TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

RADIO RECEIVER R-1051B/URR

PN 2058947–0501

Bendix Communications Division
N00039-65-C-0117

PUBLISHED BY DIRECTION OF
COMMANDER, NAVAL SEA SYSTEMS COMMAND

15 SEPTEMBER 1972

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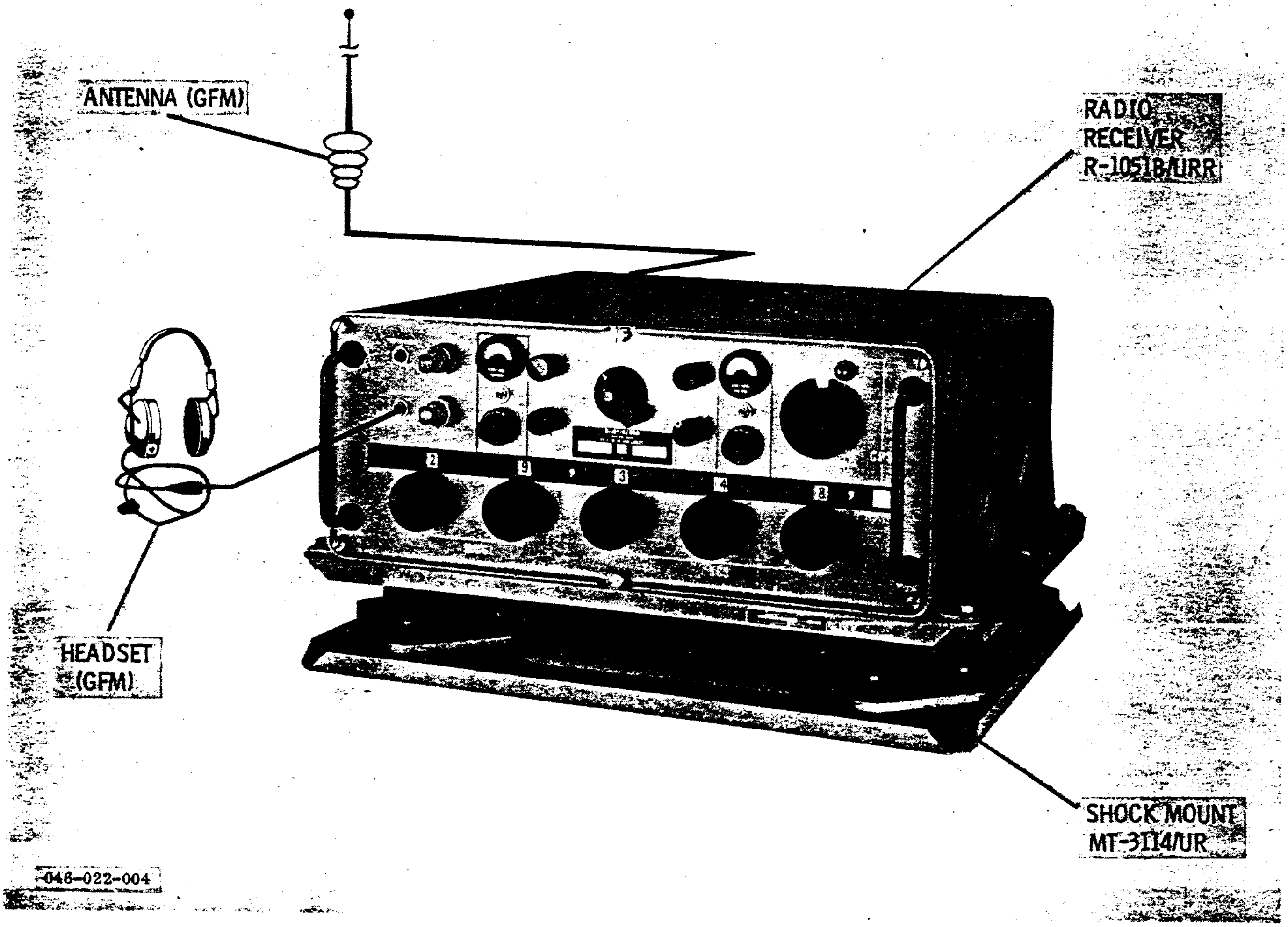


Figure 1-1. Radio Receiver R-1051B/URR

SECTION 1
GENERAL INFORMATION

1-1. SCOPE.

1-2. This Technical Manual is in effect upon receipt. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications. Volume I of this Technical Manual covers installation, troubleshooting procedures, maintenance procedures, and a parts list for Radio Receiver R-1051B/URR (hereafter also referred to as the receiver or R-1051B/URR). Operating procedures for the R-1051B/URR are contained in Volume II of this Technical Manual, NAVSHIPS 0967-427-4020.

1-3. GENERAL DESCRIPTION.

1-4. The R-1051B/URR is a digitally tuned superheterodyne receiver capable of receiving lower sideband (LSB), upper sideband (USB), independent sideband (ISB), frequency shift keyed (FSK), amplitude modulated (AM), and continuous wave (CW) transmissions in the 2.0- to 30.0-MHz frequency range. The ISB mode of operation allows two different types of intelligence to be received simultaneously, one on the LSB channel and one on the USB channel. FSK reception is obtained by using suitable ancillary equipment, such as Teletype Converter-Comparator AN/URA-17 or AN/URA-8. The R-1051B/URR may also receive tone-modulated continuous wave (MCW), compatible amplitude modulated (compatible AM), and facsimile (FAX) transmissions, through the use of suitable ancillary equipment.

1-5. The R-1051B/URR may be operated in conjunction with a transmitter in systems such as Radio Set AN/WRC-1B. In this application, either simplex or duplex operation is possible. The R-1051B/URR may also be used as a separate, self-contained receiver, requiring only a headset, antenna, and a nominal 115-Vac primary power source for full operation. The functional relationship of the R-1051B/URR to accessory equipment is illustrated in figure 1-1. The R-1051B/URR is intended for ship and shore installations. For either type of installation, the R-1051B/URR may be mounted in a standard 19-inch rack, or may be mounted to the supplied shock mount.

1-6. REFERENCE DESIGNATIONS.

1-7. Reference designations of the electronic assemblies and subassemblies of the R-1051B/URR are listed in table 1-1. See figure 1-2 for location of electronic assemblies and subassemblies in the R-1051B/URR.

1-8. FUNCTION.

1-9. The function of the R-1051B/URR is to extract the intelligence from any USB, LSB, ISB, CW, or AM transmission in the 2.0- to 30.0-MHz frequency range. The R-1051B/URR is also capable of receiving MCW, compatible AM, FAX, and FSK signals, using suitable ancillary equipment.

1-10. PHYSICAL CHARACTERISTICS.

1-11. The R-1051B/URR is housed in an aluminum case. The chassis is mounted on roller-type slides (one on each side), and is secured to the case by six-captive screws through the front panel. When fully extended from the case, the chassis may be tilted up on the slides to a 90-degree angle to expose the bottom for servicing. All operating controls and indicators are located on the front panel, and all power and signal input connections are made on the rear of the case. Handles are secured to the front panel to facilitate withdrawal of the chassis and transporting the unit. The chassis contains the chain-drive mechanism for tuning,

TABLE 1-1. RADIO RECEIVER R-1051B/URR, REFERENCE DESIGNATIONS

ASSEMBLY OR SUBASSEMBLY	REFERENCE DESIGNATION
Case	A1
Filter Box Electronic Assembly	A1A1
Chassis and Front Panel	A2
Receiver Mode Selector Electronic Assembly	A2A1
Receiver IF./Audio Amplifier Electronic Assembly	A2A2 and A2A3
RF Amplifier Electronic Assembly	A2A4
Frequency Standard Electronic Assembly	A2A5
Translator/Synthesizer Electronic Assembly	A2A6
MC Synthesizer Electronic Subassembly	A2A6A1
100 KC Synthesizer Electronic Subassembly	A2A6A2
1 and 10 KC Synthesizer Electronic Subassembly	A2A6A3
100 CPS Synthesizer Electronic Subassembly	A2A6A4
Spectrum Generator Electronic Subassembly	A2A6A5
RF Translator Electronic Subassembly	A2A6A6
Code Generator Electronic Assembly	A2A7
Power Supply Electronic Assembly	A2A8
Antenna Overload Electronic Assembly	A2A9
Light Panel Electronic Assembly	A2A10
CPS Vernier Assembly	A2A11

the receptacles for the plug-in electronic assemblies, and a power supply.

1-12. ELECTRICAL CHARACTERISTICS.

1-13. The R-1051B/URR employs a digital tuning scheme for automatically tuning in 100-Hz steps. Additional vernier tuning provides continuous tuning throughout the frequency range. All circuits (except two rf amplification stages) utilize solid-state devices. These circuits are assembled into plug-in electronic assemblies. The frequency generation circuits, which are referenced to an ultrastable frequency standard, provide a stability of 1 part in 10^8 per day.

1-14. REFERENCE DATA.

1-15. The following performance data provide a summary of the electrical characteristics of the R-1051B/URR:

a. Frequency range: 2.0 to 29.9999 MHz in 0.1-kHz increments, or 2.0 to 30.0 MHz with continuous vernier tuning between 1.0-kHz increments.

b. Receiver type: superheterodyne (triple conversion).

c. Frequency stability: 1 part in 10^8 per day.

d. Frequency accuracy: ±0.5 Hz at 5 MHz.

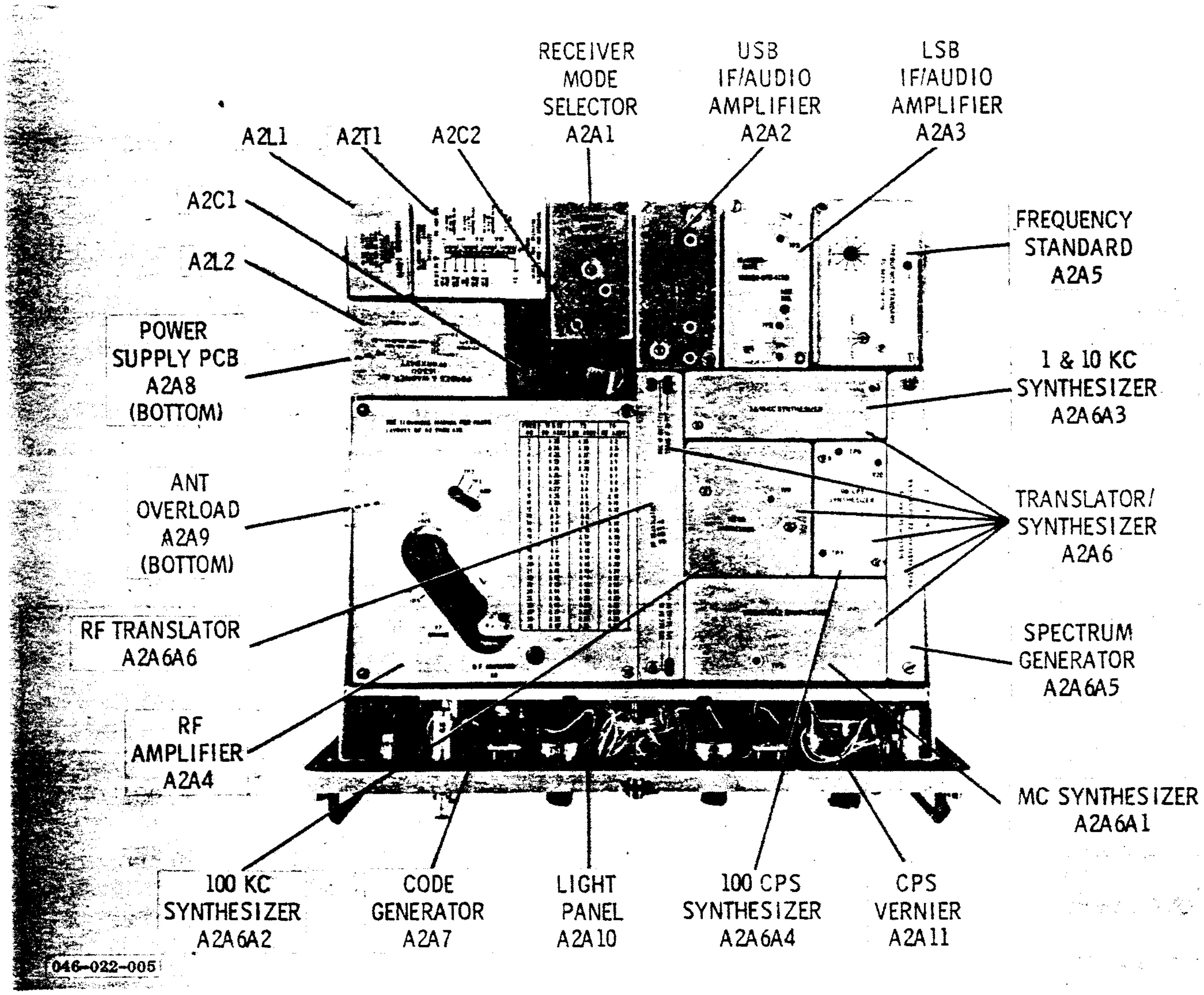


Figure 1-2. Radio Receiver R-1051B/URR, Top View, Case Removed

e. Type of frequency control: crystal-controlled synthesizer referenced to a 5-MHz internal or external standard, 0.2 volt minimum input.

f. Modes of operation: LSB, USB, ISB, AM, CW, and FSK.

g. Sensitivity: 1 μV for 10 dB $\frac{S+N}{N}$ in single-sideband (SSB) mode; 2 μV CW and FSK modes; and 4 μV in AM mode.

h. Receiver if.: first, 20 or 30 MHz; second, 2.85 MHz; third, 500 kHz.

i. Bandwidth: SSB, 3.2 kHz; AM and CW, 7 kHz.

j. Recommended antenna: 50-ohm impedance.

k. Ambient temperature limitations: 0°C to +50°C.

l. Power consumption: 55 watts.

m. Primary power requirements: 115 Vac ±10 percent, single phase, 48 to 450 Hz.

n. If. rejection: -75 dB.

o. Image rejection: -80 dB.

p. Audio output: 60 mV (mininum) into 600-ohm balanced or unbalanced remote output load; 15 mV (minimum) into 1200-ohm balanced load (local headset).

q. Audio distortion: less than 3 percent.

1-16. CRYSTAL COMPLEMENT.

1-17. The crystal complement of the R-1051B/URR is listed in table 1-2.

1-18. EQUIPMENT SUPPLIED.

1-19. Equipment and publications supplied with the R-1051B/URR are listed in table 1-3.

1-20. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

1-21. Accessory and test equipment and publications required but not supplied with the R-1051B/URR are listed in table 1-4.

1-22. FIELD AND FACTORY CHANGES.

1-23. Field and factory changes to the R-1051B/URR are listed in tables 1-5 and 1-6.

1-24. PREPARATION FOR RESHIPMENT.

1-25. To prepare the R-1051B/URR for reshipment, proceed as follows:

a. Ensure that all electronic assemblies are fastened securely. Check that tubes V1 and V2 in RF Amplifier Electronic Assembly A2A4 are mounted properly, using vibration-proof shields provided.

b. Set Mode Selector switch to OFF.

c. For reshipment, use containers and packing material similar to those originally used to ship the R-1051B/URR.

TABLE 1-2. RADIO RECEIVER R-1051B/URR, CRYSTAL COMPLEMENT

REFERENCE DESIGNATION	TYPE OF CUT	CRYSTAL OSCILLATOR FREQUENCY (MHz)	OPERATING TEMPERATURE RANGE (DEGREES CELSIUS)	TOLERANCE (PERCENT)
A2A5A3Y1	AT	5.000000	84.5 to 85.5	0.001
A2A6A1Y1	AT	2.499850	0 to 75	0.003
A2A6A1Y2	AT	3.499720	0 to 75	0.003
A2A6A1Y3	AT	4.499640	0 to 75	0.003
A2A6A1Y4	AT	5.499560	0 to 75	0.003
A2A6A1Y5	AT	7.499400	0 to 75	0.003
A2A6A1Y6	AT	8.499320	0 to 75	0.003
A2A6A1Y7	AT	9.499240	0 to 75	0.003
A2A6A1Y8	AT	10.499160	0 to 75	0.003
A2A6A1Y9	AT	11.499080	0 to 75	0.003
A2A6A1Y10	AT	12.499000	0 to 75	0.003
A2A6A1Y11	AT	14.498840	0 to 75	0.003
A2A6A1Y12	AT	15.498760	0 to 75	0.003
A2A6A1Y13	AT	16.498680	0 to 75	0.003

TABLE 1-2. RADIO RECEIVER R-1051B/URR, CRYSTAL COMPLEMENT (Cont)

REFERENCE DESIGNATION	TYPE OF CUT	CRYSTAL OSCILLATOR FREQUENCY (MHz)	OPERATING TEMPERATURE RANGE (DEGREES CELSIUS)	TOLERANCE (PERCENT)
A2A6A1Y14	AT	17.498600	0 to 75	0.003
A2A6A1Y15	AT	19.498440	0 to 75	0.003
A2A6A1Y16	AT	20.498360	0 to 75	0.003
A2A6A1Y17	AT	23.498120	0 to 75	0.003
A2A6A2Y1	AT	4.553	0 to 75	0.003
A2A6A2Y2	AT	4.653	0 to 75	0.003
A2A6A2Y3	AT	4.753	0 to 75	0.003
A2A6A2Y4	AT	4.853	0 to 75	0.003
A2A6A2Y5	AT	4.953	0 to 75	0.003
A2A6A2Y6	AT	5.053	0 to 75	0.003
A2A6A2Y7	AT	5.153	0 to 75	0.003
A2A6A2Y8	AT	5.253	0 to 75	0.003
A2A6A2Y9	AT	5.353	0 to 75	0.003
A2A6A2Y10	AT	5.453	0 to 75	0.003
A2A6A3Y1	AT	5.250	0 to 75	0.003
A2A6A3Y2	AT	5.240	0 to 75	0.003
A2A6A3Y3	AT	5.230	0 to 75	0.003
A2A6A3Y4	AT	5.220	0 to 75	0.003
A2A6A3Y5	AT	5.210	0 to 75	0.003
A2A6A3Y6	AT	5.200	0 to 75	0.003
A2A6A3Y7	AT	5.190	0 to 75	0.003
A2A6A3Y8	AT	5.180	0 to 75	0.003
A2A6A3Y9	AT	5.170	0 to 75	0.003
A2A6A3Y10	AT	5.160	0 to 75	0.003

TABLE 1-2. RADIO RECEIVER R-1051B/URR, CRYSTAL COMPLEMENT (Cont)

REFERENCE DESIGNATION	TYPE OF CUT	CRYSTAL OSCILLATOR FREQUENCY (MHz)	OPERATING TEMPERATURE RANGE (DEGREES CELSIUS)	TOLERANCE (PERCENT)
A2A6A3Y11	AT	1.850	0 to 75	0.003
A2A6A3Y12	AT	1.851	0 to 75	0.003
A2A6A3Y13	AT	1.852	0 to 75	0.003
A2A6A3Y14	AT	1.853	0 to 75	0.003
A2A6A3Y15	AT	1.854	0 to 75	0.003
A2A6A3Y16	AT	1.855	0 to 75	0.003
A2A6A3Y17	AT	1.856	0 to 75	0.003
A2A6A3Y18	AT	1.857	0 to 75	0.003
A2A6A3Y19	AT	1.858	0 to 75	0.003
A2A6A3Y20	AT	1.859	0 to 75	0.003

TABLE 1-3. RADIO RECEIVER R-1051B/URR, EQUIPMENT SUPPLIED

QTY PER EQPT	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOLUME (FT^3)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Radio Receiver	R-1051B/URR	7.0	17.38	18.9	1.33	70
1	Shock Mount	MT-3114/UR	4.25	19.71	16.66	0.81	16
1	Kit, Bracket Mounting						
1	Kit, Connector Mating, consisting of:						
2		MS-3106E-10SL-4S (for remote audio lines)					
1		MS-3106R-165-5S (for primary power)					
2		UG-941B/U (for antenna and 5-MHz input)					
1		UG-88/U (for 5-MHz output)					

TABLE 1-3. RADIO RECEIVER R-1051B/URR, EQUIPMENT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE NAME	NOMENCLATURE DESIGNATION	OVERALL DIMENSIONS (IN.) HEIGHT	WIDTH	DEPTH	VOLUME (FT^3)	WEIGHT (LB)
2	Technical Manual for Radio Receiver R-1051B/URR, Vol I	NAVSHIPS 0967-427-4010					
2	Operator's Manual for Radio Receiver R-1051B/URR, Vol II	NAVSHIPS 0967-427-4020					
1	Maintenance Standards Book for Radio Receiver R-1051B/URR	NAVSHIPS 0967-427-4030					
1	Performance Standards Sheet for Radio Receiver R-1051B/URR	NAVSHIPS 0967-427-4040					

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QTY PER EQPT	NOMENCLATURE NAME	NOMENCLATURE DESIGNATION	REQUIRED USE	EQUIPMENT CHARACTERISTICS
1	Antenna		Reception of rf signals	
1	Cable Set		Interconnection	
1	Headset		General operation	
1	Teletype Converter-Comparator	AN/URA-8 or AN/URA-17 (or equivalent)	FSK operation	
1	Audio Amplifier	AM-4453/U (or equivalent)	Speaker amplifier	
1	Kit, Extender Test Cables	W1	Mates with P1 on Receiver IF./Audio Amplifier Electronic Assembly A2A2 or A2A3	

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Kit, Extender Test Cables (Cont)	W2	Mates with P1 on Receiver Mode Selector Electronic Assembly A2A1	
		W3	Mates with P2 on Receiver Mode Selector Electronic Assembly A2A1	
1	Resistor	RC42GF510J	Maintenance	51 ohms, 2 watts
1	Resistor	RC42GF601J	Maintenance	600 ohms, 2 watts
1	RF Insert Extractor Tool	ITT Cannon P/N CET-C6B	Maintenance	
1	RF Insert Connector, Female	P/N DM 53740-5008	Troubleshooting	
1	RF Insert Connector, Male	P/N DM 53743-5014	Troubleshooting	
1	Speaker	LS-474/U (or equivalent)	Audio monitoring	
1	Multimeter	AN/PSM-4( ) (or equivalent)	Troubleshooting and maintenance procedures	Ranges: 0 to 100 Vdc, 9 ranges, 20,000 ohms/volt 0 to 250 Vac, 3 ranges, 5,000 ohms/volt 0 to 20 megohms, 5 ranges Accuracy: ±2 percent
1	RF Volt-meter	CCVO-91DA (or equivalent)	Troubleshooting and maintenance procedures	Input impedance: 20,000 ohms/volt at 500 kHz

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	RF Volt-meter (Cont)			Ranges: 0 to 1 mV 0 to 10 mV 0 to 100 mV 0 to 300 mV 0 to 1000 mV 0 to 3000 mV
1	AC Volt-meter	ME-6( )/U (or equivalent)	Troubleshooting and maintenance procedures	Frequency: 20 Hz to 5 kHz Input impedance: 100,000 ohms/volt Ranges: 0 to 0.1 volt 0 to 0.3 volt
1	Frequency Counter	AN/USM-207 (or equivalent)	Troubleshooting and maintenance procedures	Frequency range: 1 Hz to 100 MHz Period: 0.0 to 1 MHz Time interval: 1 μs to 10^7 s
1	RF Signal Generator	CAQI-606-A (or equivalent)	Troubleshooting and maintenance procedures	Output impedance: 50 ohms Frequency range: 2 to 30 MHz Output: 0 to 3 volts
1	Frequency Standard	AN/URQ-9( ) (or equivalent)	Troubleshooting and maintenance procedures	Outputs: 100 Hz, 500 kHz, and 5 MHz Stability: 1 part in 10^9 Output: 0.5 volt
1	Transistor Tester	AN/USM-206	Troubleshooting procedures	
1	Voltmeter Hetrodyne	*CDAN 2006	Troubleshooting procedures	
1	Test Set, Amplifier	*TS-2132/WRC-1	Testing RF Amplifier Electronic Assembly A2A4	Simulates actual operating conditions

* These items are available only at special Module Repair Facilities.

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Test Set, Translator/ Synthesizer	*TS-2133/WRC-1	Testing Translator/ Synthesizer Electronic Assembly A2A6	Simulates actual operating conditions
1	Test Set, Frequency Standard	*TS-2134/WRC-1	Testing Frequency Standard Electronic Assembly A2A5	Simulates actual operating conditions
1	Test Set, Electronic Circuit Plug-In Unit	*TS-2135/WRC-1	Testing common electronic assemblies	Simulates actual operating conditions
1	Electronic Multimeter	AN/USM-116( )	Troubleshooting and maintenance procedures	Voltage range: 0 to 1000 Vdc; 0 to 300 Vac (1000 Vac with external multiplier) Current range: 0 to 1000 mA dc Resistance range: 0 to infinite ohms Input impedance: Dc volts: 100 megohms; Ac volts: 15 megohms at 20 Hz, 5 megohms at 300 kHz, 125 kilohms at 500 MHz Frequency range: Up to 700 MHz Accuracy: Voltage and current: 2% (over 300 Vac, 4%); Resistance: 3% (over 10 megohms, ±1 degree of arc length)

* These items are available only at special Module Repair Facilities.

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE NAME	NOMENCLATURE DESIGNATION	REQUIRED USE	EQUIPMENT CHARACTERISTICS
1	Oscillo-scope	AN/USM-281( ) (or equivalent)	Troubleshooting and maintenance procedures	Frequency: Dc to 50 MHz Input impedance: X and Y Axis: 1 megohm Input sensitivity: 5 mV/cm
1	*Repair Book for AN/WRC-1B and R-1051B/URR, 2N Modules	NAVSHIPS 0967-034-2000	Troubleshooting and maintenance procedures	
1	*TS-2132/WRC-1B Test Data Booklet Depot	NAVSHIPS 0967-004-2000	Testing RF Amplifier Electronic Assembly A2A4	
1	*TS-2133/WRC-1B Test Data Booklet Depot	NAVSHIPS 0967-004-3000	Testing Translator/Synthesizer Electronic Assembly A2A6	
1	*TS-2134/WRC-1B Test Data Booklet Depot	NAVSHIPS 0967-004-4000	Testing Frequency Standard Electronic Assembly A2A5	
1	*TS-2135/WRC-1B Test Data Booklet Depot	NAVSHIPS 0967-004-5000	Testing common electronic assemblies	
1	*Hetrodyne Voltmeter CDAN 2006	Technical Manual 0969-247-2010		

* These items are available only at special Module Repair Facilities.

TABLE 1-4. RADIO RECEIVER R-1051B/URR, EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQPT	NOMENCLATURE NAME	NOMENCLATURE DESIGNATION	REQUIRED USE	EQUIPMENT CHARACTERISTICS
1	Coaxial T-Connector (BNC)	UG-274A/U	Troubleshooting and maintenance procedures	50 ohms
1	Adapter, BNC to N	UG-201/U	Troubleshooting and maintenance procedures	
1	AN/PSM-4( ) Technical Manual	NAVSHIPS 0967-911-6010	Troubleshooting and maintenance procedures	
1	CCVO-91DA Technical Manual	NAVSHIPS 0967-231-1010	Troubleshooting and maintenance procedures	
1	ME-6( )/U Technical Manual	NAVSHIPS 0967-091-0010	Troubleshooting and maintenance procedures	
1	AN/USM-116 Technical Manual	NAVSHIPS 93808	Troubleshooting and maintenance procedures	
1	AN/USM-281 Technical Manual	NAVSHIPS 0969-244-3010 and 3020	Troubleshooting and maintenance procedures	
1	CAQI-606-A Technical Manual	NAVSHIPS 0967-107-7010	Troubleshooting and maintenance procedures	
1	AN/URQ-9 Technical Manual	NAVSHIPS 0967-053-7010	Troubleshooting and maintenance procedures	
1	AN/USM-207 Technical Manual	NAVSHIPS 0969-028-4010 and 4020	Troubleshooting and maintenance procedures	
1	AN/USM-206 Technical Manual	NAVSHIPS 0969-002-7020	Troubleshooting and maintenance procedures	

TABLE 1-5. FIELD CHANGES

CHANGE	AUTHORIZATION	APPLICABILITY	IDENTIFICATION
1	NS0967-971-0140	All Serials	Four diodes mounted on underside of antenna overload protection assembly circuit board cover A2A9A2, figures 5-20 and 5-37.

TABLE 1-6. FACTORY CHANGES

NO.	AUTHORIZATION	APPLICABILITY	IDENTIFICATION
1	CO 117487	Data Not Available	A2A11A1R5 (63.4 ohms) changed to A2R23 (64.9 ohms).
2	CO 99258	Data Not Available	Refer to figure 5-3 and 5-4 for changes to if./audio amplifier A2A2/A2A3.
	CO 100065, 100079	Data Not Available	
	CO 100066	Data Not Available	
	CO 100230	Data Not Available	
	CO 100428	Data Not Available	
	CO 102371	Data Not Available	
	CO 102659, 102656	Data Not Available	
	CO 126644	Data Not Available	
	CO 103742	Data Not Available	
	CO 104134	Data Not Available	
	CO 104986	Data Not Available	
	CO 107471	Data Not Available	
	CO 113100	Data Not Available	
	CO 108164	Data Not Available	
	CO 109775	Data Not Available	
	CO 113086	Data Not Available	
	CO 117513	Data Not Available	
	CO 117512	Data Not Available	
	CO 118323	Data Not Available	
	CO 118713	Data Not Available	
	CO 122827	Data Not Available	
	CO 126361	Data Not Available	
	CO 127799	Data Not Available	
	CO 128081	Data Not Available	
	CO 8082-0021	Data Not Available	
3	CO 128155	Data Not Available	A2A11A1R7 changed from 4.7 megohms to 8.2 megohms.
4	CO 128157	Data Not Available	Ground at A2XDS5-2 rerouted to -30 Vdc at terminal F7 of A2S2D (Mode Selector switch).

SECTION 2
OPERATION

NOTE

This section is bound as Volume II. Refer to Volume II, Operation Instructions for Radio Receiver R-1051B/URR, NAVSHIPS 0967-427-4020, for operation of this equipment.

SECTION 3
FUNCTIONAL DESCRIPTION

3-1. GENERAL.

3-2. This section is divided into three parts: overall description, functional block diagram description, and functional circuit descriptions.

3-3. OVERALL DESCRIPTION.

3-4. GENERAL. The R-1051B/URR (see figure 3-1) is a triple-conversion superheterodyne receiver, tunable over the high-frequency range from 2 to 30 MHz. Tuning of the R-1051B/URR is accomplished digitally by five frequency controls (MCS and KCS) and a switch (CPS), located on the front panel. A display window directly above each MCS and KCS control provides a dicimal readout of the frequency to which the control is set. The displayed frequency can be changed in 1-kHz increments. The CPS switch allows the operating frequency to be changed in 100-Hz increments. This tuning provides 280,000 discrete frequencies in which the R-1051B/URR is locked to a very accurate frequency standard. Each 1-kHz increment can be continuously tuned through by selecting the V positions of the CPS switch. When using the CPS vernier control, the full accuracy of the frequency standard is sacrificed. The R-1051B/URR demodulates and provides audio outputs for the following types of received signals: LSB, USB, ISB, CW, FSK, and AM. Over the frequency range, the input sensitivity for an audio output signal plus noise-to-noise ratio of 10 dB is better than 1 μV for ISB, LSB, and USB; 2 μV for CW and FSK; and 4 μV for AM.

3-5. POWER SUPPLY. The operating voltages for the R-1051B/URR are produced by Power Supply Electronic Assembly A2A8. The 103.5- to 126.5-Vac primary power is converted to voltages of +110 Vdc (rf amplifier tubes plate and screen supply), -30 Vdc (rf amplifier tubes bias), and +28 Vdc (general use). The +28 Vdc is also regulated to +20 Vdc for use in all semiconductor circuits of the R-1051B/URR. An additional supply of +4 Vdc is developed from the +20-Vdc line by 4-Vdc Power Supply and Vernier Control Electronic Assembly A2A11.

3-6. FREQUENCY GENERATION. An accurate, stable (one part in 10^8 per day) 5-MHz oscillator is used as the frequency standard. By means of divider-multiplier circuits, 500-kHz, 1-MHz, and 10-MHz frequencies are generated. The 500-kHz is used to provide further generation of 100-kHz, 10-kHz, and 1-kHz spectra. The spectra are used to phase-lock injection oscillators (synthesizers) to the accuracy of the frequency standard. Three injection frequencies are produced by a combination of the MC, 100 KC, 1 and 10 KC, and 100 CPS Synthesizer Electronic Subassemblies A2A6A1 through A2A6A4.

3-7. The frequency errors of the synthesizers are cancelled out by means of phase-locked control circuits or additive-and-subtractive mixers, which provide error-free dial readings except in the V position of the CPS switch.

3-8. FUNCTIONAL BLOCK DIAGRAM DESCRIPTION.

3-9. SIGNAL FLOW. (See figure 3-2.)

3-10. Antenna Overload and RF Amplifiers. A received signal from the antenna passes through closed relay contacts in Antenna Overload Electronic Assembly A2A9 to RF Amplifier Electronic Assembly A2A4. Should a signal in excess of 8 volts appear at the receiver input, the antenna overload

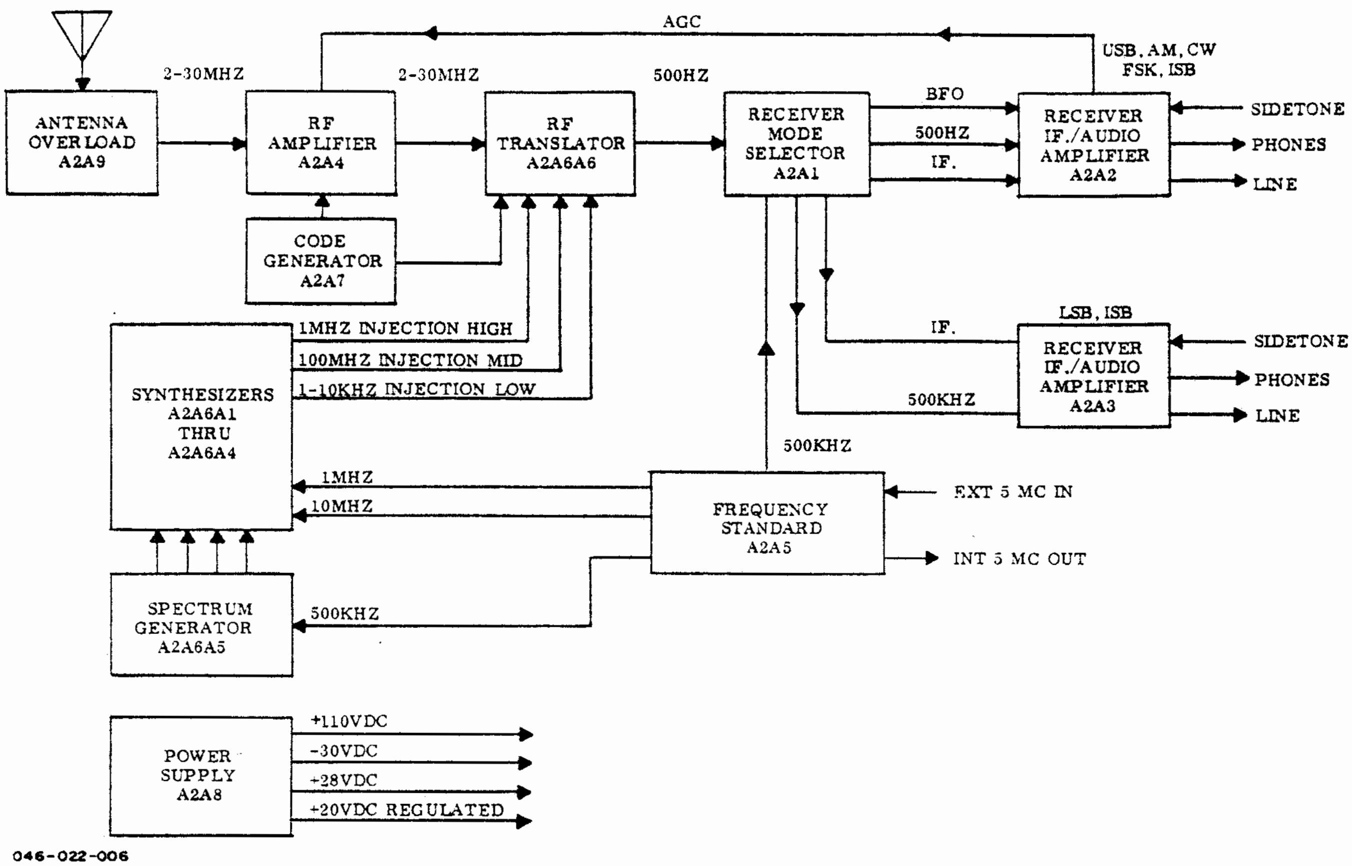
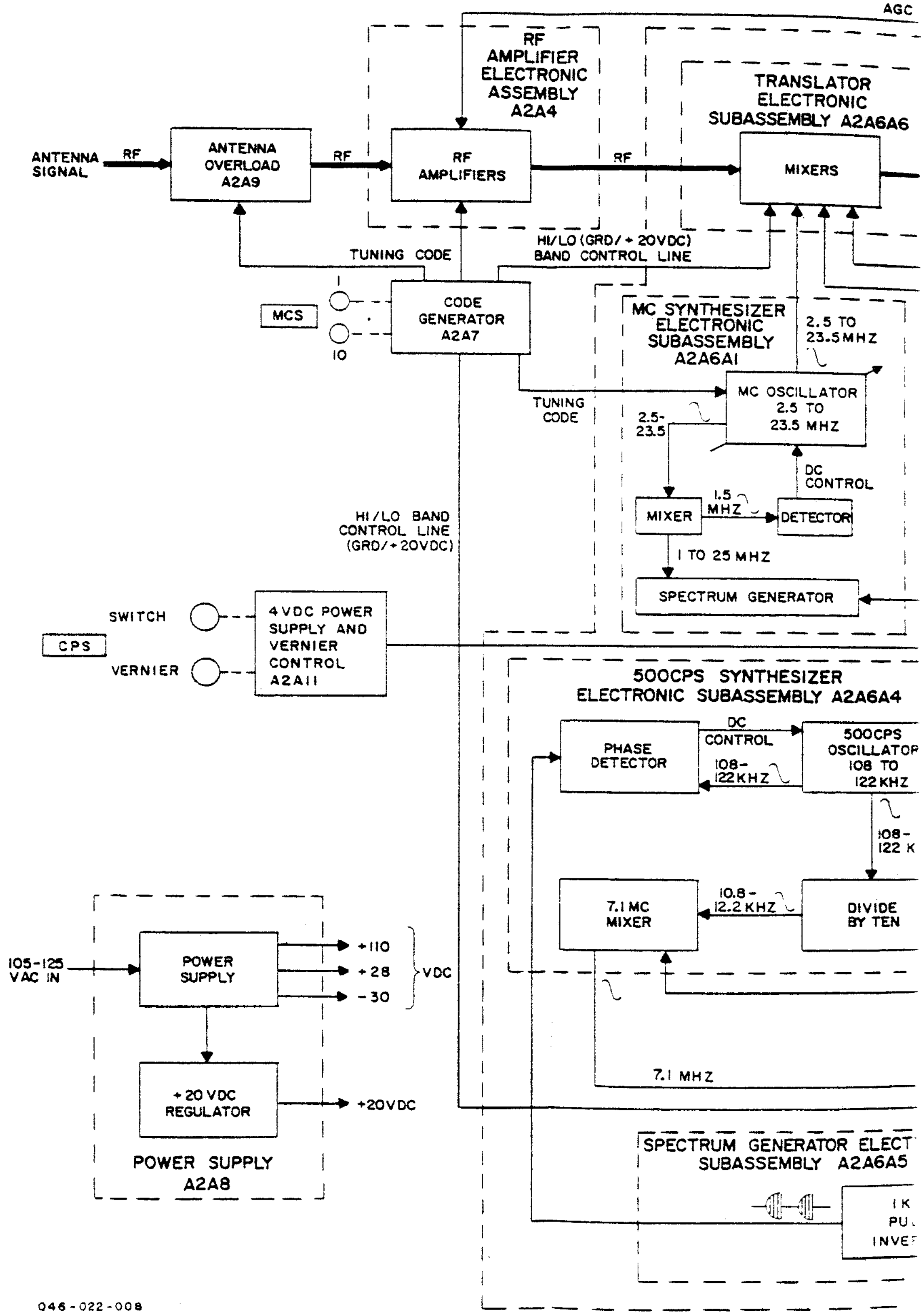


Figure 3-1. Radio Receiver R-1051B/URR, Simplified Block Diagram

circuit will open the relay contacts. The excessive voltage is thereby prevented from being applied to the rf amplifier. Within the rf amplifier, the signal passes through a double-tuned input circuit, two rf amplifier stages, a single-tuned interstage circuit, and output circuits. All of the resonant tuned circuits are tuned by the MCS and KCS frequency controls on the front panel. The MCS controls operate Code Generator Electronic Assembly A2A7, which activates a motor-driven turret containing 28 strips. Each strip contains a tuned transformer and a portion of the capacitance required by each of the four tuned circuits. For each MHz increment, a differently tuned transformer and capacitor are switched into place. The remaining tuned circuit capacitance is mechanically switched into the four tuned circuits by the 100 KCS and 10 KCS controls on the front panel. These capacitors are located on circular boards stacked in the center of the turret. The tuned circuits provide the frequency selectivity required to prevent undesired off-channel signals from distorting the desired signal by cross-modulating or overloading the rf amplifier stages. The gain of the rf amplifier stages ensures that the weak-signal sensitivity of the R-1051B/URR is maintained. The gain of both rf amplifier stages is controlled by the application of an automatic gain control (agc) voltage from the step agc circuit.

3-11. Translator (Mixers). Output from the rf amplifiers is applied to the mixers, which form a part of RF Translator Electronic Subassembly A2A6A6, located in Translator/Synthesizer Electronic Assembly A2A6. The mixers consist of three transistor mixer stages, with interstage coupling provided by selective filters. The first mixer receives injection frequencies from MC Synthesizer Electronic Subassembly A2A6A1. The injection frequency is determined by the MHz band selected by the MCS controls on the front panel. The desired output frequency from the first mixer


AGC
RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4
TRANSLATOR ELECTRONIC SUBASSEMBLY A2A6A6
ANTENNA SIGNAL
RF
ANTENNA OVERLOAD A2A9
RF AMPLIFIERS
MIXERS
TUNING CODE
HI/LO (GRD/+20VDC) BAND CONTROL LINE
MCS
1
10
CODE GENERATOR A2A7
MC SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A1
2.5 TO 23.5 MHZ
TUNING CODE
MC OSCILLATOR 2.5 TO 23.5 MHZ
2.5-23.5
DC CONTROL
1.5 MHZ
MIXER
DETECTOR
HI/LO BAND CONTROL LINE (GRD/+20VDC)
1 TO 25 MHZ
SPECTRUM GENERATOR
SWITCH
CPS
VERNIER
4VDC POWER SUPPLY AND VERNIER CONTROL A2A11
500CPS SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A4
PHASE DETECTOR
DC CONTROL
108-122KHZ
500CPS OSCILLATOR 108 TO 122KHZ
108-122 K
7.1 MC MIXER
10.8-12.2 KHZ
DIVIDE BY TEN
105-125 VAC IN
POWER SUPPLY
+110
+28
-30
VDC
+20 VDC REGULATOR
+20VDC
POWER SUPPLY A2A8
7.1 MHZ
SPECTRUM GENERATOR ELECT
SUBASSEMBLY A2A6A5
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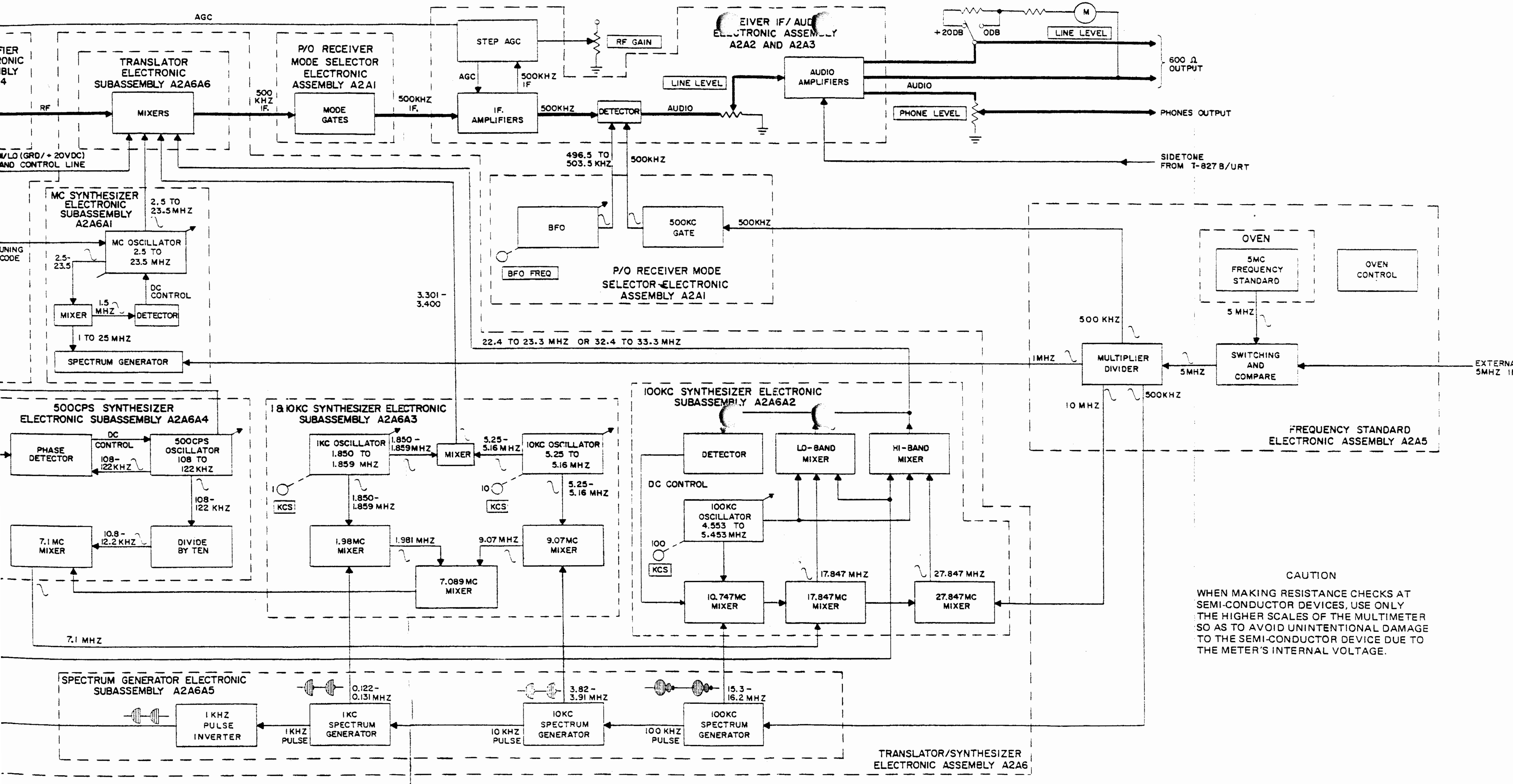


CAUTION

WHEN MAKING RESISTANCE CHECKS AT SEMI-CONDUCTOR DEVICES, USE ONLY THE HIGHER SCALES OF THE MULTIMETER SO AS TO AVOID UNINTENTIONAL DAMAGE TO THE SEMI-CONDUCTOR DEVICE DUE TO THE METER'S INTERNAL VOLTAGE.

Figure 3-2. Radio Receiver R-1051B/URR, Functional Block Diagram always falls within two frequency bands, either 19.5 to 20.5 MHz (lo band) or 29.5 to 30.5 MHz (hi band). The hi or lo band also is determined by MCS control settings.

3-12. The output from the first mixer is gated through the appropriate 20- or 30-MHz filter. This signal is mixed in the second mixer stage with the injection frequencies supplied from 100 KC Synthesizer Electronic Subassembly A2A6A2. The desired frequency band from the second mixer is 2.8 to 2.9 MHz. This signal is coupled through a 2.85-MHz filter to the third mixer. The injection frequencies for the third mixer are supplied from 1 and 10 KC Synthesizer Electronic Subassembly A2A6A3. The output from the third mixer is a 500-kHz if. signal.

3-13. Signal flow from the antenna input through the output of the third mixer is the same for any selected mode of operation.

3-14. Mode Selector. The 500-kHz if. output from the third mixer is applied to gates in the Receiver Mode Selector Electronic Assembly A2A1. Three parallel paths are presented to the signal. The path that passes through the LSB mechanical filter (also used in ISB) is not gated, since it has an independent output from the mode selector. Because the outputs from the USB mechanical filter (also used in FSK and ISB) and the AM mechanical filter (also used in CW) are paralleled for a common output, the input paths to these two filters must be gated so that only one path is open at any given time. Application of the correct gating potentials is determined by the mode of operation selected at the front panel.

3-15. IF. Amplifiers. Output from the LSB filter is applied to the if. amplifiers in Receiver IF./Audio Amplifier Electronic Assembly A2A3. Common output from the USB and AM filters also is applied to the if. amplifiers in Receiver IF./Audio Electronic Assembly A2A2. Operating dc voltage is applied to the proper electronic assembly (A2A2 or A2A3) according to the mode of operation selected at the front panel. In the ISB mode of operation, a dc operating voltage is applied to both if. amplifiers. Agc voltage from the step agc circuit controls the overall gain of the if. amplifiers by varying the attenuation of the input and the gain of the second if. amplifier stage. The input to the step agc circuit is derived from the output from the second if. amplifier stage.

3-16. Detectors and Beat Frequency Oscillator. Output from the if. amplifiers is applied to the detector circuits, consisting of a product detector and an AM detector. Depending on the mode of operation selected at the front panel, either the balanced product detector or the AM detector is powered by dc operating voltage. The product detector demodulates the USB, LSB, FSK, and ISB signals. In these modes of operating, a 500-kHz injection, originating at a multiplier-divider in Frequency Standard Electronic Assembly A2A5, is applied to the product detector for carrier reinsertion. This 500-kHz injection passes through the 500-kHz gate in Receiver Mode Selector Electronic Assembly A2A1 with little attenuation in these modes of operation. In AM and CW modes, this gate presents a high attenuation, since no carrier reinsertion is required by the AM detector. In the CW mode of operation, the beat frequency oscillator (BFO) assembly in Receiver Mode Selector Electronic Assembly A2A1 is turned on and a variable 500-kHz output is applied to the input of the AM detector in assembly A2A2. The output frequency from the BFO circuit is controlled by the BFO FREQ control on the front panel.

3-17. Audio Amplifiers. Audio derived from the detector circuits in assembly A2A2 is applied to the USB LINE LEVEL control on the front panel, which controls the audio level prior to application to the audio amplifiers. The LSB LINE LEVEL control sets the audio level from the product detector in assembly A2A3. Each Receiver IF./Audio Amplifier Electronic Assembly A2A2 or A2A3 has two outputs. One is a 600-ohm remote output, which is applied to a connector at the rear of the case; the second is to the USB or LSB PHONES jacks on the front panel. The phone output passes through a USB or LSB PHONE

LEVEL control on the front panel, which adjusts the phone signal amplitude without altering the level of the remote output. Each remote output is monitored at the front panel by a USB or LSB LINE LEVEL meter, which has two scale ranges controlled by a USB or LSB LINE LEVEL switch on the front panel.

3-18. Step AGC. The step agc circuit, which forms a part of the Receiver IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3, controls the gain of the rf amplifiers and if. amplifiers according to the received rf signal strength. Output from the if. amplifiers is applied to the step agc circuits, where it is converted to a dc voltage that is applied to the rf and if. amplifiers. The gain of the rf and if. amplifiers may be manually controlled by applying a dc voltage on the agc lines with the RF GAIN control. This manual action overrides the normal agc voltages.

3-19. FREQUENCY STANDARDIZATION. The Frequency Standard Electronic Assembly A2A5 produces an accurate, stable, 5-MHz reference frequency upon which all frequencies used in the R-1051B/URR are based. The circuit is housed in an oven assembly maintained at a nearly constant temperature of 85°C by the oven-control circuit. The accurate output from the 5-MHz frequency standard is applied to a switching and compare circuit. An external 5-MHz frequency standard may also be applied to this circuit. The switching and compare circuit routes the internal or external 5-MHz signal to the multiplier-divider circuits or to the compare circuit. The compare circuit compares the internal 5-MHz frequency with the external 5-MHz frequency for an indication of the accuracy of the internal frequency standard. The 5-MHz output from the switching and compare circuit is applied to the multiplier-divider circuit, where it is converted to frequencies of 500 kHz, 1 MHz, and 10 MHz. These three outputs are used in the mixing processes required to produce the injection frequencies used in the rf conversion process. The 500-kHz output is also applied to the 500-kHz gate circuit for insertion into the product detector for demodulation. The 5-MHz frequency standard, oven-control, multiplier-divider, and switching and compare circuits make up Frequency Standard Electronic Assembly A2A5.

3-20. FREQUENCY GENERATION. Injection frequencies used in the first frequency conversion in the mixers of RF Translator Electronic Subassembly A2A6A6 are generated within MC Synthesizer Electronic Subassembly A2A6A1. This circuit consists of a phase-locked, crystal-controlled 1-MHz oscillator that is automatically tuned to produce one of 17 frequencies between 2.5 and 23.5 MHz. The oscillator output is applied to the high-frequency mixer. The output frequency depends on the setting of the front-panel MCS controls.

3-21. Injection frequencies used in the second frequency conversion in the mixers of the rf translator are generated within 100 KC Synthesizer Electronic Subassembly A2A6A2. This circuit consists of a crystal-controlled 100-kHz oscillator, the output of which may be any one of 10 frequencies spaced at 100-kHz intervals between 4.553 and 5.453 MHz. The output frequency is determined by the setting of the front-panel 100 KCS control. If a lo-band injection frequency is required, the 17.847-MHz output from the 17.847-MHz mixer is additively mixed in the lo-band mixer with the output from the 100-kHz oscillator (4.553 to 5.453 MHz, in 100-kHz steps) to provide a frequency in the 22.4- to 23.3-MHz range. If a hi-band injection frequency is required the 27.847-MHz output from the 27.847-MHz mixer is additively mixed in the hi-band mixer with the output from the 100-kHz oscillator (4.553 to 5.453 MHz in 100-kHz steps) to provide a frequency in the 32.4- to 33.3-MHz range. In either case the resultant frequency is applied to the mid-frequency mixer.

3-22. Injection frequencies used in the third frequency conversion in the mixers circuit are generated within 1 and 10 KC Synthesizer Electronic Subassembly A2A6A3. This circuit consists of two crystal oscillators, each of which has 10 possible output frequencies. The output from the 1-kHz oscillator (1.850 to 1.859 MHz in 1-kHz steps) is determined by the setting of the front-panel 1 KCS control, and the output from the 10-kHz oscillator (5.25 to 5.16 MHz in 10-kHz steps) is determined by the setting of the front-panel 10 KCS control. The outputs from the two oscillators are subtractively mixed to provide one of 100 possible output frequencies spaced at 1-kHz intervals between 3.301 and 3.400 MHz. The output is applied to the low-frequency mixer, resulting in a 500-kHz output.

3-23. ERROR CANCELLATION. A combination of error-canceling loops and phase-locked loops is used in the frequency synthesizer circuits of the R-1051B/URR to ensure that the injection frequencies applied to the mixers are correct. These loops are described in the following paragraphs.

3-24. MC Synthesizer Electronic Subassembly A2A6A1 employs a phase-locked loop to ensure the accuracy of the MHz injection frequencies. The 1-MHz output from multiplier-divider A1 in Frequency Standard Electronic Assembly A2A5 is applied to spectrum generator A3 in the MC synthesizer to produce a spectrum of frequencies spaced at 1-MHz intervals between 1 and 25 MHz. The output from spectrum generator A2A6A1A3 and the output from MHz oscillator A2A6A1A1 are mixed. Any error in output from MHz oscillator is detected and an error voltage is produced. This error signal is applied to the MHz oscillator to lock it to the correct frequency. The accuracy of the oscillator output is the same as that of the 5-MHz frequency standard.

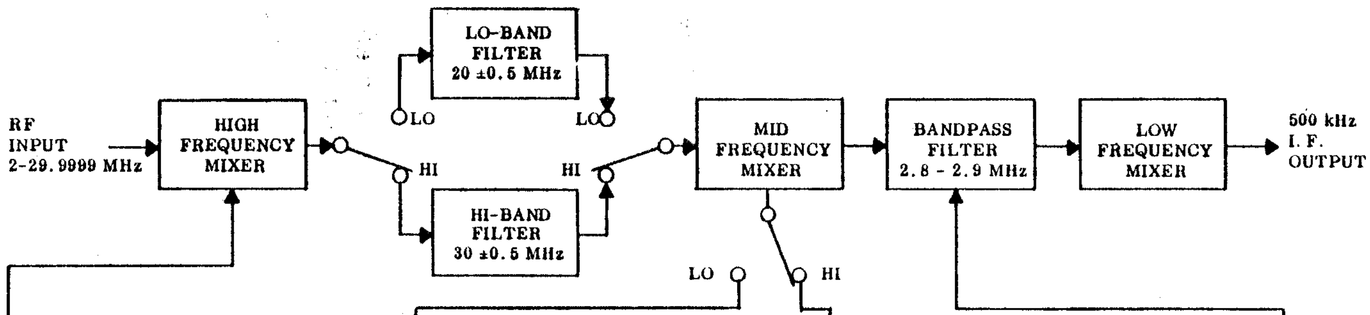
3-25. In addition, 100 KC Synthesizer Electronic Subassembly A2A6A2 employs an error-canceling loop to ensure the accuracy of the 100-kHz injection frequencies. The 500-kHz output from multiplier-divider A2A5A1 is applied to 100-kHz spectrum generator A2A6A5A1 to produce a spectrum of frequencies spaced at 100-kHz intervals between 15.3 and 16.2 MHz. The output from 100-kHz oscillator A2A6A2A1 (4.553 to 5.453 MHz in 100-kHz steps) is applied to 10.747-MHz mixer A2A6A2A2, where it is mixed with that spectrum point of the 100-kHz spectrum which will result in an output of 10.747 MHz. The 10.747-MHz signal is additively mixed with the 7.1-MHz output from 7.1-MHz mixer A2A6A4A3 to produce the 17.847-MHz signal, which is used in one of two mixing processes. It is mixed with the output of the 100-kHz oscillator to cancel any oscillator frequency error and produce the lo-band injection frequencies, or it is mixed with the 10-kHz output from multiplier-divider A2A5A1. This latter mixing produces a 27.847-MHz signal, which is mixed with the output of the 100-kHz oscillator to cancel any oscillator frequency error and produce the hi-band injection frequencies.

3-26. The hi or lo band injection frequencies is determined by the voltage level on the hi-/lo-band control line from Code Generator Electronic Assembly A2A7. If an error was present in the output of the 100-kHz oscillator, it would be canceled in this mixing scheme. This is accomplished as follows. Assume that the output from 100-kHz oscillator should be 4.553 MHz, but is 200 Hz high (4.5532 MHz), and that the desired frequency output is 22.4 MHz (in the lo band). The subtractive mixing of the oscillator output with whichever 100-kHz spectrum point will produce an output as close as possible to 10.747 MHz results in a 10.7468-MHz output (15.3 MHz - 4.5532 MHz = 10.7468 MHz). This signal is then additively mixed with the 7.1-MHz signal, producing a 17.8468-MHz output. The 17.8468-MHz signal is then additively mixed with the output of the 100-kHz oscillator (17.8468 MHz + 4.5532 MHz = 22.4 MHz), resulting in the desired 22.4-MHz output. Assume that the output from 100-kHz oscillator should be 4.953 MHz but is 300 Hz low (4.9527 MHz), and that the desired frequency output should be 32.8 MHz (in the hi band). Subtractively mixing the 100-kHz spectrum point (15.7 MHz) with the 4.9527-MHz signal results in an output of 10.7473 MHz. This signal is then mixed with the 7.1-MHz signal, resulting in a frequency of 17.8473 MHz. The 17.8473-MHz signal is further mixed with the 10-MHz signal to obtain a frequency of 27.8473 MHz, which is additively mixed with the 4.9527-MHz output from the 100-kHz oscillator to obtain the required 32.8-MHz output. Therefore, any error existing in the output from the 100-kHz oscillator will be canceled, resulting in the exact 100-kHz injection frequency required.

3-27. Any error existing in 1- and 10-kHz oscillators A2A6A3A2 and A2A6A3A1 is canceled in the following manner. The 100-kHz pulses from 100-kHz spectrum generator A2A6A5A1 are applied to 10-kHz spectrum generator A2A6A5A2, producing an output from 3.82 to 3.91 MHz in 10-kHz increments. In addition, the 10-kHz spectrum generator produces 10-kHz pulses which are applied to 1-kHz spectrum generator A2A6A5A3 to produce a spectrum of frequencies spaced at 1-kHz intervals between 0.122 and 0.131 MHz. The output from 10-kHz oscillator A2A6A3A1 (5.25 to 5.16 MHz in 10-kHz steps) is additively mixed with whichever spectrum point of the 10-kHz spectrum will result in a frequency of 9.07 MHz. The output from 1-kHz oscillator A2A6A3A2 (1.850 to 1.859 MHz in 1-kHz steps) is additively mixed with whichever spectrum point of the 1-kHz spectrum will result in a frequency of 1.981 MHz. The 1.981- and 9.07-MHz signals are then subtractively mixed, producing the 7.089-MHz signal, which contains the error of both oscillators.

3-28. In addition, the 1-kHz spectrum generator A2A6A5A3 produces a 1-kHz pulse, which is applied to 1-kHz pulse inverter A2A6A5A4 to lock the output frequency of 100-Hz phase-locked oscillator A2A6A4A2 when desired. With the front-panel CPS switch in the 000 position, the output from the 100-Hz phase-locked oscillator is 110 kHz, and is locked to that exact frequency by the 110-kHz spectrum point applied to phase detector. This 110-kHz signal is divided by 10 and applied to the 7.1-MHz mixer A2A6A4A3, where it is additively mixed with the 7.089-MHz output from 7.089-MHz mixer A2A6A3A4. The resulting 7.1-MHz signal is then applied to the error loop of 100 KC Synthesizer Electronic Subassembly A2A6A2. Therefore, if an error exists in the 1- or 10-kHz oscillators A2A6A3A2 or A2A6A3A1, the same error will exist in the 100-kHz injection frequencies. This error is then canceled in the mid- and low-frequency mixers of RF Translator Electronic Subassembly A2A6A6 (figure 3-3) in the following manner. Assume that the output from the 10-kHz oscillator should be 5.25 MHz but is actually 5.2502 MHz. Also, assume that the output from 1-kHz oscillator should be 1.852 MHz but is actually 1.8521 MHz. Subtractively mixing these two frequencies results in an injection frequency to the low-frequency mixer of 3.3981 MHz, rather than the desired 3.3980 MHz. Therefore, a 100-Hz error exists in the injection signal. The additive mixing of the 5.2502-MHz signal and the 10-kHz spectrum point (3.82 MHz) results in a frequency of 9.0702 MHz. The additive mixing of the 1.8521-MHz signal and the 1-kHz spectrum point (0.129 MHz) results in a frequency of 1.9811 MHz. Subtractively mixing the 9.0702- and the 1.9811-MHz signals results in a frequency of 7.0891 MHz. The 7.0891-MHz signal is mixed with the 11-kHz signal from divide-by-ten circuit A2A6A4A1, resulting in a frequency of 7.1001 MHz, which is mixed with the 10.747-MHz signal to produce a frequency of 17.8471 MHz. If the output from the 100-kHz oscillator is assumed to be 4.553 MHz, then the 100-kHz injection frequency would be 22.4001 MHz. The 100-kHz injection is then also 100 Hz high. Therefore, when the 1- and 10-kHz injection frequency of 3.3981 MHz (which is 100 Hz high) is subtractively mixed in the low-frequency mixer with the output from the mid-frequency mixer (which is 100 Hz high), the error will be canceled. Therefore, since any error that existed in the 1- and 10-kHz injection also exists in the 100-kHz injection, the error is canceled during the translation process.

3-29. The R-1051B/URR can be tuned in 0.1-kHz increments by using the CPS switch, or to any frequency in between by using the V (vernier) position of the CPS switch on the front panel. When the CPS switch is in the 000 position, the phase-locked oscillator output in 100-Hz oscillator A2A6A4A2 is locked to 110 kHz. Therefore, when the 11.0-kHz signal (after division by 10) is mixed with the 7.089-MHz error frequency, a frequency of 7.1000 MHz is obtained. When the CPS switch is in the 100 position, the output from the phase-locked oscillator is locked to 111 kHz. Therefore, when the 11.1 kHz (after division by 10) is mixed with the 7.089-MHz



MCS	LO	HI	100 KCS	100 kHz OSC	LO 000 TO 900 Hz IN 100 Hz STEPS*	LO VERNIER*	HI 00 TO 900 Hz IN 100 Hz STEPS*	HI VERNIER*	10 KCS	10 kHz OSC	1 AND 10 kHz INJ.	1 KCS	1 kHz OSC
2	17.5		0	4.553	22.4000 to 22.4009	22.3998 to 22.4012	32.4000 to 32.4009	32.3998 to 32.4012	0	5.25	3.400 to 3.391	0	1.850
3	16.5		1	4.653	22.5000 to 22.5009	22.4998 to 22.5012	32.5000 to 32.5009	32.4998 to 32.5012	1	5.24	3.390 to 3.381	1	1.851
4	15.5		2	4.753	22.6000 to 22.6009	22.5998 to 22.6012	32.6000 to 32.6009	32.5998 to 32.6012	2	5.23	3.380 to 3.371	2	1.852
5	14.5		3	4.853	22.7000 to 22.7009	22.6998 to 22.7012	32.7000 to 32.7009	32.6998 to 32.7012	3	5.22	3.370 to 3.361	3	1.853
6		23.5	4	4.953	22.8000 to 22.8009	22.7998 to 22.8012	32.8000 to 32.8009	32.7998 to 32.8012	4	5.21	3.360 to 3.351	4	1.854
7	12.5		5	5.053	22.9000 to 22.9009	22.8998 to 22.9012	32.9000 to 32.9009	32.8998 to 32.9012	5	5.20	3.350 to 3.341	5	1.855
8	11.5		6	5.153	23.0000 to 23.0009	22.9998 to 23.0012	33.0000 to 33.0009	32.9998 to 33.0012	6	5.19	3.340 to 3.331	6	1.856
9		20.5	7	5.253	23.1000 to 23.1009	23.0998 to 23.1012	33.1000 to 33.1009	33.0998 to 33.1012	7	5.18	3.330 to 3.321	7	1.857
10		19.5	8	5.353	23.2000 to 23.2009	23.1998 to 23.2012	33.2000 to 33.2009	33.1998 to 33.2012	8	5.17	3.320 to 3.311	8	1.858
11	8.5		9	5.453	23.3000 to 23.3009	23.2998 to 23.3012	33.3000 to 33.3009	33.2998 to 33.3012	9	5.16	3.310 to 3.301	9	1.859
12	7.5												
13		16.5											
14	5.5												
15	4.5												
16	3.5												
17		12.5											
18		11.5											
19		10.5											
20		9.5											
21		8.5											
22	2.5												
23	3.5												
24		5.5											
25		4.5											
26		3.5											
27	7.5												
28	9.5												

* NOTES:

1. ALL FREQUENCIES ARE GIVEN IN MHz UNLESS OTHERWISE SPECIFIED
2. 100-KC INJECTION FREQUENCIES MAY BE DISPLACED TO COMPENSATE FOR ERRORS IN OSCILLATOR FREQUENCY.

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Figure 3-3. RF Translator A2A6A6, Frequency Translation, Functional Block Diagram error frequency, a frequency of 7.1001 MHz is obtained. Thus, the 100-kHz injection frequency will be 100 Hz greater. The output from the mid-frequency mixer of A2A6A6 may be varied in 100-Hz increments from 22,400,000 to 23,300,900 Hz, or from 32,400,000 to 33,300,900 Hz. When the CPS switch is in the V position, the output from phase-locked oscillator A2A6A4A2 can be varied between 108 and 122 kHz. As a result, the 7.1000-MHz error frequency can be varied between 7.0998 and 7.1012 MHz. Thus, the output from the mid-frequency mixer of A2A6A6 may be varied continuously between any two 1-kHz increments.

3-30. The rf signal from the antenna is converted to the 500-kHz intermediate frequency as follows. Assume that the frequency controls on the front panel are set for a frequency of 13,492,500 Hz (see figure 3-3). The 1-MHz injection corresponding to the selected MCS digits (13) is 16.5 MHz (in the hi band). The level-controlled 16.5 MHz is additively mixed in the high-frequency mixer of A2A6A6 with 13,492,500 Hz, producing 29,992,500 Hz which is filtered and applied to the mid-frequency mixer of A2A6A6. Since the MCS digits (13) are in the hi band and the CPS switch is in the 500 position, the 100-kHz injection frequency corresponding to the 100 KCS digit (4) will be 32.8005 MHz, as shown in figure 3-3. The mid-frequency mixer of A2A6A6 subtractively mixes the 29,992,500-Hz and the 32.8005-MHz signals, thereby producing a frequency of 2,808,000 Hz, which is filtered and applied to the low-frequency mixer of A2A6A6. The 1- and 10-kHz injection is that frequency of 10-kHz oscillator A2A6A3A1 corresponding to the 10 KCS digit (9) minus that frequency of 1-kHz oscillator A2A6A3A2 corresponding to the 1 KCS digit (2). As shown in figure 3-3, this results in an injection frequency of 3.308 MHz (5.16 MHz minus 1.852 MHz). The 3.308 MHz is subtractively mixed with the 2,808,000 Hz, producing the 500-kHz intermediate frequency. Similarly, any frequency between 2 and 30 MHz may be translated into the 500-kHz intermediate frequency.

3-31. FUNCTIONAL CIRCUIT DESCRIPTIONS.

3-32. ANTENNA OVERLOAD ELECTRONIC ASSEMBLY A2A9. Antenna Overload Electronic Assembly A2A9 is a part of the receiver main frame, and protects the receiver from high-level input signals which could cause damage to the input circuit of RF Amplifier Electronic Assembly A2A4. Protection is afforded against signals of 100 volts rms open circuit in series with 50 ohms. It contains a relay which will normally deenergize and connect a resistance in series with the antenna input circuitry when the input rf reaches 6 to 8 volts rms. This resistance will also be connected whenever the MHz frequency is being changed.

3-33. Two circuit boards compose the antenna overload assembly. Circuit board A2A9A2 provides surface area for mounting zener diode clamp circuit A2A9A2CR3, CR4, CR5, and CR6, and also furnishes cover and component layout for circuit board A2A9A1. This circuit board contains signal-sampling attenuator A2A9A1R1 and R2, diode rectifier CR1, two-stage amplifier Q1 and Q2, and relay K1. (See figure 3-4.)

3-34. RF Protection Function. The rf signal from the antenna is applied to the normally open contact of relay A2A9A1K1. The pole of this relay is connected to the input transformer of the rf amplifier. When the receiver is turned off or placed in standby, the input to the rf amplifier is isolated from the antenna by resistor R10. When power is applied to the receiver and no excessive signal (rf in excess of 6 to 8 volts) is present at the antenna input terminals, transistor Q1 is biased off as a result of the action of resistors R5 and R6. This causes the collector of Q1 and the base of Q2 to rise in potential, saturating Q2 and causing K1 to operate. This shorts out resistor R10, completing the signal path from the antenna to the rf amplifier input. At the same time, the antenna input voltage is coupled by capacitor C1 to an attenuator consisting of resistors R1 and R2. Capacitors C2 and C3

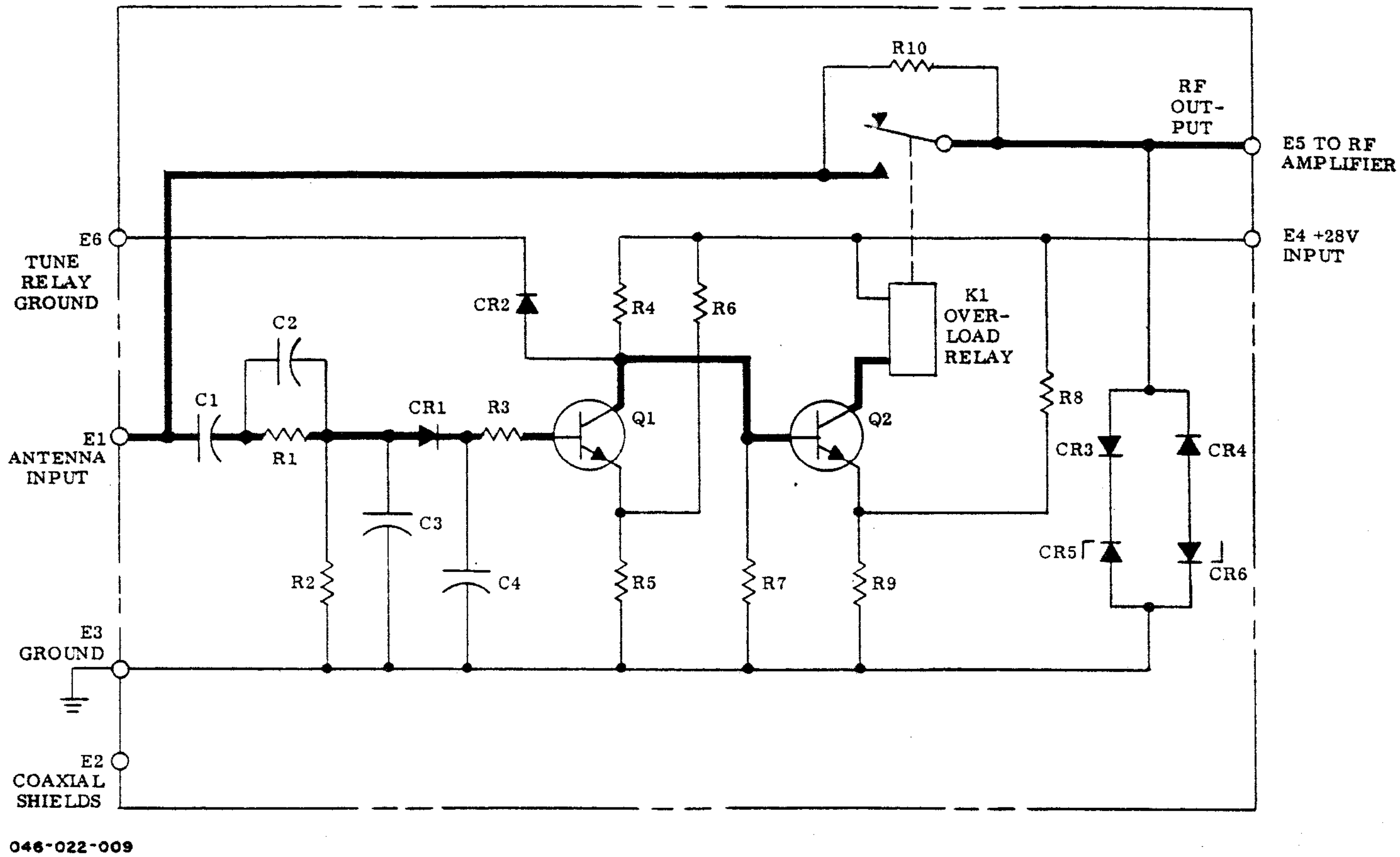


Figure 3-4. Antenna Overload Assembly A2A9, Simplified Schematic Diagram

compensate for circuit-distributed capacitances to maintain substantially constant attenuation throughout the range from 2 to 30 MHz. The attenuated signal is rectified by diode CR1, filtered by capacitor C1, and applied to the base of Q1 through resistor R3.

3-35. When the input signal amplitude rises above 6 to 8 volts rms, Q1 becomes forward-biased and conducts, causing the Q1 collector and Q2 base voltage to fall. When Q2 base voltage drops below the emitter bias established by R8 and R9, Q2 ceases to conduct, and relay K1 releases. This reduces the signal applied to the receiver input to a safe level, due to the attenuation produced by the "L" pad, consisting of R10 and the receiver input impedance. During the time between the application of an overload signal and the operation of relay K1, diodes A2A9A2CR3, CR4, CR5, and CR6 function to limit the peak voltage applied to the receiver front end to a value substantially determined by the breakdown voltage of diodes CR5 and CR6. Diodes CR3 and CR4 are low-capacitance units which function to prevent the large junction capacitance of CR5 and CR6 from loading the receiver input.

3-36. Tuning Cycle Protection Function. Terminal A2A9A1E6 is used to operate relay K1 during the tuning cycle for MHz tuning changes. This action attenuates broadband noise generated by the turret drive motor and the MHz synthesizer motor. During the tuning cycle produced by a change in the MHz tuning selectors, a circuit ground is applied to terminal E6, causing CR2 to conduct. This causes Q2 base voltage to fall below the emitter voltage, and Q2 ceases to conduct, producing the same action as an overload signal at the receiver antenna input terminals. When the tuning cycle is complete, the potential at E6 rises to +28 volts, which causes CR2 to be reverse-biased, and circuit operation returns to normal.

3-37. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4. RF Amplifier Electronic Assembly A2A4 is a depot-repairable assembly. Its functional circuit description is contained in Repair Book for AN/WRC-1B and R-1051B/URR, 2N Modules, NAVSHIPS 0967-034-2000.

3-38. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6. Translator/Synthesizer Electronic Assembly A2A6 is a depot-repairable assembly. Its functional circuit description is contained in Repair Book for AN/WRC-1B and R-1051B/URR, 2N Modules, NAVSHIPS 0967-034-2000.

3-39. RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY A2A1. Receiver Mode Selector Electronic Assembly A2A1 consists of an LSB mode gate and filter, a USB mode gate and filter, an AM mode gate and filter, a 500-kHz gate, and the beat frequency oscillator (BFO) and amplifier. These circuits are discussed separately in the following paragraphs.

3-40. LSB Mode Gate and Filter. The LSB mode gate and filter (figure 3-5) consists of LSB filter A2A1FL3 and a portion of Mode Gates Subassembly A2A1A1. Its function is to filter the 500-kHz LSB if. signal from the low-frequency mixer in RF Translator Electronic Subassembly A2A6A6 and apply it to the gain-controlled if. amplifier A2A3A2. The LSB filter circuit is used only during the LSB and ISB modes of operation. The following paragraphs describe the operation of this circuit for each of the indicated modes of operation.

3-41. In LSB operation, the 500-kHz if. signal is coupled by capacitor A2A1A1C1 to

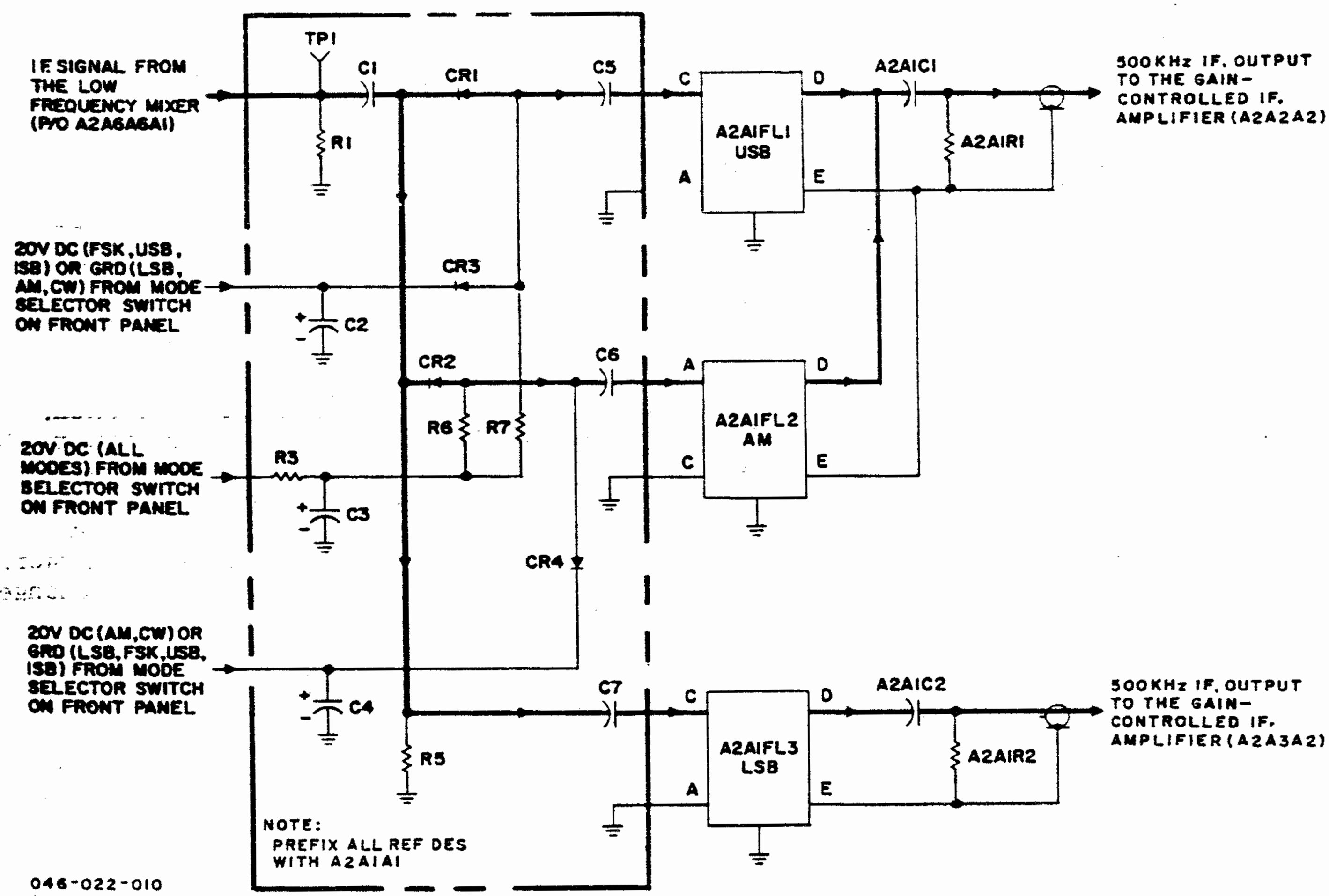


Figure 3-5. Mode Gates and Filters, Simplified Schematic Diagram

the cathodes of gating diodes CR1 and CR2 and to coupling capacitor C7. In the LSB mode, 20 Vdc is applied through resistors R3 and R7 to the anodes of diodes CR1 and CR3, and through resistors R3 and R6 to the anodes of diodes CR2 and CR4. A ground is applied to the cathodes of diodes CR3 and CR4, producing forward bias, and effectively placing the ground on the anode of diodes CR1, CR2, CR3, and CR4. Therefore, any portion of the if. signal passing through diodes CR1 and CR2 will be shorted to groun ground. The if. signal is coupled through capacitor C7 to LSB filter A2A1FL3. The LSB filter is a mechanical filter which suppresses undesired signals, allowing only the desired LSB signal to pass. Coupling capacitor A2A1A1C7 is selected to provide an input to the filter that is series-resonant at 500-kHz. Coupling capacitor A2A1C2 provides an output circuit for the filter that is series-resonant at 500 kHz. Resistor A2A1A1R5 is part of the biasing network for gates CR1 and CR2, and is also part of the input circuit to the filters. Resistors A2A1R2 is the output termination for filter A2A1FL3.

3-42. In ISB operation, the lower sideband portion of the ISB signal passes through the LSB filter in the same manner as the LSB signal, which is described above.

3-43. USB Mode Gate and Filter. The USB mode gate and filter (figure 3-5) consists of a portion of the Mode Gates Subassembly A2A1A1 and USB filter A2A1FL1. This circuit gates the 500-kHz USB if. signal from the low-frequency mixer in RF Translator Electronic Subassembly A2A6A6 through the USB filter to the gain-controlled if. amplifier A2A2A2. The USB mode gate and filter circuit is used only during the USB, ISB, and FSK modes of operation. The following paragraphs describe the operation of this circuit for each of the indicated modes of operation.

3-44. In USB operation, the 500-kHz if. signal applied to the mode gates is coupled by capacitor A2A1A1C1 to the cathodes of gating diodes CR1 and CR2. In the USB, ISB, and FSK modes, gating diode CR1 if forward-biased by 20 Vdc applied through resistors R3 and R7 to its anode, and by the ground applied through resistor R5 to its cathode. The 20 Vdc is also applied through resistors R3 and R6 to the anodes of diodes CR2 and CR4. A ground is applied to the cathode of diode CR4, producing forward-bias and effectively placing the ground on the anodes of diodes CR2 and CR4. Diode CR2 is reverse-biased due to the ground on its anode and approximately 7.3 Vdc on its cathode. The if. signal will pass through forward-biased diode CR1 and be rejected by reverse-biased diode CR2. The if. signal is then coupled through capacitor C5 to USB filter A2A1FL1. The USB filter is a mechanical filter that suppresses undesired signals, allowing only the desired signal to pass. Coupling capacitor A2A1A1C5 is selected to provide an input circuit for the filter that is series-resonant at 500 kHz. Coupling capacitor A2A1C1 provides an output circuit for the filter that is series-resonant at 500 kHz. Resistor A2A1R1 is the terminating resistor for filter A2A1FL1.

3-45. In ISB operation, the upper-sideband portion of the ISB signal passes through the USB mode gate and filter in the same manner as the USB signal discussed above.

3-46. In FSK operation, the FSK signal passes through the USB mode gate and filter in the same manner as the USB signal discussed above.

3-47. AM Mode Gate and Filter. The AM mode gate and filter (figure 3-5) consists of AM filter A2A1FL2 and a portion of the Mode Gates Subassembly A2A1A1. This circuit gates the 500-kHz AM if. signal from the low-frequency mixer in RF Translator Electronic Subassembly A2A6A6 through the AM filter to gain-controlled if. amplifier A2A2A2. The AM mode gate and filter circuit is used only during the AM and CW modes of operation. The following paragraphs describe the operation of this circuit for either of the indication modes of operation.

3-48. The 500-kHz if. signal applied to the mode gates is coupled by capacitor A2A1A1C1 to the cathode of gating diodes CR1 and CR2. In the AM and CW modes, gating diode CR2 is forward-biased by 20 Vdc applied through resistor R3 and R6 to its anode, and by ground applied through resistor R5 to its cathode. The 20 Vdc is also applied through resistors R3 and R7 to the anodes of diodes CR1 and CR3. A ground is applied to the cathode of diode CR3, producing forward bias and effectively placing the ground on the anodes of diodes CR1 and CR3. Diode CR1 is reverse-biased by the ground on its anode and approximately 7.3 Vdc on its cathode. The if. signal will pass through forward-biased diode CR2 and be rejected by reverse-biased diode CR1. The if. signal is then coupled through capacitor C6 to AM filter A2A1FL2. The AM filter is a mechanical filter which suppresses the undesired signals, allowing only the desired signal to pass. Coupling capacitor A2A1A1C6 is selected to provide an input circuit for the filter that is series-resonant at 500 kHz. Coupling capacitor A2A1C1 provides an output circuit for the filter that is series-resonant at 500 kHz.

3-49. 500-kHz Gate. The 500-kHz Gate Subassembly A2A1A2 (figure 3-6) gates the 500-kHz if. signal from the 1-MHz divide-by-two circuit in Frequency Standard Electronic Assembly A2A5 to the product detector circuit in Receiver IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3. The 500-kHz gate circuit is used only during the LSB, FSK, USB, or ISB modes of operation.

3-50. In LSB, FSK, USB, and ISB operation, the 500-kHz local carrier signal from the 1-MHz divide-by-two circuit is coupled by capacitor A2A1A2C2 to the anode of gating diode CR1. To explain the bias development for gate CR1, assume that gate CR1 is removed from the circuit. In the LSB, FSK, USB, and ISB modes, 20 Vdc is applied to voltage divider R1, R5, R6 and voltage divider R2, R3, R4. This produces a voltage of approximately 18.8 Vdc at the junction of resistors R3 and R4, and approximately 6.7 Vdc at the junction of resistors R5 and R6. Replacing the diode would result in forward-biasing. Since the gate is forward-biased, the 500-kHz if. signal is allowed to pass and is coupled by capacitor C4 to the product detector to be used in demodulating.

3-51. In the AM and CW modes, gating diode CR1 is reverse-biased by removing the 20 Vdc from voltage divider R2, R3, R4, thereby preventing the 500 kHz from being passed.

3-52. BFO and Amplifier. BFO and Amplifier Subassembly A2A1A3 (figure 3-7) consists principally of modified Colpitts oscillator Q1 and amplifier Q2. These circuits generate and amplify a signal between 496.5 and 503.5 kHz and apply it to the product detector in Receiver IF./Audio Amplifier Electronic Assembly A2A2. The BFO and amplifier circuit is used only for CW operation. The following paragraphs describe the operation of this circuit in detail.

3-53. The frequency of the BFO is determined by the setting of the BFO FREQ control on the front panel. The output voltage of this control can be varied between 0.2 and 20 Vdc. This voltage is applied across voltage-variable capacitor A2A1A3CR1, producing a capacitance dependent upon the magnitude of the voltage. The output

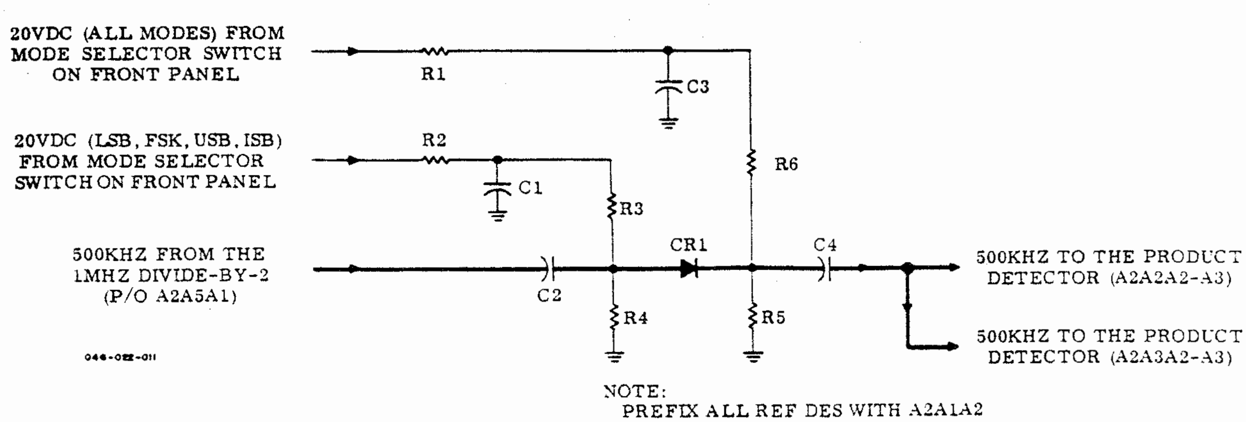


Figure 3-6. 500-kHz Gate, Simplified Schematic Diagram

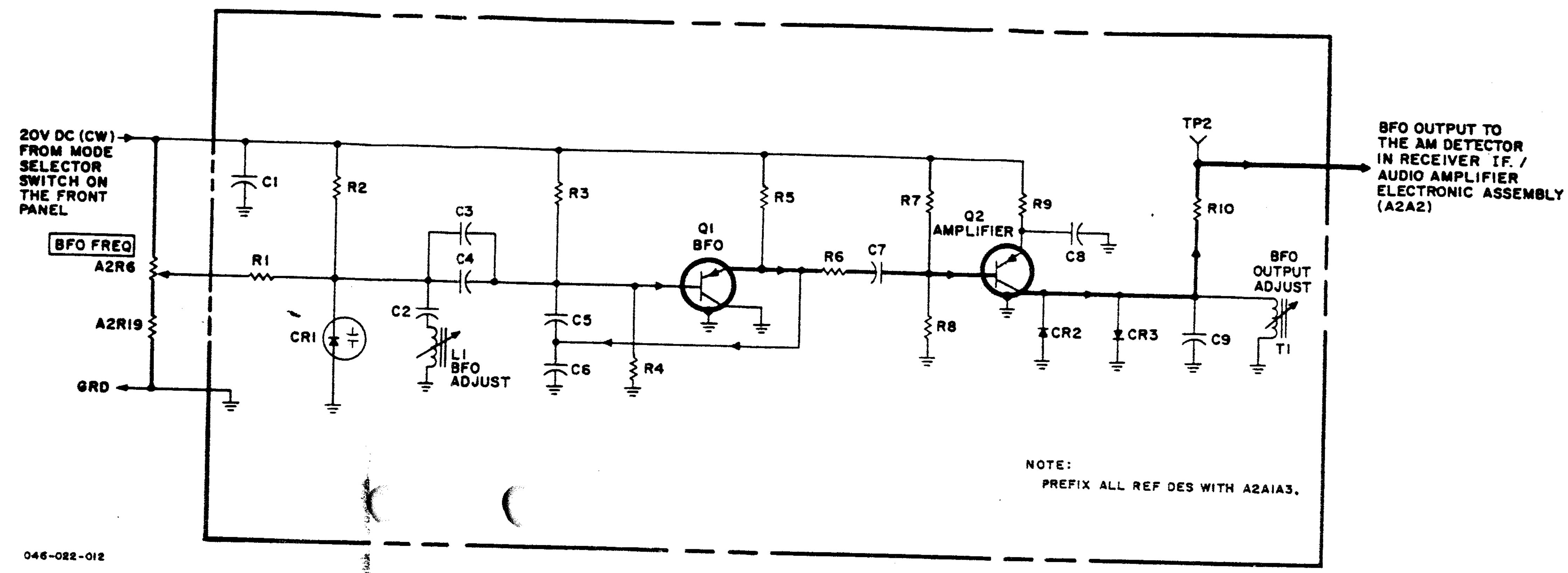


Figure 3-7. BFO and Amplifier, Simplified Schematic Diagram

frequency of oscillator Q1 is determined by the tuned circuit consisting of voltage-variable capacitor CR1, inductor L1, and capacitors C2, C3, C4, C5, and C6. Emitter-to-base feedback sustains oscillations in transistor Q1. The negative temperature coefficient characteristic of capacitor C3 compensates for variations in the operating parameters of transistor Q1 that result from ambient temperature changes.

3-54. Operating voltage for oscillator Q1 is developed from the positive 20 Vdc applied to voltage divider R3, R4 and emitter resistor R5 from the Mode Selector switch on the front panel. The output from oscillator Q1 is coupled through capacitor C7 and isolating resistor R6 to the base of amplifier Q2. The operating voltage for amplifier Q2 is developed from the positive 20 Vdc applied to voltage divider R7, R8 and emitter resistor R9 from the Mode Selector switch on the front panel. The output from amplifier Q2 is applied to limiters CR2 and CR3, where the signal is limited to approximately 150 mV, and is applied to the tuned circuit consisting of capacitor C9 and inductor T1. The signal from the tuned circuit passes through isolating resistor R10 to the product detector circuit in Receiver IF./Audio Amplifier Electronic Assembly A2A2.

3-55. RECEIVER IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 AND A2A3. The identical IF./Audio Amplifier Assemblies A2A2 and A2A3 consist of three subassemblies: Gain-Controlled IF./Audio Amplifier Subassembly A2, Step AGC and Audio Amplifier Subassembly A1, and Product/AM Detectors Subassembly A3 (all reference designations in this and the following paragraphs are understood to be prefixed by either A2A2 and A2A3). Functionally, however, the assembly may be conveniently divided into five circuits for discussion purposes. These circuits are a gain-controlled if. amplifier, a product detector, an AM detector, an audio amplifier, and a step agc circuit. These circuits are discussed separately in following paragraphs.

3-56. Gain-Controlled IF. Amplifier. The gain-controlled if. amplifier (figure 3-8) consists of four stages of if. amplification (A2Q1, Q4, Q5, and Q6), the gain of which is controlled by variable attenuators Q2 and Q3. These circuits amplify the 500-kHz if. signal from Receiver Mode Selector Electronic Assembly A2A1 to a level suitable for use in the product or AM detector circuits. The gain-controlled if. amplifier in assembly A2A2 is used during the USB, FSK, AM, and CW modes of operation. The gain-controlled if. amplifier in assembly A2A3 is used during the LSB mode of operation. Both circuits are used during the ISB mode of operation. The following paragraphs describe the operation of the gain-controlled if. amplifier circuit in detail.

3-57. The 500-kHz if. input signal is coupled to the base of amplifier A2Q1 by capacitor C1. Operating voltages for amplifier Q1 are developed from the positive 20 Vdc applied to voltage divider R1, R2, and emitter resistor R3. The amplified output from amplifier Q1 is developed across the tuned circuit, consisting of capacitor C3 and the primary of transformer T1. Transformer T1 couples the amplified if. signal to a voltage-divider network consisting of resistor R5 and attenuator Q2. The action of the agc voltage upon the combined circuits of attenuators Q2 and Q3 results in a nearly constant output from if. amplifier Q4. Agc-controlled attenuator Q2 acts as a variable shunt resistance to control the if. signal input level to amplifier Q4. Attenuator Q3 acts as a variable resistor in series with emitter-bypass capacitor C9 to control the amount of degeneration in the circuit of amplifier Q4. The agc voltage is applied to the base of attenuator Q2 through voltage divider R6, CR1, and R7. Diode CR1 is a silicon diode used for temperature compensation. An increase in temperature that would normally increase the rate of conduction of attenuator Q2 will also lower the forward resistance of diode CR1. This results in a lower voltage at the base of attenuator Q2, thereby compensating for the temperature change. The collector-emitter circuit of attenuator Q2 acts as a variable shunt resistor with a resistance that varies inversely with the if. signal strength. A strong if. signal causes an increase in the agc voltage, which is applied to the base of

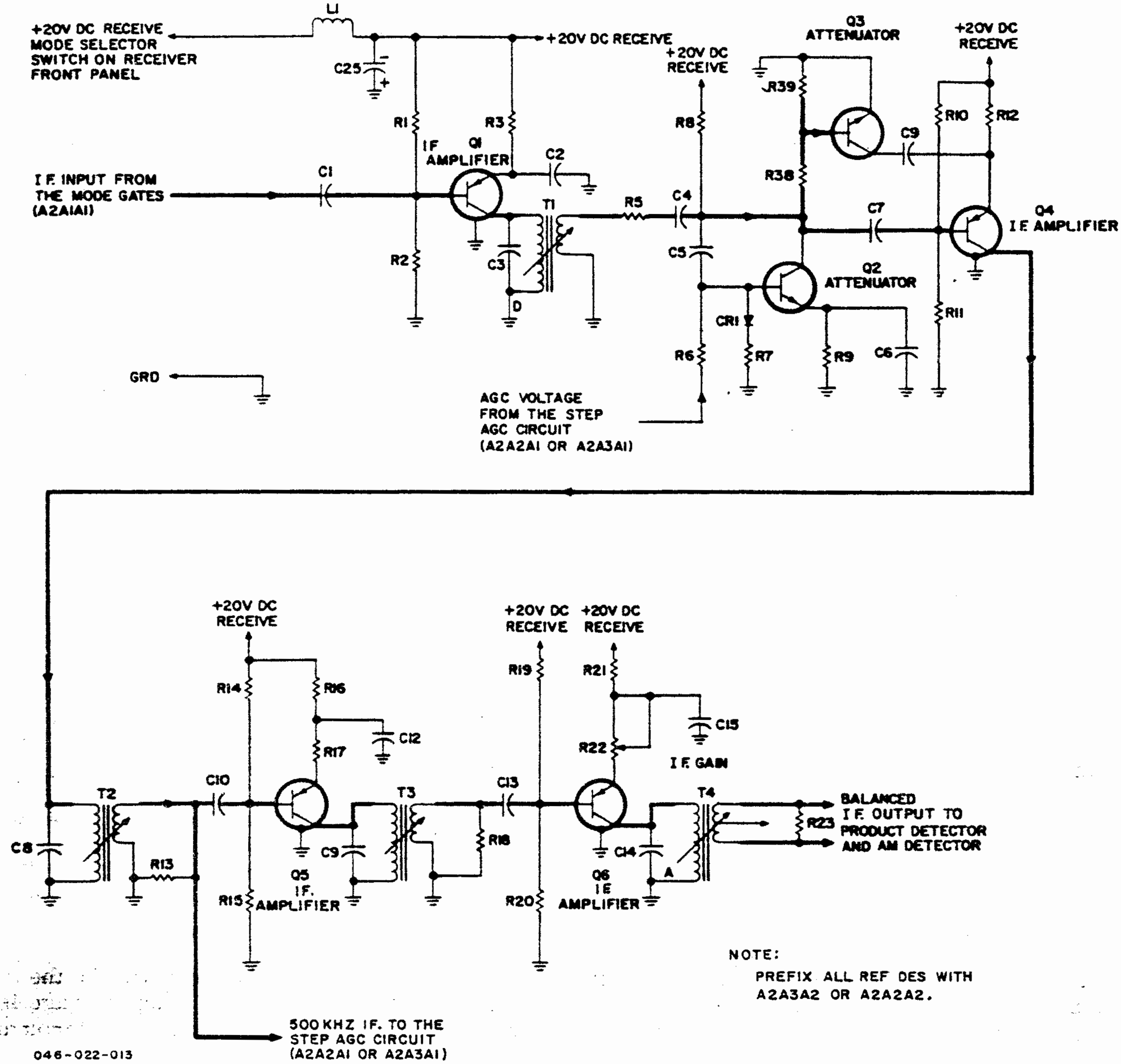


Figure 3-8. Gain-Controlled IF. Amplifier, Simplified Schematic Diagram

attenuator Q2. This results in a larger forward bias on attenuator Q2, causing a higher rate of conduction. This causes a reduction in the level of the 500-kHz if. signal that is coupled to the base of amplifier Q4 by capacitor C7.

3-58. The voltage dropped across resistor R8 varies with the rate of conduction of attenuator Q2. Therefore, increased conduction increases the voltage drop and decreases the voltage across voltage divider R38, R39. This results in a reduced forward bias, a reduced rate of conduction, and an increased collector-emitter resistance for attenuator Q3. These actions increase the degeneration in the circuit of amplifier Q4. When the if. signal disappears, the level of the agc voltage drops, biasing attenuator Q2 to cutoff. This causes a reduced voltage drop across resistor R8, and an increased voltage across divider network R38, R39. The resulting increase in forward bias on attenuator Q3 will increase its rate of conduction, resulting in a decreased collector-emitter resistance and a decrease in the degeneration in the circuit of amplifier Q4.

3-59. The output from voltage divider R5, Q2 is coupled to the base of amplifier Q4 by capacitor C7. Operating voltage for amplifier Q4 is developed from the positive 20 Vdc applied to voltage divider R10, R11, and emitter resistor R12. The amplified output from amplifier Q4 is developed across the tuned circuit consisting of capacitor C8 and the primary of transformer T2.

3-60. The output from transformer T2 is coupled to the base of amplifier Q5 by capacitor C10 and is applied to the step agc circuit. Resistor R13 serves as the load resistor for transformer T2 and increases the bandwidth of the circuit. Operating voltage for amplifier Q5 is developed from the positive 20 Vdc applied to voltage divider R14, R15, and emitter-resistor network R16, R17. A small amount of degeneration (developed by resistor R17) is used to increase the stability of amplifier Q5. The amplified output from transistor Q5 is developed across the tuned circuit consisting of capacitor C11 and the primary of transformer T3.

3-61. The amplified if. signal at the secondary of transformer T3 is coupled to the base of Q6 by capacitor C13. Resistor R18 serves as the load resistor of transformer T3 and increases the bandwidth of the circuit. Operating voltage for Q6 is developed from the positive 20 Vdc applied to voltage divider R19, R20 and emitter resistors R21 and R22. Amplifier Q6 is the last stage of amplification in the gain-controlled if. amplifier. The gain amplifier Q6 is controlled by the amount of degenerative feedback developed by potentiometer R22. The output from amplifier Q6 is developed across the tuned circuit consisting of capacitor C14 and the primary of transformer T4. The center-tapped secondary of transformer T4 develops a balanced output across load resistor R23. Transformer T4 couples the if. output to the product and AM detector circuits.

3-62. Product Detector. The product detector (figure 3-9) contains transistor stages A3Q1 and A3Q2 connected in a balanced mixer configuration. This circuit extracts intelligence from the USB, LSB, ISB, or FSK 500-kHz if. signals supplied by the gain-controlled amplifier. It utilizes a 500-kHz injection signal from the Receiver Mode Selector Electronics Assembly A2A1. The product detector in assembly A2A2 is used during the USB and FSK modes of operation. The product detector in assembly A2A3 is used during the LSB mode of operation. Both product detectors are used during the ISB mode of operation, but neither is used during the AM or CW modes of operation. The following paragraphs describe the operation of the product detector circuits in detail.

3-63. The base operating voltage for transistors A3Q1 and A3Q2 (developed by voltage divider A2R24, A2R25 from the positive 20 Vdc applied to it from relay A2K3 on the main frame) is applied through the secondary of transformer A2T4. Resistor A2R23 is the load resistor for transformer A2T4. The emitter operating voltage is applied to transistors A3Q1 and A3Q2 through bias resistors A3R2 and A3R4 from the Mode Selector switch on the front panel. (The emitter operating voltage for the product detector in assembly A2A2 is present only during the USB, FSK, and ISB modes of operation. The emitter operating voltage for the product detector in A2A3 is present only during the LSB and ISB modes of operation.) Because of the center tap (ac ground) on the secondary of transformer A2T4, the 500-kHz if. signals coupled to the bases of the product-detector transistors are of equal magnitude, but 180 degrees out of phase with each other.

3-64. A 500-kHz injection signal is coupled to the emitters of transistors A3Q1 and A3Q2 by capacitors A3C1 and A3C4, respectively. Resistors A3R1 and A3R3 provide isolation between the emitters of transistors A3Q1 and A3Q2. The 500-kHz injection and 500-kHz if. signals are mixed

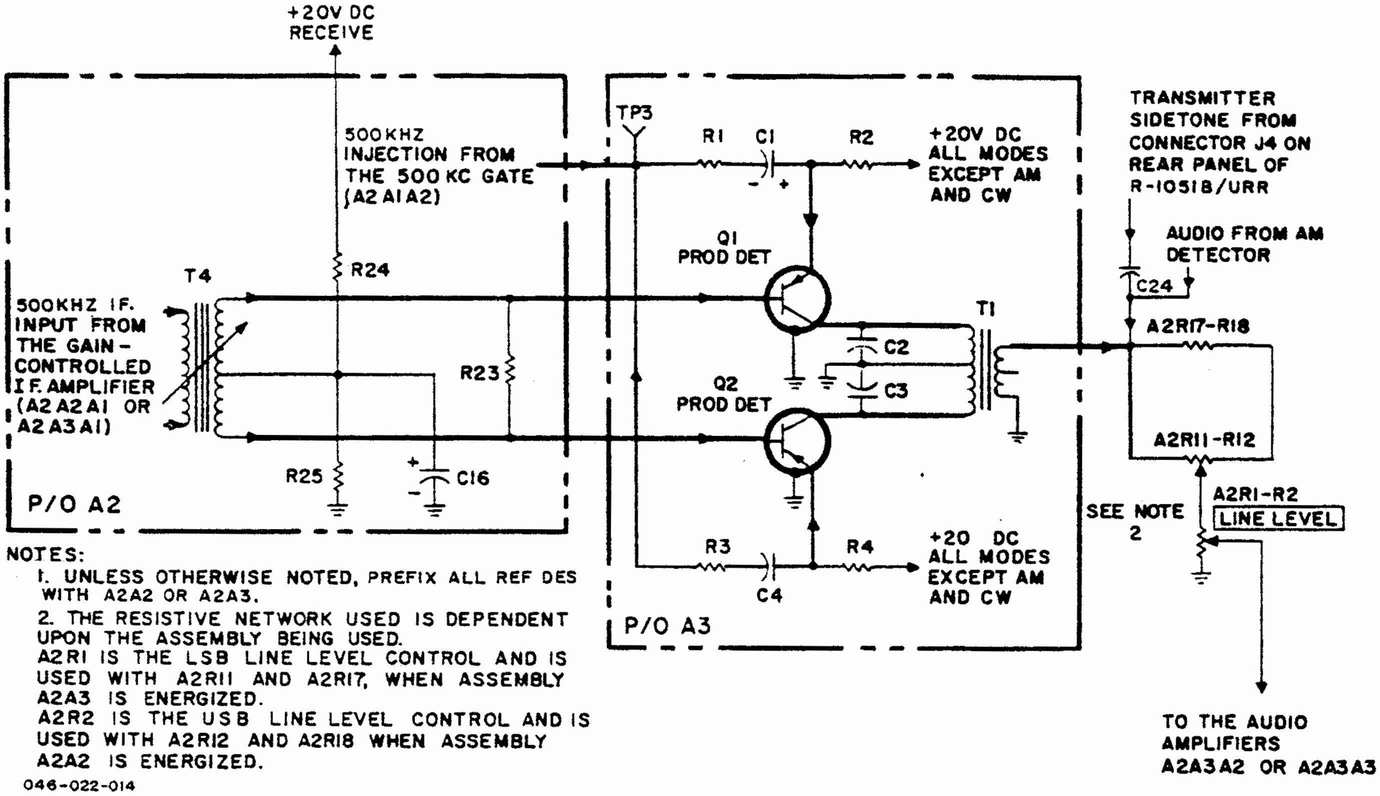


Figure 3-9. Product Detector, Simplified Schematic Diagram

in two stages, resulting in an output consisting of the sum of the two signals, the difference of the two signals, and the two individual signals. Capacitors A3C2 and A3C3 bypass the sum of the two signals to ground. Since the circuit is balanced, the outputs from transistors A3Q1 and A3Q2 that are developed across transformer A3T1 are 180 degrees out of phase with each other. This results in cancelling of the 500-kHz carrier and 500-kHz if. signals. Transformer A3T1 has an audio frequency response that will attenuate (into the noise region) any of the rf signals not previously cancelled. The difference of the two signals is the desired intelligence, and it is developed across the primary of transformer A3T1. The detected intelligence is coupled to the LINE LEVEL control on the front panel by transformer A3T1.

3-65. AM Detector. The AM detector (figure 3-10) contains if. amplifier A3Q3, diode detector A3CR2, and audio amplifier A1Q9. These circuits extract the intelligence from the 500-kHz if. signals from the gain-controlled if. amplifier in the CW and AM modes of operation, utilizing a BFO signal from the Receiver Mode Selector Electronic Assembly A2A1. The AM detector circuit in A2A2 is not used in any mode of operation. The following paragraphs describe the operation of the AM detector circuit in detail.

3-66. The 500-kHz if. signal is coupled to the base of transistor A3Q3 by transformer A2T4. The base operating voltage for transistor A3Q3 is developed by voltage divider A2R24, A2R25 from the 20 Vdc applied through the secondary of transformer A2T4. The emitter operating voltage for amplifier A3Q3 is the 20 Vdc applied through diode A3CR1 and resistor A3R5 from the Mode Selector switch on the front panel. Diode A2CR1 prevents any incidental base currents in amplifier A3Q3 from affecting the operating voltage for the product detector when operating in any mode other than AM or CW. The amplified output from amplifier A2Q3 is developed across the tuned circuit consisting of capacitor A3C6 and inductor A3L1. In the

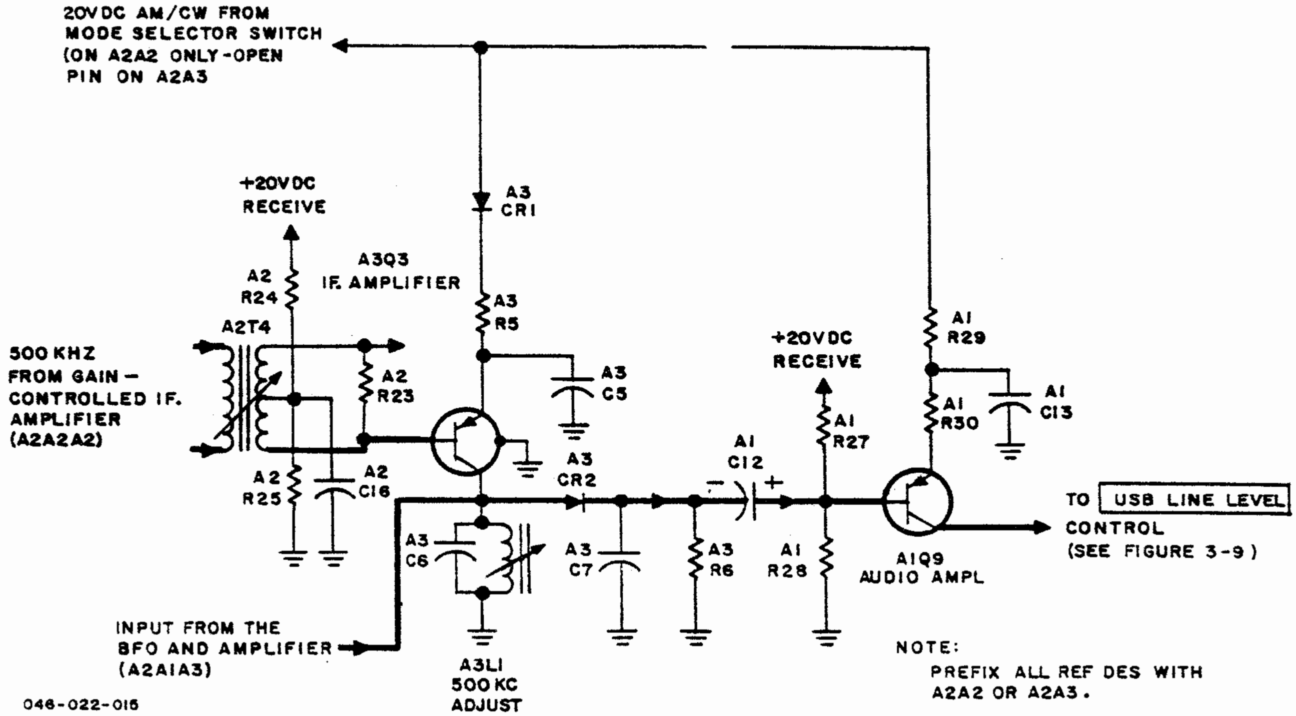


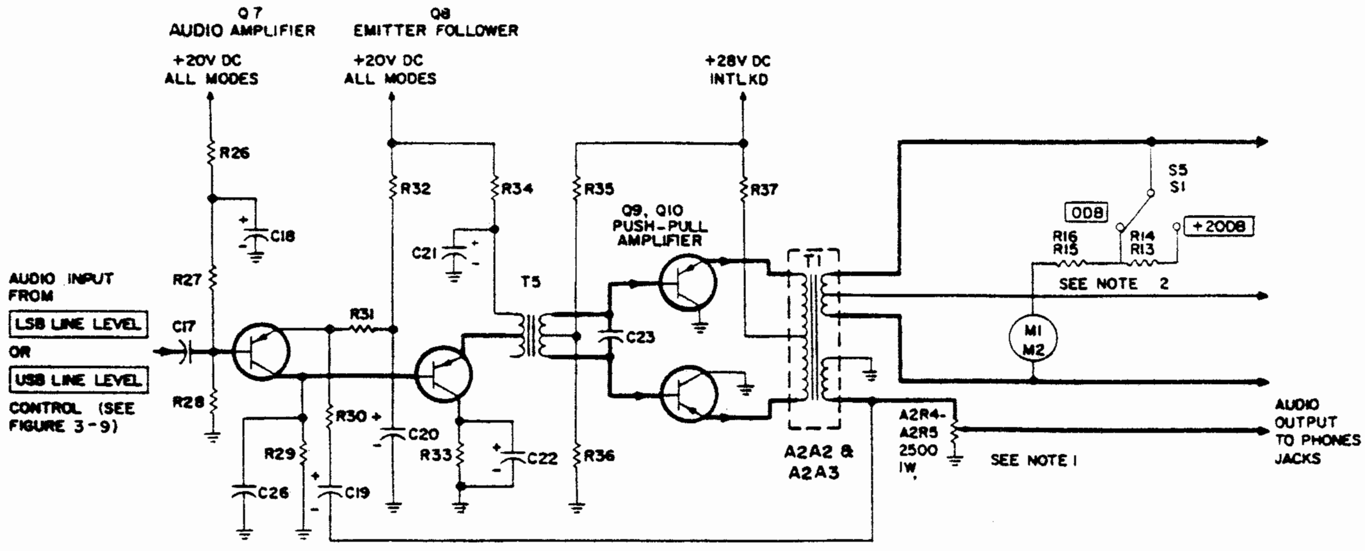
Figure 3-10. AM Detector, Simplified Schematic Diagram

CW mode of operation, the BFO input signal is mixed with the 500-kHz if. signal in the tuned circuit. The output from the tuned circuit is detected by diode A3CR2. Capacitor A3C7 bypasses any rf passed by diode A3CR2 to ground. This ensures that the ac voltages developed across A3R6 will be the voice signals extracted from the AM signal or the audio difference between the 500-kHz if. and the BFO frequency during the CW mode of operation.

3-67. The audio signals developed across resistor A3R6 are coupled to the base of amplifier A1Q9 by capacitor A1C12. The base operating voltage for amplifier A1Q9 is developed by voltage divider A1R27, A1R28 from the positive 20 Vdc applied to it from the transmit/receive relay on the main frame. The emitter operation voltage is applied through emitter resistors A1R29 and A1R30 from the 20 Vdc present at the Mode Selector switch on the front panel. Degeneration (developed by resistor A1R30) controls the gain and improves the distortion characteristics of amplifier A1Q9. The amplified output of amplifier A1Q9 is applied to the USB LINE LEVEL control on the front panel (see figure 3-11).

3-68. Audio Amplifier. The audio amplifier (figure 3-11) consists of audio amplifier Q7, emitter follower Q8, and push-pull amplifier Q9, Q10. These circuits amplify the audio signals from the USB or LSB LINE LEVEL control to a level suitable for driving the headset and the remote audio output accessories. The audio amplifier portion of assembly A2A2 is used during the USB, FSK, AM, and CW modes of operation. The audio amplifier portion of assembly A2A3 is used during the LSB mode of operation. Both audio amplifiers are used during the ISB mode of operation. The audio amplifier circuits are energized during transmit operation to allow the operator to monitor the respective sidetones. The following paragraphs describe the operation of the audio amplifier circuit in detail.

3-69. The audio signals present at the USB or LSB LINE LEVEL control are coupled to the base of audio amplifier A2Q7 by capacitor C17. (The audio signals are applied from either the product detector, AM detector, or an input connector on the rear of the R-1051B/URR.) The operating voltage for amplifier Q7 is developed by voltage divider R26, R27, R28 and emitter resistors



NOTES:

1. A2R5 IS THE USB PHONE LEVEL CONTROL AND IS CONNECTED WHEN ASSEMBLY A2A2 IS ENERGIZED. A2R4 IS THE LSB PHONE LEVEL CONTROL AND IS CONNECTED WHEN ASSEMBLY A2A3 IS ENERGIZED.
2. A2R13, A2R15, A2M1, AND A2S1 ARE THE LSB LINE LEVEL METER AND SWITCH CIRCUITS. A2R14, A2R16, A2M2, AND A2S5 ARE THE USB LINE LEVEL METER AND SWITCH CIRCUITS.
3. ☐ INDICATES EQUIPMENT MARKING.
4. PREFIX ALL REF DES WITH A2A3A2 OR A2A2A2

046-022-016

Figure 3-11. Audio Amplifier, Simplified Schematic Diagram

R31 and R32 from the positive 20 Vdc applied to them from the Mode Selector switch on the front panel. Capacitor C18 and resistor R26 perform a decoupling function to prevent any fluctuations in line voltage from affecting the operation of amplifier Q7. Capacitor C20 is an emitter-bypass capacitor. Negative feedback is produced by coupling the output from transformer T6 back to the emitter of amplifier Q7 through capacitor C19. Resistors R30 and R31 form a voltage divider for providing the desired amount of feedback to the emitter of amplifier Q7. The RC network consisting of capacitor C26 and resistor R29 provides high-frequency suppression to maintain the frequency response of the circuit within the required limitations.

3-70. The amplified audio output from amplifier Q7 is developed across resistor R29 and is applied directly to the base of emitter follower Q8. Operating voltage for emitter follower Q8 is developed by emitter resistor R34 from the positive 20 Vdc from the Mode Selector switch on the front panel. Emitter follower Q8 provides the necessary isolation and impedance matching between amplifier Q7 and the push-pull amplifier Q9, Q10. Resistor R33 is the collector resistor, which is bypassed by capacitor C22. The output from emitter follower Q8 is developed across the primary of transformer T5.

3-71. Transformer T5 couples the output from emitter follower Q8 to the bases of push-pull amplifiers Q9 and Q10. The base operating voltage for the push-pull amplifier is developed by voltage divider R35, R36 from the positive 28 Vdc from the tune relay located on the main frame. This operating voltage is applied through the secondary of transformer T5. Emitter operating voltage for the push-pull amplifier is the positive 28 Vdc from the tune relay on the main frame, which is applied through resistor R37 and the primary of the if./audio amplifier assembly main transformer T1. The 28 Vdc is interlocked through the tune relay to enable the audio output to be shut off when the R-1051B/URR is being tuned. This prevents spurious feedback from affecting the tuning. The amplified output from push-pull amplifier Q9, Q10 is developed across the primary of the if./audio amplifier assembly main transformer T1 which couples the audio signals to the USB or LSB PHONES jacks on the front panel for monitoring with the headset, and to an interconnection box for driving a remote speaker when the R-1051B/URR is used as part of a system. The USB or LSB LINE LEVEL meter is connected across the remote audio output. This meter provides an indication of the level of audio on the remote output lines. The USB or LSB LINE LEVEL switches select the meter range to be used.

3-72. Step AGC. The step agc circuit (figure 3-12) consists of if. amplifiers A1Q7 and Q8, time detector CR5, hang detector CR4, coincidence detector Q6, switch Q5, emitter follower Q4, and dc amplifiers Q1, Q2, and Q3. These circuits produce the automatic gain control (agc) voltages, which are used in the gain-controlled if. amplifier circuits and the rf amplifier circuit. The step agc portion of assembly A2A2 is used during the USB, AM, FSK, and CW modes of operation. The step agc portion of assembly A2A3 is used during the LSB mode of operation. Both step agc circuits are used during the ISB mode of operation. The following paragraphs describe the operation of the step agc circuit in detail.

3-73. The 500-kHz if. output from the gain-controlled if. amplifier is coupled to the base of if. amplifier A1Q8 by capacitor C4 in the step agc. The operating voltage for if. amplifier Q8 is developed by voltage divider R23, R26 and emitter resistor R22 from the positive 20 Vdc applied to them from the Mode Selector switch on the front panel. The amplified output from if. amplifier Q8 is developed across the tuned circuit consisting of capacitor C10 and the primary of transformer T2. Resistors R24 and R25 function together to increase the bandwidth of the amplifier circuit. The gain of if. amplifier Q8 is controlled by potentiometer R25. Capacitor C11 is the emitter-bypass capacitor.

3-74. The output from transformer T2 is coupled to the base of if. amplifier Q7 by capacitor C9. Resistor R21 serves as the load for transformer T2. The operating voltage for if. amplfier Q7 is developed by voltage divider R20, R21 and emitter resistor R18 from the 20 Vdc applied from the Mode Selector switch on the front panel. The amplified output from if. amplifier Q7 is developed across the tuned circuit consisting of capacitor C8 and the primary of transformer T1. Capacitor C7 is the emitter-bypass capacitor.

3-75. Two outputs, identical in frequency and polarity but differing in amplitude by 20 percent, are taken from transformer T1. The smaller of the two outputs (designated by E) is applied to hang detector CR4, where it is rectified and used to charge capacitor C3. The resistive network consisting of resistors R16, R15 and thermistor RT1 compensates for variations in the input that result from temperature changes to hang detector CR4. The charge on Capacitor C3 is the emitter bias for coincidence detector Q6. The larger of the two outputs (designated 1.2E) is applied to time detector CR5, where it is rectified and used to charge capacitor C5. The dc voltage at capacitor C5 is the base bias for coincidence detector Q6.

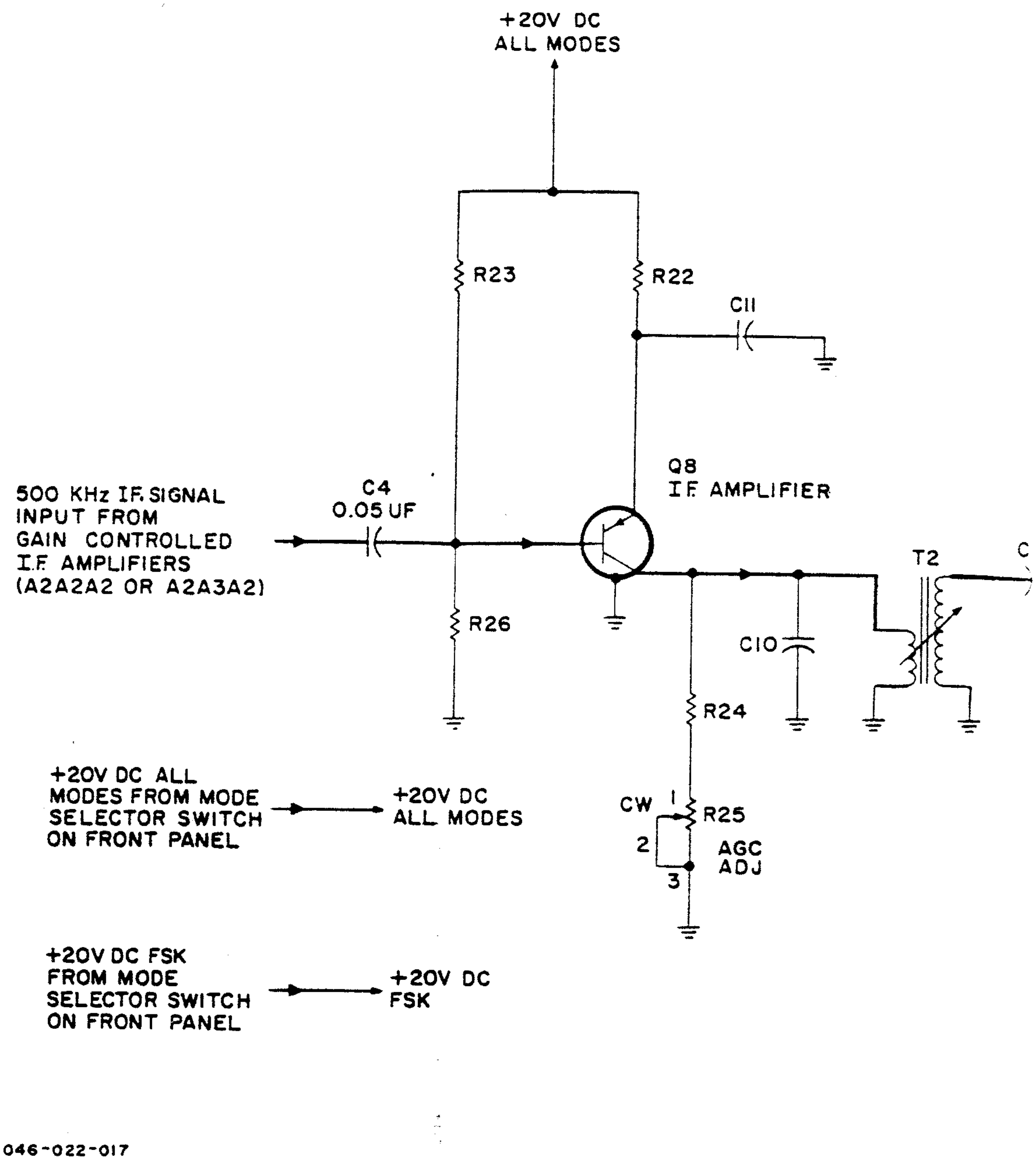
3.76. When a signal is present, coincidence detector Q6 is back-biased, due to the voltage (1.2E) on the base and the voltage (E) on the emitter. When the antenna signal is removed, capacitor C5 discharges through resistor R19, and capacitor C3 discharges through the high input impedance of emitter follower Q4. After a discharge time of approximately 600-ms duration, the voltages on capacitor C5 and capacitor C3 are equal, thereby forward-biasing coincidence detector Q6, and causing it to conduct. Capacitors C3 and C5 then discharge very rapidly to ground through the small emitter-to-collector resistance of coincidence detector Q6. If, during this process, new signal information is received, the step agc circuit will immediately reset itself on the new information, as described above.

3-77. Due to the continuous nature of an FSK signal, a shorter hang time for the agc voltage is desired. This is accomplished by reducing the RC time constant in the time detector circuit. In the FSK mode of operation, positive 20 Vdc is applied to voltage divider R13, R14 from the Mode Selector switch on the front panel. Since the emitter of switch Q5 is at ground potential, the voltage applied to the base by voltage dividier R13, R14 forward-biases switch Q5, causing it to conduct. This terminates resistor R17 at ground through the small collector-to-emitter resistance of switch Q5. Therefore, the discharge path for capacitor C5 is now through the parallel combination of resistors R17 and R19. Since the values of resistors R17 and R19 are identical, the discharge time for capacitor C5 is one-half on that given for the other modes of operation.

3-78. The strength of the input signal determines the level to which capacitor C3 charges and, thereby, determines the base bias on emitter follower Q4. The hang time, of the hang-detector and time-detector circuits are of sufficient duration so that the charge across capacitor C3 remains relatively constant during the reception of intermittent voice signals. The collector voltage for emitter follower Q4 is applied directly from the Mode Selector switch on the front panel. The RF GAIN control is normally set at a maximum sensitivity position (ground). Therefore, when a signal is present, the charge on capacitor C3 will forward-bias emitter follower Q4, causing it to conduct. This results in a voltage across resistor R12, which is the base bias for dc amplifier Q3. The collector voltage for dc amplifier Q3 is developed across resistor R11 from the positive 20 Vdc applied to it from the Mode Selector switch on the front panel. Since the emitter of dc amplifier Q3 is essentially at ground (through resistor R9), an output from emitter follower Q4 will forward-bias dc amplifier Q3, causing it to conduct. The resulting voltage developed across emitter resistor R9 is applied to the gain-controlled if. amplifiers as the required agc voltage. Resistor R9 and capacitor C2 constitute an RC network to filter any leakage (500-kHz if.) signal from the agc voltage.

3-79. With no signal output, the collector of dc amplifier Q3 is biased at 20 Vdc. This same voltage is the base bias for dc amplifier Q2. Voltage dividier R7, R8 develops a bias of approximately 17.1 Vdc on the anode of diode CR2 from the positive 20 Vdc applied to it from the Mode Selector switch on the front panel. The signal strength determines the rate of conduction of dc amplifier Q3 and the resulting voltage drop across resistor R11. Therefore, with an increase in signal strength, the voltage drop across resistor R11 will increase, and the base bias on dc amplifier Q2 will decrease. If diodes CR2 and CR3 were not in the emitter circuit of dc amplifier Q2, the signal strength would have to be of such magnitude as to cause a 3-volt drop across resistor R11 before dc amplifier Q2 would become forward-biased and conduct. Since the if. and rf agc voltages are both taken from the output from dc amplifier Q3, both circuits could have the same agc threshold. Since the rf circuits of a receiver determine its sensitivity to weak-signal reception, and the application on an agc voltage to these circuits tends to decrease this weak-signal capability, it is desirable to delay the application of agc to the rf amplifier circuits until the received signal strength has reached a sufficient signal-to-noise ratio. Therefore, diodes CR2 and CR3 are placed in the emitter circuit of dc amplifier Q2. Together, these diodes drop the emitter voltage of the dc amplifier an additional 0.8 Vdc. Therefore, the signal strength must be of sufficient magnitude to cause an additional 0.8-volt drop across resistor R11 before dc amplifier Q2 becomes forward-biased and conducts. Thus, the agc threshold for the rf amplifier circuits is at a higher signal input level than that of the if. amplifier circuit. The RF GAIN control is used to desensitize the rf and if. amplifier circuits during strong signal receptions. When the RF GAIN control is varied, a dc voltage between 0 and 5 volts is applied to the base of dc amplifier Q2 through resistor R12, thus forcing dc amplifier Q2 to conduct even in the absence of if. signals. The conduction thus caused will be of sufficient magnitude to override the normal if. and rf agc thresholds, resulting in no delay in the application of the two agc voltages.

3-80. When dc amplifier Q2 conducts, the output voltage is developed across resistors


+20V DC
ALL MODES
R23
R22
C11
Q8
I.F. AMPLIFIER
500 KHz I.F. SIGNAL
INPUT FROM
GAIN CONTROLLED
I.F. AMPLIFIERS
(A2A2A2 OR A2A3A2)
C4
0.05 UF
T2
R26
C10
R24
CW
1
R25
2
AGC
ADJ
3
+20V DC ALL
MODES FROM MODE
SELECTOR SWITCH
ON FRONT PANEL
+20V DC
ALL MODES
+20V DC FSK
FROM MODE
SELECTOR SWITCH
ON FRONT PANEL
+20V DC
FSK
046-022-017

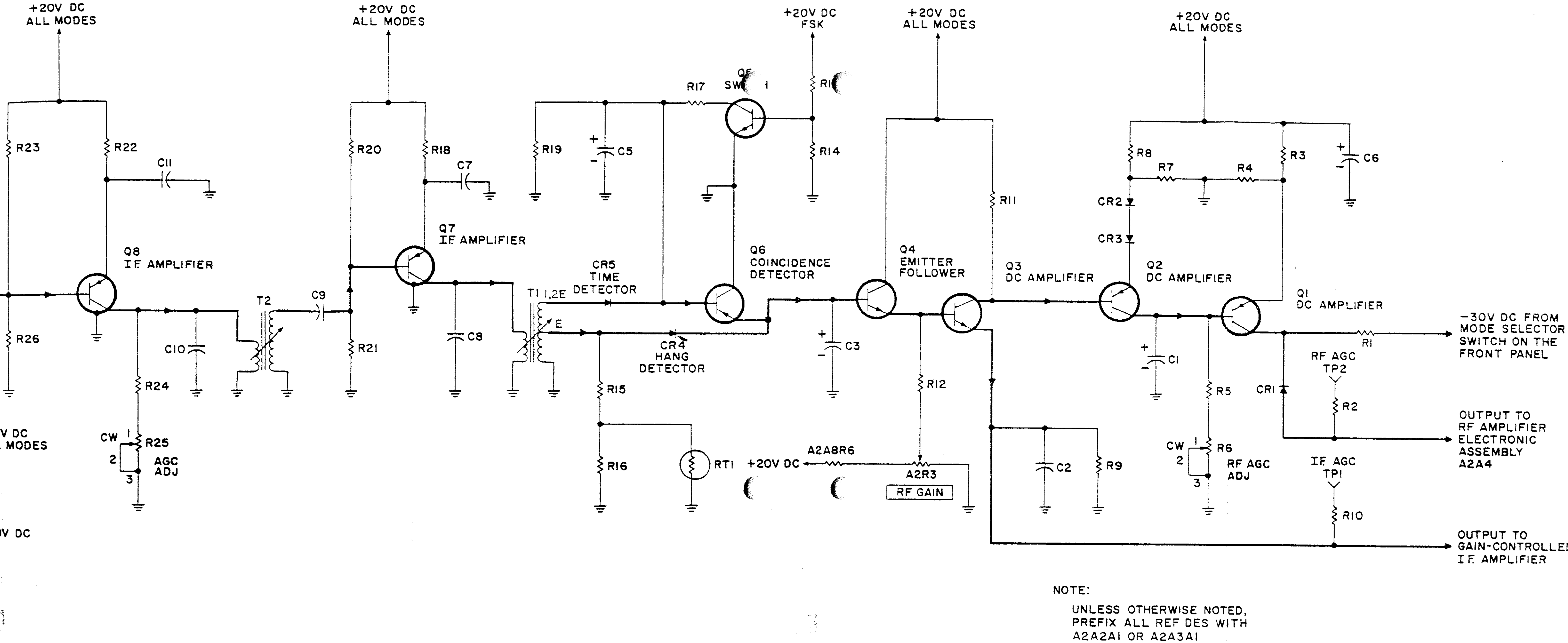


Figure 3-12. Step AGC, Simplified Schematic Diagram

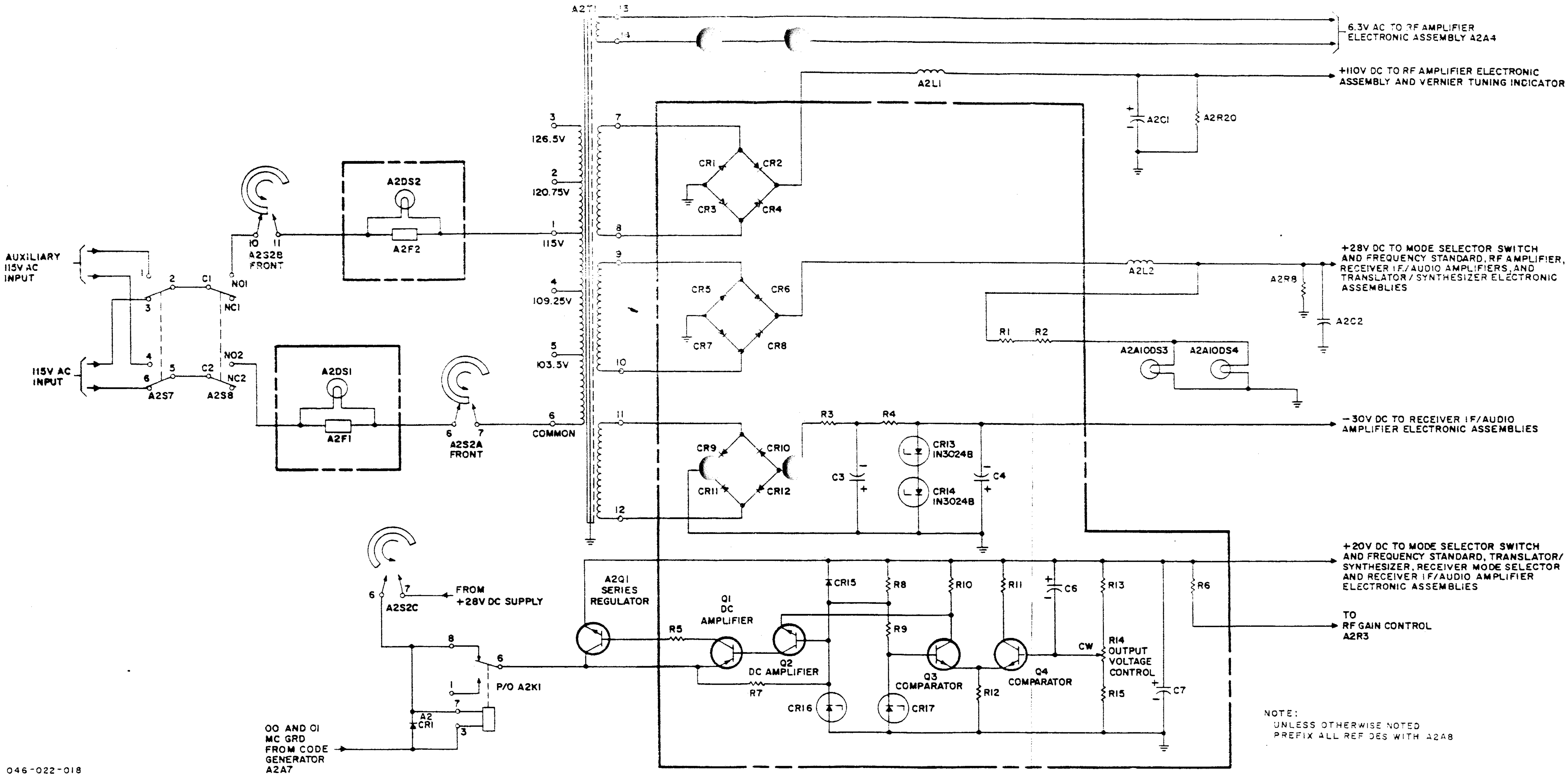


Figure 3-13. Power Supply, Simplified Schematic Diagram

R5 and R6. This voltage serves as the base bias for dc amplifier Q1 and may be varied by AGC ADJ potentiometer R6. Capacitor C1 attenuates any 500-kHz if. signal leakage. The operating voltage for dc amplifier Q1 is developed by voltage divider R3, R4 from the positive 20 Vdc applied to it from the Mode Selector switch on the front panel. With no agc voltage, the base of dc amplifier Q1 will be at ground potential, forward-biased, unless the RF GAIN control has been adjusted. This saturates dc amplifier Q1, resulting in zero or slightly positive voltage at the collector. Diode CR1 prevents any positive levels from being applied to the rf amplifier circuits. The voltage on the collector. Diode CR1 prevents any positive levels from being applied to the rf amplifier circuits. The voltage on the collector of dc amplifier Q1 is the agc voltage for the rf amplifier circuits. As the signal strength increases, the output from dc amplifier Q2 increases, decreasing the forward-biasing of dc amplifier Q1. The collector of dc amplifier Q1 goes more negative as the signal strength increases. When the signal strength is of sufficient magnitude to cut off dc amplifier Q1, the -30 Vdc will be the agc voltage applied to the rf amplifier circuit. If the RF GAIN control is set to some position other than for maximum sensitivity, the conduction of dc amplifier Q1 will no longer be dependent only on the signal strength.

3-81. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5. Frequency Standard Electronic Assembly A2A5 is a depot-repairable assembly. Its functional circuit description is contained in Repair Book for AN/WRC-1B and R-1051B/URR, 2N Modules, NAVSHIPS 0967-734-2000.

3-82. POWER SUPPLY ELECTRONIC ASSEMBLY A2A8. Power Supply Electronic Assembly A2A8 (figure 3-13) consists of the +110-Vdc supply, the +28-Vdc supply, the -30-Vdc supply, and the regulated +20-Vdc supply. These circuits supply operating power to all the circuits of the R-1051B/URR. The following paragraphs describe the operation of the power supply in detail.

3-83. All power is derived from the nominal 115-Vac line, which is applied through switches A2S7, A2S8, and A2S2 and fuses A2F1 and A2F2 to the primary power transformer A2T1. Indicator lamps A2DS1 and A2DS2 will light if fuses A2F1 and A2F2 open. The primary of transformer A2T1 is tapped, so that, in locations where line voltages differ slightly from the normal 115 Vac on a reasonably permanent basis, one can compensate for the difference by reconnecting to a new tap.

3-84. The 6.3 Vac from terminals 13 and 14 of the secondary of transformer A2T1 supplies power to the filaments of rf amplifiers V1 and V2 in RF Amplifier Electronic Assembly A2A4. The output from terminals 7 and 8 of transformer A2T1 is applied to a bridge rectifier consisting of diodes A2A8CR1 through CR4; the output of the bridge is applied to a choke input filter consisting of choke A2L1 and capacitor A2C1. The output of the choke input filter, +110 Vdc, is used to supply plate and screen voltage to rf amplifiers V1 and V2 in RF Amplifier Electronic Assembly A2A4, and to light the vernier tuning indicator on the front panel. Resistor A2R20 is a bleeder load for the +110-Vdc supply. The output from terminals 9 and 10 of transformer A2T1 is applied to a bridge rectifier consisting of diodes A2A8CR5 through CR8; the output of the bridge is applied to a choke input filter consisting of choke A2L2 and capacitor A2C2. The output of the choke input filter, +28 Vdc, is used in the RF Amplifier, Frequency Standard, Receiver IF./Audio Amplifier, and Translator/Synthesizer Electronic Assemblies A2A4, A2A5, A2A2 and A2A3, and A2A6.

3-85. The regulated +20-Vdc supply is derived from the +28-volt supply. Resistor A2R8 is the bleeder load for the +28-Vdc supply. When primary power is supplied, lamps A2A10DS3 and A2A10DS4 light, illuminating the frequency display windows above the MCS and KCS controls on the front panel. Resistors A2A8R1 and R2 are series-dropping resistors. The output from terminals 11 and 12 of transformer A2T1 is applied to a bridge rectifier consisting of diodes A2A8CR9 through CR12; the output of the bridge is applied to a filter network consisting of resistor R3 and capacitor C3. The output from this network is applied to resistor

R4 and zener diodes CR13 and CR14. Since the zener voltage of each diode is 15 Vdc, the output from this network is regulated -30 Vdc. Capacitor C4 is used to provide additional filtering. The -30 Vdc is used in the step agc circuit of Receiver IF./ Audio Amplifier Electronic Assembly A2A2 and A2A3.

3-86. The regulated +20-Vdc supply consists of series regulator A2Q1, dc amplifiers Q1 and Q2, comparators Q3 and Q4, 12-Vdc zener diode CR16, and 4.7-Vdc Zener diode CR17. This circuit provides a constant +20 Vdc regardless of the load. The input voltage of +28 Vdc is applied to th the collector of series regulator A2Q1, through contacts 7 and 6 of section C (front) of the Mode Selector switch in any position other than OFF or STD BY, and contacts 8 and 6 of relay A2K1. If the MCS controls are set in their 00 or 01 positions, a ground is applied to relay A2K1, causing it to energize. This cuts off the input to the +20-Vdc supply unless the operating frequency is 2.0 to 30.0 MHz. The collector-to-emitter resistance is directly proportional to the amount of base-to-emitter current. The output voltage, +20 Vdc in this case, is selected by adjusting output voltage control A2A8R14, which determines the bias voltage on comparator Q4. The bias voltage determines the amount of emitter current flow, thereby determining the voltage across emitter resistor R12. Since the bias voltage on the base of comparator Q3 is held constant by zener diode CR17, the collector current flow will be determined by the emitter voltage. The emitter of comparator Q3 is connected to the emitter of comparator Q4; therefore, collector current of comparator Q3 will be controlled by the bias voltage on comparator Q4. Since the base voltage of dc amplifier Q2 is held constant by zener diode CR16, the collector current flow is controlled by the collector voltage on comparator Q3. The collector current of dc amplifier Q1 is controlled by the collector current of dc amplifier Q2. The collector current through resistor R5 determines the bias voltage on the base of series regulator A2Q1, which, in turn, determines the emitter-to-collector resistance.

3-87. In order to understand the operation of the regulated +20-Vdc supply more thoroughly, assume that some of the load on the +20-Vdc supply has been removed. This condition causes the base-bias voltage of comparator A2A8Q4 to increase, thereby increasing the voltage across resistor R12. This increase causes a decrease in the base-to-emitter voltage to comparator Q3, thereby causing an increase in collector voltage. Since the emitter of the dc amplifier is connected to the collector of comparator Q3, and the base voltage is held constant by zener diode CR16, the increase in collector voltage in comparator Q3 causes the collector current to decrease in dc amplifier Q2. Since the collector of dc amplifier Q2 is connected to the base of dc amplifier Q1, the decrease in collector current in dc amplifier Q2 causes a decrease in collector current in dc amplifier Q1. Since the collector of dc amplifier Q1 is connected to the base of series regulator A2Q1 through resistor A2A8R5, a decrease in collector current in dc amplifier Q1 causes the collector-to-emitter resistance to increase, thereby causing the output voltage to return to +20 Vdc. Resistor R5 acts as a parasitic suppressor. Diode CR15 protects the circuit if the +20-Vdc line is accidentally grounded. Normally, diode CR15 is back-biased by the +20 Vdc on its anode and +12 Vdc on its cathode. If the +20-Vdc line becomes grounded, the diode will be forward-biased, dropping the base of dc amplifier Q2 to ground potential and preventing damaging current flow in dc amplifiers Q1 and Q2.

3-88. 4-VDC POWER SUPPLY AND VERNIER CONTROL ELECTRONIC ASSEMBLY A2A11. 4-Vdc Power Supply and Vernier Control Electronic Assembly A2A11 (figure 5-1) provides a source of +4 Vdc, a dc voltage to the CPS vernier control on the front panel, and a turn-on voltage to the neon CPS vernier lamp on the front panel. It consists of the front-panel CPS switch S6 and CPS vernier potentiometer R7, and a printed circuit board A1 which mounts the miscellaneous electrical components.

3-89. Input power of +20 Vdc is applied from Power Supply Electronic Assembly A2A8 through 100 CPS Synthesizer Subassembly A2A6A4. When the 100 CPS synthesizer is removed from the unit, input power is removed from the 4-Vdc power supply. The 20-Vdc input is applied to terminal A2A11A1E7. Voltage-divider network R1 through R3 provides approximately 11.5 Vdc to the CPS vernier control A2A11R7. Zener diode A2A11A1CR2 limits the dc voltage swing of this control to approximately 3.3 volts. Zener diode CR1 drops the 20-Vdc input to 4 Vdc, which is applied through terminal E6 to the 100 CPS synthesizer. Resistors R6 and R7 are current limiters for the +110 Vdc applied to the CPS vernier indicator A2DS5, located on the front panel. The +110 Vdc is present at terminal A2A11A1E9 only when the front-panel CPS switch is placed in the vernier (V) position.

3-90. MHz DIGITAL TUNING CIRCUITS. The MHz tuning circuits (figure 3-14) consist of Code Generator Electronic Assembly A2A7; switch S1, motor B1, and relay K1 in RF Amplifier Electronic Assembly A2A4; and switch S1, motor B1, and relay K1 in 1 MC Synthesizer Electronic Subassembly A2A6A1. The code generator consists of switches A2A7S3 and S4, which form three parallel, open-seeking, tuning circuits, each employing a five-wire coding scheme. Two of these tuning circuits generate a tuning code for positioning the turret assembly in the rf amplifier and the crystal switch in the 1 MC Synthesizer. The third tuning circuit is not used in tuning the R-1051B/URR. The following paragraphs describe the tuning circuits for the R-1051B/URR in detail.

3-91. Switches A2A7S3 and S4 are controlled by the 10 MCS and 1 MCS controls on the front panel. These two switches are analogously represented (figure 3-14) by sections A, B, C, D, and E; sections A and C form two 28-position masters, and sections B and D form two 28-position images. For the schematic diagram of these switches, see figure 5-14. Section A establishes the tuning code for turret motor switch A2A4S1 in the rf amplifier, and section C establishes the tuning code for crystal motor switch A2A6A1S1 in the MC synthesizer. The tuning code generated by section A is one of 28 series of opens and grounds; each series represents one of the 28 tuning positions of turret switch A2A4S1 (refer to table 3-1). Although section C is also a 28-position switch, the tuning code it generates is one of 17 series of opens and grounds; each series represents one of the 17 positions of crystal switch A2A6A1S1 (refer to table 3-1).

3-92. Section A (master) applies the coded information to turret motor switch A2A4S1-A (master). This establishes a ground path through the common contact of S1-A to pin 7 of turret motor relay K1; since position 28 Vdc is applied to pin 3, the ground causes relay K1 to energize. When turret motor relay K1 energizes, turret motor B1 is energized by application of positive 28 Vdc through contacts 5 and 2 of turret motor relay K1. When energized, turret motor B1 rotates turret motor switch S1 until the complement of the code on section A (master) is reflected by turret motor switch S1-A (master). Whenever the codes on the two masters are complementary, the ground path to turret motor relay K1 is broken, causing it to deenergize. Similarly, section C generates a code to energize crystal motor A2A6AB1, and to rotate crystal motor switch S1 to the position established by the 1 and 10 MCS controls on the front panel.

3-93. The two image switch sections in code generator A2A7S3 and S4 (sections B and D), turret motor switch section A2A4S1-B, and crystal motor switch section A2A6A1S1-B, always have the complementary code of their respective masters. This ensures that the ground, or grounds, will be applied to the masters whenever a new code is selected. This is accomplished by the cut of the wafer, which is the exact mirror image of the respective master. All contacts appearing as opens at the master appear as grounds at the image, and vice versa.

3-94. In figure 3-14, code generator switch sections A and B are positioned to represent the code 10100 (x2.xxx MHz). If the MCS controls on the front panel were set at x3.xxx MHz, sections A and B would be rotated one position counterclockwise, creating the new code 01000 (refer to

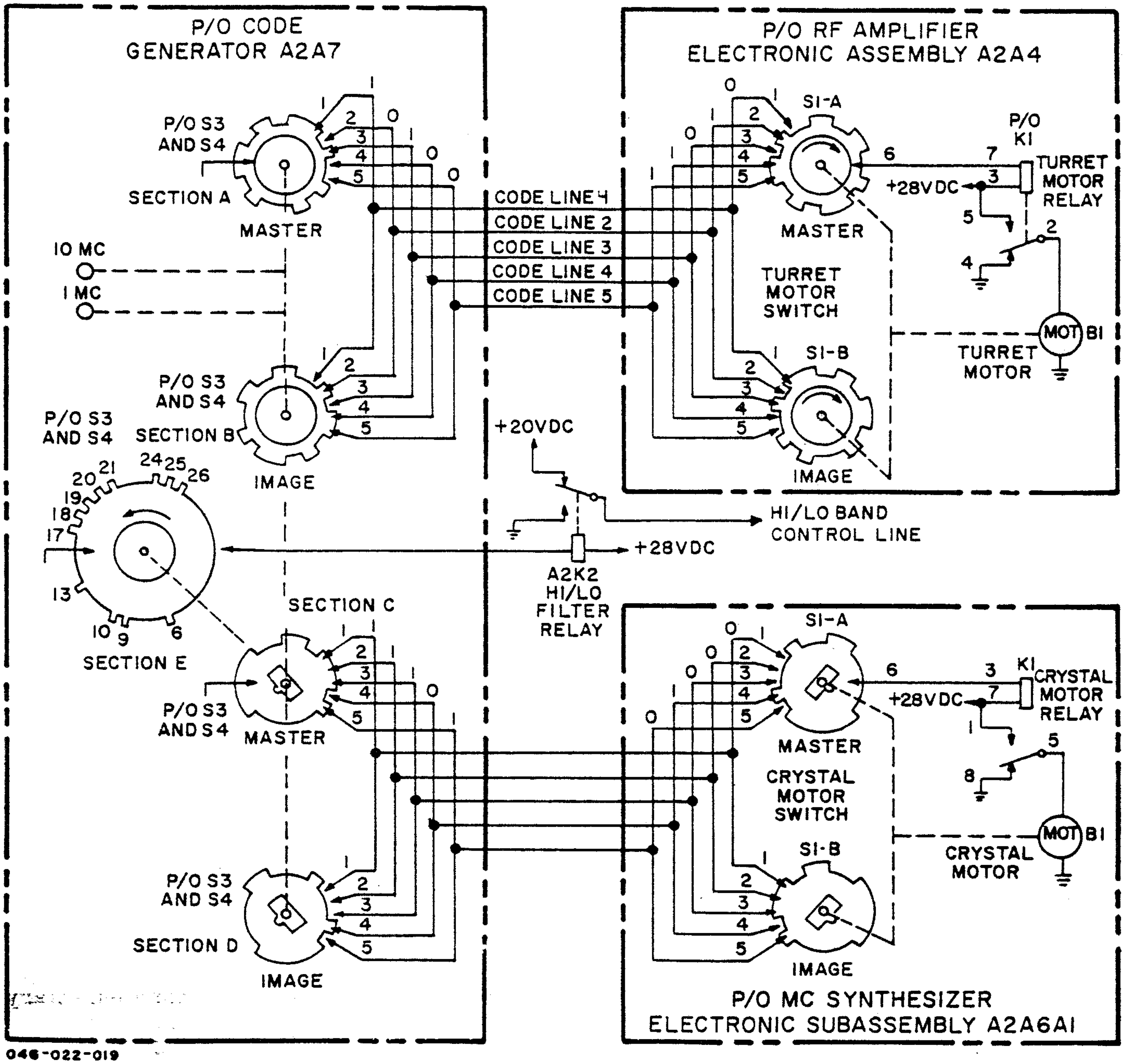


Figure 3-14. MHz Digital Tuning, Simplified Schematic Diagram

table 3-1). A ground path would be established to pin 7 of turret motor relay A2A4K1 through code line 2 and turret motor switch S1-A. This energizes turret motor relay K1, which in turn energizes turret motor B1. Turret motor switch S1 is rotated until image code 10111 is reflected by turret motor switch S1-A. At this time, the ground path is broken, causing turret motor relay K1 to deenergize.

Ground is then applied through contacts 2 and 4 of turret motor relay K1 to turret motor B1. This dynamically brakes turret motor B1. If the MCS controls on the front panel were set to 22.xxx MHz rather than x2.xxx MHz, the code generated by section A would have been 10000. As shown in figure 3-14, there is no ground path directly between the two masters. This time the ground path would be through code line 1 to

TABLE 3-1. TUNING CODE CHART

MCS AND 100 KCS CONTROLS	A2A4 CODES LINES					A2A6A1 CODES LINES				
SETTING	1	2	3	4	5	1	2	3	4	5
2	1	0	1	0	0	1	1	1	0	1
3	0	1	0	0	0	1	0	1	1	1
4	1	0	0	0	1	1	1	0	1	1
5	0	0	0	1	1	0	1	1	0	1
6	0	0	1	1	0	0	1	0	0	0
7	0	1	1	0	1	1	0	0	1	1
8	1	1	0	1	1	1	1	0	0	1
9	1	0	1	1	0	1	0	1	0	0
10	0	1	1	0	0	1	1	0	1	0
11	1	1	0	0	0	0	0	1	1	1
12	1	0	0	0	0	0	0	0	1	1
13	0	0	0	0	1	1	0	1	1	1
14	0	0	0	1	0	0	1	1	1	0
15	0	0	1	0	1	0	0	1	1	0
16	0	1	0	1	1	1	1	1	1	0
17	1	0	1	1	1	1	0	0	1	1
18	0	1	1	1	1	1	1	0	0	1
19	1	1	1	1	0	1	1	1	0	0
20	1	1	1	0	0	0	1	1	1	1
21	1	1	0	0	1	0	0	1	1	1
22	1	0	0	1	0	0	0	0	0	1
23	0	0	1	0	0	1	1	1	1	0
24	0	1	0	0	1	0	1	1	1	0
25	1	0	0	1	1	0	0	1	1	0
26	0	0	1	1	1	1	1	1	1	0
27	0	1	1	1	0	0	0	0	1	1
28	1	1	1	0	1	0	0	1	1	1
29	1	1	0	1	0	0	1	1	1	1

turret motor switch S1-B (image), code line 3 to section B (image), and code line 2 to turret motor switch S1-A (master). Therefore, the ground path to turret motor relay K1 is established using the images. In a like manner, any code can be traced, and the tuning of turret motor switch S1 will be accomplished for any code shown in table 3-1. Similarly, the codes shown in table 3-1 can energize crystal motor B1 and tune crystal motor switch S1 to the position established by the MCS controls on the front panel.

3-95. Section E of the code generator switches generates the hi-/lo-band control-line codes. The wiper of section E remains open until it is placed in an MCS position that has a tab. At this time, ground is applied to hi-lo-filter relay A2K2, causing it to energize. When relay A2K2 is energized, ground is placed on the hi-/lo-band control line. When hi-/lo-filter relay A2K2 is deenergized, positive 20 Vdc is applied to the hi-/lo-band control line.

3-96. kHz DIGITAL TUNING SYSTEM. The kHz digital tuning system (figures 5-16 through 5-20) consists of mechanical positioning of the 100-, 10-, and 1-kHz oscillator circuits. Each of three front-panel KCS controls has a digital dial, chain-drive mechanism, couplings, and detents for positive positioning of tuning shafts in RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronics Assembly A2A6. The 1 KCS control selects and centers the desired digit in the viewing window as it positions the 1-kHz index wheel on the 1 and 10 KC Synthesizer Electronic Subassembly A2A6A3 fully in its detent. The 1 KCS control positions the 10-kHz indexed coupler wheel on rf amplifier to the exact same position. Coupler wheels in the rf amplifier are not detented.

3-97. The 100-kHz positioning system functions the same as the 10-kHz positioning system. The detent spring arms on the dual sprocket assembly are positioned to give fully seated detents as the same position in which the translator/synthesizer index wheel is fully seated. The hub clamps allow positioning of each chassis coupler slot without disrupting the chain mechanism and system. The hub clamp also allows coarse adjustment of the index wheel. The hex-head screw adjustment allows alignment between the two associated couplers, i.e., the rf amplifier and the translator/synthesizer.

3-98. RELAY AND CONTROL SWITCHING. The control switching circuits (figure 5-1) consist of switches A2S2, S7, and S9 and relays K1 through K3. These circuits which form a part of main frame, energize and key the applicable circuits according to the selected mode of operation. The following paragraphs describe the control switching circuits in detail.

3-99. Primary power for the R-1051B/URR is received via pins R and S of connector A1A1J4 or pins A and C of connector A1A1J3, depending upon whether the R-1051B/URR is operated independently or in an AN/WRC-1B system. For independent operation, AUX/NORM power switch A2S7 is set to the AUX position to connect 115 Vac from A1A1J3-A and C to interlock switch A2S8. For system operation, AUX/NORM power switch A2S7 is set to the NORM position to connect 115 Vac from A1A1J4-R and S to interlock switch A2S8.

3-100. From interlock switch A2S8, one side of the 115-Vac line (A1A1J4-S) passes through fuse A2F1 to contact 6 of the front part of section A of Mode Selector switch A2S2, which is an open circuit in the OFF position. The other side of the 115-Vac line (A1A1J4-R) comes from interlock switch A2S8 and goes directly to contact 10 of the front part of section B of Mode Selector switch A2S2, which also is an open circuit in the OFF position. In the STD BY position of Mode Selector switch A2S2, one side of the 115-Vac line is switched directly to terminal 6 of power transformer A2T1. The other side of the 115-Vac line is switched through section B of switch A2S2 and fuse A2F2 to terminal 1 of power transformer A2T1. Therefore, the power input circuit of the R-1051B/URR is completed, and transformer A2T1 and the 6.3-Vac, 110-Vdc, -30-Vdc, and 28-Vdc power supplies are energized. The 28 Vdc is routed to Frequency Standard Electronic Assembly A2A5, where the 5-MHz oscillator and its associated oven-control circuits are energized. The 110-Vdc and -30-Vdc power supplies are not used in the STD BY position of Mode Selector switch A2S2.

3-101. In any on position of Mode Selector switch A2S2 (e.g., USB, CW), 28 Vdc from Power Supply Electronic Assembly A2A8 is routed through contacts 7 and 6 of the front part of section C of switch A2S2. This 28 Vdc is applied to RF Amplifier Electronic Assembly A2A4, 1 MC Synthesizer Electronic Subassembly A2A6A1, and contact 6 of SIMPLEX/DUPLEX switch A2S9. It is also applied to contact 8 and coil contact 7 of tune relay A2K1 and coil contact 7 of hi-/lo-filter relay A2K2. For operation of hi-/lo-filter relay A2K2, see paragraph 3-95. When tune relay A2K1 is deenergized, the 28 Vdc on contact 8 is routed through contact 6 to contacts 4 and 6 on the rear part of section D of switch A2S2, and also to the regulated 20-Vdc supply, providing energizing voltage (see paragraph 3-86). The 20 Vdc from power supply A2A8 is routed through contacts 2 and 4 of transmit/receive relay A2K3 to pin 4 of connector A2J17 and pin 6 of connector A2J16 on Receiver Mode Selector Electronic Assembly A2A1. Tune relay A2K1 is energized by a ground applied to coil contact 3 from pin 7 of connector A2J8 on Code Generator Electronic Assembly A2A7, whenever the MCS controls are tuned to 00 or 01, or whenever the R-1051B/URR is being tuned.

3-102. Provisions are made on pins J and K of connector A1A1J4 on the rear panel of the R-1051B/URR to receive 28 Vdc and a ground keyline, respectively, from Radio Transmitter T-827B/URT, when used with the AN/WRC-1B. When SIMPLEX/DUPLEX switch A2S9 is in the SIMPLEX position, the 28 Vdc will be routed through contacts 4 and 5 to coil contact 7 of transmit/receive relay A2K3. When the T-827B/URT is energized, a ground is routed through contacts 1 and 2 of switch A2S9 and contacts 4 and 2 of tune relay A2K1 to coil contact 3 of transmit/receive relay A2K3, thereby energizing it. When transmit/receive relay A2K3 is energized, the 110-Vdc path through contacts 6 and 8 of A2K3 is broken and the 20-Vdc path through contacts 2 and 4 of relay A2K3 is broken. When SIMPLEX/DUPLEX switch A2S9 is in the DUPLEX position, transmit/receive relay A2K3 is energized during tuning by 28 Vdc routed through contacts 6 and 5 of switch A2S9 to coil contact 7 of relay A2K3 and by a ground routed through contacts 5 and 2 of tune relay A2K1 to coil contact 3 of relay A2K3.

SECTION 4
TROUBLESHOOTING

4-1. INTRODUCTION.

4-2. OVERALL FAULT ISOLATION AND REPAIR. When the R-1051B/URR is suspected of having an operational malfunction the technician must verify there is a malfunction, isolate and perform repairs, make final adjustments, and perform the overall test to ensure receiver meets all operational requirements. Figure 4-1 provides a logical sequence of performing these steps to return the equipment to an operational condition. Study figure 4-1 to aid in understanding of the overall fault isolation and repair method used. Read paragraph 4-7 on maintenance turnon procedure, evaluate all symptoms and use figure 4-1 for guidance in fault isolation of malfunction, repair, making adjustments and overall receiver performance test.

4-3. TROUBLESHOOTING INDEX. Table 4-1 breaks down the R-1051B/URR into assemblies for separate troubleshooting and identifies text and illustrations necessary to troubleshoot and evaluate the performance of each assembly.

4-4. TEST EQUIPMENT REQUIRED FOR TROUBLESHOOTING. Test equipment and accessories required to perform the troubleshooting procedures described in this section are identified in table 4-2.

4-5. WARNING AND CAUTIONS. Observe the following warning and cautions at all times when troubleshooting this equipment:

WARNING

115 volts ac is present on the rear side of the front panel at all times except when the power switch external to the equipment is off or the power cables are removed from connectors A1A1J3 and A1A1J4 at the rear of the receiver case.

CAUTION

Additional damage to the receiver is likely if certain critical voltages are not measured prior to performing troubleshooting, maintenance, or repair work on the R-1051B/URR. When a receiver is suspected of being defective, ensure that the 4.2 volts and the 20 volts dc regulated supplied have not increased above 5 and 22 volts respectively. Circuit failures can cause these voltages to increase to approximately 20 and 28 volts respectively. When this occurs, further damage to the chassis components and modules will occur due to excessive voltages placed on many transistors. New or exchanged modules should not be installed until these voltages are measured and found correct. The procedures to measure these voltages are provided in steps 1 and 2 of table 4-3. Only two measurements are considered critical to safeguard the equipment. However, locating malfunctions is facilitated if the dc measurements provided in step 3 of the procedure are made at the same time.

CAUTION

Fault isolation by indiscriminate substitution of assemblies should not be practiced as a troubleshooting technique. This method may result in damage to the main-frame chassis, excessive voltages applied to a newly installed assembly, and alignment-adjustment problems. If an urgency arises to justify substituting operational assemblies as a means of rapid fault isolation, the following precautions should be taken:

a. Insure the Manufacturer's Part Number or the Federal Stock Number (FSN) of the assembly to be installed is the correct replacement for use in the R-1051B/URR.

b. Perform step 2 of table 4-3 to insure that voltage from the 20 Vdc and 4 Vdc supplies are not excessive.

c. After exchange, perform paragraph 5-61 and 5-83 to insure receiver is completely operational.

d. If malfunction is still present, install original assembly and proceed with the fault isolation and repair procedure in accordance with figure 4-1.

4-6. MAINTENANCE TURNON PROCEDURE.

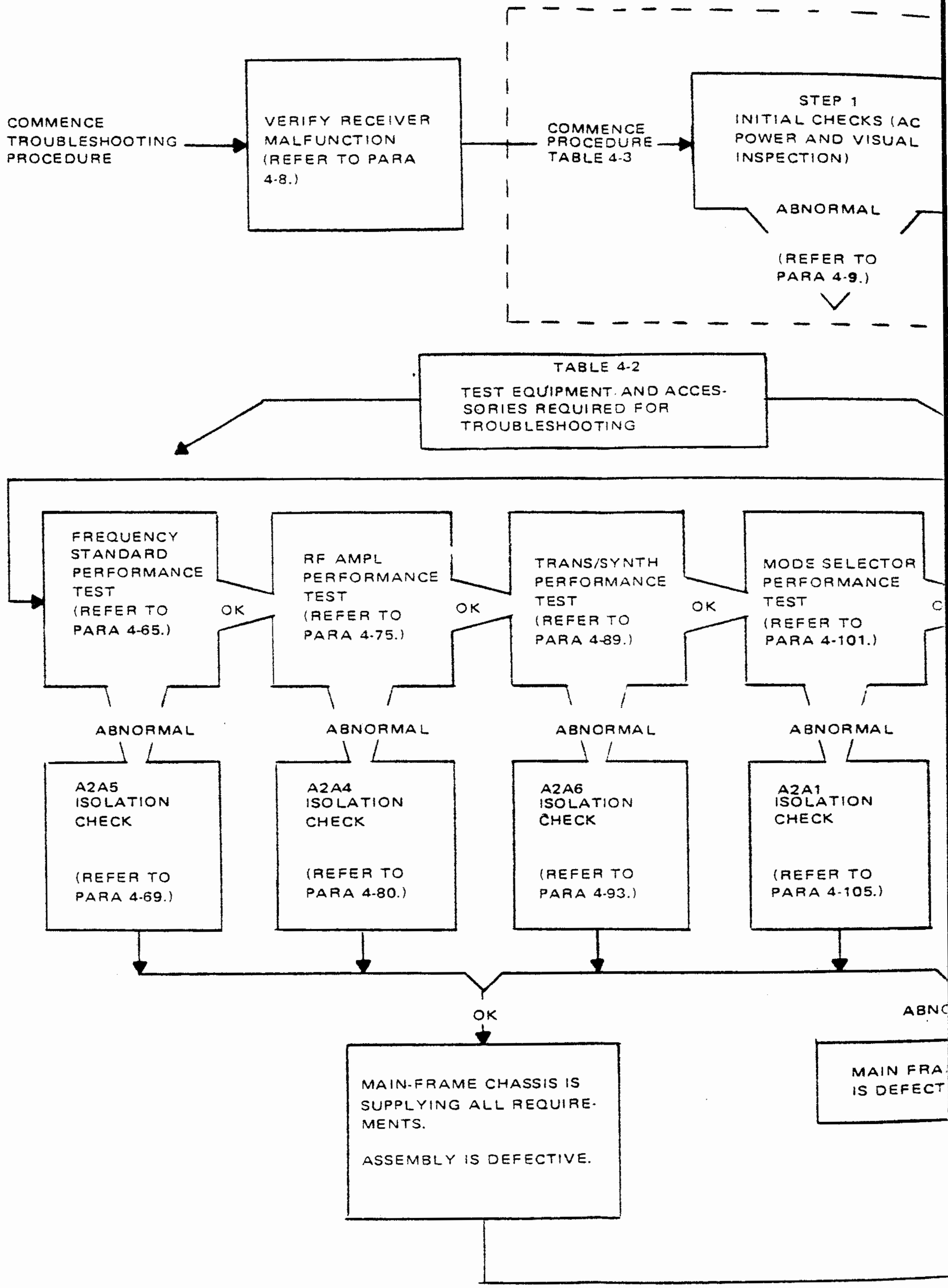
4-7. GENERAL. Table 4-3 is to be used as an aid in troubleshooting after an operational check has confirmed the existence of a receiver malfunction. The procedure is not intended to be used as an operational check, but as an aid in obtaining a sufficient number of symptoms to isolate a malfunction. When a symptom is observed that tends to indicate the area of malfunction, continue with the procedure and make brief notes of all other observed symptoms, which should be classified under a heading of noise or signal for various modes and frequencies of operation until the malfunction area is obvious. Upon completion of the maintenance turnon procedure, see figure 4-2, which is keyed to include known failure data and the most likely causes in the usual operating environments. If the faulty assembly is obvious at this point in troubleshooting, use the appropriate assembly troubleshooting procedure in paragraphs 4-63 through 4-109 to isolate the fault within the assembly. If the faulty assembly is not obvious, complete the overall receiver performance test in paragraph 5-83.

4-8. REFERENCE NOTES. The maintenance turnon procedure should be performed only after the technician has verified the existence of a malfunction. Perform the known-station receiver check in paragraph 5-85 to confirm the existence of a malfunction. If the only problem appears to be poor reception or off-frequency signals, the complete overall receiver performance test in paragraph 5-83 should be performed prior to the maintenance turnon procedure. Ensure that the associated antenna, phones, remote speakers, patch panel, and other external equipment are not the cause of the indicated receiver malfunction. Continue with step 1 of table 4-3.

4-9. If 115 Vac input is present, continue with maintenance turnon procedure through step 3. If the 28-volt measurement in step 3 is normal, refer to paragraph 5-27 for replacement of panel lamps. If 115 Vac is not present, refer to paragraph 4-35.

4-10. A reading above 22 volts indicates 20-volt series regulator A2Q1 or power supply A2A8 (printed circuit board 20-volt regulation circuitry) may be partially or completely shorted to the 28-Vdc source. Refer to paragraph 4-32. If the 22-volt measurement is not excessive, but the 5-volt measurement is excessive, troubleshoot the 4-Vdc power supply and vernier control pcb A2A11A1. Zener diode circuit A2A11A1CR1 should hold this voltage to 4.2 volts. Refer to paragraph 4-51.

4-11. Most installations will have an input cable from either Frequency Standard AN/URQ-9 or AN/URQ-10 connected directly to EXT 5MC IN connector A1J25 on the rear of the receiver case. Some installations may have an AM-2123/U rf amplifier distribution system. If no system is available, an operational equipment


COMMENCE TROUBLESHOOTING PROCEDURE
VERIFY RECEIVER MALFUNCTION (REFER TO PARA 4-8.)
COMMENCE PROCEDURE TABLE 4-3
STEP 1 INITIAL CHECKS (AC POWER AND VISUAL INSPECTION)
ABNORMAL
(REFER TO PARA 4-9.)
TABLE 4-2 TEST EQUIPMENT AND ACCESSORIES REQUIRED FOR TROUBLESHOOTING
FREQUENCY STANDARD PERFORMANCE TEST (REFER TO PARA 4-65.)
OK
RF AMPL PERFORMANCE TEST (REFER TO PARA 4-75.)
OK
TRANS/SYNTH PERFORMANCE TEST (REFER TO PARA 4-89.)
OK
MODE SELECTOR PERFORMANCE TEST (REFER TO PARA 4-101.)
ABNORMAL
ABNORMAL
ABNORMAL
ABNORMAL
A2A5 ISOLATION CHECK (REFER TO PARA 4-69.)
A2A4 ISOLATION CHECK (REFER TO PARA 4-80.)
A2A6 ISOLATION CHECK (REFER TO PARA 4-93.)
A2A1 ISOLATION CHECK (REFER TO PARA 4-105.)
OK
MAIN-FRAME CHASSIS IS SUPPLYING ALL REQUIREMENTS.
ASSEMBLY IS DEFECTIVE.

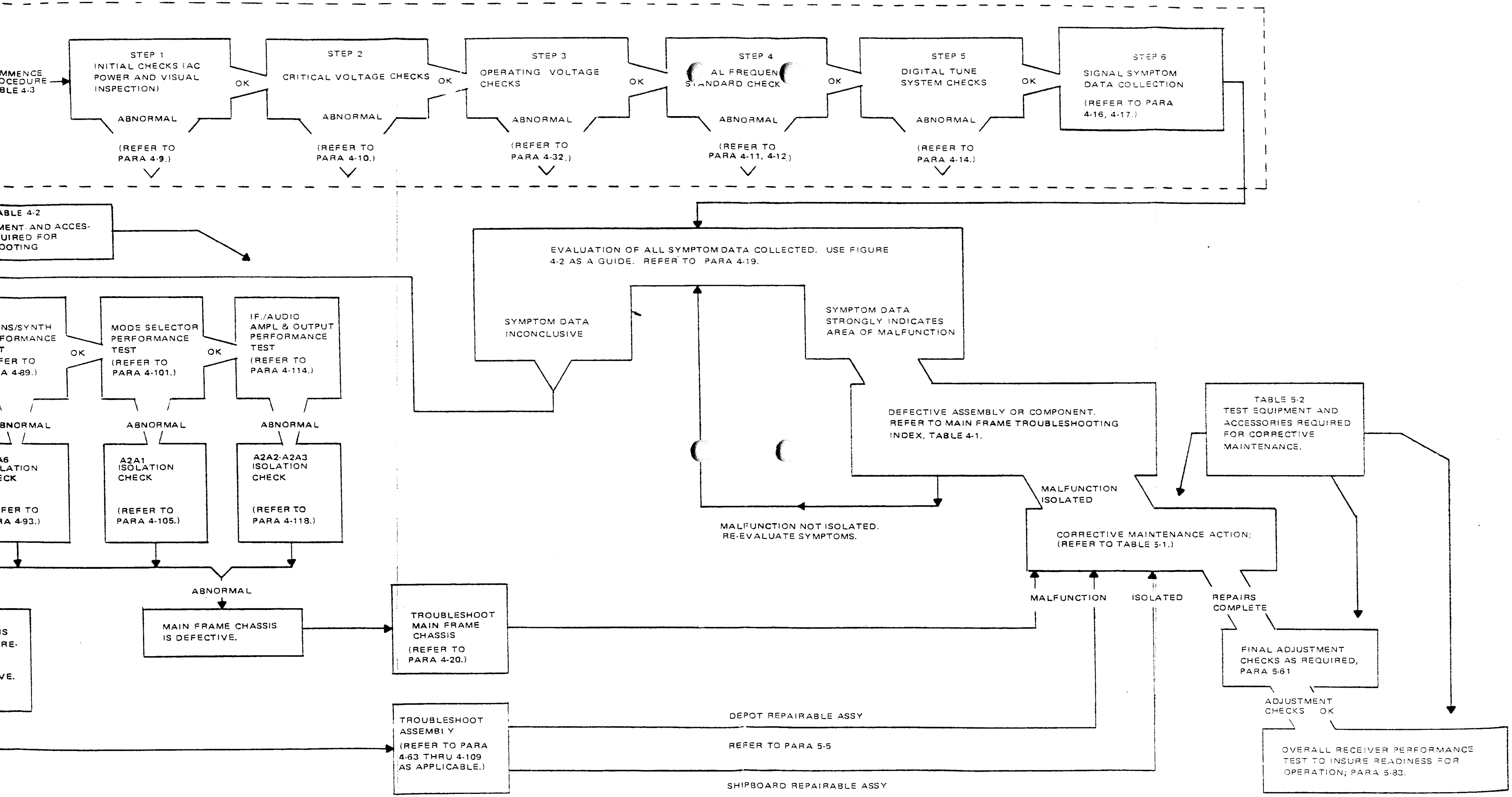


Figure 4-1. Radio Receiver R-1051B/URR, Overall Fault Isolation and Repair Diagram

TABLE 4-1. TROUBLESHOOTING INDEX

ASSEMBLY	TROUBLE-SHOOTING PARAGRAPH	TEST POINT LOCATION DIAGRAM FIGURE	PERFORMANCE TEST PARAGRAPH	ISOLATION CHECKS PARAGRAPH	SERVICING BLOCK DIA-GRAM FIG.
Chassis and Front Panel A2 (Main Frame)	4-20	4-3 thru 4-5	-	4-23 thru 4-60	4-22
Receiver Mode Selector Electronic Assembly A2A1	4-97	5-23 thru 5-27	4-101	4-105	4-23
Receiver IF. Audio Amplifier Electronic Assembly A2A2 or A2A3	4-109	5-28 thru 5-33	4-114	4-118	4-24, 25
RF Amplifier Electronic Assembly A2A4**	4-73	5-18	4-75	4-80	4-26
Frequency Standard Electronic Assembly A2A5**	4-63	5-18	4-65	4-69	4-27
Translator/Synthesizer Electronic Assembly A2A6**	4-84	5-18	4-89	4-93	4-28 thru 4-33
Code Generator Electronic Assembly A2A7	4-24	4-13, 4-14	4-14, 4-24	4-24 thru 4-31	-
Power Supply Electronic Assembly A2A8	4-32	4-3, 5-36	Table 4-3 Step 3	4-32 thru 4-46	4-22
Antenna Overload Electronic Assembly A2A9	4-47	5-37	4-75*	4-80*	4-22
Light Panel Electronic Assembly A2A10	4-50	5-17	-	-	-
4-VDC Power Supply and Vernier Control Electronic Assembly A2A11	4-51	4-15, 5-38	4-89*	4-93*	4-22

* Indicates test or check is incidental to or implied by proper performance of rf amplifier or translator/synthesizer.

** Depot-repairable assemblies.

TABLE 4-2. TEST EQUIPMENT AND ACCESSORIES REQUIRED FOR TROUBLESHOOTING

CATEGORY	RECOMMENDED	ALTERNATE
Frequency Standard	AN/URQ-9	AN/URQ-10
Frequency Counter	AN/USM-207	CAQI-5245-L
RF Signal Generator	CAQI-606-A	SG-582/U
RF Voltmeter	CCVO-91DA	CCVA-91H CCVO-91CA
Electronic Multimeter	AN/USM-116( )	CAQI-410B
Multimeter	AN/PSM-4( )	CSV-260
AC Voltmeter	ME-6( )/U	CBFM-300
Transistor Tester	AN/USM-206	TS-1100A/U
Oscilloscope	AN/USM-281( )	AN/USM-140( )
Headphones	General Purpose	
Adapter, BNC to N	UG-201/U	
*RF Insert Connector, Female	P/N DM 53740-5008	
*RF Insert Connector, Male	P/N DM 53743-5014	

CAUTION

*Remove locking clip ring prior to using for troubleshooting.

having a similar 5-MHz frequency standard may be used by placing that equipment's frequency standard switch in the compare position and connecting a 50-ohm coaxial jumper cable from the INT 5MC OUT connector on the operational equipment to the EXT 5MC IN connector A1J25 on the defective R-1051B/URR. If this is not feasible, obtain a frequency counter and check for 5 MHz at INT 5MC OUT connector A1J24, with switch in compare position. The frequency need be only within 10 Hz for initial troubleshooting. Do not adjust the frequency of the frequency standard. When the COMP/INT/EXT switch S1 on top of Frequency Standard Electronic Assembly A2A5 is in the EXT position, only the internal 5-MHz oscillator circuit is not used. The multiplier and divider circuits must still be operational. If the R-1051B/URR operates in any mode or at any frequency, the frequency standard is unlikely to be defective (other than off frequency). If noise is heard in the R-1051B/URR output in some modes, and indicator A2A5A1DS1 flickers at some visible rate, the frequency standard is operating but not necessarily at 5 MHz ±0.5 Hz, as required for proper operation. Remember that every time the receiver is turned on, the 5-MHz circuitry must restabilize. There is always an aging drift factor which requires (quarterly) slight readjustment of the 5-MHz oscillator to remain within operational requirements. The various types of frequency standard A2A5 used in the R-1051B/URR will provide different symptoms on indicator A2A5A1DS1 when operation is normal. Some types light brightly when the switch is in the COMP position without an external 5-MHz input to A1J25. Other frequency standard indicators are barely visible without an external input. Although inconclusive by itself, a low noise level heard at the LSB or USB PHONES jack provides some assurance that the frequency standard, mode selector, and if./audio amplifier (LSB or USB) are probably passing signals. This indication is true only if the gain adjustments in the if./audio amplifier are set approximately correct. With the frequency standard removed, low noise will normally be present at the R-1051B/URR output in the AM or CW mode, unless there is a malfunction in the mode selector or the if./audio amplifier. Multiple malfunctions will be greatly reduced (cutting troubleshooting and repair time) if the frequency standard is not adjusted unless the R-1051B/URR has been in standby or operate for a minimum of 3 days and in operate for the last 2 hours of the 3-day minimum. Momentary loss of power during warmup will present no problem. Flickering of indicator A2A5A1DS1 at some visible rate does not cause loss of signals, and flickering should be present after 10 minutes of power turnon. Usually, the R-1051B/URR will operate satisfactorily after a 10-minute warmup, except in multiplex operation. For best results, set the R-1051B/URR on standby or in an operate mode when not in use. Where the AM-2123/U amplifier and/or AN/URQ-9 or AN/URQ-10 frequency distribution system is installed, set the frequency standard switch A2A5S1 to EXT for normal use. Set the switch to COMP only to check and adjust the frequency standard's internal oscillator periodically, to ensure availability (in INT position) if the external distribution system fails. Refer to final adjustments in paragraph 5-61 for adjustment of the frequency standard. If the frequency standard is replaced, do not adjust the frequency for several days to avoid false symptoms of malfunction and the necessity of readjustment after warmup. Continue with step 4 of table 4-3.

4-12. If a beatnote was heard in step 4e and could be zeroed, the frequency standard is producing 500 kHz, and some noise should be present in the R-1051B/URR output. If the beatnote could not be zeroed by the BFO FREQ control, the 500-kHz output of the frequency standard may be defective. Additional data are provided in paragraph 4-13.

4-13. If step 4 conditions are normal and initial conclusions are that the frequency standard appears to be performing adequately, continue to step 5 of table 4-3. If the frequency standard is strongly suspected as being defective (by an indication such as indicator A2A5A1DS1 not flickering at some visual rate), refer to frequency standard troubleshooting in paragraph 4-63.

4-14. Step 5 provides a checkout procedure to determine if the digital motor drive system is functioning mechanically to set up all frequencies correctly. Perform step 5 without altering the procedure. Even when the tune system appears completely operational, step 5 should be performed to observe each mode of operation, noise levels at various frequencies, signals in certain modes and at certain frequencies, and other data. The technician is then provided with all of the symptoms available to aid him in the isolation of the malfunction. Take notes of symptoms observed during step 5 for evaluation after completion of step 6. As soon as any type of indication is obtained, vary all controls which should have an effect on receiver output in that mode. Determine if controls and associated circuits are operational to aid step 6 evaluation. Continue with step 5 of table 4-3.

4-15. If all indications of the digital tuning system are normal, proceed to step 6 of table 4-3. If only several MHz digits were faulty (no noise or improper rotation) and this problem is not the prime malfunction in the receiver, continue to step 6, but check out and repair the tuning problem after the prime malfunction has been located and repaired. If a major malfunction is indicated, refer to paragraph 4-56 for kHz digital tuning system troubleshooting or to paragraph 4-60 for MHz digital tuning system troubleshooting. If noise is abnormally low at certain frequencies only, ensure the kHz and MHz digital tuning systems are operational, then perform rf amplifier and translator/synthesizer performance tests in paragraph 4-75 and 4-89.

4-16. Step 6 should be performed only after completion of steps 1 through 5, or if the following conditions exist:

a. Technician has confirmed there is a malfunction.

b. The ac power distribution circuits appear normal.

c. A visual inspection of equipment has resulted in no apparent problems.

d. The dc power supply voltages are present and measure correct values.

e. The frequency standard indicator A2A5A1DS1 has indicated some visible change in intensity when compared to an external 5-MHz standard, or a frequency counter has indicated 5 MHz ±10 Hz is present.

f. The digital tuning system appears to be operational.

Most symptoms will be affecting signal flow. Step 6 provides various signal/noise/mode/frequency checks which will aid in isolating many malfunctions. The degree of assistance provided by step 6 depends on the technician's ability to evaluate all symptoms. Many malfunctions are possible with only one or two symptoms. Obtaining all symptoms present will aid in pin pointing the area of malfunction. Perform the checks in step 6 and make notes of symptoms. Step 6 is to be used only as an aid in obtaining symptoms. After completion, see the fault isolation guide, figure 4-2, to evaluate the notes taken in steps 5 and 6. Read paragraph 4-7, and then continue with step 6 of table 4-3.

4-17. Comments on noise levels in table 4-3 are for initial symptom recognition only. Noise symptoms are a very useful aid in troubleshooting. If noise is amplified and passed through the selective filters in the signal-flow path, signals will probably also pass. To define noise levels correctly, measurements are required. However, for initial observations to obtain data in isolating malfunctions, noise is broadly defined as:

a. No noticeable noise is that amount of noise an operator would have difficulty hearing at the output with controls at maximum. In an operational R-1051B/URR, it is the noise present in the output when the mode selector has been removed, and would measure approximately 0.001 to 0.01 volt at the LSB or USB PHONES jack.

b. Low noise is that amount of noise which, although detected in the output, an operator would recognize as less than the amount present in the output of an operational receiver. It is that amount of noise present in output when the translator/synthesizer has been removed, and would measure approximately 0.01 to 0.1 volt at the LSB or USB PHONES jack.

c. Normal noise is that amount of noise present from an operational receiver, and would measure approximately 0.1 to 5 volts at the LSB or USB PHONES jack.

d. All R-1051B/URR receivers having the original-type translator/synthesizer assembly (mfr PN 06845-2058940-0501) have spurious internally generated signals present at the output of the translator/synthesizer when the receiver is set to 22.500 MHz. This spurious signal will be heard in the receiver output when the frequency is set to approximately 22.5003 to 22.504 MHz in the LSB mode or 22.496 to 22.4997 MHz in other modes of operation. Since this spurious signal is synthesized, its accuracy is equal to that of the frequency standard. Although spurious and basically undesirable, the signal should not be overlooked as a very helpful aid in troubleshooting. Use this spurious signal for evaluation only when its presence indicates certain circuits, assemblies, or signal flow paths are functional. If the spurious signal (tone in output) is not present, no conclusions should be made as to the area of the malfunction. The reason for this is that later versions of the translator/synthesizer (which is interchangeable in this equipment) may be installed, and the spurious signal may not be present. If the spurious signal is not heard, use noise levels to determine initially if the translator/synthesizer is operational, and follow up troubleshooting with the performance test described in paragraph 4-89.

4-18. Determine whether a beatnote is present in output of the R-1051B/URR. Most mode selectors will have this beatnote present. (A factory change decreased the feedthrough in later models of the R-1051( )/URR.) Regardless of beatnote, low noise will be present if the mode selector, the USB if./audio amplifier, and the USB output circuits are functioning. If a beatnote is heard, it should pass through a zero beat if 500 kHz from the frequency standard is present and near the correct frequency.

4-19. Evaluate symptom data collected during steps 4 through 6 of table 4-3. If results strongly indicate a malfunction in a specific assembly or area of the main frame chassis, refer to applicable paragraph 4-4 through 4-122 for troubleshooting. If symptom data are inconclusive, see figure 4-1 for guidance. Keep the following points in mind during evaluation:

a. The received signal at the antenna has the same signal-flow path for all modes of receiver operation (LSB, FSK, AM, CW, USB, and ISB) until the signal is diverted at the mode selector filters. Therefore, if normal signals are obtained in one mode while other modes are inoperative, the defect is not likely to be in antenna overload circuit, rf amplifier, or translator/synthesizer.

b. Frequency selection takes place in the rf amplifier and the translator/synthesizer, and is affected by the MHz digital tuning system, the kHz digital tuning system, and the relay control circuits. Consistent dial inaccuracies can be caused by either of the digital tuning systems, or by the translator/synthesizer.

c. Frequency instability malfunctions usually are caused by the frequency standard, translator/synthesizer, or the 4-Vdc power supply and vernier control.

d. No noticeable noise in the output usually indicates the frequency standard or if./audio amplifier has a malfunction, if all dc voltages measured in step 3 of table 4-3 are normal. Low noise in the output usually indicates a translator/synthesizer problem, but this conclusion should be confirmed by other symptoms.

CAUTION

Never interchange a 500-CPS translator/synthesizer with a 100-CPS translator/synthesizer, or vice-versa, in any Receiver. The receiver will not operate, 4-volt zener diode CR1 in A2A11A1 may burn out, and components of the translator/synthesizer and main frame chassis may be damaged. Consult current instructions on interchangeability of the various types of translator/synthesizer.

TABLE 4-3. MAINTENANCE TURNON PROCEDURE

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
1	<u>Initial Checks</u>:		
	a. Read paragraphs 4-5 and 4-8.		
	b. Loosen the six-captive screws on the front panel, and withdraw the receiver from case.		
	c. Set the MCS controls to 03. Defeat the interlock switch. Rotate the Mode Selector switch to the STD BY position.	Panel dial lamps light. Fuse indicators do not light. Rf amplifier tube filaments light.	4-9 4-22 4-74
	d. Set Mode Selector switch to LSB.	Motors may or may not rotate.	
	e. Set MCS controls to 02.	Rf amplifier turret and translator/synthesizer motors rotate and come to a stop in several seconds.	4-23
	f. Set Mode Selector switch to OFF, release interlock, and turn main power switch OFF.		
	g. Visually check for indications of defects: (1) Look for loose or improperly seated modules, module captive screws not secured, mechanically defective front-panel controls, etc. (2) Rotate 10 and 100 KCS knobs in both directions.	Rotor plates (just visible between the two rf amplifier vacuum tubes) respond to control-knob rotation.	
	(3) Tilt chassis 90 degrees to aid visual inspection.	No overheated components, broken leads or parts, failure of detents, or slippage of gears or chain drive.	
	h. Inspect each and every insert. (Always inspect these rf inserts after installing an assembly.)	Insert is completely engaged into connector shell. (These inserts are pushed partially loose when installing modules, and often do not cause a malfunction until vibrated loose later.)	

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
1 (Cont)	i. If the translator/synthesizer has been removed since the receiver was last operational, set the KCS controls to 555. Remove translator/synthesizer.	Couplings on module are at 555 and slots in the mating couplings are pointed straight forward on chassis.	4-58
	j. Replace translator/synthesizer, rotate each KCS control from 5 to 9 to 0 to 6. Secure captive screws on assembly. (Always use this method.)	All couplings are engaged.	4-58
2	Critical Voltage Checks:		
	a. Locate resistor A2R23 or A2A11A1R5 (see figure 5-19). Set Mode Selector switch to LSB and MCS controls at 02, apply power to receiver, and defeat interlock switch.	Only one of the resistors will be in the R-1051B/URR. Later factory production units have A2R23 heat-sink-type resistor mounted on vertical support plate, while early units will have pigtail-type leads mounted on 4-VDC Power Supply A2A11A1.	4-10
	b. Using a 20,000-ohm/volt meter (AN/PSM-4 or equivalent), initially set meter scale to read at least 30 Vdc. Measure from each end of resistor A2R23 or A2A11A1R5 to ground. Translator/synthesizer must be installed to obtain readings.	Meter should read not more than 22 Vdc from one end of resistor to ground, and not more than 5 Vdc from other end of resistor to ground. Do not attempt any adjustment of voltages at this time. If voltages are below values given, proceed with this procedure.	4-10
3	Operating Voltage Checks:		
	a. Measure following voltages between terminal indicated and ground. See figure 4-3 for terminal location.		
	(1) E12 - Mode Selector switch at STD BY and each operational mode position.	25.5 to 31.5 Vdc (readings in STD BY may be slightly higher)	4-39
	(2) E15 - Mode Selector switch at each operational mode position.	25.5 to 31.5 Vdc	4-40

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
3 (Cont)	E16 - Mode Selector switch at each operational mode position.	25.5 to 31.5 Vdc with MCS controls at 02 through 29; 0 volts with MCS controls at 00 or 01; 0 volts during tune cycle (while motors are rotating)	4-23
	(3) E17 - Mode Selector switch at STD BY and each operational mode position.	103 to 130 Vdc, 103 to 120 Vdc (slow decay of meter reading when mode selector switch is rotated to OFF).	4-45
	(4) A8E10 - Mode Selector switch at STD BY and each operational mode position. (negative reading-reverse meter polarity or leads)	-28 to -33 Vdc. (slow decay of meter reading when mode selector switch rotated to OFF).	4-44
	(5) E11 - Mode Selector switch at each operational mode position and frequency above 01 MHz (positive polarity)	20 ±0.5 Vdc	4-41
	(6) E18 - Mode Selector switch at each operational mode position and frequency above 01 MHz	20 ±0.5 Vdc	4-41
	(7) A2R23 or A2A11A1R5 (5-volt end of resistor; refer to step 2) - Mode Selector switch at each operational mode position and frequency above 01 MHz.	4.2 ±0.5 Vdc in all positions of CPS vernier switch; in the V position CPS vernier indicator lamp DS5 should flash.	4-51
	b. Ensure all normal indications are present in steps 1, 2, and 3 before continuing with procedure.		
4	<u>Initial Frequency Standard Checks:</u>		
	a. Set Mode Selector switch to CW. Place COMP/INT/EXT switch on top of Frequency Standard Electronic Assembly A2A5 to COMP position. Set MCS controls above 01 MHz Connect external 5-MHz ship's frequency standard to EXT 5MC IN connector A1J25 on rear of R-1051B/URR case. NOTE: Read paragraph 4-11.	Indicator DS1 on frequency standard changes intensity at some visible rate. Several minutes may be required to notice a change. Allow 5 minutes if receiver was just turned on. Do not change the frequency adjustment at this time.	4-63

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
4 (Cont)	b. Set frequency standard switch to EXT position.	Check receiver to observe if it now operates normally.	
	c. Set frequency standard switch to INT position.	Check receiver to observe if it now operates normally.	
	d. Monitor receiver output with RF GAIN, PHONE LEVEL, and LINE LEVEL controls turned maximum clockwise.	Noise is present in receiver output in various modes.	
	e. Momentarily jumper TP8 on RF Translator Electronic Subassembly A2A6A6 to ground.	Notice in CW mode if beatnote is present and can be zeroed by BFO FREQ control. Refer to paragraph 4-12.	
	f. Evaluate symptoms. Refer to paragraph 4-13.		
5	Digital Tune Checks:		
	a. Read paragraph 4-14.		
	b. Connect 2- to 30-MHz antenna to the receiver. Connect headphones or speaker to USB PHONES jack (change as required by mode selected throughout procedure). Set LINE LEVEL meter switches to +20DB. Adjust LINE LEVEL, PHONE LEVEL, and RF GAIN controls maximum clockwise. Set CPS switch to 000. Set Mode Selector switch to AM. Set receiver frequency to 02.000 MHz.	Rf amplifier MC window indicates the same frequency as the MCS controls on the front panel, and all numbers are centered in windows on front panel.	4-60
	c. Apply slight pressure to each KCS control in each direction to lift the setting slightly out of detent.	Noise level (if present) does not increase.	4-56
	d. Rotate MCS controls in 1-MHz steps through 15.000 MHz. Repeat step 5c at any frequency having a noticeably lower noise-level output than other frequencies setup. Listen to receiver output at each setting.	Rf amplifier turret rotates and stops at correct position each time. A second motor (in the translator/synthesizer) should also drive and stop each time. Take notes on symptoms for use after step 6.	4-60

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
5 (Cont)	e. Set Mode Selector switch to CW. Set frequency to 16.333 MHz. Set CPS switch to 300. Repeat step 5d through 29.333 MHz.	Same as step 5d.	4-60
	f. Set Mode Selector switch to USB and frequency to 28.666 MHz. Set CPS switch to 600. Repeat step 5d through 15.666 MHz.	Same as step 5d.	4-60
	g. Set Mode Selector switch to LSB. Set frequency to 14.999 MHz. Set CPS switch to 900. Repeat step 5d through 6.999 MHz.	Same as step 5d.	4-60
	h. Set Mode Selector switch to ISB. Set frequency to 5.000 MHz. Set CPS switch to V with CPS vernier control set in the center of range. Repeat step 5d through 02.000 MHz.	Same as step 5d.	4-60
	i. Change frequency to 01 and 00 MHz.	Motors do not rotate and receiver has no output.	4-23
	j. Evaluate digital tune drive system. Refer to paragraph 4-15.	Retain notes on noise/signal symptoms for use in step 6.	
6	Signal Symptom Data Collection:		
	a. Read paragraph 4-16. If signals were heard at any frequency in step 5, return controls to that condition.	Ascertain whether all modes or only certain modes operate normally. Observe whether all level controls, CPS switch, and CPS vernier control operate normally.	
	If signals are present at one or more frequencies, rotate each KCS control from 0 to 9.	Note if noise level decreases noticeably only at certain digit settings.	

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
6 (Cont)	b. Read paragraph 4-17. If no signals are present but noise is present, momentarily short TP4, then TP3 (both on the rf amplifier) to ground.	Note if a static condition will pass through receiver to output at present frequency.	
	Set receiver frequency to 6.777 MHz. Repeat step b, except momentarily short TP8, then TP5 (both on the translator/synthesizer) to ground.	Note if there is a very noticeable decrease in the noise level output when TP8 is grounded and a lesser decrease in noise output when TP5 is grounded. This indicates the translator/synthesizer, mode selector, and if./audio amplifier (in use) have a signal-flow path at present hi-band frequency.	
	c. Set receiver frequency to 22.499 MHz, CPS switch to 0, and Mode Selector switch to USB. Remove the rf amplifier.	Note whether receiver output has a clear tone (tone should be precisely 1 kHz). If a tone is not present, observe output to detect if there is noticeable noise present, and then perform step 6d.	
	If tone is present, vary LINE LEVEL and RF GAIN controls, CPS switch, CPS vernier control, and 1 KCS control. Set Mode Selector switch alternately to FSK, ISB, and CW positions. Vary BFO FREQ control.	Observe normal operation of receiver as though receiving a signal carrier at 22.5000 MHz.	
	d. Set receiver frequency to 22.501 MHz with Mode Selector switch in LSB.	Observe normal operation of receiver as though receiving a signal carrier at 22.500 MHz. Note if a clear stable tone was present at 22.999 or 22.501 MHz, but not at both frequencies.	

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
6 (Cont)	e. If a tone was not present at 22.499 or 22.501 MHz, but noise was present, momentarily short TP8, then TP5 (both on the translator/synthesizer) to ground.	Note if there is a very noticeable decrease in the noise-level output when TP8 is grounded, and a lesser decrease in noise output when TP5 is grounded. This indicates the translator/synthesizer, mode selector, and if./audio amplifier (in use) have a signal-flow path at lo-band frequency.	

NOTE

Prior to condemning any depot-repairable assembly as defective, complete the performance test and isolation check for that assembly. This is necessary to ensure that the trouble is not in the chassis or elsewhere.

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
	f. If a tone was heard at USB and LSB but was varying in pitch, set the CPS switch to V, then to each 100 CPS position.	Observe if frequency is stable in any position of the CPS switch.	
	g. If no tone was heard at USB or LSB, note noise levels present, then remove translator/synthesizer.	Note noise level output in USB and LSB with translator/synthesizer removed.	
	Set Mode Selector switch to CW and vary BFO FREQ control while listening to USB output.	Note if a beatnote is present in output. Note if a low noise level is present in output. Read paragraph 4-18.	
	h. Set Mode Selector switch to OFF. Reinstall translator/synthesizer.		
	Reinstall rf amplifier.	Observe if initial noise level is present and if it increases in amplitude as rf amplifier tube filaments heat up.	

TABLE 4-3. MAINTENANCE TURNON PROCEDURE (Cont)

STEP	ACTION OR CONDITION	NORMAL INDICATION	IF FAULTY, REFER TO PARAGRAPH
6 (Cont)	i. Momentarily short TP4 and TP3 on rf amplifier to ground.	Observe if a static condition passes through receiver to output.	
	j. Perform any additional checks which will provide symptoms for evaluation.	Evaluate symptoms. Read paragraph 4-19.	

4-20. MAIN FRAME CHASSIS TROUBLESHOOTING.

4-21. GENERAL. Paragraphs 4-22 through 4-62 cover troubleshooting of the main frame chassis, assemblies, case, and filter box. To aid in troubleshooting, wiring data are provided for the chassis, case, and filter box in tables 5-4, 5-5, and 5-6. For troubleshooting and repair within the Mode Selector switch, refer to paragraphs 4-55 and 5-32. The following figures are also helpful when troubleshooting the main frame chassis:

a. Figure 4-3. Main Frame Chassis, "E" Terminal and Test Point Location Diagram.

b. Figure 4-4. Main Frame Connector Pin Location Diagram, Top View.

c. Figure 4-5. Front-Panel Components, Terminal and Switch Contact Markings.

d. Figure 4-6. Mode Selector Switch A2S2, Contact Arrangement.

e. Figure 4-7. CPS Vernier Switch Assembly, Contact Arrangement.

4-22. AC POWER AND DC VOLTAGE DISTRIBUTION. Diagrams of ac power and dc voltage distribution in the R-1051B/URR are given in figures 4-8 through 4-11. The relay control diagram in figure 4-12 and the receiver overall schematic diagram in figure 5-1 are also helpful in troubleshooting. Procedures for troubleshooting the ac power and dc supply circuits are given in paragraph 4-32.

4-23. RELAY AND CONTROL CIRCUITS. Refer to figure 4-12 when troubleshooting relay and control circuits in the receiver. Remember that all relays shown on schematics are in the deenergized condition. A brief comment on tune relay A2K1 may be helpful. The tune relay is energized when a ground is present at A2K1-3 (A2E16). This point may be grounded by having the MCS controls at either 00 or 01 MHz. A ground will then be provided by the code generator to A2J8-7 (A2A7-P7). A ground will also be present at A2K1-3 when motors in the rf amplifier or translator/synthesizer are rotating, and will appear at A2J10-6 or A2J12-6, respectively. To have a ground appear at either or both of these points, the motor relay in the respective assembly must be energized. The motor relays are energized when a ground code is received on the five-wire code lines from the code generator. This will occur when the MCS controls are rotated above 01 MHz. The motor relays also energize the motors, which continue to rotate until repositioning of the turrets removes the ground. When the detents are adjusted correctly, the ground will be removed only when the turrets have been repositioned to the same setting as the MCS control knobs. Whenever a ground appears at A2E16, it also is present at A2A9A1-E6, which deenergizes antenna overload protection relay A2A9A1K1.

4-24. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7. Troubleshooting information for code generator A2A7 is provided in the following paragraphs.

4-25. General. The code generator is not supported by piece parts for repair. The R-1051B/URR is normally supplied with a four-deck pcb assembly (see figure 4-13). A five-deck pcb assembly is supplied and required in Transmitter T-827B/URT. The receiver will operate normally with either type of assembly.

4-26. When the code generator is suspected of being defective, refer to MHz digital tuning system, paragraph 4-60, for additional data on troubleshooting.

4-27. The code generator is associated with four different circuits in the receiver: tune relay A2K1 ground, hi-lo filter relay A2K2 ground, rf amplifier A2A4 five-wire ground codes for positioning turret, and translator/synthesizer A2A6 five-wire ground codes for positioning turret. A malfunction in several of these circuits at the same time strongly indicates the MHz detents are not adjusted correctly. Refer to paragraph 4-60. To ensure proper performance of the tune relay and hi-/lo-filter relay ground circuits within the code generator, perform the procedure in paragraph 4-28. To check out the turret positioning circuits of the code generator, perform the procedure in paragraph 4-29 for A2A4 or paragraph 4-30 for A2A6.

4-28. Tune Relay A2K1 and Hi-Low Filter A2K2 Ground Circuit Check.

a. Turn Mode Selector switch on receiver to OFF. Connect Multimeter AN/PSM-4 (Rx1 scale) between A2A7A5E3 (see figure 4-13) and ground. Ensure this point is grounded. Remove meter leads. Set Mode Selector switch to any operational mode, and set MCS controls to 02 with A2A4 and A2A6 assemblies installed. Ensure approximately 28 Vdc is present at A2E16 (see figure 4-3), A2A7A5E1, and A2A7A2E10 (see figures 4-13 and 4-14). If these readings are not present, remove A2A7P1 from A2J8 and obtain these readings at A2J8 prior to continuing procedure.

b. The tune relay ground circuitry is located on pcb A2A7A5. Set multimeter to measure 30 Vdc. Connect meter leads from A2E16 (A2A7A5E1) to ground. Observe approximately 28 Vdc at all MCS control settings from 02 through 29 MHz. Observe 0 volt at 00 and 01 MHz.

c. The hi-/lo-filter relay ground circuitry is located on pcb A2A7A2. Connect multimeter leads from A2A7A2E19 (J8-6) to ground. Observe meter reads approximately 28 Vdc at following MCS settings while 0 volt at all other MCS settings: 2, 3, 4, 5, 7, 8, 11, 12, 14, 15, 16, 22, 23, 27, 28, and 29.

4-29. Five-Wire Code Lines to RF Amplifier. To ensure that the code generator is providing the correct codes on the five-wire code lines to the rf amplifier, proceed as follows:

a. Set Mode Selector switch to OFF and MCS controls to 02. Pull R-1051B/URR out of case and remove rf amplifier and translator/synthesizer. Refer to table 4-4. The rf amplifier uses terminals 1 through 5 on A2J10 (A2A4P1) as turret control-line terminals from A2J8 (A2A7P1), terminals 1 through 5.

b. Set multimeter at Rx1 scale and connect test leads between ground and terminal 1 of A2J10 (see figure 4-4). Rotate MCS controls from 02 through 29 and observe normal indications as listed in table 4-4.

c. Repeat step b for terminals 2 through 5.

d. Remove meter ground lead and connect it to A2A7A1E7 (see figure 4-13). Repeat steps b and c, observing that all readings are reversed (O is now shorted, and S is open). Both sets of conditions are necessary to ensure proper operation.

4-30. Five-Wire Code Lines to Translator/Synthesizer. To ensure that the code generator is providing the correct codes on the five-wire code lines to the translator/synthesizer, proceed as follows:

a. Set Mode Selector switch to OFF and MCS controls to 02. Pull R-1051B/URR

TABLE 4-4. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7, RESISTANCE CHECKS

MCS CONTROL SETTINGS	A2J10 (A4P1) TERMINALS					A2J12 (A6P1) TERMINALS				
	1	2	3	4	5	1	2	3	4	5
02	S	O	S	O	O	S	S	S	O	S
03	O	S	O	O	O	S	O	S	S	S
04	S	O	O	O	S	S	S	O	S	S
05	O	O	O	S	S	O	S	S	O	S
06	O	O	S	S	O	O	S	O	O	O
07	O	S	S	O	S	S	O	O	S	S
08	S	S	O	S	S	S	S	O	O	S
09	S	O	S	S	O	S	O	S	O	O
10	O	S	S	O	O	S	S	O	S	O
11	S	S	O	O	O	O	O	S	S	S
12	S	O	O	O	O	O	O	O	S	S
13	O	O	O	O	S	S	O	S	S	S
14	O	O	O	S	O	O	S	S	S	O
15	O	O	S	O	S	O	O	S	S	O
16	O	S	O	S	S	S	S	S	S	O
17	S	O	S	S	S	S	O	O	S	S
18	O	S	S	S	S	S	S	O	O	S
19	S	S	S	S	O	S	S	S	O	O
20	S	S	S	O	O	O	S	S	S	S
21	S	S	O	O	S	O	O	S	S	S
22	S	O	O	S	O	O	O	O	O	S
23	O	O	S	O	O	S	S	S	S	O
24	O	S	O	O	S	O	S	S	S	O
25	S	O	O	S	S	O	O	S	S	O
26	O	O	S	S	S	S	S	S	S	O
27	O	S	S	S	O	O	O	O	S	S
28	S	S	S	O	S	O	O	S	S	S
29	S	S	O	S	O	O	S	S	S	S

S - Shorted (less than 15 ohms)

O - Open (high resistance)

out of case and remove rf amplifier and translator/synthesizer. Refer to table 4-4. The translator/synthesizer uses terminals from A2J8 (A2A7P1), terminals 21 through 25.

b. Set multimeter at Rx1 scale and connect test leads between ground and terminal 1 of A2J12 (see figure 4-4). Rotate MCS controls from 02 through 29 and observe normal indications as listed in table 4-4.

c. Repeat step b for terminals 2 through 5.

d. Remove meter ground lead and connect it to A2A7A2E18 (see figure 4-13). Repeat steps b and c observing that all readings are reversed (O is now shorted, and S is open). Both sets of conditions are necessary to ensure proper operation.

4-31. Summary. Normal indications in paragraphs 4-28 through 4-30 indicate the code generator and MHz detents are functional. The rf amplifier performance test and translator/synthesizer performance test in paragraphs 4-75 and 4-89, respectively, will indicate if the MHz digital tuning system is functional in these assemblies. The removal and replacement procedure for the code generator is provided in paragraph 5-22. The code generator wiring list is given in table 4-5. See figure 5-14 for wiring of four-deck code generator.

4-32. POWER SUPPLY ELECTRONIC ASSEMBLY A2A8. Troubleshooting for the ac and dc power circuits of the R-1051B/URR is covered below.

4-33. General. Only the technician may determine which checks are applicable to his situation. These troubleshooting notes are initial guidelines to assist in the isolation of malfunctioning components. Voltage measurements should be taken wherever possible when troubleshooting. The only time resistance readings are likely to be necessary is when fuses are blowing, or when visual signs of overheating are observed. Resistance readings are provided and should be used only where the results can be evaluated effectively. Multimeters provide various scales and sensitivities (ohms/volt). They also vary as to internal battery polarity connections to the two test leads. The R-1051B/URR uses many semiconductors that will provide readings depending on the meter scale and test lead polarity. The readings taken below use a 20,000 ohm/volt meter on the Rx100 scale. Wherever lead reversal results in a second reading, both are listed. Prior to taking resistance measurements, all assemblies should be removed and the ac power input connector at A1A1J3 or J4 removed from the rear of the R-1051B/URR case.

4-34. When troubleshooting by resistance measurements with the Mode Selector switch in the OFF or STD BY position, misleading readings may be encountered, such as 20-Vdc output at A2E11 shorted to ground. To prevent these misleading symptoms, remove the ac input by disconnecting the power input connector at A1A1J3 or J4 on rear of case. After this is done, set the Mode Selector switch and other controls, as specified, to required position to make resistance measurements.

4-35. AC Power Input Circuits. When no ac input is apparent, ensure that AUX/NORM PWR switch A2S7 is in the correct position. See figure 4-8. The AUX position (115 Vac to A1A1J3) is for connecting the R-1051B/URR for independent operation (not having or requiring AN/WRC-1B equipment to be energized). Remove one fuse on front panel, replace fuse cap, and note that fuse indicator lights. Repeat with second fuse after replacing first fuse; then replace the second fuse. Ensure that fuses are slow-blow 3/4 amp, mil type F02B250V3-4AS. Ensure power is disconnected at A1A1J3 and A1A1J4 prior to troubleshooting with an ohmmeter. The resistance of the A2T1 primary circuit from A2XF1-2 to A2XF2-2 (see figure 4-5) is approximately 7 ohms in STD BY or any operational mode (Rx1 scale).

4-36. Fuses Blown in Standby Mode. This malfunction is most likely to occur in the 28-Vdc supply, although it could also occur in the -30-Vdc, 110-Vdc, or ac supply circuits. Set the MCS controls above 01, the

TABLE 4-5. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7, WIRING LIST

WIRE NO.***	COLOR	FROM	TO	WIRE NO.***	COLOR	FROM	TO
1	BARE	A1E1	A2E12	*30	BARE	A3E9	A4E5
2	BARE	A1E2	A2E13	*31	BARE	A3E10	A4E6
3	BARE	A1E3	A2E14	*32	BARE	A3E12	A4E7
4	BARE	A1E4	A2E15	33	BARE	A4E7	A5E5
5	BARE	A1E5	A2E16	34	WHT-BLK-BRN	P1-1	A1E10
6	BARE	A1E6	A2E17	35	WHT-BLK-RED	P1-2	A1E11
*7	BARE	A2E1	A3E1	36	WHT-BLK-ORN	P1-3	A1E8
*8	BARE	A2E2	A3E2	37	WHT-BLK-YEL	P1-4	A1E9
*9	BARE	A2E3	A3E3	38	WHT-BLK-GRN	P1-5	A2E22
*10	BARE	A2E4	A3E4	39	WHT-BLK-BLU	P1-6	A2E19
*11	BARE	A2E5	A3E5	40	WHT-BLK-VIO	P1-7	A5E1
*12	BARE	A2E6	A3E6	41	WHT-BLK-GRY	P1-8	A5E2
*13	BARE	A2E7	A3E6	42	WHT-BRN-RED	P1-9	A5E3
*14	BARE	A2E8	A3E8	*43	WHT-BRN-ORN	P1-10	A3E14
*15	BARE	A2E9	A3E9	44	WHT-BRN-YEL	P1-11	A5E4
*16	BARE	A2E10	A3E10	*45	WHT-BRN-GRN	P1-12	A3E15
*17	BARE	A2E11	A3E11	*46	WHT-BRN-BLU	P1-13	A3E17
*18	BARE	A2E12	A3E12	*47	WHT-BRN-VIO	P1-14	A3E16
**19	BARE	A2E5	A4E1	*48	WHT-BRN-GRY	P1-15	A3E19
**20	BARE	A2E6	A4E2	*49	WHT-RED-ORN	P1-16	A3E18
**21	BARE	A2E7	A4E3	50	WHT-RED-YEL	P1-17	A2E21
**22	BARE	A2E8	A4E4	*51	WHT-RED-GRN	P1-18	A3E13
**23	BARE	A2E9	A4E5	52	WHT-RED-BLU	P1-19	A1E7
**24	BARE	A2E10	A4E6	53	WHT-RED-VIO	P1-20	A2E18
**25	BARE	A2E12	A4E7	54	WHT-RED-GRY	P1-21	A2E20
*26	BARE	A3E5	A4E1	55	WHT-ORN-YEL	P1-22	A4E9
*27	BARE	A3E6	A4E2	56	WHT-ORN-GRN	P1-23	A4E8
*28	BARE	A3E7	A4E3	57	WHT-ORN-BLU	P1-24	A4E11
*29	BARE	A3E8	A4E4	58	WHT-ORN-VIO	P1-25	A4E10

* Applies when five-deck assembly is used. A3 terminals listed do not exist in four-deck assy.
** Applies when four-deck assembly is used. Refer to paragraph 4-25 and figure 4-13.
*** Wire type AWG #22 for all wiring.

CPS switch to 000, and all other controls maximum clockwise. Remove frequency standard A2A5 and note if new fuse blows in STD BY mode. If fuse blows, remove receiver ac input power. Set ohmmeter to Rx100 scale. Set Mode Selector switch to STD BY and check for the following approximate readings. See figure 4-3.

a. A2E12 to grd - 90 ohms, regardless of lead polarity.

b. A2E17 to grd - 13 kilohms or 2500 ohms, depending on lead polarity.

c. A2A8E10 to grd - above 1500 ohms or open, depending on lead polarity.

Measure resistance from A2XF1-2 to A2XF2-2, observing reading is approximately 7 ohms. (This reading is dependent on which terminals of A2T2 primary winding are connected.) Troubleshoot circuits to isolate the defective component.

4-37. Fuses Blown in Operate Modes Only, All Assemblies Installed. Set MCS controls above 01 and CPS switch to V. Remove A2A1, A2A2, A2A3, A2A5, and A2A6 assemblies. Install new fuse and place Mode Selector switch to each operational mode, allowing time for fuse to blow. If fuse does not blow, replace assemblies in the following sequence, A2A6, A2A5, A2A4, A2A3, A2A2, and A2A1, with Mode Selector switch at ISB, and observe when fuse blows. If fuse opened when A2A6 was replaced, remove A2A6, remove ac power input to receiver, and measure resistance at the following location with Mode Selector switch at ISB. Set meter to Rx100 scale and measure above 800 ohms or above 25 kilohms, depending on lead polarity, from A2A11A1E7 to ground. Refer to figure 4-15 for location.

4-38. Fuses Blown in Operate Modes Only, Assemblies A2A1 Through A2A6 Removed. Remove ac input power from rear of receiver case. Set Mode Selector switch to ISB, CPS switch to 000, MCS controls above 01, and all other controls maximum clockwise. Observe following approximate resistance measurements to ground, using a 20,000 ohm/voltmeter on Rx100 scale.

a. A2E18 to grd - 1000 ohms, regardless of lead polarity.

b. A2E15 to grd - 90 ohms, regardless of lead polarity.

c. A2E17 to grd - above 2500 ohms or 13 kilohms, depending on lead polarity.

d. A2A8E10 to grd - open or above 1500 ohms, depending on lead polarity.

Evaluate the readings and troubleshoot the defective circuit.

4-39. DC Power Circuits. When 28 Vdc and 110 Vdc are slightly high or low in operational modes, check ac line input voltage to ensure the normal operating voltage is present; then check that correct primary tap on transformer A2T2 is in use (see figure 4-8). Move primary tap as necessary to provide in-tolerance readings from the 28- and 110-Vdc supplies. Before changing the primary tap, ensure that the ac line voltage is at the same value that will be available under normal operating conditions. If the tap is changed, check the 20-Vdc supply adjustment as described in paragraph 5-63.

4-40. When 28 Vdc is not present at A2E12 in STD BY or at A2A15 in operational modes, determine if 28 Vdc is present at A2A8E3. Remove protective cover fromA2A8 pcb, and inspect for signs of overheating. See figures 4-9 and 5-1, and troubleshoot the 28-Vdc circuits.

4-41. When 20 Vdc is not present at A2E11 in operational modes, the symptom can be misleading. A protective circuit on the A2A8 pcb will cut A2Q1 series regulator off if the 20-Vdc load is shorted (2 to 3 ohms or less). This will result in 0 volt at A2E11. Also, a resistance reading, with power to the R-1051B/URR removed and the Mode Selector switch in OFF or STD BY, will cause a misleading ground to be indicated on the 20-Vdc line. If 28 Vdc is normal at A2E11, connect a voltmeter between A2E37 (or A2E11) and ground. Remove assemblies A2A1 through A2A6 while observing meter. If 20 Vdc is shorted to ground in any of the assemblies, the meter will read 20 Vdc when the defective assembly is removed. If 20 Vdc is not present with all assemblies removed, see figures 4-10, 5-1, and 5-37 to troubleshoot the 20-Vdc circuits.

4-42. When 20 Vdc is not present at A2E18, in operational modes, but is present at A2E11 (refer to table 4-3, step 3), troubleshoot A2K3 contacts using figures 4-10, 4-12, and 5-1.

4-43. When 20-Vdc supply measures above 22 Vdc at A2E11 and is not caused by misadjustment of A2A8R14, trouble may be suspected in series regulator A2Q1 or the A2A8 pcb. The collector of A2Q1 is insulated above ground by an insulated bushing and a mica disc. Measure voltage from collector to ground (25.5 to 31.5 Vdc), base to ground (20.6 Vdc), and emitter to ground (20 Vdc). If voltage on base or emitter is excessive, or if voltage on the base is not slightly higher than the emitter voltage, troubleshoot A2Q1 and the 20-Vdc regulator circuit on the A2A8 pcb. See figures 5-1 and 5-37.

4-44. When -30 Vdc is not present at A2A8E10, ensure that the correct terminal is being measured. The pcb cover terminal board marking is misleading. The correct terminal is the 7th terminal up from the bottom terminal. See figures 5-37, 4-11 and 5-1; remove the A2A2 and A2A3 assemblies; and troubleshoot the main frame chassis.

4-45. When 110 Vdc is not present at A2E17, determine if voltage is present at A2A8E7. Remove rf amplifier A2A4 and set CPS switch in 000 position. Note if 110 Vdc is not present in the operational modes. Normally, trouble will be at the A2A8 pcb, relay contacts A2K3-6, 8 or at the A2A11A1 pcb. See figures 4-11 and 5-1, and troubleshoot the 110-Vdc circuits.

4-46. Troubleshooting procedures for the 4-Vdc power supply pcb in A11A1 are provided in paragraph 4-51.

4-47. ANTENNA OVERLOAD ELECTRONIC ASSEMBLY A2A9. Troubleshooting information for antenna overload A2A9 is provided in the following paragraphs.

4-48. General. The antenna overload circuit supplies a signal path from the antenna input to rf amplifier when in operational modes. The signal path is opened when an rf signal of approximately 7 volts or higher is present on the antenna. Also, the antenna overload circuit opens the signal path when 28 volts is not present at the A2E16 terminal (during a tuning cycle). This manual incorporates Field Change 1 R-1051B/URR for increased protection of the rf input circuit. Refer to current field change listings if equipment does not contain an antenna overload assembly with four semiconductors on the inside of the top cover (see figure 5-38).

4-49. Troubleshooting Data. Poor sensitivity of the R-1051B/URR at all frequencies can be caused by contacts of relay A2A9A1K1 being open. Momentary jumpering of 2-watt, 5.1-kilohm resistor A2A9A1R10 will confirm this condition. A defect on pcb A2A9A1 that prevents the relay from energizing in the operational modes will also result in poor sensitivity. Measure resistance across A2A11A1R5 for 5100 ohms, with the R-1051B/URR in OFF and STD BY mode. Set Mode Selector switch to LSB and note that the meter reads 0 ohm. See figure 5-15 for a schematic diagram of the antenna overload assembly, and for voltage measurements on transistors when troubleshooting.

4-50. LIGHT PANEL ELECTRONIC ASSEMBLY A2A10. Repeated failures of the front-panel dial lamps in the R-1051B/URR may be reduced by increasing the value of selected resistor A2A8R2, which may be between 47 and 130 ohms, 1 watt. See figure 5-1. Refer to paragraph 5-28 for dial lamp replacement procedures.

4-51. 4-VDC POWER SUPPLY AND VERNIER CONTROL ELECTRONIC ASSEMBLY A2A11.

4-52. General. The 4-Vdc power supply and vernier control assembly consists of pcb A2A11A1, CPS switch A2A11S6, CPS vernier control A2A11R7, and mounting hardware. This assembly receives 20 Vdc from the translator/synthesizer, and furnishes 4-Vdc, coded 4-Vdc, and vernier dc voltages back to the translator/synthesizer. It also receives 110 Vdc for the CPS vernier flashing indicator lamp circuit on the front panel. Test point location data for A2A11A1 are provided in figure 4-15. CPS switch data are provided in figure 4-7.

4-53. Factory Changes. In early factory production equipments, 63.4-ohm pigtail lead resistor A2A11A1R5 was used in the 4-Vdc circuit. This resistor must be kept off pcb A2A11A1 and clear of leads and other components, since it is excessively warm to the touch during operation. In later production of R-1051B/URR receivers, 64.9-ohm heat-sink-type resistor A2R23 (mounted on the vertical shield plate behind the USB LINE LEVEL control) is used to reduce the heat problem. Also, in early R-1051B/URR receivers, the value of A2A11A1R7 was 4.7 megohms and was changed to 8.2 megohms in later models. The ground lead at A2XDS5-2 was rerouted to -30 Vdc at terminal F7 of the Mode Selector switch A2S2D to increase the reliability of the CPS vernier lamp circuit.

4-54. Troubleshooting Data. When making voltage measurements on assembly A2A11, the translator/synthesizer must be installed, since the 20-Vdc supply to A2A11A1E7 is interlocked through the translator/synthesizer. If a defect is suspected in assembly A2A11, perform the tests in paragraph 4-93. If incorrect results are obtained in paragraph 4-96, steps c or d, troubleshoot the A2A11 and main frame chassis circuitry (point-to-point) to isolate the fault.

4-55. MODE SELECTOR SWITCH A2S2. The Mode Selector switch assembly is difficult to troubleshoot completely because of inaccessibility. Replacement of the entire assembly requires time and caution at every step of disassembly and replacement. See figures 4-8 through 4-11 and figure 5-1, to isolate trouble up to the switch assembly. Ensure that all readings taken with an ohmmeter are performed after removing the ac input power to the R-1051B/URR, releasing interlock switch A2S8, and setting the Mode Selector switch to the required position. Do not be misled by readings such as the 20-Vdc line grounded, and one side of the power transformer primary grounded, when the Mode Selector switch is at OFF. See figures 4-16 through 4-21 to isolate a malfunction within the switch assembly, and refer to paragraph 5-32 for repair or replacement data.

4-56. kHz DIGITAL TUNING SYSTEM. The following data pertain to the 1-, 10-, and 100-kHz chain-drive mechanism. For troubleshooting data on the 1- and 10-MHz frequency controls, refer to paragraph 4-60.

4-57. General. Prior to proceeding with troubleshooting of the chain-drive mechanism, a short review of the following points may be helpful:

a. Correct alignment of the 1-kHz mechanism requires that the 1-kHz coupler on the bottom of the translator/synthesizer be fully in its detent at the same time as the 1 kCS digit is centered in its window and the 1 KCS control is in its detent.

b. Correct alignment of the 10-kHz mechanism requires that the 10-kHz indexed coupler wheel on the translator/synthesizer be fully in its detent at the same time as the 10-kHz indexed coupler wheel on the bottom of rf amplifier is positioned exactly at the same digit, and with that digit centered in the front-panel window. The above conditions must exist for all digits, 0 through 9. If the dual sprocket detent is fully seated without all of the above conditions existing, various symptoms of malfunction will result.

c. Correct alignment of the 100-kHz mechanism requires the same conditions as for the 10-kHz mechanism.

4-58. Coarse Mechanical Alignment.

a. Pull R-1051B/URR chassis out of case.

b. Set Mode Selector switch to OFF.

c. Set MCS and KCS controls for 11111 kHz.

d. Remove rf amplifier from chassis.

e. Remove translator/synthesizer from chassis.

f. Observe that coupling disks on the bottom of both assemblies are set at 1, and that the digit 1 appears centered in KCS windows. Rotate MCS and KCS controls on main frame chassis to 00000. The three mechanical coupling keyways for the translator/synthesizer should be pointed toward, and perpendicular to, the rear of chassis. Refer to step k below if any coupling keyway is incorrectly oriented.

g. Rotate MCS and KCS controls to 00660. The two coupling keyways for the rf amplifier should now be pointed toward, and perpendicular to, the rear of the chassic. Refer to step k below if any keyway is incorrectly oriented.

h. Rotate MCS and KCS controls to 29999 and observe that the correct digits appear in center of windows. Refer to step k below if correct digits are not centered in windows.

i. Ensure that spring washer under each coupling disk on main frame has not been flattened to such an extent as to prevent engagement of coupler when assemblies are installed. Also note that each index wheel on the bottom of the translator/synthesizer is the same height. If one of these wheels has been pushed toward the center of the assembly, it will not engage with the chassis coupler.

j. Rotate MCS and KCS controls to 11111 and install both assemblies in the chassis. Rotate KCS controls through 0 to 9 to 0 to ensure that the coupling disks are engaged, then secure assemblies with captive screws. If a KCS digital tuning malfunction is still suspected or evident, perform all the remaining steps for both coarse and fine mechanical alignment.

k. When any coupling keyway is in the wrong position, either the chain has been aligned improperly (if removed), the digital dial has loosened and slipped, or the hub clamp associated with the misaligned coupler has slipped. Since the 1 KCS control has only one coupling and detents are non-adjustable, no problem should be encountered in alignment. The hub clamp on the chassis can be loosened and the coupling positioned to mate with the translator/synthesizer's indexed coupling wheel while in its detent, and while the digit is set to the same number as the dial.

l. When the 10 and 100 KCS controls are set to 0, the rf amplifier coupling keyways should be pointed midway between the 10 and 100 KCS controls on front panel.

4-59. Fine Mechanical Alignment. If slight pressure in either direction on the 10 KCS or 100 KCS controls will result in proper operation, and adjustment of the detent spring will not restore the equipment to normal operation, perform the following steps:

a. Remove rf amplifier from chassis.

b. Remove dust cover from the assembly and reinstall in the equipment.

c. Set frequency controls to 00000.

d. Obtain a 5- to 8-inch long, 1/8-inch diameter, straight guide rod with rounded points at both ends. Ensure that the rod is not larger than 1/8 inch in diameter.

e. Ensure rf amplifier couplings are engaged by observing rotation of rotor plates, located between and behind vacuum tubes, as the 10 and 100 KCS controls are turned.

f. Return controls to 0 and gently insert rod into alignment hole located to the right of finger-stock on top of rf amplifier. Do not use force. The rod should insert into the rf amplifier at least 3-3/4 inches. If slight movement of the 10 or 100 KCS control is required to align holes, an improperly set dual sprocket coupling on the main frame chassis is indicated. Remember, however, that if the associated dual sprocket index wheel detent is reset, the associated detent in the translator/synthesizer will be moved out of detent, also. Only the coupling should be moved by loosening the hub clamp. Refer to paragraph 5-13 for complete alignment of the system.

4-60. MHz DIGITAL TUNING SYSTEM. Troubleshooting information for the MHz digital tuning system is provided in the following paragraphs.

4-61. General. The MHz digital tuning system includes the MCS controls, dials, and detents; the code generator, the rf amplifier digital system, and the translator/ synthesizer digital system. A suspected malfunction in the MHz digital tuning system must be further isolated to one of these areas. An assembly may be suspected when only the detents are out of adjustment. Paragraph 4-23 provides data associated with the MHz digital tuning system. Since the code generator is not supported for piece-part replacement, do not disassemble it until the malfunction is known to be in the code generator.

4-62. Troubleshooting Data. If proper operation results when slight turn pressure is applied to either or both MCS controls, refer to mechanical adjustment of the MHz detents in paragraph 5-19. If motors in assemblies A2A4 and A2A6 do not energize when the MCS controls are rotated above 01 MHz, refer to paragraphs 4-80 and 4-93 to ensure that 28 Vdc is available to these assemblies. If a malfunction is still present, refer to the code generator troubleshooting procedures in paragraph 4-24.

4-63. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5 TROUBLESHOOTING.

4-64. GENERAL. Frequency Standard Electronic Assembly A2A5 is a depot-repairable assembly. Refer to paragraph 5-7 for additional data. Upon determining that the assembly will not meet the performance test requirements in paragraph 4-65, and that the isolation check in paragraph 4-69 has confirmed that 20 and 28 Vdc are present, the frequency standard should be replaced. Adjustment of the frequency standard is provided for in paragraph 5-64. When the ship's frequency standard dixtribution system is utilized, the R-1051B/URR internal frequency standard should still be checked periodically to ensure its availability in case of failure of the ship's distribution system. The COMP/INT/EXT switch on top of frequency standard should be in the EXT position when the ship's distribution system is in use. The COMP position is to be used only when comparing internal frequency standard with the ship's frequency standard (AN/URQ-9 or 10), or when the internal frequency standard is required as a source of 5 MHz for the operation of another receiver. When the R-1051B/URR is in operation using only internal frequency standard, the COMP/INT/EXT switch should be in the INT position. Additional troubleshooting data are provided in table 4-3, step 4.

4-65. FREQUENCY STANDARD PERFORMANCE TEST. Test information for the Frequency Standard is provided in the following paragraphs.

4-66. Test Equipment. A frequency counter and an rf voltmeter are required for this test. Refer to table 4-2.

4-67. Preliminary Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Mode Selector switch at USB.

c. MCS and KCS controls at 02010 kHz.

d. Connect frequency counter to INT 5MC OUT connector A1J24 at rear of R-1051B/URR.

e. Set COMP/INT/EXT switch on top of frequency standard to COMP. See figure 5-18.

4-68. Procedure.

a. Observe indication on the frequency counter for five display cycles. If this indication is other than 5 MHz ± 0.5 Hz, refer to paragraph 5-64. If the frequency is within tolerance, connect the rf voltmeter probe (without 50-ohm adapter) to INT 5 MC OUT connector A1J24 on rear panel. Normal indication is 450 mV minimum. If indication is abnormal, refer to paragraph 4-69, isolation check.

b. Set COMP/INT/EXT switch to INT.

c. Remove translator/synthesizer assembly A2A6 from chassis. Connect frequency counter to terminal A3 of connector A2J12 (A6P1). Normal indication is 500 kHz ± 0.1 Hz. If indication is abnormal, refer to paragraph 4-69, isolation check. Disconnect frequency counter and connect rf voltmeter (without 50-ohm adapter) to the same terminal. Normal indication is 150 mV minimum. If indication is abnormal, refer to paragraph 4-69, isolation check.

d. Connect rf voltmeter (without 50-ohm adapter) to terminal A2 (1 MHz) of connector A2J12. Normal indication is 300 mV minimum. If indication is abnormal, refer to paragraph 4-69.

e. Connect rf voltmeter probe (with 50-ohm adapter) to terminal A1 (10 MHz) of connector A2J21. Normal indication is 20 mV minimum. If indication is abnormal, refer to paragraph 4-69.

f. Replace translator/synthesizer in chassis.

4-69. FREQUENCY STANDARD ISOLATION CHECK. An isolation check for the frequency standard is provided in the following paragraphs.

4-70. Test Equipment. Multimeter AN/PSM-4 or alternate is required for this test. Refer to table 4-2.

4-71. Preliminary Conditions and Control Setting.

a. R-1051B/URR pulled out of case.

b. Mode Selector switch at OFF.

c. MCS and KCS controls at 02010 kHz.

d. Remove frequency standard assembly A2A5.

e. Set Mode Selector switch to USB.

4-72. Procedure.

a. Connect multimeter between terminal 3 of connector A2J9 (A2A5P1) and ground. Normal indication is 28 ± 4 Vdc.

b. Connect multimeter between terminal 1 of connector A2J9 (A2A5P1) and ground. Normal indication is 20 ± 0.5 Vdc.

c. If indications in a and b are normal but paragraph 4-68 does not provide adequate results, the assembly is defective. Refer to paragraph 5-7. If indications in a or b are abnormal, refer to voltage distribution diagrams, figures 4-9 and 4-10, and troubleshoot the power-supply circuits.

4-73. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4 TROUBLESHOOTING.

4-74. GENERAL. RF Amplifier Electronic Assembly A2A4 is a depot-repairable assembly. Refer to paragraph 5-7 for additional data. Upon determining that the rf amplifier does not meet the requirements of the performance test in paragraph 4-75, ensure that the two vacuum tubes in the rf amplifier are not defective. The isolation check in paragraph 4-80 should then be performed to ensure that all input requirements to the assembly are normal prior to referring to paragraph 5-41. Mechanical synchronization of the 100 and 10 kCS frequency controls, which affect the proper operation of the rf amplifier, is covered in paragraph 4-56. The 1 and 10 MCS frequency controls, which affect the digital motor drive in setting up the correct position of the rf amplifier turret, are covered in paragraph 4-60.

4-75. RF AMPLIFIER PERFORMANCE TEST. Test information for the rf amplifier is provided in the following paragraphs.

4-76. Test Equipment. An rf signal generator and an rf voltmeter are required for this test. Refer to table 4-2.

4-77. Preliminary Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Mode Selector switch at USB.

c. MCS and KCS controls at 02.010 MHz.

d. RF GAIN control fully clockwise.

e. CPS switch at 000.

4-78. Procedure.

a. Connect the rf signal generator RF OUT connector to R-1051B/URR ANT 50 OHM connector A1J23 on the receiver rear panel. Remove mode selector assembly A2A1. Set rf signal generator to R-1051B/URR frequency and to CW, with a 1000-mV output. Connect rf voltmeter (without 50-ohm adapter) to TP4 on rf amplifier. Tune signal generator for maximum indication on the rf voltmeter. Normal indication is greater than 31.6 mV.

b. Without changing frequency, connect rf voltmeter to TP5 on translator/synthesizer assembly A2A6. Normal indication is greater than 31.6 mV.

c. Connect rf voltmeter to TP4 and check for indication greater than 31.6 mV for all frequencies listed as follows:

2.010 MHz	12.010 MHz	21.010 MHz
3.101	13.010	22.010
4.222	14.010	23.010
5.333	15.010	24.010
6.444	16.010	25.010
7.555	17.010	26.010
8.666	18.010	27.010
9.777	19.010	28.010
10.898	20.010	29.010
11.989		

4-79. Summary of Performance Test. If indications at TP5 are abnormal, check cable from A2J11A1 to A2J14A1. If rf amplifier performance test results are normal but the R-1051B/URR is not functional, proceed to translator/synthesizer troubleshooting in paragraph 4-84. If one or several frequencies in paragraph 4-78c resulted in marginal readings, note results of performing the translator/synthesizer performance test to determine if A2A4 should be replaced. If only the kHz digital tuning system is defective, refer to paragraph 4-56. If only the MHz digital tuning system is defective, refer to paragraph 4-60. If results of performance test and referenced paragraphs indicate malfunction of the rf amplifier, refer to paragraph 4-80 prior to replacement.

4-80. RF AMPLIFIER ISOLATION CHECK. An isolation check for the rf amplifier is provided in the following paragraphs.

4-81. Test Equipment. Multimeter AN/PSM-4 or alternate, a signal generator, and an rf voltmeter are required for this test. Refer to table 4-2.

4-82. Preliminary Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Mode Selector switch at STD BY.

c. MCS and KCS controls at 2.010 MHz.

d. RF GAIN control fully clockwise.

4-83. Procedure.

a. Observe that vacuum tube filaments are lit. Ensure rf amplifier turret has revolved to proper position as indicated by window and chart on top of assembly.

b. Remove rf amplifier. Connect multimeter between terminal 12 of A2J11 (A2A4P2) and ground. Refer to figure 4-4. Set Mode Selector switch to USB. Normal indication is 103 Vdc minimum. If indication is abnormal, troubleshoot main frame chassis.

c. Connect multimeter between terminal 7 of A2J10 (A2A4P1) and ground. Normal indication is from 24 to 32 Vdc. If indication is abnormal, troubleshoot main frame chassis.

NOTE

If indication was normal in step a. of paragraph 4-78, step d. below is unnecessary.

d. Connect rf signal generator as required in paragraph 4-78a, remove rf amplifier, and set output of rf signal generator for 40 mV. Connect rf voltmeter to A2J11A3. Rf voltmeter should indicate approximately the same as signal generator output (40 mV) if signal path from antenna connector to rf amplifier is normal. If abnormal, troubleshoot the main frame chassis. If all indications are normal and paragraph 4-78 does not provide required results, refer to paragraph 5-44.

4-84. <u>TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6 TROUBLESHOOTING.</u>

4-85. GENERAL. Translator/Synthesizer Electronic Subassembly A2A6 is a depot-repairable assembly. Refer to paragraph 5-7 for additional data. Upon determining that the assembly does not meet the requirements of the translator/synthesizer performance test in paragraph 4-89, the isolation check in paragraph 4-93 should be performed to ensure all input requirements of the assembly are normal prior to referring to paragraph 5-45 for replacement.

4-86. Various types of translator/synthesizers are installed in the R-1051B/URR and similar family equipments. Refer to current instructions prior to using any similar assembly.

CAUTION

Follow current instructions regarding interchangeability carefully to prevent damage to the assembly, the chassis, or both. Never interchange a translator/synthesizer of the 100-Hz type into the R-1051/URR, or a 500-Hz assembly into the R-1051B/URR receiver.

4-87. When marginal readings are obtained in the performance test, remove the rf amplifier and turn the REC GAIN ADJ (on side of rf translator subassembly A2A6A6) not more than 1/8-turn clockwise. Repeat performance test at frequencies which are marginal. Do not increase the REC GAIN ADJ more than necessary to have all marginal frequencies indicate the minimum required 100 mV.

4-88. Failures on the main frame chassis 4-Vdc power supply may cause misleading indications of a defective translator/synthesizer. Ensure that all of the isolation check is performed prior to condemning the assembly.

4-89. TRANSLATOR/SYNTHESIZER A2A6 PERFORMANCE TEST. Test information for the translator/synthesizer is provided in the following paragraphs.

4-90. Test Equipment. An rf signal generator and an rf voltmeter are required for this test. Refer to table 4-2.

4-91. Operating Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Mode Selector switch at USB.

c. MCS and KCS controls at 2.010 MHz.

d. RF GAIN control fully clockwise.

e. CPS switch at 000.

4-92. Procedure.

a. Remove receiver mode selector assembly A2A1. Connect rf signal generator RF OUT connector to R-1051B/URR ANT 50 OHM connector A1J23 at rear of case. Set rf signal generator at CW with 1000 mV output at 2.010 MHz. Connect rf voltmeter (without 50-ohm adapter) to TP8 on rf translator subassembly. Tune rf signal generator for a maximum indication of rf voltmeter. Normal indication is 100 mV minimum. If indication is either normal or abnormal, proceed with step b.

b. Repeat step a. at all frequencies listed below. All indications should be 100 mV minimum.

2.010 MHz	12.010 MHz	21.010 MHz
3.101	13.010	22.010
4.222	14.010	23.010
5.333	15.010	24.010
6.444	16.010	25.010
7.555	17.010	26.010
8.666	18.010	27.010
9.777	19.010	28.010
10.898	20.010	29.010
11.989		

c. If only several frequencies are slightly below 100 mV, refer to paragraph 4-87. If malfunction of the translator is indicated, refer to the isolation check in paragraph 4-93. If indications are normal, reinstall receiver mode selector assembly.

4-93. TRANSLATOR/SYNTHESIZER ISOLATION CHECK. An isolation check for the translator/synthesizer is provided in the following paragraphs.

4-94. Test Equipment. Multimeter AN/PSM-4 or alternate is required for this test. Refer to table 4-2.

4-95. Operating Conditions and Control Settings.

a. R-1051B/URR chassis pulled out of case.

b. Mode Selector switch at OFF.

c. MCS and KCS controls at 02010 kHz.

d. CPS switch at 000.

e. RF GAIN control fully clockwise.

4-96. Procedure.

a. Remove translator/synthesizer from chassis. Rotate Mode Selector switch to the USB position. Connect multimeter between the terminals listed below and ground, and observe that the voltages are within tolerance as specified. See figure 4-4 for location of terminals.

TERMINAL	VOLTAGE
A2J12-7	28 ±4.0 Vdc
A2J12-18	20 ±0.5 Vdc
A2J12-6	28 ±4.0 Vdc (0 Vdc when MCS control has been turned and rf amplifier turret is turning)
A2J12-10	20 ±0.5 Vdc
A2J12-20	20 ±0.5 Vdc when MCS controls are set at 2, 3, 4, 5, 7, 8, 11, 12, 14, 15, 16, 22, 23, 27, 28 and 29; 0 volt when MCS controls are set at 6, 9, 10, 13, 17, 18, 19, 20, 21, 24, 25, and 26.

b. Return MCS controls to 02.

c. Set Mode Selector switch to OFF and remove ac power connector from rear of case. Using Rx1 scale of multimeter, perform the continuity checks listed in table 4-6. See figure 4-4 for location of terminals, except as otherwise specified in table 4-6.

d. Install translator/synthesizer and connect ac power connector at rear of receiver case. Set Mode Selector switch to USB. Measure dc voltage between following terminals of A2A11A1 and ground, using the multimeter. See figure 4-15 for terminal locations.

TERMINALS	VOLTAGE
E2	3.2 to 11.0 ±1.0 Vdc (CPS switch at V, voltage varies with vernier)
E6	4.2 ±0.4 Vdc (CPS switch at 000).
E7	20 ±0.5 Vdc

e. If indications are all normal and paragraph 4-92 did not provide required results, replace translator/synthesizer as described in paragraph 5-45. If indications are abnormal, troubleshoot the main frame chassis and 4-Vdc power supply.

4-97. RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY A2A1 TROUBLESHOOTING.

4-98. GENERAL. Refer to current instructions and SM&R code on Allowance Parts List (APL) to determine if receiver mode selector is depot- or shipboard-repairable. Adequate documentation is provided in this manual for repair of the original assembly supplied with the R-1051B/URR receiver.

4-99. The mode selector has a low failure rate and will seldom fail to the extent of preventing reception of signals in all modes. When certain modes of reception are malfunctioning, fault isolation will usually result in locating a defective if./audio amplifier (A2A2 or A2A3) or frequency standard (A2A5). Temporary exchange of if./audio amplifiers A2A2 and A2A3 may expedite fault isolation of these assemblies. Slow flickering of lamp DS5 on the frequency standard usually indicates presence of 500 kHz to the mode selector. When one of the three mechanical filters has been found defective, ensure that correct values of capacitors are used on newly installed filters. These capacitors are selected according to dot on filter; i.e., orange - 130 pf ±2%, yellow - 142 pf ±2%, green - 150 pf ±2%.

4-100. Before assuming that the mode selector requires troubleshooting, complete the performance test in paragraph 4-101. Test cables required for troubleshooting and repair of this assembly are GD/E58189 P/N 666243-071 for A2A1P1, and GD/E58189 P/N 666243-072 for A2A1P2. See the schematic diagram, figure 5-2, and component location and test point diagrams, figures 5-23 through 5-27. After the malfunction has been isolated, refer to paragraph 5-47 for repair, alignment and adjustment procedures.

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TABLE 4-7. RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY A2A1, VOLTAGE CHECKS

CONNECTOR TERMINAL	OPERATIONAL MODE						IF INDICATION IS ABNORMAL*
	LSB	FSK	AM	CW	USB	ISB	
A2J16-1	-	20V	-	-	20V	20V	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.
A2J16-2	-	-	20V	20V	-	-	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.
A2J16-6	20V	20V	20V	20V	20V	20V	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.
A2J17-1	-	-	-	0.2 to 20V**	-	-	Troubleshoot A2R6 and A2R19.
A2J17-2	-	-	-	20V	-	-	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.
A2J17-4	20V	20V	20V	20V	20V	20V	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.
A2J17-5	20V	20V	-	-	20V	20V	Troubleshoot A2K3, A2FL1, and Power Supply Electronic Assembly A2A8.

* See figure 5-1.

** Varies with setting of BFO FREQ control.

4-114. IF./AUDIO AMPLIFIER AND PERFORMANCE TEST. Test information for the if./audio amplifier is provided in the following paragraphs.

4-115. Test Equipment. An rf signal generator and an ac voltmeter are required for this test. Refer to table 4-2.

4-116. Operating Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Set Mode Selector switch to USB.

c. Set MCS and KCS controls to 02.010 MHz.

d. Rotate the RF GAIN control fully clockwise.

e. Set CPS switch to 000.

f. Set USB LINE LEVEL switch to +20 dB

g. Rotate the USB LINE LEVEL control to midrange.

h. Connect the rf signal generator to ANT 50 OHM connector A1J23 on the rear of the receiver.

i. Connect ac voltmeter to AUDIO OUT 600 OHM USB connector A1A1J5 on rear of the receiver.

j. Set rf signal generator to 2.010 MHz, CW, with 1-mV output.

4-117. Procedure.

a. Adjust rf signal generator frequency for peak on ac voltmeter. Rotate USB LINE LEVEL control fully clockwise. The ac voltmeter should indicate 6 to 11 Vac.

b. Set Mode Selector switch to AM. Set rf signal generator to 1000 Hz at 30 percent modulation. Adjust rf signal generator frequency for a peak on the ac voltmeter. The ac voltmeter should read 6 to 11 Vac.

c. Set USB LINE LEVEL switch to the +20 dB position and set ac voltmeter to 0DB scale. Adjust USB LINE LEVEL control until +15 dB is indicated on the ac voltmeter. The USB LINE LEVEL meter should read -5 ±2 dB. Adjust USB LINE LEVEL control for 0 dB indication on the ac voltmeter. Set USB LINE LEVEL to the 0DB position and observe USB LINE LEVEL meter reads 0 ±2 dB. Disconnect ac voltmeter and reconnect audio cable to A1A1J5 on rear of receiver.

d. Connect ac voltmeter to AUDIO OUT 600 OHM LSB connector A1A1J6 on rear of the receiver. Set Mode Selector switch to LSB and set the signal generator to CW. Adjust signal generator frequency for a peak reading on the ac voltmeter. Rotate LSB LINE LEVEL control fully clockwise. The ac voltmeter should read 6 to 11 Vac.

e. Repeat procedure c. above, substituting LSB for USB. Upon completion, disconnect the ac voltmeter and reconnect audio cable to A1A1J6 on rear of receiver.

f. If indications are abnormal, complete the agc and if. gain loop adjustment in paragraph 5-79. If the adjustment procedure does not correct the malfunction, perform the isolation check in paragraph 4-118.

4-118. IF./AUDIO AMPLIFIER ISOLATION CHECK. An isolation check for the if./audio amplifier is provided in the following paragraphs.

4-119. Test Equipment. Multimeter AN/PSM-4 or alternate is required for this test. Refer to table 4-2.

4-120. Operating Conditions and Control Settings.

a. Receiver in full operation, chassis pulled out of case.

b. Set Mode Selector switch to OFF.

c. Set MCS and KCS controls to 02.010 MHz.

d. Remove USB (left) if./audio amplifier A2A2.

4-121. Procedure.

a. Connect multimeter between one of the connector terminals listed in table 4-8 and ground. See figure 4-4 for connector and pin locations.

b. Rotate Mode Selector switch to each of the operational modes for which a voltage is listed, observing that voltages are within limits listed in the table.

c. Repeat steps a. and b. until voltage has been checked at each connector terminal in table 4-8.

d. Reinstall if./audio amplifier A2A2 and remove if./audio amplifier A2A3.

e. Connect multimeter between one of the connector terminals listed in table 4-9 and ground.

f. Rotate Mode Selector switch to each of the operational modes for which a voltage is listed, observing that voltages are within limits listed in the table.

g. Repeat steps e. and f. until voltage has been checked at each connector terminal in table 4-9.

TABLE 4-6. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6, RESISTANCE CHECKS

MULTIMETER LEADS BETWEEN	CPS SWITCH AT	NORMAL INDICATION
A2J12-12 and A2J12-19	000 through 900	Short
A2J12-12 and A2J12-19	V (vernier)	Open
A2J12-12 and A2J12-17	200, 300, 600, 200	Short
A2J12-12 and A2J12-15	800, 900	Short
A2J12-12 and A2J12-13	400, 500, 600, 700	Short
A2J12-12 and A2J12-11	V (vernier), 100, 300, 500, 700, 900	Short
A2J12-14 and A2A11A1E2 (See figure 4-15 and location of A11A1E2.)	V (vernier)	Short
A2J12-14 and ground	000 through 900	Short
A2J12-14 and ground	V (vernier)	Open
A2J12-19 and ground	V (vernier)	Short

4-101. MODE SELECTOR PERFORMANCE TEST. Test information for the mode selector is provided in the following paragraphs.

4-102. Test Equipment. An rf signal generator, an rf voltmeter, and a frequency counter are required for this test. Refer to table 4-2.

4-103. Operating Conditions and Control Settings.

a. R-1051B/URR in full operation and chassis pulled out of case.

b. Mode Selector switch at OFF.

c. RF GAIN control fully clockwise.

d. CPS switch at 000.

e. Remove if./audio amplifiers A2A2 and A2A3 from chassis.

f. With 50-ohm coaxial cable RG-58C/U, connect RF OUT connector on rf signal generator to ANT 50 OHM connector A1J23 at rear panel of receiver.

g. Set Mode Selector switch to CW.

h. Set rf signal generator at 2010 kHz in CW with 100-mV output.

i. Connect rf voltmeter (without 50-ohm adapter) to TP1 on top of mode selector. See figure 5-18.

4-104. Procedure.

a. Adjust frequency and output level of rf signal generator for peak signal of 100 mV on rf voltmeter. Connect rf voltmeter to terminal A3 of jack A2J18 (A2A2P1). (See figure 4-4.) Normal indication is more than 4 mV when Mode Selector switch is in CW or AM position. (Disregard indications in other modes.) If indication is abnormal, proceed to step b. to aid in isolating fault.

b. Set Mode Selector switch to USB. Adjust frequency of rf signal generator for peak signal on rf voltmeter. Normal indication is more than 4 mV when Mode Selector switch is set to USB or ISB position. If indication is abnormal, proceed to step c. to aid in isolating fault.

c. Set Mode Selector switch to LSB. Connect rf voltmeter to terminal A3 of jack A2J19 (A2A3P1). Adjust frequency of rf signal generator for peak signal on rf voltmeter. Normal indication is more than 4 mV when Mode Selector switch is at LSB position.

If indication is abnormal, proceed to step d. to aid in isolating fault.

d. Connect rf signal generator to terminal A2 on jack A2J18 (A2A2P1). Verify that rf voltmeter indicates more than 100 mV in the LSB, USB, ISB, and FSK positions of the Mode Selector switch, and 0 mV in the AM and CW positions of the Mode Selector switch. If indication is abnormal, proceed to steps e. and f. to aid in osolating fault.

e. Reinstall if./audio amplifiers A2A2 and A2A3 in R-1051B/URR. Disconnect rf signal generator from ANT 50 OHM connector A1J23.

f. Set Mode Selector switch to CW and rotate RF GAIN control fully counterclockwise. Connect frequency counter to TP2 on top of mode selector. Rotate BFO FREQ control fully clockwise. Verify that counter indicates 503 kHz minimum. If indication is abnormal, refer to the BFO frequency adjustment procedure in paragraph 5-75.

g. If steps a. through f. produce normal indications, complete the performance check in paragraph 4-114 for if./audio amplifiers A2A2 and A2A3. If abnormal indications are obtained, proceed to the isolation check in paragraph 4-105.

4-105. MODE SELECTOR ISOLATION CHECK. An isolation check for the mode selector is provided in the following paragraphs.

4-106. Test Equipment. Multimeter AN/PSM-4 or alternate is required for this test. Refer to table 4-2.

4-107. Operating Conditions and Control Settings.

a. R-1051B/URR in full operation, chassis pulled out of case.

b. Mode Selector switch at OFF.

c. MCS and KCS controls at 02010 kHz.

d. Remove mode selector from R-1051B/URR.

e. Connect multimeter between one of the connector terminals listed in table 4-7 and ground.

4-108. Procedure. Rotate Mode Selector switch to each of the operational modes for which a voltage is indicated. The measured voltage in each position should be within 0.5 volt of the listed value. Repeat this procedure for each of the connector terminals in table 4-7. If all indications are normal and procedures of paragraph 4-101 have produced abnormal indications, troubleshoot the mode selector or replace the assembly as directed by current instructions.

4-109. <u>RECEIVER IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A2 AND A2A3 TROUBLESHOOTING.</u>

4-110. GENERAL. Refer to current instructions and SM&R Code on Allowance Parts List (APL) to determine if the if./audio amplifier is shipboard- or depot-repairable. Adequate documentation is provided in this manual for repair of the original assembly supplied with the R-1051B/URR.

4-111. The USB if./audio amplifier (A2A2) and the LSB if./audio amplifier (A2A3) are identical, and are interchangeable provided the agc performance test in paragraph 5-79 is made and agc circuits are adjusted as necessary.

4-112. Two versions of this assembly are currently in use in the R-1051B/URR receivers. To determine which schematic diagram, figure 5-3 or 5-4, to use, note transistor A2A2A2Q9. Early versions used a 2N1183A transistor and later versions use a 2N1131 transistor.

4-113. Before assuming that the if./audio amplifier requires troubleshooting, complete the performance test in paragraph 4-114. The test cable required for troubleshooting and repair of this assembly is GD/E 58189 P/N 666243-070 for A2A2P1. See figure 5-3 for the schematic diagram, and figures 5-28 through 5-33 for parts location and test point diagrams. After a malfunction has been isolated, refer to the repair and adjustment procedures in paragraph 5-54.

h. If any readings in steps b. through g. are abnormal, troubleshoot the main frame chassis in accordance with paragraph 4-20. If readings are normal, refer to the overall receiver performance test in paragraph 5-83.

4-122. SERVICING BLOCK DIAGRAMS.

4-123. Figures 4-22 through 4-33 provide servicing block diagrams for assemblies A2A1 through A2A5 and subassemblies A2A6A1 through A2A6A6. The figures are in order by reference designations of the assemblies.

TABLE 4-8. RECEIVER IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A2, USB VOLTAGE CHECKS

CONNECTOR TERMINAL	OPERATIONAL MODE						LIMITS
	LSB	FSK	AM	CW	USB	ISB	
A2J18-1 (A2P1)	-	28V	28V	28V	28V	28V	±4V
7	-	20V	20V	20V	20V	20V	±0.5V
11	-	20V	20V	20V	20V	20V	±0.5V
15	-	20V	-	-	-	-	±0.5V
17	-	-	20V	20V	-	-	±0.5V
18	-	20V	-	-	20V	20V	±0.5V
19	-	-30V	-30V	-30V	-30V	-30V	±1.5V
21*	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V	±0.5V
22*	0 to 30V	-	-	-	-	0 to -30V	±1.5V

*Varies with RF GAIN control. Fully clockwise is 0 volt.

TABLE 4-9. RECEIVER IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A3, LSB VOLTAGE CHECKS

CONNECTOR TERMINAL	OPERATIONAL MODE						LIMITS
	LSB	FSK	AM	CW	USB	ISB	
A2J19-1 (A3P1)	28V	-	-	-	-	28V	±4V
7	20V	-	-	-	-	20V	±0.5V
11	20V	-	-	-	-	20V	±0.5V
15	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-
18	20V	-	-	-	-	20V	±0.5V
19	-30V	-	-	-	-	-30V	±1.5V
21*	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V	±0.5V
22*	-	0 to -30V	0 to -30V	0 to -30V	0 to -30V	0 to -30V	±1.5V

*Varies with RF GAIN control. Fully clockwise is 0 volt.

MALFUNCTION * REFER TO NOTES 1 THROUGH 4	NO SIGNALS NO NOTICEABLE NOISE* AT OUTPUT: ALL MODES	NO SIGNALS NO NOTICEABLE NOISE* AT OUTPUT: CERTAIN MODES	NO SIGNALS NO NOTICEABLE NOISE* AT OUTPUT: ALL FREQUENCIES	NO SIGNALS NO NOTICEABLE NOISE* AT OUTPUT: CERTAIN FREQUENCIES	NO SIGNALS LOW NOISE* AT OUTPUT: ALL MODES	NO SIGNALS LOW NOISE* AT OUTPUT: CERTAIN MODES	NO SIGNALS LOW NOISE* AT OUTPUT: ALL FREQUENCIES	NO SIGNALS LOW NOISE* AT OUTPUT: CERTAIN FREQUENCIES	NO SIGNALS NORMAL NOISE* AT OUTPUT: ALL MODES	NO SIGNALS NORMAL NOISE* AT OUTPUT: CERTAIN MODES	NO SIGNALS NORMAL NOISE* AT OUTPUT: ALL FREQUENCIES	NO SIGNALS NORMAL NOISE* AT OUTPUT: CERTAIN FREQUENCIES	WEAK SIGNALS PRESENT AT OUTPUT: ALL MODES	WEAK SIGNALS PRESENT AT OUTPUT: CERTAIN MODES	WEAK SIGNALS PRESENT AT OUTPUT: ALL FREQUENCIES	WEAK SIGNALS PRESENT AT OUTPUT: CERTAIN FREQUENCIES	FREQUENCY OFF BUT STBL: ALL FREQUENCIES	FREQUENCY OFF BUT STBL: CERTAIN FREQUENCIES	FREQUENCY UN-STBL: ALL FREQUENCIES	FREQUENCY UN-STBL: CERTAIN FREQUENCIES
1. INTERNAL FREQUENCY STANDARD A2A5 INT/COMP/EXT SWITCH SET AT INT (OR TO COMP WITH INPUT FROM EXT FREQUENCY STANDARD)	X		X		X		X	X									X		X	
2. EXTERNAL FREQUENCY STANDARD (AN/URQ-9, -10) (A2A5 INT/COMP/EXT SWITCH SET TO EXT POSITION)	X		X														X			
3. LSB IF./AUDIO AMPLIFIER A2A3 OR OUTPUT CIRCUITS		X	X			X	X			X	X			X	X					
4. USB IF./AUDIO AMPLIFIER A2A2 OR OUTPUT CIRCUITS		X	X			X	X			X	X			X	X					
5. MODE SELECTOR A2A1		X	X			X	X			X	X			X	X					
6. TRANSLATOR/SYNTHESIZER A2A6					X		X	X	X		X	X	X		X	X	X	X	X	X
7. RF AMPLIFIER A2A4									X		X	X	X		X	X				
8. ANTENNA OVERLOAD PCB A2A9									X		X		X		X					
9. ANTENNA INPUT CIRCUITS (ANTENNA TO A2A9 ASSEMBLY)									X		X		X		X	X				
10. 4-VDC POWER SUPPLY AND VERNIER CONTROL A2A11					X		X	X									X	X	X	X
11. KCS DIGITAL TUNE SYSTEM					X		X	X	X		X	X	X		X	X	X	X		
12. MCS DIGITAL TUNE SYSTEM					X		X	X	X		X	X								

NOTES:

1. PRIOR TO USING THIS GUIDE, INSURE THAT CORRECT VOLTAGES ARE BEING SUPPLIED BY THE POWER SUPPLY. (REFER TO TABLE 4-3.)
2. THIS GUIDE IS TO BE USED ONLY AS AN AID IN INITIAL FAULT ISOLATION OF A MALFUNCTION. CONCLUSIVE RESULTS SHOULD THEN BE OBTAINED BY THE PERFORMANCE TESTS AND ISOLATION CHECKS IN SECTION 4.
3. REFER TO PARAGRAPH 4-17 FOR DEFINITION OF NOISE LEVELS.
4. AN X INDICATES THAT THE SYMPTOM IN THE COLUMN HEADING IS LIKELY TO BE CAUSED BY A MALFUNCTION IN THE ASSEMBLY INDICATED AT LEFT.

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Figure 4-2. Fault Isolation Guide

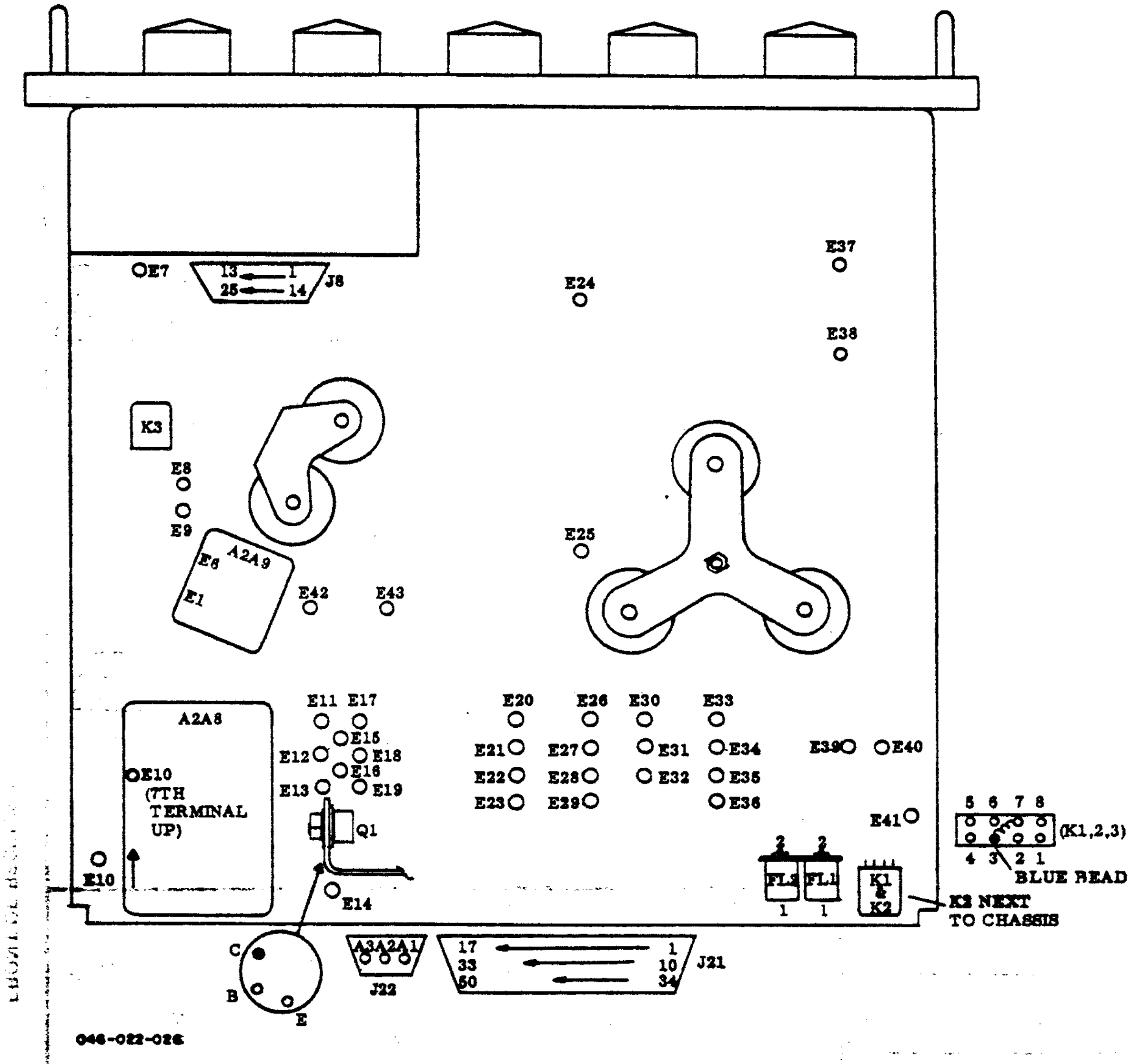


Figure 4-3. Main Frame Chassis "E" Terminal and Test Point Location Diagram

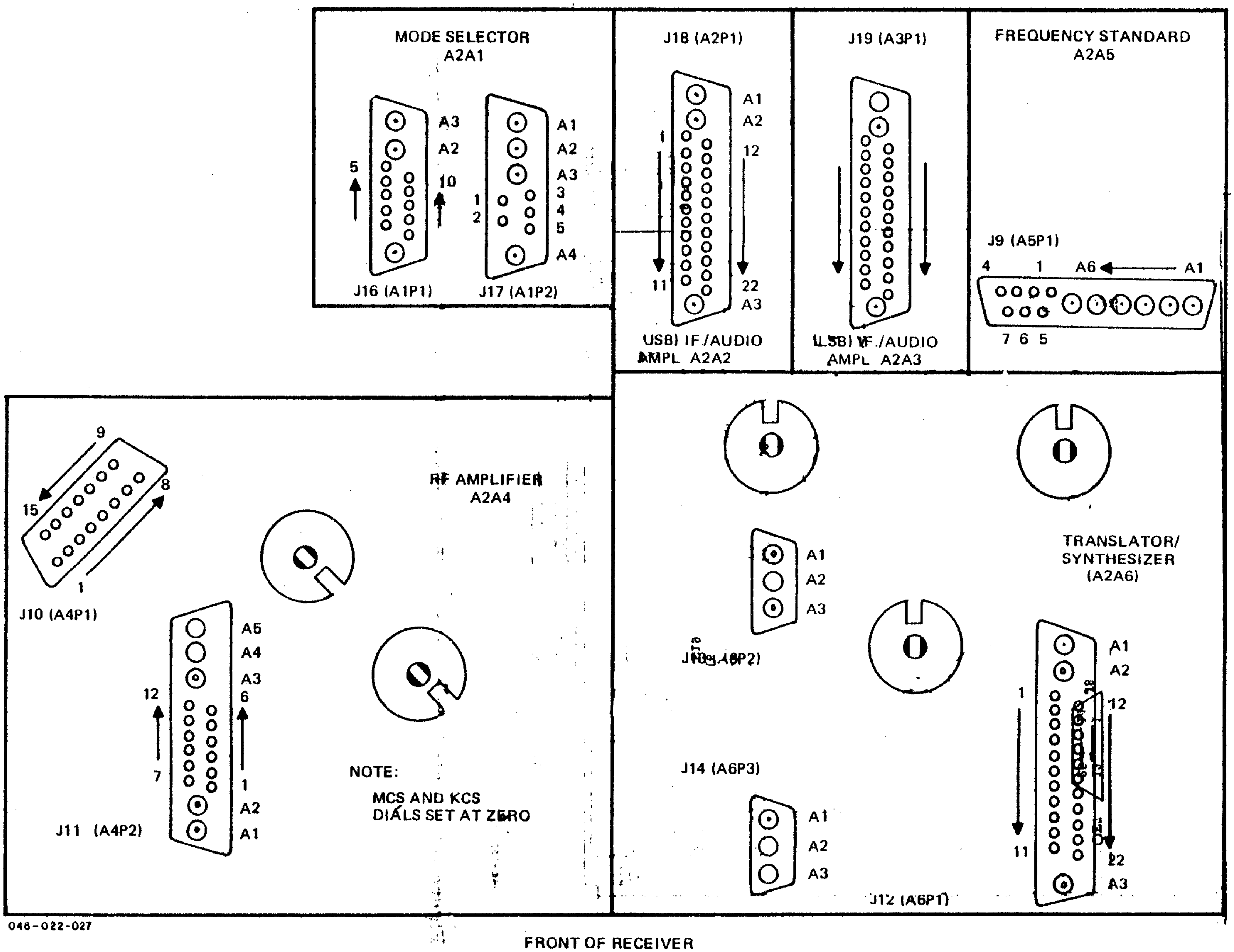
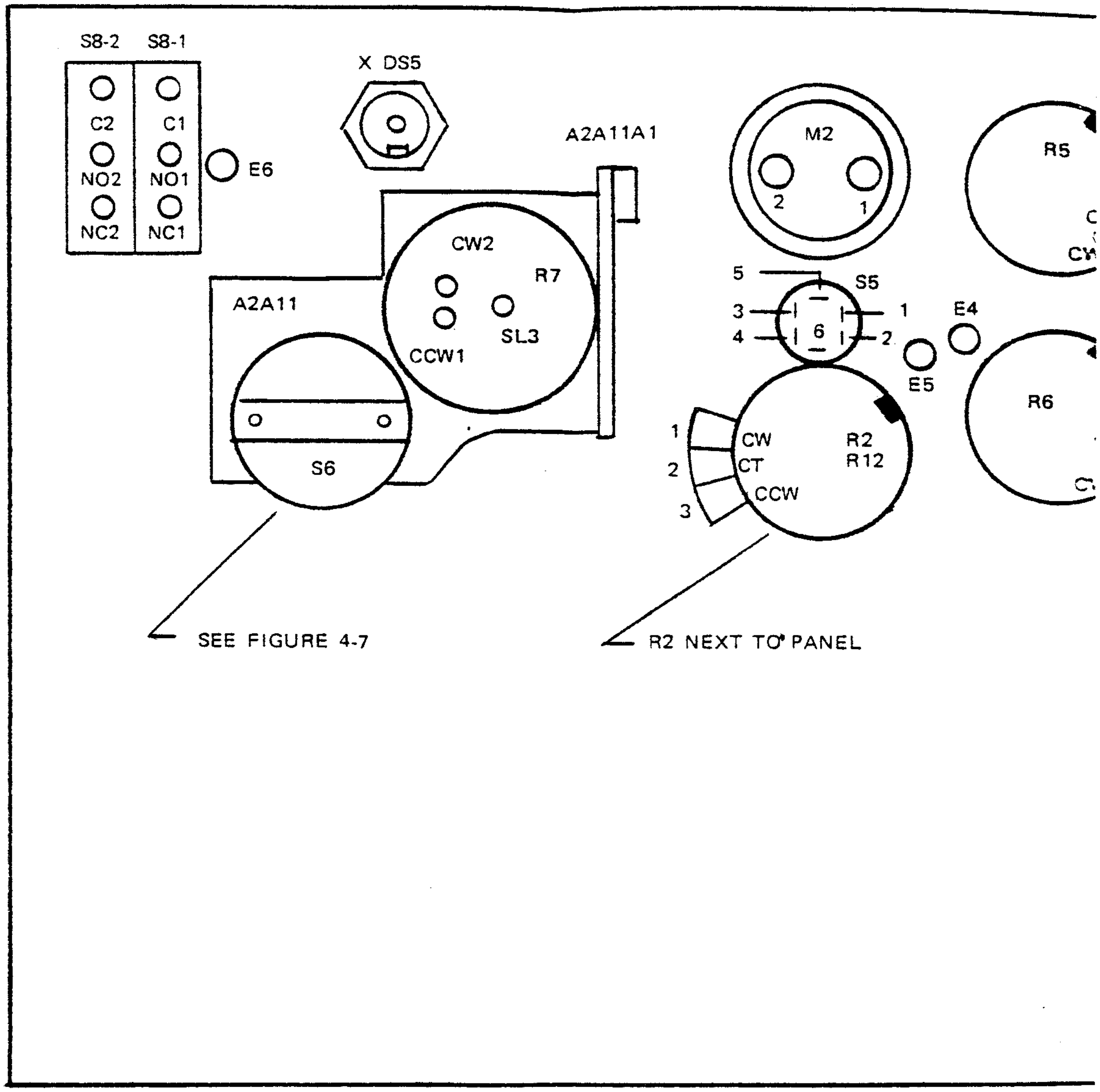


Figure 4-4. Main Frame Chassis, Top View Connector Pin Location Diagram



S8-2
S8-1
C2
C1
NO2
NO1
NC2
NC1
E6
X DS5
A2A11A1
M2
R5
A2A11
CW2
R7
CCW1
SL3
S6
S5
E4
E5
R6
CW
CT
CCW
R2
R12
SEE FIGURE 4-7
R2 NEXT TO PANEL

046-022-028

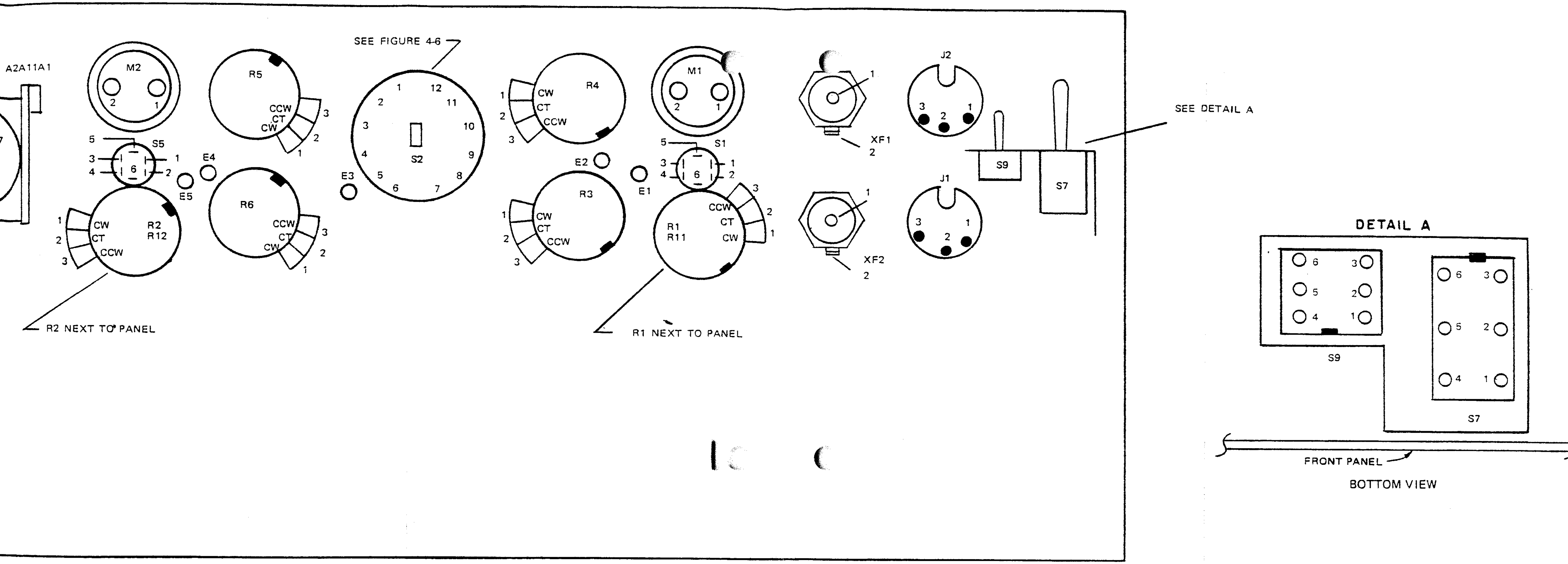
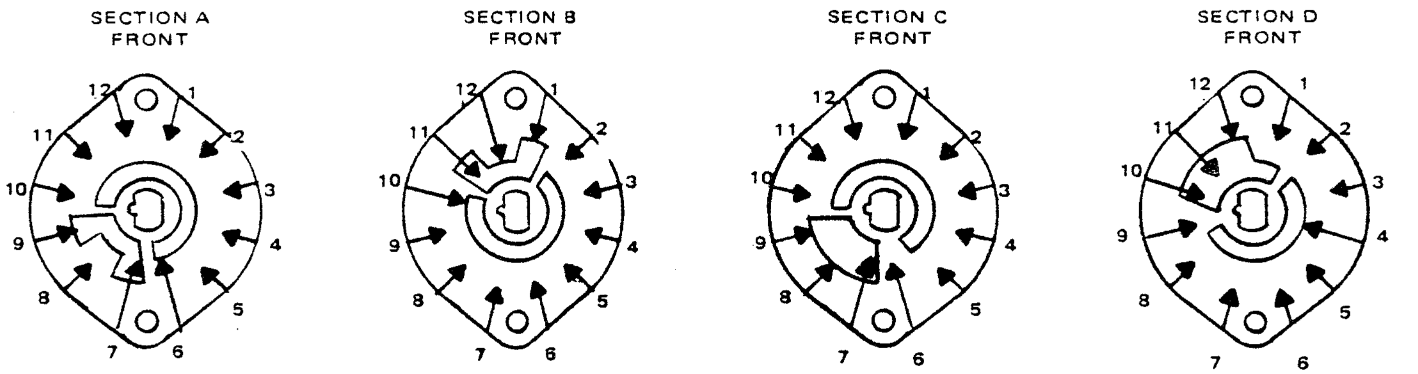


Figure 4-5. Front Panel Components, Terminal and Switch Contact Marking Diagram

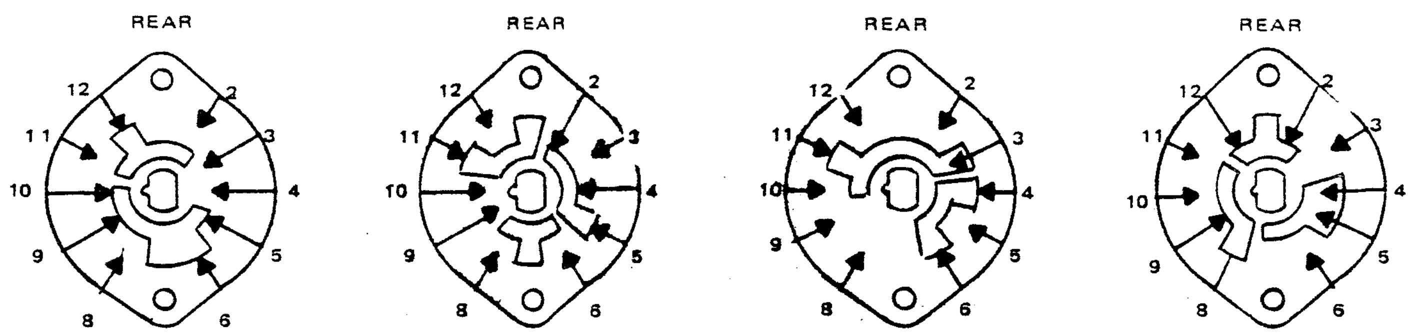


LONG CLIPS 6,7
ALL OTHERS SHORT
CLIPS

LONG CLIPS TO 11,12
ALL OTHERS SHORT
CLIPS

LONG CLIPS 6,7
ALL OTHERS SHORT
CLIPS

LONG CLIPS 4,9.10,11
ALL OTHERS SHORT
CLIPS



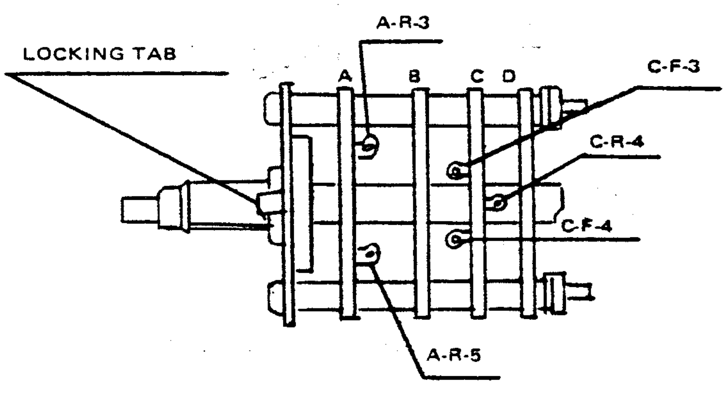
SHORT CLIPS 2,6,
8, 11, 12
LONG CLIPS 3,4,5,
9, 10

SHORT CLIPS 3,5,6,
8, 11, 12
LONG CLIPS 2,4,
9, 10

LONG CLIP 3
ALL OTHERS SHORT
CLIPS

SHORT CLIPS 3, 6, 8,
10, 11
LONG CLIPS 2, 4, 5, 9, 12

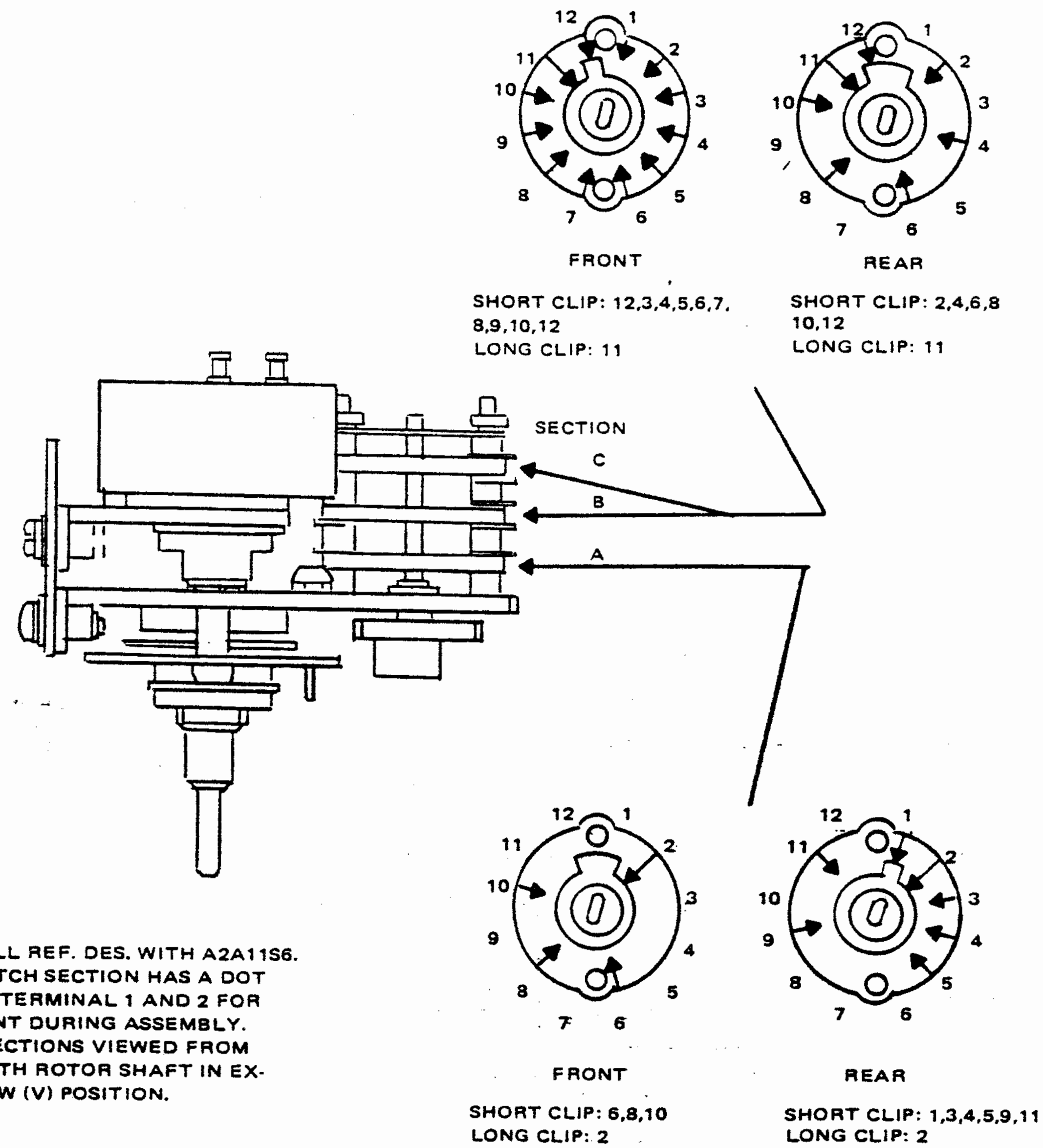
NOTES:
1. PREFIX ALL REF DES WITH A2S2.
2. SWITCH SECTIONS VIEWED FROM FRONT OR KNOB END WITH ROTOR SHAFT IN EXTREME CCW (OFF) POSITION
3. EACH SWITCH SECTION HAS A DOT AT TERMINAL 2 (REAR) FOR ALIGNMENT DURING ASSEMBLY.



RIGHT SIDE VIEW

046-022-029

Figure 4-6. Mode Selector Switch A2S2, Contact Arrangement Diagram



NOTES:
1. PREFIX ALL REF. DES. WITH A2A11S6.
2. EACH SWITCH SECTION HAS A DOT BETWEEN TERMINAL 1 AND 2 FOR ALIGNMENT DURING ASSEMBLY.
3. SWITCH SECTIONS VIEWED FROM FRONT WITH ROTOR SHAFT IN EXTREME CCW (V) POSITION.

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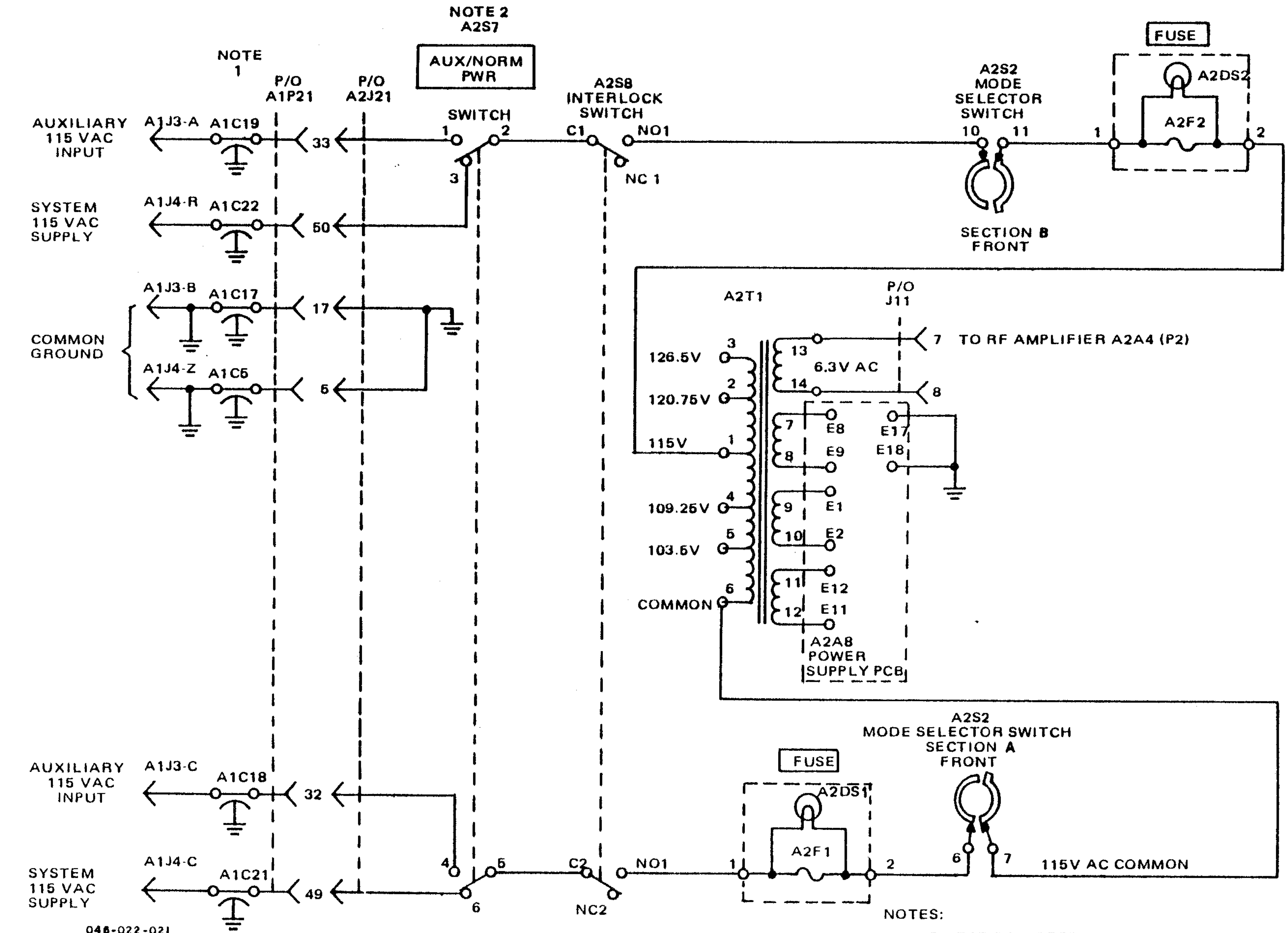
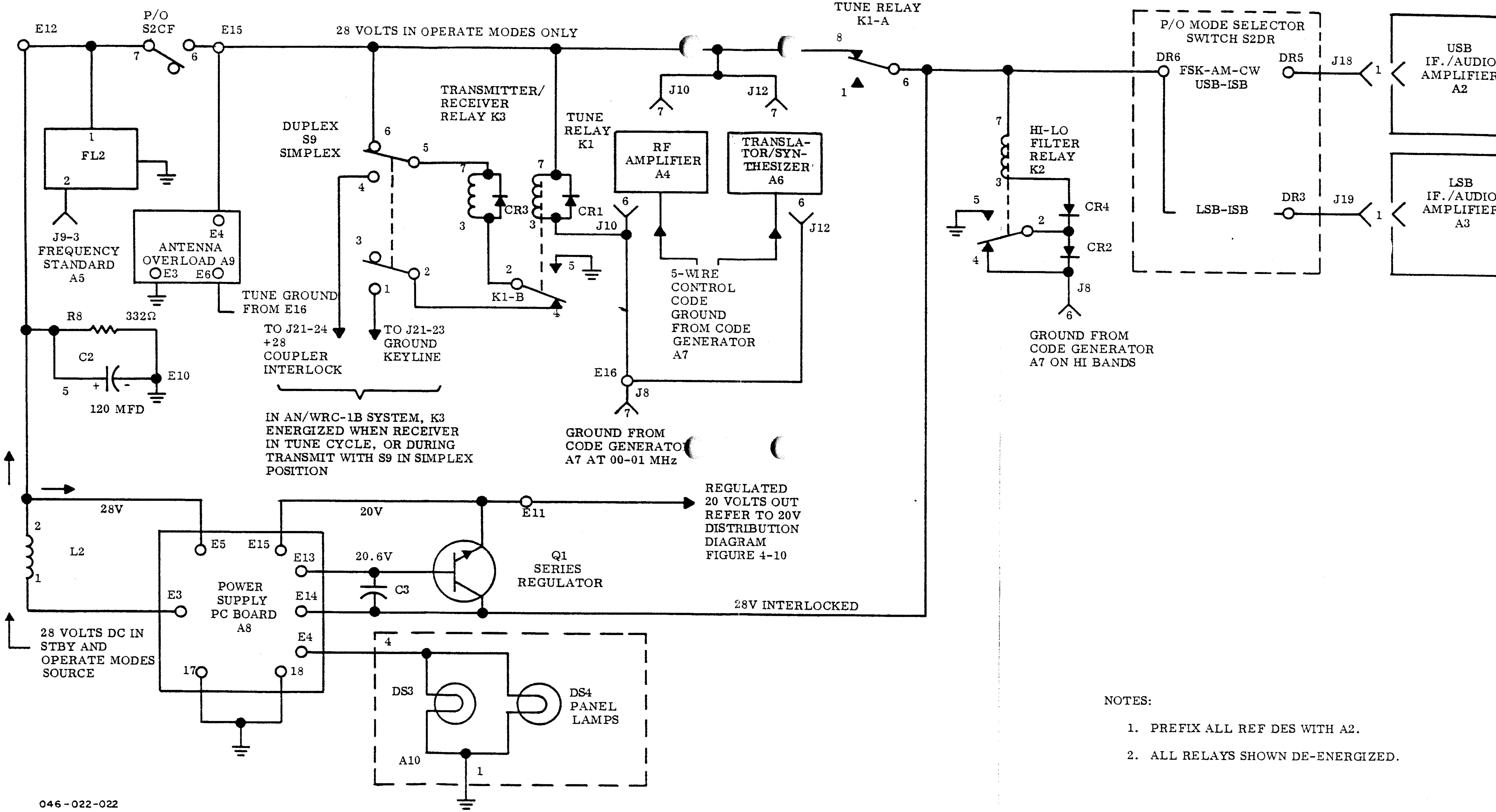
Figure 4-7. CPS Switch Assembly A2A11S6, Contact Arrangement Diagram



NOTES:

1. FILTER BOX FEED-THRU CAPACITORS ARE 0.001 MICROFARADS
2. A2S7: NORM - 115VAC SUPPLY FROM AN/WRC-1B SYSTEM
   AUX - 115VAC SUPPLY INDEPENDENT OF AN/WRC-1B SYSTEM

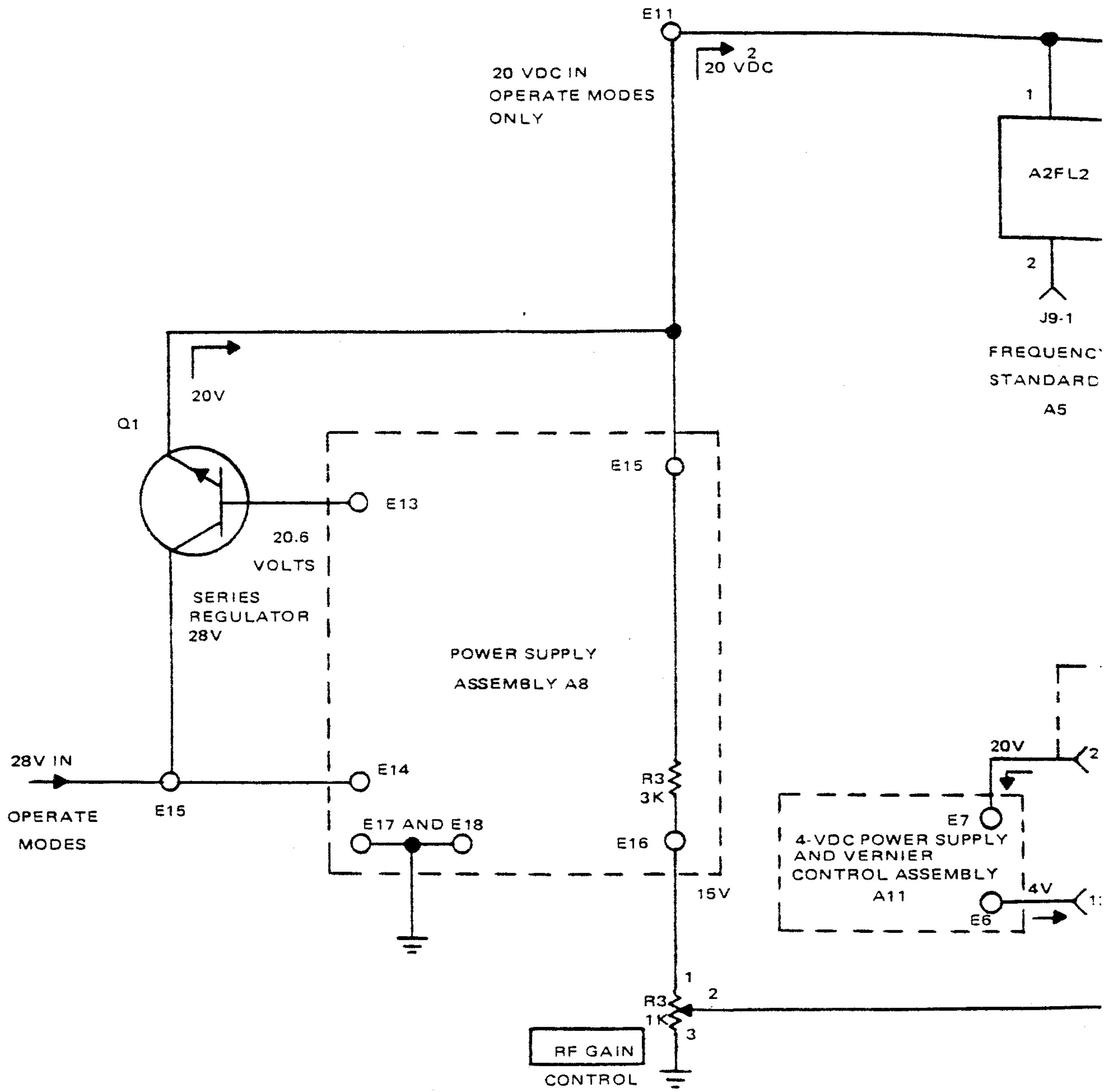
Figure 4-8. AC Power Distribution Diagram



NOTES:

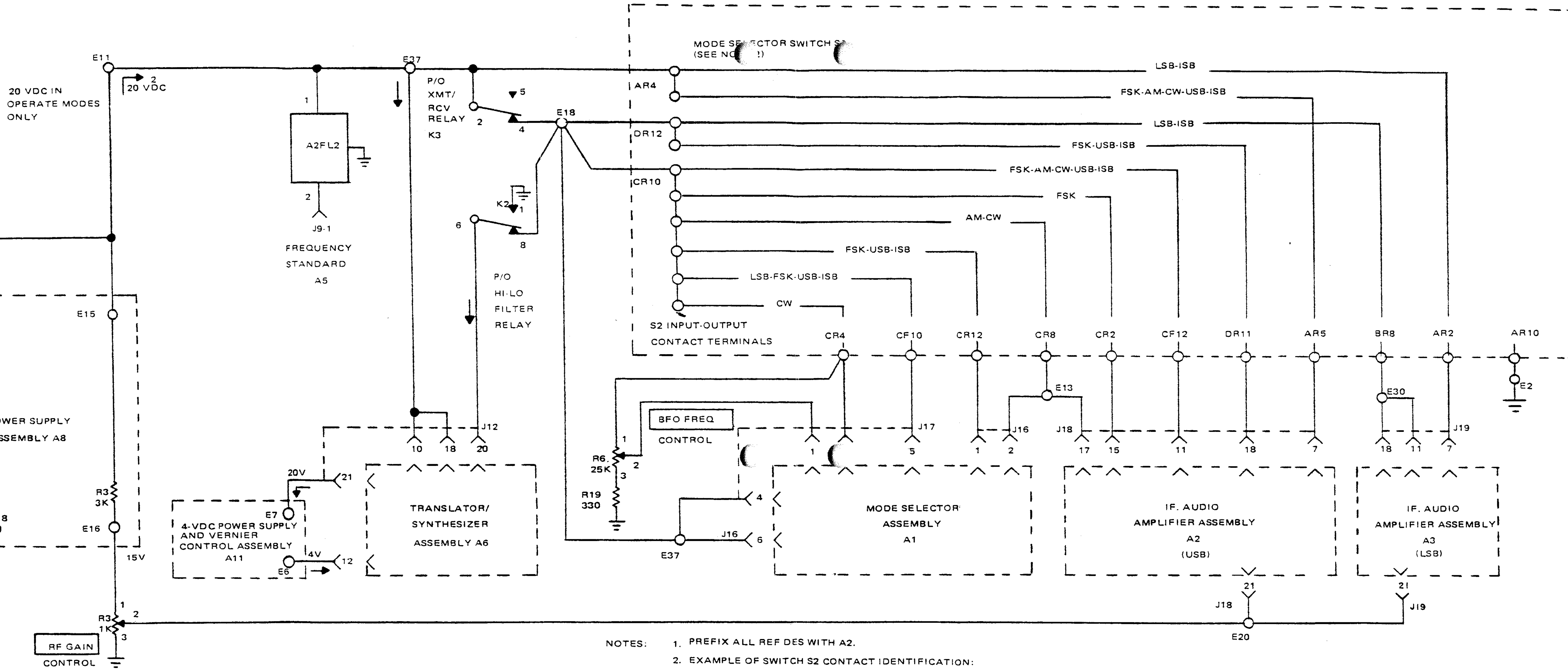
1. PREFIX ALL REF DES WITH A2.
2. ALL RELAYS SHOWN DE-ENERGIZED.

Figure 4-9. 28-VDC Distribution Diagram



E11
2
20 VDC
20 VDC IN
OPERATE MODES
ONLY
1
A2FL2
2
J9-1
FREQUENC
STANDARD
A5
20V
Q1
E15
E13
20.6
VOLTS
SERIES
REGULATOR
28V
POWER SUPPLY
ASSEMBLY A8
28V IN
OPERATE
MODES
E15
E14
R3
3K
E17 AND E18
E16
15V
20V
E7
4-VDC POWER SUPPLY
AND VERNIER
CONTROL ASSEMBLY
A11
4V
E6
1
R3
1K
2
3
RF GAIN
CONTROL

046-022-023

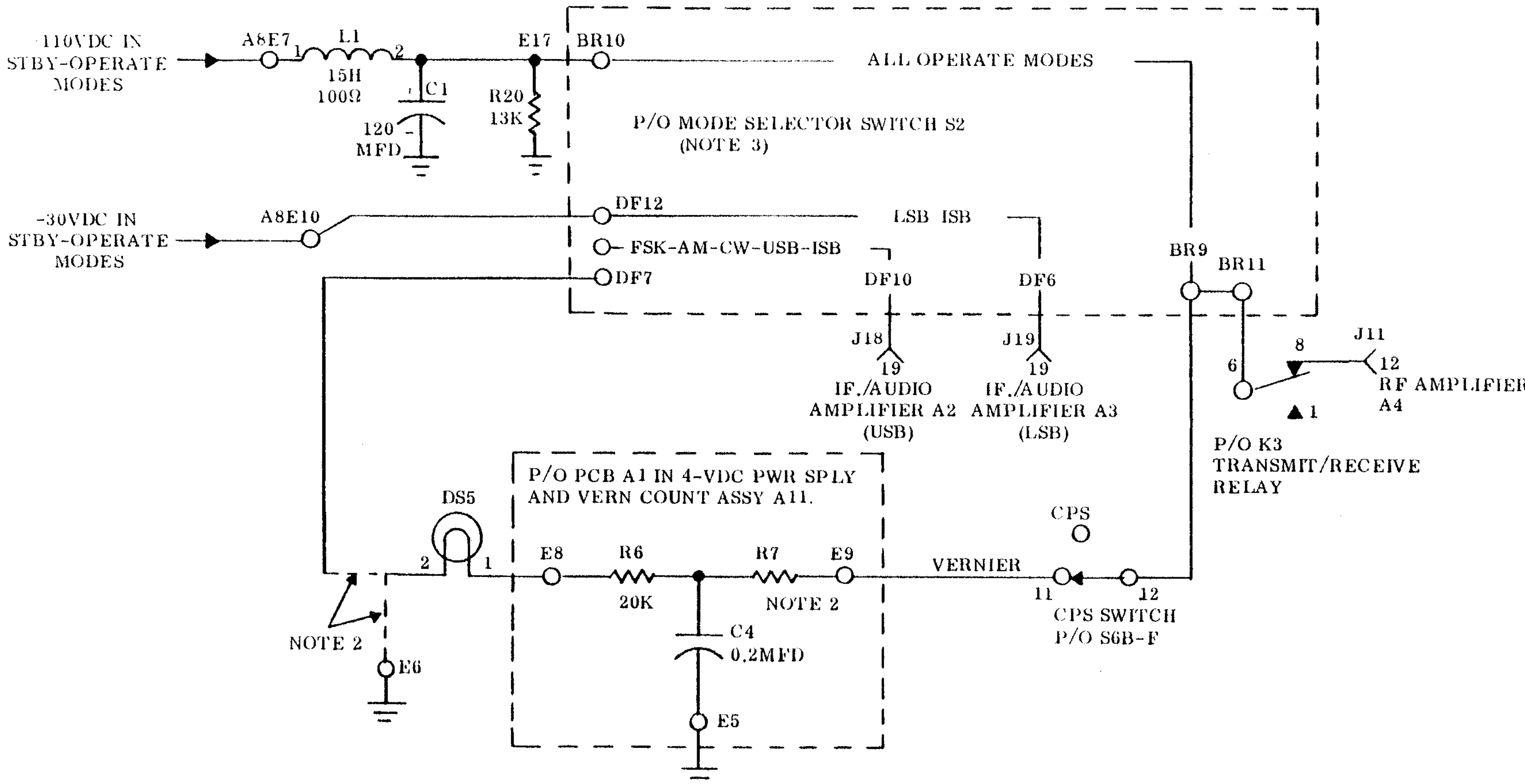


NOTES:

1. PREFIX ALL REF DES WITH A2.
2. EXAMPLE OF SWITCH S2 CONTACT IDENTIFICATION:

   AR4 IS SECTION A, REAR SIDE, CONTACT 4 OF S2.
   REFER TO FIGURE 4-6 FOR NUMBERING OF S2, SWITCH CONTACTS.
   REFER TO FIGURE 4-16 THROUGH 4-21 FOR INTERNAL SWITCHING, JUMPERS, AND TROUBLESHOOTING OF S2.

Figure 4-10. 20-VDC Distribution Diagram

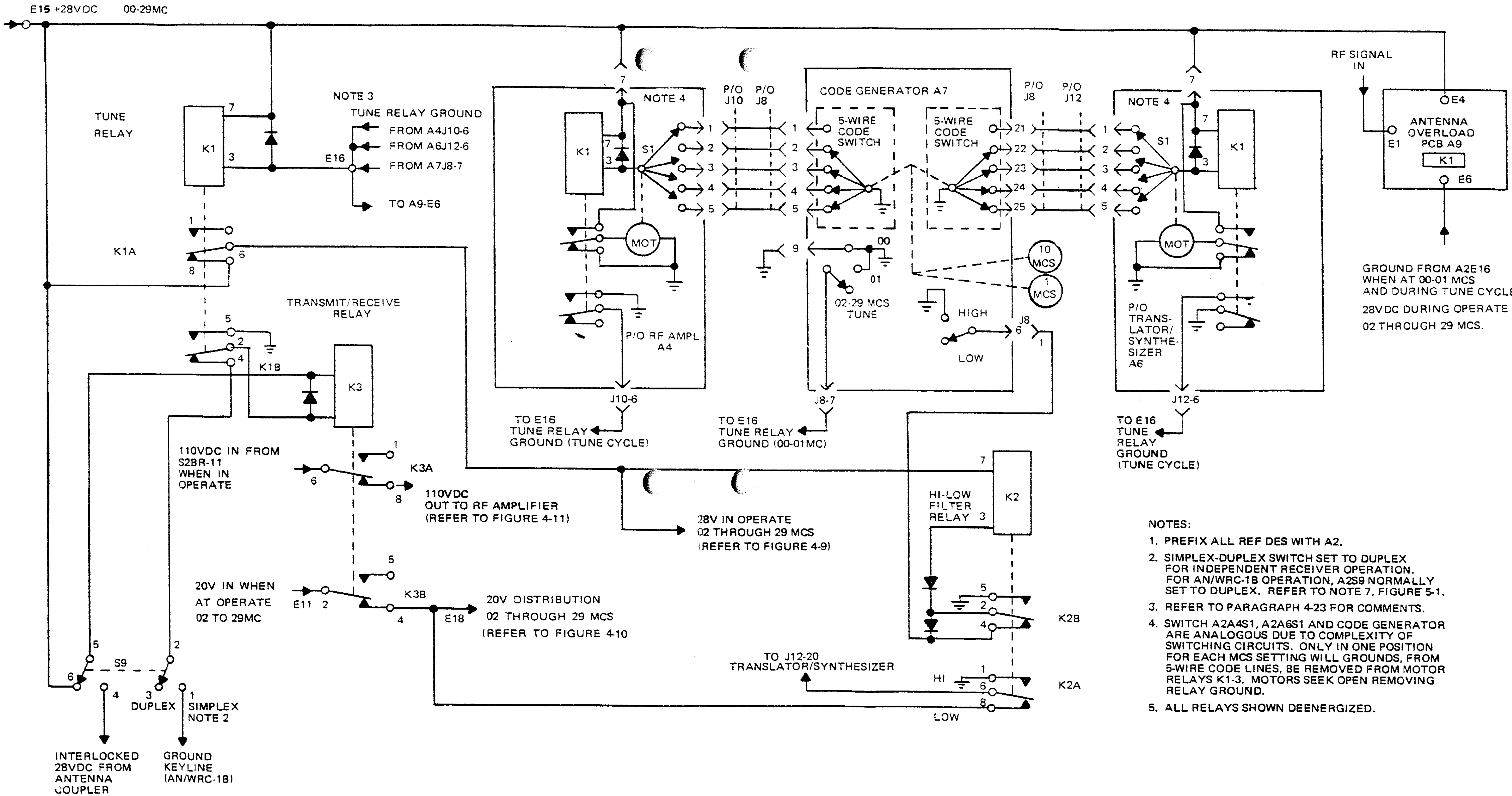


NOTES:

1. PREFIX ALL REF DES WITH A2.
2. RESISTOR A2A11A1R7 8.2 MEG Ω IN LATER EQUIPMENT. EARLY FACTORY PRODUCTION EQUIPMENTS USED 4.7 MEG Ω. EARLY EQUIPMENTS GROUNDED A2DS5-2. LATER EQUIPMENTS CONNECT A2DS5-2 TO -30V AT A2S2D-F7.
3. FOR TROUBLESHOOTING MODE SELECTOR SWITCH, REFER TO PARA 4-55.

046-022-024

Figure 4-11. 30- and 110-VDC Distribution Diagram

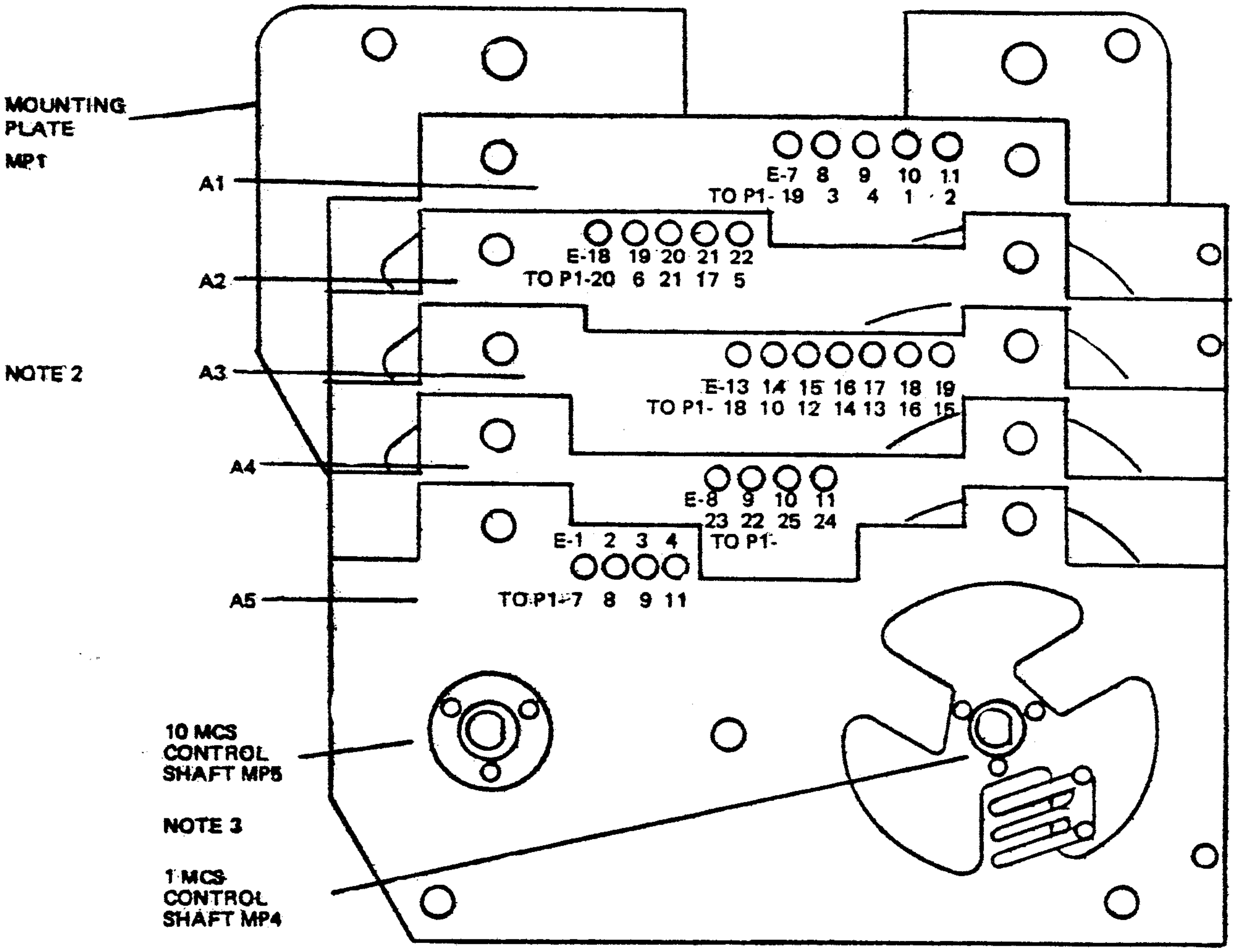


NOTES:

1. PREFIX ALL REF DES WITH A2.
2. SIMPLEX-DUPLEX SWITCH SET TO DUPLEX FOR INDEPENDENT RECEIVER OPERATION. FOR AN/WRC-1B OPERATION, A2S9 NORMALLY SET TO DUPLEX. REFER TO NOTE 7, FIGURE 5-1.
3. REFER TO PARAGRAPH 4-23 FOR COMMENTS.
4. SWITCH A2A4S1, A2A6S1 AND CODE GENERATOR ARE ANALOGOUS DUE TO COMPLEXITY OF SWITCHING CIRCUITS. ONLY IN ONE POSITION FOR EACH MCS SETTING WILL GROUNDS, FROM 5-WIRE CODE LINES, BE REMOVED FROM MOTOR RELAYS K1-3. MOTORS SEEK OPEN REMOVING RELAY GROUND.
5. ALL RELAYS SHOWN DEENERGIZED.

046-022-025

Figure 4-12. Relay Control Diagram

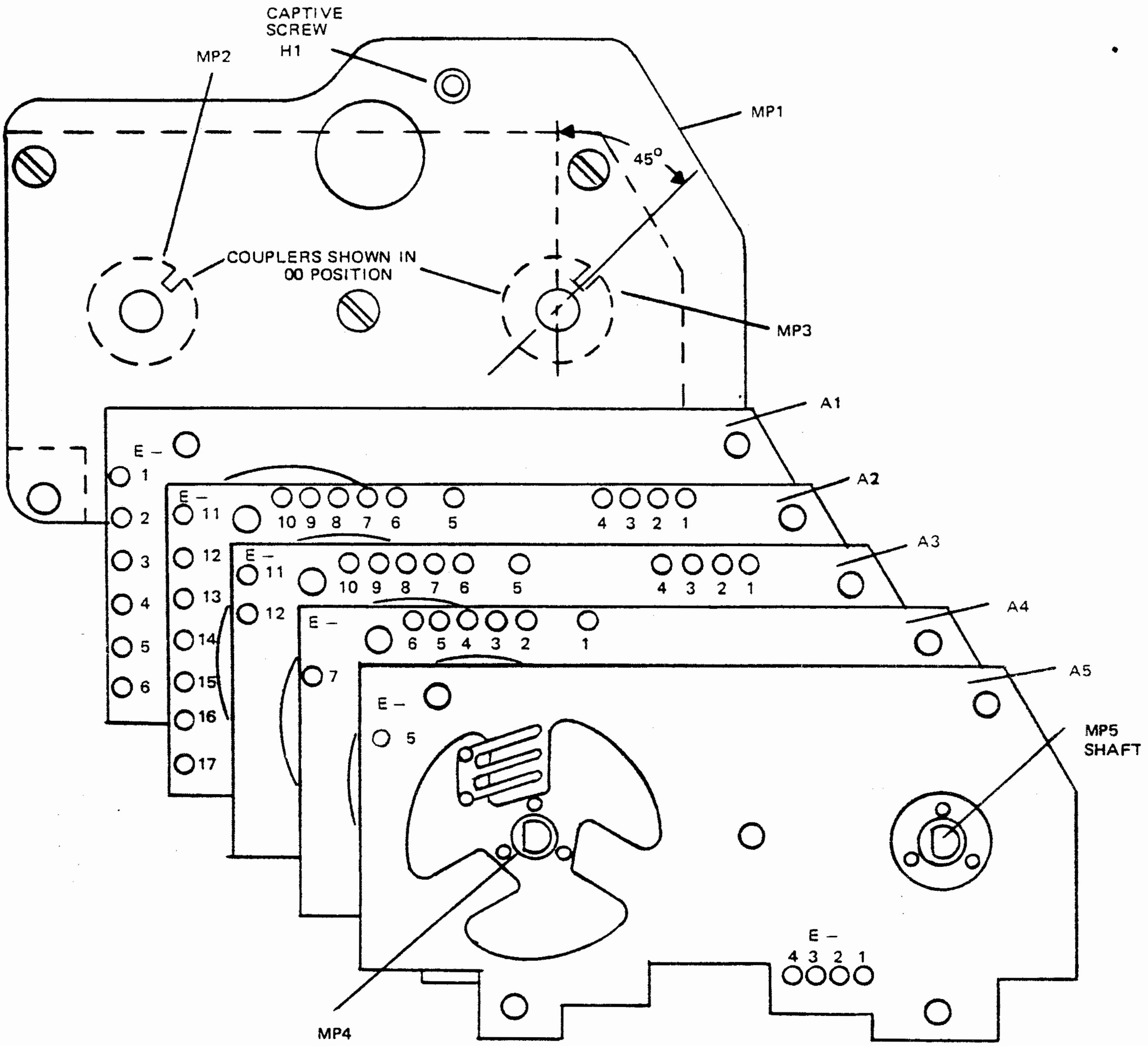


NOTES:

1. PREFIX ALL REF DES WITH A2A7
2. REFERENCE DIAGRAM IS FOR A FIVE-DECK PCB CODE GENERATOR, WHICH MAY BE USED IN RECEIVER OR EXCITER, HOWEVER, CENTER PCB (A3) IS NOT UTILIZED IN RECEIVER. IN MOST RECEIVERS, ONLY A1, A2, A4 AND A5 WILL BE PRESENT. REFER TO TABLE 4-5 FOR WIRING.
3. SHAFTS OF 1 MCS AND 10 MCS CONTROLS SHOWN IN ZERO POSITION. AS VIEWED, ROTATION IS CCW BY 30 DEGREE DETENTS. 10MCS CONTROL HAS THREE POSITIONS AND 1 MCS CONTROL HAS TEN POSITIONS BETWEEN END STOPS.

046-022-031

Figure 4-13. Code Generator Assembly A2A7, Test Point Location Diagram (Bottom-Rear View)

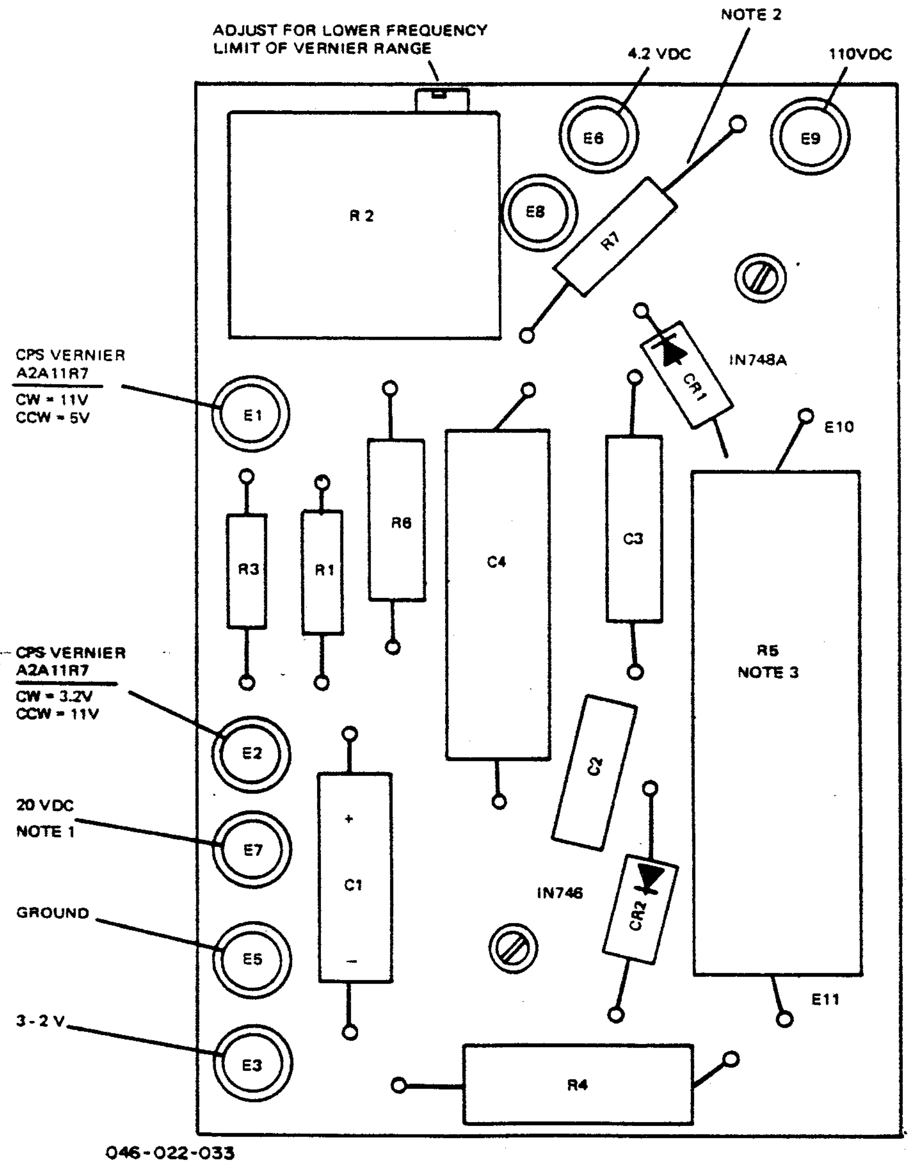


NOTES:

1. PREFIX ALL REF DES WITH A2A7
2. REFERENCE DIAGRAM IS FOR A FIVE-DECK PCB CODE GENERATOR, WHICH MAY BE USED IN RECEIVER OR EXCITER, HOWEVER, CENTER PCB (A3) IS NOT UTILIZED IN RECEIVER. IN MOST RECEIVERS, ONLY A1, A2, A4 AND A5 WILL BE PRESENT. REFER TO TABLE 4-5 FOR WIRING.
3. SHAFTS OF 1 MCS AND 10 MCS CONTROLS SHOWN IN ZERO POSITION. AS VIEWED, ROTATION IS CCW BY 30 DEGREE DETENTS. 10MCS CONTROL HAS THREE POSITIONS AND 1 MCS CONTROL HAS TEN POSITIONS BETWEEN END STOPS.

046-022-032

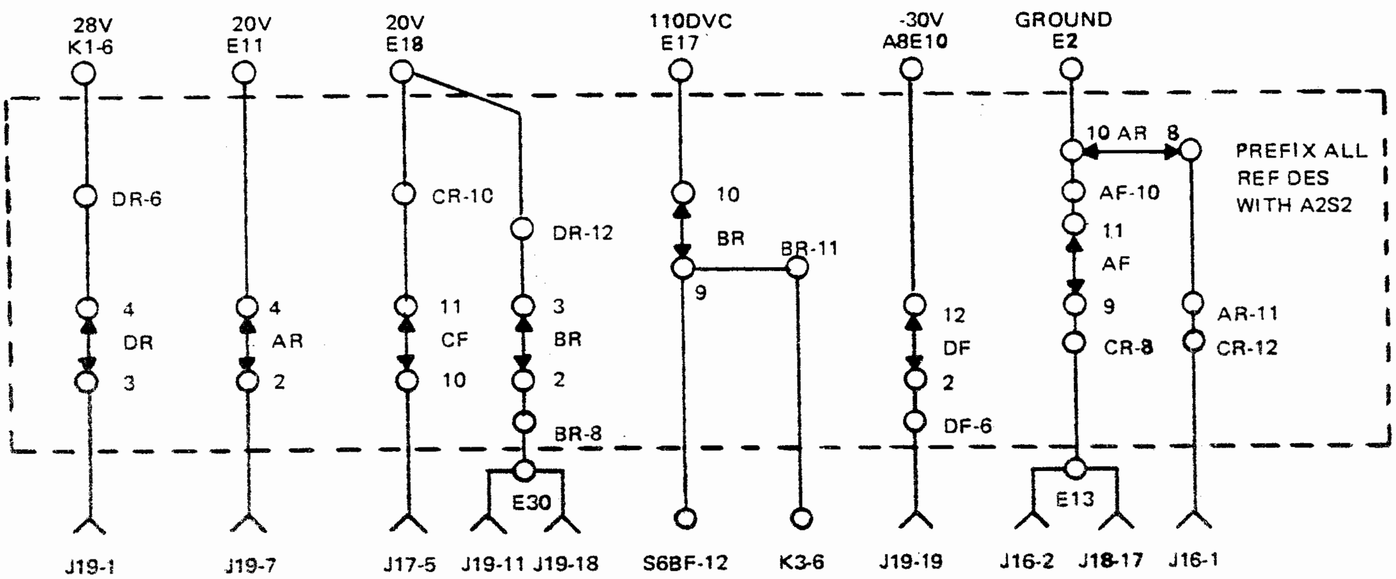
Figure 4-14. Code Generator Assembly A2A7, Test Point Location Diagram (Top-Rear View)



NOTES:

1. TRANSLATOR/SYNTHESIZER (A2A6) MUST BE INSTALLED TO SUPPLY 20VDC TO A2A11A1.
2. FOR FACTORY CHANGE TO R7, REFER TO FIGURE 4-11.
3. IN LATER MODELS, A2R23 (LOCATED ON VERTICAL SHIELD PLATE A2MP69) IS USED IN LIEU OF A2A11A1R5

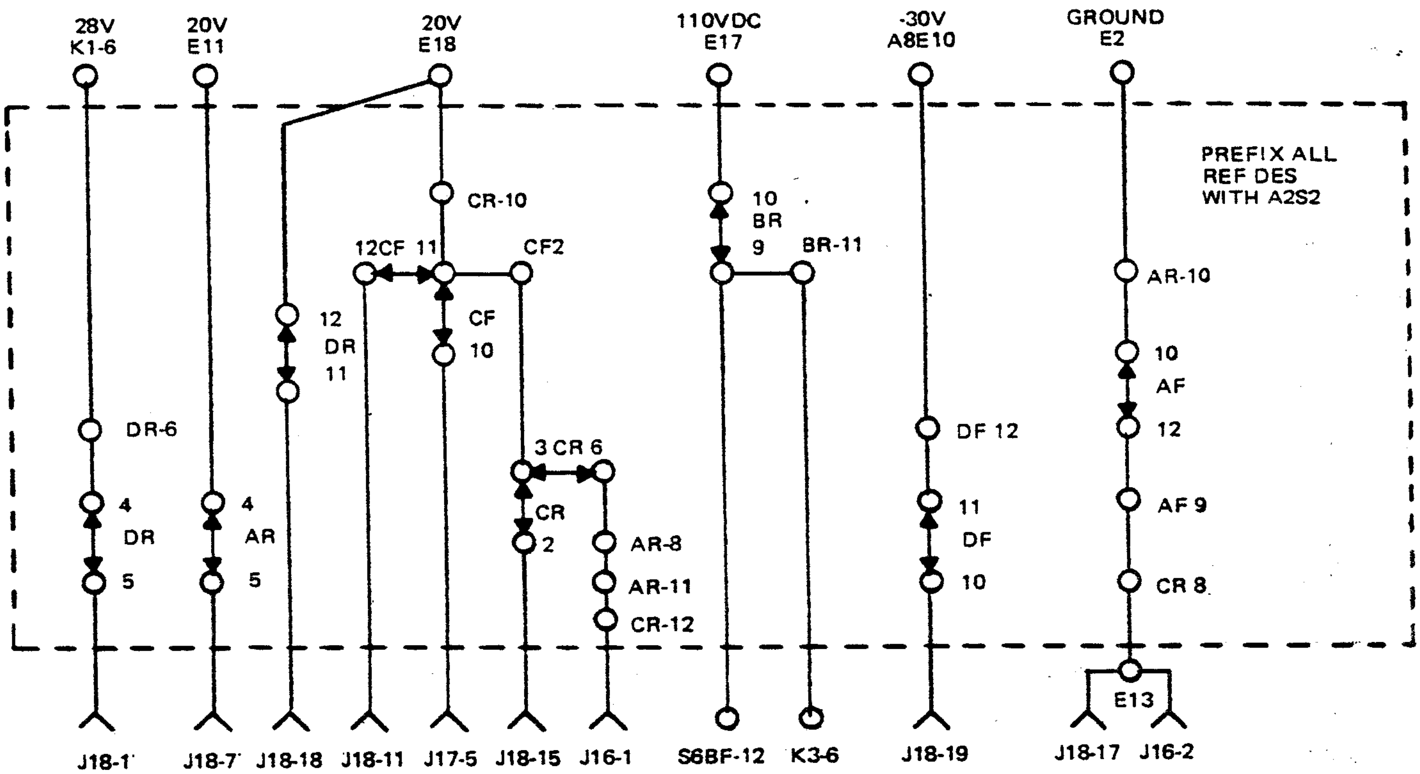
Figure 4-15. 4-VDC Power Supply PCB A2A11A1, Terminal Location Diagram



NOTE: IN TWO-LETTER IDENT, FIRST LETTER IS SW SECT., SECOND LETTER IS FRONT (F) OR REAR (R).

046-022-095

Figure 4-16. LSB Position of Mode Selector Switch A2S2



NOTE: IN TWO-LETTER IDENT, FIRST LETTER IS SW SECT., SECOND LETTER IS FRONT (F) OR REAR (R).

046-022-096

Figure 4-17. FSK Position of Mode Selector Switch A2S2

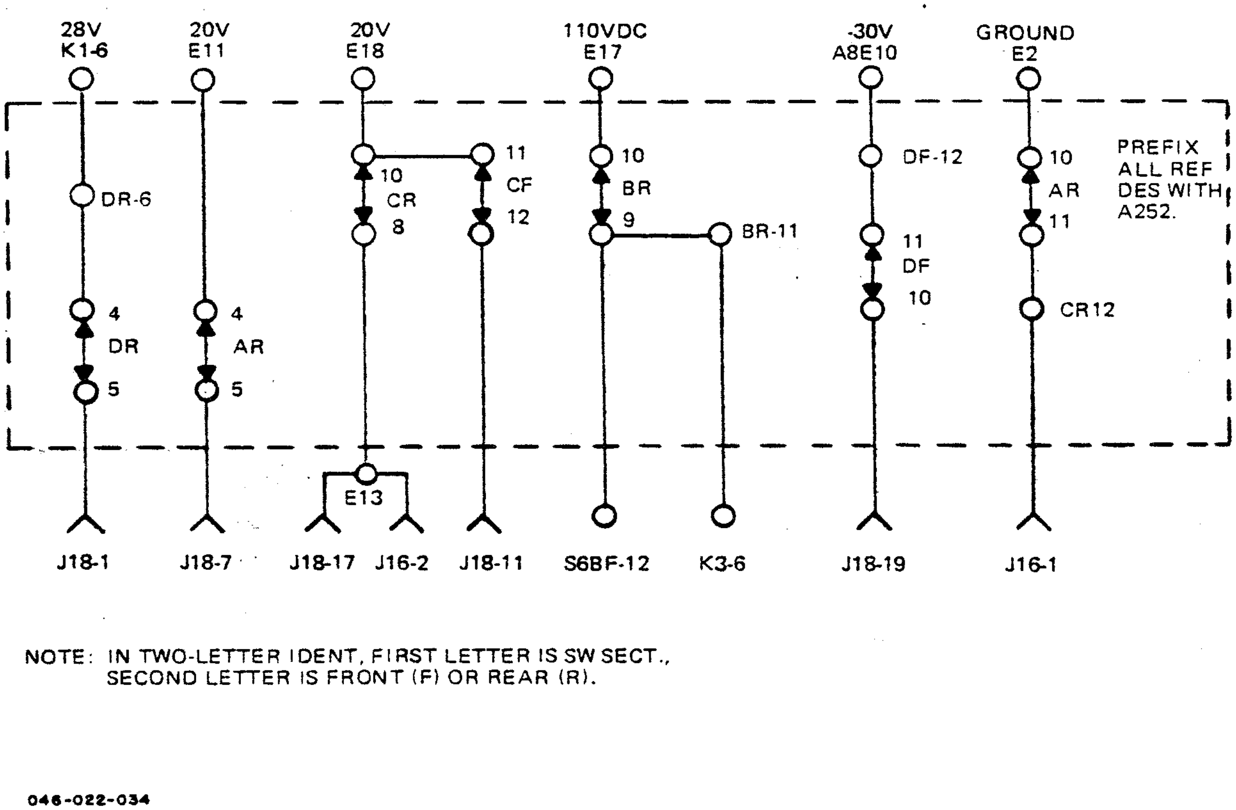


Figure 4-18. AM Position of Mode Selector Switch A2S2

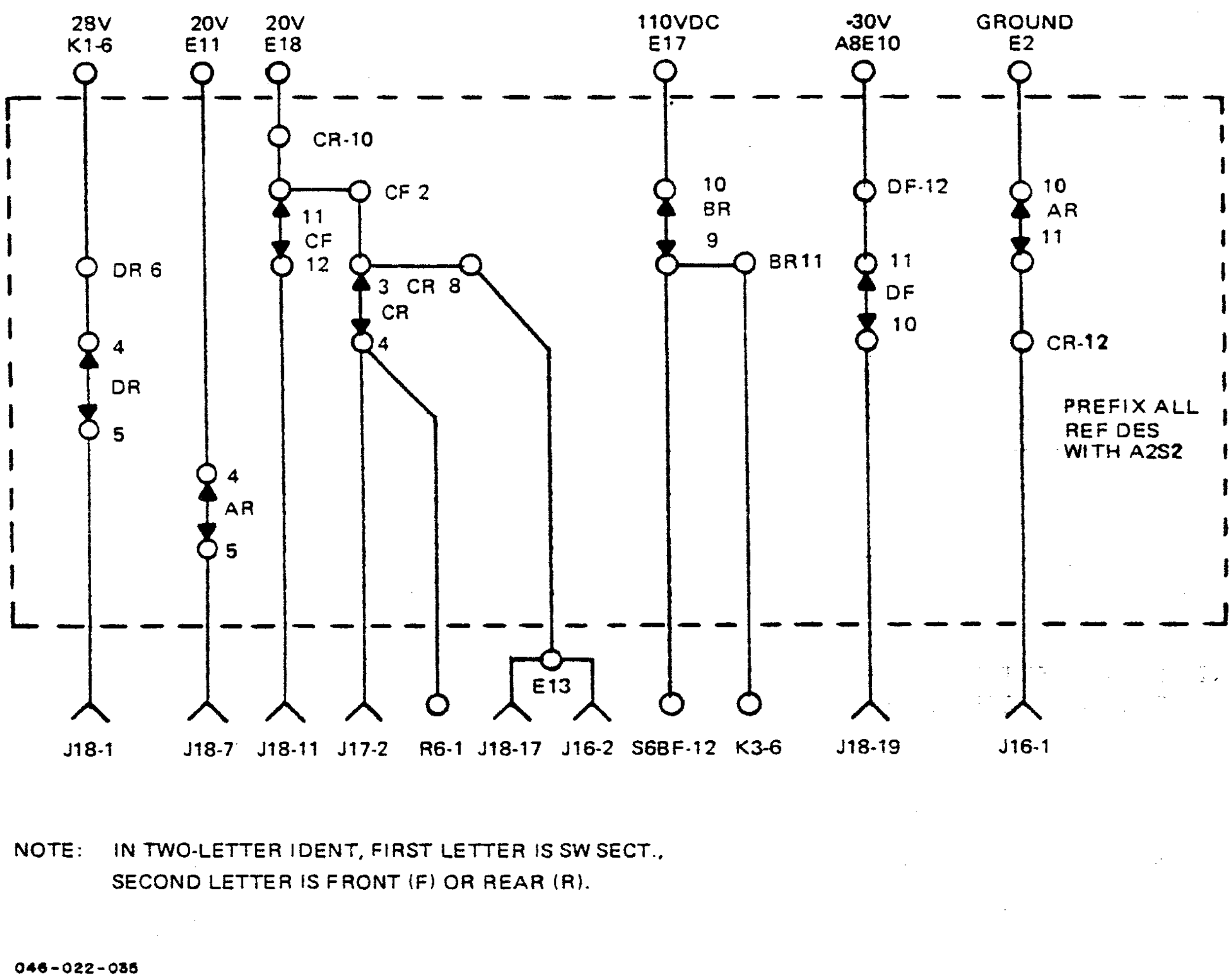
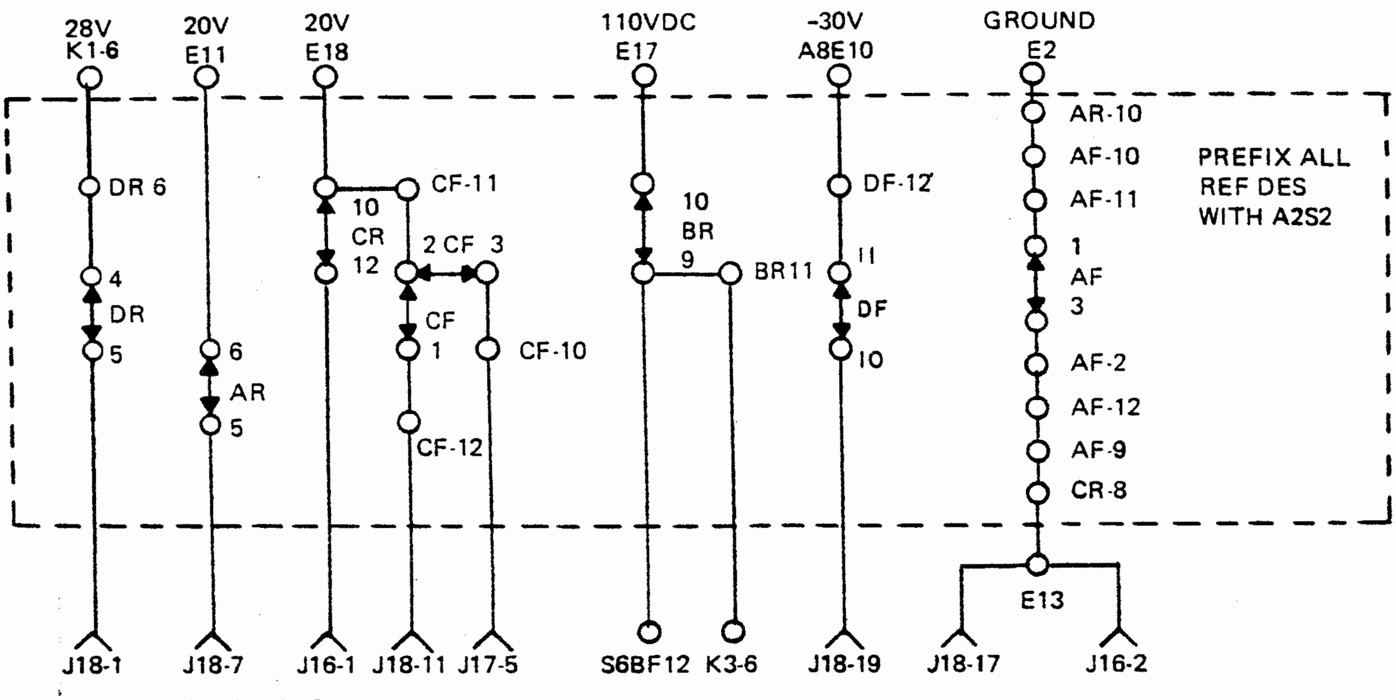


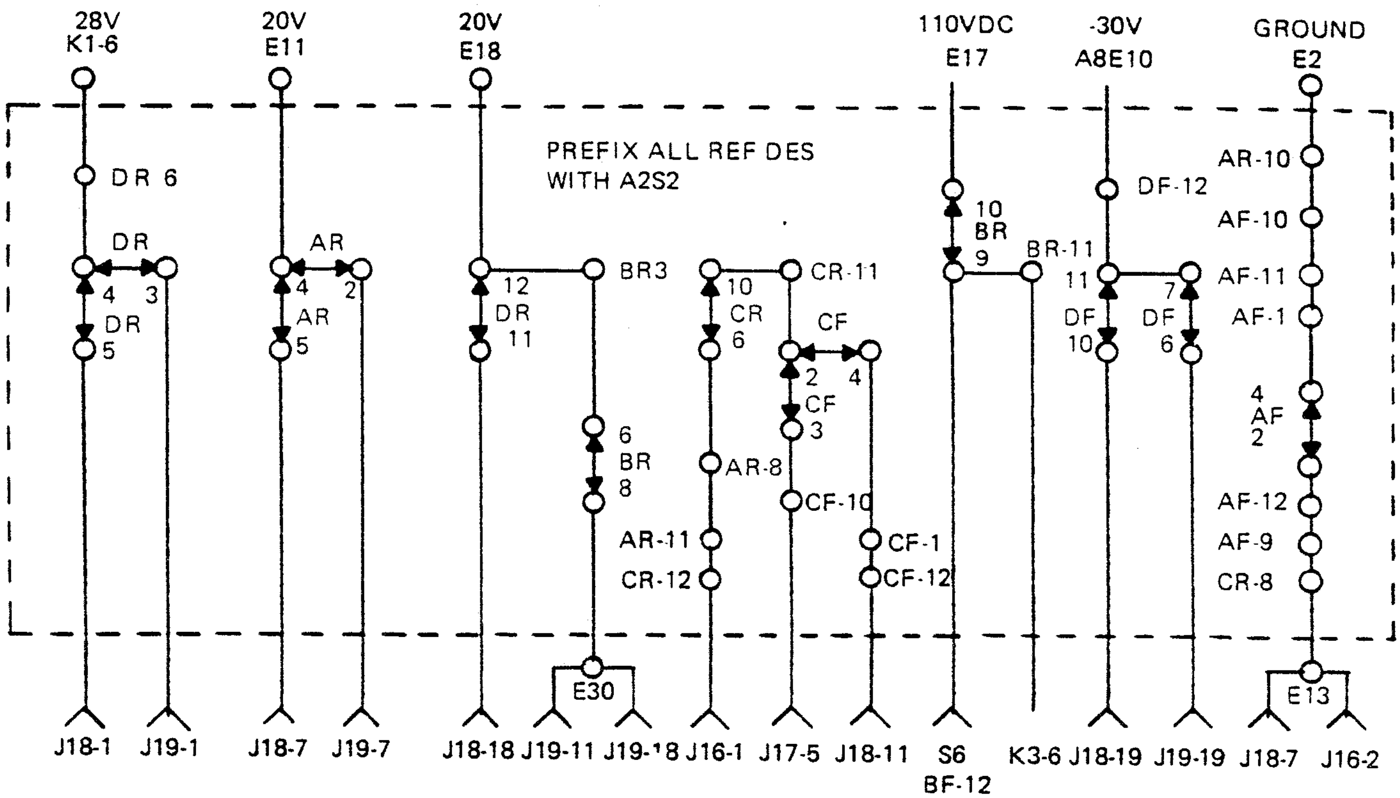
Figure 4-19. CW Position of Mode Selector Switch A2S2



NOTE: IN TWO-LETTER IDENT, FIRST LETTER IS SW SECT.,
SECOND LETTER IS FRONT (F) OR REAR (R).

046-022-036

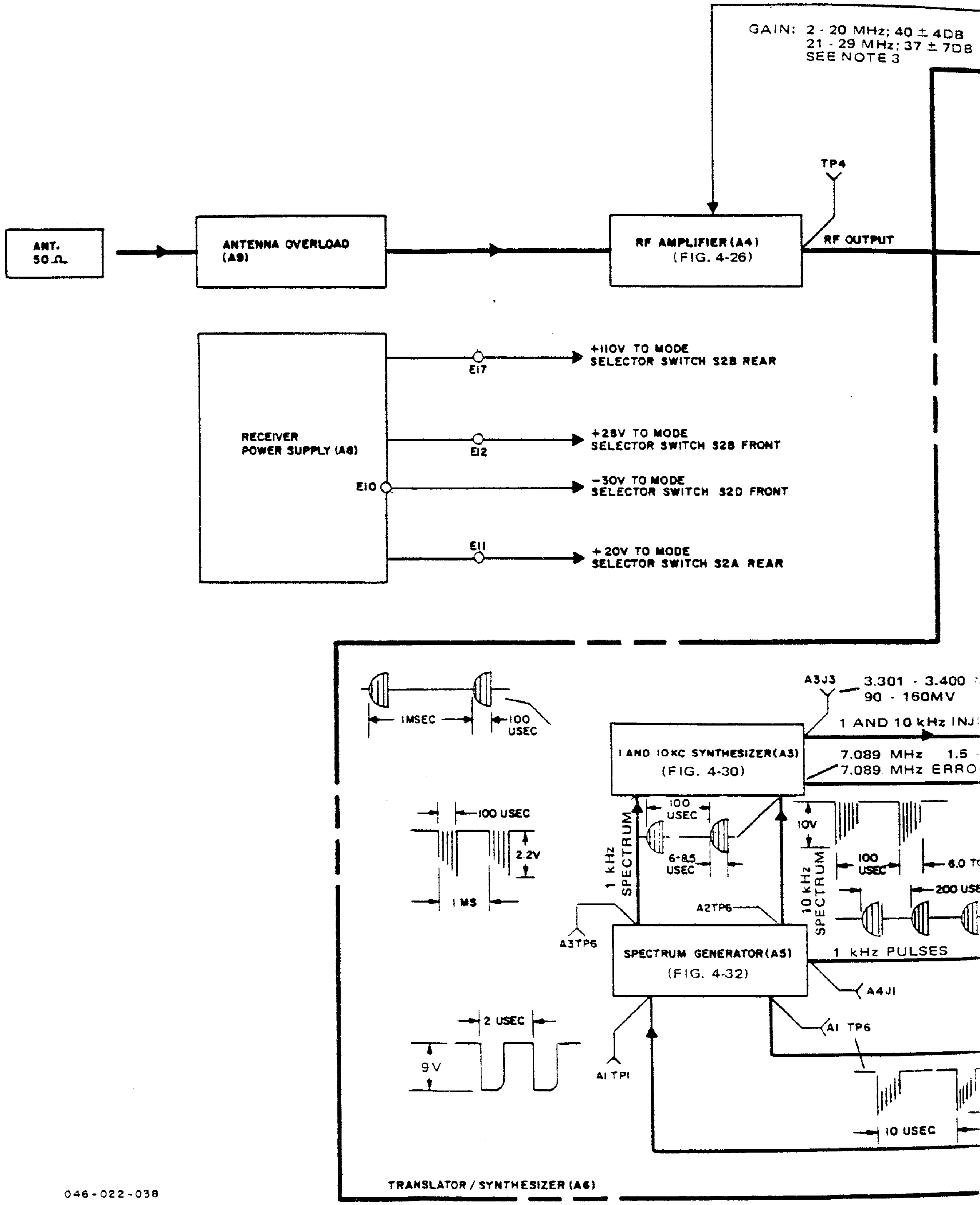
Figure 4-20. USB Position of Mode Selector Switch A2S2



NOTE: IN TWO-LETTER IDENT., FIRST LETTER IS SW SECT., SECOND LETTER IS FRONT (F) OR REAR (R).

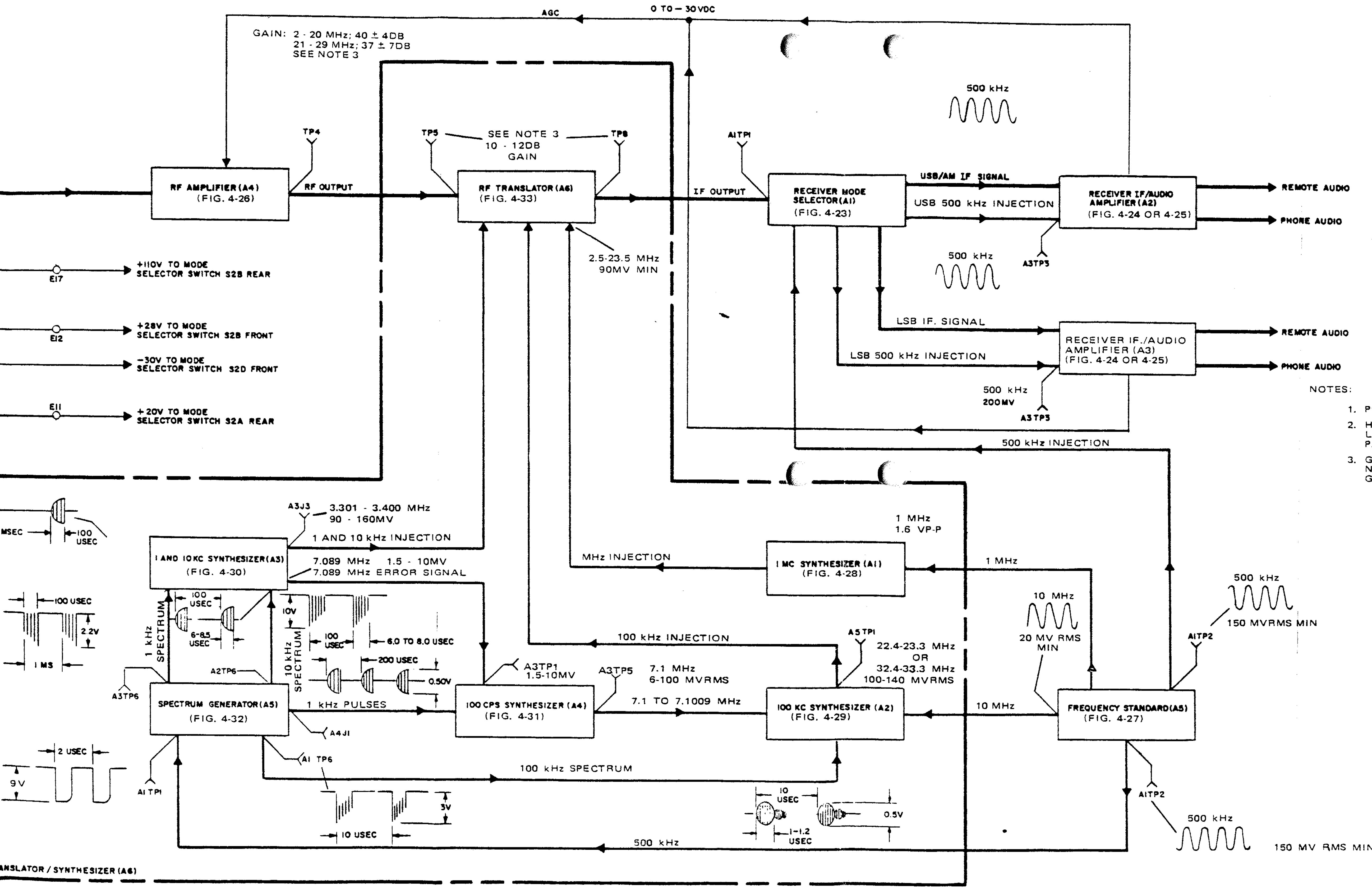
046-022-037

Figure 4-21. ISB Position of Mode Selector Switch A2S2



GAIN: 2 - 20 MHz; 40 ± 4DB
21 - 29 MHz; 37 ± 7DB
SEE NOTE 3
TP4
ANT.
50 Ω
ANTENNA OVERLOAD (A9)
RF AMPLIFIER (A4)
(FIG. 4-26)
RF OUTPUT
RECEIVER
POWER SUPPLY (A8)
E17
+110V TO MODE SELECTOR SWITCH S2B REAR
E12
+28V TO MODE SELECTOR SWITCH S2B FRONT
E10
−30V TO MODE SELECTOR SWITCH S2D FRONT
E11
+20V TO MODE SELECTOR SWITCH S2A REAR
IMSEC
100 USEC
A3J3
3.301 - 3.400
90 - 160MV
1 AND 10 kHz INJ
1 AND 10KC SYNTHESIZER (A3)
(FIG. 4-30)
7.089 MHz 1.5
7.089 MHz ERRO
100 USEC
2.2V
1 MS
1 kHz SPECTRUM
100 USEC
6-8.5 USEC
10V
10 kHz SPECTRUM
100 USEC
6.0 TO
200 USE
A2TP6
A3TP6
SPECTRUM GENERATOR (A5)
(FIG. 4-32)
1 kHz PULSES
A4J1
A1 TP6
2 USEC
9V
A1 TP1
10 USEC
TRANSLATOR / SYNTHESIZER (A6)

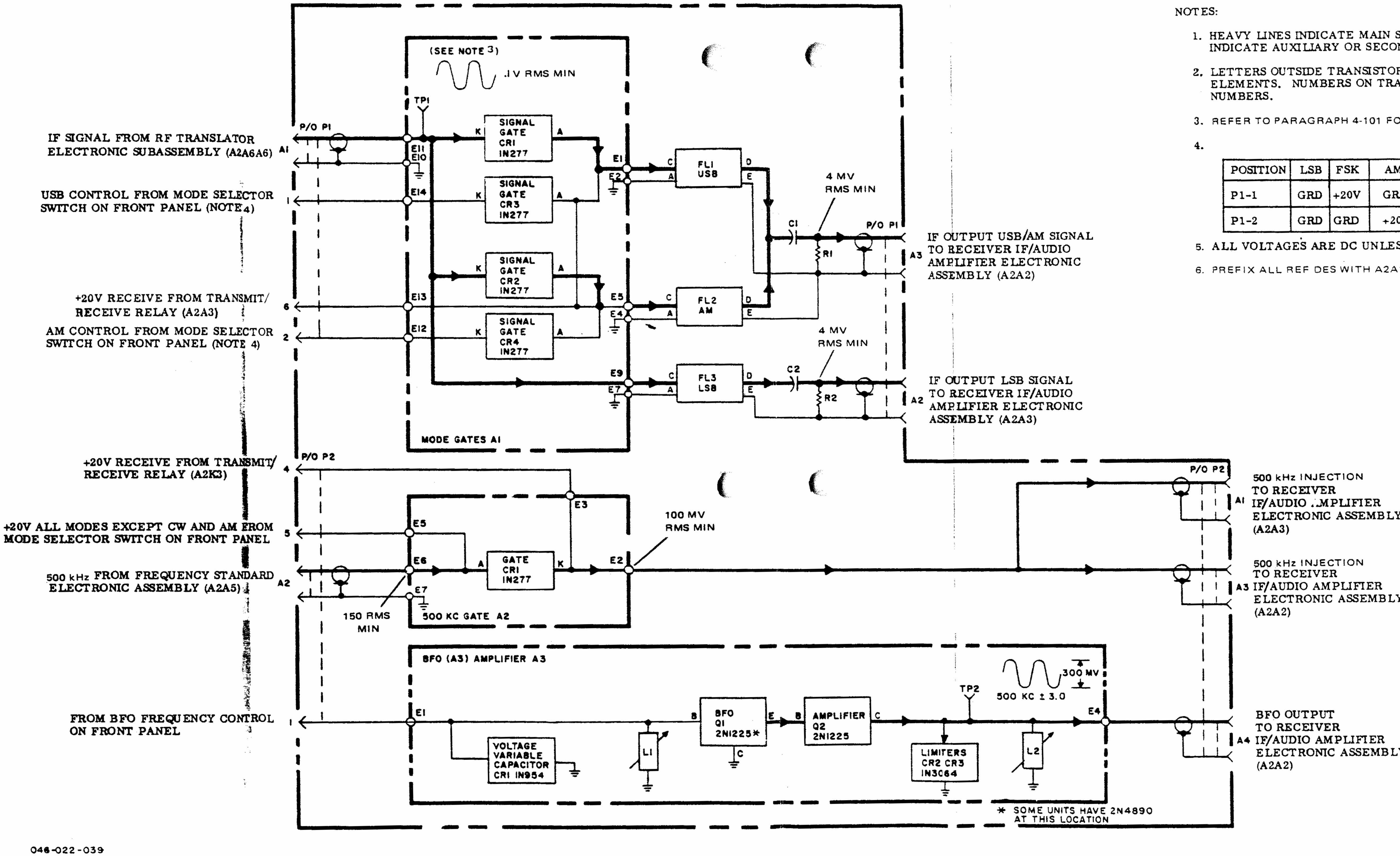
046-022-038



NOTES:

1. PREFIX ALL REF DES WITH A2.
2. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
3. GAIN MEASURED EASIER WITH AGC VOLTAGE DISCONNECTED (REMOVE RECEIVER MODE SELECTOR (A1)). GAIN EXPRESSED AS DB ABOVE PREVIOUS STAGE.

Figure 4-22. Radio Receiver R-1051B/URR, Overall Servicing Diagram



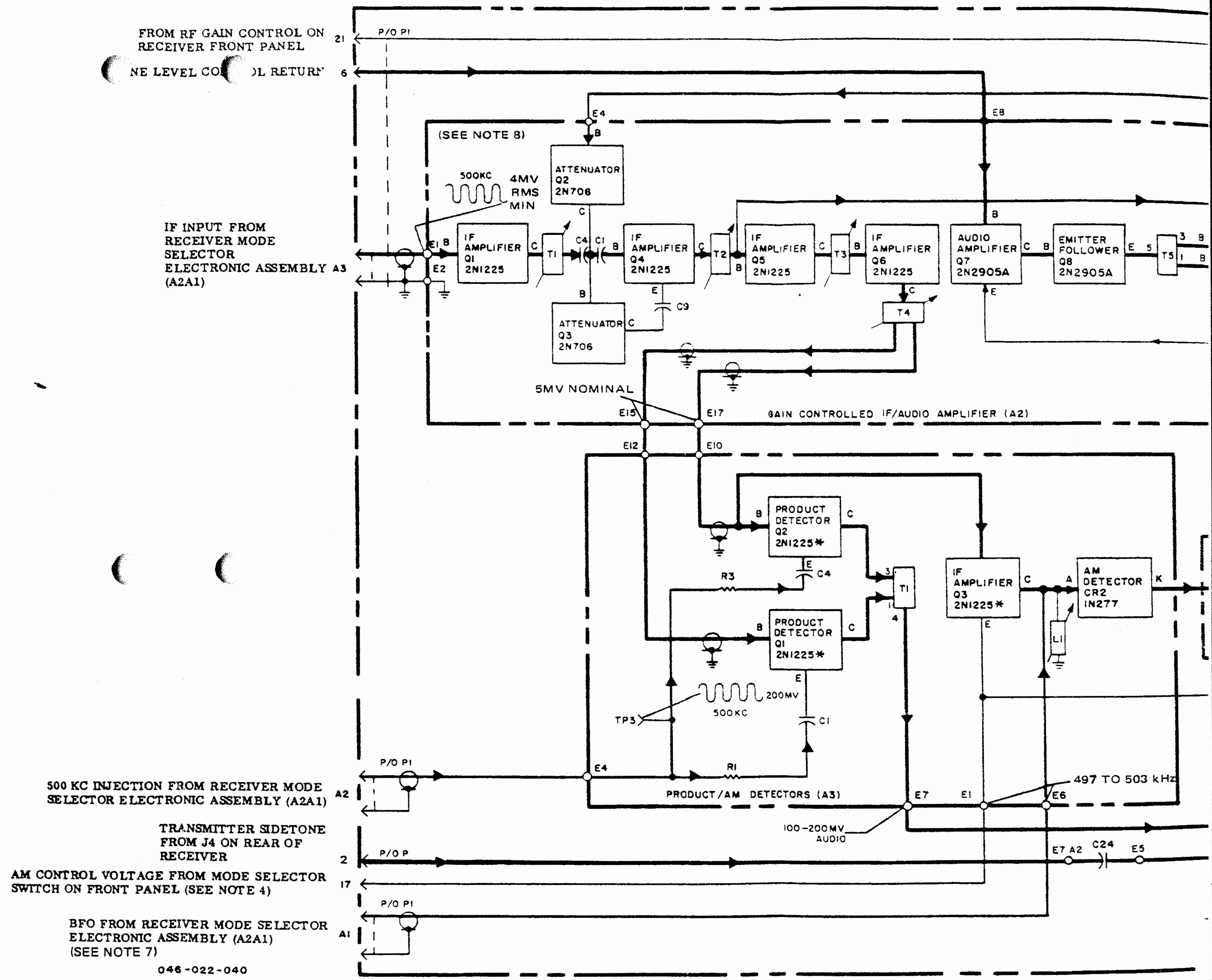
NOTES:

1. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
2. LETTERS OUTSIDE TRANSISTOR AND DIODE BLOCKS INDICATE ELEMENTS. NUMBERS ON TRANSFORMERS INDICATE TERMINAL NUMBERS.
3. REFER TO PARAGRAPH 4-101 FOR SIGNAL LEVELS.
4.

POSITION	LSB	FSK	AM	CW	USB	ISB
P1-1	GRD	+20V	GRD	GRD	+20V	+20V
P1-2	GRD	GRD	+20V	+20V	GRD	GRD

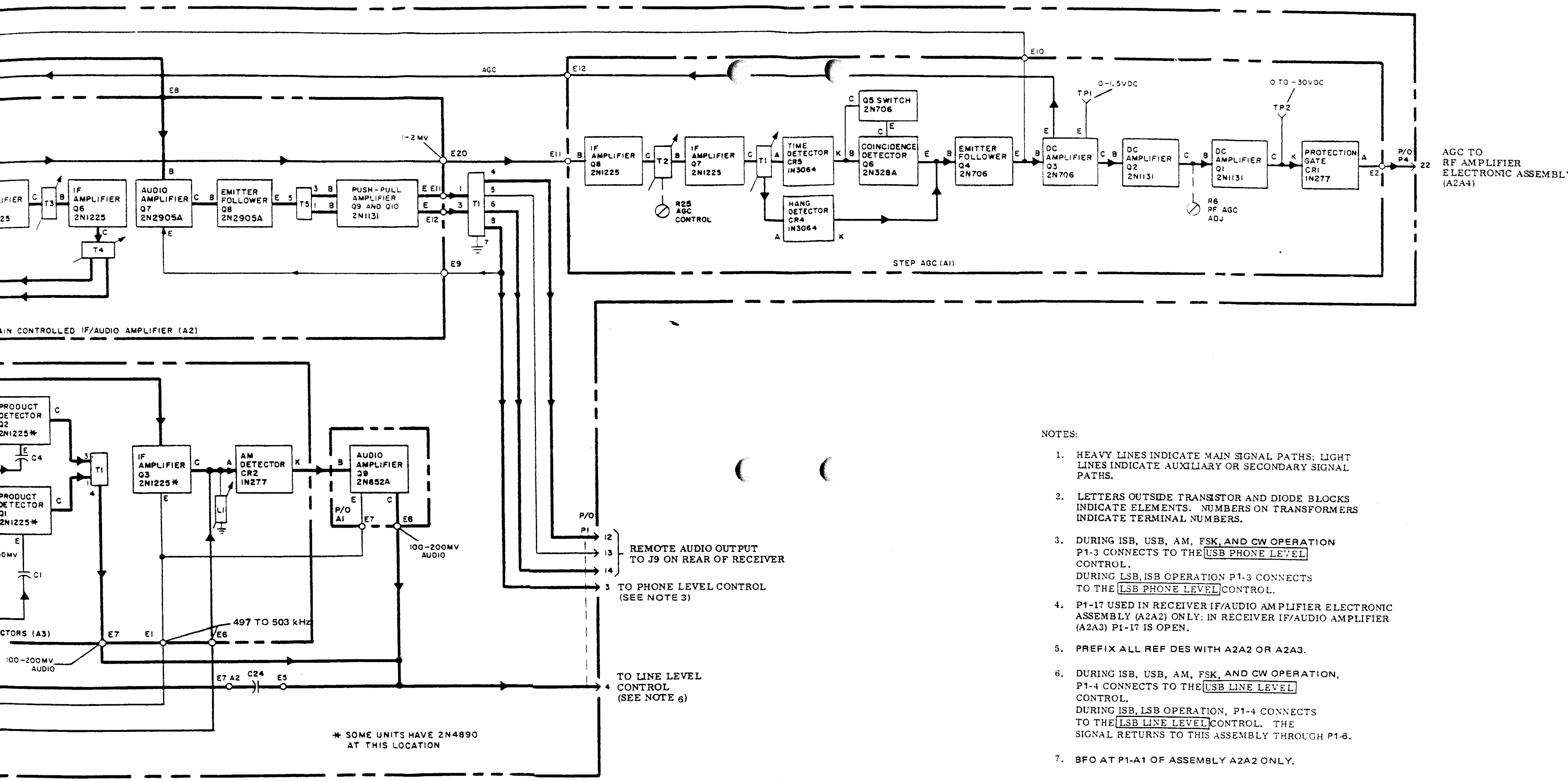
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
6. PREFIX ALL REF DES WITH A2A1.

Figure 4-23. Receiver Mode Selector Assembly A2A1, Servicing Block Diagram



FROM RF GAIN CONTROL ON RECEIVER FRONT PANEL
NE LEVEL CO OL RETURN
IF INPUT FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1)
500 KC INJECTION FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1)
TRANSMITTER SIDETONE FROM J4 ON REAR OF RECEIVER
AM CONTROL VOLTAGE FROM MODE SELECTOR SWITCH ON FRONT PANEL (SEE NOTE 4)
BFO FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1) (SEE NOTE 7)
(SEE NOTE 8)
500KC
4MV RMS MIN
ATTENUATOR Q2 2N706
ATTENUATOR Q3 2N706
IF AMPLIFIER Q1 2N1225
IF AMPLIFIER Q4 2N1225
IF AMPLIFIER Q5 2N1225
IF AMPLIFIER Q6 2N1225
AUDIO AMPLIFIER Q7 2N2905A
EMITTER FOLLOWER Q8 2N2905A
5MV NOMINAL
GAIN CONTROLLED IF/AUDIO AMPLIFIER (A2)
PRODUCT DETECTOR Q2 2N1225*
PRODUCT DETECTOR Q1 2N1225*
IF AMPLIFIER Q3 2N1225*
AM DETECTOR CR2 IN277
200MV
500KC
TP3
PRODUCT/AM DETECTORS (A3)
100-200MV AUDIO
497 TO 503 kHz

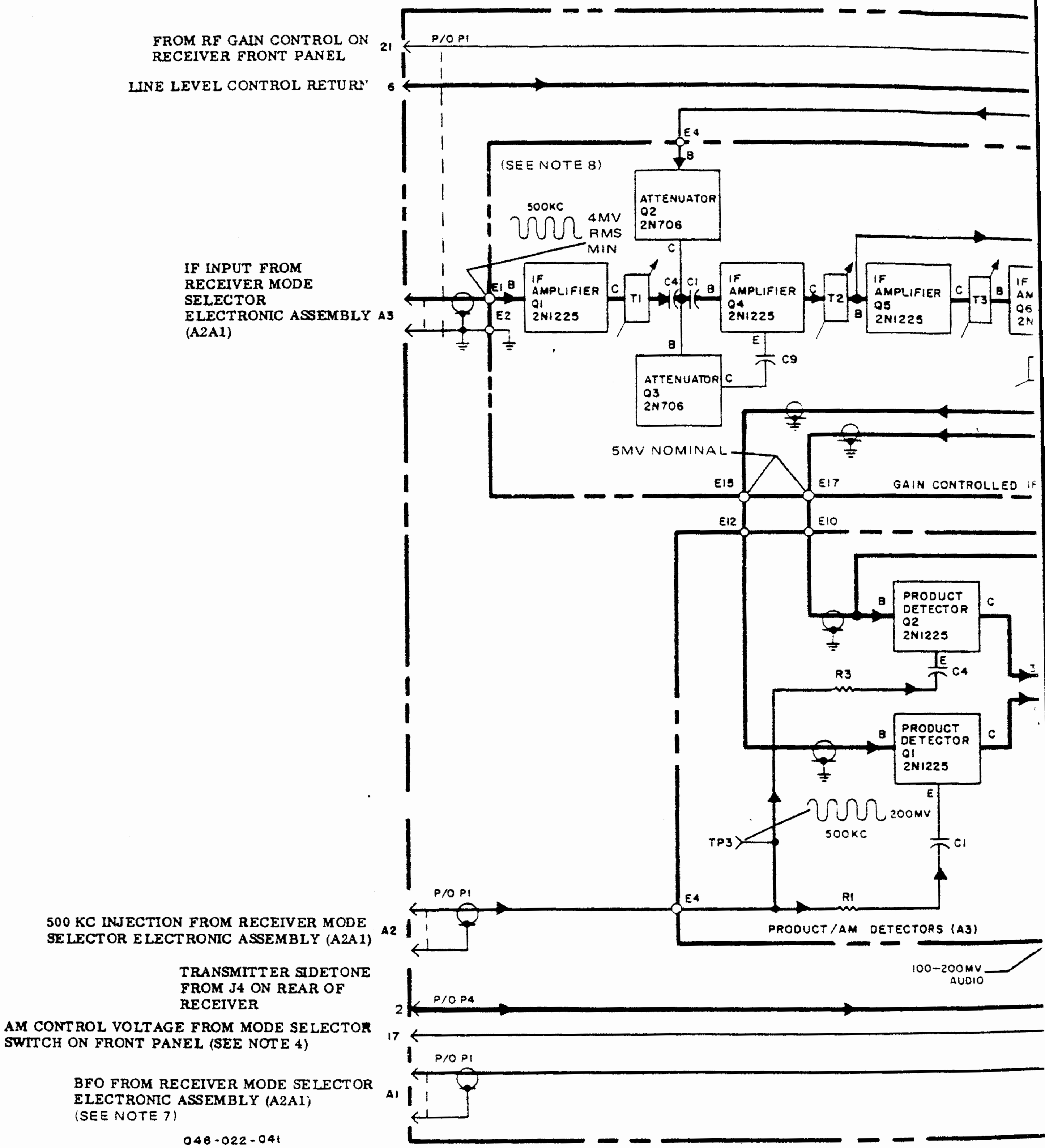
046-022-040



NOTES:

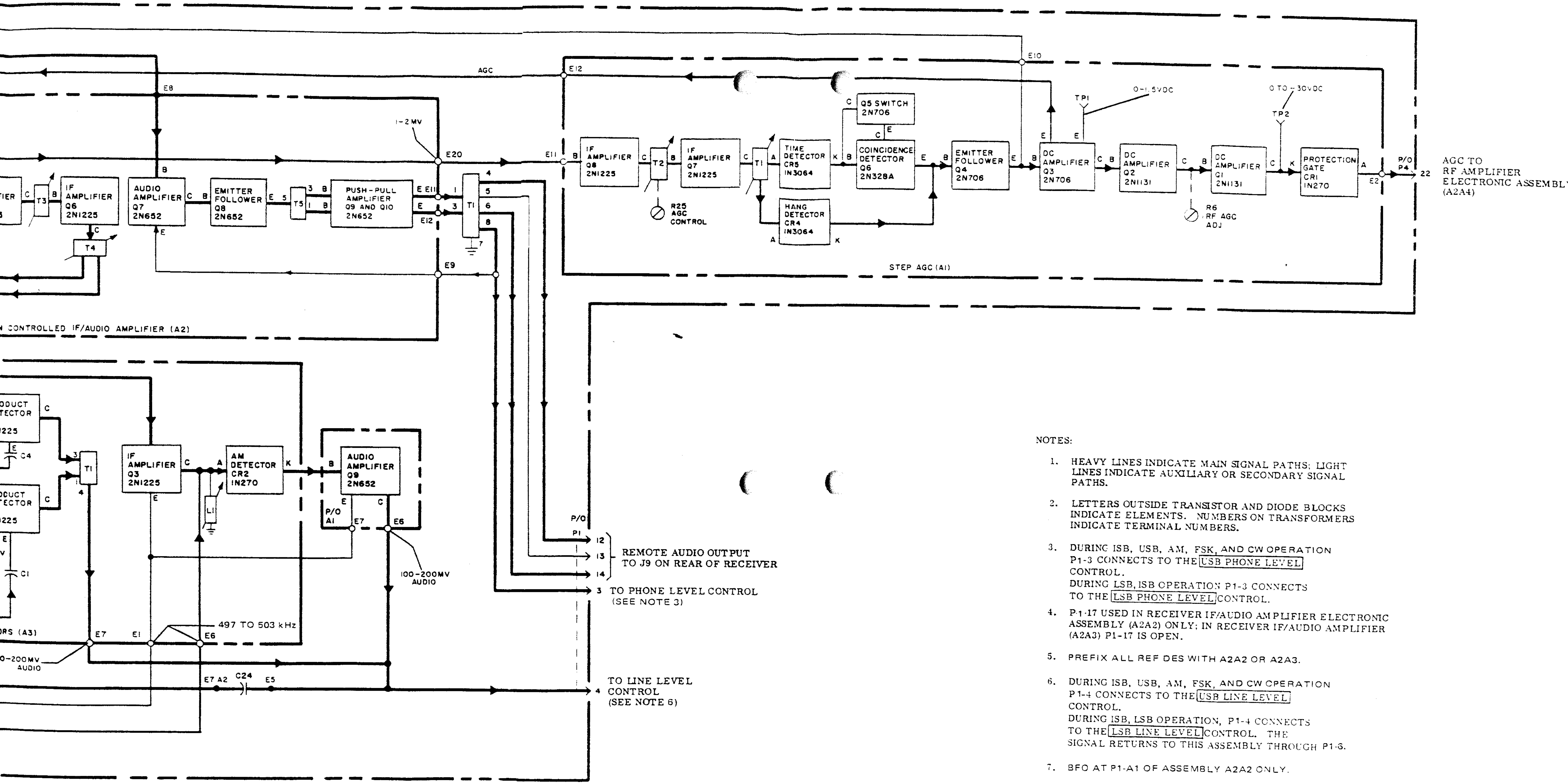
1. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
2. LETTERS OUTSIDE TRANSISTOR AND DIODE BLOCKS INDICATE ELEMENTS. NUMBERS ON TRANSFORMERS INDICATE TERMINAL NUMBERS.
3. DURING ISB, USB, AM, FSK, AND CW OPERATION P1-3 CONNECTS TO THE USB PHONE LEVEL CONTROL.
   DURING LSB, ISB OPERATION P1-3 CONNECTS TO THE LSB PHONE LEVEL CONTROL.
4. P1-17 USED IN RECEIVER IF/AUDIO AMPLIFIER ELECTRONIC ASSEMBLY (A2A2) ONLY; IN RECEIVER IF/AUDIO AMPLIFIER (A2A3) P1-17 IS OPEN.
5. PREFIX ALL REF DES WITH A2A2 OR A2A3.
6. DURING ISB, USB, AM, FSK, AND CW OPERATION, P1-4 CONNECTS TO THE USB LINE LEVEL CONTROL.
   DURING ISB, LSB OPERATION, P1-4 CONNECTS TO THE LSB LINE LEVEL CONTROL. THE SIGNAL RETURNS TO THIS ASSEMBLY THROUGH P1-6.
7. BFO AT P1-A1 OF ASSEMBLY A2A2 ONLY.
8. REFER TO PARAGRAPH 4-117 FOR SIGNAL LEVELS.

Figure 4-24. Receiver IF./Audio Amplifier Assemblies A2A2 and A2A3, Servicing Block Diagram (Late Model Version)



FROM RF GAIN CONTROL ON RECEIVER FRONT PANEL
21
P/O P1
LINE LEVEL CONTROL RETURN
6
E4
B
(SEE NOTE 8)
ATTENUATOR Q2 2N706
500KC
4MV RMS MIN
C
IF INPUT FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1)
A3
E1
E2
IF AMPLIFIER Q1 2N1225
T1
C4
C1
IF AMPLIFIER Q4 2N1225
T2
IF AMPLIFIER Q5 2N1225
T3
E
C9
ATTENUATOR Q3 2N706
5MV NOMINAL
E15
E17
GAIN CONTROLLED IF
E12
E10
PRODUCT DETECTOR Q2 2N1225
R3
PRODUCT DETECTOR Q1 2N1225
200MV
500KC
TP3
P/O P1
E4
R1
500 KC INJECTION FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1)
A2
PRODUCT/AM DETECTORS (A3)
TRANSMITTER SIDETONE FROM J4 ON REAR OF RECEIVER
100-200MV AUDIO
2
P/O P4
AM CONTROL VOLTAGE FROM MODE SELECTOR SWITCH ON FRONT PANEL (SEE NOTE 4)
17
P/O P1
BFO FROM RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY (A2A1) (SEE NOTE 7)
A1

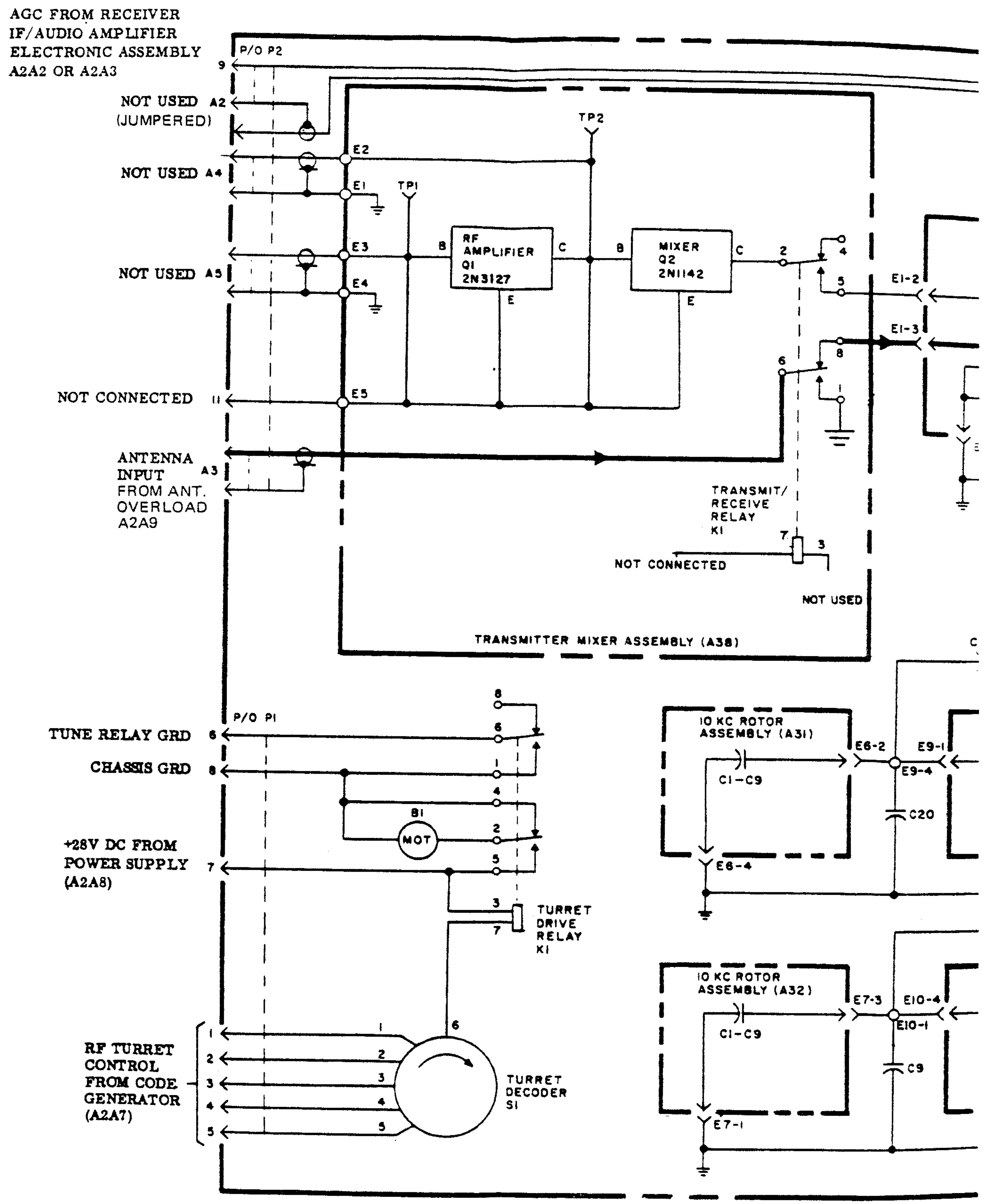
046-022-041



NOTES:

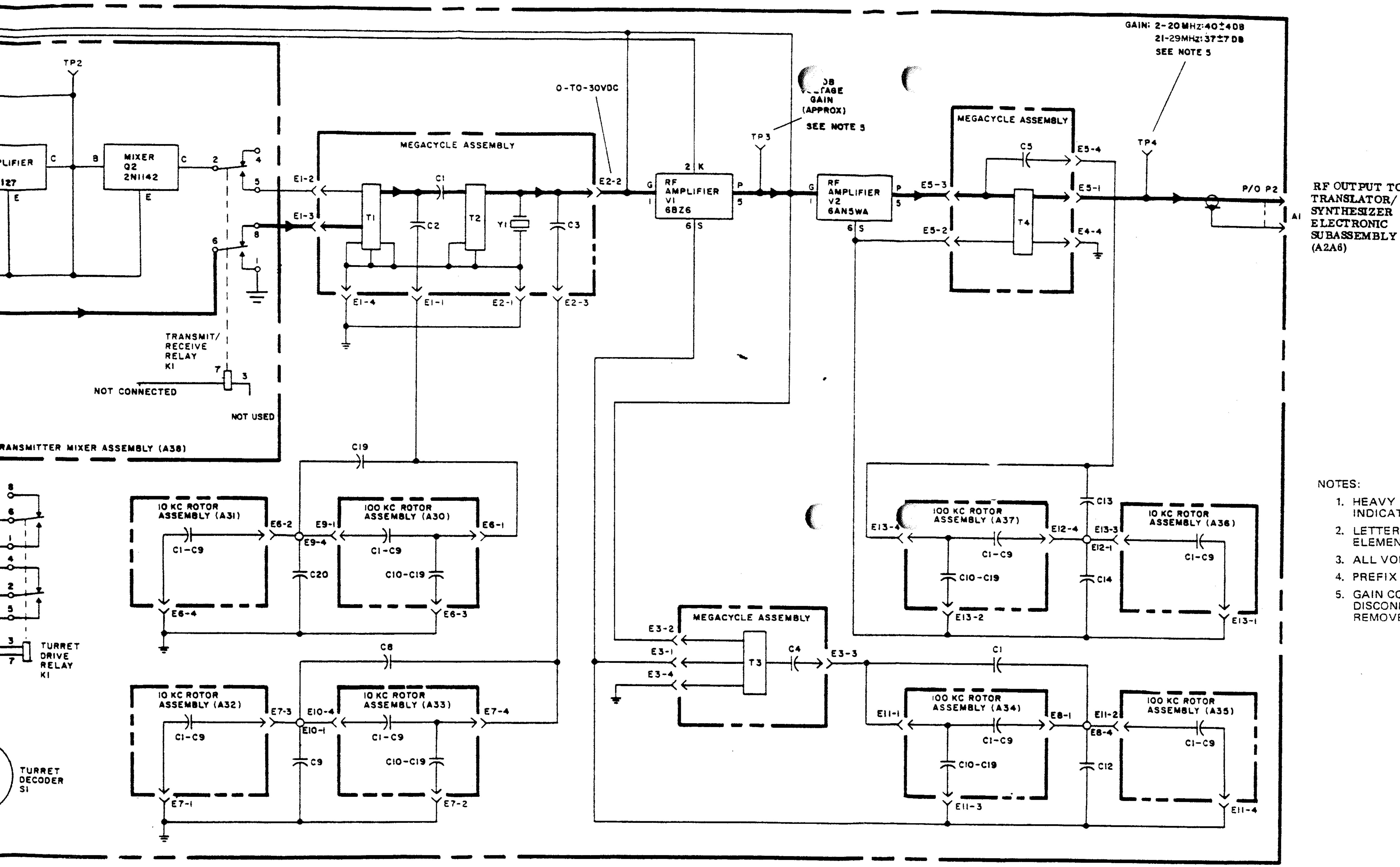
1. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
2. LETTERS OUTSIDE TRANSISTOR AND DIODE BLOCKS INDICATE ELEMENTS. NUMBERS ON TRANSFORMERS INDICATE TERMINAL NUMBERS.
3. DURING ISB, USB, AM, FSK, AND CW OPERATION P1-3 CONNECTS TO THE USB PHONE LEVEL CONTROL. DURING LSB, ISB OPERATION P1-3 CONNECTS TO THE LSB PHONE LEVEL CONTROL.
4. P1-17 USED IN RECEIVER IF/AUDIO AMPLIFIER ELECTRONIC ASSEMBLY (A2A2) ONLY; IN RECEIVER IF/AUDIO AMPLIFIER (A2A3) P1-17 IS OPEN.
5. PREFIX ALL REF DES WITH A2A2 OR A2A3.
6. DURING ISB, USB, AM, FSK, AND CW OPERATION P1-4 CONNECTS TO THE USB LINE LEVEL CONTROL. DURING ISB, LSB OPERATION, P1-4 CONNECTS TO THE LSB LINE LEVEL CONTROL. THE SIGNAL RETURNS TO THIS ASSEMBLY THROUGH P1-6.
7. BFO AT P1-A1 OF ASSEMBLY A2A2 ONLY.
8. REFER TO PARAGRAPH 4-117 FOR SIGNAL LEVELS.

Figure 4-25. Receiver IF./Audio Amplifier Assemblies A2A2 and A2A3, Servicing Block Diagram (Early Model Version)



AGC FROM RECEIVER IF/AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A2 OR A2A3
P/O P2
NOT USED A2 (JUMPERED)
NOT USED A4
NOT USED A5
NOT CONNECTED
ANTENNA INPUT A3 FROM ANT. OVERLOAD A2A9
TP2
TP1
RF AMPLIFIER Q1 2N3127
MIXER Q2 2N1142
TRANSMIT/ RECEIVE RELAY K1
NOT CONNECTED
NOT USED
TRANSMITTER MIXER ASSEMBLY (A38)
P/O P1
TUNE RELAY GRD
CHASSIS GRD
+28V DC FROM POWER SUPPLY (A2A8)
B1
MOT
TURRET DRIVE RELAY K1
10 KC ROTOR ASSEMBLY (A31)
C1—C9
C20
10 KC ROTOR ASSEMBLY (A32)
C9
RF TURRET CONTROL FROM CODE GENERATOR (A2A7)
TURRET DECODER S1

046-022-042



NOTES:

1. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
2. LETTERS OUTSIDE TRANSISTOR AND TUBE BLOCKS INDICATE ELEMENTS.
3. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
4. PREFIX ALL REF DES WITH A2A4.
5. GAIN COMPARED TO INPUT VOLTAGE WITH AGC VOLTAGE DISCONNECTED (MODE SELECTOR ELECTRONIC ASSEMBLY REMOVED). REFER TO PARAGRAPH 4-78.

Figure 4-26. RF Amplifier Assembly A2A4, Servicing Block Diagram

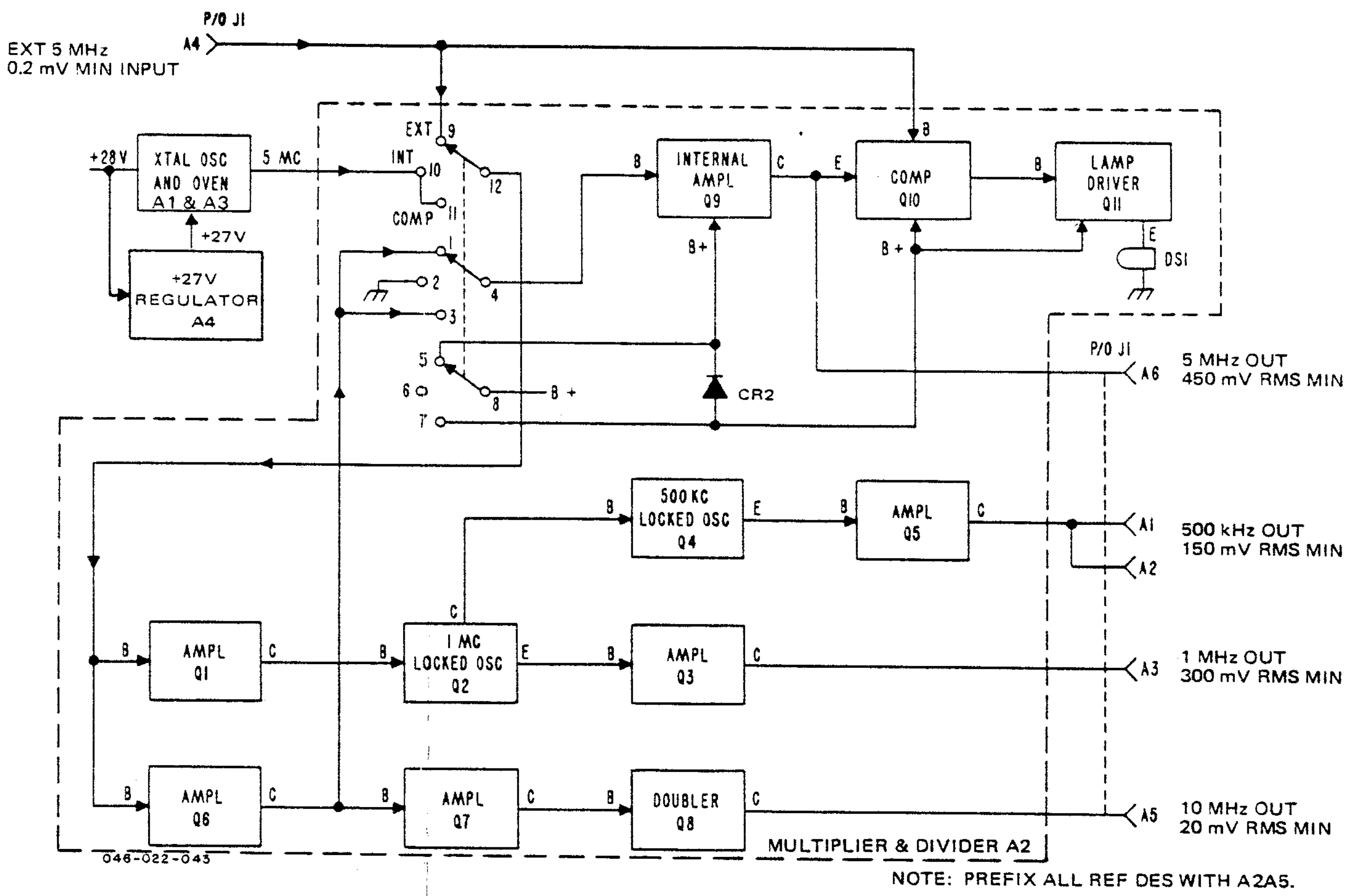
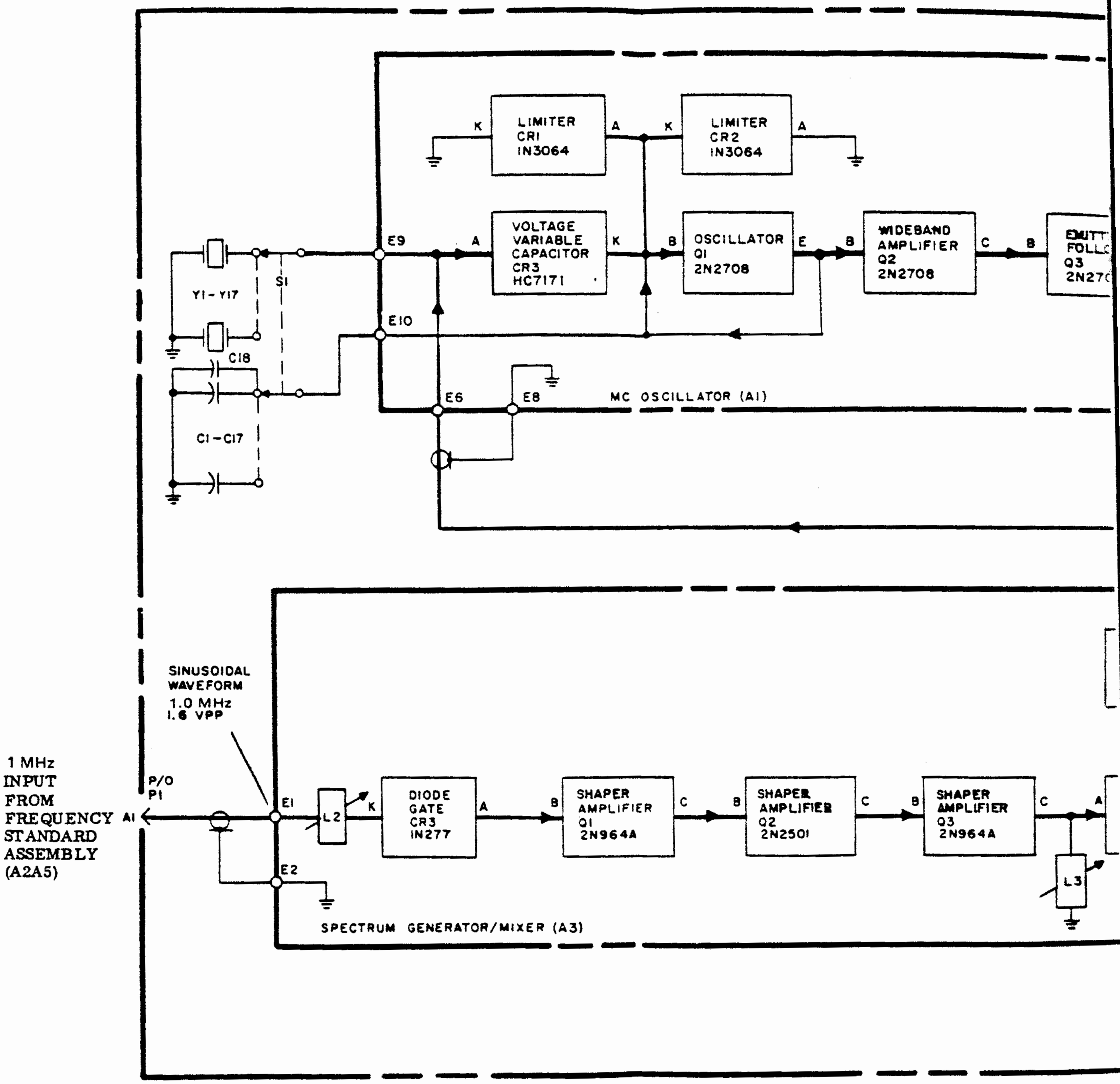
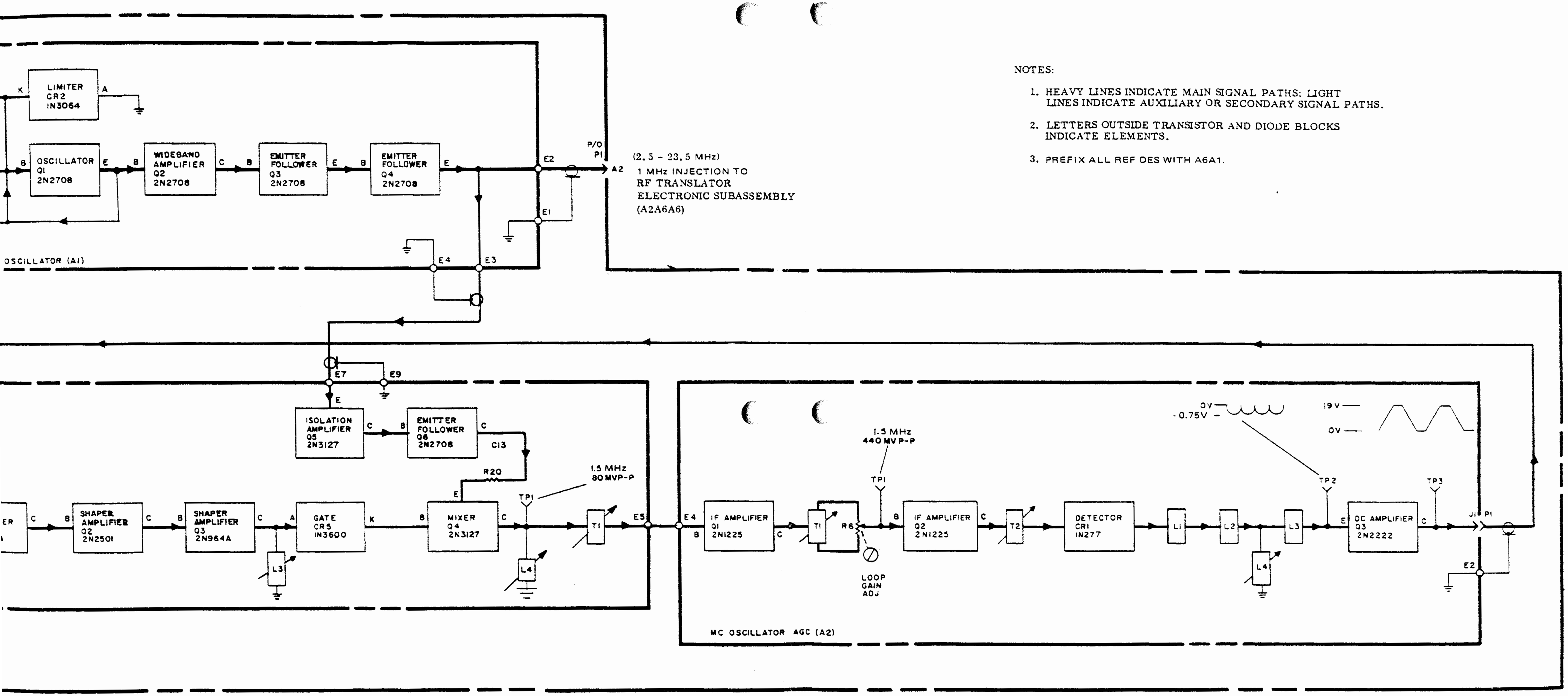


Figure 4-27. Frequency Standard Assembly A2A5, Servicing Block Diagram


LIMITER
CR1
IN3064
LIMITER
CR2
IN3064
VOLTAGE
VARIABLE
CAPACITOR
CR3
HC7171
OSCILLATOR
Q1
2N2708
WIDEBAND
AMPLIFIER
Q2
2N2708
Y1 - Y17
S1
C18
C1 - C17
E9
E10
E6
E8
MC OSCILLATOR (A1)
SINUSOIDAL
WAVEFORM
1.0 MHz
1.6 VPP
1 MHz
INPUT
FROM
FREQUENCY
STANDARD
ASSEMBLY
(A2A5)
A1
P/O
P1
E1
E2
L2
DIODE
GATE
CR3
IN277
SHAPER
AMPLIFIER
Q1
2N964A
SHAPER
AMPLIFIER
Q2
2N2501
SHAPER
AMPLIFIER
Q3
2N964A
L3
SPECTRUM GENERATOR/MIXER (A3)

046-022-044



NOTES:

1. HEAVY LINES INDICATE MAIN SIGNAL PATHS; LIGHT LINES INDICATE AUXILIARY OR SECONDARY SIGNAL PATHS.
2. LETTERS OUTSIDE TRANSISTOR AND DIODE BLOCKS INDICATE ELEMENTS.
3. PREFIX ALL REF DES WITH A6A1.

Figure 4-28. MC Synthesizer Subassembly A2A6A1, Servicing Block Diagram

SECTION 5
MAINTENANCE

5-1. INTRODUCTION.

5-2. GENERAL. This Section provides repair, alignment, and adjustment procedures to enable maintenance personnel to correct deficiencies found as a result of troubleshooting Radio Receiver R-1051B/URR. Also, final adjustment and an overall receiver performance test (to ensure that the receiver is fully operational) are included.

5-3. CORRECTIVE MAINTENANCE INDEX. An index to corrective maintenance data for each assembly in the R-1051B/URR is provided in table 5-1.

5-4. TEST EQUIPMENT AND ACCESSORIES REQUIRED. Table 5-2 lists the test equipment, connectors, special tools, and other accessories necessary to accomplish corrective maintenance on the R-1051B/URR.

5-5. REPAIRABILITY OF ELECTRONIC ASSEMBLIES.

5-6. GENERAL. Certain assemblies are not repairable except at repair depots. The primary reasons for this are:

a. Special test fixtures are required.

b. Special test equipments are required.

c. Certain interchangeable assemblies within the family of similar equipments require completely different piece-part support.

5-7. RF Amplifier Electronic Assembly A2A4, Frequency Standard Electronic Assembly A2A5, and Translator/Synthesizer Electronic Assembly A2A6 are not shipboard-repairable assemblies. Normally, the only maintenance to be performed outside of the repair depot on these assemblies is:

a. Replacement of electron tubes A2A4 V1 and V2 in the rf amplifier. Refer to paragraph 5-43.

b. Alignment check of chassis with rf amplifier positioned as directed in paragraph 5-18.g.

c. Certain gain adjustments made in conjunction with the translator/synthesizer performance test in paragraph 4-92.

d. Frequency adjustment of the frequency standard. Refer to paragraph 5-67.

5-8. To determine if other assemblies in the R-1051B/URR are shipboard- or depot-repairable, refer to current instructions and the SM&R code on the Allowance Parts List (APL).

5-9. Defective electronic assemblies are mandatory turn-in depot-level-repairable items. Ensure defective assemblies are adequately packaged to prevent damage during shipment. When possible, use the carton in which the replacement assembly was received.

5-10. The assembly performance tests provided in Section 4, Troubleshooting, are to be used only when there is a known defect in the receiver or the overall receiver performance test in paragraph 5-83 is unsatisfactory. No assembly should be considered defective when the overall receiver performance test is met, or if there is no operational indication of a malfunction.

5-11. MAIN FRAME CHASSIS A2 AND CASE A1, MAINTENANCE PROCEDURES.

5-12. GENERAL. Paragraphs 5-11 through 5-38 cover corrective maintenance

TABLE 5-1. CORRECTIVE MAINTENANCE INDEX

ASSEMBLY	REPAIR PARA	PART LOCATION FIGURE NO.	FINAL ADJUST-MENT PARA	SCHEMATIC FIGURE NO.	PERFORMANCE TEST PARA
A2 MAIN FRAME	5-11	5-16 thru 5-22	5-61	5-1	5-85
A2A1 MODE SELECTOR	5-47	5-18, 5-23 thru 5-27	5-75	5-2	5-96
A2A2 AND A2A3 IF./AUDIO AMPLIFIER	5-54	5-18, 5-28 thru 5-34	5-79	5-3 and 5-4	5-92, 5-96
A2A4 RF AMPLIFIER	5-41	5-18	--	5-5	5-96
A2A5 FREQUENCY STANDARD	5-39	5-18	5-67	5-6	5-100
A2A6 TRANSLATOR/ SYNTHESIZER	5-45	5-18, 5-35	--	5-7 thru 5-13	5-96
A2A7 CODE GENERATOR	5-22	5-20, 5-36	--	5-14	5-96
A2A8 POWER SUPPLY	5-25	5-20, 5-37	5-63	5-1	5-88
A2A9 ANTENNA OVERLOAD	5-26	5-20, 5-38	--	5-15	5-96
A2A10 LIGHT PANEL	5-27	5-17	--	5-1	--
A2A11 4-VDC POWER SUPPLY AND VERNIER CONTROL	5-32	5-17, 5-39	5-71	5-1	5-100

TABLE 5-2. TEST EQUIPMENT AND ACCESSORIES REQUIRED FOR CORRECTIVE MAINTENANCE

CATEGORY	RECOMMENDED	ALTERNATE
Frequency Standard	AN/URQ-10	AN/URQ-9
Frequency Counter	AN/USM-207	CAQI-5245-L
RF Signal Generator	CAQI-606A	SG-582/U
RF Voltmeter	CCVO-91DA	CCVO-91H CCVO-91CA
Electronic Multimeter	AN/USM-116( )	CAQI-410B
Multimeter	AN/PSM-4( )	CSV-260
AC Voltmeter	ME-6( )/U	CBFM-300
Headphones		
Resistor, 600 ohm, 2 watt	RC42GF601J	
Resistor, 51 ohm, 2 watt	RC42GF510J	
Adapter, BNC to N	UG-201/U	
Coaxial T-Connector (BNC)	UG-274A/U	
RF Insert Extractor Tool	ITT Cannon P/N CET-C6B	
Extender Test Cable (A2A2-P1)	P/N 666243-070	
Extender Test Cable (A2A1-P1)	P/N 666243-071	
Extender Test Cable (A2A1-P2)	P/N 666243-072	

data for all assemblies in the main frame chassis and case except mode selector A2A1, if. audio amplifiers A2A2 and A2A3, rf amplifier A2A4, frequency standard A2A5, and translator/synthesizer A2A6. The main frame chassis and case includes the KCS and MCS digital tuning systems, Code Generator Electronic Assembly A2A7, Light Panel Electronic Assembly A2A10, 4-Vdc Power Supply and Vernier Control Electronic Assembly A2A11, Mode Selector switch A2S2, and Filter Box Electronic Assembly A1A1.

5-13. KCS DIGITAL TUNING SYSTEM, REPAIR AND ADJUSTMENT.

5-14. Removal Procedure. This paragraph provides instructions for removing the drive chains and for removing and disassembling the sprocket assemblies on the bottom of the R-1051B/URR chassis. Removal of these components can be accomplished with the chassis in place on the slide mechanisms. To remove the drive chains and sprocket assemblies, proceed as follows, using figure 5-20 as a guide:

a. Turn off power to R-1051B/URR. Loosen front-panel screws and slide chassis out of case.

b. Remove RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6 from the chassis.

c. Tilt chassis up 90 degrees to expose bottom. Loosen three chain-tension idler gears and slide gears away from chains. Locate keeper clip on each drive chain. Carefully remove keeper clips and unthread chains.

d. Remove four nuts securing dual and triple sprocket assemblies to chassis, and lift sprocket assemblies from chassis.

e. To disassemble sprocket assemblies, remove two retaining rings located inside assembly housing and secured around shaft. Loosen coupler hub-clamp set screw and punch out shaft from end opposite coupler. Separate sprocket assembly parts as they clear the shaft.

5-15. Repair Procedure. To repair a defective sprocket assembly, proceed as follows:

a. Wipe all disassembled parts with dry, lint-free cloth, and inspect the parts for damage.

b. Replace worn parts. Replace metal springs if they no longer provide proper tension between associated parts. Replace both coupler and shaft if shaft is scored. Replace detent springs if bent so that too much or too little tension results. Replace hub clamp if it is evident during equipment operation that proper clamping action is not being maintained.

5-16. Reassembly Procedure. To reassemble the sprocket assemblies, and to reinstall the sprocket assemblies and drive chains onto bottom of chassis after repair, proceed as follows:

a. Reassemble sprocket assemblies, using new retaining rings in place of those that were removed. Do not tighten hub-clamp set screws.

b. Secure sprocket assemblies in their respective positions on chassis with four appropriate nuts.

c. Thread drive chains onto gears. Fasten ends of each chain together with keeper clip.

5-17. Drive-Chain Adjustment Procedure. After reassembly, the chain-drive mechanism must be adjusted to ensure proper relationship between the front-panel KCS controls, the couplers, and their respective detent spring positions in the sprocket assemblies. Loosen the five hub clamps on the dual and triple sprocket assemblies if entire system is being aligned. Loosen both 10 KCS coupler hub clamps for 10-kHz alignment. Loosen both 100 KCS coupler hub clamps for 100-kHz alignment. Loosen the 1 KCS coupler hub clamp for 1-kHz alignment. To obtain proper positioning of the front-panel KCS controls with respect to the fully seated position of the detent spring, adjust the position of the drive chain as follows:

a. Reinstall RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6. Ensure that all couplers are engaged properly.

b. For each KCS control, take slack out of associated drive chain by holding associated chain-tension idler gear against chain. If digit is centered in window, tighten chain-tension idler gear in that position and proceed to step d.

c. If digit is not centered in windown, release chain-tension idler gear and slide gear away from chain. Lift drive chain away from gears and shift entire chain to position where front panel KCS control and digit above control remain fairly stationary when chain is tightened. Repeat this procedure as necessary. When drive chain is positioned properly, tighten chain-tension idler gear securely against chain.

d. The dual sprocket assembly MP15 (figure 5-20) provides means for making finer adjustment for 100 KCS and 10 KCS controls. Rotate 100 KCS and 10 KCS controls and observe detent action of dual sprocket assembly. Proper detent action is displayed by relatively smooth rotation of controls with full-seating detent action. If necessary, remove spacer under detent spring to increase spring tension, or add spacer to reduce spring tension. If digit is still not fully centered in window when detent spring is fully seated, loosen two hex-head screws on wheel index engaged with detent spring. Wheel index provides seating position for detent spring. Press firmly on detent spring above roller. Do not allow wheel index to rotate. Rotate front-panel KCS control until digit is exactly centered in window as desired. Release front-panel control and detent spring. If digit moves from center of window, repeat until digit is centered exactly in window; then tighten hex-head screws on wheel index.

5-18. Coupler Adjustment Procedure. Once the drive chains have been adjusted to provide optimum detent positioning, the sprocket assembly couplers, which are operated by the KCS controls, must be adjusted for proper electromechanical alignment between the electronic assemblies and the chain-drive mechanism. To adjust the couplers, proceed as follows:

a. Remove RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6 from chassis.

b. Set 100 KCS and 10 KCS controls to 1. Insert screwdriver in coupler adjustments in dual sprocket assembly (figure 5-20), and rotate couplers so that slot in each coupler points toward, and is perpendicular to, the front panel.

c. Tighten hub-clamp set screws on dual sprocket assembly.

d. Set 100 KCS, 10 KCS, and 1 KCS controls to 0. Insert screwdriver in respective coupler adjustments in triple sprocket assembly MP14 (see figure 5-20), and rotate couplers so that each coupler slot points towards, and is perpendicular to, the rear panel.

e. Tighten hub-clamp set screws on triple sprocket assembly.

f. Set KCS controls to 1. Reinstall RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6.

g. Check fine adjustment by performing procedure in paragraph 4-59. If adjustment is needed, loosen associated hub coupler on dual sprocket assembly and move the coupler to allow fully insertion of rod. Tighten hub clamp. Restore R-1051B/URR to normal operating condition.

5-19. MCS DIGITAL TUNING SYSTEM, MECHANICAL ADJUSTMENT. The adjustment of the MCS digital tuning system provides adequate detent pressure and switch contact positioning of the two MCS controls.

5-20. To adjust detent pressure on either of the MCS controls, loosen the two screws mounting the detent spring. Loosen the two nuts on top of the detent spring mounting block. Adjust the angle of the block for required detent pressure, and tighten the two nuts. If necessary, add or remove spring spacers.

5-21. To adjust the positioning of the detent, set the MCS control to 0 and tighten the detent spring, ensuring the digit stays in the center of the window. Turn Mode Selector switch A2S2 to an operational mode and set MCS controls to 02 through 29, ensuring the rf amplifier turret rotates to the same frequency. If any frequency does not set up properly, apply slight pressure on each MCS control in each direction, to note if correct frequency setup is obtained. If correct setup is obtained, loosen that detent spring and readjust the spring position to correct condition. The flat portion of the two MCS control shafts should be vertical (as shown in figure 4-13) when the MCS controls are at 00. If proper operation cannot be obtained, troubleshoot the code generator as described in paragraph 4-24.

5-22. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7, REPAIR AND REPLACEMENT. Adjustment data on spring detents for the 1 and 10 MCS knobs on the front panel are provided in paragraph 5-19. The code generator furnished with the R-1051B/URR is a four-deck printed circuit board (pcb) assembly, and cannot be used in Radio Transmitter T-827B/URT. The code generator furnished with the T-827B/URT is a five-deck pcb assembly, which may be used in either equipment. When a five-deck assembly is used in the receiver, center pcb (A3) is not utilized.

5-23. Removal/Replacement Procedure.

a. Remove power to the R-1051B/URR

and rotate Mode Selector switch A2S2 to OFF. Set MCS controls to 11.

b. Remove RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6 from the chassis.

c. On each side of chassis, remove the two screws which secure vertical support and shield plate MP69 (see figure 5-19), and move the plate slightly away from front panel and chassis. Do not remove cable clamps from plate for any part of this procedure. From bottom of chassis, remove nuts that secure plug A2A7P1 to receptable A2J8, and separate these connectors. Remove two screws that secure code generator to chassis.

d. From top of chassis, remove partially hidden captive screw A2A7H1, which also secures the code generator to the chassis, carefully pulling and holding shield plate MP69 away from front panel. See figures 5-17 and 5-35.

e. Set couplers (on assembly to be installed) to approximately mate with key pins on MCS detent wheel. Install spare Code Generator Electronic Assembly A2A7 into mounting position, and rock MCS controls until both couplers are mated. Reassemble by reversing removal sequence.

5-24. Repair Procedure.

a. Code Generator Electronic Assembly A2A7 is not supported by piece parts. If the assembly cannot be repaired without replacement of parts, except for the connector, the assembly should be replaced.

b. This assembly can usually be repaired, as most malfunctions are open spring-finger contacts. Usually, all that is required is slight pressure added to one spring-finger contact on a switch rotor, when the defective contact can be isolated by troubleshooting. After adjusting pressure, check to ensure each finger of rotor contact makes contact at the same angle of rotation (imaginary line drawn through center of shaft and two or three fingers of contact). When reassembling, ensure all spacers and washers are replaced. Refer to paragraph 4-24 and perform required checks to ensure code generator is operational.

5-25. POWER SUPPLY ELECTRONIC ASSEMBLY A2A8, REPAIR AND REPLACEMENT. Power Supply Electronic Assembly A2A8 is shipboard-repairable. See figure 5-1 for its schematic diagram, and figure 5-36 for parts location. If the power supply pcb is badly carbonized after a failure, replace the pcb. Certain other versions of this pcb may be substituted when necessary. Different bridge diodes and other semiconductors are used in various versions of the power supply pcb, but all will operate normally when interchanged. Power supply A2A8 assemblies for the T-827B/URT have no -30-Vdc supply, and cannot be used in the R-1051B/URR. For emergency repair, other receiver versions (R-1051/URR or R-1051D/URR) may be used; however, ensure that resistor A2A8R6 has the correct value of 3 kilohms.

5-26. ANTENNA OVERLOAD ELECTRONIC ASSEMBLY A2A9, REPAIR AND REPLACEMENT. Antenna Overload Electronic Assembly A2A9 is shipboard-repairable. See figure 5-15 for a schematic diagram of the antenna overload assembly. Parts location is shown in figure 5-37. When troubleshooting through relay contacts note that the etching of the contact arrangement on the relay is a bottom view (not a through-relay view). This manual provides the schematic diagram parts location diagram and parts listing for A2A8 assemblies reflecting field change 1 to R-1051B/URR. If the power supply installed in the equipment is not as described herein, refer to current instructions.

5-27. LIGHT PANEL ELECTRONIC ASSEMBLY A2A10, REPAIR AND REPLACEMENT. The two front-panel lamps are mounted on a light bar strip. The lamp bulbs are of the screw-base type, and are not readily accessible without some disassembly. When one lamp burns out, it should be replaced as soon as possible to prevent burning out the other lamp due to the high internal resistance of the lamps.

5-28. Procedure for replacement of lamp A2A10DS4, located between the 1 KCS and 10 KCS controls (see figure 5-17), is as follows:

a. Remove power to the R-1051B/URR.

b. Slide receiver chassis out of case.

c. Set the frequency controls to 15.555 MHz.

d. Loosen the four captive hold-down screws and lift out Translator/Synthesizer Electronic Assembly A2A6. (Suggestion: lift the screws and turn about one-half turn into the captive nut. Then use the screws for handles to lift the A2A6 assembly.)

e. Replace defective panel lamp, ensuring new lamp is tight in socket.

f. Reinstall Translator/Synthesizer Electronic Assembly A2A6.

5-29. The procedure for replacement of lamp A2A10DS3, located between the 1 MCS and 10 MCS controls (see figure 5-17), is as follows:

a. Remove power to the R-1051B/URR.

b. Slide receiver chassis out of case.

c. Set the frequency controls to 15.555 MHz.

d. Loosen the four captive hold-down screws and lift out RF Amplifier Electronic Assembly A2A4.

e. Remove the two screws from the bottom of Code Generator Electronic Assembly A2A7.

f. Loosen the screw (A2A7H1) on top of the code generator mounting plate. This screw is located about 1 inch directly below fuseholder A2XF2.

g. Remove the two nuts securing code generator plug A2P8, and remove plug from jack.

h. Remove the code generator.

i. Replace defective panel lamp, ensuring new lamp is tight in socket.

j. Reinstall the code generator, mounting plug, and rf amplifier.

5-30. After replacing either lamp, restore power to the R-1051B/URR, and verify that both lamps are operating properly.

5-31. 4-VDC POWER SUPPLY AND VERNIER CONTROL ELECTRONIC ASSEMBLY A2A11, REPAIR AND REPLACEMENT. The 4-Vdc Power Supply and Vernier Control Electronic Assembly A2A11 is shipboard-repairable. If pcb A2A11A1 is badly carbonized after a failure, replace the pcb. The major failures of this board will be associated with 4-volt zener diode A2A11A1CR1. Refer to paragraph 4-51 for additional data. The following reference data will aid in repair or replacement.

a. Figure 5-38, printed circuit board A2A11A1 component location.

b. Figure 5-17, assembly location.

c. Figure 4-15, A2A11A1 terminal location diagram.

d. Figure 4-7, A2A11S6 contact arrangement.

5-32. MODE SELECTOR SWITCH A2S2, REPAIR AND REPLACEMENT. Replacement of Mode Selector switch A2S2 is time-consuming, and may cause many added problems if not performed with the correct tools, using great care. Although the following data are provided to replace the entire switch, in many cases it may be possible to repair the switch or to replace only one section of the switch. See figures 4-6 and 4-16 through 4-21. By troubleshooting, determine the exact segment and clips that are causing the malfunction. Be sure to note and remember contact arrangement on the rear sections.

5-33. Removal and Repair Procedure.

a. Remove the ac power cables at the rear of the receiver case.

b. Remove RF Amplifier Electronic Assembly A2A4 and Translator/Synthesizer Electronic Assembly A2A6.

c. Remove the four screws attaching vertical support and shield plate MP69 (see figure 5-19), and push the plate slightly forward to allow removal of the cable clamps on the bottom of the plate. Remove the clamps and any other components attached to the plate. Remove the vertical support and shield plate.

d. Remove the Mode Selector switch A2S2 from the front panel. Examine the switch to ensure no leads are broken. Usually, the only problem will be an open contact. If the switch is not damaged or burned, replacement of the entire switch assembly may not be necessary.

e. With good lighting, a magnifying glass, small tweezers, and an ohmmeter, physically locate the defective segment. If necessary to obtain more space, disassem- the switch. Be sure to account for all spacers and fiber washers.

f. Carefully move all four wafers off the shaft. Note that sections A and C have interconnections, and sections C and D have interconnections. Tag and remove any short leads preventing removal.

g. Separate the sections and locate the exact point of malfunction. Determine if the switch is repairable. If only one switch is defective, ensure the replacement switch section is identical mechanically as well as electrically, and that the replacement section is positioned correctly (see figure 4-6).

h. When the entire switch is to be replaced, refer to table 5-3.

5-34. Reassembly Procedure. Connect jumper wires to new switch, but do not solder contacts indicated by an asterisk in table 5-3 until external leads are connected to these points. Complete the wiring of section A through section D. After completion of wiring, make continuity checks in all positions, using referenced data to ensure correct wiring. Reassemble hardware, replace assemblies, and make voltage measurements to ensure repair of switch.

5-35. MAIN FRAME CHASSIS, WIRING DATA. Table 5-4 lists complete wiring data for main frame chassis A2 of the R-1051B/URR. Bear the following information in mind when using this wiring list:

a. Terminal identification for components not marked appears on figures 4-3 through 4-7, and 4-13 through 4-15.

b. The color code of the wires cannot be used for wire tracing in every case. If the color in the equipment is not as specified for a certain lead, verify the connection by continuity checks.

c. The wire item number information is provided to aid identification. The parts list in table 6-2 provides a complete description of wiring items. A description of each wire is given below:

ITEM NO.	DESCRIPTION
27	Cable, coax, no. 28 AWG, double shield
28	Wire, shield, no. 20 AWG, twisted pair
29	Wire, shielded, no. 20 AWG
30	Wire, bare, no. 24 AWG
31 - 67	Wire, electrical, no. 24 AWG
68	Wire, electrical, no. 22 AWG

d. Wire item number 28 cabling, and noted as direct wiring in the remarks column, is outside of the cable duct.

5-36. RECEIVER CASE, WIRING DATA. Table 5-5 lists complete wiring data for receiver case A1 of the R-1051B/URR. The wire item numbers and descriptions are given below:

ITEM NO.	DESCRIPTION
15	Cable, coax, no. 28 AWG, double shield
16	Wire, shield, no. 20 AWG, twisted pair
17 - 33	Wire, electrical, no. 20 AWG

5-37. FILTER BOX ELECTRONIC ASSEMBLY A1A1, WIRING DATA. Wiring data for Filter Box Electronic Assembly A1A1 are listed in table 5-6.

TABLE 5-3. MODE SELECTOR SWITCH A2S2, WIRING LIST

JUMPERS

FROM	TO
S2A-F4	S2A-F1
S2A-F1	S2A-F11
S2A-F11	S2A-F10
S2A-F10	S2A-R10*
S2A-F3	S2A-F2
S2A-F2	S2A-F12
S2A-F12	S2A-F9
S2A-F9	S2C-R8*
S2A-R6	S2A-R4
S2C-R6	S2A-R8
S2A-R8	S2A-R11
S2A-R11	S2C-R12*
S2B-F2	S2B-F3
S2B-F3	S2B-F6
S2B-F6	S2B-F7*
S2B-F4*	S2B-F5*
S2B-R2	S2B-R8*
S2C-R3	S2C-F2
S2C-F2	S2C-F11
S2C-F11	S2C-R10*
S2B-R6	S2B-R3
S2B-R3	S2D-R12*
S2B-R11*	S2B-R9*
S2C-F4	S2C-F1
S2C-F1	S2C-F12*
S2C-F3	S2C-F10*
S2D-F2	S2D-F6*
S2D-F7	S2D-F11
S2D-F11	S2D-F12*
S2D-R4	S2D-R6*

EXTERNAL LEADS

FROM	TO
S2A-F6	XF1-2
S2A-F7	A2T1-6
S2A-R2	J19-7
S2A-R4	E11
S2A-R5	J18-7
S2A-R10	E2
S2B-F1	J21-7
S2B-F1	R4ct
S2B-F4	J21-25
S2B-F5	R5ct
S2B-F7	J21-13
S2B-F8	J21-10
S2B-F10	S8N01
S2B-F11	XF2-1
S2B-R8	E30
S2B-R9	S6B-F12
S2B-R10	K3-6
S2B-R11	E17
S2C-F6	E15
S2C-F7	E12
S2C-F10	J17-5
S2C-F12	J18-11
S2C-R2	J18-15
S2C-R4	R6-1
S2C-R4	J17-2
S2C-R8	E13
S2C-R10	E18
S2C-R12	J16-1
S2D-F6	J19-19
S2D-F10	J18-19
S2D-F12	A8E10
S2D-R3	J19-1
S2D-R5	J18-1
S2D-R6	K1-6
S2D-R11	J18-18
S2D-R12	E18
S2D-F7**	XDS5-2

* External lead connected at this contact.

** Installed in late versions. See figure 4-6 and table 5-7.

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
1	30	BARE	S2A-F4	S2A-F1	
2	30	BARE	S2A-F1	S2A-F11	
3	30	BARE	S2A-F11	S2A-F10	
4	30	BARE	S2A-F10	S2A-R10	
5	31	WHT-BLK-BRN	S2A-R10	E2	Direct
6	30	BARE	S2A-F3	S2A-F2	
7	30	BARE	S2A-F2	S2A-F12	
8	30	BARE	S2A-12F	S2A-F9	
9	30	BARE	S2A-F12	S2A-F9	
10	32	WHT-BLK-RED	S2C-R8	E13	
11	29	20 SHLD 101	S2A-F6	XF1-2	
12	29	20 SHLD 102	S2A-F7	T1-6	
13	68	WHITE	SHLD OF 101	SHLD OF 102	At S2
14	33	WHT-BLK-ORN	S2A-R2	J19-7	
15	30	BARE	S2A-R6	S2A-R4	
16	34	WHT-BLK-YEL	S2A-R4	E11	
17	35	WHT-BLK-GRN	S2A-R5	J18-7	
18	30	BARE	S2C-R6	S2A-R8	
19	30	BARE	S2A-R8	S2A-R11	
20	30	BARE	S2A-R11	S2C-R12	
21	36	WHT-BLK-BLU	S2C-R12	J16-1	
22	27	COAX 1	S2B-F1	J21-7	
23	27	COAX 2	S2B-F1	R4-2	Direct
24	68	WHITE	SHLD OF 1	SHLD OF 2	At S2
25	30	BARE	S2B-F2	S2B-F3	
26	30	BARE	S2B-F3	S2B-F6	
27	30	BARE	S2B-F6	S2B-F7	
28	27	COAX 3	S2B-F7	J21-13	
29	30	BARE	S2B-F4	S2B-F5	
30	27	COAX 4	S2B-F4	J21-25	
31	27	COAX 5	S2B-F5	SHLD OF 4	At S2
32	68	WHITE	SHLD OF 3	SHLD OF 4	At S2
33	68	WHITE	SHLD OF 4	SHLD OF 5	At S2

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
34	27	COAX 6	S2B-F8	J21-10	
35	29	20 SHLD 103	S2B-F10	S8-NO 1	
36	29	20 SHLD 104	S2B-F11	XF2-1	
37	68	WHITE	SHLD OF 103	SHLD OF 104	At S2
38	30	BARE	S2B-R2	S2B-R8	
39	37	WHT-BLK-VIO	S2B-R8	E30	
40	30	BARE	S2C-R3	S2C-F2	
41	30	BARE	S2C-F2	S2C-F11	
42	30	BARE	S2C-F11	S2C-R10	
43	38	WHT-BLK-GRY	S2C-R10	E18	
44	30	BARE	S2B-R6	S2B-R3	
45	30	BARE	S2B-R3	S2D-R12	
46	39	WHT-BRN-RED	S2D-R12	E18	
47	30	BARE	S2B-R11	S2B-R9	
48	33	WHT-BLK-ORN	S2B-R9	S6B-F12	
49	41	WHT-BRN-YEL	S2B-R11	K3-6	
50	42	WHT-BRN-GRN	S2B-R10	E17	
51	30	BARE	S2C-F4	S2C-F1	
52	30	BARE	S2C-F1	S2C-F12	
53	43	WHT-BRN-BLU	S2C-F12	J18-11	
54	30	BARE	S2C-F3	S2C-F10	
55	44	WHT-BRN-VIO	S2C-F10	J17-5	
56	45	WHT-BRN-GRY	S2C-F6	E15	
57	47	WHT-RED-ORN	S2C-F7	E12	
58	48	WHT-RED-YEL	S2C-R2	J18-15	
59	49	WHT-RED-GRN	S2C-R4	J17-2	
60	50	WHT-RED-BLU	S2C-R4	R6-1	Direct
61	30	BARE	S2D-F2	S2D-F6	
62	51	WHT-RED-VIO	S2D-F6	J19-19	
63	30	BARE	S2D-F7	S2D-F11	
64	30	BARE	S2D-F11	S2D-F12	
65	52	WHT-RED-GRY	S2D-F12	A8-10	
66	53	WHT-ORN-YEL	S2D-F10	J18-19	

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
67	54	WHT-ORN-GRN	S2D-R3	J19-1	
68	30	BARE	S2D-R4	S2D-R6	
69	55	WHT-ORN-BLU	S2D-R6	K1-6	
70	56	WHT-ORN-VIO	S2D-R5	J18-1	
71	57	WHT-ORN-GRY	S2D-R11	J18-18	
72	46	WHT-RED-BRN	J1-1	J2-1	Direct
73	39	WHT-BRN-RED	J1-1	E2	Direct
74	27	COAX 7	J1-3	R4-2	
75	27	COAX 8	J2-3	R5-2	
76	68	WHITE	SHLD OF 7	SHLD OF 8	At J1 and J2
77	68	WHITE	SHLD OF 7	SHLD OF 2	At R4 see wire no. 23
78	68	WHITE	SHLD OF 2	E2	At R4
79	68	WHITE	SHLD OF 8	SHLD OF 5	At R5 see wire no. 31
80	68	WHITE	SHLD OF 5	R5-3	At R5
81		R10	J1-1	J1-2	
82		R9	J2-1	J2-2	
83	29	20 SHLD 105	XF1-1	S8-NO 2	
84	68	WHITE	SHLD OF 105	SHLD OF 101	At XF1 see wire no. 11
85	68	WHITE	SHLD OF 105	SHLD OF 103	At S8 see wire no. 35
86	68	WHITE	SHLD OF 103	SHLD OF 103	At S8
87	29	20 SHLD 106	XF2-2	T1-1	
88	68	WHITE	SHLD OF 106	SHLD OF 104	At XF2 see wire no. 36
89	68	WHITE	SHLD OF 106	SHLD OF 102	At T1 see wire no. 12
90	68	WHITE	SHLD OF 102	E19	At T1
91		R15	M1-1	E1	
92		R13	E1	S1-2	
93	30	BARE	E1	S1-4	
94	27	COAX 9	S1-6	E36	
95	68	WHITE	SHLD OF 9	E35	At E36

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
96	27	COAX 10	M1-2	E33	
97	68	WHITE	SHLD OF 10	E35	At E33
98		R16	M2-1	E5	
99		R14	E5	S5-2	
100	30	BARE	E5	S5-4	
101	27	COAX 11	S5-6	E26	
102	68	WHITE	SHLD OF 11	E27	At E26
103	27	COAX 12	M2-2	E23	
104	68	WHITE	SHLD OF 12	E21	At E23
105	33	WHT-BLK-ORN	A10-4	A8-4	
106	40	WHT-BRN-ORN	A10-1	R2-3	Direct
107	34	WHT-BLK-YEL	R1-1	R11-2	Direct
108		COAX 13	R1-2	J19-6	
109		COAX 14	R11-3	J19-4	
110		WHITE	SHLD OF 13	SHLD OF 14	At R1 and R11
111		WHITE	SHLD OF 14	R1-3	At R11 and R1
112	35	WHT-BLK-GRN	R1-3	E2	Direct
113		R17	R11-1	R11-3	
114	34	WHT-BLK-YEL	R2-1	R12-2	Direct
115	27	COAX 15	R2-2	J18-6	
116	27	COAX 16	R12-3	J18-4	
117	68	WHITE	SHLD OF 15	SHLD OF 16	At R2 and R12
118	68	WHITE	SHLD OF 16	R2-3	At R12 and R2
119	40	WHT-BRN-ORN	R2-3	E4	Direct
120		R18	R12-1	R12-3	
121	37	WHT-BLK-VIO	R3-1	R4-3	Direct
122	38	WHT-BLK-GRY	R3-1	E2	Direct
123	39	WHT-BRN-RED	R3-2	E20	
124	58	WHT-YEL-GRN	R3-3	A8-16	
125	27	COAX 17	R4-1	J19-3	
126	68	WHITE	SHLD OF 17	R4-3	At R4
127	27	COAX 18	R5-1	J18-3	
128	68	WHITE	SHLD OF 18	E4	At R5

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
129	47	WHT-RED-ORN	R5-3	E3	Direct
130	59	WHT-YEL-BLU	R6-2	J17-1	
131		R19	R6-3	E3	
132	59	WHT-YEL-BLU	S6B-R11	J12-19	
133	58	WHT-YEL-GRN	S6C-R12	R7-SL	Direct
134	60	WHT-YEL-VIO	S6C-R11	J12-14	
135	61	WHT-YEL-GRY	A11A1-E7	J12-21	
136	61	WHT-YEL-GRY	A11A1-E11	R23	*Direct
137	62	WHT-GRN-BLU	S6C-R10	E6	Direct
138	63	WHT-GRN-VIO	DS5-2	S2D-F7	*
139	43	WHT-BRN-BLU	A11A1-E3	R7-CW	Direct
140	44	WHT-BRN-VIO	A11A1-E6	J12-12	
141	45	WHT-BRN-GRY	A11A1-E1	R7-CCW	Direct
142	47	WHT-RED-ORN	A11A1-E6	S6A-F2	Direct
143	48	WHT-RED-YEL	A11A1-E8	DS5-1	Direct
144	49	WHT-RED-GRN	A11A1-E9	S6B-F11	Direct
145	50	WHT-RED-BLU	A11A1-E2	R7-SL	Direct
146	44	WHT-BRN-VIO	A11A1-E10	R23	*Direct
147	57	WHT-ORN-GRY	A11A1-E5	E4	Direct
148	28	WHT TP1	S8-C1	S7-2	
149		BLK TP1	S8-C2	S7-5	
150	68	WHITE	SHLD OF TP1	E6	At S8
151	28	BLK TP2	S7-1	J21-33	
152		WHT TP2	S7-4	J21-32	
153	28	BLK TP3	S7-3	J21-50	
154		WHT TP3	S7-6	J21-49	
155	68	WHITE	SHLD OF TP1	SHLD OF TP2 S7 END	
156	68	WHITE	SHLD OF TP2	SHLD OF TP3 S7 END	
157	53	WHT-ORN-YEL	S9-1	J21-23	
158	54	WHT-ORN-GRN	S9-2	K1-4	
159	55	WHT-ORN-BLU	S9-4	J21-24	

*Indicates a factory or field change; refer to table 5-7.

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
160	56	WHT-ORN-VIO	S9-5	K3-7	
161	57	WHT-ORN-GRY	S9-6	K1-7	
162	31	WHT-BLK-BRN	J8-1	J10-1	
163	32	WHT-BLK-RED	J8-2	J10-2	
164	33	WHT-BLK-ORN	J8-3	J10-3	
165	34	WHT-BLK-YEL	J8-4	J10-4	
166	35	WHT-BLK-GRN	J8-5	J10-5	
167	44	WHT-BRN-VIO	J8-6	K2-4	
168	48	WHT-RED-YEL	J8-7	E16	
169	49	WHT-RED-GRN	J8-9	E7	
170	39	WHT-BRN-RED	J8-21	J12-1	
171	40	WHT-BRN-ORN	J8-22	J12-2	
172	41	WHT-BRN-YEL	J8-23	J12-3	
173	42	WHT-BRN-GRN	J8-24	J12-4	
174	43	WHT-BRN-BLU	J8-25	J12-5	
175	32	WHT-BLK-RED	J9-1	FL1-2	Direct
176	47	WHT-RED-ORN	J9-2	E39	Direct
177	34	WHT-BLK-YEL	J9-3	FL2-2	Direct
178	35	WHT-BLK-GRN	FL1-1	E11	
179	36	WHT-BLK-BLU	FL2-1	E12	
180	53	WHT-ORN-YEL	J10-6	E16	
181	54	WHT-ORN-GRN	J10-7	E15	
182	55	WHT-ORN-BLU	J10-8	E9	
183	55	WHT-ORN-BLU	J11-1	E9	Direct
184	28	BLK TP4	J11-7	T1-13	
185	28	WHT TP4	J11-8	T1-14	
186	68	WHITE		E9	
187	68	WHITE		E19	
188	54	WHT-ORN-GRN	J11-9	E29	
189	42	WHT-BRN-GRN	J11-12	K3-8	Direct
190	37	WHT-BLK-VIO	K3-2	E11	
191	31	WHT-BLK-BRN	K3-3	K1-2	
192		CR3	K3-3	K3-7	Cathode to K3-7

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
193	33	WHT-BLK-ORN	K3-4	E18	
194	41	WHT-BRN-YEL	A9-E1	E12	*
195	44	WHT-BRN-VIO	A9-E2	E8	*
196	44	WHT-BRN-VIO	XC1-1	E42	Direct
197	43	WHT-BRN-BLU	XC1-5	E43	Direct
198	43	WHT-BRN-BLU	E43	E17	
199		R20	E42	E43	
200	55	WHT-ORN-BLU	J12-6	E16	
201	56	WHT-ORN-VIO	J12-7	E15	
202	58	WHT-YEL-GRN	J12-8	E38	
203	57	WHT-ORN-GRY	J12-10	E37	
204	58	WHT-YEL-GRN	J12-16	E38	
205	57	WHT-ORN-GRY	J12-18	E37	
206	57	WHT-ORN-GRY	E37	E11	
207	45	WHT-BRN-GRY	J12-20	K2-6	
208	49	WHT-RED-GRN	K1-3	E16	
209		CR1	K1-3	K1-7	Cathode to K1-7
210	30	BARE	K1-7	K1-8	
211	50	WHT-RED-BLU	K1-8	E15	
212	32	WHT-BLK-RED	K1-5	E41	Direct
213	33	WHT-BLK-ORN	K1-6	Q1-C	
214					
215	30	BARE	K2-7	K1-6	
216	52	WHT-RED-GRY	K2-8	E18	
217		CR2	K2-2	K2-4	Cathode to K2-4
218	31	WHT-BLK-BRN	J16-2	E13	
219	63	WHT-GRN-VIO	J16-6	E18	
220	67	WHT-BLU-GRY	J16-7	E19	
221	65	WHT-BLU-YEL	J17-3	E21	
222	64	WHT-GRN-GRY	J17-4	E18	
223	31	WHT-BLK-BRN	J18-2	J21-6	
224	32	WHT-BLK-RED	J18-9	E27	

*Indicates a factory or field change; refer to table 5-7.

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
225	33	WHT-BLK-ORN	J18-12	E26	
226	34	WHT-BLK-YEL	J18-13	E22	
227	36	WHT-BLK-BLU	J18-14	E23	
228	44	WHT-BRN-VIO	J18-17	E13	
229	37	WHT-BLK-VIO	J18-20	E28	
230	38	WHT-BLK-GRY	J18-21	E20	
231	40	WHT-BRN-ORN	J18-22	E29	
232	68	WHITE	SHLD OF 18	SHLD OF 16	At J18 see wire nos. 116, 127
233	68	WHITE	SHLD OF 16	SHLD OF 15	At J18 see wire no. 115
234	68	WHITE	SHLD OF 15	E21	At J18
235	41	WHT-BRN-YEL	J19-2	J21-8	
236	42	WHT-BRN-GRN	J19-9	E31	
237	43	WHT-BRN-BLU	J19-11	E30	
238	44	WHT-BRN-VIO	J19-12	E36	
239	45	WHT-BRN-GRY	J19-13	E34	
240	47	WHT-RED-ORN	J19-14	E33	
241	48	WHT-RED-YEL	J19-18	E30	
242	49	WHT-RED-GRN	J19-20	E31	
243	50	WHT-RED-BLU	J19-21	E20	
244	58	WHT-YEL-GRN	J19-22	E29	
245	68	WHITE	SHLD OF 17	SHLD OF 14	At J19 see wire nos. 125, 109
246	68	WHITE	SHLD OF 14	SHLD OF 13	At J19 see wire no. 108
247	68	WHITE	SHLD OF 13	E31	At J19
248	67	WHT-BLU-GRY	J21-5	E28	
249	59	WHT-YEL-BLU	J21-11	E36	
250	69	WHT-YEL-VIO	J21-12	E33	
251	61	WHT-YEL-GRY	J21-14	E28	
252	62	WHT-GRN-BLU	J21-17	E28	
253	63	WHT-GRN-VIO	J21-18	E26	
254	64	WHT-GRN-GRY	J21-19	E23	

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
255	66	WHT-BLU-VIO	J21-48	E28	
256	68	WHITE	SHLD OF 1	E32	At J21 see wire no. 22
257	68	WHITE	SHLD OF 6	E32	At J21 see wire no. 34
258	68	WHITE	SHLD OF 3	E32	At J21 see wire no. 28
259	68	WHITE	SHLD OF 4	E32	At J21 see wire no. 30
260	68	WHITE	SHLD OF TP2	Lug on J21	At J21 see wire nos. 151, 152
261	68	WHITE	SHLD OF TP3	Lug on J21	At J21 see wire nos. 153, 154
262	37	WHT-BLK-VIO	Q1-E	A8-15	Direct
263	58	WHT-YEL-GRN	Q1-E	E11	
264	35	WHT-BLK-GRN	Q1-B	A8-13	Direct
265	36	WHT-BLK-BLU	Q1-C	A8-14	Direct
266	34	WHT-BLK-YEL	L1-1	A8-7	
267	59	WHT-YEL-BLU	L1-2	E17	
268	31	WHT-BLK-BRN	L2-1	A8-3	
269	32	WHT-BLK-RED	L2-2	A8-5	
270	47	WHT-RED-ORN	L2-2	R8-1	
271	60	WHT-YEL-VIO	R8-1	E12	
272	48	WHT-RED-YEL	R8-2	E10	Direct
273	38	WHT-BLK-GRY	E10	A8-17	
274	39	WHT-BRN-RED	T1-7	A8-8	
275	40	WHT-BRN-ORN	T1-8	A8-9	
276	41	WHT-BRN-YEL	T1-9	A8-1	
277	45	WHT-BRN-GRY	T1-1-	A8-2	
278	43	WHT-BRN-BLU	T1-11	A8-12	
279	44	WHT-BRN-VIO	T1-12	A8-11	
280	26	BRAID	A8-18	E14	Sleeve with item 3
281	27	COAX 19	J9-A1	J12-A3	
282	68	WHITE	SHLD OF 19	E40	At J9
283	68	WHITE	SHLD OF 19	E38	At J12

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
284	27	COAX 20	J9-A2	J17-A2	Direct
285	68	WHITE	SHLD OF 20	E40	At J9
286	27	COAX 21	J9-A3	J12-A2	
287	68	WHITE	SHLD OF 21	E40	At J9
288	68	WHITE	SHLD OF 21	E38	At J12
289	27	COAX 22	J9-A4	J22-A2	Direct
290	68	WHITE	SHLD OF 22	E39	At J9
291					
292	27	COAX 23	J9-A5	J12-A1	
293	68	WHITE	SHLD OF 23	E39	At J9
294	68	WHITE	SHLD OF 23	E38	At J12
295	27	COAX 24	J9-A6	J22-A1	Direct
296	68	WHITE	SHLD OF 24	E39	At J9
297	68	WHITE	SHLD OF 24	Lug on J21	At J21
298	27	COAX 25	J11-A1	J14-A1	Direct
299	68	WHITE	SHLD OF 25	E24	At J14
300	27	COAX 26	J11-A3	A9-E5	Direct
301	68	WHITE	SHLD OF 26	E8	At J11
302	68	WHITE	SHLD OF 26	A9-E4	*At J9
303	27	COAX 27	J13-A1	J16-A1	Direct
304	68	WHITE	SHLD OF 27	E25	At J13
305	27	COAX 28	J16-A2	J19-A3	Direct
306	68	WHITE	SHLD OF 28	E31	At J19
307	27	COAX 29	J16-A3	J18-A3	At J18
308	68	WHITE	SHLD OF 29	E21	At J18
309	27	COAX 30	J17-A1	J19-A2	Direct
310	68	WHITE	SHLD OF 30	E32	At J19
311	27	COAX 31	J17-A3	J18-A2	Direct
312	68	WHITE	SHLD OF 31	E21	At J18
313	27	COAX 32	J17-A4	J18-A1	Direct
314	68	WHITE	SHLD OF 32	E21	At J18
315	27	COAX 33	J22-A3	A9-E3	*Direct
316	68	WHITE	SHLD OF 33	A9-E4	*At A9

*Indicates a factory or field change; refer to table 5-7

TABLE 5-4. MAIN FRAME CHASSIS A2, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO	REMARKS
317	30	BARE	J11-A2 Center Pin	J11-A2 Outside Sleeve	Shorting connector
318	44	WHT-BRN-VIO	XC2-1	E42	Direct
319	66	WHT-BLU-VIO	XC2-5	L2-2	
320		CR4	K2-3	K2-2	Cathode to K2-2
321	32	WHT-BLK-RED	K2-1	E41	
322	32	WHT-BLK-RED	K2-5	E41	
323					
324	30	BARE	J13-A3 Center Pin	J13-A3 OUT SHLD	Shorting connector
325	30	BARE	S6A-F2	S6A-R2	
326	30	BARE	S6A-R2	S6B-R10	
327					
328	30	BARE	S6C-R8	S6C-R10	
329	30	BARE	S6C-R8	S6C-R6	
330	30	BARE	S6C-R6	S6C-R4	
331	30	BARE	S6C-R4	S6C-R2	
332	30	BARE	S6B-R2	S6B-R4	
333	30	BARE	S6B-R4	S6B-R6	
334	30	BARE	S6B-R6	S6B-R8	
335	30	BARE	S6B-R8	S6B-R10	
336	30	BARE	S6A-R9	S6A-R11	
337	30	BARE	S6A-R11	S6A-R1	
338	30	BARE	S6A-R1	S6A-R3	
339	30	BARE	S6A-R4	S6A-R5	
340	30	BARE	S6A-F6	S6A-F8	
341	67	WHT-BLU-GRY	S6A-R4	J12-17	
342	45	WHT-BRN-GRY	S6A-R3	J12-11	
343	66	WHT-BLU-VIO	S6A-F6	J12-13	
344	42	WHT-BRN-GRN	S6A-F10	J12-15	
345	30	BARE	S6B-R12	S6C-R10	
346		C3	Q1-C	Q1-B	
347	68	WHITE	SHLD OF 33	E9	
348		R21	R11-3	R1-3	
349		R22	R12-3	R2-3	

TABLE 5-5. RECEIVER CASE A1, WIRING LIST

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO
1	17	WHT-BLK-BRN	C1	P21-1
2	18	WHT-BLK-RED	C2	P21-2
3	19	WHT-BLK-ORN	C3	P21-3
4	20	WHT-BLK-YEL	C4	P21-4
5	21	WHT-BLK-GRN	C5	P21-5
6	22	WHT-BLK-BLU	C6	P21-6
7	23	WHT-BLK-VIO	C7	P21-7
8	24	WHT-BLK-GRY	C8	P21-8
9	25	WHT-BRN-RED	C9	P21-9
10	26	WHT-BRN-ORN	C10	P21-10
11	16	BLACK TP1	C11	P21-11
12		WHITE TP1	C12	P21-12
13	32	WHT-RED-ORN	C13	P21-13
14	16	BLACK TP2	C15	P21-18
15		WHITE TP2	C16	P21-19
16	27	WHT-BRN-YEL	C17	P21-17
17	16	WHITE TP3	C18	P21-32
18		BLACK TP3	C19	P21-33
19	16	WHITE TP4	C21	P21-49
20		BLACK TP4	C22	P21-50
21	28	WHT-BRN-GRN	C23	P21-23
22	29	WHT-BRN-BLU	C24	P21-24
23	30	WHT-BRN-VIO	C25	P21-25
24	31	WHT-BRN-GRY	C26	P21-26
25	15	COAX 1	J24	P22-A1
26	15	COAX 2	J23	P22-A3
27	15	COAX 3	J25	P22-A2
28	33	WHITE	SH OF TP1	SH OF TP2
29	33	WHITE	SH OF TP2	C14
30	33	WHITE	SH OF TP3	SH OF TP4
31	33	WHITE	SH OF TP4	C20
32	33	WHITE	SH OF TP2	SH OF TP1
33	33	WHITE	SH OF TP1	P21-14

TABLE 5-5. RECEIVER CASE A1, WIRING LIST (Cont)

WIRE NO.	WIRE ITEM NO.	COLOR	FROM	TO
34	33	WHITE	SH OF TP3	SH OF TP4
35	33	WHITE	SH OF TP4	P21-48
36	14	BRAID	SH OF A3	Lug on P22

TABLE 5-6. FILTER BOX ELECTRONIC ASSEMBLY A1A1, WIRING LIST

WIRE NO.	COLOR	FROM	TO	WIRE NO.	COLOR	FROM	TO
1	WHT-BLK-BRN	J4-E	C1	17	WHT-RED-YEL	J4-h	C14
2	WHT-BLK-RED	J4-D	C2	18	WHT-RED-GRN	J4-d	C15
3	WHT-BLK-ORN	J4-B	C3	19	WHT-RED-BL	C15	J5-A
4	WHT-BLK-YEL	J4-C	C4	20	WHT-RED-VIO	J4-e	C16
5	WHT-BLK-GRN	J4-Z	C5	21	WHT-RED-GRY	C16	J5-8
6	WHT-BLK-BLU	C5	E1	22	WHT-ORN-YEL	J3-B	C17
7	WHT-BLK-VIO	J4-Y	C6	23	WHT-ORN-GRN	C17	E1
8	WHT-BLK-GRY	J4-a	C7	24	WHT-ORN-BL	J3-C	C18
9	WHT-BRN-RED	J4-X	C8	25	WHT-ORN-VIO	J3-A	C19
10	WHT-BRN-ORN	J4-A	C9	26	WHT-ORN-GRY	J4-1	C20
11	WHT-BRN-YEL	J4-W	C10	27	WHT-YEL-GRN	J4-S	C21
12	WHT-BRN-GRN	J4-m	C11	28	WHT-YEL-BL	J4-R	C22
13	WHT-BRN-BLU	C11	J6-A	29	WHT-YEL-VIO	J4-K	C23
14	WHT-BRN-VIO	J4-n	C12	30	WHT-YEL-GRY	J4-J	C24
15	WHT-BRN-GRY	C12	J6-B	31	WHT-GRN-BL	J4-b	C25
16	WHT-RED-ORN	J4-H	C13	32	WHT-GRN-VIO	J4-F	C26

NOTES: 1. All wire is no. 20 AWG.

2. Wire Nos. 12 and 15, 18 and 20, 24 and 25, and 27 and 28 are twisted to form pairs.

5-38. FACTORY AND FIELD CHANGES TO WIRING DATA. Table 5-7 lists all wiring changes made at the factory or in the field, and references these changes to tables 5-3 through 5-6, as applicable.

5-39. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5, MAINTENANCE PROCEDURES.

5-40. Frequency Standard Electronic Assembly A2A5 is not repairable aboard ship (refer to paragraph 5-5). To replace Frequency Standard Electronic Assembly A2A5, loosen the two corner captive screws on top of the assembly and lift it from the chassis. Install the spare frequency standard into the chassis and tighten the captive screws. Check bottom of chassis to ensure all rf inserts are fully seated in connector. Verify proper R-1051B/URR operation by performing the overall receiver performance test given in paragraph 5-83.

5-41 RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4, MAINTENANCE PROCEDURES.

5-42. GENERAL. RF Amplifier Electronic Assembly A2A4 may be repaired aboard ship only to the extent of replacing defective electron tubes V1 and V2. Otherwise, the rf amplifier is replaced with a spare assembly aboard ship (refer to paragraph 5-5). The following paragraphs provide instructions for replacement of electron tubes, and for replacement of RF Amplifier Electronic Assembly A2A4 as a unit.

5-43. ELECTRON TUBE REPLACEMENT PROCEDURE. To replace a defective electron tube, proceed as follows:

a. Turn off power to R-1051B/URR.

b. Loosen front-panel screws and slide chassis from case.

c. Withdraw tube shield by bail handle, replace defective tube, and reinstall shield.

d. Slide chassis into case and tighten front-panel screws.

e. Apply power and verify that R-1051B/URR operates satisfactorily by performing the overall receiver performance test given in paragraph 5-83.

5-44. RF AMPLIFIER REPLACEMENT PROCEDURE. To replace a defective rf amplifier assembly, proceed as follows:

a. Turn off power to R-1051B/URR.

b. Set KCS controls to 111.

c. Loosen four captive screws at corners of rf amplifier, and lift the assembly from the chassis.

d. Check that slots in chassis couplers point toward, and are perpendicular to, the front panel. If slots are not properly aligned, refer to paragraph 5-18.

e. Set couplers on bottom of spare rf amplifier at position 1, and place spare rf amplifier assembly into chassis, applying small amount of finger pressure.

f. Rotate 100 KCS and 10 KCS controls to 0, then to 2, and then to 1, while observing digital tuning rotor assemblies on the turret assembly located inside the rf amplifier. This is done by looking through tube access slot in top of the dust cover. As the 100 KCS control is rotated, the top two wafers (with vertical posts) should rotate. As the 10 KCS control is rotated, the lower rotor (with printed circuit visible) should rotate.

g. When couplers are fully engaged, tighten four captive screws at corners of rf amplifier.

h. Apply power and verify that R-1051B/URR operates satisfactorily by performing the overall receiver performance test given in paragraph 5-83.

5-45. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6, MAINTENANCE PROCEDURES.

5-46. Translator/Synthesizer Electronic Assembly A2A6 may be replaced with a spare assembly aboard ship (refer to paragraph 5-5). To replace a defective translator/synthesizer, proceed as follows:

TABLE 5-7. FACTORY AND FIELD CHANGES TO WIRING LISTS

TABLE	MFR CHANGE OR FIELD CHANGE	WIRE NO.	COLOR	REMARKS
5-4	MFR	136	WHT-YEL-GRY	Added - From A11A1-E11 to R23
		146	WHT-BRN-VIO	Added - From A11A1-E10 to R23
				Above change removed A11A1R5 and added R23.
5-4	MFR	138	WHT-GRN-VIO	Removed - From DS5-2 to E2
		138	WHT-GRN-VIO	Added - From DS5-2 to S2D-F7
5-3	MFR	138	WHT-GRN-VIO	Added - From DS5-2 to S2D-F7
5-5	MFR			None
5-6	MFR			None
5-4	FIELD CHANGE 1	194	WHT-BRN-YEL	Removed - From A9E1 to E12
		194	WHT-BRN-YEL	Added - From A9E4 to E15
		195	WHT-BRN-VIO	Removed - From A9E2 to E8
		195	WHT-BRN-VIO	Added - From A9E3 to E8
		315	COAX 33	Removed - From J22-A3 to A9E3
		315	COAX 33	Added - From J22-A3 to A9E1
		316	SHLD of 33	Removed - From A9E4
		316	SHLD of 33	Added - To A9E2
		302	SHLD of 26	Removed - From A9E4
		302	SHLD of 26	Added - To A9E2
		1001	YELLOW	Added - From A9E6 to E16

a. Turn off power to R-1051B/URR.

b. Loosen four fastening screws at corners of the translator/synthesizer.

c. Rotate KCS controls to 111, and carefully lift out the translator/synthesizer assembly. Rotate KCS controls to 000.

d. Check that slots in couplers point toward, and are perpendicular to, rear chassis panel. If slots are not properly aligned, refer to paragraph 4-56.

e. Rotate KCS controls to 111. Carefully place new translator/synthesizer assembly into chassis.

f. Apply slight finger pressure on top of translator/synthesizer assembly, and rotate KCS controls. When couplers are fully engaged, tighten four fastening screws in corners of the translator/synthesizer.

g. Apply power and verify that R-1051B/URR operates satisfactorily by performing the overall receiver performance test given in paragraph 5-83.

5-47. RECEIVER MODE SELECTOR ELECTRONIC ASSEMBLY A2A1, MAINTENANCE PROCEDURES.

5-48. GENERAL. The following paragraphs provide instructions for removal, cleaning, repair, and adjustment of Receiver Mode Selector Electronic Assembly A2A1. Refer to paragraph 5-5 for repairability of this assembly.

5-49. REMOVAL PROCEDURE. To remove the mode selector assembly, loosen the two corner captive screws on top of the assembly and lift it from the chassis. Remove the dust-cover screw and lift the dust cover.

5-50. REPAIR PROCEDURE. Remove dust and other foreign matter from the assembly. Inspect the entire assembly for defective electrical components, frayed wiring, and loose connections or connectors. See figures 5-23 through 5-27 for component location.

5-51. REASSEMBLY PROCEDURE. Replace any connections removed for repair. Replace the dust cover, reinstall the assembly into the chassis, and tighten the two corner captive screws.

5-52. ADJUSTMENT PROCEDURE. The only adjustment performed on mode selector is adjustment of the BFO frequency (refer to paragraph 5-75).

5-53. TEST PROCEDURE. After repair is complete, ensure receiver is operational by completing the overall receiver performance test given in paragraph 5-83.

5-54. RECEIVER IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 AND A2A3, MAINTENANCE PROCEDURES.

5-55. GENERAL. The following paragraphs provide instructions for removal, cleaning, repair, and adjustment of IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3. Refer to paragraph 5-5 for repairability of this assembly.

5-56. REMOVAL PROCEDURE. If./audio amplifiers A2A2 and A2A3 are located side by side at the rear of the chassis (see figure 5-18). They operate identically and are interchangeable. To remove either the A2A2 or A2A3 assembly, loosen the two corner captive screws on top of the assembly and lift it from the chassis. Remove the two dust-cover screws, and lift the dust cover from the assembly.

5-57. REPAIR PROCEDURE. Remove dust and other foreign matter from the if./audio amplifier. Inspect the entire assembly for defective electrical components, frayed wiring, and loose connections or connectors. See figures 5-28 through 5-33 for parts location.

5-58. REASSEMBLY PROCEDURE. Afer repair, reinstall any component board that may have been removed for repair or replacement of parts.

5-59. ADJUSTMENT PROCEDURE. If electrical components were replaced in the if./audio amplifier, necessitating the tuning of any or all of the variable transformers, adjust the if./audio amplifier as follows:

a. Plug extender test cable, part no. 666243-070 (table 5-2), into P1 on bottom of if./audio amplifier (see figure 5-31 or 5-32).

b. Plug extender test cable, part no. 666243-070, into J18 on chassis.

NOTE

The variable transformers in the if./audio amplifiers are sealed at the factory after adjustment. In repairing as assembly, it may be necessary to break the cement seal, or to install a new transformer that is not cemented. In either case, apply a small amount of Glyptal cement to the transformer adjustment after tuning is complete.

NOTE

To ensure uniform alignment of if./audio amplifiers, both assemblies (A2A2 and A2A3) should be tested, one at a time, with extender test cable, part no. 666243-070, connected to chassis connector J18.

c. Set R-1051B/URR controls as follows:

(1) Mode Selector switch A2S2 at AM.

(2) MCS and KCS controls at 06.000 MHz.

(3) RF GAIN control fully clockwise.

(4) CPS switch at 000.

(5) AUDIO LEVEL meter switch at USB.

(6) USB LINE LEVEL control at midrange.

(7) LSB and USB LINE LEVEL meter switches to +20 DB.

(8) Chassis interlock switch A2S8 defeated by pulling upward.

d. Connect rf signal generator (table 5-2) to A1J23 on rear panel. Set signal generator as follows:

(1) Frequency at 6.00 MHz

(2) Output level at 1 mV.

(3) Modulation at INT 1000 Hz.

(4) Modulation amplitude at 30 percent.

e. Connect ac voltmeter (table 5-2) to A1A1J5 on rear panel. Connect the 600-ohm, 2-watt resistor (table 5-2) across the terminals on the ac voltmeter, and set the ac voltmeter to indicate 10 Vac full scale.

f. Adjust USB LINE LEVEL control for a 2-volt indication on ac voltmeter.

g. Connect Multimeter AN/PSM-4 or alternate (table 5-2) to TP1 (see figure 5-28) on the if./audio amplifier. Set multimeter to indicate 1 Vdc full scale. Adjust rf output level of rf signal generator for a 0.3- to 0.45-volt indication on multimeter.

h. Tune rf signal generator for peak indication on ac voltmeter.

NOTE

The variable transformers in the if./audio amplifiers have very broad bandwidths, and sometimes require repeated adjustment to obtain the correct peak.

i. Tune transformers A2T1, A2T2, A2T3, and A2T4 (see figure 5-31/5-32) for peak indication on the multimeter. If the indication exceeds 6 volts, rotate USB LINE LEVEL control in a counterclockwise direction to decrease indication. Tune transformers A2T3 and A2T4 for peak indication on the ac voltmeter. If reading exceeds 6 volts, rotate USB LINE LEVEL control counterclockwise until meter indicates 6 volts.

j. Rotate AGC ADJ potentiometer A1R25 (see figure 5-28) fully counterclockwise. Decrease rf signal generator output level for a 0.2- to 0.3-volt indication on the multimeter. Tune transformers A1T1 and A1T2 (see figure 5-28) for peak indication on the multimeter.

NOTE

After setting potentiometer A1R25, perform procedures in paragraph 5-92 with the if./audio amplifier plugged into the connector from which it was originally removed.

k. Set Mode Selector A2S2 switch to AM. Tune inductor A3L1 (see figure 5-28) for peak indication on the ac voltmeter.

5-60. TEST PROCEDURE. After repair and adjustments are completed, proceed to the overall receiver performance test given in paragraph 5-83.

5-61. FINAL ADJUSTMENT PROCEDURES.

5-62. GENERAL. The final adjustment procedures in this paragraph should be performed when referred to by other procedures, when an assembly containing adjustable components is replaced, and when scheduled by a planned maintenance system. Frequency Standard Electronic Assembly A2A5 must be checked (with very slight adjustment necessary) at least monthly.

5-63. 20-VOLT REGULATOR CIRCUIT ADJUSTMENT. Power Supply Electronic Assembly A2A8 provides a regulated 20-Vdc output which must be adjusted if the voltage varies more than ±0.5 volt from 20 Vdc.

5-64. Test Equipment. This adjustment uses Multimeter AN/PSM-4( ) or alternate (refer to table 5-2).

5-65. Preliminary Conditions and Control Settings.

a. Set the Mode Selector switch A2S2 to STD BY.

b. Loosen front-panel screws and slide chassis from case.

c. Defeat chassis interlock switch A2S8.

d. Tilt chassis up 90 degrees to expose bottom.

e. Set multimeter to read 50 volts full scale.

f. Connect positive lead of multimeter to solder terminal E11 or E37 on bottom of chassis (see figure 4-3).

g. Connect negative lead of multimeter to chassis.

5-66. Adjustment Procedure. To adjust the 20-volt regulator circuit, proceed as follows:

a. Set Mode Selector switch A2S2 to AM.

b. Set MCS controls for 02 MHz.

c. Adjust output voltage control A2A8R14 (see figure 5-20) for an indication of 20 ±0.1 Vdc on multimeter. If reading is above 22 volts or adjustment does not have enough range, refer to paragraph 4-41.

NOTE

Whenever A2A8R14 is adjusted, the 5-MHz oscillator circuit adjustment (paragraph 5-67) should be checked.

d. Set Mode Selector switch A2S2 to OFF. Tilt chassis back to horizontal. Slide chassis into case and tighten front-panel screws.

5-67. 5-MHz OSCILLATOR CIRCUIT ADJUSTMENT. The 5-MHz oscillator circuit in Frequency Standard Electronic Assembly A2A5 must be adjusted properly to ensure accurate development of frequencies in the R-1051B/URR. However, the adjustment must not be made until it has been determined that the 5-MHz output frequency is in error. Unnecessary adjustment cause poor equipment operation that requires difficult and time-consuming maintenance procedures.

5-68. Test Equipment. An external frequency standard is required to perform this adjustment (refer to table 5-2).

5-69. Preliminary Conditions and Control Settings.

a. Set the Mode Selector switch A2S2 to STD BY. Allow at least a 3-day warmup period before proceeding with the adjustment.

If immediate adjustment is necessary, proceed but recheck oscillator adjustment after required warmup period.

b. Connect 5 MC OUTPUT jack on external frequency standard to EXT 5 MC IN jack A1J25 at rear of R-1051B/URR.

c. Loosen front-panel screws on R-1051B/URR and slide chassis from case.

d. Defeat chassis interlock switch A2S8.

5-70. Adjustment Procedure. To adjust the 5-MHz oscillator circuit, proceed as follows:

a. Using a small screwdriver, rotate COMP/INT/EXT switch A2A5S1 on top of the frequency standard to COMP.

b. Set Mode Selector switch A2S2 to AM and observe comparator lamp A2A5DS1 on top of frequency standard. Lamp will flicker at rate equal to error frequency. Measure from time lamp is just visibly increasing in brilliance, until again just visibly increasing in brilliance. Make adjustment only if time measured is less than 20 seconds. If lamp does not flicker, refer to table 4-3, step 4.

CAUTION

Less than one-quarter turn of FREQ ADJ capacitor A2A5C1 will correct for most drift. Do not force the adjustment.

NOTE

Some type frequency standards require removal of cover.

c. Adjust FREQ ADJ capacitor A2A5C1 on frequency standard until lamp A2A5DS1 changes brilliance as slowly as possible (see figure 5-18).

d. Wait 5 minutes and repeat steps b. and c. until time measured is in excess of 20 seconds.

e. Rotate COMP/INT/EXT switch to required position for operation (refer to paragraph 4-64).

f. Slide chassis into case and tighten front-panel screws.

g. Disconnect the external frequency standard.

5-71. VERNIER FREQUENCY ADJUSTMENT.

5-72. Test Equipment. The vernier frequency adjustment requires a frequency counter (refer to table 5-2).

5-73. Preliminary Conditions and Control Settings.

a. Set COMP/INT/EXT switch S1 on Frequency Standard Electronic Assembly A2A5 to COMP.

b. Set Mode Selector switch A2S2 to LSB, CPS switch to 000, RF GAIN control fully clockwise, MCS and KCS controls at 5.001 MHz, and LSB LINE LEVEL and LSB PHONE LEVEL controls fully clockwise.

c. Connect INT 5 MC OUT jack A1J24 to ANT 50 OHM jack A1J23 at rear of the R-1051B/URR.

d. Set LSB LINE LEVEL switch to +20 DB.

e. Adjust LSB LINE LEVEL control for -10 dB on LSB LINE LEVEL meter.

f. Connect frequency counter to LSB PHONES jack.

5-74. Adjustment Procedure. To adjust the vernier frequency, proceed as follows:

a. Frequency counter should read 1000 Hz.

b. Set CPS switch at V position, and rotate the CPS vernier control fully counterclockwise.

c. Adjust potentiometer A2A11A1R2 (see figure 5-18) for not more than 980-Hz indication on the frequency counter.

d. Rotate CPS vernier control fully clockwise and observe frequency counter for indication of not less than 2020 Hz.

e. Repeat steps b. through d. as necessary until both frequencies are within limits.

5-75. BFO FREQUENCY ADJUSTMENT. The BFO circuit in Receiver Mode Selector Electronic Assembly A2A1 is adjustable to produce a frequency between 497 and 503 kHz, depending upon the setting of the BFO FREQ control on the front panel.

5-76. Test Equipment. A frequency counter (table 5-2) is recommended to perform this adjustment accurately. However, satisfactory results may be obtained by connecting headphones to the USB PHONES jack and centering the BFO FREQ control without the use of the frequency counter.

5-77. Preliminary Conditions and Control Settings.

a. Set the Mode Selector switch A2S2 to CW, MCS and KCS controls for 5.000 MHz, and CPS switch to 000.

b. Loosen front-panel screws and slide chassis from case.

c. Rotate COMP/INT/EXT switch S1 on Frequency Standard Electronic Assembly A2A5 to COMP.

d. Defeat chassis interlock switch A2S8.

e. Connect INT 5 MC OUT jack A1J24 to ANT 50 OHM jack A1J23, using BNC-to-N adapter UG-201/U (table 5-2).

f. Connect input of frequency counter to USB PHONES jack.

5-78. Adjustment Procedure. To adjust the BFO frequency, proceed as follows:

a. Rotate BFO FREQ control fully counterclockwise and note frequency indicated by counter. If no reading is obtained on counter, increase USB PHONE LEVEL and USB LINE LEVEL adjustments until a stable reading is obtained.

b. Rotate BFO FREQ control fully clockwise and note frequency indicated by frequency counter. Adjust BFO ADJ inductor A2A1A3L1 (see figure 5-18) so that counter reads 3 kHz minimum when BFO FREQ control is at extreme counterclockwise and clockwise positions.

c. Set Mode Selector switch A2S2 to OFF. Disconnect counter from USB PHONES jack. Remove test connections from A1J23 and A1J24 and connect antenna to ANT 50 OHM jack A1J23.

5-79. AGC AND IF. GAIN LOOP ADJUSTMENT. The agc and if. gain loops in Receiver IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3 are adjusted as indicated in the following paragraphs.

5-80. Test Equipment. Adjustment of the agc and if. gain loops requires use of an rf signal generator (refer to table 5-2).

5-81. Preliminary Conditions and Control Settings.

a. Set the Mode Selector switch A2S2 to USB.

b. Set MCS and KCS controls to 26.510 MHz.

c. Set RF GAIN control fully clockwise.

d. Set CPS switch to 000, USB LINE LEVEL meter switch to +20 DB, and USB LINE LEVEL control fully clockwise.

e. Connect rf signal generator to ANT 50-OHM jack A1J23 on rear of receiver.

f. Connect extender test cable A2A2-P1 (see table 5-2) between if./audio amplifier A2A2 (left assembly) and the chassis connector, and remove dust cover from the assembly.

g. Defeat interlock switch A2S8.

5-82. Adjustment Procedure.

a. Initially adjust rf agc adjust potentiometer A2A2A1R6 20 turns clockwise, if. gain adjust potentiometer A2A2A2R22 20 turns clockwise and then 5 turns counterclockwise, and agc adjust potentiometer A2A2A1R25 20 turns counterclockwise (see figure 5-28 and 5-32).

b. Set signal generator to CW with 1-μV output. Tune signal generator for a peak on USB LINE LEVEL meter. Turn USB LINE LEVEL control fully counterclockwise and set USB LINE LEVEL meter switch to 0 DB. Adjust USB LINE LEVEL control to -5 dB on the meter.

c. Increase signal generator output to 5 μV. Adjust A2A2A1R25 clockwise until USB LINE LEVEL meter reads 0 dB. Set USB LINE LEVEL meter switch to +20 DB position and USB LINE LEVEL control fully clockwise. Set signal generator output to 1000 μV. Adjust A2A2A2R22 for 0 dB on USB LINE LEVEL meter. Reduce signal generator output to 1 μV, turn USB LINE LEVEL control fully counterclockwise, and set USB LINE LEVEL meter switch to 0 DB position. Adjust USB LINE LEVEL control to -5 dB on the meter. Increase signal generator output to 5 μV and readjust A2A2A1R25 for 0 dB on USB LINE LEVEL meter.

d. Increase signal generator output to 0.1 volt and adjust A2A2A1R6 counterclockwise until USB LINE LEVEL meter reads +1.5 dB (momentary downscale deflection of meter must be observed while adjusting R6). Decrease signal generator output to 1000 μV and set USB LINE LEVEL switch to +20 DB position. Turn USB LINE LEVEL control fully clockwise. USB LINE LEVEL must indicate between -2 and +3 dB. If indication is incorrect, repeat steps a. thru d. of this procedure.

e. Repeat the procedure in paragraphs 5-81 and 5-82 for if./audio amplifier A2A3 (right assembly), substituting LSB for USB and assembly A2A3 for A2A2 throughout the procedure.

f. Perform the overall receiver performance test given in paragraph 5-83 to verify proper operation of the R-1051B/URR.

5-83. OVERALL RECEIVER PERFORMANCE TEST.

5-84. GENERAL. The overall receiver performance test should be performed when scheduled; whenever an assembly is exchanged by installing a new or used assembly; after any repair has been performed or adjustment made that could affect overall receiver performance; and when a receiver is suspected of being in a poor operational condition (poor sensitivity, off frequency, etc.).

5-85. KNOWN-STATION RECEIVER CHECK

5-86. Preliminary Conditions and Control Settings.

a. Set Mode Selector switch A2S2 to CW.

b. Rotate RF GAIN control fully clockwise.

c. Set CPS switch to 000.

d. Set USB LINE LEVEL switch to +20 DB.

e. Rotate USB LINE LEVEL control fully counterclockwise.

5-87. Checkout Procedure.

a. Tune receiver to WWV or WWVH at 5, 10, or 15 MHz. Plug headset into USB PHONES jack. Adjust USB LINE LEVEL control and USB PHONE LEVEL control for comfortable signal level.

b. Verify that signal is received and signal tone varies when BFO FREQ control is varied.

c. Set Mode Selector switch to USB. Tune receiver 1 kHz lower, and check that signal is heard in headset. Set Mode Selector switch to ISB and ensure signal is present.

d. Set Mode Selector switch to LSB. Tune receiver 1 kHz higher than WWV carrier, plug headset into LSB PHONES jack, and set LSB LINE LEVEL control and LSB PHONE LEVEL control for comfortable signal level. Check that signal is heard in headset.

e. Rotate CPS switch to V and check that signal tone varies as CPS vernier control is rotated. Set Mode Selector switch to ISB and ensure signal is present.

f. Set Mode Selector switch to AM. Plug headset into USB PHONES jack. Tune receiver to a known AM station, such as Armed Forces frequency at 15.330 MHz. Check that signal is heard in headset.

g. Set Mode Selector switch to FSK. Check that signal is heard in headset. If teletype system is available, refer to R-1051B/URR Operation Instructions, NAVSHIPS 0967-427-4020. Set up equipment as required by receiver and associated manuals to a known FSK frequency, and ensure proper operation.

5-88. DC POWER SUPPLY VOLTAGE CHECK.

5-89. Test Equipment. Multimeter AN/PSM-4 or alternate (refer to table 5-2) is required for this test.

5-90. Preliminary Conditions and Control Settings.

a. Receiver in full operation, chassis pulled out of case.

b. Set Mode Selector switch A2S2 to AM.

c. Set MCS controls to 02.

d. Rotate RF GAIN control fully clockwise.

e. Defeat interlock switch A2S8.

5-91. Checkout Procedure.

a. Tilt receiver chassis up 90 degrees to expose bottom. Set multimeter to 100-Vdc scale. In lower left-hand corner to the right of pcb A2A8 (see figure 4-3), locate test points E11, E12, and E17 (see figure 4-3). Voltage at E11 should be 19.5 to 20.5 Vdc. If adjustment is necessary, refer to paragraph 5-63.

b. Voltage at E12 should be 25 to 31 Vdc.

c. Set multimeter to 250-Vdc scale. Voltage at E17 should be 103 to 117 Vdc.

d. Along left side of pcb A2A8 is a row of terminals. Count 7 terminals up from bottom to locate the -30-volt terminal, E10. Set multimeter switch for negative reading. Voltage at this terminal should be -28.5 to -31.5 Vdc.

NOTE

If voltage in steps b. and c. are out of limits, check the ac line voltage and the setting of the primary winding tap on transformer A2T1 (see figure 4-8).

5-92. AGC PERFORMANCE TEST.

5-93. Test Equipment. This test requires use of an rf signal generator (refer to table 5-2).

5-94. Preliminary Conditions and Control Settings.

a. Set Mode Selector switch A2S2 to USB.

b. Set MCS and KCS controls to 02.010 MHz.

c. Rotate RF GAIN control fully clockwise.

d. Set CPS switch to 000.

e. Rotate USB and LSB LINE LEVEL controls fully clockwise.

f. Set USB and LSB LINE LEVEL switches to +20 DB position.

g. Disconnect audio cables from A1A1J5 and A1A1J6 (rear of receiver).

5-95. Test Procedure.

a. Connect rf signal generator to ANT 50 OHM connector A1J23 at rear of receiver. Set signal generator to receiver frequency, CW mode, with 1-μV output. Tune signal generator for a peak reading on USB LINE LEVEL meter, which should indicate -12 dB minimum with USB LINE LEVEL switch in +20 DB position. If peak is obtained but is not within the requirement, perform the agc and if. gain loop adjustment described in paragraph 5-79.

b. Set Mode Selector switch to LSB and repeat step a. above, substituting LSB for USB.

c. Set Mode Selector switch to USB. Peak the signal generator to the receiver frequency. Turn USB LINE LEVEL control fully clockwise, and set USB LINE LEVEL meter switch to 0 DB position. Slowly increase USB LINE LEVEL control clockwise until -5 dB is indicated on USB LINE LEVEL meter. Increase signal generator output to 5 μV and note that USB LINE LEVEL meter reads between -5 and +1 dB.

d. Increase signal generator output to 0.1 volt and peak signal generator frequency on USB LINE LEVEL meter, which should indicate not more than 3 dB above previously noted 5-μV reading. If these limits are not obtained, perform agc and if. gain loop adjustment described in paragraph 5-79.

e. Set Mode Selector switch to LSB and repeat steps c. and d. substituting LSB for USB. Reconnect cables to A1A1J5 and A1A1J6.

5-96. RECEIVER SENSITIVITY TEST.

5-97. Test Equipment. Performance of this test requires an rf signal generator (refer to table 5-2).

5-98. Preliminary Conditions and Control Settings.

a. Set Mode Selector switch A2S2 to USB.

b. Set MCS and KCS controls to 02.010 MHz.

c. Rotate RF GAIN control fully clockwise.

d. Set CPS switch to 000.

e. Set USB LINE LEVEL switch to 0 DB position.

f. Rotate USB LINE LEVEL control fully counterclockwise.

g. Set LSB LINE LEVEL switch to 0 DB position.

h. Rotate LSB LINE LEVEL control f fully counterclockwise.

5-99. Test Procedure.

a. Connect rf signal generator to ANT 50 OHM connector A1J23 at rear of receiver. Set modulation selector switch on signal generator to CW mode, and set generator for 1-μV output.

b. Set rf signal generator frequency approximately 150 kHz away from receiver frequency. Adjust USB LINE LEVEL control for -10 dB noise reference level as read on USB LINE LEVEL meter. Less than -10 dB (toward -20 dB) with USB LINE LEVEL control maximum is acceptable, provided correct dB reading is obtained in the remainder of these steps. Adjust signal generator frequency and output attenuator for a peak on-scale indication. Adjust signal generator attenuator for 0 dB on USB LINE LEVEL meter. Sideband sensitivity reading (signal generator attenuator setting) should be not more than 1 μV.

c. Set Mode Selector switch to LSB. Repeat step b. above, substituting LSB LINE LEVEL control and meter for USB LINE LEVEL control and meter.

d. Turn Mode Selector switch to sideband (USB or LSB) having the poorest sensitivity (larger numerical reading) of step b. or c.

e. Set rf signal generator frequency approximately 150 kHz away from receiver frequency and set signal generator attenuator for 1-μV output. Adjust LSB or USB LINE control for -10 dB of noise on associated LINE LEVEL meter. Tune signal generator slowly through receiver frequency and observe that LSB or USB LINE LEVEL meter deflects above 0 dB with the associated meter switch in the 0 dB position. Test all frquencies (in MHz) listed below:

2.010	16.010
3.101	17.010
4.222	18.010
5.333	19.010
6.444	20.010
7.555	21.010
8.666	22.010
9.777	23.010
10.898	24.010
11.989	25.010
12.010	26.010
13.010	27.010
14.010	28.010
15.010	29.010

NOTE

It is important to test all frequencies in table to ensure that receiver is operational at all selected combinations of digits.

f. Set the Mode Selector switch to USB and adjust BFO FREQ control to midrange position. Adjust the USB LINE LEVEL control for -10 dB of noise on USB LINE LEVEL meter. Set Mode Selector switch to CW and adjust RF GAIN control for -10 dB of noise on the USB LINE LEVEL meter. Tune the signal generator to receiver frequency (2.010 MHz) for a peak, and adjust signal generator output attenuator for 0 dB on the USB LINE LEVEL meter. CW sensitivity reading on signal generator should be not more than 2 μV.

g. Set the Mode Selector switch to AM and the USB LINE LEVEL switch to 0 DB. Set RF GAIN control fully clockwise. With the signal generator modulator selector switch at the 1000-Hz, 30-percent modulation position, adjust signal generator frequency and output attenuator for a peak reading of 0 dB on USB LINE LEVEL meter with USB LINE LEVEL switch at 0 DB. With the signal generator modulation selector switch in the CW position, adjust USB LINE LEVEL control for -10 dB on USB LINE LEVEL meter with USB LINE LEVEL switch at 0 DB. AM sensitivity reading on signal generator should be not more than 4 μV.

5-100. FREQUENCY, LOCKING ACTION, AND VERNIER TEST.

5-101. Test Equipment. An external frequency standard and a frequency counter are required for the performance of this test (refer to table 5-2).

5-102. Preliminary Conditions and Control Settings.

a. Receiver in full operation, chassis pulled out of case.

b. Set Mode Selector switch A2S2 to USB.

c. Set MCS and KCS controls for 04.996 MHz.

d. Rotate RF GAIN control fully clockwise.

e. Set CPS switch to 500.

f. Set USB and LSB LINE LEVEL switches to +20 DB position.

g. Rotate USB and LSB LINE LEVEL controls fully counterclockwise.

h. Rotate USB and LSB PHONE LEVEL controls fully clockwise.

5-103. Test Procedure.

a. Connect external frequency standard 5-MHz output to EXT 5 MC IN jack A1J25 on receiver. On top of Frequency Standard Electronic Assembly A2A5, rotate COMP/INT/EXT switch S1 to COMP. Observe that comparator indicator lamp DS1 fades out and lights not more than once in 20 seconds. Measure time from instant when lamp visibly increases in brilliance to next instant when lamp visibly increases in brilliance. If the lamp flickers rapidly, or stays lit without varying intensity for longer than 4 minutes, refer to table 4-3, step 4, and to paragraphs 4-63 through 4-72. Disconnect the external frequency standard from receiver EXT 5 MC IN jack A1J25.

b. Connect INT 5 MC OUT jack A1J24 to ANT 50 OHM jack A1J23. Connect frequency counter to USB PHONES jack and adjust USB LINE LEVEL control so that signal level on USB LINE LEVEL meter reads -10 dB. Frequency counter should read 3500 Hz. Change receiver frequency to 4997.5, 4998.5, and 4999.5 kHz, and note that frequency counter reads 2500, 1500, and 500 Hz, respectively.

c. Set Mode Selector Switch to LSB. Set receiver frequency to 5003.500 kHz. Connect frequency counter to LSB PHONES jack and set LSB LINE LEVEL control so that signal level on LSB LINE LEVEL meter reads -10 dB. Frequency counter should read 3500 Hz. Change receiver frequency to 5002.5, 5001.5, and 5000.5 kHz, and observe that frequency counter reads 2500, 1500, and 500 Hz, respectively. Change receiver frequency to 5001.000 kHz, and observe that counter reads 1000 Hz. Rotate CPS switch from 000 through 900, observing that counter increases in 100-Hz steps to 1900 Hz.

d. Set CPS switch to V and rotate CPS vernier control fully counterclockwise. Frequency counter indication should be not more than 980 Hz. Rotate CPS vernier control fully clockwise. Counter indication should be above 2020 Hz. If these readings are not with tolerance, refer to paragraph 5-71.

NOTE

The CPS vernier dial is not calibrated, and is as arbitrary scale only. Vernier operation must permit selection of any frequency within the 1-kHz slot selected by the KCS controls.

e. Set CPS switch to 000 and note counter reading is 1000 Hz. Rotate MCS controls from 02 through 29 MHz, observing 1000 Hz on counter at each MHz step. Remove counter from LSB PHONES jack.

f. Set MCS and KCS controls to 5.000 MHz. Set Mode Selector switch to CW. Connect phones to USB PHONES jack. Vary BFO FREQ control from one extreme to the other, observing a zero-beat note near midrange of control. If zero beat is not near midrange, set control to midrange and adjust BFO ADJ on top of Mode Selector Electronic Assembly A2A1 for zero beat.

g. Rotate COMP/INT/EXT switch on Frequency Standard Electronic Assembly A2A5 to INT or EXT as required for normal operation (refer to paragraph 4-63). Remove test cable from connectors A1J23 and A1J24 on rear of receiver, and reconnect antenna cable to A1J23.

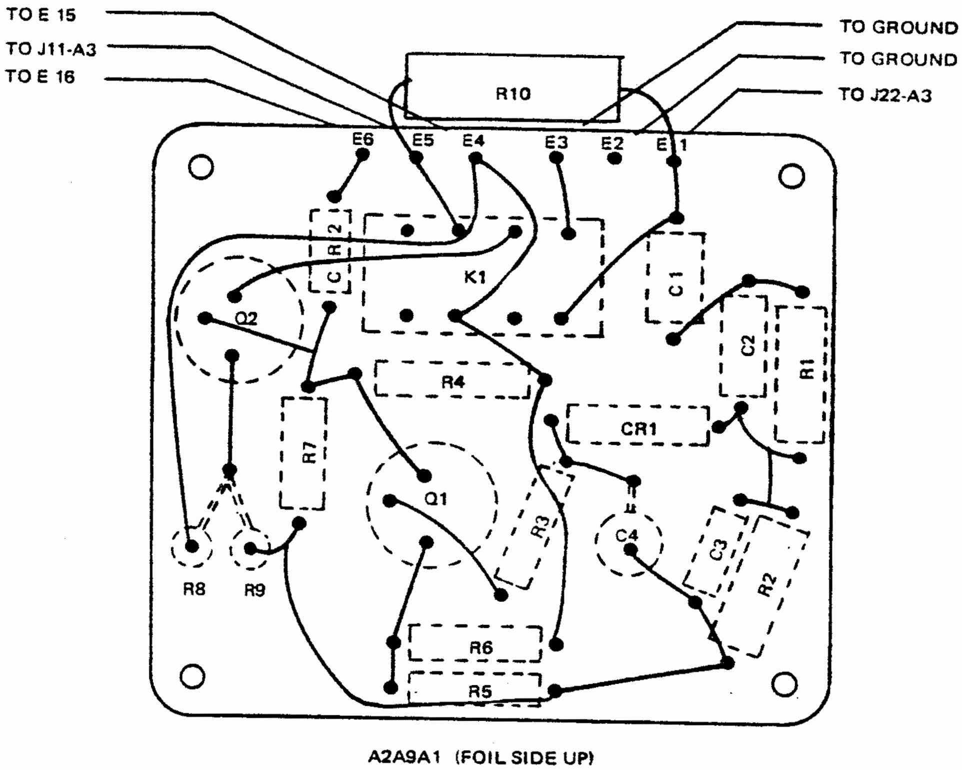
5-104. RECEIVER SCHEMATIC DIAGRAMS.

5-105. The Radio Receiver R-1051B/URR chassis and main frame schematic diagram is figure 5-1.

5-106. All other schematic diagrams are supplied in figures 5-2 through 5-15 in order by reference designation sequence.

5-107. RECEIVER PARTS LOCATION DIAGRAMS.

5-108. Main frame chassis and case parts location diagrams are given in Figures 5-16 through 5-22. Figures 5-23 through 5-38 provide parts locations diagrams for assemblies and subassemblies. To locate a specific part, refer to Section 6. Locate the part by reference designation and refer to the figure location column. All parts not in an assembly should appear in figures 5-16 through 5-22 or in figures 5-35 through 5-38.



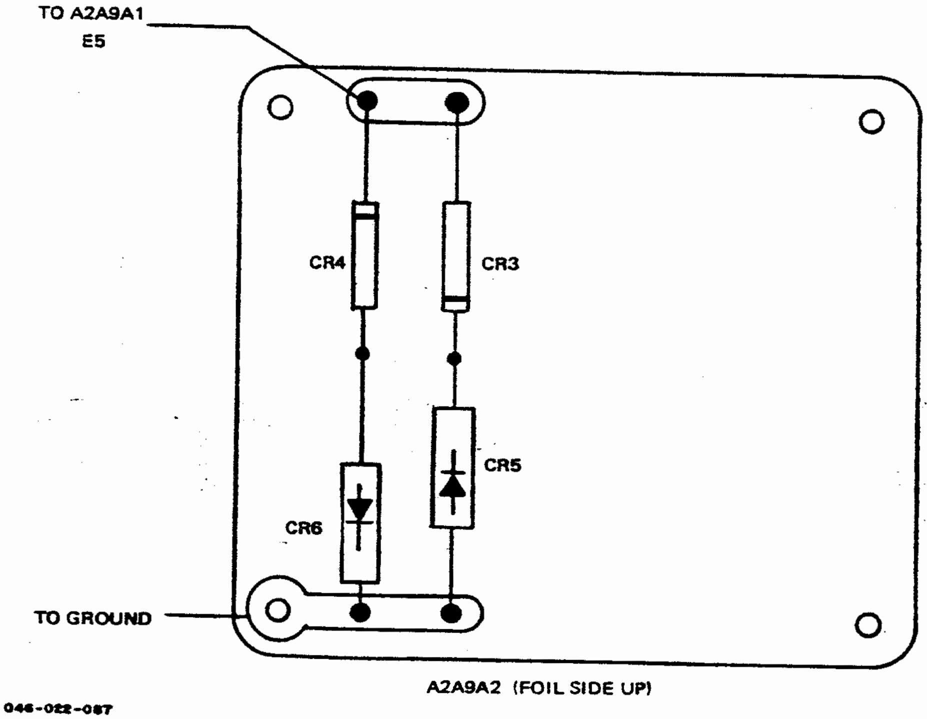
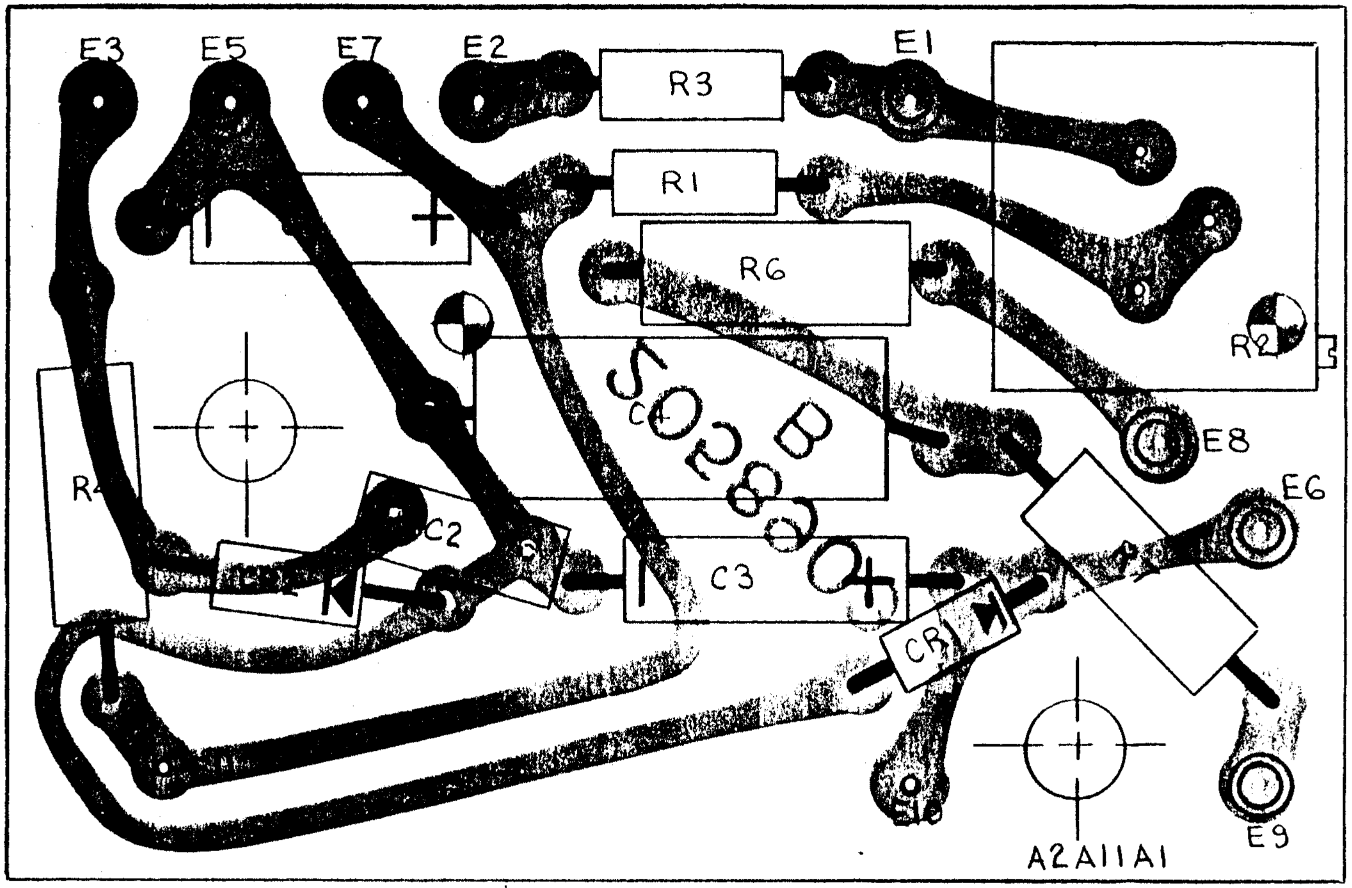


Figure 5-37 Antenna Overload Assembly, A2A9
Component and Test Point Location



046-022-088

Figure 5-38. 4-VDC Power Supply and Vernier Control Component Location

NOTES:

1. EARLY VERSIONS OF A2A11A1 PCB HAVE R5 CONNECTED BETWEEN E10 AND E11. LATE VERSIONS HAVE LEADS FROM E10 AND E11 CONNECTED TO HEAT SINK TYPE RESISTOR A2R23 (see figure 5-19).
2. IN EARLY VERSIONS OF A2A11A1, R7 IS 4.7 MEGOHMS. IN LATE VERSIONS OF A2A11A1, R7 is 8.2 MEGOHMS.

SECTION 6
PARTS LIST

6-1. INTRODUCTION.

6-2. REFERENCE DESIGNATIONS. The unit numbering method of assigning reference designations has been used to identify units, assemblies, subassemblies, and parts. This method has been expanded as much as necessary to adequately cover the various degrees of subdivision of the equipment. Examples of this unit numbering method and typical expansions of the same are illustrated by the following:

Example 1:

1 R 1

Unit No. | Class of Item | Item No. within class

Read as: First (1) resistor (R) of first unit (1).

Example 2:

4 A1 R1

Unit No. | Subassembly designation | Class and No. of item

Read as: First (1) resistor (R) of first (1) subassembly (A) of fourth (4) unit.

Example 3:

3 A1 A2 R1

Unit No. | Subassembly designation | Subassembly designation | Class and No. of item

Read as: First (1) resistor (R) of second (2) subassembly (A) of first (1) subassembly (A) of third (3) unit.

6-3. REFERENCE DESIGNATION PREFIX. Partial reference designations are used on the equipment and illustrations. The partial reference designations consist of the class letter(s) and the identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are provided on illustration notes.

6-4. LIST OF UNITS AND ASSEMBLIES.

6-5. Table 6-1 is a listing of assemblies within Radio Receiver R-1051B/URR. The receiver is designated unit 1 when it is part of Radio Set AN/WRC-1B. Consequently, each reference designation in this section is preceded by the number 1.

6-6. MAINTENANCE PARTS LIST.

6-7. Table 6-2 lists all assemblies and required parts. The assemblies are listed in numerical sequence. Maintenance parts for each assembly are listed alphabetically-numerically by class of part following the unit designation. Thus the parts for each assembly are grouped together. Table 6-2 provides the following information: (1) the complete reference designation each unit, assembly, subassembly, or part, (2) reference to explanatory notes in paragraph 6-13, (3) noun name and brief description, and (4) identification of the illustration which pictorially locates the part.

6-8. Printed circuit boards, assembly boards modules, etc., are listed first as individual items in the maintenance parts list. In addition, at the completion of a parts listing for each assembly the individual circuit board, assembly board, module, etc. is then broken down by components into separate parts listings. When there is a redundancy of such electronic assemblies, reference is made to the parts breakdown previously listed.

6-9. LIST OF MANUFACTURERS.

6-10. Table 6-3 lists the manufacturer of parts used in the equipment. The table includes the manufacturer's code used in table 6-2 to identify the manufacturers.

6-11. STOCK NUMBER IDENTIFICATION.

6-12. Allowance Parts List (APL) issued by the Electronics Supply Office (ESO) include Federal Stock Numbers and Source Maintenance and Recoverability Codes. Therefore, reference should be made to the APL prepared for the equipment for stock numbering information.

6-13. NOTES.

6-14. Parts variation within each article are identified by a Letter Symbol in the Notes Column of table 6-2. The absence of a Letter Symbol in the Notes Column indicates that the part is used on all articles covered by this manual.

Note 1 - selected value at assembly.

TABLE 6-1. LIST OF ASSEMBLIES

UNIT AND ASSEMBLY NO.	QTY	NAME	IDENTIFYING FIGURE	PARTS PAGE
1	1	Radio Receiver	1-1	6-3
1A1	1	Case	5-21, 5-22	6-3
1A1A1	1	Filter box	5-22	6-3
1A2	1	Main frame	5-18	6-3 — 6-8
1A2A1	1	Mode selector	5-18, 5-23	6-8 — 6-10
1A2A2	1	IF./audio amplifier	5-18, 5-28	6-10 — 6-14
1A2A3	1	IF./audio amplifier	5-18, 5-31	6-14
1A2A4	1	RF amplifier	5-18	6-15
1A2A5	1	Frequency standard	5-18	6-15
1A2A6	1	Translator/ synthesizer	5-18, 5-36	6-15
1A2A7	1	Code generator	5-35	6-15 — 6-16
1A2A8	1	Power supply	5-20, 5-34	6-16
1A2A9	1	Antenna overload	5-20, 5-37	6-16
1A2A10	1	Panel lamp assembly	5-17	6-17
1A2A11	1	CPS vernier assembly	5-17	6-18

TABLE 6-2. MAINTENANCE PARTS LIST

RECEIVER, RADIO R-1051B/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1		RECEIVER,RADIO R-1051B/URR: Mfr 06845, pn 2058947-0502.	1-1

CASE ASSEMBLY RECEIVER

1A1		CASE ASSEMBLY RECEIVER: Mfr 06845, pn 666230-006 or 403067 9-0501	5-21 5-22
1A1H1-H6		INSERT: Mfr 83324, pn 540725-131.	5-22
1A1H7-H10		POST, CABLE: 0.750 in. w across flats × 0.40 in. lg, nylon per MIL-P-17091, mfr 58189, pn 666231-373.	
1A1J1-J22		Not used	
1A1J23		CONNECTOR, RECEPTACLE, ELECTRICAL: 1.1563 in. lg, 0.6875 in. dia, mfr 91146, pn NJBFO.	5-21
1A1J24		CONNECTOR, RECEPTACLE, ELECTRICAL: 1.1563 in. lg, 0.6875 in. dia, mfr 71468, pn BNCJB7FO.	
1A1J25		Same as A1J23.	
1A1MP1		CAP, RECEPTACLE - for J24: Type CW123A/U.	
1A1MP2		CAP, RECEPTACLE - for J25: Type MX913/U.	5-21
1A1MP3		SLIDE, RIGHT HAND (complete - includes case and chassis assembly): Mfr 05236 or 83508, 06845, dwg 4030800-0702.	5-22
1A1MP4		SLIDE, LEFT HAND (complete - includes case and chassis assembly): Mfr 05236 or 83508, 06845, dwg 4030800-0701.	
1A1MP5-MP8		BRACKET, SLIDE: Mfr 06845, pn 4030961-0501.	
1A1P1-P20		Not used	
1A1P21		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.635 in. w × 0.605 in. h, 0.633 in. thk steel shell, gold contacts, mfr 91146, pn DDMF50S.	
1A1P22		CONNECTOR, RECEPTACLE, ELECTRICAL: 1.541 in. w × 0.494 in. h, 0.390 in. thk steel shell, copper alloy contacts, mfr 91146, pn DAMF3W3S.	
1A1P22A1-A3		CONNECTOR PLUG, ELECTRICAL: Coaxial, rt angle, mfr 91146, pn DM53743-5054	5-22

FILTER BOX ASSEMBLY

1A1A1		FILTER BOX ASSEMBLY: Mfr 06845, pn 4030715-0501.	5-22
1A1A1C1-C26		CAPACITOR, FIXED CERAMIC: MIL type CK70AW102M.	5-22
1A1A1J1-J2		Not used	
1A1A1J3		CONNECTOR, RECEPTACLE, ELECTRICAL: 0.375 in. lg, × 1.375 in. w × 1.093 in. h; 3 contacts, mfr 77820, pn 71-741-16S5P.	5-21
1A1A1J4		CONNECTOR, RECEPTACLE, ELECTRICAL: 0.316 in. × 1.812 in. × 1.812 in. dia, 39 contacts, mfr 77820, pn PT07A20-39P.	
1A1A1J5-J6		CONNECTOR, PLUG, ELECTRICAL: Mfr 77820, pn 71-741-10SL4P.	5-21

CHASSIS, RECEIVER

1A2		CHASSIS, RECEIVER: Mfr 06845, pn 2058946-0501.	5-18
1A2C1		CAPACITOR, FIXED: MIL type CE51C121J.	5-19
1A2C2		CAPACITOR, FIXED: MIL type CE51C301G.	5-19
1A2C3		CAPACITOR, FIXED: 0.170 in. × 0.240 in. × 0.625 in. lg, 0.1 μF ±20%, 200 Vdc, mfr 02777, 06845, dwg 4030795-0703.	5-20
1A2CR1-CR4		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N649.	5-20
1A2DS1-DS2		Not used	
1A2DS3-DS4		Not used (refer to 1A2A10DS3)	

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CHASSIS, RECEIVER (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2DS5		LAMP, GLOW: -90 Vdc max./starting, 1.0 mA, 0.9375 in. lg, 0.290 in. dia, mfr 08806, pn NE2J.	5-16
1A2E1		TERMINAL, STANDOFF: 0.250 in. dia × 0.719 in. lg, mfr 81312, pn 766.	4-5
1A2E2		TERMINAL, GND: 0.25 in. dia, 0.66 in. lg, mfr 71279, pn 2381-1-05.	
1A2E3		TERMINAL, STANDOFF: 0.25 in. dia, 0.60 in. lg, mfr 71279, pn 2380-1.	
1A2E4		Same as 1A2E3	
1A2E5		Same as 1A2E1	4-5
1A2E6		Same as 1A2E2	4-3
1A2E7-E8		Same as 1A2E3	
1A2E9		Same as 1A2E2	
1A2E10		Same as 1A2E3	
1A2E11-E13		Same as 1A2E1	
1A2E14		Same as 1A2E3	
1A2E15-E18		Same as 1A2E1	
1A2E19		Same as 1A2E2	
1A2E20		Same as 1A2E1	
1A2E21		Same as 1A2E2	
1A2E22-E23		Same as 1A2E1	
1A2E24-E25		Same as 1A2E3	
1A2E26		Same as 1A2E1	
1A2E27-E28		Same as 1A2E2	
1A2E29-E30		Same as 1A2E1	
1A2E31-E32		Same as 1A2E2	
1A2E33-E34		Same as 1A2E1	
1A2E35		Same as 1A2E2	
1A2E36-E37		Same as 1A2E1	
1A2E38-E40		Same as 1A2E2	
1A2E41		Same as 1A2E3	
1A2E42		Same as 1A2E2	
1A2E43		Same as 1A2E1	4-3
1A2F1-F2		FUSE: 3/4 amp, slow blow, MIL type F02B250V3-4AS.	5-19
1A2FL1-FL2		FILTER, RADIO FREQUENCY: 0.844 in. lg, 0.670 in. dia, 0.3A, 2.7 ohms, 300 Vdc, mfr 56289, pn 1JX97.	5-20
1A2H1-H5		SCREW, CAPTIVE: Mfr 58189, pn 666164-260 or mfr 06845, 4030574-0001.	5-16
1A2H6		SCREW, CAPTIVE: Mfr 13809, or 06845, pn 666231-671.	5-16
1A2H7-H12		NUT, CAPTIVE: Mfr 13809, pn 666164-259.	5-17
1A2H13-H29		NUT, SELF LOCKING: Mfr 86455, pn LAC032-2.	5-19
1A2J1-J2		JACK, TIP: MIL spec JJ089.	5-16
1A2J3-J7		Not used	
1A2J8		CONNECTOR, RECEPTACLE, ELECTRICAL: 1.583 in. × 0.494 in. × 0.426 in., mfr 91146, pn DBMF25S.	5-20
1A2J9		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.729 in. lg, 0.494 in. w, 13 contacts, mfr 91146, pn DCMF13W6S.	5-19
1A2J9A1-A6		CONNECTOR, PLUG, ELECTRICAL: Coaxial, rt angle, mfr 91146, pn DM53743-5054	4-4
1A2J10		CONNECTOR, RECEPTACLE,, ELECTRICAL: 0.541 in. lg, 0.494 in. w, 0.429 in., 15 contacts, mfr 91146, pn DAMF 15S2.	5-19
1A2J11		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.789 in. lg, 0.494 in. w, 17 contacts, mfr 91146, pn DCMF17W5S.	5-19
1A2J11A1-A3		Same as 1A2J9A1	4-4
1A2J12		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.729 in. lg, 0.494 in. w, 25 contacts, mfr 91146, pn DCMF25W3S.	5-19
1A2J12A1-A3		Same as 1A2J9A1	4-4
1A2J13		CONNECTOR, RECEPTACLE, ELECTRICAL: 0.422 in. lg, 0.494 in. w, 1.541 in. dia, 3 contacts, mfr 91146, pn DAMF3W3S.	5-19

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CHASSIS, RECEIVER (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2J13A1		Same as 1A2J9A1	4-4
1A2J13A2		Not used	
1A2J13A3		Same as 1A2J9A1	4-4
1A2J14		Same as 1A2J13	5-19
1A2J14A1-A2		Not used	
1A2J14A3		Same as 1A2J9A1	4-4
1A2J15		Not used	
1A2J16		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.088 in. lg, 0.494 in. w, 13 contacts, mfr 91146, pn DBMF13W3S2.	5-19
1A2J16A1-A3		Same as 1A2J9A1	4-4
1A2J17		CONNECTOR, RECEPTACLE, ELECTRICAL: 2.088 in. lg, 0.494 in. w, 9 contacts, mfr 91146, pn DBMF9W4S2.	5-19
1A2J17A1-A4		Same as 1A2J9A1	4-4
1A2J18-J19		Same as 1A2J12	5-19
1A2J18A1-A3		Same as 1A2J9A1	4-4
1A2J19A1-A3		Same as 1A2J9A14-4.	
1A2J20		Not used	
1A2J21		CONNECTOR, RECEPTACLE, ELECTRICAL: 0.426 in. × 0.605 in. × 2.635 in. dia, mfr 91146, pn DDM50P..	5-20
1A2J22		CONNECTOR, RECEPTACLE, ELECTRICAL: 0.541 in. lg, 0.494 in. w, 3 contacts, mfr 91146, pn DAM3W3P.	5-20
1A2J22A1-A3		Same as 1A2J9A1	4-3
1A2K1-K3		RELAY, ARMATURE, ELECTROMAGNETIC: 0.427 in. × 1.085 in. × 1.330 in. dia, 2 form C/DPDT/, 3 amp at 28 Vdc, 975 ohms dc ±10% at 25 deg c, 26.5 Vdc RTV ±5%, mfr 02289, pn 2B2111.	5-20
1A2L1		INDUCTOR, POWER: 4.500 in. × 2.625 in. × 1.688 in. dia, 2 terminals, 175V working, mfr 70674, pn A14514.	5-19
1A2L2		INDUCTOR, POWER: 1.500 in. × 4.125 in. × 4.375 in. h, 2 terminals, 400 millihenrys, 1.4 amp, 140V working, mfr 93928, pn 16300-1.	5-19
1A2M1-M2		METER: audio level, electrical indicator, power level, 1 in. dia, RD case style 05, 3900 ohms ±2 dB at -10 dB, ± 1/2 dB at 0 dB, ±1 dB at +3 dB., mfr 81030, pn 3201-210.	5-16
1A2MP1-MP5		KNOB ASSEMBLY: Mfr 06845, pn 2058802-0501.	
1A2MP6-MP9		KNOB,CONTROL: MIL Spec type MS91528-102B.	
1A2MP10		KNOB: Dial skirted, white line, mfr 49956, pn 70-8WL2G.	
1A2MP11		Not used	
1A2MP12-MP13		DIAL, MC: Mfr 06845, pn 4013395-0501.	5-16
1A2MP14		SPROCKET ASSEMBLY: Triple, complete with all parts, 06845, pn 666162-221 or pn 4030590-0501.	5-20
1A2MP14A		CHASSIS SPIDER: W/o gears and hardware, mfr 06845, pn 666162-134.	
1A2MP14B-14G		BEARING, SLEEVE: Mfr 70901, pn 2031154-0001.	
1A2MP14H-14J		SPROCKET DRIVE: Pitch dia 1.411, pitch 0.1475, 30 teeth, mfr 72625, 06845, dwg 666273-099 or 4030801-0701.	5-20
1A2MP14K-14M		DISK, COUPLING: 0.875 in. dia × 0.390 in. cres, mfr 06845, pn 666231-631 or 4030895-0001.	5-19
1A2MP14N-14Q		SPRING WASHER: 0.562 in. dia × 0.001 in. thk, mfr 73682, 06845, dwg 810000-506.	5-19
1A2MP14R-14W		RING, RETAINING: Mfr 96906, pn MS16333-1819.	5-20
1A2MP14X-14Y		SHAFT, COUPLING: 0.1874 in. dia, 1.062 in. lg cres, mfr 06845, pn 666231-619 or 4030601-0501.	5-19
1A2MP14Z-14AB		RING, RETAINING: 0.472 in. od, 0.382 in. id, 0.025 in. thk, mfr 77339, pn TRC820	5-20
1A2MP14AC-14AE		CLAMP, SPROCKET: 0.344 in. w, 0.484 in. lg, 0.187 in. thk, mfr Metal Screw Products, Inc., pn A09455-001 or 4030502-0001.	5-20

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CHASSIS, RECEIVER (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2MP14AF		SHAFT, COUPLING: 0.1874 in. dia, 1.328 in. lg, cres mfr 06845, pn 666231-617 or 4030598-0501.	5-19
1A2MP14AG-14AI		PIN DOWEL: 96906 type no. MS16555-606.	5-19
1A2MP15		SPROCKET ASSEMBLY: Dual, with all parts 58189, pn 666162-222 or 4030675-0501.	5-20
1A2MP15A		CHASSIS, SPIDER, STAKED: W/o gears and hardware, mfr 06845, pn 666163-116 or 4030872-0501.	5-20
1A2MP15B-15C		Same as 1A2MP14AF	5-19
1A2MP15D-15E		SPROCKET, DRIVE: 1.463 in. dia, pitch dia 1.411, teeth 30, mfr 72625, 06845, dwg 666162-066 or 4030777-0701.	5-20
1A2MP15F-15G		Same as 1A2MP14N	5-19
1A2MP15H-15L		Same as 1A2MP14B	5-20
1A2MP15M-15N		Same as 1A2MP14K	5-19
1A2MP15P-15S		SPACER: 0.48 in. lg × 0.300 in. w × 0.062 in. thk, brass 1/2 hard, mfr 06845, pn 666163-806.	5-20
1A2MP15T-15U		BEARING ROLLER, NEEDLE: 1.11/32 od, 3/16 in. id, 1/4 in. lg, mfr 60380, pn B34.	5-20
1A2MP15V-15W		PIN, ROLLER: 0.1875 in. dia, 0.400 in. lg, cres mfr 06845, pn 666163-114.	
1A2MP15X-15Y		ARM, SPRING, ANGLED: 2.14 in. × 0.300 in. × 0.38 in., mfr 06845, pn 666163-199 or 4030879-0001.	
1A2MP15Z-15AA		WHEEL INDEX: 1.24 in. dia, 10 lobes, cres, mfr 06845, pn 666163-115.	5-20
1A2MP15AB-15AC		SCREW CAP, HEX SOCKET: 4-40 × 0.375 in. lg, mfr 06432, 06845, dwg 2031168-0702.	5-20
1A2MP15AD-15AE		Same as 1A2MP14AC	5-19
1A2MP15AF-15AG		Same as 1A2MP14AG	
1A2MP16		BLOCK ADJUSTABLE IDLER ASSEMBLY LOW, WITH SPROCKET: Mfr 06845, pn 666162-094 or 4030550-0501.	5-20
1A2MP16A		SHAFT, SPROCKET IDLER: 0.1875 in. dia, 0.64 in. lg, cres, 06845, pn 666162-073 or 4030871-0001.	
1A2MP16B		SPROCKET, WHEEL: Pitch 0.1475, teeth 24, dia 1.130, mfr 72625, 06845, dwg 666162-092 or 4030779-0701.	
1A2MP16C		Same as 1A2MP15T-15U	
1A2MP17		Same as 1A2MP16	
1A2MP17A		Same as 1A2MP16A	5-20
1A2MP17B		Same as 1A2MP16B	
1A2MP17C		Same as 1A2MP16C	
1A2MP18		BLOCK ADJUSTABLE IDLER ASSEMBLY HIGH, WITH SPROCKET: Mfr 06845, pn 666162-095 or 4030550-0502.	
1A2MP18A		Same as 1A2MP16A	
1A2MP18B		Same as 1A2MP16B	
1A2MP19		CHAIN: 19.7650 in., 0.1475 pitch, 134 pitches with master link, mfr 72625, pn CAV4147CL0019.7650IN, 06845, dwg 666273-066.	
1A2MP19A		MASTER LINK WITH KEEPER AND CLIP: Mfr 72625, pn CAV4147CL00.	
1A2MP20		CHAIN: 10 KC, 30.9750 in., 0.1475 pitch, 210 pitches with master link, for 10 KC drive, mfr 72625, pn CAV4147CL00-30.9750IN, 06845, dwg 666162-201.	
1A2MP20A		Same as 1A2MP19A	
1A2MP21		CHAIN: 23.8950 in., 0.1475 pitch, 162 pitches with master link for 100 KC drive, mfr 72625, pn CAV4147CL0023.8950IN, 06845, dwg 666162-202.	
1A2MP21A		Same as 1A2MP19A	5-20
1A2MP22		Not used.	

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CHASSIS, RECEIVER (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2MP23		MOUNTING KIT: For 1A2Q1, fabricate or procure.	5-20
1A2MP24-MP25		SPRING, DETENT: 06845, pn 666230-191	
1A2MP26-MP27		PIN, BEARING: 0.1562 in. dia, 0.40 in. lg, mfr 06845, pn 666230-187.	
1A2MP28-MP29		BEARING, ROLLER: Mfr 60380, pn B2-1-2-4.	5-20
1A2MP30-MP32		GEAR, MITER (PAIR): Diameteral pitch 64, teeth 32, pitch dia 500, mfr 00141, pn N2-1.	5-17
1A2MP33		SPROCKET, DRIVE: 30 teeth, pitch .1475 dia 1.411, od 1.463, mfr 72625, 06845, dwg 4030778-0701.	5-20
1A2MP34-MP35		SPROCKET, DRIVE: 36 teeth, ptich .1475, dia 1.692, mfr 72625, 06845, dwg 666162-109.	
1A2MP36-MP38		SHAFT, SUPPORT BRACKET GEAR, MACHINED: 0.171 in. dia × 2.122 in. lg, mfr 06845, pn 4030873-0001.	
1A2MP39-MP40		SHAFT, MCS, MACHINED: 0.0619 in. dia, 1.76 in. lg mfr 06845, pn 666231-235.	
1A2MP41		DETENT SHAFT (1 KC): Mfr 76854, pn Type H Base Frame, 06845, dwg 4030604-0701	
1A2MP42-MP43		SHAFT, FEEDTHRU (10-100 KC): 0.625 in. dia × 2.296 in. lg, mfr 76854, 06845, dwg 666163-194 or 4030788-0701.	5-20
1A2MP44-MP46		DIAL AND COLLAR ASSEMBLY (KCS): Mfr 06845, pn 666162-227.	5-17
1A2MP47-MP55		BEARING, BALL, ANNULAR: 0.422 in. OD × 0.1875 in. ID × 0.1406 in. thk, mfr 52676, pn SD1224VAC.	5-17
1A2MP56		PLATE STAKED (1 MHZ-KHZ): Mfr 06845, pn 4013365-0001.	5-16
1A2MP57		PLATE STAKED (10 MHZ): Mfr 06845, pn 4013364-0001.	
1A2MP58		LENS, INDICATOR LAMP (P/O X055): Mfr 11237, pn LC13YN.	
1A2MP59		Not used	
1A2MP60		KNOB, VERNIER DIAL: Mfr 23480, pn 4030603-0001.	
1A2MP61		KNOB, 100 CPS: 2.05 in. dia, 0.38 in. thk, mfr 23480, pn 2058964-0701.	
1A2MP62-MP63		KNOB: Ms91528-1N2B.	
1A2MP64-MP65		KNOB, LOCKING DEVICE: Mfr 49956, pn KL701G.	5-16
1A2MP66		ACTUATOR, INTERLOCK SWITCH, MODIFIED: Mfr 06845, pn 666230-745.	5-17
1A2MP67-MP68		BUSHING, SHAFT, PANEL CODE GENERATOR: Mfr 06845, pn 2058974-0001.	5-16
1A2MP69		PLATE, VERTICAL SUPPORT AND SHIELD (for reference only): 15.544 in. lg, 2.40 in. w, 0.58 in. thk, mfr 06845, pn 2058966-0501.	5-19
1A2MP70-MP71		HANDLE, RECEIVER FRONT PANEL: Mfr 06845, pn 540542-019.	5-16
1A2MP72-79		Not used	
1A2MP80		SPIRAL PIN: 1/16 in. dia. × 1/2 in. lg, MIL type MS39086-104	5-17
1A2Q1		TRANSISTOR: Case style A13, mfr 80131, pn 2N1209.	5-20
1A2R1 and R2		RESISTOR, VARIABLE, LINEAR PRECISION: 1000 ohms ±10%, 1.265 in. dia, 1.156 in. thk, include 1A2R11 and 1A2R12 mfr 01121, pn JD1E056S102UA.	5-17
1A2R3		RESISTOR: MIL type RV4SAYSD102A.	
1A2R4-R5		RESISTOR: MIL type RV4SAYSD252C.	
1A2R6		RESISTOR: MIL type RV4SAYSD253C.	5-17
1A2R7		Not used (refer to 1A2A11R7)	
1A2R8		RESISTOR, FIXED WIREWOUND: 1.125 in. lg, × 0.646in. × 0.317 in., 332 ohms ±3%, 5W, mfr 91637, pn RH5-33OHMSPORM3PCT.	5-20
1A2R9-R10		RESISTOR: MIL type RC07GF122J.	5-17

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CHASSIS, RECEIVER (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2R11, R12		Refer to 1A2R1,	5-17
1A2R13-R14		RESISTOR: MIL type RL07S433J.	
1A2R15-R16		RESISTOR: MIL type RL07S112J.	
1A2R17-R18		RESISTOR: MIL type RC07GF102J.	
1A2R19		RESISTOR: MIL type RC07GF331J.	5-17
1A2R20		RESISTOR: MIL type RL42S133J.	5-20
1A2R21, R22		RESISTOR: MIL type RL07S511J.	5-17
1A2R23		RESISTOR: MIL type RE65G64R9 (not present in early versions), A2A11A1R5 installed in lieu of A2R23.	5-19
1A2S1		SWITCH, TOGGLE: DPDT, 28 Vdc, 120 Vac, 0.469 in. dia, 1.281 in. lg, mfr 81640, pn TW2150.	5-17
1A2S2		SWITCH, ROTARY: 4 section, 18p, 8 position, nonshorting 1.350 in. od, 2.633 in. lg, mfr 76854, pn 276779K4.	5-17
1A2S3		Refer to 1A2A7	
1A2S4		Refer to 1A2A7	
1A2S5		Same as 1A2S1	5-17
1A2S6		Not used - refer to 1A2A11S6	
1A2S7		SWITCH, TOGGLE: MIL type MS35059-41.	5-18
1A2S8		INTERLOCK SWITCH: Mfr 91929, pn 11SM3T.	
1A2S9		SWITCH, TOGGLE: MIL type MS24656-231.	5-18
1A2T1		TRANSFORMER, POWER: 4.500 in. h, 2.750 in. w, 3.438 in. deep, 14 terminals 48-450 cps, 215V max, mfr 91574, pn W5508.	5-19
1A2W1		COAX TYPE NO. 28 (Double Shield - Miniature 50 Ohms): Mfr 06090, Raychem pn 42-508 (used in various assemblies).	5-20
1A2W2		COAX TYPE RG196: (Used in various assemblies).	5-20
1A2W3		SHIELDED PAIR TYPE B NO. 20: MIL Type per MIL-W-16878C.	5-19
1A2XC1-XC2		SOCKET, TUBE OCTAL: Mfr 72825, pn 2729-38.	5-20
1A2XDS1-XDS4		Not used (refer to 1A2A10XDS-3).	
1A2XDS5		HOUSING, LAMP INDICATOR: Mfr 72619, type LH74/2, 125 volts, 0.550 in. dia, 1.047 in. lg.	5-17
1A2XF1-XF2		FUSHEHOLDER: MIL type FHL17G.	5-16

RECEIVER MODE SELECTOR ASSEMBLY

1A2A1		RECEIVER MODE SELECTOR ASSEMBLY: Mfr 06845, pn 666230-015 or 4030939-0501	5-18
1A2A1C1-A, C2-A, C3-A		CAPACITOR, FIXED, MICA: 0.460 in. lg, 0.370 in. w, 0.180 in. thk, 130 pF ±2%, 300 Vdc, mfr 72136, 06845, dwg 4030802-0711.	5-23
1A2A1C1-B, C2-B, C3-B		CAPACITOR, FIXED, MICA: 0.450 in. lg, 0.358 in. w, 0.172 in. thk, 142 pf ±2%, 300 Vdc, mfr 72136, type DM15.	
1A2A1C1-C C2-C, C3-C		CAPACITOR, FIXED, MICA: 0.460 in. lg, 03.70 in. w, 0.190 in. thk, 150 pf ±2%, 300 Vdc, mfr 72136, 06845, dwg 4030802-0712.	5-23
1A2A1C4		Not used	
1A2A1C5, 6, 7		Same as 1A2A1C1	5-23, 5-24
1A2A1E1-E4		TERMINAL STUD: 0.093 in. dia × 0.240 in. lg, mfr 86577, pn 103-8B.	5-24
1A2A1E5		Not used	
1A2A1E6-E15		Same as 1A2A1E1	5-24
1A2A1FL1		FILTER, BANDPASS: Hermetically sealed case, cres or sb dip fin, 500 kHz, 2.250 in. × 0.750 in. × 0.670 in. oa dim, mfr 95105, pn 526-9420-000.	5-23

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER MODE SELECTOR ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1FL2		FILTER, BANDPASS: Hermetically sealed case, cres or sb dip fin, 500 kHz, 2.250 in. × 0.750 in. × 0.670 in. oa dim, mfr 95105, pn 526-9421-00.	5-23
1A2A1FL3		FILTER, BANDPASS: Hermetically sealed case, cres or sn dip pl fin, 500 kHz, 2.250 in. × 0.750 in. × 0.670 in. oa dim, mfr 95105, pn 526-9419-00.	5-23
1A2A1H1-H2		SCREW, CAPTIVE: Mfr 06845, pn 4030521-0001.	5-18
1A2A1MP1		FRAME, STAKED: 4.38 in. lg, × 3.275 in. w, × 2.078 in. h, mfr 06845, pn 4030600-0501.	5-23
1A2A1MP2		COVER, MARKED: 4.406 in. lg × 3.588 in. w, mfr 06845, pn 4030747-0501.	5-23
1A2A1P1		CONNECTOR: 2.088 in. lg × 0.494 in. h × 0.661 in. thk, mfr 91146, pn DBM13W3PC31(F115).	5-23
1A2A1P1A1-A3		CONNECTOR PLUG, ELECTRICAL: Coaxial rt angle, mfr 91146, pn DM53741-5040.	5-23
1A2A1P2		CONNECTOR: 2.088 in. lg × 0.494 in. h × 0.661 in. thk., mfr 91146, pn DBM9W4PF115.	5-25
1A2A1P2A1-A4		CONNECTOR, PLUG, ELECTRICAL: Coaxial rt angle, mfr 91146, pn DM53741-5040.	5-25
1A2A1R1-A	1	RESISTOR: MIL type RC07GF101J.	5-23
1A2A1R1-B	1	RESISTOR: MIL type RC07GF151J.	
1A2A1R1-C	1	RESISTOR: MIL type RC07GF181J.	
1A2A1R1-E	1	RESISTOR: MIL type RC07GF221J.	
1A2A1R1-F	1	RESISTOR: MIL type RC07GF271J.	
1A2A1R1-G	1	RESISTOR: MIL type RC07GF331J.	
1A2A1R1-H	1	RESISTOR: MIL type RC07GF391J.	
1A2A1R1-J	1	RESISTOR: MIL type RL07S431J.	
1A2A1R1-K	1	RESISTOR: MIL type RC07GF471J.	
1A2A1R1-L	1	RESISTOR: MIL type RL07S511J.	
1A2A1R1-M	1	RESISTOR: MIL type RC07GF561J.	
1A2A1R1-N	1	RESISTOR: MIL type RL07S621J.	
1A2A1R1-P	1	RESISTOR: MIL type RC07GF681J.	
1A2A1R1-Q	1	RESISTOR: MIL type RL07S751J.	
1A2A1R1-R	1	RESISTOR: MIL type RC07GF821J.	
1A2A1R1-S	1	RESISTOR: MIL type RL07S911J.	
1A2A1R1-T	1	RESISTOR: MIL type RC07GF102J.	
1A2A1R2-A	1	RESISTOR: MIL type RC07GF101J.	
1A2A1R2-B	1	RESISTOR: MIL type RC07GF151J.	
1A2A1R2-C	1	RESISTOR: MIL type RC07GF181J.	
1A2A1R2-D	1	RESISTOR: MIL type RC07GF221J.	
1A2A1R2-E	1	RESISTOR: MIL type RC07GF271J.	
1A2A1R2-F	1	RESISTOR: MIL type RC07GF331J.	
1A2A1R2-G	1	RESISTOR: MIL type RC07GF391J.	
1A2A1R2-H	1	RESISTOR: MIL type RL07S431J.	
1A2A1R2-J	1	RESISTOR: MIL type RC07GF471J.	
1A2A1R2-K	1	RESISTOR: MIL tyep RL07S511J.	
1A2A1W1-W2		Same as 1A2W2.	5-23
1A2A1A1		MODE GATES: Mfr 06845, pn 666231-740 or 4030740-0501.	5-24
1A2A1A1C1		CAPACITOR, FIXED: Metalized, paper, dielectric, 0.1 uf, ±10%, 200 Vdc, 0.625 in. × 0.240 in. × 0.260 in., mfr 06845, pn 4030795-0703.	
1A2A1A1C2-C4		CAPACITOR: MIL type CS13BF105M.	
1A2A1A1CR1-CR4		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N277.	
1A2A1A1R1		Same as 1A2R19	
1A2A1A1R2		Not used	
1A2A1A1R3		Same as 1A2R17	
1A2A1A1R4		Not used	
1A2A1A1R5		RESISTOR: MIL type RC07GF392J.	5-24

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER MODE SELECTOR ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1A1R6-R7		Same as 1A2A1A1R5	5-24
1A2A1A1TP1		JACK, TIP: L-loss polyamide/MIL-P-17091, BE cop cont. stl pl fin, 0.156 in. × 0.203 in. × 0.410 in. oa dim, mfr 74970, pn 105-751WHT.	5-24
1A2A1A2		FILTER AND GATE: 500 kHz, mfr 06845, pn 666231-035.	5-26
1A2A1A2C1		CAPACITOR, FIXED: Metalized, paper, dielectric, 0.2 μF ±20%, 200 Vdc, 0.275 in. w × 0.625 in. lg, mfr 02777, 06845, dwg 4030795-0704.	
1A2A1A2C2-C4		Same as 1A2A1A2C1	
1A2A1A2CR1		Same as 1A2A1A1CR1.	
1A2A1A2E1		Same as 1A2A1E1	
1A2A1A2R1		RESISTOR: MIL type RL20S911J.	
1A2A1A2R2		RESISTOR: MIL type RC07GF471J.	
1A2A1A2R3		Same as 1A2A1A2R2	
1A2A1A2R4		RESISTOR: MIL type RC07GF153J.	
1A2A1A2R5		RESISTOR: MIL type RL20S511J.	
1A2A1A2R6		RESISTOR: MIL type RC07GF101J.	5-26
1A2A1A3		BFO, RESISTOR-CAPACITOR ASSEMBLY: Mfr 06845, pn 666231-745, or 4030742-0501.	5-27
1A2A1A3C1		Same as 1A2A1A2C1	
1A2A1A3C2		CAPACITOR: MIL type CM06F302G03.	
1A2A1A3C3		CAPACITOR: MIL type CC52UJ111J.	
1A2A1A3C4		CAPACITOR: MIL type CM05F201G03.	
1A2A1A3C5		CAPACITOR: MIL type CM06F821G03.	
1A2A1A3C6		Same as 1A2A1A3C2	
1A2A1A3C7		Same as 1A2A1A2C1	
1A2A1A3C9		CAPACITOR: MIL type CM06F751G03.	
1A2A1A3CR1		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N954.	
1A2A1A3CR2-CR3		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N3064.	
1A2A1A3E1-E5		Same as 1A2A1E1	
1A2A1A3L1		REACTOR: 470 μH, nom L, 45L at 7.9 nom MCQ, 18.0 ohms max, 500 Vdc, 0.400 in. × 0.500 in oa dim, mfr 72259, pn V1H470.	
1A2A1A3Q1		TRANSISTOR, PNP: 0.370 in. dia, 0.260 in. h, mfr 04713, pn 2N4890.	
1A2A1A3Q2		TRANSISTOR: MIL type 2N1225.	
1A2A1A3R1		RESISTOR: MIL type RC07GF684J.	
1A2A1A3R2		RESISTOR: MIL type RC07GF105J.	
1A2A1A3R3		RESISTOR: MIL type RC07GF103J.	
1A2A1A3R4-A	1	RESISTOR: MIL type RC07GF103J.	
1A2A1A3R4-B	1	RESISTOR: MIL type RC07GF223J.	
1A2A1A3R4-C	1	RESISTOR: MIL type RC07GF473J.	
1A2A1A3R4-D	1	RESISTOR: MIL type RC07GF683J.	
1A2A1A3R4-E	1	RESISTOR: MIL type RC07GF823J.	
1A2A1A3R5		RESISTOR: MIL type RC07GF222J.	
1A2A1A3R6		Same as 1A2R17	
1A2A1A3R7		RESISTOR: MIL type RC07GF123J.	
1A2A1A3R8		RESISTOR: MIL type RC07GF183J.	
1A2A1A3R9		RESISTOR: MIL type RC07GF562J.	
1A2A1A3R10		RESISTOR: MIL type RC07GF272J.	
1A2A1A3R11		RESISTOR: MIL type RC07GF101J.	
1A2A1A3T1		TRANSFORMER; INTERMEDIATE FREQUENCY:: Approx. 107.5 turns CW, 900 Hz ±1 pF, mfr 06845, pn 4030501-0501.	
1A2A1A3TP2		Same as 1A2A1A1TP1	5-27

RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2		RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY: Mfr 06845, pn 666230-011 or mfr 06845, pn 4030674-0501.	5-18

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2H1-H2		Same as 1A2A1H1	5-18
1A2A2MP1		FRAME, STAKED: Mfr 06845, pn 4030591-0501.	5-28
1A2A2MP2		COVER, MARKED: Mfr 06845, pn 4030618-0501.	
1A2A2P1		CONNECTOR: 2.729 in. lg × 0.494 in. h × 0.661 in. thk, mfr 91146, pn DCM25W3PC31F115.	
1A2A2P1A1		Same as 1A2A1P1A1	
1A2A2P1A2		CONNECTOR, PLUG, ELECTRICAL: Coaxial, rt angle, mfr 91146, pn DM53741-5039.	
1A2A2P1A3		Same as 1A2A1P1A1	5-28
1A2A2T1		TRANSFORMER, RADIO FREQUENCY: Case/MIL-T-27A 7500 ohms, ±10%, CT Prim, 600 ohms, ±10%, CT Sec, 0.187 in. × 1.000 in. oa dim, mfr 16157, pn J813.	
1A2A2W1		CABLE, COAXIAL: MIL type RG196AU.	
1A2A2W2		CABLE, COAXIAL: Type no. 28DBLSHLD, mfr 06090, pn 42-508.	5-28
1A2A2A1		AMPLIFIER, AGC-AUDIO: Mfr 06845, pn 666230-959 or mfr 06845, pn 4030684-0501.	5-29
1A2A2A1C1		CAPACITOR: MIL type CS13BF685K.	
1A2A2A1C2		CAPACITOR: MIL type CS13BE156K.	
1A2A2A1C3		CAPACITOR: MIL type CS13BC396K.	
1A2A2A1C4		CAPACITOR, FIXED: Metalized, paper, phenolic coating, 0.500 in. lg × 0.222 in dia, 0.05 μF, ±20%, 100 Vdc, mfr 00656, type V146ZR.	
1A2A2A1C5		CAPACITOR, FIXED, ELECTROLYTIC: Plate ins, 0.185 in. dia, 0.510 in. lg, 22 μF ±10%, 100 Vdc, mfr 56289, pn 150D226X0010B2.	
1A2A2A1C6		CAPACITOR: MIL type CS13BF226K.	
1A2A2A1C7		CAPACITOR, FIXED: MIL type CK15AX223M.	
1A2A2A1C8		CAPACITOR, FIXED: MIL type CM06E821G03.	
1A2A2A1C9		Same as 1A2A2A1C4	
1A2A2A1C10		Same as 1A2A1A3C8	
1A2A2A1C11		CAPACITOR, FIXED: Metalized, plastic film, 0.500 in. lg, 0.222 in. dia, 0.01 μF ±20%, 100 Vdc, mfr 00654, type V146ZR.	
1A2A2A1C12		Same as 1A2A2A1C2	
1A2A2A1C13		Same as 1A2A2A1C2	
1A2A2A1CR1-CR2		Same as 1A2A1A1CR1	
1A2A2A1CR3		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N645.	
1A2A2A1CR4-CR5		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N3064.	
1A2A2A1E1-E12		Same as 1A2A1E1	
1A2A2A1Q1		TRANSISTOR: MIL type 2N1131.	
1A2A2A1Q2		Same as 1A2A2A1Q1	
1A2A2A1Q3		TRANSISTOR: MIL type 2N706.	
1A2A2A1Q4		TRANSISTOR: MIL type 2N706.	
1A2A2A1Q5		Same as 1A2A2A1Q3	
1A2A2A1Q6		TRANSISTOR: MIL type 2N328A.	
1A2A2A1Q7		Same as 1A2A1A3Q2	
1A2A2A1Q8		Same as 1A2A1A3Q2	
1A2A2A1Q9		TRANSISTOR: MIL type 2N652A.	
1A2A2A1R1		RESISTOR: MIL type RL07S622J.	
1A2A2A1R2		Same as 1A2R17	
1A2A2A1R3		RESISTOR: MIL type RC07GF272J.	
1A2A2A1R4		RESISTOR: MIL type RC07GF182J.	
1A2A2A1R5		RESISTOR: MIL type RL07S511J.	
1A2A2A1R6		RESISTOR, VARIABLE: 0.500 in. lg, 0.220 in. w, 1000 ohms ±5%, minus 65 deg C to plus 175 deg C, mfr 80294, pn 3250W66-102.	
1A2A2A1R7		RESISTOR: MIL type RC07GF332J.	
1A2A2A1R8		RESISTOR: MIL type RL07S621J.	5-29

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A1R9		Same as 1A2R17	5-29
1A2A2A1R10		Same as 1A2R17	
1A2A2A1R11		RESISTOR: MIL type RL07S752J.	
1A2A2A1R12		RESISTOR: MIL type RC07GF103J.	
1A2A2A1R13		RESISTOR: MIL type RC07GF682J.	
1A2A2A1R14		Same as 1A2R19	
1A2A2A1R15		RESISTOR: MIL type RL07S362J.	
1A2A2A1R16		RESISTOR: MIL type RL07S512J.	
1A2A2A1R17		RESISTOR: MIL type RC07GF683J.	
1A2A2A1R18		Same as 1A2A2A1R3	
1A2A2A1R19		Same as 1A2A2A1R17	
1A2A2A1R20		Same as 1A2A2A1R13	
1A2A2A1R21		Same as 1A2A1A1R5	
1A2A2A1R22		Same as 1A2A2A1R12	
1A2A2A1R23		Same as 1A2A1A2R4	
1A2A2A1R24		RESISTOR: MIL type RL07S201J.	
1A2A2A1R25		RESISTOR, VARIABLE: 1.250 in. lg, 0.190 in. w, 5000 ohms ±5%, minus 65 deg C to plus 175 deg C, mfr 80294, pn 224P1-502.	
1A2A2A1R26		Same as 1A2A2A1R12	
1A2A2A1R27		Same as 1A2A2A1R12	
1A2A2A1R289		Same as 1A2A2A1R12	
1A2A2A1R29		Same as 1A2A2A1R3	
1A2A2A1R30		RESISTOR: MIL type RC07GF101J.	
1A2A2A1R31		RESISTOR: MIL type RC07GF472J.	
1A2A2A1RT1		RESISTOR, THERMAL: 5290 ohms plus 5%, 4.8 deg C temp. coef, 0 deg C to 50 deg C temp range, 0.270 in. dia, 0.100 in. thk, mfr 75263, pn RL2006-2930-120S4.	
1A2A2A1T1		TRANSFORMER, RF: 0.490 in. lg × 0.422 in. dia, 500 kHz frequency, secondary load resis 6.2 ohms, dielectric voltage 100 V rms, mfr 06845, pn 2058935-0505.	
1A2A2A1T2		TRANSFORMER, RF: 0.490 in. lg × 0.422 in. dia, 500 kHz primary load 1.5 ohms, mfr 06845, pn 2058935-0506.	
1A2A2A1TP1		Same as 1A2A1A1TP1	
1A2A2A1TP2		Same as 1A2A1A1TP2	5-29
1A2A2A2		IF AUDIO AMPLIFIER: Mfr 06845, pn 666230-949 or pn 4030957-0501.	5-33
1A2A2A2C1		Same as 1A2A1A1C1	
1A2A2A2C2		Same as 1A2A1A1C1	
1A2A2A2C3		CAPACITOR, FIXED, MICA: 0.470 in. lg, 0.378 in. h, 0.220 in. thk, 820 pF, ±2%, 300 Vdc, mfr 72136, pn DM15E821G300VWDC.	
1A2A2A2C4		Same as 1A2A2A1C4	
1A2A2A2C5		Same as 1A2A2A1C4	
1A2A2A2C6		Same as 1A2A1A1C1	
1A2A2A2C7		Same as 1A2A2A1C4	
1A2A2A2C8		Same as 1A2A2A2C3	
1A2A2A2C9		Same as 1A2A1A1C1	
1A2A2A2C10		Same as 1A2A2A1C4	
1A2A2A2C11		Same as 1A2A2A2C3	
1A2A2A2C12		CAPACITOR, FIXED: 0.222 in. dia. 0.500 in. lg, 0.05 μF ±20%, 100 Vdc, mfr 00654, type V146ZR.	
1A2A2A2C13		Same as 1A2A2A1C4	
1A2A2A2C14		Not used	
1A2A2A2C15		Same as 1A2A1A1C1	
1A2A2A2C16		Same as 1A2A2A1C2	
1A2A2A2C17		Same as 1A2A2A1C2	
1A2A2A2C18		CAPACITOR: MIL type CS13BE476K.	
1A2A2A2C19		Same as 1A2A2A1C1	5-33

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A2C20		Same as 1A2A2A1C2	5-33
1A2A2A2C21		Same as 1A2A2A1C2	
1A2A2A2C22		Same as 1A2A2A1C2	
1A2A2A2C23		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.732 in. × 0.478 in. × 0.200 in. 1200 μμF, ±5%, mfr 72136, pn DM20E122J500V.	
1A2A2A2C24		Same as 1A2A2A1C2	
1A2A2A2C25		CAPACITOR: MIL type CS13BF476K.	
1A2A2A2C26		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.360 in. lg, 0.360 in. w, 0.01 μF plus 100%, minus 20%, 75 Vdc, mfr 86335, pn K4000.01Z.	
1A2A2A2CR1		Same as 1A2A2A1CR3	
1A2A2A2L1		COIL: MIL type MS90537-6.	
1A2A2A2Q1		Same as 1A2A1A3Q2	
1A2A2A2Q2		Same as 1A2A2A1Q3	
1A2A2A2Q3		Same as 1A2A2A1Q3	
1A2A2A2Q4		Same as 1A2A1A3Q2	
1A2A2A2Q5		Same as 1A2A1A3Q2	
1A2A2A2Q6		Same as 1A2A1A3Q2	
1A2A2A2Q7		TRANSISTOR: MIL type 2N2905A.	
1A2A2A2Q8		Same as 1A2A2A2Q7	
1A2A2A2Q9		TRANSISTOR: MIL type 2N1131.	
1A2A2A2Q10		Same as 1A2A2A2Q9	
1A2A2A2R1		Same as 1A2A1A2R4	
1A2A2A2R2		Same as 1A2A2A1R12	
1A2A2A2R3		Same as 1A2A2A1R12	
1A2A2A2R4		Not used	
1A2A2A2R5		RESISTOR: MIL type RC07GF151J.	
1A2A2A2R6		Same as 1A2A1A2R2	
1A2A2A2R7		RESISTOR: MIL type RC07GF561J.	
1A2A2A2R8		Same as 1A2R17	
1A2A2A2R9		RESISTOR: MIL type RC07GF470J.	
1A2A2A2R10		Same as 1A2A1A2R4	
1A2A2A2R11		Same as 1A2A2A1R12	
1A2A2A2R12		Same as 1A2A2A1R12	
1A2A2A2R13		RESISTOR: MIL type RC07GF220J.	
1A2A2A2R14		Same as 1A2A1A2R4	
1A2A2A2R15		Same as 1A2A2A1R12	
1A2A2A2R16		Same as 1A2A2A1R12	
1A2A2A2R17		Same as 1A2A1A2R6	
1A2A2A2R18		RESISTOR: MIL type RL07S620J.	
1A2A2A2R19		Same as 1A2A1A2R4	
1A2A2A2R21		Same as 1A2A2A1R12	
1A2A2A2R22		RESISTOR, VARIABLE: 0.500 in. lg, 0.220 in. w, 200 ohms ±5%, minus 65 deg C to plus 175 deg C, mfr 80294, pn 3250W1-201.	
1A2A2A2R23		RESISTOR: MIL type RL07S510J.	
1A2A2A2R24		Same as 1A2A2A1R12	
1A2A2A2R25		RESISTOR: MIL type RL07S113J.	
1A2A2A2R26		Same as 1A2R17	
1A2A2A2R27		Same as 1A2R17	
1A2A2A2R28		RESISTOR: MIL type RL07S163J.	
1A2A2A2R29		RESISTOR: MIL type RC07GF472J.	
1A2A2A2R30		Same as 1A2A2A1R1	
1A2A2A2R31		Same as 1A2A2A2R18	
1A2A2A2R32		Same as 1A2A2A2R7	
1A2A2A2R33		Same as 1A2A2A1R8	
1A2A2A2R34		RESISTOR: MIL type RC07GF821J.	
1A2A2A2R35		RESISTOR: MIL type RC07GF121J.	5-33

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

RECEIVER, INTERMEDIATE FREQUENCY/AUDIO AMPLIFIER ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A2R36		Same as 1A2A2A2R29	5-33
1A2A2A2R37		RESISTOR: MIL type MS35043-47.	
1A2A2A2R38		Same as 1A2A2A1R13	
1A2A2A2R39		Same as 1A2R19	
1A2A2A2T1		TRANSFORMER, RF: 0.422 in. dia × 0.490 in. lg, 500 kHz frequency, secondary load resis. 330 ohms, dielectric voltage 100 V rms, mfr 06845, pn 2058935-0501.	
1A2A2A2T2		TRANSFORMER, RF: 0.490 in. lg, × 0.422 in. dia, 500 kHz frequency, secondary load resis 22 ohms, dielectric voltage 100 V rms, mfr 06845, pn 2058935-0502.	
1A2A2A2T3		TRANSFORMER, RF: 0.490 in. lg × 0.422 in. dia, 500 kHz frequency, secondary load resis 62 ohms, dielectric voltage 100 V rms, mfr 06845, pn 2058935-0503.	
1A2A2A2T4		TRANSFORMER, RF: 0.490 in. lg × 0.422 in. dia, 51 ohms dielectric voltage 100 V rms, mfr 06845, pn 2058935-0504.	
1A2A2A2T5		TRANSFORMER, AUDIO FREQUENCY: Molded epoxy resin case, 25000 ohms ±15% center tapped, primary 1200 ohms ±15% center tapped secondary, 0.781 in × 0.531 in. × 0.875 in. OA dim, mfr 01961, pn PE9334.	5-33
1A2A2A3		DETECTOR, SSB-AM: Mfr 06845, pn 666230-954 or 4030683-0501.	5-30
1A2A2A3C1		Same as 1A2A2A1C3	
1A2A2A3C2		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.200 in. lg, 0 - 200 in. w, 0.002 μ F, plus 100% minus 20%, 75 Vdc, mfr 86335, pn K4000N.002Z.	
1A2A2A3C3		Same as 1A2A2A3C2	
1A2A2A3C4		Same as 1A2A2A1C3	
1A2A2A3C5		Same as 1A2A1A1C1	
1A2A2A3C6		Same as 1A2A2A2C3	
1A2A2A3C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.270 in. lg, 0.270 in. w, 0.005 μ F, plus 100%, minus 20%, 75 Vdc, mfr 86335, pn K4000N.005Z.	
1A2A2A3CR1		Same as 1A2A1A1CR1	
1A2A2A3CR2		Same as 1A2A1A1CR1	
1A2A2A3E1-E13		Same as 1A2A1E1	
1A2A2A3L1		INDUCTOR, VARIABLE: 0.422 in. dia, × 0.490 in. lg, 500 kHz frequency, mfr 06845, pn 2058922-0501.	
1A2A2A3Q1		Same as 1A2A1A3Q1	
1A2A2A3Q2		Same as 1A2A1A3Q1	
1A2A2A3Q3		Same as 1A2A1A3Q1	
1A2A2A3R1		RESISTOR: MIL type RC07GF120J.	
1A2A2A3R2		Same as 1A2R9	
1A2A2A3R3		Same as 1A2A2A3R1	
1A2A2A3R4		Same as 1A2R9	
1A2A2A3R5		RESISTOR: MIL type RL07S202J.	
1A2A2A3R6		Same as 1A2A2A1R12	
1A2A2A3TP1-TP2		Not Used	
1A2A2A3TP3		Same as 1A2A1A1TP1	
1A2A2A3T1		Same as 1A2A2A2T5	5-30

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

IF./AUDIO AMPLIFIER ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A3		IF./AUDIO AMPLIFIER ASSEMBLY: Mfr 06845, pn 666230-011 or mfr 06845, pn 4030674-0501. NOTE: This assembly is identidcal to 1A2A2. Use 1A2A2 prefix in lieu of 1A2A3 for parts identification and location.	5-18

RF AMPLIFIER ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4		RF AMPLIFIER ASSEMBLY: Mfr 58189, pn A70733-001, mfr 06845, pn 666230-029, or mfr 06845, pn 4030677-0501. NOTE: This assembly is depot repairable except replacement of vacuum tubes. All parts are listed in Overhaul and Repair Manual, NAVSHIPS 0967-034-2000.	5-18
1A2A4V1		TUBE, ELECTRON: MIL type 6BZ6	
1A2A4V2		TUBE, ELECTRON: MIL type 6AN5WA	5-18

FREQUENCY STANDARD ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5		FREQUENCY STANDARD ASSEMBLY: Mfr 58189, pn 666230-006, mfr 06845, pn 4013399-0701, or mfr 58189, pn A70744-001.	5-18
1A2A5H1-H2		SCREW, CAPTIVE: Mfr 14844, pn 5227-946. NOTE: This assembly is depot repairable. All parts are listed in Overhaul and Repair Manual, NAVSHIPS 0967-034-2000.	5-18

TRANSLATOR/SYNTHESIZER ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6		TRANSLATOR/SYNTHESIZER ASSEMBLY: Mfr 06845, pn 2058940-0501, mfr 06845, pn 2058940-0502, mfr 58189, pn A70733-001. NOTE: This assembly (of six sub-modules) is depot repairable. All parts are listed in Overhaul and Repair Manual, NAVSHIPS 0967-034-2000.	5-18

CODE GENERATOR ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A7		CODE GENERATOR ASSEMBLY (for use in Receivers only): Mfr 58189, pn 666230-794 or 809000-252 or mfr 06845, pn 809000-252 or 06845, pn 4030745-0501. The Code Generator Assembly (for use in Exciter (T-827( )/URT or Receiver R-1051( )/URR) mfr 58189, pn 666230-795 or 809000-253 or 06845, pn 4030746-0501.	5-20
1A2A7A1		PRINTED CIRCUIT BOARD (PCB) 1st (FRONT) SECTION: (For reference only), mfr 06845, pn 4030743-0501.	5-35
1A2A7A2		PCB, 2nd SECTION: (For reference only), mfr 06845, pn 4030937-0501	5-35

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CODE GENERATOR ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A7A3		PCB, 3rd SECTION: (For reference only) Mfr 06845, pn 4030744-0501.	5-35
1A2A7A4		PCB, 4th SECTION: (For reference only) Mfr 06845, pn 4030748-0501.	
1A2A7A5		PCB, 5th SECTION: (For reference only) Mfr 06845, pn 4030740-0501.	
1A2A7H1		SCREW, CAPTIVE: (For reference only) Mfr 06845, pn 666273-015.	
1A2A7MP1		MOUNTING PLATE: (For reference only), 3.800 in. × 3.40 in. × 0.090 in. thk, mfr 06845, pn 666273-014.	
1A2A7MP2-MP3		COUPLING DISK 1 AND 10 MHz: (For reference only), 0.750 in. dia × 0.284 in., mfr 06845, pn 666231-236.	
1A2A7MP4-MP5		SHAFT, 1 AND 10 MHz: (For reference only), 0.210 in. dia × 1.76 in. lg mfr 06845, pn 666231-235.	5-35

POWER SUPPLY PRINTED CIRCUIT BOARD

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A8		POWER SUPPLY PRINTED CIRCUIT BOARD: With all parts mounted. Mfr 06845, pn 666230-755 or 4030719-0501.	5-20
1A2A8C1-C2		Not used.	
1A2A8C3-C4		CAPACITOR: MIL type C1640K390MP3.	5-36
1A2A8C5		Not used	
1A2A8C6		CAPACITOR: MIL type CS13BF156K.	
1A2A8C7		CAPACITOR, FIXED, TANTALUM: 0.765 in. lg × 0.375 in. dia, 120 μF, +75 -15%, 40 Vdcw, mfr 14433, pn TO314-120MFD7500RM15%.	
1A2A8CR1-CR4		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N649.	
1A2A8CR5-CR8		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N4246.	
1A2A8CR9-CR12		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N277.	
1A2A8CR13-CR14		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N3024B	
1A2A8CR15		Same as 1A2A8CR9	5-36
1A2A8CR16		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N963B.	5-36
1A2A8CR17		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N750A.	5-36
1A2A8Q1		TRANSISTOR: MIL type 2N1131.	
1A2A8Q2-Q4		TRANSISTOR: MIL type 2N697.	
1A2A8R1-R2		RESISTOR, FIXED: 47 ohms 1W MIL type RC32GF470J.	
1A2A8R3		Same as 1A2A1A2R6.	
1A2A8R4		RESISTOR, FIXED: MIL type MS35043-87.	
1A2A8R5		RESISTOR, FIXED: MIL type MS35043-55.	
1A2A8R6		RESISTOR, FIXED: MIL type RL07S302J.	
1A2A8R7		Same as A2A2A2R29	
1A2A8R8		Same as A2A2A2R34	
1A2A8R9		RESISTOR, FIXED: MIL type RC07GF681J.	
1A2A8R10-R11		Same as A2A2A2R29	
1A2A8R12		Same as A2R17	
1A2A8R13		RESISTOR, FIXED: MIL type RC07GF152J.	5-36
1A2A8R14		RESISTOR, VARIABLE: 1.250 in. lg, 0.190 in. W, dia. 500 ohms ±5%, mfr 80294, pn 224P1-501.	5-36
1A2A8R15		Same as 1A2R19	5-36

ANTENNA OVERLOAD PROTECTION PRINTED CIRCUIT BOARD ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A9		ANTENNA OVERLOAD PCB ASSEMBLY: Consists of 1A2A9A1 and 1A2A9A2 with all components mounted. mfr 24558, pn 450SK2110269.	5-20
1A2A9A1		PRINTED CIRCUIT BOARD: (For reference only)	
1A2A9A1C1		CAPACITOR, FIXED CERAMIC: 0.001 μF, 500 volts dc, MIL-C-11015 type CK61Y102Z.	5-37

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

PRINTED CIRCUIT BOARD ASSEMBLY (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A9A1C2		CAPACITOR, FIXED GLASS: 5.1 pF, MIL-C-11272 type CY10C5R1C.	5-37
1A2A9A1C3		CAPACITOR, FIXED GLASS: 3.0 pF, MIL-C-11272 type CY10C3ROC.	
1A2A9A1C4		CAPACITOR, TANTALUM ELECTROLYTIC: 4.7 μF, 50 volts dc, type CS13BG475K.	
1A2A9A1CR-CR2		CRYSTAL RECTIFIER: Silicon diode, type JAN 1N4148.	
1A2A9A1K1		RELAY: MIL-R-5757, type M5757/9-003, 26.5 Vdc/700 ohms, Allied control RY4YY4B3P11.	
1A2A9A1Q1-Q2		TRANSISTOR: Type JAN 2N1613.	
1A2A9A1R1		RESISTOR, FIXED COMPOSITION: 27K ohm, 5%, 1/2W MIL-R-39008A, type RCR20G273JS	
1A2A9A1R2		RESISTOR, FIXED COMPOSITION: 39K ohm, 5%, 1/2W MIL-R-39008A, type RCR20G393JS.	
1A2A9A1R3		RESISTOR, FIXED COMPOSITION: 56K ohm 5%, 1/4W MIL-R-39008A, type RCR07G563JS.	
1A2A9A1R4		RESISTOR, FIXED COMPOSITION: 12K ohm 5%, 1/4W MIL-R-39008A, type RCR07G123JS.	
1A2A9A1R5		RESISTOR, FIXED COMPOSITION: 470 ohm, 5%, 1/4W MIL-R-39008A, type RCR07G471JS.	
1A2A9A1R6		RESISTOR, FIXED COMPOSITION: 27K ohm, 5%, 1/4W MIL-R-39008A, type RCR07G273JS.	
1A2A9A1R7		Same as R4	
1A2A9A1R8		RESISTOR, FIXED COMPOSITION: 2700 ohm, 5%, 1/2W MIL-R-39008A type RCR20G272JS.	
1A2A9A1R9		RESISTOR, FIXED COMPOSITION: 220 ohm, 5%, 1/2W MIL-R-39008A type RCR20G221JS.	
1A2A9A1R10		RESISTOR, FIXED COMPOSITION: 5100 ohm, 5%, 2W MIL-R-39008A type RCR42G512JS.	
1A2A9A2		PLASTIC COVER BOARD: (For reference only) Includes 1A2A9A2CR3 thru CR6.	
1A2A9A2CR1-CR2		Not used	
1A2A9A2CR3-CR4		CRYSTAL RECTIFIER: Silicon diode, type JAN 1N4148.	
1A2A9A2CR5-CR6		ZENER DIODE: Type JAN 1N3029B.	5-37

LIGHT PANEL SUBASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A10		LIGHT PANEL SUBASSEMBLY: pn 06845, pn 666230-235 or pn 4030553-0501.	5-17
1A2A10DS1-S2		Not used	
1A2A10DS3-S4		LAMP: Mfr 72914, 28 volts, 0.04 amps, type A9906-1.	5-17
1A2A10XDS1-XDS2		Not used	
1A2A10XDS3-XDS4		SOCKET, LAMP: 0.437 in. dia, 0.563 in. lg, mfr 72914 pn A9905-4.	5-17

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

CPS-VERNIER ASSEMBLY

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A11		CPS-VERNIER ASSEMBLY: Includes switch, gears, detent, vernier control and PCB with all parts, mfr 06845, pn 2058943-0501.	5-17
1A2A11MP1		DETENT SUBASSEMBLY: Mfr 76854, pn 4030494-0501.	5-18
1A2A11MP2		GEAR, SPUR, RECESSED: Idler diametral pitch 48, pressure angle 20° teeth 26, pitch diameter 0.5416, mfr 00141, pn G3-26 mod, A00009-001.	
1A2A11MP3		GEAR, SPUR, MODIFIED: diametral pitch 48, pressure angle 20°, teeth 36, pitch diameter 0.7500, mfr 00141 pn G2-36.	5-18
1A2A11R1-R6		Not used	
1A2A11R7		POTENTIOMETER, VERNIER: 30 K ohms ±5%, 2W 1.312 in. dia × 2.125 in., mfr 73138, pn SG1231.	5-17
1A2A11S6A		SWITCH SECTION ROTARY: (front) 0.906 in. dia × 0.088 in. 2 poles, 12 positions, non shorting contacts, 1 amp at 115 volts, mfr 31356, pn 5205.	
1A2A11S6B		SWITCH SECTION ROTARY: (center section) 0.906 in. dia × 0.088 in., 2 poles, 12 positions, non shorting contacts 1 amp at 115 volts, mfr 31356, pn 5211.	
1A2A11S6C		SWITCH SECTION ROTARY: (rear section) same as 1A2A11S6B	
1A2A11A1		4 VOLT PS - VERNIER PRINTED CIRCUIT BOARD: With all parts mounted, mfr 06845, pn 2058942-0501.	5-17
1A2A11A1C1		CAPACITOR: MIL type CS13BF105M.	5-38
1A2A11A1C2		CAPACITOR, FIXED CERAMIC: 0.340 in. W 0.480 in. H 0.125 in. thk 0.01MFD-20%, 75 Vdcw, mfr 86335, pn SSM.01-88.	5-38
1A2A11A1C3		Same as A2A11A1C1	5-38
1A2A11A1C4		CAPACITOR, FIXED MYLAR: 0.625 in. lg, 0.275 in. W, 0.215 in. thk, 0.2MFD±20%, 200 Vdcw, mfr 02777, 06845 dwg 4030795-0704.	
1A2A11A1CR1		SEMICONDUCTOR: MIL type 1N748A.	
1A2A11A1CR2		SEMICONDUCTOR: MIL type 1N746A.	
1A2A11A1R1		RESISTOR, FIXED: MIL type RC07GF333J.	
1A2A11A1R2		RESISTOR, VARIABLE: MIL type RT22C2P502.	
1A2A11A1R3		RESISTOR: MIL type RL07S512J.	
1A2A11A1R4		RESISTOR: MIL type RC20GF102J.	
1A2A11A1R5		RESISTOR: MIL type RWP21F63R4F, used in early version.	
1A2A11A1R6		RESISTOR: MIL type RL20S203J.	
1A2A11A1R7		RESISTOR: MIL type RC20GF825J.	5-38

TABLE 6-3. LIST OF MANUFACTURERS

MFR CODE	NAME	ADDRESS
00141	PIC Design Corporation	P.O. Box 335 Benrus Center Ridgefield, Ct. 06877
00654	Electroforms, Inc.	239 E. Gardenia Boulevard Gardena, Calif. 90247
00656	Aerovox Corporation	740 Belleville Avenue New Bedford, Ma. 02741
01121	Allen-Bradley Company	1201S. 2nd Street Milwaukee, Wi. 53204
01961	Pulse Engineering Inc.	560 Robert Avenue Santa Clara, Calif. 95050
02289	HIG, Inc.	Spring Street and Route 75 Windsor Locks, Conn. 06096
02777	Hopkins Engineering Company	12900 Foothill Boulevard San Fernando, Calif. 91342
04713	Motorola, Inc. Semiconductor Products Division	5005 E. McDowell Road Phoenix, Az. 85008
05236	Jonathan Manufacturing Company	1101 S. Acacia Avenue Fullerton, Calif. 92631
06090	Raychem Corporation	300 Constitution Drive Menlo Park, Calif. 94025
06432	All Craft Screw and Hardware Company, Inc.	40-17-22nd Street Long Island City, N. Y. 11101
06845	The Bendix Corporation Communications Division	E. Joppa Road Baltimore, Md. 21204
08806	General Electric Company Miniature Lamp Department	Nela Park Cleveland, Ohio 44112
11237	CTS Keene, Inc.	3230 Riverside Avenue Paso Robles, Calif. 93446
13809	Merka Mfg Corp.	29-10 37th Avenue Long Island City, N.Y. 11101
14433	ITT Semiconductors, A Division of International Telephone and Telegraph Corp.	3301 Electronics Way West Palm Beach, Fla. 33401
16157	Dynamic Components Corporation	1 Franklin Street Hornell, N.Y. 14843
23480	Electronic Hardware Corp.	180-08 Liberty Avenue Jamaica, N.Y. 11433

TABLE 6-3. LIST OF MANUFACTURERS (Cont)

MFR CODE	NAME	ADDRESS
24558	Naval Ship Engineering Center Norfolk Division Naval Station	Norfolk, Va. 23511
31356	JBT Instruments, Inc.	424 Chapel Street P.O. Box 1818 New Haven, Conn. 06508
49956	Raytheon Company	141 Spring Street Lexington, Ma. 02173
52676	SKF Industries, Inc.	Front Stand Erie Avenue Philadelphia, Pa. 19132
56289	Sprague Electric Company	North Adams, Mass. 01247
58189	General Dynamics Corporation Electronics Division	Orlando, Florida
60380	Torrington Company, The Subsidiary of Ingersoll-Rand Corp.	59 Field Street Torrington, Ct. 06790
7-674	ADC Products Division of Magnetic Controls Company	4900 West 78th Street Minneapolis, Minn. 55435
70901	Beemer Engineering Co.	Industrial Park Fort Washington, Pa. 19034
71279	Cambridge Thermionic Corporation	445 Concord Avenue Cambridge, Mass. 02138
71468	ITT Cannon Electric	666 E. Dyer Road Santa Ana, Ca. 92702
72136	The Electro Motive Mfg. Co., Inc.	South Park and John Streets Willimantic, Conn. 06226
72259	Nytronics, Inc.	10 Pelham Parkway Pelham Manor, N. Y. 10803
72619	Dialight Corporation, Subsidiary of Digitronics Corporation	60 Stewart Avenue Brooklyn, N. Y. 11237
72625	Amsted Industries, Inc. Diamond Chain Company Division	402 Kentucky Avenue Indianapolis, In. 46225
72825	Eby Hugh H Inc.	4701 Germantown Avenue Philadelphia, Pa. 19144
72914	Grimes Manufacturing Company	515 N. Russell Urbana, Ohio 43078
73138	Beckman Instruments, Inc. Helipot Division	2500 Harbour Boulevard Fullerton, Calif. 92634

TABLE 6-3. LIST OF MANUFACTURERS (Cont)

MFR CODE	NAME	ADDRESS
73682	Garrett George K. Company Division MSL Industries, Inc.	Torresdale Ave. at Tolbut Street Philadelphia, PA. 19136
74970	Johnson EF Company	299 10th Avenue SW Waseca, Minn. 56093
75263	Keystone Carbon Company	1935 State Street St . Marys, Pa. 15857
76854	Oak Mfg. Co. Division of Oak Electro/Netics Corporation	S. Main Street Crystal Lake, Ill. 60014
77339	National Lock Washer Company	Industrial Parkway P.O. Box 115 North Branch, N. J. 08876
77820	The Bendix Corporation Electrical Components Division	Sherman Avenue Sidney, N. Y. 13838
80131	Electronic Industries Association	
80294	Bourns Inc.	1200 Columbia Avenue Riverside, Calif. 92507
81030	International Instruments Division Sigma Instrument, Inc.	88 Marsh Hill Road Orange, Conn. 06477
81312	Winchester Electronic Division Litton Industries Inc.	Main Street and Hillside Avenue Oakville, Conn. 06779
81640	Controls Company of America Control Switch Division	1420 Delmar Drive Folcroft, Pa. 19032
83324	Rosan Inc.	2901 W. Coast Highway Newport Beach, Calif. 92663
83508	Grant Pulley and Hardware Co.	High Street West Nyack, N.Y. 19904
86335	Glenco Corporation	212 Durham Avenue Metuchen, N.J. 08841
86455	Pennsylvania Engineering Company	1119 N. Howard Philadelphia, Pa. 19123
86577	Precision Metal Products of Malden, Inc.	41 Elm Street Stoneham, Mass. 02180

TABLE 6-3. LIST OF MANUFACTURERS (Cont)

MFR CODE	NAME	ADDRESS
91146	ITT Cannon Electric Salem Division	Salem, Ma.
91574	Caledonia Electronics Division Electro Networks Inc.	Maple Street Caledonia, N.Y.. 14423
91637	Dale Electronics, Inc.	P.O. Box 609 Columbus, Nebr. 68601
93928	Forbes and Wagner, Inc.	345 Central Avenue Silver Creek, N.Y. 14136
95105	Collins Radio Company	Newport Beach, Calif.
96335	Carlson Metal Specialties Corp.	4632 N. Clark Chicato, Ill. 60640
96906	Military Standards Promulgated by Military Departments Under Authority of Defense Standardization Manual 4120 3-M.	

SECTION 7
INSTALLATION

7-1. UNPACKING AND HANDLING.

7-2. Special procedures need not be followed when unpacking Radio Receiver R-1051B/URR. Since the R-1051B/URR is an accurately calibrated precision equipment, rough handling should be avoided. Handles are provided on the front panel for lifting or carrying the equipment. Extreme caution must be exercised when removing the unit from the packing container to prevent damage to the equipment and connectors.

7-3. POWER REQUIREMENTS.

7-4. The R-1051B/URR is designed to operate from a nominal 115-Vac, single-phase, 48- to 450-Hz power source.

7-5. SITE SELECTION.

7-6. In selecting a shipboard installation site, adequate consideration must be given to space requirements (figure 7-1). These requirements include space for servicing the slide-mounted equipment when extended from the cases, for shock-mount deflection, and for cable bends. For best results, the antenna should be mounted as high as possible above the ship's superstructure.

7-7. In selecting a shore installation site, similar considerations must be given to the space requirements. The antenna should be mounted high enough to clear any surrounding hills, woods, or building. In addition, the antenna should be located as far as possible from any high-power transmission lines or hospitals to prevent interference.

7-8. INSTALLATION REQUIREMENTS.

7-9. CONSIDERATIONS. The following factors should be considered when determining the proper location for the R-1051B/URR:

a. Best operating conditions.

b. Ease of maintenance, adjustment of equipment, and replacement and repair of defective parts.

c. Possibility of interaction between the R-1051B/URR and other electronic equipment in the vicinity.

d. Critical and minimum cable length requirements.

e. Adequate heat dissipation.

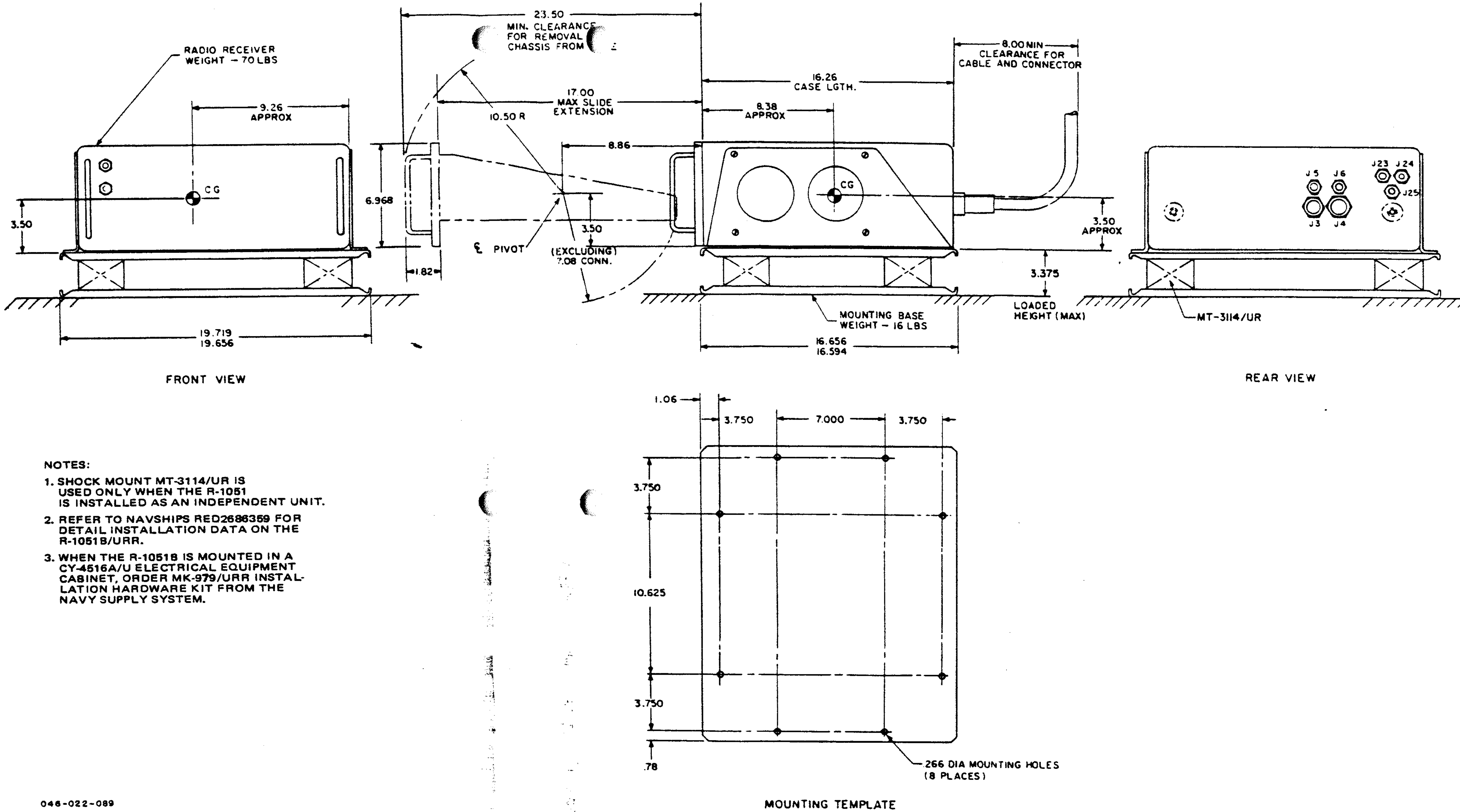
f. Availability of a good system ground.

7-10. INSTALLATION. The R-1051B/URR may be installed independently in any convenient location, using Shock Mount MT-3314/UR aboard ship. The R-1051B/URR may be mounted in a standard 19-inch rack by means of adapter plates. For all required installation dimensions, see figure 7-1. Figure 7-2 illustrates the mounting bracket used for rack mounting the R-1051B/URR. The completed shock-mounted installation is shown in figure 7-3.

7-11. If the R-1051B/URR is to be installed as part of a system such as Radio Set AN/WRC-1B, refer to Section 7 of NAVSHIPS 0967-427-5010 for instructions.

WARNING

To avoid injury to personnel, do not overstress mounting bolts, since shock may cause them to shear.

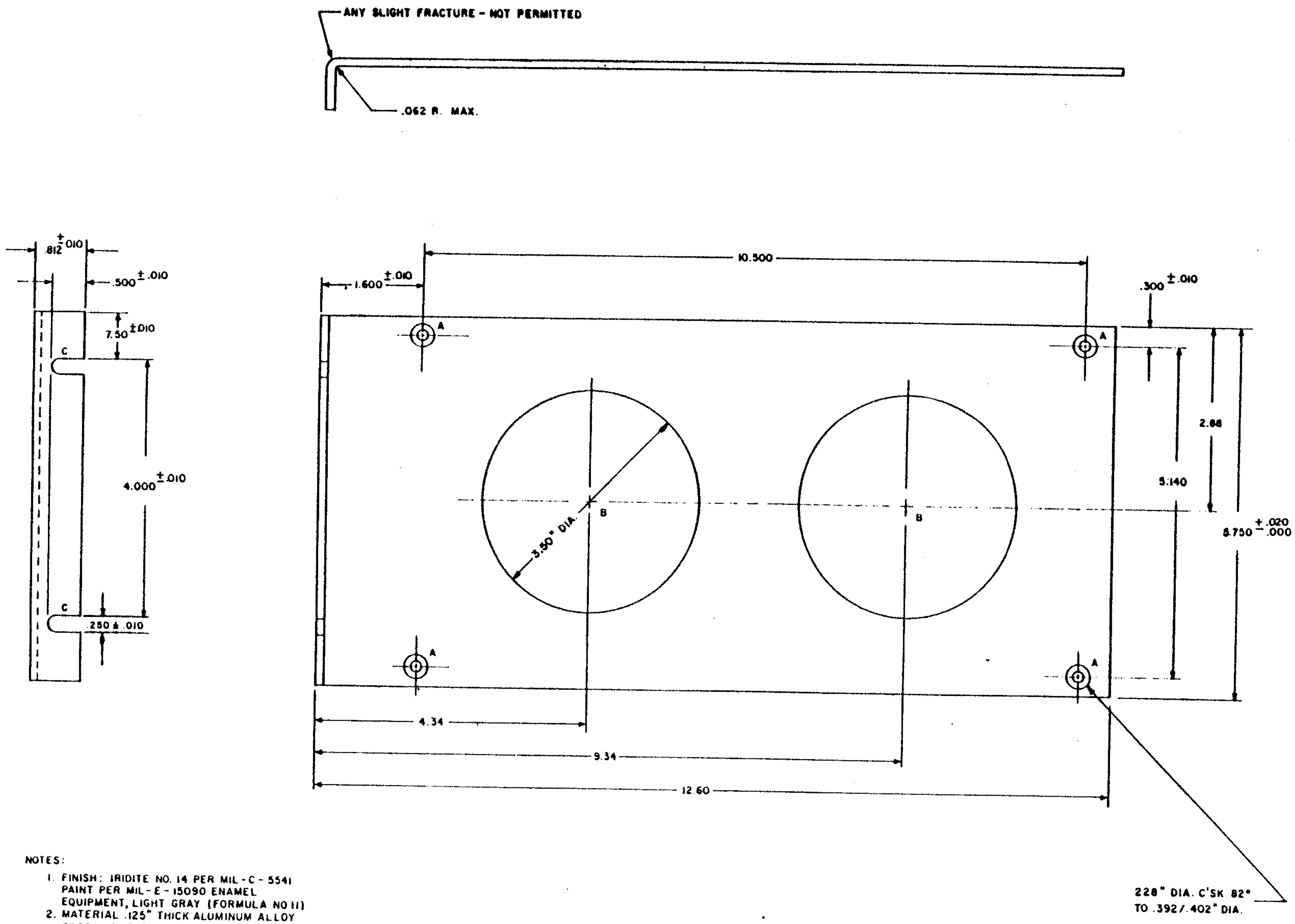


NOTES:

1. SHOCK MOUNT MT-3114/UR IS USED ONLY WHEN THE R-1051 IS INSTALLED AS AN INDEPENDENT UNIT.
2. REFER TO NAVSHIPS RED2686359 FOR DETAIL INSTALLATION DATA ON THE R-1051B/URR.
3. WHEN THE R-1051B IS MOUNTED IN A CY-4516A/U ELECTRICAL EQUIPMENT CABINET, ORDER MK-979/URR INSTALLATION HARDWARE KIT FROM THE NAVY SUPPLY SYSTEM.

046-022-089

Figure 7-1. Radio Receiver R-1051B/URR, Outline and Mounting Dimensions



NOTES:

1. FINISH: IRIDITE NO. 14 PER MIL-C-5541 PAINT PER MIL-E-15090 ENAMEL EQUIPMENT, LIGHT GRAY (FORMULA NO 11)
2. MATERIAL .125" THICK ALUMINUM ALLOY 5052-H32 PER QQ-A-318
3. NOT SUPPLIED. IF REQUIRED, INSTALLATION ACTIVITY MUST FABRICATE

046-002-045

Figure 7-2. Radio Receiver R-1051B/URR, Mounting Bracket for Rack Mounting

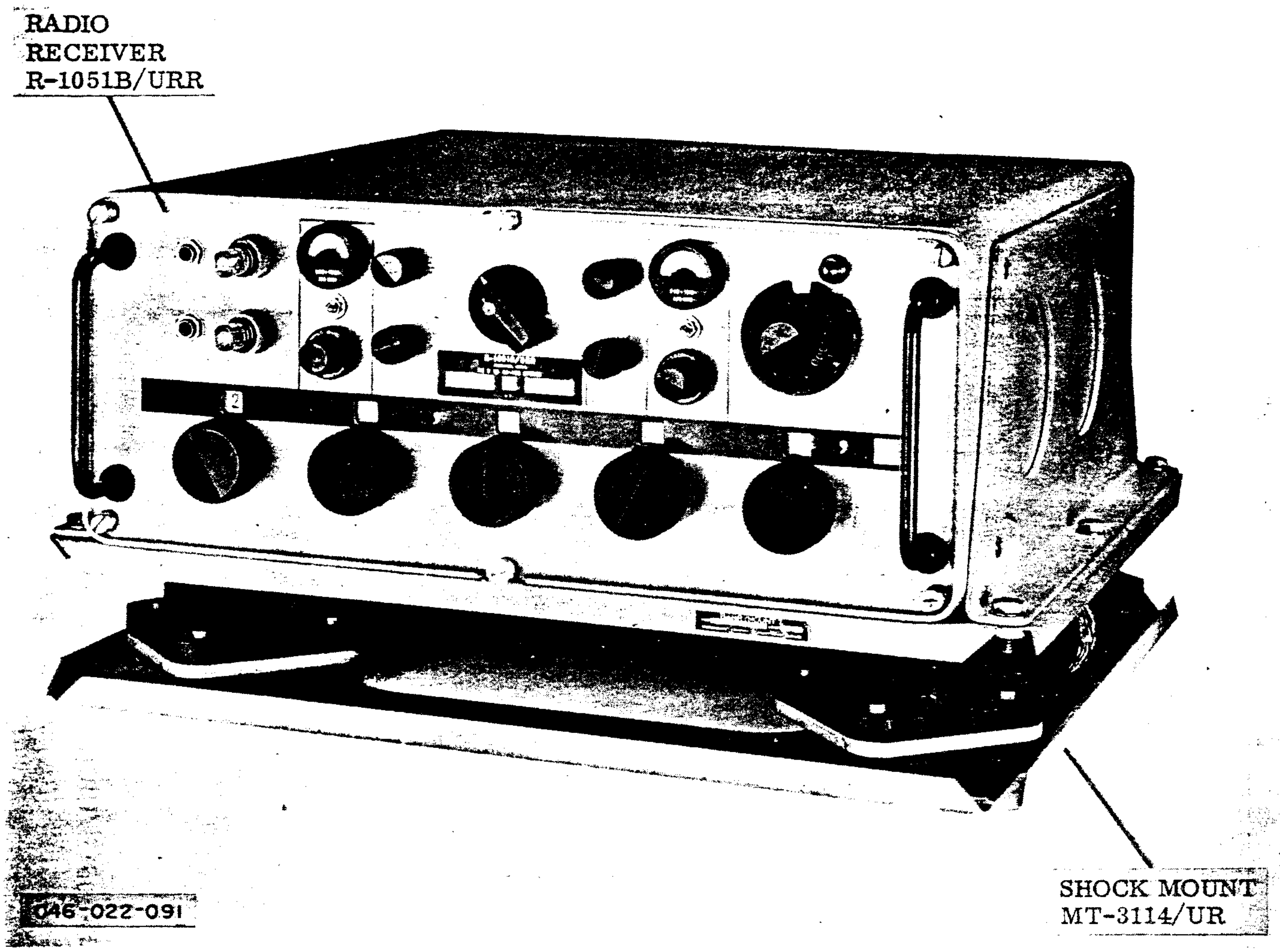


Figure 7-3. Radio Receiver R-1051B/URR, Oblique Front View

7-12. INTERCONNECTION. All connections are made at the rear of the unit (see figure 7-4) with the exception of the receiver headset, which is connected to either the USB PHONES or the LSB PHONES jack on the front panel. An rf input is obtained by mating a type UG-941B/U connector and the necessary length of RG-215/U coaxial cable with connector J23, when the R-1051B/URR is installed separately.

7-13. REQUIREMENTS FOR SPECIAL USAGE. When the R-1051B/URR is to be operated as a remote unit, connection is made to the remote audio lines and the power source as follows:

a. Connect the receiver switchboard remote audio lines to connectors J5 (USB) and J6 (LSB) on the rear of the R-1051B/URR, using type MS-3106J165-5S connectors.

b. Connect the power source to connector J3 (AUX AC PWR IN) on the rear of the R-1051B/URR.

c. Loosen front-panel screws and slide the R-1051B/URR chassis from the case.

d. Set switch S7 (AUX/NORM) to AUX. This switch is located just behind the front panel on the left.

e. Slide chassis back into case and secure it.

7-14. When the R-1051B/URR is to be operated as an independent unit, connect

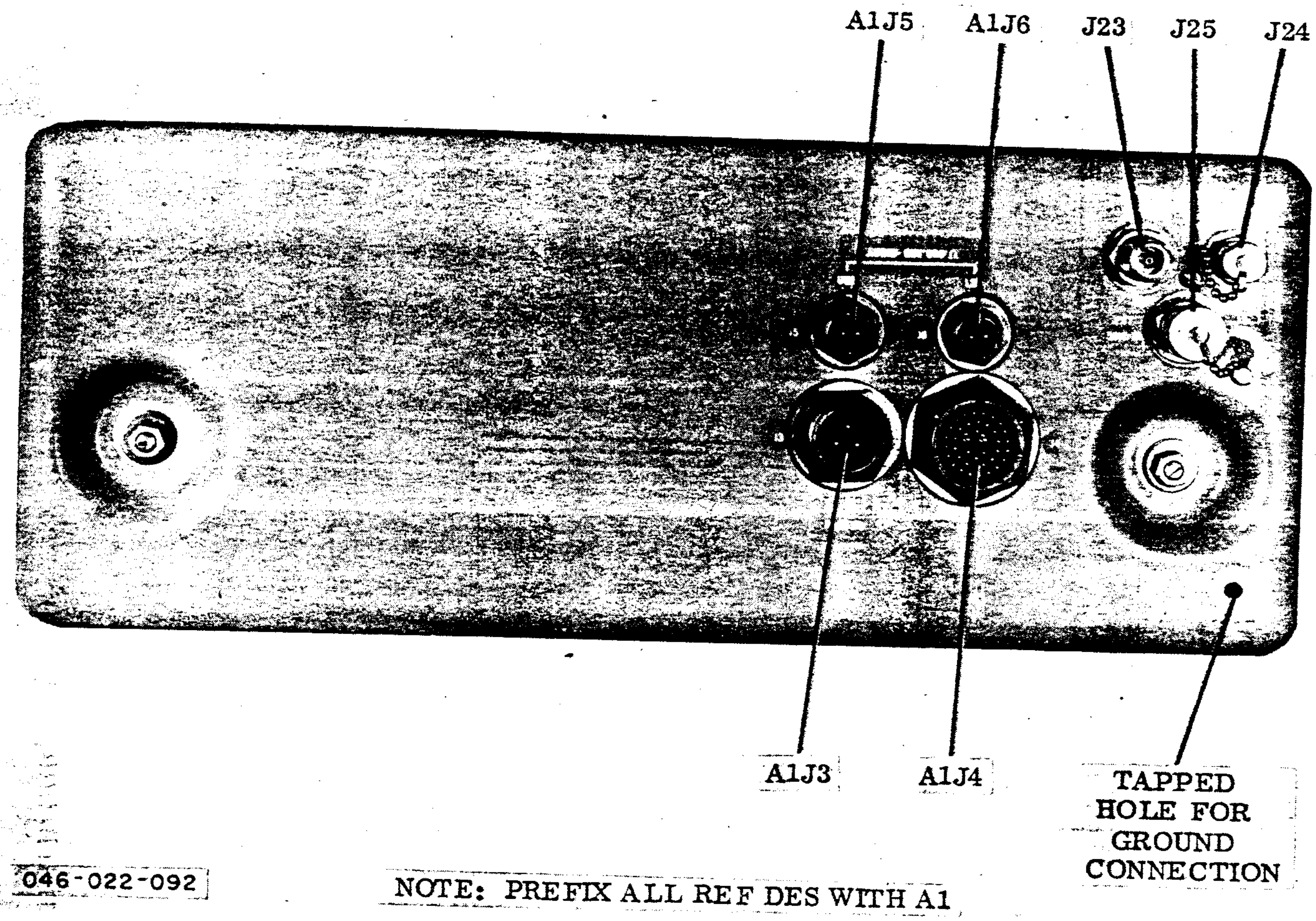


Figure 7-4. Radio Receiver R-1051B/URR, Rear View, Connectors

all cables as shown in figure 7-5. When the R-1051B/URR is to be operated as part of a system, refer to Section 7 of NAVSHIPS 0967-427-5010 for instructions.

7-15. If it is required to use an external frequency standard for operation of the R-1051B/URR, proceed as follows:

a. Connect the output from the external frequency standard to connector J25 (EXT 5 MC IN) on the rear of the R-1051B/URR.

b. Loosen front-panel screws and slide the R-1051B/URR chassis out from the case.

c. Set switch S1 (COMP/INT/EXT) on top of the Frequency Standard Electronic Assembly to EXT. This electronic assembly is located at the right rear of the chassis.

d. Slide the chassis back into the case and secure it.

7-16. If it is required to use the output from the Frequency Standard Electronic Assembly to operate another unit, proceed as follows:

a. Loosen front-panel screws and slide the R-1051B/URR chassis out from the case.

b. Set switch S1 (COMP/INT/EXT) on top of the Frequency Standard Electronic Assembly to COMP. This electronic assembly is located at the right rear of the chassis.

c. Slide chassis back into case and secure it.

d. Connect cable between connector J24 (INT 5 MC OUT) on the rear of the

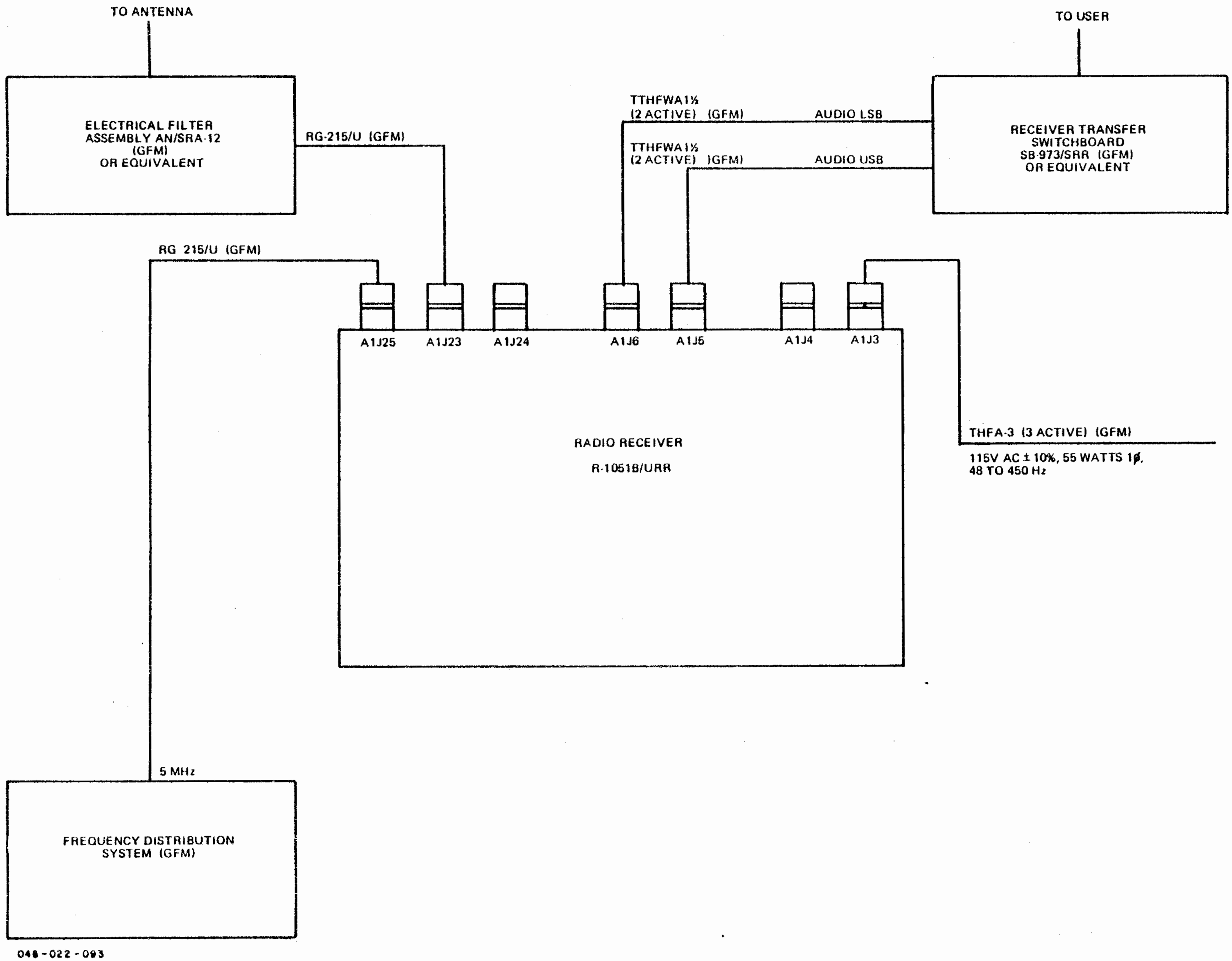


Figure 7-5. Radio Receiver R-1051B/URR, Typical Interconnection Diagram

R-1051B/URR and the frequency standard input connector in the other unit.

7-17. If it is required to use an external frequency standard for calibration, proceed as follows:

a. Connect the output from the external frequency standard to connector J24 (EXT 5 MC IN) on the rear of the R-1051B/URR.

b. Loosen front-panel screws and slide R-1051B/URR chassis out from case.

c. Set switch S1 (COMP/INT/EXT) on top of the Frequency Standard Electronic Assembly to COMP. This electronic assembly is located at the right rear of the chassis.

d. After performing the required calibration, set switch S1 back to required position.

e. Slide chassis back into case and secure it.

7-18. If the internal frequency standard is to be used for operation, ensure that switch S1 (COMP/INT/EXT) on top of the Frequency Standard Electronic Assembly is set to INT. This electronic assembly is located at the right rear of the chassis.

7-19. If the R-1051B/URR is to be used in simplex operation, connect all cables as shown in figure 7-5. Then proceed as follows:

a. Loosen front-panel screws and slide the R-1051B/URR chassis out from the case.

b. Set switch S9 (SIMPLEX/DUPLEX) to SIMPLEX. This switch is located just behind the front panel on the left.

c. Slide chassis back into case and secure it.

7-20. If the R-1051B/URR is to be used in duplex operation, proceed as follows:

a. Ensure that connector J23 (ANT 50Ω) on the rear of the R-1051B/URR is connected to an antenna different from the one connected to the antenna coupler.

b. Loosen the front-panel screws and slide the R-1051B/URR chassis out from the case.

c. Set switch S9 (SIMPLEX/DUPLEX) to DUPLEX. This switch is located just behind the front panel on the left.

d. Slide the chassis back into the case and secure it.

7-21. The audio transformers in the R-1051B/URR (located in the Receiver IF./Audio Electronic Assemblies) do not have grounded center taps as supplied. If it is required that these transformers work into a balanced, grounded, center-tap circuit, proceed as follows:

CAUTION

Do not ground center taps if working into an unbalanced circuit.

a. Loosen front-panel screws and slide chassis out from the case.

b. Tilt chassis up 90 degrees to expose bottom. Refer to figure 5-18 and locate J18 and J19.

c. Refer to figure 5-3 and perform the steps outlined in note 3 on that schematic.

d. Tilt the chassis back to horizontal, release slide locks, slide chassis back into case, and secure it.

7-22. INSPECTION AND ADJUSTMENT.

7-23. INSPECTION. Because of the design and construction of the R-1051B/URR, relocation should have little or no effect on adjustment. Since the R-1051B/URR is in an operational condition when packed, inspect for the following before applying power:

a. External damage to indicators, switches, lamps, and connectors.

b. Verify that tubes V1 and V2 in RF Amplifier Electronic Assembly A2A4 are secure in their respective sockets.

7-24. ADJUSTMENT. After installation, refer to Maintenance Standards Book, NAVSHIPS 0967-427-4030, and use the procedures therein outlined to check out the R-1051B/URR. Before applying power, ensure that all cables are properly connected and that all fuses are in place. Also, ensure that the following switches are in the proper positions, according to the type of operation required:

a. S9 (SIMPLEX/DUPLEX).

b. S7 (AUX/NORM).

c. A5S1 (COMP/INT/EXT).

7-25. INTERFERENCE REDUCTION. As a precaution against possible interference, operate the R-1051B/URR with drawer fully closed and with front-panel mounting screw tightened. Verify that the R-1051B/URR is properly grounded.

7-25. PERFORMANCE CHECKS. Refer to Section 5 and perform the applicable operating procedures to ensure proper installation.

ALPHABETICAL INDEX

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