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INTERFACE CONTROL DOCUMENT
FOR
THE RDA/RPG

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1 SCOPE

1.1 Identification

This document defines the interface between the Radar Data Acquisition (RDA) and Radar Product Generation (RPG) functional areas of the WSR-88D system. This document revision is applicable to the RDA design employing the Versa Module Eurocard Bus (VMEbus) communications subsystem and to the RPG design employing client/server technology. This RPG design is more commonly called the Open RPG (RPG).

1.2 System Overview

The WSR-88D acquires, generates, and distributes doppler radar products for meteorological and hydrological applications. Specifically, the RDA functional area acquires radar data; controls antenna, transmitter, and receiver electronics; prepares radar data in a digital format; transmits radar data and status to the RPG; and processes control information from the RPG. The RPG functional area receives radar data and status information from the RDA, formats and sends control commands to the RDA, generates radar products, and distributes radar products for graphical and alphanumeric display systems.

The WSR-88D system was developed in the mid to late 1980s. Full scale deployment began in 1992 and was completed in 1995. DoD, DOC, and DOT jointly sponsored the development, acquisition, and deployment of the WSR-88D. There are 158 operating sites which include the RDA and RPG functional areas.

1.3 Documentation Overview

This document provides information needed to interface either the RDA or the RPG functional areas of the WSR-88D. Contents include detailed description of the interface components including hardware and software. The document is structured to address applicable layers of the Open System Interconnect (OSI) model.

2 REFERENCE DOCUMENTS

This section lists the number, title, revision, and date of all documents referenced in this specification. This section shall also identify the source for all documents not available through normal Government stocking activities.

2.1 Government Documents

2.1.1 Specifications

Reference Number	Title
2810000C	WSR-88D System Specification
2830013	WSR-88D System/Subsystem Design Document
DVl208256E, SCN-003	**Critical Item Development Specification for Wideband Communications Link**
2620015A	Microwave Line Of Site Fault Alarm System ICD
2620008A	RDA Base Data User ICD
2620036	RPG to Base Date Distribution Server (BDDS) ICD
2620013	BDDS to User ICD
2820046	BDDS Software Product Specification
2630002	BDDS Software Administrator's Manual (SAM)
2630003	BDDS Software User's Manual (SUM)
2660007	BDDS Software Test Description (STD)
Source:	WSR-88D Radar Operations Center 3200 Marshall Avenue, Suite 100 Norman, OK 73072

2.1.2 Military Standards and Handbooks

Reference Number	Title
N/A	
Source:	Document Automation and Production Service Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094

2.2 Non-Government Documents

2.2.1 Industry Standards

Reference Number	Title
ANSI T1403-1989 **ANSI T1.403-1995 (latest)**	Carrier-to-Carrier Installation, DS1 Metallic Interface Network-to-Customer Installation – DS1 Metallic Interface

American National Standards Institute
11 West 42nd Street
13th Floor
New York, NY 10036
URL: http://www.ansi.org

Reference Number	Title
CCITT Recommendation X.25 (1984)	Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit

Source: International Telecommunications Union (ITU)
URL: http://www.itu.int

2.2.2 Request for Comments

Reference Number	Title
N/A	

Source: http://www.rfc-editor.org/

3 INTERFACE DESIGN

3.1 Functional Description

This interface is for transfer of data between the RDA and the RPG functional areas. Figure 3-1 shows a simplified diagram of the RDA/RPG interface. The component descriptions are provided here as a functional overview.

3.1.1 Interface Identification and Diagram

The RDA functional area is uniquely identified as WSR-88D Configuration Item 9 (CI-09). Likewise, the RPG functional area is identified as CI-07. The interconnecting communications area between RDA and RPG is identified as CI-06. Modification to the CI-07 area for transition to the client/server model of RPG will result in changes to the CI-06 communications area, but application software interface constraints imposed by the RDA area will remain.

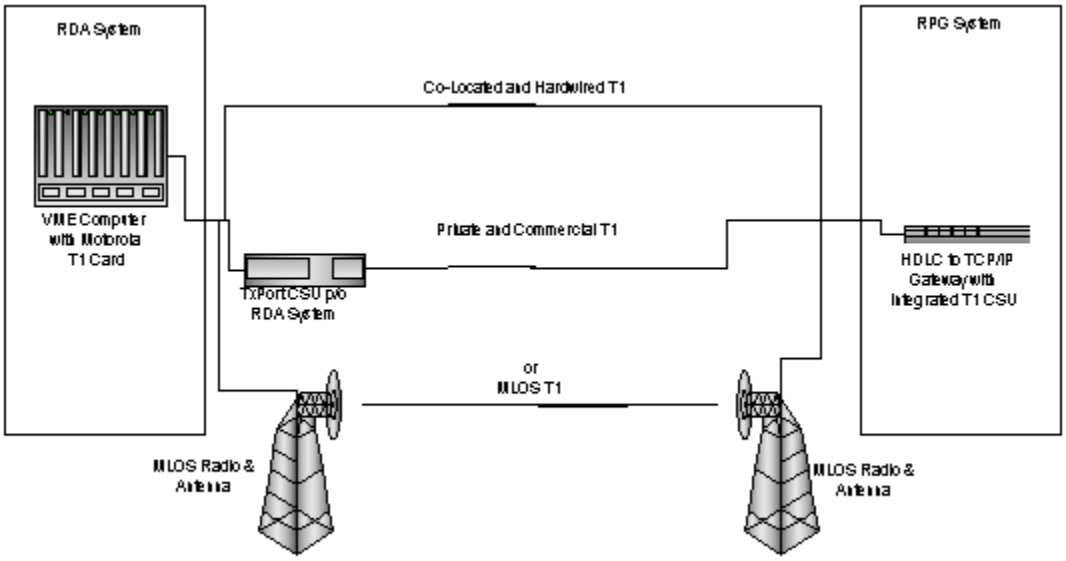

Figure 3-1

3.2 Component Descriptions

3.2.1 RDA Components

3.2.1.1 Versa Module Eurocard to Concurrent Bus Interface (VCI-C)

3.2.1.2 Motorola Versa Module Eurocard (MVME)

The Motorola VME Controller consists of one circuit board and provides the interface to the communication medium, namely: Commercial T1, Digital Cross Connect (DSX-1) Wire, or Microwave Line-of-Sight (MLOS). The T1 span is a standard telecommunications interface capable of data transfer at 1.544 Megabits per second. The MVME may be configured to support either standard T1 or restricted Telco T1 data rates. The MVME board supports the DSX-1 communication for wire cable lengths up to 200 meters (650 feet) without any external digital communications equipment. The RDA side of the link is configured as the logical DCE while the RPG side of the link is configured as the logical DTE. The VME Controller performs the necessary protocol functions based on site specific configurations including:

- T1 clock recovery functions or acceptance of Network clocking, if applicable
- Cyclic redundancy checking
- Support for D4 Superframe (SF) and Extended Superframe (ESF) synchronization as defined in ANSI T1.403
- Ones-density encoding for either B8ZS (Bipolar with 8-zero substitution) for support of ESF or transparent AMI (Alternate Mark Inversion) for SF

In addition, the MVME Controller accumulates link statistics and supports download of link parameters when the card is activated by the host processor.
The MVME Controller provides support for the HDLC LAPB data link layer protocol used for this interface. A combination of hardware and firmware communication components, resident in the RDA VME subsystem, supplies the data link protocol management described further in section 4.

3.2.1.3 Channel Service Unit (CSU)

A CSU is required to interface the MVME controller with either the private or commercial T1 link. For the MLOS configurations, a CSU may or may not be required between the MVME controller and the MLOS radio transceiver. It is dependent on distance between the equipment, site specific grounding considerations, and surge suppression requirements.

3.2.2 RPG Component Description

3.2.2.1 Polycom Gateway

The Polycom gateway is a programmable serial communications controller, which supports an Ethernet local area network (LAN) connection and integrated T1 CSU. The gateway supports a unique GFE firmware image, which supports translation between TCP/IP over the LAN interface and LAPB over the serial T1 CSU interface. There are several variations of the firmware image, which account for site specific differences in T1 line encoding and line build out (LBO).

3.2.3 RDA to RPG Microwave Link Components

3.2.3.1 Line of Sight Transceiver

The Microwave line-of-sight transceiver provides full duplex communications at 1.544 megabits/second over a microwave link. Up to two links fit in a standard 19" radio rack. Each link occupies 28" in height in the rack.
The equipment has three power levels for various distance transmissions, +20, +27, and +32 dBm. The receiver has a sensitivity of -86 dBm at a bit error rate of 10-6, and has a dynamic range of 50 dB. The microwave line-of-sight radio mounts in its own radio rack at each site.

3.2.3.2 Antenna

The microwave antenna is typically a 6 foot diameter dish. Other types are available depending upon the distance of the link and the environment. The antenna is designed so that a second link may use the same antenna by transmitting with an orthogonal polarization. Coaxial cable is required to connect the microwave transceiver to the microwave antenna.

3.2.3.3 Power Supply

A -48 VDC to -24 VDC power supply is required to power the microwave radio equipment. The microwave link power supply supports one link and can provide up to 5.8 amps.

3.3 Recommended Manufacturers

Component	FSCM*	Vendor
Motorola MVME Controller (MVME-381-01)	57761	Motorola, Inc. Computer Group Technical Systems Division 2900 So. Diablo Way Tempe, AZ 85282
Microwave Line-of-Sight Radio	N/A	Harris Corporation Farinon Division 1691 Bayport Ave. San Carlos, CA 94070 URL: http://www.harris.com/communications/
Power Supply	N/A	Lambda Electronics, Inc. 515 Broadhollow Rd Melville, New York 11747-3700 URL: http://www.lambdapower.com/
Microwave Antenna MLOS Radio Coax Cable	80203	Gabriel Electronics Corporation P.O. Box 70 Scarborough, ME 04070-0070 URL: http://www.gabrielnet.com/
CSU (RDA) TxPort 1544		TXPORT, Inc. 127 Jetplex Circle Madison, Alabama 35758 URL: http://www.txport.com
Polycom Gateway		Polycom URL: http://www.ace360.com

* FSCM - Federal Supply Code for Manufacturers

4 RDA TO RPG PHYSICAL LAYER

4.1 Applicable Standards

The applicable physical layer standard is ANSI T1.403.

4.2 Communications Medium

The medium consists of copper wire cable, microwave, or private/commercial T1 as shown in functional diagram of section 3.1.1.

The direct connected cable consists of a twisted shielded pair compatible with the 100 ohm impedance used by the DSX-1 cross connect standard interface. The maximum wire length is 650 feet. Two twisted shielded pairs are required for full duplex operation.

A short wire cable, to a maximum of 50 feet, is used to connect the MVME to the CSU. This cable has the same characteristics as the as the direct connect DSX-1 wire.

4.2.1 Link Characteristics

The phsical layer settings for the RDA VME card are given in Appendix A.

The interface is designed to accommodate communication links having the following characteristics:

Link	Wire, MLOS, Private/Commercial T1
Type	Full Duplex
Rate	1.544 Mbs
Timing	Synchronous

4.2.2 Transfer Rate

The estimated transfer rates for the RDA to RPG interface are tabulated below. The estimates only include radial data transfer during operational VCPs. There is an estimated minimum, average, and maximum transfer rate for each VCP, as applicable. Omitted in estimates is the additional payload of status data. The estimated maximum is based on a worse case possible future VCP, which is subject to the limitation of the maximum rated antenna rotation speed. The estimate may be less depending on how efficient the packaging of radial data is into the 4096 byte frame.

The LAPB frame size for radial data consists of 2400 bytes of radial data + 16 bytes of message header + 12 bytes of data with no significance + 5 bytes of data for LAPB frame overhead. See the description of messages from RDA to RPG for more information on the 12 bytes with no significance.

VCPs	Antenna Scan Rate (RPM)	Antenna Scan Rate (RPS)	1 Rev / Beamwidth (360°/.95 °)	Frames / Sec	Radial Frame Size (2433 bytes * 8 bits/byte)	Bits / Sec
VCP 31	0.84	0.01	378.95	5.31	19464	103,262
VCP 32 Min	0.68	0.01	378.95	4.29	19464	83,593
VCP 32 Avg	0.75	0.01	378.95	4.71	19464	92,198
VCP 32 Max	0.83	0.01	378.95	5.24	19464	102,032
VCP 21 Min	1.86	0.03	378.95	11.75	19464	228,651
VCP 21 Avg	2.02	0.03	378.95	12.73	19464	248,320
VCP 21 Max	2.40	0.04	378.95	15.16	19464	295,033
VCP 11 Min	2.69	0.04	378.95	16.99	19464	330,683
VCP 11 Avg	3.57	0.06	378.95	22.58	19464	438,862
VCP 11 Max	4.28	0.07	378.95	27.03	19464	526,143
Estimated Max.	6	0.10	378.95	37.89	19464	737,583

4.3 RDA Mechanical Connection Description

The cable assembly from the MVME controller terminates at the RDA I/O panel with a D-type DB-15P (Female) connector with the following pin out:

Pin 1 — Transmit (TIP)
Pin 9 — Transmit (RING)
Pin 3 — Receive (TIP)
Pin 11 — Receive (RING)
Pins 2 and 4 — Chassis

4.4 RPG Mechanical Connection Description

The cable assembly from the Polycom Gateway terminates at the RPG I/O panel with a modular RJ-48C to DB 15 (female) connector with the following pin out:

Pin 2 — Receive (RING)
Pin 10 — Receive (TIP)
Pin 9 — Transmit (TIP)
Pin 1 — Transmit (RING)
Pins 3, 6 to 8, and11 to 15 — Not Connected

5 RDA TO RPG DATA LINK LAYER

In this section, stations may be referred to as host RDA (configured as logical DCE) or RPG (configured as logical DTE). Frames are abbreviated as [Command or Response/ADDRESS] COMMAND/RESPONSE(Poll/Final/0/1/X). If an address value is given, it is assumed the RDA station is address X'01' and the RPG station is X'03'.

The Data Link Layer protocol settings such as timers and counters as set for the RDA are given in Appendix A.

5.1 Applicable Standards

The RDA/RPG data link level communications conforms to CCITT Recommendation X.25. This protocol provides procedures for:

- Logical establishment and disconnection of communications links
- Data insensitive (transparent) link data transmission
- Error detection and recovery from data transmission errors
- Enhancement of link capabilities

The following sections provide frame structure, station descriptions, logical states and modes, and logical configurations. Applicable sections of CCITT Recommendation X.25 appear in this document as X.25 {#.#} where #.# is an X.25 section number.

5.2 Media Access Control

5.2.1 Class of Procedure

NEXRAD RDA, RPG/Base Data User interface links utilize the Link Access Procedure, Balanced (LAPB) under Single Link Procedures (SLP) defined in X.25 {2.1}.

5.2.2 Balanced Configuration

NEXRAD RPG, and RDA function in a balanced configuration (X.25{2.1.4}), connected point-to-point. In a balanced configuration, either station may transmit and receive, command and response frames. Stations have compatible data transfer and link control capability.

5.2.3 Asynchronous Balanced Mode

While in Information Transfer State (ITS), NEXRAD stations operate in Asynchronous Balanced Mode (ABM). ABM grants stations the freedom to asynchronously (without remote station permission) initiate transmission of all balanced configuration command frames. This allows both stations to transfer information or indicate status without a poll cycle delay.

5.2.4 Asynchronous Disconnect Mode

NEXRAD stations use Asynchronous Disconnect Mode (ADM) while in the Logically Disconnected State (LDS). ADM is a non-operational mode in which a station is logically disconnected from the link. In ADM, a station may not transmit or receive information.

5.3 Frame Structure and Transmission

The NEXRAD Data Link frame structure is as defined in X.25 {2.2}. The following sections describe the frame structure and specify transmission characteristics.

5.3.1 Frame Field Definition

All commands, responses and information transferred between stations are binary codes conveyed within a frame. The link frame size range (not including flags) is from 4 to 4100 bytes. The longest information field within a frame is 4096 bytes. The actual frame size (not including flags) is: {4096 byte buffer + [A field (1) + C field (1) + FCS (2)] = 4100 bytes. Messages of length greater than 4100 bytes are broken into smaller information frames. An illustration of the frame structure is presented below.

Data Link Level Frame Structure

← Frame →

F	A	C	INFO	FCS	F

→ Byte ←

F = FLAG SEQUENCE
A = ADDRESS FIELD
C = CONTROL FIELD
INFO = INFORMATION FIELD (OPTIONAL)
FCS = FRAME CHECK SEQUENCE

Each I-frame has a control field containing sequentially-numbered send, N(s) and receive, N(r) variables. These sequence numbers range from 0 to 7, modulo 8. Sequence numbers are reset upon entrance to ITS (Information Transfer State) and incremented as defined in section 4.2.4.2.
All synchronous NEXRAD communication frames (here specified in X.25 {2.2}) must conform to the following structure:

F , A , C , [I ,] FCS , F

where:

F = Flag Sequence
A = Address Field
C = Control Field
I = Information Field
FCS = Frame Check Sequence

All transmissions are in frames containing three required fields: the address field (A-field), control field (C-field), and frame check sequence (FCS). The information field (I-field) is optional and may be used for information frames (I-Frame) and frame reject response frames (FRMR). I-frame I-fields are variable length and may be transmitted between the C-field and FCS. A leading and trailing flag sequence marks the start and end of each frame.

The control field indicates whether a frame is a command or a response. The format for the command control field and response control field are given below.

Control Field Poll/Final Bit Setting Format for Command/Response
Control Field Poll/Final Bit Setting Format for Command/Response

COMMAND
(Control Field 1 byte)

				P			

1=Poll
PRIMARY/COMBINED STATION
COMMAND FRAME TRANSMISSIONS

RESPONSE
(Control Field 1 byte)

				F			

1=Final
SECONDARY/COMBINED STATION

NOTE: First bit transmitted is from left.

5.3.1.1 Address Field

The address field contains the link address of a local (response frame) or remote (command frame) station.

5.3.1.1.1 Addressing

Two stations in a balanced configuration must have different station addresses. The RDA normally uses a single octet link address of X'01'. The RPG assigns link address X'03' to their stations and send commands to address X'01'(RDA).
In a balanced configuration, the link address is used to distinguish between command and response frames. Command frames carry the address of the remote (destination) station. Response frames include the address of the local (transmitting) station.

5.3.1.2 Control Field

The control field contains a command or response control code. Sequence numbers are included within the C-field of numbered commands and responses. The C-field length is 1 byte (8 bits) for normal control and 2 bytes for extended control. The send and receive variables N(s) and N(r) contain 3 bits for normal control and 7 bits for extended control. This interface will only use normal control. Section 5.3.2 provides details on commands and responses. The normal control fields used in NEXRAD communications are as follows:
Information Transfer:

	8 7 6	5	4 3 2	1
I	N(r)	P	N(s)	0

Supervisory:

	8 7 6	5	4 3 2 1
RR	N(r)	P/F	0 0 0 1

	8 7 6	5	4 3 2 1
REJ	N(r)	P/F	0 1 0 1

	8 7 6	5	4 3 2 1
RNR	N(r)	P/F	1 0 0 1

Unnumbered:

	8 7 6	5	4 3 2 1
SABM	0 0 1	P	1 1 1 1

	8 7 6	5	4 3 2 1
DISC	0 1 0	P	0 1 0 1

	8 7 6	5	4 3 2 1
UA	0 1 1	F	0 0 1 1

	8 7 6	5	4 3 2 1
DISC	0 1 0	P	0 1 0 1

	8 7 6	5	4 3 2 1
FRMR	1 0 0	F	0 1 1 1

	8 7 6	5	4 3 2 1
DM	0 0 0	F	1 1 1 1

5.3.1.3 Frame Check Sequence (FCS)

For error detection purposes, all frames include a 16-bit FCS just prior to the closing FLAG. The contents of the A,C and I-fields are used to calculate the FCS.

The transmission integrity of each received frame is judged by examination of the frame check sequence (FCS). The FCS is the remainder of a cyclic redundancy checking, modulo-2 division, using the CCITT V.41 generator polynomial (x**16 + x**12 + x**5 + 1) as a divisor. The FCS within each frame is the 16-bit version specified in X.25 {2.2.7}. A transmitting station generates an FCS based on the A,C and I-field bit stream (excluding ones inserted for transparency). The FCS is then transparently transmitted prior to the trailing FLAG. The receiving station computes FCS of the incoming frame. When a trailing FLAG is received, the receiving station has already included the incoming FCS in its calculation.

5.3.1.4 Flag Field

A flag sequence (FLAG) is a unique succession of bits used to delimit frames. All frames start and end with the flag sequence consisting of one 0 bit followed by six contiguous 1 bits followed by one 0 bit (binary '01111110'). One flag sequence may be used as both a closing flag for one frame and an opening flag for the next frame. Stations will also transmit contiguous 8-bit flag sequences as inter-frame time fill.

5.3.1.4.1 Frame Separation

Frame transmissions are separated by at least one FLAG. A closing flag may be used to open the next frame. Inter-frame time is handled by transmitting continuous FLAGs. There is no upper limit to the number of FLAGs that may be transmitted between frames.

5.3.1.4.2 Transparency

FLAGs are not permitted to appear within a frame's A-field, C-field, I-Field, or FCS. Zero Bit Insertion / Deletion (ZBID) is used to code these fields such that, regardless of field data, a FLAG will never occur within a frame. When transmitting, the frame fields between flags is examined, a zero is inserted after 5 contiguous 1 bits. When receiving, a zero following 5 contiguous 1 bits is discarded. This technique ensures frame transparency.

In NEXRAD, to meet standard T1 system equipment requirements for 1's density (1's are needed to recover synchronization information from the data stream at receivers) an inverted High-Level Data Link Control (HDLC) procedure is performed as follows:

- A standard Zero Bit Insertion is performed.
- The entire data stream is inverted (ensuring one's density).

Therefore, a hexadecima1 value of X'05' is actually transmitted as X'FA'. A receiving station must invert the received data stream and perform a Zero Bit Deletion.

5.3.2 Commands and Responses

X.25 Section 2 functionally defines a set of commands and responses for controlling link operation. The particular subset used for synchronous NEXRAD communications consists of the basic repertoire for an ISO balanced class of procedures (X.25 {2.3.4}). The resulting set of commands and responses is summarized below.

FORMAT	COMMAND	RESPONSE
Information (I)	[I] Information	N/A
Supervisory (S)	[RR] Receiver Ready	[RR] Receiver Ready
	[RNR] Receiver Not Ready	[RNR] Receiver Not Ready
	[REJ] Reject	[REJ] Reject
Unnumbered (U)	[SABM] Set Asynchronous Balanced Mode	[UA] Unnumbered Acknowledgment
	[DISC] disconnect	[DM] Disconnect Mode
		[FRMR] Frame Reject

5.3.2.1 Information (I) Command / Response

The function of the I-frame is to transfer sequentially numbered frames containing an I-field to the other station. I-frames are only transmitted while in Information Transfer State (ITS). ITS is described in Section 5.4.2.

5.3.2.2 Receiver Ready Command / Response

The RR supervisory frame is used by a NEXRAD station to:

- Indicate it is ready to receive an I-frame
- Acknowledge previously received I-frames numbered up to and including N(r)-1
- Respond to an I-frame or RR which had the poll bit set
- Indicate clearance of a busy condition reported by earlier transmission of an RNR
- Request status by setting the poll bit

5.3.2.3 Receiver Not Ready (RNR) Command / Response

The RNR supervisory frame is used to indicate a busy condition (see Section 5.6.1). I-frames numbered up to and including N(r)-1 are acknowledged. I-frames numbered N(r) and any subsequent I-frames are not acknowledged. The acceptance status of subsequent I-frames is indicated by subsequent S-frames or I-frames.

The RNR frame may be used, with poll bit set, to query a remote station of its status.

5.3.2.4 Reject (REJ) Command / Response

The REJ supervisory frame is used to request retransmission of I- frames, starting with the frame numbered N(r). Unacknowledged I-frames numbered N(r)-1 and below are acknowledged.

The REJ frame may be used to indicate the clearance of a busy condition reported by the earlier transmission of an RNR frame. Additionally the REJ frame may be used, with poll bit set, to query a remote station of its status (recommended are I, RR or RNR). Only one REJ exception condition for a given direction of information transfer may be established at any time.

5.3.2.5 Set Asynchronous Balance Mode (SABM) Command

The SABM unnumbered command is used to place the addressed station in Asynchronous Balanced Mode (ABM), where all control fields are one byte in length (normal control). The receiving station confirms acceptance of SABM by immediately transmitting UA and entering ITS. The sending (SABM) station enters ITS upon receipt of UA. The SABM/UA exchange cause both stations to initialize (0) their send and receive variables. SABM may also be used as a response to receiving an unimplemented command.

The SABM may be used in LDS for link set-up, or in ITS for link reset. In the latter case, previously unacknowledged I-frames remain unacknowledged. It is recommended that the poll bit in the SABM control field always be set.

5.3.2.6 Disconnect (DISC) Command

The DISC unnumbered command is used by a station to inform the remote station of operation suspension. Acceptance of the DISC is confirmed by immediately transmitting UA or DM which upon receipt causes the station that sent the DISC command to enter LDS. Any previously unacknowledged I-frames remain unacknowledged. It is recommended that the poll bit in the DISC control field always be set.

5.3.2.7 Unnumbered Acknowledgment (UA) Response

The UA unnumbered response is used to acknowledge the receipt and acceptance of unnumbered commands. Action on unnumbered commands is not taken until transmission of UA. If the acknowledged unnumbered command had poll bit set, the UA response should have the final bit set.

5.3.2.8 Disconnected Mode (DM) Response

The DM unnumbered response is used to report status where a station is in the LDS. While in LDS any command, other than SABM, with the poll bit set should be acknowledged by transmission of DM with the final bit set to 1.

5.3.2.9 Frame Reject (FRMR) Response

The FRMR unnumbered response is used to report an error condition not recoverable by retransmission of the identical frame (see Section 5.6.4).

The basic information field, which immediately follows the control field and consists of 3 bytes, is returned with this response to provide the reason for frame rejection (X.25 {2.3.4.9}).

5.4 Data Link Operational States

Any physically connected and logically active RDA/RPG link will conduct communications in two logical states; Logically Disconnected State (X.25 {2.4.4.4}, or Information Transfer State (X.25 {2.4.4.2}). The following subsections of this document define the logical states and describe state transitions.

5.4.1 Logically Disconnected State (LDS)

While in LDS, a station is logically disconnected from the link and may not transmit or receive any information or supervisory frames, but may transmit a SABM command to initiate data link setup procedures. The response capability of a station in LDS is limited to accepting a mode setting command (SABM or DISC) and transmitting an appropriate UA or [DM] response at any respond opportunity.

Upon achieving physical connection to the RDA station, the RPG station may initially find the RDA host in the LDS. In LDS, a logical DCE station will respond to [01]SABM(P) with [01]UA(F) and reset its send and receive variables. When addressed and polled with any other command ([01]CMD(P)), the station will respond [01]DM(F). The remote station (logical DTE) transmits the proper mode-setting command, [01]SABM(P), to set up the link and enter Information Transfer State (ITS). X.25 {2.4.4.1} provides more detailed link setup procedures.

Any of the following events may cause the RDA station to enter the LDS:

- station is turned on
- station recovers from a power interruption
- station becomes logically active by software request
- station becomes logically active by operator request
- station receives DISC command (ITS -> LDS)
- station status timer (T1 and retry limit N2) expires (ITS -> LDS)

5.4.2 Information Transfer State (ITS)

While in ITS, a station may transmit and receive information and control frames. The stations conduct information transfer as defined in X.25 {2.4.4.2}. A host station will achieve a state transition from LDS to ITS upon the successful transmission of [01]UA(F) in response to [01]SABM(P). The remote station should enter ITS upon reception of [01]UA(F) in response to a [01]SABM(P) transmission.

While entering ITS, a station must initialize (0) its send sequence number N(s), receive sequence number N(r), consecutive poll time-out count and consecutive I-frame retransmission count. The first I-frame has N(s) = 0. Send sequence numbers for subsequent I-frames are incremented by 1, modulo 8 (e.g., N(0), N(1), N(2)...N(7), N(0)...). A receiving station acknowledges I-frames by transmitting a numbered frame with control N(r) equal to the next expected I-frame N(s) (e.g., [C]I(X){0,X} is acknowledged by [R]RR(X){1} or [R](X){X,1}).

When in ITS, the stations may use the following commands and responses for the purposes described:

Command/Response	Explanation
[C]I(X)N(s)N(r)	Transfer of sequentially numbered frames containing information fields as specified in Section 4.2.
[C/R]RR(X)N(r)	Acknowledgment of successful reception of I-frame(s) or status polling
[C/R]RNR(X)N(r)	Report and recovery from exception as defined in Section 4.1.6
[C/R]REJ(X)N(r)	
[C]SABM(P)	
[R]FRMR(X)N(s)N(r)<I-field bits>	
where: <I-field bits>	are bit settings contained within the INFO field defined in Section 5.3.1. The location and meaning of the information field bits are defined in Table 7/X.25. X - Don't Care

5.5 Timers

The data link level procedures (LAPB) of X.25 provides for 3 general purpose timers, namely T1 (X.25 {2.4.8.1}), T2 (X.25 {2.4.8.2}) and T3 (X.25 {2.4.8.3}). These timers in conjunction with a retry-count limit N2 (X.25 {2.4.8.4}) are used extensively in data link setup (X.25 {2.4.4.1}), information transfer (X.25 {2.4.4.2}), during data link disconnect (X.25 {2.4.4.3}) and while in the disconnect state (X.25 {2.4.4.4}). An outline of each timer along with the default values used in NEXRAD is given in the following subsections. Timer expiration values are modifiable for the RDA during operating system generation. Timer expiration values are modifiable for the RPG in configuration files.

5.5.1 Frame Unacknowledged Timer (T1)

The NEXRAD Frame Unacknowledged Timer indicates the amount of time which may elapse before retransmission of a frame is initiated. If the timer expires the frame is retransmitted and a retry-count variable is incremented. If the retry-count reaches the maximum, N2, the NEXRAD host will execute the data link reset procedure described in X.25 {2.4.7.2}.

The NEXRAD Frame Unacknowledged Timer has a default value of 3 seconds. The default value for the N2 retry limit is 3.

5.5.2 Frame Acknowledge Timer (T2)

The Frame Acknowledge Timer indicates the maximum amount of time available before an acknowledgment frame must be initiated, in order to ensure its receipt before the remote station's T1 expires.

The NEXRAD Frame Acknowledge Timer has a default value of 1 second.

5.5.3 Long Idle Timer (T3)

The Long Idle Timer indicates the amount of time before an observed excessively long idle channel state condition is passed to application software. Expiration of this timer will cause a data link reset procedure to be executed as defined in X.25 {2.4.7.2}.

The NEXRAD Long Idle Timers has a default value of 30 seconds.

5.6 Exception Condition Reporting and Recovery

All synchronous NEXRAD stations are capable of recovery from exception conditions resulting from transmission, station malfunctions, and operational situations. The definition of these conditions and their recovery procedures are described in the following subsections.

5.6.1 Busy Condition

A busy condition occurs when a station cannot receive, or continue to receive, information frames. A station busy condition is reported by transmission of [C/R]RNR(X){r} (X.25 {2.3.5.1}). An indication that the busy condition has cleared is communicated by transmission of [C/R]RR(X){r}, [R]REJ(X){r}, [C]SABM(X) or [R]UA(X) (only in response to SABM).

A NEXRAD station will experience a busy condition when its percent of buffers available falls below the ready/busy threshold. The busy host will change its status to ready upon reclamation of enough buffers to boost its buffer availability percentage above the busy/ready threshold. If no responses are pending, a NEXRAD host will indicate a busy/ready transition by transmitting [C]RR(P){r}.

When a remote's busy condition is detected, the NEXRAD host will complete transmission of the current frame, respond if necessary, and cease further transmission of I-frames. The remote station should respond [R]RNR(F){r} if busy and able to transmit. If ready, the remote station should respond to poll with [R]RR(F){r}. A remote station, whose busy condition has been cleared and has not yet been polled, may transmit [C]RR(X){r} to indicate its ready status.

5.6.2 Sequence Error

A sequence error occurs when a station receives an uncorrupted I-frame with an N(s) value not equal to receiving station's N(r) variable. A sequence exception may result from a transmission error (bad FCS) on a previous I-frame.

A station detecting a sequence error must not acknowledge (increment its N(r) variable) and must discard the I-field portion of the I-frame or any subsequent I-Frames until an I-frame with the correct N(s) is received, although it will accept control information received in the N(r) field and the poll/finale bit of such frames to perform data link control functions (X.25{2.3.5.2}).

Retransmission of lost or errored I-frames is initiated by the expiration of the frame unacknowledged timer (T1, Section 4.2.5.1) or use of rejection recovery. Upon receipt of an I-frame with N(s) <> local N(r), a NEXRAD host will immediately transmit [C/R]REJ(X){r} and note the existence of a sequence exception. Outstanding I-frames numbered N(r)-1 and below are acknowledged. Only one sequence exception for a given direction of information may be established at any time.

The presence of N(r) in REJ permits the station that has detected the sequence error to inform the transmitting station of its next expected I-frame N(s). The station receiving a REJ frame should sequentially retransmit I-frames starting with the I-frame N(s) equal to N(r) in the received REJ.

5.6.3 Frame Check Sequence (FCS) Error

A frame with an FCS error, which is received by the receiving station must be discarded by the receiving station. The receiving station should not act on any frame with an FCS error because no portion of such a frame may be considered reliable. Rejection of the frame is implied by the receiving station's failure to take action, thus causing the transmitting station's unacknowledged timer (T1) to expire. Failure to act will indirectly cause explicit rejection of subsequent I-frames if the FCS-errored frame was an I-frame (due to sequence error).

Note: NEXRAD stations keep an internal account of each frame type received and transmitted during a session. Frames received with bad FCS are accounted for separately and used to dynamically estimate physical link quality.

5.6.4 Frame Rejection

A frame reject exception condition is established upon receipt of an error-free frame (good FCS) which creates an error condition that is not recoverable by retransmission of the identical frame. A NEXRAD host will detect a frame reject error condition upon receipt of a frame with:

- a control field that is invalid or unimplemented
- an I-field which exceeded the maximum established length
- an invalid N(r) - (i.e., an N(r) pointing to a previously transmitted AND acknowledged I-frame, or to an I-frame which has not been acknowledged AND is not the next sequential I-frame pending transmission)
- Receipt of a frame with an information field which is not permitted, or receipt of a supervisory or unnumbered frame with an invalid length

The exception condition will be reported to the remote station by transmission of an [R]FRMR(X) (frame reject, refer to subsection 5.3.2.9) as specified in X.25 {2.3.4.9}.

In the frame rejection condition, I-frames and Supervisory frames will not be transmitted to the remote station. Also, received I-frames and Supervisory frames will be discarded, except for observance of the poll bit set to 1 which will cause retransmission of the FRMR response with the same basic information field as originally transmitted. The frame rejection condition is maintained until receipt of a [C]SABM(P) to reset the data link or a [C]DISC(P) to disconnect, or until the NEXRAD host initiates these commands in the event the remote station does not respond, as specified in X.25{2.4.7.3}.

If an [R]FRMR(X), R[UA](X), or [R]DM(X) is received from the remote station during Information Transfer State, the NEXRAD host will either transmit a [C]SABM(P) to initiate data link resetting procedures itself, or return an [R]DM(X) to request the remote station to do so, as specified in X.25{2.4.6}. After transmitting a DM response, the NEXRAD host will enter the Logically Disconnected State described in section 5.4.1.

5.6.5 Mode Setting Contention

A mode-setting contention situation (also known as a collision) exists when a station issues a mode setting command ([C]SABM(X) or [C]DISC(X)) and, before receiving an appropriate response ([R]UA(X) or [R]DM(X)), receives a mode-setting command from the remote station.

If the send and receive mode-setting commands are the same, both stations should send [R]UA(X) at the earliest opportunity and immediately enter the indicated state according to option 3 of X.25 {2.4.4.5.1}. If the mode-setting commands are different, both stations should enter LDS and respond [R]DM(X) at the earliest opportunity. X.25 {2.4.4.6} and X.25 {2.4.4.7} further define action to be taken in the event of a collision of unnumbered commands.

6 RDA TO RPG NETWORK LAYER

There are no ISO OSI layer 3 characteristics for this interface. The interface is independent of network layer constraints.

7 RDA TO RPG TRANSPORT LAYER

There are no ISO OSI layer 4 characteristics for this interface. The interface is independent of transport layer constraints.

8 RDA TO RPG SESSION LAYER

There are no ISO OSI layer 5 characteristics for this interface. The interface is independent of session layer constraints.

9 RDA TO RPG PRESENTATION LAYER

9.1 Applicable Standard

There is not an applicable standard governing presentation layer formats for the interface.

9.2 Presentation Layer Data Format

The following data formats are referenced in this document:

Byte	One octet or 8 bits of data
Halfword, 2 Bytes	One halfword contains two (8 bit) bytes of data
Integer*2	One halfword of integer data in standard 2's complement format
Integer*4	One fullword (32 bits) of integer data in standard 2's complement format
Integer and Formatted Integer Code	Bit stream of 1s and 0s, represented as an integer number, not in 2's complement format (i.e., 32,768 integer code would represent setting the MSB of a halfword). Normally used to represent bit settings, or when all integer values are to be positive.
Fixed Point Scaled Integer	Integer values with an assumed decimal point whose position is defined by the precision of the item
Real, Real*4, and 32 Bit Floating Point	One fullword (32 bits) of real data, where the MSB is the Sign-bit, followed by a 7 bit Exponent and a 24 bit Mantissa.

10 RDA TO RPG APPLICATION LAYER

10.1 Operating Procedures

The data messages to be transferred between the RDA and the RPG are listed in Table I. A message header of format specified in Table II is attached to each message transmitted across the link.

Table I Data Message Types

Type	Description	Source	Recipient	Format
1	Digital Radar Data	RDA	RPG	Table III
2	RDA Status Data	RDA	RPG	Table IV
3	Performance/Maintenance Data	RDA	RPG	Table V
4	Console Message	RDA	RPG	Table VI
6	RDA Control Commands	RPG	RDA	Table X
7	Volume Coverage Pattern	RPG	RDA	Table XI
8	Clutter Censor Zones	RPG	RDA	Table XII
9	Request for Data	RPG	RDA	Table XIII
10	Console Message	RPG	RDA	Table VI
11	Loop Back Test	RDA	RPG	Table VIII
12	Loop Back Test	RPG	RDA	Table VIII
13	Clutter Filter Bypass Map	RDA	RPG	Table IX
14	Edited Clutter Filter Bypass Map	RPG	RDA	Table IX
15	Clutter Filter Notch Width Map	RPG	RDA	Table XIV
16	Reserved / FAA RMS Only	N/A	N/A	N/A
17	Reserved/FAA RMS Only	N/A	N/A	N/A
18	Reserved/RAA RMS Only	N/A	N/A	N/A
20	Console Message	RDA or RPG	Base Data User	Table VI
21	Console Message	Base Data User	RDA or RPG	Table VI
22	Loop Back Test	RDA	Base Data User	Table VIII
23	Loop Back Test	Base Data User	RDA	Table VIII

10.1.1 Messages from RDA

Per Table I, data transmitted from the RDA to the RPG consists of RDA Status Data, Digital Radar Data, RDA Performance/Maintenance Data, Console Messages, Loop Back Test and Clutter Filter Bypass Map.

Digital Radar Data format is given in Table III, RDA Status Data format is given in Table IV, RDA Performance/Maintenance Data format is given in Table V, Console Message format is given in Table VI, Loop Back Test format is given in Table VIII, and Clutter Filter Bypass Map format is given in Table IX.

The RDA sends 2 bytes, followed by the ICD format message, followed by 10 bytes to the RPG. The leading 2 bytes and trailing 10 bytes have no significance. The 10 bytes is accounted for in the in the message size given in the message header. The additional 12 bytes do not contain valid data. At the RPG end, the communications manager (RPG software task) inserts an additional 10 bytes to the ICD format message and discards the 10 trailing bytes. The communications manager also inserts a communications manager header to the message, and then the message is sent to the RPG ingest

application. This is also the same information, which is sent to the Base Data Distribution System (BDDS) processor.

10.1.2 Messages from RPG

Per Table I, data to be transmitted from the RPG to the RDA consists of RDA control Commands, Volume Coverage Patterns, Clutter Censor Zones, Request for Data, Loop Back Test, Edited Clutter Filter Bypass Map, and Console Messages. RDA Control Command format is given in Table X, Volume Coverage Pattern format is given in Table XI, Clutter Censor Zones format is given in Table XII and Request For Data format is given in Table XIII.

Within the RPG application, the messages to RDA consist of a communications manager header (24 bytes), Channel Terminal Manager (CTM) header (12 bytes), followed by the message data, which conforms to the RDA/RPG ICD for that particular message. The communications manager strips off its header and 10 (of the 12) bytes of CTM header. The transmitted message to the RDA will then consist of the RDA/RPG ICD format message (i.e., message header followed by message data) followed by a 2 byte word. There is no significance to the 2 bytes.

10.1.3 Messages to/from Base Data User

Per Table I, data transmitted from the RDA to the Base Data User consists of: RDA Status Data, Digital Radar Data, and Console Messages. Data transmitted from the RDA to the Base Data User also includes the Loop Back Test Message. Data transmitted to the RDA from the User consists of: Console Messages and Loop Back Tests. Data transmitted to the RPG from the BDDS User consists of the Console Message only.

The RDA to Base Data User sends 2 bytes, followed by the ICD format message, followed by 10 bytes to the Base Data User. The leading 2 bytes and trailing 10 bytes have no significance. The 10 bytes is accounted for in the in the message size given in the message header. The additional 12 bytes do not contain valid data.

10.2 Message Descriptions

The following sections define the message formats exchanged via this interface.
The maximum number of halfwords to be transferred at one time is 1208 halfwords (2416 bytes), including the Message Header of Table II. Messages with a length greater than 1208 halfwords are divided into segments of 1208 halfwords or less. The Message Header of each segment contains both the total number of segments in the entire message and the individual segment number. For messages with length of 1208 halfwords or less, the number of message segments is one, and the individual segment number is not applicable.

10.2.1 Digital Radar Data

Digital Radar Data Message format is shown in Table III. This message consists of the actual base data sent from the RDA to RPG or from the RDA (or RPG) to the Base Data User(s), namely: reflectivity, mean radial velocity, and spectrum width data. The frequency and volume of data are dependent on the antenna scanning strategy employed and the type of digital radar data being sent.

10.2.2 Status Data Message

RDA status data is shown in Table IV. The message reflects the current state and operating status of the RDA. Alarms contained in this message are summarized in Table IV-A. The message is sent following status change within the RDA or upon request by the RPG and is at least as periodic as once per volume scan.

10.2.3 Console Message

The console message format is shown in Table VI. This message is an ASCII text message for operator terminal communications between the RDA and RPG. In addition, console messages may

be exchanged between the RDA (or RPG) and their respective Base Data User. The console message is sent upon operator command.

10.2.4 Loop Back Test Message

The Loopback Test Message is shown in Table VIII. Loopback is optional in the RDA to Base Data User Interface as specified by RDA adaptation data.

Table II Message Header Data

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	BYTE LOCATION
Message Size	Message size in halfwords (1)	Integer	Halfwords	10 to 1028	1	0 and 1
RDA Redundant Channel	RDA Channel No. for redundant channel configuration (not defined for other configurations	Integer	ID Number	1 to 2; 1= RDA1 2=RDA2	1	2
Message Type	Integer code from Table I	Integer	N/A	1 to 4; 6 to 15 20 to 23	N/A	3
I.D. Sequence Number	Message Sequence Number	Integer	ID Number	0 to 32,767 then roll over to 0	1	4 and 5
Julian Date	Julian Date - 2440586.5 (2)	Integer	Days	1 to 65,535	1	6 and 7
Milliseconds of Day	Number of milliseconds from Midnight, Greenwich Mean Time	Integer	Milliseconds	0 to 86,399,999	± 2000/ ± 1	8 to 11
Number of Message Segments	Message larger than 1208 halfwords are segmented and transmitted separately	Integer	Segments	1 to 32,767	1	12 and 13
Message Segment Number	Segment number of this message	Integer	Segment ID Number	1 to 32,767	1	14 and 15

(1) This is the message size for this message segment, not for the total of all segments in the message.
(2) 1 January 1970 00.00 Greenwich Mean Time = 1 Modified Julian Date.

Table III Digital Radar Data (Message Type 1)

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	BYTE LOCATION
Time	Zulu reference time at which radial data was collected	Integer, 4 bytes	millisecond	0 to 86,399,999	± 2000/ ± 1	0 and 3
Modified Julian Date	Current Julian date - 2440586.5(1)	Integer, 2 bytes	Day	1 to 65,535	1	4 and 5
Unambiguous Range	Unambiguous range, Interval Size	Integer, 2 bytes(2)	Km	115 to 511	± 0.1/ ± 0.1	6 and 7
Azimuth Angle (3)	Azimuth angle at which radial data was collected	Integer, (4), 2 bytes	Deg.	0 to 359.956055	± 0.1°/ ± 0.043945°	8 and 9
Azimuth Number (3)	Radial number within elevation cut	Integer, 2 bytes	Count	1 to 400	1	10 and 11
Radial Status	Radial Status (e.g. first, last)	Integer, (5), 2 bytes	N/A	N/A	N/A	12 and 13
Elevation Angle (6)	Elevation angle at which radial radar data was collected	Integer, (4) bytes	Deg.	353 to 70	± 0.1°/ ± 0.043945°	14 and 15
Elevation Number (6)	Elevation number within volume scan	Integer, 2 bytes	Count	1 to 25	1	16 and 17
Surveillance Range	Range to center of first surveillance gate (BIN)	Integer (2) , (7) , 2 bytes	Km	-32,768 to +32,768	± 0.05/ ± 0.001	18 and 19
Doppler Range	Range to center of first Doppler gate (BIN)	Integer (2) , 7) , 2 bytes	Km	-32,768 to +32,768	± 0.05/ ± 0.001	20 and 21
Surveillance Range Sample	Size of surveillance sample interval	Integer (2) , (7) , 2 bytes	Km	0.25 to 4	± 0.05/ ± 0.001	22 and 23

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	BYTE LOCATION
Interval						
Doppler Range Sample Interval	Size of Doppler Sample Interval	Integer Ref (2) , Ref (7) , 2 bytes	Km	0.25 to 4	± 0.05/ ± 0.001	24 and 25
Number of Surveillance Bins	Number of surveillance bins for current radial	Integer, 2 bytes	Count	0 to 460	1	26 and 27
Number of Doppler Bins	Number of Doppler bins for current radial	Integer, 2 bytes	Count	0 to 920	1	28 and 29
Cut Sector Number	Sector Number within cut	Integer, 2 bytes	Count	1 to 3	1	30 and 31
Calibration Constant (SYSCAL)	Scaling constant used by PS to calculate reflectivity	32 bit floating point	dB	-50.0 to +50.0	± 1/ N/A	32 to 35
Surveillance Pointer	Pointer to first location of surveillance data in radial	Integer, 2 bytes	BYTE	100 (8)	1	36 and 37
Velocity Pointer	Pointer to first location of, velocity data in radial	Integer, 2 bytes	BYTE	100 to 560 (8)	1	38 and 39
Spectral Width Pointer	Pointer to first location of spectral width data in radial	Integer, 2 bytes	BYTE	100 to 1480(8)	1	40 and 41
Doppler Velocity Resolution	Indicates scaling used for Doppler Velocity	Integer 2 = 0.5m/s 4 = 1.0m/s	N/A	N/A	N/A	42 and 43
Volume Coverage Pattern Number	Identifies Volume Coverage Pattern being used	Integer, 2 bytes	N/A	1 to 767	1	44 and 45

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	BYTE LOCATION
Spare	Reserved for use by V + V Simulator (CPCI 24)					46 and 53
Archive II Surveillance Pointer	Pointer to first location of surveillance data in radial, used for Archive II	Integer, 2 bytes	BYTE	100	1	54 and 55
Archive II Velocity Pointer	Pointer to first location of velocity data in radial, used for Archive II	Integer, 2 bytes	BYTE	100 to 560	1	56 and 57
Archive II Spectral Width Pointer	Pointer to first location of spectral width data in radial, used for Archive II	Integer, 2 bytes	BYTE	100 to 1480	1	58 and 59
Nyquist Velocity	Nyquist Velocity	Fixed Point Scaled Integer, 2 Bytes	m/s	5.00 to 327.67	± .003/ ± .01	60 and 61
ATMOS	Atmospheric Attenuation Factor	Fixed Point Scaled Integer, 2 Bytes	dB/Km	-.02 to -.002	± .004/ ± .001	62 and 63
TOVER	Threshold parameter which specifies the minimum difference in echo power between two resolution cells for them not to be labeled "overlayed"	Fixed Point Scaled Integer, 2 Bytes	dB	0.0 to 20.0	± .1/ ± .1	64 and 65
Radial Spot Blanking Status	Spot blanking status for current radial, elevation cut and volume scan.	Integer, 2 Bytes (9)	N/A	1=radial 2=elevation 4=volume	N/A	66 and 67

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	BYTE LOCATION
Spare	Undefined (for future expansion)					68 and 99
Reflectivity	Weather radar surveillance data (0 to 460 Cells)	(10)Fixed Point Scaled Integer, 1 Byte (11)	dBz	-32 to +94.5	± 1/ ± 0.5	100 to 559
Doppler Velocity	Weather radar velocity data (0 to 920 Cells)	(10)Fixed Point Scaled Integer, 1 Byte (11)	m/s	-63.5 to +63 -127 to 126	± 1/0.5 ± 1/1	100 to 1479 (12)
Doppler Spectrum Width	Weather radar spectral width data (0 to 920 Cells)	(10)Fixed Point Scaled Integer, 1 Byte(11)	m/s	-63.5 to +63	± 1/0.5	100 to 2399 (13)

(1) 1 January 1970 00.00 GMT = 1 Modified Julian Date
(2) Fixed Point Scaled
(3) For Vertical Raster Scan, these denote "Elevation Angle" and "Elevation Number", along with associated units, range, and accuracy.
(4) Format Defined in Table III-A
(5) Format Defined in Table III-C
(6) For Vertical Raster Scan, these denote "Azimuth Angle" and “Azimuth Number", along with associated units, range and accuracy.
(7) Format Defined in Table III-B
(8) A 0 indicates No Data.
(9) Equals 0 when spot blanking disabled; equals 4 when spot blanking enabled and no spot blanking radials in current elevation cut; equals 6 when there are no spot blanked radials in current elevation cut and current radial not spot blanked; equals 7 when current radial is spot blanked.
(10) Code of 00 is Signal Below Threshold, Code of 01 is Signal Overlaid
(11) See Table III-E for Scaling - Range of Doppler Velocity set in accordance with Doppler Velocity Resolution
(12) Byte Start Location depends on length of Reflectivity Field, Byte Stop Location depends on Length of Velocity Field.
(13) Byte Start Location depends on length of Reflectivity and Velocity Fields, Byte Stop Location depends on Length of Spectral Width Field.

Table III-A	Angle Data Format (Degrees)	Table III-B	Range Format (Km)
BIT #	**MEANING**	**BIT #**	**MEANING**
15	180 deg	15	Sign
14	90 deg	14	16.384
13	45 deg	13	8.192
12	22.5 deg	12	4.096
11	11.25 deg	11	2.048
10	5.625 deg	10	1.024
9	2.8125 deg	9	0.512
8	1.40625 deg	8	0.256
7	0.70313 deg	7	0.128
6	0.35156 deg	6	0.064
5	0.17578 deg	5	0.032
4	0.08789 deg	4	0.016
3 (LSB)	0.043945 deg	3	0.008
2	X	2	0.004
1	X	1	0.002
0	X	0 (LSB)	0.001

X = NOT APPLICABLE
NOTE: A positive elevation angle is defined as being up from the horizontal plane, and a positive azimuth angle is defined as being clockwise from true north, when looking down at the radar.

Table III-C Radial Status Data Format

Radial Status Indicator (Hex)	Setting (Hex)	Bad Data (Hex)
Start of new Elevation	00	80
Intermediate Radial Data	01	81
End of Elevation	02	82
Beginning of Volume Scan	03	83
End of Volume Scan	04	84

Table III-E Base Data Scaling

LSB = 0.5	R = NINT [2.*(R_{num} + 32.)] + 2
LSB = 0.5	V = NINT [2.*(V_{num} + 63.5)] + 2
LSB = 1.0	V = NINT [V_{num} + 127.] + 2
LSB = 0.5	SW = NINT [2.*(SW_{num} + 63.5)] + 2

Where:
NINT is a rounding function (i.e., NINT[1.5] returns 2) R_{num}, V_{num}, SW_{num} are values before scaling.
The inverse relationships are:

$$R_{num} = (R \div 2) - 33.0$$

$$V_{num} = (V \div 2) - 64.5 \text{ or } V - 129.0$$

$$SW_{num} = (SW \div 2) - 64.5$$

Table IV Message 2 - RDA Status Data

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
RDA STATUS	Start-Up Standby Restart Operate Playback Off-line Operate	Integer Code	N/A	As Listed 2 4 8 16 32 64	N/A	1
OPERABILITY STATUS	RDA - On-line RDA - Maintenance Action Required RDA - Maintenance Action Mandatory RDA - Commanded Shut Down RDA - Inoperable RDA - Automatic Calibration Disabled	Integer Code	N/A	As Listed 2 4 8 16 32 Add 1 to Above codes	N/A	2
CONTROL STATUS (Mutually Exclusive)	Local Only RPG (Remote) Only Either	Integer Code	N/A	As Listed 2 4 8	N/A	3
AUXILIARY POWER GENERATOR STATE	Utility PWR Available Generator On Transfer Switch - Manual Commanded Switchover Switched to Auxiliary Power	Integer Code	N/A	As Listed 2 4 8 16 Add 1 to Above codes	N/A	4
AVERAGE TRANSMITTER POWER	Calculated over a range of samples	Integer	Watts	0 to 9999	± 0.02/ ± 1	5
REFLECTIVITY CALIBRATION CORRECTION	Difference from Adaptation Data	Fixed Point Scaled	dB	-10 to +10	± 1 / ± .25	6

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
		Integer				
DATA TRANSMISSION ENABLED	(Any combination of Data Enabled) None Reflectivity Velocity Width	Integer Code	N/A	As Listed 2 4 8 16	N/A	7
VOLUME COVERAGE PATTERN NUMBER	(Magnitude defines Pattern, Sign defines selection) No Pattern Maintenance/Test Operational Constant Elevation Types RDA Local Pattern Selected RDA Remote Pattern Selected	Integer*2	N/A	As Listed 0 Number > 255 Number $\leq$ 255 1 to 99 Negative Positive	1	8
RDA CONTROL AUTHORIZATION	 No Action Local Control Requested Remote Control Enabled	Integer Code	N/A	As Listed 0 2 4	N/A	9
INTERFERENCE DETECTION RATE	Number of Pulses Detected Per Second	Integer	Pulses/ Second	0 to 32767	1% $\pm$ 1/1	10
OPERATIONAL MODE	 Maintenance Operational	Integer Code	N/A	As Listed 2 4	N/A	11
INTERFERENCE SUPPRESSION UNIT	 ISU Enabled ISU Disabled	Integer Code	N/A	As Listed 2 4	N/A	12
ARCHIVE II STATUS	 Not Installed Installed Loaded Reserved (Write Protected)	Integer Code	N/A	As Listed 0 1 2 4	N/A	13

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
	Reserved Record Playback Available Note (1) Search Playback Fast Forward Check Label Tape Transfer Not Used TAPE#1 Note (2) TAPE#2 Note (2) TAPE#3 Note (2) TAPE#4 Note (2) TAPE#5 Note (2) TAPE#6 Note (2) TAPE#7 Note (2) TAPE#8 Note (2) TAPE#9 Note (2) TAPE#10 Note (2) NA(no tape available) Note (2)			8 16 32 64 128 256 512 1024 2048 4096 8192 12288 16384 20480 24576 28672 32768 36864 40690 0		
ARCHIVE II - ESTIMATED REMAINING CAPACITY	Estimated Number of Volume Scans (Worst Case)	Integer	Volume Scans	1 to 900	1	14
RDA ALARM SUMMARY	 No alarms Tower/Utilities Pedestal Transmitter Receiver/Signal Processor RDA Control RPG Communication User Communication Archive II	Integer Code	N/A	As Listed 0 2 4 8 16 32 64 128 256	N/A	15

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
COMMAND ACKNOWLEDGMENT	No Acknowledgment Remote VCP Received Clutter Bypass map Received Clutter Censor Zones Received Redundant Channel STBY Command Accepted	Integer Code	N/A	As listed 0 1 2 3 4	N/A	16
CHANNEL CONTROL STATUS	Identifies whether channel is the controlling channel: Controlling Non-controlling	Integer Code	N/A	As Listed 0 1	N/A	17
SPOT BLANKING STATUS	Status of Spot Blanking: Not Installed Enabled Disabled	Integer Code	N/A	As Listed 0 2 4	N/A	18
BYPASS MAP GENERATION DATE	Julian Date - 2440586.5 Note (3)	Integer	Days	1 to 65535	1	19
BYPASS MAP GENERATION TIME	Number of minutes since midnight, Greenwich Mean Time	Integer	Minutes	0 to 1440	1	20
NOTCHWIDTH MAP GENERATION DATE	Julian date - 2440586.5 Note (3)	Integer	Days	1 to 65535	1	21
NOTCHWIDTH MAP GENERATION TIME	Number of minutes since Midnight, Greenwich Mean Time	Integer	Minutes	0 to 1440	1	22
SPARE						23
TRANSITION POWER SOURCE STATUS	Status of TPS: Not Installed OFF OK	Integer Code	NA	 0 1 3	N/A	24
RMS CONTROL STATUS Note (4)	Status of RMS Control: NON-RMS SYSTEM RMS IN CONTROL MMI IN CONTROL	Integer	N/A	 0 2 4	N/A	25
SPARE						26

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
ALARM CODES	One condition per halfword (Maximum of 14 alarms sent at a time). See Alarm Message Table IV-A for individual alarm codes. MSB set indicates alarm has been removed.	Integer Code	N/A	0 to 800	N/A	27 to 40

(1) "Playback Available" status may be paired with status codes 1 to 16, and 64 to 1024.
(2) “Tape Number” status may be paired with status codes 1to1024
(3) January 1970 00.00 Greenwich Mean Time = 1 Modified Julian Date
(4) FAA redundant radars with RMS installed

This following table summarizes alarms generated by the RDASC Program. Alarms are grouped by Functional Areas.

Each alarm is described as it is seen displayed in the alarm messages on the Maintenance Console and on the UCP.

The "STATE" column indicates the state of the RDA as a result of alarm:
MM = Maintenance Mandatory
MR = Maintenance Required
IN = Inoperative
SEC = Secondary (secondary alarms not specifically tied to a “STATE” change).

Alarms are classified as three different Alarm Types based on how alarms are reported to the RDA. Alarms identified in the table as ED (Edge Detected) are reported every time the test associated with the alarm fails consecutively for a number of times equal to the alarm reporting count (see "Sample" column). Such alarms will be removed (MSB set) when the test outcome first passes after the alarm is reported. Alarms identified in the table as OC (Occurrence) are reported each time the outcome of the associated test is FAILED. Alarms identified in the table as FO (Filtered Occurrence) are reported each time the outcome of the associated test is failed, but are not reported within 15 minutes of the last reporting.

Acronyms under Device Column are as follows:

CTR = Control	PED = Pedestal	RSP = Receiver/Signal Processor
WID= (Wideband) RPG Link	USR = User Base Data Link	
UTL = Tower Utility	XMT= Transmitter	ARC = Archive II

Table IV-A RDA Alarm Messages

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
0	N/A	N/A	N/A		NO ALARMS - Build 10.0
1	N/A	N/A	N/A		RESERVED
2	N/A	N/A	N/A		RESERVED
3	N/A	N/A	N/A		SPARE
4	N/A	N/A	N/A		SPARE
5	N/A	N/A	N/A		SPARE
6	N/A	N/A	N/A		SPARE
7	N/A	N/A	N/A		SPARE
8	N/A	N/A	N/A		SPARE
9	N/A	N/A	N/A		SPARE
10	N/A	N/A	N/A		SPARE
11	N/A	N/A	N/A		SPARE
12	N/A	N/A	N/A		SPARE
13	N/A	N/A	N/A		SPARE
14	N/A	N/A	N/A		SPARE
15	N/A	N/A	N/A		SPARE
16	N/A	N/A	N/A		SPARE
17	N/A	N/A	N/A		SPARE
18	N/A	N/A	N/A		SPARE
19	N/A	N/A	N/A		SPARE
20	MM	ED	WID	1	RPG LINK - GENERAL ERROR
21	MM	ED	WID	1	RPG LINK - SVC 15 ERROR
22	MM	ED	WID	1	RPG LINK - MAJOR XMTR ALARM (1)
23	MM	ED	WID	1	RPG LINK - MAJOR RCVR ALARM (1)
24	MM	ED	WID	1	RPG LINK - MINOR ALARM (1)
25	MM	ED	WID	1	RPG LINK -FUSE ALARM (1)
26	MM	ED	WID	1	RPG LINK -MAJOR ALARM (1)
27	MM	ED	WID	1	RPG LINK -REMOTE ALARM (1)
28	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
29	N/A	N/A	N/A		SPARE
30	MM	ED	USR	1	USER LINK - GENERAL ERROR
31	MM	ED	USR	1	USER LINK - SVC 15 ERROR
32	MM	ED	USR	1	USER LINK - MAJOR XMTR ALARM (1)
33	MM	ED	USR	1	USER LINK - MAJOR RCVR ALARM (1)
34	MM	ED	USR	1	USER LINK - MINOR ALARM (1)
35	MM	ED	USR	1	USER LINK - FUSE ALARM (1)
36	MM	ED	USR	1	USER LINK - MAJOR ALARM (1)
37	MM	ED	USR	1	USER LINK - REMOTE ALARM (1)
38	N/A	N/A	N/A		SPARE
39	N/A	N/A	N/A		SPARE
40	IN	ED	XMT	2	FILAMENT POWER SUPPLY OFF
41	N/A	N/A	N/A		SPARE
42	N/A	N/A	N/A		SPARE
43	IN	ED	XMT	3	WAVEGUIDE SWITCH FAILURE
44	IN	ED	XMT	2	WAVEGUIDE/PFN TRANSFER INTERLOCK
45	IN	ED	XMT	2	XMTR IN MAINTENANCE MODE
46	N/A	N/A	N/A		SPARE
47	IN	ED	XMT	3	PFN/PW SWITCH FAILURE
48	MM	ED	XMT	2	XMTR +5VDC POWER SUPPLY 6 FAIL
49	MM	ED	XMT	2	XMTR +15VDC POWER SUPPLY 4 FAIL
50	MM	ED	XMT	2	XMTR +28VDC POWER SUPPLY 3 FAIL
51	MM	ED	XMT	2	XMTR -15VDC POWER SUPPLY 5 FAIL
52	MM	ED	XMT	2	XMTR +45VDC POWER SUPPLY 7 FAIL
53	MM	ED	XMT	2	FILAMENT POWER SUPPLY VOLTAGE FAIL
54	MM	ED	XMT	2	VACUUM PUMP POWER SUPPLY VOLTAGE FAIL
55	MM	ED	XMT	2	FOCUS COIL POWER SUPPLY VOLTAGE FAIL
56	MM	ED	XMT	2	CIRCULATOR OVERTEMP
57	MM	ED	XMT	2	SPECTRUM FILTER LOW PRESSURE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
58	MM	ED	XMT	2	WAVEGUIDE ARC/VSWR
59	MM	ED	XMT	2	TRANSMITTER CABINET INTERLOCK OPEN
60	MM	ED	XMT	2	TRANSMITTER CABINET OVER TEMP
61	MM	ED	XMT	2	TRANSMITTER CABINET AIR FLOW FAIL
62	N/A	N/A	N/A		SPARE
63	N/A	N/A	N/A		SPARE
64	MM	ED	XMT		MODULATOR OVERLOAD
65	MM	ED	XMT	2	MODULATOR INVERSE CURRENT FAIL
66	MM	ED	XMT	2	MODULATOR SWITCH FAILURE
67	MM	ED	XMT	2	TRANSMITTER MAIN POWER OVER VOLTAGE
68	MM	ED	XMT	2	FLYBACK CHARGER FAILURE
69	MM	ED	XMT	2	INVERSE DIODE CURRENT UNDER VOLTAGE
70	MM	ED	XMT	2	TRIGGER AMPLIFIER FAILURE
71	N/A	N/A	N/A	2	SPARE
72	MM	ED	XMT		TRANSMITTER OVER VOLTAGE
73	MM	ED	XMT	2	TRANSMITTER OVER CURRENT
74	MM	ED	XMT	2	FOCUS COIL CURRENT FAILURE
75	MM	ED	XMT	2	FOCUS COIL AIRFLOW FAILURE
76	MM	ED	XMT	2	TRANSMITTER OIL OVER TEMP
77	MM	ED	XMT	2	PRF LIMIT
78	MM	ED	XMT	2	TRANSMITTER OIL LEVEL LOW
79	N/A	N/A	N/A	2	SPARE
80	MM	ED	XMT		KLYSTRON OVER CURRENT
81	MM	ED	XMT	2	KLYSTRON FILAMENT CURRENT FAIL
82	MM	ED	XMT	2	KLYSTRON VACION CURRENT FAIL
83	MM	ED	XMT	2	KLYSTRON AIR OVER TEMP
84	MM	ED	XMT	2	KLYSTRON AIR FLOW FAILURE
85	N/A	N/A	N/A		SPARE
86	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
87	N/A	N/A	N/A		SPARE
88	N/A	N/A	N/A		SPARE
89	N/A	N/A	N/A		SPARE
90	N/A	N/A	N/A		SPARE
91	N/A	N/A	N/A		SPARE
92	N/A	N/A	N/A		SPARE
93	MR	ED	XMT	2	XMTR MODULATOR SWITCH REQUIRES MAINT
94	MR	ED	XMT	2	XMTR POST CHARGE REG REQUIRES MAINT
95	MM	ED	XMT	2	WAVEGUIDE HUMIDITY/PRESSURE FAULT
96	IN	ED	XMT	3	TRANSMITTER HV SWITCH FAILURE
97	MM	ED	XMT	2	TRANSMITTER RECYCLING
98	IN	ED	XMT	2	TRANSMITTER INOPERATIVE
99	MM	ED	RSP	2	COHO/CLOCK FAILURE
100	IN	ED	CTR	2	DAU UART FAILURE
101	N/A	N/A	N/A		SPARE
102	N/A	N/A	N/A		SPARE
103	N/A	N/A	N/A		SPARE
104	N/A	N/A	N/A		SPARE
105	N/A	N/A	N/A		SPARE
106	N/A	N/A	N/A		SPARE
107	N/A	N/A	N/A		SPARE
108	N/A	N/A	N/A		SPARE
109	N/A	N/A	N/A		SPARE
110	MM	ED	XMT	2	XMTR/DAU INTERFACE FAILURE
111	N/A	N/A	N/A		SPARE
112	N/A	N/A	N/A		SPARE
113	N/A	N/A	N/A		SPARE
114	N/A	N/A	N/A		SPARE
115	N/A	N/A	N/A		SPARE
116	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
117	N/A	N/A	N/A		SPARE
118	N/A	N/A	N/A		SPARE
119	N/A	N/A	N/A		SPARE
120	MM	ED	UTL	2	AC UNIT#1 COMPRESSOR SHUTOFF
121	MM	ED	UTL	2	AC UNIT#2 COMPRESSOR SHUTOFF
122	MR	ED	UTL	2	GENERATOR MAINTENANCE REQUIRED
123	N/A	N/A	N/A		SPARE
124	MM	ED	UTL	2	GEN STARTING BATTERY VOLTAGE LOW
125	MM	ED	UTL	2	GENERATOR ENGINE MALFUNCTION
126	MM	ED	UTL	2	TPS IS OFF
127	N/A	N/A	N/A		SPARE
128	MM	ED	UTL	2	POWER TRANSFER NOT ON AUTO
129	MM	ED	UTL	2	GENERATOR EXERCISE FAILURE
130	MM	ED	UTL	2	AIRCRAFT HAZARD LIGHTING FAILURE
131	MR	ED	UTL	2	EQUIP SHELTER HALON/DETECT SYS FAULT
132	MM	ED	RSP	2	RCVR +5V POWER SUPPLY 5 FAIL
133	MR	ED	UTL	2	FIRE/SMOKE IN EQUIP SHELTER
134	MM	ED	RSP	2	RCVR +/-18V POWER SUPPLY 1 FAIL
135	MM	ED	RSP	2	RCVR -9V POWER SUPPLY 4 FAIL
136	MR	ED	UTL	2	FIRE/SMOKE IN GENERATOR SHELTER
137	MR	ED	UTL	2	GEN SHELTER HALON/DETECTION SYS FAULT
138	N/A	N/A	N/A		SPARE
139	MM	ED	RSP	2	RCVR +9V POWER SUPPLY 6 FAIL
140	MM	ED	RSP	2	A/D +/-15V POWER SUPPLY 8 FAIL
141	MM	ED	RSP	2	A/D +5V POWER SUPPLY 2 FAIL
142	N/A	N/A	N/A		SPARE
143	MM	ED	RSP	2	A/D -5.2V POWER SUPPLY 7 FAIL
144	MR	ED	UTL	2	UNAUTHORIZED SITE ENTRY
145	MR	ED	UTL	2	SECURITY SYSTEM EQUIPMENT FAILURE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
146	MR	ED	UTL	2	SECURITY SYSTEM DISABLED
147	MM	ED	RSP	2	RCVR PROT +5V POWER SUPPLY 9 FAIL
148	N/A	N/A	N/A		SPARE
149	N/A	N/A	N/A		SPARE
150	IN	OC	CTR		RDA CHANNEL CONTROL FAILURE
151	IN	ED	UTL	2	RADOME ACCESS HATCH OPEN
152	MR	ED	UTL	2	AC UNIT#1 FILTER DIRTY
153	MR	ED	UTL	2	AC UNIT#2 FILTER DIRTY
154	MR	ED	UTL	2	TRANSMITTER FILTER DIRTY
155	N/A	N/A	N/A		SPARE
156	N/A	N/A	N/A		SPARE
157	N/A	N/A	N/A		SPARE
158	N/A	N/A	N/A		SPARE
159	N/A	N/A	N/A		SPARE
160	N/A	N/A	N/A		SPARE
161	N/A	N/A	N/A		SPARE
162	N/A	N/A	N/A		SPARE
163	N/A	N/A	N/A		SPARE
164	N/A	N/A	N/A		SPARE
165	N/A	N/A	N/A		SPARE
166	N/A	N/A	N/A		SPARE
167	N/A	N/A	N/A		SPARE
168	N/A	N/A	N/A		SPARE
169	N/A	N/A	N/A		SPARE
170	N/A	N/A	N/A		SPARE
171	MM	ED	UTL	2	EQUIPMENT SHELTER TEMP EXTREME
172	MM	ED	UTL	2	AC UNIT#1 DISCHARGE TEMP EXTREME
173	MM	ED	UTL	2	TRANSMITTER LEAVING AIR TEMP EXTREME
174	MR	ED	UTL	2	RADOME AIR TEMP EXTREME

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
175	MM	ED	UTL	2	GENERATOR SHELTER TEMP EXTREME
176	MR	ED	UTL	2	GENERATOR FUEL STORAGE TANK LEVEL LOW
177	N/A	N/A	N/A		SPARE
178	N/A	N/A	N/A		SPARE
179	N/A	N/A	N/A		SPARE
180	N/A	N/A	N/A		SPARE
181	N/A	N/A	N/A		SPARE
182	N/A	N/A	N/A		SPARE
183	N/A	N/A	N/A		SPARE
184	MM	ED	UTL	2	AC UNIT#2 DISCHARGE TEMP EXTREME
185	N/A	N/A	N/A		SPARE
186	N/A	N/A	N/A		SPARE
187	N/A	N/A	N/A		SPARE
188	N/A	N/A	N/A		SPARE
189	N/A	N/A	N/A		SPARE
190	N/A	N/A	N/A		SPARE
191	N/A	N/A	N/A		SPARE
192	N/A	N/A	N/A		SPARE
193	N/A	N/A	N/A		SPARE
194	N/A	N/A	N/A		SPARE
195	N/A	N/A	N/A		SPARE
196	N/A	N/A	N/A		SPARE
197	N/A	N/A	N/A		SPARE
198	N/A	N/A	N/A		SPARE
199	N/A	N/A	N/A		SPARE
200	MM	ED	XMT	1	TRANSMITTER PEAK POWER LOW
201	MM	ED	XMT	1	TRANSMITTER PEAK POWER HIGH
202	N/A	N/A	N/A		SPARE
203	N/A	N/A	N/A		SPARE
204	MM	ED	XMT	1	ANTENNA PEAK POWER LOW

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
205	MM	ED	XMT	1	ANTENNA PEAK POWER HIGH
206	MM	ED	CTR	1	XMTR POWER METER ZERO OUT OF LIMIT
207	MM	ED	CTR	1	ANTENNA POWER METER ZERO OUT OF LIMIT
208	MM	ED	XMT	1	XMTR/ANT PWR RATIO DEGRADED
209	MM	ED	CTR	1	TRANSMITTER POWER BITE FAIL
210	MM	ED	CTR	1	ANTENNA POWER BITE FAIL
211	N/A	N/A	N/A		SPARE
212	N/A	N/A	N/A		SPARE
213	N/A	N/A	N/A		SPARE
214	N/A	N/A	N/A		SPARE
215	N/A	N/A	N/A		SPARE
216	N/A	N/A	N/A		SPARE
217	N/A	N/A	N/A		SPARE
218	N/A	N/A	N/A		SPARE
219	N/A	N/A	N/A		SPARE
220	N/A	N/A	N/A		SPARE
221	N/A	N/A	N/A		SPARE
222	N/A	N/A	N/A		SPARE
223	N/A	N/A	N/A		SPARE
224	N/A	N/A	N/A		SPARE
225	N/A	N/A	N/A		SPARE
226	N/A	N/A	N/A		SPARE
227	N/A	N/A	N/A		SPARE
228	N/A	N/A	N/A		SPARE
229	N/A	N/A	N/A		SPARE
230	N/A	N/A	N/A		SPARE
231	N/A	N/A	N/A		SPARE
232	N/A	N/A	N/A		SPARE
233	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
234	N/A	N/A	N/A		SPARE
235	N/A	N/A	N/A		SPARE
236	N/A	N/A	N/A		SPARE
237	N/A	N/A	N/A		SPARE
238	N/A	N/A	N/A		SPARE
239	N/A	N/A	N/A		SPARE
240	N/A	N/A	N/A		SPARE
241	MM	ED	RSP	2	SIGNAL PROC +5V POWER SUPPLY FAIL
242	N/A	N/A	N/A		SPARE
243	N/A	N/A	N/A		SPARE
244	N/A	N/A	N/A		SPARE
245	N/A	N/A	N/A		SPARE
246	N/A	N/A	N/A		SPARE
247	N/A	N/A	N/A		SPARE
248	N/A	N/A	N/A		SPARE
249	N/A	N/A	N/A		SPARE
250	MM	ED	CTR	2	MAINT CONSOLE +28V POWER SUPPLY FAIL
251	MM	ED	CTR	2	MAINT CONSOLE +15V POWER SUPPLY FAIL
252	MM	ED	CTR	2	MAINT CONSOLE +5V POWER SUPPLY FAIL
253	N/A	N/A	N/A		SPARE
254	N/A	N/A	N/A		SPARE
255	N/A	N/A	N/A		SPARE
256	N/A	N/A	N/A		SPARE
257	N/A	N/A	N/A		SPARE
258	N/A	N/A	N/A		SPARE
259	N/A	N/A	N/A		SPARE
260	N/A	N/A	N/A		SPARE
261	N/A	N/A	N/A		SPARE
262	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
263	N/A	N/A	N/A		SPARE
264	N/A	N/A	N/A		SPARE
265	MM	ED	CTR	2	MAINT CONSOLE -15V POWER SUPPLY FAIL
266	MM	ED	CTR	2	DAU A/D LOW LEVEL OUT OF TOLERANCE
267	MM	ED	CTR	2	DAU A/D MID LEVEL OUT OF TOLERANCE
268	MM	ED	CTR	2	DAU A/D HIGH LEVEL OUT OF TOLERANCE
269	N/A	N/A	N/A		SPARE
270	N/A	N/A	N/A		SPARE
271	N/A	N/A	N/A		SPARE
272	N/A	N/A	N/A		SPARE
273	N/A	N/A	N/A		SPARE
274	N/A	N/A	N/A		SPARE
275	N/A	N/A	N/A		SPARE
276	N/A	N/A	N/A		SPARE
277	N/A	N/A	N/A		SPARE
278	N/A	N/A	N/A		SPARE
279	N/A	N/A	N/A		SPARE
280	N/A	N/A	N/A		SPARE
281	N/A	N/A	N/A		SPARE
282	N/A	N/A	N/A		SPARE
283	N/A	N/A	N/A		SPARE
284	N/A	N/A	N/A		SPARE
285	N/A	N/A	N/A		SPARE
286	N/A	N/A	N/A		SPARE
287	N/A	N/A	N/A		SPARE
288	N/A	N/A	N/A		SPARE
289	N/A	N/A	N/A		SPARE
290	N/A	N/A	N/A		SPARE
291	N/A	N/A	N/A		SPARE
292	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
293	N/A	N/A	N/A		SPARE
294	N/A	N/A	N/A		SPARE
295	N/A	N/A	N/A		SPARE
296	N/A	N/A	N/A		SPARE
297	N/A	N/A	N/A		SPARE
298	N/A	N/A	N/A		SPARE
299	N/A	N/A	N/A		SPARE
300	IN	ED	PED	2	ELEVATION AMPLIFIER INHIBIT
301	MM	ED	PED	2	ELEVATION AMPLIFIER CURRENT LIMIT
302	MM	ED	PED	2	ELEVATION AMPLIFIER OVERTEMP
303	MM	ED	PED	2	PEDESTAL +150V OVER VOLTAGE
304	MM	ED	PED	2	PEDESTAL +150V UNDER VOLTAGE
305	MM	ED	PED	2	ELEVATION MOTOR OVERTEMP
306	IN	ED	PED	2	ELEVATION STOW PIN ENGAGED
307	MM	ED	PED	2	ELEVATION PCU DATA PARITY FAULT
308	MM	ED	PED	2	ELEVATION IN DEAD LIMIT
309	N/A	N/A	N/A		SPARE
310	MM	ED	PED	2	ELEVATION + NORMAL LIMIT
311	MM	ED	PED	2	ELEVATION - NORMAL LIMIT
312	N/A	N/A	N/A		SPARE
313	MM	ED	PED	2	ELEVATION ENCODER LIGHT FAILURE
314	MM	ED	PED	2	ELEVATION GEARBOX OIL LEVEL LOW
315	IN	ED	PED	2	AZIMUTH AMPLIFIER INHIBIT
316	MM	ED	PED	2	AZIMUTH AMPLIFIER CURRENT LIMIT
317	MM	ED	PED	2	AZIMUTH AMPLIFIER OVERTEMP
318	N/A	N/A	N/A		SPARE
319	N/A	N/A	N/A		SPARE
320	MM	ED	PED	2	AZIMUTH MOTOR OVERTEMP
321	IN	ED	PED	2	AZIMUTH STOW PIN ENGAGED
322	MM	ED	PED	2	AZIMUTH PCU DATA PARITY FAULT

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
323	N/A	N/A	N/A		SPARE
324	MM	ED	PED	2	AZIMUTH ENCODER LIGHT FAILURE
325	MM	ED	PED	2	AZIMUTH GEARBOX OIL LEVEL LOW
326	MM	ED	PED	2	BULL GEAR OIL LEVEL LOW
327	MM	ED	PED	2	ENCODER +5V POWER SUPPLY FAIL
328	IN	ED	PED	2	ELEVATION HANDWHEEL ENGAGED
329	IN	ED	PED	2	AZIMUTH HANDWHEEL ENGAGED
330	MM	ED	PED	2	PEDESTAL +15V POWER SUPPLY 1 FAIL
331	MM	ED	PED	2	PEDESTAL -15V POWER SUPPLY 1 FAIL
332	MM	ED	PED	2	PEDESTAL +5V POWER SUPPLY 1 FAIL
333	MM	ED	PED	2	PEDESTAL +28V POWER SUPPLY 2 FAIL
334	MM	ED	PED	2	AZIMUTH AMP POWER SUPPLY FAIL
335	MM	ED	PED	2	ELEVATION AMP POWER SUPPLY FAIL
336	IN	ED	PED	1	PEDESTAL DYNAMIC FAULT
337	IN	ED	PED	1	PEDESTAL INTERLOCK OPEN
338	IN	ED	PED	1	PEDESTAL STOPPED
339	IN	ED	PED	1	PEDESTAL UNABLE TO PARK
340	N/A	N/A	N/A		SPARE
341	IN	ED	PED	3	PED SERVO SWITCH FAILURE
342	N/A	N/A	N/A		SPARE
343	N/A	N/A	N/A		SPARE
344	N/A	N/A	N/A		SPARE
345	N/A	N/A	N/A		SPARE
346	N/A	N/A	N/A		SPARE
347	N/A	N/A	N/A		SPARE
348	N/A	N/A	N/A		SPARE
349	N/A	N/A	N/A		SPARE
350	N/A	N/A	N/A		SPARE
351	N/A	N/A	N/A		SPARE
352	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
353	N/A	N/A	N/A		SPARE
354	N/A	N/A	N/A		SPARE
355	N/A	N/A	N/A		SPARE
356	N/A	N/A	N/A		SPARE
357	N/A	N/A	N/A		SPARE
358	N/A	N/A	N/A		SPARE
359	N/A	N/A	N/A		SPARE
360	MM	ED	RSP	1	RF GEN FREQ SELECT OSCILLATOR FAIL
361	MM	ED	RSP	1	RF GEN RF/STALO FAIL
362	MM	ED	RSP	1	RF GEN PHASE SHIFTED COHO FAIL
363	N/A	N/A	N/A		SPARE
364	N/A	N/A	N/A		SPARE
365	N/A	N/A	N/A		SPARE
366	N/A	N/A	N/A		SPARE
367	N/A	N/A	N/A		SPARE
368	N/A	N/A	N/A		SPARE
369	N/A	N/A	N/A		SPARE
370	N/A	N/A	N/A		SPARE
371	N/A	N/A	N/A		SPARE
372	N/A	N/A	N/A		SPARE
373	N/A	N/A	N/A		SPARE
374	N/A	N/A	N/A		SPARE
375	N/A	N/A	N/A		SPARE
376	N/A	N/A	N/A		SPARE
377	N/A	N/A	N/A		SPARE
378	N/A	N/A	N/A		SPARE
379	N/A	N/A	N/A		SPARE
380	MM	ED	CTR	1	NOTCH WIDTH MAP GENERATION ERROR
381	SEC	FO	RSP		PRT1 INTERVAL ERROR
382	SEC	FO	RSP		PRT2 INTERVAL ERROR

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
383	SEC	FO	RSP		RADIAL TIME INTERVAL ERROR
384	N/A	N/A	N/A		SPARE
385	N/A	N/A	N/A		SPARE
386	N/A	N/A	N/A		SPARE
387	N/A	N/A	N/A		SPARE
388	N/A	N/A	N/A		SPARE
389	N/A	N/A	N/A		SPARE
390	N/A	N/A	N/A		SPARE
391	SEC	OC	WID		RPG LOOP TEST TIMED OUT
392	SEC	OC	WID		RPG LOOP TEST VERIFICATION ERROR
393	SEC	OC	CTR		INVALID REMOTE VCP RECEIVED
394	SEC	OC	CTR		REMOTE VCP NOT DOWNLOADED
395	SEC	OC	CTR		INVALID RPG COMMAND RECEIVED
396	SEC	OC	RSP		RADIAL DATA LOST
397	SEC	OC	RSP		EXCESSIVE RADIALS IN A CUT
398	SEC	OC	CTR		STANDBY FORCED BY INOP ALARM
399	N/A	N/A	N/A		SPARE
400	SEC	FO	CTR		DAU STATUS READ TIMED OUT
401 to 420	N/A	N/A	N/A		RESERVED FOR INTERNAL RDA USE
421	SEC	OC	UTL		RECOMMEND SWITCH TO UTILITY POWER
422	N/A	N/A	N/A		SPARE
423	N/A	N/A	N/A		SPARE
424	N/A	N/A	N/A		SPARE
425	N/A	N/A	N/A		SPARE
426	N/A	N/A	N/A		SPARE
427	N/A	N/A	N/A		SPARE
428	N/A	N/A	N/A		SPARE
429	N/A	N/A	N/A		SPARE
430	N/A	N/A	N/A		SPARE
431	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
432	N/A	N/A	N/A		SPARE
433	N/A	N/A	N/A		SPARE
434	N/A	N/A	N/A		SPARE
435	N/A	N/A	N/A		SPARE
436	N/A	N/A	N/A		SPARE
437	N/A	N/A	N/A		SPARE
438	N/A	N/A	N/A		SPARE
439	MM	ED	CTR	1	MOD ADAP DATA FILE READ FAILED
440	N/A	N/A	N/A		SPARE
441	MM	ED	CTR	1	BYPASS MAP FILE READ FAILED
442	MM	ED	CTR	1	RDASOT CAL DATA FILE, READ FAILED
443	N/A	N/A	N/A		SPARE
444	MR	ED	CTR	1	CENSOR ZONE FILE READ FAILED
445	N/A	N/A	N/A		SPARE
446	N/A	N/A	N/A		SPARE
447	N/A	N/A	N/A		SPARE
448	IN	ED	CTR	3	DAU INITIALIZATION ERROR
449	MM	ED	CTR	1	MMI INITIALIZATION ERROR
450	IN	ED	PED	3	PEDESTAL INITIALIZATION ERROR
451	IN	ED	RSP	3	SPS INITIALIZATION ERROR
452	MM	ED	WID	1	RPG LINK INITIALIZATION ERROR
453	MM	ED	USR	1	USER LINK INITIALIZATION ERROR
454	MM	ED	CTR	1	SYSTEM STATUS MONITOR INIT ERROR
455	MM	ED	CTR	1	DISABLE/ENAB/AUTO SWITCH IN DISABLE
456	MM	ED	USR	1	USER LU ASSIGN ERROR
457	MM	ED	ARC	1	ARCH2 LU ASSIGN ERROR
458	N/A	N/A	N/A		SPARE
459	N/A	N/A	N/A		SPARE
460	SEC	FO	CTR		MMI I/O STATUS ERROR
461	SEC	FO	CTR		DAU I/O STATUS ERROR

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
462	SEC	FO	RSP		SPS I/O STATUS ERROR
463	SEC	FO	PED		PEDESTAL I/O STATUS ERROR
464	SEC	FO	CTR		REDUN CHAN INTERFACE I/O STATUS ERROR
465	SEC	OC	CTR		MULT DAU I/O ERROR-RDA FORCED TO STBY
466	SEC	OC	RSP		MULT SPS I/O ERROR-RDA FORCED TO STBY
467	SEC	OC	PED		MULT PED I/O ERROR-RDA FORCED TO STBY
468	N/A	N/A	N/A		SPARE
469	MM	ED	RSP	1	LOG CHANNEL NOISE LEVEL DEGRADED
470	MM	ED	RSP	1	LIN CHANNEL NOISE LEVEL DEGRADED
471	MM	ED	RSP	1	SYSTEM NOISE TEMP DEGRADED
472	MM	ED	RSP	1	I/Q AMP BALANCE DEGRADED
473	MM	ED	RSP	1	I/Q PHASE BALANCE DEGRADED
474	MM	ED	RSP	1	IF ATTEN STEP SIZE DEGRADED
475	N/A	N/A	N/A		SPARE
476	MM	ED	RSP	1	IF ATTEN CAL INHIBITED-INVALID DATA
477	MM	ED	RSP	1	IF ATTEN CALIBRATION SIGNAL DEGRADED
478	N/A	N/A	N/A		SPARE
479	MR	ED	RSP	1	LIN CHAN GAIN CAL CHECK-MAINT REQD
480	MM	ED	RSP	1	LIN CHAN GAIN CAL CHECK DEGRADED
481	MM	ED	RSP	1	LIN CHAN GAIN CAL CONSTANT DEGRADED
482	MM	ED	RSP	1	LOG CHAN GAIN CAL CONSTANT DEGRADED
483	MM	ED	RSP	1	VELOCITY/WIDTH CHECK DEGRADED
484	MR	ED	RSP	1	VELOCITY/WIDTH CHECK-MAINT REQUIRED
485	N/A	N/A	N/A		SPARE
486	MM	ED	RSP	1	LIN CHAN CLUTTER REJECTION DEGRADED
487	MR	ED	RSP	1	LIN CHAN CLTR REJECT-MAINT REQUIRED
488	MM	ED	RSP	1	LOG CHAN CLUTTER REJECTION DEGRADED

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
489	MR	ED	RSP	1	LOG CHAN CLTR REJECT-MAINT REQUIRED
490	MM	ED	RSP	1	I CHANNEL BIAS OUT OF LIMIT
491	MM	ED	RSP	1	Q CHANNEL BIAS OUT OF LIMIT
492	N/A	N/A	N/A		SPARE
493	N/A	N/A	N/A		SPARE
494	N/A	N/A	N/A		SPARE
495	N/A	N/A	N/A		SPARE
496	N/A	N/A	N/A		SPARE
497	N/A	N/A	N/A		SPARE
498	N/A	N/A	N/A		SPARE
499	N/A	N/A	N/A		SPARE
500	N/A	N/A	N/A		SPARE
501	N/A	N/A	N/A		SPARE
502	N/A	N/A	N/A		SPARE
503	MR	ED	RSP	1	IF ATTEN STEP SIZE-MAINT REQUIRED
504	N/A	N/A	N/A		SPARE
505	MR	ED	RSP	1	I/Q AMP BALANCE-MAINT REQUIRED
506	N/A	N/A	N/A		SPARE
507	MR	ED	RSP	1	I/Q PHASE BALANCE-MAINT REQUIRED
508	N/A	N/A	N/A		SPARE
509	N/A	N/A	N/A		SPARE
510	N/A	N/A	N/A		SPARE
511	N/A	N/A	N/A		SPARE
512	N/A	N/A	N/A		SPARE
513	N/A	N/A	N/A		SPARE
514	N/A	N/A	N/A		SPARE
515	N/A	N/A	N/A		SPARE
516	N/A	N/A	N/A		SPARE
517	N/A	N/A	N/A		SPARE
518	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
519	N/A	N/A	N/A		SPARE
520	N/A	N/A	N/A		SPARE
521	MR	ED	RSP	1	SYSTEM NOISE TEMP-MAINT REQUIRED
522	MM	ED	RSP	1	ISU PERFORMANCE DEGRADED
523	MM	ED	RSP	1	LIN CHAN RF DRIVE TST SIGNAL DEGRADED
524	MM	ED	RSP	1	LOG CHAN RF DRIVE TST SIGNAL DEGRADED
525	N/A	N/A	N/A		SPARE
526	N/A	N/A	N/A		SPARE
527	MM	ED	RSP	1	LIN CHAN TEST SIGNALS DEGRADED
528	MM	ED	RSP	1	LOG CHAN TEST SIGNALS DEGRADED
529	N/A	N/A	N/A		SPARE
530	MM	ED	RSP	1	LOG CHAN CAL CHECK DEGRADED
531	N/A	N/A	N/A		SPARE
532	MR	ED	RSP	1	LOG CHAN CAL CHK-MAINT REQUIRED
533	MM	ED	RSP	1	LIN CHAN KLY OUT TEST SIGNAL DEGRADED
534	MM	ED	RSP	1	LOG CHAN KLY OUT TEST SIGNAL DEGRADED
535	N/A	N/A	N/A		SPARE
536	N/A	N/A	N/A		SPARE
537	N/A	N/A	N/A		SPARE
538	N/A	N/A	N/A		SPARE
539	N/A	N/A	N/A		SPARE
540	N/A	N/A	N/A		SPARE
541	N/A	N/A	N/A		SPARE
542	N/A	N/A	N/A		SPARE
543	N/A	N/A	N/A		SPARE
544	N/A	N/A	N/A		SPARE
545	N/A	N/A	N/A		SPARE
546	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
547	N/A	N/A	N/A		SPARE
548	N/A	N/A	N/A		SPARE
549	N/A	N/A	N/A		SPARE
550	SEC	OC	CTR		INTERPROCESSOR CONTROL CMD REJECTED
551	SEC	OC	CTR		NO INTERPROCESSOR COMMAND RESPONSE
552	SEC	OC	CTR		UNABLE TO CMD OPER-REDUN CHAN ONLINE
553	SEC	OC	CTR		CHAN ALREADY CONTROLLING-CMD REJ
554	SEC	OC	CTR		CHAN ALREADY NON-CONTROLLING-CMD REJ
555	SEC	OC	CTR		CMD NOT VALID FROM CHANNEL 1-CMD REJ
556	N/A	N/A	N/A		SPARE
557	N/A	N/A	N/A		SPARE
558	N/A	N/A	N/A		SPARE
559	N/A	N/A	N/A		SPARE
560	N/A	N/A	N/A		SPARE
561	N/A	N/A	N/A		SPARE
562	N/A	N/A	N/A		SPARE
563	N/A	N/A	N/A		SPARE
564	N/A	N/A	N/A		SPARE
565	N/A	N/A	N/A		SPARE
566	N/A	N/A	N/A		SPARE
567	N/A	N/A	N/A		SPARE
568	N/A	N/A	N/A		SPARE
569	N/A	N/A	N/A		SPARE
570	N/A	N/A	N/A		SPARE
571	N/A	N/A	N/A		SPARE
572	N/A	N/A	N/A		SPARE
573	N/A	N/A	N/A		SPARE
574	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
575	N/A	N/A	N/A		SPARE
576	N/A	N/A	N/A		SPARE
577	N/A	N/A	N/A		SPARE
578	N/A	N/A	N/A		SPARE
579	N/A	N/A	N/A		SPARE
580	SEC	FO	RSP		SPS READ TIMING ERROR
581	SEC	FO	RSP		SPS WRITE TIMING ERROR
582	SEC	FO	RSP		AU0 PARITY ERROR
583	SEC	FO	RSP		AU1 PARITY ERROR
584	SEC	FO	RSP		AU2 PARITY ERROR
585	N/A	N/A	N/A		SPARE
586	N/A	N/A	N/A		SPARE
587	N/A	N/A	N/A		SPARE
588	SEC	FO	RSP		CLUTTER FILTER PARITY ERROR
589	MM	ED	RSP	1	HWSP END AROUND TEST ERROR
590	SEC	FO	RSP		SPS MEMORY CLEAR ERROR
591	SEC	FO	RSP		SPS MICRO/ECW DATA FILE READ FAIL
592	SEC	FO	RSP		SPS MICROCODE/ECW VERIFY ERROR
593	SEC	FO	RSP		SPS COEFFICIENT RAM LOAD ERROR
594	N/A	N/A	N/A		SPARE
595	SEC	FO	RSP		SPS AU0 RAM LOAD ERROR
596	N/A	N/A	N/A		SPARE
597	N/A	N/A	N/A		SPARE
598	N/A	N/A	N/A		SPARE
599	N/A	N/A	N/A		SPARE
600	N/A	N/A	N/A		SPARE
601	N/A	N/A	N/A		SPARE
602	N/A	N/A	N/A		SPARE
603	SEC	FO	RSP		SPS CLOCK/MICRO_P SET ERROR
604	SEC	FO	PED		PEDESTAL SELF TEST 1 ERROR

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
605	SEC	FO	PED		PEDESTAL SELF TEST 2 ERROR
606	N/A	N/A	N/A		SPARE
607	N/A	N/A	N/A		SPARE
608	N/A	N/A	N/A		SPARE
609	N/A	N/A	N/A		SPARE
610	N/A	N/A	N/A		SPARE
611	N/A	N/A	N/A		SPARE
612	N/A	N/A	N/A		SPARE
613	N/A	N/A	N/A		SPARE
614	N/A	N/A	N/A		SPARE
615	N/A	N/A	N/A		SPARE
616	N/A	N/A	N/A		SPARE
617	N/A	N/A	N/A		SPARE
618	N/A	N/A	N/A		SPARE
619	N/A	N/A	N/A		SPARE
620	SEC	OC	CTR		MMI TASK PAUSED-RESTART INITIATED
621	SEC	OC	CTR		DAU TASK PAUSED-RESTART INITIATED
622	SEC	OC	CTR		SPS TASK PAUSED-RESTART INITIATED
623	SEC	OC	CTR		PED TASK PAUSED-RESTART INITIATED
624	SEC	OC	CTR		WIDBND TASK PAUSED-RESTART INITIATED
625	SEC	OC	CTR		ARCH II TASK PAUSED-RESTART INITIATED
626	SEC	OC	CTR		REDUN CHAN TSK PAUSED-RSTRT INITIATED
627	SEC	OC	CTR		WDOG TIMER TSK PAUSED-RSTRT INITIATED
628	N/A	N/A	N/A		SPARE
629	N/A	N/A	N/A		SPARE
630	N/A	N/A	N/A		SPARE
631	N/A	N/A	N/A		SPARE
632	N/A	N/A	N/A		SPARE

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
633	N/A	N/A	N/A		SPARE
634	N/A	N/A	N/A		SPARE
635	N/A	N/A	N/A		SPARE
636	N/A	N/A	N/A		SPARE
637	N/A	N/A	N/A		SPARE
638	N/A	N/A	N/A		SPARE
639	N/A	N/A	N/A		SPARE
640	N/A	N/A	N/A		SPARE
641	N/A	N/A	N/A		SPARE
642	N/A	N/A	N/A		SPARE
643	N/A	N/A	N/A		SPARE
644	N/A	N/A	N/A		SPARE
645	N/A	N/A	N/A		SPARE
646	N/A	N/A	N/A		SPARE
647	N/A	N/A	N/A		SPARE
648	N/A	N/A	N/A		SPARE
649	N/A	N/A	N/A		SPARE
650	SEC	FO	WID		SEND WIDEBAND STATUS TIMED OUT
651	SEC	FO	CTR		SEND DAU COMMAND TIMED OUT
652	N/A	N/A	N/A		SPARE
653	N/A	N/A	N/A		SPARE
654	SEC	OC	CTR		MULT DAU CMD TOUTS-RESTART INITIATED
655	N/A	N/A	N/A		SPARE
656	N/A	N/A	N/A		SPARE
657	N/A	N/A	N/A		SPARE
658	N/A	N/A	N/A		SPARE
659	N/A	N/A	N/A		SPARE
660	N/A	N/A	N/A		SPARE
661	SEC	FO	RSP		SPS DIM LOOP TEST ERROR
662	SEC	FO	RSP		SPS SMI LOOP TEST ERROR

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
663	SEC	FO	RSP		SPS MICROCODE/ECW LOAD ERROR
664	SEC	FO	RSP		SPS RTD LOOP TEST ERROR
665	SEC	FO	RSP		SPS HSP LOOP TEST ERROR
666	N/A	N/A	N/A		SPARE
667	SEC	FO	RSP		SPS HARDWARE INIT SELECT ERROR
668	SEC	FO	RSP		SPS EEPROM DOWNLOAD FAILURE
669	N/A	N/A	N/A		SPARE
670	N/A	N/A	N/A		SPARE
671	SEC	FO	USR		USER LOOP TEST TIMED OUT
672	SEC	FO	USR		USER LOOP TEST VERIFICATION ERROR
673	N/A	N/A	N/A		SPARE
674	N/A	N/A	N/A		SPARE
675	N/A	N/A	N/A		SPARE
676	N/A	N/A	N/A		SPARE
677	N/A	N/A	N/A		SPARE
678	N/A	N/A	N/A		SPARE
679	SEC	OC	CTR		INVALID CENSOR ZONE MESSAGE RECEIVED
680	N/A	N/A	N/A		SPARE
681	N/A	N/A	N/A		SPARE
682	N/A	N/A	N/A		SPARE
683	N/A	N/A	N/A		SPARE
684	N/A	N/A	N/A		SPARE
685	N/A	N/A	N/A		SPARE
686	N/A	N/A	N/A		SPARE
687	SEC	OC	CTR		REMOTE VCP FILE WRITE FAILED
688	N/A	N/A	N/A		SPARE
689	SEC	OC	CTR		CENSOR ZONE FILE WRITE FAILED
690	MM	ED	CTR		STATE FILE WRITE FAILED
691	SEC	OC	CTR		BYPASS MAP FILE WRITE FAILED

CODE	STATE	ALARM TYPE	DEVICE	SAMPLE	ALARM MESSAGE
692	SEC	FO	CTR		RDASC CAL DATA FILE WRITE FAILED
693	N/A	N/A	N/A		SPARE
694	N/A	N/A	N/A		SPARE
695	N/A	N/A	N/A		SPARE
696	N/A	N/A	N/A		SPARE
697	N/A	N/A	N/A		SPARE
698	N/A	N/A	N/A		SPARE
699	N/A	N/A	N/A		SPARE
700	SEC	OC	CTR		INIT SEQ TIMEOUT-RESTART INITIATED
701	SEC	OC	CTR		CONTROL SEQ TIMEOUT-RESTART INITIATED
702 to 750	N/A	N/A	N/A		SPARES
751	SEC	OC	ARC		ARCHIVE II I/O ERROR
752	SEC	OC	ARC		ARCHIVE II ALLOCATION/MEDIA FULL ERROR
753	SEC	OC	ARC		ARCHIVE II FILE MANAGEMENT ERROR
754	SEC	OC	ARC		ARCHIVE II LOAD ERROR
755	SEC	OC	ARC		ARCHIVE II PLAYBCK VOLUME SCAN NOT FOUND
756	SEC	OC	ARC		ARCHIVE II CAPACITY LOW
757	SEC	OC	ARC		ARCH II NEW 8MM TAPE INSTALLED
758	SEC	OC	ARC		ARCH II UNABLE TO LOAD TAPE
759	SEC	ED	ARC		ARCH II WRITE_PROTECT TAPE ERROR
760	SEC	ED	ARC		ARCH II TAPE HEAD CLEANING REQ"D
761 to 800	N/A	N/A	N/A		SPARES

(1) Not Set by VME

Table V Message 3 Performance/Maintenance Data

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
RPG Interface						
DCU Status	1	-	-	-	-	See Table V-A
General Error Code	2	-	0 to 1F	Hex	1	See Table V-B
SVC 15 Error Code	3	-	0 to 27	Hex	1	See Table V-C
Outgoing Frames	4	-	0 to 2^{16}-1	Integer	1	
Frames With FCS Errors	5	-	0 to 2^{16}-1	Integer	1	
Retransmitted I-frames	6	-	0 to 2^{16}-1	Integer	1	
Polls Sent And Received	7	-	0 to 2^{16}-1	Integer	1	
Poll Timeout Expiration	8	-	0 to 10	Integer	1	
Minimum Buffers in Read Pool	9	-	0 to 2^{16}-1	Integer		
Maximum Buffers in Read Done	10	-	0 to 2^{16}-1	Integer	1	
Loop Back Test Status	11	-	0 to 3	Integer	1	0=Pass; 1=Fail; 2=Timeout; 3=Not Tested (No)
Spare	12	-	-			
Spare	13	-	-	-	-	
Spare	14	-	-	-	-	
Spare	15	-	-	-	-	
Base Data User Interface						
DCU Status	16	-	-	-	-	See Table V-A
General Error Code	17	-	0 to IF	Hex	1	See Table V-B
SVC 15 Error Code	18	-	0 to 27	Hex	1	See Table V-C
Outgoing Frames	19	-	0 to 2^{16}-1	Integer	1	
Frames with FCS Errors	20	-	0 to 2^{16}-1	Integer	1	
Retransmitted I-frames	21	-	0 to 2^{16}-1	Integer	1	
Polls Sent and Received	22	-	0 to 2^{16}-1	Integer	1	
Poll Timeout Expiration	23	-	0 to 10	Integer	1	
Minimum Buffers in Read Pool	24	-	0 to 2^{16}-1	Integer	1	
Maximum Buffers in Read Done	25	-	0 to 2^{16}-1	Integer	1	
Loop Back Test Status	26	-	0,1,2,3,4	Integer	1	0=Pass; 1=Fail; 2=Timeout; 3=Not Tested (No); 4=Not

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
						Configured
Spare	27	-		-		
Spare	28	-		-		
Spare	29	-		-		
Spare	30	-		-		
Transmitter						
Filament P	31	8	-	-	-	1 = Off
Klystron Warmup	31	9	-	-	-	1 = Preheat
Transmitter Available	31	10	-	-	-	1 = Not Available
WG Switch Position	31	11	-	-	-	1 = Dummy Load
WG/PFN Transfer Interlock	31	12	-		-	1 = Open
Maintenance Mode	31	13	-	-	-	1 = Maintenance
Maintenance Required	31	14	-	-	-	1 = Work Required
PFN Switch Position	31	15	-	-	-	1 = Long Pulse
+5 VDC PS	31	0	-	-	-	1 = Fault
+15 VDC PS	31	1	-	-	-	1 = Fault
+28 VDC PS	31	2	-	-	-	1 = Fault
-15 VDC PS	31	3	-	-	-	1 = Fault
+45 VDC PS	31	4	-	-	-	1 = Fault
Filament PS Voltage	31	5	-	-	-	1 = Fault
Vacuum Pump PS Voltage	31	6	-	-	-	1 = Fault
Focus Coil PS Voltage	31	7	-	-	-	1 = Fault
Circulator Temperature	32	8	-	-	-	1 = Fault
Spectrum Filter Pressure	32	9	-	-	-	1 = Fault
WG ARC/VSWR	32	10	-	-	-	1 = Fault
Cabinet Interlock	32	11	-	-	-	1 = Fault
Cabinet Air Temperature	32	12	-	-	-	1 = Fault
Cabinet Airflow	32	13	-	-	-	1 = Fault
Spare	32	14	-	-	-	0 = Spare
XMTR SPARE	32	15	-	-	-	0 = Spare
Modulator Overload	32	0	-	-	-	1 = Fault
Modulator Inv Current	32	1	-	-	-	1 = Fault
Modulator Switch Fail	32	2	-	-	-	1 = Fault
Main Power Voltage	32	3	-	-	-	1 = Fault
Flyback Charger	32	4	-	-	-	1 = Fault
Inverse Diode Curr	32	5	-	-	-	1 = Fault
Trigger Amplifier	32	6	-	-	-	1 = Fault
Spare	32	7	-	-	-	0 = Spare
Transmitter O.V.	33	8	-	-	-	1 = Fault
Transmitter O.C.	33	9	-	-	-	1 = Fault
Focus Coil Current	33	10	-	-	-	1 = Fault
Focus Coil Airflow	33	11	-	-	-	1 = Fault
Oil Temperature	33	12	-	-	-	1 = Fault
PRF Limit	33	13	-	-	-	1 = Fault

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Oil Level	33	14	-	-	-	1 = Fault
Transmitter Battery Charging	33	15	-	-	-	0 = Yes; 1= No
Klystron Current	33	0	-	-	-	1 = Fault
Klystron Fil. Current	33	1	-	-	-	1 = Fault
Klystron Vacion Current	33	2	-	-	-	1 = Fault
Klystron Air Temperature	33	3	-	-	-	1 = Fault
Klystron Airflow	33	4	-	-	-	1 = Fault
One Test Bit 5	33	5	-	-	-	1 = Normal
One Test Bit 6	33	6	-	-	-	1 = Normal
One Test Bit 7	33	7	-	-	-	1 = Normal
One Test Bit 0	34	8	-	-	-	1 = Normal
One Test Bit 1	34	9	-	-	-	1 = Normal
One Test Bit 2	34	10	-	-	-	1 = Normal
One Test Bit 3	34	11	-	-	-	1 = Normal
One Test Bit 4	34	12	-	-	-	1 = Normal
Nod. Switch Maintenance	34	13	-	-	-	1 = Maint. Req'd
Post Chrg. Reg.	34	14	-	-	-	1 =Maint. Req'd
WG Pressure/Humidity	34	15	-	-	-	1 = Fault
Zero Test Bit 0	34	0	-	-	-	0 = Normal
Zero Test Bit 1	34	1	-	-	-	0 = Normal
Zero Test Bit 2	34	2	-	-	-	0 = Normal
Zero Test Bit 3	34	3	-	-	-	0 = Normal
Zero Test Bit 4	34	4	-	-	-	0 = Normal
Zero Test Bit 5	34	5	-	-	-	0 = Normal
Zero Test Bit 6	34	6	-	-	-	0 = Normal
Zero Test Bit 7	34	7	-	-	-	0 = Normal
H.V.	35	8	-	-	-	0 = On, 1= Off
TX Recycling Summary	35	9	-	-	-	1 = Recycling
XMTR Inoperable	35	10	-	-	-	1 = Inoperative
Spare	35	13-15	-	-	-	1 = Spare
XMTR Air Filter	37	2	-	-	-	0 = Dirty
Transmitter RF Pwr (Sensor)	46	0-7	-.4 to 9.6	MW	10/255	(1)
Antenna RF Power (Sensor)	47	8-15	-.4 to 9.6	MW	10/255	Note (1)
DAU Interface	62	-	-	Code	-	1 = OK, 0= Failed
XMTR Summary Status	63	-	-	Code	-	0=OK, 1=Fail, 2=Maint, 3=Recyc
Ant Peak Power	123	-	0 to	KW	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
	and 124		999.9			
XMTR Peak Power	125 and 126	-	0 to 999.9	KW	-	Real
Ant RF Avg Power	127 and 128	-	0 to 999.9	Watts	-	Real
XMTR RF Avg Power	129 and 130	-	0 to 999.9	Watts	-	Real
M/Wave Loss (Ant/XMTR Power Ratio)	131 and 132	-	-99.9 to +99.9	DB	-	Real
Ant Power Meter Zero	133 and 134	-	0.0 to 255.0	-	Note (2)	Real
XMTR Power Meter Zero	135 and 136	-	0.0 to 255.0	-	Note (2)	Real
XMTR Recycle Count	137 and 138	-	0 to 999,999	Count	1	Integer
Spares	139 and 140	-	-	-	-	
Tower						
AC Unit#1 Compressor Shut off	35	0	-	-	-	1 = Shutoff
AC Unit#2 Compressor Shut off	35	1	-	-	-	1 = Shutoff
Generator Maintenance Reqd	35	2	-	-	-	0 = Maint Reqd
Power Source	35	3	-	-	-	0 = Utility Power
Gen Battery Voltage	35	4	-	-	-	1= OK
Gen. Engine	36	5	-	-	-	1= OK
Transitional Power Source	35	6 and 7	-	-	-	1= Off, 0= OK
Dau Uart	35	12	-	-	-	1= Fault
Pwr Xfer Switch	35	8	-	-	-	1 = Auto, 0 = Manual
Gen. Volt/freq Available	36	9	-	-	-	1 = Available
Aircraft Lighting	36	10	-	-	-	1 = OK
Equipment Shelter Halon/Detection						
Equip- Shelter Fire System	36	11	-	-	-	0 = Normal
Equipment Shelter	36	13	-	-	-	0 = Normal

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Fire/smoke Generator Shelter	36	0	-	-	-	1 = Normal
Fire/Smoke Equipment Shelter Halon System	36	1	-	-	-	0 = Normal
Utility Voltage/Frequency	36	2	-	-	-	1= Available
Spare	36	6	-	-	-	1 = Spare
Site Security	37	8	-	-	-	0= Alarm
Security Equipment	37	9	-	-	-	0= Fault, 1 =OK
Security System	37	10	-	-	-	0 = Disabled, 1 =OK
Spare	37	12	-	-	-	1 = Spare
Spare	37	13	-	-	-	1 = Spare
Receiver Connected to Antenna	37	14	-	-	-	1 = Not Connected
Radome Hatch	37	15	-	-	-	0= Open
AC Unit#1 Filter Dirty	37	0	-	-	-	0 = Dirty
AC Unit #2 Filter Dirty	37	1	-	-	-	0 = Dirty
Spare	37	3	-	-	-	1 = Spare
Spare	37	4	-	-	-	1= Spare
Spare	37	5	-	-	-	1 = Spare
Spare	37	6 to 7	-	-	-	1 = Spare
Outside Temperature	38	8 to 15	-50 to +50	Deg C	100/204	Note (3)
Equipment Shelter Temperature	38	0 to 7	0 to +50	Deg C	50/204	Note (3)
Ac Unit #1 Discharge Air Temp	39	8 to 15	0 to +50	Deg C	50/204	Note (3)
Transmitter Air Temp	39	0 to 7	-10 to +60	Deg C	70/204	Note (3)
Radome Air Temperature	40	8 to 15	-50 to +50	Deg C	100/204	Note (3)
Generator Shelter Temperature	40	0 to 7	0 to +50	Deg C	50/204	Note (3)
Gen Fuel Level	41	8 to 15	0 to 100	%	100/204	Note (3)
Spare	41	0 to 7	-	-	-	1 = Spare
Spare	42	8 to 15	-	-	-	1= Spare
Spare	42	0 to 7	-	-	-	1 = Spare
Spare	43	8 to 15	-	-	-	1 = Spare
Spare	43	0 to 7	-	-	-	1 = Spare
Spare	44	8 to 15	-	-	-	1= Spare
Spare	44	0 to 7	-	-	-	1 = Spare
AC Unit#2 Air Temp	45	8 to 15	0 to +50	Deg C	-	Note (3)
Spare	45	0 to 7	-	-	-	1= Spare
Spare	46	8 to 15	-	-	-	1= Spare
Spare	47	0 to 7	-	-	-	

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Spare	48	8 to 15	-	-	-	1= Spare
Spare	48	0 to 7	-	-	-	
Spare	49	8 to 15	-	-	-	
Spare	50	8 to 15	-	-	-	
Spare	51	8 to 15	-	-	-	
Spare	52	8 to 15	-	-	-	
Spare	52	0 to 7	-	-	-	
Spare	53	0 to 7	-	-	-	
Maint. Console +28v PS	54	8 to 15	0 to 37.4	Volts	37.4/255	Note (4)
Maint. Console +15v PS	54	0 to 7	0 to 20.0	Volts	20.0/255	Note (4)
Maint. Console +5v PS	55	8 to 15	0 to 6.64	Volts	6.64/255	Note (4)
Spare	55	0 to 7	-	-	-	
Spare	56	8 to 15	-	-	-	
Spare	56	0 to 7	-	-	-	
Spare	57	0 to 7	-	-	-	
Spare	58	8 to 15	-	-	-	
Converted Gen Fuel Level	502	-	0 to 100	%	1	Integer Percent
Tower Utilities						
Maint. Console -15v PS	58	0 to 7	0 to 19.9	Volts	15/192	Note (4)
Spare	59	8 to 15	-	-	-	
DAU Test 0	59	0 to 7	0 to 255	None	1	10 = Normal
DAU Test 1	60	8 to 15	0 to 255	None	1	127 = Normal
DAU Test 2	60	0 to 7	0 to 255	None	1	245 = Normal
Spare	61	8 to 15	-	-	-	
Spare	61	0 to 7	-	-	-	
Spare	64 to 95	-	-	-	-	
Interprocessor Chan Response	501	-	0 to 2	Integer	1	0=N/A, 1=No, 2=Yes
Channel in Control	503	-	0 to 2	Integer	1	0=N/A, 1=No, 2=Yes
Pedestal						
Pedestal +28v PS	49	0 to 7	0 to 40.8	Volts	40.8/255	Note (4)
Pedestal +15v PS	50	0 to 7	0 to 20.0	Volts	20.0/255	Note (4)
Encoder +5v PS	50	8 to 15	0 to 18.36	Volts	18.36/255	Note (4)
Pedestal +5v PS	51	0 to 7	0 to 6.64	Volts	6.64/255	Note (4)
Pedestal -15v PS	57	8 to 15	0 to 20.0	Volts	20.0/255	Note (4)

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Elevation Servo Amp Inhibit	96	1	-	-	-	1 = Inhibit
Elevation Servo Amp Short Circuit	96	2	-	-	-	1 = Short Circuit
Elevation Servo Amp Overtemp	96	3	-	-	-	1 = Overtemp
+150V 0vervoltage	96	4	-	-	-	0 = Normal
+150V Undervoltage	96	5	-	-	-	0 = Normal
Elevation Motor Overtemp	96	6	-	-	-	0 = Normal, 1 = Overtemp
Elevation Stow Pin	96	7	-	-	-	1= Engaged
Elevation PCU Parity	96	8	-	-	-	1 = Parity Error
Elevation Dead Limit	96	9	-	-	-	1= in Dead Limit
Spare	96	10	-	-	-	0= Spare
Elevation + Normal Limit	96	11	-	-	-	1= in Nrml+limit
Elevation - Normal Limit	96	12	-	-	-	1= in Nrml-limit
Spare	96	13	-	-	-	0= Spare
Elevation Encoder Light	96	14	-	-	-	1= Failure
Elevation Gearbox Oil	96	15	-	-	-	1= Oil Level Low
Azimuth Servo Amp Inhibit	97	1	-	-	-	1 = Inhibit
Azimuth Servo Amp Short Circuit	97	2	-	-	-	1 = Short Circuit
Azimuth Servo Amp Overtemp	97	3	-	-	-	1 = Overtemp
Spare	97	4	-	-	-	0 = Spare
Spare	97	5	-	-	-	0 = Spare
Azimuth Motor Overtemp	97	6	-	-	-	0 = Normal, 1 = Overtemp
Azimuth Stop Pin	97	7	-	-	-	1 = Engaged
Azimuth PCU Parity	97	8	-	-	-	1 = Parity Error
Azimuth Encoder Light	97	9	-	-	-	1 = Failure
Azimuth Gearbox Oil	97	10	-	-	-	1 = Oil Level Low
Azimuth Bull Gear Oil	97	11	-	-	-	1 = Oil Level Low
Spare	97	12	-	-	-	0 = Spare
Spare	97	13	-	-	-	1 = Engaged
Azimuth Handwheel	97	14	-	-	-	1 = Engaged
Spare	97	15	-	-	-	0 = Spare
Spare	98	1	-	-	-	0 = Spare
Spare	98	2	-	-	-	0 = Spare
Spare	98	3	-	-	-	0 = Spare

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Azimuth Servo Amp PS	98	4	-	-	-	0 = Normal
Elevation Amp PS	98	5	-	-	-	0 = Normal
Servo	98	6	-	-	-	1 = Off, 0 = on
Pedestal Interlock Switch	98	7	-	-	-	1 = Safe, 0 = Oper
Spare	98	8 to 15	-	-	-	0 = Spares
Azimuth Position Correction	99	-	0 to 360	Degrees	-	See Table III-A for format
Elevation Position Correction	100	-	0 to 360	Degrees	-	See Table III-A for format
Spare	101	-	-	-	-	
Spare	102	-	-	-	-	
Spare	103	-	-	-	-	
Spare	104	-	-	-	-	
Spare	105	-	-	-	-	
Self Test 1 Status See Note (5)	404	-	-	Code	1	1=No, 2=OK, 3=Fail
Self Test 2 Status See Note (5)	405	-	-	Code	1	1=No, 2=OK, 3=Fail
Self Test 2 Data	406	-	-	-	-	Hex, See ICD 1208311 Table VI
RF Generator/Receiver/Signal Processor						
COHO/clock	35	11	-	-	-	1 = Fault
+9v Receiver PS	36	3	-	-	-	1 = Fault
±15v A/D Conversion PS	36	4	-	-	-	1 = Fault
+5v A/D Conversion PS	36	5	-	-	-	1 = Fault
-5.2 A/D Conversion PS	36	7	-	-	-	1 = Fault
+5v Receiver PS	36	12	-	-	-	1 = Fault
±18v Receiver PS	36	14	-	-	-	1 = Fault
-9v Receiver PS	36	15	-	-	-	1 = Fault
+5v Rec Prot PS	37	11	-	-	-	1 = Fault
Signal Processor +5v PS	53	8 to 15	0 to 6.64	Volts	6.64/255	Note (6)
SPS Spares	106	0 to 4	-	-	-	
Rf Gen Freq Select Oscillator	106	7	-	-	-	1 = Fail
Rf Gen RF/STALO	106	6	-	-	-	1 = Fail
Rf Gen Phase Shifted COHO	106	5	-	-	-	1 = Fail
Spares	106	8 to 15	-	-	-	
Spare	107	-	-	-	-	
Spare	108	-	-	-	-	
Parity Alarm CF1	109	0	-	-	-	1 = Parity

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Parity Alarm CF2	109	1	-	-	-	Error 1 = Parity Error
Parity Alarm CF3	109	2	-	-	-	1 = Parity Error
Parity Alarm CF4	109	3	-	-	-	1 = Parity Error
Parity Alarm CF5	109	4	-	-	-	1 = Parity Error
Parity Alarm CF6	109	5	-	-	-	1 = Parity Error
Parity Test Gen RAM	109	6	-	-	-	1 = Parity Error
Spares	109	7 to 15	-	-	-	
Spare	110	-	-	-	-	
Spare	111	-	-	-	-	
Prt1-interval	112	-	0 to 65535	9.6 Mhz		
Clock Count	1	Integer				
Prt2-interval	113	-	0 to 65535	9.6 Mhz		
Clock Count	1	Integer				
Spares	114 and 122	-	-	-	-	
Short Pulse, Lin Chan Noise	141 and 142	-	-	-	-	Real
Short Pulse, Log Chan Noise	143 and 144	-	-	-	-	Real
Long Pulse, Lin Chan Noise	145 and 146	-	-	-	-	Real
Long Pulse, Log Chan Noise	147 and 148	-	-	-	-	Real
System Noise Temp	149 and 150	-	0 to 9999	Deg K	-	Real
IDU Test Detections	151	-	0 to 9999	Integer	1	Integer
Spare	152	-	-	-	-	-
Calibration						
AGC Step 1 Amp	153 and	-	.0 to 99.9	DB	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
	154					
AGC Step 2 Amp	155 and 156	-	.0 to 99.9	DB	-	Real
AGC Step 3 Amp	157 and 158	-	.0 to 99.9	DB	-	Real
AGC Step 4 Amp	159 and 160	-	.0 to 99.9	DB	-	Real
AGC Step 5 Amp	161 and 162	-	.0 to 99.9	DB	-	Real
AGC Step 6 Amp	163 and 164	-	.0 to 99.9	DB	-	Real
AGC Step 1 Phase	165 and 166	-	-180 to +180	Deg	-	Real
AGC Step 2 Phase	167 and 168	-	-180 to +180	Deg	-	Real
AGC Step 3 Phase	169 and 170	-	-180 to +180	Deg	-	Real
AGC Step 4 Phase	171 and 172	-	-180 to +180	Deg	-	Real
AGC Step 5 Phase	173 and 174	-	-180 to +180	Deg	-	Real
AGC Step 6 Phase	175 and 176	-	-180 to +180	Deg	-	Real
AGC I/Q Amp Balance	177 and 178	-	.0 to 9.999	-	-	Real
AGC I/Q Phase Balance	179 and 180	-	0 to 360	Deg	-	Real
Spares	181 and 200	-	-	-	-	
CW Lin Target Expected Amp	201 and 202	-	-99.9 to +99.9	DBZ	-	Real
RFD1 Lin Target Expected Amp	203 and 204	-	-99.9 to +99.9	DBZ	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
RFD2 Lin Target Expected Amp	205 and 206	-	-99.9 to +99.9	DBZ	-	Real
RFD3 Lin Target Expected Amp	207 and 208	-	-99.9 to +99.9	DBZ	-	Real
CW Log Target Expected Amp	209 and 210	-	-99.9 to +99.9	DBZ	-	Real
RFD1 Log Target Expected Amp	211 and 212	-	-99.9 to +99.9	DBZ	-	Real
RFD2 Log Target Expected Amp	213 and 214	-	-99.9 to +99.9	DBZ	-	Real
RFD3 Log Target Expected Amp	215 and 216	-	-99.9 to +99.9	DBZ	-	Real
CW Lin Target Measured Amp	217 and 218	-	-99.9 to +99.9	DBZ	-	Real
RFD1 Lin Target Measured Amp	219 and 220	-	-99.9 to +99.9	DBZ	-	Real
RFD2 Lin Target Measured Amp	221 and 222	-	-99.9 to +99.9	DBZ	-	Real
RFD3 Lin Target Measured Amp	223 and 224	-	-99.9 to +99.9	DBZ	-	Real
CW Log Target Measured Amp	225 and 226	-	-99.9 to +99.9	DBZ	-	Real
RFD1 Log Target Measured Amp	227 and 228	-	-99.9 to +99.9	DBZ	-	Real
RFD2 Log Target Measured Amp	229 and 230	-	-99.9 to +99.9	DBZ	-	Real
RFD3 Log Target Measured Amp	231 and 232	-	-99.9 to +99.9	DBZ	-	Real
Short Pulse, Lin Chan SYSCAL	233 and 234	-	-99.9 to +99.9	DB	-	Real
Short Pulse, Log Chan SYSCAL	235 and 236	-	-99.9 to +99.9	DB	-	Real
Long Pulse, Lin Chan	237	-	-99.9	DB	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
SYSCAL	and 238		to +99.9			
Long Pulse, Log Chan SYSCAL	239 and 240	-	-99.9 to +99.9	DB	-	Real
Phase RAM 1 Expected VEL	241 and 242	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 2 Expected VEL	243 and - 244	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 3 Expected VEL	245 and 246	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 4 Expected VEL	247 and 248	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 1 Measured VEL	249 and 250	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 2 Measured VEL	251 and 252	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 3 Measured VEL	253 and 254	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 4 Measured VEL	255 and 256	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 1 Expected Width	257 and 258	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 2 Expected Width	259 and 260	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 3 Expected Width	261 and 262	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 4 Expected Width	263 and 264	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 1 Measured Width	265 and 266	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 2 Measured Width	267 and 268	-	-99.9 to +99.9	m/s	-	Real
Phase RAM 3 Measured Width	269 and	-	-99.9 to	m/s	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
	270		+99.9			
Phase RAM 4 Measured Width	271 and 272	-	-99.9 to +99.9	m/s	-	Real
Spares	273 and 290	-	-	-	-	
KD1 Lin Target Expected Amp	291 and 292	-	-99.9 to +99.9	DBZ	-	Real
KD2 Lin Target Expected Amp	293 and 294	-	-99.9 to +99.9	DBZ	-	Real
KD3 Lin Target Expected Amp	295 and 296	-	-99.9 to +99.9	DBZ	-	Real
KD1 Log Target Expected Amp	297 and 298	-	-99.9 to +99.9	DBZ	-	Real
KD2 Log Target Expected Amp	299 and 300	-	-99.9 to +99.9	DBZ	-	Real
KD3 Log Target Expected Amp	301 and 302	-	-99.9 to +99.9	DBZ	-	Real
KD1 Lin Target Measured Amp	303 and 304	-	-99.9 to +99.9	DBZ	-	Real
KD2 Lin Target Measured Amp	305 and 306	-	-99.9 to +99.9	DBZ	-	Real
KD3 Lin Target Measured Amp	307 and 308	-	-99.9 to +99.9	DBZ	-	Real
KD1 Log Target Measured Amp	309 and 310	-	-99.9 to +99.9	DBZ	-	Real
KD2 Log Target Measured Amp	311 and 312	-	-99.9 to +99.9	DBZ	-	Real
KD3 Log Target Measured Amp	313 and 314	-	-99.9 to +99.9	DBZ	-	Real
Spares	315 to 330	-	-	-	-	
Clutter Suppression Check						
Unfiltered Lin Chan Power	331 and	-	-99.9 to	DB	-	Real

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
	332		+99.9			
Filtered Lin Chan Power	333 and 334	-	-99.9 to +99.9	DB	-	Real
Unfiltered Log Chan Power	335 and 336	-	-99.9 to +99.9	DB	-	Real
Filtered Log Chan Power	337 and 338	-	-99.9 to +99.9	DB	-	Real
Spares	339 to 360	-	-	-	-	
Disk File Status						
State File Read Status	361	-	1 to 2	Integer	1	1=OK, 2=Error
State File Write Status	362	-	1 to 2	Integer	1	1=OK, 2=Error
Bypass Map File Read Status	363	-	1 to 2	Integer	1	1=OK, 2=Error
Bypass Map Pile Write Status	364	-	1 to 2	Integer	1	1=OK, 2=Error
RDASC Cal Data File Read Status	365	-	1 to 2	Integer	1	1=OK, 2=Error
RDASC Cal Data File Write Status	366	-	1 to 2	Integer	1	1=OK, 2=Error
RDASOT Cal Data Pile Read Status	367	-	1 to 2	Integer	1	1=OK, 2=Error
Mod Adap File Read Status	368	-	1 to 2	Integer	1	1=OK, 2=Error
Spare	369	-	-	-	-	1= Spare
Censor Zone File Read Status	370	-	1 to 2	Integer	1	1=OK, 2=Error
Censor Zone File Write Status	371	-	1 to 2	Integer	1	1=OK, 2=Error
Remote VCP File Read Status	372	-	1 to 2	Integer	1	1=OK, 2=Error
Remote VCP File Write Status	373	-	1 to 2	Integer	1	1=OK, 2=Error
Spares	374-400	-	-	-	-	
Device Initialization						
DAU Init Status Note (7)	401	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Maint Console Init Status Note (7)	402	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Pedestal Init Status	403	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
Note (7) SPS Init Status	407	-	1 to 3	Integer	1	1=No, 2=OK,3=Fail
Note (7) SPS Download Status	408	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) SPS Dim Loop Test Status	409	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) SPS SMI Loop Test Status	410	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) SPS HSP Loop Test Status	411	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) Rpg Link Init Status	412	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) User Link Init Status	413	-	1 to 3	Integer	1	1=No, 2=OK, 3=Fail
Note (7) Spares	414 to 430	-	-	-	-	
Device I/O Error Status						
DAU I/O Error Status	431 and 432	-	-	-	1	Hex Note (8)
DAU I/O Error Date	433 and 434	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
DAU I/O Error Time	435 to 438	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
MC I/O Error Status	439 and 440	-	-	-	1	HexNote (8)
MC I/O Error Date	441 and 442	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
MC I/O Error Time	443 to 446	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
Ped I/O Status	447 and 448	-	-	-	1	Hex Note (8)
Ped I/O Error Date	449 and 450	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
Ped I/O Error Time	451 to 454	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)

DESCRIPTION	HALF WORD	BIT #	RANGE	UNITS	LSB	REMARKS
SPS I/O Error Status	455 and 456	-	-	-	1	Hex Note (8)
SPS I/O Error Date	457 and 458	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
SPS I/O Error Time	459 to 462	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
Arch II I/O Error Status	463 and 464	-	-	-	1	Hex Note (8)
Arch II I/O Error Date	465 and 466	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
Arch II I/O Error Time	467 to 470	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
Disk I/O Error Status	471 and 472	-	-	-	-	Hex Note (8)
Disk I/O Error Date	473 and 474	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
Disk I/O Error Time	475 to 478	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
Arch II Summary Error Status	479 and 480	-	0 to 99	-	1	Integer (See Table V-D)
Redun Chan I/O Error Status	481 and 482	-	-	-	1	Hex Note (8)
Redun Chan I/O Error Date	483 and 484	-	1 to 2^{32}-1	Days	1	Integer Julian Date Note (9)
Redun Chan I/O Error Time	485 to 488	-	0 to 9,:	Hh:mm:ss	-	ASCII (See Table V-E)
Spares	489 to 500	-	-	-	-	-
Spares	504 to 520	-	-	-	-	

(1) Power = (Value - Meter Zero)/lsb, Where Range of Value Is 0 to 255. See Halfword 133-134 and 135-136 for Meter Zeros. The LSB Is a Design Center Value.
(2) LSB of RF (Sensor), See Halfword 46 (Bits 0-7) and Halfword 47 (Bits 8-15).
(3) Biased Outputs Low End of Range = 51 High End of Range = 255
(4) Low End of Range = 0 High End of Range = 255
(5) No = Not Configured, or Not Initialized
(6) Low End of Range = 0 High End of Range = 255
(7) No = Not Configured, or Not Initialized

(8) SVC1 Error Codes: See OS/32 Supervisor Call (SVC) Reference Manual (48-038). Byte 1 (Most Significant Byte) = Function Code; Byte 2 = Logical Unit; Byte 3 = Device-independent Status; Byte 4 = Device-dependent Status.
(9) Modified Julian Date: Integer Number of Days from 1 January 1970 (= 1 January 1970)

Table V-A DCU Status Word (1)

Bit(2)	Microwave	Fiber Optics	Direct Link
9	Spare	Minor Alarm	
10	Spare	Major Alarm	Spare
14	Spare	Remote Alarm	Spare
15	Spare	Spare	Spare

(1) DCU Status bits are not set in VME configurations
(2) A value of "1" indicates an alarm

Table V-B General Error Codes

CODE	DESCRIPTION
00	Successful deactivation of drop
01	Illegal response-mode code in DCB.SLS
02	Specified mode (TWS/TWA) not supported
03	Specifies site (PRIM/SCND) not supported
04	SVC 1 parameter block error
05	Invalid user-frame type specified
06	Loss of a read pool buffer
07	Illegal output control sequence
08	Limit on poll time-outs reached
09	Irrecoverable error on input
0A(1)	Irrecoverable error on output
0B	Address check error read pool buffer
0C	Address check error of write buffer
0D	Line (physical) connection error
0E	Drop connection error
0F	Drop disconnection error
10	Read pool setup error
11	Read-done setup error
12	Write list setup error
13	Write-done list setup error
14	Statistics buffer setup error
15	Modifier-buffer setup error
16	SSA-change operation error
17	SSA-query operation error
18	Reserved
19	Reserved
1A	Read pool shortage in effect
1B	Read pool shortage rectified
1C	Output frame buffer too large
1D	Read pool buffer too small (FRMR)
1E	Irrecoverable error in protocol (FRMR)
1F	Successful drop activation

Table V-C SVC 15 Error Codes

CODE	TYPE	STATUS	DESCRIPTION
00	2	No Error	No error
01	2		N/A
02	2		N/A
03	2		N/A
04	2		N/A
05	2	Data Check	FCS error
06	1	Buffer Limit	Buffer limit reached
07	2		N/A
08	2		N/A
09	2		N/A
0A	1	Loss of Carrier	Loss of carrier on line
0B	1	Clear-to-Send Error	Loss of clear-to-send
0C	1	Data Set Not Ready	Data set not ready
0D	1	Device Unavailable	Adapter not present
0E	1	Overflow	Character overflow
0F	1	Ring	Ring detected
10	1	Buffer Overrun –1	Busy/done bit already set in queued buffer
11	2	NCE Overflow	More than 255 commands executed
12	2	Task Trap Error	Trap queue was full or invalid
13	1	Buffer Overrun –2	ESR did not execute in time
14	1	Timeout Error	Timeout on the operation
15	3	Halt I/O	Halt I/O
16	2		N/A
17	2		N/A
18	2	Illegal Command	Command/modifier invalid
19	2	Memory Fault –1	Memory fault in referencing
1A	2	Memory Fault –2	Memory fault in referencing buffer
1B	2	Illegal LU	Device does not support SVC 15
1C	2	Illogical Status	Invalid device status
1D	3	Power-Fail/Cancel	Power failure or cancellation of I/O
1E	2		N/A
1F	2		N/A
20	0	Idle Line	Idle-Line sequence found
21	2	Frame Abort	Abort sequence found
22	1	Invalid Frame	Frame has less than 32 bits; Not a multiple of octets
23	1	Buffer List Empty	FROM buffer queue found empty
24	1	Buffer List Overflow	TO buffer queue overflowed
25	2		(Reserved)
26	2		(Reserved)
27	2		(Reserved)

(1) The halfword for the SVC 15 Error Code indicates the type of I/O error

Table V-D Archive II Summary Error Codes

SUMMARY ERROR CODE	DESCRIPTION
0	No Error
1	Mount Timeout
2	Write Error
3	Read Error
4	Playback Started OK
5	Allocate File Error
6	Arch 2 File Close Error
7	Watchdog Error
8	Mount Error
9	Dismount Error
10	File Not Found
11	Started OK
12	Assign Arch 2 File Error
13	Position Error
14	Unload Error (Jukebox)
15	Write-protected Tape Error
16	Unload OK (Jukebox)
17	Clean Arch2 Tape Heads

Table V-E ASCII Character Set Definition

CHARACTER	FORMAT	UNITS	(8-BIT) HEX VALUE	PRECISION ACCURACY/
0	ASCII	N/A	30	N/A
1	ASCII	N/A	31	N/A
2	ASCII	N/A	32	N/A
3	ASCII	N/A	33	N/A
4	ASCII	N/A	34	N/A
5	ASCII	N/A	35	N/A
6	ASCII	N/A	36	N/A
7	ASCII	N/A	37	N/A
8	ASCII	N/A	38	N/A
9	ASCII	N/A	39	N/A
A	ASCII	N/A	41	N/A
B	ASCII	N/A	42	N/A
C	ASCII	N/A	43	N/A
D	ASCII	N/A	44	N/A
E	ASCII	N/A	45	N/A
F	ASCII	N/A	46	N/A
G	ASCII	N/A	47	N/A
H	ASCII	N/A	48	N/A
I	ASCII	N/A	49	N/A
J	ASCII	N/A	4A	N/A
K	ASCII	N/A	4B	N/A
L	ASCII	N/A	4C	N/A
M	ASCII	N/A	4D	N/A
N	ASCII	N/A	4E	N/A
O	ASCII	N/A	4F	N/A
P	ASCII	N/A	50	N/A
Q	ASCII	N/A	51	N/A
R	ASCII	N/A	52	N/A
S	ASCII	N/A	53	N/A
T	ASCII	N/A	54	N/A
U	ASCII	N/A	55	N/A
V	ASCII	N/A	56	N/A
W	ASCII	N/A	57	N/A
X	ASCII	N/A	58	N/A
Y	ASCII	N/A	59	N/A
Z	ASCII	N/A	5A	N/A
a	ASCII	N/A	61	N/A
b	ASCII	N/A	62	N/A
c	ASCII	N/A	63	N/A
d	ASCII	N/A	64	N/A
e	ASCII	N/A	65	N/A
f	ASCII	N/A	66	N/A
g	ASCII	N/A	67	N/A
h	ASCII	N/A	68	N/A
i	ASCII	N/A	69	N/A
j	ASCII	N/A	6A	N/A

CHARACTER	FORMAT	UNITS	(8-BIT) HEX VALUE	PRECISION ACCURACY/
k	ASCII	N/A	6B	N/A
l	ASCII	N/A	6C	N/A
m	ASCII	N/A	6D	N/A
n	ASCII	N/A	6E	N/A
o	ASCII	N/A	6F	N/A
p	ASCII	N/A	70	N/A
q	ASCII	N/A	71	N/A
r	ASCII	N/A	72	N/A
s	ASCII	N/A	73	N/A
t	ASCII	N/A	74	N/A
u	ASCII	N/A	75	N/A
v	ASCII	N/A	76	N/A
w	ASCII	N/A	77	N/A
x	ASCII	N/A	78	N/A
y	ASCII	N/A	79	N/A
z	ASCII	N/A	7A	N/A
!	ASCII	N/A	21	N/A
“	ASCII	N/A	22	N/A
#	ASCII	N/A	23	N/A
$	ASCII	N/A	24	N/A
%	ASCII	N/A	25	N/A
&	ASCII	N/A	26	N/A
‘	ASCII	N/A	27	N/A
(	ASCII	N/A	28	N/A
)	ASCII	N/A	29	N/A
*	ASCII	N/A	2A	N/A
+	ASCII	N/A	2B	N/A
	ASCII	N/A	2C	N/A
-	ASCII	N/A	2D	N/A
.	ASCII	N/A	2E	N/A
/	ASCII	N/A	2F	N/A
:	ASCII	N/A	3A	N/A
;	ASCII	N/A	3B	N/A
<	ASCII	N/A	3C	N/A
=	ASCII	N/A	3D	N/A
>	ASCII	N/A	3E	N/A
?	ASCII	N/A	3F	N/A
@	ASCII	N/A	40	N/A
[	ASCII	N/A	5B	N/A
\	ASCII	N/A	5C	N/A
]	ASCII	N/A	5D	N/A
^	ASCII	N/A	5E	N/A
.	ASCII	N/A	5F	N/A
`	ASCII	N/A	60	N/A
{	ASCII	N/A	7B	N/A
}	ASCII	N/A	7C	N/A
|	ASCII	N/A	7D	N/A
- (overline/tilde)	ASCII	N/A	7E	N/A

CHARACTER	FORMAT	UNITS	(8-BIT) HEX VALUE	PRECISION ACCURACY/
Non-Printable Characters:				
NUL (null)	ASCII	N/A	00	N/A
SOH (start of Heading)	ASCII	N/A	01	N/A
STX (start of text)	ASCII	N/A	02	N/A
ETX (end of text)	ASCII	N/A	03	N/A
EOT (end of Transmission)	ASCII	N/A	04	N/A
ENQ (enquiry)	ASCII	N/A	05	N/A
ACK (acknowledge)	ASCII	N/A	06	N/A
BEL (bell)	ASCII	N/A	07	N/A
BS (backspace)	ASCII	N/A	08	N/A
HT (horizontal tabulation)	ASCII	N/A	09	N/A
LF (line feed)	ASCII	N/A	0A	N/A
VT (vertical tabulation)	ASCII	N/A	0B	N/A
FF (form feed)	ASCII	N/A	0C	N/A
CR (carriage return)	ASCII	N/A	0D	N/A
SO (shift out)	ASCII	N/A	0E	N/A
SI (shift in)	ASCII	N/A	0F	N/A
DLE (data link escape)	ASCII	N/A	10	N/A
DC1 (device control 1)	ASCII	N/A	11	N/A
DC2 (device control 2)	ASCII	N/A	12	N/A
DC3 (device control 3)	ASCII	N/A	13	N/A
DC4 (device control 4)	ASCII	N/A	14	N/A
NAK (negative	ASCII	N/A	15	N/A
SYN (synchronous idle)	ASCII	N/A	16	N/A
ETB (end of transmission)	ASCII	N/A	17	N/A
CAN (cancel)	ASCII	N/A	18	N/A
EM (end of medium)	ASCII	N/A	19	N/A
SUB (substitution)	ASCII	N/A	1A	N/A
ESC (escape)	ASCII	N/A	1B	N/A
FS (file separator)	ASCII	N/A	1C	N/A
GS (group separator)	ASCII	N/A	1D	N/A
RS (record separator)	ASCII	N/A	1E	N/A
US (unit separator)	ASCII	N/A	1F	N/A
SP (space)	ASCII	N/A	20	N/A
DEL (delete)	ASCII	N/A	7F	N/A

Table VI Console Message

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	HALF WORD
Console Message Size	Number of bytes/characters in message.	Integer	N/A	2 to 404	1	1
Message	ASCII characters, 2 characters per halfword, includes imbedded carriage returns, line feeds, etc.	ASCII	Characters	See Table V-E	N/A	2 to 203
Message Type 4	Console Message RDA to RPG					
Message Type 10	Console Message RPG to RDA					
Message Type 20	Console Message RDA to Base Data User					
Message Type 21	Console Message Base Data User to RDA					

Table VIII Loopback Message

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	HALF WORD
Loopback Message Size	Number of halfwords in message (does not include message header)	Integer	N/A	2 to 404	1	1
Bit Pattern	Bit Pattern of 0's and 1's used to test interface.	N/A	N/A	N/A	N/A	2 to 1200
Message Type 11	Loopback Message RDA to RPG					
Message Type 12	Loopback Message RPG to RDA					
Message Type 22	Loopback Message RDA to Base Data User					
Message Type 23	Loopback Message Base Data User to RDA					

Table IX Clutter Filter Bypass Map

NAME	DESCRIPTION	FORMAT	UNITS	RANGE	ACCURACY/ PRECISION	HALFWORD LOCATION
Number of Segments	Number of Elevation Segments	Integer*2	N/A	1 to 5	1	1
For Each Segment: See Note (1)						
Segment Number	Segment Number	Integer*2	N/A	1 to 5	1	E1
Range Bins	Radial 1, Range Bins 0 to 15	Integer*2	N/A	0, 1 See Note (2)	MSB = BIN 0	E2
Range Bins	Radial 1, Range Bins 16 to 31	Integer*2	N/A	0, 1	MSB BIN = 16	E3
Range Bins	Radial 1, Range Bins 496 to 511	Integer*2	N/A	0, 1	MSB = BIN 496	E33
Range Bins	Radial 2, Range Bins 0 to 15	Integer*2	N/A	0, 1	MSB = BIN 0	E34
Range Bins	Radial 2, Range Bins 16 to 31	Integer*2	N/A	0, 1	MSB = BIN 16	E35
Range Bins	Radial 1, Range Bins 496 to 511	Integer*2	N/A	0, 1	MSB = BIN 496	E65
Range Bins	Radial 256, Range Bins 0 to 15	Integer*2	N/A	0, 1	MSB = BIN 0	E8161
Range Bins	Radial 256, Range Bins 16 to 31	Integer*2	N/A	0, 1	MSB = BIN 16	E8162
Range Bins	Radial 256, Range Bins 496 to 511	Integer*2	N/A	0, 1	MSB = BIN 496	E8193
Message Type 13	Clutter Filter Bypass Map					
Message Type 14	Edited Clutter Filter Bypass Map					

(1) Each elevation segment includes 256 azimuth radials, each of which consists of 512 range cells with each range cell having 1 kilometer resolution starting at 0 to 1 kilometer. The first azimuth radial, R 0, subtends the angle $360 - 180/256 \leq R\ 0 < 180/256$ degrees, with the next azimuth radial, R 1, subtending the angle $180/256 \leq R\ 1 < 540/256$ degrees, etc. Increasing angles are taken to be clockwise relative to true north. Elevation segment number 1 is closest to the ground, increasing segment numbers denote increasing elevation.
(2) Range Bins: 0 = perform clutter filtering; 1 = bypass the clutter filters

Table X RDA Control Commands (Message Type 6)

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
RDA STATE COMMAND Note (1)	Stand-By Offline Operate Operate Restart Archive II Playback No Change	Integer Code (bit 0 & 15 =1) (bit 1 & 15 =1) (bit 2 & 15 =1) (bit 3 & 15 =1) (bit 4 & 15 =1) Note (2)	N/A	As Listed 32769 32770 32772 32776 32784 0	N/A	1
BASE DATA TRANSMISSION ENABLE Note (3)	Reflectivity Velocity Width No Change	Integer Code (bit 0 & 15 =1) (bit 1 & 15 =1) (bit 2 & 15 =1)	N/A	As Listed 32769 32770 32772 0	N/A	2
AUXILIARY POWER GENERATOR CONTROL Note (4)	Activate/Switch to Aux. Power Switch to Utility Power No Change	Integer Code (bit 2 & 15 =1) (bit 1 & 15 =1)	N/A	As Listed 32772 32770 0	N/A	3
RDA CONTROL COMMANDS AND AUTHORIZATION	No Change Control Command Clear Local Control Enabled Remote Control Accepted Remote Control Requested	Integer Code	N/A	As listed 0 2 4 8 16	N/A	4

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
RESTART VCP OR ELEVATION CUT	Volume Coverage Pattern Elevation Cut	Integer Code (bit 15 = 1) (bit 15 = 1; set binary number of cut in bits 0 to 7)	N/A	As Listed 32768 32768 + cut number	N/A	5
SELECT LOCAL VCP NUMBER FOR NEXT VOLUME SCAN	Pattern Number Use Remote Pattern No Change	Integer*2	N/A	As Listed 1 to 767 0 32767	1	6
AUTOMATIC CALIBRATION OVERRIDE	Automatic Calibration Calibration Override No Change	Integer*2, Scaled 2's Complement	N/A dB	As Listed -1000 -40 to +40 32767	1 1/4dB 1	7
SPARE	N/A	N/A	N/A	N/A	N/A	8 to 9
CONTROL INTERFERENCE SUPPRESSION UNIT	Leave at Current State Enable ISU Disable ISU	Integer Coded	N/A	As Listed 0 2 4	N/A	10
SELECT OPERATING MODE	Leave at Current State Maintenance Operational	Integer Code	N/A	As Listed 0 2 4	N/A	11
CHANNEL CONTROL		Integer Code	N/A	As Listed	N/A	12

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
COMMAND	No Change Set to Controlling Channel Set to Non-controlling Channel			0 1 2		
ARCHIVE II CONTROL (RECORD)	No Change Start Stop	Integer Code (bit 0&15 =1) (bit 1&15 =1)	N/A	As Listed 0 32769 32770	N/A	13
ARCHIVE NUMBER OF VOLUME SCANS	Continuous Recording Number of Volume Scans	Integer	N/A	As Listed 0 1 to 900	1	14
PLAYBACK START TIME Note (5)	Number of Milliseconds after Midnight, Greenwich Mean Time	Integer*4	ms	0 to 86,399,999	± 2000/± 1	15 - 16
PLAYBACK START DATE Note (5)	Julian Date (Number of days from 1 January 1970)	Integer	Days	0 to 65,535	1	17
PLAYBACK STOP DATE Note (6)	Julian Date (Number of days from 1 January 1970)	Integer	Days	0 to 65,535	1	18
PLAYBACK STOP TIME Note (6)	Number of Milliseconds after Midnight, Greenwich Mean Time	Integer*4	ms	0 to 86,399,999	± 2000/± 1	19 to 20

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
SPOT BLANKING	No Change Enable Spot Blanking Disable Spot Blanking	Integer	N/A	As Listed 0 2 4	N/A	21
SPARE	N/A	N/A	N/A	N/A	N/A	22 to 26

(1) Only one commands is allowed at a time; except Restart, which is allowed with operational commands.
(2) LSB = bit 0
(3) Any and all combinations of data enabling are allowed; as well as all, and none.
(4) The following states are mutually exclusive: Deactivate & Activate Power Generator; Switch to Aux. & Comm. Power; Switch to Aux. Power & Deactivate Power Generator.
(5) In halfwords 15 to 17 (start time and date) are set to 0, then Playback will start at the beginning of the recorded data. (1 = 1 January 1970.)
(6) If halfwords 18 to 20 (stop time and date) are set to 0, then Playback will stop at the last recorded data. 1 = 1 January 1970.

Table XI Volume Coverage Patter Data (Message Type 7)

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
MESSAGE SIZE	Number of Halfwords in Message	Integer*2	Halfwords	23 to 594	1	1
PATTERN TYPE	Constant Elevation Cut Horizontal Raster Scan Vertical Raster Scan Searchlight	Integer Code	N/A	As listed 2 4 8 16	N/A	2
PATTERN NUMBER	Maintenance/Test Operational Constant Elevation Types	Integer*2	N/A	As Listed number > 255 number <=255 1 to 99	1	3
NUMBER OF ELEVATION CUTS (1)		Integer*2	N/A	1 to 25	1	4
CLUTTER MAP GROUP NUMBER		Integer*2	N/A	1 to 99	1	5
DOPPLER VELOCITY RESOLUTION	(Upper byte) 0.5 meters/second 1.0 meters/second	Integer Code	N/A	As Listed 2 4	N/A	6
PULSE WIDTH	(Lower byte) Short	Integer Code	N/A	As listed 2	N/A	6

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
	Long			4		
SPARE		N/A	N/A	N/A	N/A	7 to 11
ELEVATION ANGLE Note (2)						
WAVEFORM TYPE AND CONFIGURATION (Upper Byte)	Linear Channel Log Channel Random Phase Constant Phase	Integer Code	N/A	As Listed MSB=0 MSB=1 MSB=1 MSB=0	N/A	E2
WAVEFORM TYPE AND CONFIGURATION (Lower Byte)	(Mutually Exclusive) Contiguous Surveillance Contiguous Doppler w/ Ambiguity Resolution Contiguous Doppler w/o Ambiguity Resolution Batch Staggered Pulse Pair	Integer Code	N/A	As Listed 1 2 3 4 5	N/A	E2
SURVEILLANCE PRF NUMBER		Integer*2	N/A	1 to 8	1	E3
SURVEILLANCE PRF PULSE COUNT/RADIAL	Integer*2	N/A	1 to 999	1	E4	
AZIMUTH RATE		See Table XI-D				E5
REFLECTIVITY THRESHOLD	(LSB = 1/8 dB)	Integer*2,	dB	-12.0 to	1/8 dB	E6

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
		Scaled		+20.0		
VELOCITY THRESHOLD	(LSB = 1/8 dB)	Integer*2, Scaled	dB	-12.0 to +20.0	1/8 dB	E7
SPECTRUM WIDTH THRESHOLD	(LSB = 1/8 dB)	Integer*2, Scaled	dB	-12.0 to +20.0	1/8 dB	E8
SPARES		N/A	N/A	N/A	N/A	E9 to E11
EDGE ANGLE	Sector 1 Azimuth Clockwise Edge Angle (denotes start angle)	See Table III-A				E12
DOPPLER PRF NUMBER	Sector 1 Doppler PRF Number	Integer*2	N/A	1 to 8	1	E13
DOPPLER PRF PULSE COUNT/RADIAL	Sector 1 Doppler Pulse Count/Radial	Integer*2	N/A	1 to 999	1	E14
SPARE		N/A	N/A	N/A	N/A	E15
SAME AS E12 to E15 FOR SECTOR 2						E16 to E19
SAME AS E12 to E15 FOR SECTOR 3						E20 to E23

(1) For Constant Elevation Cut Type: (See Table XI-A, B, C for other types)
(2) For Each Elevation Cut.

Table XI-A Horizontal Raster Scan Pattern Data

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
NUMBER OF ELEVATION CUTS		Integer*2	N/A	1 to 25	1	4
CLUTTER MAP GROUP MEMBER		Integer*2	N/A	1 to 99	1	5
DOPPLER VELOCITY RESOLUTION	(Upper byte) 0.5 meters/second 1.0 meters/second	Integer Code	N/A	As Listed 2 4	N/A	6
PULSE WIDTH	(Lower byte) Short Long	Integer Code	N/A	As Listed 2 4	N/A	6
ELEVATION ANGLE Note (1)		See Table III-A				E1
WAVEFORM TYPE AND CONFIGURATION	Contiguous Surveillance Contiguous Doppler Batch Staggered Pulse Pair Linear Channel Log Channel Random Phase (first four are mutually exclusive; the two Channels are mutually exclusive; last	Integer Code	N/A	As Listed 2 4 8 16 MSB=0 MSB=1 Add 128 to above	N/A	E2

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
	item is additive)					
SURVEILLANCE PRF NUMBER		Integer*2	N/A	1 to 8	1	E3
SURVEILLANCE PRF PULSE COUNT/RADIAL		Integer*2	N/A	1 to 999	1	E4
AZIMUTH RATE		See Table XI-D				E5
EDGE ANGLE	Sector Counter Clockwise Edge Angle (denotes start angle)	See Table III-A				E6
EDGE ANGLE	Sector Clockwise Edge Angle (denotes start angle)	See Table III-A				E7
DOPPLER PRF NUMBER		Integer*2	N/A	1 to 8	1	E8
DOPPLER PRF PULSE COUNT/RADIAL		Integer*2	N/A	1 to 999	1	E9
THRESHOLD PARAMETER	(LSB = 1/8 dB)	Integer*2, Scaled	dB	-12.0 to +20.0	1/8 dB	E10

(1) For Each Elevation Cut.

Table XI-B Vertical Raster Scan Pattern

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
NUMBER OF ELEVATION CUTS		Integer*2	N/A	1 to 25	1	4
CLUTTER MAP GROUP NUMBER		Integer*2	N/A	1 to 99	1	5
DOPPLER VELOCITY RESOLUTION	(Upper byte) 0.5 meters/second 1.0 meters/second	Integer Code	N/A	As Listed 2 4	N/A	6
PULSE WIDTH	(Lower byte) Short Long	Integer Code	N/A	As Listed 2 4	N/A	6
ELEVATION ANGLE Note (1)		See Table III-A				A1
WAVEFORM TYPE AND CONFIGURATION	Contiguous Surveillance Contiguous Doppler Batch Staggered Pulse Pair Linear Channel Log Channel Random Phase (first four are mutually exclusive; the two Channels are mutually exclusive; last item is additive)	Integer Code	N/A	As Listed 2 4 8 16 MSB=0 MSB=1 Add 128 to above	N/A	A2

SURVEILLANCE PRF NUMBER		Integer*2	N/A	1 to 8	1	A3
SURVEILLANCE PRF PULSE COUNT/RADIAL		Integer*2	N/A	0 to 999	1	A4
ELEVATION RATE		See Table XI-D				A5
EDGE ANGLE	Sector Lower Edge Angle (denotes start angle)	See Table III-A				A6
EDGE ANGLE	Sector Upper Edge Angle (denotes start angle)	See Table III-A				A7
DOPPLER PRF NUMBER		Integer*2	N/A	1 to 8	1	A8
DOPPLER PRF PULSE COUNT/RADIAL		Integer*2	N/A	1 to 999	1	A9
THRESHOLD PARAMETER	(LSB = 1/8 db)	Integer*2, Scaled	db	-12.0 to +20.0	1/8 dB	A10

(1) For Each Elevation Cut.

Table XI-C Searchlight Pattern Data

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
SPARE		N/A	N/A	N/A	N/A	4
CLUTTER MAP GROUP NUMBER		Integer*2	N/A	1 to 99	1	5
DOPPLER VELOCITY RESOLUTION	(Upper byte) 0.5 meters/second 1.0 meters/second	Integer Code	N/A	As Listed 2 4	N/A	6
PULSE WIDTH	(Lower byte) Short Long	Integer Code	N/A	As Listed 2 4	N/A	6
ELEVATION ANGLE		See Table III-A				7
WAVEFORM TYPE AND CONFIGURATION	 Contiguous Surveillance Contiguous Doppler Batch Staggered Pulse Pair Linear Channel Log Channel Random Phase (first four are mutually exclusive; the two Channels are mutually exclusive; last item is additive)	Integer Code	N/A	As Listed 2 4 8 16 MSB=0 MSB=1 Add 128 to Above	N/A	8
SURVEILLANCE PRF NUMBER		Integer*2	N/A	1 to 8	1	9
SURVEILLANCE PRF PULSE COUNT/RADIAL		Integer*2	N/A	1 to 999	1	10
SPARE		N/A	N/A	N/A	N/A	11
AZIMUTH ANGLE		See Table III-A				12
DOPPLER PRF NUMBER		Integer*2	N/A	1 to 8	1	13
DOPPLER PRF PULSE COUNT/ RADIAL		Integer*2	N/A	1 to 999	1	14
THRESHOLD PARAMETER	(LSB = 1/8 dB)	Integer*2, Scaled	dB	-12.0 to +20.0	1/8 dB	15

Table XI-D Azimuth and Elevation Rate Data

BIT	WEIGHT
0	X Note (1)
1	X
2	X
3	0.010986328125
4	0.02197265625
5	0.0439453125
6	0.087890625
7	0.17578125
8	0.3515625
9	0.703125
10	1.40625
11	2.8125
12	5.625
13	11.25
14	22.5
15	Sign Bit (1 indicates negative

Note: Units are degrees/second
(1) X indicates not applicable
Word is 2's complement binary scaled integer (i.e., Integer *2)

Table XII Clutter Censor Zones (Message 8)

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
OVERRIDE REGIONS	Number of Clutter Map Override Regions	Integer	N/A	0 to 15	1	1
START RANGE (1)		Integer	Km	2 to 510	1	R1
STOP RANGE		Integer	Km	2 to 510	1	R2
START AZIMUTH		Scaled Integer	Degree	0 to 360	0/360 256	R3
STOP AZIMUTH		Scaled Integer	Degree	0 to 360	0/360 256	R4
ELEVATION SEGMENT NUMBER	Elevation segment 1 is closest to the ground, increasing segment number denotes increasing elevation.	Integer	N/A	1 to 5	1	R5
OPERATOR SELECT CODE	 Bypass Filter Forced (no filtering) Bypass Map in Control Clutter Filtering Forced	Integer Code	N/A	As Listed 0 1 2	N/A	R6
CHANNEL D.	Channel D. Clutter Suppression Level (Minimum) (Medium) (Maximum)	Integer Code	N/A	As Listed 1 2 3	N/A	R7
CHANNEL S.	Channel S. Clutter Suppression Level (Minimum) (Medium) (Maximum)	Integer Code	N/A	As Listed 1 2 3	N/A	R8

(1) For Each Region. Second region uses halfwords 10 through 17, third region uses halfwords 18 through 25, etc.

Table XIII Request for Data (Message 9)

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	HALFWORD LOCATION
DATA TYPE	(LSB = bit 0) Request Summary RDA Status Request RDA Performance Monitoring Data and more Complete Calibration Data Request Clutter Filter Bypass Map Request Clutter Filter Notchwidth Map	Integer Code (bit 0&7=1) (bit 1&7=1) (bit 2&7=1) (bit 3&7 = 1)	N/A	As Listed 129 130 132 136	N/A	1

Table XIV Clutter Filter Notchwidth Map

NAME	DESCRIPTION	FORMAT	UNITS	RANGE (OR VALUE)	ACCURACY/ PRECISION	BYTE LOCATION
Notchwidth Map Generation Date(1)	Julian Date - 2440586.5 Note (2)	Integer*2	Days	1 to 65535	1	1 to 2
Notchwidth Map Generation Time	Number of Minutes since Midnight Greenwich Mean Time	Integer*2	Minutes	0 to 1440	1	3 to 4
Op Code	 Bypass Filter Bypass map in Control Force Filter	Integer Code	N/A	As Listed 0 1 2	N/A	(2048*RangeZone) + (4*AzSeg) + (2*{El Seg-1}) +5
End Range (3)	Stop Range per Zone	Integer Code	Km	0 to 510	2	(2048*RangeZone) + (4*AzSeg) + (2*{El Seg-1}) + 6
Doppler Channel Width (D Notch)	 No Suppression Low Suppression Medium Suppression High Suppression	Integer Code	N/A	As Listed 0 1 2 3	N/A	(2048*RangeZone) + (4*AzSeg) + (2*{El Seg-1}) + 1029
Surveillance Channel Width (S Notch)	 No Suppression Low Suppression Medium Suppression High Suppression	Integer Code	N/A	As Listed 0 1 2 3	N/A	(2048*RangeZone) + (4*AzSeg) +(2*{El Seg-1}) + 1030

(1) Layout of data depicted in Table XIV-A
(2) 1 January 1970 00.00 Greenwich Mean Time = 1 Modified Julian Date
(3) Each elevation segment includes 256 azimuth radials, each of which consists of 116 range zones. Not all range zones of a radial need to be defined, only that the last defined range zone must have an END RANGE of 510. The first azimuth radial, R 0, subtends the angle (360 - 180/256 ≤ R 0 < 180/256) degrees, with the next azimuth radial, R 1, subtending the angle (180/256 ≤ R 1 < 540/256) degrees, etc. Increasing angles are taken to be clockwise relative to true north. Elevation segment number 1 is closest to the ground, increasing segment numbers denote increasing elevation

Table XIV-A Layout of Data in Clutter Filter Notchwidth Map

Notchwidth Map Generation Date (Upper Byte) (1)	Notchwidth Map Generation Date (Lower Byte)	Notchwidth Map Generation Time (Upper Byte)	Notchwidth Map Generation Time (Lower Byte) (4)				
El Seg 1 Az Seg 0 RangeZone 0 Op code (5)	El Seg 1 Az Seg 0 RangeZone 0 End range	El Seg 2 Az Seg 0 RangeZone 0 Op Code	El Seg 2 Az Seg 0 RangeZone 0 End Range	El Seg 1 Az Seg 1 RangeZone 0 Op Code	El Seg 1 Az Seg 1 RangeZone 0 End Range	El Seg 2 Az Seg 1 RangeZone 0 Op Code	El Seg 2 Az Seg 1 RangeZone 0 End Range (12)
El Seg 1 Az Seg 2 RangeZone 0 Op Code	El Seg 1 Az Seg 2 RangeZone 0 End Range	El Seg 2 Az Seg 2 RangeZone 0 Op Code	El Seg 2 Az Seg 2 RangeZone 0 End Range	El Seg 1 Az Seg 3 RangeZone 0 Op Code	El Seg 1 Az Seg 3 RangeZone 0 End Range	El Seg 2 Az Seg 3 RangeZone 0 Op Code	El Seg 2 Az Seg 3 RangeZone 0 End Range (20)
...	...	...	...	...	...	...	...
El Seg 1 Az Seg 254 RangeZone 0 Op Code	El Seg 1 Az Seg 254 RangeZone 0 End Range	El Seg 2 Az Seg 254 RangeZone 0 Op Code	El Seg 2 Az Seg 254 RangeZone 0 End Range	El Seg 1 Az Seg 255 RangeZone 0 Op Code	El Seg 1 Az Seg 255 RangeZone 0 End Range	El Seg 2 Az Seg 255 RangeZone 0 Op Code	El Seg 2 Az Seg 255 RangeZone 0 End Range (1028)
El Seg 1 Az Seg 0 RangeZone 0 D Notch	El Seg 1 Az Seg 0 RangeZone 0 S Notch	El Seg 2 Az Seg 0 RangeZone 0 D Notch	El Seg 2 Az Seg 0 RangeZone 0 S Notch	El Seg 1 Az Seg 1 RangeZone 0 D Notch	El Seg 1 Az Seg 1 RangeZone 0 S Notch	El Seg 2 Az Seg 1 RangeZone 0 D Notch	El Seg 2 Az Seg 1 RangeZone 0 S Notch (1036)
...	...	...	...	...	...	...	...
El Seg 1 Az Seg 254 RangeZone 0	El Seg 1 Az Seg 254 RangeZone 0	El Seg 2 Az Seg 254 RangeZone 0	El Seg 2 Az Seg 254 RangeZone 0	El Seg 1 Az Seg 255 RangeZone	El Seg 1 Az Seg 255 RangeZone	El Seg 2 Az Seg 255 RangeZone	El Seg 2 Az Seg 255 RangeZone 0

D Notch	S Notch	D Notch	S Notch	0 D Notch	0 S Notch	0 D Notch	S Notch (2052)
El Seg 1 Az Seg 0 RangeZone 1 Op Code	El Seg 1 Az Seg 0 RangeZone 1 End Range	El Seg 2 Az Seg 0 RangeZone 1 Op Code	El Seg 2 Az Seg 0 RangeZone 1 End Range	El Seg 1 Az Seg 1 RangeZone 1 Op Code	El Seg 1 Az Seg 1 RangeZone 1 End Range	El Seg 2 Az Seg 1 RangeZone 1 Op Code	El Seg 2 Az Seg 1 RangeZone 1 End Range (2060)
...	...	...	...	...	...	...	...
El Seg 1 Az Seg 254 RangeZone 15 Op Code	El Seg 1 Az Seg 254 RangeZone 15 End Range	El Seg 2 Az Seg 254 RangeZone 15 Op Code	El Seg 2 Az Seg 254 RangeZone 15 End Range	El Seg 1 Az Seg 255 RangeZone 15 Op Code	El Seg 1 Az Seg 255 RangeZone 15 End Range	El Seg 2 Az Seg 255 RangeZone 15 Op Code	El Seg 2 Az Seg 255 RangeZone 15 End Range (31748)
El Seg 1 Az Seg 0 RangeZone 15 D Notch	El Seg 1 Az Seg 0 RangeZone 15 S Notch	El Seg 2 Az Seg 0 RangeZone 15 D Notch	El Seg 2 Az Seg 0 RangeZone 15 S Notch	El Seg 1 Az Seg 1 RangeZone 15 D Notch	El Seg 1 Az Seg 1 RangeZone 15 Notch	El Seg 2 Az Seg 1 RangeZone 15 D Notch	El Seg 2 Az Seg 1 RangeZone 15 S Notch
…	...	...	...	...	...	...	...
El Seg 1 Az Seg 254 RangeZone 15 D Notch	El Seg 1 Az Seg 254 RangeZone 15 S Notch	El Seg 2 Az Seg 254 RangeZone 15 D Notch	El Seg 2 Az Seg 254 RangeZone 15 S Notch	El Seg 1 Az Seg 255 RangeZone 15 D Notch	El Seg 1 Az Seg 255 RangeZone 15 S Notch	El Seg 2 Az Seg 255 RangeZone 15 D Notch	El Seg 2 Az Seg 255 RangeZone 15 S Notch (32772)

Note: Bold fields indicate data changed from previous byte.

APPENDIX A WSR-88D RDA PROTOCOL CONFIGURATION OVERVIEW

The values described in this appendix are configured at the time of generating the RDA Concurrent Computer Corporation OS/32 operating system build.

Physical Layer (OSI Level 1)

Parameter	Description	Default	Permissible Values
T1Clock	T1 Clocking: Specifies whether internal of network (external) clock signals are to be used for timing.		NETWORK INTERNAL
T1FRAME	T1 Framing: Determines whether T1 framing shall be Extended Super Frame or Super Frame.	ESF	ESF or SF (SF is used for Twin Lakes KTLX only)
T1LCODE	T1 Line Code: Determines whether B8Zs or AMI T1 Line Coding shall be specified. This item should be allowed to be default so that the code shall be picked based on the T1FRAME value		0 for B8ZS Select if T1FRAME=ESF 2 for AMI Select if T1FRAME=SF

Additional Notes on Physical Layer
Conforms to T1 standards
Support for Extended Super Frame (ESF) and Super Frame (SF)

The data link parameters are described in the following table.

Data Link Layer (OSI Level 1) LAPB Controls

Parameter	Description	Default	Permissible Values
T200	T1 Timer: X.25 T1 Timer a.k.a. Frame Unacknowledge Timer. Values are increments of .05 seconds.	60	
T201	T2 Timer: X.25 T2 Timer a.k.a. Frame Acknowledge Timer. Values are increments of .05 seconds.	20	
T202	TEI Timer: Q.921(LAPD) TEI value. Values are increments of .05 seconds. A zero indicates inactive.	0	
T203	T3 Timer: X.25 T3 Timer a.k.a. Long Idle Timer. Values are increments of .05 seconds.	600	
N200	N2 Max Retransmissions a.k.a. Retry Counter: X.25 N2 maximum retransmissions.	3	
N201	N1 Max I-Frame Size: X.25 N1 maximum number of octets in an I-Frame.	4096	Any power of 2 up to 409
K	Max I-Frame Outstanding: X.25 maximum I-Frames awaiting acknowledgment.	7	1 - 127
CONTTYPE	Connections Type: x2912 for ESF-DCE x2512 for ESF-DTE x3912 for SF-DCE x3512 for SF-DTE	DCE	DCE DTE
HDLCCH	HDLC Channel Code: Y00FFFFFF for ESF-DCE Y00FFFFFF for ESF-DTE Y007FFFF for SF-DCE Y007FFFF for SF-DTE		FFFFFF If T1FRAME=ESF 7FFFFF If T1FRAME=SF

Additional Notes on Data Link Layer
Link Access Procedure Balanced (LAPB)
Single Link Procedures (SLP)
Connected Point to Point
Transmitting station performs ZBID insertion to ensure 1's density
Receiving station performs ZBID deletion

APPENDIX B GLOSSARY TABLE

Acronym / Abbreviation	Description
A/D	Analog/Digital
AC	Air conditioner
AGC	Automatic Gain Control
AMI	Alternate Mark Inversion
AMP	Ampere
ANSI	American National Standards Institute
ANT	Antenna
ARC/VSWR	Arc/Voltage Standing Wave Ratio
ARCH	Archive
ASCII	American Standard Code for Information Interchange
ATTEN	Attenuator
AU	Arithmetic Unit
AUX	Auxiliary
B8ZS	Bipolar with 8-zero substitution
BITE	Built-in-Test-Equipment
CAL	Calibration
CCITT	Consultative Committee International Telephone and Telegraph
CHAN	Channel
CHRG	Charge
CLIN	Contract Line Item Number
CMD	Command
COHO	Coherent
CSU	Channel Service Unit
CW	Contiguous Wave
D/A	Digital to Analog
DAU	Data Acquisition Unit
DB	Decibels
DBZ	Reflectivity, in decibels
DCE	Data Circuit-Terminating Equipment
DCU	Digital Communications Unit
DEG	Degree
DETECT	Detection
DIM	Diagnostic Interface Mode
DTE	Data Terminal Equipment
EDMA	Extended Direct Memory Access
ENAB	Enable
EQUIP	Equipment
ESF	Extended Superframe
FCS	Frame Check Sequence
FIL	Filter
FO	Fiber Optic
FREQ	Frequency
FRMR	Frame Reject
GEN	Generator
HEX	Hexadecimal
HSP	Hardwired Signal Processor

Acronym / Abbreviation	Description
HV	High Voltage
HASP	Hardwired Signal Processor
I/O	Input/Output
I/Q	In-phase/Quadrature
ID, I.D.	Identification
INIT	Initialization
INV.	Inverse
KLY	Klystron
KM	Kilometer
KW	Kilowatts
KWATTS	Kilowatts
LIN	Linear
LOG	Logarithmic
LSB	Least Significant Bit
M/WAVE	Microwave
MAINT	Maintenance
MC	Maintenance Console
MLOS	Microwave Line-Of-Sight
MM	Maintenance Mandatory
MMI	Man Machine Interface
MOD	Modified
MSB	Most Significant Bit
MVME	Motorola Versa Module Eurocard
MW	Megawatt
N/A	Not Applicable
NEXRAD	Next Generation Weather Radar
NRML	Normal
NTR	NEXRAD Technical Requirements
O.C.	Over Current
O.V.	Over Voltage
OPER	Operational
OS	Operating System
PED	Pedestal
PFN	Pulse Forming Network
PRF	Pulse Repetition Frequency
PRIM	Primary
PROT	Protection
PRT1	Pulse Repetition Timer 1
PS	Power Supply
PWR	Power
RAM	Random Access Memory
RCVR	Receiver
RDA	Radar Data Acquisition Group
RDASC	Radar Data Acquisition and Status Control
RECYC	Recycle
REDUND	Redundant
REF	Reference
REG	Regulator

Acronym / Abbreviation	Description
REQ'D	Required
RF	Radiated Frequency
RPG	Radar Product Generation Group
RRC	Request for Requirements Change
SCN	Specification Change Notice
SCND	Secondary
SEQ	Sequence
SF	Superframe
SMI	Serial Maintenance Interface
SPS	Signal Processor Subsystem
SSA	Secondary Station Address
STALO	Stable Local Oscillator
SVC	Supervisor Call
SW	Software
SYS	System
SYSCAL	System Calibration
TEMP	Temporary
TOUTS	Time-outs
TST	Test
TWA	Two-way Alternate Transmission
TWS	Two-way Simultaneous Transmission
TX	Transmitter
UART	Universal Asynchronous Receiver/Transmitter
V	Volts
VCP	Volume Coverage Pattern
VAC	Volts Alternating Current
VDC	Volts Direct current
VEL	Velocity
VME	Versa Module Eurocard
VMEBI	Versa Module Eurocard Bus Interface
VSWR	Voltage Standing Wave Ratio
W/	With
W/O	Without
WG	Wave Guide
XMTR	Transmitter