

RADIO RECEIVER ALARM MATRIX

The radio receiver alarm matrix, Table A, can be used to quickly determine the most probable cause of a receiver alarm and the corrective action necessary to clear the alarm. The block diagram of the radio receiver, Fig. 1, supplements the alarm matrix by identifying the major radio receiver units and the nominal power levels. (A comparable diagram of the space diversity receiver appears as Fig. 9 under the previous SHELF tab.)

The receiver requirements are provided in Table B. These requirements should be met after replacing a defective unit and/or when performing a test identified in the alarm matrix or the replacement matrix. Space diversity requirements are contained under "Tests and Adjustments" in the O&M manuals and under the "Performance Monitoring" tab in this volume.

Table C lists the internal specifications for the IF FILTER and BASIC EQUALIZER modules that make up the IF FILTER AND BASIC EQUALIZER unit. These specifications are referenced from the requirements listed in Table B.

TABLE A
RADIO RECEIVER ALARM MATRIX (NOTES 1 THROUGH 6)

REMOTE SCAN POINT - ALARM(A) OR STATUS(S)	ALARM UNIT STATUS		UNIT STATUS			POSSIBLE CONDITION(S) CAUSING ALARM	SUGGESTED CORRECTIVE ACTION
	INDICATOR	ALARM CONDITION	UNIT	INDICATOR	ALARM CONDITION		
COMMON RADIO () RF PREAMP FAIL (A)	RCVR RF PRE AMP	Lighted	RF PREAMP	NORM	OFF	(1) Loss of dc voltage supply (2) Faulty RF PREAMPLIFIER unit	(1) Replace RCVR PWR unit associated with the preamplifier (2) Replace RF PREAMPLIFIER unit receiver
RCVG CHAN () RADIO FAIL (A)	RCVR: GEN OVEN COMB IF AMP ADPT EQL RF PREAMP	Lighted (If transmitter power units have not failed)	RCVR PWR	RCVR ON	OFF	(1) Faulty power unit (2) Abnormal current demand caused by associated receiver unit	(1) Replace RCVR PWR unit (2) Replace receiver unit causing abnormal current demand
RCVG CHAN () RADIO FAIL (A)	RCVR GEN OVEN	Lighted	DOWN CONV & MWV GEN	None	None	Faulty microwave generator unit in DOWN CONV & MWV GEN	Replace RECEIVER DOWN CONV & MWV GEN unit
RCVG CHAN () RADIO FAIL (A)	COMB	Lighted	IF COMBINER	MAN	Lighted	PUSHBUTTON IN MAN POSITION	Set pushbutton to AUTO position
				REGLPWIN DIVLPWIN	Lighted	Abnormally long fade, faulty IF COMBINER, RCVR DOWN CONVR & MWV GEN, or LINEAR DELAY EQUALIZER	If condition not temporary, check IF input to combiner. If input present, replace COMBINER. If no input or low, input, check RCVR DOWN CONV & MWV GEN and LINEAR DELAY EQUALIZER and replace if necessary
RCVG CHAN () RADIO FAIL (A)	RCVR IF AMP	Lighted	IF AGC AMPL	MAN	Lighted	(1) Pushbutton in the MAN position (2) Faulty IF AGC AMPL unit	(1) Set pushbutton to the AUTO position (2) Replace and adjust IF AGC AMPL unit

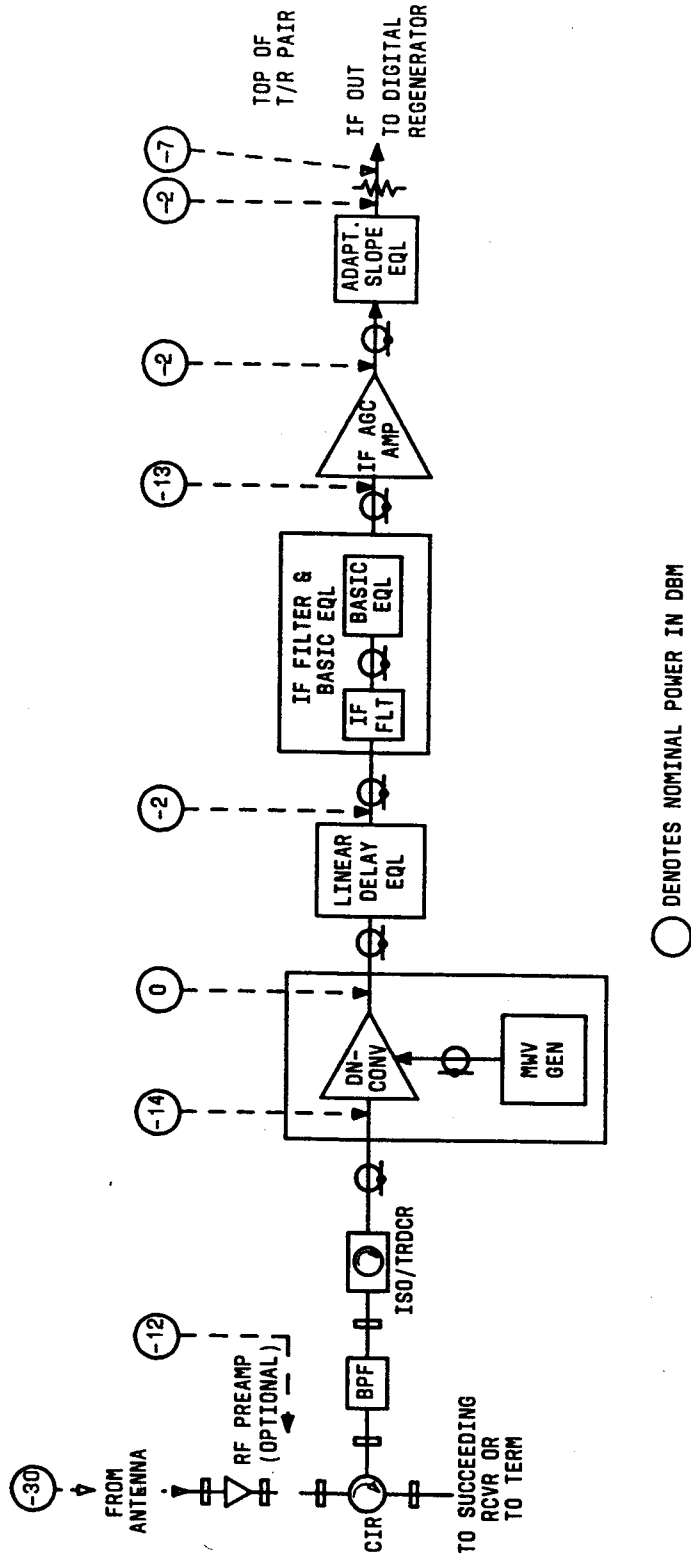
Notes:

1. Knowledge of admonishments, equipment, and procedures is required to use this matrix.
2. Indications are listed in order of priority.
3. DC voltages and cable connections should always be checked before attempting corrective action.
4. Detailed instructions to clear alarms are provided in "Radio Frame Trouble Isolation" tab in the Operations and Maintenance manual for the Terminal Station (421-300-103) or Regenerator Station (421-300-104).
5. Detailed instructions to replace units are provided in "Radio Receiver Replacement Procedures" in the Operation and Maintenance manual for the Terminal Station (421-300-103) or Regenerator Station (421-300-104).
6. Radio receiver requirements for the tests referenced in this matrix are provided in Table B.

TABLE A (Contd)							
RADIO RECEIVER ALARM MATRIX (NOTES 1 THROUGH 6)							
REMOTE SCAN POINT - ALARM(A) OR STATUS(S)	ALARM UNIT STATUS		UNIT STATUS			POSSIBLE CONDITION(S) CAUSING ALARM	SUGGESTED CORRECTIVE ACTION
	INDICATOR	ALARM CONDITION	UNIT	INDICATOR	ALARM CONDITION		
RCVG CHAN () RADIO FAIL (A)	RCVR IF AMP	Lighted	IF AGC AMPL	LPW IN (can be lighted without RCVR IF AMP indicator lighted)	Lighted	(1) Low IF input to IF AGC AMPL unit (2) Faulty IF AGC AMPL unit	(1) Check frequency and power levels at RECEIVER DOWN CONV & MWV GEN unit. Replace unit if necessary. If RF input is low, suspect RF PREAMPLIFIER, previous transmitter power problem, or waveguide components (2) Check loss of LINEAR DELAY EQUALIZER. Replace 2001() equalizer module(s) if necessary. (3) Check power level at output of IF COMBINER. Replace if necessary. (4) Check loss of IF FILTER AND BASIC EQUALIZER. If low, check IF FILTER insertion loss. Replace IF FILTER and/or BASIC EQUALIZER as necessary (5) Replace and adjust IF AGC AMPL unit
RCVG CHAN () RADIO FAIL (A)	RCVR ADPT EQL	Lighted	ADAPTIVE SLOPE EQL	EQL OFF	Lighted	(1) Pushbutton in the MAN position (2) Faulty ADAPTIVE SLOPE EQL unit	(1) Set pushbutton to the AUTO position (2) Replace ADAPTIVE SLOPE EQL unit

TABLE A (Contd)
RADIO RECEIVER ALARM MATRIX (NOTES 1 THROUGH 6)

REMOTE SCAN POINT - ALARM(A) OR STATUS(S)	ALARM UNIT STATUS		UNIT STATUS			POSSIBLE CONDITION(S) CAUSING ALARM	SUGGESTED CORRECTIVE ACTION
	INDICATOR	ALARM CONDITION	UNIT	INDICATOR	ALARM CONDITION		
RCVG CHAN () RADIO FAIL (A)	RCVR ADPT EQL	Lighted	ADAPTIVE SLOPE EQL	EXCS SLP	Lighted	(1) Faulty ADAPTIVE SLOPE EQL unit (2) Excessive slope input to ADAPTIVE SLOPE EQL unit	(1) Replace the ADAPTIVE SLOPE EQL unit (2) Check power level at IF AGC AMPL output. Replace unit if necessary (3) Check receiver IF-to-IF amplitude response. If good, suspect RF PREAMPLIFIER, previous transmitter shape trouble, or waveguide components (4) Check frequency and power levels at RECEIVER DOWN CONV & MWV GEN unit. Replace unit if necessary (5) Check amplitude response of LINEAR DELAY EQUALIZER. Replace EQUALIZER module(s) if necessary (6) Check amplitude response of IF FILTER AND BASIC EQUALIZER. If out of limits, check amplitude response of IF FILTER. Replace BASIC EQUALIZER and/or IF FILTER as necessary (7) If problem not localized above, replace IF COMBINER



○ DENOTES NOMINAL POWER IN DBM

Fig. 1—DR 6-40-140 Radio Receiver Block Diagram (Non-Space Diversity)

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TABLE B RADIO RECEIVER REQUIREMENTS (NOTES 1 AND 2)				
UNIT	TEST POINT	NOMINAL VALUE	RECOMMENDED ADJUSTMENT OR OPTIMUM TOLERANCE	MAINTENANCE OPERATING WINDOW
ALARM AND METER (-24 V and -48 V)	AGC V	Previous Recorded Value (Nominal = -1.0 V to -3.5 V)	None	None
	Abnormal Fading Check. Voltage varying greater than \pm ___ V			
	+5 V	+5 V	No Adjustment	± 0.3 V
	+15 V	+15 V	No Adjustment	± 0.4 V
	-15 V A	-15 V	No Adjustment	± 0.4 V
	-15 V B	-15 V	No Adjustment	± 0.4 V
RCVR PWR (-24 V and -48 V)	+5 V	+5 V	No Adjustment	± 0.3 V
	+15 V	+15 V	No Adjustment	± 0.4 V
	-15 V A	-15 V	No Adjustment	± 0.4 V
	-15 V B	-15 V	No Adjustment	± 0.4 V
	-24 V	-24 V	No Adjustment	-20 to -28.5 V
	-48 V	-48 V	No Adjustment	-42 to -60 V
Notes: 1. In-service measurements unless otherwise specified. 2. Gain measured at midband.				

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TABLE B (Contd)				
RADIO RECEIVER REQUIREMENTS (NOTES 1 AND 2)				
UNIT	TEST POINT	NOMINAL VALUE	RECOMMENDED ADJUSTMENT OR OPTIMUM TOLERANCE	MAINTENANCE OPERATING WINDOW
RF PREAMP	Power Plug Pin 4 to Pin 3 (GND)	+15 V	No Adjustment	±0.4 V
	Power Plug Pin 2 to Pin 1 (GND)	-15 V	No Adjustment	±0.4 V
	No Test Point	Gain at midband: 6 GHz = 11/18 dB 11 GHz = 8 dB	No Adjustment	±2 dB (No Fading)
RECEIVER DOWN CONV & MWV GEN	Cable removed from RF IN (Out of Service)	Previous Recorded Value (Nominal = -14 dBm)	No Adjustment	±4 dB (No Fading)
	IF OUT (Out of Service)	0 dBm	No Adjustment	±3 dB of Previous Gain
	GEN MON (Power)	-3.0 dBm	No Adjustment	±3 dB
	GEN MON (Frequency)	Frequency of Generator	6 GHz = ±3 kHz 11 GHz = ±5 kHz	6 GHz = ±140 kHz 11 GHz = ±240 kHz
LINEAR DELAY EQUALIZER*	IF IN to IF OUT (Loss)	Depends on codes used. See Table C.	No Adjustment	±4 dB
	IF IN to IF OUT (Amplitude & Delay Response)	Depends on codes used. See Table C.	No Adjustment	See LINEAR DELAY EQUALIZER Amplitude and Delay Response Test in "Tests and Adjustments" tab of O & M manuals
* See Table C for internal module characteristics.				

TABLE B (Contd)
RADIO RECEIVER REQUIREMENTS (NOTES 1 AND 2)

UNIT	TEST POINT	NOMINAL VALUE	RECOMMENDED ADJUSTMENT OR OPTIMUM TOLERANCE	MAINTENANCE OPERATING WINDOW
IF FILTER AND BASIC EQUALIZER*	IF IN to IF OUT (Loss) (Out of Service)	Previous Recorded Loss Value (Nominal = 11 dB below LINEAR DELAY EQL. IF OUT level) See TABLE C.	No Adjustment	±1 dB of Previous Recorded Value
	IF IN to IF OUT (Amplitude & Delay Response) (Out of Service)	Depends on codes used. See Table D.	No Adjustment	See IF Filter and Basic Equalizer Amplitude and Delay Response Test in "Tests and Adjustments" tab of O & M manuals
	IF FILTER Output (Power) (Out of Service)	Previous Recorded Value (Nominal = 9 dB below LINEAR DELAY EQL. IF OUT level)	No Adjustment	
	IF FILTER Output (Amplitude & Delay Response) (Out of Service)	Over 40 MHz: 7 dB insertion loss 0 ns delay	No Adjustment	±0.3 dB loss ±0.4 ns delay
IF AGC AMPL	IF OUT (Power) (MAN and AUTO) (Out of Service)	-2 dBm (No Fading)	-7 dBm ±0.2 dB (at IF OUT jack at top of frame)	±1.0 dB
	IF OUT (Amplitude Response) (Out of Service)	0	No Adjustment	±0.2 dB
	AGC V	Previous Recorded Value (Nominal = -1.0 V to -3.5 V)	No Adjustment	None
* See Table C for internal module characteristics.				

TABLE B (Contd) RADIO RECEIVER REQUIREMENTS (NOTES 1 AND 2)				
UNIT	TEST POINT	NOMINAL VALUE	RECOMMENDED ADJUSTMENT OR OPTIMUM TOLERANCE	MAINTENANCE OPERATING WINDOW
ADAPTIVE SLOPE EQL	IF OUT (Power) (Out of Service)	-2 dBm	No Adjustment	±1 dB
	IF OUT (MAN mode) (Amplitude Response) (Out of Service)	Flat	No Adjustment	±0.2 dB
	CONT V	Previous Recorded Value	No Adjustment	None
RECEIVER (Overall Receiver Amplitude Response)	LINEAR DELAY EQL. Network IF IN jack to ADAPT. SLOPE EQL. IF OUT jack (Out of Service)	0 dB slope 0.6 dB Amplitude Smile (Insertion Loss)	No Adjustment	±0.8 dB slope ±0.2 dB loss
	IF OUT jack at top of frame (Power) (Out of Service)	-7 dBm	±0.2 dB	±1 dB

TABLE C					
IF FILTER AND EQUALIZER CHARACTERISTICS					
CODE	DELAY SLOPE (NS) OVER 40 MHZ	DELAY TOLERANCE (NS) 70 ±20 MHZ	TYPICAL LOSS (DB) AT 70 MHZ	AMPLITUDE DEVIATION (DB) 70 ±20 MHZ	TYPICAL ABSOLUTE DELAY (NS) AT 70 MHZ
LINEAR DELAY EQUALIZER					
2001A	+2	<±0.4	1.1	<±0.2	8.05
2001B	-2	<±0.4	1.1	<±0.2	6.65
2001C	+4	<±0.4	1.7	<±0.2	27.0
2001D	-4	<±0.4	1.2	<±0.2	23.6
2001E	+6	<±0.4	1.7	<±0.2	26.5
2001F	-6	<±0.4	1.4	<±0.2	28.0
2001G	+8	<±0.4	1.4	<±0.2	29.0
2001H	-8	<±0.4	0.4	<±0.2	16.4
2001J	+10	<±0.4	1.5	<±0.2	27.0
2001K	-10	<±0.4	0.5	<±0.2	17.0
2001L	+20	<±0.4	1.5	<±0.2	26.0
2001M	-20	<±0.4	0.6	<±0.2	26.6
2001N	+30	<±0.4	3.2	<±0.2	33.0
2001P	-30	<±0.5	0.7	<±0.2	30.0
BASIC EQUALIZER					
2002A	15	< 2	4.9	< 0.2	60.0
2002B	20	< 2	5.0	< 0.2	65.0
2002E	10	< 1	5.6	<±0.2	50.5
2002F	25	< 2	4.6	<±0.5	69
IF BANDPASS FILTER					
1603A	0	< ±0.4	7.0	< ±0.3	49.5

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