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NAVSHIPS 0967-878-3010

VOLUME I

TECHNICAL MANUAL

for

RADIO RECEIVER R-1051D/URR

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND

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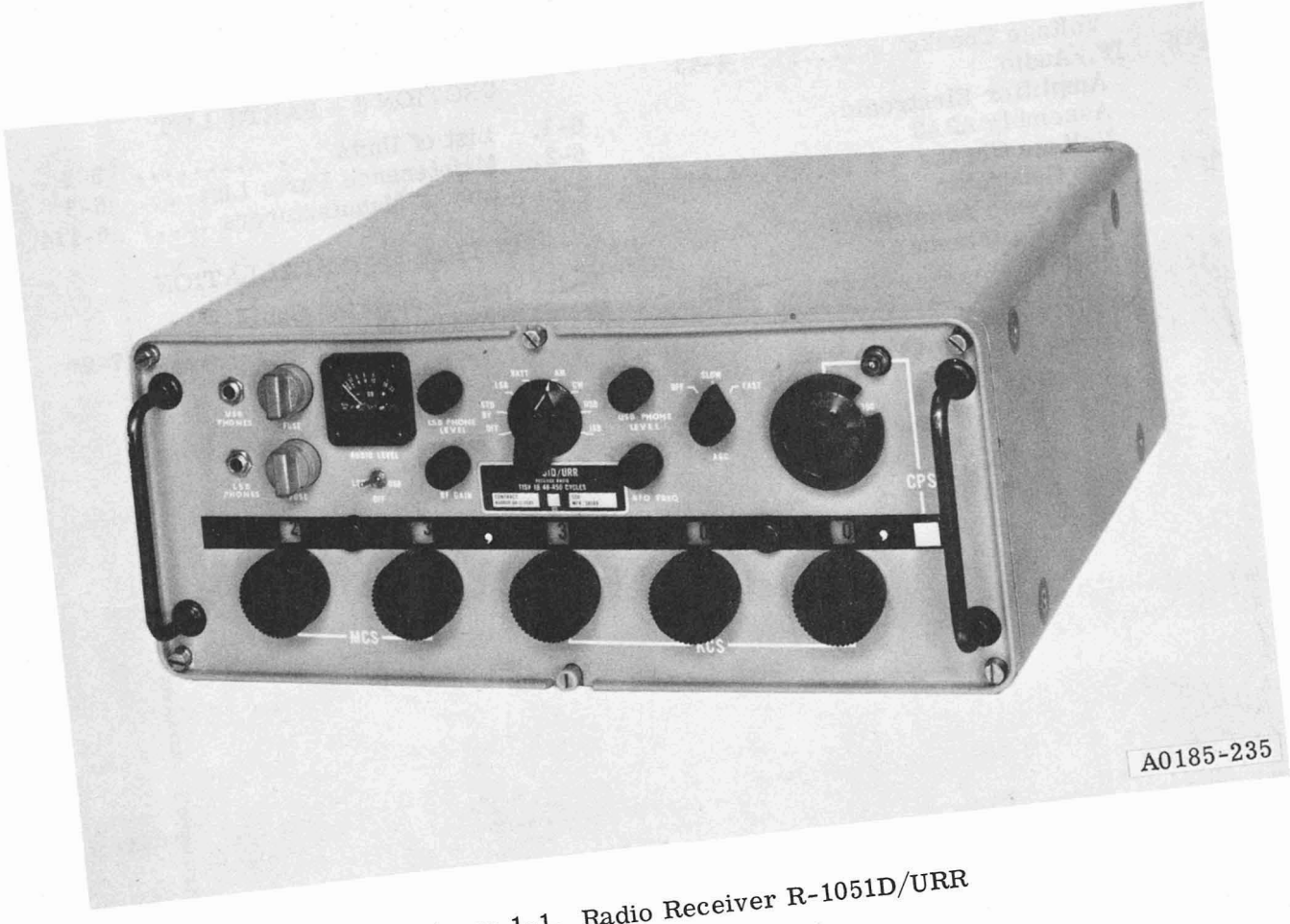


Figure 1-1. Radio Receiver R-1051D/URR

SECTION 1

GENERAL INFORMATION

1-1. SCOPE.

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 describes Radio Receiver R-1051D/URR (hereafter referred to as the R-1051D/URR) and covers installation, troubleshooting procedures, maintenance procedures and a parts list for this unit. Operating procedures for the R-1051D/URR are contained in Volume II of this Technical Manual.

1-2. GENERAL DESCRIPTION.

The R-1051D/URR (see figure 1-1) is a digitally tuned, superheterodyne receiver capable of receiving lower sideband (LSB), upper sideband (USB), independent sideband (ISB), radio teletype (RATT), amplitude modulated (AM), and continuous wave (CW) transmissions in the 2.0- to 30.0-megahertz 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. RATT reception is obtained by using suitable ancillary equipment, such as Teletype Converter-Comparator AN/URA-17 or AN/URA-8. The R-1051D/URR may also receive tone-modulated continuous wave (MCW), compatible amplitude modulated (compatible AM), and facsimile (through the use of suitable ancillary equipment) transmissions. The R-1051D/URR may be operated, in conjunction with a transmitter, as a transmitter-receiver in systems such as Radio Set AN/WRC-1. In this application, either simplex or duplex operation is possible. The R-1051D/URR may also be used as a separate, self-contained receiver requiring only a headset, antenna, and 115-Vac primary power source for full operation. The R-1051D/URR is intended for ship and shore installations. For either type of installation, the R-1051D/URR may be mounted in a standard 19-inch rack, or may be mounted to Shock Mount MT 3114/UR.

1-3. REFERENCE DESIGNATIONS.

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

TABLE 1-1. REFERENCE DESIGNATIONS

ELECTRONIC ASSEMBLY OR SUBASSEMBLY	REFERENCE DESIGNATION
Case	A1
Main Frame	A2
Mode Selector	A2A1
IF./Audio Amplifier	A2A2 and A2A3
RF Amplifier	A2A4
Frequency Standard	A2A5
Translator/Synthesizer	A2A6
MC Synthesizer	A2A6A1
100 KC Synthesizer	A2A6A2
1 and 10 KC Synthesizer	A2A6A3
100 CPS Synthesizer	A2A6A4
Spectrum Generator	A2A6A5
RF Translator	A2A6A6
Code Generator	A2A7
Power Supply	A2A8
Antenna Overload	A2A9
CPS Switch Assembly	A2A11

1-4. PHYSICAL CHARACTERISTICS.

The R-1051D/URR (figure 1-1) is housed in a metal 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 on the slides at ±90-degree angles to expose the bottom or top for servicing. All operating controls and indicators are located on the

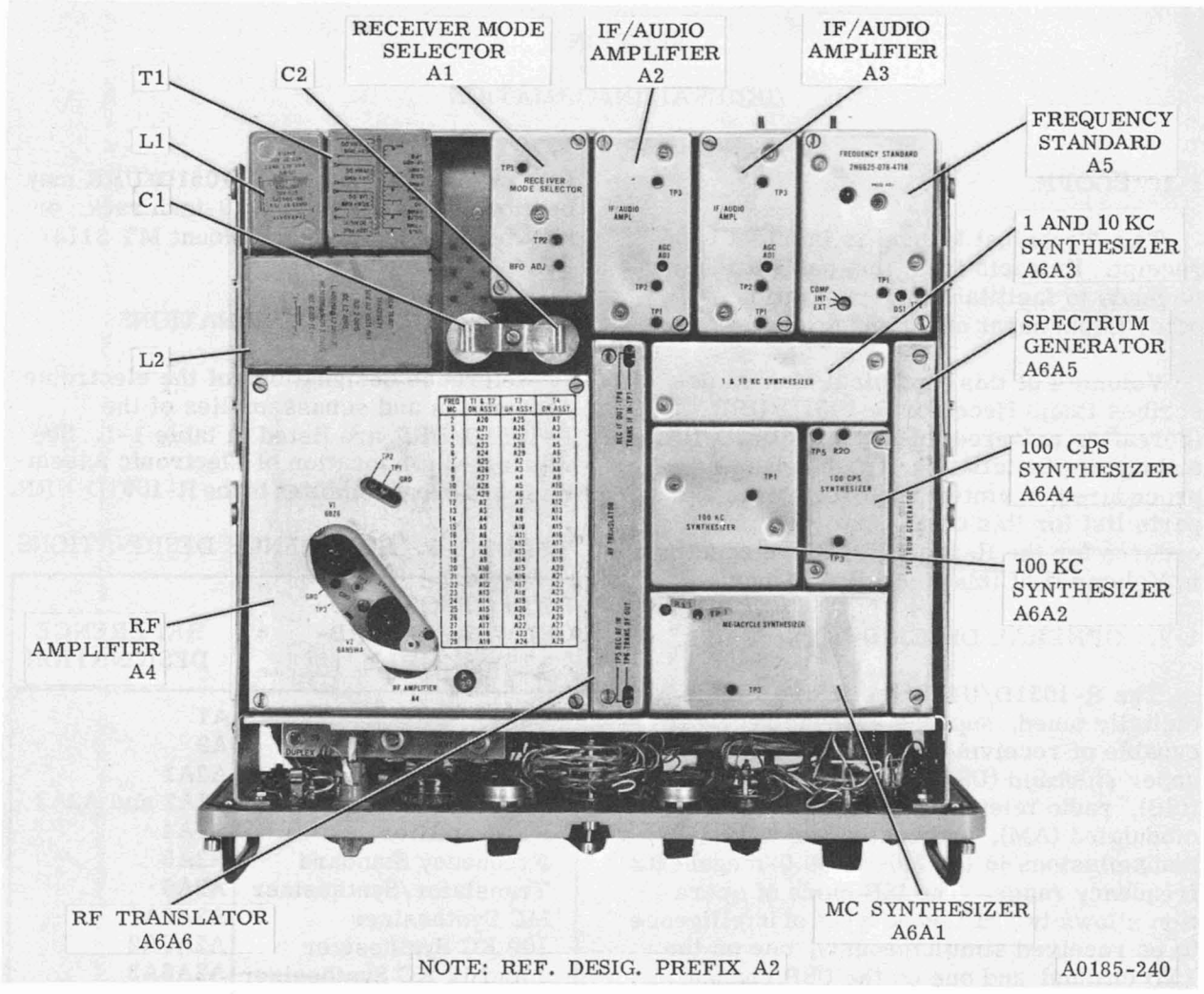


Figure 1-2. Radio Receiver R-1051D/URR, Top View, Case Removed

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 withdrawing the chassis and transporting the unit. The chassis contains the chain drive mechanism for tuning, the receptacles for the plug-in electronic assemblies, and a power supply.

1-5. REFERENCE DATA.

The R-1051D/URR employs a digital tuning scheme for automatically tuning to any one of 280,000 operating channels. 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 ultra-stable frequency standard, provide a stability of 1 part in 10^8 per day.

a. ELECTRICAL CHARACTERISTICS. - Table 1-2 provides a summary of the electrical characteristics of the R-1051D/URR.

b. CRYSTAL COMPLEMENT. - The crystal complement of the R-1051D/URR is listed in table 1-3.

c. EXTENDER TEST CABLE DATA.- Table 1-6 lists pertinent extender test cable data for the R-1051D/URR.

1-6. EQUIPMENT SUPPLIED.

Equipment supplied with the R-1051D/URR is listed in table 1-4.

1-7. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

Accessory and test equipment and publications required but not supplied with the R-1051D/URR are listed in table 1-5.

1-8. FACTORY AND FIELD CHANGES.

No factory or field changes have been made to the R-1051D/URR.

1-9. EQUIPMENT SIMILARITIES.

Basic similarities and differences among the R-1051/URR, R-1051A/URR, R-1051B/URR, and R-1051D/URR are listed in table 1-7.

1-10. PREPARATION FOR RESHIPMENT.

To prepare the R-1051D/URR for reshipment, proceed as follows:

a. Ensure that all electronic assemblies are fastened securely. Check that electron tubes V1 (6BZ6) and V2 (6AN5WA) in rf amplifier electronic assembly A2A4 are mounted properly, using vibration-proof shields provided.

b. Set Mode Selector switch at OFF.

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

TABLE 1-2. ELECTRICAL CHARACTERISTICS

Frequency range	2.0000 to 29.9999 MHz in 100-Hz increments, or 2.0 to 30.0 MHz with continuous vernier tuning between 1-kHz increments
Receiver type	Triple-conversion superheterodyne First IF.: 20 or 30 MHz (depending upon range) Second IF.: 2.85 MHz Third IF.: 500 kHz Aggregate IF. bandwidth SSB modes: 3.0 kHz; other modes: 6 kHz -75-dB off-channel rejection
Frequency stability	1 part in 10^8 per day
Type of frequency control	Crystal controlled synthesizer referenced to a 5-MHz internal or external standard with 0.5-volt to 5-volt input level.
Modes of operation	LSB, USB, ISB, AM, CW, and RATT
Sensitivity	0.5 microvolt for 10 dB $\frac{S+N}{N}$ in SSB mode; 1 microvolt for CW and RATT modes; and 2 microvolts for compatible AM mode

TABLE 1-2. ELECTRICAL CHARACTERISTICS (Continued)

Recommended antenna	50-ohm impedance
Ambient temperature limitations	0°C to +50°C
Power consumption	60 watts
Primary power requirements	115 Vac ±10 percent, single phase, 48 to 450 Hz
Image rejection	-80 dB
Audio output	60 mW (minimum) into 600-ohm balanced or unbalanced remote output load; 15 mW (minimum) into 1200-ohm unbalanced load (local headset)
Audio distortion	Less than 3 percent
Heat dissipation	15°C rise
Installation	Shock mounted for mobile use, table or rack mounted for fixed station use

TABLE 1-3. CRYSTAL COMPLEMENT

REF DESIG	TYPE OF CUT	CRYSTAL OSC FREQ (MHz)	OPERATING TEMP RANGE	TOLERANCE (PERCENT)
A2A5A3Y1	AT	5.000000	83.0°C to 87.0°C	0.001
A2A6A1A1A2Y1	AT	2.499850	0°C to 75°C	0.003
A2A6A1A1A2Y2	AT	3.499720	0°C to 75°C	0.003
A2A6A1A1A2Y3	AT	4.499640	0°C to 75°C	0.003
A2A6A1A1A2Y4	AT	5.499560	0°C to 75°C	0.003
A2A6A1A1A2Y5	AT	7.499400	0°C to 75°C	0.003
A2A6A1A1A2Y6	AT	8.499320	0°C to 75°C	0.003
A2A6A1A1A2Y7	AT	9.499240	0°C to 75°C	0.003
A2A6A1A1A2Y8	AT	10.499160	0°C to 75°C	0.003
A2A6A1A1A2Y9	AT	11.499080	0°C to 75°C	0.003
A2A6A1A1A2Y10	AT	12.499000	0°C to 75°C	0.003

TABLE 1-3. CRYSTAL COMPLEMENT (Continued)

REF DESIG	TYPE OF CUT	CRYSTAL OSC FREQ (MHz)	OPERATING TEMP RANGE	TOLERANCE (PERCENT)
A2A6A1A1A2Y11	AT	14.498840	0°C to 75°C	0.003
A2A6A1A1A2Y12	AT	15.498760	0°C to 75°C	0.003
A2A6A1A1A2Y13	AT	16.498680	0°C to 75°C	0.003
A2A6A1A1A2Y14	AT	17.498600	0°C to 75°C	0.003
A2A6A1A1A2Y15	AT	19.498440	0°C to 75°C	0.003
A2A6A1A1A2Y16	AT	20.498360	0°C to 75°C	0.003
A2A6A1A1A2Y17	AT	23.498120	0°C to 75°C	0.003
A2A6A2Y1	AT	4.553	0°C to 75°C	0.003
A2A6A2Y2	AT	4.653	0°C to 75°C	0.003
A2A6A2Y3	AT	4.753	0°C to 75°C	0.003
A2A6A2Y4	AT	4.853	0°C to 75°C	0.003
A2A6A2Y5	AT	4.953	0°C to 75°C	0.003
A2A6A2Y6	AT	5.053	0°C to 75°C	0.003
A2A6A2Y7	AT	5.153	0°C to 75°C	0.003
A2A6A2Y8	AT	5.253	0°C to 75°C	0.003
A2A6A2Y9	AT	5.353	0°C to 75°C	0.003
A2A6A2Y10	AT	5.453	0°C to 75°C	0.003
A2A6A2A3Y1	AT	17.845	0°C to 75°C	0.003
A2A6A2A3Y2	AT	27.845	0°C to 75°C	0.003
A2A6A3A5Y11	AT	1.850	0°C to 75°C	0.003
A2A6A3A5Y12	AT	1.851	0°C to 75°C	0.003
A2A6A3A5Y13	AT	1.852	0°C to 75°C	0.003
A2A6A3A5Y14	AT	1.853	0°C to 75°C	0.003
A2A6A3A5Y15	AT	1.854	0°C to 75°C	0.003

TABLE 1-3. CRYSTAL COMPLEMENT (Continued)

REF DESIG	TYPE OF CUT	CRYSTAL OSC FREQ (MHz)	OPERATING TEMP RANGE	TOLERANCE (PERCENT)
A2A6A3A5Y16	AT	1.855	0°C to 75°C	0.003
A2A6A3A5Y17	AT	1.856	0°C to 75°C	0.003
A2A6A3A5Y18	AT	1.857	0°C to 75°C	0.003
A2A6A3A5Y19	AT	1.858	0°C to 75°C	0.003
A2A6A3A5Y20	AT	1.859	0°C to 75°C	0.003
A2A6A3A6Y1	AT	5.25	0°C to 75°C	0.003
A2A6A3A6Y2	AT	5.24	0°C to 75°C	0.003
A2A6A3A6Y3	AT	5.23	0°C to 75°C	0.003
A2A6A3A6Y4	AT	5.22	0°C to 75°C	0.003
A2A6A3A6Y5	AT	5.21	0°C to 75°C	0.003
A2A6A3A6Y6	AT	5.20	0°C to 75°C	0.003
A2A6A3A6Y7	AT	5.19	0°C to 75°C	0.003
A2A6A3A6Y8	AT	5.18	0°C to 75°C	0.003
A2A6A3A6Y9	AT	5.17	0°C to 75°C	0.003
A2A6A3A6Y10	AT	5.16	0°C to 75°C	0.003

TABLE 1-4. EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		UNIT NO.	*OVER-ALL DIMENSIONS (IN.)			VOLUME (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
1	Radio Receiver	R-1051D/URR	1	6.97	17.38	18.5	1.33	70
1	Kit, Connector Mating		1					
2	Technical Manual for Radio Receiver R-1051D/URR	NAVSHIPS 0967-878-3010						

TABLE 1-4. EQUIPMENT SUPPLIED (Continued)

QTY PER EQUIP	NOMENCLATURE		UNIT NO.	*OVER-ALL DIMENSIONS (IN.)			VOLUME (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
2	Operator's Handbook for Radio Receiver R-1051D/URR	NAVSHIPS 0967-878-3020						
1	Reference Standards Book for Radio Receiver R-1051D/URR	NAVSHIPS 0967-878-3050						
1	Performance Standards Sheet for Radio Receiver R-1051D/URR	NAVSHIPS 0967-878-3040						

*Exclusive of rear connectors.

TABLE 1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
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)	RATT operation	
1	Audio Amplifier	AM-215/U (or equivalent)	Speaker amplifier	
1	Kit, Extender Test Cable	666243-070 A09948-004 666243-071 666243-072	Extension of receiver electronic assemblies for trouble-shooting and maintenance	

TABLE 1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Continued)

QTY PER EQUIP	NOMENCLATURE NAME	NOMENCLATURE DESIGNATION	REQUIRED USE	EQUIPMENT CHARACTERISTICS
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, 8 ranges, 5000 ohms/volt 0 to 20 megohms, 5 ranges Accuracy: ±2 percent
1	Multimeter, Electronic	AN/USM-116 ( ) (or equivalent)	Troubleshooting and maintenance procedures	Ranges: 0 to 10V 0 to 30V 0 to 100V Input impedance: 5 megohms
1	Multimeter, Electronic (rf voltmeter)	CCVO-91CA (or equivalent)	Troubleshooting and maintenance procedures	Input impedance: 20,000 ohms/volt at 500 kHz 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	Multimeter, Electronic	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

TABLE 1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Continued)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Oscilloscope	AN/USM-105(A) (or equivalent)	Troubleshooting and maintenance procedures	Frequency: DC to 15 MHz Frequency response: 100 kHz Ranges: 0.5 volt peak-to-peak, 3 volts peak-to-peak, 10 volts peak-to-peak, 2500 volts peak-to-peak Sensitivity: 2 to 10 Vdc
1	Frequency Meter	AN/USM-207( ) (or equivalent)	Troubleshooting and maintenance procedures	Frequency range: 0 to 30 MHz Accuracy: ±0.1 Hz
1	RF Signal Generator	CAQI-606A (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 kHz, 500 kHz, and 5 MHz Stability: 1 part in 10^8 Output: 0.5 volt
1	Voltmeter, Heterodyne	CDAN-2005	Maintenance procedures	
1	Test Set, Amplifier	*TS-2132/ WRC-1	Testing rf amplifier electronic assembly	Simulates actual operating conditions

*These Test Sets are special test fixtures available only at the Special Module Repair Facility.

TABLE 1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Continued)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Test Set, Translator/ Synthesizer	*TS-2133/ WRC-1	Testing translator/ synthesizer electronic assembly	Simulates actual operating conditions
1	Test Set, Frequency Standard	*TS-2134/ WRC-1	Testing frequency standard electronic assembly	Simulates actual operating conditions
1	Coaxial Tee 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 91583	Trouble-shooting and maintenance procedures	
1	CCVO-91CA Technical Manual	NAVSHIPS 0967-097-5010	Trouble-shooting and maintenance procedures	
1	ME-6( )/U Technical Manual	NAVSHIPS 92423	Trouble-shooting and maintenance procedures	
1	AN/USM-116( ) Technical Manual	NAVSHIPS 93808	Trouble-shooting and Maintenance Procedures	
1	AN/USM-105A Technical Manual	NAVSHIPS 0967-085-3012	Trouble-shooting and maintenance procedures	
1	CAQI-606A Technical Manual	NAVSHIPS 0967-186-6010	Trouble-shooting and maintenance procedures	

*These Test Sets are special test fixtures available only at the Special Module Repair Facility.

TABLE 1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Continued)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	AN/URQ-9 Technical Manual	NAVSHIPS 93806(A)	Troubleshooting and maintenance procedures	
1	AN/USM-207( ) Technical Manual	NAVSHIPS 0969-028-4010	Trouble-shooting and maintenance procedures	
1	CDAN-2005 Technical Manual	NAVSHIPS 0967-090-4010	Maintenance procedures	
1	Resistor	RC42GF510J (or equivalent)	Trouble-shooting and maintenance procedures	51 ohms, ±5 percent, 2 watts, non-inductive
1	Resistor	RC42GF601J (or equivalent)	Troubleshooting and maintenance procedures	600 ohms, 2 watts, carbon

TABLE 1-6. EXTENDER TEST CABLE DATA

PART NO.*	FSN*	NAME	MATES WITH
666243-070**	1N5995-021-6999	Cable Assembly W1	Plug P1 on if/audio amplifier electronic assembly A2A2 or A2A3
666243-071**		Cable Assembly W2	Plug P1 on mode selector electronic assembly A2A1
666243-072**	1N5995-021-7006	Cable Assembly W3	Plug P2 on mode selector electronic assembly A2A1
A09948-002**		Cable Assembly W1	Plug P1 on transistor/synthesizer electronic assembly A2A6
A09948-003***		Cable Assembly W2	Plugs P2 or P3 on translator/synthesizer electronic assembly A2A6
A09948-004***	1N5995-021-7003	Cable Assembly W3	Plug P1 on frequency standard electronic assembly A2A5
A09948-005***		Cable Assembly W4	Plug P1 on rf. amplifier electronic assembly A2A4
A09948-006***		Cable Assembly	Plug P2 on rf. amplifier electronic Assembly A2A4

*A set of electronic assembly extender test cables was furnished with each R-1051/URR on early contracts. These were deleted from later contracts for economic reasons. The cables are now issued on an allowance basis by ESO.

**Part of Kit, Extender Cables, Part No. 666243-069, which contains a total of ten cables.

***Part of Kit, Extender Cables, Part No. A09948-001, which contains a total of the above five cables.

TABLE 1-7. EQUIPMENT SIMILARITIES

ITEM	R-1051/UR	R-1051A/URR	R-1051B/URR	R-1051D/URR
Tuning Increments	500 Hz	100 Hz	100 Hz	100 Hz
AGC time constant	Fixed	Fixed	Fixed	Fast or slow
KCS controls	Incorporate stops to limit rotation to 270°	Incorporate stops to limit rotation to 270°	Incorporate stops to limit rotation to 270°	360° Rotation.
Positive antenna overload protection	Not incorporated	Not incorporated	Not incorporated	Incorporated
Interchangeability of electronic assemblies:				
Mode selector A2A1	Interchangeable with R-1051A/URR, R-1051B/URR and R-1051D/URR	Interchangeable with R-1051/URR R-1051B/URR and R-1051D/URR	Interchangeable with R-1051/URR R-1051A/URR and R-1051D/URR	Interchangeable with R-1051/URR R-1051A/URR and R-1051B/URR
If./audio amplifier A2A2 or A2A3	Same as A2A1	Same as A2A1	Same as A2A1	Same as A2A1
RF amplifier A2A4	Same as A2A1	Same as A2A1	Same as A2A1	Same as A2A1
Frequency standard A2A5	Same as A2A1	Same as A2A1	Same as A2A1	Same as A2A1
Translator/synthesizer A2A6	Not interchangeable	Not interchangeable	Interchangeable with R-1051D/URR only.	Interchangeable with R-1051B/URR only.

TABLE 1-7. EQUIPMENT SIMILARITIES

ITEM	R-1051/URR	R-1051B/URR	R-1051D/URR	R-1051E/URR
Tuning Increments	500 Hz	100 Hz	100 Hz	100 Hz
AGC time constant	Fixed	Fixed	Fast, slow or OFF	Fast, slow or OFF
KCS controls	Rotation limited to 270°	Rotation limited to 270°	360° rotation	360° rotation
ositive ntenna verload rotection	FC 5 installs	FC 1 installs	Incorporated	Incorporated
nterchange-ility of lectronic ssemblies:				
ode selector A2A1	Interchangeable with R-1051B, R-1051D, R-1051E/URR	Interchangeable with R-1051, R-1051D R-1051E/URR	Interchangeable with R-1051, R-1051B, R-1051E/URR	Interchangeable with R-1051, R-1051B, R-1051D/URR
F./audio mplifier A2A2 or A2A3	Interchangeable with R-1051E/URR	Interchangeable with R-1051/URR	Interchangeable with R-1051E/URR	Interchangeable with R-1051D/URR
F Amplifier A2A4	Same as A2A1	Same as A2A1	Same as A2A1	Same as A2A1
Frequency Standard A2A5	Same as A2A1	Same as A2A1	Same as A2A1	Same as A2A1
Translator/ Synthesizer A2A6	Not interchangeable	Same as A2A1	Same as A2A1	Same as A2A1

SECTION 2

OPERATION

Note

This section is bound as Volume II. Refer to Volume II, Operator's Handbook for Radio Receiver R-1051D/URR, NAVSHIPS 0967-878-3020, for operation of this equipment.

SECTION 3

FUNCTIONAL DESCRIPTION

3-1. OVER-ALL DESCRIPTION.

The R-1051D/URR is a triple-conversion superheterodyne receiver, tunable over the high-frequency range from 2 to 30 MHz. Tuning of the R-1051D/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 decimal 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-1051D/URR is locked to a very accurate frequency standard. Each 1-kHz increment can be continuously tuned through by selecting the V position of the CPS switch. When using the vernier, the full accuracy of the frequency standard is sacrificed. The R-1051D/URR demodulates and provides audio outputs for the following types of received signals: LSB, USB, ISB, CW, RATT, 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 0.5 microvolt for ISB, LSB, USB, 1 microvolt for CW and RATT, 2 microvolts for AM. Figure 3-1 illustrates the functional groups of circuits comprising the electronic assemblies and subassemblies of the R-1051D/URR.

a. MAIN SIGNAL FLOW. - A received signal from the antenna is coupled to the rf amplifier of rf amplifier electronic assembly A2A4. 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 MHz (MCS), 100 kHz (KCS), and 10 kHz (KCS) frequency controls on the front panel. The gain of the rf amplifier stages ensures that the weak-signal sensitivity of the R-1051D/URR is maintained. The gain of both rf amplifier stages is controlled by the application of an agc voltage from the step agc circuit.

The 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 linear integrated-circuit mixer stages, with interstage coupling provided by selective filters. The output from the first mixer is gated through the appropriate 20- or 30-MHz filter. This signal is mixed in the mid frequency mixer stage with the injection frequencies supplied from 100 KC synthesizer electronic subassembly A2A6A2 (22.4 to 23.3 MHz). The desired frequency band from the second mixing action is 2.8 to 2.9 MHz. This signal is coupled through a 2.85-MHz filter to the third mixing action. The injection frequencies for the third mixer are supplied from 1 and 10 KC synthesizer electronic subassembly A2A6A3 and are between 3.301 and 3.4 MHz. The output from the third mixer is a 500-kHz if. signal. Signal flow from the antenna input through the output of the third mixer is identical, regardless of the selected mode of operation.

The 500-kHz if. output from the third mixer is amplified and applied to the mode gates. Three parallel paths are presented to the signal depending on mode of operation selected at the front panel.

The if. output for LSB operation is applied to the if. amplifiers in if./audio amplifier electronic assembly A2A3. The if. output in USB or AM operation is applied to the if. amplifiers in if./audio amplifier electronic assembly A2A2. 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.

The output from the if. amplifiers is applied to the detector circuits,

consisting of a product detector for single sideband 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 enabled. The product detector demodulates the USB, LSB, RATT, and ISB signals. In these modes of operation, a 500-kHz injection, originating at a multiplier-divider in frequency standard electronic assembly A2A5, is applied to the product detector for carrier reinsertion. In the CW mode of operation, the BFO assembly in mode selector electronic assembly A2A1 is turned on, and a variable 500-kHz output is applied to the input of the AM detector in if./audio amplifier electronic assembly A2A2. The output frequency from the BFO circuit is controlled by the BFO FREQ control on the front panel.

The audio derived from the detector circuits in if./audio amplifier electronic assembly A2A2 is applied to the USB LINE LEVEL control behind the front panel which controls the audio level prior to its application to the audio amplifiers. The LSB LINE LEVEL control sets the audio level from the product detector in assembly A2A3. Each if./audio amplifier electronic assembly has two outputs. One is a 600-ohm remote output, which is applied to a connector at the rear of the case. The second output is to the LSB or USB PHONES jack on the front panel. The phone output passes through the LSB or USB PHONE LEVEL control on the front panel, which adjusts the phone signal amplitude without altering the level of the remote output. Each remote output may be monitored at the front panel by the AUDIO LEVEL meter. The meter may be switched to monitor LSB or USB audio levels or switched to OFF.

b. STEP AGC SIGNAL FLOW. - The step agc circuit, which forms a part of 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. The output from the if. amplifiers is applied to the step agc circuits, where it is converted to a dc voltage that is applied to both 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 operates only when the AGC switch is set at OFF.

c. FREQUENCY STANDARD. - The 5 mc frequency standard produces an accurate, stable reference frequency upon which all frequencies used in the R-1051D/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 mc frequency standard is applied to a switching and compare circuit. An external 5-MHz frequency 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 kc gate circuit for insertion into the product detector for demodulation. The 5 mc frequency standard, oven control, multiplier-divider, and switching and compare circuits comprise frequency standard electronic assembly A2A5.

d. FREQUENCY GENERATION. - The injection frequencies used in the first frequency conversion in the mixers circuit are generated within mc synthesizer electronic subassembly A2A6A1. This circuit consists of a phase-locked crystal oscillator that is automatically tuned to produce one of seventeen frequencies between 2.5 MHz and 23.5 MHz. The output is applied to the high frequency mixer. The output frequency depends on the setting of the front-panel MCS controls.

The injection frequencies used in the second frequency conversion in the mixers circuit are generated within 100 kc synthesizer electronic subassembly A2A6A2. This circuit consists of a crystal oscillator, the output from which is one of

ten 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-kHz (KCS) control. If a lo-band injection frequency is required (refer to paragraph 3-1e), the 17.847-MHz output from the 17.847 mc mixer is additively mixed in the lo-band mixer with the output from the 100 kc oscillator (4.553 MHz 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 (refer to paragraph 3-1e), the 27.847-MHz output from the 27.847 mc mixer is additively mixed in the hi-band mixer with the output from the 100 kc oscillator (4.553 MHz 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.

The 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 ten possible output frequencies. The output from the 1 kc oscillator (1.850 MHz to 1.859 MHz in 1-kHz steps) is determined by the setting of the front-panel 1-kHz (KCS) control, and the output from the 10 kc oscillator (5.25 MHz to 5.16 MHz in 10-kHz steps) is determined by the setting of the front-panel 10-kHz (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 MHz and 3.400 MHz. The output is applied to the low frequency mixer resulting in a 500-kHz output.

e. ERROR CANCELLATION. - A combination of error-canceling loops and phase-locked loops is used in the frequency synthesizer circuits of the R-1051D/URR to ensure that the injection frequencies applied to the mixers are correct. 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 mc synthesizer electronic subassembly A2A6A1 to produce a spectrum of frequencies spaced at 1-MHz intervals between 1 MHz and 25 MHz. The output from spectrum generator A2A6A1A5 and the output from mc oscillator A2A6A1A1A1 via mc level control A2A6A1A4 are mixed. Any error in output from mc oscillator A2A6A1A1A1 is detected and an error voltage is produced. This error signal is applied to the mc 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.

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 kc spectrum generator A2A6A5A1 to produce a spectrum of frequencies spaced at 100-kHz intervals between 15.3 MHz and 16.2 MHz. The output from 100 kc oscillator A2A6A2A1 (4.553 MHz to 5.453 MHz in 100-kHz steps) is applied to 10.747 mc 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 mc 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 100 kc oscillator A2A6A2A1 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 mixing produces a 27.847-MHz signal, which is mixed with the output of 100 kc oscillator A2A6A2A1 to cancel any oscillator frequency error and produce the hi-band injection frequencies. The hi- or lo-band of 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 100 kc oscillator A2A6A2A1, it would be canceled in this mixing scheme. This is accomplished as follows. Assume that the output from 100 kc oscillator A2A6A2A1 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 100 kc oscillator A2A6A2A1 (17.8468 MHz + 4.5532 MHz = 22.4 MHz), resulting in the desired 22.4-MHz output. Assume that the output from 100 kc oscillator A2A6A2A1 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 100 kc oscillator A2A6A2A1 to obtain the required 32.8-MHz output. Therefore, any error existing in the output from 100 kc oscillator A2A6A2A1 will be canceled, resulting in the exact 100-kHz injection frequency required.

Any error existing in 1 and 10 kc oscillators A2A6A3A2 and A2A6A3A1 is canceled in the following manner. The 100-kHz pulses from 100 kc spectrum generator A2A6A5A1 are applied to 10 kc spectrum generator A2A6A5A2, producing an output from 3.82 to 3.91 MHz in 10-kHz increments. In addition, 10 kc spectrum generator A2A6A5A2 produces 10-kHz pulses which are applied to 1 kc spectrum generator A2A6A5A3 to produce a spectrum of frequencies spaced at 1-kHz intervals between 0.122 MHz and 0.131 MHz. The output from 10 kc oscillator A2A6A3A1 (5.25 MHz 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 kc oscillator A2A6A3A2 (1.850 MHz 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-MHz and the 9.07-MHz signals are then subtractively mixed, producing the 7.089-MHz signal, which contains the errors of both oscillators. In addition, 1 kc spectrum generator A2A6A5A3 produces a 1-kHz pulse, which is applied to 1 kc pulse inverter A2A6A5A4 to lock the output frequency of 100 cps phase-locked oscillator A2A6A4A2 when desired. With the front panel CPS switch in the 000 position, the output from 100 cps phase-locked oscillator A2A6A4A2 is 110 kHz and is locked to that exact frequency by the 110-kHz spectrum point applied to phase detector A2A6A4A2Z1. This 110-kHz signal is divided by 10 and applied to 7.1 mc mixer A2A6A4A3, where it is additively mixed with the 7.089-MHz output from 7.089 mc 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 1 or 10 kc oscillators A2A6A3A2 or A2A6A3A1, the same error will exist in the 100-kHz injection frequencies. This error is then canceled in mid and low frequency mixers A2A6A6Z3 and A2A6A6Z3 in the following manner. Assume that the output from 10 kc oscillator A2A6A3A1 should be 5.25 MHz but is actually 5.2502 MHz. Also, assume that the output from 1 kc oscillator A2A6A3A2 should be 1.852 MHz but is actually 1.8521 MHz. Subtractively mixing these two frequencies results in an injection frequency to low frequency mixer A2A6A6Z3 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-MHz 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 A2A6A4A1Z4, 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 100 kc oscillator A2A6A2A1 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 low frequency mixer A2A6A6Z3 with the output from mid frequency mixer A2A6A6Z2 (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.

The R-1051D/URR can be tuned to 0.1-kHz increments by using the CPS switch, or to any frequency in between by using the 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 cps 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 error frequency, a frequency of 7.1001 MHz is obtained. Therefore, the 100-kHz injection frequency will be 100 Hz greater. Thus, the output from mid frequency mixer A2A6A6Z2 may be varied in 100-Hz increments from 22, 400, 000 Hz to 23, 300, 900 Hz, or from 32, 400, 000 Hz to 33, 300, 900 Hz. When the CPS switch is in the V position, the output from phase-locked oscillator A2A6A4A2Q2 can be varied between 108 kHz and 122 kHz. As a result, the 7.1000-MHz error frequency can be varied between 7.0998 MHz and 7.1012 MHz. Thus, the output from mid frequency mixer A2A6A6Z2 may be varied continuously between any two 1-kHz increments.

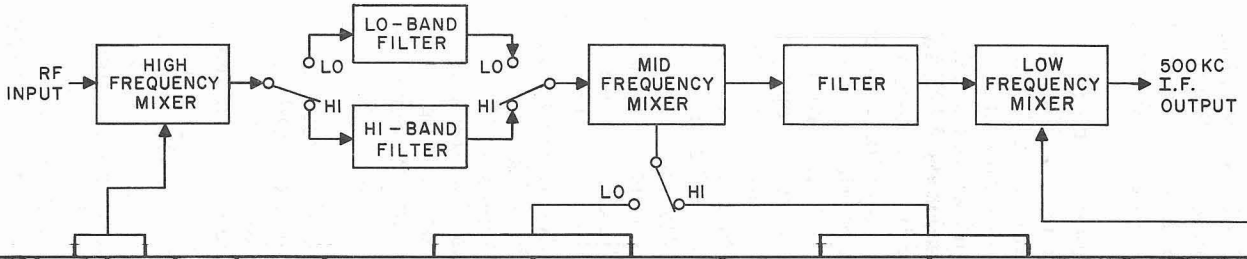
The rf signal from the antenna is converted to the 500-kHz intermediate frequency as follows. Assume that the frequency controls on the front panel are set for a frequency of 13, 492, 500 Hz. (See figure 3-2 for frequency translation in the R-1051D/URR.) The 1-MHz injection corresponding to the selected MHz digits (13) is 16.5 MHz in the hi-band. The level-controlled 16.5 MHz is additively mixed in high frequency mixer A2A6A6Z1 with 13, 492, 500 Hz producing 29, 992, 500 Hz which is filtered and applied to mid frequency mixer A2A6A6Z2. Since the MHz 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-kHz digit (4) will be 32.8005 MHz, as shown in figure 3-2. Mid frequency mixer A2A6A6Z2 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 low frequency mixer A2A6A6Z3. The 1- and 10-kHz injection is that frequency of 10 kc oscillator A2A6A3A1 corresponding to the 10-kHz digit (9) minus that frequency of 1 kc oscillator A2A6A3A2 corresponding to the 1-kHz digit (2). As shown in figure 3-2, this results in an injection frequency (5.16 MHz minus 1.852 MHz) of 3.308 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 MHz and 30 MHz may be translated into the 500-kHz intermediate frequency.

f. POWER SUPPLIES. - The operating voltages for the R-1051D/URR are produced by power supply electronic assembly A2A8. The 103.5- to 126.5-Vac primary power is converted to dc voltages of 110 volts (rf amplifier tubes plate and screen supply), -30 volts (rf amplifier tubes bias), and 28 volts (general use). The 28 Vdc is also regulated to 20 Vdc for use in all semiconductor circuits of the R-1051D/URR. An additional supply of 4 Vdc is developed from the 20 Vdc line by 4 Vdc power supply and vernier control A2A11A1.

3-2. FUNCTIONAL BLOCK DIAGRAM DESCRIPTION.

Assemblies and subassemblies of the R-1051D/URR are described by function in subsequent paragraphs (according to each servicing block diagram contained in Section 4), and are presented in assembly reference designation order.

a. MODE SELECTOR ELECTRONIC ASSEMBLY A2A1. - Mode selector electronic assembly A2A1 (figure 4-1) consists



MCS	LO	HI	100. KCS	100 KC OSC	LO 000 CPS TO 900 CPS IN 100 CPS STEPS*	LO VERNIER*	HI 000 CPS TO 900 CPS IN 100 CPS STEPS*	HI VERNIER*	10 KCS	10 KC OSC	1 and 10 KC INJ.	1 KCS	1 KC 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											
12		8.5											
22	2.5												
23	3.5												
24		5.5											
25		4.5											
26		3.5											
27	7.5												
28	8.5												
29	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.

Figure 3-2. Frequency Translation, Functional Block Diagram

of three electrically unrelated printed-circuit boards, mode gate A2A1A1, 500 kc gate A2A1A2, and BFO amplifier A2A1A3.

The if. signal from rf translator electronic subassembly A2A6A6 is applied to the base of emitter follower Q1 of mode gate A2A1A1 in all of the R-1051D/URR operating modes. The output of emitter follower Q1 is applied to USB filter FL1, AM filter FL2, and LSB filter FL3. The output of filter FL3 is sent through emitter follower Q3 and capacitor C20 to if./audio amplifier electronic assembly A2A3. In RATT, USB, and ISB modes of operation, a +20-volt USB control signal from Mode Selector switch A2S2 biases diode switch CR1 on and biases diode switch CR2 off, applying the output of USB filter FL1 to the base of emitter follower Q2. In AM and CW modes, a +20-volt AM control signal from Mode Selector switch A2S2 biases diode switch CR2 on and biases diode switch CR1 off, applying the output of AM filter FL2 to the base of emitter follower Q2. Transmit/receive relay A2K3 provides collector voltage only during the R-1051D/URR operation, disabling the R-1051D/URR whenever the transmitter is keyed. The output of emitter follower Q2 is coupled by capacitor C18 to if./audio amplifier electronic assembly A2A2.

The 500-kHz signal from frequency standard electronic assembly A2A5 is passed through gate A1A2CR1 to if./audio amplifier electronic assemblies A2A2 and A2A3 during all modes of the R-1051D/URR operation selected by Mode Selector switch A2S2, except AM and CW. During AM and CW receiver operation, gate A1A2CR1 is biased closed. Gate bias is controlled by Mode Selector switch A2S2. The gate bias is at ground for AM and CW receiver operation and at +20 volts for all other modes of receiver operation. Transmit/receive relay A2K3 provides +20-volt bias during all modes of receiver operation.

The BFO frequency dc control voltage A2R6 on the front panel is supplied to BFO amplifier A2A1A3 when Mode Selector switch A2S2 on the front panel is at CW. This circuit consists of voltage variable capacitor CR1, variable slug-tuned coil L1, BFO Q1, amplifier Q2, and transformer T1. The signal emerges from transformer T1 as the BFO output to if./audio amplifier electronic assembly A2A2.

b. IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 AND A2A3. - Two identical if./audio amplifier electronic assemblies A2A2 and A2A3 (figure 4-2) amplify the if. signal from mode selector electronic assembly A2A1, demodulate the if. signal, amplify the resulting audio signals, and develop agc voltages which maintain the if. signal at an optimum level for the detectors. Either fast or slow agc response time, or manual gain control is provided, as selected at the front panel.

IF. input from mode selector electronic assembly A2A1 is amplified in gain controlled if./audio amplifier A2A2A2 and A2A3A2 by transformer-coupled if. amplifiers Q1, Q4, Q5, and Q6 for application to the product/am. detectors A2A2A3 and A2A3A3, respectively if. gain adjustment R22 sets receiver if. gain for a given input signal amplitude. A portion of the output of if. amplifier Q4 is taken from transformer A2T2 and applied to step agc A2A2A1 or A2A3A1. This input to the step agc is amplified by transformer-coupled (A1T2) if. amplifiers Q8 and Q7 and applied to hang detector CR4 and time detector CR5 whenever the control signal from the AGC switch on the front panel is set at either SLOW (open) or FAST (+20 volts). When the AGC switch is set at OFF (ground), preamplifier A12 holds switch Q13 off, denying emitter supply to if. amplifier Q7, thereby disabling the agc circuit. When either fast or slow agc operation is selected, agc adjustment R25 affords adjustment of the if. agc signal gradient.

The output of hang detector CR4 and time detector CR5, when coincident, produces an output from coincidence detector Q6. Whenever the control signal from the AGC switch on the front panel is +20 volts (FAST), preamplifier Q11 holds switch Q10 off, removing capacitor C14 from between the output of hang detector CR4 and ground, thereby reducing agc response time. Output of coincidence detector Q6 is isolated by emitter follower Q4. Output of emitter follower Q4 in fast or slow agc operation, or a control signal

from the RF GAIN control on the front panel in manual gain control, is placed on dc amplifier Q3. Output from the emitter of dc amplifier Q3 is returned as agc voltage to gain controlled if./audio amplifier A2A2A3 or A2A3A3 and is applied through dc amplifier Q2 and agc amplifier Q3 to control the gain of if. amplifier Q4. Thus, the outputs of if. amplifiers Q4, Q5, and Q6 remain nearly constant regardless of received signal strength. Output from the collector of dc amplifier Q3 in step agc A2A2A1 or A2A3A1 is applied through dc amplifiers Q2 and Q1 and protective gate CR1 to rf amplifier electronic assembly A2A4 as rf agc voltage. RF agc adjustment R6 affords adjustment of the rf agc signal gradient. Whenever the control signal from the AGC switch on the front panel is +20 volts (FAST), switch Q5 conducts, connecting capacitor C1 between the output of dc amplifier Q2 and ground to provide smooth agc action.

Output of if. amplifier Q6 in gain controlled if./audio amplifier A2A2A2 or A2A3A2 is applied through transformer T4 to a product detector consisting of transistors Q1 and Q2 and transformer T1 on board A3, and to if. amplifier Q3. When Mode Selector switch A2S2 on the front panel is in either the RATT, USB, LSB, or ISB position, a 500-kHz injection from mode selector electronic assembly A2A1 is applied to the product detector as carrier reinsertion. Audio output of the product detectors taken from transformer T1, is applied to either the LSB or USB LINE LEVEL control (A2R1 for product/am. detections A2A3A3 or A2R2 for product/am. detectors A2A2A3, respectively). When the Mode Selector switch is in the AM or CW position, an AM control voltage is applied to energize if. amplifier Q3 and audio amplifier Q9 on board A2A2A3, only. When these stages are energized, if. amplifier Q3, AM detector CR2, and audio amplifier Q9 produce audio output which is applied to USB LINE LEVEL control A2R1. When the Mode Selector switch is in the CW position, a BFO signal from mode selector electronic assembly A2A1 is mixed in the tuned circuit (L1 and C6) with the if. signal to produce an audio tone whenever an unmodulated carrier is present. When the R-1051D/URR is used with a transmitter, the sidetone output of the transmitter is coupled to the LSB or USB LINE LEVEL controls A2R1 or A2R2 enabling the operator to hear the transmitter at the R-1051D/URR audio output.

Output of either the LSB or USB LINE LEVEL control (A2R1 for product/am. detectors A2A3A3 or A2R2 for product/am. detectors A2A2A3, respectively) is amplified in gain controlled if./audio amplifier A2A3A2 or A2A2A2, respectively, by audio amplifier Q7, emitter follower Q8, and transformer-coupled push-pull amplifiers Q9 and Q10. Output is taken from transformer T1 for the remote audio output, and for either LSB PHONE LEVEL control A2R4 or USB PHONE LEVEL control A2R5 on the front panel. The output of each control is available at the respective phone jack on the front panel. A portion of the output of transformer T1 is fed back to audio amplifier Q7 as degenerative feedback to ensure over-all amplifier stability.

c. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4. - In all receiver operating modes, rf amplifier electronic assembly A2A4 (figure 4-3) supplies the rf output signal to translator/synthesizer electronic assembly A2A6 utilizing an agc input from if./audio amplifier electronic assembly A2A2 or A2A3, an rf turret control signal from code generator electronic assembly A2A7, +28 Vdc from power supply electronic assembly A2A8, and antenna input signals.

The rf input signal from the antenna is applied through normally closed contacts of transmit/receive relay K1 in transmitter mixer assembly A38 to one of megacycle assemblies A2 through A29 selected by the MCS controls on the front panel. The MCS controls position code generator electronic assembly A2A7, which transmits an electrical code to turret decoder S1. The turret decoder causes turret drive relay K1 to step until turret motor B1 repositions the turret decoder to satisfy the electrical code input, thereby positioning the appropriate megacycle assembly. The megacycle assembly selected consists of two transformers coupled by a capacitor (this is replaced by a tuned trap on assemblies A12 and A13), and a crystal filter for increased selectivity on assemblies A9, A10, and A19.

Two 100 kc rotor assemblies A30 and A33 and two 10 kc rotor assemblies A31 and A32 are provided for tuning via the KCS controls on the R-1051D/URR front panel. The output of the selected megacycle assembly is applied to rf amplifier V1 whose output is tuned by part of a different megacycle assembly (A2 through A29). This part of the megacycle assembly uses tuned transformer T3 for required frequency selectivity, and is connected to 100 kc and 10 kc rotor assemblies A34 and A35. The tuned output of amplifier V1 is applied to amplifier V2, which tunes its output by use of another part of a third selected megacycle assembly consisting of tuned transformer T4, which is connected to 100 kc and 10 kc rotor assemblies A37 and A36. The 100 kc and 10 kc rotor assemblies A37 and A36 provide for tuning via the KCS controls. The output from T4 is applied to translator/ synthesizer electronic assembly A2A6.

d. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5. - In all receiver operating modes, frequency standard electronic assembly A2A5 (figure 4-4) generates a 1-MHz output to mc synthesizer electronic subassembly A2A6A1, a 10-MHz output to 100 kc synthesizer electronic subassembly A2A6A2, a 500-kHz output to spectrum generator electronic subassembly A2A6A5, and a 500-kHz output to mode selector electronic assembly A2A1. A 5-MHz output is also applied to jack J24 on the rear panel of the R-1051D/URR.

An external 5-MHz input from jack J25, located on the rear panel, enters COMP/ INT/EXT switch A2A5S1 at pin 1. This switch is a three-pole, three-circuit wafer switch. Switch A2A5S1 also receives an input at pins 2 and 3 from buffer amplifier A2Q6 which is attenuated by potentiometer A1R22. Routing is provided via pin 4 to the base of 10 mc amplifier A1Q4, through variable transformer A1T4, to produce the 10-MHz output of 5 mc multiplier, dividers, and comparator A2A5A1.

Buffer amplifier A2Q6 is driven by the internal 5 mc frequency standard consisting of 5 mc oscillator A3Q5 (utilizing crystal A3Y1) on 5 mc oscillator circuit A2A5A3, and the oven circuit, which includes oven control circuit A2A5A2 and dec amplifier A2A5Q1, heating element A2A5HR1, and temperature sensor A2A5RT1. Oven control circuit A2A5A2 consists of amplifiers A2Q1, A2Q2, and emitter follower A2Q3; ambient temperature compensator A2RT2; and coupling transformer A2T1. The 5-MHz signal is also produced at the 10 mc amplifier base junction A1Q4, is coupled to the base of buffer amplifier A1Q5, and coupled by tuned transformer A1T5 to switch A2A5S1 at pin 8. Pin 7 of wafer switch A2A5S1 produces the drive to tuned transformer A1T6, comparator A1Q7, and amplifier A1Q6, and enables frequency error lamp A2A5DS1 on board A1. Pin 12 of switch A2A5S1 is connected to the output of tuned transformer A1T5 with pins 9 and 11 providing the 5-MHz output to jack J24 on the rear panel.

The circuitry of 5 mc multiplier, dividers, and comparator A2A5A1 also contains tuned variable transformer A1T3. This transformer receives an input from the collector of 1 mc amplifier A1Q3. Transformer A1T3 drives both tuned transformer A1T1 and 1 mc amplifier A1Q2. The output of A1Q2 drives tuned transformer A1T2. This transformer drives the base of 1 mc amplifier A1Q3 (to complete one loop). The signal is also routed in a similar loop through tuned transformer A1T1 to the base of 500 kc amplifier A1Q1 and out the collector, returning to A1T1 as an input. The resultant output of A1T1 supplies the 500-kHz output signal to spectrum generator electronic subassembly A2A6A5 and mode selector electronic assembly A2A1. The final output of A1T3 provides the 1-MHz output signal to mc synthesizer electronic subassembly A2A6A1.

e. MC SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A1. - In all of the R-1051D/URR operating modes, mc synthesizer electronic subassembly A2A6A1 (figure 4-5) generates an output to rf translator electronic subassembly A2A6A6. A 1-MHz signal from frequency standard assembly A2A5 provides the initial input. The input signal is applied to spectrum generator mixer A2A6A1A3. The input signal is applied through slug-tuned coils L2, L3, and L4, diode gate CR3, shaper amplifiers Q1 through Q3, and gate CR5 to the base of mixer Q4. MC oscillator A2A6A1A1A1 drives isolation amplifier Q5 and emitter follower Q6, providing a

signal to the emitter of mc error mixer Q4. The output of mixer Q4, containing the difference frequency between both inputs, is coupled by tuned transformer T1 to error detector/amplifier A2A6A1A2.

Error detector/amplifier A2A6A1A2 is composed of if. amplifiers Q1 and Q2, tuned transformers T1 and T2, crystal detector CR1, inductors L1 through L4, and dc amplifier Q3. The signal continues from Q3 to mc oscillator A2A6A1A1A1, which consists of voltage variable capacitor CR3, limiters CR1 and CR2, oscillator Q1, wideband amplifier Q2, and emitter followers Q3 and Q4. Here, oscillator Q1 is tuned by voltage variable capacitor CR3 according to the output of error detector/amplifier A2A6A1A2. MC level control A2A6A1A4 receives the output of mc oscillator A2A6A1A1A1 and limits signal amplitude through circuitry consisting of gain control amplifier Q1, emitter follower Q2, crystal detector CR1, and differential amplifier Q3, Q4, which supplies the agc voltage input to Q1 before applying the 2.5- to 23.5-MHz 70-mV injection signal output to the high-frequency mixer in rf translator electronic subassembly A2A6A6.

f. 100 KC SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A2. - In all of the R-1051D/URR operating modes, 100 kc synthesizer electronic subassembly A2A6A2 (figure 4-6) supplies the 100-kHz injection signal to rf translator electronic subassembly A2A6A6 utilizing a 10-MHz input from frequency standard electronic assembly A2A5, a 7.1-MHz input signal from 100 cps synthesizer electronic subassembly A2A6A4, and the 100-kHz spectrum (15.3 to 16.2 MHz) from spectrum generator electronic subassembly A2A6A5.

A stable frequency determined by the crystal selected by S1 from among crystals Y1 through Y10 is produced by 4.553-5.453 mc oscillator A2A6A2A1. After limiting provided by diodes CR1 and CR2 in the oscillator Q1 base circuit and filtering by C9, C10, C11, L1 and T1, the 4.553-5.453 MHz output is applied to mixers Q1 and Q2 on hi-band/lo-band mixer/amplifier A2A6A2A4. The 4.553-5.453 MHz output from A1Q1 is coupled to isolation amplifier Q2 (10.747 mc mixer board A2).

Hi-band/lo-band mixer/amplifier A2A6A2A2 contains high-band mixer Q1, high-band amplifier Q3, low-band mixer Q2 and low-band amplifier Q4. Low- and high-band tuned circuits and traps are used to filter mixer and amplifier outputs. The low-band mixer receives the applied output of 4.553-5.453 mc oscillator A2A6A2A1 and a 17.847-MHz signal from 17.847/27.847 mc mixer A2A6A2A3 as inputs. After selecting the desired mixer output frequency by the use of slug-tuned inductors L4, L5, and transformer T2, this signal is applied to trap amplifier Q4 which then drives agc A2A6A2A5. The high-band mixer also accepts the output of 4.553-5.453 mc oscillator A2A6A2A1, but mixes this signal with a 27.847-MHz signal from 17.847/27.847 mc mixer A2A6A2A3. The desired high-band mixer output frequency is selected by the use of slug-tuned inductors L1, L2, and transformer T1. This signal is then applied to high-band amplifier Q3 which also applies its output to agc A2A6A2A5.

Inputs to agc A2A6A2A5 are applied to the base of emitter follower Q1. The output of Q1 is applied to agc amplifier Q2 and also forms the 100-kHz injection signal to rf translator electronic subassembly A2A6A6. After the Q1 output is amplified by agc amplifier Q2, agc amplifier Q3 continues amplification and applies its output to transistor detector Q4. This detected output is applied as bias to mixer Q1 on the 10.747 mc mixer A2A6A2A2.

In addition to this agc input, 10.747 mixer A2A6A2A2 receives the output of 4.553-5.453 mc oscillator A2A6A2A1 and the 100-kHz spectrum (15.3 to 16.2 MHz) from spectrum generator electronic subassembly A2A6A5. The 4.533-5.453 MHz output is first applied to isolation amplifier Q2, and then drives tuned transformer T1. The T1 output is applied to mixer Q1. The 100-kHz spectrum forms the second input to mixer Q1, and the mixed output is applied to tuned transformer T2, then to filter FL1, and finally to tuned transformer T3, assuring an output free of spurious signals on a frequency of 10.747 MHz before application to 17.847/27.847 mc mixer A2A6A2A3.

The 10.747-MHz output from A2A6A2A2 and the 7.1-MHz signal from 100 cps synthesizer electronic subassembly A2A6A4 are applied to 17.847/27.847 mc mixer A2A6A2A3. These signals are applied to mixer Q1 whose output drives tuned transformer T1 and 17.847-MHz crystal filter Y2. The filter output is then applied to tuned transformer T2 which couples its output to 27.847 mixer Q2, and to the low-band mixer of hi-band/lo-band mixer/amplifier A2A6A2A4.

In addition, 17.847/27.847 mc mixer A2A6A2A3 receives the 10-MHz signal from frequency standard electronic assembly A2A5 after gating performed by diodes CR1 and CR3. The mixer output is then applied to tuned transformer T3, crystal filter Y2 (27.847 MHz), and tuned transformer T4 before being applied to the high-band mixer of hi-band/lo-band mixer/amplifier A2A6A2A4.

g. 1 AND 10 KC SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A3. - In all of the R-1051D/URR operating modes, 1 and 10 kc synthesizer electronic subassembly A2A6A3 (figure 4-7) produces two output signals: the 1- and 10-kHz outputs to rf translator electronic subassembly A2A6A6, and the 7.089-MHz error signal to 100 cps synthesizer electronic subassembly A2A6A4.

The 1 and 10 kc synthesizer utilizes two internal oscillators. The 1 kc oscillator on 1.850-1.859 mc oscillator A2A6A3A2 generates any one of ten stable frequencies in the range of 1.850 through 1.859 MHz, with the correct frequency crystal selected by the 1 KCS control on the front panel of the R-1051D/URR. The selected crystal (A5Y11, A5Y12, ... A5Y20) is wired to the base circuit of oscillator Q1. Limiter diodes CR1 and CR2 in the oscillator base circuit prevent excessive voltage from damaging a crystal. The output from the oscillator is taken from the emitter and applied to the base of buffer amplifier Q2. The output of Q2 is tuned by transformer T1 and is applied to mixer Q11 on 1 and 10 kc output and blanker A2A6A3A3, and to isolation amplifier Q7 on 1 and 10 kc error mixer A2A6A3A4.

The 10 kc oscillator on 5.16-5.25 mc oscillator A2A6A3A1 also generates any one of ten stable frequencies in the range of 5.16 through 5.25 MHz, with the correct frequency crystal selected by the 10 KCS control on the front panel of the R-1051D/URR. The selected crystal (A6Y1, A6Y2 ... A6Y10) is wired to the base circuit of oscillator Q1. Limiter diodes CR1 and CR2 in the oscillator base circuit prevent excessive voltage from damaging a crystal. The output from the oscillator is taken from the emitter and applied to the base of buffer amplifier Q2. The output of Q2 is tuned by transformer T1 and is applied to mixer Q11 on 1 and 10 kc output and blanker A2A6A3A3, and to isolation amplifier Q6 on 1 and 10 kc error mixer A2A6A3A4.

The oscillator outputs are applied to 1 and 10 kc output and blanker A2A6A3A3. Coils L5, L6, and L7 provide tuned trapping. The output is applied through tuned transformer T3 as the 1- and 10-kHz outputs to rf translator electronic subassembly A2A6A6. The 1 kc oscillator output is amplified by transistor Q7, and the 10 kc oscillator output is amplified by transistor Q6 on 1 and 10 kc error mixer A2A6A3A4. The resulting outputs are applied to inductors L4 and L3, respectively, and then to 1 kc error mixer Q10 and 10 kc error mixer Q8, respectively. The 1 kc error mixer mixes the isolated 1 kc oscillator output with the 1-kHz spectrum signal (0.122 to 0.131 MHz) from spectrum generator electronic subassembly A2A6A5 and produces an output which is filtered by FL2 at 1.981 MHz. The 10 kc error mixer mixes the isolated 10 kc oscillator output with the 10-kHz spectrum signal (3.82 to 3.91 MHz) from spectrum generator electronic subassembly A2A6A5 and produces an output which is filtered by FL1 at 9.07 MHz. Both filter outputs are applied to mixer Q9 whose output is tuned by transformer T1 to the 7.089-MHz error output signal which is applied to the 100 cps synthesizer electronic subassembly A2A6A4.

h. 100 CPS SYNTHESIZER ELECTRONIC SUBASSEMBLY A2A6A4. - In all of the R-1051D/URR operating modes, 100 cps synthesizer electronic subassembly A2A6A4 (figure 4-8) generates a 7.0998- to 7.1012-MHz signal for application to 100 kc synthesizer electronic subassembly A2A6A2.

As input, 100 cps synthesizer electronic subassembly A2A6A4 receives pulses from 1 kc spectrum generator electronic subassembly A2A6A5, a vernier frequency control signal from CPS vernier control A2A11R7, a 7.089-MHz signal from 1 and 10 kc synthesizer electronic subassembly A2A6A3, and the 100 cps tuning control four-wire code from CPS switch A2A11S6 on the R-1051D/URR front panel. The 100 cps synthesizer electronic subassembly A2A6A4 consists of three electrically connected printed-circuit boards: 100 cps oscillator A2A6A4A2, preset counter A2A6A4A1, and 7.1 mc mixer A2A6A4A3.

When CPS switch A2A11S6 is at any position other than the V position, 1-kHz input pulses from spectrum generator electronic assembly A2A6A5, consisting of frequencies of from 122 kHz to 131 kHz at intervals of 1 kHz, are applied to phase detector A2Z1 along with reset pulses obtained from preset counter A2A6A4A1. Output of the phase detector, a dc voltage proportional to phase difference between spectrum generator pulses and reset pulses, is amplified by A2Q1 and applied to variable tuning elements A2CR7, A2CR8, and A2CR9. These variable tuning elements are voltage-variable capacitors which slave the output of oscillator A2Q2 to the input from spectrum generator electronic subassembly A2A6A5. Oscillator output is limited in amplitude by CR5 and CR6, and is applied to preset counter A1 through buffer amplifier A2Q3 for isolation. When CPS switch A2A11S6 is at the V position, frequency of oscillator A2Q2 is slaved to the vernier frequency control signal.

Output of buffer amplifier A2Q3 is applied through pulse shaper A1Q5, A1Q6 which functions as a Schmitt trigger, through decade divider A1Z4, and through amplifier A1Q7 to 7.1 mc mixer A3. When CPS switch A2A11S6 is at any position other than the V position, preset counter A2A6A4A1, consisting of decade dividers A1Z3, A1Z1, inverter amplifier A1Q8, flip-flop A1Z2, reset pulser A1Q1 through A1Q4, and emitter follower A1Q9, is preloaded to a value from 000 Hz to 900 Hz according to the particular 100 cps tuning control four-wire binary code received from CPS switch A2A11S6 through gates A1CR3 through A1CR10. This preload slaves oscillator A2Q2 to the CPS switch frequency selected, through operation of phase detector A2Z1.

Output of amplifier A1Q7 is applied through emitter follower A3Q1 as one input to mixer A3Q2. A 7.089-MHz signal from 1 and 10 kc synthesizer electronic subassembly A2A6A3 is applied as the other input to mixer A3Q2. Mixer output frequencies are applied to 7.1 mc filter A3FL2 which passes only the summation frequency. This 7.1-MHz output is applied through emitter follower A3Q3, amplifier A3Q4, and tuned transformer A3T1 to 100 kc synthesizer electronic subassembly A2A6A2.

i. SPECTRUM GENERATOR ELECTRONIC SUBASSEMBLY A2A6A5. - In all of the R-1051D/URR operating modes, spectrum generator electronic subassembly A2A6A5 (figure 4-9) generates a 100-kHz spectrum signal (15.3 to 16.2 MHz) for 100 kc synthesizer electronic subassembly A2A6A2, a 10-kHz spectrum signal (3.82 to 3.91 MHz) for 1 and 10 kc synthesizer electronic subassembly A2A6A3, a 1-kHz spectrum signal (0.122 to 0.131 kHz) for 1 and 10 kc synthesizer electronic subassembly A2A6A3, and a 1-kHz pulse for 100 cps synthesizer electronic subassembly A2A6A4.

The initial input is a 0.2-volt rms, 500-kHz signal from frequency standard electronic assembly A2A5. The signal enters 100 kc spectrum generator A2A6A5A1 consisting of variable inductor L2, trigger amplifier Q1, divide-by-five multivibrator Q2, Q3, gate amplifier Q4, keyed oscillator Q5, tuned transformer T1, amplifier Q6 and broadband filter L5 and T2, producing the 100-kHz spectrum output. In addition, an output from the collector of Q3 drives the base of divide-by-two multivibrator Q1, Q2 which drives divide-by-five multivibrator Q3, Q4, gate amplifier Q5, keyed oscillator Q6, and tuned transformer T1 of 10 kc spectrum generator A2A6A5A2 to produce the 3.82- to 3.91-MHz spectrum output.

Similarly, the signal is routed from the collector of Q4 in 10 kc spectrum generator A2A6A5A2 to 1 kc spectrum generator A2A6A5A3 to produce the 1-kHz spectrum. This board consists of divide-by-two multivibrator Q1, Q2, divide-by-five multivibrator Q3, Q4, gate amplifier

Q5, keyed oscillator Q6, and tuned transformer T1. The output of T1 supplies the 1-kHz spectrum (0.122 to 0.131 MHz) to 1 and 10 kc synthesizer electronic subassembly A2A6A3. The output from Q4 of the divide-by-five multivibrator is applied to 1 kc pulse inverter A2A6A5A4. This board consists of inverter Q1 which supplies 1-kHz pulses to 100 cps synthesizer electronic subassembly A2A6A4.

j. RF TRANSLATOR ELECTRONIC SUBASSEMBLY A2A6A6. - As shown in figure 4-10, rf translator electronic assembly A2A6A6 supplies the 500-kHz output signal to mode selector electronic assembly A2A1. This is accomplished by use of three mixing stages which mix the MHz injection frequencies, 100-kHz injection frequencies, 1- and 10-kHz injection frequencies, and 2- to 30-MHz inputs.

As input, rf amplifier electronic assembly A2A4 feeds a 2- to 30-MHz signal to high frequency mixer Z3 after limiting by diodes CR19 and CR20. This signal is applied to high-frequency mixer gate CR18, tuned transformer T7, and mixer Z3, which also receives the MHz injection signal from mc synthesizer electronic subassembly A2A6A1. The mixed output is applied to tuned transformer T6 and then to gates CR15 and CR17. The high-frequency mixer output from CR15 is applied either to 20 MHz filter FL1 or to 30 MHz filter FL2 as either gates CR12 and CR10 are biased on and gates CR13 and CR11 are biased off in lo-band (20-MHz first intermediate frequency), or gates CR13 and CR11 are biased on and gates CR12 and CR10 are biased off in hi-band (30-MHz first intermediate frequency).

The filtered output drives mid frequency mixer Z2, which is similar to high frequency mixer Z3 except that the input signal is mixed with the 100-kHz injection signal from 100 kc synthesizer electronic subassembly A2A6A2. After mixing and gating, the mid frequency mixer output signal is applied to filter FL3. The FL3 output drives low frequency mixer Z1, which is also similar to high frequency mixer Z3, so that the input signal is mixed with 1- and 10-kHz injection signal from 1 and 10 kc synthesizer electronic subassembly A2A6A3.

After mixing and gating, the low-frequency mixer output signal is applied through L2 to Q1, where it is amplified and fed to tuned transformer T1 whose output is the 500-kHz output signal.

3-3. FUNCTIONAL CIRCUIT DESCRIPTION.

Repairable circuits of the R-1051D/URR are described in paragraphs a through av.

a. ANTENNA OVERLOAD. - The antenna overload circuit (figure 3-3) consists of diode detector CR1, amplifier Q1, relay driver Q2, and relay K1. The rf signal from the antenna is coupled by capacitor C1 to divider R1 and R2 which is frequency compensated by C2 and C3. The reduced rf signal is applied to diode CR1.

Output of the detector, half-wave rectified positive voltage proportional to antenna signal strength, is smoothed by capacitor C4 and applied through resistor R3 to the base of amplifier Q1. Resistors R2 and R3 self-bias the base of amplifier Q1 at a level such that transistor Q1 is near, or at, cutoff with a safe level of rf signal applied to detector CR1. Resistors R5 and R6 bias the emitter of transistor Q1, and resistor R4 is the collector load. Output voltage from the collector of amplifier Q1 is coupled directly to the base of relay driver Q2. With a safe level of rf signal applied to detector CR1, the base of relay driver Q2 is forward-biased by resistor R7 and resistors R8 and R9 develop emitter bias for Q2. In this state, relay driver Q2 holds relay K1 energized, passing the rf signal from the antenna to rf amplifier electronic assembly A2A4.

When the rf signal from the antenna approaches an excessive level, amplifier Q1 conducts, cutting off relay driver Q2. This deenergizes relay K1, removing the antenna signal from the rf amplifier input. When the rf signal from the antenna returns to a safe level, conduction of amplifier Q1 is reduced, returning relay driver Q2 to conduction and restoring the rf signal through relay K1 to the rf amplifier. Whenever a tune ground is applied from code generator electronic assembly A2A7 through diode gate CR2, relay driver Q2 cuts off and relay K1 deenergizes, which grounds the rf amplifier input.

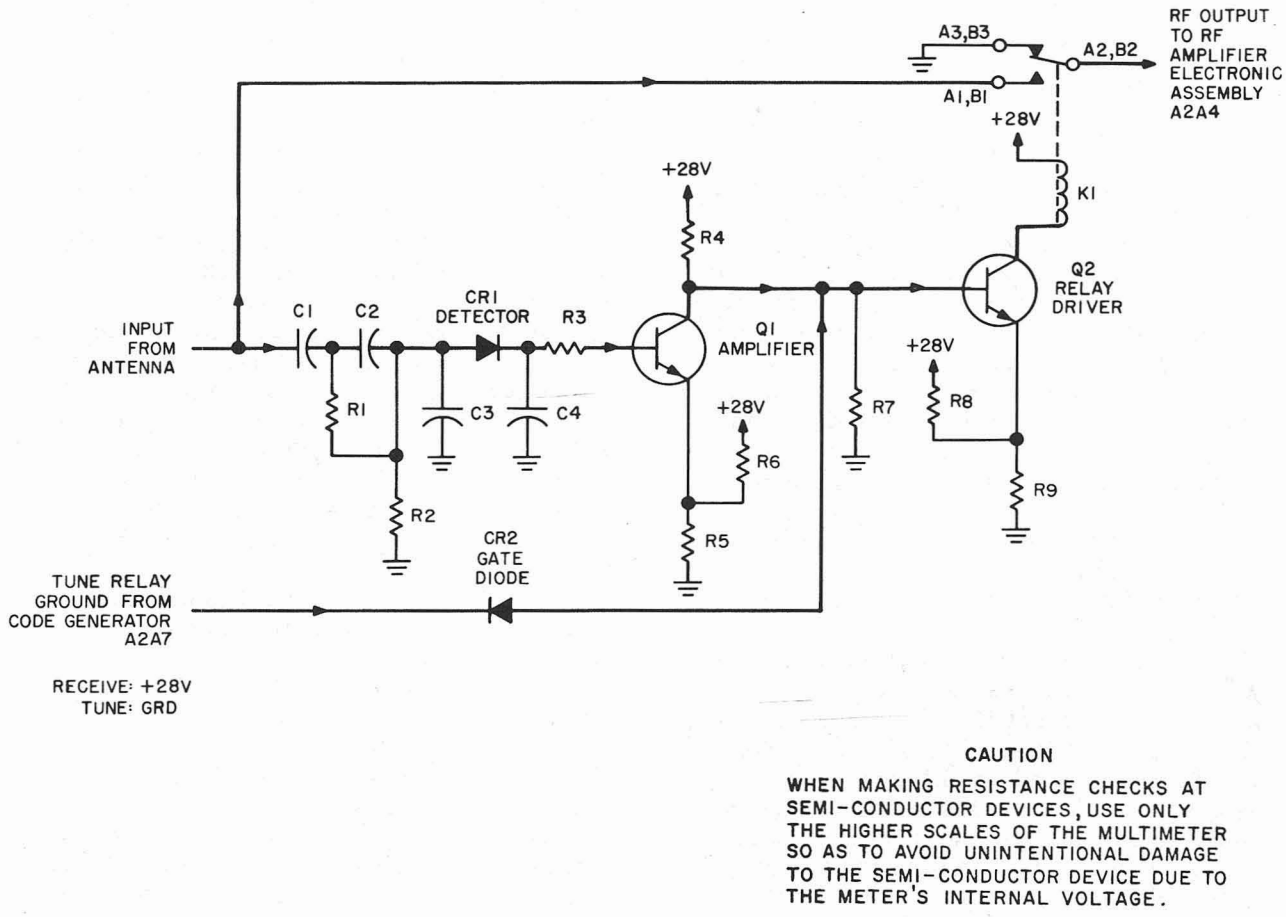


Figure 3-3. Antenna Overload, Simplified Schematic Diagram

b. RF AMPLIFIER V1. - RF amplifier V1 circuit (figure 3-4), which forms a part of rf amplifier electronic assembly A2A4, amplifies the rf input signal from the antenna for application to rf amplifier V2. The following paragraphs describe the operation of this circuit in detail.

The signal from the antenna overload circuit passes through contacts 6 and 8 of relay A38K1 and is applied to the primary of transformer T1 in the megacycle assembly. The megacycle assembly is composed of a double-tuned circuit with capacity coupling. The secondary of transformer T1 forms a parallel-tuned circuit with capacitor C2 in series with a capacitance network composed of capacitors C19, C20, and the capacitors on rotor assemblies A30 and A31. The signal is coupled from transformer T1 to transformer T2 by capacitor C1. Capacitor C1 is replaced by tuned trap L1, C1 on assemblies A12 and A13. Transformer T2 forms a parallel-tuned circuit with capacitor C3 in series with a capacitance network composed of capacitors C8, C9, and the capacitors on rotor assemblies A32 and A33. Crystal Y1 is used only on assemblies A9, A10, and A19.

Megacycle assemblies A2 through A29 are automatically switched into the circuit for each setting of the MCS controls (2 through 29 MHz). Transformers T4, T3, and T2 are located on different megacycle assemblies. The values of the components on these assemblies are shown in chart C on figure 5-12. For each of the ten settings of the 100 kc (KCS) control, different combinations of capacitors on the A30 and A33 rotor board (C1 through C9 and C10 through C19) are switched into the circuit. The values of these components are shown in chart B on figure 5-12. For each of the ten settings of the 10 kc (KCS) control, different capacitors on the A31 and A32 rotor board (C1 through C9) are switched into the circuit. The values of these components are shown in chart A on figure 5-12.

The signal from the megacycle assembly is applied through parasitic suppressor FL1 and coupled by capacitor C1 to the control grid of rf amplifier V1. Screen voltage (110 Vdc) for rf amplifier V1 is applied through decoupling resistor A1R4. Plate voltage (110 Vdc) for rf amplifier V1 is applied through decoupling resistor A1R4 and transformer T3. The agc for rf amplifier V1 is applied to voltage divider A1R1, A1R2 from step agc circuit in if./audio amplifier electronic assemblies A2A2 and A2A3. From the voltage divider, the agc is applied through resistor R1 to the control grid of rf amplifier V1 to vary the gain of the stage according to the strength of the received signal. The cathode bias for rf amplifier V1 is developed across resistors R2 and A1R3. Capacitors C2, C3, C4, A2C1, and A2C2 are rf bypass capacitors.

The output circuit of rf amplifier V1 consists of transformer T3, which forms a parallel-tuned circuit with capacitor C4 in series with a capacitance network composed of capacitors C11, C12 and the capacitors on circuit board assemblies A34 and A35. The circuit description presented earlier holds true for this tuned circuit, except that the 100-kHz capacitors are located on the A34 assembly and the 10-kHz capacitors are located on the A35 assembly.

The rf input signal is amplified by rf amplifier V1, for application to rf amplifier V2.

c. RF AMPLIFIER V2. - RF amplifier V2 (figure 3-5), which forms a part of rf amplifier electronic assembly A2A4, amplifies the signal from rf amplifier V1 for application to the high-frequency mixer in rf translator electronic subassembly A2A6A6. The following paragraphs describe the operation of this circuit in detail.

The signal from rf amplifier V1 is coupled through capacitor C5 and parasitic suppressor FL2, and is applied to the control grid of rf amplifier V2. Screen voltage (110 Vdc) for rf amplifier V2 is applied through decoupling resistor A1R6. Plate voltage (110 Vdc) for rf amplifier V2 is applied through decoupling resistor A1R6, the primary rf transformer T4, and parasitic suppressor FL3. Capacitor C7 is an rf bypass capacitor. The agc voltage from the step agc circuit in if./audio amplifier electronic assemblies A2A2 and A2A3 for rf amplifier V2 is attenuated by a voltage divider composed of resistors R4 and R5,

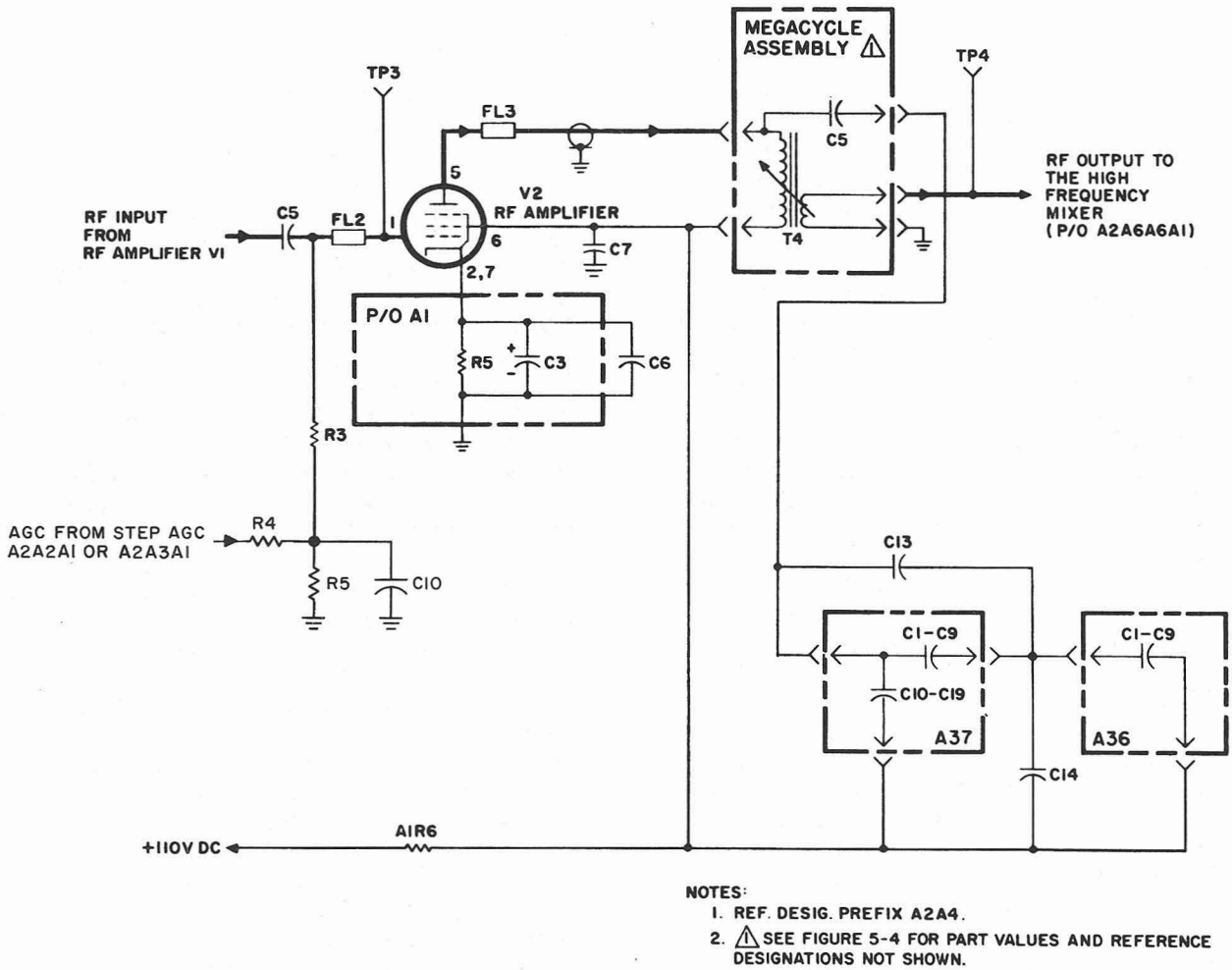


Figure 3-5. RF Amplifier V2, Simplified Schematic Diagram

smoothed by capacitor C10, and is applied to the control grid through resistor R3. The agc varies the gain of the stage according to the strength of the received signal. The cathode bias for rf amplifier V2 is developed across resistor A1R5. The output circuit for rf amplifier V2 consists of transformer T4, which forms a parallel-tuned circuit with capacitor C5 in series with a capacitance network composed of capacitors C13, C14 and the capacitors on rotor assemblies A37 and A36. The circuit description in paragraph 3-3b holds true for this tuned circuit, except that the 100-kHz capacitors are located on the A37 assembly and the 10-kHz capacitors are located on the A36 assembly.

The amplified signal from rf amplifier V2 is applied to high frequency mixer Z1 in rf translator electronic subassembly A2A6A6.

d. HIGH FREQUENCY MIXER. - High frequency mixer Z1 (figure 3-6), which forms a part of rf translator electronic

subassembly A2A6A6, mixes the signal from rf amplifier V2 in rf amplifier electronic assembly A2A4 with the MHz injection frequency from mc level control A4 in mc synthesizer electronic subassembly A2A6A1. The following paragraphs describe the operation of this circuit in detail.

The 2- to 30-MHz signal from rf amplifier A2A4V2 is applied across a peak noise limiter composed of diodes CR19 and CR20 to RF GAIN potentiometer R52. A portion of this signal is coupled from the wiper of R52 through capacitor C63, switching diode CR18, and transformer T7 to integrated circuit Z3. The MHz injection, 2.5 to 23.5 MHz in frequency, is coupled by capacitor C62 to integrated circuit Z3. Here, high-frequency mixing occurs. The output of integrated circuit Z3, containing both the applied frequencies and the sum and difference frequencies, is applied through transformer T6, switching diode CR15, and capacitor C48 to a filter network. In the R-1051D/URR, bias voltage is continuously applied to keep switching diodes CR16 and CR17 off and CR18 and CR15 on.

The mixer output is fed to either channel of a two-channel filter network accordingly as bias is applied to switching diodes CR10 through CR13 from hi/lo filter relay A2K2. For 10-band operation, diodes CR13 and CR11 are biased off while diodes CR12 and CR10 are biased on, passing the signal through capacitor C45 and filter FL1. The pass frequency of filter FL1, 19.5 to 20.5 MHz, corresponds to the desired output of the high frequency mixer for lo-band operation. Chokes L13, L10, and L8 prevent signal leakage through the switching diode bias path. For hi-band operation, diodes CR12 and CR10 are biased off while diodes CR13 and CR11 are biased on, passing the signal through capacitor C44 and filter FL2. The pass frequency of filter FL2, 29.5 to 30.5 MHz, corresponds to the desired output of the high frequency mixer for hi-band operation. Chokes L11, L10, and L9 prevent signal leakage through the switching diode bias path. For either band, output of high frequency mixer Z1 is sent to mid frequency mixer Z2.

e. MID FREQUENCY MIXER. - Mid frequency mixer Z2 (figure 3-7), which forms a part of rf translator electronic subassembly A2A6A6, mixes the signal from the high frequency mixer with the 100-kHz injection frequency from 100 kc synthesizer electronic subassembly A2A6A2. The following paragraph describes the operation of the circuit in detail.

Either the 19.5 to 20.5 MHz or 29.5 to 30.5 MHz signal from high frequency mixer A2A6A6A1Z3 and the appropriate filter network is coupled through capacitors C38 and C37, switching diode CR9, and transformer T5 to integrated circuit Z2. The 100-kHz injection, in 100-kHz increments, either between 22.4 and 23.3 MHz (lo-band) or between 32.4 and 33.3 MHz (hi-band), is coupled by capacitor C34 to integrated circuit Z2. Here, mid-frequency mixing occurs. The output of integrated circuit Z2, containing both the applied frequencies and the sum difference frequencies, is applied through transformer T4, switching diode CR6, and capacitors C25 and C24 to filter F13. In the R-1051D/URR, bias voltage is continuously applied to keep switching diodes CR7 and CR8 off and CR9 and CR6 on. The output of filter FL3, 2.8 to 2.9 MHz, is the desired output of mid frequency mixer A2A6A6Z2 and is sent to low frequency mixer A2A6A6Z3.

f. LOW FREQUENCY MIXER. - Low frequency mixer Z3 (figure 3-8), which forms a part of rf translator electronic subassembly A2A6A6, mixes the signal from the mid frequency mixer with the 1- and 10-kHz injection frequency from 1 and 10 kc synthesizer electronic subassembly A2A6A3. The following paragraph describes the operation of this circuit in detail.

The 2.8- to 2.9-MHz signal from mid frequency mixer A2A6A6A1Z2 and filter FL3 is coupled through capacitors C18 and C20, switching diode CR4, and transformer T2 to integrated circuit Z1. The 1- and 10-kHz injection, between 3.301 and 3.400 MHz in 1-kHz increments, is coupled by capacitor C6 to integrated circuit Z1. Here, low-frequency mixing occurs. The output of integrated circuit Z1, containing both the applied frequencies

and the sum and difference frequencies, is applied through switching diode CR3 and a 500-kHz pass filter, consisting of capacitors C13, C12, and C10 and choke L2, to amplifier Q1. In the R-1051D/URR, bias voltage is continuously applied to keep switching diodes CR4 and CR3 on and CR2 and CR5 off. The output of amplifier Q1 at 500 kHz is the desired output of low frequency mixer A2A6A6Z3 and is sent to mode selector electronic assembly A2A1.

g. MODE GATE. - The mode gate (figure 3-9) consists of emitter followers Q1, Q2, and Q3, filters FL1, FL2, and FL3, switching diodes CR1 and CR2, and Zener diode VR1. This circuit, which forms a part of mode selector electronic assembly A2A1, routes the 500-kHz if. signal from rf translator electronic subassembly A2A6A6, through those filters appropriate to the setting of Mode Selector switch A2S2, to the if. amplifiers used for the selected mode of the R-1051D/URR operation. The following paragraph describes the operation of this circuit for all modes of the R-1051D/URR operation.

The 500-kHz if. signal from low frequency mixer A2A6A6A1Z1 is isolated by emitter follower Q1 and applied to filters FL1, FL2, and FL3. In all modes of operation other than STD BY, the output of LSB filter FL3 is applied through emitter follower Q3 to gain controlled if. amplifier A2A3A2 as the LSB if. signal. In the RATT, USB, or ISB modes of operation, +20 volts is applied by the Mode Selector switch to turn diode switch CR1 on, applying the output of USB filter FL1 to emitter follower Q2. In either the AM or CW modes of operation, +20 volts is applied by the Mode Selector switch to turn diode switch CR2 on, applying the output of AM filter FL2 to emitter follower Q2. The output of the emitter follower, the USB/AM if. signal, is sent to gain controlled if. amplifier A2A2A2. Zener diode VR1 furnishes +10-volt regulated bias, obtained from the positive 20-volt supply, to diode switches CR1 and CR2. Thus, when +20-volts is not applied by the Mode Selector switch to either CR1 or CR2, as in the LSB mode of operation, both diode switches are biased off and no USB/AM if. signal is produced. Whenever the +20-volt receive bus is interrupted by the transmit/receive relay A2K3 or tune relay A2K1, the mode gate is disabled and both outputs fall to zero volts.

h. GAIN CONTROLLED IF. AMPLIFIER. - Gain controlled if. amplifier A2A2A2 or A2A3A2 (figure 3-10) consists of if. amplifiers Q1, Q4, Q5, and Q6, the gain of which is controlled by variable gain amplifier Q3 through dc amplifier Q2. These circuits, which form a part of if./audio amplifier electronic assemblies A2A2 and A2A3, amplify the 500-kHz if. signal from mode gates A2A1A1 to a level suitable for use in the product or AM detector circuits. Gain controlled if. amplifier A2A2A2 is used during the USB, RATT, AM, and CW modes of operation. Gain controlled if. amplifier in assembly A2A3A3 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.

The 500-kHz if. signal from mode gates A2A1A1 is coupled to the base of amplifier Q1 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 dc amplifier Q2. The action of the agc voltage upon the combined circuits of amplifiers Q2 and Q3 results in a nearly constant output from if. amplifier Q4. AGC-controlled dc amplifier Q2 acts as a variable shunt resistance to control the if. signal input level to amplifier Q4. Variable-gain amplifier 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 dc amplifier 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 dc amplifier Q2 also lowers the forward resistance of

diode CR1. This results in a lower voltage at the base of dc amplifier Q2, thereby compensating for the temperature change. The collector-emitter circuit of dc amplifier Q2 acts as a variable shunt resistor 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 dc amplifier Q2. This places a larger forward bias on dc amplifier Q2, causing a higher rate of conduction. This reduces the level of the 500-kHz if. signal that is coupled to the base of amplifier Q4 by capacitor C7.

The voltage dropped across resistor R8 varies with the rate of conduction of dc amplifier Q2. Therefore, increased conduction increases the voltage drop and decreases the voltage across voltage divider R38, R39. This reduces forward bias, rate of conduction, and increases collector-emitter resistance of the variable-gain amplifier and the degeneration in the circuit of if. amplifier Q4. When the if. signal disappears, the level of the agc voltage drops, biasing dc amplifier Q2 to cut-off. 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 variable-gain amplifier 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.

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

The output from transformer T2 is coupled to the base of if. 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 if. amplifier Q5 is developed from the positive 20 Vdc applied to voltage divider R14, R15, and emitter resistor network R16 and R17. A small amount of degeneration (developed by resistor R17) is used to increase the stability of if. amplifier Q5. The amplified output from transistor Q5 is developed across the tuned circuit consisting of capacitor C11 and the primary of transformer T3.

The amplified if. signal at the secondary of transformer T3 is coupled to the base of if. amplifier Q6 by capacitor C13. Resistor R18 serves as the load resistor for 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. IF. amplifier Q6 is the last stage of amplication in gain controlled if. amplifier A2. The gain of amplifier Q6 is controlled by the amount of degenerative feedback developed by potentiometer R22. The output from if. 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 product/am. detector A3.

i. PRODUCT DETECTOR. - The product detector portion (figure 3-11) consists of transistor stages A3Q1 and A3Q2 connected in a balanced mixer configuration. This circuit, which forms a part of if./audio amplifier electronic assemblies A2A2 and A2A3, extracts intelligence from the USB, LSB, ISB, or RATT 500-kHz if. signals. Product detector A2A2A3 is used during the USB and RATT modes of operation. Product detector A2A3A3 is used during the LSB mode of operation. Both product detectors are used during the ISB mode of operation. Neither product detector is used during the AM or CW modes of operation. The following paragraphs describe the operation of the product detector circuits in detail.

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

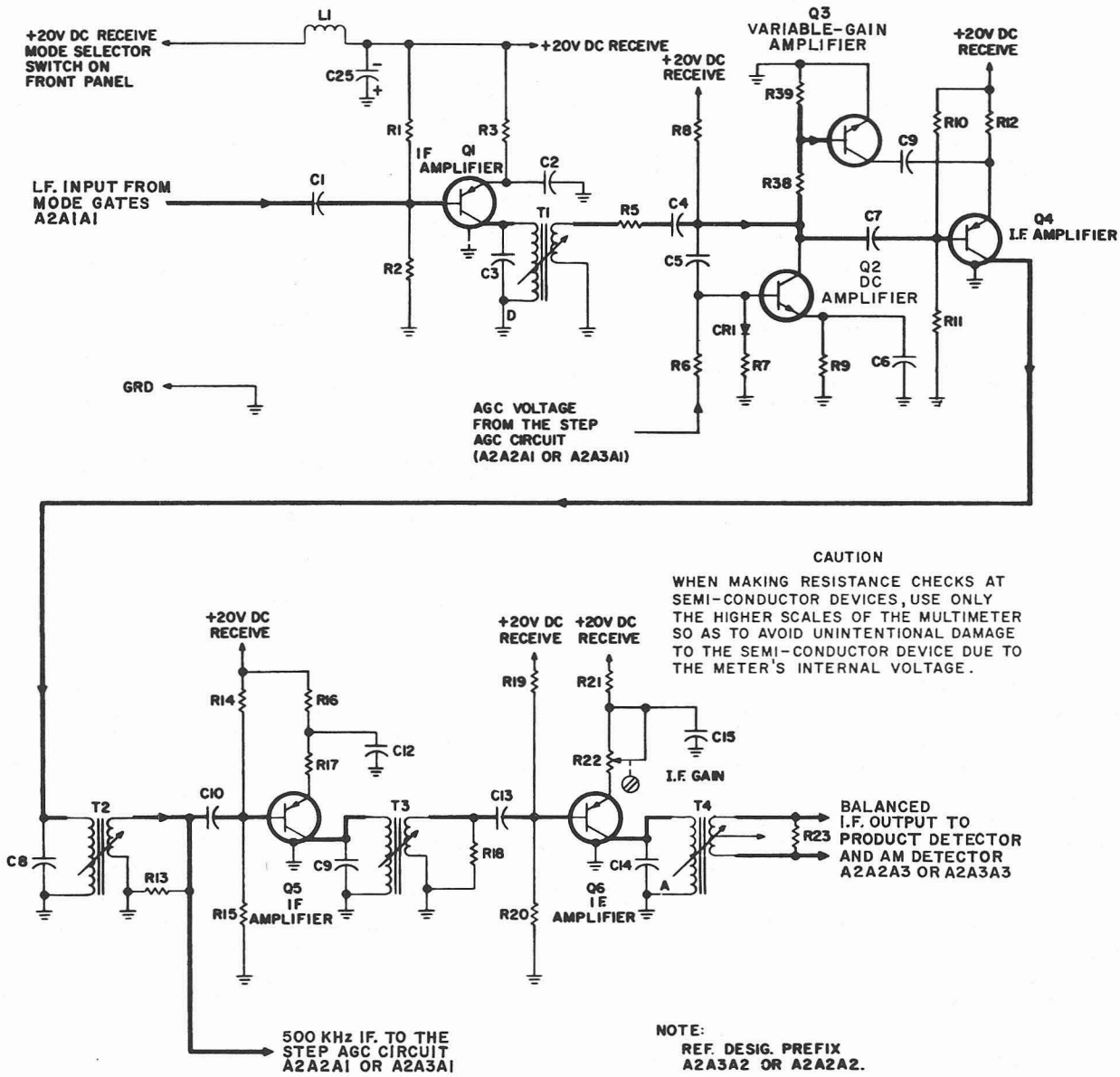


Figure 3-10. Gain Controlled IF. Amplifier, Simplified Schematic Diagram

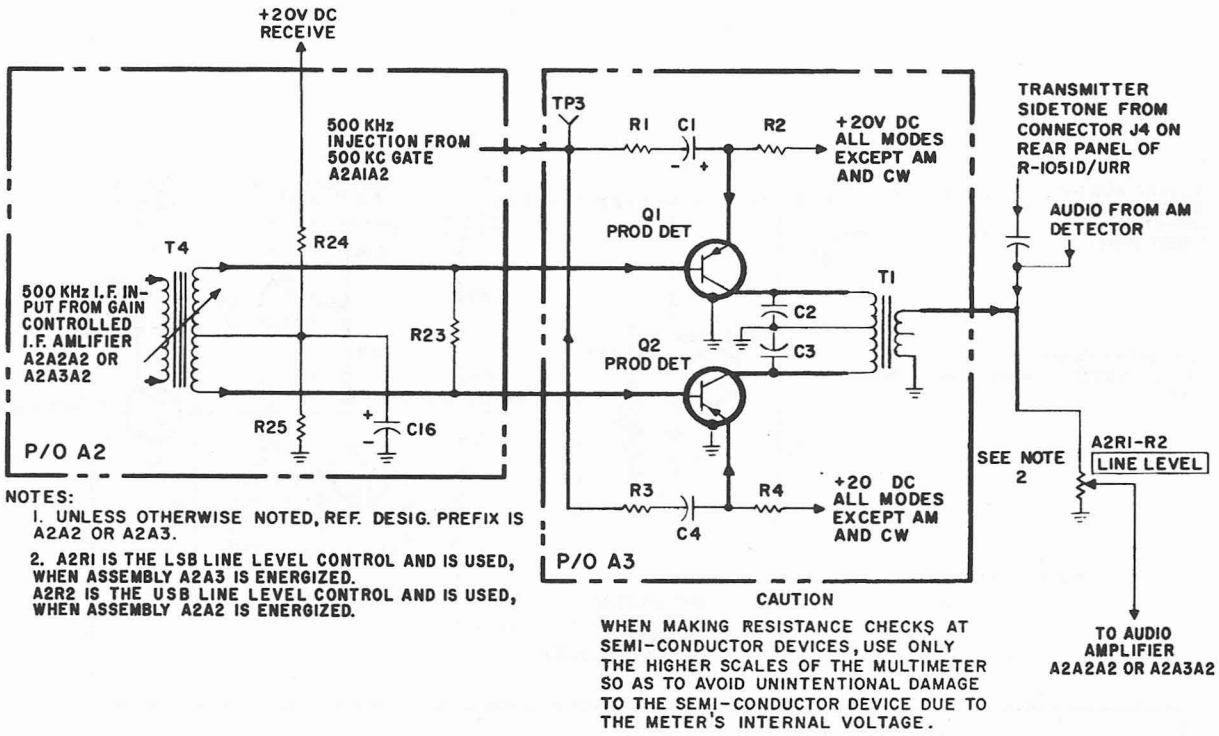


Figure 3-11. Product Detector, Simplified Schematic Diagram

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, RATT, 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.

A 500-kHz injection signal from 500 kc gate A2A1A2 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 in the 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 canceling 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 canceled. 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 behind the front panel by transformer A3T1.

j. AM DETECTOR. - The AM detector portion of A2A2A3 or A2A3A3 (figure 3-12) consists of if. amplifier A3Q3, diode detector A3CR2, and audio amplifier A1Q9. These circuits, which form a part of if./audio amplifier electronic assemblies A2A2 and A2A3, extract the intelligence from the 500-kHz if. signals in the CW and AM modes of operation. The AM detector circuit in A2A2 is used during the CW and AM modes of operation. The AM detector circuit in A2A3 is not used in any mode of operation. The following paragraphs describe the operation of the AM detector circuit in detail.

The 500-kHz if. signal is coupled to the base of transistor A3Q3 by transformer A2T4. The base operating voltage for transistor A3Q3 (developed by voltage divider A2R24, A2R25 from the 20 Vdc applied to it from relay A2K3 on the main frame) is 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 A3CR1 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 A3Q3 is developed across the tuned circuit consisting of capacitor A3C6 and inductor A3L1. In the CW mode of operation, the BFO signal from mode selector electronic assembly A2A1 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 A3R36 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.

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 relay A2K3 on the main frame. The emitter operating 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 output of amplifier A1Q9 is applied to the USB LINE LEVEL control behind the front panel (see figure 3-11).

k. AUDIO AMPLIFIER. - The audio amplifier portion of A2A2A2 and A2A3A2 (figure 3-13) consists of audio amplifier Q7, emitter follower Q8, and push-pull amplifier Q9, Q10. These circuits, which form a part of if./audio amplifier electronic assemblies A2A2 and A2A3, 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 accessory. The audio amplifier portion of assembly A2A2 is used during the USB, RATT, 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.

The audio signals present at the USB or LSB LINE LEVEL control are coupled to the base of audio amplifier Q7 by capacitor C17. (The audio signals are applied from either the product detector, AM detector, or connector J4 on the rear of the R-1051D/URR.) The operating voltage for amplifier Q7 is developed by voltage divider R26, R27, R28 and emitter resistors 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 A2A2T1 or A2A3T1 back to the emitter of amplifier Q7 through capacitor C19. Resistors R30 and R31

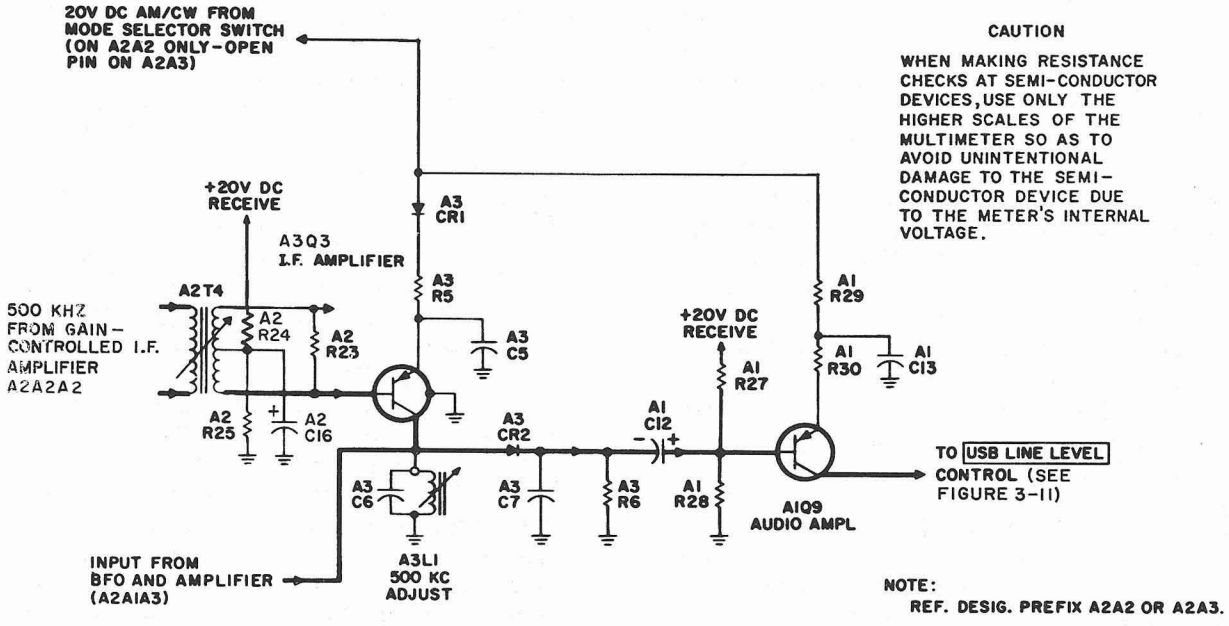


Figure 3-12. AM Detector, Simplified Schematic Diagram

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.

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 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.

Transformer T5 couples the output from emitter follower Q8 to the bases of push-pull amplifier Q9, Q10. The base operating voltage for the push-pull amplifier is developed by voltage divider R35, R36 from the positive 28 Vdc from tune relay A2K1 (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 tune relay A2K1 (on the main frame), which is applied through resistor R37 and the primary of transformer A2A2T1 or A2A3T1. The 28 Vdc is interlocked through relay A2K1 to enable the audio output to be shut off when the R-1051D/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 transformer A2A2T1 or A2A3T1. Transformer A2A2T1 or A2A3T1 couples the audio signals to the PHONES jacks on the front panel for monitoring with the headset, and to the appropriate line level control A2R1 (LSB) or A2R2 (USB). The AUDIO LEVEL meter is connected across the remote audio output. This meter provides an indication of the level of audio on the remote output lines.

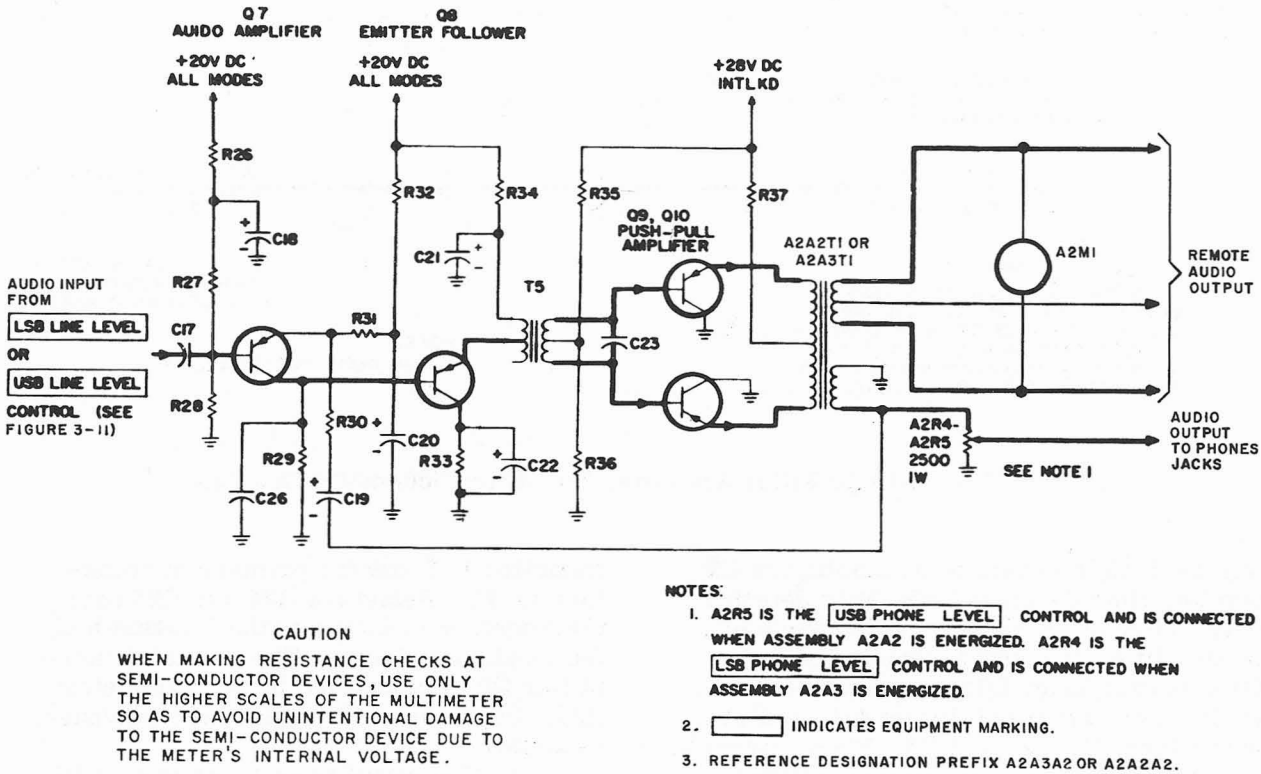


Figure 3-13. Audio Amplifier, Simplified Schematic Diagram

1. 500 KHZ FILTER AND GATE. - The 500 kHz filter and gate A2A1A2 (figure 3-14), which forms a part of mode selector electronic assembly A2A1, gates the 500-kHz if. signal from the 1 mc divide-by-two circuit in frequency standard electronic assembly A2A5 to the product detector circuit in if./audio amplifier electronic assemblies A2A2 and A2A3. The 500-kHz gate circuit is used only during the LSB, RATT, USB, and ISB modes of operation. The following paragraphs describe the operation of this circuit for each of the indicated modes of operation in detail.

(1) LSB, RATT, AND ISB OPERATION. - The 500-kHz local carrier signal from the 1 mc divide-by-two circuit is coupled by capacitor C2 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 LSB, RATT, 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. Returning gating diode CR1 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.

(2) AM AND CW OPERATION. - In AM and CW modes, gating diode CR1 is reverse-biased by removing the 20 Vdc from voltage divider R2, R3, R4, thereby blocking the 500-kHz if. signal.

m. STEP AGC. - The step agc circuit portion of A2A2A1 and A2A3A1

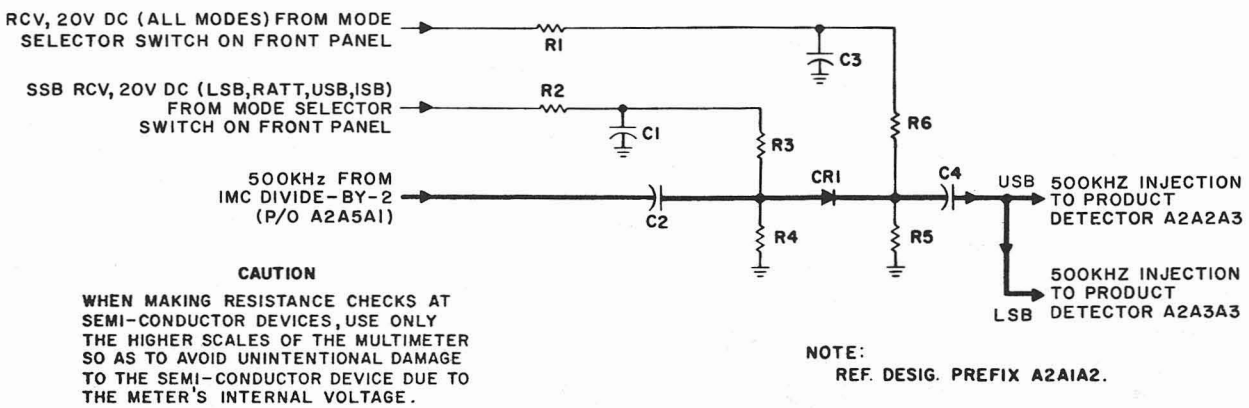


Figure 3-14. 500 kHz Filter and Gate, Simplified Schematic Diagram

(figure 3-15) consists of if. amplifiers Q7 and Q8, time detector CR5, hang detector CR4, coincidence detector Q6, switch Q5, preamplifier Q11 and associated switch Q10, preamplifier Q12 and associated switch Q13, emitter follower Q4, and dc amplifiers Q1, Q2, and Q3. These circuits, which form a part of if./audio amplifier electronic assemblies A2A2 and A2A3, produce the automatic gain control (agc) voltages, which are used in the gain-controlled if. amplifier circuits and the rf amplifier circuit. (Refer to paragraphs 3-3c and 3-3h.) The step agc portion of if./audio amplifier electronic assembly A2A2 is used during the USB, AM, RATT, and CW modes of operation. The step agc portion of if./audio amplifier electronic 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.

The 500-kHz if. output from gain controlled if. amplifier A2Q4 (paragraph 3-3h) is coupled to the base of if. amplifier Q8 by capacitor C4. The operating voltage for if. amplifier Q8 is developed by voltage divider R23, R26 and emitter resistor R22 from the positive 20 Vdc applied through the Mode Selector switch on the front panel. The output of 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.

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. amplifier Q7 is developed by voltage divider R20, R21 from the 20 Vdc applied from the Mode Selector switch on the front panel. The emitter voltage of if. amplifier Q7 is supplied through emitter resistor R18 with positive 20 Vdc applied by preamplifier Q12 and associated switch Q13 when the AGC switch on the front panel is set at either SLOW or FAST. When the AGC switch is set at OFF, if. amplifier Q7 and the entire agc function are disabled. The 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.

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 to hang detector CR4 that result from temperature changes. 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.

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 R13. The capacitors will discharge until the voltage 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 at the same rate 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 previously.

The strength of the input signal determines the level to which capacitor C3 charges and, while discharging through resistor R13, 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. When the AGC switch on the front panel is set at SLOW, preamplifier Q11 and associated switch Q10 connect capacitor C14 in parallel with capacitor C3, greatly increasing the agc delay. The collector voltage for emitter follower Q4 is applied through resistor R31 from the Mode Selector switch on the front panel. When a signal is present, the charge on capacitor C3 will forward-bias emitter follower Q4, causing it to conduct. This places a voltage across resistor R12 (R12 is switched to ground when AGC switch is set at SLOW or FAST), 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.

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 divider 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 would have the same agc threshold. Since the rf circuits of a receiver determine its sensitivity to weak signal reception, and the application of 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. Therefore, 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 when receiving strong signals when the AGC switch is set at OFF. When the RF GAIN control is varied, a dc voltage between 0.6 and 3 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.

When dc amplifier Q2 conducts, the output voltage is developed across resistors R5 and R6. This voltage serves as the base bias for dc amplifier Q1 and is adjusted by potentiometer R6. When the AGC switch on the front panel is set at FAST, switch Q5 grounds capacitor C1, which stabilizes the rf agc circuitry, thereby preventing oscillations. 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. 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 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 negative 30 Vdc will be the agc voltage applied to the rf amplifier circuit.

n. BFO AND AMPLIFIER. - BFO and amplifier A2A1A3 (figure 3-16) consists of modified Colpitts (Pierce) oscillator Q1 and amplifier Q2. These circuits, which form a part of receiver mode selector electronic assembly A2A1, generate and amplify a signal between 496.5 and 503.5 kHz and apply it to the AM detector in 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.

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 6 and 20 Vdc. This voltage is applied across voltage-variable capacitor CR1, producing a capacitance dependent upon the magnitude of the voltage. The output 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.

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 resistors R9 and R11 from the Mode Selector switch on the front panel. The output from amplifier Q2 is applied to the tuned circuit consisting of capacitor C9 and inductance T1. The signal from the tuned circuit passes through isolating resistor R10 to the product detector circuit in if./audio amplifier electronic assembly A2A2.

o. MC OSCILLATOR. - MC oscillator A2A6A1A1A1 (figure 3-17) consists of oscillator Q1, wideband amplifier Q2, and emitter followers Q3 and Q4. These circuits, which form a part of mc synthesizer electronic subassembly A2A6A1, provide 17 discrete frequencies (2.5 to 23.5 MHz) for use in the high-frequency mixer. The following paragraphs describe the operation of the mc oscillator in detail.

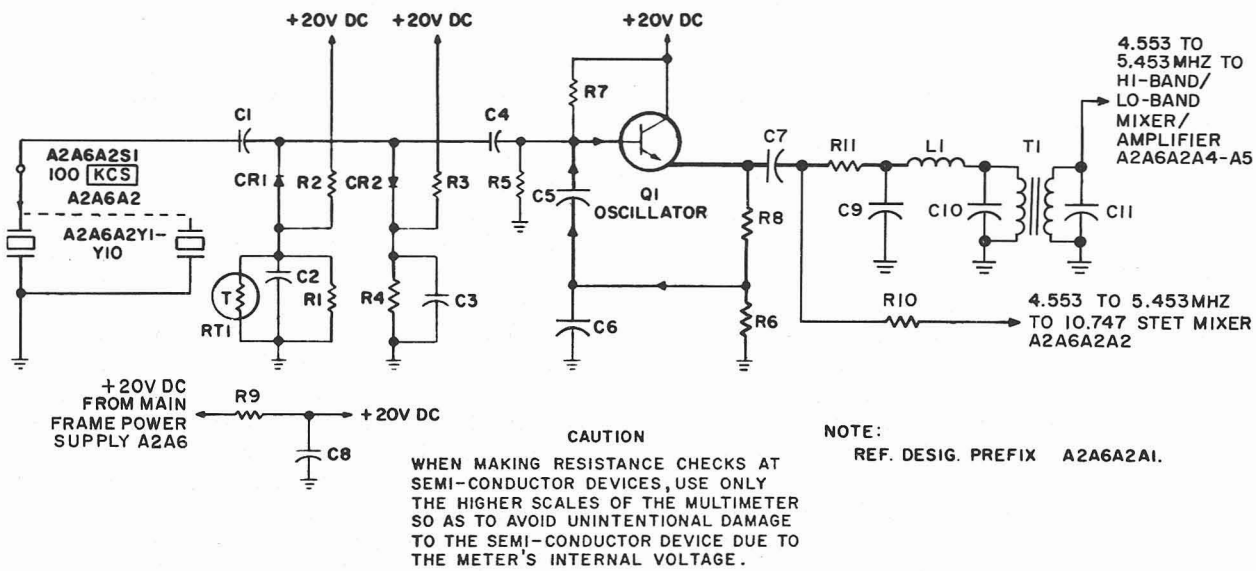


Figure 3-19. 4.553 to 5.453 MC Oscillator, Simplified Schematic Diagram

the cathode bias on diode CR2 (developed by voltage divider R3, R4) plus the drop of diode CR2. Therefore, the peak-to-peak amplitude of the signal is limited by the established dc reference levels. As the temperature of the circuit varies, the forward drop of diodes CR1 and CR2 varies. Without compensation, this would result in variations in the signal amplitude. Thermistor RT1 varies the anode bias of diode CR1 according to the temperature changes. Therefore, the negative-going limit for the signal is shifted so that the limiting region is constant. This ensures that the amplitude of the signal does not vary with changes in temperature. Capacitors C2 and C3 are rf bypass capacitors. Capacitor C4 is used for dc blocking and is also used with capacitors C1, C5, and C6 to form the required feedback network. Resistor R8 provides degeneration to increase the stability of oscillator Q1. The output of oscillator Q1 is developed across emitter resistors R6 and R8.

Capacitor C7 and resistor R10 couple the oscillator output to 10.747 mc mixer A2A6A2A2. The oscillator output is also fed through a filter, composed of capacitors C9, C10, and C11, resistor R11, choke L1, and transformer T1, to hi-band/ lo-band mixer/ amplifier A2A6A2A4-A5.

r. HI-BAND/LO-BAND MIXER/ AMPLIFIER. - Hi-band/lo-band mixer/ amplifier A2A6A2A4 and portion of A2A6A2A5 (figure 3-20) consists of mixers A4Q1 and A4Q2, trap amplifiers A4Q3 and A4Q4, and emitter follower A5Q1. These circuits, which form a part of 100 kc synthesizer electronic subassembly A2A6A2, produce either a high (hi) band of injection frequencies (32.4 to 33.3 MHz) or low (lo) band of injection frequencies (22.4 to 23.3 MHz), used in the mid frequency mixer of rf translator electronic subassembly A2A6A6. The output of these circuits is also used in 10.747 mc mixer agc circuit A2A6A2A5 to develop the agc voltage for controlling the gain of 10.747 mc mixer A2A6A2A2. These circuits are used in all modes of operation. The following paragraphs describe the operation of the hi-band/lo-band mixer/ amplifier in detail.

Only one-half of the hi-band/lo-band mixer/amplifier circuits are on at any one time, depending on whether the high (32.4 to 33.3 MHz) or low (22.4 to 23.3 MHz) band is required for mixing in rf translator electronic subassembly A2A6A6.

The hi-band circuits will be discussed first. Unless otherwise noted, all components referenced are located on the A4 assembly.

The 27.847-MHz output from the 17.847/27.847 mc mixer is coupled to the base of mixer Q1 by capacitor C22. The output from the 4.553 to 5.453 mc oscillator is coupled to the emitter of mixer Q1 by capacitor C1. When the hi/lo band control line is at ground potential, base bias will be provided for mixer Q1 and trap amplifier Q3 by voltage divider R4, R6 and voltage divider R13, R14, respectively. Resistor R1 is the emitter resistor. Capacitor C4 is an rf bypass capacitor. At the same time, mixer Q2 and trap amplifier Q4 will be rendered inoperative by the ground potentials applied to the emitter base-bias circuits from the hi/lo band control line. The output from mixer Q1 is a frequency in the band from 32.4 to 33.3 MHz. All other products of the mixer, except for a small amount of the 27.847 MHz, are eliminated by the triple-tuned filter composed of inductors L1 and L2, transformer T1, and capacitors C7, C10, C11, C14, and C15. From the triple-tuned filter, the signal is coupled through capacitor C18 to the base of amplifier Q3. The emitter circuit of trap amplifier Q3 (capacitor C20 and inductor L3) is parallel-tuned to 27.847 MHz. At 27.847 MHz, the trap provides degeneration to eliminate effectively the 27.847 MHz from the output signal. Resistor R11 and capacitor C27 provide decoupling for trap amplifier Q3. Resistor R17 is the emitter bias resistor, which is rf bypassed by capacitor C23. The output of trap amplifier Q3 is developed across resistor R21 and is coupled by capacitor A5C1 to the base of emitter follower A5Q1. Base bias for emitter follower Q1 is provided by voltage divider A5R1, A5R2. Inductor A5L1 and A5C3 provide the necessary filtering for the 20-Vdc line voltage. The output of emitter follower A5Q1 is developed across emitter resistor A5R3 and is coupled by capacitor A5C5 to the mid frequency mixer of rf translator electronic subassembly A2A6A6. The output of emitter follower A5Q1 is also applied to 10.747 mc mixer agc A2A6A2A5.

The lo-band circuits are identical to the hi-band circuits. When the hi/lo band control line is at +20 Vdc, operating voltages are applied to the emitters and bases of mixer Q2 and trap amplifier Q4. At the same time, the +20 Vdc is applied to the bases of mixer Q1 and trap amplifier Q3, thereby providing back bias for the transistors, since the emitters are at +20 Vdc also. The 17.847-MHz output from the 17.847 mc mixer is coupled to the base of mixer Q2 by capacitor C6. The output from the 4.553 to 5.453 mc oscillator is coupled to the emitter of mixer Q2 by capacitor C2. The output of mixer Q2 is a frequency in the band from 22.4 to 23.3 MHz. All other products of the mixer, except for a small amount of the 17.847-MHz signal, are eliminated by the triple-tuned filter composed of inductors L4 and L5, transformer T2, and capacitors C9, C12, C13, and C16, and C17. From the triple-tuned filter, the signal is coupled by capacitor C19 to the base of trap amplifier Q4. The emitter circuit of trap amplifier Q4 is parallel-tuned to 17.847 MHz to eliminate the 17.847-MHz signal. The output of trap amplifier Q4 is developed across resistor R22. Resistor R23 compensates for the difference between hi-band trap amplifier Q3 output and lo-band trap amplifier Q4 output. Lo-band output is coupled by capacitor A5C2 to the base of emitter follower A5Q1. The output of emitter follower A5Q1 is applied to 10.747 mc mixer agc A2A6A2A5 and the mid frequency mixer in rf translator electronic subassembly A2A6A6.

s. 5.18 TO 5.25 MC OSCILLATOR. - The 5.16 to 5.25 mc oscillator A2A6A3A1 (figure 3-21) consists of 10 kc (KCS) crystal switch A2A6A3A6S1, limiter circuit CR1, CR2, oscillator Q1, and buffer amplifier Q2. These circuits, which form a part of 1 and 10 kc synthesizer electronic subassembly A2A6A3, produce one of ten outputs in 10-kHz steps over the frequency range of 5.16 through 5.25 MHz for use in 1 and 10 kc output mixer A2A6A3A3, and 9.07 mc error mixer A2A6A3A4. These circuits function in all modes of operation. The following paragraphs describe the operation of the 5.16 to 5.25 mc oscillator in detail.

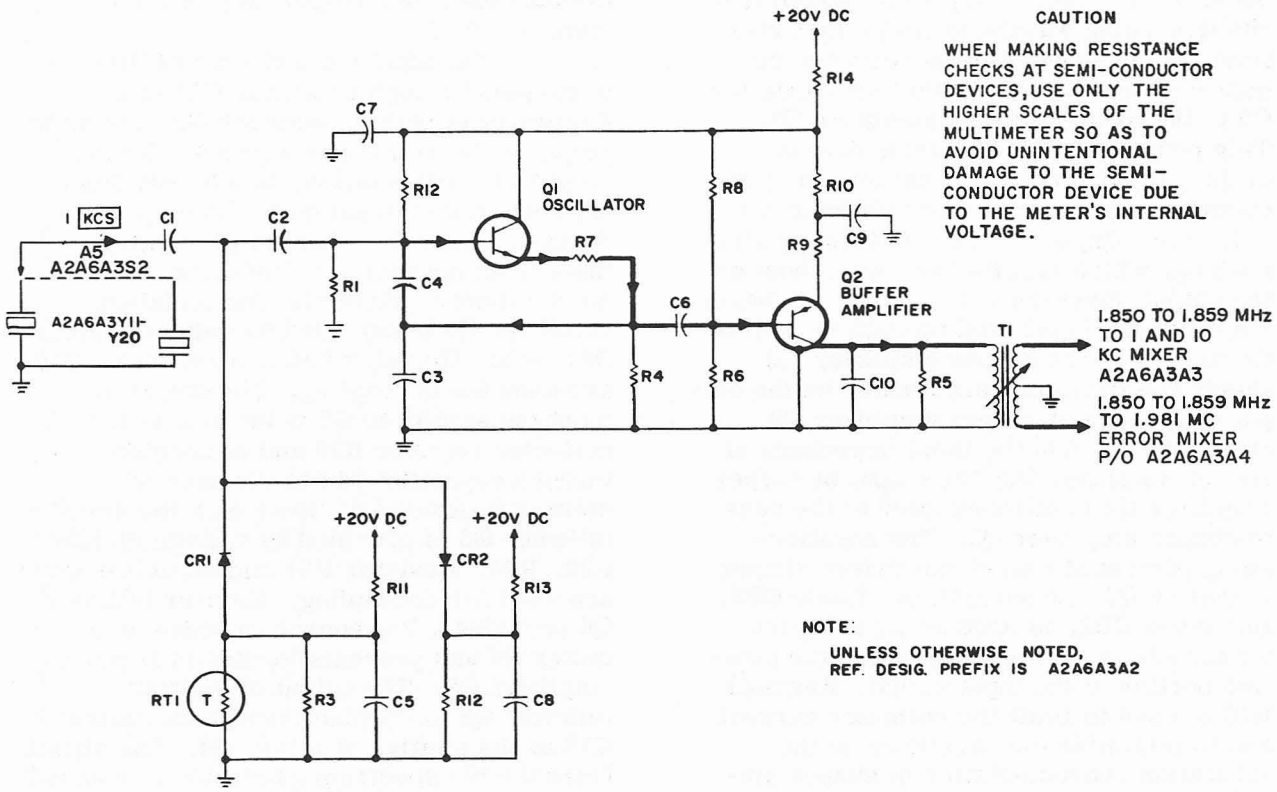


Figure 3-22. 1.850 to 1.859 MC Oscillator, Simplified Schematic Diagram

into saturation, thus creating a low-impedance path from the junction of capacitors C52 and C54 to ac ground for the duration of the pulse. This means that the signal at the junction of capacitors C52 and C54 is essentially shorted to ac ground for the duration of the pulse.

v. MC SPECTRUM GENERATOR. - The mc spectrum generator portion of A2A6A1A3 (figure 3-24) consists of shaper amplifiers Q1, Q2, and Q3. These circuits, which form a part of mc synthesizer electronic subassembly A2A6A1, provide a spectrum of frequencies from 1 to 25 MHz in 1-MHz steps for use in the mc error mixer. The following paragraphs describe the operation of the circuits in detail.

These circuits operate from the positive 10 Vdc derived by Zener diode CR1 and series resistor R1 from the positive 20 Vdc. The 1-MHz input is applied to inductor L2 through resistor R33. Resistor R33 prevents loading of the 5 mc divide-by-five circuit. Inductor L2 functions as an autotransformer, raising the level of the 1-MHz signal and applying it to the diode clipper consisting of diode CR3 and resistor R5. Inductor L2 is tuned to 1 MHz by capacitor C3. The diode clipper removes the positive portion of the 1-MHz signal. The remaining negative portion is coupled through capacitor C2 to the base of shaper amplifier Q1, driving it into saturation. Diode CR2 protects shaper amplifier Q1 against excessive reverse bias on the base-emitter junction. When the base voltage attempts to go more positive than the emitter voltage, diode CR2 will be forward-biased, thereby clamping the base voltage. The emitter voltage is determined by voltage divider R3, R4, and by the average current drawn

by the emitter of shaper amplifier Q1. The output of the shaper amplifier, which is a positive-going waveform with a fast rise time, is developed across collector resistor R6 and is applied through capacitor C5 to the base of shaper amplifier Q2. This positive-going waveform drives shaper amplifier Q2 into saturation, producing a negative-going waveform at its collector. Capacitor C6 provides emitter peaking, which results in an overshoot on the output waveform. The output of shaper amplifier Q2 is coupled through capacitor C8 to the base of shaper amplifier Q3. Due to the time constant formed by the output impedance of shaper amplifier Q2, capacitor C8, and the input impedance of shaper amplifier Q3, the output of shaper amplifier Q2 is differentiated at the base of shaper amplifier Q3. The negative-going portion of this signal drives shaper amplifier Q3 into saturation. Diode CR4, like diode CR2, is used as a protective device and is also used to clamp the positive portion of the input signal. Resistor R15 is used to limit the collector current and to minimize the variations in the saturation characteristics of shaper amplifier Q3. The output of shaper amplifier Q3 is developed across an LR differentiating network consisting of resistor R15 and inductor L3. The output of shaper amplifier Q3 is taken across inductor L3. The network, consisting of diode CR5, resistor R17, and resistor R22, forms a diode clipper circuit eliminating the negative portion of the output across inductor L3. Resistors R17 and R22 also form an attenuator with the output taken across resistor R22. The output obtained is a positive pulse that provides a uniform spectrum from 1 MHz to 25 MHz. This output is applied to the mc error mixer.

w. MC ERROR MIXER. - The mc error mixer portion of A2A6A1A3 (figure 3-25) consists of isolation amplifier Q5, emitter follower Q6, and mixer Q4. These circuits, which form a part of mc synthesizer electronic subassembly A2A6A1, mix the signal from the mc oscillator with the signal from the mc spectrum generator. This produces an error signal which, in the locked condition, is proportional to the phase relationship between the spectrum and the oscillator. The following paragraphs describe the operation of the circuits in detail.

The input from the mc oscillator is coupled through capacitor C18 to the emitter of isolation amplifier Q5. Isolation amplifier Q5 is used in a grounded-base amplifier configuration, which provides a high reverse attenuation to the output products of mixer Q4, thereby preventing them from appearing in the output from the mc oscillator. Base bias for isolation amplifier Q5 is provided by voltage divider R27, R28. Resistor R30 and capacitor C20 are used for decoupling. The output of isolation amplifier Q5 is taken across collector resistor R29 and is coupled through capacitor C14 to the base of emitter follower Q6. Base bias for emitter follower Q6 is provided by voltage divider R23, R24. Resistor R31 and capacitor C12 are used for decoupling. Emitter follower Q6 provides a low source impedance to mixer Q4 and prevents loading of isolation amplifier Q5. The output of emitter follower Q6 is coupled through capacitor C13 to the emitter of mixer Q4. The signal from the mc spectrum generator is coupled through capacitor C9 to the base of mixer Q4. Base bias for mixer Q4 is provided by voltage divider R18, R21. Resistor R20 provides a small amount of degeneration to stabilize mixer Q4. The output of mixer Q4 is a double-tuned circuit consisting of inductor L4, capacitors C16, C15, and C17, resistor R32, and transformer T1, which is tuned to 1.5 MHz. When there is a frequency error, the signal from the mc oscillator is mixed with the two spectrum points that are within ±1.5 MHz of the oscillator frequency. The output of mixer Q4 consists of two frequencies (one less than 1.5 MHz and one more than 1.5 MHz), if the mc oscillator has an error. When the mc oscillator is locked, only one frequency is present, since the frequency of the oscillator ± the spectrum points is 1.5 MHz. To understand this more readily, assume that the mc oscillator frequency is 11.499 MHz; therefore, the two closest spectrum points will be 10 and 13 MHz, which when mixed will produce difference frequencies of 1.499 and 1.501 MHz. It can be seen that when the mc oscillator

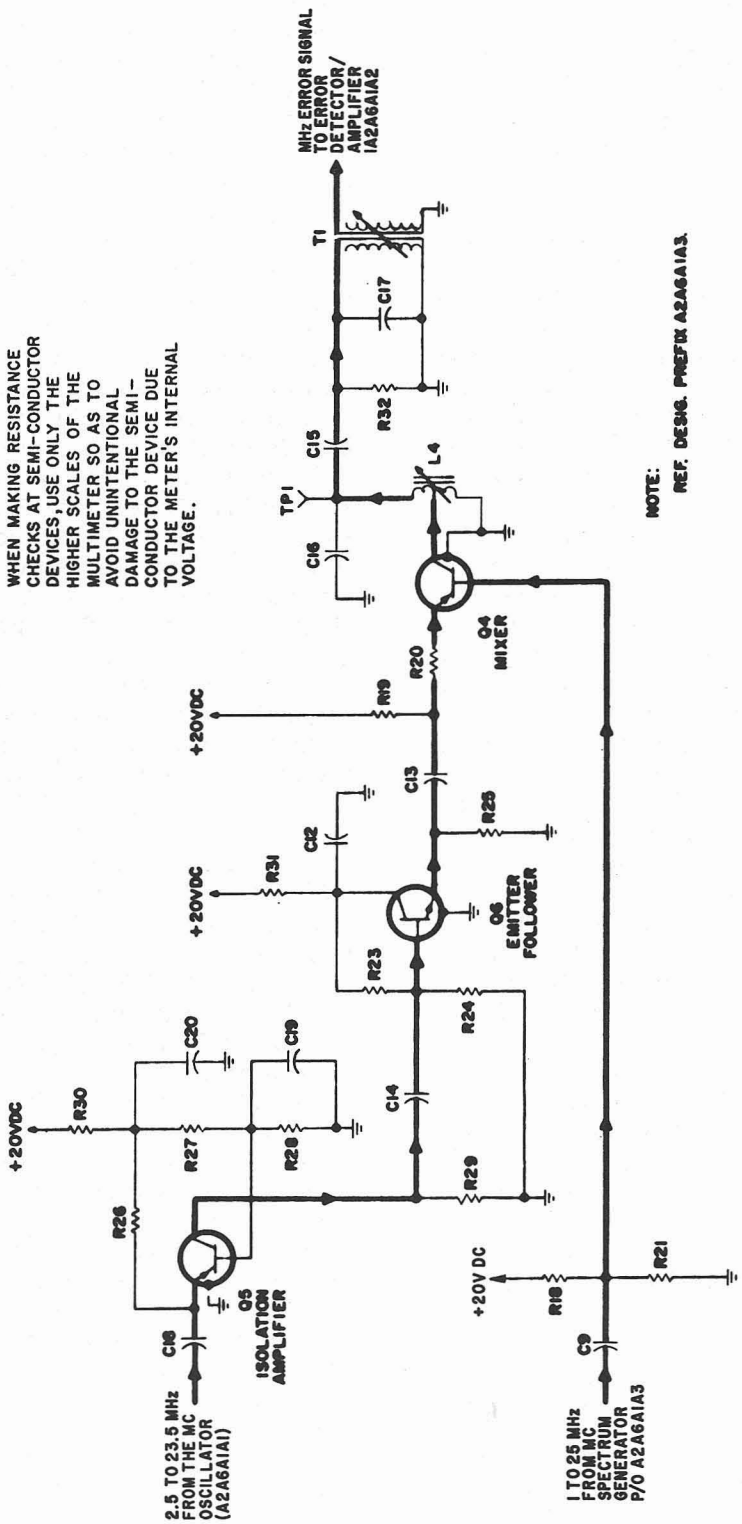


Figure 3-25. MC Error Mixer, Simplified Schematic Diagram

frequency is exactly 11.5 MHz, the two difference frequencies will be identical (1.5 MHz). The double-tuned circuit attenuates all mixer products except the difference frequencies. The output of the double-tuned filter is coupled through transformer T1 to the error detector/amplifier.

x. ERROR DETECTOR/AMPLIFIER.- Error detector/amplifier A2A6A1A2 (figure 3-26) consists of if. amplifiers Q1 and Q2, and dc amplifier Q3. These circuits, which form a part of mc synthesizer electronic subassembly A2A6A1, amplify and detect the mc error signal, resulting in a correction signal for application to the mc oscillator. The following paragraphs describe the operation of the error detector/amplifier circuit in detail.

The signal from the error mixer is coupled through capacitor C1 to the base of if. amplifier Q1. The base bias for if. amplifier Q1 is provided by voltage divider R1, R2. Resistor R22 and capacitor C14 are used for decoupling. Resistor R4 provides a small amount of degeneration to add to the stability of if. amplifier Q1. The output circuit of if. amplifier Q1 is a tuned circuit consisting of capacitor C3 and transformer T1, which is tuned to 1.5 MHz. Resistor R5 is used to load the tank circuit sufficiently to ensure uniformity. The output signal of if. amplifier Q1 is coupled through transformer T1 to potentiometer R6, which is used to adjust the gain of the phase-lock loop. The output from the wiper of this potentiometer is coupled through capacitor C12 to the base of if. amplifier Q2. The base bias for if. amplifier Q2 is provided by voltage divider R7, R8. Resistor R10 provides a small amount of degeneration to add to the stability of if. amplifier Q2. The output circuit of if. amplifier Q2 is a tuned circuit consisting of capacitor C6 and transformer T2, which is tuned to 1.5 MHz. Resistor R11 is used to load the tank circuit sufficiently to ensure uniformity. The output signal from error amplifier Q2 is coupled through transformer T2 and applied to a diode detector circuit. The diode detector circuit consists of diode CR1, resistor R12, and capacitor C13. The output of the diode detector is filtered by the network consisting of a composite of a constant-k section and an m-derived section. The constant-k section consists of capacitor C7, inductor L1, and a portion of inductor L2. The m-derived section consists of inductors L3 and L4, capacitor C8, and the remaining portion of inductor L2. Inductor L4 is made variable to compensate for the tolerance of the components used in the m-derived section. Resistor R13 and capacitor C9 form the termination of the filter. The output of this filter is applied to the emitter of dc amplifier Q3. Resistor R14 provides a small amount of degeneration to add to the stability of dc amplifier Q3. Base bias for dc amplifier Q3 is provided by voltage divider R17, R18, R19, R20, RT1. Thermistor RT1 varies the bias with temperature to compensate for changes in the base-emitter voltage of dc amplifier Q3 that result from temperature changes. Resistors R15 and R16, and capacitor C10 in the collector circuit of dc amplifier Q3 serve as the collector load and as a lag network for the phase-locked loop, which decreases the noise output and increases the loop stability. Resistor R21 prevents the collector voltage of dc amplifier Q3 from rising above 19 Vdc and forward-biasing voltage variable capacitor A2A6A1A1CR3. The error voltage is taken from the collector of dc amplifier Q3 and applied to mc oscillator A2A6A1A1A1.

y. 5 MC FREQUENCY STANDARD. - The 5 mc frequency standard A2A5A3 and portion of A2A5A2 (figure 3-27) consist of oscillator Q5 and buffer amplifier Q6. These circuits, which form a part of frequency standard electronic assembly A2A5, provide an accurate 5.000000-MHz signal to be used as a standard throughout the R-1051D/URR. The 5 mc frequency standard circuit is used during all modes of operation. Assembly A2A5A2 is housed in an oven, the temperature of which is maintained at a constant 85°C by the oven control circuit. The following paragraphs describe the operation of the circuits in detail.

The frequency of oscillator Q5 is 5.000000 MHz as determined by the parallel resonant tuned circuit consisting of capacitor C7 and the primary of transformer T2 and controlled by the series resonant

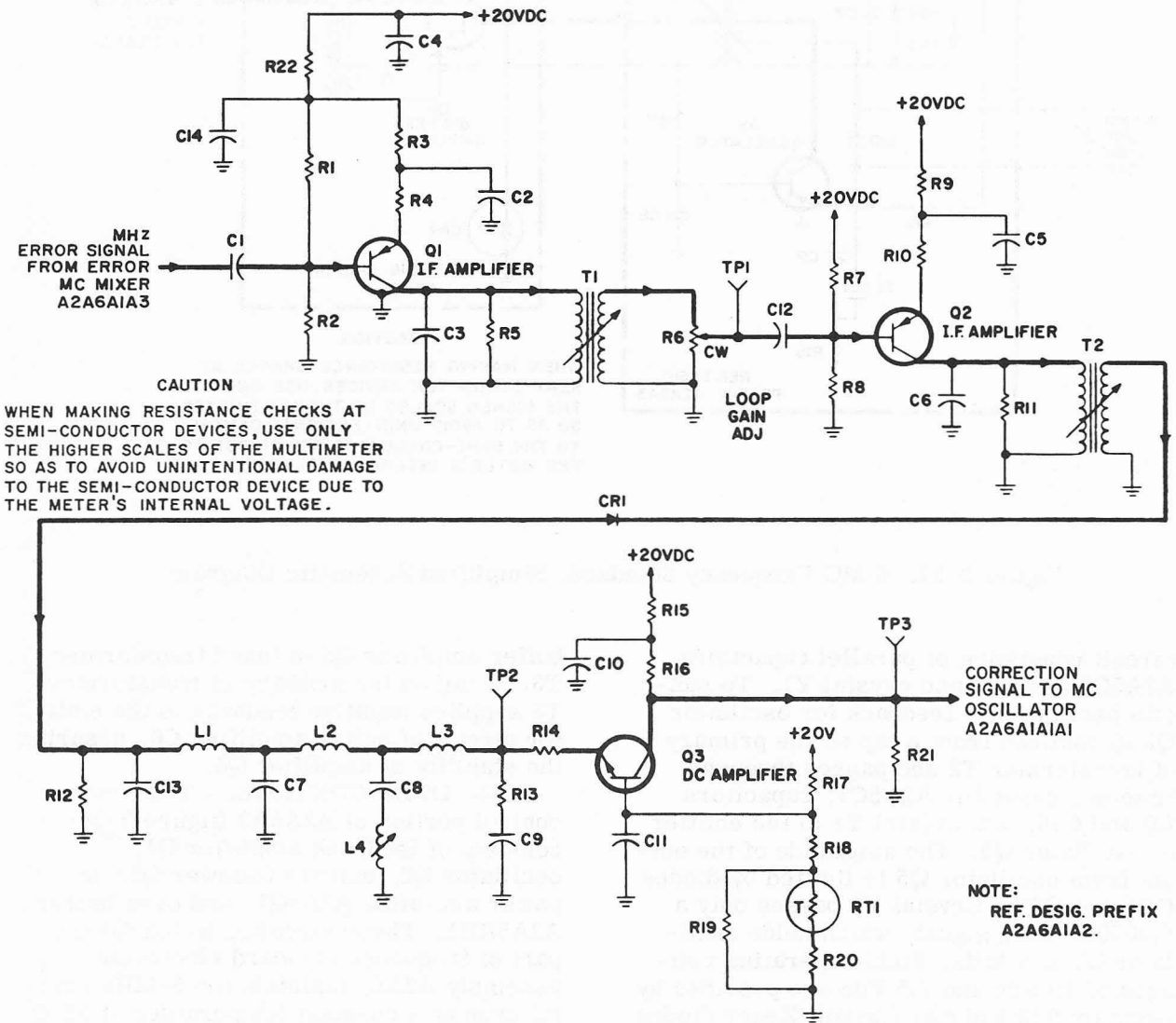


Figure 3-26. Error Detector/Amplifier, Simplified Schematic Diagram

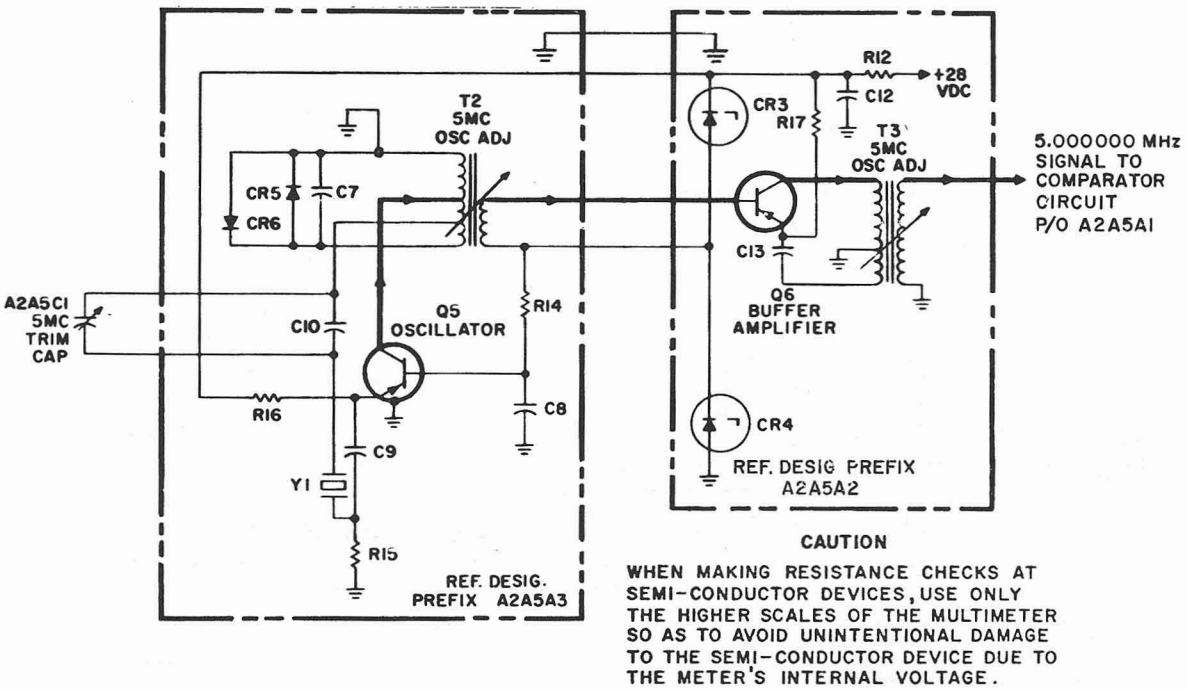


Figure 3-27. 5 MC Frequency Standard, Simplified Schematic Diagram

circuit consisting of parallel capacitors A2A5C1 and C10 and crystal Y1. To sustain oscillations, feedback for oscillator Q5 is obtained from a tap on the primary of transformer T2 and passed through trimmer capacitor A2A5C1, capacitors C9 and C10, and crystal Y1 to the emitter of oscillator Q5. The amplitude of the output from oscillator Q5 is limited by diodes CR5 and CR6. Crystal Y1 passes only a 5.000000-MHz signal, which holds oscillator Q5 at 5 MHz. Stable operating voltages of 15 Vdc and 7.5 Vdc are provided by resistor R12 and two 7.5-volt Zener diodes CR3 and CR4 in series across the 23 Vdc supply. Base bias for oscillator Q5 is taken from the junction of Zener diodes CR3 and CR4 and is applied through resistor R14 to the base of oscillator Q5. Capacitor C8 is a bypass capacitor. Resistor R18 is an emitter load resistor.

The output of oscillator Q5 is coupled by transformer T2 to the base of buffer amplifier Q6. The output load of buffer amplifier Q3 is tuned transformer T3. A tap on the primary of transformer T3 supplies negative feedback to the emitter circuit of buffer amplifier C6, assuring the stability of amplifier Q6.

z. OVEN CONTROL. - The oven control portion of A2A5A2 (figure 3-28) consists of feedback amplifier Q1, oscillator Q2, emitter follower Q3, dc power amplifier A2A5Q1, and oven heater A2A5HR1. These circuits, which form a part of frequency standard electronic assembly A2A5, maintain the 5-MHz crystal oven at a constant temperature of 85°C (185°F). The oven control circuit is used during all modes of operation. The following paragraphs describe the operation of the circuits in detail.

The frequency of oscillator Q2 is approximately 18 kHz, as determined by the tuned circuit consisting of capacitor C2 and the primary of transformer T1. The feedback for oscillator Q2 is produced by a bridge circuit and amplifier Q1.

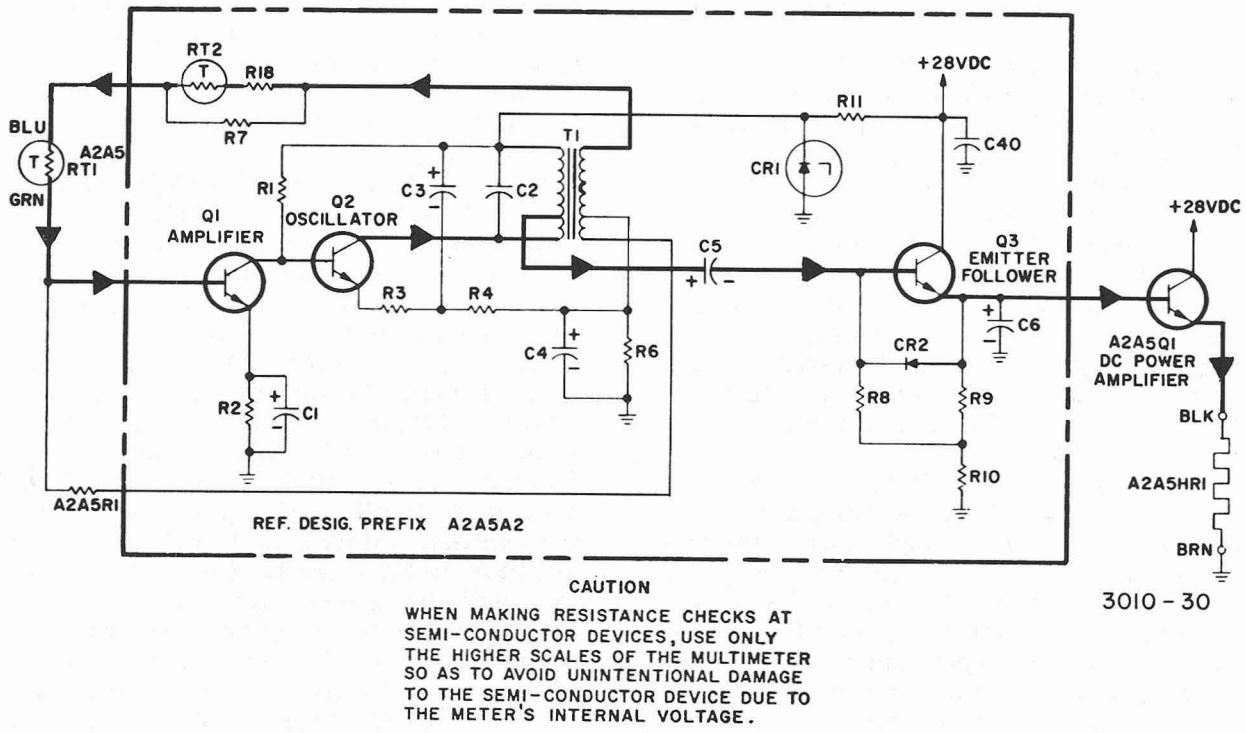


Figure 3-28. Oven Control, Simplified Schematic Diagram

The center-tapped secondary of transformer T1 acts as two of the legs of the bridge, and resistor A2A5R1 and thermistor A2A5RT1, thermistor RT2, resistor R18, resistor R7 act as the other two legs. This bridge is designed to balance when thermistor A2A5RT1 is at a temperature of 85°C. Thermistor A2A5RT1 is physically mounted underneath heater A2A5HR1. Due to heat loss to its surroundings, the bridge will never become balanced; therefore, the oscillator will never stop oscillating. Emitter resistor R2 provides self-bias for amplifier Q1. Capacitor C1 functions as an emitter bypass capacitor. Emitter resistors R3, R4, and R6 provide self-bias for oscillator Q2. DC bias is also taken from the junction of resistors R4 and R6 and applied through the secondary of transformer T1 and resistor A2A5R1 to the base of amplifier Q1. Capacitors C3 and C4 function as emitter bypass capacitors.

The 18-kHz signal is taken from a tap on the primary of transformer T1, and is coupled through capacitor C5 to the base of emitter follower Q3, where it is rectified. Capacitor C6 smoothes the rectified signal. The rectified signal is applied to the base of power amplifier A2A5Q1. This controls the amount of current through heater A2A5HR1 in the emitter circuit of power amplifier A2A5Q1 and consequently the temperature of the oven. The amount of current flow is directly proportional to the amount of unbalance caused in the bridge circuit, which determines the amplitude of the output signal from oscillator Q2. Diode CR2 protects emitter follower Q3 against excessive reverse bias on the emitter-base junction. When the base voltage attempts to go more negative than the emitter voltage, diode CR2 will be forward-biased, thereby keeping the base voltage at the same level as the emitter voltage.

Stable operating voltages for oscillator Q2 are provided by resistor R11 and Zener diode CR1.

aa. COMPARATOR. - The comparator portion of A2A5A1 (figure 3-29) consists of buffer amplifier Q5, comparator stage Q7, and amplifier Q3. These circuits, which form a part of frequency standard electronic assembly A2A5, compare the 5.000000-MHz signal received from the 5 mc frequency standard circuit with an accurate external 5-MHz signal. This function is required to determine and maintain the accuracy of the applied internal 5 mc frequency standard signal. The following paragraphs describe the operation of this circuit in detail.

In the INT position of switch A2A5S1, the 5-MHz signal from the 5 mc frequency standard is applied to buffer amplifier Q5 through 5 MC LEVEL ADJ potentiometer R22, contacts 2 and 4 of switch A2A5S1, and coupling capacitor C19. The amplified 5-MHz signal output of this stage is applied to the 5 mc divide-by-five circuit through a portion of the primary winding of 5 MC ADJ transformer T5. When switch A2A5S1 is in the INT position, the input 5 mc frequency standard signal is also applied to the 5 mc multiply-by-two circuit through 5 MC ADJ potentiometer R22 and switch A2A5S1. Base bias for buffer amplifier Q5 is provided by voltage divider R19 and R21. Negative feedback to the emitter of buffer amplifier Q5 is provided by transformer coupling of the amplifier 5-MHz output through the center-tapped primary winding of 5 MC ADJ transformer T5 and capacitor C18. This feedback provides frequency stability to this amplification stage. Comparator Q7 is cut off at this time by the positive voltage applied through resistor R31 and transformer T6 to the base. Resistor R17 is the output load resistor for buffer amplifier Q5. Resistor R20 is the emitter resistor.

When switch A2A5S1 is in the EXT position, the externally supplied 5-MHz signal is amplified by buffer amplifier Q5 and applied to the 5 mc divide-by-five circuit in the same manner as described for INT operation. Similarly, the signal is coupled directly to the 5 mc multiply-by-two circuit through contacts 1 and 4 of switch A2A5S1. Since contacts 7-8 are not closed, no internal 5-MHz signal is applied to comparator Q7, which is held at cutoff by bias obtained through resistor R31 from the positive 20 Vdc supply. Comparison of the internally generated 5-MHz signal with an externally applied 5-MHz standard is possible by placing switch A2A5S1 in the COMP position. In this condition, the 5-MHz internal signal is applied to the secondary winding of transformer T6 through contacts 3 and 4 of switch A2A5S1 buffer amplifier Q5, transformer T5, and contacts 7-8 of switch A2A5S1. The 5-MHz external signal is also applied to transformer T6 from connector J25, on the rear panel of the R-1051D/URR, through isolating resistor R23. Comparator Q7 and associated amplifier Q6 operate since both the external and internal 5-MHz signals are available to the circuit. The amplitude of externally applied signals is limited to approximately 300 millivolts peak by means of the voltage divider network consisting of resistors R24 and R25 and diode CR1. In the event that the frequencies of the two signals are different, the resulting difference frequency is coupled to the base of comparator Q7. A portion of the output from comparator Q7 is dc coupled to the base of amplifier Q6 by voltage divider-collector load resistors R29 and R30. The output of amplifier Q6 is developed across lamp DS1 in its emitter circuit, causing the lamp to flash at the difference frequency. Resistor R28 is the emitter bias resistor for comparator Q7 which is rf bypassed by capacitor C24. Capacitor C25 is an rf bypass capacitor. Diode CR2 in the emitter circuit of comparator Q7 keeps the gain of the stage constant in spite of temperature variations. This control is effected since the resistance of diode CR2 varies with temperature change. Resistor R27 is the collector-dropping resistor for amplifier Q6. Resistor R26 is a bleeder resistor for stabilizing the quiescent emitter bias for dc amplifier Q6.

ab. 5 MC DIVIDE-BY-FIVE. - The 5 mc divide-by-five circuit portion of A2A5A1 (see figure 3-30) consists of 4 mc amplifier Q2 and 1 mc amplifier Q3. These circuits, which form a part of frequency standard electronic assembly A2A5,

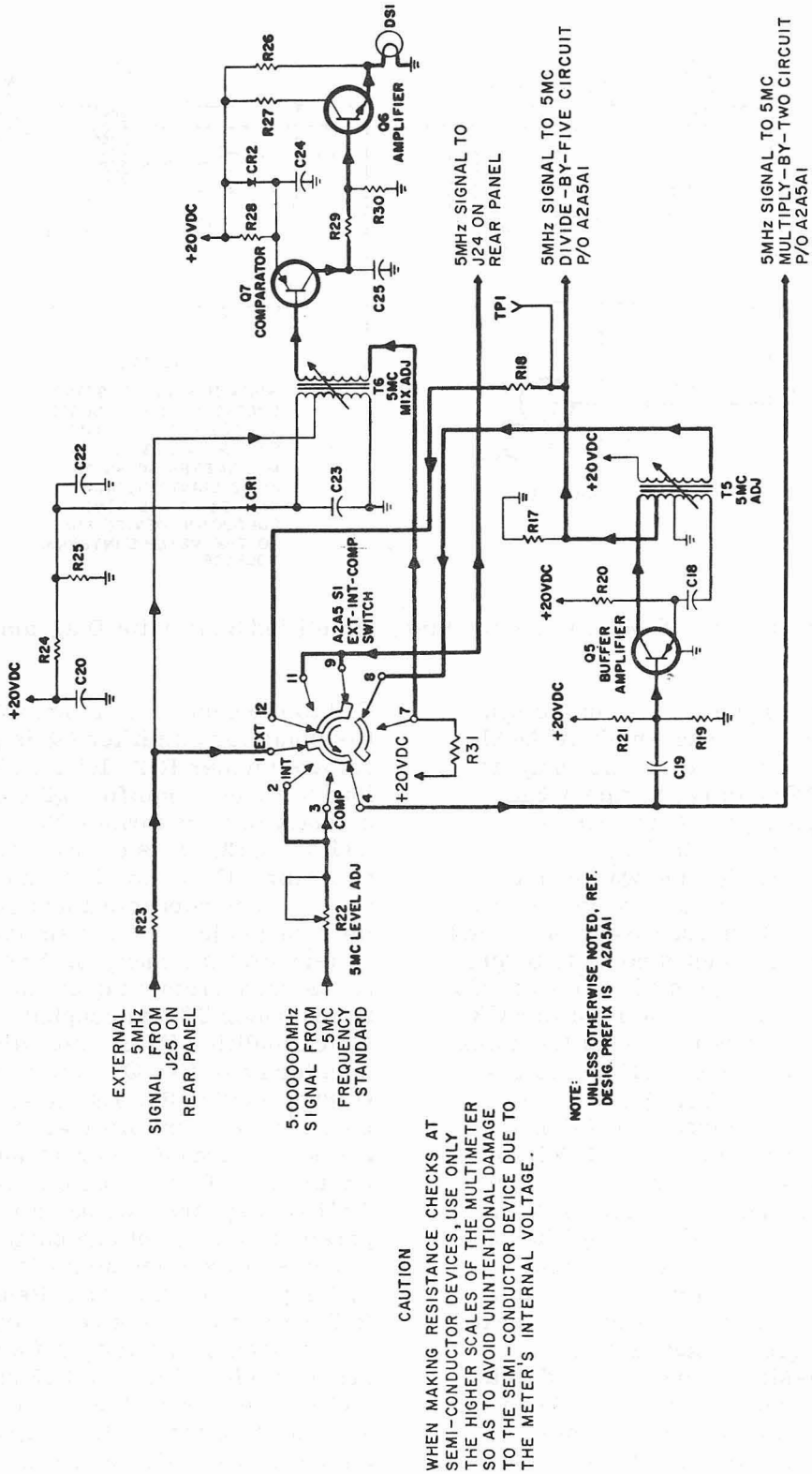


Figure 3-29. Comparator, Simplified Schematic Diagram

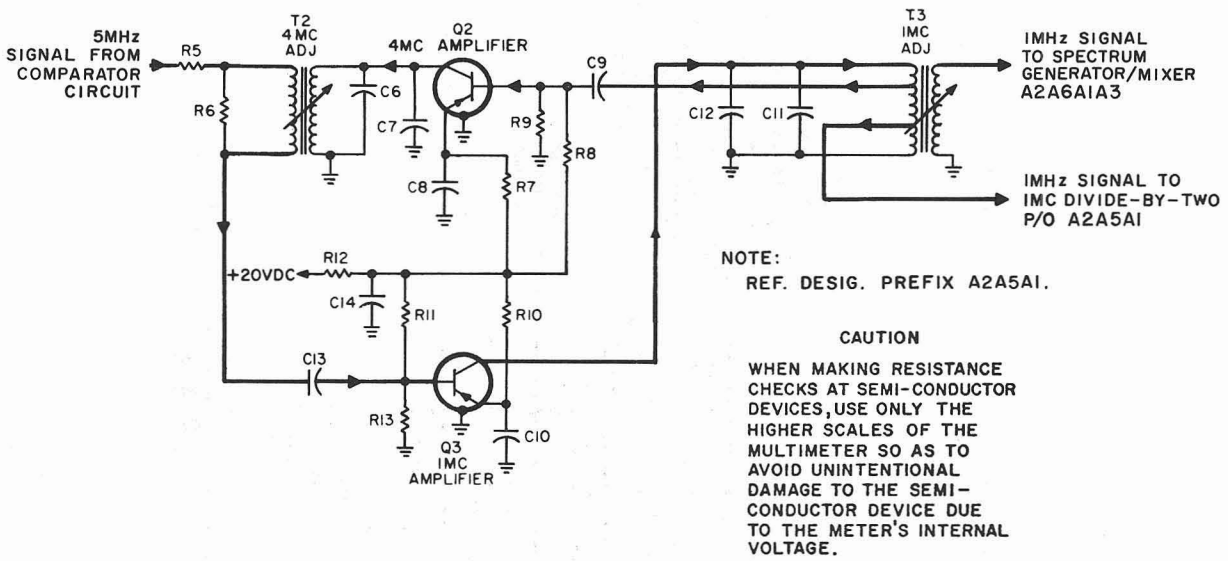


Figure 3-30. 5 MC Divide-By-Five, Simplified Schematic Diagram

derive a 1-MHz signal for use in mc synthesizer electronic subassembly A2A6A1 from the 5-MHz signal from the comparator circuit. (Refer to paragraph 3-3aa.) The following paragraphs describe the operation of the circuit in detail.

Amplifiers Q2 and Q3 form a regenerative closed loop to provide a 1-MHz output. At the instant that power is applied, circuit disturbance causes noise to be produced in the tuned outputs of amplifiers Q2 and Q3. The tuned output of amplifier Q3 allows only the 1-MHz portion of the noise to pass. This low-level 1-MHz signal is applied to 4 mc amplifier Q2. Amplifier Q2 is biased in a nonlinear condition so that the fourth harmonic of the 1-MHz is amplified. The 4-MHz is mixed with the 5-MHz input, providing a 1-MHz input to amplifier Q3. The 1 MHz is amplified and applied to amplifier Q2. This resultant flywheel effect is repeated until a stable 1-MHz output is produced, which is locked to the 5 mc frequency standard.

The 5-MHz signal, applied to the primary of transformer T2, is mixed with the 4-MHz signal from the secondary, producing a 1-MHz difference frequency. The 1 MHz signal is coupled by capacitor C13 to the base of 1 mc amplifier Q3. The base bias for amplifier Q3 is provided by voltage divider R12, R11, R13. The output load for 1 mc amplifier Q3 consists of the primary of transformer T3 and capacitors C11 and C12. This output circuit is tuned to 1 MHz. Capacitor C12 has a negative temperature coefficient and compensates for changes in the 1 mc amplifier caused by temperature changes. The 1-MHz signal is taken from a tap on the primary of transformer T3 and coupled to the base of 4 mc amplifier Q2 by capacitor C9. Base bias for amplifier Q2 is provided by voltage divider R8, R9, R12. The output load for 4 mc amplifier Q2 consists of the primary of transformer T2 and capacitors C6 and C7. This output circuit is tuned to 4 MHz. Capacitor C7 has a negative temperature coefficient and compensates for changes in the 4 mc amplifier output caused by temperature changes. Resistors R7 and R10 are emitter bias resistors, which are rf bypassed by capacitors C8 and C10, respectively. Resistor R12 and capacitor C14 provide decoupling for amplifiers Q2 and Q3. The two 1-MHz outputs from the 5 mc divide-by-five circuits are taken from the primary and secondary of

transformer T3 and applied to the 1 mc divide-by-two circuit and to the spectrum generator/mixer circuit in mc synthesizer electronic subassembly A2A6A1, respectively.

ac. 1 MC DIVIDE-BY-TWO. - The 1 mc divide-by-two circuit portion of A2A5A1 which consists of 500 kHz amplifier Q1 in a regenerative oscillator configuration (figure 3-31) forms a part of frequency standard electronic assembly A2A5. This circuit derives a 500-kHz signal from the 1 MHz signal obtained from the 5 mc divide-by-five circuit. The 500-kHz signal is used as the local carrier for reinsertion into the signal in the product detector and serves as the trigger for 100 kc spectrum generator A2A6A5A1. The following paragraph describes the operation of the circuit in detail.

With no 1-MHz signal input, the 1 mc divide-by-two circuit will not oscillate. When the 1-MHz signal is applied through isolating resistor R4, the feedback winding of transformer T1, and coupling capacitor C4 to the base of 500 kc amplifier Q1, the transistor is biased on. At this time, turning on amplifier Q1 causes noise to be produced. Since transformer T1 is tuned to 500 kHz, the 500-kHz portion of this noise passes through transformer T1 and mixes with the 1-MHz signal, producing a 500-kHz difference frequency. This difference is amplified by 500-kHz amplifier Q1 and is again applied to transformer T1, thereby sustaining oscillations. Resistor R2 is the base-bias resistor. Resistor R1 is the emitter resistor, which is rf bypassed by capacitor C1. Resistor R3 and capacitors C2 and C3 provide decoupling for 500-kHz amplifier Q1. The 500-kHz output is taken from the secondary of transformer T1 and applied to the 500 kc gates in mode selector electronic assembly A2A1 and 100 kc spectrum generator circuit A2A6A5A1.

ad. 100 KC SPECTRUM GENERATOR. - The 100 kc spectrum generator A2A6A5A1 (figure 3-32) consists of trigger amplifier Q1, divide-by-five multivibrator Q2 and Q3, gate amplifier Q4, keyed oscillator Q5, amplifier Q6, and double-tuned filter L5 and T2. This circuit, which forms a part of spectrum generator electronic subassembly A2A6A5, produces a spectrum of frequencies between 15.3 and 16.2 MHz. These frequencies are applied to 10.747 mc mixer A2A6A2A2 to produce the 10.747 MHz reference frequency used for error cancellation in the 100-kHz mixing frequency scheme. This circuit also provides the 100-kHz trigger pulses to 10 kc spectrum generator A2A6A5A2. The following paragraphs describe the operation of the 100 kc spectrum generator in detail.

The input to the 100 kc spectrum generator is the 500-kHz sinusoidal output of 1 mc divide-by-two circuit A2A5A1. This signal is applied to autotransformer L2, where it is stepped up and, in turn, coupled to the base of trigger amplifier Q1 by capacitor C3. A positive 20 Vdc is applied to the 100 kc spectrum generator in all modes of operation from main frame power supply A2A8. The positive 20 Vdc is regulated to 10 Vdc by Zener diode CR1, which draws enough current, in addition to the current drawn by the load, to maintain a 10-Vdc drop across R1. This regulated 10 Vdc is used to provide a stable supply for trigger amplifier Q1 and multivibrator Q2, Q3. The negative halves of the 500-kHz signal applied to the base of trigger amplifier Q1 are of sufficient magnitude to drive it into saturation. Thus, the collector of trigger amplifier Q1 is switched between zero (non-conducting) and 9.0 Vdc (saturated). The small drop (1 volt) is caused by the small forward resistance of the diode and the collector-to-emitter resistance of the transistor. Diode CR2 provides temperature compensation for trigger amplifier Q1 and aids in the shaping of the positive output triggers. Resistor R2 is the base-return resistor, providing a discharge path for coupling capacitor C3. The output pulses from trigger amplifier Q1 are developed across resistor R3 and are differentiated by capacitor C4 together with the input impedance of divide-by-five multivibrator Q2, Q3. This results in a series of positive and negative triggers to multivibrator Q2, Q3 at a 500-kHz repetition rate.

Divide-by-five multivibrator Q2, Q3 is an astable multivibrator, which is locked at a 500-kHz rate. The following is a detailed discussion of multivibrator Q2,

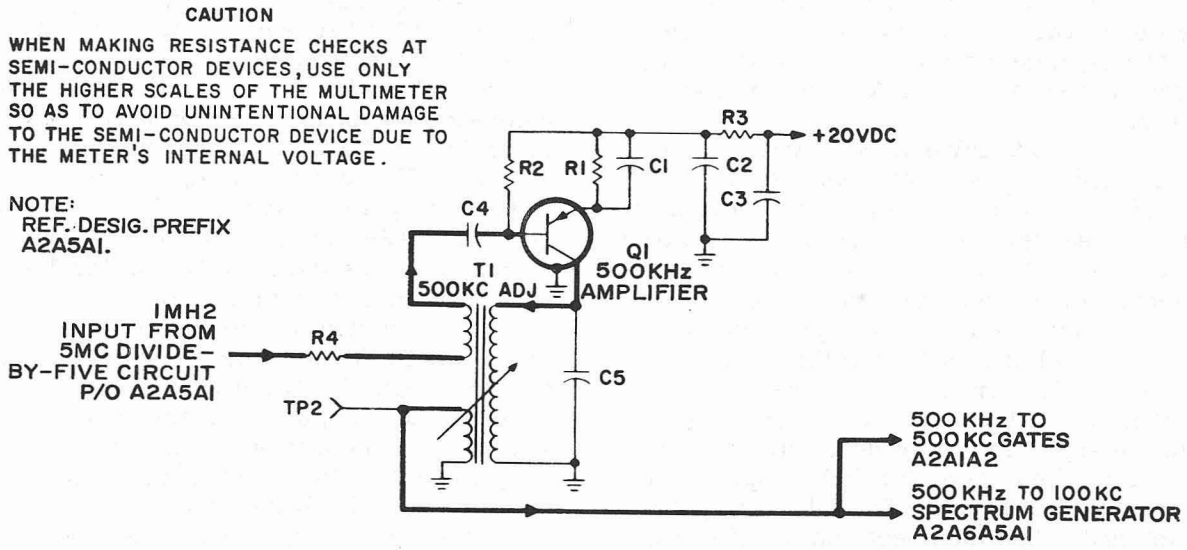


Figure 3-31. 1 MC Divide by-Two, Simplified Schematic Diagram

Q3 (see timing diagram, figure 3-33). Multivibrator Q2, Q3 is free running until locked by the 500-kHz input trigger pulses from trigger amplifier Q1. Assume that a positive trigger pulse is applied to the base of transistor Q2, and that transistors Q2 and Q3 are both cut off. The collector of transistor Q2 and the base of transistor Q3 are both at the voltage supply level (10 Vdc) at this time. When the input pulse causes transistor Q2 to conduct, a voltage drop is developed across resistor R6, decreasing the voltage at the base of transistor Q3. Since the emitter of transistor Q3 is essentially at the supply voltage level (when it is cut off), transistor Q3 becomes forward-biased and begins to conduct. Conduction causes the collector of transistor Q3 to go from 0 volts (no conduction) to approximately 9 volts. The 1-volt drop from the 10-Vdc supply voltage level is caused by the small forward drop of diode CR3 and the collector-to-emitter drop of transistor Q3. Base voltage divider R4, R5, R7 for transistor Q2 now has 9 Vdc (collector voltage of transistor Q3) at one end and 10-Vdc supply voltage at the other end. This causes transistor Q2 to become saturated. Therefore, transistors Q2 and Q3 are now both in saturation. Capacitor C6 now charges through two paths. One path is through transistor Q2 and resistors R4, R5, and R6. The other path is through resistor R8, transistor Q3, and diode CR3. As capacitor C6 charges, the emitter voltage of transistor Q2 increases, resulting in a decrease of forward bias on transistor Q2. This reduces the collector current of transistor Q2, resulting in a decreased drop across resistor R6. Therefore, the base voltage on transistor Q3 will start to go positive, resulting in a decrease of its forward bias. The collector current for transistor Q3 then begins to decrease as the forward bias decreases. Therefore, the collector voltage of transistor Q3 begins to decrease, increasing the voltage across the base voltage divider of transistor Q2. This reduces the forward bias of transistor Q2 even more. This regeneration brings transistors Q2 and Q3 out of saturation and continues until they are both cut off. Capacitor C6 now starts to discharge through resistors R10, R9, and R8. During this discharge period, the positive and negative trigger pulses are still applied to the base of transistor Q2, but are not of sufficient amplitude to forward-bias and turn on transistor Q2. When transistors Q2 and Q3 are cut off, the base bias of transistor Q2 is determined by voltage divider R4, R5, R7, R9, R10. The emitter

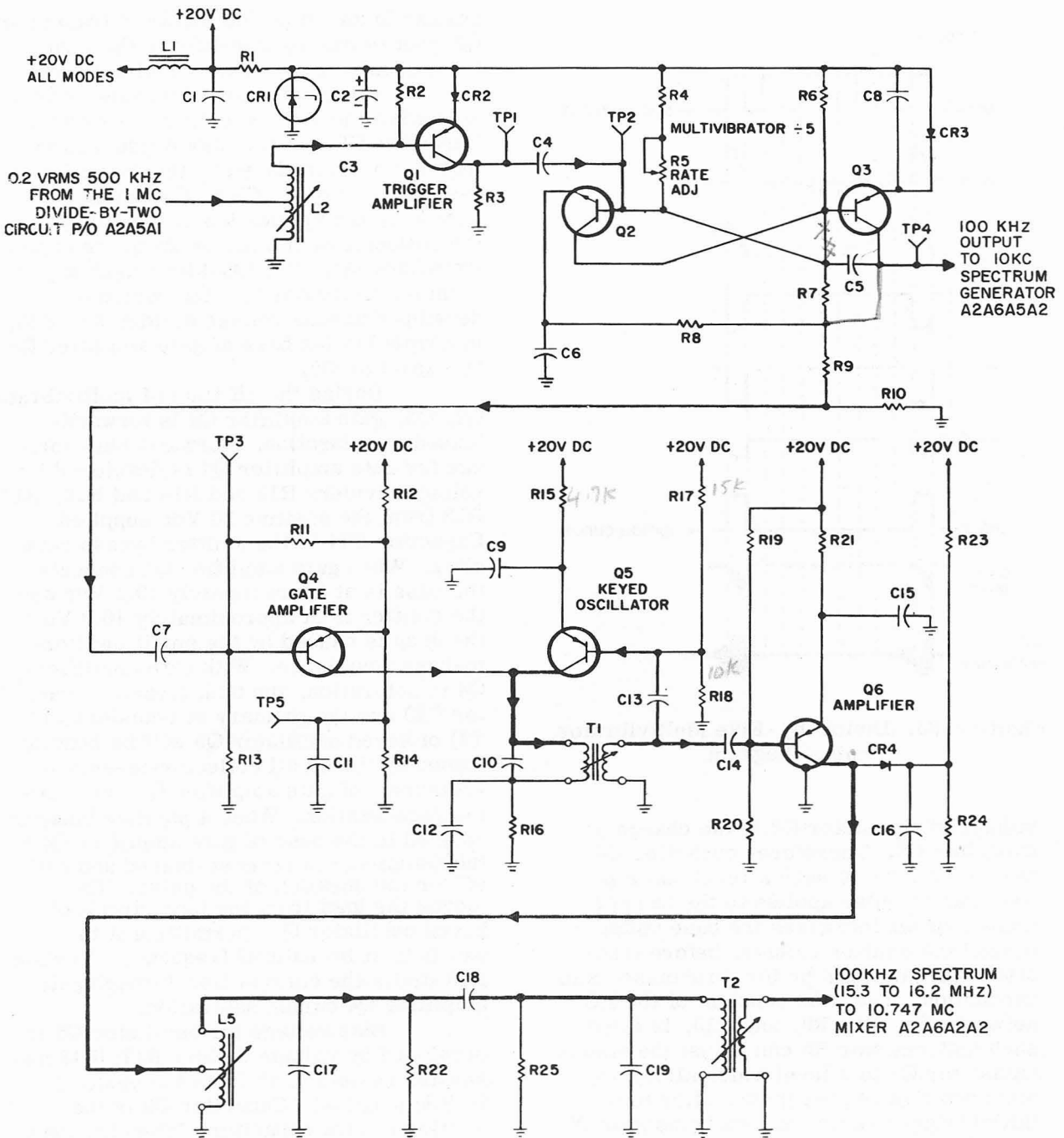


Figure 3-32. 100 KC Spectrum Generator, Simplified Schematic Diagram

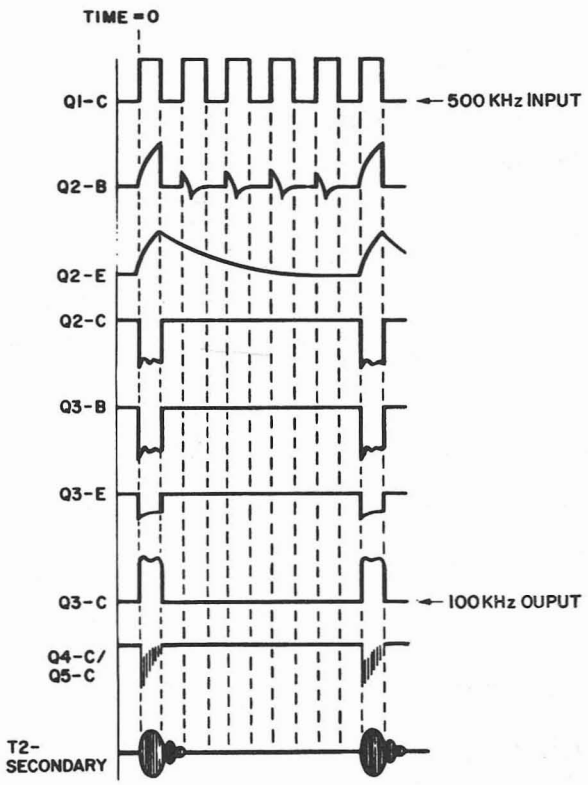


Figure 3-33. Divide-by-Five Multivibrator, Timing Diagram

voltage of transistor Q2 is the charge on capacitor C6. Therefore, capacitor C6 must discharge to such a level that a positive trigger pulse applied to the base of transistor Q2 increases the base voltage beyond the emitter voltage, before transistor Q2 can again be forward-biased into conduction. The time constant of the RC network, C6, R8, R9, and R10, is fixed such that resistor R5 can adjust the bias on transistor Q2 to a level which allows every sixth positive trigger pulse, after the initial trigger pulse, to turn transistor Q2 on. When this occurs, the collector voltage on transistor Q2 will again drop, and the regeneration process previously described will be repeated. Thus, the process of regeneration occurs before the natural period has been completed and is triggered by every sixth positive trigger pulse on the base of transistor Q2. This results in an output (collector of transistor Q3) that is exactly one-fifth of the input trigger pulse rate. The 100-kHz signal present on the collector of transistor Q3 is applied to the 10 kc spectrum generator. Capacitor C8 prevents any degeneration that may be introduced by the small forward resistance of diode CR3. Capacitor C5 speeds up the application of the pulses from the collector of transistor Q3 to the base of transistor Q2. The 100-kHz output signal from multivibrator Q2, Q3, which is developed across voltage divider R9, R10, is coupled to the base of gate amplifier Q4 by capacitor C7.

During the off time of multivibrator Q2, Q3, gate amplifier Q4 is forward-biased to saturation. Forward-bias voltage for gate amplifier Q4 is developed by voltage dividers R12 and R14 and R12, R11, R13 from the positive 20 Vdc supplied. Capacitor C11 is the emitter bypass capacitor. When gate amplifier Q4 conducts, the base is at approximately 10.1 Vdc and the emitter is at approximately 10.3 Vdc; the drop is caused by the small emitter-to-base resistance. With gate amplifier Q4 in saturation, the tank circuit (capacitor C10 and the primary of transformer T1) of keyed oscillator Q5 will be heavily loaded by the small collector-to-emitter resistance of gate amplifier Q4, preventing regeneration. When a positive pulse is coupled to the base of gate amplifier Q4, the transistor is reverse-biased and cut off for the duration of the pulse. This removes the load from the tank circuit of keyed oscillator Q5, permitting it to oscillate at its natural frequency. Resistor R16 limits the current flow through gate amplifier Q4 during saturation.

Bias voltage for oscillator Q5 is developed by voltage divider R17, R18 and emitter resistor R15 from the positive 20 Vdc supplied. Capacitor C9 is the emitter bypass capacitor. When the load created by the conduction of gate amplifier Q4 is removed from the tank circuit of keyed oscillator Q5, the tank circuit will produce a sinusoidal burst of frequencies 0.8 microsecond in duration. This results in a spectrum of frequencies centered around the free-running frequency of keyed oscillator Q5. The desired spectrum

consists of ten spectrum points, which are below the free-running (center) frequency of keyed oscillator Q5 and are separated by the 100-kHz keying rate. The secondary of transformer T1 and capacitor C13 provide the required feedback path for keyed oscillator Q5, so that the necessary loop gain can be developed to sustain oscillations. Capacitor C12 is an rf bypass, for resistor R16, at the output frequency of keyed oscillator Q5.

The spectrum output from the tank circuit is coupled to the base of amplifier Q6 by capacitor C14. Operating voltage for amplifier Q6 is developed by voltage divider R19, R20 and emitter resistor R21 from the positive 20 Vdc supplied. The output of amplifier Q6 is limited by diode CR4. The amount of limiting is adjusted by selecting the value of resistor R24. Resistors R23 and R24 form a voltage divider that develops the cathode bias on limiter CR4. Capacitors C15 and C16 are bypass capacitors. The output of amplifier Q6 is developed across a tuned circuit consisting of capacitor C17 and inductor L5. Resistor R22 increases the bandwidth of the tuned circuit and ensures uniformity. The output from tuned circuit L5, C17 is coupled by capacitor C18 to another tuned circuit consisting of capacitor C19 and the primary of transformer T2. Resistor R25 increases the bandwidth of this tuned circuit. The passband of these two tuned filters is sufficient to pass the desired 15.3- to 16.2-MHz spectrum, but has sufficient selectivity to eliminate all the undesired harmonics and products produced by keyed oscillator Q5. The output from 100 kc spectrum generator A2A6A5A1 is coupled to 10.747 mc mixer A2A6A2A2.

ae. 10.747 MC MIXER. - The 10.747 mc mixer A2A6A2A2 (figure 3-34) consists of isolation amplifier Q2, mixer Q1, and 10.747-kHz crystal filter FL1. These circuits, which form a part of 100 kc synthesizer electronic subassembly A2A6A2, produce a 10.747-MHz output at a level suitable for use in 17.847/27.847 mc mixer A2A6A2A3. The following paragraphs describe the operation of the 10.747 mc mixer in detail.

The 4.553- to 5.453-MHz output from 4.553 to 5.453 mc oscillator A2A6A2A1 is coupled to the emitter of isolation amplifier Q2 by capacitor C7. Operating voltage for isolation amplifier Q2 is developed by voltage divider R4, R5 and emitter resistor R7 from the positive 20-Vdc supply line. Resistor R6 and capacitor C6 provide decoupling to prevent any interaction with other circuits connected to the positive 20-Vdc supply line. Capacitor C3 is an rf bypass capacitor. Isolation amplifier Q2 is a grounded-base amplifier, which prevents the spectrum frequencies and mixer products of mixer Q1 from being fed back into hi-band/lo-band mixer/amplifier A2A6A2A4 and portion of A2A6A2A5 circuits via 4.553 to 5.453 mc oscillator circuit A2A6A2A1. The output of isolation amplifier Q2 is developed across the primary of transformer T1. Resistor R9 ensures uniformity of the signal developed across transformer T1.

The 4.553- to 5.453-MHz output from isolation amplifier Q2 is coupled to the emitter of mixer Q1 by capacitor C1. The 100-kHz spectrum (15.3 to 16.2 MHz) from 100 kc spectrum generator A2A6A5A1 is coupled to the base of mixer Q1 by capacitor C2. Base bias for mixer Q1 is developed by voltage divider R1, R2 from the positive 20-Vdc supply line. Resistor R3 and capacitor C4 provide decoupling to prevent any interaction with the other circuits connected to the positive 20-Vdc supply line. The emitter bias for mixer Q1 is developed from the output of 10.747 mc mixer agc circuit A2A6A2A3 by emitter resistor R8. The agc voltage is a variable voltage that controls the amount of forward-biasing and, thereby, the gain of mixer Q1. The output of 4.553 to 5.453 mc oscillator A2A6A2A1 is mixed with each of the ten spectrum points applied by 100 kc spectrum generator A2A6A5A1. The resulting mixer products are developed across a tuned circuit consisting of capacitor C5 and the primary of transformer T2. This circuit is tuned to 10.747 MHz, the desired mixer product. Transformer T2 couples the output from mixer Q1 to filter FL1. Filter FL1 is a crystal

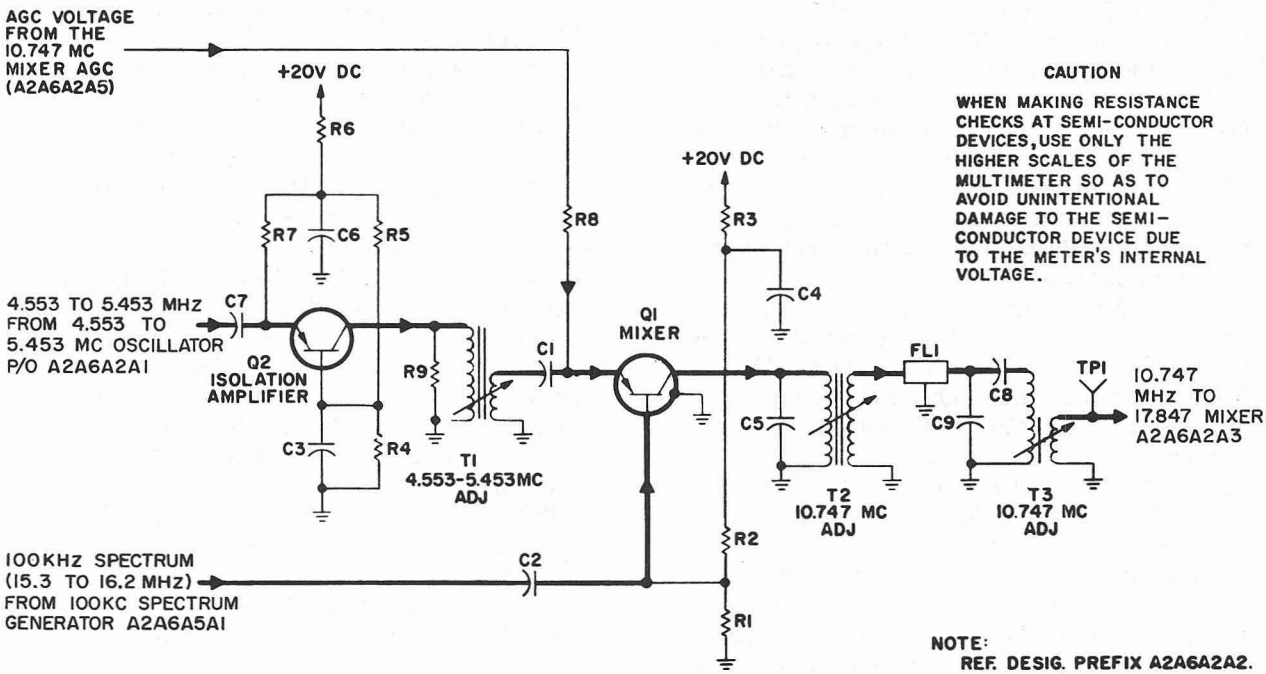


Figure 3-34. 10.747 MC Mixer, Simplified Schematic Diagram

lattice filter tuned to 10.747 MHz to eliminate all other mixing products. The 10.747-MHz output from filter FL1 is developed across the tuned circuit consisting of capacitors C8 and C9 and the primary of transformer T3. The output from 10.747 mc mixer circuit A2A6A2A2 is coupled to 17.847/27.847 mc mixer A2A6A2A3 by transformer T3.

af. 10.747 MC MIXER AGC. - The 10.747 mc mixer agc circuit A2A6A2A5 (figure 3-35) consists of agc amplifiers Q2 and Q3, and detector Q4. These circuits, which form a part of 100 kc synthesizer electronic subassembly A2A6A2, produce an agc voltage which is used to control the gain of mixer Q1 in 10.747 mc mixer A2A6A2A2. These circuits are used in all modes of operation. The following paragraphs describe the operation of the 10.747 mc mixer agc circuit in detail.

The 22.4- to 23.3-MHz or 32.4- to 33.3-MHz output from the hi-band/lo-band mixer/amplifier is coupled to the base of agc amplifier Q2 by capacitor C4. Bias voltage for agc amplifier Q2 is developed by voltage divider R4, R5 from the positive 20-Vdc supply line. Inductor L2 is a peaking coil which compensates high-frequency roll-off and provides a uniform output for both the hi- and lo-band mixing frequencies. Resistor R7 develops enough degeneration to flatten the frequency response and provide stability. Resistor R8 is the emitter resistor, which is rf bypassed by capacitor C6. The output of agc amplifier Q2 is developed across resistor R6 and inductor L2, and is coupled to the base of agc amplifier Q3 by capacitor C7.

Bias voltage for agc amplifier Q3 is developed by voltage divider R9, R10 from the positive 20-Vdc supply line. Resistors R12 and R13 develop degeneration for increased stability and for controlling the agc loop gain. The gain of agc amplifier Q3 is set by AGC LEVEL ADJ potentiometer R13. Resistor R14 is the emitter resistor, which is rf bypassed by capacitor C9. The output of agc amplifier Q3 is developed across resistor R11 and

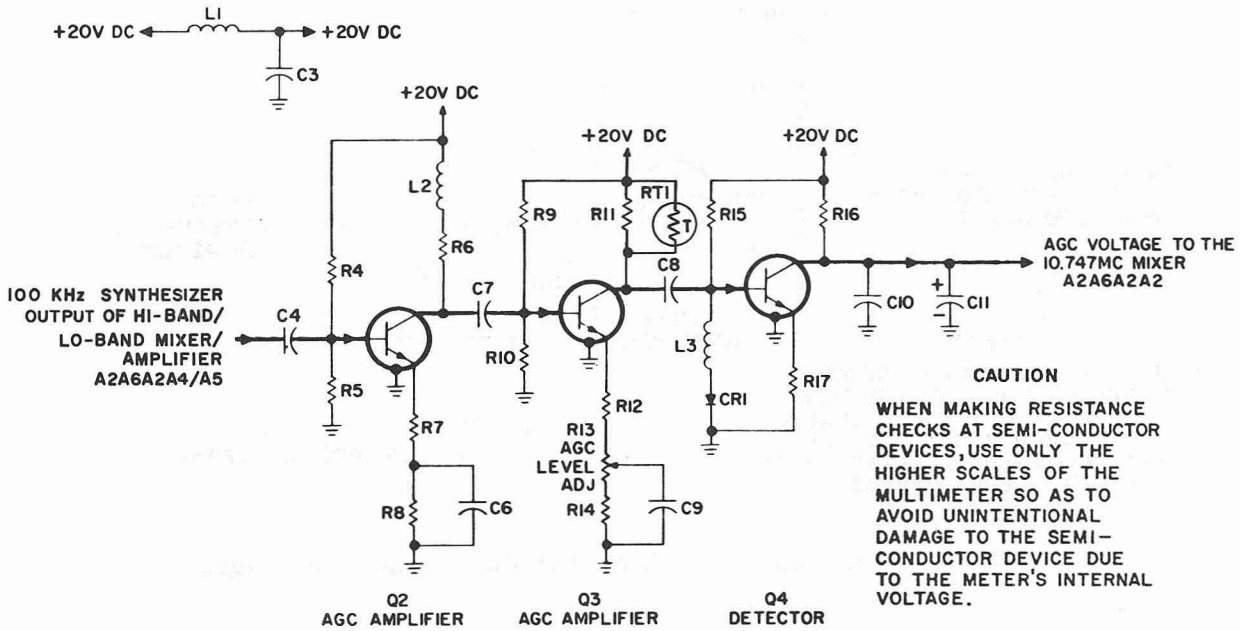


Figure 3-35. 10.747 MC Mixer AGC, Simplified Schematic Diagram

RT1 and is coupled to the base of detector Q4 by capacitor C8. RT1 provides temperature compensation for the purpose of decreasing agc voltage which increases 100-kHz injection to the mid frequency mixer.

Bias voltage for detector Q4 is developed by resistor R15, inductor L3, and diode CR1 from the positive 20-Vdc supply line. Inductor L3 provides a high input impedance and a low dc resistance to the ac signal. This prevents loading the output of agc amplifier Q3. Diode CR1 is used to compensate for temperature variations in the base-to-emitter circuit of detector Q4. Resistor R17 provides a small amount of degeneration to improve the stability of detector Q4. With no signal applied, detector Q4 is non-conducting. The positive portions of the applied signal forward-bias the base-to-emitter diode of detector Q4, causing current to flow. Capacitor C11 starts to charge to 20 Vdc when there is no collector current in detector Q4. When collector current starts to flow, the collector voltage drops, causing capacitors C10 and C11 to discharge through transistor Q4. Once the output of agc amplifier Q3 reaches a steady state, each input cycle sustains the charge on capacitors C10 and C11, preventing fluctuations in the dc output voltage. Since this circuit forms a closed loop with all the other circuits of 100 kc synthesizer electronic subassembly A2A6A2, the gain of all circuits will reach a steady-state condition, thus maintaining a constant output from detector Q4, and a constant output from hi-band/lo-band mixer/amplifier A2A5A2A4 and portion of A2A5A2A5.

ag. 5 MC MULTIPLY-BY-TWO. - The 5 mc multiply-by-two circuit portion of A2A5A1 (figure 3-36) doubles the 5-MHz input signal from switch A2A5S1 in the comparator circuit for use in 17.847/27.847 mc mixer A2A6A2A3. This circuit consists of 10 MHz amplifier Q4 and is part of frequency standard electronic assembly A2A5. The following paragraph describes the operation of this circuit in detail.

The 5-MHz input signal from the comparator circuit is coupled to the base of

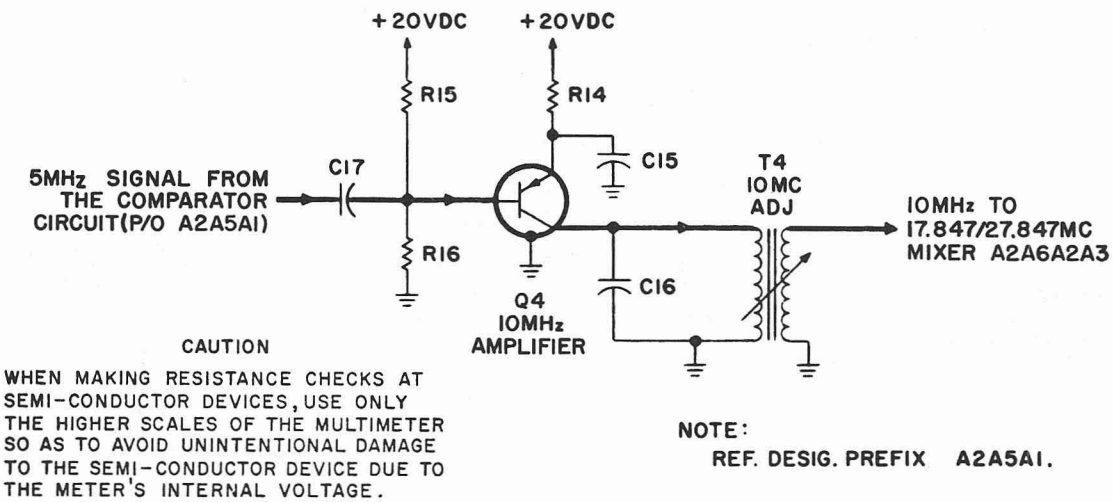


Figure 3-36. 5 MC Multiply-by-Two, Simplified Schematic Diagram

10 MHz amplifier Q4 by capacitor C17. Bias for the base of 10 MHz amplifier Q4 is provided by voltage divider R15, R16. Emitter resistor R14 is rf bypassed by capacitor C15. The tuned output circuit, consisting of the primary of transformer T4 and capacitor C16, is tuned to 10 MHz. Since this stage is biased so that the amplification is nonlinear, the second harmonic (10 MHz) of the 5-MHz signal will be produced and amplified. The 10-MHz signal is coupled through transformer T4 and applied to 17.847/27.847 mc mixer A2A6A2A3.

ah. 17.847/27.847 MC MIXER. - The 17.847/27.847 mc mixer A2A6A2A3 (figure 3-37) consists of mixers Q1 and Q2, gating circuit CR1, CR3, 17.847 mc filter Y1, and 27.847 mc filter Y2. These circuits, which form a part of 100 kc synthesizer electronic subassembly A2A6A2, produce either a 17.847-MHz or 27.847-MHz frequency for use in the mixing circuits of hi-band/lo-band mixer/amplifier A2A6A2A4. These circuits are used in all modes of operation. The following paragraphs describe the operation of 17.847/27.847 mc mixer A2A6A2A3 in detail.

The 7.1-MHz output from 7.1 mc mixer A2A6A4A1 mixer is coupled to the emitter of mixer Q1 by capacitor C5. The 10.747-MHz output from 10.747 mc mixer A2A6A4A2 is coupled to the base of mixer Q1 by capacitor C1. Operating voltage for mixer Q1 is developed by voltage divider R1, R2 and emitter resistor R4 from the positive 20-Vdc supply line. Resistor R3 and capacitor C6 provide decoupling to prevent interaction with the other circuits connected to the 20-Vdc supply line. Resistor R16 is the terminating resistor for the 7.1-MHz input signal. Mixer Q1 mixes the two input signals and develops the resulting mixing products across the tuned circuit consisting of capacitor C7 and the primary of transformer T1. The circuit is tuned to 17.847 MHz, the desired additive product.

The output of mixer Q1 is coupled to a crystal filter consisting of transformers T1 and T2, capacitors C8 and C9, and crystal Y1. Crystal Y1 is series resonant at 17.847 MHz to pass the desired additive mixing product. Since the crystal can also be parallel resonated with its own shunt capacitance, capacitor C8 and the bottom half of transformer T2 primary are adjusted to cancel the effect of this shunt capacitance. The output of the filter is coupled to hi-band/lo-band mixer/amplifier

A2A6A2A4 (when the lo-band of mixing frequencies is required) and to the base of mixer Q2 (when the hi-band of mixing frequencies is required) by transformer T2. Resistor R5 is the termination for crystal filter T1.

The 10-MHz signal from the 5 mc multiply-by-two circuit portion of A2A5A1 is coupled to the anode of diode CR1 by capacitor C15. Zener diode CR2 regulates the positive 20 Vdc to 10 Vdc by drawing enough current, in addition to the load current, to maintain a 10-Vdc drop across resistor R12. The regulated 10 Vdc is applied to the cathode of diode CR3 and to the anode of diode CR1 through isolating resistor R11. When the lo-band output from hi-band/lo-band mixer/amplifier A2A6A2A4 is required, 20 Vdc is applied to resistors R6, R10, and R14. Voltage divider R6, R7, which biases the base of mixer Q2, then has 20 Vdc applied to both ends. Thus, mixer Q2 is biased off when the lo-band of frequencies is being used. The lo-band positive 20 Vdc is also applied through resistor R10 to the cathode of diode CR1. Therefore, when the lo-band of frequencies is being used, diode CR1 is back-biased and blocks the 10-MHz signal. The lo-band positive 20 Vdc is also applied to the anode of diode CR3 through resistor R14. Therefore, diode CR3 is forward-biased and conducts the 10-MHz signal through coupling capacitor C16 to 51 ohm load resistor R13. Therefore, resistor R13 loads the 10-MHz signal when the lo-band mixing frequencies are required.

When the hi-band mixing frequencies are required, a ground is applied to resistors R14, R10, and R6. The ground is applied through isolating resistors R14 and R10 to diodes CR3 and CR1, respectively. This back-biases diode CR3 and forward-biases diode CR1. When diode CR1 is forward-biased, it conducts the 10-MHz signal through coupling capacitor C13 to the emitter of mixer Q2.

Operating voltage for mixer Q2 is developed by voltage divider R6, R7 and emitter resistor R9 from the positive 20-Vdc supply line. Resistor R8 and capacitor C11 provide decoupling to prevent interaction with other circuits connected to the positive 20-Vdc supply line. Capacitor C12 is the emitter bypass capacitor. The 17.847-MHz output from the crystal filter is coupled to the base of mixer Q2 by capacitor C10. The 17.847- and 10-MHz signals are mixed, and the resulting products are developed across the tuned circuit consisting of capacitor C18 and the primary of transformer T3. This circuit is tuned to 27.847 MHz, the desired additive mixer product. Transformer T3 couples the output of mixer Q2 to a crystal filter consisting of crystal Y2, transformers T3 and T4, and capacitors C19 and C20, which have the same functions as the corresponding components in the 17.847 mc crystal filter. The output of this crystal filter is coupled to the hi-band/lo-band mixer/amplifier A2A6A2A4 by transformer T4.

ai. 10 KC SPECTRUM GENERATOR. - The 10 kc spectrum generator A2A6A5A2 (figure 3-38) consists of divide-by-two multivibrator Q1, Q2, divide-by-five multivibrator Q3, Q4, gate amplifier Q5, and keyed oscillator Q6. These circuits, which form a part of spectrum generator electronic subassembly A2A6A5, produce a spectrum of frequencies between 3.82 and 3.91 MHz. This spectrum is applied to the 9.07 mc error mixer portion of A2A6A3A4 to produce the reference frequencies used in the error canceling scheme. These circuits also provide 10-kHz trigger pulses to 1 kc spectrum generator A2A6A5A3. The 10 kc spectrum generator is used in all modes of operation. The following paragraphs describe the operation of 10 kc spectrum generator A2A6A5A2 in detail.

The input to 10 kc spectrum generator A2A6A5A2 is the 100-kHz pulsed output of 100 kc spectrum generator A2A6A5A1. A positive 20 Vdc is applied to the 10 kc spectrum generator in all modes of operation by main frame power supply electronic assembly A2A8. The positive 20 Vdc is regulated at 10 Vdc by Zener diode CR1, which draws enough current, in addition to the current drawn by the load, to maintain a 10-Vdc drop across resistor R1. The regulated 10-Vdc is the stable supply voltage for divide-by-two multivibrator Q1, Q2 and divide-by-five multivibrator Q3, Q4.

Divide-by-two multivibrator Q1, Q2 is a conventional bistable multivibrator,

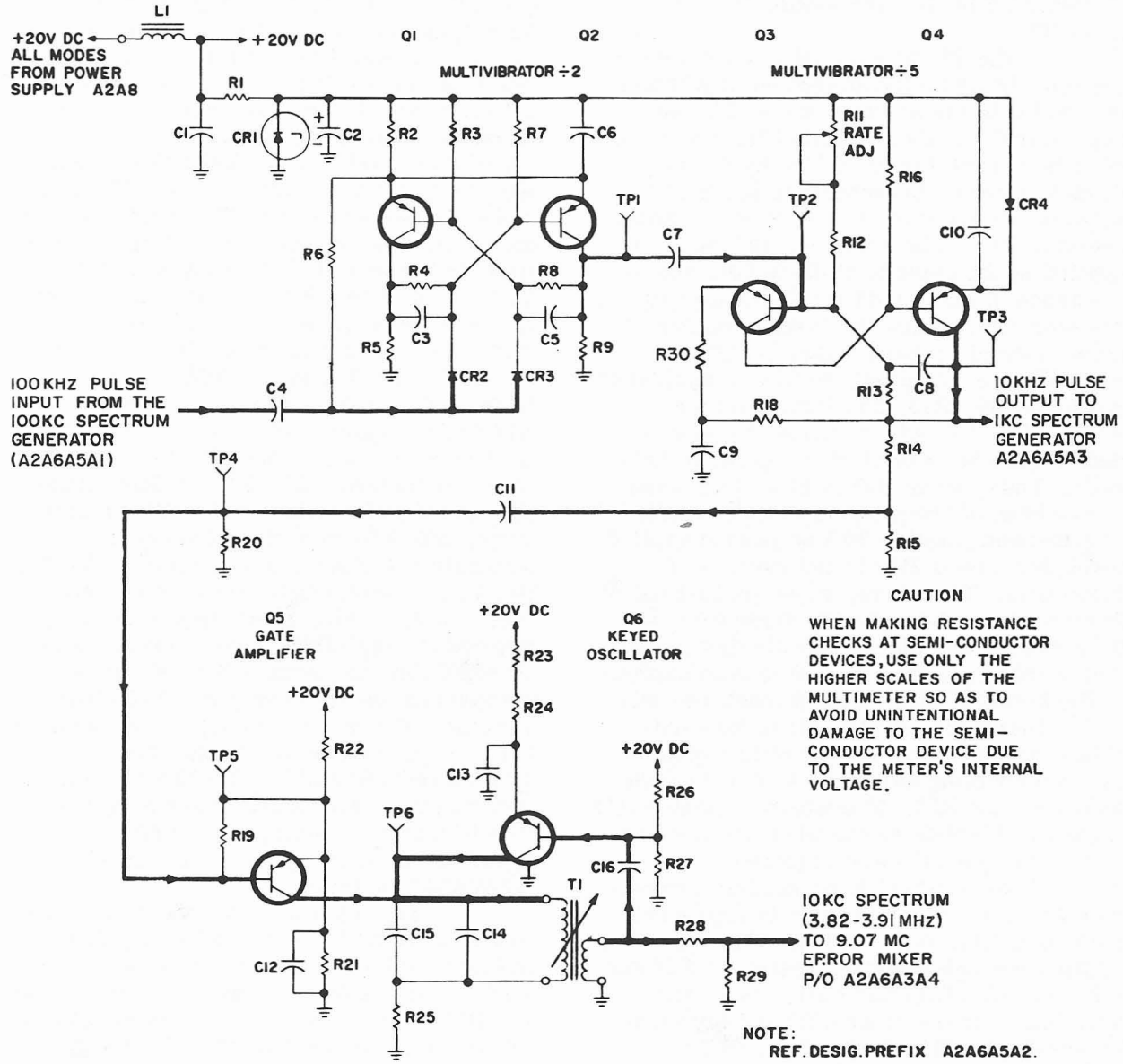


Figure 3-38. 10 KC Spectrum Generator, Simplified Schematic Diagram

producing one output pulse for every two input pulses. The 100-kHz input pulses are differentiated by capacitor C4 and the input impedance of multivibrator Q1, Q2. The resulting positive triggers are directed to the saturated transistor of divide-by-two multivibrator Q1, Q2 by steering diodes CR2 and CR3. This cuts off the saturated transistor and starts the process of regeneration. Resistor R6 references the anodes of steering diodes CR2 and CR3 to the same potential as the emitters of transistors Q1 and Q3, and provides the return path for capacitor C4.

The output of divide-by-two multivibrator Q1, Q2 is a square wave at a 50-kHz repetition rate. This signal is differentiated by capacitor C7 and the input impedance of divide-by-five multivibrator Q3, Q4. The resulting positive pulses are used to trigger divide-by-five multivibrator Q3, Q4. Divide-by-five multivibrator Q3, Q4 is identical to divide-by-five multivibrator Q2, Q3 in 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad), except for the time constants. The 10-kHz output signal from divide-by-five multivibrator Q3, Q4 is applied directly to 1 kc spectrum generator A2A6A5A1. The 10-kHz output signal is also divided by resistors R14 and R15 and coupled to the base of gate amplifier Q5 by capacitor C11. Gate amplifier Q5 is identical to gate amplifier Q4 in 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad). Gate amplifier Q5 turns keyed oscillator Q6 on and off at a 10-kHz repetition rate. Keyed oscillator Q6 is identical to keyed oscillator Q5 in 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad). The output of keyed oscillator Q6 is a sinusoidal burst of frequencies about 0.7 microsecond in duration, repeated at a 10-kHz rate. The spectrum of frequencies thus produced is 3.82 to 3.91 MHz; the spectrum points are separated by 10 kHz. The output of keyed oscillator Q6 is divided by resistors R28 and R29, and applied to the 9.07 mc error mixer portion of A2A6A3A4.

aj. 1 KC SPECTRUM GENERATOR.- The 1 kc spectrum generator A2A6A5A3 (figure 3-39) consists of divide-by-two multivibrator Q1, Q2, divide-by-five multivibrator Q3, Q4, gate amplifier Q5, and keyed oscillator Q6. These circuits, which form a part of the spectrum generator electronic subassembly A2A6A5, produce a spectrum of frequencies between 0.122 and 0.131 MHz. This spectrum is applied to the 1.981 mc error mixer portion of A2A6A3A4 to produce the reference frequencies used in error cancellation. These circuits also provide the 1-kHz pulse for 1 kc pulse inverter A2A6A5A4. The 1 kc spectrum generator is used in all modes of operation. The following paragraphs describe the operation of 1 kc spectrum generator A2A6A5A3 in detail.

The input to 1 kc spectrum generator A2A6A5A3 is the 10-kHz pulse output of 10 kc spectrum generator A2A6A5A2. This input signal is differentiated by capacitor C4 and the input impedance of divide-by-two multivibrator Q1, Q2. The resulting positive pulses trigger divide-by-two multivibrator Q1, Q2. Divide-by-two multivibrator Q1, Q2 is identical to divide-by-two multivibrator Q1, Q2 in 10 kc spectrum generator A2A6A5A2 (paragraph 3-3ai). The 5-kHz pulse output of the divide-by-two multivibrator is differentiated by capacitor C7 and the input impedance of divide-by-five multivibrator Q3, Q4. Diode CR4 provides a fast turn-on time for transistor Q3 and holds transistor Q3 in saturation during its conductive period. Divide-by-five multivibrator Q3, Q4 is identical to divide-by-five multivibrator Q3, Q4 in 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad), except for the time constants. The 1-kHz pulse output is applied directly to the 1 kc pulse inverter. The 1-kHz pulsed output of divide-by-five multivibrator Q3, Q4 is also divided by resistors R14 and R15 and coupled to the base of gate amplifier Q5. Gate amplifier Q5 is identical to gate amplifier Q4 in 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad). Gate amplifier Q5 turns keyed oscillator Q6 on and off at a 1-kHz repetition rate. Keyed oscillator Q6 is identical to keyed oscillator Q5 in the 100 kc spectrum generator A2A6A5A1 (paragraph 3-3ad). The output of keyed oscillator A6 is a 10-microsecond sinusoidal burst of frequencies filtered by L2 and C17. The spectrum of frequencies thus produced is 0.122 to 0.131 MHz; the spectrum points are separated by 1 kHz.

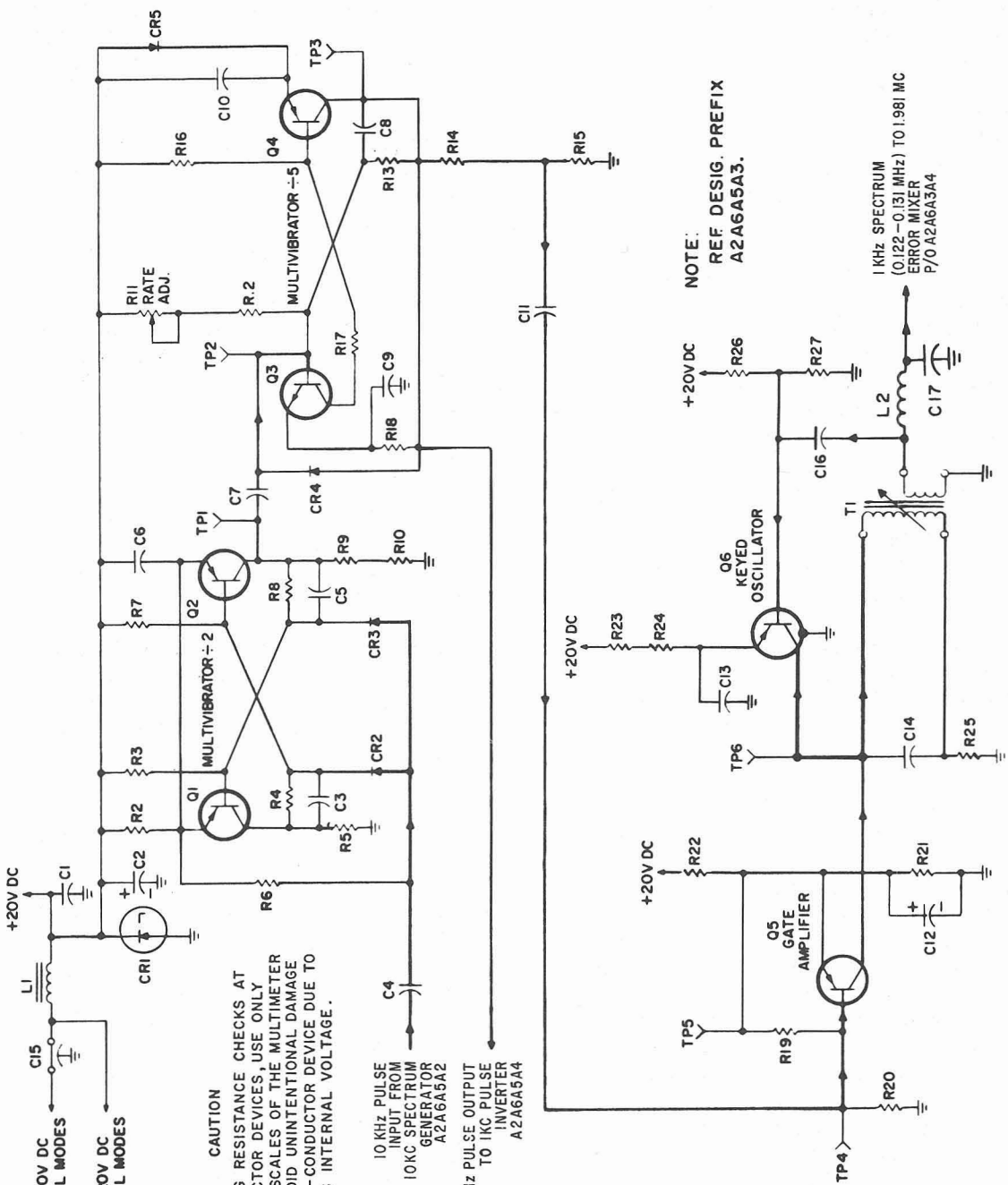


Figure 3-39. 1 KC Spectrum Generator, Simplified Schematic Diagram

ak. 1.981 MC ERROR MIXER. - The 1.981 mc error mixer portion of A2A6A3A4 (figure 3-40) consists of isolation amplifier Z2Q7, mixer A1Q10, and 1.981 mc filter FL2. These circuits, which form a part of 1 and 10 kc synthesizer electronic subassembly A2A6A3, mix the output signal from 1.850 to 1.859 mc oscillator A2A6A3A2 with one of the 1-kHz spectrum points to produce the 1.981-MHz product signal used in the 7.089 mc mixer portion of A2A6A3A4. The following paragraph describes the operation of the 1.981 mc error mixer portion of A2A6A3A4 in detail.

The signal from 1.850 to 1.859 mc oscillator A2A6A3A2 is coupled through capacitor C30 to the emitter of isolation amplifier Z2Q7. The grounded base configuration of isolation amplifier Z2Q7 provides a high reverse attenuation to the spectrum and mixer products present in mixer Z1Q10. Base bias is provided by voltage divider Z2R29, Z2R27. Resistor R12 and capacitor C13 provide decoupling for isolation amplifier Z2Q7. Capacitor Z2C29 provides ac ground to the base of isolation amplifier Z2Q7. The output of isolation amplifier Z2Q7 is applied to inductor L4, which provides the impedance transformation necessary to drive mixer Z1Q10. Resistor Z2R26 is used to ensure uniformity of the signal developed across inductor L4. The output of inductor L4 is coupled through capacitor Z1C43 to the base of mixer Z1Q10. The 1-kHz spectrum is coupled through capacitor Z1C44 to the emitter of mixer Z1Q10. Base bias is provided by voltage divider Z1R44, Z1R42. Resistor R12 and capacitor C13 provide decoupling. The mixing products at the collector of mixer Z1Q10 are applied to crystal filter FL2 where all the products except the sum, 1.981 MHz, are attenuated. Resistor Z1R41 and capacitor C9 form the input termination of crystal filter FL2. Capacitor C8 forms a part of the output termination of crystal filter FL2. The output of crystal filter FL2 is applied to the 7.089 mc error mixer portion of A2A6A3A4.

al. 9.07 MC ERROR MIXER. - The 9.07 mc error mixer portion of A2A6A3A4 (figure 3-41) consists of isolation amplifier Z3Q6, mixer Q8, and 9.07 mc filter FL1. These circuits, which form a part of 1 and 10 kc synthesizer electronic subassembly A2A6A3, mix the output signal from 5.16 to 5.25 mc oscillator A2A6A3A1 with one of the 10-kHz spectrum points to produce the 9.07-MHz product signal used in the 7.089 mc mixer portion of A2A6A3A4. This circuit is similar, except for several component values, and absence of a resistor in series with the mixer emitter, to the 1.981 mc error mixer portion of A2A6A3A4. Refer to paragraph 3-3ak for details of circuit operation.

am. 7.089 MC MIXER. - The 7.089 mc mixer portion of A2A6A3A4 (figure 3.42), which forms a part of 1 and 10 kc synthesizer electronic subassembly A2A6A3, mixes the 1.981-MHz signal from the 1.981 mc error mixer portion of A2A6A3A4 with the 9.07-MHz signal from the 9.07 mc error mixer portion of A2A6A3A4. This circuit, which consists of mixer Q9, produces the 7.039-MHz error signal used in 7.1 mc mixer A2A6A4A1 of 100 cps synthesizer electronic subassembly A2A6A4. The following paragraph describes the operation of the circuit in detail.

The 1.981-MHz signal is coupled through capacitor C7 and isolating resistor R7 to the base of mixer Q9. The 9.07-MHz signal is coupled through capacitor C6 and isolating resistor R6 to the base of mixer Q9. Since the outputs of the 1.981 mc error mixer and the 9.07 mc error mixer are combined at the base of mixer Q9, the output termination for the respective filters is located in the 7.089 mc mixer. This termination consists of resistors R6 and R7, capacitors C5, C6, C7, and C8, the input impedance of mixer Q9, and the output impedance of the respective filters. Base bias for mixer Q9 is provided by voltage divider R9, R8. Emitter bias is provided through emitter resistor R10. Resistor R30 provides a small amount of degeneration to stabilize mixer Q9. Resistor R11 and capacitor C11 provide decoupling for mixer Q9. The output circuit of mixer C9 is a tuned circuit consisting of capacitor C10 and transformer T1, and is tuned to 7.089 MHz. Therefore, all mixing products except the difference frequency, 7.089 MHz, will be attenuated by the output circuit of mixer Q9. The 7.089-MHz signal is coupled through transformer T1 to the

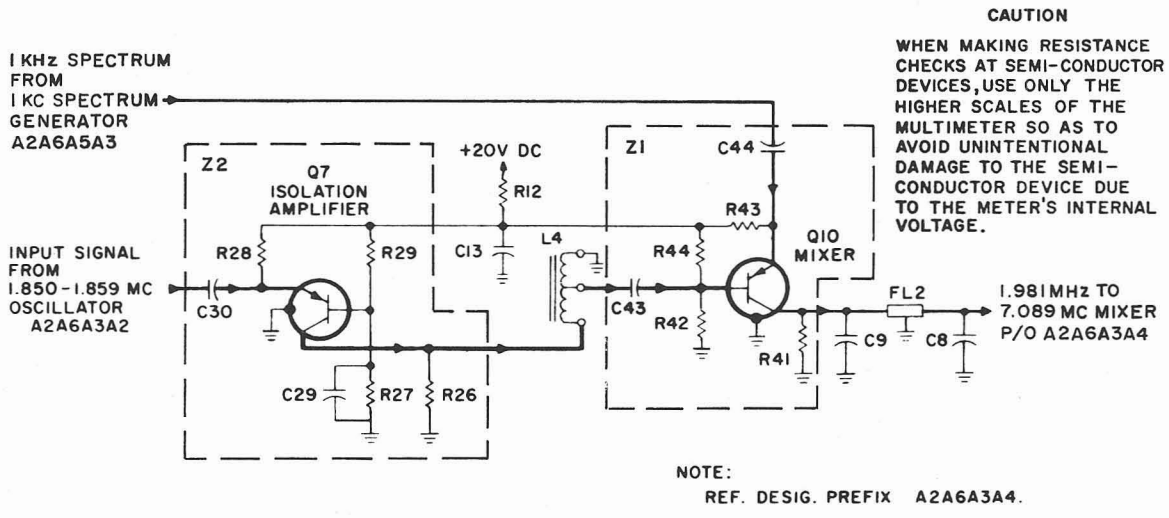


Figure 3-40. 1.981 MC Error Mixer, Simplified Schematic Diagram

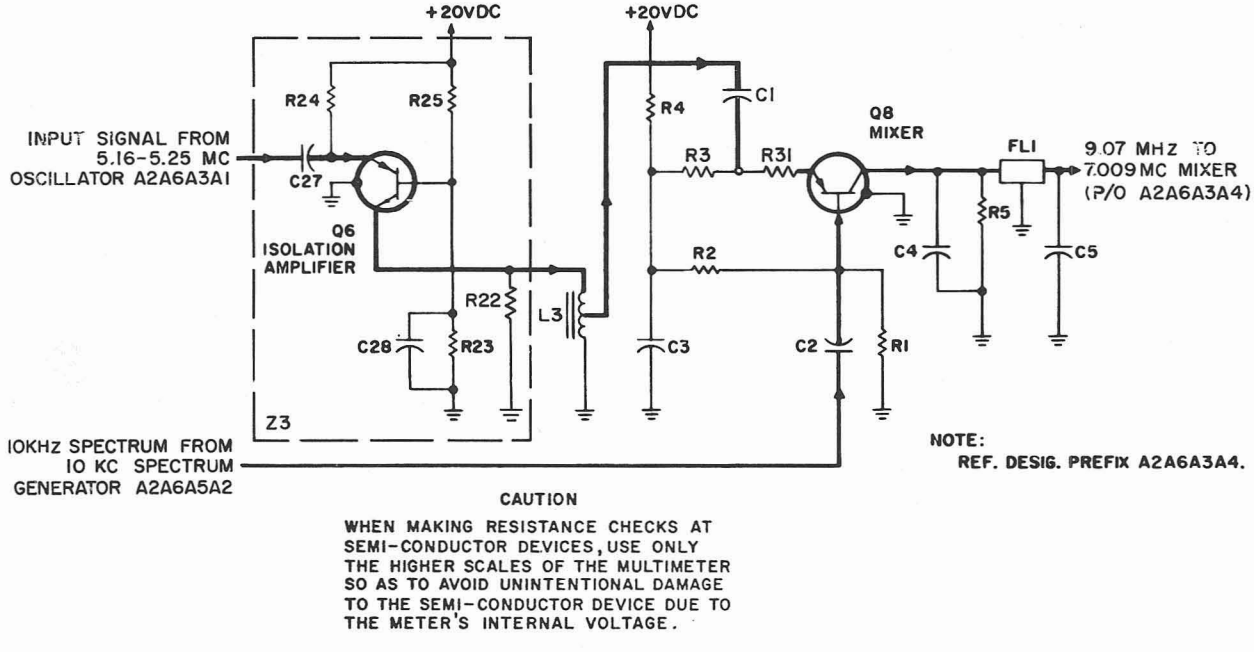


Figure 3-41. 9.07 MC Error Mixer, Simplified Schematic Diagram

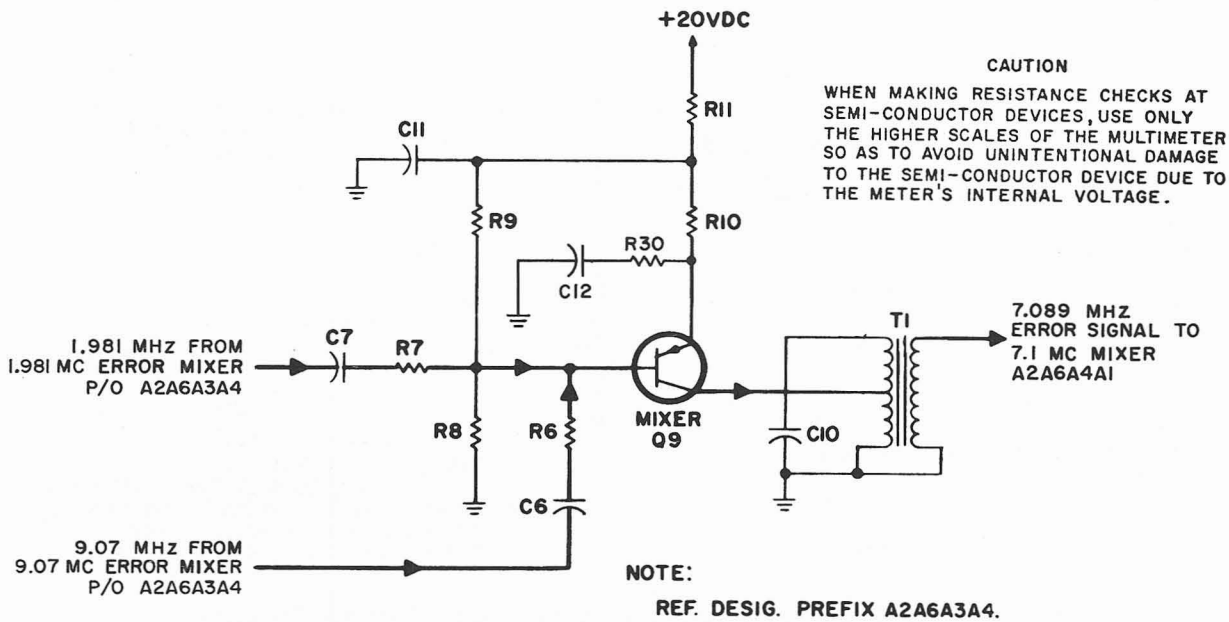


Figure 3-42. 7.089 MC Mixer, Simplified Schematic Diagram

7.1 mc mixer circuit in 100 cps synthesizer electronic subassembly A2A6A4.

an. 1 KC PULSE INVERTER. - The 1 kc pulse inverter A2A6A5A4 (figure 3-43) consists of overdriven amplifier Q1. This amplifier is a part of spectrum generator electronic subassembly A2A6A5 and supplies the accurate 1-kHz reference pulses required by phase detector A2A6A4A2Z1 (integrated circuit) to phase lock 100 cps oscillator A2A6A4A2. The 1 kc pulse inverter is used in all modes of operation. The following paragraph describes the operation of 1 kc pulse inverter A2A6A5A4 in detail.

The input to 1 kc pulse inverter A2A6A5A4 is the 1-kHz pulse output of divide-by-five multivibrator Q3, Q4 in 1 kc spectrum generator A2A6A5A3. The 1-kHz pulses are coupled to the base of pulse amplifier Q1 through isolating resistor R4 in order to reduce the amplifier loading on the divide-by-five multivibrator. Resistor R4 also forms a voltage divider in conjunction with resistor R5 to supply the base bias for amplifier Q1. Resistors R2 and R3 form a voltage divider to furnish a low collector voltage and a relatively stiff collector voltage source to ensure that amplifier Q1 is always driven into saturation by the input pulses, thus improving output amplitude uniformity and pulse waveform. Resistor R1 and capacitor C1 form a decoupling network for the collector voltage source. The output of the 1 kc pulse inverter amplifier is applied to 100 cps synthesizer electronic subassembly A2A6A4.

ao. 100 CPS OSCILLATOR. - The 100 cps oscillator A2A6A4A2 (figure 3-44) consists of modified Colpitts (Clapp) oscillator Q2, dc amplifier Q1, buffer amplifier Q3, and phase detector (integrated circuit Z1). The 100 cps oscillator, which forms a part of 100 cps synthesizer electronic subassembly A2A6A4, generates the 100-Hz increments and vernier frequency. Tuning of the oscillator from 110 kHz to 119 kHz in 1-kHz steps, and vernier frequency control from 108 kHz to 122 kHz is accomplished by the reactance control circuit using voltage-variable capacitors CR7, CR8, and CR9. When locked 100-Hz steps are required, phase detector A2A6A4A2Z1 furnishes the desired frequency control voltages. In vernier, phase detector A2A6A4A2Z1 is disabled by

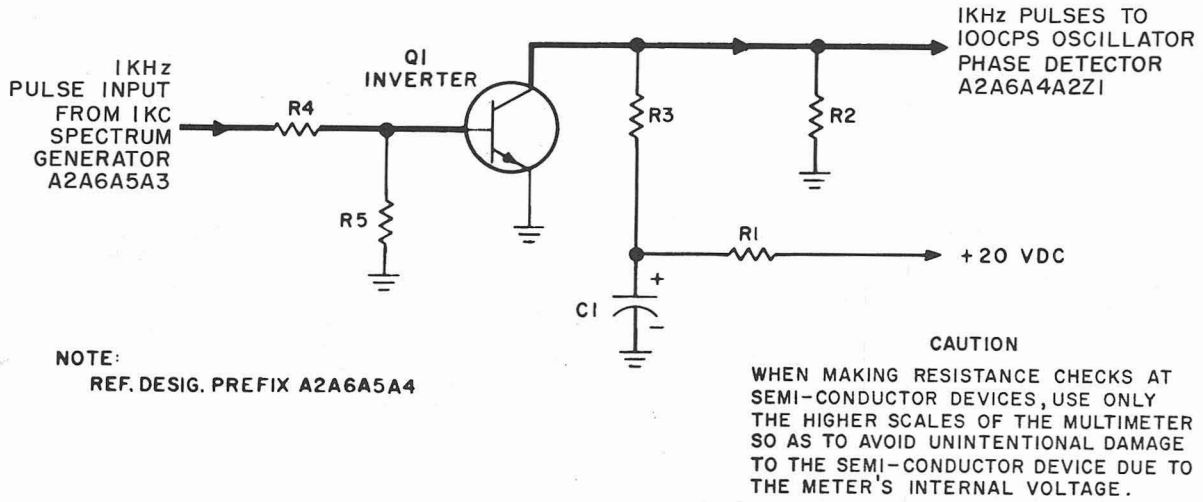


Figure 3-43. 1 KC Pulse Inverter, Simplified Schematic Diagram

removing the supply voltage. The voltage to the voltage variable capacitors CR7, CR8, and CR9 is then varied manually. The oscillator output is coupled to buffer amplifier Q3 whose input is stabilized by a set of limiting diodes CR5 and CR6.

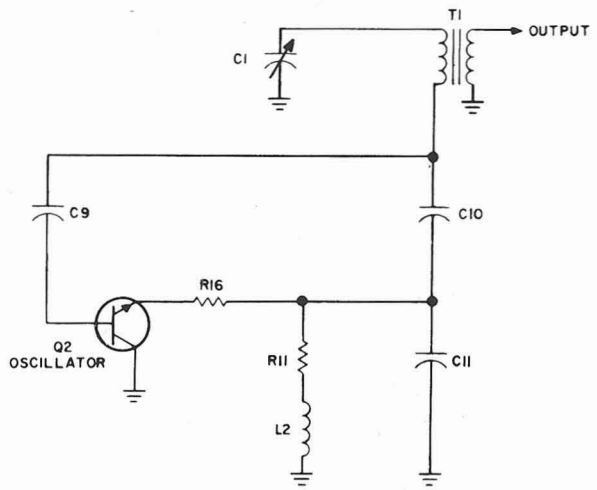
The positive 20-Vdc supply voltage for all circuits of the 100 cps oscillator is obtained from main frame power supply electronic assembly A2A8.

The tank circuit of oscillator Q2 consists of capacitors C9, C10, C11, C13, C14, C15, C5 and the voltage variable capacitors CR7, CR8, and CR9. Capacitor C14 is initially adjusted for the required frequency range of oscillator Q2. The voltage-variable capacitors CR7, CR8, and CR9 provide the required pulling range for the phase-lock loop. Capacitor C15 has a negative temperature coefficient to compensate for temperature changes in oscillator Q2. The parallel and series combination of the aforementioned capacitances results in an equivalent variable capacity C1. A simplified ac equivalent circuit of oscillator Q2 is shown in figure 3-45 as an aid in analyzing the oscillator tank circuit. Capacitor C1 and transformer T1 form the parallel resonant tank circuit of oscillator Q2.

When operating voltage is applied to oscillator Q2, the oscillator produces an output of approximately 110 kHz to to 119 kHz, depending on the setting of the CPS switch. These output frequencies will only approximate the desired operating frequencies until the phase-lock loop is closed. The output of oscillator Q2 is amplitude-limited by diodes CR5 and CR6. Both the negative- and positive-going limit of the oscillator signal are established by the diode bias voltages developed across the secondary of transformer T1 and the forward voltage drop of the diodes.

The output of oscillator Q2 is applied through transformer T1 to the base of buffer amplifier Q3 which, in turn, develops the signal across resistor R10. Buffer amplifier Q3 provides isolation for oscillator Q2, preventing succeeding stages from adversely loading the oscillator. The output of buffer amplifier Q3 is coupled to the base of pulse shaper A2A6A4 A1Q6 by capacitor A2A6A4A1 C13. A small amount of degeneration is developed by unbypassed emitter resistor R8 to increase the stability of amplifier Q3.

The output of 1 kc pulse inverter A2A6A5A4 module is coupled directly to phase detector Z1. A reset pulse from



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 3-45. 100 CPS Oscillator, AC Equivalent Circuit, Schematic Diagram

counter A2A6A4A1 is also coupled directly to phase detector Z1. The output voltage from phase detector Z1 is applied to amplifier Q1 by the network consisting of resistor R3 and capacitor C3. The output of amplifier Q1 is filtered and then applied to the voltage-variable capacitors to control the oscillator Q2 frequency.

The phase detector is basically a flip-flop (figure 3-46). The reset pulses are applied to both stages of the flip-flop, while the 1-kHz standard frequency reference pulse is applied to one side only. Therefore, if the input frequencies are both equal, the output will be a pulse with a duration equal to the time between the input reference and the preset divider output (reset pulse). If the output is a symmetrical waveform, the triggers are 180 degrees out of phase. When a low-pass filter is employed, the flip-flop output provides an average voltage which is a linear function of the phase difference. Thus, for the case where the phase detector output is a symmetrical waveform (180-degree phase relationship), the average voltage from the filter will be one-half the peak-to-peak phase detector output. This circuit permits up to 360 degrees of control in-phase between two signals, whereas the usual sinusoidal type of phase detector permits only 180 degrees of control. If the frequency of one signal is different from the other, the triggers will pass each other in time, and the average output from the circuit will be a sawtooth. These cases are shown in figure 3-47 for $f_1 = f_2$, $f_2 > f_1$, and $f_1 > f_2$.

In the feedback loop, filter network FL1 is designed to have a low-pass characteristic with a cutoff frequency at about 250 Hz, well above the loop cutoff frequency. Consequently, the oscillator capture range is equal to its hold-in range. The filtered dc output is then applied to voltage-variable capacitors CR7, CR8, and CR9 to vary the capacity in the tank circuit of oscillator Q2, thus controlling the oscillator frequency. This slaves the oscillator to a frequency that is preset into the divider chain of counter A2A6A4A1.

Assume that the output of the oscillator is 110.2 kHz. The desired oscillator frequency is 110 kHz. The oscillator output of 110.2 kHz is coupled to the pulse shaper circuit of the counter. This output is then coupled to the preset dividers and divided down by a factor of 110 to a frequency of 1.02 kHz. This output is coupled directly to phase detector Z1. A 1-kHz pulse from the spectrum generator is also coupled directly to the phase detector. The two inputs of 1 kHz and 1.02 kHz are compared and an ac voltage (sawtooth waveform) is developed. This ac output is coupled to amplifier Q1 and filtered in filter network FL1. The voltage is then applied to voltage-variable capacitors, CR7, CR8, and CR9, thus sweeping the oscillator frequency. Since the feedback loop is closed, this frequency decreases with time due to the decrease of the oscillator output frequency as it is being swept. After this sweep frequency has been decreased to a frequency within the pull-in range of the oscillator, the oscillator pulls in and locks at the desired 110 kHz. At this

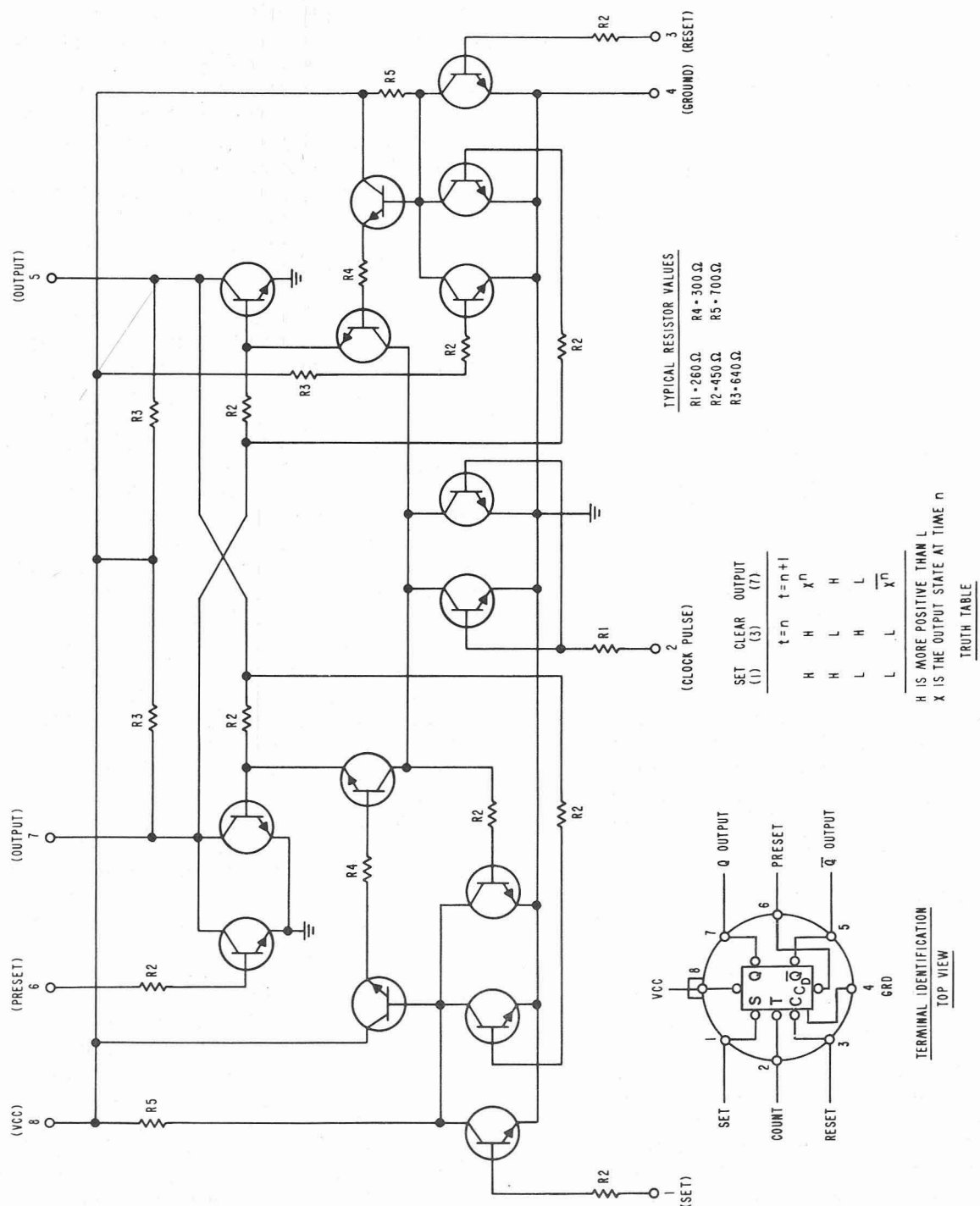


Figure 3-46. Phase Detector Z2Z1 and A1Z2 Simplified Schematic Diagram and Truth Table

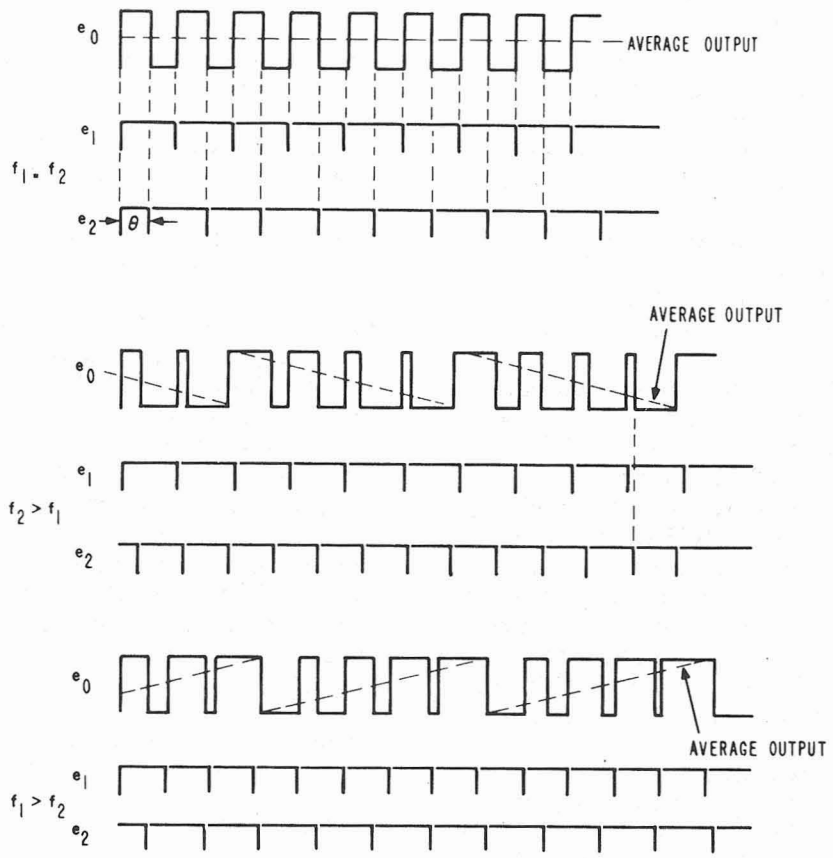


Figure 3-47. Phase Detector Waveforms

time, the output of the phase detector is the dc reference level. If the phase of the oscillator begins to drift, the phase difference is detected by the phase detector circuit and the dc output is shifted accordingly to correct the oscillator frequency.

ap. PRESET COUNTER. - The preset counter A2A4A6A1 (figure 3-48) consists of pulse shaper Q5 and Q6, three decade dividers (integrated circuits Z4, Z1, and Z3), inverter amplifier Q8, a flip-flop (integrated circuit Z2), reset pulser Q1, Q2, Q3, Q4, emitter follower Q9, and amplifier Q7. These circuits form a part of 100 cps synthesizer electronic subassembly A2A6A4. These circuits provide two functions. They divide the 110-kHz to 119-kHz output from 100 cps oscillator A2A6A4A2 by 10 to provide the 11-kHz to 11.9-kHz signal required for mixing in 7.1 mc mixer A2A6A4A3. They generate a reset pulse, the frequency of which dictates whether any oscillator frequency error exists from that which is preselected. This reset pulse is coupled to phase detector A2A6A4A2Z1 for comparison with the 1-kHz standard frequency. The following paragraphs describe operation of the counter circuits in detail.

Pluse shaper Q5, Q6 is a Schmitt trigger circuit which receives the locked 110-kHz to 119-kHz sinusoidal output from 100 cps oscillator A2A6A4A2 through capacitor C13. This input signal is developed into a negative output pulse with

a sharp leading edge for each cycle of oscillator A2A6A4A2Q2 output frequency. Resistors R23, R24, R25, R26, R27, and R39 comprise resistive networks for developing the required operating voltages for pulse shaper Q5 and Q6. The pulse shaper output is coupled directly to decade divider Z4 and to decade divider Z3 of the preset counter.

Operating voltage for decade divider Z4 is applied from the 4-Vdc supply. The divider provides one output pulse for every ten input pulses applied from the pulse shaper.

The 11-kHz to 11.9-kHz output from decade divider Z4 is coupled to the base of amplifier Q7 by capacitor C16. The operating voltage for amplifier Q7 is developed by voltage divider R38, R30 and emitter resistors R32, R33 from the positive 20-Vdc supply line. Decoupling is provided by capacitor C15 and resistor R31 to prevent interaction with other circuits connected to the positive 20-Vdc supply line. Capacitor C17 is the emitter bypass capacitor of amplifier Q7. The amplified output signals from amplifier Q7 are developed across a tuned circuit consisting of capacitor C14 and the primary of transformer T1. Resistor R34 increases the bandwidth of the tuned circuit. The sinusoidal output from the secondary of transformer T1 is applied to 7.1 mc mixer A2A6A4A3.

The preset divider is a digital device composed of integrated circuits Z1, Z3, and Z2 and coding from CPS switch A2A11S6 on the front panel. When a preselected count is reached, a coincidence gate triggers a circuit which resets the dividers. The preset dividers are reset to zero and a count is initiated by the pulses derived from oscillator A2Q2. This count continues until coincidence is reached at some digitally preselected count from cps switch A2A11S6 on the front panel, then a reset is generated. The reset-to-zero time of the counter must be shorter than the time between incoming pulses. When the counter is reset, a trigger is also generated for phase detector A2A6A4A2Z1. (This frequency is divided by 10 for desired 100-Hz increments.) If the oscillator frequency is precisely the frequency for which the preset divider is coded, the reset circuitry output will be exactly 1 kHz. If, however, there is a 0.5 percent error in oscillator frequency, the reset trigger output frequency to the phase detector will contain the same percent error or 5 Hz. When this signal is compared in the phase detector against the 1 kHz derived from the frequency standard, a phase detector correction voltage is generated. This voltage, by means of A2A6A4A2CR7 through A6A6A4A2CR9, corrects the oscillator frequency so that the divider output is 1 kHz, thus maintaining the oscillator in lock with the frequency standard.

Integrated circuits Z1, Z3, and Z2 and transistor Q8 form a preset divider which may be coded to divide by any number between 110 and 119. Therefore, any oscillator frequency between 110 and 119 kHz may be divided down to 1 kHz for phase comparison in the phase detector A2A6A4A2Z1 with the standard 1-kHz reference pulse. This produces 1-kHz increments from 110 kHz to 119 kHz. The preset divider chain is used to provide a coded count that is representative of the corresponding frequency digit.

Decade divider Z3 divides by a maximum of 10, but may be programmed by cps switch A2A11S6 on the front panel to reset at any integer count less than 10. The four flip-flops in the decade are arranged to generate a binary code. This is accomplished by diode coding gates CR3 through CR10 which, when energized, contribute to the generation of a reset pulse. The table included in figure 3-49 indicates what combination of coding leads must be energized in order to achieve the desired count in the dividers. Figure 3-50 indicates the method of programming a decade of the preset divider. The absence of coding voltage on any of the four gates effectively removes the flip-flop corresponding to that gate from the coincidence circuit. By selectively energizing 0, 1, 2, or 3 lines per decade, the coding from 0 to 9 is accomplished.

Output of decade divider Z3 is fed to integrated circuit Z1 transistor Q8, and integrated circuit Z2 which are programmed by gates CR11 through CR14 to divide by 11. Transistor Q8 functions as a buffer and inverter amplifier between Z1 and Z2.

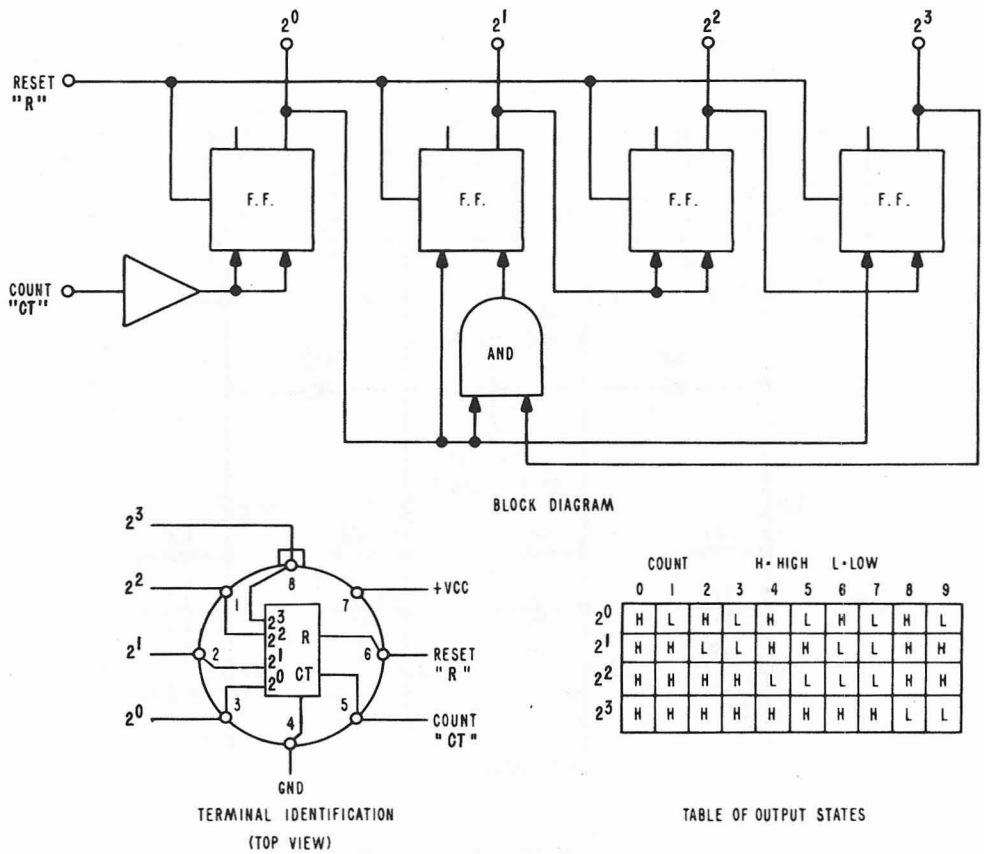
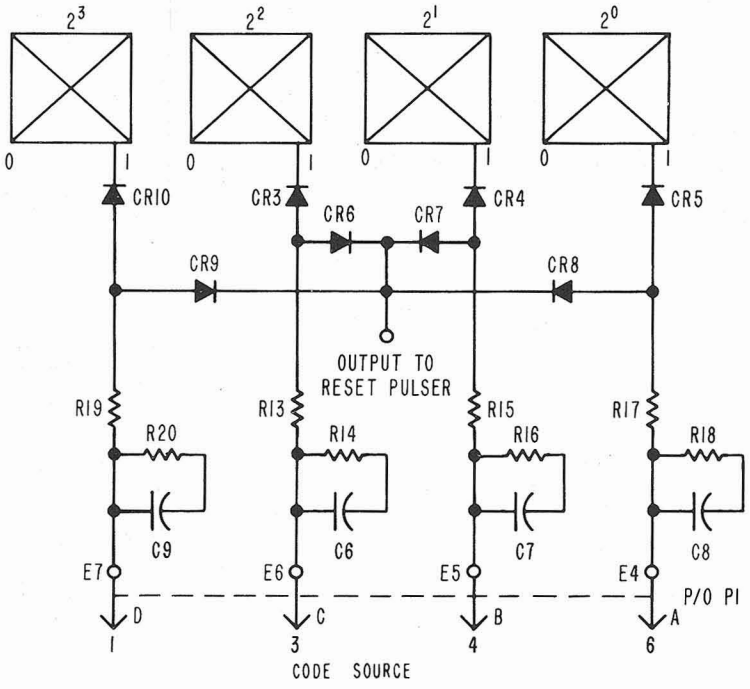


Figure 3-49. Decade Counter A1Z1, A1Z3, and A1Z4), Simplified Block Diagram And Truth Table

The gate outputs from the decade and the divide-by-eleven counters are summed to provide control voltage for the reset pulser. When the entire programmed count is reached, the disappearance of control voltage on the output gates (junction of diodes CR6 through CR9) initiates a reset pulse through emitter follower Q9. The reset pulser consists of a pair of overdriven amplifiers Q1 and Q2 which shape a pulse suitable to trigger the 7-microsecond delay multivibrator Q3 and Q4. The delay multivibrator generates a 7-microsecond negative pulse which is applied to the reset circuit (pin 6) of all the integrated circuits in the preset divider group. The count is now complete and a new identical sequence follows.

aq. 7.1 MC MIXER. - The 7.1 mc mixer A2A6A4A3 (figure 3-51) consists of emitter followers Q1 and Q3, 7.1 MHz crystal filter FL2, mixer Q2, and amplifier Q4. These circuits, which form a part of 100 cps synthesizer electronic subassembly A2A6A4, mix the 11-kHz to 11.9-kHz output from counter A2A6A4A1 with the 7.089-MHz output from 7.089 mc mixer A2A6A3A4 to produce a nominal 7.1-MHz output of a level suitable for use in 17.847/27.847 mc mixer A2A6A2A3. These circuits are used in all modes of operation. The following paragraphs describe the



DECADE PROGRAM SEQUENCE

DESIRED COUNT	LINE CODE D	C	B	A
DIVIDE BY 110	0	0	0	0
111	0	0	0	1
112	0	0	1	0
113	0	0	1	1
114	0	1	0	0
115	0	1	0	1
116	0	1	1	0
117	0	1	1	1
118	1	0	0	0
119	1	0	0	1

Figure 3-50. Decade Counter Coding Scheme

operation of 7.1 mc mixer A2A6A4A3 in detail.

The sinusoidal output from transformer A2A6A4A1T1 is coupled to the base of emitter follower Q1 by capacitor C15. The operating voltage for emitter follower Q1 is developed by voltage divider R2, R3. Resistor R1 and capacitor C1 provide decoupling to prevent interaction with the other circuits connected to the positive 20-Vdc supply line. Emitter follower Q1 provides a low impedance source for mixer Q2. The output from emitter follower Q1 is developed across resistor R4 and coupled to the emitter of mixer Q2 by capacitor C2.

The operating voltage for mixer Q2 is developed from the positive 20-Vdc supply line by emitter resistor R6 and voltage divider R7, R8. Resistor R21 and capacitor C4 provide decoupling to prevent interaction with the other circuits connected to the positive 20-Vdc supply line. Capacitor C3 is the emitter bypass capacitor. Due to the large difference in frequency between the two inputs, resistor R6 develops a small amount of degeneration to increase the stability of mixer Q2. The 7.089-MHz output from 7.089 mc mixer A2A6A3A4 is coupled to the base of mixer Q2 by capacitor C5. Transistor Q2 mixes the 11-kHz to 11.9-kHz signal with the 7.089-MHz signal to provide one of ten fixed outputs, depending upon the position of the CPS switch on the front panel. If 11 kHz is used (front panel CPS switch at 000 setting), the mixing products are 11 kHz, 7.089 MHz, 7.078 MHz, and 7.1 MHz. If 11.9 kHz is used (front panel CPS switch at 900 setting), the mixing products are 11.9 kHz, 7.089 MHz, 7.0771 MHz, and 7.1009 MHz. The mixing products are developed across resistor R9 and applied to filter FL2. Filter FL2 is very selective, allowing only the 7.0998-MHz to 7.1012-MHz signals to pass. Capacitor C7 and resistor R9, and capacitor C8 and resistor R10 form the input and output terminations, respectively, for crystal filter FL2. The output from filter FL2 is coupled to the base of emitter follower Q3 by capacitor C16.

The operating voltage for emitter follower Q3 is developed from the positive 20-Vdc supply line by voltage divider R11, R12 and emitter resistor R15. Resistor R13 and capacitor C11 provide decoupling to prevent interaction with the other circuits connected to the positive 20-Vdc supply line. Emitter follower Q3 isolates filter FL2 to prevent it from being adversely loaded by amplifier Q4. The output from emitter follower Q3 is developed across resistor R15 and is coupled to the base of amplifier Q4 by capacitor C10.

The operating voltage for amplifier Q4 is developed by voltage divider R16, R18 and emitter resistor R19. Resistor R17 and capacitor C11 provide decoupling to prevent interaction with the other circuits connected to the positive 20-Vdc supply line. Capacitor C14 is the emitter bypass capacitor. The amount of gain provided by amplifier Q4 is controlled by adjusting the amount of degeneration developed by potentiometer R20. The amplified output from amplifier Q4 is developed across the tuned circuit consisting of capacitor C13 and the primary of transformer T1, and is applied to 17.847/27.847 mc mixer A2A6A2A3.

ar. POWER SUPPLY. - Power supply electronic assembly A2A8 (figure 3-52) consists of the positive 110-Vdc supply, the positive 28-Vdc supply, the negative 30-Vdc supply, and the regulated positive 20-Vdc supply. These circuits, which form a part of receiver main frame A2, supply operating power to all the circuits of the R-1051D/URR. The following paragraphs describe the operation of the power supply in detail.

All power is derived from the nominal 115-Vac line, which is applied through switches A1A2S1, A1A2S2, A2S2 and fuses A2F1, A2F2 to the primary of power transformer A2T1. Indicator lamps which are part of A2XF1 and A2XF2 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. 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 CR1 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, positive 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. Resistor A2R20 is a bleeder load for the positive 110 Vdc supply. The output from terminals 9 and 10 of transformer A2T1 is applied to a bridge rectifier consisting of diodes CR5 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, positive 28 Vdc, is used in rf amplifier A2A4, frequency standard A2A5, receiver if./audio amplifier A2A2 and A2A3 and translator/synthesizer A2A6, electronic assemblies. The regulated positive 20-Vdc supply is derived from the positive 28-Vdc supply. Resistor A2R8 is the bleeder load for the positive 28-Vdc supply. When primary power is supplied, lamps A2DS3 and A2DS4 light, illuminating the frequency display windows above the MCS and KCS controls. Resistors R1 and R2 are series-dropping resistors. The output from terminals 11 and 12 of transformer T1 is applied to a bridge rectifier consisting of diodes CR9 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 a regulated negative 30 Vdc. Capacitor C4 is used to provide additional filtering. The negative 30 Vdc is used in step agc circuit A1 of if./audio amplifier electronic assemblies A2A2 and A2A3, and as the negative supply for the vernier tuning indicator.

The regulated positive 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 positive 20 Vdc regardless of the load. The input voltage of positive 28 Vdc is applied to the collector of series regulator A2Q1, through contacts 7 and 6 of section C front of Mode Selector switch A2S2, 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 positive 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 positive 20 Vdc in this case, is selected by adjusting output voltage control R14, 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.

To better understand the operation of the regulated positive 20-Vdc supply, assume that some of the load on the positive 20-Vdc supply has been removed. This condition causes the output voltage to rise. This rise causes the base-bias voltage of comparator Q4 to increase, thereby increasing the voltage across resistor R12. This increase causes a decrease in the base-to-emitter voltage in comparator Q3, thereby causing an increase in collector voltage. Since the

emitter of the dc amplifier Q2 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 R5, 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 positive 20 Vdc. Resistor R5 acts as a parasitic suppressor. Diode CR15 protects the circuit if the positive 20-Vdc line is accidentally grounded. Normally, diode CR15 is back-biased by the positive 20 Vdc on its cathode and positive 12 Vdc on its anode. If the positive 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.

as. TUNING. - The tuning circuit (figure 3-53) consists 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 mc synthesizer electronic subassembly A2A6A1. Code generator electronic assembly A2A7 consists of switches S3 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 rf amplifier electronic assembly A2A4 and the crystal switch in mc synthesizer electronic subassembly A2A6A1. The third tuning circuit is not used in tuning the R-1051D/URR. The following paragraphs describe the tuning circuits for the R-1051D/URR in detail.

Switches S3 and S4 in code generator electronic assembly A2A7 are controlled by the 10-MHz (MCS) and 1-MHz (MCS) controls on the front panel. These two switches are analogously represented (figure 3-53) 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 5-2a. Section A establishes the tuning code for turret switch S1 in rf amplifier electronic assembly A2A4, and section C establishes the tuning code for crystal switch S1 in mc synthesizer electronic subassembly A2A6A1. 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 S1 (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 S1 (refer to table 3-1). Section A (master) applies the coded information to turret switch S1-A (master). This establishes a ground path through the common contact of S1-A to pin 7 of turret motor relay K1; since positive 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, motor B1 rotates turret 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 switch S1 motor, and to rotate crystal switch S1 to the position established by the 1- and 10-MHz (MCS) controls on the front panel.

The image switches in code generator electronic assembly A2A7 (sections B and D), turret switch S1-B, and crystal switch S1-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.

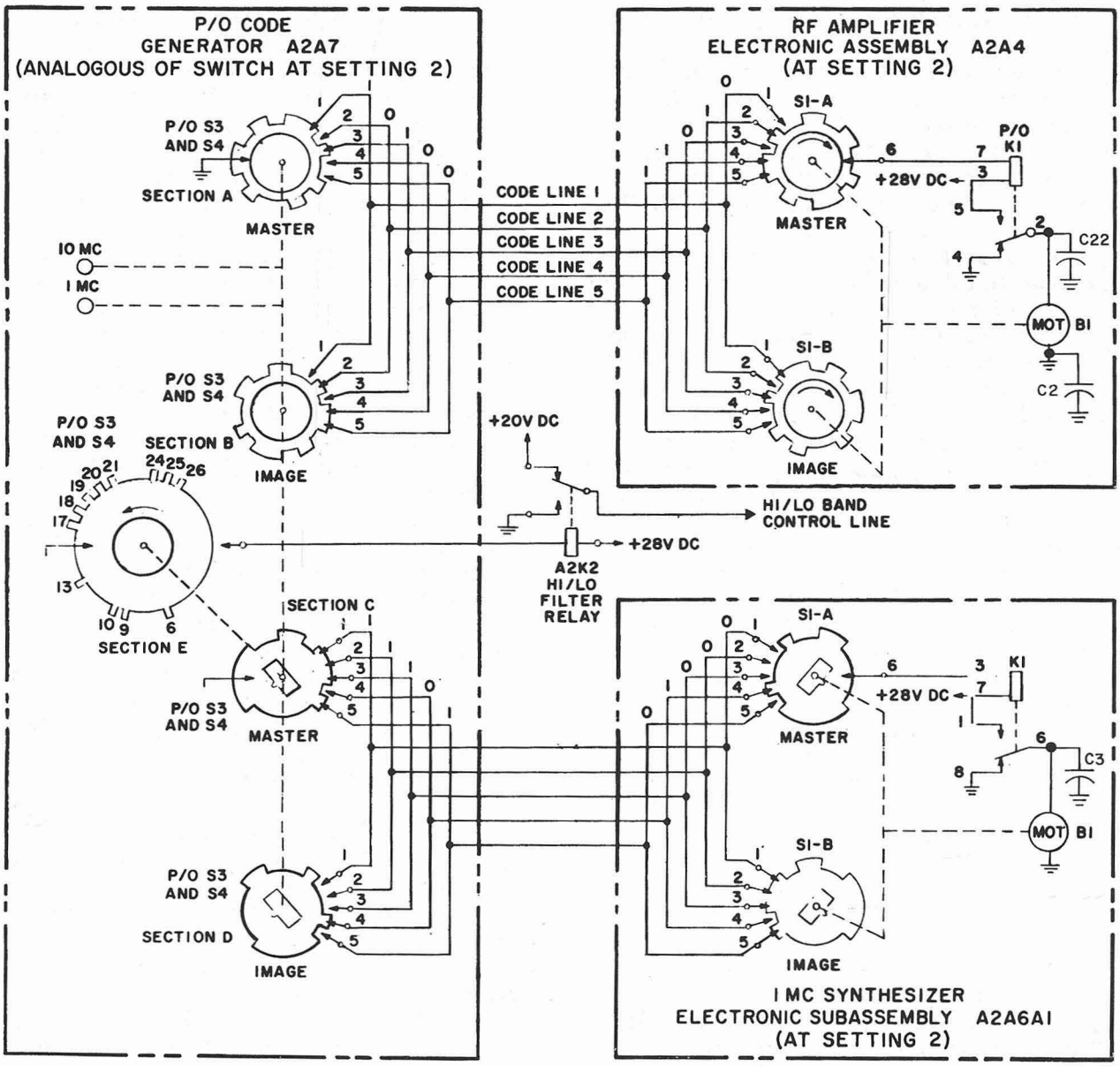


Figure 3-53. Tuning, Simplified Schematic Diagram

In figure 3-53, 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 table 3-1). A ground path would be established to pin 7 of turret motor relay K1 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. 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 3-53, there is no ground path directly between the two masters. This time the ground path would be through code line 1 to 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 like manner, any code can be traced, and the tuning of turret switch S1 will be accomplished for any code shown in table 3-1. Similarly, the codes shown in table 3-1 can energize crystal switch motor B1 and tune crystal switch S1 to the position established by the MCS controls on the front panel.

Section E of code generator electronic assembly A2A7 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.

at. CONTROL SWITCHING. - The control switching circuits (figure 5-9) consist of switches A1A2S1, A1A2S2, A2S2, and A2S9 and relays A2K1 and A2K3. These circuits, which form a part of main frame A2, energize and key the applicable circuits according to the selected mode of operation. The following paragraphs describe the control switching circuits in detail. Unless otherwise noted, all components in the following paragraphs have reference designator prefix A2.

Primary power for the R-1051D/URR is received via pins R and S of connector A1J4 on the rear of the R-1051D/URR. In the NORM position of AUX-NORM switch A1A2S1, the nominal 115 Vac is connected through interlock switch A1A2S2. If desired, primary power may be routed directly to the R-1051D/URR by placing AUX-NORM switch A1A2S1 in the AUX position and connecting the primary power to pins A and C of connector A1J3, thus bypassing the normal input. From interlock switch A1A2S2 one side of the 115-Vac line A1J4-S is applied to contact 6 of the front part of section 1 of switch S2, which is an open circuit in the OFF position. The other side of the 115-Vac line A1J4-R comes from interlock switch A1A2S2 and goes directly to contact 10 of the front part of section 2 of Mode Selector switch S2, which also is an open circuit in the OFF position. In the STD BY position of Mode Selector switch S2, one side of the 115-Vac line is switched through fuse F1 to terminal 6 of power transformer T1. The other side of the 115-Vac line is switched through fuse F2 to terminal 1 of power transformer T1. Therefore, the power input circuit of the R-1051D/URR is completed, and transformer T1 and the 6.3-Vac positive 110-Vdc, negative 30-Vdc, and positive 28-Vdc power supplies are energized (refer to paragraph 3-3ar). Power from the positive 28-Vdc supply is routed to frequency standard electronic assembly A2A5, where 5 mc oscillator A2A5A3 and its associated oven control circuits A2A5A2 are energized. The positive 110-Vdc and negative 30-Vdc power supplies are not used in the STD BY position of Mode Selector switch S2.

In any operating position of Mode Selector switch S2 (USB or CW, for example), positive 28 Vdc from power supply electronic assembly A2A8 is routed through contacts 7 and 6 of the front part of section 3 of Mode Selector switch S2. This 28 Vdc is applied to rf amplifier electronic assembly A2A4, mc synthesizer

TABLE 3-1. TUNING CODE CHART

MCS CONTROLS	A2A4 CODE LINES					A2A6A1 CODE 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

electronic subassembly A2A6A1, and contact 6 of SIMPLEX/DUPLEX switch S9. It is also applied to contact 8 and coil contact 7 of tune relay K1, and coil contact 7 of hi/lo filter relay K2. For operation of hi/lo filter relay K2, refer to paragraph 3-3as. When tune relay K1 is deenergized, positive 28 Vdc on contact 8 is routed through contact 6 to contacts 4 and 6 on the rear part of section D of switch S2 and also to the regulated positive 20-Vdc supply, providing energizing voltage (refer to paragraph 3-3ar). The positive 20 Vdc from power supply electronic assembly A2A8 is routed through contacts 2 and 4 of transmit/receive relay K3 to pin 4 of connector J17 and pin 6 of connector J16 on mode selector electronic assembly A2A1. Tune relay K1 is energized by a ground applied to coil contact 3 from pin 7 of connection J8 on code generator electronic assembly A2A7 whenever the MCS dials are tuned to 00 or 01, or whenever the R-1051D/URR is being tuned. Provisions are made on pins J and K of connector A1J4 on the rear panel of the R-1051D/URR to receive positive 28 Vdc and a ground keyline, respectively, from a transmitter used with the R-1051D/URR. When SIMPLEX/DUPLEX switch S9 is in the SIMPLEX position, positive 28 Vdc will be routed through contacts 4 and 5 to coil contact 7 of transmit/receive relay K3. When the T-827D/URT is energized, a ground is routed through contacts 1 and 2 of switch S9 and contacts 4 and 2 of tune relay K1 to coil contact 3 of transmit/receive relay K3, thereby energizing it. When transmit/receive relay K3 is energized, the 110-Vdc path through contacts 6 and 8 of K3 is broken and the 20-Vdc path through contacts 2 and 4 of relay K3 is broken. When SIMPLEX/DUPLEX switch S9 is in the DUPLEX position, transmit/receive relay K3 is energized during tuning by 28 Vdc routed through contacts 6 and 5 of switch S9 to coil contact 7 of relay K3, and by a ground routed through contacts 5 and 2 of tune relay K1 to coil contact 3 of relay K3.

au. 4 VDC POWER SUPPLY AND VERNIER CONTROL. - The 4 Vdc power supply and vernier control (figure 3-54) consists of a Zener diode voltage regulator producing positive 4 Vdc from a positive 20-Vdc input, a network which excites CPS vernier control A2A11R7 with a dc voltage obtained from a positive 20-Vdc input, and a sawtooth oscillator network which causes CPS vernier indicator A2DS5 on the R-1051D/URR front panel to flash intermittently whenever CPS switch A2A11S6 is V.

The 4 Vdc regulator, consisting of series resistor R5, Zener diode CR2, and surge capacitance C2, receives positive 20 Vdc from power supply electronic assembly A2A8 through translator/synthesizer electronic assembly A2A6. Capacitor C1 bypasses transients. Output of the 4 Vdc regulator is applied to CPS switch A2A11S6 for generating frequency code signals, and to translator/synthesizer electronic assembly A2A6. The 4 Vdc regulator output is also used internally in developing excitation for the CPS vernier control.

Excitation for CPS vernier control A2A11R7 is obtained from the positive 20-Vdc supply attenuated by a voltage divider consisting of resistors R1 and R3 and potentiometer R2, and from the positive 4-Vdc regulated output attenuated to approximately positive 3 volts by a voltage divider consisting of resistors R8 and R9. Potentiometer R2 affords adjustment of the gradient of the CPS vernier control. Output from the wiper of the CPS vernier control is applied to control the oscillator frequency within 100 cps synthesizer electronic subassembly A2A6A4 when CPS switch A2A11S6 is at the V position.

When CPS switch A2A11S6 is at V, positive 110 volts from power supply electronic assembly A2A8 is applied through a sawtooth oscillator network consisting of charging resistor R7, capacitor C4, and discharge current-limiting resistor R6 to neon lamp A2DS5 on the front panel. Whenever the network is energized, capacitor C4 charges slowly through resistor R7 to the firing voltage of A2DS5, approximately 90 volts. When A2DS5 fires, capacitor C4 is discharged rapidly through resistor R6 and indicator lamp A2DS5, illuminating the lamp for a short interval. When the voltage drop across lamp A2DS5 falls below that required to maintain illumination, the lamp goes out and capacitor C4 begins to recharge

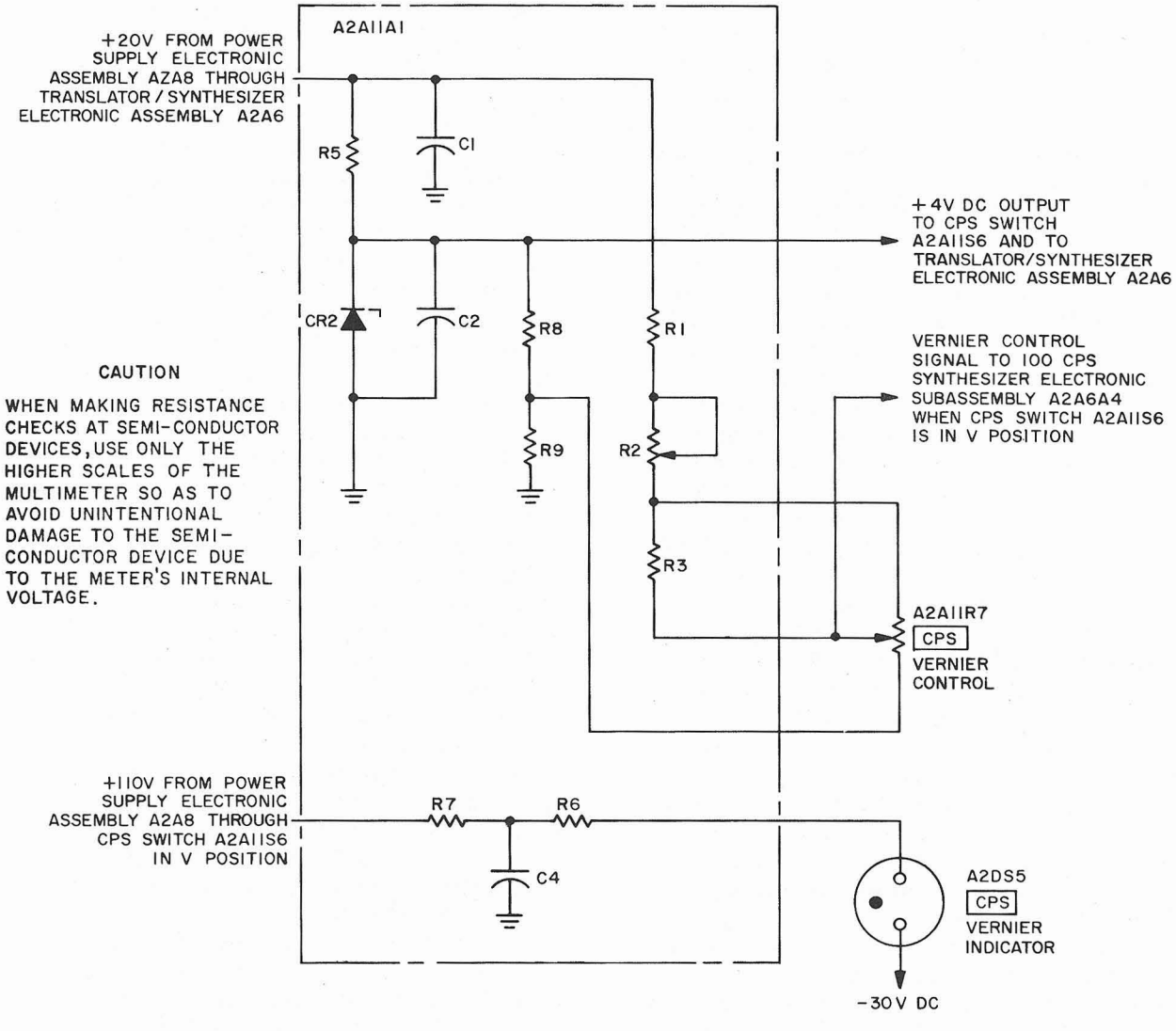


Figure 3-54. 4 VDC Power Supply and Vernier Control, Simplified Schematic Diagram

through resistor R7. This sawtooth oscillator flashes as the CPS vernier indicator when the R-1051D/URR is used in vernier operation.

av. SWITCHING FUNCTIONS FOR MODE SELECTOR SWITCH S2. - Paragraphs (1) through (6) contain switching function information for Mode Selector switch S2. All components in the following tables have the reference designation prefix A2. Switch parts are abbreviated in the following tables; for example, S2-4-R means the rear part of section 4 of switch S2, and S2-3-F means the front part of section 3 of switch S2.

(1) LSB POSITION. - Table 3-2 contains information concerning voltage routing through Mode Selector switch S2 in the LSB mode of operation.

(2) RATT POSITION. - Table 3-3 contains information concerning voltage routing through Mode Selector switch S2 in the RATT mode of operation.

(3) AM POSITION. - Table 3-4 contains information concerning voltage routing through Mode Selector switch S2 in the AM mode of operation.

(4) CW POSITION. - Table 3-5 contains information concerning voltage routing through Mode Selector switch S2 in the CW mode of operation.

(5) USB POSITION. - Table 3-6 contains information concerning voltage routing through Mode Selector switch S2 in the USB mode of operation.

(6) ISB POSITION. - Table 3-7 contains information concerning voltage routing through Mode Selector switch S2 in the ISB mode of operation.

TABLE 3-2. MODE SELECTOR SWITCH S2, LSB POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	4 and 3	J19-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 9	K3-6
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	4 and 2	J19-7
+20 Vdc	K3-4	S2-3-F	11 and 10	J17-5
+20 Vdc	K3-4	S2-2-R	3 and 2	J19-11 and J19-18
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	12 and 2	J19-19
Ground	Ground	S2-1-F	11 and 9	J18-17
Ground	Ground	S2-1-R	10 and 8	J16-1
LSB audio	R4	S2-2-F	1 and 3	J21-13

TABLE 3-3. MODE SELECTOR SWITCH S2, RATT POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	4 and 5	J18-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 9	K3-6
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	4 and 5	J18-7
+20 Vdc	K3-4	S2-3-F	11, 10 and 12	J17-5, J18-11
+20 Vdc	K3-4	S2-3-R	6	J16-1
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	11 and 10	J18-19
Ground	Ground	S2-1-F	10 and 12	J16-2, J18-17
USB audio	R5	S2-2-F	4 and 2	J21-13

TABLE 3-4. MODE SELECTOR SWITCH S2, AM POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	4 and 5	J18-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 11	K3-6

TABLE 3-4. MODE SELECTOR SWITCH S2, AM POSITION (Continued)

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	4 and 5	J18-7
+20 Vdc	K3-4	S2-3-F	11 and 12	J18-11
+20 Vdc	K3-4	S2-3-R	10 and 8	J16-2, J18-17
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	11 and 10	J18-19
Ground	Ground	S2-1-R	10 and 11	J16-1
AM audio	R5	S2-2-F	5 and 3	J21-13

TABLE 3-5. MODE SELECTOR SWITCH S2, CW POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	6 and 5	J18-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 9	K3-6
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	4 and 5	J18-7
+20 Vdc	K3-4	S2-3-F	2 and 1	J18-11

TABLE 3-5. MODE SELECTOR SWITCH S2, CW POSITION (Continued)

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+20 Vdc	K3-4	S2-3-R	3, 4 and 8	J17-2, R6, J16-2, J18-17
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	11 and 10	J18-19
Ground	Ground	S2-1-R	10 and 11	J16-1
Audio	R5	S2-2-F	4 and 6	J21-13

TABLE 3-6. MODE SELECTOR SWITCH S2, USB POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	4 and 5	J18-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 11	K3-6
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	6 and 5	J18-7
+20 Vdc	K3-4	S2-3-F	2, 3 and 1	J17-5, J18-11
+20 Vdc	K3-4	S2-3-R	10 and 12	J16-1
+20 Vdc	K3-4	S2-4-R	12 and 11	J18-18

TABLE 3-6. MODE SELECTOR SWITCH S2, USB POSITION (Continued)

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	11 and 10	J18-19
Ground	Ground	S2-1-F	1 and 3	J16-2, J18-17
USB audio	R5	S2-2-F	5 and 7	J21-13

TABLE 3-7. MODE SELECTOR SWITCH S2, ISB POSITION

FUNCTION	FROM	THROUGH		TO
		SWITCH	CONTACTS	
+28 Vdc	K1-6	S2-4-R	4, 5 and 3	J18-1, J19-1
+110 Vdc	Power supply electronic assembly A2A8	S2-2-R	10 and 9	K3-6
+20 Vdc	Power supply electronic assembly A2A8	S2-1-R	4, 5 and 2	J18-7, J19-7
+20 Vdc	K3-4	S2-3-F	2, 3 and 4	J17-5, J18-11
+20 Vdc	K3-4	S2-2-R	6 and 8	J19-11, J19-18
+20 Vdc	K3-4	S2-3-R	10 and 6	J16-1
+20 Vdc	K3-4	S2-4-R	12 and 11	J18-18
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	11 and 10	J18-19
-30 Vdc	Power supply electronic assembly A2A8	S2-4-F	7 and 6	J19-19
Ground	Ground	S2-1-F	4 and 2	J16-2, J18-17
ISB audio	J4-W	S2-2-F	8 and 6	J21-13

SECTION 4

TROUBLE SHOOTING

4-1. INTRODUCTION.

The maintenance technician has trouble-shooting aids available in the form of diagrams, parts location illustrations, and descriptions of the operation of each circuit in the equipment. The technician should avail himself of all of these aids in locating the cause of trouble. Functional circuit descriptions are supplemented by simplified schematic diagrams. Servicing block diagrams, schematic diagrams, interconnection diagrams, and parts location illustrations provide the maintenance technician with the detailed information required to isolate the source of trouble.

4-2. FAULT ISOLATION.

After checking obvious malfunction possibilities such as loose connections, damaged components, etc., the following three sequential steps should be followed when trouble shooting the R-1051D/URR:

Step 1. Performance and isolation checks to isolate a malfunction to a faulty electronic assembly.

Step 2. A check of the suspect electronic assembly to isolate the malfunction to a faulty assembly board or functional group of circuits.

Step 3. A check of the suspect circuit group to isolate the malfunction to a faulty circuit or component.

a. PERFORMANCE TEST. - The overall receiver performance check should be performed using the procedures given in paragraph 4-5. Test equipment required to perform all three levels of check is listed in table 4-1. The performance checks should be made in the sequence presented in paragraph 4-5. If the recommended procedure for a particular check fails to isolate the malfunction, the technician should proceed to the next step in the sequence and continue in sequence until the malfunction is isolated.

TABLE 4-1. TEST EQUIPMENT REQUIRED FOR TROUBLE SHOOTING

NAME	DESIGNATION
Frequency Standard	AN/URQ-9
Multimeter	AN/PSM-4 ( )
Frequency Meter	AN/USM-207( )
RF Signal Generator	CAQI-606A
Multimeter, Electronic (rf voltmeter)	CCVO-91CA
Multimeter, Electronic	ME-6( )/U
Adapter, BNC to N	UG-201/U

Failure of any one or more of the procedures listed in paragraph 4-5 will indicate a malfunction in the chassis assembly or in one of the following electronic assemblies:

(1) Mode selector electronic assembly A2A1.

(2) IF./audio amplifier electronic assemblies A2A2 and A2A3.

(3) RF amplifier electronic assembly A2A4.

(4) Frequency standard electronic assembly A2A5.

(5) Translator/synthesizer electronic assembly A2A6.

(6) Code generator electronic assembly A2A7.

(7) Power supply electronic assembly A2A8.

(8) Antenna overload electronic assembly A2A9.

(9) CPS switch assembly A2A11.

Note

If the shipboard receiver performance check indicates that the malfunction is in frequency standard electronic assembly A2A5, rf amplifier electronic assembly A2A4, or translator/synthesizer electronic assembly A2A6, the malfunctioning assembly should be sent to a depot facility for repair.

b. ISOLATION TEST. - Once the malfunctioning electronic assembly has been determined, the technician should refer to the appropriate servicing block diagram (figure 4-1 through 4-10) for assistance in isolating a faulty board or functional group of circuits within an electronic assembly. (For physical location of connector pins, see figure 4-11.) To perform a check of the suspect electronic assembly, the test setup used to perform the over-all receiver check should be maintained, while individual checks of each output signal are made at each test point shown on the servicing block diagram. Where different control settings are needed to perform a meaningful measurement on the circuit under test, notes on the servicing block diagram will indicate settings of operator's controls to the technician. In most cases, however, reference to the appropriate over-all receiver check will be all that is necessary to ascertain the required setting of these controls. If the value measured at any test point is not consistent with the value shown on the servicing block diagram, the malfunction can be attributed to the board or functional group of circuits generating that output. The servicing technician should then refer to the appropriate schematic diagram in Section 5 for further assistance in isolating the faulty circuit or functional element within that circuit.

Note

Some circuit outputs which measure out of tolerance can be adjusted to a correct reading by using the appropriate circuit adjustment procedure in Section 5. In performing the circuit check, also perform any applicable adjustments contained in Section 5 to attempt to bring the measurement to the required value. If, after the adjustment has been performed, the value is still incorrect, the circuit should be considered faulty.

4-3. TEST POINTS.

Each schematic diagram contains test points and test values at critical circuit points. Using the identical control settings and test setup used for checking the parent functional group of circuits, each test point should be monitored until a malfunctioning circuit or circuit element is indicated by an out-of-tolerance reading. Once the malfunction has been isolated to the lowest shipboard-replaceable level, refer to Section 5 for appropriate alignment or replacement procedures.

4-4. TROUBLE SHOOTING STRATEGY.

The following questions are suggested as an aid in determing appropriate remedial action following the turn-on checkout procedure.

a. Does the R-1051D/URR appear to have a power supply failure?

b. Is the type of problem encountered caused by malfunction of the mode selected, frequency selected, or both?

If mode selection only is suspected, does the malfunction appear to be in if./audio amplifier electronic assemblies A2A2 and A2A3, mode selector electronic assembly A2A1, or frequency standard electronic assembly A2A5?

If frequency selection only is suspected: Does the malfunction appear to be in frequency standard electronic assembly A2A5, translator/synthesizer electronic assembly A2A6, or rf amplifier electronic assembly A2A4? Does the R-1051D/URR appear to have no input signal at certain settings of the 1, 10, or 100 KCS controls, indicating that certain crystals may be defective? Does the rf amplifier and antenna input circuit pass signals at only certain settings of the 1 and 10 MCS controls?

If both mode selection and frequency selection are suspected, does the malfunction appear to be caused by frequency standard electronic assembly A2A5, translator/synthesizer electronic assembly A2A6, rf amplifier electronic assembly A2A4, antenna input circuits or main frame circuits?

c. If firm conclusions have resulted from initial checks, the technician may refer directly to the performance and then isolation checks for the suspected defective module.

d. If firm conclusions have not been reached, perform the following checks:

(1) Receiver operation (paragraph 4-5b).

(2) Power supply (paragraph 4-5c).

(3) Receiver sideband selectivity (paragraph 4-5d).

(4) AGC performance (paragraph 4-5e).

(5) Receiver sensitivity (paragraph 4-5f).

(6) Frequency, locking action, and vernier operation (paragraph 4-5g).

(7) Frequency standard electronic assembly A2A5 (paragraph 4-5h).

(8) RF amplifier electronic assembly A2A4 (paragraph 4-5j).

(9) Translator/synthesizer electronic assembly A2A6 (paragraph 4-51).

(10) Mode selector electronic assembly A2A1 (paragraph 4-5n).

(11) IF./audio amplifier electronic assemblies A2A2 and A2A3 (paragraph 4-5p).

(12) Code generator electronic assembly (paragraph 4-5r).

(13) Mechanical synchronization (paragraph 4-5s).

e. After isolation to a specific assembly or subassembly, determine from current instructions whether the module is shipboard or depot repairable. If the module is shipboard repairable, use servicing block diagrams and schematic diagrams for modules, and the chassis and main frame schematic diagram (figure 5-9) to isolate malfunction to the component.

f. After all repairs, including the exchange of modules, perform all operational checks to verify that agc settings, frequency standard, calibration, receiver sensitivity, and other adjustments meet all requirements of the operational checks.

4-5. RADIO RECEIVER R-1051D/URR PERFORMANCE AND ISOLATION TESTS.

a. TURN-ON CHECKOUT PROCEDURE. - The turn-on checkout procedure calls mainly for observations made with controls in various positions to determine which circuits appear normal. To avoid premature conclusions regarding the source of trouble, the technician should follow the turn-on checkout procedure until all pertinent information has been obtained. These checks require little time. Often a malfunction may be localized to a smaller portion of the R-1051D/URR by combining the results of several checks. Utility of these tests is greatly increased when the technician has performed them previously on an operational R-1051D/URR. These procedures should be used only as guidelines. Following every key procedure, a course of remedial action is suggested as an aid in determining the cause of trouble. No major corrective action should be taken based upon the initial checks alone. Proceed as follows.

(1) PRE-OPERATION CHECK. - Before operating the R-1051D/URR, perform the following:

(a) Loosen front panel screws and slide chassis out fully on slides.

(b) Ensure that AUX-NORM switch A1A2S1 is in AUX position and that SIMPLEX/DUPLEX switch A2S9 is in SIMPLEX position.

Note

If the R-1051D/URR is to be energized with the chassis out of the case, defeat the chassis interlock by gripping the plunger, positioning in center of hole in chassis bracket, and pulling outward. The interlock switch is located at the top right of the chassis inside the case.

(c) Release slide locks, slide chassis back into case, and secure it.

(2) TURN-ON PROCEDURE. - Place the R-1051D/URR in operation as follows:

(a) Set Mode Selector switch at USB and AGC switch at OFF.

Note

The R-1051D/URR does not operate below 2 MHz.

(b) Observe that fuse lamps are not lit and that front panel indicator lamps are lit. If both are normal, 115-Vac line voltage is present and 28 Vdc is present at power supply electronic assembly A2A8. Verify that 28 Vdc is present by rotating MCS controls and observe, while chassis is open and interlock is defeated, that motor in rf amplifier electronic assembly A2A4 drives. Always suspect indicating device if correct results are not obtained. If indications are abnormal, see primary power distribution diagram (figure 5-21), and chassis and main frame schematic diagram (figure 5-9, sheet 1), refer to power supply check (paragraph 4-5c), and proceed with trouble shooting.

(c) Set CPS switch at V and note that vernier indicator lamp flashes. This indicates that 110 Vdc is present at power supply electronic assembly A2A8 for use in rf amplifier electronic assembly A2A4. It also indicates that -30 volts is available for use in if./audio amplifier electronic assemblies A2A2 and A2A3. If indication is abnormal, refer to power supply check (paragraph 4-5c).

(d) Approximately 20 Vdc appears to be present at power supply if:

1. Signals or noise appear normal in any mode or position of controls.
2. Frequency standard indicator A2A5DS1 on top of frequency standard electronic assembly A2A5 is lit when COMP/INT/EXT switch is set at COMP. If lamp A2A5DS1 is lit, 5 mc circuit is operating, although not necessarily at correct frequency. Do not adjust frequency standard electronic assembly A2A5 at this time.

(e) If any of indications of step d are present, then 20 volts is present at power supply electronic assembly A2A8. However, 20-volt series regulator circuitry may have shorted, placing 28 volts on 20-volt line. This possibility is checked later if initial troubleshooting does not locate malfunction. Return COMP/INT/EXT switch to original position. If indications are abnormal, refer to power supply check (paragraph 4-5c) and see main frame and chassis schematic (figure 5-9). If 20 Vdc is believed present, but frequency standard lamp did not light, refer to frequency standard electronic assembly A2A5 performance check (paragraph 4-5h).

(3) VISUAL CHECK. - Perform a visual check as follows:

(a) Tilt chassis and inspect rf connector inserts. Ensure that all rf inserts are fully seated in connector shells. These rf inserts work out of connector shells if they are not properly mated with module connector insert.

(b) Visually check for any positive indications of electrical or mechanical failure.

(4) FREQUENCY STANDARD CHECK. - Perform a frequency standard check as follows:

(a) If frequency standard electronic assembly A2A5 is used, set COMP/INT/EXT switch at COMP. Connect ships, Frequency Standard AN/URQ-9 to EXT 5MC IN jack A1J25 at rear of R-1051D/URR.

(b) Check receiver operation. If normal operation is restored, frequency standard electronic assembly A2A5 appears defective. However, if receiver remains inoperative, frequency standard electronic assembly A2A5 may or may not be defective. Using external frequency standard allows R-1051D/URR to operate in spite of malfunctioning 5 mc master oscillator circuit. All other circuits in frequency standard electronic assembly A2A5 must be operating while using external frequency standard.

Note

Frequency standard electronic assembly A2A5 must always be installed for the R-1051D/URR to operate.

(c) Return COMP/INT/EXT switch to original position.

(5) APPARENT NOISE LEVEL CHECK. - Perform apparent noise level checks as follows:

Note

The following steps make reference to noise level as observed on AUDIO LEVEL meter or on headphones. Ensure line levels, phone levels, and rf gain control are fully clockwise for all these checks. In initial checks, reference to noise levels is made relative to other test points within the R-1051D/URR. A high noise level is considered to be all noise normally generated within an operational R-1051D/URR. A medium noise level is that amount of noise generated in the translator synthesizer electronic assembly A2A6, mode selector electronic assembly A2A1, and if./audio amplifier electronic assemblies A2A2 and A2A3. A low noise level is that amount of noise normally generated only in assemblies A2A1, A2A2, and A2A3.

(a) Rotate Mode Selector switch through all positions while listening to noise output on headphones. If noise is present at any position of Mode Selector switch, momentarily jumper REC IF OUT jack TP8 on translator/synthesizer electronic assembly A2A6 to ground. Verify that low noise level is present in each mode. Remove jumper. If low noise level is present in either LSB or USB mode, frequency standard electronic assembly A2A5, is supplying 500 kHz to mode selector electronic assembly A2A1. If low noise level is not present in all modes, an initial conclusion is that frequency standard electronic assembly A2A5, mode selector electronic assembly A2A1, or if./audio amplifier electronic assembly A2A2 or A2A3 may have malfunction.

(b) Set Mode Selector at LSB and AUDIO LEVEL meter switch at LSB. If no noise is present at LSB position but noise is present at other positions, interchange if./audio amplifier electronic assemblies A2A2 and A2A3. If noise appears and R-1051D/URR operates in LSB, original LSB if./audio amplifier electronic assembly A2A3 requires trouble shooting. Refer to performance and isolation checks, paragraphs 4-5p and 4-5q, and see figure 4-2.

Note

Original if./audio amplifier electronic assemblies A2A2 and A2A3 should be returned to their original positions, otherwise agc adjustments may be necessary.

(c) Set Mode Selector switch at USB and AUDIO LEVEL meter switch at USB. If noise is not present for all modes, interchange if./audio amplifier electronic assemblies A2A2 and A2A3. If R-1051D/URR functions normally in USB mode, original USB if./audio amplifier electronic assembly A2A2 requires trouble shooting. Refer to performance and isolation checks, paragraphs 4-5p and 4-5q, and see figure 4-2. If noise at output results for only some positions of Mode Selector switch, 500-kHz output of frequency standard electronic assembly A2A5 should be suspected. Refer to paragraph 4-5h.

(d) If known signals can be received at least at one position of Mode Selector switch but not at other positions, initial conclusion can be made that antenna input circuits, rf amplifier circuits, and translator/synthesizer circuits appear to be operating normally. If TP8 is momentarily grounded and then ground is removed, noise level should increase from low to medium level.

1. If noise level increases to medium, translator/synthesizer electronic assembly A2A6, mode selector elect-

ronic assembly A2A1, and if./audio amplifier electronic assemblies A2A2 and A2A3 appear to be passing signals.

2. If noise level did not increase to medium when jumper was removed, translator/synthesizer electronic assembly A2A6 or frequency standard electronic assembly A2A5 may be suspected.

Note

Most of the noise is generated in translator/synthesizer electronic assembly A2A6. Only the frequency is selected prior to mode selector electronic assembly A2A1. All signals, regardless of mode selected follow the same path until they enter mode selector electronic assembly A2A1.

(e) Momentarily jumper REC RF IN jack TP5 on top of translator/synthesizer electronic assembly A2A6 to ground. Slight reduction in noise should be heard in headphones.

1. If output decreases slightly, translator/synthesizer electronic assembly A2A6 appears to be operating normally.

2. If output did not decrease even slightly, translator/synthesizer electronic assembly A2A6 or frequency standard electronic assembly A2A5 may be defective.

(f) If noise is present in any mode, RF GAIN control should vary output when AGC switch is at OFF and should have no effect when AGC switch is at either FAST or SLOW position. AGC circuits must still be operating with AGC switch at OFF, even though agc is not fully applied.

CAUTION

Prior to exchanging a suspected defective module for a good module, check that the regulated 20 Vdc does not measure above 21 volts. If the series regulator has shorted, the 20-volt line will carry the full 28 volts and the life span of all modules will be drastically reduced. One or more modules may fail immediately; all modules using regulated 20 Vdc will fail prematurely.

(6) INPUT CIRCUIT CHECK. - Perform an input circuit check as follows:

Note

If a medium noise level is present in all modes but no signals are present, antenna overload electronic assembly A2A9 or rf amplifier electronic assembly A2A4 are the probable causes of the malfunction. Translator/synthesizer electronic assembly A2A6 or frequency standard electronic assembly A2A5 may still be suspected, but are not as likely causes.

(a) Momentarily jumper A2A9-E5 to TP5 on translator/synthesizer electronic assembly A2A6. This bypasses rf amplifier electronic assembly A2A4. Tune R-1051D/URR to several frequencies having very strong signal level input.

1. If R-1051D/URR operates properly on strong signals, rf amplifier circuits appear defective. Remove jumper and refer to rf amplifier performance check (paragraph 4-5j).

2. If R-1051D/URR does not receive signals, tune to known signal and momentarily jumper antenna input cable from antenna patch panel directly to A2A9-E5. This inserts signal directly into A2A4, bypassing antenna input and antenna overload circuit. If R-1051D/URR operates normally, malfunction is between antenna input connector and input to rf amplifier electronic assembly A2A4. See figure 5-9.

(b) To ensure that R-1051D/URR is capable of passing rf signals from input of translator/synthesizer electronic assembly A2A6 to audio output of R-1051D/URR on at least one frequency, place COMP/

INT/EXT switch at COMP position. Loosely couple (by wrapping insulated leads) INT 5MC OUT at rear of R-1051D/URR to translator/synthesizer electronic assembly A2A6 REC RF IN jack TP5. Tune R-1051D/URR to 5 MHz, vary vernier control with CPS switch in V position, and note if signal is present at audio output. Harmonics at multiples of 5 MHz may also be used. Overcoupling will result in erroneous conclusions.

CAUTION

Do not connect an antenna to this point if a radio transmitter is operated nearby. A strong rf signal from any transmitter in the vicinity may burn up translator/synthesizer electronic assembly A2A6.

(7) FEEDBACK CHECK. - Perform a feedback check as follows:

(a) Remove antenna from R-1051D/URR and tune to 22.501 MHz in LSB mode. An audible heterodyne, signal sometimes very weak, may be heard in output. Note whether or not this signal is present and whether or not its frequency or amplitude appears to vary. Also check that audible signal may be varied in pitch by CPS switch and vernier control.

(b) Tune R-1051D/URR to 22.499 in USB mode. Verify that same results are obtained as for LSB. If signal is present and stable, it may be assumed that all circuitry after rf amplifier electronic assembly A2A4 will pass signals in some modes at some frequencies. If signal is present but is not stable in frequency, either A2A11 circuits, A2A6 circuits, or A2A5 may be defective. If signal cannot be heard on either LSB or USB, this check is inconclusive.

(8) RF AMPLIFIER CHECK. - Perform an rf amplifier check as follows:

(a) Observe that two electron tubes in rf amplifier electronic assembly A2A4 are lit, indicating that filament power is applied.

(b) If CPS indicator flashes when CPS switch is in V position, 110-Vdc plate voltage is available from power supply.

(c) If turret rotates when MCS controls are rotated above 2 MHz, 28 Vdc is present in rf amplifier electronic assembly A2A4.

(d) Observe that digit viewed in rf amplifier frequency indicator window is same as frequency indicated on 10 and 1 MCS windows on front panel. Check all MCS dial settings from 2 to 29 MHz. Abnormal indications may result from malfunction in code generator electronic assembly A2A7 or rf amplifier electronic assembly A2A4. Refer to code generator check (paragraph 4-5r) and see code generator schematic diagram (figure 5-20).

(e) If R-1051D/URR operates normally at some frequencies but not at others, note whether it operates on 2 through 5 MHz but not on 17 through 21 MHz. If this is case, check hi-lo filter relay circuit A2K2 on main frame. See figure 5-9.

(f) While observing rf amplifier turret, note that motor in mc synthesizer electronic subassembly A2A6A1 drive is audible when MCS controls are turned to select new frequency. This motor may not rotate each time, as more than one digit may use one particular crystal within mc synthesizer electronic subassembly A2A6A1.

b. RADIO RECEIVER R-1051D/URR OPERATION CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) Mode Selector switch at CW.

(b) RF GAIN control fully clockwise.

(c) CPS switch at 000.

(d) AGC switch at OFF.

(e) BFO FREQ at mid-range.

(2) PROCEDURE. - Proceed as follows:

(a) Tune R-1051D/URR to WWV or WWVH at 5, 10, or 15 MHz. Plug headset in USB PHONES jack. Adjust USB PHONE LEVEL control (and USB LINE LEVEL control, if necessary) for comfortable signal level. If no signal is heard, proceed until malfunction is isolated.

(b) Check that signal tone varies when BFO FREQ control is varied. If BFO FREQ control does not vary signal

pitch, trouble shoot A2R6, A2R19, mode selector electronic assembly A2A1 (figure 4-1), and if./audio amplifier electronic assembly A2A2 (figure 4-2).

(c) Set Mode Selector switch at USB. Tune receiver 1 kHz lower and check that signal is heard in headset. If signal is not heard, trouble shoot mode selector electronic assembly A2A1 and if./audio amplifier electronic assembly A2A2.

(d) Set Mode Selector switch at LSB. Tune receiver 1 kHz higher than WWV carrier; plug headset in LSB PHONES jack. Set LSB PHONE LEVEL control (and LSB LINE LEVEL control, if necessary) for comfortable signal level. If signal is not heard, trouble shoot mode selector electronic assembly A2A1 and if./audio amplifier electronic assembly A2A3.

(e) Set CPS switch at V (vernier) and check that signal tone varies as CPS vernier control is rotated. If tone does not vary, trouble shoot cps switch assembly A2A11 (figure 5-9) and perform performance check of translator/synthesizer electronic assembly A2A6 (paragraph 4-5l).

(f) Set Mode Selector switch at AM. Plug headset in USB PHONES jack. Tune R-1051D/URR to known AM station such as Armed Forces frequency 15.330 MHz. Check that signal is heard in headset. If signal is not heard, trouble shoot mode selector electronic assembly A2A1.

(g) Set AUDIO LEVEL meter switch at USB. Turn RF GAIN control fully counterclockwise. Note that level on AUDIO LEVEL Meter decreases. Set AGC switch at SLOW. Level on AUDIO LEVEL meter should increase. If indication is abnormal, proceed to AGC performance check (paragraph 4-5e).

c. POWER SUPPLY CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at AM.

(c) MCS controls at 02 MHz.

(d) RF GAIN control fully clockwise.

(e) AGC switch at SLOW.

(2) PROCEDURE. - Proceed as follows:

(a) Tilt chassis 90 degrees to expose bottom. Set Multimeter AN/PSM-4 ( ) to 100-Vdc scale. In lower left-hand corner to right of printed-circuit board, locate tie points E11, E12, and E17. Measure voltage at E11. If voltage is not between +19.5 and +20.5 Vdc, perform 20-volt regulator circuit adjustment [paragraph 5-2b (1) (a) through (d)]. If this adjustment does not bring voltage within required range, trouble shoot power supply electronic assembly A2A8 (see figure 5-9).

(b) Measure voltage at E12. If voltage is not between +24 and +32 Vdc, trouble shoot power supply electronic assembly A2A8. See note following step (d).

(c) Along left side of printed-circuit board A2A8A1 is row of terminals. Count seven terminals up from bottom to locate -30-volt terminal E10. Set switch for negative reading on AN/PSM-4( ) and measure voltage at this terminal. If voltage is not between -28.5 and -31.5 Vdc, trouble shoot power supply electronic assembly A2A8. See note following step (d).

(d) Set AN/PSM-4( ) to 250-Vdc scale and positive meter reading. Measure voltage at E17. Normal indication is between +103 and +117 Vdc. If indication is abnormal, trouble shoot power supply electronic assembly A2A8.

Note

If indications in steps (b), (c), and (d) are not within tolerance, check ac line voltage and setting of power transformer A2T1 primary winding tap. (See figure 5-9.)

d. RADIO RECEIVER R-1051D/URR SIDEBAND SELECTIVITY CHECK.

Note

This check should be performed only when poor receiver selectivity is suspected. Voice and CW signals may be affected; however, composite facsimile and multichannel teletype signals may be seriously distorted if receiver selectivity is not up to standard.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) Mode Selector switch at LSB.

(b) MCS and KCS controls at 05.000 MHz.

(c) CPS switch at V.

(d) RF GAIN control fully clockwise.

(e) AGC switch at SLOW.

(f) AUDIO LEVEL meter switch at LSB.

(g) Vernier control fully clockwise.

(h) LSB and USB PHONE LEVEL controls fully clockwise.

(2) PROCEDURE. - Proceed as follows:

(a) Open receiver and rotate COMP/INT/EXT switch on frequency standard electronic assembly A2A5 to COMP. Connect frequency meter, AN/USM-207( ) to LSB PHONES jack. Connect INT 5MC OUT jack J24 to ANT 50 Ω jack J23 using BNC to N adapter UG-201/U and 50-ohm coaxial test cable.

(b) Adjust LSB LINE LEVEL for 8 dB on AUDIO LEVEL meter. Turn AGC switch to off and set RF GAIN control for 8 dB on AUDIO LEVEL meter. Turn vernier control counterclockwise until meter reads 4 dB on skirt of filter. Record reading from frequency meter.

(c) Slowly turn vernier control clockwise while observing AUDIO LEVEL meter. Meter should not dip below 4 dB or increase above 12 dB.

(d) Return vernier control to maximum counterclockwise position. Set frequency controls at 05.001 MHz.

(e) While observing AUDIO LEVEL meter, slowly rotate vernier control maximum clockwise. AUDIO LEVEL meter should not dip below 4 dB or increase above 12 dB.

(f) Repeat steps (d) and (e) with frequency controls set at 05.002 MHz.

(g) Repeat step (d), except set frequency controls at 05.003 MHz.

(h) While observing AUDIO LEVEL meter, rotate vernier control clockwise until AUDIO LEVEL meter, decreases to 4 dB on skirt of filter. Record reading from the frequency meter.

(i) Subtract reading obtained in step (b) from reading obtained in step (h). Difference should be 3 kHz minimum.

(j) Set frequencey controls at 04.999 MHz. Connect frequency meter to USB PHONES jack and set AUDIO LEVEL switch at USB. Turn vernier control fully counterclockwise. Set Mode Selector switch at USB. Set AGC switch at SLOW and adjust USB line level for 8 dB. Turn AGC switch to OFF and set RF GAIN control for 8 dB. Turn vernier controls clockwise until meter indicates 4 dB on skirt of filter.

(k) Record reading from frequency meter.

(l) While observing AUDIO LEVEL meter, slowly rotate vernier control fully counterclockwise. AUDIO LEVEL meter should not dip below 4 dB or increase above 12 dB.

(m) Rotate vernier control fully clockwise and set frequency controls at 04.998 MHz.

(n) Observing AUDIO LEVEL meter, slowly rotate vernier control fully counterclockwise. AUDIO LEVEL meter should not dip below 4 dB or increase above 12 dB.

(o) Repeat steps (m) and (n) with frequency controls at 04.997 MHz.

(p) Repeat step (m), except set frequency controls at 04.996 MHz.

(q) Rotate vernier control counterclockwise until AUDIO LEVEL meter dips to 4 dB on skirt of filter. Record counter frequency.

(r) Subtract reading of step (k) from reading of step (q).

(s) If indications in steps (b) through (h) (LSB) or steps (j) through (q) (USB) were abnormal, mode selector module (LSB or USB mechanical filter or circuitry) may be defective. See figure 5-10.

e. AGC PERFORMANCE CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) Mode Selector switch at LSB.

(b) MCS and KCS controls at 22010 kHz.

(c) RF GAIN control fully clockwise.

(d) CPS switch at 000.

(e) USB and LSB PHONE LEVEL controls fully clockwise.

(f) USB and LSB LINE LEVEL controls fully clockwise.

(g) AGC switch at OFF.

(h) Disconnect audio cables to J5 and J6 on rear of R-1051D/URR.

(2) PROCEDURE. - Proceed as follows:

(a) Connect RF Signal Generator CAQI-606A to ANT 50 Ω jack J23 at rear of R-1051D/URR. Set CAQI-606A to receiver frequency and CW, with 0.5-microvolt output. Set AUDIO LEVEL meter switch at LSB. Tune CAQI-606A for peak reading on AUDIO LEVEL meter. AUDIO LEVEL meter should indicate 6 dB minimum. If indication is not obtained, see note following step (g).

(b) Set LSB LINE LEVEL control to indicate 4 dB on AUDIO LEVEL meter. Set CAQI-606A for 0.4 microvolt. Set AGC switch at FAST and observe that AUDIO LEVEL meter indication does not change. If indication does change, see note following step (g).

(c) Set CAQI-606A to 2.5 microvolts. AUDIO LEVEL meter should indicate less than 10 dB. Note indication. Increase CAQI-606A level to 0.05 volt. Meter indication should not increase by more than +3 dB. If abnormal indication is obtained, see note following step (g).

(d) Set step attenuator in CAQI-606A at 0.1 volt. Rotate step attenuator to 10-microvolt position. AUDIO LEVEL meter should indicate at least +4 dB with no noticeable hang time.

(e) Set AGC switch at SLOW. Rotate step attenuator on CAQI-606A rapidly to 10-microvolt position while observing AUDIO LEVEL meter indication. Meter should hang or delay below -2 dB and then rise to at least +4 dB.

(f) Repeat steps (a) through (e) with Mode Selector switch at USB. Set AUDIO LEVEL meter switch at USB.

(g) Reconnect cables to J5 and J6.

Note

Perform all of agc and if. gain loop adjustments [paragraph 5-2b(5) (a) through (d)] .

f. RADIO RECEIVER R-1051D/URR SENSITIVITY CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) Mode Selector switch at USB.

(b) MCS and KCS controls at 2.010 MHz.

(c) RF GAIN control fully clockwise.

(d) CPS switch at 000.

(e) USB PHONE LEVEL control fully counterclockwise.

(f) LSB PHONE LEVEL control fully counterclockwise.

(g) USB LINE LEVEL control at mid-position.

(h) LSB LINE LEVEL control at mid-position.

(i) AGC switch at OFF.

(2) PROCEDURE. - Proceed as follows:

(a) Connect RF Signal Generator CAQI-606A RF OUT jack to ANT 50 Ω jack J23 at rear of R-1051D/URR. Use 50-ohm coaxial test cable with BNC to N adapter UG-201/U.

(b) Set modulation selector switch on CAQI-606A at CW.

(c) Set AUDIO LEVEL meter switch at USB.

(d) Set frequency of CAQI-606A approximately 150 kHz away from receiver frequency. Adjust USB LINE LEVEL control for -2 dB noise reference level as indicated on AUDIO LEVEL meter. Adjust frequency and output attenuator of CAQI-606A for peak on-scale indication. Adjust output attenuator for +8 dB on AUDIO LEVEL meter. If indication is above 0.5 microvolts; proceed to paragraphs 4-5c and 4-5i.

(e) Set Mode Selector switch at LSB. Set AUDIO LEVEL meter

switch at LSB. Repeat step (d), substituting LSB LINE LEVEL control in place of USB LINE LEVEL control. If indication is greater than 0.5 microvolts, proceed to paragraphs 4-5c and 4-5i.

(f) Set Mode Selector switch at sideband having poorest sensitivity [larger reading of step (d) or step (e)]. Repeat sensitivity measurements on all frequencies listed in table 4-2, using procedure of step (g).

(g) Set frequency of CAQI-606A approximately 150 kHz away from receiver frequency and set attenuator for 0.5-microvolt output. Adjust LSB or USB LINE LEVEL control for -2 dB noise on AUDIO LEVEL meter. Tune CAQI-606A slowly through receiver frequency and observe that AUDIO LEVEL meter deflects above +8 dB at all frequencies listed in table 4-2. If meter indicates less than +8 dB at any frequency in table 4-2, proceed to paragraphs 4-5c and 4-5i.

Note

It is important to test all frequencies in table 4-2 to ensure that the R-1051D/URR meets this specification at all selected combinations of digits.

(h) Set Mode Selector switch at CW. Set frequency at 2.010 MHz and BFO FREQ control in center of its range. Repeat steps (c) and (d). If indication is greater than 1 microvolt, troubleshoot mode selector electronic assembly A2A1 (see figure 4-1) and if./audio amplifier electronic assembly A2A2 (see figure 4-1).

(i) Set Mode Selector switch at AM. Set AUDIO LEVEL meter switch at USB. Alternate by switching modulation selector switch on CAQI-606A between 1000 Hz, 30 percent modulation and CW, until following indication is obtained in each position. When modulation selector switch is set at 1000 Hz, 30 percent modulation, adjust CAQI-606A frequency and output attenuator for peak indication of 8 dB on AUDIO LEVEL meter. When CAQI-606A is set at CW, adjust USB LINE LEVEL control for -2 dB on AUDIO LEVEL meter. AM sensitivity is output attenuator setting. If 2-microvolts maximum is not obtained, check agc performance (paragraph 4-5e).

TABLE 4-2. TEST FREQUENCIES - MHZ

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

g. FREQUENCY, LOCKING ACTION, AND VERNIER OPERATION CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at USB.

(c) MCS and KCS controls at 04.996 MHz.

(d) RF GAIN control fully clockwise.

(e) CPS switch at 500.

(f) USB and LSB PHONE LEVEL controls fully clockwise.

(g) USB and LSB LINE LEVEL controls fully counterclockwise.

(h) AGC switch at SLOW.

(i) AUDIO LEVEL meter switch at USB.

(2) PROCEDURE. - Proceed as follows:

(a) Connect 5-MHz output of

Frequency Standard AN/URQ-9 to EXT 5MC IN jack J25 on R-1051D/URR. On top of frequency standard electronic assembly A2A5, set COMP/INT/EXT switch at COMP (figure 5-22). Observe that comparator lamp DS1 fades out and lights not more than once in 20 seconds measured from time lamp is just visibly increasing in brilliance, until again is just visible increasing in brilliance. If lamp flickers rapidly or stays on longer than 4 minutes, perform 5 mc oscillator circuit adjustment procedure [paragraph 5-2b(2) (a) through (d)]. If indication is abnormal (other than frequency adjustment), proceed to paragraph 4-5h.

(b) Disconnect AN/URQ-9 from R-1051D/URR EXT 5MC IN jack. Set COMP/INT/EXT switch at INT.

(c) Connect INT 5 MC OUT jack J24 to ANT 50Ωjack J23. Connect Frequency Meter AN/USM-207( ) to USB PHONES jack and set USB LINE LEVEL control so that signal level on AUDIO LEVEL meter is at +10 dB. Verify that AN/USM-207( ) indicates 3500 Hz. Change receiver frequency to 4997.500, 4998.500, and 4999.500 kHz. Verify that AN/USM-207( ) indicates 2500, 1500, and 500 Hz, respectively. If indication is abnormal, proceed to paragraph 4-5h.

(d) Set Mode Selector switch at LSB. Set AUDIO LEVEL meter switch at LSB. Set receiver frequency at 5003.500 kHz. Connect AN/USM-207( ) to LSB PHONES jack and set LSB LINE LEVEL control so that signal level on AUDIO LEVEL meter is at +10 dB. Verify that AN/USM-207( ) indicates 3500 Hz. Change receiver frequency to 5002.500, 5001.500, and 5000.500 kHz. Verify that AN/USM-207( ) indicates 2500, 1500, and 500 Hz, respectively. Change receiver frequency to 5001.000 kHz. Verify that AN/USM-207( ) indicates 1000 Hz. · Rotate 100 CPS switch from 000 through 900. Verify that AN/USM-207( ) indicates form 1100 Hz through 1900 Hz in 100-Hz increments. If indication is abnormal, proceed to paragraph 4-5h.

(e) Set receiver frequency at 5001.000 kHz. Rotate CPS switch to V (vernier position). Turn CPS vernier control fully counterclockwise. Verify that AN/USM-207( ) indicates 980 Hz maximum. Turn CPS vernier control fully clockwise. Verify that AN/USM-207( ) indicates 2020 Hz minimum. If indication is abnormal, proceed to paragraph 4-5h.

Note

The CPS vernier dial is not calibrated and is an arbitry scale only. Vernier operation must permit selection of any frequency within the kHz slot.

(f) Set CPS switch at 000.

(g) Remove AN/USM-207( ) from LSB PHONES jack.

(h) Set MCS and KCS controls at 5.000 MHz. Set Mode Selector switch at CW. Connect headphones to USB PHONES jack. Vary BFO FREQ front-panel control from one extreme to the other, observing a zero-beat note near mid-range of control. If zero beat is not near mid-range, set control to mid-range and adjust BFO ADJ on top of mode selector electronic assembly A2A1 (figure 5-22) for zero beat.

(i) Remove test cable from J23 and J24 at rear of R-1051D/URR and reconnect antenna cable to J23.

Note

When the ship's frequency standard distribution system is utilized, the receiver internal frequency standard should still be checked to ensure its availability in case of failure of the distribution system. The COMP/INT/EXT switch on the top of frequency standard electronic assembly A2A5 should be in EXT position when the ship's distribution system is in use. The COMP position is to be used when comparing the receiver internal frequency standard to ship's Frequency Standard AN/URQ-9, AN/URQ-10, or when it is necessary to use the internal frequency standard as an external source of 5 MHz for the operation of another R-1051D/URR. When the receiver is in operation using the internal frequency standard, the switch should be in the INT position.

h. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5 PERFORMANCE CHECK. (See figure 4-4.)

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at USB.

(c) MCS and KCS controls at 02010 kHz.

(d) AGC switch at SLOW.

(2) PROCEDURE. - Proceed as follows:

(a) Connect Frequency Meter AN/USM-207( ) to INT 5MC OUT jack J24 at rear of R-1051D/URR. Set COMP/INT/EXT switch on top of frequency standard electronic assembly A2A5 (figure 5-22) at COMP. Observe indication on AN/USM-207( ) for five display cycles. If this indication is other than 5 MHz ±0.5 Hz, perform steps (a) and (b) of paragraph 4-5g before making any adjustment. Electronic Multimeter (rf voltmeter) CCVO-91CA probe (without 50-ohm adapter) to INT 5MC OUT jack J24 on rear panel. Normal indication should be 450 mV minimum. If indication is abnormal, refer to paragraph 4-5i.

(b) Set COMP/INT/EXT switch at INT.

(c) Remove translator/synthesizer electronic assembly A2A6 from chassis paragraph 5-3b(3) (a) through (d). Connect AN/USM-207( ) to terminal A3 of jack A2J12 (A6P1). Normal indication should be 500 kHz ±0.1 Hz. If indication is abnormal, refer to paragraph 4-5i.

(d) Disconnect AN/USM-207( ) and connect Electronic Multimeter (rf voltmeter) CCVO-91CA probe (without 50-ohm adapter) to same terminal. Normal indication should be 150 mV minimum. If indication is abnormal, refer to paragraph 4-5i.

(e) Connect CCVO-91CA probe (without 50-ohm adapter) to terminal A2 of jack A2J12. See figure 4-11. Normal indication should be 300 mV minimum. If indication is abnormal, refer to paragraph 4-5i.

(f) Connect CCVO-91CA probe (without 50-ohm adapter) to terminal A1 of jack A2J12. Normal indication should be 60 mV minimum. Frequency standards not having TP1 and TP2 access holes on top of dust cover have minimum value of 20 mV. If indication is abnormal, refer to paragraph 4-5i.

(g) Replace translator/synthesizer electronic assembly A2A6 in chassis [refer to paragraph 5-3b(3)(e) and (f)].

(h) If steps (a) through (g) produce normal indications, proceed to paragraph 4-5j.

i. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5 ISOLATION TEST.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) R-1051D/URR pulled out of case.

(b) Mode Selector switch at OFF.

(c) MCS and KCS controls at 02010 kHz.

(2) PROCEDURE. - Proceed as follows:

(a) Remove frequency standard electronic assembly A2A5. Set Mode Selector switch at USB and connect Multimeter AN/PSM-4( ) between terminal 3 of jack A2J9 (A2A5P1) and ground. Normal indication should be 28 ±4 Vdc. If indication is abnormal, trouble shoot A2FL2, A2L2, A2C2, and power supply electronic assembly A2A8 (refer to paragraph 4-5c).

(b) Connect AN/PSM-4( ) between terminal 1 of jack A2J9 (A2A5P1) and ground. Normal indication should be 20 ±0.5 Vdc. If indication is abnormal, trouble shoot A2FL1 and power supply electronic assembly A2A8 (refer to paragraph 4-5c).

(c) Check that all rf connector inserts to A2A5 are fully seated and rf cables between A2J9 and A2J12 are not defective.

(d) If all indications of steps (a) and (b) are within tolerance but indications in paragraph 4-5h(2) do not fall within tolerance, frequency standard electronic assembly A2A5 is defective, and further troubleshooting of this assembly must be accomplished only at depot facility [refer to paragraph 5-6b(1) through (6)].

j. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4 PERFORMANCE CHECK. (See figure 4-3.)

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) R-1051D/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.

(f) AGC switch at OFF.

(2) PROCEDURE. - Proceed as follows:

(a) Connect RF Signal Generator CAQI-606A RF OUT jack to ANT 50Ω jack J23. Set CAQI-606A to receiver frequency and CW, with 1000-microvolt output. Connect Electric Multimeter (rf voltmeter) CCVO-91CA (without 50-ohm adapter) to TP4 on rf amplifier electronic assembly A2A4. Tune CAQI-606A for maximum indication on CCVO-91CA. Normal indication should be greater than 31.6 mV. If indication is abnormal, perform rf amplifier electronic assembly A2A4 isolation test (paragraph 4-5k).

(b) Without changing frequency, connect CCVO-91CA to TP5 on translator/synthesizer electronic assembly A2A6. Normal indication should be greater than 31.6 mV [same as step (a)]. Repeat procedure for measurements at TP4 for all frequencies listed in table 4-2. All indications should be greater than 31.6 mV. If indication at TP5 is abnormal, cable from A2J11A1 to A2J14A1 is defective. If one or several frequencies are defective, rf amplifier electronic assembly A2A4 should be sent to depot repair facility for further testing. If normal results are not obtained, perform isolation test (paragraph 4-5k).

(c) If all indications are normal, perform translator/synthesizer electronic assembly A2A6 performance check, (paragraph 4-5l).

k. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4 ISOLATION TEST.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. -Set controls as follows:

(a) R-1051D/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.

(2) PROCEDURE. - Proceed as follows:

(a) Electron tube filaments should be lighted. If indication is abnormal, check V1, V2, and A2T1 (6.3-Vac winding). Also check that turret has revolved to proper position as indicated by window and chart on top of rf amplifier electronic assembly A2A4.

(b) Remove rf amplifier electronic assembly A2A4. Connect Multimeter AN/PSM-4( ) between terminal 12 of A2J11 (A2A4P2) and ground. See figure 4-11. Set Mode Selector switch at USB. Normal indication is 103 Vdc minimum. If indication is abnormal, trouble shoot A2K3, A2L1, and power supply electronic assembly A2A8 [paragraph 4-5c(2)(c)].

(c) Connect AN/PSM-4( ) between terminal 7 of A2J10 (A2A4P1) and ground. Normal indication is from 24 to 32 Vdc. If indication is abnormal, trouble shoot A2A8.

(d) Connect AN/PSM-4( ) between ANT 50 Ω jack J23 at rear of R-1051D/URR and ground. Set scale at Rx10k. Verify that AN/PSM-4( ) indicates an open circuit. If indication is abnormal, check cable from A1J23 to A1P22, check cable from A2J22 to A2A9E1, and/or trouble shoot antenna overload electronic assembly A2A9. See figure 5-9.

(e) Remove ground lead of AN/PSM-4( ) and connect to A2J11A3 (A2A4P2A3). Verify that AN/PSM-4( ) indicates less than 3 ohms on Rx1 scale. If indication is abnormal, check cable from A2J11A3 to A2A9E5.

(f) If steps (a) through (e) produce normal indications, and steps (a) and (b) of paragraph 4-5j(2) do not, rf amplifier electronic assembly A2A4 is defective and should be sent to depot facility for repair. (Refer to paragraph 5-6a(1) through (6).)

l. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6 PERFORMANCE CHECK. (See figures 4-5 through 4-10.)

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) R-1051D/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.

(f) AGC switch at OFF.

(2) PROCEDURE. - Proceed as follows:

(a) Connect RF Signal Generator CAQI-606A RF OUT jack to R-1051D/URR ANT 50Ωjack J23 at rear of R-1051D/URR. Set CAQI-606A at CW with 1000-microvolt output at 2.010 MHz. Connect Electronic Multimeter (rf voltmeter) CCVO-91CA (without 50-ohm adapter) to TP8 on rf translator electronic subassembly A2A6A6. Tune CAQI-606A for maximum indication on CCVO-91CA. Normal indication is at least 100 mV. If indication is either normal or abnormal, proceed to step (b).

(b) Repeat the step (a) at all frequencies listed in table 4-2. If indication is normal at all tested frequencies, perform mode sleector electronic assembly A2A1 performance check (paragraph 4-5n). If one or several frequencies are defective, translator/synthesizer electronic assembly A2A6 should be sent to depot repair facility for further testing. (Refer to paragraph 5-6c(1) through (5).) If normal results are not obtained, perform translator/synthesizer electronic assembly A2A6 isolation test (paragraph 4-5m).

m. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6 ISOLATION TEST.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) R-1051D/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) AGC switch at OFF.

(f) RF GAIN control fully clockwise.

(2) PROCEDURE. - Proceed as follows:

(a) Remove translator/synthesizer electronic assembly A2A6 from chassis. Connect Multimeter AN/PSM-4( ) between terminals listed in table 4-3 and ground. Rotate Mode Selector switch through all six operational modes and observe that voltages are within tolerance listed in table 4-3.

(b) Return MCS controls to 02.

(c) Set Mode Selector switch at OFF and remove ac power connector from rear panel. Using Rx1 scale of AN/PSM-4( ), perform tests listed in table 4-4.

(d) Replace translator/synthesizer electronic assembly A2A6 and reconnect ac power connector at rear panel. Set Mode Selector switch at USB. Using AN/PSM-4( ) and referring to table 4-5, perform dc voltage measurements between terminals listed and ground.

Note

See figure 5-102 for location of the listed terminals.

(e) If all indications are within tolerance (except measurement at A2A11A1E4 in step d) and results of procedures in paragraph 4-51(2) are abnormal, translator/synthesizer electronic assembly A2A6 is defective. Further troubleshooting of this assembly must be accomplished only at depot repair facility. (Refer to paragraph 5-6c (1) through (5).)

n. MODE SELECTOR ELECTRONIC ASSEMBLY A2A1 PERFORMANCE CHECK. (See figure 4-1).

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at STD BY.

TABLE 4-3. TRANSLATOR/SYNTHESIZER VOLTAGE ELECTRONIC ASSEMBLY A2A6 CHECKS

TERMINAL	NORMAL INDICATION	IF INDICATION IS ABNORMAL*
A2J12-7	28 ±4.0 Vdc	Trouble shoot main frame
A2J12-18	20 ±0.5 Vdc	Trouble shoot A2FL1 and power supply electronic assembly A2A8
A2J12-6	28 ±4.0 Vdc, 0 Vdc when MCS control and rf amplifier turret is turning	Trouble shoot A2A7 code generator electronic assembly and rf amplifier electronic assembly A2A4
A2J12-10	20 ±0.5 Vdc	Trouble shoot A2FL1, and power supply electronic assembly A2A8
A2J12-20	20 ±0.5 Vdc when MCS controls are set at 05, and 0 Vdc when set at 06	Trouble shoot A2K2, A2K3, power supply electronic assembly and A2A8

*See figure 4-11 and 5-9.

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

MULTIMETER LEADS BETWEEN	CPS SWITCH AT	INDICATION	IF INDICATION IS ABNORMAL*
A2J12-12 and A2J12-19	000 through 900	Short	Trouble shoot A2A11S6-B (rear)
A2J12-12 and A2J12-19	V (vernier)	Open	Trouble Shoot A2A11S6-B (rear)
A2J12-12 and A2J12-17	200, 300, 600, 700	Short	Trouble shoot A2A11S6-A (rear)
A2J12-12 and A2J12-15	800, 900	Short	Trouble shoot A2A11S6-A (front)

*See figure 5-9.

TABLE 4-4. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6 RESISTANCE CHECKS (Continued)

MULTIMETER LEADS BETWEEN	CPS SWITCH AT	INDICATION	IF INDICATION IS ABNORMAL*
A2J12-12 and A2J12-13	400, 500, 600, 700	Short	Trouble shoot A2A11S6-A (front)
A2J12-12 and A2J12-11	V (vernier), 100, 300, 500, 700, 900	Short	Trouble shoot A2A11S6-A (rear)
A2J12-14 and A2A11A1E2 (See figure 5-100 for location of A11A1E2.)	V (vernier)	Short	Trouble shoot A2A11S6-B (front)
A2J12-14 and ground	000 through 900	Short	Trouble shoot A2A11S6-B (front)
A2J12-14 and ground	V (vernier)	Open	Trouble shoot A2A11S6-B (front)
A2J12-19 and ground	V (vernier)	Open	Trouble shoot A2A11S6-B (rear)

*See figure 5-9.

TABLE 4-5. CPS SWITCH ASSEMBLY A2A11 VOLTAGE CHECKS

TERMINAL	NORMAL INDICATION	IF INDICATION IS ABNORMAL*
A2A11A1E6	4.5 ±0.5 Vdc (CPS switch at 000)	Check A2A11A1, CR2, and C2.
A2A11A1E4	20.0 ±0.5 Vdc	Translator/synthesizer electronic assembly A2A6 is defective provided checks in table 4-2 are normal. Further trouble shooting of this assembly must be accomplished only at depot facility. (Refer to paragraph 5-6c (1) through (5).)
A2A11A1E2	3.2 to 11.0 ±1.0 Vdc (CPS switch at V varies with CPS vernier control)	Trouble shoot A2A11R7, A2A11A1-R3, R2, R1, C1, R8, and R9.

*See figure 4-11 and 5-9.

(c) RF GAIN control fully clockwise.

(d) CPS switch at 000.

(e) AGC switch at OFF.

(2) PROCEDURE. - Proceed as follows:

(a) Remove both if./audio amplifier electronic assemblies A2A2 and A2A3 from chassis. With 50-ohm coaxial cable RG-58C/U, connect RF OUT jack on 58 RF Signal Generator CAQI-606A to ANT 50Ω jack J23 at rear panel. Set Mode Selector switch at CW. Set frequency of CAQI-606A at 2010 kHz, CW, with 100-microvolt output. Connect Electronic Multimeter (rf Voltmeter) CCVO-91CA (without 50-ohm adapter) to TP1 on top of mode selector electronic assembly A2A1 (figure 5-22). Adjust frequency and output level of CAQI-606A for peak signal of 100 mV on CCVO-91CA. Connect CCVO-91CA to terminal A3 of jack A2J18 (A2A2P1). (See figure 4-11.) Normal indication is more than 4 mV when Mode Selector switch, and is at CW and AM positions. (Disregard indications in other modes.) If indication is abnormal, proceed to step (b) to aid in isolating fault.

(b) Set Mode Selector switch at USB. Adjust frequency of CAQI-606A for peak signal on CCVO-91CA. Normal indication is more than 4 mV when Mode Selector switch is set at USB, RATT, and ISB positions. If indication is abnormal, proceed to step (c) to aid in isolating fault.

(c) Set Mode Selector switch at LSB. Connect CCVO-91CA to terminal A3 of jack A2J19 (A2A3P1). Adjust frequency of CAQI-606A for peak signal on CCVO-91CA. Normal indication is more than 4 mV when Mode Selector switch is at LSB and ISB positions. If indication is abnormal, proceed to step (d) to aid in isolating fault.

(d) Connect CCVO-91CA to terminal A2 on jack A2J18 (A2A2P1). Verify that CCVO-91CA indicates more than 100 mV at LSB, USB, ISB, and RATT positions of Mode Selector switch, and zero mV in AM and CW positions of Mode Selector switch. If indication is abnormal, proceed to step (e) to aid in isolating fault. Replace both if./audio amplifier electronic assemblies A2A2 and A2A3 in R-1051D/URR. Disconnect CAQI-606A from ANT 50 jack J23.

(e) Set Mode Selector switch at CW and rotate RF GAIN control fully counterclockwise. Connect Frequency Meter AN/USM-207( ) to TP2 on top of mode selector electronic assembly A2A1 (see figure 5-22). Rotate BFO FREQ control fully countercloskwise. Verify that AN/USM-207( ) indicates 497 kHz maximum. Rotate BFO FREQ control fully clockwise. Verify that AN/USM-207( ) indicates 503 kHz minimum. If either indication is abnormal, refer to BFO frequency adjustment procedure [paragraph 5-2b(4) (a) through (d)].

(f) If steps (a) through (e) produce normal indications, perform if./audio amplifier electronic assemblies A2A2 and A2A3 performance check (paragraph 4-5p). If abnormal indications are obtained, proceed to mode selector electronic assembly A2A1 isolation test (paragraph 4-5o).

o. MODE SELECTOR ELECTRONIC ASSEMBLY A2A1 ISOLATION TEST. (See figure 4-1 and 4-11.)

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at OFF.

(c) MCS and KCS controls at 02010 kHz.

(2) PROCEDURE. - Proceed as follows:

(a) Remove mode selector electronic assembly A2A1 from R-1051D/URR. Connect Multimeter AN/PSM-4( ) between connector terminals listed in table 4-6 and gound. Rotate Mode Selector switch through all six operational modes. All voltages measured should be within 0.5 volt of listed value.

(b) If all indications are normal and procedures of paragraph 4-5n have produced abnormal indications, trouble shoot mode selector electronic assembly A2A1 (see figure 4-1).

p. IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 and A2A3 PERFORMANCE CHECK. (See figure 4-2.)

TABLE 4-6. MODE SELECTOR ELECTRONIC ASSEMBLY A2A1 VOLTAGE CHECKS

CONNECTOR	LSB	RATT	AM	CW	USB	ISB	IF INDICATION IS ABNORMAL*
A2J16-1	-	20	-	-	20	20	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8
A2J16-2	-	-	20	20	-	-	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8
A2J16-6	20	20	20	20	20	20	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8
A2J17-1	-	-	-	6 to 20**	-	-	Trouble shoot A2R6, and A2R19.
A2J17-2	-	-	-	20	-	-	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8.
A2J17-4	20	20	20	20	20	20	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8
A2J17-5	20	20	-	-	20	20	Trouble shoot A2K3, A2FL1, and power supply electronic assembly A2A8

*See figure 5-9.
**Varies with setting of BFO FREQ control.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at USB.

(c) MCS and KCS controls at 02010 kHz.

(d) RF GAIN control fully clockwise.

(e) CPS switch at 000.

(f) USB PHONE LEVEL control at mid-range.

(g) AGC switch at SLOW.

(2) PROCEDURE. - Proceed as follows:

(a) Connect RF Signal Generator CAQI-606A to ANT 50Ω jack J23 at rear of R-1051D/URR. Connect Electronic Multimeter ME-6( )/U to J5 (remote 600-ohm USB/AM/CW/ISB output) at rear of R-1051D/URR. Set CAQI-606A at 2.010 MHz, CW, with 1-mV output. Adjust frequency for CAQI-606A for peak on ME-6( )/U. Rotate USB LINE LEVEL control fully clockwise (adjust multimeter range as required). Verify that ME-6( )/U indicates from 6 to 9 Vac. If indication is abnormal, proceed to step (b) to aid in isolating fault.

(b) Set Mode Selector at AM. Set CAQI-606A for 1000 Hz, 30 percent modulation. Adjust CAQI-606A frequency for peak on ME-6( )/U. Normal indication is between 6 and 9 Vac.

If indication is abnormal, proceed to step (c) to aid in isolating fault.

(c) Set ME-6( )/U to 0 dB scale. Adjust USB LINE LEVEL control for +12 dB on ME-6( )/U. Set AUDIO LEVEL meter switch at USB. AUDIO LEVEL meter should indicate +12 ±2 dB. Adjust USB LINE LEVEL control for 0 dB on ME-6( )/U. AUDIO LEVEL meter should indicate 0 ±2 dB. Reconnect audio cable at rear of R-1051D/URR. If any indication is abnormal, proceed to step (d) to aid in isolating fault.

(d) Set ME-6( )/U to 0 dB scale. Connect ME-6( ) to J6 (remote 600-ohm LSB/ISB output) at rear panel. Set Mode Selector switch at LSB. Set CAQI-606A at CW and adjust frequency for peak on ME-6( )/U. Rotate LSB LINE LEVEL control fully clockwise. Verify that ME-6( )/U indicates from 6 to 9 Vac. If indication is abnormal, proceed to step (e) to aid in isolating fault.

(e) Adjust LSB LINE LEVEL control for indication of +12 dB on ME-6( )/U. Set AUDIO LEVEL meter switch at LSB. AUDIO LEVEL meter should indicate +12 ±2 dB. Adjust LSB LINE LEVEL control for 0 dB indication on ME-6( )/U. AUDIO LEVEL meter should indicate 0 ±2 dB. Disconnect ME-6( )/U from J6 and reconnect audio cable to J6. If indication is abnormal, proceed to step (f) to aid in isolating fault.

(f) If steps (a) through (e) produce normal indications, proceed to paragraph 4-5r. If steps (a) through (e) do not produce normal indications and agc performance check (paragraph 4-5e) has been attempted, proceed to paragraph 4-5q.

q. IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 AND A2A3 ISOLATION TEST. (See figures 4-2 and 4-11.)

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

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

(b) Mode Selector switch at OFF.

(c) MCS and KCS controls at 02010 KHz.

(d) AGC switch at OFF.

(2) PROCEDURE. - Proceed as follows:

(a) Remove if./audio amplifier electronic assembly A2A2 from chassis. Connect Multimeter AN/PSM-4( ) between connector terminal listed in table 4-7 and ground. Ensure that no cable is connected to ANT 50Ω jack J23. Rotate Mode Selector switch through all six operational modes. Voltages measured should be within following tolerances: 28 ±4 Vdc; 20 ±0.5 Vdc; -30 ±1.5 Vdc; 0.7 to 3 ±0.5 Vdc; and 0 to -30 ±1.5 Vdc.

(b) Replace if./audio amplifier electronic assembly A2A2 in chassis.

Note

If the preceding measurements are performed with both if./audio amplifier electronic assemblies A2A2 and A2A3 removed, the results in step (a) will not be obtained; therefore, ensure that the assembly not under test is installed in the R-1051D/URR.

(c) Remove if./audio amplifier electronic assembly A2A3 from chassis. Connect Multimeter AN/PSM-4( ) between connector terminal listed in table 4-8 and ground. Rotate Mode Selector switch through all six operational modes. Voltages measured should be within tolerances listed in step (a).

(d) Replace if./audio amplifier electronic assembly A2A3 in chassis.

(e) If all indications in steps (a) through (c) are normal, and procedures in paragraph 4-5p(2) produce abnormal results, trouble shoot defective if./audio amplifier electronic assembly A2A2 or A2A3.

Note

After replacing defective if./audio amplifier electronic assembly A2A2 or A2A3, perform agc performance check (paragraph 4-5e). Further trouble shooting of a defective A2A2 or A2A3 assembly can be performed aboard ship with the use of applicable

servicing block diagram (figure 4-2), schematic (figure 5-11) and parts location diagrams (figures 5-34 through 5-40). After replacement of a component, alignment may be necessary. Perform agc performance check (paragraph 4-5e).

r. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7 CONTINUITY CHECK.

(1) OPERATING CONDITIONS AND SETTINGS. - Set controls as follows:

(a) R-1051D/URR chassis pulled out of case.

(b) Mode Selector switch at OFF.

(c) MCS and KCS controls at 00000 kHz.

(2) PROCEDURE. - Proceed as follows:

(a) Remove rf amplifier electronic assembly A2A4 from chassis.

(b) Remove translator/synthesizer electronic assembly A2A6 from chassis.

(c) Refer to table 4-9.

Note

RF amplifier electronic assembly A2A4 uses terminals 1 through 5 on A2J10 (A2A4P1) as turret control line terminals. These terminals receive a binary code from A2J8 (A2A7P8) terminals 1 through 5 of code generator electronic assembly A2A7. Translator/synthesizer electronic assembly A2A6 uses terminals 1 through 5 on A2J12 (A2A6P1) as translator/synthesizer control line terminals. These terminals also receive a binary code from A2J8 (A2A8P8) terminals 21 through 25 of code generator electronic assembly A2A7.

(d) Set Multimeter AN/PSM-4 ( ) at Rx1 scale and connect test leads between ground and terminal 1 of A2J10 (A2A4P1). See figure 4-11. Normal indication is listed in table 4-9.

(e) Repeat step (d) for each of five terminals of rf amplifier electronic assembly connector A2J10, and for each of five terminals of translator/synthesizer electronic assembly connector A2J12.

(f) Repeat step (d) for each MCS control setting from 02 through 29 MHz. Check that at each setting of MCS controls, all open circuits on each connector are wired together. Example: With MCS controls at 10, check that terminals 1, 4, and 5 of A2J10 are open to ground but connected together. Also, check that terminals 3 and 5 of A2J12 are open to ground and connected together.

(g) If any indication is abnormal, remove code generator electronic assembly A2A7 as follows.

CAUTION

Be certain that interlock has not been defeated.

(1) Remove rf amplifier electronic assembly A2A4 from chassis [paragraph 5-3b(1)(b)].

(2) Remove translator/synthesizer electronic assembly A2A6 from chassis [paragraph 5-3b(3)].

Note

Obtain access to top and bottom of chassis as required for the following steps by rotating chassis to expose either the top or bottom at the front if necessary

(3) From top of chassis, remove screws which secure rear protective bracket of front panel and move bracket slightly away from front panel and chassis. Do not remove cable clamps from bracket for any part of this procedure. See figure 5-99 to locate hidden screw.

(4) From bottom of chassis, remove nuts that secure plug A2A7P8 to receptacle A2J8 and separate these connectors. Remove two screws that secure code generator electronic assembly A2A7 to chassis.

TABLE 4-7. IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A2 VOLTAGE CHECKS

CONNECTOR	LSB	RATT	AM	CW	USB	ISB	IF INDICATION IS ABNORMAL*
A2J18-1	-	28	28	28	28	28	Trouble shoot A2K1
A2J18-7	-	20	20	20	20	20	Trouble shoot A2FL1, power supply electronic assembly A2A8, and chassis wiring
A2J18-11	-	20	20	20	20	20	Trouble shoot A2FL1, power supply electronic assembly A2A8, and chassis wiring
A2J18-15	-	-	-	-	-	-	Trouble shoot A2S5 wiring
**	30	-	-	-	-	3	
***	20	20	20	20	20	20	
A2J18-17	-	-	20	20	-	-	Trouble shoot A2FL1, power supply electronic assembly A2A8, and chassis wiring
A2J18-18	-	20	-	-	20	20	Trouble shoot A2FL1, power supply electronic assembly A2A8, and chassis wiring
A2J18-19	-	-30	-30-	-30	-30	-30	Trouble shoot power supply electronic assembly A2A8, and chassis wiring
A2J18-21****	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	Trouble shoot power A2A3, A2R13, and chassis wiring
A2J18-22**	0 to -30	-	-	-	-	0 to -30	Trouble shoot chassis wiring to rf amplifier electronic assembly A2A4

*See figure 5-9.
**AGC SET at SLOW.
***AGC SET at FAST.
****Varies with setting of RF GAIN control with AGC at OFF.

(5) Specially prepare 3/16-inch wide screwdriver with round shank by wrapping masking tape along length of shank to prevent chafing insulation on wiring.

CAUTION

Use care to avoid damaging wiring when using screwdriver.

TABLE 4-8. IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLY A2A3 VOLTAGE CHECKS

CONNECTOR	LSB	RATT	AM	CW	USB	ISB	IF INDICATION IS ABNORMAL*
A2J19-1	28	-	-	-	-	28	Trouble shoot A2K1 and chassis wiring
A2J19-7	20	-	-	-	-	20	Trouble shoot A2FL1, power supply electronic assembly A2A8, and chassis wiring
A2J19-11	20	-	-	-	-	20	Trouble shoot A2K3 and chassis wiring
A2J19-15	-	-	-	-	-	-	Trouble shoot A2S5 wiring
**	-	3	3	3	3	3	
***	20	20	20	20	20	20	
A2J19-17	-	-	-	-	-	-	This terminal should not be wired
A2J19-18	20	-	-	-	-	20	Trouble shoot A2K3 and chassis wiring
A2J19-19	-30	-	-	-	-	-30	Trouble shoot power supply electronic assembly A2A8 and chassis wiring
A2J19-21****	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	0.7 to 3	Trouble shoot A2R3, A2R13, and chassis wiring
A2J19-22**	-	0 to -30	0 to -30	0 to -30	0 to -30	0 to -30	Trouble shoot chassis wiring to A2A4

*See figure 5-9.
**AGC set at SLOW.
***AGC set at FAST.
****Varies with setting of RF GAIN control with AGC at OFF.

(6) From top of chassis, expose partially hidden captive screw which still secures assembly A2A7 to chassis by carefully pulling and holding rear protective bracket away from front panel. Locate captive screw and use specially prepared screwdriver to loosen it in order to free assembly A2A7. Work this assembly out of chassis from bottom.

(7) Install spare code generator electronic assembly A2A7 by reversing removal sequence.

(h) Leave rf amplifier electronic assembly A2A4 and translator/synthesizer electronic assembly A2A6 out of chassis for mechanical synchronization of chassis check covered in paragraph 4-5s.

TABLE 4-9. CODE GENERATOR ELECTRONIC ASSEMBLY A2A7 RESISTANCE CHECKS

Note

S=Shorted (less than 5 ohms)
O=Open (high resistance

MCS DIALS	A2J10 (A2A4P1) 1	2	3	4	5	A2J12 (A2A6P1) 1	2	3	4	5
0	O	O	O	O	O	O	O	O	O	O
1	O	O	O	O	O	O	O	O	O	O
2	S	O	S	O	O	S	S	S	O	S
3	O	S	O	O	O	S	O	S	S	S
4	S	O	O	O	S	S	S	O	S	S
5	O	O	O	S	S	O	S	S	O	S
6	O	O	S	S	O	O	S	O	O	O
7	O	S	S	O	S	S	O	O	S	S
8	S	S	O	S	S	S	S	O	O	S
9	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	S	S	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. MECHANICAL SYNCHRONIZATION OF CHASSIS CHECK.

(1) OPERATING CONDITIONS AND CONTROL SETTINGS. - Set controls as follows:

(a) R-1051D/URR chassis pulled out of case.

(b) Mode Selector switch at OFF.

(c) MCS and KCS controls at 11111 kHz.

(2) PROCEDURE. - Proceed as follows:

(a) Remove rf amplifier electronic assembly A2A4 from chassis.

(b) Remove translator/synthesizer electronic assembly A2A6 from chassis.

(c) Coupling disks on bottom of assemblies should be set at 1. Rotate MCS and KCS controls on main frame to 00000. Three mechanical coupler keyways for translator/synthesizer electronic assembly A2A6 should be towards rear of chassis.

(d) Rotate MCS and KCS controls to 00660. Two keyways for rf amplifier electronic assembly A2A4 should be towards rear of chassis.

(e) Rotate MCS and KCS controls to 00000 and then to 29999, observing that numbers appear near center of windows.

(f) Ensure that spring washer under each coupling disk on main frame has not been flattened enough to prevent engagement of coupler when assemblies are installed.

(g) Rotate MCS and KCS controls to 11111 and replace both assemblies in chassis. Rotate KCS controls to ensure that all coupling disks are engaged.

SECTION 5

MAINTENANCE

5-1. FAILURE, AND PERFORMANCE AND OPERATIONAL REPORTS.

Note

The Naval Ship Systems Command no longer requires the submission of failure reports for all equipments. Failure Reports and Performance and Operational Reports are to be accomplished for designated equipments (refer to Electronics Installation and Maintenance Book, NAVSHIPS 900,000) only to the extent required by existing directives. All failures shall be reported for those equipments requiring the use of Failure Reports.

5-2. PREVENTIVE MAINTENANCE.

a. GENERAL. For preventive maintenance procedures, refer to the Reference Standards Book for Radio Receiver R-1051D/URR, NAVSHIPS 0967-878-3050. Separate tuning and adjustment procedures for the 20-volt regulator circuit, the 5 mc oscillator, vernier frequency, BFO frequency, and AGC and if. gain loop are provided under tuning and adjustment. For test equipment required in Section 5, refer to table 5-1.

b. TUNING AND ADJUSTMENT.

(1) 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.

(a) TEST EQUIPMENT. - Multimeter AN/PSM-4 ( ) is required to perform this adjustment.

(b) PRELIMINARY CONTROL SETTINGS. - Set the Mode Selector switch at STD BY prior to the start of the adjustment.

(c) TEST SETUP. - Connect the equipment as follows:

1. Loosen front-panel screws and slide chassis from case.
2. Defeat chassis interlock by gripping plunger, positioning in center of hole in chassis bracket, and pulling outward.
3. Tilt chassis 90 degrees to expose bottom.
4. Set Multimeter AN/PSM-4( ) to indicate 50 volts full-scale.
5. Connect positive lead of AN/PSM-4( ) to solder terminal E11 on bottom of chassis (figure 5-24).
6. Connect negative lead of AN/PSM-4( ) to chassis.

(d) ADJUSTMENT. - To adjust the 20-volt regulator circuit, proceed as follows:

1. Set Mode Selector switch at AM.
2. Set MCS controls for frequency greater than 2 MHz. Adjust output voltage control A2A8R14 (figure 5-24) for indication of 20 ±0.1 Vdc on AN/PSM-4 ( ).

Note

Whenever A2A8R14 is adjusted, perform 5 mc oscillator circuit adjustment procedure of paragraph 5-2b(2).

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

(2) 5 MC OSCILLATOR CIRCUIT ADJUSTMENT. - The 5 mc oscillator circuit in frequency standard electronic assembly A2A5 must be adjusted properly to ensure accurate development of frequencies in the R-1051D/URR. However, the adjustment must not be made until it has been determined

TABLE 5-1. TEST EQUIPMENT REQUIRED FOR MAINTENANCE

NAME	DESIGNATION
Frequency Standard	AN/URQ-9
Multimeter	AN/PSM-4( )
Frequency Meter	AN/USM-207( )
RF Signal Generator	CAQI-606A
Multimeter, Electronic (rf voltmeter)	CCVO-91CA
Multimeter, Electronic	ME-6( )/U
Multimeter, Electronic	AN/USM-116( )
Voltmeter, Heterodyne	CDAN-2005
Oscilloscope	AN/USM-105(A)
Test Set, Amplifier	TS-2132/WRC-1
Test Set, Translator/ Synthesizer	TS-2133/WRC-1
Test Set, Frequency Standard	TS-2134/WRC-1
Adapter, BNC to N	UG-201/U
Resistor, 600 ohm, 2 watt	RC42GF601J
Coaxial Tee Connector (BNC)	UG-274A/U
Extender Test Cable	666243-070
Extender Test Cable	666243-071

that the 5-MHz output frequency is in error. Unnecessary adjustment will cause poor equipment operation that is not only difficult to correct, but requires lenghthy maintenance time.

(a) TEST EQUIPMENT. - Frequency Standard AN/URQ-9 is required to perform this adjustment.

(b) PRELIMINARY CONTROL SETTINGS. - Set the Mode Selector switch at STD BY. Allow at least a 3-day warm-up period before proceeding with the final adjustment. If immediate adjustment is necessary, check oscillator adjustment after required warm-up period.

(c) TEST SETUP. - Connect the equipment as follows:

1. Connect 5 MC OUTPUT jack on Frequency Standard AN/URQ-9 to EXT 5MC IN jack J25 at rear of R-1051D/URR.

2. Loosen front-panel screws on R-1051D/URR and slide chassis from case. Defeat chassis interlock by gripping plunger, positioning in center of hole in chassis bracket, and pulling outward.

(d) ADJUSTMENT. - To adjust the 5 mc oscillator circuit, proceed as follows:

1. Using a small screwdriver, rotate COMP/INT/EXT switch S1 on top of frequency standard electronic assembly A2A5 to COMP.

2. Set Mode Selector switch at AM. Observe comparator lamp DS1 on top of frequency standard electronic assembly A2A5. 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.

CAUTION

Less than one-quarter turn will correct for most drift. Do not force adjustment.

3. Adjust capacitor C1 (labeled FREQ ADJ) frequency standard electronic assembly A2A5 until lamp changes brilliance as slowly as possible. (See figure 5-22.) Less than one-quarter turn will correct for most drift.

4. Wait 5 minutes and repeat steps 2 and 3 until time measured is in excess of 20 seconds.

5. Rotate COMP/INT/EXT switch to INT. Set Mode Selector switch at OFF. Slide chassis into case and tighten front-panel screws.

6. Disconnect Frequency Standard AN/URQ-9.

(3) VERNIER FREQUENCY ADJUSTMENT. (See figure 5-28.)

(a) TEST EQUIPMENT. - Frequency Meter AN/USM-207( ) is required to perform this adjustment.

(b) PRELIMINARY CONTROL SETTINGS. - Set COMP/INT/EXT switch on frequency standard electronic assembly A2A5 at COMP. Set Mode Selector switch at LSB, CPS switch at 000, RF GAIN control fully clockwise, MCS and KCS controls at 5.001 MHz, AUDIO LEVEL meter switch at LSB, and LSB PHONE LEVEL control fully clockwise.

(c) TEST SETUP. - Connect INT 5MC OUT jack J24 to ANT 50 Ω jack J23 at rear of the R-1051D/URR. Adjust LSB LINE LEVEL control for +10 dB on AUDIO LEVEL meter. Connect Frequency Meter AN/USM-207( ) to LSB PHONES jack.

(d) ADJUSTMENT. - To adjust the vernier frequency, proceed as follows:

1. Frequency meter should read 1000 Hz. Set CPS switch at V position.

2. Rotate CPS vernier control fully counterclockwise.

3. Adjust potentiometer A2A11A1R2, located adjacent to vernier potentiometer near front, top, right side of R-1051D/URR (figure 5-28), for not more than 980-Hz indication on AN/USM-207( ).

4. Rotate CPS vernier control fully clockwise and check AN/USM-207 ( ) for indication of not less than 2020 Hz.

5. Recheck and adjust potentiometer A2A11A1R2 as necessary until both frequencies are within limits.

(4) BFO FREQUENCY ADJUSTMENT. - The BFO circuit in mode selector electronic assembly A2A1 is adjusted to produce a frequency between 497 and 503 kHz, depending upon the setting of the BFO FREQ control on the front panel.

(a) TEST EQUIPMENT. - Frequency Meter AN/USM-207( ) is required to perform this adjustment accurately. However, completely adequate results may be obtained by connecting headphones to USB PHONES jack and centering BFO FREQ control instead of using AN/USM-207( ).

(b) PRELIMINARY CONTROL SETTINGS. - Set the Mode Selector switch at CW, AGC switch at FAST, MCS and KCS controls at 5.000 MHz, and CPS switch at 000.

(c) TEST SETUP. - Connect the equipment as follows:

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

2. Rotate COMP/INT/EXT switch on frequency standard electronic assembly A2A5 to COMP.

3. Defeat chassis interlock by gripping plunger, positioning in center of hole in chassis bracket, and pulling outward. Connect INT 5MC OUT jack J24 to ANT 50 Ω jack J23, using BNC to N adapter UG-201/U.

4. Connect input of AN/USM-207( ) to USB PHONES jack.

(d) ADJUSTMENT. - To adjust the BFO frequency, proceed as follows:

1. Rotate BFO FREQ control fully counterclockwise and note frequency indicated by AN/USM-207( ). If no reading is obtained on AN/USM-207( ), increase USB PHONE LEVEL and USB LINE LEVEL adjustments until stable reading is obtained.

2. Rotate BFO FREQ control fully clockwise and note frequency indicated by AN/USM-207( ). Adjust BFO ADJ inductor A2A1A3L1 so that AN/USM-207( ) reads 3 kHz minimum when BFO FREQ control is at extreme counterclockwise and clockwise positions.

3. Set Mode Selector switch at OFF. Disconnect AN/USM-207( ) from USB PHONE jack. Remove antenna test cable and connect antenna to ANT 50 Ω jack J23.

(5) AGC AND IF. GAIN LOOP ADJUSTMENT. - The AGC and if. gain loop in if./audio amplifier electronic assemblies A2A2 and A2A3 are adjusted as indicated in the following paragraphs.

(a) TEST EQUIPMENT. - The following test equipment is required to perform this adjustment: RF Signal

Generator CAQI-606A, Electronic Multimeter AN/USM-116( ), and Electronic Multimeter (rf voltmeter) CCVO-91CA.

(b) PRELIMINARY CONTROL SETTINGS. - Set Mode Selector switch at USB, MCS and KCS controls at 22.010 MHz, CPS switch at 000, RF GAIN control fully clockwise, USB LINE LEVEL control fully clockwise, AGC switch at FAST and AUDIO LEVEL meter switch to USB.

(c) TEST SETUP. - Connect the equipment as follows:

1. Connect RF Signal Generator CAQI-606A to ANT 50 Ω jack J23 at rear of R-1051D/URR (figure 5-25).

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

3. Defeat chassis interlock by gripping plunger, positioning in center of hole in chassis bracket, and pulling outward.

4. Loosen two screws and remove dust cover from if./audio amplifier electronic assembly A2A2 (left assembly, figure 5-22).

5. Set Electronic Multimeter AN/USM-116( ) for +DC on 1-volt scale. Connect dc lead to TP1 at top of left if./audio amplifier A2A2 and common lead to chassis ground.

(d) ADJUSTMENT. - To adjust the agc and if. gain loop, proceed as follows:

1. Set CAQI-606A to CW with 0.5-microvolt output. Tune CAQI-606A to receiver frequency observing AUDIO LEVEL meter, and then for peak reading on Electronic Multimeter AN/USM-116( ). Adjust R25 (AGC ADJ on top of if./audio amplifier) for 0.2 volt on AN/USM-116( ). Detune CAQI-606A slightly and repeat to check setting of R25.

2. Set CAQI-606A output to 0.05 volt. Adjust R22 on if./audio amplifier electronic assembly A2A2 for 20 dB on AUDIO LEVEL meter. Refer to removed dust cover for location of R22. Turn R22 clockwise to increase output and counterclockwise to decrease output. To adjust R22, remove module, turn R22 in correct direction, replace assembly, and recheck measurement.

3. If measurement cannot be obtained in step a, perform step b in place of step a.

a. Connect Electronic Multimeter (rf voltmeter) CCVO-91CA (without 50-ohm adapter) to TP5 on rf translator electronic subassembly A2A6A6, and set scale to 10 millivolts. Increase CAQI-606A output to 0.075 volt and adjust frequency for peak indication on AUDIO LEVEL meter. Adjust R6 on A2A2A1 printed-circuit board for 6 millivolts on CCVO-91CA. Replace dust cover.

b. Set AN/USM-116( ) for -DC on 30-volt scale. Connect dc lead to TP2 on if./audio amplifier electronic assembly A2A2 and common lead to ground. Set CAQI-606A for 0.075-volt output and adjust CAQI-606A frequency for peak on AN/USM-116( ). Adjust R6 on A1 printed-circuit board for -17 volts on AN/USM-116 ( ).

4. Set Mode Selector switch at LSB and LSB LINE LEVEL control fully clockwise. Use same procedure to adjust LSB AGC in if./audio amplifier electronic assembly A2A3, substituting LSB in place of USB throughout procedure.

5-3. REPAIR OF ELECTRONIC ASSEMBLIES.

The instructions in this portion of the maintenance section provide repair and adjustment instructions for if./audio amplifier electronic assemblies A2A2 and A2A3, and mode selector electronic assembly A2A1. Code generator electronic assembly A2A7 is a non-repairable assembly; when found defective it is discarded. RF amplifier electronic assembly A2A4, frequency standard electronic assembly A2A5, and translator/synthesizer electronic assembly A2A6 are not repaired aboard ship.

Note

Before attempting repair of any module, consult equipment APL to determine repair status of module by SM & R coding.

a. SHIPBOARD REPAIRABLE ELECTRONIC ASSEMBLIES

Note

The variable transformers in the electronic assemblies are cemented in the factory after adjustment. In repairing an electronic assembly, it may be necessary to break the cement seal, or put in a new transformer that is not cemented. In either case, apply a small amount of Glyptal cement to the transformer after adjustment.

(1) IF./AUDIO AMPLIFIER ELECTRONIC ASSEMBLIES A2A2 AND A2A3. - The following paragraphs provide instructions for removal, cleaning, repair, and adjustment of if./audio amplifier electronic assemblies A2A2 and A2A3.

(a) TEST EQUIPMENT. - The following test equipment is required to adjust if./audio amplifier electronic assembly A2A2 or A2A3 after repair: RF Signal Generator CAQI-606A; Electronic Multimeter ME-6 ( )/U; Multimeter AN/PSM-4 ( ); Cable assembly, Part No. 666243-070; and 600-ohm, 2-watt, carbon resistor RC42GF601J.

(b) REMOVAL. - IF./audio amplifier electronic assemblies A2A2 and A2A3 are located side-by-side at the rear of the chassis (figure 5-22). They operate identically and are interchangeable. To remove either electronic assembly, loosen the two corner fastening screws on top of the electronic assembly and lift it from the chassis. Remove the two dust cover screws and lift the dust cover from the electronic assembly.

(c) REPAIR. - Clean dust and other foreign matter from the electronic assembly. Inspect the entire electronic assembly for defective electrical components, frayed wiring, or loose connections or connectors. The only parts or components to be replaced are electrical components. See figures 5-35 through 5-41 for component location.

(d) REASSEMBLY. - After repair, replace any component board that may have been removed for repair or replacement of parts. If electrical components were replaced in the electronic assembly, refer to paragraph (c).

(e) ADJUSTMENTS. - If electrical components were replaced in the electronic assembly, which necessitates retuning any or all of the variable transformers, adjust the electronic assembly as follows:

1. Plug cable assembly Part No. 666243-070 into P1 on bottom of electronic assembly (figure 5-11).
2. Plug cable assembly Part No. 666243-070 into J18 on chassis.

Note

To ensure uniform alignment of if./audio amplifier electronic assemblies A2A2 and A2A3, both assemblies should be tested, one at a time, with cable assembly Part No. 666243-070 connected to chassis connector J18.

3. Set R-1051D/URR controls as follows:
   a. Mode Selector switch at AM.
   b. MCS and KCS controls at 06,000 kHz.
   c. RF GAIN control fully clockwise.
   d. CPS switch at 000.
   e. AUDIO LEVEL meter switch at USB.
   f. USB LINE LEVEL control at mid-range.
   g. AGC switch at SLOW.
4. Defeat chassis interlock by gripping plunger, positioning in center of hole in chassis bracket, and pulling outward.
5. Connect RF Signal Generator CAQI-606A to J23 on rear panel. Set CAQI-606A as follows:
   a. Frequency at 6.00 MHz.
   b. Output level at 1 millivolt.
   c. Modulation at INT 1000 Hz.
   d. Modulation amplitude at 30 percent.
6. Connect Electronic Multimeter ME6( )/U to J5 at rear of panel.

Connect the 600-ohm resistor RC42GF601J across the terminals of electronic multimeter. Set ME-6( )/U to indicate 10 Vac full-scale.

7. Adjust USB LINE LEVEL control for 2-volt indication on ME-6( )/U.

8. Connect Multimeter AN/PSM-4( ) to TP1 (figure 5-36) on if./audio amplifier electronic assembly A2A2. Set AN/PSM-4( ) to indicate 1 Vdc full-scale. Adjust CAQI-606A rf output level for a 0.3- to 0.45-volt indication on AN/PSM-4( ).

9. Tune CAQI-606A for peak indication on ME-6( )/U.

Note

The variable transformers in the electronic assembly have very broad bandwidths and sometimes require repeated adjustment to obtain the correct peak.

10. Tune transformers A2T1, A2T2, A2T3 and A2T4 for peak indication on AN/PSM-4( ). If indication on AN/PSM-4( ) exceeds 6 volts, rotate USB LINE LEVEL control in counterclockwise direction to decrease indication. Tune transformers A2T3 and A2T4 for peak indication on ME-6( )/U. If reading exceeds 6 volts, rotate USB LINE LEVEL control counterclockwise until meter indicates 6 volts.

11. Rotate AGC GAIN adjust A1R25 (figure 5-36) fully counterclockwise. Decrease CAQI-606A output level for a 0.2- to 0.3-volt indication on AN/PSM-4 ( ). Tune transformers A1T1 and A1T2 for peak indication on AN/PSM-4( ).

Note

After setting potentiometer A1R25, perform agc alignment [(paragraph 5-2b(5)] with the module plugged into the connector from which it was originally removed. For if./audio amplifier electronic assembly A2A3, perform step 4 of paragraph 5-2b(5)(d).

12. Set Mode Selector switch at AM. Tune inductor A3L1 on electronic assembly (figure 5-40 or 5-41) for peak indication on ME-6( )/U.

(2) MODE SELECTOR ELECTRONIC ASSEMBLY A2A1. - The following paragraphs provide instructions for removal, cleaning, repair, and adjustment of mode selector electronic assembly A2A1.

(a) TEST EQUIPMENT. - Frequency Meter AN/USM-207( ) is required to adjust mode selector electronic assembly A2A1 after repair.

(b) REMOVAL. - To remove mode selector electronic assembly A2A1, located at the left-rear center of the chassis, loosen the two corner fastening screws on top of the electronic assembly and lift it from the chassis. Remove the dust cover screw and lift the dust cover.

(c) REPAIR. - Clean dust and foreign matter from the electronic assembly. Inspect the entire electronic assembly for defective electrical components, frayed wiring, or loose connections or connectors. See figures 5-29 through 5-34 for component location.

(d) REASSEMBLY. - Replace any connections removed for repair. Replace the dust cover and place the electronic assembly into the chassis and tighten the two corner fastening screws.

(e) ADJUSTMENTS. - The only adjustment performed on the electronic assembly is adjustment of the BFO frequency. Refer to paragraph 5-2b(4).

b. NON-SHIPBOARD REPAIRABLE ELECTRONIC ASSEMBLIES.

(1) RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4. - RF amplifier electronic assembly A2A4 may be repaired aboard ship only to the extent of replacing defective electron tubes V1 and/or V2; otherwise the entire electronic assembly is replaced with a spare electronic assembly aboard ship. The following paragraphs provide instructions for replacement of electron tubes and for replacement of rf amplifier electronic assembly A2A4 as a unit.

(a) REPLACEMENT OF ELECTRON TUBES. - To replace a defective electron tube, proceed as follows:

1. Turn off power to R-1051D/URR.

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

3. As necessary, withdraw tube shield by bail handle, replace defective tube, and install shield.

4. Slide chassis within case and tighten front-panel screws.

5. Apply power and verify that R-1051D/URR operates satisfactorily.

(b) REPLACEMENT OF ENTIRE ELECTRONIC ASSEMBLY. - To replace a defective electronic assembly, proceed as follows:

1. Turn off power to R-1051D/URR.

2. Set KCS controls for 111.

3. Loosen four fastening screws at corners of rf amplifier electronic assembly A2A4 and lift electronic assembly from chassis.

4. Check that slots in chassis couplers point toward and are perpendicular to front panel. If not, refer to paragraph 5-5d(2).

5. Set couplers on bottom of spare rf amplifier electronic assembly A2A4 at position 1. Place spare assembly into chassis, applying small amount of finger-pressure. Rotate 100 KCS and 10 KCS controls to 0, then to 2, and then to 1, while observing digital tuning rotor assemblies on turret assembly located inside electronic assembly. This is done by looking through tube access slot in top of dust cover. As 100 KCS control is rotated, top two wafers (with vertical posts) should rotate. As 10 KCS control is rotated, lower rotor (with printed circuit visible) should rotate.

6. When couplers are fully engaged, tighten four fastening screws at corners of rf amplifier electronic assembly A2A4.

(2) FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5. - Frequency standard electronic assembly A2A5 is a non-repairable electronic assembly. To replace a defective electronic assembly, loosen the two corner fastening screws on top of the electronic assembly and lift it from the chassis. Place the spare electronic assembly into the chassis and tighten the fastening screws.

(3) TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6. - Translator/synthesizer electronic assembly A2A6 is replaced with a spare electronic assembly aboard ship. To replace a defective electronic assembly, proceed as follows:

(a) Turn off power.

(b) Loosen four fastening screws at corners of translator/synthesizer electronic assembly A2A6.

(c) Rotate KCS controls to 111 and carefully lift out electronic assembly. Rotate KCS controls to 000.

(d) Check that slots in couplers point toward and are perpendicular to rear chassis panel. If not, refer to paragraph 5-5d(2).

(e) Rotate KCS controls back to 111. Carefully place new electronic assembly into chassis.

(f) Apply slight finger-pressure on top of electronic assembly and rotate KCS controls. When couplers are fully engaged, tighten four fastening screws in corners of translator/synthesizer electronic assembly A2A6.

(g) Apply power and verify that R-1051D/URR operates satisfactorily.

c. NON-REPAIRABLE ELECTRONIC ASSEMBLY CODE GENERATOR ELECTRONIC ASSEMBLY A2A7. - Code generator electronic assembly A2A7 is completely non-repairable. Refer to paragraph 4-5r(2)(g) for the replacement procedure.

5-4. EMERGENCY MAINTENANCE FOR ELECTRONIC ASSEMBLIES.

IF./audio amplifier electronic assemblies A2A2 and A2A3 function identically and are interchangeable. If it is essential that the R-1051D/URR be operated in USB, AM, CW, or RATT modes of operation and if./audio amplifier electronic assembly A2A2 malfunctions, replace it with if./audio amplifier electronic assembly A2A3. If LSB mode of operation is desired and if./audio amplifier electronic assembly A2A3 malfunctions, replace it with if./audio amplifier electronic assembly A2A2. Both of the electronic assemblies must be functioning properly for ISB mode of operation.

In addition, rf amplifier electronic assembly A2A4, frequency standard electronic assembly A2A5 and translator/

synthesizer electronic assembly A2A6, are interchangeable with the same electronic assemblies (A2A4, A2A5, and A2A6) in Radio Transmitter T-827D/URT. Refer to paragraphs 5-3b(1) through (3) to replace these electronic assemblies.

If the 5 mc oscillator in frequency standard electronic assembly A2A5 malfunctions, refer to paragraph 7-4d for patching the 5 mc output of the frequency standard in another unit to the R-1051D/URR.

5-5. REPAIR OF MECHANICAL ASSEMBLIES - RADIO RECEIVER R-1051D/URR CHAIN DRIVE MECHANISM.

a. REMOVAL. - This paragraph provides instructions for removing the drive chains and for removing and disassembling the sprocket assemblies on the bottom of the R-1051D/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 5-24 as a guide:

(1) Turn off power to R-1051D/URR. Loosen front-panel screws and slide chassis out from case.

(2) Remove rf amplifier electronic assembly A2A4 and translator/synthesizer electronic assembly A2A6 from chassis.

(3) Tilt chassis 90 degress to expose bottom.

(4) To remove drive chains, proceed as follows:

(a) Loosen three chain-tension idler gears and slide away from chains.

(b) Locate keeper clip on each drive chain. Carefully remove keeper clips and unthread chains.

(5) Remove four nuts securing dual and triple sprocket assemblies to chassis and lift off sprocket assemblies.

(6) 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 shaft.

b. REPAIR. - To repair a defective sprocket assembly, proceed as follows:

(1) Wipe all disassembled parts with dry, lint-free cloth.

(2) Inspect all parts for damage. Replace worn parts.

(3) Replace metal springs if they no longer provide proper tension between associated parts.

(4) Replace both coupler and shaft if shaft is scored.

(5) Replace detent springs if bent so that too much or too little tension results.

(6) Replace hub clamp if it is evident during equipment operation that proper clamping action was not being maintained.

c. REASSEMBLY. - To reassemble the sprocket assemblies, and to install the sprocket assemblies and drive chains onto bottom of chassis after repair, proceed as follows:

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

(2) Secure sprocket assemblies in their respective positions on chassis with four appropriate nuts.

(3) Thread drive chains onto gears. Fasten ends of each chain together with keeper clip.

d. ADJUSTMENTS. - After reassembly, the chain drive mechanism must be adjusted to assure proper relationship between the front-panel KCS controls, the couplers, and their respective detent spring position in the sprocket assemblies.

(1) DRIVE CHAIN ADJUSTMENT. - To obtain proper positioning of the front-panel KCS controls with respect to the full or "seated" position of the detent spring, adjust the position of the drive chain as follows:

(a) Replace rf amplifier electronic assembly A2A4 and translator/synthesizer electronic assembly A2A6. Make sure that all couplers are engaged properly [(refer to paragraphs 5-3b(1)(b) and 5-3b(3)].

(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 paragraph 5-5d(2).

If digit is not centered in window, proceed as follows:

1. Release chain-tension idler gear and slide away from chain.

2. Lift drive chain away from gears and shift entire chain to position where front-panel control and digit above control remain fairly stationary when chain is tightened. In most cases, trial-and-error method must be used to determine proper chain position.

3. When drive chain is positioned properly, tighten chain-tension idler gear securely against chain.

(c) The Dual sprocket assembly (MP15, figure 5-24) provides means for making finer adjustment for 100 KCS and 10 KCS controls. To make fine adjustment, proceed as follows:

1. 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 detent or "seating" action. If necessary, remove spacer from under detent spring to increase spring tension or add spacer to reduce spring tension.

2. If digit is still not centered fully in window when detent spring is "seated" fully, loosen two hex-head screws on wheel index engaged with detent spring. Wheel index provides "seating" position for detent spring.

3. Press firmly on detent spring above roller. Do not allow wheel index to rotate.

4. Rotate front panel control until digit is exactly centered in window as desired.

5. Release front panel control and detent spring. If digit moves from center of window, repeat steps 3 through 5. When digit is centered exactly in window, tighten hex-head screws on wheel index.

(2) COUPLER ADJUSTMENT. - 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 electrical-mechanical 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 at 1. Insert screwdriver in coupler adjustments in dual sprocket assembly (figure 5-24) and rotate couplers so that slot in each coupler points toward and is perpendicular to front panel.

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

(d) Set 100 KCS, 10 KCS, and 1 KCS controls at 0. Insert screwdriver in respective coupler adjustments in triple sprocket assembly MP14, (figure 5-24) and rotate couplers so that each coupler slot points toward and is perpendicular to rear panel.

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

(f) Set KCS controls to 1. Replace rf amplifier electronic assembly A2A4 and translator/synthesizer electronic assembly A2A6. Restore R-1051D/URR to normal operating condition.

5-6. DEPOT REPAIR.

The following paragraphs provide instructions for repair of rf amplifier electronic assembly A2A4, frequency standard electronic assembly A2A5, and translator/synthesizer electronic assembly A2A6. These depot procedures utilize respective test sets TS-2132/WRC-1, TS-2134/WRC-1, and TS-2133/WRC-1.

a. RF AMPLIFIER ELECTRONIC ASSEMBLY A2A4. - The following procedures provide instructions for test and repair of rf amplifier electronic assembly A2A4. All testing is accomplished using Amplifier Test Set TS-2132/WRC-1.

(1) TEST EQUIPMENT. - The following test equipment or equivalent is required:

(a) Amplifier Test Set TS-2132/WRC-1.

(b) Multimeter AN/PSM-4( ).

(c) RF Signal Generator CAQI-606A (2 required).

(d) Frequency Meter AN/USM-207( ).

(e) Electronic Multimeter (rf voltmeter) CCVO-91CA (with 50-ohm load).

(f) Heterodyne Voltmeter CDAN-2005.

(2) PRELIMINARY INSTRUCTIONS. - Proceed as follows:

(a) Set MCS AND KCS frequency controls on test set at 00.000 MHz.

(b) Test Set control settings:
OFF/STANDBY/OPERATE switch STANDBY.
STD BY indicator: on
28V ON indicator: on
20V DC test points: +20 Vdc (use multimeter and set with 20V ADJ)

(c) Plug electronic assembly into top panel of test set. Secure with four captive screws.

(d) Rotate frequency controls on test set back and forth one full turn to ensure that couplers are fully engaged, and return to 00.000 MHz.

(e) Test set control settings:
OFF/STANDBY/OPERATE switch: OPERATE
STD BY indicator: off
OPERATE indicator: on
110 VDC test points: -110 ±10 Vdc (use multimeter)
110 VDC indicator: on
-30 VDC test point: -30 ±1 Vdc

(3) RECEIVE GAIN AND TRACKING TEST - Proceed as follows:

(a) For test setup, see figure 5-1.

(b) Test set control settings:
EXCITE/RECEIVE switch: RECEIVE
RECEIVE indicator: on
AGC ADJUST control: fully counterclockwise
Frequency controls: 02.100 MHz

(c) RF Signal Generator CAQI-606A settings:
Frequency: 2.1 MHz
Output: 1 mV
Modulator: CW

(d) Set Electronic Multimeter CCVO-91CA scale at 0.3 volt.

(e) Result: 44 ±5 db gain above 1 mV.

(f) Set test set KCS control at 0.

(g) RF Signal Generator CAQI-606A settings:
Frequency: 2.00 MHz ±200 Hz
Output: adjust for mid-scale indication on electronic multimeter

(h) RF Signal Generator CAQI-606A operation: Vary frequency slowly above and below center frequency; observe Electronic Multimeter CCVO-91CA.

(i) Result: maximum variation 3 dB above reference.

(j) Repeat steps (f) through (i) at 02.100 MHz through 02.900 MHz.

(k) Repeat steps (f) through (h) at 02.010 MHz through 02.080 MHz.

(l) Result: maximum variation 1 dB above reference.

(4) RECEIVE AGC TEST. - Proceed as follows:

(a) Set test set frequency controls at 02.100 MHz.

(b) Connect Electronic Multimeter CCVO-91CA to AGC jacks and set to measure (-) dc voltage.

(c) Set AGC ADJUST control for 0 Vdc on electronic multimeter.

(d) Set electronic multimeter scale at 1 volt.

(e) RF Signal Generator CAQI-606A control settings:
Frequency: 2.1 MHz
Output: 1 volt on electronic multimeter

(f) Set AGC ADJUST control on test set for 50 dB down from 1 volt on electronic multimeter.

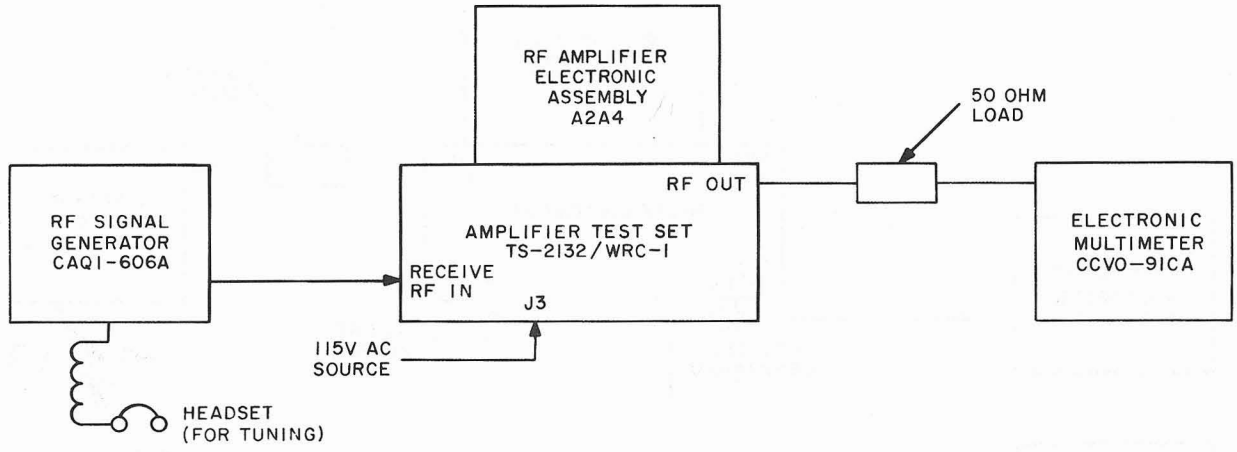


Figure 5-1. RF Amplifier Electronic Assembly A2A4, Preliminary Instructions Test Setup

(g) Result: electronic multimeter indicates -15 ±2 Vdc.

(5) EXCITE GAIN TEST. - Proceed as follows:

Note

RF amplifier electronic assembly A2A4 is designed to be interchangeable with other equipment in the same series. When used for the T-827D/URT, the A38 subassembly performs the function of amplifying only. When used for certain other transmitting applications, the A38 subassembly is used as a mixer. For this reason, the following exciter gain procedure is divided into two parts to test the A38 subassembly of rf amplifier electronic assembly A2A4 as both an amplifier and mixer.

(a) For test setup, see figure 5-2 (first part of test).

(b) Test set control settings:
AGC ADJUST control: fully counterclockwise
EXCITE/RECEIVE switch: EXCITE
EXCITE indicator: on
Frequency controls: 02.100 MHz

(c) RF Signal Generator CAQI-606A (No. 1) settings:
Frequency: 2.1 MHz
Output: 1.75-volt indication on electronic multimeter
Modulation: CW

(d) Heterodyne Voltmeter CDAN-2005 settings:
Frequency: 2.1 MHz
Scale: 15 mV

(e) Result: 3 mV maximum on heterodyne voltmeter.

(f) Repeats steps (c) through (e) at all positions of MCS frequency control on test set, and set rf signal generator No. 1 at same frequency, that is, 3.1, 4.1, 5.1 MHz, etc. This completes first part of exciter gain test.

(g) For test setup, see figure 5-3 (second part of test).

(h) Test set control settings:
AGC ADJUST control: fully counterclockwise
EXCITE/RECEIVE switch: EXCITE

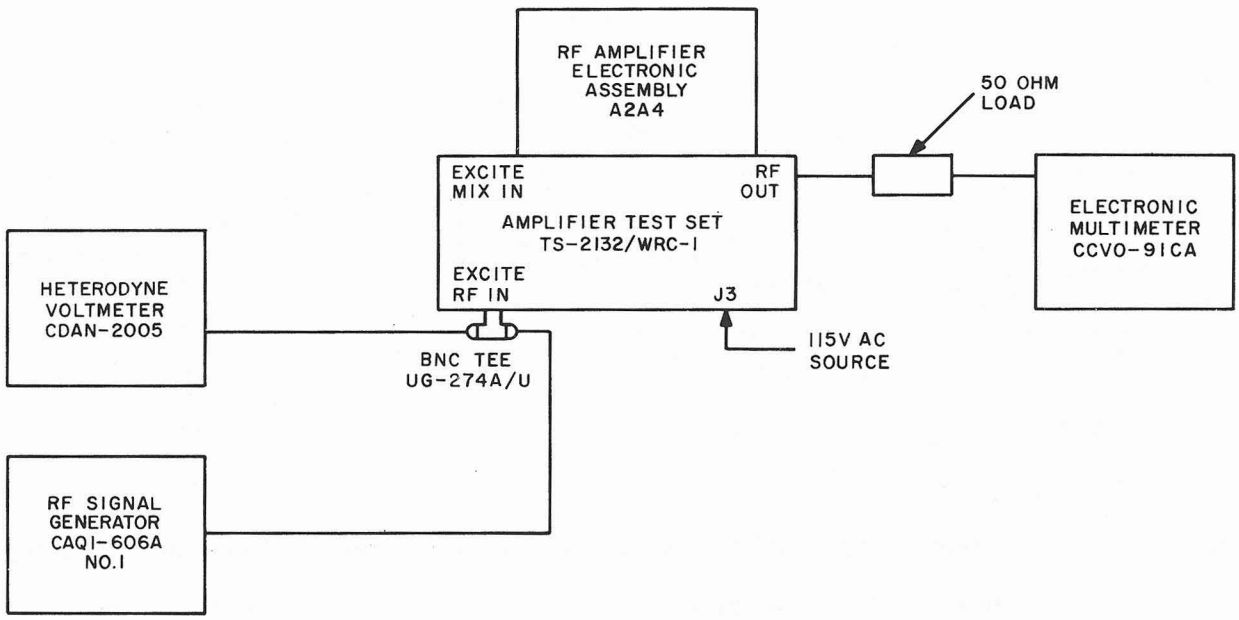


Figure 5-2. RF Amplifier Electronic Assembly A2A4, Exciter Gain Test Setup for First Part of Test

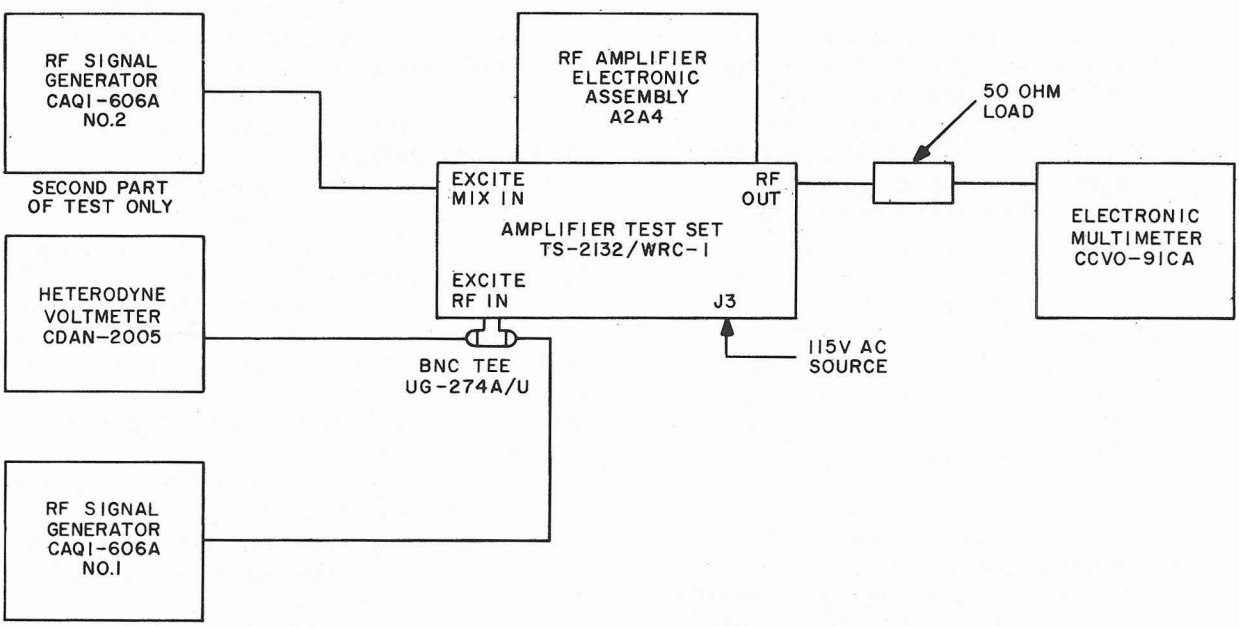


Figure 5-3. RF Amplifier Electronic Assembly A2A4, Exciter Gain Test Setup for Second Part of Test

EXCITE indicator; on Frequency controls: 02, 100 KHz

(i) Rf Signal Generator CAQI-606A (No. 2) settings:

Frequency: 17.5 MHz
Output: 100 mV
Modulation: CW

(j) Rf Signal Generator CAQI-606A (No. 1) settings:

Frequency: 19.6 MHz
Modulation: CW
Output: Adjust for 1.75-volt indication on electronic multimeter.

(k) Heterodyne Voltmeter CDAN-2005 settings:

Frequency: 19.6 MHz
Scale: 15 mV

(l) Result: 6 mV maximum on heterodyne voltmeter.

(m) Vary frequency slightly above and below settings on rf signal generators No. 1 and No. 2.

(n) Result: Electronic multimeter voltage varies in response to varitions in both signal generators.

Note

If varying the frequency of rf signal generators No. 1 and No. 2 does not result in a change of voltage on the electronic multimeter, reduce the output level of rf signal generator No. 1 a small amount and repeat steps (m) and (n). Repeat these steps until control by both signal generators is obtained. Under these conditions, the voltage on the electronic multimeter may rise above the specified 1.75 volts, and voltage output of signal generator No. 1 may drop much below 6 mV, but signal generator No. 2 must be maintained at 100 mV.

(o) Repeat steps (i) through (n) at all positions of MCS frequency control on test set. At each setting, equipment is set as follows:

1. RF signal generator No. 2

Frequency: tuned to frequency under MIX IN column on top panel of test set.

Output: 100 mV

2. RF signal generator No. 1

Frequency: tuned to sum of frequencies under RF IN column on test set

Output: set for 1.75 volts on electronic multimeter

(p) Result: 6 mV maximum on heterodyne voltmeter at all frequencies.

(q) Turn off all power and disconnect power and test cables. Remove electronic assembly from test set.

(6) REPAIR. - Proceed as follows:

(a) Remove captive screws through top of electronic assembly cover. Remove screws at sides of cover. Remove cover to expose turret.

(b) Replace any megacycle strip as follows:

1. Lift off shock ring from top of turret.
2. Remove four screws on retaining ring and remove ring.
3. Withdraw defective megacycle strip and replace with correct spare megacycle strip.
4. Install retaining ring and secure with four screws.
5. Replace shock ring.

(c) Disassemble turret subassembly, as necessary, as follows:

1. Lift off shock ring.
2. Remove four screws on retaining ring and remove ring.
3. Remove megacycle strips A2 through A29.
4. To remove bottom ring assembly, remove screws which secure bearing pillow blocks. Unsolder leads from printed-circuit board as necessary to free board.
5. To remove top plate, remove screws and kc switch. For complete disassembly, remove couplings. Use Allen wrench to loosen set screw on innermost shaft. Note witness marks for reassembly.

(d) Reassemble turret subassembly by reversing order of disassembly.

(e) To remove motor, remove three screws and disconnect leads; replace with spare or repaired motor, as necessary.

(f) When repairs are complete, install electronic assembly cover and

secure using screws at sides of cover. Replace captive screws, removed in step (a), through top of cover.

b. FREQUENCY STANDARD ELECTRONIC ASSEMBLY A2A5. - The following procedures provide instructions for test and repair of frequency standard electronic assembly A2A5. All testing is accomplished using Frequency Standard Test Set TS-2134/WRC-1.

(1) TEST EQUIPMENT. - The following test equipment or equivalent is required:

(a) Frequency Standard Test Set TS-2134/WRC-1.

(b) Multimeter AN/PSM-4( ).

(c) Electronic Multimeter CCVO-91CA.

(d) Frequency Meter AN/USM-207( ).

(e) Frequency Standard AN/URQ-9, or other 5-MHz signal source good to 1 part in 10^9 for frequency and having an output amplitude between 0.3 and 5.volts.

(2) PRELIMINARY INSTRUCTIONS. - Proceed as follows:

(a) Remove dust cover from electronic assembly.

(b) For test setup, see figure 5-4.

(c) Apply power to equipment and allow 4-hour warm-up period.

(d) Set test set heater current meter selector switch (5 positions, located on side of test set), at position 1.

(e) Observe that heater current meter reading is 250 to 300 mA when cold. When frequency standard heats, current will slowly drop to between 90 and 100 mA. Allow 4-hour warm-up period.

Note

Remaining test positions on test set are for aging and are used primarily to prepare up to four electronic assemblies for calibration or testing.

(f) Test set control settings:
OUTPUT SELECTOR switch: 1
20 VDC test points: 20 Vdc (use multimeter)

(g) Set COMP/INT/EXT switch S1 on frequency standard electronic assembly A2A5 at COMP.

(3) FREQUENCY TEST. - Proceed as follows:

(a) Frequency meter control settings:
Display time: 0.5 second
Sync: internal

(b) Result: 5 MHz ±0.5 Hz

(c) Repeat measurement at following jacks:

Test Set Jack	Result
1 MC	1 MHz ±0.1 Hz
10 MC	10 MHz ±1.0 Hz
500 KC	500 KHz ±0.05 Hz

(4) OUTPUT SIGNAL LEVEL TEST. - Proceed as follows:

(a) Electronic Multimeter CCVO-91CA range: 1 volt full-scale.

(b) Result: 470 mV (minimum).

(c) Repeat measurement at following jacks:

Test Set Jack	Result
1 MC	320 mV minimum
10 MC	70 mV minimum
500 KC	170 mV minimum

(d) Disconnect electronic multimeter from test set.

(5) COMPARATOR CIRCUIT TEST. - Proceed as follows:

(a) For test setup, see figure 5-5.

(b) Frequency standard AN/URQ-9 control settings:
Frequency: 5 MHz ±0.25 Hz
Amplitude: 1.5 volts

(c) On frequency standard electronic assembly A2A5, set COMP/INT/EXT switch S1 at COMP.

(d) Result:

1. Indicator DS1 remains lit, but lamp brilliance varies. If lamp flickers on and off, adjustment or maintenance is required.

2. Electronic multimeter indicates 90 to 110 mV (at S1-1).

(e) Turn off all power and disconnect all power and test cables.

(f) Remove electronic assembly from test set. Set COMP/INT/EXT switch S1 at INT. Replace dust cover.

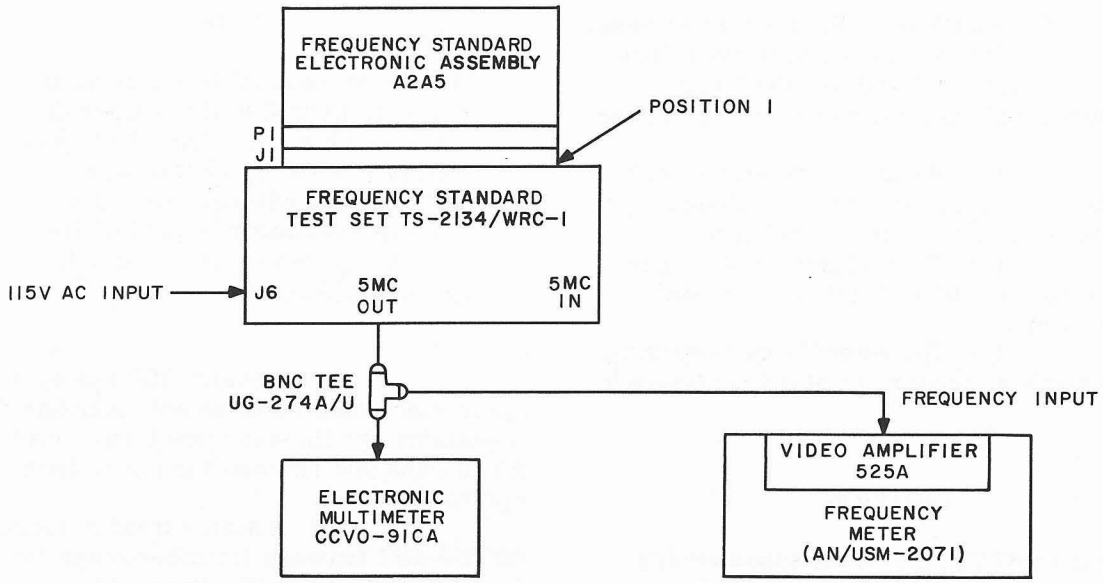


Figure 5-4. Frequency Standard Electronic Assembly A2A5, Output Signal Level Test Setup

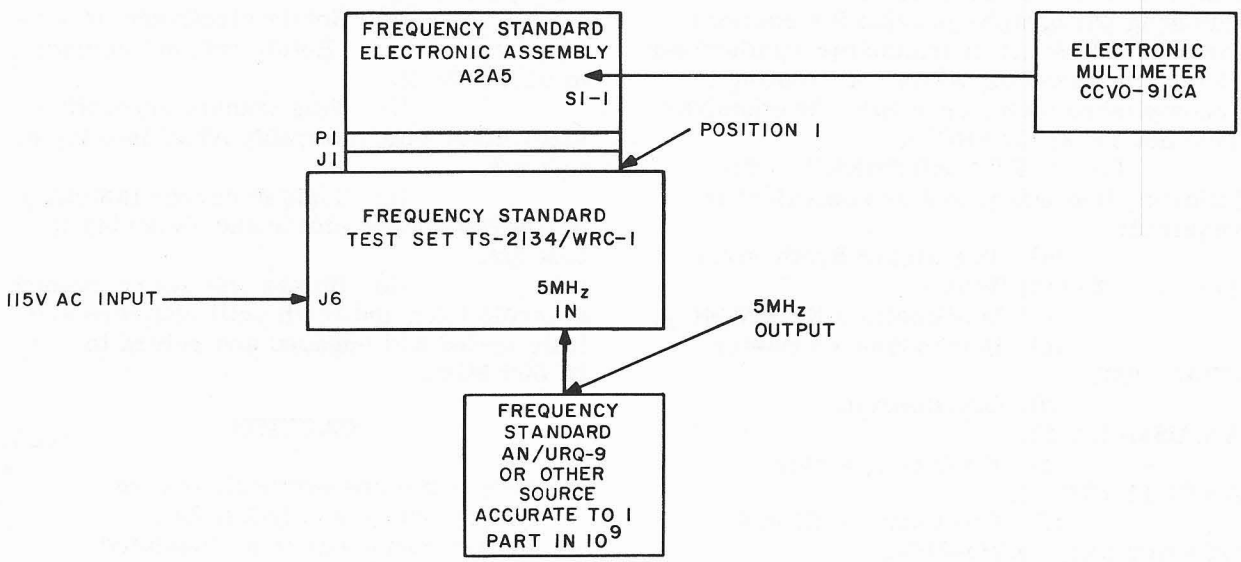


Figure 5-5. Frequency Standard Electronic Assembly A2A5, Comparator Circuit Test Setup

(6) REPAIR. - Proceed as follows:

(a) Remove two screws from cover of frequency standard electronic assembly A2A5 and remove cover to expose oven.

(b) Remove two screws and separate element from crystal subassembly while holding down white foam toroid.

(c) To replace crystal, remove screw securing crystal to crystal subassembly.

(d) Reassemble by reversing disassembly procedure of steps (a) through (c).

CAUTION

When installing crystal subassembly in oven, place wires in trough in oven assembly and in existing depression in white foam toroid. Do not pinch or misalign wires while tightening screws.

c. TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY A2A6. - The following paragraphs provide instructions for test and repair of translator/synthesizer electronic assembly A2A6. All testing is accomplished using Translator/Synthesizer Test Set TS-2133/WRC-1.

(1) TEST EQUIPMENT. - The following test equipment or equivalent is required:

(a) Translator/Synthesizer Test Set TS-2133/WRC-1.

(b) Multimeter AN/PSM-4( ).

(c) Heterodyne Voltmeter CDAN-2005.

(d) Oscilloscope AN/USM-105(A).

(e) Frequency Meter AN/USM-207( ).

(f) Electronic Multimeter (rf voltmeter) CCVO-91CA.

(g) Extender test cable 666243-071.

(2) PRELIMINARY INSTRUCTIONS. - Proceed as follows:

Note

A lock adjustment is required in order to establish the proper dc level at which the phase lock portion of the 100 cps oscillator (A2A6A4A2) will operate. The 100 cps oscillator is part of 100 cps synthesizer electronic subassembly A2A6A4.

(a) Remove 100 cps synthesizer electronic subassembly A2A6A4 from translator/synthesizer electronic assembly A2A6 base and remove the cover from 100 cps synthesizer.

(b) Install extender cable 666243-071 between translator/synthesizer jack for 100 cps synthesizer and plug on 100 cps synthesizer.

(c) Inside TS-2133/WRC-1 test set, ensure that dummy plug has been removed from J105 and that P105 is connected.

(d) Set BDX (100 cps)/GDE (100 cps)/GDE (500 cps) switch at RDX position.

(e) Rotate electronic assembly couplers to 0. Rotate test set couplers to 02.000 MHz.

(f) Plug translator/synthesizer electronic assembly A2A6 into top of test set.

(g) Tighten corner fastening screws to secure electronic assembly to test set.

(h) Rotate test set frequency controls back and forth until couplers are fully mated and engaged and return to 02.000 MHz.

CAUTION

Place 100 cps synthesizer electronic subassembly A2A6A4 (cover removed) on an insulated surface.

(i) For test setup, see figure 5-6.

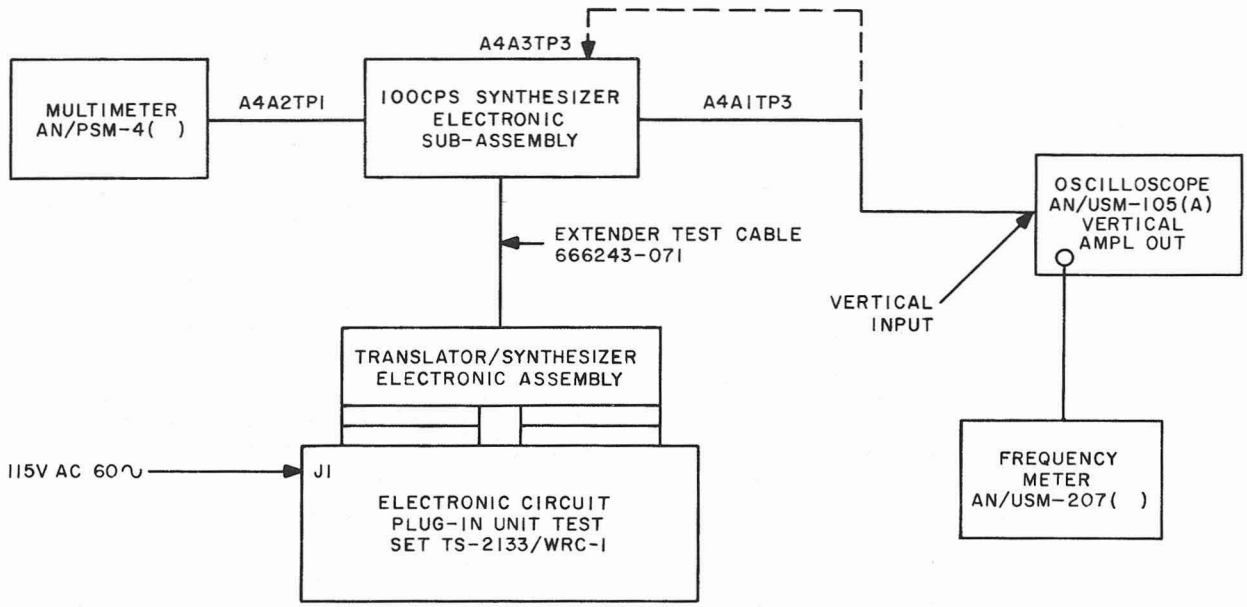


Figure 5-6. Translator/Synthesizer Electronic Assembly A2A6, Preliminary Instructions Test Setup

(j) Test set control settings:
115 VAC switch: ON
115 VAC indicator: on
FREQ STD switch: ON
FREQ STD indicator: on
Check FREQ. STD output (rear panel)
100 CPS/VERNIER switch: 900
EXCITE/RECEIVE switch: RECEIVE
RECEIVE indicator lit
5 MHz output at rear of test set: 5 MHz ±0.1 Hz

(k) Test set voltage checks (rear panel):
20V test points: +20 Vdc (use multimeter and set with 20V ADJ.)
28V test points: +28 ±2.8 Vdc

(l) Oscilloscope control settings:
Vertical deflection: 1V/cm
Sweep speed: 1 ms/cm
Input: AC

(m) Result: 119.0 kHz (at A4A1TP3); 9.0 ±0.2 Vdc (At A4A2TP1).

(n) If necessary, adjust capacitor A4A2C14 on 100 cps oscillator to obtain required dc level.

(o) Set test set 100 CPS/ VERNIER switch at 000.

(p) Result: 110.0 kHz; 4.4 ±0.3 Vdc.

(q) Remove oscilloscope probe from test point A4A1TP3 and connect it to test point A4A3TP3.

(r) Result: 11.000 kHz.

(s) Set test set 100 CPS/ VERNIER switch consecutively at 000 through 900 CPS.

(t) Result: 11.000 to 11.900 kHz.

(u) Set test set VERNIER ADJ control fully counterclockwise.

(v) Set test set 100 CPS/ VERNIER control at VERNIER.

(w) Set test set R2 control for 10.980 kHz or less on frequency meter.

(x) Set test set VERNIER ADJ control fully clockwise.

(y) Result: 12.020 kHz or higher.

(z) Disconnect test equipment and reassemble translator/synthesizer electronic assembly A2A6.

(3) RECEIVE GAIN TEST. - Proceed as follows:

(a) For test setup, see figure 5-7.

(b) Set test set frequency controls at 2.000 MHz.

(c) RF signal generator control settings:

Frequency: 26.000 MHz
Amplitude: 1 mV
Modulation: CW

(d) Heterodyne voltmeter control settings:

Frequency: 500 kHz
Voltage range: 150 mV

(e) Result: 4 mV. (Adjust GAIN potentiometer R52 located on side of rf translator electronic subassembly A2A6 as necessary.)

(f) Repeat steps (b) and (c) for 2 through 29 MHz in 1-MHz steps.

(g) Result: 4 mV minimum. (Adjust R52 as necessary.)

(h) Repeat steps (b) and (c) for 26.100 to 26.900 MHz in 100-kHz steps.

(i) Result: 4 mV minimum.

(j) Repeat steps (b) and (c) for 26.910 to 26.990 MHz in 10-kHz steps.

(k) Result: 4 mV minimum.

(l) Repeat steps (b) and (c) for 26.991 to 26.999 MHz in 1-kHz steps.

(m) Result: 4 mV minimum.

(4) EXCITER GAIN TEST. - Proceed as follows:

(a) For test setup, see figure 5-8.

(b) Verify test set control settings:

EXCITE/RECEIVE switch: EXCITE (EXCITE indicator lights)
Frequency controls: 07.999 MHz
100 CPS/VERNIER switch: 000
500 KC ADJ potentiometer: 5 mV
Heterodyne voltmeter CDAN-2005 connected to 500 KC jack)

(c) Tune Heterodyne Voltmeter CDAN-2005 to 7.999 MHz.

(d) Result:

1. 2.5 mV (minimum) on heterodyne voltmeter.

2. Check that frequency meter reading corresponds to frequency under TRANSLATOR SYNTHESIZER FREQUENCIES column on top panel of test set.

(e) Test set frequency controls: 07.555 MHz.

(f) Tune heterodyne voltmeter to 7.555 MHz.

(g) Result: 2.5 mV (minimum). (Check mc synthesizer electronic subassembly A2A6A1 TP1 frequency.)

(h) Test set frequency controls: 07.000 MHz.

(i) Tune heterodyne voltmeter to 7.000 MHz.

(j) Result: 2.5 mV (minimum). (Check mc synthesizer electronic subassembly A2A6A1 TP1 frequency.)

(k) Test set frequency controls: 09.000 MHz.

(l) Tune heterodyne voltmeter to 9.000 MHz.

(m) Result: 2.5 mV (minimum). (Check mc synthesizer electronic subassembly A2A6A1 TP1 frequency.)

(n) Test set frequency controls: 09.555 MHz.

(o) Tune heterodyne voltmeter to 9.555 MHz.

(p) Result: 2.5 mV (minimum). (Check mc synthesizer electronic subassembly A2A6A1 TP1 frequency.)

(q) Test set frequency controls: 09.999 MHz.

(r) Tune heterodyne voltmeter to 9.999 MHz.

(s) Result: 2.5 mV (minimum). (Check mc synthesizer electronic subassembly A2A6A1 TP1 frequency.)

(t) Connect Electronic Multimeter CCVO-91CA to mc synthesizer electronic subassembly A2A6A1 TP1 jack on test set.

(u) Result: 95 ±5 mV. Adjust level control R11 on mc synthesizer electronic subassembly A2A6A1, as necessary.

(v) Turn off power and disconnect all power and signal cables. Remove electronic assembly from test set.

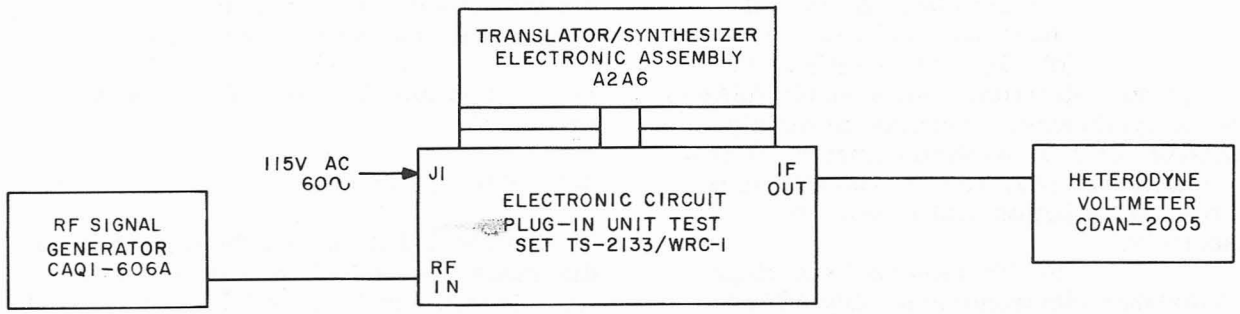


Figure 5-7. Translator/Synthesizer Electronic Assembly A2A6, Receive Gain Test Setup

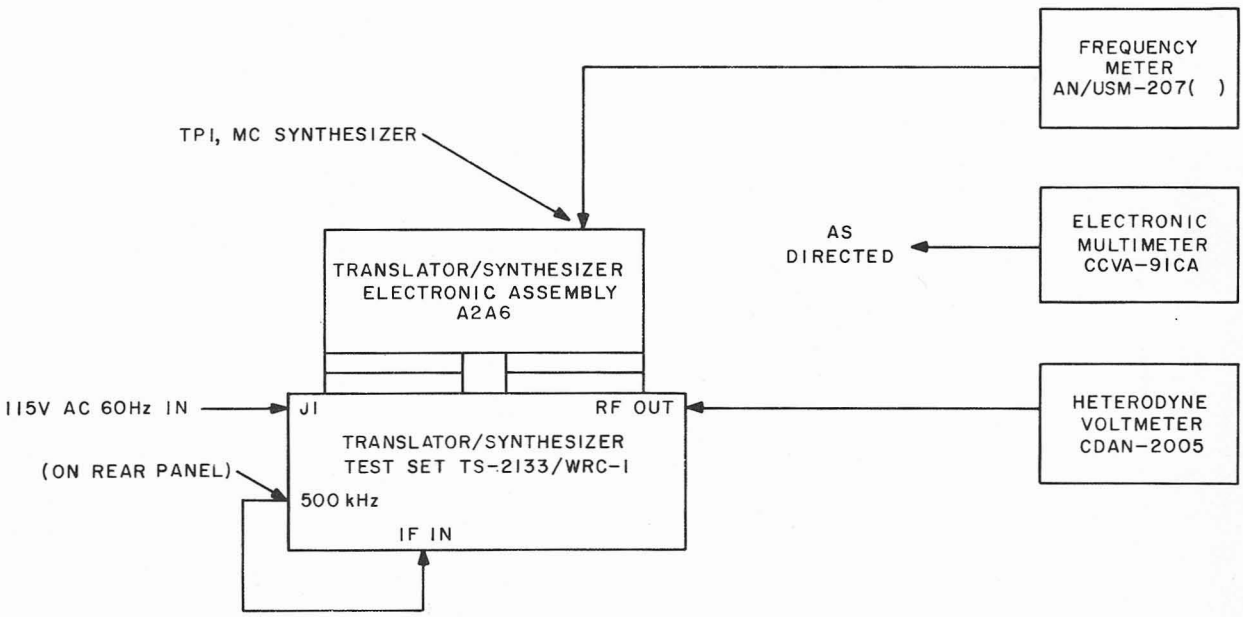


Figure 5-8. Translator/Synthesizer Electronic Assembly A2A6, Transmit Gain Test Setup

(5) REPAIR. - To repair translator/synthesizer electronic assembly A2A6, proceed as follows:

(a) To remove translator/synthesizer electronic assembly A2A6 (consisting of rf translator electronic subassembly A2A6A6, spectrum generator electronic subassembly A2A6A5, and four synthesizer modules), loosen and free four corner captive screws associated with this assembly.

(b) To remove either of side modules, rf translator electronic subassembly A2A6A6 or spectrum generator electronic subassembly A2A6A5, remove associated side plate screws and remove modules.

(c) To remove any circuit board from rf translator electronic subassembly A2A6A6 or spectrum generator electronic subassembly A2A6A5, first remove chassis captive screws; then remove

attaching screws from boards, pry off feedthrough connectors, and remove board.

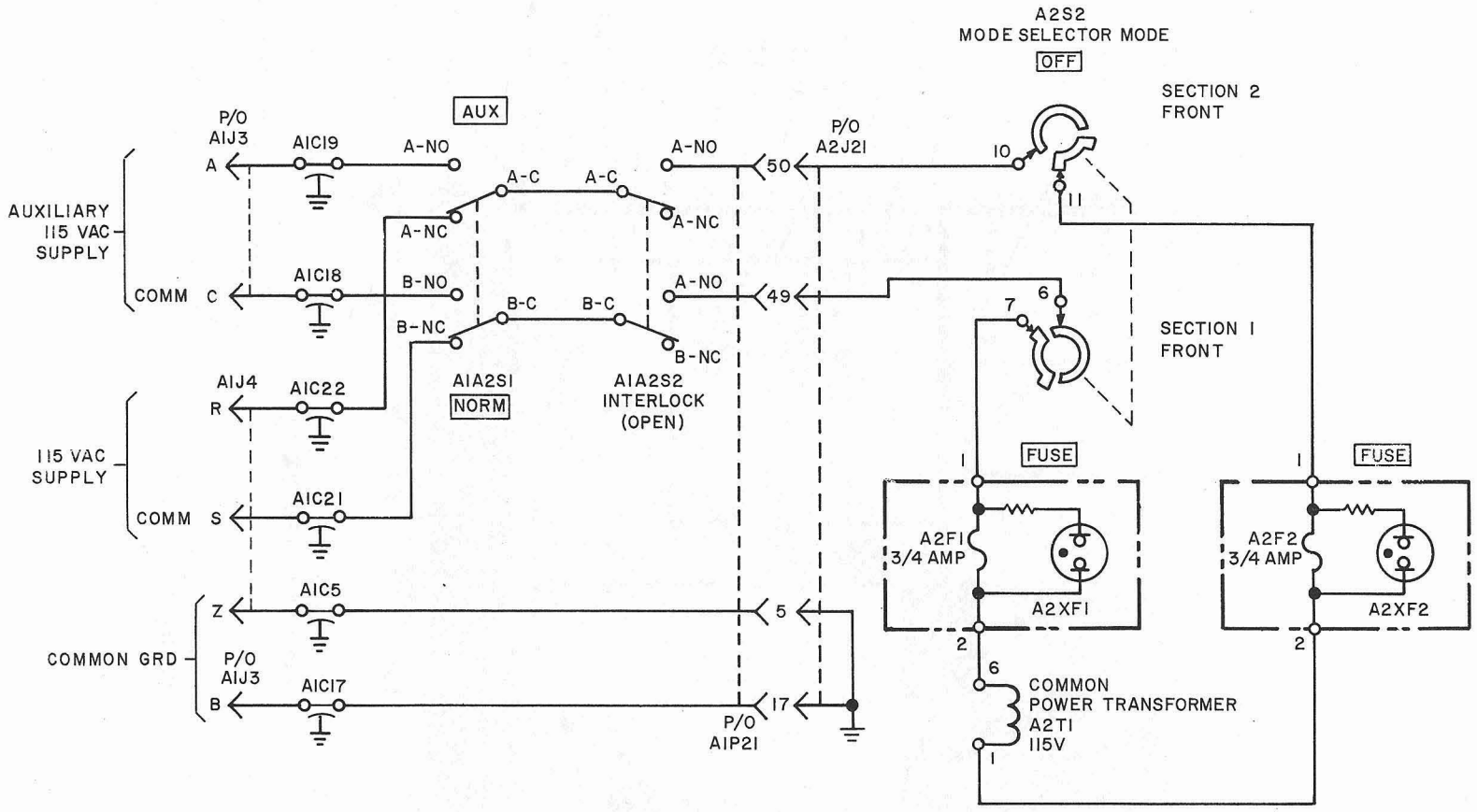
(d) To remove either mc synthesizer electronic subassembly A2A6A1, 100 kc synthesizer electronic assembly A2A6A2, or 100 cps synthesizer electronic assembly A2A6A4, remove two attaching screws from bottom and remove subassembly.

(e) To remove 1 and 10 kc synthesizer electronic assembly A2A6A3, remove two attaching screws from bottom, disconnect gold-colored connectors using pliers, and remove subassembly.

(f) Reinstall any circuit board or module by reversing removal procedure.

5-7. DIAGRAMS.

Figures 5-9 through 5-20 are schematic diagrams, figure 5-21 is a power distribution diagram and figures 5-22 through 5-102 are component location diagrams.



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 5-21. Radio Receiver R-1051D/URR, Primary Power Distribution Diagram

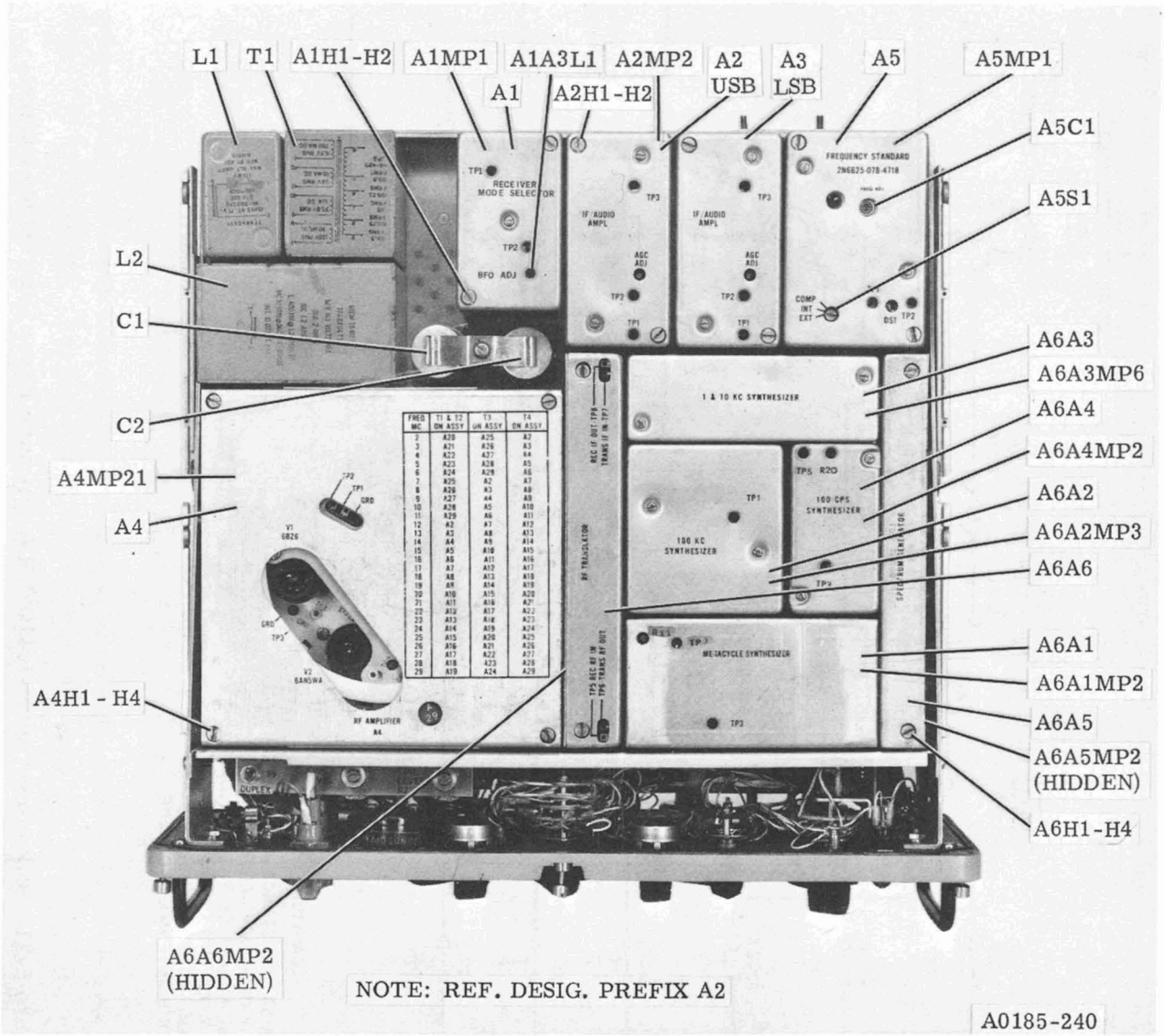


Figure 5-22. Radio Receiver R-1051D/URR, Chassis, Top View, Case Removed, Subassembly Location

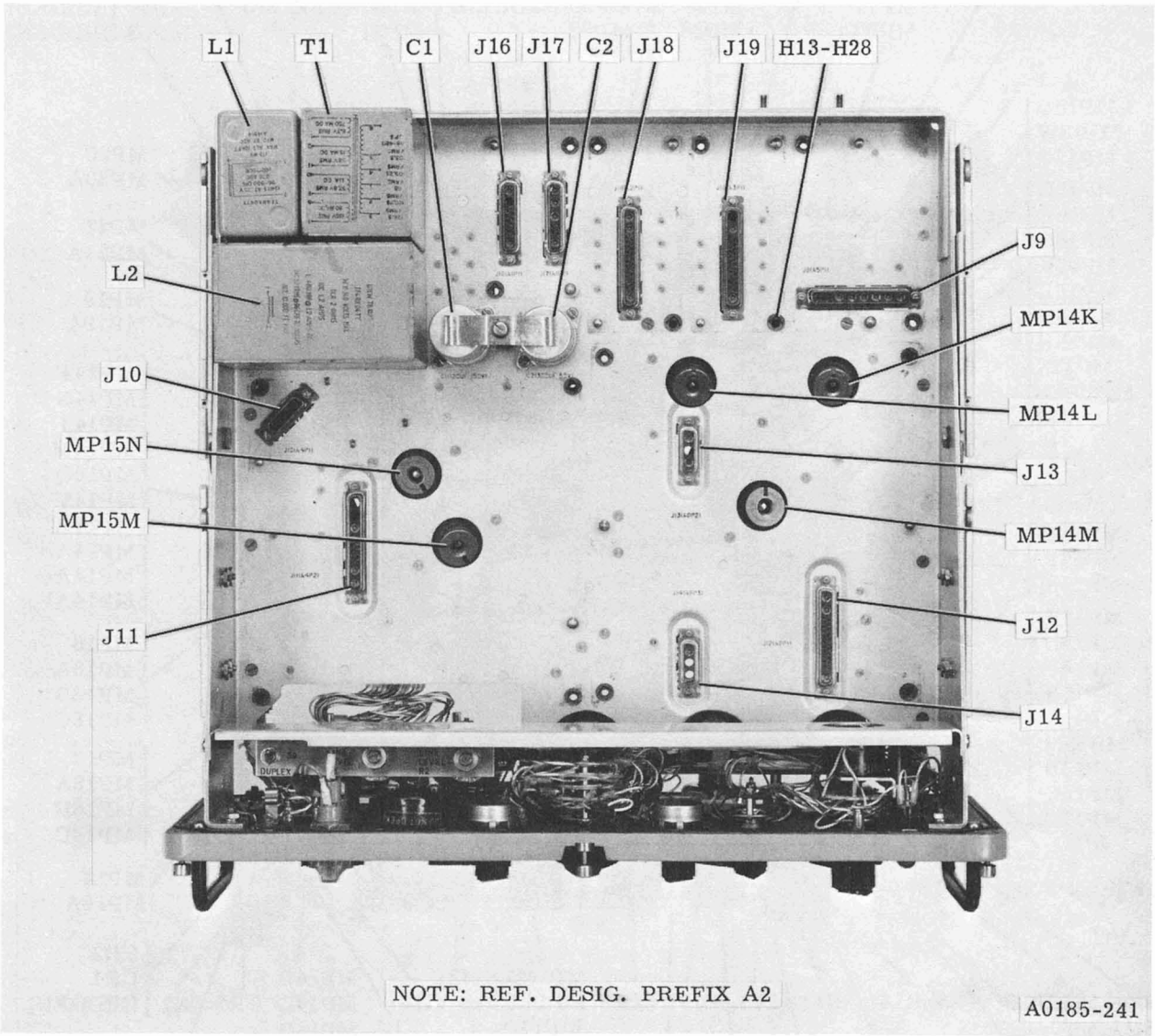


Figure 5-23. Radio Receiver R-1051D/URR, Chassis, Top View, Modules Removed, Component Location

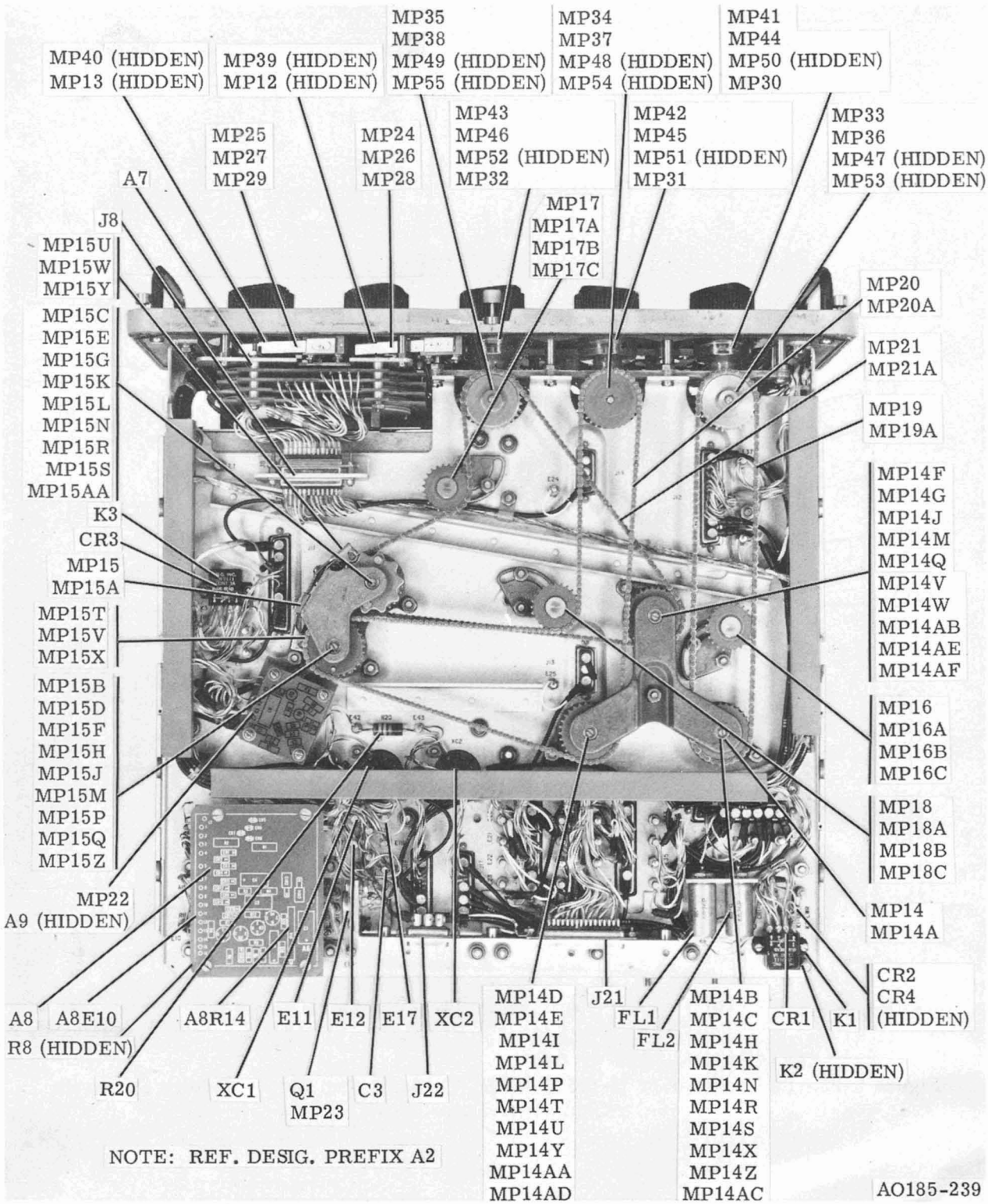


Figure 5-24. Radio Receiver R-1051D/URR, Chassis, Bottom View, Component Location

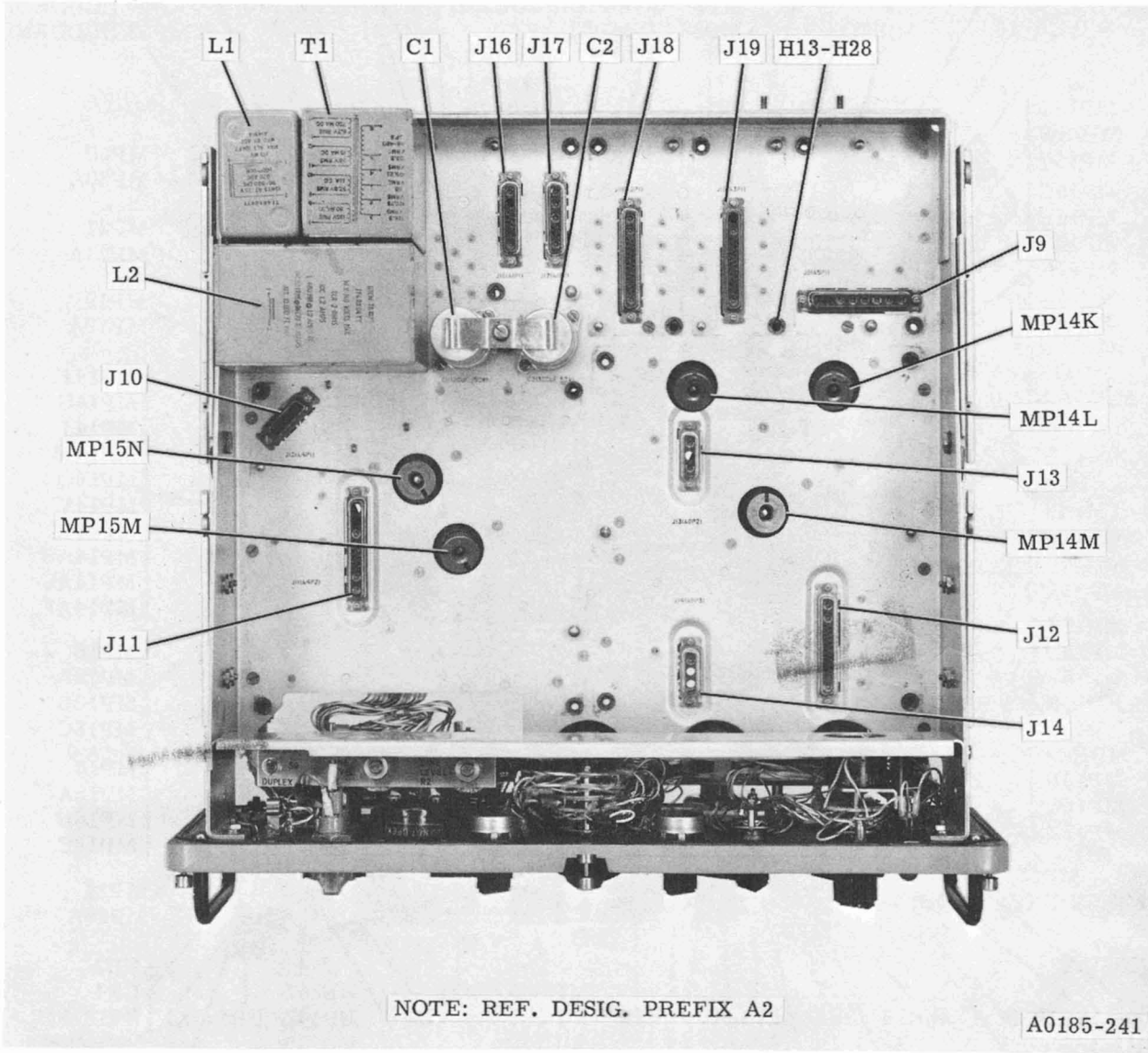


Figure 5-23. Radio Receiver R-1051D/URR, Chassis, Top View, Modules Removed, Component Location

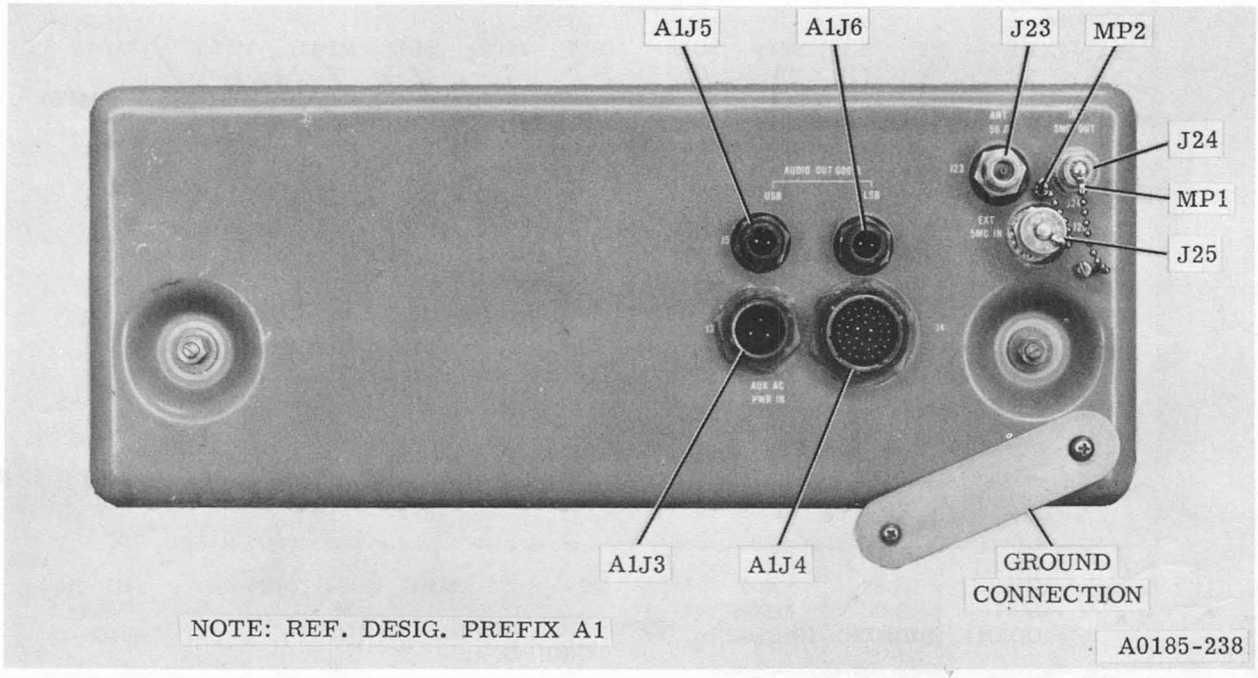


Figure 5-25. Radio Receiver R-1051D/URR, Case Assembly A1, Rear View, Component Location

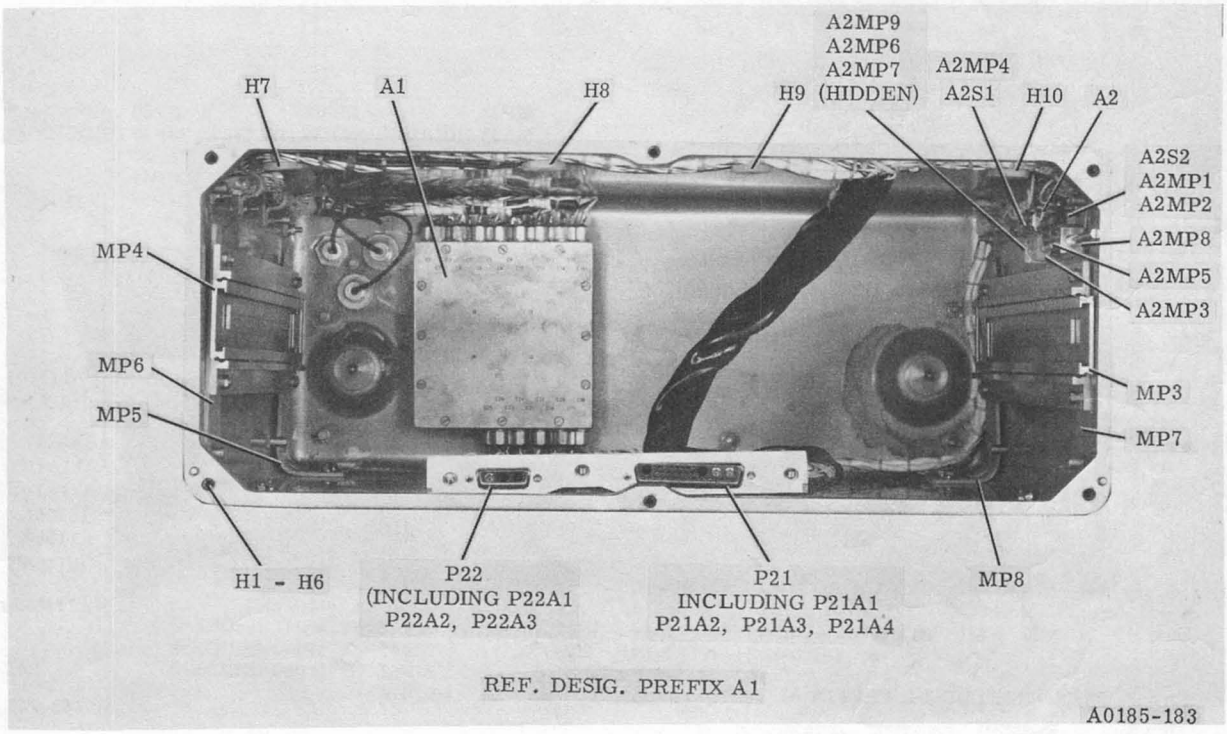


Figure 5-26. Radio Receiver R-1051D/URR, Case Assembly A1, Inside View, Component Location

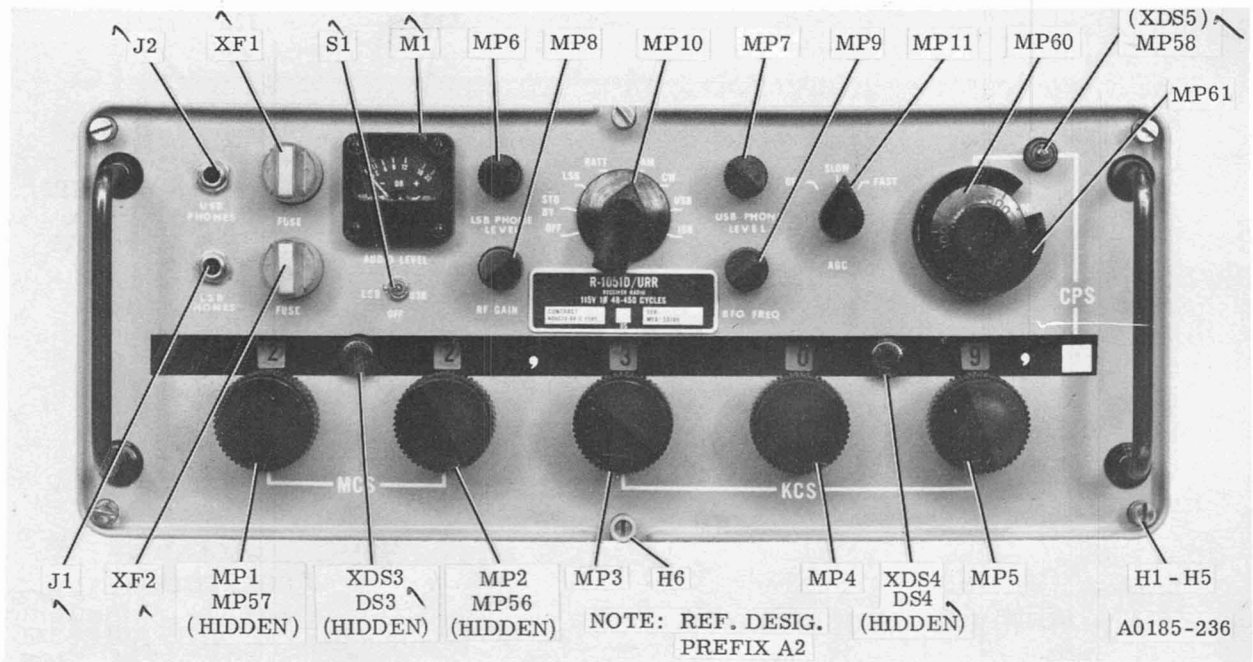


Figure 5-27. Radio Receiver R-1051D/URR, Front Panel Assembly, Component Location

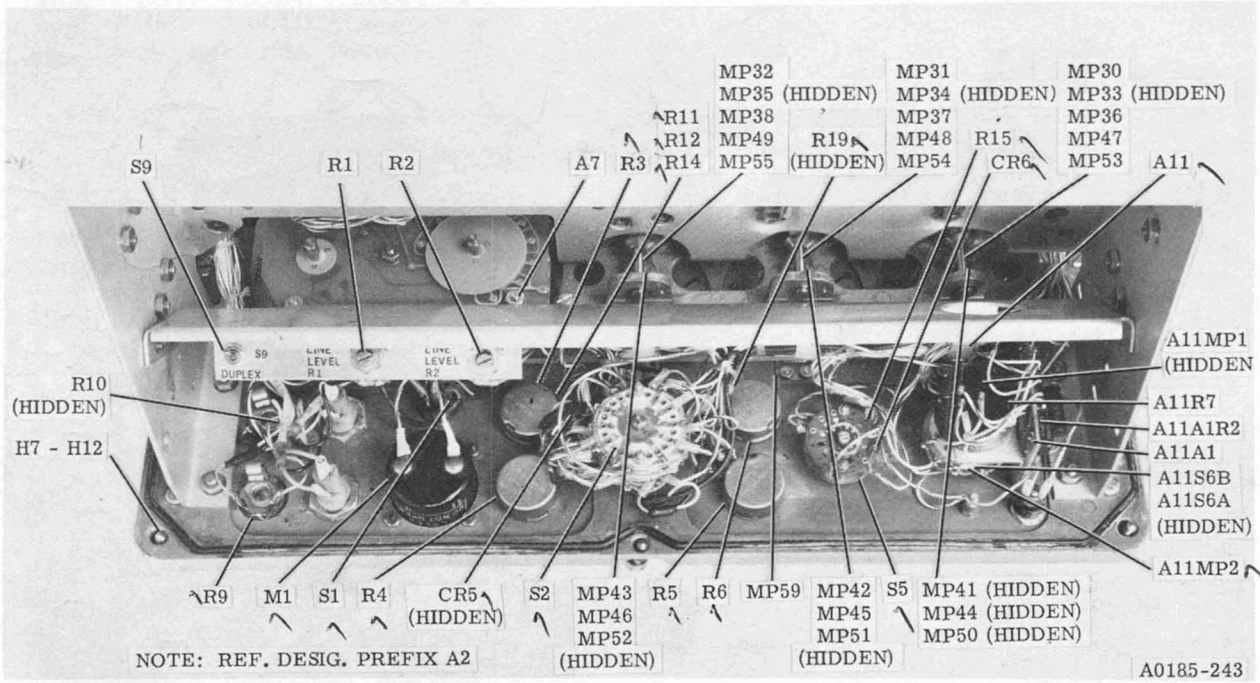


Figure 5-28. Radio Receiver R-1051D/URR, Front Panel Assembly, Rear View, Component Location

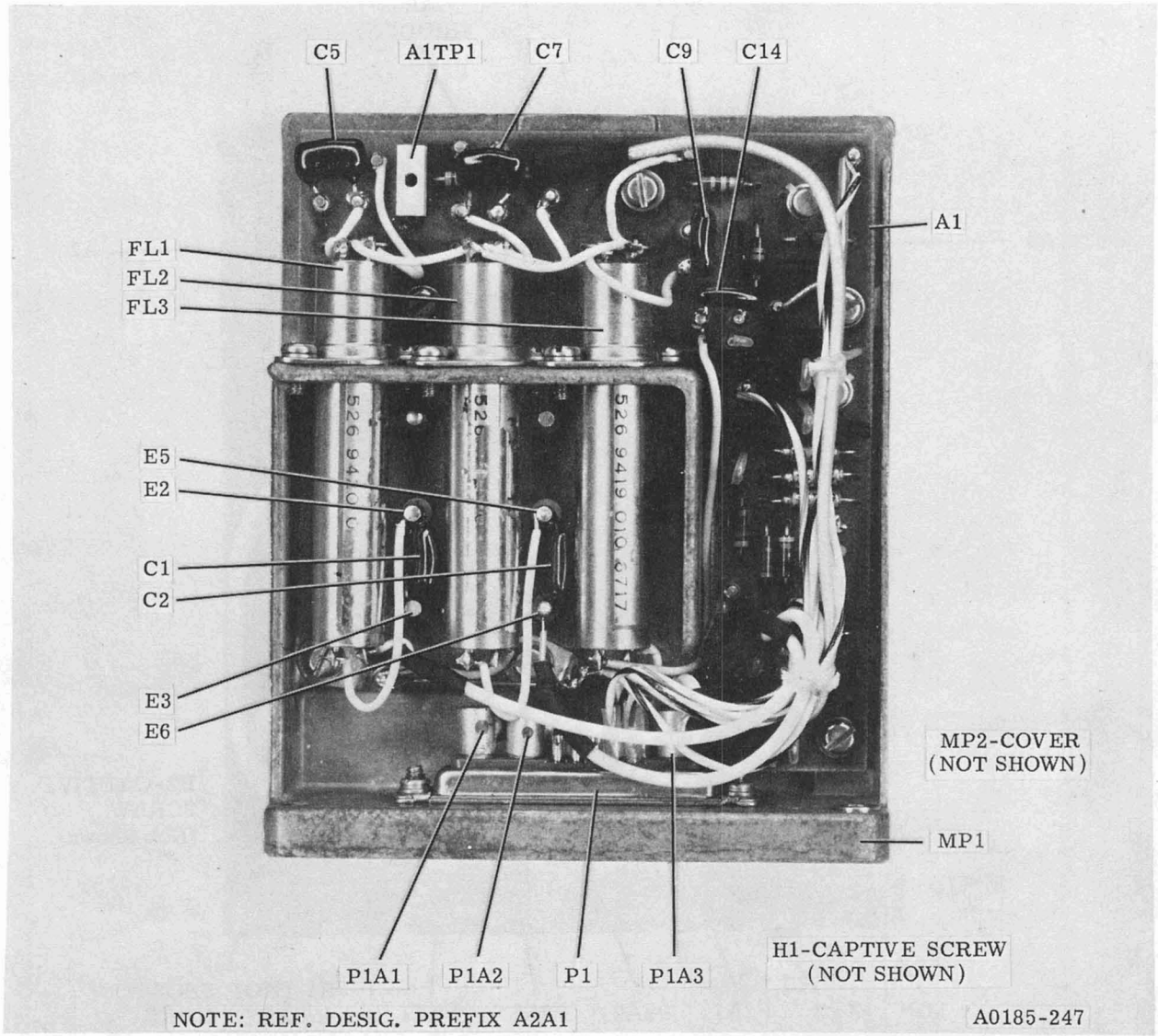


Figure 5-29. Mode Selector Electronic Assembly A2A1, Left Side Component Location

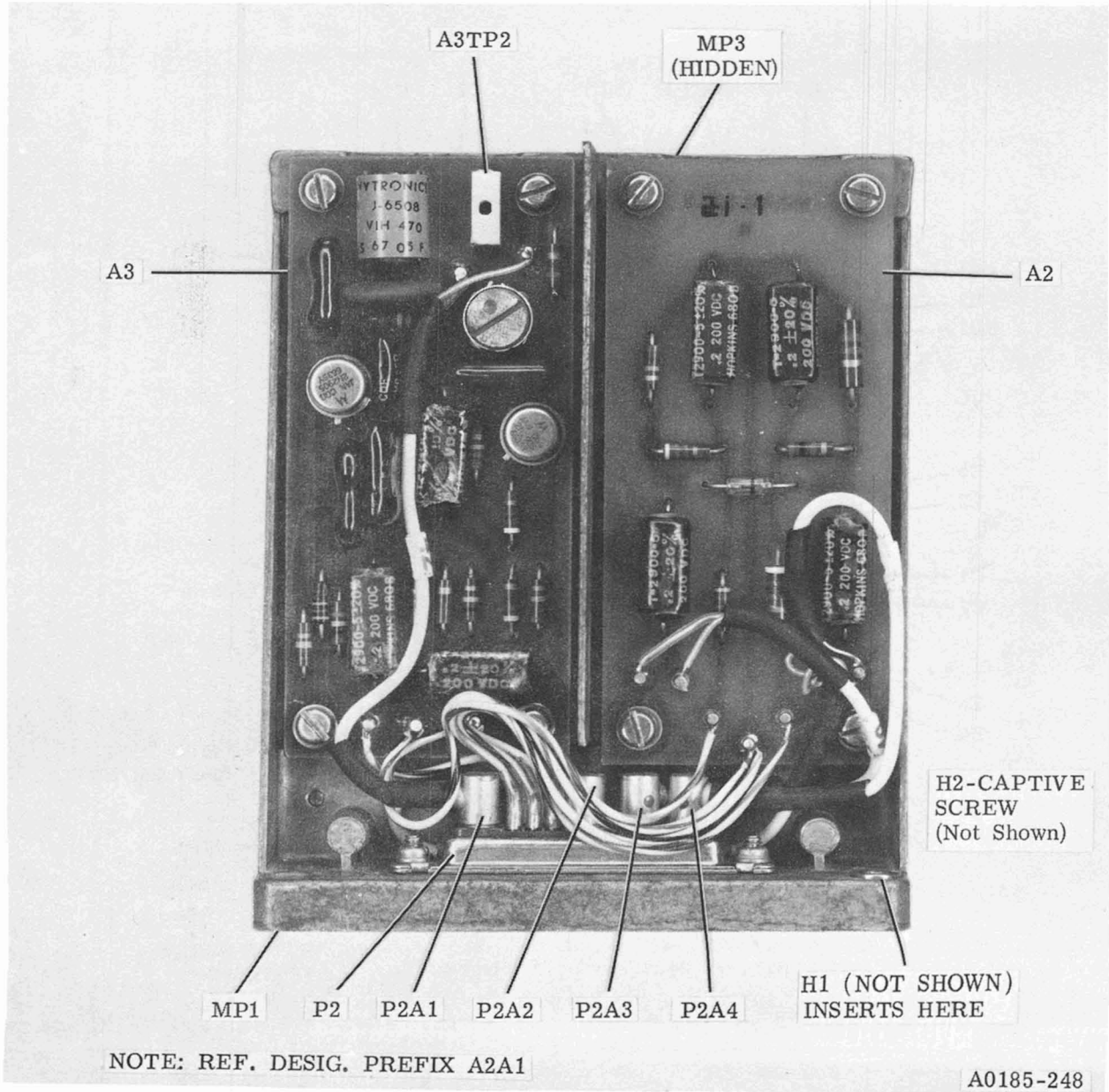


Figure 5-30. Mode Selector Electronic Assembly A2A1, Right Side, Component Location

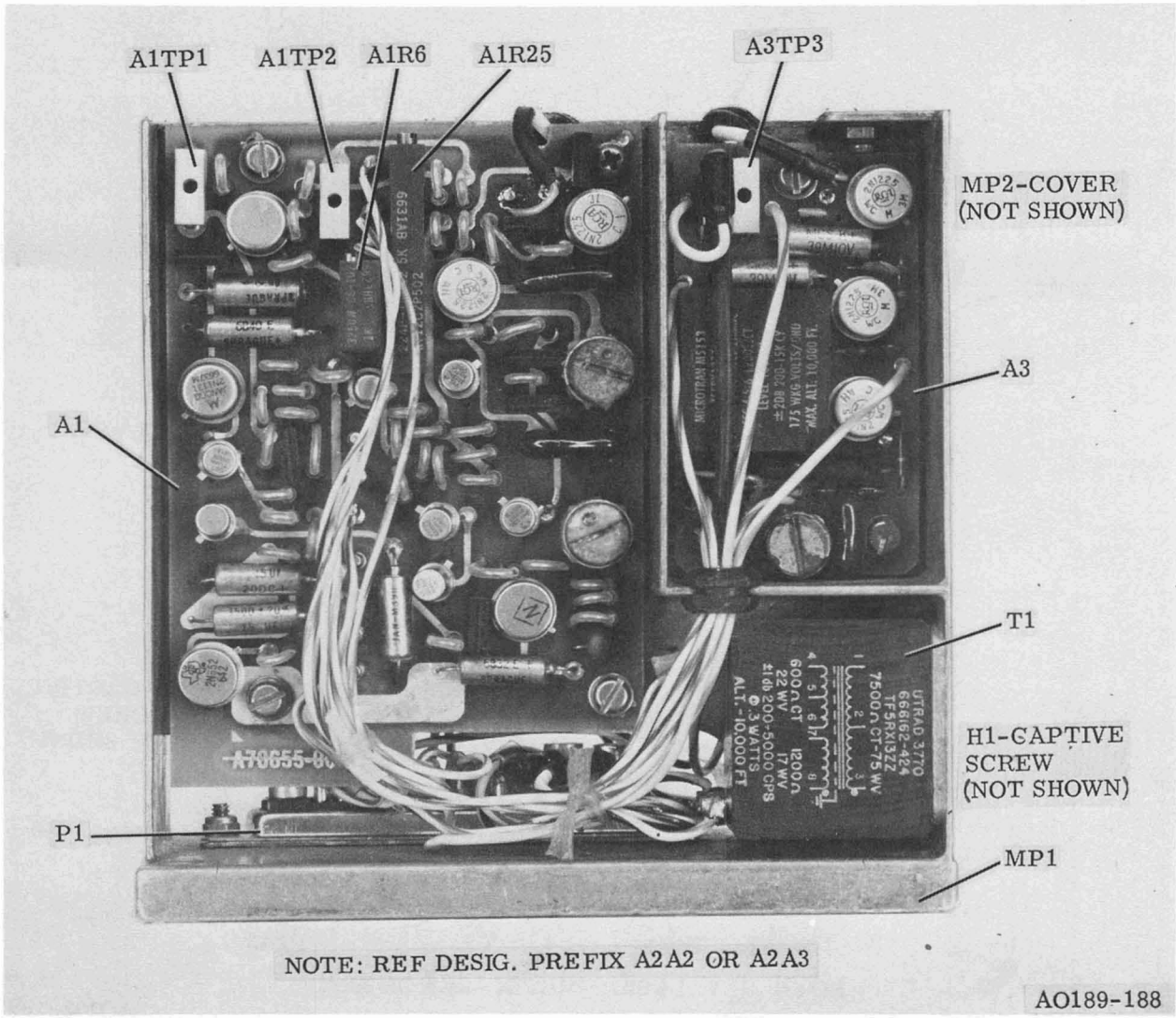


Figure 5-35. IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3, Right Side, Component Location

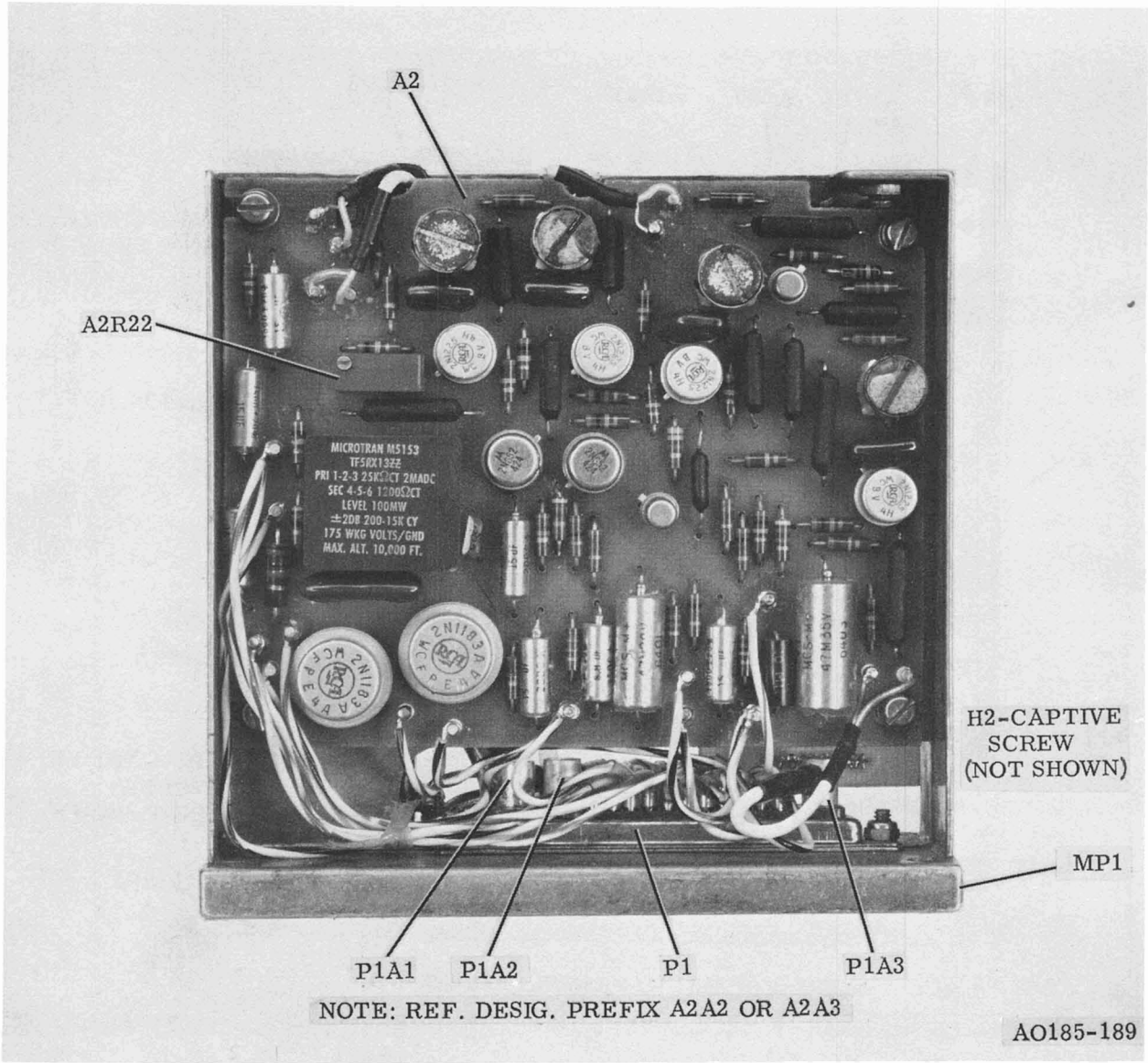


Figure 5-36. IF./Audio Amplifier Electronic Assemblies A2A2 and A2A3, Left Side , Component Location

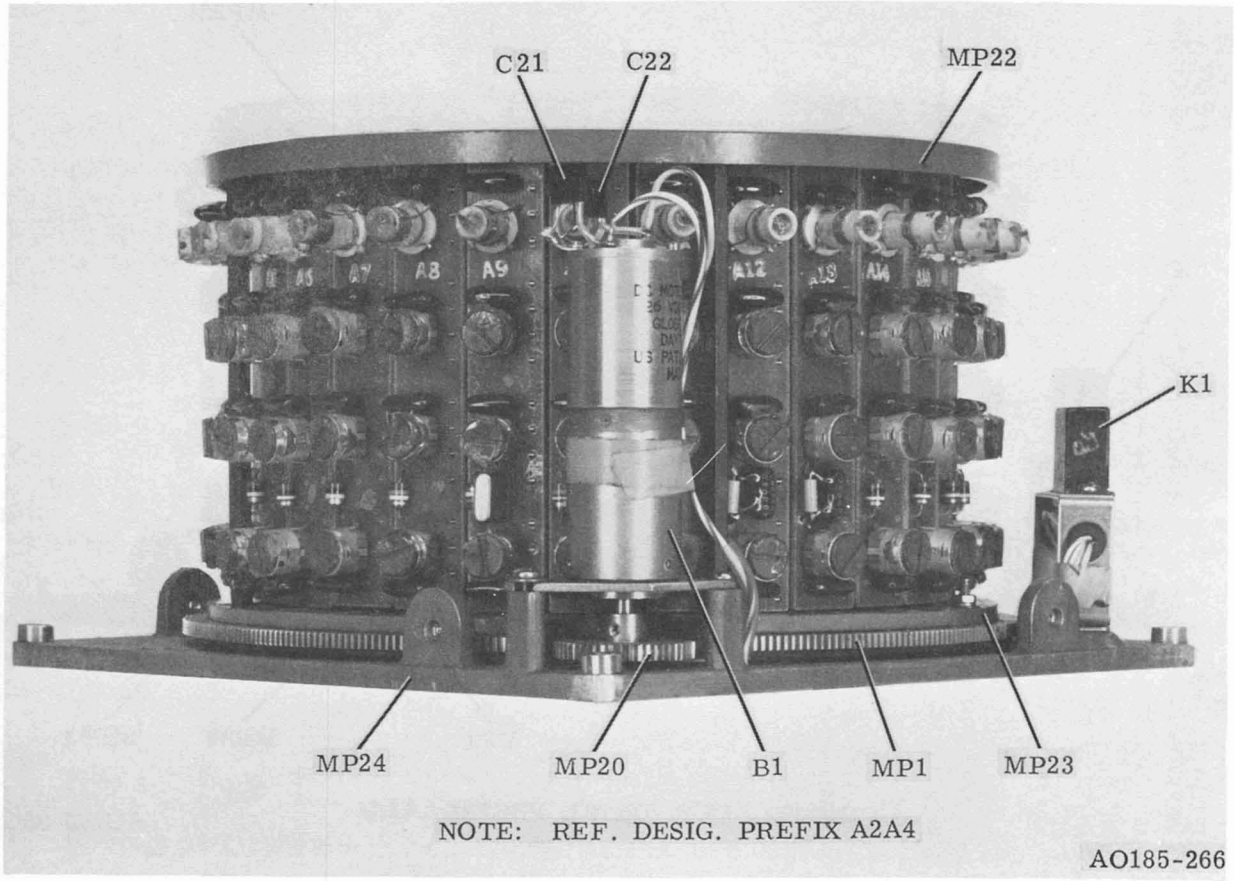


Figure 5-42. RF Amplifier Electronic Assembly A2A4, Rear and Right Side, Component Location

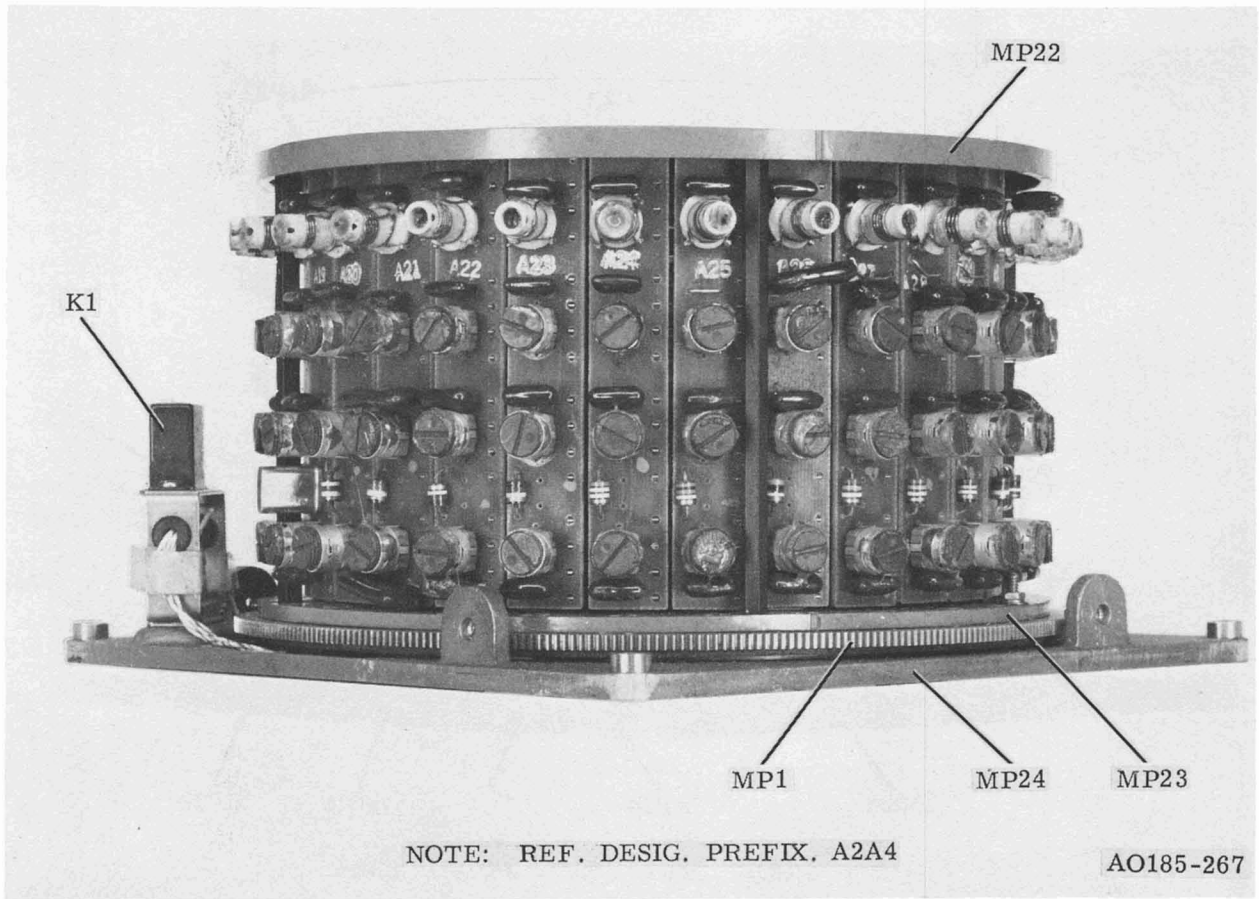


Figure 5-43. RF Amplifier Electronic Assembly A2A4, Front and Left Side, Component Location

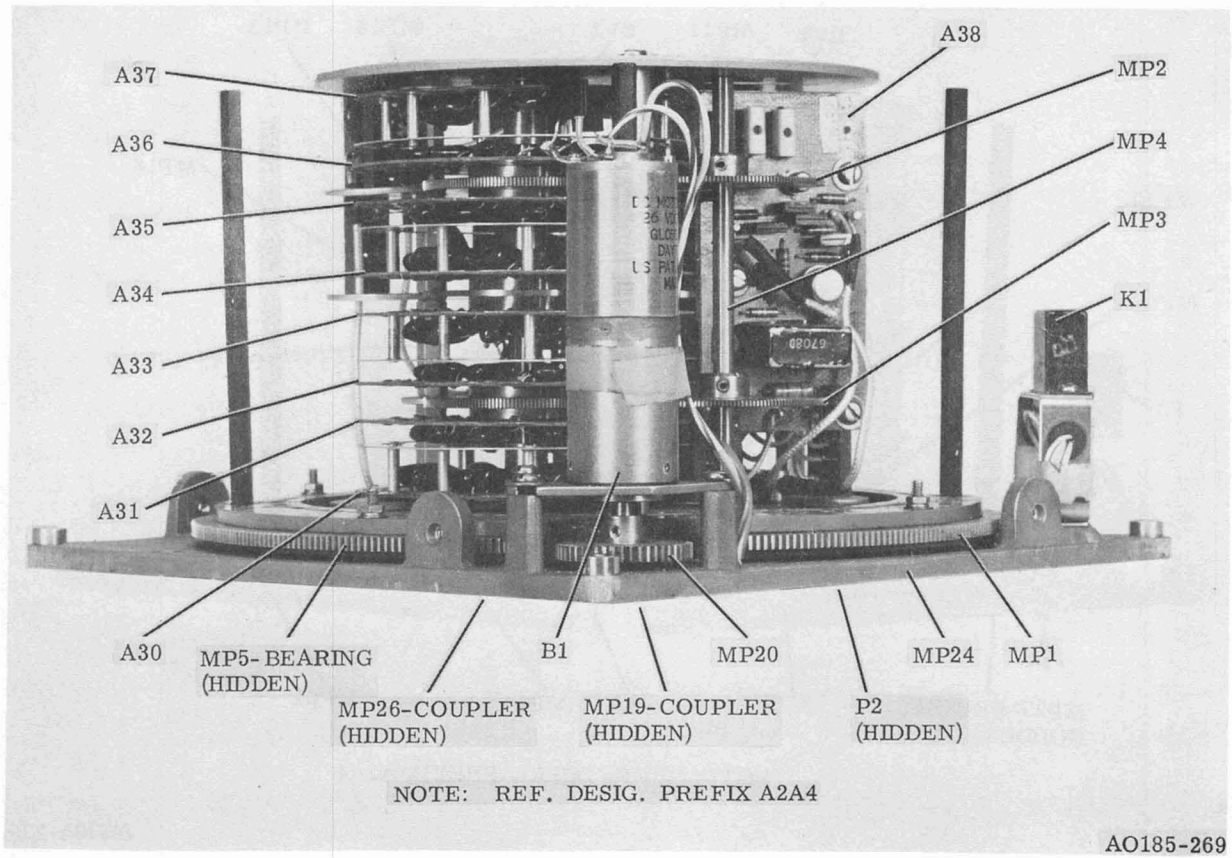


Figure 5-44. RF Amplifier Electronic Assembly A2A4, Turret Removed, Rear and Right Side, Component Location

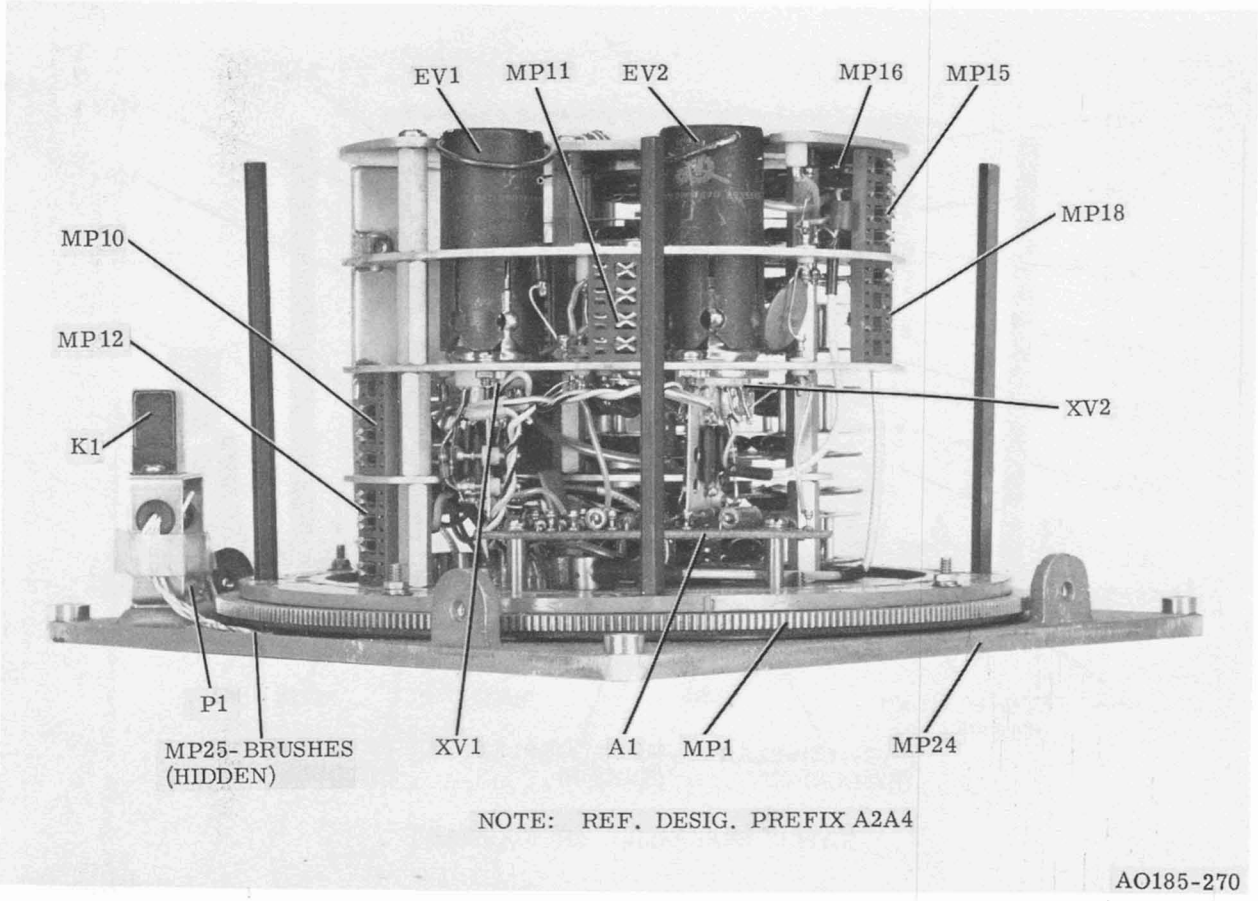


Figure 5-45. RF Amplifier Electronic Assembly A2A4, Turret Removed, Front and Left Side, Component Location

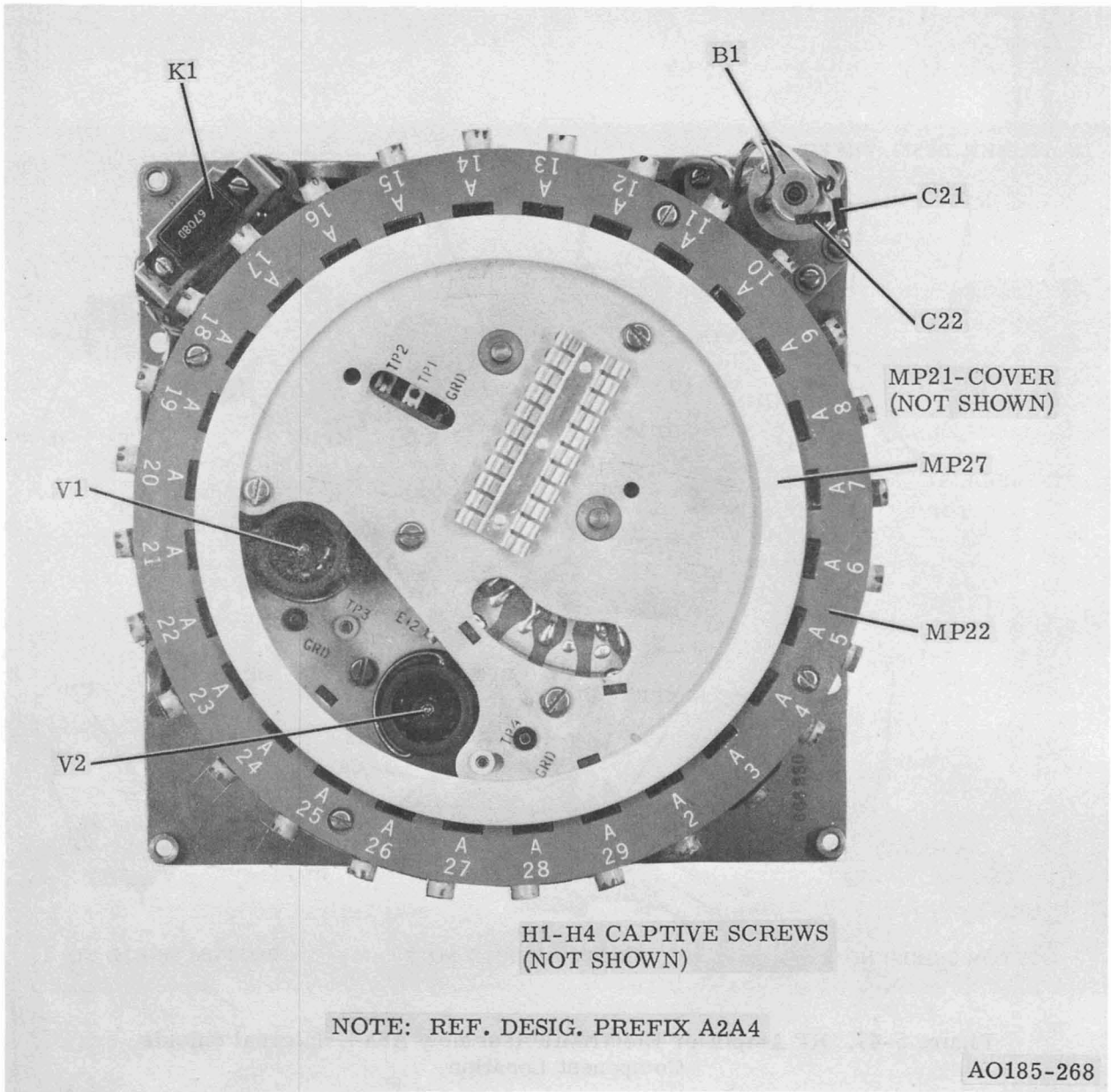


Figure 5-46. RF Amplifier Electronic Assembly A2A4, Top View, Cover Removed Component Location

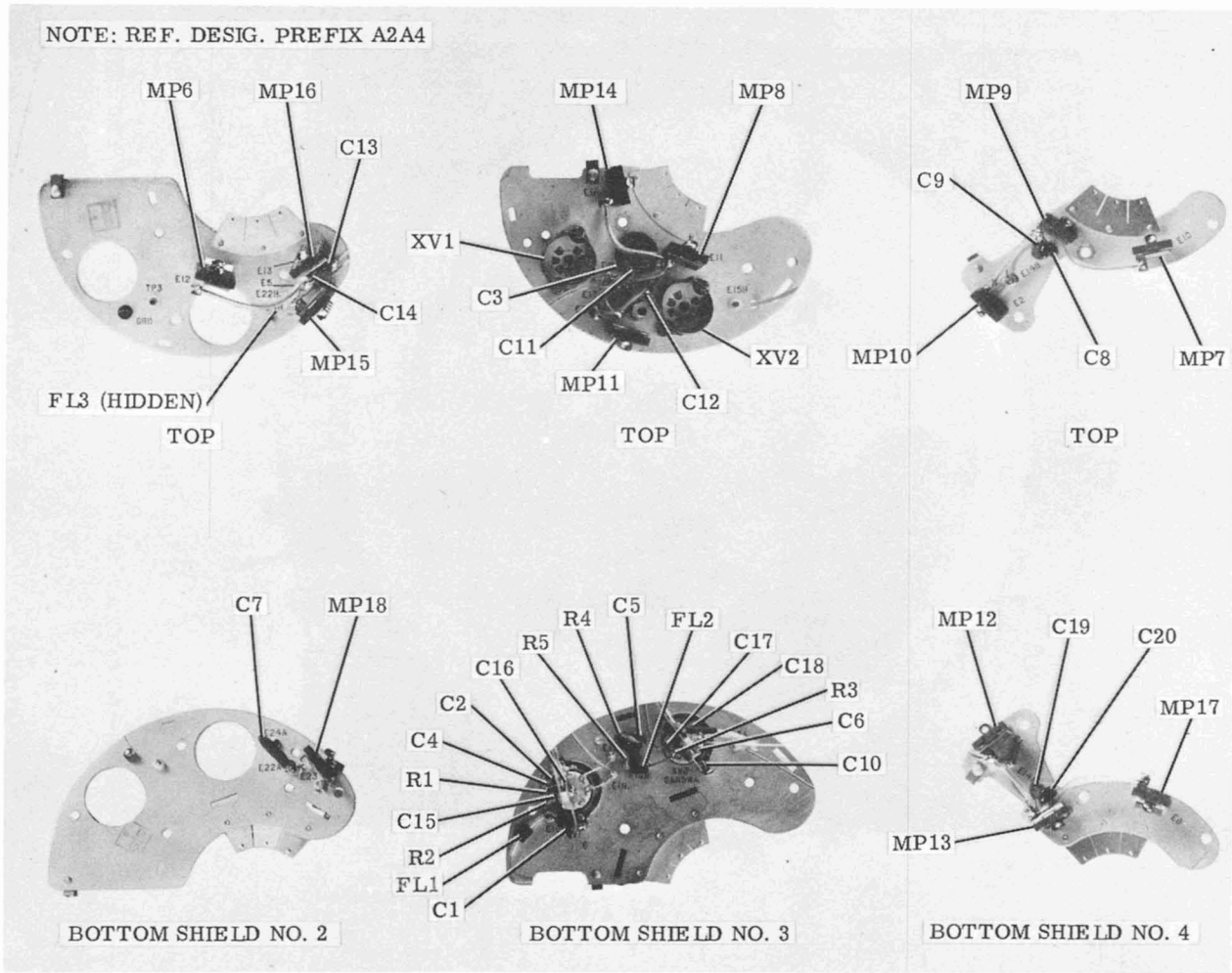


Figure 5-47. RF Amplifier Electronic Assembly A2A4, Internal Shields, Component Location

NOTES

1. REF. DESIG. PREFIX A2A4A30
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1, C10	0.00MHz
C2, C11	0.10MHz
C3, C12	0.20MHz
C4, C13	0.30MHz
C5, C14	0.40MHz
C6, C15	0.50MHz
C7, C16	0.60MHz
C8, C17	0.70MHz
C9, C18	0.80MHz
C19	0.90MHz

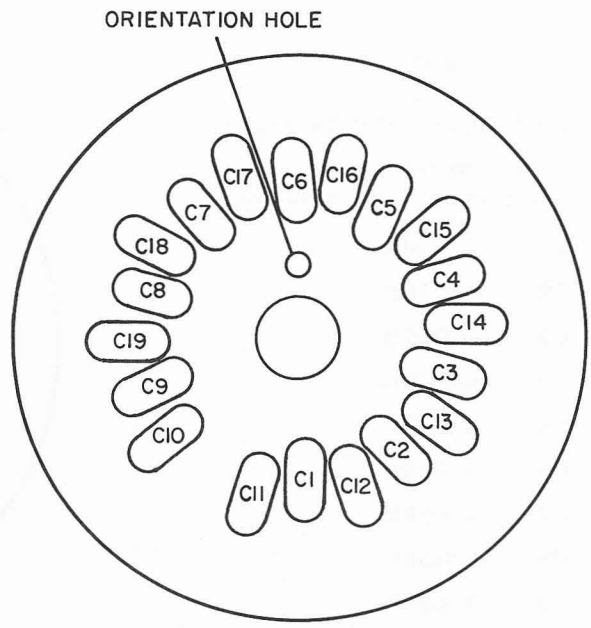


Figure 5-50. 100 KC Rotor Assembly A2A4A30, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A31
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1	0.00MHz
C2	0.01MHz
C3	0.02MHz
C4	0.03MHz
C5	0.04MHz
C6	0.05MHz
C7	0.06MHz
C8	0.07MHz
C9	0.08MHz

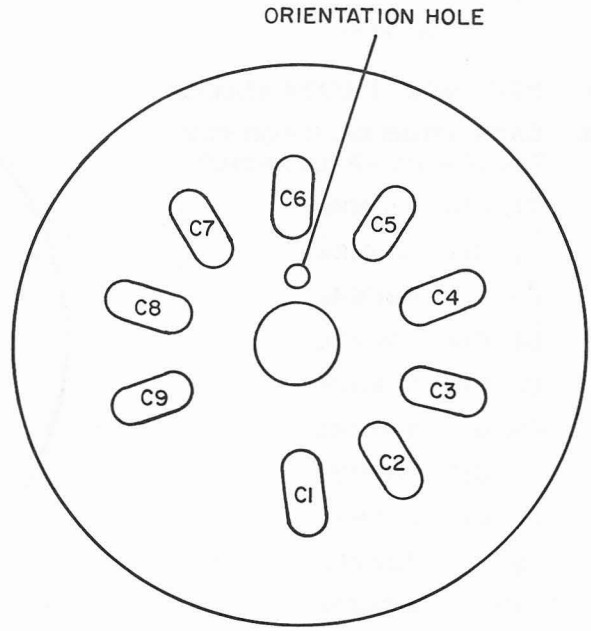


Figure 5-51. 10 KC Rotor Assembly A2A4A31, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A32
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1	0.00MHz
C2	0.01MHz
C3	0.02MHz
C4	0.03MHz
C5	0.04MHz
C6	0.05MHz
C7	0.06MHz
C8	0.08MHz
C9	0.09MHz

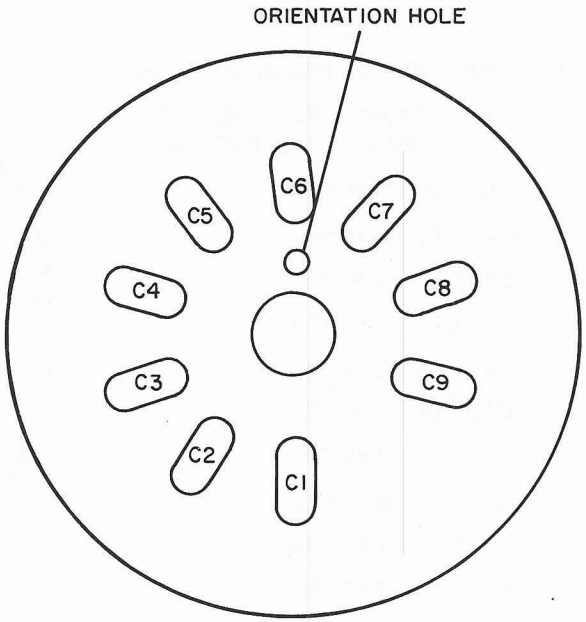


Figure 5-52. 10 KC Rotor Assembly A2A4A32, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A33,
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1, C10	0.00MHz
C2, C11	0.10MHz
C3, C12	0.20MHz
C4, C13	0.30MHz
C5, C14	0.40MHz
C6, C15	0.50MHz
C7, C16	0.60MHz
C8, C17	0.70MHz
C9, C18	0.80MHz
C19	0.90MHz

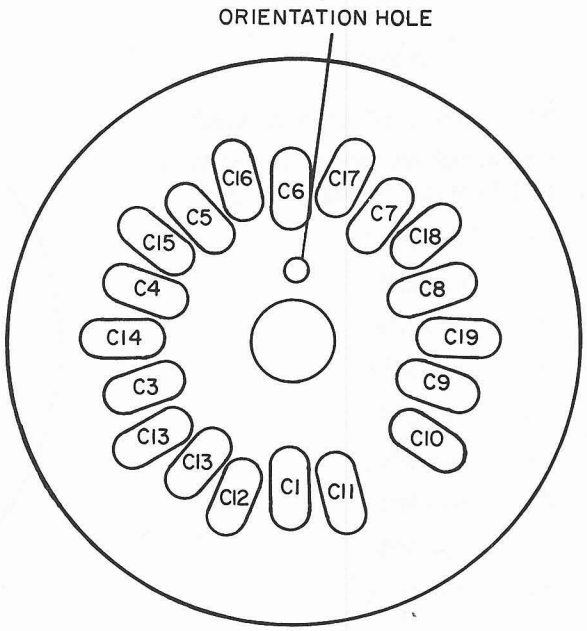


Figure 5-53. 100 KC Rotor Assembly A2A4A33, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A34
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1, C10	0.00MHz
C2, C11	0.10MHz
C3, C12	0.20MHz
C4, C13	0.30MHz
C5, C14	0.40MHz
C6, C15	0.50MHz
C7, C16	0.60MHz
C8, C17	0.70MHz
C9, C18	0.80MHz
C19	0.90MHz

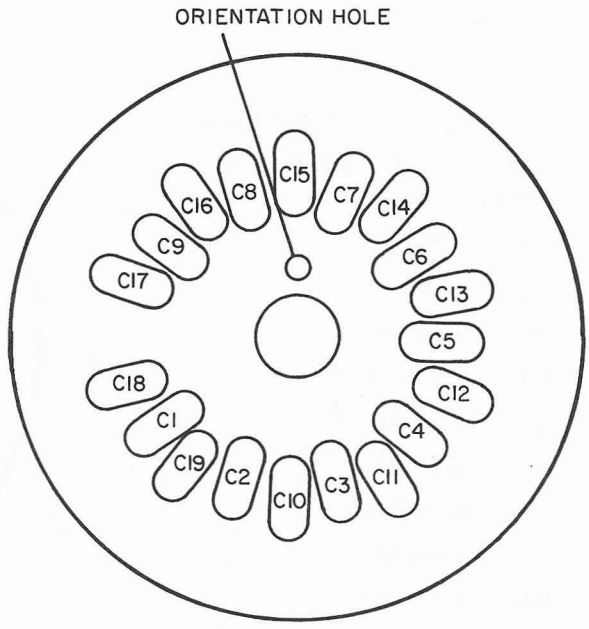


Figure 5-54. 100 KC Rotor Assembly A2A4A34, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A35
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1	0.00MHz
C2	0.01MHz
C3	0.02MHz
C4	0.03MHz
C5	0.04MHz
C6	0.05MHz
C7	0.06MHz
C8	0.07MHz
C9	0.08MHz

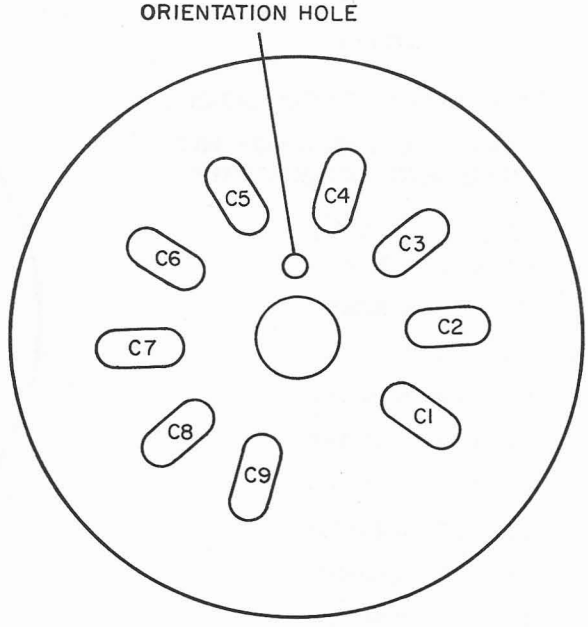


Figure 5-55. 10 KC Rotor Assembly A2A4A35, Component Location

NOTES:

1. REF. DESIG. PREFIX A2A4A36
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1	0.00MHz
C2	0.01MHz
C3	0.02MHz
C4	0.03MHz
C5	0.04MHz
C6	0.05MHz
C7	0.06MHz
C8	0.07MHz
C9	0.08MHz

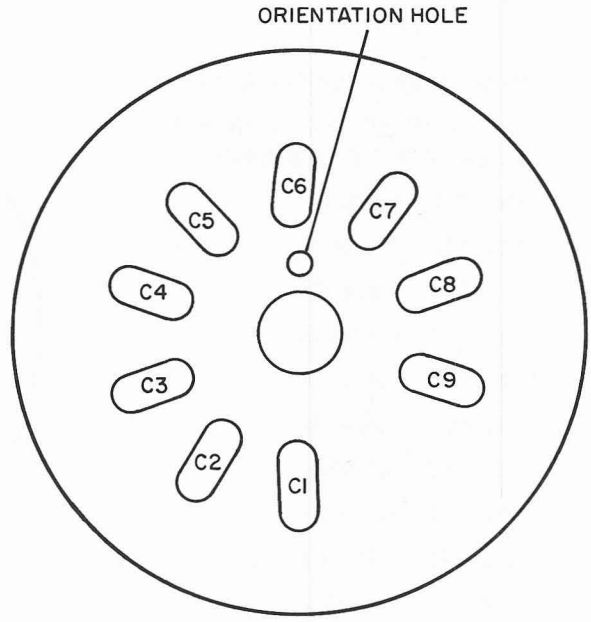


Figure 5-56. 10 KC Rotor Assembly A2A4A36, Component Location

NOTES:

1. REF..DESIG. PREFIX A2A4A37
2. CAPACITORS USED FOR THE FOLLOWING FREQUENCIES:

C1, C10	0.00MHz
C2, C11	0.10MHz
C3, C12	0.20MHz
C4, C13	0.30MHz
C5, C14	0.40MHz
C6, C15	0.50MHz
C7, C16	0.60MHz
C8, C17	0.70MHz
C9, C18	0.80MHz
C19	0.90MHz

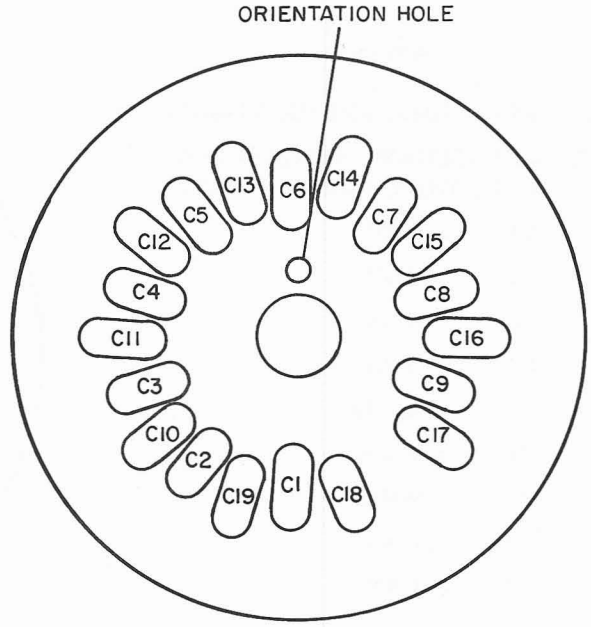


Figure 5-57. 100 KC Rotor Assembly A2A4A37, Component Location

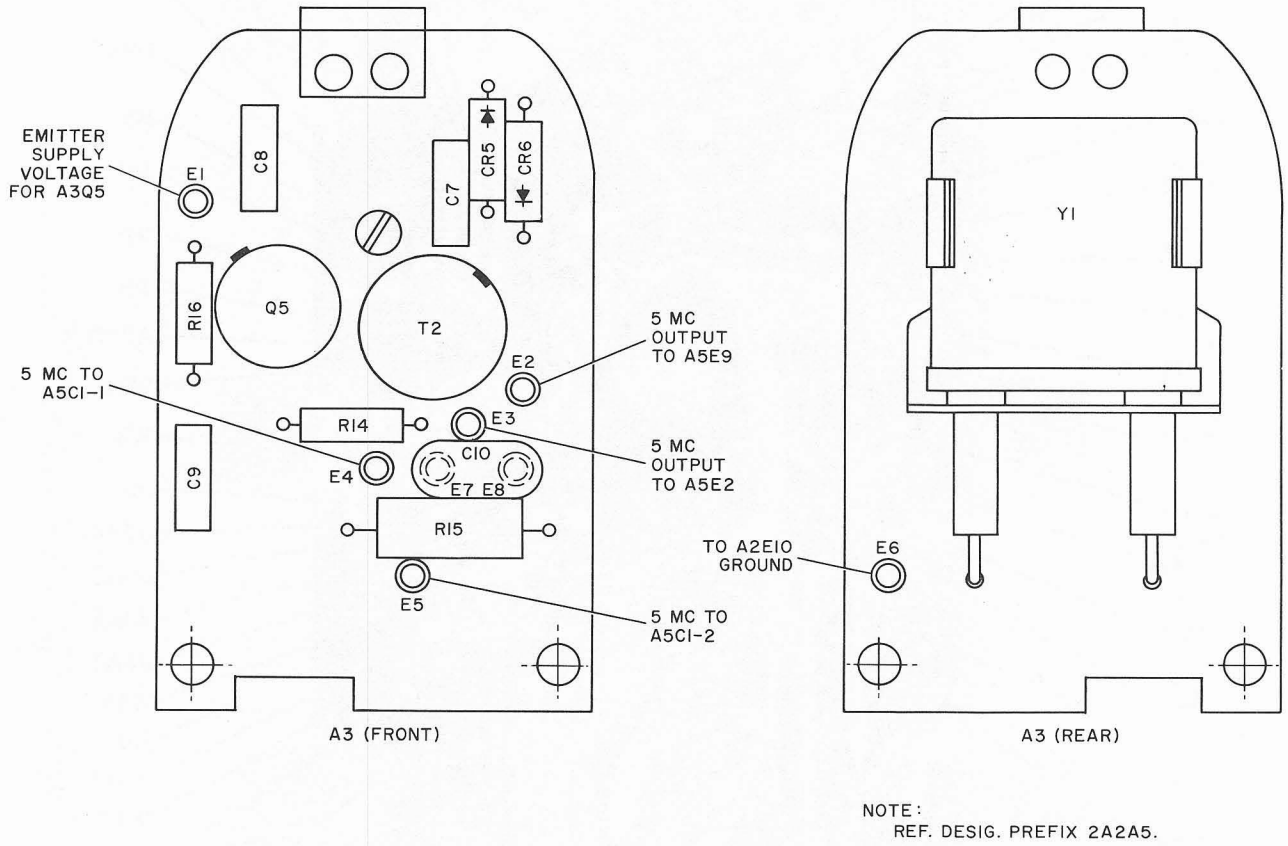


Figure 5-62. 5 MC Oscillator A2A5A3, Component Location

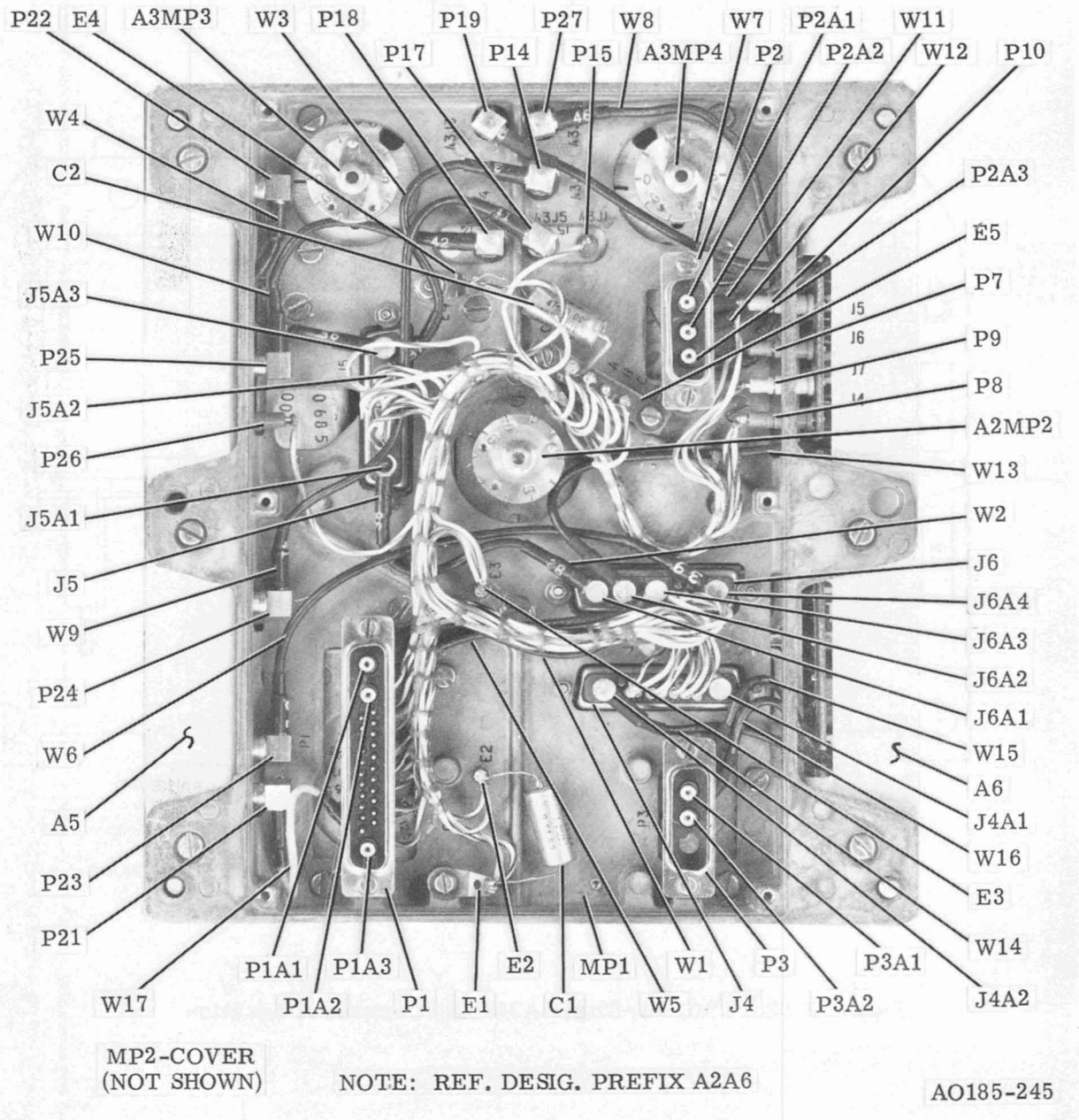


Figure 5-63. Translator/Synthesizer Electronic Assembly A2A6, Bottom View, Component Location

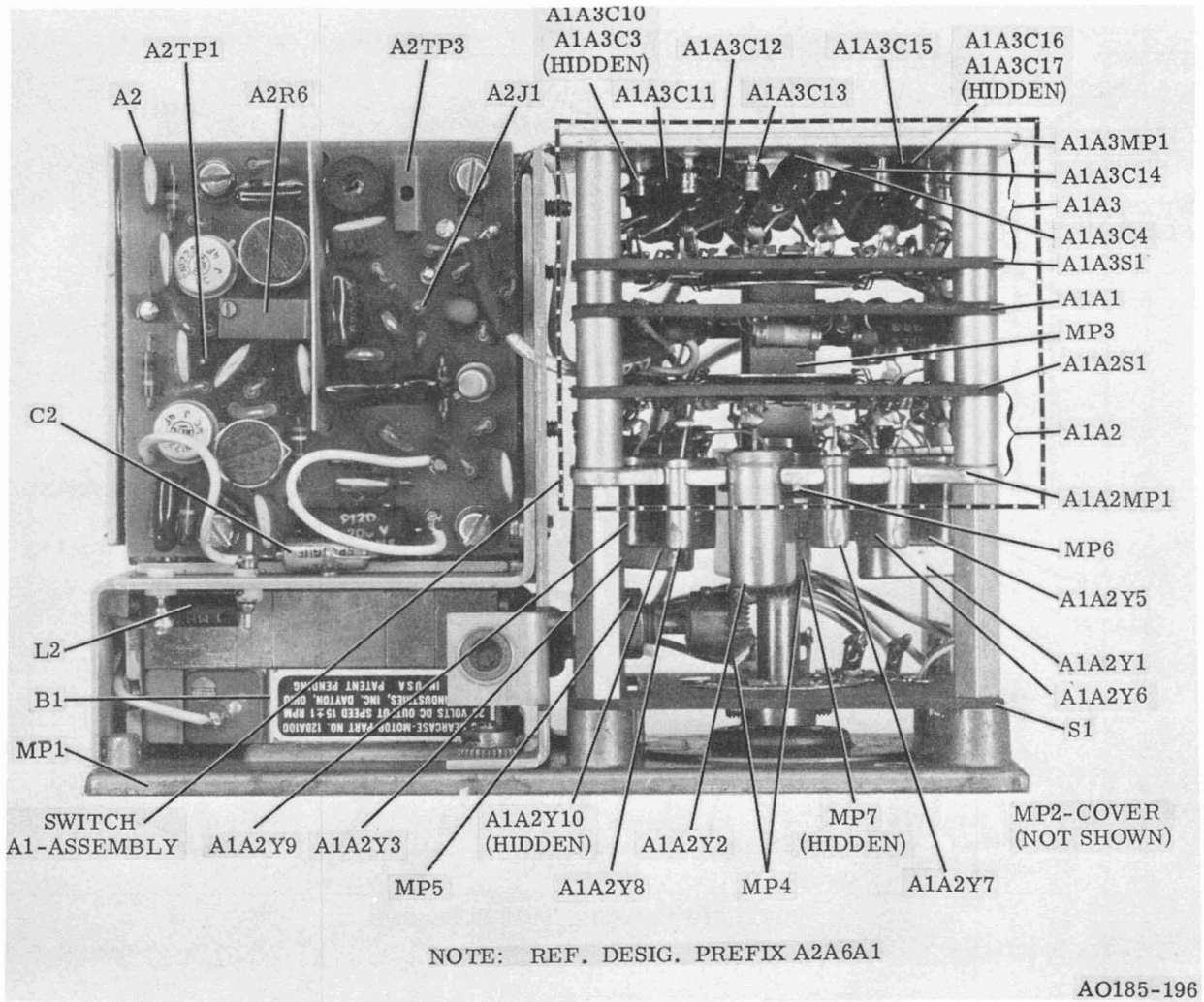


Figure 5-64. MC Synthesizer Electronic Subassembly A2A6A1, Front View, Component Location

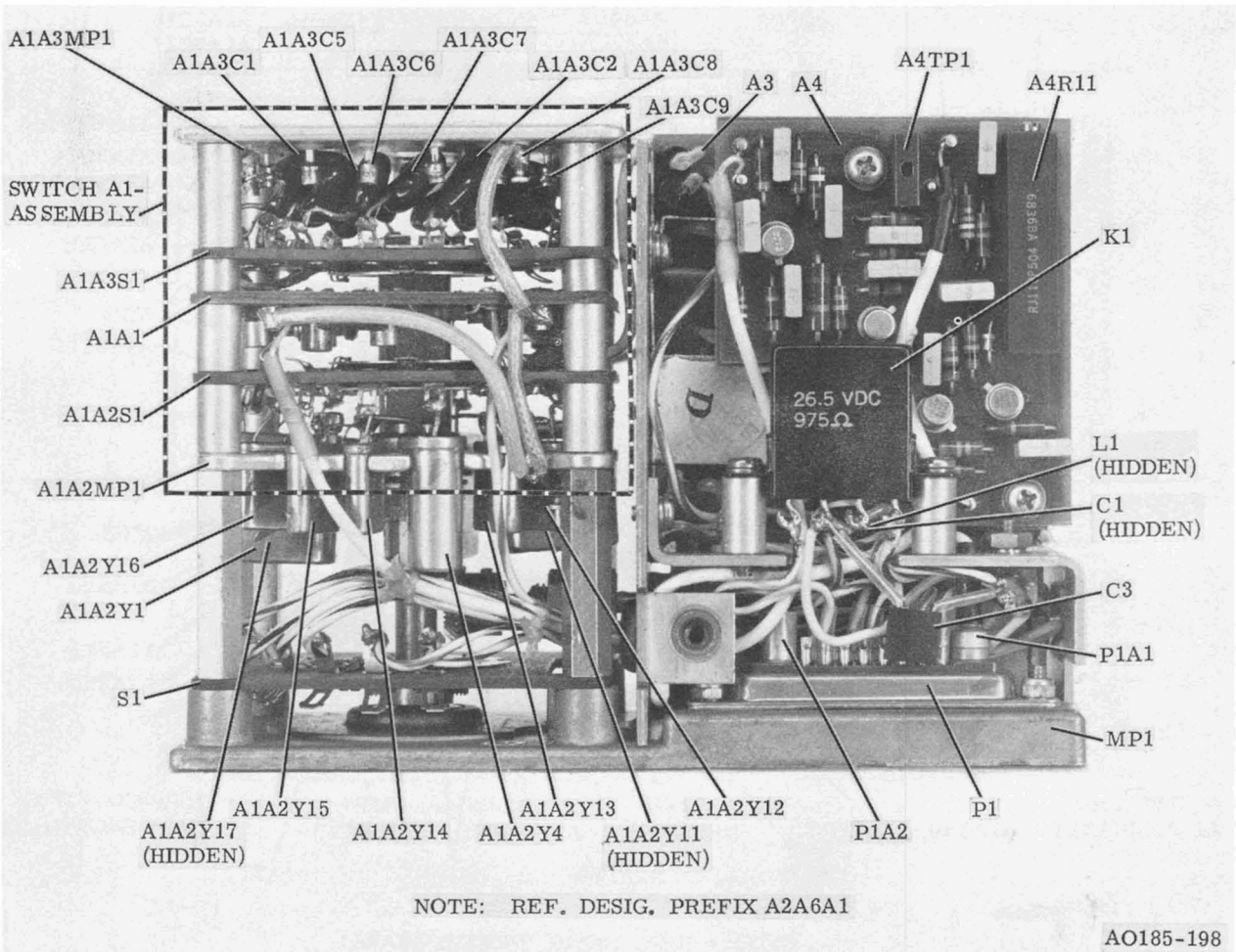


Figure 5-65. MC Synthesizer Electronic Subassembly A2A6A1, Rear View, Component Location

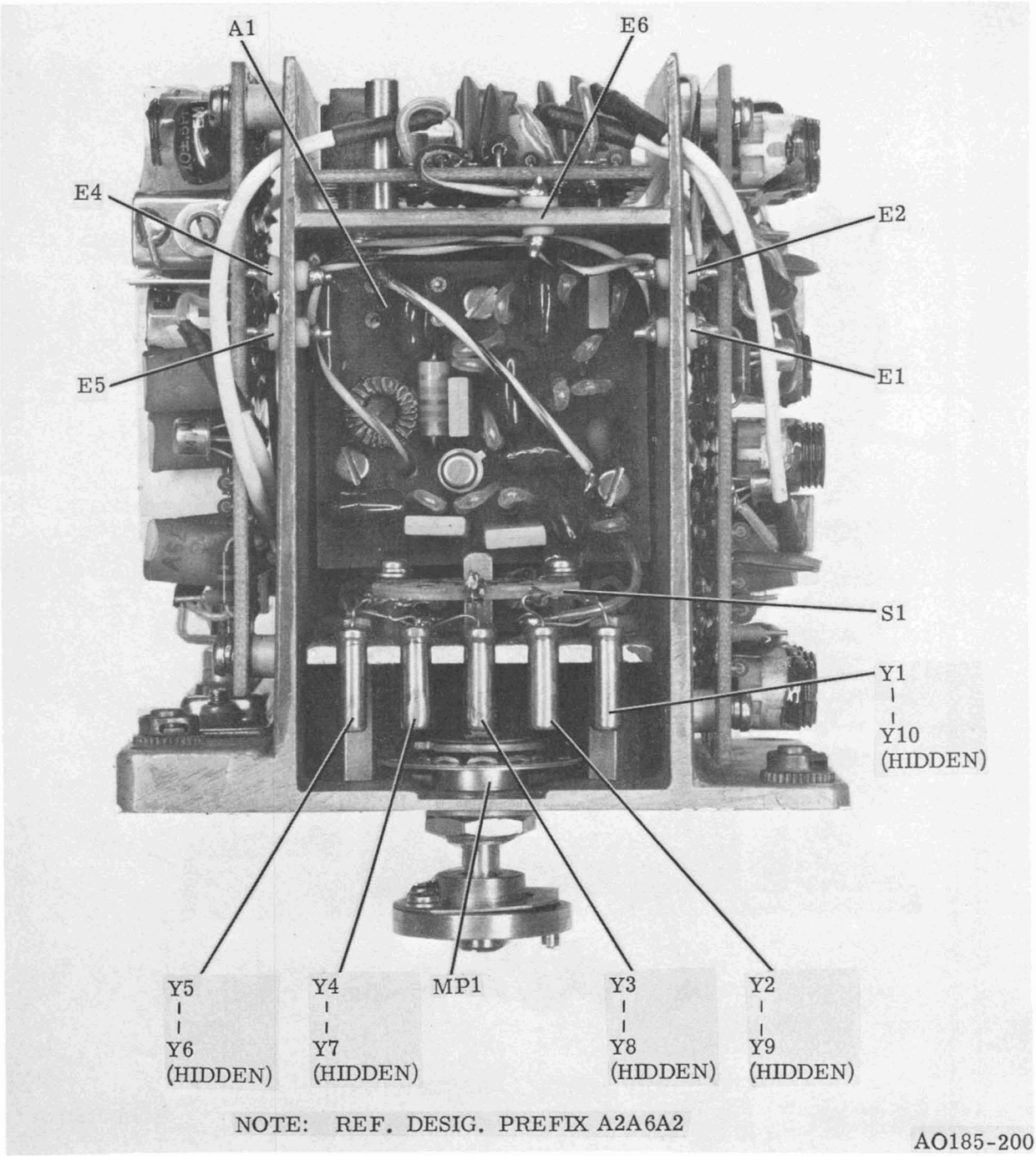


Figure 5-70. 100 KC Synthesizer Electronic Subassembly A2A6A2, Right Side, Component Location

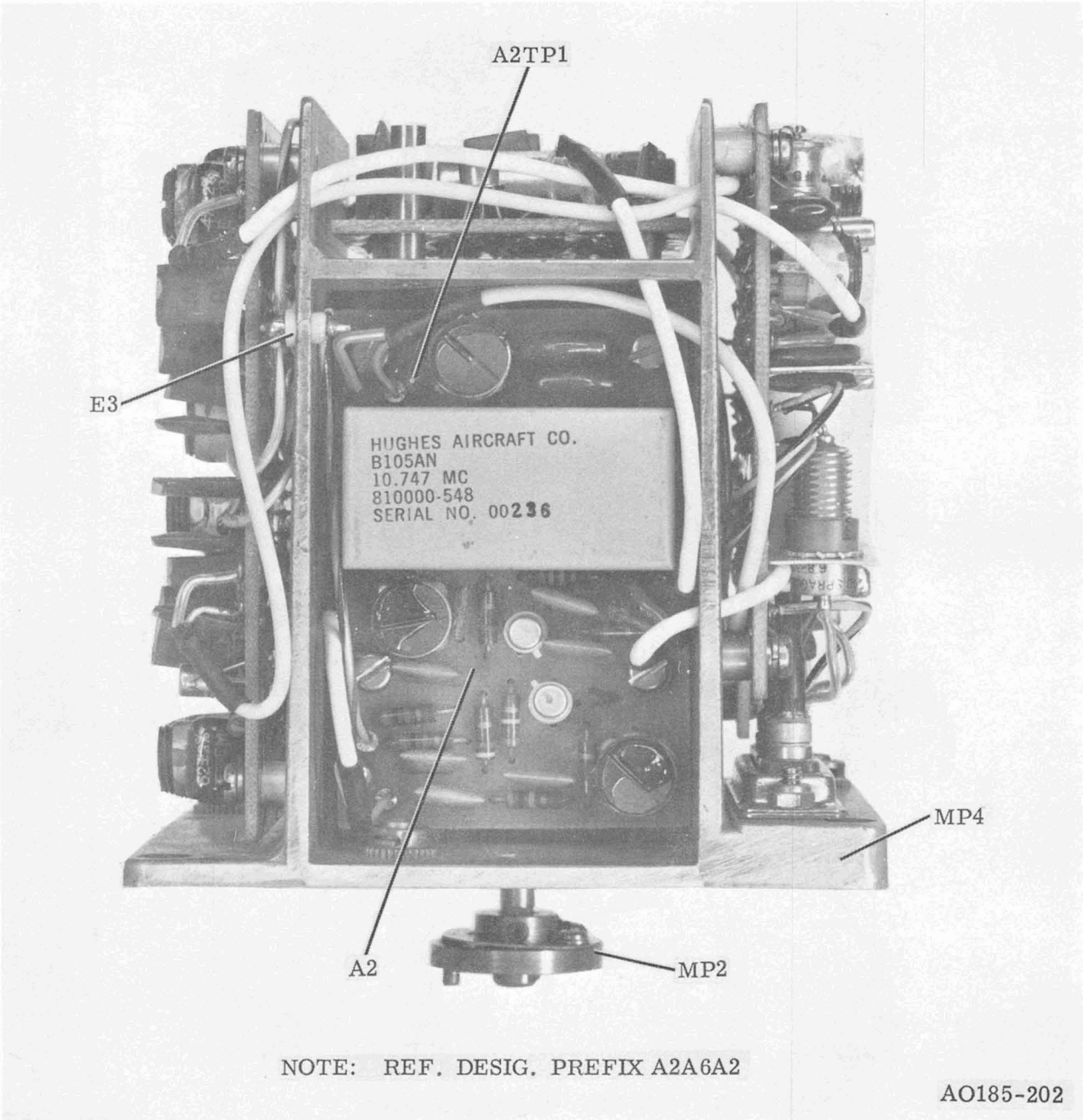


Figure 5-71. 100 KC Synthesizer Electronic Subassembly A2A6A2, Left Side, Component Location

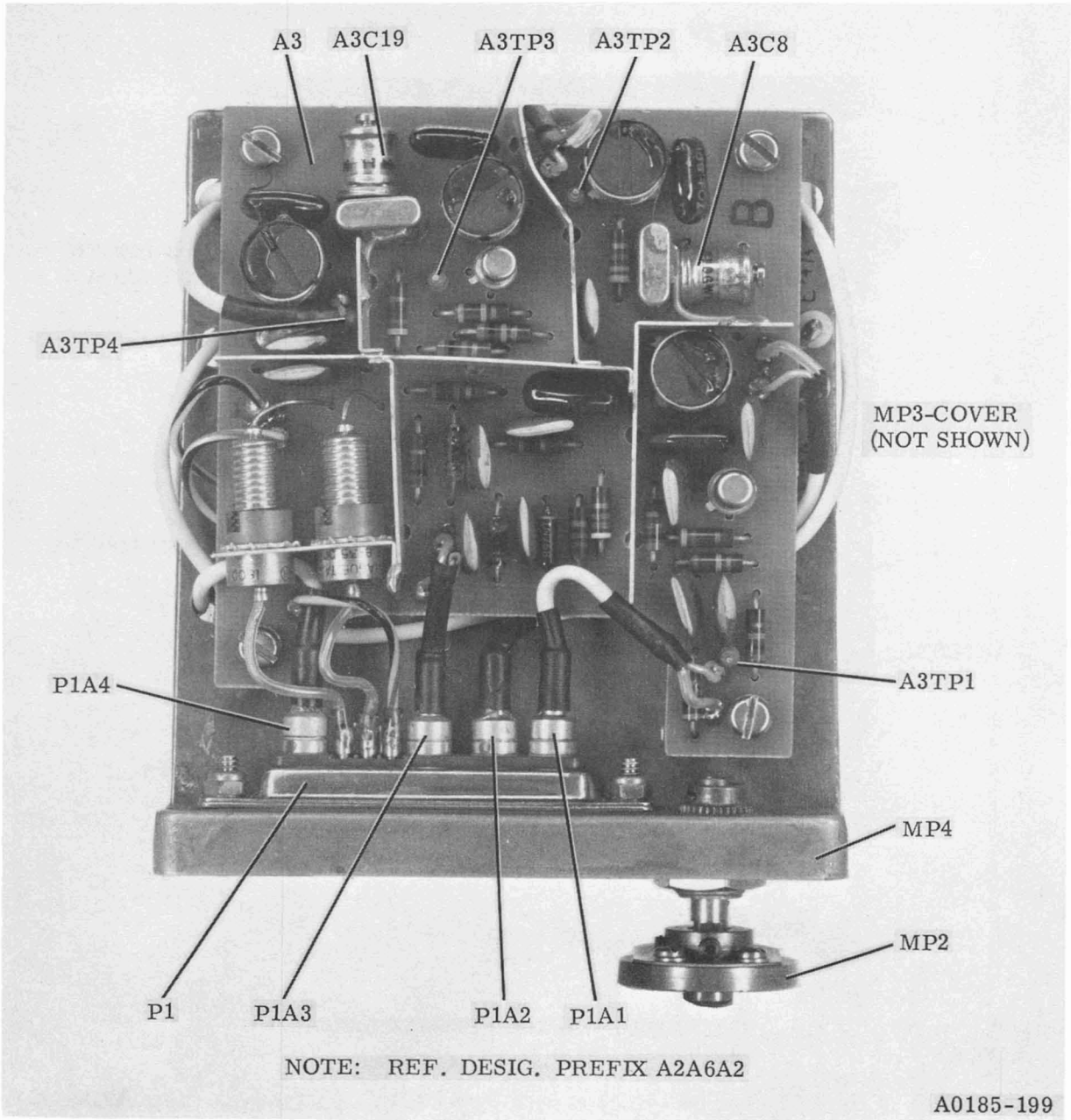


Figure 5-72. 100 KC Synthesizer Electronic Subassembly A2A6A2, Front View, Component Location

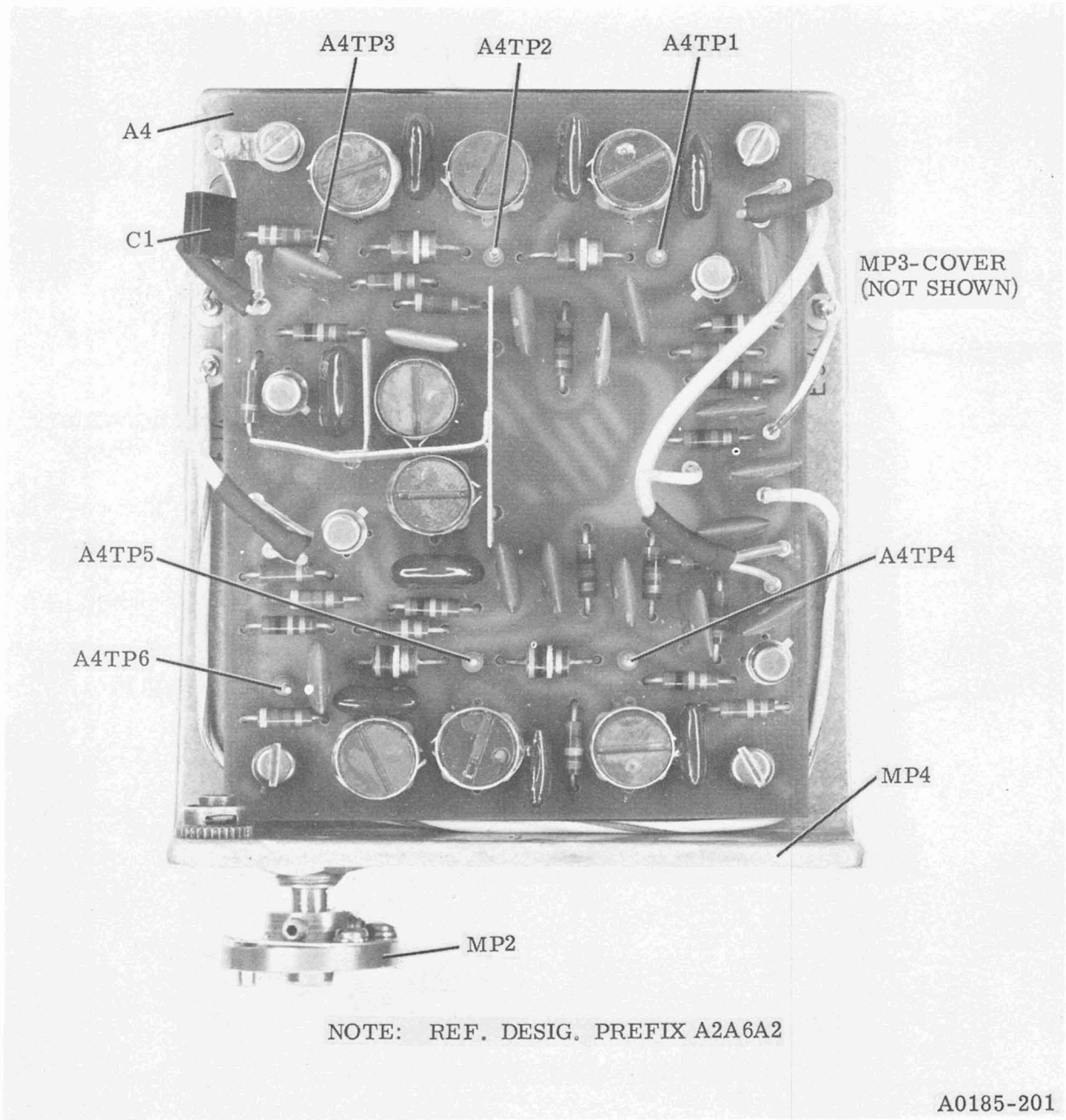


Figure 5-73. 100 KC Synthesizer Electronic Subassembly A2A6A2, Rear View, Component Location

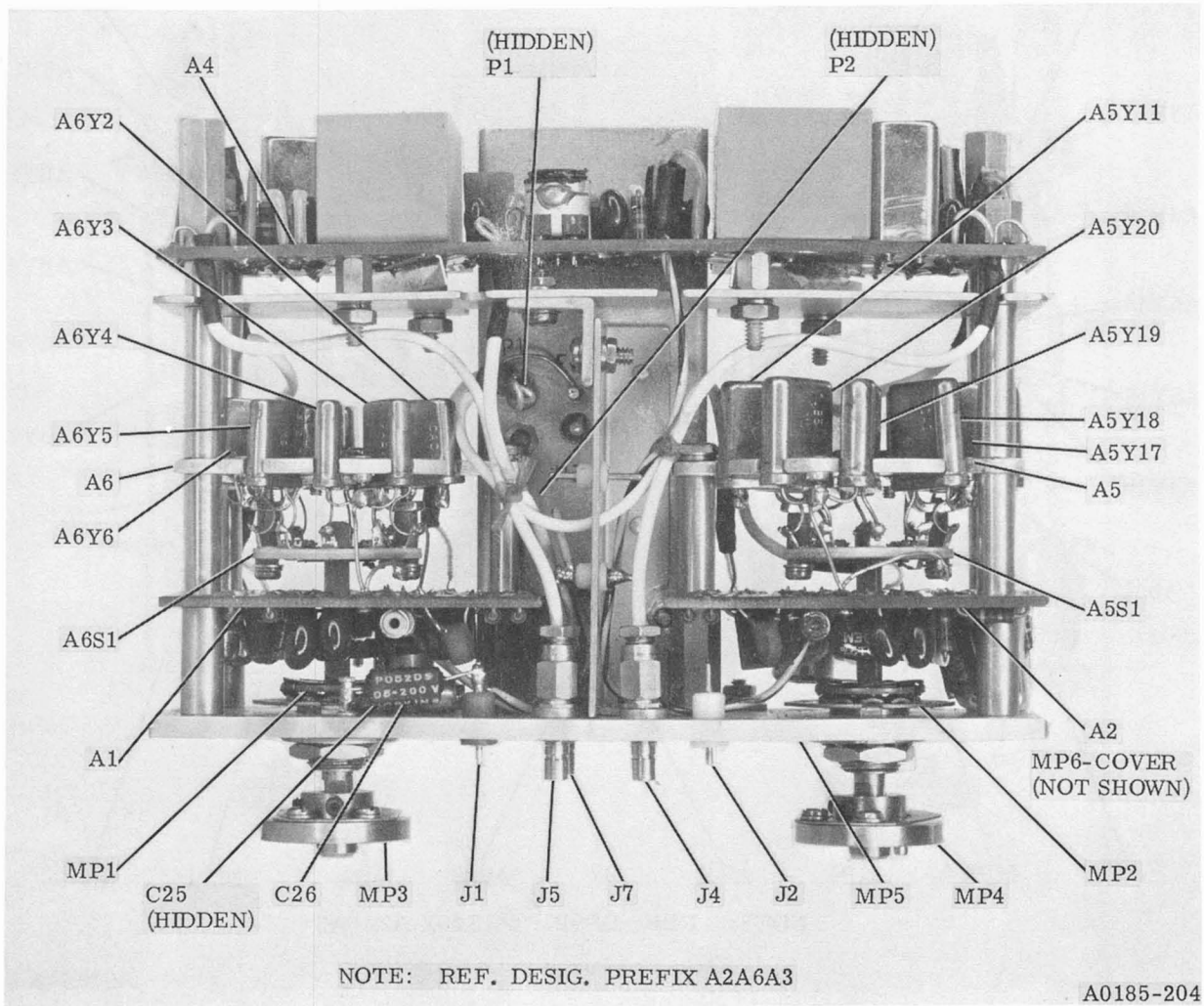


Figure 5-80. 1 and 10 KC Synthesizer Electronic Subassembly A2A6A3, Front View, Component Location

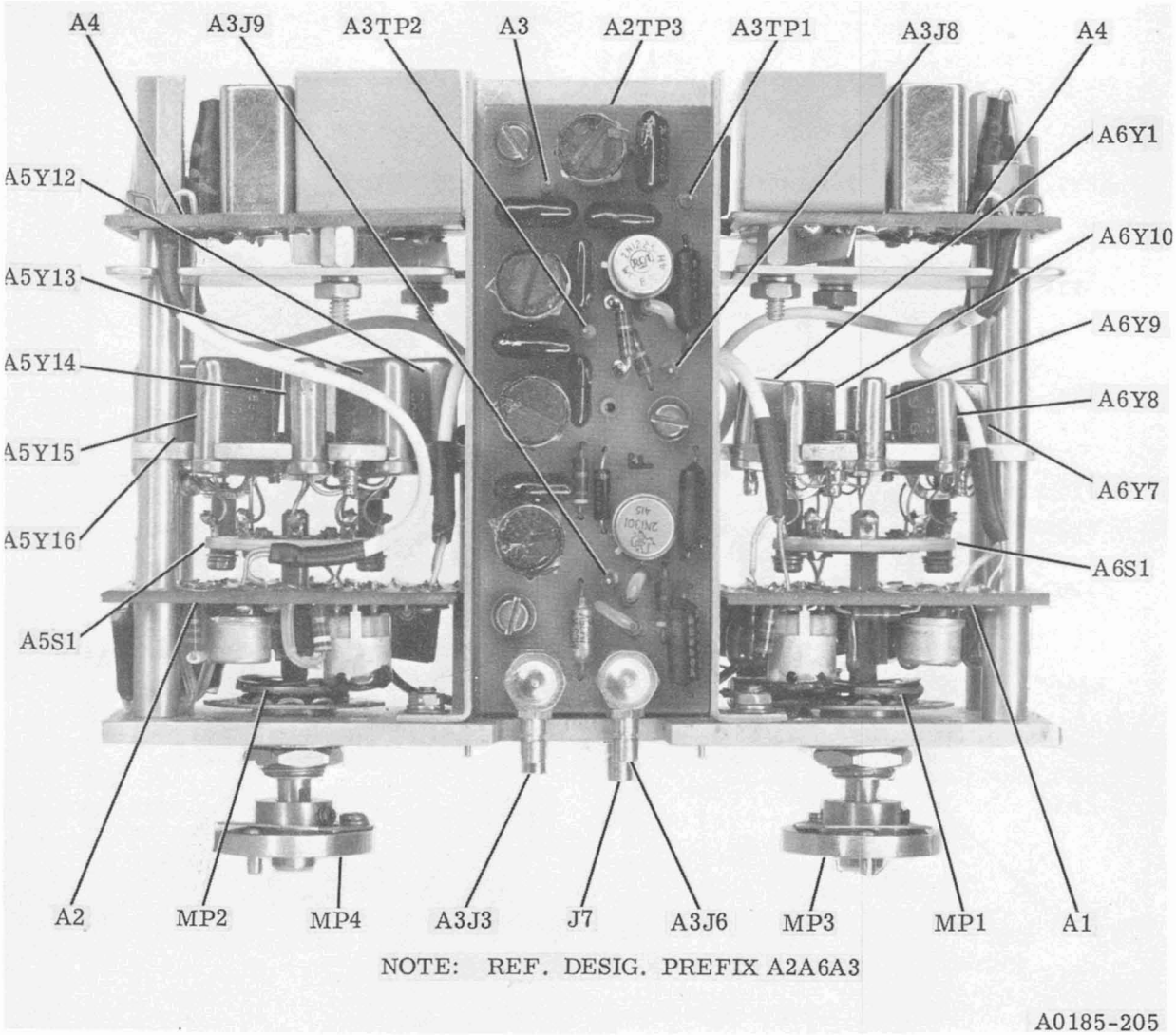


Figure 5-81. 1 and 10 KC Synthesizer Electronic Subassembly A2A6A3, Rear View, Component Location

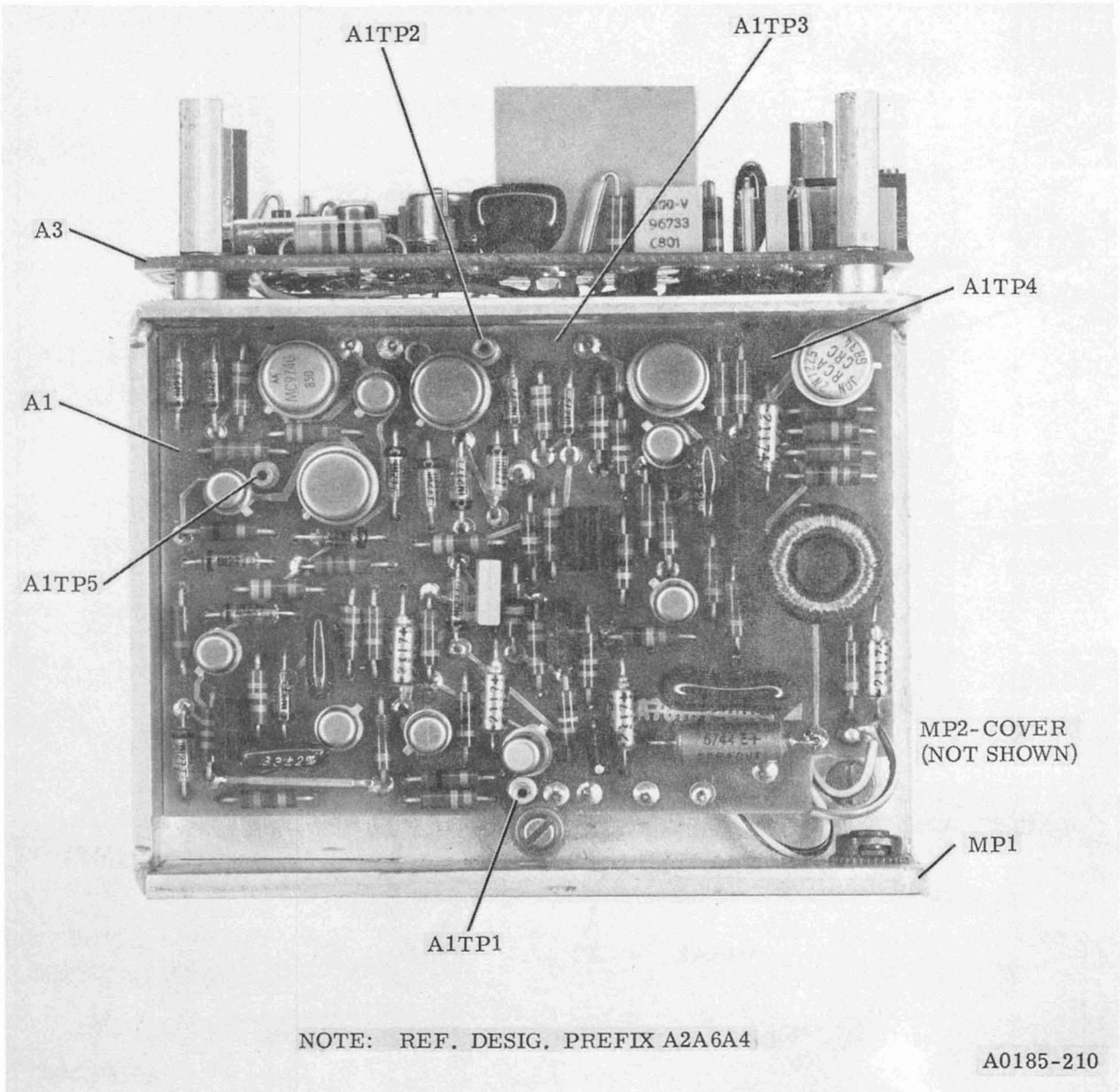


Figure 5-86. 100 CPS Synthesizer Electronic Subassembly A2A6A4, Right Side, Component Location

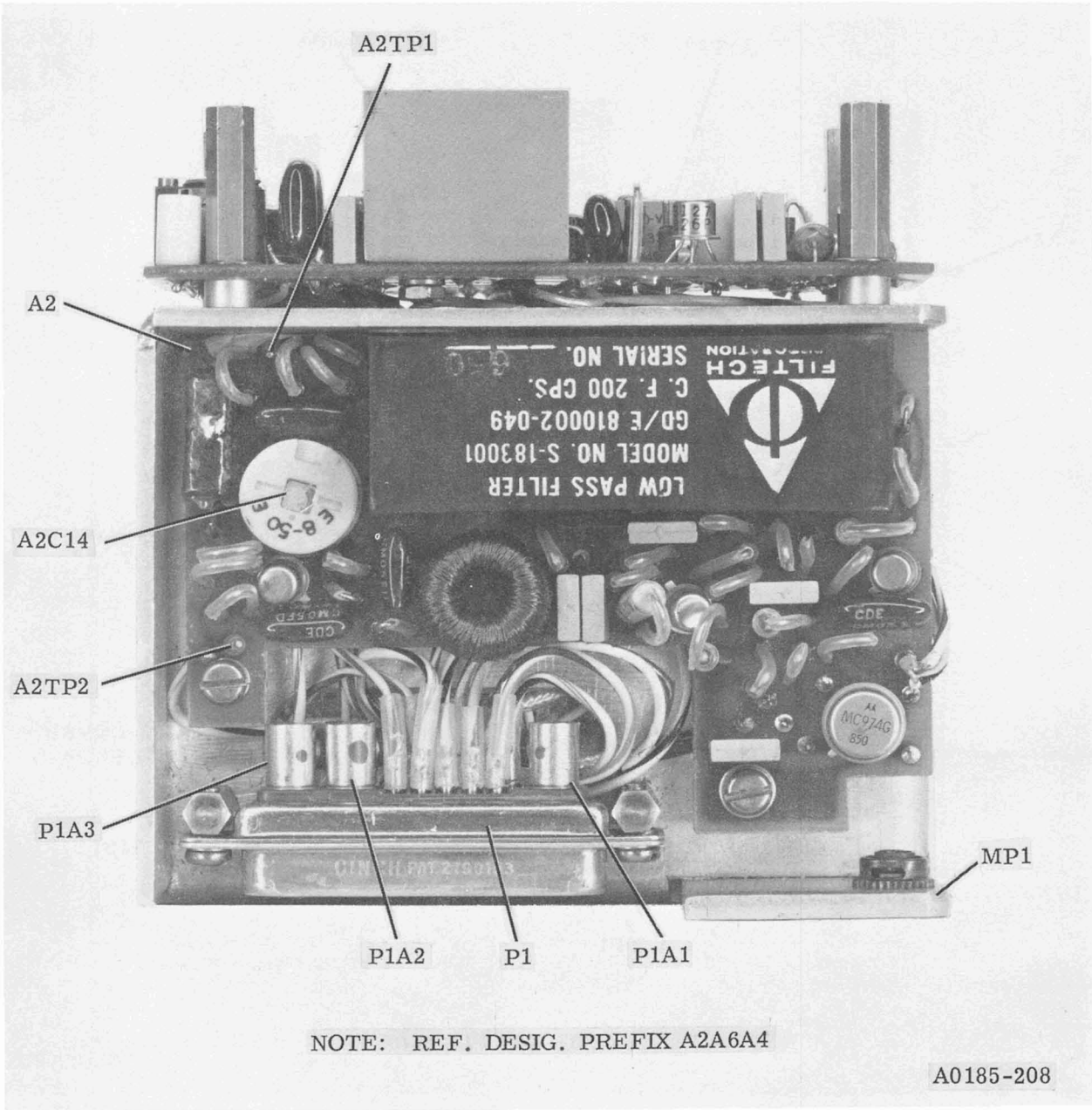


Figure 5-87. 100 CPS Synthesizer Electronic Subassembly A2A6A4, Left Side, Component Location

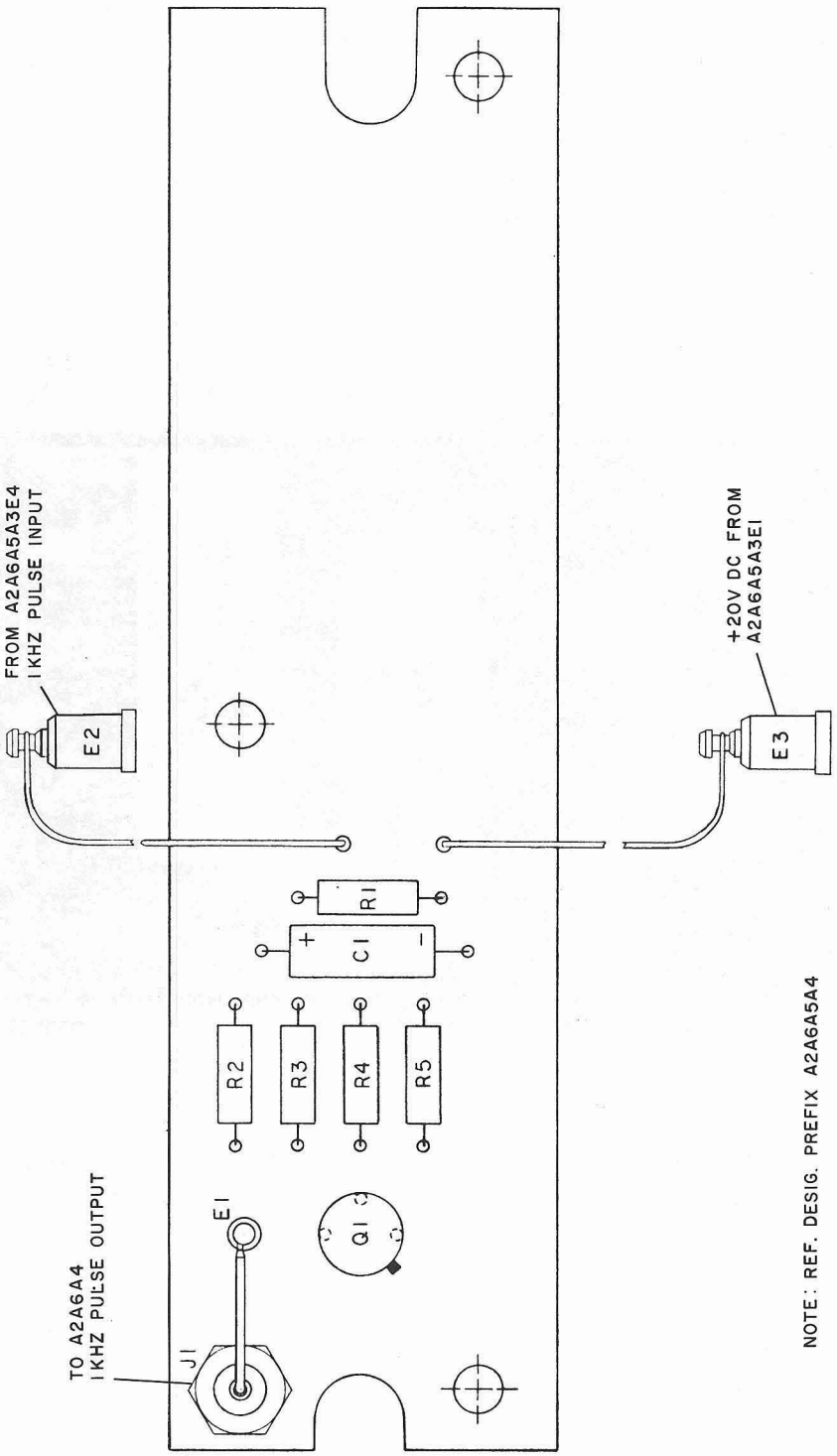


Figure 5-96. 1 KC Pulse Inverter A2A6A5A4, Component Location

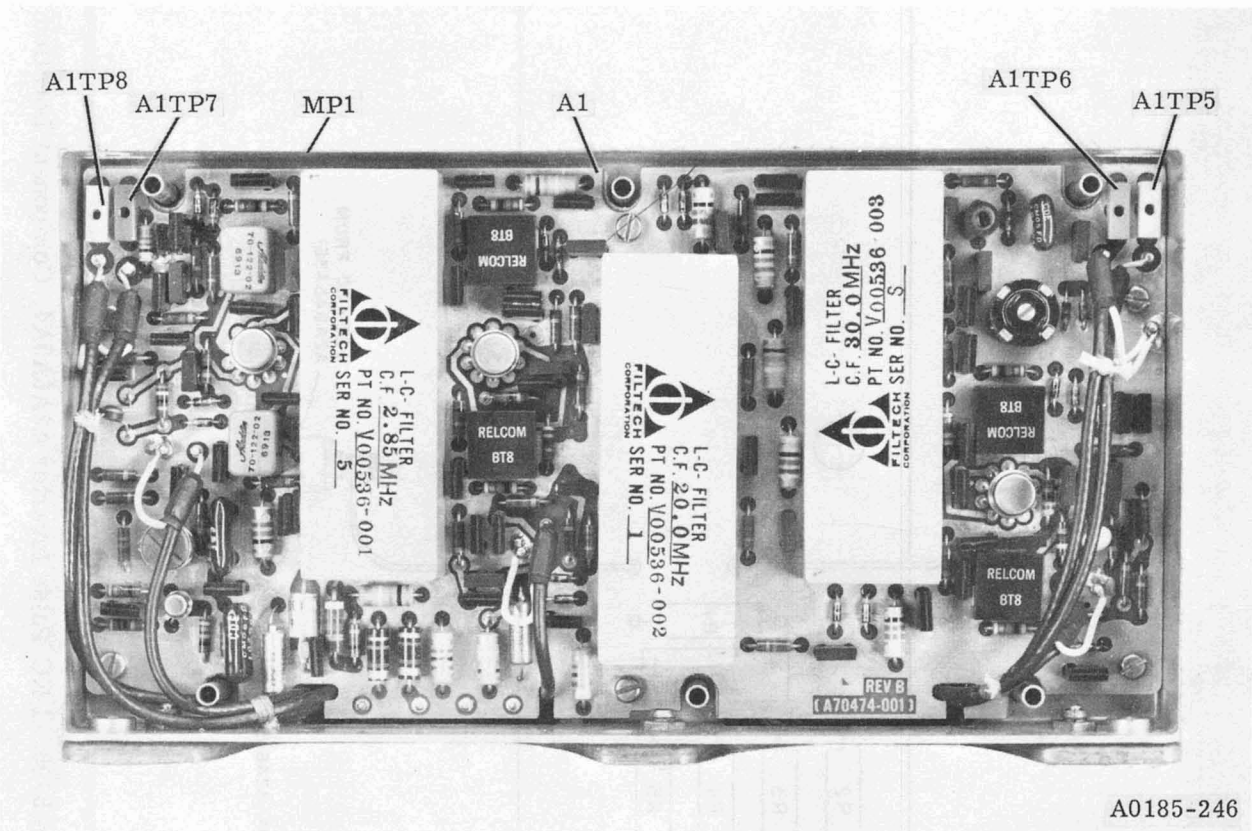


Figure 5-97. RF Translator Electronic Subassembly A2A6A6, Component Location

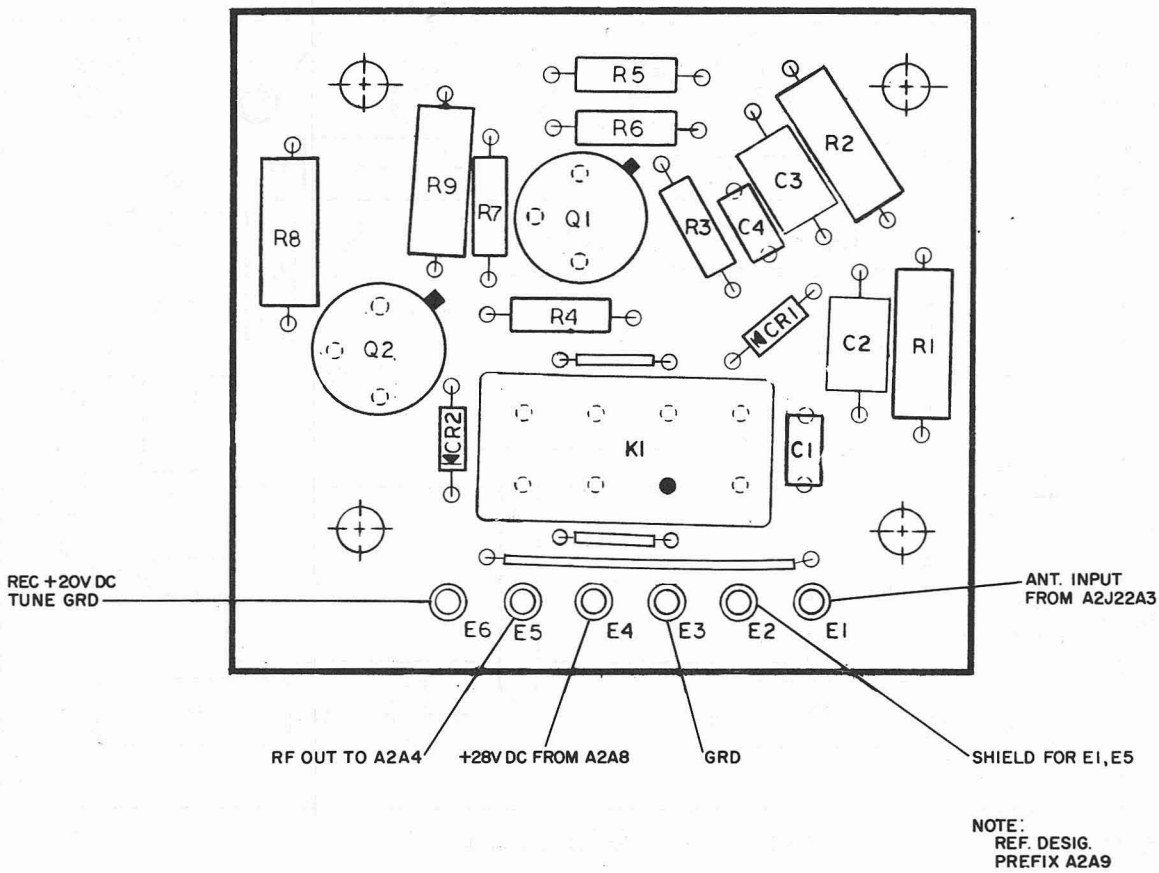


Figure 5-101. Antenna Overload Electronic Assembly A2A9, Component Location

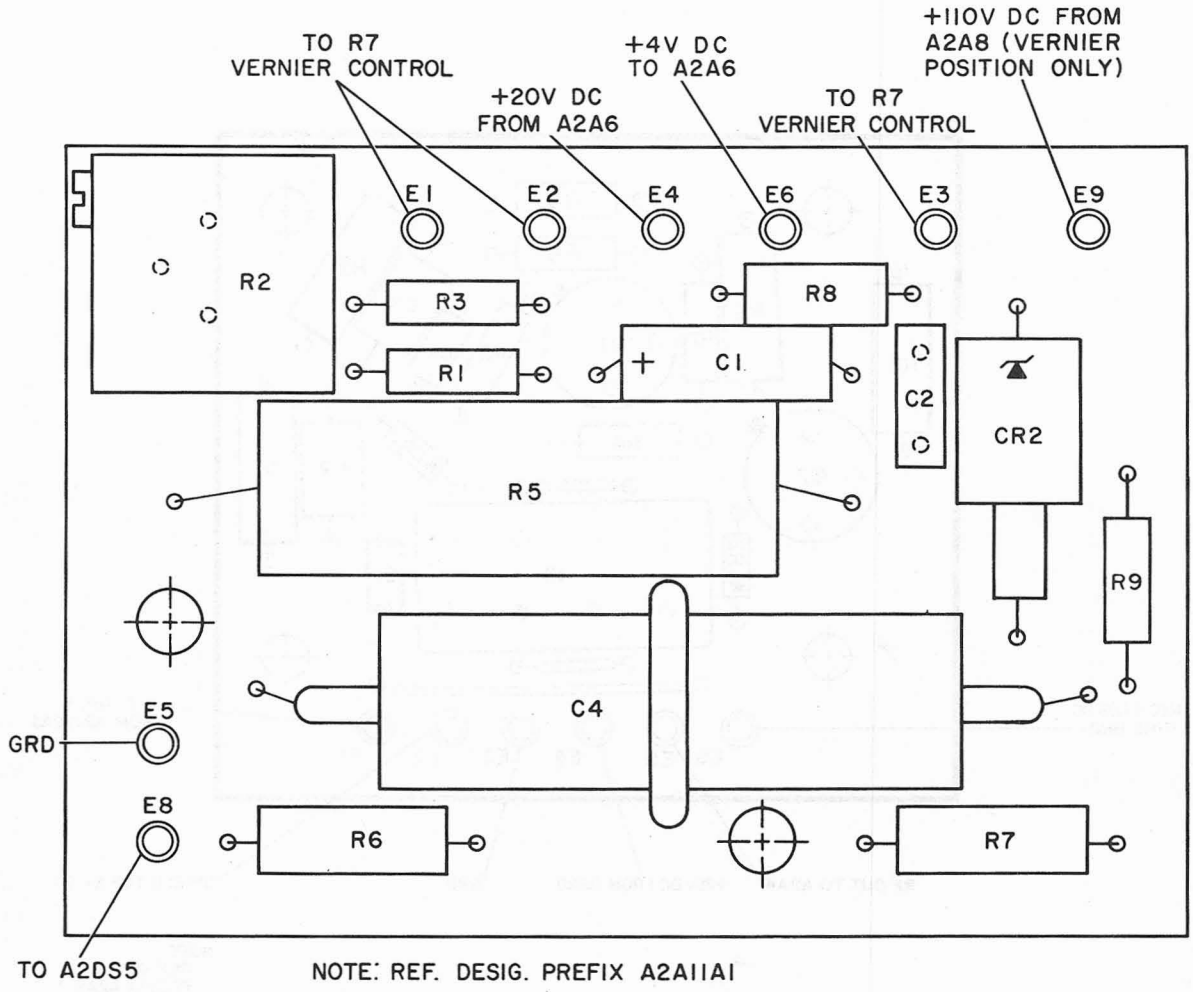


Figure 5-102. 4 VDC Power Supply A2A11A1, Component Location

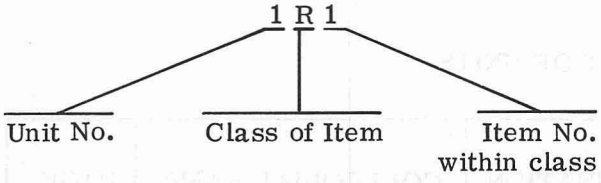
SECTION 6

PARTS LIST

6-1. INTRODUCTION.

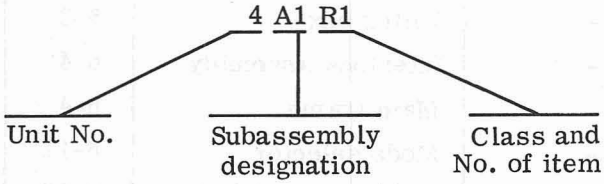
a. REFERENCE DESIGNATIONS - The unit numbering method of assigning reference designations has been used to identify units, assemblies, subassemblies, and parts. This method has been expanded as much as necessary to adequately cover the various degrees of subdivision of the equipment. Examples of this unit numbering method and typical expansions of the same are illustrated by the following:

Example 1:



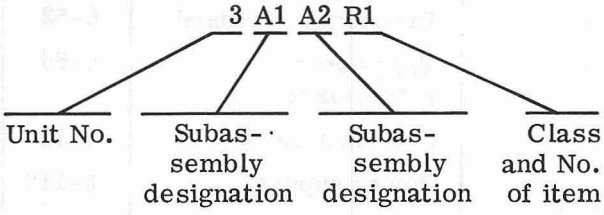
Read as: First (1) resistor (R) of first unit (1).

Example 2:



Read as: First (1) resistor (R) of first (1) subassembly (A) of fourth (4) unit.

Example 3:



Read as: First (1) resistor (R) of second (2) subassembly (A) of first (1) subassembly (A) of third (3) unit.

b. REF DESIG 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 illustrations following the notation "REF DESIG PREFIX".

6-2. LIST OF UNITS.

Table 6-1 is a listing of the units comprising the equipment. The units are listed by unit numbers in numerical order. Thus when the complete reference designation of a part is known, this table will furnish the identification of the unit in which the part is located, since the first number of a complete reference designation provides the following information for each unit listed: (1) quantity per equipment, (2) official name, (3) designation, (4) colloquial name, and (5) location of the first page of its parts listing in table 6-2.

6-3. MAINTENANCE PARTS LIST.

Table 6-2 lists all units and their maintenance parts. The units are listed in numerical sequence. Maintenance parts for each unit are listed alphabetically-numerically by class of part following the unit designation. Thus the parts for each unit 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 6-6, (3) noun name and brief description, and (4) identification of the illustration which pictorially locates the part.

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 unit, 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 in subsequent units, reference is made to the parts breakdown previously listed.

6-4. LIST OF MANUFACTURERS.

Table 6-3 lists the manufacturers of parts used in the equipment. The table includes the manufacturer's code used in table 6-2 to identify the manufacturers. The code is contained in Federal Supply Code for Manufacturers, H4-1.

6-5. STOCK NUMBER IDENTIFICATION.

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.

6-6. NOTES.

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.

TABLE 6-1. LIST OF UNITS

UNIT NO.	QTY	NAME OF UNIT	DESIGNATION	COLLOQUIAL NAME	PAGE
1	1	Radio Receiver	R-1051D/URR	Receiver	6-3
1A1	1	Case	-	Case	6-3
1A1A1	1	Filter box	-	Filter box	6-3
1A1A2	1	Interlock assembly	-	Interlock assembly	6-4
1A2	1	Main frame	-	Main frame	6-4
1A2A1	1	Mode selector	-	Mode selector	6-11
1A2A2	1	IF/audio amplifier	-	IF/audio amplifier	6-15
1A2A3	1	IF/audio amplifier	-	IF/audio amplifier	6-22
1A2A4	1	RF amplifier	-	RF amplifier	6-22
1A2A5	1	Frequency standard	-	Frequency standard	6-52
1A2A6	1	Translator/ synthesizer	-	Translator/ synthesizer	6-60
1A2A7	1	Code generator	-	Code generator	6-110
1A2A8	1	Power supply	-	Power supply	6-110
1A2A9	1	Antenna overload	-	Antenna overload	6-111
1A2A11	1	CPS switch assembly	-	CPS switch assembly	6-112

TABLE 6-2. MAINTENANCE PARTS LIST

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1		RECEIVER, R-1051D/URR, MFR 58189, P/N A70175-001	
1A1		CASE SUBASSEMBLY, RECEIVER, MFR 58189, P/N A70283-001	
1A1H1-H6		INSERT, MFR 83324, P/N SR192L10-32	5-26
1A1H7-H10		POST, CABLE, MFR 58189, P/N 666231-373	5-26
1A1J1-J22		NOT USED	
1A1J23		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 91146, P/N NJBFO	5-25
1A1J24		CONNECTOR, RECEPTACLE, ELECTRICAL MFR 91146, P/N BNCJB7FO	5-25
1A1J25		SAME AS 1A1J23	5-25
1A1MP1		CAP, RECEPTACLE, J24, MIL TYPE MX913U	5-25
1A1MP2		CAP, RECEPTACLE, J25, MIL TYPE MS35186-123A	5-25
1A1MP3		SLIDE, RIGHT HAND, MFR 58189, P/N A70272-001	5-26
1A1MP4		SLIDE, LEFT HAND, MFR 58189, P/N A70272-002	5-26
1A1MP5-MP8		BRACKET, SLIDE, MFR 58189, P/N 666231-938	5-26
1A1P1-P20		NOT USED	
1A1P21		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.635 IN. LG X 0.605 IN. W X 0.563 IN. H, MFR 7146P, P/N DDSMF50S	5-26
1A1P22		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.541 IN. LG X 0.494 IN. W X 0.664 IN. H, MFR 91146, P/N DAMF3W3S	5-26
1A1P22A1-A3		CONNECTOR INSERT, MFR 71468, P/N DM53743-5068	5-26
1A1A1		FILTER BOX ASSEMBLY, MFR 58189, P/N 666230-733	5-26
1A1A1C1-C26		CAPACITOR, MIL TYPE CK70AW1C2M	5-26
1A1A1J1-J2		NOT USED	
1A1A1J3		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.375 IN. LG X 1.375 IN. W X 1.093 IN. H, MFR 77820, P/N 71-74116-5P	5-25

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A1J4		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.812 IN. LG X 1.812 IN. W X 1.105 IN. H, MFR 7782C, P/N PT07A2C-39P	5-25
1A1A1J5-J6		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.000 IN. LG X 1.000 IN. W X 1.093 IN. H, MFR 77820, P/N 71-74111-4P	5-25
1A1A2		SWITCH INTERLOCK AUX-NORM ASSEMBLY, MFR 58189, P/N A70296-001	5-26
1A1A2MP1-MP2		ACTUATOR, ROLLER LEAF FOR INTER-LOCK SWITCH, MFR 91929, P/N JS70	5-26
1A1A2MP3		ACTUATOR, BLOCK, NYLON, MFR 58189, P/N A70787-001	5-26
1A1A2MP4		ACTUATOR, SWITCH, MFR 58189, P/N A707176-001	5-26
1A1A2MP5		SHAFT, ACTUATOR, MFR 58189, P/N A70292-001	5-26
1A1A2MP6-MP7		RING, RETAINING, MFT 79136, P/N 5133-185	5-26
1A1A2MP8		PLATE, SWITCH MOUNTING, MFR 58189, P/N A70291-001	5-26
1A1A2MP9		SPRING, MFR 58189, P/N A70295-001	5-26
1A1A2S 1A, 1B, 2A, 2B		SWITCH, MFR 74059, P/N 11SM3T	5-26
1A2		CHASSIS, RECEIVER, MFR 58189, P/N A70738-001	
1A2C1		CAPACITOR, MIL TYPE M62-08-214	5-22
1A2C2		CAPACITOR, MIL TYPE M62-08-187	5-22
1A2C3		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.1 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-4	5-24
1A2CR1-CR4		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N649	5-24
1A2CR5-CR6		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N4454	5-28
1A2DS1-DS2		NOT USED	
1A2DS3-DS4		LAMP, INCANDESCENT, MIL TYPE, MS25237-327	5-27
1A2DS5		LAMP, INCANDESCENT, MFR 24455, P/N NE2J	5-27
1A2E1-E5		TERMINAL, MFR 71279, P/N 238-1-05	5-28
1A2E6		NOT USED	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2E7		TERMINAL, MFR 71279, P/N 2380-1	5-24
1A2E8-E9		SAME AS 1A2E1-E5	5-24
1A2E10		SAME AS 1A2E7	5-24
1A2E11-E13		TERMINAL, MFR 16258, P/N 6122	5-24
1A2E14		SAME AS 1A2E7	5-24
1A2E15-E18		SAME AS 1A2E11-E13	5-24
1A2E19		SAME AS 1A2E1-E5	5-24
1A2E20		SAME AS 1A2E11-E13	5-24
1A2E21		SAME AS 1A2E1-E5	5-24
1A2E22-E23		SAME AS 1A2E11-E13	5-24
1A2E24-E25		SAME AS 1A2E7	5-24
1A2E26		SAME AS 1A2E11-E13	5-24
1A2E27-E28		SAME AS 1A2E1-E5	5-24
1A2E29-E30		SAME AS 1A2E11-E13	5-24
1A2E31-E32		SAME AS 1A2E1-E5	5-24
1A2E33-E34		SAME AS 1A2E11-E13	5-24
1A2E35		SAME AS 1A2E1-E5	5-24
1A2E36-E37		SAME AS 1A2E11-E13	5-24
1A2E38		SAME AS 1A2E7	5-24
1A2E39-E42		SAME AS 1A2E1-E5	5-24
1A2E43		SAME AS 1A2E11-E13	5-24
1A2E44		NOT USED	
1A2E45		SAME AS 1A2E7	5-24
1A2F1-F2		FUSE, MIL TYPE F02B250V3-4AS	5-27
1A2FL1-FL2		FILTER, RADIO INTERFERENCE, MFR 56289, P/N 1JX97	5-24
1A2H1-H5		SCREW, CAPTIVE, MFR 58189, P/N 666164-260	5-27
1A2H6		SCREW, CAPTIVE, MFR 58189, P/N 666231-671	5-27
1A2H7-H12		NUT, CAPTIVE, MFR 58189, P/N 666164-259	5-28

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2H13-H28		NUT, SELF LOCKING, MFR 46384, P/N LAC032-2	5-23
1A2J1-J2		JACK, TIP, MIL SPEC JJ089	5-27
1A2J3-J7		NOT USED	
1A2J8		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DBSM25S1	5-24
1A2J9		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM13W6S	5-23
1A2J9A1-9A6		CONNECTOR, INSERT, MFR 71468, P/N DM53743-5014	5-23
1A2J10		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 91146, P/N DASM15S2	5-23
1A2J11		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM 17W5S1	5-23
1A2J11A1-J11A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J12		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM25W3S1	5-23
1A2J12A1-J12A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J13		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DAM3W3S1	5-23
1A2J13A1-J13A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J14		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DAM3W3S1	5-23
1A2514A1-A2		NOT USED	
1A2J14A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J15		NOT USED	
1A2J16		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DBM13W3S2	5-23
1A2J16A1-A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J17		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DBM9W4S2	5-23
1A2J17A1-A4		SAME AS 1A2J9A1-J9A6	5-23
1A2J18		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM25W3S1	5-23

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2J18A1-A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J19		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM25W3S1	5-23
1A2J19A1		NOT USED	
1A2J19A2-A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J20		NOT USED	
1A2J21		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR91146, P/N DDSM50P	5-24
1A2J22		CONNECTOR, PLUG, ELECTRICAL, MFR 71468, P/N DAM3W3P	5-24
1A2J22A1-A3		SAME AS 1A2J9A1-J9A6	5-24
1A2K1-K3		RELAY, ARMATURE, MFR 71482, P/N 2F2427	5-24
1A2L1		REACTOR, MFR 70674, P/N A14514	5-23
1A2L2		REACTOR, MFR 17637, P/N TB1022	5-23
1A2M1		METER, MIL SPEC MR13B100SPECR	5-27
1A2MP1-MP5		KNOB, MFR 58189, P/N 666162-078	5-27
1A2MP6-MP9		KNOB, MFR 49956, P/N 70-2-2G	5-27
1A2MP10		KNOB, MFR 49956, P/N 70-8WL2G	5-27
1A2MP11		KNOB, MIL TYPE MS91528-1K2B	5-27
1A2MP12-MP13		DIAL, MC, MFR 58189, P/N 666230-177	5-24
1A2MP14		SPROCKET ASSEMBLY, TRIPLE, MFR 58189, P/N A70765-001	5-24
1A2MP14A		CHASSIS, SPIDER, W/O GEARS AND HARDWARE, MFR 58189, P/N 666162-134	5-24
1A2MP14B-14G		BEARING, MFR 40920, P/N S6632FCE8972	5-24
1A2MP14H-14J		SPROCKET, DRIVE, 1.46 INCH DIA, 30 TEETH MFR 58189, P/N 666273-099	5-24
1A2MP14K-14M		DISK, COUPLING, MFR 58189, P/N 666231-631	5-23-5-24
1A2MP14N-14Q		SPRING WASHER, MFR 58189, P/N 810000-506	5-24
1A2MP14R-14W		RING, MFR 96906, P/N MS16333-1819	5-24
1A2MP14X-14Y		SHAFT, COUPLING, MACHINED, 1.062 INCH LONG, MFR 58189, P/N 666231-619	5-24

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2J18A1-A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J19		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 71468, P/N DCM25W3S1	5-23
1A2J19A1		NOT USED	
1A2J19A2-A3		SAME AS 1A2J9A1-J9A6	5-23
1A2J20		NOT USED	
1A2J21		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR91146, P/N DDSM50P	5-24
1A2J22		CONNECTOR, PLUG, ELECTRICAL, MFR 71468, P/N DAM3W3P	5-24
1A2J22A1-A3		SAME AS 1A2J9A1-J9A6	5-24
1A2K1-K3		RELAY, ARMATURE, MFR 71482, P/N 2F2427	5-24
1A2L1		REACTOR, MFR 70674, P/N A14514	5-23
1A2L2		REACTOR, MFR 17637, P/N TB1022	5-23
1A2M1		METER, MIL SPEC MR13B100SPECR	5-27
1A2MP1-MP5		KNOB, MFR 58189, P/N 666162-078	5-27
1A2MP6-MP9		KNOB, MFR 49956, P/N 70-2-2G	5-27
1A2MP10		KNOB, MFR 49956, P/N 70-8WL2G	5-27
1A2MP11		KNOB, MIL TYPE MS91528-1K2B	5-27
1A2MP12-MP13		DIAL, MC, MFR 58189, P/N 666230-177	5-24
1A2MP14		SPROCKET ASSEMBLY, TRIPLE, MFR 58189, P/N A70765-001	5-24
1A2MP14A		CHASSIS, SPIDER, W/O GEARS AND HARDWARE, MFR 58189, P/N 666162-134	5-24
1A2MP14B-14G		BEARING, MFR 40920, P/N S6632FCE8972	5-24
1A2MP14H-14J		SPROCKET, DRIVE, 1.46 INCH DIA, 30 TEETH MFR 58189, P/N 666273-099	5-24
1A2MP14K-14M		DISK, COUPLING, MFR 58189, P/N 666231-631	5-23-5-24
1A2MP14N-14Q		SPRING WASHER, MFR 58189, P/N 810000-506	5-24
1A2MP14R-14W		RING, MFR 96906, P/N MS16333-1819	5-24
1A2MP14X-14Y		SHAFT, COUPLING, MACHINED, 1.062 INCH LONG, MFR 58189, P/N 666231-619	5-24

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2MP14Z-MP14AB		RING, RETAINING, MFR 58189, P/N 666231-603	5-24
1A2MP14AC-MP14AE		CLAMP, SPROCKET, MFR 58189, P/N A09455-001	5-24
1A2MP14AF		SHAFT COUPLING, MACHINED 1.328 INCH LONG, P/N 666231-617, MFR 58189	5-24
1A2MP15		SPROCKET ASSEMBLY, DUAL, MFR 58189, P/N 666162-222	5-24
1A2MP15A		CHASSIS SPIDER, STAKED, W/O GEARS AND HARDWARE, MFR 58189, 666163-116	5-24
1A2MP15B-15C		SAME AS 1A2MP14AF	5-24
1A2MP15D-15E		SPROCKET, DRIVE, 1.46 INCH DIA, 30 TEETH, MFR 58189, P/N 666162-066	5-24
1A2MP15F-15G		SAME AS 1A2MP14N-14Q	5-24
1A2MP15H-15L		SAME AS 1A2MP14B-14G	5-24
1A2MP15M-15N		SAME AS 1A2MP14K-14M	5-24
1A2MP15P-15S		SPACER, MFR 58189, P/N 666163-195	5-24
1A2MP15T-15U		BEARING ROLLER NEEDLE, MFR 60380, P/N B34	5-24
1A2MP15V-15W		PIN, ROLLER, 0.1875 IN. DIA., MFR 58189, P/N 666163-114	5-24
1A2MP15X-15Y		ARM, SPRING, ROLLER, MFR 58189, P/N 666163-199	
1A2MP15Z-15AA		WHEEL INDEX, 1.24 INCH DIA., 10 LOBES, MFR 58189, P/N 666163-115	5-24
1A2MP16		BLOCK ADJUSTABLE IDLER ASSEMBLY LOW, WITH SPROCKET, MFR 58189, P/N 666162-094	5-24
1A2MP16A		SHAFT, MACHINED, 0.92 INCH LONG, MFR 58189, P/N 666162-073	5-24
1A2MP16B		SPROCKET, IDLER, 1.13 INCH DIA., 24 TEETH, MFR 58189, P/N 666162-092	5-24
1A2MP16C		SAME AS 1A2MP15T-15U	5-24
1A2MP17		SAME AS 1A2MP16	5-24
1A2MP17A		SAME AS 1A2MP16A	5-24
1A2MP17B		SAME AS 1A2MP16B	5-24
1A2MP17C		SAME AS 1A2MP15T-15U	5-24
1A2MP18		BLOCK ADJUSTABLE IDLER ASSEMBLY HIGH, WITH SPROCKET, MFR 58189, P/N 666162-095	5-24

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2MP18A		SAME AS 1A2MP16A	5-24
1A2MP18B		SAME AS 1A2MP16B	5-24
1A2MP18C		SAME AS 1A2MP15T-15U	5-24
1A2MP19		CHAIN, 0.1475 IN. PITCH, 136 PITCHES W/ MASTER LINK, MFR 58189, P/N A70764-001	5-24
1A2MP19A		MASTER LINK, 0.1475 IN PITCH, MFR 58189, P/N A70764-002	5-24
1A2MP20		CHAIN, 0.1475 IN. PITCH, 208 PITCHES W/ MASTER LINK, MFR 58189, P/N A70762-001	5-24
1A2MP20A		MASTER LINK, 0.1475 IN. PITCH, MFR 58189, P/N A70762-002	5-24
1A2MP21		CHAIN, 0.1475 IN. PITCH, 160 PITCHES, W/ MASTER LINK, MFR 58189, P/N A70763-001	5-24
1A2MP21A		MASTER LINK, 0.1475 IN. PITCH, MFR 58189, P/N A70763-002	5-24
1A2MP22		COVER, PROTECTOR, A9 PC ASSEMBLY, MFR 58189, P/N A70684-001	5-24
1A2MP23		MOUNTING KIT, TRANSISTOR, MFR 61758, P/N 7305209	5-24
1A2MP24-MP25		SPRING DETENT SUBASSY, MFR 58189, P/N 666230-191 INCLUDING 1A2MP26-MP27 and 1A1MP28-MP29	5-24
1A2MP26-MP27		PIN, BEARING, MFR 58189, P/N 666230-187	5-24
1A2MP28-MP29		BEARING ROLLER, MFR 60380, P/N B2-1-2-4	5-24
1A2MP30-MP32		GEAR, MITER, (PAIR) 0.5 IN. DIA., 32 TEETH, MFR 58189, P/N 666162-110	5-24 & 5-28
1A2MP33-MP35		SPROCKET, DRIVE, MFR 58189, P/N 666162-067	5-24 & 5-28
1A2MP36-MP38		SHAFT, SUPPORT BRACKET GEARS, MACHINED, 1.062 INCHES LONG, MFR 58189, P/N 666162-100	5-24 & 5-28
1A2MP39-MP40		SHAFT, MC CONTROL KNOB, MACHINED, 1.27 IN. LONG W/DOWEL PIN, MFR 58189, P/N 666230-171	5-24
1A2MP41		DETENT SHAFT, MFR 58189, P/N A70826-001	5-24 & 5-28
1A2MP42-MP43		SHAFT, FEED THRU, MFR 58189, P/N 666163-194	5-24 & 5-28
1A2MP44-MP46		DIAL AND COLLAR ASSEMBLY, MARKED, MFR 58189, P/N A70766-001	5-24 & 5-28

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2MP47-MP55		BEARING, MFR 40920, P/N S6632FC	5-24 & 5-28
1A2MP56		PLATE, STAKED, MFR 58189, P/N 666162-082	5-27
1A2MP57		PLATE, STAKED, MFR 58189, P/N 666162-120	5-27
1A2MP58		LENS, INDICATOR LIGHT, MFR 72619, P/N LC13YN	5-27
1A2MP59		LIGHT BAR, MFR 58189, P/N A55332-001	5-28
1A2MP60		CONTROL KNOB, VERNIER DIAL, MFR 58189, P/N 666231-005	5-27
1A2MP61		CONTROL KNOB, 100 CPS, MFR 58189, P/N A00083-001	5-27
1A2Q1		TRANSISTOR, MIL TYPE 2N3442	5-24
1A2R1-R2		RESISTOR, MIL TYPE RV 4NAYSD254A	5-28
1A2R3		RESISTOR, MIL TYPE RV4SAYSD253A	5-28
1A2R4-R5		RESISTOR, MIL TYPE RV4SAYSD252C	5-28
1A2R6		RESISTOR, MIL TYPE RV4SAYSD253A	5-28
1A2R7		NOT USED	
1A2R8		MIL TYPE RE60G3220	5-24
1A2R9-R10		RESISTOR, MIL TYPE RC07G122JM	5-28
1A2R11-R12		RESISTOR, MIL TYPE RCR07G242J	5-28
1A2R13		NOT USED	
1A2R14		RESISTOR, MIL TYPE RCR07G121JS	5-28
1A2R15		RESISTOR, MIL TYPE RCR07G153JS	5-28
1A2R16-R18		NOT USED	
1A2R19		RESISTOR, MIL TYPE RCR07G163JS	5-28
1A2R20		RESISTOR, MIL TYPE RC42GF133J	5-24
1A2S1		SWITCH, TOGGLE, DPDT, MFR 96906, P/N MS24656-211	5-28 & 5-27
1A2S2		SWITCH ROTARY, 1.5 IN. DIA X 1.975 IN. LG, 4 SECTION 18 POLES 8 POSITIONS, MFR 76854, P/N SR/02/N30B1MP	5-28
1A2S3-S4		NOT USED	
1A2S5		SWITCH, MFR 58189, P/N V00515-001	5-28

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2S6-S8		NOT USED	
1A2S9		SWITCH, MIL TYPE MS24656-231	5-28
1A2T1		TRANSFORMER, POWER, STEP-DOWN, 2.625 IN. LG X 2.250 IN. W X 4.875 IN. H, MFR 91574, P/N W5444	5-22
1A2XC1-XC2		SOCKET, ELECTRON TUBE, MFR 72825, P/N 9729-38	5-24
1A2XDS1-XDS2		NOT USED	
1A2XDS3-XDS4		LIGHT, INDICATOR, MFR 72914, P/N A-4921-	5-27
1A2XDS5		LIGHT, INDICATOR, MFR 72619, P/N 137-8864-09-522	5-27
1A2XF1-XF2		FUSEHOLDER, MIL TYPE FLH17G2	5-27
1A2A1		MODE SELECTOR, RECEIVER, MFR 58189, P/N A70638-001	5-22
1A2A1C1 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 130 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E131G300V	5-29
1A2A1C1 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 142 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15F1420G300V	5-29
1A2A1C1 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 150 UUF PORM, 2 PCT, 300 WVDC, MFR 72136, P/N DM15E151G300V	5-29
1A2A1C2		SAME AS 1A2A1C1	5-29
1A2A1C3-C4		NOT USED	
1A2A1C5		SAME AS 1A2A1C1	5-29
1A2A1C6		NOT USED	
1A2A1C7		SAME AS 1A2A1C1	5-29
1A2A1C8		NOT USED	
1A2A1C9		SAME AS 1A2A1C1	5-29
1A2A1C10-C13		NOT USED	
1A2A1C14		SAME AS 1A2A1C1	5-29
1A2A1FL1		FILTER, BAND PASS, 500KC, MFR 95105, P/N 526-9420-00	5-29
1A2A1FL2		FILTER, BAND PASS, 500KC, MFR 95105, P/N 526-9421-00	5-29

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1FL3		FILTER, BAND PASS, 500KC, MFR 95105, P/N 526-9419-00	5-29
1A2A1H1-H2		SCREW, CAPTIVE, MFR 58189, P/N 666163-233	5-22
1A2A1MP1		FRAME, STAKED, MFR 58189, P/N 666273-061	5-29 & 5-30
1A2A1MP2		COVER, MARKED, MFR 58189, P/N A70635-001	5-22
1A2A1MP3		SHIELD, MFR 58189, P/N A70179-001	5-31
1A2A1P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.663 IN. H, MFR 71468, P/N DBM13W3P	5-29
1A2A1P1A1-P1A3		CONNECTOR, INSERT, MFR 71468, P/N DM53741-5059	5-29
1A2A1P2		CONNECTOR, PLUG, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.661 IN. H, MFR 71468, P/N DBM9W4P	5-30
1A2A1P2A1-P2A4		SAME AS 1A2A1P1A1-P1A3	5-30
1A2A1A1		MODE GATE, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70569-001	5-29
1A2A1A1C1		CAPACITOR, MIL TYPE CK06BX103M	5-32
1A2A1A1C2-C3		CAPACITOR, MIL TYPE M39003/01-2117	5-32
1A2A1A1C4		CAPACITOR, MIL TYPE CK06BX104M	5-32
1A2A1A1C5		NOT USED	
1A2A1A1C6		SAME AS 1A2A1A1C1	5-32
1A2A1A1C7		NOT USED	
1A2A1A1C8		SAME AS 1A2A1A1C1	5-32
1A2A1A1C9		NOT USED	
1A2A1A1C10		SAME AS 1A2A1A1C2-C3	5-32
1A2A1A1C11		SAME AS 1A2A1A1C1	5-32
1A2A1A1C12-C14		NOT USED	
1A2A1A1C15-C16		SAME AS 1A2A1A1C1	5-32
1A2A1A1C17-C20		SAME AS 1A2A1A1C4	5-32

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1A1CR1-CR2		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE JAN1N4554	5-32
1A2A1A1Q1-Q3		TRANSISTOR, MIL TYPE JAN2N2222	5-32
1A2A1A1R1		RESISTOR, MIL TYPE RCR07G331JS	5-32
1A2A1A1R2		RESISTOR, MIL TYPE RCR07G753JS	5-32
1A2A1A1R3		RESISTOR, MIL TYPE RCR07G133JS	5-32
1A2A1A1R4-R5		RESISTOR, MIL TYPE RCR07G101JS	5-32
1A2A1A1R6		RESISTOR, MIL TYPE RCR07G202JS	5-32
1A2A1A1R7-R9		SAME AS 1A2A1A1R4-R5	5-32
1A2A1A1R10		RESISTOR, MIL TYPE RCR07G102JS	5-32
1A2A1A1R11-R12		RESISTOR, MIL TYPE RCR07G361JS	5-32
1A2A1A1R13		RESISTOR, MIL TYPE RCR07G512JS	5-32
1A2A1A1R14		SAME AS 1A2A1A1R1	5-32
1A2A1A1R15		SAME AS 1A2A1A1R4-R5	5-32
1A2A1A1R16		SAME AS 1A2A1A1R2	5-32
1A2A1A1R17		SAME AS 1A2A1A1R3	5-32
1A2A1A1R18		SAME AS 1A2A1A1R2	5-32
1A2A1A1R19		SAME AS 1A2A1A1R3	5-32
1A2A1A1R20		SAME AS 1A2A1A1R6	5-32
1A2A1A1R21		SAME AS 1A2A1A1R4-R5	5-32
1A2A1A1R22		SAME AS 1A2A1A1R6	5-32
1A2A1A1R23		SAME AS 1A2A1A1R4-R5	5-32
1A2A1A1TP1		JACK, TIP, MFR 74970, P/N 105-751-10	5-32
1A2A1A1VR1		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE JAN1N758A	5-32
1A2A1A2		500KC FILTER AND GATE, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666231-035	5-30
1A2A1A2C1-C4		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.2 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-5	5-33
1A2A1A2CR1		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N270	5-33

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1A2R1		RESISTOR, MIL TYPE RC20GF911J	5-33
1A2A1A2R2-R3		MIL TYPE RC07GF471J	5-33
1A2A1A2R4		RESISTOR, MIL TYPE RC07GF153J	5-33
1A2A1A2R5		RESISTOR, MIL TYPE RC20GF511J	5-33
1A2A1A2R6		MIL TYPE RC07GF101J	5-33
1A2A1A3		BFO PRINTED CIRCUIT BOARD, W/ALL COMPONENTS MOUNTED, MFR 58189, P/N A70634-001	5-30
1A2A1A3C1		SAME AS 1A2A1A2C1-C4	5-34
1A2A1A3C2		CAPACITOR, MIL TYPE CM06F302G03	5-34
1A2A1A3C3		CAPACITOR, MIL TYPE CC52TH101G	5-34
1A2A1A3C4		CAPACITOR, MIL TYPE CM05F201G03	5-34
1A2A1A3C5		CAPACITOR, MIL TYPE CM06F821G03	5-34
1A2A1A3C6		SAME AS 1A2A1A3C2	5-34
1A2A1A3C7-C8		SAME AS 1A2A1A2C1-C4	5-34
1A2A1A3C9		CAPACITOR, MIL TYPE CM06FD9110G03	5-34
1A2A1A3CR1		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N954	5-34
1A2A1A3L1		REACTOR, 470 UH, 500 VDC, 0.500 IN. H X 0.400 IN. DIA, MFR 72259, P/N J6508	5-34
1A2A1A3Q1-Q2		TRANSISTOR, MFR 80131, P/N 2N2905	5-34
1A2A1A3R1		RESISTOR, MIL TYPE RCR07G223JS	5-34
1A2A1A3R2		RESISTOR, MIL TYPE RCR07G104JS	5-34
1A2A1A3R3		RESISTOR, MIL TYPE RCR07G203JS	5-34
1A2A1A3R4		RESISTOR, MIL TYPE RCR07G104JS	5-34
1A2A1A3R5		RESISTOR, MIL TYPE RCR07G222JS	5-34
1A2A1A3R6		RESISTOR, MIL TYPE RCR07G102JS	5-34
1A2A1A3R7		RESISTOR, MIL TYPE RCR07G123JS	5-34
1A2A1A3R8		RESISTOR, MIL TYPE RCR07G183JS	5-34
1A2A1A3R9		RESISTOR, MIL TYPE RCR07G472JS	5-34
1A2A1A3R10		RESISTOR, MIL TYPE RCR07G562JS	5-34
1A2A1A3R11		RESISTOR, MIL TYPE RCR07G911JS	5-34

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1A3T1		TRANSFORMER, INTERMEDIATE FREQUENCY, MFR 58189, P/N 666162-422	5-34
1A2A1A3TP1		NOT USED	
1A2A1A3TP2		SAME AS 1A2A1A1TP1	5-34
1A2A1A3XQ1-XQ2		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10027	5-34
1A2A2		RECEIVER ASSEMBLY, INTERMEDIATE FREQUENCY, MFR 58189, P/N A70244-001	5-22
1A2A2H1-H2		SAME AS 1A2A1H1-H2	5-22
1A2A2MP1		FRAME, STAKED, MFR 58189, P/N 666273-051	5-35 & 5-36
1A2A2MP2		COVER, MARKED, MFR 58189, P/N A70801-001	5-22
1A2A2P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.729 IN. LG X 0.494 IN. W X 0.660 IN. H, MFR 71468, P/N DCM 25W3P	5-35& 5-36
1A2A2P1A1		SAME AS 1A2A1P1A1-P1A3	5-36
1A2A2P1A2		CONNECTOR, INSERT, MFR 71468, P/N DM53741-5051	5-36
1A2A2P1A3		SAME AS 1A2A1P1A1-P1A3	
1A2A2T1		TRANSFORMER, RADIO FREQUENCY, 1.187 IN. LG X 0.875 IN. W X 1.187 IN. H, MFR 58189, P/N 666162-424	5-35
1A2A2A1		AGC AUDIO AMPLIFIER, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70653-001	5-35
1A2A2A1C1		CAPACITOR, MIL TYPE M39003-01-2032	5-37
1A2A2A1C2		CAPACITOR, MIL TYPE M39014-02-0230	5-37
1A2A2A1C3-C4		CAPACITOR, MIL TYPE M39014-02-0225	5-37
1A2A2A1C5		CAPACITOR, MIL TYPE M39003-01-2015	5-37
1A2A2A1C6		CAPACITOR, MIL TYPE M39003-01-2065	5-37
1A2A2A1C7		CAPACITOR, MIL TYPE M39014-02-0222	5-37
1A2A2A1C8		CAPACITOR, MIL TYPE CM06F821G03	5-37
1A2A2A1C9		SAME AS 1A2A2A1C4	5-37
1A2A2A1C10		SAME AS 1A2A2A1C8	5-37
1A2A2A1C11		CAPACITOR, MIL TYPE CK06CW103M	5-37
1A2A2A1C12-C13		CAPACITOR, MIL TYPE M39003-01-2050	5-37

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A1C14		CAPACITOR, MIL TYPE M39003-01-2018	5-37
1A2A2A1C15		SAME AS 1A2A2A1C2	5-37
1A2A2A1CR1-CR2		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N3666	5-37
1A2A2A1CR3		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N645	5-37
1A2A2A1CR4-CR5		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N4454	5-37
1A2A2A1Q1-Q2		TRANSISTOR, MIL TYPE 2N1131	5-37
1A2A2A1Q3-Q4		TRANSISTOR, MFR 80131, P/N 2N930	5-37
1A2A2A1Q5		TRANSISTOR, MFR 80131, P/N 2N2222	5-37
1A2A2A1Q6		TRANSISTOR, MFR 80131, P/N 2N328A	5-37
1A2A2A1Q7-Q8		TRANSISTOR, MFR 80131, P/N 2N1225	5-37
1A2A2A1Q9		TRANSISTOR, MFR 80131, P/N 2N652A	5-37
1A2A2A1Q10-Q12		SAME AS 1A2A1Q5	5-37
1A2A2A1Q13		TRANSISTOR, MIL TYPE 2N2907	5-37
1A2A2A1R1		RESISTOR, MIL TYPE RCR07G622JS	5-37
1A2A2A1R2		RESISTOR, MIL TYPE RCR07G102JS	5-37
1A2A2A1R3		RESISTOR, MIL TYPE RCR07G272JS	5-37
1A2A2A1R4		RESISTOR, MIL TYPE RCR07G182JS	5-37
1A2A2A1R5		RESISTOR, MIL TYPE RCR07G511JS	5-37
1A2A2A1R6		RESISTOR, VARIABLE, 1K OHMS PORM 5 PCT, 1W, MFR 80294, P/N 3250W66-102	5-37 5-37
1A2A2A1R7		RESISTOR, MIL TYPE RCR07G332JS	5-37
1A2A2A1R8		RESISTOR, MIL TYPE RCR07G621JS	5-37
1A2A2A1R9-R10		SAME AS 1A2A2A1R2	5-37
1A2A2A1R11		RESISTOR, MIL TYPE RCR7G752JS	5-37
1A2A2A1R12		RESISTOR, MIL TYPE RCR07G103JS	5-37
1A2A2A1R13		RESISTOR, MIL TYPE RCR07G474JS	5-37
1A2A2A1R14		RESISTOR, MIL TYPE RCR07G471JS	5-37
1A2A2A1R15		RESISTOR, MIL TYPE RCR07G362JS	5-37

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A1R16		RESISTOR, MIL TYPE RCR07G512JS	5-37
1A2A2A1R17		SAME AS 1A2A2A1R12	5-37
1A2A2A1R18		SAME AS 1A2A2A1R3	5-37
1A2A2A1R19		RESISTOR, MIL TYPE RCR07G334JS	5-37
1A2A2A1R20		RESISTOR, MIL TYPE RCR07G682JS	5-37
1A2A2A1R21		RESISTOR, MIL TYPE RCR07G392JS	5-37
1A2A2A1R22		SAME AS 1A2A2A1R12	5-37
1A2A2A1R23		RESISTOR, MIL TYPE RCR07G153JS	5-37
1A2A2A1R24		RESISTOR, MIL TYPE RCR07G201JS	5-37
1A2A2A1R25		RESISTOR, MIL TYPE RT12C2P502	5-37
1A2A2A1R26-28		SAME AS 1A2A2A1R12	5-37
1A2A2A1R29		SAME AS 1A2A2A1R3	5-37
1A2A2A1R30		RESISTOR, MIL TYPE RCR07G181JS	5-37
1A2A2A1R31		RESISTOR, MIL TYPE RCR07G472JS	5-37
1A2A2A1R32		SAME AS 1A2A2A1R14	5-37
1A2A2A1R33		SAME AS 1A2A2A1R12	5-37
1A2A2A1R34		RESISTOR, MIL TYPE RCR07G223JS	5-37
1A2A2A1R35		SAME AS 1A2A2A1R12	5-37
1A2A2A1R36		SAME AS 1A2A2A1R34	5-37
1A2A2A1R37		SAME AS 1A2A2A1R2	5-37
1A2A2A1R38		RESISTOR, MIL TYPE RCR07G473JS	5-37
1A2A2A1RT1		RESISTOR, THERMAL, 5.29K OHMS PORM 5 PCT, MFR 75263, P/N RL2006-2930-120S4	5-37
1A2A2A1T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-368	5-37
1A2A2A1T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-369	5-37
1A2A2A1TP1-TP2		JACK, TIP, MFR 74970, P/N 105-751-10	5-37
1A2A2A1XQ1-XQ2		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10012	5-37

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A1XQ3-XQ5		NOT USED	
1A2A2A1XQ6		SAME AS 1A2A2A1XQ1-XQ2	5-37
1A2A2A1XQ7-XQ8		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10027	5-37
1A2A2A1XQ9		SAME AS 1A2A2A1XQ1	5-37
1A2A2A2		IF-AUDIO AMPLIFIER, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70248-001	5-36
1A2A2A2C1-C2		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.1 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-4	5-38
1A2A2A2C3		CAPACITOR, FIXED, MICA DIELECTRIC, 820 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E821G300V	5-38
1A2A2A2C4-C5		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.05 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-1	5-38
1A2A2A2C6		SAME AS 1A2A2A2C1-C2	5-38
1A2A2A2C7		SAME AS 1A2A2A2C4-C5	5-38
1A2A2A2C8		SAME AS 1A2A2A2C3	5-38
1A2A2A2C9		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.01 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-2	5-38
1A2A2A2C10		SAME AS 1A2A2A2C4-C5	5-38
1A2A2A2C11		SAME AS 1A2A2A2C3	5-38
1A2A2A2C12-C13		SAME AS 1A2A2A2C4-C5	5-38
1A2A2A2C14		SAME AS 1A2A2A2C3	5-38
1A2A2A2C15		SAME AS 1A2A2A2C1-C2	5-38
1A2A2A2C16-C17		SAME AS 1A2A2A1C12-C13	5-38
1A2A2A2C18		CAPACITOR, MIL TYPE M39003-01-2056	5-38
1A2A2A2C19		SAME AS 1A2A2A1C6	5-38
1A2A2A2C20-22		SAME AS 1A2A2A1C12-C13	5-38
1A2A2A2C23		CAPACITOR, FIXED, MICA DIELECTRIC, 1200 UUF PORM 5 PCT, 500 WVDC, MFR 72136, P/N DM20E122J500V	5-38
1A2A2A2C24		SAME AS 1A2A2A1C12-C13	5-38

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A2C25		CAPACITOR, MIL TYPE M39003-01-2073	5-38
1A2A2A2C26		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF, PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM01-88	5-38
1A2A2A2CR1		SAME AS 1A2A2A1CR3	5-38
1A2A2A2L1		COIL, RADIO FREQUENCY, 10,000 UF, MFR 99800, P/N 1537-756	5-38
1A2A2A2Q1		SAME AS 1A2A2A1Q7-Q8	5-38
1A2A2A2Q2-Q3		TRANSISTOR, MFR 80131, P/N 2N706	5-38
1A2A2A2Q4-Q6		SAME AS 1A2A2A1Q7-Q8	5-38
1A2A2A2Q7-Q8		TRANSISTOR, MFR 80131, P/N 2N652	5-38
1A2A2A2Q9-Q10		TRANSISTOR, MIL TYPE 2N1183A	5-38
1A2A2A2R1		SAME AS 1A2A2A1R23	5-38
1A2A2A2R2-R3		SAME AS 1A2A2A1R12	5-38
1A2A2A2R4		NOT USED	
1A2A2A2R5		RESISTOR, MIL TYPE RCR07G151JS	5-38
1A2A2A2R6		RESISTOR, MIL TYPE RCR07G471JS	5-38
1A2A2A2R7		RESISTOR, MIL TYPE RCR076561JS	5-38
1A2A2A2R8		SAME AS 1A2A2A1R2	5-38
1A2A2A2R9		RESISTOR, MIL TYPE RCR07G470JS	5-38
1A2A2A2R10		SAME AS 1A2A2A2R1	5-38
1A2A2A2R11-R12		SAME AS 1A2A2A1R12	5-38
1A2A2A2R13		RESISTOR, MIL TYPE RCR07G220JS	5-38
1A2A2A2R14		SAME AS 1A2A2A2R1	5-38
1A2A2A2R15-R16		SAME AS 1A2A2A1R12	5-38
1A2A2A2R17		RESISTOR, MIL TYPE RCR07G101JS	5-38
1A2A2A2R18		RESISTOR, MIL TYPE RCR07G620JS	5-38
1A2A2A2R19		SAME AS 1A2A2A2R1	5-38
1A2A2A2R20-R21		SAME AS 1A2A2A1R12	5-38
1A2A2A2R22		RESISTOR, VARIABLE, 1K OHMS PORM 5 PCT, 1W, MFR 80294, P/N 3250W1-102	5-38

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A2R23		RESISTOR, MIL TYPE RCR07G510JS	5-38
1A2A2A2R24		RESISTOR, MIL TYPE RCR07G122JS	5-38
1A2A2A2R25		RESISTOR, MIL TYPE RCR07G113JS	5-38
1A2A2A2R26		RESISTOR, MIL TYPE RCR07G511JS	5-38
1A2A2A2R27		SAME AS 1A2A1A3R6	5-38
1A2A2A2R28		RESISTOR, MIL TYPE RCR07G163JS	5-38
1A2A2A2R29		RESISTOR, MIL TYPE RCR07G472JS	5-38
1A2A2A2R30		RESISTOR, MIL TYPE RCR07G622JS	5-38
1A2A2A2R31		SAME AS 1A2A2A2R18	5-38
1A2A2A2R32		SAME AS 1A2A2A2R7	5-38
1A2A2A2R33		RESISTOR, MIL TYPE RCR07G621JS	5-38
1A2A2A2R34		RESISTOR, MIL TYPE RCR07G821JS	5-38
1A2A2A2R35		SAME AS 1A2A2A2R9	5-38
1A2A2A2R36		SAME AS 1A2A2A1R12	5-38
1A2A2A2R37		RESISTOR, MIL TYPE RCR20G101JS	5-38
1A2A2A2R38		RESISTOR, MIL TYPE RCR07G682JS	5-38
1A2A2A2R39		RESISTOR, MIL TYPE RCR07G331JS	5-38
1A2A2A2T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-364	5-38
1A2A2A2T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-365	5-38
1A2A2A2T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-366	5-38
1A2A2A2T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-367	5-38
1A2A2A2T5		TRANSFORMER, AUDIO FREQUENCY, 0.875 IN. LG X 0.781 IN. WD X 0.531 IN. H, MFR 11899 P/N M5153	5-38
1A2A2A2XQ1		SAME AS 1A2A2A1XQ7-XQ8	5-38

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A2XQ2-XQ3		NOT USED	
1A2A2A2XQ4-XQ6		SAME AS 1A2A2A1XQ7-XQ8	5-38
1A2A2A2XQ7-XQ8		SAME AS 1A2A2A1XQ1-XQ2	5-38
1A2A2A3XQ9-XQ10		MOUNTING PAD, TRANSISTOR, 0.600 IN.DIA. X 0.064 IN.THICK, MFR 07047, P/N 10104	5-38
1A2A2A3		SINGLE SIDE BAND AUDIO MODULATION DETECTOR, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-954	5-35
1A2A2A3C1		CAPACITOR, FIXED, ELECTROLYTIC, 39 UF PORM 20 PCT, 10 WVDC, MFR 56289, P/N 150D396X9010B2	5-40
1A2A2A3C2-C3		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.002 UF PLUS 100 PCT MINUS 20 PCT, 75 WVDC, MFR 86335, P/N K4000N.002Z	5-40
1A2A2A3C4		SAME AS 1A2A2A3C1	5-40
1A2A2A3C5		SAME AS 1A2C3	5-40
1A2A2A3C6		SAME AS 1A2A2A2C3	5-40
1A2A2A3C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.005 UF PLUS 100 PCT MINUS 20 PCT, 75 WVDC, MFR 86335, P/N K4000N.005Z	5-40
1A2A2A3CR1-CR2		SAME AS 1A2A1A2CR1	5-40
1A2A2A3L1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 500 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-750	5-40
1A2A2A3Q1-Q3		TRANSISTOR, MIL TYPE 2N1225	5-40
1A2A2A3R1		RESISTOR, MIL TYPE RC07GF130J	5-40
1A2A2A3R2		RESISTOR, MIL TYPE RC07GF122J	5-40
1A2A2A3R3		RESISTOR, MIL TYPE RC07GF130J	5-40
1A2A2A3R4		SAME AS 1A2A2A3R2	5-40
1A2A2A3R5		RESISTOR, MIL TYPE RC07GF202J	5-40
1A2A2A3R6		RESISTOR, MIL TYPE RC07GF103J	5-40
1A2A2A3T1		SAME AS 1A2A2A2T5	5-40
1A2A2A3TP1-TP2		NOT USED	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A2A3TP3		SAME AS 1A2A2A1TP1-TP2	5-40
1A2A2A3XQ1-XQ3		SAME AS 1A2A2A1XQ1-XQ3	5-40
1A2A3		RECEIVER ASSEMBLY, INTERMEDIATE FREQUENCY, MFR 58189, P/N A70244-01 SAME AS 1A2A2 (ALL PIECE PARTS IN 1A2A3 ARE THE SAME AS IN 1A2A2)	5-22
1A2A4		AMPLIFIER, RADIO FREQUENCY, MFR 58189, P/N A70229-001	5-22
1A2A4B1		MOTOR, DIRECT CURRENT, CONTINUOUS DUTY, 26 VDC, MFR 05106, P/N 43A333	5-42
1A2A4C1-C2		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF, PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM01-88	5-47
1A2A4C3		CAPACITOR, MIL TYPE CK63AW103M	5-47
1A2A4C4		SAME AS 1A2A4C1-C2	5-47
1A2A4C5		CAPACITOR, FIXED, MICA DIELECTRIC, 330 UUF PORM 5 PCT, 500 WVDC, MFR 72136, P/N DM15F331J500V	5-47
1A2A4C6		SAME AS 1A2A4C1-C2	5-47
1A2A4C7		SAME AS 1A2A4C3	5-47
1A2A4C8		CAPACITOR, FIXED, MICA DIELECTRIC, 356 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3560D500V	5-47
1A2A4C9		CAPACITOR, FIXED, MICA DIELECTRIC, 775 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F7750D300V	5-47
1A2A4C10		SAME AS 1A2A4C1-C2	5-47
1A2A4C11		SAME AS 1A2A4C8	5-47
1A2A4C12		SAME AS 1A2A4C9	5-47
1A2A4C13		SAME AS 1A2A4C8	5-47
1A2A4C14		SAME AS 1A2A4C9	5-47
1A2A4C15-C18		SAME AS 1A2A4C1-C2	5-47
1A2A4C19		CAPACITOR, FIXED, MICA DIELECTRIC, 369 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3690D500V	5-47

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4C20		CAPACITOR, FIXED, MICA DIELECTRIC, 784 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F7840D300V	5-47
1A2A4C21-C22		SAME AS 1A2A2A1C11	5-42
1A2A4EV1-EV2		SHIELD, ELECTRON TUBE, MFR 98978, P/N TR5-5020-21B	5-45
1A2A4H1-H4		SAME AS 1A2A1H1-H2	5-22
1A2A4FL1-FL3		BEAD, FERRITE, 0.250 IN LG X 0.200 IN. DIA., MFR 58189, P/N 666164-347	5-47
1A2A4K1		RELAY, ARMATURE, 3 AMPS AT 28VDC, 1.320 IN. LG X 0.375 IN. W X 1.085 IN. H, MFR 02289, P/N 2F2426	5-42 & 5-43
1A2A4MP1		GEAR ASSEMBLY, TURRET DRIVE, MFR 58189, P/N A70266-001	5-42 & 5-43
1A2A4MP2-MP3		GEAR ROTOR DRIVE, 1.792 IN.DIA, 170 TEETH, MFR 58189, P/N 666230-271	5-44
1A2A4MP4		SHAFT, GEAR ROTOR DRIVE, 4.22 IN. LONG., MFR 58189, P/N 666230-270	5-44
1A2A4MP5		BEARING, MODIFIED, 5.500 IN. DIA X 0.250 IN. THK, MFR 58189, P/N 666162-739	5-44
1A2A4MP6-MP7		PLATE, STATOR, MFR 58189, P/N 666230-615	5-47
1A2A4MP8-MP9		PLATE, STATOR, MFR 58189, P/N 666230-614	5-47
1A2A4MP10		PLATE, STATOR, MFR 58189, P/N 666230-616	5-45 & 5-47
1A2A4MP11-MP12		PLATE, STATOR, MFR 58189, P/N 666162-666	5-45 & 5-47
1A2A2MP13		SAME AS 1A2A4MP8-MP9	5-47
1A2A2MP14		PLATE, STATOR, MFR 58189, P/N 666162-673	5-47
1A2A2MP15		PLATE, STATOR, MFR 58189, P/N 666162-665	5-45

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4MP16		PLATE, STATOR, MFR 58189, P/N 666162-664	5-45 or 5-47
1A2A4MP17		SAME AS 1A2A4MP6-MP7	5-47
1A2A4MP18		PLATE, STATOR, MFR,58189, P/N 666230-617	5-45 & 5-47
1A2A4MP19		COUPLING ASSEMBLY, MFR 58189, P/N 666230-240	5-44
1A2A4MP20		GEAR, SPUR, MFR 58189, P/N 666162-728	5-42 & 5-44
1A2A4MP21		COVER, MARKED, MFR 58189, P/N A70231-001	5-22
1A2A4MP22		RING, TOP, MFR 58189, P/N 666230-255	5-42
1A2A4MP23		RING, BOTTOM, MFR 58189, P/N 666230-257	5-42
1A2A4MP24		BASE, MARKED, MFR 58189, P/N 666165-269	5-42
1A2A4MP25		BRUSH, BLOCK ASSEMBLY, MFR 58189 P/N 666162-633 (PART OF 1A2A4S1)	5-45
1A2A4MP26		SAME AS 1A2A4MP19	5-44
1A2A4MP27		RING, SHOCK, MFR 58189, P/N A70794-001	5-46
1A2A4P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.541 IN. LG X 0.494 IN. W X 0.656 IN. H, MFR 71468, P/N DAM15P	5-45
1A2A4P2		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.729 IN. LG X 0.494 IN. W X 0.660 IN. H, MFR 71468, P/N DCM17W5PC31F115	5-44
1A2A4P2A1-P2A2		SAME AS 1A2A1P1A1	5-44
1A2A4P2A3		CONNECTOR INSERT, MFR 71468, P/N DM53741-5008	5-44
1A2A4P2A4-P2A5		SAME AS 1A2A1P1A1	5-44
1A2A4R1		RESISTOR, MIL TYPE RCR07G104JS	5-47
1A2A4R2		RESISTOR, MIL TYPE RCR07G510JM	5-47
1A2A4R3		SAME AS 1A2A4R1	5-47

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4R4		RESISTOR, MIL TYPE RCR07G183JS	5-47
1A2A4R5		SAME AS 1A2A4R1	5-47
1A2A4V1		ELECTRON TUBE, MIL TYPE 6BZ6	5-46
1A2A4V2		ELECTRON TUBE, MIL TYPE 6AN5WA	5-46
1A2A4XV1-XV2		SOCKET, MIL TYPE TS102C01	5-47
1A2A4A1		AMPLIFIER SUBASSEMBLY, RADIO FREQUENCY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70627-001	5-45
1A2A4A1C1		SAME AS 1A2A4C1-C2	5-48
1A2A4A1C2-C3		CAPACITOR, MIL TYPE M39003-01-2050	5-48
1A2A4A1R1		RESISTOR, MIL TYPE RCR07G104JS	5-48
1A2A4A1R2		RESISTOR, MIL TYPE RCR07G223JS	5-48
1A2A4A1R3		RESISTOR, MIL TYPE RCR07G151JS	5-48
1A2A4A1R4		RESISTOR, MIL TYPE RCR20G621JS	5-48
1A2A4A1R5		RESISTOR, MIL TYPE RCR20G181JS	5-48
1A2A4A1R6		RESISTOR, MIL TYPE RCR20G121JS	5-48
1A2A4A2		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70477-001	5-46
1A2A4A2C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 2.2 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA2R2J500V	5-49
1A2A4A2C2		CAPACITOR, FIXED, MICA DIELECTRIC, 126 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1260D500V	5-49
1A2A4A2C3		CAPACITOR, FIXED, MICA DIELECTRIC, 132 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1320D500V	5-49
1A2A4A2C4		CAPACITOR, FIXED, MICA DIELECTRIC, 250 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2500D500V	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A2T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 12 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 66230-324	5-49
1A2A4A2T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 12 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-352	5-49
1A2A4A2T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-375	5-49
1A2A4A2T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 2 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-001	5-49
1A2A4A3		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70559-001	5-46
1A2A4A3C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 2 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA2R0J500V	5-49
1A2A4A3C2		CAPACITOR, FIXED, MICA DIELECTRIC, 115 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1150D500V	5-49
1A2A4A3C3		CAPACITOR, FIXED, MICA DIELECTRIC, 120 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1200D500V	5-49
1A2A4A3C4		CAPACITOR, FIXED, MICA DIELECTRIC, 208 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2080D500V	5-49
1A2A4A3C5		CAPACITOR, FIXED, MICA DIELECTRIC, 1253 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM20F12530D300V	5-49
1A2A4A3T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 13 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 66230-325	5-49
1A2A4A3T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 13 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-353	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A3T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 8 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-396	5-49
1A2A4A3T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 3 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-002	5-49
1A2A4A4		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70558-001	5-46
1A2A4A4C1		SAME AS 1A2A4A3C1	5-49
1A2A4A4C2		CAPACITOR, FIXED, MICA DIELECTRIC, 105 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1050D500V	5-49
1A2A4A4C3		CAPACITOR, FIXED, MICA DIELECTRIC, 111 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1110D500V	5-49
1A2A4A4C4		CAPACITOR, FIXED, MICA DIELECTRIC, 179 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1790D500V	5-49
1A2A4A4C5		CAPACITOR, FIXED, MICA DIELECTRIC, 629 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F6290D300V	5-49
1A2A4A4T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 14 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-326	5-49
1A2A4A4T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 14 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-354	5-49
1A2A4A4T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-376	5-49
1A2A4A4T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 4 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-003	5-49
1A2A4A5		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70557-001	5-46

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A5C1		SAME AS 1A2A4A3C1	5-49
1A2A4A5C2		CAPACITOR, FIXED, MICA DIELECTRIC, 97 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F970F500V	5-49
1A2A4A5C3		CAPACITOR, FIXED, MICA DIELECTRIC, 103 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1030D500V	5-49
1A2A4A5C4		CAPACITOR, FIXED, MICA DIELECTRIC, 157 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1570D500V	5-49
1A2A4A5C5		CAPACITOR, FIXED, MICA DIELECTRIC, 422 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F4220D300V	5-49
1A2A4A5T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 15 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-327	5-49
1A2A4A5T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 15 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-355	5-49
1A2A4A5T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 10 MC, 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-377	5-49
1A2A4A5T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 5 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-004	5-49
1A2A4A6		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70556-001	5-46
1A2A4A6C1		SAME AS 1A2A4A3C1	5-49
1A2A4A6C2		CAPACITOR, FIXED, MICA DIELECTRIC, 91 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F910F500V	5-49
1A2A4A6C3		CAPACITOR, FIXED, MICA DIELECTRIC, 96 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F960F500V	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A6C4		CAPACITOR, FIXED, MICA DIELECTRIC, 140 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1400D500V	5-49
1A2A4A6C5		CAPACITOR, FIXED, MICA DIELECTRIC, 318 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3180D500V	5-49
1A2A4A6T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 16 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-328	5-49
1A2A4A6T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 16 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-356	5-49
1A2A4A6T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 11MC, 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-378	5-49
1A2A4A6T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 6 MC, 8.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-005	5-49
1A2A4A7		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70555-001	5-46
1A2A4A7C1		SAME AS 1A2A4A3C1	5-49
1A2A4A7C2		CAPACITOR, FIXED, MICA DIELECTRIC, 85 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F850F500V	5-49
1A2A4A7C3		CAPACITOR, FIXED, MICA DIELECTRIC, 90 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F900F500V	5-49
1A2A4A7C4		SAME AS 1A2A4A2C2	5-49
1A2A4A7C5		CAPACITOR, FIXED, MICA DIELECTRIC, 256 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2560D500V	5-49
1A2A4A7T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 17 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-329	5-49
1A2A4A7T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 17 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-357	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A7T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 12 MC, 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-379	5-49
1A2A4A7T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-006	5-49
1A2A4A8		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70554-001	5-46
1A2A4A8C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1.8 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA1R8J500V	5-49
1A2A4A8C2		CAPACITOR, FIXED, MICA DIELECTRIC, 80 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E800F500V	5-49
1A2A4A8C3		SAME AS 1A2A4A7C2	5-49
1A2A4A8C4		SAME AS 1A2A4A3C2	5-49
1A2A4A8C5		CAPACITOR, FIXED, MICA DIELECTRIC, 214 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2140D500V	5-49
1A2A4A8T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 18 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-330	5-49
1A2A4A8T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 18 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-358	5-49
1A2A4A8T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 13 MC, 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-380	5-49
1A2A4A8T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 8 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-007	5-49
1A2A4A9		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70553-001	5-46
1A2A4A9C1		SAME AS 1A2A4A8C1	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A9C2		CAPACITOR, FIXED, MICA DIELECTRIC, 75 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E750F500V	5-49
1A2A4A9C3		SAME AS 1A2A4A8C2	5-49
1A2A4A9C4		SAME AS 1A2A4A4C2	5-49
1A2A4A9C5		CAPACITOR, FIXED, MICA DIELECTRIC, 185 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1850D500V	5-49
1A2A4A9T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 19 MC, 0.620 IN, LG X 0.422 IN. DIA, MFR 58189, P/N 666230-331	5-49
1A2A4A9T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 19 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-359	5-49
1A2A4A9T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 14 MC 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-381	5-49
1A2A4A9T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 9 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-008	5-49
1A2A4A9Y1		CRYSTAL UNIT, QUARTZ, 21.000 MC, 0.418 IN. LG X 0.166 IN. W X 0.515 IN. H EXCLUDING LEADS, MFR 58189, P/N 666162-598	5-49
1A2A4A10		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70552-001	5-46
1A2A4A10C1		SAME AS 1A2A4A8C1	5-49
1A2A4A10C2		CAPACITOR, FIXED, MICA DIELECTRIC, 71 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E710F500V	5-49
1A2A4A10C3		CAPACITOR, FIXED, MICA DIELECTRIC, 76 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E760F500V	5-49
1A2A4A10C4		SAME AS 1A2A4A5C2	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A10C5		CAPACITOR, FIXED, MICA DIELECTRIC, 163 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1630D500V	5-49
1A2A4A10T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 20 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-332	5-49
1A2A4A10T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 20 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-360	5-49
1A2A4A10T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 15 MC, 0.620 IN. LG X 0.442 IN. DIA, MFR 58189, P/N 666230-382	5-49
1A2A4A10T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 10 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-009	5-49
1A2A4A10Y1		CRYSTAL UNIT, QUARTZ, 19.000 MC, 0.418 IN. LG X 0.166 IN. W X 0.515 IN. H EXCLUDING LEADS, MFR 58189, P/N 666162-597	5-49
1A2A4A11		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70551-001	5-46
1A2A4A11C1		SAME AS 1A2A4A3C1	5-49
1A2A4A11C2		CAPACITOR, FIXED, MICA DIELECTRIC, 67 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E670F500V	5-49
1A2A4A11C3		CAPACITOR, FIXED, MICA DIELECTRIC, 73 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E730F500V	5-49
1A2A4A11C4		SAME AS 1A2A4A6C2	5-49
1A2A4A11C5		CAPACITOR, FIXED, MICA DIELECTRIC, 146 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1460D500V	5-49
1A2A4A11T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 21 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-333	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A11T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 21 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-361	5-49
1A2A4A11T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 16 MC, 0.620 IN LG X 0.422 IN. DIA, MFR 58189, P/N 666230-383	5-49
1A2A4A11T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 11 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-010	5-49
1A2A4A12		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70841-001	5-46
1A2A4A12C1		CAPACITOR, FIXED, MICA DIELECTRIC 8 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15C080F500V	5-49
1A2A4A12C2		CAPACITOR, FIXED, MICA DIELECTRIC, 64 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E640F500V	5-49
1A2A4A12C3		CAPACITOR, FIXED, MICA DIELECTRIC, 68 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E680F500V	5-49
1A2A4A12C4		SAME AS 1A2A4A7C2	5-49
1A2A4A12C5		SAME AS 1A2A4A2C3	5-49
1A2A4A12L1		COIL, RADIO FREQUENCY, MFR 82142, P/N 4446-3J	5-49
1A2A4A12T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 22 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-334	5-49
1A2A4A12T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 22 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-362	5-49
1A2A4A12T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 17 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-384	5-49
1A2A4A12T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 12 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-12	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A13		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70842-001	5-46
1A2A4A13C1		SAME AS 1A2A4A12C1	5-49
1A2A4A13C2		CAPACITOR, FIXED, MICA DIELECTRIC, 61 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E610F500V	5-49
1A2A4A13C3		CAPACITOR, FIXED, MICA DIELECTRIC, 66 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E660E500V	5-49
1A2A4A13C4		SAME AS 1A2A4A8C2	5-49
1A2A4A13C5		SAME AS 1A2A4A3C3	5-49
1A2A4A13L1		SAME AS 1A2A4A12L1	5-49
1A2A4A13T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 23 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-335	5-49
1A2A4A13T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 23 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-363	5-49
1A2A4A13T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 18 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-385	5-49
1A2A4A13T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 13 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-013	5-49
1A2A4A14		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70550-001	5-46
1A2A4A14C1		SAME AS 1A2A4A3C1	5-49
1A2A4A14C2		CAPACITOR, FIXED, MICA DIELECTRIC, 58 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E580F500V	5-49
1A2A4A14C3		CAPACITOR, FIXED, MICA DIELECTRIC, 63 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E630F500V	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A14C4		SAME AS 1A2A4A9C2	5-49
1A2A4A14C5		SAME AS 1A2A4A4C3	5-49
1A2A4A14T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 24 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-336	5-49
1A2A4A14T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 24 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-364	5-49
1A2A4A14T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 19 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-386	5-49
1A2A4A14T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 14 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-014	5-49
1A2A4A15		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70489-001	5-46
1A2A4A15C1		SAME AS 1A2A4A3C1	5-49
1A2A4A15C2		CAPACITOR, FIXED, MICA DIELECTRIC, 56 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E560F500V	5-49
1A2A4A15C3		SAME AS 1A2A4A13C2	5-49
1A2A4A15C4		SAME AS 1A2A4A10C2	5-49
1A2A4A15C5		SAME AS 1A2A4A5C3	5-49
1A2A4A15T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 25 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-337	5-49
1A2A4A15T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 25 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-365	5-49
1A2A4A15T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 20 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-387	5-49
1A2A4A15T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 15 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-015	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A16		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70488-001	5-46
1A2A4A16C1		SAME AS 1A2A4A3C1	5-49
1A2A4A16C2		CAPACITOR, FIXED, MICA DIELECTRIC, 54 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E540F500V	5-49
1A2A4A16C3		CAPACITOR, FIXED, MICA DIELECTRIC 59 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E590F500V	5-49
1A2A4A16C4		SAME AS 1A2A4A11C2	5-49
1A2A4A16C5		SAME AS 1A2A4A6C3	5-49
1A2A4A16T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 26 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-338	5-49
1A2A4A16T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 26 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-366	5-49
1A2A4A16T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 21 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-388	5-49
1A2A4A16T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 16 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-016	5-49
1A2A4A17		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70487-001	5-46
1A2A4A17C1		SAME AS 1A2A4A3C1	5-49
1A2A4A17C2		CAPACITOR, FIXED, MICA DIELECTRIC, 52 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E520F500V	5-49
1A2A4A17C3		CAPACITOR, FIXED, MICA DIELECTRIC, 57 UUF PORM 1PCT, 500 WVDC, MFR 72136, P/N DM15E570F500V	5-49
1A2A4A17C4		SAME AS 1A2A4A12C2	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A17C5		SAME AS 1A2A4A7C3	5-49
1A2A4A17T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 27 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-339	5-49
1A2A4A17T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 27 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-367	5-49
1A2A4A17T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 22 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-389	5-49
1A2A4A17T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 17 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-017	5-49
1A2A4A18		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70486-001	5-46
1A2A4A18C1		SAME AS 1A2A4A3C1	5-49
1A2A4A18C2		CAPACITOR, FIXED, MICA DIELECTRIC, 50 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E500F500V	5-49
1A2A4A18C3		CAPACITOR, FIXED, MICA DIELECTRIC, 55 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E550F500V	5-49
1A2A4A18C4		SAME AS 1A2A4A13C2	5-49
1A2A4A18C5		SAME AS 1A2A4A7C2	5-49
1A2A4A18T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 28 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-340	5-49
1A2A4A18T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 28 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-368	5-49
1A2A4A18T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 23 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-390	5-49
1A2A4A18T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 18 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-018	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A19		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70485-001	5-46
1A2A4A19C1		SAME AS 1A2A4A3C1	5-49
1A2A4A19C2		CAPACITOR, FIXED, MICA DIELECTRIC, 48 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E480F500V	5-49
1A2A4A19C3		CAPACITOR, FIXED, MICA DIELECTRIC, 53 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E530F500V	5-49
1A2A4A19C4		SAME AS 1A2A4A14C2	5-49
1A2A4A19C5		SAME AS 1A2A4A8C2	5-49
1A2A4A19T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 29 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-341	5-49
1A2A4A19T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 29 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-369	5-49
1A2A4A19T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 24 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-397	5-49
1A2A4A19T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 19 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-019	5-49
1A2A4A19Y1		CRYSTAL UNIT, QUARTZ, 28.500 MC, 0.418 IN. LG X 0.166 IN. W X 0.515 IN. H EXCLUDING LEADS, MFR 58189, P/N 666162-599	5-49
1A2A4A20		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70484-001	5-46
1A2A4A20C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 9.1 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA9R1J500V	5-49
1A2A4A20C2-C3		NOT USED	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A20C4		SAME AS 1A2A4A15C2	5-49
1A2A4A20C5		SAME AS 1A2A4A10C3	5-49
1A2A4A20T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 2 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-314	5-49
1A2A4A20T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 2 MC, 0.620 IN. LG X 0.422 IN. DIA. MFR 58189, P/N 666230-342	5-49
1A2A4A20T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 25 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-391	5-49
1A2A4A20T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 20 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-020	5-49
1A2A4A21		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70483-001	5-46
1A2A4A21C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 6.2 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA6R2J500V	5-49
1A2A4A21C2		CAPACITOR, FIXED, MICA DIELECTRIC, 1247 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM20F12470D300V	5-49
1A2A4A21C3		SAME AS 1A2A4A3C5	5-49
1A2A4A21C4		SAME AS 1A2A4A16C2	5-49
1A2A4A21C5		SAME AS 1A2A4A11C3	5-49
1A2A4A21T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 3 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-315	5-49
1A2A4A21T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 3 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-343	5-49
1A2A4A21T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 26 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-392	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A21T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 21 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-021	5-49
1A2A4A22		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70482-001	5-46
1A2A4A22C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 5.6 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA5R6J500V	5-49
1A2A4A22C2		CAPACITOR, FIXED, MICA DIELECTRIC, 623 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F6230D300V	5-49
1A2A4A22C3		SAME AS 1A2A4A4C5	5-49
1A2A4A22C4		SAME AS 1A2A4A17C2	5-49
1A2A4A22C5		SAME AS 1A2A4A12C3	5-49
1A2A4A22T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 4 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-316	5-49
1A2A4A22T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 4 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-344	5-49
1A2A4A22T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 27 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-393	5-49
1A2A4A22T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 22 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-022	5-49
1A2A4A23		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70481-001	5-46
1A2A4A23C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 5.1 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA5R1J500V	5-49
1A2A4A23C2		CAPACITOR, FIXED, MICA DIELECTRIC, 416 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F4160D300V	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A23C3		SAME AS 1A2A4A5C5	5-49
1A2A4A23C4		SAME AS 1A2A4A18C2	5-49
1A2A4A23C5		SAME AS 1A2A4A13C3	5-49
1A2A4A23T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-317	5-49
1A2A4A23T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-345	5-49
1A2A4A23T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 28 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-394	5-49
1A2A4A23T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 23 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-023	5-49
1A2A4A24		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70480-001	5-46
1A2A4A24C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 3.9 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA3R9J500V	5-49
1A2A4A24C2		CAPACITOR, FIXED, MICA DIELECTRIC, 312 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3120D500V	5-49
1A2A4A24C3		SAME AS 1A2A4A6C5	5-49
1A2A4A24C4		SAME AS 1A2A4A19C2	5-49
1A2A4A24C5		SAME AS 1A2A4A13C3	5-49
1A2A4A24T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 6 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-318	5-49
1A2A4A24T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 6 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-346	5-49
1A2A4A24T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 29 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-395	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A24T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 24 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-024	5-49
1A2A4A25		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70479-001	5-49
1A2A4A25C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 3.3 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA3R3J500V	5-49
1A2A4A25C2		SAME AS 1A2A4A2C4	5-49
1A2A4A25C3		SAME AS 1A2A4A7C5	5-49
1A2A4A25C4		NOT USED	
1A2A4A25C5		SAME AS 1A2A4A13C2	5-49
1A2A4A25T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-319	5-49
1A2A4A25T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-347	5-49
1A2A4A25T3		TRANSFORMER, MFR 58189, P/N 666230-370	5-49
1A2A4A25T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 25 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-025	5-49
1A2A4A26		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70478-001	5-46
1A2A4A26C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 3 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA3R0J500V	5-49
1A2A4A26C2		SAME AS 1A2A4A3C4	5-49
1A2A4A26C3		SAME AS 1A2A4A8C5	5-49
1A2A4A26C4		SAME AS 1A2A4A21C2	5-49
1A2A4A26C5		SAME AS 1A2A4A16C3	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A26T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 8 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-320	5-49
1A2A4A26T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 8 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-348	5-49
1A2A4A26T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 3 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-371	5-49
1A2A4A26T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 26 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-026	5-49
1A2A4A27		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70573-001	5-46
1A2A4A27C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 2.7 UUF PORM 5 PCT, 500 WVDC, MFR, 78488, P/N GA2R7J500V	5-49
1A2A4A27C2		SAME AS 1A2A4A4C4	5-49
1A2A4A27C3		SAME AS 1A2A4A9C5	5-49
1A2A4A27C4		SAME AS 1A2A4A22C2	5-49
1A2A4A27C5		SAME AS 1A2A4A17C3	5-49
1A2A4A27T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-321	5-49
1A2A4A27T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-349	5-49
1A2A4A27T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 4 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-372	5-49
1A2A4A27T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 27 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-027	5-46
1A2A4A28		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70570-001	5-49

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A28C1		SAME AS 1A2A4A27C1	5-49
1A2A4A28C2		SAME AS 1A2A4A5C4	5-49
1A2A4A28C3		SAME AS 1A2A4A10C5	5-49
1A2A4A28C4		SAME AS 1A2A4A23C2	5-49
1A2A4A28C5		SAME AS 1A2A4A18C3	5-49
1A2A4A28T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 10 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-322	5-49
1A2A4A28T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 10 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-350	5-49
1A2A4A28T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-373	5-49
1A2A4A28T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 28 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-028	5-49
1A2A4A29		MEGACYCLE ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70566-001	5-46
1A2A4A29C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 2.4 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA2R4J500V	5-49
1A2A4A29C2		SAME AS 1A2A4A6C4	5-49
1A2A4A29C3		SAME AS 1A2A4A11C5	5-49
1A2A4A29C4		SAME AS 1A2A4A24C2	5-49
1A2A4A29C5		SAME AS 1A2A4A19C3	5-49
1A2A4A29T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 11 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-323	5-49
1A2A4A29T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 11 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-351	5-49
1A2A4A29T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 6 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666230-374	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A29T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 29 MC, 0.678 IN. LG X 0.535 IN. DIA, MFR 58189, P/N A70560-029	5-49
1A2A4A30		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-585	5-44
1A2A4A30C1		CAPACITOR, FIXED, MICA DIELECTRIC, 545 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F5450D300V	5-50
1A2A4A30C2		CAPACITOR, FIXED, MICA DIELECTRIC, 426 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F4260D300V	5-50
1A2A4A30C3		CAPACITOR, FIXED, MICA DIELECTRIC, 332 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3320D500V	5-50
1A2A4A30C4		CAPACITOR, FIXED, MICA DIELECTRIC, 257 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2570D500V	5-50
1A2A4A30C5		CAPACITOR, FIXED, MICA DIELECTRIC, 195 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1950D500V	5-50
1A2A4A30C6		CAPACITOR, FIXED, MICA DIELECTRIC, 143 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1430D500V	5-50
1A2A4A30C7		CAPACITOR, FIXED, MICA DIELECTRIC, 99 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F990F500V	5-50
1A2A4A30C8		SAME AS 1A2A4A13C2	5-50
1A2A4A30C9		CAPACITOR, FIXED, MICA DIELECTRIC, 29 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E290F500V	5-50
1A2A4A30C10		CAPACITOR, FIXED, MICA DIELECTRIC, 253 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2530D500V	5-50
1A2A4A30C11		CAPACITOR, FIXED, MICA DIELECTRIC, 219 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2190D500V	5-50

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A30C12		CAPACITOR, FIXED, MICA DIELECTRIC, 190 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F19001D500V	5-50
1A2A4A30C13		CAPACITOR, FIXED, MICA DIELECTRIC, 165 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1650D500V	5-50
1A2A4A30C14		CAPACITOR, FIXED, MICA DIELECTRIC, 144 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1440D500V	5-50
1A2A4A30C15		CAPACITOR, FIXED, MICA DIELECTRIC, 125 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1250D500V	5-50
1A2A4A30C16		CAPACITOR, FIXED, MICA DIELECTRIC, 109 UUF PROM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1090D500V	5-50
1A2A4A30C17		CAPACITOR, FIXED, MICA DIELECTRIC, 95 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15F950F500V	5-50
1A2A4A30C18		CAPACITOR, FIXED, MICA DIELECTRIC, 83 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E830F500V	5-50
1A2A4A30C19		CAPACITOR, FIXED, MICA DIELECTRIC, 74 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E740F500V	5-50
1A2A4A31		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, 666230-588	5-44
1A2A4A31C1		SAME AS 1A2A4A2C4	5-51
1A2A4A31C2		CAPACITOR, FIXED, MICA DIELECTRIC, 215 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2150D500V	5-51
1A2A4A31C3		CAPACITOR, FIXED, MICA DIELECTRIC, 183 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1830D500V	5-51

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A31C4		CAPACITOR, FIXED, MICA DIELECTRIC, 153 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1530D500V	5-51
1A2A4A31C5		CAPACITOR, FIXED, MICA DIELECTRIC, 124 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1240D500V	5-51
1A2A4A31C6		SAME AS 1A2A4A6C3	5-51
1A2A4A31C7		CAPACITOR, FIXED, MICA DIELECTRIC, 70 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E700F500V	5-51
1A2A4A31C8		CAPACITOR, FIXED, MICA DIELECTRIC, 45 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E450F500V	5-51
1A2A4A31C9		CAPACITOR, FIXED, MICA DIELECTRIC, 22 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15C220F500V	5-51
1A2A4A32		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-591	5-44
1A2A4A32C1		CAPACITOR, FIXED, MICA DIELECTRIC, 260 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F26001D500V	5-52
1A2A4A32C2		CAPACITOR, FIXED, MICA DIELECTRIC, 224 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2240D500V	5-52
1A2A4A32C3		SAME AS A2A4A30C12	5-52
1A2A4A32C4		CAPACITOR, FIXED, MICA DIELECTRIC, 158 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM1580D500V	5-52
1A2A4A32C5		CAPACITOR, FIXED, MICA DIELECTRIC, 128 UUF porm 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1280D500V	5-52
1A2A4A32C6		SAME AS 1A2A4A30C7	5-52
1A2A4A32C7		CAPACITOR, FIXED, MICA DIELECTRIC, 72 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E720F500V	5-52

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A32C8		CAPACITOR, FIXED, MICA DIELECTRIC, 47 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E470F500V	5-52
1A2A4A32C9		CAPACITOR, FIXED, MICA DIELECTRIC, 23 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15C230F500V	5-52
1A2A4A33		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-595	5-44
1A2A4A33C1		CAPACITOR, FIXED, MICA DIELECTRIC, 517 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F5170D300V	5-53
1A2A4A33C2		CAPACITOR, FIXED, MICA DIELECTRIC, 405 UUF PORM 1/2 PCT, 300 WVDC, MFR 72136, P/N DM15F4050D300V	5-53
1A2A4A33C3		CAPACITOR, FIXED, MICA DIELECTRIC 316 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F3160D500V	5-53
1A2A4A33C4		CAPACITOR, FIXED, MICA DIELECTRIC, 245 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F2450D500V	5-53
1A2A4A33C5		CAPACITOR, FIXED, MICA DIELECTRIC, 186 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1860D500V	5-53
1A2A4A33C6		CAPACITOR, FIXED, MICA DIELECTRIC, 137 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1370D500V	5-53
1A2A4A33C7		SAME AS 1A2A4A30C17	5-53
1A2A4A33C8		SAME AS 1A2A4A16C3	5-53
1A2A4A33C9		CAPACITOR, FIXED, MICA DIELECTRIC, 28 UUF PORM 1 PCT, 500 WVDC, MFR 72136, P/N DM15E280F500V	5-53
1A2A4A33C10		SAME AS 1A2A4A30C4	5-53
1A2A4A33C11		CAPACITOR, FIXED, MICA DIELECTRIC, 222 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136 P/N DM15F2220D500V	5-53

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A33C12		CAPACITOR, FIXED, MICA DIELECTRIC, 193 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1930D500V	5-53
1A2A4A33C13		CAPACITOR, FIXED, MICA DIELECTRIC, 167 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1670D500V	5-53
1A2A4A33C14		SAME AS 1A2A4A11C5	5-53
1A2A4A33C15		CAPACITOR, FIXED, MICA DIELECTRIC, 127 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F1270D500V	5-53
1A2A4A33C16		CAPACITOR, FIXED, MICA DIELECTRIC 110 UUF PORM 1/2 PCT, 500 WVDC, MFR 72136, P/N DM15F11001D500V	5-53
1A2A4A33C17		SAME AS 1A2A4A5C3	5-53
1A2A4A33C18		SAME AS 1A2A4A30C18	5-53
1A2A4A33C19		SAME AS 1A2A4A30C19	5-53
1A2A4A34		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-599	5-44
1A2A4A34C1		SAME AS 1A2A4A33C1	5-54
1A2A4A34C2		SAME AS 1A2A4A33C2	5-54
1A2A4A34C3		SAME AS 1A2A4A33C3	5-54
1A2A4A34C4		SAME AS 1A2A4A33C4	5-54
1A2A4A34C5		SAME AS 1A2A4A33C5	5-54
1A2A4A34C6		SAME AS 1A2A4A33C6	5-54
1A2A4A34C7		SAME AS 1A2A4A30C17	5-54
1A2A4A34C8		SAME AS 1A2A4A16C3	5-54
1A2A4A34C9		SAME AS 1A2A4A33C9	5-54
1A2A4A34C10		SAME AS 1A2A4A30C4	5-54
1A2A4A34C11		SAME AS 1A2A4A33C11	5-54
1A2A4A34C12		SAME AS 1A2A4A33C12	5-54
1A2A4A34C13		SAME AS 1A2A4A33C13	5-54
1A2A4A34C14		SAME AS 1A2A4A11C5	5-54

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A34C15		SAME AS 1A2A4A33C15	5-54
1A2A4A34C16		SAME AS 1A2A4A33C16	5-54
1A2A4A34C17		SAME AS 1A2A4A6C3	5-54
1A2A4A34C18		SAME AS 1A2A4A30C18	5-54
1A2A4A34C19		SAME AS 1A2A4A30C19	5-54
1A2A4A35		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-602	5-44
1A2A4A35C1		SAME AS 1A2A4A32C1	5-55
1A2A4A35C2		SAME AS 1A2A4A32C2	5-55
1A2A4A35C3		SAME AS 1A2A4A30C12	5-55
1A2A4A35C4		SAME AS 1A2A4A32C4	5-55
1A2A4A35C5		SAME AS 1A2A4A32C5	5-55
1A2A4A35C6		SAME AS 1A2A4A30C7	5-55
1A2A4A35C7		SAME AS 1A2A4A32C7	5-55
1A2A4A35C8		SAME AS 1A2A4A32C8	5-55
1A2A4A35C9		SAME AS 1A2A4A32C9	5-55
1A2A4A36		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-605	5-56
1A2A4A36C1		SAME AS 1A2A4A32C1	5-56
1A2A4A36C2		SAME AS 1A2A4A32C2	5-56
1A2A4A36C3		SAME AS 1A2A4A30C12	5-56
1A2A4A36C4		SAME AS 1A2A4A32C4	5-56
1A2A4A36C5		SAME AS 1A2A4A32C5	5-56
1A2A4A36C6		SAME AS 1A2A4A30C7	5-56
1A2A4A36C7		SAME AS 1A2A4A32C7	5-56
1A2A4A36C8		SAME AS 1A2A4A32C8	5-56
1A2A4A36C9		SAME AS 1A2A4A32C9	5-56

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A37		ROTOR ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-609	5-44
1A2A4A37C1		CAPACITOR, FIXED, MICA DIELECTRIC, 517 UUF PORM 1 PCT, 300 WVDC, MFR 72136, P/N DM15F5170F300V	5-57
1A2A4A37C2		SAME AS 1A2A4A33C2	5-57
1A2A4A37C3		SAME AS 1A2A4A33C3	5-57
1A2A4A37C4		SAME AS 1A2A4A33C4	5-57
1A2A4A37C5		SAME AS 1A3A4A33C5	5-57
1A2A4A37C6		SAME AS 1A2A4A33C6	5-57
1A2A4A37C7		SAME AS 1A2A4A30C17	5-57
1A2A4A37C8		SAME AS 1A2A4A16C3	5-57
1A2A4A37C9		SAME AS 1A2A4A33C9	5-57
1A2A4A37C10		SAME AS 1A2A4A30C4	5-57
1A2A4A37C11		SAME AS 1A2A4A33C11	5-57
1A2A4A37C12		SAME AS 1A2A4A33C12	5-57
1A2A4A37C13		SAME AS 1A2A4A33C13	5-57
1A2A4A37C14		SAME AS 1A2A4A11C5	5-57
1A2A4A37C15		SAME AS 1A2A4A33C15	5-57
1A2A4A37C16		SAME AS 1A2A4A33C16	5-57
1A2A4A37C17		SAME AS 1A2A4A6C3	5-57
1A2A4A37C18		SAME AS 1A2A4A30C18	5-57
1A2A4A37C19		SAME AS 1A2A4A30C19	5-57
1A2A4A38		MIXER, TRANSMITTER, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70235-001	5-44
1A2A4A38C1		SAME AS 1A2A2A1C11	5-58
1A2A4A38C2		CAPACITOR, MIL TYPE CK05CW471K	5-58
1A2A4A38C3-C4		SAME AS 1A2A2A1C11	5-58
1A2A4A38C5-C6		SAME AS 1A2A2A1C11	5-58
1A2A4A38E1		TERMINAL, FEED, THRU, MFR 09211, P/N 105-753-10	5-58

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A4A38E2-E6		TERMINAL, TURRET TYPE, MFR 58189, P/N 559997-119	5-58
1A2A4A38E7-E8		NOT USED	
1A2A4A38E9-E10		SAME AS 1A2A4A38E2-E6	
1A2A4A38K1		SAME AS 1A2A4K1	5-58
1A2A4A38L1		COIL, RADIO FREQUENCY, 240 UH, MFR 99800, P/N 1537-94	5-58
1A2A4A38Q1		TRANSISTOR, MFR 58189, P/N 810000-659	5-58
1A2A4A38Q2		TRANSISTOR, MFR 80131, P/N 2N1142	5-58
1A2A4A38R1		SAME AS 1A2A4R2	5-58
1A2A4A38R2		RESISTOR, MIL TYPE RCR07G82JM	5-58
1A2A4A38R3		RESISTOR, MIL TYPE RCR07G133JM	5-58
1A2A4A38R4		NOT USED	
1A2A4A38R5		RESISTOR, MIL TYPE RCR07G122JM	5-58
1A2A4A38R6		RESISTOR, MIL TYPE RCR07G471JM	5-58
1A2A4A38R7		RESISTOR, MIL TYPE RCR07G123JM	5-58
1A2A4A38R8		SAME AS 1A2A4A38R2	5-58
1A2A4A38R9		RESISTOR, MIL TYPE RCR07G182JM	5-58
1A2A4A38R10		RESISTOR, MIL TYPE RCR07G472JM	5-58
1A2A4A38TP1-TP2		JACK, TIP, MFR 74790, P/N 105-751-10	5-58
1A2A5		MODULE ASSEMBLY, FREQUENCY STANDARD, MFR 58189, P/N A70744-001	5-22
1A2A5C1		CAPACITOR, VARIABLE, GLASS DIELECTRIC, 1.0 to 28.0 UUF, 1000 WVDC, MFR 73899, P/N VCJ711B	5-59
1A2A5H1-H2		SAME AS 1A2A1H1	5-22
1A2A5HR1		OVEN HOUSING ASSEMBLY, MFR 58189, P/N 666163-058	5-59
1A2A5MP1		DUST COVER ASSEMBLY, MFR 58189, P/N A70750-001	5-22
1A2A5MP2		CASE, MARKED, MFR 58189 P/N 666163-042	5-59
1A2A5MP3		OVEN ASSEMBLY, MFR 58189, P/N 666231-946, includes 1A2A5 HR1, A3, R1, C1, and Q1	5-59
1A2A5MP4		COVER ASSEMBLY, MFR 58189, P/N666163-085, includes 1A2A5 MP6, MP7, gearing	5-59

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5MP5		INSULATOR OVEN, MFR 58189, P/N 666231-881	5-59
1A2A5MP6		COUPLING, MFR 58189, P/N 666163-031	5-59
1A2A5MP7		WRENCH, MFR 58189, P/N 666163-047	5-59
1A2A5P1		CONNECTOR, RECEPTACLE, ELECTRICAL 2.729 IN. LG X 0.494 IN. W X 0.660 IN. H, MFR 71468, P/N DCM13W6PC31F115	5-59
1A2A5P1A1-P1A6		CONNECTOR, INSERT, MFR 71468, DM53741-5012	5-59
1A2A5Q1		TRANSISTOR, MFR 80131, P/N 2N1117A	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 200 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-200 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 210 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-210 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 220 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-220 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 240 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-240 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 255 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-255 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 270 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-270 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 285 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-285 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 300 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-300 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 315 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-315 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 330 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-330 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 345 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-345 PORM 1	5-59
1A2A5R1 SELECTED		RESISTOR, FIXED, WW, 360 OHMS PORM 1 PCT, 1/2W, MFR 91637, P/N RS1-2-360 PORM 1	5-59
1A2A5RT1		PART OF 1A2A5HR1	
1A2A5S1		SWITCH, ROTARY, 1 SECTION, 3 POLES, 3 POSITIONS, NON-SHORTING CONTACTS, MFR 58189, P/N 666163-057	5-59

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A1		MULTIPLIER AND DIVIDER ASSEMBLY, 5 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70749-001	5-59
1A2A5A1C1		CAPACITOR, FIXED, CERAMIC, DIELECTRIC, 0.005 UF PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM005-35	5-60
1A2A5A1C2-C3		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.1 UF PORM 20 PCT, 50 WVDC, MFR 02777, P/N T2901	5-60
1A2A5A1C4		SAME AS 1A2A5A1C1	5-60
1A2A5A1C5		CAPACITOR, FIXED, MICA DIELECTRIC, 681 UUF PORM 1 PCT, 300 WVDC, MFR 72136, P/N DM15E681G300V	5-60
1A2A5A1C6		CAPACITOR, FIXED, MICA DIELECTRIC, 330 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E331G300V	5-60
1A2A5A1C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 47 UUF PORM 5 PCT, 75 WVDC, MFR 86335, P/N MINU47J	5-60
1A2A5A1C8		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF, PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM01-88	5-60
1A2A5A1C9		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF PLUS 100 PCT MINUS 20 PCT, 75 WVDC, MFR 86335, P/N K4000N.01Z	5-60
1A2A5A1C10		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.007 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-6	5-60
1A2A5A1C11		CAPACITOR, FIXED, MICA DIELECTRIC, 510 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E511G300V	5-60
1A2A5A1C12		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 100 UUF PORM 5 PCT, 75 WVDC, MFR 86335, P/N MINU100J	5-60
1A2A5A1C13		SAME AS 1A2A5A1C9	5-60
1A2A5A1C14		SAME AS 1A2A5A1C2-C3	5-60

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A1C15		SAME AS 1A2A5A1C9	5-60
1A2A5A1C16		CAPACITOR, FIXED, MICA DIELECTRIC, 220 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E221G300V	5-60
1A2A5A1C17-C19		SAME AS 1A2A5A1C9	5-60
1A2A5A1C20-C22		SAME AS 1A2A5A1C8	5-60
1A2A5A1C23		CAPACITOR, FIXED, MICA DIELECTRIC, 160 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E161G300V	5-60
1A2A5A1C24		SAME AS 1A2A5A1C9	5-60
1A2A5A1C25		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.001 UF PORM 20 PCT, 75 WVDC, MFR 86335, P/N K1200M.001M	5-60
1A2A5A1C26		SAME AS 1A2A5A1C8	5-60
1A2A5A1CR1-CR2		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N IN3063	5-60
1A2A5A1E1-E32		TERMINAL, TURRET TYPE, MFR 58189, P/N 559997-119	5-60
1A2A5A1DS1		LAMP, INCANDESCENT, 10V, MFR 58854, P/N 10ES	5-60
1A2A5A1L1		COIL, RADIO FREQUENCY, 39.0 MICROHENRIES, 23 MC, MFR 74956, P/N 10203-40	5-60
1A2A5A1L2		COIL, RADIO FREQUENCY, 1, 500 MICROHENRIES, MFR 99800, P/N 1537-746	5-60
1A2A5A1Q1-Q5		TRANSISTOR, MFR 80131, P/N 2N1225	5-60
1A2A5A1Q6		TRANSISTOR, MFR 80131, P/N 2N332	5-60
1A2A5A1Q7		SAME AS 1A2A5A1Q1-Q5	5-60
1A2A5A1R1		RESISTOR, MIL TYPE RCR07G102JM	5-60
1A2A5A1R2		RESISTOR, MIL TYPE RCR07G222JM	5-60
1A2A5A1R3		RESISTOR, MIL TYPE RCR07G101JM	5-60
1A2A5A1R4		RESISTOR, MIL TYPE RCR07G221JM	5-60
1A2A5A1R5		RESISTOR, MIL TYPE RCR07G331JM	5-60
1A2A5A1R6		RESISTOR, MIL TYPE RCR07G561JM	5-60
1A2A5A1R7		SAME AS 1A2A5A1R2	5-60
1A2A5A1R8		RESISTOR, MIL TYPE RCR07G472JM	5-60

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A1R9		RESISTOR, MIL TYPE RCR07G393JM	5-60
1A2A5A1R10		RESISTOR, MIL TYPE RCR07G122JM	5-60
1A2A5A1R11		SAME AS 1A2A5A1R2	5-60
1A2A5A1R12		SAME AS 1A2A5A1R1	5-60
1A2A5A1R13		RESISTOR, MIL TYPE RCR07G563JM	5-60
1A2A5A1R14		RESISTOR, MIL TYPE RCR07G243JM	5-60
1A2A5A1R15-R16		RESISTOR, MIL TYPE RCR07G103JM	5-60
1A2A5A1R17		SAME AS 1A2A5A1R3	5-60
1A2A5A1R18		RESISTOR, MIL TYPE RCR07G470JM	5-60
1A2A5A1R19		RESISTOR, MIL TYPE RCR07G153JM	5-60
1A2A5A1R20		RESISTOR, MIL TYPE RCR07G152JM	5-60
1A2A5A1R21		SAME AS 1A2A5A1R2	5-60
1A2A5A1R22		RESISTOR, VARIABLE, 500 OHMS PORM 5 PCT, 1W, MFR 80294, P/N 3250W1-501	5-60
1A2A5A1R23		RESISTOR, MIL TYPE RW81U47R5F	5-60
1A2A5A1R24		RESISTOR, MIL TYPE RCR07G512JM	5-60
1A2A5A1R25		RESISTOR, MIL TYPE RCR07G821JM	5-60
1A2A5A1R26		RESISTOR, MIL TYPE RCR07G202JM	5-60
1A2A5A1R27		SAME AS 1A2A5A1R6	5-60
1A2A5A1R28		SAME AS 1A2A5A1R4	5-60
1A2A5A1R29-R30		SAME AS 1A2A5A1R2	5-60
1A2A5A1R31		SAME AS 1A2A5A1R1	5-60
1A2A5A1T1		TRANSFORMER, RADIO FREQUENCY, 0.500 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-067	5-60
1A2A5A1T2		TRANSFORMER, RADIO FREQUENCY, 4 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-066	5-60
1A2A5A1T3		TRANSFORMER, RADIO FREQUENCY, 1 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-065	5-60
1A2A5A1T4		TRANSFORMER, RADIO FREQUENCY, 10 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-064	5-60

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A1T5		TRANSFORMER, RADIO FREQUENCY, 2 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-063	5-60
1A2A5A1T6		TRANSFORMER, RADIO FREQUENCY, 5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-062	5-60
1A2A5A1TP1-TP2		JACK, TIP, MFR 98291, P/N SKT103PCWHITE	5-60
1A2A5A1XQ1-XQ5		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10027	5-60
1A2A5A1XQ6		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10012	5-60
1A2A5A1XQ7		SAME AS 1A2A5A1XQ1-XQ5	5-60
1A2A5A2		OVEN CONTROL CIRCUIT, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666231-936	5-59
1A2A5A2C1		CAPACITOR, FIXED, ELECTROLYTIC, 3.3 UF PORM 20 PCT, 15 WVDC, MFR 56289, P/N 150D335X0015A2	5-61
1A2A5A2C2		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.01 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-2	5-61
1A2A5A2C3-C4		SAME AS 1A2A5A2C1	5-61
1A2A5A2C5-C6		CAPACITOR, FIXED, ELECTROLYTIC, 1 UF PORM 10 PCT, 35 WVDC, MFR 56289, P/N 150D105X9035A2	5-61
1A2A5A2C7-C11		NOT USED	
1A2A5A2C12-C13		SAME AS 1A2A5A1C8	5-61
1A2A5A2C14-C39		NOT USED	
1A2A5A2C40		SAME AS 1A2A5A1C8	5-61
1A2A5A2CR1		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N IN969B	5-61
1A2A5A2CR2		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE IN270	5-61

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A2CR3-CR4		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N IN755A	5-61
1A2A5A2E1-E23		SAME AS 1A2A5A1E1	5-61
1A2A5A2Q1-Q2		TRANSISTOR, MFR 80131, P/N 2N388	5-61
1A2A5A2Q3		TRANSISTOR, MFR 80131, P/N 2N333	5-61
1A2A5A2Q4-Q5		NOT USED	
1A2A5A2Q6		SAME AS 1A2A5A1Q4-Q5	5-61
1A2A5A2R1-R2		RESISTOR, MIL TYPE RC07GF562J	5-61
1A2A5A2R3		RESISTOR, MIL TYPE RC07GF121J	5-61
1A2A5A2R4		RESISTOR, MIL TYPE RC07GF392J	5-61
1A2A5A2R5		NOT USED	
1A2A5A2R6		SAME AS 1A2A5A2R4	5-61
1A2A5A2R7		RESISTOR, MIL TYPE RC07GF430J	5-61
1A2A5A2R8		SAME AS 1A2A5A1R19	5-61
1A2A5A2R9		RESISTOR, MIL TYPE RC07GF272J	5-61
1A2A5A2R10		SAME AS 1A2A5A2R1-R2	5-61
1A2A5A2R11		SAME AS 1A2A5A1R1	5-61
1A2A5A2R12		SAME AS 1A2A5A1R20	5-61
1A2A5A2R13-R16		NOT USED	
1A2A5A2R17		SAME AS 1A2A5A1R8	5-61
1A2A5A2R18		RESISTOR, MIL TYPE RC07GF270J	5-61
1A2A5A2RT1		NOT USED	
1A2A5A2RT2		RESISTOR, THERMAL, MFR 83186 P/N 13E3	5-61
1A2A5A2T1		TRANSFORMER, AUDIO FREQUENCY, MFR 82068, P/N S71057	5-61
1A2A5A2T2		NOT USED	
1A2A5A2T3		TRANSFORMER, RADIO FREQUENCY, 2 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-068	5-61
1A2A5A2XQ1-XQ3		SAME AS 1A2A5A1XQ6	5-61

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A2XQ4-XQ5		NOT USED	
1A2A5A2XQ6		SAME AS 1A2A5A1XQ1-XQ5	5-61
1A2A5A3		OSCILLATOR SUBASSEMBLY, COMPONENT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666163-081	5-59
1A2A5A3C1-C6		NOT USED	
1A2A5A3C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 68 UUF PORM 5 PCT, 75 WVDC, MFR 86335, P/N GTC75R68J	5-62
1A2A5A3C8		CAPACITOR, MIL TYPE CK06CW472M	5-62
1A2A5A3C9		SAME AS 1A2A5A1C1	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 33 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E330G300V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 47 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E470G300V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC 56 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E560G300V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 62 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E620G000V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 68 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E680G000V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC, 75 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E750G300V	5-62
1A2A5A3C10 SELECTED		CAPACITOR, FIXED, MICA DIELECTRIC 82 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E820G300V	5-62
1A2A5A3CR1-CR4		NOT USED	
1A2A5A3CR5-CR6		SAME AS 1A2A5A1CR1-CR2	5-62
1A2A5A3E1-E8		SAME AS 1A2A5A1E1	
1A2A5A3Q1-Q4		NOT USED	5-62
1A2A5A3Q5		SAME AS 1A2A5A1Q1-Q5	
1A2A5A3R1-R13		NOT USED	5-62
1A2A5A3R14		RESISTOR, MIL TYPE RC07GF271J	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A5A3R15		RESISTOR, MIL TYPE RC20GF220J	5-62
1A2A5A3R16		SAME AS 1A2A5A2R4	5-62
1A2A5A3T1		NOT USED	
1A2A5A3T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-048	5-62
1A2A5A3XQ1-XQ4		NOT USED	
1A2A5A3XQ5		SAME AS 1A2A5A1XQ1-XQ5	5-62
1A2A5A3Y1		CRYSTAL UNIT, QUARTZ, 5 MC, MFR 58189, P/N 666163-049	5-62
1A2A6		TRANSLATOR-SYNTHESIZER SUBASSEMBLY, MFR 58189, P/N A70733-001	5-22
1A2A6C1-C2		CAPACITOR, MIL TYPE M39003-01-2073	5-63
1A2A6E1		TERMINAL, LUG, MFR 78189, P/N 2104-04-00	5-63
1A2A6E2-E3		TERMINAL, MFR 71279, P/N 4884-1-0116	5-63
1A2A6E4		SAME AS 1A2A6E1	5-63
1A2A6E5		TERMINAL BOARD, MFR 58189, P/N 666231-300	5-63
1A2A6H1-H4		SAME AS 1A2A1H1-H2	5-22
1A2A6J1-J3		NOT USED	
1A2A6J4		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.664 IN. H, MFR 71468, P/N DBMF17W2S2C31	5-63
1A2A6J4A1-J4A2		SAME AS 1A1P22A1	5-63
1A2A6J5		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.663 IN. H, MFR 71468, P/N DBMF13W3S2C31	5-63
1A2A6J5A1-J5A3		SAME AS 1A1P22A1	5-63
1A2A6J6		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 91146, P/N DBMF9W4S2C31	5-63
1A2A6J6A1-J6A4		SAME AS 1A1P22A1	5-63
1A2A6MP1		BASE, ASSEMBLY, COMPLETE WITH WIRING, MFR 58189, P/N A70721-001	5-63
1A2A6MP1A		BASE, STAKED, NO WIRING OR COMPONENTS, MFR 58189, P/N 666231-932	5-63
1A2A6MP2		COVER, BASE, MFR 58189, P/N A70722-001	5-63

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.729 IN. LG X 0.494 IN. W X 0.660 IN. H, MFR 71468, P/N DCM25W3P	5-63
1A2A6P1A1-P1A3		SAME AS 1A2A2P1A2	5-63
1A2A6P2		CONNECTOR, RECEPTACLE, ELECTRICAL, 1.541 IN. LG X 0.494 IN. W X 0.656 IN. H, MFR 91146, P/N DAM3W3P	5-63
1A2A6P2A1-A3		SAME AS 1A2A2P1A2	5-63
1A2A6P3		SAME AS 1A2A6P2	5-63
1A2A6P3A1-A2		SAME AS 1A2A2P1A2	5-63
1A2A6P4-P6		NOT USED	
1A2A6P7		CONNECTOR INSERT, MFR 98291, P/N SKT14RED	5-63
1A2A6P8		CONNECTOR INSERT, MFR 98291, P/N SKT14GREEN	5-63
1A2A6P9		CONNECTOR INSERT, MFR 98291, P/N SKT14ORANGE	5-63
1A2A6P10		CONNECTOR INSERT, MFR 98291, P/N SKT14GRAY	5-63
1A2A6P11-P13		NOT USED	
1A2A6P14		CONNECTOR PLUG, RIGHT ANGLE, MFR 98291, P/N 51-028-0059	5-63
1A2A6P15		SAME AS 1A2A6P7	5-63
1A2A6P16		NOT USED	
1A2A6P17-P19		SAME AS 1A2A6P14	5-63
1A2A6P20		NOT USED	
1A2A6P21-P25		SAME AS 1A2A6P14	5-63
1A2A6P26		SAME AS 1A2A6P7	5-63
1A2A6P27		SAME AS 1A2A6P14	5-63
1A2A6A1		SYNTHESIZER ASSEMBLY, 1 MC, MFR 58189, P/N A70795-001	5-22
1A2A6A1B1		MOTOR, DIRECT CURRENT, 0.5 AMPS, 26 VDC, 3.494 IN. LG X 0.838 IN. W X 0.867 IN. H, MFR 25140, P/N 128A100	5-64
1A2A6A1C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF, PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM01-88	5-65

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1C2		CAPACITOR, FIXED, ELECTROLYTIC, 6.8 UF PORM 20 PCT, 35 WVDC, MFR 56289, P/N 150D685X0035B2	5-64
1A2A6A1C3		CAPACITOR, MIL TYPE CK06W103M	5-65
1A2A6A1K1		RELAY, ARMATURE, 3 AMPS at 28 VDC, 1.320 IN. LG X 0.375 IN. W X 1.085 IN. H, MFR 02289, P/N 2F2426	5-65
1A2A6A1L1-L2		COIL RADIO FREQUENCY, 1000 UH, MFR 99800, P/N 1537-744	5-64& 5-65
1A2A6A1MP1		BASE PLATE ASSY, 666230-121, MFR 58189, COMPLETE WITH ROLL PIN AND BEARING, P/N 666230-124	5-64
1A2A6A1MP2		COVER, MC SYNTHESIZER P55484-001, MFR 58189	5-22
1A2A6A1MP3		SHAFT, SWITCH, 2.96 IN. LG, MACHINED, MFR 58189, P/N 666230-131	5-64
1A2A6A1MP4		GEAR, MITER, PAIR, 32-TEETH, MFR 58189, P/N 666230-138	5-64
1A2A6A1MP5		PILOT BEARING, MOTOR SHAFT, MFR 58189, P/N 666231-887	5-64
1A2A6A1MP6		RING, RETAINING, MFR 71468, P/N 639514-043	5-64
1A2A6A1MP7		PIN, SPRING, MIL TYPE MS16562-211	5-64
1A2A6A1P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.422 IN. H MFR 91146, P/N DBM17W2P	5-65
1A2A6A1P1A1		CONNECTOR INSERT MFR 71468, P/N DM53740-5108	5-65
1A2A6A1P1A2		CONNECTOR INSERT, MFR 71468, P/N DM53741-5059	5-65
1A2A6A1S1		SWITCH, ROTARY, SINGLE WAFER, 18 POSITIONS, MFR 81716, P/N 22075-001	5-64 & 5-65
1A2A6A1A1		SWITCH ASSEMBLY, SYNTHESIZER, MFR 58189, P/N 666230-126	5-64 & 5-65
1A2A6A1A1A1		OSCILLATOR, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-158	5-64
1A2A6A1A1A1C1-C17		NOT USED	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A1A1C18-C20		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF GMV, 100 WVDC, MFR 96095, P/N C80R01GMV	5-66
1A2A6A1A1A1C21		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 82 UUF PORM 2 PCT, 500 WVDC, MFR 15450, P/N 301N5600-82 PORM 2	5-66
1A2A6A1A1C22		NOT USED	
1A2A6A1A1A1C23		SAME AS 1A2A6A1A1C18-C20	5-66
1A2A6A1A1A1C24		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 430 UUF PORM 2 PCT, 500 WVDC, MFR 15450, P/N 301N5600-430 PORM 82	5-66
1A2A6A1A1A1C25-C28		SAME AS 1A2A6A1A1C18-C20	5-66
1A2A6A1A1A1CR1-CR2		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N3063	5-66
1A2A6A1A1A1CR3		CAPACITOR, FIXED, SILICON, 56 UUF, 30 WVDC, MFR 73293, P/N HC70608	5-66
1A2A6A1A1A1L1		SAME AS 1A2A6A1L1-L2	5-66
1A2A6A1A1A1L2-L3		COIL, RADIO FREQUENCY, 22.0 UH±10% AT 2.5MC, MFR 99800, P/N 1537-724	5-66
1A2A6A1A1A1Q1-Q4		TRANSISTOR, MFR 80131, P/N 2N2708	5-66
1A2A6A1A1A1R1		RESISTOR, MIL TYPE RC07GF224J	5-66
1A2A6A1A1A1R2		RESISTOR, MIL TYPE RC07GF474J	5-66
1A2A6A1A1A1R3		RESISTOR, MIL TYPE RC07GF133J	5-66
1A2A6A1A1A1R4		RESISTOR, MIL TYPE RC07GF201J	5-66
1A2A6A1A1A1R5		ASME AS 1A2A6A1A1A1R3	5-66
1A2A6A1A1A1R6		RESISTOR, MIL TYPE RC07GF391J	5-66
1A2A6A1A1A1R7		RESISTOR, MIL TYPE RC07GF472J	5-66
1A2A6A1A1A1R8		RESISTOR, MIL TYPE RC07GF153J	5-66
1A2A6A1A1A1R9		RESISTOR, MIL TYPE RC07GF100J	5-66
1A2A6A1A1A1R10		RESISTOR, MIL TYPE RC07GF182J	5-66
1A2A6A1A1A1R11		RESISTOR, MIL TYPE RC07GF183J	5-66
1A2A6A1A1A1R12		RESISTOR, MIL TYPE RC07GF911J	5-66
1A2A6A1A1A1R13		RESISTOR, MIL TYPE RC07GF103J	5-66
1A2A6A1A1A1R14		RESISTOR, MIL TYPE RC07GF621J	5-66
1A2A6A1A1A1R15		RESISTOR, MIL TYPE RC07GF222J	5-66
1A2A6A1A1A1R16		SAME AS 1A2A6A1A1A1R10	5-66

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A1A1R17		RESISTOR, MIL TYPE RC07GF221J	5-66
1A2A6A1A1A1R18		RESISTOR, MIL TYPE RC07GF470J	5-66
1A2A6A1A1A1RT1		RESISTOR, THERMAL, 248 OHMS PORM 10 PCT, MFR 75263, P/N RL2012-248-73S3	5-66
1A2A6A1A1A2		CRYSTAL SWITCH ASSEMBLY MFR 58189, P/N 666230-025	5-64 & 5-65
1A2A6A1A1A2MP1		CRYSTAL HOLDER, MFR 58189, P/N 666230-141	5-64 & 5-65
1A2A6A1A1A2S1		SWITCH, ROTARY, MFR 76854, P/N 806274-001	5-64 & 5-65
1A2A6A1A1A2Y1		CRYSTAL UNIT, QUARTZ, 2499.850 KC, MFR 58189, P/N 810000-393	5-64 & 5-65
1A2A6A1A1A2Y2		CRYSTAL UNIT, QUARTZ, 3499.720 KC, MFR 58189, P/N 810000-394	5-64
1A2A6A1A1A2Y3		CRYSTAL UNIT, QUARTZ, 4499.640 KC, MFR 58189, P/N 810000-395	5-64
1A2A6A1A1A2Y4		CRYSTAL UNIT, QUARTZ, 5499.560 KC, MFR 58189, P/N 810000-396	5-65
1A2A6A1A1A2Y5		CRYSTAL UNIT, QUARTZ, 7499.400 KC, MFR 58189, P/N 810000-397	5-64
1A2A6A1A1A2Y6		CRYSTAL UNIT, QUARTZ, 8499.320 KC, MFR 58189, P/N 810000-398	5-64
1A2A6A1A1A2Y7		CRYSTAL UNIT, QUARTZ, 9499.240 KC, MFR 58189, P/N 810000-399	5-64
1A2A6A1A1A2Y8		CRYSTAL UNIT, QUARTZ, 10499.240 KC, MFR 58189, P/N 810000-400	5-64
1A2A6A1A1A2Y9		CRYSTAL UNIT, QUARTZ, 11499.080 KC, MFR 58189, P/N 810000-401	5-64
1A2A6A1A1A2Y10		CRYSTAL UNIT, QUARTZ, 12499.000 KC, MFR 58189, P/N 810000-402	5-64
1A2A6A1A1A2Y11		CRYSTAL UNIT, QUARTZ, 14498.840 KC, MFR 58189, P/N 810000-403	5-65

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A1A2Y12		CRYSTAL UNIT, QUARTZ, 15498.760 KC, MFR 58189, P/N 810000-404	5-65
1A2A6A1A1A2Y13		CRYSTAL UNIT, QUARTZ, 16498.680 KC, MFR 58189, P/N 810000-405	5-65
1A2A6A1A1A2Y14		CRYSTAL UNIT, QUARTZ, 17498.600 KC, MFR 58189, P/N 810000-406	5-65
1A2A6A1A1A2Y15		CRYSTAL UNIT, QUARTZ, 19498.440 KC, MFR 58189, P/N 810000-407	5-65
1A2A6A1A1A2Y16		CRYSTAL UNIT, QUARTZ, 20498.360 KC, MFR 58189, P/N 810000-408	5-65
1A2A6A1A1A2Y17		CRYSTAL UNIT, QUARTZ, 23498.120 KC, MFR 58189, P/N 810000-409	5-65
1A2A6A1A1A3		CAPACITOR-SWITCH ASSEMBLY, MFR 58189, P/N 666230-026	5-64 & 5-65
1A2A6A1A1A3C1		CAPACITOR, FIXED, MICA, 1300 UUF, PORM 2 PCT, 500 WVDC, MFR 72136, P/N DM19F132G500V	5-64 & 5-65
1A2A6A1A1A3C2		CAPACITOR, FIXED, MICA, 1000 UUF, PORM 2 PCT, 500 WVDC, MFR 72136, P/N DM19F102G500V	5-64 & 5-65
1A2A6A1A1A3C3		SAME AS 1A2A2A2C3	5-64 & 5-65
1A2A6A1A1A3C4		CAPACITOR, FIXED, MICA, 680 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E681G300V	5-64 & 5-65
1A2A6A1A1A3C5		CAPACITOR, FIXED, MICA, 500 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15F5010F300V	5-64 & 5-65
1A2A6A1A1A3C6		CAPACITOR, FIXED, MICA, 430 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E431G300V	5-64 & 5-65
1A2A6A1A1A3C7		CAPACITOR, FIXED, MICA, 360 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E361G300V	5-64 & 5-65
1A2A6A1A1A3C8		CAPACIOTR, FIXED, MICA, 300 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E301G300V	5-64 & 5-65

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A1A3C9		CAPACITOR, FIXED, MICA 270 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E271G300V	5-64 & 5-65
1A2A6A1A1A3C10		CAPACITOR, FIXED, MICA, 240 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E241G300V	5-64 & 5-65
1A2A6A1A1A3C11		CAPACITOR, FIXED, MICA, 200 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E201G300V	5-64 & 5-65
1A2A6A1A1A3C12		CAPACITOR, FIXED, MICA, 180 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E181G300V	5-64 & 5-65
1A2A6A1A1A3C13		SAME AS 1A2A5A1C23	5-64 & 5-65
1A2A6A1A1A3C14		SAME AS 1A2A5A1C23	5-64 & 5-65
1A2A6A1A1A3C15		CAPACITOR, FIXED, MICA, 115 UUF, PORM 1 PCT, 300 WVDC, MFR 72136, P/N DM15F1150F500V	5-64 & 5-65
1A2A6A1A1A3C16		CAPACITOR, FIXED, MICA, 110 UUF, PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E111G300V	5-64 & 5-65
1A2A6A1A1A3C17		SAME AS 1A2A5A3C10G	5-64 & 5-65
1A2A6A1A1A3MP1		PLATE, GROUNDING, MFR 58189, P/N 666230-128	5-64 & 5-65
1A2A6A1A1A3S1		SWITCH, ROTARY, MFR 76854, P/N 806274-001	5-64 & 5-65
1A2A6A1A2		AMPLIFIER ASSEMBLY, IF/DC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-148	5-64
1A2A6A1A2C1-C2		SAME AS 1A2A6A1C1	5-67

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A2C3		CAPACITOR, FIXED, MICA DIELECTRIC, 620 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E621G300V	5-67
1A2A6A1A2C4-C5		SAME AS 1A2A6A1C1	5-67
1A2A6A1A2C6		SAME AS 1A2A6A1A2C3	5-67
1A2A6A1A2C7		CAPACITOR, FIXED, MICA DIELECTRIC, 1000 UUF PORM 2 PCT, 500 WVDC, MFR 72136, DM20E102G500V	5-67
1A2A6A1A2C8		SAME AS 1A2A6A1A2C3	5-67
1A2A6A1A2C9		SAME AS 1A2A6A1C1	5-67
1A2A6A1A2C10		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.1 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-4	5-67
1A2A6A1A2C11-C12		SAME AS 1A2A6A1C1	5-67
1A2A6A1A2C13		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.005 UF PORM 20 PCT, 75 WVDC, MFR 86335, P/N SSM005-35	5-67
1A2A6A1A2C14		SAME AS 1A2A6A1C1	5-67
1A2A6A1A2CR1		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N270	5-67
1A2A6A1A2J1-J2		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 06776, P/N NS430-20	5-67
1A2A6A1A2L1		COIL, RADIO FREQUENCY, 39 UH, MFR 99800, P/N 1537-727	5-67
1A2A6A1A2L2		COIL, RADIO FREQUENCY, 68 UH, MFR 99800, P/N 1537-730	5-67
1A2A6A1A2L3		COIL, RADIO FREQUENCY, 27 UH, MFR 99800, P/N 1537-725	5-67
1A2A6A1A2L4		REACTOR, VARIABLE, 11 TO 18 UH, MFR 03550, P/N 64215-22	5-67
1A2A6A1A2P1		NOT USED	
1A2A6A1A2P2		PIN, MINIATURE, MFR 06776, P/N CP19	5-67
1A2A6A1A2Q1-Q2		TRANSISTOR, MFR 80131, P/N 2N1225	5-67
1A2A6A1A2Q3		TRANSISTOR, MFR 80131, P/N 2N2222	5-67
1A2A6A1A2R1		SAME AS 1A2A6A1A1A1R8	5-67

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A2R2		SAME AS 1A2A6A1A1A1R13	5-67
1A2A6A1A2R3		SAME AS 1A2A6A1A1A1R7	5-67
1A2A6A1A2R4		RESISTOR, MIL TYPE RC07GF101J	5-67
1A2A6A1A2R5		RESISTOR, MIL TYPE RC07GF223J	5-67
1A2A6A1A2R6		RESISTOR, VARIABLE, 200 OHMS PORM 5 PCT, 1W, MFR 80294, P/N 3250P1-201	5-67
1A2A6A1A2R7		SAME AS 1A2A5A1A1A1R13	5-67
1A2A6A1A2R8		SAME AS 1A2A6A1A1A1R8	5-67
1A2A6A1A2R9		RESISTOR, MIL TYPE RC07GF392J	5-67
1A2A6A1A2R10		SAME AS 1A2A6A1A2R4	5-67
1A2A6A1A2R11		SAME AS 1A2A6A1A2R5	5-67
1A2A6A1A2R12		SAME AS 1A2A6A1A1R15	5-67
1A2A6A1A2R13		RESISTOR, MIL TYPE RC07GF271J	5-67
1A2A6A1A2R14		RESISTOR, MIL TYPE RC07GF511J	5-67
1A2A6A1A2R15-R16		SAME AS 1A2A6A1A1A1R3	5-67
1A2A6A1A2R17		SAME AS 1A2A6A1A1A1R11	5-67
1A2A6A1A2R18		RESISTOR, MIL TYPE RC07GF131J	5-67
1A2A6A1A2R19		SAME AS 1A2A6A1A1A1R6	5-67
1A2A6A1A2R20		RESISTOR, MIL TYPE RC07GF750J	5-67
1A2A6A1A2R21		SAME AS 1A2A6A1A1A1R2	5-67
1A2A6A1A2R22		SAME AS 1A2A6A1A2R4	5-67
1A2A6A1A2RT1		SAME AS 1A2A6A1A1A1RT1	5-67
1A2A6A1A2T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 1.5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-902	5-67
1A2A6A1A2T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 1.5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-903	5-67
1A2A6A1A2TP1-TP2		TERMINAL, FEED THRU, INSULATED, MFR 98291, P/N FTMM16L2RED	5-67
1A2A6A1A2TP3		JACK, TIP, MFR 74970, P/N 105-760-10	5-67
1A2A6A1A2XQ1-XQ2		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10027	5-67

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A3		GENERATOR AND MIXER ASSEMBLY, SPECTRUM, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-152	5-65
1A2A6A1A3C1-C2		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3C3		SAME AS 1A2A6A1A1A3C16	5-68
1A2A6A1A3C4		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3C5		SAME AS 1A2A6A1A1A3C16	5-68
1A2A6A1A3C6		SAME AS 1A2A6A1A1A3C4	5-68
1A2A6A1A3C7		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3C8		CAPACITOR, FIXED, MICA DIELECTRIC, 10 UUF PORM 5 PCT, 500 WVDC, MFR 72136, P/N DM15C100J500V	5-68
1A2A6A1A3C9		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3C10		SAME AS 1A2A6A1A2C10	5-68
1A2A6A1A3C11-C12		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3C13-C14		SAME AS 1A2A6A1A2C10	5-68
1A2A6A1A3C15		CAPACITOR, FIXED, MICA DIELECTRIC, 10 UUF PORM 5 PCT, 300 WVDC, MFR 72136, P/N DM15C100J300V	5-68
1A2A6A1A3C16-C17		SAME AS 1A2A6A1A1A3C8	5-68
1A2A6A1A3C18-C20		SAME AS 1A2A6A1C1	5-68
1A2A6A1A3CR1		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N758A	5-68
1A2A6A1A3CR2-CR4		SAME AS 1A2A6A1A2CR1	5-68
1A2A6A1A3CR5		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N3600	5-68
1A2A6A1A3L1		SAME AS 1A2A6A1L1-L2	5-68
1A2A6A1A3L2		COIL, RADIO FREQUENCY, 790 KC, 0.602 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-348	5-68
1A2A6A1A3L3		REACTOR, VARIABLE, 0.38 TO 0.56 UH, MFR 03550, P/N 64047-22	5-68
1A2A6A1A3L4		COIL, RADIO FREQUENCY, 2.5 MC, 0.620 IN, LG X 0.422 IN. DIA, MFR 58189, P/N 666163-351	5-68

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A3Q1		TRANSISTOR, MFR 80131, P/N 2N964A	5-68
1A2A6A1A3Q2		TRANSISTOR, MFR 80131, P/N 2N2501	5-68
1A2A6A1A3Q3		SAME AS 1A2A6A1A3Q1	5-68
1A2A6A1A3Q4-Q5		SAME AS 1A2A4A38Q1	5-68
1A2A6A1A3Q6		SAME AS 1A2A6A1A1A1Q1-Q4	5-68
1A2A6A1A3R1		RESISTOR, MIL TYPE RC20GF511J	5-68
1A2A6A1A3R2		RESISTOR, MIL TYPE RC07GF683J	5-68
1A2A6A1A3R3		RESISTOR, MIL TYPE RC07GF102J	5-68
1A2A6A1A3R4		RESISTOR, MIL TYPE RC07GF622J	5-68
1A2A6A1A3R5		SAME AS 1A2A6A1A1A1R13	5-68
1A2A6A1A3R6		RESISTOR, MIL TYPE RC07GF822J	5-68
1A2A6A1A3R7		RESISTOR, MIL TYPE RC07GF473J	5-68
1A2A6A1A3R8		SAME AS 1A2A6A1A2R4	5-68
1A2A6A1A3R9		RESISTOR, MIL TYPE RC07GF152J	5-68
1A2A6A1A3R10		RESISTOR, MIL TYPE RC07GF681J	5-68
1A2A6A1A3R11		SAME AS 1A2A6A1A3R4	5-68
1A2A6A1A3R12		SAME AS 1A2A6A1A3R2	5-68
1A2A6A1A3R13		SAME AS 1A2A6A1A2R14	5-68
1A2A6A1A3R14		RESISTOR, MIL TYPE RC07GF333J	5-68
1A2A6A1A3R15		RESISTOR, MIL TYPE RC07GF390J	5-68
1A2A6A1A3R16		SAME AS 1A2A6A1A3R10	5-68
1A2A6A1A3R17		SAME AS 1A2A6A1A2R4	5-68
1A2A6A1A3R18		SAME AS 1A2A6A1A1A1R8	5-68
1A2A6A1A3R19		SAME AS 1A2A6A1A1A1R7	5-68
1A2A6A1A3R20		RESISTOR, MIL TYPE RC07GF300J	5-68
1A2A6A1A3R21		SAME AS 1A2A6A1A1A1R13	5-68
1A2A6A1A3R22		SAME AS 1A2A6A1A1A1R18	5-68
1A2A6A1A3R23-R24		SAME AS 1A2A6A1A1A1R8	5-68
1A2A6A1A3R25		SAME AS 1A2A6A1A1A1R15	5-68

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A3R26		SAME AS 1A2A6A1A1A1R7	5-68
1A2A6A1A3R27		SAME AS 1A2A6A1A1A1R8	5-68
1A2A6A1A3R28		SAME AS 1A2A6A1A1A1R13	5-68
1A2A6A1A3R29		RESISTOR, MIL TYPE RC07GF151J	5-68
1A2A6A1A3R30		SAME AS 1A2A6A1A3R3	5-68
1A2A6A1A3R31		SAME AS 1A2A6A1A2R4	5-68
1A2A6A1A3R32		SAME AS 1A2A6A1A1A1R8	5-68
1A2A6A1A3R33		SAME AS 1A2A6A1A1A1R18	5-68
1A2A6A1A3T1		TRANSFORMER, RADIO FREQUENCY, 2.5 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-349	5-68
1A2A6A1A3TP1		SAME AS 1A2A6A1A2TP1-TP2	5-68
1A2A6A1A4		MC LEVEL CONTROL ASSEMBLY, MFR 58189, P/N P55479-001	5-65
1A2A6A1A4C1		CAPACITOR, MIL TYPE CK06CW103M	5-69
1A2A6A1A4C2		CAPACITOR, MIL TYPE M39014-02-0225	5-69
1A2A6A1A4C3-C7		SAME AS 1A2A6A1A4C1	5-69
1A2A6A1A4C8		SAME AS 1A2A6A1A4C2	5-69
1A2A6A1A4C9		SAME AS 1A2A6A1A4C1	5-69
1A2A6A1A4C10		SAME AS 1A2A6A1A4C2	5-69
1A2A6A1A4CR1		SEMICONDUCTOR DEVICE, DIODE, MFR 58189, P/N 810002-664	5-69
1A2A6A1E1-E2		EYELET, FLAT FLANGE, MFR 70528, P/N 384	5-69
1A2A6A1E3-E6		TERMINAL, TURRET TYPE, MFR 58189, P/N 559997-119	5-69
1A2A6A1A4Q1		TRANSISTOR, MFR 02735, P/N 3N140	5-69
1A2A6A1A4Q2		TRANSISTOR, MFR 80131, P/N 2N918	5-69
1A2A6A1A4Q3-Q4		TRANSISTOR, MIL TYPE 2N930	5-69
1A2A6A1A4R1		RESISTOR, MIL TYPE RCR07G223J	5-69
1A2A6A1A4R2		RESISTOR, MIL TYPE RC07GF822J	5-69
1A2A6A1A4R3		RESISTOR, MIL TYPE RC07GF102J	5-69
1A2A6A1A4R4		RESISTOR, MIL TYPE RC07GF103J	5-69
1A2A6A1A4R5		RESISTOR, MIL TYPE RC07GF623J	5-69
1A2A6A1A4R6		RESISTOR, MIL TYPE RC07GF391J	5-69

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A1A4R7		RESISTOR, MIL TYPE RC20GF272J	5-69
1A2A6A1A4R8		RESISTOR, MIL TYPE RC07GF153J	5-69
1A2A6A1A4R9		SAME AS 1A2A6A1A4R1	5-69
1A2A6A1A4R10		RESISTOR, MIL TYPE RC07GF202J	5-69
1A2A6A1A4R11		RESISTOR, MIL TYPE RJ11CP504	5-69
1A2A6A1A4R12		SAME AS 1A2A6A1A4R8	5-69
1A2A6A1A4R13		RESISTOR, MIL TYPE RC07GF393J	5-69
1A2A6A1A4R14		RESISTOR, MIL TYPE RC07GF222J	5-69
1A2A6A1A4R15-R16		SAME AS 1A2A6A1A4R4	5-69
1A2A6A1A4R17		SAME AS 1A2A6A1A4R5	5-69
1A2A6A1A4R18		RESISTOR, MIL TYPE RC07GF512J	5-69
1A2A6A1A4R19		RESISTOR, MIL TYPE RC07GF390J	5-69
1A2A6A1A4TP1		TERMINAL, FEED, THRU, MFR 09211, P/N 105-758-10	5-69
1A2A6A2		SYNTHESIZER ASSEMBLY, 100 KC, MFR 58189, P/N A70544-001	5-22
1A2A6A2C1		CAPACITOR, MIL TYPE CK06CW103M	5-73
1A2A6A2E1-E6		TERMINAL, FEED THRU, MFR 05009, P/N FTSM9L2WHITE	5-70 & 5-71
1A2A6A2MP1		DETENT, SWITCH, 10 POSITIONS EVERY 36 DEGREES, MFR 58189, P/N 666230-439	5-70
1A2A6A2MP2		COUPLING ASSEMBLY, COMPLETE, INCLUDES DRIVE PIN & SPRING, MFR 58189, P/N 666162-106	5-71
1A2A6A2MP3		COVER, 100 KC SYNTHESIZER, MFR 58189, P/N A70549-001	5-22
1A2A6A2MP4		FRAME, STAKED, MFR 58189, P/N 666231-277	5-71
1A2A6A2P1		CONNECTOR, RECEPTACLE, ELECTRICAL 2.088 IN. LG X 0.494 IN. W X 0.663 IN. H, MFR 91146, P/N DBM 9W4PC31	5-72
1A2A6A2P1A1-P1A4		SAME AS 1A2A6A1P1A1	5-72
1A2A6A2S1		SWITCH SECTION, ROTARY, MFR 58189, P/N 666163-515	5-70
1A2A6A2Y1		CRYSTAL UNIT, QUARTZ, 4.553 MF, MFR 58189, P/N 666163-670	5-70

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2Y2		CRYSTAL UNIT, QUARTZ, 4.653 MC, MFR 58189, P/N 666163-671	5-70
1A2A6A2Y3		CRYSTAL UNIT, QUARTZ, 4.753 MC, MFR 58189, P/N 666163-672	5-70
1A2A6A2Y4		CRYSTAL UNIT, QUARTZ, 4.853 MC, MFR 58189, P/N 666163-673	5-70
1A2A6A2Y5		CRYSTAL UNIT, QUARTZ, 4.953 MC, MFR 58189, P/N 666163-674	5-70
1A2A6A2Y6		CRYSTAL UNIT, QUARTZ, 5.053 MC, MFR 58189, P/N 666163-675	5-70
1A2A6A2Y7		CRYSTAL UNIT, QUARTZ, 5.153 MC, MFR 58189, P/N 666163-676	5-70
1A2A6A2Y8		CRYSTAL UNIT, QUARTZ, 5.253 MC, MFR 58189, P/N 666163-677	5-70
1A2A6A2Y9		CRYSTAL UNIT, QUARTZ, 5.353 MC, MFR 58189, P/N 666163-678	5-70
1A2A6A2Y10		CRYSTAL UNIT, QUARTZ, 5.453 MC, MFR 58189, P/N 666163-679	5-70
1A2A6A2A1		OSCILLATOR ASSEMBLY, 4.553 TO 5.453 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N P69357-001	5-70
1A2A6A2A1C1		CAPACITOR, FIXED, MICA DIELECTRIC, 36 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E360G300V	5-75
1A2A6A2A1C2-C3		SAME AS 1A2A6A1C3	5-75
1A2A6A2A1C4		SAME AS 1A2A6A1A1A3C9	5-75
1A2A6A2A1C5		SAME AS 1A2A2A2C3	5-75
1A2A6A2A1C6		SAME AS 1A2A6A1A1A3C7	5-75
1A2A6A2A1C7-C8		SAME AS 1A2A6A1C3	5-75
1A2A6A2A1C9		SAME AS 1A2A6A1A2C3	
1A2A6A2A1C10		SAME AS 1A2A6A1A1A3C6	5-75
1A2A6A2A1C11		CAPACITOR, MIL TYPE CM06FD911G03	5-75
1A2A6A2A1CR1-CR2		SAME AS 1A2A6A1A1A1CR1-CR2	5-75
1A2A6A2A1L1		COIL, RADIO FREQUENCY, MIL TYPE MS18130-14	5-75

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A1Q1		SAME AS 1A2A6A1A2Q3	5-75
1A2A6A2A1R1		SAME AS 1A2A6A1A1A1R6	5-75
1A2A6A2A1R2-R3		SAME AS 1A2A6A1A1A1R3	5-75
1A2A6A2A1R4		SAME AS 1A2A6A1A1A1R4	5-75
1A2A6A2A1R5		SAME AS 1A2A6A1A1A1R8	5-75
1A2A6A2A1R6		SAME AS 1A2A6A1A3R3	5-75
1A2A6A2A1R7		SAME AS 1A2A6A1A1A1R8	5-75
1A2A6A2A1R8		RESISTOR, MIL TYPE RC07GF150J	5-75
1A2A6A2A1R9		RESISTOR, MIL TYPE RC07GF101J	5-75
1A2A6A2A1R10		RESISTOR, MIL TYPE RC07GF431J	5-75
1A2A6A2A1R11		RESISTOR, MIL TYPE RC07GF821J	5-75
1A2A6A2A1RT1		SAME AS 1A2A6A1A1A1RT1	5-75
1A2A6A2A1T1		TRANSFORMER, TOROID, RADIO FREQUENCY, MFR 58189, P/N P69363-003	5-75
1A2A6A2A2		MIXER, 10.747 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-864	5-71
1A2A6A2A2C1-C4		SAME AS 1A2A6A1C1	5-76
1A2A6A2A2C5		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 47 UUF PORM 5 PCT, 75 WVDC, MFR 86335, P/N MINC47J	5-76
1A2A6A2A2C6-C7		SAME AS 1A2A6A1C1	5-76
1A2A6A2A2C8-C9		CAPACITOR, FIXED, MICA DIELECTRIC, 750 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E751G300V	5-76
1A2A6A2A2FL1		FILTER, BAND PASS, 10.747 MC, MFR 88463, P/N 7911007	5-76
1A2A6A2A2Q1-Q2		SAME AS 1A2A6A1A3Q4-Q5	5-76
1A2A6A2A2R1		SAME AS 1A2A6A1A1A1R3	5-76
1A2A6A2A2R2		RESISTOR, MIL TYPE RC07GF562J	5-76
1A2A6A2A2R3		SAME AS 1A2A6A1A2R4	5-76

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A2R4		SAME AS 1A2A6A1A1A1R13	5-76
1A2A6A2A2R5		SAME AS 1A2A6A1A1A1R8	5-76
1A2A6A2A2R6		SAME AS 1A2A6A1A2R4	5-76
1A2A6A2A2R7		SAME AS 1A2A6A1A1A1R13	5-76
1A2A6A2A2R8		RESISTOR, MIL TYPE RC07GF512J	5-76
1A2A6A2A2R9		SAME AS 1A2A6A1A1A1R15	5-76
1A2A6A2A2T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-905	5-76
1A2A6A2A2T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 10.747 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-906	5-76
1A2A6A2A2T3		TRANSFORMER, VARIABLE RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-368	5-76
1A2A6A2A2TP1		SAME AS 1A2A6A1A2TP1-TP2	5-76
1A2A6A2A3		MIXER, 17.847/27.847 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-869	5-72
1A2A6A2A3C1		SAME AS 1A2A6A1C1	5-77
1A2A6A2A3C2-C3		CAPACITOR, FIXED, ELECTROLYTIC, 6.8 UF PORM 20 PCT, 35 WVDC, MFR 56289, P/N 180D685X0035	5-77
1A2A6A2A3C4-C6		SAME AS 1A2A6A1C1	5-77
1A2A6A2A3C7		CAPACITOR, FIXED, MICA DIELECTRIC, 56 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E560G300V	5-77
1A2A6A2A3C8		CAPACITOR, MIL TYPE PC41J4R5	5-77
1A2A6A2A3C9		SAME AS 1A2A6A1A3C15	5-77
1A2A6A2A3C10-C11		SAME AS 1A2A6A1C1	5-77
1A2A6A2A3C12		SAME AS 1A2A2A2C3	5-77
1A2A6A2A3C13-C17		SAME AS 1A2A6A1C1	5-77

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A3C18		CAPACITOR, FIXED, MICA DIELECTRIC, 43 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E430G300V	5-77
1A2A6A2A3C19		SAME AS 1A2A6A2A3C8	5-77
1A2A6A2A3C20		SAME AS 1A2A6A1A3C15	5-77
1A2A6A2A3CR1		SAME AS 1A2A6A1A2CR1	5-77
1A2A6A2A3CR2		SAME AS 1A2A6A1A3CR1	5-77
1A2A6A2A3CR3		SAME AS 1A2A6A1A2CR1	5-77
1A2A6A2A3Q1-Q2		SAME AS 1A2A6A1A3Q4-Q5	5-77
1A2A6A2A3R1		SAME AS 1A2A6A1A1A1R13	5-77
1A2A6A2A3R2		SAME AS 1A2A6A1A1A1R8	5-77
1A2A6A2A3R3		SAME AS 1A2A6A1A2R4	5-77
1A2A6A2A3R4		SAME AS 1A2A6A1A1A1R7	5-77
1A2A6A2A3R5		RESISTOR, MIL TYPE RC07GF331J	5-77
1A2A6A2A3R6		SAME AS 1A2A6A1A1A1R13	5-77
1A2A6A2A3R7		SAME AS 1A2A6A1A1A1R8	5-77
1A2A6A2A3R8		SAME AS 1A2A6A1A2R4	5-77
1A2A6A2A3R9		SAME AS 1A2A6A1A1A1R13	5-77
1A2A6A2A3R10		RESISTOR, MIL TYPE RC07GF821J	5-77
1A2A6A2A3R11		SAME AS 1A2A6A1A2R13	5-77
1A2A6A2A3R12		SAME AS 1A2A6A1A1A1R12	5-77
1A2A6A2A3R13		RESISTOR, MIL TYPE RC07GF510J	5-77
1A2A6A2A3R14		RESISTOR, MIL TYPE RC07GF202J	5-77
1A2A6A2A3R15		SAME AS 1A2A6A2A3R5	5-77
1A2A6A2A3R16		SAME AS 1A2A6A1A3R20	5-77
1A2A6A2A3T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-909	5-77
1A2A6A2A3T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-371	5-77

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A3T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-372	5-77
1A2A6A2A3T4		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-373	5-77
1A2A6A2A3TP1-TP4		SAME AS 1A2A6A1A2TP1-TP2	5-77
1A2A6A2A3Y1		CRYSTAL UNIT, QUARTZ, 17.845 MC, MFR 58189, P/N 666163-642	5-77
1A2A6A2A3Y2		CRYSTAL UNIT, QUARTZ, 27.845 MC, MFR 58189, P/N 666163-643	5-77
1A2A6A2A4		FILTER, TRIPLE TUNED, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-874	4-73
1A2A6A2A4C1-C6		SAME AS 1A2A6A1C1	5-78
1A2A6A2A4C7		CAPACITOR, FIXED, MICA DIELECTRIC, 47 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E470G300V	5-78
1A2A6A2A4C8		SAME AS 1A2A6A1C1	5-78
1A2A6A2A4C9		CAPACITOR, FIXED, MICA DIELECTRIC, 62 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E620G300V	5-78
1A2A6A2A4C10		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 1.5 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA1R5J500V	5-78
1A2A6A2A4C11		SAME AS 1A2A6A2A4C7	5-78
1A2A6A2A4C12		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 3 UUF PORM 5 PCT, 500 WVDC, MFR 78488, P/N GA3R0J500V	5-78
1A2A6A2A4C13		SAME AS 1A2A6A2A4C9	5-78
1A2A6A2A4C14		SAME AS 1A2A6A2A4C10	5-78
1A2A6A2A4C15		SAME AS 1A2A6A2A4C7	5-78
1A2A6A2A4C16		SAME AS 1A2A6A2A4C12	5-78
1A2A6A2A4C17		SAME AS 1A2A6A2A4C9	5-78

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A4C18-C19		SAME AS 1A2A6A1C1	5-78
1A2A6A2A4C20		CAPACITOR, FIXED, MICA DIELECTRIC, 510 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E511G300V	5-78
1A2A6A2A4C21-C23		SAME AS 1A2A6A1C1	5-78
1A2A6A2A4C24		CAPACITOR, FIXED, MICA DIELECTRIC, 560 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E561G300V	5-78
1A2A6A2A4C25-C27		SAME AS 1A2A6A1C1	5-78
1A2A6A2A4L1		COIL, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-340	5-78
1A2A6A2A4L2		COIL, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-341	5-78
1A2A6A2A4L3		COIL, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-342	5-78
1A2A6A2A4L4		COIL, VARIABLE, RADIO FREQUENCY 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-343	5-78
1A2A6A2A4L5		COIL, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-344	5-78
1A2A6A2A4L6		COIL, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666273-076	5-78
1A2A6A2A4Q1-Q4		SAME AS 1A2A6A1A3Q4-Q5	5-78
1A2A6A2A4R1-R2		SAME AS 1A2A6A1A1A1R13	5-78
1A2A6A2A4R3		SAME AS 1A2A6A1A2R4	5-78
1A2A6A2A4R4-R5		SAME AS 1A2A6A1A1A1R8	5-78
1A2A6A2A4R6-R7		SAME AS 1A2A6A1A1A1R13	5-78
1A2A6A2A4R8-R9		SAME AS 1A2A6A1A1A1R8	5-78
1A2A6A2A4R10		SAME AS 1A2A6A2A3R5	5-78
1A2A6A2A4R11		SAME AS 1A2A6A1A2R4	5-78

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A4R12		NOT USED	
1A2A6A2A4R13		SAME AS 1A2A6A1A1A1R13	5-78
1A2A6A2A4R14		SAME AS 1A2A6A1A1A1R8	5-78
1A2A6A2A4R15		SAME AS 1A2A6A1A1A1R13	5-78
1A2A6A2A4R16		SAME AS 1A2A6A1A1A1R8	5-78
1A2A6A2A4R17		SAME AS 1A2A6A1A1A1R7	5-78
1A2A6A2A4R18		NOT USED	
1A2A6A2A4R19-R20		SAME AS 1A2A6A1A2R4	5-78
1A2A6A2A4R21-R22		SAME AS 1A2A6A1A1A1R15	5-78
1A2A6A2A4R23		RESISTOR, MIL TYPE RC07GF471J	5-78
1A2A6A2A4T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-365	5-78
1A2A6A2A4T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-366	5-78
1A2A6A2A4TP1-TP6		SAME AS 1A2A6A1A2TP1-TP2	5-78
1A2A6A2A5		AGC ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70545-001	5-74
1A2A6A2A5C1-C10		SAME AS 1A2A6A1C1	5-79
1A2A6A2A5C11		CAPACITOR, FIXED, ELECTROLYTIC, 47 UF PORM 20 PCT, 35 WVDC, MFR 56289 P/N 150D476X0C35S2	5-79
1A2A6A2A5CR1		SAME AS 1A2A6A1A1A1CR1-CR2	5-79
1A2A6A2A5L1		SAME AS 1A2A6A1A2L3	5-79
1A2A6A2A5L2		COIL, RADIO FREQUENCY, 3.3 UH, MFR 99800, P/N 1537-714	5-79
1A2A6A2A5L3		SAME AS 1A2A6A1A2L3	5-79
1A2A6A2A5Q1		SAME AS 1A2A6A1A3Q4-Q5	5-79
1A2A6A2A5Q2-Q4		SAME AS 1A2A6A1A1A1Q1-Q4	5-79
1A2A6A2A5R1		RESISTOR, MIL TYPE RCR07G682JS	5-79
1A2A6A2A5R2		RESISTOR, MIL TYPE RCR07G153JS	5-79

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A2A5R3		RESISTOR, MIL TYPE RCR07G222JS	5-79
1A2A6A2A5R4		RESISTOR, MIL TYPE RCR07G133JS	5-79
1A2A6A2A5R5		RESISTOR, MIL TYPE RCR07G912JS	5-79
1A2A6A2A5R6		RESISTOR, MIL TYPE RCR07G471JS	5-79
1A2A6A2A5R7		RESISTOR, MIL TYPE RCR07G241JS	5-79
1A2A6A2A5R8		RESISTOR, MIL TYPE RCR07G182JS	5-79
1A2A6A2A5R9		SAME AS 1A2A6A2A5R4	5-79
1A2A6A2A5R10		SAME AS 1A2A6A2A5R5	5-79
1A2A6A2A5R11		RESISTOR, MIL TYPE RCR07G511JS	5-79
1A2A6A2A5R12		RESISTOR, MIL TYPE RCR07G330JS	5-79
1A2A6A2A5R13		RESISTOR, MIL TYPE RT24C2W501	5-79
1A2A6A2A5R14		RESISTOR, MIL TYPE RCR07G162JS	5-79
1A2A6A2A5R15		RESISTOR, MIL TYPE RCR07G104JS	5-79
1A2A6A2A5R16		RESISTOR, MIL TYPE RCR07G472JS	5-79
1A2A6A2A5R17		RESISTOR, MIL TYPE RCR07G200JS	5-79
1A2A6A2A5RT1		RESISTOR, THERMAL, 2000 OHMS PORM 10 PCT, MFR 15857, P/N RL41ST	5-79
1A2A6A2A5TP1		JACK, TIP, MFR 74970, P/N 105-851	5-79
1A2A6A3		SYNTHESIZER ASSEMBLY, 1 AND 10 KC, MFR 58189, P/N A09495-001	5-22
1A2A6A3C1-C24		NOT USED	
1A2A6A3C25		SAME AS 1A2A6A1C2	5-80
1A2A6A3C26		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.05 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-1	5-80
1A2A6A3J1		JACK, TIP, MFR 98291, P/N FTM19WHITE	5-80
1A2A6A3J2		JACK, TIP, MFR 98291, P/N FTM19RED	5-80
1A2A6A3J3		SEE 1A2A6A3A3J3	5-81
1A2A6A3J4-J5		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 98291, P/N 3113	5-80
1A2A6A3J6		SEE 1A2A6A3A3J6	5-81
1A2A6A3J7		SAME AS 1A2A6A3J4-J5	5-80

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3MP1-MP2		DETENT, SWITCH, 10 POSITIONS AT EVERY 36 DEGREES, MFR 58189, P/N 666163-514 (INCLUDES SWITCH SHAFT)	5-80 & 5-81
1A2A6A3MP3-MP4		SAME AS 1A2A6A2MP2	5-80& 5-81
1A2A6A3MP5		BASE, MARKED, MFR 58189, P/N 666163-563 (INCLUDES 1A2A6A3J1 and 1A2A6A3J2)	5-80
1A2A6A3MP6		COVER, MARKED, MFR 58189, P/N A09494-001	5-22
1A2A6A3P1		SAME AS 1A2A6P8	5-80
1A2A6A3P2		SAME AS 1A2A6P7	5-80
1A2A6A3A1		OSCILLATOR ASSEMBLY, 5.16 TO 5.25 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-884	5-80 & 5-81
1A2A6A3A1C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 33 UUF PORM 2 PCT, 500 WVDC, MFR 15450, P/N 301N2200-33G	5-82
1A2A6A3A1C2		SAME AS 1A2A6A1A1A3C9	5-82
1A2A6A3A1C3		SAME AS 1A2A6A1A1A3C7	5-82
1A2A6A3A1C4		SAME AS 1A2A2A2C3	5-82
1A2A6A3A1C5-C9		CAPACITOR, MIL TYPE CK06CW103M	5-82
1A2A6A3A1C10		SAME AS 1A2A6A1A1A3C11	5-82
1A2A6A3A1C11		SAME AS 1A2A6A1A1A3C10	5-82
1A2A6A3A1CR1-CR2		SAME AS 1A2A6A1A1A1CR1-CR2	5-82
1A2A6A3A1Q1		SAME AS 1A2A6A1A3Q2	5-82
1A2A6A3A1Q2		SAME AS 1A2A6A1A2Q1-Q2	5-82
1A2A6A3A1R1		RESISTOR, MIL TYPE RC07GF203J	5-82
1A2A6A3A1R2		RESISTOR, MIL TYPE RC07GF123J	5-82
1A2A6A3A1R3		SAME AS 1A2A6A1A1A1R6	5-82
1A2A6A3A1R4		RESISTOR, MIL TYPE RC07GF132J	5-82
1A2A6A3A1R5-R6		SAME AS 1A2A6A1A1A1R8	5-82
1A2A6A3A1R7		RESISTOR, FIXED COMPOSITION, 5.1 OHMS, PORM 5 PCT, 1/4 WATT, MFR 58189, P/N 666231-644	5-82

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A1R8		SAME AS 1A2A6A1A1A1R13	5-82
1A2A6A3A1R9		SAME AS 1A2A6A1A1A1R6	5-82
1A2A6A3A1R10		SAME AS 1A2A6A1A1A1R7	5-82
1A2A6A3A1R11		SAME AS 1A2A6A1A1A1R3	5-82
1A2A6A3A1R12		SAME AS 1A2A6A1A1A1R4	5-82
1A2A6A3A1R13		SAME AS 1A2A6A1A1A1R3	5-82
1A2A6A3A1R14		SAME AS 1A2A6A1A2R4	5-82
1A2A6A3A1R15		SAME AS 1A2A6A2A3R10	5-82
1A2A6A3A1R16		SAME AS 1A2A6A1A2R4	5-82
1A2A6A3A1RT1		SAME AS 1A2A6A1A1A1RT1	5-82
1A2A6A3A1T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7.9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-904	5-82
1A2A6A3A1XQ1		NOT USED	
1A2A6A3A1XQ2		SAME AS 1A2A6A1A3XQ1-XQ2	5-82
1A2A6A3A2		OSCILLATOR ASSEMBLY, 1.859 TO 1.859 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-889	5-80 & 5-81
1A2A6A3A2C1		CAPACITOR, FIXED, CERAMIC, DIELECTRIC, 43 UUF PORM 2 PCT, 500 WVDC MFR 15450, P/N 301N5600-43G	5-83
1A2A6A3A2C2		SAME AS 1A2A6A1A1A3C10	5-83
1A2A6A3A2C3		SAME AS 1A2A6A2A2C8-C9	5-83
1A2A6A3A2C4		SAME AS 1A2A6A1A2C3	5-83
1A2A6A3A2C5		SAME AS 1A2A6A3A1C5-C9	5-83
1A2A6A3A2C6-C7		CAPACITOR, MIL TYPE CK14BX473K	5-83
1A2A6A3A2C8		SAME AS 1A2A6A3A1C5-C9	5-83
1A2A6A3A2C9		SAME AS 1A2A6A3A2C6-C7	5-83
1A2A6A3A2C10		SAME AS 1A2A6A2A2C8-C9	5-83
1A2A6A3A2CR1-CR2		SAME AS 1A2A6A1A1A1CR1-CR2	5-83
1A2A6A3A2Q1		SAME AS 1A2A6A1A3Q2	5-83
1A2A6A3A2Q2		SAME AS 1A2A6A1A2Q1-Q2	5-83

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A2R1		SAME AS 1A2A6A3A1R1	5-83
1A2A6A3A2R2		SAME AS 1A2A6A3A1R2	5-83
1A2A6A3A2R3		SAME AS 1A2A6A1A1A1R6	5-83
1A2A6A3A2R4		SAME AS 1A2A6A3A1R4	5-83
1A2A6A3A2R5		SAME AS 1A2A6A1A3R14	5-83
1A2A6A3A2R6		SAME AS 1A2A6A1A1A1R8	5-83
1A2A6A3A2R7		SAME AS 1A2A6A1A1A1R9	5-83
1A2A6A3A2R8		SAME AS 1A2A6A1A1A1R13	5-83
1A2A6A3A2R9		SAME AS 1A2A6A1A2R14	5-83
1A2A6A3A2R10		SAME AS 1A2A6A1A1A1R7	5-83
1A2A6A3A2R11		SAME AS 1A2A6A1A1A1R3	5-83
1A2A6A3A2R12		SAME AS 1A2A6A1A1A1R4	5-83
1A2A6A3A2R13		SAME AS 1A2A6A1A1A1R3	5-83
1A2A6A3A2R14		SAME AS 1A2A6A1A2R4	5-83
1A2A6A3A2R15		SAME AS 1A2A6A1A1A1R6	5-83
1A2A6A3A2R16		RESISTOR, MIL TYPE RC07GF241J	5-83
1A2A6A3A2RT1		SAME AS 1A2A6A1A1A1RT1	5-83
1A2A6A3A2T1		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7.9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-907	5-83
1A2A6A3A2XQ1		NOT USED	
1A2A6A3A2XQ2		SAME AS 1A2A6A1A2XQ1-XQ2	5-83
1A2A6A3A3		OUTPUT AND BLANKER SUBASSEMBLY, 1 AND 10 KC, COMPONENT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A09449-001	5-84
1A2A6A3A3C1-C45		NOT USED	
1A2A6A3A3C46-C47		SAME AS 1A2A6A3C26	5-84
1A2A6A3A3C48-C49		CAPACITOR, FIXED, MICA DIELECTRIC, 470 UUF PORM 1 PCT, 300 WVDC, MFR 72136, P/N DM15E471F300V	5-84

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A3C50		CAPACITOR, FIXED, MICA DIELECTRIC, 15 UUF PORM 3 PCT, 300 WVDC, MFR 72136, P/N DM15C150H300V	5-84
1A2A6A3A3C51		SAME AS 1A2A6A3A3C48-C49	5-84
1A2A6A3A3C52		SAME AS 1A2A6A3A3C50	5-84
1A2A6A3A3C53		CAPACITOR, FIXED, ELECTROLYTIC, 1 UF PORM 10 PCT, 35 WVDC, MFR 56289, P/N 150D105X9035A2	5-84
1A2A6A3A3C54		SAME AS 1A2A6A3A3C48-C49	5-84
1A2A6A3A3C55		SAME AS 1A2A6A3C26	5-84
1A2A6A3A3C56		SAME AS 1A2A6A3A3C50	5-84
1A2A6A3A3CR1-CR6		NOT USED	
1A2A6A3A3CR7		SEMICONDUCTOR DEVICE, DIODE, MFR 82577, P/N HD6730	5-84
1A2A6A3A3J1-J2		NOT USED	
1A2A6A3A3J3		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 98291, P/N 3108	5-84
1A2A6A3A3J4-J5		NOT USED	
1A2A6A3A3J6		SAME AS 1A2A6A3A3J3	5-84
1A2A6A3A3J7		NOT USED	
1A2A6A3A3J8-J9		TERMINAL, FEED THRU, INSULATED, MFR 98291, P/N FTSM9WHITE	5-84
1A2A6A3A3L1-L4		NOT USED	
1A2A6A3A3L5		COIL, RADIO FREQUENCY, 3.35 MC 0.620 IN. LG X 0.422 IN. IDA, MFR 58189, P/N 666163-904	5-84
1A2A6A3A3L6-L7		COIL, RADIO FREQUENCY, 3.35 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-902	5-84
1A2A6A3A3Q1-Q10		NOT USED	
1A2A6A3A3Q11		SAME AS 1A2A6A1A2Q1-Q2	5-84
1A2A6A3A3Q12		TRANSISTOR, MFR 80131, P/N 2N1301	5-84
1A2A6A3A3R1-R46		NOT USED	
1A2A6A3A3R47		SAME AS 1A2A6A1A1A1R8	5-84

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A3R48		SAME AS 1A2A6A1A1A1R7	5-84
1A2A6A3A3R49		SAME AS 1A2A6A1A2R4	5-84
1A2A6A3A3R50		SAME AS 1A2A6A1A3R3	5-84
1A2A6A3A3R51		SAME AS 1A2A6A1A1A1R7	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF120J	5-84
1A2A6A3A3R52 SELECT		SAME AS 1A2A6A2A1R8	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF180J	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF200J	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF220J	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF240J	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF270J	5-84
1A2A6A3A3R52 SELECT		SAME AS 1A2A6A1A3R20	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF330J	5-84
1A2A6A3A3R52 SELECT		RESISTOR, MIL TYPE RC07GF360J	5-84
1A2A6A3A3R52 SELECT		SAME AS 1A2A6A1A3R15	5-84
1A2A6A3A3R53		NOT USED	
1A2A6A3A3R54		SAME AS 1A2A6A1A1A1R13	5-84
1A2A6A3A3T1-T2		NOT USED	
1A2A6A3A3T3		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 3.35 MC, 0.620 IN. LG X 0.422 IN DIA, MFR 58189, P/N 666163-901	
1A2A6A3A3TP1-TP3		SAME AS 1A2A6A1A2TP1-TP2	5-84
1A2A6A3A3XQ1-XQ10		NOT USED	
1A2A6A3A3XQ11		SAME AS 1A2A6A1A2XQ1-XQ2	5-84
1A2A6A3A3XQ12		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK, MFR 07047, P/N 10012	5-84
1A2A6A3A4		ERROR MIXER ASSEMBLY, 1 AND 10 KC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A09493-001	5-80 & 5-81
1A2A6A3A4C1-C3		SAME AS 1A2A6A1C1	5-85

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A4C4-C5		CAPACITOR, FIXED, MICA DIELECTRIC, 15 UUF PORM 5 PCT, 500 WVDC, MFR 72136, P/N DM15C150J500V	5-85
1A2A6A3A4C6		SAME AS 1A2A6A1C1	5-85
1A2A6A3A4C7		CAPACITOR, FIXED, MICA DIELECTRIC, 220 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E221G300V	5-85
1A2A6A3A4C8		CAPACITOR, FIXED, MICA DIELECTRIC, 5 UUF PORM 5 PCT, 500 WVDC, MFR 72136, P/N DM15C050J500V	5-85
1A2A6A3A4C9		CAPACITOR, FIXED, MICA DIELECTRIC, 68 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E680G000V	5-85
1A2A6A3A4C10		SAME AS 1A2A6A1A1A3C11	5-85
1A2A6A3A4C11-C12		SAME AS 1A2A6A1C1	5-85
1A2A6A3A4C13		SAME AS 1A2A6A3C26	5-85
1A2A6A3A4FL1		FILTER, BAND PASS, 9.07 MC, MFR 19057, P/N 790900	5-85
1A2A6A3A4FL2		FILTER, BAND PASS, 1.981 MC, MFR 19057, P/N 767109	5-85
1A2A6A3A4L1-L2		NOT USED	
1A2A6A3A4L3		TRANSFORMER, AUDIO FREQUENCY, 10 KC, MFR 58189, P/N 666163-544	5-85
1A2A6A3A4L4		TRANSFORMER, AUDIO FREQUENCY, 1 KC, MFR 58189, P/N 666163-543	5-85
1A2A6A3A4Q1-Q7		NOT USED	
1A2A6A3A4Q8-Q9		SAME AS 1A2A4A38Q1	5-85
1A2A6A3A4R1		SAME AS 1A2A6A1A1A1R13	5-85
1A2A6A3A4R2		SAME AS 1A2A6A1A1A1R8	5-85
1A2A6A3A4R3		SAME AS 1A2A6A1A1A1R13	5-85
1A2A6A3A4R4		SAME AS 1A2A6A1A2R4	5-85
1A2A6A3A4R5		SAME AS 1A2A6A1A3R9	5-85
1A2A6A3A4R6		SAME AS 1A2A6A1A3R29	5-85
1A2A6A3A4R7		SAME AS 1A2A6A1A1A1R4	5-85
1A2A6A3A4R8		SAME AS 1A2A6A1A1A1R13	5-85

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A4R9		SAME AS 1A2A6A1A1A1R8	5-85
1A2A6A3A4R10		SAME AS 1A2A6A1A1A1R13	5-85
1A2A6A3A4R11		SAME AS 1A2A6A1A1A1R4	5-85
1A2A6A3A4R12		SAME AS 1A2A6A1A2R4	5-85
1A2A6A3A4R13-R29		NOT USED	
1A2A6A3A4R30		SAME AS 1A2A6A2A1R8	5-85
1A2A6A3A4R31		RESISTOR, MIL TYPE RC07GF620J	5-85
1A2A6A3A4T1		TRANSFORMER, RADIO FREQUENCY, 7.9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-369	5-85
1A2A6A3A4Z1		ERROR MIXER ASSEMBLY, 1 KC, MFR 58189, P/N 666163-565	5-85
1A2A6A3A4Z2		ISOLATION AMPLIFIER, 1 KC, MFR 58189, P/N 666231-880	5-85
1A2A6A3A4Z3		AMPLIFIER, ISOLATION 10 AND 100 KC, MFR 58189, P/N 666163-567	5-85
1A2A6A3A5		SWITCH SECTION, ROTARY, MFR 58189, P/N 666163-516, COMPLETE WITH CRYSTAL HOLDER, SPACERS, SWITCH BRACKET, SWITCH SECTION AND CRYSTALS	5-80 & 5-81
1A2A6A3A5S1		SWITCH SECTION, WAFER, 10 POSITION, 36° THROW, MFR 58189, P/N 666163-515	5-80 & 5-81
1A2A6A3A5Y1-Y10		NOT USED	
1A2A6A3A5Y11		CRYSTAL UNIT, QUARTZ, 1.850 MC, MFR 58189, P/N 666163-690	5-80

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A5Y12		CRYSTAL UNIT, QUARTZ, 1.851 MC, MFR 58189, P/N 666163-691	5-81
1A2A6A3A5Y13		CRYSTAL UNIT, QUARTZ, 1.852 MC, MFR 58189, P/N 666163-692	5-81
1A2A6A3A5Y14		CRYSTAL UNIT, QUARTZ, 1.853 MC, MFR 58189, P/N 666163-693	5-81
1A2A6A3A5Y15		CRYSTAL UNIT, QUARTZ, 1.854 MC, MFR 58189, P/N 666163-694	5-81
1A2A6A3A5Y16		CRYSTAL UNIT, QUARTZ, 1.855 MC, MFR 58189, P/N 666163-695	5-81
1A2A6A3A5Y17		CRYSTAL UNIT, QUARTZ, 1.856 MC, MFR 58189, P/N 666163-696	5-80
1A2A6A3A5Y18		CRYSTAL UNIT, QUARTZ, 1.857 MC, MFR 58189, P/N 666163-697	5-80
1A2A6A3A5Y19		CRYSTAL UNIT, QUARTZ, 1.858 MC, MFR 58189, P/N 666163-698	5-80
1A2A6A3A5Y20		CRYSTAL UNIT, QUARTZ, 1.859 MC, MFR 58189, P/N 666163-699	5-80
1A2A6A3A6		CRYSTAL SWITCH ASSEMBLY, MFR 58189, P/N 666163-517, COMPLETE WITH CRYSTAL HOLDER, SPACERS, SWITCH BRACKET, SWITCH SECTION AND CRYSTALS	5-80 & 5-81
1A2A6A3A6S1		SAME AS 1A2A6A3A5S1	5-80& 5-81
1A2A6A3A6Y1		CRYSTAL UNIT, QUARTZ, 5.25 MC, MFR 58189, P/N 666163-689	5-81
1A2A6A3A6Y2		CRYSTAL UNIT, QUARTZ, 5.24 MC, MFR 58189, P/N 666163-688	5-80
1A2A6A3A6Y3		CRYSTAL UNIT, QUARTZ, 5.23 MC, MFR 58189, P/N 666163-687	5-80
1A2A6A3A6Y4		CRYSTAL UNIT, QUARTZ, 5.22 MC, MFR 58189, P/N 666163-686	5-80
1A2A6A3A6Y5		CRYSTAL UNIT, QUARTZ, 5.21 MC, MFR 58189, P/N 666163-685	5-80
1A2A6A3A6Y6		CRYSTAL UNIT, QUARTZ, 5.20 MC, MFR 58189, P/N 666163-684	5-80

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A3A6Y7		CRYSTAL UNIT, QUARTZ, 5.19 MC, MFR 58189, P/N 666163-683	5-81
1A2A6A3A6Y8		CRYSTAL UNIT, QUARTZ, 5.18 MC, MFR 58189, P/N 666163-682	5-81
1A2A6A3A6Y9		CRYSTAL UNIT, QUARTZ, 5.17 MC, MFR 58189, P/N 666163-681	5-81
1A2A6A3A6Y10		CRYSTAL UNIT, QUARTZ, 5.16 MC, MFR 58189, P/N 666163-680	5-81
1A2A6A4		SYNTHESIZER ASSEMBLY, 100 CPS, MFR 58189, P/N A70685-001	5-22
1A2A6A4MP1		FRAME, STAKED, MFR 58189, P/N A00088-001	5-86 & 5-87
1A2A6A4MP2		COVER, MARKED, MFR 58189, P/N A70690-001	5-22
1A2A6A4P1		CONNECTOR, RECEPTACLE, ELECTRICAL, 2.088 IN. LG X 0.494 IN. W X 0.663 IN. H, MFR 91146, P/N DBM13W3PC31F115	5-87
1A2A6A4P1A1-A3		CONNECTOR INSERT, MFR 71468, P/N DM53741-5059	5-87
1A2A6A4A1		MIXER ASSEMBLY, 7.1 MC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70642-001	5-86
1A2A6A4A1C1-C2		CAPACITOR, MIL TYPE M39003-01-2117	5-89
1A2A6A4A1C3		CAPACITOR, MIL TYPE CM05ED330G03	5-89
1A2A6A4A1C4		CAPACITOR, MIL TYPE CK06CW103K	5-89
1A2A6A4A1C5		SAME AS 1A2A6A4A1C3	5-89
1A2A6A4A1C6-C10		SAME AS 1A2A6A4A1C4	5-89
1A2A6A4A1C11		SAME AS 1A2A6A4A1C1-C2	5-89
1A2A6A4A1C12		SAME AS 1A2A6A4A1C3	5-89
1A2A6A4A1C13		CAPACITOR, MIL TYPE CK05CW271K	5-89
1A2A6A4A1C14		CAPACITOR, MIL TYPE CM06FD432G03	5-89
1A2A6A4A1C15-C16		SAME AS 1A2A6A4A1C1-C2	5-89
1A2A6A4A1C17		CAPACITOR, MIL TYPE M39003-01-2123	5-89

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A4A1CR1-CR14		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N277	5-89
1A2A6A4A1Q1		TRANSISTOR, MFR 80131, P/N 2N964	5-89
1A2A6A4A1Q2-Q6		TRANSISTOR, MFR 80131, P/N 2N706	5-89
1A2A6A4A1Q7		TRANSISTOR, MFR 80131, P/N 2N1225	5-89
1A2A6A4A1Q8-Q9		SAME AS 1A2A6A4A1Q2-Q6	5-89
1A2A6A4A1R1		RESISTOR, MIL TYPE RCR07G182JS	5-89
1A2A6A4A1R2		RESISTOR, MIL TYPE RCR07G751JS	5-89
1A2A6A4A1R3		RESISTOR, MIL TYPE RCR07G123JS	5-89
1A2A6A4A1R4		RESISTOR, MIL TYPE RCR07G102JS	5-89
1A2A6A4A1R5		RESISTOR, MIL TYPE RCR07G100JS	5-89
1A2A6A4A1R6		RESISTOR, MIL TYPE RCR07G331JS	5-89
1A2A6A4A1R7-R8		RESISTOR, MIL TYPE RCR07G161JS	5-89
1A2A6A4A1R9-R10		RESISTOR, MIL TYPE RCR07G133JS	5-89
1A2A6A4A1R11		RESISTOR, MIL TYPE RCR07G562JS	5-89
1A2A6A4A1R12		RESISTOR, MIL TYPE RCR07G222JS	5-89
1A2A6A4A1R13		RESISTOR, MIL TYPE RCR07G332JS	5-89
1A2A6A4A1R14		RESISTOR, MIL TYPE RCR07G104JS	5-89
1A2A6A4A1R15		SAME AS 1A2A6A4A1R13	5-89
1A2A6A4A1R16		SAME AS 1A2A6A4A1R14	5-89
1A2A6A4A1R17		SAME AS 1A2A6A4A1R13	5-89
1A2A6A4A1R18		SAME AS 1A2A6A4A1R14	5-89
1A2A6A4A1R19		SAME AS 1A2A6A4A1R13	5-89
1A2A6A4A1R20		SAME AS 1A2A6A4A1R14	5-89
1A2A6A4A1R21		SAME AS 1A2A6A4A1R13	5-89
1A2A6A4A1R22		RESISTOR, MIL TYPE RCR07G560JS	5-89
1A2A6A4A1R23		RESISTOR, MIL TYPE RCR07G103JS	5-89
1A2A6A4A1R24		SAME AS 1A2A6A4A1R12	5-89
1A2A6A4A1R25		RESISTOR, MIL TYPE RCR07G203JS	5-89
1A2A6A4A1R26-R27		RESISTOR, MIL TYPE RCR07G561JS	5-89
1A2A6A4A1R28		RESISTOR, MIL TYPE RCR07G822JS	5-89

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A4A1R29		SAME AS 1A2A6A4A1R12	5-89
1A2A6A4A1R30		RESISTOR, MIL TYPE RCR07G273JS	5-89
1A2A6A4A1R31		RESISTOR, MIL TYPE RCR07G101JS	5-89
1A2A6A4A1R32		RESISTOR, MIL TYPE RCR07G272JS	5-89
1A2A6A4A1R33		RESISTOR, MIL TYPE RCR07G122JS	5-89
1A2A6A4A1R34		SAME AS 1A2A6A4A1R28	5-89
1A2A6A4A1R35		SAME AS 1A2A6A4A1R4	5-89
1A2A6A4A1R36		RESISTOR, MIL TYPE RCR07G681JS	5-89
1A2A6A4A1R37		SAME AS 1A2A6A4A1R13	5-89
1A2A6A4A1R38-R39		SAME AS 1A2A6A4A1R23	5-89
1A2A6A4A1R40		SAME AS 1A2A6A4A1R6	5-89
1A2A6A4A1T1		TRANSFORMER, MFR 58189, P/N 666231-911	5-89
1A2A6A4A1TP1-TP5		TERMINAL, TURRET TYPE, MFR 58189, P/N 559997-119	5-86 &5-89
1A2A6A4A1Z1		INTEGRATED CIRCUIT, MFR 07263, P/N U5B995879X	5-89
1A2A6A4A1Z2		INTEGRATED CIRCUIT, MFR 04713, P/N MC974G	5-89
1A2A6A4A1Z3-Z4		SAME AS 1A2A6A41Z1	5-89
1A2A6A4A2		DIVIDER ASSEMBLY, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70639-001	5-87
1A2A6A4A2C1		CAPACITOR, MIL TYPE M390003-01-2117	5-90
1A2A6A4A2C2		SAME AS 1A2A6A4A1C4	5-90
1A2A6A4A2C3		SAME AS 1A2A6A4A1C3	5-90
1A2A6A4A2C4		CAPACITOR, MIL TYPE M390003-01-2111	5-90
1A2A6A4A2C5		CAPACITOR, FIXED, PLASTIC DIELECTRIC, 0.18 UF PORM 20 PCT, 100 WVDC, MFR 09454, P/N D1-184E	5-90
1A2A6A4A2C6		CAPACITOR, MIL TYPE CM05FD101G03	5-90
1A2A6A4A2C7		SAME AS 1A2A6A4A1C4	5-90
1A2A6A4A2C8		SAME AS 1A2A6A4A2C1	5-90
1A2A6A4A2C9		SAME AS 1A2A6A4A1C4	5-90
1A2A6A4A2C10		SAME AS 1A2A2A1C3	5-90

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A4A2C11-C12		SAME AS 1A2A6A4A1C4	5-90
1A2A6A4A2C13		CAPACITOR, MIL TYPE CM05ED820G03	5-90
1A2A6A4A2C14		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC, 8.0 TO 50.0 UUF, 350 WVDC, MFR 72982, P/N 557-043-8-50E	5-90
1A2A6A4A2C15		CAPACITOR, MIL TYPE CM05ED470G03	5-90
1A2A6A4A2CR1		SEMICONDUCTOR, DIODE, MFR 12954, P/N DT30319C	5-90
1A2A6A4A2CR2		NOT USED	
1A2A6A4A2CR3		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N4454	5-90
1A2A6A4A2CR4		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N758A	5-90
1A2A6A4A2CR5-CR6		SAME AS 1A2A6A4A2CR3	5-90
1A2A6A4A2CR7-CR9		SEMICONDUCTOR DEVICE, DIODE, MFR 58189, P/N 810000-583	5-90
1A2A6A4A2FL1		FILTER, LOWPASS, 0-350 HZ, MFR 08715 - L1394	5-90
1A2A6A4A2L1		NOT USED	
1A2A6A4A2L2		COIL, RADIO FREQUENCY, MIL TYPE MS90537-73	5-90
1A2A6A4A2Q1-Q3		TRANSISTOR, MFR 80131, P/N 2N706	5-90
1A2A6A4A2R1		RESISTOR, MIL TYPE RCR07G271JS	5-90
1A2A6A4A2R2		NOT USED	
1A2A6A4A2R3		SAME AS 1A2A6A4A1R11	5-90
1A2A6A4A2R4		SAME AS 1A2A6A4A1R12	5-90
1A2A6A4A2R5		RESISTOR, MIL TYPE RCR07G152JS	5-90
1A2A6A4A2R6		SAME AS 1A2A6A4A1R13	5-90
1A2A6A4A2R7		RESISTOR, MIL TYPE RCR07G682JS	5-90
1A2A6A4A2R8		SAME AS 1A2A4A1R3	5-90
1A2A6A4A2R9		SAME AS 1A2A6A4A1R31	5-90
1A2A6A4A2R10		SAME AS 1A2A6A4A1R1	5-90
1A2A6A4A2R11		SAME AS 1A2A6A4A1R31	5-90

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A4A2R12-R13		RESISTOR, MIL TYPE RCR07G333JS	5-90
1A2A6A4A2R14		SAME AS 1A2A6A4A1R26	5-90
1A2A6A4A2R15		SAME AS 1A2A6A4A2R12-R13	5-90
1A2A6A4A2R16		RESISTOR, MIL TYPE RCR07G270JS	5-90
1A2A6A4A2R17		RESISTOR, MIL TYPE RCR07G473JS	5-90
1A2A6A4A2T1		TRANSFORMER, MFR 58189, P/N A00095-001	5-90
1A2A6A4A2TP1-TP2		SAME AS 1A2A6A4A1TP1-TP5	5-87
1A2A6A4A2Z1		SAME AS 1A2A6A4A1Z1	5-90
1A2A6A4A3		OSCILLATOR, 100 CPS, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70640-001	5-88
1A2A6A4A3C1		SAME AS 1A2A6A4A1C1	5-91
1A2A6A4A3C2		SAME AS 1A2A6A4A1C17	5-91
1A2A6A4A3C3-C5		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3C6		SAME AS 1A2A2A1C6	5-91
1A2A6A4A3C7-C8		CAPACITOR, MIL TYPE CM05CD100D03	5-91
1A2A6A4A3C9		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3C10 SELECT		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3C11-C12		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3C13		CAPACITOR, MIL TYPE CM06FD431G03	5-91
1A2A6A4A3C14		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3C15		CAPACITOR, MIL TYPE M39003-01-2123	5-91
1A2A6A4A3C16		SAME AS 1A2A6A4A1C4	5-91
1A2A6A4A3FL1		NOT USED	
1A2A6A4A3FL2		FILTER, BAND PASS MFR 19057, P/N 767701MOD	5-91
1A2A6A4A3L1		NOT USED	
1A2A6A4A3L2		COIL, RADIO FREQUENCY, 150,000 UH, MFR 96908, P/N MS90537-49	5-91
1A2A6A4A3Q1		TRANSISTOR, MFR 80131, P/N 2N706	5-91
1A2A6A4A3Q2		TRANSISTOR, MFR 80131, P/N 2N3127	5-91

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A4A3Q3-Q4		SAME AS 1A2A4A38Q2	5-91
1A2A6A4A3R1		SAME AS 1A2A6A4A1R31	5-91
1A2A6A4A3R2		SAME AS 1A2A6A4A1R23	5-91
1A2A6A4A3R3		SAME AS 1A2R15	5-91
1A2A6A4A3R4		SAME AS 1A2A6A4A1R12	5-91
1A2A6A4A3R5		RESISTOR, MIL TYPE RCR07G473JS	5-91
1A2A6A4A3R6		RESISTOR, MIL TYPE RCR07G270JS	5-91
1A2A6A4A3R7		SAME AS 1A2R15	5-91
1A2A6A4A3R8		SAME AS 1A2A6A4A1R23	5-91
1A2A6A4A3R9-R10		SAME AS 1A2A6A4A1R36	5-91
1A2A6A4A3R11		SAME AS 1A2A6A4A1R23	5-91
1A2A6A4A3R12		SAME AS 1A2R15	5-91
1A2A6A4A3R13		SAME AS 1A2A6A4A1R31	5-91
1A2A6A4A3R14		RESISTOR, MIL TYPE RCR07G470JS	5-91
1A2A6A4A3R15		SAME AS 1A2A6A4A1R13	5-91
1A2A6A4A3R16		SAME AS 1A2A6A4A1R23	5-91
1A2A6A4A3R17		SAME AS 1A2A6A4A3R14	5-91
1A2A6A4A3R18		SAME AS 1A2R15	5-91
1A2A6A4A3R19		SAME AS 1A2A6A4A1R33	5-91
1A2A6A4A3R20		RESISTOR, MIL TYPE 3280W1-201	5-91
1A2A6A4A3R21		SAME AS 1A2A6A4A3R14	5-91
1A2A6A4A3T1		TRANSFORMER, AUDIO FREQUENCY, MFR 58189, P/N 666231-908	5-91
1A2A6A4A3TP1-TP2		SAME AS 1A2A6A1A2TP1	5-91
1A2A6A4A3TP3		SAME AS 1A2A6A2A5TP1	5-91
1A2A6A4A3TP4		SAME AS 1A2A6A1A2TP1	5-91
1A2A6A4A3TP5		SAME AS 1A2A6A2A5TP1	5-91
1A2A6A4A3XQ1-XQ6		NOT USED	
1A2A6A4A3XQ7-XQ8		SAME AS 1A2A1A3XQ1	5-91
1A2A6A5		SPECTRUM GENERATOR ASSEMBLY, COMPLETE, MFR 58189, P/N A00022-001	5-22& 5-92
1A2A6A5MP1		HOUSING, COMPLETE WITH FEED THRU TERMINALS, STANDOFFS, MFR 58189, P/N 666231-129	5-92

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5MP1A-MP1F		TERMINAL, FEED THRU, MFR 98291, P/N FTSM9L2WHITE	5-92
1A2A6A5MP2		COVER, MFR 58189, P/N A00085-001	5-22
1A2A6A5A1		SPECTRUM GENERATOR ASSEMBLY, 100 KC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-924	5-92
1A2A6A5A1C1		SAME AS 1A2A6A1C1	5-93
1A2A6A5A1C2		CAPACITOR, FIXED, ELECTROLYTIC, 15 UF PORM 20 PCT, 20 WVDC, MFR 56289, P/N 150D156X0020B2	5-93
1A2A6A5A1C3		SAME AS 1A2A6A1C1	5-93
1A2A6A5A1C4		CAPACITOR, FIXED, MICA DIELECTRIC, 5 UUF PORM 10 PCT, 500 WVDC, MFR 72136, P/N DM15C050K500V	5-93
1A2A6A5A1C5		CAPACITOR, FIXED, MICA DIELECTRIC, 20 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E200G300V	5-93
1A2A6A5A1C6		CAPACITOR, FIXED, PLASTIC DIELECTRIC, 1800 UUF PORM 10 PCT, 100 WVDC, MFR 02777, P/N 1P1182K	5-93
1A2A6A5A1C7-C8		SAME AS 1A2A6A1C1	5-93
1A2A6A4A1C9		SAME AS 1A2A5A1C25	5-93
1A2A6A5A1C10		CAPACITOR, MIL TYPE CC64UH121G	5-93
1A2A6A4A1C11		SAME AS 1A2A6A3C26	5-93
1A2A6A5A1C12		SAME AS 1A2A5A1C25	5-93
1A2A6A5A1C13		CAPACITOR, FIXED, CERAMIC, DIELECTRIC, 0.002 UF PORM 20 PCT, 75 WVDC, MFR 86335, P/N K1200M002M	5-93
1A2A6A5A1C14-C16		SAME AS 1A2A6A1C1	5-93
1A2A6A5A1C17		CAPACITOR, FIXED, MICA DIELECTRIC, 33 UUF PORM 2 PCT, 300 WVDC, MFR 72136, P/N DM15E330G300V	5-93
1A2A6A5A1C18		SAME AS 1A2A6A2A4C12	5-93
1A2A6A5A1C19		SAME AS 1A2A6A2A1C1	5-93
1A2A6A5A1CR1		SAME AS 1A2A6A1A3CR1	5-93
1A2A6A5A1CR2-CR3		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N816	5-93

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A1CR4		SAME AS 1A2A6A1A1A1CR1-CR2	5-93
1A2A6A5A1E1		SAME AS 1A2A6P7	5-93
1A2A6A5A1E2-E5		NOT USED	
1A2A6A5A1E6		SAME AS 1A2A6P9	5-93
1A2A6A5A1J1-J2		NOT USED	
1A2A6A5A1J3		CONNECTOR, RECEPTACLE, ELECTRICAL, MFR 98291, P/N 51-043-4300	5-93
1A2A6A5A1J4-J5		NOT USED	
1A2A6A5A1J6		SAME AS 1A2A6A5A1J3	5-93
1A2A6A5A1L1		SAME AS 1A2A6A1L1-L2	5-93
1A2A6A5A1L2		COIL, RADIO FREQUENCY, 250 KC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-353	5-93
1A2A6A5A1L3-L4		NOT USED	
1A2A6A5A1L5		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7.9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-901	5-93
1A2A6A5A1Q1		SAME AS 1A2A6A3A3Q12	5-93
1A2A6A5A1Q2		SAME AS 1A2A6A4A1Q2-Q6	5-93
1A2A6A5A1Q3		SAME AS 1A2A6A4A3Q12	5-93
1A2A6A5A1Q4		TRANSISTOR, MFR 80131, P/N 2N705	5-93
1A2A6A5A1Q5-Q6		SAME AS 1A2A6A1A3Q4-Q5	5-93
1A2A6A5A1R1		SAME AS 1A2A6A2A3R10	5-93
1A2A6A5A1R2-R3		SAME AS 1A2A6A1A1A1R7	5-93
1A2A6A5A1R4		SAME AS 1A2A6A2A5R1	5-93
1A2A6A5A1R5		RESISTOR, VARIABLE, WIREWOUND, 5000 OHMS, PORM 5 PCT, MFR 80294, P/N 3250W1-502	5-93
1A2A6A5A1R6		SAME AS 1A2A6A1A1A1R10	5-93
1A2A6A5A1R7-R8		SAME AS 1A2A6A1A1A1R13	5-93
1A2A6A5A1R9		RESISTOR, MIL TYPE RC07GF361J	5-93
1A2A6A5A1R10		SAME AS 1A2A6A3A4R31	5-93

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A1R11		SAME AS 1A2A6A1A1A1R13	5-93
1A2A6A5A1R12		SAME AS 1A2A6A1A1A1R10	5-93
1A2A6A5A1R13		SAME AS 1A2A6A1A3R14	5-93
1A2A6A5A1R14		SAME AS 1A2A6A2A2R2	5-93
1A2A6A5A1R15		SAME AS 1A2A6A1A1A1R7	5-93
1A2A6A5A1R16		SAME AS 1A2A6A1A1A1R15	5-93
1A2A6A5A1R17		SAME AS 1A2A6A1A1A1R8	5-93
1A2A6A5A1R18		SAME AS 1A2A6A1A1A1R13	5-93
1A2A6A5A1R19		SAME AS 1A2A6A1A1A1R8	5-93
1A2A6A5A1R20		SAME AS 1A2A6A1A1A1R13	5-93
1A2A6A5A1R21		SAME AS 1A2A6A1A1A1R7	5-93
1A2A6A5A1R22		SAME AS 1A2A6A1A1A1R11	5-93
1A2A6A5A1R23		SAME AS 1A2A6A1A2R5	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A4A1R13	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A3R9	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A1A1R10	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A1A1R15	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A4A1R23	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A4A1R11	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A3R3	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A2R9	5-93
1A2A6A5A1R24 SELECT		RESISTOR, MIL TYPE RC07GF432J	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A1A1A1R7	5-93
1A2A6A5A1R24 SELECT		SAME AS 1A2A6A2A2A2R8	5-93
1A2A6A5A1R25		SAME AS 1A2A6A1A1A1R11	5-93
1A2A6A5A1T1		TRANSFORMER, RADIO FREQUENCY, 25 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-354	5-93
1A2A6A5A1T2		TRANSFORMER, VARIABLE, RADIO FREQUENCY, 7.9 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666231-900	5-93

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A1TP1-TP6		SAME AS 1A2A6A1A2TP1-TP2	5-93
1A2A6A5A1XQ1-XQ2		SAME AS 1A2A2A1XQ1	5-93
1A2A6A5A2		SPECTRUM GENERATOR ASSEMBLY, 10 KC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N 666230-929	5-92
1A2A6A5A2C1		SAME AS 1A2A6A1C1	5-94
1A2A6A5A2C2		SAME AS 1A2A6A5A1C2	5-94
1A2A6A5A2C3-C5		SAME AS 1A2A5A3C10, P/N DM15E750G300V	5-94
1A2A6A5A2C6		SAME AS 1A2A6A1C1	5-94
1A2A6A5A2C7		SAME AS 1A2A6A1A3C8	5-94
1A2A6A5A2C8		SAME AS 1A2A6A5A1C5	5-94
1A2A6A5A2C9		CAPACITOR, FIXED, PLASTIC DIELECTRIC, 0.033 UF PORM 10 PCT, 100 WVDC, MFR 02777, P/N 1P133K	5-94
1A2A6A5A2C10		SAME AS 1A2A6A1C1	5-94
1A2A6A5A2C11		SAME AS 1A2A6A1A2C10	5-94
1A2A6A5A2C12		CAPACITOR, FIXED, ELECTROLYTIC, 3.3 UF PORM 20 PCT, 35 WVDC, MFR 56289, P/N 150D335X0035B2	5-94
1A2A6A5A2C13		SAME AS 1A2A6A1C1	5-94
1A2A6A5A2C14		SAME AS 1A2A6A1A1A3C9	5-94
1A2A6A5A2C15		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 100 UUF PORM 5 PCT, 75 WVDC, MFR 86335, P/N MINU100J	5-94
1A2A6A5A2C16		SAME AS 1A2A6A1A2C13	5-94
1A2A6A5A2CR1		SAME AS 1A2A6A1A3CR1	5-94
1A2A6A5A2CR2-CR3		SAME AS 1A2A6A1A2CR1	5-94
1A2A6A5A2CR4		SAME AS 1A2A6A5A1CR2-CR3	5-94
1A2A6A5A2E1-E2		SAME AS 1A2A6P7	5-94
1A2A6A5A2E3-E4		SAME AS 1A2A6P9	5-94
1A2A6A5A2J1-J4		NOT USED	
1A2A6A5A2J5		SAME AS 1A2A6A5A1J3.	5-94

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A2L1		SAME AS 1A2A6A1L1-L2	5-94
1A2A6A5A2Q1-Q2		SAME AS 1A2A6A3A3Q12	5-94
1A2A6A5A2Q3		SAME AS 1A2A6A4A1Q2-Q6	5-94
1A2A6A5A2Q4-Q5		SAME AS 1A2A6A3A3Q12	5-94
1A2A6A5A2Q6		SAME AS 1A2A6A1A3Q4-Q5	5-94
1A2A6A5A2R1		SAME AS 1A2A6A1A3R1	5-94
1A2A6A5A2R2		SAME AS 1A2A6A1A1A1R17	5-94
1A2A6A5A2R3		SAME AS 1A2A6A2A5A5R1	5-94
1A2A6A5A2R4		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R5		SAME AS 1A2A6A1A1A1R10	5-94
1A2A6A5A2R6		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R7		SAME AS 1A2A6A2A5A5R1	5-94
1A2A6A5A2R8		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R9		SAME AS 1A2A6A1A1A1R10	5-94
1A2A6A5A2R10		NOT USED	
1A2A6A5A2R11		SAME AS 1A2A6A5A1R5	5-94
1A2A6A5A2R12		RESISTOR, MIL TYPE RC07GF332J	5-94
1A2A6A5A2R13		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R14		SAME AS 1A2A6A5A1R9	5-94
1A2A6A5A2R15		SAME AS 1A2A6A3A4R31	5-94
1A2A6A5A2R16		SAME AS 1A2A6A1A1A1R10	5-94
1A2A6A5A2R17		NOT USED	
1A2A6A5A2R18-R19		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R20		SAME AS 1A2A6A1A3R14	5-94
1A2A6A5A2R21		SAME AS 1A2A6A2A5R1	5-94
1A2A6A5A2R22		SAME AS 1A2A6A1A1A1R10	5-94
1A2A6A5A2R23		SAME AS 1A2A6A1A3R9	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A3R3	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A4A1R13	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A3R9	5-94

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A1A1R10	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A1A1R15	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A1A1R23	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A4A1R11	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A4A2R9	5-94
1A2A6A5A2R24 SELECT		RESISTOR, MIL TYPE RC07GF432J	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A1A1R7	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A2A2R8	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A2A2R2	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A3R4	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A2A5R1	5-94
1A2A6A5A2R24 SELECT		RESISTOR, MIL TYPE RC07GF752J	5-94
1A2A6A5A2R24 SELECT		SAME AS 1A2A6A1A3R6	5-94
1A2A6A5A2R25		SAME AS 1A2A6A1A3R9	5-94
1A2A6A5A2R26		SAME AS 1A2A6A1A1A1R8	5-94
1A2A6A5A2R27		SAME AS 1A2A6A1A1A1R13	5-94
1A2A6A5A2R28-R29		SAME AS 1A2A6A3A1R7	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A3A1R7	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A1A1R9	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A1A1R8	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A5R17	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A3R20	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A3R15	5-94
1A2A6A5A2R30 SELECT		SAME AS 1A2A6A1A1A1R18	5-94
1A2A6A5A2T1		TRANSFORMER, RADIO FREQUENCY, 7.90 MC, 0.620 IN. LG X 0.422 IN. DIA, MFR 58189, P/N 666163-358	5-94
1A2A6A5A2TP1-TP6		SAME AS 1A2A6A1A2TP1-TP2	5-94
1A2A6A5A2XQ1-XQ2		SAME AS 1A2A6A3A3XQ12	5-94
1A2A6A5A2XQ3		NOT USED	

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A2XQ4-XQ5		SAME AS 1A2A6A3A3XQ12	5-94
1A2A6A5A3		SPECTRUM GENERATOR ASSEMBLY, 1 KC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A00099-001	5-92
1A2A6A5A3C1		SAME AS 1A2A6A1C2	5-95
1A2A6A5A3C2		SAME AS 1A2A6A5A1C2	5-95
1A2A6A5A3C3-C5		SAME AS 1A2A5A3C10, P/N DM15E750G300V	5-95
1A2A6A5A3C6		SAME AS 1A2A6A1C1	5-95
1A2A6A5A3C7		SAME AS 1A2A6A1A3C8	5-95
1A2A6A5A3C8		SAME AS 1A2A6A5A1C5	5-95
1A2A6A5A3C9		CAPACITOR, FIXED, PLASTIC DIELECTRIC, 0.33 UF PORM 10 PCT, 100 WVDC, MFR 96733, P/N W40140	5-95
1A2A6A5A3C10		SAME AS 1A2A6A1C1	5-95
1A2A6A5A3C11		SAME AS 1A2A6A1A2C10	5-95
1A2A6A5A3C12		SAME AS 1A2A6A5A2C12	5-95
1A2A6A5A3C13		SAME AS 1A2A6A3C26	5-95
1A2A6A5A3C14		CAPACITOR, MIL TYPE CM06F162G03	5-95
1A2A6A5A3C15		SAME AS 1A2A6A2A3C2-C3	5-95
1A2A6A5A3C16		SAME AS 1A2A6A3C26	5-95
1A2A6A5A3C17		CAPACITOR, FIXED, METALIZED PAPER DIELECTRIC, 0.005 UF PORM 20 PCT, 200 WVDC, MFR 02777, P/N T2900-3	5-95
1A2A6A5A3CR1		SAME AS 1A2A6A1A3CR1	5-95
1A2A6A5A3CR2-CR3		SAME AS 1A2A6A1A2CR1	5-95
1A2A6A5A3CR4		SAME AS 1A2A6A1A1A1CR1-CR2	5-95
1A2A6A5A3CR5		SAME AS 1A2A6A5A1CR2-CR3	5-95
1A2A6A5A3E1-E2		SAME AS 1A2A6P7	5-95
1A2A6A5A3E3-E4		SAME AS 1A2A6P9	5-95
1A2A6A5A3J1		NOT USED	
1A2A6A5A3J2		TERMINAL, FEED THRU, MFR 98291, P/N FRTM14RED	5-95

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A3J3		NOT USED	
1A2A6A5A3J4		SAME AS 1A2A6A5A1J3	5-95
1A2A6A5A3L1		SAME AS 1A2A6A1L1-L2	5-95
1A2A6A5A3L2		COIL, MIL TYPE MS75008-45	5-95
1A2A6A5A3Q1-Q2		SAME AS 1A2A6A3A3Q12	5-95
1A2A6A5A3Q3		SAME AS 1A2A6A4A1Q2-A6	5-95
1A2A6A5A3Q4-Q5		SAME AS 1A2A6A3A3Q12	5-95
1A2A6A5A3Q6		SAME AS 1A2A6A1A3Q4-Q5	5-95
1A2A6A5A3R1		SAME AS 1A2A6A1A3R1	5-95
1A2A6A5A3R2		SAME AS 1A2A6A1A1A1R17	5-95
1A2A6A5A3R3		SAME AS 1A2A6A2A5R1	5-95
1A2A6A5A3R4		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R5		SAME AS 1A2A6A1A1A1R10	5-95
1A2A6A5A3R6		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R7		SAME AS 1A2A6A2A5R1	5-95
1A2A6A5A3R8		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R9		SAME AS 1A2A6A1A3R10	5-95
1A2A6A5A3R10		SAME AS 1A2A6A3A1R4	5-95
1A2A6A5A3R11		SAME AS 1A2A6A5A1R5	5-95
1A2A6A5A3R12		SAME AS 1A2A6A1A1A1R7	5-95
1A2A6A5A3R13		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R14		SAME AS 1A2A6A5A1R9	5-95
1A2A6A5A3R15		SAME AS 1A2A6A3A4R31	5-95
1A2A6A5A3R16		SAME AS 1A2A6A1A1A1R10	5-95
1A2A6A5A3R17		SAME AS 1A2A6A1A1A1R17	5-95
1A2A6A5A3R18-R19		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R20		SAME AS 1A2A6A1A3R14	5-95
1A2A6A5A3R21		SAME AS 1A2A6A2A2R2	5-95
1A2A6A5A3R22		SAME AS 1A2A6A1A1A1R10	5-95
1A2A6A5A3R23		SAME AS 1A2A6A1A3R9	5-95

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A3R3	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A3R9	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A1A1R10	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A1A1R15	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A4A1R23	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A4A1R11	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A2R9	5-95
1A2A6A5A3R24 SELECT		RESISTOR, MIL TYPE RC07GF432J	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A1A1R7	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A2A2R8	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A2A2R2	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A3R4	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A2A5R1	5-95
1A2A6A5A3R24 SELECT		RESISTOR, MIL TYPE RC07GF752J	5-95
1A2A6A5A3R24 SELECT		SAME AS 1A2A6A1A3R6	5-95
1A2A6A5A3R25		SAME AS 1A2A6A1A1A1R15	5-95
1A2A6A5A3R26		SAME AS 1A2A6A1A1A1R8	5-95
1A2A6A5A3R27		SAME AS 1A2A6A1A1A1R13	5-95
1A2A6A5A3T1		COIL, RADIO FREQUENCY, 1000 UH, MFR 58189, P/N 666231-140	5-95
1A2A6A5A3TP1-TP6		SAME AS 1A2A6A1A2TP1-TP2	5-95
1A2A6A5A3XQ1-XQ2		SAME AS 1A2A6A3A3XQ12	5-95
1A2A6A5A3XQ3		NOT USED	
1A2A6A5A3XQ4-XQ5		SAME AS 1A2A6A3A3XQ12	5-95
1A2A6A5A4		SPECTRUM GENERATOR ASSEMBLY, 5 KC, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A00073-001	5-92
1A2A6A5A4C1		SAME AS 1A2A6A4A1C1	5-96
1A2A6A5A4E1		TERMINAL, TURRET TYPE, MFR 71279, P/N 160-3653-02-05	5-96
1A2A6A5A4E2		SAME AS 1A2A6P9	5-92
1A2A6A5A4E3		CONNECTOR, MFR 98291, P/N SKT14WHITE	5-92

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A5A4J1		SAME AS 1A2A6A5A1J3	5-96
1A2A6A5A4Q1		SAME AS 1A2A6A1A3Q4-Q5	5-96
1A2A6A5A4R1		SAME AS 1A2A6A1A2R4	5-96
1A2A6A5A4R2		RESISTOR, MIL TYPE RC07GF561J	5-96
1A2A6A5A4R3		RESISTOR, MIL TYPE RC07GF362J	5-96
1A2A6A5A4R4-R5		SAME AS 1A2A2A3R6	5-96
1A2A6A6		TRANSLATOR ASSEMBLY, COMPLETE WITH COVER, ALL COMPONENTS, MFR 58189, P/N A70216-001	5-22
1A2A6A6MP1		HOUSING, STAKED, MFR 58189, P/N A70243-001	5-97
1A2A6A6MP2		COVER, MFR 58189, P/N A70246-001	5-22
1A2A6A6A1		TRANSLATOR, PRINTED CIRCUIT BOARD W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70476-001	5-97
1A2A6A6A1C1		CAPACITOR, MIL TYPE CK06BX104M	5-98
1A2A6A6A1C2		CAPACITOR, MIL TYPE CM06FD821G03	5-98
1A2A6A6A1C3-C4		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C5		CAPACITOR, MIL TYPE M39003-01-2065	5-98
1A2A6A6A1C6		CAPACITOR, MIL TYPE CK06BX103M	5-98
1A2A6A6A1C7-C11		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C12		CAPACITOR, MIL TYPE CM06FD102G03	5-98

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A6A1C13-C17		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C18		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C19		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C20		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C21-C23		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C24-C25		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C26-C27		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C28		SAME AS 1A2A6A6A1C5	5-98
1A2A6A6A1C29-C33		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C34		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C35-C36		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C37-C38		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C39-C40		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C41-C42		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C43		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C44-C45		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C46-C47		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C48		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C49-C50		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C51		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C52-C55		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C56-C58		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C59		CAPACITOR, MIL TYPE CM05FD301G03	5-98
1A2A6A6A1C60		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C61		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C62-C63		SAME AS 1A2A6A6A1C6	5-98
1A2A6A6A1C64-C65		SAME AS 1A2A6A6A1C1	5-98
1A2A6A6A1C66		CAPACITOR, MIL TYPE CK05BX102K	5-98
1A2A6A6A1CR1		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N30208	5-98

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A6A1CR2-CR20		SAME AS 1A2A2A1CR4-CR5	5-98
1A2A6A6A1E1-E12		TERMINAL, TURRET TYPE, MFR 58189, P/N 559997-119	5-98
1A2A6A6A1FL1		FILTER, BAND PASS, 20 MC, MFR 19057, P/N 1267	5-98
1A2A6A6A1FL2		FILTER, BAND PASS, 30 MC, MFR 19057, P/N 1268	5-98
1A2A6A6A1FL3		FILTER, BAND PASS, 2.85 MC, MFR 19057, P/N 1266	5-98
1A2A6A6A1J1-J3		NOT USED	
1A2A6A6A1J4		TERMINAL, FEED THRU, MFR 98291, P/N RFTM14GREEN	5-98
1A2A6A6A1J5		TERMINAL, FEED THRU, MFR 98291, P/N RFTM14GRAY	5-98
1A2A6A6A1J6		SAME AS 1A2A6A5A3J2	5-98
1A2A6A6A1J7		TERMINAL, FEED THRU, MFR 98291, P/N RFTM14ORANGE	5-98
1A2A6A6A1L1		COIL, RADIO FREQUENCY, MIL TYPE MS90537-49	5-98
1A2A6A6A1L2		COIL, RADIO FREQUENCY, MIL TYPE MS90537-29	5-98
1A2A6A6A1L3		COIL, MIL TYPE MS90537-33	
1A2A6A6A1L4-L5		SAME AS 1A2A6A6A1L1	5-98
1A2A6A6A1L6-L7		SAME AS 1A2A6A6A1L3	5-98
1A2A6A6A1L8		SAME AS 1A2A6A6A1L2	5-98
1A2A6A6A1L9		COIL, MFR 96906, P/N MS18130-21	5-98
1A2A6A6A1L10		SAME AS 1A2A6A6A1L3	5-98
1A2A6A6A1L11		SAME AS 1A2A6A6A1L9	5-98
1A2A6A6A1L12		SAME AS 1A2A6A6A1L1	5-98
1A2A6A6A1L13		SAME AS 1A2A6A6A1L2	5-98
1A2A6A6A1L14		COIL, RADIO FREQUENCY, 0.22 UH, MFR 03550, P/N 63022	5-98
1A2A6A6A1L15		COIL, RADIO FREQUENCY, 22 UH, MFR 99800, P/N 1025-52	5-98
1A2A6A6A1Q1		SAME AS 1A2A2A1Q5	5-98
1A2A6A6A1R1		RESISTOR, MIL TYPE RCR07G121JS	5-98

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A6A1R2		RESISTOR, MIL TYPE RCR07G471JS	5-98
1A2A6A6A1R3		RESISTOR, MIL TYPE RCR07G390JS	5-98
1A2A6A6A1R4		RESISTOR, MIL TYPE RCR07G202JS	5-98
1A2A6A6A1R5		RESISTOR, MIL TYPE RCR07G300JS	5-98
1A2A6A6A1R6		RESISTOR, MIL TYPE RCR07G221JS	5-98
1A2A6A6A1R7		RESISTOR, MIL TYPE RCR07G102JS	5-98
1A2A6A6A1R8-R9		RESISTOR, MIL TYPE RCR07G103JS	5-98
1A2A6A6A1R10		SAME AS 1A2A2A6A1R6	5-98
1A2A6A6A1R11		RESISTOR, MIL TYPE RCR07G510JS	5-98
1A2A6A6A1R12		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R13		RESISTOR, MIL TYPE RCR07G271JS	5-98
1A2A6A6A1R14		RESISTOR, MIL TYPE RCR07G301JS	5-98
1A2A6A6A1R15-R17		RESISTOR, MIL TYPE RCR07G222JS	5-98
1A2A6A6A1R18		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R19		SAME AS 1A2A6A6A1R15-R17	5-98
1A2A6A6A1R20-R22		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R23-R26		SAME AS 1A2A6A6A1R15-R17	5-98
1A2A6A6A1R27		SAME AS 1A2A6A6A1R4	5-98
1A2A6A6A1R28-R29		SAME AS 1A2A6A6A1R14	5-98
1A2A6A6A1R30		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R31		SAME AS 1A2A6A6A1R11	5-98
1A2A6A6A1R32		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R33		RESISTOR, MIL TYPE RCR07G430JS	5-98
1A2A6A6A1R34-R35		RESISTOR, MIL TYPE RCR07G122JS	5-98
1A2A6A6A1R36		SAME AS 1A2A6A6A1R1	5-98
1A2A6A6A1R37-R38		SAME AS 1A2A6A6A1R34-R35	5-98
1A2A6A6A1R39		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R40		RESISTOR, MIL TYPE RCR07G332JS	5-98
1A2A6A6A1R41		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R42-R43		SAME AS 1A2A6A6A1R15-R17	5-98
1A2A6A6A1R44		SAME AS 1A2A6A6A1R34-R35	5-98
1A2A6A6A1R45-R46		SAME AS 1A2A6A6A1R15-R17	5-98

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6A6A1R47-R48		SAME AS 1A2A6A6A1R14	5-98
1A2A6A6A1R49		SAME AS 1A2A6A6A1R34-R35	5-98
1A2A6A6A1R50		RESISTOR, MIL TYPE RCR07G330JS	5-98
1A2A6A6A1R51		RESISTOR, MIL TYPE RCR07G101JS	5-98
1A2A6A6A1R52		RESISTOR, VARIABLE, COMPOSITION, 100 OHMS PORM 20 PCT, 1/4W, MFR 01121, P/N FM101M	5-98
1A2A6A6A1R53-R54		SAME AS 1A2A6A6A1R6	5-98
1A2A6A6A1R55		RESISTOR, MIL TYPE RCR07G241JS	5-98
1A2A6A6A1RT1		RESISTOR, THERMAL, 198.8 OHMS PORM 10 PCT, MFR 75263, P/N RL2FIT	5-98
1A2A6A6A1RT2		NOT USED	
1A2A6A6A1RT3		SAME AS 1A2A6A1A1A1RT1	5-98
1A2A6A6A1T1		TRANSFORMER, RADIO FREQUENCY, MFR 58189, P/N A70742-002	5-98
1A2A6A6A1T2-T3		TRANSFORMER, RADIO FREQUENCY, MFR 06978, P/N 70-122-02	5-98
1A2A6A6A1T4-T7		TRANSFORMER, RADIO FREQUENCY, MFR 27956, P/N BT8	5-98
1A2A6A6A1TP1-TP4		NOT USED	
1A2A6A6A1TP5		JACK, TIP, MFR 74970, P/N 105-757-10	5-98
1A2A6A6A1TP6		JACK, TIP, MFR 74970, P/N 105-756-10	5-98
1A2A6A6A1TP7		JACK, TIP, MFR 74970, P/N 105-752-10	5-98
1A2A6A6A1TP8		JACK, TIP, MFR 74970, P/N 105-751-10	5-98
1A2A6A6A1Z1-Z3		INTEGRATED CIRCUIT, MFR 15818, P/N 911BE	5-98
1A2A6W1		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERTS 1A2A6P1-A2 AND 1A2A6J4-A1.	5-63
1A2A6W2		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERTS 1A2A6J5-A1 AND 1A2A6J6-A1.	5-63
1A2A6W3		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, CONNECTOR 1A2A6P14 AND CONNECTOR INSERT 1A2A6J5-A2.	5-63

*ALL COAXIAL CABLE IS MINIATURE, DOUBLE SHIELDED, 50 OHM CABLE, MFR 58189, P/N 820100-001.

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6W4		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, CONNECTOR 1A2A6P22 AND CONNECTOR INSERT 1A2A6J5-A3.	5-63
1A2A6W5		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERTS 1A2A6P1-A1 AND 1A2A6J6-A3.	5-63
1A2A6W6		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, CONNECTOR 1A2A6P23 AND CONNECTOR INSERT 1A2A6J6-A4.	5-63
1A2A6W7		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR 1A2A6P19. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E4 AND E9.	5-63
1A2A6W8		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, CONNECTOR 1A2A6P27 AND CONNECTOR INSERT 1A2A6P2-A3.	5-63
1A2A6W9		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTORS 1A2A6P17 AND 1A2A6P24.	5-63
1A2A6W10		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTORS 1A2A6P18 AND 1A2A6P25.	5-63
1A2A6W11		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6P2-A1. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E3 AND E2.	5-63
1A2A6W12		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6P2-A2. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E1 AND E2.	5-63
1A2A6W13		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6J6-A2. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E6 AND E7.	5-63

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A6W14		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6J4-A2. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E9 AND E8.	5-63
1A2A6W15		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6P3-A1. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E10 AND E11.	5-63
1A2A6W16		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, AND CONNECTOR INSERT 1A2A6P3-A2. ALSO TERMINATED ON ASSEMBLY 1A2A6A6A1E12 AND E11.	5-63
1A2A6W17		CABLE ASSEMBLY, REFERENCE ONLY, MFR 58189, NO P/N, CONSISTS OF COAXIAL CABLE*, CONNECTOR INSERT 1A2A6P1-A3 AND CONNECTOR 1A2A6P21.	5-63
1A2A7		CODE GENERATOR, MFR 58189, P/N 666230-794 (GD/E P/N 666230-795 MAY BE USED IN LIEU OF 666230-794)	5-24 & 5-99
1A2A8		POWER SUPPLY, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70777-001	5-24
1A2A8C1-C2		NOT USED	
1A2A8C3-C4		CAPACITOR, FIXED, ELECTROLYTIC, 35 UF PLUS 50 PCT MINUS 15 PCT, 60 WVDC, MFR 02859, P/N T0319	5-100
1A2A8C5		NOT USED	
1A2A8C6		CAPACITOR, MIL TYPE M39003-01-2138	5-100
1A2A8C7		CAPACITOR, FIXED, ELECTROLYTIC, 120 UF PLUS 75 PCT MINUS 15 PCT, 40 WVDC, MFR 02859, P/N T0314	5-100
1A2A8CR1-CR4		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N649	5-100

*ALL COAXIAL CABLE IS MINIATURE, DOUBLE SHIELDED, 50 OHM CABLE, MFR 58189, P/N 820100-001.

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A8CR5-CR8		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N5199	5-100
1A2A8CR9-CR12		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N270	5-100
1A2A8CR13-CR14		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N3024B	5-100
1A2A8CR15		SAME AS 1A2A8CR9-CR12	5-100
1A2A8CR16		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N963B	5-100
1A2A8CR17		SEMICONDUCTOR DEVICE, DIODE, MFR 80131, P/N 1N750A	5-100
1A2A8MP1		HEAT SINK, MFR 18915, P/N 3AL 697-2R	5-100
1A2A8Q1		TRANSISTOR, MIL TYPE 2N3634	5-100
1A2A8Q2-Q4		TRANSISTOR, MFR 04713, P/N 2N2219	5-100
1A2A8R1-R2		RESISTOR, MIL TYPE RCR32G470JS	5-100
1A2A8R3		RESISTOR, MIL TYPE RCR07G101JM	5-100
1A2A8R4		RESISTOR, MIL TYPE RCR20G102JM	5-100
1A2A8R5		RESISTOR, MIL TYPE RCR07G470JM	5-100
1A2A8R6		RESISTOR, MIL TYPE RCR20G102JS	5-100
1A2A8R7		RESISTOR, MIL TYPE RCR07G472JM	5-100
1A2A8R8		RESISTOR, MIL TYPE RCR07G821JM	5-100
1A2A8R9		RESISTOR, MIL TYPE RCR07G681JM	5-100
1A2A8R10-R11		SAME AS 1A2A8R7	5-100
1A2A8R12		RESISTOR, MIL TYPE RCR07G102JM	5-100
1A2A8R13		RESISTOR, MIL TYPE RCR07G152JM	5-100
1A2A8R14		RESISTOR, MIL TYPE RT12C2P501	5-100
1A2A8R15		RESISTOR, MIL TYPE RCR07G331JM	5-100
1A2A8XQ1-XQ4		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN. THK. MFR 07047 P/N 10012	5-100
1A2A9		ANTENNA CUTOUT, PRINTED CIRCUIT BOARD, W/ALL COMPONENTS ASSEMBLED FOR OPERATION, MFR 58189, P/N A70681-001	5-24
1A2A9C1		CAPACITOR, MIL TYPE CK05CW102K	5-101
1A2A9C2		CAPACITOR, MFR 58189, P/N 552169-033	5-101

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A9C3		CAPACITOR, FIXED, CERAMIC DIELECTRIC, 0.01 UF, PORM 20 PCT, 75 WVDC, MFR 58189, P/N 552169-039	5-101
1A2A9C4		CAPACITOR, MIL TYPE M39003-01-2129	5-101
1A2A9CR1-CR2		SEMICONDUCTOR DEVICE, DIODE, MIL TYPE 1N4454	5-101
1A2A9K1		RELAY, MIL TYPE M5757-9-003	5-101
1A2A9Q1-Q2		TRANSISTOR, MFR 80131, P/N 2N1613	5-101
1A2A9R1		RESISTOR, MIL TYPE RCR20G473JS	5-101
1A2A9R2		RESISTOR, MIL TYPE RCR20G393JS	5-101
1A2A9R3		RESISTOR, MIL TYPE RCR07G563JS	5-101
1A2A9R4		RESISTOR, MIL TYPE RCR07G123JS	5-101
1A2A9R5		RESISTOR, MIL TYPE RCR07G471JS	5-101
1A2A9R6		RESISTOR, MIL TYPE RCR07G273JS	5-101
1A2A9R7		SAME AS 1A2A9R4	5-101
1A2A9R8		RESISTOR, MIL TYPE RCR20G272JS	5-101
1A2A9R9		RESISTOR, MIL TYPE RCR20G221JS	5-101
1A2A9XQ1-XQ2		MOUNTING PAD, TRANSISTOR, 0.344 IN. DIA X 0.075 IN THK, MFR 07047, P/N 10012	5-101
1A2A10		NOT USED	
1A2A11		100 CPS SWITCH ASSEMBLY, ASSEMBLED FOR OPERATION, MFR 58189, P/N A70843-001	5-28
1A2A11MP1		DETENT SHAFT, MFR 58189, P/N V00358-001	5-28
1A2A11MP2		INSULATOR, MFR 58189, P/N A70199-001	5-28
1A2A11R1-R6		NOT USED	
1A2A11R7		RESISTOR, VARIABLE, MFR 05721, P/N SG1231	5-28
1A2A11S1-S5		NOT USED	
1A2A11S6A		SWITCH SECTION, MFR 58189, P/N V00356-001	5-28
1A2A11S6B		SWITCH SECTION, MFR 58189, P/N V00357-001	5-28
1A2A11A1		CIRCUIT CARD ASSEMBLY, MFR 58189, P/N A70695-001	5-102

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

RADIO RECEIVER R-1051D/URR

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A11A1C1		CAPACITOR, MIL TYPE M39003-01-2117	5-102
1A2A11A1C2		CAPACITOR, MIL TYPE CK06CW103M	5-102
1A2A11A1C3		NOT USED	
1A2A11A1C4		CAPACITOR, MIL TYPE M18312-02-0426	5-102
1A2A11A1CR1		NOT USED	
1A2A11A1CR2		DIODE, MIL TYPE 1N3825A	5-102
1A2A11A1R1		RESISTOR, MIL TYPE RCR07G303JS	5-102
1A2A11A1R2		RESISTOR, MIL TYPE RT22C2P502	5-102
1A2A11A1R3		RESISTOR, MIL TYPE RCR07G512JM	5-102
1A2A11A1R4		NOT USED	
1A2A11A1R5		RESISTOR, MIL TYPE RW67V620	5-102
1A2A11A1R6		RESISTOR, MIL TYPE RCR20G203JM	5-102
1A2A11A1R7		RESISTOR, MIL TYPE RCR20G475JM	5-102
1A2A11A1R8		RESISTOR, MIL TYPE RCR07G111JS	5-102
1A2A11A1R9		RESISTOR, MIL TYPE RCR07G301JS	5-102

TABLE 6-3. LIST OF MANUFACTURERS

MFR CODE	NAME	ADDRESS
00213	Sage Electronics Corp. r	Rochester, N.Y.
00348	Microtran Co., Inc.	Valley Stream, N.Y.
01121	Allen-Bradley Co.	Milwaukee, Wis.
01281	TRW Semiconductors, Inc.	Lawndale, Calif.
02735	Radio Corp. of America, Solid State and Receiving Tube Division	Somerville, N.J.
02777	Hopkins Engineering Co.	San Fernando, Calif.
02859	ITT Industrial Products Division, International Telephone and Telegraph Corp.	San Fernando, Calif.
03550	Vanguard Electronics Co.	Inglewood, Calif.
04713	Motorola Semiconductor Products, Inc.	Phoenix, Ariz.
05009	Sealectro Corp.	Mamaroneck, N.Y.
07047	Milton Ross Co.	Southhampton, Penn.
08715	Electro Networks Inc.	Caledonia, N.Y.
09026	Babcock Electronics Corp., Relays Division	Costa Mesa, Calif.
09211	Anelex Corp.	Boston, Mass.
15818	Teledyne Inc., Amelco Semiconductor Division	Mountain View, Calif.
16258	Space Lok Inc.	Burbank, Calif.
17637	Universal Toroid Coil Winding Inc.	Irvington, N.J.
18915	The Birtcher Corp., Industrial Division	Monterey Park, Calif.
19057	Filtech Corp.	Franklin Park, Ill.
22278	The Filtex Corp.	Los Angeles, Calif.
24455	General Electric Co., Lamp Division of Consumer Products Group	Nela Park (Cleveland), Ohio
25140	Globe Industries In.	Dayton, Ohio
27956	Relcom	Mountain View, Calif.

TABLE 6-3. LIST OF MANUFACTURERS (Continued)

MFR CODE	NAME	ADDRESS
31356	J-B-T Instruments Inc.	New Haven, Conn.
40920	Miniature Precision Bearings Inc.	Keene, N.H.
46384	Penn Engineering and Mfg Corp.	Doylestown, Pa.
49956	Raytheon Co.	Lexington, Mass.
56289	Sprague Electric Co.	North Adams, Mass.
58189	General Dynamics Corp., Electronics Division	Rochester, N.Y.
58854	Sylvania Electric Products, Inc., Lighting Products Division	Salem Mass.
60380	The Torrington Co.	Torrington, Conn.
70528	Atlas Tack Corp.	Fairhaven, Mass.
70674	ADC Products Inc.	Minneapolis, Minn.
71279	Cambridge Thermionic Corp.	Cambridge, Mass.
71468	ITT Cannon Electric Inc.	Los Angeles, Calif.
71482	C.P. Clare and Co.	Chicago, Ill.
71785	Cinch Mfg. Co. and Howard B. Jones Div.	Chicago, Ill.
72136	The Electro Motive Mfg. Co.	Willimantic, Conn.
72259	Nytronics Inc.	Berkeley Heights, N.J.
72619	Dialight Corp.	Brooklyn, N.Y.
73293	Hughes Aircraft Co., Electron Dynamic Division	Torrance, Calif.
74059	Micro Switch Corp.	Freeport, Ill.
74956	Jeffers Electronics Corp.	St. Marys, Pa.
74970	E.F. Johnson Co.	Waseca, Minn.
75263	Keystone Carbon Co., Inc.	St. Marys, Pa.
76854	Oak Mfg Co.	Crystal Lake, Ill.
77820	The Bendix Corp., Electrical Components Division	Sidney, N.Y.

TABLE 6-3. LIST OF MANUFACTURERS (Continued)

MFR CODE	NAME	ADDRESS
78189	Shakeproof Division of Illinois Tool Works Inc.	Elgin, Ill.
78488	Stackpole Carbon Co.	St. Marys, Ill.
79136	Waldes Kohineor Inc.	Long Island City, N.Y.
80131	Electronic Industries Association	Washington, D.C.
80294	Bourns Inc.	Riverside, Calif.
81030	International Instruments Inc.	Orange, Conn.
81640	Control Switch Division, Controls Co. of America	Folcroft, Pa.
81716	Oak Mfg Co.	Crystal Lake, Ill.
82142	Jeffers Electronics Division of Speer Carbon Co.	DuBois, Pa.
83186	Victory Engineering Corp.	Springfield, N.J.
83324	Rosan Inc.	Newport Beach, Calif.
86335	Glenco Corp.	Metuchen, N.J.
91146	ITT Cannon Electric Inc., Salem Division	Salem, Mass.
91637	Dale Electronics Inc.	Columbus, Nebr.
91674	Erie Electric Mfg Corp.	Erie, Pa.
91929	Honeywell Inc., Micro Switch Division	Freeport, Ill.
92054	Radio Cores Inc.	Oak Lawn, Ill.
92829	Pard Transformer Corp.	Lawrence, N.Y.
95105	Collins Radio Co., Information and Science Center	Newport Beach, Calif.
96905	Hi-Q Division of Aerovox Corp.	Olean, N.Y.
96733	San Fernando Electric Mfg Co.	San Fernando, Calif.
98291	Sealectro Corp.	Mamaroneck, N.Y.
98978	International Electronic Research Corp.	Burbank, Calif.
99800	Delevan Electronics Corp.	East Aurora, N.Y.

SECTION 7

INSTALLATION

7-1. UNPACKING AND HANDLING.

Special procedures need not be followed when unpacking the R-1051D/URR. Since the R-1051D/URR is an accurately calibrated precision equipment, rough handling should be avoided. Extreme caution must be exercised when removing the unit from the packing container to prevent damage to the controls and connectors.

7-2. POWER REQUIREMENTS.

The R-1051D/URR is designed to operate from a nominal 115 Vac, single phase, 48 to 450 Hz.

7-3. SITE SELECTION.

In selecting a shipboard installation site, adequate consideration must be given to space requirements (figure 7-1.) This requirement includes 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.

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 buildings. In addition, the antenna should be located as far as possible from any high-power transmission lines or hospitals to prevent interference.

7-4. INSTALLATION REQUIREMENTS.

a. CONSIDERATIONS. - The following factors should be considered when determining the proper location for the R-1051D/URR:

(1) Best operating conditions.

(2) Ease of maintenance, adjustment of equipment, and replacement and repair of defective parts.

(3) Possibility of interaction between the R-1051D/URR and other electronic equipment in the vicinity.

(4) Critical and minimum cable length requirements.

(5) Adequate heat dissipation.

(6) Availability of a good system ground.

b. CABLE ASSEMBLIES. - Cable assemblies required for installation of the R-1051D/URR are described in table 7-1.

c. INSTALLATION. - The R-1051D/URR may be installed independently in any convenient location, using shock mount MT-3114/UR aboard ship. The R-1051D/URR may be mounted in a standard 19-inch rack. Adapter plates are used to install the R-1051D/URR in a standard 19-inch wide rack. For all required installation dimensions, see figure 7-1. Figure 7-2 illustrates the mounting bracket used for mounting the R-1051D/URR in a standard rack. Figure 7-3 illustrates mounting of the R-1051D/URR to the shock mount.

If the R-1051D/URR is to be installed as part of a system, such as Radio Set AN/WRC-1, refer to Section 2 of NAVSHIPS 0967-971-0010 for instructions.

WARNING

To avoid injury to personnel, do not overstress mounting bolts, since shock may cause them to shear.

d. INTERCONNECTION. - All connections are made at the rear of the unit (figure 7-4), with the exception of the receiver headset. 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-1051D/URR is installed separately.

(1) OPERATION AS REMOTE UNIT. - When the R-1051D/URR is to be

TABLE 7-1. INTERCONNECTING CABLE ASSEMBLIES

CABLE TYPE	NUMBER OF CABLE CONDUCTORS	FROM		TO
		CONNECTOR PART NO.	CONNECTOR REF DESIG	UNIT
TSGA-3	3	MS-3106E16S-5S	A1A1J3 (AUX AC PWR IN)	Main power distribution panel
MIL-C-27072-41*	41 (33 active)	MS-3116J-20-39S	A1A1J4 (REMOTE CONTROLS AND OUTPUT)	J5 of Interconnection Box J-1265/U
RG-215/U	Coaxial	UG-941B/U	A1A1J23 (RF INPUT)	Antenna or antenna coupler (antenna lead in)
RG-215/U	Coaxial	UG-941B/U	A1A1J25 (EXT 5MC IN)	Frequency Standard AN/URQ-9 distribution
TTHFWA1-1/2	2	MS-3106E10SL-4S	A1A1J5 (USB AUDIO OUTPUT)	Receiver switchboard
TTHFWA1-1/2	2	MS-3106E10SL-4S	A1A1J6 (LSB AUDIO OUTPUT)	Receiver switchboard

*Used only when part of AN/WRC-1 system.

operated as a remote unit, connection is made to the remote audio lines and the power source as follows:

(a) Connect receiver switchboard remote audio lines to connectors J5 (USB) and J6 (LSB) on rear of R-1051D/URR using type MS-3106E10SL-4S connectors.

(b) Connect power source to AUX AC PWR IN connector J3 at rear of R-1051D/URR using type MS-3106E16SL-5S connector.

(c) Loosen front-panel screws and slide R-1051D/URR chassis from case.

(d) Set AUX/NORM switch A1A2S1 at AUX. This switch is located at top right corner of case.

(e) Slide chassis back into case and secure it.

(2) OPERATION AS INDEPENDENT UNIT. - When the R-1051D/URR is to be operated as an independent unit, connect all cables as shown in figure 7-5. When the R-1051D/URR is to be operated as part of a system, such as Radio Set AN/WRC-1, refer to Section 2 of NAVSHIPS 0967-971-0010 for instructions.

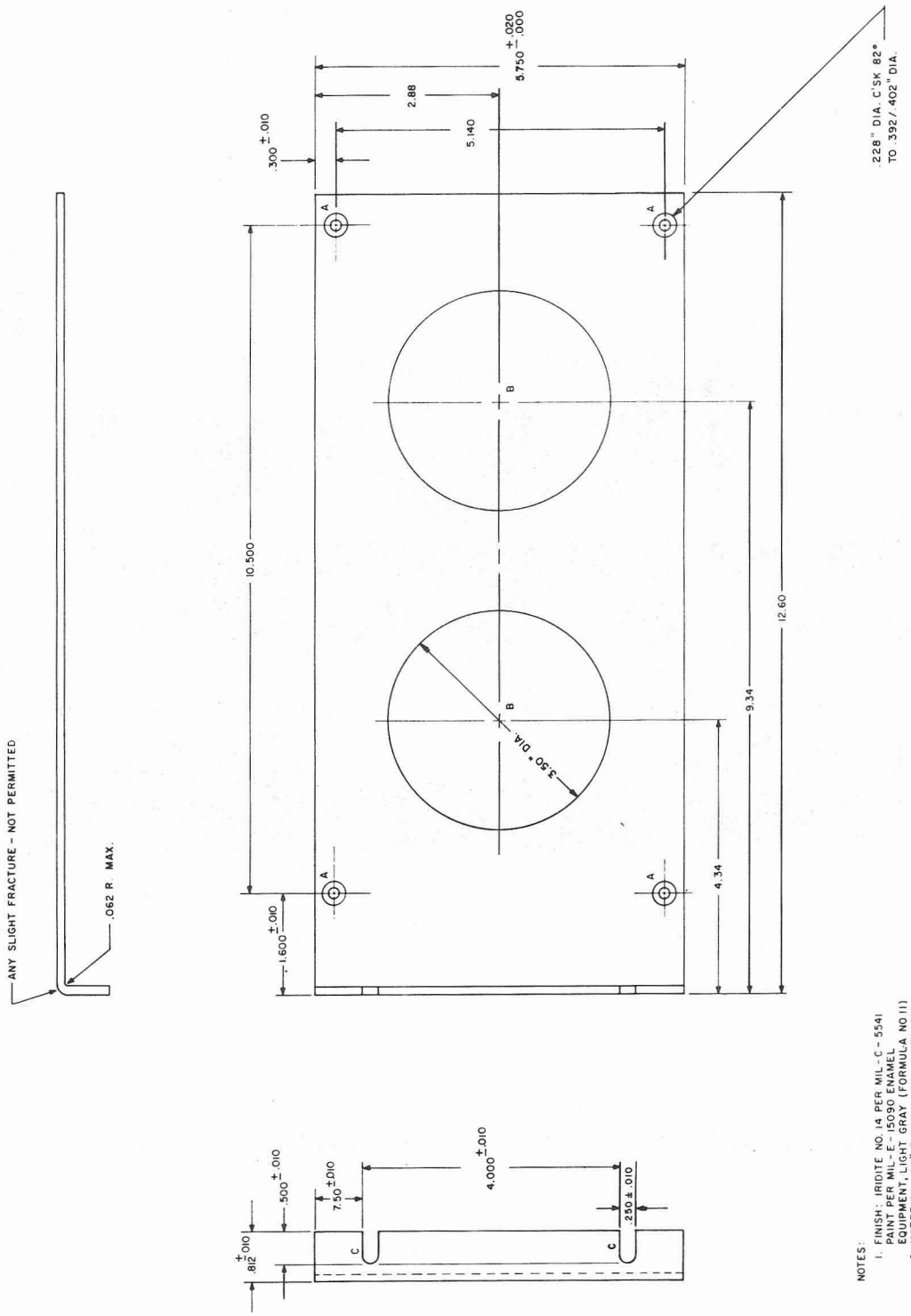


Figure 7-2. Radio Receiver R-1051D/URR, Mounting Bracket for Rack Mounting

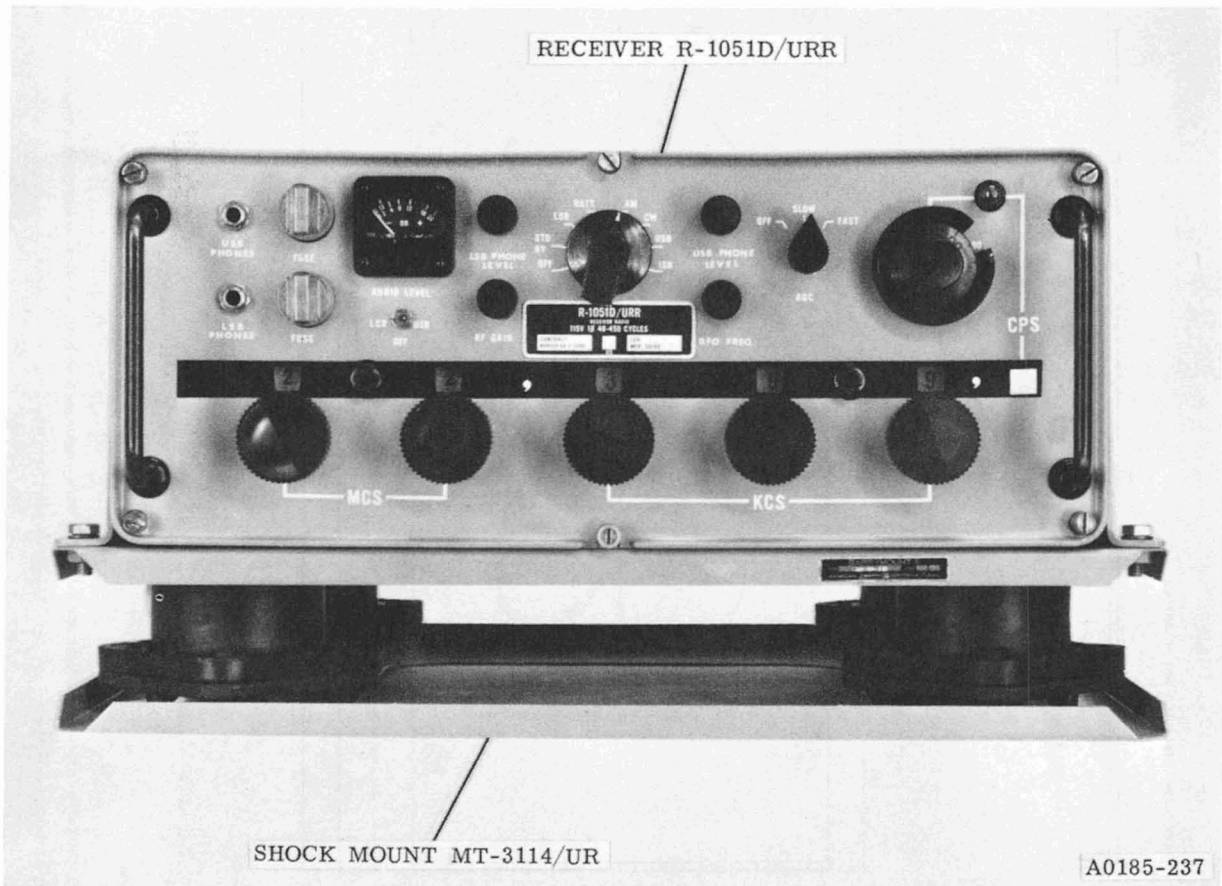


Figure 7-3. Radio Receiver R-1051D/URR, Installation Diagram

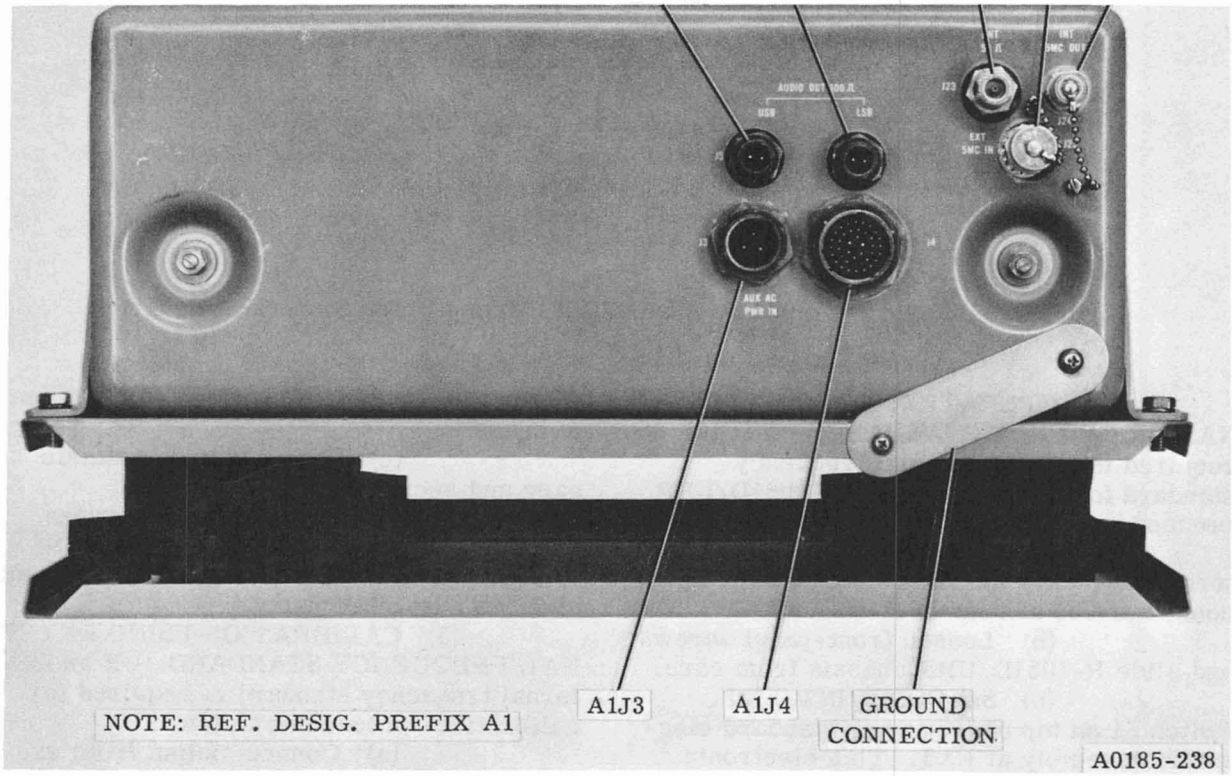


Figure 7-4. Radio Receiver R-1051D/URR, Rear View

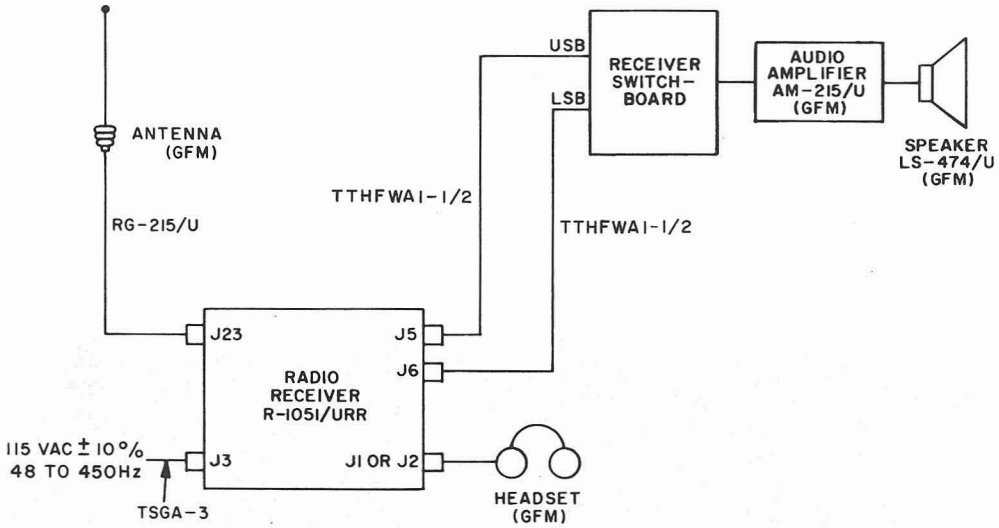


Figure 7-5. Radio Receiver R-1051D/URR, Typical Interconnection Diagram

(3) OPERATION USING EXTERNAL FREQUENCY STANDARD. - If it is required to use an external frequency standard for operation of the R-1051D/URR, proceed as follows:

(a) Connect output from external frequency standard to EXT 5MC IN connector J25 at rear of R-1051D/URR.

(b) Loosen front-panel screws and slide R-1051D/URR chassis from case.

(c) Set COMP/INT/EXT switch S1 on top of frequency standard electronic assembly at EXT. This electronic assembly is located at right rear of chassis.

(d) Slide chassis back into case and secure it.

(4) OPERATION OF ANOTHER UNIT USING FREQUENCY STANDARD ELECTRONIC ASSEMBLY OUTPUT. - If the output from the frequency standard electronic assembly is required to operate another unit, proceed as follows:

(a) Loosen front-panel screws and slide R-1051D/URR chassis from case.

(b) Set COMP/INT/EXT switch S1 on top of frequency standard electronic assembly A2A5 at COMP. This electronic assembly is located at right rear of chassis.

(c) Slide chassis back into case and secure it.

(d) Connect cable between INT 5MC OUT connector J24 on rear of R-1051D/URR and frequency standard input connector on other unit.

(5) CALIBRATION USING EXTERNAL FREQUENCY STANDARD. - If an external frequency standard is required for calibration, proceed as follows:

(a) Connect output from external frequency standard to EXT 5MC IN connector J25 at rear of R-1051D/URR.

(b) Loosen front-panel screws and slide R-1051D/URR chassis from case.

(c) Set COMP/INT/EXT switch S1 on top of frequency standard electronic assembly A2A5 at COMP. This electronic assembly is located at right rear of chassis. (Refer to paragraph 5-2b(2).)

(d) After performing required calibration, set switch S1 back to required position. Slide chassis back into case and secure it.

(6) OPERATION USING INTERNAL FREQUENCY STANDARD. - If the internal frequency standard is to be used for operation, ensure that COMP/INT/EXT switch S1 on top of frequency standard electronic assembly A2A5 is set at INT. This electronic assembly is located at the right rear of the chassis.

(7) SIMPLEX OPERATION. - If the R-1051D/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 R-1051D/URR chassis from case.

(b) Set SIMPLEX/DUPLEX switch S9 at SIMPLEX. This switch is located just behind front panel on left.

(c) Slide chassis back into case and secure it.

(8) DUPLEX OPERATION. - If the R-1051D/URR is to be used in duplex operation, proceed as follows:

(a) Ensure that ANT 50 Ω jack J23 on rear of R-1051D/URR is connected to antenna.

(b) Loosen front-panel screws and slide R-1051D/URR chassis from case.

(c) Set SIMPLEX/DUPLEX switch S9 at DUPLEX. This switch is located just behind front panel on left.

(d) Slide chassis back into case and secure it.

(9) CONNECTION OF AUDIO TRANSFORMERS IN CENTER - TAP GROUNDED CIRCUIT. - The audio transformer in the R-1051D/URR (located in receiver if./audio amplifier electronic assemblies A2A2 and A2A3) does not have grounded center taps as supplied. If it is required that these transformers work into a balanced circuit-center-tap grounded circuit, proceed as follows:

CAUTION

Do not ground center taps if working into an unbalanced circuit.

(a) Loosen front-panel screws and slide chassis from case.

(b) Tilt chassis up 90 degrees to expose bottom. See figure 5-23 for location of J18 and J19.

(c) See figure 5-9 and perform the steps given in Note 3 on that schematic.

(d) Tilt chassis back to horizontal, release slide locks, slide chassis back into case, and secure it.

7-5. INSPECTION AND ADJUSTMENT.

a. INSPECTION. - Because of the design and construction of the R-1051D/URR, relocation should have little or no effect on adjustment. Since the R-1051D/URR is in an operational condition when packed, before applying power inspect for external damage to indicators, switches, lamps, and connectors and verify that electron tubes V1 (6BZ6) and V2 (6AN5WA) in rf amplifier electronic assembly A2A4 are secure in their respective sockets.

When energizing the R-1051D/URR for the first time following installation, perform the turn-on checkout procedure of paragraph 4-5a.

b. ADJUSTMENT. - After installation, refer to Reference Standards Book NAVSHIPS 0967-878-3050 and use the procedures outlined therein to check out the R-1051D/URR.

c. PERFORMANCE CHECKS. - Refer to Section 2 and perform the applicable operating procedures to ensure proper installation.

7-6. INTERFERENCE REDUCTION.

As a precaution against possible interference, operate the R-1051D/URR with drawer fully closed and with front-panel mounting screws tightened. Verify that the R-1051D/URR is properly grounded.

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