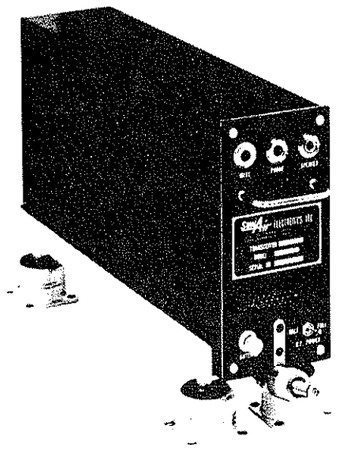
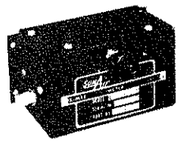
SUNAIR HF TRANSCEIVER MODELS SA-14/14R
14 or 28 VOLTS DC
55 - 65 WATTS
2.000 to 18.000 MEGACYCLES

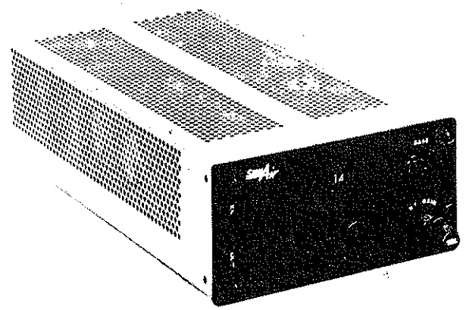


TRANSCEIVER SA-14R

CONTROL HEAD SA-14R



RF INVERTER SIV-1



TRANSCEIVER SA-14

HF TRANSCEIVER MODELS SA-14 & SA-14R

SUNAIR ELECTRONICS, INC.
3101 SOUTHWEST THIRD AVENUE
FORT LAUDERDALE, FLORIDA, U. S. A.

JUN 1 1967

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SECTION A

MINIMUM PERFORMANCE SPECIFICATION

Amended 9-28-64 S.A.Spec. 14-002/64

Transceiver SA-14 and SA-14R
Power Supply Modulator SAV-903 and SAV-904

RECEIVER

Test Voltage	13.00 or 26.5 volts.
Current	4.0 Amps +/-10% at 13.0 V (No Signal) 2.0 Amps +/-10% at 26.5 V (No Signal)
Oscillator	NMT+/- .005 per cent of assigned channel frequency.
Sensitivity	NLT 300 milliwatts output into 3.2 ohms at S+N/N ratio of NLT 4 db with input signal of 1 uv modulated 30 per cent 1000 cps. R.F. Gain fully C.W.
Gain	NLT 6 watts output into 3.2 ohms at S+N/N ratio of NLT 15 db with input signal of 5 uv modulated 30 per cent 1000 cps. R.F. Gain fully C.W.
Headphone Output.....	NLT 100 milliwatts output into 500 ohms with an input of 5 uv modulated 30 per cent 1000 cps (3.2 output loaded).
Selectivity	NLT 6 KC and NMT 9 KC at 6 db down. NLT 30 KC and NMT 42 KC at 60 db down. (Readings taken below knee of AGC)
AGC	NMT 6 db change in receiver output with a signal input from 10 to 100,000 uv modulated 30 per cent 1000 cps.
Volume Control.....	With an input of 100,000 uv modulated 30 per cent 1000 cps the volume control shall vary the output NLT 40 db below 6 watts. R.F. Gain fully C.W.
R.F. Gain Control	With an input of 100,000 uv modulated 30 per cent 1000 cps the R.F. gain control shall vary the output NLT 40 db below 6 watts. Volume fully C.W.

I. F. Rejection	NLT 60 db down from assigned channel frequency.
Image Rejection	NLT 40 db down from assigned channel frequency.
Distortion	NMT 20 per cent with signal input from 10 to 100,000 uv modulated 85 per cent from 350 to 2500 cps. R. F. Gain and volume adjusted for 6 watts output.
Channeling	Channeling selector shall operate with voltage varied from 11.0 to 15.0 volts or from 22.0 to 30.0 volts.
On-Off Switch	The on-off relay shall operate with voltage varied from 11.0 to 15.0 volts or from 22.0 to 30.0 volts.

TRANSMITTER

Test Voltage.....	13.0 or 26.5 volts 15.0 Amps +/- 15% at 13.0 V (No Modulation) 8.0 Amps+/- 15% at 26.5 V(No Modulation)
Power Output	NLT 50 watts (cw) from 2.0 to 14.0 MC and NLT 45 watts from 14 MC to 18 MC with Ip + Ig2 NLT 135 MA or NMT 165 MA.
Output Frequency	NMT+/-.005 per cent from assigned channel freqency.
Modulation	Adjust for NMT 95% modulation.
Distortion	NMT 20 per cent distortion at 85 per cent Modulation with input varied from 350 to 2500 cps.
Sidetone	NLT 50 MW into 500 ohms at 85 per cent modulation.

PURPOSE OF MANUAL

1. This manual contains installation, alignment, operation and maintenance information on the SA-14 and SA-14R High-Frequency Transceivers manufactured by SunAir Electronics, Inc. The data included is designed to aid authorized service agencies and other technical personnel in the servicing of these units.

PARTS REPLACEMENT

2. A complete stock of replacement parts for all SunAir equipment is maintained at the factory. In some cases, the part supplied against an order for a replacement item may not be an exact duplicate of the original part where the original item has been superseded by a newer and mre efficient design. Such replacement parts will be interchangeable electrically. If the new part has a different size or shape, all necessary hardware to permit installation in older sets will be furnished.

   Parts for SunAir equipment may be secured from SunAir distributors and dealers throughout the world. When direct orders from the factory are required, please specify the following:

   (a) Serial number, model number and voltage of the transceiver

   (b) Description of part required, and (c) Quantity required

EQUIPMENT AND PARTS REPAIR

3. Complete factory service is available on any SunAir equipment. Repairs, adjustments or modifications which are of such a nature as to warrant factory service will be made in accordance with the instructions of the customer.

RETURN OF EQUIPMENT OR MATERIAL

4. To return equipment or material, advise SunAir Electronics, Inc., giving full particulars.

If the item is thought to be defective, give full information concerning the nature of the defect. SunAir will then authorize the return. Failure to secure this authorization prior to forwarding the equipment or material, or failure to provide complete information may cause unnecessary delay in processing.

PARTS SHORTAGE OR DAMAGE

5. Unpack and inspect all parts and equipment as soon as received. Do not accept a shipment where there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage or if any evidence of damage is noted, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier.

   If concealed damage is discovered after a shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report of the damage should also be forwarded to SunAir. Include the following:

   (a) Order number
   (b) Model and serial number
   (c) Name of transportation agency

   When SunAir receives this information, arrangements will be made for repair or replacement.

PRODUCTION CHANGES

6. Engineering and production changes may be made from time to time in order to incorporate any feature or design which will improve performance, increase reliability or improve the usefulness of the equipment. Notice of such changes will be made through periodic service letters to all SunAir dealers.

   When such changes affect the parts list or schematic diagram, a record of the "first used" serial number will be made and noted on the new parts list or schematic. By referring to the serial number, service personnel can quickly determine the proper schematic diagram for a given transceiver.

SunAir reserves the right to make improvements, additions or changes in design without obligation to install such changes, designs or improvements in equipment previously manufactured.

FIELD SERVICE LETTERS

Section F of this manual is devoted entirely to special service notes and service letters. As information on special service problems and modifications is released, it is intended that the last section of the book be used to file all this type of information so as to keep the manual current at all times.

GENERAL OPERATING PROCEDURE

8. TO A LARGE EXTENT, THE DEGREE OF SATISFACTION OBTAINED FROM THE USE OF ANY COMMUNICATIONS EQUIPMENT DEPENDS UPON THE OPERATOR. A casual or indifferent microphone technique can result in a very substantial loss in communication range. In many cases, other aircraft will be using the same frequency and will be trying to contact the same operator with messages of equal urgency or importance. The following suggestions are offered to help obtain the maximum utility from your SunAir Transceiver.

   (a) Always monitor the frequency to be certain another operator is not using it before making a transmission.

   (b) Hold the microphone close to the lips and speak clearly and distinctly. Use a normal voice level. Loud talking or shouting are not necessary and will distort the transmission.

   (c) Keep all transmissions brief and to the point. Avoid cluttering the frequency with unnecessary conversation.

   (d) Have the transceiver checked at regular intervals by a competent radio service agency to make certain it is always in good operating condition. A gradual loss of performance might otherwise go unnoted and communication range will be reduced.

RECEIVER

9. The SunAir models SA-14 and SA-14R HF Communication Equipment are small, compact, voice amplitude modulated, transmitting-receiving systems designed for use in aircraft to effect long-range radio transmission and reception in the frequency range of 2 to 18 megacycles. The transceivers have 14 crystal-controlled channels with unlimited channel frequency assignments. A slide switch within the unit is used as a filament group switch for either 14 or 28 volt operation, and the series resistors for changing the operating voltage of the channeling solenoid are provided.

   The transmitter provides a minimum RF power output of 45 watts up to a maximum of 65 watts across the frequency range. The transceiver contains a crystal-controlled receiver with a sensitivity of 1 microvolt for signal plus noise-to-noise ratio of 4 db. The receiver gain is 5 microvolts for a 6 watt power output at a signal plus noise-to-noise ratio of 15 db.

   A single conversion superheterodyne system is employed in the receiver section. The tube, V4 6BH6, is used as the RF amplifier. The received signal is coupled into the grid circuit of V4 inductively. Each channel employs a separate coil and tuning capacitor, L21 through L34 and C67 through C80 for channels 1 through 14, respectively. Wafer SW1-14 through SW1-16 of the channel selector switch are used to connect the antenna tank circuit of the channel selected.

   A separate tuned circuit for each of the channels is coupled into the plate circuit of V4. Coils L35 through L48 and capacitors C89 through C102 are used to make up the individual tank circuits. Wafers SW1-4 and SW1-5 are used to connect the plate tank circuit of the channel selected.

   The output of the RF amplifier is coupled to the grid of the mixer tube V4 6BH6. The output of the receiver local oscillator 1/2 V1, 6J11 is also coupled to the grid of the mixer through coupling capacitor C104 1 pf. The receiver local oscillator is crystal-controlled with 14 crystals, one for each channel. The local oscillator crystals are cut 1500 kc above the receive frequency for receive frequencies 2 mc to 8 mc. Local oscillator crystals for receive frequencies above 8 mc are cut 1500 kc below the receive frequency.

The IF transformer T1, T2 and T3 are double tuned filters, resonant at 1500 kc.

AGC voltage is developed across resistor R59 after rectification with crystal diode CR2. The demodulator circuit consists of diode CR1 and capacitor C118. Noise limiting is accomplished by the diode CR3 and the delay circuit consisting of R57, C119 and R58.

Both RF gain control and volume control are provided for in the transceivers. RF gain control is accomplished with potentiometer R52. The setting of R52 determines the cathode bias on the RF amplifier V4, the mixer V5 and the first IF amplifier V6, and thus controls the gain of these stages.

Tube V8 is utilized as an audio amplifier and cathode follower. The audio output of the receiver is taken from the cathode of V8, matching the low impedance input to the transistorized audio circuits in the modulator/power supply, SAV 903 or SAV 904.

TRANSMITTER

10. The transmitter consists of the oscillator, the driver, the RF power amplifier, and the associated output circuitry.

    The transmitter oscillator 1/2 V1 uses the same type circuitry as the receiver local oscillator. It is an electron coupled colpitts oscillator, frequency controlled with crystal units Y1 through Y14. The output of the transmitter oscillator is coupled to the grid of the driver tube V2, type 8106. The plate circuit of V2 is resonant at the channel frequency. A separate tank circuit is used for each channel. Switching of tank circuits is accomplished by SW1-9 and SW1-10. The individual tank circuits are tunable with capacitors C9 through C22.

    The driver output is coupled to the grid of the RF power amplifier V3, 7984. The output of the power amplifier is tuned and impedance matched to 50 ohms with the tank circuit consisting of the tapped coil L17, variable input capacitors C28 through C41 and output capacitors C42 through C55. Switching with wafers SW2-1, Sw2-2 and SW 2-3 is accomplished in the output circuit in order to provide the proper input capacitor, tap of L17 and output capacitor.

Harmonics are filtered from the output with the low pass filter consisting of C56, L18, C58, L19 and C59.

MODULATOR/POWER SUPPLY

11. The modulator/power supply for use with the SunAir SA-14 and SA-14R Transceivers consists of a one-unit package which contains the power supply, the audio amplifier and the modulator circuits of the system. The two units are available, the SAV 903 for 14 volt operation, and the SAV 904 for 28 volt operation.

    Each of the SunAir modulator/power supply units is completely transistorized. Their special design permits proper operation of all transistors up to ambient temperatures of 55° C. A large surface (finned heatsink) with low thermal resistance insures fast dissipation of heat developed by the class B AF power amplifier, which is used for both receiver output and transmitter modulation. Three major etched circuit boards are employed for the power supply, audio amplifier and bias networks. Adequate shielding eliminates interference of power supply switching pulses with other equipment.

    With the transceiver in the receive position, the high B+, 700 volt DC is inoperative, while oly the low B+ of 260 volts DC is being supplied to the receiver portion of the transceiver. Relay K201 normally is not energized and thus connects the output of the cathode follower AF amplifier in the receiver to the base of the driver transistor Q202. A resistor of suitable value, in most cases 3.3k ohm, is connected in series with the base and the audio source to equalize gain of the unit and provide linearization of the base current. The collector of Q202 feeds the primary of the driver transformer T201, which in turn provides out-of-phase drive currents for the class B power amplifier. The bias network for the power amplifier adjusts the quiescent collector currents to a value of approximately 50 to 100 ma to prevent crossover distortion at low signal levels. The output transformer T202 assures proper loading of class B amplifier in order to obtain the required output power. Secondary No. 1, designed for a load of 4k ohm, is used to modulate the RF amplifier; while secondary No. 2 provides output for a speaker with nominal impedance of 3 ohms and for headphones with an impedance of 500 ohms. In the transmit position the secondary No. 2 is disconnected from ground and thus does not load the amplifier.

In the transmit position the relay K201 disconnects the base of Q202 from the receiver output and switches it to the output of Q201. At the same time, high B+ is applied through the secondary No. 1 of T202 to the RF power amplifier. The carbon microphone obtains the required DC power through the microphone potentiometer R201. The magnitude of the microphone signal can be adjusted by moving the rotor of R201. The small signal transistor Q201 is biased in such a manner that symmetrical clipping will take place above a certain signal level. The resulting harmonic distortion is then removed in the speech filter, which consists of the inductor L201 and the capacitors C205 and C206. By proper adjustment of the microphone potentiometer R201 a consistent modulation level of 95% can be assured, and over-modulation can be safely prevented.

The 14 volt and 28 volt units differ in several component values and transistor types employed in the class B power amplifier and the switching circuit of the power supply. In the 28 volt units, transistors with a higher collector breakdown voltage are used, as well as a different power and modulation transformer.

The high voltage power supply consists of a matched pair of switching transistors which generate a square wave alternating current through the primary of T203, which then is transformed into the two secondary windings. The 700 volt high B+ uses a full wave bridge rectifier circuit. Large filter capacitors and inductors eliminate remaining ripple and provide pure DC to the transceiver.

The power supply transformer T203 differs in design in the 14 and 28 volt units. When ordering the unit, the available power system voltage of the aircraft must be specified.

NOTE: The modulator/power supplies SAV 903 and SAV 904 are equipped with a diode CR208 in series with the coil of the main power relay. The transceiver will be completely inoperative if the plus and minus source leads are accidentally reversed.

INSTRUCTIONS FOR FREQUENCY CHANGE

12. The components used in the SA-14 and SA-14R, other than crystals, that are required for frequency changes are listed on the following pages.

Selection of coils should be made so that the frequency falls in the center of the coil range.

The procedure for determining the proper components is the same in the case of a channel frequency change or the activation of a blank channel.

If the channel frequency change is but a small amount, the components installed in the channel may have sufficient tunability to cover the new frequency.

Example: Small frequency change

Old frequency 5680
New frequency 5790

As shipped from the plant, this transceiver will have an RF amplifier coil, part No. 48557, with a range 5400 kc to 8500 kc covering both the old and new channel frequency. The mixer coil will be part No. 63583 with a range 5300 kc to 7700 kc; the driver coil, part No. 63571, has a range of 4500 kc to 7000 kc. The output tank components: tap 18, input capacitor of 56 pf and output capacitor of 430 pf cover the range of 5400 kc to 5800 kc.

If this small frequency change is required in the field, all that is necessary is to change the channel crystals and adjust the tuning capacitors for the RF amplifier, driver, mixer and output tank circuits of that channel.

Example: Large frequency change

Channel 6, old frequency 5680
Channel 6, new frequency 9840

The components for the old frequency of 5680 are: RF amplifier coil, part No. 48557; mixer coil, part No. 63583; and driver, part No. 63571.

The output coil tap will be tap 18 with a fixed input capacitor of 56 pf and an output capacitor of 430 pf. The new components to be installed will be RF amplifier coil, part No. 48533; mixer coil, part No. 63569; and driver coil, part No. 63557. The output tap for channel 6 will be number 11; no fixed input capacitor will be required, but an output capacitor of 200 pf is necessary. Tuning of the variable capacitors for RF amplifier, mixer, driver and output will be required.

Component Location

The RF amplifier coils L21 through L34 are tied between wafers number 13 and 15. They can be located by referring to Fig. 3a or Fig. 4a.

The driver coils L2 through L15 are tied between wafers number 10 and 12. Refer to Fig. 1a or Fig. 2a.

The mixer coils L35 through L48 are tied between wafers number 5 and 7. Refer to Fig. 1a or Fig. 2a.

The location of the individual coils for a given channel may be determined by referring to the equipment photographs and illustrations in Section C.

Individual channel coils may also be located by looking down on the top of the SA-14 with the faceplate toward you. The position of channel 1 is the first position to the right (clockwise) of the switch wafer mounting screw. The channel positons are clockwise in sequence 1 through 14.

The transmitter coil tap, fixed input capacitor and output capacitor may be located as follows:

The fixed input capacitor, if required, is soldered in place as shown in Fig. 4a. Looking down on the bottom of the SA-14 with the faceplate toward you, channel position is left to right, 5, 6, 7, 4, 3, 2, 1, 14, 13, 12, 11, 10, 9, 8. Looking at the radio in the same position, the output capacitors, C42 through C55, correspond to channel position numbered from left to right, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14. The coil taps are numbered left to right: top row in even numbers, 2 through 26, and the bottom row, 1 through 25.

Oscillator Cathode Resistor

Fixed resistors are switched into the cathode circuit of the oscillators. The value of the fixed resistor is dependent upon the oscillator frequency. Three values are switched in the tranmitter cathode circuit, 1500 ohms, 1000 ohms and 470 ohms. The receiver local oscillator uses two resistors, 1000 ohms and 470 ohms.

Wafer number six from the front is used to select the transmitter cathode resistors. R8, 1500 ohms, which is brought out on a black lead, should be connected to channels with a frequency range of 2000 kc to 2200 kc. R7, 1000 ohms, which is brought out on a brown lead, should be connected to channels with a frequency range of 2200 kc to 6200 kc. R6, 470 ohms, which is brought out on an orange lead, should be used on channels with a frequency range of 6200 kc to 18,000 kc.

Wafer number eleven from the front is used to select the receiver local oscillator cathode resistor. R20, 1000 ohms, which is brought out on a brown/white lead, should be connected to channels with a frequency range of 2000 kc to 6200 kc. R19, 470 ohms, which is brought out on an orange/white lead, should be connected to channels with a frequency range of 6200 kc to 18,000 kc.

Crystal Change

Whenever a channel frequency is changed or added, a new crystal for that channel must also be used. The crystals are located behind the faceplate. In order to change a crystal the front portion of the transceiver must be removed, using the following procedure:

1. Select channel 1.
2. Remove the four acorn nuts at the four corners of the faceplate.
3. Remove the three control knobs, using the Bristol wrench supplied with the transceiver.
4. Remove the faceplate.

5. Unsolder blue wire going to the lamps.

6. Remove the four 6/23 nuts at the four corners of the drum plate.

7. Remove the retaining nut from the off-on volume control.

8. Ease the drum plate forward and be sure that the gear on the channel selector shaft disengages from the drum control mechanism.

9. Remove the crystals and insert the new crystals as required.

NOTE: Transmitter and receiver crystals may be located by referring to Fig. 5a and 6a.

The faceplate assembly is reassembled by replacing the components in reverse order, starting with step 8. The drum should be held in position where the channel No. 1 will show in the window when the gears are engaged.

MIXER COIL SELECTOR
SA-14 and SA-14R

Frequency Range From	To	Coil	Capacitor
2,000 kc	2,100 kc	63624	33pf - 26078
2,100	2,200	63624	20pf - 26092
2,200	2,400	63612	43pf - 26080
2,400	2,600	63612	33pf - 26078
2,600	2,800	63612	20pf - 26042
2,800	3,000	63612	10pf - 25983
3,000	3,400	63612	
3,400	3,600	63600	10pf - 25983
3,600	4,200	63600	
4,200	5,200	63595	
5,200	6,800	63583	
6,800	8,200	63571	
8,200	10,200	63569	
10,200	12,000	63557	
12,000	15,000	63545	
15,000	18,000	63533	

DRIVER COIL SELECTOR

Frequency Range From	To	Coil
1,700 kc	2,500 kc	63624
2,200	3,300	63612
2,600	3,900	63600
3,100	4,600	63595
3,700	5,800	63583
4,500	7,000	63571
5,600	8,750	63569
6,600	10,000	63557
8,000	12,000	63545
9,750	15,000	63533
13,500	20,500	63521

RF AMPLIFIER TRANSFORMER COIL SELECTOR

SA-14 and SA-14R

Frequency Range From	To	Made From Coil	Transformer	Capacitor
2,000 kc	2,200 kc	63624	48595	33pf - 26078
2,200	2,400	63612	48583	68pf - 26107
2,400	2,600	63612	48583	43pf - 26080
2,600	2,800	63612	48583	33pf - 26078
2,800	3,200	63612	48583	20pf - 26042
3,200	3,600	63612	48583	10pf - 25983
3,600	4,200	63612	48583	
4,200	4,800	63600	48571	
4,800	5,500	63595	48569	
5,500	7,000	63583	48557	
7,000	8,500	63571	48545	
8,500	10,500	63569	48533	
10,500	12,000	63557	48521	
12,000	15,000	63545	48519	
15,000	18,000	63533	48507	

OUTPUT TANK TAP

Frequency Range From	To	Tap	Frequency Range From	To	Tap
2,000 kc	2,100 kc	26	8,000	8,500	12
2,100	2,600	25	8,500	10,000	11
2,600	2,800	24	10,000	10,500	10
2,800	3,200	23	10,500	11,000	9
3,200	3,800	22	11,000	11,500	8
3,800	5,000	21	11,500	12,500	7
5,000	5,400	19	12,500	13,500	6
5,400	6,200	18	13,500	14,000	5
6,200	6,600	17	14,000	15,500	4
6,600	7,000	16	15,500	16,500	3
7,000	7,500	15	16,500	18,000	2
7,500	8,000	14			

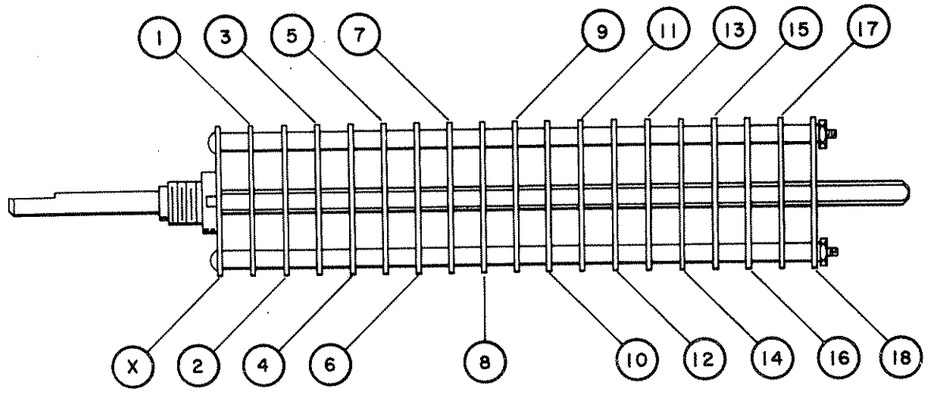
OUTPUT TANK OUTPUT CAPACITOR

Frequency Range From	To	Capacitor PF	SunAir Part No.
2,000 kc	2,100 kc	1200	25610
2,100	2,200	1100	25608
2,200	2,300	1000	25593
2,300	2,400	910	25581
2,400	2,600	820	25579
2,600	3,000	750	25567
3,000	3,200	680	25555
3,200	3,400	620	25543
3,400	4,200	560	25531
4,200	4,600	530	25529
4,600	5,000	500	25517
5,000	5,400	470	25505
5,400	5,800	430	25490
5,800	6,200	390	25488
6,200	6,600	360	25476
6,600	7,000	330	25464
7,000	7,500	300	25452
7,500	8,000	270	25440
8,000	9,000	250	25438
9,000	10,500	200	25426
10,500	13,000	150	25414
13,000	15,500	100	25646
15,500	18,000	50	25634

OUTPUT TANK INPUT CAPACITOR

Frequency Range From	To	Capacitor PF	SunAir Part No.
2,000 kc	2,100 kc	330	26494
2,100	2,200	300	26482
2,200	2,300	270	26470
2,300	2,400	250	26468
2,400	2,500	220	26456
2,500	2,600	200	26444
2,600	3,000	170	26810
3,000	3,400	150	25892
3,400	3,800	120	25907
3,800	4,200	100	25919
4,200	5,000	70	25921
5,000	5,800	50	25933
5,800	6,400	30	25945
6,400	7,500	20	25957
7,500	8,500	10	25969

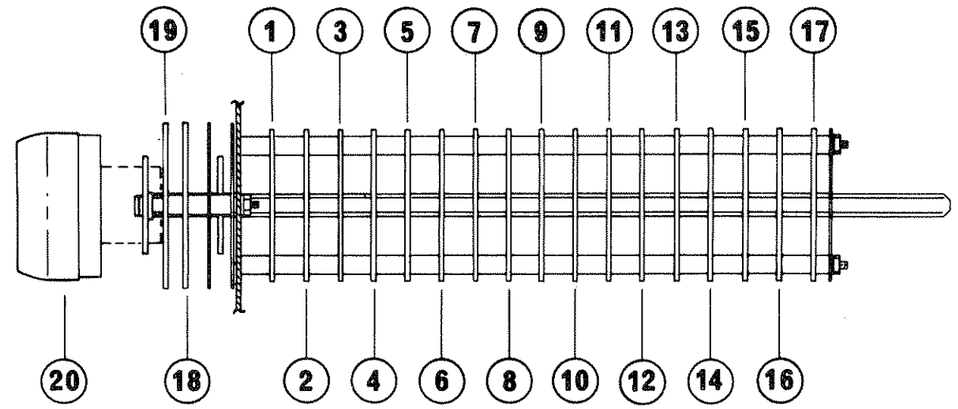
No capacitor required above 8,500 kc.



Item	Circuit Symbol	Description
1.	SW1-1	Receiver Crystals Selector
2.	SW1-2	Transmitter Crystals Selector
3.	SW1-3	RF Amp. Tank Capacitor Common
4.	SW1-4	RF Amp. Tank Selector
5.	SW1-5	RF Amp. Tank Selector
6.	SW1-6	Transmitter Osc. Cathode Resistor Selector
7.	SW1-7	RF Amp. Tank Coil Common
8.	SW1-8	Driver Tank Capacitor Common
9.	SW1-9	Driver Tank Selector
10.	SW1-10	Driver Tank Selector
11.	SW1-11	Receiver Osc. Cathode Resistor Selector
12.	SW1-12	Driver Tank Coil Common
13.	SW1-13	Ant. Tank Coil Common
14.	SW1-14	Ant. Tank RF Input
15.	SW1-15	Ant. Tank Selector
16.	SW1-16	Ant. Tank Selector
17.	SW1-17	Ant. Tank Caoacitor Common
18.	SW1-18	Remote Control Wafer
X		Switch Detent w/Shaft

Figure No. 1a

Switch Deck Parts Call Out, SA-14



Item	Circuit Symbol	Description
1.	SW1-1	Receiver Crystals Selector
2.	SW1-2	Transmitter Crystals Selector
3.	SW1-3	RF Amp. Tank Capacitor Common
4.	SW1-4	RF Amp. Tank Selector
5.	SW1-5	RF Amp. Tank Selector
6.	SW1-6	Transmitter Osc. Cathode Resistor Selector
7.	SW1-7	RF Amp. Tank Coil Common
8.	SW1-8	Driver Tank Capacitor Common
9.	SW1-9	Driver Tank Selector
10.	SW1-10	Driver Tank Selector
11.	SW1-11	Receiver Osc. Cathode Resistor Selector
12.	SW1-12	Driver Tank Coil Common
13.	SW1-13	Ant. Tank Coil Common
14.	SW1-14	Ant. Tank RF Input
15.	SW1-15	Ant. Tank Selector
16.	SW1-16	Ant. Tank Selector
17.	SW1-17	Ant. Tank Capacitor Common
18.	SW1-18	Remote Control Wafer
19.		Interrupter Wafer
20.		Rotary Solenoid

Figure No. 2a

Switch Deck Parts Call Out, SA-14R

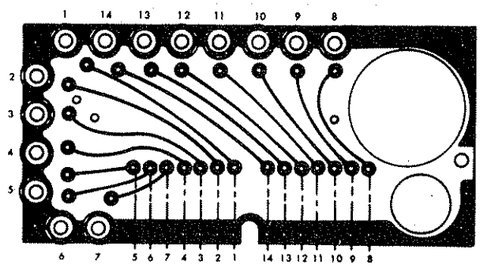


Figure No. 3a

Location of Tank Circuit Tuning Component

Numbers show location of Tank Circuit Components in channeling sequence.

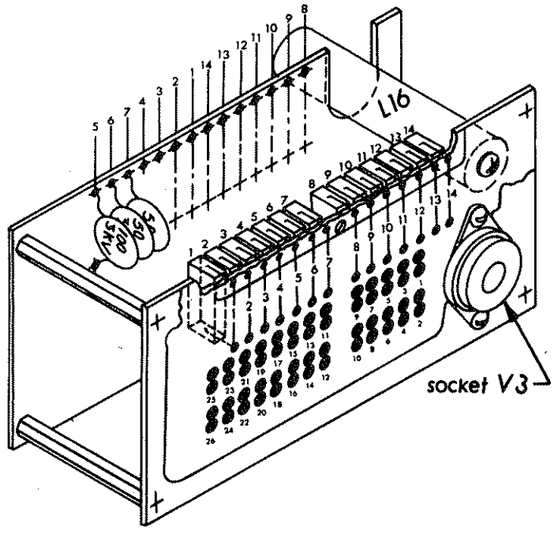
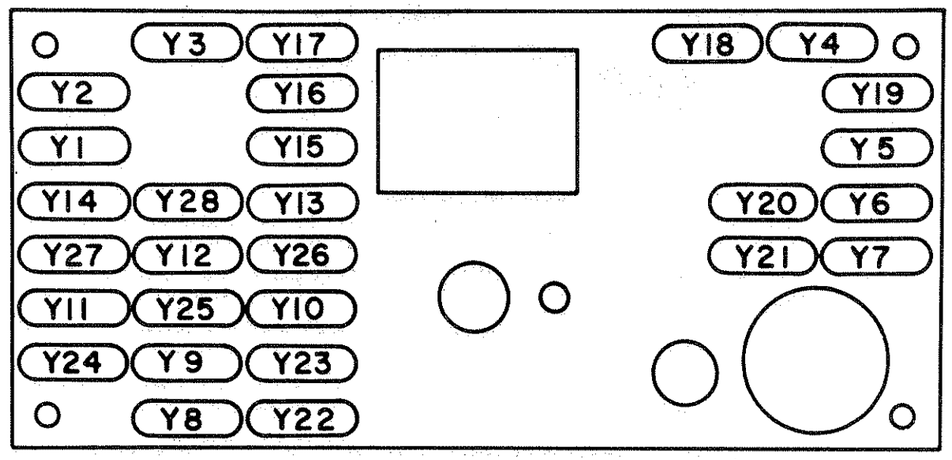


Figure No. 4a

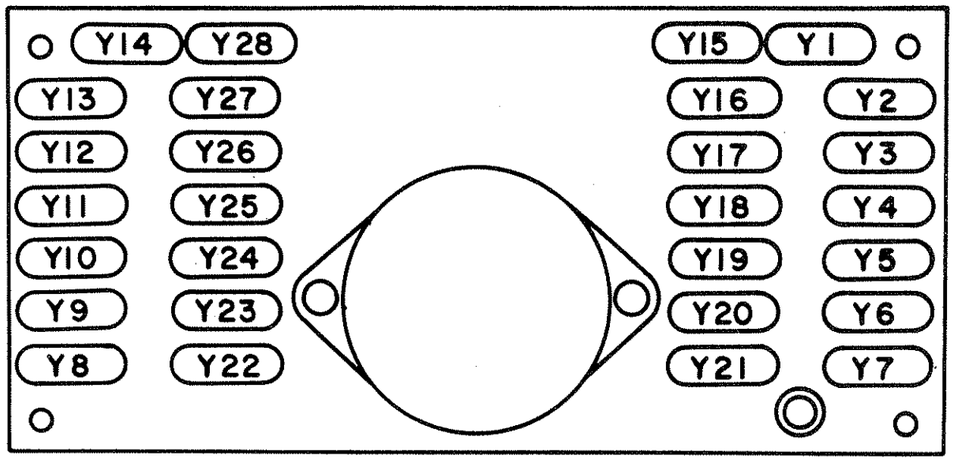
Capacitor Locations, RF Power Module



Circuit Symbol	Description	Channel No.
Y1	Crystal, Transmitter	1
Y2	" "	2
Y3	" "	3
Y4	" "	4
Y5	" "	5
Y6	" "	6
Y7	" "	7
Y8	" "	8
Y9	" "	9
Y10	" "	10
Y11	" "	11
Y12	" "	12
Y13	" "	13
Y14	" "	14
Y15	Crystal, Receiver	1
Y16	" "	2
Y17	" "	3
Y18	" "	4
Y19	" "	5
Y20	" "	6
Y21	" "	7
Y22	" "	8
Y23	" "	9
Y24	" "	10
Y25	" "	11
Y26	" "	12
Y27	" "	13
Y28	" "	14

Figure No. 5a

Crystal Location Drawing - SA-14



Circuit Symbol	Description	Channel No.
Y1	Crystal, Transmitter	1
Y2	" "	2
Y3	" "	3
Y4	" "	4
Y5	" "	5
Y6	" "	6
Y7	" "	7
Y8	" "	8
Y9	" "	9
Y10	" "	10
Y11	" "	11
Y12	" "	12
Y13	" "	13
Y14	" "	14
Y15	Crystal, Receiver	1
Y16	" "	2
Y17	" "	3
Y18	" "	4
Y19	" "	5
Y20	" "	6
Y21	" "	7
Y22	" "	8
Y23	" "	9
Y24	" "	10
Y25	" "	11
Y26	" "	12
Y27	" "	13
Y28	" "	14

Figure No. 6a
Crystal Location Drawing - SA-14R

SECTION B

INSTALLATION

Complete instructions for the installation of the SA-14 and SA-14R Transceiver are contained in this section. Use care when unpacking and handling the equipment. Check the contents to insure that all items have been included.

INSTALLATION PARTS LIST

13. The following additional items are usually required for the installation:

    a. Speaker, 3 ohm nominal impedance
    b. 3-pole microphone, carbon, with push-to-talk button, 100 ohms impedance
    c. Headset, 500 ohms
    d. Main cable assembly (see Fig. 5b & Fig. 7b)
    e. Antenna cable assembly (see Fig. 8b)
    f. Suitable antenna (see paragraph 18)
    g. Microphone and headset jacks
    h. Mounting brackets for transceiver (2 required)
    i. Ground and support strap

The transceiver has been carefully adjusted at the factory for optimum performance. However, it is possible that the equipment may have been mishandled while in transit. Therefore, it is recommended that a pre-installation bench check-out be made to insure proper operation. In order to accomplish this test, fabrication of the cable referred to in the installation parts list will be required. SunAir will supply this calbe as optional equipment if required. See Figure 5b for detail on SA-14 and Figure 7b for detail on SA-14R.

TRANSCEIVER

14. If the main interconnection cable is to be supplied by SunAir, dimensions for the installation, in detail, must be furnished in accord with the appropriate installation diagram. The antenna cable used with the transceiver should be RG-58 A/U.

This cable should be as short as possible and all bends should have at least a 2-inch radius. A BNC connector is supplied for the interconnection of the antenna and the transceiver. See Figure 8b, page 16b, for the proper method of assembling the BNC connector.

The SA-14 and SA-14R antenna installation may consist of either

a. A fixed antenna with an antenna coupler or
b. A trailing antenna or
c. Both a fixed antenna with an antenna coupler and a trailing antenna with a coax relay which enables the operator to select either the fixed or trailing antenna.

The SA-14 Transceiver is designed for installation in the instrument panel of the aircraft. The SA-14 can be installed by means of two mounting brackets which will attach to the sides of the unit and to the instrument panel. A bolt and wing nut have been provided on the back of the case to which a supporting strap will be connected by the installer. (This strap to be fabricated by the installer).

See Figures 1b and 2b for transceiver dimensions.

Detailed Instructions for Mounting Transceiver

a. Provide a rectangular opening in the instrument panel 6 21/64 inches wide by 3 3/32 inches high.

b. Install the transceiver case in the opening from the rear, attaching by means of the two mounting brackets.

c. Slide the transceiver into the case and secure by turning the fastener on the rear of the case 90^{o} in a clockwise direction to lock the chassis in the case.

d. Using the wing nut, secure the ground stud on the rear of the transceiver chassis to the airframe grounding strap. This will not only provide a ground connection, but will also provide additional support for the transceiver.

Instructions for Mounting the Modulator/Power Supply

The modulator/power supply can be mounted in any suitable position. Four mounting holes are provided in the base of the unit for attaching it to the airframe. The use of a shockmount is recommended.

The connection of the modulator/power supply unit to the transceiver is accomplished by means of the main cable assembly described in Figures 5 & 7b, while a 6-foot pigtail extending from the modulator/power supply has been provided for the connection to the PLUS pole of the power system. The MINUS connection requires a No. 12 wire or cable from the grounding stud of the modulator/power supply unit to the airframe, or preferably directly to the MINUS pole of the aircraft battery. These primary power connections shall be as short as possible in order to prevent unnecessary voltage drops across the cable resistance.

The SA-14R Transceiver is designed for remotely locating in the equipment rack. Dimensions and mounting detail for the SA-14R will be found on Fig. 2b, Page 10-B. The only space requirement on the instrument panel is for the control unit. Dimensions and mounting detail for the control unit will be found on Fig. 4b, Page 12-B.

CONNECTION OF CABLE ASSEMBLIES

15. Connect the transceiver to the madulator/power supply by means of the main cable assembly (see Fig. 5b & 7b).

Connect the transceiver th the antenna by means of the anteena cable assembly (see Fig. 5b & 7b).

PERFORMANCE CHECK-OUT (IN AIRCRAFT)
(When Used with Antenna Coupling Unit)

16. After installation in the aircraft, the SA-14 Transceiver should be subjected to a complete performance check-out. The check-out should be performed on the ground with normal power ON and with the aircraft engines running.

To insure proper operation of the SA-14 system, measure the primary voltages in the transmit position at the fuse inside the modulator/ power supply unit. This voltage should be 13.75 volts for 14 volt systems, and 27.5 volts for 28 volt systems.

This voltage cannot be obtained unless the aircraft engines are running. The generators and voltage regulators under this condition should provide the indicated voltages. If that is not the case, check the voltage drop across the primary power calbes to the modulator/power supply unit; and if necessary, use heavier wires for the connection to the battery.

Listen while the engines are idling for abnormal noise in the receiver output. Change the rpm of the engine and note a change in the noise frequency. This will indicate ignition or generator noise. In most instances, proper application of capacitors and noise suppressors will remove the trouble. If the voltage does not reach 13.75 volts, the voltage regulator may require adjustment.

Equipment Required for Performance Check-Out in Aircraft

a. Thru-line wattmeter with 100 watt insert (Bird or equivalent)

b. HF receiver

Detailed Check-Out Procedure

a. Connect wattmeter between antenna and transceiver.

b. Set transceiver to Channel No. 1.

c. Press microphone transmitting button and check standing wave ratio by reading the forward and reflected power on the wattmeter.

d. The reflected power should not exceed a maximum of 5 watts.

e. Follow the above procedure tuning the transceiver to each channel.

f. Perform a brief modulation check by monitoring the transmission with another HF receiver.

g. Check headphones for sidetone while transmitting.

OPERATIONAL PROCEDURE

17. To operate the transceiver proceed as follows:

    a. Turn volume control knob to the right. (This will also turn on a dial light visible in darkness).

    b. A high-pitched sound can be heard in the headphone unit, indicating proper operation of the power supply.

    c. Turn RF gain knob to the right for maximum sensitivity.

    d. Turn channel selector switch to desired frequency.

    e. Press microphone button and call station with which you wish to communicate.

    f. Wait for reply and adjust volume to satisfactory level.

    g. Reset the RF gain knob until background noise disappears.

    NOTE: If the field strength of received station is small, the RF gain knob may have to remain at fully CW position for maximum sensitivity.

ANTENNA REQUIREMENTS

18. The transceiver will operate effectively with either a trailing wire antenna or a fixed antenna installation and the required antenna matching unit.

FIXED ANTENNA WITH COUPLING UNIT

19. For ease in operation a fixed antenna with an antenna matching device is suggested. The SunAir AC-14 series antenna coupling unit will provide the required 50 ohm load to the transmitter.

An AC antenna coupling unit can be provided to match specific antenna lengths. Each unit is pretuned at the factory to match a given antenna at preselected channel frequencies. Once the coupling unit is installed and operating, no further consideration to antenna matching is required.

When deciding upon the location of the coupling unit (Fig. 9b) in the aircraft, one important fact must be remembered. The length of wire between the coupling unit and the fixed antenna feed-through must be as short as possible. It should be six (6) inches or less. Excessive length causes radiation inside the aircraft. It will result in considerable detuning and very limited range, even though the meter indicates that it is properly tuned.

When calculating the length of the antenna, the length of the lead should be considered as this lead becomes part of the radiating element.

The antenna and load coil should be matched to the transmitter. The transmitter should not be tuned to the antenna. Tuning the transmitter to the antenna results in severe detuning, excessive current and overheating. Under no circumstance should the transmitter be retuned unless a 50-ohm load is connected to the transmitter output.

A fixed antenna kit is available for SunAir. The various parts are shown in Figure 14b.

Important - All joints must be extremely solid to avoid trouble caused by vibration, corrosion and arcing.

20. Electric Reel and Fairlead

The electric reel assembly weighs 11 pounds (Figure 15b). It is necessary to remember this when making an installation in a light plane. The assembly should be installed as close to the rear of the baggage compartment as possible. On heavier aircraft, this weight factor may not be important.

Mounting brackets should be constructed from material that meets FAA standards. Structural member chosen to carry the assembly must be of sufficient strength to support its weight.

Bolt the mounting bracket to the rib of the aircraft with metal screws (No. 8-32) so that the required number of threads will show through the fiber stop nuts. Bolt the assembly to the bracket.

Begin installing the fairlead by placing the bottom end against the skin of the aircraft and laying the top of the fairlead across the top of the reel. Mark the spot where the hole must be drilled through the skin. The angle of the fairlead to the antenna is very important. If the fairlead is in direct line with the antenna, a poor electrical connection will result. If the angle is too large, excessive drag will be imposed on the antenna and extreme wear will occur on the fairlead.

Once the hole is drilled it must be elongated to fit the angle at which the fairlead is to pass through. Angle and brackets must be built to mount the fairlead securely to the aircraft.

Extra long fairlead and stand-off insulators may produce undesirable transmission effects. Since frequencies of 10 to 15 megacycles have an average wave length of between 12 to 7 feet, nearly all of the antenna should be reeled in.

The RF inverter location is generally at the junction of the coax feedline and the antenna reel. In some cases where the inverter is of necessity located elsewhere in the line, standing waves will produce false indications. If this problem arises, changing the location of the inverter is either direction on the line may solve it.

All parts needed to complete the trailing wire antenna installation are included in the antenna kit. The chrome-plated swivel in the kit permits easy drag sock rotation. This prevents the antenna from twisting and snapping when it is reeled in. See Figure 17b for drag cup installation.

The back half of the drag sock should be sheared off when installing trailing wire antennas on aircraft which cruise at 200 mph or more. This will eliminate excessive drag.

Trailing Wire Antenna Electric Reel Control

The trailing wire antenna control box is mounted as close to the pilot or operator as possible, ususally on the side panel of the aircraft. Figure 16b illustrates this control. Switching the toggle switch from its centered position marked "OFF" to "OUT" activates the reel motor and permits the antenna wire to be pulled from the reel by the drag cup. As the antenna wire leaves the reel, the length of wire released is recorded on the dial directly above the toggle switch.

The operator may either depress the microphone press-to-talk switch and watch th RF indicator until it registers maximum deflection and then stop the reel, or, if he is familiar with the equipment, he can stop the reel after the approximate length of antenna needed for the frequency is registered on the reel control box. Exact antenna length can then be determined by depressing the microphone button and watching the RF indicator. Generally, the higher the frequency, the more deflection there will be. The reel is stopped by switching the toggle switch to the position marked "OFF". To return the antenna to the reel, the operator moves the control to the position marked "IN". A signal light at the top of the antenna control box is lit when the antenna is released. It should go out when the antenna is reeled in completely. If it fails to do so, the reel has not pulled in the drag cup completely and the micro switch in the assembly must be adjusted.

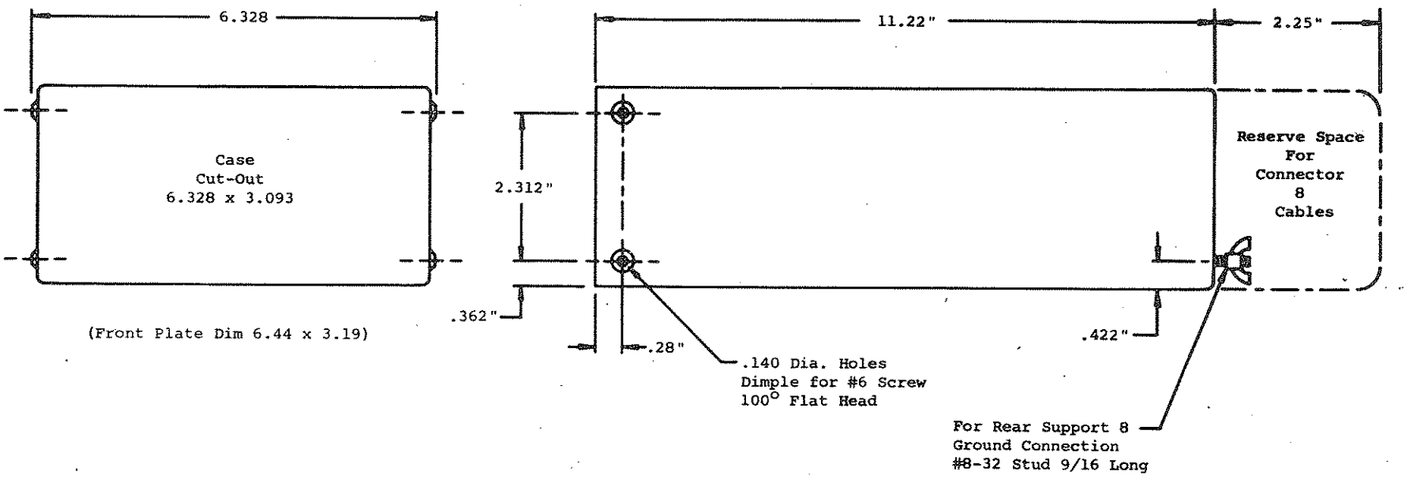


Figure No. 1b

Mounting Dimension Drawing, SA-14

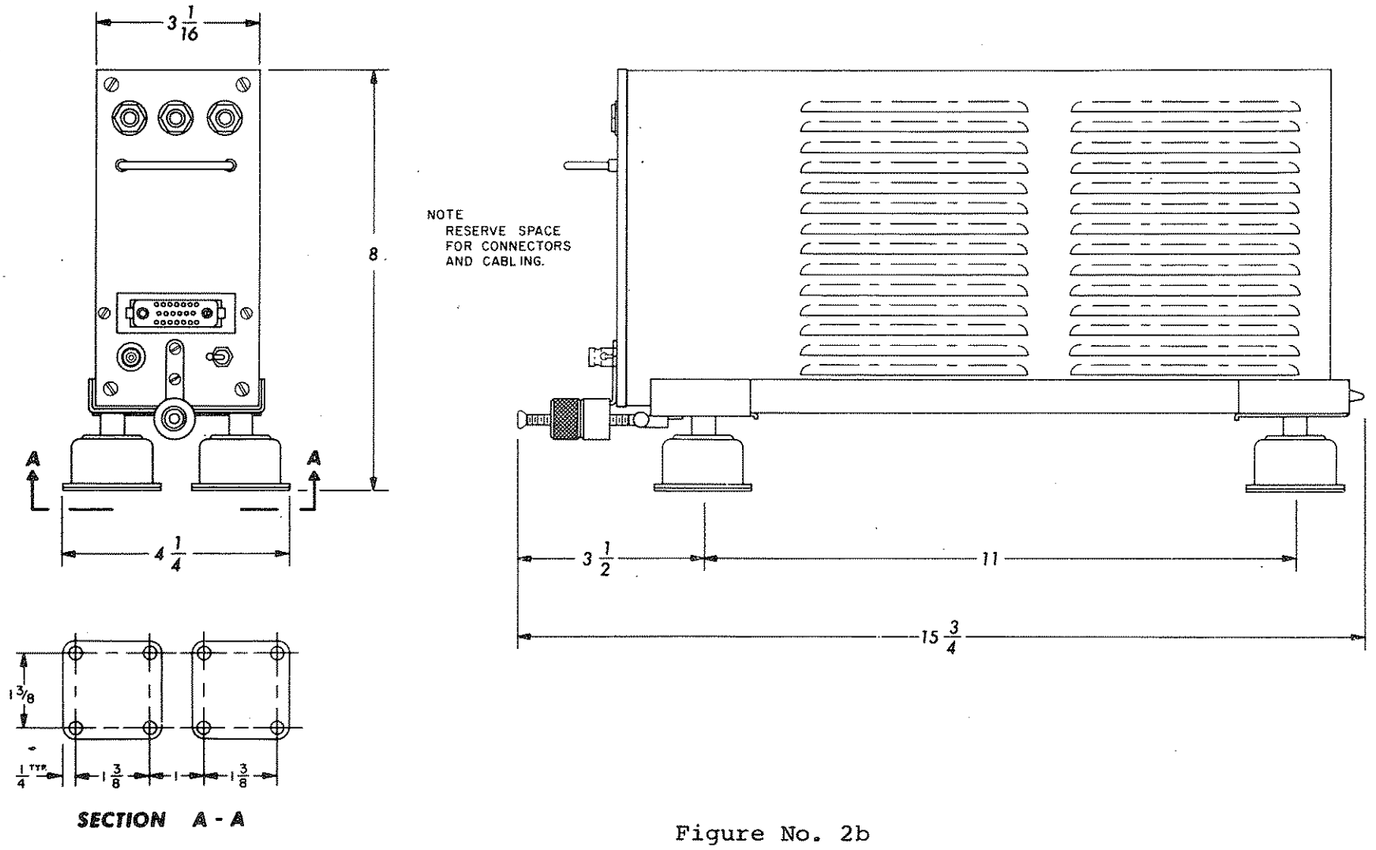


Figure No. 2b

Mounting Dimension Drawing, SA-14R

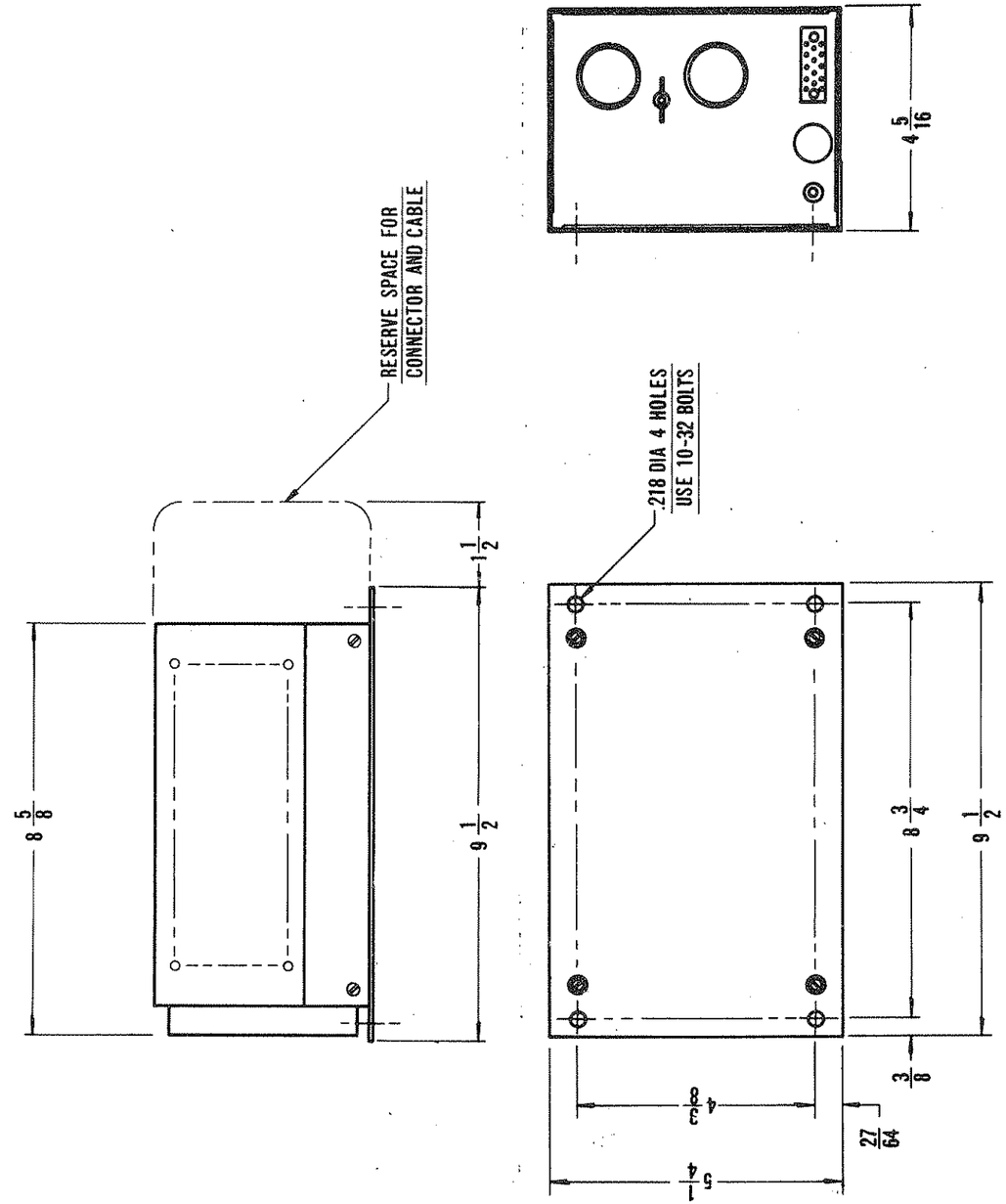


Figure No. 3b

Mounting Dimension Drawing, Modulator/Power Supply

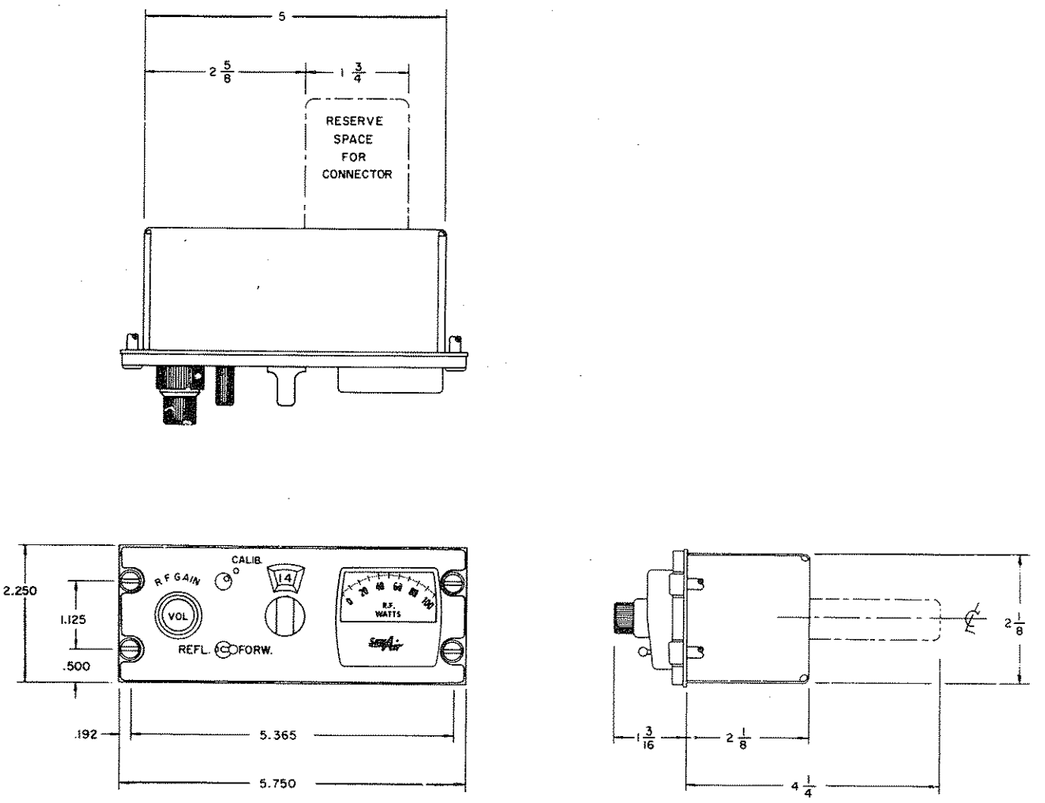
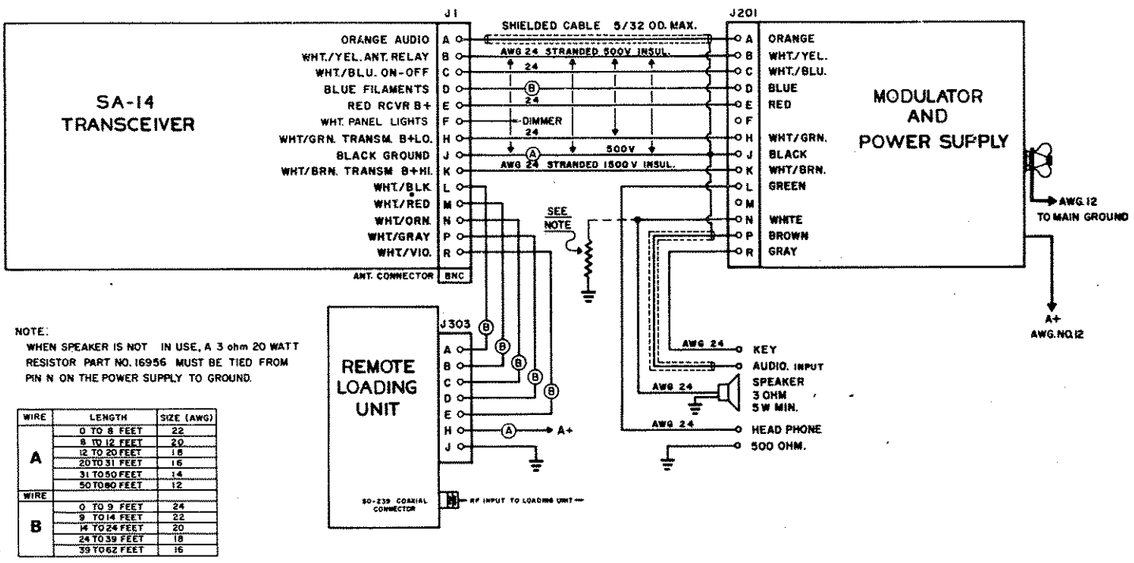


Figure No. 4b

Mounting Dimension Drawing, SA-14R Control Unit

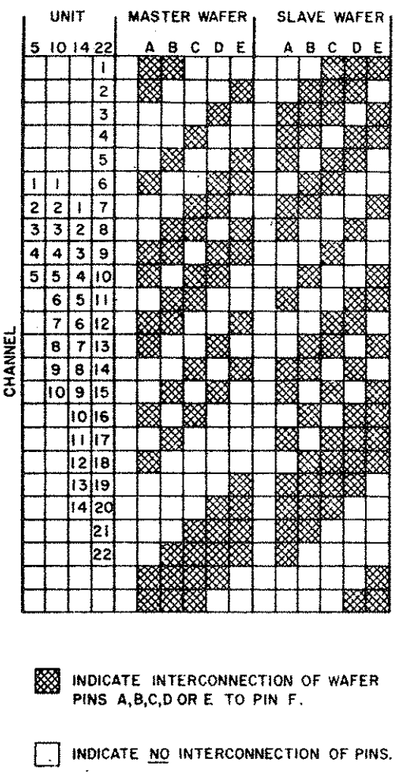


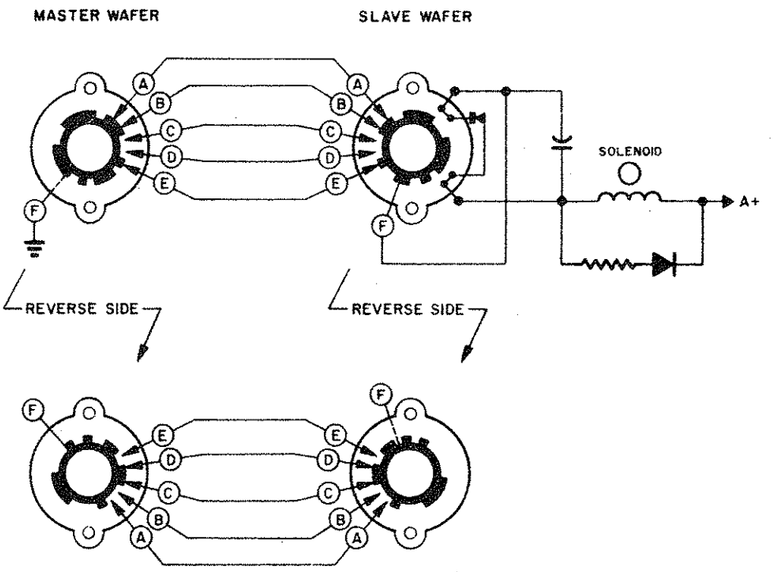
NOTE:
WHEN SPEAKER IS NOT IN USE, A 3 ohm 20 WATT RESISTOR PART NO. 16956 MUST BE TIED FROM PIN N ON THE POWER SUPPLY TO GROUND.

WIRE	LENGTH	SIZE (AWG)
A	0 TO 8 FEET	22
	8 TO 12 FEET	20
	12 TO 20 FEET	18
	20 TO 31 FEET	16
	31 TO 50 FEET	14
	50 TO 80 FEET	12
WIRE		
B	0 TO 9 FEET	24
	9 TO 14 FEET	22
	14 TO 24 FEET	20
	24 TO 39 FEET	18
	39 TO 62 FEET	16

Figure No. 5b

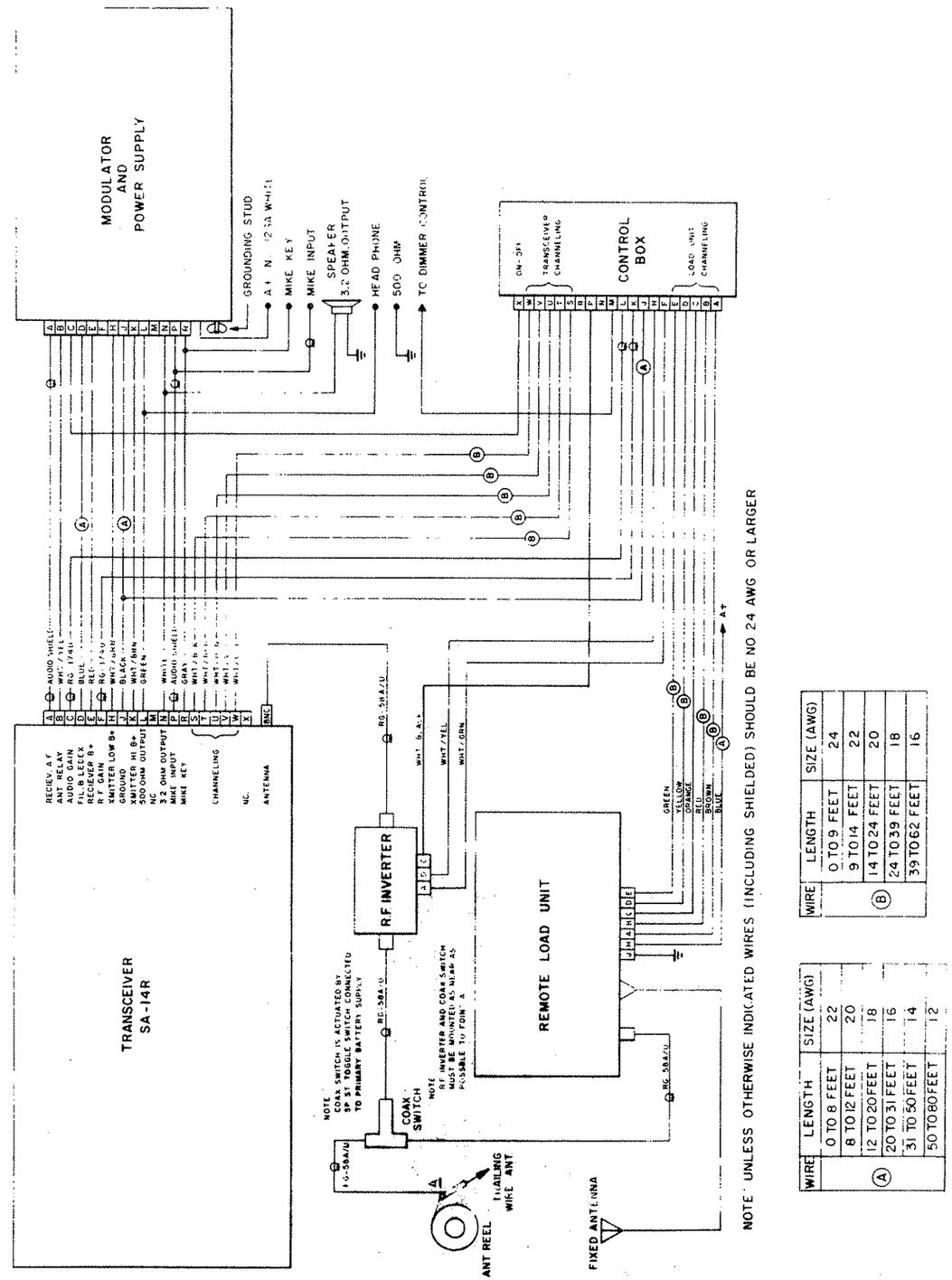
Transceiver Interconnection Diagram, SA-14





Wafers Shown in
Channel No. 1

Figure No. 6b
Transceiver Channeling Schematic



WIRE	LENGTH	SIZE (AWG)
Ⓐ	0 TO 8 FEET	22
	8 TO 12 FEET	20
	12 TO 20 FEET	18
	20 TO 31 FEET	16
	31 TO 50 FEET	14
	50 TO 80 FEET	12

WIRE	LENGTH	SIZE (AWG)
Ⓑ	0 TO 9 FEET	24
	9 TO 14 FEET	22
	14 TO 24 FEET	20
	24 TO 39 FEET	18
	39 TO 62 FEET	16

Figure No. 7b

Transceiver Interconnection Diagram, SA-14R

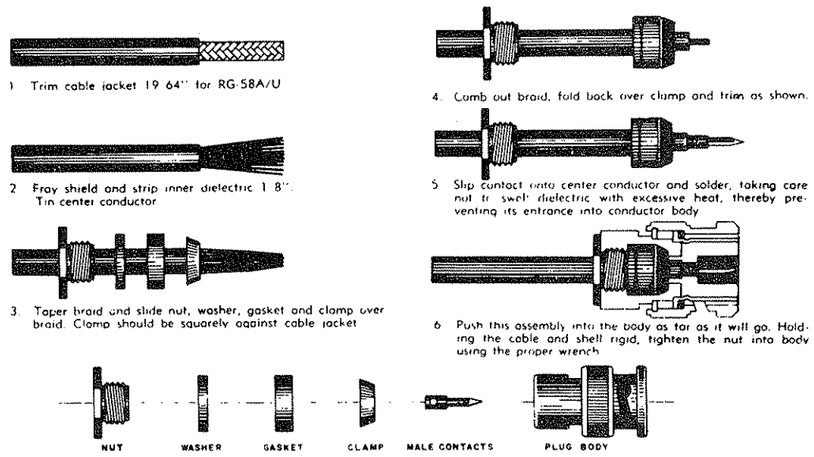


Figure No. 8b

BNC Connector Assembly Instructions

The main cable assembly for the installation of the transceiver must be fabricated by the installer. The connectors for this cable assembly are supplied as part of the system. Figure 5b shows the cabling required for the interconnection of the SA-14 system and Figure 7b for the SA-14R system. (SunAir will furnish the main cable assembly on request at a nominal cost.) To order this cable, SunAir must be provided with accurate dimensions for the installation of the main cable assembly in accordance with the Systems Installation Plan as shown in drawing Figure 5b.

The antenna cable for use with the transceiver should be RG-58 A/U. This cable should be as short as possible and all bends should have at least a 2-inch radius. A BNC connector is supplied for the interconnection of the antenna and the transceiver. See the drawing above for the proper method of assembling the BNC connector.

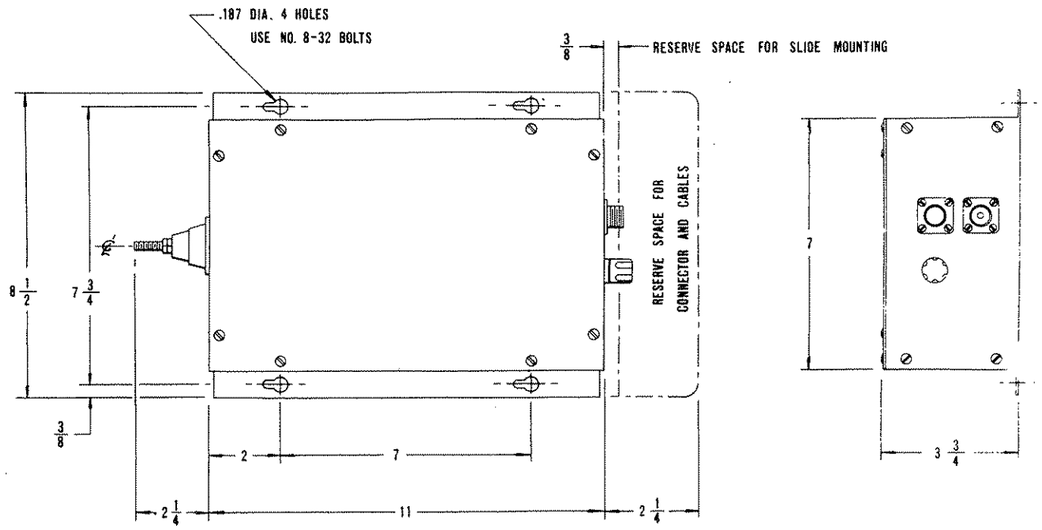
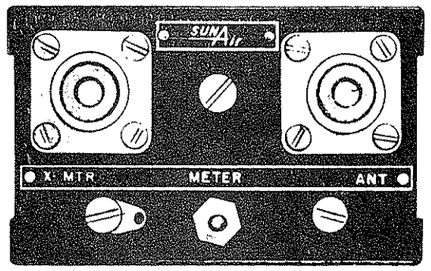


Figure No. 9b

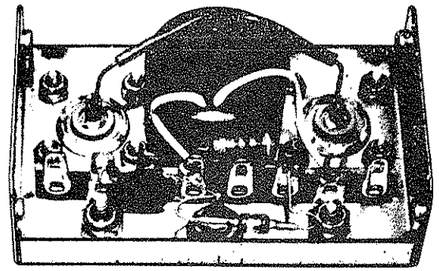
Coupling Unit Mounting Detail



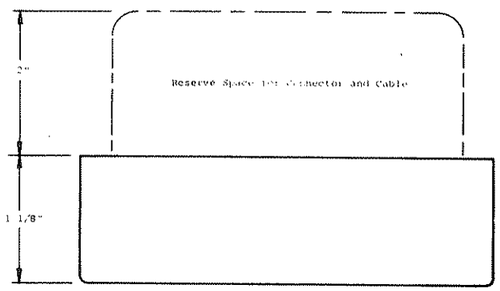
RF Inverter

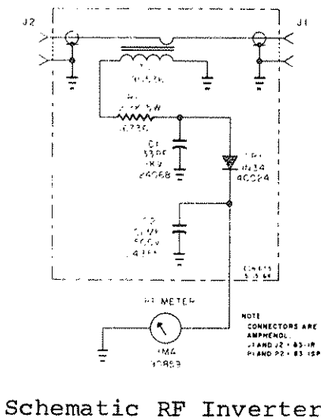
RF Inverter Model No. 90861

Switch Inverter Model No. 91396

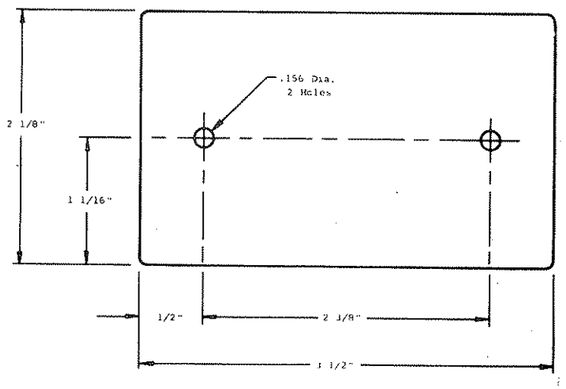


Interior View
RF Inverter

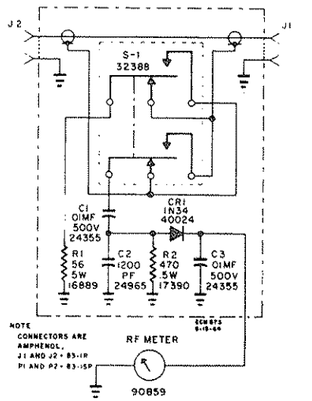




Schematic RF Inverter
No. 90861



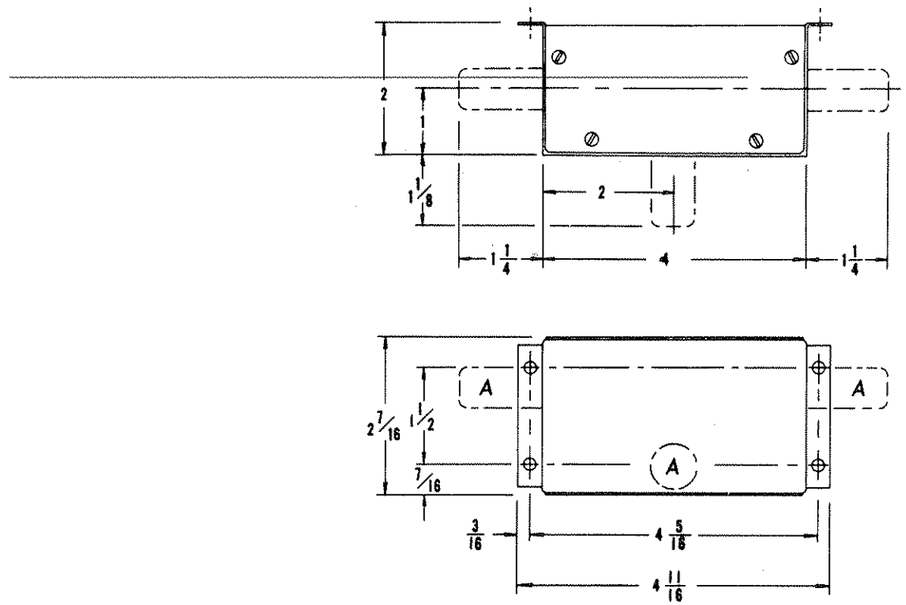
RF Inverter and SWRD
Mounting Dimensions



Schematic Switch Inverter
No. 91396

Figure No. 10b

RF Inverter Mounting Detail and Schematics



NOTE
RESERVE SPACE FOR CONNECTOR
3 PLACES AT A.

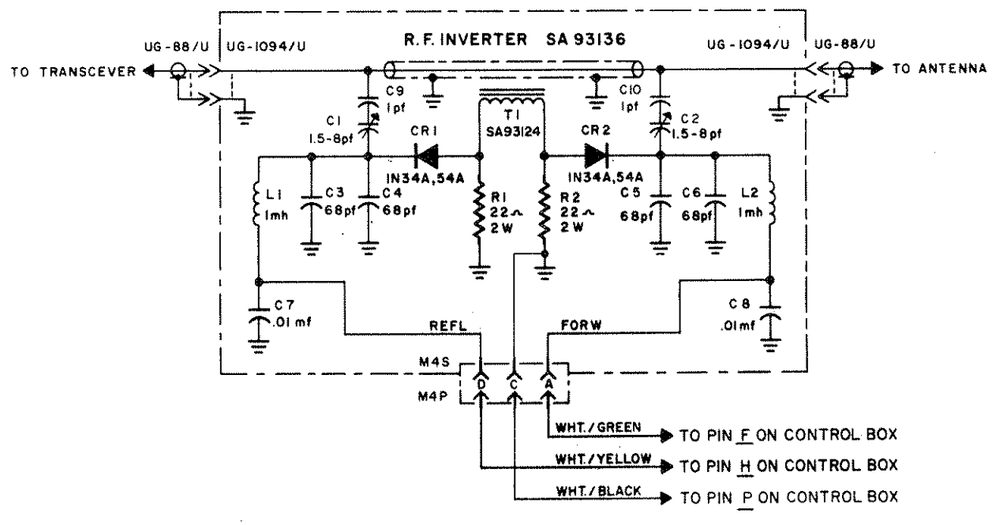


Figure No. 11b

RF Inverter Mounting Detail and Schematic, SA 93136

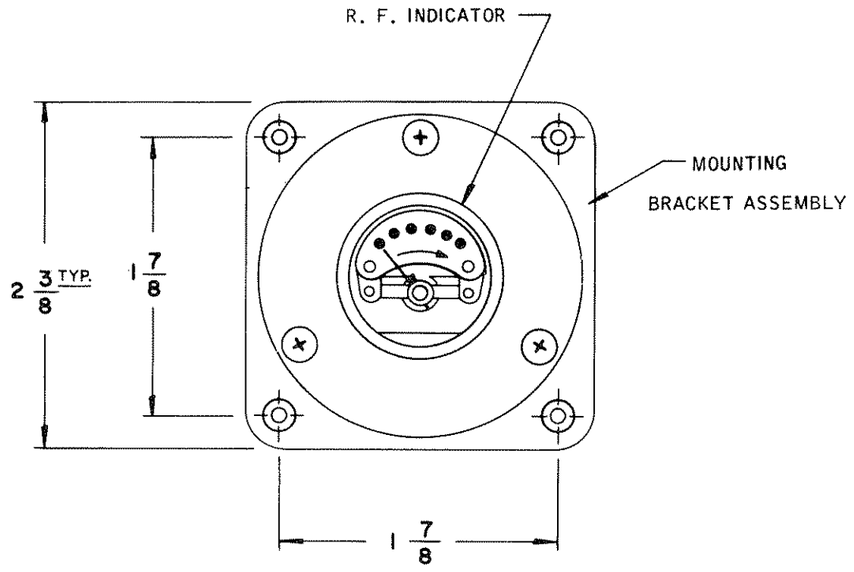
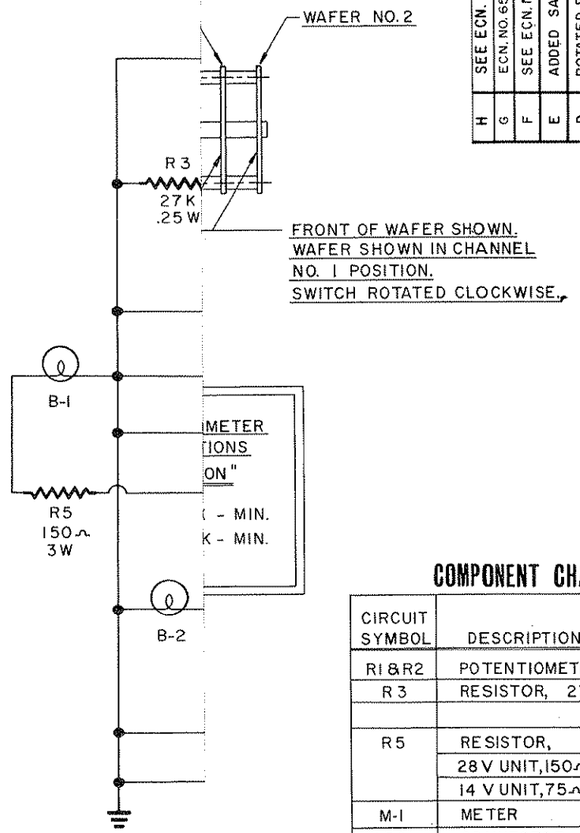


Figure No. 12b

RF Indicator Mounting Detail



SYM	DESCRIPTION	DATE
	REVISIONS	
H	SEE ECN. NO. 774	1-7-64
G	ECN. NO. 653, DELETED R4 & R6 (R3)	4-10-64
F	SEE ECN. NO. 622	2-14-64
E	ADDED SA-PART NUMBERS	1-27-64
D	ROTATED PIN CONNECTIONS NO. 1	1-20-64
C	ROTATED WAFER NO. 2 CONTACTS	1-16-64
B	REDRAWN WITH CHANGES	1-4-64

TITLE SCHEMATIC, SA-14R CONTROL UNIT

DRAWN

CHECKED

APPROVED

DATE 1-3-64

SUNAIR ELECTRONICS, INC.

DWG. NO. 10732 H

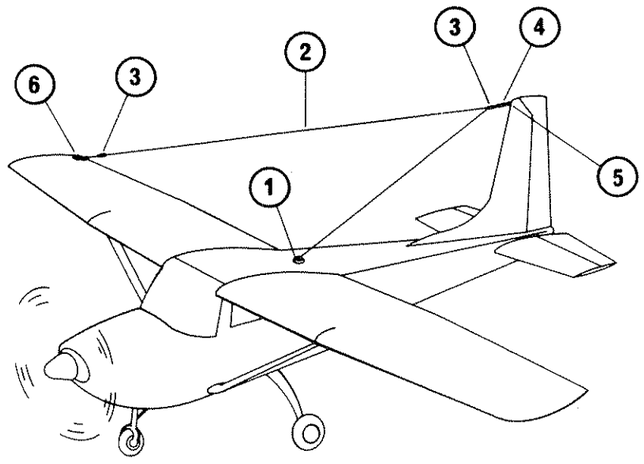
; TO
EQUENT

COMPONENT CHART

CIRCUIT SYMBOL	DESCRIPTION	SUNAIR PART NO.
R1 & R2	POTENTIOMETER	32895
R3	RESISTOR, 27K	17120
R5	RESISTOR,	
	28 V UNIT, 150Ω 3W	16011
	14 V UNIT, 75Ω 3W	16944
M-1	METER	86080
J 301	CONNECTOR	74491
P 301	CONNECTOR	74506
B-1	LAMP, 12V (RED)	86054
B-2	LAMP, PANEL	
	14 V UNIT, NO. 330	84367
	28V UNIT, NO. 327	84355

95146 FIXED ANTENNA KIT

(H. F. BARE WIRE)



INSTALLATION

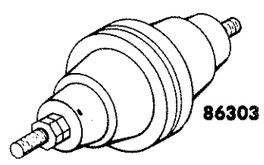
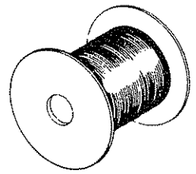
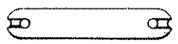
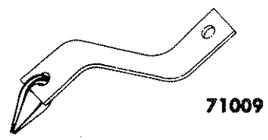
①  86303 **FEED THROUGH INSULATOR**	②  58863 **100 FEET #18 COPPERWELD WIRE**
③  71279 (2 Req.) **STRAIN INSULATOR**	④  71281 **TENSION SPRING**
⑤  71293 **VERTICAL FIN ANCHOR**	⑥  71009 **WING TIP BRACKET**

Figure No. 14b

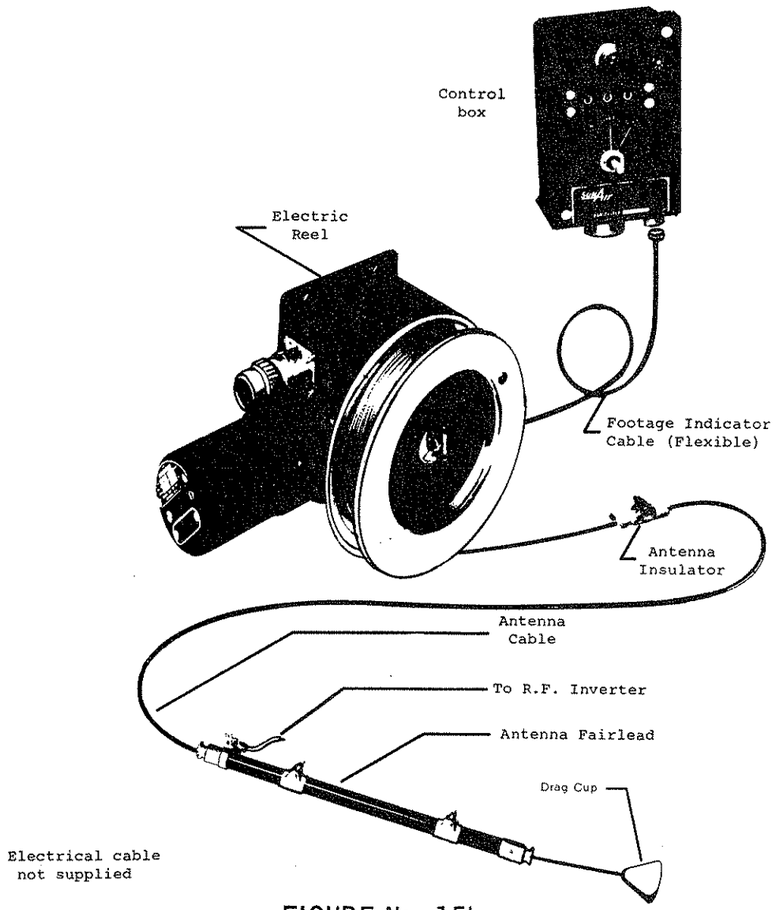


FIGURE No. 15b

COMPONENTS OF TRAILING WIRE ANTENNA INSTALLATION

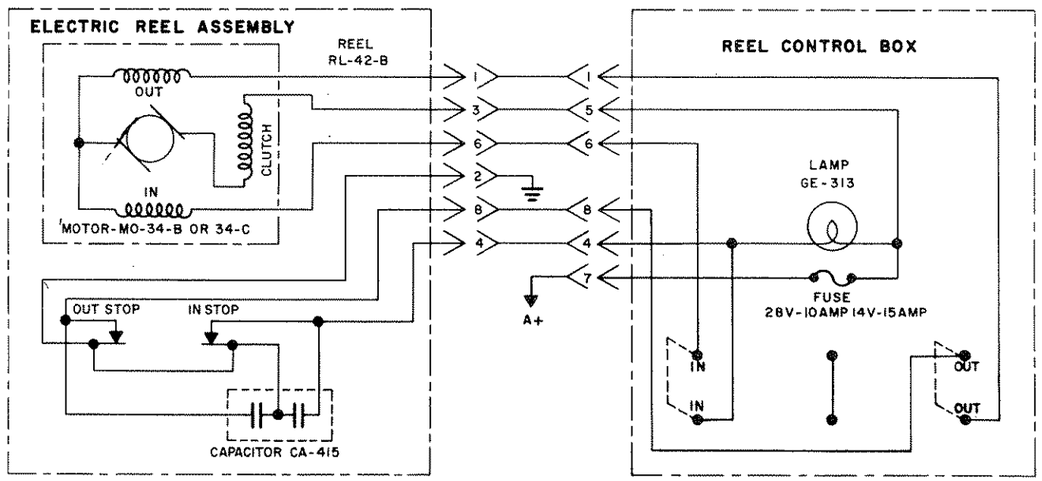
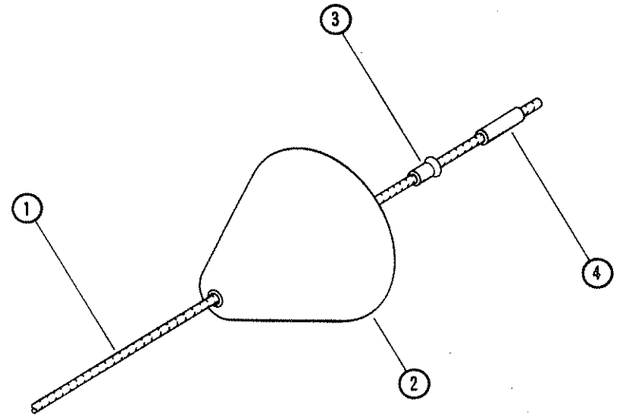


FIGURE No. 16b

WIRING DIAGRAM FOR ELECTRICAL REEL AND CONTROL BOX



Item	Description	Part Number
1	Antenna Wire	58875
2	Drag Cup	94192
3	Ball and Shank	50847
4	Connector	50835

INSTALLATION - Feed wire (Item 1) through drag cup (Item 2). Then feed through ball and shank (Item 3) and connector (Item 4). The connector may be crimped on with an AMP tool; if not available, use common pliers.

Figure No. 17b

Drag Cup for Trailing Antenna

SECTION C

ALIGNMENT AND SERVICE INFORMATION

It is recommended that preventive maintenance be performed at regular intervals--at least every eight months--in order to assure trouble-free operation of the transceiver. This periodic maintenace should include a complete bench check-out as described on pages 2-C to 5-C. In addition to the bench check-out, it is recommended that all vacuum tubes be tested for performance with a standard tube tester. Lubrication at this time should not normally be necessary; however, all bearing surfaces of moving parts of the tuning mechanism and the bearings of the switches may be lubricated with a high temperature lubricant such as Dow-Corning No. 4D compound.

21 EQUIPMENT REQUIRED

a. Frequency Counter (HP 524 or equivalent)
b. Calibration Set-up for Counter (WWV Receiver)
c. Oscilloscope (Tektronix 543 or equivalent)
d. Audio Generator (HP 200 C or equivalent)
e. Audio VTVM
f. DC VTVM
g. Phantom Microphone
h. DC Voltmeter
i. DC Ammeter
j. Coaxial Cables, Connector, Couplings, Capacitors
k. RF Load, 50 ohm, up to 18 MC
l. Signal Generator HP 606 A or equivalent
m. Bird Thru-line Wattmeter, 100 watt insert 2-30 MC

22. ALIGNMENT PROCEDURE FOR TRANSMITTER

NOTE: All voltages and currents are indicated on schematic diagrams.

a. Connect power supply to transceiver. Set power supply either to 13.75 or 27.5 volts according to system being used.

b. Switch on transceiver and readjust input voltage to nominal value if necessary.

c. Connect 50 ohm dummy RF load to the antenna terminal of the transceiver.

Driver

Connect DC vacuum tube voltmeter to test point No. 20. Use a one meg. resistor in series with the voltmeter probe to prevent detuning. Set VTVM to 100v. Key the transmitter and check grid leak bias for required value. If required, tuning capacitors C9 through C22 may be adjusted for maximum DC at test point No. 20. (Capacitor C9 for Channel No. capacitor C22 for Channel No. 14).

Power Amplifier

Connect a thru-line wattmeter and the 50 ohm, 100 watt antenna load with 50 ohm coaxial cables to the antenna terminal of the transceiver. Key the transmitter and adjust C28 through C42 for maximum power output. The cathode voltage at test point No. 19 should be monitored during this adjustment. Proper adjustment is the maximum power at minimum cathode voltage of the output tank circuit. Normal cathode voltage is from 13.0 to 16.5 volts when the power amplifier is properly adjusted.

Frequency Check

Connect the frequency counter to the pick-off unit (see Fig. 3c). A loop pickup may be used if a pick-off type unit is not available.

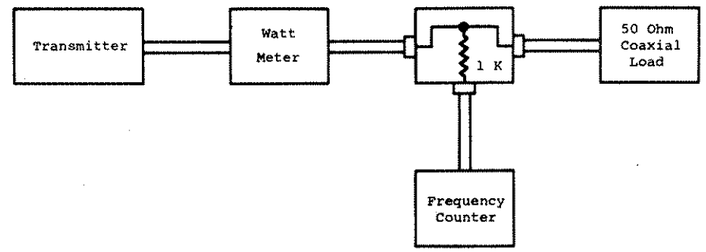


Figure No. 1c

Transmitter Frequency Check

Key the transmitter and check the frequency of the output power. The measured frequency should be within .005% of the assigned frequency.

Modulation Check-Out

a. Connect the audio signal generator via the phantom microphone to the modulator and adjust the input voltage to the phantom microphone to .3 volts rms at 1000 cps.

b. Connect the vertical input of an oscilloscope to the 50 ohm output terminal of the transceiver, which in turn is connected to the 50 ohm 100 watt load.

c. The scope horizontal input is set on internal sweep so that a 1000 cycle signal may be readily observed.

d. Adjust the amplitude to a convenient value in order to observe the modulated carrier accurately. Modulation percent is calculated as follows:

$$\% \text{ Modulation} = \frac{\text{peak - trough x 100}}{\text{2 x carrier}}$$

e. At the indicated audio input voltage the carrier should be modulated approximately 95%. A further increase in audio input does not increase the modulation depth.

ALIGNMENT PROCEDURE FOR RECEIVER

23. NOTE:Damage to the signal generator may occur if the transmitter is keyed while the signal generator is connected to the antenna terminal.

a. Connect transceiver to modulator/power supply with prescribed test cable.

b. Turn on transceiver and adjust power supply to either 13.75 or 27.5 volts according to system being used.

c. Connect the speaker output to a 3 ohm 10 watt resistor, non-inductive.

IF Amplifier Check

a. Connect the signal generator 606A to the antenna input terminal of the transceiver. Adjust the frequency of the 606A to 1500 kc modulated 30% at 1000 cps.

b. Connect the audio VTVM across the 3 ohm load on the speaker output.

c. Set the VTVM scale to 10 volts scale.

d. Set the volume control and r-f gain control fully clockwise.

e. Set the signal generator microvolt output so that the audio output with modulation is twice the output without modulation (signal plus noise-to-noise ratio is 6 db).

f. Begin adjusting the IF amplifier by tuning the last transformer T3 for maximum voltage as indicated by audio output voltage. (Care must be taken that the tuning cores are located on the very extreme ends of the coil form; ortherwise, serious deterioration of the bandwidth will occur.)

g. Proceed to T2 and T1, always tuning for maximum output voltage and steadily decreasing the input voltage.

h. The final refinement shall be made with the lowest input giving a 6 db signal plus noise-to-noise ratio by slightly adjusting every core in the IF amplifier.

RF Amplifier Check

a. Connect signal generator to antenna terminal and set transceiver to Channel No. 1.

b. Adjust signal generator for the same fequency as Channel No. 1 and the output to 5 microvolts.

c. Adjust trimmer capcitors C67 and C89 for maximum output.

d. Reduce signal generator voltage to 1 microvolt and refine the two adustments as made before.

e. The output voltage across the 3 ohm load resistor now should be approximately 1 volt rms.

f. After switching off the modulation in the signal generator, the remaining noise voltage output will be approximately 0.50 volts, or less, according to a signal plus noise-to-noise ratio of 6 db, or better.

g. Channels 2 through 14 are adjusted in the same manner.

TROUBLE SHOOTING INFORMATION

24. The following is a list of commonly-encountered trouble indications, probable cause of the malfunctions and recommended corrective procedures:

Trouble Indication	Probable Cause	Corrective Procedure
Power switch on, no A+ to transceiver or audio and power supply sections	Main fuse defective	Check for short circuits in primary circuits; after removal of short, replace fuse.
	Faulty connection to battery	Check primary voltage on main fuse with voltmeter.
	Power relay not operating	Check relay K201 for proper operation and inspect switch coupled to volume control S3.
Power switch on, tube filaments are dark	Faulty switch S4 or poor contact	Check position of S4 set to proper voltage and check contact.
	Open filaments of tubes	Check tubes.
Power switch on, no B+	Shorted B+ in power supply	Check transistorized power supply for operation; measure B+ at test point 162 and 163.
	Faulty relay contacts	Check relay contacts K201, contact numbers 14 and 5.
	Transistors inoperative	Check test point No. 152 for battery voltage. Check test point No. 153 for proper bias voltage. Clean relay contacts. Change transistors.

Trouble Indication	Probable Cause	Corrective Procedure
		Note: Switching transistors and audio power transistors are matched pairs and must be replaced in matched pairs.
	Short circuit in B+ line	Remove short circuit.
	Defective components	Check mainly electrolytic capacitors, replace if necessary.

Note: Operative high voltage power supply can easily be recognized by an audible high-pitched sound, generated by the switching of the transistors. When this sound is present, the high voltage power supply is operative.

RECEIVER SECTION OF TRANSCEIVER

It is assumed that the high voltage power supply A+ connections and all connections to antenna, speaker and headphones are in proper order; furthermore, that all tubes have been checked on a regular tube tester and have been found acceptable.

Trouble Indication	Probable Cause	Corrective Procedure
Volume fully clockwise, RF gain control fully clockwise, no noise in speaker	Audio amplifier inoperative	Check AF amplifier's performance by injecting an audio voltage of 1000 cps into pin A of J1 or pin A of J201. Full AF power output must be obtained with 0.5 volts RMS. If no output or too low, check AF amplifier. Check voltage of V8 for proper values. Check volume control.
	Detector circuit inoperative	Check CR1 through CR3; replace if necessary.

Trouble Indication	Probable Cause	Corrective Procedure
	IF amplifier inoperative	Realign.

Note: When V5, V6, V7 and V8 and the AF power amplifier are operative, a noise will be present in the speaker and headphones.

No reception when 1500 kc signal modulated 30% at 1000cps fed in antenna terminal	If amplifer inoperative	Check for proper voltages as indicated on circuit diagram.
	Audio amplifier inoperative	Check for proper voltages as indicated on circuit diagram.

Note: If the IF amplifier is completely misaligned, no output will be present at the speaker. Realign according to alignment procedure.

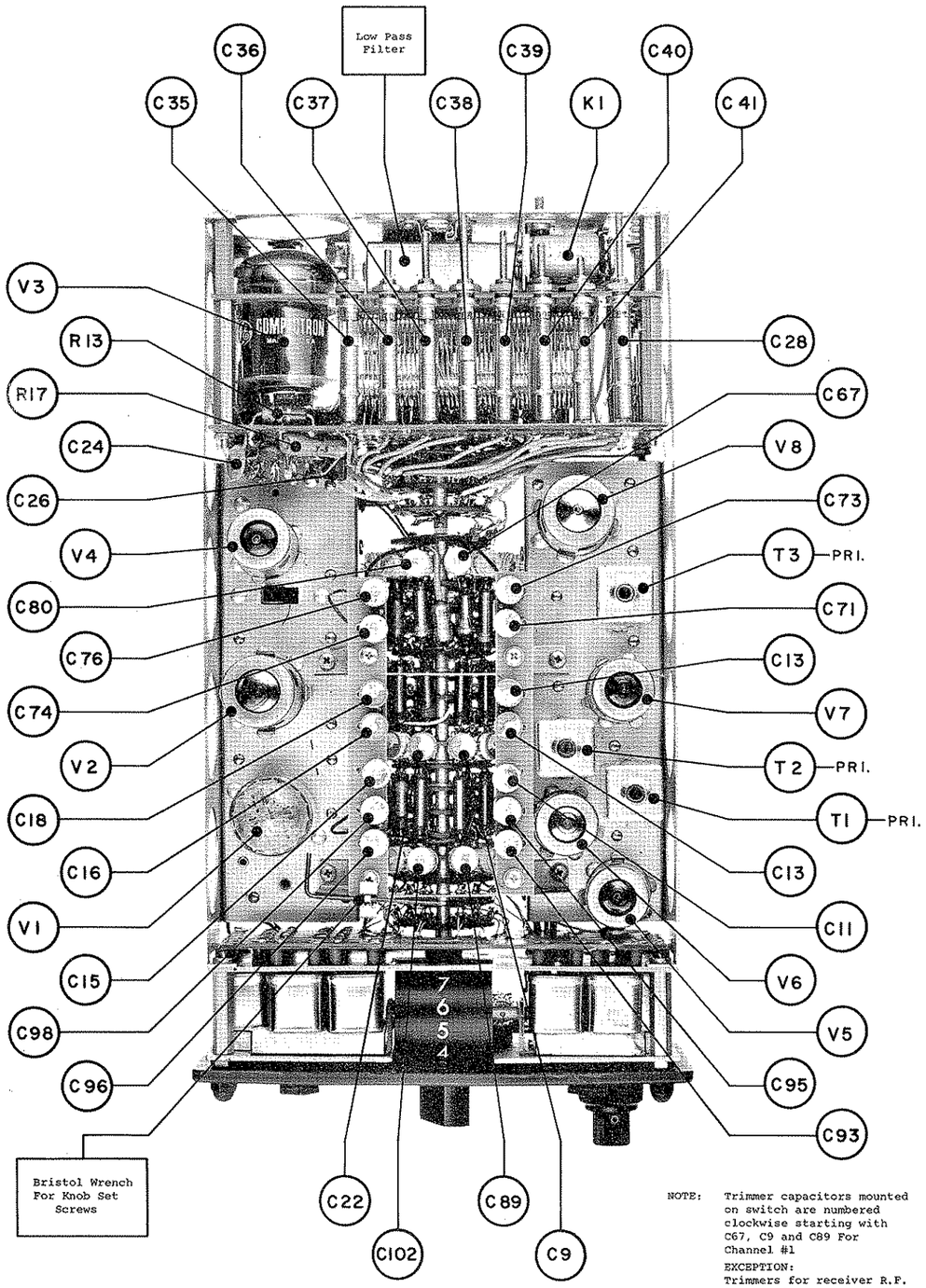
No reception when channel frequency signal fed into antenna terminal at 10 microvolt level modulated 30% at 1000 cps	RF amplifier inoperative	Check V4 for proper voltages as indicated on circuit diagram. Re-align RF amplifier.
	Antenna relay bad contacts	Check and clean contacts.
	Local oscillator inoperative	Check for proper voltages as indicated on diagram. Check crystal.
No reception when signal generator is tuned to channel frequencies	RF amplifier inoperative	Check V4 for proper voltages as indicated on circuit diagram. Check and clean if necessary antenna relay K1. Check diode CR5 and replace if required. Realign RF amplifier according to alignment procedure.

TRANSMITTER SECTION OF TRANSCEIVER

It is recommended that another HF transceiver be tuned to the frequencies on which the check-out of the transmitter is to be made, and the results be monitored for modulation quality, frequency, etc. Disconnect signal generator and connect RF load and thru-line wattmeter before making this check.

Trouble Indication	Probable Cause	Corrective Procedure
No RF power output	Faulty components	Check V1, V2 and V3 for proper voltages.
	Antenna relay contacts	Check and clean if required.
No drive at test point No. 20	Driver inoperative	Check V2 for proper voltages and realign if required.
	RF oscillator inoperative	Check for proper voltages at V1
RF power output sufficient, no modulation	Defrective microphone	Check and replace.
	Relay contacts inoperative	Clean and adjust if required.
	Microphone potentiometer R202 maladjusted or defective	Adjust and clean if required.
	Transistors defective	Check Q201 for proper no signal voltages, replace if required. Check Q202 for proper no signal voltages, replace if required. Check Q203 and Q204 for proper operating voltages without AF input, replace if required.

Trouble Indication	Probable Cause	Corrective Procedure
RF power output sufficient, no modulation (cont'd)	Modulation transformer defective	Check according to circuit diagram for proper resistance values and insulation.
	No A+ on one or more transistors	See previous procedure.
	Faulty connectors or interconnecting	Check and remove fault.
Modulation insufficient	Maladjusted microphone potentiometer	Adjust and check modulation depth with scope and calculate or adjust modulation by observation. Over-moduation is prevented by clipping Q201.



NOTE: Trimmer capacitors mounted on switch are numbered clockwise starting with C67, C9 and C89 For Channel #1

EXCEPTION: Trimmers for receiver R.F. input and mixer channels 4, 7, 8, 10 and driver, channels 3, 4, 5, 7, 8 and 10 are mounted on PC strips

Fig. No. 2c
SA-14 Top View Parts Callout

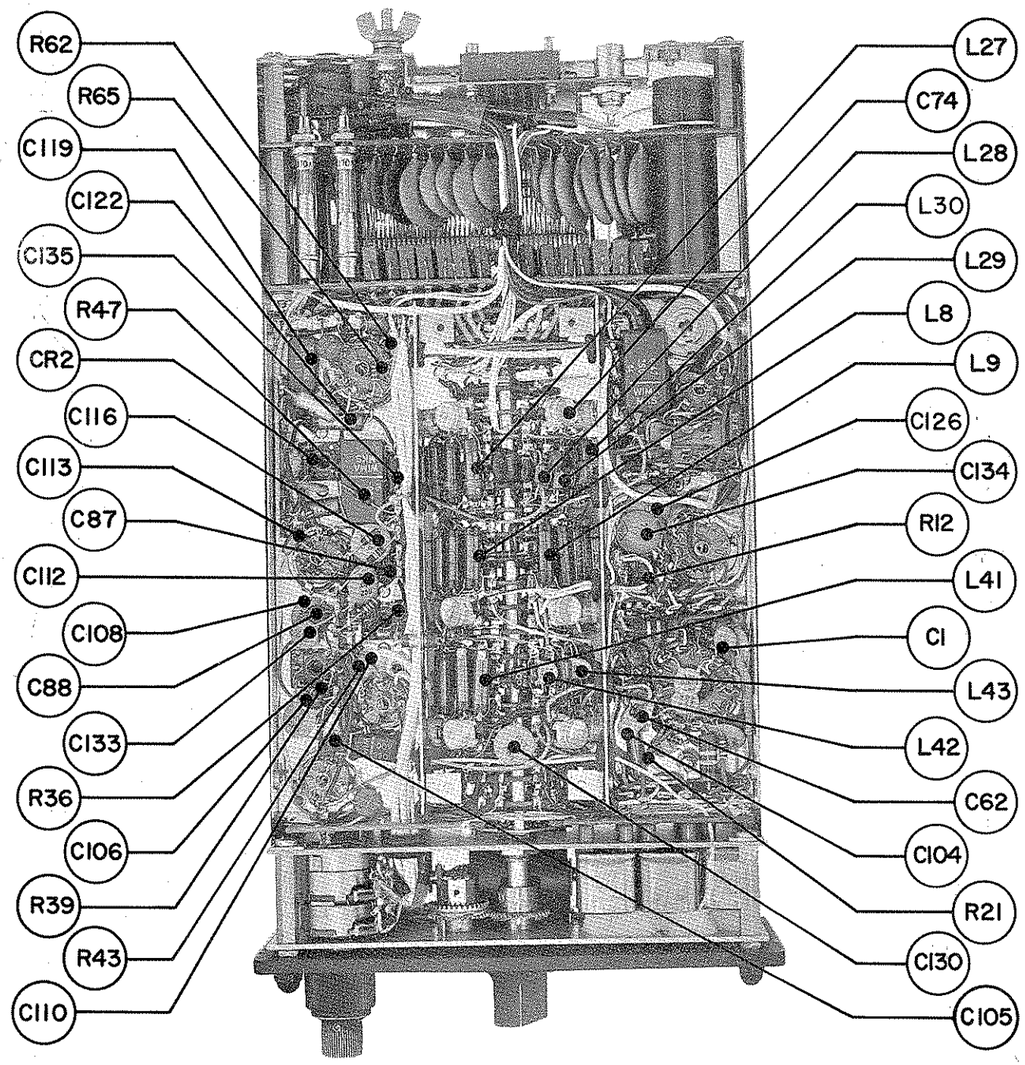


Fig. No. 3c
SA-14 Bottom View Parts Callout

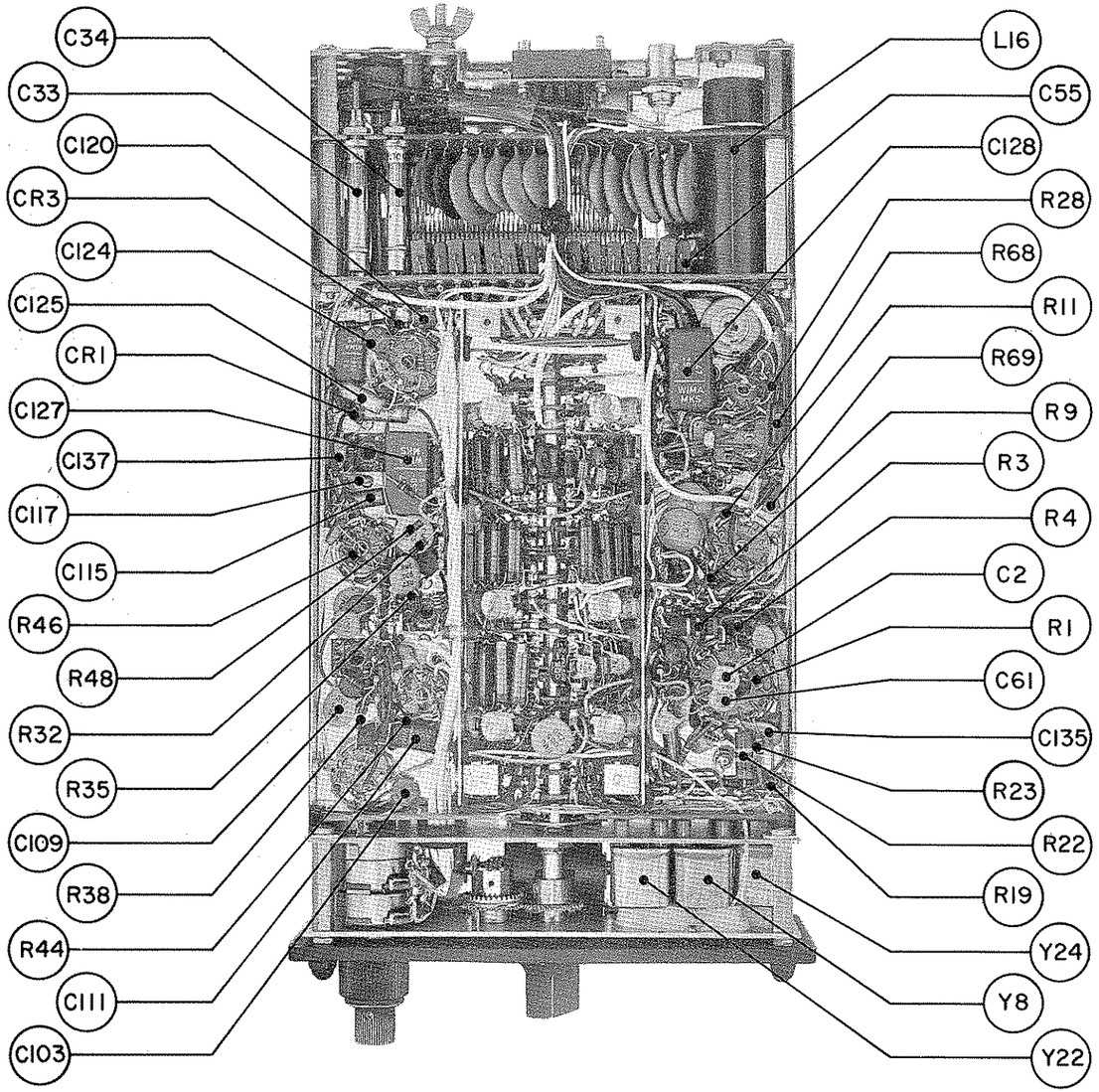


Fig. No. 4c
SA-14 Bottom View Parts Callout

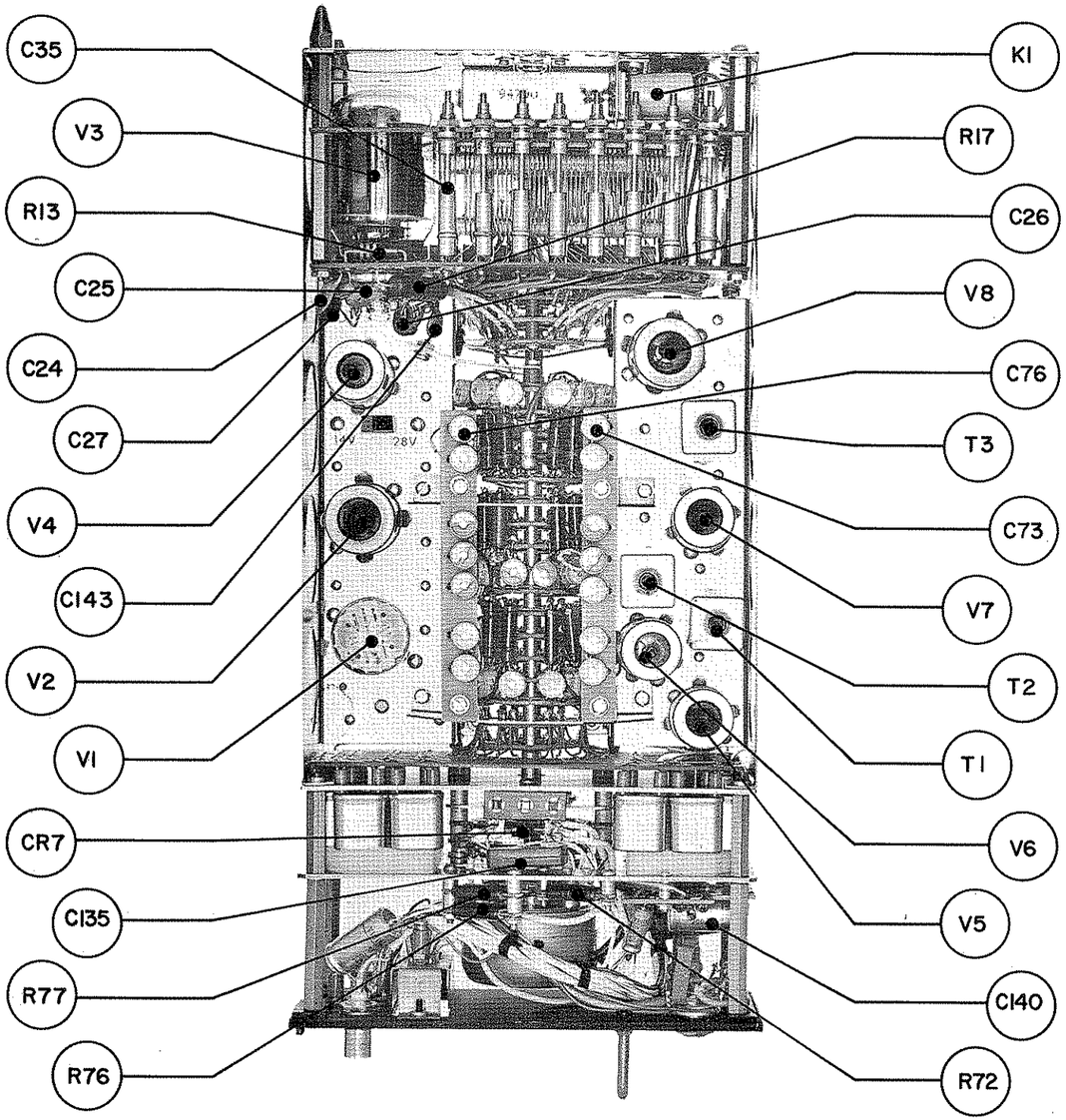


Fig. No. 5c
SA-14R Top View Parts Callout

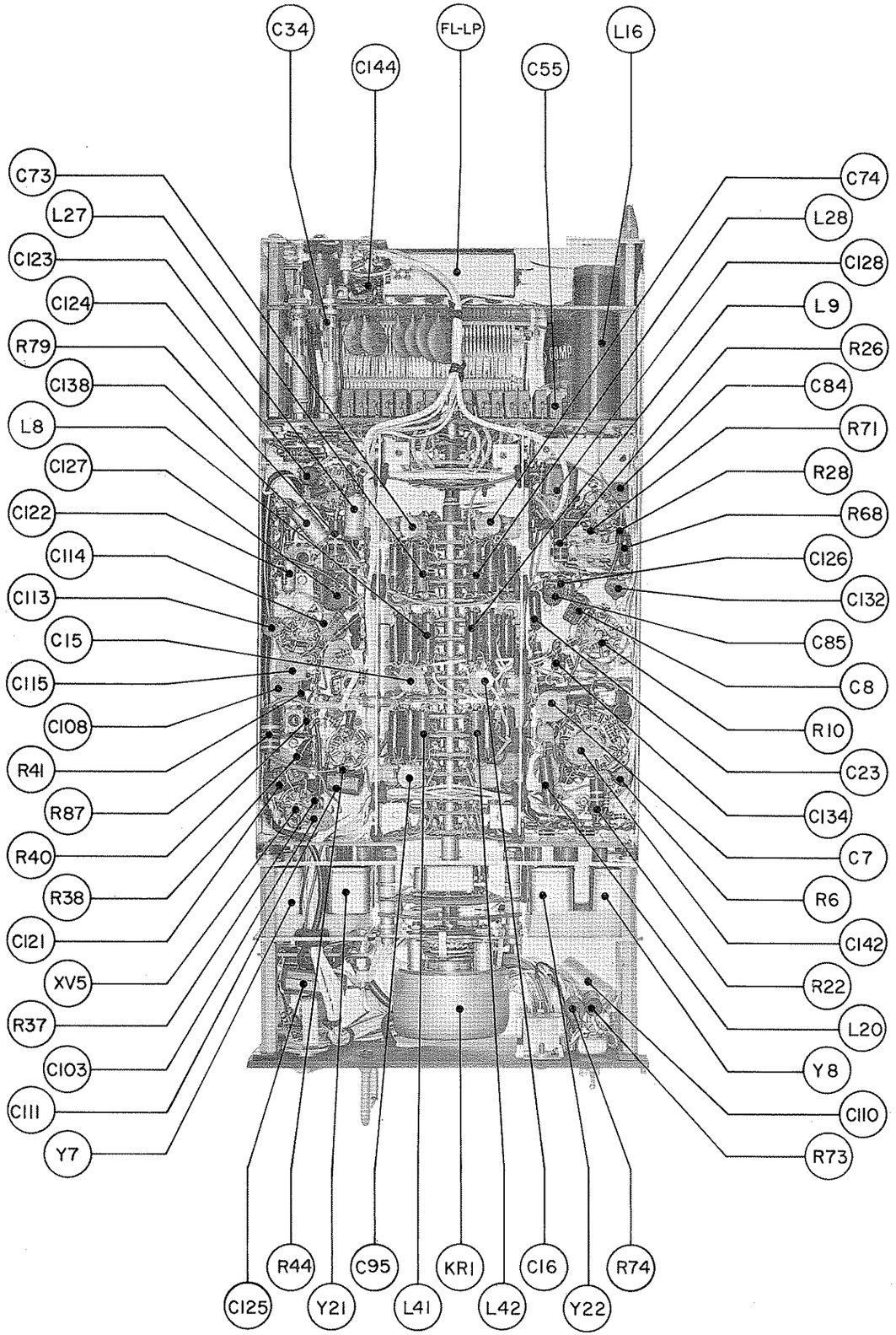
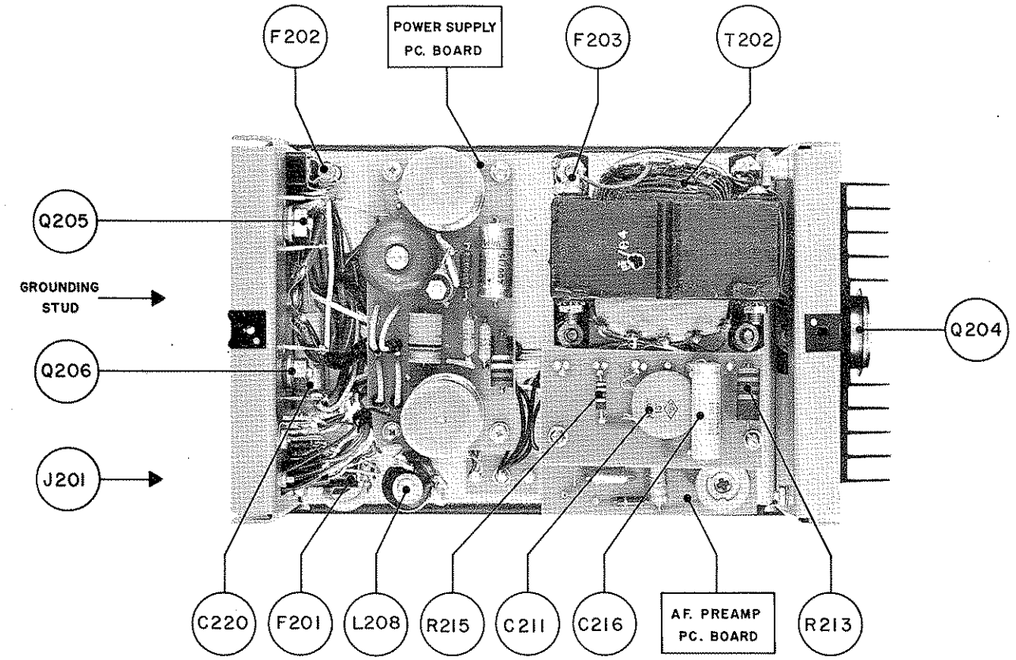


Fig. No. 6c SA-14 Bottom View Parts Callout



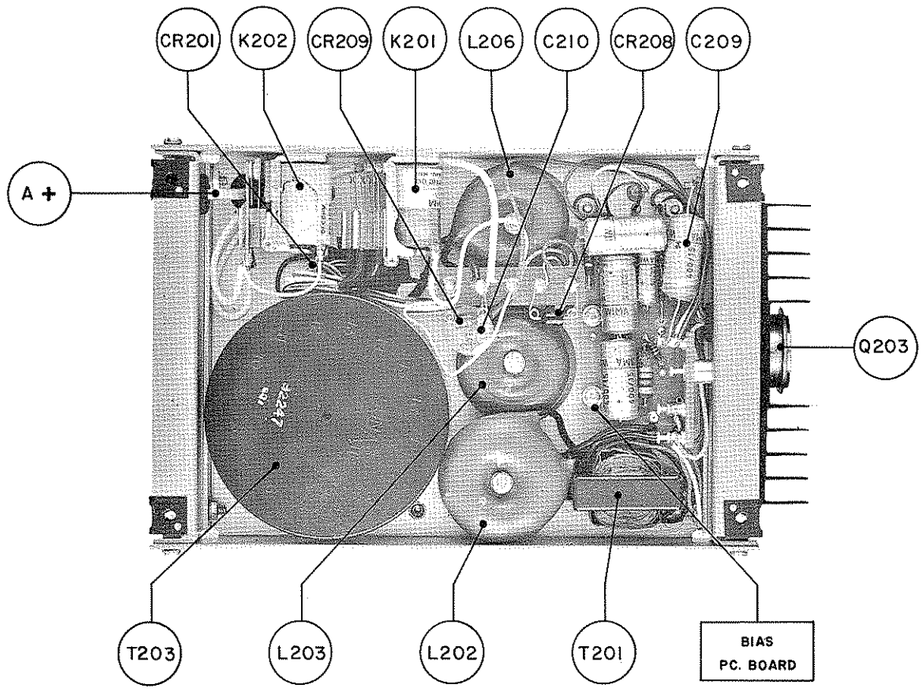
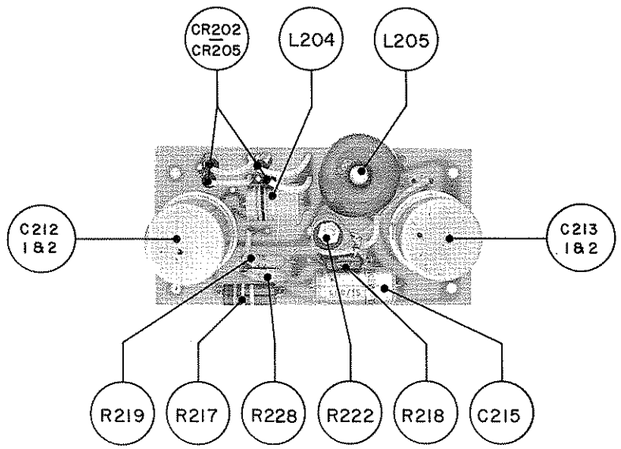
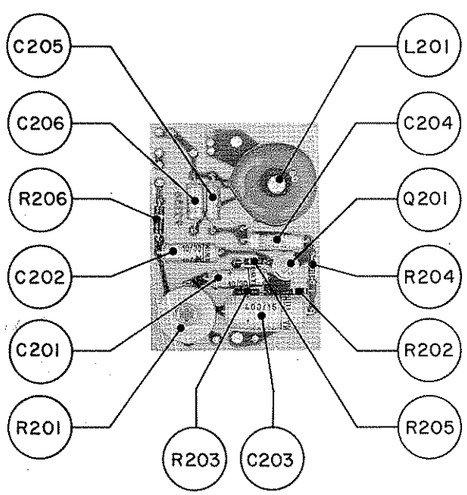


Fig. No. 7C
Modulator/Power Supply Top & Bottom Callout





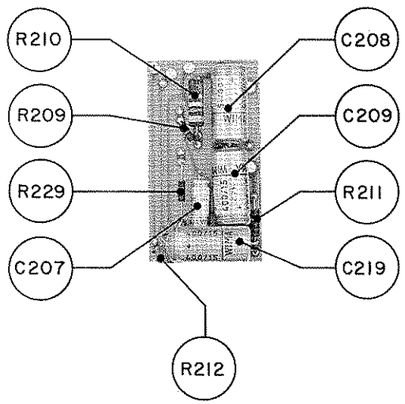


Fig. No. 8c
Modulator/ Power Supply, Module Parts Callout

752	N	DELETED R228 1K 5W	12-7-64
727	M	DELETED R227 CHANGED R 215 & 216	11-4-64
679	L	REVISED R207, R220, R221, R230, R228 & R229	10-1-64
669	K	SEE E.C.N. 668	5-26-64
654	J	ADDED C220 AND L208	4-16-64
642	I	SEE ECN. NO. 642	3-24-64
632	H	SEE ECN. NO. 632	3-24-64
598	G	SEE E.C.N. NO. 598	11-29-63
	F	REVISED & CHECKED BY	7-8-63
555	E	SEE E C N NO. 555	6-19-63
550	D	SEE E C N NO. 550	5-24-63
546	C	SEE E C N NO. 546	5-14-63
540	B	SEE ECN. NO. 540	4-4-63
522	A	ADDED CAP C218 & FILTER HASH	2-7-63
ECN.#	SYM	DESCRIPTION	DATE

REVISIONS

TITLE SCHEMATIC POWER SUPPLY AND MODULATOR

SUNAIR ELECTRONICS, INC.

DRAWN | APPROVED DATE 11-14-62

CHECKED | DWG. NO. 12962

28 VOLT COMPONENT CHART

CKT.SYM.	VALUE FOR 28V UNITS ONLY
R 206	820 OHM 1/2W
R 208	6800 OHM 1/4W
R 209	18 K 1/4W
R 210	100 OHM 3W
R 211	1K 3W
R 214	75 OHM 3W
R 218	1 K 3W
R 219	2 0 OHM 3W
R 220	75 OHM 3W
R 221	75 OHM 3W
CR 209	36V 10% 10W 1E36Z10
L 207	2 H
Q 203	2N174
Q 204	2N174
Q 205	2N174
Q 206	2N174
C 209	200 MF 30V
C 215	200 MF 30V
C 218	200 MF 30V
C 219	200 MF 30V

TRANSFORMER T203

MODEL	VOLTAGE	SUNAIR PART NO.
SA-14	14V	92247
SA-14	28V	92261

FUSE F201

MODEL	VOLTAGE	AMPERAGE
SA-14	14V	20 AMP
SA-14	28V	10 AMP

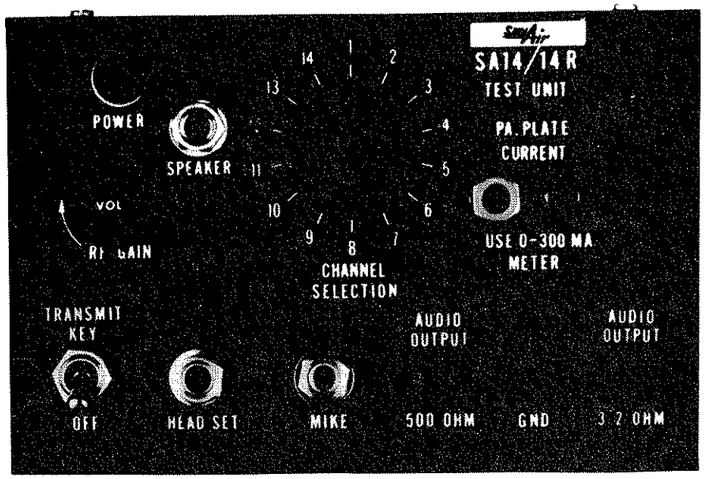
FIG. NO. 11c

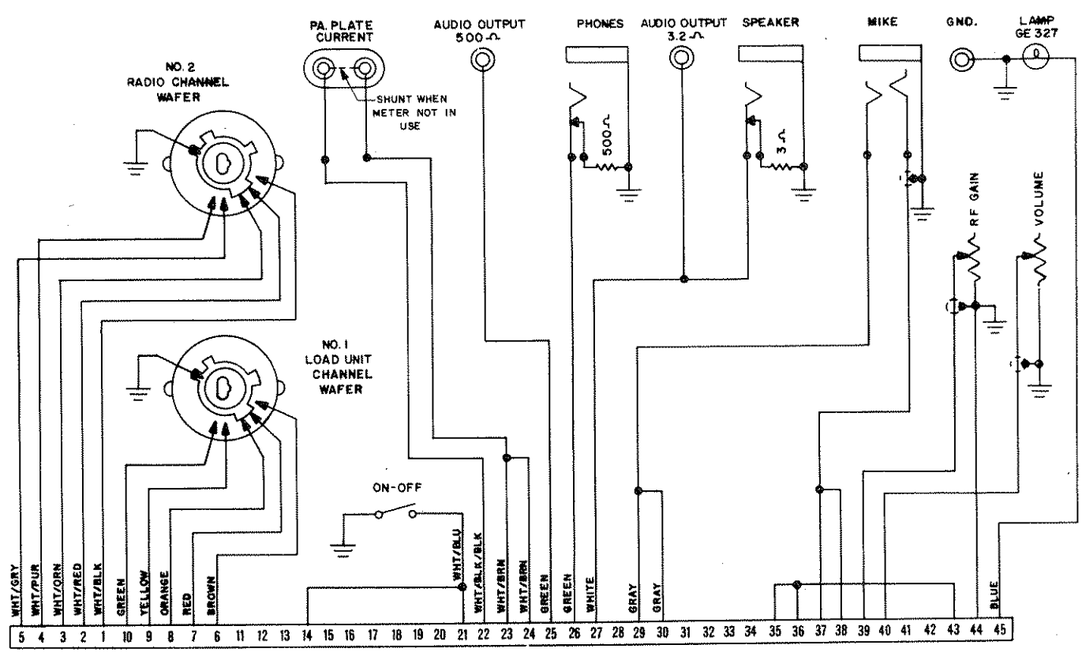
SCHEMATIC, MODULATOR / POWER SUPPLY

SAV-903 & SAV-904

20-0

SERIAL NO. 2300 UP





TEST SET SA 14/14R

FIGURE NO. 12C

TRANSCEIVER SA-14 and SA-14R

S.A. SPEC. 14-002/64

TEST PROCEDURES
FOR
H.F. TRANSCEIVERS
SA-14 and SA-14R

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SECTION D

TEST PROCEDURES

EQUIPMENT REQUIRED

Signal Generator, Radio Frequency:	Hewlett-Packard, Model 606A, or equivalent.
Signal Generator, Audio Frequency:	Hewlett-Packard, Model 200-C, or equivalent.
Vacuum Tube Voltmeter (Audio):	Hewlett-Packard, Model 400-H, or equivalent.
Vacuum Tube Voltmeter (DC):	Hewlett-Packard, Model 412-A, or equivalent.
Wattmeter (Thru-line):	50 ohm, Bird Electronic Corp., Model 43, or equivalent.
Antenna Load Resistor:	50 ohm 80 watt, Bird Electronic Corp., Model 81B, or equivalent.
RF Wattmeter:	100 watt, Bird Electronic Corp., Model 2-30 MC, or equivalent.
Distortion Analyzer:	Hewlett-Packard, Model 330C, or equivalent.
Oscilloscope:	Tektronix, Model 515A, or equivalent.
Frequency Counter:	Hewlett-Packard, Model 5245-L, or equivalent.
Test Set:	SunAir, Part No. 93629, or equivalent.
Phantom Microphone:	In accord with Sketch II, page 16-D
Linear Detector:	In accordance with standard circuit as required by RTCA/

Field Strength and Noise Intensity Meter:	Empire Devices, Model NF-105, or equivalent.
Power Supply:	Requlated, DC, 0 to 30 volts, 20 amp rating.
Shielded Enclosure:	Lindgren, or equivalent, 120 db minimum attenuation from 15 kc to 1000 mc.

Various cables, connectors and accessories as required.

DEFINITION OF TERMS

Primary Voltage: The system voltage, as measured at the input terminals for primary power on the modulator power supply unit, adjusted to:
13.00 volts for 14v systems
26.50 volts for 28v systems

Signal Generator Level: The RF voltage measured across the antenna terminals of the receiver. Signal generators indicating the EMF shall be adjusted so that the power match between the internal or source impedance and the load impedance is assured. Under this condition the EMF shall be adjusted to twice the signal level indicated in the following test procedures.

Standard Modulation: A modulation depth of 30% at 1000 cps.

Audio Output Voltages: RMS voltages or the equivalent power generated in the proper load impedances.

Signal Plus Noise-to Noise Ratio: The ratio of an audio power output with standard modulation divided by an audio power output without modulation, expressed in decibel.

Receiver Sensitivity: With the signal generator level producing a signal plus nois-to-noise ratio as specified and an audio output power of 300 milliwatts with standard signal modulation into a 3 ohm resistor terminating the speaker terminals.

Oscillator Frequency: The frequency produced at room temperature ambient ($20^{o}C$).

Receiver Gain: A signal level of 5 microvolts with standard modulation producing rated audio output into a 3 ohm non-inductive load.

Headphone Output:	A signal level of 5 microvolts with standard modulation producing rated audio output into a 500 ohm non-inductive load with the speaker output terminated into a 3 ohm load.
IF Rejection:	Is measured at the lowest nominal channel frequency available in the transceiver under test.
Image Rejection:	Is measured at the highest channel frequency available on the transceiver under test.
Distortion:	The total harmonic distortion present in either the receiver audio output under conditions as specified, or as envelope distortion present on the modulated transmitter carrier.
Transmitter Power Output:	The average unmodulated carrier output as measured with the specified test equipment when the primary voltage is adjusted to the prescribed values.
Output Frequency:	The carrier frequency when a 50 ohm load is connected to the transmitter output and the primary voltages are adjusted to the prescribed values. No. modulation shall be applied.
Sidetone:	The audio output level as measured across the headphone terminals, terminated with a 500 ohm non-inductive load when the transmitter is modulated at not less than 85% at 1000 cps.

TEST NO. 1 - RECEIVER OSCILLATOR FREQUENCY

The receiver oscillator frequency shall be within ± .005% of the assigned channel frequency plus 1500 kc for channel frequencies below 10,000 kc and channel frequency minus 1500 kc for channel frequencies above 10,000 kc.

Measurement Procedure

Adjust primary voltage to values as described above and allow 15 minutes warm-up time for transceiver under test. Connect capacitance pick-up device to frequency counter and apply pick-up to oscillator tube 6J11, V1. Adjust frequency counter to measure the applicable oscillator frequency. Record results on test data sheet.

Repeat test on each of the remaining channels. At room ambient temperature, 20°C, the receiver oscillator frequency on all channels shall be within ± .005% of the nominal oscillator frequency.

TEST NO. 2 - RECEIVER SENSITIVITY

The level of the input signal, with standard modulation applied, required to produce a signal plus noise-to-noise ratio of not less than 4 db shall not exceed 1 microvolt.

Measurement Procedure

Adjust primary voltage to the values described above and allow 15 minutes warm-up time for the transceiver under test. Remove all transmitter keying devices from the circuit. Connect the RF signal generator to the antenna terminal of the transceiver under test. Terminate speaker terminals with a 3 ohm, 10 watt resistor and headphone terminals with a 500 ohm, 2 watt noninductive resistor.

Connect the AF vacuum tube voltmeter across the 3 ohm load and set voltage range to 10 volts. Adjust signal generator to the nominal channel frequency and set signal level to 1 microvolt. Volume and RF gain control shall be set fully clockwise. Adjust signal generator frequency for maximum signal output; adjust volume control of the transceiver under test to produce a voltage of 1 volt across the 3 ohm speaker load. Remove the

modulation from the input signal; record the output voltage measured across the 3 ohm speaker load without modulation.

Repeat this test on each of the remaining channels. The audio output, without modulation, shall be less than .625 volts.

This test shall be performed within a shielded enclosure as specified above.

TEST NO. 3 - RECEIVER GAIN

An input signal of not more than 5 microvolts with standard modulation shall produce a receiver output which is not less than the manufacturer's rated output.

Measurement Procedure

Adjust the primary voltage to the values described above and allow 15 minutes warm-up time for the transceiver under test. Test equipment set-up shall be the same as described under Test No. 2. Adjust the RF signal generator output to 5 microvolts with standard modulation. Set the voltage range of the output metering device to 10 volts and adjust volume and RF gain control to a position fully clockwise. Adjust the frequency of the signal generator to the nominal channel frequency of the transceiver under test and begin the measurement with Channel No. 1. Measure the audio output voltage across the 3 ohm speaker termination and record results on the test data sheet.

Repeat the test on each of the remaining channels. The audio output voltage on all channels shall be not less than 4.25 volts.

NOTE: Test No. 3 can be performed most economically in conjunction with Test No. 2 by first completing Test No. 2 and then proceeding immediately to Test No. 3 before a change of the channel frequency is performed.

TEST NO. 4 - HEADPHONE OUTPUT

The headphone output level shall not be less than 100 milliwatts into a 500 ohm, 2 watt non-inductive load connected across the headphone output terminals at a signal level of 5 microvolts with standard modulation. The 3 ohm termination of the speaker output terminals shall remain in the circuit.

Measurement Procedure

The measurement set-up and procedure is identical to the measurement procedures for Tests No. 2 and 3, except that the AF vacuum tube voltmeter is connected across the headphone termination. Adjust the frequency of the signal generator to the nominal channel frequency, beginning with Channel No. 1, and set the signal output level to 5 microvolts with standard modulation. Record the output voltage as indicated by the AF vacuum tube voltmeter connected across the headphone termination.

Repeat this test on all of the remaining channels.

NOTE: Test No. 4 can be performed most economically in conjunction with Tests No. 2 and 3 by measuring the output voltage across the headphone termination before changing the channel frequency.

TEST NO. 5 - RECEIVER SELECTIVITY

A. Over the frequency range from not less than +3 kc to -3 kc of the center frequency and not more than +4.5 kc to -4.5 kc, the level of an input signal required to produce specified output shall not vary more than 6 db.

B. At frequencies not less than 15 kc and not more than 21 kc from the center frequency, the level of an input signal required to produce specified output shall be at least 60 db greater than the input required to produce specified output at the frequency of maximum response.

Measurement Procedure

Adjust primary voltage to the values described above and allow 15 minutes warm-up time for the transceiver under test. Connect the RF signal generator to the antenna terminal of the transceiver. Remove all keying devices from the circuit. Select a channel between 4 and 8 MC nominal channel

frequency and adjust the frequency of the signal generator to the frequency of the channels selected. Set the signal level of the signal generator to 1 microvolt with standard modulation and vary the frequency of the signal generator to a setting where maximum output is indicated by the output measuring device across the 3 ohm speaker termination. This is the nominal center frequency.

Record the audio output voltage as the center frequency output on the data sheet. Double the amplitude of the RF signal level and vary the frequency of the RF signal generator towards higher frequencies and record the frequency at which the center frequency output is obtained.

Decrease the frequency of the RF signal generator and record the frequency at which center frequency output is obtained. These frequencies shall be at least equal to the center frequency plus 3 kc and center frequency minus 3 kc and not more than center frequency plus 4.5 kc, respectively center frequency ninus 4.5 kc.

Adjust the signal level to 1000 times the 1 microvolt reference signal. Vary the signal generator frequency towards the higher and lower directions. Record the frequencies at which reference center frequency output is obtained. These frequencies shall not be greater than center frequencies $\pm$ 21 kc.

NOTE: This test shall be performed within a shielded enclosure as specified above.

TEST NO. 6 - AGC PERFORMANCE

Between the limits of 10 microvolt and 100,000 microvolt signal level with standard modulation, the audio output shall not vary more than 6 db.

Measurement Procedure

Adjust primary voltage to the values described above and allow 15 minutes warm-up time for the transceiver under test. Measurement equipment set-up is identical to Test No. 1. Set the transceiver under test to Channel No. 1 and adjust the frequency of the signal generator to the channel frequency. Adjust the signal level of the signal generator to 10 microvolts with standard

modulation. Adjust the volume control of the transceiver under test to obtain 4.25 volts as indicated by the output metering device and set RF gain control fully clockwise. Increase the signal level to 100,000 microvolts and record the audio output voltage on the test data sheet and express the ratio of the audio output at 100,000 microvolts to the audio output as obtained with 10 microvolt signal level in decibels.

The output at any input from 10 microvolts to 100,000 microvolts should not change by more than 6 db.

TEST NO. 7 - VOLUME CONTROL RANGE

With an input signal level of 100,000 microvolts with standard modulation, the volume control shall vary the output by not less than 40 db below rated output.

Measurement Procedure

Adjust primary voltage to the values as described above and allow 15 minutes warm-up time for the transceiver under test. Measurement equipment set-up is identical to Test No. 1. Adjust signal level of the signal generator to 100,000 microbolts with standard modulation and set the volume control of the transceiver under test to obtain 4.25 volts as indicated by the output metering device across the 3 ohm load. Adjust the volume control fully counter-clockwise and measure the audio output voltage.

The audio output voltage as indicated by the output metering device across the 3 ohm load shall be not more than .425 volts when the volume control is fully counter-clockwise.

TEST NO. 8 - RF GAIN CONTROL RANGE

With an input signal level of 100,000 microvolts with standard modulation, the RF gain control shall vary the audio output level by at least 40 db below rated output.

Measurement Procedure

Adjust primary voltage to the levels as described above and allow 15 minutes warm-up time for the transceiver under test. Measuring equip-

ment set-up is identical to Test No. 1. Set transceiver under test to Channel No. 1 and adjust signal generator to the nominal channel frequency with a signal level of 100,000 microvolts with standard modulation. Adjust volume control of transceiver under test to obtain 4.25 volts output voltage as indicated by the output metering device across the 3 ohm load with RF gain control set fully clockwise. Turn the RF gain control fully counter-clockwise while the volume control remains fully clockwise.

The audio output voltage with the RF gain control fully counter-clockwise shall not be more than .425 volts.

TEST NO. 9 - IF AND IMAGE REJECTION

The IF rejection, as measured on the lowest nominal channel frequency available on the transceiver under test, shall not be less than 60 db and the image rejection, as measured on the channel with the highest available nominal channel frequency, shall not be less than 40 db.

Measurement Procedure

Adjust the primary voltage to the values as described above and allow 15 minutes warm-up time for the transceiver under test. Measuring equipment set up is identical to Test No. 1.

A) Set the transceiver under test to the lowest channel frequency available and adjust signal generator level to 1 microvolt with standard modulation. After signal generator frequency has been set to obtain maximum output as indicated by the output metering device connected across the 3 ohm load, adjust audio output voltage to 1 volt with the volume control, while keeping the RF gain control fully clockwise. Set signal generator frequency to 1500 kc and increase signal generator level until an output voltage of 1 volt is indicated by the output metering device. The increase in signal generator level shall be not less than 60 db to obtain specified output.

B) Set the transceiver under test to the highest available channel frequency and adjust signal generator to this frequency with a signal level of 1 microvolt and standard modulation. Adjust the volume control to obtain 1 volt as indicated by the output metering device across the 3 ohm load, while keeping the RF gain control fully clockwise. On channel frequencies below 10,000 kc then adjust the signal generator frequency to a frequency exactly

1,500 kc above the nominal channel frequency, and for channel frequencies above 10,000 kc adjust the signal generator frequency to a frequency exactly 1,500 kc below the nominal channel frequency. Increase the signal generator signal level until the output metering device indicated an audio output voltage of 1 volt.

The increase in signal generator level to obtain specified output shall not be less than 40 db.

TEST NO. 10 - DISTORTION

The combined noise and harmonic distortion in the receiver output signals shall not exceed 20% at rated power output when the receiver input signal is modulated 85% and the signal level is varied over the range from 10 to 100,000 microvolts. This requirement shall be met over the modulation frequency range from 350 to 2,500 cps.

Measurement Procedure

Adjust the primary voltage to the level as described above and allow 15 minutes warm-up time for the transceiver under test. Connect a distortion analyzer across the 3 ohm termination in parallel with the audio output metering device. Set the signal generator modulation switch to external and connect an audio signal generator to the external modulation terminal of the signal generator. Set the audio signal generator to 350 cps and adjust the modulation level to 85%. Set the signal generator level to 10 microvolts. This test may be performed at any channel frequency. Adjust the signal generator frequency to the nominal channel frequency and adjust the RF gain and volume control for an audio output voltage of 4.25 volts as indicated by the output metering device across the 3 ohm load. Measure and record the total harmonic distortion. Repeat the test at a signal generator level of 100,000 microvolts, modulated 85% with 350 cps. Adjust RF gain and volume control for an audio output voltage of 4.25 volts as indicated by the output metering device connected across the 3 ohm load. Measure and record the total harmonic distortion.

Repeat these tests at 1,000 and 2,500 cps modulation frequency.

The total harmonic distortion at rated audio output shall not exceed 20%.

TEST NO. 11 - CHANNELING PERFORMANCE

The channeling selector shall operate properly within a primary voltage range varied from 11 to 15 volts, respectively, from 22 to 30 volts primary voltage as measured at the input terminals of the modulator/power supply unit.

Measurement Procedure

Adjust primary voltage to 11 volts for 14 volt units and 22 volts for 28 volt units. Operate the channeling selector located on the remote control unit. Channel the unit so as to increase the channel numbers and decrease the channel numbers. This should take place without any indication of malfunction. Repeat the test by adjusting the primary voltage to 15 volts for 14 volt units and to 30 volts for 28 volt units. Operate the channeling in the same manner.

Record results on test data sheet.

TEST NO. 12 - ON-OFF SWITCH PERFORMANCE

The main On-Off relay shall operate with the primary voltage varied from 11 to 15 volts on the 14 volt units and from 22 to 30 volts for the 28 volt units.

Measurement Procedure

The main On-Off relay shall operate instantaneously at both the low and high voltage limit as indicated above.

TEST NO. 13 - TRANSMITTER RF POWER OUTPUT

The transmitter shall be capable of delivering an unmodulated radio frequency power equal to or greater than the manufacturer's rated carrier power output.

Measurement Procedure

Connect the wattmeter and 50 ohm load to the antenna terminal of the transceiver under test. Adjust the primary voltage to 13 volts for 14 volt units and 26.5 volts for 28 volt units as measured at the input terminals of the modulator/power supply unit. Key the transmitter and record the output as indicated on the wattmeter. Repeat the test on all remaining channels.

TEST NO. 14 - TRANSMITTER CARRIER FREQUENCY

The frequency of the unmodulated RF carrier shall be within ± .005% of the assigned channel frequency.

Measurement Procedure

Adjust the primary voltage to 13 volts for 14 volt units and 26.5 volts for 28 volt units as measured on the input terminals of the modulator/power supply unit. Connect the wattmeter and load to the antenna terminal of the transceiver under test and couple the electronic frequency counter to the transmitter output. Key the transmitter and record the carrier frequency as indicated by the electronic frequency counter. This test shall take place at room ambient temperature and shall be repeated on all remaining channels.

NOTE: This test can be most economically performed in conjunction with Test No. 13.

TEST NO. 15 - MODULATION CAPABILITY

The transmitter output carrier shall be capble of being amplitude modulated not less than 85% by an audio frequency input signal of 1,000 cps over the audio input voltage range for which the transmitter is designed.

Measurement Procedure

Connect the phantom microphone to the modulator, while the remaining test equipment set-up is equivalent to Test No. 13. Adjust the primary voltage to 13 volts for 14 volt units or to 26.5 volts for 28 volt units. The adjustment of the primary voltage shall be repeated when the transmitter is keyed and the modulation is applied. Adjust the audio signal generator to 1,000 cps and set the audio signal level as measured on the phantom microphone to .30 volts. The determination of the depths of modulation can be performed by the method of oscilloscopic display of the carrier envelope or by calculating the depth of modulation from the RF carrier output with or without modulation applied.

The depth of madulation shall not be less than 85% at a modulation frequency of 1,000 cps.

TEST NO. 16 - CARRIER ENVELOPE DISTORTION

The combined distortion and noise of the demodulated output of the transmitter shall not exceed 20% of the total demodulated output at the modulation frequencies of 350, 1,000 and 2,500 cps. when the level of the audio input to the transmitter is held constant at the value producing at least 85% modulation at 1,000 cps.

Measurement Procedure

Select Channel No. 1. Adjust the primary voltage to 13 volts for 14 volt units and 26.5 volts for 28 volt units. Connect the phantom micrpohone to the modulator and connect the audio signal generator to the phantom microphone. The remaining measuring equipment set up is identical to Test No. 13. Adjust the signal level of the audio generator to .30 volts at 1,000 cps. Connect the linear detector into the 50 ohm coax cable from the transmitter to the 50 ohm load, and connect the output of the detector to the input terminals of the

distortion analyzer. Key the transmitter, determine depth of modulation and measure and record the distortion as indicated by the distortion analyzer.

While keeping the audio frequency generator signal level constant at .30 volts, adjust the frequency to 350 cps and measure and record the distortion of the detected transmitter at this modulation frequency. Then adjust the frequency to 2,500 cps and repeat the measurement.

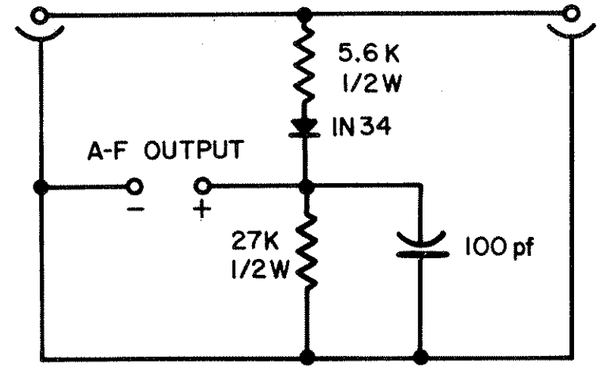
Repeat this test on one channel in the mid-frequency range and at the highest available channel frequency.

TEST NO. 17 - SIDETONE LEVEL

The sidetone level as measured across the headphone termination shall not be less than the manufacturer's rated value when the transmitter is modulated 85% at a modulation frequency of 1,000 cps.

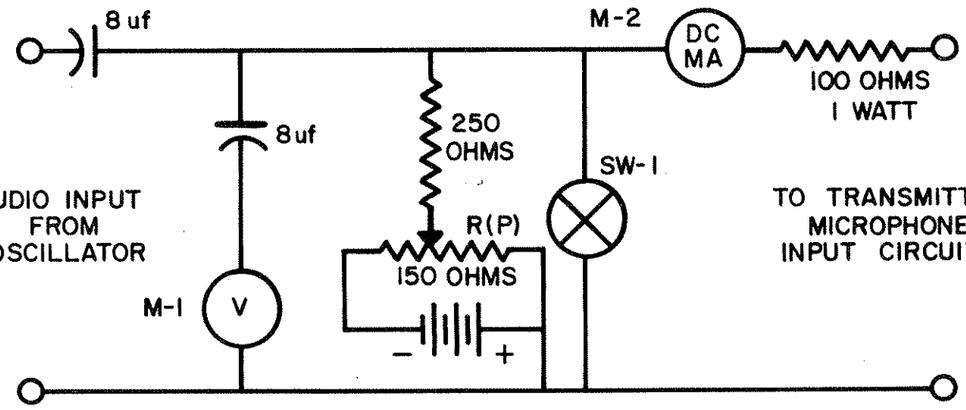
Measurement Procedure

Adjust the primary voltage to 13 volts for 14 volt units and 26.5 volts for 28 volt units. Select Channel No. 1 on the transceiver under test. Adjust the audio signal generator level at the phantom microphone input to .30 volts at 1,000 cps. Terminate the transmitter with a 50 ohm load. Measure and record the audio voltage as indicated by the output metering device across the 500 ohm load on the headphone terminals.



Sketch No. 1

CIRCUIT DIAGRAM OF LINEAR DETECTOR



Sketch No. 2

CIRCUIT DIAGRAM OF PHANTOM MICROPHONE

M-1: Weston Model 695 (or equal) M-2: Weston Model 301 (or equal)

Adjust resistor R(P) to give same reading on milliammeter M-2 with SW-1 open as when closed. (NOTE: When SW-1 is closed, M-2 measures the DC microphone current supplied by the transmitter. SW-1 must be open when conducting the tests.) The audio frequency input voltage to the transmitter is measured by voltmeter M-1.

SECTION E

PARTS LIST

SA-14 PANEL MOUNT TRANSCEIVER AND ACCESSORIES SUPPLIED

	Part Number	Unit List Price
SA-14 panel mount transceiver, complete with crystals, tubes and dust cover	92091	
SAV 903, 14 volt, modulator/power supply, complete with cover and boase plate (see page 3-E for shockmounts)	92584	375.00
SAV 904, 28 volt, modulator/power supply, complete with cover and base plate (see page 3-E for shockmounts)	92596	375.00
2, each, mating connectors with hoods and locks. Winchester MRE-14P-GH-VL (mates J1 on SA-14 and J201 on SAV 903 and SAV 904)	74427	4.50
1, each, mating connector. Amphenol BNC UG-88/U (mates J2 on SA-14)	74403	1.30
RF inverter	90861	34.50
2, each, mating connectors and adapters. Amphenol 83-1SP plug and 83-185 adapter for use with RG-58 coax cable (mates J1 and J2 on RF inverter)	90873	1.50
RF meter	90859	38.50

Optional Accessories

RF inverter, complete with 2, each, mating connectors, part No. 74403 (Amphenol BNC UG-88/U) and 1, each mating connector with hood and lock, part No. 74465 (Winchester M4P-LSH10)	93136	75.00
RF wattmeter	86080	45.00

Toggle switch, switch to select forward or reflected power readings (used with RF wattmeter, part No. 86080)	32388	8.80
RF switch inverter SWRD-1	91396	34.50

SA-14R REMOTE MOUNT TRANSCEIVER AND ACCESSORIES SUPPLIED

SA-14R remote mount transceiver, complete with crystals, tubes and dust cover	94013	
SAV 903, 14 volt, modulator/power supply, complete with cover and base plate (see page 3-E for shockmounts)	92584	375.00
SAV 904, 28 volt, modulator/power supply, complete with cover and base plate (see page 3-E for shockmount)	92596	375.00
SCU-14-1, 14 volt, remote control unit, complete with on-off switch, volume control RF gain control, channel selector, forward-reflect selector switch	93253	
SCU-14-2, 28 volt, remote control unit, complete with on-off switch, volume control, RF gain control, channel selector, forward-reflect selector switch	94996	125.00
2, each, mating connectors, complete with hoods and locks. Winchester MRE-20S-GH-VL (mates P1 on SA-14R and J301 on control box	74506	9.20
1, each, mating connector, complete with hoods and locks. Winchester MRE 14P-GH-VL (mates J201 on SAV 903 or SAV 904)	74427	4.50
3, each, mating connectors. Amphenol BNC UG-88/U (1 mates J2 on SA-14R; 2 mate receptables on RF inverter, No. 93136)	74403	1.30
Shockmount for SA-14R	93344	25.50
SIV-1 RF inverter	93136	75.00

ACCESSORIES AVAILABLE BUT NOT SUPPLIED WITH TRANSCEIVER

Shockmounts for antenna coupler unit and modulator/power supply SAV 903 and SAV 904 (4, each, required per unit)	11827	3.45
Bench test unit with harness and plugs for testing both SA-14 and SA-14R	93629	168.00/ net
Speaker, 3.2 ohm, Cletron 1D1-750, or equivalent	84032	9.35
or		
Load resistor, 3 ohm 20w, used in place of speaker for loading of audio amplifier	16956	.95
RG-58A/U coax cable. Connects SA-14 Transceiver to antenna coupler and trail antenna (see pg. 13-B for estimating required length)	58813	.10/ft.

Fixed Antenna

H.F. bare wire fixed antenna kit	95146	18.00
H.F. encapsulated anti-precipitation static fixed antenna kit	95158	59.00
AC-14-14 antenna coupler unit, complete with channeling mating connector No. 74362 (Amohenol 165-10) and RF coax mating connector No. 90873 (Amphenol 83-1SP plug and 83-085 adapter). 14 volt	95445	350.00
AC-14-28 antenna coupler unit (includes connectors listed with AC-14-14). 28 volt.	95457	350.00

Trailing Antenna

ER-14 electric reel antenna kit. 14 volt.	96920	165.00
ER-28 electric reel antenna kit. 28 volt.	96932	125.00
MR-1 manual reel antenna kit	96918	49.50

Coax relay kit, complete with 3 ea. No. 90873 mating connectors. Amphenol 83-1SP plug and 83-185 adapter for use with RG-58 coax cable	10811	59.40
Coax relay kit, complete with 3 ea. No. 90873 mating connectors. Amphenol 83-1SP plug and 83-185 adapter for use with RG-58 coax cable	10823	59.40
DPDT toggle switch to operate coax relay	32118	4.05
Installation cabling for SA-14 panel mount		
Installation cabling for SA-14R remote		
Carbon microphone, 100 ohms, Electrovoice 205STCKKP, or equivalent	84006	54.75
Headset, 500 ohm, Murdock model P-23, or equivalent	84020	12.00
or		
Headset, 500 ohm, Telex cat. No. HTW-2, or equivalent	84018	17.50

TUBES, DIODES, LAMPS

Symbol	Description	Part No.	Unit List Price
V1	Tube, Type 6J11, 1/2 Transmitter oscillator, 1/2 Receiver oscillator	76499	3.30
V2	Tube, Type 8106, Driver	76358	2.70
V3	Tube, Type 7984, Power amplifier	76504	5.75
V4	Tube, Type 6BH6, RF amplifier	76372	2.05
V5	Tube, Type 6BH6, Mixer (SA-14)	76372	2.05
V5	Tube, Type 6DK6, Mixer (SA-14R)	76633	1.80
V6	Tube, Type 6BH6, IF amplifier	76372	2.05
V7	Tube, Type 6BH6, IF amplifier	76372	2.05
V8	Tube, Type 8102, Audio amplifier	76346	2.60
CR1	Diode, Type 1N461, Demodulator	40141	.70
CR2	Diode, Type 1N461, AGC delay	40141	.70
CR3	Diode, Type 1N461, Noise limiter	40141	.70
SA-14R Only			
CR4	Diode, Type CSD2648, Channeling noise gate	40127	1.05
CR5	Diode, Type 1N461, Channeling noise gate	40141	.70
CR6	Diode, Type 1N461, Channeling noise gate	40141	.70
CR7	Diode, Type 1N534, Arc suppressor	40165	1.15
SA-14 Only			
B1	Lamp, Type 330, 14 volt	84367	1.20
B1	Lamp, Type 327, 28 volt	84355	1.60
B2	Lamp, Type 330, 14 volt	84367	1.20
B2	Lamp, Type 327, 28 volt	84355	1.60
Models SCU-14-1 and SCU-14-2 Remote Control Units for SA-14R			
B1	Lamp, Type CM8-640 Red	86054	1.35
B2	Lamp, Type 330 (panel bulb, 14v units)	84367	1.20
B2	Lamp, Type 327 (panel bulb, 28v units)	84355	1.60

TRANSISTOR, DIODE AND FUSE COMPLEMENT
SAV 903 and SAV 904

Symbol	Description	Part No.	Unit List Price
Q201	Transistor, Type 2N1379, Audio amplifier	44056	2.95
Q202	Transistor, Type 2N669, Audio driver	44135	2.85
Q203	Transistor, Type 2N277, Audio amplifier or modulator - SAV 903	44147	7.80
Q203	Transistor, Type 2N174, Audio amplifier or modulator - SAV 904	44020	8.05
Q204	Transistor, Type 2N277, Audio amplifier or modulator - SAV 903	44147	7.80
Q204	Transistor, Type 2N174, Audio amplifier or modulator - SAV 904	44020	8.05
Q205	Transistor, Type 2N277, Power supply oscillator - SAV 903	44147	7.80
Q205	Transistor, Type 2N174, Power supply oscillator - SAV 904	44020	8.05
Q206	Transisitor, Type 2N277, Power supply oscillator - SAV 903	44147	7.80
Q206	Transisitor, Type 2N174, Power supply oscillator - SAV 904	44020	8.05
CR201	Diode, Type 1N461, Transient suppressor	40141	.70
CR202	Diode, Type CER73, Power supply rectifier	40103	4.50
CR203	Diode, Type CER73, Power supply rectifier	40103	4.50
CR204	Diode, Type CER73, Power supply rectifier	40103	4.50
CR205	Diode, Type CER73, Power supply rectifier	40103	4.50
CR208	Diode, Type 1N534, Reverse polarity protection	40165	1.15
CR209	Diode, Type 1E18Z, Transient suppressor - SAV 903	40191	3.90
CR209	Diode, Type 1E36Z, Transient suppressor - SAV 904	40244	4.75
F201	Fuse, Type 20A, A+ input - SAV 903	86030	.10
F201	Fuse, Type 10A, A+ input - SAV 904	84886	.10
F202	Fuse, Type .25A, Power supply rectifier	86078	.45
F203	Fuse, Type 5A, Modulation transformer	86107	.30

PARTS LIST SA-14 AND SA-14R

Circuit Symbol	Description	Part No.	Unit List Price
C1	Capacitor, Ceramic Disc 150 pf ±20% NPO 500v	24020	.25
C2	Capacitor, Ceramic Disc 32 pf ±10% NPO 500v	25878	.25
C3	Capacitor, Ceramic Disc 68 pf ±20%	25672	.25
C4	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C5	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C6	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C7	Capacitor, Ceramic Disc 68 pf ±20%	26572	.25
C8	Capacitor, Ceramic Disc.01 mf 400v	26303	.25
C9	Capacitor Variable, Ceramic 15-60 pf N1500	25268	1.35
C10	Same as C9		
C11	Same as C9		
C12	Same as C9		
C13	Same as C9		
C14	Same as C9		
C15	Same as C9		
C16	Same as C9		
C17	Same as C9		
C18	Same as C9		
C19	Same as C9		
C20	Same as C9		
C21	Same as C9		
C22	Same as C9		
C23	Capacitor, Metalized Paper .068 mf 400v	25696	.25
C24	Capacitor, Ceramic Disc 68 pf ±20%	25672	.25
C25	Capacitor, Ceramic Disc 1000 pf ±20% NPO 500v	25684	.25
C26	Capacitor, Ceramic Disc 1500 pf 3kv	24381	.25
C27	Capacitor, Ceramic Disc .01 mf 400v	26303	.25
C28	Capacitor, Ceramic Disc, Value as Reguired by Freq.		
C29	Same as C28		
C30	Same as C28		
C31	Same as C28		
C32	Same as C28		
C33	Same as C28		
C34	Same as C28		
C35	Same as C28		
C36	Same as C28		
C37	Same as C28		
C38	Same as C28		
C39	Same as C28		
C40	Same as C28		
C41	Same as C28		

PLEASE NOTE: C28 thru C41 describe the capacitors required in parallel with the variable capacitors shown on the schematic. The variable capacitors C28 thru C41 carry the following description:

"Capacitor, variable, glass
SunAir P/N 24850" $5.85

Symbol	Description	Part No.	Unit List Price
C42	Capacitor, Molded Mica, Value as Reguired by Freq.		
C43	Same as C42		
C44	Same as C42		
C45	Same as C42		
C46	Same as C42		
C47	Same as C42		
C48	Same as C42		
C49	Same as C42		
C50	Same as C42		
C51	Same as C42		
C52	Same as C42		
C53	Same as C42		
C54	Same as C42		
C55	Same as C42		
C56	Deleted		
C57	Capacitor, Ceramic Disc .01 mf 1.4 kv	24410	.35
C58	Deleted		
C59	Deleted		
C60	Capacitor, Ceramic Disc 150 pf ±20% NPO 500v	24020	.25
C61	Capacitor, Ceramic Disc 32 pf ±10% NPO 500v	25878	.25
C62	Capacitor, Ceramic Disc 68 pf ±20%	25672	.25
C63	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C64	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C65	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C66	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v (SA-14)	24422	.25
C66	Capacitor, Ceramic Disc 220 pf 500v (SA-14R)	25086	.25
C67	Capacitor, Variable Ceramic 9-35 pf N750	24795	1.35
C68	Same as C67		
C69	Same as C67		
C70	Same as C67		
C71	Same as C67		
C72	Same as C67		
C73	Same as C67		
C74	Same as C67		
C75	Same as C67		
C76	Same as C67		
C77	Same as C67		
C78	Same as C67		
C79	Same as C67		
C80	Same as C67		
C81	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C82	Capacitor, Mylar 0.1 mf .125v 10%	25141	.25

Symbol	Description	Part No.	Unit List Price
C83	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C84	Capacitor, Ceramic Disc .02 mf 150v	24458	.25
C85	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C86	Capacitor, Ceramic Disc 4.7 pf ±.25 pf, Type C, N33	25024	.25
C87	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C88	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v (SA-14 only)	24422	.25
C89	Capacitor, Variable Ceramic 9-35 pf N750	24795	1.35
C90	Same as C89		
C91	Same as C89		
C92	Same as C89		
C93	Same as C89		
C94	Same as C89		
C95	Same as C89		
C96	Same as C89		
C97	Same as C89		
C98	Same as C89		
C99	Same as C89		
C100	Same as C89		
C101	Same as C89		
C102	Same as C89		
C103	Capacitor, Ceramic Disc .02 mf 150v	24458	.85
C104	Capacitor, Ceramic Disc 1.0 pf ±.25 pf N33	24991	.25
C105	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C106	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C107	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C108	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C109	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C110	Capacitor, Ceramic Disc .02 mf 150v (SA-14)	24458	.85
C110	Capacitor, Electrolytic, 200 mf 30v (SA-14R)	25816	.35
C111	Capacitor, Metalized Paper .068 mf 400v	25696	.25
C112	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C113	Capacitor, Ceramic Disc .02 mf 150v	24458	.85
C114	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C115	Capacitor, Mylar .1 mf 125v (SA-14)	25141	.25
C115	Capacitor, Ceramic Disc .005 mf 500v (SA-14R)	25103	.25
C116	Capacitor, Ceramic Disc .005 mf 500v (SA-14)	25103	.25
C116	Capacitor, Ceramic Disc .01 mf 400v (SA-14R)	26303	.25
C117	Capacitor, Ceramic Disc 10 pf 500v (SA-14)	25048	.25
C117	Capacitor, Ceramic Disc 100 pf 500v (SA-14R)	25074	.25
C118	Capacitor, Ceramic Disc 3300 pf 500v (SA-14)	24422	.25
C118	Capcitor, Ceramic Disc 100 pf 500v (SA-14R)	25074	.25
C119	Capacitor, Mylar .1 mf 125v	25141	.25

Symbol	Description	Part No.	Unit List Price
C120	Capacitor, Ceramic Disc .02 mf 150v (SA-14)	24458	.85
C120	Capacitor, Ceramic Disc 500 pf 500v (SA-14R)	25098	.25
C121	Capacitor, Metalized Paper .1 mf 250v (SA-14R only)	25713	.25
C122	Capacitor, Mylar .1 mf 125v (SA-14)	25141	.25
C122	Capacitor, Mylar .047 mf 125v (SA-14R)	25189	.25
C123	Capacitor, Electrolytic 10 mf 30v (SA-14R only)	25153	.25
C124	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C125	Capacitor, Mylar .1 mf 125 v (SA-14)	25141	.25
C125	Capacitor, Metalized Paper 1 mf 250v (SA-14R)	25830	.55
C126	Capacitor, Metalized Paper .01 mf 400v	26303	.25
C127	Capacitor, Metalized Paper .47 mf 250v	25725	.35
C128	Capacitor, Metalized Paper .47 mf 250v	25725	.35
C129	Capacitor, Ceramic Disc 3300 pf ±20% X5U 500v	24422	.25
C130	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C131	Capacitor, Feedthru 1000 pf	25866	.25
C132	Capacitor, Ceramic Disc .02 mf 150v	24458	.85
C133	Capacitor, Ceramic Disc .02 mf 150v	24458	.85
C134	Capacitor, Metalized Paper .01 mf 400v	26303	.25
C135	Capacitor, Metalized Paper .01 mf 400v (SA-14)	26303	.25
C135	Capacitor, Metalized Paper .47 mf 250v (SA-14R)	25725	.35
C136	Capacitor, Electrolytic 200 mf 30v (SA-14R)	25816	.35
C136	Capacitor, Ceramic Disc .005 mf 500v (SA-14)	25103	.25
C137	Capacitor, Ceramic Disc 2.2 pf 500v (SA-14)	25000	.25
C138	Capacitor, Electrolytic 10 mf 30v (SA-14R)	25153	.25
C139	Capacitor, Electrolytic 10 mf 30v (SA-14R)	25153	.25
C140	Capacitor, Electrolytic 200 mf 30v (SA-14R)	25816	.35
C141	Capacitor, Ceramic Disc .005 mf 500v	25103	.25
C142	Capacitor, Ceramic Disc .005 mf 500v (SA-14R)	25103	.25
C143	Capacitor, Ceramic Disc NPO 10 pf 3kv	25969	.25
C144	Capacitor, Dipped Silver Mica 200 pf	25804	.35
R1	Resistor, Comp. 47k ±10% .25w	17106	.10
R2	Resistor, Comp. 47k ±10% .25w	17106	.10
R3	Resistor, Comp. 10k ±10% 1w	17417	.15
R4	Resistor, Comp. 100k ±10% .25w	17039	.10
R5	Resistor, Comp. 1k ±10% .25w	17156	.10
R6	Resistor, Comp. 470 ±10% .25w	17261	.10
R7	Resistor, Comp. 1k ±10% .25w	17156	.10
R8	Resistor, Comp. 1.5k ±10% .25w	17247	.10
R9	Resistor, Comp. 22k ohm ±10% .25w	17223	.10
R10	Resistor, Comp. 47k ±10% .25w	17106	.10
R11	Resistor, Comp. 56 ±10% .25w	17429	.10
R12	Resistor, Comp. 1k ±10% .5w	16748	.10

Symbol	Description	Part No.	Unit List Price
R13	Resistor, Comp. 27k ±10% 1w	17431	.15
R14	Resistor WW 10 ±10% 3w	16322	.75
R15	Resistor, WW 33k ±10% 10w	18112	1.50
R16	Resistor, WW 10 ±10% 3w	16322	.75
R17	Resistor, WW 100 ±10% 5w	17443	.65
R18	Resitor, Comp. 47k ±10% .25w	17106	.10
R19	Resistor, Comp.470 ±10% .25w	17261	.10
R20	Resistor, Comp. 1k ±10% .25w	17156	.10
R21	Resistor, Comp. 100k ±10% .25w	17039	.10
R22	Resistor, Comp. 10k ±10%1w	17417	.15
R23	Resistor, Comp. 47k ±10% .25w	17106	.10
R24	Resistor, Comp. 1k ±10% .25w	17156	.10
R25	Resistor, Comp. 220 ohm ±10% .25w	17132	.10
R26	Resistor, 27k .25w (SA-14)	17120	.10
R26	Resistor, 68k 1w (SA-14R)	17900	.15
R27	Deleted		
R28	Resistor, Comp. 1k ±10% .5w	16748	.10
R29	Resistor, 68k .25w (SA-14 only)	17352	.10
R30	Resistor, Comp. 1k ±10% .25w	17156	.10
R31	Resistor, 27k 1w	17431	.15
R32	Resistor, 270k .25w (SA-14)	17211	.10
R32	Resistor, 1M .25w (SA-14R)	17065	.10
R33	Resistor, 270k .25w (SA-14 only)	17211	.10
R34	Resistor, 330k .25w (SA-14 only)	17467	.15
R35	Resistor, Comp. 47k ±10% .25w	17106	.10
R36	Resistor, Comp. 47k ±10% .25w	17106	.10
R37	Resistor, Comp. 1k ±10% .25w	17156	.10
R38	Resistor, 100k .25w (SA-14)	17039	.10
R38	Resistor, 470k .25w (SA-14R)	18057	.10
R39	Resistor, Comp. 1k ±10% .25w	17156	.10
R40	Resistor, Comp. 1k ±10% .25w	17156	.10
R41	Resistor, 270k .25w	17211	.10
R42	Resistor, 330k .25w (SA-14 only)	17467	.15
R43	Select Value 270 ohms .25w to 1k ohm .25w		
	270 ohm	17845	.15
	390 ohm	17833	.15
	470 ohm	17261	.10
	680 ohm	17663	.10
	820 ohm	17821	.10
	1k ohm	17156	.10
R44	Resistor, Comp. 100k ±10% .25w	17039	.10
R45	Resistor, Comp. 1k ±10% .25w	17156	.10
R46	Resistor, Comp. 1k ±10% .25w	17156	.10
R47	Resistor, Comp. 1k ±10% .25w	17156	.10
R48	Resistor, Comp. 22k ohm ±10% .25w	17223	.10
R49	Resistor, 1M .25w (SA-14)	17065	.10

Symbol	Description	Part No.	Unit List Price
R49	Resistor, 100k .25w (SA-14R)	17039	.10
R50	Deleted		
R51	Deleted		
R52	Resistor, 100k ohm Pot (SA-14 only)	32596	3.15
R53	Resistor, 1000 ohm Pot. (SA-14 only)	32728	.75
R54	Resistor, 47k .25w (SA-14)	17106	.10
R54	Resistor, 82k .25w (SA-14R)	17168	.10
R55	Resistor, 100k .25w (SA-14)	17039	.10
R55	Resistor, 330k .25w (SA-14R)	17467	.15
R56	Deleted		
R57	Resistor, 270k .25w (SA-14)	17211	.10
R57	Resistor, 1M.25w (SA-14R)	17065	.10
R58	Resistor, 100k .25w (SA-14)	17039	.10
R58	Resistor, 1M .25w (SA-14R)	17065	.10
R59	Resistor, 1M .25w (SA-14)	17065	.10
R59	Resistor, 470k .25w (SA-14R)	18057	.10
R60	Resistor,100k ohm Pot. Audio Taper (SA-14)	32596	3.15
R60	Resistor, 10k .25w (SA-14R)	17041	.10
R61	Resistor, 15k .25w (SA-14)	17235	.10
R61	Resistor, 22M .25w (SA-14R)	18095	.10
R62	Resistor, Comp. 1.5k ±10% .25w	17247	.10
R63	Resistor, 1M .25w (SA-14R only)	17065	.10
R64	Resistor, Comp. 1.2 meg. ohm ±10% .25w	17493	.15
R65	Resistor, Comp. 47k ±10% .25w	17106	.10
R66	Resistor, Comp. 1.5k ±10% .25w	17247	.10
R67	Resistor, Comp. 3.3k ohm ±10% .25w	17089	.10
R68	Resistor, WW 30 ohm ±10% .25w	17546	.75
R69	Resistor, 75 ohm, 3w	16944	.85
R70	Resistor, 10M .25w	17584	.15
R71	Resistor, 68k .25w (SA-14)	17352	.10
R71	Resistor, 10k .25w (SA-14R)	17041	.10
R72	Resistor, 1 ohm 10w (SA-14R only)	16968	.15
SA-14R Only			
R73	Resistor, 65k 5w	17455	.95
R74	Resistor, 300 ohm 5w	16114	.50
R75	Resistor, 1 ohm 1w	17027	.45
R76	Resistor, 1 ohm 10w	16968	.15
R77	Resistor, 1 ohm 10w	16968	.15
R78	Resistor, 4.7M .25w	18239	.25
R79	Resistor, 100k 1w	17948	.90
R80	Resistor, 15k .5w	16607	.10
R81	Resistor, 10k .5w	16724	.10
R82	Resistor, 680 ohm .5w	16750	.10
R83	Resistor, 10k .5w	16724	.10

Symbol	Description	Part No.	Unit List Price
SA-14R Only			
R84	Resistor, 10k .5w	16724	.10
R85	Resistor, 22k .5w	17053	.10
R86	Resistor, 1.5k .5w	17730	.15
R87	Resistor, 47k 2w	16346	.80
L1	Inductor Fixed 6.8 UH ±20%	63569	.50
L2	Inductor Fixed 1.1 UH to 120 UH as required by channel frequency		
L3	Same as L2		
L4	Same as L2		
L5	Same as L2		
L6	Same as L2		
L7	Same as L2		
L8	Same as L2		
L9	Same as L2		
L10	Same as L2		
L11	Same as L2		
L12	Same as L2		
L13	Same as L2		
L14	Same as L2		
L15	Same as L2		
L16	Inductor Fixed 190 UH	94829	2.55
L17	Inductor Fixed	96607	8.50
L18	Deleted		
L19	Deleted		
L20	Inductor Fixed 6.8 UH ±20%	63569	.50
L21	Inductor Fixed 1.1 UH to 120 UH as required by channel frequency		
L22	Same as L21		
L23	Same as L21		
L24	Same as L21		
L25	Same as L21		
L26	Same as L21		
L27	Same as L21		
L28	Same as L21		
L29	Same as L21		
L30	Same as L21		
L31	Same as L21		
L32	Same as L21		
L33	Same as L21		
L34	Same as L21		
L35	Same as L21		

Symbol	Description	Part No.	Unit List Price
L36	Same as L21		
L37	Same as L21		
L38	Same as L21		
L39	Same as L21		
L40	Same as L21		
L41	Same as L21		
L42	Same as L21		
L43	Same as L21		
L44	Same as L21		
L45	Same as L21		
L46	Same as L21		
L47	Same as L21		
L48	Same as L21		
L49	Coil Assy. IF Trap	95031	3.75
SW4	Switch Slide DPDT, 125v DC 3A	32534	2.35
KR-1	Rotary Solenoid (SA-14R only)	32974	48.35
K-1	Relay Antenna 14v SPDT	66286	8.00
T-1	Transformer IF	48844	3.60
T-2	Transformer IF	48844	3.60
T-3	Transformer IF	48844	3.60
FL-LP	Low Pass Filter	94790	5.60
Y-1 Thru Y-14	Crystal, Tranmitter CR-18/U	80036	10.00
Y-15 Thru Y-23	Crystal, Receiver CR-18/U	80036	10.00

Symbol	Description	Part No.	Unit List Price
J-1	14 Pole Receptacle, Chassis, Female (SA-14 only)	74415	4.20
J-1	20 Pole Receptacle, Chassis, Male (SA-14R only)	74491	4.50
P-1	14 Pole Plug, Cable, Male (SA-14 only)	74427	4.50
P-1	20 Pole Plug. Cable, Female (SA-14R only)	74506	9.20
J-2	BNC Antenna Receptacle UG1094/U	74374	1.30
P-2	BNC Antenna Plug UG-88/U	74453	1.25
J-3	Jack, Speaker (SA-14R only)	84044	.45
J-4	Jack, Headphone (SA-14R only)	84044	.45
J-5	Jack, Mike (SA-14R only)	84056	.90
	Socket, Tube 7 pin	76437	.25
	Socket, Tube 9 pin	76449	.25
	Socket, Tube 12 pin	76451	.25
	Base, Tube Shield 7 pin	76413	.10
	Base, Tube Shield 9 pin	76425	.10
	Shield, Tube 7 pin	76396	.10
	Shield, Tube 9 pin	76401	.15

MODULATOR/POWER SUPPLY

MODELS SAV 903, SAV 904

Circuit Symbol	Description	Part No.	Unit List Price
C201	Capacitor, 10 mf 30v	25153	.25
C202	Capacitor, 10 mf 30v	25153	.25
C203	Capacitor, 400 mf 15v	25165	.35
C204	Capacitor, 10 mf 30v	25153	.25
C205	Capacitor, .001 mf 400v	25177	.25
C206	Capacitor, .047 mf 125v	25189	.25
C207	Capcitor, 10 mf 30v	25153	.25
C208	Capacitor, 400 mf 15v	25165	.35
C209	Capacitor, 400 mf 15v (14v units)	25165	.35
C209	Capacitor, 200 mf 30v (29v units)	25816	.35
C210	Capacitor, .05 mf 75v	24393	.50
C211	Capacitor, .01 mf 1.4kv	24410	.35
C212-1	Capacitor, Dual 8 mf - 8 mf 500v	25191	1.65
C212-2	Capacitor, Dual 8mf - 8 mf 500v	25191	1.65
C213-1	Capacitor, Dual 8 mf - 8 mf 500v	25191	1.65
C213-2	Capacitor, Dual 8 mf - 8 mf 500v	25191	1.65
C214	Deleted		
C215	Capacitor, 400 mf 15v (14v units)	25165	.35
C215	Capacitor, 200 mf 30v (28v units)	25816	.35
C216	Capacitor, 47 mf 50v	26781	10.30
C217	Deleted		
C218	Capacitor, 400 mf 15v (14v units)	25165	.35
C218	Capacitor, 200 mf 30v (28v units)	25816	.35
C219	Capacitor, 200 mf 15v (14v units)	25165	.35
C219	Capacitor, 200 mf 30v (28v units)	25816	.35
C220	Capacitor, 2 mf 250v	26377	2.25
R201	Potentiometer, 250 ohm 1w	32455	.35
R202	Resistor, 47k ohm .25w	17106	.10
R203	Resistor, 15k ohm .25w	17235	.10
R204	Resistor, 470 ohm .25w	17261	.10
R205	Resistor, 180 ohm .25w	17522	.10
R206	Resistor, 220 ohm .5w (14v units)	17285	.10
R206	Resistor, 820 ohm .5w (28v units)	17560	.15
R207	Resistor, Selected Value 1k ohm .25w to 10k ohm .25w — 1k	17156	.10
	1.5k	17247	.10
	2.2k	17807	.15
	3.3k	17089	.10
	3.9k	17883	.15
	4.7k	17077	.10

Symbol	Description		Part No.	Price
		6.8k	17481	.15
		8.2k	18112	1.50
		10k	17041	.10
R208	Resistor, 15k ohm .25w (14v units)		17235	.10
R208	Resistor, 6.8k ohm .25w (28v units)		17481	.15
R209	Resistor, 10k ohm .25w (14v units)		17041	.10
R209	Resistor, 18k ohm .25w (28v units)		17572	.15
R210	Resistor, WW .47 ohm lw (14v units)		17297	.10
R210	Resistor, 100 ohm 3w (14v units)		16308	.60
R211	Resistor, 220 ohm .5w (14v units)		17285	.10
R211	Resistor, 1000 ohm 3w (28v units)		16279	.60
R212	Resistor, WW 1.5 ohm 2w		17302	.25
R213	Resistor, 6.8k ohm 2w		16839	.15
R214	Resistor, 75 ohm 3w (28v units)		16944	.85
R215	Resistor, 330 ohm .5w		17338	.10
R216	Deleted			
R217	Resistor, 270k ohm 2w		17405	.30
R218	Resistor, 350 ohm 3w (14v units)		16281	.60
R218	Resistor, 1000 ohm 3w (28v units)		16279	.60
R219	Resistor, 7.5 ohm 3w (14v units)		16322	.75
R219	Resistor, 20 ohm 3w (28v units)		17558	.75
R220	Resistor, 75 ohm 3w (28v units)		16944	.85
R221	Resistor, 75 ohm 3w (28v units)		16944	.85
R222	Resistor, WW 4k ohm 5w		17649	1.00
R223	Resistor, 1000 ohm 3w		16279	.60
R224	Deleted			
R225	Deleted			
R226	Deleted			
R227	Deleted			
R228	Resistor, 7.5 ohm 3w (14v units		16322	.75
R229	Resistor, Selected Value 1k ohm .25w to 10k ohm .25w	1k	17156	.10
		1.5k	17247	.10
		2.2k	17807	.15
		3.3k	17089	.10
		3.9k	17883	.15
		4.7k	17077	.10
		6.8k	17481	.15
		8.2k	18112	1.50
		10k	17041	.10
R230	Thermistor		94415	3.45
L201	Choke, 160 mh		93758	8.45
L202	Choke, 9 mh		93772	12.45
L203	Choke, .4 mh		93734	7.70
L204	Choke, 10 mh		56152	1.20
L205	Choke, 400 mh		93772	6.50

Symbol	Description	Part No.	Price
L206	Choke, 0.7 mh	93760	4.15
L207	Choke 2H	94647	4.50
L208	Choke 35D7	56097	2.85
K201	Relay, (Transmit, Recieve)	66315	11.25
K202	Relay, (On-Off)	66016	9.10
T201	Transformer, TR-64 (Driver)	48181	4.65
T202	Transformer, (Modulation)	48650	9.45
T203	Transformer, (Power) 14v	92247	33.70
T203	Transformer, (Power) 28v	92261	22.85
J201	Receptacle, 14 Pole, Chassis, Female	74415	4.20
P201	Plug, 14 Pole, Cable, Male	74427	4.50

PARTS LIST SIV-1 RF INVERTER, PART NO. 93136

Symbol	Description	Part No.	Unit List Price
C1	Capacitor, ceramic trimmer 1.5 - 8 pf	26250	2.15
C2	Capacitor, ceramic trimmer 1.5 - 8 pf	26250	2.15
C3	Capacitor, silver mica 68pf	26107	.55
C4	Capacitor, silver mica 68pf	26107	.55
C5	Capacitor, silver mica 68pf	26107	.55
C6	Capacitor, silver mica 68pf	26107	.55
C7	Capacitor, ceramic disc .01 uf	24355	.25
C8	Capacitor, ceramic disc .01 uf	24355	.25
C9	Capacitor, silver mica 1 pf	26016	.35
C10	Capacitor, silver mica 1 pf	26016	.35
R1	Resistor, Comp. 22 ohm 2w	16994	.30
R2	Resistor, Comp. 22 ohm 2w	16994	.30
L1	Choke, 1 mh	56308	.90
L2	Choke, 1 mh	56308	.90
CR1	Diode, 1N34A	40024	.70
CR2	Diode, 1N34A	40024	.70
T1	Transformer assembly	93124	1.20
J401	Recetacle, lock spring and nut, Winchester M4S-LRGN	74477	2.70
P401	Plug, lock spring and hood, Winchester M4P-LSH10	74465	2.15
J402	Receptacle, BNC UG-1094/U	74374	1.30
P402	Plug, BNC UG-88/U	74403	1.30
J403	Receptacle, BNC UG-1094/U	74374	1.30
J403	Plug, BNC UG-88/U	74403	1.30

PARTS LIST SA-14R-1 CONTROL UNIT, PART NO. 93253
AND SA-14R-2 CONTROL UNIT, PART NO. 94996

Symbol	Description	Part No.	Unit List Price
R1	Potentiometer	32895	.25
R2	Potentiometer	32895	.25
R3	Resistor, 27k	17120	.10
R4	Potentiometer	32883	4.50
R5	Resistor, 14v unit, 75 ohm 3w	16944	.85
	28v unit, 150 ohm 3w	16011	1.20
R6	Resistor, 27k	17120	.10
M-1	Meter	86080	45.00
J301	Connector	74491	4.50
P301	Connector	74506	9.20
B-1	Lamp, 12v (red)	86054	1.35
B-2	Lamp, panel, 14v unit, No. 330	84367	1.20
	28v unit, No. 327	84355	1.60

SERVICE LETTER #14-001

April 23, 1963

Subject: SA-14 FREQUENCY SELECTION

Orders for SA-14 HF Transceivers should specify at least 6 frequencies for the 14 channels available.

In the event that a full complement of crystals is not required, the following channels will be filled:

3, 4, 5, 8, 9 and 10

If a future frequency change in the field is contemplated, channels other than those listed above should be selected for the temporary frequency.

SERVICE LETTER #14-002

January 22, 1965

Subject: POWER SUPPLY AUDIO SECTION

Modification: Addition of a 3 ohm resistor in the power supply audio section. This effectively connects the resistor across capacitor C216 to ground.

Procedure: Remove the noise suppression PC board and replace the two 1 1/8" fiber standoffs with the 3/4" fiber standoffs furnished in order to lower the PC board. Place a solder lug under the right PC board mounting screw and add the resistor mounting bracket by fastening them under the heads of the PC board mounting screw. Add the metal spacers to raise the resistor up and away from the capacitor C216. Mount the resistor and replace the PC board with the shorter screws furnished. Connect one lead of the 3 ohm 20 watt resistor to the center terminal of transformer T202. The center terminal of T202 is number 8 and has the black and white lead. Dress and connect the remaining lead of the resistor to the lug under the PC board mounting screw. Solder and clean all connections. Refer to modulator/power supply parts call out photos, page 16-C, 17-C, also schematic page 20-C.

MODIFICATION PARTS KIT NO. 97508

2 - 3/4" long standoffs
2 - 1" 6-32 RH screws
1 - 3 ohm resistor, 20 watts with mounting hardware
1 - Solder lug
1 - Sleeving, 1 3/4"
2 - Metal Spacers.

SERVICE LETTER #14-003

January 22, 1965

Subject: RECEIVER OSCILLATOR

Modification: Addition of capacitor to the receiver oscillator circuit.

Purpose: To increase the load capacitance of the crystal circuit. This decreases the operating frequency of the oscillator approximately 100 to 150 cycles on the higher frequency channels.

Procedure: Connect the 130 pf capacitor across C60. C60 is located adjacent to C62 and connected from Pin 5 of the tube socket V1 to the standoff located near R22. Refer to the parts call out photos page 12-C, 13-C and schematics page 18-C and 19-C.

Parts Required: 1 each capacitor, 130 pf CD 15 Series Cornell Dubilier or equivalent. SunAir part No. 26195.

SERVICE LETTER #14-004

January 26, 1965

Subject: RECEIVER DISTORTION

Modification: Additon of diode in transmitter driver circuit. Tube type 8106, Socket V2 .

Purpose: To eliminate regeneration in the transmitter driver circuit when the transceiver is in the "Receive" position.

Procedure: Solder the tapered end of the diode which is marked with a silver band to Pin 1 of the tube socket. Solder the other end to ground. Driver capacitors C9 through C22 must be re-peaked for maximum drive after addition of the diode. Refer to tuning instructions on Page 2-C. Refer to schematic page 19-C and parts call out page 15-C.

Parts Required: 1 ea. Diode, type CER-72 or equivalent. SunAir part number 40153.

SUNAIR ELECTRONICS INC
MANUAL FOR HF COMMUNICATION
TRANSCEIVER MODELS SA-14
AND SA-14R

ADDENDUM 1
DATE: 8-13-65

PCN NUMBER: 883

PCN DATE: 8-13-65

EFFECTIVITY: SAV-903 SER. NO. 1200
SAV-904 SER. NO. 2500 DATE: 9-13-65

MODELS AFFECTED: SAV-903 AND SAV-904 POWER SUPPLIES

MANUAL REFERENCE: FIGURE NO. 11C, PAGE 20C

SCHEMATIC NUMBER: 12962

SCHEMATIC ISSUE: 0

SUBJECT: IMPROVE TEMPERATURE STABILITY AND REDUCE POWER SUPPLY SWITCHING NOISE.

TEXT:

C221	26963	CAPACITOR, TANTALUM; 110 uf, 30 WVDC. ADDED: SAV-903 AND SAV-904
R231	16956	RESISTOR, FIXED, W.W.; 3 OHM, 20W. ADDED: SAV-903 AND SAV-904
R232	16205	RESISTOR, FIXED, W.W.; 5 OHM, 10W. ADDED: SAV-904 ONLY
F203	86107	FUSE, 5 AMP. DELETED: SAV-904 ONLY.
K201-6		CONTACT 8 CONNECTED TO LUG 3 OF T202. CONTACT 9 CONNECTED TO GROUND. SAV-904 ONLY.

SUNAIR ELECTRONICS, INC.
MANUAL FOR HF COMMUNICATIONS
TRANSCEIVER
MODEL SA-14, SA-14R

ADDENDUM 2
DATE: 9/1/65

PCN NUMBER: 887 - 888

PCN DATE:

EFFECTIVITY: R. F. Inverter DATE: 9/1/65
Serial No. 0001

MODELS AFFECTED: R. F. Inverter and R.F. Meter Indicator

MANUAL REFERENCE: Page 8-B, Page 18-B, Page 20-B
Parts List, Page 1-E, Page 2-E

SCHEMATIC NUMBER:

SCHEMATIC ISSUE:

SUBJECT: Redesign of R. F. Inverter

TEXT:

On page 1-E and 2-E of the manual, the R. F. Inverter Model #90861, Switch Inverter Model #91396 and Meter R.F. Indicator Model #90859 will be discontinued and replaced by R.F. Inverter Part No. 97912 and Meter R.F. Indicator Part No. 98100

Fig. 230 replaced the schematics and views on page 18-B of the manual.

Fig. 2b on page 20-B of the manual is obsolete. The revised diagram is Fig. 213.

On Page 8-B under section "Trailing Wire Antenna Electric Reel Control" the second paragraph should read, "The operator may either depress the microphone 'press-to-talk' switch and watch the R.F. Indicator until it registers

minimum deflection and then stop the reel, or, if he is familiar with the equipment, he can stop the reel after the approximate length of antenna needed for the frequency is registered on the reel control box. Exact antenna length can then be determined by depressing the microphone button and watching the R.F. Indicator. The reel is stopped by switching the toggle switch to the position marked "Off". To return the antenna to the reel, the operator moves the control to the position marked "In". A signal light at the top of the antenna control box is lit when the antenna is released. It should go out when the antenna is reeled in completely. If it fails to do so, the reel has not pulled in the drag cup completely and the Micro switch in the assembly must be adjusted.

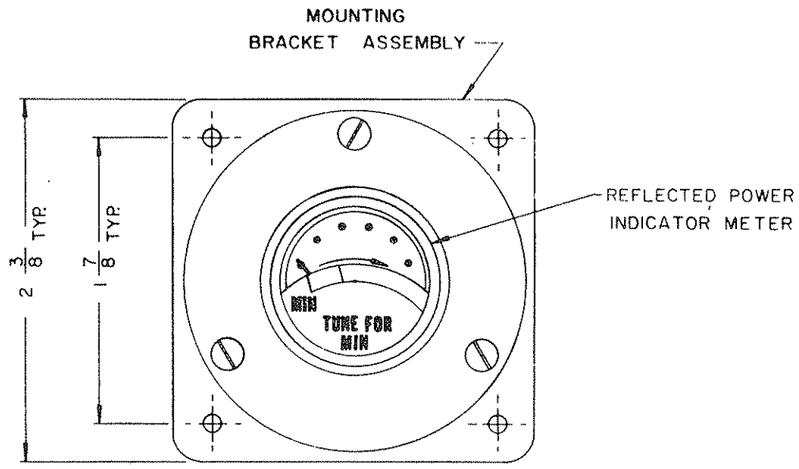
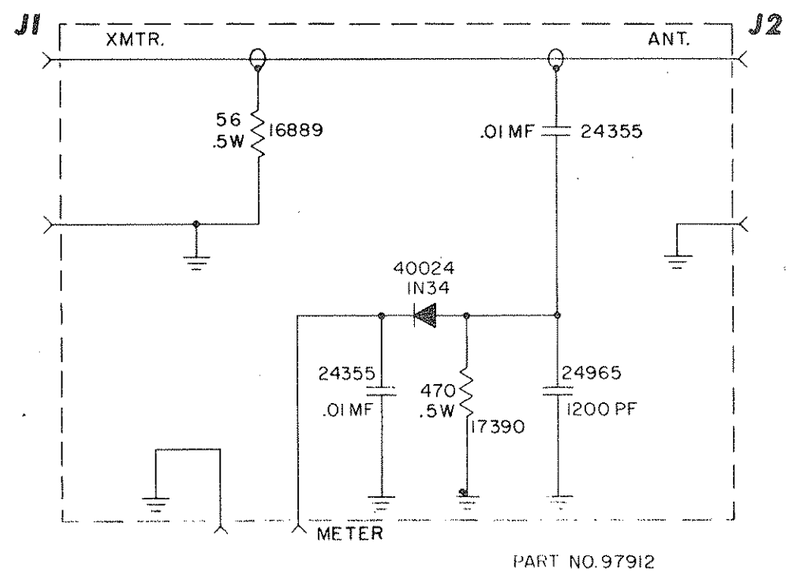


FIG. 213



PART NO. 97912

FIG. 230

SUNAIR ELECTRONICS INC.
MANUAL: SA-14 and SA-14R

ADDENDUM 3
DATE: 1/20/66

REFERENCE: ECN 1039

PURPOSE: To provide service information relative to circuit changes for improved efficiency of the Modulator/Power Supply.

EFFECTIVITY: SAV-903 Serial No. 1400
SAV-904 Serial No. 2700

MANUAL REFERENCE: Parts List, page 17E
Transistor, Diode & Fuse Compliment, page 6-E
Schematic, 12962, Issue "0"

TEXT: SAV-903 (14V)

R228 17895 Resistor 7.5 Ohms 3W changed to 16982 Resistor 10 Ohms, 5W

R217 17405 Resistor 270K, 10% 2W changed to 18526 Resistor 470K, 10% 2W

R219 17895 Resistor 7.5 Ohms, 3W Deleted

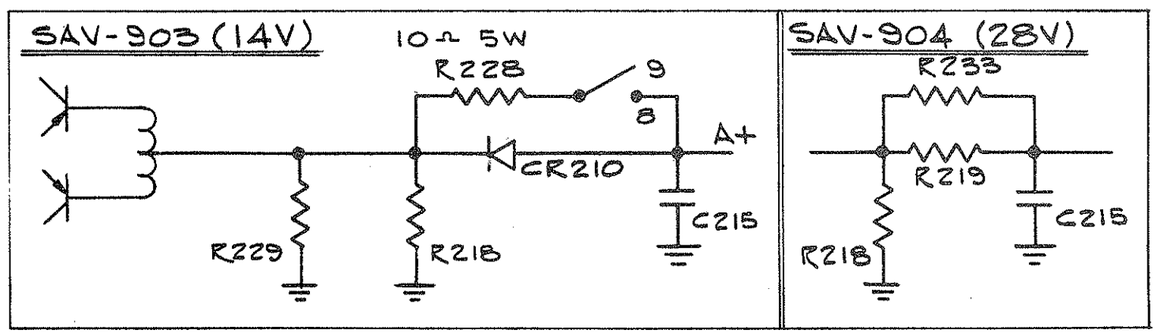
CR-210 40165 Diode IN534 Added

SAV-904 (28V)

R217 17405 Resistor 270K, 10% 2W changed to 18526 Resistor 470K, 10% 2W

R219 17558 Resistor 20 Ohm 3W changed to 16310 Resistor 40 Ohm 3W

R233 16310 Resistor 40 Ohm 3W Added



If additional information is desired, it will be furnished immediately by contacting the Customer Service Department, SunAir Electronics, Fort Lauderdale, Florida, U.S.A.

SUNAIR ELECTRONICS, INC.
MANUAL: SA-14 and SA-14R

ADDENDUM 4
DATE: 2/8/66

REFERENCE: ECN 1069

PURPOSE: To provide service information relative to the new CU-1400 Series Antenna Coupler.

MANUAL REFERENCE:
Transceiver Interconnection Diagram SA-14, Page 13-B
Transceiver Interconnection Diagram SA-14R, Page 15-B
Coupling Unit Mounting Detail, Page 17-B

TEXT:

Pin "H" of the connector, on the Remote Loading Unit, has been used as A + input on all installation. On the new series of antenna couplers, Pin "H" is used only as A+ input on 28 Volt installations.

Pin "L" of the connector has not previously been used. On the new series of antenna couplers, Pin "L" has been activated. Pin "L" is used only as A + input on 14 Volt installations.

All other interconnection wiring remains unchanged.

Page Two of this Addendum illustrates the mounting dimensions for the CU-1400, Antenna Coupler.

If additional information is desired, it will be furnished immediately by contacting the Customer Service Department, SunAir Electronics, Fort Lauderdale, Florida, U. S. A.

SUNAIR ELECTRONICS, INC.
MANUAL: SA-14 and SA-14R

ADDENDUM 5
DATE: 2/17/66

REFERENCE — ECN 1055

PURPOSE: — To improve demodulator efficiency

EFFECTIVITY: — SA-14 Serial No. D-1270

SA-14R Serial No. E-2340

MANUAL REFERENCE: — Parts Lists, page 5E

Schematics, 10768, Issue "K"
12467, Issue "L"

TEXT: — CR1, 40141, Diode Type 1N461

Changed to 44290, Diode Type 1N914

If additional information is desired, it will be furnished immediately by contacting the Customer Service Department, SunAir Electronics, Fort Lauderdale, Florida, U.S.A.

SUNAIR ELECTRONICS, INC.
MANUAL: SA14 and SA14-R

ADDENDUM 6
DATE: 3/29/66

REFERENCE: ECN 1161

MODELS AFFECTED: SAV 903 and SAV 904 Power Supplies.

PURPOSE: To change fuse, F201, to slow blow type.

MANUAL REFERENCE: Parts List, page 6-E

TEXT:

Change part number of F201

Fuse, Type 20A, A + input - SAV 903 to 85892

Fuse, type 10A, A + input - SAV 904 to 84848

If additional information is desired, it will be furnished immediately by contacting the Customer Service Department, SunAir Electronics, Fort Lauderdale, Florida, U.S.A.