INSTRUCTION BOOKLET

DIRECTION FINDER SET
VHF HOMER AN/SRD-21

MADE FOR

DEPARTMENT OF TRANSPORTATION

UNITED STATES COAST GUARD

CONTRACTOR

INTECH INC. 33967

SANTA CLARA, CAL. 95050

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS

LIST OF TABLES

SECTION I - THEORY OF OPERATION

1.1 INTRODUCTION

This section is divided into three major parts: (a) a description of the basic operating principles of the AN/SRD-21 VHF Homer (hereinafter referred to as the homer) (b) a description of the homer keyed to a functional block diagram and (c) a detailed circuit analysis. The simplified block diagram (figure 1-1) represents the homer in its most basic form and the functional block diagram (figure 1-2) details the circuitry within the three units of the homer.

1.2 OPERATING PRINCIPLES

The homer guides the vessel to a source of radio transmission in the VHF/FM marine band by providing the helmsman with a visual indication of the direction to steer to reach the source. The homer is comprised of three parts: an antenna unit, a receiver unit, and an indicator unit. The antenna unit consists of two identical VHF/FM antennas mounted vertically on the mast of the vessel, a fixed distance apart and at right-angles to the fore-and-aft axis of the vessel. The receiver unit is an 8-channel crystal-controlled VHF/FM receiver. An internal loudspeaker permits monitoring the homing signal or using the unit as a monitor receiver. In addition, the receiver unit contains the homer circuitry. This includes a clock oscillator, antenna and signal switching circuits, an AM detector, and a meter amplifier. The indicator unit houses a center-reading meter driven by the meter amplifier in the receiver unit and provides the helmsman with steering information.

The homing action of the system is derived from the gain pattern of the antenna unit. Viewed from above, the gain pattern is as shown in Figure 1-1A. When the system is operating in the homing mode, the right antenna and the left antenna are alternately switched to the input of the receiver. A signal source dead ahead will generate equal signal strengths to the receiver in both the right and left mode. See Figure 1-1B. A signal source to the right or left of the vessel will generate a smaller signal to the receiver from the direction of the source. This is illustrated in Figures 1-1C and 1-1D.

The homer is an amplitude modulation (AM) signal strength balancing system. A difference in signal strength is detected by the AM detector. The detected signal strength charges the "R" capacitor in the right mode and the "L" capacitor in the left mode. Any difference between the two voltages on the capacitors is amplified by the meter amplifier driving the zero center-reading meter in the indicator unit. When the capacitor voltages are equal (signal source dead ahead), the pointer on the meter will be centered. A voltage difference caused by a difference in the left/right signal amplitudes will deflect the pointer to the right or the left. Following the right/left direction indicated by the meter, the heading of the vessel can be changed until a dead-ahead indication is observed. By maintaining this heading, a transmitter can be followed to its source.

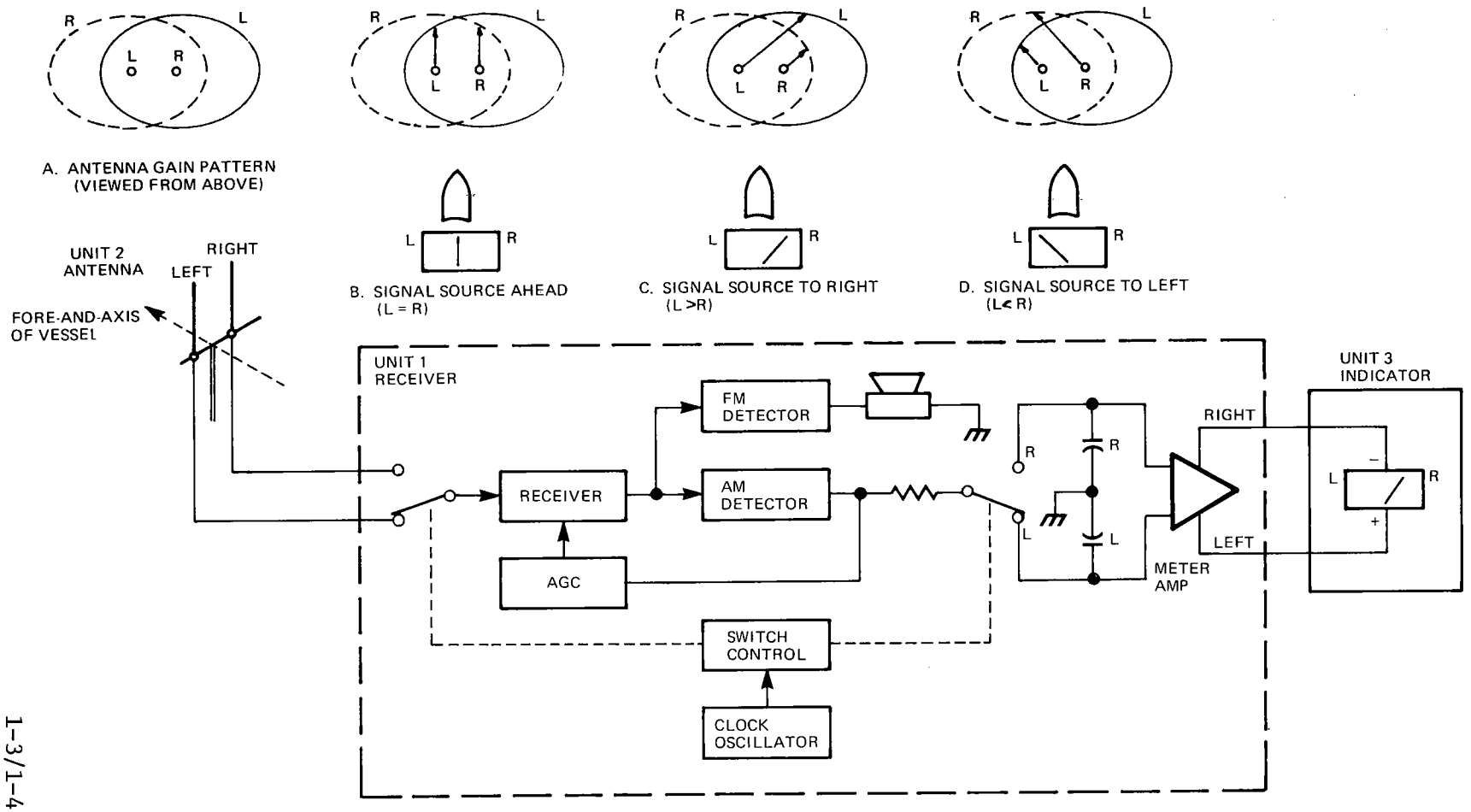


Figure 1-1. Homer Simplified Block Diagram

The clock oscillator actuates the switching and signal amplitude sensing circuit approximately 16 times per second. An automatic gain control (AGC) system derived from an AM detector allows the homer to operate over a wide range of signal strength without operator adjustment of the receiver controls.

The homer may also be used as a monitor receiver. In the monitor mode, the left antenna is connected to the receiver, and the homer logic and AGC system are disabled.

1.3 FUNCTIONAL BLOCK DIAGRAM

The following paragraphs contain descriptions keyed to the functional block diagram of the homer (Figure 1-2). The block diagram is drawn for function and does not show circuit details. Schematics and wiring diagrams are contained in Section VII.

1.3.1 Antenna Unit. - The antenna unit (unit 2 of the homer) consists of two VHF/FM antennas mounted vertically a fixed distance apart and at right angles to the fore-and-aft axis of the vessel. The antennas are connected via antenna switch assembly 1A1 to the input of receiver assembly 1A3.

1.3.2 Receiver Unit. - The following is a description of the assemblies contained in the receiver unit (unit 1 of the homer).

1.3.2.1 Antenna Switch 1A1. - Assembly 1A1, responding to "right" and "left" signals from homer logic assembly 1A4, alternately switches the right antenna and the left antenna to the input of receiver assembly 1A3. During the interval that an antenna is disconnected from the receiver, it is terminated into its characteristic impedance of 50 ohms.

1.3.2.2 Receiver 1A3. - Assembly 1A3 contains a crystal-controlled double-conversion superhetrodyne VHF/FM receiver and a number of the circuits required to implement the homing function. The receiver circuit includes two stages of radio frequency (RF) amplification with automatic gain control (AGC), a mixer, a crystal filter, a 16.9MHz first intermediate frequency (IF) amplifier and second mixer, a second local oscillator, a second IF amplifier and FM detector, and a FM audio deemphasis network. The homer circuitry includes an AM detector and buffer, and an AGC comparator. When the system is in the homing mode, the receive signal is alternately connected to the receiver from the left antenna and the right antenna while the output of the AM buffer is sampled as directional information in homer logic assembly 1A4. Un-deemphasized audio from the FM detector is coupled to (a) the squelch circuit on audio assembly 1A5 and (b) the deemphasis network on the receiver assembly. Deemphasized audio is coupled via VOLUME control 1R2 to audio power amplifier U2 in audio assembly 1A5 and hence to the loudspeaker.

1.3.2.3 Local Oscillator/Multiplier 1A6. - Assembly 1A6 supplies crystal-controlled oscillator injection for the mixer in receiver assembly 1A3. Assembly 1A6 contains a crystal-controlled oscillator with PIN diode crystal switching, a multiplier, and a buffer. Selection of the crystals is controlled by front-panel CHANNEL switch 1S1.

1.3.2.4 Homer Logic 1A4. - Assembly 1A4 contains logic and metering circuits that implement the homing function. These circuits include a clock oscillator, a divide-by-two divider that provides drive to the antenna switching and sampling circuits, a meter amplifier that amplifies the difference signal and drives the meter in the indicator unit, and a monostable multivibrator. The latter circuit supplies drive to an FM audio gating circuit that removes "buzz" from the loudspeaker audio when the system is in the homing mode. Assembly 1A4 also contains a solid-state variable voltage source, controlled by the front panel DIMMER control, which supplies power to the panel lights on the receiver and indicator units.

1.3.2.5 Audio 1A5. - Assembly 1A5 contains a noise-activated squelch circuit, an audio power amplifier, and a receiver muting capability. The squelch circuit provides audio noise quieting in the absence of an RF signal at the input of the receiver. The squelch circuit includes a squelch filter, a noise detector, an adjustable comparator, and a squelch gate. The audio amplifier provides 4 watts of audio to the loudspeaker. The muting circuit is activated by applying a ground to the MUTE jack on the rear panel of the receiver unit. Muting is useful for preventing acoustical feedback from a nearby transceiver.

1.3.2.6 Power Supply 1A2. - Assembly 1A2 operates from a 115V AC or 24V DC (negative ground) source to provide unregulated and regulated DC operating voltages for the circuits in the homer. The input power circuits contain protection fuses. Both input power sources may be connected simultaneously to the homer. The DC input circuit is protected from polarity reversal.

1.3.3 Indicator Unit. - The indicator unit (unit 3 of the homer) contains a zero center-reading meter which is driven by the meter amplifier on homer logic assembly 1A4. The meter is illuminated by two red light-emitting diodes powered by the dimmer circuit in the logic assembly 1A4. The intensity of illumination is controlled by the DIMMER control on the receiver unit.

1.4 CIRCUIT DETAILS

The following paragraphs provide a detailed explanation of the individual circuits in the homer.

1.4.1 Antenna Unit. - The antenna unit consists of two omni-directional, vertically polarized, half-wave, marine antennas mounted 19-inches apart and at right angles to the fore-and-aft axis of the vessel. Each antenna

is connected alternately to receiver assembly 1A3 by antenna switch assembly 1A1. The switching action produces the homing effect described in paragraph 1.2. The antenna system forms a directional pattern with a minimum gain in the direction of the antenna switched to the receiver. The terminated antenna (see paragraph 1.4.2.1) becomes the director of a crude directional antenna.

1.4.2 Receiver Unit. - The following is a description of the circuits contained in the receiver unit.

1.4.2.1 Antenna Switch 1A1. - (Refer to figure 7-11 for schematic diagram.) Assembly 1A1 employs PIN diode switches to alternately switch the left antenna and the right antenna to the input of receiver assembly 1A3. A PIN diode is a solid-state switching device. When forward biased, it has a low impedance (less than one ohm) and a high impedance when non-conducting (greater than 10 kilohms). The diodes are driven by the "right" and "left" signals generated by homer logic assembly A4. Refer to paragraph 1.4.2.4.1. These signal are alternately "on" and have an exact 50 percent duty cycle. Operation of the circuit when the right antenna is connected to the receiver and the left antenna is terminated is shown in figure 1-3A. In this configuration, PIN diodes CR6 and CR7 are forward biased, (on) and PIN diodes CR5 and CR8 unbiased (off).

Figure 1-3B shows circuit operation when the left antenna is connected to the receiver and right antenna is terminated. PIN diodes CR5 and CR8 are biased (on) whereas PIN diodes CR6 and CR7 are unbiased (off).

For proper operation, the two halves of the antenna switch must be symmetrical. Potentiometer R7 permits this balance to be adjusted.

Diodes CR1 through CR4 provide input protection to the receiver in the event of a large signal overload. Resistors R1 and R2 set the current through diodes CR5 and CR6. Resistors R5 and R6 similarly set the current through diodes CR7 and CR8. Resistors R1, R2 and inductors L1, L2 isolate RF signals from the DC control voltage sources.

1.4.2.2 Receiver 1A3. - (Refer to figure 7-13 for schematic diagram.) Transistors Q1 and Q2 are dual-gate MOSFET RF amplifiers tuned to cover a frequency range of 156 to 163 MHz. Automatic gain control (AGC) for the amplifiers is provided by varying the AGC voltage at pin 2 of Q1 and Q2.

Transistor Q3 is a dual-gate MOSFET mixer. The amplified receive signal from Q2 is mixed with the local oscillator signal (input from local oscillator/multiplier assembly 1A6) to generate the first intermediate frequency (IF) of 16.9MHz. The tuned circuit of L7 and C25, C27 is tuned to 16.9MHz.

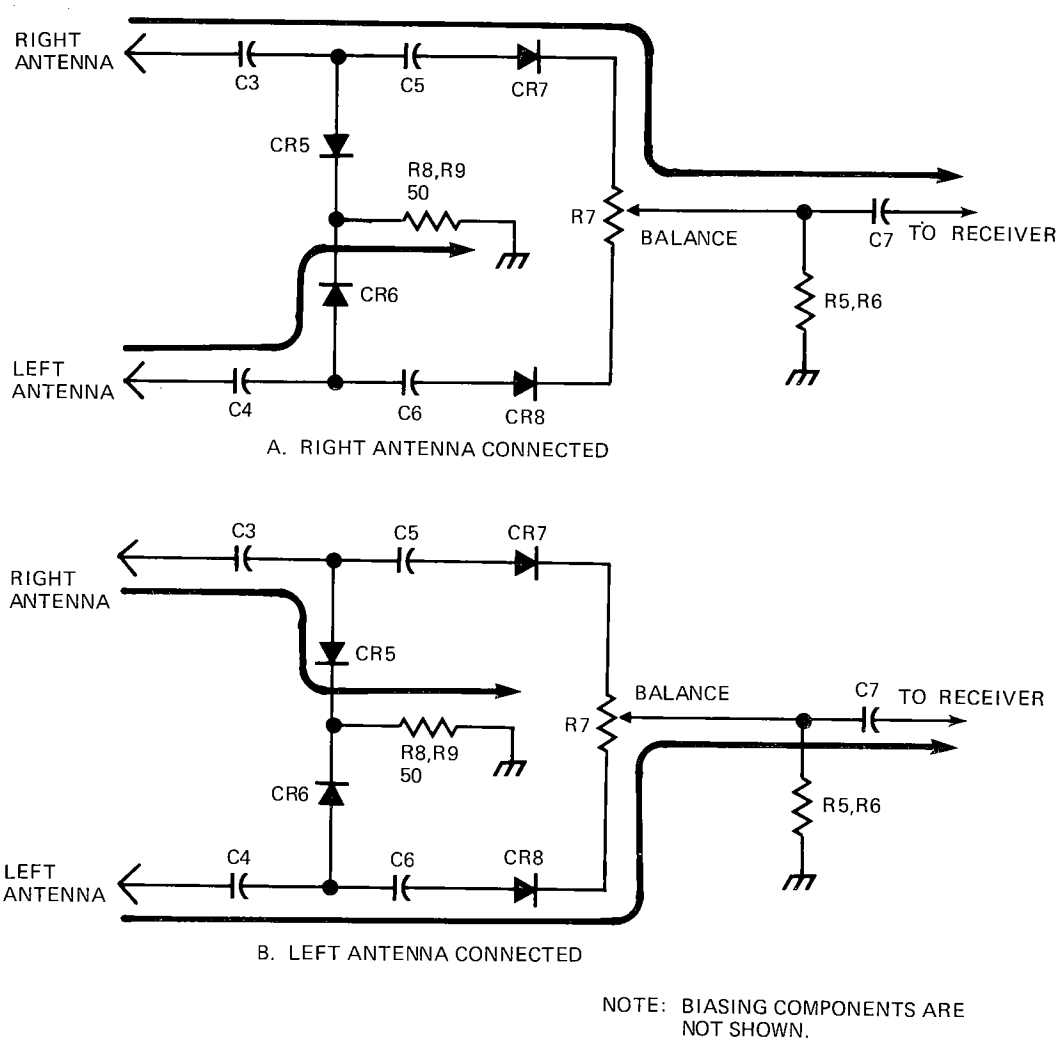


Figure 1-3. Antenna Switching Simplified Schematic Diagram

The IF signal is filtered by 8-pole crystal filter FL1 to remove adjacent channel and other undesireable receiver signals. The filter bandwidth of approximately 15kHz allows only the desired receive signal to pass.

The 16.9MHz IF signal is amplified by first IF amplifier U1. (Refer to figure 1-4 for a simplified schematic diagram of the first IF amplifier/ mixer stage.) Integrated circuit U1 also contains a mixer that mixes the second local oscillator (Q4) frequency of 17.34625MHz with the 16.9MHz to produce the second IF frequency of 446.25kHz. The second IF frequency is filtered by a circuit consisting of inductor L9 and capacitors C40, C41 to further reduce spurious response. The filtered 446.25kHz signal is fed to AM detector U3 and FM detector U2.

The FM detector (U2) is a limiter amplifier and quadrature detector. (Refer to figure 1-5 for a simplified schematic diagram of the circuit.) The limiting amplifier prevents the detection of AM interference such as ignition noise and the quadrature detector demodulates the FM audio signal.

The output of the quadrature detector (U2-pin 1) is un-deemphasized FM audio. The signal is fed first to FM audio gate switch U3C on homer logic assembly 1A4, to remove switching "buzz" from the audio. The un-deemphasized audio is also used to operate the squelch circuit on audio assembly 1A5. The gated audio is returned to the receiver assembly where it is deemphasized by resistor R24 and capacitor C50. Deemphasis of the audio yields a substantial improvement in sensitivity and signal to noise ratio. The deemphasized audio is fed via VOLUME control 1R2 to the input of power audio amplifier U2 on audio assembly 1A5 and hence to loudspeaker 1LS1.

The 446.25kHz second IF signal is also fed to AM detector U3. (Refer to figure 1-6 for a simplified schematic diagram of the circuit.) The circuit detects the signal strength of the incoming signal and produces an output (pin 1) which is used to operate AGC detector U4A. Integrated circuit U3 also demodulates AM at the antenna switching frequency which, after being buffered by U4B, is fed to homer logic assembly 1A4 as homing information.

The AGC comparator U4A compares the DC voltage from AGC potentiometer R28 with the DC output of the AM detector (signal strength) from pin 1 of U3. (Refer to figure 1-7 for a simplified schematic diagram of the AGC system.) With no input to the receiver, the signal at the non-inverting (+) input (pin 5) of U4A is greater than the signal at the inverting (-) input (pin 6). This causes the output of U4A (pin 7) to be high.

The output is translated by diodes CR9 through CR11, and resistors R35, R36 to a level suitable for application to RF amplifiers Q1 and Q2. This causes the receiver to be at maximum gain. As the level of the receive signal increases, the potential at the inverting (-) terminal of U4A increases, causing the AGC voltage level to drop towards ground. This reduces the gain of Q1, Q2 and hence the IF signal level to the AM detector. The feedback process tends to equalize the voltage at the non-

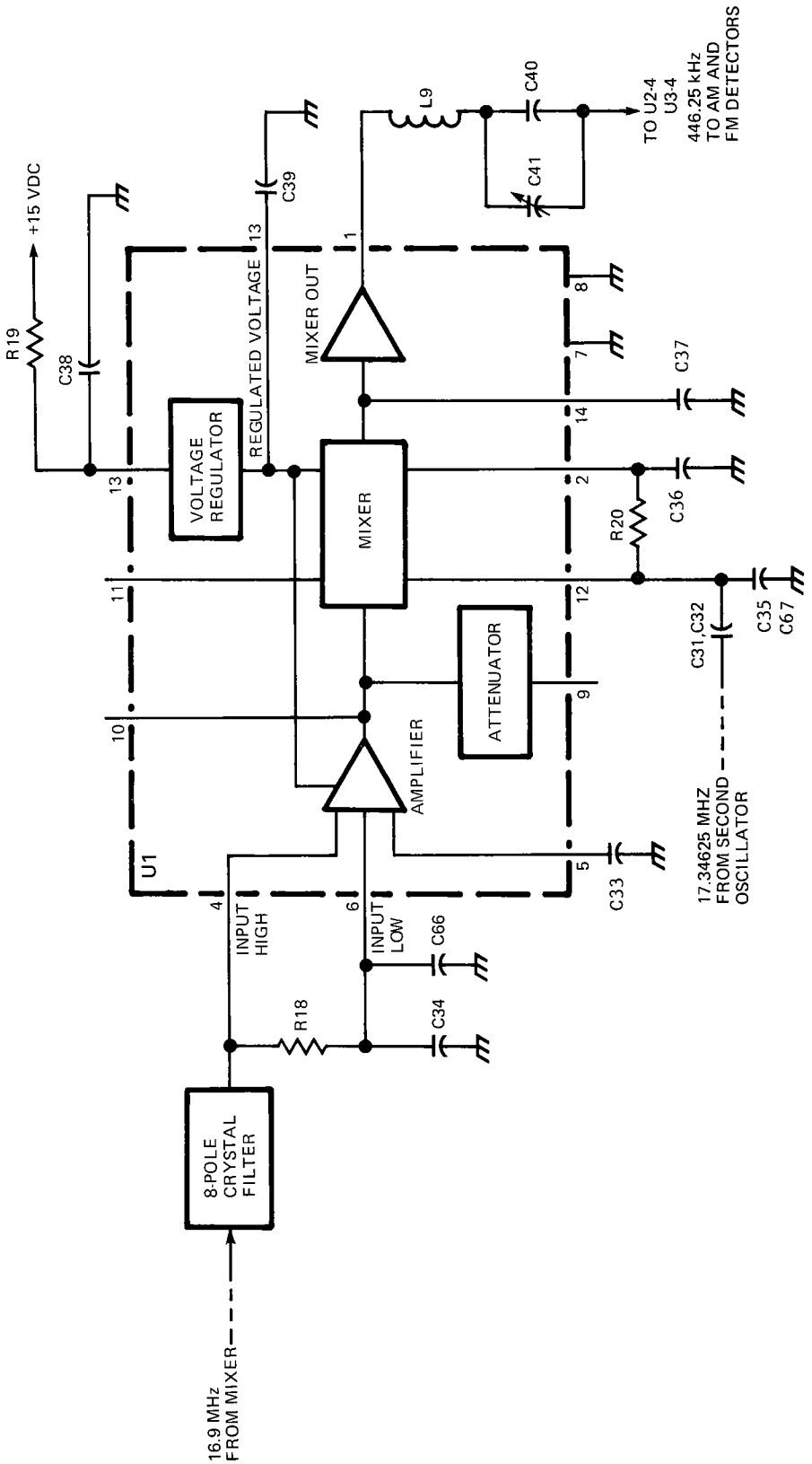


Figure 1-4. First IF Amplifier/Second Mixer Simplified Schematic Diagram

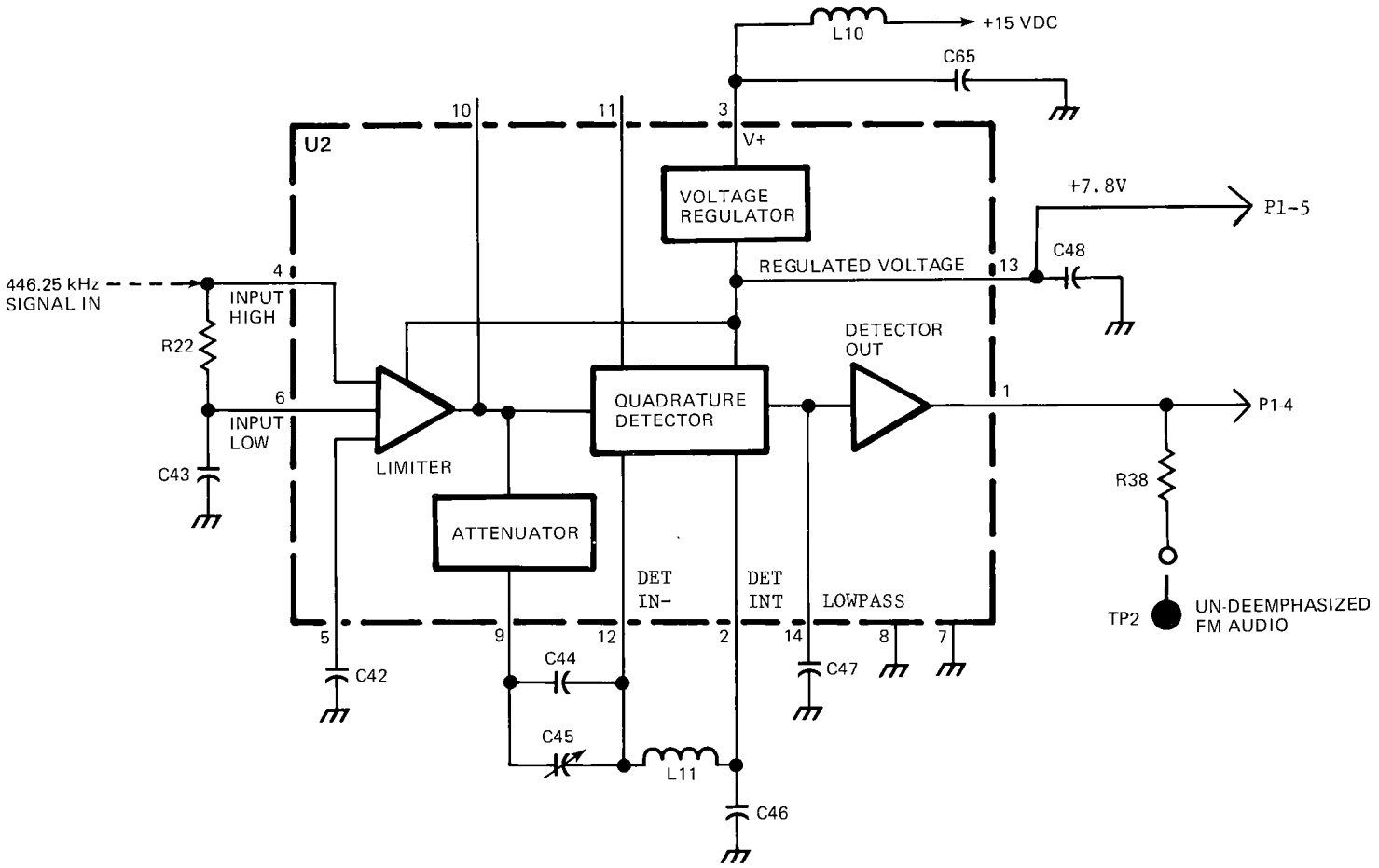


Figure 1-5. FM Limiter Amplifier and FM Quadrature Detector Simplified Schematic Diagram

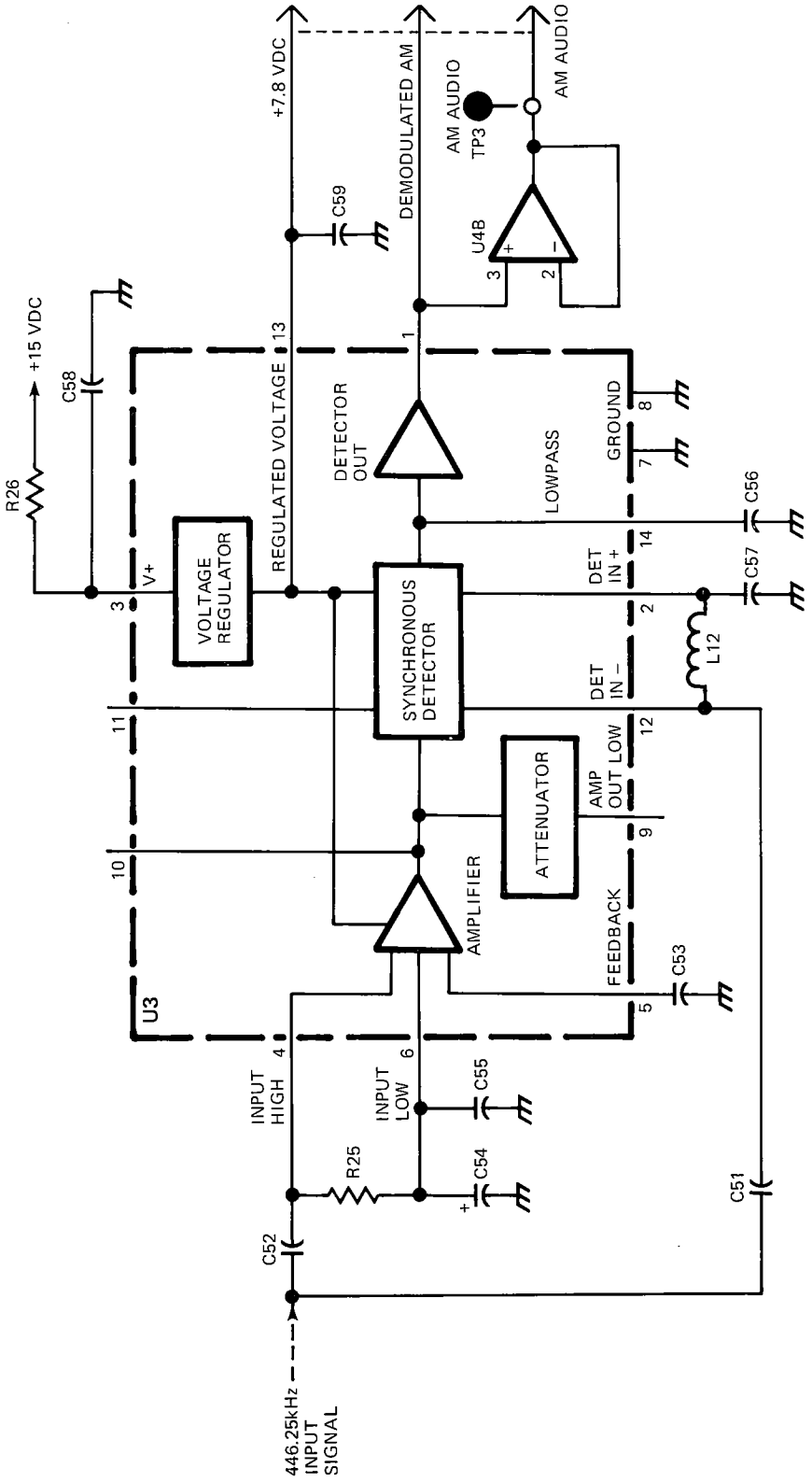


Figure 1-6. AM Synchronous Detector Simplified Schematic Diagram

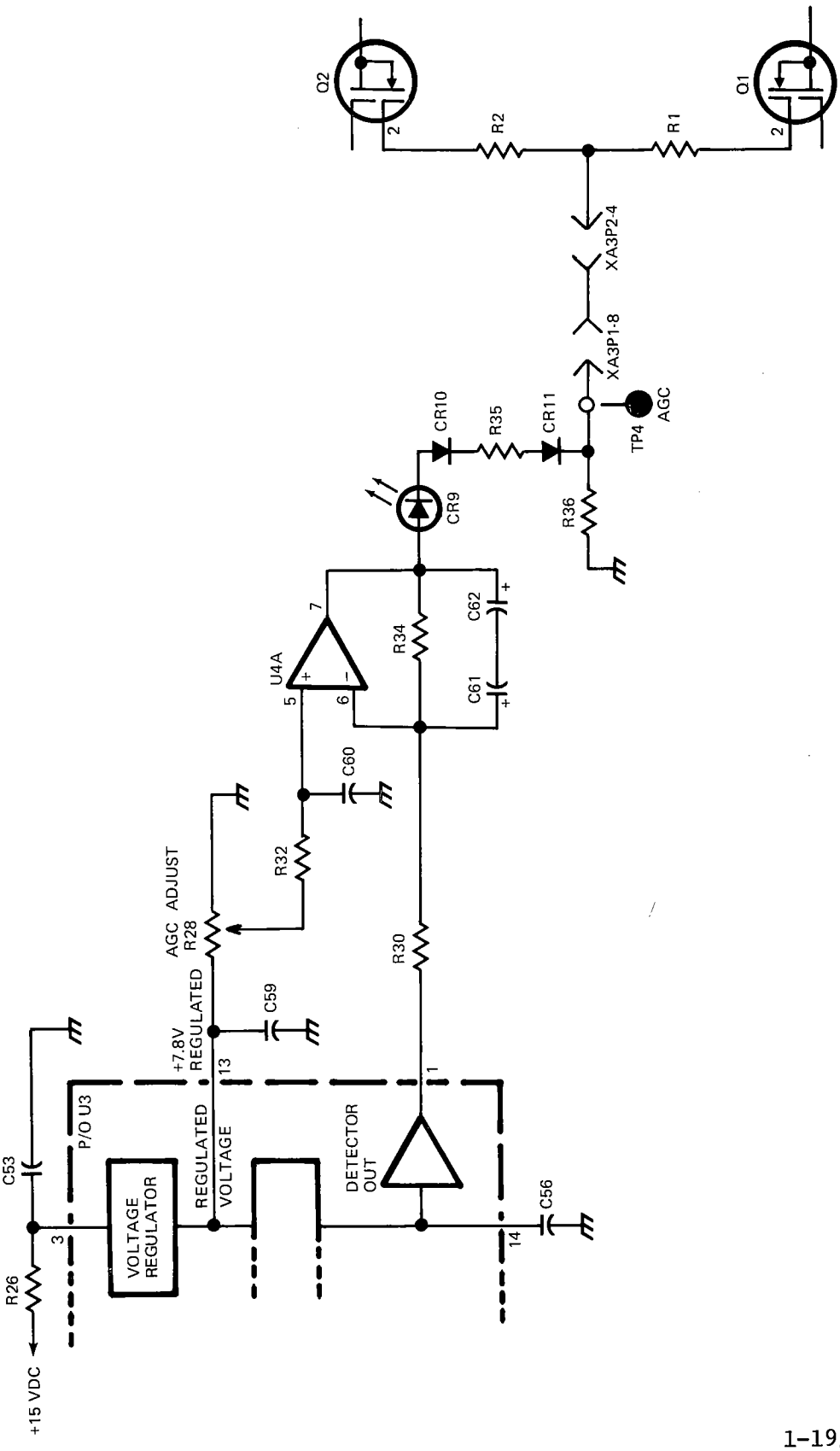


Figure 1-7. AGC System Simplified Schematic Diagram

inverting (+) terminal and the inverting (-) terminal of U4A, with the result that the operation of the AM detector is maintained in a linear region. The AGC action described above is necessary to prevent AM detector distortion. The time constant of the AGC is much longer than the antenna switching rate. This prevents the AGC from following the signal strength variations produced by antenna switching during the homing process.

The action of the AGC circuit can be monitored by observing light-emitting diode CR9. With no input signal, the LED will be brightly lit, indicating maximum AGC voltage. As the receiver signal level increases, the LED will go dimmer.

In the monitor mode, the AGC is disabled by +7.8V DC, applied via R33, allowing the full limiting action of FM limiter U2 to enhance FM reception quality.

1.4.2.3 Oscillator/Multiplier 1A6. - (Refer to figure 7-16 for schematic diagram.) Transistor Q1 is a clapp type crystal oscillator operating at a fundamental frequency of approximately 15MHz. The crystal frequency of the oscillator is determined as follows:

$$\text{XTAL (MHz)} = \frac{\text{Receiver (MHz)} - 16.9\text{MHz}}{9}$$

For example:
Channel 16 -

$$\text{XTAL} = \frac{156.800 - 16.9}{9}$$

$$= 15.54444\text{MHz}$$

Test point TP1 permits the frequency of the oscillator to be measured with a counter.

The desired crystal for Q1 is selected by diode switching. CHANNEL switch 1S1 applies +15V DC to resistors R1 through R12. This forward biases corresponding PIN switching diodes CR1 through CR12, causing the selected diode to conduct. The conducting (on) impedance of a PIN diode is very low (less than one ohm) and the non-conducting (off) impedance is high (greater than 10 kilohms). This effectively grounds one end of the selected crystal, resulting in a solid-state crystal switching action. Variable capacitors C13 through C24 allow each crystal to be tuned to frequency.

The collector of Q1 is tuned to the third harmonic of the crystal frequency. Tuned circuits L1, C44 and L3, C45 are both tuned to the third harmonic.

Transistor Q2 is a multiplier stage that multiplies the frequency of the third harmonic signal from Q1 by three. Tuned circuits L4, C50 and L4, C51 are tuned to approximately 140MHz.

The output signal from Q2 is amplified by buffer Q3. Circuits tuned to 140MHz in the stage include L6, C56 and L7, C58, C59. Capacitors C58, C59 form a capacitance divider for a 50 ohm output impedance. Hot carrier diode CR13 allows the level of the buffer output to be measured at test point TP3 with a DC voltmeter.

1.4.2.4 Homer Logic 1A4. - The Homer Logic Circuitry is driven by a clock oscillator consisting of CMOS gates U1A and U1B connected in a stable multivibrator configuration. The frequency of the clock is established by the values of capacitor C1 and resistor R2. The output waveform from the clock may be monitored at test point TP1. The frequency of the clock oscillator is halved by divide-by-two divider U2A. The output signals at pins 14 and 15 to U2A are square waves, 180 degrees out of phase, with a duty cycle of exactly 50 percent. Emitter followers Q1 and Q2, driven by the square waves, increase the current capability of U2A and provide the "right" and "left" drive signals input to antenna switch assembly 1A1. These signals cause the PIN diode switches on 1A1 to alternately connect the right antenna and the left antenna to the RF input of receiver assembly 1A3.

The two square waves from U2A, inverted by gates U1C and U1D, are also used to alternately turn on (close) solid-state switch gates U3A and U3B. Gate U3A is closed during the time that the right antenna is connected to the receiver and U3B is closed during the time that the left antenna is connected to the receiver. Demodulated AM (signal strength) information from receiver assembly 1A3 is connected through R3 to the common input of gates U3A and U3B. The switching action of U3A and U3B alternately allows capacitor C6 (left antenna) and capacitor C7 (right antenna) to charge to the AM signal voltage level. When the received signal strength in both the left and right modes is equal (signal source dead ahead), the DC voltage level on C6 and C7 will be equal. A difference in signal strength, caused by the signal source being to either side of the antenna array will cause the DC voltage levels on C6 and C7 to be different.

Meter amplifier U4 amplifies the DC difference signal from C6, C7 and provides drive for the zero center-reading meter in the indicator unit. Diodes CR3 through CR6 in the output circuit of the amplifier provide an output with a logarithmic characteristic. This causes the meter to be more sensitive to bearing changes near its zero-center null point and less sensitive to bearing extremes.

Flip-flop A4U2B, connected as a monostable multivibrator (one-shot), generates a pulse at every positive transition of the clock oscillator output waveform. The duration of the pulse is established by the values of capacitor C3 and resistor R6. The output of the one-shot (pin 2) is used to turn off (open) gate U3C, connected in the un-deemphasized FM audio line. The switch gates out the alternating spikes, caused by the antenna switching, which appear in the un-deemphasized FM audio and cause a "buzz" on the loudspeaker signal.

The description of the homing logic provided above assumes that the Home/ Monitor switch on SQUELCH control 1R1 was in the "Home" position. When the switch is set to "Monitor", +7.8V DC is applied to pin 10 of A4P1, disabling the homing mode as follows:

a) Clock oscillator U1A, U1B is disabled.

b) Divide-by-two divider U2A is reset, connecting the left antenna to the receiver.

c) Gates U3A and U3B are both closed simultaneously, causing the meter in the indicator unit to stop at its last homing indication. This prevents full-scale deflection of the meter when the homer is in the monitor mode.

d) One-shot U2B is held in its reset state. This holds FM audio gate U3C permanently closed.

1.4.2.4.1 Dimmer Control. - Transistor Q3 and Q4 are connected as an emitter-follower current amplifier. The voltage established at the arm of DIMMER control 1R3, reduced by approximately 1.2 volts, appears at the output of the circuit and is used to drive the dial lights on the receiver and indicator units. The voltage is adjustable from zero to approximately 15V DC. Resistor R18 and transistor Q5 limit the output current to approximately 180 milliamperes, providing the circuit with short-circuit protection.

1.4.2.5 Audio Assembly 1A5. - (Refer to figure 7-15 for circuit diagram.) The audio assembly contains a squelch circuit, an audio power amplifier, and a muting capability. These features are described in the following paragraphs.

1.4.2.5.1 Squelch Circuit. - Operational amplfiers U1A and U1B, together with associated components, comprise a 25kHz band-pass filter. Un-deemphasized FM audio (from the output of FM audio switch gate U3C in homer logic assembly 1A4) is fed to the input of the filter. The filter removes voice frequencies and passes only 25kHz noise. The output of the filter may be monitored at TP1. The noise output is rectified by positive peak detector U1C. With no RF signal applied to the input of receiver assembly 1A3, the level of the rectified noise is at a maximum. As the RF signal level at the receiver input is increased, the FM "quieting" action of the receiver decreases the level of the rectified noise. The output level of the rectified noise may be monitored at test point TP2. Comparator U1D compares the level of the rectified noise with a DC voltage level set by SQUELCH control 1R3. If the noise voltage is more positive than the SQUELCH control voltage (no RF input signal), the output of U1D (pin 10) is high. This turns on squelch gate Q1, effectively clamping to ground the deemphasized FM audio input to audio power amplifier U2. If the rectified noise voltage is less positive than the SQUELCH control voltage (RF input signal present), pin 10 of U1D is low. This turns squelch gate Q1 off, allowing FM audio to be applied to the input of audio power amplifier U2.

1.4.2.5.2. Power Amplifier. - Power amplifier U2 is a monolithic integrated circuit that amplifies the deemphasized FM audio to approximately four watts into 16 ohm loudspeaker 1LS1. A description of U2 is provided in Figure 7-10. The level of the input signal is determined by VOLUME control 1R2 which is connected to the FM deemphasis network in receiver assembly 1A3. Connection to loudspeaker LS1 is made via a jumper on INDICATOR connector 1J3, permitting an external loudspeaker to be connected through 1J3.

1.4.2.5.3. Muting. - The audio amplifier stage may be muted by connecting a ground to MUTE connector 1J6 on the rear panel of the receiver unit. This sets the squelch control voltage low, causing comparator U1D to hold squelch gate Q1 on. No amount of RF signal at the input of the receiver can now turn Q1 off.

1.4.2.6. Power Supply 1A2. - (Refer to figure 7-12 for circuit diagram.) The 115V AC input power is applied via rear panel connector 1J1, fuse 1F1, and the on/off switch on VOLUME control 1R1, to the primary winding of transformer 1T1. Varistor A2CR1 protects the homer from damage by line transients having an amplitude of greater than 150 volts peak.

The AC input voltage is transformed to 20 volts rms by transformer 1T1 and connected to bridge rectifier A2U1. The positive DC output from A2U1 is applied to a filter consisting of C1, R1, and C2, which removes hum.

The 24V DC input power is applied to the hum filter via rear panel connector 1J2, fuse 1F2, the on/off switch on VOLUME control 1R1, and diode A3CR1. Diode 1CR1 protects the homer from reversal of the 24V DC power source polarity.

The filtered +24V DC voltage is fed to +15V regulator A2U2, which provides the regulated +15V DC supply. Capacitors A2C3, A2C4 and diode A2CR3 protect the regulator from oscillations and polarity reversal.

Unfiltered +24V DC, available at the input of the hum filter, supplies current to the dimmer circuit on homer logic assembly 1A4.

SECTION II - INSTALLATION

2.1 INTRODUCTION

This section provides installation instructions for the homer. Included in these instructions are site preparation data, installation procedures and performance verification checks.

2.2 SITE PREPARATION

Site preparation information for the homer includes environment limitations, power requirements and mounting considerations.

2.2.1 Environmental Limitations. - Environmental limitations for operating and non-operating conditions of the homer are specified in Table 2-1.

Table 2-1. Homer Environmental Limitations

AMBIENT TEMPERATURE:	Operating -20°C to 55°C Storage -30°C to 55°C
RELATIVE HUMIDITY:	95%, non-condensing
WIND:	100mph 80mph with ½-inch radial ice loading

2.2.2 Power Requirements. - The homer is delivered with the power supply configured to operate from a single-phase 115 ±10% volts AC or a 24 volt DC (negative ground). Maximum current consumption of the homer is as follows:

115V AC operation - 0.3 amperes

24V DC operation - 0.7 amperes

It is mandatory that the panels, chassis, and housings of the homer be grounded to the hull of the vessel to protect operating and service personnel. A grounded three-conductor female AC power outlet and bonding connections must be made available to satisfy this requirement.

2.2.3 Cooling Requirements. - There are no cooling requirements for the homer provided it is operated within the environmental specifications listed in Table 2-1.

2.2.4 Mounting Considerations. - The receiver and indicator units may be mounted at any convenient location, provided the following precautions are observed:

a. Allow a clearance of at least 4 inches at the rear of the units for cable access.

b. In weather exposed mountings, do not mount the units with front panels facing upwards, i.e., bulkhead mounted. This is to prevent water collecting on the top of the panels and the eventual leakage of moisture into the interior of the units.

2.3 UNPACKING AND INSPECTION

The homer was carefully inspected, both mechanically and electrically, before shipment. It should be free of mars or scratches and in perfect electrical order upon receipt.

The homer is shipped in a number of containers. Unpack the containers and locate the shipping list. Verify that all components of the homer have been received. To confirm that the homer is in good mechanical order, carefully examine the components after unpacking. Look for damage such as broken controls and fuseholders, dented corners, bent covers, surface scratches, and loose components.

2.4 INSTALLATION REQUIREMENTS

Ensure that the following requirements are met before beginning installation of the homer.

2.4.1 Tools Required. - Only ordinary handtools, including the coaxial connector crimping tool listed below, are required for installation of the homer.

Tool	Manufacturer	Manufacturer Part No.
Crimp connector crimping tool	AMP Incorporated, Harrisburg, PA	69478 - 1

2.4.2 Test Equipment Required. - Test equipment required to verify the adequacy of the AC main voltage and DC source are listed in Table 2-2.

Table 2-2. Installation Test Equipment

INSTRUMENT	CRITICAL SPECIFICATIONS	RECOMMENDED INSTRUMENT
Digital Voltmeter	At least 3 digit readout. Minimum input impedance 1M ohm fullscale ranges, to $\geq$50V AC.	HP 34702A
AC Voltmeter	Expanded scale type capable of measuring AC power mains ±1%.	RCA WV-120B

2.4.3 AC Power Source. - The female power outlet to be used to supply AC mains power to the homer must be checked to ensure that it furnished the proper voltage. Check the power outlet with an ungrounded AC voltmeter to ensure that the required single-phase voltage is present. The voltage must be in the range of 103.5 to 126.5 volts AC (rms). If the line voltage is in the correct range, check the power outlet to ensure that it is correctly wired with respect to AC high potential, AC neutral, and earth ground. If the outlet is wired improperly, correction must be made before installation.

For safety reasons, it is mandatory that a connection be made between the chassis and earth ground. Ensure that the earth ground wire in the AC power cable is connected to the hull of the vessel.

The homer is equipped with an AC primary power fuse (F1), located on the rear panel of the receiver unit. Check that the rating of F1 conforms to the specifications listed in Table 2-3.

2.4.4 DC Power Source. - The homer operates from a 24V DC negative ground system. Using a digital voltmeter, verify that the voltage is 24V DC ±10% and that the negative terminal is the common vessel ground. The homer is equipped with a DC primary power fuse (F2), located on the rear panel of the receiver unit. Check that the rating of F2 conforms to the specifications listed in Table 2-3.

Table 2-3. Primary Power Fuse Ratings

SOURCE	FUSE	RATING	MANUFACTURERS PART NO.
115V AC	F1	1A	Buss MDL1
24V DC	F2	3A	Buss AGC3

2.5 INSTALLATION INSTRUCTIONS

The following paragraphs provide detailed installation instructions for the three units of the homer.

2.5.1 Preliminary Steps. - Before installation of the units, carry out the following steps.

2.5.1.1 Unit Locations. - Determine the approximate locations of the receiver, indicator, and antenna units.

2.5.1.2 Cable Lengths. - Check that the following cables are supplied with the homer. All cables are supplied with only one end terminated. The cables may be cut to the required length without degrading operation of the homer.

(a) 20-foot dual coaxial cable for connecting antenna unit to homer.

(b) 30-foot dual coaxial cable for connecting antenna unit to homer.

(c) 20-foot cable for connecting indicator unit to receiver unit.

(d) 25-foot 115V AC power cable.

(e) 25-foot 24V DC power cable.

2.5.1.3 Mast. - Determine if the mast has any rotational "slop" or any other type of play. This movement must be minimized before installation of the homer otherwise a dead-ahead error will be introduced.

2.5.2 Antenna Installation. - The antenna unit consists of two matched antennas and a U-shaped mounting bracket. To mount the assembly proceed as follows:

(a) Mount the bracket perpendicular to the bow-stern line of the vessel. The bracket may be mounted with the U-shape pointing upwards or downwards, whichever is most convenient.

(b) Ensure that the bracket is mounted at the highest position on the mast. Any obstructions above the bracket level will affect accuracy.

In some configurations, a light is mounted at the top of the mast. This is acceptable if the light is perfectly symmetrical to the bow-stern-mast line of the vessel.

(c) Mount the bracket with any of the following methods:

    (1) Nuts and bolts to a flat plate with gusset. Drilling additional holes in the bracket is allowable.

    (2) Heli-arc welding. Be sure to remove the antennas from the bracket before welding to avoid heat damage.

2.5.2.1 Tolerances. - The tolerances shown in figure 2-1 indicate the relative importance of various mounting errors. The most important consideration is that the installation be symmetrical about the bow-stern-mast line.

2.5.2.2 Off-Center Line Masts. - An off-center line mast may be used to mount the antenna unit. However, the mounting bracket should still be perpendicular to the bow-stern line of the vessel. This configuration is less desirable than the centerline mounted mast as the symmetry of the system is affected.

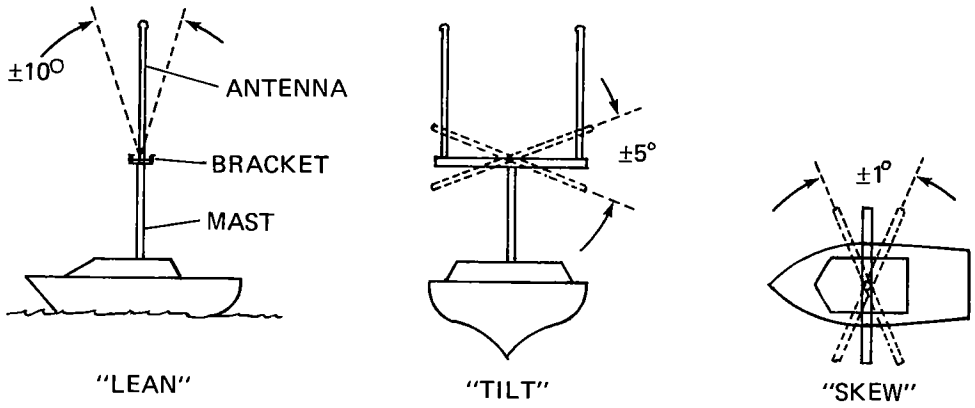


Figure 2-1. Antenna Unit Mounting Tolerances

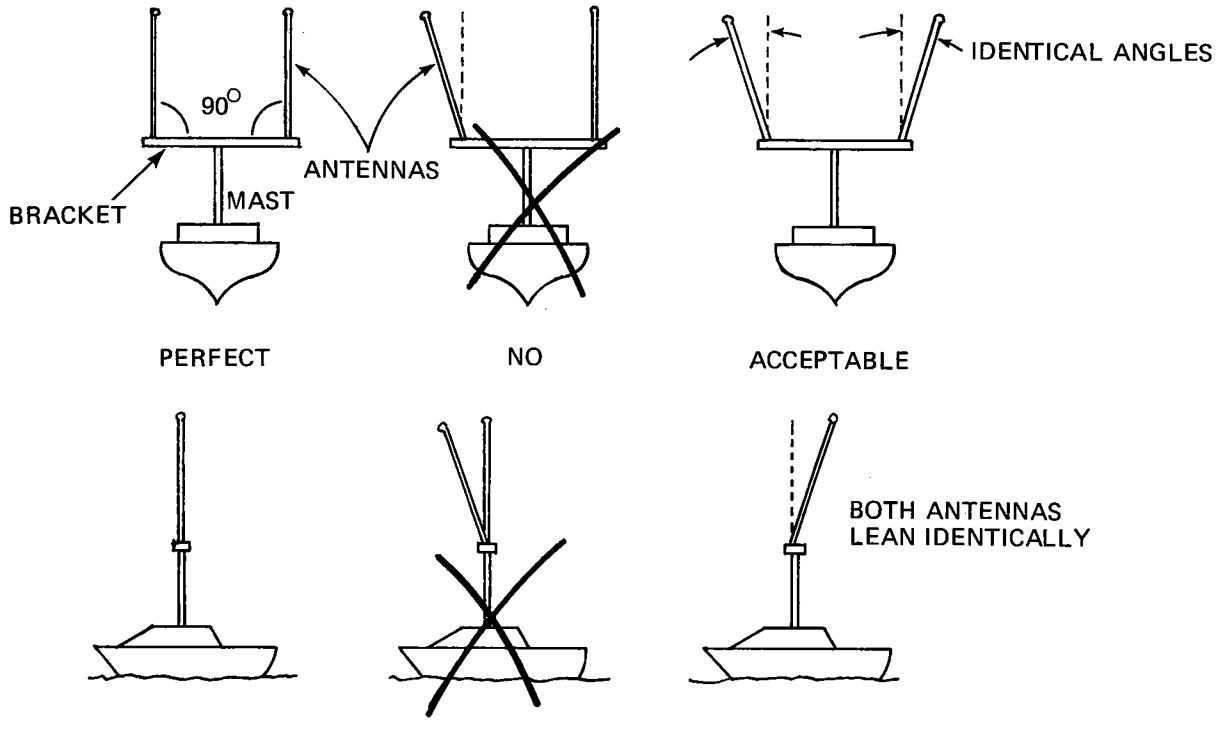


Figure 2-2. Antenna Mounting Tolerances

2.5.2.3 Antenna Attachment. - Mount the antennas on the bracket after it has been attached to the mast. With coaxial cables disconnected, install the antennas and finger tighten the mounting nuts. Rotate the antennas until they are vertical or symmetrical as shown in figure 2-2. When satisfied that the best positioning has been achieved, carefully tighten the mounting nuts.

CAUTION

1. Do not grip the antenna with vice grips, hose pliers, or similar tools. These will crush or crack the fiberglass antenna.

2. Do not rotate or twist the 6-inch coaxial cable at the end of the antenna. Excessive rotation will break the shield inside the antenna.

3. The homer accuracy is very sensitive to the location of other VHF antenna. Under no circumstances should another VHF antenna be mounted at the same elevation as the homer antenna unit. Other antennas must be mounted below the level of the bracket. If this antenna is mounted on the same mast as the homer antenna unit, it should be centered on the mast bow-stern line to prevent any distortion of the symmetry.

2.5.2.4 Coaxial Cable Installation. - To install the coaxial cables to the antenna unit, proceed as follows:

(a) Cut the dual coaxial cable (if necessary) to the desired length. It is very important that the dual cable be cut exactly the same length. If possible, cut the cables before running as twists tend to distort the cables.

CAUTION

1. Improper installation of the coaxial cables will affect the accuracy and stability of the homer. Avoid sharp bends and crimps. These will eventually cause the coax dielectric to migrate, changing the characteristics of the cable and hence the accuracy of the homer.

2. Do not nick or gouge the cables as water entering the cable will also eventually change the characteristics of the cable.

2.5.2.5 Coaxial Cable Connector Installation. - To install the coaxial connectors, proceed as follows:

(a) Cut coaxial cable pair to identical lengths.

(b) Strip to identical lengths, as shown in instructions supplied with connectors.

(c) Crimp connectors to cables with crimp tool, as per instructions supplied with tool.

(d) Check for short circuit with VOM, DVM or a continuity tester.

2.5.2.6 Coaxial Cable Attachment to Antenna Unit. - Connect the coaxial cables to the antenna unit as shown in figure 2-3. The cables must be support (Ty-wrapped) to the bracket and should not be allowed to flop in the wind. Avoid sharp bends in the coaxial cables. The coaxial connectors should not be under tension especially on long vertical cable runs. This may cause the connectors to part.

2.5.3 Indicator Unit. - The indicator unit may be mounted in any convenient location. Refer to paragraph 2.2.4 for mounting precautions.

2.5.3.1 Indicator Cable. - For ease of installation, the indicator cable assembly is supplied with only the receiver unit end assembled. The cable may be cut to any length without degrading operation. Avoid sharp bends and crimps when installing cable

2.5.3.2 Indicator Connector. - To attach the connector to the indicator cable, proceed as follows:

(a) Cut cable to desired length. Ensure there is sufficient slack at the end of the cable for a service loop.

(b) Bend bonding ring tab as shown below:

Figure 2-4. Indicator Cable Mounting Details

(c) Assemble clamp, bonding ring, bell, and ring as shown below. Strip back approximately 1.5 inches of outer sleeving.

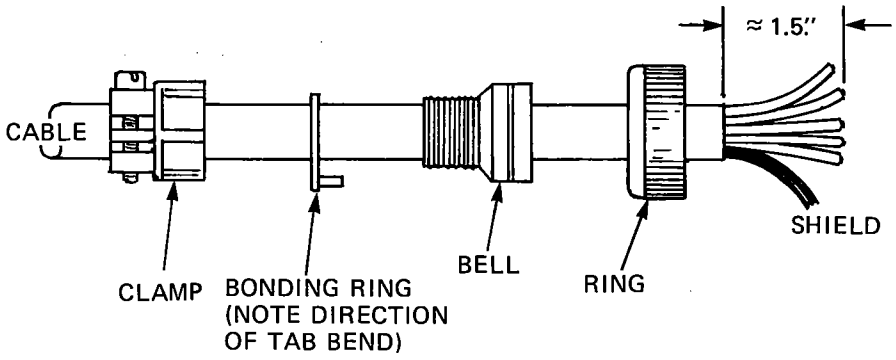


Figure 2-5. Indicator Cable Mounting Details

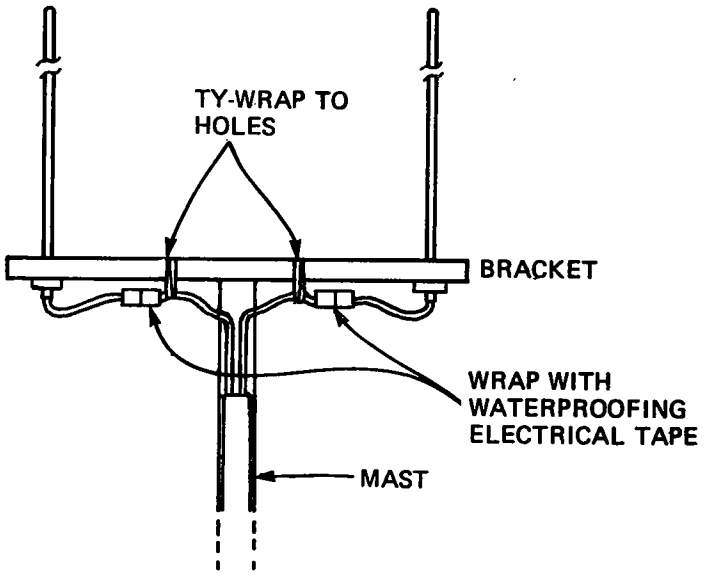


Figure 2-3. Coaxial Cable Installation Details

(d) Twist braided shield together.

(e) Note the numbering on the conductors (1, 2, 3, and 4).

(f) Cut and strip wires, one at a time, as shown below:

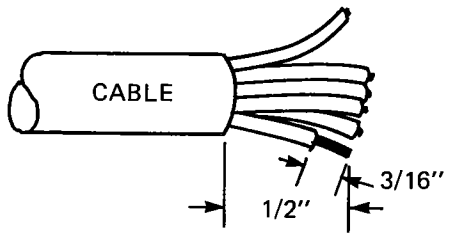


Figure 2-6. Indicator Cable Cut and Strip Details

(g) Solder the wires to the connector (part no. MS3106A145-6P) as detailed below. Connect a jumper between pins B and C.

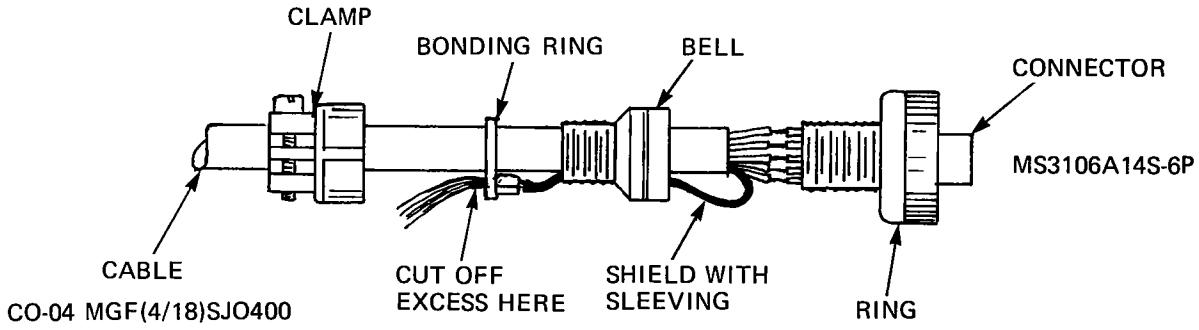


Figure 2-7. Indicator Cable Solder Details

Table 2-4. Indicator Cable Wire Function.

Cable Wire Number	Connector Pin	Function
1 BK	D	GND
2 WHT	E	METER +
3 RED	F	METER -
4 GRN	A	Light
Jumper	B	Internal Loudspeaker
	C	Amplifier Output
SHIELD	BONDING RING	SHIELD

(h) After the four wires and the jumper are soldered, slide a 7/8-inch piece of sleeving over the twiested shield braid. Slide shield under ring, bell and bonding ring, as shown below. Bend ears inward around shield and solder. Be sure no frayed wires or loose strands remain.

(i) Assemble connector and tighten strain relief.

(j) With both ends unplugged, check the cable for continuity, shorts, and shorts to ground, using a digital voltmeter.

2.5.4 Receiver Unit. - The receiver unit may be mounted in any convenient location. Refer to paragraph 2.2.4 for mounting precautions.

2.5.4.1 Power Cables. - Both power cables are supplied with only one end terminated. Both cables may be cut to the required length without degrading the performance of the homer. The power source ends of the cables should be terminated with crimp or solder terminals (not supplied). Avoid sharp bends and crimps in the cables.

2.5.4.2 115V AC Cable. - Pin assignments for the 115V AC power cable are detailed below:

Table 2-5. 115V AC Cable Wire Function.

Wire Color	Pin	Function
Black	A	HIGH
Green	B	GROUND (receiver chassis)
White	D	NEUTRAL

2.5.4.3 24V DC Cable. - Pin assignments for the 24V DC power cable are detailed below:

Table 2-6. 24V DC Cable Wire Function.

Wire Color	Pin	Function
Black	A	Negative (ground receiver chassis)
White	B	Positive 24V DC

2.6 VERIFICATION CHECK

To check that the homer is operating correctly following installation, carry out the following tests.

2.6.1 Power Sources. - Check that the homer is correctly connected to the primary power sources as follows:

(a) Turn VOLUME control clockwise to a convenient listening level and set CHANNEL switch to W1 or W2. Check that weather broadcast can be heard.

(b) Turn receiver off (set VOLUME control to extreme counterclockwise position).

(c) Remove +24V DC power cable from rear of receiver unit.

(d) Switch receiver on. Check that weather broadcast can still be heard.

(e) Switch receiver off. Replace +24V DC power cable and remove 115V AC power cable. Repeat step (d).

(f) Switch receiver off and replace 115V AC power cable.

2.6.2 Homing Function. - To check the homing function of the homer, carry out the functional check described in paragraph 3.4.2.

SECTION III - OPERATION

3.1 INTRODUCTION

This section contains operator instructions for the homer. The information provided includes operating precautions, a description of operator controls and indicators, and operating procedures.

3.2 OPERATING PRECAUTIONS

The following precautions should be observed when operating the homer.

(a) When homing, ensure that the SQUELCH control is pushed in (homer mode selected).

(b) To obtain loudspeaker audio, insure that the indicator cable is connected to the INDICATOR jack on the rear panel of the receiver unit.

3.3 CONTROLS AND CONNECTORS

The following is a description of the controls and connectors on the front and rear panels of the receiver unit and the indicator unit. The index numbers preceding the control and connector names are keyed to figure 3-1.

3.3.1 Receiver Unit. - The controls and connectors on the front and rear panels of the receiver unit serve the following functions:

(1) VOLUME. Controls level of loudspeaker audio. Extreme counterclockwise position (OFF) disconnects primary power to homer.

(2) CHANNEL. Selects desired VHF FM marine band channel.

(3) SQUELCH. Mutes loudspeaker audio in absence of a received signal. Noise will be heard in extreme counterclockwise position. Setting of SQUELCH control does not affect homing function. A switch incorporated in SQUELCH control allows homer to be used as a monitor receiver without audio having switching "buzz" audible when in homing mode. Out position of SQUELCH control selects monitor mode; in position selects homing mode.

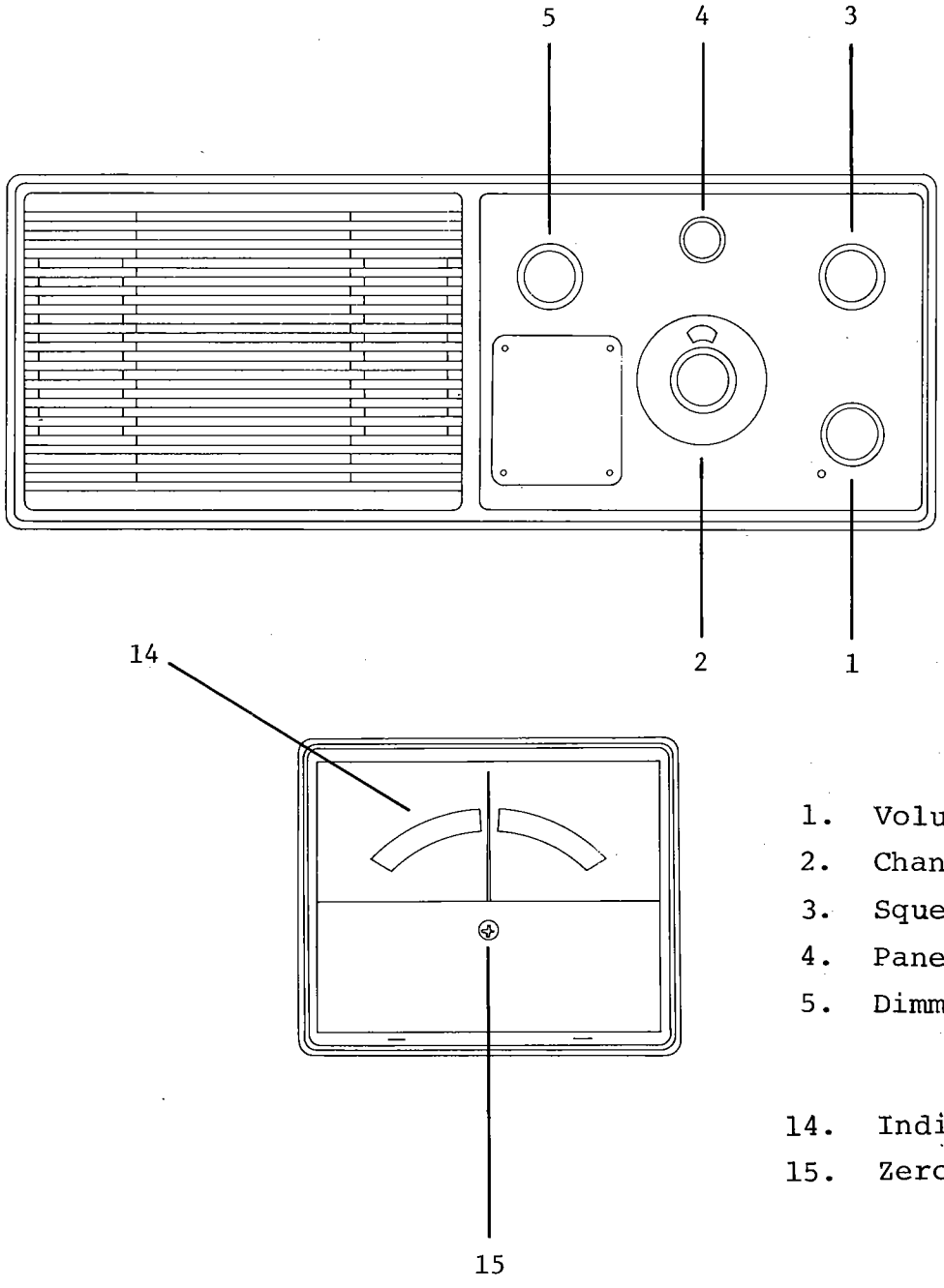
(4) Panel Light. Illuminates front panel controls of receiver unit.

(5) DIMMER. Controls brilliance of panel light on receiver unit and illumination of indicator unit. Rotate control clockwise for maximum illumination.

(6) F1. A 1A fuse for 115V AC input power.

(7) F2. A 3A fuse for 24V DC input power.

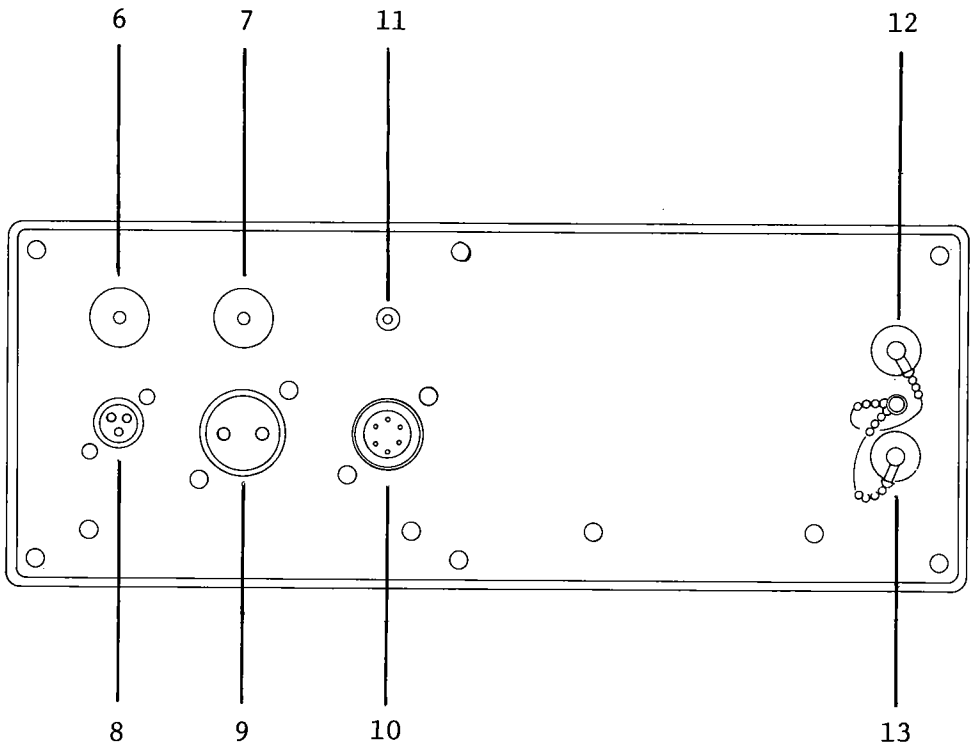
(8) 115V AC. Connector for 115V AC input power cable.



1. Volume
2. Channel
3. Squelch
4. Panel Lite
5. Dimmer

14. Indicator
15. Zero Set

Figure 3-1. Receiver and Indicator Controls and Connectors



6. Fuse AC
7. Fuse DC
8. 115V AC Connector
9. 24V DC Connector
10. Indicator Connector
11. Mute
12. Antenna Right
13. Antenna Left

16. Indicator

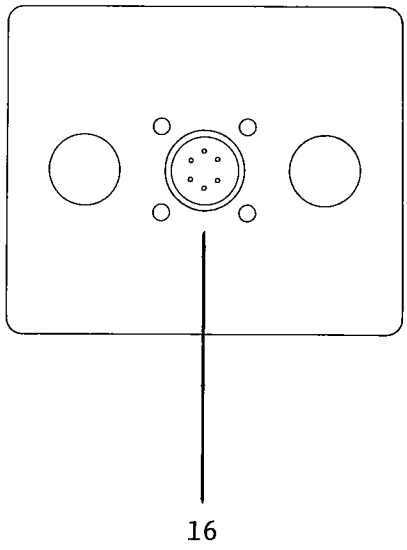


Figure 3-1. Receiver and Indicator Controls and Connectors

(9) 24V DC. Connector for 24V DC input power cable.

(10) INDICATOR. Connector for cable to indicator unit. Also contains provision for connecting external loudspeaker.

(11) MUTE. Connection for push-to-talk (PTT) line from nearby transceiver to prevent acoustical feedback. A ground to MUTE connector disables speaker audio.

(12) ANTENNA RIGHT. BNC connector for coaxial cable from starboard antenna of antenna unit.

(13) ATNENNA LEFT. BNC connector for coaxial cable from port antenna of antenna unit.

3.3.2 Indicator Unit. - The front and rear panel controls and connectors on the indicator unit serve the following functions:

(14) INDICATOR. Indicates to coxswain corrective action required to home to a transmitting station. A zero reading (pointer centered) indicates transmitter is dead ahead or astern.

(15) ZERO SET. Adjusts zero setting of meter. Adjust only when homer is turned off.

(16) Indicator Jack. Connector for cable from receiver unit.

3.4 OPERATING PROCEDURES

The following paragraphs provide basic operating procedures for the homer.

3.4.1 Turn-On Procedure. - To turn on the homer, carry out the following steps:

(a) Set CHANNEL switch to desired channel number.

(b) Turn SQUELCH control fully counterclockwise.

(c) Set VOLUME control to convenient listening level. Receiver noise should be heard.

(d) Rotate SQUELCH control until receiver noise disappears.

3.4.2 Functional Check. - Two functional checks are provided, one for use when the vessel is in port and the other for use when the vessel is at sea and has maneuvering room.

3.4.2.1 Functional Check - In Port. - To ensure that the homer is in an operating condition, proceed as follows:

(a) Set CHANNEL switch to W1 or W2 (whichever is within receiving range).

(b) Push SQUELCH control in (homing mode selected).

(c) Determine bearing of weather channel transmitter from vessel. If vessel is pointing in general direction of transmitter, check that indicator shows a turn in direciton of transmitter is required. If vessel is pointing away from the transmitter, check that the indicator shows a turn in the opposite direction of transmitter is required.

(d) Set CHANNEL switch to another transmitter of known location and repeat steps (b) and (c) above.

(e) Check that VOLUME and SQUELCH controls operate as described in paragraph 3.3.1.

(f) Check that DIMMER control operates as described in paragraph 3.3.1.

3.4.2.2 Functional Check - At Sea. - To ensure that homer is in an operating condition, proceed as follows:

(a) Listen for a transmitter of known location (W1, W2, marine operator, etc.).

(b) Check that homer operates as described in paragraph 3.4.3.

3.4.3 Homing. - To operate the homer in the homing mode, proceed as follows:

(a) Turn VOLUME control clockwise for best audio level.

(b) Set CHANNEL control to desired channel.

(c) Set SQUELCH control so that noise just disappears.

(d) Push SQUELCH control in for homing, pull out for monitoring.

(e) Turn vessel in direction shown on indicator until pointer is centered.

(f) Verify that homer is not centered on a reciprocal course as follows:

(1) Swing vessel 30 degrees from original heading.

(2) Check that indicator directs you to return to original heading.

(3) If not, follow indicator to correct heading.

(4) Repeat steps (1) and (2) above.

(g) During night operations, adjust DIMMER control for a convenient illumination level.

(h) Ensure that system is calibrated by periodically verifying bearing of vessel to a known transmitter location.

CAUTION

When passing in the proximity of large metal structures or ships, the indicator may be influenced by radio wave reflections. This can cause the indicator pointer to swing erratically from side to side.

3.4.4 Standby/Monitor. - To operate the homer as a standby auxiliary receiver, proceed as follows:

(a) Set CHANNEL switch to desired channel.

(b) Set VOLUME and SQUELCH controls as described in paragraph 3.4.1. The SQUELCH control may be either in homing (in) or monitoring (out) position.

(c) When returning to the homing mode, ensure that the SQUELCH control is pushed in.

SECTION IV - MAINTENANCE

4.1 INTRODUCTION

This section contains a preventive maintenance schedule, performance tests, adjustment procedures, and troubleshooting information for the homer. The preventive maintenance schedule is intended to improve the reliability of the homer and should be carried out at the intervals stated. The performance tests determine whether the homer is operating within its listed specifications. The adjustment procedures are provided to help maintain the homer within its specifications. The troubleshooting information is intended to aid in locating and correcting homer malfunctions.

4.2 RECOMMENDED TEST EQUIPMENT

Test equipment required for the performance tests, adjustment procedures, and troubleshooting is listed in Table 4-1. Any equipment that satisfies the specifications given may be substituted for the recommended model.

Table 4-1. Recommended Test Equipment

INSTRUMENT TYPE	RECOMMENDED MODEL	REQUIRED SPECIFICATIONS
RF Signal Generator	Hewlett-Packard Model 8640B	156-163MHz, AM, FM modulation
Distortion Analyzer	Hewlett-Packard Model 334A	With 1kHz (or tunable) notch filter
6dB Power Splitter	Intech 8301-0080 (See Section VI)	Balanced to $\leq$.2dB @ 156MHz
Frequency Counter	Hewlett-Packard Model 5382A	20MHz or higher. High input impedance (not 50 ohms)
Oscilloscope	Hewlett-Packard Model 1700A	5MHz or higher band width
Digital Multimeter	Hewlett-Packard Model 3472A	3½ digits, volts and ohms

4.3 PREVENTIVE MAINTENANCE

A good preventive maintenance schedule will result in greater homer reliability. A visual inspection of the units comprising the homer are the first step in the operation. Inspect the units for corrosion, dirt, moisture, and loose or binding connectors. Inspect the cables for wear or signs of stress. Table 4-2 details recommended preventive maintenance operations and the suggested time interval between the operations.

Table 4-2. Preventive Maintenance Schedule

INTERVAL	PROCEDURE
Quarterly	1. Check units for corrosion. 2. Inspect cables for outer jacket failure. 3. Inspect all homer connections for corrosion, dirt and broken pins. 4. Inspect antenna coaxial connections for internal corrosion, water, and salt accumulation.
Yearly	1. Inspect antennas for mechanical damage (breakage, corrosion, etc.). 2. Lubricate with contact cleaner front panel controls and switches.

4.4 PERFORMANCE CHECKS

Use the following procedures to determine if the homer is operating within specifications. The performance of the homer should be tested upon installation and at regular intervals thereafter. If the homer fails to meet one or more of the tests, refer to the adjustment procedures in the following paragraphs.

WARNING

Hazardous voltages are exposed when the covers of the receiver unit are removed and AC power is applied.

4.4.1 Power Supply Check. - To check operation of the power supply, proceed as follows:

(a) Connect homer to primary power source.

(b) Remove top cover from receiver unit.

(c) Connect positive lead of voltmeter to A2TP1 and negative lead to any black TP. Check that reading is 21.6-26.4 volts DC.

(d) Move positive lead to A2TP2. Check that reading is 13.5 to 16.5 volts DC.

4.4.2 Frequency Check. - To check tuning of the receiver unit, proceed as follows:

(a) Connect frequency counter to A6TP1.

(b) Set CHANNEL switch to 6.

(c) Measure frequency at A6TP1. Check that frequency is 15.488888MHz ±10Hz.

(d) Measure frequency at A6TP1 for remainder of channels. Ensure that frequencies are as detailed in Table 4-3. If any reading is out of tolerance, refer to paragraph 4.5.1 for tuning instructions.

Table 4-3. Receiver Frequency Check

Channel Number	Receiver Frequency (MHz)	Crystal Frequency (MHz)	Local Oscillator Output (MHz)
6	156.300	15.488888	139.400
12	156.600	15.522222	139.700
13	156.650	15.527777	139.750
14	156.700	15.533333	139.800
16	156.800	15.444444	139.900
22A	157.100	15.577777	140.200
W1	162.550	16.183333	145.650
W2	162.400	16.166666	145.500
Allowable tolerance: Crystal frequency ±10Hz Local oscillator output ±100Hz			

4.4.3 Sensitivity (12dB SINAD) Check. - To perform this check, proceed as follows:

(a) Connect test equipment to receiver unit, as shown in figure 4-1.

(b) Set signal generator controls as follows:

Frequency: 156.800MHz

FM Modulation: 1kHz

Deviation: ±3.0kHz

Output level: 1000μV

(c) Set receiver unit controls as follows:

CHANNEL switch: 16

SQUELCH control: fully CCW, pulled out (monitor mode)

(d) Adjust VOLUME control for a reading of 6.35V rms (2.5 watts) on distortion analyzer (in voltmeter mode).

(e) Reduce signal generator output level until SINAD is 12dB. Minimum specification is 0.7μV/12dB SINAD.

4.4.4 Audio Power Output Check. - To perform this check, proceed as follows:

(a) Connect test equipment to receiver unit as shown in figure 4-1 and set receiver controls as detailed in paragraph 4.4.3.c.

(b) Set RF signal generator output level to 1 millivolt, rms.

(c) Adjust VOLUME control for rated audio output power reading (6.35V rms or 2.5 watts) on distortion analyzer.

(d) Measure distortion of audio output. Ensure that it is 10% or less.

4.4.5 Squelch Threshold Sensitivity Check. - To perform this test, proceed as follows:

(a) Connect test equipment to receiver unit as shown in figure 4-1.

(b) Reduce RF output of signal generator to zero.

(c) Adjust SQUELCH control for squelch threshold setting.

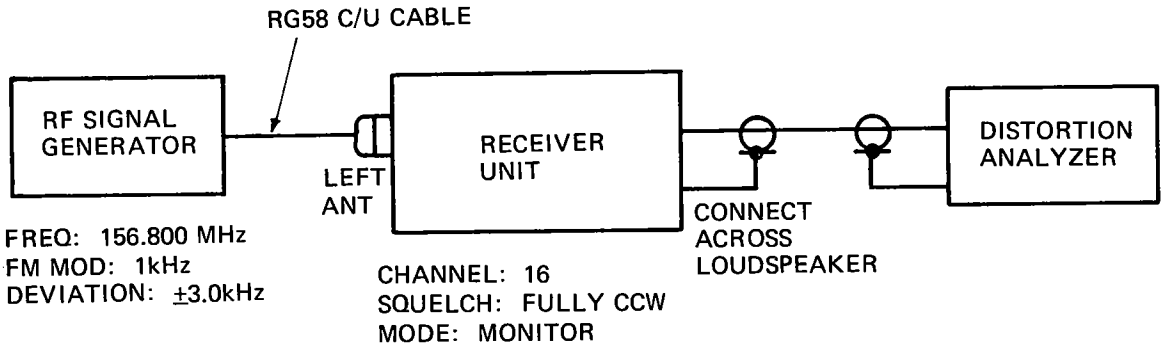


Figure 4-1. Sensitivity Check Test Set-Up

(d) Increase RF output of signal generator until squelch opens.

(e) Read RF signal level of signal generator. Minimum specification is 0.7 microvolts.

4.4.6 AGC Range Check. - To perform this test, proceed as follows:

(a) Connect test equipment to receiver unit as shown in figure 4-2.

(b) Set receiver unit controls as follows:

CHANNEL switch: 16

SQUELCH control: in (homing mode)

(c) Set signal generator controls as follows:

Frequency: 156.800MHz

AM Modulation: 1kHz, 30%

FM: off

(d) Check that a 1kHz sine wave is visable on oscilloscope. Increase signal generator output level until sine wave just disappears. Record signal level. The minimum specification is 10,000 times 12dB SINAD sensitivity. For example, if the 12dB SINAD sensitivity is 0.3μV, 10,000 times 0.30μV equals 3mV. Minimum specification is therefore 3mV. If reading is outside of tolerance, refer to paragraph 4.5.2.

4.4.7 Homing Function Check. - To perform this test, proceed as follows:

(a) Adjust homer for homing on weather channel.

(b) Disconnect right antenna cable from rear of receiver unit. Check that indicator unit indicates a turn to starboard is required. Reconnect right antenna cable.

(c) Disconnect left antenna cable from rear of receiver unit. Check that indicator unit indicates that a turn to port is required. Reconnect left antenna cable.

(d) Check that the indicator transitions are smooth and do not stick at any point.

4.4.8 Homing Accuracy Check. - The homing accuracy of the homer can only be tested at sea in an actual homing environment. Refer to paragraph 3.4.2.2, functional check-at-sea.

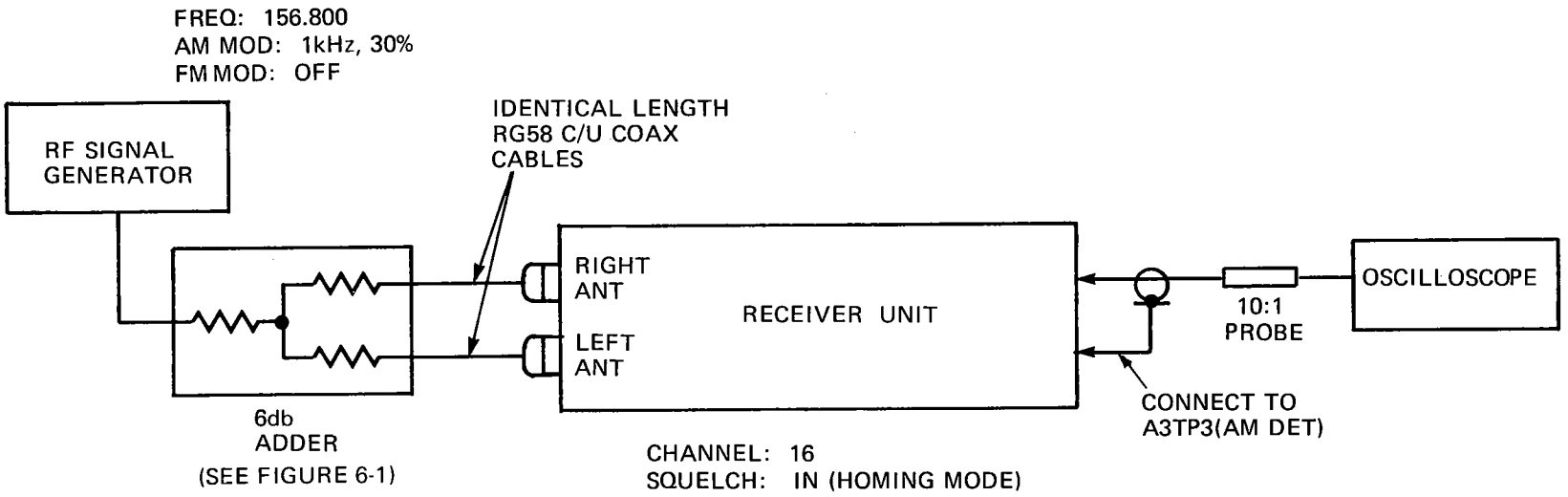


Figure 4-2. AGC Range and Homer Heading Test Set-Up

4.5 ADJUSTMENTS

The following paragraphs provide adjustment procedures to return the homer to peak operating condition when repairs are required. Adjustment controls are illustrated in figure 4-3 and test points in figure 4-4. Refer to paragraph 4.6 for troubleshooting information. Schematics, wiring diagrams, and other service related information are provided in Section VII of this manual.

WARNING

Hazardous voltage are exposed when the covers of the receiver unit are removed and AC power applied.

4.5.1 Receiver Frequency Set. - To adjust receiver frequency tuning, proceed as follows:

(a) Connect counter to A6TP1.

(b) Refer to paragraph 4.4.2 and determine crystal frequency for channel selected by CHANNEL switch.

(c) Using a non-magnetic tuning tool, tune trimmer capacitor for selected channel until frequency is within specification noted in Table 4-3. Check that DC level measured at A6TP2 is within specification. ($\geq$2.5V DC.)

4.5.2 AGC Adjustment. - To make this adjustment, proceed as follows:

(a) Set up test equipment as detailed in figure 4-2.

(b) Set RF generator for an output of approximately 2μV rms.

(c) Adjust AGC potentiometer A3R28 for maximum on oscilloscope. If an accurate peak is unobtainable, readjust RF level slightly and readjust A3R28 for maximum.

4.5.3 Homer RF Balance Adjustment. - To perform this adjustment, proceed as follows:

NOTE

This adjustment should be performed only if:

(1) Boards 1A1, or 1A3 have been repaired or replaced.

(2) Any part of the antenna system has been repaired or replaced.

(a) Set up test equipment as shown in figure 4-2.

(b) Adjust AGC as described in paragraph 4.5.2.

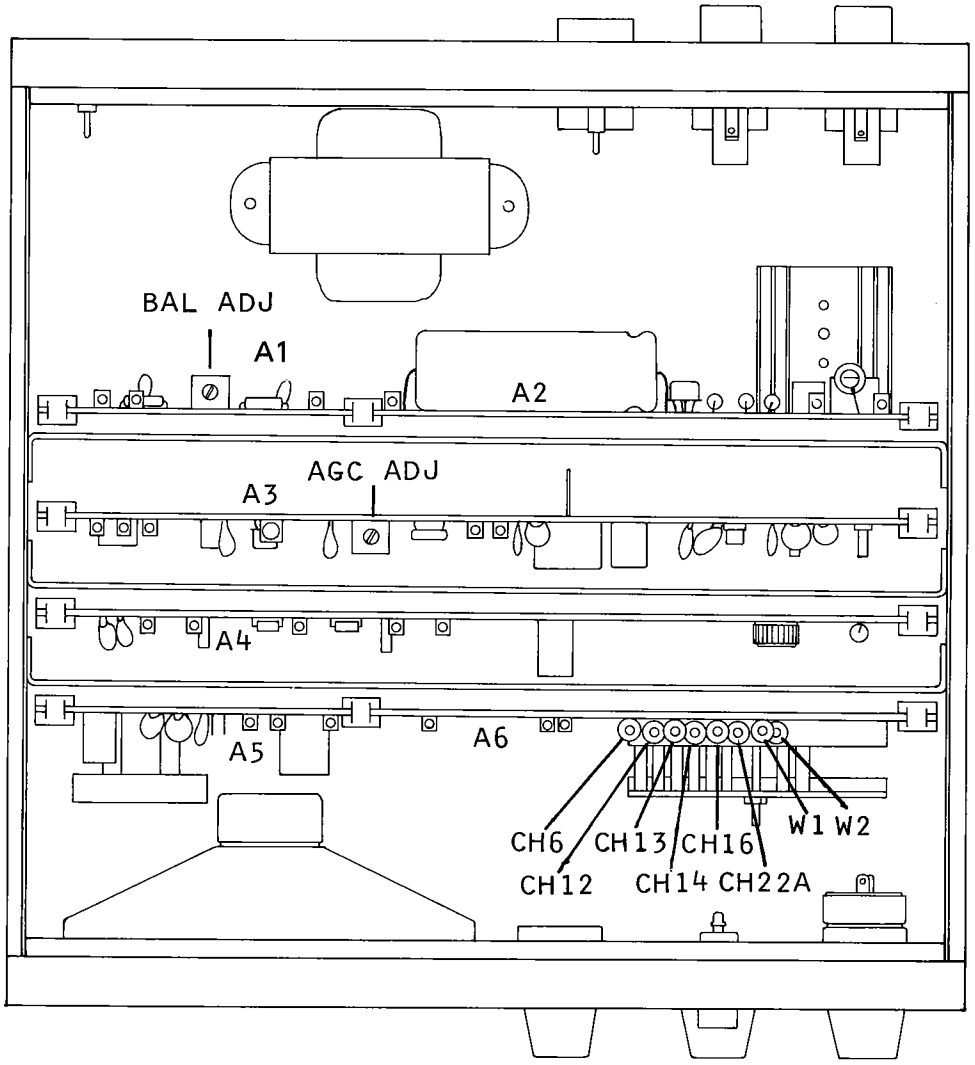


Figure 4-3. Receiver Unit Adjustment Controls

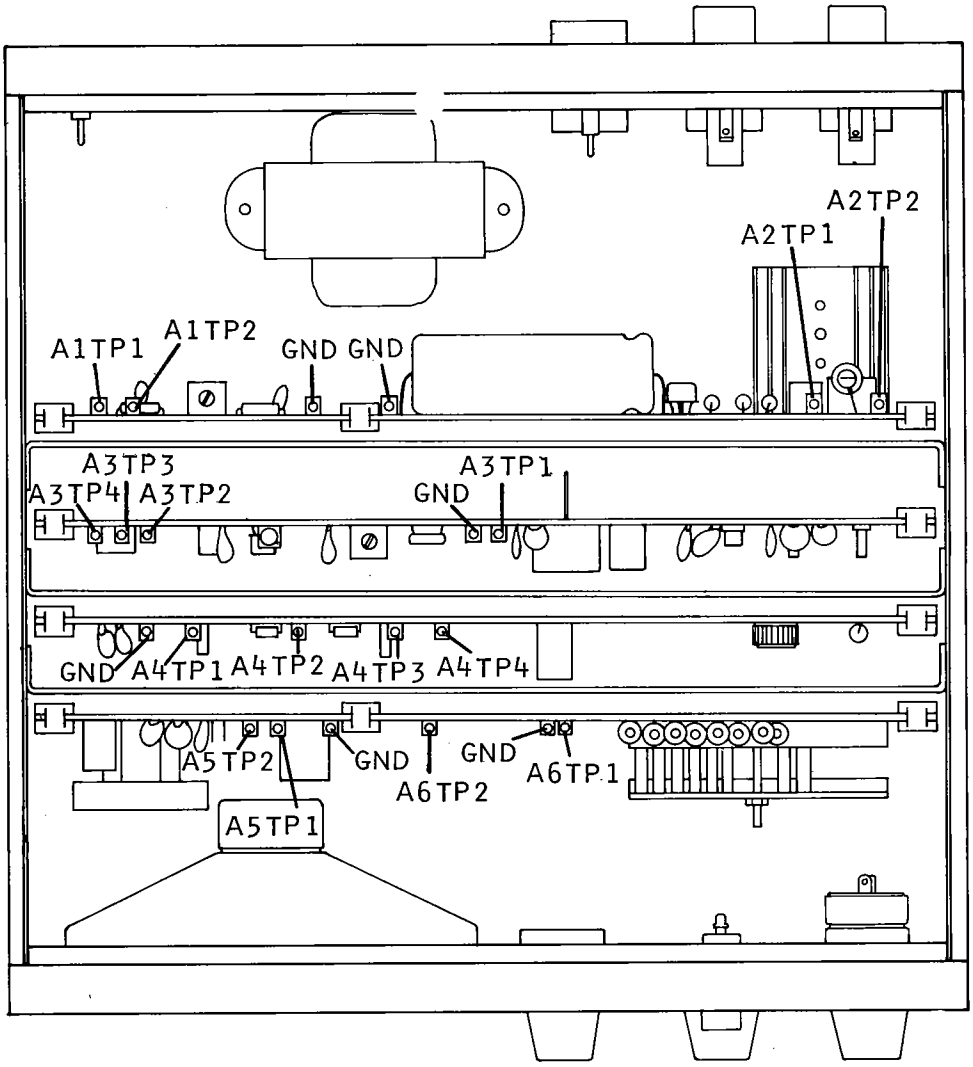


Figure 4-4. Receiver Unit Test Points

(c) Set signal generator RF level to 100μV rms.

(d) Adjust "Bal" potentiometer A1R7 for a zero center reading on indicator.

Reverse left and right antenna cables at receiver unit.

Check that the indicator is still centered.

4.5.4 Other Adjustments. - There are no other adjustments that can be performed in the field. All other adjustments must be made in a service depot using the proper test equipment, test fixtures, etc. Inadvertant accidental adjustment of coils and capacitors will necessitate the substitution of the board on which the components are located with another board.

4.6 TROUBLESHOOTING

Two important requirements for successful troubleshooting are (a) understanding how the homer is designed to operate and (b) knowing the correct use of the front panel controls and indicator readout. Apparent malfunctions can be caused by incorrect control settings. Refer to Section V for operating principles and circuit theory. Refer to Section III for an explanation of the controls and operating instructions.

If trouble is suspected, visually inspect the units of the homer. Check for loose cables, burnt components, and blown fuses. Verify that all printed-circuit boards are making good contact and are not shorting to an adjacent shield. If no obvious trouble is found, check the external power sources and the power supply voltages on power supply assembly 1A2. (Refer to paragraph 4.4.1 for voltage tolerances.)

4.6.1 Initial Troubleshooting Procedures. - Before troubleshooting the homer in detail, ensure that none of the conditions listed in Table 4-4 exist.

4.6.2 DC Voltages and Waveforms. - Receiver unit test point DC voltages and waveforms, and the conditions for making these measurements are given in Table 4-5 and figure 4-5 respectively. The test points are identified in figure 4-4. Since the conditions for making the measurement may differ from one test point to another, note the measurement conditions given.

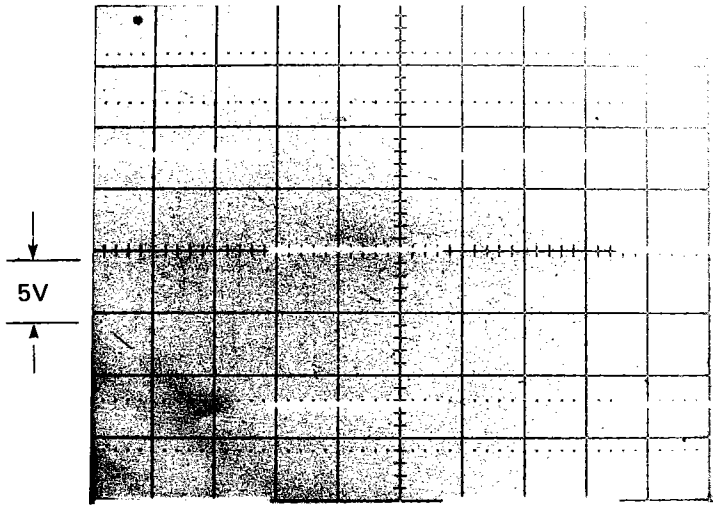
4.6.3 Trouble Diagnosis. - By the use of the front panel controls, together with the visual and audible response of the homer, determine as many details of the malfunction as possible. After this, consult the appropriate sheet of the troubleshooting flowcharts provided in figure 4-6 and follow the instructions given for isolating and correcting the malfunction.

Table 4-4. Symptom - Cause Table.

SYMPTOM	PROBABLE CAUSE
No audio. No squelch.	(1) Indicator cable disconnected. (2) MUTE connector shorted to ground.
Homer indicator works backward.	(1) Antenna cables plugged into wrong jacks.
Indicator drifts slowly when in monitor mode.	This is normal operation.
Indicator slightly off-center when in homing mode and no input signal.	This is normal operation.

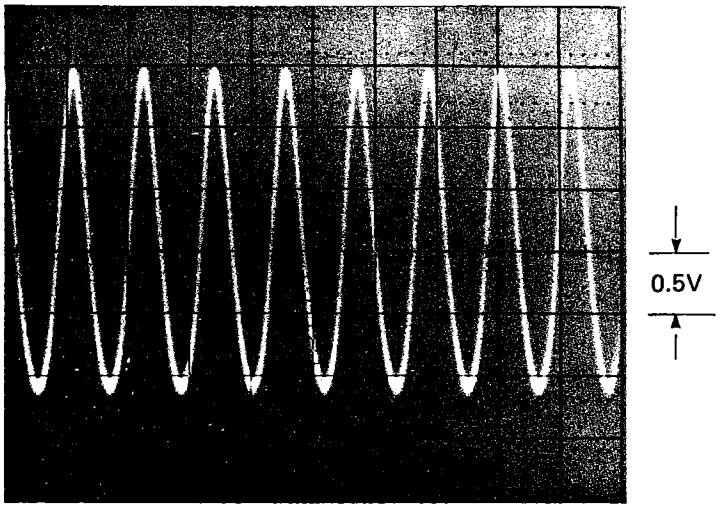
Table 4-5. Receiver Unit DC Test Point Voltages

TEST POINT	SIGNAL	RECEIVER CONTROL SETTINGS	RF SIGNAL INPUT	DC VOLTAGE	NOTES
A2TP1	Unregulated DC power in		None	22-28V DC	
A2TP2	Regulated +15V DC		None	15.0V DC ±10%	
A3TP4	AGC	CH 16, homing mode	See note	+7.5V DC at no signal	Decreases to 0V DC as signal level increases.
A3TP4	AGC	CH 16, monitor mode	See note	+7.5V DC	7.5V DC at all signal levels.
A3LED	AGC indicator	CH 16, homing mode	See note		Max. brilliance at no signal. Dims as signal increases.
A3LED	AGC indicator	CH 16, monitor mode	See note		Max. brilliance at all signal levels.
A4TP3 A4TP4	Meter Drive	WX, homing mode	Antenna	Connect VM between TP3-TP4	Voltage varies with homing direction.
A5TP2	Detected Squelch noise	Ch 16, monitor mode	See note	+4V DC	No signal.
				+1.6V DC	Strong signal. Not affected by squelch control.
A6TP2	Rectified LO output		None	≥+2.5V DC	Varies with L.O. output level.



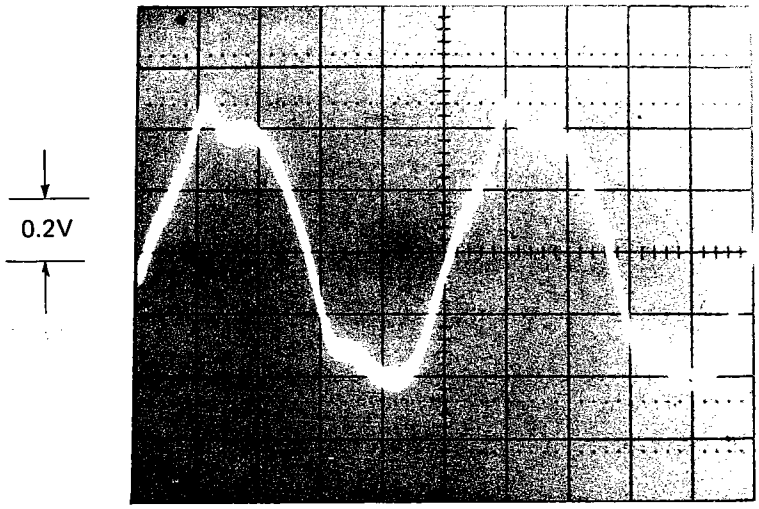
TEST POINT:	A1TP1, A1TP2
SIGNAL:	ANTENNA SWITCH DRIVE
RECEIVER CONTROLS:	HOMING MODE SELECTED
RF INPUT:	NONE
SCOPE SETTINGS:	VERT – 5V/div, DC, CHOPPED
	HORIZ – 10 msec/div
	SYNC – DC
	TRIG – EXT, A4TP1

Figure 4-5. Receiver Unit Test Point Waveforms



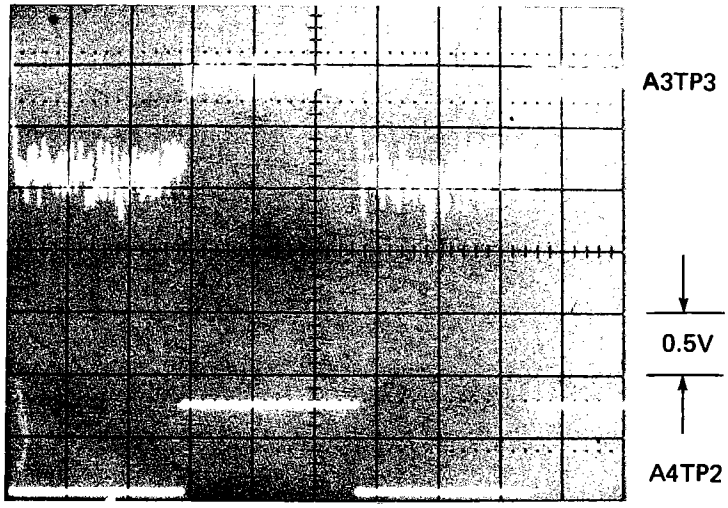
TEST POINT:	A3TP1
SIGNAL:	17.34625 MHz 2nd L.O.
RF INPUT:	NONE
SCOPE SETTINGS.	VERT – 0.05V/div, AC, 10:1 PROBE
	HORIZ – 0.01 msec/div
	SYNC – AC
	TRIG – INT

Figure 4-5. Receiver Unit Test Point Waveforms



TEST POINT:	A3TP2
SIGNAL:	UN-DEEMPHASIZED FM AUDIO
RF INPUT:	1 mV FROM SIGNAL GENERATOR 1kHz MODULATION, ±3kHz DEVIATION
RECEIVER CONTROLS:	MONITOR MODE SELECTED.
SCOPE SETTINGS:	VERT – 0.2V/div, AC HORIZ – 0.2 msec/div TRIG – INT

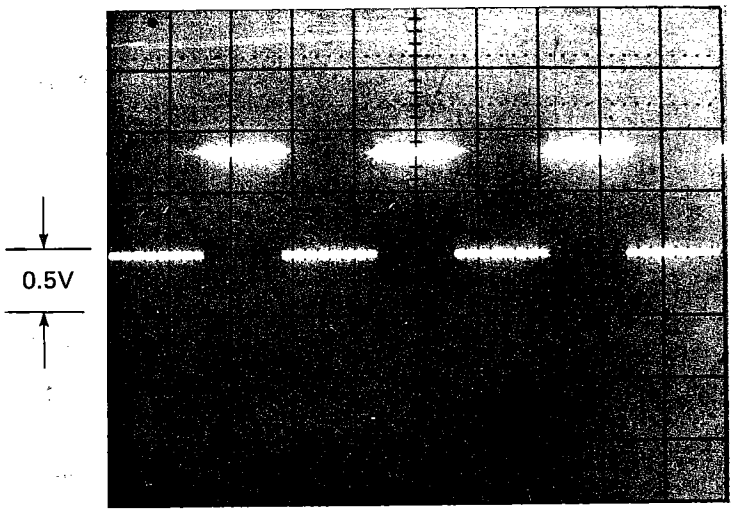
Figure 4-5. Receiver Unit Test Point Waveforms



TEST POINT:	A3TP3
SIGNAL:	DEMODULATED AM
TEST POINT:	A4TP2
SIGNAL:	FILTERED AM
RF INPUT:	ANTENNA
RECEIVER CONTROLS:	WEATHER CHANNEL, HOMING MODE SELECTED, ANTENNA CONNECTED.
SCOPE SETTINGS:	VERT – 0.5V/div, DC, CHOPPED HORIZ – 10 msec/div SYNC – DC TRIG – EXT, A4TP1

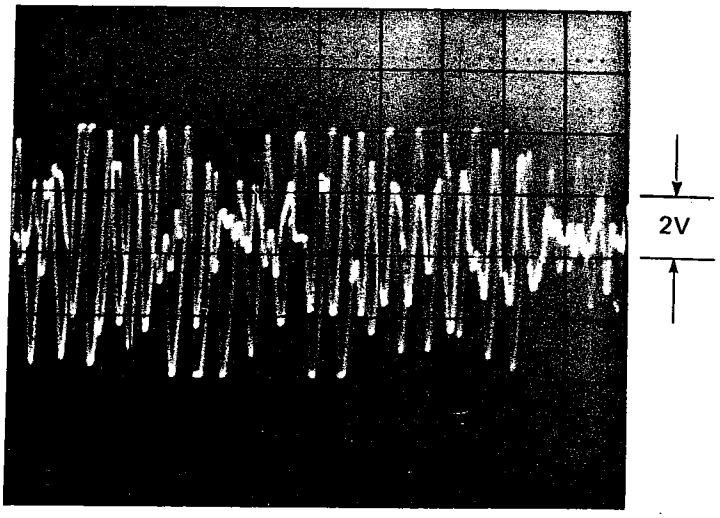
NOTE: AMPLITUDES WILL VARY WITH HOMING DIRECTION.

Figure 4-5. Receiver Unit Test Point Waveforms



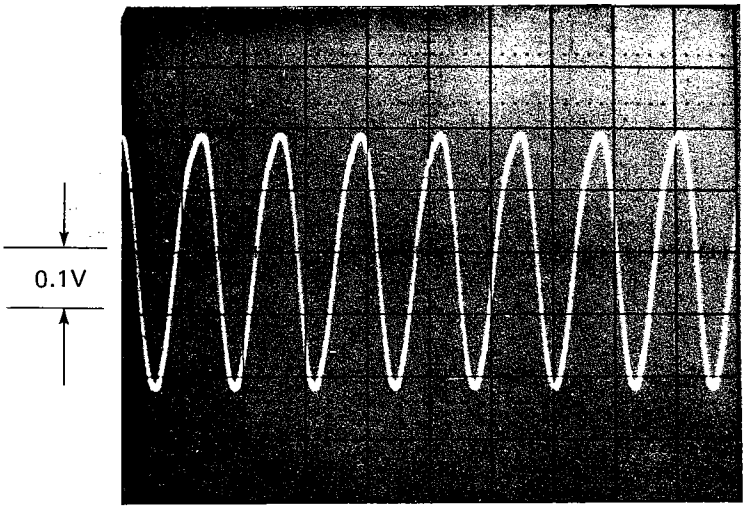
TEST POINT:	A4TP1
SIGNAL:	CLOCK
RECEIVER CONTROLS:	HOMING MODE SELECTED
RF INPUT:	NONE
SCOPE SETTINGS:	VERT – 5V/div, DC
	HORIZ – 10 msec/div
	SYNC – DC
	TRIG – INT

Figure 4-5. Receiver Unit Test Point Waveforms



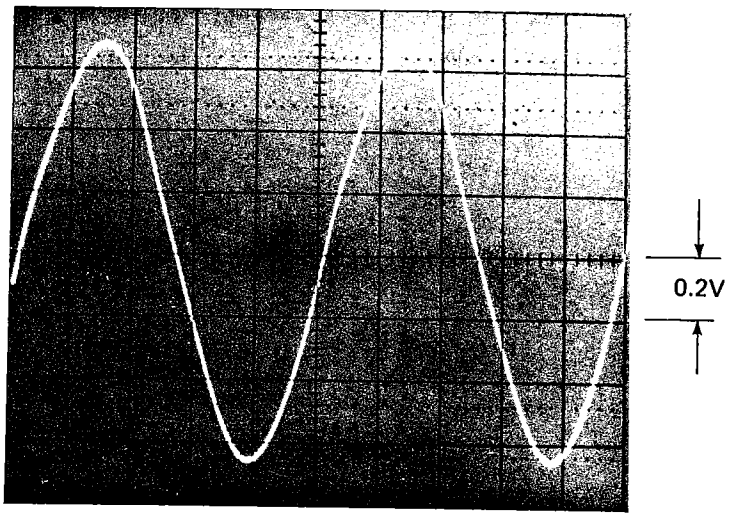
TEST POINT:	A5TP1
SIGNAL:	SQUELCH FILTER OUT.
RECEIVER CONTROLS:	CHANNEL 16, MONITOR MODE SELECTED
RF INPUT:	NONE
SCOPE SETTINGS:	VERT – 2V/div, AC
	HORIZ – 0.1 msec/div
	SYNC – AC
	TRIG – INT

Figure 4-5. Receiver Unit Test Point Waveforms



TEST POINT:	A6TP1
SIGNAL:	CRYSTAL OSCILLATOR
RECEIVER CONTROLS:	ANY CHANNEL
RF INPUT:	NONE
SCOPE SETTINGS:	VERT – 0.01/div AC, 10:1 PROBE
	HORIZ – 0.05 μsec/div
	SYNC – AC
	TRIG – INT

Figure 4-5. Receiver Unit Test Point Waveforms



TEST POINT:	SPEAKER AUDIO
RECEIVER CONTROLS:	CHANNEL 16, MONITOR MODE SELECTED . *SQUELCH* CONTROL FULLY CW, *VOLUME* CONTROL MID-POSITION.
RF INPUT:	1mV FROM SIGNAL GENERATOR, FM, 1kHz MODULATION ± 3kHz DEVIATION.
SCOPE SETTINGS:	VERT – 0.2V/div, AC HORIZ – 0.2msec/div SYNC – AC TRIGGER – INT

Figure 4-5. Receiver Unit Test Point Waveforms

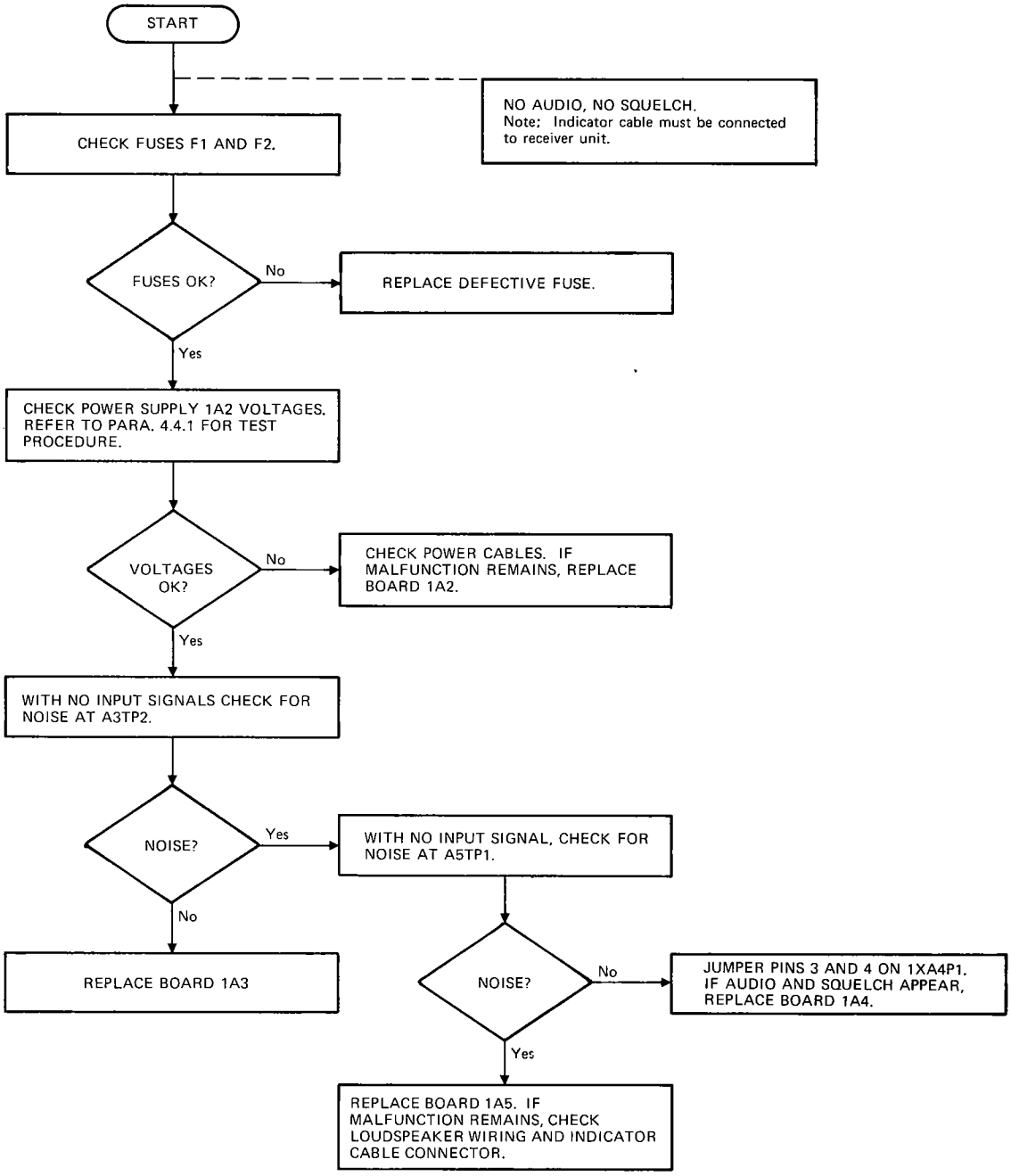


Figure 4-6. Homer Troubleshooting Flowchart

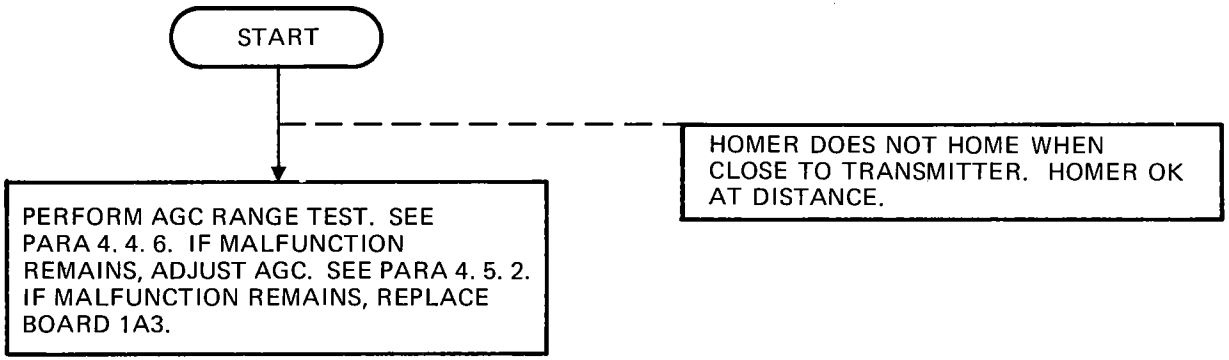


Figure 4-6. Homer Troubleshooting Flowchart

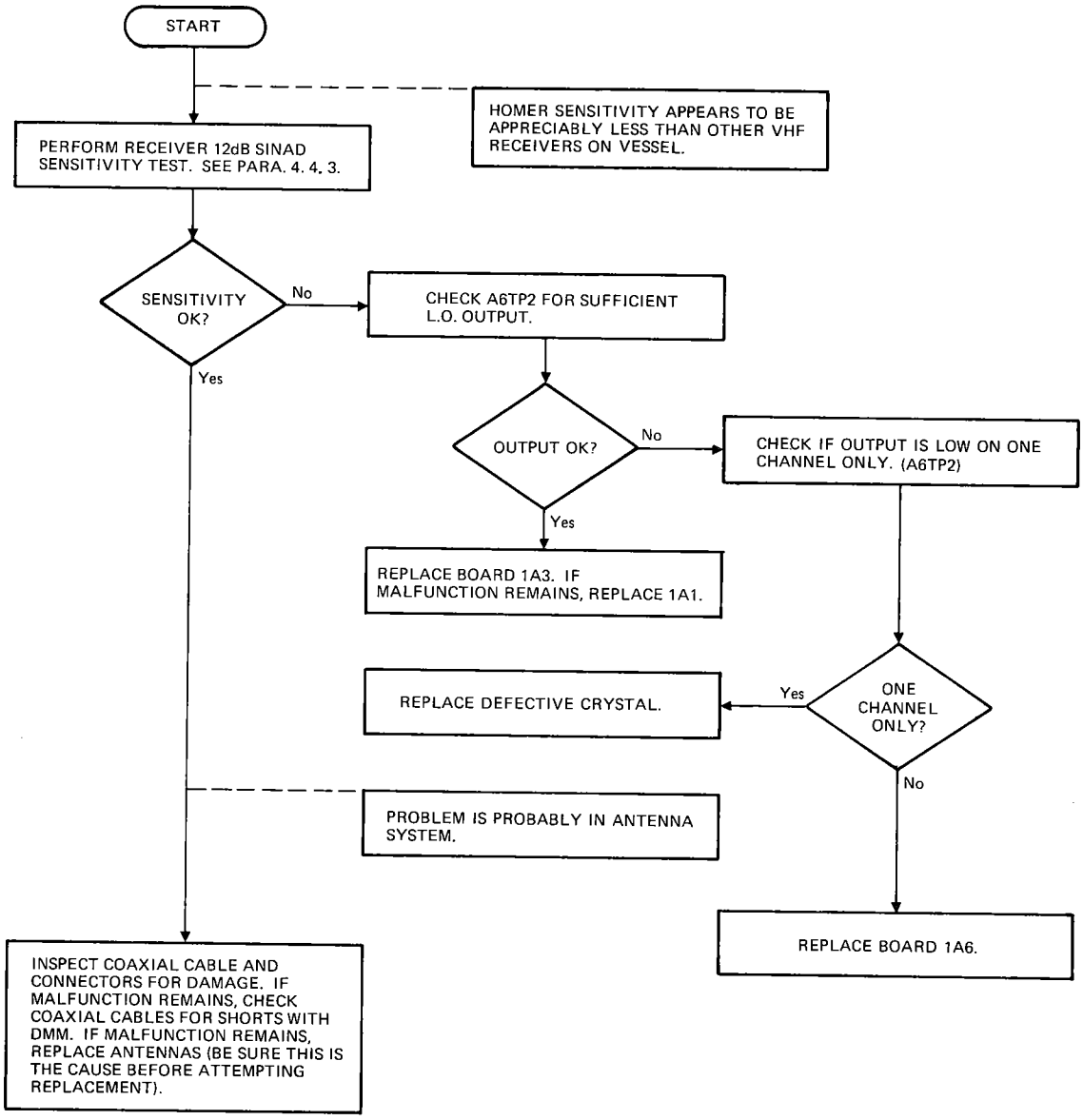


Figure 4-6. Homer Troubleshooting Flowchart

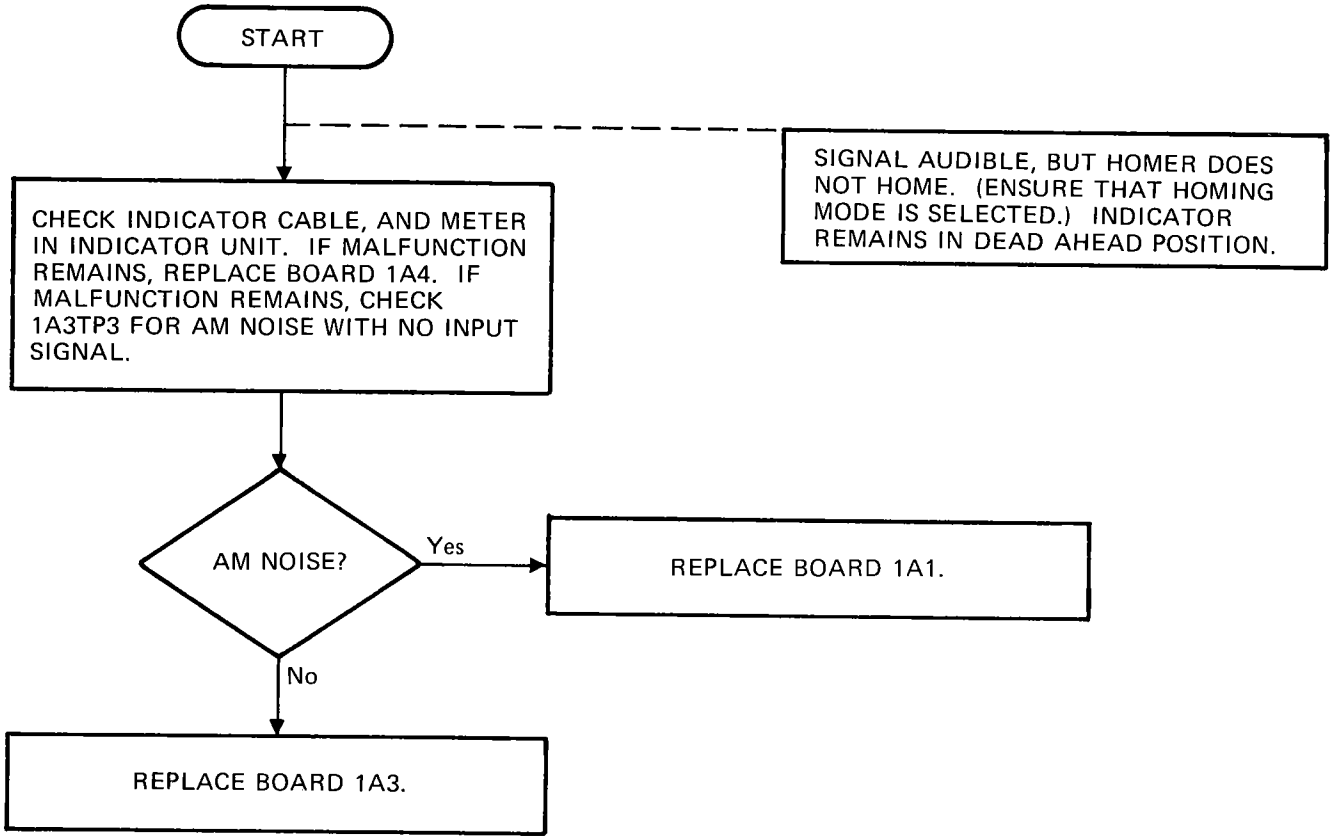


Figure 4-6. Homer Troubleshooting Flowchart

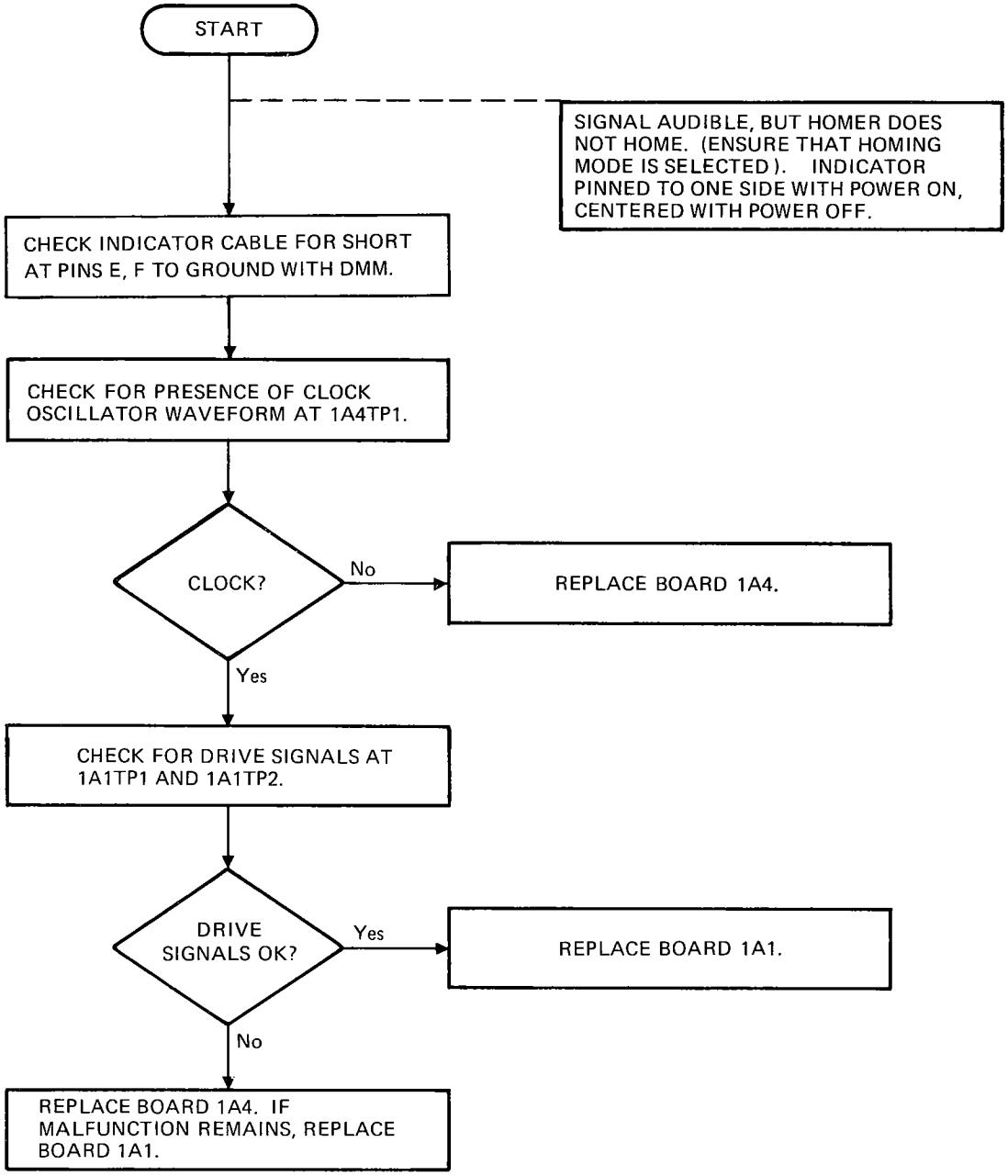


Figure 4-6. Homer Troubleshooting Flowchart

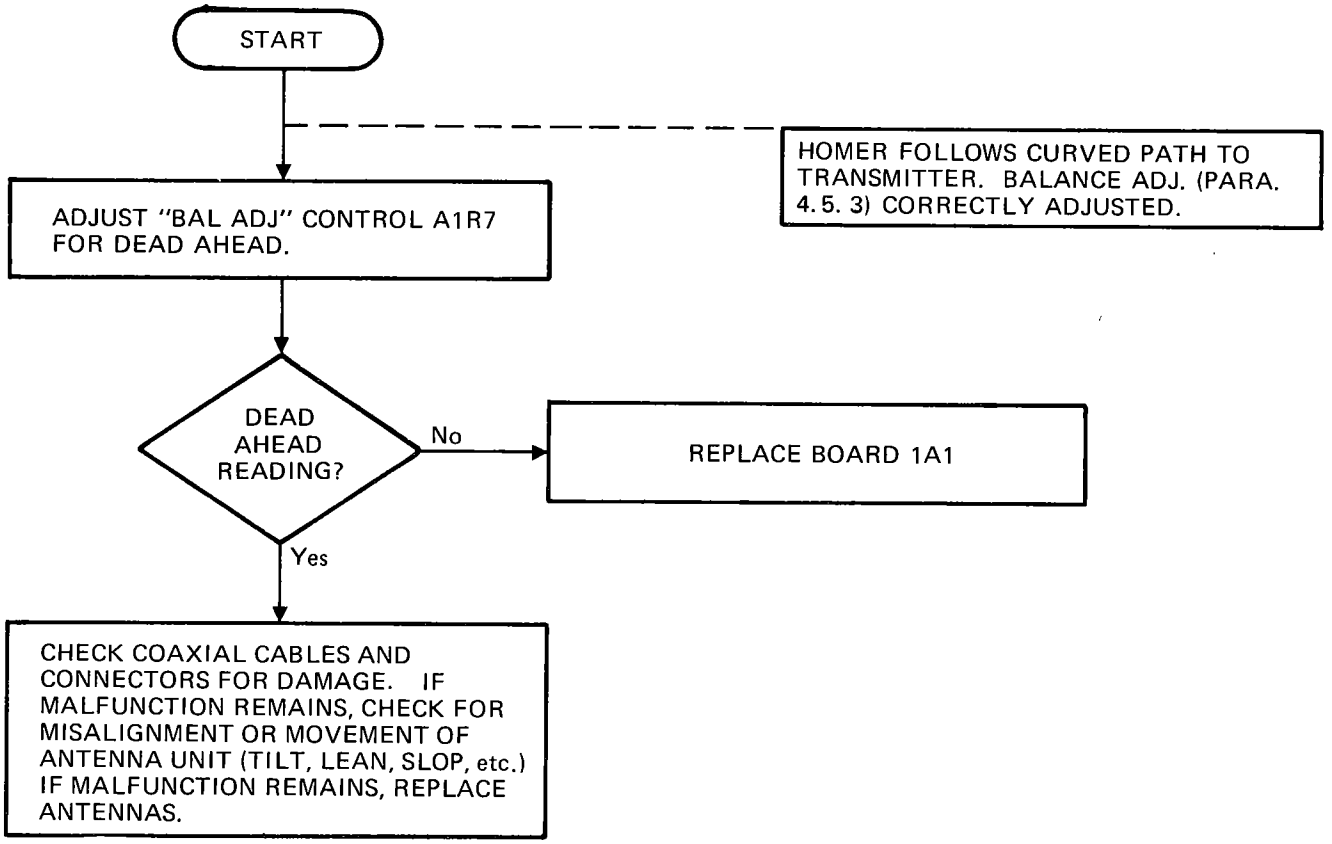


Figure 4-6. Homer Troubleshooting Flowchart

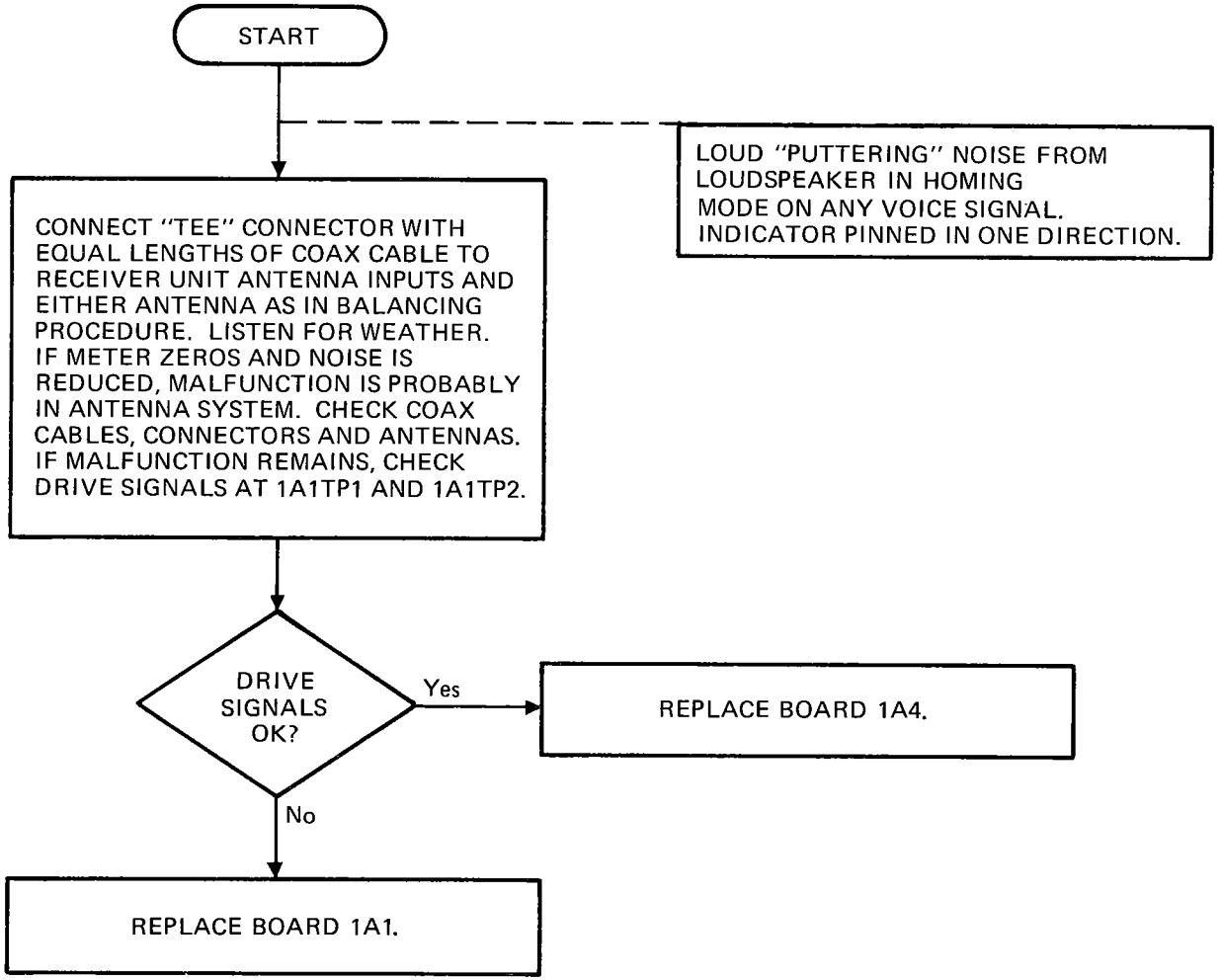


Figure 4-6. Homer Troubleshooting Flowchart

SECTION V - PARTS LIST

5.1 INTRODUCTION

This section contains listings for all replaceable parts for the homer. Tables 5-1 through 5-3 list parts in alphanumeric order by reference designation for the receiver unit, antenna unit, and indicator unit, respectively. The tables provide the following information:

(a) REF. DESIG. The reference designation for each replaceable part.

(b) DESCRIPTION. The description for each replaceable part.

(c) MFR. CODE. Manufacturer's Federal Supply Code Number. Refer to Table 5-4 for manufacturer's name and address.

(d) MFR. PART NO. Manufacturer's part number for replaceable part.

Table 5-1. Receiver Unit 1 Parts List

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
UNIT 1	RECEIVER	33967	91157200
1CR3	DIODE	81349	1N5400
1C1	CAPACITOR, FIXED .001μF, 1KV	56289	5GA-D10
1C2	Same as C1		
1C3	Same as C1		
1C4	Same as C1		
1C5	Same as C1		
1C6	CAPACITOR, FEED-THRU .001μF	72982	2425-003
1C7	Same as C6		
1C8	Same as C6		
1C9	Same as C6		
1DS1	LAMP	71744	CM-459
1F1	FUSE 1 AMP	71400	AGC1
1F2	FUSE 3 AMP	71400	AGC3
1J1	CONNECTOR	81349	MS-3102A-10SL-3P
1J2	CONNECTOR	81349	MS-3102A-12S-3P
1J3	CONNECTOR	81349	MS-3102A-14S-6S
1J4	CONNECTOR	81349	UG-1094A/U
1J5	Same as J4		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1J6	CONNECTOR	81349	MIL-C-39024/10-01
1LS1	SPEAKER	07109	135C2948
1L1	INDUCTOR, FIXED 3.3μH	99800	1537-24
1L2	Same as L1		
1L3	INDUCTOR, FIXED 10 Turn	33967	1200 0014
1R1	POTENTIOMETER 10K	71450	2700 0003A
1R2 & 1S2	POT & SWITCH 10K & SPST	71450	2700 0019
1R3 & 1S3	POT & SWITCH 10K & DPST	71450	2700 0001
1S1	SWITCH, ROTARY 12 Position	29604	73-1023
1T1	TRANSFORMER	80089	P-8604
1XA1A	CONNECTOR	54453	1SM10SREH
1XA2A	Same as XA1A		
1XA2B	Same as XA1A		
1XA3A	Same as XA1A		
1XA3B	Same as XA1A		
1XA4A	Same as XA1A		
1XA4B	Same as XA1A		
1XA5A	Same as XA1A		
1XA6A	Same as XA1A		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1XA6B	Same as XA1A		
1XDS1	LAMP POST	72619	113-1930-2931-20
1XDF1	FUSE HOLDER	75915	342022
1XDF2	Same as XDF1		
1XJ1	CONNECTOR CAP	02660	9760-10
1XJ2	CONNECTOR CAP	02660	9760-12
1XJ3	CONNECTOR CAP	02660	9760-14
1XJ4	CONNECTOR CAP	81349	CW-123A/U
1XJ5	Same as XJ4		
1MPLS1	SPEAKER CLOTH	33967	5120 0002
1MPR1	KNOB	32767	105
1MPR2	Same as MPR1		
1MPR3	Same as MPR1		
1MPS1	DIAL ASSEMBLY	33967	5515 6975
1MP	TOP COVER, BEIGE	33967	5115 7358
1MP	BOTTOM COVER, BEIGE	33967	5115 7359
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	PC CARD GUIDE	23880	1250V
1MP	CLIP	78553	C12043-017
1MP	CLIP	78553	C12043-017
1MP	CLIP	78553	C12043-017
1MP	CLIP	78553	C12043-017
1MP	RF SPEADER CLOTH	33967	5115 7397
1MP	MOUNTING BRACKET	33967	9115 7379.
1MP	OPERATING INSTRUCTION PLATE	33967	5515 7289
1MP	GRILLE	33967	5500 1001
1MP	FRONT PANEL	33967	5515 7157
1MP	KNOB, INSERT	32767	775-25
1MP	KNOB, INSERT	32767	775-25
1MP	KNOB, INSERT	32767	775-25

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1MP	KNOB, INSERT	32767	775-25
1W1	PWR. CABLE AC	33967	9115 7223
1W2	PWR. CABLE DC	33967	9115 7224

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A1	PTD. WRG. BD.	33967	9115 7201
1A1CR1	DIODE	04404	5082-3168
1A1CR2	Same as CR1		
1A1CR3	Same as CR1		
1A1CR4	Same as CR1		
1A1CR5	Same as CR1		
1A1CR6	Same as CR1		
1A1CR7	Same as CR1		
1A1CR8	Same as CR1		
1A1C1	CAPACITOR, FIXED 560pF	04062	DM-15-561J
1A1C2	Same as C1		
1A1C3	Same as C1		
1A1C4	Same as C1		
1A1C5	Same as C1		
1A1C6	Same as C1		
1A1C7	Same as C1		
1A1L1	INDUCTOR, FIXED 1.5μH	99800	1537-16
1A1L2	Same as L1		
1A1R1	RESISTOR, FIXED 1K, 1/4W, 5%	09021	CF1/4-1K,5%

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A1R2	Same as R1		
1A1R3	RESISTOR, FIXED 100Ω, 1/4W, 5%	09021	CF1/4-2K,5%
1A1R4	Same as R3		
1A1R5	RESISTOR, FIXED 2K, 1/4W, 5%	09021	CF1/4-2K,5%
1A1R6	Same as R5		
1A1R7	POTENTIOMETER, 20Ω	73138	72XWR20
1A1R8	Same as R3		
1A1R9	Same as R3		
1A1TP1	TEST POINT, WHITE	74970	105-0751-001
1A1TP2	TEST POINT, BROWN	74970	105-0758-001
1A1TP3	TEST POINT, BLACK	74970	105-0753-001
1A1MP	BOARD	33967	2315 7201

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A2	PTD. WRG. BD.	33967	9115 7202
1A2CR1	DIODE	81349	1N5400
1A2CR2	VARISTOR	09214	V130LA10A
1A2CR3	DIODE	81349	1N4002
1A2C1	CAPACITOR, FIXED 2100μF, 30V	90201	TCG212U030L2L
1A2C2	Same as C1		
1A2C3	CAPACITOR, FIXED .22μF	52736	MKT-1822-227/00
1A2C4	CAPACITOR, FIXED .1μF	52736	MKT-1819-410/0
1A2E1	JUMPER	55210	L-2007-1
1A2R1	RESISTOR, FIXED .47Ω, 2W	75042	BWH-0.47Ω,2W,5%
1A2R2	Same as R1		
1A2R3	RESISTOR, FIXED 15Ω, 8W	44655	1508
1A2TP1	TEST POINT, RED	74970	105-0752-001
1A2TP2	TEST POINT, GREEN	74970	105-0754-001
1A2TP3	TEST POINT, BLACK	74970	105-0753-001
1A2U1	DIODE ASSEBMLY	83701	PF05
1A2U2	MICROCIRCUIT	04713	MC7815CP
1A2XU2	HEATSINK	30161	60130-015
1A2MP	BOARD	33967	2315 7202

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3	PTD. WRG. BD.	33967	9115 7203
1A3CR1	DIODE	81349	1N4148
1A3CR2	Same as CR1		
1A3CR3	Same as CR1		
1A3CR4	Same as CR1		
1A3CR5	Same as CR1		
1A3CR6	Same as CR1		
1A3CR7	DELETED		
1A3CR8	Same as CR1		
1A3CR9	LED	72619	550-0103
1A3CR10	Same as CR1		
1A3CR11	Same as CR1		
1A3C1	CAPACITOR, FIXED .001μF	22701	1008 0047
1A3C2	CAPACITOR, FIXED 330pF	22701	1008 0040
1A3C3	Same as C1		
1A3C4	CAPACITOR, FIXED 5pF	22701	1008 0011
1A3C5	CAPACITOR, FIXED 1pF	22701	1008 0001
1A3C6	CAPACITOR, FIXED 22pF	22701	1008 0020
1A3C7	CAPACITOR, FIXED 10pF	22701	1008 0015

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3C8	CAPACITOR, FIXED 8.2pF	22701	1008 0014
1A3C9	Same as C1		
1A3C10	Same as C2		
1A3C11	Same as C1		
1A3C12	Same as C1		
1A3C13	Same as C5		
1A3C14	Same as C7		
1A3C15	Same as C8		
1A3C16	Same as C8		
1A3C17	Same as C1		
1A3C18	Same as C5		
1A3C19	Same as C7		
1A3C20	Same as C7		
1A3C21	Same as C7		
1A3C22	Same as C1		
1A3C23	CAPACITOR, FIXED .1µF	52736	MKT-1819-410/0
1A3C24	Same as C1		
1A3C25	CAPACITOR, FIXED 82pF	04062	DM15-820J
1A3C26	Same as C1		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3C27	CAPACITOR, FIXED 200pF	04062	DM15-201J
1A3C28	CAPACITOR, FIXED 470pF	04062	DM15-471J
1A3C29	Same as C28		
1A3C30	Same as C1		
1A3C31	CAPACITOR, VARIABLE 5.5-18pF	52763	105-TRIKO-22-IN-003
1A3C32	Same as C6		
1A3C33	CAPACITOR, FIXED .047µF	51642	200-050-651-473M
1A3C34	Same as C23		
1A3C35	Same as C28		
1A3C36	Same as C23		
1A3C37	Same as C6		
1A3C38	Same as C1		
1A3C39	CAPACITOR, FIXED .047µF	52763	MKT-1819-347/0
1A3C40	CAPACITOR, FIXED 100pF	04062	DM15-101J
1A3C41	CAPACITOR, VARIABLE 10-60pF	52763	105-TRIKO-22-IN-1500-10/60
1A3C42	Same as C33		
1A3C43	Same as C39		
1A3C44	Same as C40		
1A3C45	Same as C41		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3C46	Same as C39		
1A3C47	Same as C28		
1A3C48	Same as C23		
1A3C49	CAPACITOR, FIXED 10μF, 35V	31433	T368C106M035AS
1A3C50	CAPACITOR, FIXED 1μF, 25V	31433	T368A105M025AS
1A3C51	CAPACITOR, FIXED .01μF	22701	1008 0055
1A3C52	Same as C51		
1A3C53	Same as C33		
1A3C54	Same as C49		
1A3C55	Same as C39		
1A3C56	CAPACITOR, FIXED .015μF	52763	MKT-1819-315/0
1A3C57	Same as C39		
1A3C58	Same as C39		
1A3C59	Same as C23		
1A3C60	Same as C51		
1A3C61	Same as C49		
1A3C62	Same as C49		
1A3C63	Same as C49		
1A3C64	Same as C1		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3C65	Same as C39		
1A3C66	Same as C1		
1A3C67	Same as C1		
1A3C68	Same as C1		
1A3E1	JUMPER	55210	L-2007-1
1A3FL1	FILTER, CRYSTAL	25120	1457
1A3L1	INDUCTOR, VARIABLE 3 1/4 Turn	23880	12255
1A3L2	Same as L1		
1A3L3	Same as L1		
1A3L4	Same as L1		
1A3L5	Same as L1		
1A3L6	Same as L1		
1A3L7	INDUCTOR, VARIABLE 17 1/4 Turn	77630	51246
1A3L8	INDUCTOR, FIXED 100µH	99800	1025-68
1A3L9	INDUCTOR, FIXED 1MH	99800	1025-92
1A3L10	Same as L8		
1A3L11	Same as L9		
1A3L12	Same as L9		
1A3Q1	FET	02735	40820

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3Q2	Same as Q1		
1A3Q3	FET	02735	40673
1A3Q4	TRANSISTOR	81349	2N2222
1A3R1	RESISTOR, FIXED 100K, 1/4W, 5%	09021	CF1/4-100K,5%
1A3R2	Same as R1		
1A3R3	RESISTOR, FIXED 270Ω, 1/4W, 5%	09021	CF1/4-270Ω,5%
1A3R4	RESISTOR, FIXED 10K, 1/4W, 5%	09021	CF1/4-10K,5%
1A3R5	Same as R4		
1A3R6	Same as R3		
1A3R7	RESISTOR, FIXED 1K, 1/4W, 5%	09021	CF1/4-1K,5%
1A3R8	Same as R4		
1A3R9	Same as R7		
1A3R10	RESISTOR, FIXED 56Ω, 1/4W, 5%	09021	CF1/4-56Ω,5%
1A3R11	DELETED		
1A3R12	RESISTOR, FIXED 100Ω, 1/4W, 5%	09021	CF1/4-100Ω,5%
1A3R13	Same as R3		
1A3R14	Same as R3		
1A3R15	Same as R7		
1A3R16	Same as R4		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3R17	Same as R4		
1A3R18	RESISTOR, FIXED 620Ω, 1/8W, 5%	81349	RC05S621J
1A3R19	Same as R12		
1A3R20	RESISTOR, FIXED 33Ω, 1/4W, 5%	09021	CF1/4-33Ω,5%
1A3R21	Same as R10		
1A3R22	RESISTOR, FIXED 1K, 1/8W, 5%	81349	RC05S102J
1A3R23	DELETED		
1A3R24	RESISTOR, FIXED 820Ω, 1/4W, 5%	09021	CF1/4-820Ω,5%
1A3R25	Same as R22		
1A3R26	Same as R10		
1A3R27	DELETED		
1A3R28	RESISTOR, VARIABLE 2K	73138	72XR2K
1A3R29	DELETED		
1A3R30	Same as R4		
1A3R31	DELETED		
1A3R32	Same as R1		
1A3R33	Same as R7		
1A3R34	RESISTOR, FIXED 1M, 1/4W, 5%	09021	CF1/4-1MEG-5%
1A3R35	Same as R7		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A3R36	RESISTOR, FIXED 2.2K, 1/4W, 5%	09021	CF1/4-2.2K,5%
1A3R37	Same as R12		
1A3R38	Same as R7		
1A3R39	Same as R7		
1A3TP1	TEST POINT, WHITE	74970	105-0751-001
1A3TP2	TEST POINT, BROWN	74970	105-0758-001
1A3TP3	TEST POINT, RED	74970	105-0752-001
1A3TP4	TEST POINT, GREEN	74970	105-0754-001
1A3TP5	TEST POINT, BLACK	74970	105-0753-001
1A3U1	MICROCIRCUIT	07263	uA2136DC
1A3U2	Same as U1		
1A3U3	Same as U1		
1A3U4	MICROCIRCUIT	07933	RC1558T
1A3Y1	CRYSTAL, FIXED 17.34625 MHz	00809	1618 0206
1A3Q1	TRANSIPAD	19080	RCT018030-2
1A3XQ2	Same as XQ1		
1A3XQ3	Same as XQ1		
1A3XQ4	Same as XQ1		
1A3MP	BOARD	33967	2315 7203
1A3MP	SHIELD	33967	5115 7288

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A4	PTD. WRG. BD.	33967	9115 7204
1A4CR1	DIODE	81349	1N4148
1A4CR2	Same as CR1		
1A4CR3	Same as CR1		
1A4CR4	Same as CR1		
1A4CR5	Same as CR1		
1A4CR6	Same as CR1		
1A4C1	CAPACITOR, FIXED .022µF	52763	MKT-1819-322/0
1A4C2	CAPACITOR, FIXED 10µF, 35V	31433	T368C106M035AS
1A4C3	CAPACITOR, FIXED .001µF,	22701	1008 0047
1A4C4	CAPACITOR, FIXED 100µF, 40V	52763	EK-100/40
1A4C5	Same as C2		
1A4C6	CAPACITOR, FIXED 4.7µF, 25V	52763	T330A475K025AS
1A4C7	Same as C6		
1A4E1	JUMPER	55210	L-2007-1
1A4E2	Same as E1		
1A4Q1	TRANSISTOR	81349	2N2222
1A4Q2	Same as Q1		
1A4Q3	Same as Q1		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A4Q4	Same as Q1		
1A4Q5	TRANSISTOR	81349	2N2219
1A4R1	RESISTOR, FIXED 1M, 1/4W, 5%	09021	CF1/4-1MEG,5%
1A4R2	RESISTOR, FIXED 470K, 1/4W, 5%	09021	CF1/4-470K,5%
1A4R3	RESISTOR, FIXED 100K, 1/4W, 5%	09021	CF1/4-100K,5%
1A4R4	RESISTOR, FIXED 10K, 1/4W, 5%	09021	CF1/4-10K,5%
1A4R5	RESISTOR, FIXED 1K, 1/4W, 5%	09021	CF1/4-1K,5%
1A4R6	Same as R2		
1A4R7	Same as R4		
1A4R8	RESISTOR, FIXED 100Ω, 1/4W, 5%	09021	CF1/4-100Ω,5%
1A4R9	Same as R4		
1A4R10	Same as R4		
1A4R11	Same as R3		
1A4R12	RESISTOR, FIXED 2.2K, 1/4W, 5%	09021	CF1/4-2.2K,5%
1A4R13	RESISTOR, FIXED 30K, 1/4W, 5%	09021	CF1/4-30K,5%
1A4R14	Same as R3		
1A4R15	Same as R4		
1A4R16	Same as R12		
1A4R17	Same as R12		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A4R18	RESISTOR, FIXED 1Ω, 1/4W, 10%	81349	RC07S1R0K
1A4R19	Same as R8		
1A4R20	RESISTOR, FIXED 5.6K, 1/4W, 5%	09021	CF1/4-5.6K,5%
1A4R21	Same as R4		
1A4R22	RESISTOR, FIXED 75Ω, 3 1/4W, 5%	44655	4387
1A4S1	DELETED		
1A4TP1	TEST POINT, WHITE	74970	105-0751-001
1A4TP2	TEST POINT, RED	74970	105-0752-001
1A4TP3	TEST POINT, GREEN	74970	105-0754-001
1A4TP4	TEST POINT, YELLOW	74970	105-0757-001
1A4TP5	TEST POINT, BLACK	74970	105-0753-001
1A4U1	MICROCIRCUIT	04713	MC14001BCL
1A4U2	MICROCIRCUIT	04713	MC14027BCL
1A4U3	MICROCIRCUIT	04713	MC14066BCL
1A4U4	MICROCIRCUIT	07933	RC1558T
1A4XQ1	TRANSIPAD	19080	RCT018030-2
1A4XQ2	Same as XQ1		
1A4XQ3	Same as XQ1		
1A4XQ4	Same as XQ1		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A4XQ5	TRANSIPAD	19080	RCT05030-2
1A4MP	BOARD	33967	2315 7204
1A4MPQ1	FERRITE BEAD	02114	56590 65/4A
1A4MPQ2	Same as MPQ1		
1A4MPQ3	DELETED		
1A4MPQ4	DELETED		
1A4MPQ5	HEATSINK	18915	3AL-635-2R

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A5	PTD. WRG. BD.	33967	9115 7205
1A5CR1	DIODE	81349	1N960B
1A5CR2	DIODE	81349	1N4148
1A5CR3	Same as CR2		
1A5C1	CAPACITOR, FIXED 56pF	22701	1008 0028
1A5C2	CAPACITOR, FIXED 220pF, 500V	04062	DM15-221J
1A5C3	Same as C2		
1A5C4	CAPACITOR, FIXED .01µF	22701	1008 0055
1A5C5	CAPACITOR, FIXED .1µF	52763	MKT-1819-410/0
1A5C6	CAPACITOR, FIXED 10µF, 35V	31433	T368C106M035AS
1A5C7	CAPACITOR, FIXED 4.7µF, 10V	52763	ETPI 4.7/10
1A5C8	CAPACITOR, FIXED 470pF	22701	1008 0042
1A5C9	Same as C4		
1A5C10	CAPACITOR, FIXED 47µF, 6V	56289	196D476X9006JA1
1A5C11	CAPACITOR, FIXED 100µF, 16V	52763	EK 100/16
1A5C12	CAPACITOR, FIXED .001µF	22701	1008 0047
1A5C13	Same as C5		
1A5C14	CAPACITOR, FIXED 330pF	22701	1008 0040
1A5C15	CAPACITOR, FIXED 100µF, 40V	52763	EK 100/40

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A5C16	Same as C15		
1A5C17	Same as C5		
1A5Q1	TRANSISTOR	81349	2N2222
1A5R1	RESISTOR, FIXED 56K, 1/4W, 5%	09021	CF1/4-56K,5%
1A5R2	RESISTOR, FIXED 430K, 1/4W, 5%	09021	CF1/4-430K,5%
1A5R3	RESISTOR, FIXED 1M, 1/4W, 5%	09021	CF1/4-1MEG,5%
1A5R4	Same as R3		
1A5R5	RESISTOR, FIXED 680Ω, 1/4W, 5%	09021	CF1/4-680Ω,5%
1A5R6	RESISTOR, FIXED 3.3K, 1/4W, 5%	09021	CF1/4-3.3K,5%
1A5R7	RESISTOR, FIXED 200K, 1/4W, 5%	09021	CF1/4-200K,5%
1A5R8	RESISTOR, FIXED 39K, 1/4W, 5%	09021	CF1/4-39K,5%
1A5R9	RESISTOR, FIXED 470K, 1/4W, 5%	09021	CF1/4-470K,5%
1A5R10	RESISTOR, FIXED 1.5M, 1/4W, 5%	09021	CF1/4-1.5MEG,5%
1A5R11	RESISTOR, FIXED 22K, 1/4W, 5%	09021	CF1/4-22K,5%
1A5R12	RESISTOR, FIXED 100K, 1/4W, 5%	09021	CF1/4-100K,5%
1A5R13	RESISTOR, FIXED 270Ω, 1/4W, 5%	09021	CF1/4-270Ω,5%
1A5R14	Same as R12		
1A5R15	RESISTOR, FIXED 8.2K, 1/4W, 5%	09021	CF1/4-8.2K,5%
1A5R16	Same as R12		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A5R17	RESISTOR, FIXED 2.2M, 1/4W, 5%	09021	CF1/4-2.2MEG,5%
1A5R18	RESISTOR, FIXED 10K, 1/4W, 5%	09021	CF1/4-10K,5%
1A5R19	RESISTOR, FIXED 1K, 1/4W, 5%	09021	CF1/4-1K,5%
1A5R20	DELETED		
1A5R21	Same as R5		
1A5R22	RESISTOR, FIXED 2.7K, 1/4W, 5%	09021	CF1/4-2.7K,5%
1A5R23	Same as R18		
1A5R24	Same as R19		
1A5R25	RESISTOR, FIXED 15Ω, 1/4W, 5%	09021	CF1/4-15Ω,5%
1A5R26	RESISTOR, FIXED 1Ω, 1/4W, 10%	81349	RC07S1R0K
1A5R27	Same as R5		
1A5R28	Same as R25		
1A5TP1	TEST POINT, WHITE	74970	105-0751-001
1A5TP2	TEST POINT, RED	74970	105-0752-001
1A5TP3	TEST POINT, BLACK	74970	105-0753-001
1A5U1	MICROCIRCUIT	27014	LM2900N
1A5U2	MICROCIRCUIT	07263	TBA800A
1A5XQ1	TRANSIPAD	19080	RCT018030-2
1A5XU2	HEATSINK	33967	5115 7271

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A5MP	BOARD	33967	2315 7205

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6	PTD. WRG. BD.	33967	9115 7206
1A6CR1	DIODE	04404	5082-3168
1A6CR2	Same as CR1		
1A6CR3	Same as CR1		
1A6CR4	Same as CR1		
1A6CR5	Same as CR1		
1A6CR6	Same as CR1		
1A6CR7	Same as CR1		
1A6CR8	Same as CR1		
1A6CR9	NOT PROVIDED		
1A6CR10	NOT PROVIDED		
1A6CR11	NOT PROVIDED		
1A6CR12	NOT PROVIDED		
1A6CR13	DIODE	07263	FH1100
1A6C1	CAPACITOR, FIXED .001µF	22701	1008 0047
1A6C2	Same as C1		
1A6C3	Same as C1		
1A6C4	Same as C1		
1A6C5	Same as C1		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6C6	Same as C1		
1A6C7	Same as C1		
1A6C8	Same as C1		
1A6C9	NOT PROVIDED		
1A6C10	NOT PROVIDED		
1A6C11	NOT PROVIDED		
1A6C12	NOT PROVIDED		
1A6C13	CAPACITOR, VARIABLE 3.5-13pF	52763	7S-TRIKO-07-N1500
1A6C14	Same as C13		
1A6C15	Same as C13		
1A6C16	Same as C13		
1A6C17	Same as C13		
1A6C18	Same as C13		
1A6C19	Same as C13		
1A6C20	Same as C13		
1A6C21	NOT PROVIDED		
1A6C22	NOT PROVIDED		
1A6C23	NOT PROVIDED		
1A6C24	NOT PROVIDED		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6C25	CAPACITOR, FIXED 22pF	22701	1008 0020
1A6C26	Same as C25		
1A6C27	Same as C25		
1A6C28	Same as C25		
1A6C29	Same as C25		
1A6C30	Same as C25		
1A6C31	Same as C25		
1A6C32	Same as C25		
1A6C33	NOT PROVIDED		
1A6C34	NOT PROVIDED		
1A6C35	NOT PROVIDED		
1A6C36	NOT PROVIDED		
1A6C37	DELETED		
1A6C38	CAPACITOR, FIXED 560pF	04062	DM-15-561J
1A6C39	Same as C38		
1A6C40	CAPACITOR, FIXED 3900pF	22701	1008 0072
1A6C41	Same as C1		
1A6C42	CAPACITOR, FIXED 10µF, 35V	31433	T368C106M035AS
1A6C43	CAPACITOR, FIXED 100µF	54473	ECE-A16V100N

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6C44	CAPACITOR, FIXED 82pF	04062	DM-15-820J
1A6C45	Same as C44		
1A6C46	CAPACITOR, FIXED 5pF	22701	1008 0011
1A6C47	CAPACITOR, FIXED 3.3pF	22701	1008 0008
1A6C48	Same as C1		
1A6C49	Same as C1		
1A6C50	CAPACITOR, FIXED 15pF	22701	1008 0017
1A6C51	Same as C50		
1A6C52	CAPACITOR, FIXED 1pF	22701	1008 0001
1A6C53	Same as C46		
1A6C54	Same as C1		
1A6C55	Same as C1		
1A6C56	Same as C50		
1A6C57	Same as C52		
1A6C58	Same as C50		
1A6C59	CAPACITOR, FIXED 47pF	04062	DM-15-470J
1A6C60	Same as C25		
1A6C61	Same as C1		
1A6L1	INDUCTOR, VARIABLE 5 1/4 Turn	23880	12256

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6L2	INDUCTOR, VARIABLE 100μH	99800	1025-68
1A6L3	Same as L1		
1A6L4	INDUCTOR, VARIABLE 3 1/4 Turn	23880	12255
1A6L5	Same as L4		
1A6L6	Same as L4		
1A6L7	Same as L4		
1A6Q1	TRANSISTOR	81349	2N918
1A6Q2	Same as Q1		
1A6Q3	Same as Q1		
1A6R1	RESISTOR, FIXED 1K, 1/4W, 5%	09021	CF1/4-1K,5%
1A6R2	Same as R1		
1A6R3	Same as R1		
1A6R4	Same as R1		
1A6R5	Same as R1		
1A6R6	Same as R1		
1A6R7	Same as R1		
1A6R8	Same as R1		
1A6R9	NOT PROVIDED		
1A6R10	NOT PROVIDED		

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6R11	NOT PROVIDED		
1A6R12	NOT PROVIDED		
1A6R13	RESISTOR, FIXED 10K, 1/4W, 5%	09021	CF1/4-10K,5%
1A6R14	Same as R13		
1A6R15	RESISTOR, FIXED 270Ω, 1/4W, 5%	09021	CF1/4-270Ω,5%
1A6R16	Same as R15		
1A6R17	RESISTOR, FIXED 47Ω, 1/4W, 5%	09021	CF1/4-47Ω,5%
1A6R18	Same as R15		
1A6R19	RESISTOR, FIXED 33K, 1/4W, 5%	09021	CF1/4-33K,5%
1A6R20	RESISTOR, FIXED 18K, 1/4W, 5%	09021	CF1/4-18K,5%
1A6R21	Same as R1		
1A6R22	Same as R15		
1A6R23	Same as R13		
1A6R24	Same as R13		
1A6R25	Same as R1		
1A6TP1	TEST POINT, WHITE	74970	105-0751-001
1A6TP2	TEST POINT, RED	74970	105-0752-001
1A6TP3	TEST POINT, BLACK	74970	105-0753-001
1A6XQ1	TRANSIPAD	19080	RCT018030-2

Table 5-1. Receiver Unit 1 Parts List
(continued)

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
1A6XQ2	Same as XQ1		
1A6XQ3	Same as XQ1		
1A6Y1	CRYSTAL, CH6	00809	1618 0006
1A6Y2	CRYSTAL, CH12	00809	1618 0012
1A6Y3	CRYSTAL, CH13	00809	1618 0013
1A6Y4	CRYSTAL, CH14	00809	1618 0014
1A6Y5	CRYSTAL, CH16	00809	1618 0016
1A6Y6	CRYSTAL, CH22A	00809	1618 0042
1A6Y7	CRYSTAL, CHW1	00809	1618 0000
1A6Y8	CRYSTAL, CHW2	00809	1618 0032
1A6Y9	NOT PROVIDED		
1A6Y10	NOT PROVIDED		
1A6Y11	NOT PROVIDED		
1A6Y12	NOT PROVIDED		
1A6XY1-12	CRYSTAL SOCKET	74970	126-0110-008
1A6XY1-12	BRACKET	33967	5115 7274
1A6MP	BOARD	33967	2315 7206

Table 5-2. Antenna Unit 2 P. .ts List

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
UNIT 2	ANTENNA	33967	9115 7226
2A1	ANTENNA MATCHED SET	71628	TYPE 1-5
2W1	ANTENNA CABLE MATCHED, 30'	33967	SET 9115 7228
2W2	ANTENNA CABLE MATCHED, 20'	33967	SET 9115 7280

Table 5-3. Indicator Unit 3 Parts List

REF DESIG	DESCRIPTION	MFR CODE NO.	MFR PART NO.
UNIT 3	INDICATOR	33967	9115 7229
3DS1	LAMPS, LED	04404	5082-4655
3DS2	Same as DS1		
3J1	CONNECTOR	81349	MS3102A-14S-6P
3M1	METER	32171	T3-LS-DUA-5H5-S
3R1	RESISTOR, FIXED 330Ω, 1/4W, 5%	81349	RCR07G331KS
3R2	Same as R1		
3XJ1	CONNECTOR, CAP	02660	9760-14
3MP	THUMBSCREW	72914	GRC-364-368
3MP	THUMBSCREW	72914	GRC-364-368
3MP	BRACKET	33967	5115 7232
3MP	LAMP HOLDER BD.	33967	2315 7235
3MP	CAP PLUG	99017	B-659
3MP	CAP PLUG	99017	B-659
3W1	INDICATOR CONTROL CABLE	33967	9115 7225

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.		
CODE NO.	MANUFACTURER	ADDRESS
00809	TEDFORD/HARRIS	TEDFORD/HARRIS CROVEN LTD. 500 BEECH ST. WHITBY, ONTARIO CANADA
02114	FERROX	FERROXCUBE CORP. P.O. BOX 359 MT. MARION RD. SAUGERTES, NY 12477
02660	AMPHENOL	BUNKER RAMO CORP. CONNECTOR DIV. 2801 S. 25th AVE. BROADVIEW, IL 60153
02735	RCA	RCA CORP. SOLID STATE DIV. ROUTE 202 SOMERVILLE, NJ 08876
04062	ELMENCO	ELECTRO MOTIVE CROP. SUBSIDIARY OF INTERNATIONAL ELECTRONICS CORP. P.O. BOX 7600 LAUTER AVE. FLORENCE, SC 29501 FC 72036
04404	HP	HEWLETT-PACKARD CO. AUTOMATIC MEASUREMENT DIV. 974 ARQUES AVE. SUNNYVALE, CA 94086
04713	MOTOROLA	MOTOROLA INC. SEMICONDUCTOR PRODUCTS DIV. P.O. BOX 20923 5005 E. MCDOWELL RD. PHEONIX, AZ 85036
07109	OAKTRON	OAKTRON INDUSTRIES 704 30th ST. MONROE, WI 53566

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

CODE NO.	MANUFACTURER	ADDRESS
07263	FAIRCHILD	FAIRCHILD CAMERA AND INSTRUMENT CORP. SEMICONDUCTOR DIV. 464 ELLIS ST. MOUNTAIN VIEW, CA 94042
07933	RAYTHEON	RAYTHEON CO. SEMICONDUCTOR DIV. T & Q 350 ELLIS ST. MOUNTAIN VIEW, CA 94042
09021	SPEER-AIRCO	AIRCO ELECTRONICS P.O. BOX 334 FOSTER BROOK RD. BRADFORD, PA 16701
18915	BRITCHER CORP.	BIRTCHER CORP. THE INDUSTRIAL DIV. 4371 VALLEY BDVD. LOS ANGELES, CA 90032
19080	ROBISON	ROBISON ELECTRONICS INC. 3580 SACRAMENTO DR. SAN LUIS OBISPO, CA 93401
22701	DILECTRON	BESTRAN CORP. DILECTRON DIV. 2669 SO. MYRTLE AVE. MONTROVIA, CA 91016
23880	SAE	STANFORD APPLIED ENGINEERING INC. 340 MARTIN AVE. SANTA CLARA, CA 95050
24226	GOWANDA	GOWANDA ELECTRONICS CORP. 179 BROADWAY RD. GOWANDA, NY 14070

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

CODE NO.	MANUFACTURER	ADDRESS
25120	PIEZO TECHNOLOGY INC.	PIEZO TECHNOLOGY INC. P.O. BOX 7877 2400 DIVERSIFIED WAY ORLANDO, FL 32804
26365	GRC	GRIES REPRODUCER CO. DIV. OF COATS AND CLARK INC. 125 BEECHWOOD AVE. NEW ROCHELLE, NY 10802
27014	NATIONAL	NATIONAL SEMICONDUCTOR 2900 SEMICONDUCTOR DR. SANTA CLARA, CA 95051
29604	STACKPOLE	STACKPOLE COMPONENTS CO. P.O. BOX 14466 RALEIGH INC. 27610
30161	AAVID ENGINEERING INC.	AAVID ENGINEERING INC. 30 COOK CT. LACONIA, NH 03246
31433	KEMET	UNION CARBIDE CORP. MATERIALS SYSTEMS DIV. COMPONENTS DEPT. HIGHWAY 276 S.E. GREENVILLE, SC 29606
32171	MODETUC	MODETUC INC. 18 MARSHALL ST. NORWALK CT. 06854 PLANT LOCATED AT 421 HARVARD ST. MANCHESTER, NH
32767	GRIFFITH	GRIFFITH PLASTICS CORP. P.O. BOX 4365 1026 CALIFORNIA DR. BURLINGAME, CA 94010

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

CODE NO.	MANUFACTURER	ADDRESS
33967	INTECH INC.	INTECH INC. 282 BROKAW RD. SANTA CLARA, CA 95050
44655	OHMITE	OHMITE MFG. CO. 3601 W. Howard St. Skokie, IL 60076
51642	CENTRE	CENTRE ENGINEERING INC. 2820 E. COLLEGE AVE. STATE COLLEGE, PA 16801
52763	STETTNER-TRUSH	STETTNER-TRUSH INC. 67 ALBANY ST. CASENOVIA, NY 13035
54453	SULLINS	SULLINS ELECTRONIC CORP. P.O. BOX 757 541B TWIN OAKS VALLEY RD. SAN MARCOS, CA 92069
54473	MATSUSHITA	MATSUSHITA ELECTRIC CORP. OF AMERICA ONE PANASONIC WAY SAUCUS, NJ 07094
55210	GETTIG	GETTIG ENGINEERING & MFG. CO. INC. P.O. BOX 85 OFF RT. 45 SPRING MILLS, PA
56289	SPRAGUE	SPRAGUE ELECTRIC CO. NORTH ADAMS, MA 01247

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.		
CODE NO.	MANUFACTURER	ADDRESS
71400	BUSS	BUSSMAN MFG. DIV. OF MCGRAW-EDISON 2536 W. UNIVERSITY ST. ST. LOUIS, MO 63106
71450	CTS	CTS CORP. 1142 W. BEARDSLEY AVE. ELKHART, IN 14052
71744	CHICAGO MIN.	CHICAGO MINIATURE/DRAKE 4433 RAVENSWOOD AVE. CHICAGO, IL 60640
72619	DIALIGHT	DIALIGHT DIV. AMPEREX ELECTRONIC CORP. 203 HARRISON PL. BROOKLYN, NY 11237
72914	GRIMES	GRIMES MFG. CO. 515 N. RUSSELL URBANA, OHIO 43078
72982	ERIE TECH. PROD. INC.	ERIE TECHNOLOGH PRODUCTS INC. 644 W. 12th ST. LOGANSPORT, IN 46947
73138	BECKMAN	BECKMAN INSTRUMENTS INC. HELIPOT DIV. 2500 HARBOR BLVD. FULLERTON, CA 92634
74970	E.F. JOHNSON	JOHNSON EF CO. 299 10th AVE. S.W. WASECA, MN 56093

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

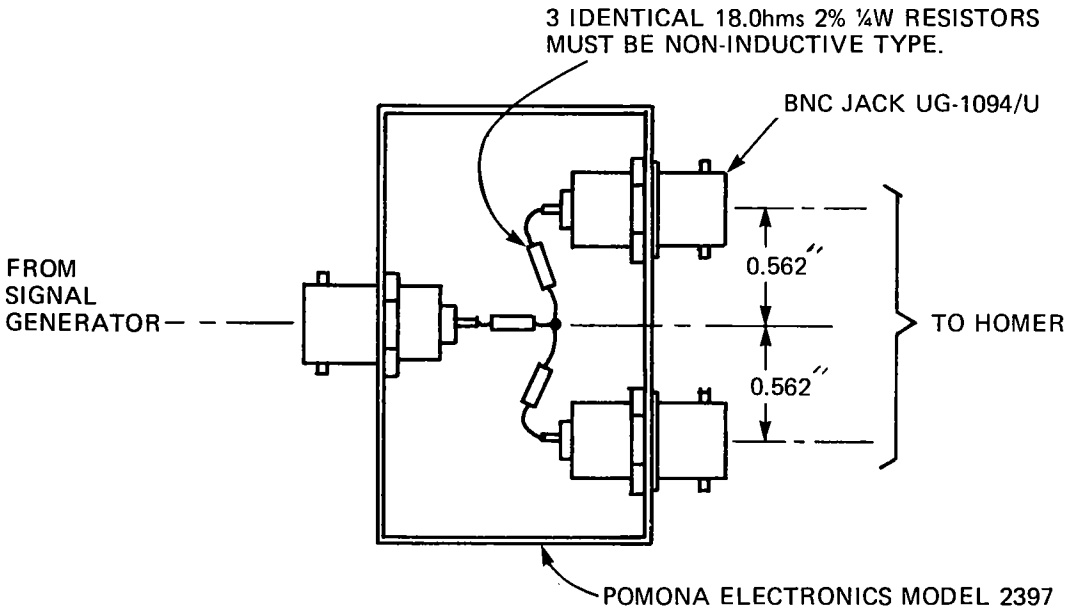
CODE NO.	MANUFACTURER	ADDRESS
75042	IRC	TRW ELECTRONIC COMPONENTS IRC FIXED RESISTOR PHILADELPHIA DIV. 401 N. BROAD ST. PHILADELPHIA, PA 19108
75915	LITTLE FUSE	LITTLEFUSE INC. 800 E. NORTHWEST HWY DES PLAINS, IL 60076
77630	TRW	TRW ELECTRONIC COMPONENTS TRW ELECTRONIC FUNCTIONS DAVIS AND COPEWOOD ST. CAMDEN, NJ 08103
78553	TINNERMAN	EATON CORP. ENGINEERING FASTENERS DIV. TINNERMAN PLANT P.O. BOX 6688 8700 BROOKPARK RD. CLEVELAND, OHIO 44101
80089	STANCOR	ESSEX GROUP INC. CONTROLS DIV. 131 GODFREY ST. LOGANSPORT, IN 46947
81349	MILITARY STANDARDS	MILITARY SPECIFICATIONS PROMULGATED BY MILITARY DEPARTMENTS/AGENCIES UNDER AUTHORITY OF DEFENSE STANDARDIZATION MANUAL 4120 3-M.
83701	EDI	ELECTRONIC DEVICES INC. 21 GRAY OAKS AVE. YONKERS, NY 10710
90201	MALLORY	MALLORY CAPACITOR CO. DIV. OF P.R. MALLORY AND CO. INC. P.O. BOX 372 3029 E. WASHINGTON ST. INDIANAPOLIS, IN 46206

Table 5-4. Code List of Manufacturers

The following code numbers are extracted from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1, and H4-2, and their supplements.

CODE NO.	MANUFACTURER	ADDRESS
99017	CAPLUG	PROTECTIVE CLOSURES CO. INC. CAPLUG DIV. 2150 ELMWOOD AVE. BUFFALO, NY 14207
99800	DELEVAN	AMERICAN PRECISION INDUSTRIES INC. DELEVAN DIV. 270 QUAKER RD. EASY AURORA, NY 15042
09214	G.E.	GENERAL ELECTRIC CO. SEMICONDUCTOR PRODUCTS DEPT. POWER SEMICONDUCTOR PRODUCTS OPN SEC. W. GENESSEE ST. AUBURN, NY 13021
71628	PHELPS-DODGE	PHELPS-DODGE COMM. CO. DIV. OF PHELPS-DODGE COPPER PRODUCTS ROUTE 79 MARLBORO, NJ 07746

SECTION VI - PHOTOGRAPHS AND MECHANICAL DRAWINGS



1. SCRAPE PAINT OFF UNDER BNC JACKS TO INSURE GOOD GROUND CONNECTION.

Figure 6-1. 6dB Power Splitter, Intech Part No. 8301-0080

SECTION VII - CIRCUIT DIAGRAMS

7.1 DIAGRAMS

Reference information for troubleshooting and repair of the homer is contained in the diagrams that follow these paragraphs. The information consists of a cabling diagram, wiring diagrams, parts location diagrams, integrated circuit diagrams, and schematic diagrams.

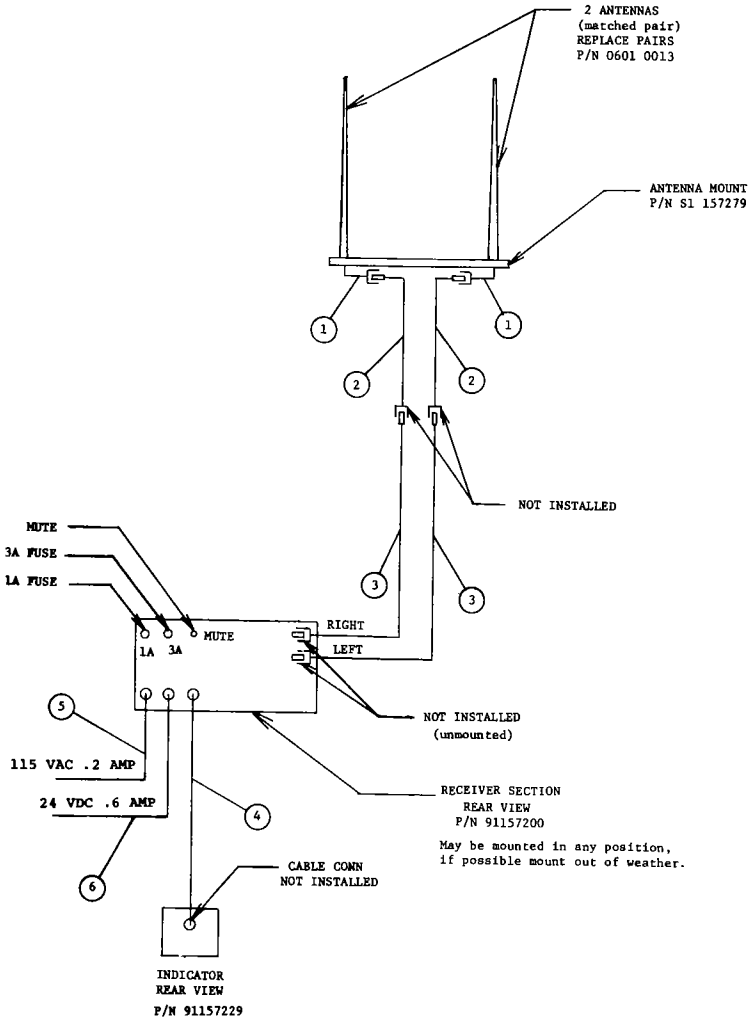
7.1.1 Cable Assy. Diagram. - Figure 7-1 is a Cable Assy. diagram for the homer. Refer to Section II of this manual for cabling details, including connectors and cables used, maximum allowable length of cables, wire color codes and connector pin assignments.

7.1.2 Wiring Diagrams. - Wiring information for the receiver unit and the indicator unit is provided in figures 7-2 and 7-3, respectively. There is no internal wiring in the antenna unit.

7.1.3 Parts Location Diagrams. - Figures 7-4 through 7-9 are parts location diagrams for the printed-circuit (PC) boards contained in the receiver unit. Each diagram shows the location and appearance of the electrical parts on the PC board. The parts are identified by the reference designations used on the corresponding schematic diagrams and in the receiver unit spare parts list (Table 5-1).

7.1.4 Integrated Circuit Diagrams. - Figure 7-10 provides details of the integrated circuits (IC's) used in the receiver unit. Information provided includes logic diagrams, truth tables, and connection diagrams.

7.1.5 Schematic Diagrams. - Figures 7-11 through 7-16 provide schematics for the PC boards contained in the receiver unit. Figures 7-17 and 7-18 are schematic diagrams for the antenna unit and the indicator unit, respectively.



Receiver: 7.5 lbs., 10" x 3.75" x 10" deep. Allow 3" for connectors at the rear.

Indicator: .82 lbs., 5" x 3.5" x 3.5" deep. Allow 3" for connectors at the rear.

Antenna: .63 lbs., 39.5" long - uses 1/2-20 mounting thread.

Antenna Mount: 3.5 lbs., 3" x 1.5"□ 20" long.

Cables: Note - Except for the Cutter end of the power cables, all connectors are provided. To facilitate cable routing not all of the connectors are installed. For installation of the RG58C/U connectors use AMP crimp tool #69478-3.

1. 6" long RG58A/U, part of the antenna, must be firmly fastened to the antenna base.
2. 20' long dual RG58C/U, 91 157280.
3. 30' long dual RG58C/U, 91 157228. Note - The combined length of cables 2 & 3 if replaced cannot exceed 50'.
4. 25' long four conductor shielded, 91-157225, if replaced cannot exceed 100'.
5. 20' long three conductor 115 VAC 91 157223, if replaced cannot exceed, 50'.
6. 20' long two conductor 24 VDC, 91 957224, if replaced cannot exceed 50'.

Normal care should be excercised when handling 115V.

Figure 7-1. Homer Cable Assembly Diagram 7-3/7-4

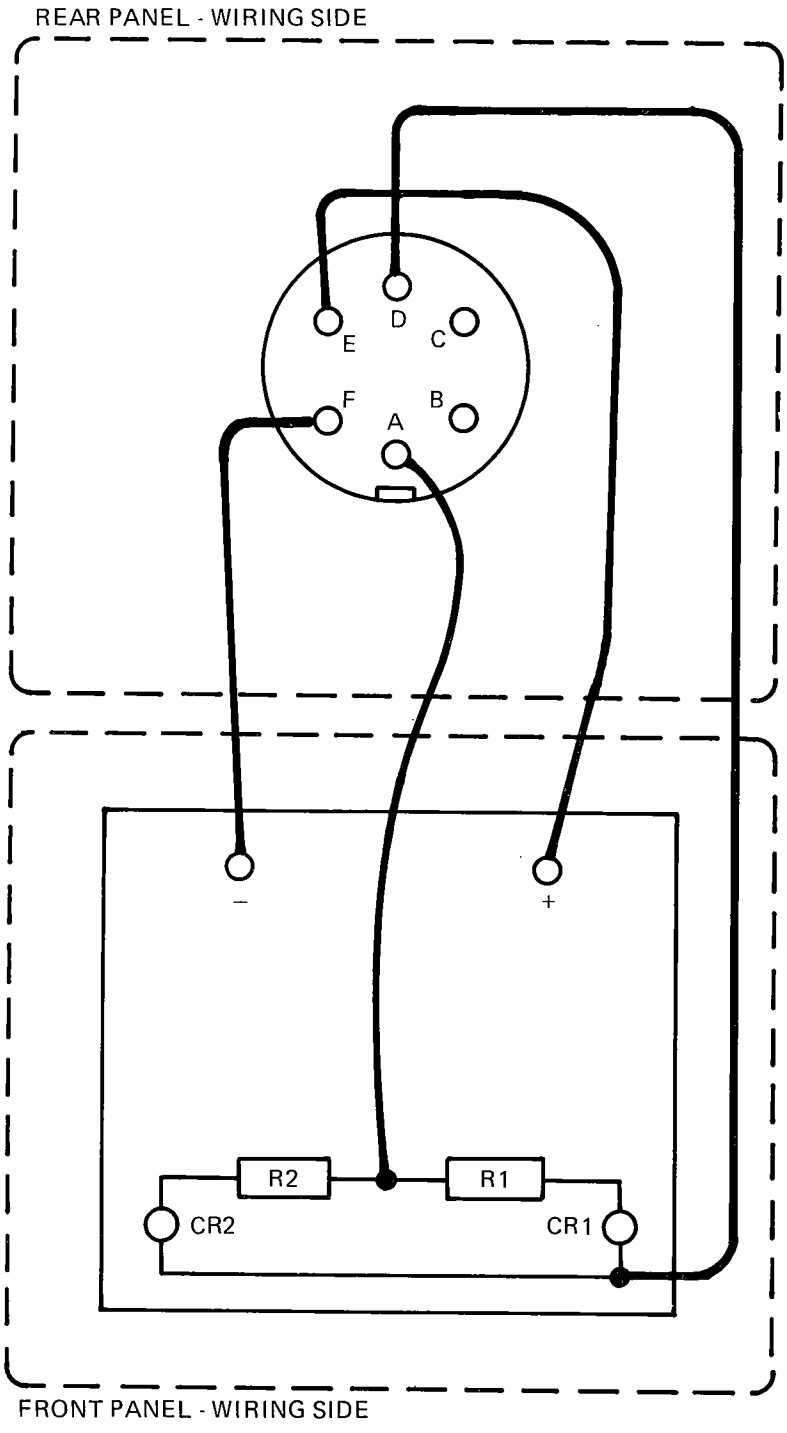
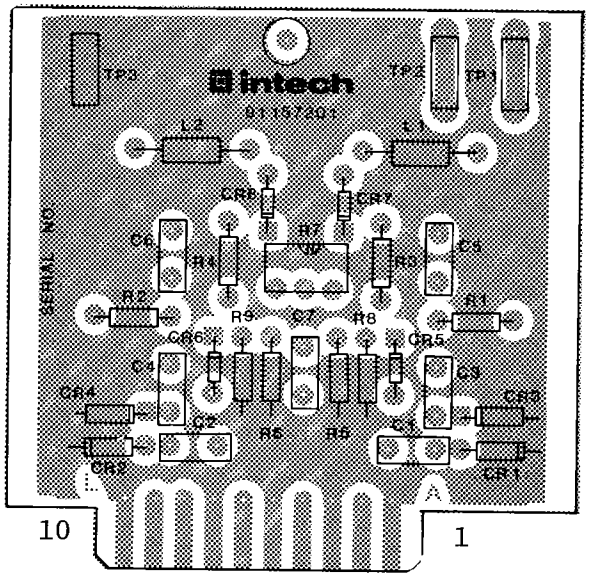


Figure 7-3. Indicator Unit Wiring Diagram



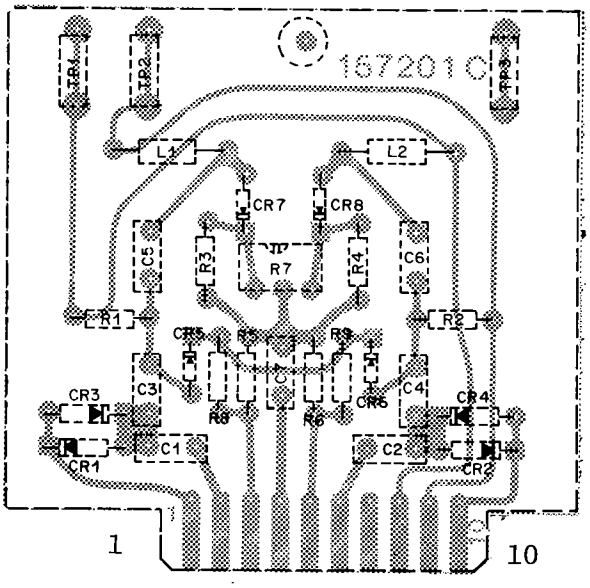


Figure 7-4. Antenna Switch 1A1 Component Location Diagram

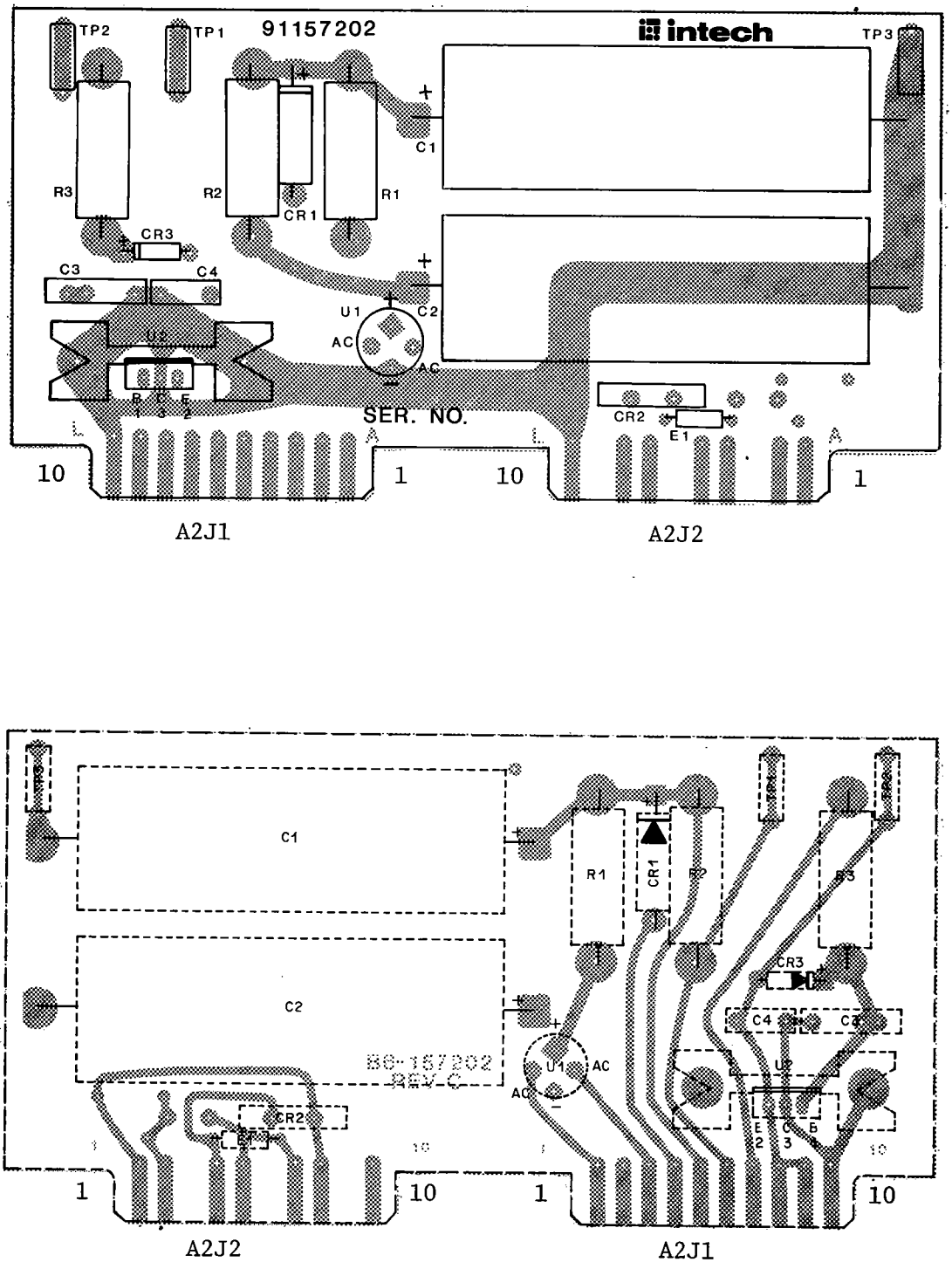


Figure 7-5. Power Supply 1A2 Component Location Diagram

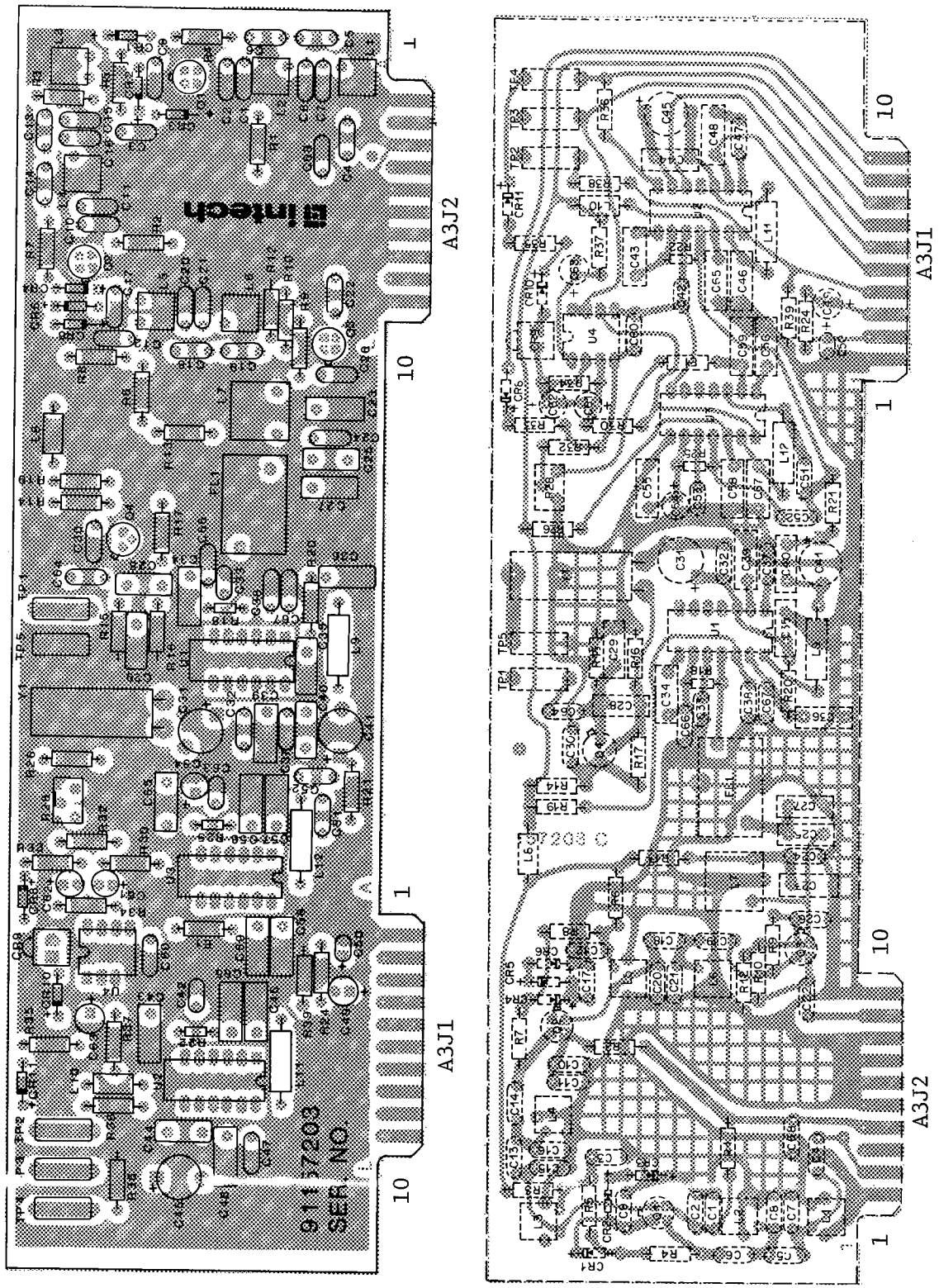


Figure 7-6. Receiver 1A3 Component Location Diagram

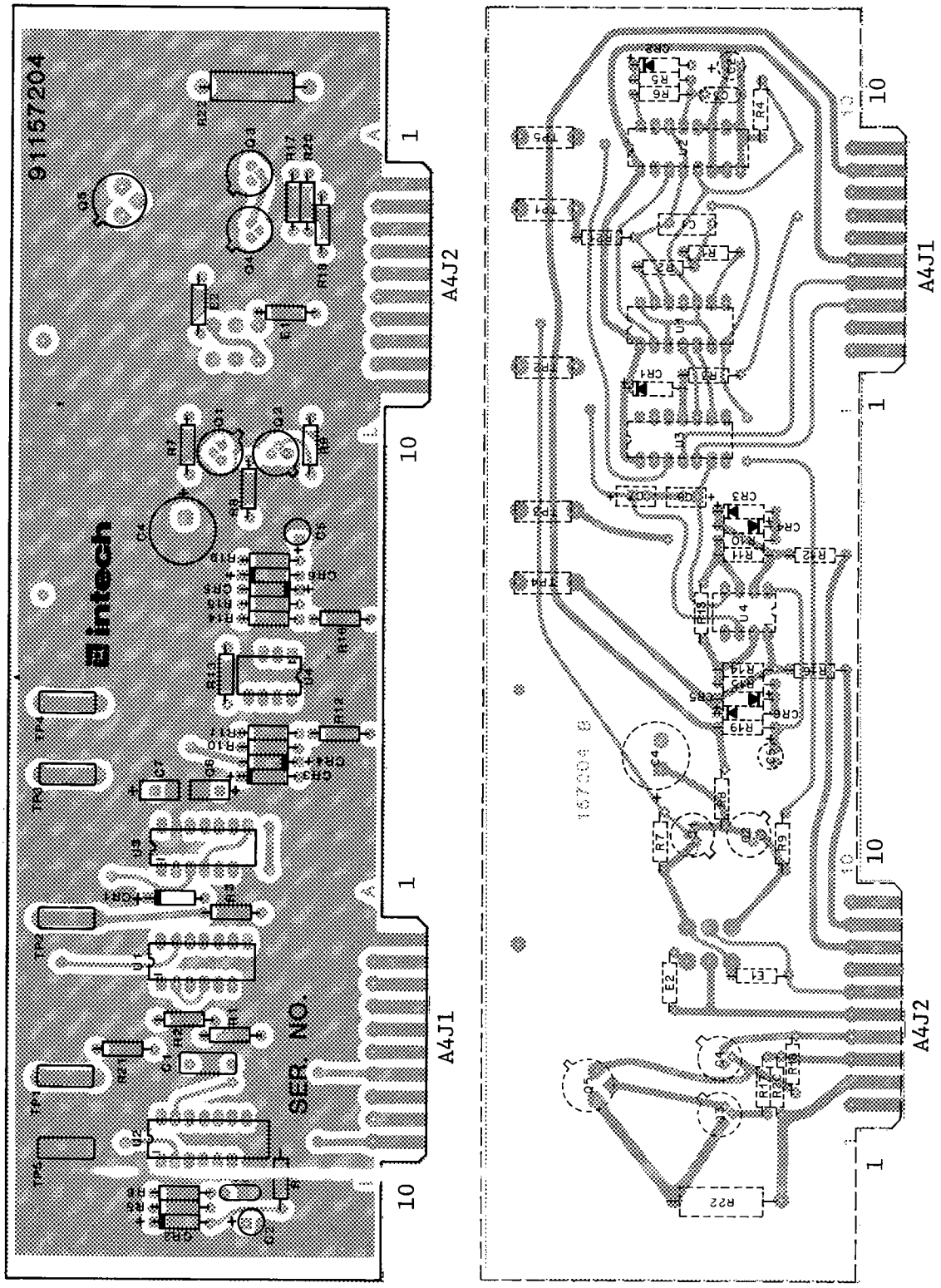
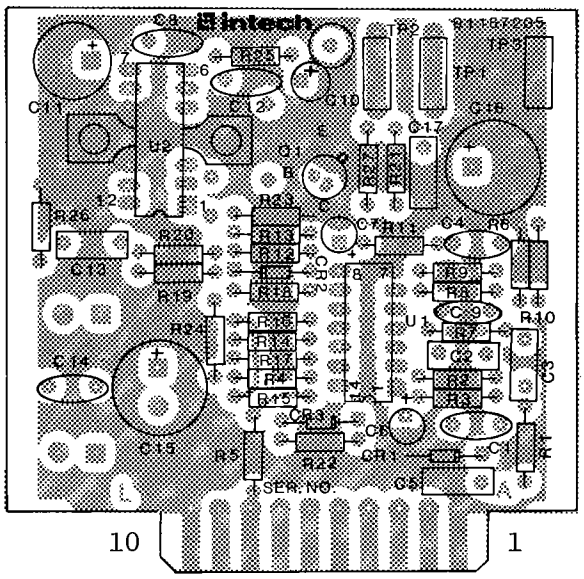


Figure 7-7. Homer Logic 1A4 Component Location Diagram



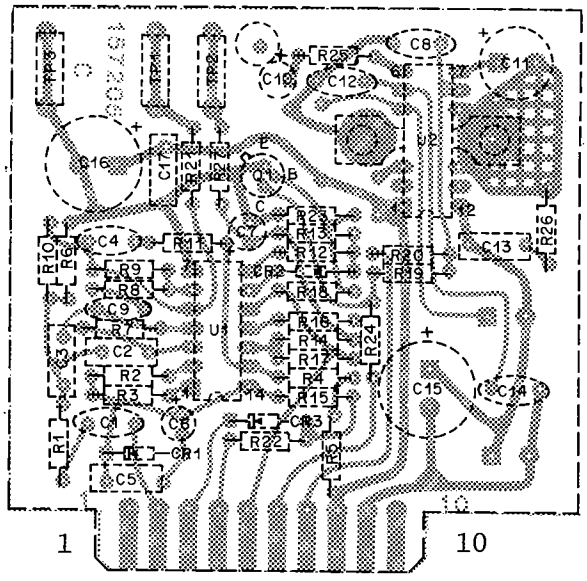


Figure 7-8. Audio 1A5 Component Location Diagram

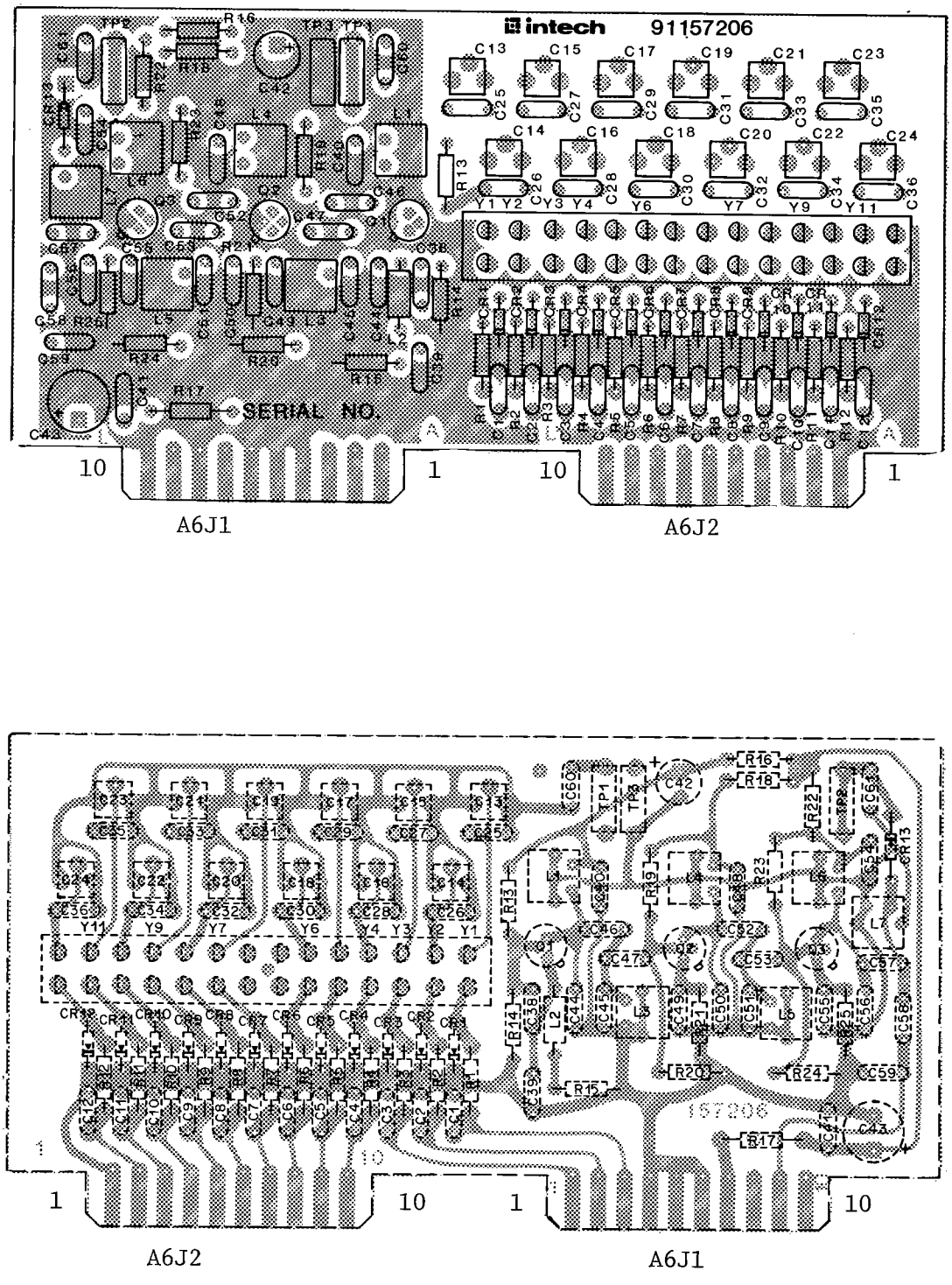


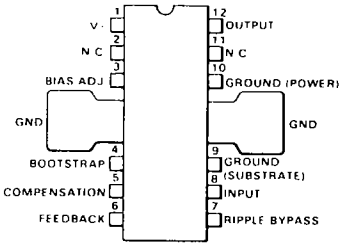
Figure 7-9. Local Oscillator/Multiplier 1A6 Component Location Diagram

TBA800 5-WATT AUDIO AMPLIFIER

GENERAL DESCRIPTION – The TBA800 is a monolithic Audio Power Amplifier constructed using the Fairchild Planar* Epitaxial process. The external cooling tabs enable 2.5 W output power to be achieved without external heat sink and 5 W output power using a small area of the pc board copper as a heat sink.

It is ideally suited as an audio amplifier in solid state television receivers and other Class B audio amplifier applications over a wide range of supply voltage (5-30 V).

CONNECTION DIAGRAM
12-PIN POWER PACKAGE
(TOP VIEW)



EQUIVALENT CIRCUIT

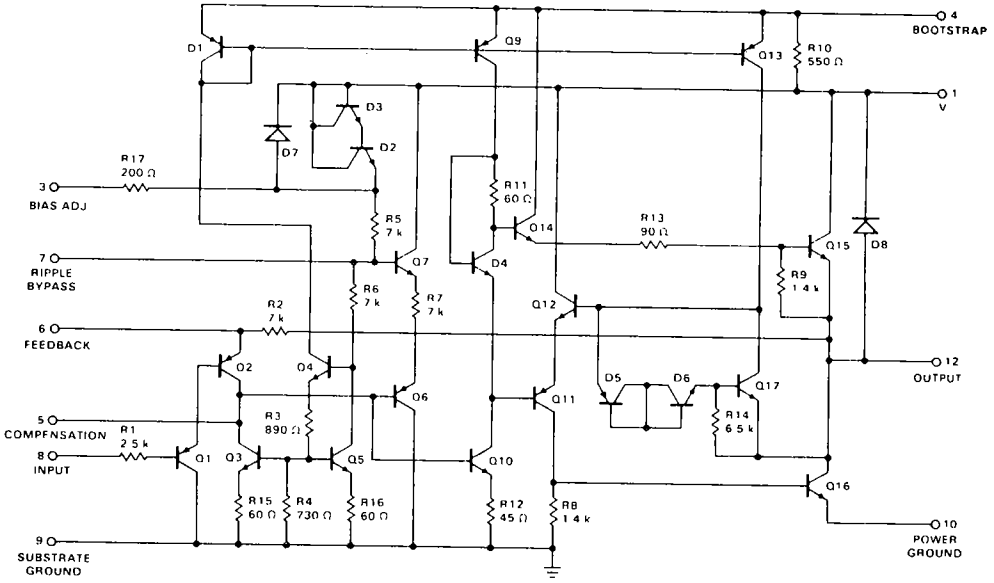
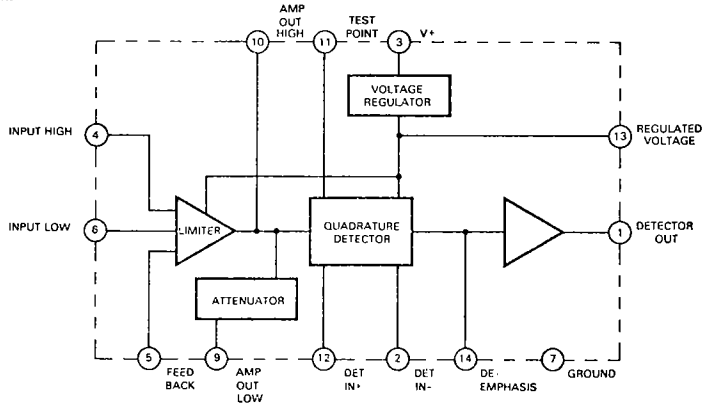


Figure 7-10. Integrated Circuit Elements

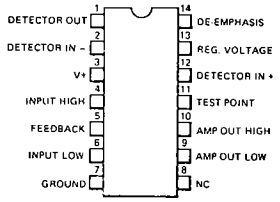
2136 FM IF AMPLIFIER/LIMITER/DETECTOR

GENERAL DESCRIPTION – The 2136 is a monolithic three-stage limiting amplifier and FM detector circuit constructed using the patented Fairchild Planar* epitaxial process. The chip also contains a regulator which reduces parameter variations with temperature and applied supply voltage.

BLOCK DIAGRAM



CONNECTION DIAGRAM
14-LEAD DIP
(TOP VIEW)



4001 QUAD 2-INPUT GATE

DESCRIPTION – These CMOS logic elements provide the positive input NOR function. The outputs are fully buffered for highest noise immunity and pattern insensitivity of output impedance.

4001
LOGIC AND CONNECTION DIAGRAM
DIP (TOP VIEW)

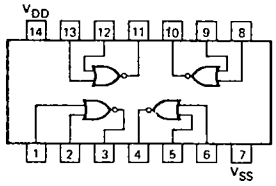


Figure 7-10. Integrated Circuit Elements

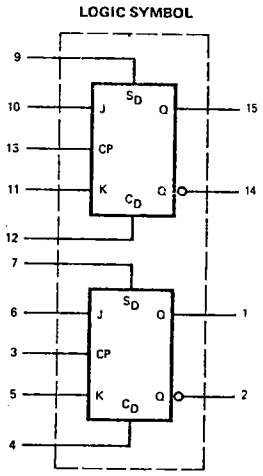
4027 DUAL J-K MASTER-SLAVE FLIP-FLOP

DESCRIPTION — The 4027 is a Dual JK Flip-Flop which is edge-triggered and features independent Direct Set, Direct Clear, and Clock inputs. Data is accepted when the Clock is LOW and transferred to the output on the positive-going edge of the Clock. The active HIGH asynchronous Clear Direct (C_D) and Set Direct (S_D) are independent and override the J, K, or Clock inputs. The outputs are buffered for best system performance.

PIN NAMES

J, K	Synchronous Inputs
CP	Clock Input (L → H Edge-Triggered)
S_D	Asynchronous Direct Set Input (Active HIGH)
C_D	Asynchronous Direct Clear Input (Active HIGH)
Q	True Output
$\overline{Q}$	Complement Output

LOGIC SYMBOL



V_{DD} = Pin 16
V_{SS} = Pin 8

TRUTH TABLES

ASYNCHRONOUS INPUTS		OUTPUTS	
S_D	C_D	Q	$\overline{Q}$
L	H	L	H
H	L	H	L
H	H	H	H

SYNCHRONOUS INPUTS			OUTPUTS	
CP	J	K	Q_{n+1}	$\overline{Q}_{n+1}$
⎍	L	L	NO CHANGE	
⎍	H	L	H	L
⎍	L	H	L	H
⎍	H	H	$\overline{Q}_n$	Q_n

Conditions: $S_D = C_D$ = LOW

L = LOW Level
H = HIGH Level
⎍ = Positive-Going Transition
X = Don't Care
Q_{n+1} = State After Clock Positive Transition

CONNECTION DIAGRAM

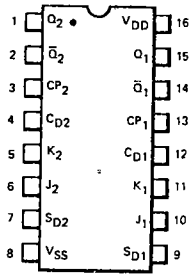


Figure 7-10. Integrated Circuit Elements

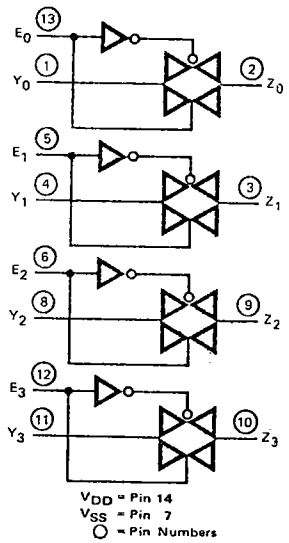
4066 QUAD BILATERAL SWITCH

DESCRIPTION – The 4066 has four independent bilateral analog switches (transmission gates). Each switch has two Input/Output Terminals (Y_n, Z_n) and an active HIGH Enable Input (E_n). A HIGH on the Enable Input establishes a low impedance bidirectional path between Y_n and Z_n (ON condition). A LOW on the Enable Input disables the switch; high impedance between Y_n and Z_n (OFF condition).

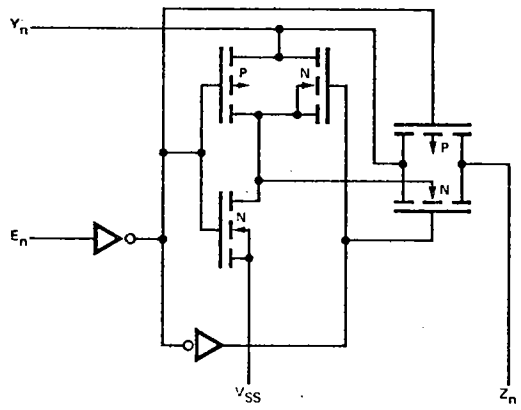
PIN NAMES

$E_0 - E_3$	Enable Inputs
$Y_0 - Y_3$	Input/Output Terminals
$Z_0 - Z_3$	Input/Output Terminals

LOGIC SYMBOL



LOGIC DIAGRAM (1/4 OF A 4066)



CONNECTION DIAGRAM (TOP VIEW)

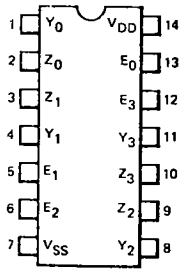


Figure 7-10. Integrated Circuit Elements

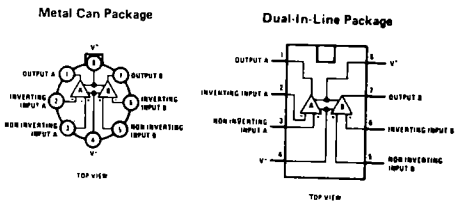
LM1558/LMI458 DUAL OPERATIONAL AMPLIFIER

general description

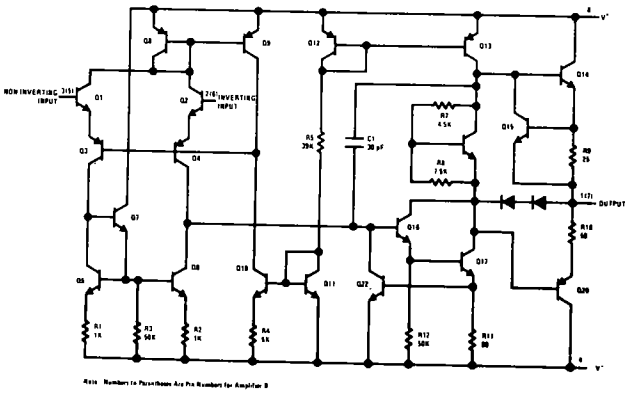
The LM1558 and the LM1458 are general purpose dual operational amplifiers. The two amplifiers share a common bias network and power supply leads. Otherwise, their operation is completely independent. Features include:

- No frequency compensation required
- Short-circuit protection
- Wide common-mode and differential voltage ranges

connection diagrams



schematic



LM3900 QUAD AMPLIFIER

general description

The LM3900 consists of four independent, dual input, internally compensated amplifiers which were designed specifically to operate off of a single power supply voltage and to provide a large output voltage swing. These amplifiers make use of a current mirror to achieve the non-inverting input function.

schematic and connection diagrams

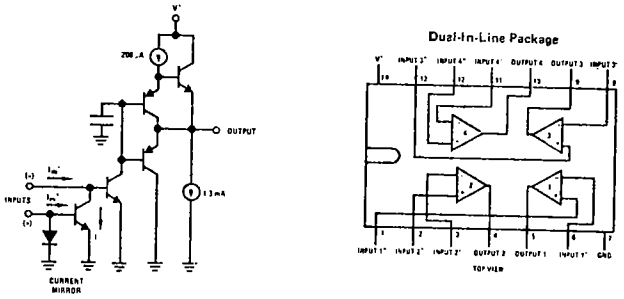


Figure 7-10. Integrated Circuit Elements

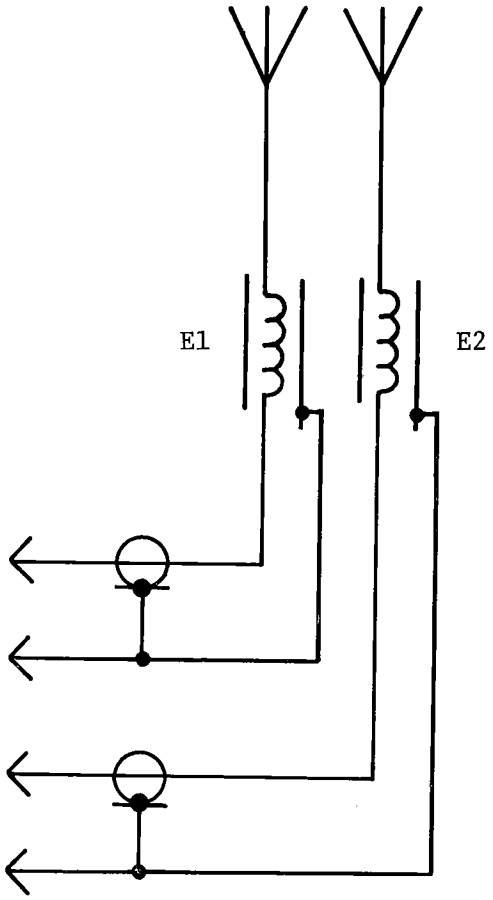


Figure 7-17. Antenna Unit 2 Schematic Diagram

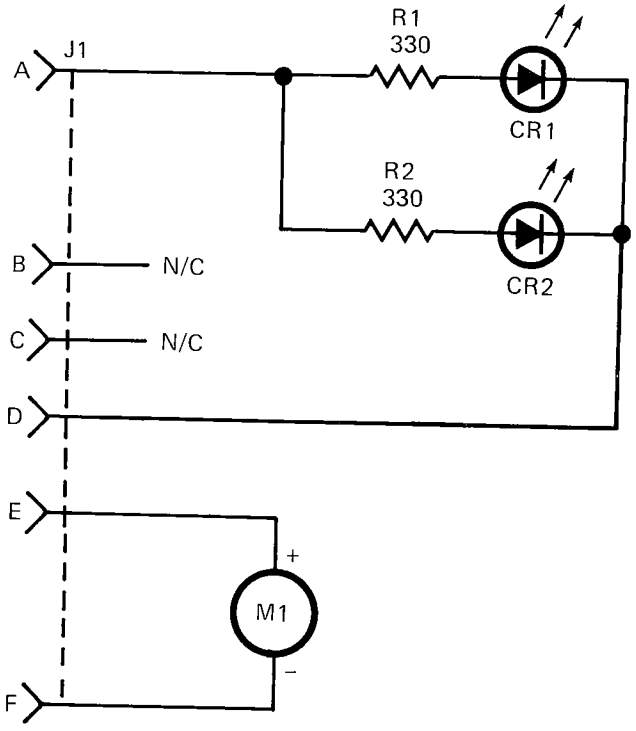


Figure 7-18. Indicator Unit 3 Schematic Diagram

ERRATA

Page 1-13	Figure 1-4	Pin next to Pin 11 is Pin 3 and not Pin 13.
Page 1-22	1.4.2.4	Include (Figure 7-14) after the Homer Logic Circuitry.
Page 1-23	1.4.2.4	Line 2 should read SQUELCH control 1R3.
	1.4.2.4.1	Line 3 should read DIMMER control 1R1.
Page 1-24	1.4.2.6	Line 3 should read VOLUME control 1R2.
	1.4.2.6	Line 10 should read VOLUME control 1R2.
Page 5-36	22701	Location is Monrovia, CA 91016

Rev. A
9.9.77