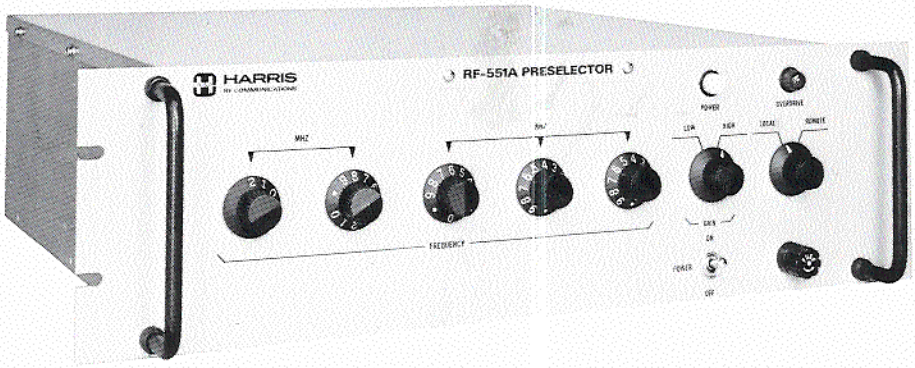
PUBLICATION NUMBER: 10096-0006C
JULY 1983

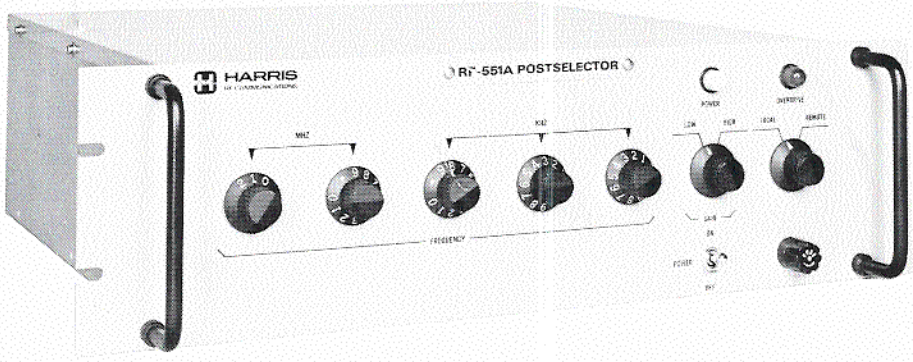
HARRIS

RF COMMUNICATIONS

RF-551A
PRESELECTOR



RF-551A
POSTSELECTOR



PUBLICATION NUMBER: 10096-0006C
JULY 1983

RF-551A
PRESELECTOR

RF-551A
POSTSELECTOR

HARRIS

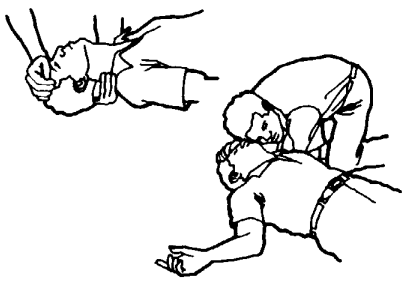
HARRIS CORPORATION RF COMMUNICATIONS GROUP
1680 University Avenue Rochester, New York 14610 U.S.A.
Tel: 716-244-5830 Cable: RFCOM; Rochester, N.Y. TELEX: 978464

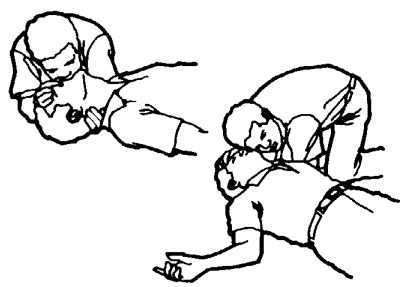
Equipment manufactured by Harris Corporation, RF Communications Division meets stringent quality and safety standards. However, high voltages are present in many radio products, and only a skilled technician should attempt to remove outer covers and make adjustments or repairs. All personnel who operate and maintain the equipment should be familiar with this page as a safety preparedness measure. Although this procedure is reproduced as a service to the personnel involved with this equipment, Harris Corporation assumes no liability regarding any injuries incurred during the operation and repair of such equipment, or the administration of this suggested procedure.

ELECTRICAL SHOCK: EMERGENCY PROCEDURE

The victim will appear unconscious and may not be breathing. If the victim is still in contact with the voltage source, disconnect the power source in a manner safe to you, or remove the victim from the source with an insulated aid (wooden pole or rope). Next, determine if the victim is breathing and has a pulse. If there is a pulse but no breathing, administer artificial respiration. If there is no pulse and no breathing, perform CPR (if you have been trained to do so). If you have not been trained to perform CPR, administer artificial respiration anyway. Never give fluids to an unconscious person.

WHEN BREATHING STOPS





FIRST, send someone to get a **DOCTOR**.
THEN, administer first aid to restore breathing (artificial respiration):

1 IF A VICTIM APPEARS TO BE UNCONSCIOUS

TAP VICTIM ON THE SHOULDER AND SHOUT, "ARE YOU OKAY?"

2 IF THERE IS NO RESPONSE

TILT THE VICTIM'S HEAD, CHIN POINTING UP. Place one hand under the victim's neck and gently lift. At the same time, push with the other hand on the victim's forehead. This will move the tongue away from the back of the throat to open the airway.

IMMEDIATELY LOOK, LISTEN, AND FEEL FOR AIR.

While maintaining the backward head tilt position, place your cheek and ear close to the victim's mouth and nose. Look for the chest to rise and fall while you listen and feel for the return of air. Check for about five seconds.

3 IF THE VICTIM IS NOT BREATHING

GIVE FOUR QUICK BREATHS.

Maintain the backward head tilt, pinch the victim's nose with the hand that is on the victim's forehead to prevent leakage of air, open your mouth wide, take a deep breath, seal your mouth around the victim's mouth, and blow into the victim's mouth with four quick but full breaths just as fast as you can. When blowing, use only enough time between breaths to lift your head slightly for better inhalation.

If you do not get an air exchange when you blow, it may help to reposition the head and try again.

AGAIN, LOOK, LISTEN, AND FEEL FOR AIR EXCHANGE.

4 IF THERE IS STILL NO BREATHING

CHANGE RATE TO ONE BREATH EVERY FIVE SECONDS.

For more information about these and other life-saving techniques, contact your Red Cross chapter for training.
"When Breathing Stops" reproduced with permission from an American Red Cross Poster.

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LIST OF TABLES

RF-551A SPECIFICATIONS

FREQUENCY RANGE	2.000 to 29.999 MHz in four octave bands
TUNING	Front panel switches or remote (1500 feet maximum, optional)
TUNING ACCURACY	Better than 1%, typically better than 0.5%
SELECTIVITY	60 dB nominal attenuation at frequencies 10% removed from tuned frequencies, increasing to better than 100 dB at greater separation
NOISE FIGURE	$\leqslant$ 15 dB nominal
OVERALL GAIN	High gain 8 dB, nominal; Low gain -24 dB, nominal
IMPEDANCE	50 ohms nominal, input and output
DESENSITIZATION	Less than 1 dB for a 0.5 volt signal within the passband
INTERMODULATION	Third order, IM products for two equal 100 millivolt signals will be at least 60 dB below the level of either signal
CROSS MODULATION	Cross modulation due to a 3.0 volt, 30% modulated signal 10% removed in frequency from a 100 millivolt desired signal will be at least 20 dB down
OVERDRIVE PROTECTION	Set to open at 100 watts of RF power nominal
INPUT POWER	115/230 Vac, ±10%, 50/400 Hz, 45 watts maximum consumption
WEIGHT	35 pounds (15.9 k)
DIMENSIONS	5.25H x 19.0W x 16.0D inches (13.3H x 48.3W x 40.6D cm)

ABOUT THIS MANUAL

This manual contains general introductory information, installation procedures, operating and maintenance instructions, and supporting information.

The contents of this manual cover the RF-551A Preselector and the RF-551A Postselector. The differences will be covered in the text and by notes on diagrams where a distinction is necessary. All common functions will be referred to as being for the RF-551A.

The manual is divided into the following sections.

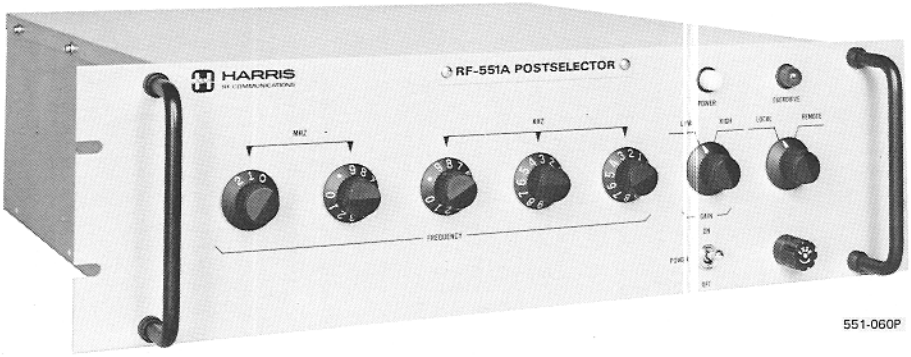
- Introduction
- Installation
- Operation
- Maintenance
- Functional Description
- Optional Equipment

HARRIS
RF COMMUNICATIONS

RF-551A
PRESELECTOR

RF-551A
POSTSELECTOR

551-061P



551-060P

RF-551A Preselector and RF-551A Postselector

SECTION 1

INTRODUCTION

1.1 INTRODUCTION

This manual provides complete user information for the RF-551A Preselector and RF-551A Postselector. (Addition of an external 6 dB pad and adjustment of a limiter potentiometer allows the RF-551A to be used as a postselector.) The RF-551A was designed and manufactured by Harris Corporation, RF Communications Division, 1680 University Avenue, Rochester, New York, 14610, USA.

Detailed information for the main chassis and for all component subassemblies is covered in this manual. Figures 1-1 and 1-2 are simplified diagrams of the RF-551A.

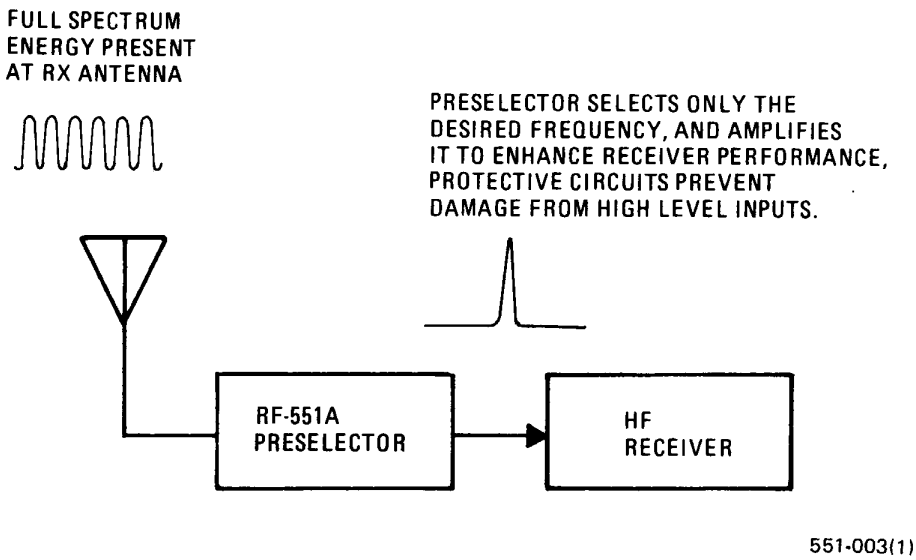


Figure 1-1. RF-551A Preselector Simplified Block Diagram

1.2 GENERAL DESCRIPTION

The RF-551A is a manually/remotely tuned, sharply-selective bandpass filter that can be used as a preselector or as a postselector. The frequency range is 2.000 to 29.999 MHz. Figure 1-3 is a block diagram of the RF-551A.

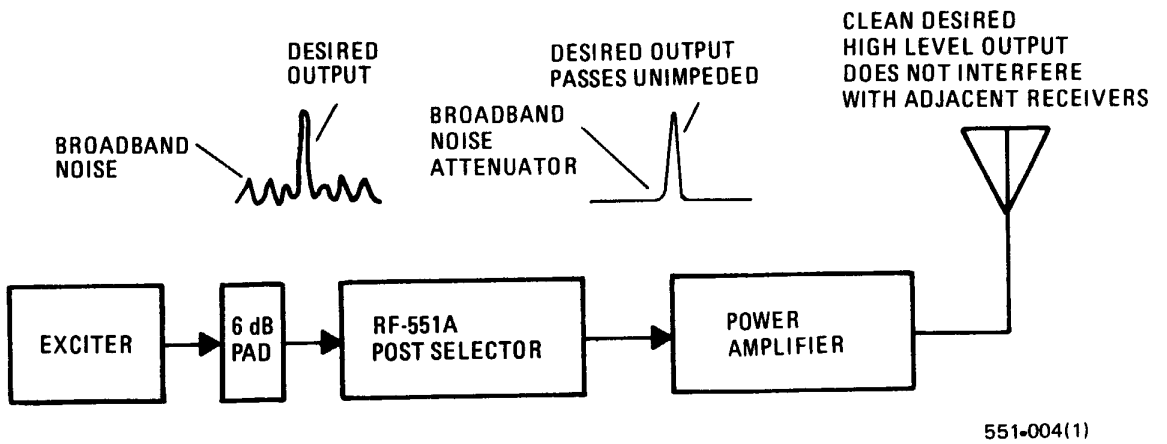


Figure 1-2. RF-551A Postselector Simplified Block Diagram

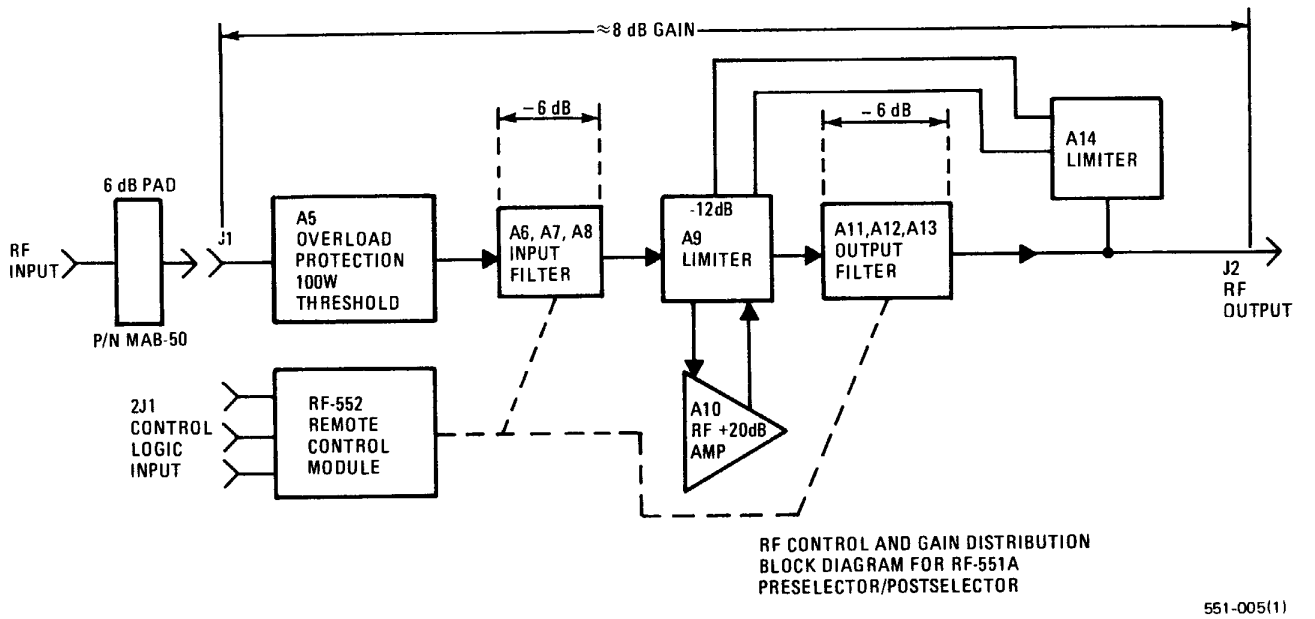


Figure 1-3. RF-551A Preselector/Postselector RF and Control Line Block Diagram

1.2.1 RF-551A Preselector

The RF-551A Preselector provides the extra selectivity required when operating in the presence of strong off-frequency RF antenna voltages. Such voltages could be caused by the proximity of shipboard HF transmitters, radar equipment, etc. Weak signals in the passband are amplified and fed to the receiver. Signals that are off-frequency, such as those from nearby transmitters, are sharply attenuated by the filter circuits, and do not distort weaker signals. If the amplitude of input RF signals inside or outside the passband exceeds safe limits, protective circuits provide positive protection for the RF-551A Preselector and the receiver.

1.2.2 RF-551A Postselector

The RF-551A Postselector requires the addition of a 6 dB pad and the full, counterclockwise adjustment of A9R1. The 6 dB pad is connected between the exciter and the input to the RF-551A Postselector. Using the RF-551A Postselector will reduce broadband exciter noise.

1.3 FREQUENCY SELECTION

Frequency selection is done by front panel switches. Switch positions provide a BCD code that is converted to an analog voltage which is proportional to the selected frequency. This voltage causes the servo motor, that tunes C1 and C2, to select the proper capacitance for the selected frequency. (An optional RF-552 Remote Control Module is available for remote frequency selection.) When the RF-552 is used, the GAIN switch is disabled and the unit is in HIGH GAIN at all times.

1.4 BAND SELECTION

Band selection is controlled by the 10 MHz and 1 MHz frequency switches (S1-B and S2-E) on the front panel. As the 10 MHz and 1 MHz frequency switches are positioned to the desired frequency, a ground is applied to one contact of open-seeking switch A6S3. Bandswitch motor A3B1 rotates, while A6S3 seeks an open. When an open is found, the slider bars located on the first and second bandswitch circuits (A6, A11) have selected the proper band components for the desired frequency band. Refer to table 1-1 figure 1-4, and figure 1-5. Transistor A3Q1 acts as a dynamic brake to quickly stop motor rotation once an open has been found by A6S3.

Table 1-1. Truth Table for Slider Bars

Frequency Range MHz	Band	Bar A	Bar B	Bar C	Bar D
2.000 to 3.999	1	FWD	FWD	FWD	FWD
4.000 to 7.999	2	FWD	BACK	BACK	FWD
8.000 to 15.999	3	BACK	FWD	FWD	BACK
16.000 to 29.999	4	BACK	BACK	BACK	BACK

See figure 4-3 for slider bar location.

FWD = Slider Bar moved to the front of the unit.
BACK = Slider Bar moved to the back of the unit.

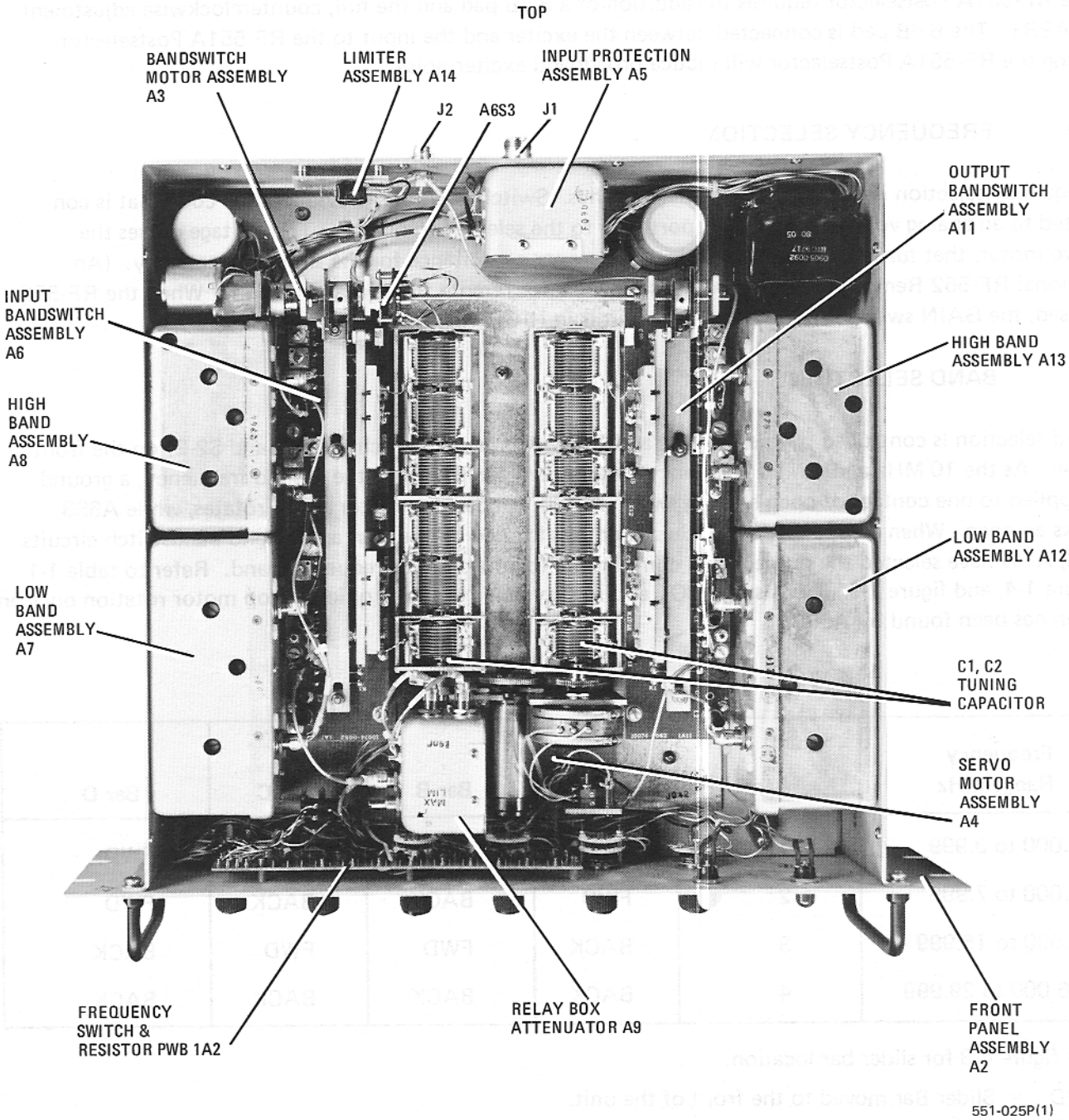


Figure 1-4. Slider Bar and Subassembly Locations (Top)

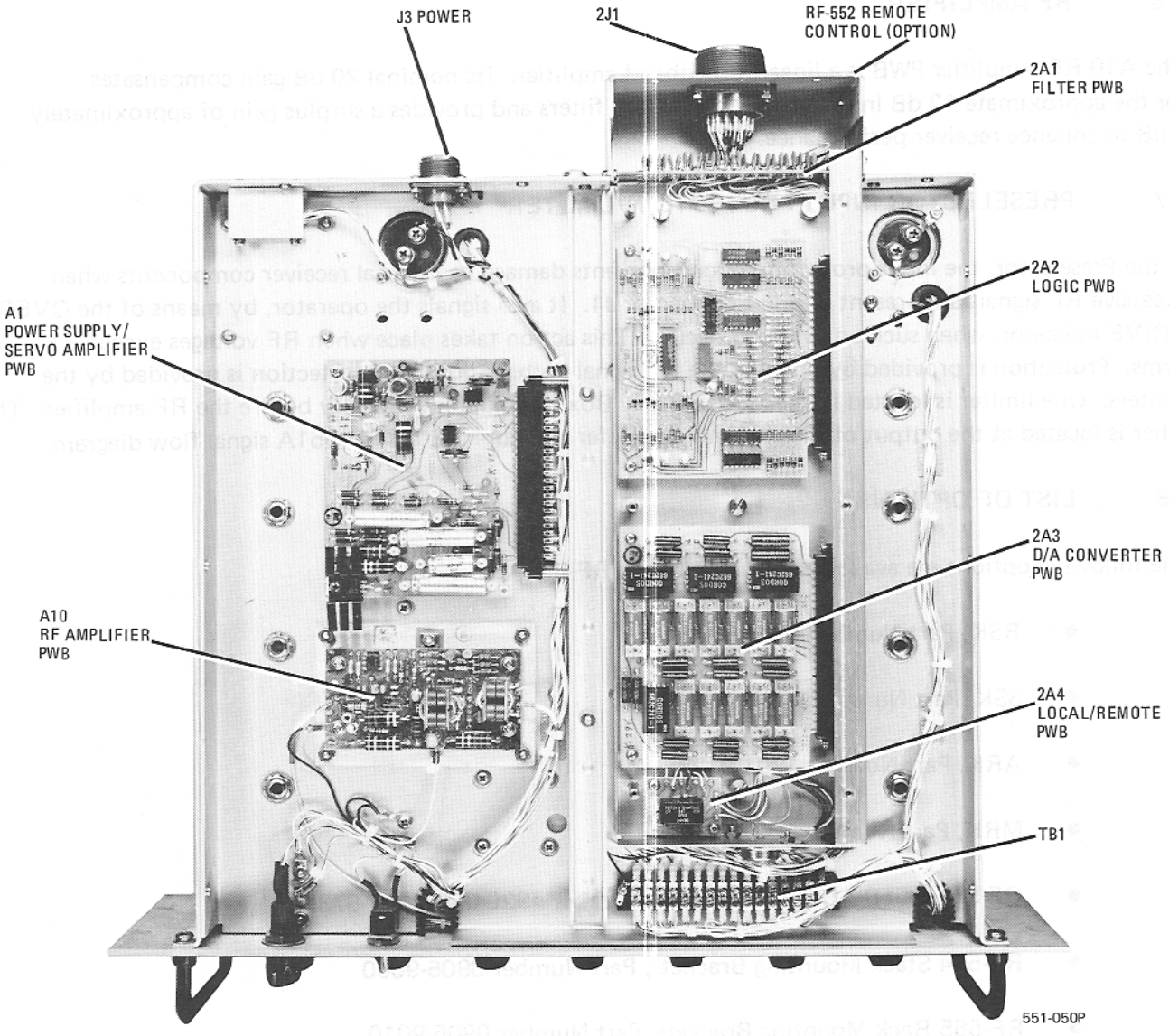


Figure 1-5. Subassembly Locations (Bottom)

1.5 RF SELECTIVITY

Two sets of mutually-coupled, double-tuned bandpass circuits provide 60 dB nominal attenuation to signals 10 percent removed from the selected frequency.

1.6 RF AMPLIFIER

The A10 RF Amplifier PWB is a linear, broadband amplifier. Its nominal 20 dB gain compensates for the approximate 12 dB insertion loss of the two filters and provides a surplus gain of approximately 8 dB to enhance receiver performance.

1.7 PRESELECTOR INPUT PROTECTION/LIMITER

In the Preselector, the input protection circuit prevents damage to internal receiver components when excessive RF signals are present at input connector J1. It also signals the operator, by means of the OVER-DRIVE indicator, when such an overload occurs. This action takes place when RF voltages exceed 71 Vrms. Protection is provided by opening the RF signal path. Additional protection is provided by the limiters. One limiter is located in the A9 RF Relay Box Attenuator Assembly before the RF amplifier. The other is located at the output of the preselector. Refer to figure 1-6 for RF-551A signal flow diagram.

1.8 LIST OF OPTIONS

The following options are available for use with the RF-551A.

- RSK, Part Number 1001-0126
- SSK, Part Number 1001-0420
- ARK, Part Number 1001-0128
- MRK, Part Number 1001-0129
- RF-551A/550 AC Cable Kit, Part Number 1920-0501 (RF-573)
- RF-554 Stack Mounting Brackets, Part Number 0905-9000
- RF-555 Rack Mounting Brackets, Part Number 0905-9010
- RF-559 Cable Junction Box, Part Number 0905-9000
- RF-552 Remote Control Module 0905-1100
- RF-553A Remote Control Adapter for the RF-505AC

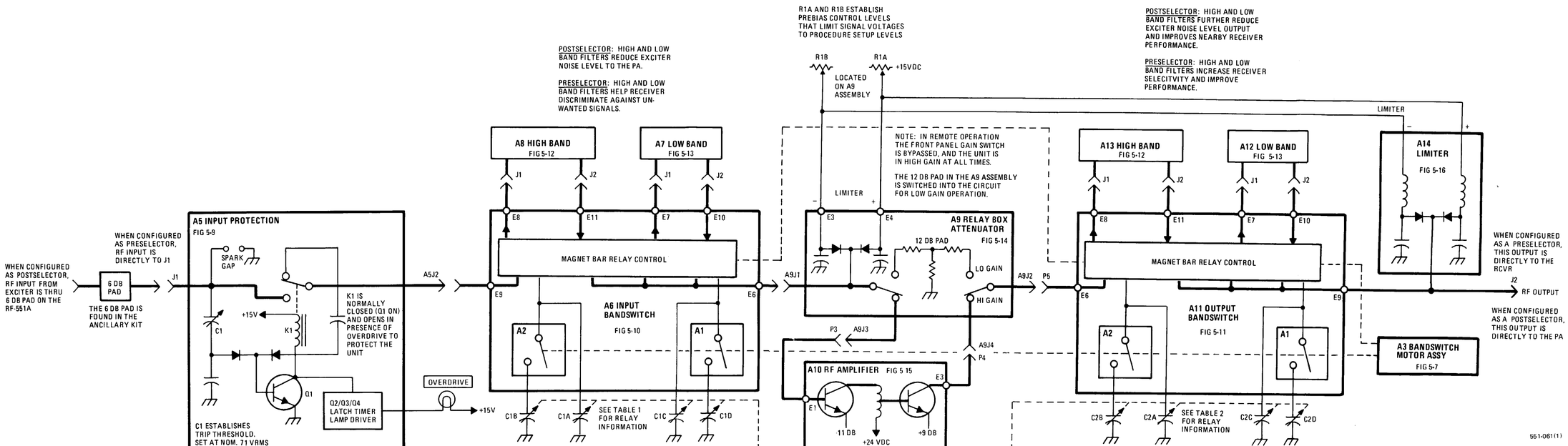


TABLE 1

FREQ MHZ	FILTER	RELAYS A6	A6A1	A6A2
2-3.999	LOW	K1,K3,K7, K9,K13, K15	K1,K2	K1,K2
4-7.999	LOW	K1,K3,K7, K9,K13, K15	---	---
8-15.999	HIGH	K2,K4,K5, K6,K8,K10, K11,K12, K14,K16	K1,K2	K1,K2
16-29.999	HIGH	K2,K4,K5, K6,K8, K10,K11, K12,K14, K16	---	---

TABLE 2

FREQ MHZ	FILTER	RELAYS A11	A11A1	A11A2
2-3.999	LOW	K1,K3,K7, K9,K13,K15	K1,K2	K1,K2
4-7.999	LOW	K1,K3,K7, K8,K13,K15	---	---
8-15.999	HIGH	K2,K4,K5, K6,K8,K10, K11,K12, K14,K16	K1,K2	K1,K2
16-29.999	HIGH	K2,K5,K5 K6,K8,K10, K11,K12, K14,K16	---	---

Figure 1-6. RF-551A Signal Flow Diagram

SECTION 2

INSTALLATION

2.1 GENERAL

The following paragraphs provide installation and interface information for the RF-551A Postselector and RF-551A Preselector. Information relating to packing instructions, power requirements, interconnection requirements, and an options list is included.

2.2 UNPACKING AND INSPECTION

Carefully open the shipping carton and check the contents against the packing list secured to the outside of the container. Inspect all items for indications of damage. Immediately notify the carrier if any damage is noted. Save all packing material for possible reshipment.

2.3 POWER REQUIREMENTS

The RF-551A operates on 115/230 Vac, 50 to 400 Hz single-phase input power selected at S9 on the rear panel. Power consumption is 45 watts.

2.4 INSTALLATION REQUIREMENTS

The RF-551A is mounted in a standard 19-inch (48.26 cm) rack. Typical installations are shown in figures 2-1 and 2-2. The following factors should be considered in determining the proper location for the RF-551A.

- Ease of operation
- Ease of maintenance, adjustment of equipment, and replacement and repair of defective parts or complete units
- Possibility of interaction between units and other equipment in the vicinity
- Adequate heat dissipation
- Common chassis grounds when used in a system
- Strong magnetic fields may interfere with operation of unit

The RF-551A may be supplied with slides (operational P/N 0905-2018), which enable the operator to pull the equipment from the rack for easy maintenance and alignment. Slides are provided with the RF-554 Stack Mounting Kit or RF-555 Rack Mounting Kit.

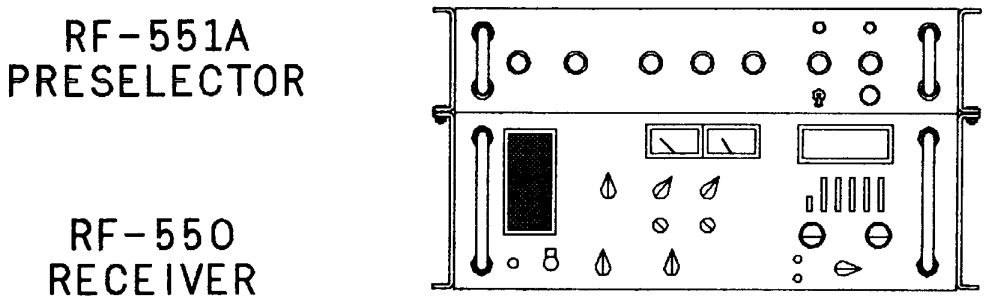


Figure 2-1. Typical RF-551A Stack Mount Configuration

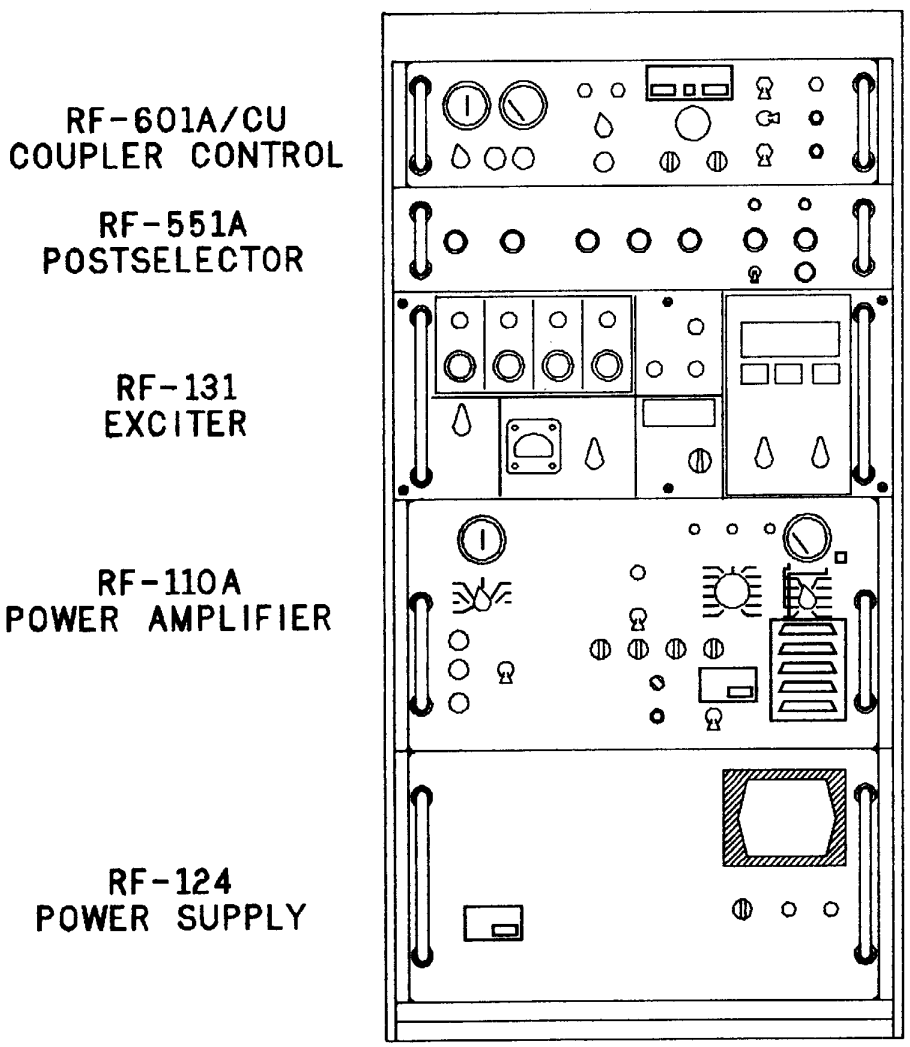


Figure 2-2. Typical RF-551A Rack Mount Configuration

2.5 INTERCONNECTION REQUIREMENTS

2.5.1 RF-551A

The RF-551A Preselector is connected between an HF antenna and receiver system. See figure 2-3 for cable connection details.

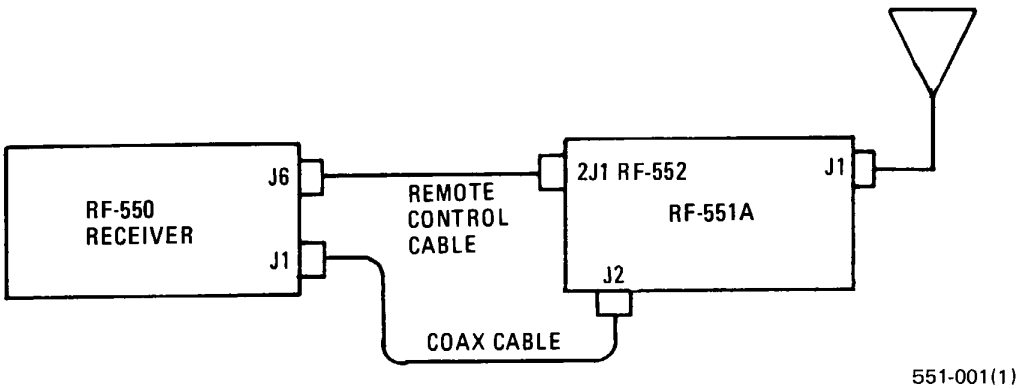


Figure 2-3. RF-551A/RF-550 System Cable Connections

The RF-551A Postselector is connected between an exciter and a power amplifier. See figure 2-4 for cable connection details.

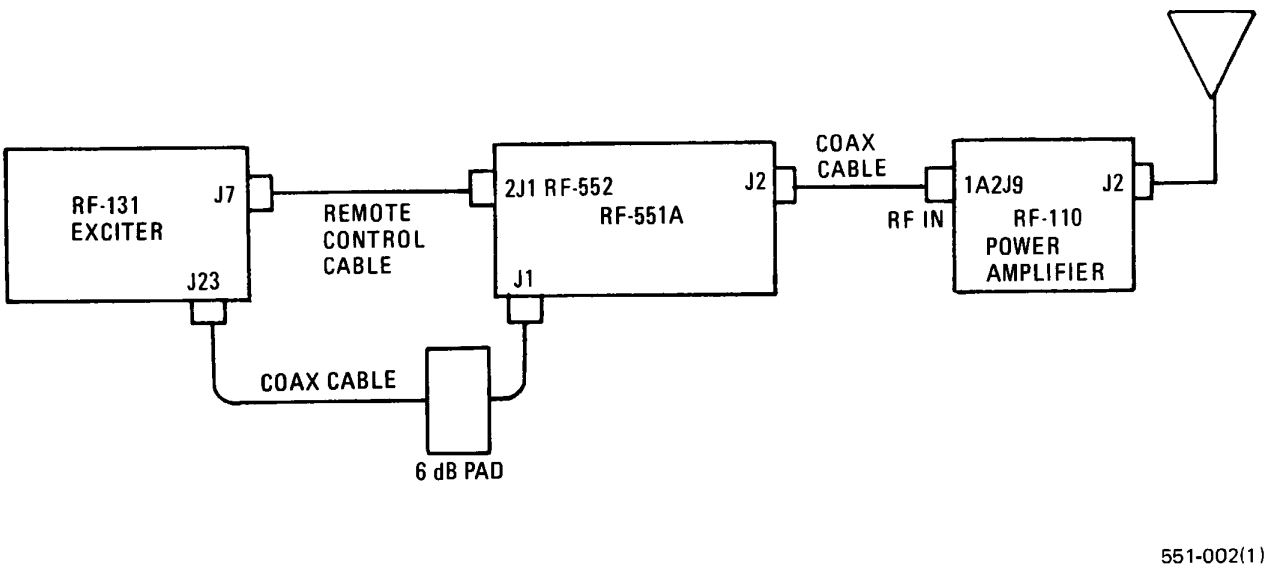


Figure 2-4. RF-131/RF-551A/RF-110A System Cable Connections

2.6 230 VAC OPERATION

The RF-551A can be operated on 230 Vac. The front panel fuse must be changed to 1/2 amp and the slide switch S9 on rear of unit must be put in the 230 position before turning on unit. See figure 2-5 for a rear view of the RF-551A.

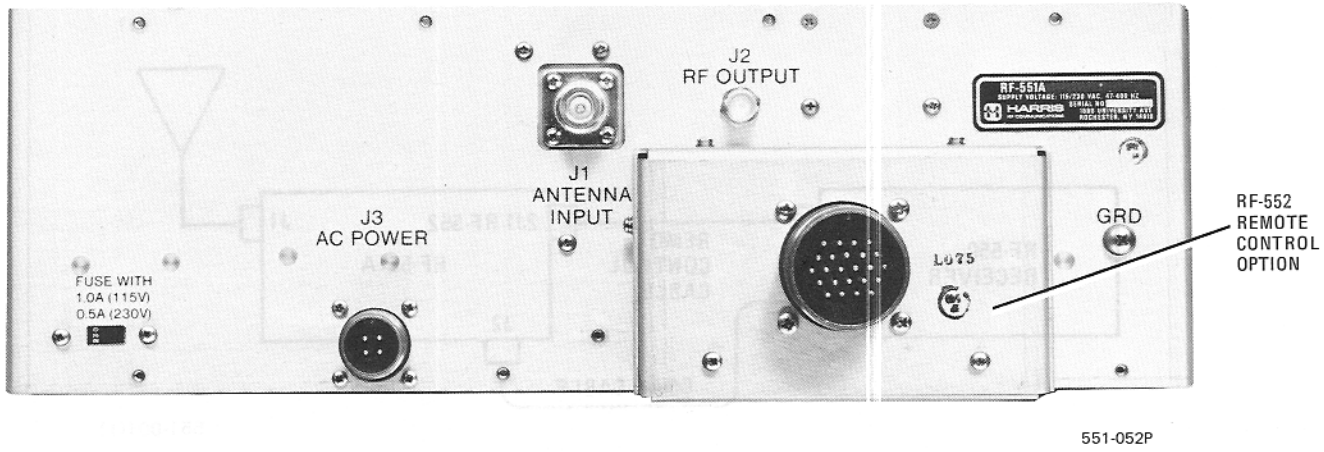


Figure 2-5. RF-551A Rear View

2.7 115 VAC OPERATION

The RF-551A can be operated on 115 Vac. The front panel fuse must be changed to 1 amp and the slide switch S9 on the rear of unit must be in the 115 position before turning on unit, see figure 2-5.

2.8 ADJUSTMENTS

For RF-551A Preselector operation, nominal limiting of the input signals can be obtained by adjusting limiter potentiometer A9R1 fully clockwise (maximum limiting) and then 1/4 turn counterclockwise.

For RF-551A Postselector operation, no limiting is desired and A9R1 should be adjusted fully counter-clockwise.

SECTION 3

OPERATION

3.1 GENERAL DESCRIPTION

This section provides operating information for the RF-551A. Information about front panel controls and indicators is also included.

3.2 OPERATING PROCEDURE

To operate the RF-551A, set the POWER switch to ON and the frequency controls to the desired operating frequency. Allow approximately three seconds for the RF-551A to tune. If an overload occurs, the OVERDRIVE indicator will illuminate. The indicator will automatically go out when the cause of the overload is removed. Refer to figure 3-1 and table 3-1 for Front Panel Controls and Indicators and their functions. Refer to figure 3-2 and table 3-2 for Rear Panel Jacks and Switches and their functions.

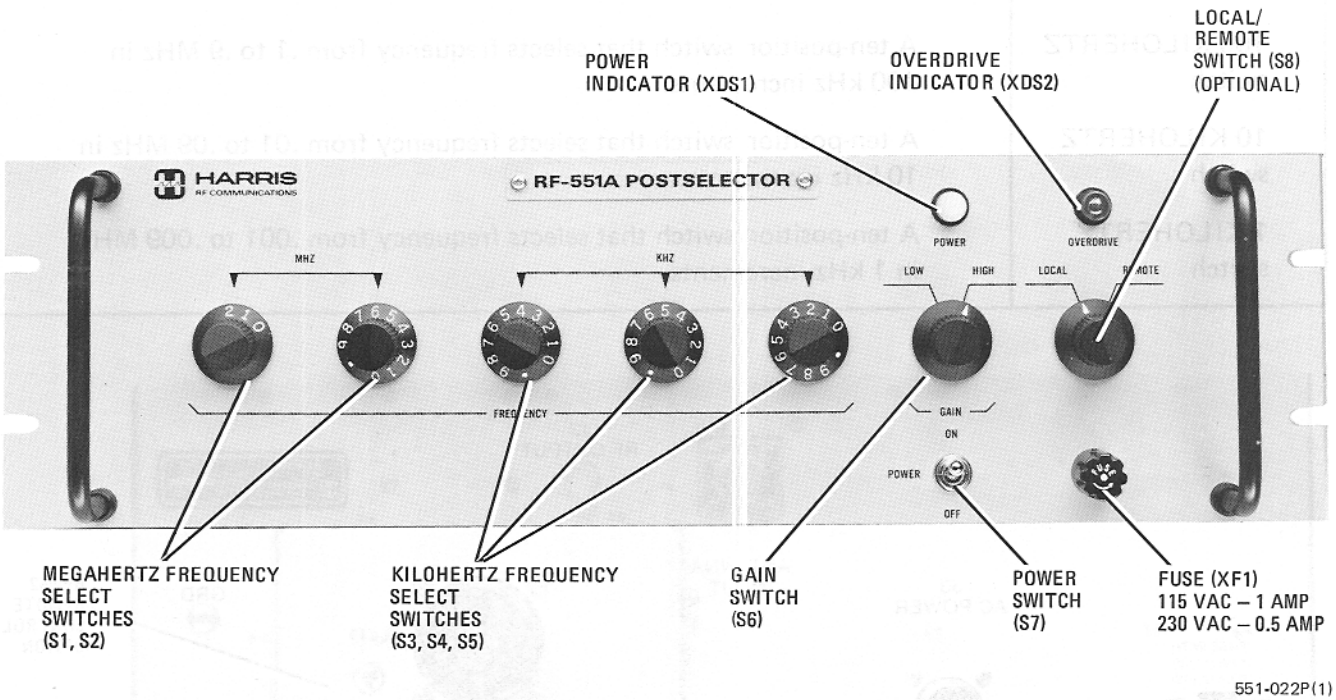


Figure 3-1. RF-551A Front Panel Controls and Indicators

Figure 3-1. RF-551A Front Panel Controls and Indicators

Control Or Indicator	Function
POWER switch	Turns RF-551A on or off.
POWER indicator	Indicator illuminates when POWER switch is ON.
OVERDRIVE indicator	Indicator illuminates when an RF overload occurs.
GAIN switch	When set to HIGH the RF signal is amplified; when set to LOW the RF signal is attenuated.
LOCAL/REMOTE (option)	Turns on the RF-552 Remote Control option. (In REMOTE operation the GAIN switch is overridden and the unit is in high gain.)
10 MEGAHERTZ switch	A three-position switch that selects frequency from 0 to 20 MHz in 10 MHz increments.
1 MEGAHERTZ switch	A ten-position switch that selects frequency from 1 to 9 MHz in 1 MHz increments.
100 KILOHERTZ switch	A ten-position switch that selects frequency from .1 to .9 MHz in 100 kHz increments.
10 KILOHERTZ switch	A ten-position switch that selects frequency from .01 to .09 MHz in 10 kHz increments.
1 KILOHERTZ switch	A ten-position switch that selects frequency from .001 to .009 MHz in 1 kHz increments.

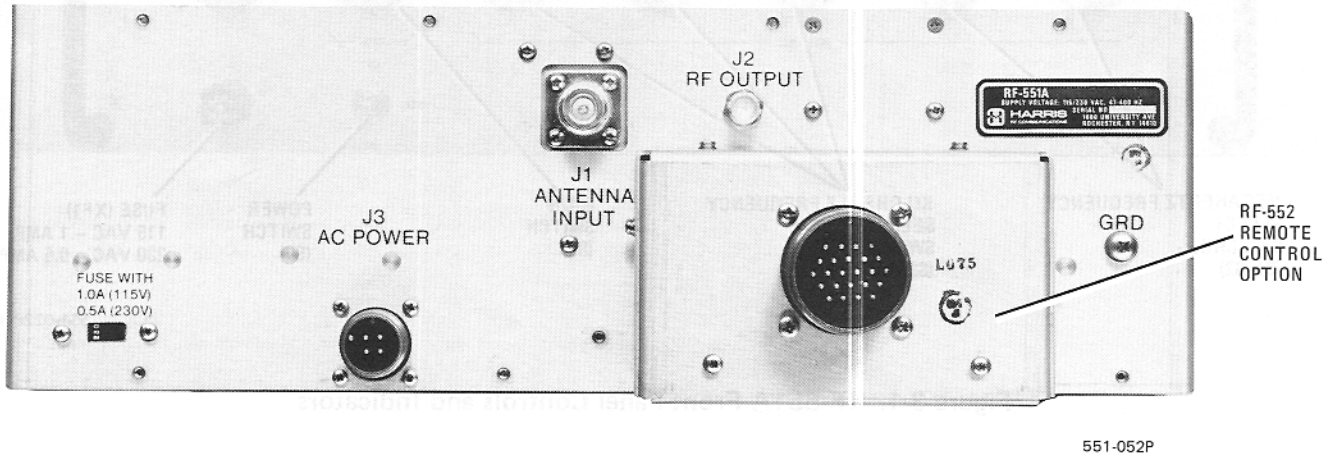


Figure 3-2. RF-551A Rear Panel Jacks and Switches

Table 3-2. RF-551A Rear Panel Jacks and Switches

Jack or Switch	Function
RF INPUT J1	J1 is used as antenna input (preselector) or exciter input (postselector).
RF OUTPUT J2	J2 is used as RF output.
AC POWER J3	J3 is used to connect Line Voltage to unit.
2J1 RF-552 Remote Control Assembly	All control lines from receiver or exciter are connected to 2J1.
Ac Voltage Select S9	S9 is set to input voltage 115 Vac or 230 Vac.

SECTION 4

MAINTENANCE

4.1 GENERAL

This section provides maintenance, troubleshooting, and adjustment information for the RF-551A. Maintenance information is provided for routine items to ensure optimum equipment reliability. Troubleshooting aids are in the form of figures, tables, and procedures. All mechanical and electrical alignments have been completed at the factory, and should normally not require adjustment in the field. Alignment instructions are included to aid in the understanding of the operation of the unit. These instructions will also aid in troubleshooting frequency related problems.

4.2 MAINTENANCE

The RF-551A requires periodic lubrication of all motor gears. The lubricant is supplied in the Maintenance Repair Kit (MRK, Part Number 1001-0129).

4.3 TROUBLESHOOTING

4.3.1 Reed Relay Troubleshooting

NOTE

Reed relays in the RF-551A are controlled by permanent magnets embedded in the slider bars. Figure 4-1 shows the location of slider bars, reed relays, and bandswitch assemblies A6 and A11. If a reed relay is not switching properly, use the following procedure and table 4-1.

a. Select POWER OFF switch on the RF-551A and disconnect primary power.

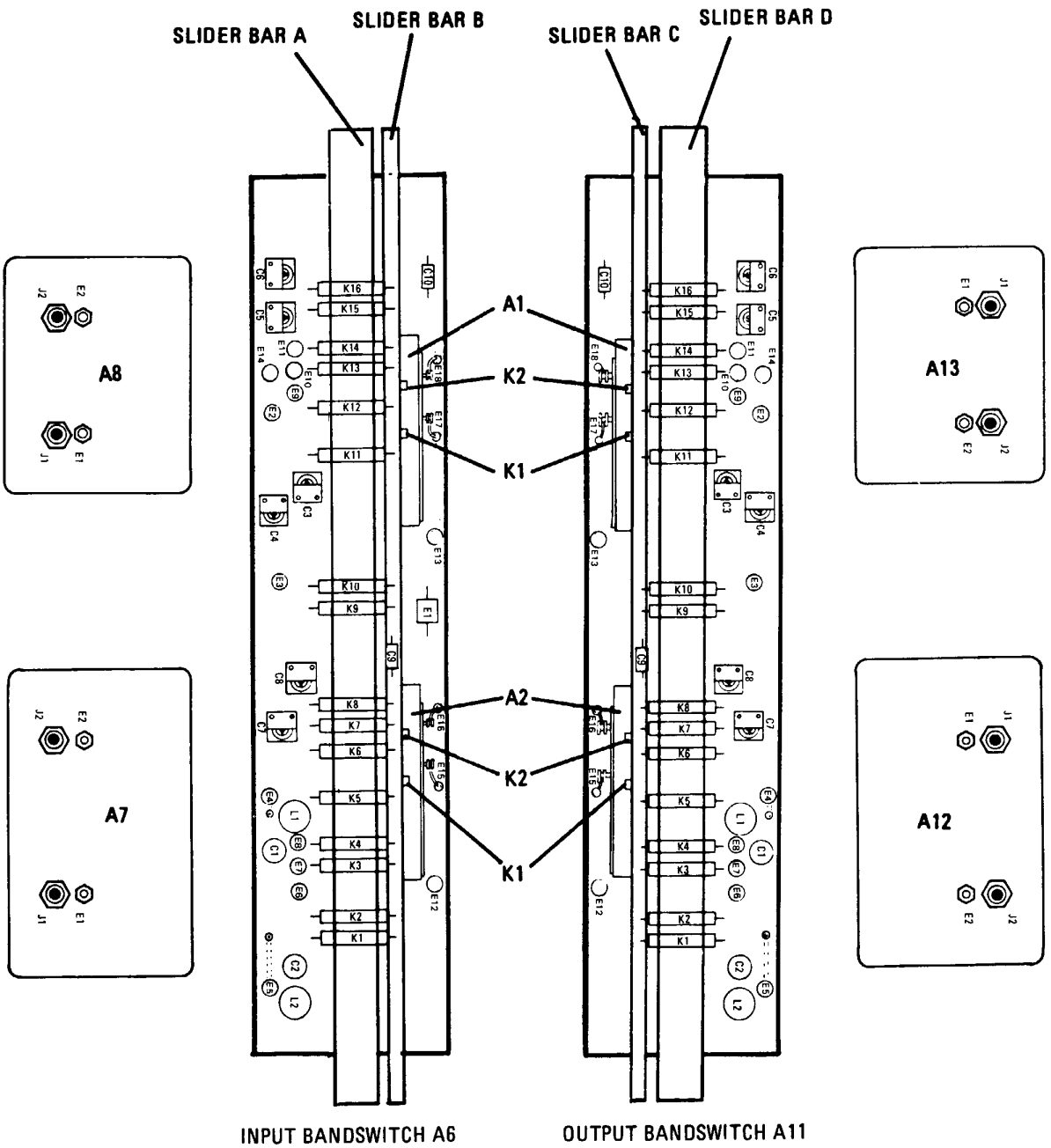
b. Visually inspect for loose or broken parts, poor solder joints, and loose hardware.

c. Disconnect all wires and cables at the high band and low band assemblies shown in figure 4-2. Insulate the wire ends to prevent shorting.

d. Connect a continuity checker between the FROM and TO terminals specified in table 4-1 (see figure 4-1 for terminal locations). Set POWER to ON.

e. Follow each step in table 4-1, operating the slider using front panel controls as outlined in table 4-2.

f. Replace or repair defective components.



DISCONNECT ALL WIRES AT E1 AND E2 OF A7, A8, A12, A13.
DISCONNECT ALL JACKS FROM J1 AND J2 OF A7, A8, A12, A13.

551-014(1)

Figure 4-1. Locations of Reed Relays on A6 and A11 Assemblies

Table 4-1. Reed Relay Troubleshooting Table

Reed Relay Being Checked and Condition	Bar	Bar Position	From	To	Reading Open or Short
K1 OPENS	A or D	BACK	E12	E5	OPEN
K1 CLOSES	A or D	FORWARD	E12	E5	SHORT
K2 OPENS	A or D	FORWARD	E5	GRD	OPEN
K2 CLOSES	A or D	BACK	E5	GRD	SHORT
K3 OPENS	A or D	BACK	E6	E7	OPEN
K3 CLOSES	A or D	FORWARD	E6	E7	SHORT
K4 OPENS	A or D	FORWARD	E6	E8	OPEN
K4 CLOSES	A or D	BACK	E6	E8	SHORT
K5/6 OPENS	A or D	FORWARD	E15	E3	OPEN
K5/6 CLOSES	A or D	BACK	E15	E3	SHORT
K7 OPENS	A or D	BACK	E16	C7 STATOR	OPEN
K7 CLOSES	A or D	FORWARD	E16	C7 STATOR	SHORT
K8 OPENS	A or D	FORWARD	E16	C8 STATOR	OPEN
K8 CLOSES	A or D	BACK	E16	C8 STATOR	SHORT
K9 OPENS	A or D	BACK	E13	E4	OPEN
K9 CLOSES	A or D	FORWARD	E13	E4	SHORT
K10 OPENS	A or D	FORWARD	E4	GRD	OPEN
K10 CLOSES	A or D	BACK	E4	GRD	SHORT
K11/12 OPENS	A or D	FORWARD	E17	E2	OPEN
K11/12 CLOSES	A or D	BACK	E17	E2	SHORT
K13 OPENS	A or D	BACK	E9	E10	OPEN
K13 CLOSES	A or D	FORWARD	E9	E10	SHORT
K14 OPENS	A or D	FORWARD	E9	E11	OPEN
K14 CLOSES	A or D	BACK	E9	E11	SHORT
K15 OPENS	A or D	BACK	E18	C5 STATOR	OPEN

Table 4-1. Reed Relay Troubleshooting Table (Cont.)

Reed Relay Being Checked and Condition	Bar	Bar Position	From	To	Reading Open or Short
K15 CLOSES	A or D	FORWARD	E18	C5 STATOR	SHORT
K16 OPENS	A or D	FORWARD	E18	C6 STATOR	OPEN
K16 CLOSES	A or D	BACK	E18	C6 STATOR	SHORT
A1K1/2 OPENS	B or C	BACK	E18	E17	OPEN
A1K1/2 CLOSES	B or C	FORWARD	E18	E17	SHORT
A2K1/2 OPEN	B or C	BACK	E15	E16	OPEN
A2K1/2 CLOSES	B or C	FORWARD	E15	E16	SHORT

4.4 BAND SWITCHING TROUBLESHOOTING

Use this procedure if there is a problem with band switching in the RF-551A.

a. The unit must have power applied.

b. Select frequencies in the Frequency Range MHz column of table 4-2, and note that the slider bars shown in figure 4-1 are in the proper position according to table 4-2.

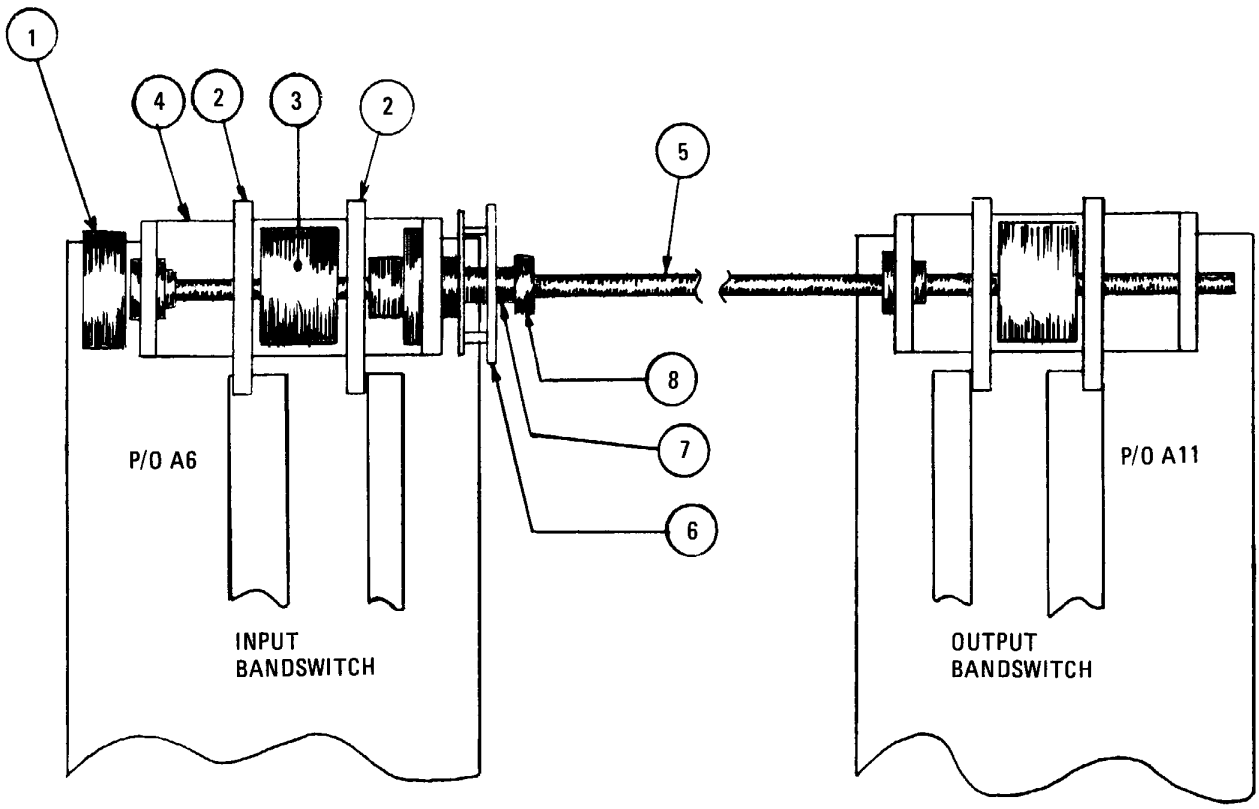
c. Refer to paragraph 4.5, Mechanical Alignment, as an aid to locating banding problems.

Table 4-2. Truth Table for Slider Bars

Frequency Range MHz	Band	Bar A	Bar B	Bar C	Bar D
2.000 to 3.999	1	FWD	FWD	FWD	FWD
4.000 to 7.999	2	FWD	BACK	BACK	FWD
8.000 to 15.999	3	BACK	FWD	FWD	BACK
16.000 to 29.999	4	BACK	BACK	BACK	BACK

4.5 MECHANICAL ALIGNMENT

Refer to figure 4-2 for component locations and identification. Mechanical alignment of the bandswitch is performed as outlined in the step by step procedure of table 4-3.



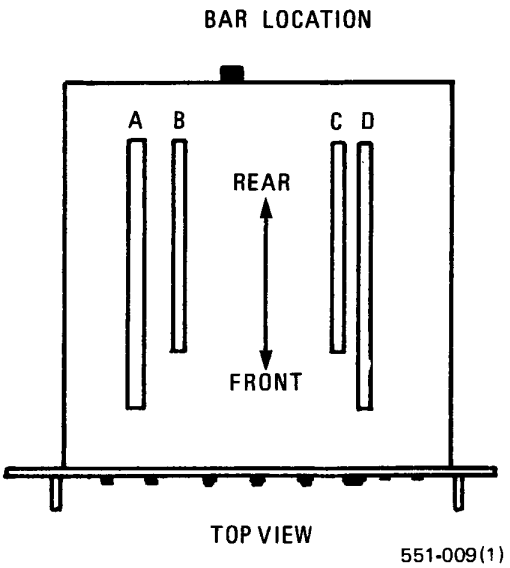
551-008(1)

ITEM		DESCRIPTION
1	–	MOTOR COUPLING
2	–	CAM FOLLOWER
3	–	CAM
4	–	SHAFT GUIDE
5	–	SHAFT
6	–	OPEN-SENSING SWITCH
7	–	SWITCH CLAMP
8	–	CLAMP LOCK

Figure 4-2. Bandswitch Component Locations and Identification

Table 4-3. Mechanical Alignment of Bandswitch

Objective	Procedure
Expose bandswitch	a. Turn power OFF, and remove top cover from the RF-551A.
Lock open-sensing switch rotor to bandswitch shaft	b. With power OFF, align open-sensing switch clamps with switch rotor and tighten clamp lock using a small 1/16 Allen wrench as shown in figure 4-2.
Loosen bandswitch cams	c. Turn power ON and select a frequency to expose the cam setscrews (two per cam). Loosen setscrews so that cams are free to rotate on shaft.
Stop shaft on band 1	d. With power ON, select 2 MHz using front panel switches. (If 2 MHz was selected before power was applied, the bandswitch motor should be cycled. Do this by selecting a frequency above 4 MHz and returning to 2 MHz.) Turn power OFF.
Position cams to band 1	e. With power OFF, rotate each cam to position bars to band 1. Refer to figure 4-3 for bar position and figure 4-4 for cam position. Lock setscrews when cams are positioned properly.
Check and/or adjust servo stops on band 1.	f. Turn power ON, and set frequency to 2 MHz (cycle as in step d). Note that all bars are forward, and that the cam of bars A and D have stopped exactly as shown in figure 4-4. If correction is required, proceed as follows: • Turn power OFF. • Loosen setscrew on open-sensing switch clamp lock and rotate clamp and rotor in direction necessary to correct cam error. • Tighten setscrew on clamp lock. • Turn power ON and cycle bandswitch motor; stop at 2 MHz, band 1. • Recheck cams per figure 5-4. If cams are properly adjusted, go to step g. If not, repeat step f.
Check remaining bands	g. Turn power ON, and select frequencies in remaining bands 2, 3, and 4. Note that bar positions agree with those given in figure 4-3. Alignment is complete.

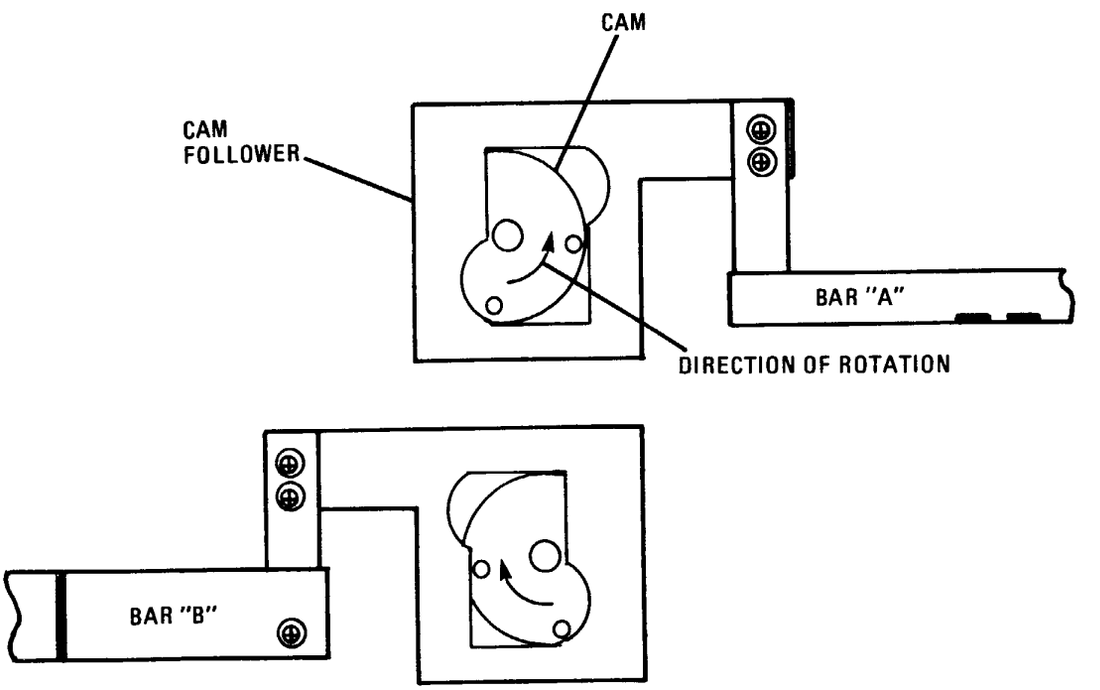


FREQ. RANGE	BAND	BAR A	BAR B	BAR C	BAR D
2 – 3.9999	1	F	F	F	F
4 – 7.9999	2	F	B	B	F
8 – 15.9999	3	B	F	F	B
16 – 29.9999	4	B	B	B	B

F – FORWARD OR FRONT

B – BACK OR REAR

Figure 4-3. Switch Bar Positions



NOTES:

1. ROTATE CAMS TO POSITION WHERE ALL BARS ARE FORWARD.
2. CAM IS PROPERLY POSITIONED ONLY WHEN CAM PINS ARE POSITIONED AS SHOWN FOR BARS "A" AND "D".

551-010(2)

Figure 4-4. Cam Positions

4.5.1 A1 Servo Amplifier Zero

There are three balance potentiometers on the Power Supply/Servo Amplifier PWB A1 which adjust any offset or inherent error voltage in the operational amplifier integrated circuits. With the frequency set for 3 MHz, and the servo tuned to the frequency, turn off the power to the unit. Apply a ground on the output of the follower potentiometer A4R2, figure 4-5. Ground E-18 on the A2A1 Resistor PWB. See figure 5-6 component location diagram A2A1 Resistor PWB. Also apply a ground to A1TP9 (black). Turn on power and measure output of A1U1 pin 6 (A1TP7, brown). Adjust potentiometer A1R44 until output is 0 volts. Similarly, adjust A1R43 until output of A1U3, pin 6 (A1TP6, orange) is also 0 volts. Finally, adjust A1R18 until the servo output at A1TP8 (violet) is ≈ 0 volts. Turn off power and remove grounds applied to follower potentiometer output, E18 on the A2A1 and A1TP9. For TP locations, see figure 4-6.

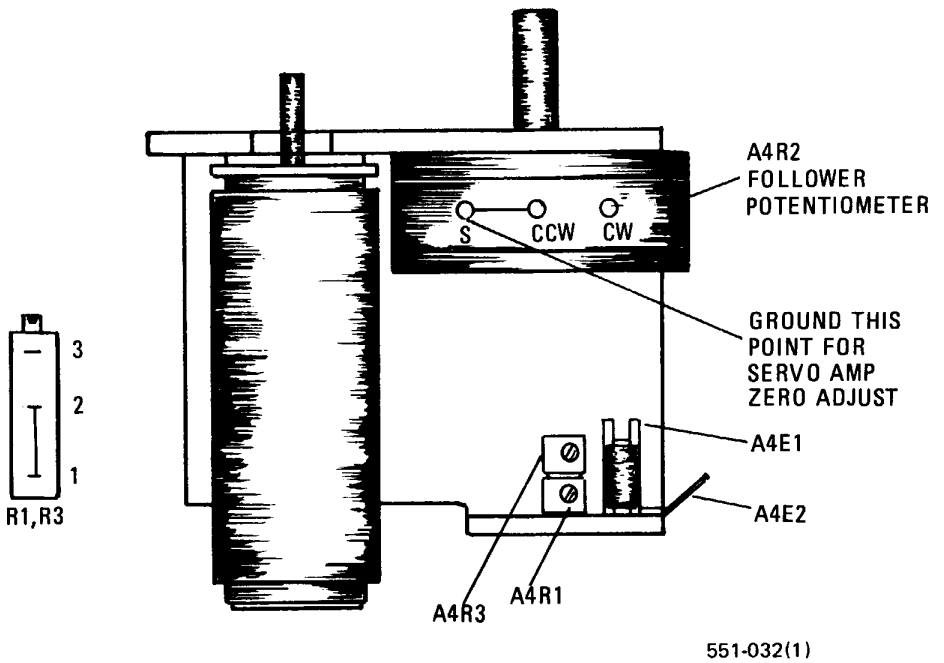


Figure 4-5. Locations of Connections on A4 Assembly

4.5.2 A4 Servo Motor Assembly Alignment

a. Remove Power Supply/Servo Amplifier PWB A1. Loosen spur gear setscrews on capacitors C1 and C2 such that gears are free to move on capacitor shafts. Attach the negative lead of a dc power supply to A4E1 and the positive lead A4E2. Slowly increase power supply voltage (5 volts maximum) to drive servo motor until its end stop is reached. Carefully rotate capacitors C1 and C2 until both capacitors are in a fully meshed state. Tighten both capacitor spur gear setscrews. This is zero degrees reference. See figure 4-5 and figure 4-7.

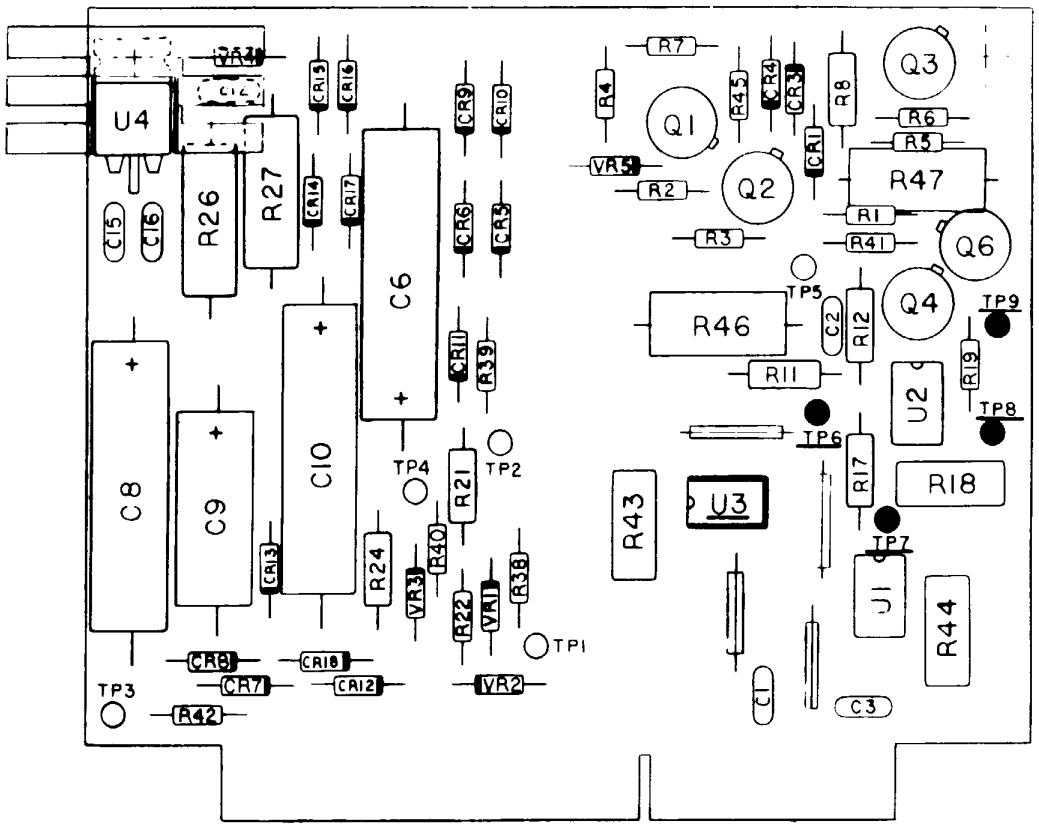


Figure 4-6. TP Locations on A1 PWB Power Supply/Servo Amplifier

b. Remove lead wire from A4R2 clockwise terminal and loosen A4R2 mounting nut. Connect Simpson Model 260 VOM (or equivalent) between clockwise and counterclockwise terminals and adjust potentiometer to obtain 200 ±10 ohm indication.

c. Adjust 1/8 turn (45 degrees) tension on A4R2 antibacklash gear. Tighten A4R2 mounting nut so that a final adjustment to the position of A4R2 can still be made. Reconnect VOM between A4R2 counterclockwise and clockwise terminals. Adjust A4R2 potentiometer for 200 ±10 ohm indication. Tighten A4R2 mounting nut.

NOTE

Adjustment should now leave both ganged capacitors C1 and C2 in a fully meshed state, A4R2 antibacklash gear with 1/8 turn tension applied, and potentiometer A4R2 set for 200 ±10 ohms and tightened securely.

d. Reconnect lead wire to A4R2 clockwise terminal.

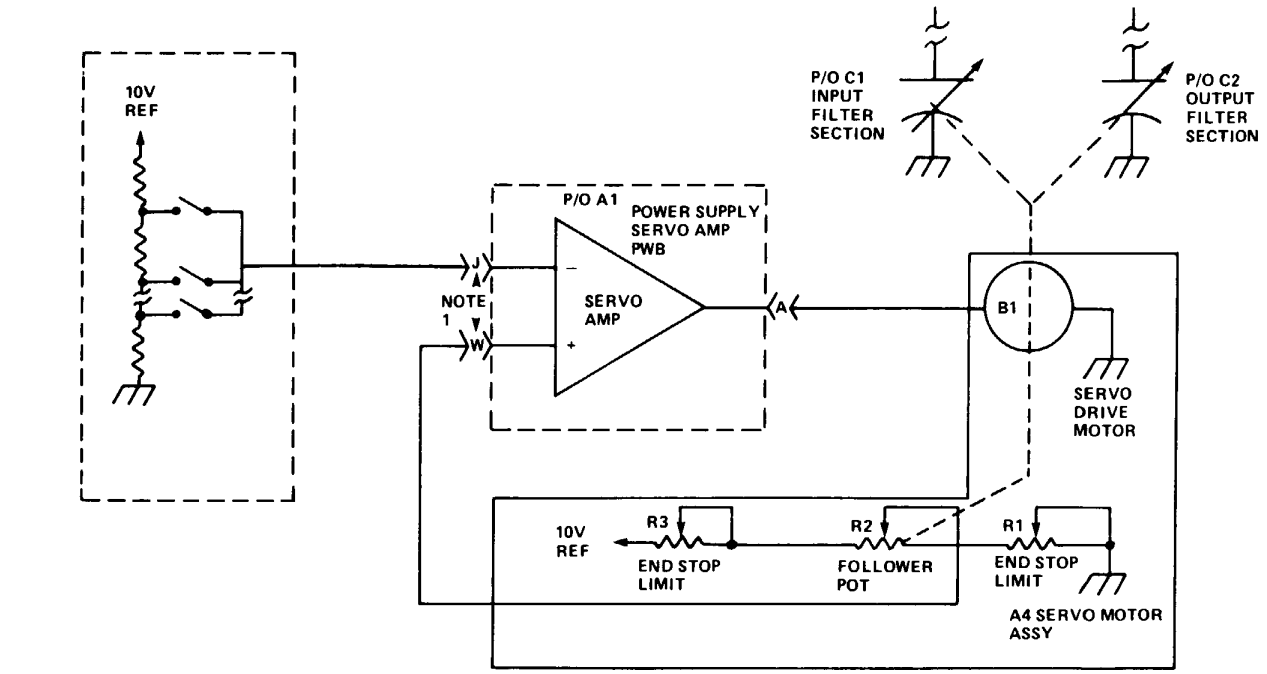


Figure 4-7. Simplified Block Diagram of Servo Control Circuits

4.6 RF ALIGNMENT

NOTE

The RF alignment should be performed only after the mechanical alignment has been verified. This alignment is done at the factory and should not require adjustment. The recommended RF level for performing the following alignment is -10 dBm.

The resonator assemblies A7, A8, A12, and A13 were aligned in the factory and due to the nature of these assemblies, they should never need realignment. It is suggested that the skirt and insertion loss portion of this alignment, steps 6, 13, 18, and 22, be passed over unless these assemblies are out of alignment.

Table 4-4 contains alignment procedures for setup and alignment of the RF-551A. Figure 4-8 shows locations for adjustment alignments.

4.6.1 Test Equipment

The following equipment is used to align the RF section of the RF-551A.

a. Simpson 260.

b. 100 watt RF amplifier.

c. RF voltmeter.

d. Dc variable power supply, 0 to 30 Vdc adjustable.

e. Spectrum analyzer and tracking generator.

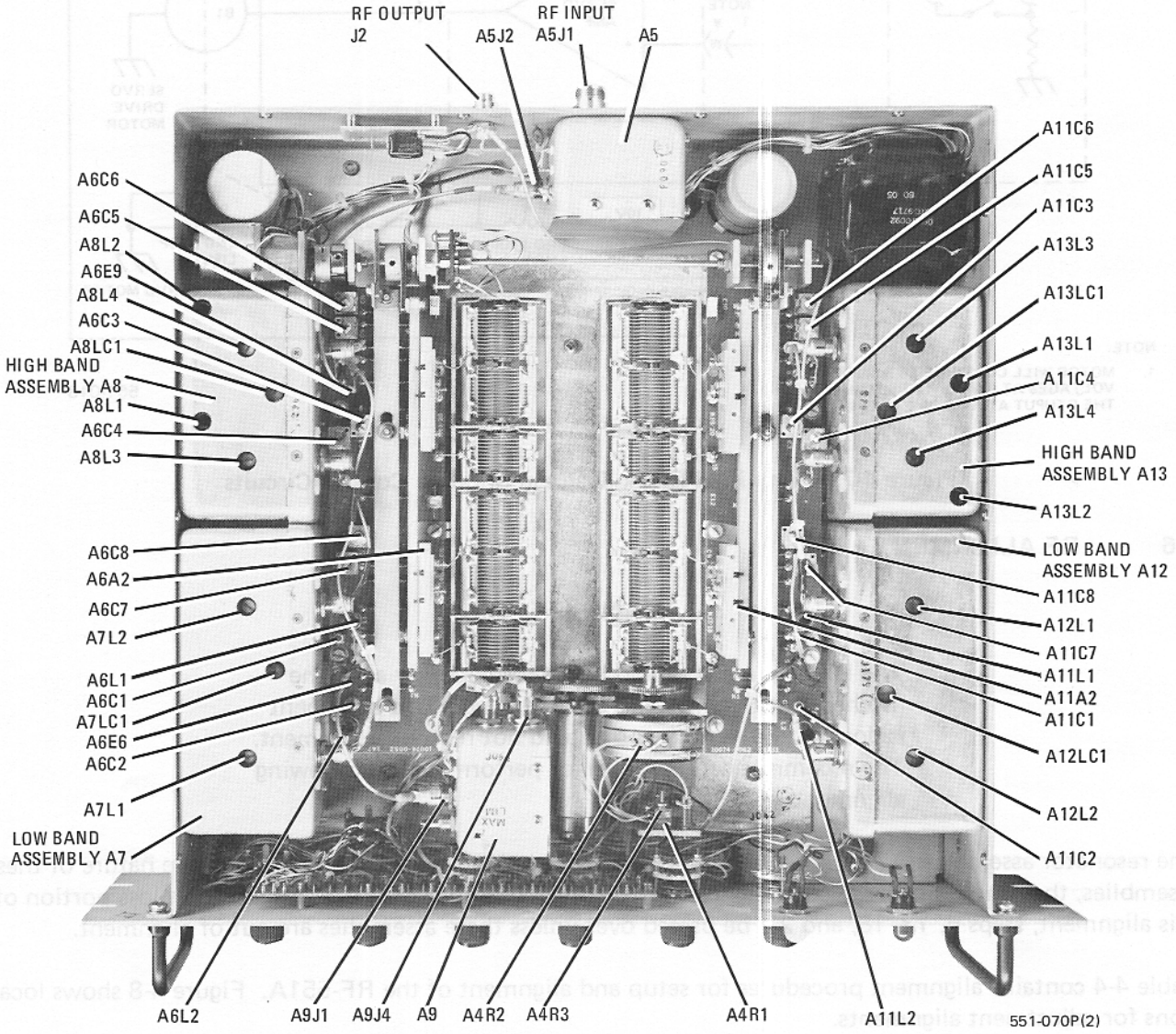


Figure 4-8. Adjustment Locations for Alignment

NOTES:

These notes refer to table 4-4.

1. These glass variable capacitors, namely A6C1, A6C2, A11C1, and A11C2, break very easily when jammed against their end stop. Rotate carefully and stop when a higher torque is encountered.

2. Minus approximately 10 degrees (-≅ 10^{o}).

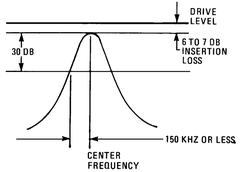
3. Repeat steps 3 and 4 of the alignment procedure several times because these adjustments interact.

CAUTION

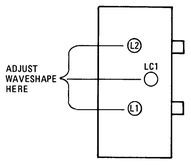
Do not allow servo to jam against end stops for any prolonged period or damage may result.

4. Do not attempt to center output to proper frequency. Adjust for maximum peaked output while keeping A6L1 and A6L2 as close to electrical center as possible.

5. On low band assembly, A7 or A12, the three adjustments are used to obtain the wave shape shown in figure 4-9. Adjust for wave shape and insertion loss only.



551-011



TOP VIEW OF A7 AND A12

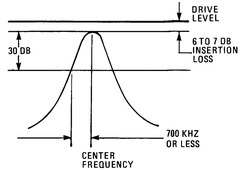
551-020(1)

Figure 4-9. Low Band Assembly Wave Shape Adjustment

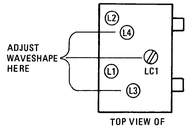
6. Steps 8 and 9 interact a great deal and may need to be repeated several times before going to next step.

7. Connect a voltmeter (VOM or equivalent) across servo motor. Dial 7.9999 and check that voltage drops below 1 volt when motor stops. Dial 2.000 and repeat motor voltage test. This checks that servo is not jammed against end stop. If it does, some component in the RF path is out of tolerance and C1/C2 position is trying to make up for the error. Trouble-shoot before proceeding.

8. On high band assembly A8 and A13, the three adjustments shown are used to obtain the wave shape shown in figure 4-10.



551-013

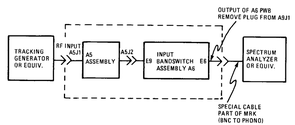
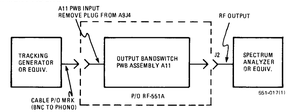


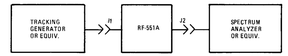
TOP VIEW OF A8 AND A13

551-012(1)

Figure 4-10. High Band Assembly Wave Shape Adjustment

Table 4-4. RF-551A Alignment Procedure

Step	
1	CONNECT EQUIPMENT AS SHOWN  551-016(1)
2	ANY / A6C1 / Full counterclockwise / 1
3	2.000.0 / A4R3 / C1/C2 closed mesh – ≅10^{o} (slightly off end stop) / 2,3
4	3.900.0 / A4R1 / C1/C2 open mesh – ≅10^{o} (slightly off end stop) / 2,3 / Repeat step 3
5	2.000.0 / A6L1,A6L2 / Single Peak, Max Output / 4
6	2.000.0 / A7L1,A7L2, A7LC1 / Insertion loss, skirts / 5 / Repeat step 5
7	7.800.0 / A6C2 / Single peak, Max Output / 4
8	2.200.0 / A4R3 / On frequency @ 2.200.0 MHz
9	7.500.0 / A4R1 / On frequency @ 7.500.0 MHz / 6,7 / Repeat step 8
10	3.500.0 / A6C5,A6C7 / On frequency @ 3.500.0 MHz insertion loss -6 dB
11	7.500.0 / A6C1,A6C2 / On frequency @ 7.500.0 MHz insertion loss -6dB / Repeat steps 8 through 10
12	8.400.0 / A8L1,A8L2 / Max Out @ 8.400.0 MHz
13	8.400.0 / A8L3,A8L4, A8LC1 / Insertion loss, skirts / 8 / Repeat step 12
14	15.000.0 / A6C6,A6C8 / On frequency @ 15.000.0 MHz insertion loss -6 dB
15	29.000.0 / A6C3,A6C4 / On frequency @ 29.000.0 MHz insertion loss -6 dB / Repeat steps 12 through 14
16	CONNECT EQUIPMENT AS SHOWN  551-017(1)

Step	Frequency	Adjust	Adjust For	See Note	Repeat Steps
17	2.200.0	A11L1,A11L2	Max output @ 2.200 MHz		
18	2.200.0	A12L1,A12L2, A12LC1	Insertion loss, skirts	5	Repeat step 17
19	7.500.0	A11C1,A11C2	On frequency @ 7.500 MHz insertion loss -6 dB		
20	3.500.0	A11C5,A11C7	On frequency @ 3.500 MHz insertion loss -6 dB		Repeat steps 17 and 19
21	8.400.0	A13L1,A13L2	Max output @ 8.400 MHz		
22	8.400.0	A13L3,A13L4, A13LC1	Insertion loss, skirts	8	Repeat step 21
23	15.000.0	A11C6,A11C8	On frequency @ 15.000 MHz insertion loss -6 dB		
24	29.000.0	A11C3,A11C4	On frequency @ 29.000 MHz insertion loss -6 dB		Repeat step 21
25	CONNECT EQUIPMENT AS SHOWN  551-018(1)				

Step	Frequency	Adjust	Adjust For
26	2.200.0	A6L1, A6L2, A11L1, A11L2	Centered Frequency and Overall Gain of 5 to 11 dB
27	3.500.0	A6C5, A6C7, A11C5, A11C7	
28	7.500.0	A6C1, A6C2, A11C1, A11C2	
29	8.400.0	A8L1, A8L2, A13L1, A13L2	
30	15.000.0	A6C6, A6C8, A11C6, A11C8	
31	29.000.0	A6C3, A6C4, A11C3, A11C4	

4.7 OVERLOAD PROTECTION ADJUSTMENT

Proceed as follows to adjust the overload protection threshold.

a. Remove coaxial cable from A5J2 and terminate J2 into 50 ohms.

b. Connect output of 100 watt RF amplifier to A5J1.

c. With power on, and frequency set to 10 MHz, adjust RF level until the voltage at A5J1 is 71 Vrms as measured with an RF voltmeter.

d. Adjust trimmer capacitor A5C1 until OVERDRIVE indicator on front panel is illuminated, and relay A5K1 is deenergized.

e. Turn off power source and reconnect coaxial cables.

4.8 REMOTE CONTROL ASSEMBLY RF-552

Figure 4-11 contains a simplified block diagram of Remote Control Assembly RF-552. This can be used as an aid in troubleshooting the RF-552.

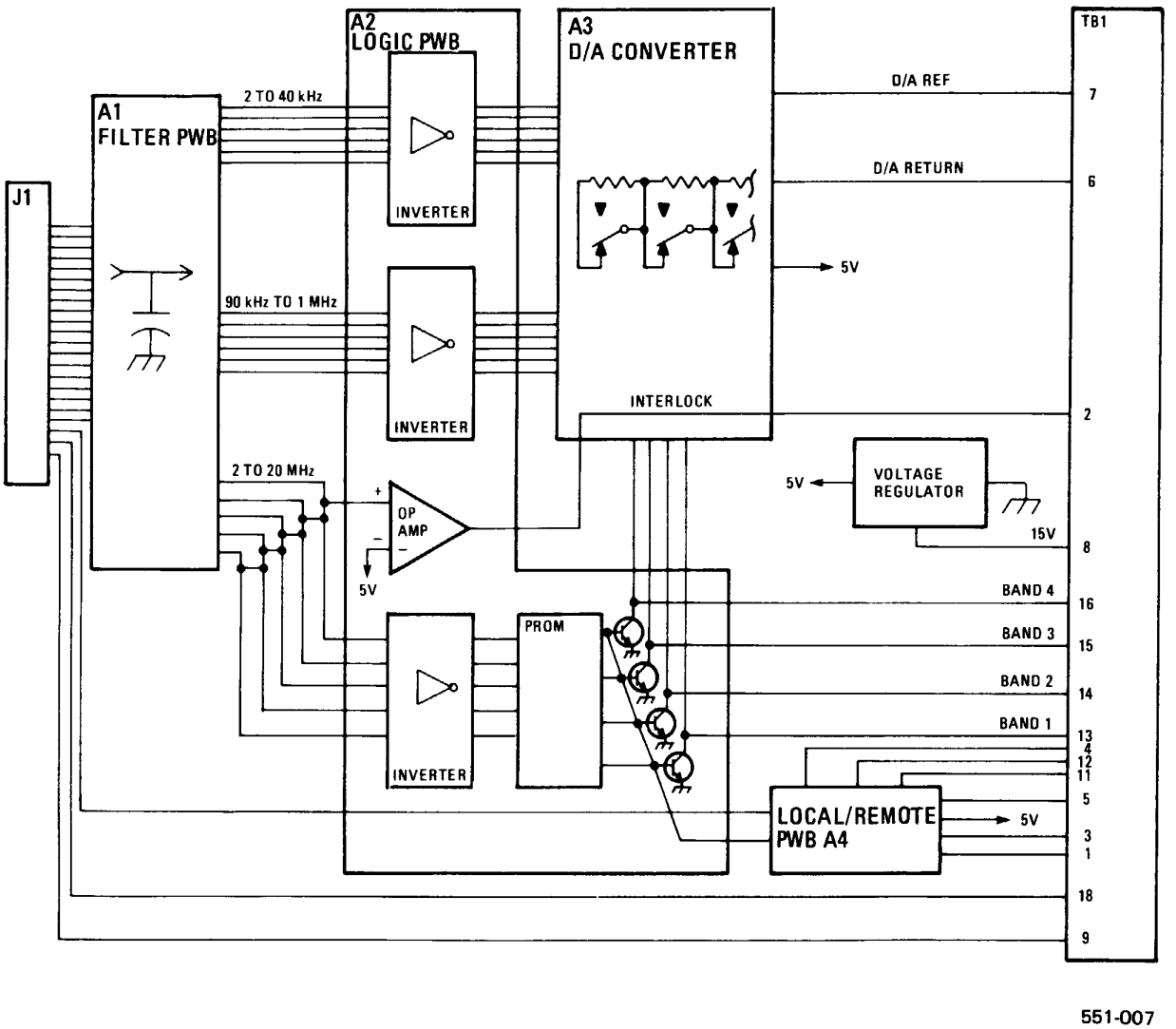


Figure 4-11. Simplified Block Diagram of the Remote Control Assembly RF-552

SECTION 5

FUNCTIONAL DESCRIPTION

5.1 GENERAL

This section contains RF-551A circuit descriptions, schematics, parts lists, and component locations. Assemblies covered in this section are as follows:

- RF-551A Interconnect Diagram
- A1 Power Supply/Servo Amplifier PWB
- A2 Front Panel
- A2A1 Resistor PWB
- A3 Bandswitch Motor Assembly
- A4 Servo Motor Assembly
- A5 Input Protection Assembly
- A6/A11 Input and Output Bandswitch Assemblies
- A7/A12 Low Band Assemblies
- A8/A13 High Band Assemblies
- A9 RF Relay Box Attenuator
- A10 RF Amplifier PWB
- A14 Limiter Assembly

5.2 OVERALL FUNCTIONAL DESCRIPTION

The RF-551A is a manually or remotely tuned active bandpass filter. Front panel controls provide continuous tuning from 2.000 to 29.999 MHz in 1 kHz increments. The bandswitch circuits, A6 and A11, tune this frequency range in four octave bands; 2.000 to 3.999 MHz, 4.000 to 7.999 MHz, 8.000 to 15.999 MHz, and 16.000 to 29.000 MHz. Band changes are made automatically as the front panel frequency controls are changed. Tuning of the RF circuits is accomplished by a servo mechanism which automatically repositions

the multigang tuning capacitor whenever the frequency controls are changed. Two sets of mutually coupled, double-tuned bandpass circuits (A7, A8, A12, and A13), provide the necessary selectivity.

The RF-551A provides a narrow bandpass centered on the selected frequency. The bandpass filter allows receiving and transmitting antennas to be located near each other, if the transmitting frequency is removed from the receive frequency by at least 10%, and the RF voltage is no more than 71 Vrms on the receive antenna. Signals in the passband may be amplified by a low distortion RF amplifier (A10) that provides a nominal gain of 20 dB. Overall circuit gain is then 8 dB nominal.

An input RF protection circuit prevents damage to internal receiver components when excessive RF signals are present at antenna input connector J1. It also signals the operator, by means of the OVER-DRIVE indicator, when such an overload occurs. This action takes place when RF voltages exceed 71 Vrms. Protection is provided by opening a relay in the RF signal path.

Attenuation or amplification of the RF signal within the passband is selected by the GAIN switch. When the GAIN switch is set to HIGH, RF amplifier A10 is connected in series with the RF signal path that provides an overall gain of 8 dB nominal. When set to LOW, the RF signal is attenuated by the relay box attenuator A9, causing an overall attenuation of 24 dB.

Although RF amplifier A10 and receiver will withstand moderate overloads for prolonged periods, additional protection is provided before the RF amplifier in the relay box attenuator A9 and at the RF output of the preselector. These limiters consist of two diodes of opposite polarities connected across a 50 ohm line. Each may be prebiased by potentiometers A9R1A and R1B. Thus, the maximum RF voltage may be limited over a range of approximately 0.5 to 15.0 volts.

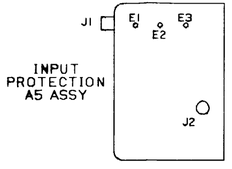
5.3 RF-551A INTERCONNECT DIAGRAM

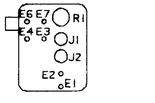
Refer to figure 5-1, RF-551A Interconnect Diagram. See table 5-1 for main frame parts lists.

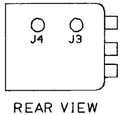
NOTE:

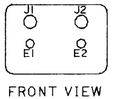
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. THIS SCHEMATIC REPRESENTS THE RF-551A.
3. UNLESS OTHERWISE SPECIFIED:
   A.) ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
   B.) ALL CAPACITOR VALUES ARE IN MICROFARADS.

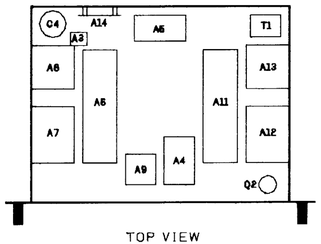
ASSEMBLY LOCATOR — A1 — A2

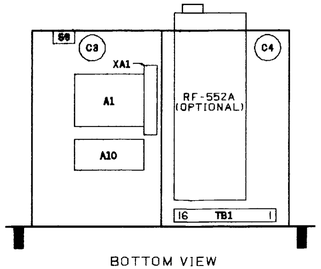












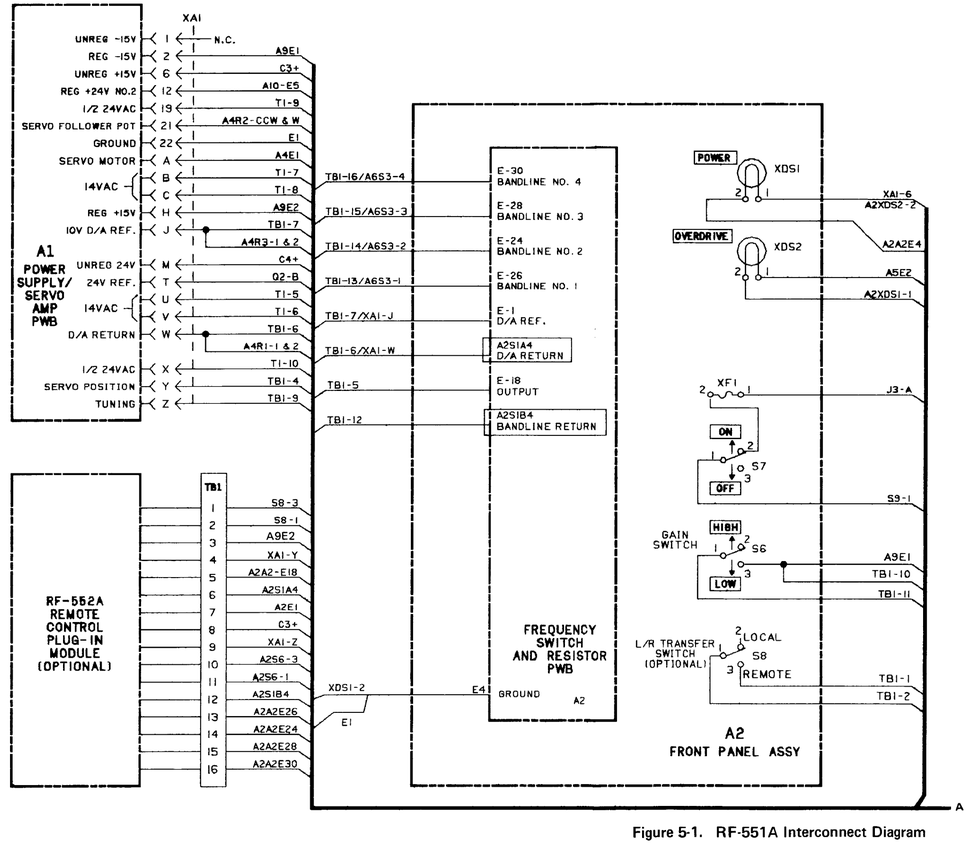


Figure 5-1. RF-551A Interconnect Diagram (Sheet 1 of 3)

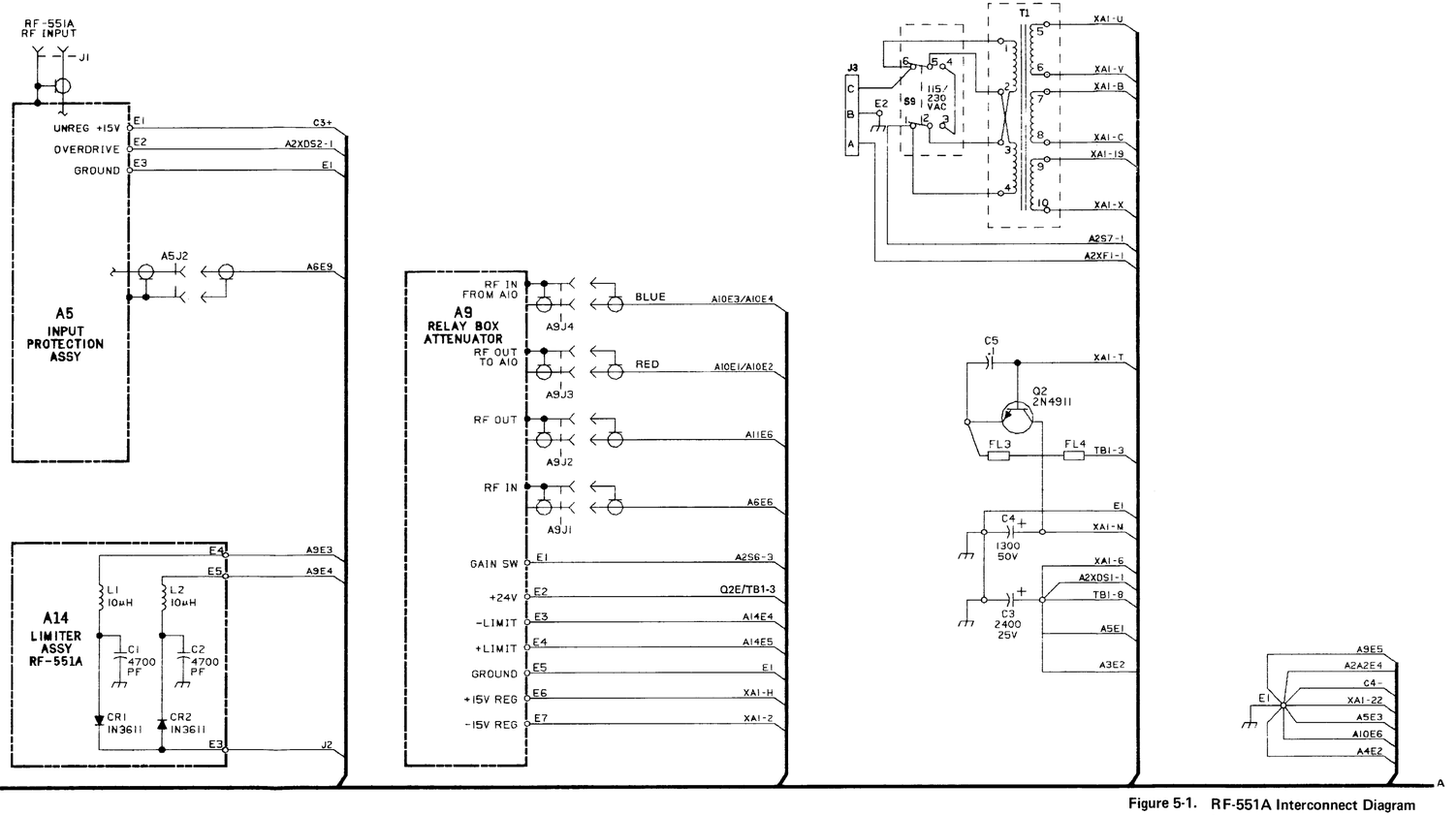


Figure 5-1. RF-551A Interconnect Diagram (Sheet 2 of 3)

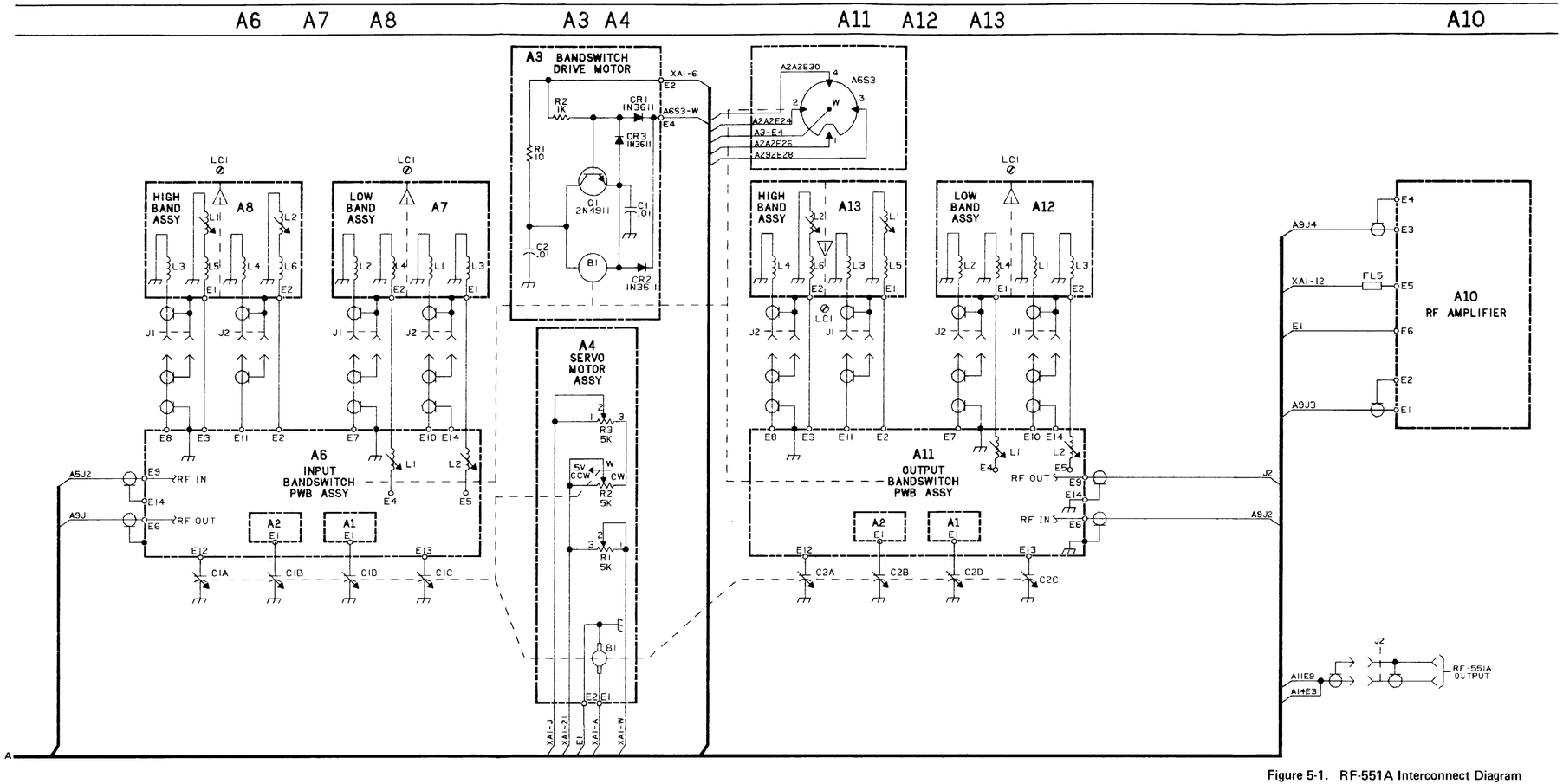


Figure 5-1. RF-551A Interconnect Diagram (Sheet 3 of 3)

Table 5-1. RF-551A Main Frame Parts List

Ref. Desig.	Description	Part No.
1	RF-551A Preselector	905-0000
C1, C2	Not Used	
C3	Capacitor, Fixed, Electrolytic, 2400 uF, 25 W Vdc	905-8003
C4	Capacitor, Fixed, Electrolytic, 1300 uF, 50 W, Vdc	905-8004
C5	Capacitor, Fixed, Ceramic, 0.1 uF, 50 V	C11-0005-104
Q1	Not Used	
Q2	Transistor, NPN	2N4911
T1	Transformer	905-0092
	Rear Panel	
J2	Connector, Receptacle	UG-625B/U
J3	Connector, Receptacle	MS3102A-14S-2P
P7	Connector, Plug	MS3106A-14S-2S
S9	Switch, Slide, DPST	10075-0221
TB1	Terminal Board	E31-0009-016

5.4 POWER SUPPLY/SERVO AMPLIFIER PWB A1

The power supply section of the Power Supply/Servo Amplifier PWB A1 converts the 115/230 volt, 50 to 400 Hz input to +15 volts regulated, +15 volts unregulated, -15 volt regulated, -15 volts unregulated, and +24 volts regulated.

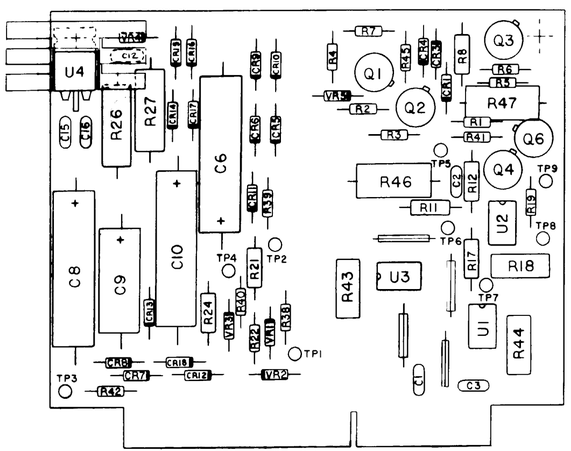
Diodes A1CR5, A1CR6, A1CR9, and A1CR10 provide full-wave rectification for the +15 regulated and unregulated supply. Zener diode VR1 provides regulation of the +15 volt regulated output. Zener diode VR2 regulates the D/A REF output at +10 Vdc.

Diodes A1CR7, A1CR8, A1CR12, and A1CR18 provide full-wave rectification for the -15 volt regulated and unregulated supply. Regulation for the -15 volt regulated output is provided by Zener diode A1VR3.

The +24 volt regulated supply has two outputs. One supplies the operating voltage for the RF amplifier PWB A10 and the other supplies all other +24 volt loads such as the relays on the A5 assembly and that of remote assembly. Full-wave rectification is provided by diodes A1CR14, A1CR15, A1CR16, and A1CR17. The +24 volt regulated supply to the RF amplifier PWB is provided by a +24 volt, 3 terminal regulator U4. Output current is internally limited at 1 ampere.

The servo amplifier section of Power Supply/Servo Amplifier PWB A1 consists essentially of three operational amplifiers (A1U1, A1U2, and A1U3) and two drive transistors (A1Q4 and A1Q6). Other components include potentiometers A1R18, A1R43, and A1R44, which allow adjustment of the op amps for any offset or inherent error voltage; and transistors A1Q1, A1Q2, and A1Q3, which are used to provide a ground on pin Z while the servo is running.

Both A1U1 and A1U3 have uniform gains of "1". In A1U2, the D/A converter input is compared with the servo potentiometer input. See figure 5-2 for PWB A1 component locations and schematic diagram. See table 5-2 for parts list information. A1U2 will generate a positive or negative output as a function of the polarity of the error voltage from the follower pot on the tuning servo. A positive output from A1U2 will turn on A1Q4, applying a positive voltage to the tuning servo motor. A negative output from A1U2 will turn on A1Q6, applying a negative voltage to the tuning servo motor. In this way, the servo motor can be made to run in either direction until a precise balance point is found, that is, where the follower potentiometer on the tuning servo agrees with the reference from the remote control module.



Power Supply/Servo Amplifier PWB A1 Components

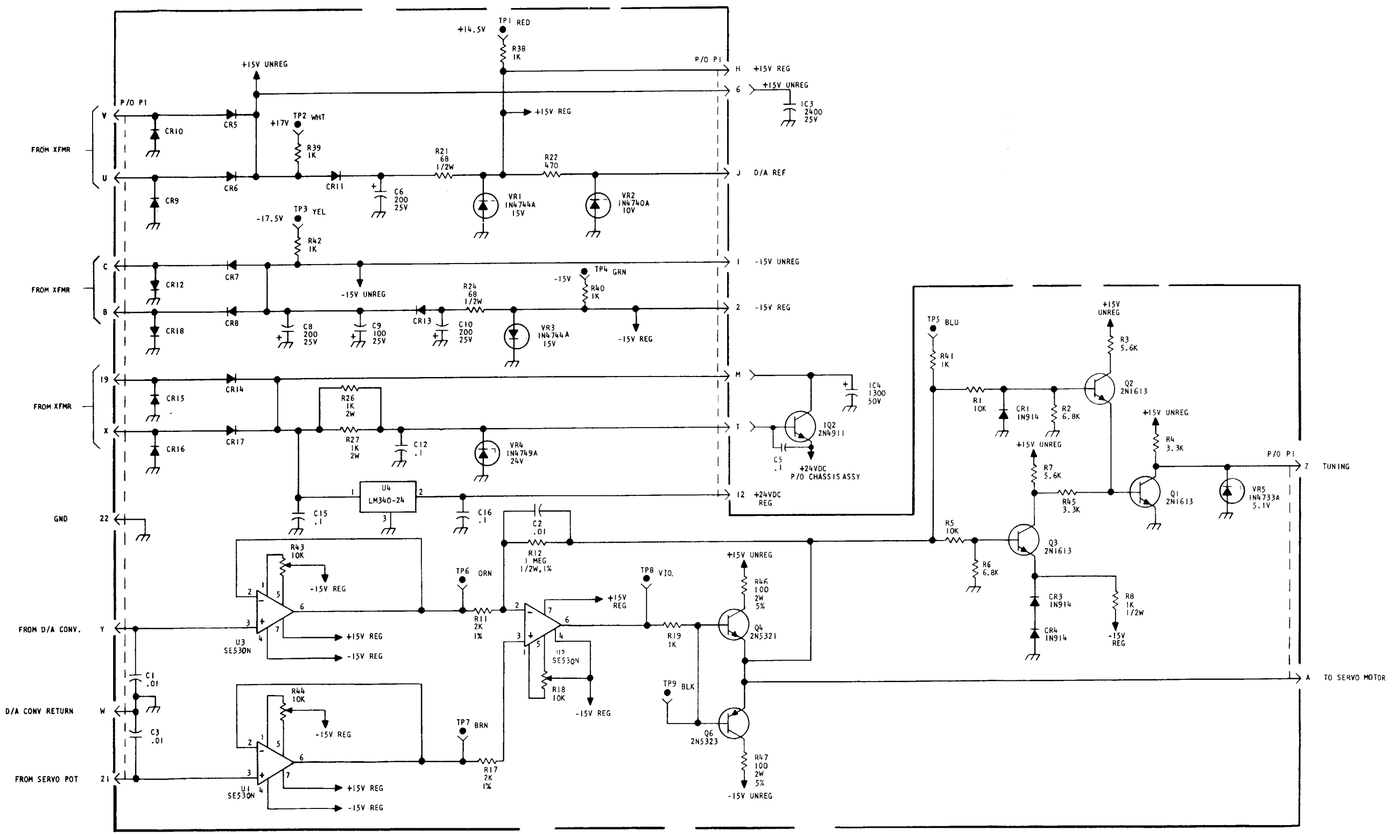


Figure 5-2. Power Supply/Servo Amplifier Schematic Diagram and Component Location Diagram

Table 5-2. Power Supply/Servo Amplifier Parts List

Ref. Desig.	Description	Part No.
A1	Power Supply/Servo Amplifier PWB Assembly	6705-0020
C1 – C3	Capacitor, Fixed, Ceramic, 0.01 uF, 50 W Vdc	C11-0005-103
C4, C5	Not Used	
C6	Capacitor, Fixed, Electrolytic, 200 uF, 25 W Vdc	10075-0216
C7	Not Used	
C8	Capacitor, Fixed, Electrolytic, 200 uF, 25 W Vdc	10075-0216
C9	Capacitor, Fixed, Electrolytic, 100 uF, 25 V	10075-0215
C10	Capacitor, Fixed, Electrolytic, 200 uF, 25 W Vdc	10075-0216
C11	Not Used	
C12	Capacitor, Fixed, Ceramic, 0.1 uF, 50 V	C11-0005-104
C13, C14	Not Used	
C15, C16	Capacitor, Fixed, Ceramic, 0.1 uF, 50 V	C11-0005-104
CR1	Diode	1N914
CR2	Not Used	
CR3, CR4	Diode	1N914
CR5 – CR18	Diode, 3A, 1 kV	CR-0034
Q1 – Q3	Transistor, NPN	2N1613
Q4	Transistor, NPN	2N5321
Q5	Not Used	
Q6	Transistor	2N5323
R1	Resistor, Fixed, Composition, 10K, 1/4 W, 5%	RCR07G103JM
R2	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R3	Resistor, Fixed, Composition, 5.6K, 1/4 W, 5%	RCR07G562JM
R4	Resistor, Fixed, Composition, 3.3K, 1/4 W, 5%	RCR07G332JM
R5	Resistor, Fixed, Composition, 10K, 1/4 W, 5%	RCR07G103JM
R6	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R7	Resistor, Fixed, Composition, 5.6K, 1/4 W, 5%	RCR07G562JM
R8	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR20G102JM
R9, R10	Not Used	
R11	Resistor, Fixed, Film, 2K, 1/8 W, 1%	RN60C2001F
R12	Resistor, Fixed, Film, 1m, 1/2 W, 1%	RN60C1004F
R13 – R16	Not Used	
R17	Resistor, Fixed, Film, 2K, 1/8 W, 1%	RN60C2001F
R18	Resistor, Variable, 10K	10075-0219
R19	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM
R20	Not Used	
R21	Resistor, Fixed, Composition, 68 ohms, 1/2 W, 5%	RCR20G680JM
R22	Resistor, Fixed, Composition, 470 ohms, 1/4 W, 5%	RCR07G471JM
R23	Not Used	
R24	Resistor, Fixed, Composition, 68 ohms, 1/2 W, 5%	RCR20G680JM
R25	Not Used	

Table 5-2. Power Supply/Servo Amplifier Parts List (Cont.)

Ref. Desig.	Description	Part No.
R26, R27	Resistor, Fixed, Composition, 1K, 2 W, 5%	RCR42G102JM
R28 – R37	Not Used	
R38 – R42	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM
R43, R44	Resistor, Variable, 10K	10075-0219
R45	Resistor, Fixed, Composition, 3.3K, 1/4 W, 5%	RCR07G332JM
R46, R47	Resistor, Fixed, Composition, 100 ohms, 2 W, 5%	RCR42G101JM
TP1	Test Jack, Red	J-0066
TP2	Test Jack, White	J-0065
TP3	Test Jack, Yellow	J-0070
TP4	Test Jack, Green	J-0068
TP5	Test Jack, Blue	J-0072
TP6	Test Jack, Orange	J-0069
TP7	Test Jack, Brown	J-0071
TP8	Test Jack, Violet	J-0073
TP9	Test Jack, Black	J-0067
U1 – U3	Integrated Circuit	10075-0246
U4	Voltage Regulator	I11-0001-008
VR1	Diode, Zener, 15 V	1N4744A
VR2	Diode, Zener, 10 V	1N4740A
VR3	Diode, Zener, 15 V	1N4744A
VR4	Diode, Zener, 24 V	1N4749A
VR5	Diode, Zener, 5.1 V	1N4733A

5.5 FRONT PANEL ASSEMBLY A2

Front panel assembly A2 (see figure 5-3 for the schematic diagram and table 5-3 for the parts list) consists of front panel switches S1 through S8 and Resistor PWB A2A1. This assembly; in conjunction with the servo amplifier section of A1, Bandswitch Motor Assembly A3, and Servo Motor Assembly A4; provides the control which tunes the RF-551A to the desired frequency.

Band selection is controlled by the 10 MHz and 1 MHz frequency switches (S1-B and S2-E) on the front panel. As the 10 MHz and 1 MHz frequency switches are positioned to the desired frequency, a ground is applied to one contact of open-seeking switch A6S3. Bandswitch motor A3B1 rotates while A6S3 seeks an open. When an open is found, the reed relays located in the first and second bandswitch circuits (A6/A11) have selected the proper band components for the desired frequency band. Refer to table 4-1.

Frequency selection is accomplished by use of a BCD to analog converter. The resistance between terminals E1 and E18 on Resistor PWB A2A1 is directly proportional to the frequency selected. For example, if the selected frequency was 21.754 MHz, the resistance between terminals E1 and E18 would be 21,754 ohms.

The resistance between the D/A return and terminal E18 is either 2000, 4000, 8000, or 16000 ohms depending upon whether band 1, 2, 3, or 4 is being used. This logic is performed by the interlocking switching of S1-A rear and S2-D. The largest resistor in use locks out any lower value so only one resistor will be connected. The resulting network is shown in simplified form in figure 5-4. The resistance between terminals E1 and E18 of the Resistor PWB is broken into two components; R_a which is equal to the minimum frequency of the band selected, and a series variable resistance having a maximum of R_a and a minimum value of zero ohms. Then, by applying a reference voltage across the total network, the output voltage will swing from $\frac{Eref}{2}$ to $\frac{Eref}{3}$ linearly with frequency. The net result is an analog voltage proportional to the position of the selected frequency in the band.

If a potentiometer of the range $0 - R_p$ is placed in series with two other resistors (R_p) having fixed values, and the potentiometer (A4R2) ganged to variable capacitors C1 and C2, the capacitors can be made to move in the same linear manner as the frequency. Because the useful range of the capacitor is less than 180°, small differences in R1, R2, and R3 on servo assembly A4 are necessary.

Refer to figure 5-5 for resistor PWB A2A1 components. A parts list for assembly A2A1 is given in table 5-4.

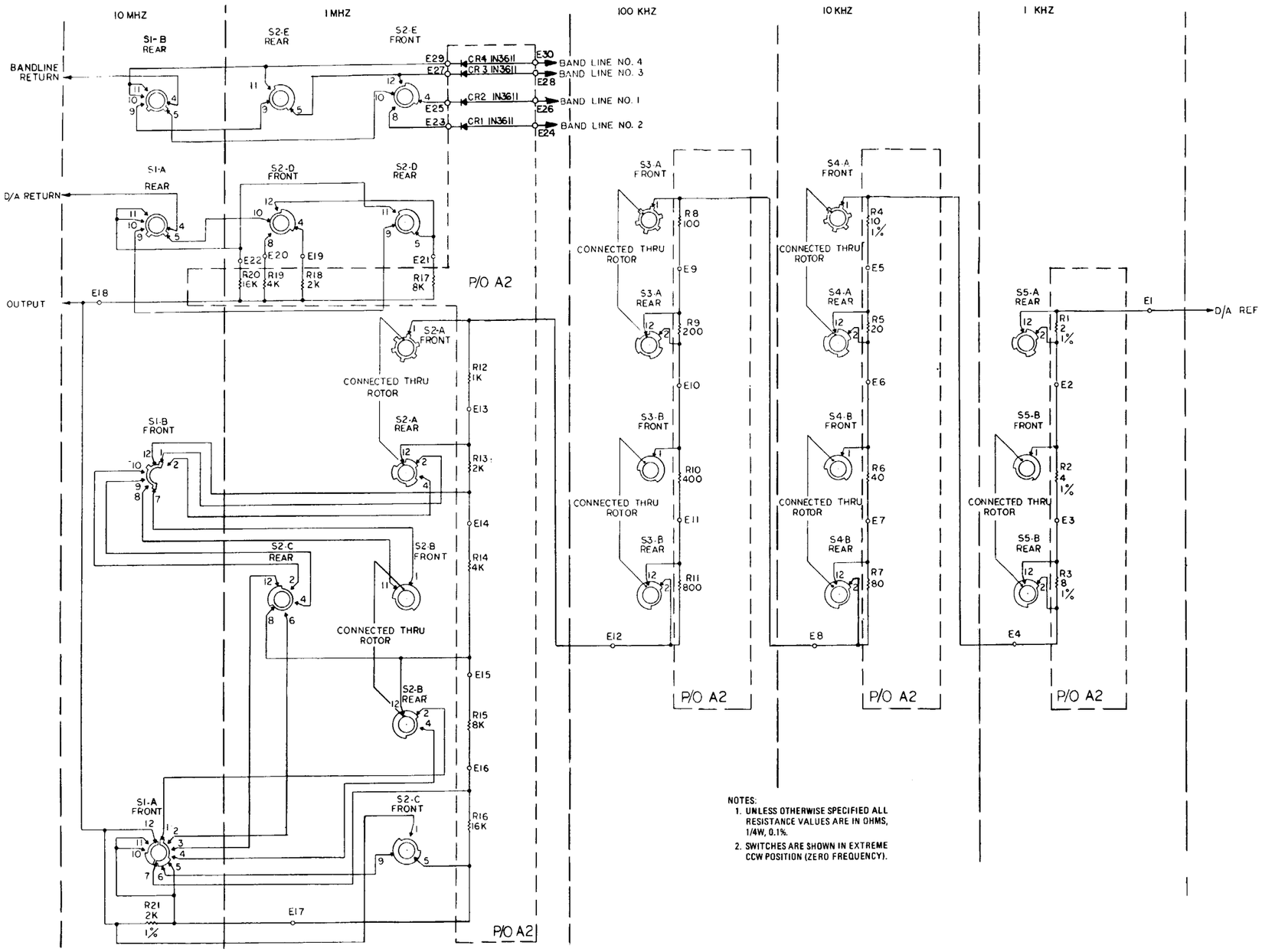


Figure 5-3. Frequency Switch and Resistor PWB A2 Schematic Diagram

Table 5-3. Front Panel Parts List

Ref. Desig.	Description	Part No.
DS1	Yellow Lens	LC12YT
DS2	Red Lens	LC12RT
F1	1/2 Amp. Fuse	F02A250V1/2A
S1	Switch, 10 MHz	905-0094
S2	Switch, 1 MHz	905-0093
S3 – S5	Switch	724-0015
S6	Switch (High/Low)	724-0017
S7	Toggle Switch (On/Off)	10075-0031
S8	Switch (with option RF-552 added)	724-0017
XDS1, XDS2	Lamp Holder	LH31/1
XF1	Fuse Holder	X-0006
	Knob 0-2	724-0193
	Knob 0-9	724-0194
	Knob High/Low	MP-0000

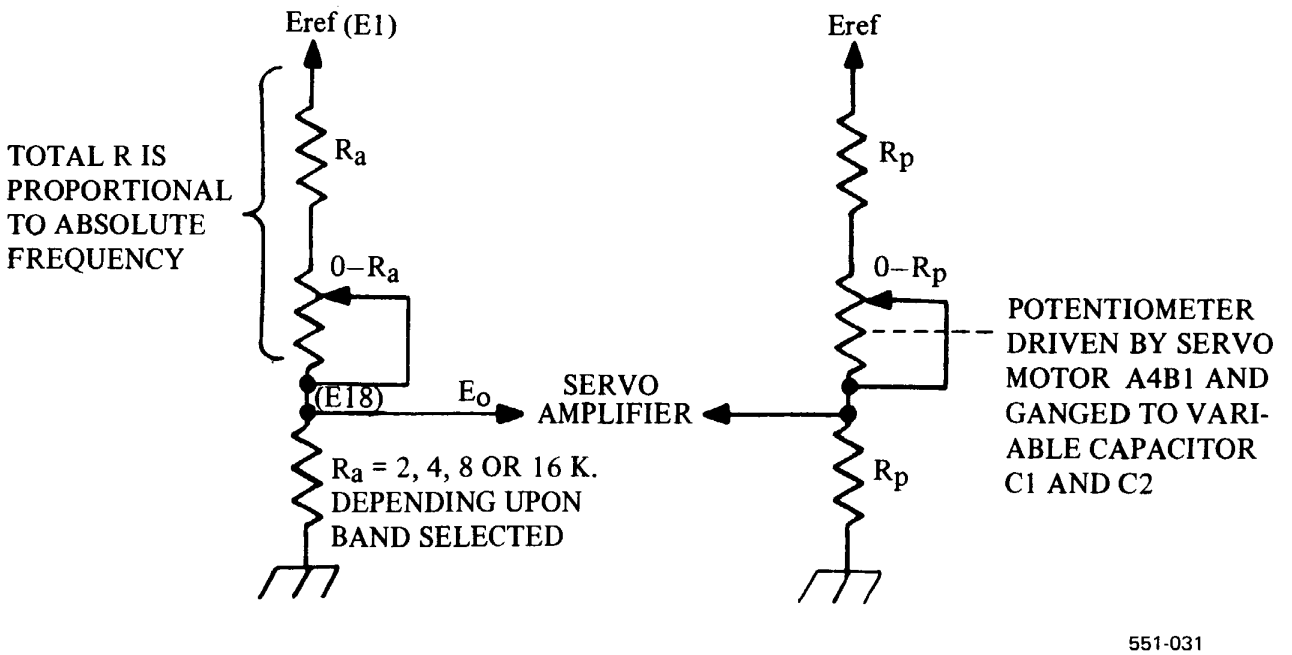
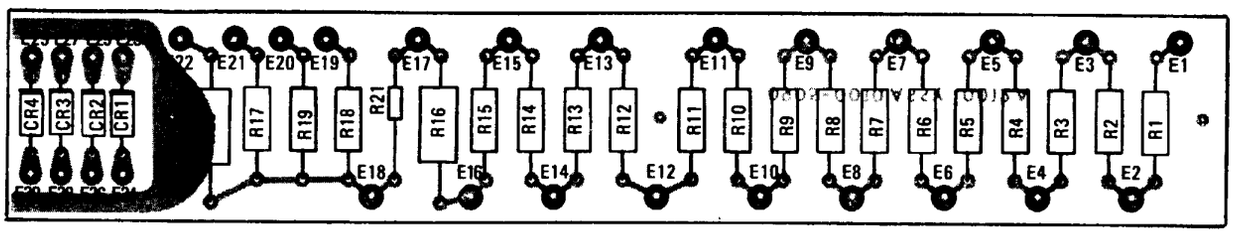


Figure 5-4. Simplified Tuning System



COMPONENT VIEW SHOWING REVERSE SIDE TRACK

Figure 5-5. Resistor PWB A2A1 Components

Table 5-4. Resistor PWB Assembly A2A1 Parts List

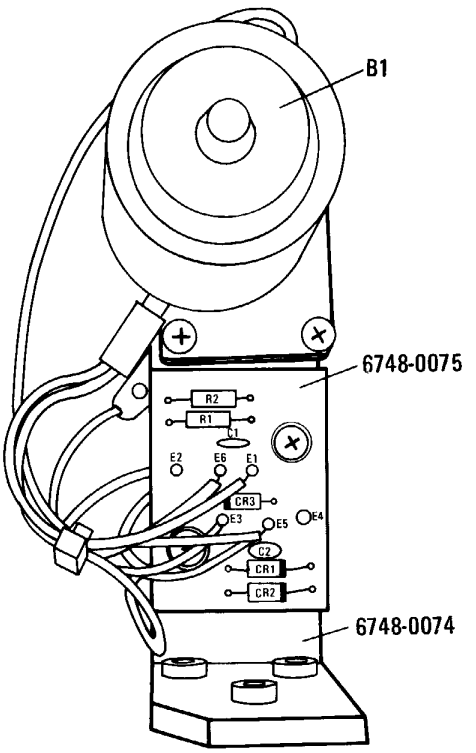
Ref. Desig.	Description	Part No.
A2A1	Resistor PWB Assembly	905-0010
CR1 to CR4	Diode	D10-3611-000
MP1	PWB	905-0012
R1	Resistor, Fixed Wirewound, 2 ohms, 1/4 W, 1%	905-0013-001
R2	Resistor, Fixed Wirewound, 4 ohms, 1/4 W, 1%	905-0013-002
R3	Resistor, Fixed Wirewound, 8 ohms, 1/4 W, 1%	905-0013-003
R4	Resistor, Fixed Wirewound, 10 ohms, 1/4 W, 1%	905-0013-004
R5	Resistor, Fixed Wirewound, 20 ohms, 1/4 W, 0.1%	905-0013-005
R6	Resistor, Fixed Wirewound, 40 ohms, 1/4 W, 0.1%	905-0013-006
R7	Resistor, Fixed Wirewound, 80 ohms, 1/4 W, 0.1%	905-0013-007
R8	Resistor, Fixed Wirewound, 100 ohms, 1/4 W, 0.1%	905-0013-008
R9	Resistor, Fixed Wirewound, 200 ohms, 1/4 W, 0.1%	905-0013-009
R10	Resistor, Fixed Wirewound, 400 ohms, 1/4 W, 0.1%	905-0013-010
R11	Resistor, Fixed Wirewound, 800 ohms, 1/4 W, 0.1%	905-0013-011
R12	Resistor, Fixed Composition, 1K, 1/4 W, 0.1%	905-0013-012
R13	Resistor, Fixed Composition, 2K, 1/4 W, 0.1%	905-0013-013
R14	Resistor, Fixed Wirewound, 4K, 1/4 W, 0.1%	905-0013-014
R15	Resistor, Fixed Wirewound, 8K, 1/4 W, 0.1%	905-0013-015
R16	Resistor, Fixed Wirewound, 16K, 1/2 W, 0.1%	905-0013-016
R17	Same as 1A2R15	
R18	Same as 1A2R13	
R19	Same as 1A2R14	
R20	Same as 1A2R16	
R21	Resistor, Fixed Film, 2K, 1/4 W, 1%	RN60C2001F

5.6 BANDSWITCH MOTOR ASSEMBLY A3

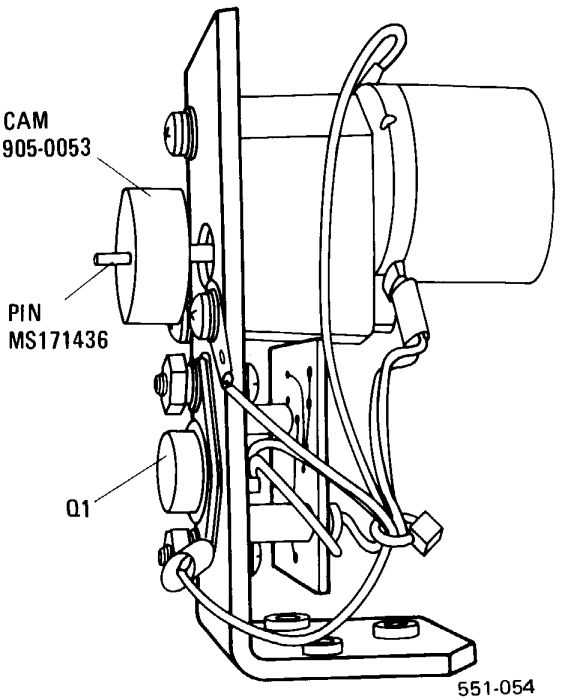
Bandswitch Motor Assembly A3, shown in figure 5-6, consists of motor A3B1, transistor Q1, and diodes CR1, CR2, and CR3. Motor A3B1 drives bandswitches A6 and A11 through a cam arrangement. It is controlled by open-seeking switch A6S3. Transistor Q1 acts as a dynamic brake to quickly stop motor rotation once an open has been found by A6S3. A parts list for A3 is given in table 5-5.

Table 5-5. Bandswitch Motor Assembly A3 Parts List

Ref. Desig.	Description	Part No.
A3	Bandswitch Motor Assembly	6748-0070
B1	Bandswitch, Motor, mfr 11680	B-0038
A3A1	Bandswitch, Motor PWB	6748-0075
C1, C2	Capacitor, Fixed Ceramic, .01 uF	C11-0005-103
CR1 to CR3	Diode	D10-3611-000
Q1	Transistor	2N4911
R1	Resistor, Fixed Composition, 10 ohms, 1/4 W, 10%	RCR07G100JM
R2	Resistor, Fixed Composition, 1K, 1/4 W, 10%	RCR07G102JM



551-053



551-054

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTORS ARE IN OHMS, 1/4W, ±10%.
   B. ALL CAPACITORS ARE IN MICROFARADS.
2. PREFIX ALL REFERENCE DESIGNATORS WITH 1A3 AND APPLICABLE SUB-ASSEMBLY DESIGNATOR,

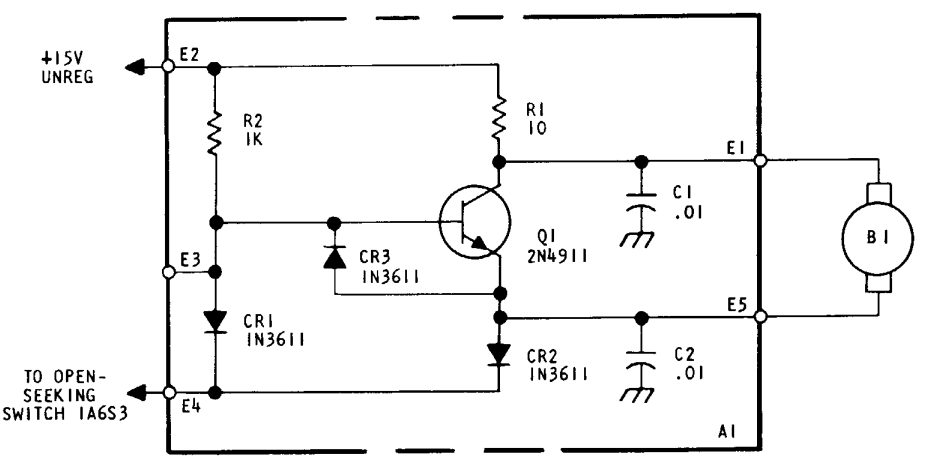


Figure 5-6. Bandswitch Motor Assembly A3 Component Location Diagram and Schematic Diagram

5.7 SERVO MOTOR ASSEMBLY A4

For information on Front Panel control refer to paragraph 5.5. The following description refers to the control of the A4 Servo Motor Assembly by the RF-552. This servo motor is controlled by the selection of divider networks on the relay PWB. The output of the D/A Converter (pin Y) drives the servo amplifier in the RF-551A which in turn drives the servo motor B1. The servo motor is ganged to potentiometer A4R2 and the SLF (Straight Line Frequency) capacitor C1 and C2. In this manner, the servo motor will move C1 and C2 until the output of the D/A Converter in the Remote Control Module and the output of potentiometer A4R2 equal each other. When the outputs are equal, capacitors C1 and C2 are positioned for the selected frequency. See table 5-6 for the A4 Assembly parts list and figure 5-7 for the component location and schematic diagram.

Table 5-6. Servo Motor Assembly A4 Parts List

Ref. Desig.	Description	Part No.
A4	Servo Motor Assembly	6705-5000
R1	Resistor, Variable, Cermet, 5K	10075-0006
R2	Resistor, Variable, Wirewound, 5K	10075-0222
R3	Resistor, Variable, Cermet, 5K	10075-0006

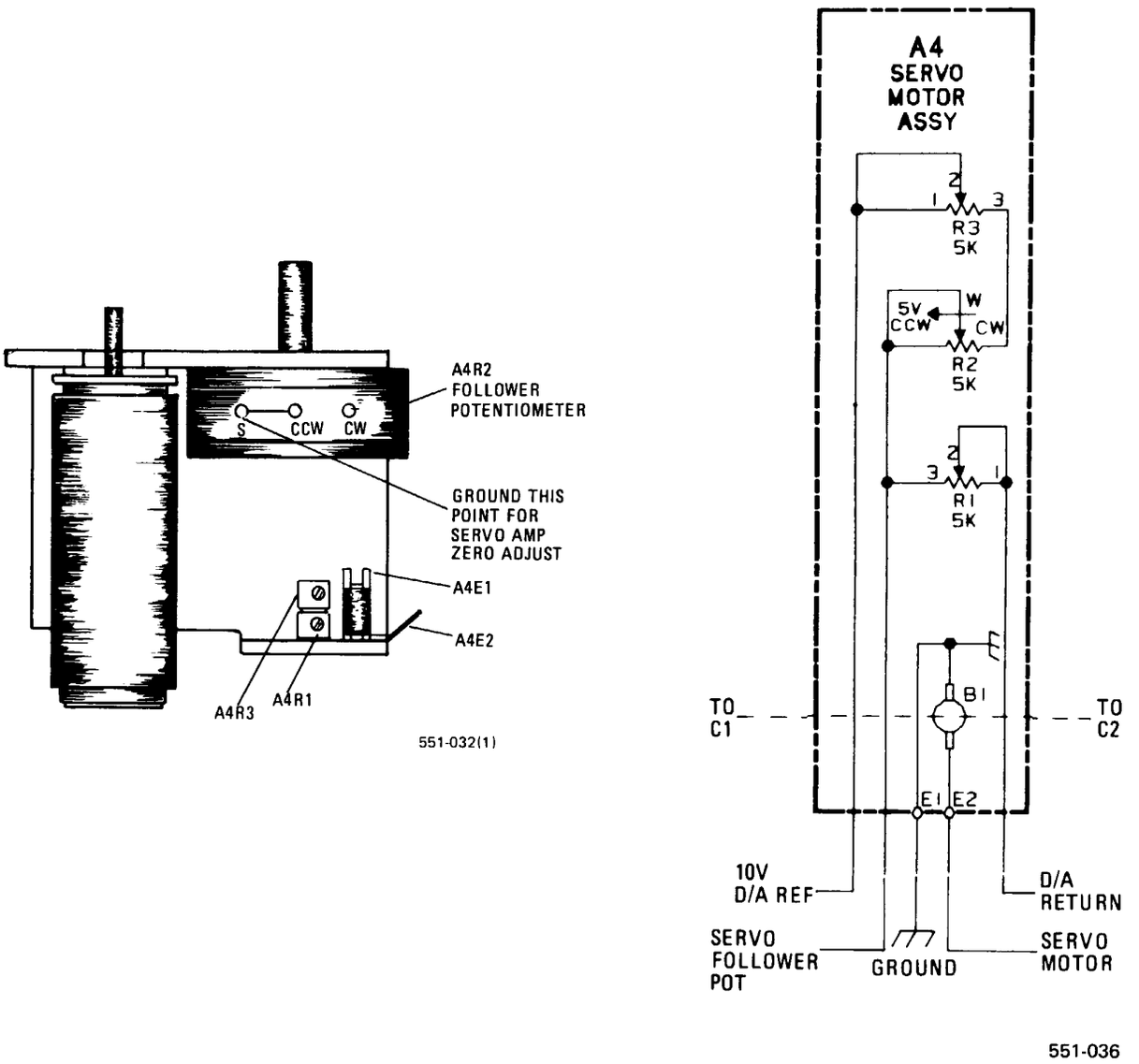


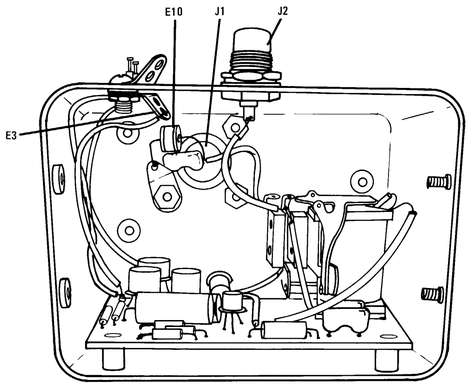
Figure 5-7. Servo Motor Assembly A4 Component Location Diagram and Schematic Diagram

5.8 INPUT PROTECTION CIRCUIT A5

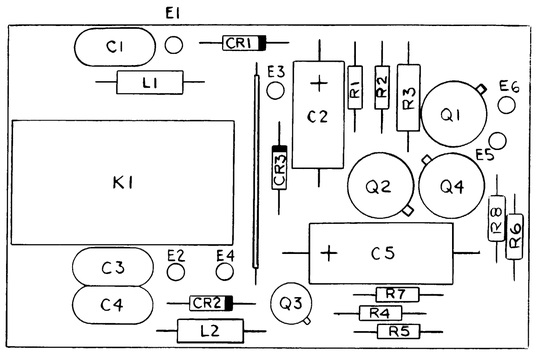
As the signal level reaches 71 Vrms, the overdrive sensing diode A5CR1 will develop a sufficient voltage to turn on the indication lamp. This causes A5K1 on the Protection Assembly to deenergize. The signal will be routed to E2 on the Overdrive Protection A5A1 PWB. This effectively opens the signal path and prevents damage to the preselector.

Depending on impedance and the length of transmission lines, it is possible to have the voltage change from its maximum rms voltage with the input connected to the preselector to no voltage when the input is open circuited. Such a condition would cause A5K1 to chatter. To prevent this, feedback resistors A5A1R4 and A5A1R5 latch A5A1Q1 on, once A5K1 is deenergized. Then, in approximately three seconds, unijunction transistor A5A1Q3 will turn on, shorting the feedback voltage. If no detected RF is present, A5A1Q1 will turn off and return the circuit to normal operation.

If a detected RF signal is present, the voltage holds A5A1Q1 on until A5A1Q3 turns off again. At this point, the feedback from A5A1Q3 latches the circuit again. This sampling occurs every three seconds until the overload is removed, at which time the protection circuit will automatically reconnect the preselector to the RF input. Figure 5-8 is the Input Protection Assembly schematic and component location diagrams. Table 5-7 is the Input Protection Assembly parts list.



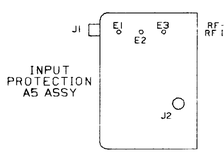
Assembly Component Diagram



PWB Component Location Diagram

NOTE:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
   B. ALL CAPACITOR VALUES ARE IN MICROFARADS.
   D. K1 SHOWN ENERGIZED.
3. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.



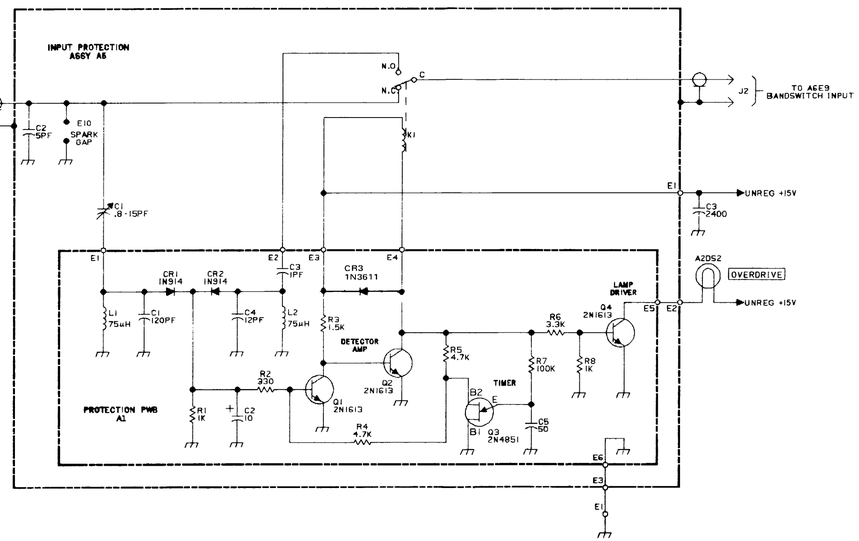


Figure 5-8. Input Protection A5 Component Location and Schematic Diagram

Table 5-7. Input Protection Assembly A5 Parts List

Ref. Desig.	Description	Part No.
A5	Input Protection	905-4000
C1	Capacitor, Variable, 0.5 - 16 pF	10075-0225
C2	Capacitor, Mica, 5 pF	CM05CD050D03
E10	Surge Arrestor, 230 V	10075-0224
J1	Panel, Receptacle, Type N	UG58A/U
J2	Jack, Connector, Phono Jack	10075-0273
A5A1	Input Protection PWB Assembly	905-4010
C1	Capacitor, Fixed, Mica, 120 pF	CM05FD121J03
C2	Capacitor, Fixed, Electrolytic, 10 uF, 12 W Vdc	10075-0212
C3	Capacitor, Fixed, Mica, 1 pF	CM05CD010K03
C4	Capacitor, Fixed, Mica, 12 pF	CM05CD120K03
C5	Capacitor, Fixed, Electrolytic, 50 uF, 25 W Vdc	10075-0214
CR1, CR2	Diode	1N914
CR3	Diode	D10-3611-000
K1	Relay	10075-0218
L1, L2	Inductor, Choke, 75 uH	L10-0006-750
Q1, Q2	Transistor, NPN	2N1613
Q3	Transistor, Unijunction	2N4851
Q4	Transistor, NPN	2N1613
R1	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM
R2	Resistor, Fixed, Composition, 330 ohms, 1/4 W, 5%	RCR07G331JM
R3	Resistor, Fixed, Composition, 1.5K, 1/2 W, 5%	RCR20G152JM
R4, R5	Resistor, Fixed, Composition, 4.7K, 1/4 W, 5%	RCR07G472JM
R6	Resistor, Fixed, Composition, 3.3K, 1/4 W, 5%	RCR07G332JM
R7	Resistor, Fixed, Composition, 100K, 1/4 W, 5%	RCR07G104JM
R8	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM

5.9 BANDSWITCH ASSEMBLY A6 AND A11

The slider bar is moved by the selection of a frequency at the front panel of the control unit. This causes the reed relay to be activated and select the proper resonant filter assembly and connect it with the proper section of C1 and C2.

Table 5-8 is a parts list for the Input Bandswitch PWB Assembly A6/A11. Figure 5-9 is the component location diagram and schematic diagram of the input bandswitch.

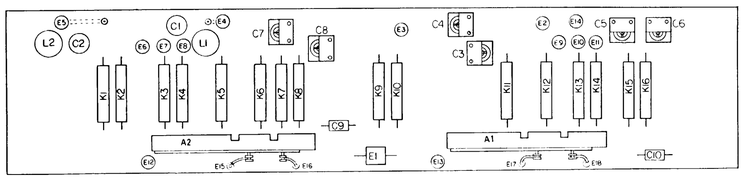
Figure 5-10 is the schematic diagram and component location diagram of the output bandswitch.

Table 5-8. Input Bandswitch PWB Assembly A6/A11 Parts List

Ref. Desig.	Description	Part No.
A6	Input Bandswitch PWB Assembly	10074-1650
A11	Output Bandswitch PWB Assembly	10074-1640
C1, C2	Capacitor, Variable, 0.6 - 5.5 pF	10075-0223
C3 – C8	Capacitor, Variable, 1.5 - 11.6 pF	10075-0001
C9, C10	Capacitor, Porc., 47 pF	10075-0217
E1	Surge Arrestor (A6 Assembly only)	CG230L
E2 – E14	Terminal PWB	E36-0011-002
K1 to K16	Reed Switch	10074-0011
L1, L2	Trimmer Coil	10074-0013
A6A1/A6A2	Input Vertical Relay PWBs	10074-0700
A11A1/ A11A2	Output Vertical Relay PWBs	10074-0800
K1, K2	Reed Switch	10074-0011

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. RELAYS ARE SHOWN WITH BARS A & B IN THE BACK POSITION. WHEN BAR MOVES FORWARD ALL RELAYS ASSOCIATED WITH PARTICULAR BAR WILL SWITCH TO OPPOSITE POSITION SHOWN.



BAR POSITION CHART

FREQ. MHZ	BAR A	BAR B
2-3.999	FORWARD	FORWARD
4-7.999	FORWARD	BACK
8-15.999	BACK	FORWARD
16-29.999	BACK	BACK

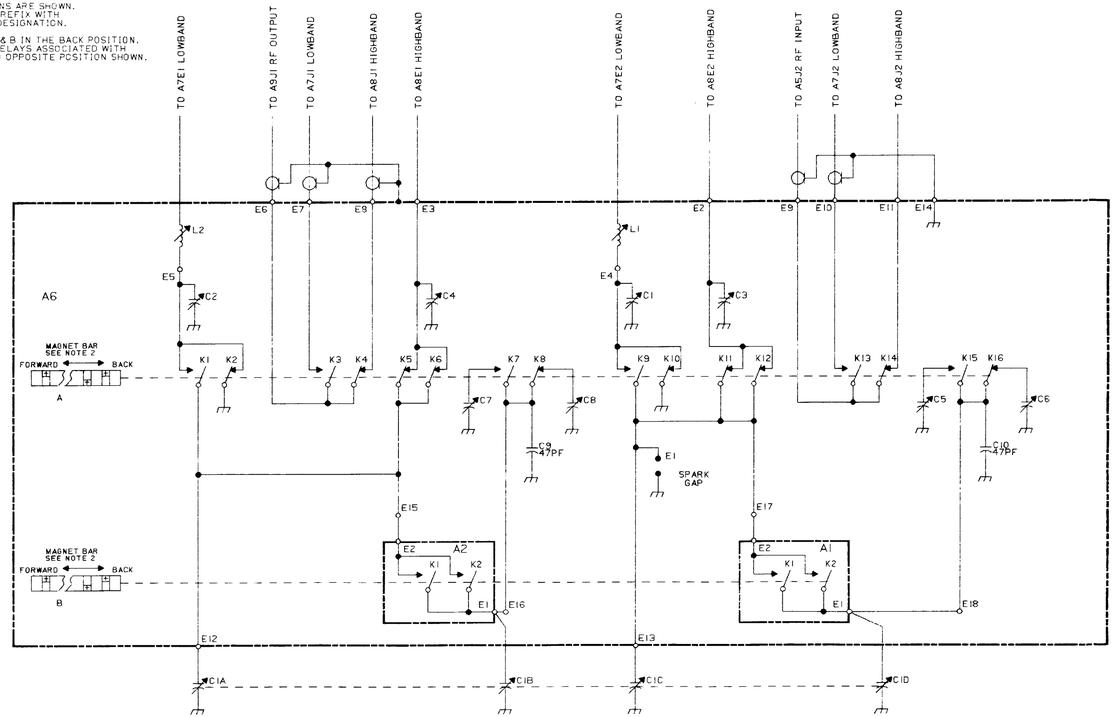
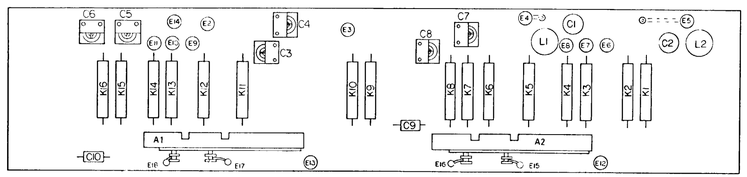


Figure 5-9. Input Bandswitch A6 Schematic Diagram and Component Location Diagram



NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. RELAYS ARE SHOWN WITH BARS C & D IN THE BACK POSITION. WHEN BAR MOVES FORWARD ALL RELAYS ASSOCIATED WITH PARTICULAR BAR WILL SWITCH TO OPPOSITE POSITION SHOWN.

BAR POSITION CHART

FREQ. MHZ	BAR D	BAR C
2-3.999	FORWARD	FORWARD
4-7.999	FORWARD	BACK
8-15.999	BACK	FORWARD
16-29.999	BACK	BACK

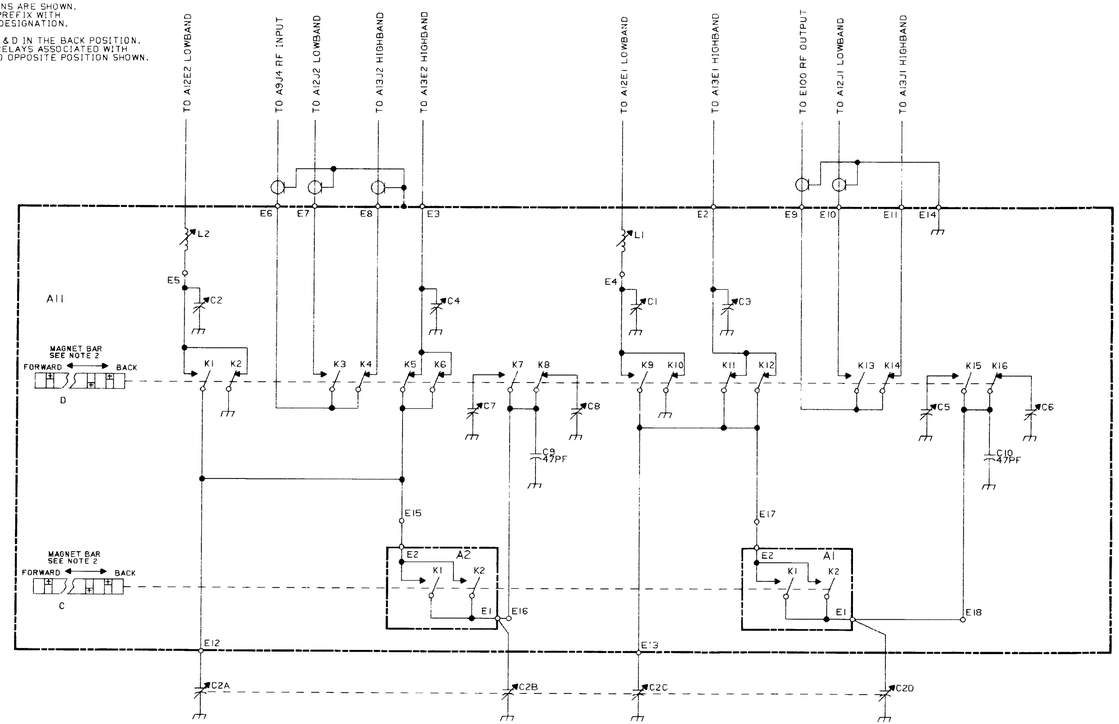


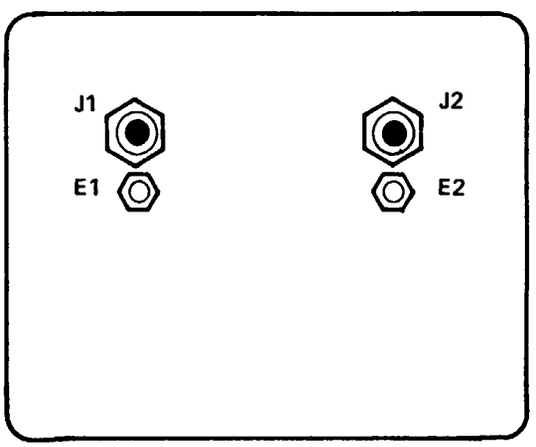
Figure 5-10. Output Bandswitch A11 Schematic Diagram and Component Location Diagram

5.10 HIGH BAND A8/A13 ASSEMBLIES

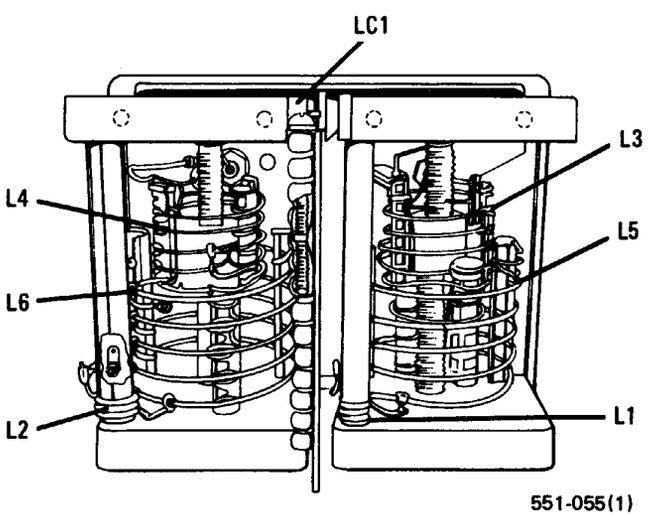
Resonators A8/A13 and A7/A12 are not likely to fail in the field and cannot be repaired. See table 5-9 for ordering new resonators. Figures 5-11 and 5-12 show the connector and component locations on these assemblies.

Table 5-9. Resonator Module Assembly Parts List

Ref. Desig.	Description	Part No.
A8, A13	High Band Resonator Module Assembly	0905-3000
A7, A12	Low Band Resonator Module Assembly	0905-2000



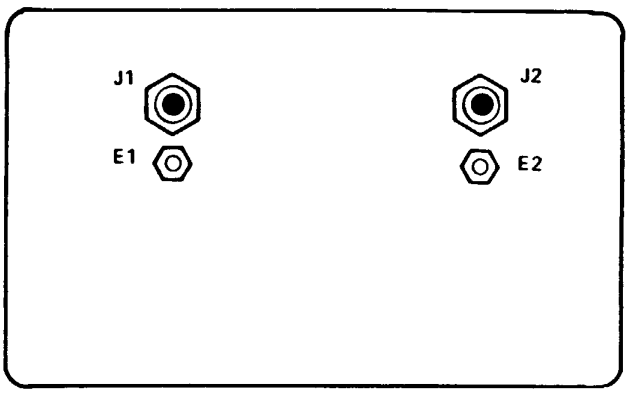
551-034



551-055(1)

Figure 5-11. High Band Assemblies A8/A13

5.11 LOW BAND A7/A12 ASSEMBLIES



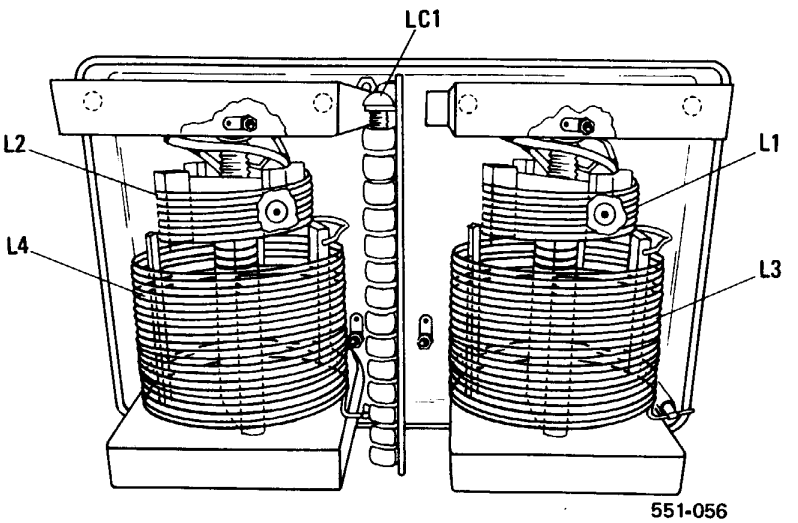


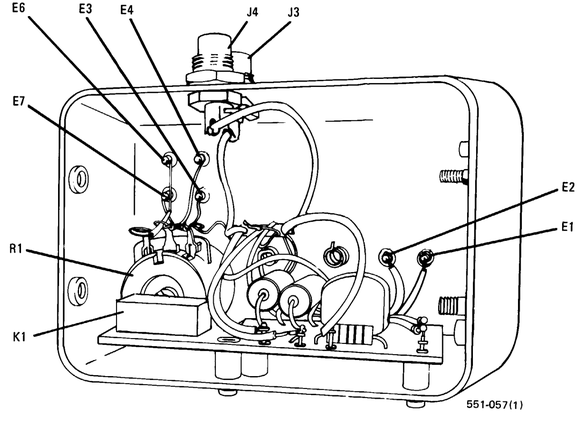
Figure 5-12. Low Band Assemblies A7/A12

5.12 RELAY BOX ATTENUATOR A9

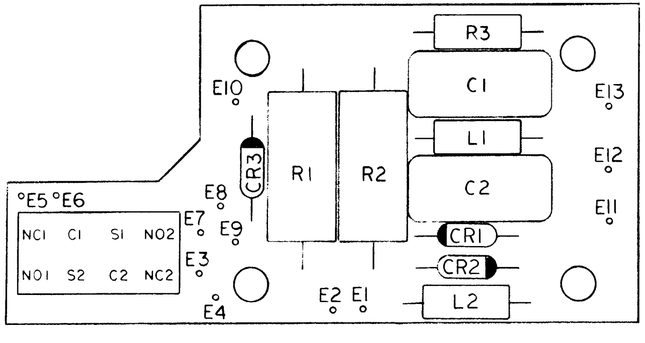
Although RF Amplifer A10 and the receiver will withstand moderate overloads for prolonged periods, additional protection (limiting) is provided before the RF amplifier in the Relay Box Attenuator A9 (figure 5-13). This limiter consists of two diodes of opposite polarities connected across a 50-ohm line. The diodes on A9 may be prebiased by potentiometers A9R1A and A9R1B. Therefore, the maximum RF voltage may be limited over a range of approximately 0.5 to 15.0 volts. The attenuator in A9 is bypassed when the GAIN switch is set to HIGH. Refer to table 5-10 for parts list of the A9 assembly.

Table 5-10. Relay Box Attenuator A9 Parts List

Ref. Desig.	Description	Part No.
A9	Relay Box Attenuator Module Assembly	6705-7000
J1	Connector, Phono Jack; mfr 82389	10075-0273
J2 – J4	Same as 1A9J1	
R1	Resistor, Variable, Twin	905-8001
9A1	Relay Box Attenuator PWB Assembly	6705-7010
C1	Capacitor, Fixed, Mica, 4700 pF	CM06FD472J03
C2	Same as 1A9A1C1	
CR1	Diode	905-3611
CR2	Same as 1A9A1CR1	
CR3	Diode	D10-3611-000
K1	Relay, RF, DPDT, 24 Vdc	6705-7003
L1	Inductor, Choke, 10 uH; mfr 99800	L10-0007-100
L2	Same as 1A9A1L1	
R1	Resistor, Fixed Composition, 33 ohm, 2 W, 10%	RCR42G330JM
R2	Same as 1A9A1R1	
R3	Resistor, Fixed Composition, 18 ohms, 1/2 W, 10%	RCR20G180JM



Assembly Component Diagram



PWB Component Location Diagram

NOTES: UNLESS OTHERWISE SPECIFIED:
1. RESISTOR VALUES ARE IN OHMS, 1/4W, ±10%.

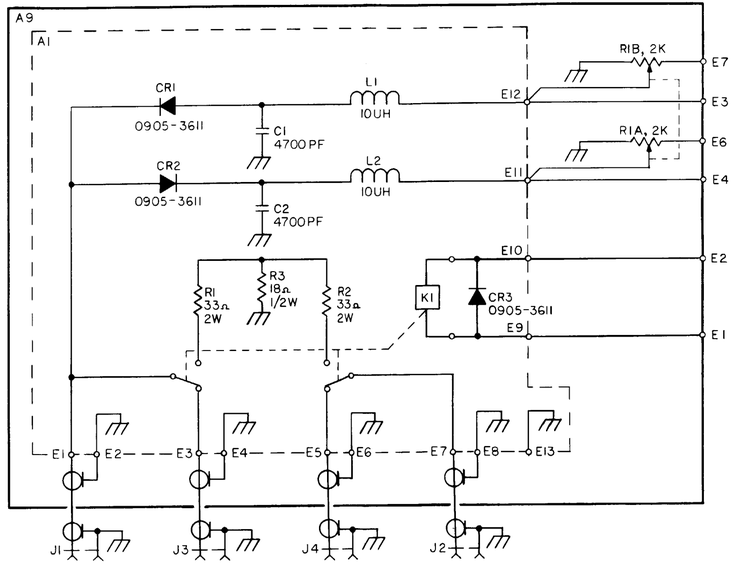


Figure 5-13. Relay Box Attenuator A9 Schematic Diagram and Component Location Diagram

5.13 RF AMPLIFIER PWB A10

RF Amplifier A10, shown in figure 5-14, is a linear, broadband two-stage transistor amplifier. Amplifiers A10Q1 and A10Q2 provide amplification. Resistor A10R8 and the combination of A10R12 through A10R15 stabilize the amplification of A10Q1 and provide a 12.5-ohm input impedance. The input impedance of the A10Q1 state is transformed to a 50-ohm input impedance of the RF amplifier by A10T1.

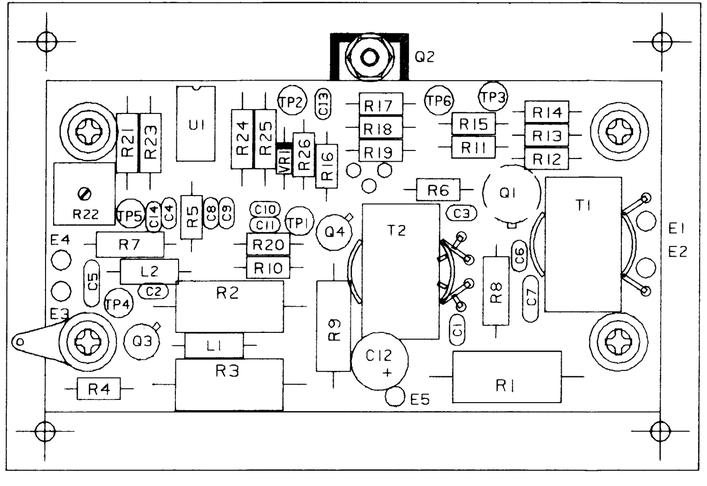
Transformer A10T2 is used to reduce the current swing of A10Q1 by stepping up the input impedance of the A10Q2 stage. Resistor A10R7 and the combination of A10R17 through A10R19 stabilize the second stage as well as provide a 50-ohm output impedance.

The combination of A10U1B and A10Q4 provide current biasing for A10Q1 by monitoring the voltage drop across A10Q1s emitter combination. This in turn determines the amount of base drive that can be applied to A10Q1 in order to keep a constant collector current. A10U1A and A10Q3 provide a similar function in controlling A10Q2s collector current.

A parts list for RF Amplifier PWB A10 is given in table 5-11.

Operation of the RF Amplifier Assembly A10 can be confirmed by a static (no signal applied) test and an active (gain) test. The static tests require applying +24 volts, and then monitoring the various test points. TP2 should measure $\approx$ .35 volts during operation and TP3 should measure between 0.35 and 0.36 volts if Q1 is operating properly. The Q2 state is adjustable to select the optimum operating point. Adjust R22 for 0.78 volts at TP6.

To check the gain of the amplifier, connect A9P3 to a signal generator set to 8.0 MHz. Adjust the applied signal level to -20 dBm. Connect A9P4 to the spectrum analyzer and confirm that a gain of 18 - 22 dB does exist. If both the static and active tests are passed, the amplifier is operating properly.



NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

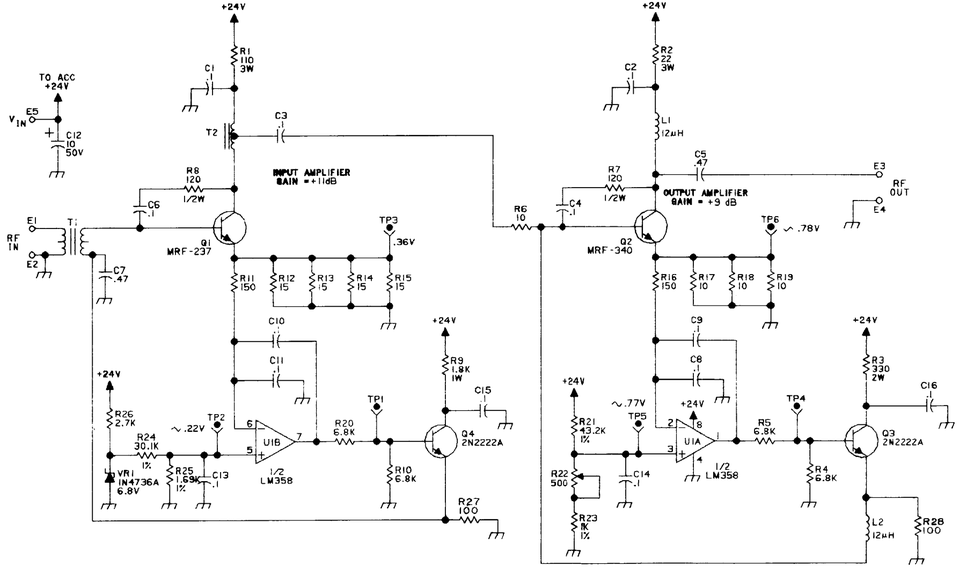


Figure 5-14. RF Amplifier PWB A10 Schematic Diagram and Component Location Diagram

Table 5-11. RF Amplifier PWB A10 Parts List

Ref. Desig.	Description	Part No.
A10	RF Amplifier PWB Assembly	10096-0030
C1 - C4	Capacitor, Fixed, 0.1 uF	C11-0005-104
C5	Capacitor, Fixed, 0.47 uF	C11-0005-474
C6	Capacitor, Fixed, 0.1 uF	C11-0005-104
C7	Capacitor, Fixed, 0.47 uF	C11-0005-474
C8 - C11	Capacitor, Fixed, 0.1 uF	C11-0005-104
C12	Capacitor, Fixed, Electrolytic, Tantalum, 10 uF, 50 W Vdc	C26-0050-100
C13, C14	Capacitor, Fixed, 0.1 uF	C11-0005-104
L1, L2	Inductor, 12 uH	MS14046-5
Q1	Transistor, Mfr. Motorola MRF-237	Q25-0014-000
Q2	Transistor, Mfr. Motorola MRF-340	Q25-0016-000
Q3, Q4	Transistor, 2N2222A	2N2222A
R1	Resistor, Fixed, Metal Film, 110 ohm, 3 W	R80-0004-004
R2	Resistor, Fixed, Metal Film, 22 ohm, 3 W	R80-0004-003
R3	Resistor, Fixed, Composition, 330 ohm, 2 W	RCR42G331JM
R4, R5	Resistor, Fixed, 6.8K ohm	R65-0003-682
R6	Resistor, Fixed, 10 ohm	R65-0003-100
R7	Resistor, Fixed, 120 ohm, 1/2 W	R65-0004-121
R8	Resistor, Fixed, 120 ohm, 1/2 W	R65-0004-121
R9	Resistor, Fixed, Composition, 1.8K ohm, 1 W	RCR32G182JM
R10	Resistor, Fixed, 6.8K ohm	R65-0003-682
R11	Resistor, Fixed, 150 ohm	R65-0003-151
R12 - R15	Resistor, Fixed, 15 ohm	R65-0003-150
R16	Resistor, Fixed, 150 ohm	R65-0003-151
R17 - R19	Resistor, Fixed, 10 ohm	R65-0003-100
R20	Resistor, Fixed, 6.8K ohm	R65-0003-682
R21	Resistor, Fixed, 43.2K ohm, 1%	R16-0004-623
R22	Resistor, Variable, 500 ohm	R-2205
R23	Resistor, Fixed, 1K ohm, 1%	R16-0004-012
R24	Resistor, Fixed, 30.1K ohm, 1%	R16-0004-473
R25	Resistor, Fixed, 1.69K ohm, 1/8 W, 1%	R16-0004-232
R26	Resistor, Fixed, 2.7K ohm	R65-0003-272
T1	Transformer, 2:1	10079-1460
T2	Transformer, 2:1	10096-0035
TP1	Test point, brown	J-0071
TP2	Test point, red	J-0066
TP3	Test point, orange	J-0069
TP4	Test point, yellow	J-0070
TP5	Test point, green	J-0068
TP6	Test point, blue	J-0072

Table 5-11. RF Amplifier PWB A10 Parts List (Cont.)

Ref. Desig.	Description	Part No.
U1	Integrated circuit, LM-358N	130-0020-103
VR1	Diode, Zener, 6.8 V, 5%	1N4736A

5.14 LIMITER ASSEMBLY A14

This limiter consists of two diodes of opposite polarities connected across a 50-ohm line. The diodes on A14 are prebiased by potentiometers A9R1A and A9R1B. The maximum RF voltage may be limited over a range of approximately 0.5 to 15.0 volts. Figure 5-15 shows the schematic and component location diagrams. Table 5-12 contains parts list information.

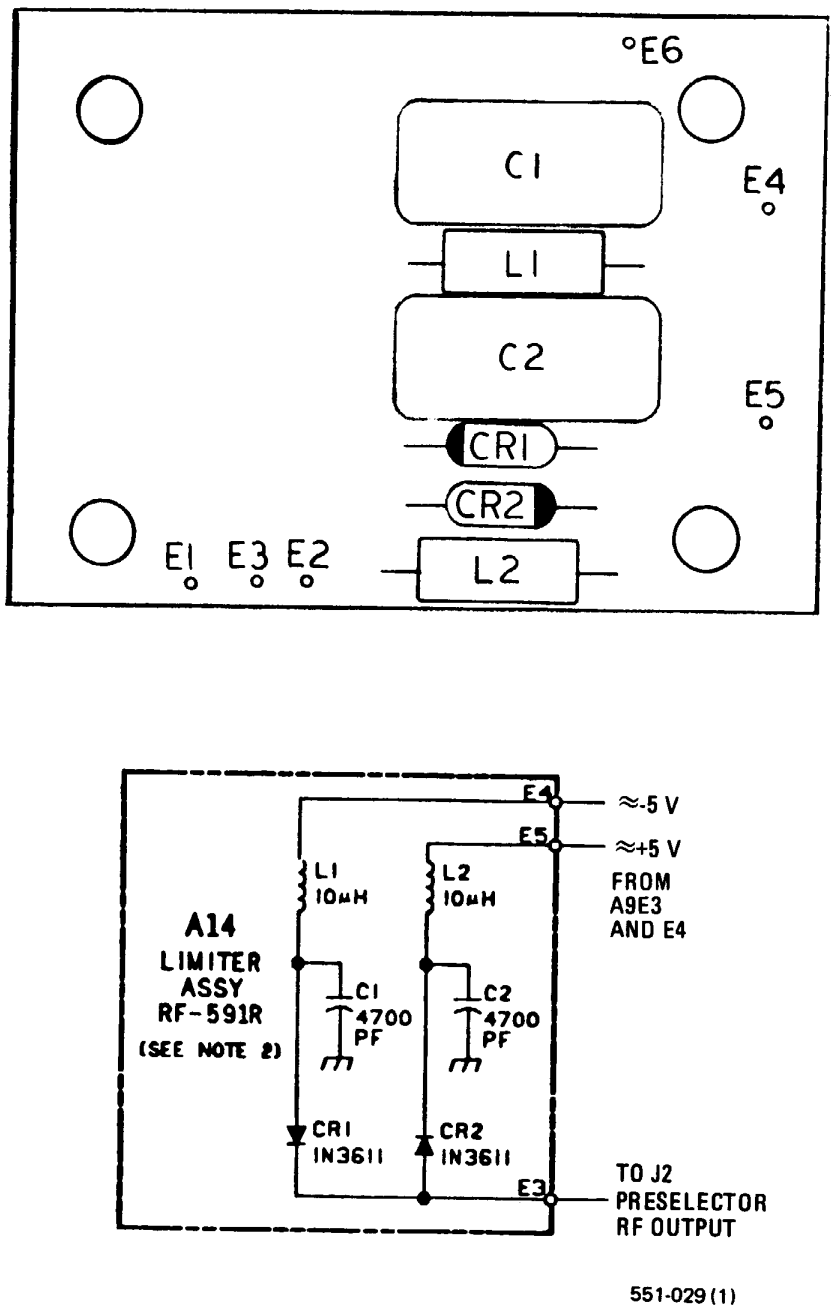


Figure 5-15. Limiter Assembly A14 Component Location and Schematic Diagram

Table 5-12. Limiter PWB A14 Parts List

Ref. Desig.	Description	Part No.
A14	Limiter PWB	905-7050
C1, C2	Capacitor, Fixed, Mica, 4700 pF	CM06FD472J03
CR1, CR2	Diode	905-3611
L1, L2	Inductor, Choke, 10 uH	L10-0007-100

SECTION 6

OPTIONAL EQUIPMENT

6.1 GENERAL

This section contains information relative to the RF-552 Remote Control Module, and the RF-533A Remote Control Adapter for the RF-505AC Receiver.

The RF-552 can be used in a variety of systems. However, the RF-533A is required only when the RF-551A Preselector is used with the RF-505AC Receiver.

6.2 RF-552 REMOTE CONTROL MODULE

The Remote Control Module, shown in figure 6-1, allows automatic frequency selection of the preselector or postselector up to 1500 feet away (457.2 m). The module comprises the following four major PWBs.

- Filter PWB 2A1
- Logic PWB 2A2
- D/A Converter PWB 2A3
- Local/Remote Relay 2A4

See figure 6-2 for the Remote Control Assembly Schematic Diagram.

The BCD frequency inputs are supplied to the Logic PWB, where the high order bits (2 MHz through 20 MHz) are converted to binary form. The resulting binary information is supplied to the D/A Converter PWB. This information is then converted to an analog voltage, proportional to the position of the selected frequency in the band. The analog output of the D/A Converter PWB drives the servo amplifier in the preselector, which drives the servo motor. The servo motor positions the ganged tuning capacitor to the required position.

The Local/Remote Relay PWB transfers bandline information, and D/A analog voltage from the control unit to the Remote Control Module. See figure 6-2 for the Remote Control Assembly Schematic Diagram.

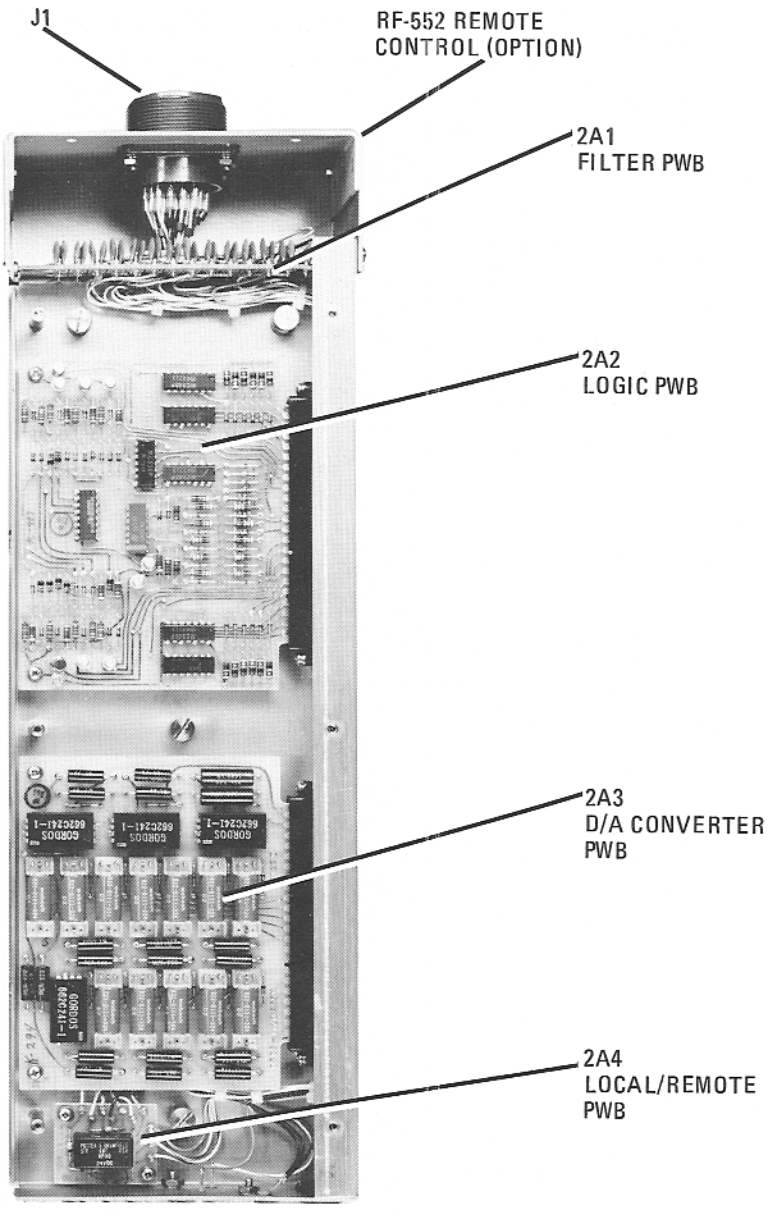


Figure 6-1. Remote Control Assembly Location

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTORS ARE IN OHMS, 1/4W, ±10%.
   B. ALL DIODES ARE IN914.
   C. ALL TRANSITORS ARE 2N718A.
3. VOLTAGE MEASUREMENTS TAKEN AT 2.0000 MHZ.
4. TERMINAL BOARD PART OF RF-551 PRESELECTOR.
5. REFER TO TRUTH TABLE FOR 0905-1154 LOGIC.
6. FILTER PWB A1 C1-C22 ARE .01UF, 150V.
7. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY; COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

TRUTH TABLE FOR U7 (0905-1154, POSITIVE LOGIC)

INPUT PINS					OUTPUT PINS BCD TO BINARY			
14	13	12	11	10	4	3	2	1
0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	1
0	0	0	1	0	0	0	1	0
0	0	0	1	1	0	0	1	1
0	0	1	0	0	0	1	0	0
0	0	1	0	1	0	1	0	1
0	0	1	1	0	0	1	1	0
0	0	1	1	1	0	1	1	1
0	1	0	0	0	1	0	0	0
0	1	0	0	1	1	0	0	1
0	1	0	1	0	1	0	1	0
0	1	0	1	1	1	0	1	1
0	1	1	0	0	1	1	0	0
0	1	1	0	1	1	1	0	1
0	1	1	1	0	1	1	1	0
0	1	1	1	1	1	1	1	1

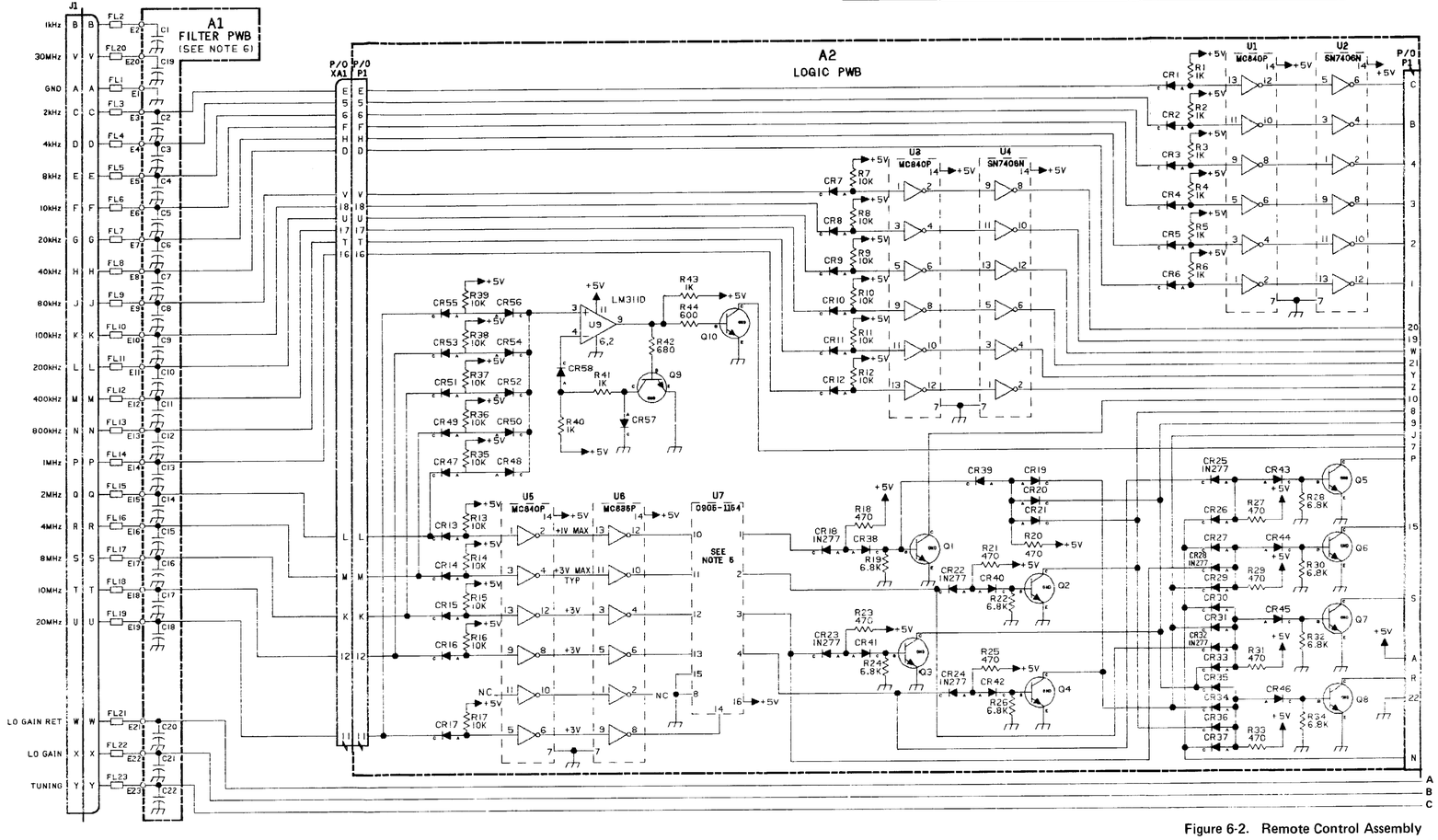


Figure 6-2. Remote Control Assembly Schematic Diagram (Sheet 1 of 2)

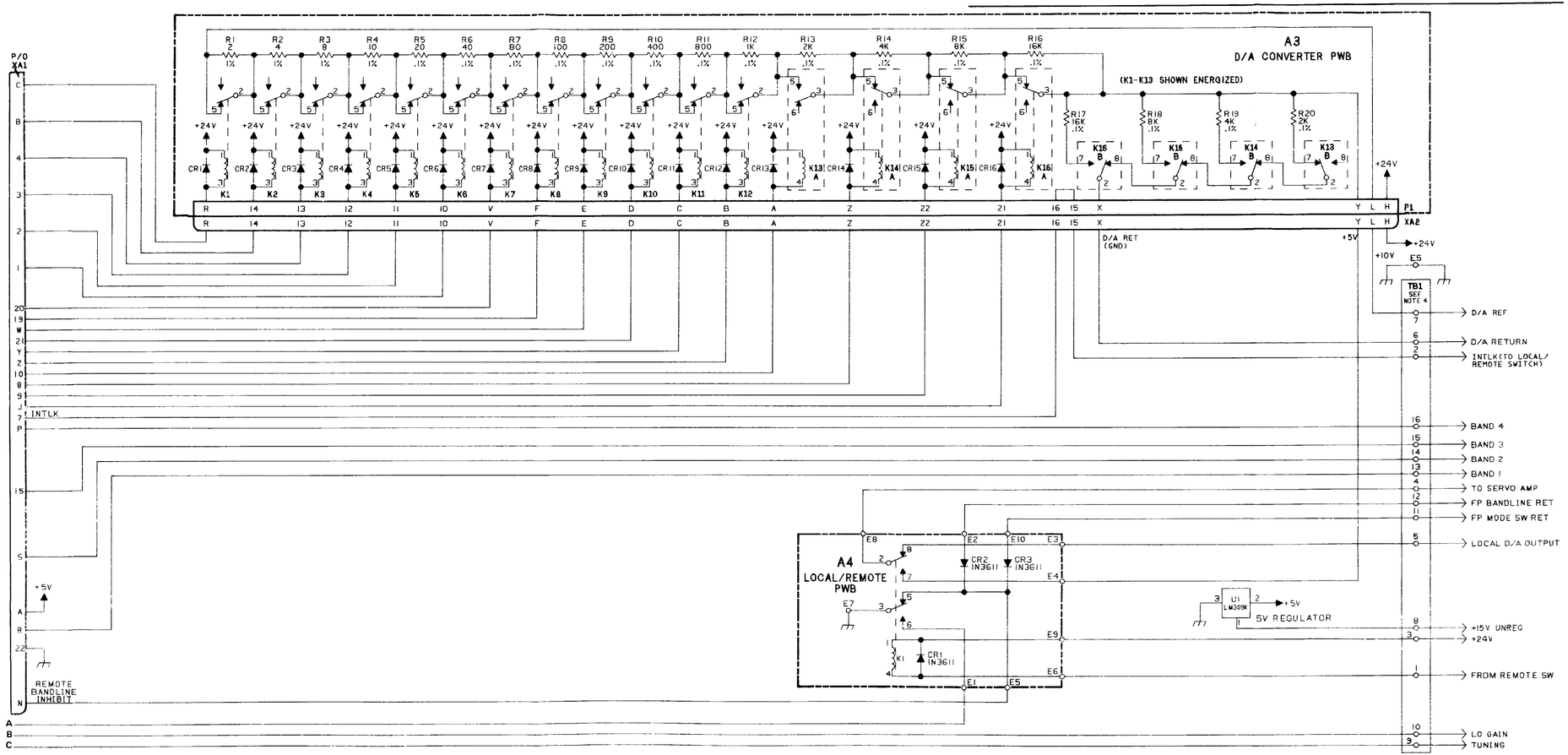


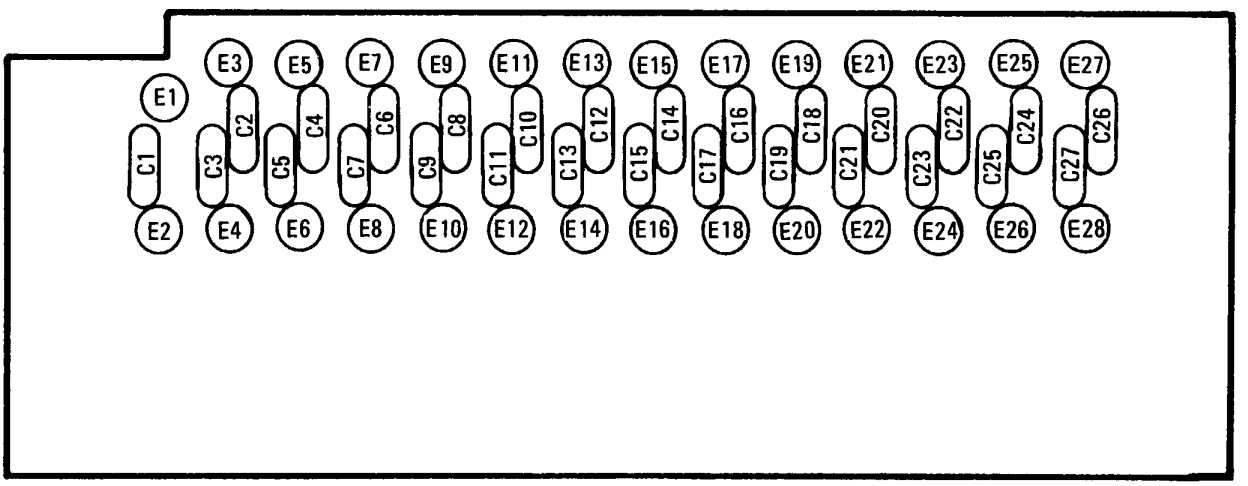
Figure 6-2. Remote Control Assembly Schematic Diagram (Sheet 2 of 2)

6.2.1 Filter PWB 2A1

Filter PWB 2A1 has all frequency data lines running through it and decoupled with 0.01 uF capacitor to ground. Refer to table 6-1 for filter PWB 2A1 parts. See figures 6-3 and 6-4 for filter PWB component locations and schematics.

Table 6-1. Filter PWB 2A1 Parts List

Ref. Desig.	Description	Part No.
2A1	Filter PWB Assembly	905-1130
C1 - C27	Capacitor, Fixed, Ceramic, 0.01 uF, 150 V	C-0065



551-059

Figure 6-3. Filter PWB 2A1 Component Locations

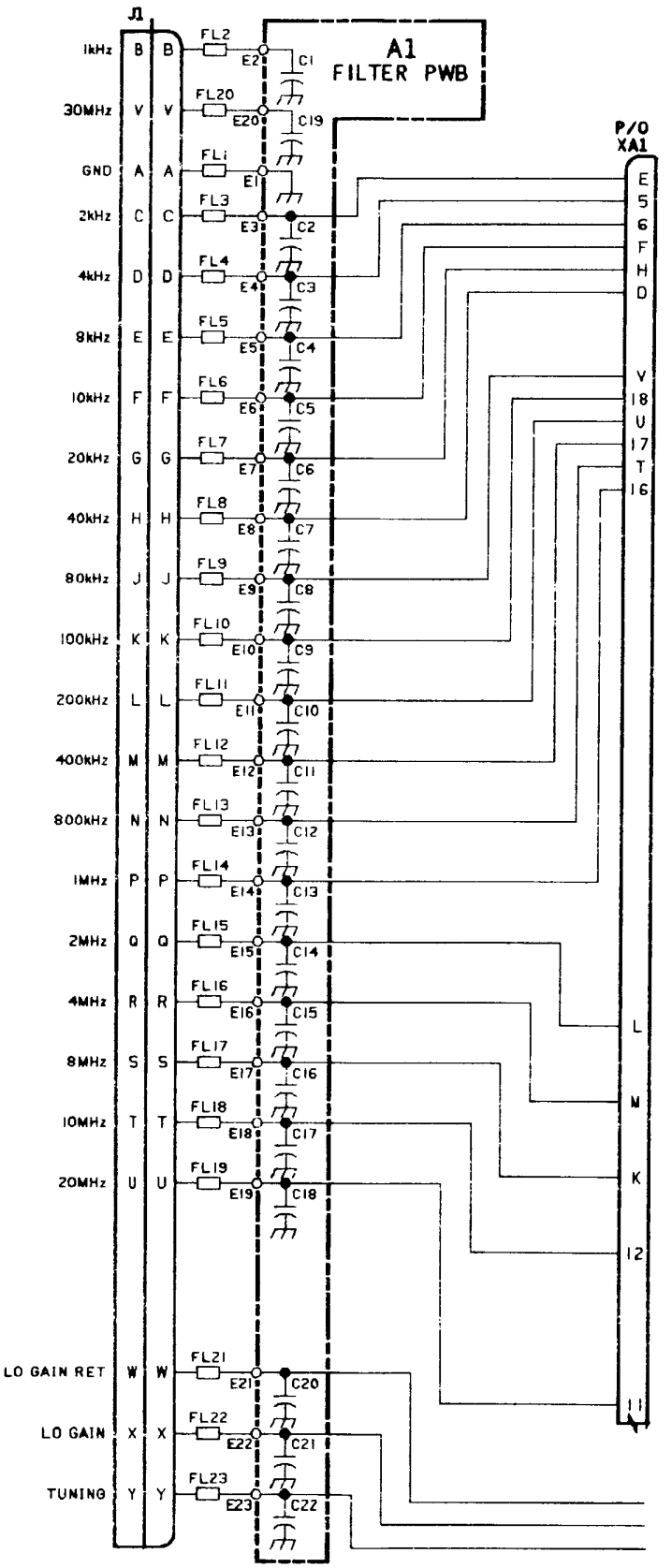


Figure 6-4. Filter PWB 2A1 Schematic Diagram

6.2.2 Logic PWB 2A2

The BCD frequency input information to the Logic PWB is buffered by inverters A2U1, A2U3, and A2U5 with external diodes A2CR1 through A2CR17 which protect the unit from transients. Another set of inverters, A2U2 and A2U4, convert the 2 kHz to 1 MHz logic information from integrated circuits A2U1 and A2U3. A2U2 and A2U4 drive relays A2K1 through A2K12 on the D/A Converter PWB 2A3.

Two MHz through 20 MHz logic information from A2U5 is inverted by A2U6, and is then converted to straight binary by BCD-to-Binary converters A2U7 and A2U8.

The binary outputs of A2U7 are used to turn off transistors A2Q1 through A2Q8. Transistors A2Q1 through A2Q4 drive relays A2K13, A2K14, A2K15, and A2K16 on the D/A Converter PWB. Transistors A2Q5 through A2Q8 generate band information for the bandswitch in the RF-551A.

Refer to figures 6-5 and 6-6 for component locations and schematic diagram. Table 6-2 contains a parts list for the 2A2 PWB assembly.

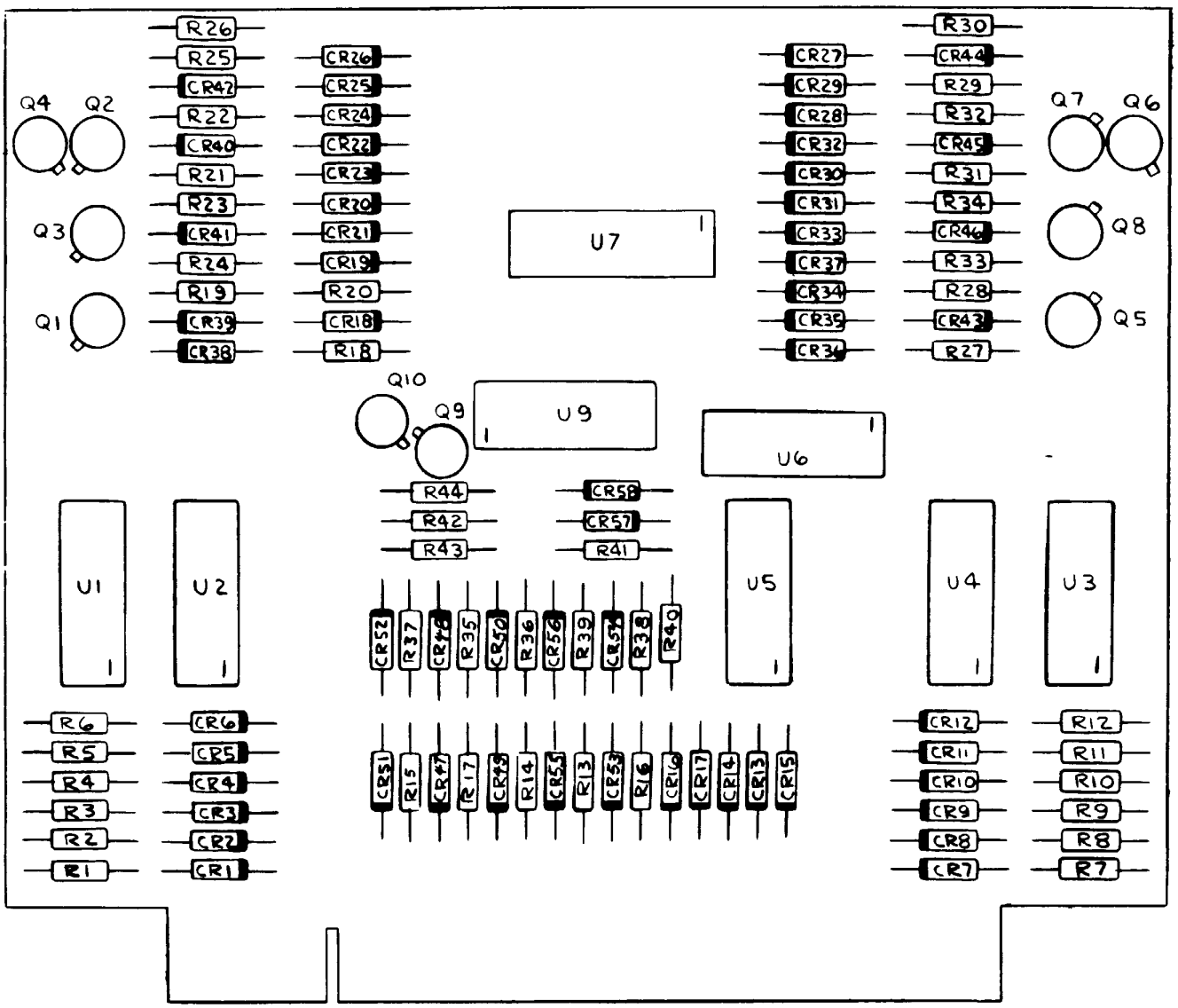


Figure 6-5. Logic PWB 2A2 Component Location

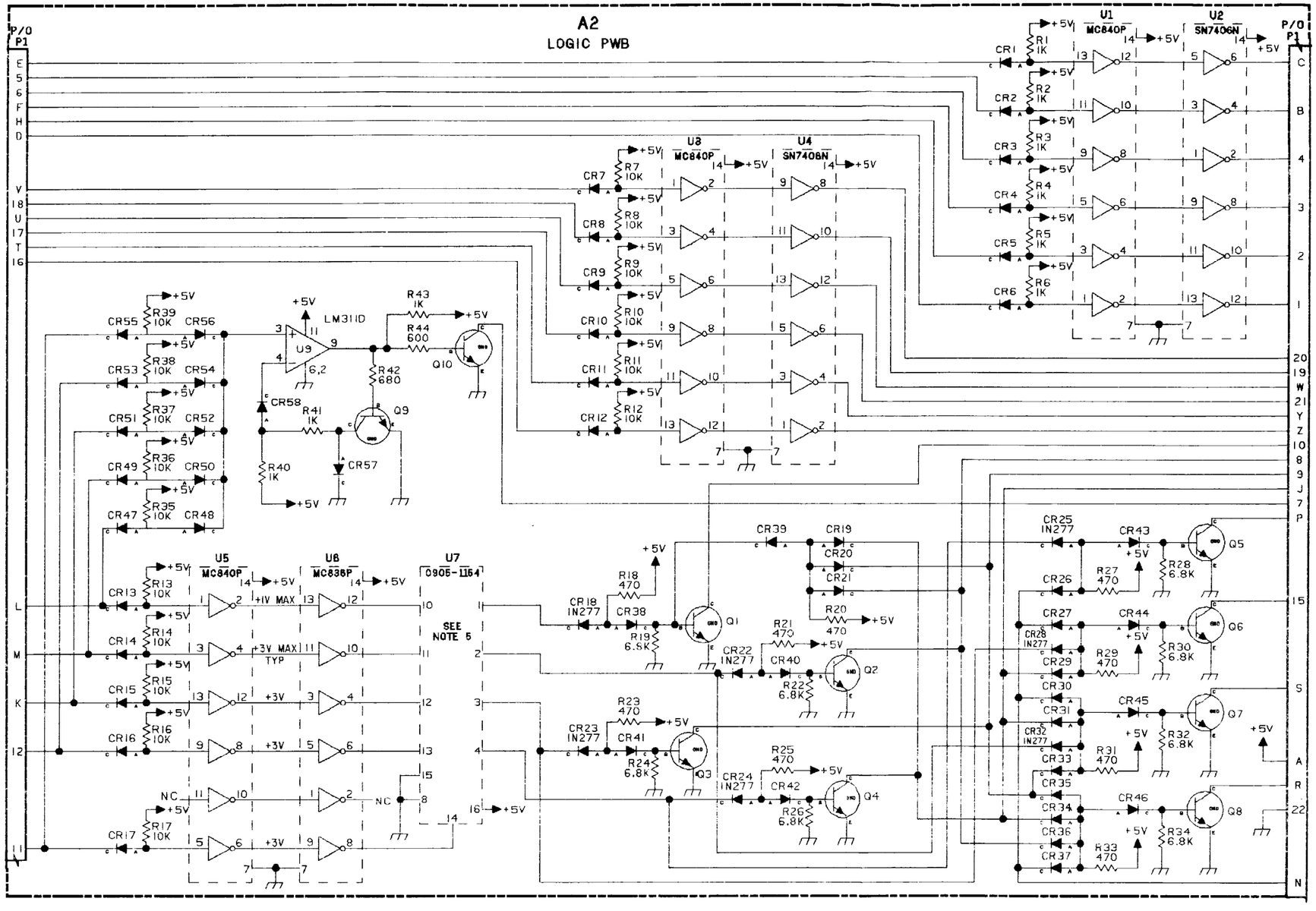


Figure 6-6. Logic PWB 2A2 Schematic Diagram

Table 6-2. Logic PWB 2A2 Assembly Parts List

Ref. Desig.	Description	Part No.
2A2	Logic PWB Assembly	905-1110
CR1 to CR17	Diode	1N914
CR18	Diode, Germanium	1N277
CR19 to CR21	Diode	1N914
CR22 to CR25	Diode, Germanium	1N277
CR26, CR27	Diode	1N914
CR28	Diode, Germanium	1N277
CR29 to CR31	Diode	1N194
CR32	Diode, Germanium	1N277
CR33 to CR58	Diode	1N914
R1 to R17	Resistor, Fixed, Composition, 10K, 1/4 W, 5%	RCR07G103JM
R18	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R19	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R20, R21	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R22	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R23	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R24	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R25	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R26	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R27	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R28	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R29	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R30	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R31	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R32	Resistor, Fixed, Composition, 6.8K, 1/4 W, 5%	RCR07G682JM
R33	Resistor, Fixed, Composition, 470 ohm, 1/4 W, 5%	RCR07G471JM
R34	Resistor, Fixed, Composition, 5.8J, 1/4 W, 5%	RCR07G682JM
R35 to R39	Resistor, Fixed, Composition, 10K, 1/4 W, 5%	RCR07G103JM
R40, R41	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM
R42	Resistor, Fixed, Composition, 680 ohm, 1/4 W, 5%	RCR07G681JM
R43	Resistor, Fixed, Composition, 1K, 1/4 W, 5%	RCR07G102JM
R44	Resistor, Fixed, Composition, 680 ohm, 1/4 W, 5%	RCR07G681JM
Q1 to Q10	Transistor, NPN	2N718A
U1	Integrated Circuit	10075-0053
U2	Integrated Circuit	I02-0004-000
U3	Integrated Circuit	10075-0053
U4	Integrated Circuit	I02-0004-000
U5	Integrated Circuit	10075-0053
U6	Integrated Circuit	10075-0235
U7	Integrated Circuit	905-1155
U8	Not Used	
U9	Integrated Circuit	I20-0002-000

6.2.3 D/A Converter PWB 2A3

The D/A Converter PWB 2A3, shown in figures 6-7 and 6-8, converts the BCD and binary information from the Logic PWB 2A2 to an analog voltage which is proportional to the position of the selected frequency in the band. The D/A Converter consists of relays A3K1 through A3K16 and a resistive network A3R1 through A3R20.

A regulated +10 V provides a reference for the resistive network. Relays A3K1 through A3K12, A3K13A, A3K14A, A3K15A, and A3K16A are energized by the selected frequency information from the Logic PWB. For a selected frequency of 2.000 MHz, relay A3K13A will be energized, removing the short on R13. A resistance of 2000 ohms will appear between pin L and Y of the D/A Converter. In this manner, the total resistance between pin L and Y is always proportional to the frequency selected.

The resistance between pins X and Y is either 2000, 4000, 8000, or 16000 ohms, which is equal to the minimum frequency of the band selected. The output of the D/A Converter (pin Y) drives the servo motor A4R2 and also the SLF (Straight Line Frequency) capacitor C1 and C2. In this manner, the servo motor will move C1 and C2 until the output of the D/A Converter in the Remote Control and the output of potentiometer A4R2 equal each other. When the outputs are equal, capacitors C1 and C2 are positioned for the selected frequency. See table 6-3 for D/A Converter PWB 2A3 Assembly Parts List.

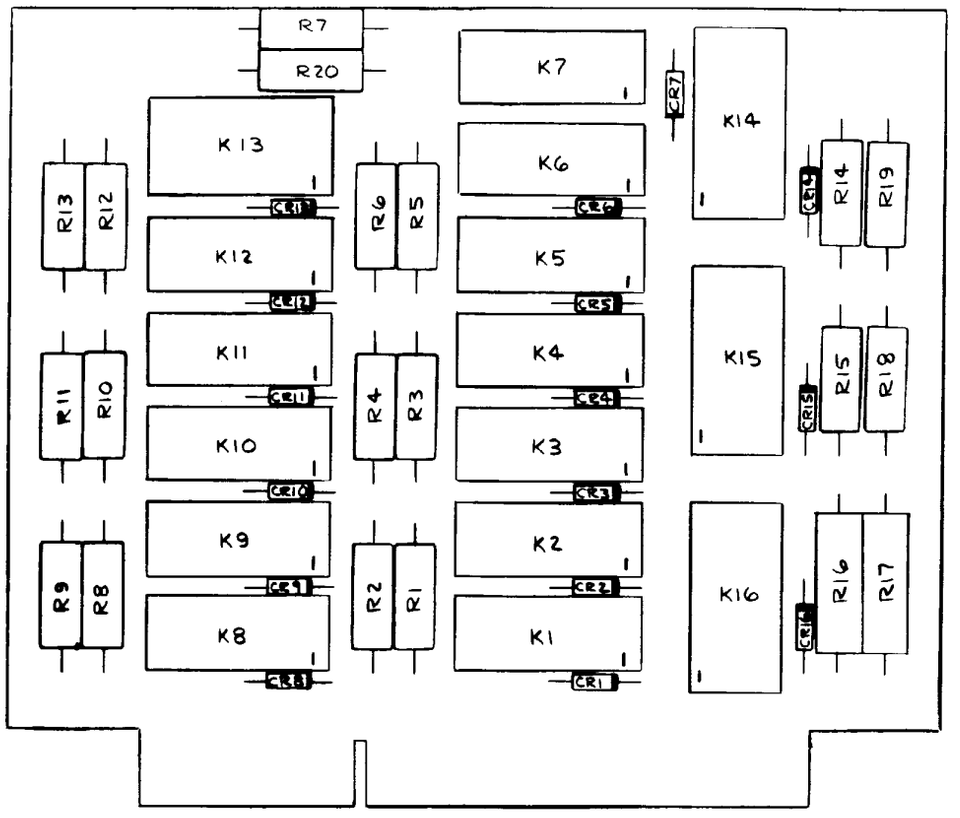


Figure 6-7. D/A Converter PWB 2A3 Component Location

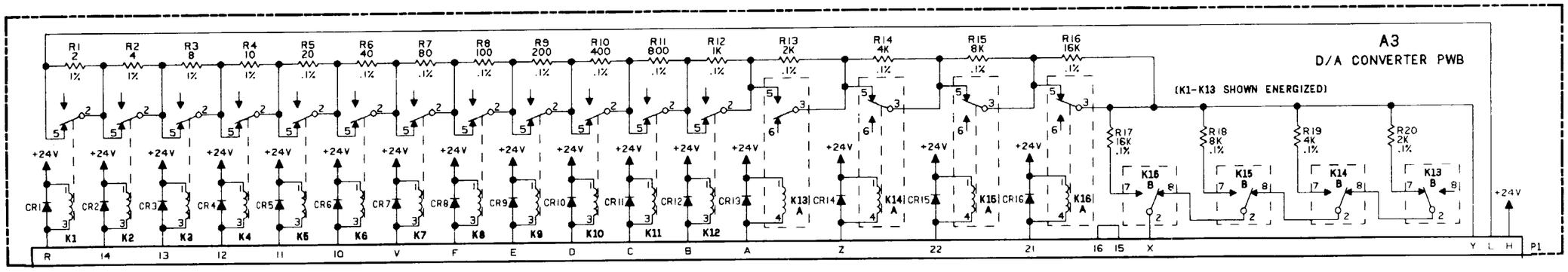


Figure 6-8. D/A Converter PWB 2A3
Schematic Diagram

Table 6-3. D/A Converter PWB 2A3 Assembly Parts List

Ref. Desig.	Description	Part No.
2A3	D/A Converter PWB Assembly	905-1120
CR1 to CR16	Diode	1N914
K1 to K12	Relay, Reed, DPDT, 24 Vdc	905-8010
K13 to K16	Relay, Reed, DPDT, 24 Vdc	905-8011
R1	Resistor, Film, 2 ohm, 1/4 W, 1%	905-0013-001
R2	Resistor, Film, 4 ohm, 1/4 W, 1%	905-0013-002
R3	Resistor, Film, 8 ohm, 1/4 W, 1%	905-0013-003
R4	Resistor, Film, 10 ohm, 1/4 W, 1%	905-0013-004
R5	Resistor, Film, 20 ohm, 1/4 W, 1%	905-0013-005
R6	Resistor, Film, 40 ohm, 1/4 W, 1%	905-0013-006
R7	Resistor, Film, 80 ohm, 1/4 W, 1%	905-0013-007
R8	Resistor, Film, 100 ohm, 1/4 W, 1%	905-0013-008
R9	Resistor, Film, 200 ohm, 1/4 W, 1%	905-0013-009
R10	Resistor, Film, 400 ohm, 1/4 W, 1%	905-0013-010
R11	Resistor, Film, 800 ohm, 1/4 W, 1%	905-0013-011
R12	Resistor, Film, 1K, 1/4 W, 1%	905-0013-012
R13	Resistor, Film, 2K, 1/4 W, 1%	905-0013-013
R14	Resistor, Film, 4K, 1/4 W, 1%	905-0013-014
R15	Resistor, Film, 8K, 1/4 W, 1%	905-0013-015
R16, R17	Resistor, Film, 10K, 1/4 W, 1%	905-0013-016
R18	Resistor, Film, 8K, 1/4 W, 1%	905-0013-015
R19	Resistor, Film, 4K, 1/4 W, 1%	905-0013-014
R20	Resistor, Film, 2K, 1/4 W, 1%	905-0013-013

6.2.4 Local/Remote PWB 2A4

Local/Remote PWB 2A4, shown in figure 6-9, transfers the bandline information and D/A analog voltage from the control unit to the 2A3 module. To accomplish this, the interlock line must be grounded by the presence of both the Logic and D/A PWBs on their proper connectors, and that the voltage on at least one of the 1-20 MHz control lines is greater than +3 V. Otherwise, the relay A2K1 will keep the control in the local condition, figures 6-9 and 6-10. Table 6-4 contains a parts list for the Local/Remote PWB 2A4 Assembly.

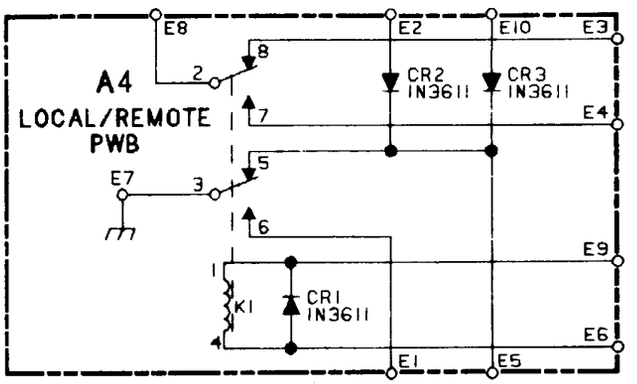
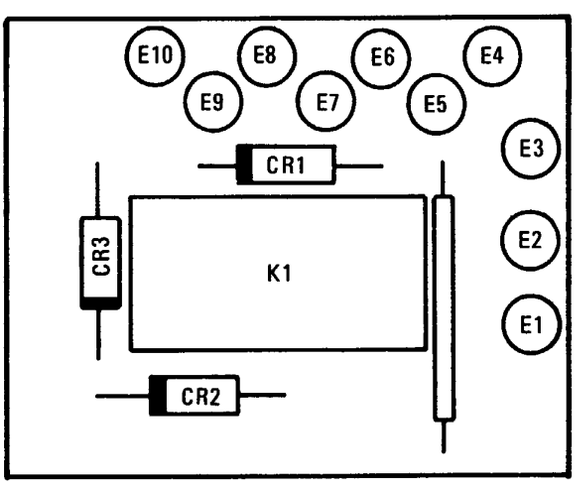


Figure 6-9. Local/Remote PWB 2A4 Schematic Diagram



551-060

Figure 6-10. Local/Remote PWB 2A4 Component Location

Table 6-4. Local/Remote PWB 2A4 Assembly Parts List

Ref. Desig.	Description	Part No.
2A4	Local/Remote PWB Assembly	905-1140
CR1 to CR3	Diode	D10-3611-000
K1	Relay, DPDT, 24 V	10075-0234

6.3 RF-553A REMOTE CONTROL ADAPTER FOR THE RF-505AC RECEIVER

NOTE

Factory installed in RF-505AC.

The RF-553A Remote Control Adapter modifies the RF-505AC HF SSB/ISB Receiver to provide Binary Coded Decimal (BCD) frequency control information to the RF-552 Remote Control Module/RF-551A. The RF-553A converts the various frequency selection coding schemes of the RF-505AC into BCD logic for use in the RF-552/RF-551A. Each RF-553A output line is buffered so that faults originating in the RF-551A or interconnecting cables will not cause the RF-505AC to become inoperative. The RF-553A is installed in the RF-505AC chassis.

6.3.1 Theory of Operation

The RF-553A Remote Control Adapter converts some of the outputs of the RF-505AC HF SSB/ISB Receiver to BCD for use with the RF-552 Remote Control Module/RF-551A to provide external frequency control data.

Referring to figure 6-11, the 1 kHz and 10 kHz inputs from the RF-505AC are already in BCD format. This data is buffered only, then routed to the RF-552/RF-551A.

The 100 kHz and 1 MHz RF-505AC outputs (ten's complement with reference to the RF-552/551A - see table 6-5) are routed through ten's complement converters U3 and U5 to provide BCD, which is then buffered and routed to the RF-552/551A.

Table 6-5. Truth Table Number 1

Position	RF-505AC 100 kHz or 1 MHz Switch Output				RF-553A 100 kHz or 1 MHz Switch Output			
	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	0
1	1	0	0	1	0	0	0	1
2	1	0	0	0	0	0	1	0
3	0	1	1	1	0	0	1	1
4	0	1	1	0	0	1	0	0
5	0	1	0	1	0	1	0	1
6	0	1	0	0	0	1	1	0
7	0	0	1	1	0	1	1	1
8	0	0	1	0	1	0	0	0
9	0	0	0	1	1	0	0	1

1 = High 0 = Low

Only the 0 MHz and 10 MHz RF-505AC outputs are required to generate the 10 MHz BCD control information to the RF-552/RF-551A. The derivation of this data is shown in table 6-6 and presented schematically in figure 6-11.

Table 6-6. RF-553A 10 MHz BCD Format Generation Truth Table

RF-505AC Switch Position	RF-505AC Line	At Freq. Below 10 MHz	At Freq. 10 To 19.999 MHz	At Freq. 20 To 29.999 MHz	RF-553A 10 MHz Out. Bit Status	
					2 Bit	1 Bit
0	0 MHz	Lo (0)	Hi (1)	Hi (1)	0	0
1	10 MHz	Hi (1)	Lo (0)	Hi (1)	0	1
2	20 MHz	Hi (1)	Hi (1)	Lo (0)	1	0

In addition to 10 MHz BCD data, U1 is also an open collector gate that provides isolation between the RF-505AC and the RF-552/RF-551A.

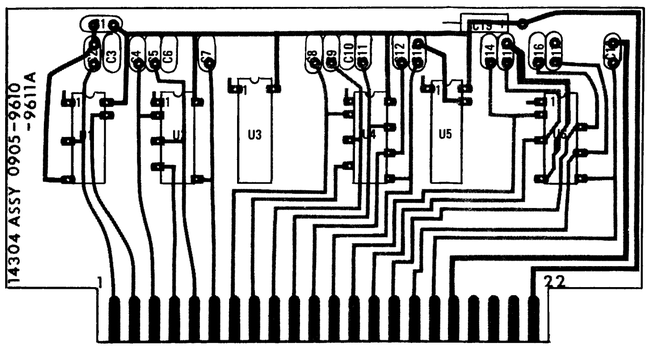
Capacitors C1 through C18 are bypass capacitors which, in conjunction with ferrite beads (at the P-553-2 connector) on the rear of the RF-505AC prevent RF signals from interfering with RF-505AC operation. Capacitor C19 is a +5 Vdc decoupling capacitor.

6.3.2 Parts List

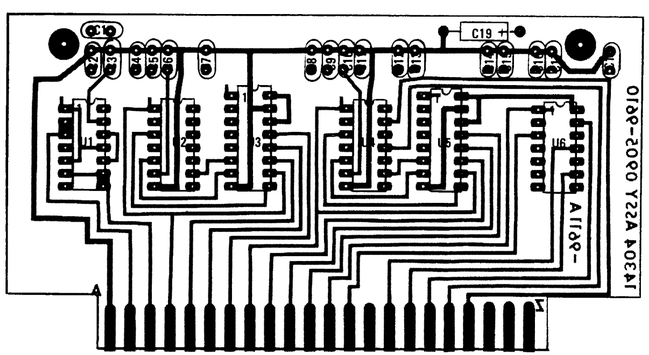
A parts list for the RF-553A is presented in table 6-7. Figure 6-11 shows component locations.

Table 6-7. RF-553A Remote Control Adapter Parts List

Ref. Desig.	Description	Part No.
RF-553A	Number Converter PWB	905-9600
	Number Converter PWB Assembly	905-9610
C1 to C18	Capacitor, Fixed Ceramic, 0.1 uF, 50 V	C11-0005-104
C19	Capacitor, Fixed Tantalum, 0.1 uF, 50 V	CSR13G105K
MP1	PWB	905-9611
U1	Integrated Circuit, Quad, Dual Input Buffer	SN7433N
U2	Integrated Circuit, Hex Inverter	I02-0014-000
U3	Integrated Circuit, BCD to Binary Converter	I41-0018-000
U4	Same as U2	
U5	Same as U3	
U6	Same as U2	



COMPONENT SIDE



COMPONENT VIEW SHOWING REVERSE SIDE TRACK

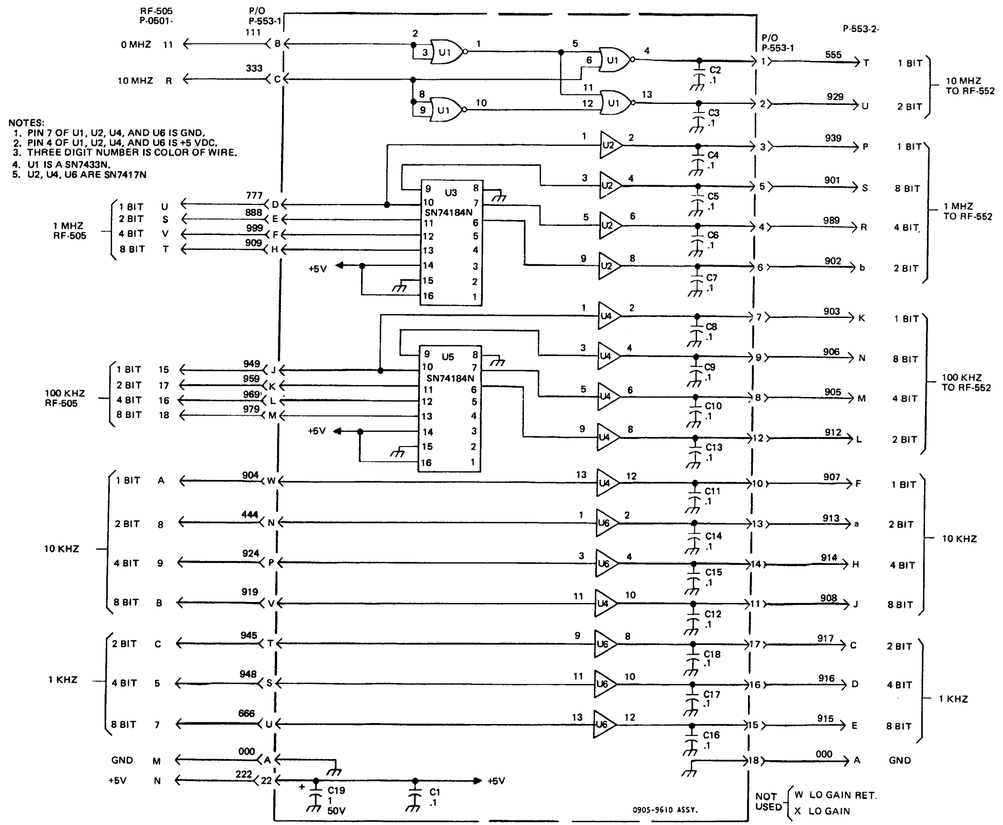


Figure 6-11. RF-553A Number Converter PWB Schematic and Component Location Diagrams

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