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TECHNICAL MANUAL
INSTALLATION, OPERATION, MAINTENANCE AND REPAIR INSTRUCTIONS WITH PARTS LIST

RADIO RECEIVER
AN/URR-74(V)2

WATKINS-JOHNSON COMPANY
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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operaiton and maintence.

KEEP AWAY FROM LIVE CIRCUITS

When it is necessary to work on equipment with the primary power (115 vac or 220 vac) energized, use extreme caution to avoid contact with this dangerous voltage.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should nay person reach into the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid in case of electrical shock.

RESUSCITATION

Personnel working in high voltage areas should be familiar with modern methods of resuscitation as prescribed by the navy Bureau of Medicine and Surgery.

The folloiwng warnings and cautions are a summation of more detailed warnings and cautions appearing throughout the manual, and are shown here for emphasis. It is recommended that they be thoroughly read before performing any maintenance.

WARNING

This equipment employs dangerous voltages which can be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed. (Paragraphs 4-3.c, 4-4.a, 5-5, 5-10 through 5-29, 6-5, 6-6.a through 6-6.f, 6-7.a through 6-7.f, 6-8, 8-7).

WARNING

To prevent electrical shock or damage, aways disconnect the receiver from the power source before removing modules or when soldering or replacing components (paragraph 6-9).

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CAUTION

As a safety precaution and to prevent possible damage to the receiver no power cord should be connected to the power input connector, A13J1, and the receiver power switch should be in the OFF position (button in out position with brightly colored panel not displayed) during selections (paragraph 8-8).

CAUTION

Excessive lubrication of the encoder shaft may destroy the optical characteristics of the encoder wheel (paragraph 4-3.a).

CAUTION

Avoid the use of chemical cleaning agents containing benzene, zylene, acetone or similar solvents. These chemcials may damage plastics used in the receiver (paragraph 4-3.b).

CAUTION

Line Audio output levels in excess of 24.5 Vac (with A11 attenuator OFF) may cause damage to the receiver and/or the 600 Ω load resistor. With A11 on, the level should not exceed 0.774 Vac (paragraphs 4-4.3.4.c and 4-4.f.4.b).

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CHAPTER 1

GENERAL INFORMATION AND SAFETY PRECAUTIONS

1-1. SAFETY PRECAUTIONS. All safety precautions necessary for the protection of personnel and equipment are stated in warnings and cautions in the text of this manual. The safety summary that precedes Chapter 1 contains the general safety precautions and lists all warnings and cautions that appear in the manual.

1-2. INTRODUCTION. This manual will provide the user with an explanation of the use and function of the AN/URR-74(V)2 high frequency radio receiver. It will give instructions for installation, operation and troubleshooting and will provide detailed schematic diagrams and parts lists sufficient to assist the technician in effecting any necessary repairs.

1-3. The AN/URR-74(V)2 must be used in conjunction with an appropriate antenna system and requires audio monitoring equipment such as headphones, speakers, or tape recorders.

1-4. EQUIPMENT DESCRIPTION. The AN/URR-74(V)2 radio receiver (figure 1-1) detects AM, FM, CW and SSB signals in a frequency range of 5 kHz to 29.99999 MHz. It has selectable IF bandwidths, gain modes, BFO offset, audio attenuation and features a seven-digit LED frequency readout.

1-5. The receiver handles AM, FM, CW, USB, LSB and ISB signals. The detection mode is selected via front panel push buttons. In the AM, FM, or CW modes, one of the five available bandwidths must be selected by front panel push buttons. The options are 0.3, 1.0, 3.2, 6, and 16 kHz. The Gain Mode push buttons allows selection of Fast AGC, useful for AM and FM signals; Slow AGC, used with the CW and SSB signals, or Manual Gain, used to activate the RF Gain Control. BFO Offset is actuated only in the CW mode and it provides ±8.9 kHz of offset in 100 kHz steps selectable by this switches on the front panel.

1-6. The audio output for the detected mode is supplied as the Line Audio at the rear panel output audio connector and through the phones jack at the front panel. In the ISB detection mode, the USB audio is supplied at the rear panel Line Audio output while the LSB audio is supplied through a seperate ISB Audio output at the rear panel output audio connection. Also, in the ISB detection mode, the USB audio is supplied at the front panel phones tip while the LSB audio is supplied at the ring. The Phones output level is adjustable by a phone level control on the front panel, while the Line Audio output level is adjustable by a line audio level potentiometer on the the rear panel. A separate switchable audio attenuator is used for each of the Line Audio and ISB Audio outputs. The two audio attenuators, when out, have no effect on the audio output. When selected in, attenuator number one provides 30 dB of attenuation for the Line Audio output and attenuator number two provides 20 dB of attenuation for the ISB Audio output.

1-7. Tuning the receiver is done manually using the tuning knob in conjunction with the tuning rate push buttons. One of these push buttons provides a method of locking the frequency to prevent accidental changes. A non-volatile memory stores the tuned frequency for a minimum of 48 hours after any power interruption. A dual-purpose RF/Audio meter indicates either Signal Strength or Line Audio Level, as selected. An elapsed time meter shows receiver running time from 0 to 9999 hours.

1-8. Internal frequency tuning circuitry of the receiver includes the 1st, 2nd and 3rd LO and the BFO Synthesizers. The phase lock loop frequency synthesizers determine tuned frequency to a resolution of 10 Hz.

1-9. Rear panel features include a type-N RF Input connector, a BNC 455 kHz IF Output

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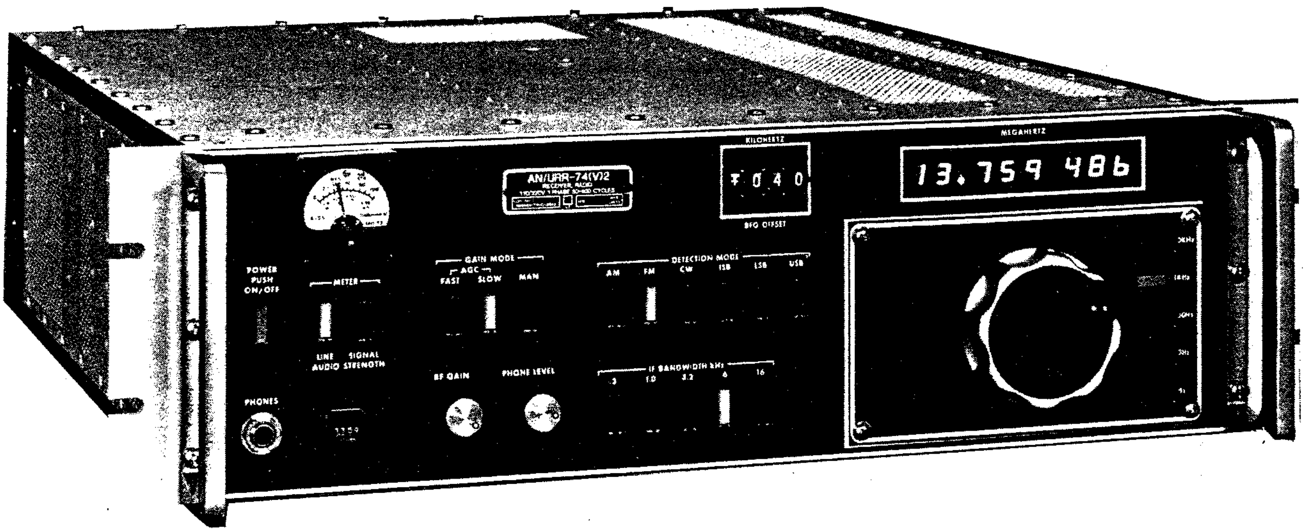

Figure 1-1. AN/URR-74(V)2 Receiver

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connector, a 13-pin Bendix Audio Output connector for phones, line, ISB, FM/CW/SSB audio, a 1 MHz reference input/output, selectable by a related slide switch, and a Military Standard type-MS-3102-16S-5P power input connector adaptable to either 115 or 230 Vac operation.

1-10. Maintenance operations are straight forward due to clean mechanical packaging and the placement of nearly all components on plug-in circuit boards. These circuit boards are in turn mounted on motherboards which have all pins accessible from the bottom of the receiver. Removing the top cover exposes the assemblies all of which may be unplugged from their sockets or freed from the main chassis by quick disconnect plugs. The dc power supplies are thermal and short circuit protected, require no adjustments and can be easily replaced.

1-11. The receiver mounts in a standard 19-inch equipment rack, occupies 5.25 inches of vertical space, and extends 19.62 inches into the rack. The main chassis, front, rear, top, bottom, and internal compartment panels are constructed of aluminum. The top and bottom covers provide EMI shielding per the requirements of MIL-STD-461A. All "in operation" controls and indicators are located on the front panel and all input and output cables, with the exception of the front panel mounted phone jack, are connected to jacks on the rear panel. Switchable Audio Attenuators A11 and A12 and voltage select switches S2 and S3 are operator accessible only after removal of the top cover.

1-12. The receiver side panels are nickel-plated, cast aluminum, the front panel 0.19 inch aluminum plate, and the rear panel, main deck, and internal partitions are stamped aluminum. The side panels and top and bottom covers are perforated to allow for flow-through ventilation.

1-13. REFERENCE DATA. All applicable reference data may be found in table 1-1, following.

1-14. EQUIPMENT AND DOCUMENTS SUPPLIED. This data may be found in table 1-2, following.

1-15. EQUIPMENT REQUIRED BUT NOT SUPPLIED. This data may be found in table 1-3, following.

1-16. FIELD AND FACTORY CHANGES. No field or factory changes are in effect at the time of this printing. Tables 1-4 and 1-5 provice space for recording future field and factory changes. Make appropriate entries in these tables when field or factory changes are incorporated into the equipment.

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Table 1-1. AN/URR-74(V)2 Receiver, Reference Data

Characteristics	Specification
Tuning Range	5 kHz to 29.99999 MHz.
Tuning Resolution	10 Hz.
Antenna Conducted Oscillator Radiation	-87 dBm, maximum.
Antenna Input Protection	The antenna input will withstand the effects of RF power to +15 dBm and static build-up.
Input Impedance	50 Ω, unbalanced, nominal.
IF Bandwidths (3 dB)	Standard: 0.3, 1, 3.2, 6, and 16 kHz.
IF Shape Factor	IF BW — 60 dB: 3 dB, Typical 0.3 kHz — 7.0:1 1 kHz — 4.5:1 3.2 kHz — 2.5:1 6 kHz — 2.3:1 16 kHz — 2.0:1
Detection Modes	AM, FM, CW. LSB, USB, ISB.
Gain Control Modes	Manual, Fast AGC, Slow AGC.
AGC and Manual Range	100 dB, minimum.
AGC Threshold	3.0 µV, typical.
AGC Attack Time	15 ms, maximum.
AGC Release Time	Fast AGC: 25 ms, maximum. Slow AGC: 4 sec, maximum.
Frequency Display	7 digit, LED's.
Frequency Resolution/Readout	10 Hz.
Frequency Stability	6×10^{-8} per day, 2×10^{-6} per year.
Frequency Control	Manual
Synthesizer Lock-Up Time	3 ms, typical; 10 ms, maximum.
Synthesized BFO	455 kHz ±8.9 kHz in 100 Hz steps.
Power Interrupt	With the Manual Control Module option, storage of the frequency data will automatically occur. Upon restoration of power, the receiver will return to the previously tuned frequency.
IF Rejection	Greater than 90 dB.
Image Rejection	Greater than 90 dB.
Sensitivity (0.2-30 MHz, see CW Sensitivity for extended frequency range)	
AM Sensitivity (6 kHz IF Bandwidth)	A 1.7 µV signal 50% AM modulated at a 400 Hz rate will produce at least a 10 dB (S+N)/N ratio at the audio output.
FM Sensitivity (16 kHz IF Bandwidth)	A 2.5 µV signal FM modulated at a 400 Hz rate to a 4.8 kHz peak deviation will produce at least a 17 dB (S+N)/N ratio at the audio output.

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Table 1-1. AN/URR-74(V)2 Receiver, Reference Data (Continued)

Characteristics	Specification
CW Sensitivity (0.3 kHz IF Bandwidth)	
200 kHz-30 MHz	A 0.4 µV signal will produce a 16 dB (S+N)/N ratio at the audio output.
50 kHz-200 kHz	A 0.63 µV signal will produce a 16 dB (S+N)/N ratio at the audio output.
15 kHz-50 kHz	A 1.4 µV signal will produce a 16 dB (S+N)/N ratio at the audio output.
5 kHz-15 kHz	A 63 µV signal will produce a 16 dB (S+N)/N ratio, typically at the audio output.
ISB, (USB, LSB) Sensitivity (3 kHz SSB Bandwidth)	A 0.56 µV signal will produce a 10 dB (S+N)/N ratio at the audio output.
Audio Outputs:	
ISB Output (Attenuator Out)	100 mW, maximum across 600 Ω.
(Attenuator In 20 dB)	600Ω
Line Audio (Attenuator Out)	1 W, minimum, across 600 Ω for an input signal of 3 µV, 30% AM modulated at a 400 Hz ratio.
(Attenuator In 30 dB)	600Ω
Headphone Output	30 mW, minimum, for an input signal of 3 µV, 30% AM modulated at a 400 Hz rate.
Audio Distortion	Less than 5% at rated audio output.
Audio Frequency Response	±1.5 dB from 100 Hz to 8 kHz, 1 kHz reference frequency.
Final IF Output	20 mV, minimum, into 50 Ω for input signals greater than 3.0 µV.
Intermodulation Distortion:	
3rd Order Input Intercept Point	+20 dBm, minimum for signals separated by 30 kHz, (performance may degrade below 3 MHz).
Unwanted Sideband Rejection	50 dB at 350 Hz into unwanted sideband.
Signal Meter	Indicates carrier level or line audio level.
Reciprocal Mixing	With a desired signal of 25 µV in the 3.2 kHz IF bandwidth, the desired signal-to-noise ratio will be greater than 20 dB, when an undesired signal 70 dB higher in amplitude and 30 kHz removed in frequency is present.
Cross Modulation	With a desired signal of 10 µV an undesired signal 70 dB higher, 30% AM modulated will produce less than 10% cross modulation for frequency separation of greater than 50 kHz in the 1 kHz IF bandwidth.

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Table 1-1. AN/URR-74(V)2 Receiver, Reference Data (Continued)

Characteristics	Specification
Operating Temperature Range	0°C to 50°C.
Maximum Humidity	95% (with no condensation)
Power Consumption	0.6 A at 115 Vac, approximately.
Power Requirements	115/230 Vac ±15% 48-420 Hz.

Table 1-2. Equipment and Documents Supplied

			Dimensions				
Quantity	Nomenclature	Unit No.	Height (in.) */**	Width (in) */**	Depth (in) */**	Weight (lb) */**	Volume (cu ft) */**
1	Receiver, radio AN/URR-74(V)2	1	5.25/10	19/24	19.4/26	35/49	1.12/3.61
1	Technical Manual	1	—	--	--	--	--

*Uncrated
**Crated

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Table 1-3. Equipment Required But Not Supplied

Category	Equipment	Alternate	Test Parameters	Application
Signal Generator	CAQI-8640B		AM,FM,CW,RF Output -111 dBm to 0 dBm	SM, TS, CM
Oscilloscope	AN/USM-281	CBTV-475-4	dc to 50 MHz	SM, TS, CM
RF Voltmeter	CCVO-91H-S7		1 mV to 3.0 V -50 dBm to +20 dBm	SM, TS, CM
Variable Transformer	CN-16B/U		metered output from 90-115 Vac	
Variable Transformer	General Radio W5HMT or equivalent		Output Variable from 180-220 Vac	
AC Voltmeter	CAQI-400GL-CO1	CAQI-400E	1 mV to 300 V full scale	SM, TS
Digital Counter	AN/USM-207	CAQI-5245L	0 to 500 MHz	SM, TS, CM
Digital Voltmeter	CCUH-8120A	CCUH-8300A-01-02	dc ranges, 1%or better	TS, CM
Sweep Generator	SG-1020/UR	CCAQ-1520A	100 kHz to 11.0 MHz	CM
Headphones	Any mono or or stero headphone of 600 Ω impedance			SM, TS
Summer	Mini-circuits ZSC-2-1 or equivalent		2:1, 50Ω	CM

*Applications are coded as follows: Scheduled maintenance (SM), corrective maintenance (CM) and troubleshooting (TS).

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Table 1-4. Field Changes

Change Number	Nomenclature	Descriptions

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CHAPTER 2

OPERATION

2-1. INTRODUCTION. Operation of the AN/URR-74(V)2 radio receiver is simple and does not require the operator to manipulate any other units as all controls, connectors and indicators are located on the receiver proper. Figures 2-1 and 2-2 are photographs of the front and rear panels of the receiver. All items on these panels are number coded and are identified and explained in the following paragraphs. This chapter also contains detailed procedures for operation of the receiver in its various modes.

2-2. CONTROLS AND INDICATORS. All items on the front and rear panels are discussed in the order in which they are positioned as one faces the receiver, looking from left to right and from top to bottom.

a. Front Panel. Refer to figure 2-1. The numbers shown in the figure correspond to the paragraph numbers below.

(1) RF/audio meter. Located in the upper, left-hand corner of the equipment, this meter reads either signal strength, with a range of 0 to 110 dBm or line audio level in dB, above 1 mW, referenced to 600 Ω. Meter readings are selected by the METER push buttons located below the indicator. The meter is moisture-tight and meets the standards of MIL-M-10304.

(2) BFO OFFSET. These thumbwheel switches are activated only in the CW detection mode. The BFO offset is ±8.9 kHz (from 455 kHz) in steps of 100 Hz. The BFO signal is injected after the IF bandwidth filters, thus ensuring that the pitch is independent of IF bandwidth. Switching to "0" of the "+, 0, -" section of the switch automatically tunes the BFO to 455 kHz, regardless of the setting of the numerical sections.

(3) Tuned frequency readout. This seven-digit readout displays the tuned frequency of the receiver. Each digit is a seven-segment yellow LED with intensity controlled by a single potentiometer located inside the receiver. The least-significant digit, at the far right, indicates 10's of Hz.

(4) POWER PUSH ON/OFF switch. Depressing this switch energizes the equipment. When in the ON position, a mechanical indicator in the push button will shown a red background indicating the powered condition.

(5) METER switches. These switches determine what function the meter will indicate. With LINE AUDIO selected, the rear panel LINE AUDIO output can be set for 0 to 1W (0 V to 24.5 V rms). Rear panel LINE AUDIO LEVEL potentiometer R1 establishes the level. In the SIGNAL STRENGTH position the indication is related to the AM detector voltage. In the AGC modes it provides a logarithmic indication of signal strength; in the manual gain mode it represents a near linear indication of AM detector voltage. These and all other push button groups on the receiver indicate their selection by means of a colored background that appears when the button is depressed. The tuning increment push buttons are green, all others are yellow. An interlock device prevents more than one button (in a parameter group) being depressed at any one time.

(6) GAIN MODE switches. These switches establish the receiver gain mode. In FAST AGC, the 15 ms response time provided is useful for AM and FM signals. SLOW AGC gives a 15 ms attack time and a 2 second decay time, suitable for CW, ISB and SSB signals. The MAN GAIN MODE activates the RF GAIN control which otherwise has no effect.

(7) DETECTION MODE switches. One of the following six detection switches must be depressed to establish a detection mode. If the AM, FM, or CW switch is selected, an IF BANDWIDTH kHz switch also must be selected. Selection of ISB, USB, or LSB

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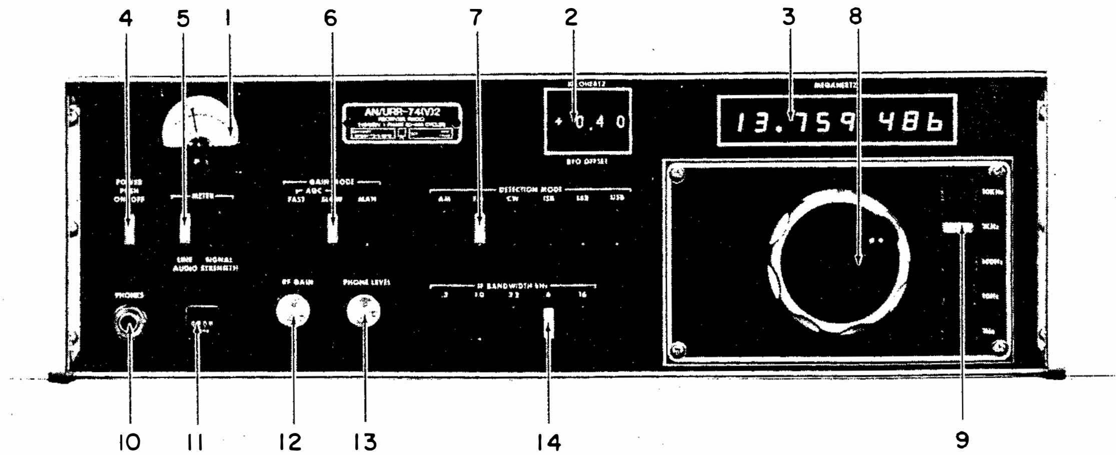

Figure 2-1. AN/URR-74(V)2 Receiver, Front Panel View

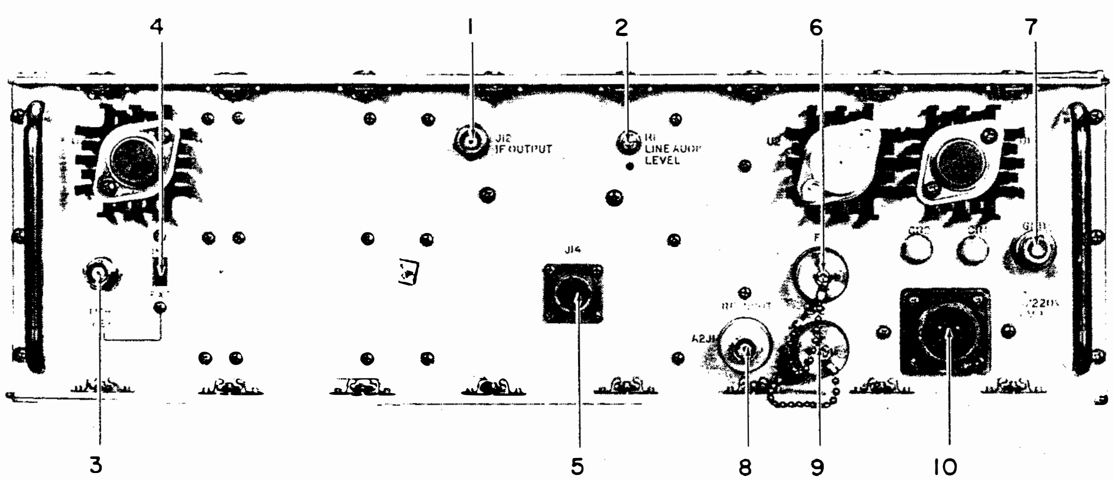

Figure 2-2. AN/URR-74(V)2 Receiver, Rear Panel View

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switches automatically activates other bandwidth filters related to these modes of operation.

(a) AM MODE. The Line Audio and Phone Audio (from the rear panel Audio output connector J14, see paragraph 2.2.b.5), and front panel PHONES audio are taken from the AM detector in this mode.

(b) FM MODE. The Line Audio, Phone Audio, and front panel PHONES audio are taken from the FM detector in this mode.

(c) CW MODE. Selection of this mode enables the BFO and the BFO OFFSET switch. The Line Audio, Phone Audio, and front panel PHONES audio are taken from the CW/SSB product detector in this mode.

(d) USB MODE. Selection of this mode overrides the front panel IF bandwidth switches and activates the independent IF filter for upper sideband reception. Audio will be available at the front panel PHONES jack, and at the Audio output connector on the rear panel. The BFO is enabled but fixed in frequency at 455 kHz. The frequency readout indicates the corresponding suppressed carrier frequency.

(e) LSB MODE. Except for the sideband selected, this mode is functionally identical to the USB mode.

(f) ISB MODE. Selection of this detection mode automatically activates separate IF filters independent of the front panel IF bandwidth selection. Both upper and lower sidebands are separately and simultaneously demodulated. The stereo PHONES jack provides the USB component of the signal on the tip contact and the LSB component of the signal on the ring contact. With mono headphones, only the USB component of the signal will be heard. In this mode the USB audio is available at the Line Audio and Phone Audio outputs of the rear panel Audio output connector J14. The LSB audio is available at the ISB Line Audio output of the rear Panel Audio output connector J14.

(8) Manual tuning knob. Rotating this knob clockwise increases the tuned frequency while counterclockwise rotation decreases it. Continuing to tune past the end of the range causes the receiver to step to the opposite end of the band and to continue tuning in the same increasing or decreasing frequency direction. The receiver tunes from 0.00000 MHz to 29.99999 MHz, usable above 5 kHz.

(9) Tuning push buttons.

(a) TUNING DISABLE. Engaging this button locks the receiver to the frequency currently being displayed. Any other tuning-related button engaged will be released and the tuning knob disabled. Depressing any tuning button slightly releases all buttons and also disables tuning.

(b) 10 kHz button. With this button engaged, only the four most-significant digits of the readout can be varied by the tuning knob. The 1 kHz, 100 Hz, and 10 Hz digits will be locked to the frequency indicated when the 10 kHz button was engaged.

(c) 1 kHz button. With this button engaged, the five most-significant digits of the readout can be varied by the tuning knob. The two least-significant digits will be locked to a fixed frequency.

(d) 100 Hz button. With this button engaged, only the 10 Hz digit is locked to frequency. All others are available for tuning.

(e) 10 Hz button. With this button engaged, all digits are available for tuning.

(10) PHONES. This output is intended to drive a 600 Ω, or greater, stereo headphone set. When operating in the ISB mode, both USB and LSB information can be monitored simultaneously through the headphones. Mono headphones may be used. However, there will be a loss of LSB when operating in the ISB mode. In all other modes, both stereo and mono headphones will provide essentially the same results.

(11) Elapsed time meter. This meter is a hermetically sealed microminiature meter

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that meets the requirements of MIL-M-7793. It has a four-digit readout which indicates receiver running time from 0 to 9999 hours.

(12) RF GAIN control. When in the MAN GAIN MODE, rotating the RF GAIN control clockwise approximates a logarithmic increase in receiver gain. In the AGC GAIN MODE, this control will have no effect.

(13) PHONE LEVEL control. Rotating the PHONE LEVEL control clockwise increases the level of both the phone audio at the rear panel Audio Output connector J14 and the front panel PHONES jack.

(14) IF BANDWIDTH kHz controls. One of the IF bandwidth switches must be selected when in the AM, FM or CW detection modes; in the other three detection modes, IF bandwidth switches are inoperative. Available bands are 0.3, 1.0, 3.2, 6 and 16 kHz.

b. Rear Panel. Refer to figure 2-2. The numbers shown on the figure correspond to the paragraph numbers below.

(1) J12 IF OUTPUT. This BNC connector supplies a 455 kHz IF output. The level will be 20 mV minimum into 50 ohms in AGC mode, for RF signals greater than 3 μV.

(2) R1 LINE AUDIO LEVEL. This potentiometer adjusts the level of audio signals appearing at the Line Audio terminals of the output connector. The front panel meter monitors this output when the related LINE AUDIO switch is engaged. Rotating this control fully clockwise will provide at least 1W audio output (24.5 V rms/+30 dBm) into 600 Ω.

(3) J11 1 MHz REF reference. When the CLOCK switch is in the INT position, this BNC connector provides a 1 MHz, 100 mV rms output into 50 Ω. When the switch is set in the EXT position, a 1 MHz reference signal of at least 50 mV rms into 50 Ω must be applied to J11 to provide a time base for the receiver.

(4) INT/EXT S2 CLOCK switch. Setting this switch to the INT position selects the internal time base for the receiver and provides the internal 1 MHz reference output at J11. Setting this switch to the EXT position deactivates the internal reference so that an external signal may be applied to J11.

(5) J14 Audio output connector. This connector is a 13-pin Bendix model with an EMI backshell. The pin functions are listed in table 2-1. Each audio output is described below.

Table 2-1. Audio Output Connector Pin Functions

Pin	Function
1	Ground
2	Phone Audio
3	Line audio
4	Line Audio Ct.
5	Line Audio
6	No Connection
7	ISB Audio
8	ISB Audio Ct.
9	ISB Audio
10	Ground
11	FM, CW, SSB Audio
12	No Connection
13	No Connection

(a) Line Audio output. This output (from terminals 3,4 and 5) provides a floating, 600Ω, center tapped audio for the selected detection mode. This output will drive a 600Ω load from zero (0)W to at least 1W (0 V to 24.5 V rms) depending on the setting of rear panel R1 LINE AUDIO LEVEL potentiometer (see paragraph 2.2.b.2). This line voltage is monitored by the front panel meter when the METER LINE AUDIO switch is engaged.

(b) Phone Audio output. This output (from terminals 1 and 2) provides a single ended output, which is essentially in parallel with the front panel PHONES jack, and is meant to drive a 600Ω lead. Output level is controlled by the front panel PHONE LEVEL potentiometer and is typically a maximum of 7.8 V rms.

(c) ISB Audio output. This output (from terminals 7,8 and 9) provides a center

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tapped audio for the LSB in the ISB detection mode. This is the only signal available from these terminals. No signal is available during any other detection mode. The USB audio for the ISB detection mode is available at the Line Audio output terminals (3,4 and 5).

(d) FM/CW/SSB Audio output. This output (from terminals 11 and 10) provides a single ended dc coupled monitoring output of the detector module in the FM, CW or SSB detection modes. Measure with a high impedance voltmeter.

(6) F1 Fuse. This receiver ac power input circuit is double-fused. A fuse is located in either side of the power input lines between the Power Input Filter Assembly and the receiver power switch. The fuses are normally 1 amp slow-blow which can be used for either 115 or 230 Vac operation. However, if the receiver is to be used for extended periods of time with a 230 Vac input, 1/2 amp slow-blow fuses should be used to replace the 1 amp fuses.

(7) GND Grounding terminal. This connector is provided to give additional grounding beyond that provided by the Power Input connector, if so desired.

(8) RF INPUT connector. This is a type-N connector that provides the RF signal input for the receiver. Nominal input impedance is 50 Ω. The input is protected against signals exceeding +15 dBm (1.25 V rms) and static build-up.

(9) F2 Fuse. This receiver ac power input circuit is double-fused. A fuse is located in either side of the power input lines between the Power Input Filter Assembly and the receiver power switch. The fuses are normally 1 amp slow-blow which can be used for either 115 or 230 Vac operation. However, if the receiver is to be used for extended periods of time with a 230 Vac input, 1/2 amp slow-blow fuses should be used to replace the 1 amp fuses.

(10). A13J1 110/220V 1 AMP Power input connector. This is a military standard type MS-3102-16S-5P Environmental Connector. It is a screw-on type with the following connector pin designation:

Pin A - Hot
Pin B - Ground
Pin C - Hot

To change input voltage selections refer to Chapter 8 - Installation, paragraph 8-8.

2-3. OPERATOR TURN-ON. Turn-on procedures for the receiver are quite simple and straight-forward. To begin operations, insure the unit is attached to a proper power supply and that the input leads are connected. All primary controls are located on the receiver front panel. To turn-on the receiver simply depress the POWER PUSH ON/OFF switch.

2-4. MODES OF OPERATION. The receiver can be set to operate in the AM, FM, CW, USB, LSB or ISB mode, based upon the type of signal to be intercepted. Operation in each of these modes is covered in tables 2-2 through 2-7.

2-5. OPERATION UNDER INTERFERING CONDITIONS. Operation under interfering condions is the same as operation under normal conditions.

2-6. OPERATOR TURN-OFF. To turn-off the receiver, simply depress the POWER PUSH ON/OFF switch.

2-7. BATTLE-SHORT OR EMERGENCY OPERATION. There are no special procedures for emergency operation of the URR-74(V)2 receiver due to its simplicity. Should the receiver fail to function, the only operator action necessary is to check fuses F1 and F2 on the rear panel for continuity, see figure 2-2.

2-8. EMERGENCY TURN-OFF. In the event of an emergency requiring shut down of the receiver, simply depress the POWER PUSH ON/OFF switch. If deemed advisable, the power cord may then be disconnected from jack A13J1, located on the rear panel, see figure 2-2.

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2-9. OPERATOR'S MAINTENANCE ACTIONS AND SCHEDULES. Table 2-8 provides a schedule of operators maintenance actions with reference to instructions for their accomplishments.

2-10. VISUAL INSPECTION. Inspect the receiver for the following:

a. Loose Switches, Knobs, Covers and Panels. Tighten loose switches, knobs, covers and panels as necessary.

b. Nicks, Scratches or Worn Spots on Surfaces. Sand and retouch surfaces as necessary.

c. Accumulation of Dust, Dirt, or Oil. Clean as described in paragraph 2-11.

d. Check all Cable Connectors for Tightness. Tighten as required.

2-11. EXTERNAL CLEANING. Use a soft, lint-free cloth and a soft brush to remove dust and dirt from the equipment. Remove caked on dirt and grease from the equipment using a cloth dipped in a mild soap and water solution.

Table 2-2. AM Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the AM detection mode by depressing the DETECTION MODE AM pushbutton.	The AM selector button displays a yellow background behind the clear cover.	Item 7
3	Select the desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons. See paragraph 2-2.a (14).	The bandwidth selector button displays a yellow background behind the clear cover.	Item 14
4	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9).	The tuning increment selector button displays a green background behind the clear cover.	Item 9
5	Select the RF/Audio meter to read signal strength by depressing the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
6	Select the MANUAL GAIN MODE by depressing the MAN pushbutton	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
7	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3

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Table 2-2. AM Signal Detection Mode (Cont'd)

Step	Action	Indication	Reference Figure 2-1
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
8	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain knob is rotated.	Item 1
9	Select AGC FAST GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
10	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None	Item 10
11	Adjust the PHONE LEVEL control to a comfortable level.	Audio output in the headphones	Item 13
12	If desired, the audio level from the audio output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
13	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton displays a yellow background behind the clear cover.	Item 9
	If a different AM signal is to be intercepted, return to Step 4 and proceed through the appropriate steps. If another type of signal other than AM is to be intercepted, go to the appropriate table for instructions.		
14	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background.	Item 4
		The frequency display will go dark.	Item 3

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Table 2-3. FM Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the FM detection mode by depressing the DETECTION MODE FM pushbutton.	The FM selector button displays a yellow background behind the clear cover.	Item 7
3	Select the desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons. See paragraph 2-2.a.(14).	The bandwidth selector button displays a yellow background behind the clear cover.	Item 14
4	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9).	The tuning increment selector button displays a green background behind the clear cover.	Item 9
5	Select the RF/audio meter to read signal strength by depressing the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
6	Select the MANUAL GAIN MODE by depressing the MAN pushbutton.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
7	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
8	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain knob is rotated.	Item 1
9	Select AGC FAST GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6

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Table 2-3. FM Signal Detection Mode (Cont'd)

Step	Action	Indication	Reference Figure 2-1
10	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 10
11	Adjust the PHONE LEVEL control to a comfortable level.	Audio output in the headphones.	Item 13
12	If desired, the audio level from the Audio Output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
13	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton display a yellow background behind the clear cover.	Item 9
	If a different FM signal is to be intercepted, return to step 4 and proceed through the appropriate steps.		
	If another type of signal other than FM is to be intercepted, go to the appropriate table for instructions.		
14	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background.	Item 4
		The frequency display will go dark.	Item 3

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Table 2-4. CW Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the CW detection mode by depressing the DETECTION MODE CW pushbutton.	The CW selector button displays a yellow background behind the clear cover.	Item 7
3	Select the desired bandwidth by depressing one of the IF BANDWIDTH kHz pushbuttons. See paragraph 2-2.a.(14).	The bandwidth selector button displays a yellow background behind the clear cover.	Item 14
4	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9).	The tuning increment selector button displays a green background behind the clear cover.	Item 9
5	Select the RF/audio meter to read signal strength by depressing the the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
6	Select the MANUAL GAIN MODE by depressing the MAN pushbutton.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
7	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
8	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain knob is rotated.	Item 1
9	Select AGC SLOW GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6

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Table 2-4. CW Signal Detection Mode (Continued)

Step	Action	Indication	Reference Figure 2-1
10	Select BFO OFFSET as desired. See paragraph 2-2.a.2.	The BFO offset indicator will show the selected value.	Item 2
11	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 10
12	Adjust the PHONE LEVEL control to a comfortable level.	Audio output in the headphones.	Item 13
13	If desired, the audio level from the Audio Output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
14	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton displays a yellow background behind the clear cover.	Item 9
	If a different CW signal is to be intercepted, return to step 4 and proceed through the appropriate steps. If another type of signal other than CW is to be intercepted, go the the appropriate table for instructions.		
15	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background.	Item 4
		The frequency display will go dark.	Item 3

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Table 2-5. USB Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the USB detection mode by depressing the DETECTION MODE USB pushbutton.	The USB selector button displays a yellow background behind the clear cover.	Item 7
3	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9).	The tuning increment selector button displays a green background behind the clear cover.	Item 9
4	Select the RF/audio meter to read signal strength by depressing the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
5	Select the MANUAL GAIN MODE by depressing the MAN pushbutton.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
6	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
7	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain knob is rotated.	Item 1
8	Select AGC SLOW GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
9	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None	Item 10

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Table 2-5. USB Signal Detection Mode (Cont'd)

Step	Action	Indication	Reference Figure 2-1
10	Adjust the PHONE LEVEL control to a comfortable level.	Audio output in the headphones.	Item 13
11	If desired, the audio level from the Audio Output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
12	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton displays a yellow background behind the clear cover.	Item 9
	If a different USB signal is to be intercepted, return to step 3 and proceed through the appropriate steps. If another type of signal other than USB is to be intercepted, go to the appropriate table for instructions.		
13	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background.	Item 4
		The frequency display will go dark.	Item 3

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Table 2-6. LSB Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the LSB detection mode by depressing the DETECITON MODE LSB pushbutton.	The LSB selector button displays a yellow background behind the clear cover.	Item 7
3	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9)	The tuning increment selector button displays a green background behind the clear cover.	Item 9
4	Select the RF/audio meter to read signal strength by depressing the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
5	Select the MANUAL GAIN MODE by depressing the MAN pushbutton.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
6	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
7	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain is rotated.	Item 1
8	Select AGC SLOW GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
9	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 10

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Table 2-6. LSB Signal Detection Mode (Cont'd)

Step	Action	Indication	Reference Figure 2-1
10	Adjust the PHONE LEVEL control to comfortable level.	Audio output in the headphones.	Item 13
11	If desired, the audio level from the Audio Output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
12	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton displays a yellow background behind the clear cover.	Item 9
	If a different LSB signal is to be intercepted, return to step 3 and proceed through the appropriate steps. If another type of signal other than LSB is to be intercepted, go to the appropriate table for instructions.		
13	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background.	Item 4
		The frequency display will go dark.	Item 3

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Table 2-7. ISB Signal Detection Mode

Step	Action	Indication	Reference Figure 2-1
1	Turn ON receiver power by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button displays a red background behind the clear cover.	Item 4
		The tuned frequency LED readout illuminates.	Item 3
2	Select the ISB detection mode by depressing the DETECTION MODE ISB pushbutton.	The ISB selector button displays a yellow background behind the clear cover.	Item 7
3	Select the proper tuning increment pushbutton for the tuning desired. See paragraph 2-2.a.(9).	The tuning increment selector button displays a green background behind the clear cover.	Item 9
4	Select the RF/audio meter to read signal strength by depressing the the METER SIGNAL STRENGTH pushbutton.	The meter selector button displays a yellow background behind the clear cover.	Item 5
5	Select the MANUAL GAIN MODE by depressing the MAN pushbutton.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
6	Tune to the frequency desired using the manual tuning knob.	The LED frequency display will change as the knob is rotated indicating a change of receiver frequency.	Item 3
		The signal strength meter will indicate relative signal strength. Tune for a maximum indication.	Item 1
7	If it is desired to change the signal strength, adjust using the RF GAIN knob.	The indication on the RF/audio meter will vary as the gain knob is rotated.	Item 1
8	Select AGC SLOW GAIN MODE.	The gain mode selector button displays a yellow background behind the clear cover.	Item 6
9	If the signal is to be monitored by the operator, plug headphones into the front panel PHONES jack.	None.	Item 10

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Table 2-7. ISB Signal Detection Mode (Cont'd)

Step	Action	Indication	Reference Figure 2-1
10	Adjust the PHONE LEVEL control to a comfortable level.	Audio output in the headphones. See paragraph 2.2.a.10.	Item 13
11	If desired, the audio level from the Audio Output connector on the rear panel may be monitored by depressing the LINE AUDIO pushbutton.	The meter sélector button displays a yellow background behind the clear cover.	Item 5
12	If the receiver is to remain at this tuned frequency, depress the TUNING DISABLE pushbutton to disable the tuning knob.	The tuning disable pushbutton displays a yellow background behind the clear cover.	Item 9
	If a different ISB signal is to be intercepted, return to step 3 and proceed through the appropriate steps. If another type of signal other than ISB is to be intercepted, go to the appropriate table for instructions.		
13	If no further use is to be made of the receiver at this time, turn the receiver OFF by depressing the POWER PUSH ON/OFF pushbutton.	The power switch indicator button will display a black background. The frequency display will go dark.	Item 4 Item 3

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Table 2-8. Operators Maintenance Schedule

Periodicity*	Maintenance Action	Reference
D	Visual Inspection	Para. 2-10
W	External Cleaning	Para. 2-11
As Required	Equipment Tuning	Tables 2-2 through 2-7

*D represents daily, W represents weekly.

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CHAPTER 3

FUNCTIONAL DESCRIPTION

SECTION I. OVERALL LEVEL

3-1. INTRODUCTION. This section covers the overall function of the URR-74(V)2 receiver. Refer to the Overall Block Diagram, figure 3-1.

3-2. RF AND IF SECTIONS. Signals enter the receiver via the RF input connector on the rear panel. The RF Filter (A2) accepts signals between 5 kHz and 30 MHz. These signals are passed to the Input Converter (A3) where the tuned frequency band is translated to the band about the 10.7 MHz IF. This IF bandwidth is 16 kHz. The 10.7 MHz IF is fed to the IF section (A4) where it is further translated to the band about the 455 kHz IF. The bandwidth of this IF is selectable from the front panel. The 455 kHz IF is demodulated in the AM, FM, CW, USB, LSB or ISB mode. Selection of the detection mode is made via the front panel. Audio from the selected detection mode is fed through the Switchable Attenuator (A11) and output transformer T2 which is applied to the LINE AUDIO output connector on the rear panel. In the ISB detection mode, the Line Audio output is the audio from the USB. The audio from the LSB in the ISB mode is fed through Switchable Attenuator (A12) and is applied to the ISB AUDIO output connector on the rear panel. In the AM, FM or CW detection modes the 455 kHz IF bandwidth is selectable from the front panel is to be 0.3, 1.0, 1.6, 3.2, 6.0 or 16 kHz. In the USB, LSB and ISB modes the IF bandwidth is fixed and therefore the front panel IF bandwidth selection is inoperable. The output from the FM/CW/SSB detector is applied to the rear panel as the FM/CW/SSB Detector Output Monitor. The 455 kHz IF is also applied to the rear panel. Receiver gain is controlled from the front panel and may be selected for Manual, AGC Fast or AGC slow. In Manual, the RF Gain knob on the front panel controls the gain.

3.3. SYNTHESIZER SECTION. The Synthesizer Section (A5) contains four synthesizers and a time base. Three synthesized LO's supply the signals required to translate all RF input signals to the 455 kHz IF. When operating in a CW or SSB mode, the fourth (BFO) synthesizer beats with the 455 kHz IF to produce an audio output. The time base is derived from an internal or optional external reference.

3-4. CONTROL SECTION. Receiver parameters are controlled from the front panel through the Manual Tuning Up/Down Counter (A6A1) and the Front Panel Interconnect (A6A2) on the IO/Motherboard (A6). The Manual Tuning Up/Down Counter contains the RF frequency data. This information is sent to the Synthesizer Section and is also encoded for multiplexing to the Frequency Display. Frequency data is changed by the Manual Tuning Module (A7) on the front panel. The Manual Tuning Module is connected to the Manual Tuning Up/Down Counter and controls the direction and rate of change of the tuned frequency.

3-5. The Frequency Display (A8) accepts the multiplexed information from the Up/Down Counter and displays it on the seven LED's of the front panel located display.

3-6. The BFO Switch (A9) provides a variation of 0.0 +0 8.9 kHz from 455 kHz. It gives a direction of offset and a selectable amount. A zero setting in the directional control will automatically return the BFO to 455 kHz.

3-7. The Front Panel Controls (A10A1 and A10A3) allow manual selection of detection mode, gain mode, meter mode, IF bandwidth, RF gain, and headphone levels. For all detection modes except ISB, both the tip and ring of the front panel phones jack will yield the Line Audio output. In the ISB detection mode, the tip yields the USB Audio while the ring yields the LSB Audio. The front panel

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Phone Level control sets the output level for both tip and ring outputs. The tip output is sent back through an amplifier in the IF section and is applied to the rear panel as the Aux. Phone output.

3-8. POWER SUPPLY. The receiver may be operated from either 115 or 230 Vac. The Power Supply Section of the receiver accepts the input voltage via a filter assembly, the input fuses, a voltage selector and the power switch. The input voltage passes to the receiver's transformer which then supplies two lesser ac voltages to the power distribution board. Through the use of rectifiers and voltage regulators, these ac voltages are converted to +15, -15, +5, +12 Vdc and unregulator +10 Vdc, which are, in turn, supplied to the various units of the receiver. When the Power Supply is on, a voltage is supplied to activate the Elapse Time Meter on the front panel.

3-9. RECEIVER INTERCONNECTIONS. F0-1, sheets 1 through 6, is the receiver main chassis diagram. It shows connections between all units in the receiver.

SECTION II. FUNCTIONAL LEVEL

3-10. INTRODUCTION. This section describes the operation of the various units of the AN/URR-74(V)2 receiver as shown on the accompanying block diagrams. Certain units, due to their inherent simplicity do not have block diagrams included.

3-11. RF FILTER (A2). The RF Filter location is shown in the Overall Block Diagram, figure 3-1 and in the schematic diagram F0-2. The RF Filter is composed of a torodial coil, and a 30 MHz low pass filter.

3-12. INPUT CONVERTER (A3). This unit is made up of the 1st and 2nd Mixers, the 1st and 2nd IF Filters, a filterboard, the 1st and a portion of the 2nd IF Amplifier. See block diagram, figure 3-2, and schematic diagram F0-3. The 1st Mixer receives signals from the RF Filter (A2) and an input from the 1st LO Synthesizer which shifts the RF signal up in frequency to produce the 1st IF which is in the range 42.90000 to 42.91000 MHz. This signal is amplified and filtered by the 28 kHz bandwidth band-pass filter. It then passes through a filter board (A3A3) and is amplified before passing into the 2nd Mixer, where, with the appropriate input (in the range 32.20000 to 32.21000 MHz) from the 2nd LO Synthesizer, the RF signal is down converted to 10.7 MHz. This signal is then amplified and further filtered by the 16 kHz bandwidth band-pass crystal filter. The overall net gain of the Input Converter is approximately +12 dB. The relationships between the tuned frequency, 1st LO, 1st IF, 2nd LO and 2nd IF will be described further in paragraphs 3-15 and 3-74 through 3-76.

3-13. IF SECTION (A4). The IF Section, mounted on motherboard A4 is composed of four filter switches, three detector boards, two audio amplifiers, an AGC circuit and a 10.7 MHz to 455 kHz converter. See figure 3-3.

a. 10.7 MHz Filter Switch (A4A1). This switch receives the 10.7 MHz signal that has been output by the Input Converter, (A3). At this point, the IF bandwidth has been set at 16 kHz by the crystal filter in the Input Converter. The 10.7 MHz Filter Switch contains band-pass filters for 6 and 3.2 kHz bandwidth. This circuit routes the IF signal through one of these filters or through a wideband path, which allows the full 16 kHz bandwidth to pass, as determined by the IF Bandwidth selection.

b. 10.7 MHz/455 kHz Converter (A4A2). This unit, also called the 3rd Mixer, converts signals from 10.7 MHz to 455 kHz. The 3rd LO signal is applied at a fixed frequency of 11.155 MHz and a level of approximately -6 dBm, and is amplified to roughly +7 dBm before entering the mixer. The converter output is fed in parallel to the 455 kHz, USB and ISB/LSB filter switches.

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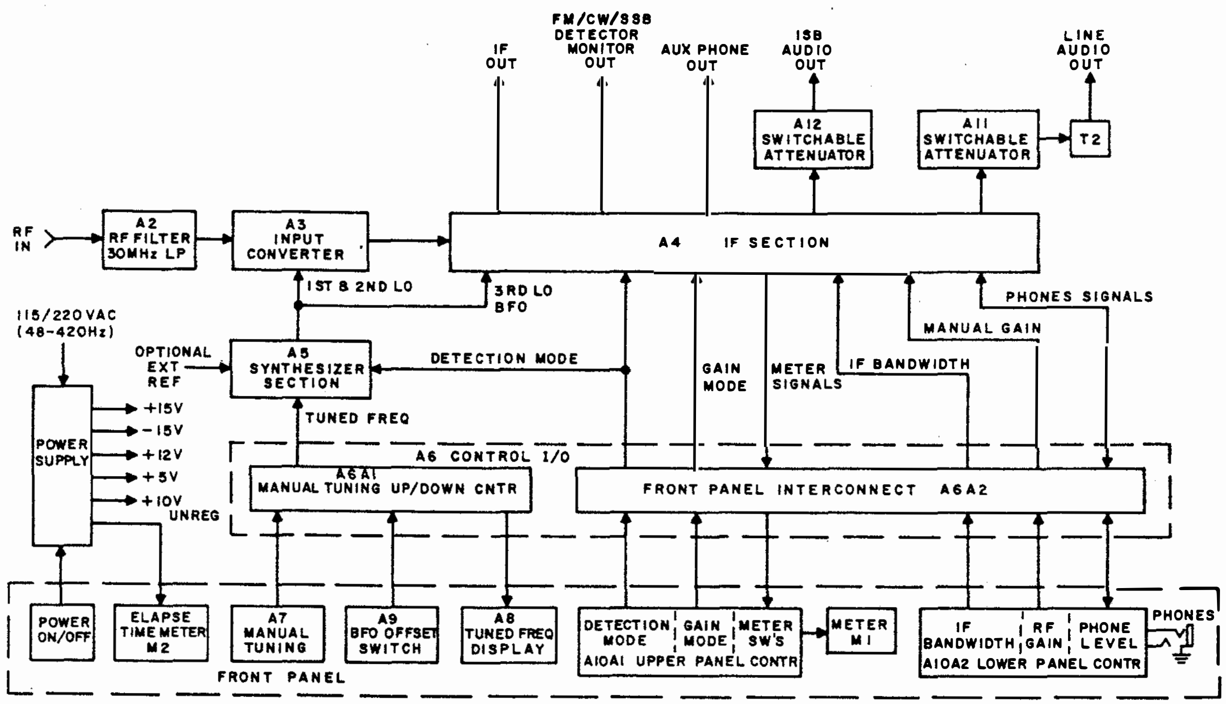

Figure 3-1. Receiver Overall Block Diagram

Courtesy of http://BlackRadios.terryo.org

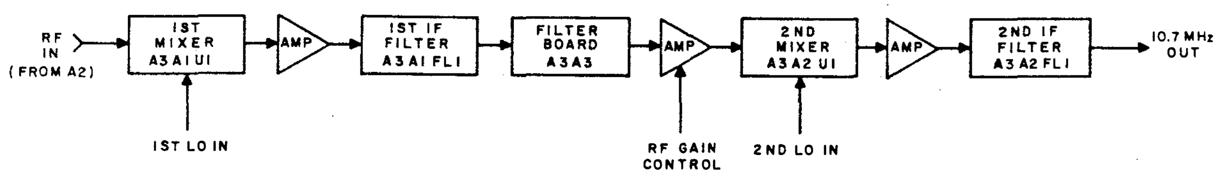

Figure 3-2. Input Converter Functional Block Diagram

c. 455 kHz Filter Switch (A4A3). The 455 kHz Filter Switch is similar in function to the 10.7 MHz Filter Switch. Both contain three possible signal paths, two with crystal filters and one with broad bandwidth. There are, however, important differences between the two filter switches. Two of the bandwidths are 0.3 and 1.0 kHz. When the broad bandwidth path is energized the overall receiver bandwidth is controlled by either the 10.7 MHz Filter Switch or the Input Converter. In the 455 kHz Filter Switch all paths are off when the USB or LSB filters are selected.

d. USB Filter switch (A4A4). The USB Filter Switch connects into the 455 kHz IF signal path, in parallel with the 455 kHz Filter Switch. When the receiver is operating in either the USB mode or the ISB mode, the upper sideband modulation is passed in this circuit and sent to the 455 kHz Amplifier/AM Detector (A4A7). The upper sideband filter has a bandpass extending from 455.25 kHz to 458.2 kHz.

e. ISB/LSB Filter Switch (A4A5). The ISB/LSB Filter Switch connects into the 455 kHz IF signal path, in parallel with the 455 kHz Filter Switch. The circuit has two signal outputs, one to the 455 kHz Amplifier/AM Detector (A4A7), and one to the ISB Detector and Audio (A4A8). When the receiver is operating in the LSB detection mode, the lower sideband modulation is applied to the 455 kHz Amplifier/AM Detector (A4A7). When the receiver is in the ISB detection mode, the lower sideband modulation is applied to the ISB Detector and Audio (A4A8). The lower sideband filter has a bandwidth extending from 451.8 kHz to 454.75 kHz.

f. 455 kHz Amplifier/AM Detector (A4A7). Although received signals are amplified by most of the circuits in the receiver, the majority of the amplification of weak signals takes place in the 455 kHz amplifier of A4A7. Following a two-stage gain controlled amplifier, the input signal is split to provide three outputs: the IF sample which operates the FM/CW/SSB Demodulator, the IF output for the rear panel, and the input to the AM Detector. The AM Detector, which operates at a relatively high level for good linearity, has its output directly coupled to the AGC module and the Audio Amplifier.

Courtesy of http://BlackRadios.terryo.org

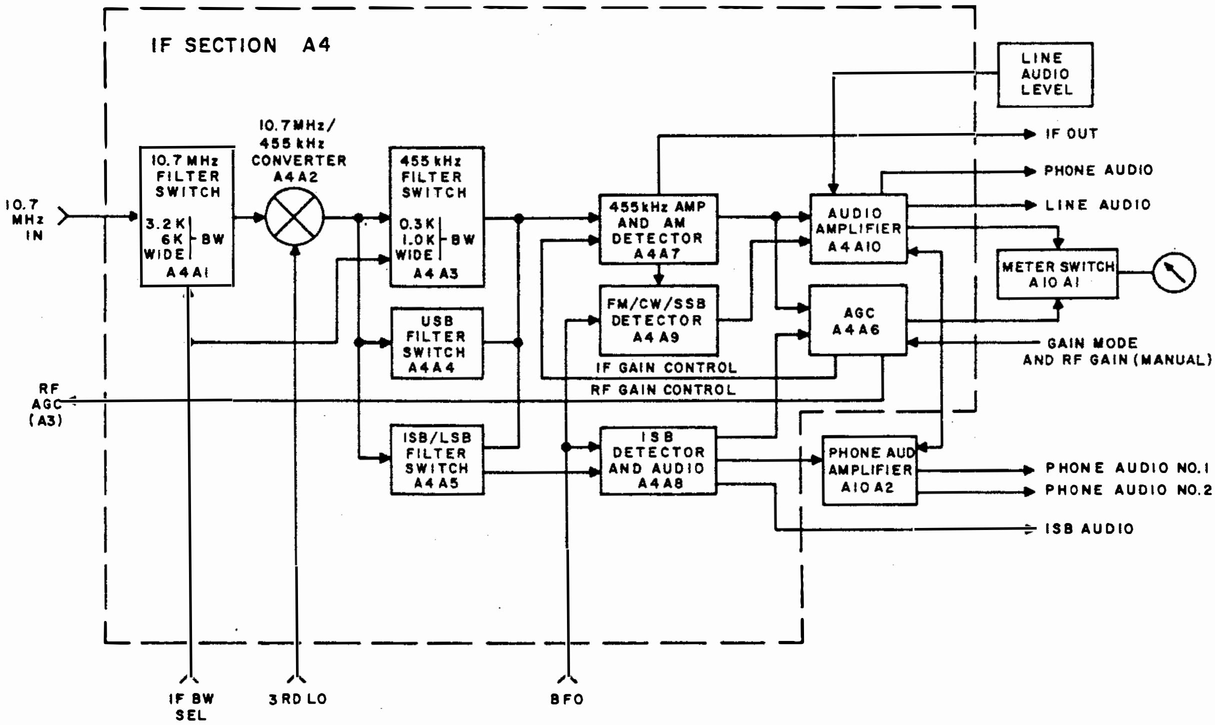

Figure 3-3. IF Section Funcitonal Block Diagram

Courtesy of http://BlackRadios.terryo.org

g. FM/CW/SSB Detector (A4A9). For FM reception, this module contains a limiter and discriminator. Power for these circuits is supplied when the FM detection mode is selected. For CW or SSB reception, there is a product detector which has its power applied when the CW, USB, LSB, or ISB detection modes are selected. Also, when the product detector is energized, the BFO Synthesizer is enabled and its output is applied to the product detector.

h. Automatic Gain Control (A4A6). The primary function of the AGC module is to generate control voltages which adjust the amplification of signals passing through the receiver. When the Fast AGC or Slow AGC gain mode is selected, this module attempts to adjust the receiver's amplification (gain) to maintain a constant output from the AM Detector. If the desired signal entering the receiver should fade in amplitude, the receiver gain would increase just enough to compensate for the fade. When the Manual gain mode is selected, the receiver's gain is fixed at a level which depends on the setting of the RF Gain potentiometer on the front panel. This module, as a secondary function, provides voltage to operate the signal strength meter.

i. Audio Amplifier (A4A10). The Audio Amplifier receivers the audio outputs of the AM detector and FM/CW/SSB detector and feeds them to the LINE AUDIO LEVEL control on the rear panel and the PHONE LEVEL control on the front panel. The signal returned from the LINE AUDIO LEVEL potentiometer drives the line audio amplifier. The signal returned from the PHONE LEVEL control drives the auxiliary phone amplifier which feeds the Phone Audio terminals of the Audio Output connector on the rear panel. A rectifier which samples the output of the line audio amplifiers supplies dc to operate the front panel meter in the LINE AUDIO setting.

j. ISB Detector and Audio (A4A8). For ISB operation, two independent single sideband signals must be demodulated. Since they share the same carrier frequency, they may be processed together up to a certain point. In this receiver, ISB is handled as a single composite signal through the 3rd Mixer. At that point it is split, the USB component being filtered and passed through the main signal path, the LSB component filtered and separately amplified and demodulated by the ISB Detector and Audio module. The ISB Detector and Audio module is therefore a combination of circuits from other modules previously discussed. There is a 455 kHz amplifier similar to part of A4A7, a product detector similar to that on A4A9, an AGC circuit like part of A4A6, and an ISB line audio amplifier similar to the auxiliary phone amplifier on A4A10. A sample of the AGC voltage developed in this module is sent to the main AGC module to produce a combined RF AGC.

k. IF Bandwidth Relationships. Table 3-1 shows the bandwidths used in the 10.7 MHz and 455 kHz Filter Switches for the various receiver IF Bandwidths and detection modes selected on the front panel.

l. Detection Mode and Output Signal Relationships. Table 3-2 lists the status of the detectors, BFO and Audio output signals for the various detection modes selected on the front panel.

3-14. SWITCHABLE AUDIO ATTENUATORS. Two switchable attenuators are used in the receiver. As shown in figure 3-1, one is used for line audio output while the second is used for the ISB audio output.

a. 16 Ohm Switchable Attenuator (A11). This attenuator is physically located to the right of Transformer T2 at the rear of the receiver. With attenuator switch S1 in the IN position, the attenuator provides a 16 ohm impedance and 30 dB attenuation to transformer T2. Thus, the line audio output impedance is 600 ohms. With switch S1 in the OUT position, it has no effect on line audio output. The front panel RF/Audio meter will indicate the dBm level of the line audio output whether switch S1 is IN or OUT.

b. 600 Ohm Switchable Attenuator (A12). Attenuator A4A12 is located on the left of Transformer T2. With attenuator switch S1 in the IN position, it provides a 600 ohm impedance and 20 dB of attenuation to the ISB audio output. With switch S1 in the OUT position, it has no effect on the ISB line audio output.

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Table 3-1. Receiver IF Bandwidth Relationships

Selected Detection Mode	Selected Receiver Bandwidth	10.7 MHz IF Filter Bandwidth	455 kHz IF Filter Bandwidth
AM, FM, or CW	16 kHz	16 kHz	16 kHz
	6 kHz	6 kHz	16 kHz
	3.2 kHz	3.2 kHz	16 kHz
	1.0 kHz	16 kHz	1.0 kHz
	0.3 kHz	16 kHz	0.3 kHz
USB	BANDWIDTHS	16 kHz	USB (2.95 kHz)
LSB	ARE FIXED IN	16 kHz	LSB (2.95 kHz)
ISB	THESE MODES	16 kHz	USB + LSB

NOTE: The Input Converter Bandwidth is 16 kHz.

Table 3-2. Detection Mode Output Signal Relationships

DETECTION MODE	AM DET	FM DET	CW DET & BFO	LINE AUDIO SIGNAL	ISB AUDIO SIGNAL
AM	ON	OFF	OFF	AM	OFF
FM	ON	ON	OFF	FM	OFF
CW	ON	OFF	ON	CW	OFF
USB	ON	OFF	ON	USB	OFF
LSB	ON	OFF	ON	LSB	OFF
ISB	ON	OFF	ON	USB	LSB

Courtesy of http://BlackRadios.terryo.org

3-15. SYNTHESIZER SECTION (A5). Figure 3-4 is a functional block diagram of the synthesizer section. Figure 3-5 shows the relationship of the synthesizers to the receiver signal processing. Together, three synthesizers translate all RF input signals to 455 kHz. Other stages of the receiver then demodulate this 455 kHz IF. If the receiver operates in the CW or a sideband mode, a fourth synthesizer signal beats with the 455 kHz IF to produce an audio output. The tuning process involves the 1st and 2nd LO; the 3rd LO is fixed at 11.155 MHz and the BFO varies ±8.9 kHz from 455 kHz.

a. 1st LO Synthesizer (A5A1). The 1st LO tunes from 42.91 MHz to 72.90 MHz, in 10 kHz steps, in accordance with the tuned frequency control input. This range corresponds to an RF input range of 00.00000 MHz to 29.99999 MHz. Each 10 kHz step of the 1st LO causes a different 10 kHz section of the RF spectrum to be converted to the 1st IF range (42.90 MHz to 42.91 MHz) by taking the difference products from the 1st Mixer. A filter follows the 1st mixer which passes signals in this 10 kHz range, plus their sidebands which extend approximately 9 kHz beyond each end of this range, for a total bandwidth of 28 kHz.

b. 2nd LO Synthesizer (A5A2). The 2nd LO tunes from 32.21000 MHz to 32.20001 MHz, in 10 Hz steps, in accordance with the tuned frequency control input. This range allows conversion of any signal in the 1st IF range to the center frequency of the 2nd IF (10.7 MHz), by the 2nd Mixer. A 16 kHz bandpass filter follows the 2nd Mixer to set the receiver's maximum IF bandwidth. As the receiver is tuned upward, the 2nd LO tunes downward across its entire range, then returns to its starting frequency as the 1st LO steps up to its next increment. This interlocking sweep action allows any 10 Hz increment of the RF range to be converted to the center of the 10.7 MHz 2nd IF passband.

c. 3rd LO Synthesizer (A5A1). The 3rd LO provides an 11.15500 MHz signal to the 3rd Mixer. Signals centered on 10.7 MHz output from the 2nd Mixer mix with the signal from the 3rd LO to produce signals centered at 455 kHz. The output from the 3rd Mixer passes through another bandpass filter either to be demodulated by other stages in the receiver or mixed with the BFO output for CW or Sideband detection.

d. BFO Synthesizer (A5A3). The BFO Synthesizer produces a signal ranging from 446.1 kHz to 463.9 kHz, in accordance with the BFO offset and Detection mode control inputs. This range centers about 455 kHz (±8.9 kHz) and beats with the 455 kHz signal from the 3rd Mixer to produce an audio output.

e. Time Base Circuits (A5A1). All four synthesizer circuits are synchronized by a common Time Base. Reference frequencies of 1 MHz, 50 kHz, 40 kHz, 10 kHz, and 1 kHz are supplied from a 2 MHz temperature compensated crystal oscillator or from a 1 MHz external source input at rear panel jack J11. The rear panel INT/EXT clock switch S2 allows selection at the internal and external reference. When in the internal mode, the 1 MHz internal reference is output from rear panel jack J11.

3-16. CONTROL SECTION. The Digital Control section is composed of the Manual Tuning Up/Down Counter; the Front Panel Interconnect; the Manual Tuning Module; the Frequency Display; the BFO Switch, the Upper Panel Control and the Lower Panel Control. Figure 3-1 shows the overall relationship of these units.

a. Manual Tuning Up/Down Counter (A6A1). The Manual Tuning Up/Down Counter contains the RF frequency data. This information is sent to the 1st and 2nd LO Synthesizers and is encoded for multiplexing to the display board. The frequency data is changed by means of the Manual Tuning Module on the front panel.

b. Front Panel Interconnect (A6A2). This module translates information received from the manually controlled front panel into control information for the receiver. Front panel information entering this module controls detection mode, gain mode, meter mode, and IF bandwidth, in addition to headphone and RF gain levels. This information is then decoded,

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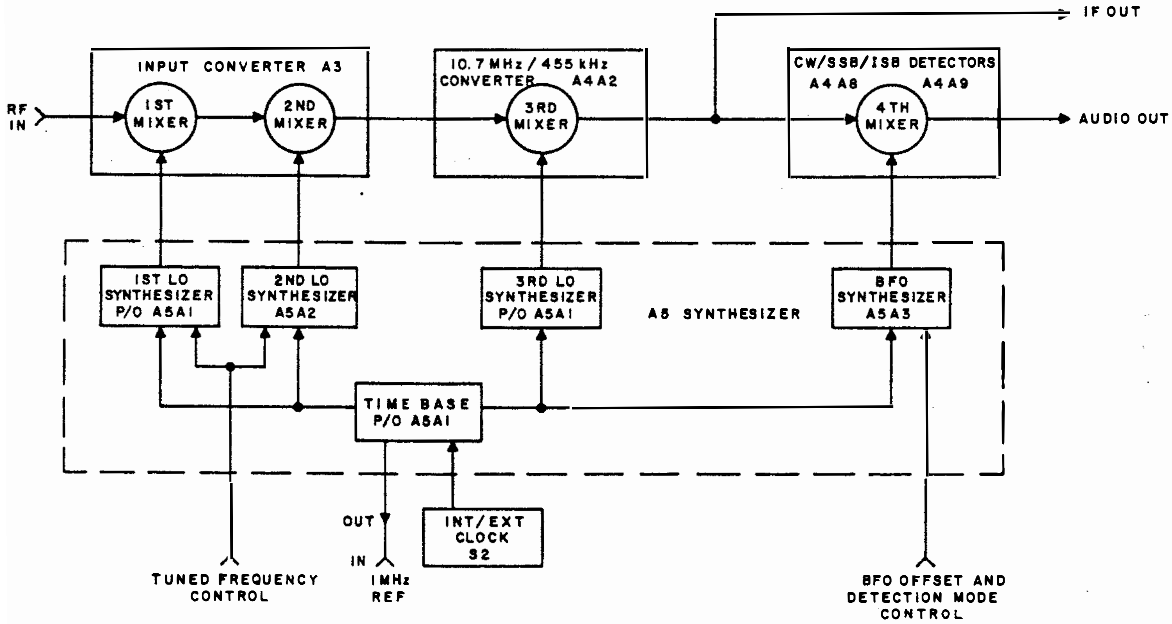

Figure 3-4. Synthesizer Section Functional Block Diagram

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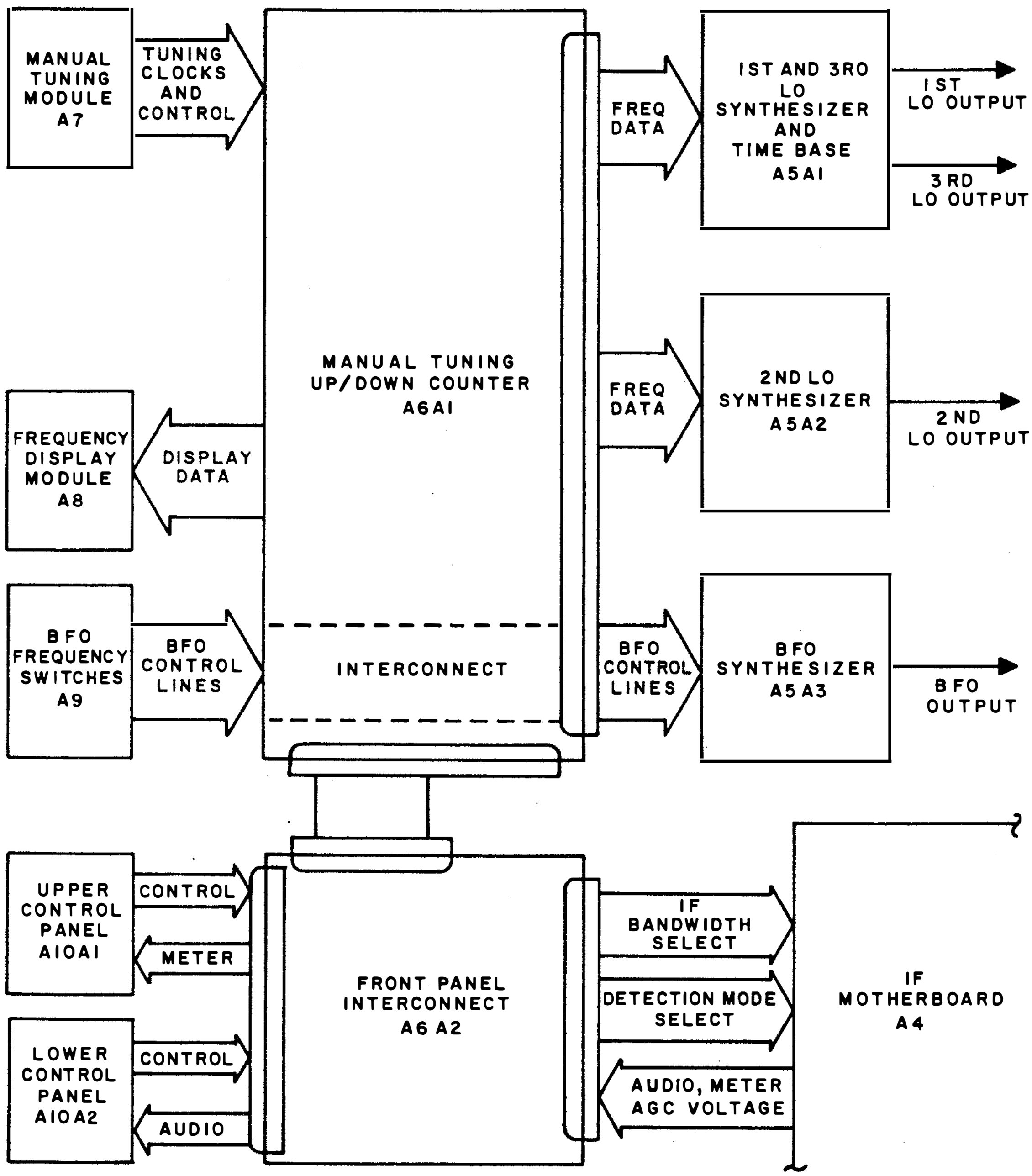

Figure 3-5. Digital Section Functional Block Diagram

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for use primarily in the IF stages of the receiver. Two output lines from the Front Panel Interconnect, however, control the BFO for the various detection modes.

c. Manual Tuning module (A7). The Manual Tuning Module controls the direction and rate of change of the tuned frequency. This module connects to the Manual Tuning Up/Down Counter (A6A1) and is mounted behind the receiver's front panel. The Manual Tuning Module consists of two parts, the Encoder Assembly and the Tuning Resolution switches. The Encoder Assembly converts tuning knob rotation into digital pulses for the Manual Tuning Up/Down Counter. When the knob is rotated clockwise it will increase tuned frequency, counterclockwise it will decrease it. The Tuning Resolution switches select the desired tuning step to be used. Switching is accomplished by connecting the desired tuning step to the step select switch line of the Manual Tuning Up/Down Counter board. Tuning steps available are 10 Hz, 100 Hz, 1 kHz, and 10 kHz.

d. Frequency Display (A8). The Frequency Display accepts the multiplexed information from the Manual Tuning Up/Down Counter and displays it on the seven front panel LEDs. These are seven-segment common-cathode displays which are controlled by an IC decoder/driver. The Up/Down Counter places digit display information in the IC where it is decoded into the proper number and sent to the display in its proper position.

e. BFO Switch (A9). Three thumbwheel switches provide a BFO variation of ±8.9 kHz from 455 kHz. The +, 0, -, thumbwheel provides the direction of offset, the second thumbwheel varies in range from 0 to 8, and the third thumbwheel varies in range from 0 to 9. A '0' setting of the direction thumbwheel causes the BFO to return automatically to 455 kHz regardless of the other thumbwheel settings.

f. Front Panel Control (A10). The Front Panel Control consists of the Upper and Lower Panel Control boards joined by a 40-pin ribbon connector. This connector is attached to the Front Panel Interconnect (A6A2) and controls the manual selection of detection mode, gain mode, meter mode, IF bandwidth, RF gain, and headphone levels. Signals for the phone outputs also connect to the lower panel control through the Front Panel Interconnect.

(1) Upper panel control (A10A1). The Upper Panel Control allows selection of detection mode, gain mode, and meter mode. Each gang of switches mechanically operates to allow only one pushbutton to be depressed at any time. All control lines connect to be Front Panel Interconnect card.

(2) Lower panel control (A10A2). The Lower Panel Control allows selection of IF bandwidth and variation of RF gain and phone level potentiometers. This card also contains the amplifiers to drive the headphone outputs. The amplifiers operate independently. They both receive the same signal in all detection modes except ISB. In this mode, one amplifier receives the upper sideband information while the other receives the lower sideband information. No damage will be done to the amplifiers when using mono headphones; however, LSB in the ISB mode will not be monitored.

3-17. POWER SUPPLY SECTION. See figure 3-6 for the power supply block diagram. The receiver may be operated from either 110 Vac ±15% or 220 Vac ±15%. This voltage feeds the Power Input Filter Assembly (A13) which contains filter FL1. It then passes through fuses F1 and F2 and through the main power switch, S1. From the switch, current is routed through the Voltage Selector and into Transformer T1. The Transformer has a dual primary and center-tapped secondaries and produces outputs of 34 and 16 Vac both of which enter the Power Distribution board, (A1).

a. Power Distribution (A1). The Power Distribution board receives the 34 and 16 Vac inputs and rectifies these voltages for various circuits in the receiver. The 34 Vac enters this board, is rectified and filtered and sent to regulators U1, U2 and U4. The 16 Vac is rectified by two diodes located on the rear panel and returned to the Distribution board to be filtered and become a +10 V unregulated supply.

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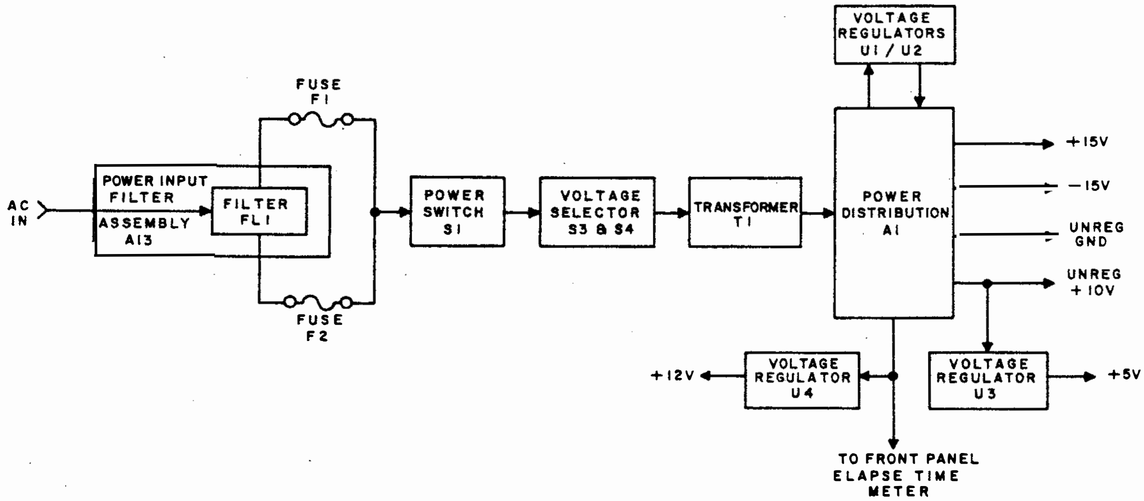

Figure 3-6. Power Supply Section Functional Block Diagram.

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b. Power Supply Regulators. U1 and U2 located on the back of the chassis provide regulated +15 Vdc and -15 Vdc, respectively. These two voltages are supplied to most of the circuits in the receiver. The unregulated 10 Vdc, with its unregulated ground, connects to U3, a +5 Vdc regulator. U3 supplies +5 Vdc to the BFO and 2nd LO Synthesizers, the Up/Down counter board, and the Front Panel Interconnect card. The unregulated 10 Vdc also connects through other +5 Vdc regulators to provide this voltage to the 1st and 3rd LO Synthesizers. U4 provides regulated +12 Vdc for the Audio Amplifier (A4A10). The unregulated input to U4 also goes to activate the front panel Elapse Time meter while power is turned on.

SECTION III. CIRCUIT LEVEL

3-18. INTRODUCTION. This section describes the electronic circuits found in the AN/URR-74(V)2 receiver, identifies all significant components, and discuss appropriate schematic diagrams. Complex units are afforded in-depth coverage with supplementary schematic and block diagrams and other figures and tables as may be necessary.

3-19. RF FILTER (A2). The schematic diagram for this circuit is shown in F0-2. The unit is a 10-pole, elliptic function, low-pass RF filter, with an insertion loss of less than 1.5 dB over the normal 0.005 to 30 MHz input range. Above 30 MHz, the attenuation increases rapidly. This attenuation improves the image rejection and reduces the conducted LO leakage of the receiver. Over the range of LO and image frequencies, the attenuation of the input filter exceeds 80 dB. Resistor R1 provides a dc path to ground to bleed off any accumulated static charge at the RF input. Diodes CR1 and CR2, use the Zener breakdown potential to protect the rest of the receiver from input signals in excess of +15 dBm. The nominal input impedance of the filter is 50 Ω.

3-20. INPUT CONVERTER (A3). All signals entering the Input Converter from the RF Filter are converted up in frequency and filtered. Signals passed by the 1st IF Filter are amplified and down converted in frequency to 10.7 MHz. Here they are further amplified and filtered. The overall net gain of the Input Converter is roughly +12 dB when zero gain control current is applied. The schematic diagram of the Input Converter is shown in F0-3.

3-21. Signals reaching the 1st Mixer, A1U1, may be any frequency from 5 kHz up to slightly above 30 MHz and any level from the noise floor to +30 dBm. In general, many signals will be present covering a wide range of levels. The role of the 1st Mixer is to handle these in such a way that the balance of the receiver can select the desired signal and reject all others. To accomplish this, a high level mixer is used and relatively high (+20 dBm) local oscillator power is applied. The conversion loss of the 1st Mixer is approximately 6 dB. Therefore, the 1st Mixer is followed by an amplifier to restore the signals to their original levels. This amplifier uses a grounded gate FET, A1Q2, to obtain a low noise figure, a good terminating impedance for the mixer, and a large signal handling ability. To set the operating point of A1Q2, a constant current source, A1Q1 and its associated circuitry, is used. Due to the variation between FET's, the effects of temperature, and other conditions of the circuit, the dc voltage at the collector of A1Q1 and the source of A1Q2 may range from about 0.5 V to greater than 3 V.

3-22. The output load for A1Q2 is transformer A1T1 which is broadly tuned by A1C3 to ensure a proper driving impedance for the 1st IF crystal filter A1FL1. This filter requires a 50 Ω source and load and has a center frequency of 42.905 MHz and a 3 dB bandwidth of 28 kHz. The primary function of A1FL1 is to reject unwanted signals which are passed by the RF Filter and 1st Mixer and to establish the initial IF bandpass.

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3-23. Signals passed by A1FL1 are coupled to a second amplifier, A2Q2, through a coupling network consisting of L1 and A2C1. This amplifier is very similar to A1Q2 and has a similar constant current source biasing it. Its output circuit is also a broadly tuned transformer, but is shunted by gain control diode A2CR2. As the current through the diode increases, its RF impedance decreases and the net gain of A2Q2 is decreased. Current to A2CR2 is supplied by the RF Gain portion of the AGC, A4A6. As the current varies from zero to maximum, there is approximately 30 dB of gain reduction.

3-24. The output signal of A2Q2 is down converted by the 2nd Mixer, A2U1. The 2nd LO signal enters the Input Converter via A2J1 at a level of approximately 0 dBm. Common emitter amplifiers, A2Q5 and A2Q6, provide enough gain to bring the 2nd LO signal to a nominal level of +17 dBm. Each of these stages is broadly tuned transformer-coupled and each has some unbypassed emitter resistance to preserve a relatively low harmonic content in the 2nd LO signal.

3.25. The 2nd Mixer is followed by a bipolar cascode amplifier. It consists of common emitter stage A2Q4 and common base stage A2Q3. These provide relatively high gain with good stability and low noise contribution. Transformer A2T2 couples the output of A2Q3 to crystal filter A2FL1. This filter has a center frequency of 10.7 MHz, a bandwidth of 16 kHz, and requires 50 Ω terminations.

3-26. The received signal frequency which corresponds to the center of the 2nd IF at exactly 10.7 MHz depends on the frequencies of both the 1st and 2nd LO's. The control of these two oscillators is described in the Synthesizer Section, paragraph 3-15.

3-27. IF MOTHERBOARD (A4). The schematic diagram for this unit is found on sheets 3 of 6 of the main chassis schematic, F0-1. The IF Motherboard has eleven positions for plug-in circuit cards. In the current receiver configuration, 10 positions are used and the eleventh is a spare.

3-28. 10.7 MHz Filter Switch (A4A2). The schematic diagram for this circuit board is shown in F0-4. The 10.7 MHz Filter Switch receives the 10.7 MHz IF signal output from the Input Converter, A3. At this point, the IF bandwidth has been set at 16 kHz by a filter in the Input Converter. The 10.7 MHz Filter Switch contains filters of 6 kHz and 3.2 kHz bandwidth. The purpose of this circuit is to route the IF signal through one of these filters, or through a wideband path which allows the full 16 kHz bandwidth to pass. The selection of the filter path is made by application of a logic high level to one of the three control terminals.

3-29. In any IF bandwidth, a logic high is applied to one of three control lines from the I/O motherboard, at pin 19, 17, or 15. These lines are connected to the non-inverting inputs of U1A, U1B, and U2A. The inverting inputs are held at approximately 0.8V by voltage divider R52-R53. The output voltage of the selected op-amp swings positive, turning on one pair of common-emitter IF amplifier stages. For example, if U1A is selected, Q1 and Q4 are turned on.

3-30. The 10.7 MHz IF signal is input at pin 13 and coupled through C1 to the base circuits of Q1, Q2, and Q3. If Q1 is on, the signal is amplified and coupled to FL1. This filter has a 50 Ω input impedance and a 3 dB bandwidth of 3.2 kHz. The filtered IF signal is applied to amplifier Q4 through level-adjust potentiometer R26. The amplified IF signal is output at pin 57. If 6 kHz bandwidth is selected, the IF signal is routed through Q2, FL2, and Q5. If any other bandwidth is selected, the IF signal is routed through Q3, attenuator R22, R23, R24, and Q6. The gain of the three signal paths is equalized by R26, R28, and R30 to approximately 14 dB. The circuit has nominal input and output impedance of 50 Ω.

3-31. 10.7 MHz/455 kHz CONVERTER. The schematic diagram for this converter is shown in F0-5. This 3rd Mixer converts signals from 10.7 MHz to 455 kHz. The 3rd LO signal is input at the fixed frequency of 11.155 MHz and a level of approximately -6 dBm, and is amplified by transistor Q1 and its associated circuitry to roughly +7 dBm before entering the mixer. The amplifier

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operates as a common emitter stage with some unbypassed emitter resistance to stabilize its gain and reduce distortion. The pi-network, C7-L2-C8, serves as an impedance transformer and low-pass filter, further reducing distortion of the LO signal.

3-32. Low-pass filter C9, L3, C10, L4, and C11 removes undesired components above 500 kHz from the mixer output and matches impedances between the mixer and the following circuits. The sideband structure of the 455 kHz signal is a replica of those which entered the receiver at the RF IN connector. This is not true of the 1st and 2nd IF signals.

3-33. When a mixer generates an IF frequency which is the difference between an input signal frequency and local oscillator of higher frequency than the input signal, the output has a sideband spectrum which is reversed from the input. Therefore, if a single sideband signal is received which is transmitted as upper sideband, upon reaching the 1st IF the signal would appear to be lower sideband. In the 2nd Mixer, the LO is below that mixer input frequency, no additional spectral reversal occurs and the 2nd IF signal would also appear to be a lower sideband. Finally, in the 3rd Mixer, another spectral reversal occurs and the signal again appears this time as an upper sideband. This matters primarily when troubleshooting by injecting IF test signals. When a signal is injected into the 1st or 2nd IF, if its frequency is increased, the frequency of the 3rd IF signal will appear to decrease. Remember, however, there is no apparent reversal from the RF input to the 3rd IF.

3-34. 455 kHz FILTER SWITCH (A4A3). The schematic diagram for this circuit is shown in F0-6. The 3rd IF signal from the 10.7 MHz/455 kHz converter is fed in parallel to the 455 kHz Filter Switch, A4A3, the USB Filter Switch, A4A4, and the ISB/USB Filter Switch A4A5. The USB Filter Switch and ISB/LSB Filter Switch have relatively high input and output impedances.

3-35. The 455 kHz Filter Switch contains three possible signal paths, two with crystal filters and one with broad bandwidth. The 455 kHz bandwidth is 0.3 kHz when Q1 and Q2 are activated, and 1 kHz when Q3 and Q4 are activated. When Q5 and Q6 are activated the broad bandwidth path is energized, thus allowing the overall receiver bandwidth to be controlled by the 10.7 MHz Filter Switch or the Input Converter. In the 455 kHz Filter Switch it is possible for all paths to be off when the USB or LSB filters are selected.

3-36. The input signal connects in parallel to Q1, Q3, and Q5. When Q1 is biased on, the signal passes through Q1 and is fed through the 0.3 kHz crystal filter, FL1. The biasing of Q1 and Q2 is controlled by the voltage on pin 19. When this voltage is high (+5V), the output of U1D will be +12V to +15V, thus biasing Q1 and Q2. When this voltage is low (0V), the output of U1D will be -12V to -15V which will cause an approximate 1V reverse bias to the bases of Q1 and Q2, and thus they are turned off.

3-37. When the 1 kHz bandwidth is selected, module pin 17 is high, and U1A turns on Q3 and Q4. When the 3.2 kHz, 6 kHz, or 16 kHz bandwidths are selected, module pin 15 is high and U1B turns on Q5 and Q6. When ISB, LSB, or USB are selected, all three control lines to this card are low and all three signal paths are inhibited.

3-38. All transistors, Q1 through Q6, are operated as common emitter amplifiers with unbypassed emitter resistors to control their gain. Through any of the three signal paths there is a net voltage gain of approximately 9 dB from the input to the output of the module. OP AMP section U1C is not used and is as shown in the schematic connected in an inoperative condition.

3-39. USB FILTER SWITCH (A4A4). The schematic diagram for this circuit description is shown in F0-7. The USB Filter Switch is connected in parallel with the 455 kHz Filter Switch at both the input and the output. It functions like a single channel of the other Filter Switch modules previously mentioned. The USB Filter passes signals between 455.25 kHz and 458.2 kHz and amplifies with a net voltage gain of approximately 9 dB. Because the passband of the filter is offset above the center of the 3rd IF, this filter

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passes only the upper sideband information when the receiver is tuned to a signal's carrier frequency. This signal path is enabled when either the USB or ISB detection mode is selected. The USB or ISB detection mode inhibits the operation of the 455 kHz Filter Switch.

3-40. When either the USB or ISB detection mode is selected, a logic high is applied to the non-inverting input of U1A. This causes its output voltage to swing to near +15V. The switching threshold (approximately 1.6V) is set by R17 and R18. The positive output voltage supplies bias current to amplifiers Q1 and Q2, turning them on. The 455 kHz IF signal with 16 kHz bandwidth, is amplified by Q1 and applied to the upper sideband filter, FL1. The upper sideband is amplified by Q2 and output via pin 57. Potentiometer R23 provides gain adjustment for equalizing the USB signal level with the other filtered IF signals. Resistors R7 and R8 provide impedance matching for the filter input and output, respectively.

3-41. ISB/LSB FILTER SWITCH (A4A5). The ISB/LSB Filter Switch connects in parallel with the 455 kHz Filter Switch although the ISB/LSB Filter Switch has an additional output. This output feeds into the ISB Detector/Audio module. The LSB filter is offset below the center of the 3rd IF, passing signals between 451.8 kHz and 454.75 kHz. This corresponds to the lower sideband information of a signal whose carrier frequency equals the receiver's dial frequency. See schematic diagram F0-8 for circuitry.

3-42. When the LSB Detection mode is selected, a logic high is applied to the non inverting input of U1A. This causes the output voltage to swing to near +15V. The switching threshold (approximately 2.5V) is set by R23 and R24. Diode CR1 conducts, supplying bias current through R15 to turn on IF amplifier Q1. Output amplifier Q2 is also biased on, by current flow in R21 and R9. The 455 kHz IF signal, with 16 kHz bandwidth, is amplified by Q1 and applied to the lower sideband filter, FL1. The lower sideband is amplified by Q2 and output via pin 57.

3-43. When the ISB detection mode is selected, Q1 is biased on by U1B and CR2, as previously described. Output amplifier Q3 is also biased on by current flow in R26 and R27. The lower-sideband information is amplified by Q3 and output via pin 53. Notice that only one output amplifier is operating in either mode. Potentiometer R32 allows gain adjustment for equalizing the filtered IF signal levels. Resistor R8 provides input impedance matching for the filter, and the output impedance is matched by R9 and R27.

3-44. 455 kHz AMPLIFIER/AM DETECTOR (A4A7). The schematic diagram for this circuit description is shown in F0-9. Although received signals are amplified by most of the circuits in the receiver, the majority of the amplification of weak signals takes place in the 455 kHz amplifier of A4A7. Following a two-stage gain controlled amplifier, the input signal is split to provide three outputs: the IF sample which operates the FM/CW/SSB Demodulator, the IF output for the rear panel, and the input to the AM Detector. The AM Detector, which operates at a relatively high level for good linearity, has its output directly coupled to the AGC module and the Audio Amplifier.

3-45. FET's Q1 and Q2 operate as common source amplifiers with their gains controlled by a variable voltage applied to gate 2 of each transistor. Inductor L1 broadly tunes the output of Q1 by cancelling any stray capacitance, but the network consisting of L2, C9, C10, C11, and L3 forms a double-tuned bandpass filter of approximately 35 kHz bandwidth. This filter is narrow enough to suppress any broadband noise contributed by earlier stages of the receiver, but at the same time is wide enough not to restrict the receiver's bandwidth. Potentiometer R7 between the first and second amplifiers adjusts the maximum gain of the amplifiers and hence of the whole receiver.

3-46. Transistor Q3 serves as a buffer between the 455 kHz amplifier and its three outputs. For signals fed to the FM/CW/SSB Detector (pin 13), Q3 acts as an emitter-follower stage. For the rear panel IF Output, Q3 feeds the signal to Q4, which acts as a power amplifier. Transformer T1 supplies a

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50 Ω IF output to the rear panel, providing a nominal 20 mV IF output for RF inputs greater than 3 μV. For the AM detector, Q3 and Q5 both act as common-emitter amplifiers to raise the IF signal to a level of several volts which will permit the detector diode, CR3, to perform linearly. Diodes CR4 and CR5 provide a dc-bias to operate the AM Detector and emitter-follower (Q6) above ground to establish the proper dc level for the AGC circuit. The low-pass filter of L7 and C28 suppresses any residual IF signal.

3-47. AUTOMATIC GAIN CONTROL (A4A6). The Automatic Gain Control adjusts the amplification of signals passing through the receiver. In the Fast or Slow AGC gain mode, the module endeavors to adjust receiver gain by generating appropriate control voltages. In this way, consistent amplification output can be maintained by the AM Detector. In manual gain mode, receiver amplification is determined by the setting of the RF Gain potentiometer located on the front panel. The AGC module also supplies the voltage necessary for operation of the Signal Strength meter.

3-48. The differences in decay times of Fast and Slow AGC make them useful for different kinds of signals. In the Fast AGC mode, the gain of the receiver adjusts about as quickly for a rise in signal strength as it does for a fall in signal strength. The time taken to respond to a rise is referred to as attack time, and the time taken for a fall is known as decay time. The response to rising signals remains fast in the Slow AGC mode, but when the signal strength falls the change in gain occurs much more slowly. For AM and FM signals, the total power contained in the carrier and sidebands does not vary much with time at the transmitter. With these types of signals, the main purpose of the AGC is to compensate for atmospheric losses between transmitter and receiver. These changes may occur very slowly or as rapidly as several rises and falls per second. For signals of this sort, the characteristics of the Fast AGC mode will usually serve best. However, for pulsed signals such as telegraphy (A1 emission) and for SSB voice signals (A3J emission) there are rapid fluctuations in transmitted power with recurring peaks. When this type of signal is received, it is usually desirable that the AGC have a sort of memory for the peaks but still be able to respond quickly if there is an abrupt increase in signal level. Hence, the fast attack and slow decay times of the Slow AGC will usually be desired for these cases.

3-49. There will also be instances where it is desirable to fix the gain of the receiver at some value to make critical comparisons of signal strength or to eliminate signals or noise below a particular amplitude. For these cases, the Manual gain mode is useful. When using this mode, it is desirable to adjust the RF GAIN control so that the signal strength meter reads at the MAN SET line for the average signal to be monitored, to obtain the greatest latitude for signal level change.

3-50. In the following discussions, it may be helpful to consider the simplified AGC circuit figure 3-7 and the schematic shown in F0-10. In the AGC module, the direct coupled output of the AM detector is filtered by R5 and C3 to limit the speed of response of the Fast AGC. In the Fast AGC Mode, Q7 is biased off, disconnecting C4, so Q1 operates simply as an emitter follower. Q7 is biased on when Slow AGC is selected, grounding the negative end of C4. In this case Q1 can charge C4 quickly if there is a rise in input from the AM Detector, but when the input falls below its peak value Q1 is turned off by the charge stored in C4. Q1 continues to be off until C4 is discharged by R3. This action gives the fast attack response and slow decay response of the Slow AGC mode. Zener diode CR2 acts as a limiter to prevent short bursts of signal from overcharging C4 (which might cut off the amplifiers for many seconds).

3-51. OP AMP U1A acts as a buffer between C4 and the following circuits. A general-purpose diversity AGC output is provided at pin 16. Transistor Q2 acts as a threshold detector, blocking AGC action for weak signals. This is desirable to allow a maximum signal-to-noise ratio to be obtained in all stages of the receiver before any gain reduction is permitted. The base of Q2 is biased to approximately +0.2V. If the emitter of Q2 is lower than about +0.8V, Q2 will be turned off and no AGC action can occur. When the

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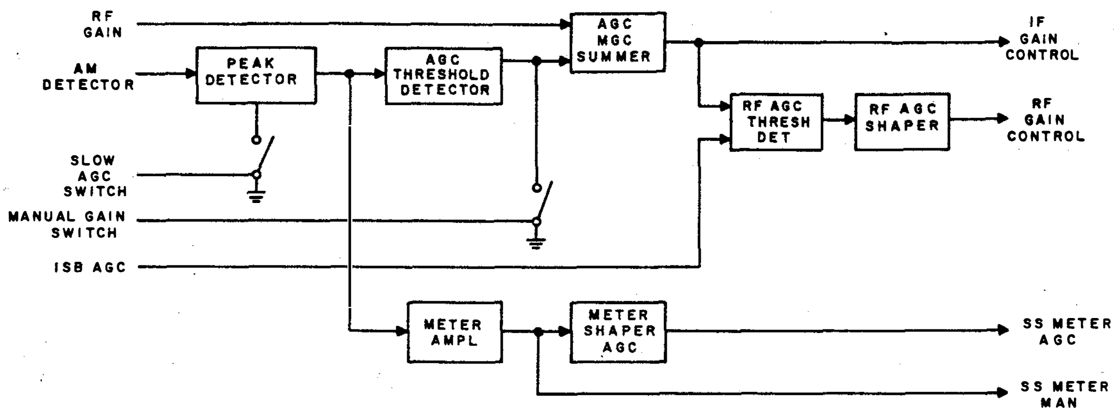

Figure 3-7. Simplified AGC Circuit

output of U1A is greater than +0.8V, Q2 conducts and a gain control voltage appears across R13. When the Manual gain mode is selected, Q3 and Q6 will be turned on and will clamp the voltage on R13 to ground, and +5V will be applied to the RF Gain potentiometer on the front panel. OP AMP U2B acts as an inverting summing amplifier for the voltage at R13 (which will be zero in Manual gain mode) and the voltage on the RF GAIN control (which will be zero in FAST or SLOW AGC modes).

3-52. The output of summing amplifier U2B is buffered by OP AMP U1D and fed to the 455 kHz amplifier on A4A7. Zero volts from U1D allows the 455 kHz amplifier to operate at maximum gain while a negative output from U1D causes the gain of the IF amp to be reduced.

3-53. A sample of the IF gain control voltage from U2B is also applied to RF AGC threshold detector Q5. This threshold detector causes the gain reduction to occur only in the 3rd IF amplifier, unless the signal at the RF input of the receiver and in the early stages of the receiver is great enough to ensure a good signal-to-noise ratio even in the early stages. The operation of the threshold detector is the same as that of Q2, except with polarities reversed to allow for the inversion which occurs in U2B. The base of Q5 is biased around -2.7V so the IF gain control voltage must be more negative than -3.3V for Q5 to conduct. When the ISB Detector and Audio module (A4A8) is energized (ISB mode only), a similar AGC circuit in that module supplies a corresponding sample of its IF gain control voltage to Q4. This allows the RF gain control to respond to either the USB component, amplified by A4A7, or the LSB component, amplified by A4A8. This combined action is necessary to protect against possible overload of the 1st and 2nd IF's which are common to both USB and LSB. Q4 duplicates the operation of Q5. When the ISB module is not selected, Q4 does not conduct and may be ignored.

3-54. As stated in the description of the Input Converter, the gain control in the 1st IF amplifier is accomplished by varying the RF

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impedance of a diode that shunts the load circuit of one stage. The impedance of this diode is approximately inversely proportional to the dc current through it. Therefore, to obtain a 6 dB gain reduction requires a certain current, an additional 6 dB reduction requires doubling the current and another 6 dB reduction requires four times the original current and so on. To achieve the desired relationship between AM Detector output and RF gain reduction requires that the control diode current rise slowly at first, then more rapidly as the received signal strength increases further (exponentially). This current/voltage relationship is obtained through a shaping network comprised of U2D, R47, R48, CR5, and R31. The actual current for the control diode is supplied by buffer U2A.

3-55. The relationship between signal strength and the voltage out of U1A make this voltage suitable for operation of the signal strength meter. In the Manual gain mode, this voltage is proportional to the RF input signal voltage. Its polarity is inverted by OP AMP U1C and it is applied through R49 and front panel switches A10A1S1B and S2C to the meter. This allows the receiver to act as a tuned voltmeter whose calibration depends on the setting of the RF GAIN control.

3-56. In the AGC modes, the voltage out of U1A increases approximately linearly with signal voltage up to the AGC threshold level of 3 μV (RF input). Above this level the U1A output is compressed by AGC action to be nearly proportional to the logarithm of the RF input voltage. By using a shaping network composed of R41, R50, R51, CR6, CR7, and CR8 to suitably compress the output of U1C at low signal levels, the signal strength meter is made to be approximately linear in dB over a greater than 100 dB range. Resistors R50 and R51 control the amount of compression and the exact fit of the meter scale with signal strength. If an accurate source of variable signal level is available, these fixed resistors may be replaced with variable ones which may be adjusted for best tracking of the meter. The variable resistors may then be removed, measured and replaced with fixed resistors of the same value.

3-57. FM/CW/SSB DETECTOR (A4A9). When the FM detection mode is selected, the limiter and discriminator circuits contained in the module are energized. When either the CW, USB, LSB or ISB detection modes are energized the product detector circuits are activated as is the BFO Synthesizer whose output is directed to the product detector. The schematic diagram for the following circuit discussion is F0-11.

3-58. The IF output sample of approximately 10 mV from the 455 kHz amplifier of A4A7 is the input signal for this module. It is applied to both demodulators although only one is actuated at a time. When FM is selected, the control input at pin 41 is high (+5V) and Q2 and Q1 are turned on. This applies approximately +9V to limiter U1. The input signal is amplified and clipped by cascaded stages within U1, so its output is free of any amplitude variations. The extent to which the amplitude variations are removed contributes to the AM rejection of the radio when receiving FM. The output of the limiter drives the Foster-Seeley discriminator. Diodes CR1 and CR2 rectify the composite signals fed to them by C7 and T1. When the signal from the limiter is at exactly 455 kHz, T1 is tuned so that equal and opposite voltages are produced across load resistors R6 and R7, giving a net output of zero to buffer U3A. For inputs slightly off 455 kHz, the voltages of R6 and R7 do not cancel causing a positive output for inputs above 455 kHz and a negative for those below 455 kHz. (Note that these polarities are reversed by U3C, so the output of the module will go negative when the signal frequency increases.) Proper adjustment of L1 will make the output voltage vary linearly with input frequency over ±8 kHz from 455 kHz. At the output of U3A, a low-pass filter, L3 and C11, reduces higher frequency noise components which are present in the discriminator output.

3-59. When the CW mode or any of the sideband modes is selected, the control input on pin 43 is high (+5V). This turns on Q4 and Q3, applying +9V to balanced modulator U2. The BFO is also applied to U2 (approximately a 40 mV level). This allows U2 to act as the 4th mixer in the signal path as described in

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the Synthesizer Relationships section. Its action may be considered to down-convert IF signals to the audio frequency range. For sideband signals, proper tuning of the receiver places the center of the IF signal at the frequency corresponding to the carrier frequency of the received signal. This causes the audio components out of U2 to reconstruct those of the original signal transmitted. For CW signals, the BFO is offset from the signal either by use of the BFO offset control on the front panel or by shifting the tuned frequency slightly. Either method will cause an audible tone at the audio output when a signal is present. When the narrowest IF bandwidth is used, however, the receiver tuning may only be offset a small amount without forcing the signal out of the passband, so the BFO offset must be used to produce a tone in the middle of the audio range where hearing is most acute.

3-60. The output of U2 goes through low-pass filter L2 and C17, which rejects higher frequency noise components, to buffer U3B. OP AMP U3C acts as a summing amplifier for the outputs of the FM discriminator or product detector when either is present. It gives different amplifications to these two signals to bring them up to approximately equal levels. The audio output of this module goes to both the Audio Amplifier and the FM Audio terminal on the rear of the receiver.

3-61. AUDIO AMPLIFIER (A4A10). This module receives the audio outputs of the AM and the FM/CW/SSB Detectors and sends them to the rear panel located Line Audio Level control and to the Phone Level control located on the front panel. The line audio amplifier is driven by a signal returned from the wiper of the Line Audio Level potentiometer. The auxiliary phone amplifier is driven by a signal from the Phone Level control. This amplifier feeds the Phone Audio terminals of the rear panel Audio Output Connector. Power to operate the front panel RF/Audio meter is obtained from a rectifier sampling the line audio amplifier's output. See schematic diagram F0-12 for the following circuit description.

3-62. When the AM detection mode is selected, the control input to pin 47 is high (+5V). The output of U1A is roughly +14V, which reverse biases CR1. The gate of FET Q1 will then assume the same potential as its source and Q1 will be on, acting as a closed switch for AM audio. Both demodulators of the FM/CW/SSB Detector will be off so the output of U1D will be AM audio only. When any other detection mode is selected, the control input to pin 47 will be low (0 V) and the output of U1A will be approximately -14V. This will tend to forward bias CR1 and will cause the gate of Q1 to be similarly negative, cutting off all signal flow through Q1. The audio signal from the FM/CW/SSB Detector will appear at the output of U1D.

3-63. The signal into line audio amplifier U2 is the output of U1D attenuated by the Line Audio Level control, R1, on the rear panel (see sheet 3 of 7 of the main chassis schematic, F0-1). The two sections of U2 act as a push-pull bridge amplifier, driving output transformer T2 located on the inside of the rear panel. T2 is driven through switchable Attenuator A11 (see sheet 3 of 6 of the main chassis schematic, F0-1). U2 is powered by the regulated +12V (from regulator U4 in the power supply) through pin 7. This supply is filtered by C18. A circuit within U2 provides a bias voltage at pin 1 which is equal to one-half the supply voltage. This is connected to the non-inverting inputs of both amplifier sections of U2. Both amplifiers use unity feedback at dc. That is, the only dc path to the inverting inputs is from the outputs, so there is very little dc difference between their outputs at pins 2 and 13.

3-64. The input signal is applied to the non-inverting input of U2B, pin 9. Although pins 6 and 9 are at the same dc potential, pin 6 is bypassed so no ac signal appears there. The operation of amplifier U2B will be clear if pin 7, the inverting input of U2A, is considered to be at ac ground. With this assumption, U2B simply appears as a non-inverting amplifier with a closed-loop ac gain of 50. Its ac gain is determined by the ratio of feedback resistors R20 and R19. On the other hand, U2A may then be viewed as an inverting amplifier with an ac gain of nearly one. Its input is the full output of U2B and its gain is

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determined by R20 and R19 acting as input resistors and R21 as feedback resistor. As with inverting OP AMPs, extremely little signal voltage appears at the amplifier inverting input terminal, thus satisfying the assumption made to explain the behavior of U2B. The net gain of the combined amplifier is 100 and its outputs are balanced with respect to ground. Due to the high current U2 can pass, it is grounded separately from the other circuits on the Audio Amplifier module to prevent ground current coupling which might lead to instability and parasitic oscillations.

3-65. The output signal of U2A is rectified and filtered to indicate Line Audio level on the front panel meter. The rectifier is a voltage doubler consisting of CR2, CR3, C12, and C13. It responds to peak-to-peak input voltage and is calibrated by resistors R22, R23, and R24 to indicate the RMS value of a sine-wave at the Line Audio terminals of the Audio Output Connector on the rear panel. Its calibration is therefore most accurate for sine-wave voltages. The auxiliary phone amplifier U1B and U1C is a low power bridge amplifier and is therefore similar to U2. It operates from both +15V and -15V supplies and has its inputs biased at ground. Comparing its circuit with that of U2 it should be apparent that it also uses unity dc feedback and has a closed loop gain of 100 for ac signals. Its output current capability is much lower than U2, so it can only supply slightly over 100 mW compared to 1 Watt from U2.

3-66. ISB DETECTOR/AUDIO (A4A8). The schematic diagram for this circuit description is shown in F0-13. For ISB operation, two independent single sideband signals must be demodulated. Since they share the same carrier frequency, they may be processed together up to a certain point. In this receiver, ISB is handled as a single composite signal through the 3rd Mixer. At that point it is split, the USB component being filtered and passed through the main signal path, the LSB component filtered and separately amplified and demodulated by the ISB Detector and Audio module.

3-67. The ISB Detector and Audio module is therefore a combination of circuits from other modules previously discussed. There is a 455 kHz amplifier similar to part of A4A7, a product detector similar to that on A4A9, an AGC circuit like part of A4A6, and an ISB line audio amplifier similar to the auxiliary phone amplifier on A4A10. A sample of the AGC voltage developed in this module is sent to the main AGC module to produce a combined RF AGC.

3-68. Common source FET amplifiers Q1 and Q2 have variable gain depending on their gate 2 voltage. This voltage is derived from the module's AGC section. Potentiometer R8 is used to set the maximum gain of the amplifier to give the same input level to balanced modulator U1 as is received by A4A9U2 at low signal levels. To adjust maximum gain, tune to an AM signal of about a 1 µV level and set R8 so that equal USB and LSB outputs appear at the front panel Phones jack.

3-69. Balanced modulator U1 uses the BFO to act as a 4th Mixer and converts the LSB signal to audio. When the ISB mode is selected, +5V is applied to pin 49 and U2A switches on, supplying power to U1. Its output is low-pass filtered and then amplified by U3A. The output of U3A splits three ways. It leaves the module to go to the front panel which provides LSB phone audio in the ISB mode. It also feeds the ISB Line Audio amplifier through level control R36, and drives the AGC circuit.

3-70. The AGC is a simplified form of the one on A4A6. It always acts in the Slow AGC mode. Peak detector Q4 charges C19, which discharges through R52. Buffer U2D drives AGC threshold detector Q3. The output of Q3 is amplified by U3D to supply the IF AGC to amplifiers Q1 and Q2 via buffer U3C, and the sample to the RF AGC circuit on A4A6. When the ISB mode is selected, Q5 is turned off by the positive output from U2A. No meter outputs are supplied by this module.

3-71. The ISB Line Audio amplifier (U2B and U2C) is identical, except for component values, to the auxiliary phone amplifier on A4A10.

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3-72. 16 OHM SWITCHABLE ATTENUATOR (A11). The schematic diagram for this circuit is shown in F0-14. When attenuator switch S1 is in the IN position, the attenuating network formed by R1 through R6 provides a 16 ohm impedance and 30 dB attenuation to the line audio output. The attenuator card is placed in the circuit between the line audio output lines of Audio Amplifier A4A10 and the audio output transformer T2. See sheet 3 of 6 of the main chassis schematic, F0-1. The secondary coils of T2 connect to pins 3, 4, and 5 of the rear panel audio connector, J14. If S1 is in the OUT position, the attenuator has no effect on the line audio.

3-73. 600 OHM SWITCHABLE ATTENUATOR (A12). This attenuator is similar to the A4A11 attenuator shown in F0-14, except for resistor values. With attenuator switch S1 in the IN position, the attenuating network formed by R1 through R6 provides a 600 ohm impedance and 20 dB attenuation to the ISB audio output. The attenuator is placed in the circuit between the ISB audio output lines from ISB Detector and Audio A4A8, and pins 7, and 9 of the rear panel audios output connector. See sheet 3 of 6 of the main chassis schematic, F0-1. If S1 is in the OUT position, the attenuator has no effect on the ISB audio level.

3-74. SYNTHESIZER SECTION RELATIONSHIPS. Figure 3-5 shows the relationship of the synthesizers to receiver signal processing. It is the task of the three LO synthesizers to convert all RF input signals to 455 kHz. A good, brief discussion of the synthesizer relationships may be found in Section II, paragraph 3.15. The following paragraphs go into synthesizer operations in much greater detail.

3-75. Table 3-3 provides an example of frequency translation from the RF input to the output of the 3rd Mixer. This translation begins with an RF input signal of 00.00000 MHz (column A) and ends with a signal centered at 455 kHz. Columns B and C are tabulated for input frequencies of 00.00500 and 00.01999 MHz, respectively. In column C, notice that the 1st LO has stepped up to its second increment (42.92 MHz).

3-76. The 2nd Mixer translates the signals in the 1st IF range to the 2nd IF frequency of 10.7 MHz. The 9.99 kHz range of the 2nd LO works with the increment sizes of the 1st LO to provide a translation of all 1st IF signals to 10.7 MHz. The corresponding 2nd LO frequencies are shown in Table 3-3 along with the resultant 2nd IF of 10.7 MHz. To determine the 1st LO and 2nd LO frequencies corresponding to a received RF frequency, refer to the examples in Table 3-4.

3-77. The 3rd Mixer converts the 10.7 MHz 2nd IF to 455 kHz. A fixed 3rd LO frequency of 11.15500 MHz provides the necessary difference frequency for this conversion. The 3rd IF resultant is shown only in column B of table 3-3. Demodulation of the 3rd IF takes place either in the 4th Mixer (product detector) or in the AM or FM demodulation stages of the receiver.

3-78 In CW detection mode, the product detector combines the 455 kHz signal from the 3rd Mixer with the 455 ±8.9 kHz variable BFO signal. The resultant signal is an audible tone for monitoring. For single sideband demodulation, the BFO signal is fixed at 455 kHz, and is mixed with the filtered 3rd IF sideband to produce an audio signal.

3-79. PHASE LOCK LOOPS. The phase lock loop is the method used in this receiver to provide accurate numerical control of the local oscillator frequencies. This technique allows the oscillators to be controlled by any appropriate source of BCD digital data, including remote control sources. The basic phase lock loop is composed of four circuits: a phase detector, a low-pass filter (sometimes called a lead-lag filter, integrator, or loop filter), a voltage-controlled oscillator (VCO), and a frequency divider (counter). A basic phase lock loop configuration is shown in figure 3-8. Depending on the application, the frequency divider circuit may be fixed (to divide by a certain number), or may be programmable to divide by any number in a specific range (20 to 29, for example). The frequency divider may consist of several

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Table 3-3. 1st and 2nd LO Tuning Increments

	RF Input	A (0.00000 MHz)	B (0.00500 MHz)	C (0.01999 MHz)
1st Mixer	1st LO RF INPUT 1st IF	42.91000 -00.00000 42.91000	42.91000 -00.00500 42.90500	42.92000 -00.01999 42.90001
2nd Mixer	1st IF 2nd LO 2nd IF	42.91000 -32.21000 10.70000	42.90500 -32.20500 10.70000	42.90001 -32.20001 10.70000
3rd Mixer	3rd LO 2nd IF 3rd IF		11.15500 -10.70000 0.45500	
4th Mixer	3rd IF BFO AUDIO	0.455 -0.455 ±8.9 kHz ±8.9 kHz	AM or FM DEMODULATOR	

Table 3-4. 1st and 2nd LO Frequencies Versus Tuned Frequency

To Obtain 1st and 2nd LO Frequencies for Any Tuned Frequency
Example Frequency 15.75635 MHz

TO OBTAIN 1st LO FREQUENCY Use 4 Most Significant Digits From Readout	TO OBTAIN 2nd LO FREQUENCY Use 3 Least Significant Digits From Readout
15.75000	00.00635
Add 42.91 to these Digits	Subtract them from 32.21000
Add 15.75 42.91 58.66 = Frequency 1st LO	Subtract 32.21000 .00635 32.20365 = Frequency 2nd LO

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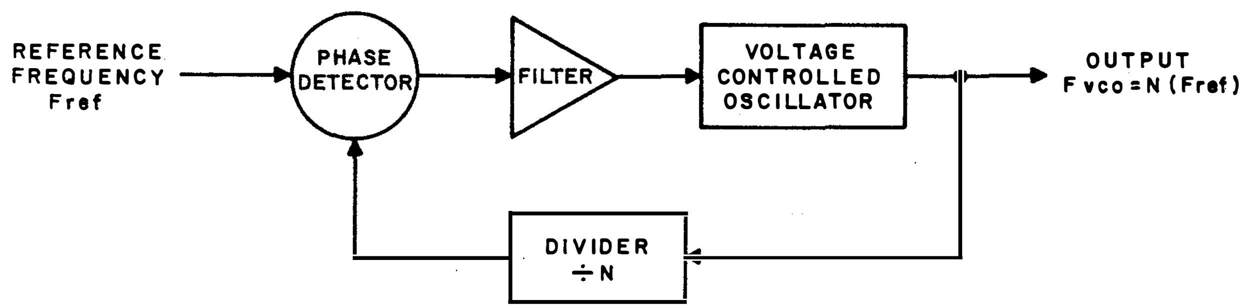

Figure 3-8. Basic Phase Lock Loop Configuration

counters cascaded together, to provide division by a large number. The operation of the basic phase lock loop requires a stable fixed frequency source, to be used as the reference frequency. This receiver contains a temperature-compensated crystal oscillator (TCXO) to provide the basic reference frequency, and may also be operated using an externally supplied 1 MHz reference signal. Both fixed and programmable loops are discussed in the following paragraphs.

3-80. BASIC PHASE LOCK LOOP. The basic phase lock loop technique compares the frequency and phase of an incoming reference signal to the output of the voltage controlled oscillator (VCO). If the two signals differ in frequency and/or phase, an error voltage is generated by the phase detector/filter and applied to the VCO, causing it to correct in the direction required for decreasing the frequency/phase difference. The phase detector produces output pulses which are related to the frequency/phase difference. The filter circuit averages (integrates) these pulses into a proportional error correction voltage. This voltage is applied to control the capacitance of a varicap diode in the VCO circuit, and thus tune the VCO toward the correct frequency. The correction procedure continues until lock is achieved, after which the VCO will track the incoming reference signal.

3-81. Dividing a VCO output by two before applying it to the phase detector results in an error voltage that drives the VCO to twice the reference frequency. A divide-by-3 action results in an error voltage that drives the VCO to three times the reference frequency. Thus, the reference frequency is always multiplied by the divider ratio to give the VCO output frequency. From this, the following relationship can be given:

$$Fvco = N(Fref)$$

3-82. An example of the basic phase lock loop technique, using numbers, will provide an understanding of its actual operation. Referring to figure 3-9, the desired frequency is

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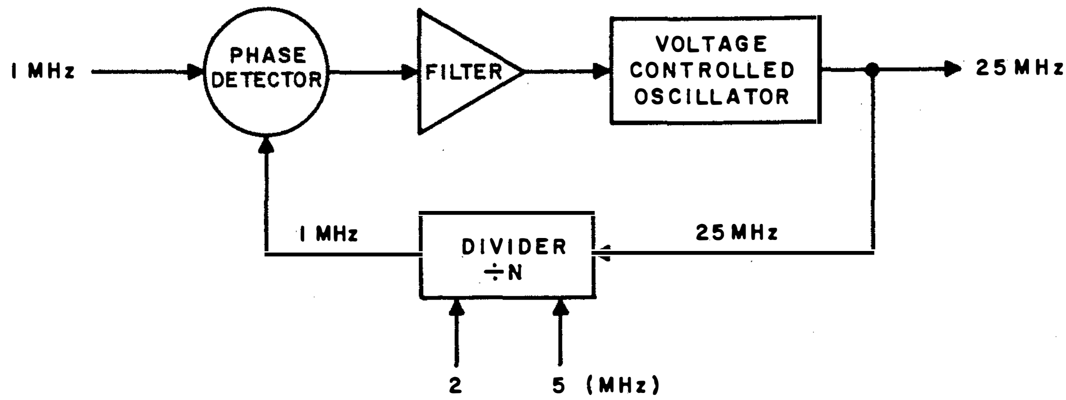

Figure 3-9. Programmable Phase Lock Loop

obtained by programming the variable divider through selectable inputs. Assuming the VCO is locked at the desired frequency of 25 MHz, this signal enters the input of the (in this case) divide-by-25 counter (divider). The counter emits a pulse at its output each time 25 pulses enter its input. Therefore, the 25 MHz input results in an output of 1 MHz. This 1 MHz signal is compared to the reference frequency of 1 MHz, indicating a locked situation. If the divider's output had been less than 1 MHz, the phase detector would have produced pulses to drive the VCO to a higher frequency. Similarly, if the divider's output had been greater than 1 MHz, the VCO would have been driven to a lower frequency. An important concept to be noted here is that the phase lock loop's output frequency is dependent upon the selectable inputs of the variable divider.

3-83. PHASE LOCK LOOP PRESCALING TECHNIQUE. A variation of the basic phase lock loop, shown in figure 3-10, is utilized in the 1st and 2nd LO Synthesizers. The divider portion consists of two module prescaler and two programmable counters. The two-module (divider) prescaler accepts the output from the VCO and divides it by one of two numbers (P or P+1). The prescaler in the 1st LO is a divide-by-50/51 counter and the 2nd LO prescaler is a divide-by-100/101 counter. The swallow counter controls the number of times the prescaler divides by P+1. The programmable counter counts the number of pulses from the prescaler. Totally, these three components provide for coarse (N) and fine (A) tuning of the VCO.

3-84. In operation, the prescaler divides by P+1, A times. For every P+1 pulse from the prescaler, both the swallow counter and programmable counter are decremented by 1. The prescaler divides by P+1 until the swallow counter reaches its zero state. At this point, the module of the prescaler changes to P and the swallow counter is disabled. The prescaler then divides by P until the remaining count in the programmable counter (N-A) decrements to zero. At this time the output of the programmable counter emits a pulse while the swallow and programmable counters are reset. The cycle then repeats.

3-85. An example of the two-module prescaling technique is given in figure 3-11. For illustration, a VCO output of 153 MHz is desired. Selected into the programmable counter are the two most significant digits, 1 and 5. Selected into the swallow counter is the least significant digit, 3. Under lock conditions, the divider has an input of 153 MHz and an output of 1 MHz.

3-86. To produce a 1 MHz signal from a 153 MHz signal requires a divide ratio of 153.

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Table 3-5 shows a count sequence with 153 input pulses resulting in one output pulse. Similarly, a 153 MHz input results in a 1 MHz output. The programmable counter emits a pulse every time it counts 15 pulses. With the swallow counter set to three, the prescaler divides-by-11 three times and then switches to the divide-by-10 state. At this point, the programmable counter needs 12 input pulses before emitting an output pulse. The prescaler then divides-by-10 twelve times to finish the count sequence. With 3 counts of 11 (3x11=33), and 12 counts of 10 (12x10=120), one output pulse emits from the programmable counter every 153 input pulses (33+120=153).

Table 3-5. Prescaler Counting Sequence

Program Counter	Swallow Counter	Prescaler Counts	Input Pulses
15	3	0	0
14	2	11	11
13	1	11	22
12	0	11	33
11	-	10	43
10	-	10	63
9	-	10	73
8	-	10	83
7	-	10	93
6	-	10	103
5	-	10	113
4	-	10	123
3	-	10	133
4	-	10	143
5	-	10	153

153 Input Pulses = 1 Output Pulse

3-87. The two phase lock loop types described are used throughout the synthesizer section. The 1st LO and part of the 2nd LO utilize the prescaler configuration while the 3rd LO and another part of the 2nd LO use a fixed divide-by-N ratio. The BFO uses the basic phase lock loop configuration, utilizing the divide-by-N technique (Fvco=N Fref). Common to all the synthesizers in this receiver is the phase detector used. It will be described in detail below.

3-88. PHASE DETECTOR. The phase detector used in all of the synthesizers is actually a phase and frequency detector. The integrated circuit also includes a charge pump and an amplifier. Each of these three sections will be discussed. Table 3-6 provides some information about the phase detectors in these synthesizers. Refer to the 1st and 3rd LO schematic diagram, (F0-15, sheets 1 and 2) for illustration of typical phase detector operation.

3-89. The phase detector normally receives a fixed reference frequency at one input (R) and a variable frequency at the input (V) from the divider section. The output responds only to transitions from the two inputs and has four output states as shown in figure 3-12. If the frequency and phase match exactly, outputs U and D remain high. If the variable input leads in phase with respect to the reference input, U remains high and D goes low. If the variable input lags in phase with respect to the reference input, D remains high and U goes low. When inputs V and R are separated by a frequency difference, the output at pins U or D varies high and low at a rate proportional to the difference frequency of the two inputs.

3-90. Under lock conditions, when the input of both V and R are identical in phase and frequency, the output pulses from U and D will be extremely narrow and appear on an oscilloscope as spikes. For a large difference between the two input frequencies, as when a new LO frequency is established, the outputs respond as described above with wide pulses appearing on the proper outputs.

3-91. The charge pump accepts both outputs from the phase detector and translates the voltage levels before they are applied to the loop filter. The input to pin 11 (U22B, F0-15, sheet 2) appears as an inverted output at pin 10. The input to pin 4 appears as an output at pin 5. There will be a pulsed

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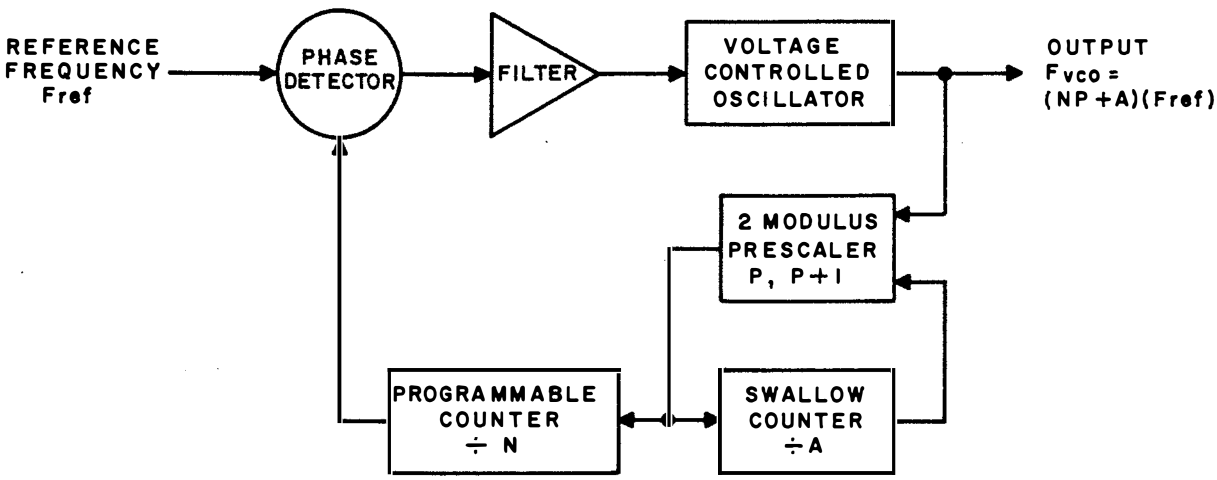

Figure 3-10. Two-Module Prescaling in the Phase Lock Loop

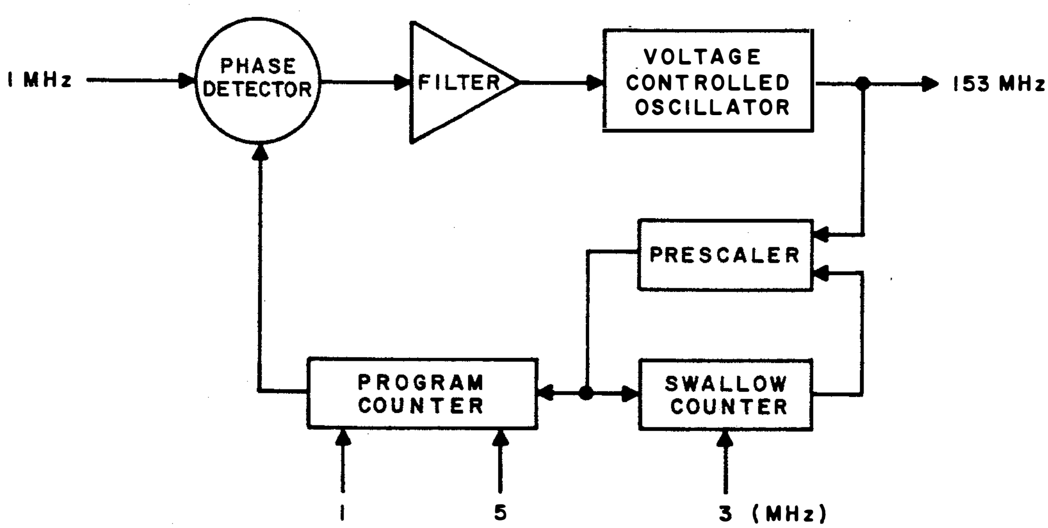

Figure 3-11. Prescaler Dividing Technique

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Table 3-6. Receiver's Phase-Lock Loop Characteristics

Synthesizer	Phase Detector Ref. Des.	Ref. Freq.	Programmable Divider?	VCO Range	Output Frequency
1st LO	U5	40 kHz	YES	171.64-291.60 MHz	42.91-72.90 MHz
32M	U1A, B	1 MHz	NO	32 MHz	
2nd LO PROG	U12A, B	10 kHz	YES	20-210 MHz	
OUT	U6A, B	200-210 kHz	NO	32.20-32.21 MHz	32.20-32.21 MHz
3rd LO	U22A, B	5 kHz	NO	11.1555 MHz	11.155 MHz
BFO	U9A, B	1 kHz	YES	4461-4639 kHz	446.1-463.9 kHz

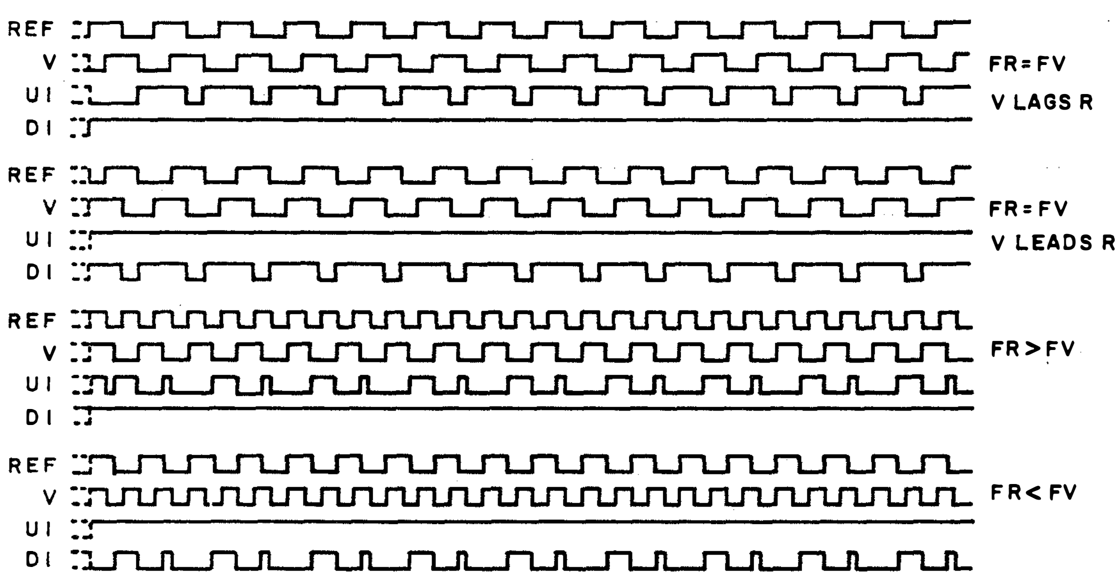

Figure 3-12. Phase Detector Timing Diagram

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waveform entering either pin 4 or pin 11 at any given time. The charge pump delivers voltage commands from 2.25V on positive swings to 0.75V on negative swings, with a mean value of 1.5V. The charge pump outputs are applied to a low-pass active filter.

3-92. The active filter normally uses the amplifier contained in the phase detector IC plus external resistors and capacitors. In some cases an external transistor will also be used, or an external OP AMP. This filter has a direct influence on loop bandwidth, capture range, and transient response. Its output is the VCO tuning voltage, which is applied to control the capacitance of a varicap tuning diode in the VCO tank circuit, thereby controlling the VCO frequency.

3-93. TIME BASE CIRCUITS (A5A1A2). The Time Base circuits are part of card A5A1A2. The Time Base circuits have two sources of reference from which to choose. As shown in the functional block diagram, figure 3-13, it can be controlled internally with a 2 MHz temperature compensated crystal oscillator (TCXO) and divide-by-2 frequency divider, or with a 1 MHz external source. This 1 MHz reference is divided down to 50 kHz, 40 kHz, 10 kHz, and 1 kHz. Buffer amplifiers Q6 and Q7 are used for isolation purposes. Synthesizers that need certain reference frequencies are listed below each frequency in the diagram. Refer to the schematic diagram in F0-15, sheet 2. S2 in figure 3-13 represents the function of U23.

3-94. An internal source of reference is provided by a 2 MHz TCXO, while an external source of reference must be a 1 MHz signal of approximately 50 mV. Tri-state buffers accomplish the switching of internal and external reference sources. A truth table of the tri-state buffers used is given in figure 3-14. Getting information from input A to output Y depends upon the state of input C. Information passes from input A to output Y when the state of input C is low. Similarly, information is inhibited from the output when the state of input C is high.

3-95. When operating with an external source of reference, the external select (EXT) line is grounded and the internal select (INT) is pulled high by R84, and the externally supplied 1 MHz reference is seen at module pin A17, EXT/INT STD. The internal 1 MHz reference is inhibited when it reaches tri-state buffer U23B. Therefore, the only source for the 1 MHz signal to transformer T1 is the external one. T1 and C23 resonate at 1 MHz while the voltage divider of R34 and R35 shifts the 1 MHz signal to a 2.5 Vdc level. This signal enters U16 which converts the sine wave to TTL levels. The output of U16 passes through tri-state buffer U23A and on to the rest of the Time Base circuits.

3-96. Operation with the internal source grounds the internal select line and allows the external select line to be pulled up by R85. Tri-state buffer U23 allows the 2 MHz signal that is divided to 1 MHz to be passed on to the rest of the circuitry. The 1 MHz reference splits to two parts of the circuit. In one direction, the reference signal passes through U23C and out the EXT/INT STD connection. The signal does continue to pass through U16 but is inhibited at U23A. In the other direction, the reference signal passes to pin 3 of U23A (EXT) or pin 11 of U23B (INT), and on to the rest of the time base circuitry.

3-97. For either source of reference, a 1 MHz TTL signal is present at the input of Q6 and U15B. This signal is divided by 25, through U15B and U17, to become a 40 kHz reference for the 1st LO. The 1 MHz signal also passes through an isolation amplifier Q6 to board pin A9 to be used as a reference for the 2nd LO. The 1 MHz signal also passes through another isolation amplifier, Q7, to be divided down to three more reference frequencies.

3-98. U18A and U19A form a divide-by-4 network whose input is 1 MHz and whose output is 250 kHz. This 250 kHz divides down to 50 kHz through divider U19B and is sent to U21B, the digital mixer of the 3rd LO. The output of U19B also enters U18B, whose output is a 10 kHz signal. This signal leaves the board to be used as a reference for the 2nd LO, and is divided to 5 kHz by U21A to act as a reference for the 3rd LO circuit. The 10 kHz signal also passes through a divide-by-10 network, consisting of U20A and U20B, for

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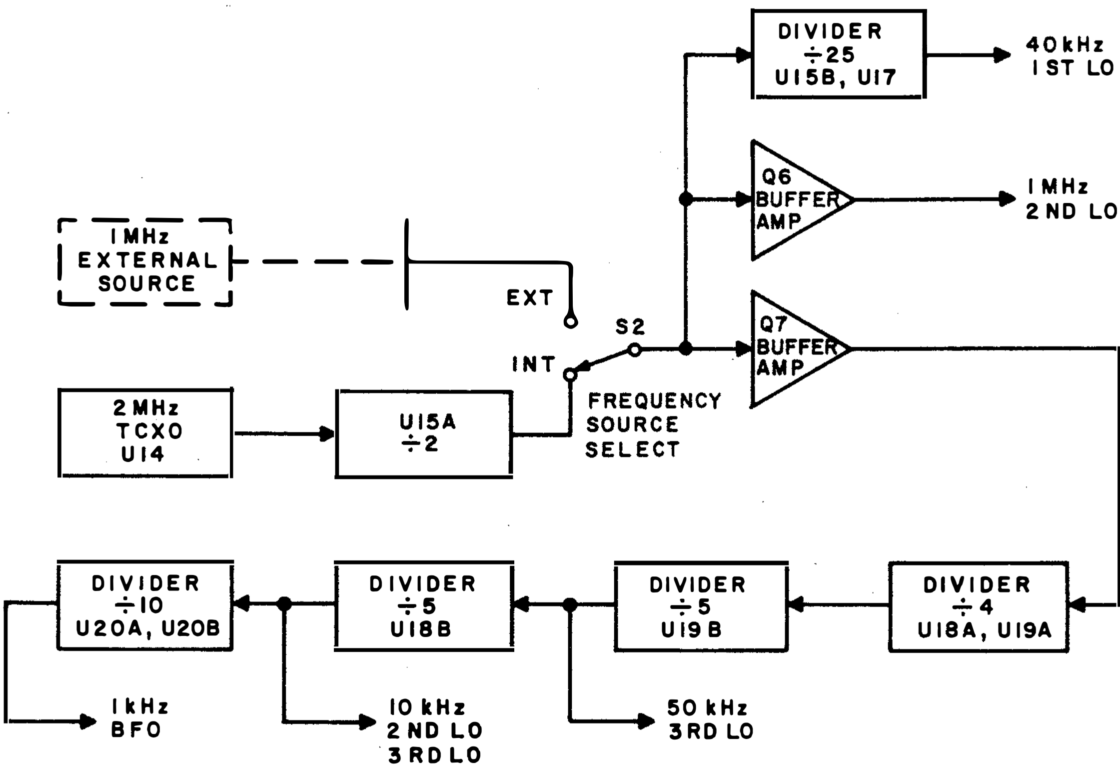
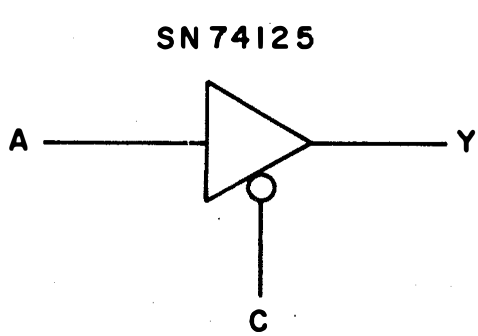


Figure 3-13. Time Base Circuits Functional Block Diagram



U23A
U23B
U23C

TRUTH TABLE

INPUTS		OUTPUTS
A	C	Y
H	L	H
L	L	L
X	H	HI-Z

Figure 3-14. Tri-State Buffers

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an output reference signal of 1 kHz.

3-99. 3rd LO SYNTHESIZER (A5A1A2). The 3rd LO is part of the 1st and 3rd LO/Time Base board. The 3rd LO has an input of two reference frequencies from the Time Base and a fixed output frequency of 11.155 MHz. The 3rd LO utilizes a basic phase lock loop configuration and a digital mixing technique. A functional description along with a circuit description is provided below.

3-100. Figure 3-15 shows a functional block diagram of the 3rd LO. Included in the diagram are reference designations that correspond to the 3rd LO schematic. The 3rd LO is part of the 1st and 3rd LO/Time Base schematic diagram, F0-15, sheets 1 and 2.

3-101. The VCXO (voltage-controlled crystal oscillator) for this synthesizer is formed by Q8, Y1, CR7, and their associated components. The oscillator is crystal-controlled to 11.155 MHz, and will be driven into proper phase relationship by the dc tuning voltage applied to CR7. The oscillator signal is buffered by emitter-follower Q9 and is split into two signal paths. One path is to board pin A55, the 3rd LO output. The other path is to flip-flop U21B. The flip-flop acts as a digital mixer, producing an output frequency equal to the difference between the VCO frequency (11.155 MHz) and the frequency that is the nearest integral multiple of the clock frequency (223 x 50 kHz = 11.15 MHz). The difference equals 5 kHz. This signal is applied to phase detector U22A along with a 5 kHz reference derived from the Time Base circuit by U21A. The error pulses are integrated into a control voltage for the VCO.

The 3rd LO output, found at pin A55 of the 1st and 3rd LO Synthesizer board (A5A1A2), is roughly a 100 mV rms sine wave. This signal also couples to Q6, through C37, where it is amplified to levels applicable for the digital mixer. The 3rd LO signal is compared to a 50 kHz reference at pin 11 of U21B, to produce a 5 kHz output, when the 3rd LO is locked. This 5 kHz signal from the mixer is compared to a 5 kHz signal from the time base, via divide-by-2 U21A, in the phase detector, U22A. The charge pump U22B converts the differences in phase and/or frequency into positive and negative going dc levels. These levels pass through filter U22C and bias varactor diode CR7. The 11.155 MHz crystal oscillator is then driven in the direction to achieve lock. The 3rd LO frequency then passes through buffer amplifier Q9 and

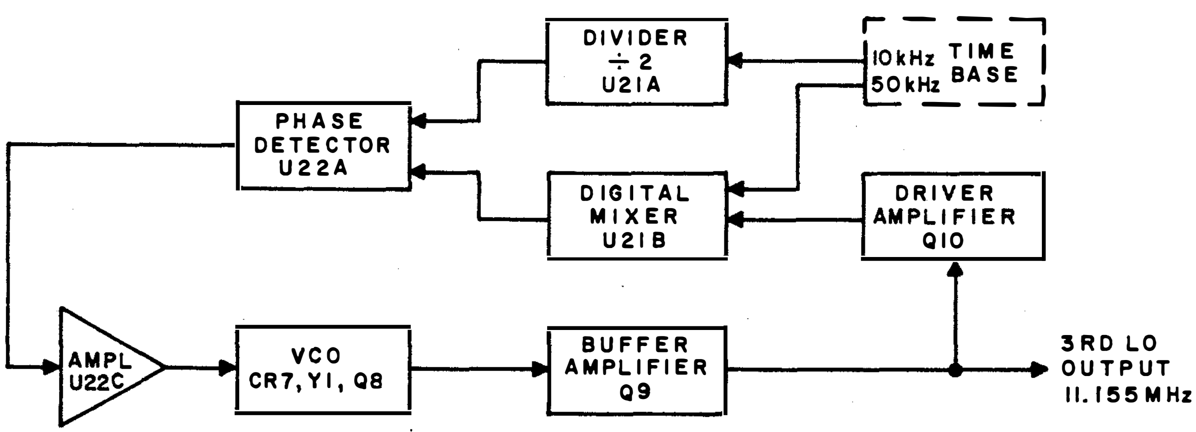

Figure 3-15. 3rd LO Functional Block Diagram

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TTL driver Q6 to complete the loop.

3-102. Although the VCO incorporates an 11.155 MHz crystal, Y1, a phase lock loop is still needed. The purpose of the phase lock loop is to vary the oscillator frequency for the purpose of phase-locking it with the Time Base. With the phase lock loop disconnected, the crystal oscillator can produce a usable output frequency for the 3rd LO but would not be exactly the correct frequency to mix with the 10.7 MHz output of the 2nd Mixer.

3-103. BFO SYNTHESIZER (A5A3). The BFO Synthesizer produces a 455 kHz ±8.9 kHz signal. The BFO therefore tunes from 446.1 to 463.9 kHz, in 100 Hz steps. This synthesizer utilizes the basic phase lock loop configuration shown in figure 3-8. The actual phase lock loop operates at a frequency range of 10 times the BFO output to allow for the use of a 1 kHz reference frequency.

3-104. A functional block diagram of the BFO Synthesizer is shown in figure 3-16. Some reference designations are included in the diagram and correlate with the BFO schematic diagram shown in F0-16. The functional block diagram does not include all external connections and should only be used with this discussion.

3-105. The VCO produces a frequency that is distributed to the BFO output connection (via divide-by-10 counter U10) and to the programmable counter clock inputs. The presettable inputs, in conjunction with the end of cycle detector, create a divide-by-N counter. The end of cycle detector produces pulses which are compared to a 1 kHz reference frequency in the phase detector. The resultant output is pulses that characterize the difference in frequency and phase of the two input frequencies. The loop filter takes the output pulses from the phase detector and integrates them into a varying dc voltage. This varying voltage drives the VCO in the proper direction to establish the desired frequency.

3-106. The circuit description of the BFO synthesizer is presented in a sequential manner to facilitate understanding. The BFO phase lock loop will be discussed in the following order: programmable divider, phase detector, charge pump, loop filter, and VCO. Integrated circuit data is supplied where needed.

3-107. Refer to F0-16 to aid in the description of the counters used in the programmable divider. U1, U2, U3, and U4 are BCD synchronous up/down counters. These counters may be programmed, through inputs D, C, B and A, for any initial state, 0 through 9. The ripple clock output and count enable input permit cascading. The ripple clock output, normally high, produces a low level pulse when the counter is at 9 when counting up, and at 0 when counting down. A high at the enable input inhibits counting while a low level input enables counting. The direction of count is determined by the level of the up/down (U/D) input. When low, the counter counts up, and when high, it counts down. The preset function is controlled by the state of the load inputs. When a logic low is applied to the load input, the BCD number at the preset inputs (D, C, B and A) is loaded into the counter, and counting will begin from that number.

3-108. The programmable divider must produce an output of 1 kHz for any input signal in the range of 4.461 to 4.639 MHz. Therefore, the divide ratio of the programmable counter must be from 4461 (4.461 MHz $\div$1 kHz) to 4639 (4.639 MHz $\div$1 kHz). Because counters U1 through U4 are cascaded (by connecting the ripple clock of one to the enable of another) and have a maximum count of 10000 (10x10x10x10), additional circuitry is needed to reduce the divide ratio.

3-109. To reduce the maximum count, an end-of-cycle detector circuit is used to terminate the count sequence. The end-of-cycle detector, consisting of U5A, U5B, U6A, U6B, U6C, U7A, and U7B, terminates the counting of U4, U3, U2, and U1 at 5450. When this number is detected, a pulse is sent to the phase detector (U9) and the counters are reset.

3-110. The preset of U4 is always set (hard wired) to 0000. U3 has two preset inputs which depend on the direction of counting.

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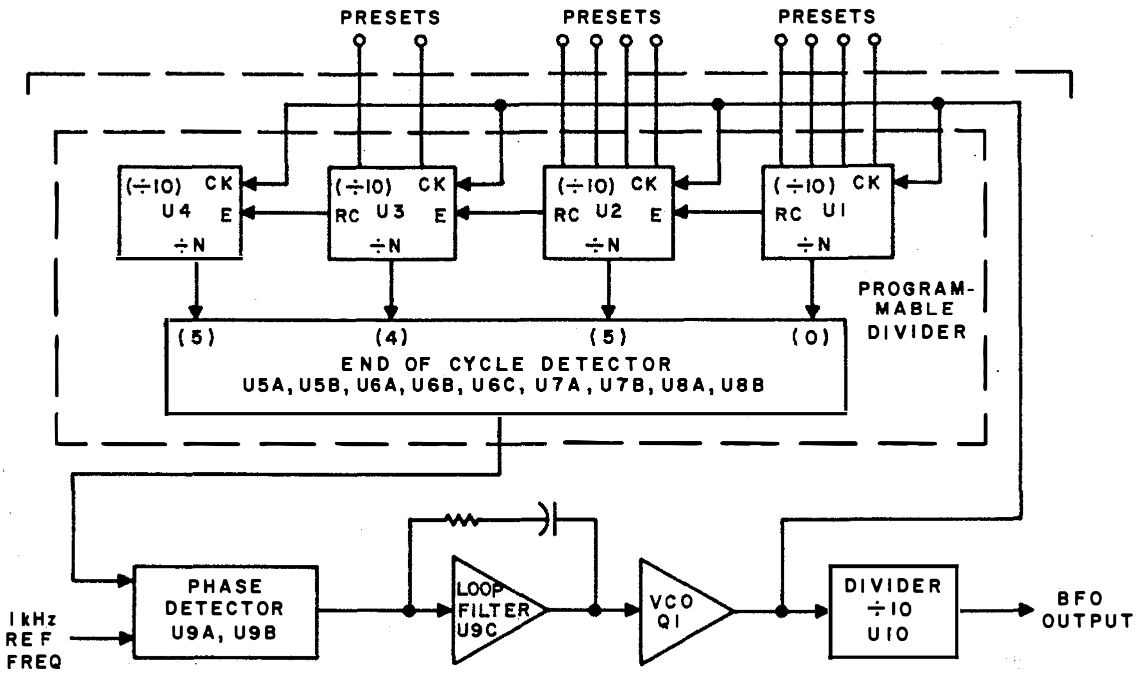

Figure 3-16. BFO Functional Block Diagram

These inputs to U3 connect to the plus or minus (±) thumbwheel switch for variable BFO selection. Selecting a negative (-) BFO frequency enters a 1001 into U3 and the counters count up. Selecting a positive (+) BFO frequency enters a 0000 into U3 and the counters count down. U2 has nine possible preset input states from BCD 0000 to 1000. U1 has ten possible preset states from 0000 to 1001. These possible preset states are determined by the setting of the BFO switch. Selecting a zero BFO offset (±0.0 kHz) grounds all preset inputs of U1 and U2, loading both counters with 0000. Also, selecting a "0" from the "+, 0, -" thumbwheel grounds all thumbwheel preset inputs causing a zero BFO offset. In all sideband modes, the BFO offset line is grounded, in turn grounding the presets of U1 and U2 and loading them with 0000. Refer to the BFO Switch Truth Table, (table 3-11) for further clarification of the BFO Switch operation.

3-111. Knowing the possible input values of the divider and the end-of-cycle detection number, an example will help explain the count sequence (refer to FO-16). Assume that counters U4, U3, U2, and U1 are all loaded with 0000. This corresponds to a BFO frequency of 455 kHz, a VCO frequency of 4.55 MHz, and a BFO thumbwheel setting of 0.0 kHz. A "+" thumbwheel setting initiates down counting. Therefore, counting from 0000 down to 5450 results in a divide ratio of 4550. (Note that the next count down from 0000 is 9999). With a divide ratio of 4550, the counters will reach a terminal count 1000 times a second with an input frequency of 4.55 MHz. Setting the thumbwheel switches to -0.0 kHz indicates the same VCO frequency, 4.55 MHz, but initiates "up" counting. A negative "-" setting enters a 1001 (BCD 9) in U3, making the count start from 0900. With an input of 0900, counting up to 5450 results in the same divide ratio of 4550.

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3-112. Assume a BFO frequency of 460.4 kHz is needed. This corresponds to a thumbwheel selection of +5.4 kHz, and a VCO frequency of 4.604 MHz. From the thumbwheel election, a "+" presets U3 with a 0000, a "5" presets U2 with a 0101, and a "4" presets U1 with a 0100. Therefore, counting from 0054 down to 5450 results in a divide ratio of 4604. With a divide ratio of 4604, the counters will reach terminal count 1000 times a second with an input frequency of 4.604 MHz.

3-113. U8A and U8B have two purposes: to send a pulse to the LOAD input of the counters for presetting and to extend the width of the end of cycle detector's pulse.

3-114. Phase detector U9A receives a fixed 1 kHz frequency at its reference input, pin 1, and a signal from the divider at its variable input, pin 3. These two signals produce an output that characterizes their differences in frequency and phase. Charge pump U9B receives this pulsed waveform from the phase detector outputs and translates them to fixed positive and negative-going amplitude levels (centered about 1.5V).

3-115. These levels are filtered and integrated by the loop filter, Q4 and U9C, providing the tuning voltage for the VCO. A more complete description of the phase detector can be found in paragraphs 3-88 through 3-92 above.

3-116. Buffer Q4 provides a high-input impedance for the preceeding stage. Positive and negative going pulses at the gate are developed across the source output and applied to inverting amplifier U9C. The output of U9C is coupled back to the gate of Q4, through R3 and C1, providing the integrating action. Potentiometer R1 establishes zero gate to source voltage (Vgs) to Q4.

3-117. Emitter-coupled oscillator Q1 with its external tank circuit comprises the VCO. Varactor diode CR1 receives a control voltage from the active filter and adjusts the tank circuit's frequency of oscillation to establish lock. The VCO operates from 4.461 to 4.639 MHz. Resistors R8, R9, and R10 form the dc bias network, and feedback capacitor C7 sustains oscillation along with tuned circuit C8 and L1. R11 and C9 form a low-pass filter for +15V isolation, and the VCO's output is coupled to the next stage by C10.

3-118. Q2 and its surrounding components form a tuned amplifier for the incoming VCO output frequency. This VCO sine-wave frequency is then coupled to a sine-wave to TTL converter, Q3. From here, the digital signal returns as the clock input of the programmable divider, and is divided by 10 in U10 and provided as the BFO output signal.

3-119. 2nd LO SYNTHESIZER (A5A2). The 2nd LO tunes from 32.20001 to 32.21000 MHz in 10 Hz steps. This synthesizer utilizes three phase lock loops to produce the 2nd LO output. The functional block diagram of the 2nd LO is shown in figure 3-17.

3-120. The phase lock loop in the upper left section of the diagram has a reference input of 1 MHz from the Time Base and a fixed output of 32 MHz. The bottom phase lock loop is programmable and produces an output from 200 to 210 MHz. This output routes through a divide-by-1000 stage, resulting in a programmable output from 200 to 210 kHz. The third phase lock loop depends on the other two phase lock loops to produce the 2nd LO output.

3-121. An explanation of the 2nd LO output loop will clarify the overall operation of this synthesizer. The 2nd LO output routes to mixer U4, where it is mixed with the fixed-frequency phase lock loop output of 32 MHz. This mixer produces the difference of its two input frequencies, resulting in an output within the 200 to 210 kHz range. This output is amplified and level translated for TTL compatibility. Mixer output and divide-by-1000 output signals are compared in frequency and phase by U6A, whose output characterizes the difference between its two inputs. Filter U6B integrates the phase detector output into a varying dc voltage which drives the VCO to establish the desired frequency. The VCO output is sent through a buffer amplifier whose output is the 2nd LO.

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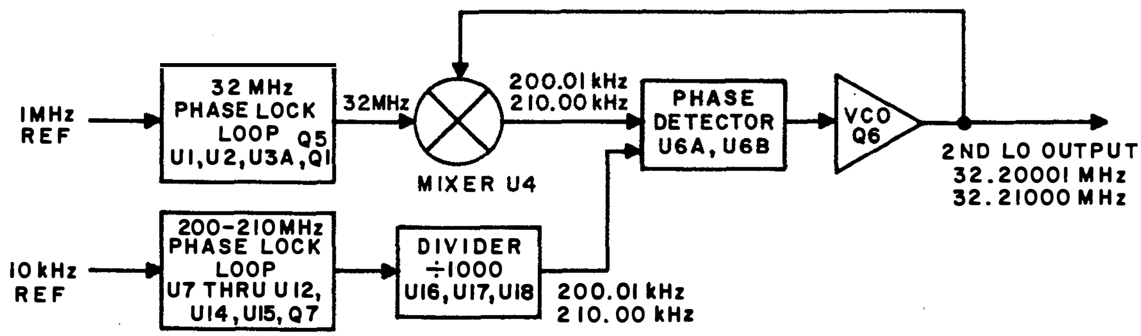

Figure 3-17. 2nd LO Functional Block Diagram

3-122. The circuit description for the 2nd LO follows the same organization as the functional description. The 2nd LO will be discussed in the following order: 32 MHz phase lock loop, programmable phase lock loop, and 2nd LO output loop. The schematic diagram for the 2nd LO is shown in F0-17.

3-123. The 32 MHz phase lock loop utilizes the basic phase lock loop configuration shown in figure 3-8. The VCO output (from oscillator Q5) is applied to buffer amplifier Q1. The collector output of Q1 routes through a divide-by-2 counter, U3A, and a divide-by-16 counter, U2, dividing the 32 MHz output down to 1 MHz. This signal and the 1 MHz reference from the time base are compared in phase detector U1A, and filtered in U1B; these circuits are described in paragraphs 3-88 through 3-92. The dc voltage from U1B varies the capacitance of varactor diode CR3. Q5's oscillation frequency depends on the tuned circuit incorporating CR3. Q1 is a buffer amplifier which has two outputs isolated from each other. C9 and L9 passes the 32 MHz emitter signal to the mixer while rejecting any harmonics of 32 MHz or any 1 MHz signals from the input of U4. The collector output is returned to the counter to close the loop.

3-124. The programmable phase lock loop incorporates a two-module prescaler, swallow counter, divider, phase detector, filter, and VCO. The output of this loop, from Q7, feeds into U15 and U16. U14 and U15 form a prescaler whose divide ratios are 100 and 101. Figure 3-18 illustrates the prescaler operation. Individually, U15 is a divide-by-10 or 11 counter and U14 is a divide-by-10 counter. Cascading the two counters results in divide ratios of 100 and 101. U15 divides by 11 when both E5 and E4 are at a low state. This occurs only during the swallow counting sequence when E4 is held low by U11C. U15 divides by 10 for 90 input pulses from the VCO. Because of this, nine input pulses enter U14 at pin 2. At this point U14's ripple clock output, pin 15, goes low for one input pulse. This enables U15 to divide by 11 once. Therefore, dividing by 10 nine times (9x10) and dividing by 11 once (1x11) results in a divide ratio of 101 (90+11).

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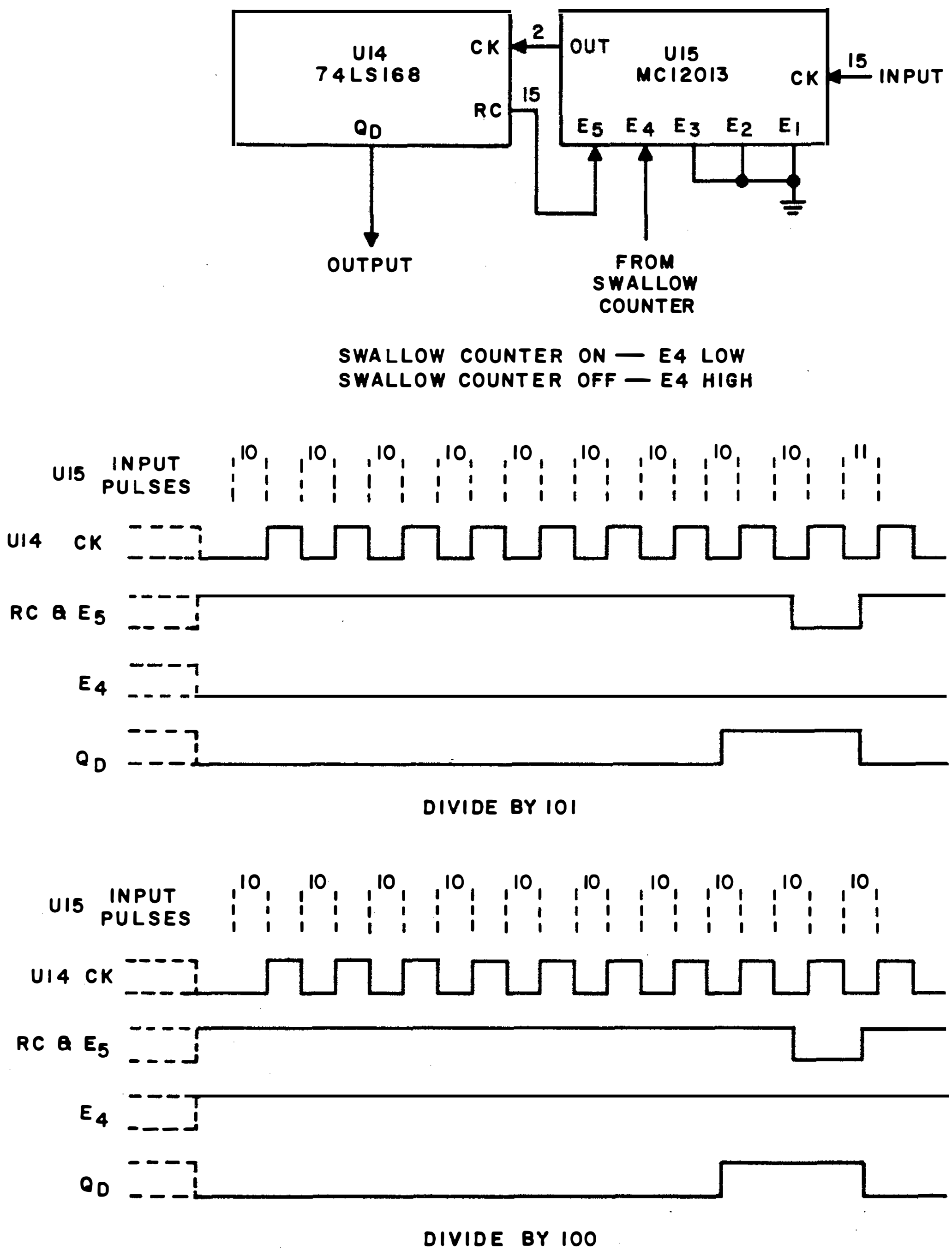

Figure 3-18. 2nd LO Prescaler Timing Diagram

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This division of 101 occurs until the swallow counter (U7 and U8) reaches terminal count. From this point, E4 of U15 remains high until the divider reaches terminal count, thus dividing by 10. U11B and U11C detect the state of the swallow counter while U11D detects the terminal count of the divider.

3-125. The swallow counter is comprised of U7 (a decade counter) and U8 (a binary counter). U11A, B, and C form the swallow counter terminal count detector. The counter can be loaded with any number between 00 and 99, inclusive. During a load pulse U7 and U8 are loaded, and the output of the NAND latch formed by U11B and U11C is reset. This low signal is sent to the prescaler control input of U15, causing it to divide by 101. When U8 reaches state 1010, sensed by U11A, the NAND latch will be set causing the prescaler to divide by 100. As soon as U8 is clocked to state 1010, U7 will be in 0000 state because up counting is used. Since detection occurs when U7 is 0 and U8 is 10, the terminal count for the swallow counter is 100.

3-126. The main programmable counter consists of binary counters U9 and U10. U11D is used as the detector. U9 can be loaded with any value between 0 and 9, and U10 is always loaded with 2. Since binary counters are used, the 2 loaded in the second digit is not worth 20 (2x10), but is worth 32 (2x16). U11D senses a high level on the QA output of U9 and the minimum/maximum output of U10. The first time this occurs while up counting is when U10 and U9 are in states 15 and 1, respectively. Again the 15 in the second digit is worth 240(15x16), so the terminal count is 240 + 1 = 241. Each count of the programmable counter is equal to 100 counts of the overall divide chain so the actual terminal count for the programmable counter is 241 x 100 = 24100.

3-127. Combining the terminal counts of both counters will yield the overall terminal count. The terminal count for the swallow counter was 100 and for the programmable counter was 24100. Therefore, the terminal count for the whole chain is 100 + 24100 = 24200. The programmable counter is always loaded with 32 plus the input to U9 so the overall chain is loaded with 3200 (32x100) plus the inputs to the three stages.

3-128. Suppose 000 is loaded into the 2nd LO. The input to the counters is 3200 + 000 = 3200. The terminal count is 24200, so the divide ratio is 24200 - 3200 = 21000. Suppose 999 is loaded. The input is 3200 + 999 = 4199. The divide ratio is 24200 - 4199 = 20001. Suppose 500 is loaded. The input is 3200 + 500 = 3700. The divide ratio is 24200 - 3700 = 20500.

3-129. Assuming lock is achieved, a 10 kHz signal should be seen at the output of U11D. This signal is compared to a 10 kHz reference frequency from the Time Base, in phase detector U12A, and filtered in U12B. The dc voltage from U12B varies the capacitance of varactor CR5 which varies the frequency of oscillator Q7. This signal, ranging from 200.01 MHz to 210.00 MHz, feeds the prescaler and routes to a divide-by-1000 circuit. U16, U17, and U19 each are divide-by-10 counters. When cascaded, the circuit provides a division ratio of 1000 (10x10x10). The input to U6A is a signal ranging from 200.01 kHz to 210.00 kHz.

The 2nd LO output loop produces the 2nd LO frequency range of 32.20001 to 32.2100 MHz in 10 Hz steps. This range of frequencies and the 32 MHz signal from Q1 mix in U4, resulting in a difference frequency range from 200.01 kHz to 210.00 kHz.

3-130. Differential amplifier U5 accepts the push-pull output from U4 and amplifies the signal approximately 10 times into a single-ended output. Q2 translates the output level of U5 to TTL levels for the input to U6A. This signal and the phase locked frequency from the programmable divider are compared in phase detector U6A, producing dc voltages that are filtered by U6B. U6B's output varies the capacitance of varactor diode CR4 and tunes oscillator Q6. This output enters a buffer amplifier, Q3, where the signal is output to mixer U4, and is coupled through impedance matching voltage divider C22, C23, to become the 2nd LO output.

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3-131. 1st LO SYNTHESIZER (A5A1A2). The 1st LO Frequency Synthesizer circuits are part of the 1st and 3rd LO/Time Base circuit board. The 1st LO utilizes a phase lock loop configuration with the prescaling technique previously described in paragraph 3-10.b. The output of the 1st LO tunes in 10 kHz steps from 42.91 MHz to 72.90 MHz. This tuning range mixes with the 0.0 to 29.99 MHz receiver tuning range to produce a 1st IF signal in the range of 42.90 to 42.91 MHz. A block diagram of the 1st LO is shown in figure 3-19.

3-132. The programmable divider, phase detector, and lead-lag filter of the 1st LO Synthesizer are contained on the main circuit board, the VCO and tuning voltage control circuits are mounted separately, but together with the main circuit board, they form a combined assembly. The phase detector (U5), charge pump (U6C), and lead-lag filter (U7) of the 1st LO will be discussed lightly since a detailed description of these circuits was presented previously in paragraphs 3-79 through 3-92.

3-133. A two-module prescaler, described in paragraphs 3-83 through 3-85, is used at the input to the divide-by-N counter to divide down the frequency from the VCO so that it can be handled by conventional low-power Schottky counters. If the 1st LO is locked on the correct frequency, the output of the programmable counter will be 40 kHz. This 40 kHz is compared to the 40 kHz reference frequency from the Time Base in phase detector U5. The difference in frequency and phase of these two input signals produces a series of pulses which the charge pump converts to positive or negative going voltages. These voltages are integrated by lead-lag filter U7 to provide the tuning voltage for the VCO. The Notch Filter and Tuning Voltage ground reference circuits isolate the VCO tuning voltage from any ripple from the 40 kHz reference frequency. An octal band-switching code, generated by octal encoder U13 from the divider section, switches the VCO to one of eight tuning ranges spaced 16 MHz apart.

3-134. The VCO has two inputs and two outputs. The inputs to the VCO are a tuning voltage and a band-switching code. Together they supply the VCO with the necessary information for tuning to the correct frequency. The actual VCO generates frequencies between 171.64 MHz and 291.60 MHz. This range is sent to the programmable divider of the phase lock loop. The other output of the VCO is applied to a frequency divider. Since the 1st LO frequency range is from 42.91 MHz to 72.90 MHz, the VCO frequency range must be divided by 4. For this same reason, the eight tuning ranges of the VCO (from the band switching code) are spaced 16 MHz apart within the VCO and 4 MHz apart (16 MHz 4) for the 1st LO output. In summary, the VCO frequency is four times that of the 1st LO output frequency.

3-135. The programmable divider has an input range from 171.64 MHz to 291.60 MHz, in 40 kHz steps, and must divide each of these frequencies down to exactly 40 kHz. This condition calls for the programmable divider to have a divide ratio from 4291 (171.64 ÷40 kHz) to 7290 (291.60 MHz ÷40 kHz).

3-136. From the conditions above, the counters within the programmable divider, U8, U9, U10 and U11, must have a divide range from 4291 to 7290. The inputs of the counters are always preset from the BCD equivalents of the four most significant digits of the tuned frequency. This range is from 0000 to 2999. One other condition exists at the input to the counters; U11 is wired to automatically add 8 to its preset. Therefore, the VCO presets have a range from 8000 to 10999. The external logic circuits connected to the counters stop the counters from counting when they reach the terminal count number 3709. Since the counters are wired to count down, the overall divide range needed from the counters is obtained; the divide range is from 4291 (8000-3709) to 7290 (10999-3709).

3-137. COUNTING CYCLE. Although the counters have the correct divide range needed to divide the input frequency down to

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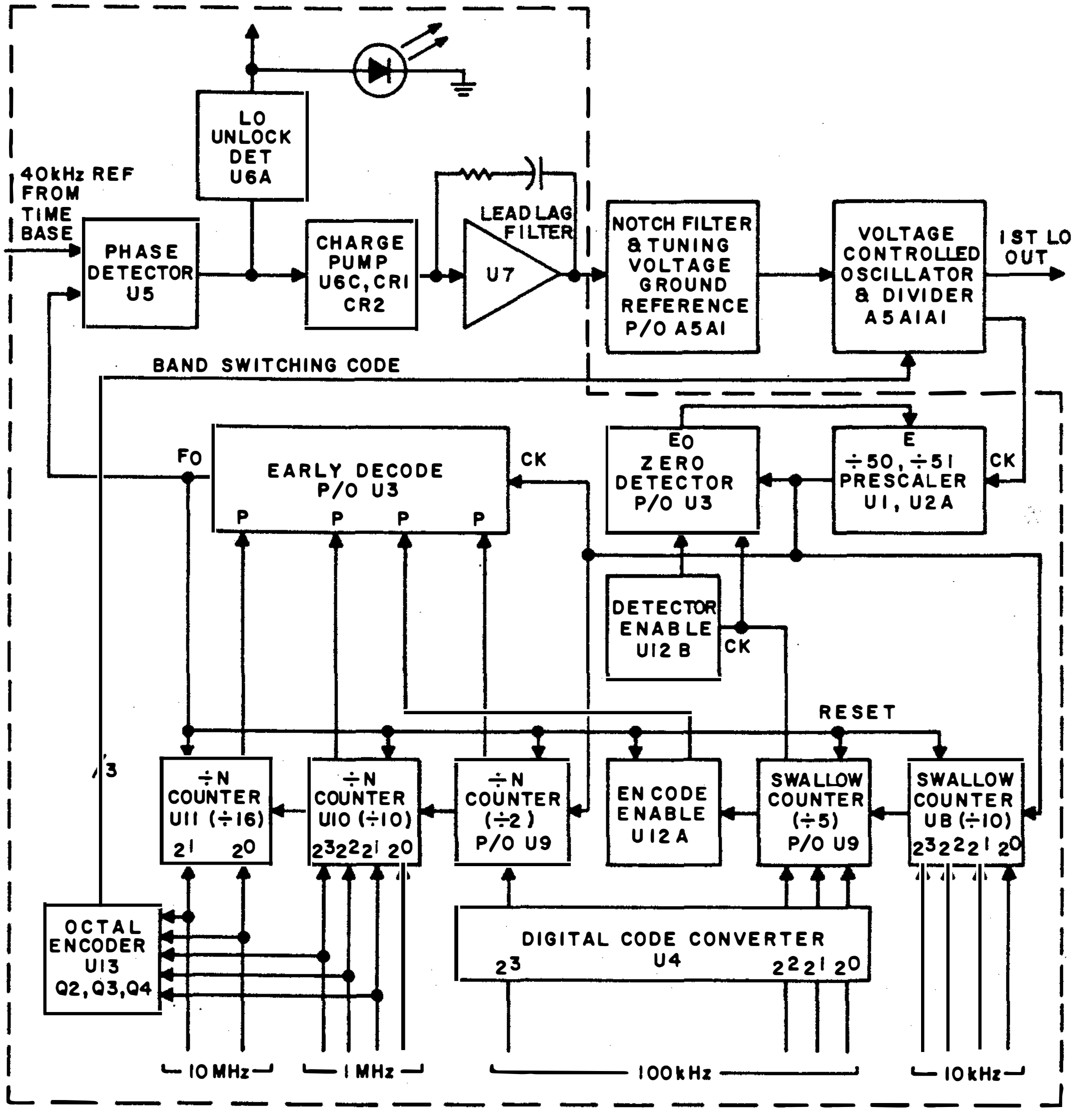

Figure 3-19. 1st LO Functional Block Diagram

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40 kHz, the VCO output frequency is too high for the counters to operate properly. Therefore, a high-speed, two-module prescaler is used to divide the input frequency to a range that can be handled by the counters.

3-138. The prescaler used in the 1st LO divides either by 50 or 51. In order for the counters to divide correctly, they must divide in increments of 50 or 51 also. When the prescaler divides by either 50 or 51, only one pulse is sent to the counters. Therefore, the counters must interpret this pulse as representing either 50 input pulses or 51 input pulses.

3-139. The counter section shown in figure 3-19 is divided into two parts: a programmable counter and a swallow counter. The programmable counter consists of U11, U10, and part of U9, and the swallow counter consists of U8 and part of U9. Both counters receive the same clock pulse from the prescaler output. By having the swallow counter control the prescaler, the represented count will decrement by 51 when the programmable counter and the swallow counter are counting. When the swallow counter reaches terminal count, the prescaler will begin to divide by 50 and the swallow counter will be disabled for the remainder of the cycle.

3-140. Figure 3-20 shows graphically a typical 1st LO counting cycle. The prescaler divides by 51 until the swallow counter reaches terminal count. When the outputs of the swallow counter reach this state, they cause the zero detector's E output state to become high. This causes the prescaler to divide by 50 until the end of the count cycle. Since the programmble counter is separately clocked, it continues to count down until its terminal count is detected by the early decode circuit. When this occurs, the $\overline{F_0}$ output of the early decode goes high after the next clock pulse from the prescaler. This is the output pulse supplied to the phase detector. When the output from the early decode circuit again goes low, it resets the counters to the preset number on their inputs. It also causes the reset enable circuit to reset the zero detector circuit causing its output to go low so the prescaler can divide by 51 during the next count cycle.

3-141. PRESCALER, U1 AND U2A. The prescaler input frequency ranges from 171.64 MHz to 291.60 MHz. The prescaler divides this by 50 or 51, depending on the states of the E inputs of U1 (refer to the schematic diagram of the 1st LO, F0-15). Figure 3-21 illustrates the prescaler's operation. U1 is a divide-by-10/11 counter and U2A is a divide-by-5 counter. The prescaler divides by 51 when E4 is low and when E5 pulses low once for every five pulses from U2A. E5 is low for only one count out of five so the complete count cycle of U1 and U2A takes 51 counts (4 x 10 + 1 x 11). This count cycle continues until the swallow counter reaches terminal count. E4 then goes high and U1 divides by 10 only, giving U1 and U2A a complete count cycle of 50.

3-142. DIGITAL CODE CONVERTER U4. U4 is a programmable ROM (Read Only Memory) that serves as a decoder or code converter. It behaves as a look-up table to translate a BCD input, which has bit values of 2^3, 2^2, 2^1, 2^0, to a new code with bit values of 5^1, 2^2, 2^1, 2^0. Table 3-6 illustrates all possible inputs and outputs of U4.

3-143. U4 serves as part of the programmable counter and part of the swallow counter. Output Y_4 presets the divide-by-2 counter, which is part of the programmable counter. Outputs Y_1, Y_2, and Y_3 preset the divide-by-5 counter which is part of the swallow counter. The function of U4 in each counter section will be discussed below.

3-144. PROGRAMMABLE COUNTER U9, U10, U11. The programmable counter is formed by U11, U10, and part of U9. U11 and U10 count down and U9 counts up. U10 is a divide-by-10 counter (BCD). U11 is a divide-by-10 counter (BCD). With the D input of U11 tied high (to Vcc 3), the counter is always preset with at least 8 (1000). The divide-by-2 counter within bi-quinary counter U9 is part of the programmable counter, using preset input A and output QA.

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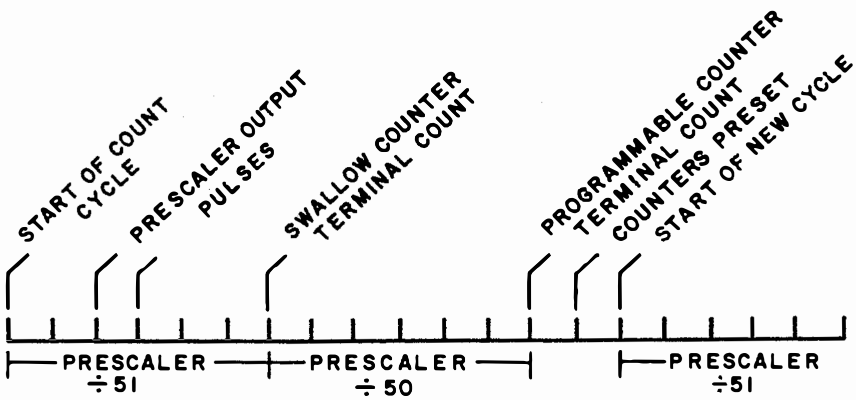

Figure 3-20. 1st LO Counting Cycle

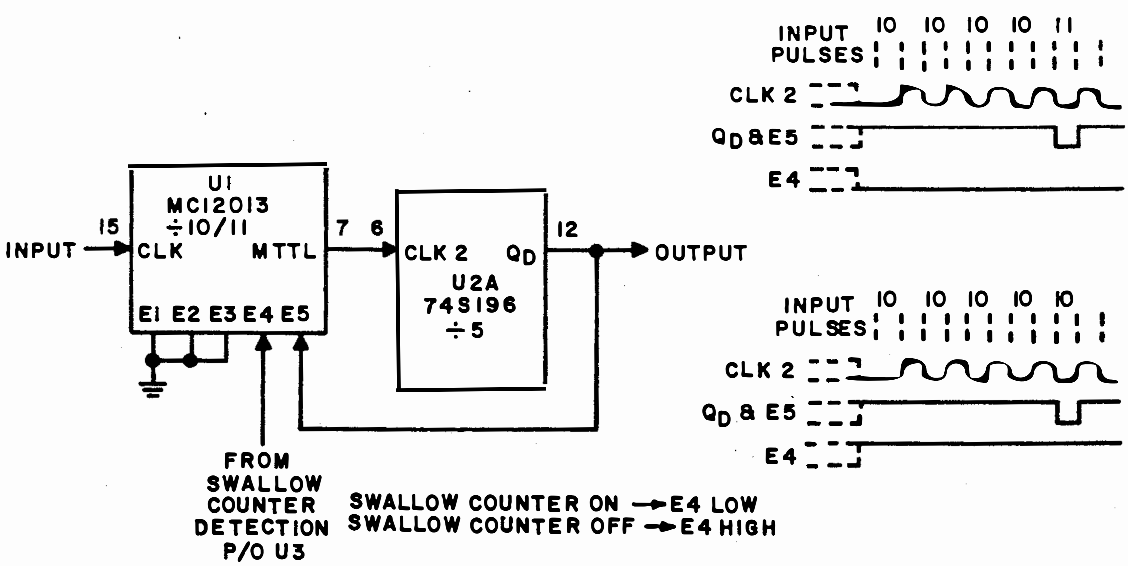

Figure 3-21. 1st LO Prescaler Timing Diagram

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Table 3-7. Code Converter U4, Truth Table

BCD Inputs to U4				Outputs from U4			
2^3	2^2	2^1	2^0	5^1	2^2	2^1	2^0
D	C	B	A	Y_4	Y_3	Y_2	Y_1
0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	0	0	1
0	1	0	1	1	0	0	0
0	1	1	0	1	1	0	0
0	1	1	1	1	0	1	1
1	0	0	0	1	0	1	0
1	0	0	1	1	0	0	1

3-145. U11, U10, and U9 are cascaded with a clock input entering U9 at pin 8 (CLK1). U9 cascades to U10 and clocks U10 on its 0 to 1 transition. U10 cascades to U11. The programmable counter counts from its preset values on U11, U10, and U9 down to a detection number of 370 (0011, 0111, 0000). A carry condition is the only exception to this count sequence and will be discussed later.

3-146. SWALLOW COUNTER U8 AND U9. The 1st LO swallow counter is formed by decade counter U8 and the divide-by-5 part of bi-quinary counter U9. Cascaded, they form a divide-by-50 counter which controls the divide mode of prescaler U1. The counting mode of the swallow counter is unusual, in that U8 counts down and clocks U9, which counts up. Refer to table 3-6. The terminal count for the swallow counter occurs at 09. At this point the Z inputs of control device U3 must all be low. However, the $\overline{Z_0}$ input is controlled by U12B, which enables detection of the terminal count. The Q output of U12B is set high at the beginning of each count cycle, and will not go low until the most significant swallow counter digit, from U9, steps from 1 to 2. This clocks U12B, validates the terminal count, and the prescaler mode will be changed when the counter reaches 09. Therefore, for preset values between 29 and 40, the counter cycles past the first 09 count to the 10 to 29 transition, then terminates at 09.

3-147. CARRY CONDITION U12A AND U6B. A carry condition occurs in the programmable counter when the preset to the swallow counter falls into the range of 29 to 00. Refer to table 3-8. If the preset to the swallow counter is 00, the first count will cause the transition to 19. When this occurs, the U9 output Q^B will go high, while Q^C remains low. The logic of U24B and U24A produces a logic high to clock U12A. The Q output of U12A is preset high at the beginning of each cycle, but if the 00 to 19 transition occurs, it is clocked low. This applies a logic low to NAND gate U6B, and effectively shifts the actual terminal count of the programmable counter from 370 to 371. (The actual number detected is 380 or 381, see the following paragraph for explanation.)

3-148. COUNT SEQUENCE. Table 3-9 lists the count-down sequence of the 1st LO divider for two RF input frequencies. In the

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Table 3-8. Count Sequence, 1st LO Swallow Counter

5 U9B (UP)	10 U8 (DOWN)	Comments	5 U9B (UP)	10 U8 (DOWN)	Comments
0	0	This transition	3	4	
1	9	sets carry condition	3	3	
1	8	(U8 clocks U9)	3	2	
1	7		3	1	
1	6		3	0	
1	5		4	9	U8 clocks U9
1	4		4	8	
1	3		4	7	
1	2		4	6	
1	1		4	5	
1	0	Swallow counter	4	4	
2	9	validate (U8 clocks U9)	4	3	
2	8		4	2	
2	7		4	1	
2	6		4	0	
2	5		0	9	Terminal count
2	4		0	8	(U8 clocks U9)
2	3		0	7	
2	2		0	6	
2	1		0	5	
2	0		0	4	
3	9	U8 clocks U9	0	3	
3	8		0	2	
3	7		0	1	
3	6		0	0	Repeat cycle
3	5		1	9	U8 clocks U9

first example, the receiver is tuned to 00.00XXX MHz and the 1st LO counter presets are loaded with the value 8000, as explained previously. The two most significant preset digits (8 and 0) are loaded directly into U11 and U10. The least significant digit (0) is loaded directly into U8. The 0 applied to code converter U4 results in a 0 preset to both sections of U9, as explained in paragraph 3-10.g.(3). The swallow counter (U8, U9B) and the programmable counter (U9A, U10 and U11) are both decremented by 1 prescaler output pulse for each 51 prescaler input pulses. When the swallow counter reaches its terminal count (at 09) the prescaler divide mode changes to ÷50. Since the swallow counter was preset with 00, a carry condition exists and the terminal count for the programmable counter is 371, as explained in paragraph 3-10.g.(6). When the programmable counter reaches terminal count, the cumulative number of pulses into the prescaler equals 4291. Since the loop reference frequency is 40 kHz, the VCO frequency is 4291 x 40 kHz, or 171.64 MHz. The VCO output to the mixer is divided by 4, resulting in an actual LO output of 42.91 MHz. This is the LO frequency corresponding to a tuned RF of 00.00XXX MHz.

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Table 3-9. 1st LO Divider Count-Down Cycles

Pre-Scaler Mode	Pulses into Prescaler New	Pulses into Prescaler Cum.	Prescaler Output Pulses	U9B (5)	U8 (10)	U11 (16)	U10 (10)	U9A (2)	Comments
51	0	0	0	0	0	8	0	0	Preset for tuned
	51	51	1	1	9	7	9	1	freq. of 00.00XXX MHz
	51	102	1	1	8	7	9	0	
	408	510	8	1	0	7	5	0	
	51	561	1	2	9	7	4	1	Swallow ctr. validation
	1530	2091	30	0	9	5	9	1	Swallow ctr. terminal
50	50	2141	1			5	9	0	count
	900	3041	18			5	0	0	
	1000	4041	20			4	0	0	
	100	4141	2			3	9	0	
	50	4191	1			3	8	1	Early Decode
	100	4291	2			3	7	1	Terminal count
									(carry condition)
	4291 x 40 kHz								Divide ratio = 4291
	= 171.64 MHz								
51	0	0	0	1	9	10	9	1	Preset for tuned
	51	51	1	1	8	10	9	0	freq. of 29.99XXX MHz
	408	459	8	1	0	10	5	0	
	51	510	1	2	9	10	4	1	Swallow ctr. validation
	1530	2040	30	0	9	8	9	1	Swallow ctr. terminal
50	1000	3040	20			7	9	1	count
	1000	4040	20			6	9	1	
	1000	5040	20			5	9	1	
	1000	6040	20			4	9	1	
	1000	7040	20			3	9	1	
	150	7190	3			3	8	0	Early Decode
	100	7290	2			3	7	0	terminal count
									(No carry condition)
	7290 x 40 kHz								Divide ratio = 7290
	= 291.60 MHz								

3-149. The second entry in table 3-9 gives an example with the receiver tuned to 29.99XXX MHz and the 1st LO counter presets loaded with the value 10999. The two most significant preset digits (10 and 9) are loaded directly into U11 and U10. The least significant digit (9) is loaded directly into U8. The 9 applied to code converter U4 results in a value of 1 applied to U9A, and a value of 1 applied to U9B, as explained previously. Since the swallow counter preset is 19, no carry condition exists and the terminal count for the programmable counter is 370. When terminal count is reached, the cumulative number of pulses

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into the prescaler equals 7290. With a loop reference of 40 kHz, the VCO frequency is 291.6 MHz, and the actual LO output (291.6 MHz ÷4) equals 72.90 MHz. This corresponds to a tuned RF of 29.99XXX MHz.

3-150. DIVIDER SECTION TERMINAL COUNT. The terminal counts of both the swallow counter and the programmable counter are detected by the terminal count control IC, U3, see F0-15. The prescaler mode is controlled by the swallow counter logic outputs applied to the Z inputs of U3, as described in paragraph 3-146. The terminal count of the programmable (main) counter is obtained when the correct logic levels are applied to the P and B inputs of U3. As previously stated, the actual terminal count occurs at 370 (or 371, with the carry condition). However, because of the relatively high counting speed, the counters require about two clock pulses to reset at the end of each counting cycle. Therefore, the divider makes use of a two-pulse "early decode" circuit contained in U3, see figure 3-22.

3-151. When the terminal count logic conditions are satisfied (at the P and B inputs) U3 counts one clock pulse, then drops the F_0 output line low. This resets the flip-flops and presets (loads) the counters. At the end of the second clock pulse, the F_0 output goes high, starting the count cycle and clocking the VCO phase detector, U5. Therefore, the number detected by U3 is 380 (or 381, in the carry condition) but the actual terminal count is 370 (or 371), because two more prescaler output pulses occur before the F_0 output goes high.

3-152. VCO BAND SELECT CODE. The VCO Band Select circuits are shown in the middle of sheet 1 of the 1st and 3rd LO Synthesizer schematic diagram, F0-15. The purpose of U13, Q2, Q3, and Q4 is to translate the 1st LO frequency range into eight different bands for the VCO. The band select code causes different combinations of inductance to be placed across the VCO tuning circuitry, thereby changing the VCO frequency range.

3-153. Octal encoder U13 accepts BCD inputs from the two most significant digits of the 1st LO frequency word and translates them into a binary coded word on Y_2, Y_3, and Y_4. The transistors connected to these outputs supply negative true-code outputs. For example, when Y_2 is low, -12V appears at the base and emitter of Q2 turning the transistor off. This causes the collector to be off and +15V to appear at output E1. When Y_2 is high, Zener diode CR8 conducts causing Q2 to turn on, resulting in a -12V potential at output E1. The relationship of the band select code to the LO frequency word is detailed in Table 3-9.

3-154. VOLTAGE CONTROLLED OSCILLATOR (A5A1 A1). Figure 3-23 is the functional block diagram for the Voltage Controlled Oscillator. The VCO is an integral part of the 1st LO Synthesizer loop, whose inputs are a tuning voltage and a band select code, and whose output is the 1st LO frequency. The VCO operates at a frequency four times the desired 1st LO frequency. The band select code and the tuning voltage combine to tune the oscillator from 171.64 MHz to 291.60 MHz in 40 kHz steps. The oscillator output is amplified by Q2 and split between the buffer amplifier and the Divide-by-4 Assembly. Buffer amplifier Q3 provides the synthesizer with a sample of the oscillator signal. The sample is processed and, if required, a correction is made to the tuning voltage. The amplified oscillator frequency is divided by 4 (by U1) since the oscillator frequency is actually four times the desired 1st LO frequency. Amplifier Q7 supplies a high-level signal for the 1st Mixer.

3-155. Refer to F0-18 for the schematic diagram of this circuit. Applying a negative-true-code voltage to the BAND SELECT inputs tunes the oscillator to one of eight different frequency bands. When the BAND SELECT inputs are all positive, CR1 through CR3 are off, and L2 through L4 are effectively out of the circuit. This allows the inductance of T1 to be maximum. When any or all of the BAND SELECT inputs are negative, the corresponding diode will conduct and the inductance of T1 will be reduced by the shunting effect of the inductor (L2, L3, or L4). Varactor diode CR4 fine tunes the

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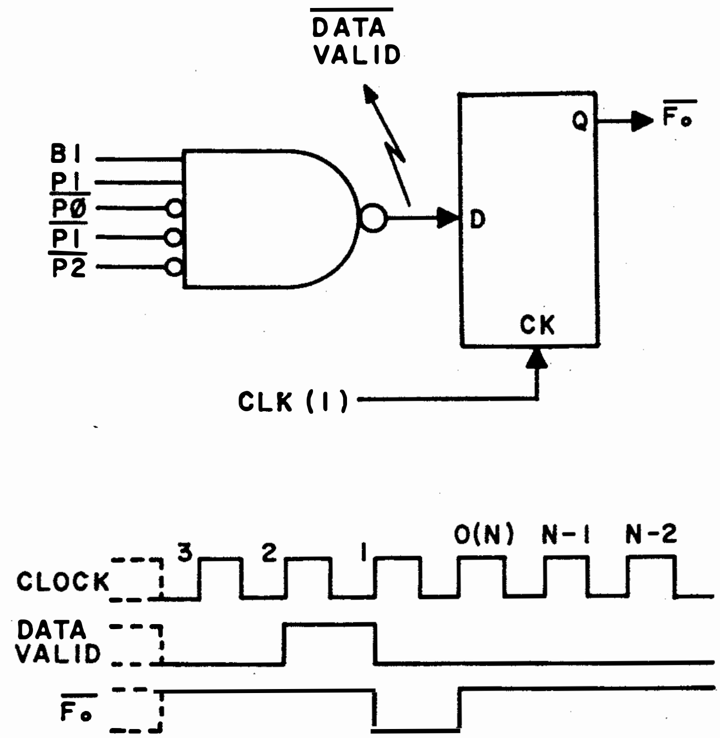

Figure 3-22. Two-Pulse Early Decode, Count Termination

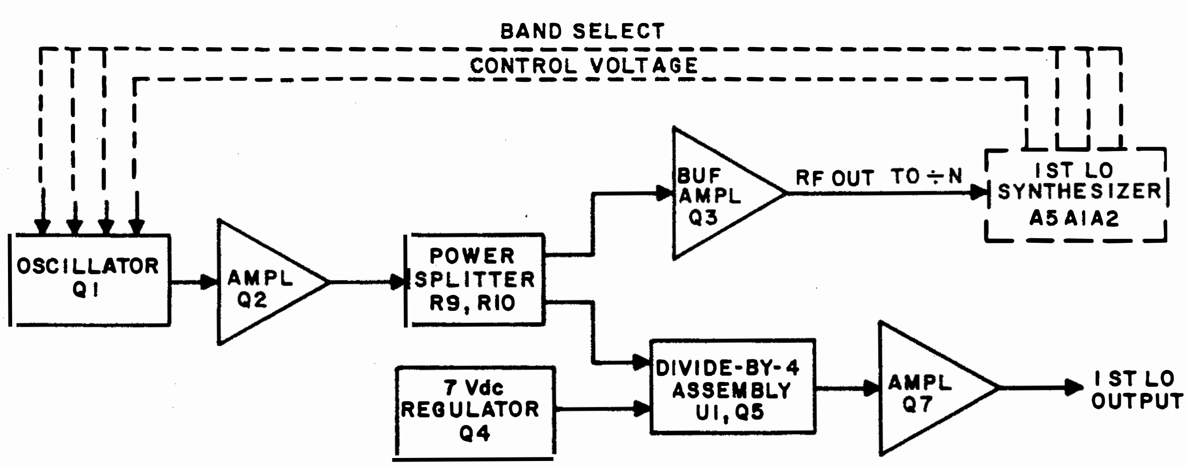

Figure 3-23. VCO Functional Block Diagram

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oscillator in response to the tuning voltage input. Common-emitter amplifier Q2 keeps load changes at the input of power divider R9 and R10 from being reflected back to the output of oscillator Q1. T2 matches the output of the amplifier to the input of the power divider. The signal is coupled to buffer amplifier Q3, which drives the prescaler of the synthesizer. R9 and C15 couple the signal from Q2 to the input of the divide-by-4 circuit U1. MECL divider U1 divides the signal frequency by four and amplifier Q5 isolates its output from load changes. Voltage regulator Q4 provides U1 and Q5 with a -7.0V power input from the -12V power supply input to the assembly. Amplifiers Q5 and Q7 provide the relatively high currents needed to drive the input of the 1st Mixer.

3-156. 1st AND 3rd LO SYNTHESIZER/TIME BASE (A5A1). This assembly is located in the right-hand side of the receiver and connects the 1st and 3rd LO/Time Base circuit board to the 1st LO VCO circuit board. The connections include three lines for the VCO band select code, two lines for the VCO tuning voltage, and one line connecting the VCO output to the 1st LO divider section. Also on this board is a -12 Vdc regulator that supplies voltage to both the 1st LO Synthesizer and the 1st LO VCO.

3-157. The schematic diagram corresponding to this circuit board is shown in F0-19. The tuning voltage connects to the VCO through a 40 kHz trap (C1, C3, L1, L2, and L3) and a low-pass filter (C4, C6, C8, R4, and L4). CR1, CR2, and CR3 provide a 1.8 V potential on the tuning voltage reference line. A -15 Vdc potential from the 1st LO circuit board enters pin 3 of the voltage regulator VR1 and is regulated to a -12 Vdc output on pin 2. The -12 Vdc is supplied to the VCO, to power its circuits, and to the 1st LO Synthesizer to power lead-lag filter U7 and the band switching circuit.

3-158. SYNTHESIZER MOTHERBOARD. The 1st and 3rd LO Synthesizer/Time Base (A5A1), 2nd LO Synthesizer (A5A2) and BFO Synthesizer (A5A3) assemblies plug into the Synthesizer Motherboard A5. The schematic diagram of this board is shown on sheet 6 of the main chassis schematic, F0-1.

3-159. CONTROL SECTION. The Control Section is made up of seven separate modules which, together, control the functioning of the receiver by means of the front panel controls. Figure 3-1, located in Section I of this chapter, shows the working relationships of these seven units. Each will be discussed in detail below.

3-160. A6 MOTHERBOARD AND FRONT PANEL. The Manual Tuning Up/Down Counter and the Front Panel Interconnect (A6A2) modules plug into the A6 Motherboard, as shown on sheet 4 of the main chassis schematic, F0-1. The Manual Tuning (A7) and Frequency Display (A8) modules and the BFO offset switch (A9) and Upper Panel (A10A1) and Lower Panel (A10A2) control boards mount on the front panel. The schematic diagram for these units is shown on sheet 5 of the main chassis schematic, F0-1.

3-161. MANUAL TUNING UP/DOWN COUNTER (A6A1). The data that constitutes the RF frequency is present in the Up/Down Counter and it is sent to the 1st and 2nd LO Synthesizers and is encoded for use by the frequency display board. The Manual Tuning Module is the means by which frequency information is changed in the receiver. A block diagram of the Up/Down Counter is shown in figure 3-24.

3-162. Integrated circuit 14510 is a presettable up/down decade counter and is shown in figure 3-25. Pin 15 is the clock input. The counter will increment for each rising edge of the clock when the up/down input (pin 10) is high; when pin 10 is low, the counter will decrement. If the parallel enable input (pin 1) is high, clocking is inhibited and the information on the P inputs are transferred to the corresponding Q outputs. Cascading of counters is accomplished by tying the carry input (pin 5) of one counter to the carry output (pin 2) of the preceding counter and by connecting the control inputs (clock, up/down, parallel enable) in parallel. If the carry input is high, the counter is inhibited

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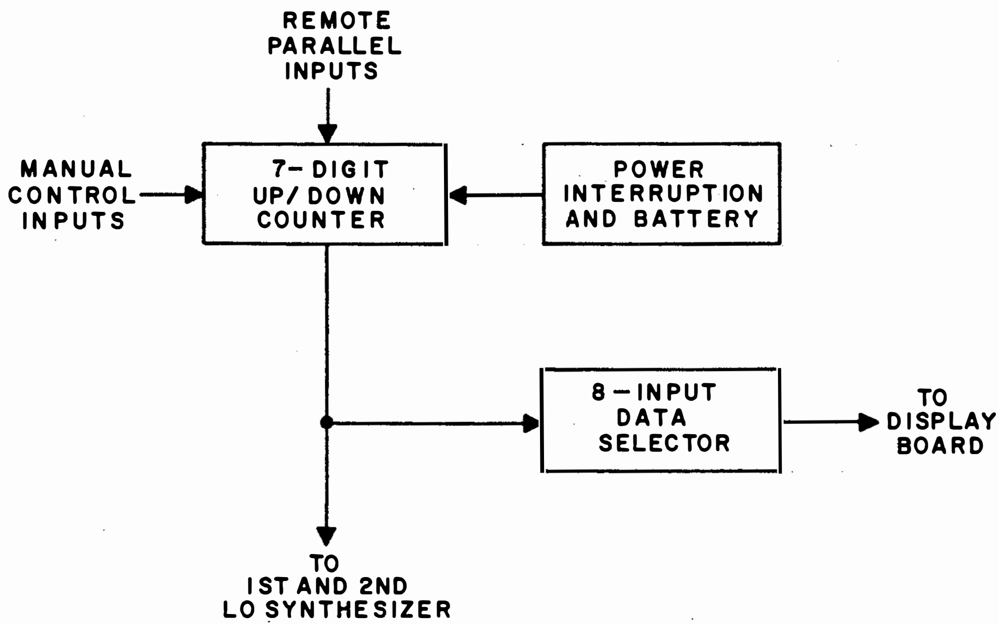
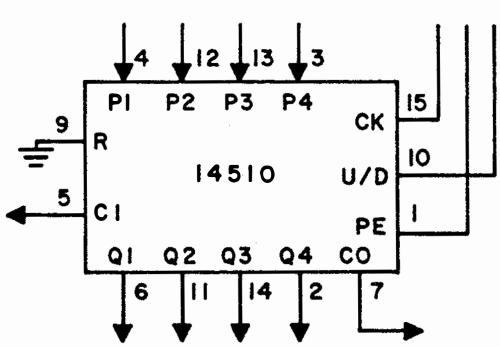


Figure 3-24. Manual Tuning Up/Down Counter Block Diagram



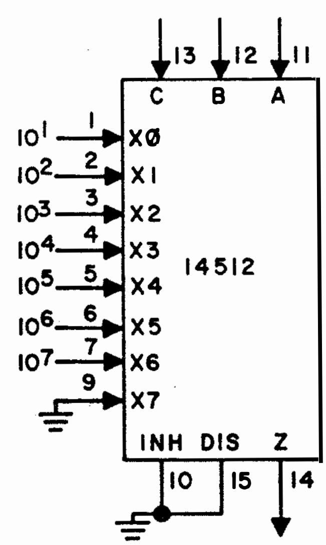


Figure 3-25. Up/Down Counter Integrated Circuit Data

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from clocking. The carry output, normally high, goes low during a carry condition. Carry conditions occur when the counter is in a 0 state during down counting or when the counter is in a 9 state during up counting. Therefore, any stage in a counter chain will clock only when all preceding stages are in a carry condition.

3-163. Integrated circuit 14512 is an eight-input data selector and is shown in figure 3-25. Control inputs A, B, and C select which of the data inputs, X_0 to X_7, is gated to output Z. The data input selected is determined by the binary equivalent of the control inputs. When activated, the disable line will force a low on the Z output and the inhibit input will cause it to go to the high impedance state. Inhibit and disable inputs are not used in this application.

3-164. The schematic diagram for the Manual Tuning Up/Down Counter is shown in FO-20. The Up/Down Counter is composed of U2 through U11. U2 through U7 are MC14510's cascaded to form a six-digit presettable up/down decade counter. U1F, U8C, U9, U10, and U11 form the last stage of the counter. U9 is a dual JK flip-flop. U1F, U8C, U18B, U10B, and U10D form the logic to control the states of U9. During an up count, U9 will clock from 0 to 2 and then back to 0 again. Down counting will produce states in the opposite direction. U11, U10C, and U10A form the logic to preset U9. With the remote frequency load line low, the outputs of U11 will all be low, having no effect on U9. If the load line is high, U9A will reset if the 2^0 of 10^7 input is high and clear if it is low; U9B will reset if 2^1 of 10^7 is high and clear if it is low. There are no connections to the J1 remote input connector in this receiver. U8A, U8B, and U8D are used to gate the carry outputs of the first three stages to be used for the tuning resolution select. The tuning resolution switches (from front panel manual tuning module) provide a short to the step select switch output (from J4, pin 16, normally low) for the activated switch and an open circuit for the switches not chosen. Resistors R5 to R8 are pull-up resistors to provide a high level on the open circuited lines. If the 10^1 switch is selected, counter U2 will be enabled. Since the other lines will all be high, all AND gates will be enabled. The resultant is a normal seven decade counter. If the 10^2 step select is chosen, AND gate U8D will be disabled. U2 will be inhibited since its carry input will be high. Since the carry input of U3 is now always low, it will clock for each pulse received on its clock input. U8B and U8A will still be enabled allowing for normal carry operation. The counter now behaves as though counter U2 is no longer in the circuit. If the 10^3 select is chosen, both U2 and U3 are disabled; if the 10^4 is chosen, U2, U3, and U4 are disabled.

3-165. The clock and direction signals are from the Manual Tuning Module. When up counting is desired, the clock line lags the direction line by 90°; when down counting is desired, it leads by 90°. U1A and U1E are Schmitt triggers to buffer the input signals. Since both clock and direction lines are inverted, the relative sense between the two signals is maintained. During up counting, the rising edge of the clock will always occur when the direction line is high, causing the counter to increment. In down counting, the rising edge will always occur when the direction line is low, decrementing the counter.

3-166. The P inputs of the counters provide for a remote control option, and are connected to the Remote Input Jack, J1. When the remote frequency load line is pulsed high, the levels on the P lines will be transferred to the outputs of the counter. If the load line returns low the counter will resume clocking from the new data. The Remote Input Jack also contains lines from the IF bandwidth select circuitry. This allows remote control/monitor of the IF BW. Remote inputs are not used in this receiver.

3-167. The RF frequency information is sent to the 1st and 2nd LO Synthesizers via the I/O and Synthesizer Motherboards. It is also sent to multiplexers U12 to U15. U12 receives the 2^0 bit of each digit, U13 receives the 2^1 bit, U14 receives the 2^2 bit, and U15 receives the 2^3 bit. The control inputs of U12 to U15 are all tied in parallel and feed to a binary counter U16. This counter is continuously

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clocked from an oscillator formed by U1C, U1B, C2, and R14. The frequency of oscillation is approximately 2.3 kHz. The outputs of U16 are also sent to J2 for decoding on the display board. The outputs of U12 to U15 are buffered by U17.

3-168. Operation of the data selector is as follows: when counter U16 has all zeros on its outputs, the A, B, and C inputs of U12 to U15 will be low. This will gate all X_0 inputs to their respective Z outputs. The information sent to the display board via J2 will be:

If $Q_2\ Q_1\ Q_0 = 000$, then:

$2^3\ 2^2\ 2^1\ 2^0 = 10^1$ Digit

When the oscillator clocks U16 again, the outputs will become 001. This will cause the X_1 input of each multiplexer to appear at its respective Z output. As the counter U16 clocks, all X inputs will be sent to the Z output in the code shown in Table 3-10.

3-170. During power down the tuned frequency is remembered by powering the up/down counter from battery BT1. Diode CR1 is used to charge this Nicad battery when power is on and to isolate the battery from the rest of the receiver when power is down. It is a hot carrier diode, dropping only about 0.4V when forward biased. When power is on, V_{DD} is at 5V, forward biasing the diode and charging the battery through R9. If power fails, V_{DD} drops to 0V and diode CR1 becomes reverse biased, allowing battery current to flow only to the chips connected to V_{DD2}.

The purpose of Q1 and its circuitry is to inhibit all counters when power down occurs. Without it, the counters could clock when power was again applied to the encoder assembly, because the clock input could go from a low (during power down) to a high (during power up).

Table 3-10. Band Select Coding

RF Digit		Band Select Code (Negative True)		
10 MHz (U11)	1 MHz (U10)	2^2 (E3)	2^1 (E2)	2^0 (E1)
0	0	0	0	0
0	4	0	0	1
0	8	0	1	0
1	2	0	1	1
1	6	1	0	0
2	0	1	0	1
2	4	1	1	0
2	8	1	1	1

3-169. This information can now be decoded on the display board. The display board determines which digit is present on the 2^3, 2^2, 2^1, and 2^0 lines by decoding the Q_2, Q_1, and Q_0 inputs.

3-171. Transistor Q1 controls the step select switch common. When power is on, the 10V across voltage divider R11 and R12 will turn Q1 on, which will place a low on the step select common. If the 10 V line drops below

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7V, the base of Q1 will drop below 0.7V, and the transistor will turn off placing a high on the step select common through resistor R10. This high will prevent any of the step select lines from going low. The step select button chosen will short to a high level now, not a low, and the unchosen switches will still be pulled high by resistors R5 through R8.

3-172. FRONT PANEL INTERCONNECT (A6A2). The Front Panel Interconnect provides control information for the receiver. To accomplish this task, it takes the manually input data from the front panel controls and either directly or after decoding, relays it to the interior circuitry. Data relayed by the interconnect includes detection mode, IF bandwidth, gain mode, meter mode, BFO, and RF and headphone gain levels. The schematic diagram for this module is included in sheet 4 of the main chassis schematic, F0-1. This circuit description explains the operation of each manually-controlled input to this module and how it decodes and sends the information to the IF and BFO circuits.

3-173. Inputs from the front panel controls are received through J1 and outputs go to the interior circuitry through XA2. As can be seen from the schematic diagram, most of the lines from the front panel are simply passed through to the rest of the receiver. For these lines, this module serves as a patch panel. Decoding for the IF Bandwidth and Detection Mode front panel selections is implemented through diodes CR1-CR10 and multiplexers U1 and U2. Figure 3-26 is a diagram of this multiplexer integrated circuit which also contains the truth table for its inputs and outputs. This IC performs as three digitally controlled SPDT switches. When control input A is logic low, terminals X and X_0 are internally connected. When A is logic high, X and X_1 are connected. Similarly, input B controls Y, Y_0, and Y_1 and input C controls Z, Z_0, and Z_1. This circuit performs logic functions associated with the front panel pushbuttons for detection mode (on A10A1) and IF bandwidth (on A10A2). Refer to both sheets 4 and 5 of F0-1 for the following descriptions. Notice that both A10A1 and A10A2 have their own set of "E" terminals to A10P1, using some of the same numbers.

3-174. Table 3-1 lists the filters activated in the 10.7 MHz Filter (A4A1) and the 455 kHz Filter (A4A3) modules for the various IF Bandwidth selections on the front panel. The logic circuitry, consisting of CR1-CR3, CR5-CR10 and U2, activates (through connector XA2) the appropriate filters for the front panel IF Bandwidth selections (through connector J1).

3-175. When the 16 kHz IF bandwidth is selected, E15 connects to E19. This activates the 16 kHz wideband paths in both the 10.7 MHz and 455 kHz filter modules through CR9 and CR10. E19 receives +5V through U1 in the AM, FM and CW detection modes, as will be described later.

3-176. When the 6 kHz IF bandwidth is selected, E12 connects to E19. This directly activates the 6 kHz filter in the 10.7 MHz filter module and, through CR8, activates the 16 kHz wideband path in the 455 kHz filter module.

3-177. When the 3.2 kHz IF bandwidth is selected, E11 connects to E19. This directly activates the 3.2 kHz filter in the 10.7 MHz filter module and, through CR7 and the X-X_0 and Y_0-Y paths in 42 (A and B inputs at low), activates the 16 kHz wideband path in the 455 kHz filter module.

3.178. When the 1.0 kHz IF bandwidth is selected, E8 connects to E19. This directly activates the 1.0 kHz filter in the 455 kHz filter module and, through CR6, activates the 3.2 kHz filter in the 10.7 MHz filter module. Here, the path through U2 is open since input A is high.

3-179. When the 0.3 kHz IF bandwidth is selected, E7 connects to E19. This directly activates the 0.3 kHz filter in the 455 kHz filter module and, through CR5, activates the 3.2 kHz filter in the 10.7 MHz filter module. Here, the path through U2 is open since input B is high.

3-180. As will be described below, in the LSB, USB and ISB detection modes, the +5V is removed from E19 (U1 path), and thus none of

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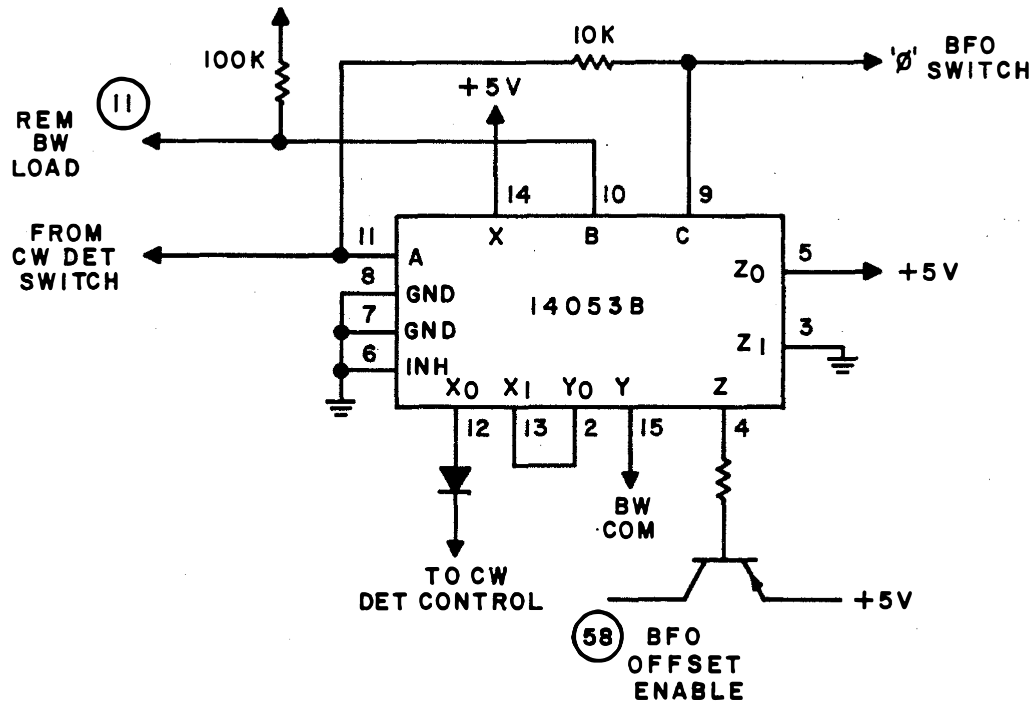

Figure 3-26. Front Panel Interconnect Integrated Circut

the filter paths in the 10.7 MHz or 455 kHz filter modules will be activated through this source. However, in the LSB, USB or ISB detection modes the Detection Mode selection switch places a high on E7, E8 or E11 (from the Detection Mode switch), respectively. This will activate the 16 kHz wideband path in the 10.7 MHz filter module through CR3, CR2 or CR1, respectively.

3-181. When the CW mode is selected, the detection mode switch connects E4 to E12, and E5 to E6. This places +5V on the CW select line to IF Motherboard A4. Input B of U1 is controlled by the remote bandwidth control line entering at XA2 pin 11. Since this line is logic low in local mode, U1 input B is normally low, and Y is connected to Y_0. Therefore, when E5 is connected to E6, the +5V at U1 input A causes the +5V line at X to be connected through X1, Y_0, and Y, to E19 and the IF bandwidth switch common line, enabling these switches. Therefore, any bandwidth may be selected in the CW mode. If "0" is selected on the "+, 0 ,-" BFO switch, the switch common (ground) places a low on U1 input C, Z and Z_0 are connected, Q1 is turned off, and the resulting low voltage at XA2 pin 58 causes the BFO preset lines to be pulled low, producing a fixed 455 kHz BFO frequency. (Refer to paragraph 3-10.e for a description of the BFO presets.) If "+" or "-" is selected, the ground is removed and U1 input C is pulled high by R7, Q1 is turned on and power is applied to the BFO preset pull-up resistors, entering whatever frequency code is present at the BFO Switch. Therefore, the BFO may be either fixed or variable in the CW mode.

3-182. When the AM mode is selected, the detection mode switch connects E4 to E16, and E5 and E14 to E6. This places +5V on the AM select line (to A4) and allows +5V on the bandwidth switch common line (E19), enabling these switches. This also places +5V on XA2 pin 60, which inhibits BFO operation.

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3-183. When the FM mode is selected, the detection mode switch connects E4 to E15, and E5 and E14 to E6. This places +5V on the FM select line (to A4), enables the bandwidth switches and inhibits the BFO, as previously described.

3-184. When the USB mode is selected, the detection mode switch connects E4 to E8 and grounds E5 and E14. This places +5V on the USB select line (to A4) and places a low at U1 input A. This disables the IF bandwidth switches and turns off Q1, fixing the BFO at 455 kHz, as previously described.

3-185. When the LSB mode is selected, the detection mode switch connects E4 to E7 and grounds E5 and E14. This places +5V on the LSB select line, disables the IF bandwidth switches and fixes the BFO at 455 kHz.

3-186. When the ISB mode is selected, the detection mode switch connects E4 to E11, E9 to E10, and opens the normal connection between E10 and E13. Connecting E4 to E11 places +5V on the ISB select line to A4. In all other modes, the combined audio line is supplied to both audio amplifiers on A10A2, via E9 and E3. In the ISB mode, the combined audio line to A10A2E9 is replaced by the ISB/LSB audio line, via the E9-E10 connection. Therefore, the USB audio is supplied to A10A2 headphone amplifier U1A via the combined audio line, and the LSB audio is supplied to amplifier U1B.

3-187. MANUAL TUNING MODULE (A7). The Manual Tuning Module controls the direction and rate of change of the tuned frequency. This module connects to the Manual Tuning Up/Down Counter (A6A1) and is mounted behind the receiver's front panel. The Manual Tuning Module consists of two parts: the Encoder Assembly and the Tuning Resolution switches. The schematic diagram of this module can be found in sheet 5 of F0-1.

3-188. TUNING RESOLUTION (A7A1). The Tuning Resolution switches select the desired tuning step to be used. The tuning steps are: 10 Hz, 100 Hz, 1 kHz, and 10 kHz. Switching is accomplished by connecting the desired tuning step to the step select switch line (+5V) of the Manual Tuning Up/Down Counter board (A6A1).

3-189. When the 10 Hz button is depressed, E2 (10 Hz step line) connects to E16 (+5V) and all digits are available for tuning. When the 100 Hz button is depressed, E10 (the 100 Hz step line) connects to E16 (+5V). The 10 Hz digit is locked to the frequency indicated when the 100 Hz button was engaged, while all other digits are available for tuning. When the 1 kHz button is depressed, E12 connects to E16, thus the five most significant digits of the readout can be varied by the tuning knob. The two least significant digits will be locked to the frequency indicated when this button is engaged. When the 10 kHz button is selected, E8 connects to E16 and only the four most-significant digits of the readout can be varied by the tuning knob. The 1 kHz, 100 Hz, and 10 Hz digits will be locked to the frequency indicated when the 10 kHz button is engaged.

3-190. When the tuning disable button is engaged, the receiver locks to the frequency currently being displayed, any other tuning button will be released, and manual tuning is disabled. In receivers with the remote control option, depressing the tuning button enables remote control operation.

3-191. ENCODER ASSEMBLY (A7U1). This assembly converts tuning knob rotation to digital pulses for the Manual Tuning Up/Down Counter. When the tuning knob is turned, each of the two output lines from the encoder (DIR and CLK) will swing repeatedly between approximately +5V and 0V. If the knob is rotated at constant speed, these two outputs will appear as trains of square waves. Due to the internal mechanics of the encoder, the transitions of these two wave trains will be staggered in time with respect to each other. When the knob is rotated clockwise to increase tuned frequency, the square wave on the direction line will appear to lead that on the clock line as shown in figure 3-27. The action of the up/down counter depends on the level of its up/down input at the instant its clock line goes high. The level of the up/down input at any other time has no effect. Therefore, clockwise rotation causes the counter to count up and the tuned frequency to increase.

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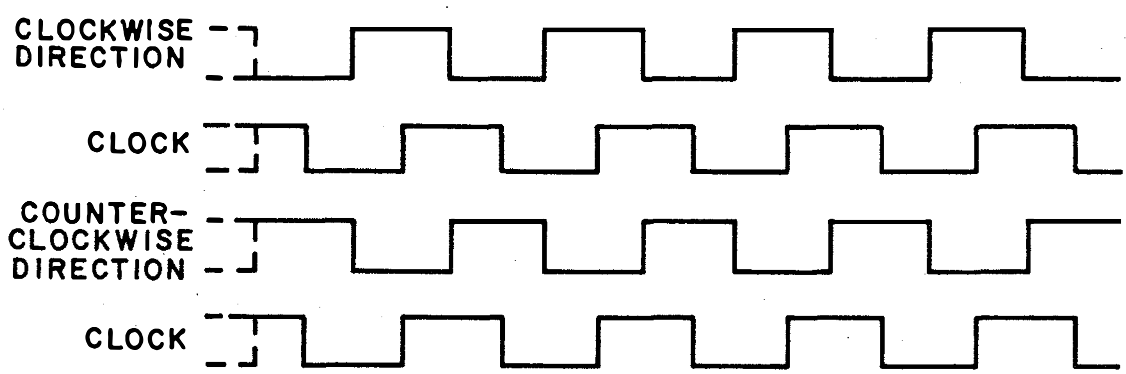

Figure 3-27. Encoder Assembly Timing Diagram

3-192. If the tuning knob is rotated counterclockwise, the sequence of outputs is reversed; the direction square wave lags the clock square wave. In this case the direction line will be low when the clock line swings high causing the counter to count down, reducing the tuned frequency.

3-193. The two outputs of the encoder go through approximately 120 cycles per revolution of its input shaft. This causes a tuning step for roughly each 3° of knob rotation.

3-194. The encoder assembly uses infrared optics to accomplish its internal functions. It is not considered a repairable assembly.

3-195. FREQUENCY DISPLAY (A8). The Frequency Display accepts the multiplexed information from the Manual Tuning Up/Down Counter via connector J2 (see sheets 4 and 5 of F0-1) and displays it on seven LED's on the front panel. The schematic diagram for this circuit is shown in F0-21. U1 to U7 are the seven segment common-cathode LED displays. All segments of each display are connected in parallel to the corresponding outputs of U8, a BCD to seven-segment decoder/driver. U8 accepts a BCD word on its A, B, C and D inputs, converts it to a seven-segment equivalent, and places the information on its a to g outputs. The outputs are internally current limited to provide about 50 mA so that external resistors are not needed. To turn a particular digit on, its common cathode input must be logic low. This selection is provided by U9, a binary to octal decoder. It accepts the Q0 to Q2 data on its A, B, and C inputs and places a high on the Q output with the equivalent binary value. U10 is an eight-section buffer inverter, capable of providing up to 500 mA of sink current.

3-196. The Up/Down Counter places digit display information into the A, B, and C inputs of U9. BCD information enters the A,

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B, C and D lines of U8. In U8, this information is decoded into a seven-segment number and sent to all the LED's. U9 enables only one display at a time as commanded by its input information. Since the rate of change is 2 kHz, each digit is refreshed every 4 msec (2 kHz/8). This flicker rate is undetectable by the human eye.

3-197. Transistor Q1 is used for the intensity control. It is connected as a pass transistor from the unregulated 10V to the supply voltage of U8. As the supply voltage of U8 is increased the current delivered to the LEDs will increase, giving more intensity. R1, R2, and R4 are a voltage divider which bounds the emitter voltage of Q1 between about 4.5V and 7V.

3-198. The decimal point, CR1, is always on, receiving its current from Q1 through resistor R3.

3-199. BFO SWITCH (A9). The BFO Switch schematic diagram can be found in sheet 5 of the main chassis schematic diagram F0-1. Three thumbwheel switches provide a BFO variation of ±8.9 kHz from 455 kHz. The +, 0, -, thumbwheel provides the direction of offset, the second thumbwheel varies in range from 0 to 8, and the third thumbwheel varies in range from 0 to 9. A '0' setting of the direction thumbwheel causes the BFO to return automatically to 455 kHz (regardless of the other thumbwheel settings). The truth table for these switches is given in table 3-11.

3-200. FRONT PANEL CONTROL (A10). The Front Panel Control consists of the Upper and Lower Panel Control boards joined by a 40-pin ribbon connector. This connector is attached to the Front Panel Interconnect (A6A2) and controls the manual selection of detection mode, gain mode, meter mode, IF bandwidth, RF gain, and headphone levels. Signals for the phone outputs also connect to the lower panel control through the Front Panel Interconnect. The functions of the IF bandwidth and detection mode switches are described in paragraphs 3-172 through 3-186.

a. Upper panel control (A10A1). The Upper Panel Control allows selection of detection mode, gain mode, and meter mode. Each gang of switches mechanically operates to allow only one pushbutton to be depressed at any time. All control lines connect to the Front Panel Interconnect card. The schematic diagram for this circuit is shown in sheet 5 of F0-1.

b. Lower panel control (A10A2). The Lower Panel Control allows selection of IF bandwidth and variation of RF gain and phone level potentiometers. The schematic diagram for this circuit is shown in sheet 5 of F0-1. This card also contains the amplifiers to drive the headphone outputs. The amplifiers operate independently. They receive the same signal in all detection modes except ISB. In this mode, amplifier U1A receives the upper sideband information while U1B receives the lower sideband information. No damage will be done to the amplifiers when using mono headphones; however, LSB in the ISB mode will not be monitored.

3-201. POWER SUPPLY SECTION. Refer to the main chassis schematic diagram, sheet 2 of F0-1. The receiver may be operated from either 110 Vac ±15% or 220 Vac ±15%. The input voltage feeds Power Input Filter Assembly (A13), for initial filtering. The two filter output lines each pass through fuses (F1 and F2), the Power ON/OFF switch S1 (one switch in each line) and the voltage selector switches, S3 and S4, before driving power transformer T1. S3 is used to select 115 Vac/230 Vac while S4 is used to select HI/LO for the input line voltage. T1 has a dual primary and two center-tapped secondaries, with 34 Vac across pins 9-11 and 16 Vac across pins 6-8.

a. Power Distribution (A1). The 34 Vac enters this board and is full-wave rectified by A1CR1, CR2, CR3, and CR4. The voltage is then filtered by A1C1 and A1C2 and sent to regulators U1, U2 and U4. The 16 Vac is rectified by CR1 and CR2, which are located on the back of the chassis, and applied to the Distribution board to be filtered by A1C3 and A1C4 to become a +10 V unregulated supply.

b. Power Supply Regulators. U1 and U2 are located on the back of the chassis and

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Table 3-11. Data Selector 14512, Digit Control Codes

Q_2	Q_1	Q_0	2^3 2^2 2^1 2^0
0	0	0	10^1 Digit
0	0	1	10^2 Digit
0	1	0	10^3 Digit
0	1	1	10^4 Digit
1	0	0	10^5 Digit
1	0	1	10^6 Digit
1	1	0	10^7 Digit
1	1	1	All Low

provide regulated +15 Vdc and -15 Vdc, respectively. These two voltages are supplied to most of the circuits in the receiver. The unregulated 10 Vdc, with its unregulated ground, connects to U3, a +5 Vdc regulator located on the back of the chassis. U3 supplies +5 Vdc to the BFO and 2nd LO Synthesizers, the Up/Down Counter board, and the Front Panel Interconnect card. The unregulated 10 Vdc also connects to A5U1 and A5U2, which are +5 Vdc regulators for the 1st and 3rd LO Synthesizers. The regulators all have internal protection from thermal and current overload. U1 and U2, on the rear panel, will automatically shut down when current exceeds 1 A. Similarly, U3 on the rear panel will shut down when current exceeds 3 A. U4, located on the bottom side of the power supply compartment baseplate, provides regulated +12 Vdc for the Audio Amplifier (A4A10). The unregulated input to U4 also goes to activate the front panel Elapse Time meter (M2) when power is turned on. U4 will shut down when current exceeds 0.5A.

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CHAPTER 4

SCHEDULED MAINTENANCE

4-1. INTRODUCTION. This chapter covers the scheduled maintenance procedures for the AN/URR-74(V)2 Radio Receiver. These recommended procedures should be carried out in order to promote long component life and fault-free operation. The procedures include both operator and performance checks, cleaning and lubrication procedures, and routine checks for damage or wear. Data contained herein covers, in order, recommended periodicity of actions, procedures for basic checks, and scheduled performance checks that are to be accomplished by qualified technicians.

NOTE

The scheduled maintenance instructions in this manual are cancelled when the Planned Maintenance System (PMS) is implemented for this equipment aboard your ship or station.

4-2. SCHEDULED MAINTENANCE ACTION INDEX. This index, contained in table 4-1, shows all actions deemed necessary to complete the scheduled maintenance, the recommended performance intervals, and reference to appropriate sections of the manual containing maintenance details.

4-3. PREVENTATIVE MAINTENANCE PROCEDURES.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Lubrication. The optical encoder assembly shaft requires periodic lubrication to prevent excessive wear. The other rotating assemblies in the receiver are sealed and do not require lubrication. There are no other parts of the receiver that require lubri-

Table 4-1. Maintenance Action Index

Periodicity*	Maintenance Action	Reference
M	Lubrication	Paragraph 4-3.a
	Cleaning	Paragraph 4-3.b
	Inspection for damage or wear	Paragraph 4-3.c
S	Performance tests	Paragraph 4-4
	Adjustment/Alignment	Chapter 6, Section I

*M = monthly
*S = semi annually

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cation.To lubricate the encoder assembly shaft, perform the following steps:

CAUTION

Excessive lubrication of the encoder shaft may destroy the optical characteristics of the encoder wheel.

(1) Place the receiver in a vertical position and remove the encoder knob.

(2) Apply one drop of (SAE 5W-20W, Federal Spec. No._____, Stock No.___) oil to the encoder shaft at the retaining ring.

(3) Reassemble the encoder assembly knob and rotate the knob several times to distribute the lubricant.

This function may be accomplished by any qualified operator of the equipment.

b. Cleaning. Cleaning should be performed to remove accumulated dust, grease, and other contamination, and to ensure trouble-free operation.

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, zylene, acetone, or similar solvents. These chemicals may damage the plastics used in this receiver.

(1) Exterior. Dust the cabinet with a soft cloth. Dust the front panel controls with a small soft-bristled paint brush. Dirt clinging to the cabinet may be removed with a clean, lint-free cloth dampened with a mild detergent and water solution. Avoid using abrasive cleaners. They will scratch the front panel.

(2) Interior. Dust in the interior of the unit should be removed before it builds up enough to cause arcing and short circuits during periods of high humidity. The interior of the receiver is accessed by removing the top and bottom covers. Dust is best removed by dry, low-pressure air. Dirt clinging to surfaces may be removed with a soft-bristled paint brush or a clean, lint-free cloth dampened with a mild detergent and water solution. Use a cotton-tipped applicator for cleaning in narrow spaces and on the circuit boards.

(3) Switch contacts. When maintenance is necessary due to accumulated dirt and dust on the contacts, observe the following precautions: Clean the switch contacts with isopropyl alcohol (Federal Spec. No.___, Stock No.___) or a mild detergent solution. Avoid cleaning solutions containing benzene, acetone, or similar solvents.

This function may be accomplished by any Electronic Technician Third Class or above.

c. Inspection for Damage or Wear.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

Many potential or existing faults can be detected by making a visual inspection of the unit. For this reason, a complete visual inspection should be made on a routine basis and whenever the receiver is inoperative. At a minimum, the following items should be visually inspected.

(1) Inspect the equipment covers and front panel for condition of finish and panel markings.

(2) Inspect for dents, punctures, or warped areas.

(3) Inspect quarter-turn fasteners and receptacles.

(4) Inspect the external surfaces for loose or missing screws or washers.

(5) Inspect the receptacles for conditions of pins, contacts, and mountings.

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(6) Inspect the internal components for signs of deterioration, discoloration, or charring. Check for melted insulation and damaged, cracked, or broken components.

(7) Inspect the printed circuit boards for damaged tracks, loose connections, corrosion, or other signs of deterioration.

(8) Inspect the PC connectors, interface connectors, and chassis wiring for excessive wear, looseness, misalignment, corrosion, or other signs of deterioration.

This function may be accomplished by any Electronic Technician Third Class or above.

4-4. SCHEDULED PERFORMANCE TESTS. The performance tests determine if the receiver operates in all detection modes, gain modes and IF bandwidths. These tests should be used for initial inspection, periodic operational checks, or to confirm performance standards after repairs have been made. Only technicians of the prescribed rating or above should perform the tests. Tests should be carried out using the prescribed equipment or authorized substitute only. If a receiver fault is encountered as a result of conducting a given test, refer to the appropriate referenced section of Chapter 5 for troubleshooting procedures.

a. Procedure Guidelines.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

When conducting the performance tests the technician shall comply with the following provisions:

(1) Read each paragraph and test procedure carefully before attempting to perform the test.

(2) All tests are to be performed under the following environmental conditions unless otherwise specified:

Temperature:	$+25^{\circ}$ C $\pm 5^{\circ}$ C ($+77^{\circ}$ F $\pm 9^{\circ}$ F)
Altitude:	Room ambient
Humidity:	Room ambient

(3) Allow a minimum of 30 minutes warm-up time for test equipment prior to performing any of the tests.

(4) All inputs to and outputs from the equipment under test which are not used during a particular test are to be terminated with their characteristic impedances.

(5) All equipment covers shall be in place unless a particular test requires their removal.

(6) The tests should be performed in the order given. If a receiver problem is noted, refer to Chapter 5 for troubleshooting information.

b. Operator Performance Test.

(1) Test equipment required. None.

(2) Technician rating required. Any qualified operator may conduct this test.

(3) Set up data. Set receiver front panel controls as follows:

(a) RF Gain - Maximum Counterclockwise.

(b) Phone Level - Maximum Counterclockwise

(c) IF Bandwidth kHz - 16*

(d) BFO Offset - +0.0

(e) Detection Mode - AM*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

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(f) Gain Mode - MAN*

(g) Meter - SIGNAL STRENGTH*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) The Frequency Display should illuminate almost instantly. Display intensity should be bright and uniform.

(c) Depress the 10 Hz tuning rate button. Note the appearance of the green indicator in the pushbutton. Rotate the Tuning Knob until the 10 Hz Frequency Display digit (the furthest right-hand number on the display) reads 0.

(d) Depress the 100 Hz tuning rate button. Note the appearance of the green indicator in the pushbutton. Rotate the Tuning Knob until the 100 Hz Frequency Display digit (the second number from the right on the display) reads 0.

(e) Depress the 1 kHz tuning rate button. Note the appearance of the green indicator in the pushbutton. Rotate the Tuning Knob until the 1 kHz Frequency Display digit (the third number from the right) reads 0.

(f) Depress the 10 kHz tuning rate button. Note the appearance of the green indictor in the pushbutton. Rotate the Tuning knob until all the remaining Frequency Display digits read 0.

(g) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch. Note that the pushbutton indicator changes to black and that the Frequency Display goes off.

(5) Corrective actions. If the receiver did not operate properly, refer to the Troubleshooting Index, table 5-1, for corrective procedures.

c. IF Gain and Bandwidth Test.

(1) Test equipment required. This test will utilize a signal generator, an RF voltmeter and a 50 Ω RF probe. Specifics are set forth in table 6-1.

(2) Technician rating required. An Electronic Technician Second Class or above should perform this test.

(3) Set up data. The test equipment should be connected to the receiver as shown in figure 4-1.

(a) Set the Signal Generator output frequency to 15.00500 MHz unmodulated and output level to -103 dBm.

(b) Set the RF Voltmeter to -20 dBm range.

(c) Set the receiver controls as follows:

1 RF Gain - Maximum Clockwise
2 Phone Level - Maximum Counterclockwise
3 IF Bandwidth kHz - 16*
4 Detection Mode - AM*
5 Gain Mode - MAN*
6 Meter - SIGNAL STRENGTH*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) Select the appropriate tuning rate buttons and use the Tuning Knob to tune the receiver to 15.00500 MHz.

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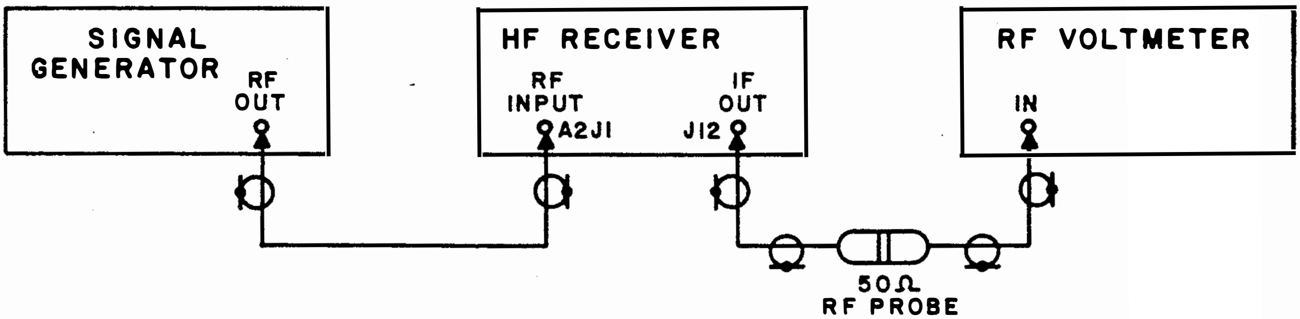

Figure 4-1. IF Gain and Bandwidth Performance, Test Setup

(c) The Signal Strength meter should indicate a reading of 1/4 to 1/2 full scale and the RF Voltmeter should indicate -21 dBM ±2 dBm.

(d) Depress the IF Bandwidth kHz 6, 3.2, 1.0 and .3 pushbuttons in succession. For each bandwidth, the RF voltmeter should indicate -21 dBm ±2 dBm.

(e) Set the generator output frequency to 15.00650 MHz. Depress the Detection Mode USB button. The RF voltmeter should indicate -21 dBm ±2 dBm.

(f) Set the generator output frequency to 15.00350 MHz. Depress the Detection Mode LSB button. The RF voltmeter should indicate -21 dBm ±2 dBm.

(g) Disconnect the signal generator from the RF Input Jack, A2J1, and connect a 50 Ω termination to A2J1.

(h) Depress the Detection Mode AM switch and the IF Bandwidth kHz 16 switch. The RF voltmeter should indicate -38 dBm ±2 dBm.

(i) Depress the IF Bandwidth kHz 6 switch. The RF voltmeter should indicate -42 dBm ±2 dBm.

(j) Depress the IF Bandwidth kHz 3.2 switch. The RF voltmeter should indicate -45 dBm ±2 dBm.

(k) Depress the Detection Mode USB switch and then the LSB switch. The RF voltmeter should indicate -45 dBm ±2 dBm for both modes.

(l) Depress the Detection Mode AM switch and the IF Bandwidth kHz 1.0 switch. The RF voltmeter should indicate -50 dBm ±2 dBm.

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(m) Depress the IF Bandwidth kHz 0.3 switch. The RF voltmeter should indicate -55 dBm ±2 dBm.

(n) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch and disconnect the test equipment.

(5) Corrective actions. If the receiver fails to meet the parameters specified, refer to the Troubleshooting Index, table 5-1, for corrective procedures.

d. Signal-to-Noise Ratio Test.

(1) Test equipment required. This test will utilize a signal generator, an RF voltmeter, and a 50 Ω RF probe. The equipment required is identical to that specified in paragraph 4-4.c.(1) above.

(2) Technician rating required. An Electronic Technican Second Class or above should perform this test.

(3) Set up data. The test equipment should be connected to the receiver as shown in figure 4-1.

(a) Set the signal generator output frequency to 29.99990 MHz unmodulated and output level to -103 dBm.

(b) Set the RF voltmeter to the -20 dBm range.

(c) Set the receiver controls as follows:

1 RF Gain - Maximum Clockwise

2 Phone Level - Maximum Counterclockwise

3 IF Bandwidth kHz - 6*

4 Detection Mode - AM*

5 Gain Mode - MAN*

6 Meter - SIGNAL STRENGTH*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) Select the appropriate tuning rate buttons and the the Tuning Knob to tune the receiver to 29.99990 MHz.

(c) Record the IF Output Level indicated on the RF voltmeter (-21 dBm).

(d) Turn the signal generator RF ON/OFF switch to the OFF position.

(e) The reading on the RF voltmeter should decrease by at least 10 dB.

(f) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch and disconnect the test equipment.

(5) Corrective actions. If the receiver fails to meet the parameters specified, refer to table 5-1 for corrective procedures.

e. Detection Mode Test.

(1) Test equipment required. This test will utilize a signal generator, voltmeter, a dual-trace oscilloscope, headphones, and two 600 Ω resistors. Specifics are set forth in table 6-1.

(2) Technician rating required. An Electronic Technician Second Class or above should perform this test.

(3) Set up data. The test equipment should be connected to the receiver as shown in figure 4-2.

(a) Set the signal generator output frequency to 15.00500 MHz and output level to -97 dBm. Set the generator for 50% AM modulation at 400 Hz.

(b) Set the voltmeter to the 50 Vac range.

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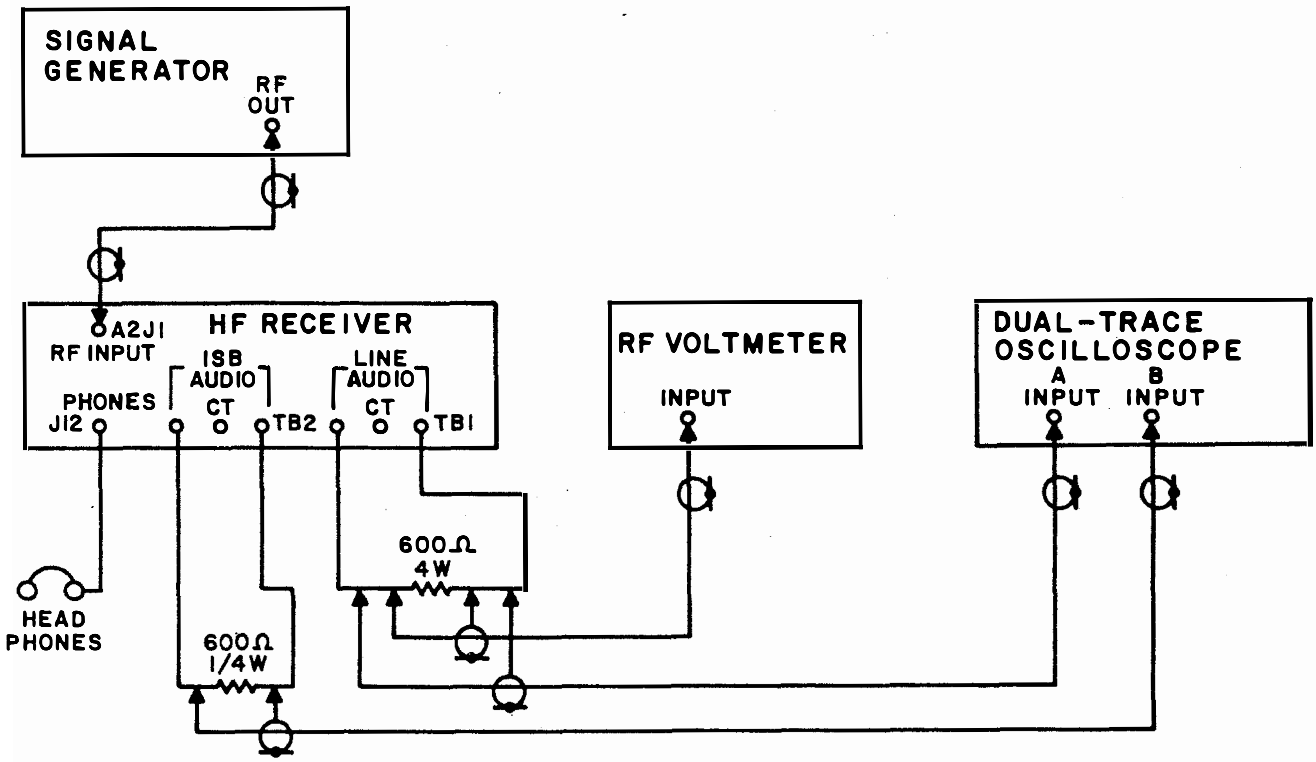

Figure 4-2. Detection Mode Performance, Test Setup

(c) Set the oscilloscope to display the A vertical input.

(d) Set the receiver controls as follows:

1 RF Gain - Maximum Clockwise

2 Phone Level - Maximum Counterclockwise

3 Line Audio - Maximum Counterclockwise

4 IF Bandwidth kHz - 6*

5 Detection Mode - AM*

6 Gain Mode - MAN*

7 Meter - LINE AUDIO*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) Select the appropriate tuning rate buttons and use the Tuning Knob to tune the receiver to 15.00500 MHz.

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(c) Rotate the PHONE LEVEL control clockwise until a 400 Hz tone is heard in the headpones at a comfortable listening level. The tone should be clear and distinct, and free from noise, hum, and other signal distortions.

CAUTION

Line Audio output levels in excess of 24.5 Vac (with Attenuator A11 OFF) may cause damage to the receiver and/or the 600 Ω load resistor. With A11 ON levels must not exceed 0.774 Vac.

(d) Rotate the LINE AUDIO control (R1 on rear panel) clockwise until the voltmeter indicates 24.5 Vac (with Attenuator A11 OFF) or 0.774 Vac (with Attenuator ON). The oscilloscope should show a clean sine wave with no evidence of clipping or distortion.

(e) Turn off the signal generator modulation.

(f) Depress the Detection Mode CW and IF Bandwidth kHz 1.0 buttons. Set the BFO Offset to +0.4. A clear, distinct 400 Hz tone should be heard in the headphones.

(g) Set the signal generator output frequency to 15.00540 MHz. Depress the Detection Mode USB button. A clear, distinct 400 Hz tone should be heard in the headphones.

(h) Set the signal generator output frequency to 15.00460 MHz. Depress the Detection Mode LSB button. A clear, distinct 400 Hz tone should be heard in the headphones.

(i) Depress the Detection Mode ISB button. A clear, distinct 400 Hz tone should be heard in the headphones.

(j) Depress the oscilloscope B vertical input button. The oscilloscope should display a clean sine wave of ~ 22 volts p-p (with Attenuator A12 OFF) or ~ 2.2 volts p-p (with Antenuator ON), with no evidence of clipping or distortion.

(k) Set the signal generator output frequency to 15.0050 MHz. Set the Generator Modulation to FM, modulation frequency to 400 Hz, and deviation to 4.8 kHz. Depress the IF Bandwidth kHz 16 and Detection Mode FM buttons. A clear, distinct 400 Hz tone should be heard in the headphones.

(l) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch and disconnect the test equipment.

(5) Corrective actions. If the receiver fails to meet the parameters specified, refer to the Troubleshooting Index, table 5-1, for corrective procedures.

f. Manual/Automatic Gain Control Test.

(1) Test equipment required. This test will utilize a signal generator, voltmeter, and a 600 Ω resistor. Specifics are set forth in table 6-1.

(2) Technician rating required. An Electronic Technican Second Class or above should perform this test.

(3) Set up data. The test equipment should be connected to the receiver as shown in figure 4-3.

(a) Set the signal generator output frequency to 15.00500 MHz and output level to -97 dBm. Set the generator for 50% AM modulation at 400 Hz.

(b) Set the voltmeter to the 50 Vac range.

(c) Set the receiver controls as follows:

1 RF Gain - Maximum Clockwise
2 IF Bandwidth kHz - 6*
3 Detection Mode - AM*
4 Gain Mode - MAN*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

Courtesy of http://BlackRadios.terryo.org

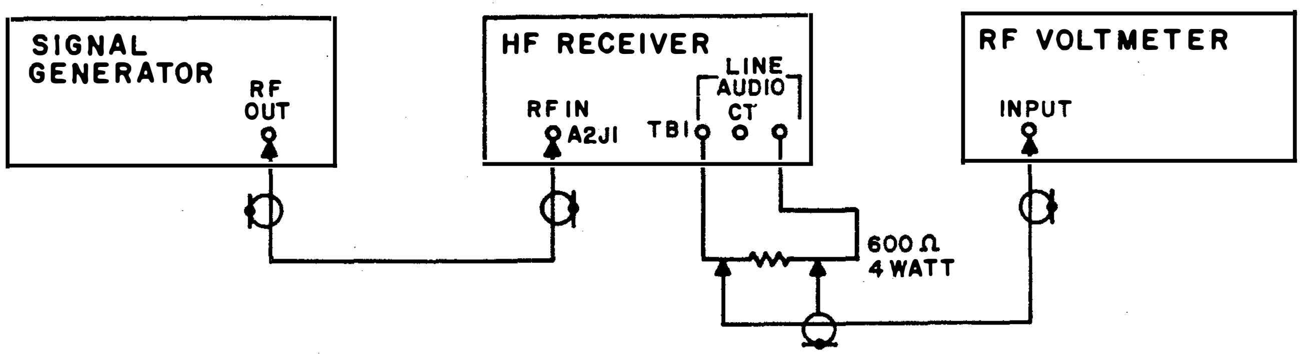

Figure 4-3. Manual/Automatic Gain Control Performance, Test Setup

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) Select the appropriate tuning rate buttons and use the Tuning Knob to tune the receiver to 15.00500 MHz.

CAUTION

Line Audio output levels in excess of 24.5 Vac (with Attenuator A11 OFF) may cause damage to the receiver and/or the 600 Ω load resistor. With A11 ON, levels must not exceed 0.774 Vac.

(c) Adjust the Line Audio control for an indication of 24.5 Vac (with Attenuator A11 OFF) or 0.774 Vac (with Attenuator ON) on the voltmeter.

(d) Turn the receiver RF Gain control fully counterclockwise.

(e) Increase the signal generator output level to +3 dBm.

(f) The voltmeter reading should be no greater than 24.5 Vac (with Attenuator A11 OFF) or no greater than 0.774 Vac (with Attenuator ON). Rotate the receiver RF Gain control clockwise until the voltmeter indicates 24.5 Vac. (A11 OFF) or 0.774 Vac (A11 ON).

(g) Decrease the signal generator output level to -97 dBm.

(h) Depress the Gain Mode FAST AGC pushbutton.

(i) Adjust the receiver Line Audio control for an indication of 12.25 Vac (with Attenuator A11 OFF) or 0.387 Vac with Attenuator ON, on the voltmeter.

(j) Increase the generator output level to +3 dBm. The reading on the voltmeter should be no greater than 24.5 Vac (with Attenuator A11 OFF) or no greater than 0.774 Vac (with Attenuator ON).

(k) Depress the Gain Mode SLOW AGC pushbutton. The reading on the voltmeter should not change.

(l) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch and disconnect the test equipment.

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(5) Corrective actions. If the receiver fails to meet the parameters specified, refer to table 5-1 for corrective procedures.

g. Frequency Tuning Test.

(1) Test equipment required. This test will utilize a signal generator and a frequency counter. Specifics are set forth in table 6-1.

(2) Technician rating required. An Electronic Technician Second Class or above should perform this test.

(3) Set up data. The test equipment should be connected to the receiver as shown in figure 4-4.

(a) Set the signal generator output frequency to 00.50001 MHz, unmodulated, and output level to -97 dBm.

(b) Set the frequency counter to provide 10 Hz resolution at a 1 sec sample rate.

(c) Set the receiver controls as follows:

1 IF Bandwidth kHz - 6*
2 Detection Mode - AM*
3 Gain Mode - FAST AGC*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

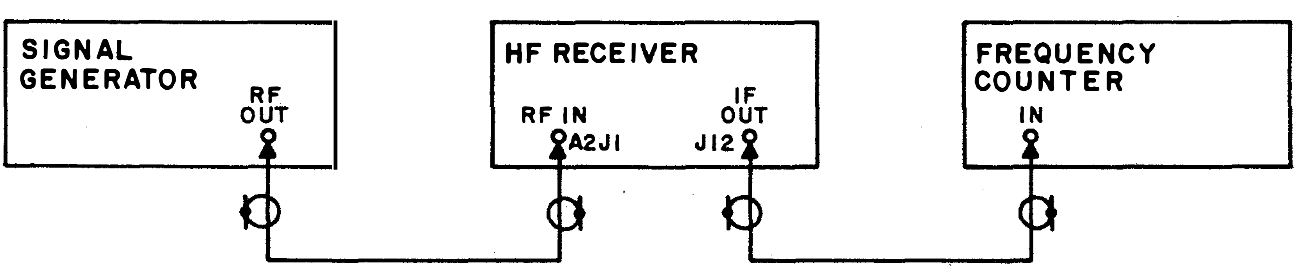

Figure 4-4. Frequency Tuning Performance, Test Setup

Courtesy of http://BlackRadios.terryo.org

(4) Procedures.

(a) Energize the receiver by depressing the POWER PUSH ON/OFF switch. Note the appearance of the red indicator in the pushbutton.

(b) Select the appropriate tuning rate pushbuttons and use the Tuning Knob to tune the receiver to 00.50001 MHz. The frequency counter should indicate an IF output frequency of 455.00 kHz ±0.10 kHz.

(c) Increase the signal generator output frequency to 29.99999 MHz.

(d) Tune the receiver to 29.99999 MHz. The frequency counter should indicate an IF output frequency of 455.00 kHz ±0.10 kHz.

(e) Deenergize the receiver by depressing the POWER PUSH ON/OFF switch and disconnect the test equipment.

(5) Corrective actions. If the receiver fails to meet the parameters specified, refer to table 5-1 for corrective procedures.

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CHAPTER 5

TROUBLESHOOTING

5-1. INTRODUCTION. This chapter contains procedures for locating malfunctions within the URR-74(V)2 radio receiver. Troubleshooting instructions are provided for isolating a malfunction, first to a module or the power supply and then for further isolation (within the module or power supply) to the component level. The instructions consist of detailed fault logic diagrams and step-by-step proceedures, as required. A troubleshooting index, a protective device index and power distribution and signal flow diagrams are also provided to assist the technician in his efforts. References are made to schematic diagrams, components location diagrams and other areas of the manual appropriate to each troublshooting procedure.

5-2. TROUBLESHOOTING INDEX. This index, presented in table 5-1, will provide reference to the technician to appropriate procedures used to troubleshoot a specific functional area. It also references functional description and alignment/adjustment information pertinent to the functional areas being investigated.

5-3. PROTECTIVE DEVICE INDEX. This index is presented in table 5-2.

5-4. MAINTENANCE TURN ON PROCEDURES. To energize the receiver for troubleshooting follow the procedures in table 5-3.

5-5. TROUBLESHOOTING PROCEDURES.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

Perform troubleshooting in the following sequence:

a. Perform maintenance turn on procedure (table 5-3).

b. Perform receiver overall troubleshooting procedures to isolate fault to a funcitonal area (figure 5-1).

c. Troubleshoot functional area to isolate fault to the power supply or a module (figure 5-2 through 5-8).

d. Troubleshoot power supply or module to isolate fault to component (paragraphs 5-9 through 5-29).

e. Peform necessary repair and adjustments/alignment in accordance with procedures of Chapter 6.

5-6. ACCESS FOR TROUBLESHOOTING. The receiver is accessed by removing the top and bottom covers. Refer to Chapter 7 for location of modules and components. PC board circuitry may be accessed, while energized, by use of one or both of the extender cards, type 791647-1 and -2. Both cards are identical, except that one of the cards has a card puller and alignment tool attached.

5-7. RECEIVER OVERALL TROUBLESHOOTING. Figure 5-1 is the receiver overall troubleshooting fault logic diagram. This gives the sequence for performing the performance tests detailed in Chapter 4. When a fault is detected during this sequence (in a functional area), this diagram indicates the next fault logic diagram to follow to continue troubleshooting. The troubleshooting index, in table 5-1, also indicates the next logic diagram to follow for a fault in a particular functional area.

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Table 5-1. Troubleshooting Index

Functional Area	Troubleshooting Diagram, (figure no.)	Functional Description Paragraph	Alignment/ Adjustment Paragraph
Frequency display	5-2	3-16.d, 3-195	-
IF output, all band-widths	5-3	3-13, 3-27 through 3-44	6-5, 6-6.a, 6-6.b 6-6.c, 6-6.d
IF output, USB/LSB	5-4	3-13, 3-39 through 3-44	6-6.d
IF noise output, all bandwidths	5-4	-	-
Signal-to-noise ratio	5-5	3-20 through 3-26	6-5
AM detection	5-5	3-13, 3-44 through 3-46, 3-61 through 3-65	6-6.b
Line audio output	5-5	3-61 through 3-65	-
CW detection	5-6	3-44 through 3-46, 3-57 through 3-60	6-6.b, 6-6.f, 6-7.f.
USB/LSB detection	5-7	3-44 through 3-46 3-57 through 3-71	6-6.d.
FM detection	5-7	3-44 through 3-46, 3-57 through 3-60	6-6.f.
Manual/Automatic gain control	5-8	3-47 through 3-56	-
Tuning per-formance	5-8	3-74 through 3-157	6-7.a through 6-7.f.

Courtesy of http://BlackRadios.terryo.org

Table 5-2. Protective Device Index

Reference Designation	Rear Panel Marking	Rating		Circuit Protected	Troubleshooting Diagram (Fig. no.)
		Volts	Amps		
F1*	F1	115	1(slow blow)	AC power input	5-9
F2*	F2	115	1(slow blow)	AC power input	5-9

* If equipment is to be operated from a 230 V source, both fuses should be changed for 1/2 amp, slow blow devices.

Table 5-3. Maintenance Turn On Procedures

Step	Observe	Reference
1. Preliminary Procedure. Ensure the power cord is attached and all con nectors on the rear panel are secure.	Connections made	
2. Power on. Depress POWER PUSH ON/OFF switch.	Red indicator appears in the pushbutton. Frequency display illuminates.	Paragraph 2-2.a.(4)
3. Functional check. Is the tuning knob operational?	Frequency Display	Paragraph 2-2.a(8)

Receiver is ready for further troubleshooting checks

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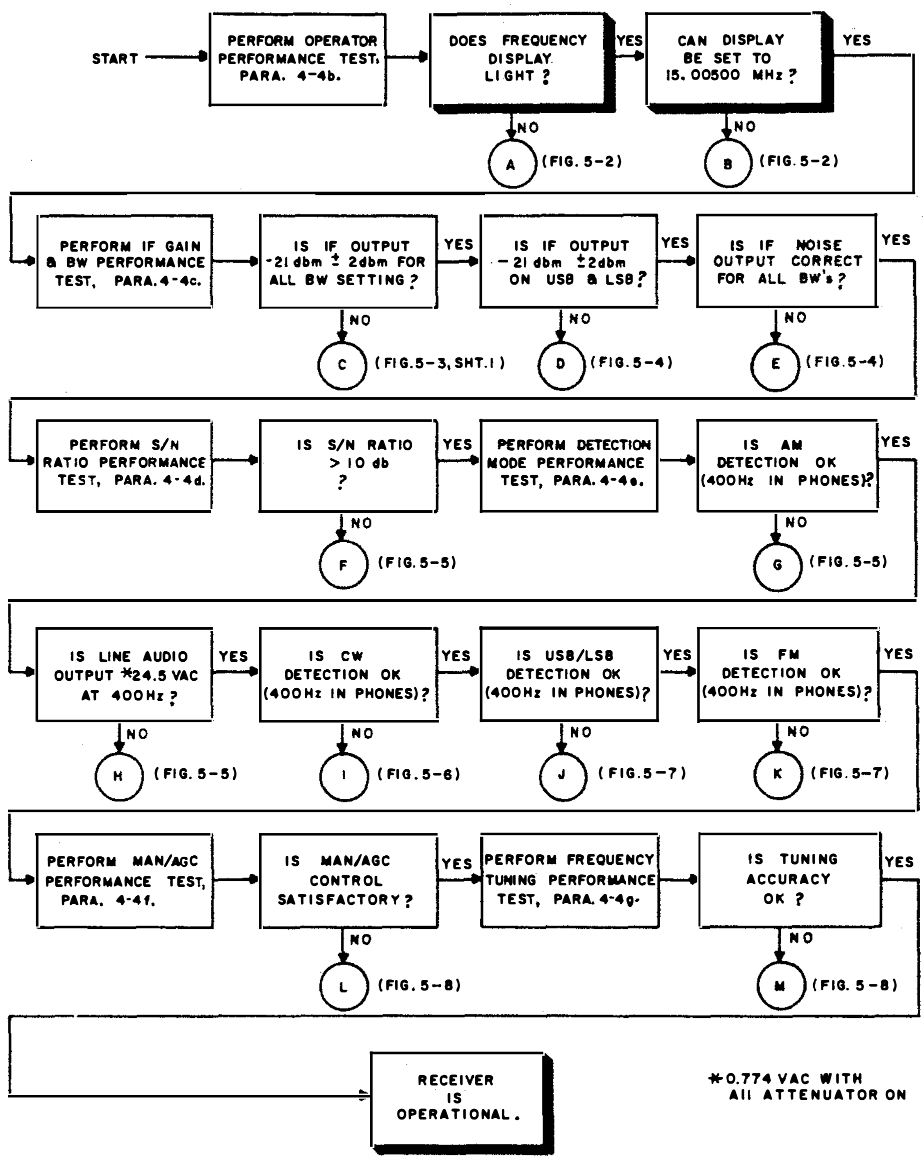


Figure 5-1. Receiver Overall Troubleshooting Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

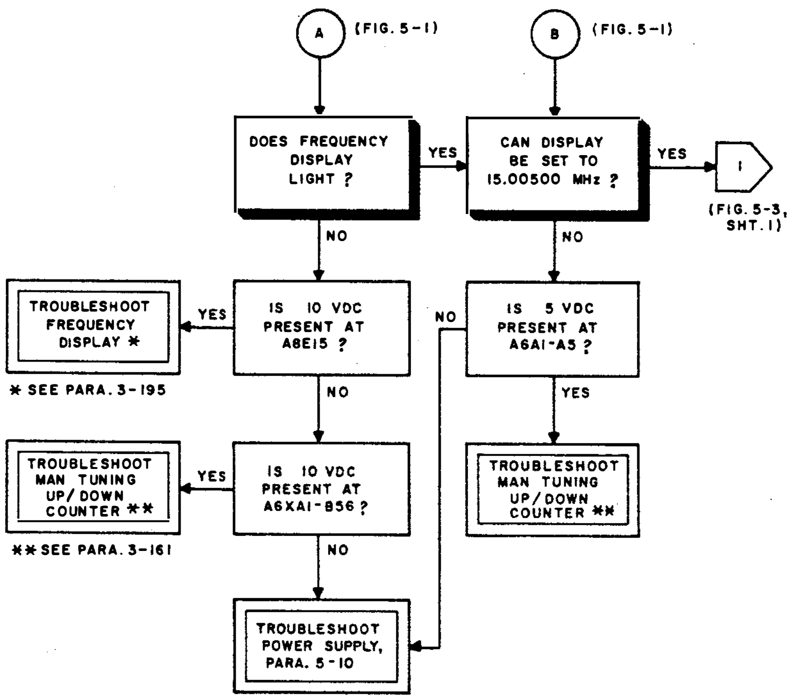
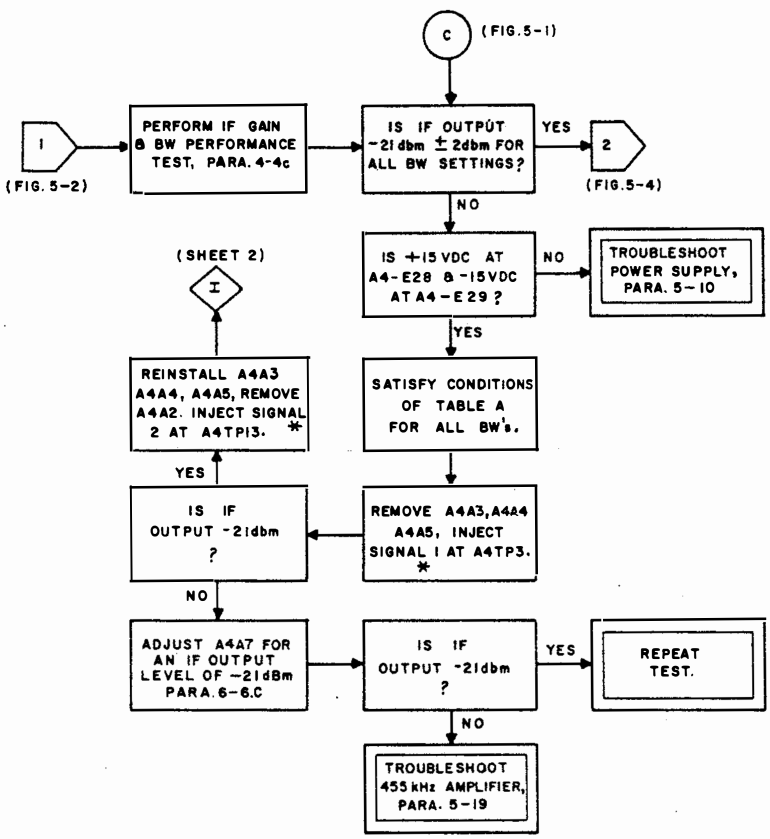


Figure 5-2. Troubleshooting Fault Logic Diagrams A and B

Courtesy of http://BlackRadios.terryo.org



* SIGNALS
1 — 455 kHz UNMOD AT -75 dBm
2 — 455 kHz UNMOD AT -84 dBm

** ON A4 MOTHERBOARD

TABLE A BW SWITCHING VOLTAGE

PIN**	16 kHz	6 kHz	3 kHz	1 kHz	.3 kHz
A1-15	+5	0	0	0	0
A1-17	0	+5	0	0	0
A1-19	0	0	+5	+5	+5
A3-15	+5	+5	+5	0	0
A3-17	0	0	0	+5	0
A3-19	0	0	0	0	+5

NOTE: TO RESOLVE INCORRECT VOLTAGE LEVELS, TROUBLESHOOT FRONT PANEL INTERCONNECT OR LOWER PANEL CONTROL.

Figure 5-3. Troubleshooting Fault Logic Diagram C (Sheet 1 of 3)

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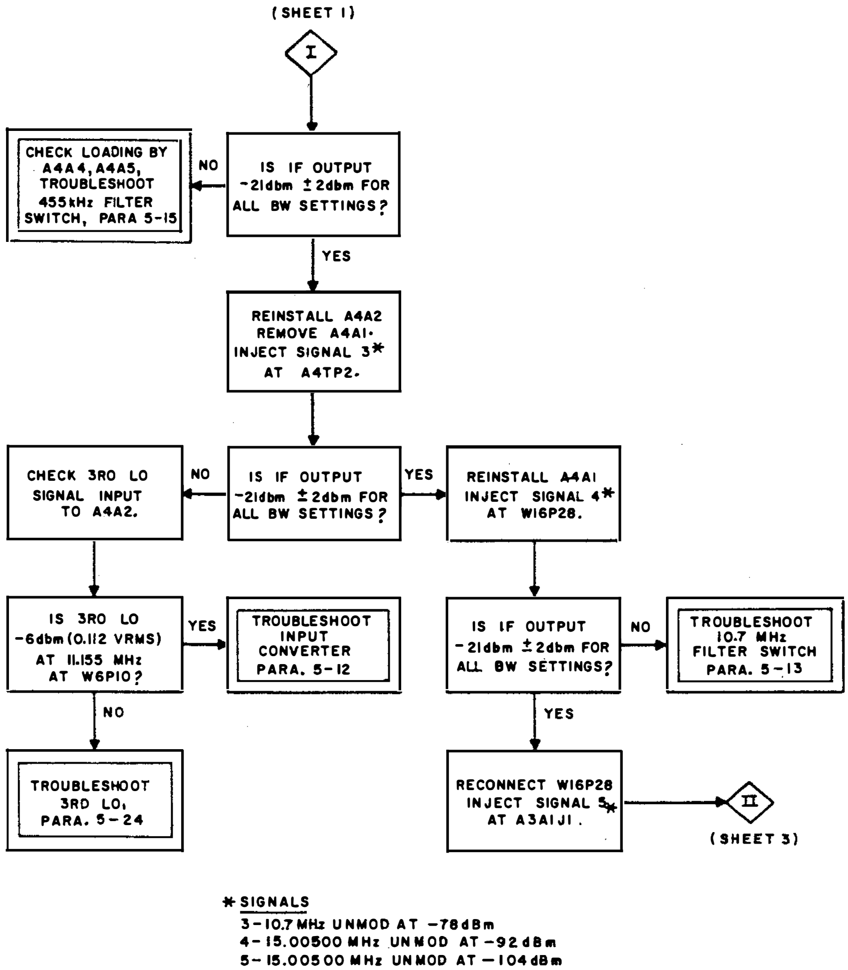

Figure 5-3. Troubleshooting Fault Logic Diagram C (Sheet 2 of 3)

Courtesy of http://BlackRadios.terryo.org

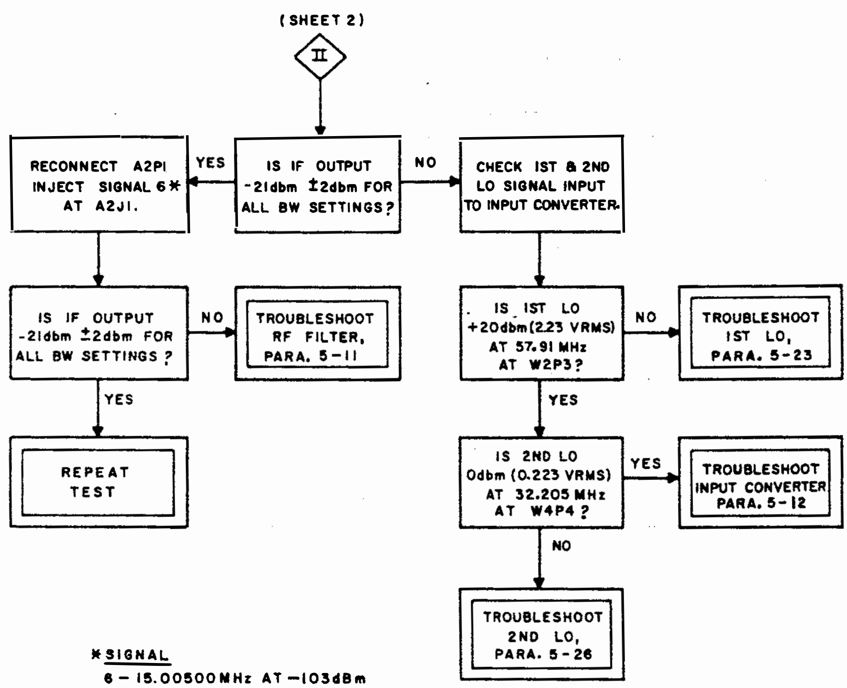

Figure 5-3. Troubleshooting Fault Logic Diagram C (Sheet 3 of 3)

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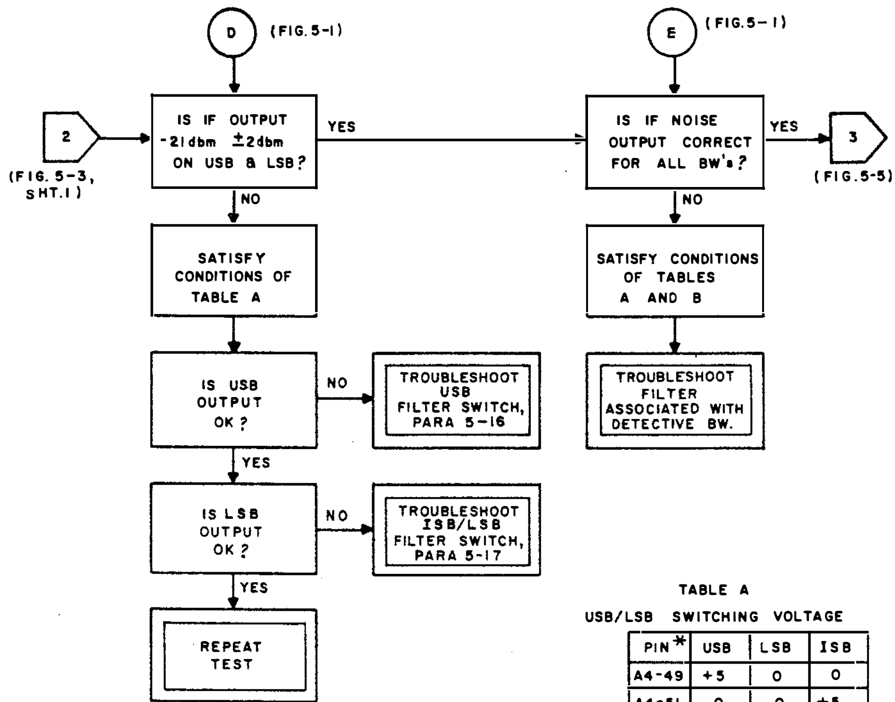

TABLE A

USB/LSB SWITCHING VOLTAGE

PIN*	USB	LSB	ISB
A4-49	+5	0	0
A4-51	0	0	+5
A5-49	0	+5	0
A5-51	0	0	+5

NOTE: TO RESOLVE INCORRECT VOLTAGE LEVELS, REFER TO FRONT PANEL INTERFACE TROUBLESHOOTING.

TABLE B BW SWITCHING VOLTAGE

PIN*	16 kHz	6 kHz	3 kHz	1 kHz	.3 kHz
A1-15	+5	0	0	0	0
A1-17	0	+5	0	0	0
A1-19	0	0	+5	+5	+5
A3-15	+5	+5	+5	0	0
A3-17	0	0	0	+5	0
A3-19	0	0	0	0	+5

* ON A4 MOTHERBOARD

NOTE: TO RESOLVE INCORRECT VOLTAGE LEVELS, TROUBLESHOOT FRONT PANEL INTERCONNECT OR LOWER PANEL CONTROL.

Figure 5-4. Troubleshooting Fault Logic Diagrams D and E

Courtesy of http://BlackRadios.terryo.org

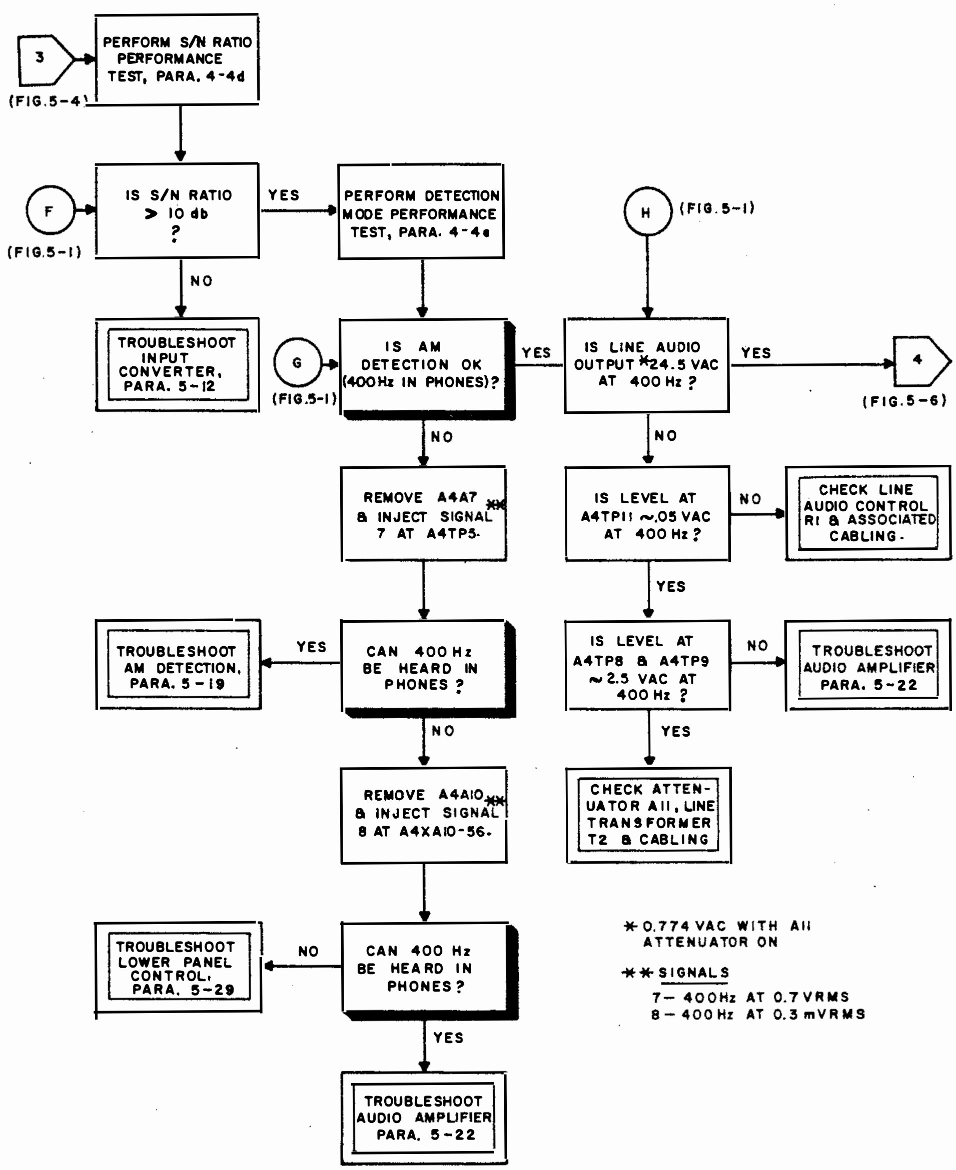

Figure 5-5. Troubleshooting Fault Logic Diagrams F, G and H

Courtesy of http://BlackRadios.terryo.org

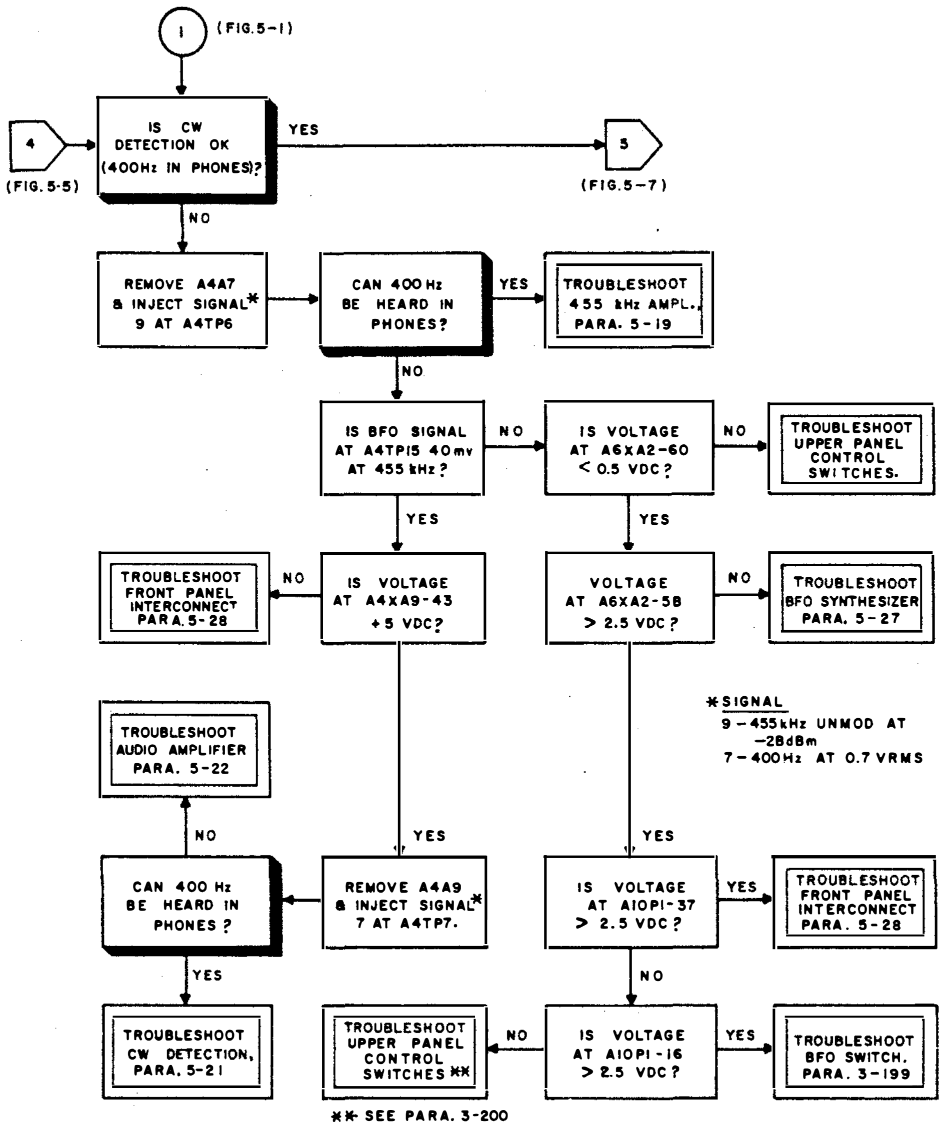

Figure 5-6. Troubleshooting Fault Logic Diagram I

Courtesy of http://BlackRadios.terryo.org

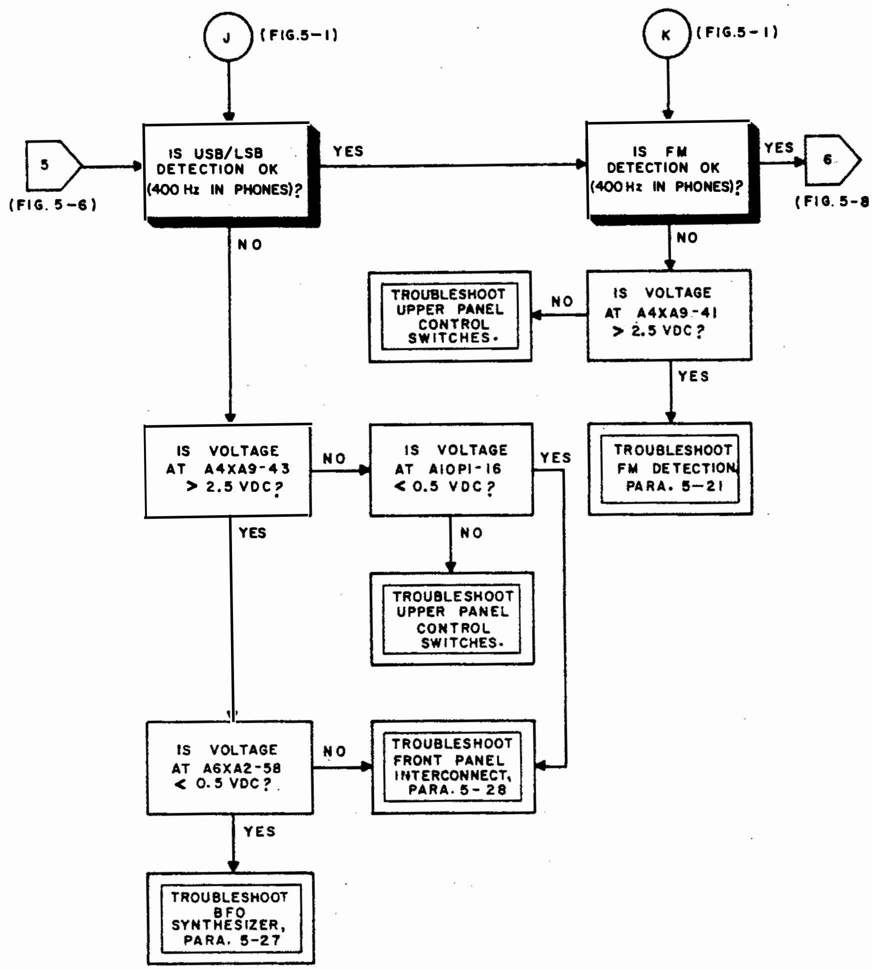

Figure 5-7. Troubleshooting Fault Logic Diagrams J and K

Courtesy of http://BlackRadios.terryo.org

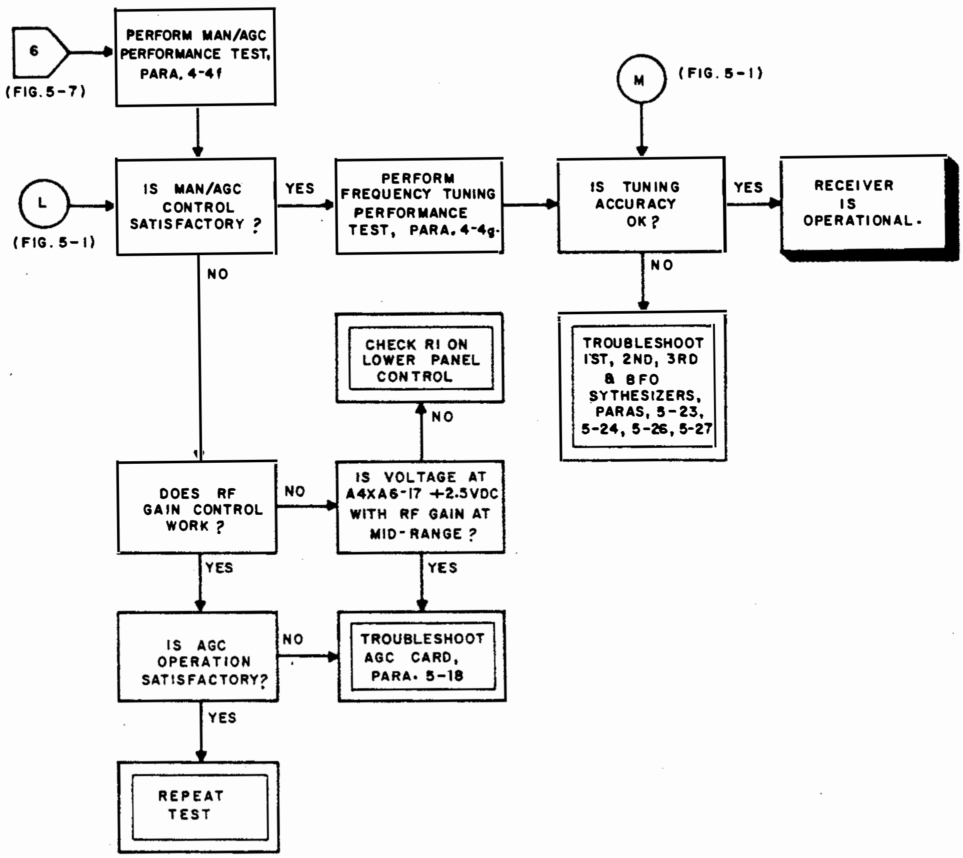

Figure 5-8. Troubleshooting Fault Logic Diagrams L and M

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Table 5-1 also indicates the location of pertinent functional descriptions and Alignment/Adjustment procedures for these areas.

5-8. TROUBLESHOOTING TO POWER SUPPLY OR MODULE. Figure 5-2 through 5-8 are the fault logic diagrams which contain procedures for isolating malfuctions to the power supply or a module. When a fault is isolated to the power supply or module, these diagrams indicate the next procedures to follow to further isolate the fault to the component level. Refer to table 5-1 for location of the pertinent functional descriptions. In addition, the items listed below are provided as aids in fault isolation.

a. FO-1, sheets 1 through 6, Receiver Main Chassis Schematic

b. FO-22, sheets 1 through 3, Receiver Power Distribution Diagrams.

c. FO-23, sheets 1 through 3, Receiver Signal Flow Diagrams.

d. FO-1, sheets 3 through 6, Receiver Control System (on Main Chassis Schematic).

e. Figure 7-2 and 7-3, Receiver, Top and Bottom Views, Location of Components.

5-9. TROUBLESHOOTING POWER SUPPLY AND MODULES. The following paragraphs contain procedures for testing and troubleshooting the power supply and various modules in the receiver. Checkout procedures are provided to help identify symptoms and verify performance. Fault logic diagrams are provided to guide the technician in tracing signal flow through the power supply and modules. In addition, references to circuit descriptions in Chapter 3 and to schematic and component location diagrams are included, as appropriate. When testing or trouble shooting observe the following:

a. Always allow a full 30 minutes for test equipment warm-up.

b. Read all test procedures throughly before beginning a test.

c. After repairs are complete, verify correct operation by repeating the appropriate check out procedure.

5-10. POWER SUPPLY.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. A digital voltmeter is required for this test, see table 6-1 for specifics.

b. Power Supply Checkout Procedure. Perform the following actions in the sequence given.

If any specified result is not obtained, refer to paragraph 5-10.c., below.

(1) Deenergize the receiver.

(2) Connect the common (-) digital voltmeter test lead to the receiver ground terminal E4.

(3) Connect the (+) voltmeter test lead to the unregulated dc output at C8.

(4) Set the voltmeter to the 200 Vdc range.

(5) Energize the receiver. The voltmeter should indicate at least +22 Vdc.

(6) Deenergize the receiver.

(7) Connect the (+) voltmeter test lead to test point E1.

(8) Set the voltmeter to the 20 Vdc range.

(9) Energize the receiver. The voltmeter should indicate +15 Vdc ±0.75 Vdc.

(10) Deenergize the receiver.

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(11) Connect the (+) voltmeter test lead to test point E2.

(12) Energize the receiver. The voltmeter should indicate -15 Vdc ±0.75 Vdc.

(13) Deenergize the receiver.

(14) Connect the (+) voltmeter test lead to test point E3.

(15) Energize the receiver. The voltmeter should indicate at least +10 Vdc.

(16) Deenergize the receiver and disconnect the test equipment.

c. Power Supply Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the Power Supply for normal operation by repeating the checkout procedure above.

(1) Figure 5-9, Power Supply Fault Logic Diagram.

(2) FO-1, Sheet 2, Main Chassis Schematic Diagram.

(3) Power Supply circuit description, paragraph 3-101.

(4) Figure 7-4 Power Distribution (A1), Location of Components.

(5) Parts replacement guidelines, Chapter 6, Section II.

5-11. RF FILTER (A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) RF voltmeter
(3) Digital voltmeter

b. RF Filter Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-11.c, below:

(1) Deenergize the receiver.

(2) Disconnect A2P1 from A3A1J1 on the Input Converter.

(3) Connect the RF voltmeter and 50 Ω adapter to A2P1.

(4) Connect the output of the signal generator to A2J1 on the rear panel of the receiver.

(5) Set the RF voltmeter to the 0 dBm range.

(6) Set the signal generator output frequency to 1.0 MHz and output level to 0 dBm.

(7) The RF voltmeter should indicate a level between 0 dBm and -1.0 dBm.

(8) Tune the signal generator to 10 MHz, 20 MHz, and 30 MHz successively, maintaining the output level at 0 dBm for each frequency. The filter output level should not be less than -1.0 dBm for each frequency.

(9) Disconnect the test equipment from the receiver.

(10) Reconnect A2P1 to A3A1J1.

c. RF Filter Fault Isolation.

(1) Deenergize the receiver.

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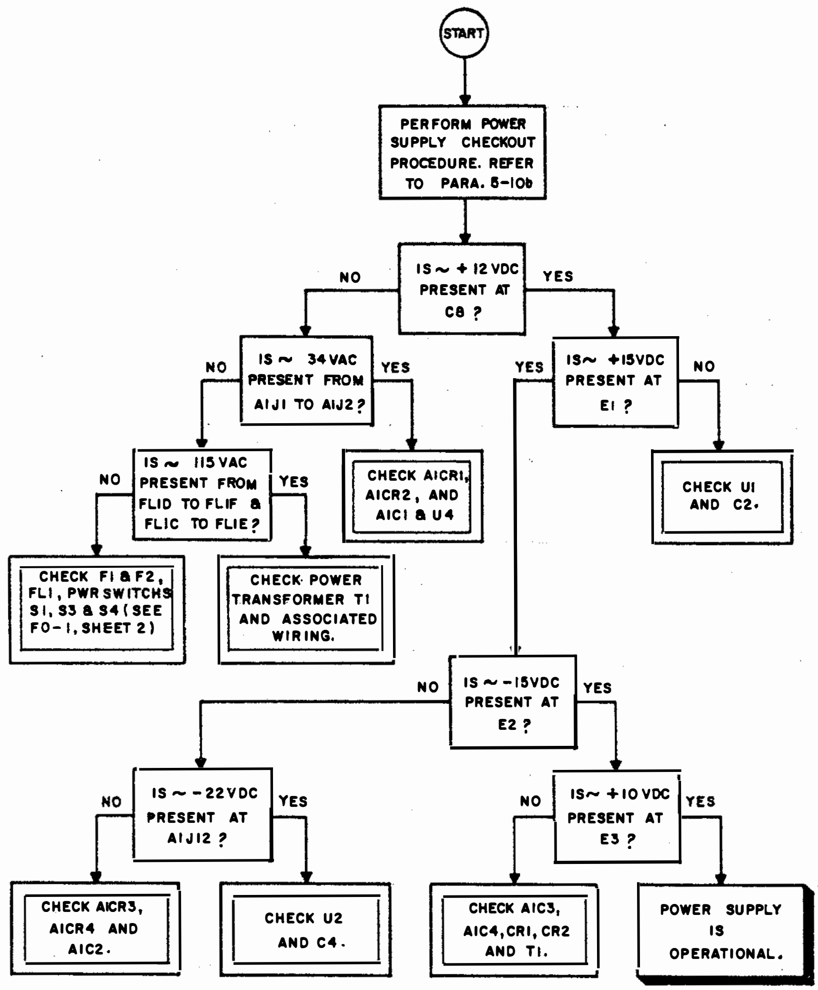

Figure 5-9. Power Supply Fault Logic Diagram

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(2) Remove the filter from the receiver and remove the filter's protective cover.

(3) Using the digital voltmeter check all capacitors and the two Zener diodes for leakage to ground. (See FO-2).

(4) Check all inductors for continuity.

5-12. INPUT CONVERTER (A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope

b. Input Converter Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-12.c., below.

(1) Deenergize the receiver.

(2) Disconnect A2P1 from A3A1J1 and P28 from A3A2J2.

(3) Set the receiver front panel controls as follows:

(a) Gain Mode - MAN*
(b) RF Gain - Maximum Clockwise

* Note the appearance of the yellow indicator in the pushbutton when depressed.

(4) Connect the oscilloscope to connector A3A2J2 using a short coaxial cable.

(5) Connect the signal generator to connector A3A1J1 using a short coaxial cable. Set the generator output frequency to 15.00500 MHz and output level to -10 dBm.

(6) Energize the receiver and tune to 15.00500 MHz.

(7) The oscilloscope should display a level of ~3V p-p at ~10.7 MHz. The waveform should be a clean sine wave.

(8) Deenergize the receiver and disconnect the test equipment.

c. Input Converter Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the Input Converter for normal operation by repeating the checkout procedure above.

(1) Figure 5-10, Input Converter Fault Logic Diagram.

(2) Table 5-4, Input Converter Voltage Table.

(3) FO-3, Input Converter Schematic Diagram.

(4) Input Converter circuit description, paragraph 3-20.

(5) Figure 7-8, Input Converter, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

(7) Input Converter alignment, paragraph 6-5.

5-13. 10.7 MHz FILTER SWITCH (A4A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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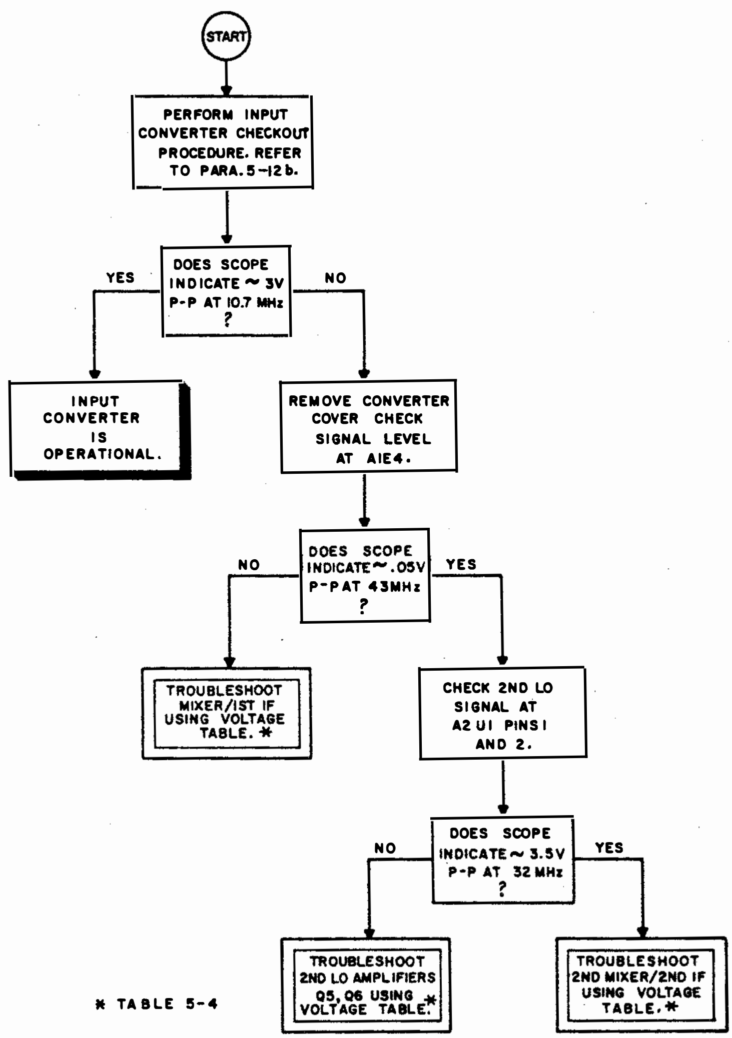

Figure 5-10. Input Converter Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

Table 5-4. Input Converter Voltage Table

Transistor Pin		Voltage	Transistor Pin		Voltage
A1Q1	E	+ 0.45	A2Q3	E	+ 8
	B	+ 1.1		B	+ 8.8
	C	+ 3.2		C	+ 14
A1Q2	S	+ 3.2	A2Q4	E	+ 1.25
	G	0.0		B	+ 1.95
	D	+ 15		C	+ 7
A2Q1	E	+ 0.45	A2Q5	E	- 12
	B	+ 1.1		B	- 11
	C	+ 1.9		C	0.0
A2Q2	S	+ 1.95	A2Q6	E	- 10
	G	0.0		B	- 9.5
	D	+ 15		C	0.0

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clipleads on one end (2).

b. 10.7 MHz Filter Switch Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-13.c., below.

(1) Deenergize the receiver.

(2) Disconnect connector P19 from A4XA1.

(3) Remove PC card A4A2.

(4) Depress the IF Bandwidth kHz 3.2 button.

(5) Connect the oscilloscope to A4XA1 pin 57 (TP2) using a short coaxial cable with clip leads on one end.

(6) Connect the signal generator to A4XA1 pin 13 (TP1) using a short coaxial cable with clip leads on one end. Set the generator output frequency to 10.7 MHz and output level to -40 dBm.

(7) Energize the receiver. The oscilloscope should display a level of ~30 mV p-p at ~10.7 MHz. The waveform should be a clean sine wave.

(8) Depress the IF Bandwidth kHz 6 pushbutton and then the 16 button. The oscilloscope should display ~30 mV p-p at ~10.7 MHz for both BW positions.

(9) Deenergize the receiver and disconnect the test equipment.

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(10) Reinstall PC card A4A2 in its proper slot.

c. 10.7 MHz Filter Switch Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 10.7 MHz Filter Switch for normal operation by repeating the checkout procedure above.

(1) Figure 5-11, 10.7 MHz Filter Switch Fault Logic Diagram.

(2) Table 5-5, 10.7 MHz Filter Switch Voltage Table.

(3) FO-4, 10.7 MHz Filter Switch Schematic Diagram.

(4) 10.7 MHz Filter Switch circuit description, paragraph 3-28.

(5) Figure 7-13, 10.7 MHz Filter Switch, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

(7) 10.7 MHz Filter Switch adjustment, paragraph 6-6.a.

5-14. 10.7 MHz/455 kHz CONVERTER (A4A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

Table 5-5. 10.7 MHz Filter Switch Voltage Table

Bandwidth (kHz)					Bandwidth (kHz)				
PIN		16	6	3.2	PIN		16	6	3.2
Q1	A	+15.26	+15.26	+14.50	Q4	C	+15.32	+15.32	+15.29
	B	- 2.38	- 2.38	+ 2.68		B	- 2.24	- 2.24	+ 2.48
	C	0.00	0.00	+ 2.04		E	0.00	0.00	+ 1.83
Q2	C	+15.26	+14.49	+15.26	Q5	C	+15.32	+15.29	+15.32
	B	- 2.53	+ 2.85	- 2.53		B	- 2.21	+ 2.44	- 2.21
	E	0.00	+ 2.19	0.00		E	0.00	+ 1.78	0.00
Q3	C	+15.17	+15.25	+15.26	Q6	C	+15.29	+15.32	+15.32
	B	+ 2.76	- 2.36	- 2.36		B	+ 2.50	- 2.23	- 2.23
	E	+ 2.01	0.00	0.00		E	+ 1.88	0.00	0.00

Courtesy of http://BlackRadios.terryo.org

LOGIC SIGNAL CHART

BW \ PIN	15	17	19
16	X		
6		X	
3.2			X
1.0			X
.3			X

X = VOLTAGE AT PIN ≥ 2.5V

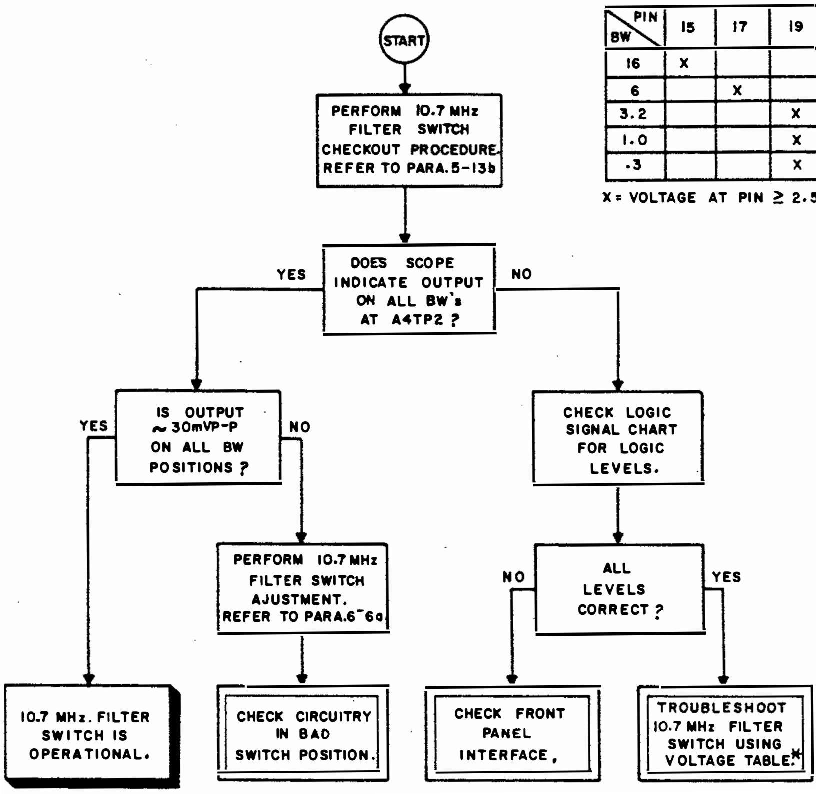

*TABLE 5-5

Figure 5-11. 10.7 MHz Filter Switch Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clipleads on one end (2).

b. 10.7 MHz/455 kHz Converter Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-14.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A1, A4A3, A4A4, and A4A5.

(3) Connect the oscilloscope to A4XA2 pin 19 (TP13) using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA2 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 10.7 MHz and the output level to -28 dBm.

(5) Energize the receiver. The oscilloscope should display a level of ~0.1V p-p at ~455 kHz. The waveform should be a clean sine wave.

(6) Deenergize the receiver and disconnect the test equipment.

(7) Reinstall PC cards A4A1, A4A3, A4A4 and A4A5 in their proper slots.

c. 10.7 MHz/455 kHz Converter Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 10.7 MHz/455 kHz Converter for normal operation by repeating the checkout procedure above.

(1) Figure 5-12, 10.7 MHz/455 MHz Converter Fault Logic Diagram.

(2) Table 5-6, 10.7 MHz/455 kHz Converter Voltage Table.

(3) FO-5, 10.7 MHz/455 kHz Converter Schematic Diagram.

(4) 10.7 MHz/455 kHz Converter circuit description, paragraph 3-31.

(4) Figure 7-14, 10.7 MHz/455 kHz Converter, Location of Components.

(5) Parts replacement guidelines, Chapter 6, Section II.

5-15. 455 kHz FILTER SWITCH (A4A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clip leads at one end (2).

Table 5-6. 10.7 MHz/455 kHz Converter Voltage Table

A2Q1	Emitter	+ 3.24
	Base	+ 3.96
	Collector	+14.8

Courtesy of http://BlackRadios.terryo.org

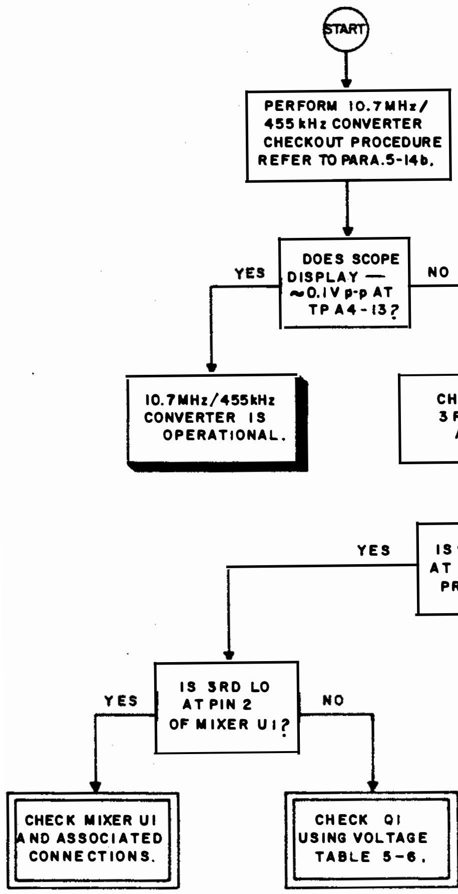

Figure 5-12. 10.7 MHz/455 kHz Converter Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

b. 455 kHz Filter Switch Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-15.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A2, A4A4, A4A5, and A4A7.

(3) Depress the receiver IF Bandwidth kHz 16 button.

(4) Connect the oscilloscope vertical input to A4XA3 pin 57 (TP3) using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(5) Connect the signal generator RF output to A4XA3 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 455 kHz and the output level to -36 dBm.

(6) Energize the receiver. The oscilloscope should display a level of ~15 mV p-p at ~455 kHz. The waveform should be a clean sine wave.

(7) Depress the IF Bandwidth kHz 1.0 pushbutton and then the 0.3 pushbutton.

(8) The oscilloscope should display a level of ~15 mV p-p at ~455 kHz for both BW positions.

(9) Deenergize the receiver and disconnect the test equipment.

(10) Replace PC cards A4A2, A4A4, A4A5 and A4A7 in their proper slots.

c. 455 kHz Filter Switch Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the 455 kHz Filter Switch for normal operation by repeating the checkout procedure above.

(1) Figure 5-13, 455 kHz Filter Switch Fault Logic Diagram.

(2) Table 5-7, 455 kHz Filter Switch Voltage Table.

(3) FO-6, 455 kHz Filter Switch Schematic Diagram.

(4) 455 kHz Filter Switch circuit description, paragraph 3-34.

(5) Figure 7-15, 455 kHz Filter Switch, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

5-16. USB FILTER SWITCH (A4A4).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, for details see table 6-1.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clip leads on one end (2)

b. USB Filter Switch Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-16.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A2, A4A3, A4A5, and A4A7.

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LOGIC SIGNAL CHART

BW \ PIN	15	17	19
16	X		
6	X		
3.2	X		
1.0		X	
.3			X

X = VOLTAGE AT PIN ≥ 2.5V

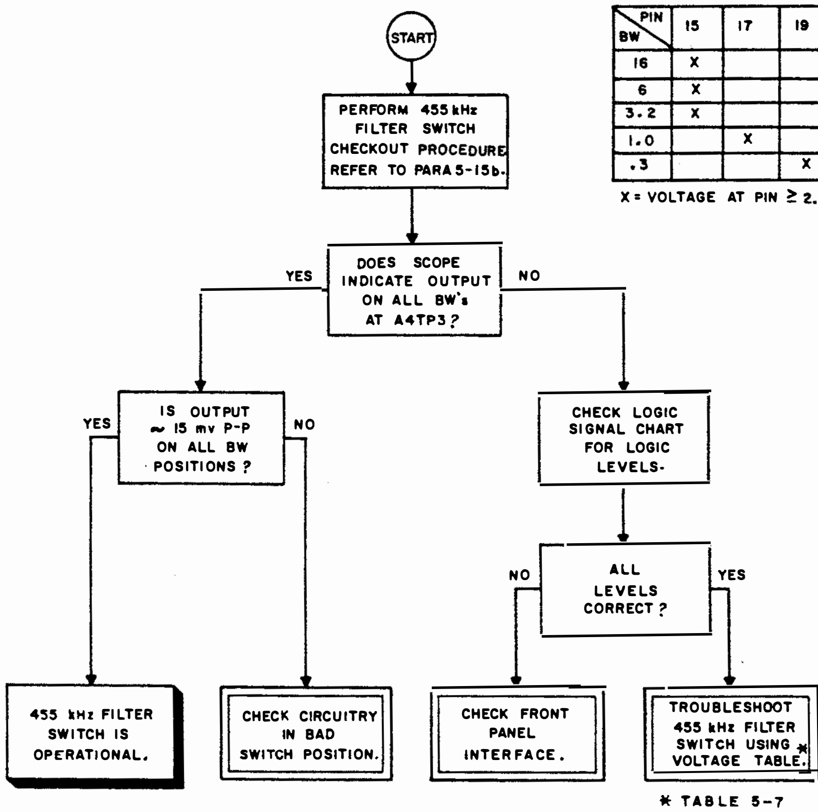

Figure 5-13. 455 kHz Filter Switch Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

Table 5-7. 455 kHz Filter Switch Voltage Table

		Bandwidth (kHz)		
	Pin	16/6/3.2	1.0	0.3
U1	1	- 12.9	+ 13.5	- 12.9
	3	0.0	+ 4.6	0.0
	5	+ 4.4	0.0	0.0
	7	+ 13.6	- 13	- 13
	11	- 14	- 14	- 14
	12	0.0	0.0	+ 4.6
	13	+ 2.7	+ 2.7	+ 2.7
	14	- 13	- 13	+ 13.6
Q1	E	0.0	0.0	0.0
	B	- 1.8	- 1.8	+ 1.8
	C	+ 14.9	+ 14.9	+ 14.9
Q2	E	0.0	0.0	+ 0.9
	B	- 1.5	- 1.5	+ 1.5
	C	14	14	14
Q3	E	0.0	+ 2.3	0.0
	B	- 3	+ 3	- 3
	C	14.9	14.3	14.8
Q4	E	0.0	0.8	0.0
	B	- 1.4	+ 1.4	- 1.4
	C	14	14	14
Q5	E	1.25	0.0	0.0
	B	+ 1.9	- 1.9	- 1.9
	C	+ 14.7	+ 14.7	+ 14.7
Q6	E	+ 0.8	0.0	0.0
	B	+ 1.4	- 1.4	- 1.4
	C	+ 14	+ 14	+ 14

(3) Connect the oscilloscope Vertical Input to A4XA4 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA4 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 456.6 kHz and the output level to -36 dBm.

(5) Energize the receiver and depress the Detection Mode USB pushbutton. The oscilloscope should display a level of ~200 mV p-p at ~456.5 kHz. The waveform should be a clean sine wave.

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(6) Deenergize the receiver and disconnect the test equipment.

(7) Reinstall PC cards A4A2, A4A3, A4A5 and A4A7 in their proper slots.

c. USB Filter Switch Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the USB Filter Switch for normal operation by repeating the checkout procedure above.

(1) Figure 5-14, USB Filter Switch Fault Logic Diagram.

(2) Table 5-8, USB Filter Switch Voltage Table.

(3) FO-7, USB Filter Switch Schematic Diagram.

(4) USB Filter Switch circuit description, paragraph 3-39.

(5) Figure 7-16, USB Filter Switch, Location of Components.

(6) USB and ISB/LSB Filter Switches Adjustments, paragraph 6-6.d.

5-17. ISB/LSB FILTER SWITCH (A4A5).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clip leads on one end (2)

b. ISB/LSB Filter Switch Checkout Procedures. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-17.c.,below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A2, A4A3, A4A4, A4A7, and A4A8.

(3) Connect the oscilloscope Vertical Input to A4XA5 pin 57 using a short coaxial

Table 5-8. USB Filter Switch Voltage Table

Pin		USB Mode	Other Modes
Q1	C	+ 14.69	+ 15.38
	B	+ 2.34	- 2.15
	E	+ 1.68	0.00
Q2	C	+ 14.78	+ 15.38
	B	+ 1.80	- 1.76
	E	+ 1.14	0.00

Courtesy of http://BlackRadios.terryo.org

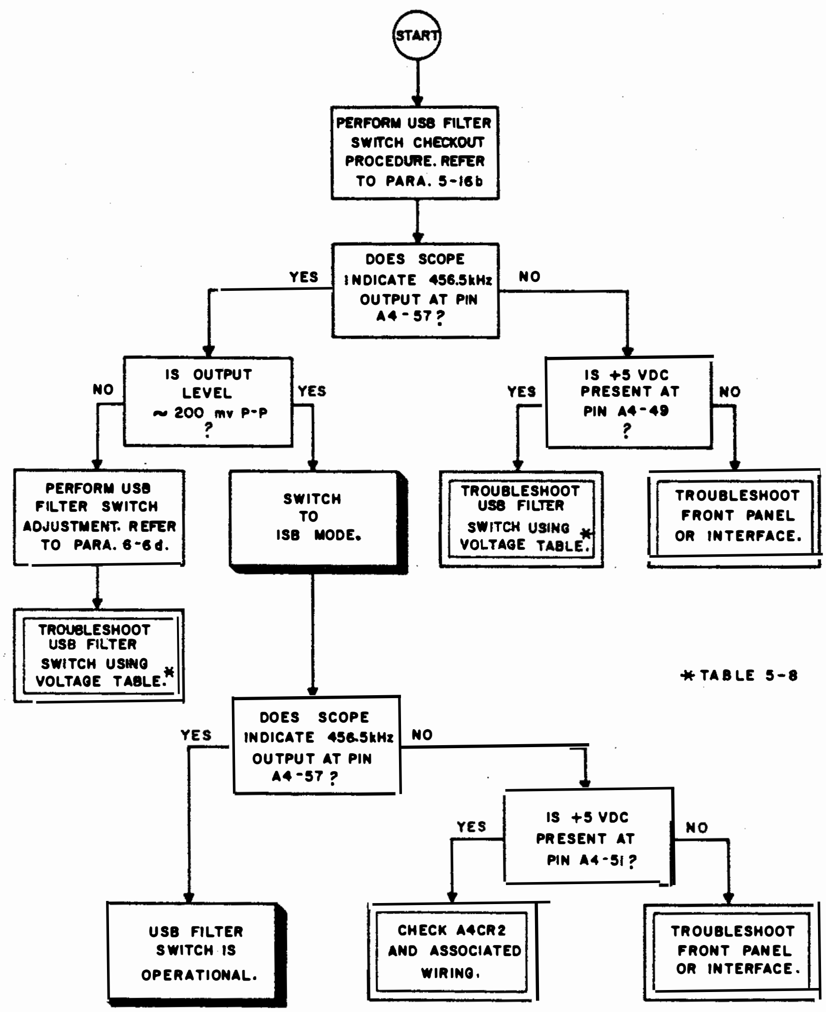

Figure 5-14. USB Filter Switch Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA5 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 453.5 kHz and the output level to -36 dBm.

(5) Energize the receiver and depress the detection Mode LSB pushbutton. The oscilloscope should display a level of ~200 mV p-p at ~453.5 kHz. The waveform should be a clean sine wave.

(6) Move the oscilloscope clip lead to pin A4XA5-53 (TP14) and depress the Detection Mode ISB button. The oscilloscope should display a level of ~200 mV p-p at ~453.5 kHz.

(7) Deenergize the receiver and disconnect the test equipment.

(8) Replace PC cards A4A2, A4A3, A4A4, A4A7 and A4A8 in their proper slots.

c. ISB/LSB Filter Switch Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the ISB/LSB Filter Switch for normal operation by repeating the checkout procedure above.

(1) Figure 5-15, ISB/LSB Filter Switch Fault Logic Diagram.

(2) Table 5-9, ISB/LSB Filter Switch Voltage Table.

(3) FO-8, ISB/LSB Filter Switch Schematic Diagram.

(4) ISB/LSB Filter Switch circuit description, paragraph 3-41.

(5) Figure 7-17, ISB/LSB Filter Switch, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

(7) USB and ISB/LSB Filter Switches Adjustments, paragraph 6-6.d.

5-18. AUTOMATIC GAIN CONTROL (A4A6).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Digital voltmeter
(3) Short length of coaxial cable with clip leads on one end (2)

b. AGC Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-18.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A3, A4A4, A4A5, and A4A10.

(3) Set the receiver Gain Mode to FAST AGC and the Meter switch to LINE AUDIO.

(4) Connect the digital voltmeter input to A4XA6 pin 47 (TP19) using a short cable with clip leads one one end. Connect the common lead to the IF Motherboard ground plane. Set the digital voltmeter to the 20 Vdc range.

Courtesy of http://BlackRadios.terryo.org

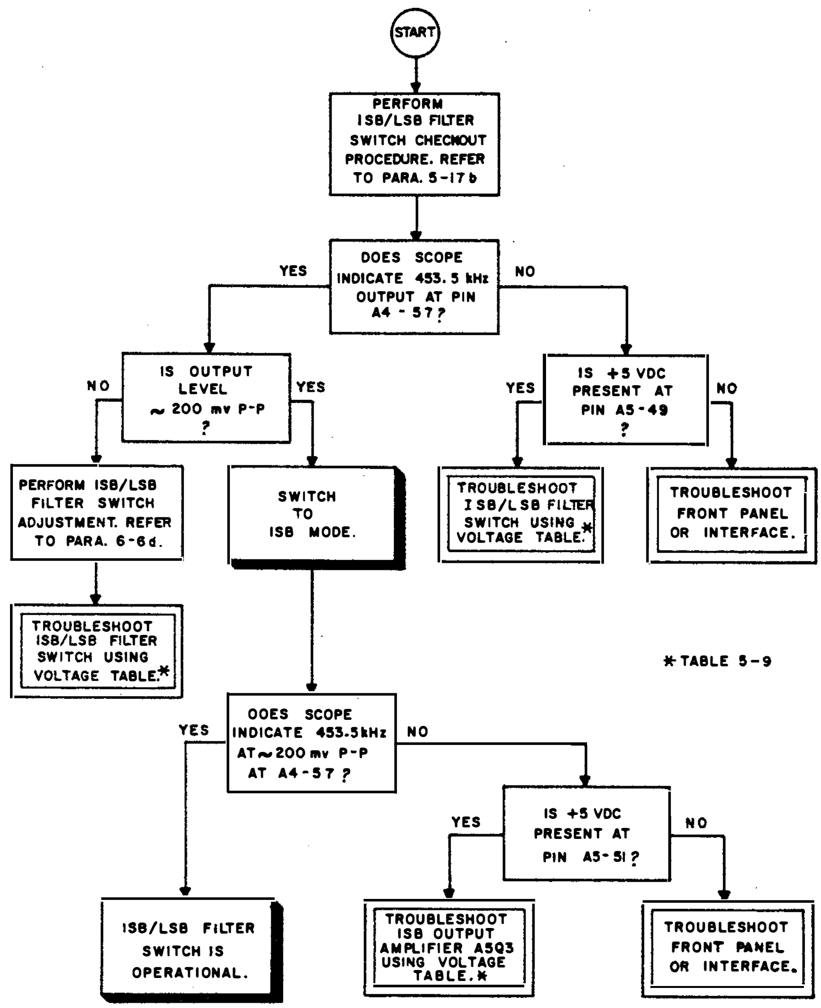

Figure 5-15. ISB/LSB Filter Switch Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

Table 5-9. ISB/LSB Filter Switch Voltage Table

	Pin	LSB Mode	ISB Mode	Other Modes
Q1	C	+ 14.65	+ 14.67	+ 15.37
	B	+ 2.18	+ 2.19	- 1.26
	E	+ 1.53	+ 1.54	0.00
Q2	C	+ 14.57	+ 15.02	+ 15.37
	B	+ 2.25	- 2.21	- 2.18
	E	+ 1.59	0.00	0.00
Q3	C	+ 14.99	+ 14.64	+ 15.37
	B	- 2.23	+ 2.11	- 2.21
	E	0.00	+ 1.45	0.00

(5) Connect the signal generator output to A4XA7 pin 57 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 455 kHz and the output level to -40 dBm.

(6) Energize the reciever. The digital voltmeter should indicate ~-3.5 Vdc.

(7) Depress the receiver Gain Mode MAN pushbutton. Adjust the RF GAIN control until the digital voltmeter indicates the same level indicated in step (6).

(8) Depress the Gain Mode FAST AGC pushbutton.

(9) Connect the digital voltmeter clip lead to A4XA6 pin 19. The voltmeter should indicate ~+0.7 Vdc.

(10) Connect the digital voltmeter clip lead to A4XA6 pin 41. The voltmeter should indicate ~-3.0 Vdc.

(11) Deenergize the receiver and disconnect the test equipment.

(12) Reinstall PC cards A4A3, A4A4, A4A5, and A4A10 in their proper slots.

c. AGC Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the data to trace the fault to a defective component or connection. After the problem has been corrected, check the AGC card for normal operation by repeating the checkout procedure above.

(1) Table 5-10, AGC Voltage Table.

(2) FO-10, AGC Schematic Diagram.

Courtesy of http://BlackRadios.terryo.org

Table 5-10. AGC Voltage Table

		Input Signal			No Signal		
Transistor		MAN	SLOW	FAST	MAN	SLOW	FAST
Q1	E	1.7	2.2	2.2	0.05	0.06	0.06
	B	2.0	2.6	2.6	+ 0.4	0.38	0.38
	C	14.3	14.3	14.4	14.4	14.3	14.4
Q2	E	0.77	0.77	0.77	0.06	0.06	0.06
	B	0.18	0.20	0.20	0.02	0.2	0.02
	C	0.0	0.13	0.13	0.0	0.0	0.0
Q3	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	0.6	0.0	0.0	0.59	0.0	0.0
	C	0.0	0.0	0.0	0.01	0.0	0.0
Q4	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3
	C	- 0.06	- 0.6	- 0.6	0.0	0.0	0.0
Q5	E	- 2.9	- 2.8	- 2.8	- 0.50	0.07	0.07
	B	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3	- 2.3
	C	- 0.6	- 0.6	- 0.6	0.0	0.0	0.0
Q6	E	0.0	0.0	0.0	0.0	0.0	
	B	0.58	0.0	0.54	0.0	0.0	
	C	0.05	0.13	0.13	0.01	0.0	0.0
Q7	E	0.0	0.0	0.0	0.0	0.0	0.0
	B	- 3.9	0.62	- 3.9	- 3.9	0.63	- 3.9
	C	N/A	N/A	N/A	N/A	N/A	N/A
U1	1	2.0	2.2	2.2	0.06	0.07	0.07
	2	2.0	2.2	2.2	0.06	0.07	0.07
	3	2.0	2.2	2.2	0.05	0.06	0.05
	4	14.3	14.3	14.4	14.4	14.3	14.4
	5	0.0	5.0	0.0	0.0	5.0	0.0
	6	1.5	1.7	1.7	1.7	1.7	1.7
	7	- 12.6	12.9	- 12.6	- 12.9	12.9	- 12.6
	8	- 2.0	- 2.2	- 2.2	- 0.05	- 0.05	- 0.05
	9	0.0	0.0	0.0	0.0	0.0	0.0
	10	0.0	0.0	0.0	0.0	0.0	0.0
	11	- 13.8	- 13.8	- 13.8	- 13.8	- 13.9	- 13.8
	12	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07
	13	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07
	14	- 3.6	- 3.6	- 3.6	- 0.5	0.07	0.07

Courtesy of http://BlackRadios.terryo.org

Table 5-10. AGC Voltage Table (Cont'd)

Transistor		Input Signal MAN	Input Signal SLOW	Input Signal FAST	No Signal MAN	No Signal SLOW	No Signal FAST
U2	1	0.86	0.82	0.83	- 0.08	- 0.08	- 0.08
	2	0.86	0.82	0.83	- 0.08	- 0.8	- 0.8
	3	0.86	0.82	0.83	- 0.08	- 0.08	- 0.08
	4	14.3	14.4	14.4	14.3	14.3	
	5	0.0	0.0	0.0	0.0		
	6	0.0	0.0	0.0	0.0	0.0	0.0
	7	- 6.6	- 6.5	- 6.5	- 0.8	0.12	0.12
	8	- 0.25	- 0.24	- 0.24	0.03	0.03	0.03
	9	- 0.05	- 0.06	0.0	0.0	0.0	
	10	- 0.06	- 0.06	- 0.06	0.0	0.0	0.0
	11	- 13.8	- 13.8	- 13.8	- 13.8	- 13.9	- 13.8
	12	0.0	0.0	0.0	0.0	0.0	0.0
	13	0.0	0.0	0.0	0.0	0.0	0.0
	14	0.85	0.82	0.8	0.0	0.0	0.0

NOTE

Two sets of data are given: one with an input signal and one without. When using the Input Signal data, tune the receiver to 15.00500 MHz and inject an unmodulated signal of 15.00500 MHz at -40 dBm into RF Input jack A2J1. Nominal voltage values are given for each of the three Gain Modes: MAN, FAST AGC and SLOW AGC. The RF GAIN control must be set maximum clockwise when using MAN Gain Mode No Signal data. To use data for the MAN Gain Mode with Input Signal, reduce the gain setting to achieve the same meter reading as in one of the AGC modes.

Courtesy of http://BlackRadios.terryo.org

(3) AGC circuit description, paragraph 3-47.

(4) Figure 7-18, AGC, Location of Components.

(5) Parts replacement guidelines, Chapter 6, Section II.

5-19. 455 kHz AMPLIFIER/AM DETECTOR (A4A7)

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clip leads at one end (2).

b. 455 kHz Amplifier/AM Detector Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-19.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A3, A4A6, A4A9 and A4A10.

(3) Connect the oscilloscope Vertical Input to A4XA7 pin 17 (TP18) using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA7 pin 57 using a short coaxial cable with clip leads on one end. Connect cable shield to the IF Motherboard ground plane. Set the generator output frequency to 455 kHz and output level to -74 dBm.

(5) Energize the receiver. The oscilloscope should display a level of ~60 mV p-p at ~455 kHz. The waveform should be a clean sine wave.

(6) Move the oscilloscope clip lead to A4XA7 pin 13 (TP6). The oscilloscope should display a level of ~60 mV p-p at ~455 kHz.

(7) Turn on the signal generator AM Modulation and set it for 50% modulation at 400 Hz.

(8) Move the oscilloscope clip lead to A4XA7 pin 51 (TP5). The oscillosocope should display a level of ~0.3 V p-p at ~400 Hz. The waveform should be a clean sine wave.

(9) Deenergize the receiver and disconnect the test equipment.

(10) Reinstall PC cards A4A3, A4A6, A4A9, and A4A10 in their proper slots.

c. 455 kHz Amplifier/AM Detector Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault ot a defective component or connection. After the problem has been corrected, check the 455 kHz Amplifier/AM Detector for normal operation by repeating the checkout procedure above.

(1) Figure 5-16, 455 kHz Amplifier/AM Detector Fault Logic Diagram.

(2) Table 5-11, 455 kHz Amplifier/AM Detector Voltage Table.

(3) FO-9, 455 kHz Amplifier/AM Detector Schematic Diagram.

(4) 455 kHz Amplifier/AM Detector circuit description, paragraph 3-44.

(5) Figure 7-19, 455 kHz Amplifier/AM Detector, Location of Components.

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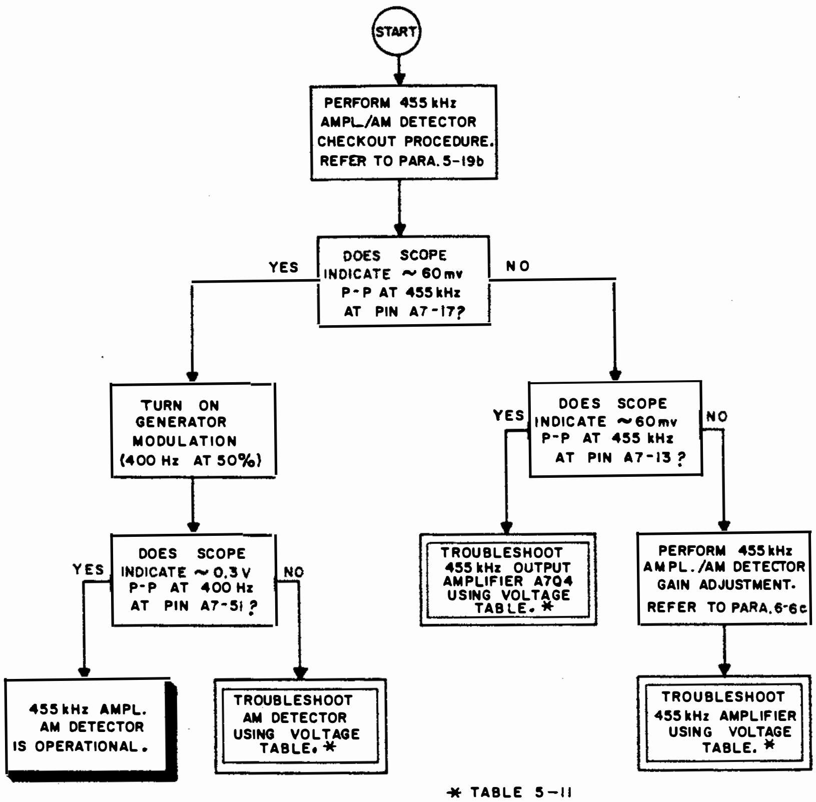

Figure 5-16. 455 kHz AMP/AM Detector Fault Logic Diagram

Courtesy of http://BlackRadios.terryo.org

Table 5-11. 455 kHz Amplifier/AM Detector Voltage Table

	Pin	Voltage		Pin	Voltage
Q1	1 2 3 4	+ 13.7 + 3.75 + 0.87 + 1.6	Q4	E B C	+ 3.5 + 4.1 + 14.4
Q2	1 2 3 4	+ 15 + 3.8 + 0.9 + 1.4	Q5	E B C	- 0.7 - 0.1 + 14.2
Q3	E B C	- 0.5 0.0 + 15.0	Q6	E B C	+ 0.46 + 0.95 + 15.0

(6) Parts replacement guidelines, Chapter 6, Section II.

(7) 455 kHz Amplifier/AM Detector Response Alignment, paragraph 6-6.b.

(8) 455 kHz Amplifier/AM Detector Gain Adjustment, paragraph 6-6.c.

5-20. ISB DETECTOR/AUDIO (A4A8).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Oscilloscope
(3) Short length of coaxial cable with clip leads one one end (2)

b. ISB Detector/Audio Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-20.c., below.

(1) Deenergize the receiver.
(2) Remove PC cards A4A5 and A4A6.

(3) Connect the oscilloscope Vertical Input to A4XA8 pin 41 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA8 pin 53 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the generator output frequency to 454.6 kHz and the output level to -46 dBm.

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(5) Energize the reciever and depress the Detection Mode ISB pushbutton. The oscilloscope should display a level of ~11 V p-p at ~400 Hz. The waveform should be a clean sine wave.

(6) Move the oscilloscope clip lead to A4XA8 pin 44 (TP16). Move the shield clip lead to A4XA8 pin 48. Adjust A8R36 for an oscilloscope reading of ~ 8 V p-p at ~400 Hz. The waveform should be a clean sine wave.

(7) Move the oscilloscope clip lead to A4XA8 pin 43. Connect the cable shield to the IF Motherboard ground plane. The oscilloscope should display ~ 0.0 Vdc.

(8) Increase the generator output level by 10 dBm. The level displayed on the oscilloscope should increase to ~ -2.5 Vdc.

(9) Deenergize the receiver and disconnect the test equipment.

(10) Reinstall PC cards A4A5 and A4A6 in the proper slots.

c. ISB Detector/Audio Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the ISB Detector/Audio Card for normal operation by repeating the checkout procedure above.

(1) Figure 5-17, ISB Detector/Audio Fault Logic Diagram.

(2) Table 5-12, ISB Detector/Audio Voltage Table.

(3) FO-13, ISB Detector/Audio Schematic Diagram.

(4) ISB Detector/Audio Circuit description, paragraph 3-66.

(5) Figure 7-20, ISB Detector/Audio, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

(7) ISB Detector/Audio Adjustment, paragraph 6-6.e.

5-21. FM/CW/SSB DETECTOR (A4A9).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Wideband oscilloscope
(3) Short length of coaxial cable with clip leads on one end (2)

b. CW/SSB Detector Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5.21.d., below.

(1) Deenergize the receiver.
(2) Remove PC cards A4A7 and A4A10.

(3) Connect the oscilloscope Vertical Input to A4XA9 pin 57 (TP7) a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4X49 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the ground plane. Set the generator output frequency to 455.4 kHz and output level to -28 dBm.

(5) Energize the receiver and depress the Detection Mode USB pushbutton. The oscilloscope should display a level of ~ 2 V p-p at ~ 400 Hz. The waveform should be a clean sine wave.

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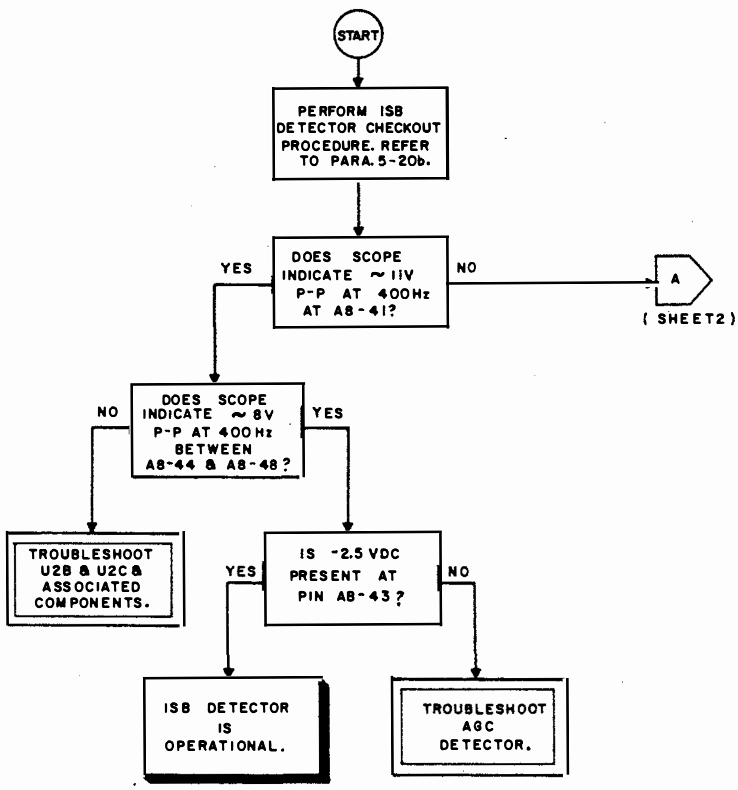

Figure 5-17. ISB Detector/Audio Fault Logic Diagram (sheet 1 of 2)

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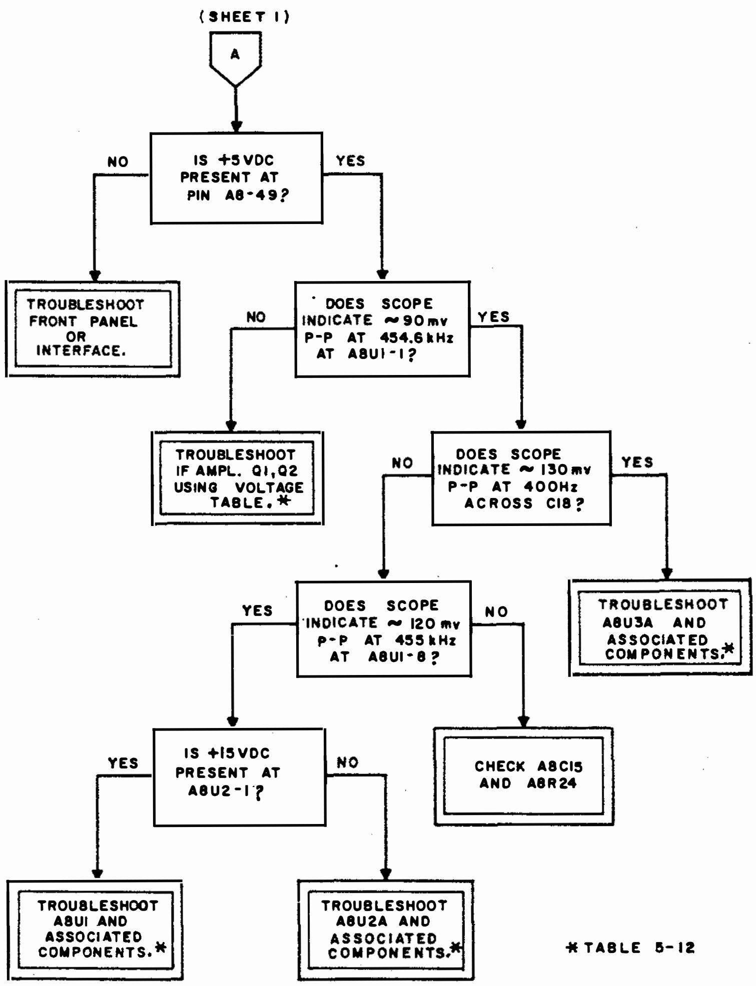

Figure 5-17. ISB Detector/Audio Fault Logic Diagram (sheet 2 of 2)

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Table 5-12. ISB Detector/Audio Voltage Table

	Pin	ISB	Other Modes		Pin	ISB	Other modes
U1	1	- 7.5	- 7.5	Q1	1	+ 14.5	+ 14.5
	4	- 7	- 7		2	+ 3.3	+ 3.3
	5	- 13.5	- 13.5		3	+ 0.9	+ 0.9
	6	+ 1.3	- 0.8		4	+ 1	+ 1
	12	+ 1	- 0.8				
	14	+ 15	+ 15	Q2	1	+ 14	+ 14
					2	+ 3.3	+ 3.3
U2	1	+ 14	- 13.5		3	+ 0.8	+ 0.8
	2	+ 1.5	+ 1.5		4	+ 1	+ 1
	3	+ 5	0.0				
	4	+ 15	+ 15	Q3	E	0.0	+ 7.5
	11	- 15	- 15		B	+ 0.2	+ 0.2
	12	0.0	0.0		C	0.0	0.0
	13	+ 1	+ 5				
	14	+ 1	+ 5	Q4	E	0.0	0.0
					B	0.0	0.0
U3	4	+ 15	+ 15		C	+ 15	+ 15
	8	0.0	0.0				
	9	0.0	0.0	Q5	E	0.0	0.0
	10	0.0	0.0		B	+ 2.8	- .5
	11	- 15	- 15		C	0.0	0.0
	12	0.0	0.0				
	13	0.0	0.0				
	14	0.0	0.0				

(6) Deenergize the receiver and disconnect the test equipment.

(7) Reinstall PC cards A4A7 and A4A10 in their proper slots.

c. <u>FM Detector Checkout Procedure.</u> Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 6-19.d., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A7 and A4A10.

(3) Connect the oscilloscope Vertical Input to A4XA9 pin 57 (TP7) using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane.

(4) Connect the signal generator RF output to A4XA9 pin 13 using a short coaxial cable with clip leads on one end. Connect the cable shield to the ground plane. Set the generator output frequency to 455 kHz and the output level to -28 dBm. Set the generator for FM Modulation at 400 Hz and 4.8 kHz deviation.

(5) Energize the receiver and depress the Detection Mode FM pushbutton. The oscilloscope should display a level of ~1 V p-p at ~ 400 Hz. The waveform should be a clean sine wave.

(6) Deenergize the receiver and disconnect the test equipment.

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(7) Reinstall PC cards A4A7 and A4A10 in their proper slots.

d. FM/CW/SSB Detector Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the FM/CW/SSB Detector for normal operation by repeating the checkout procedure above.

(1) Figure 5-18, CW/SSB Detector Fault Logic Diagram.

(2) Figure 5-19, FM Detector Fault Logic Diagram.

(3) Table 5-13, FM/CW/SSB Detector Voltage Table.

(4) FO-11, FM/CW/SSB Detector Schematic Diagram.

(5) FM/CW/SSB Detector circuit description paragraph 3-57.

(6) Figure 7-21, FM/CW/SSB Detector, Location of Components.

Table 5-13. FM/CW/SSB Detector Voltage Table

Component/ Pin		AM	FM	CW & SB	Component/ Pin		AM	FM	CW & SB
Q1	E	9.6	8.1	9.2	U2	1	- 1.6	- 1.6	- 1.6
Q1	B	9.5	7.3	9.2	U2	3	- 1.7	- 1.7	- 1.7
Q1	C	0.0	8.0	0.0	U2	4	- 1.6	- 1.6	- 1.6
					U2	5	- 3.8	- 3.8	- 3.8
Q2	E	0.0	2.0	0.0	U2	6	- 0.7	- 0.7	3.8
Q2	B	0.0	0.62	0.0	U2	7	0.0	0.0	0.0
Q2	C	9.9	0.0	9.2	U2	8	- 0.1	- 0.1	0.0
					U2	9	- 0.0	0.0	0.0
Q3	E	9.6	8.7	9.0	U2	12	- 0.7	- 0.7	4.0
Q3	B	9.6	8.7	8.4	U2	13	- 0.7	- 0.7	4.0
Q3	C	-1.8	-1.8	9.0	U2	14	-13.0	-13.0	-13.0
Q4	E	0.0	0.0	0.0	U3	1	0.0	0.3	0.0
Q4	B	0.0	0.0	0.7	U3	2	0.0	0.63	0.0
Q4	C	9.6	8.8	0.0	U3	3	0.0	0.64	0.0
					U3	4	14.0	12.5	13.5
U1	1	0.0	2.0	0.0	U3	5	0.0	0.0	0.0
U1	2	0.0	2.0	0.0	U3	6	0.0	0.0	0.0
U1	3	0.0	2.0	0.0	U3	7	0.0	0.0	0.0
U1	4	0.0	2.0	0.0	U3	8	0.0	- 0.0	0.0
U1	5	0.0	5.6	0.0	U3	9	0.0	0.0	0.0
U1	6	0.0	0.0	0.0	U3	10	0.0	0.0	0.0
U1	7	0.0	0.0	0.0	U3	11	-13.0	-13.0	-13.0
U1	8	0.0	0.0	0.0	U3	12	9.4	8.5	9.1
U1	9	0.0	0.8	0.0	U3	13	9.4	8.5	9.1
U1	10	0.0	5.6	0.0					

Courtesy of http://BlackRadios.terryo.org

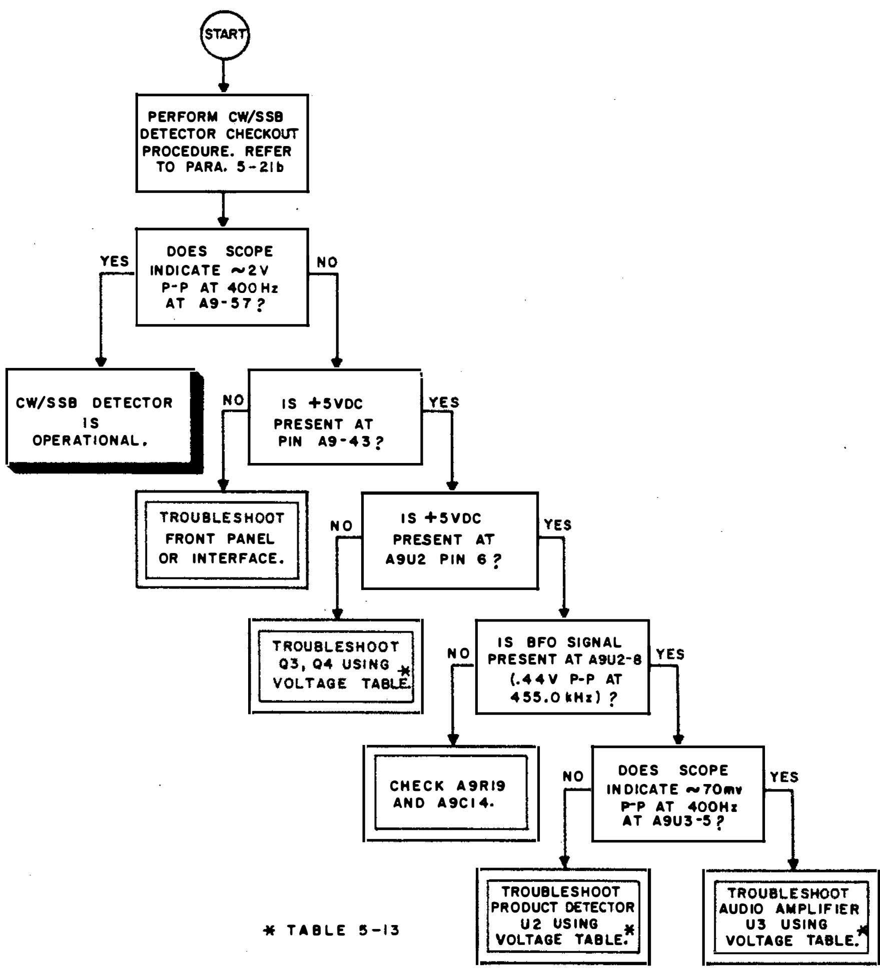

Figure 5-18. CW/SSB Detector Fault Logic Diagram

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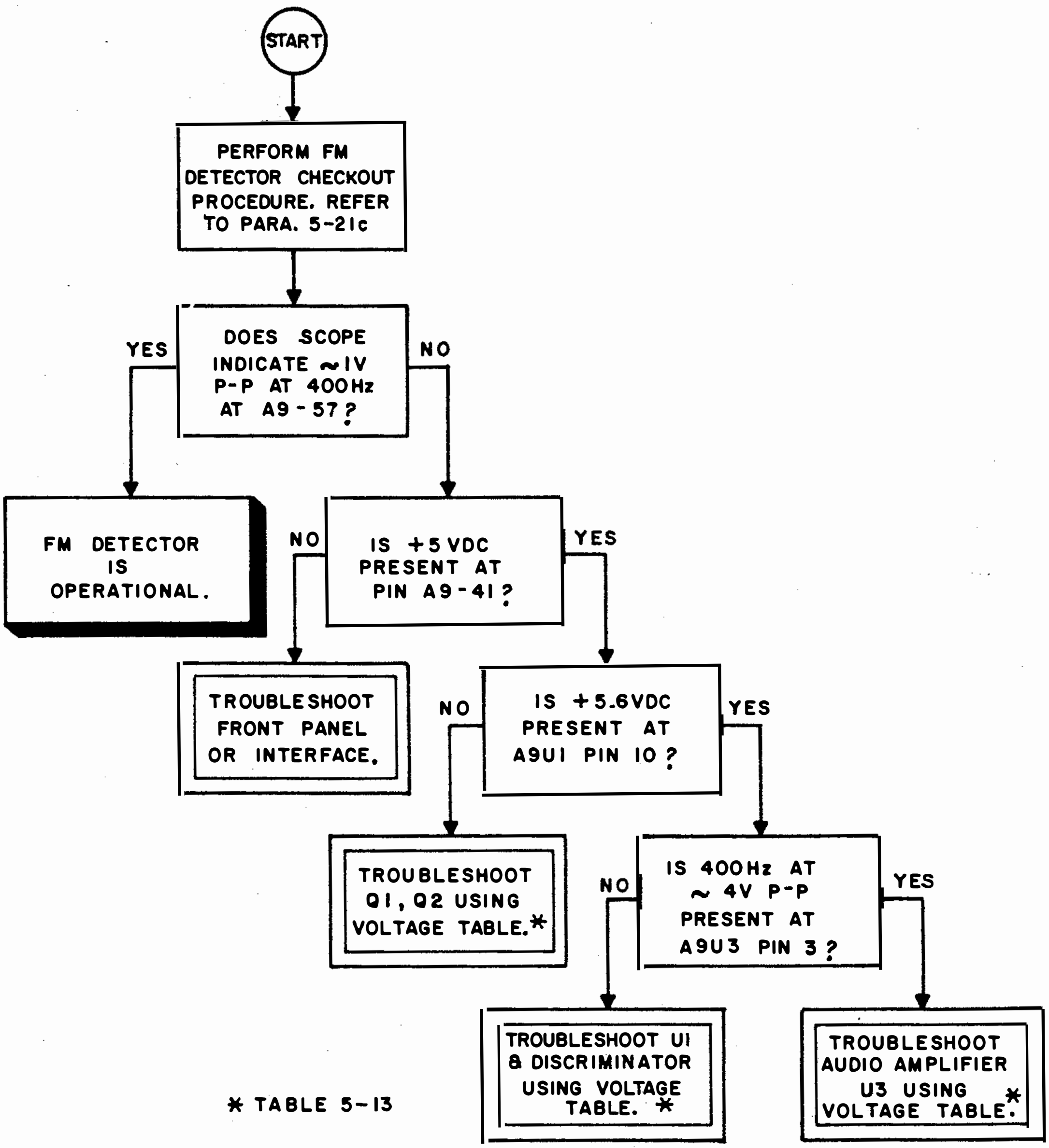

Figure 5-19. FM Detector Fault Logic Diagram

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(7) Parts replacement guidelines, Chapter 6, Section II.

(8) FM Discriminator Alignment, paragraph 6-6.f.

5-22. AUDIO AMPLIFIER (A4A10).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Oscilloscope
(3) Short length of coaxial cable with clip leads on one end (2)

b. Audio Amplifier Checkout Procedures. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-22.c., below.

(1) Deenergize the receiver.

(2) Remove PC cards A4A6, A4A7, and A4A9.

(3) Set the rear panel LINE AUDIO LEVEL potentiometer to mid-range and set the front panel PHONE LEVEL control to maximum clockwise.

(4) Connect the oscilloscope Vertical Input to A4XA10 pin 55 using a short coaxial cable with clip leads on one end. Connect the shield to IF Motherboard ground plane.

(5) Connect the signal generator AM output to A4XA10 pin 51 using a short coaxial cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. Set the signal generator Modulation Frequency to 400 Hz, set the Audio Output Level to 1.0 V rms and set the AM switch to INT.

(6) Energize the receiver and depress the Detection Mode AM pushbutton. The oscilloscope should display a level of ~2 V p-p at 400 Hz. The waveform should be a clean sine wave.

(7) Set the generator audio output level to 10 mV. Move the generator clip lead to A4XA10 pin 17. Use the oscilloscope lead to probe A4XA10 pin 13 and A4XA10 pin 11. The oscilloscope should display a level of ~2 V p-p at ~400 Hz on each pin.

(8) Connect the oscilloscope clip lead to A4XA10 pin 41. The oscilloscope should indicate a level of -0.3 Vdc.

(9) Set the generator Audio Output Level to 0.1 V. Move the generator clip lead to A4XA10 pin 53. Move the oscilloscope clip lead to A4XA10 pin 19. The oscilloscope should display a level of ~2 V p-p at ~400 Hz.

(10) Deenergize the receiver and disconnect the test equipment.

(11) Reinstall PC cards A4A6, A4A7, and A4A9 in their proper slots.

c. Audio Amplifier Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the Audio Amplifier for normal operation by repeating the checkout procedure above.

(1) Figure 5-20, Sheets 1 and 2, Audio Amplifier Fault Logic Diagram.

(2) Table 5-14, Audio Amplifier Voltage Table.

(3) FO-12, Audio Amplifier Schematic Diagram.

(4) Audio Amplifier circuit description, paragraph 3-61.

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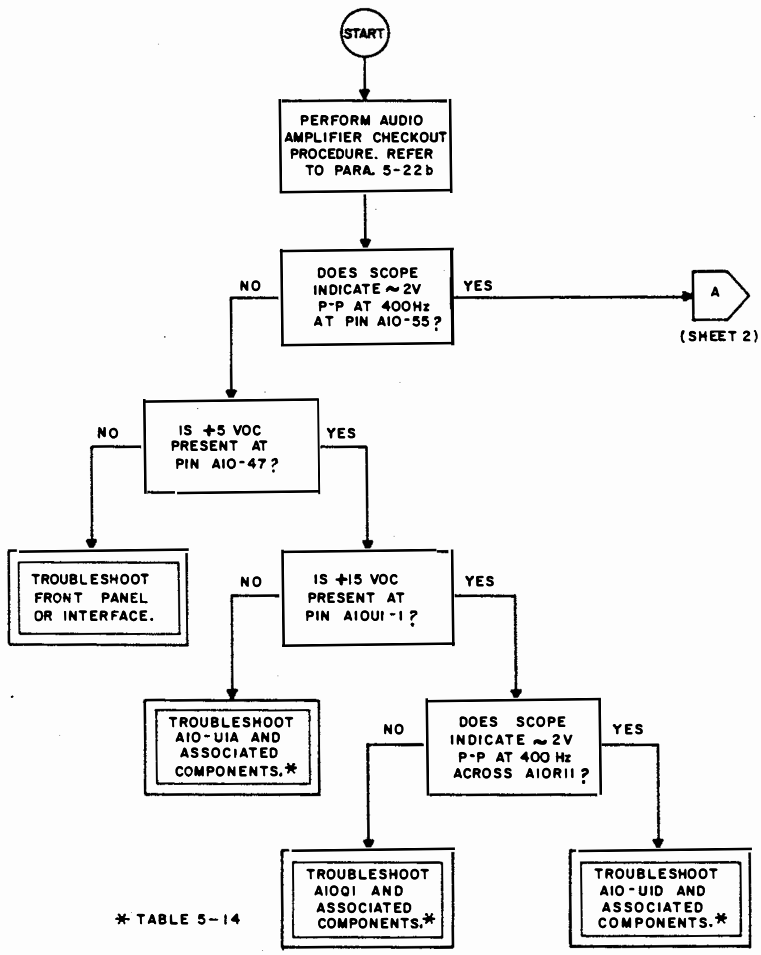

Figure 5-20. Audio Amplifier Fault Logic Diagram (sheet 1 of 2)

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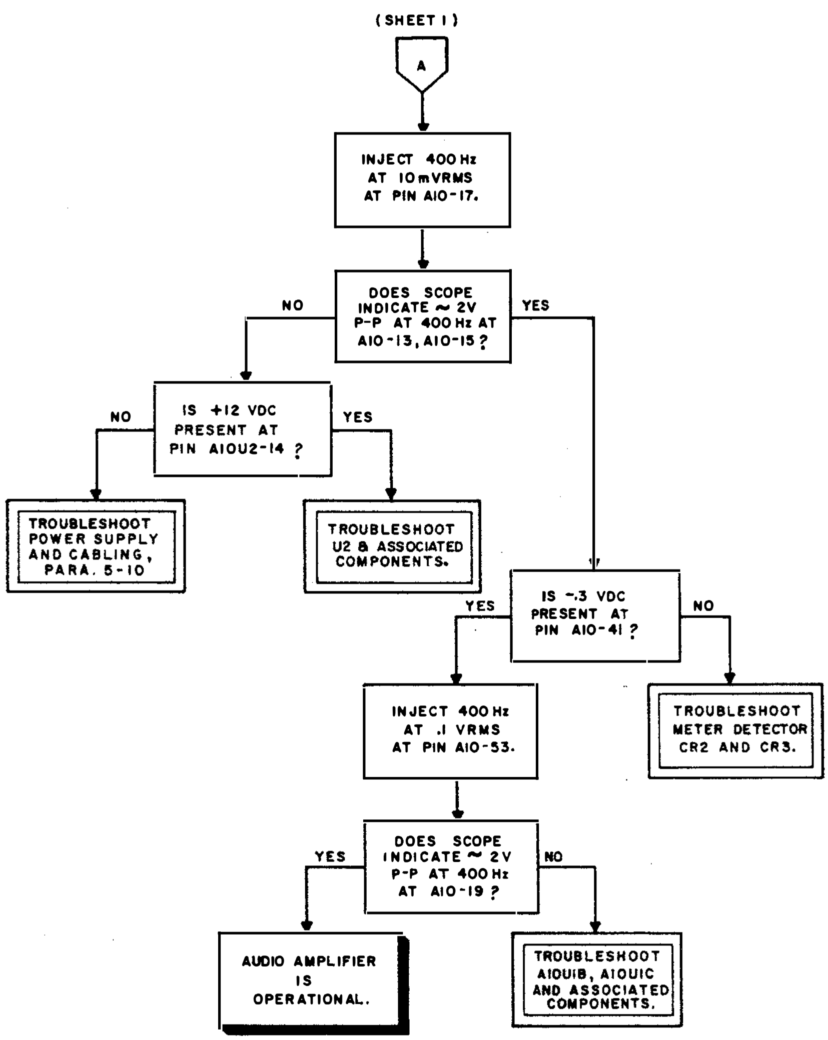

Figure 5-20. Audio Amplifier Fault Logic Diagram (sheet 2 of 2)

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Table 5-14. Audio Amplifier Voltage Table

	Pin	AM Mode Active	Other Modes Active
Q1	S	0.0	0.0
	D	0.0	0.0
	G	0.0	- 13
U1	1	+ 14	- 14
	2	+ 1.6	+ 1.6
	3	+ 5	0.0
U2	2	+ 6	+ 6
	13	+ 6	+ 6

(5) Figure 7-22, Audio Amplifier, Location of Components.

(6) Parts replacement guidelines, Chapter 6, Section II.

5-23. 1st LO SYNTHESIZER (A5A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Frequency counter
(2) Wideband oscilloscope
(3) RF voltmeter
(4) 50 Ω probe

b. 1st LO Synthesizer Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-23.c., below.

(1) Deenergize the receiver.

(2) Disconnect the connector from A1J2.

(3) Connect the frequency counter to W2P3.

(4) Energize the receiver and tune it to 00.00000 MHz. the frequency counter should indicate 171.64 MHz.

(5) Rotate the tuning knob counterclockwise and tune the receiver to 29.99999 MHz. The frequency counter should indicate 291.60 MHz.

(6) Disconnect the frequency counter and connect the RF voltmeter and the 50 Ω Probe to W2P3. The voltmeter should indicate +20 dBm ±2 dBm.

(7) Deenergize the receiver and disconnect the test equipment. Reconnect W2P3.

c. 1st Lo Synthesizer Fault Isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph d. below will aid in tracing the fault to a defective component or connection.

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(1) VCO band select circuitry. Table 5-15 checks for proper operation of U13, diodes CR8 through CR10, and Q1 through Q3, while dialing different frequencies on the front panel.

(2) Divider section. With a tuned frequency of 00.00000 MHz, or an input at J1 of the 1st and 3rd LO of 171.64 MHz, the following frequencies in table 5-16 should be found at the corresponding IC pins using a digital frequency counter.

(3) Phase detector U5. Check for a 40 kHz signal at input pin 3 of U5. If a signal is not present, troubleshoot the Time Base circuits. Check for a 40 kHz signal at pin 1 of U5. If it is not present, troubleshoot the 1st LO counter circuits. Refer to paragraph (5) and figure 5-21 for an explanation of the function of the phase detector.

(4) 1st LO VCO. The 1st LO VCO is located on the 1st and 3rd LO Synthesizer PC board. It is recommended that the circuit description of the VCO be read before troubleshooting (paragraph 3-154) The frequency of the oscillator, Q1, is controlled by the band select code and the tuning voltage. The correct VCO output frequency can be found by adding 42.91 MHz to the tuned frequency in table 5-16 and multiplying the result by 4.

(5) Phase detector operation. The phase detector normally receives a fixed reference frequency at one input (R) and a variable frequency at the input (V) from the divider section. The output responds only to transitions from the two inputs and has four output states as shown in figure 5-21. If the frequency and phase match exactly, outputs U and D remains high. If the variable input leads in phase with respect to the reference input, U remains high and D goes low. If the variable input lags in phase with respect to the reference input, D remains high and U goes low. When inputs V and R are separated by a frequency difference, the output at pins U or D vaires high and low at a rate proportional to the difference frequency of the two inputs. Under lock conditions, when the input of both V and R are identical in phase and frequency, the output pulses from U and D will be extremely narrow and appear on an oscilloscope as spikes. For a large difference between the two input frequencies, as when a new LO frequency is established, the outputs respond as described above with wide pulses appearing on the proper outputs.

d. <u>1st LO Synthesizer Supplementary Fault Isolation Data</u>. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check

Table 5-15. VCO Band Select Code

Tuned Frequency	Band Select Output (Vdc)		
	E3	E2	E1
0.00 - 3.99 MHz	+ 15	+ 15	+ 15
4.00 - 7.99 MHz	+ 15	+ 15	- 12
8.00 - 11.99 MHz	+ 15	- 12	+ 15
12.00 - 15.99 MHz	+ 15	- 12	- 12
16.00 - 19.99 MHz	- 12	+ 15	+ 15
20.00 - 23.99 MHz	- 12	+ 15	- 12
24.00 - 27.99 MHz	- 12	- 12	+ 15
28.00 - 29.99 MHz	- 12	- 12	- 12

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Table 5-16. 1st LO Frequency Chart

IC	Pin	Freq (Hz)	IC	Pin	Freq (Hz)
U1	7	17 MHz	U9	7	1.68 MHz
U1	9	3.4 MHz	U9	9	80 kHz
U1	10	40 kHz	U9	15	40 kHz
U2	12	3.4 MHz	U10	7	840 kHz
U3	7	40 kHz	U10	7	200 kHz
U3	9	40 kHz	U11	6	40 kHz
U6	3	40 kHz	U11	7	40 kHz
U8	7	340 kHz	U12	5	40 kHz
U9	1	40 kHz	U12	9	40 kHz

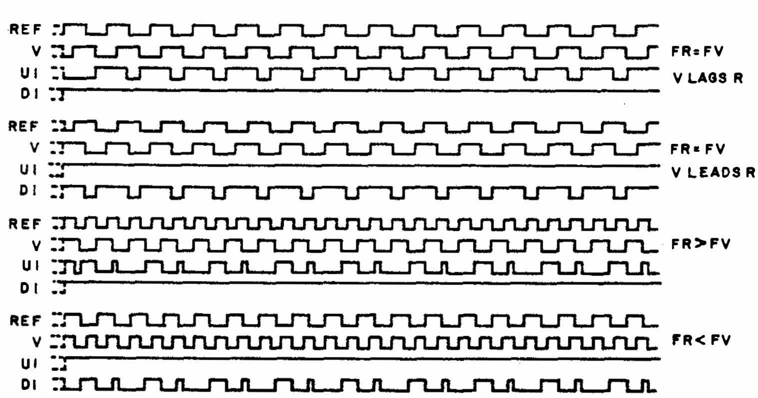

Figure 5-21. Phase Detector Timing Diagram

Courtesy of http://BlackRadios.terryo.org

the 1st LO Synthesizer for normal operation by repeating the checkout procedure in paragraph 5-23.b., above.

(1) FO-15, Sheets 1 and 2, 1st LO Synthesizer Schematic Diagram.

(2) 1st LO Synthesizer, circuit description, paragraph 3-131.

(3) Figure 7-27, 1st LO Synthesizer, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

(5) 1st LO Synthesizer Alignment, paragraph 6-7.a.

5-24. 3rd LO SYNTHESIZER (A5A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Frequency counter
(2) Wideband oscilloscope
(3) RF voltmeter
(4) 50 Ω probe

b. 3rd LO Synthesizer Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-24.c.,below.

(1) Deenergize the receiver.

(2) Disconnect connector W6P10 from J7.

(3) Connect the frequency counter to W6P10.

(4) Energize the receiver. The frequency counter should indicate 11.155 MHz.

(5) Disconnect the frequency counter and connect the RF voltmeter and the 50 Ω probe to W6P10. The voltmeter should indicate -6 dBm ±2 dBm.

(6) Deenergize the receiver and disconnect the test equipment. Reconnect W6P10.

c. 3rd LO Synthesizer Fault Isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph d., below will aid in tracing the fault to a defective component or connection.

(1) Ensure the following inputs to the 3rd LO Synthesizer circuitry are correct. If not, check the Time Base circuits.

(a) 50 kHz signal at pin 11 of U21.
(b) 10 kHz signal at pin 12 of U21.

(c) The time for two input waveforms at Pin 3 of U21 should equal one output waveform at pin 5 of U21. If not, replace U21.

(d) Observe the input (pins 1 and 3) and output (pins 2 and 13) voltages of U22 and compare them to figure 5-21. If a difference exists, replace U22. A normal value for the output (pin 8) is 2.0 to 3.0 Vdc.

(e) Proper alignment of C33 assures an approximate 2.75 Vdc at pin 9 of U22.

(f) If problems lead to the VCO, see the VCO circuit description, paragraph 3-154 and troubleshoot that component.

d. 3rd LO Synthesizer Supplementary Fault Isolation Data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the 3rd LO Synthesizer for normal operation

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by repeating the checkout procedure in paragraph 5-24.b., above.

(1) FO-15, Sheets 1 and 2, 3rd LO Synthesizer, Schematic Diagram.

(2) 3rd LO Synthesizer circuit description, paragraph 3-99.

(3) Figure 7-27, 3rd LO Synthesizer, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

(5) 3rd LO Synthesizer Alignment, paragraph 6-7.d.

5-25. TIME BASE (A5A1).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Frequency counter
(2) Wideband oscilloscope or
(3) Digital counter
(4) Short length of coaxial cable with clip leads on one end

b. Time Base Checkout Procedure. Perform the following acitons in the sequence given. If any specified result is not obtained, refer to paragraph 5-25.c., below.

(1) Deenergize the receiver.

(2) Connect the frequency counter input to A5XA1 pin A9 using a short coaxial cable with clip leads on one end. Connect the cable shield to the Motherboard ground plane.

(3) Energize the receiver. The frequency counter should read 1.000000 MHz ±3 Hz.

(4) Move the frequency counter clip lead to A5XA1 pin A47. The counter should read 10.000 kHz ±1 Hz.

(5) Move the frequency counter clip lead to A5XA1 pin A53. The counter should read 1.000 kHz ±1 Hz.

(6) Move the frequency counter clip lead to test point A5A1A2 pin E6. The counter should read 40.000 kHz ±1 Hz.

(7) Deenergize the receiver and disconnect the test equipment.

c. Time Base Fault Isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph d., below will aid in tracing the fault to a defective component or connection. Using the internal frequency source, the frequencies in table 5-17 should be found at the corresponding IC pins. A digital counter is the recommended method to check the frequencies, however, an oscilloscope may be used, remembering the time for one input waveform is proportional to the time for one output waveform, by the dividing ratio of the IC.

d. Time Base Supplementary Fault Isolation Data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the Time Base for normal operation by repeating the checkout procedure in paragraph 5-25.b., above.

(1) FO-15, Sheets 1 and 2, 1st and 3rd LO Synthesizer/Time Base Schematic Diagram.

(2) Time Base circuit description, paragraph 3-93.

Courtesy of http://BlackRadios.terryo.org

Table 5-17. Time Base Frequency Chart

IC	Pin	Frequency	IC	Pin	Frequency
U15	5	1 MHz	U18	12	10 kHz
U15	6	1 MHz	U19	5	250 kHz
U15	8	2 MHz	U19	12	50 kHz
U15	12	200 kHz	U20	5	5 kHz
U17	12	40 kHz	U20	12	1 kHz
U18	5	500 kHz	U23	8	1 MHz
U18	8	1 MHz	U23	11	1 MHz

(3) Figure 7-27, 1st and 3rd LO Synthesizer/Time Base, Location of Components.

(4) Parts replacement guidelines, Chapter 3, Section II.

(5) 2 MHz Time Base Alignment, paragraph 6-7.e.

5-26. 2nd LO SYNTHESIZER (A5A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Frequency counter
(2) Wideband oscilloscope or
(3) RF voltmeter
(4) 50 Ω probe

b. 2nd LO Synthesizer Checkout Procedure. Perform the following actions in the sequence given. If an specified result is not obtained, refer to paragraph 5-26.c., below.

(1) Deenergize the receiver.

(2) Disconnect connector W4P4 from A2J1.

(3) Connect the frequency counter to P4.

(4) Energize the receiver and tune to 00.00000 MHz. The frequency counter should indicate 32.21 MHz.

(5) Tune the receiver to 00.00999 MHz. The frequency counter should indicate 32.20 MHz.

(6) Disconnect the frequency counter and connect the RF voltmeter and the 50 Ω probe to W4P4. The voltmeter should indicate 0 dBm ±2 dBm.

(7) Deenergize the receiver and disconnect the test equipment. Reconnect P4.

c. 2nd LO Synthesizer Fault Isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additiional data in paragraph d., below will aid in tracing the fault to a defective component or connection.

(1) Determine which of the phase lock loops is causing the problem. When the problem loop is determined, troubleshoot as described below.

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(a) 32 MHz loop. Proper operation of this loop assures a 32 MHz signal on the transistor case (or collector) of Q1. If not, proceed to (2) below.

(b) Programmable loop. Proper operation of this loop assures a 200 kHz signal at pin 1 of U6 when the receiver is tuned to 15.00999 MHz and a 210 kHz signal at pin 1 of U6 when the receiver is tuned to 15.00000 MHz. Illumination of LED CR1 assures a faulty loop. If faulty, proceed to (3) below. If a problem is not detected, proceed to Step (c) below.

(c) Output loop. Troubleshooting this loop is required when no problems exist in the two loops tested above and 32.30 to 32.21 MHz is not seen at module pin B15. If this is the case, proceed to (4) below.

(2) 32 MHz loop.

(a) U3 and U2. U3 is a divide-by-2 counter. The time for two input waveforms at pin 3 of U3 equals the time for one output waveform at pin 5 of U3. If not, determine that the input levels are correct for TTL (low state less than 0.8V, high state greater than 2.0V). If these levels do exist and the output is not correct, replace U3. U2 is a divide-by-16 counter. The time for 16 input waveforms at pin 8 of U2 equals the time for one output waveform at pin 12 of U2. If not, replace U2.

(b) Assure the proper operation of phase detector U1. Check the 1 MHz reference at pin 1 of U1. If wrong or no signal, troubleshoot the Time Base circuts. A working voltage may vary from 2.0 to 3.5 Vdc (at pin 8 of U1).

(c) Vary capacitor C51 (inside the shielded unit) until 2.7 Vdc (nominal) is seen at test point E1, with the tuning tool withdrawn from the shield.

(3) Programmable loop.

(a) U19, U17 and U16. The time for one waveform at pin 5 of U19 equals 10 waveforms at pin 6 of U19. If not, replace U19. The time for one waveform at pin 12 of U17 equals 10 waveforms at pin 8 of U17. If not, replace U17. The time for one waveform at pin 7 of U16 equals 10 waveforms at pin 15 of U16 (difficult to read with the oscilloscope since the frequency at pin 15 varies from 200 - 210 MHz). If not, replace U16.

(b) Operation of the ÷100/÷101 prescaler. Tune the receiver to 15.00999 MHz. The time for 10 input waveforms at pin 2 of U14 equals one output waveform at pin 11 of U14. If not, replace U14.

(c) Operation of counters. Tune the receiver to 15.00000 MHz. This sets all inputs (A, B, C, and D) to U7, U8 and U9 with 0 Vdc. Using a frequency counter with an input impedance of greater than 1000 Ω, the following frequencies in table 5-18 should be found at the corresponding pins. If not, replace that IC.

(d) Phase detector U12. Check for 10 kHz signal at pin 1 of U12. If incorrect or no signal, troubleshoot the Time Base circuits. Compare inputs (pins 1 and 3) and outputs (pins 2 and 13) to figure 5-21 of the 1st LO Troubleshooting Test.

(e) Tune the receiver to 15.00499 MHz. Spread or compress the turns of coil L8 until 4.0 Vdc is seen at test point E3. Recheck the voltage at test point E3 to be certain that it remains between +2.0 Vdc and 6.5 Vdc as the receiver is tuned from 15.00000 to 15.00999 MHz.

(f) If the problem appears to be in the VCO, see the VCO circuit description, paragraph 3-154, and troubleshoot that component.

(4) Output loop.

(a) Measure the frequency of the output at module pin B15. If no signal is present, there is a problem in the VCO or its output amplifier. Check gate 1 of Q3 (pin 3) for signal. If there is none, the problem is with the VCO circuit of Q6. If the signal is there, the problem is in the circuit of amp-

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Table 5-18. 2nd LO Frequency Chart

IC Pin	Frequency	IC Pin	Frequency
U7 Pin 14	2.09 MHz	U9 Pin 3	1.05 MHz
U7 Pin 13	100 kHz	U9 Pin 13	130 kHz
U8 Pin 4	100 kHz	U10 Pin 14	130 kHz
U8 Pin 13	10 kHz	U10 Pin 12	10 kHz
U9 Pin 14	2.09 MHz	U10 Pin 11	10 kHz

lifier Q3. If the signal is present at pin B15, adjust C61 to bring it as close as practical to 32.300 MHz.

(b) With the VCO very near 32.200 MHz, check the signals at pins 1 and 3 of U6. Both should be TTL level signals of approximately 200 kHz (that is, low less than 0.8V and high greater than 2.0V). If the wrong signal is at pin 1, troubleshoot the programmable loop Step (3) above, if the wrong signal is at pin 3, continue.

(c) Check the base of Q2. The signal there should be roughly sinusoidal and about 0.5V p-p. If so, the problem is in the circuits of U4 and U5.

(d) Because of the low signal levels at the inputs of U4 and U5, signal tracing is difficult. The signal at U4 pin 1 should be 32.2 MHz, at U4 pin 7 should be 32.0 MHz, and U5 pins 1 and 2 should be 200 kHz. Grounding of the scope probe is critical if the true signal is to be isolated. It is more likely that careful visual inspection of these circuits and a few voltage checks will be useful. The voltage at pins 1 and 2 of U15 will be approximatley +5V and must be equal within 0.2 Vdc. If they differ by more than this, replace U4. If the 200 kHz at pins 1 and 2 of U5 can be measured, the output at pin 6 should be amplified by about 10 times from that level. There may be some distortion present at the output of U5 which is reduced at the based of Q2.

(e) If the signals at pins 1 and 3 of U6 both appear correct, compare its outputs at pins 2 and 13 with those of figure 5-21. If these appear correct, the problem must be in the amplifier section of U6 pins 8 and 9 and its connection to the VCO.

d. <u>2nd LO Synthesizer Supplementary Fault Isolation Data</u>. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the 2nd LO Synthesizer for normal operation by repeating the checkout procedure in paragraph 5-26.b., above.

(1) FO-17, 2nd LO Synthesizer, Schematic Diagram.

(2) 2nd LO Synthesizer circuit description, paragraph 3-119.

(3) Figure 7-28, 2nd LO Synthesizer, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

(5) 2nd LO Synthesizer Alignment, paragraph 6-7.b.

5-27. BFO SYNTHESIZER (A5A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Frequency counter
(2) Wideband oscilloscope or
(3) Short length of coaxial cable with clip leads on one end

b. BFO Synthesizer Checkout Procedures. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 6-27.c., below.

(1) Deenergize the receiver.

(2) Disconnect connector W7P11 from J8.

(3) Connect the frequency counter to W7P11.

(4) Energize the receiver and depress the Detection Mode CW button. Set the BFO Offset to +0.0 kHz. The frequency counter should read 455.000 kHz.

(5) Set the BFO Offset first to +8.9 kHz and then to -8.9 kHz. The frequency counter should read 463.900 kHz and 446.1 kHz respectively.

(6) Disconnect the frequency counter and reconnect W7P11 to J8.

(7) Connect the oscilloscope input to A4TP15 (A4XA8-18) using a shielded cable with clip leads on one end. Connect the cable shield to the IF Motherboard ground plane. The oscilloscope should display a level of ~120 mV p-p at ~446.1 kHz.

(8) Deenergize the receiver and disconnect the test equipment.

c. BFO Synthesizer Fault Isolation. The fault isolation procedures include tests to aid in isolating a problem to a defective stage or circuit. Additional data in paragraph d., below will aid in tracing the fault to a defective component or connection.

(1) Set the front panel BFO Offset thumbwheel switches to +0.0.

(2) In the programmable circuits, if a 1 kHz signal is not seen entering the phase detector, pin 3 of U9, check that the frequencies in table 5-19 are found at their corresponding IC pins. If a problem is detected, troubleshoot and/or replace the IC from which the signal originates.

(3) Phase detector U9.

(a) 1 kHz signal should be seen at pin 1 of U9. If not, troubleshoot the time base circuits.

(b) A voltage level of roughly 1.25 Vdc should be seen at pin 10 of U9. If not, replace U9.

(c) adjust capacitor C8 until a 2.7 Vdc level is seen at module pin 7.

(4) Amplifier Q2 and Sine Wave to TTL Converter Q3 should be troubleshoot when the signal from the VCO through capacitor C10 is not amplified at the collector of Q3. Refer to the circuit description for these circuits, paragraph 3-103.

(5) Output divider U10. Use table 5-20 to check the operation of U10 with the front panel BFO Offset switches set to +0.0.

d. BFO Synthesizer Supplementary Fault Isolation Data. The following data is to be used with the tests described above as an aid in correcting receiver malfunctions. After the problem has been resolved, check the BFO Synthesizer for normal operation by repeating the checkout procedure in paragraph 5-27.b., above.

(1) FO-16, BFO Synthesizer, Schematic Diagram.

(2) BFO Synthesizer circuit description, paragraph 3-103.

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Table 5-19. BFO Frequency Chart

IC	Pin	Freq	IC	Pin	Freq	IC	Pin	Freq
U1	2	910 kHz	U2	2	91 kHz	U3	2	9 kHz
U1	3	2.275 MHz	U2	3	228 kHz	U3	3	23 kHz
U1	4	0	U2	4	455 kHz	U3	4	46 kHz
U1	6	455 kHz	U2	6	46 kHz	U3	6	5 kHz
U1	7	455 kHz	U2	7	46 kHz	U3	7	5 kHz
U1	11	1 kHz	U2	11	1 kHz	U3	11	1 kHz
U1	14	4.55 MHz	U2	14	4.55 MHz	U3	14	4.55 MHz
U4	2	1 kHz	U5	2	1 kHz	U6	10	27 kHz
U4	3	3 kHz	U5	4	1 kHz	U6	11	24 kHz
U4	4	5 kHz	U5	5	5 kHz	U6	12	12 kHz
U4	6	1 kHz	U5	6	5 kHz	U6	13	13 kHz
U4	7	1 kHz	U6	1	5 kHz	U7	1	455 kHz
U4	11	1 kHz	U6	2	46 kHz	U7	2	455 kHz
U4	14	4.55 MHz	U6	3	12 kHz	U7	4	910 kHz
U5	8	27 kHz	U6	4	228 kHz	U7	5	2.275 kHz
U5	9	9 kHz	U6	5	455 kHz	U7	6	455 kHz
U5	10	23 kHz	U6	6	24 kHz	U7	8	4.55 kHz
U5	12	46 kHz	U6	8	1 kHz	U7	9	4.55 kHz
U5	13	91 kHz	U6	9	1 kHz	U8	2	1 kHz

Table 5-20. Output Divider U10 Frequency Chart

IC	Pin	Freq
U10	1	4.55 MHz
U10	11	910 kHz
U10	12	455 kHz
U10	14	910 kHz

(3) Figure 7-29, BFO Synthesizer, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

(5) BFO Synthesizer Alignment, paragraph 6-7.f.

5-28. FRONT PANEL INTERCONNECT (A6A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. A digital voltmeter will be required for this test, see table 6-1 for specifics.

b. Front Panel Interconnect Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-28c., below.

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(1) Deenergize the receiver.

(2) Connect the common (-) input of the digital voltmeter to chassis ground using a short test lead.

(3) Energize the receiver.

(4) Refer to table 5-21 and depress the indicated Detection Mode and IF Bandwidth kHz pushbuttons in succession. For each button selected, use the voltmeter positive (+) test lead to probe for high (>2.5 vdc) or low (< 0.5 Vdc) conditions as indicated.

(5) Deenergize the receiver and disconnect the test equipment.

c. Front Panel Interconnect Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the Front Panel Interconnect for normal operation by repeating the checkout procedure above.

Table 5-21. Front Panel Interconnect Voltage Table

			Detection Mode			
Pin Nos.	AM	CW	FM	USB	LSB	ISB
A6XA2-5	Low	Low	Low	Low	High	Low
A6XA2-3	Low	Low	Low	High	Low	Low
A6XA2-1	Low	Low	Low	Low	Low	High
A6XA2-18	Low	High	Low	High	High	High
A6XA2-16	Low	Low	High	Low	Low	Low
A6XA2-48	High	Low	Low	Low	Low	Low
A6XA2-58	High	High	High	Low	Low	Low
A6XA2-60	High	Low	High	Low	Low	Low
A10J1-22	High	High	High	Low	Low	Low
A10J1-37	High	High	High	Low	Low	Low
A10J1-16	High	High	High	Low	Low	Low

		IF Bandwidth kHz				Detection Mode
Pin Nos.	16 kHz	6 kHz	3 kHz	1 kHz	.3 kHz	USB/LSB/ISB
A6XA2-49	High	High	High	Low	Low	Low
A6XA2-51	High	Low	Low	High	High	High
A6XA2-53	Low	High	Low	Low	Low	Low
A6XA2-55	Low	Low	High	Low	Low	Low
A6XA2-47	Low	Low	Low	High	Low	Low
A6XA2-45	Low	Low	Low	Low	High	Low

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(1) FO-1, AN/URR-74(V)2 Main Chassis, Schematic Diagram.

(2) Front Panel Interconnect circuit description, paragraph 3-172.

(3) Figure 7-32, Front Panel Interconnect, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

5-29. LOWER PANEL CONTROL (A10A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. Test Equipment Required. The following equipment will be required for this test, see table 6-1 for specifics.

(1) Signal generator
(2) Oscilloscope
(3) Short length of coaxial cable with clip leads on one end (2)

b. Lower Panel Control Checkout Procedure. Perform the following actions in the sequence given. If any specified result is not obtained, refer to paragraph 5-29.c., below.

(1) Deenergize the receiver.

(2) Remove the front panel and gently pull it out several inches from the receiver main chassis, being careful not to place any strain on the interconnecting cables.

(3) Connect the oscilloscope Vertical Input to connector A10A2J3 using a short coaxial cable with clip leads on one end. Connect the cable shield to terminal A10A2E1.

(4) Connect the signal generator AM Output to terminal A10A2E9 using a short coaxial cable with clip leads on one end. Connect the cable shield to terminal A10A2E1. Set the signal generator Modulation Frequency to 400 Hz. Set the Audio Level to 70 mV and the AM switch to INT.

(5) Energize the receiver and rotate the PHONE LEVEL control fully clockwise. The oscilloscope should display a level of ~20 V p-p. The waveform should be a clean sine wave.

(6) Move the signal generator output lead to terminal A10A2E3 and move the oscilloscope input lead to connector A10A2-J2. The oscilloscope should display a level of ~20 V p-p. The waveform should be a clean sine wave.

(7) Deenergize the receiver and disconnect the test equipment.

c. Lower Panel Control Fault Isolation. The items listed below are provided as an aid in fault isolation. Use the fault logic diagram to isolate the problem to a stage or a circuit. Use the other data to trace the fault to a defective component or connection. After the problem has been corrected, check the Lower Panel Control for normal operation by repeating the checkout procedure above.

(1) FO-1, URR-74(V)2 Main Chassis, Schematic Diagram.

(2) Lower Panel Control circuit description, paragraph 3-200.b.

(3) Figure 7-40, Lower Panel Control, Location of Components.

(4) Parts replacement guidelines, Chapter 6, Section II.

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CHAPTER 6

CORRECTIVE MAINTENANCE

6-1. INTRODUCTION. This chapter presents the information and procedures required to perform adjustments, alignment, and component removal and replacement.

Section I contains adjustment and alignment procedures; Section II contains component removal and replacement procedures that are not obvious or that present hazards to personnel or equipment.

SECTION I

ADJUSTMENTS AND ALIGNMENT

6.2. GENERAL. This section contains adjustment and alignment procedures. These procedures should not be performed on a routine basis, but instead, should be used as aids in troubleshooting and post-repair testing. Before alignment is attempted, the technician should first perform the relevant procedures to determine which module needs alignment. These procedures may be used for testing or aligning new and repaired modules. Note there are no adjustment or alignment procedures for the following modules:

a. A1 - Power Distribution
b. A2 - RF Filter
c. A6 - I/O Motherboard and Components
d. A7 - Manual Tuning Module
e. A9 - BFO Switch
f. A10 - Front Panel Control
g. A11-A12 - Switchable Attenuator
h. A13 - Power Input Filter

Chapter 2, contains procedures for energizing and denergizing the receiver.

6-3. TEST EQUIPMENT. The adjustment and alignment procedures outlined in this chapter require use of various items of test equipment. The items necessary are specified for each procedure. Table 6-1 gives information on the specific types of test equipment required for adjustment, alignment, troublshooting and maintenance of the receiver.

6-4. EXTENDER CARDS. Each receiver is equipped with two extender cards, type 791647-1 and -2. These cards are stored in the receiver on two spare motherboard plug-in connectors. The cards are identical, except that one has a card puller and an adjustment tool attached. These extender cards allow access to the pc card for adjustment and/or alignment, as outlined in the following procedures.

6-5. INPUT CONVERTER (A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

a. <u>Test Equipment Required</u>. The following equipment will be required for this test, see table 6-1 for specifics:

(1) Signal generator
(2) RF voltmeter
(3) 50 Ω RF probe

b. <u>Procedures</u>.

(1) Deenergize the receiver and loosen the two captive screws holding the

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Table 6-1. Test Equipment Index

Equipment	Required Characteristics	Recommended Equipment	Alternate
Signal generator	AM,FM,CW,RF output, from -111 to 0 dBM		CAQI-8640B
Oscilloscope	dc to 50 MHz, dual trace	AN/USM-281	CBTV-475-4
RF voltmeter	1 mV to 3.0 V; -50 to +20 dBm	CCVO-91H-S7	
Digital counter	0 - 500 MHz	AN/USM-207	CAQI-5245L
AC voltmeter	1 mV to 300 V, full scale	CAQI-400GL-C01	CAQI-400E
Digital voltmeter	dc ranges, 1% or better	CCUH-8120A	CCUH-8300A-01-02
Sweep generator	100 kHz to 11.0 MHz	SG-1020/UR	CCAQ-1520A
Variable transformer	Metered Output, Variable from 90 to 115 Vac	CN-16B/U	
Variable transformer	Output variable from 180 to 220 Vac	General Radio WSHMT or equivalent	
Headphones	Any 600 Ω mono or stereo headphones		
Dummy Load, 600Ω	4-W dissipution	Two 1200 Ω, 2W resistors in parallel	
Dummy Load, 600Ω	1/2-W dissipation	Two 1200 Ω, 1/4W resistors in parallel	
Summer	2:1, 50 Ω	Mini-Circuits ZSC-2-1 or equivalent	

A3 module to the chassis. Pull the A3 module out and remove its cover. Connect the test equipment as shown in figure 6-1. Exercise caution so that the Input Converter does not short to the adjacent power supply circuitry.

(2) Set the following receiver front panel controls as indicated:

(a) Meter - SIGNAL STRENGTH*
(b) Gain Mode - MAN*
(c) Detection Mode - AM*
(d) RF Gain - Maximum Clockwise
(e) IF Bandwidth kHz - 16*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(3) Energize the receiver.

(4) Set the signal generator to -97 dBm, unmodulated at 15.0050 MHz. Tune the receiver to 15.00500 MHz.

(5) While observing the RF voltmeter, adjust C3 of A3A1 and C1 of A3A2 for a maximum meter reading of approximately -15 dBm (40 mV).

(6) Deenergize the receiver.

(7) Disconnect test equipment.

(8) Replace the cover on the Input Converter and reinstall it in the receiver chassis.

6-6. IF MOTHERBOARD (A4). This paragraph will cover the various items located on the IF Motherboard.

a. <u>10.7 MHz Filter Switch (A4A1).</u>

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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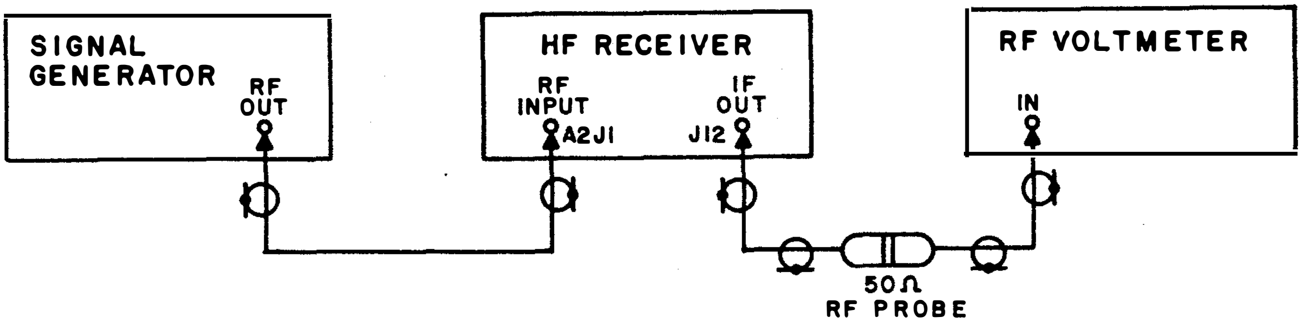

Figure 6-1. Input Converter Alignment, Test Setup

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

(a) Signal generator
(b) RF voltmeter

(2) Procedures.

(a) Deenergize the receiver.

(b) Set up test equipment as described and illustrated in figure 6-2. Disconnect P28, the 10.7 MHz input to the IF strip (at jack A2J2 of the Input Converter). Feed a 10.7 MHz unmodulated signal at -50 dBm level into P28 or the TP1 input of the IF Motherboard as shown in figure 6-2.

(c) Remove cards A4A1 and A4A2.

NOTE

A4A2 is removed to eliminate loading.

(d) Place A4A1 on an extender card.
(e) Energize the receiver.

(f) Connect the input of the RF voltmeter, terminated in 50 Ω, to TP2.

(g) Depress the IF Bandwidth kHz 3.2 button and adjust R26 for a -36 dBm reading.

(h) Depress the IF Bandwidth kHz 6 button and adjust R28 for a -36 dBm reading.

(i) Depress the IF Bandwidth kHz 16 button and adjust R30 for a -36 dBm reading.

(j) Deenergize the receiver.

(k) Disconnect the test equipment.

(l) Reinstall cards A4A1 and A4A2 into their proper slots.

b. 455 kHz Amplifier/AM Detector, Response Alignment (A4A7).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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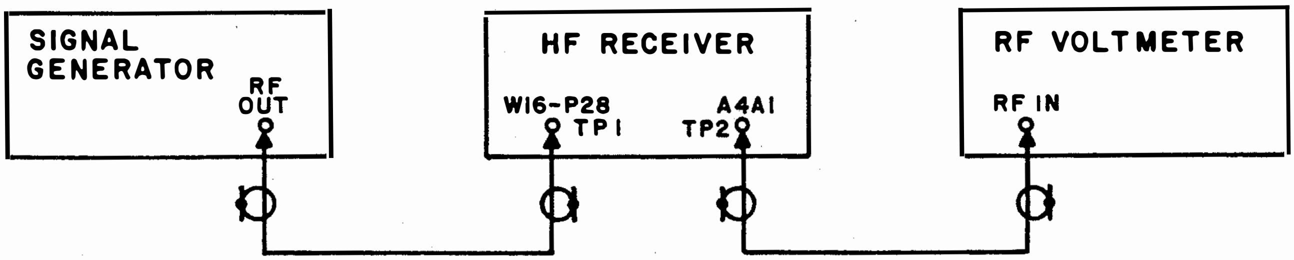

Figure 6-2. 10.7 MHz Filter Switch Adjustment, Test Setup

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

(a) Signal generator
(b) Oscilloscope
(c) Sweep generator
(d) 2:1 Summer

(2) Procedures.

(a) Deenergize the receiver.

(b) Remove cards A4A3, A4A7 and A4A10.

(c) Place card A4A7 on an extender card.

(d) Connect the test equipment as shown in figure 6-3.

(e) Set up the sweep generator as follows:

1 Power - ON
2 CW/Sweep - SYM
3 Trig/Line/Free - Line
4 Fast/Slow/Manual - Fast
5 Crystal Cal - OFF
6 Range - 11
7 Sym Sweep width Vernier -.1/1
8 1 kHz Mod - OFF
9 Output Level - -60 dBm
10 Frequency - 455 kHz

(f) Set up the signal generator for a 455 kHz output, unmodulated, at -80 dBm.

(g) Set the following receiver front panel controls as indicated:

1 Gain Mode - MAN*
2 RF Gain - Maximum Clockwise

* Note the appearance at the yellow indicator in the pushbutton when depressed.

(h) Energize the receiver.

(i) Adjust the sweep generator frequency control to center the response pattern on the oscilloscope screen.

(j) adjust A4A7L2 and A4A7L3 for an oscilloscope waveform which has maximum amplitude and is symmetrical about

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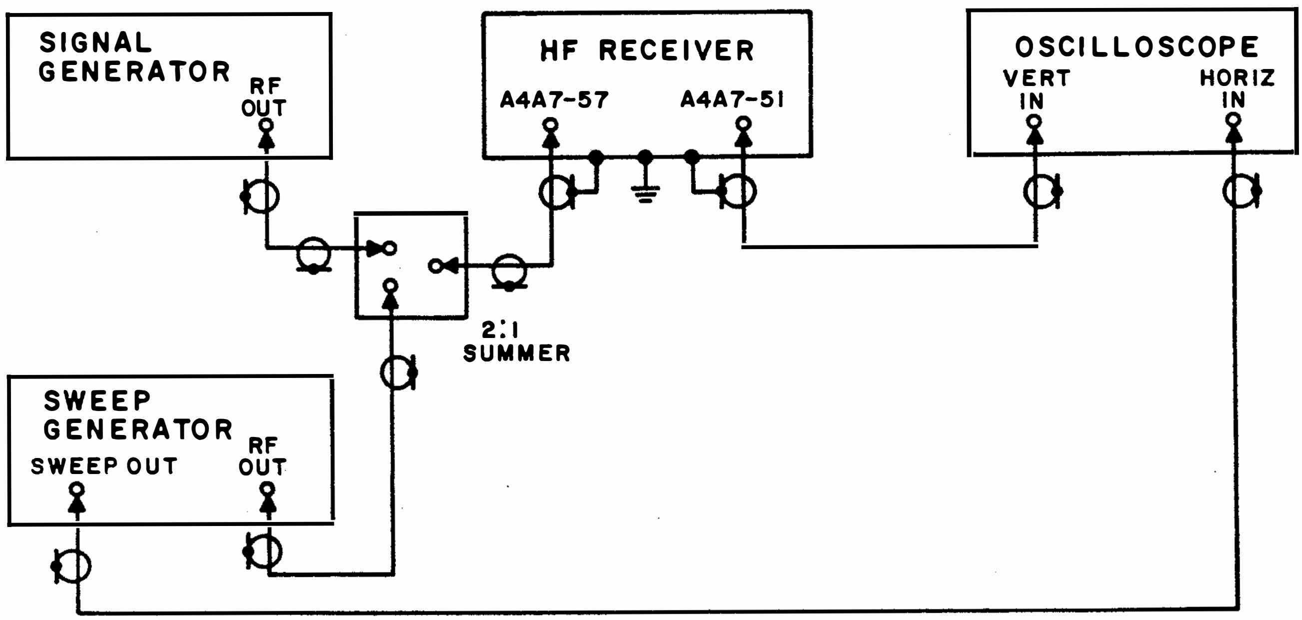

Figure 6-3. 455 kHz Amplifier/AM Detector Response Alignment, Test Setup

the marker. See figure 6-4 for a typical waveform.

(k) Deenergize the receiver.

(l) Disconnect the test equipment.

(m) Reinstall cards A4A3, A4A7 and A4A10 into their proper slots.

c. 455 kHz Amplifier/AM Detector, Gain Adjustment (A4A7).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

(a) Signal generator

Courtesy of http://BlackRadios.terryo.org

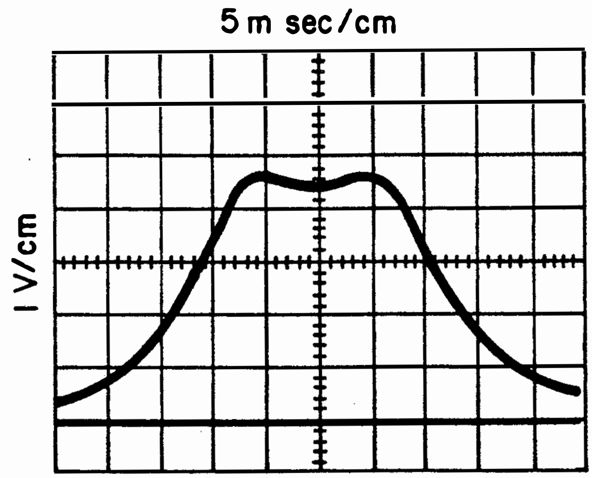

Figure 6-4. 455 kHz Amplifier/AM Detector Response Alignment, Typical

(b) RF voltmeter
(c) 50 Ω RF probe

(2) Procedures.

(a) Deenergize the receiver.

(b) Connect the test equipment as shown in figure 6-5.

(c) Set the following receiver front panel controls as indicated:

1 Meter - SIGNAL STRENGTH*
2 Gain Mode - MAN*
3 Detection Mode - AM*
4 RF Gain - Maximum Clockwise
5 IF Bandwidth kHz - 6*

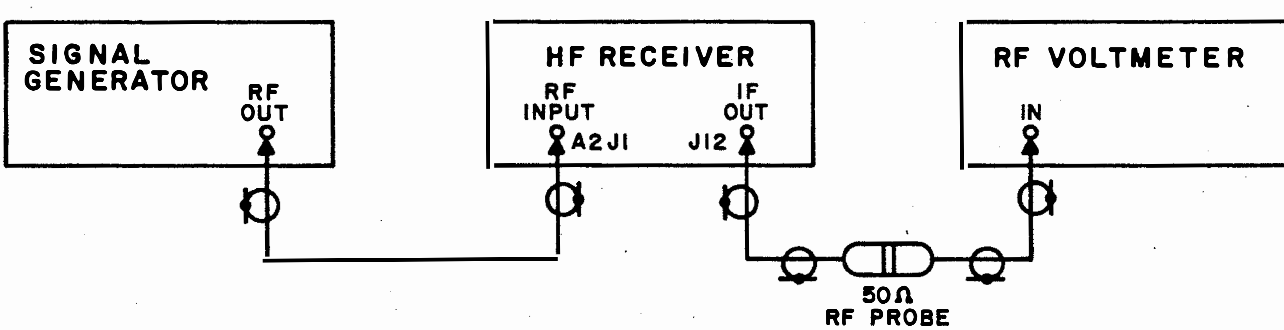

Figure 6-5. 455 kHz Amplifier, AM Detector Gain Adjustment, Test Setup

Courtesy of http://BlackRadios.terryo.org

* Note the appearange of the yellow indicator in the appropriate pushbutton when depressed.

(d) Energize the receiver.

(e) Set the RF voltmeter to the 100 mV scale.

(f) Set the signal generator to 15.0050 MHz, unmodulated at -97 dBm (3μV).

(g) Tune the receiver to 15.00500 MHz.

(h) Adjust A4A7R7 for a 40 mV reading on the RF voltmeter.

(i) Deenergize the receiver.

(j) Disconnect the test equipment.

d. USB and ISB/LSB Filter Switches (A4A4 and A4A5). This adjustment is used to equalize the output levels of A4A4 and A4A5.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A signal generator will be required for this test, see table 6-1 for specifics.

(2) Procedures.

(a) Deenergize the receiver.

(b) Connect the RF output of the signal generator to RF Input connector A2J1.

(c) Put card A4A4 on an extender card.

(d) Set the following receiver front panel controls as indicated:

1 Meter - SIGNAL STRENGTH*
2 Gain Mode - MAN*
3 Detection Mode - AM*
4 RF Gain - Maximum Clockwise
5 Phone Level - At the midpoint
6 IF Bandwidth kHz - 16*

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(e) Energize the receiver.

(f) Tune the receiver to 15.00500 MHz and set the Signal Generator to a 15.0050 MHz unmodulated signal.

(g) Adjust the signal generator output level until the Signal Strength meter reads the SET level.

(h) Change the signal generator frequency to 15.0054 MHz and the receiver Detection Mode to USB.

(i) Adjust potentiometer A4A4R23 until the meter reads the SET level or until R23 is at its maximum setting, whichever occurs first. Record the meter level.

(j) Deenergize the receiver. Replace card A4A4 in its proper slot. Put card A4A5 on an extender card.

(k) Energize the receiver. Change the signal generator frequency to 15.0046 MHz and the receiver Detection Mode to LSB.

(l) Adjust potentiometer A4A5R32 until the meter reads the level obtained in step (i). If the step (i) level cannot be obtained, set A4A5R32 at its maximum setting, record the meter reading, and perform steps (m) through (p).

(m) Deenergize receiver. Replace A4A5 in its proper slot. Put A4A4 on an extender card.

(n) Energize the receiver. Change the signal generator frequency to 15.0054 MHz and the receiver Detection Mode to USB.

Courtesy of http://BlackRadios.terryo.org

(o) Adjust potentiometer A4A4R23 until the meter reads the level obtained in step (l).

(p) Deenergize the receiver.

(q) Disconnect the test equipment. Replace A4A4, A4A5 in their proper slots.

e. ISB Detector/Audio (A4A8).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

(a) Signal generator
(b) Oscilloscope
(c) Stereo phone plug
(d) BNC TEE
(e) 600 Ω terminator

(2) Procedures.

(a) Deenergize the receiver.

(b) Connect the test equipment as shown in figure 6-6.

(c) Set the following receiver front panel controls as indicated:

1 Gain Mode - MAN*
2 Detection Mode - ISB*
3 RF Gain - Maximum Clockwise
4 Phone Level - Maximum Clockwise.

* Note the appearance of the yellow indicator in the appropriate pushbutton when depressed.

(d) Energize the receiver.

(e) Set the signal generator to a -105 dBm, unmodulated signal, at 15.0054 MHz.

(f) Tune the receiver to 15.00500 MHz.

(g) With equipment connected properly, a 400 Hz audio output of ~ 26 V p-p should be seen on the oscilloscope.

(h) Adjust the Phone Level gain control on the front panel for the maximum oscilloscope waveform, without clipping or distortion present. Record this reading. This is the Upper Sideband signal.

(i) Change the signal generator frequency to 15.0046 MHz.

(j) Connect the oscilloscope to the ring on the phone jack. This is the Lower Sideband signal.

(k) Adjust A4A8R8 to obtain the same output obtained in step (h) above, or until output is at its maximum.

(l) If the same level as in step (h) cannot be obtained, repeat steps (c) through (j), with the exception of lowering the Phone Level gain control slightly each time, so that step (h) (USB) and step (j) (LSB) waveforms are the same.

(m) Deenergize the receiver.

(n) Disconnect the test equipment.

f. FM Discriminator (A4A9).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

Courtesy of http://BlackRadios.terryo.org

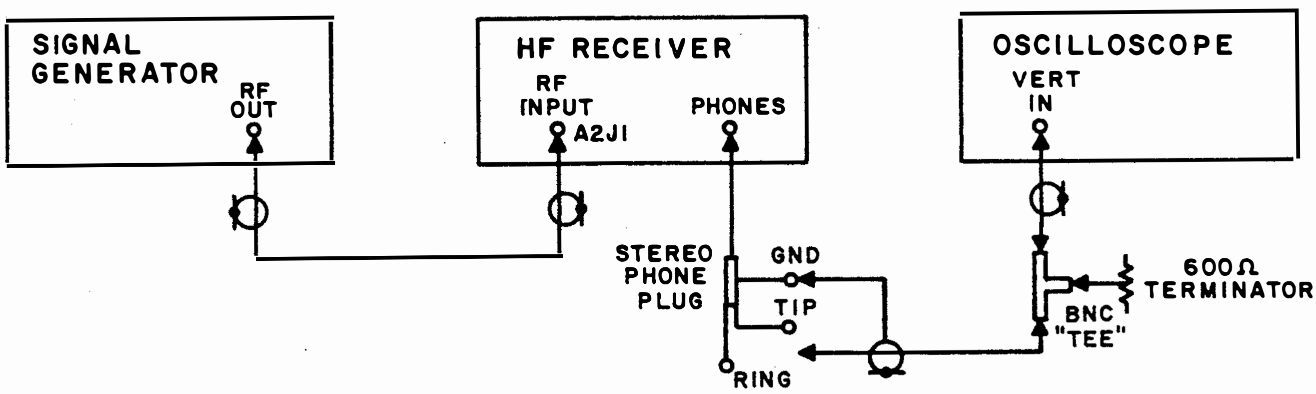

Figure 6-6. ISB Detector/Audio Adjustment, Test Setup

(a) Signal generator
(b) Sweep generator
(c) Oscilloscope
(d) 2:1 Summer

(2) Procedures.

(a) Deenergize the receiver.

(b) Remove cards A4A7, A4A9 and A4A10.

(c) Place card A4A9 on an extender card.

(d) Connect the test equipment as shown in figure 6-7.

(e) Set up the sweep generator as follows:

1 Power - ON
2 CW/Sweep - SYM
3 Trig/Line/Free - Line
4 Fast/Slow/Manual - Fast
5 Crystal Cal - OFF
6 Range - 11
7 Sym Sweep Width Vernier -.1/1
8 1 kHz Mod - OFF
9 Output Level - -10 dBm
10 Frequency - 455 kHz

(f) Set up the signal generator for a 455 kHz output, unmodulated, at -25 dBm.

(g) Set the receiver front panel Detection Mode control to FM. Note the appearance of the yellow indicator when the pushbutton is depressed.

(h) Energize the receiver.

Courtesy of http://BlackRadios.terryo.org

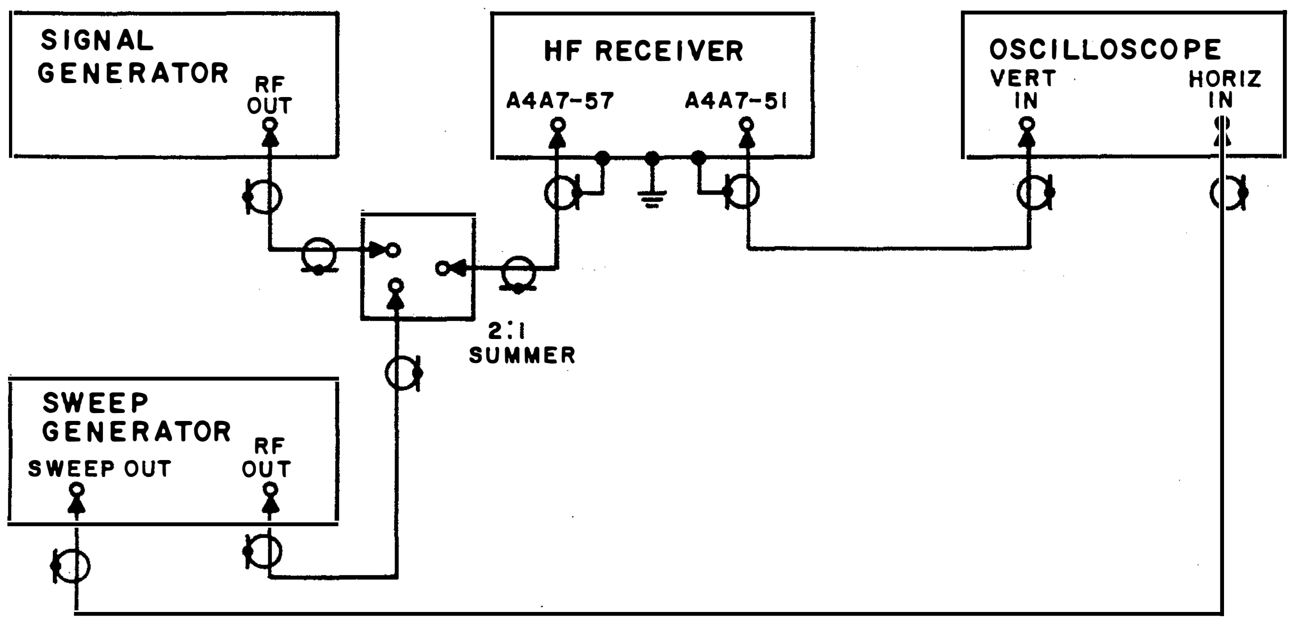

Figure 6-7. FM Discriminator Alignment, Test Setup

(i) Adjust the sweep generator frequency control to center the response pattern on the oscilloscope screen.

(j) Adjust A4A9L1 and A4A9T1 for an oscilloscope waveform which has maximum amplitude and is symmetrical and linear about the marker. See figure 6-8 for a typical waveform.

(k) Deenergize the receiver.

(l) Disconnect the test equipment.

(m) Reinstall cards A4A7, A4A9 and A4A10 into their proper slots.

6-7. SYNTHESIZER MOTHERBOARD (A5). This paragraph will cover the various items located on the Synthesizer Motherboard.

a. 1st LO Synthesizer (A5A1). The only alignment points for the 1st LO Synthesizer are in the 1st LO Voltage Controlled Oscillator (A5A1A1) which is a very sensitive circuit. Care must be taken to ensure proper operation. This procedure should be performed only when a definite alignment is needed.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is needed to complete this test, see table 6-1 for specifics.

Courtesy of http://BlackRadios.terryo.org

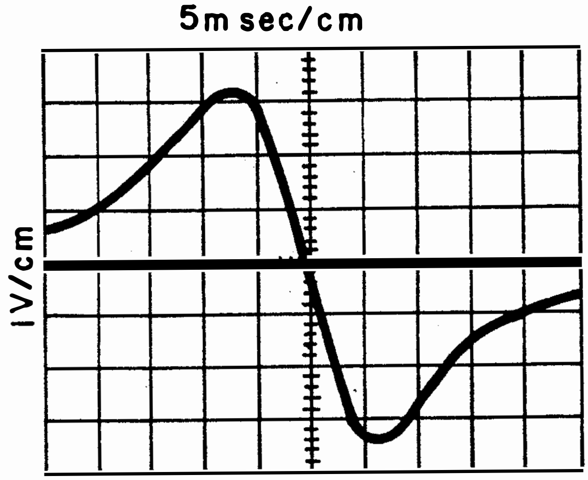

Figure 6-8. FM Discriminator Alignment, Typical Waveform

(2) Procedures.

(a) Deenergize the receiver.

(b) Mount the 1st and 3rd LO synthesizers card on extender cards.

(c) Remove the VCO front plate.

(d) Connect the digital voltmeter to module pin B1.

(e) Energize the receiver.

(f) Align the VCO from Band 0 to 7. Table 6-2 lists the components and their parameters used in this alignment. As may be noted from the table, be aware that components L2, L3 and L4 align the VCO in more than one band.

(g) Align each VCO band monitoring the voltage at module pin B1. Then check the 1st LO frequency band (test point E3 in the VCO) while dialing the tuned frequency in 10 kHz steps starting with 00.00000 MHz.

(h) Deenergize the receiver. Disconnect voltmeter, replace the VCO front plate and replace the 1st and 3rd LO syntheizers card in its proper slots.

b. 2nd LO Synthesizer (A5A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. The following equipment will be required for this test, see table 6-1 for specifics:

(a) Digital voltmeter
(b) Frequency counter

Courtesy of http://BlackRadios.terryo.org

Table 6-2. VCO Alignment Parameters

VCO Band	1st LO Freq Band (MHz)	Voltage Pin B1 (Typical)	Alignment Component
0	42.91-46.90	-8.5 to 6.0	C6*, L1
1	46.91-50.90	-7.5 to 4.1	L2
2	50.91-54.90	-7.2 to 2.8	L3
3	54.91-54.90	-5.3 to 3.9	L2, L3
4	58.91-62.90	-6.6 to 2.7	L4
5	62.91-66.90	-6.0 to 2.2	L4, L2
6	66.91-70.90	-6.2 to 0.4	L3, L4
7	70.91-72.90	-5.7 to -3.0	L4, L3, L2

* Factory Select Value

(2) Procedures. This procedure consists of a 32 MHz Loop Alignment, a Programmable Loop Alignment, and an Output Loop Alignment. Perform the procedure in the given sequence.

CAUTION

For optimum results, the 2nd LO Synthesizer alignment should be performed in an ambient temperature of +25° C ±5° C.

(a) Deenergize the receiver.

(b) Mount the 2nd LO Synthesizer card on an extender card.

(c) Energize the receiver. Allow 30 minutes for warm-up of the equipment.

(d) Using a digital voltmeter, verify that +15 Vdc ±0.75 Vdc is present at pins B5, B41, and A59, and that +5 Vdc ±0.25 Vdc is present at pins A1, B1, and B45.

(e) Using a frequency counter, verify that the 1 MHz reference frequency at pin B49 is 1.000000 MHz and that the 10 kHz reference frequency at pin A57 is 10.000 kHz.

NOTE

If the two reference frequencies are not correct, perform the Time Base Adjustment Procedure before proceeding with the 2nd LO Synthesizer alignment.

(f) 32 MHz loop alignment.

1 Connect the digital voltmeter to test point E1.

2 Adjust capacitor C51 until a voltmeter reading of +3.0 Vdc is observed with the alignment tool withdrawn from the VCO shield.

(g) Programmable loop alignment.

1 Connect the digital voltmeter to test point E3.

2 Tune the receiver to 00.00499 MHz.

3 Insert an alignment tool in the VCO shield opening and spread or squeeze the turns of L8 until a voltmeter reading of +4.0 Vdc is observed with the alignment tool withdrawn from the VCO shield.

Courtesy of http://BlackRadios.terryo.org

(h) Output loop alignment.

1 Connect the digital voltmeter to test point E2.

2 Tune the receiver to 00.00499 MHz.

3 Adjust capacitor C61 until a voltmeter reading of +3.0 Vdc is observed with the alignment tool withdrawn from the VCO shield.

4 Using the frequency counter, verify that a frequency of 32.205010 MHz ±3 Hz is present at output pin B15.

(i) Final adjustments.

1 Deenergize the receiver.

2 Remove the 2nd LO Synthesizer board from the extender card and return it to the receiver.

3 Mount the top protective cover on the receiver (use only four fasteners to secure the top cover).

4 Energize the receiver and allow it to operate for a minimum of 30 minutes.

5 Tune the receiver to 00.00499 MHz.

6 With the receiver in operation, remove the botton protective cover.

7 Using the digital voltmeter, check the Loop Test Point voltages as indicated in table 6-3.

NOTE

Test Point Voltages may drift from initial settings. If any Test Point Voltage is not within tolerance, repeat the appropriate loop alignment procedure. Set the Test Point Voltage(s) high or low as required to compensate for any drift observed in step 7. Do not proceed to step 8 until the voltages in table 6-3 are observed after the receiver has been in operation for 30 minutes with both covers in place.

8 Using the frequency counter, verify that a frequency of 32.2005010 MHz ±3 Hz is present at pin A5XA2-B15.

9 Tune the receiver first to 00.00000 MHz and then to 00.00999 MHz. The approprite Loop Test Point Voltages and the 2nd LO Output Frequency are given in table 6-4.

10 Remount the top protective cover on the receiver.

c. 2nd LO Filter.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. An RF voltmeter and a 50 Ω adapter are required for this test, see table 6-1 for specifics.

(2) Procedures.

(a) Deenergize the receiver.

(b) Disconnect connector P4 from A2J1 of the Input Converter (A3).

(c) Connect the RF voltmeter and 50 Ω adapter to P4.

(d) Set the voltmeter to the 0 dBm (0.3 mV) scale and energize the receiver.

(e) Adjust A5C13 for the maximum voltmeter reading. A5C13 is located on the bottom side of the Synthesizer Motherboard (A5) near the front panel of the receiver.

(f) Deenergize the receiver. Disconnect voltmeter and reconnect P4.

d. 3rd LO Synthesizer (A5A1A2).

Courtesy of http://BlackRadios.terryo.org

Table 6-3. Loop Test Point Voltages

Parameter	Pin Number	Test Point Voltage
32 MHz loop TP	A5XA2-B57	+3 Vdc ±0.1 Vdc
Programmable loop TP	A5XA2-A51	+4 Vdc ±0.1 Vdc
Output loop TP	A5XA2-A55	+3 Vdc ±0.1 Vdc

Table 6-4. 2nd LO Synthesizer Tuning Parameters

Parameter	Pin Number	Receiver Tuned Frequency	
		00.00000 MHz	00.00999 MHz
32 MHz loop TP	A5XA2-B57	+3 Vdc ±0.2 Vdc	+3 Vdc ±0.2 Vdc
Programmable loop TP	A5XA2-A51	1.5 Vdc	7.0 Vdc
Output loop TP	A5XA2-A55	+3 Vdc ±0.2 Vdc	+3 Vdc ±0.2 Vdc
2nd LO frequency	A5XA2-B15	32.21000 MHz	32.20010 MHz

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is required for this test, see table 6-1 for specifics.

(2) Procedures.

(a) Deenergize the receiver.

(b) Mount the 1st and 3rd LO Synthesizer on extender cards and connect the digital voltmeter to pin 8 of U22.

(c) Energize the receiver. Adjust capacitor C33 until a reading of 3.0 Vdc is seen on the voltmeter.

(d) Deenergize the receiver and disconnect digital voltmeter.

e. 2 MHz Time Base (A5A1A2).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital counter is required for this test, see table 6-1 for specifics.

Courtesy of http://BlackRadios.terryo.org

(2) Procedures.

NOTE

Before performing the following adjustment, the receiver should have been in operation for at least one hour at normal operation temperature to allow the circuit to stabilize.

(a) Deenergize the receiver.

(b) Mount the 1st and 3rd LO Synthesizer (A5A1A2) on extender cards.

(c) Connect the digital counter to the rear panel 1 MHz Ref connector J11.

(d) Set the rear panel Clock switch S2 to the INT position.

(e) Energize the receiver. Allow at least a 5 minute warm-up to stabilize the circuits. (This assumes power was not off more than 5 minutes to make the cable connections.)

(f) While observing the counter display, adjust the 2 MHz crystal oscillator (U14) for a reading of 1.000000 MHz ±3 Hz.

(g) Deenergize the receiver and disconnect the digital counter. Replace card A5A1A2 into its proper slot.

f. BFO Synthesizer (A5A3).

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

(1) Test equipment required. A digital voltmeter is required for this test, see table 6-1 for specifics.

(2) Procedures. Two alignments are required for the BFO Synthesizer. Capacitor C8 and resistor R1 are interdependent and must be aligned simultaneously.

(a) Deenergize the receiver.

(b) Mount the BFO Synthesizer card on extender cards.

(c) Connect the digital voltmeter between module pin 7 and ground. Energize the receiver.

(d) Adjust C8 until the closest reading to 3.0 Vdc is seen at module pin 7.

(e) Connect the digital voltmeter between pins 3 and 2 of Q4.

(f) Adjust R1 until the voltage difference between gate to source of Q4 (Pins 3 and 2) is 0 Vdc. (The voltage from gate to ground and from source to ground will be approximately 1.2 Vdc.)

(g) Adjust C8 again until the closest reading to 3.0 Vdc is seen at module pin 7.

(h) Deenergize the receiver. Disconnect the voltmeter.

(i) Replace card A5A3 in its proper slot.

6-8. FREQUENCY DISPLAY (A8). The intensity of the front panel LED display may be varied. No test equipment is required.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

To vary the intensity, adjust potentiometer R2, located inside the front panel on the left side of the Frequency Display LED's. Turning R2 clockwise increases intensity.

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SECTION II

REPAIR

6.9. GENERAL. This section contains removal and repair procedures that are not obvious or that present hazards to personnel or equipment.

WARNING

To prevent electrical shock or damage, always disconnect the receiver from the power source before removing modules or when soldering or replacing components.

6-10. ACCESS. All modules are readily accessed. Refer to Chapter 7 for location of modules and components. Modules and components on the front panel are accessed by removing the three screws on each end of the front panel (under the handles) and tilting the front panel forward.

6-11. SOLDERING TECHNIQUES. When removing components from a printed circuit card for inspection or replacement, be especially careful not to damage the track. The soldering iron power should be no greater than 40 W, and a solder sipper or wicking procedure should be employed when removing solder. Non-corrosive soldering flux should be used when removing solder by wicking. In returning components to the card, make sure that holes are clear and that leads do not catch the edge of the track and lift it from the card. A good grade of rosin core 60/40 solder should be used. Heat no longer than is necessary to achieve a good joint. A heat sink should be used where possible.

6-12. COMPONENT REPLACEMENT. Specific guidelines for replacing the various kinds of components are as follows:

(1) When soldering or unsoldering diodes or resistors, solder quickly to allow as little heat conduction as possible. When wiring permits, use a heat sink between the soldering iron and the part.

(2) When soldering or unsoldering transistors, use a low wattage iron and a heat sink. Solder as quickly as possible. The use of a circular soldering tip to heat all three or four joints simultaneously is recommended.

(3) When soldering or unsoldering glass or ceramic capacitors, use a heat sink between the capacitors and the iron. Excessive heat will crack the capacitor body.

(4) When any electronic part is removed, note the position of the part and its leads, and replace it the same way.

6-13. REALIGNMENT. Replacement of semiconductors or tuned circuit components may affect the alignment of the PC card being repaired. Realignment may be necessary to return the PC card to normal operation. Refer to Section I of this Chapter for the appropriate procedures.

Courtesy of http://BlackRadios.terryo.org

CHAPTER 7

PARTS LIST

7-1. INTRODUCTION.

7-2. This chapter contains a list of electrical parts and its attaching hardware for the Receiving Set, Radio AN/URR-74(V)2. The contents is broken down into six basic parts. These describe the list of major components, parts list, list of common item descriptions, list of attaching hardware, list of manufacturers and parts location illustrations. Explanations of how to use these lists are described below.

7-3. LIST OF MAJOR UNITS

7-4. Table 7-1, List of Major Components, lists the major assembly and its page number in the parts list and where the breakdown for that assembly begins.

7-5. PARTS LIST.

7-6. Table 7-2, Parts List, contains a list of parts used in the Receiving Set, Radio AN/URR-74(V)2 and describes the characteristics of each part.

7-7. The Reference Designation column is arranged by major assemblies or units in Reference Designation order. That is, Unit 1 with its parts, etc. and next the major assembly with its parts etc. All parts attached to the unit are listed first in alphanumerical order as follows:

Unit	1
(Piece Parts)	1C1 1E1 etc.
Assembly	1A1
(Assembly Parts)	1A1C1 1A1J1 etc.
Subassembly	1A1A1
(Subassembly parts)	1A1A1C1 1A1A1C2 etc.

7-8. The Name and Description column indicates the nomenclature and electrical and mechanical descriptions of the part. The manufacturers code ident. and part or drawing number is also indicated.

7-9. Subsequent appearances of the same parts are referenced to the first appearance of that item; such as, 1C9 CAPACITOR: same as 1C1 etc. Parts which appear more than 5 times in the list are referenced in table 7-3 List of Common Item Descriptions by item number; for example item 1P15 reads connector: see item 6. The full description for this item can be found under item 6 in the list of common item descriptions. When attaching hardware is used more than 5 times it will also be referenced to a item number in table 7-4 (List of Attaching Hardware.)

7-10. The Figure Number column shows the location of the part on the illustration by figure number and item number enclosed in parenthesis (i.e., 7-3(6)).

7-11. LIST OF COMMON ITEM DESCRIPTIONS.

7-12. Table 7-3, List of Common Item Descriptions, describes the parts in the parts list which are used more than 5 times. Similar parts are grouped and arranged in alphabetical order. Item numbers are assigned consecutively, for example:

Item Number	Description
1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.1 µF PORM 20 PCT 5 Vdc WORKING, MFR. 14632, PART NO. 34475-1

Courtesy of http://BlackRadios.terryo.org

2 CAPACITOR, CERAMIC, FEED-THRU: 0.01 µF, 20 PCT 600 Vdc, W/LUG TERMINALS, MFR 96733, PART NO. F1A6103K

7-13. LIST OF ATTACHING HARDWARE.

7-14. Table 7-4, List of Attaching Hardware, indicates the attaching hardware used five or more times within the parts list. Items are listed in letter code sequence and contain item nomenclature and description. They are indicated in the parts list by letter code and quantity in parenthesis, for example, (attaching parts) A(6). Items used for fewer than 5 times are completely identified on the parts list.

7-15. LIST OF MANUFACTURERS.

7-16. Table 7-5, List of Manufacturers contains the names, addresses, and Manufacturers Federal Supply Code identification (H4-2). This list is presented in numerical code ident. sequence.

7-17. PARTS LOCATION ILLUSTRATION.

7-18. Figures 7-1 through 7-41 are included to provide positive and rapid location of the parts listed in the parts list.

Table 7-1. List of Major Units

UNIT NUMBER	NOMENCLATURE NAME OF UNIT	NOMENCLATURE DESIGNATION	PAGE NUMBER
Unit 1	Receiving Set, Radio	AN/URR-74(V)2	7-

Courtesy of http://BlackRadios.terryo.org

TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1		RECEIVER, RADIO AN/URR-74(V)2: Receives AM, FM, CW, USB, LSB and ISB Emissions over frequency range of 5 kHz to 29.99999 MHz; mfr. 14632, part no. WJ-8718/NAV/MI	7-1, 7-2, 7-3
1C1		CAPACITOR: See item 12	7-2 (1)
1C2		CAPACITOR: See item 12	7-2 (1)
1C3		CAPACITOR: See item 12	7-2 (1)
1C4		CAPACITOR: See item 12	7-2 (1)
1C5		CAPACITOR: See item 10	7-2 (2)
1C6		CAPACITOR: See item 10	7-2 (2)
1C7		CAPACITOR: See item 4	7-3 (3)
1C8		CAPACITOR: See item 4	7-3 (3)
1C9		CAPACITOR: See item 4	7-3 (3)
1C10		CAPACITOR: See item 4	7-3 (3)
1C11		CAPACITOR: See item 4	7-3 (3)
1C12		CAPACITOR: See item 4	7-3 (3)
1C13		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 2.5-11 pF, 350 Vdc N300, mfr. 72982, part no. 538-01182-5-11	7-3 (4)
1C14		CAPACITOR: See item 12	7-3 (1)
1C15		CAPACITOR: See item 4	7-3 (3)
1CR1		SEMICONDUCTOR DEVICE, DIODE: 200 V, 5.0 Amp Maximum, 10-32 Stud Mount, mfr. 80131, part no. 1N1614	7-1 (5)
1CR2		SEMICONDUCTOR DEVICE, DIODE: Same as 1CR1	7-1 (5)
1E1		Terminal, Stud: Insulated, 21/32 high 4-40 X 5-32 Deep Female Thread, mfr. 92825. part no. 7A1A1	7-3 (6)
1E2		TERMINAL: Same as 1E1	7-3 (6)
1E3		TERMINAL: Same as 1E1	7-3 (6)
1E4		TERMINAL, STUD: Double Turret, 4-40, Tapped Mount, mfr. 71279, part no. 160-2381-01-05-00	7-3 (7)
1E5		TERMINAL, STUD: Feed thru insulated, Teflon Base Gold Finish Post, .157 Dia. Mounting, mfr. 04013, part no. SFU16Y	Not Shown

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1E6		TERMINAL: Same as 1E5	Not Shown
1E7		TERMINAL: Same as 1E5	Not Shown
1E8		TERMINAL: Same as 1E5	
1F1		FUSE, CARTRIDGE: 1 Amp, 3 AG, Slow Blow, 1/4 inch by 1 1/4 inch long. Glass Tube, mfr. 71400, part no. MDL1	7-1 (8)
1F2		FUSE: Same as 1F1	7-1 (8)
1J1	W14	CONNECTOR: See item 18	7-2 (9)
1J2		CONNECTOR, RECEPTACLE, ELECTRICAL: 9 position, D Style accepts No. 20 Crimp sockets, mfr. 00779, part no. 205203-1	7-3 (10)
1J3	W2	CONNECTOR: See item 18	7-2 (9)
1J4	W3	CONNECTOR: See item 18	7-2 (9)
1J5	W4	CONNECTOR: See item 18	7-2 (9)
1J6		CONNECTOR, RECEPTACLE, ELECTRICAL: Sub-Miniature, Straight, 50 Ω, Gold Plated, mfr. 80058, part no. UG1619	7-3 (11)
1J7	W12	CONNECTOR: See item 18	7-3 (9)
1J8	W13	CONNECTOR: See item 18	7-3 (9)
1J9	W9	CONNECTOR: See item 18	7-3 (9)
1J10	W10	CONNECTOR: See item 18	7-3 (9)
1J11	W11	CONNECTOR, RECEPTACLE, ELECTRICAL: STR RR MT T0-0.24 Thick Dual, Crimp RG174, mfr. 00779, part no. 225398-7	7-1 (12)
1J12	W15	CONNECTOR: Same as 1J11	7-1 (12)
1J13		Jack, Telephone: 3 conductor open Ckt. Mfr. 82389, Part No. L12B	7-1 (13)
1J14		CONNECTOR, RECEPTACLE, ELECTRICAL: Multiplin, 13 sockets, Box Mount mfr. 77820, part no. JTP02RE10-13S	7-1 (14)
1M1		METER, SIGNAL, STRENGTH: 0-1 MA DC with zero adjust, 1.75 in. wide by 1.75 in. high by 1.625 deep, mfr. 14632, part no. 380122	7-1 (15)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1M2		METER, ELAPSED, TIME: 0-9999 hours 0.5 inch square with UN-ASSEMBLED Mounting Flange, mfr. 82227, part no. K19763 W	7-1 (16)
1MP1		HANDLE, BOW: Die cast zinc allowy ASTMAC41A (XXV), bright chrome electroplate. 5.15 inch long by .38 inch wide by 1.75 inch high. 3, .188 DIA Holes spaced 1.875 off center and 2 ea. 6-32 Tapped Holes 4.750 Apart mfr. 14632, part no. 32306	7-1 (17)
1MP2		WINDOW DISPLAY: Non-Glare Circular Polarized Plastic Filter, Gray .030 THK. by 4.23 inch long by .80 inch wide. mfr. 14632, part no. 18390-1	7-1 (18)
1MP3		KNOB: Round, Indicator Dot, .720.D. .250 Shaft Glossy Black, mfr. 21604 part no. PS70D1/8	7-1 (19)
1MP4		SWITCH BUTTON: Shell with Yellow Indicator .677 in. Long by .355 in. Wide by .689 in. Deep mfr. 31918, part no. FA101-Blk w/yel	7-1 (20)
1MP5		HANDLE: Round .31 Dia 4 in. Mtg Centers 10-32 Tap Holes, Nickel Plated, mfr. 88245, part no. B1012-12	7-1 (21)
1MP6		DIODE MOUNTING HARDWARE: For case 56, Contains 10-32 Acorn nut, steel lock washer, solder terminal Flat steel washer, Mica washer and Teflon Bushing, mfr. 14632, part no. 280060	7-1 (22)
1MP7		HOUSING; RECEPTACLE: Insulated Pods, Nylon, Straight Style, .790 Long by .230 Wide by .235 High, mfr. 00779, part no. 1-480417-0	7-2 (23)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1MP8		TRANSISTOR COVER: T0-3 Nylon with snap in screw insulator, mfr. 13103, part no. 8903NW	7-1 (24)
1MP9		SWITCH BUTTON: Shell with Red Indicator, .677 in. Long by .355 in. Wide by .689 in. Deep, mfr. 31918 part no. FA101-Blk W/Red	7-1 (25)
1MP10		COVER ASSEMBLY, TOP: .050 THK AL, ALY. SHT 5052-H32 Chemical Film chromate finish. 16.62 in. Wide by 18.75 in. Long, mfr. 14632, part no. 580031-1	Not shown
1MP11		COVER ASSEMBLY, BOTTOM: .050 THK AL ALY. SHT. 5052-H32 Chemical Film chromate finish. 16.62 in. Wide by 18.75 in. Long, mfr. 14632. part no. 580031-2	Not Shown
1MP12		EXTENDER CARD: Etched Circuit Board, epoxy resin glass base laminate w/1 oz. copper circuit, 4.30 in. Wide by 3.25 in. Long by .50 in. Thick, mfr. 14632, part no. 791647-1	Not Shown
1MP13		EXTENDER CARD: Etched Circuit Board, epoxy resin glass base laminate w/1 oz. copper circuitry 4.30 in. Wide by 3.25 in. Long by .50 in. Thick, mfr. 14632, part no. 791647-2	Not Shown
1MP14		CONNECTOR, RECEPTACLE, ELECTRICAL: 3 socket cylindrical with cable clamp and 0 Ring, mfr. 96906, part no. MS3106F-16S-5S	Not Shown
1MP15		CONNECTOR, PLUG, ELECTRICAL: Multipin 13 pins with strain relief clamp, mfr. 77820, part no. JT06A10-13P-SR	Not Shown
1P1		Not Used	
1P2		Not Used	
1P3	W2	CONNECTOR: See item 17	7-2 (26)
1P4	W4	CONNECTOR: See item 17	7-2 (26)
1P5	W3	CONNECTOR: See item 17	7-2 (26)
1P6		CONNECTOR: See item 20	7-3 (27)
1P7	W5	CONNECTOR: See item 17	7-2 (26)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1P8	W5	CONNECTOR: See item 17	7-3 (26)
1P9	W6	CONNECTOR: See item 16	7-3 (28)
1P10	W6	CONNECTOR: See item 16	7-3 (28)
1P11	W7	CONNECTOR: See item 16	7-3 (28)
1P12	W7	CONNECTOR: See item 16	7-3 (28)
1P13		CONNECTOR, PLUG ASSEMBLY: Consist of Housing 3 position, Contact, No. 24 AWG Wire, 50 ohm coax cable, mfr. 14632, part no. 34704	7-3 (29)
1P14	W9	CONNECTOR: See item 22	7-3 (30)
1P15	W10	CONNECTOR: See item 22	7-3 (30)
1P16	W11	CONNECTOR: See item 22	7-3 (30)
1P17	W12	CONNECTOR: See item 22	7-3 (30)
1P18	W13	CONNECTOR: See item 22	7-3 (30)
1P19	W14	CONNECTOR: See item 22	7-3 (30)
1P20	W15	CONNECTOR: See item 22	7-3 (30)
1P21	W17	CONNECTOR: See item 20	7-2 (27)
1P22		CONNECTOR, PLUG, ASSEMBLY: Consist of 3 pos housing, Contacts #24AWG wire, Coax Cable, mfr. 14632, part no. 34529-2	7-3 (31)
1P23		CONNECTOR, PLUG ASSEMBLY: Consist of 3 pos housing, Contacts, #24AWG wire, Coax Cable, mfr. 14632, part no. 34529-3	7-3 (32)
1P24		CONNECTOR, PLUG ASSEMBLY: consit of double row 16 pos housing, Contacts #24AWG wire, Coax wire, shielded twisted pair wire, (283 1/2) Teflon Wire, mfr. 14632, part no. 43594-1	7-2 (33)
1P25	W17	CONNECTOR: See item 19	7-2 (34)
1P26	W18	CONNECTOR: See item 20	7-2 (27)
1P27	W18	CONNECTOR: See item 19	7-2 (34)
1P28	W16	CONNECTOR: See item 17	7-2 (26)
1P29	W16	CONNECTOR: See item 17	7-2 (26)
1P30		Not Used	
1P31		Not Used	
1P32	W19	CONNECTOR: See item 20	7-2 (27)
1P33		CONNECTOR: See item 20	7-2 (27)
1P34		CONNECTOR: See item 20	7-2 (27)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1P35		CONNECTOR: See item 20	7-2 (27)
1P36		CONNECTOR: See item 20	7-2 (27)
1P37		Not Used	
1P38		CONNECTOR: See item 20	7-2 (27)
1P39		CONNECTOR: See item 19	7-2 (34)
1P40		CONNECTOR: See item 19	7-2 (34)
1P41		CONNECTOR: See item 20	7-3 (27)
1P42		CONNECTOR: See item 20	7-3 (27)
1P43		CONNECTOR: See item 20	7-3 (27)
1P44		CONNECTOR: See item 20	7-3 (27)
1P45		CONNECTOR: See item 20	7-2 (27)
1P46		CONNECTOR: See item 20	7-3 (27)
1P47		CONNECTOR: See item 20	7-3 (27)
1P48		CONNECTOR, PLUG ASSEMBLY: Consist of 3 pos housing, Contacts, #24AWG wire, Coax cable, mfr. 14632, part no. 34529-1	7-3 (35)
1P49	W19	CONNECTOR: See item 19	7-2 (34)
1P50	W20	CONNECTOR: See item 20	7-2 (27)
1P51	W20	CONNECTOR: See item 19	7-2 (34)
1P52		CONNECTOR: See item 19	7-2 (34)
1P53		CONNECTOR: See item 19	7-2 (34)
1P54		CONNECTOR: See item 19	7-2 (34)
1P55		CONNECTOR: See item 19	7-2 (34)
1P56		CONNECTOR: See item 19	7-2 (34)
1P57		CONNECTOR: See item 21	7-3 (36)
1P58		CONNECTOR: See item 20	7-3 (27)
1R1		RESISTOR, VARIABLE: 25 k ohm, 10 pct, 1 W, Log Lock Bushing, mfr. 01121, part no. 70A3L036L253A	7-1 (37)
1R2		RESISTOR: See item 46	7-3 (71)
1R3		RESISTOR, FIXED, COMPOSITION: 200 ohms 5 pct. .25 watt, 250 V rated, .250 Long body by .09 Dia. by .02 Lead Dia., mfr. 81349, part no. RCR07G201JS	7-1 (37)
1R4		RESISTOR, FIXED, COMPOSITION: 10 ohms 5 pct. .5 watt, 350 V rated, .375 Long body by .14 Dia. by .03 Dia leads, mfr. 81349, part no. RCR20G100JS	7-2 (38)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1RA1		HEAT SINK, ELECTRICAL-ELECTRONIC COMPONENT: Finned extrusion for T0-3 cases .75 in high, by 1.78 long by 1.78 wide, Black anodized, mfr. 98978, part no. UP2-T03-CB	7-1 (39)
1RA2		HEATSINK: Same as 1RA1	7-1 (39)
1RA3		HEATSINK: Same as 1RA1	7-1 (39)
1S1		SWITCH, PUSH: Double pull double throw action, 2 amp, 115 Vac, TV5 rated, solder terminals on top, P.C. spikes at bottom. Brass silver plated, mfr. 31918, part no. N30-2A-TV5	7-1 (40)
1S2		SWITCH SLIDE: DPDT Screwdriver, less voltage indication, mfr. 82389, part no. 11A1211	7-1 (41)
1S3		SWITCH, SLIDE: DP DT, 2 amp 250 V 115/230 V, mfr. 82389, part no. EPS1-SL1	7-2 (42)
1S4		SWITCH: Same as 1S2	7-2 (41)
1T1		TRANSFORMER, POWER: 3.19 Wide by 3.26 long by 3.84 high, core mat. EI-125, primary #1 2 terminals, PR1 #2, 3 terminals, sec. #2 3 terminals, Sec. #2 3 terminals, 115 V, 220-230 volt, mfr. 14632, part no. 380083	7-2 (43)
1T2		TRANSFORMER, AUDIO: 75 Hz to 10 kHz, porm 1 dB at rated output, 3 watts continuous output, 6 terminals, 2.00 in. long by 1.875 in. wide by 1.460 in. high. mfr. 14632, part no. 841004	7-2 (44)
1U1		VOLTAGE REGULATOR: FXD Pos. 15 V, 1.5 A TO3 package, mfr. 80103, part no. LAS1515	7-1 (45)
1U1P1		CONNECTOR: Same as 1P6	7-2 (46)
1U1P2		CONNECTOR: Same as 1P6	7-2 (46)
1U1P3		CONNECTOR: Same as 1P6	7-2 (46)
1U2		VOLTAGE REGULATOR: Fixed neg. 15 V, 1.5 A TO3 package mfr. 80103, part no. LAS1815	7-1 (47)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1U2P1		CONNECTOR: Same as 1P6	7-2 (46)
1U2P2		CONNECTOR: Same as 1P6	7-2 (46)
1U2P3		CONNECTOR: Same as 1P6	7-2 (46)
1U3		VOLTAGE REGULATOR: Fixed positive 5 volt, 3 amp, TO3 case, mfr. 80103, part no. LAS1405	7-1 (48)
1U3P1		CONNECTOR: Same as 1P6	7-2 (46)
1U3P2		CONNECTOR: Same as 1P6	7-2 (46)
1U3P3		CONNECTOR: Same as 1P6	7-2 (46)
1U4		VOLTAGE REGULATOR: Fixed positive 12 V, 1 Amp TO-220 case, mfr. 07263, part no. 7812UC	7-3 (49)
1W1		Not Used	
1W2		CABLE ASSEMBLY: Coax cable .116 OD 7/.0067, 50 ohm with UG1468/U and UG1466/U connectors, 11 inches long, mfr. 14632, part no. 34701-1	7-2 (50)
1W3		CABLE ASSEMBLY: Coax cable .116 OD 7 strands of .0067 wire, 50 ohm with UG1468/U and UG1466/U connectors, 15 1/2 inches long, mfr. 14632, part no. 34701-2	7-2 (51)
1W4		CABLE ASSEMBLY: Coax cable .116 OD 7 strands of .0067 wire, 50 ohm with UG1468/U and UG1466/U connectors, 6 1/2 inches long, mfr. 14632, part no. 34701-3	7-2 (52)
1W5		CABLE ASSEMBLY: Coax cable, .116 OD 7 strands of .0067 wire, 50 ohm with 2 UG1466/U connectors, 17 1/2 inches long, mfr. 14632, part no. 34701-4	7-3 (53)
1W6		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with 2 UG1465/U connectors, 5 inches long, mfr. 14632 part no. 34701-5	7-3 (54)
1W7		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with 2 UG1465/U connectors, 5 inches long, mfr. 14632 part no. 34701-6	7-3 (55)
1W8		Not Used	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1W9		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohms with UG1468/U and 3 pin contact connector, 7 inch long mfr. 14632, part no. 34700-1	7-3 (56)
1W10		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with UG1468/U and 3 pin contact connector, 17 1/2 in. long, mfr. 14632, part no. 34700-2	7-3 (57)
1W11		CABLE ASSEMBLY: Coax Cable .116 Dia 7 strands of .0067 wire, 50 ohm with BNC connector and 3 pin contact connector mfr. 14632, part no. 34702-1	7-3 (58)
1W12		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with UG1468/U and 3 pin contact connectors, 20 inches long, mfr. 14632, part no. 34700-3	7-3 (59)
1W13		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with UG1468/U and 3 pin contact connectors, 11 1/2 in. long, mfr. 14632, part no. 34700-4	7-3 (60)
1W14		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with UG1468/U and 3 pin contact connectors, 6 inches long, mfr. 14632, part no. 34700-5	7-3 (61)
1W15		CABLE ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with BNC connector and 3 pin contact connector, mfr. 14632, part no. 34702-2	7-3 (62)
1W16		CONNECTOR ASSEMBLY: Coax cable .116 Dia 7 strands of .0067 wire, 50 ohm with 2 UG 1466/U connectors, 11 inches long, mfr. 14632, part no. 34701-7	7-2 (63)
1W17		CONNECTOR ASSEMBLY: #22 AWG wire 13 1/2 inches long with faston tab and 3 conductor housing, mfr. 14632, part no. 380005-1	7-2 (64)
1W18		CONNECTOR ASSEMBLY: #22 AWG wire 17 1/2 inches long with faston tab and 3 conductor housing, mfr. 14632, part no. 380005-2	7-2 (65)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1W19		CONNECTOR ASSEMBLY: #22 AWG wire 14 1/2 inches long with faston tab and 3 conductor housing, mfr. 14632, part no. 380005-3	7-2 (66)
1W20		CONNECTOR ASSEMBLY: #22 AWG wire 19 1/2 inches long with faston tab and 3 conductor housing, mfr. 14632, part no. 380005-4	7-2 (67)
1XF1		FUSEHOLDER: 3AG Size, RFI Shielded Panel Mount, 2 3/16 inch long by 7/8 inch Dia, screw on cap, mfr. 75915, part no. 340255	7-1 (68)
1XF2		FUSEHOLDER: Same as 1XF1	7-1 (68)
1XU1		SOCKET ASSEMBLY: Transistor TO-3 case, black with 2 ea. 0.1 µF capacitors and 3 teflon wires, mfr. 14632, part no. 34506-1	
1XU2		SOCKET ASSEMBLY: Transistor TO-3 case, Black with 2 ea. 0.1 µF capacitors and 3 teflon wires, mfr. 14632, part no. 34506-2	7-1 (69)
1XU3		SOCKET ASSEMBLY: Transistor TO-3 case, black with 2 ea. .47 µF, capacitors and 3 teflon wires, mfr. 14632, part no. 34506-3	7-1 (70)
1A1		CIRCUIT CARD ASSEMBLY: Power distribution, etched circuit board epoxy resin glass base liminate w/1 oz copper circuitry, receives 34 Vac and 16 Vac for inputs and rectifies voltages for various circuits and regulators. 0.500 in. thick by 6.25 in. long by 3.70 in. wide, connected by solder terminals. mfr. 14632, part no. 76240	7-4
1A1C1		CAPACITOR, FIXED, ELECTROLYTIC: Aluminum, 2200 µF M10P75 25 V axial leads, .937 Dia by 3.25 long, mfr. 56289, part no. 39D228G025HP4	7-4 (1)
1A1C2		CAPACITOR: Same as 1A1C1	7-4 (1)
1A1C3		CAPACITOR,FIXED, ELECTROLYTIC: Aluminum, 8000 µF M10P25 15 V axial leads, 1.062 Dia by 3.750 long, mfr. 56289, part no. 39D808G015JT4	7-4 (2)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A1C4		CAPACITOR: Same as 1A1C3	7-4 (2)
1A1CR1		SEMICONDUCTOR, DEVICE, DIODE: Rectifier 100 PRV 3.0 amp silicon, mfr. 80131, part no. 1N4998	7-4 (3)
1A1CR2		SEMICONDUCTOR: Same as 1A1CR1	7-4 (3)
1A1CR3		SEMICONDUCTOR: Same as 1A1CR1	7-4 (3)
1A1CR4		SEMICONDUCTOR: Same as 1A1CR1	7-4 (3)
1A1J1		CONNECTOR: See item 21	7-4 (4)
1A1J2		CONNECTOR: See item 21	7-4 (4)
1A1J3		CONNECTOR: See item 21	7-4 (4)
1A1J4		CONNECTOR: See item 21	7-4 (4)
1A1J5		CONNECTOR: See item 21	7-4 (4)
1A1J6		CONNECTOR: See item 21	7-4 (4)
1A1J7		CONNECTOR: See item 21	7-4 (4)
1A1J8		CONNECTOR: See item 21	7-4 (4)
1A1J9		CONNECTOR: See item 21	7-4 (4)
1A1J10		CONNECTOR: See item 21	7-4 (4)
1A1J11		CONNECTOR: See item 21	7-4 (4)
1A1J12		CONNECTOR: See item 21	7-4 (4)
1A1J13		CONNECTOR: See item 21	7-4 (4)
1A1J14		CONNECTOR: See item 21	7-4 (4)
1A1J15		Not Used	
1A1J16		Not Used	
1A1J17		Not Used	
1A1J18		Not Used	
1A1J19		CONNECTOR: See item 21	7-4 (4)
1A1J20		CONNECTOR: See item 21	7-4 (4)
1A1J21		CONNECTOR: See item 21	7-4 (4)
1A1J22		Not Used	
1A1J23		Not Used	
1A1J24		Not Used	
1A1J25		Not Used	
1A1J26		Not Used	
1A1J27		Not Used	
1A1J28		Not Used	
1A1J29		Not Used	
1A1J30		Not Used	
1A1J31		CONNECTOR: See item 21	7-4 (4)
1A1J32		CONNECTOR: See item 21	7-4 (4)
1A1J33		Not Used	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A1J34		Not Used	
1A1J35		CONNECTOR: See item 21	7-4 (4)
1A1MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A1 (Attaching Parts) SCREW, MACHINE: Pan head cross recessed 4-40 x 7/16 crescent, mfr. 96906, part no. MS51957-16, (4), C(4), A(4)	7-4 (5)
1A2		RF FILTER ASSEMBLY: Copper flashed nickel plated brass chassis with RFI shielded cover, restricts the signals entering the receiver to the intended frequency band of 5 kHz to 30 MHz. 4.75 in. long by 1.90 in. wide by 1.20 in. high, connected by 2 cables, mfr. 14632, part no. 791616-2	7-5
1A2E1		CONNECTOR, TERMINATION, ELECTRICAL: 50 ohm right angle for RG188 cable, 10-32 chassis mount, 21/32 by 19/32. mfr.19505, part no. 144/188	7-5 (1)
1A2J1		CONNECTOR, RECEPTACLE, ELECTRICAL: Bulkhead type N, 50 ohm 1.37/64 by 13/16, mfr. 80058, part no. UG680/U	7-5 (2)
1A2L1		COIL, RADIO FREQUENCY: Toroidal, #24SNS wire wrapped 8 turns around a doughnut shaped core, mfr. 14632, part no. 20681-208	7-5 (3)
1A2MP1		COVER ASSEMBLY: .040 Nickel plated brass with RFI lining, 4.84 in. long by 1.96 in. wide by .19 in. high mfr. 14632, part no. 280115-1	Not Shown
1A2P1		CONNECTOR: See item 17	7-5 (4)
1A2A1		CIRCUIT CARD ASSEMBLY: Filter input 30 MHz low pass, etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry, restricts signals entering the receiver to the intended frequency band of 5 kHz to 30 MHz. 0.500 in. thick by 4.00 in. long by 1.30 in. wide, connected by solder terminals, mfr. 14632, part no. 280093	7-6

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A2A1C1		CAPACITOR: See item 10	7-6 (1)
1A2A1C2		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 120 pF, 2 PCT, 500 volt, mfr. 81349, part no. CM05FD121G03	7-6 (2)
1A2A1C3		CAPACITOR, FIXED, DIELECTRIC: 10 pF 0.5 pF TOL, 500 Volt, mfr. 81349, part no. CM05CD100D03	7-6 (3)
1A2A1C4		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 180 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM05FD181G03	7-6 (4)
1A2A1C5		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 33 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM05ED330G03	7-6 (5)
1A2A1C6		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 150 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM05FD151G03	7-6 (6)
1A2A1C7		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 39 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM05ED390G03	7-6 (7)
1A2A1C8		CAPACITOR: Same as 1A2A1C6	7-6 (6)
1A2A1C9		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 18 pF, 5 PCT, 500 Volt, mfr. 81349, part no. CM05CD180J03	7-6 (8)
1A2A1C10		CAPACITOR: Same as 1A2A1C6	7-6 (6)
1A2A1C11		CAPACITOR: See item 10	7-6 (1)
1A2A1C12		CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 47 pF, 5 PCT, 100 Volt NPO, mfr. 72982, part no. 8111-100-COGO-470J	7-6 (9)
1A2A1CR1		SEMICONDUCTOR: See item 61	7-6 (10)
1A2A1CR2		SEMICONDUCTOR: See item 61	7-6 (10)
1A2A1L1		COIL, RADIO FREQUENCY: Variable 0.351-0.429 μH, .480 high by .400 Sq., 4 leads and 2 mounting tabs, mfr. 71279, part no. 558-7107-08	7-6 (11)
1A2A1L2		COIL: Same as 1A2A1L1	7-6 (11)
1A2A1L3		COIL: Same as 1A2A1L1	7-6 (11)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A2A1L4		COIL: Same as 1A2A1L1	7-6 (11)
1A2A1L5		COIL, RADIO FREQUENCY: Variable 0.297-0.363 μH, .480 high by .400 sq., 4 leads and 2 mounting tabs, mfr. 71279, part no. 558-7107-07	7-6 (12)
1A2A1MP1		PRINTED WIRING BOARD: Basic etched circuit, less the assembled parts for item 1A2A1	7-6 (13)
1A2A1R1		RESISTOR: See item 38	7-6 (14)
1A2A1VR1		SEMICONDUCTOR DEVICE, DIODE: Zener 6.2 Volt, silicon, .300 body by .125 Dia., .02 Dia. leads, mfr. 80131, part no. 1N753A	7-6 (15)
1A2A1VR2		SEMICONDUCTOR: Same as 1A2A1VR1 (Attaching Parts) D(6), C(6), A(6)	7-6 (15)
1A3		INPUT CONVERTER: Copper flashed nickel plated brass chassis with RFI cover. Converts signals from RF filter up in frequency and filters them. 1.152 in. thick by 6.94 in. long by 3.25 in. wide. Connections are made by a pigtail with connector and solder terminal. mfr. 14632, part no. 791592	7-7
1A3C1		CAPACITOR: See item 13	7-7 (1)
1A3C2		CAPACITOR: Same as 1A3C1	7-7 (1)
1A3C3		CAPACITOR: Same as 1A3C1	7-7 (1)
1A3C4		CAPACITOR: Same as 1A3C1	7-7 (1)
1A3L1		COIL, RADIO FREQUENCY: Fixed, molded, 1.8 μH, 10 PCT, phenolic core, min.Q33, .155 Dia by .375 long, mfr. 99800, part no. 1537-18	7-7 (2)
1A3MP1		SCREW, CAPTIVE: 6-32 thread, .03-.06 material thickness, .18-.31 grip length, mfr. 08524, part no. D7500-6A2	7-7 (3)
1A3MP2		CLAMP, LOOP: 1/8 in. I.D by 3/8 in. wide, black nylon, mfr. 95987, part no. 1-8-4	7-7 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3MP3		COVER ASSEMBLY: .032 thick brass copper flashed and nickel plated, lined with rubber and copper foil, 6.94 in. long by 3.34 in. wide by .12 thick, mfr. 14632, part no. 24451-1	Not Shown
1A3MP4		SOCKET, CONTACT: Crimp, snap-in pin, 20-24 AWG wire, mfr. 00779, part no. 66506-4	7-7 (5)
1A3MP5		SCREW, RETAINER: Kit containing 2 screws and retainers for D style connectors, mfr. 00779, part no. 20590-1	7-7 (6)
1A3P1		CONNECTOR, PLUG, ELECTRICAL: 9 pos. D style accepts size no. 20 crimp pins, mfr. 00779, part no. 205204-1	7-7 (7)
1A3A1		CIRCUIT CARD ASSEMBLY: 1st mixer, 1st IF, etched circuit board, epoxy resin glass base laminate w/1oz copper circuitry, converts inputs from 5 kHz to 29.99999 MHz to 1st IF frequency of (42.90001 to 42.910 MHz) 0.500 in. thick by 3.00 in. long by 2.15 in. wide, connected by solder terminals, mfr. 14632, part no. 34748	7-8
1A3A1C1		CAPACITOR: See item 1	7-8 (1)
1A3A1C2		CAPACITOR: See item 1	7-8 (1)
1A3A1C3		CAPACITOR, VARIABLE, CERAMIC, DIELECTRIC: 2.5-9 pF, 25 V NPO, 3 lead PC Mount, to adjust, .218 Dia by .145 high, mfr. 72982, part no. 518-000A2.5-9	7-8 (2)
1A3A1CR1		SEMICONDUCTOR DEVICE, DIODE: Hi conductance, silicon, 75 PRV, .200 in. long by .09 Dia., mfr. 80131, part no. 1N4446	7-8 (3)
1A3A1FL1		FILTER, BAND PASS: 42.905 MHz CF 28 kHz BW, Passivated metallic finish, 2.10 in. long by 1.05 in wide by .77 in. high with 4.040 Dia pins and 4-40 stud, mfr. 14632, part no. 92123	7-8 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A1J1		CONNECTOR, RECEPTACLE, ELECTRICAL: SMA straight PC Mount, mfr. 14632, part no. 34520-1	7-8 (5)
1A3A1J2		CONNECTOR: Same as 1A3A1J1	7-8 (5)
1A3A1L1		COIL: See item 14	7-8 (6)
1A3A1L2		COIL: See item 14	7-8 (6)
1A3A1MP1		INSULATOR: See item 26	7-8 (7)
1A3A1MP2		INSULATOR: See item 25	7-8 (8)
1A3A1MP3		PRINTED WIRING BOARD: Basic etched circuit, less the assembled parts, for item 1A3A1	7-8 (9)
		(Attaching Parts)	
		G(4), C(4), A(4)	
1A3A1Q1		TRANSISTOR: See item 63	7-8 (10)
1A3A1Q2		TRANSISTOR: Silicon epitaxial junction N-Channel field effect, TO46, mfr. 12498, part no. CP643	7-8 (11)
1A3A1RA1		HEATSINK, ELECTRICAL-ELECTRONIC COMPONENT: 1 piece for TO18, wraparound, tapped hole mounted, gold chromate , mfr. 13103, part no. 1118C	7-8 (12)
1A3A1R1		RESISTOR: See item 47	7-8 (13)
1A3A1R2		RESISTOR, FIXED, COMPOSITION: 82 ohms 5 PCT .25 watt, 250 V rated .250 long body by .09 Dia by .02 lead Dia, mfr. 81349, part no. RCR07G820JS	7-8 (14)
1A3A1R3		RESISTOR: See item 35	7-8 (15)
1A3A1R4	Note 1	RESISTOR, FIXED, COMPOSITION: 150 ohms 5 PCT .125 Watt, .145 long body by .062 Dia by .015 lead Dia. mfr. 81349, part no. RCR05G151JS	7-8 (16)
1A3A1T1		TRANSFORMER, RADIO FREQUENCY: Toroid mount, 4 terminals, 1.5 long leads by .340 Dia wide by .078 high, mfr. 14632, part no. 22295-52	7-8 (17)
	Note 1.	Nominal value, final value factory selected	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A1U1		MIXER, FREQUENCY: 2-500 MHz high level LO plus 20 dbm, double balanced, .800 long by .400 wide by .425 high, 8 pin PC mount, mfr. 27956, part no. M9D	7-8 (18)
1A3A2		CIRCUIT CARD ASSEMBLY: 2nd mixer, 2nd IF, etched circuit board, epoxy resin glass base laminate w/1oz copper circuitry. Translates signals in the 1st IF range to the 2nd IF frequency of 10.7 MHz. 0.500 in. thick by 4.00 in. long by 3.00 in. wide, connected by solder terminals. mfr. 14632, part no. 34749	7-9
1A3A2C1		CAPACITOR: Same as 1C13	7-9 (1)
1A3A2C2		CAPACITOR: See item 1	7-9 (2)
1A3A2C3		CAPACITOR: See item 1	7-9 (2)
1A3A2C4		CAPACITOR: See item 11	7-9 (3)
1A3A2C5		CAPACITOR: See item 11	7-9 (3)
1A3A2C6		CAPACITOR: See item 11	7-9 (3)
1A3A2C7		CAPACITOR: See item 11	7-9 (3)
1A3A2C8		CAPACITOR: See item 11	7-9 (3)
1A3A2C9		CAPACITOR: See item 12	7-9 (4)
1A3A2C10		CAPACITOR: See item 2	7-9 (5)
1A3A2C11		CAPACITOR: See item 2	7-9 (5)
1A3A2C12		CAPACITOR: See item 2	7-9 (5)
1A3A2C13		CAPACITOR: See item 2	7-9 (5)
1A3A2C14		CAPACITOR, FIXED, MICA DIELECTRIC: 47 pF 2 PCT 500 V, mfr. 81349, part no. CM05ED470G03	7-9 (6)
1A3A2C15		CAPACITOR: See item 2	7-9 (5)
1A3A2C16		CAPACITOR, FIXED, CERAMIC: 4.7 pF .1 pF TOL 500 V NPO, Tubular, mfr. 72982, part no. 301-000COHO-479B	7-9 (7)
1A3A2C17		CAPACITOR: See item 10	7-9 (8)
1A3A2C18		CAPACITOR, FIXED, ELECTROLYTIC: 4.7 µF, 20 PCT 35 V, tantalex, mfr. 56289, part no. 196D475X0035JE3	7-9 (9)
1A3A2CR1		SEMICONDUCTOR: Same as 1A3A1CR1	7-9 (10)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2CR2		SEMICONDUCTOR, DEVICE, DIODE: Pin, DC power dissipation 250 MW, PIV VBR, operating temp. range -65° C to $+150^{\circ}$ C, 4.32 long body by 1.93 wide, mfr. 28480, part no. 5082-3039	7-9 (11)
1A3A2FB1		FERRITE BEAD: See item 23	7-9 (12)
1A3A2FB2		FERRITE BEAD: See item 23	7-9 (12)
1A3A2FB3		FERRITE BEAD: See item 23	7-9 (12)
1A3A2FL1		FILTER, BAND PASS: 10.7 MHz CF 16 kHz BW, stud metric 2 places 040 Dia terminals 2 places, 1.42 long by 1.05 wide by .75 high, mfr. 14632, part no. 92124	7-9 (13)
1A3A2J1		CONNECTOR: Same as 1A3A1J1	7-9 (14)
1A3A2J2		CONNECTOR: Same as 1A3A1J1	7-9 (14)
1A3A2L1		COIL: See item 14	7-9 (15)
1A3A2L2		COIL: See item 14	7-9 (15)
1A3A2L3		COIL: See item 14	7-9 (15)
1A3A2L4		COIL, RADIO FREQUENCY: Fixed 0.56 μH 15 PCT .125 Dia by .25 long, mfr. 99848, part no. 202-11	7-9 (16)
1A3A2L5		COIL: See item 14	7-9 (15)
1A3A2MP1		INSULATOR DISK: See item 25	7-9 (17)
1A3A2MP2		INSULATOR DISK: 3 lead .08 thick for TO-5 case, mfr. 13103, part no. 7717-22DAP	7-9 (18)
1A3A2MP3		INSULATOR: See item 26 (2)	7-9 (19)
1A3A2MP4		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts, for item 1A3A2 (Attaching parts) G(4), C(4), A(4)	7-9 (20)
1A3A2Q1		TRANSISTOR: See item 63	7-9 (21)
1A3A2Q2		TRANSISTOR: Same as 1A3A1Q2	7-9 (22)
1A3A2Q3		TRANSISTOR: HF power amplifier NPN silicon TO-39, mfr. 80131, part no. 2N5109	7-9 (23)
1A3A2Q4		TRANSISTOR: Same as 1A3A2Q3	7-9 (23)
1A3A2Q5		TRANSISTOR: See item 64	7-9 (24)
1A3A2Q6		TRANSISTOR: Same as 1A3A2Q3	7-9 (23)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2RA1		HEAT SINK: Same as 1A3A1RA1	7-9 (25)
1A3A2R1		RESISTOR: See item 47	7-9 (26)
1A3A2R2		RESISTOR: Same as 1A3A1R2	7-9 (27)
1A3A2R3	Note 1	RESISTOR: See item 35	7-9 (28)
1A3A2R4		RESISTOR, FIXED COMPOSITION: 1.8 kohm 5 PCT .25 Watt, 250 V rated .250 long body by .09 Dia. by .02 lead Dia. mfr. 81349, part no, RCR07G182JS	7-9 (29)
1A3A2R5		RESISTOR: See item 46	7-9 (30)
1A3A2R6		RESISTOR, FIXED, COMPOSITION: 3.3 kohm 5 PCT .25 W, 250 V rated .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G332JS	7-9 (31)
1A3A2R7		RESISTOR: See item 47	7-9 (26)
1A3A2R8		RESISTOR: See item 37	7-9 (32)
1A3A2R9		RESISTOR: Same as 1R3	7-9 (33)
1A3A2R10		RESISTOR: See item 35	7-9 (28)
1A3A2R11		RESISTOR: See item 54	7-9 (34)
1A3A2R12		RESISTOR, FIXED, COMPOSITION: 4.7 ohm 5 PCT .25 W, 250 V rated .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G4R7JS	7-9 (35)
1A3A2R13		RESISTOR, FIXED, COMPOSITION: 68 ohm 5 PCT .25 W 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr, 81349, part no. RCR07G680JS	7-9 (36)
1A3A2R14		RESISTOR, FIXED, COMPOSITION: 390 ohm 5 PCT .25 W, 250 V rated, .250 long body by .02 lead Dia. mfr. 81349, part no. RCR07G391JS	7-9 (37)
1A3A2R15		RESISTOR: Same as 1A3A2R13	7-9 (36)
1A3A2R16		RESISTOR: See item 50	7-9 (38)
1A3A2R17		RESISTOR: See item 37	7-9 (32)
1A3A2R18		RESISTOR: See item 35	7-9 (28)
1A3A2R19		RESISTOR: See item 45	7-9 (39)
1A3A2R20		RESISTOR: See item 46	7-9 (30)
	Note 1.	Nominal value, final value factory selected	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A2R21		RESISTOR: See item 58	7-9 (40)
1A3A2R22		RESISTOR: See item 42	7-9 (41)
1A3A2R23		RESISTOR, FIXED, COMPOSITION: 15 ohm 5 PCT, .25 W 250 V rated 250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G150JS	7-9 (42)
1A3A2R24		RESISTOR: See item 37	7-9 (32)
1A3A2R25		RESISTOR: See item 55	7-9 (43)
1A3A2R26		RESISTOR, FIXED, COMPOSITION: 330 ohm 5 PCT .25 W 250 V rated .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G331JS	7-9 (44)
1A3A2R27		RESISTOR: See item 35	7-9 (28)
1A3A2R28		RESISTOR, FIXED, COMPOSITION: 12 ohm 5 PCT .25 W 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G120JS	7-9 (45)
1A3A2R29		RESISTOR: See item 42	7-9 (41)
1A3A2R30		RESISTOR: See item 35	7-9 (28)
1A3A2T1		TRANSFORMER, RADIO FREQUENCY: Toroid mount, 4 terminals, 1.5 long leads by .340 Dia. wide by .078 high, mfr. 14632, part no. 22295-53	7-9 (46)
1A3A2T2		TRANSFORMER, RADIO FREQUENCY: Toroid mount, 4 terminals, 1.5 long leads by .340 Dia. wide by .078 high, mfr. 14632, part no. 22295-54	7-9 (47)
1A3A2T3		TRANSFORMER, RADIO FREQUENCY: Toroid mount, 4 terminals, 1.5 long leads by .340 Dia. wide by .078 high, mfr. 14632, part no. 22295-56	7-9 (48)
1A3A2T4		TRANSFORMER, RADIO FREQUENCY: Toroid mount, 4 terminals, 1.5 long leads by .340 Dia. wide by .078 high, mfr. 14632, part no. 22295-55	7-9 (49)
1A3A2U1		MIXER, FREQUENCY: 0.05-200 MHz HI-LEVEL double balanced FL ATR 25 dB MIN PC mount, mfr. 27956 part no. M9A	7-9 (50)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A3A3		CIRCUIT CARD ASSEMBLY: Filter board, etched circuit, epoxy resin glass base laminate w/1 oz copper circuitry, serves as a trap to minimize spurs at 10.79999, 10.805 and 10.810 frequencies. 0.500 in. thick by 1.10 in. long by .65 in. high, connected by solder terminals, mfr. 14632, part no. 280080	7-10
1A3A3C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 9-35 pF 350 V N650, mfr. 72982, part no. 538-011D9-35	7-10 (1)
1A3A3L1		COIL, RADIO FREQUENCY: 0.33 μH 10 PCT .375 long by .156 Dia. by .025 lead Dia. Phenolic core molded, mfr. 99800, part no. 1537-04	7-10 (2)
1A3A3MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A3	7-10 (3)
		(Attaching Parts)	
		spacer, delrin .25 long .25 O.D. .152 Dia. I.D., mfr. 14632, part no. 20753-37	
		SCREW, MACHINE: Pan head cross recessed 4-40 x 5/8 cres., mfr. 96906, part no. MS51957-18(1) C(1), A(1)	
1A4		CIRCUIT CARD ASSEMBLY: IF motherboard, etched circuit board, epoxy resin glass base laminate w/1oz copper circuitry, provides support and interconnections for the IF section of the receiver. 0.500 in. thick by 14.40 in. long by 4.25 in. wide. connects by solder on connections, push on plugs and a multipin cable assembly, mfr. 14632, part no. 791569	7-11
1A4C1		CAPACITOR: See item 11	7-11 (1)
1A4C2		CAPACITOR: See item 11	7-11 (1)
1A4C3		CAPACITOR: See item 11	7-11 (1)
1A4C4		CAPACITOR: See item 11	7-11 (1)
1A4C5		CAPACITOR: See item 11	7-11 (1)
1A4C6		CAPACITOR: See item 11	7-11 (1)
1A4C7		CAPACITOR: See item 11	7-11 (1)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4C8		CAPACITOR: See item 11	7-11 (1)
1A4C9		CAPACITOR: See item 11	7-11 (1)
1A4C10		CAPACITOR: See item 11	7-11 (1)
1A4C11		CAPACITOR: See item 11	7-11 (1)
1A4C12		CAPACITOR: See item 11	7-11 (1)
1A4C13		CAPACITOR: See item 11	7-11 (1)
1A4C14		CAPACITOR: See item 11	7-11 (1)
1A4C15		CAPACITOR: See item 11	7-11 (1)
1A4C16		CAPACITOR: See item 11	7-11 (1)
1A4C17		CAPACITOR: See item 11	7-11 (1)
1A4C18		CAPACITOR: See item 11	7-11 (1)
1A4C19		CAPACITOR: See item 11	7-11 (1)
1A4C20		CAPACITOR: See item 11	7-11 (1)
1A4C21		CAPACITOR: See item 11	7-11 (1)
1A4C22		CAPACITOR: See item 11	7-11 (1)
1A4C23		CAPACITOR: See item 11	7-11 (1)
1A4C24		CAPACITOR: See item 11	7-11 (1)
1A4C25		CAPACITOR: See item 11	7-11 (1)
1A4C26		CAPACITOR: See item 11	7-11 (1)
1A4C27		CAPACITOR: See item 11	7-11 (1)
1A4C28		CAPACITOR: See item 11	7-11 (1)
1A4C29		CAPACITOR: See item 11	7-11 (1)
1A4J1		TERMINAL: 8 pos. feedthru .818 long. x .025 SQ. .50 below bd., mfr. 00779 part no. PE914031-2	7-11 (2)
1A4L1		CHOKE, RADIO FREQUENCY: .236 O.D. .394 long, 2 1/2 turns, 1 winding, ferrite choke, mfr. 02114, part no. VK200-10-3B	7-11 (3)
1A4L2		CHOKE: Same as 1A4L1	7-11 (3)
1A4MP1		HOUSING: 30 positions, 3.234 long, .100 x .200 post centerline spacing, glass filled nylon, black, copper contacts gold plated, mfr. 00779, part no. 117798-3	7-11 (4)
1A4MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4	7-11 (5)
		(Attaching Hardware)	
		G(8), C(8), A(8)	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4P1		CABLE ASSEMBLY: 29 conductor flat flexable 1 plug 5.5 in. with solder terminals, mfr. 00779, part no. 88523-1	7-11 (6)
1A4XA1		CONTACT STRIP: 10 pins, combination contact economate I, wrap post .025 SQ. (100 X 200) copper alloy gold plated, mfr. 00779, part no. PE7-14046	7-11 (7)
1A4XA2		Same as 1A4XA1	7-11 (7)
1A4XA3		Same as 1A4XA1	7-11 (7)
1A4XA4		Same as 1A4XA1	7-11 (7)
1A4XA5		Same as 1A4XA1	7-11 (7)
1A4XA6		Same as 1A4XA1	7-11 (7)
1A4XA7		Same as 1A4XA1	7-11 (7)
1A4XA8		Same as 1A4XA1	7-11 (7)
1A4XA9		Same as 1A4XA1	7-11 (7)
1A4XA10		Same as 1A4XA1	7-11 (7)
1A4XA11		Same as 1A4XA1	7-11 (7)
1A4A1		CIRCUIT CARD ASSEMBLY: 10.7 MHz Filter Switch, etched circuit board epoxy resin glass base laminate w/1oz copper circuitry. Selects one of three signal paths as part of the overall receiver bandwidth determining scheme and provides additional IF amplification. 0.750 in. thick by 4.30 in. long by .385 wide. Connected by plugging into motherboard, mfr. 14632, part no. 791594	7-12
1A4A1C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 91 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05FD910G03	7-12 (1)
1A4A1C2		CAPACITOR: See item 11	7-12 (2)
1A4A1C3		CAPACITOR: See item 11	7-12 (2)
1A4A1C4		CAPACITOR: See item 11	7-12 (2)
1A4A1C5		CAPACITOR: See item 11	7-12 (2)
1A4A1C6		CAPACITOR: See item 11	7-12 (2)
1A4A1C7		CAPACITOR: See item 11	7-12 (2)
1A4A1C8		CAPACITOR: See item 11	7-12 (2)
1A4A1C9		CAPACITOR: See item 12	7-12 (3)
1A4A1C10		CAPACITOR: See item 11	7-12 (2)
1A4A1C11		CAPACITOR: See item 12	7-12 (3)
1A4A1C12		CAPACITOR: See item 11	7-12 (2)
1A4A1C13		CAPACITOR: See item 12	7-12 (3)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1C14		CAPACITOR: See item 11	7-12 (2)
1A4A1C15		CAPACITOR: See item 12	7-12 (3)
1A4A1C16		CAPACITOR: See item 12	7-12 (3)
1A4A1C17		CAPACITOR: See item 12	7-12 (3)
1A4A1C18		CAPACITOR: See item 11	7-12 (2)
1A4A1C19		CAPACITOR: See item 11	7-12 (2)
1A4A1C20		CAPACITOR: See item 11	7-12 (2)
1A4A1C21		CAPACITOR: See item 11	7-12 (2)
1A4A1C22		CAPACITOR: See item 11	7-12 (2)
1A4A1C23		CAPACITOR: See item 11	7-12 (2)
1A4A1C24		CAPACITOR: See item 12	7-12 (3)
1A4A1C25		CAPACITOR: See item 12	7-12 (3)
1A4A1C26		CAPACITOR: See item 12	7-12 (3)
1A4A1C27		CAPACITOR: See item 3	7-12 (4)
1A4A1C28		CAPACITOR: See item 11	7-12 (2)
1A4A1C29		CAPACITOR: See item 11	7-12 (2)
1A4A1C30		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 130 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05FD131G03	7-12 (5)
1A4A1C31		CAPACITOR: See item 3	7-12 (4)
1A4A1C32		CAPACITOR: Same as 1A3A3C1	7-12 (6)
1A4A1FL1		FILTER, BANDPASS: 10.7 MHz CF 3.2 kHz Bandwidth, 1.42 long by 1.05 wide by .75 high, 2 metric studs and 2.040 Dia. terminals, mfr. 14632, part no. 92126	7-12 (7)
		(Attaching Hardware)	
		Nut, plain hex 2.4 MM thick steel, nickel plated, 5.5 MM across flat M3 metric thread (2)	
1A4A1FL2		FILTER, BANDPASS: 10.7 MHz CF 6 kHz bandwidth, 1.42 long by 1.05 wide by .75 high, 2 metric studs and 2 .040 Dia. terminals, mfr. 14632, part no. 92126	7-12 (8)
		(Attaching Hardware)	
		Nut, plain hex 2.4 MM. thick steel, nickel plated, 5.5 MM across flat M3 metric thread (2)	
1A4A1L1		COIL, RADIO FREQUENCY: Fixed molded 1.5 µF, 10 PCT, Phenolic core min. Q33, .155 Dia. by .375 long, mfr. 99800, part no. 1537-16	7-12 (9)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1L2 thru 1A4A1L4		Not Used	
1A4A1L5		COIL: Same as 1A3L1	7-12 (10)
1A4A1MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A1	7-12 (11)
1A4A1Q1		TRANSISTOR: See item 66	7-12 (12)
1A4A1Q2		TRANSISTOR: See item 66	7-12 (12)
1A4A1Q3		TRANSISTOR: See item 66	7-12 (12)
1A4A1Q4		TRANSISTOR: See item 66	7-12 (12)
1A4A1Q5		TRANSISTOR: See item 66	7-12 (12)
1A4A1Q6		TRANSISTOR: See item 66	7-12 (12)
1A4A1R1		RESISTOR, FIXED, COMPOSITION: 13 kohms, 5 PCT, .25 W, 250 V rated .250 long body by .09 Dia. by .02 lead Dia. mfr. 81349, part no. RCR07G133JS	7-12 (13)
1A4A1R2		RESISTOR, FIXED, COMPOSITION: 3.0 kohm, 5 PCT, .25 W, 250 V rated .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G302JS	7-12 (14)
1A4A1R3		RESISTOR: Same as 1A4A1R1	7-12 (13)
1A4A1R4		RESISTOR: Same as 1A4A1R2	7-12 (14)
1A4A1R5		RESISTOR: Same as 1A4A1R1	7-12 (13)
1A4A1R6		RESISTOR: Same as 1A4A1R2	7-12 (14)
1A4A1R7		RESISTOR, FIXED, COMPOSITION: 680 ohms, 5 PCT, .25 W, 250 V rated .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G681JS	7-12 (15)
1A4A1R8		RESISTOR: Same as 1A4A1R7	7-12 (16)
1A4A1R9		RESISTOR: Same as 1A4A1R7	7-12 (16)
1A4A1R10		RESISTOR: See item 35	7-12 (17)
1A4A1R11		RESISTOR: See item 46	7-12 (18)
1A4A1R12		RESISTOR: See item 45	7-12 (19)
1A4A1R13		RESISTOR: See item 51	7-12 (20)
1A4A1R14		RESISTOR: See item 35	7-12 (17)
1A4A1R15		RESISTOR: See item 46	7-12 (18)
1A4A1R16		RESISTOR: See item 45	7-12 (19)
1A4A1R17		RESISTOR: See item 51	7-12 (20)
1A4A1R18		RESISTOR: See item 35	7-12 (17)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1R19		RESISTOR: See item 46	7-12 (18)
1A4A1R20		RESISTOR: See item 45	7-12 (19)
1A4A1R21		RESISTOR: See item 51	7-12 (20)
1A4A1R22		RESISTOR: See item 51	7-12 (20)
1A4A1R23		RESISTOR: See item 58	7-12 (21)
1A4A1R24		RESISTOR: See item 51	7-12 (20)
1A4A1R25		RESISTOR: See item 36	7-12 (22)
1A4A1R26		RESISTOR, VARIABLE: 200 ohms 10 PCT .5 Watt, Helitrim, sealed metal housing 1/4 in. Dia. Single turn, 3 pins, mfr. 73138, part no. 62PR200	7-12 (23)
1A4A1R27		RESISTOR: See item 36	7-12 (22)
1A4A1R28		RESISTOR: Same as 1A4A1R26	7-12 (23)
1A4A1R29		RESISTOR: See item 36	7-12 (22)
1A4A1R30		RESISTOR: Same as 1A4A1R26	7-12 (23)
1A4A1R31		RESISTOR: See item 45	7-12 (19)
1A4A1R32		RESISTOR: See item 48	7-12 (24)
1A4A1R33		RESISTOR: See item 56	7-12 (25)
1A4A1R34		RESISTOR: See item 48	7-12 (24)
1A4A1R35		RESISTOR: See item 56	7-12 (25)
1A4A1R36		RESISTOR: See item 48	7-12 (24)
1A4A1R37		RESISTOR: See item 56	7-12 (25)
1A4A1R38		RESISTOR: See item 58	7-12 (21)
1A4A1R39		RESISTOR: See item 58	7-12 (21)
1A4A1R40		RESISTOR: See item 58	7-12 (21)
1A4A1R41		RESISTOR: See item 35	7-12 (17)
1A4A1R42		RESISTOR: Same as 1A3A2R28	7-12 (26)
1A4A1R43		RESISTOR: See item 35	7-12 (17)
1A4A1R44		RESISTOR: Same as 1A3A2R28	7-12 (26)
1A4A1R45		RESISTOR: See item 35	7-12 (17)
1A4A1R46		RESISTOR: Same as 1A3A2R28	7-12 (26)
1A4A1R47		RESISTOR: See item 45	7-12 (19)
1A4A1R48		RESISTOR: See item 36	7-12 (22)
1A4A1R49		RESISTOR: See item 36	7-12 (22)
1A4A1R50		RESISTOR: See item 36	7-12 (22)
1A4A1R51		RESISTOR, FIXED, COMPOSITION: 56 ohms 5 PCT .25 Watt, 250 V rated .250 long body by .09 Dia. by .02 Dia Leads, mfr. 81349, part no. RCR07G560JS	7-12 (27)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A1R52		RESISTOR, FIXED, COMPOSITION: 33 k ohms 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 Dia. leads, mfr. 81349, part no. RCR07G333JS	7-12 (28)
1A4A1R53		RESISTOR, FIXED, COMPOSITION: 6.2 k ohms 5 PCT., .25 Watt, 250 V rated, .250 long body by .09 Dia., .02 Dia. leads, mfr. 81349, part no. RCR07G622JS	7-12 (29)
1A4A1R54		RESISTOR: See item 38	7-12 (30)
1A4A1R55		RESISTOR: See item 38	7-12 (30)
1A4A1R56		RESISTOR: See item 38	7-12 (30)
1A4A1R57		RESISTOR: See item 36	7-12 (22)
1A4A1U1		INTEGRATED CIRCUIT: Dual operational amplifier, consist of two 741 OP AMPL's in a single package 8 pin dual in line, mfr. 18324, part no. MC1458N	7-12 (31)
1A4A1U2		INTEGRATED CIRCUIT: Same as 1A4A1U1	7-12 (32)
1A4A2		CIRCUIT CARD ASSEMBLY: Converter 10.7 MHz/455 kHz, etched circuit board epoxy resin glass base laminate w/1 oz copper circuitry, converts signals from 10.7 MHz to 455 kHz. 0.500 in. thick by 4.30 in. long by 3.85 in. wide. connected by plugging in to motherboard, mfr. 14632, part no. 71430	7-13
1A4A2C1		CAPACITOR: See item 11	7-13 (1)
1A4A2C2		CAPACITOR: See item 11	7-13 (1)
1A4A2C3		CAPACITOR: See item 11	7-13 (1)
1A4A2C4		CAPACITOR: See item 11	7-13 (1)
1A4A2C5		CAPACITOR: See item 11	7-13 (1)
1A4A2C6		CAPACITOR: See item 11	7-13 (1)
1A4A2C7		CAPACITOR, FIXED, MICA DIELECTRIC: 68 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05ED680G03	7-13 (2)
1A4A2C8		CAPACITOR, FIXED, MICA DIELECTRIC: 360 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM05FD361G03	7-13 (3)
1A4A2C9		CAPACITOR, FIXED, MICA DIELECTRIC: 3900 pF, 2 PCT, 500 V, mfr. 81349, part no. CM06FD392G03	7-13 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A2C10		CAPACITOR: Same as 1A4A2C9	7-13 (4)
1A4A2C11		CAPACITOR, FIXED, MICA DIELECTRIC: 1600 pF, 2 PCT, 500 V, mfr. 81349, part no. CM06FD162G03	7-13 (5)
1A4A2L1		COIL, RADIO FREQUENCY: 100 μH, 5 PCT, .375 long by .156 Dia., by .025 Lead Dia., Phenolic core, molded, mfr. 99800, part no. 1537-76	7-13 (6)
1A4A2L2		COIL, RADIO FREQUENCY: 3.3 μH, 10 PCT, .375 long by .156 Dia., by .025 lead Dia., Phenolic core, molded, mfr. 99800, part no. 1537-24	7-13 (7)
1A4A2L3		COIL, RADIO FREQUENCY: 12 μH, 10 PCT, .375 long by .156 Dia., by .025 lead Dia., Phenolic core, molded, mfr. 99800, part no. 1537-38	7-13 (8)
1A4A2L4		COIL, RADIO FREQUENCY: 82 μH, 5 PCT, .375 Dia., long by .156 Dia., by .025 lead Dia., mfr. 99800, part no. 1537-72	7-13 (9)
1A4A2MP1		INSULATOR: See item 24	7-13 (10)
1A4A2MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A2	7-13 (11)
1A4A2Q1		TRANSISTOR: RF-IF Silicon NPN Low power T0-72 case, mfr. 18714, part no. 2N2708	7-13 (12)
1A4A2R1		RESISTOR: Same as 1A4A1R51	7-13 (13)
1A4A2R2		RESISTOR: Same as 1A4A1R51	7-13 (13)
1A4A2R3		RESISTOR: See item 37	7-13 (14)
1A4A2R4		RESISTOR: See item 41	7-13 (15)
1A4A2R5		RESISTOR: See item 56	7-13 (16)
1A4A2R6		RESISTOR, FIXED, COMPOSITION: 39 ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 Dia., leads, mfr. 81349, part no. RCR07G390JS	7-13 (17)
1A4A2R7		RESISTOR: See item 58	7-13 (18)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A2R8		RESISTOR, FIXED, COMPOSITION: 300 ohms, 5 PCT, .25 W, 250 V rated .250 long body by .09 Dia. leads by .02 Dia. leads, mfr. 81349, part no. RCR07G301JS	7-13 (19)
1A4A2R9		RESISTOR, FIXED, COMPOSITION: 18 ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia., .02 Dia., leads, mfr. 81349, part no. RCR07G180JS	7-13 (20)
1A4A2R10		RESISTOR: Same as 1A4A2R8	7-13 (19)
1A4A2U1		MIXER, FREQUENCY: Balanced, 0.05-200 MHz FL @ R 30 dB min. PC mount 1.020 long by .515 wide by .280 high, mfr. 27956, part no. M6A	7-13 (21)
1A4A3		CIRCUIT CARD ASSEMBLY: 455 kHz filter switch, etched circuit board epoxy resin glass base laminate w/1oz copper circuitry. Receives the 3rd IF signal from the 10.7 MHz/455 kHz converter and selects one of three signal paths. 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr. 14632, part no. 791595	7-14
1A4A3C1		CAPACITOR: See item 10	7-14 (1)
1A4A3C2		CAPACITOR: See item 10	7-14 (1)
1A4A3C3		CAPACITOR: See item 10	7-14 (1)
1A4A3C4		CAPACITOR: See item 10	7-14 (1)
1A4A3C5		CAPACITOR: See item 10	7-14 (1)
1A4A3C6		CAPACITOR: See item 10	7-14 (1)
1A4A3C7		CAPACITOR: See item 10	7-14 (1)
1A4A3C8		CAPACITOR: See item 3	7-14 (2)
1A4A3C9		CAPACITOR: See item 10	7-14 (1)
1A4A3C10		CAPACITOR: See item 10	7-14 (1)
1A4A3C11		CAPACITOR: See item 10	7-14 (1)
1A4A3C12		CAPACITOR: See item 10	7-14 (1)
1A4A3C13		CAPACITOR: See item 10	7-14 (1)
1A4A3C14		CAPACITOR: See item 10	7-14 (1)
1A4A3C15		CAPACITOR: See item 10	7-14 (1)
1A4A3C16		CAPACITOR: See item 10	7-14 (1)
1A4A3C17		CAPACITOR: See item 10	7-14 (1)
1A4A3C18		CAPACITOR: See item 10	7-14 (1)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A3C19		CAPACITOR: See item 10	7-14 (1)
1A4A3C20		CAPACITOR: See item 10	7-14 (1)
1A4A3FL1		FILTER, BANDPASS: 325 Hz Bandwidth 455 kHz center frequency, 2.61 long by 1.36 wide by .93 high, two .040 Dia., terminals and two .040 Dia., ground pins, mfr. 14632, part no. 92128	7-14 (3)
1A4A3FL2		FILTER, BANDPASS: 1 kHz bandwidth 455 kHz center frequency, 2.61 long by 1.36 wide by .93 high, two .040 Dia., terminals and two .040 Dia., ground pins mfr. 14632, part no. 92127	7-14 (4)
1A4A3L1		COIL: See item 15	7-14 (5)
1A4A3L2		COIL: See item 15	7-14 (5)
1A4A3L3		COIL: See item 15	7-14 (5)
1A4A3MP1		INSULATOR: See item 24 (6)	7-14 (6)
1A4A3MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A3	7-14 (7)
1A4A3Q1		TRANSISTOR: See item 63	7-14 (8)
1A4A3Q2		TRANSISTOR: See item 63	7-14 (8)
1A4A3Q3		TRANSISTOR: See item 63	7-14 (8)
1A4A3Q4		TRANSISTOR: See item 63	7-14 (8)
1A4A3Q5		TRANSISTOR: See item 63	7-14 (8)
1A4A3Q6		TRANSISTOR: See item 63	7-14 (8)
1A4A3R1		RESISTOR: See item 48	7-14 (9)
1A4A3R2		RESISTOR: See item 52	7-14 (10)
1A4A3R3		RESISTOR: See item 49	7-14 (11)
1A4A3R4		RESISTOR: See item 40	7-14 (12)
1A4A3R5		RESISTOR: See item 45	7-14 (13)
1A4A3R6		RESISTOR: See item 45	7-14 (13)
1A4A3R7		RESISTOR: See item 41	7-14 (14)
1A4A3R8		RESISTOR: See item 43	7-14 (15)
1A4A3R9		RESISTOR: See item 42	7-14 (16)
1A4A3R10		RESISTOR: See item 46	7-14 (17)
1A4A3R11		RESISTOR: See item 45	7-14 (13)
1A4A3R12		RESISTOR: See item 38	7-14 (18)
1A4A3R13		RESISTOR: See item 48	7-14 (9)
1A4A3R14		RESISTOR: See item 36	7-14 (19)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A3R15		RESISTOR: See item 36	7-14 (19)
1A4A3R16		RESISTOR: See item 38	7-14 (18)
1A4A3R17		RESISTOR: See item 48	7-14 (9)
1A4A3R18		RESISTOR: See item 52	7-14 (10)
1A4A3R19		RESISTOR: See item 49	7-14 (11)
1A4A3R20		RESISTOR: See item 40	7-14 (12)
1A4A3R21		RESISTOR: See item 41	7-14 (14)
1A4A3R22		RESISTOR: See item 43	7-14 (15)
1A4A3R23		RESISTOR: See item 42	7-14 (20)
1A4A3R24		RESISTOR: See item 36	7-14 (19)
1A4A3R25		RESISTOR: See item 36	7-14 (19)
1A4A3R26		RESISTOR: See item 38	7-14 (18)
1A4A3R27		RESISTOR: See item 38	7-14 (18)
1A4A3R28		RESISTOR: See item 48	7-14 (9)
1A4A3R29		RESISTOR: See item 52	7-14 (10)
1A4A3R30		RESISTOR: See item 40	7-14 (12)
1A4A3R31		RESISTOR: See item 49	7-14 (11)
1A4A3R32		RESISTOR: See item 46	7-14 (17)
1A4A3R33		RESISTOR: See item 41	7-14 (14)
1A4A3R34		RESISTOR: See item 43	7-14 (15)
1A4A3R35		RESISTOR: See item 42	7-14 (20)
1A4A3R36		RESISTOR: See item 36	7-14 (19)
1A4A3R37		RESISTOR: See item 36	7-14 (19)
1A4A3R38		RESISTOR: See item 56	7-14 (21)
1A4A3R39		RESISTOR: See item 38	7-14 (18)
1A4A3R40		RESISTOR: See item 36	7-14 (19)
1A4A3U1		INTEGRATED CIRCUIT: See item 28	7-14 (22)
1A4A4		CIRCUIT CARD ASSEMBLY: USB Filter switch, etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry. The USB filter passes signals between 455.25 kHz and 458.2 kHz, and amplifies them with a net voltage gain of appoximately 9 dB. 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard. mfr. 14632, part no. 791596	7-15
1A4A4C1		CAPACITOR: See item 10	7-15 (1)
1A4A4C2		CAPACITOR: See item 10	7-15 (1)
1A4A4C3		CAPACITOR: See item 10	7-15 (1)
1A4A4C4		CAPACITOR: See item 10	7-15 (1)
1A4A4C5		CAPACITOR: See item 3	7-15 (2)
1A4A4C6		CAPACITOR: See item 12	7-15 (3)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A4C7		CAPACITOR: See item 10	7-15 (1)
1A4A4C8		CAPACITOR: See item 10	7-15 (1)
1A4A4C9		CAPACITOR: See item 10	7-15 (1)
1A4A4C10		CAPACITOR: See item 10	7-15 (1)
1A4A4C11		CAPACITOR: See item 10	7-15 (1)
1A4A4C12		CAPACITOR: See item 10	7-15 (1)
1A4A4C13		CAPACITOR: See item 10	7-15 (1)
1A4A4CR1		SEMICONDUCTOR: See item 61	7-15 (4)
1A4A4CR2		SEMICONDUCTOR: See item 61	7-15 (4)
1A4A4FL1		FILTER-BAND PASS: Upper side band 455 kHz, Ultimate attenuation 60 dB, ripple 6 dB bandwidth, 3.52 long by 1.82 wide by .98 high, mfr. 14632, part no. 92122	7-15 (5)
1A4A4L1		COIL, RADIO, FREQUENCY: Fixed molded, 1000 μH, 5 PCT, min. Q60, .190 Dia. by .440 long, .022 leads, mfr. 99800, part no. 2500-28	7-15 (6)
1A4A4L2		COIL: See item 15	7-15 (7)
1A4A4MP1		INSULATOR: See item 24 (2)	7-15 (8)
1A4A4MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A4	7-15 (9)
1A4A4Q1		TRANSISTOR: See item 63	7-15 (10)
1A4A4Q2		TRANSISTOR: See item 63	7-15 (10)
1A4A4R1		RESISTOR: See item 38	7-15 (11)
1A4A4R2		RESISTOR: See item 56	7-15 (12)
1A4A4R3		RESISTOR: See item 49	7-15 (13)
1A4A4R4		RESISTOR: See item 35	7-15 (14)
1A4A4R5		RESISTOR: See item 45	7-15 (15)
1A4A4R6		RESISTOR: See item 45	7-15 (15)
1A4A4R7		RESISTOR: See item 40	7-15 (16)
1A4A4R8		RESISTOR: See item 40	7-15 (16)
1A4A4R9		RESISTOR: See item 35	7-15 (14)
1A4A4R10		RESISTOR: See item 36	7-15 (17)
1A4A4R11		RESISTOR: See item 45	7-15 (15)
1A4A4R12		RESISTOR: See item 38	7-15 (11)
1A4A4R13		RESISTOR: See item 48	7-15 (18)
1A4A4R14		RESISTOR: See item 36	7-15 (17)
1A4A4R15		RESISTOR: See item 38	7-15 (11)
1A4A4R16		RESISTOR: See item 38	7-15 (11)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A4R17		RESISTOR: See item 56	7-15 (12)
1A4A4R18		RESISTOR: See item 53	7-15 (19)
1A4A4R19		RESISTOR: See item 36	7-15 (17)
1A4A4R20		RESISTOR: See item 36	7-15 (17)
1A4A4R21		RESISTOR: See item 48	7-15 (18)
1A4A4R22		RESISTOR: See item 52	7-15 (20)
1A4A4R23		RESISTOR, VARIABLE: 500 ohms 10 PCT, .5 Watt, Helitrim, sealed metal housing, 1/4 Dia. single turn 3 pins, mfr. 73138, part no. 62PR500	7-15 (21)
1A4A4R24		RESISTOR: See item 36	7-15 (17)
1A4A4U1		INTEGRATED CIRCUIT: Same as 1A4A1U1	7-15 (22)
1A4A5		CIRCUIT CARD ASSEMBLY: ISB/LSB Filter switch, etched circuit board epoxy resin glass base laminate w/1oz copper circuitry, connects in parallel with the 455 kHz filter switch. 1.00 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard mfr. 14632, part no. 791597	7-16
1A4A5C1		CAPACITOR: See item 10	7-16 (1)
1A4A5C2		CAPACITOR: See item 10	7-16 (1)
1A4A5C3		CAPACITOR: See item 10	7-16 (1)
1A4A5C4		CAPACITOR: See item 10	7-16 (1)
1A4A5C5		CAPACITOR: See item 3	7-16 (2)
1A4A5C6		CAPACITOR: See item 12	7-16 (3)
1A4A5C7		CAPACITOR: See item 10	7-16 (1)
1A4A5C8		CAPACITOR: See item 10	7-16 (1)
1A4A5C9		CAPACITOR: See item 10	7-16 (1)
1A4A5C10		CAPACITOR: See item 10	7-16 (1)
1A4A5C11		CAPACITOR: See item 10	7-16 (1)
1A4A5C12		CAPACITOR: See item 10	7-16 (1)
1A4A5C13		CAPACITOR: See item 10	7-16 (1)
1A4A5C14		CAPACITOR: See item 10	7-16 (1)
1A4A5C15		CAPACITOR: See item 10	7-16 (1)
1A4A5C16		CAPACITOR: See item 10	7-16 (1)
1A4A5C17		CAPACITOR: See item 10	7-16 (1)
1A4A5CR1		SEMICONDUCTOR: See item 61	7-16 (4)
1A4A5CR2		SEMICONDUCTOR: See item 61	7-16 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A5CR3		SEMICONDUCTOR: See item 61	7-16 (4)
1A4A5FL1		FILTER, LOW PASS: Lower sideband 455 kHz, carrier rejection 12 dB min. ultimate attenuation 60 dB, 3.52 long by 1.82 wide by .98 high, mfr. 14632, part no. 92121	7-16 (5)
1A4A5L1		COIL: Same as 1A4A4L1	7-16 (6)
1A4A5L2		COIL: See item 15	7-16 (7)
1A4A5L3		COIL: See item 15	7-16 (7)
1A4A5MP1		INSULATOR: See item 26 (3)	7-16 (8)
1A4A5MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A5	7-16 (9)
1A4A5Q1		TRANSISTOR: See item 63	7-16 (10)
1A4A5Q2		TRANSISTOR: See item 63	7-16 (10)
1A4A5Q3		TRANSISTOR: See item 63	7-16 (10)
1A4A5R1		RESISTOR: See item 38	7-16 (11)
1A4A5R2		RESISTOR: See item 52	7-16 (12)
1A4A5R3		RESISTOR: See item 37	7-16 (13)
1A4A5R4		RESISTOR: See item 35	7-16 (14)
1A4A5R5		RESISTOR: See item 49	7-16 (15)
1A4A5R6		RESISTOR: See item 45	7-16 (16)
1A4A5R7		RESISTOR: See item 45	7-16 (16)
1A4A5R8		RESISTOR: See item 40	7-16 (17)
1A4A5R9		RESISTOR, FIXED, COMPOSITION: 2.4 k ohms, 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G242JS	7-16 (18)
1A4A5R10		RESISTOR: See item 56	7-16 (19)
1A4A5R11		RESISTOR: See item 35	7-16 (14)
1A4A5R12		RESISTOR: See item 36	7-16 (20)
1A4A5R13		RESISTOR: See item 45	7-16 (16)
1A4A5R14		RESISTOR: See item 38	7-16 (11)
1A4A5R15		RESISTOR: See item 44	7-16 (21)
1A4A5R16		RESISTOR: See item 38	7-16 (11)
1A4A5R17		RESISTOR: See item 45	7-16 (16)
1A4A5R18		RESISTOR: See item 36	7-16 (20)
1A4A5R19		RESISTOR: See item 38	7-16 (11)
1A4A5R20		RESISTOR: See item 36	7-16 (20)
1A4A5R21		RESISTOR: See item 48	7-16 (22)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A5R22		RESISTOR: See item 38	7-16 (11)
1A4A5R23		RESISTOR: See item 56	7-16 (19)
1A4A5R24		RESISTOR, FIXED, COMPOSITION: 24 k ohms, 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G243JS	7-16 (23)
1A4A5R25		RESISTOR: See item 36	7-16 (20)
1A4A5R26		RESISTOR: See item 48	7-16 (22)
1A4A5R27		RESISTOR: Same as 1A4A5R9	7-16 (18)
1A4A5R28		RESISTOR: See item 56	7-16 (19)
1A4A5R29		RESISTOR: See item 36	7-16 (20)
1A4A5R30		RESISTOR: See item 35	7-16 (14)
1A4A5R31		RESISTOR: See item 38	7-16 (11)
1A4A5R32		RESISTOR: Same as 1A4A4R23	7-16 (24)
1A4A5R33		RESISTOR: See item as 36	7-16 (20)
1A4A5U1		INTEGRATED CIRCUIT: 1A4A1U1	7-16 (25)
1A4A6		CIRCUIT CARD ASSEMBLY: AGC, etched circuit board epoxy resin glass base laminate w/1oz copper circuitry. Generates control voltages which adjust the amplification of signals passing through the receiver. 0.500 in. thick by 4.30 in. long by 3.85 in. wide. connected by plugging into the motherboard, mfr. 14632, part no. 78112	7-17
1A4A6C1		CAPACITORS, FIXED, ELECTROLYTIC: 47 µF, 10 PCT 20 Volt, mfr. 81349, part no. CS13BE476K	7-17 (1)
1A4A6C2		Not Used	
1A4A6C3		CAPACITOR: See item 10	7-17 (2)
1A4A6C4		CAPACITOR, FIXED, ELECTROLYTIC: 33 µF, 10 PCT, 10 Volt, mfr. 81349, part no. CS13BC336K	7-17 (3)
1A4A6C5		CAPACITOR: See item 10	7-17 (2)
1A4A6C6		CAPACITOR: See item 12	7-17 (4)
1A4A6C7		CAPACITOR: Same as 1A4A6C1	7-17 (1)
1A4A6CR1		Not Used	
1A4A6CR2		SEMICONDUCTOR DEVICE, DIODE: Zener 5.6 Volt silicon, 400 mw, mfr. 80131, part no. 1N752A	7-17 (5)
1A4A6CR3		Not Used	
1A4A6CR4		Not Used	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6CR5		SEMICONDUCTOR: See item 61	7-17 (6)
1A4A6CR6		SEMICONDUCTOR: See item 61	7-17 (6)
1A4A6CR7		SEMICONDUCTOR: See item 61	7-17 (6)
1A4A6CR8		SEMICONDUCTOR: See item 61	7-17 (6)
1A4A6CR9		SEMICONDUCTOR: See item 61	7-17 (6)
1A4A6MP1		INSULATOR: See item 26 (7)	7-17 (7)
1A4A6MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled components for item 1A4A6	7-17 (8)
1A4A6Q1		TRANSISTOR: See item 63	7-17 (9)
1A4A6Q2		TRANSISTOR: See item 65	7-17 (10)
1A4A6Q3		TRANSISTOR: See item 63	7-17 (9)
1A4A6Q4		TRANSISTOR: See item 63	7-17 (9)
1A4A6Q5		TRANSISTOR: See item 63	7-17 (9)
1A4A6Q6		TRANSISTOR: See item 63	7-17 (9)
1A4A6Q7		TRANSISTOR: See item 63	7-17 (9)
1A4A6R1		RESISTOR: See item 39	7-17 (10)
1A4A6R2		RESISTOR: See item 57	7-17 (11)
1A4A6R3		RESISTOR, FIXED, COMPOSITION: 470) K ohms % PCT, .25 Watt 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G474JS	7-17 (12)
1A4A6R4		RESISTOR: See item 36	7-17 (13)
1A4A6R5		RESISTOR: See item 39	7-17 (10)
1A4A6R6		RESISTOR, FIXED, COMPOSITION: 330 k ohms, 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G334JS	7-17 (13)
1A4A6R7		RESISTOR: See item 59	7-17 (14)
1A4A6R8		RESISTOR: See item 36	7-17 (13)
1A4A6R9		RESISTOR: See item 44	7-17 (15)
1A4A6R10		RESISTOR, FIXED, COMPOSITION: 150 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G154JS	7-17 (16)
1A4A6R11		RESISTOR: See item 38	7-17 (17)
1A4A6R12		RESISTOR, FIXED, COMPOSITION: 82 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 Long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G823JS	7-17 (18)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6R13		RESISTOR: See item 37	7-17 (19)
1A4A6R14		RESISTOR: See item 40	7-17 (20)
1A4A6R15		RESISTOR: See item 59	7-17 (14)
1A4A6R16		RESISTOR: See item 59	7-17 (14)
1A4A6R17		RESISTOR: See item 48	7-17 (21)
1A4A6R18		RESISTOR, FIXED, COMPOSITION: 270 k ohms 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G274JS	7-17 (22)
1A4A6R19		RESISTOR: 680 k ohms 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 leads dia., mfr. 81349, part no. RCR07G684JS	7-17 (23)
1A4A6R20		RESISTOR: See item 38	7-17 (17)
1A4A6R21		RESISTOR: See item 44	7-17 (15)
1A4A6R22		RESISTOR: See item 44	7-17 (15)
1A4A6R23		RESISTOR: Same as 1A4A6R3	7-17 (12)
1A4A6R24		RESISTOR: See item 44	7-17 (15)
1A4A6R25		RESISTOR: See item 43	7-17 (24)
1A4A6R26		RESISTOR: See item 47	7-17 (25)
1A4A6R27		RESISTOR: See item 38	7-17 (17)
1A4A6R28		RESISTOR: See item 36	7-17 (13)
1A4A6R29		RESISTOR: See item 36	7-17 (13)
1A4A6R30		RESISTOR: See item 38	7-17 (17)
1A4A6R31		RESISTOR: See item 50	7-17 (26)
1A4A6R32		RESISTOR: Same as 1A3A2R14	7-17 (27)
1A4A6R33		RESISTOR: See item 56	7-17 (28)
1A4A6R34		Not Used	
1A4A6R35		RESISTOR: See item 56	7-17 (28)
1A4A6R36		RESISTOR: See item 60	7-17 (29)
1A4A6R37		RESISTOR: See item 39	7-17 (10)
1A4A6R38		RESISTOR: See item 60	7-17 (29)
1A4A6R39		RESISTOR: See item 60	7-17 (29)
1A4A6R40		RESISTOR: See item 39	7-17 (10)
1A4A6R41		RESISTOR: See item 59	7-17 (14)
1A4A6R42		RESISTOR: See item 36	7-17 (13)
1A4A6R43		RESISTOR: See item 57	7-17 (11)
1A4A6R44		Not Used	
1A4A6R45		RESISTOR: Same as 1A2A1R1	7-17 (30)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A6R46	Note 1	RESISTOR: See item 53	7-17 (31)
1A4A6R47		RESISTOR, FIXED, COMPOSITION: 820 ohms, 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G821JS	7-17 (32)
1A4A6R48		RESISTOR: Same as 1A3A2R13	7-17 (33)
1A4A6R49		RESISTOR: Same as 1A3A2R6	7-17 (34)
1A4A6R50	Note 1	RESISTOR: See item 52	7-17 (35)
1A4A6R51	Note 1	RESISTOR: Same as 1A3A2R14	7-17 (36)
1A4A6R52		RESISTOR: See item 37	7-17 (19)
1A4A6U1	Note 2	INTEGRATED CIRCUIT: See item 28	7-17 (37)
1A4A6U2	Note 2	INTEGRATED CIRCUIT: See item 28	7-17 (37)
1A4A7		CIRCUIT CARD ASSEMBLY: Amplifier and AM Detector, 455 kHz. etched circuit board epoxy resin glass base laminated w/1 oz copper circuitry. Amplifies the weak signals in the receiver and splits the input signal to provide 3 outputs: the IF sample which operated to FM/CW/SSB demodulator, the IF output for the rear panel and the input to the AM detector, 0.500 in. thick by 4.30 in. long by 3.85 in. wide connected by plugging into motherboard, mfr. 14632, part no. 72488	7-18
1A4A7C1		CAPACITOR: See item 10	7-18 (1)
1A4A7C2		CAPACITOR: See item 10	7-18 (1)
1A4A7C3		CAPACITOR: See item 11	7-18 (2)
1A4A7C4		Not Used	
1A4A7C5		CAPACITOR: See item 10	7-18 (1)
1A4A7C6		CAPACITOR: See item 10	7-18 (1)
1A4A7C7		CAPACITOR: See item 11	7-18 (2)
1A4A7C8		CAPACITOR: See item 10	7-18 (1)
	Note 1.	Nominal Value, Final Value Factory Selected.	
	Note 2.	LM348N may be used as alternate in this application	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7C9		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3300 pF, 2 PCT, 500 Volt, mfr. 81349, part no. CM06FD332G03	7-18 (3)
1A4A7C10		CAPACITOR: See item 11	7-18 (2)
1A4A7C11		CAPACITOR: Same as 1A4A7C9	7-18 (4)
1A4A7C12		CAPACITOR: See item 10	7-18 (1)
1A4A7C13		CAPACITOR: See item 10	7-18 (1)
1A4A7C14		CAPACITOR: See item 10	7-18 (1)
1A4A7C15		CAPACITOR: See item 10	7-18 (1)
1A4A7C16		CAPACITOR: See item 10	7-18 (1)
1A4A7C17		CAPACITOR: See item 10	7-18 (1)
1A4A7C18		CAPACITOR: See item 10	7-18 (1)
1A4A7C19		CAPACITOR: See item 10	7-18 (1)
1A4A7C20		CAPACITOR: See item 10	7-18 (1)
1A4A7C21		Not Used	
1A4A7C22		CAPACITOR: See item 10	7-18 (1)
1A4A7C23		CAPACITOR: See item 10	7-18 (1)
1A4A7C24		CAPACITOR: See item 10	7-18 (1)
1A4A7C25		CAPACITOR: See item 10	7-18 (1)
1A4A7C26		CAPACITOR: Same as 1A2A1C4	7-18 (5)
1A4A7C27		CAPACITOR: See item 10	7-18 (1)
1A4A7C28		CAPACITOR: Same as 1A3A2C4	7-18 (6)
1A4A7C29		CAPACITOR: See item 3	7-18 (7)
1A4A7C30		CAPACITOR: See item 10	7-18 (1)
1A4A7CR1		SEMICONDUCTOR: See item 61	7-18 (8)
1A4A7CR2		SEMICONDUCTOR: See item 61	7-18 (8)
1A4A7CR3		SEMICONDUCTOR: See item 61	7-18 (8)
1A4A7CR4		SEMICONDUCTOR: See item 61	7-18 (8)
1A4A7CR5		SEMICONDUCTOR: See item 61	7-18 (8)
1A4A7L1		COIL: See item 15	7-18 (9)
1A4A7L2		COIL, RADIO FREQUENCY: Variable 35.1, -42.9 μH, .480 high by .400 SQ., .050 mounting tabs, P.C. mount, metal shielded, mfr. 71279, part no. 558-7107-32	7-18 (10)
1A4A7L3		COIL: Same as 1A4A7L2	7-18 (10)
1A4A7L4		COIL: See item 15	7-18 (9)
1A4A7L5		COIL: See item 15	7-18 (9)
1A4A7L6		COIL: See item 15	7-18 (9)
1A4A7L7		COIL: See item 15	7-18 (9)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7MP1		INSULATOR: See item 24 (6)	7-18 (11)
1A4A7MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A7	7-18 (12)
1A4A7Q1		TRANSISTOR: See item 67	7-18 (13)
1A4A7Q2		TRANSISTOR: See item 67	7-18 (13)
1A4A7Q3		TRANSISTOR: See item 63	7-18 (14)
1A4A7Q4		TRANSISTOR: See item 63	7-18 (14)
1A4A7Q5		TRANSISTOR: See item 63	7-18 (14)
1A4A7Q6		TRANSISTOR: See item 63	7-18 (14)
1A4A7R1		RESISTOR: Same as 1A4A1R52	7-18 (15)
1A4A7R2		RESISTOR: See item 47	7-18 (16)
1A4A7R3		RESISTOR: See item 52	7-18 (17)
1A4A7R4		RESISTOR: See item 53	7-18 (18)
1A4A7R5		RESISTOR, FIXED, COMPOSITION: 120 k ohms 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G124JS	7-18 (19)
1A4A7R6		RESISTOR: See item 49	7-18 (20)
1A4A7R7		RESISTOR, VARIABLE: 5 k ohms, 10 PCT, .5 Watt, Heli trim, sealed metal housing 1/4 in. Dia. Single turn, 3 pins, mfr. 73138, part no. 62PAR5K	7-18 (21)
1A4A7R8		RESISTOR: See item 46	7-18 (22)
1A4A7R9		RESISTOR: See item 36	7-18 (23)
1A4A7R10		RESISTOR, FIXED, COMPOSITION: 680 k ohms 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G684JS	7-18 (24)
1A4A7R11		RESISTOR: See item 57	7-18 (25)
1A4A7R12		RESISTOR: See item 52	7-18 (17)
1A4A7R13		RESISTOR: See item 53	7-18 (18)
1A4A7R14		RESISTOR: See item 49	7-18 (20)
1A4A7R15		Not Used	
1A4A7R16		RESISTOR: See item 54	7-18 (26)
1A4A7R17		RESISTOR, FIXED, COMPOSITION: 8.2 k ohms, 5 PCT .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 Lead Dia., mfr. 81349, part no. RCR07G822JS	7-18 (27)
1A4A7R18		RESISTOR: See item 36	7-18 (23)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A7R19		RESISTOR: See item 36	7-18 (23)
1A4A7R20		RESISTOR: Same as 1A3A2R6	7-18 (28)
1A4A7R21		RESISTOR: See item 36	7-18 (23)
1A4A7R22		RESISTOR: See item 41	7-18 (29)
1A4A7R23		RESISTOR: See item 56	7-18 (30)
1A4A7R24		RESISTOR: See item 45	7-18 (31)
1A4A7R25		RESISTOR: See item 55	7-18 (32)
1A4A7R26		RESISTOR: Same as 1A3A2R23	7-18 (33)
1A4A7R27		RESISTOR: See item 42	7-18 (34)
1A4A7R28		RESISTOR: Same as 1A4A7R5	7-18 (35)
1A4A7R29		RESISTOR: See item 43	7-18 (36)
1A4A7R30		RESISTOR: See item 47	7-18 (16)
1A4A7R31		RESISTOR: See item 36	7-18 (23)
1A4A7R32		RESISTOR: See item 46	7-18 (22)
1A4A7R33		RESISTOR: Same as 1A3A2R4	7-18 (37)
1A4A7R34		RESISTOR: See item 36	7-18 (23)
1A4A7R35		RESISTOR, FIXED, COMPOSITION: 5.6 k ohms 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 Lead Dia., mfr. 81349, part no. RCR07G562JS	7-18 (38)
1A4A7R36		RESISTOR: See item 57	7-18 (25)
1A4A7R37		RESISTOR: See item 54	7-18 (26)
1A4A7R38		RESISTOR: See item 59	7-18 (39)
1A4A7R39		RESISTOR: See item 58	7-18 (40)
1A4A7T1		TRANSFORMER: 70 kHz - 3.6 MHz Freq. Range, Porm 2.0 dB response, 4500 Ω source, 500 Ω load, 6 wire leads, .385 wide by .510 long by .385 high, mfr. 06978, part no. 70-130	7-18 (41)
1A4A8		CIRCUIT CARD ASSEMBLY: ISB Detector and audio, etched circuit board epoxy resin glass base laminate w/1 oz copper circuitry. Processes the two demodulated SSB signals which share the same carrier frequency, ISB is handled as a single composite signal through the third mixer, it is split, the USB component being filtered and seperately amplified and demodulated by the ISB detector and Audio Module. 0.50 in. thick by 4.30 in. long by 3.85 in. wide. Connected by plugging into motherboard. mfr. 14632, part no. 791598	7-19

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8C1		CAPACITOR: See item 10	7-19 (1)
1A4A8C2		CAPACITOR: See item 10	7-19 (1)
1A4A8C3		CAPACITOR: See item 10	7-19 (1)
1A4A8C4		CAPACITOR: Not Used	
1A4A8C5		CAPACITOR: See item 10	7-19 (1)
1A4A8C6		CAPACITOR: See item 10	7-19 (1)
1A4A8C7		CAPACITOR: See item 10	7-19 (1)
1A4A8C8		CAPACITOR: See item 10	7-19 (1)
1A4A8C9		CAPACITOR: See item 10	7-19 (1)
1A4A8C10		CAPACITOR: See item 10	7-19 (1)
1A4A8C11		CAPACITOR: See item 10	7-19 (1)
1A4A8C12		CAPACITOR: See item 3	7-19 (2)
1A4A8C13		CAPACITOR: See item 3	7-19 (2)
1A4A8C14		CAPACITOR: See item 10	7-19 (1)
1A4A8C15		CAPACITOR: See item 10	7-19 (1)
1A4A8C16		CAPACITOR: See item 10	7-19 (1)
1A4A8C17		CAPACITOR: See item 10	7-19 (1)
1A4A8C18		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3300 pF, 10 PCT, 200 V, .09 thick by .290 wide by .290 long with 2 wire leads, mfr. 81349, part no. CK06BX332K	7-19 (3)
1A4A8C19		CAPACITOR, FIXED, ELECTROLYTIC: 4.7 μF, 10 PCT, 35 V, Axial leads, mfr. 81349, part no. CS13BF475K	7-19 (4)
1A4A8C20		CAPACITOR: See item 10	7-19 (1)
1A4A8C21		CAPACITOR: See item 10	7-19 (1)
1A4A8C22		CAPACITOR: See item 10	7-19 (1)
1A4A8C23		Not Used	
1A4A8C24		Not Used	
1A4A8C25		CAPACITOR: See item 10	7-19 (1)
1A4A8CR1		SEMICONDUCTOR: See item 61	7-19 (5)
1A4A8CR2		SEMICONDUCTOR: See item 61	7-19 (5)
1A4A8CR3		Not Used	
1A4A8CR4		SEMICONDUCTOR: See item 61	7-19 (5)
1A4A8L1		COIL: See item 15	7-19 (6)
1A4A8L2		COIL: See item 15	7-19 (6)
1A4A8L3		COIL, RADIO FREQUENCY: 47 μH, 10 PCT P.C. Mount, .375 Dia. by .375 wide, .025 Dia. tinned leads, mfr. 71279, part no. 553-3635-57	7-19 (7)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8MP1		INSULATOR: See item 26 (5)	7-19 (8)
1A4A8MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A8	7-19 (9)
1A4A8MP3		SHIELD: ISB Detector, Alum. Alloy, mfr. 14632, part no. 34983	7-19 (10)
1A4A8Q1		TRANSISTOR: See item 67	7-19 (11)
1A4A8Q2		TRANSISTOR: See item 67	7-19 (11)
1A4A8Q3		TRANSISTOR: See item 65	7-19 (12)
1A4A8Q4		TRANSISTOR: See item 63	7-19 (13)
1A4A8Q5		TRANSISTOR: See item 65	7-19 (12)
1A4A8R1		RESISTOR: See item 52	7-19 (14)
1A4A8R2		RESISTOR: Same as 1A4A7R5	7-19 (15)
1A4A8R3		RESISTOR: Same as 1A4A1R52	7-19 (16)
1A4A8R4		RESISTOR: See item 47	7-19 (17)
1A4A8R5		RESISTOR: See item 53	7-19 (18)
1A4A8R6		RESISTOR: See item 35	7-19 (19)
1A4A8R7		RESISTOR: See item 49	7-19 (20)
1A4A8R8		RESISTOR: Same as 1A4A7R7	7-19 (21)
1A4A8R9		RESISTOR: See item 54	7-19 (22)
1A4A8R10		RESISTOR: See item 49	7-19 (20)
1A4A8R11		RESISTOR: See item 52	7-19 (14)
1A4A8R12		RESISTOR: Same as 1A4A7R5	7-19 (23)
1A4A8R13		RESISTOR: Same as 1A4A7R10	7-19 (24)
1A4A8R14		RESISTOR: See item 57	7-19 (25)
1A4A8R15		RESISTOR: See item 53	7-19 (18)
1A4A8R16		RESISTOR: See item 35	7-19 (19)
1A4A8R17		RESISTOR: See item 49	7-19 (20)
1A4A8R18	Note 1	RESISTOR: See item 47	7-19 (17)
1A4A8R19		RESISTOR: See item 45	7-19 (26)
1A4A8R20		RESISTOR: See item 59	7-19 (27)
1A4A8R21		RESISTOR: See item 38	7-19 (28)
1A4A8R22		RESISTOR: See item 38	7-19 (28)
1A4A8R23		RESISTOR: See item 59	7-19 (27)
1A4A8R24		RESISTOR: See item 37	7-19 (29)
	Note 1.	Nominal Value, Final Value Factory Selected	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8R25		RESISTOR: See item 37	7-19 (29)
1A4A8R26		RESISTOR: See item 44	7-19 (30)
1A4A8R27		RESISTOR: See item 52	7-19 (14)
1A4A8R28		RESISTOR: See item 52	7-19 (14)
1A4A8R29		RESISTOR: See item 57	7-19 (25)
1A4A8R30		RESISTOR: See item 47	7-19 (17)
1A4A8R31		RESISTOR: Same as 1A4A6R6	7-19 (31)
1A4A8R32		RESISTOR: See item 57	7-19 (25)
1A4A8R33		RESISTOR: See item 41	7-19 (32)
1A4A8R34		RESISTOR, FIXED, COMPOSITION: 12 k ohms 5 PCT. .25 Watt 250 V rated, .250 long body by .09 Dia. by .02 Lead Dia. mfr. 81349, part no. RCR07G105JS	7-19 (33)
1A4A8R35		RESISTOR: Same as 1A4A8R34	7-19 (34)
1A4A8R36		RESISTOR, VARIABLE: 25 k ohms 10 PCT, .50 Watt, Helitrim, sealed metal housing 1/4 in. Dia. single turn, 3 pins, mfr. 73138, part no. 62PAR25K	7-19 (35)
1A4A8R37		RESISTOR: See item 45	7-19 (26)
1A4A8R38		Not Used	
1A4A8R39		RESISTOR: See item 57	7-19 (25)
1A4A8R40		Not Used	
1A4A8R41		RESISTOR: See item 38	7-19 (28)
1A4A8R42		RESISTOR: See item 44	7-19 (30)
1A4A8R43		RESISTOR: See item 36	7-19 (36)
1A4A8R44		RESISTOR: Same as 1A4A7R10	7-19 (24)
1A4A8R45		RESISTOR: See item 44	7-19 (30)
1A4A8R46		RESISTOR: See item 48	7-19 (37)
1A4A8R47		RESISTOR: See item 56	7-19 (38)
1A4A8R48		RESISTOR: Same as 1A4A6R12	7-19 (39)
1A4A8R49		RESISTOR: See item 37	7-19 (29)
1A4A8R50		RESISTOR: See item 40	7-19 (40)
1A4A8R51		RESISTOR: See item 38	7-19 (28)
1A4A8R52		RESISTOR, FIXED, COMPOSITION: 3.3 m ohms, 5 PCT, .25 Watt, 250 V rated, .250 long by .09 Dia. by .02 Lead Dia. mfr. 81349, part no. RCR07G335JS	7-19 (41)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A8R53		RESISTOR: Same as 1A4A1R52	7-19 (16)
1A4A8R54		RESISTOR, FIXED, FILM: 18.2 k ohms, 1 PCT, .10 Watt, 200 V rated, .250 long body by .088 Dia. by .09 Dia. by .02 Lead Dia. mfr. 81349, part no. RN55C1822F	7-19 (42)
1A4A8R55		RESISTOR, FIXED, FILM: 82.5 k ohms, 1 PCT, .10 Watt, 200 V rated, .250 long body by .088 Dia. by .02 Lead Dia., mfr. 81349, part no. RN55C8252F	7-19 (43)
1A4A8R56		RESISTOR, FIXED, FILM: 100 k ohms, 1 PCT, .10 Watt, 200 V rated, .250 Long body by .02 Lead Dia., mfr. 81349, part no. RN55C1003F	7-19 (44)
1A4A8R57		RESISTOR: See item 38	7-19 (28)
1A4A8R58		RESISTOR: See item 42	7-19 (45)
1A4A8R59		RESISTOR: See item 42	7-19 (45)
1A4A8R60		RESISTOR: See item 38	7-19 (28)
1A4A8R61		RESISTOR: See item 45	7-19 (26)
1A4A8R62		RESISTOR: See item 37	7-19 (29)
1A4A8R63		RESISTOR: See item 46	7-19 (46)
1A4A8R64		RESISTOR: See item 48	7-19 (37)
1A4A8R65		RESISTOR: See item 36	7-19 (36)
1A4A8R66		RESISTOR: See item 60	7-19 (47)
1A4A8R67		RESISTOR: See item 48	7-19 (37)
1A4A8R68		RESISTOR: See item 56	7-19 (38)
1A4A8T1		TRANSFORMER, AUDIO FREQUENCY: 600 ohm, CT to 600 ohm CT, DC Resistance 65 ohm PR1 75 ohm sec, max PR1 DC 4 mA, max 200 Hz power 150 MW, response PORM 1 dB 200 to 50 kHz, distortion 10 PCT max rated power 200 to 50 kHz, 6 lead PC mount, .600 high by .590 wide and .590 deep, mfr. 07388, part no. LL010	7-19 (48)
1A4A8U1		INTEGRATED CIRCUIT: Balanced modulator - demodulator, silicon monolithic, plastic dip 14 pin PC mount, mfr. 04713, part no. MC1496P	7-19 (49)
1A4A8U2		INTEGRATED CIRCUIT: See item 28	7-19 (50)
1A4A8U3		INTEGRATED CIRCUIT: See item 28	7-19 (50)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9		CIRCUIT CARD ASSEMBLY: FM/CW/SSB Detector, etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry. Contains a limiter and discriminator, powered when FM detection is selected for CW or SSB a product detector has its power applied when CW, USB, LSB or ISB detection modes are selected. 0.50 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr. 14632, part no. 791599	7-20
1A4A9C1		CAPACITOR: See item 10	7-20 (1)
1A4A9C2		CAPACITOR: See item 10	7-20 (1)
1A4A9C3		CAPACITOR: See item 10	7-20 (1)
1A4A9C4		CAPACITOR: See item 10	7-20 (1)
1A4A9C5		CAPACITOR: See item 10	7-20 (1)
1A4A9C6		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 470 pF, 2 PCT, 500 V, mfr. 72136, part no. DM 15-471G	7-20 (2)
1A4A9C7		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 330 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05FD331G03	7-20 (3)
1A4A9C8		CAPACITOR, FIXED CERAMIC DIELECTRIC: 390 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05FD391G03	7-20 (4)
1A4A9C9		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 150 pF, 5 PCT, 50 V TC-N750, .320 sq., mfr. 93958, part no. 1U150RJ	7-20 (5)
1A4A9C10		CAPACITOR: Same as 1A4A9C7	7-20 (6)
1A4A9C11		CAPACITOR, FIXED, PLASTIC DIELECTRIC: .015 µF, 5 PCT, 100 V, .187 Dia. by .50 long, mfr. 84411, part no. 663UW153-5-1W	7-20 (7)
1A4A9C12		CAPACITOR: See item 10	7-20 (1)
1A4A9C13		CAPACITOR, FIXED, ELECTROLYTIC: 18 µF, 10 PCT, 20 V, epoxy dipped, solid tantalum .225 x .425, mfr. 56289, part no.196D186X9020KE3	7-20 (8)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9C14		CAPACITOR: See item 10	7-20 (1)
1A4A9C15		CAPACITOR: See item 10	7-20 (1)
1A4A9C16		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1 μF, 20 PCT, 50 V, monobloc, .300 x .300 sq., mfr. 72982, part no. 8131-050-651-105M	7-20 (9)
1A4A9C17		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2700 pF, 2 PCT, 500 V, mfr. 81349, part no. CM06FD272G03	7-20 (10)
1A4A9C18		CAPACITOR: See item 3	7-20 (11)
1A4A9C19		CAPACITOR: Same as 1A3A2C18	7-20 (12)
1A4A9CR1		SEMICONDUCTOR: See item 61	7-20 (13)
1A4A9CR2		SEMICONDUCTOR: See item 61	7-20 (13)
1A4A9L1		COIL, RADIO, FREQUENCY: Variable, 210 μH PORM, 5 PCT, mounting assy. with bobbin, core, and trimmer, mfr. 14632, part no. 30312-258	7-20 (14)
1A4A9L2		Not Used	
1A4A9L3		COIL: Same as 1A4A8L3	7-20 (15)
1A4A9MP1	Q1-Q4	INSULATOR, DISK: 3 lead .13 thk, T0-18 conv T0-5, mfr. 13103, part no. 7717-115DAP	7-20 (16)
1A4A9MP2		PRINTED WIRING BOARD: Basic etched circuit less assembled parts for item 1A4A9	7-20 (17)
1A4A9Q1		TRANSISTOR: See item 65	7-20 (18)
1A4A9Q2		TRANSISTOR: See item 63	7-20 (19)
1A4A9Q3		TRANSISTOR: See item 65	7-20 (18)
1A4A9Q4		TRANSISTOR: See item 63	7-20 (19)
1A4A9R1		RESISTOR: See item 38	7-20 (20)
1A4A9R2		RESISTOR: See item 37	7-20 (21)
1A4A9R3		RESISTOR: See item 46	7-20 (22)
1A4A9R4		RESISTOR: See item 54	7-20 (23)
1A4A9R5		RESISTOR: See item 60	7-20 (24)
1A4A9R6		RESISTOR: See item 57	7-20 (25)
1A4A9R7		RESISTOR, FIXED, COMPOSITION: 56 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 Dia. by .02 lead dia., mfr. 81349, part no. RCR07G563JS	7-20 (26)
1A4A9R8		RESISTOR: See item 56	7-20 (27)
1A4A9R9		RESISTOR: See item 47	7-20 (28)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9R10		RESISTOR, FIXED, COMPOSITION: 560 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G564JS	7-20 (29)
1A4A9R11		RESISTOR: Same as 1A4A6R3	7-20 (30)
1A4A9R12		RESISTOR: See item 44	7-20 (31)
1A4A9R13		RESISTOR: See item 44	7-20 (31)
1A4A9R14		RESISTOR: See item 59	7-20 (32)
1A4A9R15		RESISTOR: See item 38	7-20 (20)
1A4A9R16		RESISTOR: See item 38	7-20 (20)
1A4A9R17		RESISTOR: See item 59	7-20 (32)
1A4A9R18		RESISTOR: See item 37	7-20 (21)
1A4A9R19		RESISTOR: See item 37	7-20 (21)
1A4A9R20		RESISTOR: See item 44	7-20 (31)
1A4A9R21		RESISTOR: See item 52	7-20 (33)
1A4A9R22		RESISTOR: See item 52	7-20 (33)
1A4A9R23		RESISTOR: See item 36	7-20 (34)
1A4A9R24		RESISTOR: See item 42	7-20 (35)
1A4A9R25		RESISTOR: Same as 1A4A7R35	7-20 (36)
1A4A9R26		RESISTOR: See item 60	7-20 (24)
1A4A9R27		RESISTOR: See item 57	7-20 (25)
1A4A9R28		RESISTOR: See item 54	7-20 (23)
1A4A9R29		RESISTOR: Same as 1A4A6R12	7-20 (37)
1A4A9R30		RESISTOR: See item 59	7-20 (38)
1A4A9R31		RESISTOR: See item 54	7-20 (23)
1A4A9R32		RESISTOR: Same as 1A4A6R12	7-20 (37)
1A4A9R33		RESISTOR: See item 59	7-20 (38)
1A4A9R34		RESISTOR: See item 57	7-20 (25)
1A4A9R35		RESISTOR: See item 60	7-20 (24)
1A4A9R36		RESISTOR: See item 36	7-20 (34)
1A4A9R37		RESISTOR: See item 56	7-20 (27)
1A4A9R38		RESISTOR: See item 38	7-20 (20)
1A4A9R39		RESISTOR: See item 55	7-20 (39)
1A4A9T1		COIL, RADIO FREQUENCY: Variable, 215 μH PORM, 5 PCT sec., mounting assy. with bobbin, core and trimmer, mfr. 14632, part no. 30312-257	7-20 (40)
1A4A9U1		INTEGRATED CIRCUIT: FM IF Amplifier HI G-Gain wideband, hermetic 10 lead to 5 package, mfr. 02735, part no. CA3012	7-20 (41)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A9U2		INTEGRATED CIRCUIT: same as 1A4A8U1	7-20 (42)
1A4A9U3	Note 1	INTEGRATED CIRCUIT: See item 28	7-20 (43)
1A4A10		CIRCUIT CARD ASSEMBLY: Audio amplifier, etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry. Combines the audio outputs of the AM detector and FM/CW/SSB detector and feeds them to the line audio level control on the rear panel and the phone level control on the front panel. .500 in. thick by 4.30 in. long by 3.85 in. wide, connected by plugging into motherboard, mfr. 14 - 632, part no. 746001.	7-21
1A4A10C1		CAPACITOR: See item 10	7-21 (1)
1A4A10C2		CAPACITOR: See item 12	7-21 (2)
1A4A10C3		CAPACITOR: See item 10	7-21 (1)
1A4A10C4		CAPACITOR: same as 1A4A8C19	7-21 (3)
1A4A10C5		Not Used	
1A4A10C6		CAPACITOR: See item 10	7-21 (1)
1A4A10C7		CAPACITOR: Same as 1A4A9C16	7-21 (4)
1A4A10C8		CAPACITOR: See item 10	7-21 (1)
1A4A10C9		CAPACITOR: See item 10	7-21 (1)
1A4A10C10		CAPACITOR: Same as 1A4A8C19	7-21 (3)
1A4A10C11		Not Used	
1A4A10C12		CAPACITOR: See item 3	7-21 (5)
1A4A10C13		CAPACITOR: See item 3	7-21 (5)
1A4A10C14		CAPACITOR: See item 10	7-21 (1)
1A4A10C15		Not Used	
1A4A10C16		Not Used	
1A4A10C17		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5000 pF, 20 PCT, 500 V, mfr. 91418, part no. B-GP5000PFM	7-21 (6)
1A4A10C18		CAPACITOR, FIXED, ELECTROLYTIC: 47 µF, 10 PCT, 35 V, mfr. 81349, part no. CS13BF476K	7-21 (7)
1A4A10C19		CAPACITOR: Same as 1A4A10C18	7-21 (7)
1A4A10C20		Not Used	
1A4A10C21		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 24 pF, 5 PCT, 500 V, mfr. 81349, part no. CM05ED240J03	7-21 (8)
	Note 1.	Part LM348N may be used as ALT. in this application	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A10CR1		SEMICONDUCTOR: See item 61	7-21 (9)
1A4A10CR2		SEMICONDUCTOR DEVICE DIODE: 80 V germanium point contact, miniature glass package, PFC 90 mA, ambient temp. +90°C, .265 long body by .105 Dia. by .02 lead dia., mfr. 80131, part no.1N198A	7-21 (10)
1A4A10CR3		SEMICONDUCTOR: Same as 1A4A10CR2	7-21 (10)
1A4A10MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A4A10	7-21 (11)
1A4A10Q1		TRANSISTOR: Switching junction FET/N-Channel, T0-106 BVGSS volts 40, epoxy, .215 dia. by .250 high, 3 lead PC mount, mfr. 15818, part no. U1899E	7-21 (12)
1A4A10RA1		HEATSINK, ELECTRICAL ELECTRONIC COMPONENT: .032 brass nickel plated, 1.50 long by .87 wide w/45° top angles, mfr. 14-632, part no. 24566-1	7-21 (13)
1A4A10R1		RESISTOR: See item 48	7-21 (14)
1A4A10R2		RESISTOR: Same as 1A4A6R6	7-21 (15)
1A4A10R3		RESISTOR: See item 57	7-21 (16)
1A4A10R4		RESISTOR: See item 57	7-21 (16)
1A4A10R5		RESISTOR, FIXED, COMPOSITION: 2.2 M ohms, 5 PCT, .25 Watt, 250 V rated, .25 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G225JS	7-21 (17)
1A4A10R6		RESISTOR, FIXED, COMPOSITION: 20 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G203JS	7-21 (18)
1A4A10R7		RESISTOR: See item 39	7-21 (19)
1A4A10R8		RESISTOR: See item 39	7-21 (19)
1A4A10R9		RESISTOR: See item 39	7-21 (19)
1A4A10R10		RESISTOR: See item 39	7-21 (19)
1A4A10R11		RESISTOR: See item 48	7-21 (14)
1A4A10R12		RESISTOR: See item 41	7-21 (20)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A4A10R13		RESISTOR, FIXED, COMPOSITION: 27 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G273JS	7-21 (21)
1A4A10R14		RESISTOR: See item 59	7-21 (22)
1A4A10R15		Not Used	
1A4A10R16		Not Used	
1A4A10R17		RESISTOR, FIXED, COMPOSITION: 18 k ohms, 5 PCT, .25 Watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G183JS	7-21 (23)
1A4A10R18		RESISTOR: See item 39	7-21 (19)
1A4A10R19		RESISTOR, FIXED, FILM: 2.0 k ohms, 1 PCT, .10 Watt, 200 V rated, .250 long body by .088 dia. by .02 lead dia., mfr. 81349, part no. RN55C2001F	7-21 (24)
1A4A10R20		RESISTOR: Same as 1A4A8R56	7-21 (25)
1A4A10R21		RESISTOR: Same as 1A4A8R56	7-21 (25)
1A4A10R22		RESISTOR: See item 36	7-21 (26)
1A4A10R23		RESISTOR: See item 48	7-21 (14)
1A4A10R24		RESISTOR: See item 59	7-21 (22)
1A4A10R25		Not Used	
1A4A10R26		Not Used	
1A4A10R27		RESISTOR: See item 36	7-21 (26)
1A4A10T1		TRANSFORMER: Same as 1A4A8T1	7-21 (27)
1A4A10U1		INTEGRATED CIRCUIT: See item 28	7-21 (28)
1A4A10U2		INTEGRATED CIRCUIT: Dual 4 W stereo power amplifier, 70 dB ripple rejection, 75 dB channel separation, 3 M ohm input impedance, internal thermal protection, dual in line package 14 pin, .77 long by .250 wide by .13 high, mfr. 27014, part no. LM378N	7-21 (29)
1A5		CIRCUIT CARD ASSEMBLY: SYNTHESIZER MOTHERBOARD. Etched circuit board epoxy resin glass base laminate w/1 oz copper circuitry. Provides support and interconnections for the synthesizer section. 0.500 in thick by 14.40 in. long by 2.20 in. wide. Connects with solder terminals as well as plug in connectors, mfr. 14632, part no. 791570	7-22

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5C1		CAPACITOR: See item 11	7-22 (1)
1A5C2		CAPACITOR: See item 11	7-22 (1)
1A5C3		CAPACITOR: See item 11	7-22 (1)
1A5C4		CAPACITOR: See item 11	7-22 (1)
1A5C5		CAPACITOR: See item 11	7-22 (1)
1A5C6		CAPACITOR: See item 11	7-22 (1)
1A5C7		CAPACITOR: See item 11	7-22 (1)
1A5C8		CAPACITOR: See item 11	7-22 (1)
1A5C9		CAPACITOR: See item 11	7-22 (1)
1A5C10		CAPACITOR: See item 11	7-22 (1)
1A5C11		CAPACITOR: See item 11	7-22 (1)
1A5C12		CAPACITOR: See item 11	7-22 (1)
1A5C13		CAPACITOR: See item 11	7-22 (1)
1A5C14		CAPACITOR: See item 11	7-22 (1)
1A5C15		CAPACITOR: See item 11	7-22 (1)
1A5C16		CAPACITOR: See item 11	7-22 (1)
1A5C17		CAPACITOR: See item 11	7-22 (1)
1A5C18		CAPACITOR: See item 11	7-22 (1)
1A5C19		CAPACITOR: See item 11	7-22 (1)
1A5C20		CAPACITOR: See item 11	7-22 (1)
1A5C21		CAPACITOR: See item 11	7-22 (1)
1A5C22		CAPACITOR: See item 11	7-22 (1)
1A5C23		CAPACITOR: See item 11	7-22 (1)
1A5C24		CAPACITOR: See item 11	7-22 (1)
1A5C25		CAPACITOR: See item 11	7-22 (1)
1A5C26		CAPACITOR: See item 11	7-22 (1)
1A5C27		CAPACITOR: See item 11	7-22 (1)
1A5C28		CAPACITOR: See item 11	7-22 (1)
1A5C29		CAPACITOR: See item 11	7-22 (1)
1A5C30		CAPACITOR: See item 11	7-22 (1)
1A5C31		CAPACITOR: See item 11	7-22 (1)
1A5C32		CAPACITOR: See item 11	7-22 (1)
1A5C33		CAPACITOR: See item 11	7-22 (1)
1A5C34		CAPACITOR: See item 11	7-22 (1)
1A5C35		CAPACITOR: See item 11	7-22 (1)
1A5C36		CAPACITOR: See item 11	7-22 (1)
1A5C37		CAPACITOR: See item 11	7-22 (1)
1A5C38		CAPACITOR: See item 11	7-22 (1)
1A5C39		CAPACITOR: See item 11	7-22 (1)
1A5C40		CAPACITOR: See item 11	7-22 (1)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5C41		CAPACITOR: See item 11	7-22 (1)
1A5C42		CAPACITOR: See item 11	7-22 (1)
1A5C43		CAPACITOR: See item 11	7-22 (1)
1A5C44		CAPACITOR: See item 11	7-22 (1)
1A5C45		CAPACITOR: See item 11	7-22 (1)
1A5C46		CAPACITOR: See item 11	7-22 (1)
1A5C47		CAPACITOR: See item 11	7-22 (1)
1A5C48		CAPACITOR: See item 11	7-22 (1)
1A5C49		CAPACITOR: See item 11	7-22 (1)
1A5C50		CAPACITOR: See item 11	7-22 (1)
1A5C51		CAPACITOR: See item 11	7-22 (1)
1A5C52		CAPACITOR: See item 11	7-22 (1)
1A5C53		CAPACITOR: See item 11	7-22 (1)
1A5C54		CAPACITOR: See item 11	7-22 (1)
1A5C55		CAPACITOR: See item 11	7-22 (1)
1A5C56		CAPACITOR: See item 11	7-22 (1)
1A5C57		CAPACITOR: See item 11	7-22 (1)
1A5C58		CAPACITOR: See item 11	7-22 (1)
1A5C59		CAPACITOR: See item 10	7-22 (2)
1A5C60		CAPACITOR: See item 10	7-22 (2)
1A5C61		CAPACITOR: See item 10	7-22 (2)
1A5C62		CAPACITOR: See item 10	7-22 (2)
1A5E59		TERMINAL: 5 pos, feedthru .818LGX .025 SQ .50 below BD. mfr. 00779, part no. PE914031-1	7-23 (3)
1A5E60		TERMINAL: Same as 1A5E59	7-22 (3)
1A5E61		TERMINAL: Same as 1A5E59	7-22 (3)
1A5E62		TERMINAL: Same as 1A5E59	7-22 (3)
1A5E63		TERMINAL: Same as 1A5E59	7-22 (3)
1A5J1		CONNECTOR: See item 21	7-22 (4)
1A5J2		CONNECTOR: See item 21	7-21 (4)
1A5J3		CONNECTOR: See item 21	7-21 (4)
1A5L1		CHOKE: Same as 1A4L1	7-22 (5)
1A5L2		CHOKE: Same as 1A4L1	7-22 (5)
1A5L3		CHOKE: Same as 1A4L1	7-22 (5)
1A5L4		CHOKE: Same as 1A4L1	7-22 (5)
1A5MP1		HOUSING: same as 1A4MP1	7-22 (6)
1A5MP2		INSULATOR: Thermally conductive for TO-220/TIP-32 PKG. 0.687 x 0.562, mfr. 18565, part no. 60-11-5791-1674	7-22 (7)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5MP3		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A5 (Attaching Hardware) G(6), F(2), C(8), A(8)	7-22 (8)
1A5P1		CABLE: Same as 1A4P1	7-22 (9)
1A5P2		CABLE ASSEMBLY: 29 conductor, flat flex 1 plug 4.75 in w/solder term. mfr. 00779, Part no. 88524-1	7-22 (10)
1A5U1		INTEGRATED CIRCUIT: 3 terminal positive voltage regulator, to -220, 5 volt, with mounting hole, mfr. 07263, part no. 7805UC	7-22 (11)
1A5U2		INTEGRATED CIRCUIT: Same as 1A5U1	7-22 (11)
1A5XA1		CONTACT STRIP: Same as 1A4XA1	7-22 (12)
1A5XA2		CONTACT STRIP: Same as 1A4XA1	7-22 (12)
1A5XA3		CONTACT STRIP: Same as 1A4XA1	7-22 (12)
1A5A1		CIRCUIT CARD ASSEMBLY: 1st and 3rd L.O. synthesizer/time base. Aluminum alloy plate with P.C., and brass chassis mounted and hard wired components on standoffs. Connects the 1 st and 3rd LO/time base circuit board to the 1st LO VCO circuit. 16.36 in. long by 3.92 in. wide by .75 in. thk, connected by plugging in and cable connectors. Mfr. 14632, part no. 791630	7-23
1A5A1C1		CAPACITOR: Same as 1A4A2C11	7-23 (1)
1A5A1C2		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0.47 µF, 20 PCT, 100 V, mfr. 72982, Part No. 8131M100-651-474M	7-23 (2)
1A5A1C3		CAPACITOR: Same as 1A4A2C11	7-23 (1)
1A5A1C4		CAPACITOR, FIXED, CERAMIC DIELECTRIC: .05 µF, 20 PCT, 100 V, Mfr. 56289, part no. C023B101R503M	7-23 (3)
1A5A1C5		CAPACITOR: See item 7	7-23 (4)
1A5A1C6		CAPACITOR: Same as 1A5A1C2	7-23 (2)
1A5A1C7		CAPACITOR: See item 7	7-23 (4)
1A5A1C8		CAPACITOR: Same as 1A5A1C4	7-23 (3)
1A5A1CR1		SEMICONDUCTOR: See item 61	7-23 (5)
1A5A1CR2		SEMICONDUCTOR: See item 61	7-23 (5)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1CR3		SEMICONDUCTOR: See item 61	7-23 (5)
1A5A1FB1		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB2		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB3		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB4		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB5		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB6		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB7		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB8		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB9		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB10		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB11		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB12		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB13		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB14		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB15		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB16		FERRITE BEAD: See item 23	7-23 (6)
1A5A1FB17		FERRITE BEAD: See item 23	7-23 (6)
1A5A1L1		COIL, RADIO FREQUENCY: 10 mH, 10 PCT, P.C. Mount .375 dia. by .375 wide .025 dia tinned leads, mfr. 71279, part no. 553-3635-49	7-23 (7)
1A5A1L2		COIL, RADIO FREQUENCY: 0.82 µH, 10 PCT Min Q50, Resonant Freq. 220 MHz, current rating 1020 mA, phenolic, .375 long by .156 dia. .025 dia. leads, mfr. 99800, part no. 1537-10	7-23 (8)
1A5A1L3		COIL: Same as 1A5A1L1	7-23 (7)
1A5A1L4		COIL, RADIO FREQUENCY: 4.7 mH, 10 PCT P.C. Mount .375 dia. by .375 wide, .025 dia tinned leads, mfr. 71279, part no. 553-3635-45	7-23 (9)
1A5A1MP1		TERMINAL: Subminiature standoff, teflon bushing, silver plated terminal, .350 long by .148 mounting dia., mfr. 04013, part no. S0S1.	7-23 (10)
1A5A1MP2		INSULATOR: Same as 1A5MP2	7-23 (11)
1A5A1MP3		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A5A1	7-23 (12)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1R1		RESISTOR: see item 36	7-23 (13)
1A5A1R2		RESISTOR: Same as 1A4A1R53	7-23 (14)
1A5A1R3		RESISTOR: See item 37	7-23 (15)
1A5A1R4		RESISTOR: See item 37	7-23 (15)
1A5A1VR1		VOLTAGE REGULATOR: 3 terminal neg. voltage, heatsink mounting surface plastic package, output voltage -11.5 min. -12.5 max, mfr. 04713, part no. MC7912CP	7-23 (16)
1A5A1A1		1st L.O., VCO ASSEMBLY: Copper flashed nickel plated brass chassis with RFI lined cover. Part of the 1st L.O. Synthesizer Loop, which its inputs are a tuning voltage and a band select code. Output is the 1st L.O. frequency. It operates at a frequency four times the desired 1st L.O. frequency. 3.38 in. long by 3.12 in. wide by .63 in. high, connected by 2 cables, mfr. 14632, part no. 791629	7-24
1A5A1A1C1		CAPACITOR: See item 13	7-24 (1)
1A5A1A1C2		CAPACITOR: See item 13	7-24 (1)
1A5A1A1C3		CAPACITOR: See item 13	7-24 (1)
1A5A1A1C4		CAPACITOR: See item 13	7-24 (1)
1A5A1A1C5		CAPACITOR, FIXED, ELECTROLYTIC: 68 µF, 20 PCT, 15 V, ultra-miniature solid tantalex .475 high by .375 wide by .15 thick, mfr. 56289, part no. 183DR686X0015F	7-24 (2)
1A5A1A1C6		CAPACITOR: See item 13	7-24 (1)
1A5A1A1C7		CAPACITOR: See item 10	7-24 (3)
1A5A1A1E1		CONNECTOR/TERMINATION: Right angle 1/4 sq. chassis mount, used with RG-188, mfr. 19505, part no. 144/188	7-24 (4)
1A5A1A1MP1		COVER ASSEMBLY: .032 thick brass, nickel plated, 3.47 wide by 3.19 long, RFI shield with rubber gasket, mfr. 14632, part no. 24085-1	Not Shown
1A5A1A1P1		CONNECTOR: See item 16	7-24 (5)
1A5A1A1P2		CONNECTOR: See item 17	7-24 (6)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1R1		RESISTOR, FIXED, COMPOSITION: 1.2 k ohms, 5 PCT. .125 watt, 150 V rated, .145 long body by .062 dia by .02 lead dia., mfr. 81349, part no. RCR05G122JS	7-24 (7)
1A5A1A1R2		RESISTOR: Same as 1A5A1A1R1	7-24 (7)
1A5A1A1R3		RESISTOR: Same as 1A5A1A1R1	7-24 (7)
1A5A1A1R4		RESISTOR: See item 34	7-24 (8)
1A5A1A1A1		CIRCUIT CARD ASSEMBLY: 1st L.O./VCO etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry. Part of the 1st L.O. Synthesizer loop, which its inputs are a tuning voltage and a band select code and the output is the 1st L.O. frequency. 0.500 in. thick by 3.2 in. long by 2.65 in. wide connected by solder terminals mfr. 14632, part no. 34750	7-25
1A5A1A1A1C1		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C2		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C3		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C4		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C5		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 pF 0.25 pF TOL, 500 V, solder in disc. .025 dia. .06 thick with tinned electrodes, mfr. 91984, part no. 603C0G3R0C	7-25 (2)
1A5A1A1A1C6	Note 1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5.1 pF .05 pF TOL., 500 V NPO, tubular, mfr. 72982, part no. 301-000C0H0-519D	7-25 (3)
1A5A1A1A1C7		CAPACITOR, FIXED, COMPOSITION: 2.7 pF, 10 PCT, 500 V, axial leads .156 Dia. body, mfr. 95121, part no. QC2.7PFK	7-25 (4)
1A5A1A1A1C8		CAPACITOR: Same as 1A5A1A1A1C1	7-25 (1)
1A5A1A1A1C9		CAPACITOR, FIXED, COMPOSITION: 1.0 pF, 10 PCT, 500 V, axial leads .156 dia. body, mfr. 95121, part no. QC1.0PFK	7-25 (5)
	Note 1.	Nominal value, final value factory selected.	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1C10		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C11		CAPACITOR: See item 12	7-25 (6)
1A5A1A1A1C12		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C13		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C14		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C15		CAPACITOR, FIXED, MICA DIELECTRIC: 100 pF, 2 PCT, 500 V, mfr. 81349, part no. CM04FD101G03	7-25 (8)
1A5A1A1A1C16		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C17		CAPACITOR: See item 9	7-25 (1)
1A5A1A1A1C18		CAPACITOR, FIXED, ELECTROLYTIC: 2.2 µF, 10 PCT, 20 V, mfr. 81349, part no. CS13BE225K	7-25 (9)
1A5A1A1A1C19		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C20		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C21		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C22		Not Used	
1A5A1A1A1C23		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C24		Not Used	
1A5A1A1A1C25		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1C26		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5000 pF, 20 PCT, 100 V, .300 dia. x.156 thk, mfr. 56289, part no. C023B101E502M	7-25 (10)
1A5A1A1A1C27		CAPACITOR: Same as 1A5A1A1A1C26	7-25 (10)
1A5A1A1A1C28		CAPACITOR: Same as 1A5A1A1A1C26	7-25 (10)
1A5A1A1A1C29		CAPACITOR: See item 2	7-25 (7)
1A5A1A1A1CR1		SEMICONDUCTOR DEVICE, DIODE: Pin, Switching, Silicon, V_R 35 volts, .152 x .115 by .07 thick, .03 flat leads, mfr. 04713, part no. MPN3401	7-25 (11)
1A5A1A1A1CR2		SEMICONDUCTOR: Same as 1A5A1A1A1CR1	7-25 (11)
1A5A1A1A1CR3		SEMICONDUCTOR: Same as 1A5A1A1A1CR1	7-25 (11)
1A5A1A1A1CR4		SEMICONDUCTOR DEVICE, DIODE: VHF and UHF tuning, SOD-23 package, 1.62 x .098 with flat leads .035, mfr. 52673, part no. U11-3102	7-25 (12)
1A5A1A1A1FB1		FERRITE BEAD: See item 23	7-25 (13)
1A5A1A1A1L1		COIL, RADIO FREQUENCY: .125 dia. 3 turns #22 SNS wire counter clockwise close-wound, mfr. 14632, part no. 24592-1	7-25 (14)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1L2		COIL, RADIO FREQUENCY: .125 dia. 7 turns #22 SNS wire counter clockwise close-wound, mfr. 14632, part no. 24593-1	7-25 (15)
1A5A1A1A1L3		COIL: Same as 1A5A1A1A1L2	7-25 (15)
1A5A1A1A1L4		COIL, RADIO FREQUENCY: .125 dia. 6 turns #22 SNS wire counter clockwise close-wound, mfr. 14632, part no. 24593-2	7-25 (16)
1A5A1A1A1L5		COIL: Same as 1A3A2L4	7-25 (17)
1A5A1A1A1MP1		INSULATOR: See item 25 (4)	7-25 (18)
1A5A1A1A1MP2		INSULATOR: Same as 1A3A2MP2	7-25 (19)
1A5A1A1A1MP3		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A5A1A1A1	7-25 (20)
		(Attaching Parts)	
		D (6), C (6), A (6)	
	Q4 Ref.	Screw/machine, pan head 4-40 x 5/16 Black nylon, mfr. 96906, part no. MS18212-14 Black (1)	
		Silicon Rubber Adhesive Sealant Compound Noncorrosive, mfr. 01139, part no. RTV 162	
1A5A1A1A1Q1		TRANSISTOR: N-channel silicon junction F.E.T. TO-52, 3 lead, gate source voltage -25 V gate current 20 mA, mfr. 17856, part no. U310	7-25 (21)
1A5A1A1A1Q2		TRANSISTOR: See item 64	7-25 (22)
1A5A1A1A1Q3		TRANSISTOR: See item 64	7-25 (22)
1A5A1A1A1Q4		TRANSISTOR: LF med power amplifier plastic PNP silicon mot case 77-03, mfr. 80131, part no.2N4918	7-25 (23)
1A5A1A1A1Q5		TRANSISTOR: Low-power saturated-switching, PNP silicon, TO-18, mfr. 80131, part no. 2N3251	7-25 (24)
1A5A1A1A1Q6		Not Used	
1A5A1A1A1Q7		TRANSISTOR: Same as 1A3A2Q3	7-25 (25)
1A5A1A1A1R1		RESISTOR, FIXED, COMPOSITION: 33 k ohms, 5 PCT, .125 watt, 150 V rated .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G333JS	7-25 (26)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1R2		RESISTOR, FIXED, COMPOSITION: 12 k ohms, 5 PCT, .125 watt, 150 V rated .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G123JS	7-25 (27)
1A5A1A1A1R3		RESISTOR, FIXED, COMPOSITION: 22 k ohms, 5 PCT, .125 watt, 150 V rated .145 long body by .062 dia by .02 lead dia., mfr. 81349, part no. RCR05G223JS	7-25 (28)
1A5A1A1A1R4		RESISTOR, FIXED, COMPOSITION: 470 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G471JS	7-25 (29)
1A5A1A1A1R5		RESISTOR, FIXED, COMPOSITION: 100 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 14632, part no. RCR05G104JS	7-25 (30)
1A5A1A1A1R6		RESISTOR, FIXED, COMPOSITION: 8.2 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G822JS	7-25 (31)
1A5A1A1A1R7		RESISTOR, FIXED, COMPOSITION: 5.6 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia, mfr. 81349, part no. RCR05G562JS	7-25 (32)
1A5A1A1A1R8		RESISTOR, FIXED, COMPOSITION: 300 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G301JS	7-25 (33)
1A5A1A1A1R9		RESISTOR, FIXED, COMPOSITION: 220 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G221JS	7-25 (34)
1A5A1A1A1R10		RESISTOR, FIXED, COMPOSITION: 68 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G680JS	7-25 (35)
1A5A1A1A1R11		RESISTOR, FIXED, COMPOSITION: 180 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G181JS	7-25 (36)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1R12		RESISTOR: Same as 1A5A1A1A1R10	7-25 (35)
1A5A1A1A1R13		RESISTOR: Same as 1A5A1A1A1R6	7-25 (31)
1A5A1A1A1R14		RESISTOR: Same as 1A5A1A1A1R7	7-25 (32)
1A5A1A1A1R15		RESISTOR: See item 34	7-25 (37)
1A5A1A1A1R16		RESISTOR: Same as 1A5A1A1A1R8	7-25 (33)
1A5A1A1A1R17		RESISTOR: Same as 1A3A1R4	7-25 (38)
1A5A1A1A1R18		RESISTOR: See item 33	7-25 (39)
1A5A1A1A1R19		RESISTOR, FIXED, COMPOSITION: 390 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia by .02 lead dia., mfr. 81349, part no. RCR05G391JS	7-25 (40)
1A5A1A1A1R20		RESISTOR: See item 35	7-25 (41)
1A5A1A1A1R21		RESISTOR: See item 34	7-25 (37)
1A5A1A1A1R22		RESISTOR: See item 34	7-25 (37)
1A5A1A1A1R23		RESISTOR, FIXED, COMPOSITION: 10 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G100JS	7-25 (42)
1A5A1A1A1R24		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G330JS	7-25 (43)
1A5A1A1A1R25		RESISTOR, FIXED, COMPOSITION: 270 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G271JS	7-25 (44)
1A5A1A1A1R26		RESISTOR: Same as 1A5A1A1A1R15	7-25 (37)
1A5A1A1A1R27		RESISTOR: Same as 1A5A1A1A1R1	7-25 (26)
1A5A1A1A1R28		RESISTOR: Same as 1A5A1A1A1R15	7-25 (37)
1A5A1A1A1R29		RESISTOR: See item 45	7-25 (45)
1A5A1A1A1R30		RESISTOR: Same as 1A5A1A1A1R15	7-25 (37)
1A5A1A1A1R31		Not Used	
1A5A1A1A1R32		Not Used	
1A5A1A1A1R33		Not Used	
1A5A1A1A1R34		RESISTOR, FIXED, COMPOSITION: 15 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G150JS	7-25 (45)
1A5A1A1A1R35		RESISTOR, FIXED, COMPOSITION: 560 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G561JS	7-25 (46)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A1A1R36		RESISTOR: See item 33	7-25 (39)
1A5A1A1A1R37		RESISTOR: See item 34	7-25 (37)
1A5A1A1A1R38		Not Used	
1A5A1A1A1R39		Not Used	
1A5A1A1A1R40		RESISTOR, FIXED, COMPOSITION: 51 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G510JS	7-25 (47)
1A5A1A1A1T1		Part of 1A5A1A1A1 Board	7-25 (48)
1A5A1A1A1T2		TRANSFORMER, RADIO FREQUENCY: Toroidal, twisted bifliar on doughnut core, .45 µH, mfr. 14632, part no. 21278-23	7-25 (49)
1A5A1A1A1T3		TRANSFORMER: Same as 1A5A1A1A1T2	7-25 (50)
1A5A1A1A1T4		TRANSFORMER, RADIO FREQUENCY: Toroidal, twisted bifliar on doughnut core, 1.1 µH, mfr. 14632, part no. 21278-27	7-25 (51)
1A5A1A1A1T5		Not Used	
1A5A1A1A1T6		TRANSFORMER: Same as 1A5A1A1A1T4	7-25 (51)
1A5A1A1A1U1		INTEGRATED CIRCUIT: 1 GHz divide by 4 prescaler, plastic package 8 pin dual in line, mfr. 04713, part no. MC1697P	7-25 (52)
1A5A1A2		CIRCUIT CARD ASSEMBLY: First and third L.O. Time Base, etched circuit board, epoxy resin glass base laminate w/1 oz copper circuitry. The 3rd L.O. has an input of two reference frequencies from the time base and a fixed output frequency of 11.155 MHz. 0.50 in. thk. by 8.80 in. long by 3.85 in. wide, connected by plugging in. mfr. 14632, part no. 791600	7-26
1A5A1A2C1		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 47 pF, 2 PCT, 500 V, mfr. 81349, part no. CM04ED470G03	7-26 (1)
1A5A1A2C2		CAPACITOR: Same as 1A5A1A2C1	7-26 (1)
1A5A1A2C3		CAPACITOR: See item 2	7-26 (2)
1A5A1A2C4		Not Used	
1A5A1A2C5		Not Used	
1A5A1A2C6		Not Used	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2C7		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C8		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C9		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C10		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C11		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C12		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C13		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C14		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C15		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C16		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C17		CAPACITOR: See item 2	7-26 (2)
1A5A1A2C18		CAPACITOR, FIXED, PLASTIC DIELECTRIC: 4700 pF, 10 PCT, 100 V, film wrap, epoxy end fill, .156 dia. by .500 long, mfr. 14655, part no. WMF1D47	7-26 (5)
1A5A1A2C19		Not Used	
1A5A1A2C20		CAPACITOR, FIXED, CERAMIC DIELECTRIC: .1 µF, 20 PCT, 100 V, mono bloc .300 x .300 sq., mfr. 72982, part no. 8131M100-651-104M	7-26 (6)
1A5A1A2C21		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C22		CAPACITOR: See item 1	7-26 (7)
1A5A1A2C23		CAPACITOR, FIXED, MICA DIELECTRIC: 820 pF, 5 PCT, 300 V, mfr. 72136, part no. DM15-821J	7-26 (8)
1A5A1A2C24		Not Used	
1A5A1A2C25		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C26		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C27		Not Used	
1A5A1A2C28		CAPACITOR: See item 8	7-26 (9)
1A5A1A2C29		CAPACITOR, FIXED, ELECTROLYTIC: 100 µF, 20 PCT, 10 V, solid tantalum, mfr. 56289, part no. 196D107X0010PE4	7-26 (10)
1A5A1A2C30		CAPACITOR, FIXED, ELECTROLYTIC: 2.2 µF, 20 PCT, 35 V, solid tantalum, mfr. 56289, part no. 196D225X0035JE3	7-26 (11)
1A5A1A2C31		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C32		CAPACITOR: Same as 1A5A1A2C20	7-26 (6)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2C33		CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 2-8 pF, 350 V, .375 dia., 2 leads, top adjust, mfr. 72982, part no. 538-006A2-8	7-26 (12)
1A5A1A2C34		CAPACITOR, FIXED, MICA DIELECTRIC: 220 pF, 2 PCT, 500 V, mfr. 81349, part no. CM05FD221G03	7-26 (13)
1A5A1A2C35		CAPACITOR: Same as 1A5A1A2C34	7-26 (13)
1A5A1A2C36		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C37		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C38		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C39		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C40		Not Used	
1A5A1A2C41		CAPACITOR: See item 11	7-26 (3)
1A5A1A2C42		CAPACITOR: See item 6	7-26 (4)
1A5A1A2C43	Note 1	CAPACITOR, FIXED, MICA DIELECTRIC: 15 pF, 5 PCT, 500 V, mfr. 81349, part no. CM04CD150J03	7-26 (14)
1A5A1A2C44		CAPACITOR: Same as 1A4A9C7	7-26 (15)
1A5A1A2C45		CAPACITOR: See item 5	7-26 (16)
1A5A1A2CR1		SEMICONDUCTOR DEVICE, DIODE: Schottky barrier, .34 V at 1 mA, pico-second switching speed, high breakdown voltage, up to 70 V, .076 dia. x .170 long, mfr. 28480, part no. 5082-2800	7-26 (17)
1A5A1A2CR2		SEMICONDUCTOR: Same as 1A5A1A2CR1	7-26 (17)
1A5A1A2CR3		SEMICONDUCTOR: Same as 1A5A1A2CR1	7-26 (17)
1A5A1A2CR4		SEMICONDUCTOR DEVICE, DIODE: LED, Red high efficiency T1 Dia., 2.0 MCD at 10 mA, mfr. 28480, part no. 5082-4684	7-26 (18)
1A5A1A2CR5		Not Used	
1A5A1A2CR6		Not Used	
1A5A1A2CR7		SEMICONDUCTOR: Same as 1A5A1A1A1CR4	7-26 (19)
1A5A1A2CR8		SEMICONDUCTOR DEVICE, DIODE: Zener 15 V silicon, 400 mW, D0-35, Glass, mfr. 80131, part no. 1N965B	7-26 (20)
	Note 1.	Nominal value, final value factory selected.	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2CR9		SEMICONDUCTOR: Same as 1A5A1A2CR8	7-26 (20)
1A5A1A2CR10		SEMICONDUCTOR: Same as 1A5A1A2CR8	7-26 (20)
1A5A1A2CR11		SEMICONDUCTOR: Same as 1A5A1A2CR1	7-26 (17)
1A5A1A2E1		TERMINAL: Forked, silver, for .062 BD., .094 wire area, .094 dia. x .156 off BD., mfr. 71279, part no. 140-1941-02-01	7-26 (21)
1A5A1A2J1		CONNECTOR, RECEPTACLE, ELECTRICAL: Right angle PC jack receptacle, 17/32 x 19/32, 10-32 threads, 50 ohm, mfr. 98291, part no. 50-053-0000	7-26 (22)
1A5A1A2L1		COIL, RADIO FREQUENCY: 0.24 µH, 15 PCT, .125 Dia. x .25 long, mfr. 99848, part no. 200-11	7-26 (23)
1A5A1A2L2		COIL, RADIO FREQUENCY: 8.2 µH, 10 PCT, iron core, .375 long x .156 dia., mfr. 99800, part no. 1537-34	7-26 (24)
1A5A1A2L3		COIL, RADIO FREQUENCY: 100 µH, 10 PCT, min. Q80, .375 long by .375 dia., mfr. 71279, part no. 553-3635-25	7-26 (25)
1A5A1A2MP1		INSULATOR: See item 26 (5)	7-26 (26)
1A5A1A2MP2		INSULATOR: Converter insulator for 8 lead micrologic networks, converts leads to dip lead breakout, .140 high, mfr. 19080, part no. RCT05145-8	7-26 (27)
1A5A1A2MP3		INSULATOR: See item 24	7-26 (28)
1A5A1A2MP4		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A5A1A2	7-26 (29)
		(Attaching Parts)	
		G(6), C(6), A(6)	
1A5A1A2Q1		Not Used	
1A5A1A2Q2		TRANSISTOR: High speed switch and amplifier, NPN silicon, T0-92, mfr. 80131, part no. 2N4401	7-26 (30)
1A5A1A2Q3		TRANSISTOR: Same as 1A5A1A2Q2	7-26 (30)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2Q4		TRANSISTOR: same as 1A5A1A2Q2	7-26 (30)
1A5A1A2Q5		Not Used	
1A5A1A2Q6		TRANSISTOR: High speed switch saturated, NPN silicon, T0-18, mfr. 80131, part no. 2N706	7-26 (31)
1A5A1A2Q7		TRANSISTOR: Same as 1A5A1A2Q6	7-26 (31)
1A5A1A2Q8		TRANSISTOR: See item 63	7-26 (32)
1A5A1A2Q9		TRANSISTOR: See item 63	7-26 (32)
1A5A1A2Q10		TRANSISTOR: Same as 1A5A1A2Q6	7-26 (31)
1A5A1A2RA1		HEATSINK, ELECTRICAL, ELECTRONIC: T0-5 press-on, black anodize, .75 dia. x .40 high, mfr. 13103, part no. 2225B	7-26 (33)
1A5A1A2R1		RESISTOR: See item 36	7-26 (34)
1A5A1A2R2		RESISTOR: See item 55	7-26 (35)
1A5A1A2R3		RESISTOR: See item 55	7-26 (35)
1A5A1A2R4		RESISTOR, FIXED, COMPOSITION: 82 k ohms, 5 PCT, .125 watt 150 V rated, .145 long body by .062 dia., mfr. 81349, part no. RCR05G823JS	7-26 (36)
1A5A1A2R5		RESISTOR: Same as 1A5A1A2R4	7-26 (36)
1A5A1A2R6	Note 1	RESISTOR: See item 59	7-26 (37)
1A5A1A2R7	Note 1	RESISTOR: Same as 1A4A7R35	7-26 (38)
1A5A1A2R8	Note 1	RESISTOR: See item 39	7-26 (39)
1A5A1A2R9		RESISTOR: See item 36	7-26 (34)
1A5A1A2R10		RESISTOR: See item 36	7-26 (34)
1A5A1A2R11		RESISTOR: See item 36	7-26 (34)
1A5A1A2R12		RESISTOR: See item 36	7-26 (34)
1A5A1A2R13		RESISTOR: See item 32	7-26 (40)
1A5A1A2R14		RESISTOR: See item 32	7-26 (40)
1A5A1A2R15		RESISTOR: See item 32	7-26 (40)
1A5A1A2R16		RESISTOR: See item 32	7-26 (40)
1A5A1A2R17		RESISTOR: See item 32	7-26 (40)
1A5A1A2R18		RESISTOR: See item 32	7-26 (40)
1A5A1A2R19		RESISTOR: See item 32	7-26 (40)
1A5A1A2R20		RESISTOR: See item 32	7-26 (40)
1A5A1A2R21		RESISTOR: See item 32	7-26 (40)
	Note 1.	Nominal value, final value factory selected.	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R22		RESISTOR: See item 32	7-26 (40)
1A5A1A2R23		RESISTOR: See item 47	7-26 (41)
1A5A1A2R24		RESISTOR: See item 38	7-26 (42)
1A5A1A2R25		RESISTOR: Same as 1A5A1A2R4	7-26 (36)
1A5A1A2R26		RESISTOR: Same as 1A4A10R6	7-26 (43)
1A5A1A2R27		RESISTOR: See item 47	7-26 (41)
1A5A1A2R28		RESISTOR: See item 38	7-26 (42)
1A5A1A2R29		RESISTOR: Same as 1A4A10R6	7-26 (43)
1A5A1A2R30		RESISTOR: See item 47	7-26 (41)
1A5A1A2R31		RESISTOR: See item 38	7-26 (42)
1A5A1A2R32		RESISTOR: Same as 1A4A10R6	7-26 (43)
1A5A1A2R33		RESISTOR: Same as 1A5A1A2R4	7-26 (36)
1A5A1A2R34		RESISTOR: See item 59	7-26 (37)
1A5A1A2R35		RESISTOR: Same as 1A4A7R35	7-26 (38)
1A5A1A2R36		RESISTOR, FIXED, COMPOSITION: 27 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G273JS	7-26 (44)
1A5A1A2R37		RESISTOR: Same as 1A5A1A2R36	7-26 (44)
1A5A1A2R38		RESISTOR: See item 50	7-26 (45)
1A5A1A2R39		RESISTOR: See item 47	7-26 (41)
1A5A1A2R40		RESISTOR: See item 49	7-26 (46)
1A5A1A2R41		RESISTOR, FIXED, COMPOSITION: 4.3 k ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia., by .02 lead dia., mfr. 81349, part no. RCR07G432JS	7-26 (47)
1A5A1A2R42		RESISTOR: See item 47	7-26 (41)
1A5A1A2R43		RESISTOR: See item 37	7-26 (48)
1A5A1A2R44		RESISTOR: See item 55	7-26 (35)
1A5A1A2R45		RESISTOR: Same as 1A5A1A2R36	7-26 (44)
1A5A1A2R46		RESISTOR: See item 49	7-26 (46)
1A5A1A2R47		RESISTOR: See item 49	7-26 (46)
1A5A1A2R48		RESISTOR: See item 37	7-26 (48)
1A5A1A2R49		RESISTOR: Same as 1A3A2R26	7-26 (49)
1A5A1A2R50		RESISTOR: See item 38	7-26 (42)
1A5A1A2R51		RESISTOR: See item 37	7-26 (48)
1A5A1A2R52		RESISTOR: See item 37	7-26 (48)
1A5A1A2R53		RESISTOR: See item 38	7-26 (42)
1A5A1A2R54		RESISTOR: See item 45	7-26 (50)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R55		RESISTOR, FIXED, COMPOSITION: 27 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G270JS	7-26 (51)
1A5A1A2R56		RESISTOR: See item 49	7-26 (46)
1A5A1A2R57		RESISTOR: See item 45	7-26 (50)
1A5A1A2R58		RESISTOR: See item 42	7-26 (51)
1A5A1A2R59		RESISTOR: See item 42	7-26 (51)
1A5A1A2R60		Not Used	
1A5A1A2R61		RESISTOR: See item 38	7-26 (42)
1A5A1A2R62		Not Used	
1A5A1A2R63		RESISTOR: See item 46	7-26 (52)
1A5A1A2R64		RESISTOR, FIXED, COMPOSITION: 3.3 ohms, 5 PCT, .25 watt, 250 V rated, .25 long body by .09 dia., by .02 lead dia., mfr. 81349, part no. RCR07G3R3JS	7-26 (53)
1A5A1A2R65		RESISTOR: See item 37	7-26 (48)
1A5A1A2R66		RESISTOR: See item 37	7-26 (48)
1A5A1A2R67		RESISTOR: See item 37	7-26 (48)
1A5A1A2R68		RESISTOR: See item 37	7-26 (48)
1A5A1A2R69		RESISTOR: See item 33	7-26 (54)
1A5A1A2R70		RESISTOR: See item 33	7-26 (54)
1A5A1A2R71		RESISTOR: See item 33	7-26 (54)
1A5A1A2R72		RESISTOR: See item 33	7-26 (54)
1A5A1A2R73		RESISTOR: See item 38	7-26 (42)
1A5A1A2R74		RESISTOR: See item 55	7-26 (35)
1A5A1A2R75		RESISTOR: See item 37	7-26 (48)
1A5A1A2R76		RESISTOR: See item 37	7-26 (48)
1A5A1A2R77		RESISTOR: See item 45	7-26 (50)
1A5A1A2R78		RESISTOR, FIXED, COMPOSITION: 47 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia., by .02 lead dia., mfr. 81349, part no. RCR05G473JS	7-26 (55)
1A5A1A2R79		RESISTOR: Same as 1A5A1A2R78	7-26 (55)
1A5A1A2R80		RESISTOR: See item 37	7-26 (48)
1A5A1A2R81		RESISTOR: See item 37	7-26 (48)
1A5A1A2R82		RESISTOR: See item 54	7-26 (56)
1A5A1A2R83		RESISTOR: See item 36	7-26 (34)
1A5A1A2R84		RESISTOR: See item 37	7-26 (48)
1A5A1A2R85		RESISTOR: See item 37	7-26 (48)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2R86		RESISTOR: See item 49	7-26 (46)
1A5A1A2T1		TRANSFORMER, RADIO FREQUENCY: Toroidal Tapped, 4 leads #29 SNS wire, 16 turns closewound clockwise, 23 μH, mfr. 14632, part no. 22295-69	7-26 (57)
1A5A1A2U1		INTEGRATED CIRCUIT: Divider, divide by 10/11, 0.2 to 1 GHz, ceramic 16 pin dual in line, mfr. 04713, part no. MC12013L	7-26 (58)
1A5A1A2U2		INTEGRATED CIRCUIT: TTL/S/100 MHz presettable decade and binary count, dip 14 pin, mfr. 01295, part no. SN74S196N	7-26 (59)
1A5A1A2U3		INTEGRATED CIRCUIT: Counter control logic mecl, ceramic dip 16 pin, mfr. 04713, part no. MC12014L	7-26 (60)
1A5A1A2U4		INTEGRATED CIRCUIT: Programmed N82S123B, 256 bit bipolar programmable ROM (32 x 8 ROM) 16 pin plastic dip, mfr. 14632, part no. 841013	7-26 (61)
1A5A1A2U5		INTEGRATED CIRCUIT: See item 29	7-26 (62)
1A5A1A2U6		INTEGRATED CIRCUIT: Quad 2 input nand 14 pin dip, mfr. 14632, part no. 867400	7-26 (63)
1A5A1A2U7		INTEGRATED CIRCUIT: General purpose low burst noise op amp, 8 lead T0-5 hermetically sealed case, mfr. 02735, part no. CA6741T	7-26 (64)
1A5A1A2U8		INTEGRATED CIRCUIT: See item 30	7-26 (65)
1A5A1A2U9		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U10		INTEGRATED CIRCUIT: See item 30	7-26 (65)
1A5A1A2U11		INTEGRATED CIRCUIT: See item 30	7-26 (65)
1A5A1A2U12		INTEGRATED CIRCUIT: TTL Flip-Flop with preset and clear, 14 pin dual in line, mfr. 01295, part no. SN74S74N	7-26 (67)
1A5A1A2U13		INTEGRATED CIRCUIT: TTL/BCD to Binary, 16 pin dual in line, mfr. 01295, part no. SN74184N	7-26 (68)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A1A2U14		INTEGRATED CIRCUIT: Temp. Comp. crystal osc. 2 MHz Porm 2 x 10-6 0 deg. C to 70 deg. C, 4 pin, 2.00 long by .98 wide by .50 high, mfr. 14632, part no. 841043	7-26 (69)
1A5A1A2U15		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U16		INTEGRATED CIRCUIT: Dual line receiver, single 5 V supply Porm 100 mV sensitivity, TTL outputs, dual in line 8 pin, mfr. 01295, part no SN75140N	7-26 (70)
1A5A1A2U17		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U18		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U19		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U20		INTEGRATED CIRCUIT: See item 31	7-26 (66)
1A5A1A2U21		INTEGRATED CIRCUIT: Dual D-type pos-edge-trig flip flop w/preset and clear, 14 pin dual in line, mfr. 01295, part no. SN74LS74N	7-26 (71)
1A5A1A2U22		INTEGRATED CIRCUIT: See item 29	7-26 (72)
1A5A1A2U23		INTEGRATED CIRCUIT: Quadruple buss buffer gates w/three state outputs, 14 pin dual in line, mfr. 01295, part no. SN74125N	7-26 (73)
1A5A1A2U24		INTEGRATED CIRCUIT: Quadruple 2-input positive NOR gates 5 NS/2 mW, 14 pin dual in line, mfr. 01295, part no. SN74LS02N	7-26 (74)
1A5A1A2VR1		VOLTAGE REGULATOR: Fixed POS 5 V 0.5A T0-5 package, mfr. 07263, part no. 78M05HC	7-26 (75)
1A5A1A2Y1		CRYSTAL UNIT, QUARTZ: 11.155 MHz miniature holder w/wire leads, case type HC-18/U, mfr. 80058, part no. CR64U 11.155 MHz	7-26 (76)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2		CIRCUIT CARD ASSEMBLY: 2nd LO synthesizer. Etched circuit board epoxy resin glass base laminate w/1 oz. copper circuitry. The 2nd LO tunes from 32.20001 to 32.21000 MHz in 10 Hz steps. The synthesizer uses 3 phase lock loops to produce the 2nd LO output. 0.80 in. thk by 8.80 in. long by 3.85 in. wide, connected by plugging in, mfr. 14632, part no. 791601	7-27
1A5A2C1		CAPACITOR: See item 10	7-27 (1)
1A5A2C2		CAPACITOR: See item 10	7-27 (1)
1A5A2C3		CAPACITOR: See item 7	7-27 (2)
1A5A2C4		CAPACITOR: See item 5	7-27 (3)
1A5A2C5		CAPACITOR, FIXED, ELECTROLYTIC: 1 µF, 20 PCT, 35 V, solid tantalum, mfr. 56289, part no. 196D105X0035HE3	7-27 (4)
1A5A2C6		CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2200 pF, 10 PCT, 200 V, mfr. 81349, part no. CK06BX222K	7-27 (5)
1A5A2C7		CAPACITOR: See item 5	7-27 (3)
1A5A2C8		CAPACITOR: See item 7	7-27 (2)
1A5A2C9		CAPACITOR, FIXED, MICA, DIELECTRIC: 12 pF, 5 PCT, 500 V, mfr. 81349, part no. CM05CD120J03	7-27 (6)
1A5A2C10		CAPACITOR: See item 12	7-27 (7)
1A5A2C11		CAPACITOR: See item 10	7-27 (1)
1A5A2C12		CAPACITOR: See item 10	7-27 (1)
1A5A2C13		CAPACITOR: See item 12	7-27 (7)
1A5A2C14		CAPACITOR: See item 5	7-27 (3)
1A5A2C15		CAPACITOR: See item 5	7-27 (3)
1A5A2C16		CAPACITOR: See item 2	7-27 (8)
1A5A2C17		CAPACITOR, FIXED, ELECTROLYTIC: 150 µF, 20 PCT, 6 V, solid tantalum, mfr. 56289, part no. 196D157X0006PE4	7-27 (9)
1A5A2C18		CAPACITOR: See item 7	7-27 (2)
1A5A2C19		CAPACITOR: See item 10	7-27 (1)
1A5A2C20		CAPACITOR: See item 10	7-27 (1)
1A5A2C21		CAPACITOR: See item 10	7-27 (1)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C22		CAPACITOR, FIXED, CERAMIC: Tubular 10 pF, 0.5 pF TOL 500 V NPO, mfr. 72982, part no. 301-000C0H0-100D	7-27 (10)
1A5A2C23		CAPACITOR: Same as 1A5A1A2C34	7-27 (11)
1A5A2C24		CAPACITOR: See item 10	7-27 (1)
1A5A2C25		CAPACITOR: Same as 1A5A1C5	7-27 (12)
1A5A2C26		CAPACITOR: See item 5	7-27 (3)
1A5A2C27		CAPACITOR: See item 5	7-27 (3)
1A5A2C28		CAPACITOR: See item 5	7-27 (3)
1A5A2C29		CAPACITOR, FIXED, PLASTIC DIELECTRIC: .022 µF, 5 PCT, 100 V, .187 Dia. body by .50 long, mfr. 84411, part no. 663UW223-5-1W	7-27 (13)
1A5A2C30		CAPACITOR: Same as 1A5A1A2C18	7-27 (14)
1A5A2C31		Not Used	
1A5A2C32		CAPACITOR: See item 5	7-27 (3)
1A5A2C33		CAPACITOR: See item 2	7-27 (8)
1A5A2C34		CAPACITOR: See item 2	7-27 (8)
1A5A2C35		CAPACITOR: See item 10	7-27 (1)
1A5A2C36		CAPACITOR: See item 1	7-27 (15)
1A5A2C37		CAPACITOR: See item 5	7-27 (3)
1A5A2C38		CAPACITOR: See item 1	7-27 (15)
1A5A2C39		CAPACITOR: See item 1	7-27 (15)
1A5A2C40		CAPACITOR: See item 10	7-27 (1)
1A5A2C41		CAPACITOR: See item 1	7-27 (15)
1A5A2C42		CAPACITOR: See item 10	7-27 (1)
1A5A2C43		CAPACITOR: See item 10	7-27 (1)
1A5A2C44		CAPACITOR: See item 10	7-27 (1)
1A5A2C45		CAPACITOR: See item 10	7-27 (1)
1A5A2C46		CAPACITOR: See item 10	7-27 (1)
1A5A2C47		CAPACITOR: See item 10	7-27 (1)
1A5A2C48		CAPACITOR: See item 10	7-27 (1)
1A5A2C49		CAPACITOR: See item 10	7-27 (1)
1A5A2C50		CAPACITOR, FIXED, CERAMIC: Tubular 27 pF, 5 PCT, 500 V NPO, mfr. 72982, part no. 308-000C0G0-270J	7-27 (16)
1A5A2C51		CAPACITOR, VARIABLE, AIR DIELECTRIC: .4 - 2.5 pF, 500 V, .21 high by .118 dia. w/.005 x .05 lead .11 off cent of body, mfr. 91293, part no. 7283	7-27 (17)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C52		CAPACITOR, FIXED, CERAMIC: Tubular 6.8 pF, .25 pF TOL 500 V NPO, mfr. 72982, part no. 301-000C0H0-689C	7-27 (18)
1A5A2C53		CAPACITOR: See item 8	7-27 (19)
1A5A2C54		CAPACITOR: See item 8	7-27 (19)
1A5A2C55		CAPACITOR: See item 1	7-27 (15)
1A5A2C56		CAPACITOR, FIXED, CERAMIC: Tubular 8.2 pF, .5 pF TOL 500 V NPO, mfr. 72982, part no. 301-000C0H0-829D	7-27 (20)
1A5A2C57	Note 1	CAPACITOR, FIXED, CERAMIC: Tubular 5.6 pF, 05 pF TOL 500 V N470, mfr. 72982, part no. 301-000T2J0-569D	7-27 (21)
1A5A2C58		CAPACITOR: See item 10	7-27 (1)
1A5A2C59		CAPACITOR, FIXED, CERAMIC: Tubular 33 pF, 5 PCT, 500 V NPO, mfr. 72982, part no. 308-000C0G0-330J	7-27 (22)
1A5A2C60		CAPACITOR: See item 8	7-27 (19)
1A5A2C61		CAPACITOR: Same as 1A5A2C51	7-27 (17)
1A5A2C62		CAPACITOR: Same as 1A5A2C52	7-27 (18)
1A5A2C63		CAPACITOR: See item 8	7-27 (19)
1A5A2C64		CAPACITOR: See item 8	7-27 (19)
1A5A2C65		CAPACITOR: See item 1	7-27 (15)
1A5A2C66	Note 1	CAPACITOR, FIXED, CERAMIC: Tubular 2.7 pF, .25 pF TOL, 500 V NPO, mfr. 72982, part no. 301-000C0J0-279C	7-27 (23)
1A5A2C67		CAPACITOR, FIXED, CERAMIC: Tubular 5.6 pF, 0.5 pF TOL, 500 V N750, mfr. 72982 part no. 301-000U2J0-569D	7-27 (24)
1A5A2C68		CAPACITOR: Same as 1A2A1C6	7-27 (25)
1A5A2C69		CAPACITOR: Same as 1A3A1C16	7-27 (26)
	Note 1.	Nominal value, final value factory selected.	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2C70		CAPACITOR, FIXED, CERAMIC: Tubular 2.2 pF, .25 pF TOL, 500 V NPO, mfr. 72982, part no. 301-000C0J0-229C	7-27 (27)
1A5A2C71		CAPACITOR, FIXED, CERAMIC: Tubular 15 pF, 5 PCT, NPO, mfr. 72928, part no. 301-000C0G0-150J	7-27 (28)
1A5A2C72		CAPACITOR, FIXED, MICA DIELECTRIC: 1000 pF, 5 PCT, 100 V, mfr. 72136, part no. DM15-102J	7-27 (29)
1A5A2C73		CAPACITOR: See item 1	7-27 (15)
1A5A2C74		CAPACITOR: See item 10	7-27 (1)
1A5A2C75		CAPACITOR: Same as 1A5A1A1A1C15	7-27 (30)
1A5A2CR1		SEMICONDUCTOR: Same as 1A5A1A2CR4	7-27 (31)
1A5A2CR2		SEMICONDUCTOR: Same as 1A3A1CR1	7-27 (32)
1A5A2CR3		SEMICONDUCTOR, DEVICE, DIODE: Varicap, silicon planar capacitance diode, forward current 50 mA, capacitance ratio 5 - 6.5, flat leads, 4 MM long body by 2.5 MM wide, mfr. 25088, part no. BB109-yellow	7-27 (33)
1A5A2CR4		SEMICONDUCTOR: Same as 1A5A2CR3	7-27 (33)
1A5A2CR5		SEMICONDUCTOR: Same as 1A5A2CR3	7-27 (33)
1A5A2CR6		SEMICONDUCTOR: Same as 1A5A1A2CR4	7-27 (31)
1A5A2L1		COIL, RADIO FREQUENCY: Fixed molded .47 μH, 10 PCT, iron core, .375 long by .156 dia., mfr. 99800, part no. 1537-06	7-27 (34)
1A5A2L2		COIL: Same as 1A4A1L1	7-27 (35)
1A5A2L3		Not Used	
1A5A2L4		COIL, RADIO FREQUENCY: 22 mH, 10 PCT, P.C. mount .375 dia. by .375 wide, .025 dia. tinned leads, mfr. 71279, part no. 553-3635-53	7-27 (36)
1A5A2L5		COIL, RADIO FREQUENCY: Molded, 680 μH, 5 PCT, iron core, 440 long by .19 dia., mfr. 99800, part no. 2500-20	7-27 (37)
1A5A2L6		COIL: Same as 1A5A1L2	7-27 (38)
1A5A2L7		COIL: Same as 1A5A1L2	7-27 (38)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2L8		COIL, RADIO FREQUENCY: #22 SNS 3 turns evenly spaced clockwise on QSA 140-250 coil form, mfr. 14632, part no 21210-183	7-27 (39)
1A5A2L9		COIL, RADIO FREQUENCY: Molded 2.2 μH, 10 PCT iron core, .250 long by .095 dia., mfr. 99800, part no. 1025-28	7-27 (40)
1A5A2L10		COIL, RADIO FREQUENCY: 10 μH, 10 PCT, P.C. mount .375 dia. by .375 wide .025 dia. tinned leads, mfr. 71279, part no. 553-3635-13	7-27 (41)
1A5A2L11		COIL: Same as 1A4A2L1	7-27 (35)
1A5A2MP1		INSULATOR: See item 24 (3)	7-27 (42)
1A5A2MP2		INSULATOR: See item 25 (3)	7-27 (43)
1A5A2MP3		COVER ASSEMBLY: w/ground strip, .032 al. alloy 1.98 in. long by .96 in. wide by .54 in. high, mfr. 14632, part no. 24469-1	Not Shown
1A5A2MP4		COVER ASSEMBLY: w/ground strip, .032 al. alloy 1.98 in. long by .96 in. wide by .54 in. high, mfr. 14632, part no. 24469-2	Not Shown
1A5A2MP5		COVER ASSEMBLY: .032 al. alloy 1.98 in. long by .96 in. wide by .54 in. high, mfr. 14632, part no. 24469-2	Not Shown
1A5A2MP6		2nd LO SHIELD ASSEMBLY: Epoxy resin glass base laminate w/1 oz. copper 1 side .062 thk., 8.40 long by 3.40 wide, mfr. 14632, part no. 34844-1	7-27 (44)
		(Attaching Hardware)	
		Spacer/hex, thrd 4-40 3/16 ACRFLT 1/8 Lg. al. w/alodine 1200 finish, mfr. 06540, part no. 8100-A-0440-10A (6)	
		Screw/machine pan hd cross-recessed 4-40 x 7/8 cres., mfr. 96906, part no. MS51957-20 (6), E(6)	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2MP7		PRINTED CIRCUIT BOARD: Basic etched board less the assembled parts for item 1A5A2.	7-27 (45)
1A5A2Q1		TRANSISTOR: See item 64	7-27 (46)
1A5A2Q2		TRANSISTOR: See item 63	7-27 (47)
1A5A2Q3		TRANSISTOR: See item 67	7-27 (48)
1A5A2Q4		Not Used	
1A5A2Q5		TRANSISTOR: See item 64	7-27 (46)
1A5A2Q6		TRANSISTOR: See item 64	7-27 (46)
1A5A2Q7		TRANSISTOR: Same as 1A5A1A1A1Q1	7-27 (49)
1A5A2R1		RESISTOR: See item 45	7-27 (50)
1A5A2R2		RESISTOR: See item 45	7-27 (50)
1A5A2R3		RESISTOR: See item 45	7-27 (50)
1A5A2R4		RESISTOR: Same as 1A3A2R4	7-27 (51)
1A5A2R5		RESISTOR: See item 35	7-27 (52)
1A5A2R6		RESISTOR: See item 37	7-27 (53)
1A5A2R7		RESISTOR: See item 40	7-27 (54)
1A5A2R8		RESISTOR: See item 35	7-27 (52)
1A5A2R9		RESISTOR: See item 37	7-27 (53)
1A5A2R10		RESISTOR, FIXED, COMPOSITION: 5.6 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G5R6JS	7-27 (55)
1A5A2R11		RESISTOR, FIXED, COMPOSITION: 5.1 k ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G512JS	7-27 (56)
1A5A2R12		RESISTOR: See item 37	7-27 (53)
1A5A2R13		RESISTOR: See item 35	7-27 (52)
1A5A2R14		RESISTOR: See item 37	7-27 (53)
1A5A2R15		RESISTOR: See item 54	7-27 (57)
1A5A2R16		RESISTOR: See item 54	7-27 (57)
1A5A2R17		RESISTOR: See item 54	7-27 (57)
1A5A2R18		RESISTOR: See item 54	7-27 (57)
1A5A2R19		RESISTOR: Same as 1A4A6R47	7-27 (58)
1A5A2R20		RESISTOR: See item 47	7-27 (59)
1A5A2R21		RESISTOR: See item 47	7-27 (59)
1A5A2R22		RESISTOR: See item 36	7-27 (60)
1A5A2R23		RESISTOR: Same as 1A4A10R17	7-27 (61)
1A5A2R24		RESISTOR: See item 37	7-27 (53)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2R25		RESISTOR: See item 37	7-27 (53)
1A5A2R26		RESISTOR: See item 35	7-27 (52)
1A5A2R27		RESISTOR: See item 50	7-27 (62)
1A5A2R28		RESISTOR: See item 35	7-27 (52)
1A5A2R29		RESISTOR: See item 37	7-27 (53)
1A5A2R30		RESISTOR: See item 49	7-27 (63)
1A5A2R31		RESISTOR: Same as 1A4A8R34	7-27 (64)
1A5A2R32		RESISTOR, FIXED, COMPOSITION: 820 k ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G824JS	7-27 (65)
1A5A2R33		RESISTOR: See item 39	7-27 (66)
1A5A2R34		RESISTOR, FIXED, COMPOSITION: 360 ohms, 5 PCT, .25 watt, 250 v rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G361JS	7-27 (67)
1A5A2R35		RESISTOR: See item 50	7-27 (62)
1A5A2R36		RESISTOR: See item 35	7-27 (52)
1A5A2R37		RESISTOR: Same as 1A3A2R12	7-27 (68)
1A5A2R38		RESISTOR: See item 35	7-27 (52)
1A5A2R39		RESISTOR: Same as 1A4A1R51	7-27 (69)
1A5A2R40		RESISTOR: See item 55	7-27 (70)
1A5A2R41		RESISTOR: See item 37	7-27 (53)
1A5A2R42		RESISTOR: See item 38	7-27 (71)
1A5A2R43		Not Used	
1A5A2R44		RESISTOR: See item 57	7-27 (72)
1A5A2R45		Not Used	
1A5A2R46		RESISTOR: See item 43	7-27 (73)
1A5A2R47		RESISTOR, FIXED, COMPOSITION: 750 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G751JS	7-27 (74)
1A5A2R48		RESISTOR: See item 54	7-27 (57)
1A5A2R49		RESISTOR: See item 54	7-27 (57)
1A5A2R50		RESISTOR: See item 55	7-27 (70)
1A5A2R51		RESISTOR: See item 55	7-27 (70)
1A5A2R52		RESISTOR: See item 37	7-27 (53)
1A5A2R53		RESISTOR: See item 37	7-27 (53)
1A5A2R54		RESISTOR: See item 55	7-27 (70)
1A5A2R55		RESISTOR: See item 55	7-27 (70)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2R56		Not Used	
1A5A2R57		Not Used	
1A5A2R58		Not Used	
1A5A2R59		RESISTOR: See item 54	7-27 (57)
1A5A2R60		RESISTOR: See item 37	7-27 (53)
1A5A2R61		RESISTOR: See item 37	7-27 (53)
1A5A2R62		RESISTOR: See item 38	7-27 (71)
1A5A2R63		RESISTOR: See item 38	7-27 (71)
1A5A2R64		RESISTOR, FIXED, COMPOSITION: 10 k ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G103JS	7-27 (75)
1A5A2R65		RESISTOR: Same as 1A4A8R54	7-27 (76)
1A5A2R66		RESISTOR: Same as 1A4A8R54	7-27 (76)
1A5A2R67		RESISTOR, FIXED, COMPOSITION: 22 ohms, 5 PCT, .125 watt, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G220JS	7-27 (77)
1A5A2R68		RESISTOR, FIXED, FILM: 3.92 k ohms, 1 PCT, 0.10 watt, 200 V rated, .250 long body by .088 dia. by .02 lead dia., mfr. 81349, part no. RN55C3921F	7-27 (78)
1A5A2R69		RESISTOR: Same as 1A5A2R64	7-27 (79)
1A5A2R70		RESISTOR: Same as 1A4A8R54	7-27 (76)
1A5A2R71		RESISTOR: Same as 1A4A8R54	7-27 (76)
1A5A2R72		RESISTOR: Same as 1A5A2R67	7-27 (80)
1A5A2R73		RESISTOR: Same as 1A5A2R68	7-27 (81)
1A5A2R74		RESISTOR: See item 46	7-27 (82)
1A5A2R75		RESISTOR: See item 45	7-27 (50)
1A5A2R76		RESISTOR: Same as 1A5A2R64	7-27 (79)
1A5A2R77		Not Used	
1A5A2R78		RESISTOR: See item 54	7-27 (57)
1A5A2R79		RESISTOR: See item 38	7-27 (71)
1A5A2R80		RESISTOR: See item 37	7-27 (53)
1A5A2U1		INTEGRATED CIRCUIT: See item 29	7-27 (83)
1A5A2U2		INTEGRATED CIRCUIT: 35 MHz Presettable decade and binary counter/latch, divided by (2, 4, 8, 16) 14 pin dual in line plastic, mfr. 01295, part no. SN74177N	7-27 (84)
1A5A2U3		INTEGRATED CIRCUIT: Same as 1A5A1A2U12	7-27 (85)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A2U4		INTEGRATED CIRCUIT: Double balanced modulator/demodulator, 10 pin metal can, mfr. 07263, part no. 796HC	7-27 (86)
1A5A2U5		INTEGRATED CIRCUIT: Differential ampl. 10 pin T0-5 header, short can, pin 5 connected to case, mfr. 18324, part no. N5733K	7-27 (87)
1A5A2U6		INTEGRATED CIRCUIT: See item 29	7-27 (83)
1A5A2U7		INTEGRATED CIRCUIT: See item 30	7-27 (88)
1A5A2U8		INTEGRATED CIRCUIT: Synchronous Up/Down counter w/down/up mode control, counts 8-4-2-1 BCD or binary, presettable with load control. 16 pin dip plastic, mfr. 01295, part no. SN74LS191N	7-27 (89)
1A5A2U9		INTEGRATED CIRCUIT: Same as 1A5A2U8	7-27 (89)
1A5A2U10		INTEGRATED CIRCUIT: Same as 1A5A2U8	7-27 (89)
1A5A2U11		INTEGRATED CIRCUIT: Quadruple 2 input positive-nand gates, 14 pin dip plastic, mfr. 01295, part no. SN74LS00N	7-27 (90)
1A5A2U12		INTEGRATED CIRCUIT: See item 29	7-27 (83)
1A5A2U13		Not Used	
1A5A2U14		INTEGRATED CIRCUIT: TTL Synchronous 4 bit up/down counter, 35 MHz, 100 mW, 16 pin dip plastic, mfr. 01295, part no. SN74LS168N	7-27 (91)
1A5A2U15		INTEGRATED CIRCUIT: Divider, divide by 10/11, 0.2 to 1 GHz, 600 MHz toggle freq., 16 pin dip plastic, mfr. 04713, part no. MC12013P	7-27 (92)
1A5A2U16		INTEGRATED CIRCUIT: Same as 1A5A2U15	7-27 (92)
1A5A2U17		INTEGRATED CIRCUIT: See item 31	7-27 (93)
1A5A2U18		Not Used	
1A5A2U19		INTEGRATED CIRCUIT: See item 31	7-27 (93)
1A5A2U20		INTEGRATED CIRCUIT: Same as 1A5A2U11	7-27 (90)
1A5A2U21		SEMICONDUCTOR DEVICE, DIODE: Zener 8.2 V silicon, mfr. 80131, part no. 1N756A	7-27 (94)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGINATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3		CIRCUIT CARD ASSEMBLY: BFO synthesizer, etched circuit board epoxy resin glass base laminate w/1 oz. copper circuitry, BFO synthesizer produces a 455 kHz ±8.9 kHz signal. The BFO tunes from 446.1 to 463.9 kHz in 100 Hz steps. 0.500 in. thk. by 4.30 in. long by 3.85 in. wide. Connected by plugging in, mfr. 14632, part no. 791576	7-28
1A5A3C1		CAPACITOR, FIXED, ELECTROLYTIC: 3.3 µF, 20 PCT, 35 V tantalex, mfr. 56289, part no. 196D335X0035JE3	7-28 (1)
1A5A3C2		CAPACITOR: See item 12	7-28 (2)
1A5A3C3		CAPACITOR: See item 7	7-28 (3)
1A5A3C4		CAPACITOR: See item 10	7-28 (4)
1A5A3C5		CAPACITOR: See item 11	7-28 (5)
1A5A3C6		CAPACITOR: Same as 1A5A2C59	7-28 (6)
1A5A3C7		CAPACITOR: See item 8	7-28 (7)
1A5A3C8		CAPACITOR: Same as 1A5A1A2C33	7-28 (8)
1A5A3C9		CAPACITOR: See item 11	7-28 (5)
1A5A3C10		CAPACITOR, FIXED, MICA DIELECTRIC: 10 pF, 0.5 pF TOL, 500 V, mfr. 81349, part no. CM04CD100D03	7-28 (9)
1A5A3C11		CAPACITOR: See item 1	7-28 (10)
1A5A3C12		CAPACITOR: See item 1	7-28 (10)
1A5A3C13		CAPACITOR: See item 11	7-28 (5)
1A5A3C14		CAPACITOR: Same as 1A5A3C10	7-28 (9)
1A5A3C15		Not Used	
1A5A3C16		CAPACITOR: See item 7	7-28 (3)
1A5A3C17		CAPACITOR: See item 11	7-28 (5)
1A5A3C18		CAPACITOR: See item 11	7-28 (5)
1A5A3C19		CAPACITOR: See item 11	7-28 (5)
1A5A3C20		CAPACITOR: See item 11	7-28 (5)
1A5A3C21		CAPACITOR: See item 11	7-28 (5)
1A5A3C22		CAPACITOR: See item 7	7-28 (3)
1A5A3C23		CAPACITOR: See item 11	7-28 (5)
1A5A3CR1		SEMICONDUCTOR: Same as 1A5A2CR8	7-28 (11)
1A5A3L1		COIL, RADIO FREQUENCY: 27 µH, 5 PCT, .375 long by .156 dia. by .025 lead dia. phenolic core molded, mfr. 99800, part no. 1537-48	7-28 (12)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3L2		COIL, RADIO FREQUENCY: 330 μH, 5 PCT, molded iron core, .440 long by .19 dia., mfr. 99800, part no. 2500-04	7-28 (13)
1A5A3L3		COIL: Same as 1A5A1L2	7-28 (14)
1A5A3MP1		INSULATOR: See item 26 (4)	7-28 (15)
1A5A3MP2		SHIELD, BFO: Al. aly, 5052-H32, .062 thk., 3.90 long x 3.42 wide w/4 standoffs, mfr. 14632, part no. 34982-1	7-28 (16)
		(Attaching Hardware)	
		Standoff: 4-40 x 3/16 long cres. .213 mtg. hole, mfr. 46384, part no. SOS6440-6 (4), G(4), C(4), A(4)	
1A5A3MP3		PRINTED CIRCUIT BOARD: Basic etched circuit less the assembled parts for item 1A5A3	7-28 (17)
1A5A3Q1		TRANSISTOR: See item 64	7-28 (18)
1A5A3Q2		TRANSISTOR: Silicon dual insulated - gate field-effect w/integrated gate protection, for RF ampl, mixer and IF ampl., N-channel depletion type, hermetically sealed in TO-72 package, mfr. 14632, part no. 841001-2 (RCA P/N 3N200)	7-28 (19)
1A5A3Q3		TRANSISTOR: Same as 1A5A1A2Q6	7-28 (20)
1A5A3Q4		TRANSISTOR: MOS/Field effect, N Channel, VHF amplifier, T0-72 case, mfr. 80131, part no. 3N128	7-28 (21)
1A5A3R1		RESISTOR, VARIABLE: 500 Ohm, 10 PCT .5 watt, helitrim sealed metal housing 1/4 in. dia., single turn, 3 pin, mfr. 73138, part no. 62PAR500	7-28 (22)
1A5A3R2		RESISTOR: See item 37	7-28 (23)
1A5A3R3		RESISTOR: See item 38	7-28 (24)
1A5A3R4		RESISTOR: See item 37	7-28 (23)
1A5A3R5		RESISTOR: See item 35	7-28 (25)
1A5A3R6		RESISTOR: See item 37	7-28 (23)
1A5A3R7		RESISTOR: See item 38	7-28 (24)
1A5A3R8		RESISTOR, FIXED, FILM: 4.22 k ohms, 1 PCT, 0.10 Watt, 200 V rated, .250 long body by .088 dia. by .02 lead dia., mfr. 81349, part no. RN55C4221F	7-28 (26)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3R9		RESISTOR, FIXED, FILM: 17.8 k ohms, 1 PCT, 0.10 watt, 200 V rated, .250 long body by .088 dia. by .02 lead dia., mfr. 81349, part no. RN55C1782F	7-28 (27)
1A5A3R10		RESISTOR: Same as 1A5A3R9	7-28 (27)
1A5A3R11		RESISTOR: See item 35	7-28 (25)
1A5A3R12		RESISTOR: See item 58	7-28 (28)
1A5A3R13		RESISTOR: See item 39	7-28 (29)
1A5A3R14		RESISTOR: Same as 1A4A8R34	7-28 (30)
1A5A3R15		RESISTOR: Same as 1A5A2R32	7-28 (31)
1A5A3R16		RESISTOR: See item 35	7-28 (25)
1A5A3R17		RESISTOR: See item 38	7-28 (24)
1A5A3R18		RESISTOR: See item 37	7-28 (23)
1A5A3R19		RESISTOR: See item 37	7-28 (23)
1A5A3R20		RESISTOR: Same as 1R2	7-28 (32)
1A5A3R21		RESISTOR, FIXED, COMPOSITION: 62 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G620JS	7-28 (33)
1A5A3R22		RESISTOR: See item 37	7-28 (23)
1A5A3R23		RESISTOR: See item 37	7-28 (23)
1A5A3R24		RESISTOR: See item 37	7-28 (23)
1A5A3R25		RESISTOR: See item 37	7-28 (23)
1A5A3R26		RESISTOR: See item 37	7-28 (23)
1A5A3R27		RESISTOR: See item 37	7-28 (23)
1A5A3R28		RESISTOR: See item 37	7-28 (23)
1A5A3R29		RESISTOR: See item 37	7-28 (23)
1A5A3R30		RESISTOR: See item 37	7-28 (23)
1A5A3R31		RESISTOR: See item 37	7-28 (23)
1A5A3U1		INTEGRATED CIRCUIT: See item 30	7-28 (34)
1A5A3U2		INTEGRATED CIRCUIT: See item 30	7-28 (34)
1A5A3U3		INTEGRATED CIRCUIT: See item 30	7-28 (34)
1A5A3U4		INTEGRATED CIRCUIT: See item 30	7-28 (34)
1A5A3U5		INTEGRATED CIRCUIT: Positive-NOR gates with totempole outputs, dual 4-input with strobe, 14 pin dual-in-line plastic, mfr. 01295, part no. SN7425N	7-28 (35)
1A5A3U6		INTEGRATED CIRCUIT: Positive-and gate with totempole outputs, 3 input 5nS, 2 mV, 14 pin dual-in-line plastic, mfr. 01295, part no. SN74LS11N	7-28 (36)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A5A3U7		INTEGRATED CIRCUIT: See item 29	7-28 (37)
1A5A3U8		INTEGRATED CIRCUIT: Dual D flip-flop positive edge triggered w/preset and clear, 14 pin dual-in-line plastic, mfr. 14632, part no. 867474	7-28 (38)
1A5A3U9		INTEGRATED CIRCUIT: Same as 1A5A1A2U15	7-28 (39)
1A5A3U10		INTEGRATED CIRCUIT: TTL/Counter asynchronous 2 x 5, 14 pin dual-in-line, mfr. 01295, part no. SN74LS90N	7-28 (40)
1A6		CIRCUIT CARD ASSEMBLY: I/O Motherboard, etched circuit board eposy resin glass base laminate w/1 oz. copper circuitry. Provides support and interconnections for modules in the I/O section of the receivr. 0.500 in. thk. by 14.40 in. long by 3.10 in. wide. Connected by push on tab, mfr. 14632, part no. 791580	7-29
1A6C1		CAPACITOR: See item 10	7-29 (1)
1A6C2		CAPACITOR: See item 10	7-29 (1)
1A6C3		CAPACITOR: See item 10	7-29 (1)
1A6C4		CAPACITOR, FIXED, ELECTROLYTIC: 100 μF, 20 PCT, 20 V, .750 high by .40 dia., mfr. 56289, part no. 196D107X0020TE4	7-29 (2)
1A6J1		POST/FEEDTHRU: 29 position comb, mfr. 00779, part no. PE7-14045	7-29 (3)
1A6J2		POST/FEEDTHRU: Same as 1A6J1	7-29 (3)
1A6J3		POST/FEEDTHRU: Same as 1A6J1	7-29 (3)
1A6J4		CONNECTOR: See item 21	7-29 (4)
1A6J5		CONNECTOR: See item 21	7-29 (4)
1A6J6		CONNECTOR: See item 21	7-29 (4)
1A6J7		CONNECTOR: See item 21	7-29 (4)
1A6MP1		HOUSING: Same as 1A4MP1	7-29 (5)
1A6MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A6	7-29 (6)
		(Attaching Hardware)	
		G(8), C(8), A(8)	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6XA1		CONTACT STRIP: Same as 1A4XA1	7-29 (7)
1A6XA2		CONTACT STRIP: Same as 1A4XA1	7-29 (7)
1A6A1		CIRCUIT CARD ASSEMBLY: Manual tune up/down counter, etched circuit board epoxy resin glass base laminate w/1 oz. copper circuitry. Contains the RF freq. data, which is sent to the 1st and 2nd LO Synthesizers and encoded for multiplexing to the display board. 0.500 in. thk. by 8.80 in. long by 3.85 in. wide, plugs into two connectors of the motherboard, mfr. 14632, part no. 791575-1	7-30
1A6A1BT1		BATTERY, STORAGE: Nickel cadium 2.4 V, 65 mA, PC mount, 4 mounting pins, 1.400 long by .67 wide by .60 high, mfr. 19209, part no. 41B901BD16G1	7-30 (1)
1A6A1C1		CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 10 PCT, 15 V, mfr. 81349, part no. CS13BD226K	7-30 (2)
1A6A1C2		CAPACITOR: See item 2	7-30 (3)
1A6A1C3		CAPACITOR: See item 11	7-30 (4)
1A6A1C4		CAPACITOR: See item 11	7-30 (4)
1A6A1C5		CAPACITOR: See item 11	7-30 (4)
1A6A1C6		CAPACITOR: See item 11	7-30 (4)
1A6A1C7		CAPACITOR: See item 11	7-30 (4)
1A6A1CR1		SEMICONDUCTOR, DEVICE, DIODE: Hot carrier 10 PRV, .170 long body by .076 dia. by .016 lead dia., mfr. 28480, part no. 5082-2900	7-30 (5)
1A6A1J1		Not Used	
1A6A1J2		CONNECTOR, ELECTRICAL RECEPTACLE: Gold nickel plated post, 16 positions, 1.00 long by .376 wide, mfr. 00779, part no. 87567-4	7-30 (6)
1A6A1J3		CONNECTOR: Same as 1A6A1J2	7-30 (6)
1A6A1J4		CONNECTOR: Same as 1A6A1J2	7-30 (6)
1A6A1MP1		JACK, ELECTRICAL: Printed circuit thru hole, .110 long by .080 dia. for .025 pin, captive spring insert, mfr. 18310, part no. 09-9017-1-06	7-30 (7)
1A6A1MP2		INSULATOR: See item 24	7-30 (8)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A1MP3		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A6A1	7-30 (9)
1A6A1Q1		TRANSISTOR: See item 63	7-30 (10)
1A6A1R1		RESISTOR: See item 38	7-30 (11)
1A6A1R2		RESISTOR: See item 38	7-30 (11)
1A6A1R3		RESISTOR: Same as 1A3A2R12	7-30 (12)
1A6A1R4		RESISTOR: See item 38	7-30 (11)
1A6A1R5		RESISTOR: See item 38	7-30 (11)
1A6A1R6		RESISTOR: See item 38	7-30 (11)
1A6A1R7		RESISTOR: See item 38	7-30 (11)
1A6A1R8		RESISTOR: See item 38	7-30 (11)
1A6A1R9		RESISTOR: Same as 1A4A6R47	7-30 (12)
1A6A1R10		RESISTOR: See item 38	7-30 (11)
1A6A1R11		RESISTOR: See item 37	7-30 (13)
1A6A1R12		RESISTOR: See item 36	7-30 (14)
1A6A1R13		RESISTOR: See item 37	7-30 (13)
1A6A1R14		RESISTOR: Same as 1A4A6R3	7-30 (15)
1A6A1U1		INTEGRATED CIRCUIT: Hex schmitt trigger, 3.0 V to 15 V, monolithic complimentary MOS (CMOS) constructed with N and P ch. enhancement transistors, 14 pin dual-in-line, mfr. 27014, part no. MM74C14N	7-30 (16)
1A6A1U2		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U3		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U4		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U5		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U6		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U7		INTEGRATED CIRCUIT: See item 27	7-30 (17)
1A6A1U8		INTEGRATED CIRCUIT: Quad 2-input "AND" gate, double diode protected, 14 pin dual-in-line plastic, mfr. 04713, part no. MC14081BCP	7-30 (18)
1A6A1U9		INTEGRATED CIRCUIT: Dual J-K flip flop, diode protected, 16 pin dual-in-line plastic, mfr. 04713, part no. MC14027BCP	7-30 (19)
1A6A1U10		INTEGRATED CIRCUIT: Quad exclusive "OR" gate, double diode protected, 14 pin dual-in-line plastic, mfr. 04713, part no. MC14070BCP	7-30 (20)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A1U11		INTEGRATED CIRCUIT: Same as 1A6A1U8	7-30 (18)
1A6A1U12		INTEGRATED CIRCUIT: 8 channel data selector, diode protected, 16 pin dual-in-line plastic, mfr. 04713, part no. MC14512CP	7-30 (21)
1A6A1U13		INTEGRATED CIRCUIT: Same as 1A6A1U12	7-30 (21)
1A6A1U14		INTEGRATED CIRCUIT: Same as 1A6A1U12	7-30 (21)
1A6A1U15		INTEGRATED CIRCUIT: Same as 1A6A1U12	7-30 (21)
1A6A1U16		INTEGRATED CIRCUIT: Dual Binary up counter, diode protection, 16 pin dual-in-line plastic, mfr. 04713, part no. MC14520BCP	7-30 (22)
1A6A1U17		INTEGRATED CIRCUIT: Hex buffer non-inverting, 16 pin dual-in-line plastic, mfr. 04713, part no. MC14050BCP	7-30 (23)
1A6A1U18		INTEGRATED CIRCUIT: Same as 1A6A1U8	7-30 (18)
1A6A2		CIRCUIT CARD ASSEMBLY: Front panel interconnect, epoxy resin glass base laminate w/1 oz. copper circuitry. Translates information from the manually controlled front panel into control information for the receiver, 4.30 in. long by 3.850 in. wide by .375 in. thk. plugs into the motherboard, mfr. 14632, part no. 791828	7-31
1A6A2C1		CAPACITOR: See item 10	7-31 (1)
1A6A2CR1		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR2		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR3		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR4		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR5		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR6		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR7		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR8		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR9		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2CR10		SEMICONDUCTOR: See item 62	7-31 (2)
1A6A2J1		CONNECTOR, ELECTRICAL, RECEPTACLE: 40 pin right angle header assembly double row 0.10 ctrs MOD11, mfr. 00779, part no. 1-87567-6	7-31 (3)
1A6A2MP1		INSULATOR: Same as 1A3A2MP2	7-31 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A6A2MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A6A2	7-31 (5)
1A6A2Q1		TRANSISTOR: Med. speed SW SAT PNP silicon, T0-5, mfr. 80131, part no. 2N4037	7-31 (6)
1A6A2R1		RESISTOR, FIXED, COMPOSITION: 620 ohms, 5 PCT, .25 watt, 250 V rated, .250 long body by .09 dia. by .02 lead dia., mfr. 81349, part no. RCR07G621JS	7-31 (7)
1A6A2R2		RESISTOR: See item 36	7-31 (8)
1A6A2R3		RESISTOR: See item 50	7-31 (9)
1A6A2R4		RESISTOR: See item 39	7-31 (10)
1A6A2R5		RESISTOR, FIXED, COMPOSITION: 22 ohms, 5 PCT, .5 watt, 350 V rated, .390 long body by .140 dia. by .025 lead dia., mfr. 81349, part no. RCR20G220JS	7-31 (11)
1A6A2R6		RESISTOR: See item 38	7-31 (12)
1A6A2R7		RESISTOR: See item 38	7-31 (12)
1A6A2R8		RESISTOR: See item 38	7-31 (12)
1A6A2R9		RESISTOR: See item 38	7-31 (12)
1A6A2U1		INTEGRATED CIRCUIT: Triple 2 channel multiplexer, diode protected, 16 pin dual-in-line plastic, mfr. 04713 part no. MC14053BCP	7-31 (13)
1A6A2U2		INTEGRATED CIRCUIT: Same as 1A6A2U1	7-31 (13)
1A7		MANUAL TUNING MODULE: .090 thick alum. alloy. A front panel function that uses a manual tuning knob. The manual tuning module controls the direction and rate of change of the tuned frequency. 6.00 in. long by 3.50 in. wide by 1.00 in. thick, mfr. 14632, part no. 791874-1	7-32
		(Attaching Hardware)	
		Screw/machine pan head cross-recessed 6-32 x 1/2 Cres. mfr. 96906, part no. MS51957-30 (4)	
		Washer/Lock no. 6 .144 ID .250 OD .031 thk. Cres., mfr. 96906, part no. MS35338-136 (4)	

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
		Washer/Flat no. 6 .156 ID .312 OD .035 Thick Cres., mfr. 96906, part no. MS15795-805 (4)	
1A7MP1		KNOB ASSEMBLY: Spinner, 2.50 dia. by .78 thick zink casted, mfr. 14632, part no. 280064-1	7-32 (1)
1A7MP2		BUTTON: Black shell with green indicator, mfr. 31918, part no. FA101-BLK w/GRN	7-32 (2)
1A7MP3		LENS, ACTUATOR: AL Alloy 5052-H32 .09 thk, 3.32 long by .78 deep, mfr. 14632, part no. 24459-1	7-32 (3)
1A7U1		ENCODER ASSEMBLY: Panel coder - totem pole outlet, power 5 Vdc porm 5 PCT at 60 mA max., resolution 127 PPR, output 3 V pp min. into 10 k ohm load, solder terminals, 1.50 dia. by 1.08 deep, .86 long shaft by .25 dia., mfr. 14632, part no. 34836-1	7-32 (4)
1A7A1		CIRCUIT CARD ASSEMBLY: Tuning resolution switch, etched circuit board epoxy resin glass base laminate w/1 oz copper circuitry. Switches select the desired tuning step (10 Hz, 100 Hz, 1 kHz and 10 kHz). 0.500 in. thk. by 3.20 in. long by 1.55 in. wide plus 1.00 in. switch over hang, connected by solder terminals and ribbon cable connector, mfr. 14632, part no. 791589	7-33
1A7A1MP1		CONNECTOR, PADDLE BOARD: 16 pin 0.10 post length, mfr. 00779, part no. 88213-2	7-33 (1)
1A7A1MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A7	7-33 (2)
1A7A1P1		CONNECTOR, ELECTRICAL, PLUG: Kit 16 socket double row for flat cable (kit includes 88376-8 HSG, 88340-8 C/SR), mfr. 00779, part no. 88475-3	7-33 (3)
1A7A1S1		SWITCH, PUSHBUTTON: 5 station 2 pole single throw, 3.253 long by .838 high by .319 wide, mfr. 14632, part no. 18488	7-33 (4)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A8		CIRCUIT CARD ASSEMBLY: Frequency display, etched circuit board epoxy resin glass base laminate w/1 oz. copper circuitry. Frequency display accepts the multiplexed information from the manual tuning up/down counter and display it on the front panel. 0.420 in. thk. by 6.10 in. long by 2.25 in. wide. connected by a pigtail with plug in connector, mfr. 14632, part no. 791578	7-34
1A8C1		CAPACITOR: See item 11	7-34 (1)
1A8C2		CAPACITOR: See item 11	7-34 (1)
1A8CR1		SEMICONDUCTOR DEVICE, DIODE: LED yellow defused subminiature 2.0 MCD typ, mfr. 28480, part no. 5082-4150	7-34 (2)
1A8MP1		INSULATOR: Same as 1A5MP2	7-34 (3)
1A8MP2		CONNECTOR: Same as 1A7A1MP1	7-34 (4)
1A8MP3		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A8	7-34 (5)
		(Attaching Hardware)	
		Screw/machine pan head cross-recessed 4-40 x 7/16 Cres, mfr. 96906, part no. MS51957-16 (5), C(5), A(5)	
1A8P1		CONNECTOR: Same as 1A7A1P1	7-34 (6)
1A8Q1		TRANSISTOR: N PN single-diffused mesa silicon power transistor, 30 watt at 25°C case temp., 1 Amp rated collector current, 3 lead, .550 long by .420 wide .19 thick with mounting tab., mfr. 01295, part no. TIP29	7-34 (7)
1A8R1		RESISTOR: See item 42	7-34 (8)
1A8R2		RESISTOR, VARIABLE: 100 ohms, 10 PCT, 0.75 watt, 0.75 in. long .19 wide, .25 high, rectangular 20-turn cermet, mfr. 73138, part no. 89PR100	7-34 (9)
1A8R3		RESISTOR: Same as 1A4A6R47	7-34 (10)
1A8R4		RESISTOR: Same as 1R3	7-34 (11)
1A8U1		INTEGRATED CIRCUIT: LED numeric 7 segment 0.43 in. yellow com cath right hand dec., mfr. 28480, part no. 5082-7663	7-34 (12)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A8U2		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U3		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U4		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U5		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U6		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U7		INTEGRATED CIRCUIT: Same as 1A8U1	7-34 (12)
1A8U8		INTEGRATED CIRCUIT: BCD T0-7 segment LED driver 50 mA, 16 pin dual-in-line, mfr. 27014, part no. DS8857N	7-34 (13)
1A8U9		INTEGRATED CIRCUIT: CMOS BCD to decimal decoder, 16 pin dual-in-line plastic, mfr. 02735, part no. CD4028AE	7-34 (14)
1A8U10		INTEGRATED CIRCUIT: MOS-to-LED 8 digit driver, 18 pin dual-in-line plastic, mfr. 27014, part no. DS8863N	7-34 (15)
1A9		CIRCUIT CARD ASSEMBLY: BFO switch, epoxy resin glass base laminate w/1 oz. copper circuitry, three thumbwheel switches provide a BFO variation of PORM 1.25 in. wide by 1.50 in. thk. connected by ribbon cable connector, mfr. 14632, part no. 791827	7-35
1A9MP1		CONNECTOR: Same as 1A7A1MP1	7-35 (1)
1A9MP2		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A9	7-35 (2)
		(Attaching Hardware)	
		Screw/machine 82 deg flat head slotted 2-56 x 5/16 Cres., mfr. 96906, part no. MS35249-11 (4)	
		Washer/flat no. 2 .089 ID .149 OD .016 thk. Cres., mfr. 80205, part no. NAS620C2 (4), B(4)	
		Nut/plain hex 2-56 x 5/32 ACRFLTX 1/16 thk. Cres., mfr. 80205, part no. NAS671C2 (4)	
1A9P1		CONNECTOR: Same as 1A7A1P1	7-35 (3)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A9S1		SWITCH/THUMBWHEEL: 3 section panel mount SNA Pin, matte black body, white numbers 0 thru 9, mfr. 09353, part no. 339910490-00226	7-35 (4)
1A10		FRONT PANEL CONTROL: consist of the upper and lower panel control boards joined by 40 pin ribbon connectors. Controls the manual selection of detection mode, gain mode, meter mode, IF bandwidth, RF gain and headphone levels, mfr. 14632, part no. 791684-2	7-36
1A10MP1		CONNECTOR, PADDLE BOARD: 20 pin 0.10 pin length, mfr. 00779, part no. 88213-3	7-36 (1)
1A10P1		CONNECTOR, ELECTRICAL PLUG: Kit, 40 socket double row for flat cable (kit includes 88378-1 HSG and 88340-1 C/SR), mfr. 00779, part no. 88476-7	7-36 (2)
1A10A1		CIRCUIT CARD ASSEMBLY: Upper panel control, etched circuit board epoxy resin glass base laminate w/1 oz copper circuitry. Allows selection of detection mode, gain mode and meter mode. 0.500 in. thk. by 8.88 in. long by 1.15 in. wide plus 1.00 in. switch length connected by external ribbon cable connector, mfr. 14632, part no. 791583	7-37
1A10A1J1		CONNECTOR: See item 21	7-37 (1)
1A10A1MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A10A1	7-37 (2)
1A10A1S1		SWITCH, PUSHBUTTON: 2 station 2 pole single throw, spring loaded, 1.482 long by .838 high by .319 wide, mfr. 14632, part no. 18485	7-37 (3)
1A10A1S2		SWITCH, PUSHBUTTON: 3 station 2 pole single throw, spring loaded, 2.072 long by .838 high by .319 wide, mfr. 14632, part no. 18486	7-37 (4)
1A10A1S3		SWITCH, PUSHBUTTON: 6 station 2 pole single throw, spring loaded, 3.843 long by .838 high by .319 wide, mfr. 14632, part no. 18487	7-37 (5)

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A10A2		CIRCUIT CARD ASSEMBLY: Lower panel control, plastic sheet laminated metal clad. Allows selection of IF bandwidth and variation of RF gain and phone level potentiometers. 7.58 in. long by 1.78 in. wide by .650 in. thick connected by solder terminals and push on connector, mfr. 14632, part no. 791826	7-38
1A10A2C1		CAPACITOR: See item 11	7-38 (1)
1A10A2MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A10A2	7-38 (2)
1A10A2J1		CONNECTOR: See item 21	7-38 (3)
1A10A2J2		CONNECTOR: See item 21	7-38 (3)
1A10A2J3		CONNECTOR: See item 21	7-38 (3)
1A10A2J4		CONNECTOR: See item 21	7-38 (3)
1A10A2R1		RESISTOR, VARIABLE: 25 k ohms, 10 PCT, 1 watt linear, square term. single hot molded, 3 locating lugs, plain bushing .375, .875 shaft, mfr. 01121, part no. 70M3N056L253U	7-38 (4)
1A10A2R2		RESISTOR, VARIABLE: 25k/25k ohms, 10 PCT, 1 watt log, dual hot molded, 3 locating lugs, plain bushing .375, .875 shaft, mfr. 01121, part no. 70P3N056L253A	7-38 (5)
1A10A2R3		RESISTOR: See item 46	7-38 (6)
1A10A2R4		RESISTOR: See item 46	7-38 (6)
1A10A2R5		RESISTOR: See item 39	7-38 (7)
1A10A2R6		RESISTOR: See item 37	7-38 (8)
1A10A2R7		RESISTOR: See item 39	7-38 (7)
1A10A2R8		RESISTOR: See item 37	7-38 (8)
1A10A2S1		SWITCH: Same as 1A7A1S1	7-38 (9)
1A10A2U1		INTEGRATED CIRCUIT: See item 28	7-38 (10)
1A11		CIRCUIT CARD ASSEMBLY: Switchable attenuator 30 dB, 16 ohm, epoxy resin glass base laminate w/1 oz copper circuitry, switches a 30 dB attenuation network into the rear panel line audio output. 0.400 in. thick by 3.00 in. long by 1.25 in. wide, connected by a cable connector, mfr. 14632, part no. 796094-1	7-39

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A11MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A11	7-39 (1)
		(Attaching Parts)	
		SPACER: .16 long by .187 OD by .117 ID 6061-T6 Alum. alloy tube, mfr. 14632, part no. 20753-8(4), F(4), C(4), A(4)	
1A11R1		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 PCT, 2 watt, 500 V rated .687 long body by .312 dia. by .045 lead dia., mfr. 81349, part no. RCR42G330JS	7-39 (2)
1A11R2		RESISTOR, FIXED, COMPOSITION: 36 ohms, 5 PCT, 2 Watt, 500 V rated, .687 long body by .312 dia. by .045 lead dia., mfr. 81349, part no. RCR42G360JS	7-39 (3)
1A11R3		RESISTOR, FIXED, COMPOSITION: 120 ohms, 5 PCT, .5 watt, 350 V rated, .390 long body by .140 dia. by .031 lead dia., mfr. 81349, part no. RCR20G121JS	7-39 (4)
1A11R4		RESISTOR: Same as 1A11R3	7-39 (4)
1A11R5		RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 PCT, .5 watt, 350 V rated, .390 long body by .140 dia. by .031 lead dia., mfr. 81349, part no. RCR20G330JS	7-39 (5)
1A11R6		RESISTOR, FIXED, COMPOSITION: 36 ohms, 5 PCT, .5 watt, 350 V rated, .390 long body by .140 dia. by .031 lead dia., mfr. 81349, part no. RCR20G360JS	7-39 (6)
1A11S1		SWITCH, SLIDE: 4 pole double throw PC mount, silver plated RT angle, .270 long lever, .632 long body by .396 high, mfr. 95146, part no. MSS-4200R	7-39 (7)
1A12		CIRCUIT CARD ASSEMBLY: Switchable audio attenuator - epoxy resin glass base laminate w/1 oz copper circuitry, switches a 20 dB attenuation network into the rear panel ISB audio. 0.400 in. thick by 3.00 in. long by 1.25 in. wide, connected by cable connector, mfr. 14632, part no. 796094-2	7-40

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TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A12MP1		PRINTED WIRING BOARD: Basic etched circuit less the assembled parts for item 1A12	7-40 (1)
		(Attaching Parts)	
		SPACER: .16 long by .187 OD by .117 ID 6061-T6 alum. alloy tube, mfr. 14632, part no. 20753-8 (4), F(4), C(4), A(4)	
1A12R1		RESISTOR: Same as 1A5A2R47	7-40 (2)
1A12R2		Not Used	
1A12R3		RESISTOR: See item 43	7-40 (3)
1A12R4		RESISTOR: See item 43	7-40 (3)
1A12R5		RESISTOR: Same as 1A5A2R47	7-40 (2)
1A12S1		SWITCH: Same as 1A11S1	7-40 (4)
1A13		POWER INPUT FILTER ASSEMBLY: Copper flashed nickel plated brass chassis, houses the AC line filter in a RFI frame and provides a mounting hole for special mil-connector, 3.12 in. long by 1.937 in. wide by 2.50 in. high, connected by screws, mfr. 14632, part no. 796098-1	7-41
1A13FL1		FILTER, POWER LINE: 115/250 Vac, 50-400 Hz, 15 dB/0.15 MHz, 30 dB/0.5 MHz, 55 dB/10 MHz, 2 Amp, 1.75 wide by 2.00 long by .875 high, mounting tabs .188 dia. holes, 5 leads #2 AWG, mfr. 05245, part no. 2K3	7-41 (1)
1A13J1		CONNECTOR, ELECTRICAL, RECEPTACLE: 3 pin cylindrical box mount, mfr. 96906, part no. MS3102E-16S-5P	7-41 (2)
1A13MP1		COVER, TOP: .04 thk, brass nickel plated with RFI lining, 2 bends, 1.600 long bend and .86 long bend by .12 high, four .136 dia. mounting holes, mfr. 14632, part no. 380097-1	Not Shown

Courtesy of http://BlackRadios.terryo.org

TABLE 7-2. RECEIVING SET, RADIO AN/URR-74(V)2, PARTS LIST (Cont'd)

REFERENCE DESIGNATION	NOTES	NAME AND DESCRIPTION	FIGURE NUMBER (ITEM)
1A13MP2		COVER BOTTOM: .04 brass nickel plated with RFI lining, 2.53 long by 1.96 wide, by .12 high, four mounting holes .136 dia. mfr. 14632, part no. 380098-1 (Attaching Hardware) G(4), C(4)	Not Shown

Courtesy of http://BlackRadios.terryo.org

Table 7-3. List of Common Item Descriptions

ITEM NUMBER	DESCRIPTION
1	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 1000 pF GMV, 500 V, disc. with #22 AWG tinned leads, mfr. 91418, part no. B-GP1000PFP
2	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 470 pF, 20 PCT, 1000 V, mfr. 91418, part no. B470PFM
3	CAPACITOR, FIXED, ELECTROLYTIC: 15 µF, 10 PCT, 20 V, mfr. 81349, part no. CS13BE156K
4	CAPACITOR, CERAMIC, FEED-THRU: 0.01 µF, 20 PCT, 600 V w/LUG TERMINALS, mfr. 96733, part no. F1A6103K
5	CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 20 PCT, 10 V, solid tantalum, mfr. 56289, part no. 196D226X0010JE3
6	CAPACITOR, FIXED, ELECTROLYTIC: 22 µF, 20 PCT, 15 V, solid tantalum, mfr. 56289, part no. 196D226X0015KE3
7	CAPACITOR, FIXED ELECTROLYTIC: 47 µF, 20 PCT, 20 V, .350 x .650, mfr. 56289, part no. 196D476X0020PE4
8	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 47 pF, 5 PCT, 500 V NPO, TUBULAR, mfr. 72982, part no. 308-000C0G0-470J
9	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 200 pF, P50 PCT M0, N5600 PORM 1000 P/M/°C, solder in disc., 230 DIA. by .06 thick with tinned electrodes mfr. 91984, part no. 32-257578-40
10	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.47 µF PORM, 20 PCT, 50 Vdc working, mfr. 14632, part no. 34452-1
11	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: .01 µF, 20 PCT, 500 V, mfr. 14632, part no. 34453-1
12	CAPACITOR, FIXED, CERAMIC, DIELECTRIC: 0.1 µF PORM, 20 PCT, 50 Vdc working, mfr. 14632, part no. 34475-1
13	CAPACITOR, CERAMIC, FEED-THRU: 1000 pF, GMV, 500 V, mfr. 33095 part no. 54-794-009-102W
14	COIL, RADIO FREQUENCY: FIXED MOLDED, 10 µH, 10 PCT, PHENOLIC CORE, .155 Dia. by .375 long, mfr. 99800, part no. 1537-36
15	COIL, RADIO FREQUENCY: 6.8 mH, 10 PCT, PC MOUNT, .375 Dia. by .375 wide by .025 Dia. tinned leads, mfr. 71279, part no. 553-3635-47
16	CONNECTOR, PLUG, ELECTRICAL: Subminiature gold plated, used with RG-188/U, RG-316/U, 43/64 long by 7/32 wide, mfr. 80058, part no. UG-1465/U
17	CONNECTOR, PLUG, ELECTRICAL: Subminiature, right angle, used with RG-188/U, RG-316, gold plated, 50 ohm, mfr. 80058, part no. UG1466/U
18	CONNECTOR, PLUG, ELECTRICAL: Subminiature screw on, 50 ohm, gold plated, used with RG-188/U, mfr. 80058, part no. UG-1468/U

Courtesy of http://BlackRadios.terryo.org

Table 7-3. List of Common Item Descriptions (Cont'd)

ITEM NUMBER	DESCRIPTION
19	CONNECTOR, PLUG, ELECTRICAL: Faston Receptacle for 18-22 AWG wire, mates with .032 x .250 tab insulated, mfr. 00779, part no. 2-350804-2
20	CONNECTOR, PLUG, ELECTRICAL: Faston Receptacle for 20-22 AWG wire, pre tinned brass, .15 wide by .635 long by .025 thick, mfr. 00779, part no. 42236-1
21	CONNECTOR, PLUG, ELECTRICAL: Faston Tab, 0.110 wide x 0.02 thick, PC mount, style B, mfr. 00779, part no. 62073-1
22	CONNECTOR, PLUG, ELECTRICAL: 3 position, single row, 0.10 centers for crimp contacts, mfr. 00779, part no. 87499-5
23	FERRITE BEAD: VHF, 0.047 ID 0.138 OD, 0.118 long, medium permeability ferrite material, used for shielding and parasitic suppression, mfr. 02114, part no. 56-590-65-4A
24	INSULATOR, DISK: 4 lead, .13 thick for TO-18 case, mfr. 13103, part no. 7717-44DAP
25	INSULATOR, DISK: 4 lead, .06 thick, for TO-18 case, mfr. 13103, part no. 7717-46DAP
26	INSULATOR, DISK: 4 lead, .08 thick for TO-18 case, mfr. 13103, part no. 7717-89DAP
27	INTEGRATED CIRCUIT: BCD UP/DOWN COUNTER, DIODE PROTECTED, 5.0 MHz count rate, 16 pin dual-in-line plastic, mfr. 04713, part no. MC14510BCP
28	INTEGRATED CIRCUIT: QUAD OP AMP, Internally compensated, plastic dip, silicon monolithic, 14 pin, mfr. 04713, part no. MC3403P
29	INTEGRATED CIRCUIT: phase frequency detector, dip, plastic 14 pin, mfr. 04713, part no. MC4044P
30	INTEGRATED CIRCUIT: synchronous up/down counter with down/up mode control, counts 8-4-2-1 BCD, count enable control input, ripple clock output, a synchronously presettable w/load control, parallel outputs, 16 pin dual-in-line, mfr. 01295, part no. SN74LS190N
31	INTEGRATED CIRCUIT: TTL/ LATCH flip flop and counter asynchronous, 14 pin dual-in-line, mfr. 01295, part no. SN74LS196N
32	RESISTOR, FIXED, COMPOSITION: 100 ohms, 5 PCT .125 WATT, 150 V rated, .145 long body by .062 dia. by .02 lead dia., mfr. 81349, part no. RCR05G101JS
33	RESISTOR, FIXED, COMPOSITION: 1.0 k ohms, 5 PCT, .125 WATT, 150 V rated, .145 long body by .062 Dia. by .02 lead dia., mfr. 81349, part no. RCR05G102JS
34	RESISTOR, FIXED, COMPOSITION: 47 ohms, 5 PCT, .125 WATT, 150 V rated, .145 long body by .062 Dia. by .02 lead Dia., mfr. 81349, part no. RCR05G470JS
35	RESISTOR, FIXED, COMPOSITION: 10 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G100JS

Courtesy of http://BlackRadios.terryo.org

Table 7-3. List of Common Item Descriptions (Cont'd)

ITEM NUMBER	DESCRIPTION
36	RESISTOR, FIXED, COMPOSITION: 100 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G101JS
37	RESISTOR, FIXED, COMPOSITION: 1.0 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G102JS
38	RESISTOR, FIXED, COMPOSITION: 10 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G103JS
39	RESISTOR, FIXED, COMPOSITION: 100 k ohms, 5 PCT, .25 WATT, 250 V rated, .25 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G104JS
40	RESISTOR, FIXED, COMPOSITION: 1.2 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G122JS
41	RESISTOR, FIXED, COMPOSITION: 12 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G123JS
42	RESISTOR, FIXED, COMPOSITION: 150 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., part no RCR07G151JS
43	RESISTOR, FIXED, COMPOSITION: 1.5 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia., by .02 lead Dia., mfr. 81349, part no. RCR07G152JS
44	RESISTOR, FIXED, COMPOSITION: 15 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G153JS
45	RESISTOR, FIXED, COMPOSITION: 22 ohm, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 dia. by .02 lead Dia., mfr. 81349, part no. RCR07G220JS
46	RESISTOR, FIXED, COMPOSITION: 220 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 dia. by .02 lead Dia., mfr. 81349, part no. RCR07G221JS
47	RESISTOR, FIXED, COMPOSITION: 2.2 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 dia. by .02 lead Dia., mfr. 81349, part no. RCR07G222JS
48	RESISTOR, FIXED, COMPOSITION: 22 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G223JS
49	RESISTOR, FIXED, COMPOSITION: 270 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G271JS
50	RESISTOR, FIXED, COMPOSITION: 2.7 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G272JS
51	RESISTOR, FIXED, COMPOSITION: 33 ohms, 5 PCT, .25 WATT, 250 V rated, .25 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G330JS

Courtesy of http://BlackRadios.terryo.org

Table 7-3. List of Common Item Descriptions (Cont'd)

ITEM NUMBER	DESCRIPTION
52	RESISTOR, FIXED, COMPOSITION: 3.9 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G392JS
53	RESISTOR, FIXED, COMPOSITION: 39 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead dia., mfr. 81349, part no. RCR07G393JS
54	RESISTOR, FIXED, COMPOSITION: 47 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G470JS
55	RESISTOR, FIXED, COMPOSITION: 470 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G471JS
56	RESISTOR, FIXED, COMPOSITION: 4.7 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G472JS
57	RESISTOR, FIXED, COMPOSITION: 47 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 dia. by .02 lead Dia., mfr. 81349, part no. RCR07G473JS
58	RESISTOR, FIXED, COMPOSITION: 560 ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G561JS
59	RESISTOR, FIXED, COMPOSITION: 6.8 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G682JS

ITEM NUMBER	DESCRIPTION
60	RESISTOR, FIXED, COMPOSITION: 68 k ohms, 5 PCT, .25 WATT, 250 V rated, .250 long body by .09 Dia. by .02 lead Dia., mfr. 81349, part no. RCR07G683JS
61	SEMICONDUCTOR DEVICE, DIODE: Hi cond. high speed switch, 75 PRV, silicon, mfr. 80131, part no. 1N4449
62	SEMICONDUCTOR DEVICE DIODE: High speed switch, 15 PIV, 300 long body by .107 Dia. by .022 lead Dia., mfr. 80131, part no. 1N995
63	TRANSISTOR: Medium speed switch, SW SAT and AMPL, NPN, silicon, TO-18, mfr. 80131, part no. 2N2222A
64	TRANSISTOR: RF-IF AMPLIFIER, NPN, silicon, TO-72, mfr. 80131, part no. 2N2857
65	TRANSISTOR: High speed switch, SAT, NPN, silicon, TO-18, mfr. 81350, part no. 2N2907/JAN
66	TRANSISTOR: High speed switching SAT, NPN, silicon, TO-92, mfr. 80131, part no. 2N3904
67	TRANSISTOR: Silicon dual insulated gate, field effect N channel, depletion type with integrated gate protection circuits, 4 pin, hermetically sealed in metal TO-72, mfr. 14632, part no. 841001-1 (3N187 RCA)

Courtesy of http://BlackRadios.terryo.org

Table 7-4. List of Attaching Hardware

LETTER CODE	NAME AND DESCRIPTION
A	WASHER, FLAT: MS15795-803, No. 4, .125 ID, .250 OD, .022 thick cres., mfr. 96906
B	WASHER, LOCK: MS35338-134, No. 2, .091 ID, .172 OD, .020 thick cres. mfr. 96906
C	WASHER, LOCK: MS35338-135, No. 4, .118 ID, .209 OD, .025 thick cres., mfr. 96906
D	SCREW/MACHINE, PAN HEAD CROSS-RECESSED: MS51957-13, 4-40 x 1/4 cres, mfr. 96906
E	NUT/PLAIN HEX: NAS671C4, 4-40 x 3/16 across flat x 1/16 thick cres., mfr. 80205
F	SCREW/MACHINE, PAN HEAD CROSS-RECESSED: MS51957-15, 4-40 x 3/8 cres., mfr. 96906
G	SCREW/MACHINE, PAN HEAD CROSS-RECESSED: MS51957-14, 4-40 x 5/16 cres., mfr. 96906

Courtesy of http://BlackRadios.terryo.org

Table 7-5. List of Manufacturers

FSCM CODE	MANUFACTURER
00779	Amp Inc. P.O. Box 3608 Harrisburg, PA 17105
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204
01295	Texas Instruments, Inc. Semiconductor-Components Div. 15300 North Central Expressway Dallas, TX 75231
02114	Ferroxcube Corporation, Inc. P.O. Box 359 Mt. Marion Road Saugerties, NY 12477
02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
04013	Taurus Corporation 1 Academy Hill Lambertville, NJ 08530
04713	Motorola Incorporated Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008
05245	Corcom Inc. 2635 N. Kildare Avenue Chicago, IL 60639
06978	Aladdin Electronics Div. of Aladdin Industries 703 Murfreesboro Road Nashville, TN 37210
07263	Fairchild Camera & Instr. Corp. Semiconductor Division 464 Ellis Street Mountain View, VA 94040
07388	Toretel Incorporated 13402 South 71 Highway Grandview, MO 64030
09353	C & K Components, Inc. 103 Morse Street Watertown, MA 02172
12498	Teledyne Crystalonics 147 Sherman Street Cambridge, MA 02140
13103	Thermalloy Company 2021 W. Valley View Lane Dallas, TX 75234
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20760
14655	Cornell-Dubilier Electronics Div. of Federal Pacific Electric Co. 150 Avenue L Newark, NJ 07101
15442	Mini-Circuits Laboratory Division of Scientific Components Corporation 2913 Quentin Road Brooklyn, NY 11229
15818	Teledyne Semiconductor 1300 Terra Bella Avenue Mountain View, CA 94040
16428	Belden Corporation P.O. Box 1101 Richmond, IN 47374
17856	Siliconix, Inc. 2201 Laurelwood Road Santa Clara, CA 95050

Courtesy of http://BlackRadios.terryo.org

Table 7-5. List of Manufacturers (Cont'd)

FSCM CODE	MANUFACTURER
18324	Signetics Corporation 811 East Arques Ave. Sunnyvale, CA 94086
18714	RCA Corporation Solid State Division Fostoria Road Findlay, OH 45840
19080	Robinson Electronics Inc. 3580 Sacramento Drive San Luis Obispo, CA 93401
19209	General Electric Company Battery Business Department P.O. Box 114 Gainsville, FL 32602
19505	Applied Engin. Products, Co. Division of Samarious, Inc. 300 Seymour Avenue Derby, CT 06418
21604	The Buckeye Stamping Co. 555 Marion Road Columbus, OH 43207
25088	Siemens America, Inc. 186 Wood Avenue S. Iselin, NJ 08830
26342	Fiberglass of Ohio Inc. Dayton, Ohio
27014	National Semi-Conductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
28480	Hewlett-Packard Company Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
31918	IEE/Schadow Incorporated 8081 Wallace Road Eden Prairie, MN 55343
33095	Spectrum Control, Inc. 152 E. Main Street Fairview, PA 16415
52673	KSW Electronics Corp. South Bedford Street Burlington, Maine 01803
52748	Alpha Components, Inc. 5223 East Simpson Ferry Road Mechanicsburg, PA 17055
56289	Sprague Electric Company Marshall Street North Adams, MA 01247
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
71286	Rexnord Inc. Specialty Fastener Div. 22 Spring Valley Drive P.O. Box 98 Paramus, NJ 07652
71400	Bussman Manufacturing Division of McGraw-Edison Co. 2536 W. University Street St. Louis, MO 63107
71785	TRW Electronic Components Cinch Connector Operations 1501 Morse Avenue Elk Grove Village, IL 60007
72136	Electro Motive Mfg. Co., Inc. South Park & John Streets Willimantic, CT 06226
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, PA 16512

Courtesy of http://BlackRadios.terryo.org

Table 7-5. List of Manufacturers (Cont'd)

FSCM CODE	MANUFACTURER
73138	Beckman Instruments, Inc. Helipot Division 2500 Harbor Boulevard Fullerton, CA 92634
74306	Piezo Crystal Company 100 K Street Carlisle, PA 17013
74868	Bunker Ramo Corporation The Amphenol RF Division 33 East Franklin Street Danbury, CT 06810
75042	TRW Electronic Components IRC Fixed Resistors 401 North Broad Street Philadelphia, PA 19108
75915	Littlefuse, Incorporated 800 E. Northwest Highway Des Plaines, IL 60016
77820	Bendix Corp. The Electrical Components Division Sherman Avenue Sidney, NY 13838
80058	Joint Electronic Type Designation System
80103	Lambda Electronics Corp. Div. of Veeco Instruments, Inc. 515 Broad Hollow Road Melville, NY 11746
80131	Electronic Industries Association 2001 Eye Street, N.W. Washington, D.C. 20006
80205	Military Standard
81349	Military Specifications
81350	Joint Army-Navy Specifications
82227	North American Phillips Controls Corp. Cheshire Industrial Part P.O. Box 768 Cheshire, CT 06410
82389	Switchcraft, Incorporated 5555 North Elston Avenue Chicago, IL 60630
84411	TRW Electric Components TRW Capacitors 112 W. First Street Ogallala, NE 69153
88245	Litton Industries USECO Division 13536 Saticoy Street Van Nuys, CA 91409
91293	Johanson Manufacturing Co. P.O. Box 329 Boonton, NJ 07005
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, IL 60646
91984	Maida Development Company 214 Academy Street Hampton, VA 23369
92825	Whitso Incorporated 9330 Bryon Street Schiller Park, IL 60176
93332	Sylvania Elec. Products, Inc. Semiconductor Products Division 100 Sylvan Road Woburn MA 01801
93958	Republic Electronics Corp. 176 East 7th Street Paterson, NJ 07524

Courtesy of http://BlackRadios.terryo.org

Table 7-5. List of Manufacturers (Cont'd)

FSCM CODE	MANUFACTURER
95121	Quality Components, Inc. P.O. Box 113 St. Mary's, PA 15857
95146	ALCO Electronic Products Inc. 1551 Osgood Street N. Andover, Maine 01845
96733	San Fernando Electric Mfg. Co. 1501 First Street San Fernando, CA 91341
98291	Sealectro Corporation 225 Hoyt Mamaroneck, NY 10544
98978	International Electronic Research Corporation 135 West Magnolia Blvd. Burbank, CA 91502
99800	American Precision Industries Delevan Electronics Division 270 Quaker Road East Aurora, NY 14052
99848	Wilco Corporation 4030 West 10th Street P.O. Box 22248 Indianapolis, IN 46222

Courtesy of http://BlackRadios.terryo.org

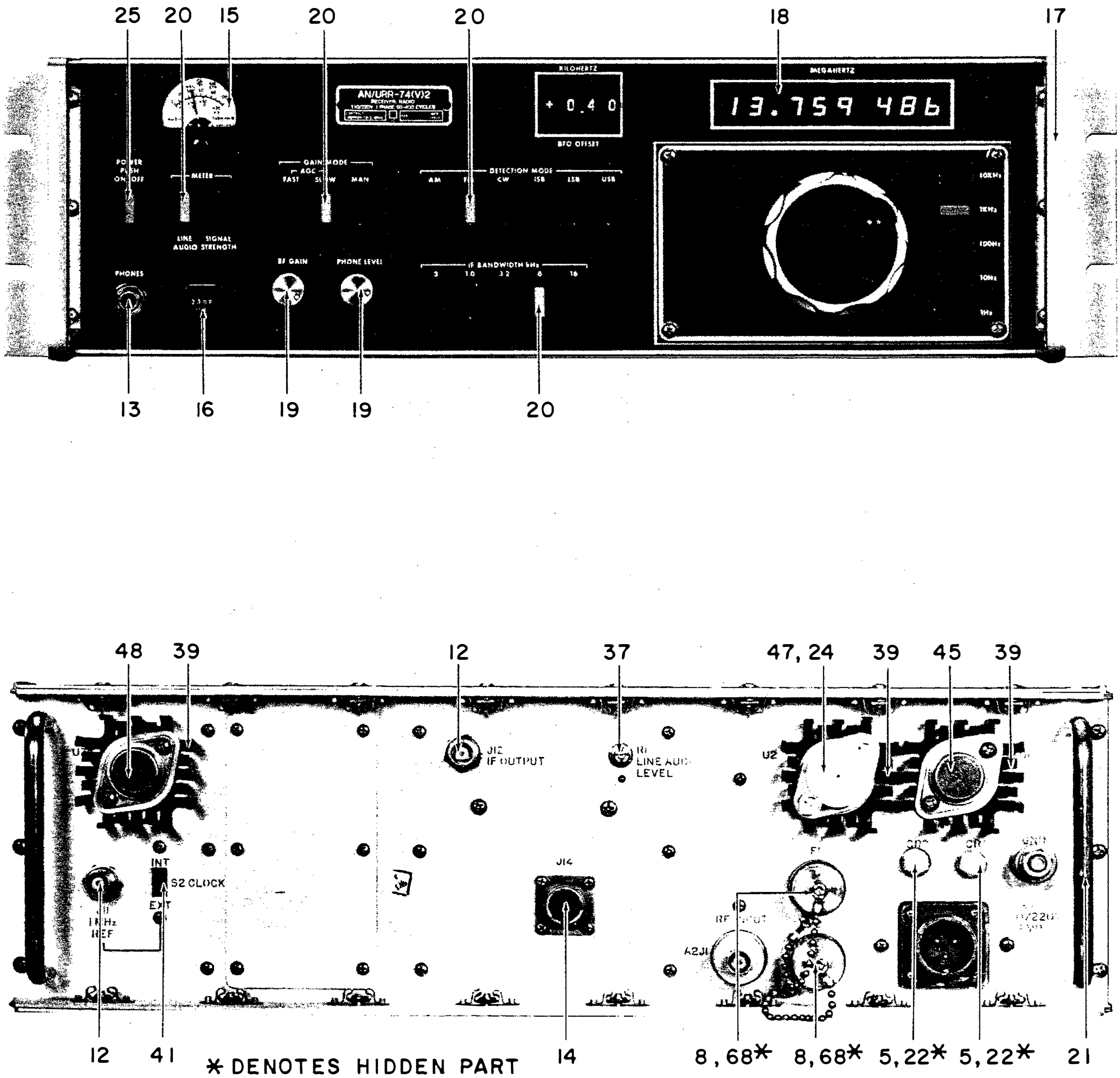


Figure 7-1. Receiving Set, Radio AN/URR-74 (V)2, Front and Rear View

Courtesy of http://BlackRadios.terryo.org

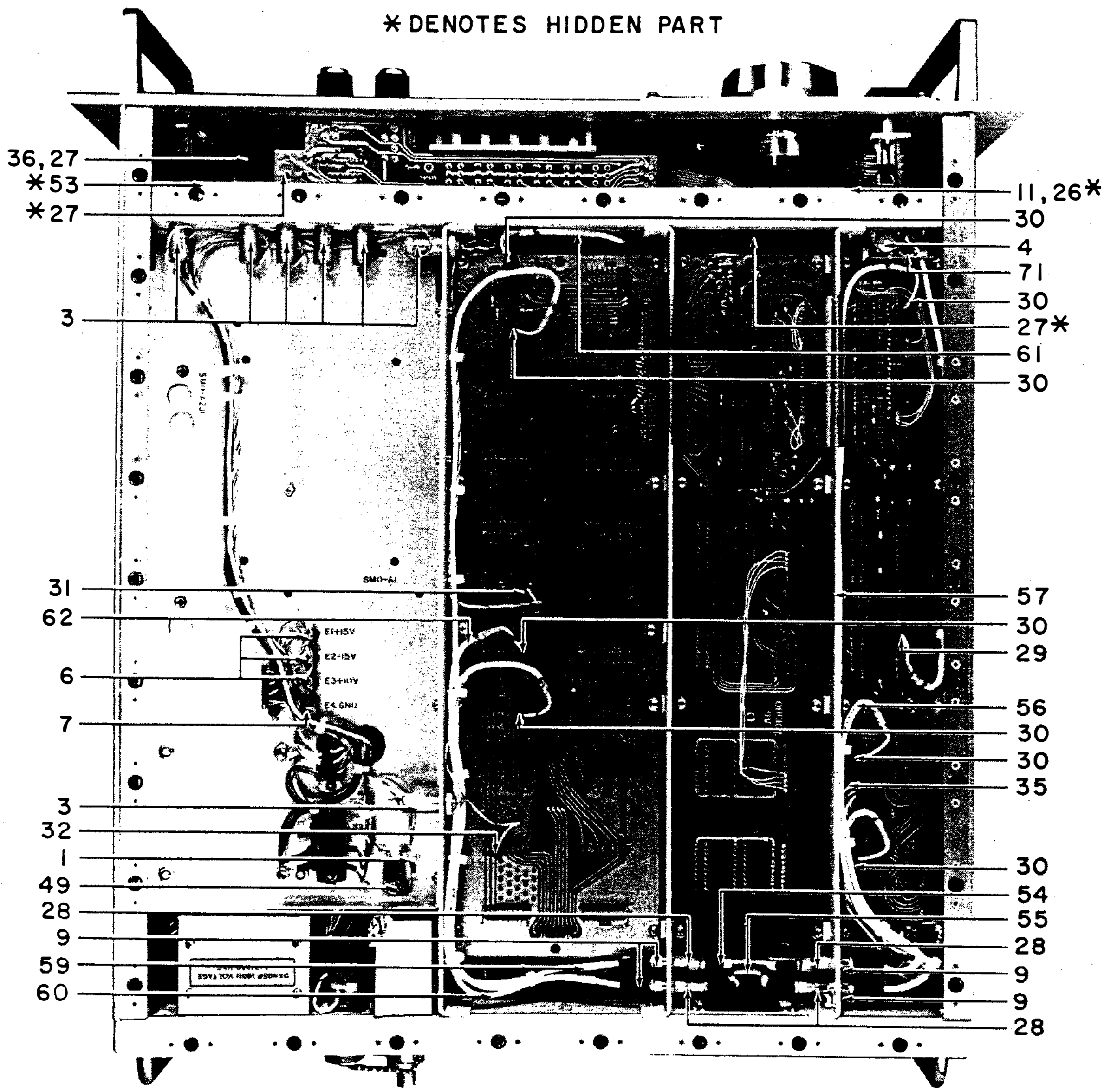


Figure 7-2. Receiving Set, Radio AN/URR-74(V)2, Top View

Courtesy of http://BlackRadios.terryo.org

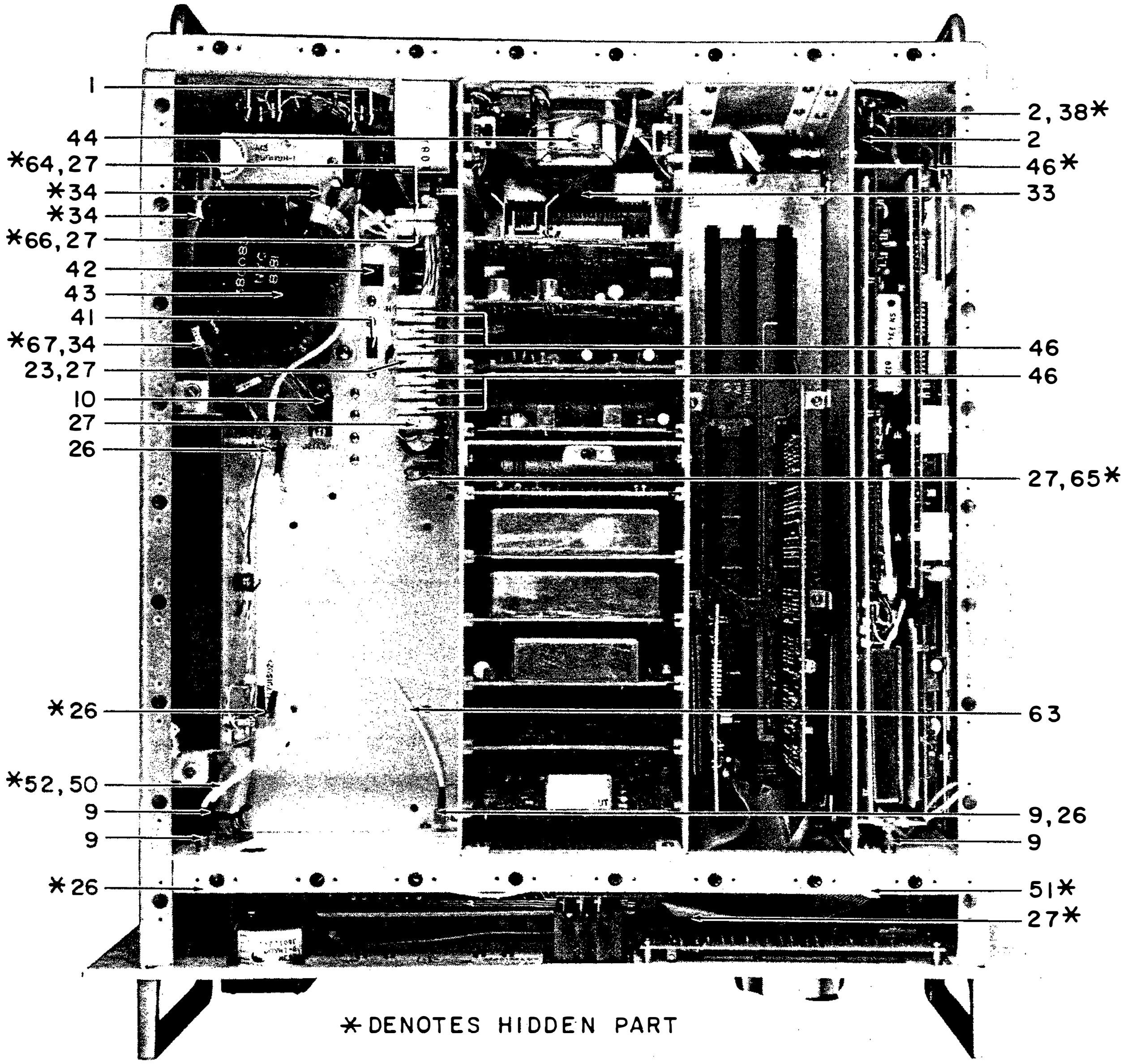
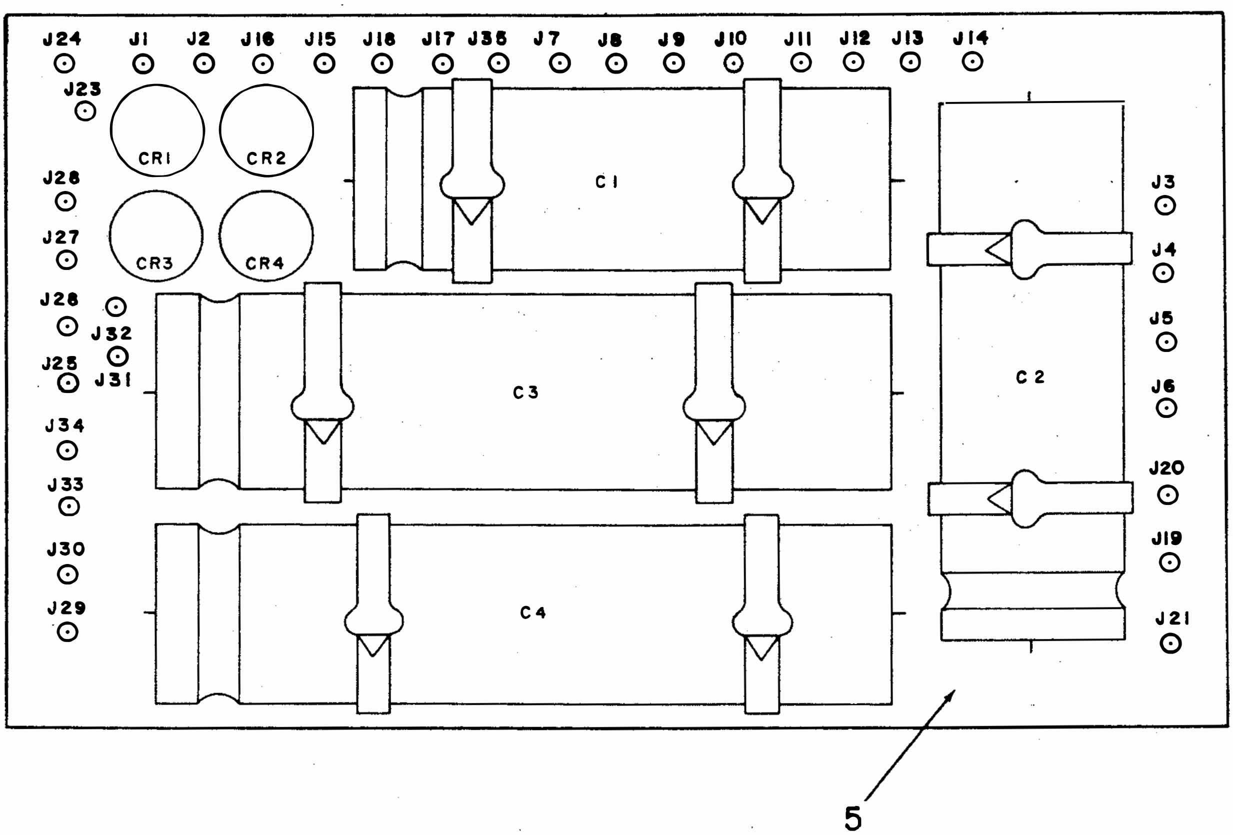


Figure 7-3. Receiving Set, Radio AN/URR-74(V)2, Bottom View

Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	J8	4
C2	1	J9	4
C3	2	J10	4
C4	2	J11	4
CR1	3	J12	4
CR2	3	J13	4
CR3	3	J14	4
CR4	3	J19	4
J1	4	J20	4
J2	4	J21	4
J3	4	J31	4
J4	4	J32	4
J5	4	J35	4
J6	4	MP1	5
J7	4		

Figure 7-4. Power Distribution 76240 (1A1)

Courtesy of http://BlackRadios.terryo.org

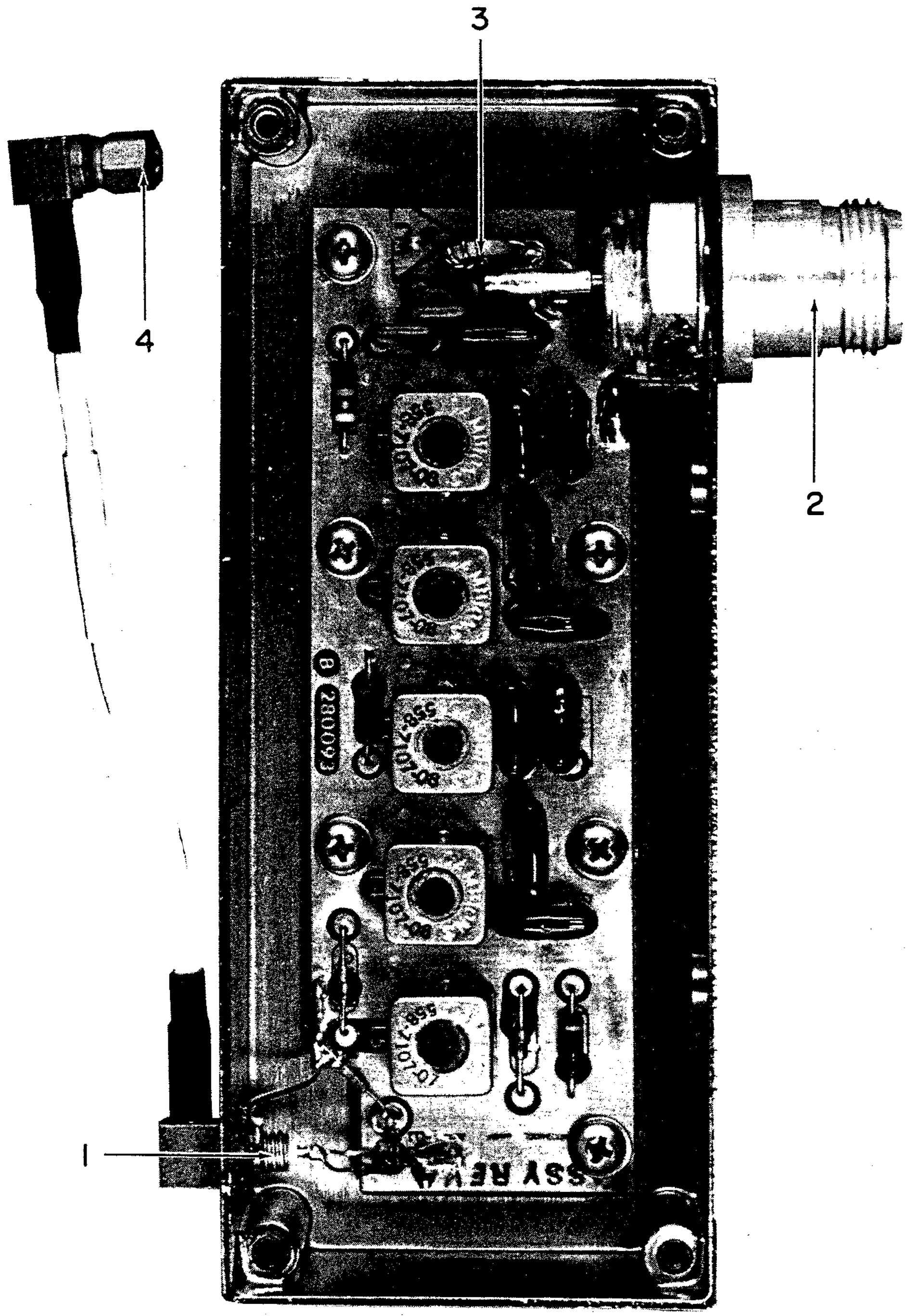
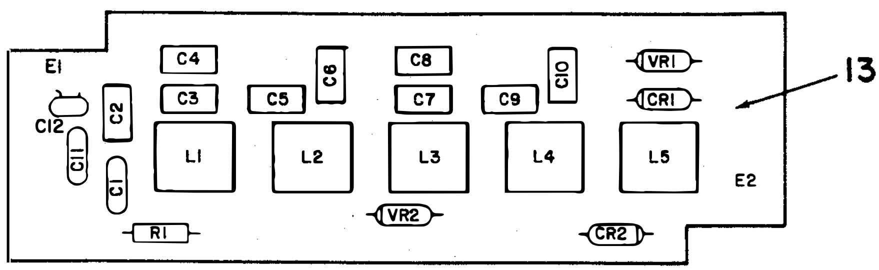


Figure 7-5. Input Filter 791616-2 (1A2)

Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	CR1	10
C2	2	CR2	10
C3	3	L1	11
C4	4	L2	11
C5	5	L3	11
C6	6	L4	11
C7	7	L5	12
C8	6	MP1	13
C9	8	R1	14
C10	6	VR1	15
C11	1	VR2	15
C12	9		

Figure 7-6. 30 MHz LP Input Filter 280093 (1A2A1)

Courtesy of http://BlackRadios.terryo.org

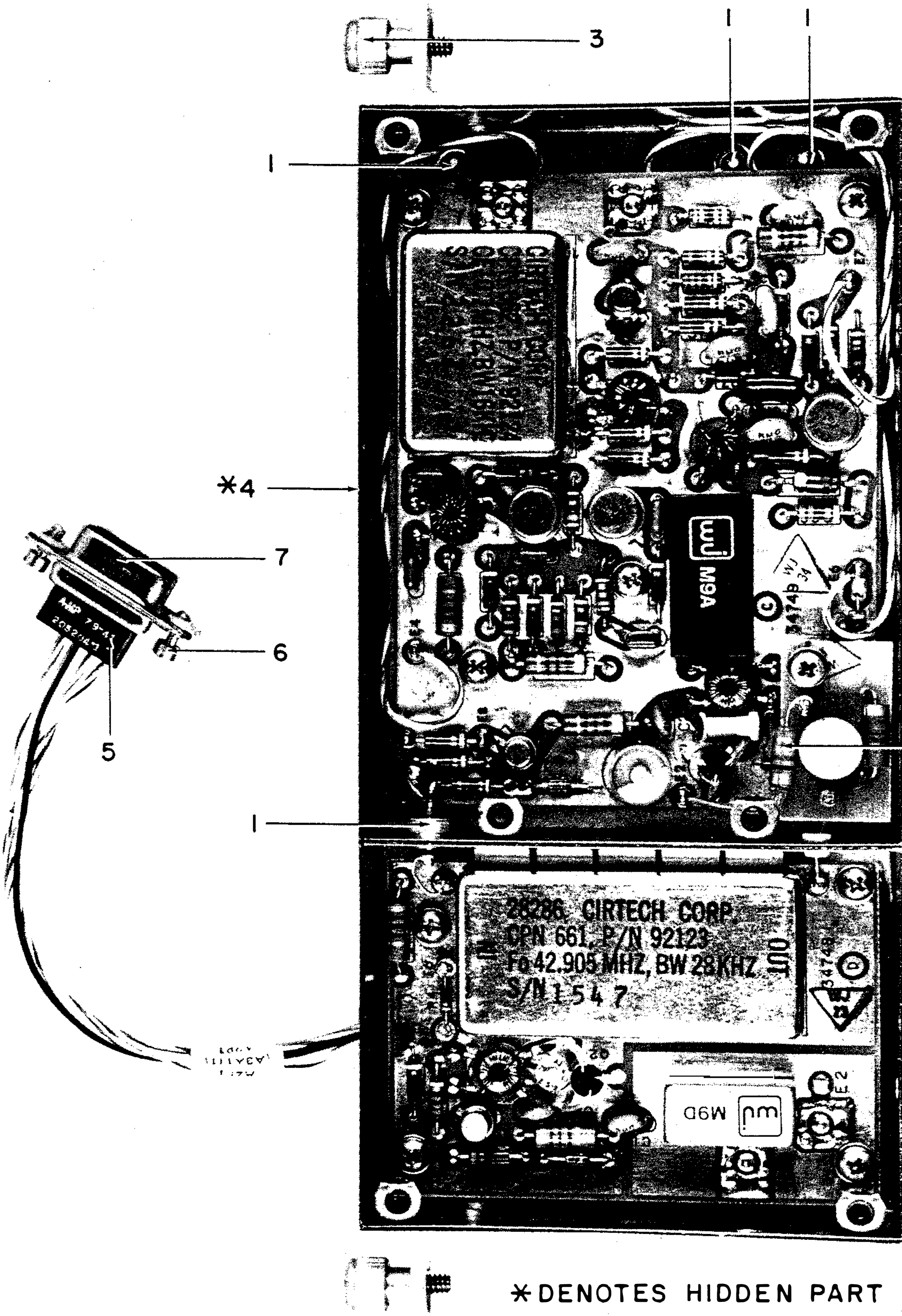
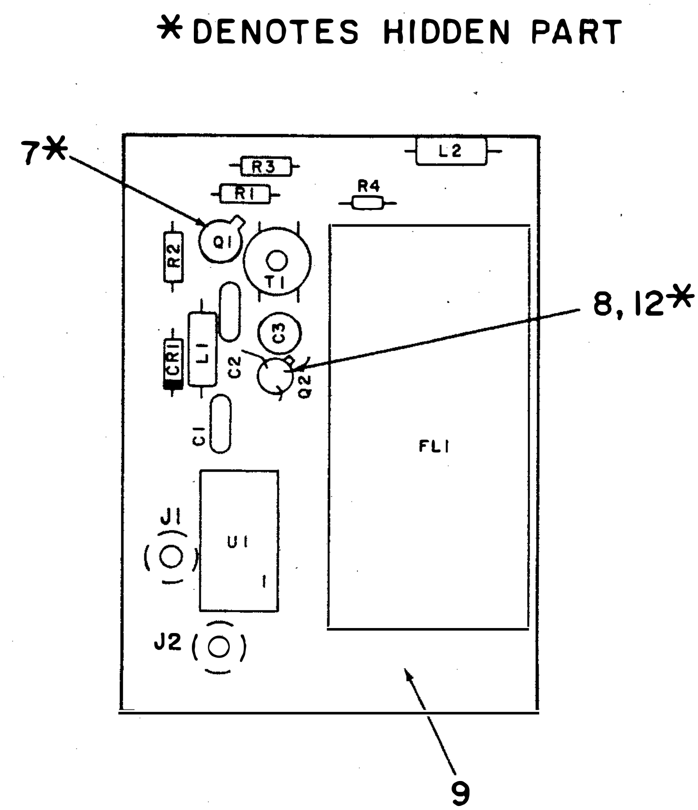


Figure 7-7. Input Converter 791592 (1A3)

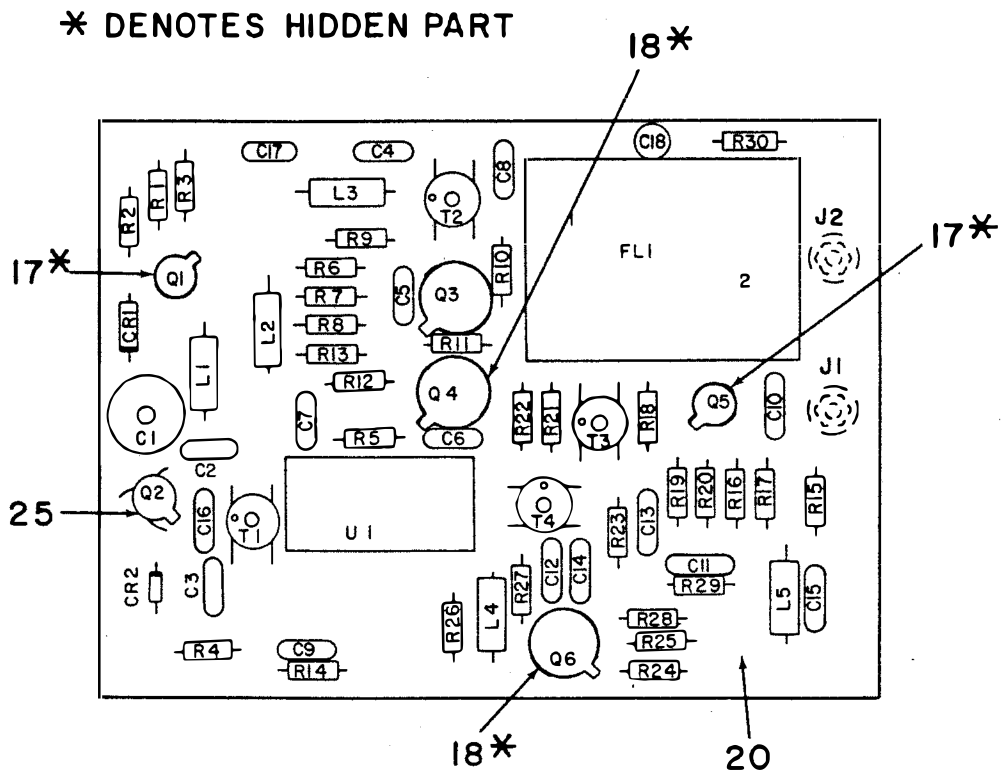
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	MP3	9
C2	1	Q1	10
C3	2	Q2	11
CR1	3	RA1	12
FL1	4	R1	13
J1	5	R2	14
J2	5	R3	15
L1	6	R4	16
L2	6	T1	17
MP1	7	U1	18
MP2	8		

Figure 7-8. 1st Mixer 1st IF 34748 (1A3A1)

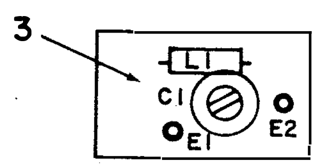
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	FB1	12	Q6	23	R19	39
C2	2	FB2	12	RA1	25	R20	30
C3	2	FB3	12	R1	26	R21	40
C4	3	FL1	13	R2	27	R22	41
C5	3	J1	14	R3	28	R23	42
C6	3	J2	14	R4	29	R24	32
C7	3	L1	15	R5	30	R25	43
C8	3	L2	15	R6	31	R26	44
C9	4	L3	15	R7	26	R27	28
C10	5	L4	16	R8	32	R28	45
C11	5	L5	15	R9	33	R29	41
C12	5	MP1	17	R10	28	R30	28
C13	5	MP2	18	R11	34	T1	46
C14	6	MP3	19	R12	35	T2	47
C15	5	MP4	20	R13	36	T3	48
C16	7	Q1	21	R14	37	T4	49
C17	8	Q2	22	R15	36	U1	50
C18	9	Q3	23	R16	38		
CR1	10	Q4	23	R17	32		
CR2	11	Q5	24	R18	28		

Figure 7-9. 2nd Mixer 2nd IF 34749 (1A3A2)

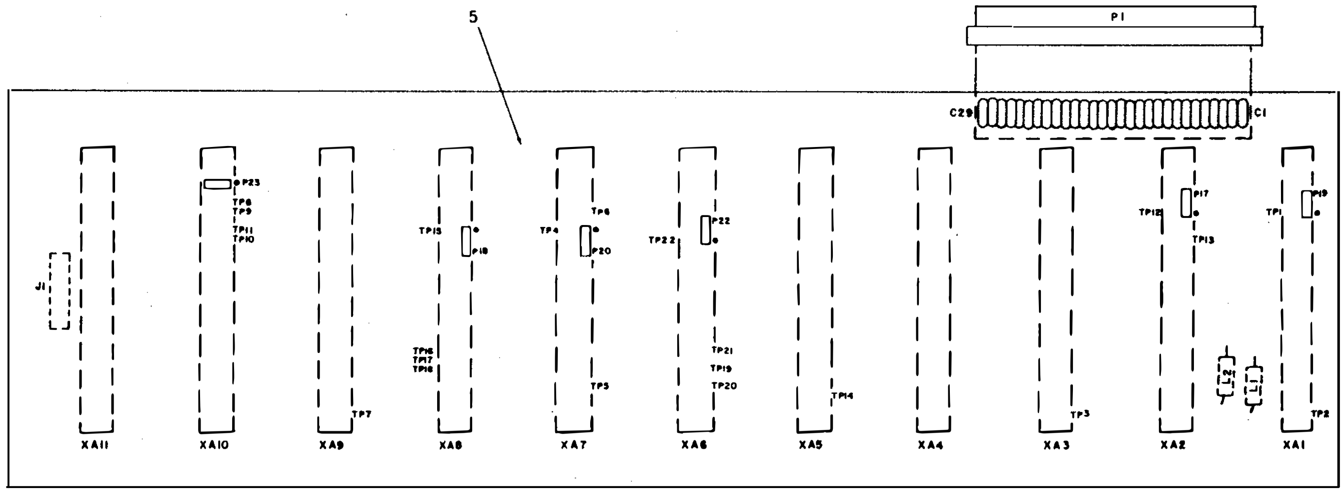
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.
C1	1
L1	2
MP1	3

Figure 7-10. Filter Board 280080 (1A3A3)

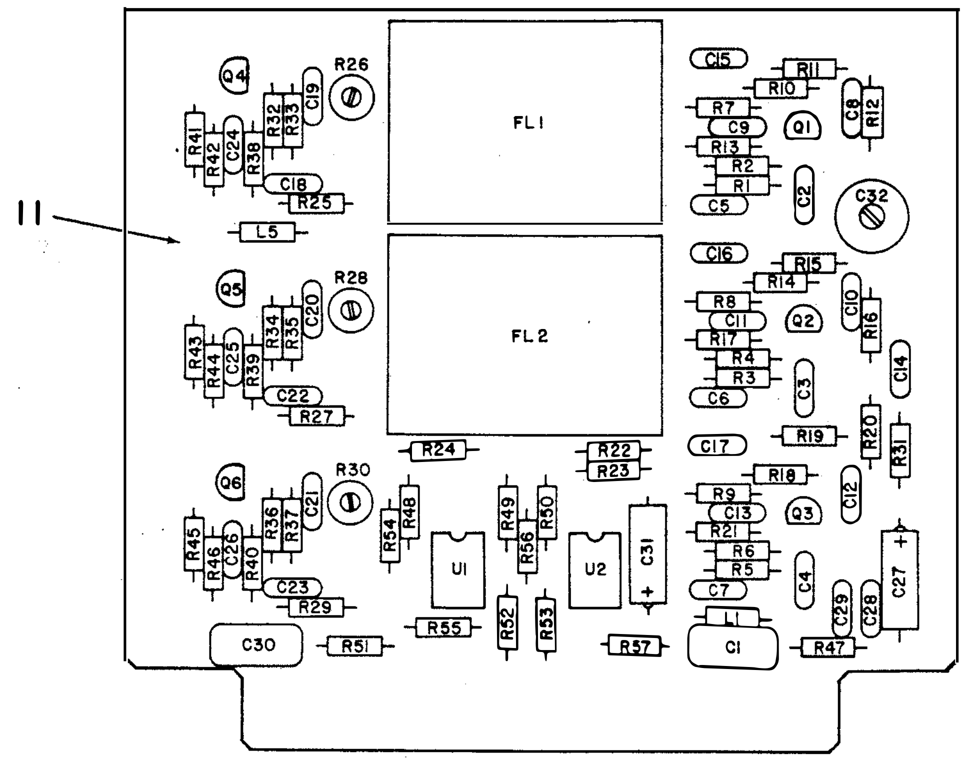
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C13	1	C25	1	XA2	7
C2	1	C14	1	C26	1	XA3	7
C3	1	C15	1	C27	1	XA4	7
C4	1	C16	1	C28	1	XA5	7
C5	1	C17	1	C29	1	XA6	7
C6	1	C18	1	J1	2	XA7	7
C7	1	C19	1	L1	3	XA8	7
C8	1	C20	1	L2	3	XA9	7
C9	1	C21	1	MP1	4	XA10	7
C10	1	C22	1	MP2	5	XA11	7
C11	1	C23	1	P1	6		
C12	1	C24	1	XA1	7		

Figure 7-11. IF Motherboard 791569 (1A4)

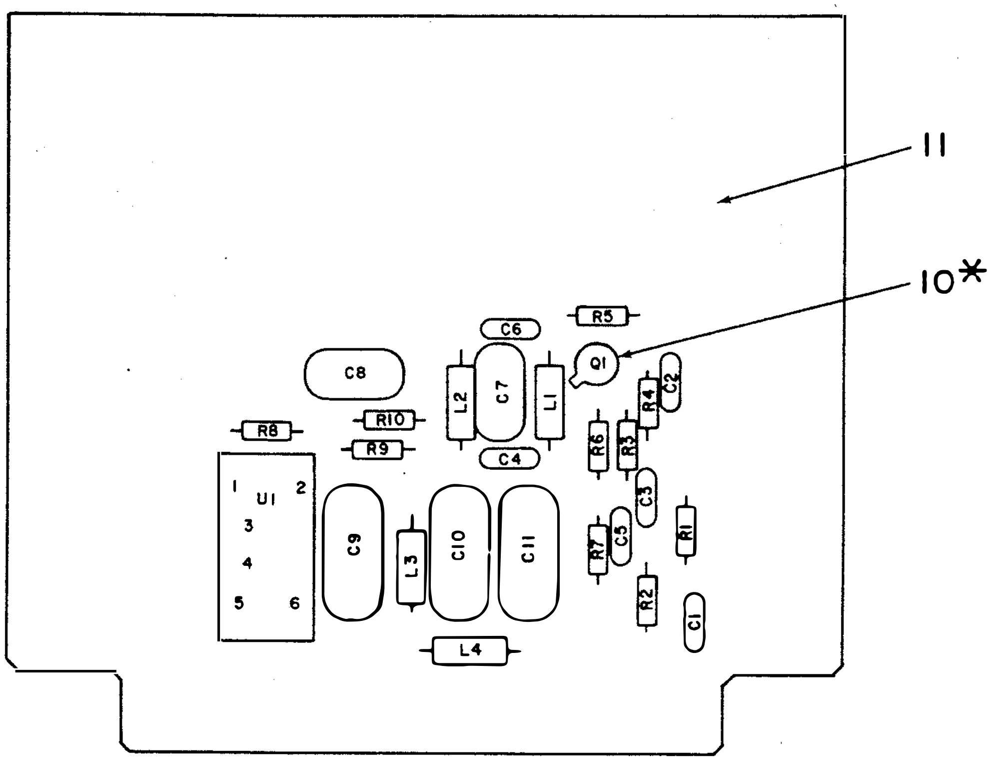
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C27	4	R10	17	R36	24
C2	2	C28	2	R11	18	R37	25
C3	2	C29	2	R12	19	R38	21
C4	2	C30	5	R13	20	R39	21
C5	2	C31	4	R14	17	R40	21
C6	2	C32	6	R15	18	R41	17
C7	2	FL1	7	R16	19	R42	26
C8	2	FL2	8	R17	20	R43	17
C9	3	L1	9	R18	17	R44	26
C10	2	L5	10	R19	18	R45	17
C11	3	MP1	11	R20	19	R46	26
C12	2	Q1	12	R21	20	R47	19
C13	3	Q2	12	R22	20	R48	22
C14	2	Q3	12	R23	21	R49	22
C15	3	Q4	12	R24	20	R50	22
C16	3	Q5	12	R25	22	R51	27
C17	3	Q6	12	R26	23	R52	28
C18	2	R1	13	R27	22	R53	29
C19	2	R2	14	R28	23	R54	30
C20	2	R3	13	R29	22	R55	30
C21	2	R4	14	R30	23	R56	30
C22	2	R5	13	R31	19	R57	22
C23	2	R6	14	R32	24	U1	31
C24	3	R7	15	R33	25	U2	32
C25	3	R8	16	R34	24		
C26	3	R9	16	R35	25		

Figure 7-12. 10.7 MHz Filter Switch 791594 (1A4A1)

Courtesy of http://BlackRadios.terryo.org

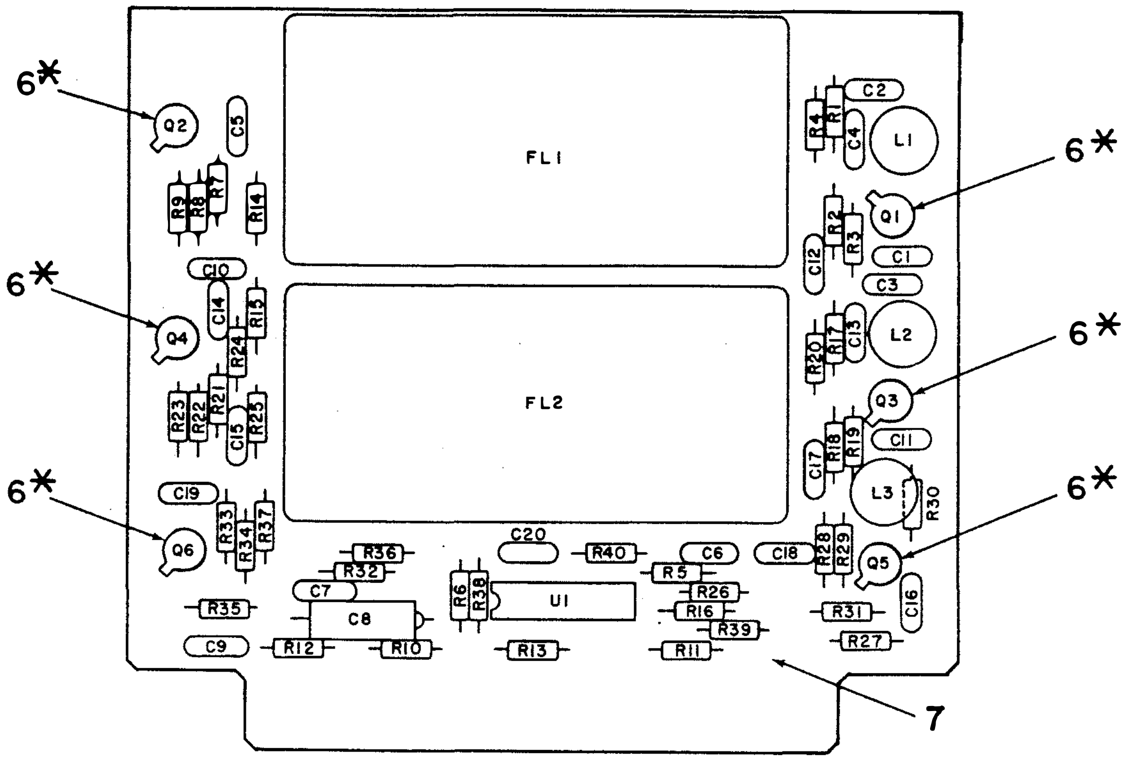


* DENOTES HIDDEN PART

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	MP1	10
C2	1	MP2	11
C3	1	Q1	12
C4	1	R1	13
C5	1	R2	13
C6	1	R3	14
C7	2	R4	15
C8	3	R5	16
C9	4	R6	17
C10	4	R7	18
C11	5	R8	19
L1	6	R9	20
L2	7	R10	19
L3	8	U1	21
L4	9		

Figure 7-13. 10.7 MHz/455 kHz 71430 Converter (1A4A2)

Courtesy of http://BlackRadios.terryo.org

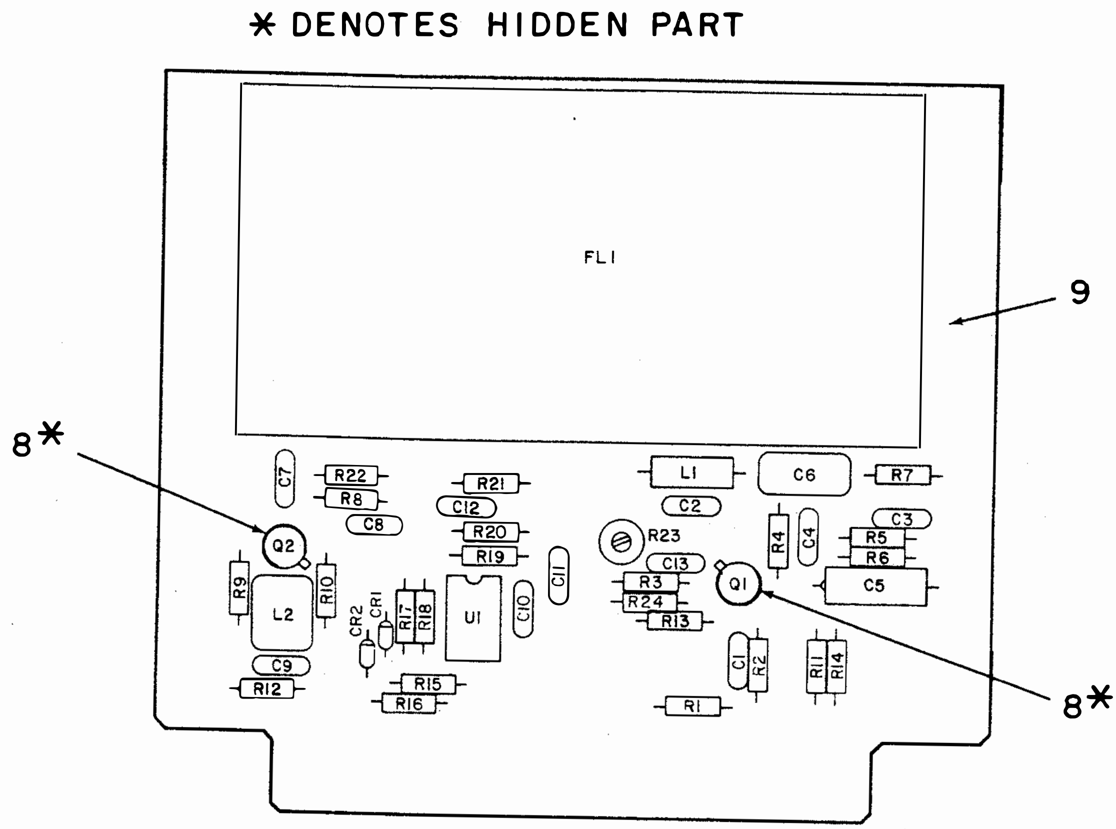


* DENOTES HIDDEN PART

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C20	1	R6	13	R25	19
C2	1	FL1	3	R7	14	R26	18
C3	1	FL2	4	R8	15	R27	18
C4	1	L1	5	R9	16	R28	9
C5	1	L2	5	R10	17	R29	10
C6	1	L3	5	R11	13	R30	12
C7	1	MP1	6	R12	18	R31	11
C8	2	MP2	7	R13	9	R32	17
C9	1	Q1	8	R14	19	R33	14
C10	1	Q2	8	R15	19	R34	15
C11	1	Q3	8	R16	18	R35	20
C12	1	Q4	8	R17	9	R36	19
C13	1	Q5	8	R18	10	R37	19
C14	1	Q6	8	R19	11	R38	21
C15	1	R1	9	R20	12	R39	18
C16	1	R2	10	R21	14	R40	19
C17	1	R3	11	R22	15	U1	22
C18	1	R4	12	R23	20		
C19	1	R5	13	R24	19		

Figure 7-14. 455 kHz Filter Switch 791595 (1A4A3)

Courtesy of http://BlackRadios.terryo.org

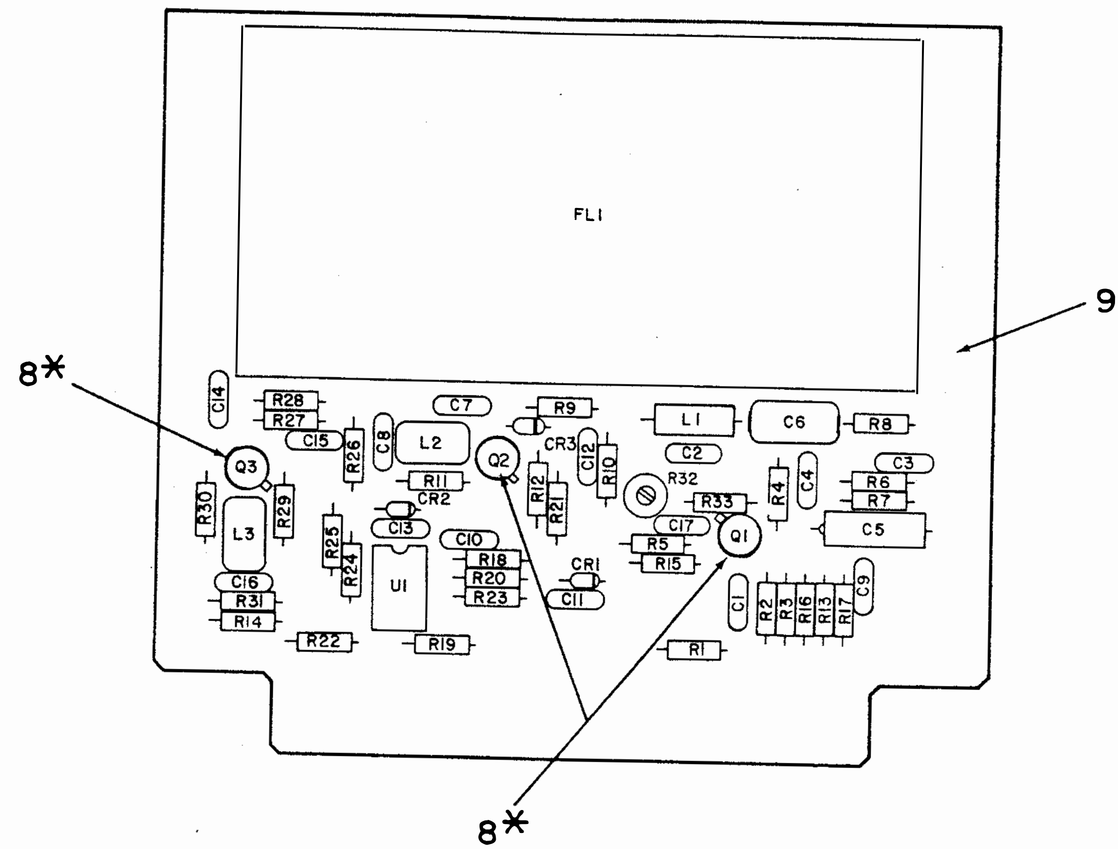


REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C13	1	R3	13	R15	11
C2	1	CR1	4	R4	14	R16	11
C3	1	CR2	4	R5	15	R17	12
C4	1	FL1	5	R6	15	R18	19
C5	2	L1	6	R7	16	R19	17
C6	3	L2	7	R8	16	R20	17
C7	1	MP1	8	R9	14	R21	18
C8	1	MP2	9	R10	17	R22	20
C9	1	Q1	10	R11	15	R23	21
C10	1	Q2	10	R12	11	R24	17
C11	1	R1	11	R13	18	U1	22
C12	1	R2	12	R14	17		

Figure 7-15. USB Filter Switch 791596 (1A4A4)

Courtesy of http://BlackRadios.terryo.org

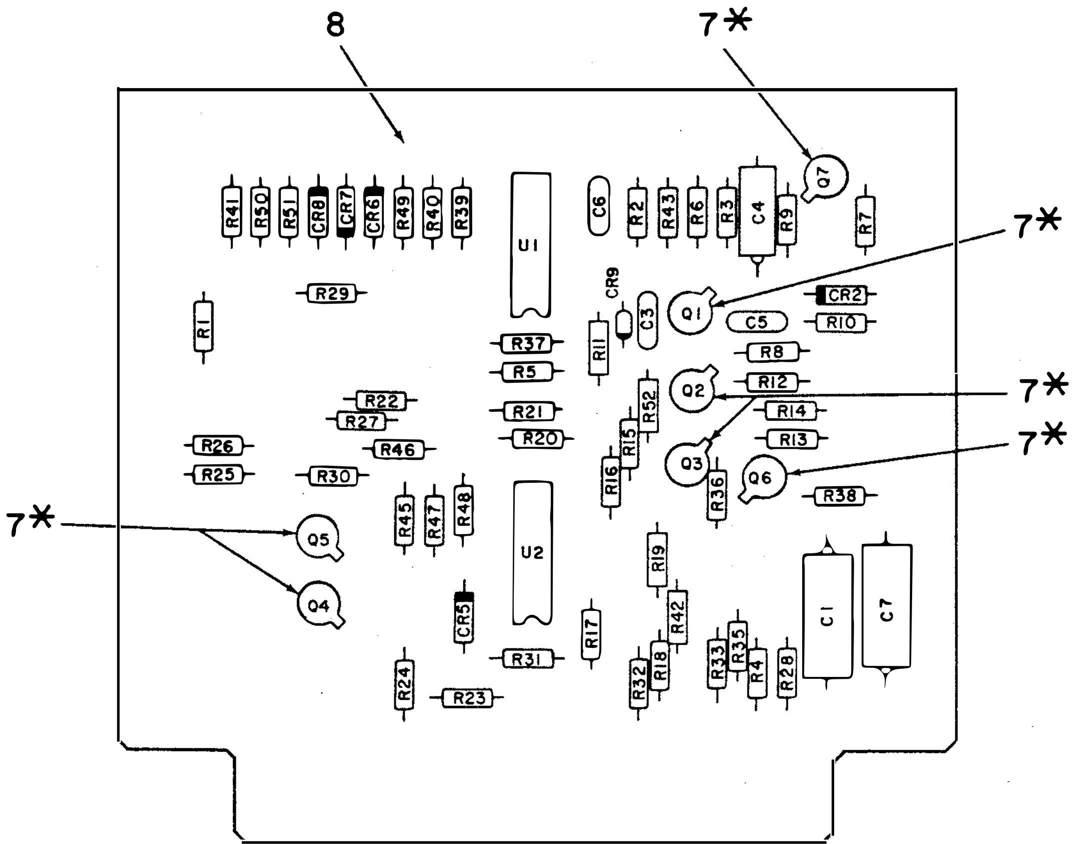
* DENOTES HIDDEN PART



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C17	1	R4	14	R20	20
C2	1	CR1	4	R5	15	R21	22
C3	1	CR2	4	R6	16	R22	11
C4	1	CR3	4	R7	16	R23	19
C5	2	FL1	5	R8	17	R24	23
C6	3	L1	6	R9	18	R25	20
C7	1	L2	7	R10	19	R26	22
C8	1	L3	7	R11	14	R27	18
C9	1	MP1	8	R12	20	R28	19
C10	1	MP2	9	R13	16	R29	20
C11	1	Q1	10	R14	11	R30	14
C12	1	Q2	10	R15	21	R31	11
C13	1	Q3	10	R16	11	R32	24
C14	1	R1	11	R17	16	R33	20
C15	1	R2	12	R18	20	U1	25
C16	1	R3	13	R19	11		

Figure 7-16. ISB/LSB Filter Switch 791597 (1A4A5)

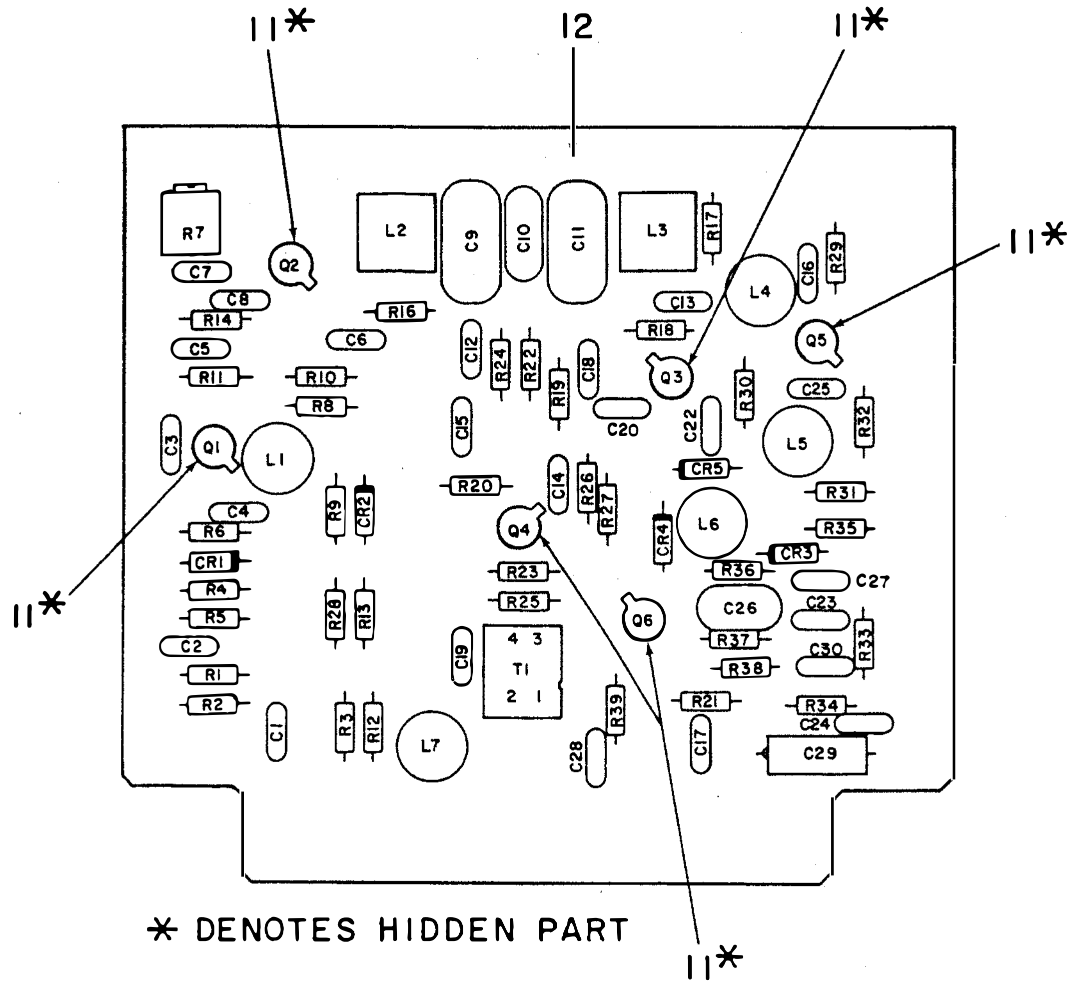
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	Q6	9	R18	22	R38	29
C3	2	Q7	9	R19	23	R39	29
C4	3	R1	10	R20	17	R40	10
C5	2	R2	11	R21	15	R41	14
C6	4	R3	12	R22	15	R42	13
C7	1	R4	13	R23	12	R43	11
CR2	5	R5	10	R24	15	R45	30
CR5	6	R6	13	R25	24	R46	31
CR6	6	R7	14	R26	25	R47	32
CR7	6	R8	13	R27	17	R48	33
CR8	6	R9	15	R28	13	R49	34
CR9	6	R10	16	R29	13	R50	35
MP1	7	R11	17	R30	17	R51	36
MP2	8	R12	18	R31	26	R52	19
Q1	9	R13	19	R32	27	U2	37
Q2	10	R14	20	R33	28		
Q3	9	R15	14	R35	28		
Q4	9	R16	14	R36	29		
Q5	9	R17	21	R37	10		

Figure 7-17. AGC Amplifier 78112 (1A4A6)

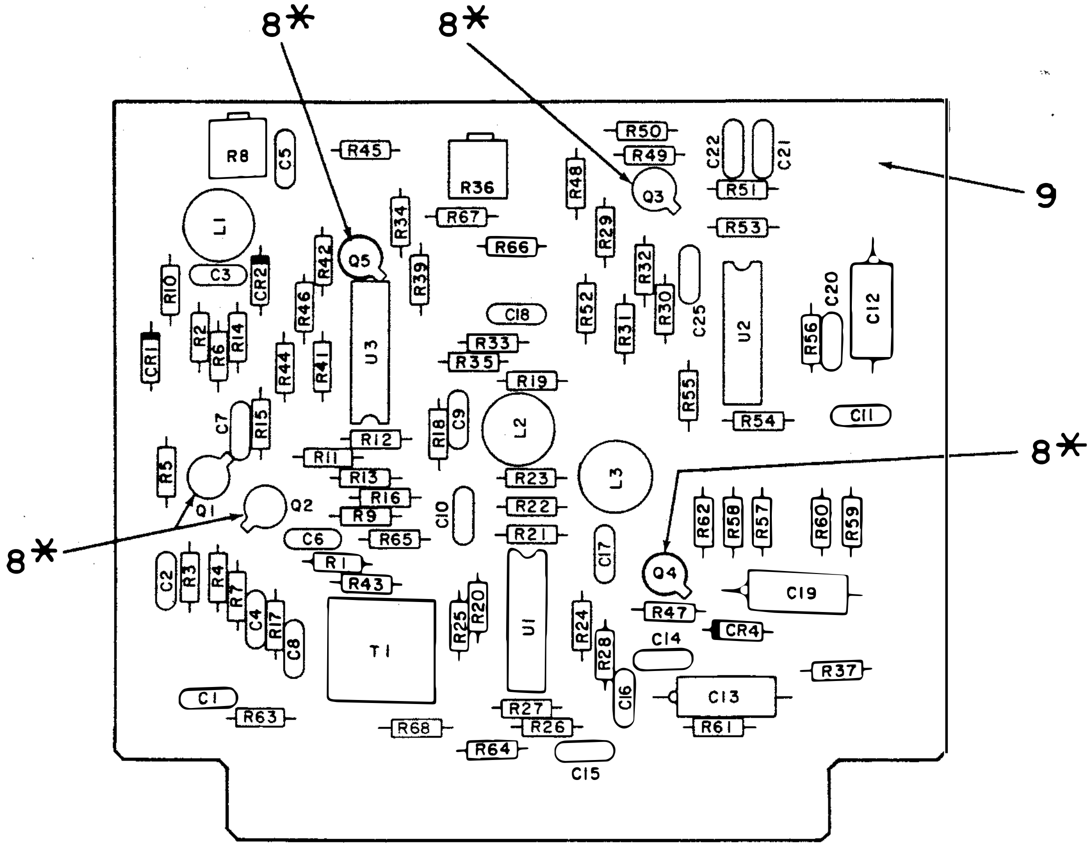
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C25	1	Q3	14	R20	28
C2	1	C26	5	Q4	14	R21	23
C3	2	C27	1	Q5	14	R22	29
C5	1	C28	6	Q6	14	R23	30
C6	1	C29	7	R1	15	R24	31
C7	2	C30	1	R2	16	R25	32
C8	1	CR1	8	R3	17	R26	33
C9	3	CR2	8	R4	18	R27	34
C10	2	CR3	8	R5	19	R28	35
C11	4	CR4	8	R6	20	R29	36
C12	1	CR5	8	R7	21	R30	16
C13	1	L1	9	R8	22	R31	23
C14	1	L2	10	R9	23	R32	22
C15	1	L3	10	R10	24	R33	37
C16	1	L4	9	R11	25	R34	23
C17	1	L5	9	R12	17	R35	38
C18	1	L6	9	R13	18	R36	25
C19	1	L7	9	R14	20	R37	26
C20	1	MP1	11	R16	26	R38	39
C22	1	MP2	12	R17	27	R39	40
C23	1	Q1	13	R18	23	T1	41
C24	1	Q2	13	R19	23		

Figure 7-18. 455 kHz Ampl. and AM Det. 72488 (1A4A7)

Courtesy of http://BlackRadios.terryo.org



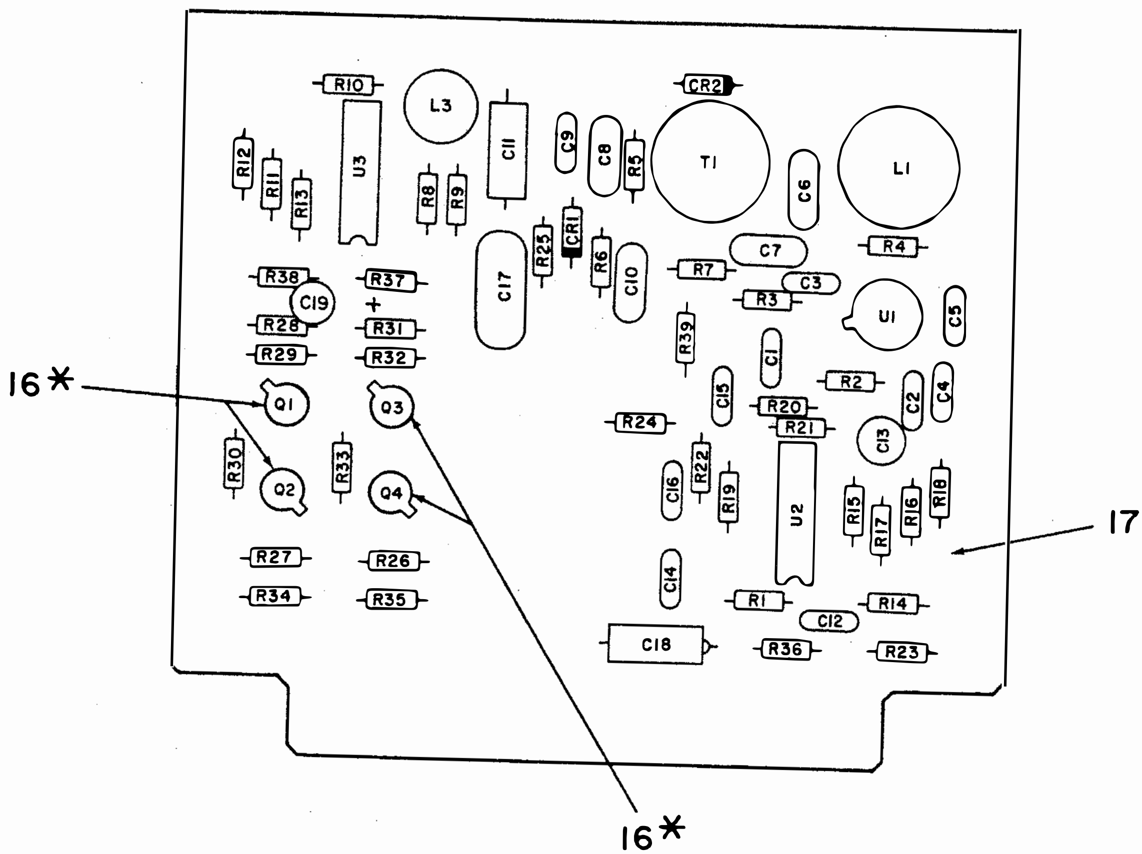
* DENOTES HIDDEN PART

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	L3	7	R19	26	R48	39
C2	1	MP1	8	R20	27	R49	29
C3	1	MP2	9	R21	28	R50	40
C5	1	MP3	10	R22	28	R51	28
C6	1	Q1	11	R23	27	R52	41
C7	1	Q2	11	R24	29	R53	16
C8	1	Q3	12	R25	29	R54	42
C9	1	Q4	13	R26	30	R55	43
C10	1	Q5	12	R27	14	R56	44
C11	1	R1	14	R28	14	R57	28
C12	2	R2	15	R29	25	R58	45
C13	2	R3	16	R30	17	R59	45
C14	1	R4	17	R31	31	R60	28
C15	1	R5	18	R32	25	R61	26
C16	1	R6	19	R33	32	R62	29
C17	1	R7	20	R34	33	R63	46
C18	3	R8	21	R35	34	R64	37
C19	4	R9	22	R36	35	R65	36
C20	1	R10	20	R37	26	R66	47
C21	1	R11	14	R39	25	R67	37
C22	1	R12	23	R41	28	R68	38
C25	1	R13	24	R42	30	T1	48
CR1	5	R14	25	R43	36	U1	49
CR2	5	R15	18	R44	24	U2	50
CR4	5	R16	19	R45	30	U3	50
L1	6	R17	20	R46	37		
L2	6	R18	17	R47	38		

Figure 7-19. ISB Detection and Audio 791598 (1A4A8)

Courtesy of http://BlackRadios.terryo.org

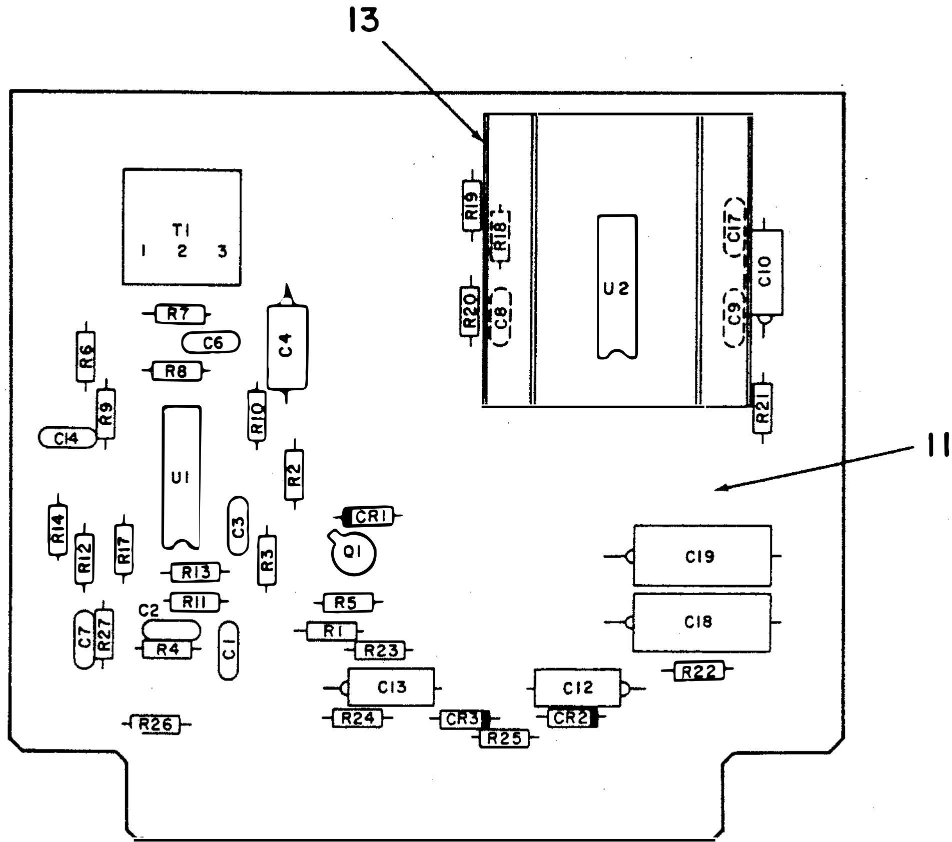
✱ DENOTES HIDDEN PART



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C19	12	R8	27	R26	24
C2	1	CR1	13	R9	28	R27	25
C3	1	CR2	13	R10	29	R28	23
C4	1	L1	14	R11	30	R29	37
C5	1	L3	15	R12	31	R30	38
C6	2	MP1	16	R13	31	R31	23
C7	3	MP2	17	R14	32	R32	37
C8	4	Q1	18	R15	20	R33	38
C9	5	Q2	19	R16	20	R34	25
C10	6	Q3	18	R17	32	R35	24
C11	7	Q4	19	R18	21	R36	34
C12	1	R1	20	R19	21	R37	27
C13	8	R2	21	R20	31	R38	20
C14	1	R3	22	R21	33	R39	39
C15	1	R4	23	R22	33	T1	40
C16	9	R5	24	R23	34	U1	41
C17	10	R6	25	R24	35	U2	42
C18	11	R7	26	R25	36	U3	43

Figure 7-20. FM, CW and SSB Detection 791599 (1A4A9)

Courtesy of http://BlackRadios.terryo.org

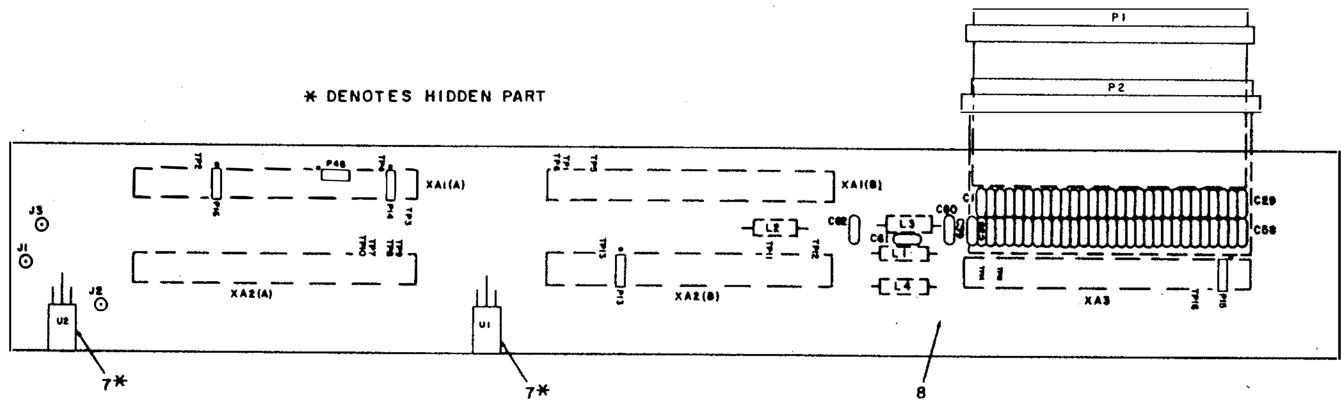


REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C17	6	R3	16	R17	23
C2	2	C18	7	R4	16	R18	19
C3	1	C19	7	R5	17	R19	24
C4	3	C21	8	R6	18	R20	25
C6	1	CR1	9	R7	19	R21	25
C7	4	CR2	10	R8	19	R22	26
C8	1	CR3	10	R9	19	R23	14
C9	1	MP1	11	R10	19	R24	22
C10	3	Q1	12	R11	14	R27	26
C12	5	RA1	13	R12	20	T1	27
C13	5	R1	14	R13	21	U1	28
C14	1	R2	15	R14	22	U2	29

Figure 7-21. Audio Amplifier 746001 (1A4A10)

Courtesy of http://BlackRadios.terryo.org

* DENOTES HIDDEN PART



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C22	1	C43	1	E60	3
C2	1	C23	1	C44	1	E61	3
C3	1	C24	1	C45	1	E62	3
C4	1	C25	1	C46	1	E63	3
C5	1	C26	1	C47	1	J1	4
C6	1	C27	1	C48	1	J2	4
C7	1	C28	1	C49	1	J3	4
C8	1	C29	1	C50	1	L1	5
C9	1	C30	1	C51	1	L2	5
C10	1	C31	1	C52	1	L3	5
C11	1	C32	1	C53	1	L4	5
C12	1	C33	1	C54	1	MP1	6
C13	1	C34	1	C55	1	MP2	7
C14	1	C35	1	C56	1	MP3	8
C15	1	C36	1	C57	1	P1	9
C16	1	C37	1	C58	1	P2	10
C17	1	C38	1	C59	2	U1	11
C18	1	C39	1	C60	2	U2	11
C19	1	C40	1	C61	2	XA1	12
C20	1	C41	1	C62	2	XA2	12
C21	1	C42	1	E59	3	XA3	12

Figure 7-22. Synthesizer Motherboard 791570 (1A5)

Courtesy of http://BlackRadios.terryo.org

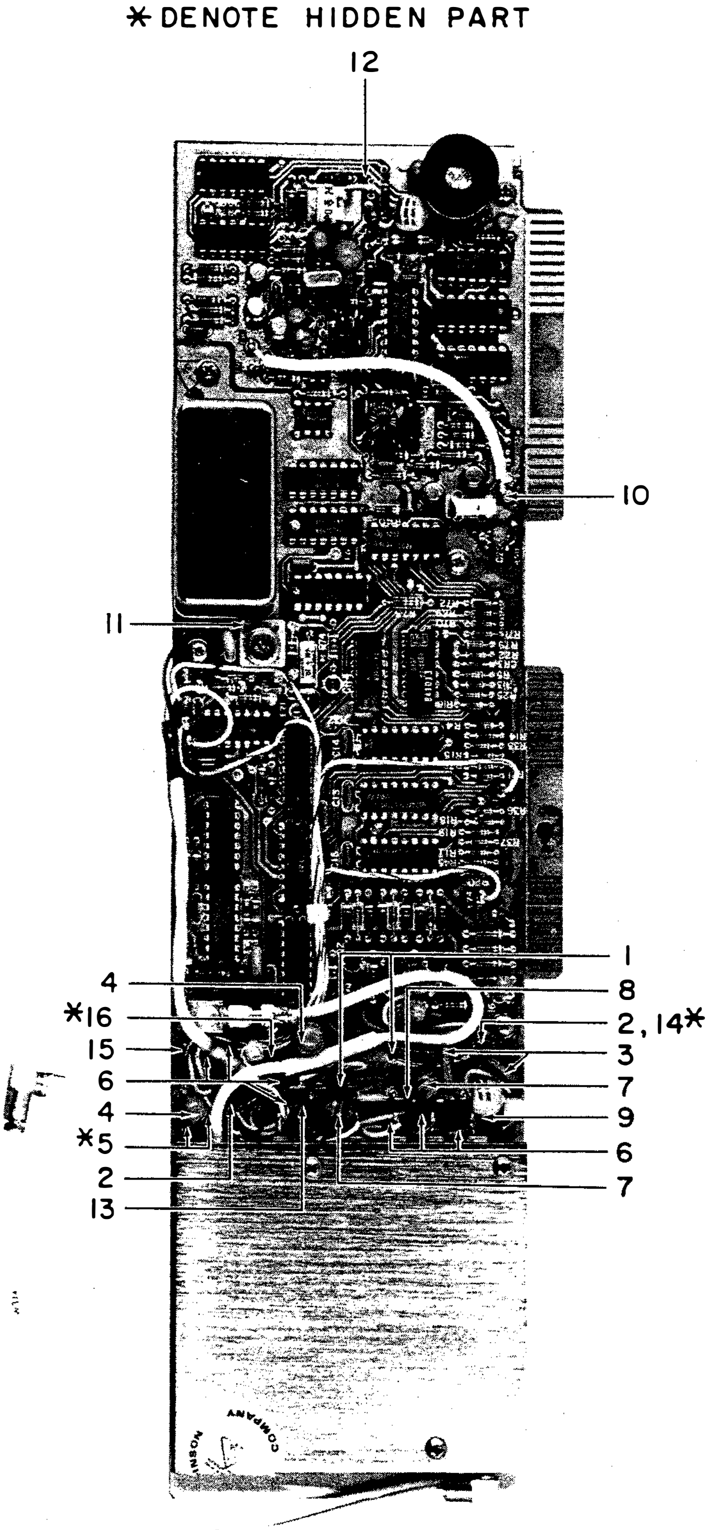


Figure 7-23. 1st and 3rd L.O. Synthesizer/Time Base 791630 (1A5A1)

Courtesy of http://BlackRadios.terryo.org

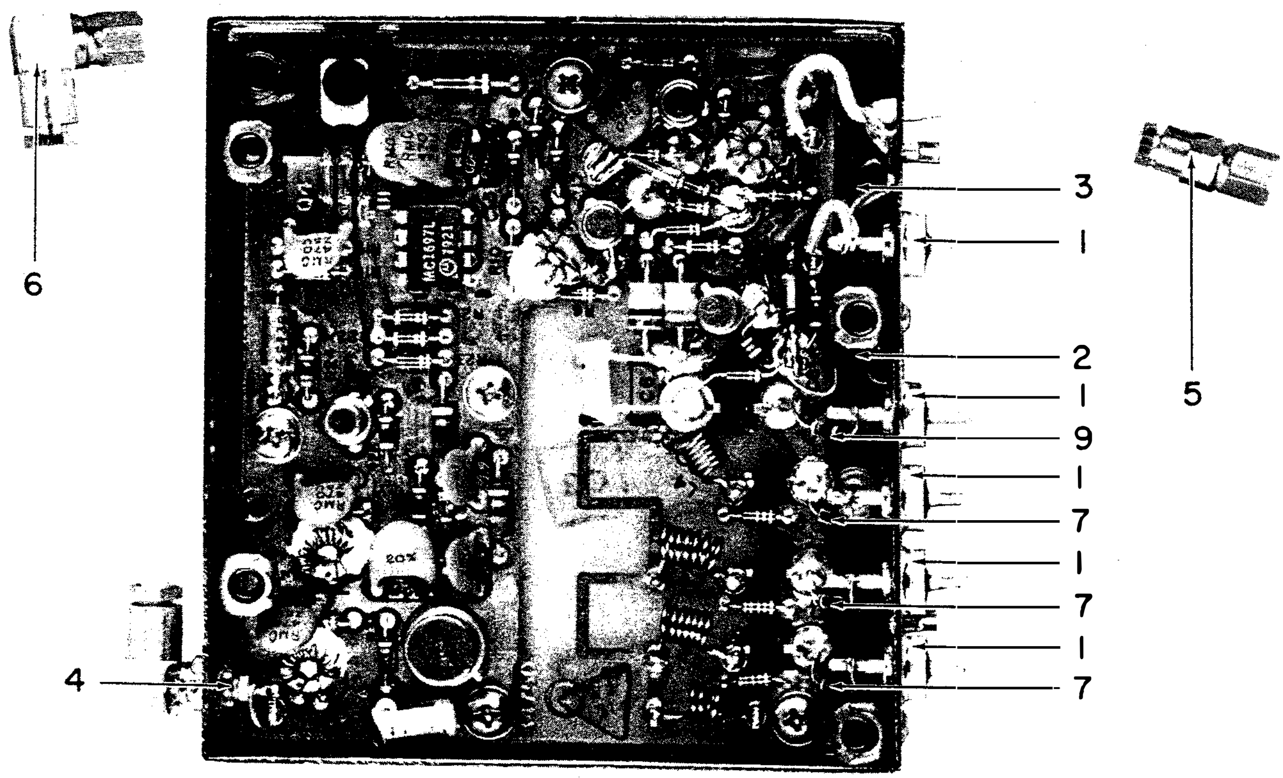
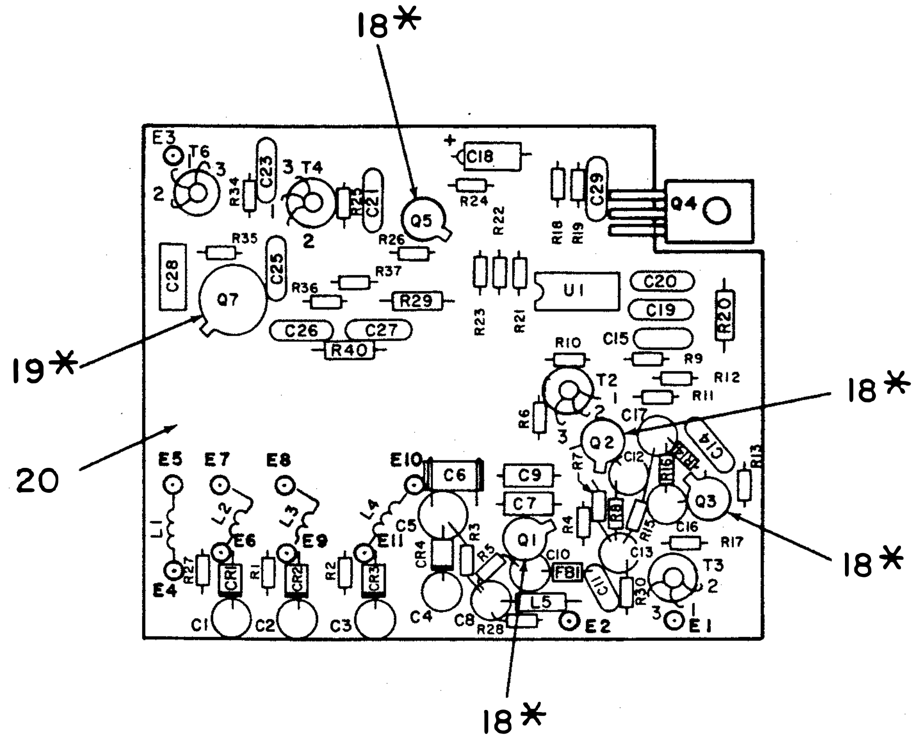


Figure 7-24. 1st L.O. VCO Assembly 791629 (1A5A1A1)

Courtesy of http://BlackRadios.terryo.org



* DENOTES HIDDEN PART

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C25	7	Q5	24	R21	37
C2	1	C26	10	Q7	25	R22	37
C3	1	C27	10	R1	26	R23	42
C4	1	C28	10	R2	27	R24	43
C5	2	C29	7	R3	28	R25	44
C6	3	CR1	11	R4	29	R26	37
C7	4	CR2	11	R5	30	R27	26
C8	1	CR3	11	R6	31	R28	37
C9	5	CR4	12	R7	32	R29	45
C10	1	FB1	13	R8	33	R30	37
C11	6	L1	14	R9	34	R34	45
C12	1	L2	15	R10	35	R35	46
C13	1	L3	15	R11	36	R36	39
C14	7	L4	16	R12	35	R37	37
C15	8	L5	17	R13	31	R40	47
C16	1	MP1	18	R14	32	T1	48
C17	1	MP2	19	R15	37	T2	49
C18	9	MP3	20	R16	33	T3	50
C19	7	Q1	21	R17	38	T4	51
C20	7	Q2	22	R18	39	T6	51
C21	7	Q3	22	R19	40	U1	52
C23	7	Q4	23	R20	41		

Figure 7-25. 1st L.O./VCO 34750 (1A5A1A1A1)

Courtesy of http://BlackRadios.terryo.org

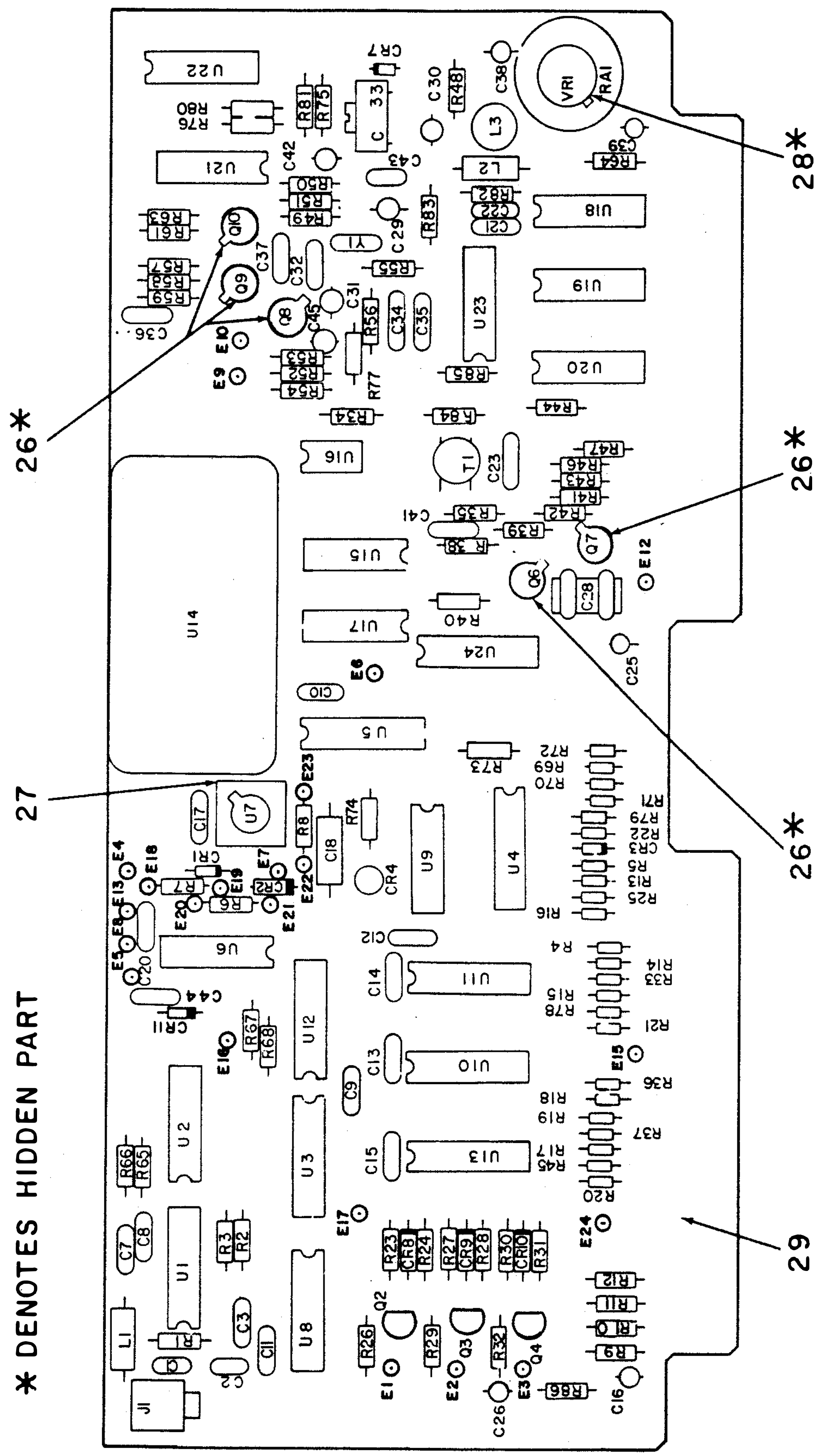


Figure 7-26. 1st and 3rd L.O./Timebase 791600 (1A5A1A2)

Courtesy of http://BlackRadios.terryo.org

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	CR9	20	R24	42	R70	54
C2	1	CR10	20	R25	36	R71	54
C3	2	CR11	17	R26	43	R72	54
C7	3	E1	21	R27	41	R73	42
C8	3	J1	22	R28	42	R74	35
C9	3	L1	23	R29	43	R75	48
C10	3	L2	24	R30	41	R76	48
C11	3	L3	25	R31	42	R77	50
C12	3	MP1	26	R32	43	R78	55
C13	3	MP2	27	R33	36	R79	55
C14	3	MP3	28	R34	37	R80	48
C15	3	MP4	29	R35	38	R81	48
C16	4	Q2	30	R36	44	R82	56
C17	2	Q3	30	R37	44	R83	34
C18	5	Q4	30	R38	45	R84	48
C20	6	Q6	31	R39	41	R85	48
C21	3	Q7	31	R40	46	R86	46
C22	7	Q8	32	R41	47	T1	57
C23	8	Q9	32	R42	41	U1	58
C25	4	Q10	31	R43	48	U2	59
C26	4	RA1	33	R44	35	U3	60
C28	9	R1	34	R45	44	U4	61
C29	10	R2	35	R46	46	U5	62
C30	11	R3	35	R47	46	U6	63
C31	4	R4	36	R48	48	U7	64
C32	6	R5	36	R49	49	U8	65
C33	12	R6	37	R50	42	U9	66
C34	13	R7	38	R51	48	U10	65
C35	13	R8	39	R52	48	U11	65
C36	3	R9	34	R53	42	U12	67
C37	3	R10	34	R54	50	U13	68
C38	4	R11	34	R55	51	U14	69
C39	4	R12	34	R56	46	U15	66
C41	3	R13	40	R57	50	U16	70
C42	4	R14	40	R58	51	U17	66
C43	14	R15	40	R59	51	U18	66
C44	15	R16	40	R61	42	U19	66
C45	16	R17	40	R63	52	U20	66
CR1	17	R18	40	R64	53	U21	71
CR2	17	R19	40	R65	48	U22	72
CR3	17	R20	40	R66	48	U23	73
CR4	18	R21	40	R67	48	U24	74
CR7	19	R22	40	R68	48	VR1	75
CR8	20	R23	41	R69	54	Y1	76

Courtesy of http://BlackRadios.terryo.org

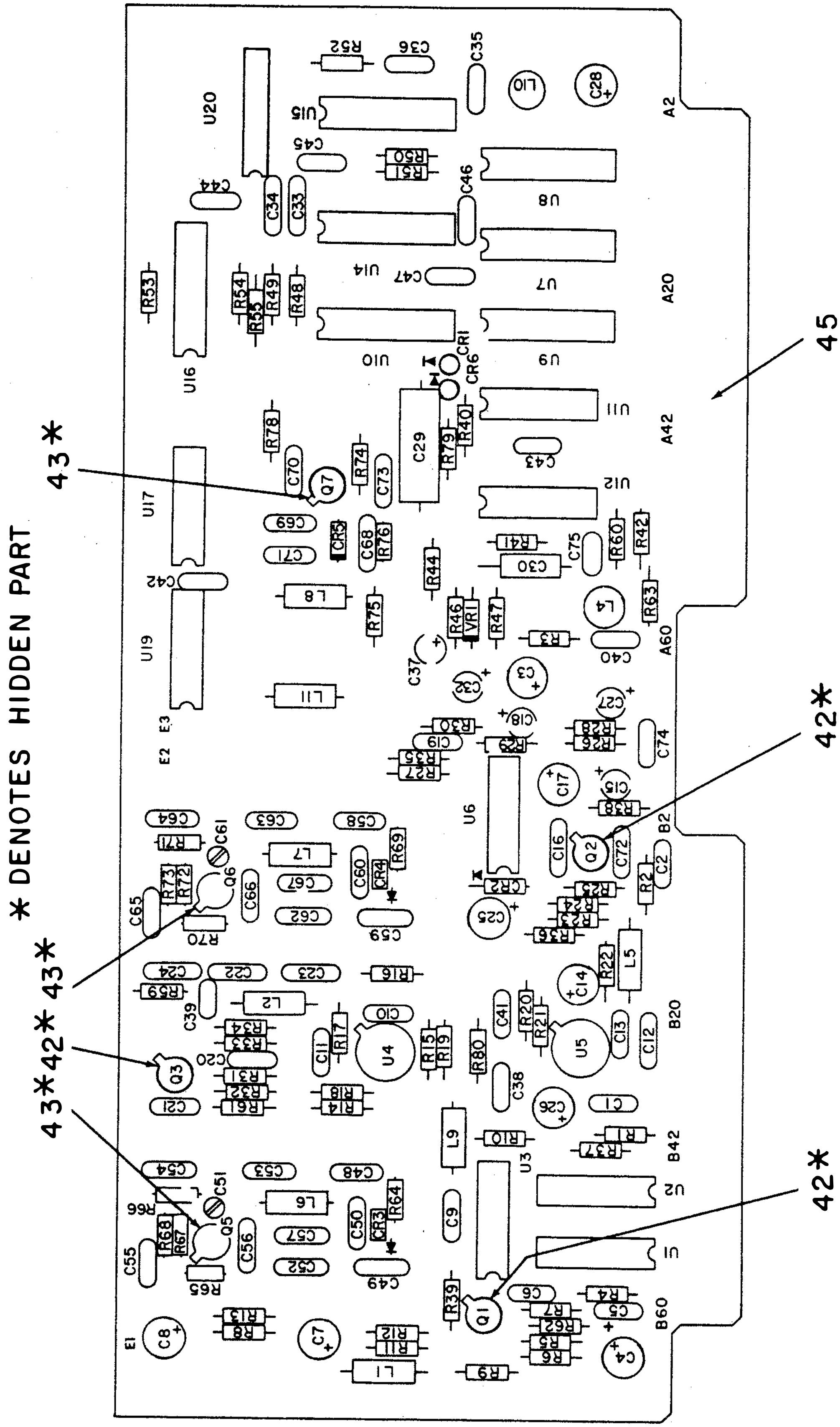
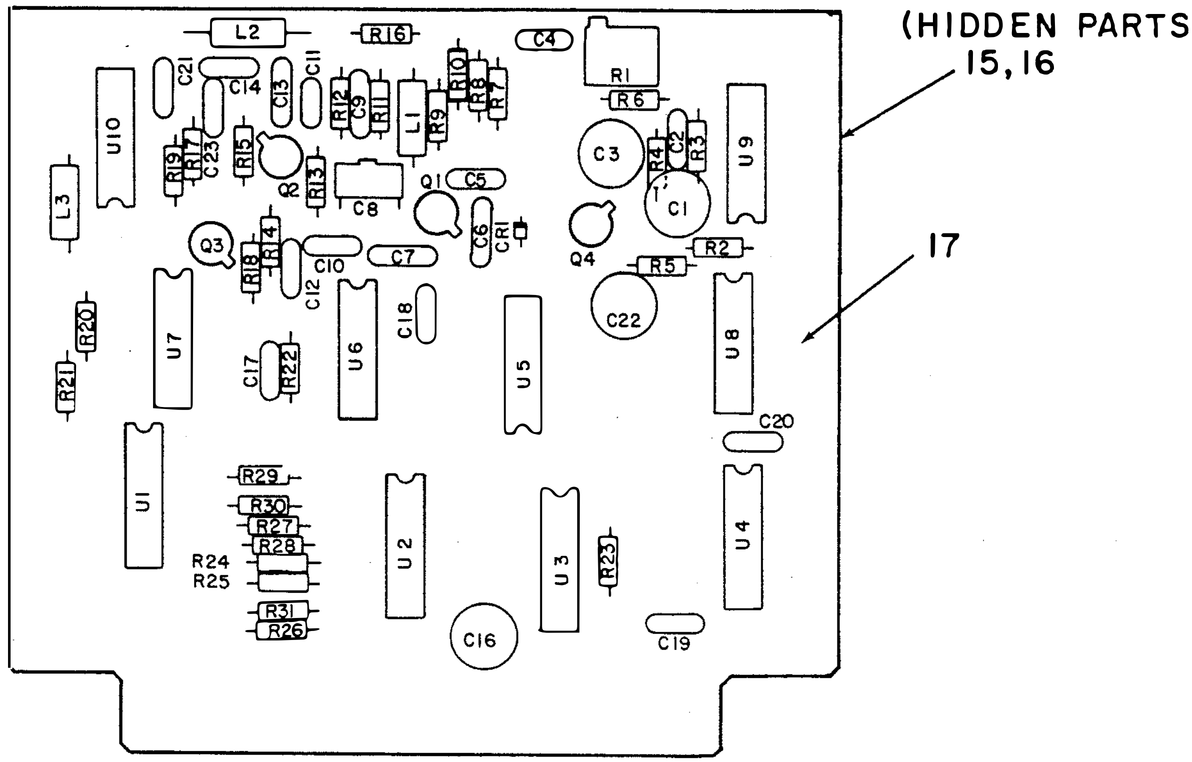


Figure 7-27. 2nd L.O. Synthesizer 791601 (1A5A2)

Courtesy of http://BlackRadios.terryo.org

REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C35	1	C68	25	Q7	49	R33	66	R71	76
C2	1	C36	15	C69	26	R1	50	R34	67	R72	80
C3	2	C37	3	C70	27	R2	50	R35	62	R73	81
C4	3	C38	15	C71	28	R3	50	R36	52	R74	82
C5	4	C39	15	C72	29	R4	51	R37	68	R75	50
C6	5	C40	1	C73	15	R5	52	R38	52	R76	79
C7	3	C41	15	C74	1	R6	53	R39	69	R78	57
C8	2	C42	1	C75	30	R7	54	R40	70	R79	71
C9	6	C43	1	CR1	31	R8	52	R41	53	R80	53
C10	7	C44	1	CR2	32	R9	53	R42	71	U1	83
C11	1	C45	1	CR3	33	R10	55	R44	72	U2	84
C12	1	C46	1	CR4	33	R11	56	R46	73	U3	85
C13	7	C47	1	CR5	33	R12	53	R47	74	U4	86
C14	3	C48	1	CR6	31	R13	52	R48	57	U5	87
C15	3	C49	1	L1	34	R14	53	R49	57	U6	83
C16	8	C50	16	L2	35	R15	57	R50	70	U7	88
C17	9	C51	17	L4	36	R16	57	R51	70	U8	89
C18	2	C52	18	L5	37	R17	57	R52	53	U9	89
C19	1	C53	19	L6	38	R18	57	R53	53	U10	89
C20	1	C54	19	L7	38	R19	58	R54	70	U11	90
C21	1	C55	15	L8	39	R20	59	R55	70	U12	83
C22	10	C56	20	L9	40	R21	59	R59	57	U14	91
C23	11	C57	21	L10	41	R22	60	R60	53	U15	92
C24	1	C58	1	L11	35	R23	61	R61	53	U16	92
C25	12	C59	22	MP1	42	R24	53	R62	71	U17	93
C26	3	C60	19	MP2	43	R25	53	R63	71	U19	93
C27	3	C61	17	MP6	44	R26	52	R64	75	U20	90
C28	3	C62	18	MP7	45	R27	62	R65	76	U21	94
C29	13	C63	19	Q1	46	R28	52	R66	76		
C30	14	C64	19	Q2	47	R29	53	R67	77		
C32	3	C65	15	Q3	48	R30	63	R68	78		
C33	8	C66	23	Q5	46	R31	64	R69	79		
C34	8	C67	24	Q6	46	R32	65	R70	76		

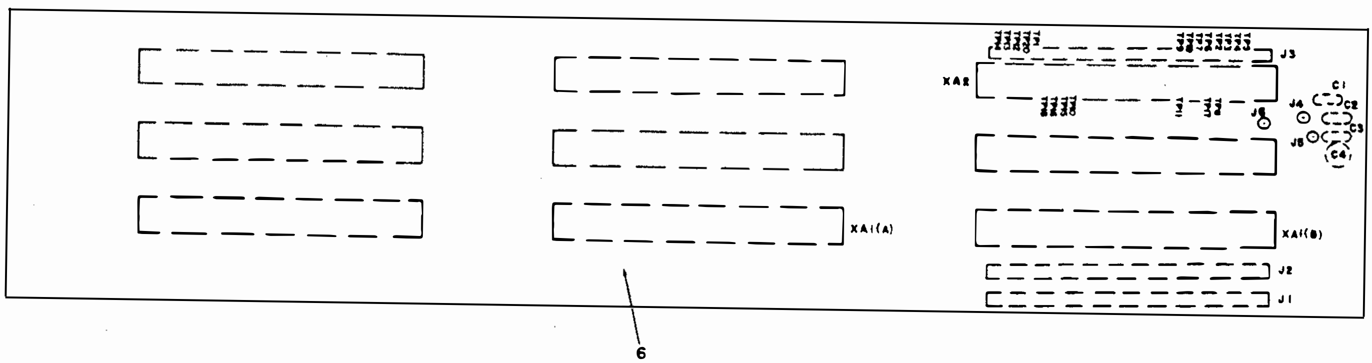
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	C21	5	R6	23	R25	23
C2	2	C22	3	R7	24	R26	23
C3	3	C23	5	R8	26	R27	23
C4	4	CR1	11	R9	27	R28	23
C5	5	L1	12	R10	27	R29	23
C6	6	L2	13	R11	25	R30	23
C7	7	L3	14	R12	28	R31	23
C8	8	MP1	15	R13	29	U1	34
C9	5	MP2	16	R14	30	U2	34
C10	9	MP3	17	R15	31	U3	34
C11	10	Q1	18	R16	25	U4	34
C12	10	Q2	19	R17	24	U5	35
C13	5	Q3	20	R18	23	U6	36
C14	9	Q4	21	R19	23	U7	37
C16	3	R1	22	R20	32	U8	38
C17	5	R2	23	R21	33	U9	39
C18	5	R3	24	R22	23	U10	40
C19	5	R4	23	R23	23		
C20	5	R5	25	R24	23		

Figure 7-28. BFO Synthesizer 791576 (1A5A3)

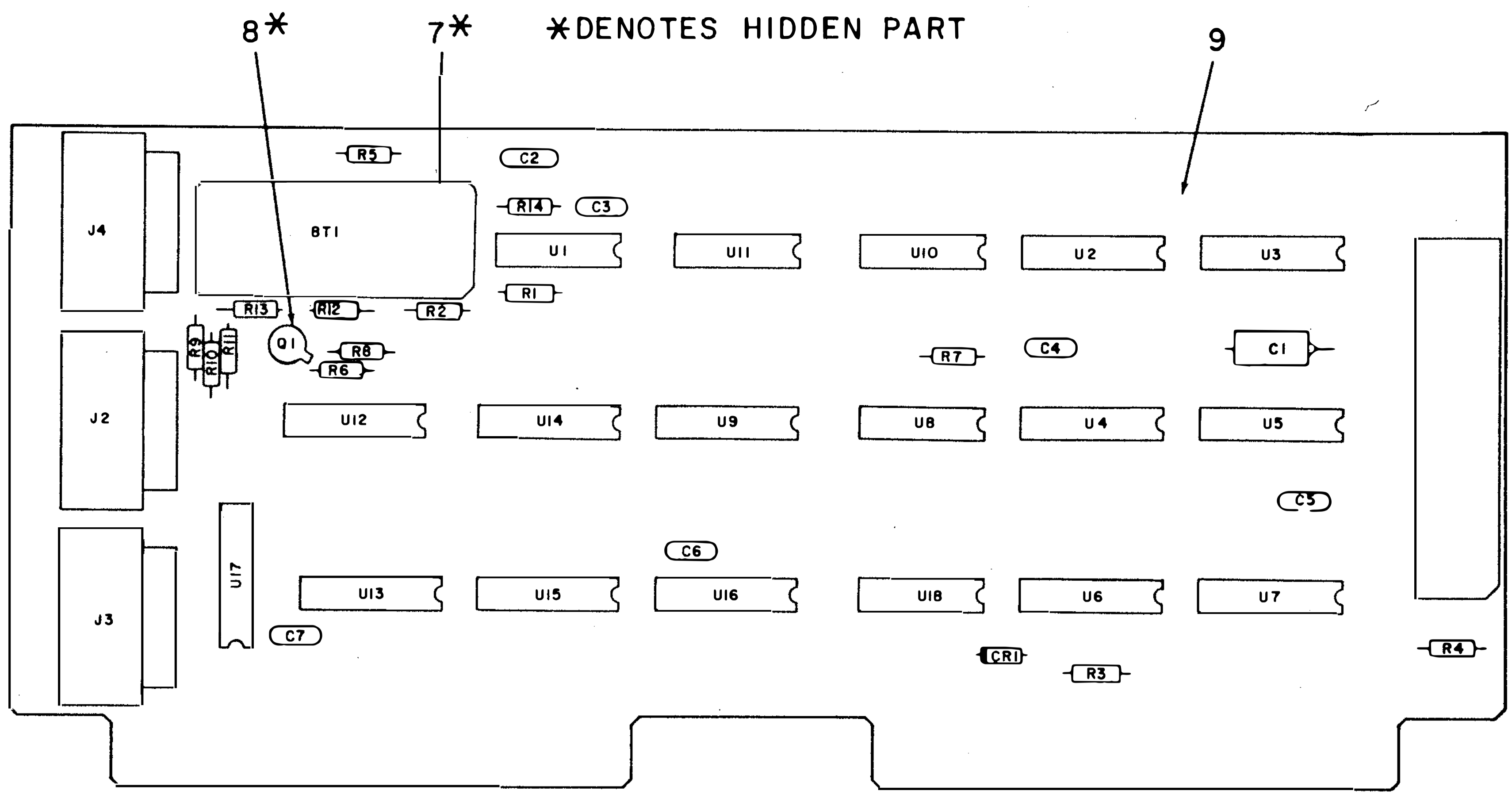
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	J5	4
C2	1	J6	4
C3	1	J7	4
C4	2	MP1	5
J1	3	MP2	6
J2	3	XA1	7
J3	3	XA2	7
J4	4		

Figure 7-29. I/O Motherboard 791580 (1A6)

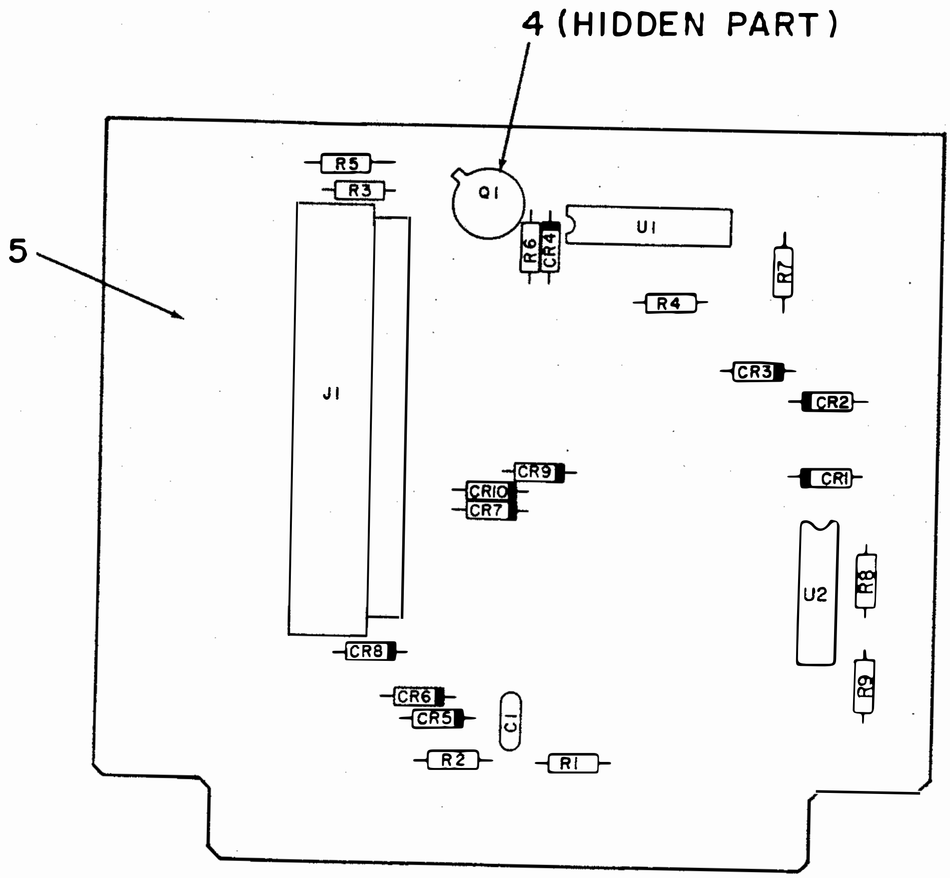
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
BT1	1	MP1	7	R9	12	U7	17
C1	2	MP2	8	R10	11	U8	18
C2	3	MP3	9	R11	13	U9	19
C3	4	Q1	10	R12	14	U10	20
C4	4	R1	11	R13	13	U11	18
C5	4	R2	11	R14	15	U12	21
C6	4	R3	12	U1	16	U13	21
C7	4	R4	11	U2	17	U14	21
CR1	5	R5	11	U3	17	U15	21
J2	6	R6	11	U4	17	U16	22
J3	6	R7	11	U5	17	U17	23
J4	6	R8	11	U6	17	U18	18

Figure 7-30. Manual Tuning/Up-Down Conv. 791575-1 (1A6A1)

Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	MP2	5
CR1	2	Q1	6
CR2	2	R1	7
CR3	2	R2	8
CR4	2	R3	9
CR5	2	R4	10
CR6	2	R5	11
CR7	2	R6	12
CR8	2	R7	12
CR9	2	R8	12
CR10	2	R9	12
J1	3	U1	13
MP1	4	U2	13

Figure 7-31. Front Panel Interconnect 791828 (1A6A2)

Courtesy of http://BlackRadios.terryo.org

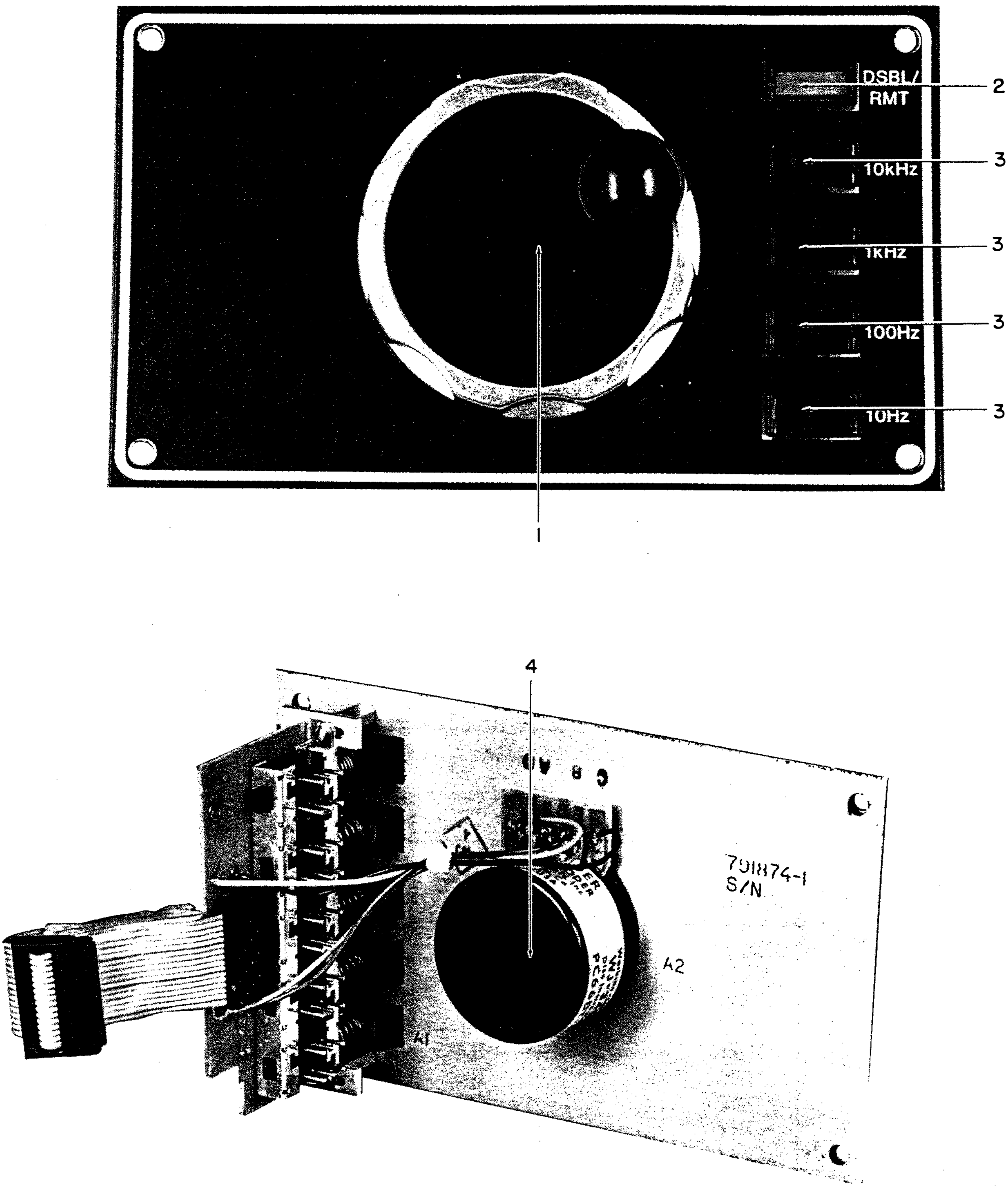
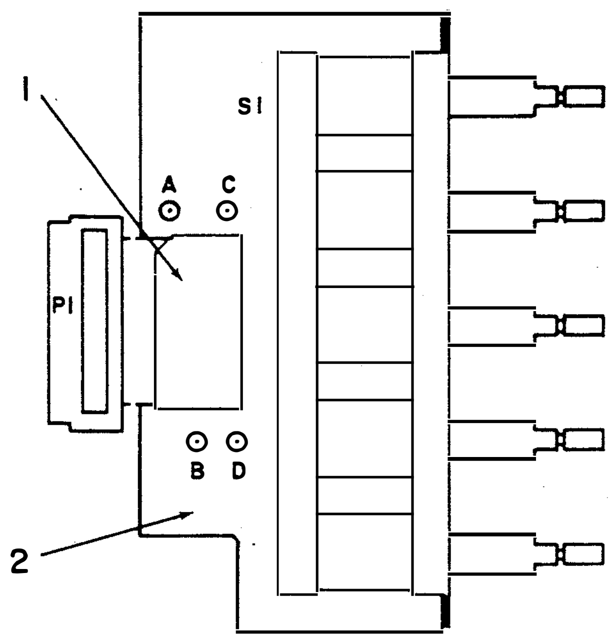


Figure 7-32. Manual Tuning Module 791874-1, Front and Rear View (1A7)

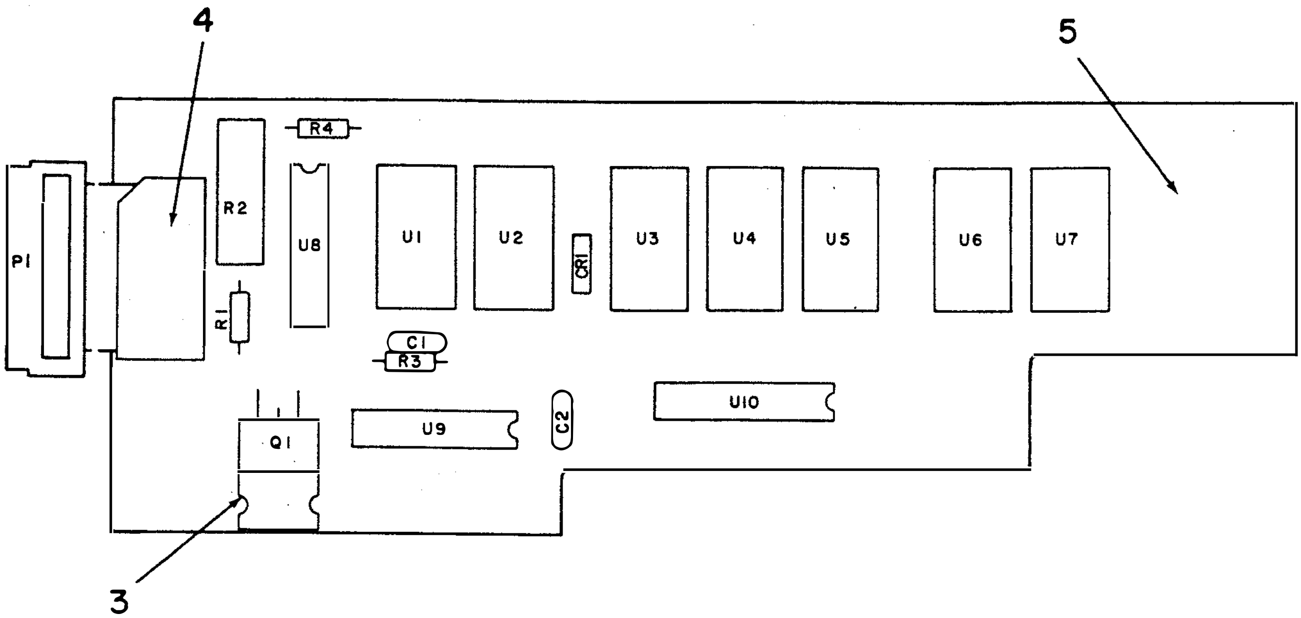
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.
MP1	1
MP2	2
P1	3
S1	4

Figure 7-33. Tuning Resolution 791589-1 (1A7A1)

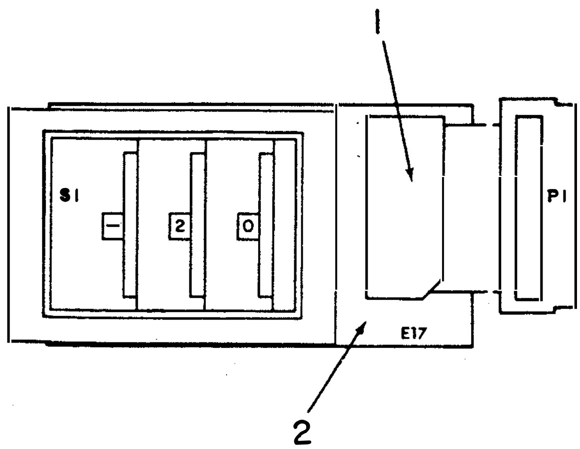
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	R4	11
C2	1	U1	12
CR1	2	U2	12
MP1	3	U3	12
MP2	4	U4	12
MP3	5	U5	12
P1	6	U6	12
Q1	7	U7	12
R1	8	U8	13
R2	9	U9	14
R3	10	U10	15

Figure 7-34. Frequency Display 791578 (1A8)

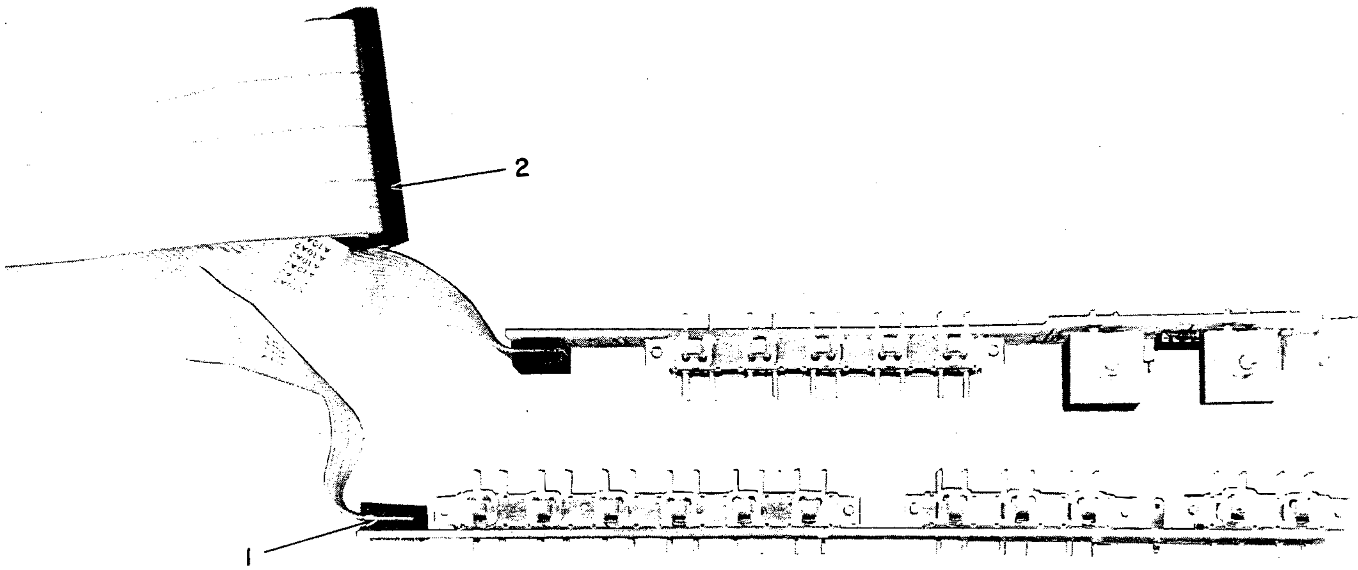
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.
MP1	1
MP2	2
P1	3
S1	4

Figure 7-35. BFO Switch 791827 (1A9)

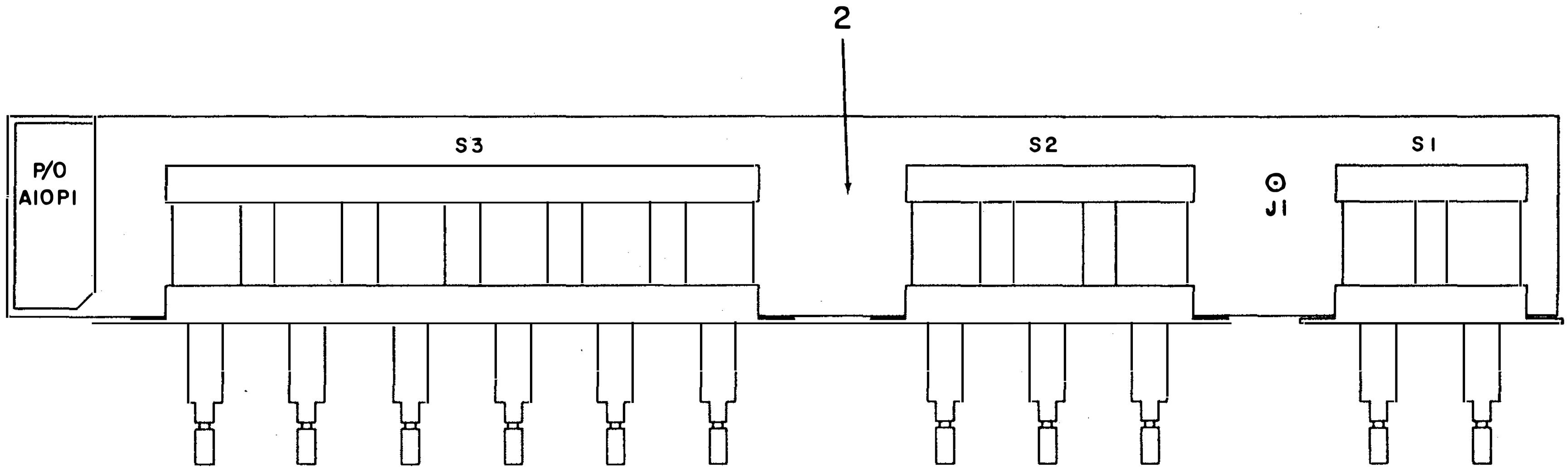
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.
MP1	1
P1	2

Figure 7-36. Front Panel Control 791684-2 (1A10)

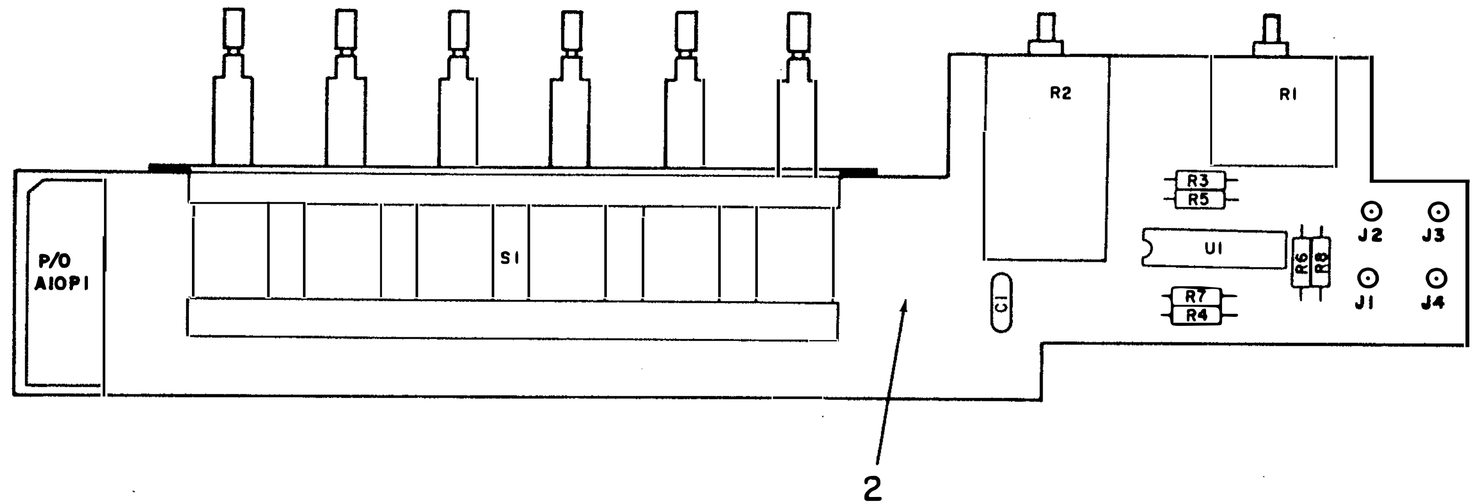
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.
J1	1
MP1	2
S1	3
S2	4
S3	5

Figure 7-37. Upper Panel Control 791583 (1A10A1)

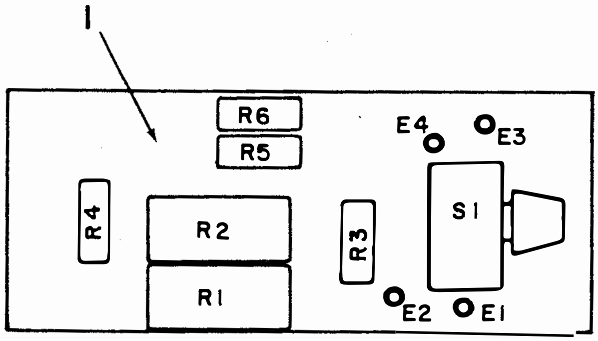
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
C1	1	R3	6
MP1	2	R4	6
J1	3	R5	7
J2	3	R6	8
J3	3	R7	7
J4	3	R8	8
R1	4	S1	9
R2	5	U1	10

Figure 7-38. Lower Panel Control 791826 (1A10A2)

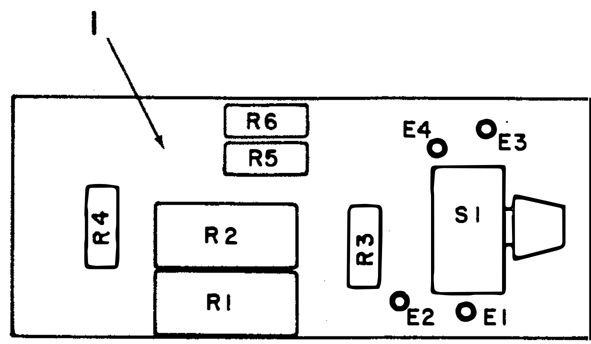
Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
MP1	1	R4	4
R1	2	R5	5
R2	3	R6	6
R3	4	S1	7

Figure 7-39. Switchable Attn. 30 dB, 16 Ω 796094-1 (1A11)

Courtesy of http://BlackRadios.terryo.org



REF. DESIG.	ITEM NO.	REF. DESIG.	ITEM NO.
MP1	1	R4	3
R1	2	R5	2
R3	3	S1	4

Figure 7-40. Switchable Attn. 20 dB, 600 Ω 796094-2 (1A12)

Courtesy of http://BlackRadios.terryo.org

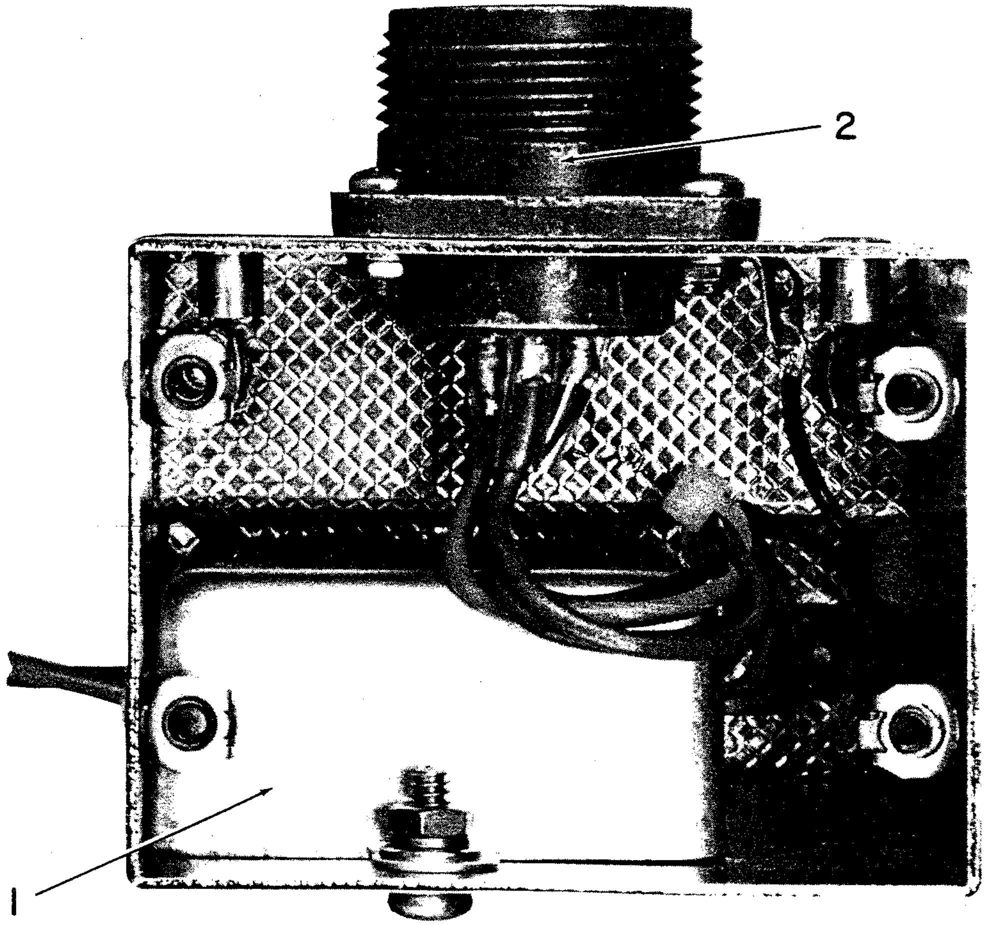


Figure 7-41. Power Input Filter 796098-1 (1A13)

Courtesy of http://BlackRadios.terryo.org

Courtesy of http://BlackRadios.terryo.org

CHAPTER 8

INSTALLATION

8-1. INTRODUCTION. This chapter describes the procedures necessary to ensure proper installation of the AN/URR-74(V)2 radio receiver, as well as unpacking/repacking information, installation inspection requirements, and initial turn on and test procedures. Figure 8-1 gives the ciritical dimensions of the unit and figure 2-2 identifies all rear panel connectors.

8-2. SITE INFORMATION. The receiver is designed to be installed in any standard electronic equipment rack than can provide the necessary cable connections and ventilation.

8-3. REFERENCE PUBLICATIONS. Refer to MIL-STD-1310A (Navy) for Shipboard Bonding and Grounding Methods for Electromagnetic Compatibility.

8-4. TOOLS AND MATERIALS REQUIRED FOR INSTALLATION. No special tools are required for this installation. Refer to table 1-3 for test equipment required for checkout procedures.

8-5. UNPACKING AND REPACKING. The receiver, together with its technical manual, is shipped in a double-walled cardboard contained that conforms to MIL-SPEC PP-PB-1364. The receiver is placed inside a 2-mil plastic bag which is sealed and placed on a bed of commercial INSTA-PAK foam, separated by a plastic sheet. A second plastic sheet is placed over the receiver and the container is then completely filled with the INSTA-PAK material. The shipping carton is then sealed shut with plastic, fiber-reinforced, strapping tape. Crated and uncrated dimensions are given in table 1-2. No special tools are required for opening the carton, a knife with a sharp blade will be sufficient.

a. To remove the receiver from its shipping container, simply place the carton in an upright position as noted on the box, cut the tape sealing the lid and open the container. Take out the lid that has been formed by the INSTA-PAK material, remove the technical manual in its separte plastic bag, and then lift the receiver from the shipping carton. Take the receiver out of its plastic bag and inspect it for any possible damage. Visually inspect all exterior surfaces for dents and scratches. If external damage is visible, remove the dust covers and inspect the internal components for apparent damage. Then check the internal cables for loose connections, and plug-in items such as printed wiring cards, which may have been loosened from their receptacles.

b. To repack the receiver, simply reverse the procedures used to unpack, if the original packing material has been retained. If it has not, use locally established procedures for packing of electronic equipment.

8-6. INPUT REQUIREMENTS. Table 8-1 provides a summary list of receiver input requirements.

8-7. INSTALLATION PROCEDURES. No assembly of the receiver is necessary as it is shipped as a complete unit. Figure 8-1 gives the critical dimensions of the unit. Internal selections for the AC line voltage and both the Line Audio and ISB Audio output attenuators should be made before mounting the receiver in the rack. The receiver may be operated from either 115 Vac or 230 Vac, ±15%, line voltage. Each of the attenuators may be switched ON or OFF, as required. Refer to table 1-1 and paragraph 2-2.b.(5), for the Line Audio and ISB Audio output characteristics with the Attenuators ON or OFF.

WARNING

This equipment employs dangerous voltages which could be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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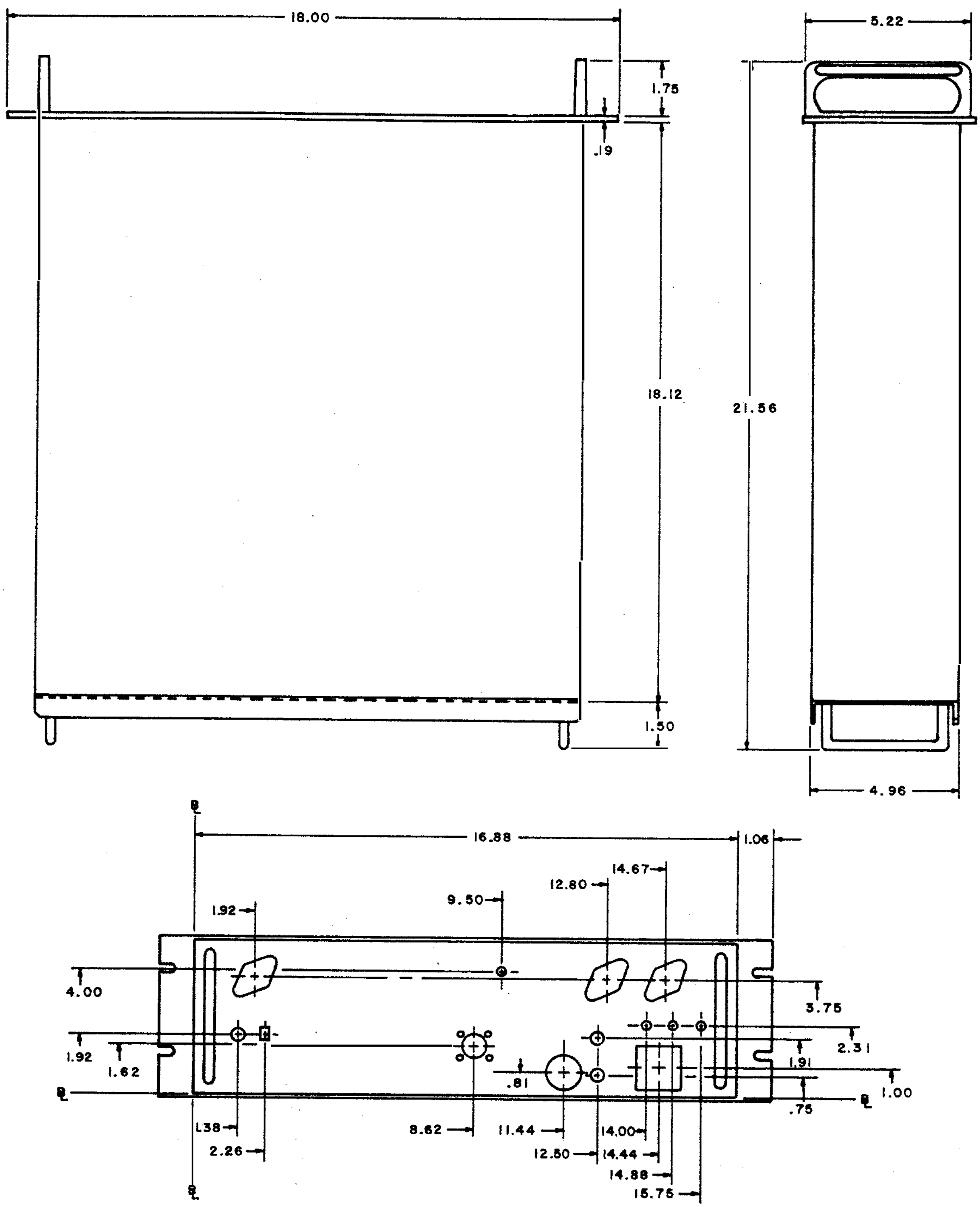

Figure 8-1. AN/URR-74(V)2 Radio Receiver, Critical Dimensions

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Table 8-1. Input Requirements

Parameter	Value
AC Input voltage	115 or 230 Vac (±15%) 48-400 Hz
RF Input impedance	50 Ω, unbalanced, nominal
Operating power	70 W (approximately) nominal
Operating temperature	0° C to 50° C

8.8. LINE VOLTAGE SELECTION.

CAUTION

As a safety precaution and to prevent possible damage to the receiver no power cord should be connected to the power output connector, A13J1, and the receiver power switch should be in the OFF positions (button in out position with brightly colored panel not displayed) during these selections.

a. Remove receiver top cover.

b. Locate voltage select switches S3 and S4 next to transformer T1 toward the rear of the receiver on the left-hand side (see Figure 7-2).

c. Set S4 to the 115 Vac or 230 Vac setting by inserting a screwdriver tip in switch slot and sliding the switch to the desired position.

d. Set S3 to HI position if the measured line voltage is between 115 Vac to 120 Vac or 230 Vac to 240 Vac or, set S2 to LO position if the measured line voltage is between 110 Vac and 115 Vac or 220 Vac to 230 Vac.

e. Use 1 amp slow-blow fuses for nominal 115 Vac or 1/2 amp slow-blow fuses for nominal 230 Vac in F1 and F2 (see figure 2-2).

8.9. AUDIO ATTENUATORS SELECTIONS

a. Locate Switchable Attenuator A11 (for the Line Audio output) to the right of transformer T2 at rear of receiver (see figure 7-2).

b. Set slide switch to desired position; OFF, when the slide switch is in the forward position or ON, when the slide switch is in the rear-most position.

c. Locate Switchable Audio Attenuator A12 (for the ISB Audio output) to the left of transformer T2.

d. Set slide switch to desired position, ON, when the slide switch is in the forward position or OFF, when the slide switch is in the rear-most position.

e. Re-install receiver top cover.

8-10. MOUNTING. The receiver is designed for mounting in a standard 19-inch equipment rack. It occupies 5.25 inches of vertical rack space and extends 19.62 inches into the rack to the tips of the rear protective handles. Do not rely solely on the front panel mounting hardware to support the receiver. Rack slides or supporting brackets should be used. The receiver contains holes on its side panels for mounting to slides. If supporting brackets

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are used, these should extend along each side from the front panel to the rear panel. All external connections are located at the rear of the receiver. Adequate space should be provided at the rear of the unit to provide connector access and cable clearance. The receiver is not provided with a ventilation system and consequently adequate separation should be provided for air flow. A minimum of 3 inches clearance should be provided at the rear with a minimum of 1 inch at the top and bottom of the receiver. More than 1 inch top and bottom clearance and/or forced air flow around the outside surfaces of the receiver may be required depending upon the amount of heat generated by the adjacent equipment.

8.11 CONNECTORS. Figure 8-2 is a photograph of the rear panel showing the location of the input and output connectors. Table 8-2 lists the function and type for each of the input and output connectors. The antenna system connects to the receiver through connector A2J1. Refer to paragraph 2-2.b.(8) for this connector input characteristics. AC line power comes in through connector A13J1. Refer to paragraph 2-2.b.(10) for connector pin designations. When used, external audio equipment is driven through Audio output connector J14. Refer to paragraph 2-2.b.(5) for pin designations and output characteristics for the various outputs from this connector. J12, supplies the receiver IF output. Refer to paragraph 2-2.b.(1) for the characteristics of this output.

8-12. INT/ENT REF SELECTION. The receiver may be operated with an internally or externally supplied reference frequency. To use the internal reference, set the INT/EXT S2, CLOCK switch on the rear panel (see figure 8-2) to INT. To use the external reference set this switch to EXT and connect the external 1 MHz reference source to J11. With S2 in the INT position a 1 MHz rederence output is available at J11. Refer to paragraph 2-2.b.(3) for the required output characteristics of the reference source to be used in EXT and the output characteristics of J11 in INT.

8-13. GROUNDING. A grounding lug (GND) is provided to give additional grounding beyond that supplied by the power input connector. If this additional grounding is deemed necessary, attach an appropriate ground lead to the lug. Refer to paragraph 8-3.

8-14. INSTALLATION CHECKOUT. This paragraph will provide the procedures necessary to demonstrate that the receiver is operating correctly and within tolerances.

a. Installation Inspection and Pre-Energizing Procedures. Carry out the inspection as listed in table 8-3 prior to application of power or any tests.

b. Initial Turn On and Preliminary Tests. Carry out the turn on and operating procedures items as detailed in paragraphs 2-3, 2-4 and tables 2-2 through 2-7.

Table 8-2. Input/Output Connections

Connector	Function	Mating Connector Type
A2J1	RF input	Any compatible type-N male BNC
A13J1	Power input	MS-3102-16S-5S
J11	1 MHz reference	Any compatible male BNC
J12	IF output	Any compatible male BNC
J14	Audio output	JT06A10-13P SR

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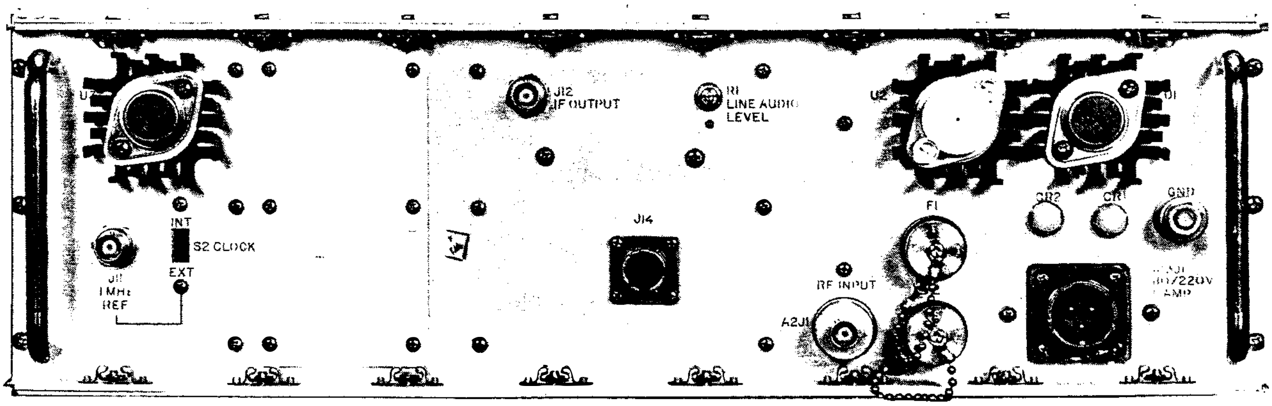

Figure 8-2. AN/URR-74(V)2 Radio Receiver, Rear Panel

Courtesy of http://BlackRadios.terryo.org

Table 8-3. Installation Inspection Check List

Step	Item To Be Checked	Yes	No
1	Internal switches S2 and S3 are correctly set for the ac line voltage.		
2	Correct value fuses installed.		
3	Internal Attenuators A11 and A12 are correctly set ON or OFF, as required.		
4	All interconnections are checked for continuity.		
5	All connections are tight.		
6	All mounting brackets are securely fastened to the equipment rack.		
7	The test equipment listed in table 1-3 is on board, operating satisfactorily, and has been calibrated.		
8	The Allowance Parts List (APL) is on board and the Coordinated Shipboard Allowance List (COSAL) includes equipment data (if applicable).		
9	Sufficient maintenance access for cable connectors has been provided.		
10	The receiver has been checked and there is an absence of loose or broken connectors, switches or meters.		
11	There is an absence of dents or scratches in the equipment.		
12	There is an absence of short circuits in the input power line.		
13	The receiver is correctly installed in the equipment rack.		
14	INT/EXT S2 Clock switch set to INT or EXT, as required.		

c. Installation Verification Tests. Successful completion of the scheduled performance tests listed in paragraph 4-4 will verify that the receiver is operating properly. Record all test results on the installation standards summary sheet which is included as table 8-4.

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Table 8-4. Installation Standards Summary, Radio Receiver AN/URR-74(V)2

INSTALLATION STANDARDS SUMMARY

Input Voltage ______________ Vac
Input Frequency ______________ Hz
A11 Attenuator ______________
A12 Attenuator ______________

Date ______________
Serial Number ______________
of Model ______________
Installed in (ship or station) ______________

Record on this summary sheet the test indications which have been obtained during the installation verification test.

Para. No.	Ref. Std.	
4-4.b(4)(a)	______	checked
4-4.b(4)(b)	______	checked
4-4.b(4)(c)	______	checked
4-4.b(4)(d)	______	checked
4-4.b(4)(e)	______	checked
4-4.b(4)(f)	______	checked
4-4.b(4)(g)	______	checked
4-4.c(4)(a)	______	checked
4-4.c(4)(c)S/S	______	reading
4-4.c(4)(c)R/F	______	dBm
4-4.c(4)(d)6 kHz	______	dBm
4-4.c(4) 3.2 kHz	______	dBm
4-4.c(4) 1.0 kHz	______	dBm
4-4.c(4) .3 kHz	______	dBm
4-4.c(4)(e)	______	dBm
4-4.c(4)(f)	______	dBm
4-4.c(4)(h)	______	dBm
4-4.c(4)(i)	______	dBm
4-4.c(4)(j)	______	dBm
4-4.c(4)(k)	______	dBm
4-4.c(4)(l)	______	dBm
4-4.c(4)(m)	______	dBm
4-4.d(4)(a)	______	checked
4-4.d(4)(c)	______	dBm
4-4.d(4)(e)	______	dBm
4-4.e(4)(a)	______	checked
4-4.e(4)(c)	______	checked
4-4.e(4)(d)	______	checked
4-4.e(4)(f)	______	checked

Para. No.	Ref. Std.	
4-4.e(4)(g)	______	checked
4-4.e(4)(h)	______	checked
4-4.e(4)(i)	______	checked
4-4.e(4)(j)	______	checked
4-4.e(4)(k)	______	checked
4-4.f(4)(a)	______	checked
4-4.f(4)(f)	______	vac
4-4.f(4)(j)	______	vac
4-4.f(4)(k)	______	checked
4-4.g(4)(a)	______	checked
4-4.g(4)(b)	______	kHz
4-4.g(4)(d)	______	kHz

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NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. ▭ DENOTES FRONT PANEL CONTROL.
3. SPARE "E" NOS. AND CAPACITORS ARE NOT SHOWN.
   EACH CAPACITOR REFERENCE NUMBER IS IDENTICAL TO EACH "E" NO.
4. a) SCHEMATIC IS SHOWN WITH TWO POSSIBLE CONTROL OPTIONS,
   1) 8718/MCM-1 MANUAL TUNING CONTROL
   2) 8718/MCM-2 MANUAL TUNING CONTROL WITH REMOTE CONTROL
   DIFFERENCE BETWEEN 8718/MCM-1 AND 8718/MCM-2 IS SHOWN IN TABLE 1. OTHER AVAILABLE OPTIONS ARE SHOWN IN TABLE 2.
5. A10A1, AND A10A2 ARE PART OF:
   FRONT PANEL CONTROL
   TYPE 791684
   REF DESIG PREFIX A10
6. MOST MODULE PINS ARE NOT SHOWN DUE TO UNNECESSARY LINE DUPLICATIONS. GROUND PINS ON SOME MODULES ARE NOT SHOWN BECAUSE OF COMPLEXITY (SEE EACH MODULE'S DWG FOR CLARITY).
7. TEST POINT/PINS NOT SHOWN ARE:
   A5A1, MODULE PINS B3 (TP1), A13 (TP2) TIED TO A17, A60 (TP3) TIED TO A55 B9 (TP5), B1 (TP6); A5A2, MODULE PINS A51 (TP7), A55 (TP8), A49 (TP10), B57, (TP12).
9. R3 & R4 SHALL BE ADDED AT U3 AS SHOWN IN DETAIL A, WHEN OPTIONS NOTED IN TABLE 2 ARE USED.

8. TEST POINT DESCRIPTIONS:

A5 — TP1 N/U
TP2 1MHz REF
TP3 3RD LO
TP4 N/U
TP5 1ST LO UNLOCK
TP6 1ST LO TUNING VOLTS
TP7 2ND LO MAIN LOOP TUNING VOLTS
TP8 2ND LO 32.2 MHz TUNING VOLTS
TP9 10kHz
TP10 2ND LO UNLOCK
TP11 1MHz REF
TP12 2ND LO 32MHz TUNING VOLTS
TP13 2ND LO OUT
TP14 1kHz REF
TP15 BFO TUNING VOLTS
TP16 BFO OUT
TP17 FIXED BFO
TP18 BFO INHIBIT

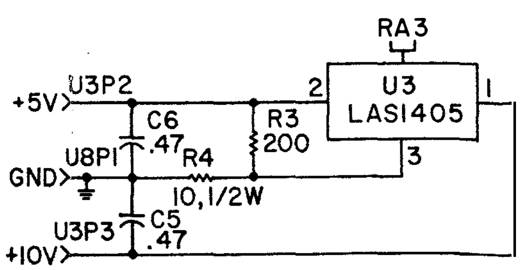
A4 — TP1 10.7MHz INHIBIT
TP2 10.7MHz FILTER SW OUTPUT
TP3 455kHz FILTER SW IF OUTPUT
TP4 455 kHz AMPLIFIER OUTPUT
TP5 DETECTED AM
TP6 IF INPUT TO FM/CW/SSB DETECTOR
TP7 FM/CW AUDIO
TP8, TP9 LINE AUDIO
TP10 PHONE AUDIO
TP11 LINE AUDIO LEVEL
TP12 3RD LO INPUT TO 10.7MHz/455kHz CONVERTER
TP13 10.7MHz/455kHz CONVERTER IF OUTPUT
TP14 ISB IF INPUT
TP15 BFO INPUT
TP16, TP17, TP18 ISB AUDIO
TP19 IF AGC
TP20 N/U
TP21 ISB AGC
TP22 RF AGC

TABLE 2

OPTION	DESCRIPTION	SCHEM	
8718/B10	10Hz BFO	480049	
8718/B18	HP21MX/12566B I/O	480070	(NOTE 9)
8718/COR	CARRIER OPERATED RELAY	480056	
8718/ISB	INDEPENDENT SIDEBAND	SEE A4 A4 A4A5,A4A8	
8718/LLA	LOW LEVEL AUDIO	380214	
8718/NAVMFP	MICROPROCESSOR FRONT PANEL	580051	(NOTE 9)
8718/PRE	PRESELECTOR	380034	
8718/SMO	SIGINAL MONITOR OUTPUT	380027	
8718/1Hz	1 Hz TUNING RESOLUTION	480058	
8718/232	RS-232 INTERFACE	480098	(NOTE 9)
8718/488-1	IEEE-488 INTERFACE LISTEN ONLY	380031	
8718/488-2	IEEE-488 INTERFACE TALK/LSTN	480115	(NOTE 9)
8718/COM	COMMAND INPUT	480093	
8718/MON	MONITOR OUTPUT	480097	

TABLE 1

OPTION	A6A1	A6A1J1	A7
8718/MCM-1	791575-1	NOT USED	791874-1
8718/MCM-2	791575-2	AS SHOWN	791874-1



DETAIL A

Figure FO-1. Receiver, Radio AN/URR-74(V)2 Main Chassis Schematic Diagram (Sheet 1 of 6)

Courtesy of http://BlackRadios.terryo.org

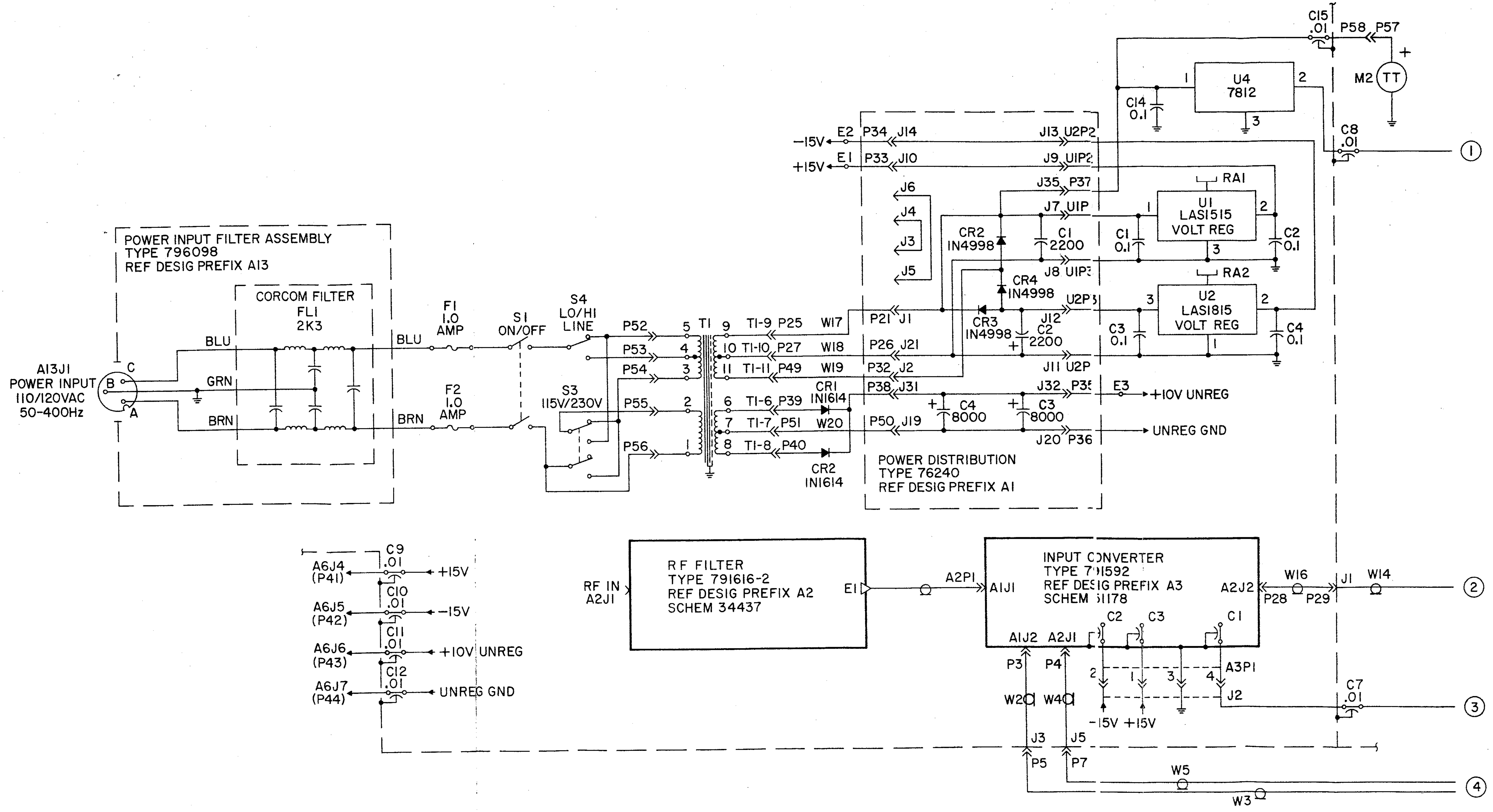


Figure FO-1. Receiver, Radio AN/URR-74(V)2
Main Chassis Schematic Diagram
(Sheet 2 of 6)

Courtesy of http://BlackRadios.terryo.org

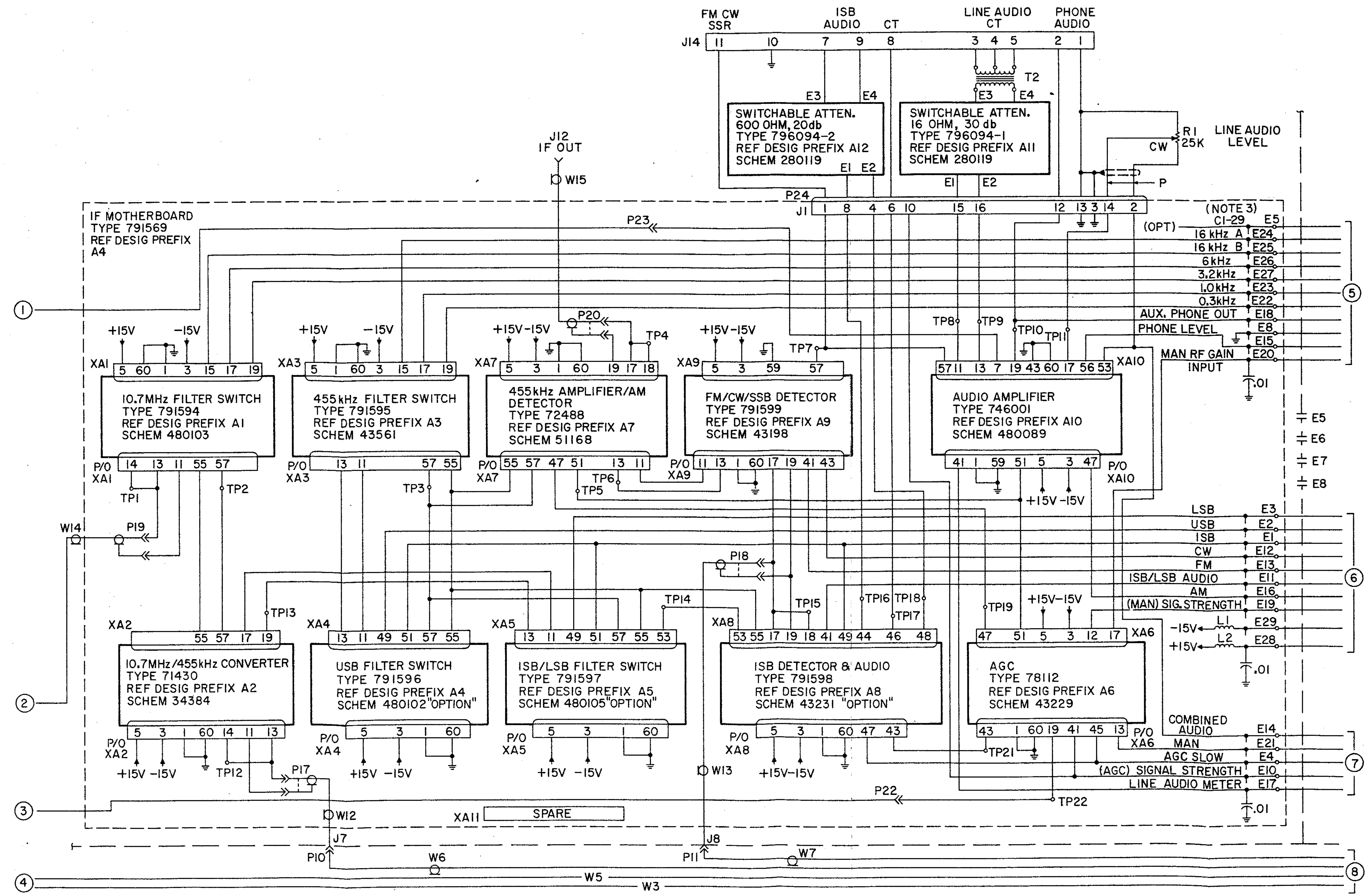


Figure FO-1. Receiver, Radio AN/URR-74(V)2 Main Chassis Schematic Diagram (Sheet 3 of 6)

Courtesy of http://BlackRadios.terryo.org

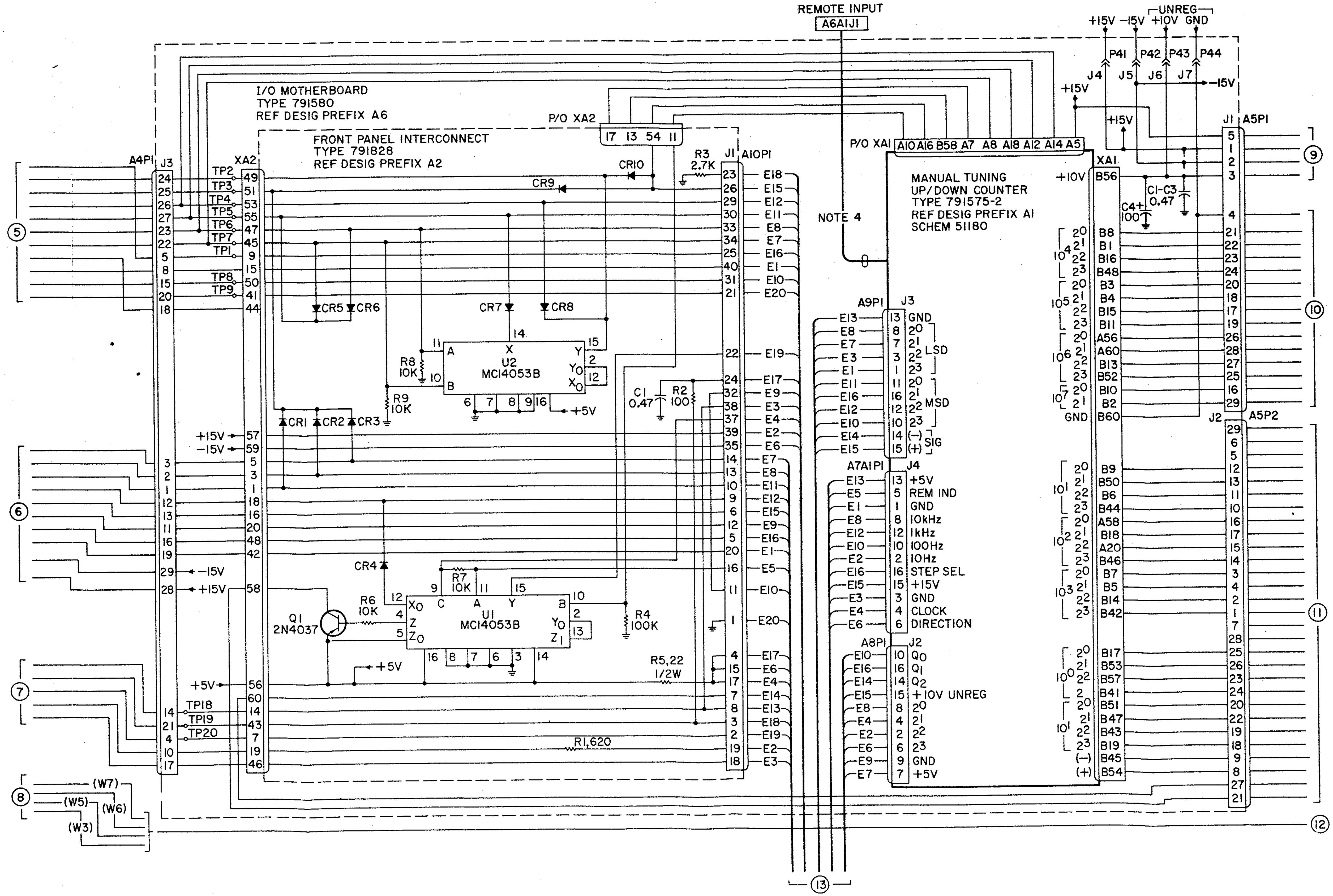


Figure FO-1. Receiver, Radio AN/URR-74(V)2 Main Chassis Schematic Diagram (Sheet 4 of 6)

Courtesy of http://BlackRadios.terryo.org

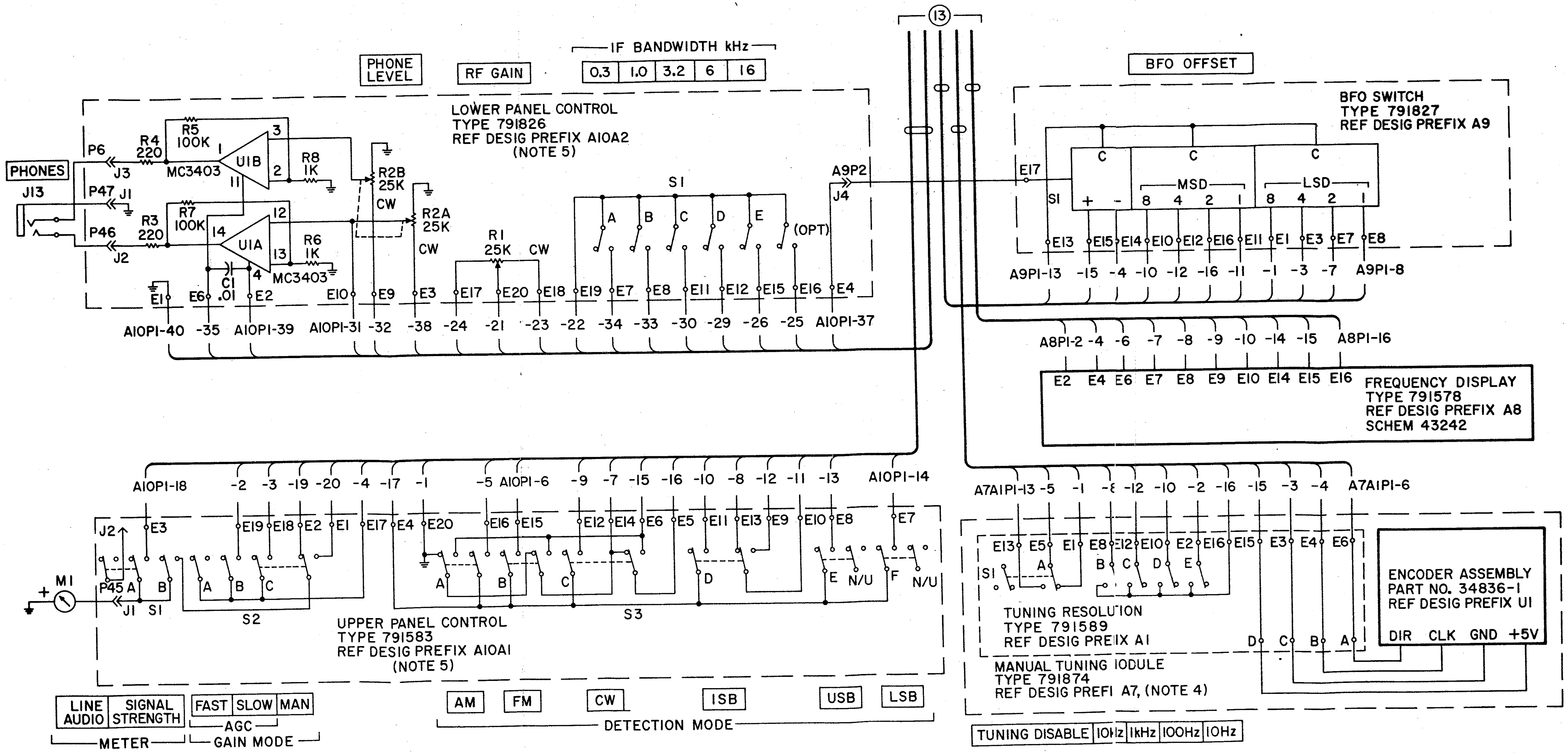


Figure FO-1. Receiver, Radio AN/URR-74(V)2
Main Chassis Schematic Diagram
(Sheet 5 of 6)

Courtesy of http://BlackRadios.terryo.org

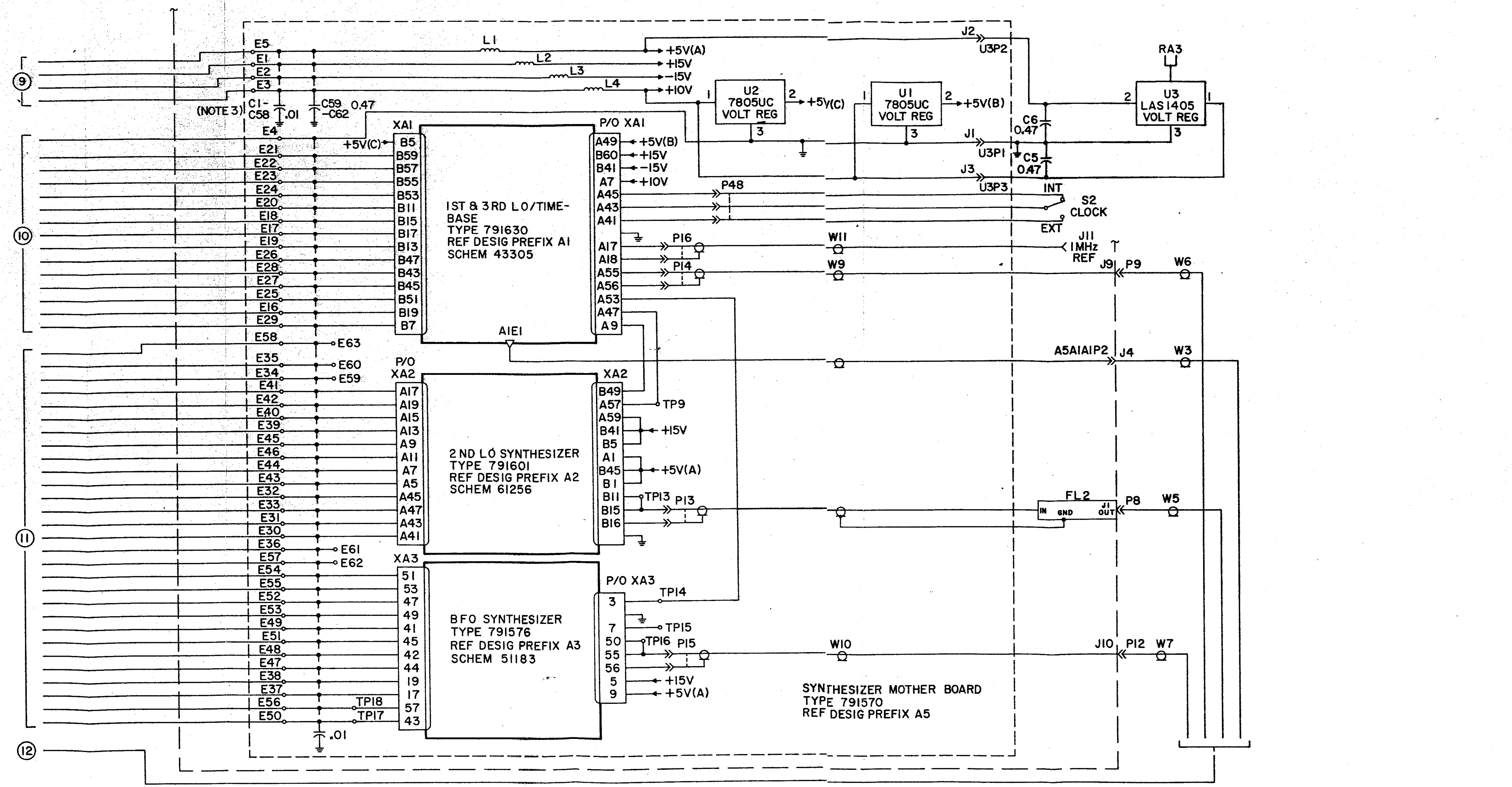
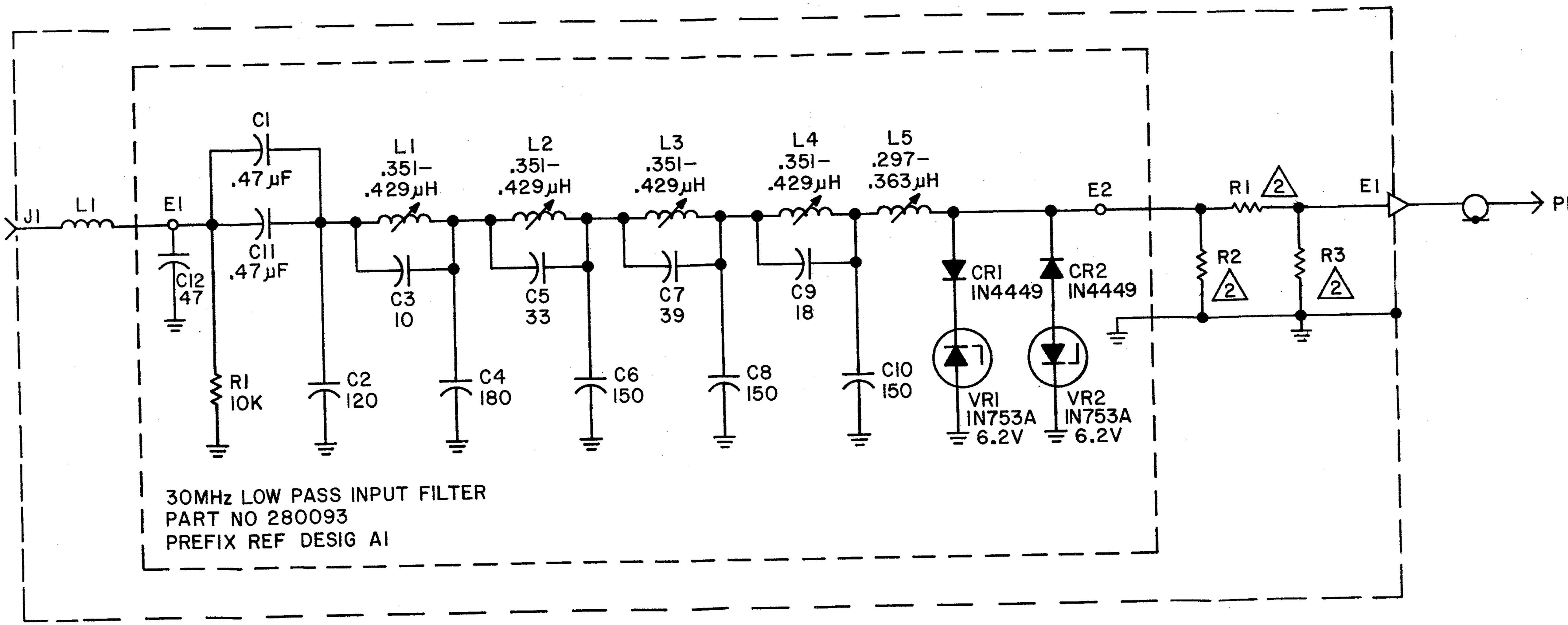


Figure FO-1. Receiver, Radio AN/URR-74(V)2
Main Chassis Schematic Diagram
(Sheet 6 of 6)

Courtesy of http://BlackRadios.terryo.org



NOTES:

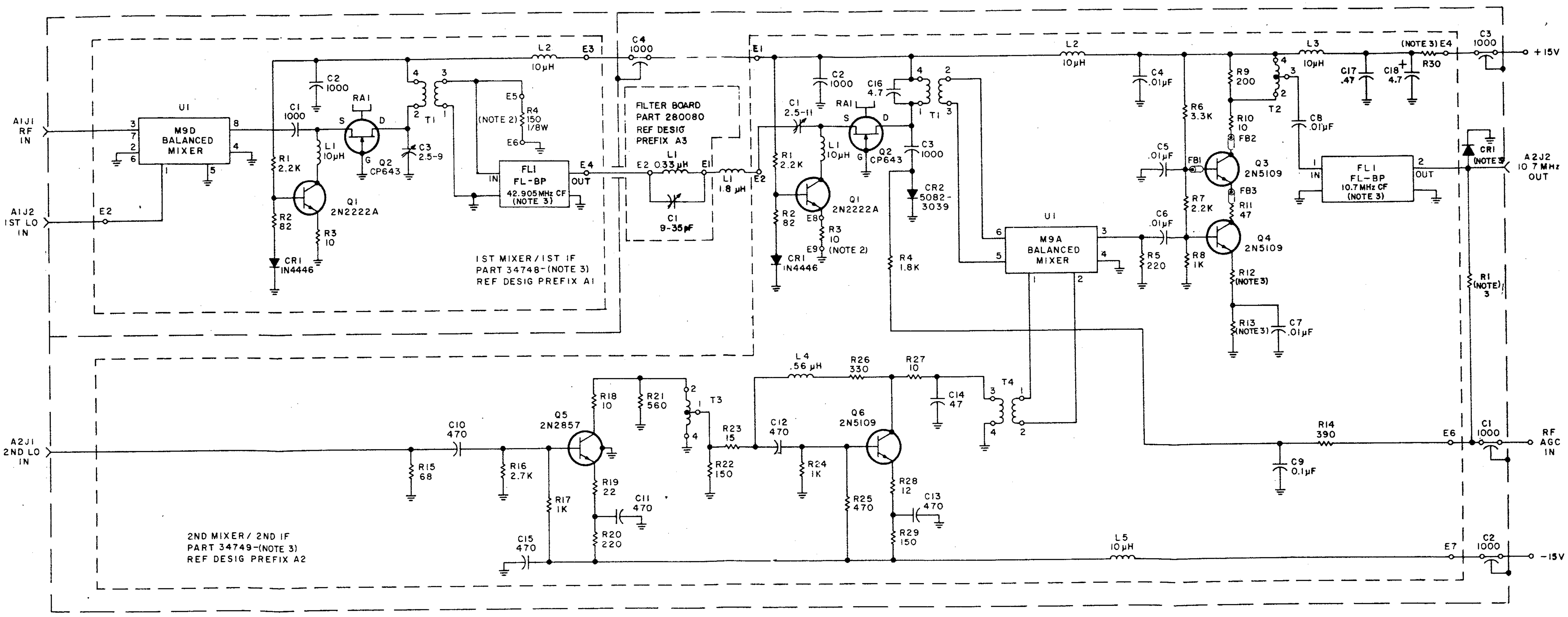
1. UNLESS OTHERWISE SPECIFIED:
   a.) RESISTANCE IS IN OHMS ±5%, 1/4W
   b.) CAPACITANCE IS IN pF

△2

DASH NO.	R1	R2	R3
-1	8.2 1/8 W	560 1/8 W	560 1/8 W
-2	NOT USED (JUMPER)	NOT USED	NOT USED

Figure FO-2. Type 791616-2 RF Filter (A2), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



NOTES:

1. UNLESS OTHERWISE SPECIFIED.
   a) RESISTANCE IS IN OHMS, ±5%, 1/4 W.
   b) CAPACITANCE IS IN pF.
2. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED
3. DIFFERENCE BETWEEN TYPES ARE SHOWN IN TABLE I.

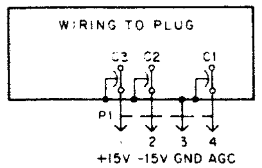
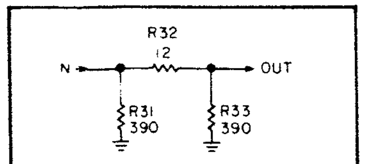


TABLE I

TYPE	A1	A2	A1FL1		A2FL1		A2R12	CR1	R1	A2R13	A2R30
			PART	BW	PART	BW					
791592-1	34748-1	34749-1	92123	28 kHz	92124	16 kHz	4.7	NOT USED	NOT USED	68	10
791592-2	34748-1	34749-1	92123	28 kHz	92124	16 kHz	4.7	5082-3039	1K	68	10
791592-3	34748-2	34749-2	92195	64 kHz	92196	40 kHz	12.0	NOT USED	NOT USED	68	10
791592-4	34748-4	34749-3	92221	100 kHz	SEE DETAIL A		4.7	NOT USED	NOT USED	68	10
791592-5	34748-5	34749-4	92212	40 kHz	92211	30 kHz	13	NOT USED	NOT USED	22	22



DETAIL A

(REPLACES A2FL1 FOR TYPE 791592-4)

Figure FO-3. Type 791592-1 Input Converter (A3), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

NOTES

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. PIN CONFIGURATION SHOWN IN DETAIL A.
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE I.

TABLE I

TYPE	R19	R46	C17	FL1		FL2		FL3	L4	R22	R23	R24
				PART	BW	PART	BW					
791594-1	220	12	0.1	92126	3.2 kHz	92125	6.0 kHz	NOT USED	NOT USED	33	560	33
791594-2	220	12	0.1	92229	4.0 kHz	92125	6.0 kHz	NOT USED	NOT USED	33	560	33
791594-3	1.2K	47	27 pF	92220	8.0 kHz	92219	40 kHz	SFE10.7MA - 5RED	10 µH	NOT USED	510	510

DETAIL A

MC1458

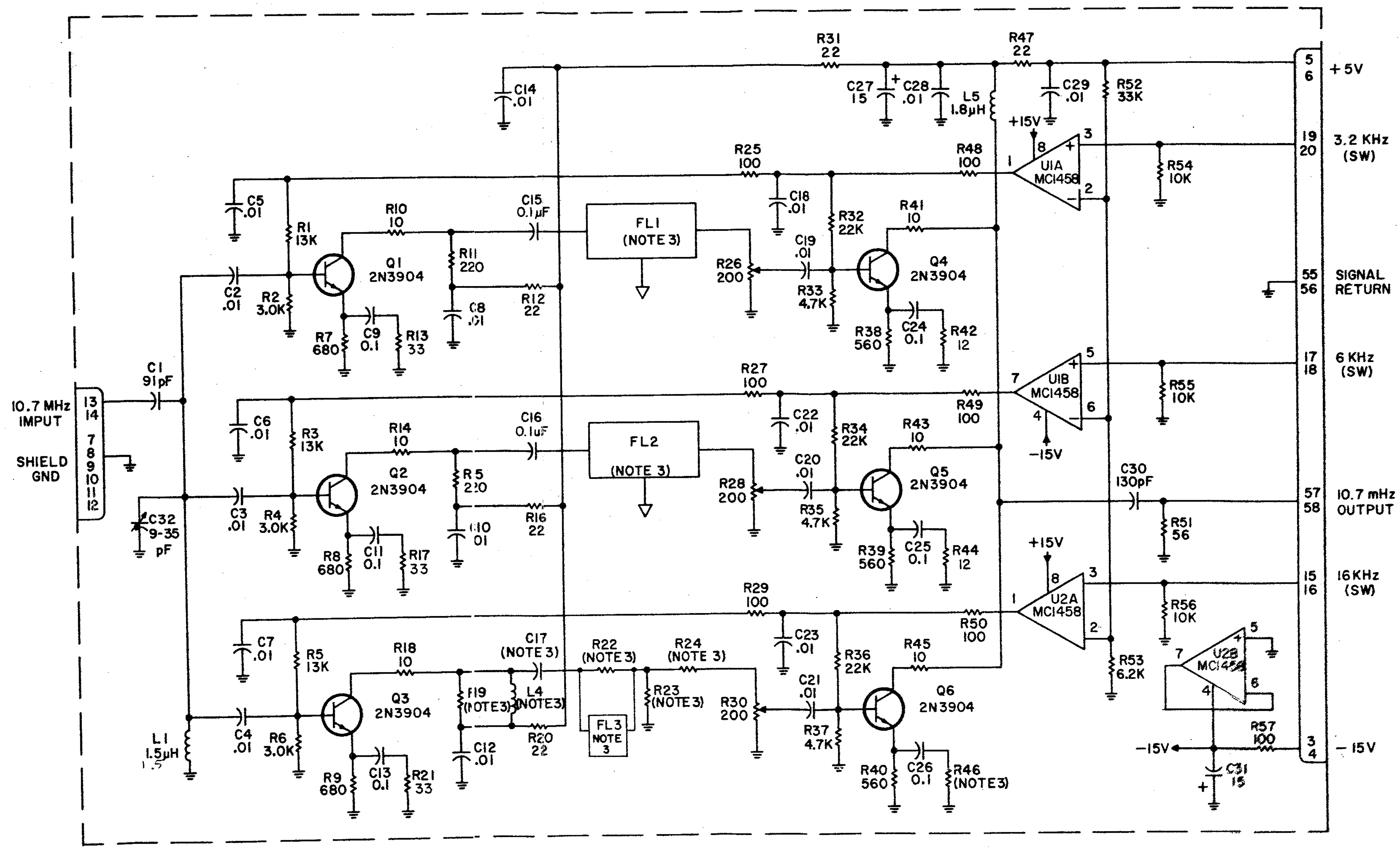
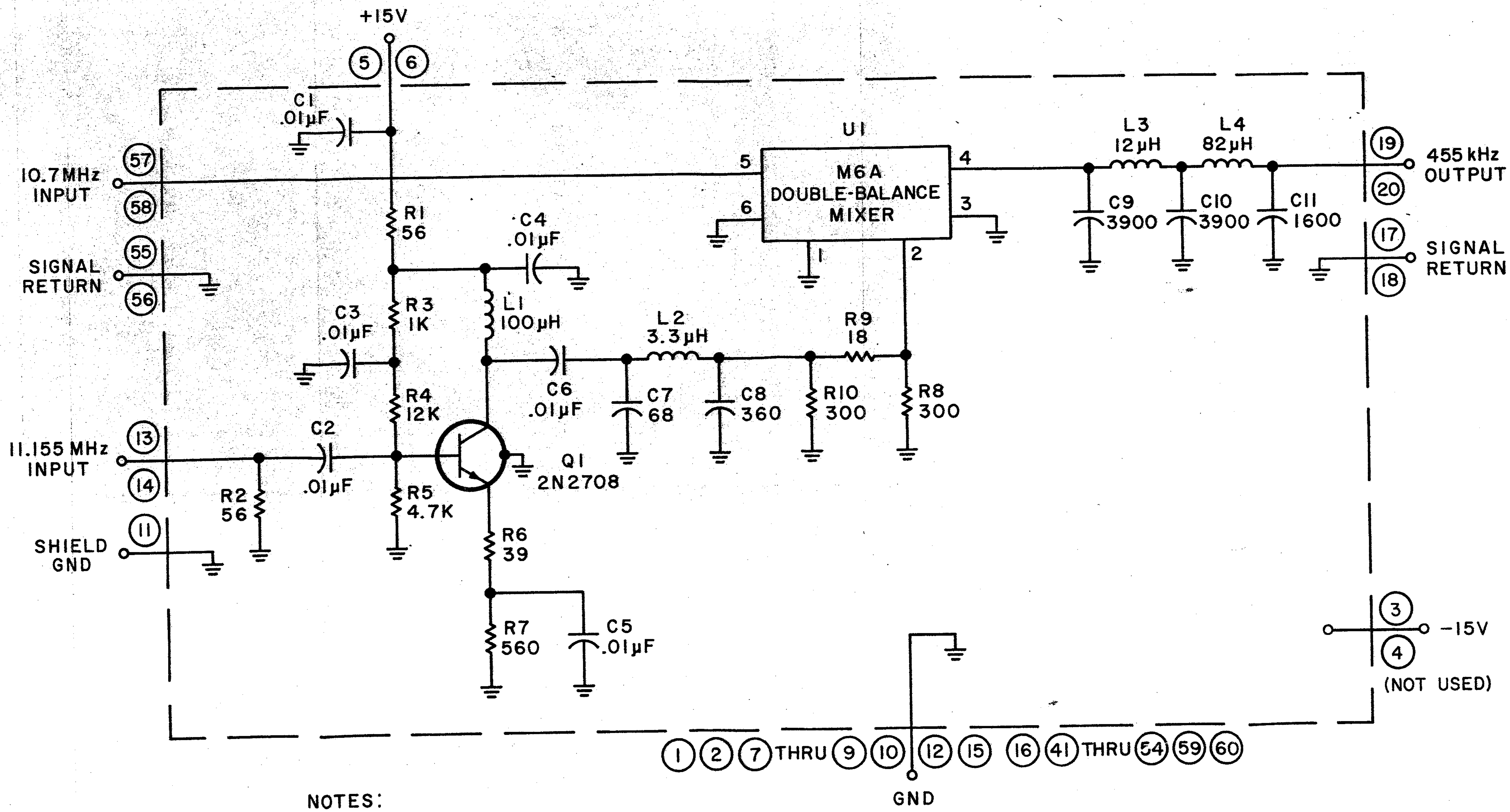


Figure FO-4. Type 791594 10.7 MHz Filter Switch (A4A1), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



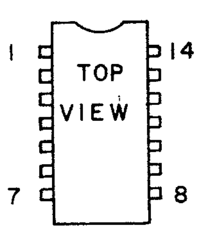
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
2. ENCIRCLED NUMBERS ARE MODULE PINS.

Figure FO-5. Type 71430 10.7 MHz/455 kHz Convert(
(A4A2), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS ±5%, 1/4 W.
   b) CAPACITANCE IS IN μF.
2. ENCIRCLED NUMBERS ARE MODULE PINS.
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE I.
4. IF DIFFICULTY OF PROCUREMENT EXISTS FOR PART MC3403P PART LM348N MAY BE USED AS ALTERNATE IN THIS APPLICATION.
5. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.



MC3403

TABLE I

TYPE	FL1 PART	FL1 BW	FL2 PART	FL2 BW	R32
791595-1	92128	325 Hz	92127	1 kHz	220
791595-2	20611	100 Hz	92127	1 kHz	220
791595-3	92210	300 Hz	92209	1 kHz	220
791595-4	92128	325 Hz	92127	1 kHz	NOTE 5

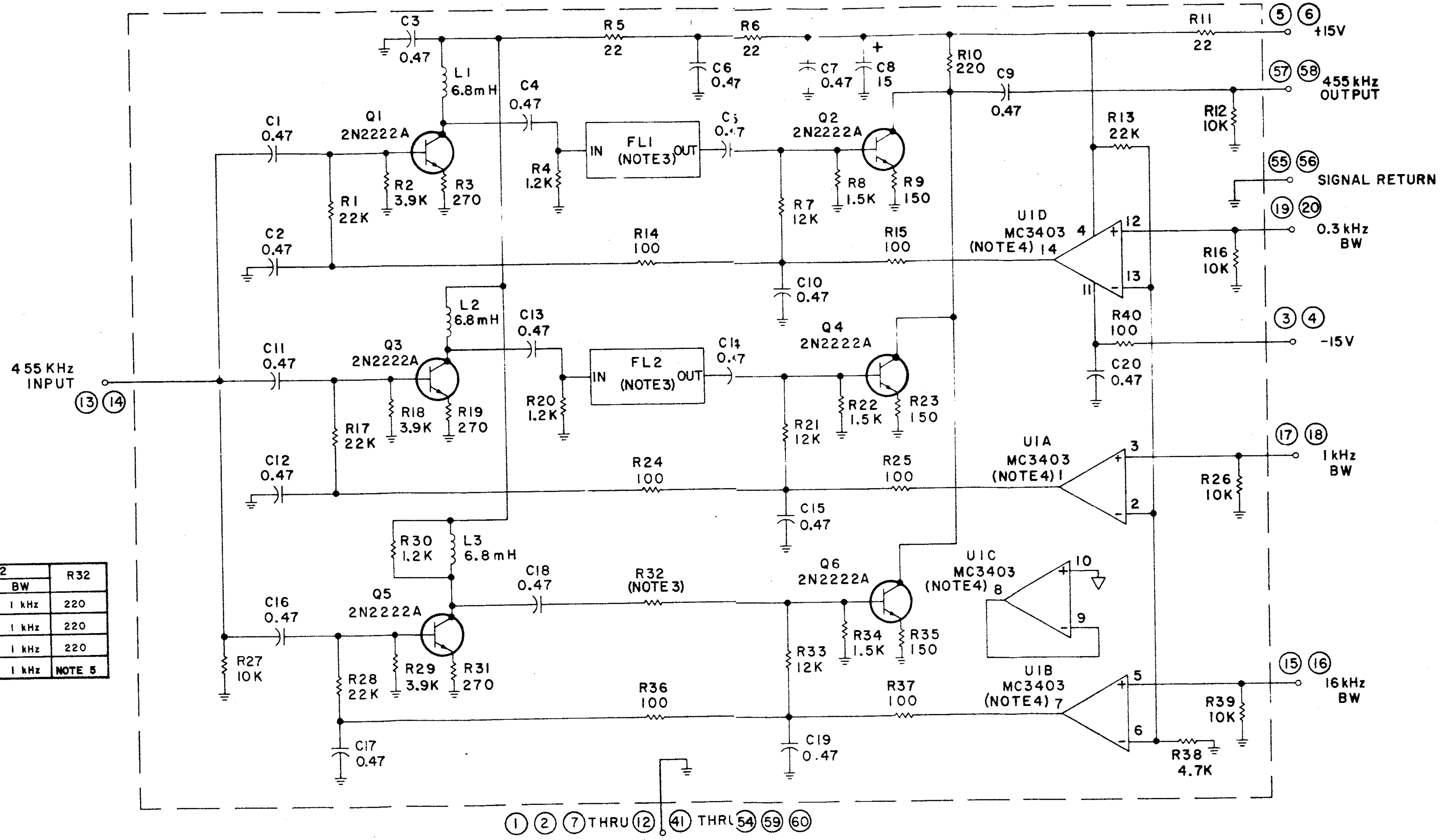


Figure FO-6. Type 791595 455 kHz Filter Switch (A4A3), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. PIN CONFIGURATION IS SHOWN IN DETAIL A
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A

DETAIL A

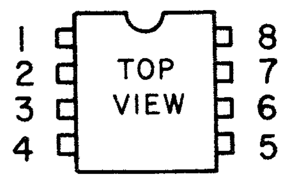


TABLE A

TYPE	FL1
791596-1	92122
791596-2	92194

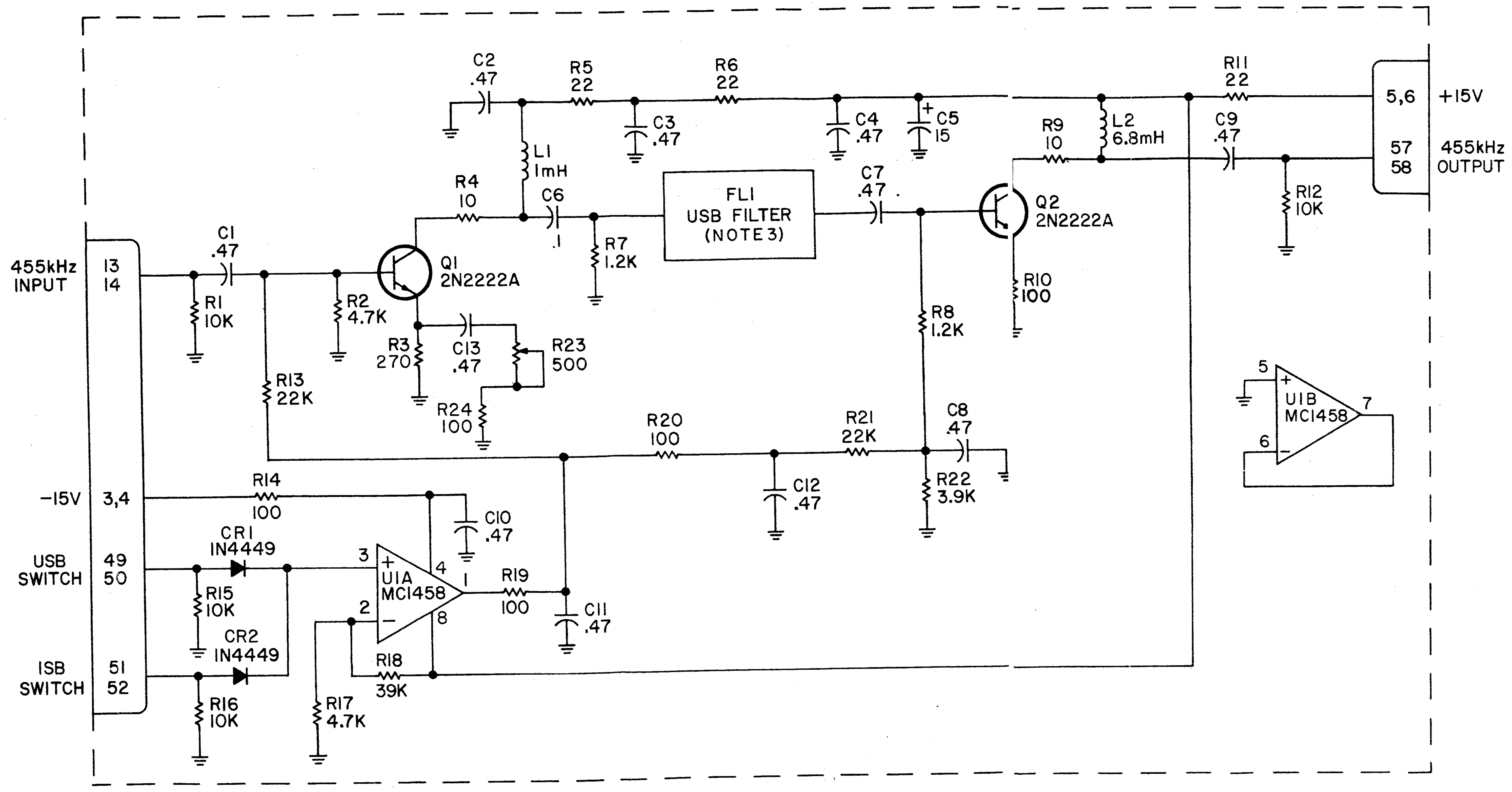
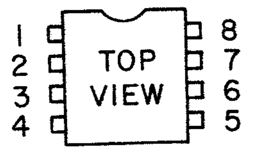


Figure FO-7. Type 791596 USB Filter Switch (A4A4), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

OTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. PIN CONFIGURATION IS SHOWN IN DETAIL A.
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A

DETAIL A



MC1458

TABLE A

TYPE	FL1
791597-1	92121
791597-2	92193

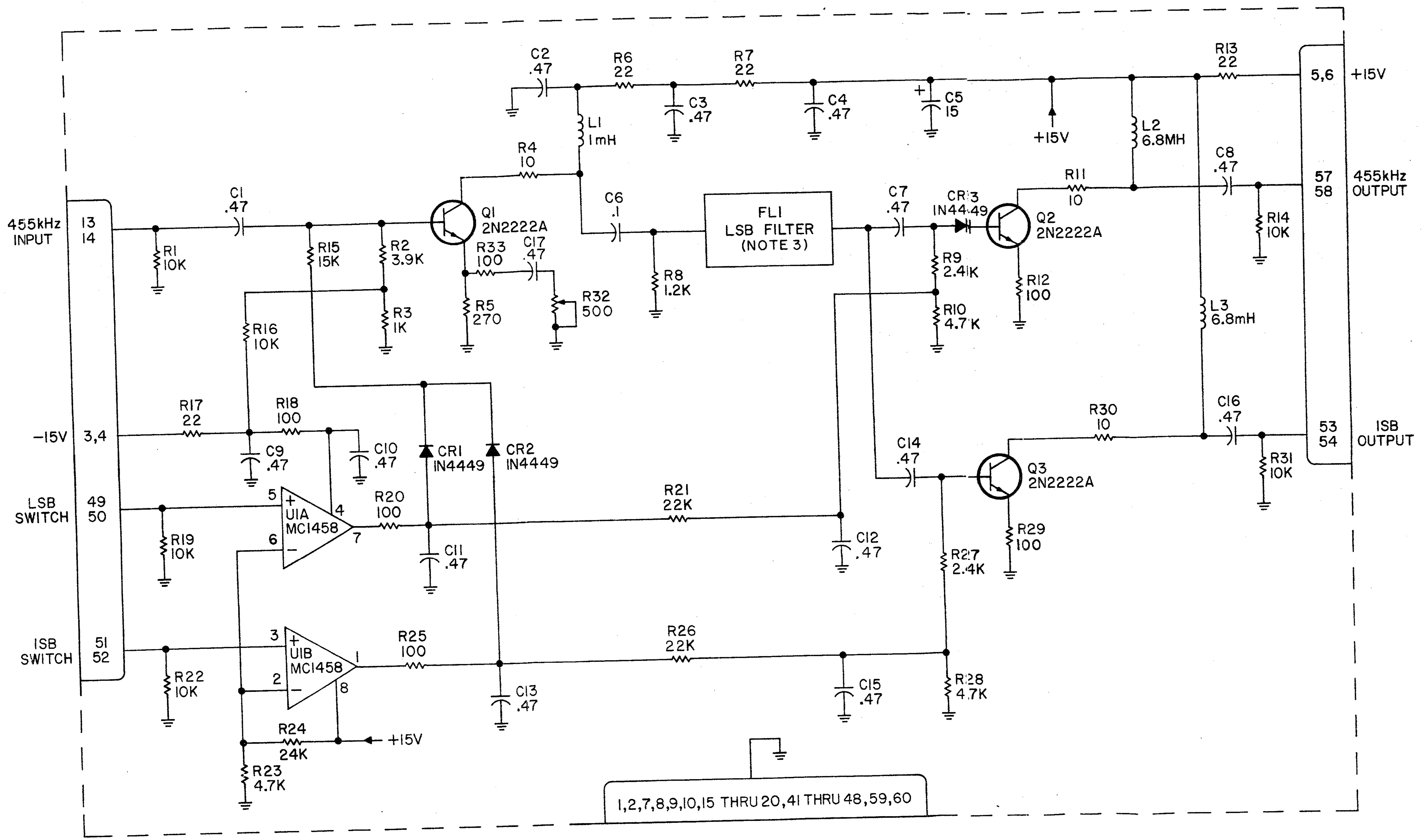


Figure FO-8. Type 791597 ISB/LSB Filter Switch (A4A5), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

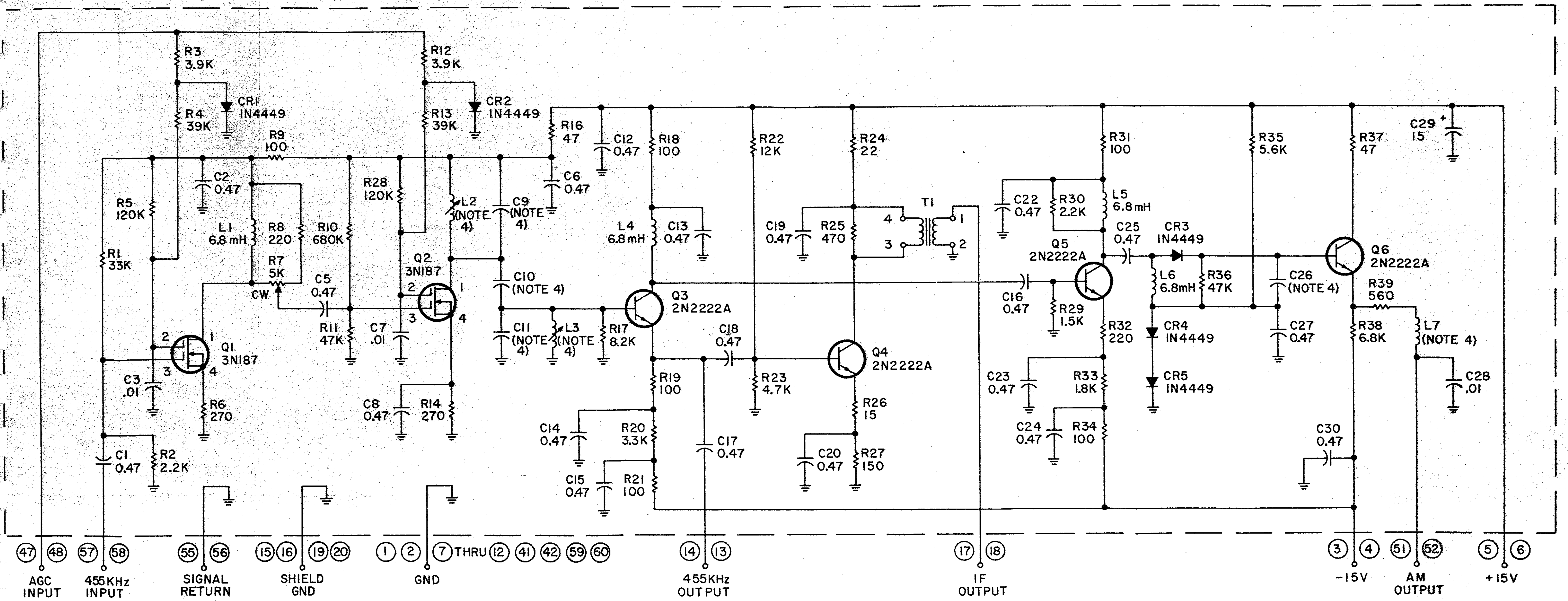


TABLE A

TYPE NO	C9	C10	C11	C26	L2	L3	L7	USED ON
72488-1	3300pF	180pF	3300pF	180pF	39µH	39µH	6.8 mH	WJ-8718
72488-2	910pF	110pF	910pF	150pF	120mH	120mH	4.7 mH	WJ-8718 12

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS µF.
2. ENCIRCLED NUMBERS (LETTERS) ARE MODULE PIN NUMBERS.
3. CW ON R7 INDICATES FULL CLOCKWISE POSITION OF ACTUATOR.
4. DIFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.

Figure FO-9. Type 72488 455 kHz Amplifier/AM Detector (A4A7), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

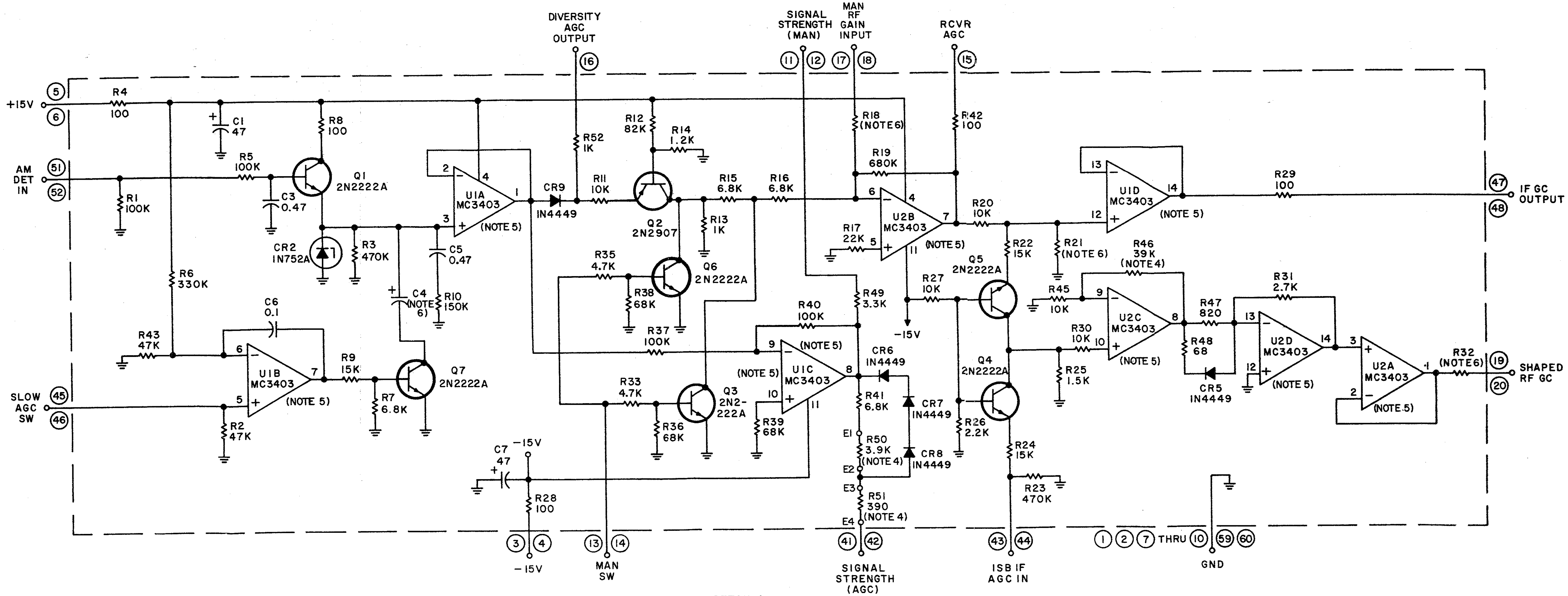


TABLE A

TYPE NO	C4	R18	R21	R32
78112-1	33 μF	270K	15K	390
78112-2	1.5 μF	270K	15K	390
78112-3	33 μF	330K	10K(VAR)	(NOTE 4)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. ENCIRCLED NUMBERS ARE MODULE PINS.
3. U1, U2 LEAD ARRANGEMENT – DETAIL A.
4. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED.
5. LM348N MAY BE USED AS AN ALTERNATIVE FOR MC3403 (SHOULD A DIFFICULTY IN PROCURING MC3403 ARISE) AT U1 AND U2 IN THIS APPLICATION.
6. DIFFERENCE BETWEEN TYPES AS INDICATED IN TABLE A

DETAIL A

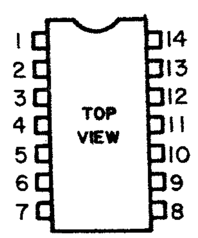


Figure F0-10. Type 78112 AGC Amplifier (A4A6), Schematic Diagram

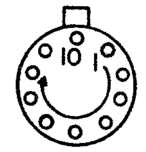
Courtesy of http://BlackRadios.terryo.org

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ± 5 %, 1/4 W.
   b) CAPACITANCE IS IN μF.
2. ENCIRCLED NUMBERS ARE MODULE PINS.
3. LEAD ARRANGEMENT OF IC'S – DETAIL A, B
✱ 4. IF DIFFICULTY OF PROCUREMENT EXISTS FOR PART MC3403P, PART LM 348N MAY BE USED AS ALTERNATE IN THIS APPLICATION.
5. DIFFERENCE BETWEEN TYPES AS INDICATED IN TABLE A.

TABLE A

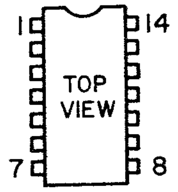
TYPE NO	C11	L3	R11
791599-1	.015	47MH	470K
791599-2	.0033	6.8MH	390K

DETAIL A



BOTTOM VIEW
U1

DETAIL B



U2, U3

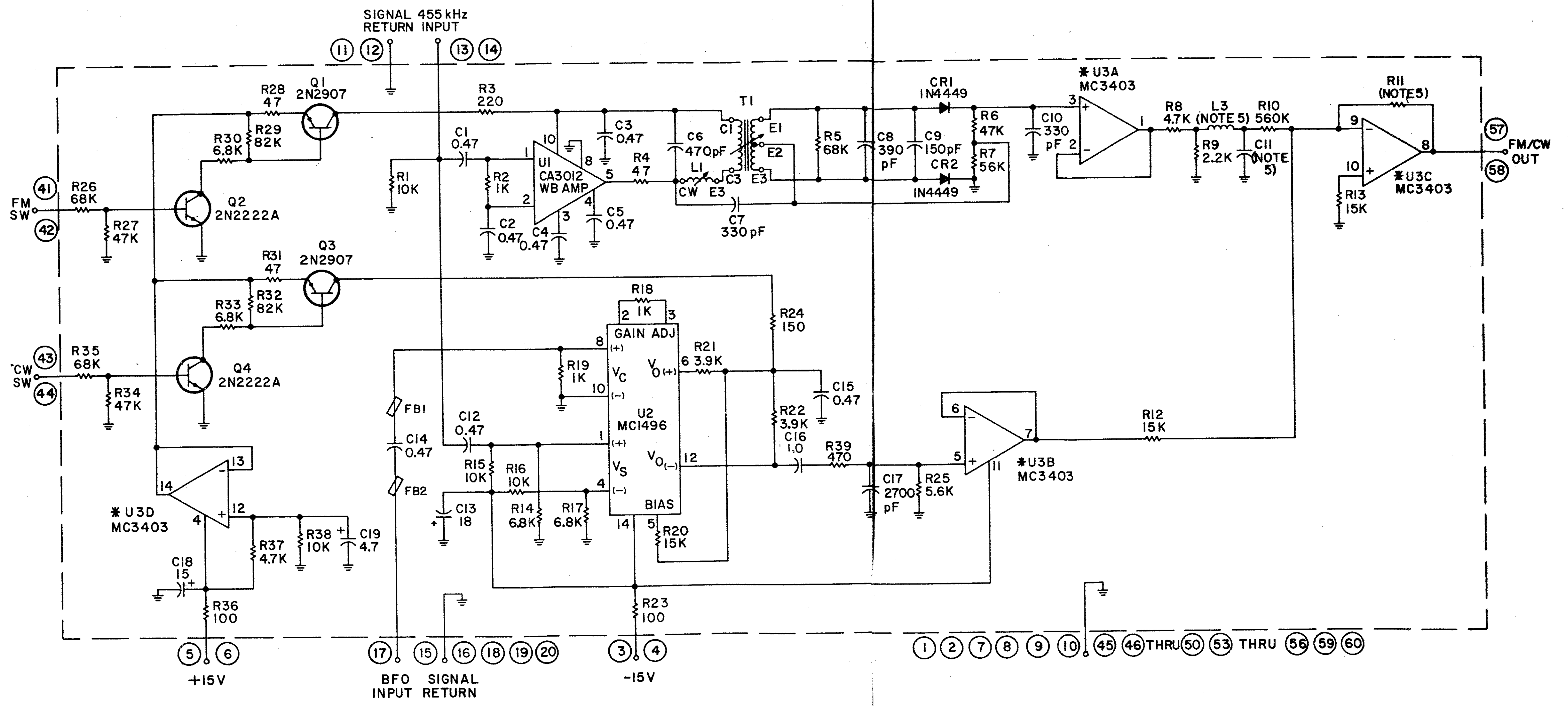


Figure FO-11. Type 791599 FM, CW and SSB Detector (A4A9), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

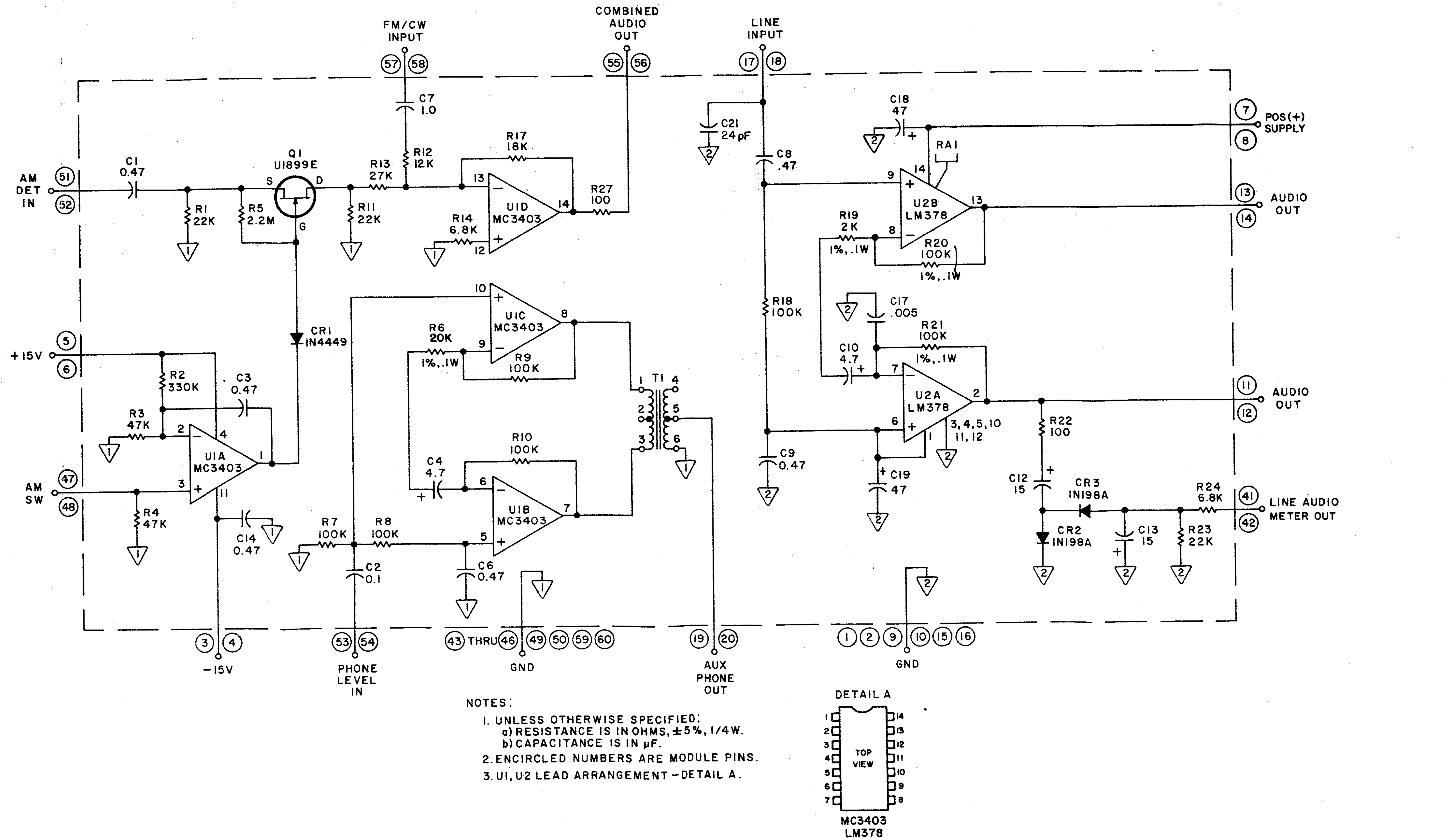
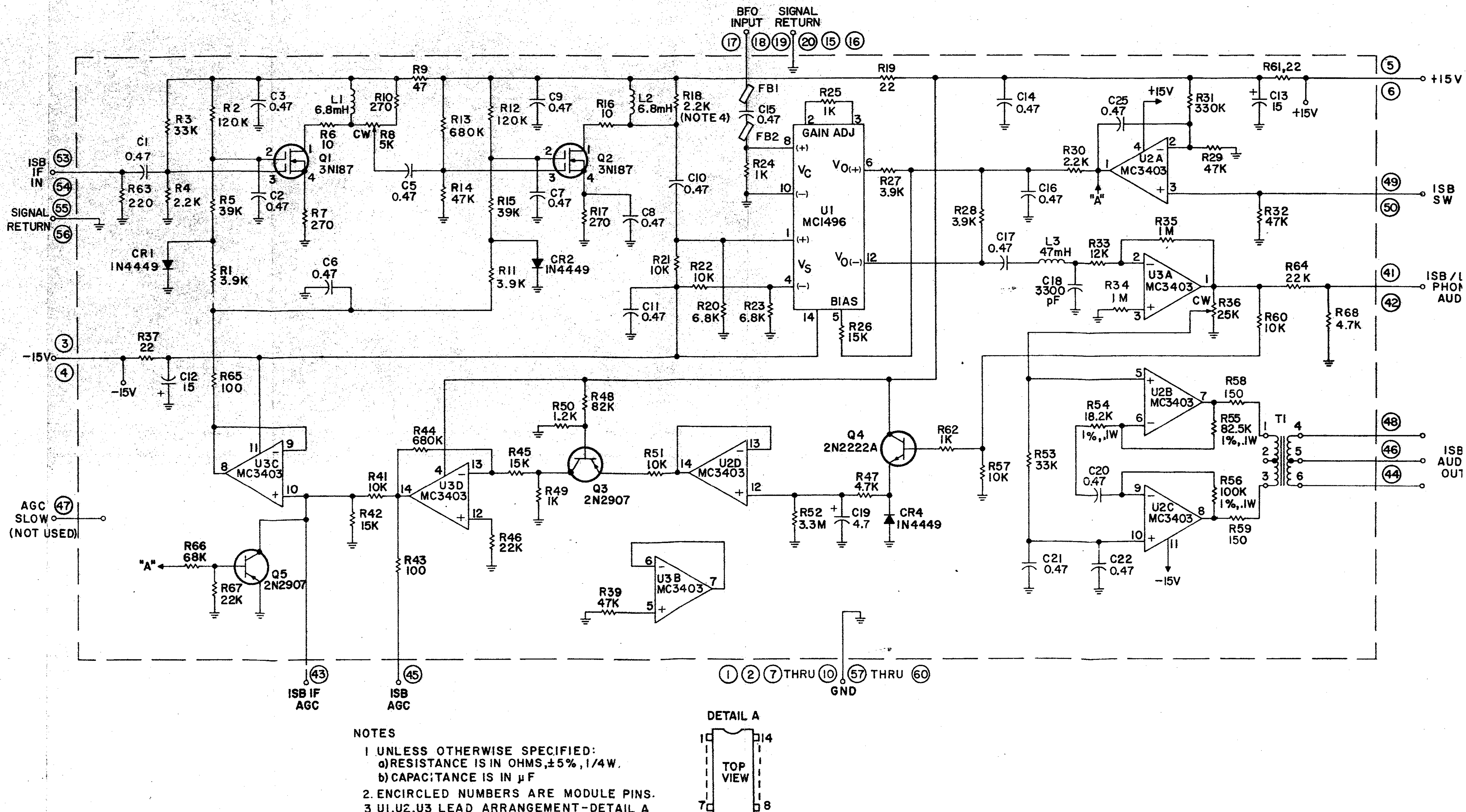


Figure FO-12. Type 746001 Audio Amplifier (A4A10), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



NOTES

1 UNLESS OTHERWISE SPECIFIED:
  a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
  b) CAPACITANCE IS IN µF
2. ENCIRCLED NUMBERS ARE MODULE PINS.
3 U1, U2, U3 LEAD ARRANGEMENT-DETAIL A
4 NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

Figure FO-13. Type 791598 ISB Detector/Audio (A4A8), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

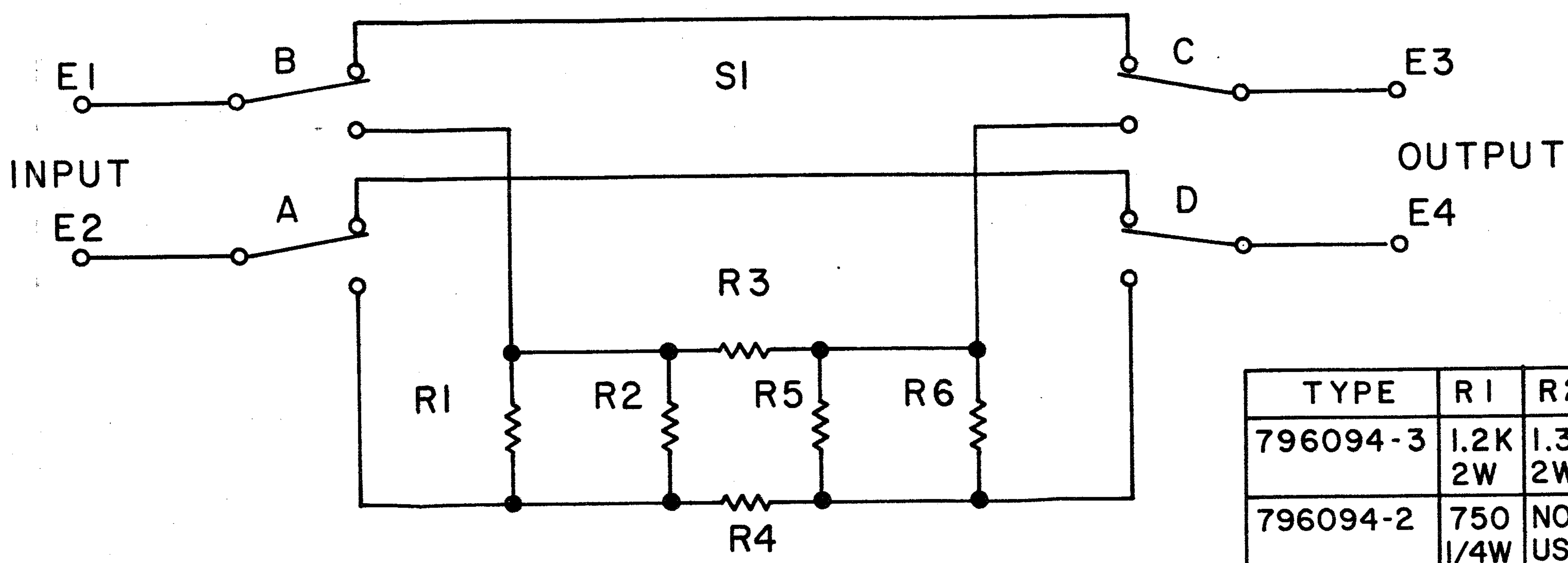


TABLE A

TYPE	R1	R2	R3	R4	R5	R6	ATTEN	IMPD
796094-3	1.2K 2W	1.3K 2W	4.7K	4.7K	1.2K	1.3K	30db	600Ω
796094-2	750 1/4W	NOT USED	1.5K 1/4W	1.5K 1/4W	750 1/4W	NOT USED	20 db	600Ω
796094-1	33 2W	36 2W	120	120	33	36	30 db	16Ω

NOTE: UNLESS OTHERWISE SPECIFIED

1. RESISTANCE IS IN OHMS, ± 5%, 1/2W.
2. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A

Figure FO-14. Type 796094-1 and 796094-2 Switchable Audio Attenuator (A11 and A12), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

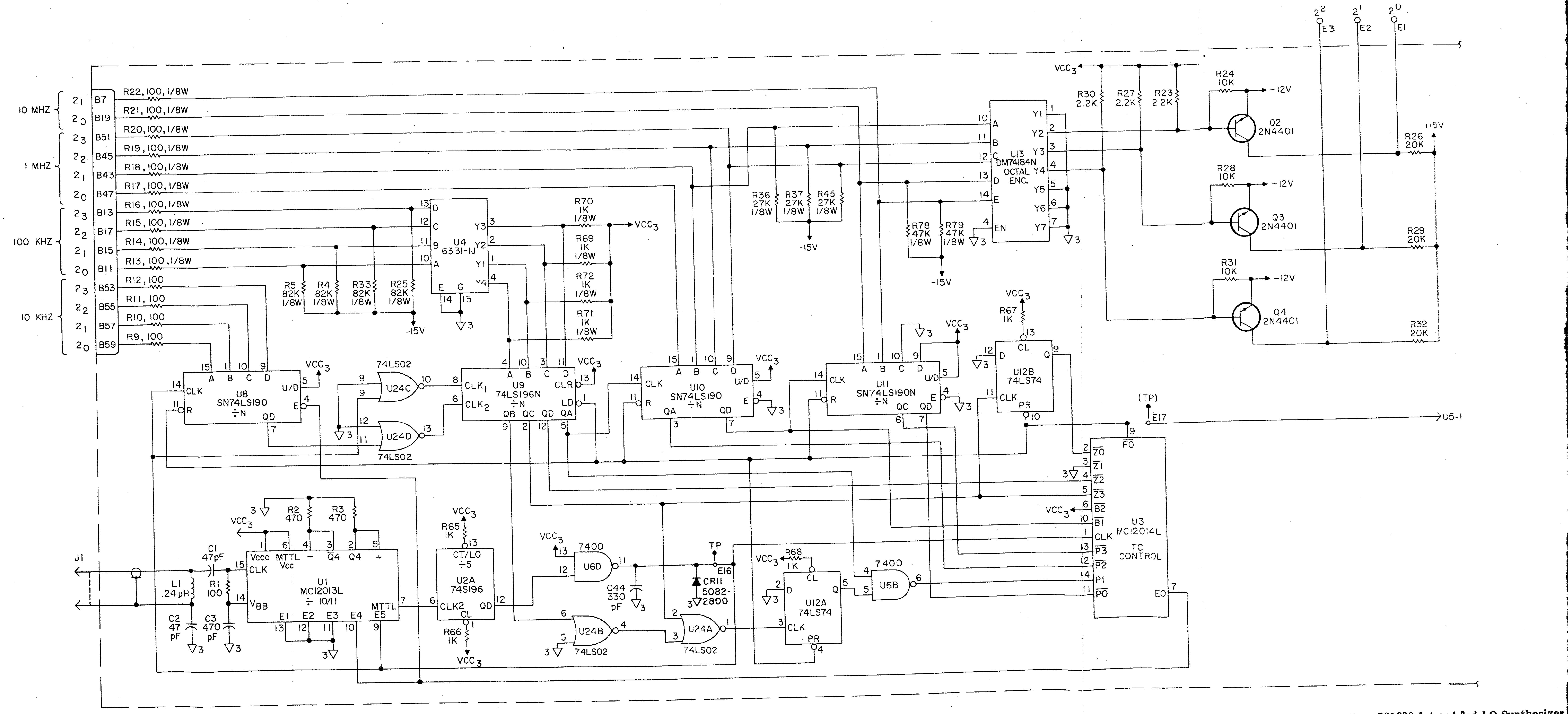


Figure FO-15. Type 791600 1st and 3rd LO Synthesizer/ Time Base (A5A1A2) Schematic Diagram (Sheet 1 of 2)

Courtesy of http://BlackRadios.terryo.org

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN uF.
2. VCC, GND PINS OF IC,S ARE SHOWN IN TABLE A.
3. LEAD ARRANGEMENT FOR IC,S ARE SHOWN IN TABLE A.
4. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.
5. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE B.
6. GROUND LEVEL PINS ARE LISTED BELOW.
   a) PIN NOS. OF GND LEVEL ONE ARE A48, A50, A52, A54, A56 & A58.
   b) GND LEVEL TWO ARE A2, A4, A6, A8, A10, A12, A14, A16, A18 A20, A42, A44, A46, A43.
   c) GND LEVEL THREE ARE B2, B4, B6, B8, B10, B12, B14, B16, B18, B20 B42, B44, B46, B48, B50, B52, B54, B56 & B58.

TABLE A

IC	REF DESIG	VCC			GND			DTL	VCC2 (FIL)
		1	2	3	1	2	3		
MC4044P	U5			14			7	B	
MC4044P	U22					7		B	14
MC12013L	U1			16			8	A	
MC12014L	U3			16			8	A	
SN74LS196N	U9			14			7	B	
SN74LS196	U2			14			7	B	
SN7400	U6			14			7	B	
82S123	U4			16			8	A	
SN74LS190	U8, U10			16			8	A	
SN74S74	U11			16			8	A	
SN74184	U13			16			8	A	
SN75140	U16	8			4			C	
74LS74	U21					7		B	14
8292	U15, U17	14			7			B	
8292	U18, U20		14			7		B	
741	U7							C	
SN74LS74	U12			14			7	B	
SN74125	U23	14			7			B	
SN74LS02	U24			14			7	B	

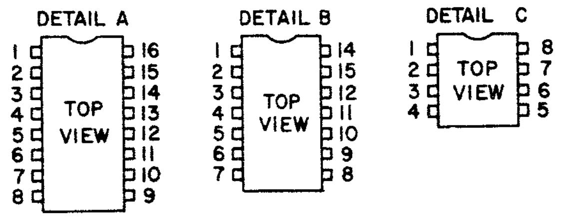


TABLE B

TYPE	C36	L3	W1	U14
791600-1	AS SHOWN	AS SHOWN	NOT USED	92063-1
791600-2	NOT USED	NOT USED	AS SHOWN	92063-1
791600-3	AS SHOWN	AS SHOWN	NOT USED	841038

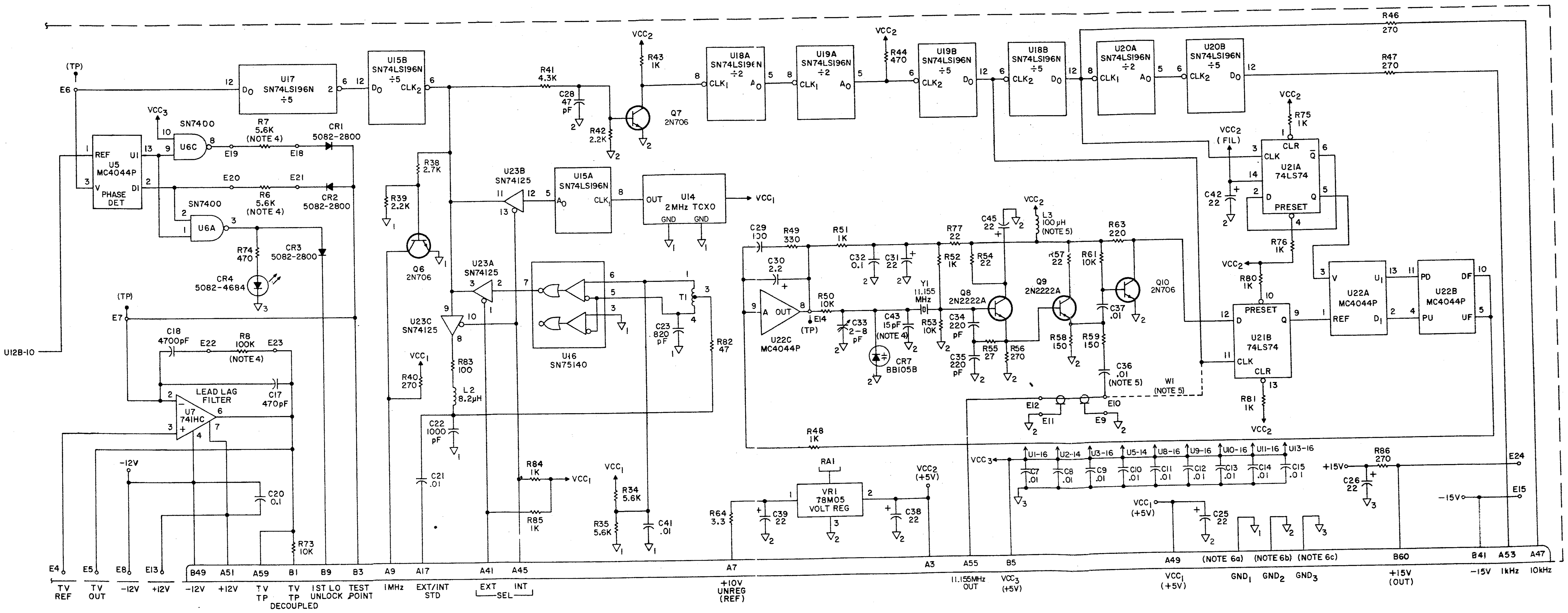
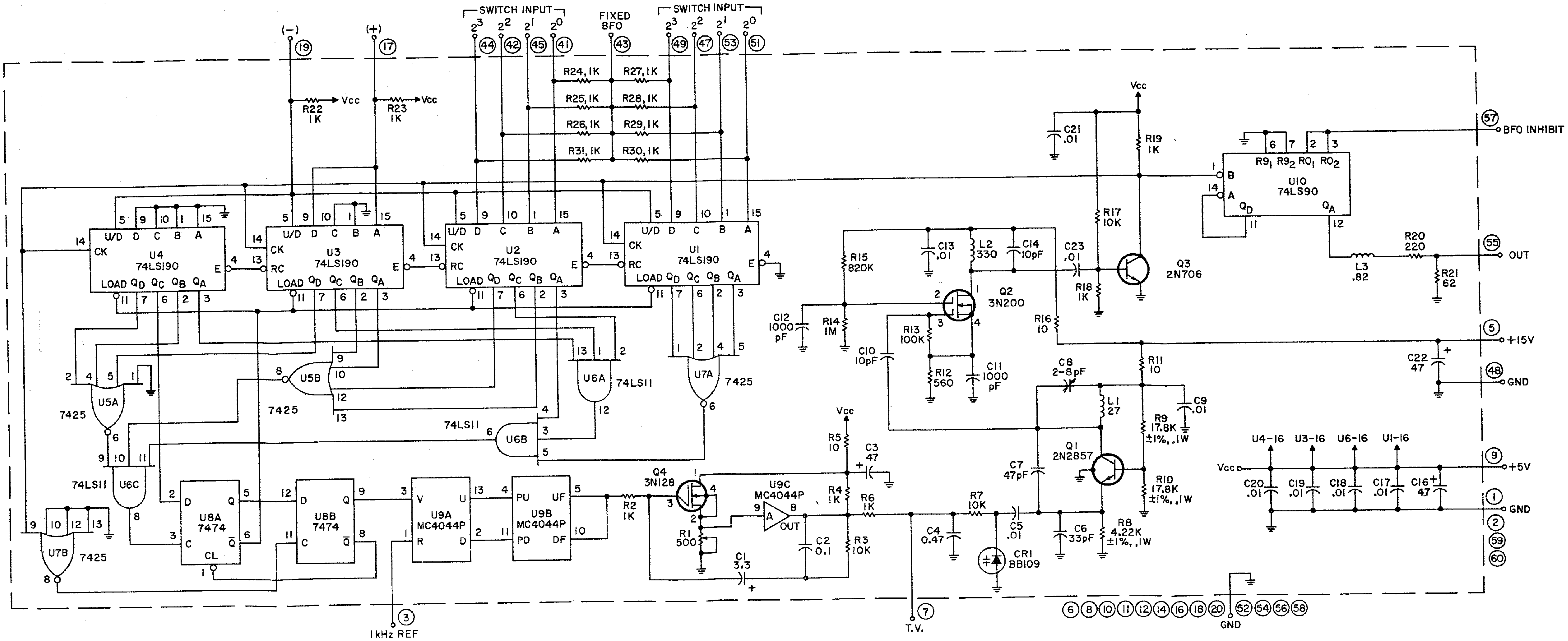


Figure FO-15. Type 791600 1st and 3rd LO Synthesizer/ Time Base (A5A1A2) Schematic Diagram (Sheet 2 of 2)

Courtesy of http://BlackRadios.terryo.org

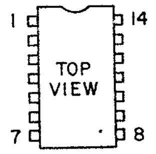


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
   c) INDUCTANCE IS IN μH.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. FOR I/C PIN ARRANGEMENTS SEE DETAILS A & B.
4. FOR PIN NOS. OF Vcc & GND SEE TABLE A.

TABLE A

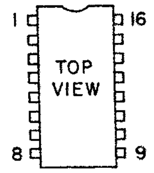
I/C	REF DESIG	Vcc	GND
74LS190	U1, U2, U3, U4	16	8
7425	U5, U7	14	7
74LS11	U6	14	7
7474	U8	14	7
MC4044P	U9	14	7
74LS90	U10	5	10

DETAIL A



7425, 7474
MC4044P
74LS90
74LS11

DETAIL B



74LS190

Figure FO-16. Type 791576 BFO Synthesizer (A5A3), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. PIN ARRANGEMENTS & POWER CONNECTIONS FOR IC'S ARE GIVEN IN TABLE 1.
3. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.

IC TYPE	REF DESIG	DETAIL	Vcc 1 PIN	Vcc 2 PIN	Vcc 3 PIN	∇_1	∇_2	∇_3
MC4044	U1	B	14			7		
74177	U2	B	14			7		
74S74	U3	B	14			7		
796	U4	C						
733	U5	C						
MC4044	U6	B		14			7	
74LS190	U7,U8	A			16			8
74LS191	U9,U10	A			16			8
74LS00	U11	B			14			7
MC4044	U12	B			14			7
74LS168	U14	A			16			8
MC12013	U15	A			16			8
MC12013	U16	A			16			8
74LS196	U17,U19	B			14			7

REF DESIG	
HIGHEST	NOT USED
C75 CR5 E3 L11 Q7 R80 U19 VR1	C31 R39, R43 R45 U13, U18

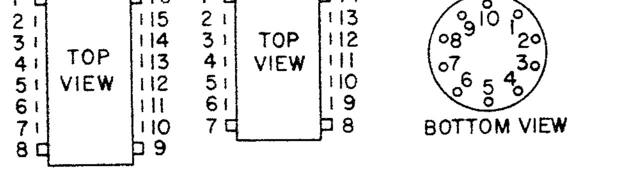
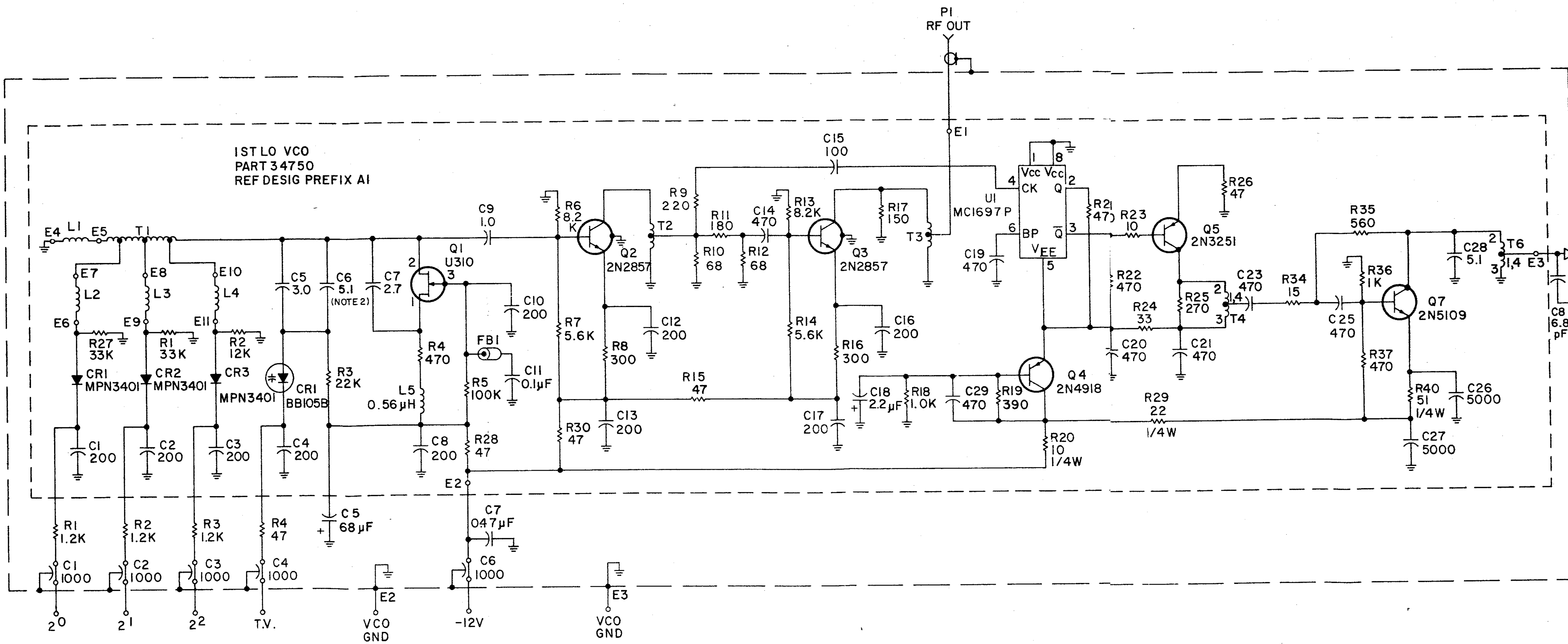


Figure FO-17. Type 791601 2nd LO Synthesizer (A5A2), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



NOTES:

1 UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS IN OHMS ±5%, 1/8W
b) CAPACITANCE IS IN pF.

2. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED.

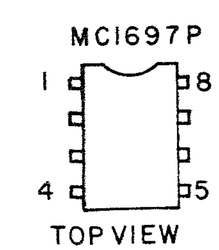


Figure FO-18. Type 791629 1st LO/VCO (A5A1A1), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

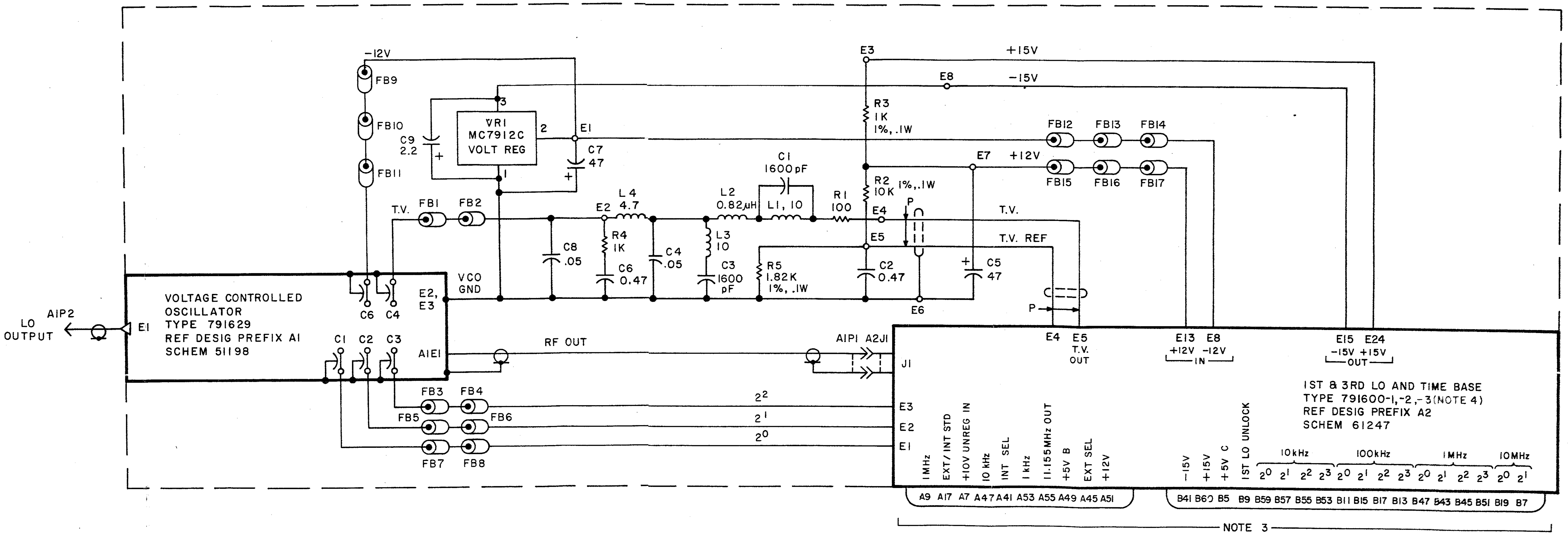
NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS IN µF.
   c) INDUCTANCE IS IN mH.
2. LEAD ARRANGEMENT FOR VR1 IS SHOWN IN DETAIL A.
3. LETTERS (NUMBERS) ARE MODULE (A2) PINS. GND PINS FOR GND_1, GND_2, GND_3, ARE LISTED IN TABLE A.
4. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE B.

TABLE A

GND	MODULE PIN
GND_1	A48, 50, 52, 54, 56, 58, 60
GND_2	A2, 4, 6, 8, 10, 14, 16, 18, 20, 42, 44, 46
GND_3	B2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 42, 44, 46, 48, 50, 52, 54, 56, 58

TABLE B

TYPE	A2
791630-1	791600-1
791630-2	791600-2
791630-3	791600-3



DETAIL A

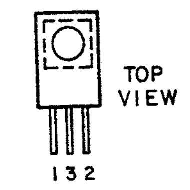


Figure FO-19. Type 791630 1st and 3rd LO Synthesizer Time Base (A5A1), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

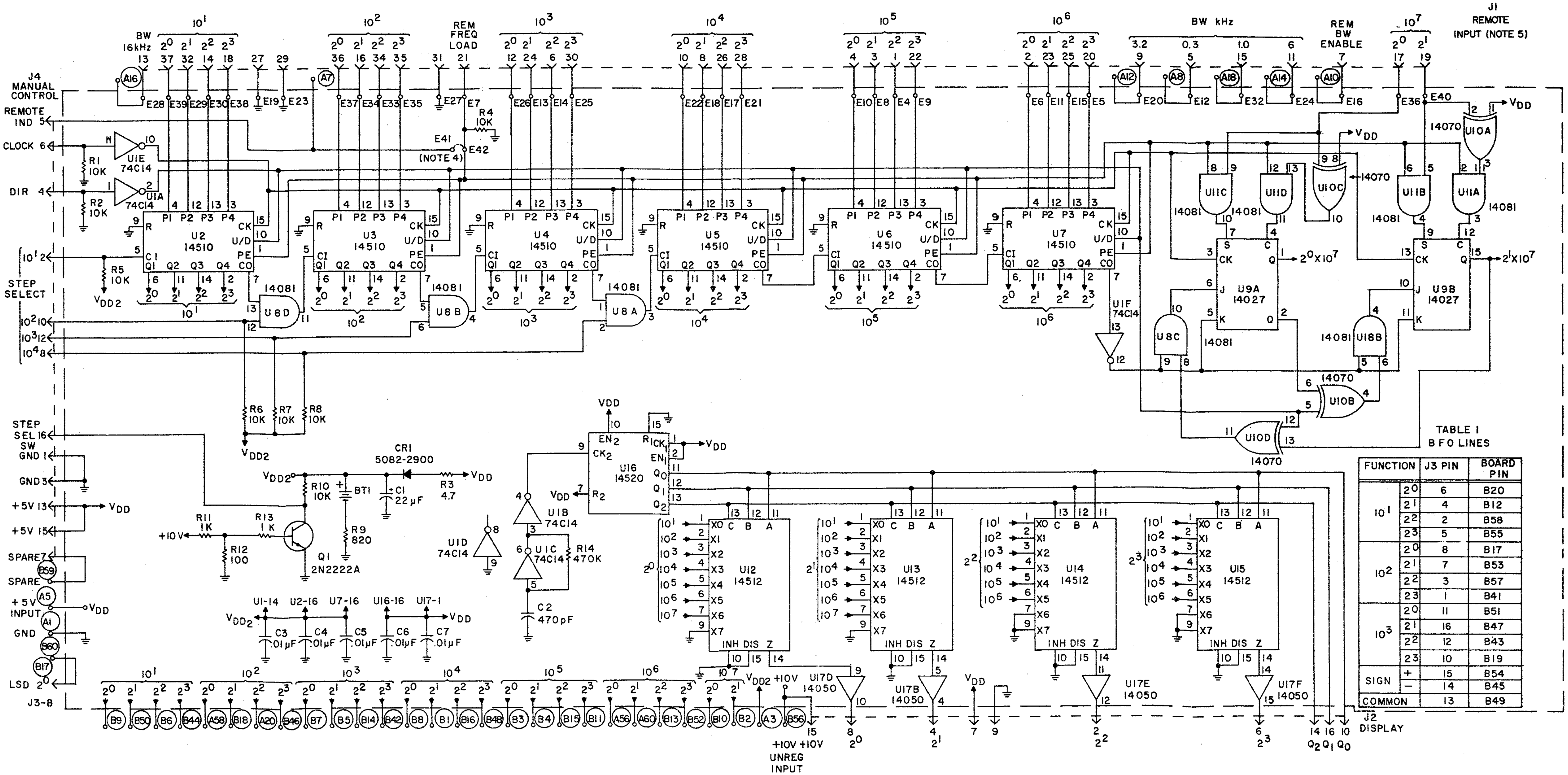


TABLE 1
B F O LINES

FUNCTION		J3 PIN	BOARD PIN
10^1	2^0	6	B20
	2^1	4	B12
	2^2	2	B58
	2^3	5	B55
10^2	2^0	8	B17
	2^1	7	B53
	2^2	3	B57
	23	1	B41
10^3	2^0	11	B51
	2^1	16	B47
	2^2	12	B43
	2^3	10	B19
SIGN	+	15	B54
	–	14	B45
COMMON		13	B49

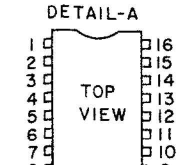
NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IS IN OHMS ± 5%, 1/4 W
2. POWER CONNECTIONS AND PIN ARRANGEMENTS FOR ICs ARE GIVEN IN TABLE 2
3. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
4. REMOVE JUMPER BETWEEN E42 AND E41 FOR EXTERNALLY ACTIVATED REMOTE CONTROL. THE PRESENSE OF THE JUMPER PROVIDES FRONT-PANEL ACTIVATED REMOTE CONTROL.
5. DIFFERENCE BETWEEN TYPES IS J1 REMOTE INPUT CABLE IS NOT USED ON DASH-1 VERSION.

TABLE 2

IC	V_{DD} PIN	V_{DD2} PIN	GND PIN	DETAIL
U1, U8, U18		14	7	B
U2-U7, U9, U12-U15		16	8	A
U10, U11	14		7	B
U16	16		8	A
U17	1		8	A

DETAIL-A



DETAIL-B

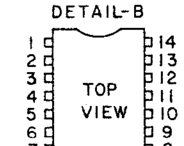
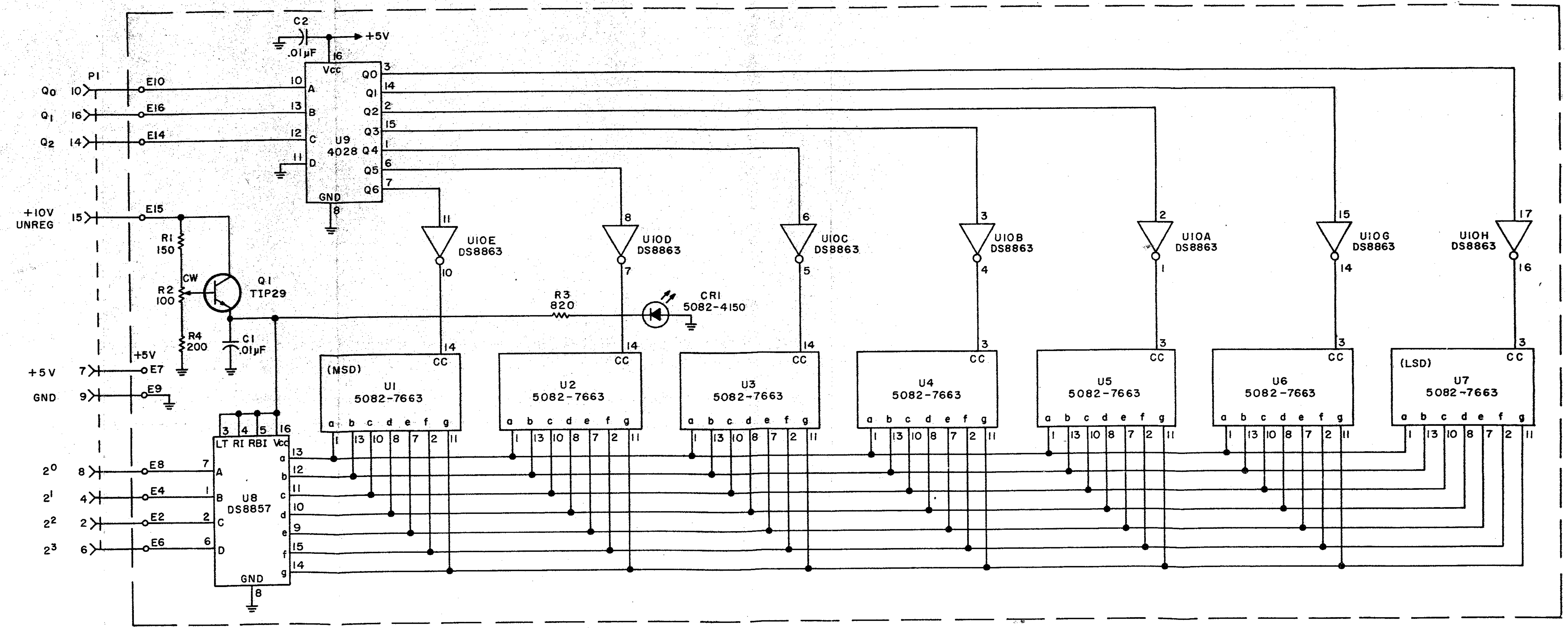


Figure FO-20. Type 791575-2 Manual Tuning Up/Down Counter (A6A1), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IS IN OHMS, ±5%, 1/4W.
2. U10 PIN 18 IS +5V; U10 PIN 9 IS GND.
3. PIN ARRANGEMENT FOR ICs IS SHOWN IN DETAILS A – C.

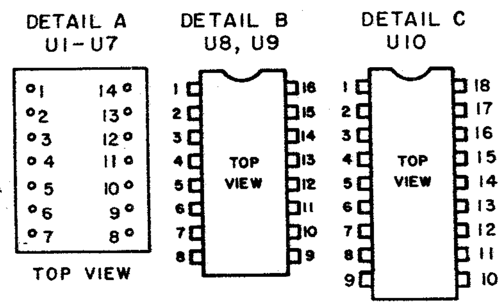


Figure FO-21. Type 791578 Frequency Display (A8), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

NOTES

1. REFER TO FO-1, SHEET 2, FOR AC POWER DISTRIBUTION.
2. ALL VOLTAGES REFERENCED TO CHASSIS GND.
3. ALL MOTHER BOARD COMMON PRINTED CIRCUIT PATHS BOLTED TO CHASSIS GND.
4. DC VOLTAGE RANGES:

NOMINAL	ALLOWABLE RANGE
+15V REG	+15 ±0.75V
−15V REG	−15 ±0.75V
+ 5V REG	+ 5 ±0.25V
+12V REG	+12 ±0.60V
+10V UNREG	+10 V MIN

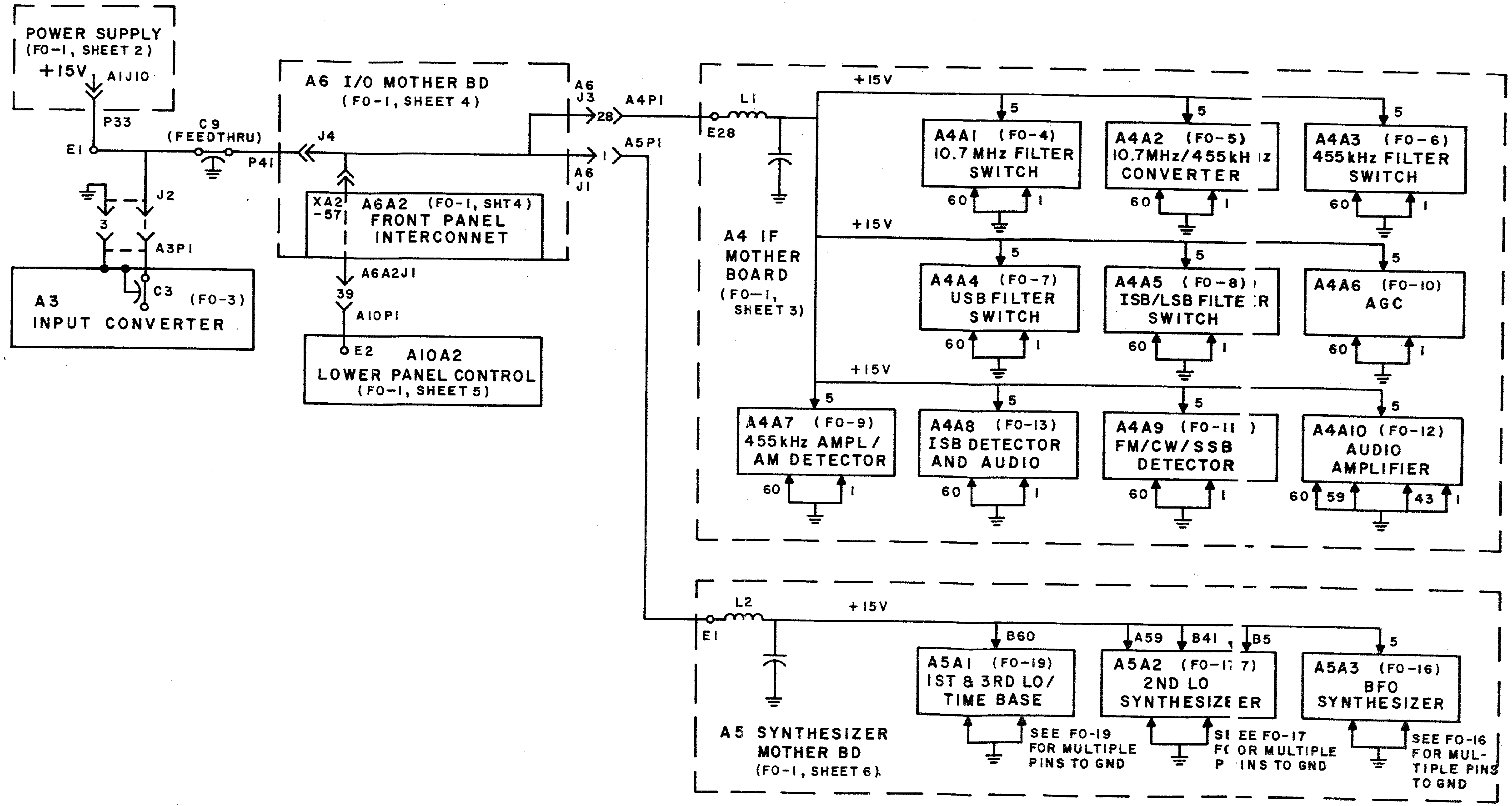


Figure F0-22. Receiver Power Distribution Diagram (Sheet 1 of 3)

Courtesy of http://BlackRadios.terryo.org

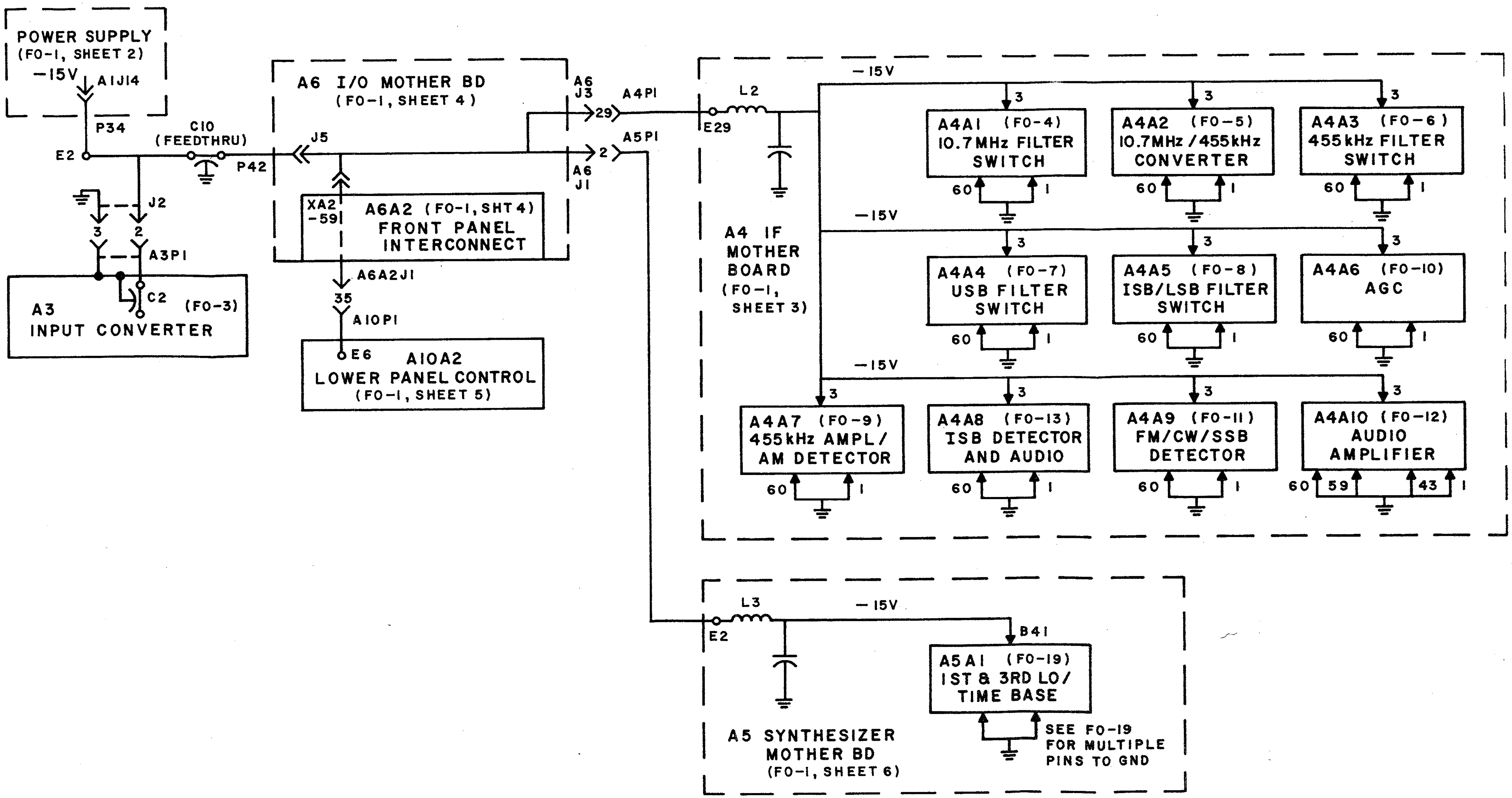


Figure F0-22. Receiver Power Distribution Diagram
(Sheet 2 of 3)

Courtesy of http://BlackRadios.terryo.org

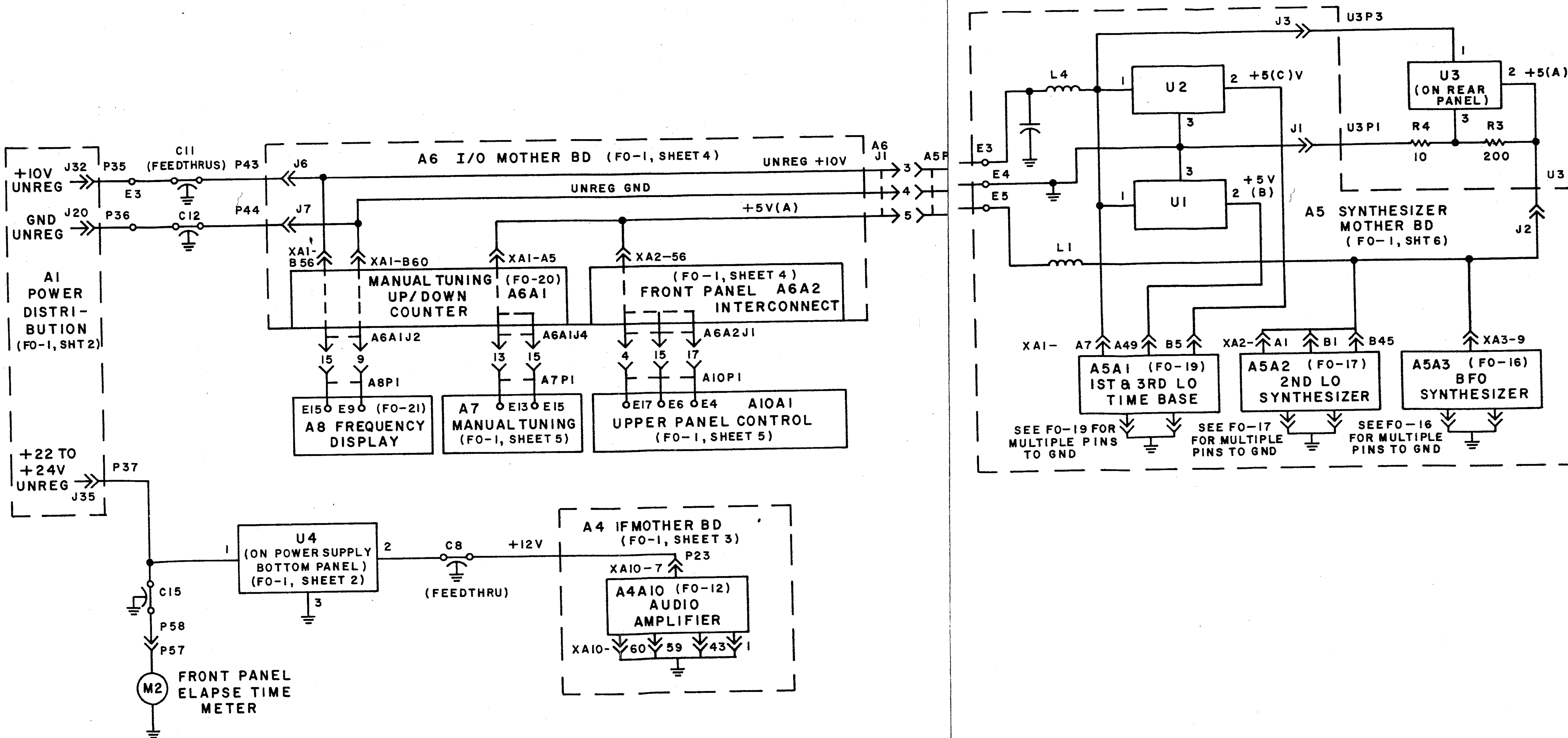


Figure F0-22. Receiver Power Distribution Diagram (Sheet 3 of 3)

Courtesy of http://BlackRadios.terryo.org

LEGEND

- MAIN SIGNAL PATH
- OPTIONAL MAIN SIGNAL PATH OR MODE
- OTHER SIGNAL PATHS

NOTES

1. REFER TO CHAPTERS 3 & 5 FOR APPROPRIATE SIGNAL FREQUENCIES AND LEVELS AS A FUNCTION OF RECEIVER INPUTS AND SETTINGS.
2. REFER TO CHAPTER 5 FOR TROUBLESHOOTING PROCEDURES.
3. REFER TO CHAPTER 6 FOR ADJUSTMENT AND ALIGNMENT PROCEDURES.

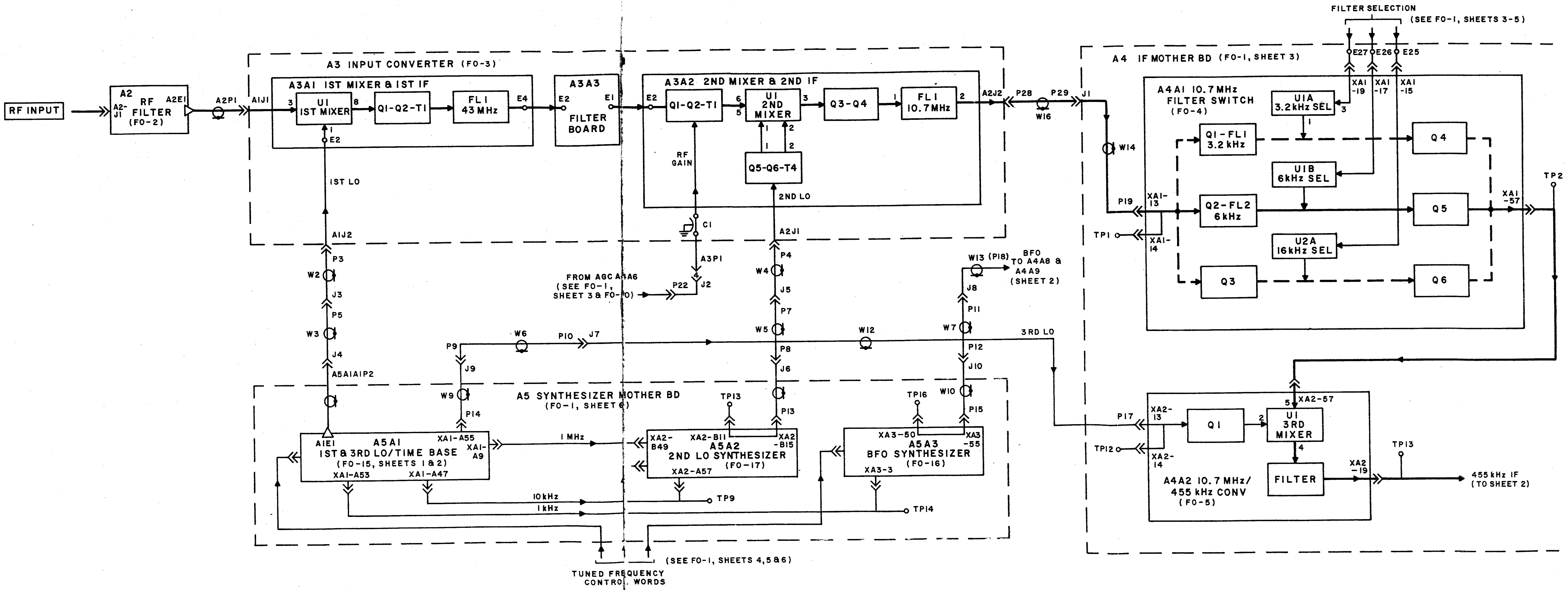


Figure F0-23. Receiver Signal Flow Diagram (Sheet 1 of 3)

Courtesy of http://BlackRadios.terryo.org

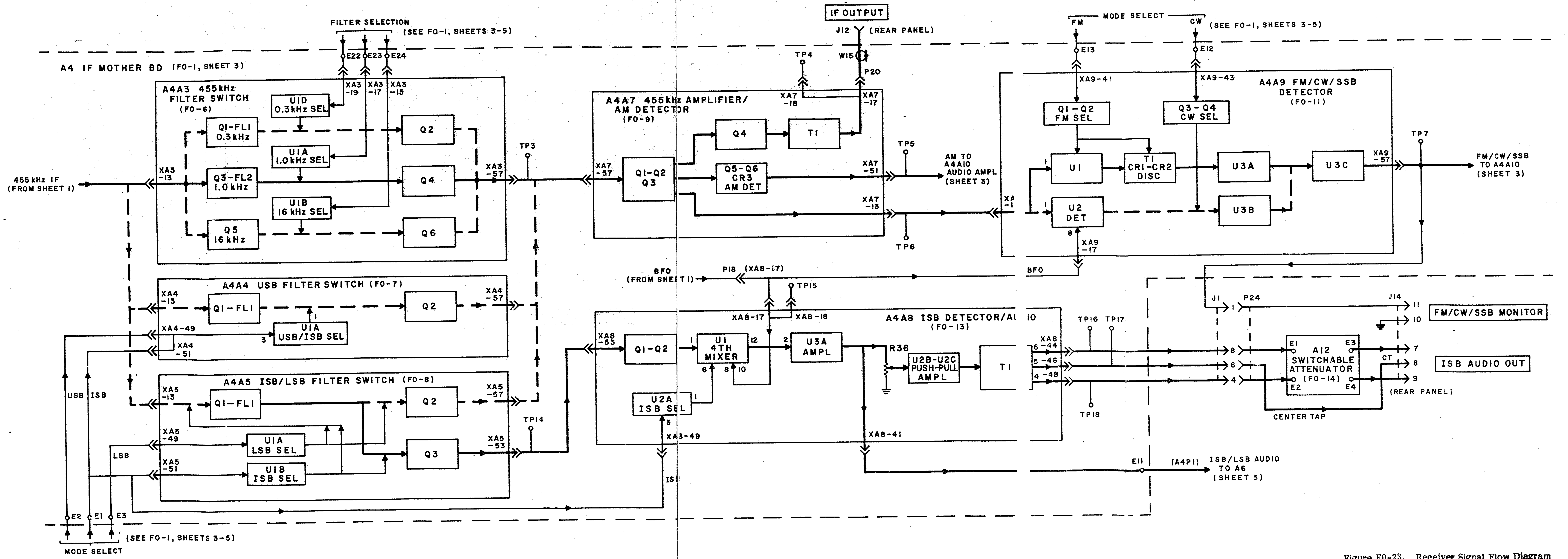


Figure F0-23. Receiver Signal Flow Diagram (Sheet 2 of 3)

Courtesy of http://BlackRadios.terryo.org

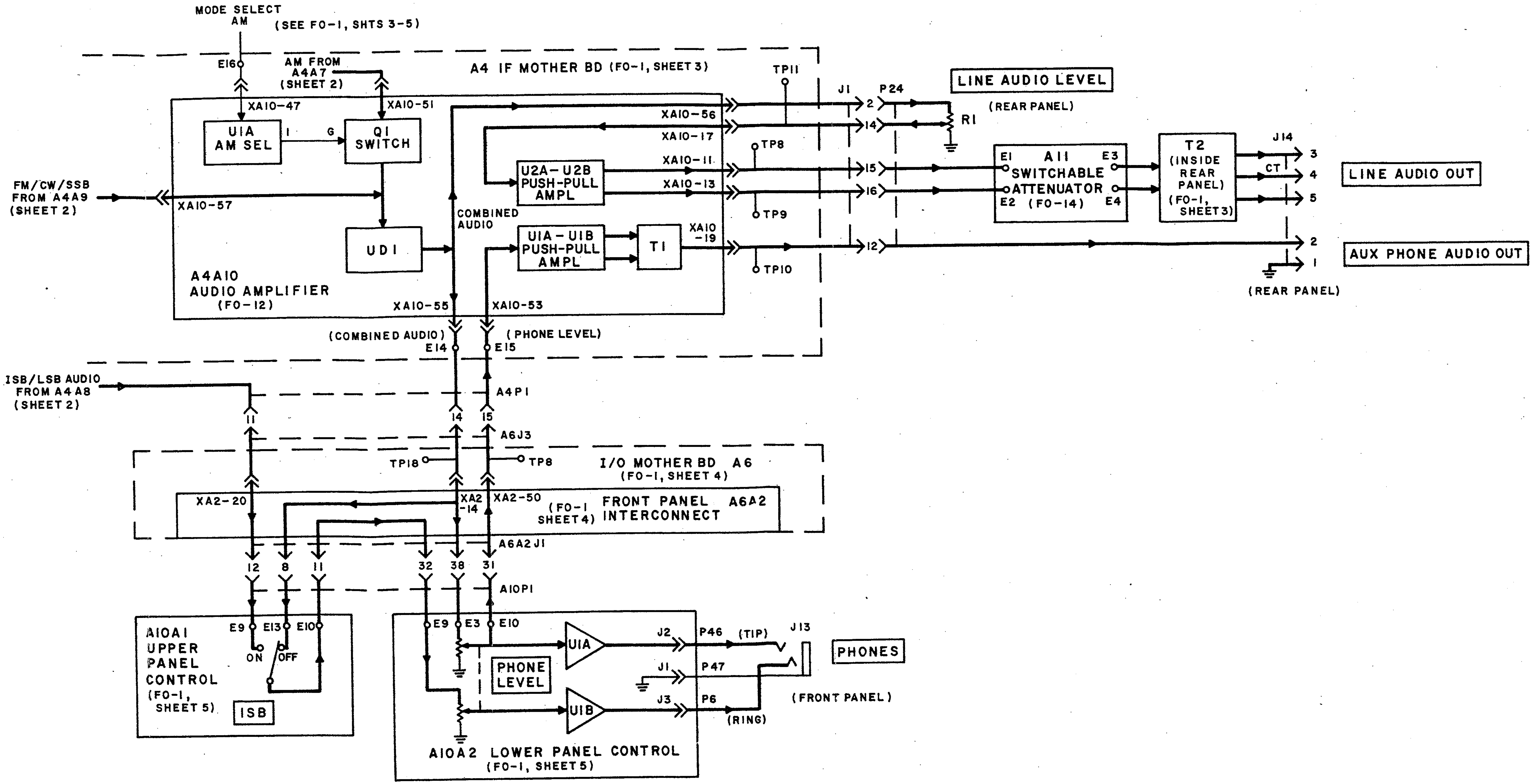


Figure F0-23. Receiver Signal Flow Diagram (Sheet 3 of 3)