correlated (X)), and beacon (uncorrelated (/), correlated (\), and identification beacon code (≡)) targets to test the system's ability to process and display different types of radar data. A series of 90-degree turns are included to follow the outside edge of a weather area.

(b) Display Area 2. Display Area 2, shown in figure 5–2, will be used to depict a flight plan aided, crossing track conflict situation. This test consists of three tracked aircraft. Flight one is on heading 090, flight level 210 climbing to 220, 300 nautical miles per hour, with a nondiscrete beacon code. Flight two is on heading 225, flight level 220, 300 nautical miles per hour, with a discrete beacon code. Flight three is on heading 315, flight level 225, 300 nautical miles per hour, with DBC. The tracks are converging and cross a point at the same time.

(c) Display Area 3. Display Area 3, shown in figure 5–3, will be used to depict search (correlated (X)) tracking, using a free track FDB, through clutter (uncorrelated short (.) run-length, search). This test will also include a flight plan aided track, through clutter, with a minimum safe altitude warning.

(d) Display Area 4. Display Area 4, shown in figure 5–4, will be used to depict overtaking and head-on conflict situations on tracked aircraft using emergency beacon codes. Flight one is on a heading of 000, flight level 300, 300 nautical miles per hour, with a beacon code of 7600 (COM FAILURE). Flight two is on a heading of 000, flight level 290, 600 nautical miles per hour, with a beacon code of 7500 (HIJACK). Flight three is on a heading of 180, flight level 310, 300 nautical miles per hour, with a beacon code of 7700 (EMERG). Flight two is overtaking flight one, and both are meeting flight three. The three tracks are converging and pass at one point.

(e) Composite Display Area. The Composite ARTCC Display, shown in figure 5–5, depicts the composite of display areas 1 through 4. It also includes tests to verify registration and collimation features of the operational program. These tracks must be located in the geographical areas making them eligible for registration calculations. Other emergency conditions should be tested and may be displayed as shown in the sample composition ARTCC display.

(f) Weather Display: include capability to verify the proper display of weather information. The outer contour lines portion of the weather display should be run during the first minutes of the test. Utilizing special geographical maps included in the adaptation for use at the SOC display during certification and for other performance analysis purposes can enhance the use of weather pattern displays. Some useful special geographical map capabilities include the following: azimuth division area outlines, range markers, sector boundaries, radar site, Permanent Echo (PE) and RTQC test target locations and deviation limits, as well as outlines of preferred radar sort box assignments in the ARTCC radar coverage area.

1 Host: WTHER and CSITE cards can be used to define the characteristics of the display to be generated. An example of a WTHER card that will generate the desired weather pattern over a hypothetical ARTCC is completed as shown in Table 5–1, Weather Display (see paragraph 5–14 for table 5–1).

2 ERAM: SGET can be used to define the characteristics of the display to be generated.

(g) Radar Strobe: include the capability to verify the proper display of the strobe function.

1 Host: Table 5–2, Strobe Function, gives samples of PLANE cards used to enter beacon (B) and search (S) type strobe displays (see paragraph 5–14 for table 5–2).

2 ERAM: SGET can be used to enter beacon (B) and search (S) type strobe displays.

(h) Reduced Vertical Separation Minima (RVSM): include the capability to depict, flight plan aided, RVSM equipped, crossing track conflict situation in high altitude. This test consists of three tracked aircraft, and each must be RVSM equipped. Flight one is on heading 090, flight level 330 climbing to 350, 300 nautical miles per hour, with a nondiscrete beacon code. Flight two is on heading 225, flight level 350, 300 nautical miles per hour, with a DBC. Flight three is on heading 315, flight level 340, 300 nautical miles per hour, with DBC. The tracks are converging and cross a point at the same time. Flights two and three are 1000 feet apart and should not be in conflict; conflict is to be detected when flight one ascends to less than 1000 feet separation of flight two and flight three.

(4) End Notification: send a message to all devices, stating that CRAD Primary Channel certification has been completed.

1 Host: input a GI message.

2 ERAM: input GI message; this can be verified via an EOPD Command Syntax report.

e. CRAD Service — Secondary Channel. The target generator data file requirements for the CRAD certification of the secondary channel (ECG with EBUS) consist of the input messages necessary to verify the radar data processing and tracking; data display and entry; video presentation; system error detection, analysis and correction capability. Simulated radar, beacon, weather, and symbol data is displayed on situation displays to verify that data can be processed and displayed correctly. Also, some RTQC, conflict alert, minimum safe altitude warning, and tracking features of the operational program are verified (reference NAS–MD–673 and 680).

(1) Start Notification: input a message to all devices, stating that CRAD Secondary Channel certification has been started.

(2) RTQC Program Verification.

NOTE: ECG and EBUS programs provided no automated techniques to verify the following RTQC functionality listed below in sections (a) through (e).

(a) Data Count Parameter: no automated verification of the Data Count Parameters is performed using the target generator (reference NAS–MD–673, section 3.4.2).

(b) Status Message: no automated verification of Status Messages is performed using the target generator.

(c) RTQC Test Target (Beacon): no automated verification of RTQC Beacon Test Targets is performed using the target generator.

(d) RTQC Test Target (Search): no automated verification of RTQC Search Test Targets is performed using the target generator.

(e) Missing Data Conditions: no automated verification of Missing Data Conditions is performed using the target generator.

(f) Registration: include the capability to verify that this portion of the RTQC program will correctly calculate registration errors, and provide an accurate indication of the magnitude of the error in the printout to the NOM. Using target generator/SMC commands, introduce a range error of 0.5 nmi and an azimuth error of 9 ACP to verify proper calculation and printout. Apply correction to the registration errors and verify calculated values are the same as the applied values.

(g) Collimation: include the capability to verify that this portion of the RTQC program will correctly calculate collimation errors and provide an accurate indication of the magnitude of the error in the printout to the NOM. Using target generator/SMC commands, introduce a range error of 3/8 nmi and 11 ACPs to verify proper calculation and printout. Apply correction to the collimation errors and verify calculated values are the same as the applied values.

(3) RDP and Tracking: include the capability to check the RDP and tracking capabilities. This data includes search only targets, beacon only targets, beacon reinforced targets, LDBs, FDBs, flight plan aided tracks, free tracks, Mode C Intruder, weather data, automatic handoff, manual handoff, and accept. The simulated requirements are illustrated by display area designation and as described in the following subparagraphs.

(a) Display Area 1. Display area 1 , shown in figure 5–1, will make use of search (uncorrelated (.), uncorrelated (+), and correlated (X)), and beacon (uncorrelated (/), correlated (\), and identification beacon code (≡)) targets to test the system's ability to process and display different types of radar data. A series of 90-degree turns are included to follow the outside edge of a weather area.

(b) Display Area 2. Display area 2, shown in figure 5–2, will be used to depict a flight plan aided, crossing track conflict situation. This test consists of three tracked aircraft. Flight one is on heading 090, flight level 210 climbing to 220, 300 nautical miles per hour, with a nondiscrete beacon code. Flight two is on heading 225, flight level 220, 300 nautical miles per hour, with a discrete beacon code. Flight three is on heading 315, flight level 225, 300 nautical miles per hour, with discrete beacon code. The tracks are converging and cross a point at the same time.

(c) Display Areas 3. Display area 3, shown in figure 5–3, will be used to depict search (correlated (X)) tracking, using a free track FDB, through clutter (uncorrelated short (.) run-length, search). This test will also include a flight plan aided track, through clutter, with a minimum safe altitude warning.

(d) Display Area 4. Display area 4, shown in figure 5–4, will be used to depict overtaking and head-on conflict situations on tracked aircraft using emergency beacon codes. Flight one is on a heading of 000, flight level 300, 300 nautical miles per hour, with a beacon code of 7600 (COM FAILURE). Flight two is on a heading of 000, flight level 290, 600 nautical miles per hour, with a beacon code of 7500 (HIJACK). Flight three is on a heading of 180, flight level 310, 300 nautical miles per hour, with a beacon code of 7700 (EMERG). Flight two is overtaking flight one, and both are meeting flight three. The three tracks are converging and pass at one point.

(e) Composite Display Area. The composite display, shown in figure 5–5, depicts display areas 1 through 4. It also includes tests to verify registration and collimation features of the operational program. These tracks must be located in the geographical areas making them eligible for registration calculations. Other emergency conditions should be tested and may be displayed.

(f) Weather Display: include the capability to verify the proper display of weather information. The outer contour lines portion of the weather display should be run during the first minutes of the test. The simulation target generator commands can be used to define the characteristics of the display to be generated. The use of weather pattern displays can be enhanced by utilizing special geographical maps, included in the adaptation for use at the SOC situation display during certification and for other performance analysis purposes. Some useful special geographical map capabilities include the following: azimuth division area outlines, range markers, sector boundaries, radar site, PE and RTQC test target locations and deviation limits, as well as outlines of preferred radar sort box assignments in the ARTCC radar coverage area.

(g) Radar Strobe: include the capability to verify the proper display of the strobe function. This simulation feature is entered using the target generator commands.

(h) Reduced Vertical Separation Minima (RVSM): include the capability to depict flight plan aided, RVSM equipped, crossing track conflict situation in high altitude. This test consists of three tracked aircraft, and each must be RVSM equipped. Flight one is on heading 090, flight level 330 climbing to 350, 300 nautical miles per hour, with a nondiscrete beacon code. Flight two is on heading 225, flight level 350, 300 nautical miles per hour, with a discrete beacon code. Flight three is on heading 315, flight level 340, 300 nautical miles per hour, with discrete beacon code. The tracks are converging and cross a point at the same time. Flights two and three are 1000 feet apart and should not be in conflict; conflict is to be detected when flight one ascends to less than 1000 feet separation of flight two and flight three.

(4) End Notification: send a message to all devices, stating that CRAD Secondary Channel certification has been completed.

(a) Host: input a GI message.

(b) ERAM: input a GI message.

f. CCCH System. The data file requirements for the CCCH system certification consist of the input messages required for CFAD and CRAD certification, plus the messages necessary to cause all reconfigurable CCCH and FDIO elements to be reconfigured.

g. DSR System. The data file requirements for the DSR system certification consist of the input messages required for CRAD certification plus the messages necessary to cause all reconfigurable units of the display system to be reconfigured.

h. URET System. The data file requirements for the URET system certification consist of the input messages required for CFAD certification plus the messages necessary to cause all reconfigurable units of the URET system to be reconfigured.

i. ECG System. The data file requirements for the ECG system certification consist of the input messages required for CRAD and CFAD certification, plus the messages necessary to cause all reconfigurable units of the ECG system to be reconfigured.

j. EAS System. The data file requirements for the EAS system certification consist of messages used in CFAD and CRAD certifications, manual entry messages, M&C status views, and reports necessary to validate the advertised services defined in appendix 1, section 8.

k. EADS System. The data file requirements for the EADS system certification consist of messages and data used in CFAD and CRAD certification and manual messages and commands necessary to validate the advertised services defined in appendix 1, section 7.

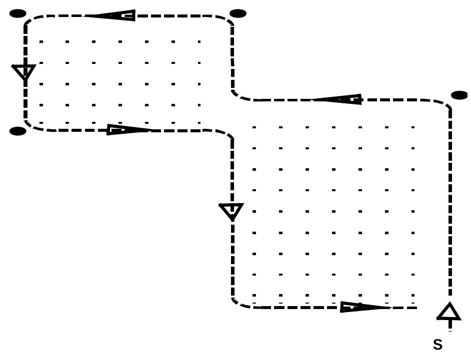

FIGURE 5–1. DISPLAY AREA 1

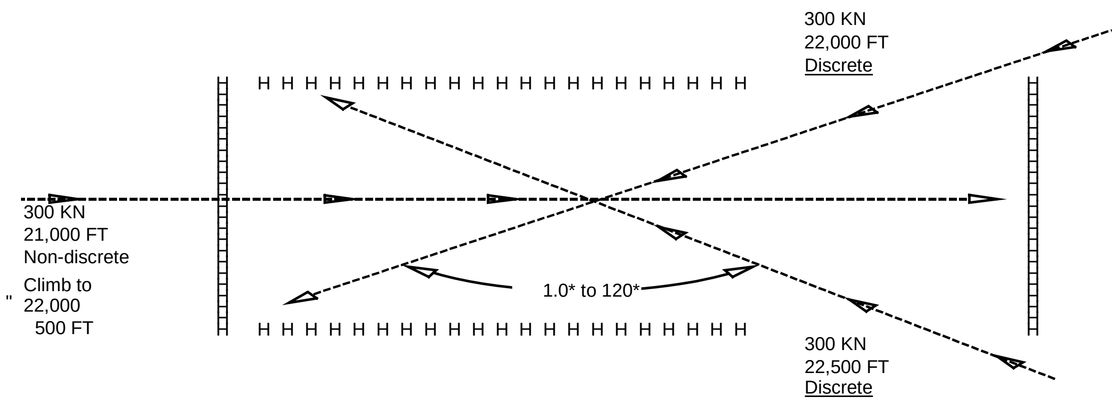

FIGURE 5–2. DISPLAY AREA 2

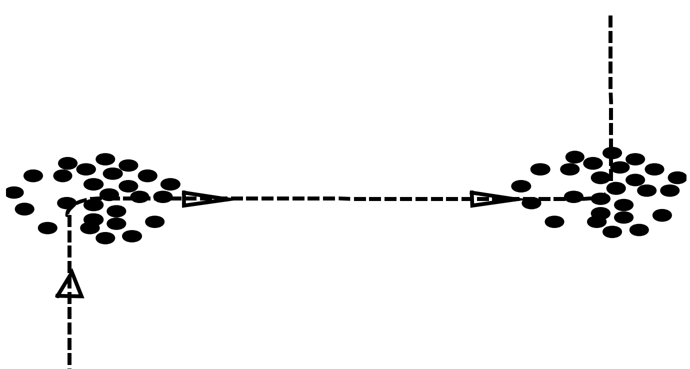

FIGURE 5–3. DISPLAY AREA 3

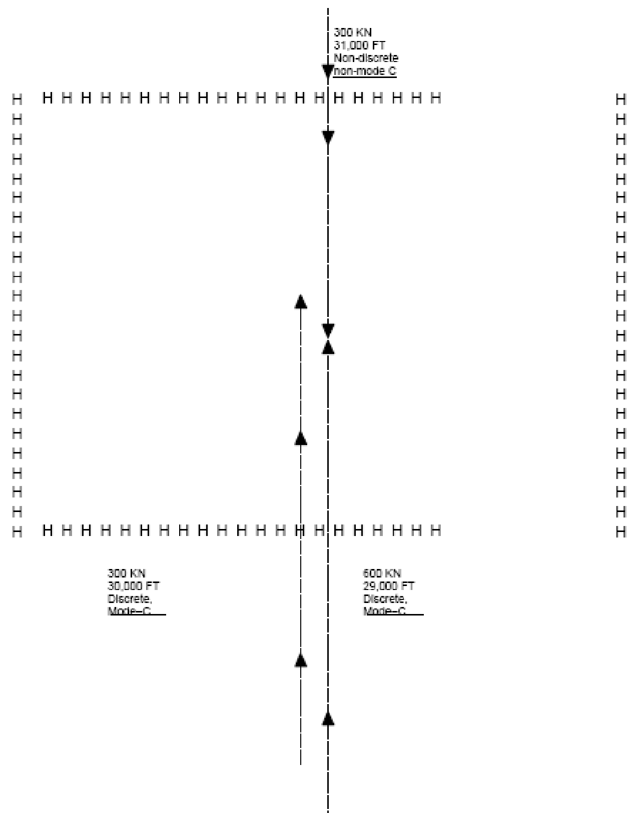

FIGURE 5–4. DISPLAY AREA 4

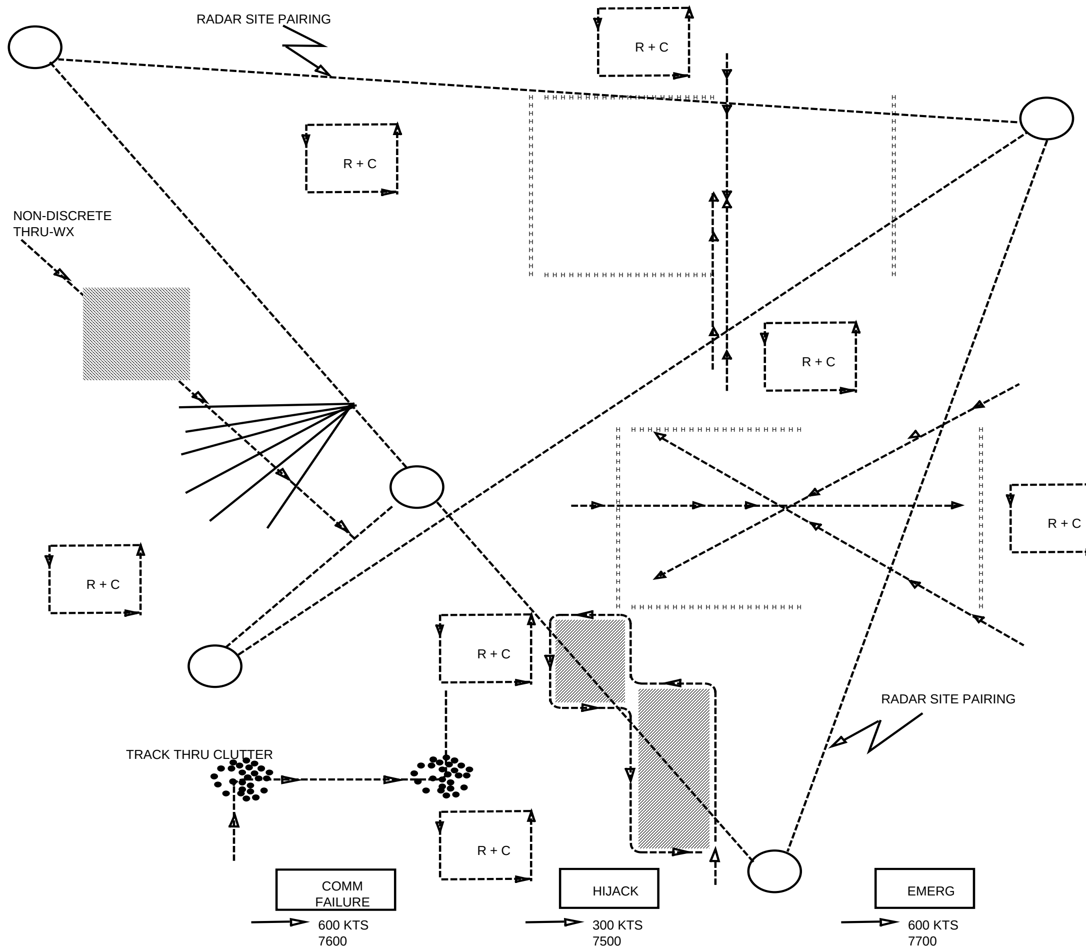

FIGURE 5–5. COMPOSITE ARTCC DISPLAY

TABLE 5–1. WEATHER DISPLAY

	Start Time	*Stop Time*	*Type Contour*	*X/Y1*	*X/Y2*	*X/Y3*	*X/Y4*
WTHER	000000	000500	PT	177/195	710/195	710/630	170/630

TABLE 5–2. STROBE FUNCTION

PLANE	000100 DA505	002900 B	560	416	600	000	000		3	10	100
(for beacon)											
PLANE	000100 DA506	000800 P	360	416	100	000	000	100	3	10	100
(for primary)											

5–15. CFAD/CRAD SERVICE LEVEL CERTIFICATION PROCEDURES.

a. Objective. To verify the ability of the system to perform FDP and RDP in support of the ATC mission of the FAA.

b. Discussion.

(1) General. This procedural guideline may be used following system startup or during continuous operation. The CFAD service should be verified first, in order to allow the earliest possible use of this service. The CRAD service verification should then be started.

(2) Certification Techniques Available. The OLC program should be the primary means of certification and structured for a minimum run time. Typical minimum run times for CFAD will be 5 minutes, and 20 minutes for the CRAD. Alternate techniques available include offline certification programs as well as the following:

(a) The applicable subsets of subsystem maintenance diagnostic programs.

(b) The testing capability of the NAS operational program.

(c) The special manual procedures designed to verify the certification parameters defined in appendix 1.

The parameters are limited to a critical subset of functional capabilities of the NAS operational system and its error checking capabilities.

(3) Certification Requirements. The certification requirements are listed in appendix 1, section 1 for the CFAD and section 2 for the CRAD.

(4) Guidance on the use of the OLC program is contained in the following documents:

(a) Host: OLC Users Manual and in the NAS Monitor Manual.

(b) ERAM: TI 6110.112.

c. Detailed Procedures.

(1) Load (if necessary) the current version of the NAS operational program.

(2) Cycle the CFAD module of the OLC program.

(3) Reconfigure at least one major element or cycle the reconfiguration module of OLC.

NOTE: If all elements are used in the operational system at least once a week, as part of a scheduled system configuration plan, a single reconfiguration is sufficient.

(4) Evaluate results, enter the certification status in the facility log, and advise AT personnel.

(5) Cycle the CRAD module of the OLC program.

(6) Verify satisfactory radar coverage and accuracy as determined at the radar sites, by current radar certification.

(7) Verify satisfactory narrowband radar site coverage. This can be accomplished by monitoring the RTQC printouts or the use of offline programs such as RARRE or QARS.

(8) Verify radar range and azimuth accuracy for each site by monitoring the PE verification, registration, and collimation function of RTQC. Otherwise use the RAPPI printouts, the search and beacon PEs, and the Digitizer displayed coordinates to verify the radar accuracy.

(9) Verify the display system accuracy by monitoring a PE or digitizer test target on the situation display.

(10) Reconfigure at least one major unit of the display system reconfiguration module of the OLC program.

NOTE: If all elements and units are used in the operational system at least once a week, as part of a scheduled system configuration plan, a single reconfiguration in each system is sufficient.

(11) Evaluate the results, enter the certification status in the facility log, and advise AT personnel.

(12) Purge simulation data from the system as necessary.

5–16. CRAD SERVICE LEVEL BACKUP CHANNEL CERTIFICATION PROCEDURES.

a. Objective. To verify the ability of the system to perform radar data processing service required of the backup system, and ECG with surveillance processing (EBUS).

b. Discussion.

(1) General. The ECG system with surveillance processing (EBUS) provides an automated certification program for the CRAD service of the backup channel. In addition, special manual techniques designed to verify certification parameters are defined in appendix 1.

(2) Certification Requirements. The certification requirements for the backup channel are listed in appendix 1, section 2 of this directive.

c. Detailed Procedures.

(1) Verify satisfactory radar coverage as determined by current, valid certification of the radar systems.

(2) Verify satisfactory narrowband radar coverage as determined by the lack of RTQC error messages from the operational program and the display presentation, or by use of offline CCCH programs such as QARS and RARRE. Also refer to paragraph 5–21.

(3) Verify that the radar (range and azimuth) accuracy meets requirements by checking one or more of the following for each radar:

(a) The beacon and search PEs are within ± 1/8 nmi and 2 ACPs of their mean average value as reported by the Permanent Echo Verification Printout (PEVP) or as observed on the display.

(b) Registration and collimation are within ± 1/8 nmi and 2 ACPs of their mean average value as reported on the Beacon Registration Printout (BRPO) and Radar/Beacon Collimation Printout (RCPO) reports.

NOTE: Collimation is only available if the beacon offset (1/2 mile delay) is active.

(4) Verify that the display accuracy meets requirements by checking that the search or beacon PE targets are within the adapted geographical map box (± 1/8 nmi and ± 2 ACPs of their mean average value).

(5) Verify the operational acceptability of radar data processing and tracking of the backup channel.

(a) Comparison to the Primary Channel. Comparison to the Primary Channel should be accomplished using targets of opportunity, presently tracked by the Primary Channel and the Backup Channel, with the Backup Channel in DARC/Host mode of operation.

NOTE: The following are guidelines for targets of opportunity selection and comparison setups:

- Monitor a minimum of three correlated, discrete beacon code, tracked aircraft and if necessary, start tracks.
- At least two of the three targets with a ground speed exceeding 300 nmi.
- One target should be in the RVSM airspace.
- One of three targets with Mode C reported altitude below 18,000 feet.

- Each target selected should be in an area covered by different types of radars (i.e., ARSR–3, FPS–67, 10-second scan, 12-second scan).
- Targets selected should not be traveling on the same relative heading to insure a variety of tracking conditions.
- Select an area of display in which a map fix (i.e., very-high frequency omnidirectional range (VOR)) may be easily centered in both systems for ease of comparison.

Comparison should be accomplished for a minimum of three minutes for each selected target. Compare the track, velocity vector, and all data block fields between the two systems. Verify the following:

1 There is no significant loss system updating of targets or FDBs.

2 The FDBs track the correct radar target, (i.e., no track swaps).

3 Aircraft Identification (ACID) and altitude fields of the FDBs are constant.

4 The ground speed and velocity vector fields of the FDBs are constant.

NOTE: Targets of opportunity and the guidelines above can be used independently of the Primary Channel (i.e., if the Primary Channel is not available for comparison).

(b) Target Generator Method. Cycle the Target Generator Program with SMC commands for the EBUS backup channel. The contents are described in paragraph 5–14.e.

5–17. SYSTEM LEVEL CERTIFICATION PROCEDURES.

a. Objective. To provide the procedures necessary to verify that the CCCH, ECG, EAS, EADS, DSR, and URET systems are capable of performing their advertised services.

b. Discussion.

(1) Certification Techniques Available. OLC actions can be performed with minimal interference to the on-going ATC operations in progress. During periods of continuous operation, system level certification can be scattered throughout the operational day. This system level certification should be performed during periods of low traffic activity, and with the approval of the ATC staff on duty. This procedural guidance is general in nature yet specific enough to support certification of the systems.

(2) Certification Requirements. The system certification requirements are listed in appendix 1 of this order as follows:

(a) CCCH in section 3;

(b) DSR in section 4;

(d) URET in section 5;

(e) ECG in section 6;

(f) EAS in section 7;

(g) EADS in section 8.

c. CCCH System Level Certification Procedures.

(1) Ascertain that the most current OLC program is loaded and available for call-up.

(2) Coordinate proposed certification actions with ATC.

(3) Run the CCCH Air Traffic Control Center (ATCC) OLC module, maintenance programs, or the manual procedures necessary to verify the certification parameters listed in appendix 1, section 3 of this order.

(4) Evaluate the results and enter the certification status in the facility maintenance log.

(5) Restore the system to normal, purging the simulation data as necessary.

d. DSR System Level Certification Procedures.

(1) Primary Channel.

(a) Ascertain that the most current OLC program is loaded and available for call-up.

(b) Coordinate proposed certification actions with ATC.

(c) Run the Radar Data Entry and Display (RDED) OLC module, maintenance programs, or the manual procedures (see paragraph 5–17.e(4)) necessary to verify the certification parameters listed in appendix 1, section 5 of this order.

(d) Evaluate the results and enter the certification status in the facility maintenance log.

(e) Restore the system to normal, purging the simulation data as necessary.

(2) Backup Channel.

(a) Ascertain that the most current EBUS SIM certification program is loaded and available for call-up.

(b) Coordinate proposed certification actions with ATC.

(c) Run the EBUS SIM module, maintenance programs, or the manual procedures (see paragraph 5–17.e(3)) necessary to verify the certification parameters listed in appendix 1, section 5 of this order.

(d) Evaluate the results and enter the certification status in the facility maintenance log.

(e) Restore the system to normal, purging the simulation data as necessary.

(3) Backup Channel Manual Procedures.

(a) R-Console Interface.

1 Set ECG/EBUS to the DARC/Host mode.

2 Enter a flight identification/beacon code message for a nonexistent flight. Verify that the message is rejected.

3 Change the R-console range. Verify that the correct display appears on the R-Console. Restore the R-console range to the initial value.

4 DSR R-console: offset the R-console center by positioning the trackball cursor to new center and depressing the multi/function and map manual keys. Verify the current display appears on the R-console. Restore the R-console center to the initial value by depressing the multi/function and map preset keys.

5 Coordinate with the NOM before changing the mode. Set DARC to the DARC mode.

6 DSR R-console: depress Function Key <Code> Type in the beacon code of LDB and ACID and keyboard enter. Verify that the preview area is cleared and that an FDB is displayed.

7 DSR R-console: <Pick> Establish beacon (mode 3/A beacon code) on the field select panel. Verify that the 3/A code in all FDBs is not displayed.

8 DSR R-console: <Pick> Establish beacon on the field select panel again. Verify that all beacon codes on the R–console have their beacon code displayed in the FDB.

9 DSR R-console: depress Function Key <Track> to initiate a flight identification to discrete beacon code association.

10 Depress the letter A on the alphanumeric keyboard. Verify that the letter A appears in the preview area of the R-console.

11 Depress the Clear key to cancel the above message. Verify that the preview area is cleared.

(b) R-Console Video Presentation: verify that the following types of displayable data are present on each R-console:

1 Primary symbols short (.) and long (+) runlength;

2 Beacon symbols (/);

3 Geographical maps (airways, sector boundaries, and special areas);

4 Data blocks;

5 Weather data (high and/or low) if known to exit.

(4) DSR Primary Channel Certification Procedures.

This procedure may be performed using live data with targets of opportunity at sectors assigned airspace and/or by using a SIM file. A specific SIM built for support of RDED may be desirable to aid in identification of SIM data.

(a) To perform DSR RDED using the SIM perform the following steps:

1 Initiate the SIM from the Host.

2 At the DSR R-console to be certified, increase the range to 400 nmi to display the SIM data which will be outside of the normal sector airspace.

3 Once the SIM data is located, place the trackball cursor over the SIM data area and press the "MULTI-FUNC" and "MAPMAN" keys simultaneously. This will center the area of SIM data on the R-console display.

4 With the SIM data centered on the display, decrease the range to clearly display the SIM data.

5 Using the SIM data, perform the DSR RDED checks as specified in appendix 1, section 4, of this order.

6 A typical OLC SIM will run approximately 30 minutes and will have to be restarted as necessary to support DSR RDED for each console.

(b) The following steps can be performed using live or SIM data:

1 At the R-console keyboard depress the "CRD" function key, type 000B001 <KYBD ENTER> and verify the change displayed in the CRD view.

2 Deselect the following functions in the DC view:

a All LDBs, select LDBs, all Primary, Non-Mode C, select Beacon and all Altitude Filter Keys 000 through 999.

b Verify that none of the above is displayed on the R-console.

3 Repeat step (a) using 030B100.

Verify that all LDBs displayed have altitudes between 3,000 and 10,000 feet.

4 Reselect all functions deselected in step (b).

Verify that all data is being displayed on the R-console.

5 Position trackball over an FDB ACID and press trackball <ENTER>.

Verify that selected FDB flight plan is displayed in CRD view.

6 Select/deselect the following in the R-console DC view:

a All primary, WX1, WX2, WX3, MAP1, MAP2, and MAP3.

b Verify all data can be displayed and cleared from the R-console, note weather if available.

7 The "D" side access keypad functionality can be validated by depressing the 13 keys and watching the action of the soft keys on the DSR display in the DC view.

8 The trackball home, pick, and enter keys can be validated by selecting and deselecting options on the DC view and validating that the proper actions occurred (range increased, decreased, cursor went to home position, etc.).

9 The display can be validated by using the MULTI-FUNC “T” option and viewing the five display test patterns to validate focus, linearity, display size, etc.

10 The entire alpha/numeric functionality can be validated by pressing the keys individually and observing the CRD view to insure the proper character was typed.

e. URET System Level Certification Procedures.

(1) Ascertain that the most current OLC program is loaded and available for call-up.

(2) Coordinate proposed certification actions with ATC.

(3) Run the URET Flight Data Entry and Display (FDED) OLC module, maintenance programs, or the manual procedures (see paragraph 5–31) necessary to verify the certification parameters listed in appendix 1, section 5 of this order.

(4) Evaluate the results and enter the certification status in the facility maintenance log.

(5) Restore the system to normal, purging the simulation data as necessary.

f. ECG System Level Certification Procedures.

(1) Primary Channel.

(a) Ascertain that the most current OLC program is loaded and available for call-up.

(b) Coordinate proposed certification actions with ATC.

(c) Run the OLC module, maintenance programs, or the manual procedures (see paragraph 5–31) necessary to verify the certification parameters listed in appendix 1, section 6 of this order.

(d) Evaluate the results and enter the certification status in the facility maintenance log.

(e) Restore the system to normal, purging the simulation data as necessary.

(2) Backup Channel.

(a) Ascertain that the most current EBUS SIM certification program is loaded and available for call-up.

(b) Coordinate proposed certification actions with ATC.

(c) Run the EBUS SIM module, maintenance programs, or the manual procedures (see paragraph 5–31) necessary to verify the certification parameters listed in appendix 1, section 6 of this order.

(d) Evaluate the results and enter the certification status in the facility maintenance log.

(e) Restore the system to normal, purging the simulation data as necessary.

g. EAS System Level Certification Procedures. System level certifications are now event-based as defined by FAA Order 6000.15.

(1) Ascertain the affected advertised service, channel, or element resulting in the allowable exception.

(2) Coordinate proposed certification actions with ATC.

(3) Run the certification method necessary to verify the certification parameter(s) affected as listed in appendix 1, section 8, of this order.

(4) Evaluate the results and enter the certification status in the appropriate facility log.

(5) Restore the system to normal.

h. EADS System Level Certification Procedures. System level certifications are now event-based as defined by FAA Order 6000.15.

(1) Ascertain the affected advertised service, channel, or element resulting in the allowable exception.

(2) Coordinate proposed certification actions with ATC.

(3) Run the certification method necessary to verify the certification parameter(s) affected as listed in appendix 1, section 7, of this order.

Alternate R-console manual procedure:

(a) Enter a flight ID/beacon code message for a non-existent flight. Verify that the message is rejected.

(b) Change the R-console range. Verify the display for the selected range setting.

(c) Offset the R-console center by positioning the trackball cursor to new center and depressing the multi/function and map manual keys. Verify that the current display appears on the R-console.

(d) Initiate a track:

1. Press the track button.

2. Pick on a blank area of airspace.

3. Enter a test call sign (i.e., ttt or TTTT).

4. Press Enter.

5. Verify that the test track initiated.

(e) Toggle to the alternate channel.

1. Compare and verify the track initiated in step (d) is the same.

2. Compare and verify the range setting as in step (b).

(f) Drop the test track initiated in step (d):

1. Press the drop track button.

2. Pick on the test track.

3. Press Enter.

4. Verify that the track deleted.

(g) Toggle back to the alternate channel.

(h) Verify that the track initiated in step (d) has been deleted.

(i) At the R-Console video presentation, verify that the following types of displayable data are present on the R-console:

1. Primary symbols, short (.) and long (+) runlength

2. Beacon symbols (/)

3. Data blocks

4. Other targets of opportunity

(4) Evaluate the results and enter the certification status in the appropriate facility log.

(5) Restore the system to normal.

5–18. ELEMENT LEVEL PERFORMANCE CHECK PROCEDURES.

a. Objective. To provide the procedures necessary to verify that the elements and equipment that make up the systems are capable of performing their intended function.

b. Discussion.

(1) Techniques Available. The techniques include evaluation using operational, support, diagnostic, and maintenance programs. The use of general and special purpose test equipment and normal maintenance techniques is necessary to verify the key performance parameters specified in this order and the equipment instruction books.

(2) Requirements. Performance Checks are required for the elements of the systems defined in chapter 4 of this Order.

(3) System Connectivity.

(a) DSR and URET. The communication paths between a DSR or URET processor and the DSR system are verified during initialization and acceptance of the subject processor. For DSR processors the communication paths consist of four Token Ring interfaces. For URET processors it consists of two Token Ring interfaces for DGWs. All other URET processors communicate with DSR via the DGWs.

When a DSR processor initializes and is presented for acceptance into role it will appear in the Processor Initialization (PIN) view. Prior to appearing in the PIN view the Local Group SMMM (LGSM) software loads Maintain Internal Facility Time (MIFT) and Basic Services (BS). BS software performs a 32-bit checksum for all LGSM, MIFT, and BS files. BS also performs an initial hardware verification and reports status to the M&C.

When the processor is accepted into role via the APRL command, LGSM initiates loading of all the required applications for the desired role of the subject processor, and BS performs 32-bit checksums of all files loaded and verifies all critical hardware components. If any checksum or hardware component fails the subject processor is placed in diagnostic (DGN) role. If a processor is accepted into it's operational role, all BS verifications have passed successfully and the processor is successfully communicating with the DSR system.

(b) CCCH. The communication paths between CCCH and its elements or devices (DSR, URET, FDIO, RADAR, DPCU, and ECG) are verified using the MDM program and/or the Host Online Diagnostic Tools. These diagnostics assist maintenance personnel in validating the interface integrity between the CCCH processor and its elements or devices. The original MDM diagnostics were developed to support certification of legacy En Route hardware systems, while the new Host Online Test Tools were developed to support the certification of both new En Route hardware systems as well as the legacy systems. These diagnostics are run in a highly complex, safety related environment and require the expertise of certified maintenance personnel.

Internal CCCH communication paths, verified using Online Test Standalone Executive Program (OLTSEP), provide the user interface and diagnostic routines to test I/O devices, control units, and channels.

c. Detailed Element Performance Procedures.

(1) Set the affected element or equipment to the configuration status required to run the tests.

(2) Load and run the test programs specified in appendix 1, observing for error free operation.

(3) Analyze results of program run. Take corrective action as appropriate.

(4) Restore the element or equipment to normal configuration status.

(5) Repeat the above procedure for each element or equipment of the system.

(6) Verify normal operation of the element in the offline/support system as required by appendix 1.

(7) Evaluate the results, and if total or partial certification criteria can be met, enter the certification status in the facility maintenance log.

d. Detailed DSR Gateway (DSGW) Procedure.

(1) Place the DSGW to be certified in DGN state.

(2) Enter the M&C command: PDGN XXXX (XXXX=DSGW to be certified).

(3) Perform a power up POST test on DSGW.

(4) Enter the M&C command: CERT XXXX (XXXX=DSGW to be certified).

(5) After the CERT command is successfully completed, enter the M&C command: ASGN R/DSGW G/DSGW XXXX (XXXX=DSGW).

(6) Enter the M&C command: APRL XXXX (XXXX=DSGW).

e. URET Processing Capability Flight Data Procedures. These procedures are to verify the URET application's ability to alter flight data. By performing an amendment in this manner, the URET application within the D-position processor passes the flight plan message to the DSR application, which passes the FP command to the Host system via the LCN and LIU path to Host.

When Host processes the amendment, the updated flight plan information is sent to the URET system via the HGW interface and as a result the ACL View will be updated via the URET communication path.

(1) Select the ACL view.

(2) Amend the flight plan.

(3) Verify that the amendment was processed and the flight plan was updated in the ACL.

5–19. DISPLAY SYSTEM ONLINE MANUAL PERFORMANCE CHECKS.

a. General.

(1) Verification of the R-console display includes the DSR portion and the EADS portion of the R-position.

(2) Provisions have not been made for guidance in all possible restoration situations or the required procedures involved; therefore, the cognizant technician must determine the extent of the actions to be taken since they will relate directly to the effect of the malfunction involved. For example, if the malfunction had no impact on the total displayable repertory of symbology, there is obviously no need to verify the quality of all the displayable symbology.

(3) New radar systems continue to be deployed in the field; these systems all have processors that generate digitized target messages, i.e., they have digitizers. References to single test target generation will be made using the term, Digitizer.

(4) The DSR performance may require rechecking prior to the next periodic checkout. One method of rechecking would be to use the Certify Hardware (CERT) command. The CERT command is used to immediately run hardware certification and software release level tests on one or more processors and obtain the results. This command will run all Operational Exerciser (OPEX) tests on the processors being tested.

b. Detailed Procedures.

(1) R-Position. At the affected sectors, verify, at a minimum, that the following types of displayable data are present to the extent required by the restoration action:

(a) Primary symbols (correlated, uncorrelated, short (.) or long (+) runlength);

(b) Beacon symbols (correlated and uncorrelated);

(c) Geographical maps (GEOMAP) (airways, sector boundaries and special areas);

(d) LDBs;

(e) FDBs;

(f) Low- and high-intensity weather symbols;

(g) Strobes;

(h) Inbound, departure, and hold lists.

(2) At the affected sectors, verify that the digitizer RTQC test target or PE symbols for all radar that are adapted are within the tolerance limits defined by their associated geographical map symbol.

(3) The following several steps are an alternate procedure that may be used to verify display channel accuracy only. It is based upon the use of the VOR geographical map symbol as a reference in conjunction with a single digitizer test target initially centered over the symbol and thereafter used as a known target over that reference location, available on demand.

(a) At the ARTCC:

1 Determine the system, X, Y coordinates of all the radar sites and record these values.

2 Using navigational charts, adaptation database information and/or Radar Sort Box (RSB) calculations (appendix E, paragraph 3, NAS–MD–320), select the VOR(s) such that their location(s) will fall within the RSB assigned to the particular radar(s) as a preferred site coverage for that RSB.

3 Ascertain the system X, Y coordinates of each VOR location and pair these coordinates with the coordinates of the radar sites.

4 Determine the differences, ΔX, ΔY, between radar sites, X, Y and associated VOR site X, Y system coordinates.

5 Calculate the approximate range values in nautical miles from each radar site to associated VOR site using the following relationship:

Range = $[\Delta X^2 + \Delta Y^2]^{1/2}$

Retain these values for use later at the radar site.

<u>**6**</u> Using a protractor and a navigational chart, determine as closely as possible the approximate azimuth angle from the radar site to the associated VOR. Retain these values for use at the radar site.

<u>**7**</u> Provide each of the radar sites with the calculated or measured range and azimuth values as a starting value to be used in centering the single digitizer test target over the associated VOR symbol.

(b) At the radar sites:

<u>**1**</u> Set up the digitizer test target generator to generate a single test target at the VOR range and azimuth values determined. Determine that the test bit is not set or the test target will not be displayed at the ARTCC.

<u>**2**</u> Advise the center that the test target is being generated and should be displayed on the selected Plan View Display (PVD) as a + symbol.

(c) At the ARTCC:

<u>**1**</u> Set the R-console controls so that the selected VOR geographical map symbol and the digitizer test target are being viewed on the 6-mile range scale.

<u>**2.**</u> Note the position of the digitizer test target, and advise the radar site technician of the appropriate changes in the test target azimuth and range required to make the + symbol center coincident with the VOR geographical map symbol center.

<u>**3**</u> When coincidence occurs, advise the remote site technician to record the test target generator settings for future use. The centered range and azimuth settings must be determined and recorded at each radar site.

<u>**4**</u> A list of radar site/VOR pairs, Digitizer Test Target Generator (DTTG) settings, and test target RAPPI printouts should be made available at both the radar site and at the NOM's position for ease of reference.

(d) At the radar site, turn off the digitizer test target after the reference settings have been determined and verification actions have been completed. This reference setting may also be used for periodic maintenance when producing the 32 target ring.

(e) If a subsequent test indicates that the test target is offset from the VOR symbol, the ARTCC observer should ask the radar site technician to change the setting until the + symbol is again centered. The radar site technician should then advise the center observer of the amount of deviation from the original centered values that were required to recenter the symbol over the VOR symbol. If this deviation exceeds ± 1/8 nmi or ± 2 ACPs, the display accuracy service should be decertified and the necessary corrective action initiated.

(4) Make the specified certification entry in the maintenance log if all other requirements have been met.

5–20. RDAT SYSTEM PERFORMANCE CHECK.

a. General. Performance check procedures are available for the major components of the radar data acquisition portion of the RDAT system. They may be found in the applicable technical handbooks for the radar, beacon, and digitizer equipment.

b. Performance Verification. Assure that the digitizing system is performing properly and is providing accurate target position data into the CCCH. This may be accomplished by using referenced handbooks, and by using the QARS program. The accuracy and coverage verification procedures in this section may also be used as alternate methods, if needed. Log the results of the verification actions in the radar site and ARTCC maintenance logs, as appropriate.

5–21. RADAR SYSTEMS COVERAGE SERVICE VERIFICATION.

a. General. Verification that the coverage being provided by the digitized radar system is adequate involves radar site and ARTCC actions.

b. Detailed Procedures.

(1) At the radar site:

(a) Complete the daily performance check tasks for the radar, beacon, and CD equipment/systems.

(b) Verify that coverage related parameters are within their operating tolerances as specified in the applicable radar, beacon, and CD technical handbooks.

(2) At the ARTCC:

(a) Monitor the data quality for the following:

1 Presence of different beacon code;

2 Search data and reinforcement rate;

3 RDAT hardware status.

(b) After the operational program has cycled for a sufficient period of time, verify the following:

1 That no excessive or missing data condition exists for any site. Checks performed at the radar site, maintenance software checks, and/or visual observations of displayed data on each channel may be utilized as alternate means for verification of these subparameters of coverage service.

2 That no beacon or search test message error conditions exist for any site.

3 The operational coverage acceptability of the radar sites by the radar site status summary printout and the radar coverage control site status printout. These printouts are solicited by entering a ZS and YR message respectively.

(c) If actual missing or excessive data conditions exists for any site, or if actual coverage is not acceptable for any site, certification for that site will be withheld until the condition is cleared.

Upon successful completion of procedures at the radar site and at the ARTCC, the NOM will enter any noted exceptions into the facility maintenance log.

5–22. RADAR DATA PROCESSING SYSTEM RANGE AND AZIMUTH ACCURACY CHECKING PROCEDURES.

a. General.

(1) Range and azimuth accuracy checking by daily visual verification of search radar PEs on the Plan Position Indicator (PPI) display is not a satisfactory technique when it is necessary to visually discriminate incremental changes of the order of 2 ACPs (0.176 degrees) in azimuth data and 1/8 nmi in range data. NAS system designers have included an online, statistical technique (the Registration Analysis (RA) task of the RTQC portion of the NAS and EBUS operational program) for site registration verification and dynamic data correction. This program compares the reported position of several beacon-equipped aircraft as viewed by two adjacent radar sites in an overlapped coverage area. Because of eligibility criteria and sample size required, the calculation may take considerable time to complete for the several pairs of sites serving a given center. While the RA function is preferred, it is not the timeliest method to use for performance verification at any given center. Accordingly, alternate techniques are included in this paragraph, and the NOM on watch, with appropriate advice from the radar sites involved, should select the technique that will permit the timeliest verification of the accuracy service items.

(2) Three basic techniques are included that:

(a) Utilize the daily performance checks conducted by the CD technician delineated in Order 6350.21, Maintenance of Common Digitizer–2 Equipment, which includes the collimation analysis task of RTQC to assure that radar and beacon data are properly collimated.

(b) Utilize adapted Geographical Map Line Segment Delete Add Record (GMLSDA) map symbology that will indicate the location of the selected PEs for each of the sites servicing the ARTCC.

(c) Rely entirely upon completion of the registration and collimation analyses with appropriate dynamic correction actions.

b. Detailed Procedures. The following subparagraphs include specific guidelines and procedures for all techniques included:

(1) Radar Site PE Accuracy Checks/Collimation Analysis Procedure — METHOD 1.

(a) Radar site PE location accuracy verification procedure:

NOTE: These guidelines are generalized in form; local variations that achieve the same basic goals may be used if desired.

1 At the radar site (site technician) will:

a Complete the daily performance checks for radar beacon and digitizer equipment.

b Verify that at least one PE is visible on both search or beacon systems. Verify that coordinates are within ± 1/8 nmi and ± 2 ACPs of the normal, mean (average) value for that PE. Refer to paragraph 5–22b.(1)(b) of this chapter for the method of developing a standard list of PE coordinates for each radar site.

c If the PE coordinates are out-of-tolerance, the radar site technician shall advise the NOM that corrective action is required, and radar site personnel shall take appropriate action to assure accuracy verification, in consonance with ARTCC/Air Defense Tactical Air Command (ADTAC) as determined through the NOM/Air Traffic Assistant Chief (ATAC) interface or the NOM/ADTAC interface.

2 At the ARTCC the NOM will:

a Verify the presence and alignment of the beacon and search test targets from all radar.

b Ascertain that the NAS operational program is cycling. Collimation calculations may be expedited if the site is advised to set the beacon offset switch to ON during this procedure. Coordinate with AT as required.

NOTE: Collimation is only available if the beacon offset (1/2 mile delay) is active.

c Initiate collimation analyses for each of the radar sites serving the ARTCC.

d Verify that collimation between search and beacon reports (less offset) is within ± 1/8 nmi and ± 2 ACPs, using the printouts from the collimation analysis. If the collimation errors exceed the tolerances, initiate corrective action and recheck collimation as appropriate.

e If the PE coordinates and collimation errors are within tolerance for all sites involved, RDP accuracy service verification is completed. Restore beacon offset to normal (if used in step b above.)

f Enter into the facility maintenance log any noted exceptions.

(b) Development of the standard PE list for each radar, beacon site:

1 The Radar Data Acquisition System (RDAS) specialist staff should work with each of the radar sites and develop a list of PEs for each site. It is essential to have a sufficient number to assure that at least one PE will be available for daily accuracy verification. Candidates for this list of "standard" PEs should be developed using the PE locator program and charts of the surrounding radar environment.

2 The standard PE list should include the arithmetic mean (or average) value of coordinate data related to each of the PEs listed. After a period of usage, the standard deviation should be prepared for each of the available PEs. This may be readily accomplished with a desk or hand calculator. Initially, the PE location coordinate statistics (mean and standard deviation) should be recalculated on a monthly basis. If they prove to be very stable, recalculation frequency should be reduced to quarterly.

3 Use of the standard deviation (a widely used measure of variance) of the PE coordinates will greatly assist the NOM in selection of the most stable PE for accuracy verification. Accordingly, a sample calculation is included for convenience. Ten azimuth data samples are given for a hypothetical PE. Two methods are shown for calculating the sum of the squares of the deviations, which can be the most tedious portion of the calculation for standard deviation. The "short" method is included and recommended for use with a calculator, since it is less subject to round-off errors than the more direct approach.

4 Several simple statistical terms and concepts should be considered in order to assure more than a "mechanical" grasp of the calculation involved. Among these terms are important and useful measures that can be associated with a set of measurements. It is the measure of "central tendency," i.e., the arithmetic mean, or simply the mean (or average). It is defined as the sum of the measurements, divided by the number of measurements. Another important measure deals with the "dispersion" or "variability" of the measurements. This "variance" measure is used in developing the standard deviation. Variance is defined as the average of the squares of the deviations of the measurements about their means. Standard deviation is also defined as the positive square root of the variance. The standard deviation restores the original units to the measure of dispersion (variance) that are, by definition, squared units of dispersion.

5 The following example illustrates the method of calculating standard deviation, based upon its definition:

Reading #	*ACPs*	*Deviations from Mean*	*Deviations Squared*
1	01	-1	1
2	02	0	0
3	03	+1	1
4	01	-1	1
5	02	0	0
6	02	0	0
7	03	+1	1
8	02	0	0
9	02	0	0
10	02	0	0
Totals	20	0	4

$$\text{Arithmetic Mean} = \frac{20}{10} = 2$$

$$\text{Standard Deviation} = \frac{\text{Sum of Deviations Squared}^{1/2}}{\text{Number of Readings}}$$

$$\text{Standard Deviation} = \frac{4^{1/2}}{10} = .63 \text{ ACPs}$$

6 Another method more suited to calculator techniques is illustrated below. It is based on a different though equivalent computation of the sum of the deviations squared, which is less subject to round-off error.

Reading #	*ACPs*	*ACPs²*
1	01	1
2	02	4
3	03	9
4	01	1
5	02	4
6	02	4
7	03	9
8	02	4
9	02	4
10	02	4
Totals	20	44

$$\text{Standard Deviation} = \text{Total of ACPs}^2 - \left[\frac{\text{Total of ACPs}^2}{\text{Number of Readings}}\right]$$

(alternate method)

$$= 44 - \frac{20^2}{10} = 44 - \frac{400}{10}$$

$$= 44 - 40 = 4$$

Again, standard deviation is the square root of the variance.

$$\text{Standard Deviation} = \frac{4^{1/2}}{10} = .63 \text{ ACPs}$$

7 Empirical rules have evolved which provide the following useful information concerning distributions, approximating the normal (bellshaped) distributions:

a The interval of the distribution between +1 standard deviation and -1 standard deviation around the mean will contain approximately 68% of the measurements.

b The interval of the distribution between +2 standard deviations and -2 standard deviations around the mean will contain approximately 95% of the measurements.

c The interval of the distribution between +3 standard deviations and -3 standard deviations around the mean will contain approximately 99.7% of the measurements.

Properly applied, these rules permit important inferences to be drawn from the measurements at the 68%, 95%, and 99% “confidence levels.”

8 The standard PE lists shall be made available for use by cognizant radar site and ARTCC personnel during verification.

9 The standard list shall be kept current by the NOM and radar site action, so that cognizant users will have the most current list available for verification purposes.

10 The PEs selected for use may be verified using the PE verifier or D7454 subsystem maintenance diagnostic program. The PE locator program assists in initially defining the candidate PEs and s generally used at Surveillance System Testing (SST).

11 During PE verification using the PE verifier, it is important that the operating digitizer equipment be in an alarm-free condition.

(2) PE Symbol/Locator Box Symbol Procedure — METHOD 2. This is a very desirable alternative method since it provides a check on site accuracy status that can be continuously available for display (for some PEs, beyond the MTI crossover). This technique includes the radar sensor, the data path, the CCCH system, and the displays involved. Basically, the technique utilizes the runlength data now available to the operational programs. PEs can be displayed as "+" symbols. The PE is encircled by a geographical map symbol shaped similar to a box. The box is centered on the actual coordinates of the PE. The box defines the range and azimuth tolerance limits (± 1/8 nmi, ± 2 ACPs) around the actual coordinates of the PE. Several PEs should be identified and located, and at least one PE must be available to accomplish verification. The geographical map symbology should be made selectable for viewing at the display as a special area function.

(a) Accuracy verification procedure:

1 Advise the radar digitizer sites to set the beacon offset switch to the ON position. Coordinate with ATAC/ADTACs as required.

2 Initiate collimation analysis for each of the radar digitizer sites serving the ARTCC/ADTAC facilities.

3 Verify that collimation between beacon and search reports is within ± 2 ACPs. If the collimation errors exceed the tolerances, the NOMs shall initiate corrective action and recheck collimation as appropriate. Restore beacon offset switches to normal.

4 Utilizing a display displaying preferred data for the radar being checked, center an adapted PE on the display. The PE should not be in a clutter area and the MTI gate may need to be moved to display the PEs chosen. Do not move the MTI gate any closer in range than necessary to preclude possible data overload conditions.

5 Set R-console range switch to minimum range.

6 Adjust runlength threshold to cause the radar-reported PE to be displayed as a +, as necessary.

7 If outside of the locator box, register the radar-reported PE with the adapted PE by centering the + symbol in the adapted PE box. (Reference ZM message, NAS–MD–311.)

8 Repeat steps 1 through 4 for each radar site feeding the ARTCC.

9 If both PE location and collimation errors are within tolerances, accuracy service verification is complete.

10 Enter into the maintenance log that the accuracy parameters have been verified for all sites involved, noting exceptions as appropriate.

(b) Development of PE locator box symbology:

1 Select several PE coordinates for each radar site from the standard list prepared in paragraph 5–22.b.(1)(b).

2 Refer to the tabulations of approximate slant/range errors for slant/range correction altitude (SLCA) of 3 and 4 nmi; see Table 5–3, Approximate Slant/Range Error.

3 Establish the box dimensions to optimize resolution accuracy for the range selected.

4 Adapt the selected PE location boxes for display continuously or as a selectable special area or blank key function, if available. The system performance staff should refer to applicable adaptation guidance documentation for more detailed adaptation information.

5 Approximate relationships of display units/1/8 nmi and the selected range are as follows:

Selected Range nmi	*Display Units/1/8 nmi*
6	10.66
9	7.11
14	4.57
20	3.20
30	2.13

(3) Registration and Collimation Analysis Method — METHOD 3.

(a) Registration analysis error printouts will occur when the completed analysis calculations indicate errors exceeding the Registration Data Range Deviation (RDRD) and Registration Data Azimuth Deviation (RDAD) range and azimuth error deviation threshold. Calculations are completed when the sample size parameter Radar Display Subsystem (RDSS) position reports are collected from Mode C, discrete code targets in the acceptable areas of the radar site pairs being registered. These constraints are formidable during certain AT conditions. Use of the registration analysis method may require considerable time and extensive coordination of effort with AT controllers to assure that discrete code assignments and Mode C replies can be used for registration. It is also essential to assure that judicious radar site pairings have been made in the adaptation in order to minimize calculation times, especially at centers with six or more radar sites feeding the centers. The following procedures are provided as general guidance in the event that this method of verification is to be used.

(b) General guidance (NOMs):

1 Verify that the following parameters are set as follows, using the CP message as necessary:

RDSS	10
RDRD	0
RDAD	0
CDSS	50 (or adapted value)

2 Analyze the collimation printouts to assure that the beacon data is within ± 1/8 nmi and ± 2 ACP of radar data.

NOTE: Collimation is only available if the beacon offset (1/2 mile delay) is active.

3 Analyze the printouts and/or apply the registration error corrections to assure in–tolerance (± 1/8 nmi and ± 2 ACP) site error conditions.

(c) Where calculations are not completed by the start of live traffic control and other alternatives using PEs are not available, the NOM should advise the ATAC that operation can continue. If the broadband system meets certification criteria for accuracy, then the broadband radar standards would apply at the discretion of the ATAC.

(d) When error corrections derived from RTQC and/or the PE method have been applied, the system accuracy performance can be verified.

(e) Enter into the maintenance log that the system accuracy parameters have been verified, noting exceptions as appropriate.

(f) Restore RDSS, RDRD, RDAD, and CDSS to their normal operational monitoring values using the CP message.

TABLE 5–3. APPROXIMATE SLANT/RANGE ERROR

(SLCA — 3 nmi)

Altitude (nmi)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
10	8.82	7.97	7.22	6.56	5.98	5.47	5.02	4.63	4.28	3.98	3.71	3.48	3.26	3.07	2.90	2.75	2.61	2.48	2.37	2.26	2.16	2.07	1.99	1.91	1.84
9	7.80	6.97	6.24	5.61	5.07	4.60	4.20	3.85	3.55	3.28	3.05	2.85	2.67	2.51	2.36	2.23	2.12	2.01	1.92	1.83	1.75	1.67	1.61	1.54	1.40
8	6.77	5.96	5.27	4.69	4.19	3.77	3.41	3.11	2.85	2.63	2.43	2.26	2.12	1.98	1.87	1.76	1.67	1.58	1.51	1.44	1.37	1.31	1.26	1.21	1.16
7	5.74	4.96	4.31	3.77	3.33	2.97	2.67	2.41	2.20	2.02	1.86	1.73	1.61	1.51	1.42	1.33	1.26	1.20	1.14	1.08	1.03	.99	.95	.91	.87
6	4.69	3.95	3.35	2.88	2.51	2.21	1.97	1.77	1.60	1.47	1.35	1.25	1.16	1.08	1.02	.96	.90	.85	.81	.77	.74	.70	.67	.65	.62
5	3.61	2.93	2.42	2.03	1.74	1.51	1.33	1.19	1.07	.98	.89	.82	.76	.71	.67	.63	.59	.56	.53	.51	.48	.46	.44	.42	.41
4	2.48	1.89	1.50	1.23	1.03	.88	.77	.69	.61	.56	.51	.47	.43	.40	.38	.35	.33	.32	.30	.29	.27	.26	.25	.24	.23
3	1.08	.80	.62	.50	.42	.35	.31	.27	.24	.22	.20	.18	.17	.16	.15	.14	.13	.12	.12	.11	.11	.10	.10	.09	.09
2	.12	-.59	-.20	-.11	-.07	-.05	-.04	-.04	-.03	-.03	-.02	-.02	-.02	-.02	-.02	-.02	-.02	-.01	-.01	-.01	-.01	-.01	-.01	-.01	-.01
1	-.29	-.88	-.92	-.52	-.39	-.31	-.26	-.23	-.20	-.18	-.16	-.15	-.14	-.13	-.12	-.11	-.10	-.10	-.09	-.09	-.08	-.08	-.08	-.07	-.07

Flight Plan Aided Tracking (FLAT) RANGE (nmi)

TABLE 5–3. APPROXIMATE SLANT/RANGE ERROR (CONTINUED)

(SLCA — 4 nmi)

Altitude (nmi)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
10	8.63	7.79	7.04	6.38	5.81	5.31	4.87	4.49	4.15	3.85	3.60	3.36	3.15	2.96	2.81	2.66	2.52	2.39	2.28	2.18	2.09	2.00	1.92	1.85	1.78
9	7.59	6.76	6.05	5.43	4.90	4.44	4.04	3.70	3.41	3.15	2.92	2.73	2.55	2.40	2.26	2.14	2.03	1.92	1.83	1.75	1.67	1.60	1.54	1.47	1.42
8	6.53	5.73	5.04	4.47	3.98	3.58	3.24	2.94	2.70	2.49	2.30	2.14	1.99	1.87	1.76	1.66	1.57	1.49	1.42	1.36	1.29	1.24	1.18	1.14	1.10
7	5.45	4.68	4.05	3.53	3.11	2.76	2.48	2.24	2.04	1.87	1.73	1.60	1.48	1.39	1.30	1.23	1.16	1.10	1.05	1.00	.96	.92	.87	.84	.80
6	4.33	3.61	3.05	2.60	2.26	1.99	1.76	1.58	1.44	1.31	1.20	1.12	1.03	.96	.91	.85	.81	.76	.72	.69	.66	.62	.60	.58	.55
5	3.13	2.50	2.04	1.70	1.45	1.26	1.11	.98	.90	.81	.74	.68	.64	.60	.55	.52	.49	.46	.44	.42	.40	.38	.37	.36	.34
4	1.55	1.23	1.00	.83	.70	.60	.53	.47	.43	.38	.35	.33	.30	.28	.26	.24	.23	.22	.21	.20	.19	.18	.18	.16	.16
3	.58	-.20	-.18	0	.04	.05	.04	.05	.04	.04	.04	.03	.03	.03	.03	.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
2	.12	-.59	-1.20	-.77	-.50	-.39	-.32	-.27	-.24	-.21	-.19	-.17	-.16	-.15	-.14	-.13	-.12	-.11	-.11	-.10	-.09	-.09	-.09	-.09	-.09
1	-.29	-.88	-1.42	-1.45	-.87	-.67	-.55	-.47	-.41	-.37	-.32	-.30	-.27	-.25	-.23	-.22	-.21	-.19	-.18	-.17	-.17	-.16	-.16	-.15	-.15

Flight Plan Aided Tracking (FLAT) RANGE (nmi)

5–23. RESERVED.

5–24. ONLINE CERTIFICATION TAPE.

a. Online Certification Tape (OLCT). The OLCT is modular in design; each module can be called up independently to exercise specific areas of the automation capability. It includes the capability to run selected modules on a start/stop time option or on device options. Reconfiguration can be accomplished on a selected system or daily basis.

b. Use of OLCT. OLCT is usable online during NAS operation. Since it exercises the same functional capabilities as OLC, it will provide similar patterns and outputs for verification of the NAS automation services and systems. These expected outcomes are a part of the information that the certifier will use to make the decision on certification.

c. Users Information. The user information for OLCT is available in NASP–9291, NAS Operational Support System User's Manual, Operational System Online Certification Program, and NASP–9280, NAS En Route Verification Post Processor (VPP) Program User's Manual.

5–25. STATUS OF OTHER EN ROUTE FACILITIES.

a. NAS Operations Manager Function. The NOM's position is the central maintenance authority on watch. The NOM or assistant NOM on duty is expected to be cognizant of the operational condition of non-automated En Route facilities in the ARTCC control area. The condition of some adjacent ARTCC facilities may also be of concern to the AT mission in any particular ARTCC.

b. Logging. As appropriate, log facility status information in the facility maintenance log.

c. Restoration Actions. Initiate restoration actions appropriate to the requirements of the air traffic situation and in accordance with the latest edition of Order 6000.15.

5–26. RDP RANGE AND AZIMUTH ACCURACY VERIFICATION DURING SHORT DURATION PRIMARY RADAR SHUTDOWN.

a. General. Essential shutdown of the primary radar system to the level that will still permit operation of the secondary radar system can be expected as a normal radar system maintenance activity and may, of necessity, occur during the operational RDP time period. These shutdowns shall be fully coordinated. Operational use of the secondary radar system to provide beacon data input for the RDP automation capability requires that the primary triggering source and antenna rotational capability be operational throughout the primary system "shutdown" period. A totally powered-down condition of the primary system will not permit normal secondary system operation, unless beacon PRF and beacon antenna rotation are achieved by other means, and are maintained within normal primary/secondary system tolerances as specified in the current system technical handbooks/orders.

b. Detailed Procedures. In a radar system shutdown with secondary radar operation to be continued, the following special procedures apply:

(1) Prior to primary radar shutdown, perform the normal primary with secondary radar system certification procedures at the site and ARTCC involved. Reference the applicable procedures and parameters in this order and the latest edition of Order 6000.15.

(2) After successful verification based on normal radar/beacon system configuration and procedures, ascertain that the registration analysis is in progress and that the registration error of the radar site to be shut down is within acceptable tolerance values. If not, initiate corrective action at the site or by RTQC corrective messages as appropriate.

(3) As soon as certification under normal radar system configuration is achieved, both radar site and ARTCC staff shall make an appropriate entry indicating normal certification status and time.

(4) Advise the affected site(s) maintenance staff(s) that the primary radar shutdown can now begin.

(5) After a brief period of monitoring registration analysis printout(s) with beacon only data input, log site RDP certification status as follows:

"___________ RADAR SYSTEM CERTIFIED FOR RDP WITH SECONDARY RADAR DATA ONLY. PRIMARY SYSTEM SHUTDOWN FOR MAINTENANCE, RADOME REFURBISHING, OR OTHER REASON(S) UNTIL ____________ HOURS THIS DATE."

(6) Restoration of the radar site to normal configuration (a change in status) shall be followed by certification in accordance with normal certification requirements.

(7) Recertification during incident/accident or out-of-tolerance conditions may necessitate return to normal radar-beacon operation if registration calculations cannot be expected to be secured in a reasonable time period.

5–27. RDP RANGE AND AZIMUTH ACCURACY VERIFICATION USING GROUND-BASED TRANSPONDERS.

a. General.

(1) Azimuth and range accuracy certification may be accomplished using the procedures in paragraph 5–22. Three alternative techniques are provided, two of which are based primarily upon the availability of search radar permanent echoes, unobscured by clutter or other adverse radar environmental conditions AND the follow-on condition of sufficient beacon data reports for the operational program to complete the collimation analysis.

(2) The third method in paragraph 5–22 is based upon the registration and collimation analyses capability available in the RTQC portion of the NAS operational program. Since completion of these analyses requires meeting of minimum track data criteria for completion, some ARTCCs are unable to accomplish certification by this technique during the pre-startup period. Consequently, they must rely heavily upon the search radar permanent echo/collimation techniques to certify site azimuth and range accuracy.

(3) Another technique is available for these sites experiencing problems with availability of uncluttered search radar permanent echoes and low traffic activity. The following technique uses the ground-based transponder as a beacon "permanent echo," and is a fallback for the PE verification capability.

b. Conditions. This procedure requires an operable ground-based beacon transponder, sited to avoid active airways as much as possible and, preferably, viewable by both the radar beacon sites normally paired for registration analysis. The transponder should be preset to respond to an ATC approved non-operational beacon code.

c. Detailed Procedures.

(1) Beacon PE and Collimation Analysis — METHOD 1. These guidelines are generalized in form. Local variations that achieve the same basic goals may be used if desired.

(a) At the radar site, site technician will:

1 Complete the performance check tasks for the radar, beacon, and digitizer equipment.

2 Verify that the ground–based transponder (beacon permanent echo) can be observed or printed, and that coordinates are within ± 1/8 nmi and ± 2 ACPs of the normal mean (average) value for that permanent echo. Refer to paragraph 5–21 for a method of calculating the standard deviation and mean of the beacon PE.

3 Establish the beacon PE checks as a new item on the site Technical Performance Record.

4 If the beacon PE coordinates are within tolerance, indicate completion of this item on the form. Advise the NOM of the results.

5 If the beacon PE coordinate(s) are out-of-tolerance, the site technician shall advise the NOM that corrective action is required. Site personnel shall take appropriate action to correct the condition.

(b) At the ARTCC NOM will:

1 Ascertain that the NAS operational program is cycling.

2 Verify the presence and alignment of the beacon and/or search test targets from all radar sites.

3 Initiate collimation analysis for each of the radar sites serving the ARTCC. COLLIMATION CALCULATION MAY BE EXPEDITED if the site is advised to set the beacon offset switch to ON during this procedure. Coordinate with AT as required.

NOTE: Collimation is only available if the beacon offset (1/2 mile delay) is active.

4 Verify that collimation between search and beacon reports (less any offset) is within ± 1/8 nmi, ± 2 ACPs, using the printouts from the collimation analysis. If the collimation errors exceed the tolerances, the NOM shall initiate corrective action and recheck collimation as appropriate.

5 If the beacon PE coordinates and collimation errors are within tolerance for all sites involved, RDP accuracy service certification is complete. Restore beacon offset to normal (if used).

6 Enter into the maintenance log that the accuracy of the serving radar digitizer sites has been certified, noting exceptions as appropriate.

(2) Beacon PE Symbol/Locator Box Symbol Procedures — METHOD 2. This technique is a very useful alternate method that can provide a continuously viewable symbol indicative of PE location accuracy. Basically, the technique uses the beacon PE slash symbol displayed on an ARTCC R-console. The symbol is enclosed by a GMLSDA map symbol shaped like a box. The GMLSDA map "box" is centered over the mean system coordinate location of the beacon PE. The box defines the range and azimuth tolerance limits (± 1/8 nmi, ± 2 ACPs) around this mean value.

(a) Certification procedure:

1 Verify that the beacon PE is visible on the display being used.

2 Advise the radar Digitizer sites to set the beacon offset switch to the ON position. (The PE symbol position will shift.) Coordinate with ATC/ADTAC.

3 Initiate collimation analysis for the radar site being certified.

4 Verify that collimation between beacon and search reports is within ± 1/8 nmi, ± 2 ACPs (exclusive of offset). If the collimation errors exceed the tolerances, the NOM shall initiate corrective action and recheck collimation as appropriate. Restore beacon offset switch to normal after collimation check is completed.

5 Utilizing a display displaying preferred data for the radar system being checked, center an adapted geographical map box on the R-console.

6 Set display range switch to minimum range.

7 If the beacon PE symbol appears outside the geographical map box, recenter the PE symbol using the ZM message (see NAS–MD–311).

8 Repeat steps 1 through 5 for each radar site being certified.

9 If both PE location and collimation errors are within tolerances, accuracy certification is complete.

10 Enter into the maintenance log that the accuracy of the radar digitizer sites has been certified, noting exceptions as appropriate.

(b) Development of PE locator box symbology:

1 Determine the beacon PE coordinates associated with each radar site utilizing the beacon PEs.

2 Refer to the tabulations in table 5–3 for SLCA of 3 and 4 nmi, as appropriate, for the PE involved.

3 Establish the box dimensions to optimize resolution accuracy for the range selected.

4 Adapt the selected beacon PE location box(es) for display continuously, or as a selectable special area or blank key function (if available). Refer to applicable adaptation guidance documentation for more detailed adaptation information.

5 Approximate relationships of display units/1/8 nmi and the selected range are as follows:

Selected Range nmi	*Display Units/1/8 nmi*
6	10.66
9	7.11
14	4.57
20	3.20
30	2.13

5–28. DISPLAY SYSTEM TRACKING VERIFICATION PROCEDURES — MANUAL ENTRY METHOD.

a. General. This procedure describes an online manual entry method for certifying the RDP tracking capability using the DYSIM function of the operational program.

b. Discussion. This is a script-oriented technique that will generate test radar targets to allow exercising of the RDP tracking function. Use of this script procedure will assure that track crossover and turn detection are included to verify the operation of the tracking function. It will provide an alternate to the NAS Certification Tape (NSCT) method of certifying the tracking function. The SIM target can be steered automatically, based on route segments from a flight plan or by operator inputs. Operation of DYSIM is internal to the ARTCC and is confined to only those sectors configured as training sectors.

c. Conditions.

(1) The simulation training (ST) message provides the capability to configure the desired training sector(s). This must be coordinated with appropriate ATC personnel.

Example DYSIM configuration steps:

(a) CS 3 — set adapted sectorization plan.

(b) CS 19/17 — assign the Fix Posting Areas (FPA) from sector 17 to sector 19.

(c) ST P17 — establish a “Pilot” (no strips) at sector 17.

(2) SIM flight input actions are entered through the category and function controls, alphanumeric keyboard, and trackball. All SIM target inputs at the configured display sector will be prefixed by “SIMULATION” at the category and function controls; only one function may be entered with each selection of the “SIMULATION” category.

d. Entry Procedures for SIM Flights.

(1) The following filter keys are needed for test observation:

(a) System Primary;

(b) MAP1;

(c) Sector Boundary;

(d) Full Data Blocks;

(e) Select Beacon Targets;

(f) All Field Select Keys;

(g) ALT — (see Flight Plan Altitude);

(h) SIM Category DISPLAY Function (Enter “LS” for SIM and LIVE display).

(2) Enter a map request (MR) on the SOC IOT to display the appropriate sector map on the DYSIM configured R-console.

(3) Enter a flight plan using the DYSIM configured keyboard. The following serve as examples:

(a) xxxAF1 C500/A 340 CRL Eaaaa 180 CRL..CRL090070

where:

aaaa is approximately 5 minutes added to the current clock time.

(b) xxxAF2 C500/A 340 CLE Ebbbb 180 CLE..CLE360060

where:

bbbb is approximately 5 minutes added to the current clock time.

(4) Perform a flight plan readout (FR) for xxxAF1 and xxxAF2. Record the NAS Computer Identification (CID) numbers.

(5) At aaaa time or before, press the category SIM key, type xxxAF1, and entry via the ANK enter key. Record the SIM CID number. This is available from the first two numbers of the third line of the SIM data block.

(6) Press quick-action key (QAK), place the slew symbol over the radar symbol, depress the trackball enter key, input the appropriate NAS CID on the ANK and depress the ANK enter key.

(7) The SIM data block may be suppressed by selecting category SIM, function DISPLAY, entering the SIM CID, and depressing the ANK enter key.

(8) At bbbb time approximately, repeat steps (5) through (7) for aircraft xxxAF2.

(9) After the targets cross, verify both targets are being tracked properly:

(a) xxxAF1 — heading east

(b) xxxAF2 — heading north

(10) After the crossover verification is completed, select category SIM and function HEADING, enter “260”, space, SIM CID for xxxAF1, and depress the ANK enter key. Repeat for xxxAF2 using “190” degrees, and the SIM CID for xxxAF2.

(11) Both targets should perform turns of approximately 170 degrees and recross.

(12) After they recross, select category SIM function STOP, enter SIM CID, and depress the ANK enter key for both targets.

(13) DYSIM configuration may be terminated by entering “ST OFF” at an IOT.

(14) Data Block Definitions:

A1	A2	A3	A4	A5	A6	A7
B1	B2	B3	B4	C1	C2	C3
D1	D2	D3	E1	E2	E3	E4

A1–7	TDB- Aircraft Identification SIM- SIM Aircraft Identification
B1–3	TDB- Assigned Altitude SIM- Target Altitude
B4	TDB- Altitude Qualifier SIM- Mode C Capability
C1–3	TDB- Reported Altitude SIM- Target Heading
D1–3 D1–2	TDB- Computer Identification (CID) SIM- Computer Identification (CID)
D3	SIM- “A” or “M” Mode Operator
E1–4	TDB- Variable Data SIM- Target Beacon Code

(15) SIM Radar Target Symbols:

3 — Correlated primary

4 — Uncorrelated primary

5 — Correlated beacon

6 — Uncorrelated beacon

e. Log Entry/Completion.

(1) Following error-free completion of the procedure, enter into the maintenance log that the system tracking functions have been verified.

(2) Advise AT of the completion of procedure and take appropriate restoration actions as required.

5–29. RESERVED.

5–30. QUICK ANALYSIS OF RADAR SITES (QARS) PROCEDURES.

a. Objective. This procedure uses the QARS program in the offline CCCH system to permit an in-depth quantitative analysis of radar/beacon performance. The procedure may be used to verify the narrowband radar site coverage, but is normally used for preventive maintenance. The data and subsequent analyses provide valuable trend data for the system performance staff, the radar site technicians, and the NOM.

b. Discussion.

(1) The QARS program is a load and go, adaptation controlled program that provides confirmation of ARTCC radar data acquisition and transfer system interfaces and operational status. It provides a more in-depth analysis of radar site performance than is available from the NAS RTQC subsystem programs.

(2) The original QARS program (D74C1) operates under control of the MDM monitor on the offline CCCH system under the VM. The new QARS program (MDQ) runs under the NAS monitor, either directly from the online CCCH system or from the offline CCCH system running TESTNAS under VM. The QARS program uses either real-time radar data inputs or prerecorded radar data inputs. The real-time radar data is obtained directly from the radar data acquisition and transfer system and the prerecorded radar data is obtained from the NAS operational programs via magnetic tape.

(3) The QARS program is made up of two routines: a quality precheck to verify each radar system's interfaces, and an analysis of beacon tracks. The precheck provides a continuous scan-to-scan printout for each radar site containing the following data:

(a) Total beacon, search, maps, and status messages.

(b) The number and quality of messages received by the three high-speed channel adapters associated with each radar site.

(c) Validation of beacon and search RTQC messages.

(d) Status message checks for digitizer alarms and control switch settings.

(4) The data analysis routine will select beacon tracks with a track life greater than 20 scans to compute the following performance parameters, expressed in percentile, for each discrete beacon code:

(a) Beacon and search blip scan;

(b) Beacon and search splits;

(c) Reinforced rate;

(d) Collimation;

(e) Ring-around and reflections;

(f) Code validity and reliability.

c. Detailed Real-Time Radar Data Procedures.

NOTE: This procedure has considerable restrictions due to timing problems caused when operating QARS under VM with real-time radar data.

(1) Determine which high-speed data channel, if any, is not available on the offline Peripheral Adapter Module (PAM), and request the technician to turn off this channel at the radar site.

(2) Set the MDM VM to a high priority and force off all other users, except standby NAS (this is to reduce the effect of the timing problems noted above). Also, restrict the number of radar sites being processed to a level that can be correctly handled by QARS, under the VM control program.

(3) Run the quality precheck routine of QARS for approximately 1 minute.

(4) Run the data analysis routine of QARS for approximately 30 minutes, dependent upon the number of radar sites and number of tracks in the system.

(5) Analyze the quality precheck printouts verifying that:

(a) Status messages indicate that the CD ran alarm free.

(b) The search and beacon RTQC messages were within tolerance.

(c) The data count was normal for the site(s).

(d) There is no more than one malfunction error (MAL) for every 2,000 messages, and no Invalid Message Label (INV) errors.

(6) Analyze the QARS data analysis printouts and verify that the parameters are acceptable. If the listed parameters do not meet the specified criteria and the radar performance based on past analysis, it is unacceptable. Perform the required corrective action.

(7) Restore data channels to normal.

d. Detailed Prerecorded Radar Data Procedures.

(1) Start ORR for all sites on the NAS operational system (ZQ RECORD ALL ON).

(2) After a minimum of 30 minutes, stop the ORR (ZQ RECORD ALL OFF).

NOTE: At facilities where Online Radar Recording and Edit (ORRE) is on continuously, the command CLOS ORR may be used to download the ORR data to tape, and leave the recording running.

(3) Verify the radar data record tape was unloaded and contains correct times.

(4) Create a CD record tape using the ORRE program, using the ORR tape previously created for input.

(a) Log on to a VM and create an Interactive System Productivity Facility (ISPF) file containing a control deck, with a file type of “CNTL”. The control deck consists of one data card (MMDDYY) and one card for each radar adapter (CUU) to be tested, and includes the adapter number, and the start and stop time (CUU HHMMSS HHMMSS).

(b) Call up to the ARTCCPDF primary option menu and select the radar data analysis function. Then select the online radar record edit option from the radar data analysis function menu.

(c) Complete the required information on the panel and submit the job.

(5) Load the QARS program under MDM in the offline CCCH system.

(6) Run the quality precheck routine of QARS for approximately 1 minute.

(7) Add tape drive and have the CD record tape created by the ORRE job mounted.

(8) Run the data analysis routine of QARS for 30 minutes.

(9) Analyze the quality precheck printouts verifying that:

(a) Status messages indicate that the CD ran alarm free.

(b) The search and beacon RTQC messages were within tolerance.

(c) The data count was normal for the site(s).

(d) There is no more than one MAL error for every 2,000 messages, and no INV errors.

(10) Analyze the QARS data analysis printouts and verify that the parameters are acceptable. If the listed parameters do not meet the specified criteria and the radar performance based on past analysis is unacceptable, perform the required corrective action.

5–31. MANUAL ONLINE CERTIFICATION PROCEDURES (ALTERNATE TO SIMULATION PROGRAMS).

a. Objective. This paragraph provides an alternate online manual entry technique for verification of the performance of the NAS operational hardware and software systems.

b. Discussion. The OLCT is a performance checking technique based on recorded simulation data sets that elicit the desired system responses with minimal manual inputs. If this technique is not available, the following procedures can serve as an alternate means of performance checking using direct manual inputs to the system.

c. Hardware/Software Requirements. The HW/SW requirements are the same as defined in paragraph 5–14 and appendix 1 of this order.

d. Conditions. These procedures are primarily “manual” in nature and partitioned to be performed at any convenient time throughout the 24-hour day. Since they will be performed during control of air traffic, advance coordination with the ATAC must be accomplished prior to performance of the procedures. Time or performance of these procedures should be chosen to minimize impact, such as during the midwatch or other slack traffic periods of the operational day. The entire set of procedures need not be completed during a single continuous period of time. Each activity MUST be completed at least once during every 24-hour operational day.

e. Detailed Procedures.

(1) Manual Reconfigurations.

(a) Enter the appropriate messages to reconfigure the major elements CP, LDDA, LIU, etc., of the complete system. Do not set elements unavailable unless they are inoperative.

Sample reconfiguration sequence:

	Online	*Offline*
Startup system	1	2
1st reconfiguration	2	1
2nd reconfiguration	1	2

(b) Allow a brief interval between reconfiguration actions to permit data processing and transfer of operations to each new system configured, to assure exercising of each new interface established.

(c) When reconfiguration actions are completed, restore the system to the desired operational configuration.

(2) Flight Data Processing (FDP). Test messages are to be sent to all intracenter and remote I/O equipment to verify:

(a) that the equipment is operational, and

(b) that data can be processed accurately. FDP service certification shall include URET and the following subsystems: KVDT, FDIO, FSP, IFDS, and A/D position CRDs.

1 KVDT: test all KVDTs using the GI and TD messages addressed to each KVDT. GI messages should include:

a Position identification (C1, E1, etc.) ;

b LDN (200, 204, etc.) ;

c Device address (8D, 3F, etc.).

2 FDIO (RCU/FSP): enter necessary TD messages to check all FDIO facilities. Check the RCU interface and message routing as evidenced by appropriate printouts to the individual FSPs.

3 FDIO (keyboard): the FDIO keyboards should be checked using the TD message as entered as the remote site.

4 FSP: exercise all ARTCC FSPs using the GI message. Include position, LDN, and hexadecimal address. Include TD messages to all FSPs.

5 CTS: see appendix 1, Section 3, Input/Output Capabilities, of this order.

6 IFDS (ARTS, URET, NAS–NAS): the TR message shall be included to elicit response from all the adjacent facilities (ARTS and NAS–NAS) and TR message with CP option to elicit response from URET (CCCH–URET). If certification is performed when the adjacent facility operational program is not cycling, a normal response will not be received from that facility. In this case, certification should be performed by manual entry of the TR message as soon as practical after the adjacent facility program begins cycling.

For URET IFA, test interface to neighboring ARTCCs with test flight plans posted to neighboring ARTCC URET position display AL. Observe DSR M&C position SUM, CRL, and PRS views for good status conditions. If certification is performed when the neighboring facility is not operational, test flight plans cannot be posted to URET displays. Verify good DSR M&C status on the SUM, CRL, and PRS views and error free URET ATC operations. Certification should be performed by manual entry as soon as practicable and in coordination with ATC operations, after the neighboring facility's URET becomes operational.

7 A/D Position CRDs.

a Enter appropriate TD messages to cause display of the CRD test pattern.

b Include invalid messages to cause appropriate response on the CRT.

c Check alphanumeric keyboards using a few selected entries.

(3) Radar Data Processing (RDP). The following guidelines define the general manual techniques to be used in certifying the RTQC, conflict alert, tracking, and weather display functional areas of the RDP capability:

(a) RTQC Program Verification:

1 For data count parameters, each of the following parameters is checked by forcing printouts and/or inducing error conditions. A printout is forced by lowering the parameter to a value near the lower limit of its range using the CP message:

Parameter	*Description*
PRRC	Primary Returns
BERC	Beacon Returns
NRRC	Nonreinforced Beacon Returns
NVRC	Nonvalidated Mode 3/A Beacon Returns
NCRC	Nonvalidated Mode–C Checking Returns

2 Printouts for the following parameters may be checked by using the MESAG card in an OLCT, and inputting erroneous bit configurations via the OLC dummy radars; otherwise, the logic filters in the ECG will cause the bad message to be discarded. These printouts shall be checked at least once a week during the NSCT run:

Parameter	*Description*
EICM	Incomplete Messages
EIVM	Nonbeacon Messages with Invalid Labels
EIVB	Invalid Messages

(b) Missing Data Conditions:

1 Introduce this condition by using the NPIO message or actually interrupting the input from one radar site. This should be done only after advance coordination with the AT watch supervisor, and preferably during a slack period of the day.

2 Correct the error conditions and verify that error printouts are no longer output.

(c) Registration, Collimation, and Status:

1 After coordination/concurrence of the ATC, contact one radar/CD site and have the beacon half-mile off-sets switch set to the ON position.

2 Verify that registration, collimation, and status message printouts are output.

3 Have the beacon off-set switch restored to normal.

4 Verify that the data from the radar/CD site has been restored to normal.

(d) R-Console Tests:

1 Coordinate with ATC.

2 Select a number of R-consoles to be tested, such that all R-consoles will be checked at least once per month.

3 Call up the enhanced test pattern capability. Observe for proper display, data presentation quality, and key entry responses.

4 Terminate the tests and restore the R-console to operational use.

(e) Tracking and Conflict Alert: This capability shall be checked using Manual Operations on Targets of Opportunity.

(f) Weather Display Checkout:

1 After proper coordination with ATC, contact the selected radar/CD site to be used for the weather display test checkout.

2 Have the technician introduce a wedge test pattern by interconnection/switch settings on the Digitizer equipment.

3 Observe the pattern for a period in excess of 12 radar scan periods to permit full buildup.

4 Restore the digitizer to normal operational conditions/settings.

5–32. NAS-AUTOMATED RADAR TERMINAL SYSTEM (ARTS) REGISTRATION.

a. General. The ARTCC RDP tracking function and the ARTS tracking function both develop aircraft position coordinates for aircraft within range of the serving radar facilities. Ideally, the position coordinates from NAS or ARTS tracking function, for the same aircraft transitioning from center to terminal control (in handoff situations), should not exceed operationally acceptable tolerance criteria. The offline Positional Error Analysis Summary (PEAS) program identifies aircraft handoffs and determines positional differences between the two systems. The latest edition of FAA–4306R, Users Manual (PEAS) Program, provides information supporting the analysis procedure.

It also contains criteria applicable to the registration checkout.

b. PEAS Program. The PEAS program is a special offline program that operates under the control of the IBM operating system. It selects and identifies aircraft tracks in the NAS operational program that are handed off from the ARTS facility. The input data is derived from the SAR tapes prepared under the NAS operational program during system operation. The SAR track data is appropriately edited for use with PEAS, using the Data Analysis and Reduction Tool (DART).

c. Action. NAS–ARTS registration procedures shall be performed on an as-required basis, when registration becomes unacceptable.

5–33. – 5–37. RESERVED.

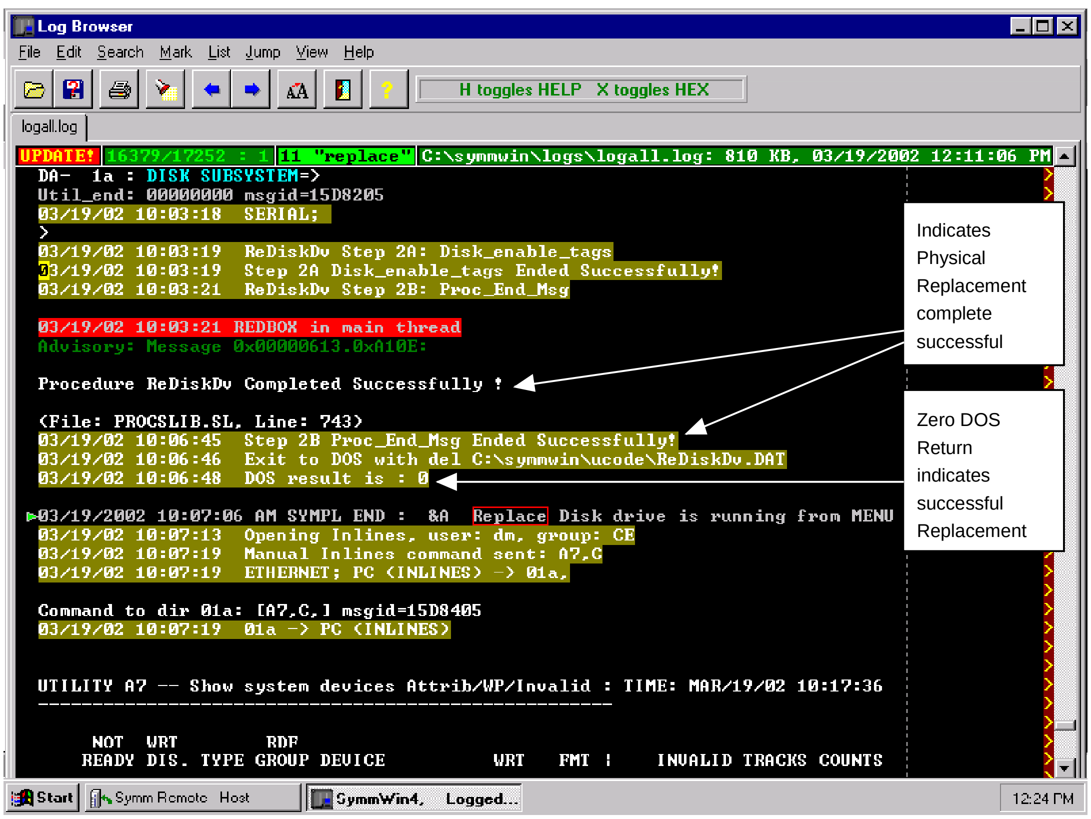

FIGURE 5–6. EMC: SUCCESS CRITERIA FOR DISK DRIVE REPLACEMENT (logall.log)

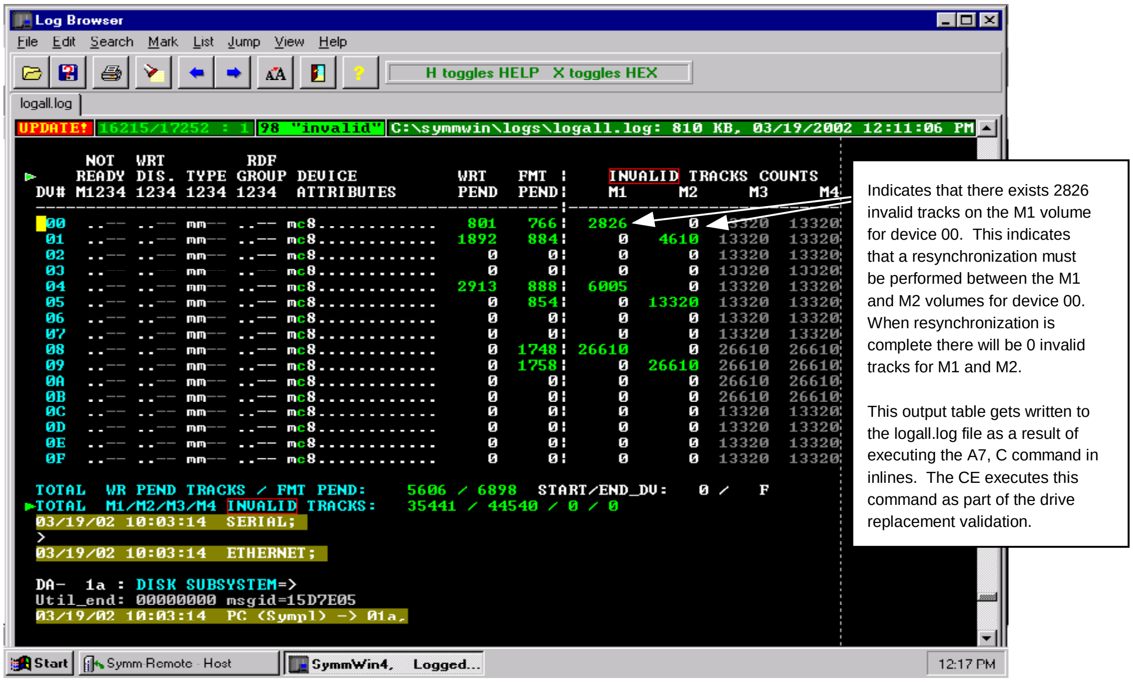

FIGURE 5–7. EMC: INDICATION FOR DISK DRIVE RESYNCHRONIZATION IN PROGRESS (logall.log)

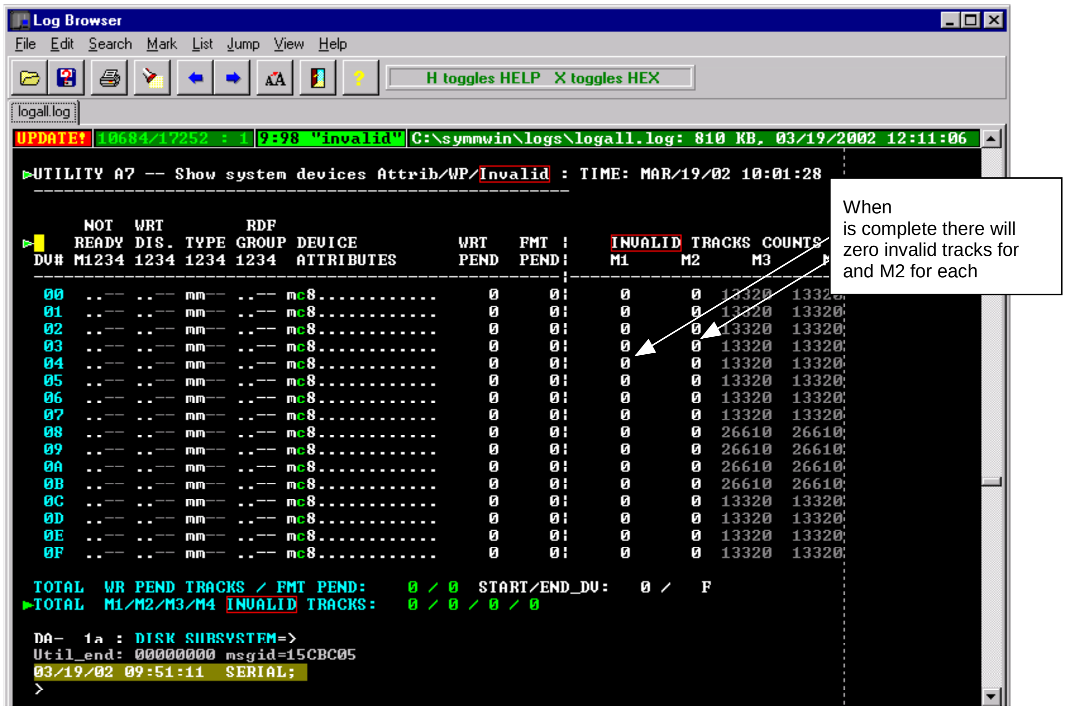

FIGURE 5–8. EMC: SUCCESS CRITERIA FOR DISK DRIVE RESYNCHRONIZATION COMPLETE (logall.log)

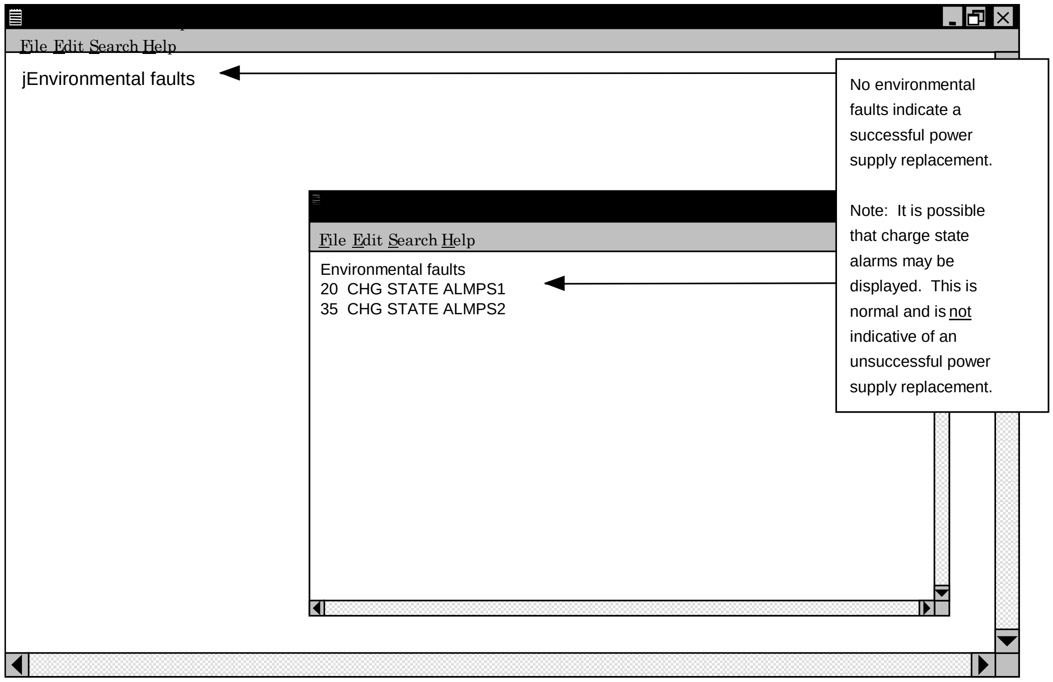

FIGURE 5–9. EMC: ENVIRONMENTAL LOG FILE WITH NO ERRORS PRESENT (env.log)

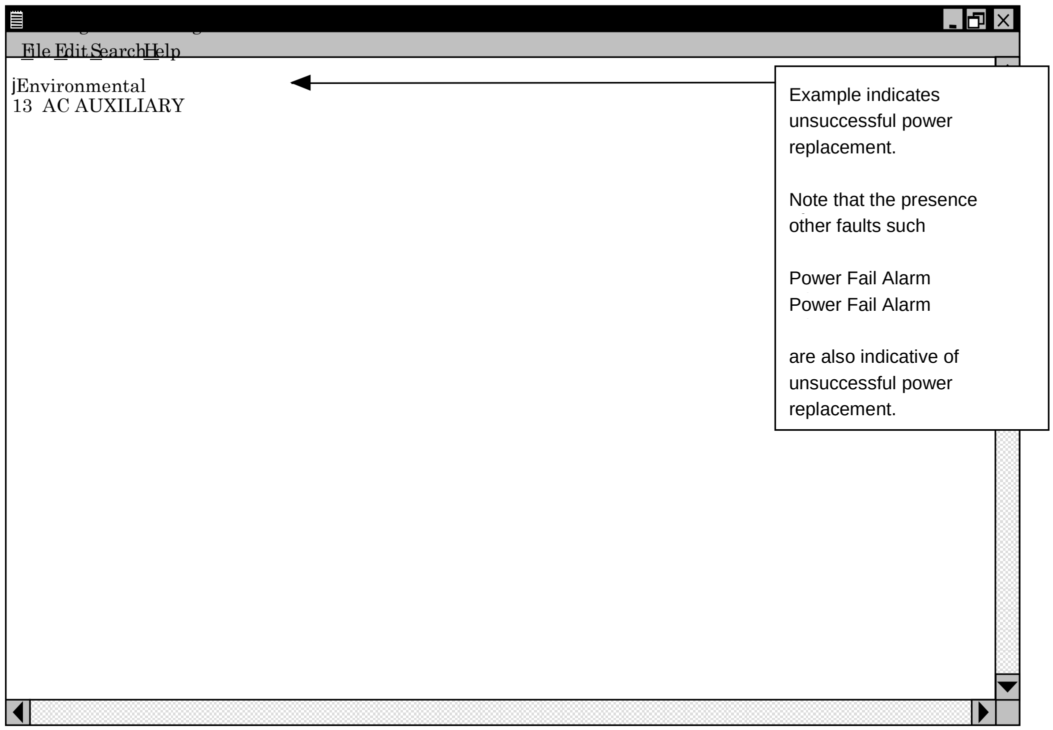

FIGURE 5–10. EMC: ENVIRONMENTAL LOG FILE WITH EXAMPLE ERROR PRESENT (env.log)

Section 2. OTHER MAINTENANCE TASK PROCEDURES

5–38. EMC 5630 DISK DRIVE/POWER SUPPLY REPLACEMENT VALIDATION.

a. Objective. After a call has been placed for a "Hot Swap Disk Drive Replacement" or "Hot Replacement of Power Supply", verification is needed to ensure there are no errors associated with the new component, in order to recertify the 5630 DASD component of CCCH after repair. These two items are the most likely to need replacement during normal usage of the unit. Although the POST satisfies this requirement, an unnecessary loss of redundancy of Host, VM/Standby and/or shutdown will be needed due to the powering down while in use. This procedure explains the steps needed to copy the data, which shows the results of the diagnostics after repair, while keeping the system running.

b. EMC Customer Engineer (CE) Procedures.

(1) Use the "Symmwin ! Procedures ! Hot Replacement Utilities ! Replace Disk Drive" script for disk drive replacement and procedure completes with "Green Box" or uses current Customer Service Procedure (e.g., SYM–CSP–01/L. "Symmetrix Power Subsystem Hot Replacement").

(2) Verify all logical volumes affected by hot replacement are in a "fully resynched" status using "A7, C" (to display invalid tracks) inlines command.

(3) Verify no environmental alarms are present using "Symmwin ! Procedures ! Statistics ! Display Environmental Faults ! Display Errors." Then quit.

(4) Use the "Symmwin ! Tools ! View Logfiles ! open logall.log" for viewing.

(5) From "Log Browser" tool bar select "File ! save as plain text ! use logall.txt" as the file name to save to the default c:\symmwin\logs directory. Exit Log Browser.

(6) Use the "Symmwin ! Tools ! View Logfiles ! open "env.log" for viewing.

(7) From the "Log Browser" tool bar select "File ! save as plain text ! use env.txt" as the file name to save to the default c:\symmwin\logs directory. Exit Log Browser.

(8) Logout of Symmwin.

c. FAA Maintenance Personnel Procedures.

(1) Copy the env.txt and logall.txt file onto to a site provided diskette as follows:

(a) On the Symmetrix service processor right click on the Microsoft (MS) Start button.

(b) Select Explore All Users.

(c) From Folders select c:\symmwin\logs directory.

(d) Insert a blank floppy diskette into service processor diskette drive.

(e) Right click on env.txt.

(f) Select Send To ! Floppy Drive (a).

(g) Right click on logall.txt.

(h) Select Send To ! Floppy Drive (a).

(i) Close the Explorer window and remove the diskette from the Service Processor.

(2) If validating the replacement action for a disk drive, browse the logall.txt file from any PC using any MS browser application (e.g., MS Word, Notepad, etc.). Reference Figure 5–6, Success Criteria for Disk Drive Replacement (logall.log), Figure 5–7, Indication for Disk Drive Resynchronization in Progress (logall.log), and 5–8, Success Criteria for Disk Drive Resynchronization Complete (logall.log), for validation criteria.

(3) If validating the replacement action for a power supply, browse the env.txt file from any PC using any MS browser application (e.g. MS Word, Notepad, etc.). Reference Figure 5–9, Environmental Log File with No Errors Present (env.log) and Figure 5–10, Environmental Log File with Example Error Present (env.log), for validation criteria.

Section 3. SPECIAL MAINTENANCE TASK PROCEDURES

5–39. REMOTE SUPPORT FACILITY OPERATIONS FOR THE 9672 RA4 PROCESSOR.

a. Background.

(1) As delivered by the manufacturer, the IBM 9672 RA4 HMC is configured with a modem and Remote Support Facility (RSF) software. If the RSF function is enabled and a telephone line is provided, the HMC can automatically dial out to the IBM RSF to report hardware malfunctions as they occur, and an IBM service engineer may dial in to observe system operation or download software to the HMC.

(2) There are operational concerns with this remote support function. For example, the ability to remotely push new software to the HMC has the potential to impair the government's configuration management of the system.

b. Policy. HMC communications shall be strictly regulated by both software and hardware controls.

(1) Software controls.

(a) Inbound calls. The call-in feature of the HMC's RSF shall be disabled and the modem shall be configured to not answer incoming calls.

(b) Outbound calls. The "call home" feature shall only be initiated via CCCH operator or technician intervention, as opposed to automatic dialing.

(2) Hardware controls. The modem shall be physically disconnected from the telephone line at all times with one exception: the modem shall only be connected to the telephone line to permit an authorized "call home" and disconnected immediately after completion of the call.

(3) Procedure. The operator shall respond to an alert informing him/her that the system needs to "call home." The responsible party shall collect applicable reference codes, Lowest Replaceable Unit (LRU) numbers, card locations, and other pertinent information from appropriate detail panels, and notify the NOM. A service call shall be placed to IBM service, and the collected information forwarded to the service representative following local site procedures. If deemed necessary by the IBM service representative, the telephone line may be connected and appropriate HMC panels may be configured to permit the "call home". Once the call has been completed, the operator or technician shall physically disconnect the telephone line from the modem and reset the appropriate HMC screens to their original configuration.

(4) Conditions. The "call home" shall not be permitted from an HMC that is connected to a 9672 running operational NAS. The "call home" shall only occur from a standby or offline system. When a non-severe hardware error occurs, a switchover will not automatically occur and the system will remain online and operational. In this case, the site shall follow local procedures to either place a voice service call in the usual fashion or perform a manual switchover at an appropriate time to permit a "call home" from the standby or offline system.

c. Responsibilities.

(1) The ARTCC Security Administrator shall periodically check to insure that the telephone line to the 9672 HMC is physically disconnected unless the system is using the line in response to a service "call home" situation.

(2) The ARTCC CCCH computer operator or technician shall contact the NOM upon notification by the system that it has detected a hardware anomaly and must "call home."

(3) The ARTCC CCCH computer operator or technician may connect the HMC's modem to the phone line and configure the appropriate HMC software screens to permit the call, if determined to be necessary by an authorized IBM service representative. Once the transfer of data is complete, the computer operator must disconnect the telephone line from the modem and reset the appropriate HMC software screens to their original configuration.

5–40. REMOTE SUPPORT OPERATIONS FOR THE CCCH 5630 DASD SUBSYSTEM.

a. Background.

(1) The EMC 5630 DASD subsystem came from the manufacturer with an external modem used in the commercial environment to constantly report any errors back to the EMC central engineering support facility. The "call-home" feature can be either enabled or disabled via the service processor laptop computer. These modems also allow the EMC engineering staff to "dial-in" and observe error conditions in order to isolate the problem, determine severity, order replacement parts, etc.

(2) Although "dial-out" or "call-home" software has been disabled, there are continuing operational concerns with this external interface's "dial-in" capability. Changes could be made without the local site's knowledge, possibly changing the baseline configuration of the 5630 subsystem.

b. Policy. The EMC external modem interface shall be strictly regulated by both software and hardware controls.

(1) Software controls.

(a) Inbound calls. The software application on the 5630 service processor that controls the "dial-in" feature of the 5630 is always active, and can only be prevented by physical hardware disconnection.

(b) Outbound calls. The local EMC CE disables the "call-home" feature at installation time, per the System Support Modification (SSM). This prevents error messages to the system operators each time a problem is detected, and the service processor attempts, and then fails, to report the error to the EMC support center.

(2) Hardware controls. The modem shall be physically disconnected from the telephone line at all times with one exception: the modem shall only be connected to the telephone line to permit an authorized "dial-in" by the EMC support center in order to repair the unit, or the sending out of error data to the EMC support center by the CE, and disconnected immediately after use.

(3) Procedure. After a service call is made to EMC to respond to an error received concerning the 5630, the CE may determine a connection of the modem is necessary in order to isolate the problem. This usually involves microcode type problems instead of simple board, power supplies, or disk device replacements. Once the troubleshooting, error reporting, or problem determination is completed, and the CE does not need the EMC support center connection any longer, the operator or technician shall physically disconnect the telephone line from the modem.

(4) Conditions. The phone line for the EMC support center modem shall not be connected to a 5630 running operational NAS. This would require repair during low activity time, such as the midshift. LDDAs must be set to “Unavailable” before connecting the modem telephone line. Depending on which set of drives is being used in the system (5630–1 contains 820, 822, 826; 5630–2 contains 920, 922, 926), two LDDAs may need to be placed “Unavailable”, necessitating a Host system shutdown, if the site would rather not run on one mirrored LDDA during repairs.

c. Responsibilities.

(1) The ARTCC Security Administrator shall periodically check to ensure that the telephone line(s) to the 5630 DASD subsystems are physically disconnected.

(2) The ARTCC CCCH computer operator or technician shall contact the NOM upon notification by the CE, that a connection to the EMC support center via the 5630 modem is necessary. The NOM will ensure the affected LDDAs are configured out of the operational system prior to the modem connection. Once the modem is no longer required for problem determination or restoration, the modem is to be disconnected from the telephone line.

5–41. – 5–99. RESERVED.

CHAPTER 6. FLIGHT INSPECTION

6–1. GENERAL.

Flight inspections are made to verify the overall performance of radar, navigational aids, and air/ground communications systems. The instructions for flight inspection are contained in the latest edition of Order OA P 8200.1, United States Standard Flight Inspection Manual, and Order 6350.12, CD Subsystem Integration Test Procedures Manual. Flight inspections are required, prior to commissioning of a facility, periodically as specified by this directive and the flight inspection manual, and when requested by the Air Traffic Facility Chief, or Regional Director.

6–2. NARROWBAND SEARCH/BEACON FLIGHT CHECKS.

Flight checks shall be performed prior to facility commissioning, using the subtest 44 and 45 procedures contained in Order 6350.12. Verify the radar site locations (normally only checked during new radar installation) and target position reporting accuracy, using the subtest 44 procedures. Determine if alignment corrections are required, and implement any required corrections in accordance with the procedures provided.

Develop and maintain a search/beacon database as described in the subtest 45 procedures. The test data is used to determine the existence of problems in the radar coverage area, such as collimation, registration, detection, search splits, and beacon false targets. This data will also be used to evaluate system improvements and monitor for system deterioration.

6–3. – 6–99. RESERVED.

APPENDIX 1. CERTIFICATION REQUIREMENTS

1. GENERAL.

This appendix contains two levels of certification requirements for surveillance display services provided in the En Route ATC environment and constituent systems used to provide these services. These two levels of certification are service certifications and system certifications. Refer to the latest edition of Order 6000.15 for general guidance on the certification of services and systems, and to the latest edition of Order JO 6040.15 for the requirements and procedures for reporting interruptions of services and systems.

2. SERVICES.

Surveillance services provide a means for ATC personnel to determine aircraft position, course, and identification during aircraft operations. These services are periodic and are certified as CFAD and CRAD in accordance with tables included in this appendix. System certifications are event based and tied directly to the decision to place a system into operation.

The following orders are provided for reference regarding the services:

a. JO 6340.13, Maintenance of Air Route Surveillance Radar, ARSR–3 Facilities, latest edition;

b. JO 6340.21, Maintenance of Air Route Surveillance Radar (ASR–1, –2) Facilities with Solid-State Receiver/Digital Moving-Target Indicator (SSR/DMTI), latest edition;

c. JO 6340.22, Radars with Solid State Receiver/Digital Moving-Target Indicators (SSR/DMTI), latest edition;

d. AF 6360.1, Radar Facilities and Equipment Modification Handbook- Radar Beacons;

e. JO 6350.21A, Maintenance of Common Digitizer-2 Equipment;

f. JO 6360.1B, Beacon Interrogator (ATCBI) Equipment;

g. JO 6360.14A, Maintenance of ATCBI–5 Equipment and Mode-S Collated with SSRBD.

3. SYSTEMS.

Remote radar (a.k.a. Primary radar) and interrogation (a.k.a. Secondary radar or beacon interrogator) systems, centralized, distributed, or back–up surveillance processing systems, and local data entry and display systems are utilized to provide these functions.

4. SUBSYSTEMS.

Subsystems are portions or elements of a system that perform a specific function by design to produce a specific operating product in the NAS.

5. EXCEPTIONS.

Order 6000.15 permits certification with exceptions where a service or system may be unable to satisfy all certification parameters or provide all advertised services, but is still able to provide somewhat less than its full functional capability, e.g., one radar site is taken out of service, yet other radar sites are still contributing to the en route surveillance service. In this event, a certification with exception is permitted. The certification statement shall identify the specific certification parameter or advertised service to be excluded.

As a result, the tables in this appendix contain examples of allowable exceptions but are not limited to only those instances.

6. FUTURE SYSTEMS.

For future planning purposes, systems that provide the above services or are used for testing or prototyping shall be certified in accordance with Order 6000.15.

Section 1. COMPOSITE FLIGHT DATA PROCESSING (CFAD) SERVICE

Service	*Certification Parameter*	*Reference Paragraph*
CFAD	Knowledge that constituent FAA systems are certified FDP processing capability FDP input and output SYNC processing capability	Order 6000.15, appendix 3, table 3 Par. 3–1a Par. 3–1b Par. 3–1c

Normal Certification Interval: Daily

Allowable Exceptions: Individual Surveillance Flight Planning Systems (URET), CP, Certification parameter

Person Responsible for Certification: NAS Operations Manager/NAS Area Specialists with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

CFAD Certified

With Exception:

CFAD Certified except (individual) surveillance flight planning system

Removing Exception:

CFAD (individual) surveillance flight planning system certified

Section 2. COMPOSITE RADAR DATA PROCESSING (CRAD) SERVICE

Service	*Certification Parameter*	*Reference Paragraph*
CRAD	Knowledge that constituent FAA systems are certified	Order 6000.15, appendix 3, table 3
	Satisfactory radar coverage as determined at the surveillance radar systems	The latest edition of Orders 6340.13, 6340.21, 6340.22, 6360.1, 6360.14, and 6350.21 (CD–2)
	Narrowband radar site coverage	Par. 3–5a(1), 3–5b(1) and Users Manuals for QARS, EQARS, RARRE
	Range and azimuth accuracy	Par. 3–5a(2) and 3–5b(2)
	Display accuracy	Par. 3–5a(3) and 3–5b(3)
	RDP and tracking	Par. 3–5a(4) and 3–5b(4)
	Data display and entry	Par. 3–5a(5) and 3–5b(5)
	Video presentation	Par. 3–5a(6), 3–5b(6)
	System error detection, analysis, and correction capability	Par. 3–5a(7) and 3–5b(7)
	Radar data transfer	Par. 3–5a(8) and 3–5b(8)

Normal Certification Interval: Daily

Allowable Exceptions: Individual surveillance processing system, or individual surveillance radar system

Person Responsible for Certification: NAS Operations Manager/NAS Area Specialists with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

CRAD Certified

With Exception:

CRAD Certified except (primary/backup) surveillance processing system

CRAD Certified except (individual) surveillance radar system

Removing Exception:

CRAD (primary/backup) surveillance processing system certified

CRAD (individual) surveillance radar system certified

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
FDP Capability	Satisfactory processing and transfer of flight data	Par. 3–11a(1)
	Satisfactory transfer of digital data between two CCCH and between Airport Traffic Control Tower (ATCT) and CCCH	Par. 3–11a(2)
RDP Capability	Satisfactory processing of radar data	Par. 3–11b(2)
	Satisfactory transfer of digital data from CD/radar site to CCCH	Par. 3–11b(1)
Connectivity Capability	Successful connectivity to ECG	Par. 3–12a
	Successful connectivity to DSR	Par. 3–12b
	Successful connectivity to URET	Par. 3–12c
Input/Output Capability	Satisfactory operation of data entry	Par. 3–13a
	Satisfactory transfer of data from the CCCH to the printers	Par. 3–13b
	Satisfactory response from peripheral devices	Par. 3–13c
	Satisfactory transfer of time of day information to CCCH	Par. 3–13d
Control Capability	Successful Fault Sensing, correct status reporting and reconfigurations of redundant units	Par. 3–14
Storage Capability	Satisfactory data transfer and retrieval operations	Par. 3–15

Normal Certification Interval: Event based

Allowable Exceptions: Advertised services (e.g., FDP processing capability, RDP processing capability) or individual elements

Person Responsible for Certification: Airway Transportation System Specialist (ATSS) with certification authority

Section 3. CENTRAL COMPUTER COMPLEX HOST (CCCH) SURVEILLANCE PROCESSING SYSTEM (Continued)

Certification Entries in Facility Maintenance Log:

Without Exception:

CCCH Certified

With Exception:

CCCH Certified except (FDP/RDP) processing

Removing Exception:

CCCH (FDP/RDP) processing certified

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing Capability	Normal operation at minimum number of DSR positions required to support AT operations	None (Go/No Go)
	Satisfactory entry, processing, and display of data on the R-CRD and R-console via primary channel (LCN)	Par. 3–33a
	Satisfactory entry, processing, and display of data on the R-CRD and R-console via backup channel (BCN)	Par. 3–33b
	Satisfactory entry, processing, and display of flight data on A and D positions	Par. 3–33c
	Satisfactory processing, transfer and printing of flight strip data	Par. 3–33d
Connectivity Capability	Successful connectivity to CCCH and URET	Par. 3–34a, b
	Successful connectivity to ECG	Par. 3–34c, d
Input/Output Capability	Satisfactory operation of data entry and ability to receive data at the M&C	Par. 3–35
Control Capability	Satisfactory reconfiguration of all DSR primary OUs (LCN)	Par. 3–36a
	Satisfactory reconfiguration of all DSR backup OUs (BCN)	Par. 3–36b
Storage Capability	Satisfactory data transfer and retrieval operations	Par. 3–37
Normal Certification Interval: Event based Allowable Exceptions: Advertised services, individual channels (primary/backup), or individual sectors Person Responsible for Certification: ATSS with certification authority		

Section 4. DISPLAY SYSTEM REPLACEMENT (DSR) SURVEILLANCE DISPLAY SYSTEM (Continued)

Certification Entries in Facility Maintenance Log:

Without Exception:

DSR Certified

With Exception:

DSR Certified except (designation) channel/sector

Removing Exception:

DSR (channel/sector designation) Certified

Section 5. USER REQUEST EVALUATION TOOL (URET) SURVEILLANCE FLIGHT PLANNING SYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing Capability	Normal operation at minimal number of URET positions required to support Air Traffic operations	None (Go/No Go) Par. 3–51
Connectivity Capability	Successful connectivity to CCCH and DSR	Par. 3–52a, b
	Successful connectivity to adjacent ARTCC(s) URET	Par. 3–52c
Input/Output Capability	Successful display of flight data	Par. 3–53a
	Successful editing of flight data	Par. 3–53b
Control Capability	Satisfactory reconfigurations of all redundant units	Par. 3–54

Normal Certification Interval: Event based

Allowable Exceptions: Advertised services, individual EAI LAN processors, or individual sectors

Person Responsible for Certification: ATSS with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

URET Certified

With Exception:

URET Certified except (position designation)

URET Certified except (designation) sector

Removing Exception:

URET (position designation) Certified

URET (designation) sector Certified

Section 6. EN ROUTE COMMUNICATION GATEWAY (ECG) SURVEILLANCE PROCESSING SYSTEM

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Primary Channel Processing Capability	Satisfactory processing and transfer of radar and flight data	Par. 3–61a
Secondary Channel Processing Capability	Satisfactory processing and transfer of data between DSR	Par. 3–61b(2)
	Satisfactory transfer of digital data from CD/radar site to ECG Secondary Channel	Par. 3–61b(3)
Connectivity Capability	Successful connectivity to CCCH	Par. 3–62a
	Successful connectivity to DSR BCN	Par. 3–62b
Input/Output Capability	Satisfactory response from peripheral devices	Par. 3–63
	Satisfactory operation of data entry	Par. 3–63
Control Capability	Successful Fault Sensing, correct status reporting and reconfigurations of redundant units	Par. 3–64
Storage Capability	Satisfactory data transfer and retrieval operations	Par. 3–65

Normal Certification Interval: Event based

Allowable Exceptions: Advertised services, primary channel processing, secondary channel processing, or individual elements (PIP, BIP, etc.)

Person Responsible for Certification: ATSS with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

ECG Certified

With Exception:

ECG Certified except (designation) channel processing

ECG Certified except (designation) element

Removing Exception:

ECG (designation) channel processing Certified

Section 7. EN ROUTE AUTOMATION DISPLAY SYSTEM (EADS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
Processing Capability	Normal operation at minimum number of sector positions required to support AT operations	None (Go/No Go)
	Satisfactory entry, processing, and display of data on the R–CRD and R-console via primary channel and backup channel	Par. 3–200a
	Satisfactory entry, processing, and display of flight data on the A and D positions via primary channel and backup channel	Par. 3–200b
	Satisfactory processing, transfer, and printing of flight strip data via primary and backup channel	Par. 3–200c
Connectivity Capability	Successful connectivity to EAS primary and backup channel	Par. 3–201
Control Capability	Satisfactory switching between primary and backup channels	Par. 3–202
Configuration Capability	Satisfactory software configurations, version level, and adaptation	Par. 3–203

Normal Certification Interval: Event based

Allowable Exceptions: Advertised services, individual channels (A or B), or individual elements

Person Responsible for Certification: ATSS with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

EADS Certified

With Exception:

EADS Certified except (designation) channel processing

EADS Certified except (designation) element

Removing Exception:

EADS (channel designation) Certified

Section 8. EN ROUTE AUTOMATION SYSTEM (EAS)

Advertised Service	*Certification Parameter*	*Reference Paragraph*
FDP Capability	Satisfactory processing and transfer of flight data via primary channel	Par. 3–300
	Satisfactory processing and transfer of flight data via backup channel	Par. 3–300
SDP Capability	Satisfactory processing of radar data via primary channel	Par. 3–301
	Satisfactory processing of radar data via backup channel	Par. 3–301
GIP Capability	Satisfactory processing of general information data via primary channel	Par. 3–302
	Satisfactory processing of general information data via backup channel	Par. 3–302
Connectivity Capability	Successful connectivity to EADS	Par. 3–303
	Successful connectivity to ECG	Par. 3–303
Input/Output Capability	Satisfactory operation of data entry and ability to receive data at the M&C	Par. 3–304
Control Capability	Satisfactory reconfiguration of OUs	Par. 3–305
	Successful fault sensing and status reporting	Par. 3–305
Configuration Capability	Satisfactory software configurations, version level, and adaptation	Par. 3–306

Normal Certification Interval: Event based

Allowable Exceptions: Advertised services, individual channels (A or B), or individual elements

Person Responsible for Certification: ATSS with certification authority

Certification Entries in Facility Maintenance Log:

Without Exception:

EAS Certified

EAS Channel A Certified, local software (release ID)

EAS Channel B Certified, local software (release ID)

With Exception:

EAS Certified except (designation) channel processing

Removing Exception:

EAS (channel designation) Certified

APPENDIX 2. GLOSSARY OF TERMS AND ABBREVIATIONS

Access Time

1. The time it takes a computer to locate data or an instruction word in its storage section and transfer it to its arithmetic unit where the required computations are performed.

2. The time it takes to transfer information that has been operated on from the arithmetic unit to the location in storage where the information is to be stored.

Adaptation — Data stored in the operational computer program that describes the physical environment in which the program must operate. This data includes fixes, airways, input device identifiers, output routing, aircraft characteristics, and parameters.

Address — An identification represented by a name, label, or number, for a register or a location in storage. Addresses are also part of an instruction that specifies an operand number for the instruction.

Alphanumeric — A combination of alphabetic and numeric characters.

Alphanumeric — A device consisting of a compact keypack grouping of keys used by the radar controller to enter various items of data into the computer.

Analog — The presentation of numerical quantities by means of physical variables; e.g., translation, rotation, voltage, or resistance (contrasted with digital).

Backup Channel Processor (BCP) — Provides a redundant processing path in the event of a primary path failure by providing an interface to EDARC via the Backup Communications Network (BCN) and EDARC System Interface (ESI).

Backup — An IEEE 802.3 network whose communications connect the EDARC System Network (BCN) Interface (ESI) to a DSR console and connects backup radar gateways to other consoles. The BCN path provides sufficient data transmissions for continuance of air traffic control in the event of local communications network (LCN) failure or loss of interface to the Host system.

Beacon Altitude — Mode C derived beacon altitude.

Blip/Scan Ratio — The ratio between the number of times a target is displayed against the number of times it should have been displayed.

Bridge — A processor connected to two rings simultaneously by way of an adapter at each ring. It allows the transfer of information from one ring to the other. Rings joined together by bridges form multiple ring networks.

Buffer — An internal portion of a data processing system serving as intermediary storage between two storage or data-handling systems with different access times or formats; usually to connect an input or output device with the main or internal high-speed storage.

Byte — A sequence of adjacent binary digits operated upon as a unit and usually shorter than a word. In the IBM 9020 an 8-bit field (exclusive of parity) is used.

Capacity — The maximum number of digits that can be handled or processed by a computer unit; also, the upper and lower limits of the numbers which can be handled by the computer.

Categories — Radar controller input actions grouped under fairly broad headings, such as: tracking, radar handoff, etc.

Category — A panel to enable the controller function panel to indicate to the computer, by push–button selection, the particular action requested in conjunction with an alphanumeric message entry.

Central Computer — The physical components of the Complex Host 9672 IBM computer and it's (CCCH) associated peripheral equipment.

Character

1. One symbol of a set of elementary symbols, such as those corresponding to the keys on a typewriter. The symbols usually include the decimal digits 0 through 9, the letters A through Z, punctuation marks, operation symbols, and any other single symbols which a computer may read, store, or write.

2. The electrical, magnetic, or mechanical profile used to represent a character in a computer, or its various storage and peripheral devices. A character may be represented by a group of other elementary marks, such as bits or pulses.

Clear — To restore a storage or memory device to a prescribed state, usually denoting zero or blank.

Clock Time — A 4-digit number specifying Greenwich Mean Time in hours and minutes. Leading zeros are required for input to the computer.

Clutter — Lines on the plan view display Density Outlines outlining weather or clutter areas.

Common Digitizer (CD) — A device that converts analog radar and beacon returns, at the radar site, into a digitized form that is transmitted via landlines for use by the central computer complex.

Computer Entry Device — A keyboard, similar to a typewriter, installed at "D" and "A" controller positions and used to enter messages into the computer for processing.

Computer Identification Number — A 3-digit numerical code, automatically assigned by the computer that can be used to identify flight information to the computer. Each aircraft will have an individual computer identification number.

Computer Program — A plan or routine for solving a problem on a computer, as contrasted with such terms as fiscal program, military program, and development program.

Coordinates, Display — Coordinates covering a particular plan view display's geographical area.

Coordinates, System — Coordinates covering a position within the geographical area of a facility.

Coordinates, X, Y — Geometric notations used to define the position of a point.

Correlation — The relative association of two sets of data; e.g., positional agreement between radar data and the computer–predicted track position.

Data Block — The symbology displayed adjacent to a tracked aircraft target, containing aircraft position symbols, leader, velocity vector, and the alphanumeric data associated with the aircraft e.g., aircraft identification, assigned altitude, Mode C altitude, computer number, beacon code, attention bars, and special condition indicators.

Data Link — Electronic equipment for automatic transmission of information in digital form.

Debug — The process of isolating and removing malfunctions from a computer or mistakes from a routine.

Departure List — A controller-located list of departing aircraft presented on the plan view display in tabular form.

Device, Input — A unit designed to bring data to be processed into a computer; e.g., a card reader, a tape reader, or a keypack.

Device, Output — A unit that translates electrical impulses representing data processed by the computer into dynamic displays or permanent results such as printer forms, punched cards, and magnetic writing on tape.

Disk Storage — A storage area on the surface of a large disk coated with a thin deposit of magnetic material.

Digitize — To convert an analog measurement of a physical variable into a numerical value, thereby expressing the quantity in digital form.

Display — A presentation of information such as a projection on a screen, generation on a cathode ray tube, or a printout.

Display — To inhibit/select data for display management

EDARC System Interface Processor (ESIP) — Provides communication and control functions necessary for interfacing the EDARC system via the Backup Communication Network (BCN) to the DSR R-consoles.

Elements — A term used for equipment in a computer system, for example, a computer element, a storage element, an input/output element, etc.

Engineering Model — The NAS Stage A computer system installed at the Federal Aviation Administration Technical Center for evaluation and experimentation.

Entry Key — A key located on keypack and keyboards used to enter messages into the computer.

Equipment, Peripheral — The auxiliary machines which may be placed under the control of the central computer. Examples of this are card readers, card punches, magnetic tape feeds, and high–speed printers. Peripheral equipment may be used online or offline depending upon computer design, job requirements, and economics.

Erase — As concerns a computer, to replace all the binary digits in a storage device by binary zeros.

Fields — Areas within a data block or input message where the different data is contained.

Flight Plan — The computer use of Flight Plan Aided Tracking and flight progress data to assist the tracking of aircraft.

Flight Plan Position — Position based on the field flight plan.

Format — An arrangement of information on a form or in storage.

Functions (Category) — Specified radar controller input actions within a category.

Hard Copy — Printed outputs, as opposed to displays and magnetic tape outputs.

Hardware — The mechanical, magnetic, electrical, and electronic devices from which a computer is constructed (equipment).

History Alert Log Processor (HAL) — Retains a historical log of significant events and supports online queries and printed reports of the log.

Hold List — A controller-located list of holding aircraft presented on the plan view display in tabular form.

Inbound List — A controller-located list of inbound aircraft presented on the plan view display in tabular form.

Inhibit — Controller or machine action to suppress the presentation of certain data.

Initiation — The process by which a controller or a computer associates speed and heading with radar data to form a track.

Input/Output Typewriter — A device used to enter information or to receive information as the result of computer processing.

Instruction — A machine word or a set of characters in machine language directing the computer to take a certain action.

Interface — The common boundary of two bodies or spaces. The functional intersystem relationships that influence system accomplishments.

Keyboard — See computer entry device.

Keypack — See alphanumeric keypack.

Leader — A straight line connecting the track symbol and the alphanumeric data.

Leading Zeros — Zeros placed ahead of positive integers for parity. In the number 0200 the zero preceding the 2 is a leading zero.

Lists — Aircraft data presented in tabular form on the plan view display.

Local Communications Network (LCN) — The network that provides communication paths among subsystems.

Network (LCN) Systems. — Token Rings are organized into access rings that interconnect subsets of DSR and backbone rings that interconnect the access rings. More than one ring is used at all levels to subdivide a transmission workload and to provide redundancy for high availability operations.

Local Communications Network Interface Unit (LIU) — An IBM RISC System/6000 processor that interfaces Host processors to LCNs, and central processors to LCNs and BCNs.

Mapping — The blanking out of unwanted returns such as clutter. Aircraft targets, when they are displayed, may appear at a reduced intensity in this area.

Matched Track — A track that is paired to its proper flight plan route segment.

Memory/Storage — The units that store information and from which information can be extracted at a later time.

Message — A group of words transported as a unit.

Mode 3/A — Transponder response for identification and tracking.

Mode C — Transponder response for automatic pressure altitude transmission.

Modem — Modulating and demodulating (communication equipment).

Multiplexing — A process by which different items of information can be transmitted simultaneously in the same direction on a single circuit.

Multiprocessing — In computer terminology, the physically independent and simultaneous processing accomplished by the use of multiple processing and input/output units.

Multiprogramming — In computer terminology, a technique for handling numerous routines or programs simultaneously by overlapping or interleaving their execution.

National Airspace System — The common system of facilities, equipment, regulations, procedures, and personnel required for the safe and efficient movement of civil and military aircraft in airspace within the jurisdiction of the United States.

Offline — In computer language, pertaining to auxiliary equipment or output devices not under control of the central processing unit.

Online — In computer language, pertaining to operation of devices under direct control of the computer.

Operational Equipment — Equipment that is in actual use for air traffic control.

Overflow (Over Capacity) — The generation of a quantity beyond the capacity of the register or location that is to receive the result.

Parameter — A computer program constant or an equipment adjustment that is set to a value within a limited range with fixed increments.

Parity Check — A check that tests whether the number of ones (or zeros) in an array of binary digits is odd or even.

Plan View Display — Radar position console.

Position Marker — A dot on the plan view display, moved in association with the trackball.

Positional Entry Device — Trackball unit.

Preferred Coverage — The radar–designated preferential coverage over a particular geographical area where coverage from two or more radars is available.

Preview Area — An area on a display used to verify message data prior to its entry into the display processor.

Primary Channel Processor (PCP) — Provides communication to all other DSR primary resources via four Token Ring interfaces, also provides communication to the DCX via system Interface (SCSI) bus.

Prime Function — The first function within a category. The prime function is selected automatically by the computer, if no function button is depressed on the category/function panel.

Print — To transfer computer information to a output device; to copy from internal storage to external storage.

Print, High-Speed — A peripheral output device that operates at a speed of 600 lines per minute, 132 characters per line.

Programming — The act of planning, coding, and debugging a computer program.

Quantize — To restrict the possible values of a variable to a discrete number of values.

Quantizer — A device that decides in what particular digital subdivision a given analog quantity should be placed.

Readout — Output from the computer on a computer readout device, flight strip printer, or input/output typewriter.

Real-Time Operation — Processing data in synchronism with a physical process in such a fashion that the results of the data processing are useful to the physical operation and relate to the passage of real time.

Reconfiguration — The procedure, either manual or program directed, whereby an element is replaced by a spare to continue full operation.

Routine, Diagnostic — A routine used to locate a malfunction in a computer, or to aid in locating mistakes in a computer program, in general, any routine specifically designed to aid in debugging or troubleshooting.

Simulation — A process of using synthetic information in a system for training, evaluation, and testing purposes.

Software — In computer terminology, all the programming systems required for effective data processing operations.

Sort Box — An area around a radar return display. Used to eliminate from correlation consideration all tracks whose positions are outside the sort box limits.

Stage A — The first stage of NAS en route implementation. NAS Stage A will contain the automated flight and radar data processing features of the most immediate concern to air traffic control.

Strobe — An area in which electronic jamming has affected target detection.

Sublist — A departure, inbound, or hold list divided by its appropriate fix.

Subsystem — An essential, functional part of a system which supports a data processing operation.

System Support Facility — The engineering model computer installation and overhead facility located at the FAA Technical Center.

Target Position Symbols — Symbols presented on the plan view display representing the actual aircraft position and indicating the target status.

Tracking — Radar target identification; positional agreement of a radar target and the computer–predicted position; computation of the difference between the predicted position and the actual position of the radar target.

Track Initiation (Automatic) — Tracking started as the result of a received discrete beacon code matching an assigned beacon code in computer storage.

Track Initiation (Manual) — Tracking started as the result of a controller action and identifying the radar data to the computer.

Trackball Unit — Includes a trackball mounted in the radar bright display equipment console and a trackball position marker on the plan view display. Manipulation of the trackball moves the marker on the display.

Update — To bring data into agreement with the most recent information available.

Velocity Vector — A straight line emanating from the track symbol indicating the anticipated path of tracked aircraft in terms of flying time.

WARP System Interface — Provides an interface to the Weather and Radar Processor (WARP) system to provide NEXRAD data to the Host path of the R-position console.

ABBREVIATIONS

A–CRD	A–Position Computer Readout Device
AFAAR	Technical Operations Aircraft Accident Representative
AC	Alternating Current
ACID	Aircraft Identification
ACP	Azimuth Change Pulse
ADC	Air Defense Center
ADTAC	Air Defense Tactical Air Command
AL	Aircraft List
AMCC	ARTCC Maintenance Control Center
AMD	Advanced Micro Devices
AMIC	Area Manager In Charge
ANK	Alphanumeric Keyboard
API	Application Programming Interface
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASR	Airport Surveillance Radar
AT	Advanced Technology
AT	Air Traffic
ATA	Advanced Technology Attachment
ATAC	Air Traffic Assistant Chief
ATC	Air Traffic Control (Controller)
ATCC	Air Traffic Control Center
ATCT	Air Traffic Control Tower
ATM	Air Traffic Management
ATO	Air Traffic Organization

ATSS	Airway Transportation System Specialist
ATWS	Air Traffic Watch Supervisor
AU	Adapter Unit
AZ	Azimuth

B

BCN	Backup Communications Network
BCP	Backup Channel Processor
BFTA	Beacon False Target Analysis
BIOS	Basic Input/Output
BIP	Backup Interface Processor
BIST	Built-in Self Test
bpi	bits per inch
BRPO	Beacon Registration Printout
BS	Basic Service (software)
BWM	Bandwidth Manager

C

CCCH	Central Computer Complex Host
CCD	Configuration Control Decision
CCLD	Core Capabilities Limited Deployment
CCU	Central Control Unit
CCW	Channel Command Word
CDR	Card Data Recorder
CDRL	Contract Data Requirements List
CD–ROM	Compact Disc-Read Only Memory
CE	Customer Engineer
CENRAP	Center Radar ARTS Presentation
CERT	Certify Hardware (command)
CFAD	Composite Flight Data Processing
cps	Characters Per Second

CHPID	Channel Path Identifier
CID	Computer Identification
CKD	Count Key Data
CM	Corrective Maintenance
CMOS	Complimentary Metal Oxide Semiconductor
CMS	Console Maintenance Switch
CMS	Common Message Set
COMDIG	Common Digitizer Data Reduction
COMM	Communications Service Software
COOP	Continuity of Operations Plan
COTS	Commercial-off-the-Shelf
CP	Central Processor
CP	Conflict Probe
CP	Control Processor
CPC	Central Processing Complex
CPD	Conflict Probe Display
CPDT	Conflict Probe Data Transfer
CPP	Conflict Probe Processing
CPP	Conflict Probe Processor
CPRB	Conflict Probe (software)
cps	Character per second
CPSD	Cursor Position Selection Device
CPSV	Conflict Probe Server
CPU	Central Processing Unit
CRAD	Composite Radar Data Processing
CRD	Computer Readout Device
CRT	Cathode Ray Tube
CS	Central Services
CSMA/CD	Carrier Sense Multiple Access with Collision Detection

CSRD	Central Services Release Depository
CTC	Channel to Channel
CTS	Coded Time Source
CWSU	Central Weather Service Unit

D

D–CRD	D-Position Computer Readout Device
DARC	Direct Access Radar Channel
DART	Data Analysis and Reduction Tool
DASD	Direct Access Storage Device
DBC	Discrete Beacon Code
D–CRD	D-Position Computer Readout Device
DCU	Disk Control Unit
DEA	Drug Enforcement Administration
DHS	Department of Homeland Security
DIMM	Dual In-Line Memory Module
DOD	Department of Defense
DOT	Department of Transportation
DPCU	DSR Printer Control Unit
DPOS	D-Position
DR&A	Data Reduction and Analysis
DRAM	Dynamic Random Access Memory
DRAP	DR&A Processor
DREC	DARC Radar Ethernet Converter
DSGW	DSR Gateway
DSR	Display System Replacement
DTTG	Digitizer Test Target Generator
DVD/RW	Digital Video Disk/Read/Write
DYSIM	Dynamic Simulation (system)

E

EADS	En Route Automation Display System
EAI	Enhanced Application Infrastructure
EAS	En Route Automation System
EASN	En Route Support Network
EBM	Extended Battery Module
EBUS	Enhanced Backup System
ECG	En Route Communications Gateway
ECGP	ECG Protocol
ECGVTS	ECG Validation Test Suite
ECOM	E-Complex Monitor
EDARC	Enhanced DARC
EDDS	En Route Data Distribution System
EDI	Enhanced Display System Infrastructure
EDIS	EDI Support Processor
ELS	External LAN Switch
EOT	End-of-Tape
EQARS	ECG QARS
EREP	Environmental Record Editing and Printing
ERIDS	En Route Information Display System
ES	Enterprise Storage
ESCON	Enterprise System Connection
ESI	EDARC System Interface
ESIP	EDARC System Interface Processor
ESSC	En Route System Support Complex
ESSP	Enhanced Site Support Processor
ETMS	Enhanced Traffic Management System

F

FAA	Federal Aviation Administration

FAS	Fabric Attached Storage
FBA	Fixed-Block Architecture
FBI	Federal Bureau of Investigation
FDB	Full Data Block
FDD	Floppy Disk Drive
FDDI	Fiber-Distributed Data Interface
FDED	Flight Data Entry and Display
FDIO	Flight Data Input/Output
FDIO–G	FDIO Gateway
FDP	Flight Data Processing
FDP	Flight Data Processor
FE	Fast Ethernet
FEMM	Field Engineering Maintenance Manual
FLAT	Flight Plan Aided Tracking
FOIA	Freedom of Information Act
FPA	Fix Posting Area
FPM	Flight Plan Manager
FPMDM	Flat Panel Main Display Monitor
FR	Flight Plan Readout
FSP	Flight Strip Printer
FSS	Flight Service Station
FTI	FAA Telecommunications Infrastructure
FOUO	For Offical Use Only

G

G3	Generation 3
GB	gigabyte
GEOMAP	Geographical Maps
GHz	Gigahertz
GI	General Information

GMLSDA	Geographical Map Line Segment Delete Add Record
GMP	Good Machine Path
GPI	General Purpose Input
GPO	General Purpose Output
GPWXP	General Information and Weather Processors
GUI	Graphical Users Interface
GWH	Host Gateway Software

H

HADDS	Host Air Traffic Management Data Distribution System
HAL	History Alert Log
HCS	Host Computer System
HGW	Host Gateway
HID	Host Interface Device
HIDS	Host Interface Device Software
HMC	Hardware Management Console
HMP	Host Maintenance Printer
HNL	HID/NAS/LAN
HP	Hewlett Packard
HSP	High-Speed Printer
HTML	Hyper Text Markup Language
Hz	Hertz (cycles per second)

I

I/O	Input/Output
IBM	International Business Machines
ICDA	Integrated Cached Disk Array
ID	Identification
ID	Identifier
IDE	Integrated Drive Electronics
IEEE	Institute of Electricians and Electrical Engineers

IFA	Interfacility
IFDS	Interfacility Data Set
IML	Initial Microcode Load
INV	Invalid Message Label
IOS	Input/Output Supervisor
IOS	Internetwork Operating System
IOT	Input/Output Typewriter
IP	Internet Protocol
IPL	Initial Program Load
ISPF	Interactive System Productivity Facility
ISSP	Information System Security Plan
ISSO	Information System Security Officer

K

Kbps	Kilobits per Second
KCNF	KVDT Configuration Notification Facility
KPR	KVDT Printer
KVDT	Keyboard Video Display Terminal
KVM	Keyboard Video and Mouse
KVM	Keyboard Video Monitor

L

LADM	Local Adaptation Management
LAN	Local Area Network
LCD	Liquid Crystal Display
LCN	Local Communications Network
LDB	Limited Data Block
LDDA	Logical Disk Device Address
LDN	Logical Device Number
LED	Light Emitting Diode
LGSM	Local Group SMMM (software)

LIC	Licensed Internal Code
LIU	LCN Interface Unit
LRU	Lowest Replaceable Unit
LSRP	Local System Release Processor

M

ms	Microsecond (mu and lower case s)
M	Mega (prefix 1 million)
m	Milli (prefix 1 thousandth)
M&C	Monitor and Control
M&C–C	Monitor and Control– Configuration
M&C–E	Monitor and Control–EDARC
M&C–H	Monitor and Control–Host
MAL	Malfunction error
MB	megabyte
Mbps	Megabits per second
MCM	Multiple Chip Module
MCP	Monitor and Control Processor
MDM	Multiprogramming Diagnostic Monitor
MHz	Megahertz
MIFT	Maintain Internal Facility Time
MIM	Maintenance Information Manual
MIPS	Million Instructions Per Second
MR	Map Request
MRDP	Multiple Radar Data Processing
MS	Microsoft
ms	Millisecond (lower case letters (ms))
MS	Modem Splitter
MSAW	Minimum Safe Altitude Warning
MSG	Message

MSP	Medium-Speed Printer
MSP	Maintenance System Printer
MSU	Modem Splitter Unit
MTI	Moving Target Indicator
MWS	Maintenance Workstation

N

NAPRS	National Airspace Performance Reporting System
NAS	National Airspace System
NAS	NAS Area Specialist
NASDA	Network Attached Storage Disk Array
NASDOC	NAS Documentation
Navaid	Navigation(al) Aid
NCP	NAS Change Proposal
NDP	NAS Defense Program
NDS	NOTAM Distribution System
NetApp	Network Appliance
NEU	Network Encryption Unit
NEXRAD	Next Generation Radar
NIC	Network Interface Controller
nmi	Nautical Mile
NOM	NAS Operations Manager
NOTAM	Notices to Airmen
NSCT	NAS Certification Tape
NSM	Network System Manager
NTI	Network Technologies, Inc.
NTP	Network Time Protocol
NVRAM	Non-Volatile Random Access Memory
NWS	National Weather Service

O

OARS	Offline Application Registration System
ODR	Offline Data Reduction
OLC	Online Certification
OLCT	Online Certification Tape
OLS	Operational LAN Switch
OLT–SEP	Online Test Standalone Executive Program
OLTS	Online Tests
OPEX	Operational Exerciser
ORRE	Online Radar Recording and Edit
ORU	Operational Router
OS	Operating System
OS/	Operating System/
OS/2	Operating System/2
OSM	Operational System Management
OU	Operational Unit
OUO	Official Use Only

P

PAM	Peripheral Adapter Module
PAMRI	Peripheral Adapter Module Replacement Item
par.	Paragraph
PAS	Primary Address Space
PC	Personal Computer
PC	Processor Controller
PCA	Parallel Communication Adapter
PCI	Peripheral Component Interconnect
PCII	Protected Critical Infrastructure Information
PCP	Primary Channel Processor
PCU	Printer Control Unit

PDF	Portable Document Format
PDU	Power Distribution Unit
PE	Permanent Echo
PEAS	Positional Error Analysis Summary
PEVP	Permanent Echo Verification Printout
pGINA	Plug In Graphical Identification aNd Authentication
PIN	Processor Initialization
PIP	Primary Interface Processor
PLMG	Plan Management (software)
PM	Periodic Maintenance
POR	Power On Reset
POST	Power On Self Test
PPI	Plan Position Indicator
PU	Processing Unit
PVD	Plan View Display

Q

QAK	Quick Action Key
QARS	Quick Analysis of Radar Sites

R

R–CRD	R–Position Computer Readout Device
RA	Registration Analysis
RAC	Real Application Cluster
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RANK	Replaceable Alphanumeric Keyboard
RAPPI	Random Access Plan Position Indicator
RARRE	Range Azimuth Radar Reinforced Evaluator
RCC	Radar Console Channel
RCM	Reliability Centered Maintenance

RCPO	Radar/Beacon Collimation Printout
R–CRD	R–Position Computer Readout Device
RCU	Remote Control Unit
RDAD	Registration Data Azimuth Deviation
RDAS	Radar Data Acquisition System
RDAT	Radar Data Acquisition and Transfer
RDED	Radar Data Entry and Display
RDBMS	Relational Database Management System
RDP	Radar Data Processing
RDRD	Registration Data Range Deviation
RDS	Radar Display Subsystem
RDSS	Radar Display Subsystem
RISC	Reduced Instruction Set Computer
RML	Remote Microwave Link
ROC	Read/Write Optical Cartridge
RPM	Revolutions per Minute
RSB	Radar Sort Box
RSF	Remote Support Facility
RTF	Run-to-Fault
RTQC	Real-Time Quality Control
RVSM	Reduced Vertical Separation Minima

S

s	Second
SAA	Special Activities Airspace
SAFA	Store and Forward Application
SAP	System Assist Processor
SAR	System Analysis Recording
SAS	Secondary Address Space
SBU	Sensitive But Classified

SCA	Serial Communication Adaptor
SCAP	Security Certification and Authorization Package
SCDP	Scenario Development
SCOPE	System Checkout of Peripheral
SCSI	Small Computer System Interface
SDA	Storage Disk Array
SDP	Surveillance Data Processor
SDRAM	Synchronous Dynamic Random Access Memory
SE	Support Element
sec.	Section
SIM	Simulator
SINE	System Integration of NAS Equipment
SKR	Support Printer
SLCA	Slant Range Correction Altitude
SMC	System Monitor Console
SMDT	System Management Data Transfer
SMGT	System Management (software)
SMO	System Management Office
SNMP	Simple Network Management Protocol
SOC	System Operations Center
SRM	System Release Manager
SSD	System Support Directive
SSE	Servicing Security Element
SSI	Sensitive Security Information
SSM	System Support Modification
SST	Surveillance System Testing
ST	Simulation Training
SUI	Sensitive Unclassified Information
SW	Software

SWI	Simulate Weather Interfacility
SWS	Support Workstation
SYNCP	Synchronization Processors

T

T&T	Test and Training
TB	Terabyte
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TCU	Terminal Control Unit
TD	Test Device
TDLS	Tower Data Link Services
TELCO	Telephone Company
TI	Technical Issuance
TJM	Trajectory Modeling
TJMD	Trajectory Modeling (software)
TKM	Track Manager
TMA	Traffic Management Adviser
TMU	Traffic Management Unit
TOS	Technical Operations Services
TPM	Trial Plan Management
TS	Terminal Server

U

UDP	User Datagram Protocol
UM	Users Manual
UPC	Universal Processor Controller
UPS	Uninterruptible Power Supply
URET	User Request Evaluation Tool
USB	Universal Serial Bus
USPS	United States Postal Service

V

v	volts
V	Volts
VM	Virtual Machine
vol.	Volume
VOR	Very High Frequency Omnidirectional Radio Range
VPP	Verification Post Processor Program
VSCS	Voice Switching and Control System
VTS	Validation Test Suite

W

W	watt
WAN	Wide Area Network
WARP	Weather and Radar Processor
WGD	Wind Grid Display
WINS	Weather Information Network Server
WJHTC	William J. Hughes Technical Center
WMSU	Weather Message Switching Unit
WP	Weather Processing
WX	Weather

APPENDIX 3. MAINTENANCE OPERATION MANUALS

Information supplied by the System Integration of NAS Equipment (SINE) contractor has been consolidated into FAA Maintenance Operational Manuals. These manuals are maintained current by the ATO through the System Support Directive (SSD) page change process, and System Documentation Releases (SDR).

A listing of, and electronic access to, all current En Route system-specific technical manuals is available at the Communications, Flight Service and Weather Engineering Group (ATO–W) NAS Documentation (NASDOC) Services electronic library at http://skil.act.faa.gov/AJW-172/library/default.aspx

APPENDIX 4. CHANGE HISTORY

The following CCDs reflect the past major changes made to Order 6100.1. Refer to paragraph 4 of this order for the approved CCDs incorporated into the current publication of Order 6100.1.

Configuration Control Decisions

a. Configuration Control Decision (CCD) N18581, Add Display System Replacement (DSR) System.

b. CCD N20030, Update Selected NAS-Level Maintenance, Certification, and Multiprogramming Diagnostic Monitor (MDM) Baseline Documents Applicable to the En Route Coded Time Source (CTS).

c. CCD N19754, Add Host Interface Device (HID)/NAS Local Area Network (LAN).

d. CCD N20656, Replacement of Host Computer System Hardware Phase 1.

e. CCD N21169, Update FAA Order 6100.1 to Remove RSCANS Program and Update the Host QARS Tolerances.

f. CCD N22138, Fabrication of Emulators to Replace RDS–500/SPB/MIDS in the DARC System.

g. CCD N18275, Change to 6100.1C.

h. CCD N22604, ARTCC DASD and DASD Controller Hardware Replacement.

i. CCD N21687, Hardware Modifications of HCS to Connect a Host/HOCSR Gateway (HGW) to URET/CCLD.

j. CCD N21880, DSR D–Console Modifications for URET CCLD.

k. CCD N22372, Replace the Host Virtual Machine (VM) Support Side KPRs (IBM 3268) with IBM 6400 Printers. Support KPR Replacement (SKR).

l. CCD L22855, Modify CCCH to Accommodate HID 3.

m. CCD N20970, Replace Maintenance System Printer (MSP) at 20 Domestic Air Route Traffic Control Centers (ARTCC) Maintenance Control Centers (AMCC) with the Host Maintenance Printer (HMP).

n. CCD N23463, Update FAA Order 6100.1E Periodic Maintenance and Certification Intervals.

o. CCD N15728, Delete PM Requirement to Check PAMRI AU and RDDU Power Supply Ripple.

p. CCD N22942, Update FAA Order 6100.1E by Removing Systems/Equipment No Longer In Operational Use.

q. CCD N23610, Replace the Host Operational KPRs (IBM 3268) with IBM 6400–050 Printers.

r. CCD N24041, Replace the Host HSPs (IBM 4248) with IBM 6400–015 Printers.

s. CCD N24465, DSR System Architecture to Incorporate URET and Cleanup #1 (URET Phase 2 National Deployment to all 20 ARTCCs).

t. CCD N24442, Include New Host Online Test Tools Diagnostics as a Certification Option.

u. CCD N24500, Update 6100.1 Certification Tables in Appendix 1.

v. CCD N24743, ECG Requests the Use of Vacant Ports Created by the HOCSR Phase 3 DASD Replacement.

w. CCD N25358, Modify the ECG System to provide backup Air Traffic Control Capabilities

x. CCD N24757, Replace Keyboard Video Display Terminals (KVDT) at ARTCCs and Support Facilities.

y. CCD N24881, Remove Host HMC/SE monthly backup from FAA Order 6100.1E.

z. CCD N24622, Flat Panel MDM Software/Firmware upgrades.

aa. CCD N25177, D–Console Upgrade: HW Design and Integration.

bb. CCD N25176, EBUS–DSR Impacts to A-Level specifications and HW changes

cc. CCD N24686, Replace IBM 3725 Communications Controller at Air Traffic Control Centers.

dd. CCD N25737, Update FAA Order 6100.1F to reflect publication of TI 6140.24, Monitor and Control (M&C).

ee. CCD N30564, En Route Information Display System (ERIDS).

ff. CCD N30722, FDIO Maintenance Handbook — Initial Issue.

gg. CCD N31372, Update Maintenance of NAS En Route Stage A — Air Traffic Control System (FAA Order 6100.1G) for EADS/ERIDS.

hh. CCD N31357**,** Hardware Change for FDIO/CCU Sustainment Project.

ii. CCD N31441, Update 6100.1G CHG 2 to Reflect DARC Removal and Addition of ERAM System Names.

jj. CCD N31485, Host Tech Refresh of 3274 Terminal Control Units and 3814 Switches.

APPENDIX 5. POLICY/PROCEDURES FOR IDENTIFYING, HANDLING, MARKING AND DISPOSAL OF SENSITIVE UNCLASSIFIED INFORMATION (SUI)

1. PURPOSE.

This appendix provides guidance to employees regarding the rules and practices for identification, handling, marking, storage, and disposal of media that contains For Official Use Only (FOUO) information, Sensitive Security Information (SSI), Sensitive Homeland Security Information (SHSI) and/or Protected Critical Infrastructure Information (PCII). This guidance does not pertain to any classified (i.e., Confidential, Secret, and Top Secret) media.

2. SCOPE.

This guidance pertains to any SUI discussed verbally, transmitted electronically, existent or generated as printed material and/or contained on hard drives, disk drives, and/or any other type of computer storage media under the purview of the FAA. It pertains to every FAA employee, contractor, consultant and grantee creating, handling, or accessing SUI.

3. BACKGROUND.

In the aftermath of September 11, 2001, there is a heightened awareness of the need to safeguard sensitive Government information that does not meet the standards for classified national security information. Of particular concern is the need to protect Government information related to homeland security. This includes information that supports the FAA global aerospace structure that contributes to the security of the nation and public safety. It is incumbent upon all FAA associated personnel to support these safeguards through increased awareness of the nature of such material and their duties and responsibilities for its protection.

4. POLICY.

In Accordance With (IAW) requirements stated in the latest edition of Order 1600.75, Protecting Sensitive Unclassified Information (SUI), SUI is unclassified information – in any form including print, electronic, visual, or aural forms – that must be protected from uncontrolled release to persons outside the FAA and indiscriminate dissemination within the FAA. It includes aviation security, homeland security, and protected critical infrastructure information. SUI may include information that may qualify for withholding from the public under the Freedom of Information Act (FOIA). All personnel shall be aware of and follow the policies and procedures contained herein and in the latest edition of Order 1600.75. If conflicting guidance is provided, comply with Order 1600.75.

5. TYPES OF SUI.

Throughout the Federal Government there are more than 50 types of SUI. Within the FAA, only four types are generally encountered or handled:

a. FOUO Information. FOUO is the primary designation given to SUI by the Department of Transportation (DOT) and FAA. It consists of information that could adversely affect the national interest, the conduct of Federal programs, or the privacy of individuals if released to unauthorized individuals. As examples, the uncontrolled use of FOUO information may allow someone to:

(1) Circumvent agency laws, regulations, legal standards, or security protective measures

or

(2) Obtain unauthorized access to an information system.

b. SSI. SSI is a designation unique to the DOT and DOT's operating administrations and to the Department of Homeland Security (DHS). It applies to information we obtain or develop while conducting security activities, including research and development activities. Unauthorized disclosure of SSI would:

(1) Constitute an unwarranted invasion of privacy (including, but not limited to, information contained in any personnel, medical, or similar file);

(2) Reveal trade secrets or privileged or confidential information obtained from any person;

or

(3) Be detrimental to transportation safety or security.

c. SHSI. SHSI is a designation unique to homeland security information that we share with State and local personnel. The Federal Government shares SHSI with State and local personnel who are involved in prevention against, preparation for, or response to terrorism. We protect it because its loss, misuse, unauthorized disclosure or access, or modification can significantly impair the capabilities and efforts of Federal, State, and local personnel to predict, analyze, investigate, deter, prevent, protect against, mitigate the effects of, or recover from acts of terrorism. If our sensitive unclassified information impairs these capabilities, we must designate it SHSI before we share it with State and local personnel to facilitate its proper protection.

d. PCII. PCII is a designation unique to critical infrastructure information provided by non–government persons and entities to the DHS. DHS uses the information for security of critical infrastructure and protected systems, analysis, warning, interdependency studies, recovery, reconstitution, or other informational purposes. While only DHS can designate information as PCII, they can share it with other Federal agencies as needed for operational purposes. PCII is defined in 6 CFR Part 29.1.

6. IDENTIFYING AND WORKING WITH SUI.

Personnel working with this system are most likely to encounter SUI identified above. However, other Federal agencies use different terminology and markings to designate SUI. For example, the Department of Energy uses Official Use Only (OUO), the Department of State uses Sensitive But Unclassified (SBU), and the Drug Enforcement Administration (DEA) uses DEA Sensitive. Many Federal law enforcement agencies use the term Law Enforcement Sensitive (LES). If an unfamiliar security designation is encountered, contact the Servicing Security Element (SSE) for guidance; treat the information in question as FOUO until specific resolution is obtained.

Most existent SUI will be marked accordingly. However, marking is not conclusive proof of sensitivity. Information sensitivity may cease because of the passage of time or change in circumstances. Also, because of error or changing sensitivities, unmarked SUI that should be marked or information that is marked but is no longer sensitive may be encountered. If there is any uncertainty about markings, contact the supporting SSE for a resolution and protect the questioned information as though it were FOUO information pending resolution.

The systems under cognizance of the Communications, En Route Peripheral Support Group, their operating systems and operational and backup data typically fall outside the scope of designation as SUI. However, the following specific information associated with the En Route Peripheral Support Group programs and systems is considered SUI:

a. Lists and/or data files of employees and their respective system passwords or access codes. (FOUO);

b. System specific security information. (FOUO);

c. System or organizational vulnerability assessments. (SSI);

d. Continuity of Operations Plan (COOP) documentation. (SSI);

e. Security Certification and Authorization Package (SCAP) documentation (SSI);

f. Contingency planning documents, such as Disaster Recovery Plans (SSI);

g. Trade secret or proprietary corporate information supplied in proposals and/or provided to the FAA under contract license agreements (SSI).

A comprehensive, but generic listing of the specific information comprising SSI is provided in Order 1600.75, Appendix A.

7. MARKING/LABELING SUI.

Marking is a basic protective measure that draws a reader's attention to the sensitivity of information and the need to protect it. Marking aids in making disclosure decisions and selecting and applying appropriate protective measures.

All personnel are required to properly mark information when created or it is determined that it meets the standards of sensitive unclassified information. Exceptions:

a. Records in storage. If there are unmarked records in storage that should be marked, they need not be removed from storage only to mark them. Mark them when removed from storage for other purposes other than destruction. Stored documents slated for destruction need not be marked prior to destruction provided the individual removing the document from storage can ensure destruction is accomplished as specified in paragraph 10 of this appendix.

b. Records marked under old authority. Information marked under an old regulatory authority, e.g., 14 CFR § 191 for Sensitive Security Information may be marked differently than directed by this order. Remarking these documents is not required.

c. Sensitive non–government information. Your office may receive information from contractors, grantees, businesses, and regulated parties marked as business sensitive, company confidential, proprietary, trade secret, and so on. Remarking this information is not required, but it must be protected from unauthorized disclosure. Unless greater protective measures are specified by the information's originator, protect it as FOUO information.

Refer to Order 1600.75, Appendices D and E, for the most current guidance for marking FOUO information and SSI, which have different marking protocols. The SHSI Program Officer and PCII Officer will issue separate marking guidance for SHSI and PCII.

When marking documents and other material containing both classified national security information and SUI, refer to the latest edition of Order 1600.2, Safeguarding Controls and Procedures for Classified National Security Information and Sensitive Unclassified Information.

Mark other records, such as photographs, films, tapes, slides, or records residing in information systems with appropriate protective markings and distribution limitation statements in a conspicuous way so that persons having access to them are aware of their sensitivity.

Mark removable electronic media, e.g., diskettes and compact disks, with the appropriate protective marking and distribution limitation statement in a conspicuous way so that persons having access to them are aware of their sensitivity. The system Information System Security Plan (ISSP) will contain additional specific measures for labeling and marking removable media.

8. STORING SUI.

a. During Working Hours.

(1) Physical custody or control. When SUI is not in secure storage, it must be under the protection and control of an authorized person.

(2) *Not under* physical custody or control. When your SUI is not under the physical custody or control of an authorized person, you must store it in a lockable container, such as a file cabinet or desk, or in a locked space. Your office must control the keys to the locks of these containers and spaces, and key holders must be authorized persons.

b. After Working Hours.

(1) Uncontrolled work spaces. If the work area is accessible to persons, who are not authorized access to the SUI, it must be stored in a secure container such as a locked desk, file cabinet, or an inaccessible locked space. The sub-team office must control the keys to the locks of these containers and spaces, and key holders must be authorized persons.

(2) Controlled work spaces. If the work area is accessible only to persons who are authorized access to the SUI, additional protective measures are not needed. Again, the sub-team office must control the keys to the locks for these controlled work spaces.

c. At Home or On Travel. Working on SUI outside the workplace poses additional security risks and challenges. If there is a need to work with SUI at home or while on travel, the system manager's approval to do so must be obtained. Each individual holder of SUI is responsible for protecting it from unauthorized disclosure while at home or traveling. Whether working and storing SUI from home or an assigned travel destination, the information is to be provided the same level of protection that it is afforded at the normal work site.

9. DISTRIBUTION PROCEDURES FOR SUI.

SUI may be carried, mailed, or shipped in any manner that prevents inadvertent disclosure of the contents. When sending SUI records outside the DOT, include supplementary markings and notices to explain the significance of the information and promote its proper handling. For example, include a statement such as the following in a transmittal record or directly on the record containing SUI:

This document/record belongs to the Federal Aviation Administration and may be used for official government purposes only. It may not be released without the express permission of the Federal Aviation Administration. Refer requests for the document to:

(insert name and address of originating office.)

a. Hand carrying. Place the information in an opaque envelope or carry it within a brief case, pad folio, or other container. For FOUO information, use DOT Form 1600.7–1, FOUO Cover Sheet, or the FAA Form 1360–39, FOUO Envelope, if available.

b. Interoffice mail. Use a sealed opaque envelope with the addressee indicated on it. This is in addition to or instead of any office messenger envelopes. If available, use FAA Form 1360–39.

c. U.S. or contract mail. Mail or send documents and materials in properly addressed opaque envelopes or containers by United States Postal Service (USPS) first-class, certified, or registered mail or contracted delivery service. Bulk shipments, such as directives, may be sent by 'fourth-class' mail provided the shipment is wrapped in opaque covering.

d. Telephone. Confirm that you are speaking to an authorized person before discussing the information, and inform the person that your discussion will include SUI and what part of the discussion is sensitive. Never leave voicemail messages containing SUI.

e. Fax.

(1) Mark the fax. Ensure that the documents being faxed are appropriately marked;

(2) Send to correct number. Use special care to ensure that documents are being sent to the correct fax number; and

(3) Determine how faxes are handled at the receiving end:

(a) If sending the fax to a controlled area, where only authorized persons will have access to it, then it may be sent without further precautions.

(b) If sending the fax to an uncontrolled area, where unauthorized persons might have access to it, then request an authorized person stand by at the receiving end while the fax is being sent. Ask for a confirming receipt.

f. Electronic Mail. Mark emails in the subject line "For Official Use Only" or "Sensitive Security Information" as appropriate. Send sensitive unclassified information as attachments; ensure they are appropriately marked IAW Order 1600.75, Appendices D and E. Also the security and encryption procedures of Order 1370.81, Electronic Mail, must be followed.

g. Web Sites. Posting SUI to an unsecured web site that can be accessed by the public from the Internet is prohibited. Public web sites must not be provided links to web sites where SUI is posted. SUI may be posted to restricted FAA web sites provided they have special logon protocols and password protection. Passwords to these sites may be provided only to persons who satisfy the “duty to protect” and “need-to-know” requirements explained in Order 1600.75, Chapter 2.

Destruction Standards for Paper Documents and Records		
If your document is:	Then your destruction standard is	Method
FOUO	To make recognition and reconstruction difficult	At a minimum, tearing or shredding each page into small pieces and mixing those pieces into regular trash
SSI	Completely to preclude recognition or reconstruction	Burning, shredding, wet-pulping and chemical decomposition (see Note)
SHSI	By any means approved for destruction of classified information or by any other means that would make it difficult to recognize or reconstruct the information	Burning, cross-cut shredding, wet-pulping and chemical decomposition
PCII	By any method that prevents unauthorized retrieval	Burning, cross-cut shredding, wet-pulping and chemical decomposition
NOTE: Existing strip shredders may be used, but cross-cut shredding is preferred. Any new shredding equipment must have a cross-cut feature. The local Servicing Security Element (SSE) can provide assistance in selecting an appropriate destruction method and equipment.		

10. DISPOSAL OF SUI.

The following guidance is provided for paper documents and record IAW requirements stated in Order 1600.75. Refer to the current version of this order to ensure this information is current.

Refer to appendix 6 for guidance pertaining to electronic/computer storage media.

APPENDIX 6. SENSITIVE SECURITY INFORMATION AND MAGNETIC MEDIA DISPOSAL/REUTILIZATION POLICY/PROCEDURES

1. PURPOSE.

This appendix provides guidance to TOS employees who have a requirement to dispose of, or reuse, unclassified computer storage media that contains SSI or FOUO information. These procedures do not pertain to any Classified (i.e., Secret, Top Secret) media.

2. SCOPE.

These procedures pertain to any SBU data contained on hard drives, disk drives, and any other type of computer storage media under the purview of the FAA that contains SSI or FOUO information. Computer storage media located at FAA site(s), but owned or managed by other government agencies (i.e., DoD, Federal Bureau of Investigation (FBI)), will not use these procedures, but will follow the procedures and/or guidelines for reusing or destroying magnetic media dictated by that particular agency. If the storage media is FAA-owned but contains sensitive information from another outside agency (i.e., DoD), then the sanitization procedures from the outside agency must be followed. If the outside agency's procedures are determined by the division Information System Security Officer (ISSO) to be better than or equal to the procedures outlined in this appendix, then no other action is necessary. If the outside agency's procedures are unknown or less stringent, then the procedures outlined in this appendix should be utilized.

3. BACKGROUND.

Computer storage media that contains SBU information cannot be reused or excessed unless all information has been destroyed or removed beyond comprehension. Reformatting the drive or deleting files will not completely remove the data from a system. There is still a great chance that the data can be recovered.

A number of methods can be used to accomplish proper sanitization. This document will provide three sets of procedures that will satisfy requirements necessary for reusing or disposing of electronic storage media. These procedures are:

a. overwriting the data manually and/or using approved data-overwriting software,

b. degaussing (i.e., demagnetizing the data), and

c. destroying the media.

4. POLICY.

In accordance with requirements stated in the latest edition of Order 1370.82, Information Systems Security Program, to maintain the confidentiality and accountability of sensitive information, TOS FAA and support contractor personnel shall ensure confidentiality of sensitive data when reusing or disposing of magnetic media. The procedures contained in this document shall be followed when disposing of, or reusing, unclassified computer storage media that contains SSI and/or FOUO information. Authority to destroy magnetic media must be obtained from the owner or Property Custodian, whichever is appropriate, prior to executing any procedure that destroys data or the media.

All personnel shall follow the latest edition of Order 1600.2, when disposing or reusing magnetic media that contains classified information.

5. PROCEDURES FOR SANITIZING SBU ELECTRONIC STORAGE MEDIA.

Any one of the following procedures can be used when sanitizing any SBU electronic storage media before reuse or disposal. Before SBU media is to be removed or reused, the division ISSO must be notified and consulted.

a. Overwriting Electronic Storage Media for Sanitization.

Overwriting is the process of replacing information (data) with meaningless data in such a way that the meaningful information cannot be recovered. The individual performing the overwriting will be responsible for certifying that the process has been successfully completed.

The process of overwriting data must be correctly understood and carefully implemented to be effective. Overwriting consists of recording data onto magnetic media by writing a pattern of binary ones (1) and zeros (0). These patterns can then be read back and interpreted as individual bits, eight (8) of which are used to represent a byte or character. If the data is properly overwritten with a pattern (e.g., “11111111” followed by “00000000”) the magnetic fluxes will be physically changed and the drive’s read/write heads will only detect the new pattern and the previous data will be effectively erased. To purge a hard drive requires overwriting with a pattern and then its complement, and finally with another pattern (e.g., overwrite first with “00110101,” followed by “11001010” then “10010111”). Sanitization is not complete until all six passes of the three cycles are completed.

b. Data-overwriting Software.

Another method for sanitizing storage media is using commercial software. Certain software can be used but it must meet the criteria listed below in Paragraph 7, Acceptable Commercial Software Products, of this appendix. Software products and applications not meeting the stated minimum specifications are not acceptable for sanitizing SBU storage media. Overwriting software that reformats or repartitions a hard drive will not be accepted within the scope of this policy. Also, some software product versions may not have the capability to remove the operating system (OS) during the overwrite process. To ensure the integrity of the sanitization process, overwriting software must have the following functions and capabilities:

(1) The ability to purge all data or information, including the OS, from the physical or virtual drives, thereby making it impossible to recover any meaningful data by keyboard or laboratory attack

(2) A compatibility with, or capability to run independent of, the OS loaded on the hard drive

(3) A compatibility with, or capability to run independent of, the type of hard drive being sanitized (e.g., Advanced Technology (AT) Attachment (ATA)/Integrated Drive Electronics (IDE) (ATA/IDE)) or SCSI type hard drives)

(4) A capability to overwrite the entire hard disk drive independent of any Basic Input/Output (BIOS) or firmware capacity limitation that the system may have,

(5) A capability to overwrite using a minimum of three cycles (six passes) of data patterns on all sectors, blocks, tracks, and slack or unused disk space on the entire hard disk medium,

(6) A method to verify that all data has been removed from the entire hard drive and to review the overwrite pattern.

c. Degaussing.

Degaussing is a procedure that reduces the magnetic flux of a medium to virtual zero by applying a reverse magnetizing field. Properly applied, degaussing renders any previously-stored data on magnetic media unreadable. The drawback to degaussing is that very seldom can a drive be used after this process. For a degausser to be effective here are a few standards and procedures which must be used:

(1) Degaussers used on FAA hard drives must have a nominal rating of at least 1700 Oersted.

(2) Degaussers must be operated at their full magnetic strength.

(3) The product manufacturer's directions must be carefully followed. Deviations from an approved method or rate of coercivity could leave significant portions of data remaining on a hard drive.

(4) All shielding materials (e.g., castings, cabinets, and mounting brackets) which may interfere with the degausser's magnetic field must be removed from the hard drive before degaussing.

(5) Hard disk platters must be in a horizontal direction during the degaussing process.

(6) For degaussing hard drives with very high coercivity ratings, it may be necessary to remove the magnetic platters from the hard drive's housing.

(7) Degaussing products should be acquired from the National Security Agency's (NSA) degausser products list which can be obtained by contacting:

National Security Agency
Attn: S7 Media Technology Center
9800 Savage Road, Ft. George G. Meade, MD 20755–6877
Tel: 1 (800) 688–6115 (option #3) or 1 (410) 854–7661
Fax: 1 (410) 854–7668

d. Destruction of Media.

Destruction of media is generally used when a disk has damaged or unusable tracks and sectors and the disk is not reusable. Authority to destroy the media must be obtained from the Property Custodian before proceeding. Destruction of storage media is the process of physically damaging a medium so that it is not usable in a computer, and so that no known exploitation method can retrieve data from it. If possible, operable media should be overwritten or degaussed prior to destruction. The three acceptable methods of destruction are:

(1) Physical destruction/impairment beyond reasonable use: Remove the hard drive from the chassis or cabinet. Remove any steel shielding materials, mounting brackets, and cut any electrical connection to the hard drive unit. In a suitable facility with individuals wearing appropriate safety equipment, subject the hard drive to physical force (i.e., pounding with a sledgehammer) that will disfigure, bend, mangle, or otherwise mutilate the hard drive so that it cannot be re-inserted into a functioning computer. Sufficient force should be used directly on top of the hard drive unit to cause shock/damage to the disk surfaces. In addition, any connectors that interface into the computer must be mangled, bent, or otherwise damaged to the point that the hard drive could not be re-connected without significant rework.

(2) Destruction at a metal destruction facility, (i.e., smelting, disintegration, or pulverization).

(3) Application of an abrasive substance (emery wheel or disk sander) to a magnetic disk or drum recording surface. Make certain that the entire recording surface is completely removed. Ensure proper safety measures, to include protection from inhaling abraded dust and use of protective eyewear.

6. DEFINITIONS.

a. Clearing — Rendering stored information unrecoverable unless special utility software or techniques are used.

b. Degaussing — Reduces the magnetic flux to virtual zero by applying a reverse magnetizing field. Properly applied, degaussing renders any previously stored data on magnetic media unreadable and may be used as a method of sanitization.

c. Media — Short for storage media. Physical objects on which data can be stored, such as hard drives, floppy disks, CD–ROMs, and tapes.

d. Overwriting — Process of writing patterns of data on top of the data stored on a magnetic medium.

e. Oerstad — A unit of magnetic field strength.

f. Sanitize — To expunge data from storage media so that data recovery is impossible. Sanitizing includes overwriting, degaussing, and destruction (destruction is not an appropriate means for TOS purposes). Clearing data does not constitute sanitizing.

g. SBU Information — SBU information is any information the loss, misuse, or unauthorized access to, or modification of, or the privacy to which individuals are entitled under Section 552a of Title 5, United Stated Code (The Privacy Act), but which has not been specifically authorized under criteria established by Executive Order or an Act of Congress to be kept secret in the interest of national defense or foreign policy. This includes information in routine FAA payroll, finance, logistics, and personnel management systems.

7. ACCEPTABLE COMMERCIAL SOFTWARE PRODUCTS.

The following commercial software is of acceptable use for overwriting computer storage media. This is not to be considered an all-inclusive list, as there are other products that meet the minimum requirements, but this list should be used as a reference. This list is subject to change and should only be used as a reference.

a. Product Name: "No Trace"
Communication Technologies, Inc.,
14151 Newbrook Dr., Suite 400, Herndon, VA 20170
Tel: (703) 961–9080
www.comtechnologies.com

b. Product Name: "DataEraser"
ONTRACK Data International, Inc.
Tel: 1 (800) 872–2599
www.ontrack.com

c. Product Name: "UniShred Pro"
Los Altos Technologies
Tel: (919) 233–9889
www.lat.com

d. Product Name: "CleanDrive"
Access Data Corporation
(800) 574–5199
www.accessdata.com

e. Product Name: "Sanitizer D 4.01"
Infraworks
(512) 583–5000
www.infraworks.com/products/sanitizer

RECORD OF CHANGES

DIRECTIVE NO. JO 6100.1H

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL

FAA FORM 1320-5 (6-80) USE PREVIOUS EDITION

CASE FILE/ NAS CHANGE PROPOSAL

(PLEASE TYPE OR PRINT NEATLY)

1. Case File Number

2. For CM Use — **Case File Received Date** | **NCP Issuance Date** | **NCP Number**

3. Scope of Change

☐ Local ☐ National
☐ Test

4. Reason For Change

☐ Safety ☐ Technical Upgrade ☐ Systems Interface
☐ Requirements Change ☐ Design Error ☐ Parts Unavailability
☐ Baseline ☐ Other

5. Priority

☐ Normal
☐ Time–Critical
☐ Urgent

6. Justification of Time Critical/Urgent Priority

7. Supplemental Change Form

☐ ECR/ECP ☐ TES ☐ N/A

7a. Supplemental Change No. ______________________

7b. Supplemental Change Initiation Date ______________________

8. Case File Originator | **9. Originator's Organization** | **10. Telephone Number** | **11. Case File Initiation Date**

12. Type of Document Affected

☐ CPFS ☐ SPEC ☐ MTBK ☐ ______________________________
☐ TI ☐ DWG ☐ IRD/ICD

13. Baseline Document Number(s)

14. CI Subsystem Designator | **15. FA Type** | **16. CI Component Designator**

17. Facility Identifier (FACID) | **18. Facility Code (FACCODE)** | **19. Cost Center Code** | **20. Software System Version**

21. Title

22. Description: **(a) identification of problem, (b) proposed change, (c) interface impact, (d) cost estimate (e) funding source (f) benefits/risks, (g) Schedule (h) Other (e.g. logistics, quality, etc.)**

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

Blocks 1 through 22 are to be completed by originator and/or the NCP coordinator. If a block is not applicable, write n/a. Attach additional sheets if necessary. See current revision of NAS-MD-001 for detailed completion instructions.

Case File Number	NCP Number	Page 2 of ___

23. Name and Title of Originator's Immediate Supervisor (Type/Print Clearly)	Signature	Date

24. Facility/SMO Review (AT/AF)

Name	Routing Symbol	Date	Concur	Non–Concur

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

25. Regional Review

Name	Routing Symbol	Date	Concur	Non–Concur

☐ **Recommend Approval** (Enter into CM/STAT. Forward to Prescreening)

☐ **Disapprove** (Return to Originator)

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	
Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/ Reg Exec Sec
Date	

25a. Comments

(Attach additional sheets if necessary)

26.

PRESCREENING

Prescreening Office __________________

Prescreening Comments:

(Attach additional sheets if necessary)

Reviewers	Routing Symbol	Date	Concur	Non–Concur

Recommended Must Evaluators

☐ **Recommend Approval**

☐ **New Requirement**

☐ **Recommend Disapproval** (Return original to originating office through the Regional NCP Coordinator)

Routing Symbol	Signature
Date	

27. **For Internal Configuration Management Use Only**