A. Serial Control Formats

The RCP8 is controlled by a two-way, asynchronous RS-232 data line that is typically run at speed of 19.2K baud. A host computer controls the servo and the antenna while receiving feedback status. The information is then transferred in packets consisting of two or more bytes—each packet begins with a SYNC byte and ends with an END byte of FF(Hex). All SYNC bytes have the MSB set and the value indicates the type of packet to follow. The variety of packets currently available are 80(hex) for antenna, C0(hex) for BITE, and B0(hex) for time. The packet layouts are described in the following paragraph. Each packet-type has a specific direction of travel, such as to or from the RCP8, but packets can arrive in any order within the serial stream.

Several types of antenna communication formats are supported. Older systems use the RCV01 and XMT01 formats but the newer systems can use the RCV02 and the XMT02 formats. The RCV03 format is intended for systems on moving platforms, such as ships or airplanes. One of the challenges of these systems is to correct the radar's measured radial velocity for the motion of the platform. To make this correction, the three-dimensional velocity and orientation of the platform must be recorded. Typically, the information comes from an inertial navigation system. For shipboard system, an update rate of approximately 20 reports per second can satisfy the velocity correction requirements at 19200 baud.

The following angles, with the exception of the latitude and the longitude, are transmitted as 14-bit binary angles. The latitude and longitude are both 21-bit binary angles.

- azimuth and elevation
- train order
- pitch, roll, and heading

In the XMT01 format, the angular speed is a signed number in units of 0.55^{o}/sec. In all other formats, the angular rates are in signed 14-bit binary angles per second. Therefore, the largest possible value is 180^{o}/sec (30 rpm) and the step is 0.022^{o}/sec. All velocities are in signed cm/sec with the altitude in signed meters. If some of the information is not available at the full resolution of the data format, the low bits are filled with zeros.

The azimuth and the elevation angles are corrected angles relative to the north and are the angles that the antenna is pointed relative to the deck of the platform. These calculations are derivable from the other angles but are also reported to assist in the data analysis, especially if one of the sensors or the stabilization fails.

The pitch is the angle between the fore-and-aft axis of the platform and the horizontal is measured in the vertical plane. The pitch is positive when the bow is down and the roll is the rotation angle about the fore-and-aft axis in its pitched position. The pitch is measured in the plane perpendicular to the fore-and-aft axis, which is generally not the vertical plane, and the roll is positive when the deck is down on the port side.

Note: The pitch can be directly measured by a level on the fore-and-aft axis but the roll cannot be directly measured by a one-axis tilt meter.

The heading is referred to as the direction the platform is pointed but is not the same as direction of motion. The platform could be pointed one way and drifting backwards.

The time stamp is a 14-bit counter incremented by the RCP8 once per millisecond. The RCP8 should latch all the data for a packet at the same time. This counter allows the host computer to accurately judge the time between samples without the serial line latencies and fluctuations due to the time sharing operating system.

The position of the platform is reported by the latitude, the longitude, and the altitude. Since the altitude may not be implemented for systems on ships, the setting will be zero.

Table A–1: Status Packet RCV01 Format (RCP8 to Host)

Char	Function
1	SYNC Byte (80 Hex)
2	Azimuth Low 7 bits
3	Azimuth High 7 bits
4	Elevation Low 7 bits
5	Elevation High 7 bits
6	Status #1 D6 = Low air flow D5 = Low Waveguide pressure D4 = Servo power D3 = Antenna Local mode D2 = Interlock D1 = Standby D0 = Radiate On
7	Status #2 D6 = RCP8 is shutdown D5 = LSB pulse width D4 = T/R power On D3 = T/R Local mode D2 = Spare D1 = MSB pulse width D0 = Magnetron current normal
8	End Of Message (FF Hex)

Table A–2: Control Packet XMT01 Format (Host to RCP8)

Char	Function
1	SYNC Byte (80 Hex)
2	Azimuth Low 7 bits
3	Azimuth High 7 bits
4	Elevation Low 7 bits
5	Elevation High 7 bits
6	Control Word #1 D6 = MSB of Pulse Width D5 = Leave Pulse Width unchanged D4 = Spare D3 = Signal Generator On D2 = Signal Generator CW D1 = EL (1 = Scan, 0 = Position) D0 = AZ (1 = Scan, 0 = Position)
7	Control Word #2 D6 = Reset RCP8 on edge D5 = Noise Source On D4 = LSB of Pulse width D3 = Radiate On complemented D2 = Radiate On D1 = Servo Power On D0 = T/R Power On
8	Control Word #3 (all spare)
9	Signal generator level (unsigned 0–127dB attenuation)
10	AZ/EL Antenna speed (signed 7 bit, 0.55 degree resolution)
11	END OF MESSAGE (FF Hex)

Table A–3: Status Packet RCV02 / RCV04 Format (RCP8 to Host)

Char	Function
1	SYNC Byte (80 Hex)
2	Azimuth Low 7 bits
3	Azimuth High 7 bits
4	Elevation Low 7 bits
5	Elevation High 7 bits
6	Azimuth Rate Low 7 bits
7	Azimuth Rate High 7 bits
8	Elevation Rate Low 7 bits
9	Elevation Rate High 7 bits
10	Status #1 D6 = Low air flow D5 = Low Waveguide pressure D4 = Servo Power D3 = Antenna Local mode D2 = Interlock Open D1 = Standby D0 = Radiate On
11	Status #2 D6 = RCP8 is shutdown D5 = LSB pulse width D4 = T/R Power On D3 = T/R Local mode D2 = Spare D1 = MSB pulse width D0 = Mag. current normal
12	Status #3 D6 = IRIS Mode 2 D5 = IRIS Mode 1 D4 = IRIS Mode 0 D3 = Spare D2 = Signal Generator fault D1 = Signal Generator On D0 = Signal Generator CW
13	Signal generator level (0=max power)
14	Time Stamp Low 7 bits
15	Time Stamp High 7 bits
16	END OF MESSAGE (FF Hex)

Table A–4: Control Packet XMT02 / XMT04 Format (Host to RCP8)

Char	Function
1	SYNC Byte (80 Hex)
2	Azimuth Low 7 bits
3	Azimuth High 7 bits
4	Elevation Low 7 bits
5	Elevation High 7 bits
6	Control Word #1 D6 = MSB of Pulse Width D5 = Leave Pulse Width unchanged D4 = Spare D3 = Signal Generator On D2 = Signal Generator CW D1 = EL (1 = Scan 0 = Position) D0 = AZ (1 = Scan 0 = Position)
7	Control Word #2 D6 = Reset RCP8 on rising edge D5 = Noise Source On D4 = LSB of Pulse width D3 = Radiate On complemented D2 = Radiate On D1 = Servo Power On D0 = T/R Power On
8	Control Word #3 D6 = IRIS Mode 2 D5 = IRIS Mode 1 D4 = IRIS Mode 0 D3 = Radar Workstation A okay D2 = Radar Workstation B okay D1 = Data Processor A okay D0 = Data Processor B okay
9	Signal Generator level (0–127 dB attenuation)
10	AZ Antenna Speed Low 7 bits
11	AZ Antenna Speed High 7 bits
12	EL Antenna Speed Low 7 bits
13	EL Antenna Speed High 7 bits
14	END OF MESSAGE (FF Hex)

Table A–5: Status Packet RCV03 Format (RCP8 to Host)

Char	Function
1	SYNC Byte (80 Hex)
2	Identification byte
3	Azimuth Low 7 bits (Earth relative)
4	Azimuth High 7 bits
5	Elevation Low 7 bits (Earth relative)
6	Elevation High 7 bits
7	Train Order Low 7 bits (azimuth of pedestal relative to the ship)
8	Train Order High 7 bits
9	Elevation Order Low 7 bits (elevation of pedestal relative to the ship)
10	Elevation Order High 7 bits
11	Pitch Low 7 bits
12	Pitch High 7 bits
13	Roll Low 7 bits
14	Roll High 7 bits
15	Heading Low 7 bits
16	Heading High 7 bits
17	Azimuth Rate Low 7 bits
18	Azimuth Rate High 7 bits
19	Elevation Rate Low 7 bits
20	Elevation Rate High 7 bits
21	Pitch Rate Low 7 bits (LSB = Zero)
22	Pitch Rate High 7 bits
23	Roll Rate Low 7 bits (LSB = Invalid Roll)
24	Roll Rate High 7 bits
25	Heading Rate Low 7 bits (LSB = Invalid Heading)
26	Heading Rate High 7 bits
27	Status #1 D6 = Low air flow D5 = Low Waveguide pressure D4 = Servo power D3 = Antenna Local mode D2 = Interlock open D1 = Standby D0 = Radiate ON

28 Status #2

D6 = RCP8 is shutdown
D5 = LSB pulse width
D4 = T/R Power on
D3 = T/R Local mode
D2 = Spare
D1 = MSB pulse width
D0 = Mag. current normal

29 Status #3

D6 = Reserved
D5 = Spare
D4 = Spare
D3 = Spare
D2 = Signal Generator fault
D1 = Signal Generator On
D0 = Signal Generator CW

30 Signal generator value (0=full signal)

31 Time Stamp Low 7 bits
32 Time Stamp High 7 bits

33 Latitude Low 7 bits
34 Latitude Middle 7 bits
35 Latitude High 7 bits

36 Longitude Low 7 bits
37 Longitude Middle 7 bits
38 Longitude High 7 bits

39 Altitude Low 7 bits
40 Altitude High 7 bits

41 Velocity East Low 7 bits (LSB = Invalid Lat/Lon)
42 Velocity East High 7 bits

43 Velocity North Low 7 bits (LSB = Zero)
44 Velocity North High 7 bits

45 Velocity Up Low 7 bits (LSB = Invalid Altitude)
46 Velocity Up High 7 bits

47 END OF MESSAGE (FF Hex)

Table A–6: Status Packet RCV05 Format (RCP8 to Host)

Char	Function
1–15	These bytes exactly match the RCV02 / RCV04 format
16	Dual-System Status D6 = RCP8 is configured as a Dual-System D5 = Dual-System Mode MSB D4 = Dual-System Mode LSB D3 = This packet was sent from Unit "A" D2 = Information is known about the "Other" unit D1 = Unit "A" is the preferred system D0 = Unit "B" is disabled Note: The 2-bit Dual-System Mode codes are: 00 : Unknown 01 : System "A" 10: System "B" 11 : Auto Switch
17	Dual-System Status D6 = Unit "B" is okay D5 = Unit "B" Activity Code MSB D4 = Unit "B" Activity Code LSB D3 = Unit "A" is disabled D2 = Unit "A" is okay D1 = Unit "A" Activity Code MSB D0 = Unit "A" Activity Code LSB Note: The 2-bit Dual-System Activity codes are: 00 : Inactive 01 : Warmup 10: Active Now 11 : Reserved
18	Dual-System Status D6 = RCP8 is configured for voluntary flipping D5 = Unit "B" is offering to give up control D4 = Unit "A" is offering to give up control D3 = Unit "B" would be used if it were available D2 = Unit "A" would be used if it were available
19	Polarization Status D2:0 = Current Polarization XMT control 0=Horizontal; 1=Vertical; 2=Alternating; 3=Simultaneous D3 = Polarization switch is OK to XMT
20	Spare
21	Spare
22	Spare
23	Spare
24	END OF MESSAGE (FF Hex)

Table A–7: Control Packet XMT05 Format (Host to RCP8)

Char	Function
1–13	These bytes exactly match the XMT02 / XMT04 format
14	Control Word #4 D6 = Dual-System: Mode MSB D5 = Dual-System: Mode LSB D4 = Dual-System: Offer to relinquish control D3 = Dual-System: Unit would be used if available D2 = Spare D1 = Spare D0 = Spare Note: The 2-bit Dual-System Mode codes are: 00 : No change 01 : System "A" 10: System "B" 11 : Auto Switch
15	Control Word #5 D2:0 = Requested Polarization XMT control 0=Horizontal; 1=Vertical; 2=Alternating; 3=Simultaneous 7=Unchanged D6:3 = Spare
16	Spare
17	Spare
18	END OF MESSAGE (FF Hex)

Table A–8: Time Packet (RCP8 to Host)

Char	Function
1	SYNC Byte (B0 Hex)
2	Year Low 7 bits
3	Year High 7 bits
4	Month
5	Day
6	Hour
7	Minute
8	Second
9	1/100 of second
10	Status (unused, zero)
11	END OF MESSAGE (FF Hex)

Table A–9: Generic BITE Packet (RCP8 To/From Host)

The BITE status packet consists of a packet from 3 to 20 bytes in length. The first two bytes, and the last byte, are used for identification purposes. The bytes in the middle must have their MSB zero, but can contain arbitrary status in the lower 7 bits. This is typically used to report test results in the individual bits, such as cabinet interlocks, airflow sensors, and power supply checks.

Char	Function
1	SYNC Byte (C0 Hex)
2	Identification byte (00 Hex)
3	Status byte #1
4	Status byte #2
.	
.	
N–1	Status byte #N–3
N	END OF MESSAGE (FF Hex)

Table A–10: Q–BITE Status Packet (Both ways)

The Q-BITE (Quantitative byte) status packets consists of from 3 to 128 bytes. The first two and last bytes are used for identification purposes. The middle bytes must have the MSB set to zero and can contain an arbitrary value in the lower 7 bits. Typically this is used to report back voltage/power levels. This report should not be sent by the BITE every time the status changes. This report is sent in response to the Q-bite interrogate command. IRIS sends the interrogate command every 60 seconds.

The Q-BITE data stream consists of a series of integer values. Each value is packed into a series of 7-bit characters, using between 1 and 5 depending on the desired resolution. The low bits come first, and IRIS supports up to 32 bits per value. IRIS can easily be configured to display any such values with appropriate units and scaling.

Char	Function
1	SYNC Byte (AF Hex)
2	BITE Unit ID byte (selectable in the range 00–7F Hex)
3	Status byte #1
4	Status byte #2
.	
.	
N–1	Status byte #N–3
N	END OF MESSAGE (FF Hex)

Table A–11: Internal BITE Packet (RCP8 to Host)

The RCP8 can optionally generate this "internal" BITE packet. These bits convey additional status information that is not contained in any of the other transmission formats. The shutdown status of the RCP8 (up to 32 different conditions) is contained in the first five bytes. The last five bytes hold other miscellaneous information. The identification byte is selectable, so that conflicts with other BITE packets can be avoided.

Char	Function
1	SYNC Byte (C0 Hex)
2	Identification byte (User Choice)
3	Shutdown Conditions 0–6 D6 = EL Velocity Exceeded D5 = AZ Velocity Exceeded D4 = EL Axis Unresponsive D3 = AZ Axis Unresponsive D2 = EL Tach Inconsistent D1 = AZ Tach Inconsistent D0 = Diagnostics Failed
4	Shutdown Conditions 7–13 D6 = IP-SERIAL Conflicts D5 = EL Upper Lim Switch D4 = EL Lower Lim Switch D3 = EL–UP Shutdown Limit D2 = EL–LO Shutdown Limit D1 = AZ–HI Shutdown Limit D0 = AZ–LO Shutdown Limit
5	Shutdown Conditions 14–20 D6 = Reserved D5 = Reserved D4 = Reserved D3 = Reserved D2 = IP-DIGITAL-48 Conflicts D1 = Output Remap Conflict D0 = Missing IP-SYNCHRO
6	Shutdown Conditions 21–27 D6 = Reserved D5 = Reserved D4 = Reserved D3 = Reserved D2 = Reserved D1 = Reserved D0 = Reserved

7 Shutdown Conditions 28–31
- D6 = Spare
- D5 = Power-up error(s) occured
- D4 = RCP8 is shutdown (OR of Bits 0–31)
- D3 = User Shutdown #2
- D2 = User Shutdown #1
- D1 = Reserved
- D0 = Reserved

8 INU Status
- D6 = Invalid horizontal position/velocity
- D5 = Reduced vertical position/velocity
- D4 = Invalid vertical position/velocity
- D3 = Reduced roll and pitch
- D2 = Invalid roll and pitch
- D1 = Reduced heading
- D0 = Invalid heading

9 Antenna/Radar/Servo and INU status
- D6 = Reduced horizontal position/velocity
- D5 = No INU Data Stream
- D4 = T/R Power On
- D3 = T/R Local mode
- D2 = LSB pulse width
- D1 = MSB pulse width
- D0 = Mag. current normal

10 Antenna/Radar/Servo status
- D6 = Low air flow
- D5 = Low Waveguide pressure
- D4 = Servo Power
- D3 = Antenna Local mode
- D2 = Interlock Open
- D1 = Standby
- D0 = Radiate On

11 Local Variables V6, V5, V4, V3, V2, V1, V0

12 Local Variables V13, V12, V11, V10, V9, V8, V7

13 END OF MESSAGE (FF Hex)

Table A–12: Auxiliary Status/Control BITE Packets

The RCP8 contains 64 auxiliary status and control variables, labeled S[0:63] and C[0:63]. These bits may be sent to and from the host computer in the form of 13-byte BITE packets holding the full set of 64 bits. The format of these packets is the same in both directions, and the identification byte is selectable so that conflicts with other BITE packets can be avoided. A subset of the auxiliary bits may optionally be assigned to electrical input and output lines that are driven by one or two additional IP-DIGITAL-48 modules. The low numbered variables are assigned to however many hardware lines are allocated.

Char	Function							
1	SYNC Byte (C0 Hex)							
2	Identification byte (User Choice)							
3	Control/Status Bits	6	5	4	3	2	1	0
4	Control/Status Bits	13	12	11	10	9	8	7
5	Control/Status Bits	20	19	18	17	16	15	14
6	Control/Status Bits	27	26	25	24	23	22	21
7	Control/Status Bits	34	33	32	31	30	29	28
8	Control/Status Bits	41	40	39	38	37	36	35
9	Control/Status Bits	48	47	46	45	44	43	42
10	Control/Status Bits	55	54	53	52	51	50	49
11	Control/Status Bits	62	61	60	59	58	57	56
12	Control/Status Bit							63
13	END OF MESSAGE (FF Hex)							

Table A–13: WSR-88D DCU BITE Packet (RCP8 to Host)

The RCP8 will generate this BITE packet whenever the WSR-88D DCU pedestal interface has been enabled. The identification byte is selectable, so that conflicts with other BITE packets can be avoided. The "S" number appearing after each table entry is the numbered status variable that is driven by the respective bit. Most bits in the BITE packet are merely copies of their DCU counterparts (with their original word and bit numbers shown in parenthesis). However, S110 through S119 are supplied by the RCP8 itself.

Char	Function	
1	SYNC Byte (C0 Hex)	
2	Identification byte (User Choice)	
3	WSR-88D DCU Status and Fault Conditions	
	D6 = (1/6) Elev Axis Enc Light Source Monitor	(S70)
	D5 = (1/5) Spare	(S69)
	D4 = (1/4) Elevation Axis minus Normal Limit	(S68)
	D3 = (1/3) Elevation Axis plus Normal Limit	(S67)
	D2 = (1/2) Spare	(S66)
	D1 = (1/1) Elevation Axis Deal Limit	(S65)
	D0 = (1/0) Elevation Axis PCU Data Parity	(S64)
4	WSR-88D DCU Status and Fault Conditions	
	D6 = (1/14) Elevation Axis Motor Over Temp.	(S77)
	D5 = (1/13) +150 V Under Voltage	(S76)
	D4 = (1/12) +150 V Over Voltage	(S75)
	D3 = (1/11) EL Axis Servo Amp Over Temp	(S74)
	D2 = (1/10) EL Axis Servo Amp Short Circuit	(S73)
	D1 = (1/9) Elevation Axis Servo Amp Inhibit	(S72)
	D0 = (1/7) Elevation Axis Gearbox Oil Level	(S71)
5	WSR-88D DCU Status and Fault Conditions	
	D6 = (2/5) Elevation Handwheel Engaged	(S84)
	D5 = (2/4) Spare	(S83)
	D4 = (2/3) Azimuth Axis Bull Gear Oil Level	(S82)
	D3 = (2/2) Azimuth Axis Gearbox Oil Level	(S81)
	D2 = (2/1) Azith Axis Encoder Light Source Mon	(S80)
	D1 = (2/0) Azimuth Axis PCU Data Parity	(S79)
	D0 = (1/15) Elevation Axis Stow Pin Engaged	(S78)
6	WSR-88D DCU Status and Fault Conditions	
	D6 = (2/13) Spare	(S91)
	D5 = (2/12) Spare	(S90)
	D4 = (2/11) AZ Axis Servo Amp Over Temp	(S89)
	D3 = (2/10) AZ Axis Servo Amp Short Circuit	(S88)

	D2 = (2/9) Azimuth Axis Servo Amp Inhibit	(S87)
	D1 = (2/7) Spare	(S86)
	D0 = (2/6) Azimuth Handwheel Engaged	(S85)
7	WSR-88D DCU Status and Fault Conditions	
	D6 = (3/4) Spare	(S98)
	D5 = (3/3) Spare	(S97)
	D4 = (3/2) Spare	(S96)
	D3 = (3/1) Spare	(S95)
	D2 = (3/0) Spare	(S94)
	D1 = (2/15) Azimuth Axis Stow Pin Engaged	(S93)
	D0 = (2/14) Azimuth Axis Motor Over Temp	(S92)
8	WSR-88D DCU Status and Fault Conditions	
	D6 = (3/12) Azimuth Axis Servo Amp PS	(S105)
	D5 = (3/11) Spare	(S104)
	D4 = (3/10) Spare	(S103)
	D3 = (3/9) Spare	(S102)
	D2 = (3/7) Spare	(S101)
	D1 = (3/6) Spare	(S100)
	D0 = (3/5) Spare	(S99)
9	WSR-88D DCU Status and Fault Conditions	
	D6 = Spare	(S112)
	D5 = Spare	(S111)
	D4 = Spare	(S110)
	D3 = DCU Timeout (From DCU antenna record)	(S109)
	D2 = (3/15) Ped Interlock	(S108)
	D1 = (3/14) Servo Off	(S107)
	D0 = (3/13) Elevation Axis Servo Amp PS	(S106)
10	WSR-88D DCU Status and Fault Conditions	
	D6 = No ANT record received for 0.5 seconds	(S119)
	D5 = No BIT record received for 2.5 seconds	(S118)
	D4 = Spare	(S117)
	D3 = Spare	(S116)
	D2 = Spare	(S115)
	D1 = Spare	(S114)
	D0 = Spare	(S113)
11	END OF MESSAGE (FF Hex)	

Table A–14: WSR-88D DCU Self-Test1 BITE Packet (RCP8 to Host)

The RCP8 will generate this BITE packet whenever the WSR-88D DCU pedestal responds to a Self-Test1 command. Most bits in the BITE packet are merely copies of their DCU counterparts (with their original word and bit numbers shown in parenthesis).

Char	Function	
1	SYNC Byte (C0 Hex)	
2	Identification byte (User Choice)	
3	D6 = (1/6)	Az Command loopback
	D5 = (1/5)	Az Command loopback
	D4 = (1/4)	Az Command loopback
	D3 = (1/3)	Az Command loopback
	D2 = (1/2)	Az Command loopback
	D1 = (1/1)	Az Command loopback
	D0 = (1/0)	Az Command loopback
4	D6 = (1/13)	Az Command loopback
	D5 = (1/12)	Az Command loopback
	D4 = (1/11)	Az Command loopback
	D3 = (1/10)	Az Command loopback
	D2 = (1/9)	Az Command loopback
	D1 = (1/8)	Az Command loopback
	D0 = (1/7)	Az Command loopback
5	D6 = (2/4)	El Command loopback
	D5 = (2/3)	El Command loopback
	D4 = (2/2)	El Command loopback
	D3 = (2/1)	El Command loopback
	D2 = (2/0)	El Command loopback
	D1 = (1/15)	Az Command loopback
	D0 = (1/14)	Az Command loopback
6	D6 = (2/11)	El Command loopback
	D5 = (2/10)	El Command loopback
	D4 = (2/9)	El Command loopback
	D3 = (2/8)	El Command loopback
	D2 = (2/7)	El Command loopback
	D1 = (2/6)	El Command loopback
	D0 = (2/5)	El Command loopback
7	D6 = Spare	
	D5 = Spare	
	D4 = Spare	
	D3 = (2/15)	El Command loopback

	D2 = (2/14)	El Command loopback
	D1 = (2/13)	El Command loopback
	D0 = (2/12)	El Command loopback
8	END OF MESSAGE (FF Hex)	

Table A–15: WSR-88D DCU Self-Test2 BITE Packet (RCP8 to Host)

The RCP8 will generate this BITE packet whenever the WSR-88D DCU pedestal responds to a Self-Test2 command. Most bits in the BITE packet are merely copies of their DCU counterparts (with their original word and bit numbers shown in parenthesis).

Char	**Function**	
1	SYNC Byte (C0 Hex)	
2	Identification byte (User Choice)	
3	D6 = (1/6)	AZ Power Amp
	D5 = (1/5)	Spare
	D4 = (1/4)	Spare
	D3 = (1/3)	Spare
	D2 = (1/2)	Spare
	D1 = (1/1)	Spare
	D0 = (1/0)	Digital PWA
4	D6 = (1/13)	Spare
	D5 = (1/12)	El Encoder
	D4 = (1/11)	AZ Encoder
	D3 = (1/10)	El Motor
	D2 = (1/9)	AZ Motor
	D1 = (1/8)	Analog PWA
	D0 = (1/7)	El Power Amp
5	D6 =	<unused>
	D5 =	<unused>
	D4 =	<unused>
	D3 =	<unused>
	D2 =	<unused>
	D1 = (1/15)	Spare
	D0 = (1/14)	Spare
6	END OF MESSAGE (FF Hex)	

Table A–16: WSR-88D DAU BITE Packet (RCP8 to Host)

The RCP8 will generate this BITE packet whenever the WSR-88D DAU pedestal interface has been enabled. The identification byte is selectable, so that conflicts with other BITE packets can be avoided. The "S" number appearing after each table entry is the numbered status variable that is driven by the respective bit. Most bits in the BITE packet are merely copies of their DAU counterparts (with their original word and bit numbers shown in parenthesis). However, S232 through S245 are supplied by the RCP8 itself.

Char	Function	
1	SYNC Byte (C0 Hex)	
2	Identification byte (User Choice)	
3	WSR-88D DAU Status and Fault Conditions	
	D6 = (0/6) Maintenance Work Required	(S126)
	D5 = (0/5) Maintenance Model/No Control	(S125)
	D4 = (0/4) W/G PFN Transfer Interlock	(S124)
	D3 = (0/3) W/G Switch Dummy Load	(S123)
	D2 = (0/2) Transmitter Not Available	(S122)
	D1 = (0/1) Klystron Preheat	(S121)
	D0 = (0/0) Filament PS Off	(S120)
4	WSR-88D DAU Status and Fault Conditions	
	D6 = (1/5) Filament PS Voltage	(S133)
	D5 = (1/4) +45 VDC PS Summary Fault	(S132)
	D4 = (1/3) -15 VDC PS Summary Fault	(S131)
	D3 = (1/2) +28 VDC PS Summary Fault	(S130)
	D2 = (1/1) +15 VDC PS Summary Fault	(S129)
	D1 = (1/0) +5 VDC PS Summary Fault	(S128)
	D0 = (0/7) PFN Switch Long Pulse	(S127)
5	WSR-88D DAU Status and Fault Conditions	
	D6 = (2/4) Cabinet Air Temperature	(S140)
	D5 = (2/3) Cabinet Interlock	(S139)
	D4 = (2/2) W/G Arc/VSWR (summary)	(S138)
	D3 = (2/1) Spectrum Filter Low Pressure	(S137)
	D2 = (2/0) Circulator Over–Temperature	(S136)
	D1 = (1/7) Focus Coil PS Voltage	(S135)
	D0 = (1/6) Vacuum Pump PS Voltage	(S134)
6	WSR-88D DAU Status and Fault Conditions	
	D6 = (3/3) Main Power Overvoltage	(S147)
	D5 = (3/2) Modulator Switch Failure	(S146)
	D4 = (3/1) Modulator Inverter Current	(S145)
	D3 = (3/0) Modulator Overload	(S144)

	D2 = (2/7) Transmitter Spare	(S143)
	D1 = (2/6) Transmitter Spare	(S142)
	D0 = (2/5) Cabinet Airflow	(S141)
7	WSR-88D DAU Status and Fault Conditions	
	D6 = (4/2) Focus Coil Current	(S154)
	D5 = (4/1) Transmitter Overcurrent	(S153)
	D4 = (4/0) Transmitter Overvoltage	(S152)
	D3 = (3/7) Transmitter Spare	(S151)
	D2 = (3/6) Trigger Amplifier Failure	(S150)
	D1 = (3/5) Inverse Diode Current/Undervoltage	(S149)
	D0 = (3/4) Flyback Charge Failure	(S148)
8	WSR-88D DAU Status and Fault Conditions	
	D6 = (5/1) Klystron Filament Current	(S161)
	D5 = (5/0) Klystron Overcurrent	(S160)
	D4 = (4/7) Battery Charging	(S159)
	D3 = (4/6) Oil Level (Transmitter)	(S158)
	D2 = (4/5) PRF Limit (Summary)	(S157)
	D1 = (4/4) Oil Temperature (Transmitter)	(S156)
	D0 = (4/3) Focus Coil Airflow	(S155)
9	WSR-88D DAU Status and Fault Conditions	
	D6 = (6/0) 'One' Test Bit 0	(S168)
	D5 = (5/7) 'One' Test Bit 7	(S167)
	D4 = (5/6) 'One' Test Bit 6	(S166)
	D3 = (5/5) 'One' Test Bit 5	(S165)
	D2 = (5/4) Klystron Airflow	(S164)
	D1 = (5/3) Klystron Air Temperature	(S163)
	D0 = (5/2) Klystron Vacion Current	(S162)
10	WSR-88D DAU Status and Fault Conditions	
	D6 = (6/7) W/G, Pressure/Humidity	(S175)
	D5 = (6/6) Post–Charge Regulator Maintenance	(S174)
	D4 = (6/5) Modulator Switch Maintenance	(S173)
	D3 = (6/4) 'One' Test Bit 4	(S172)
	D2 = (6/3) 'One' Test Bit 3	(S171)
	D1 = (6/2) 'One' Test Bit 2	(S170)
	D0 = (6/1) 'One' Test Bit 1	(S169)
11	WSR-88D DAU Status and Fault Conditions	
	D6 = (7/6) 'Zero' Test Bit 6	(S182)
	D5 = (7/5) 'Zero' Test Bit 5	(S181)
	D4 = (7/4) 'Zero' Test Bit 4	(S180)
	D3 = (7/3) 'Zero' Test Bit 3	(S179)

D2 = (7/2) 'Zero' Test Bit 2 (S178)
D1 = (7/1) 'Zero' Test Bit 1 (S177)
D0 = (7/0) 'Zero' Test Bit 0 (S176)

12 WSR-88D DAU Status and Fault Conditions
D6 = (8/5) Spare (S189)
D5 = (8/4) UART Error (S188)
D4 = (8/3) COHO/Clock (S187)
D3 = (8/2) Transmitter Inoperable (S186)
D2 = (8/1) Transmitter Recycle (S185)
D1 = (8/0) HV Off (S184)
D0 = (7/7) 'Zero' Test Bit 7 (S183)

13 WSR-88D DAU Status and Fault Conditions
D6 = (9/4) Batter Voltage Low (S196)
D5 = (9/3) Auto–Transfer SW on Utility Power (S195)
D4 = (9/2) Generator Maintenance Required (S194)
D3 = (9/1) AC Unit 2 Compressor Shut Off (S193)
D2 = (9/0) AC Unit 1 Compressor Shut Off (S192)
D1 = (8/7) Spare (S191)
D0 = (8/6) Spare (S190)

14 WSR-88D DAU Status and Fault Conditions
D6 = (10/3) Equip Shelter Halon/Detect Sys Troub (S203)
D5 = (10/2) Aircraft Hazard Light Failure (S202)
D4 = (10/1) Generator Volt and Freq Available (S201)
D3 = (10/0) Generator Selector SW Not Auto (S200)
D2 = (9/7) TPS (Reserved) (S199)
D1 = (9/6) TPS (S198)
D0 = (9/5) Generator Engine Malfunction (S197)

15 WSR-88D DAU Status and Fault Conditions
D6 = (11/2) Utility Voltage and Frequency Avail (S210)
D5 = (11/1) Gen Shelter Halon/Detect Sys Trbl (S209)
D4 = (11/0) Fire/Smoke in Generator Shelter (S208)
D3 = (10/7) -9 V Receiver PS Summary Fault (S207)
D2 = (10/6) +/– 18 V Receiver PS Summary Fault (S206)
D1 = (10/5) Fire/Smoke in Equipment Shelter (S205)
D0 = (10/4) +5 V Receiver PS Summary Fault (S204)

16 WSR-88D DAU Status and Fault Conditions
D6 = (12/1) Security System Equipment Trouble (S217)
D5 = (12/0) Security Syst Unauthor Entry Alarm (S216)
D4 = (11/7) -5.2 V A/D Converter PS Summ Fault (S215)
D3 = (11/6) Spare (S214)

	D2 = (11/5) +5 V A/D Converter PS Sum. Fault	(S213)
	D1 = (11/4) +/– 15 V A/D Convert PS Sum. Fault	(S212)
	D0 = (11/3) +9 V Receiver PS Summary Fault	(S211)
17	WSR-88D DAU Status and Fault Conditions	
	D6 = (13/0) AC Unit 1 Filter Dirty	(S224)
	D5 = (12/7) Radome Access Hatch Open	(S223)
	D4 = (12/6) Receiver Not Conn. to Antenna	(S222)
	D3 = (12/5) Spare	(S221)
	D2 = (12/4) Spare	(S220)
	D1 = (12/3) +5 V Receivr Protect PS Sum. Fault	(S219)
	D0 = (12/2) Security System Disabled	(S218)
18	WSR-88D DAU Status and Fault Conditions	
	D6 = (13/7) Spare	(S231)
	D5 = (13/6) Spare	(S230)
	D4 = (13/5) Spare	(S229)
	D3 = (13/4) AC Unit 4 Filter Dirty	(S228)
	D2 = (13/3) AC Unit 3 Filter Dirty	(S227)
	D1 = (13/2) Transmitter Filter Dirty	(S226)
	D0 = (13/1) AC Unit 2 Filter Dirty	(S225)
19	WSR-88D DAU Status and Fault Conditions	
	D6 = Spare	(S238)
	D5 = Spare	(S237)
	D4 = Spare	(S236)
	D3 = Spare	(S235)
	D2 = Spare	(S234)
	D1 = Spare	(S233)
	D0 = Spare	(S232)
20	WSR-88D DAU Status and Fault Conditions	
	D6 = No DAU reply to last command	(S245)
	D5 = Spare	(S244)
	D4 = Spare	(S243)
	D3 = Spare	(S242)
	D2 = Spare	(S241)
	D1 = Spare	(S240)
	D0 = Spare	(S239)
21	END OF MESSAGE (FF Hex)	

Many of the DAU functions can also be controlled from the RCP8 via numbered control variables as follows. When DAU mode is enabled, a new DAU "Data Message" is sent every second, and immediately after a control BITE packet is received.

Audible Alarm Control-1	(C63)
Audible Alarm Control-2	(C62)
High Voltage ON Command	(C61)
Antenna Command	(C60)
Channel 2 Command	(C59)
Pedestal Operate	(C58)
Spare Lamp Driver	(C57)
Switch to Diesel Generator	(C56)
Switch to Utility Power	(C55)
Audible Alarm Enable	(C54)

Table A–17: WSR-88D DAU Q-BITE Packet (RCP8 to Host)

In addition to the standard BITE packets shown in Table A–16, the RCP8 will output the following Q-BITE packets which represent the quantitative values that are read from the DAU. The numbers shown in parenthesis are the original DAU status byte numbers that supplied each value. A total of 30 14-bit values are sent.

Char	Function
1	SYNC Byte (AF Hex)
2	Identification byte (User Choice)
3–4	(14) Outside Ambient Temperature
5–6	(15) Equipment Shelter Temperature
7–8	(16) AC Unit 1 Discharge Air Temperature
9–10	(17) Transmitter Discharge Air Temperature
11–12	(18) Radome Area Temperature
13–14	(19) Generator Shelter Temperature
15–16	(20) Storage Tank Fuel Level
17–18	(27) AC Unit 3 Discharge Air Temperature
19–20	(28) AC Unit 2 Discharge Air Temperature
21–22	(31) Transmitter RF Power
23–24	(32) Antenna RF Power
25–26	(34) AC Unit 4 Discharge Air Temperature
27–28	(37) Pedestal +28V Power
29–30	(38) Encoder +5V Power
31–32	(39) Pedestal +15V Power
33–34	(41) Pedestal +5V Power
35–36	(44) Signal Processor +5V Power
37–38	(46) Maintenance Console +28V Power
39–40	(47) Maintenance Console +15V Power
41–42	(48) Maintenance Console +5V Power

43–44	(52) Pedestal –15V Power
45–46	(55) Maintenance Console –15V Power
47–48	(57) DAU Test 0
49–50	(58) DAU Test 1
51–52	(59) DAU Test 2
53–54	Spare
55–56	Spare
57–58	Spare
59–60	Spare
61–62	Spare
63	END OF MESSAGE (FF Hex)

Table A–18: BITE Interrogate Packet (Host to RCP8)

The BITE "interrogate" packet is a request to a remote device that it immediately reply with its current BITE packet(s). This is how the local device can insure that it has the most recent valid data.

The RCP8 will send BITE "interrogate" packets to the host computer whenever the RCP8 is expecting to receive BITE packets of any sort. These RCP8 "interrogate" requests are sent every 30 seconds beginning at startup. This insures that all control bits will be valid in the RCP8 immediately upon startup, and will resume their correct states after any serial line interruptions.

The RCP8 responds to incoming BITE "interrogate" packets by sending the current version of all standard BITE status packets that it is configured to output. Q-BITE packets are not sent in response to this command.

Char	**Function**
1	SYNC Byte (C0 Hex)
2	Command (0x4D = Interrogate)
3	END OF MESSAGE (FF Hex)

Table A–19: Q-BITE Interrogate Packet (Host to RCP8)

This packet has the same function as the standard BITE Interrogate packet, except that only the Quantitative BITE units will report back.

Char	**Function**
1	SYNC Byte (90 Hex)
2	Command (0x01 = Interrogate)
3	END OF MESSAGE (FF Hex)

Table A–20: BITE Individual Request Packet (Host to RCP8)

The BITE individual request packet is used to request information about a single BITE unit, separate from all the others.

The RCP8 responds to an interrogate packet by sending the current version of the specified BITE status packet. The RCP8 responds to a sample data packet by sending requests out the the remote device to get information, then responding to the host computer with the new BITE status packet when the information arrives. The RCP8 responds to the reset packet by sending a reset command to the remote device.

Char	Function
1	SYNC Byte (C1 Hex)
2	ID of the BITE unit for which the command will be applied
3	Command: 0x4D=Interrogate, 0x44=Sample Data, 0x43=Reset
4	END OF MESSAGE (FF Hex)

Table A–21: Chat-Mode Packet

These packets are sent in both directions to convey serial TTY communication. Up to six 7-bit characters can be sent in each packet with two characters of overhead for SYNC and END. This allows up to 75% of the available serial bandwidth to be used for chatting. If a "chat-mode" packet contains fewer than six characters, then a NULL (zero byte) is inserted after the last one.

Char	Function
1	SYNC Byte (F1 Hex)
2...7	7-Bit ASCII characters (possibly NULL terminated)
8	END OF MESSAGE (FF Hex)