Technical Manual

Model SSB-20A and Model SSB-20MA
Radiotelephones

stoner communications, inc.

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TECHNICAL MANUAL
CHANGE NOTICE

SSB-20A/SSB-20MA

Incorporate the attached change pages into the subject technical manual as follows:

(1) Add new Change 1 page 7-11 to manual following existing page 7-10.

(2) Add Appendix A title sheet behind transmitter assembly schematic diagram.

(3) Add Change 1 page A-1 behind new Appendix A title sheet.

(4) Add new PS-20/2 schematic diagram behind page A-1.

(5) Insert this change notice/instruction sheet between the title sheet and page a.

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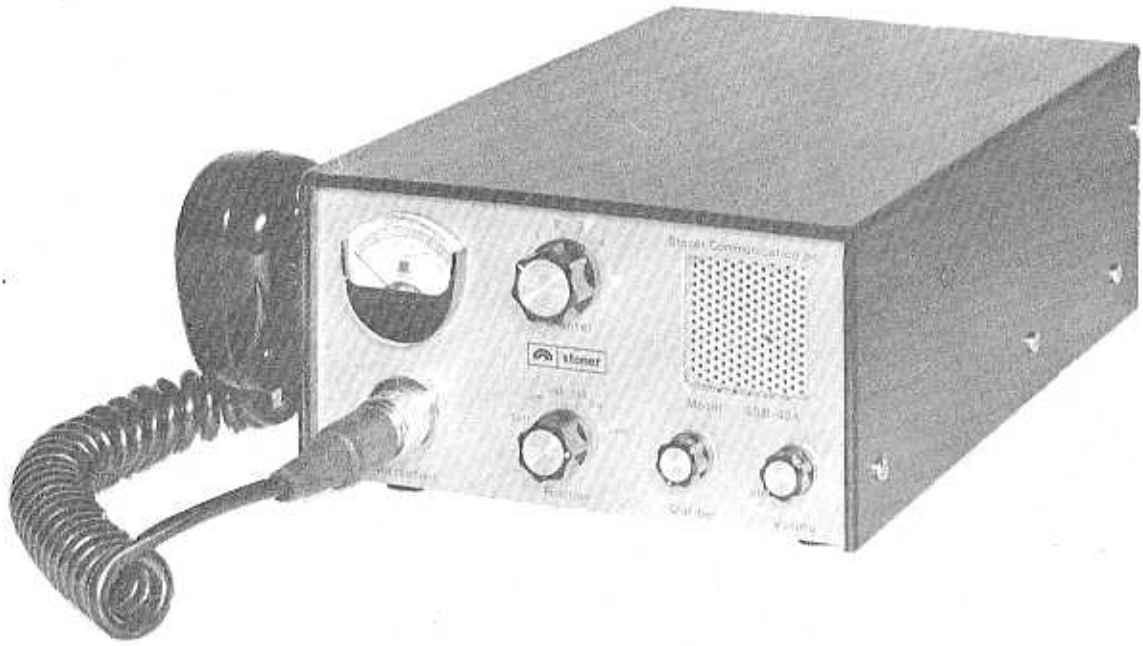


FIGURE 1 - STONER SSB-40A/SSB-20A
SINGLE SIDEBAND RADIOTELEPHONE

SECTION I

INTRODUCTION

1-1 PURPOSE OF EQUIPMENT

The Stoner Model SSB-20A/20MA radiotelephones have been designed for use where compact size, light weight and long range communications are desired. When equipped with all optional channels and modes, the unit may be operated on upper sideband (USB), Amplitude Modulation (AM) or telegraphy (CW) on any one of four frequencies or on lower sideband (LSB) on any one of the same four basic frequencies. This, in effect, can provide up to eight sideband channels of operation in addition to CW operation, or four sideband channels, four AM channels and CW operation.

The normal operating range for the SSB-20A/20MA is up to 400 miles (600 km) although the actual operating range for an individual installation varies with the frequency selected, the type of antenna system being used and surrounding electrical noise conditions at the transmitting and receiving sites. Propagation by the ionosphere permits operation over obstacles such as buildings, mountains, forests or jungles and into the low areas.

The basic SSB-20A may be ordered for operation from 12V dc or from 115/230V ac. The backpack version, SSB-20MA, is designed for operation from the self contained 12 volt battery pack.

All configurations of the SSB-20A and SSB-20MA are electrically identical with the exception of the power converter used in the 115/230V ac version.

The primary difference between the SSB-20A and the SSB-20MA is the physical configuration. The SSB-20MA is housed in a weather resistant ruggedized container and is intended for portable applications. In addition, all controls and connectors are on the front panel. The internal circuitry and components in the SSB-20MA are identical to those used in the 12V dc version of the SSB-20A. The SSB-20MA is supplied with 12V batteries.

NOTE

If operation from 24V dc power source is necessary, the Stoner Model SSB-40A/2 should be used. The Model SSB-20A is not available for operation from 24V dc.

All test checkout, fault isolation, and alignment procedures for the SSB-20MA are the same as for the SSB-20A.

1-2 GENERAL DESCRIPTION

The Model SSB-20A is a completely transistorized single sideband transceiver designed for operation on up to four channels between the

carrier frequency range of 2.0 to 8.0 MHz with output power of 15 watts Peak Envelope Power (P.E.P.) Power consumption is extremely low due to the all solid state design. The unit may be used in both mobile and base station applications. The circuit is protected against reversed power input polarity, internally and protection against short circuits is provided by an automatic resetting circuit breaker. When an overload occurs, the circuit breaker will open as a result of excessive heat. After cooling, the breaker will automatically reset and the unit will again operate.

CAUTION

When the circuit breaker opens troubleshooting procedures should be initiated immediately.

1-3 EQUIPMENT SUPPLIED (SSB-20A)

The basic SSB-20A is supplied as follows:

(1) 12V dc SSB-20A radiotelephone Model SSB-20A/1
115/230V ac SSB-20A radiotelephone Model SSB-20A/3

(2) Microphone (M-2) Dynamic with coiled cord and plug.

The minimum equipment required for a BASE STATION INSTALLATION is as follows: (Not supplied with the SSB-20A unless specifically ordered).

(1) Stoner Model AC-108A Dipole Antenna or equivalent.

(2) A power source such as a 12V wet cell battery for the 12V dc version or a source of 115 or 230V ac for the ac version.

The minimum equipment required for a MOBILE INSTALLATION is as follows: (Not supplied with the SSB-20A unless specifically ordered).

(1) Stoner Model AC-26/1 mobile mounting kit.

(2) Stoner Model AC-110 mobile noise suppression kit.

(3) Stoner Model AC-111A/1 - /2 - /3 or /4 mobile whip antenna, single channel.

1-4 EQUIPMENT SUPPLIED (SSB-20MA)

The basic SSB-20MA is supplied as follows:

(1) Model SSB-20MA Radiotelephone

(2) Hand-Held Microphone, M-2.

The minimum equipment required for a base station installation is as follows: (Not supplied with the SSB-20MA unless specifically ordered).

(1) Stoner Model AC-26/2 Mobile Mounting Kit.

(2) Stoner Model AC-110 Mobile Noise Suppression Kit.

(3) Stoner Model AC-111A/1 - /2 - /3 or /4 Mobile Whip Antenna, single channel or equivalent.

The minimum equipment required for a portable system is as follows: (Not supplied with the SSB-20MA unless specifically ordered).

(1) Stoner Model AC-24B Rechargeable Battery Pack, or AC-24D, D-Cell Battery Pack with 16 D-cell batteries.

(2) Stoner Model AC-30A Nylon carrying bag.

(3) Stoner Model AT-1/2 whip antenna, permeability tuned.

SECTION 2

SPECIFICATIONS

GENERAL

SSB-20A/1 Input Voltage:	11/14V dc
SSB-20A/3 Input Voltage:	115/230V ac ±10% 50/60 Hz
SSB-20MA Input Voltage:	11-14V dc
Polarity-Input Voltage:	Negative ground, only, reverse polarity protected
Frequency Range:	2.0-8.0MHz - 4-channels (anywhere within frequency range)
Operating Modes:	Selectable sideband (USB/LSB) AM-Compatible AM (optional) CW-Telegraphy
Input Impedance:	50 ohms nominal
Climatization:	Completely tropicalized
Dimensions and Weight:	
SSB-20A	8" X 4" X 10" (20.3 cm X 10.2 cm X 25.4 cm) dc-7.25 lbs (3.3 kg); ac-8.25 lbs. (3.7 kg)
SSB-20MA	12 1/2" X 4 1/4" X 12" (31 cm X 11 cm X 28 cm) 15 3/4 lb. (7.2 kg) including batteries
Controls:	Volume-ON/OFF, Clarifier, Channel, Function
Connector:	Microphone
Antenna Connector:	UHF type SO239
Metering:	Meter indicates battery voltage, relative received signal strength and relative transmitter power output.
SSB-20MA Batteries:	Rechargeable 6 AH internally mounted.

TRANSMITTER

Power Output:	
SSB:	10-15 watts P.E.P.
AM:	5-7 watts P.E.P.
CW:	5 watts
Power Consumption:	1 amperes average, voice
Output Impedance:	50 ohms nominal, unbalanced
Carrier Suppression:	-40 dB
Sideband Suppression:	-40 dB
Radiated Harmonic Output:	-40 dB
Frequency Stability:	$\pm$ .002% or 100 Hz whichever is greater from 0° to 50°C
Audio Bandwidth:	Less than $\pm$3 dB from 300-2400 Hz
Microphone:	Ruggedized high impedance dynamic

RECEIVER

Circuit:	Superheterodyne, single conversion
Power Consumption:	80 mA average
Sensitivity:	1 uV for 10 dB S/N ratio and 50 mW of audio output
Selectivity:	Crystal filter: 2.1 KHz at -6dB; 5.0 KHz at -40 dB
Automatic Gain Control (AGC):	Fast Attack, slow release. Less than 10 dB change.
Clarifier Shift:	0.003%
Intermediate Frequency:	1650 KHz
Image Rejection:	-60 dB
Audio Output:	0.5 watts, less than 10% distortion

SECTION 3

PREPARATION FOR USE

3-1 INSPECTION

There are no special requirements for unpacking the SSB-20A. After unpacking, the following inspection procedures should be accomplished to insure that the unit is undamaged.

(1) Carefully inspect exterior of equipment for signs of damage incurred in shipment.

(2) Remove four (4) screws from each side of top cover.

(3) Pull top cover forward slightly and tip up to remove.

(4) Turn unit upside down and remove nine (9) screws holding bottom cover in place and remove bottom cover.

(5) Carefully inspect interior of unit for possible damage to the speaker, wiring, components on the printed circuit boards and other components in the unit.

NOTE

If damage is evident, immediately notify the carrier and file a damage claim. DAMAGED EQUIPMENT MUST NOT BE PLACED IN SERVICE UNDER ANY CIRCUMSTANCES.

(6) Verify that all internal connectors are solidly in place.

(7) Replace top and bottom covers on the unit and continue with installation procedures if inspection has revealed no damage.

3-2 INSTALLATION SSB-20A (BASE STATION)

The SSB-20A should be installed in a location convenient to the operator. Power is connected to the SSB-20A at the terminal strip on the rear panel through the power cord supplied.

In base station installations, it is recommended that the dc versions of the SSB-20A/MA be operated from a heavy duty storage battery such as a marine or automobile battery. Using this type of power source has the advantages of continued operation for long periods of time, even in the event of power line failure. Also, the possiblity of damage to the unit from power line surges is eliminated.

CAUTION

Use care to observe correct battery polarity. The SSB-20A/SSB-20MA will operate from negative ground power sources only. If polarity is incorrect the unit will not operate since the circuit is protected against reversed battery or power supply connections.

Do not energize the transmitter with the antenna disconnected. This will cause excessive voltage in the transmitter and might destroy the power amplifier transistors.

For proper installation, perform the following procedures.

(1) Attach the terminal lug on the red wire in the power cable to terminal 4 on terminal strip TB1 on the rear panel of the unit.

(2) Attach the terminal lug on the brown wire in the power cable to terminal 3 on terminal strip TB1 on the rear panel of the unit.

(3) Connect the microphone to microphone connector J1 on the front panel of the unit.

(4) Connect the antenna cable to antenna connector J2 on the rear panel of the unit.

(5) Connect the red clip from the power cable to the positive terminal of the battery or power supply.

(6) Connect the black clip from the power cable to the negative terminal of the battery or power supply.

NOTE

The radiotelephone is factory pretuned and does not require further adjustment or installation procedures.

Refer to the antenna installation instructions provided with antenna for proper installation of the antenna.

3-3 INSTALLATION SSB-20A (MOBILE STATION)

The SSB-20A transceiver may be mounted under the dash of an automobile by using the Model AC-26/1 mounting kit. For this type of installation the Model AC-111A mobile whip antenna should be used and to eliminate possible engine noise in the radiotelephone the Model AC-110 Noise Suppression Kit should be installed in the vehicle. For installation procedures for these accessories, refer to the installation instructions supplied with the accessory.

In some instances it may be desireable to fabricate special mounting brackets locally and install the unit in the glove box of the vehicle.

CAUTION

The SSB-20A/MA may be installed only in vehicles with negative ground electrical systems.

After all mobile accessory items have been installed in the vehicle, the following procedures should be performed to complete installation of the SSB-20A in the vehicle.

(1) Remove battery clips from power cable.

(2) Remove insulation from about 1/4 inch of the brown wire of the power cable and install terminal lug.

(3) Connect brown wire to good chassis ground.

(4) Remove insulation from about 1/4 inch of the red wire of the power cable and install terminal lug.

(5) Connect terminal lug on red wire to battery side of vehicle starter solinoid.

(6) Attach the terminal lug on the red wire in the power cable to terminal 4 on terminal strip TB1 on the rear panel of the unit.

(7) Attach the terminal lug on the brown wire in the power cable to terminal 3 on terminal strip TB1 on the rear panel of the unit.

(8) Connect antenna connector to J3 at back of transceiver.

(9) Connect microphone connector to connector J1 on front panel of transceiver.

3-4 INSTALLATION (SSB-20MA)

Procedures required for installation of the SSB-20MA in both base and mobile installations is identical to those required for the SSB-20A with the exceptions that the power and the antenna cables both plug into mating connectors on the front panel.

Portable systems require no special installation procedures except those provided with the battery pack and the antenna used.

For CW operation the J-47 telegraph key may be plugged into the KEY phone socket on the front panel.

To use AC-119 headphones, plug the headphone plug into the PHONES phone socket on the front panel.

To set up the equipment for operation, assemble the antenna to the unit, attach the counterpoise wire to the screw terminal at the bottom of the antenna and extend along the ground in a convenient direction.

Tune the antenna to the correct channel frequency as described in the antenna installation instructions.

3-5 CHANNELIZING KIT INSTALLATION (P/N 142020-XX)

The channelizing kit for the SSB-20A/20MA consists of the following:

(a) 1 ea. 142002-XX Receive module pre-aligned to customer frequency.

(b) 1 ea. 142004-XX Transmit module, pre-aligned to customer frequency.

(c) 1 ea. 135025-01 Channel crystal to customer frequency.

(d) 1 set Power amplifier resonating capacitors.

Channelizing Kit, Part No. 142019-XX is the same as 142020-XX, except that the channel crystal is not supplied.

These kits are available in 20 configurations to cover the complete frequency spectrum from 2 to 8 MHz. The available kit frequencies and part numbers are as follows:

Frequency Range	Part Number
2.0-2.099	142020-01
2.1-2.199	142020-02
2.2-2.299	142020-03
2.3-2.499	142020-04
2.5-2.699	142020-05
2.7-2.899	142020-06
2.9-3.199	142020-07
3.2-3.349	142020-08
3.35-3.499	142020-09
3.5-3.799	142020-10
3.8-4.199	142020-11
4.2-4.499	142020-12
4.5-4.899	142020-13
4.9-5.499	142020-14
5.5-5.699	142020-15
5.7-6.149	142020-16
6.15-6.499	142020-17
6.5-6.949	142020-18
6.95-7.649	142020-19
7.65-8.000	142020-20

Crystals supplied by Stoner Communications, Inc. for use in the SSB-20A/20MA are fabricated for SSB service in transistorized equipment.

Crystals in the channel oscillator circuit (local oscillator) are correlated for a 16 pF load capacitance rather than the 32 pF which is standard for vacuum tube equipment. Note also that the crystal oscillating frequency is always 1650 KHz above the channel or operating frequency.

CHANNELIZING CHART
TRANSMITTER OUTPUT STAGE

FREQUENCY RANGE	C216-C219	PART NO.	FIXED PARALLEL CAPACITOR Value/Part No.	C222-C225	PART NO.
2.0 - 2.099	90-400 pF	5005-400	1800pF/4915-182	5500 pF	4915-502 +4910-501
2.1 - 2.199	90-400 pF	5005-400	1600pF/4915-162	4500 pF	4915-432 +4910-201
2.2 - 2.299	90-400 pF	5005-400	1500pF/4915-152	4000 pF	4915-392 +4910-101
2.3 - 2.499	90-400 pF	5005-400	1200pF/4910-122	3500 pF	4915-332 +4910-201
2.5 - 2.699	90-400 pF	5005-400	1000pF/4910-102	3000 pF	4915-302
2.7 - 2.899	90-400 pF	5005-400	680pF/4910-681	2500 pF	4915-252
2.9 - 3.199	90-400 pF	5005-400	680pF/4910-681	2000 pF	4915-202
3.2 - 3.349	90-400 pF	5005-400	680pF/4910-681	2000 pF	4915-202
3.35- 3.499	90-400 pF	5005-400	500pF/4910-501	1500 pF	4915-152
3.5 - 3.799	90-400 pF	5005-400	400pF/4910-401	1500 pF	4915-152
3.8 - 4.199	90-400 pF	5005-400	300pF/4910-301	1200 pF	4910-122
4.2 - 4.499	90-400 pF	5005-400	300pF/4910-301	1000 pF	4910-102
4.5 - 4.899	90-400 pF	5005-400	200pF/4910-201	820 pF	4910-821
4.9 - 5.499	90-400 pF	5005-400	-	500 pF	4910-501
5.5 - 5.699	90-400 pF	5005-400	-	400 pF	4910-401
5.7 - 6.149	90-400 pF	5005-400	-	360 pF	4910-361
6.15- 6.499	90-400 pF	5005-400	-	250 pF	4910-251
6.5 - 6.949	90-400 pF	5005-400	-	200 pF	4910-201
6.95- 7.649	14-150 pF	5005-150	-	150 pF	4910-151
7.65- 8.0	14-150 pF	5005-150	-	100 pF	4910-101

NOTE: Values shown are to be used as a guide only. Actual values may differ by ±20% from those shown for a given frequency.

RECEIVE MODULE
RESONATING CAPACITORS

FREQ. MHz	C502	PART NO.	C503	PART NO.	C504	PART NO.	C505	PART NO.
2.0 -2.299	200 pF	4900-201	220 pF	4900-221	300 pF	4900-301	200 pF	4900-201
2.3 -2.699	150 pF	4900-151	160 pF	4900-161	250 pF	4900-251	160 pF	4900-161
2.7 -2.899	100 pF	4900-101	120 pF	4900-121	200 pF	4900-201	120 pF	4900-121
2.9 -3.349	91 pF	4900-910	100 pF	4900-101	200 pF	4900-201	100 pF	4900-101
3.34-3.799	56 pF	4900-560	68 pF	4900-680	150 pF	4900-151	68 pF	4900-680
3.8 -4.199	47 pF	4900-470	56 pF	4900-560	100 pF	4900-101	56 pF	4900-560
4.2 -4.899	33 pF	4900-330	39 pF	4900-390	82 pF	4900-820	39 pF	4900-390
4.9 -5.699	20 pF	4900-200	27 pF	4900-270	68 pF	4900-680	27 pF	4900-270
5.7 -6.149	15 pF	4900-150	20 pF	4900-200	47 pF	4900-470	22 pF	4900-220
6.150-6.949	7 pF	4900-070	15 pF	4900-150	30 pF	4900-300	15 pF	4900-150
6.950-7.649	2 pF	4900-020	10 pF	4900-100	20 pF	4900-200	12 pF	4900-120
7.65-8.0	-	-	5 pF	4900-050	10 pF	4900-100	5 pF	4900-050

TRANSMIT MODULE
RESONATING CAPACITORS

FREQ. MHz	C602	PART NO.	C603	PART NO.	C604	PART NO.	C605	PART NO.
2.0 -2.299	250 pF	4900-251	300 pF	4900-301	250 pF	4900-251	250 pF	4900-251
2.3 -2.699	160 pF	4900-161	250 pF	4900-251	160 pF	4900-161	160 pF	4900-161
2.7 -2.899	120 pF	4900-121	200 pF	4900-201	120 pF	4900-121	120 pF	4900-121
2.9 -3.349	100 pF	4900-101	200 pF	4900-201	100 pF	4900-101	100 pF	4900-101
3.35-3.799	75 pF	4900-750	150 pF	4900-151	75 pF	4900-750	75 pF	4900-750
3.8 -4.199	56 pF	4900-560	100 pF	4900-101	56 pF	4900-560	47 pF	4900-470
4.2 -4.899	39 pF	4900-390	82 pF	4900-820	39 pF	4900-390	39 pF	4900-390
4.9 -5.699	27 pF	4900-270	68 pF	4900-680	27 pF	4900-270	27 pF	4900-270
5.7 -6.149	20 pF	4900-200	47 pF	4900-470	20 pF	4900-200	15 pF	4900-150
6.150-6.949	15 pF	4900-150	30 pF	4900-300	15 pF	4900-150	10 pF	4900-100
6.950-7.649	15 pF	4900-150	20 pF	4900-200	12 pF	4900-120	10 pF	4900-100
7.65-8.0	10 pF	4900-100	20 pF	4900-200	10 pF	4900-100	7 pF	4900-070

See page 7-0 (Module Layout)

Upon completion of the installation of the new channelizing kit, perform the channel frequency adjustment procedures outlined in Section 6.

3-6 CRYSTAL REPLACEMENT PROCEDURES

The following procedures must be accomplished when changing crystals in the SSB-20A/20MA.

(1) Remove bottom cover from unit and locate crystal to be changed.

(2) Remove selected crystal from crystal socket and replace with new crystal from channelizing kit.

3-7 CRYSTAL FILTER REPLACEMENT PROCEDURES

The crystal filters used in the SSB-20A/MA are mounted on printed circuit board PC-100 and are connected to the circuit with four soldered connections. Perform the following procedures to replace a crystal filter.

(1) Remove the bottom cover from the unit, disconnect PC board connector P1, remove five (5) screws holding PC board in place and remove PC board from chassis.

(2) Locate the four (4) soldered connections for the individual filter on the underside of the PC board.

(3) Unsolder the filter from the PC board using the procedures outlined in Section 6.

(4) Clean holes in PC board to permit installation of new filter.

(5) Place new filter from channelizing kit on PC board with connecting pins protruding through holes where old filter was connected and solder in place with a low wattage soldering iron.

SECTION 4

OPERATION

4-1 FUNCTION OF CONTROLS AND INDICATORS

Meter	Indicates relative signal strength in receive mode, relative rf output in transmit mode and battery condition when switched to BATT position at FUNCTION selector switch.
CHANNEL Selector	Selects any one of four channels in the 2 to 8 MHz frequency range.
FUNCTION Selector	Six position switch functioning as follows:
BATT	Connects meter across battery or dc power source with correct load to determine battery condition.
AM (DSB)	Selects optional AM mode of operation.
USB	Selects upper sideband mode of operation.
LSB	Selects optional lower sideband mode of operation.
	NOTE: Only 2 modes of operation available (USB/LSB or USB/AM or LSB/AM)
CW	Selects CW mode to permit keyed continuous wave telegraphic code transmission.
TUNE	Keys transmitter and generates a tone for tuning and output checks.
CLARIFIER Control	Permits vernier adjustment of frequency in receive condition to enable elimination of garbled or unintelligible speech.
OFF-VOLUME Control	Turns radiotelephone on or off and controls rf gain.
MICROPHONE Connector J2	Provides for audio input from microphone or handset.
ANT Connector J1	(On rear of unit) Provides for connection of antenna to unit.
Terminal Strip TB1	Ten (10) terminal, strip providing for the following connections:
Terminal 1 & 2	Provide for connection of telegraph key for CW code transmission.

Terminals 3 & 4	Positive and Negative 12 V dc connections for power source.
Terminal 5	Common connection point for antenna tuner
Terminals 6,7,8,9	Channel connections for antenna tuner.
Terminal 10	Keyed 12 V dc

4-2 SEMICONDUCTOR COMPLEMENT

TRANSISTORS

Q101	2N3694	Receiver mixer
Q102	2N3694	USB 1st I-F amplifier
Q103	2N3694	LSB 1st I-F amplifier
Q104	2N3694	2nd I-F amplifier
Q105		Not used
Q106	2N3694	AVC amplifier
Q107	2N3694	Tone Oscillator emitter follower
Q108	2N3694	Tone oscillator
Q109	2N3694	Local oscillator
Q110	2N3694	Transmitter mixer
Q111		Not used
Q112	2N5484	Microphone Preamplifier
Q113	2N3694	Carrier generator
Q114	2N3694	First audio amplifier
Q115	2N3691	Second audio amplifier
Q116	2N3691	Class "B" audio amplifier (NPN)
Q117	2N3638	Class "B" audio amplifier (PNP)
Q118		Not used
Q119	2N3694	Product detector switch
Q120	2N3694	Product detector switch
Q121	MPSU06	+9 Volt dc regulator
Q201	MPSU06	Transmitter driver amplifier
Q202	MPSU06	Transmitter buffer amplifier
Q203	MPSU06	Transmitter buffer amplifier
Q204	2N5039	Transmitter buffer amplifier
Q205	2N5039	Transmitter final amplifier
Q501	2N5484	RF amplifier (Transmit channel module)
Q601	2N5484	RF amplifier (Receive channel module)

DIODES

CR1	SD05	Speaker isolation
CR2	SD05	Volume Control Bypass
CR101		Not used
CR102	SD05	Receiver Input I-F decoupling
CR103	1N662	Transmitter I-F output coupling
CR104	S262	AM detector
CR105	S262	AM detector
CR106	1N662	Transmitter I-F input coupling
CR107	SD05	AVC reference
CR108	1N662	AVC voltage doubler
CR109	1N662	AVC voltage doubler
CR110	S262	Balanced modulator
CR111	S262	Balanced modulator

DIODES (cont.)

CR112	S262	Balanced modulator
CR113	S262	Balanced modulator
CR114	1N456	Channel crystal gating
CR115	1N456	Channel crystal gating
CR116	1N456	Channel crystal gating
CR117	1N456	Channel crystal gating
CR118	SD05	Clarifier reference
CR119	SD05	Receiver clarifier
CR120		Not used
CR121	1N662	"S" Meter detector
CR122	SD05	Audio bias stabilizer
CR123	SD05	Audio bias stabilizer
CR124	1N662	Receiver rf voltage protection
CR125	1N662	Receiver rf voltage protection
CR126	SZ10.0A	Ten volt reference zener
CR201	S262	Antenna current detector
CR202	SD05	Reverse polarity protect
CR501	ED3001A	Channel module gating (rcvr channel module)
CR502	ED3001A	Channel module gating (rcvr channel module)
CR503	1N662	Channel module gating (rcvr channel module)
CR601	ED3001A	Channel module gating (xmtr channel module)
CR602	ED3001A	Channel module gating (xmtr channel module)

4-3 OPERATING PROCEDURES

Operation of the SSB-20A is very simple due to the minimum of controls and the simplicity of function. To achieve normal operation the following procedures should be performed. Operating procedures for the SSB-20MA are the same as those for the SSB-20A.

(1) Select channel of operation at the CHANNEL switch.

(2) Select mode of operation at the FUNCTION switch.

(3) Rotate OFF-VOLUME control clockwise to turn the unit on and adjust the volume to a comfortable listening level.

(4) Adjust CLARIFIER control to eliminate garbled or unintelligible reception that is present. The unit should now be receiving in a normal manner.

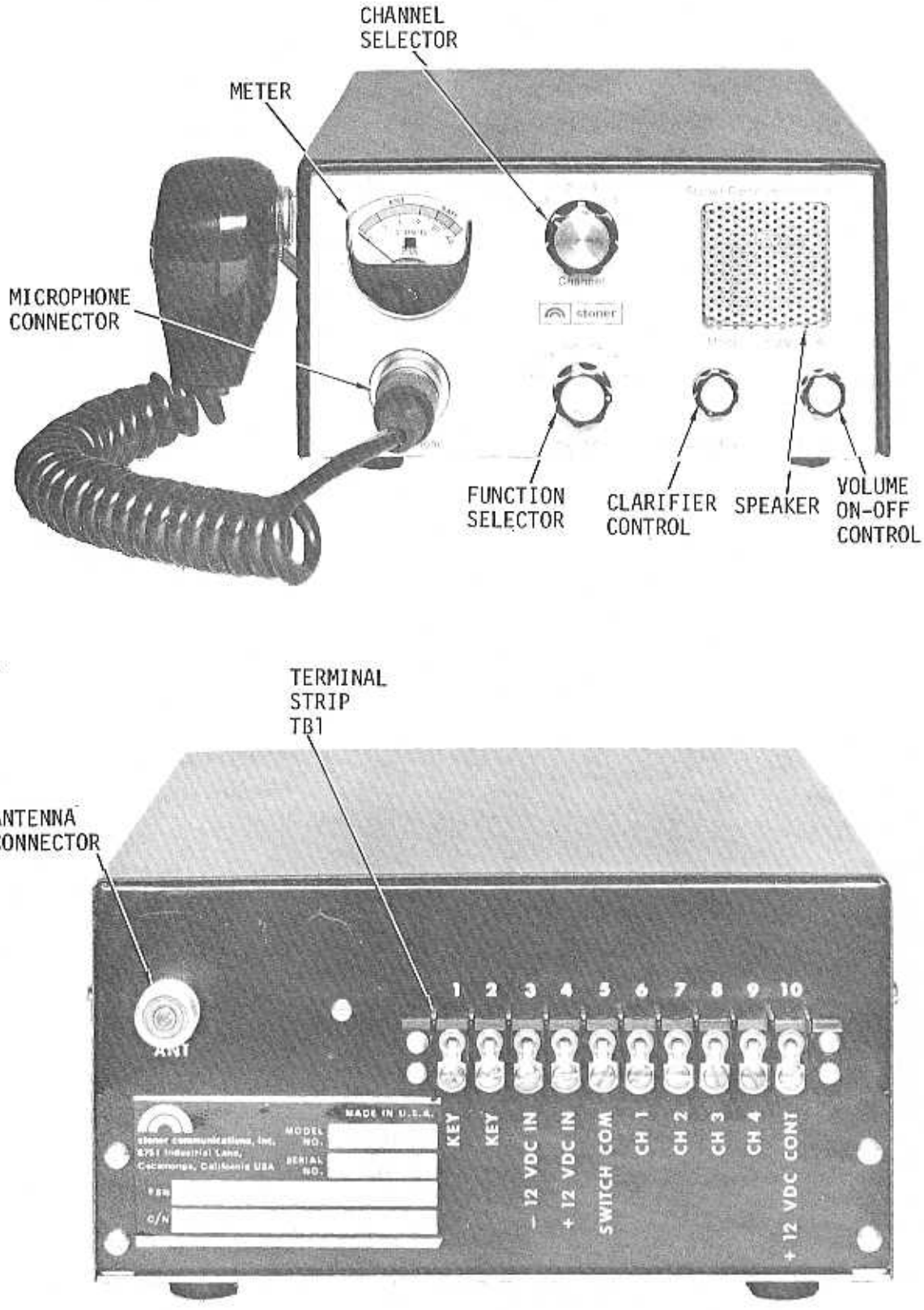


FIGURE 2 - FRONT AND REAR PANEL CONNECTORS, CONTROLS AND INDICATORS

SECTION 5

THEORY OF OPERATION

5-1 GENERAL

The SSB-20A/20MA is a fully transistorized single sideband transceiver designed to operate on up to four channels in the 2 to 8 MHz section of the high frequency spectrum.

Changeover from receive to transmit mode is accomplished electronically in most circuits. The majority of small signal circuits employ identical transistors. The SSB-20A/20MA is divided into two major sections. Circuit board PC-100 which is located below the main chassis and contains all audio i-f, rf, filter circuits, rf modules for transmit and receive functions, the 9 volt regulator, the transmit mixer stage, the receive i-f amplifier stage, the oscillators and the AVC amplifier. The second section circuit board PC-200 contains the transmitter driver stages and class B power amplifier stage. The class B power amplifier transistors are mounted on a metal heatsink plate along with the driver circuitry and components.

In addition to these major sections, the 115/230V ac version has a power supply to convert the 115/230V ac input power to 12V dc for normal operation.

The peak envelope power (PEP) of 15 watts will vary somewhat depending on frequency and battery condition. Various other assemblies are inter-connected with wiring harnesses. The boards may easily be removed for inspection and servicing. Re-channelizing is accomplished by plugging active channel modules and the channel crystal into the circuit board. The channel module is then peaked for maximum output or maximum receive signal depending on whether the set is in transmit or receive mode. The channel module is energized by the application of regulated +9V dc to the input. Each channel module contains a field effect transistor for low noise high gain amplification.

5-2 RECEIVE MODE

5-3 RF Amplification

Signals picked up by the antenna are coupled to the SSB-20A/20MA through the antenna connector. RFC1 is connected between the antenna lead and ground to provide a dc path to ground for antenna static. The signals are passed through the antenna section of relay K201 to pin F on circuit board PC-200. This signal is then applied through pin V on printed circuit board PC-100 to the channel receive module. Protection against excessive rf voltage is provided by diodes CR124 and CR125 connected across the antenna and antenna return connection, pins V and W respectively. Within the channel receive module unwanted signals are rejected and the receive signal is amplified and coupled out of the channel module through capacitor C102 to the

base of transistor Q101. The local oscillator signal from transistor Q109 is injected into the emitter of this transistor which hetrodynes the receive signal to the i-f section. The output of this stage passes through T-105 to the i-f and audio section through de-coupling diode CR102. In transmit mode this complete rf/i-f section has the regulated 9V removed thereby making it inoperative.

5-4 I-F Amplification

Signals from the mixer are applied to transformer T-101 and then to the upper sideband (and lower sideband or AM if installed) filter, through resistor R106 and resistor R107. The output from the filters is connected to transistors Q102 and Q103 through resistors R106 and R107. The received signal is then coupled to transistor Q104 through capacitor C113. The signal now enters transformer T102. The output from transformer T102 is coupled to the base of transistor Q119 by capacitor C118. This transistor provides for impedance matching of the received signal. The output of Q119 is direct coupled to transformer T103.

5-5 Local Oscillator

The local oscillator Q109 is common to both the receive and transmit sections of the transceiver and is controlled by the channel crystals. Capacitors C146 through C149 serve to net the equipment by varying the parallel resonant frequency of the crystals slightly.

5-6 Gating Circuits

The terminology up-gate and down-gate is used on the schematic diagrams. Up-gate means that the line indicated is 0 volts on receive and goes to +9 volts on transmit. Down-gate means that the line indicated is +9 volts on receive and goes down to 0 volts on transmit. This is part of the control system for the electronic switching.

5-7 Clarifier

The clarifier circuit permits a slight adjustment of the receiver to permit the transceiver to receive signals clearly from stations that are not exactly on frequency. In operation, diodes CR118 and CR119 are reverse biased and exhibit the characteristics of a variable capacitor. During receive operation, diode CR118 is varied by the clarifier control through its full capacitance range. During transmit, diode CR119 is fixed biased at the center of the capacity range exhibited by diode CR118. Connected in this way, diode CR118 can vary the receive frequency in either direction from the transmit frequency. Diodes CR114 through CR117 are switching diodes and are energized by applying +9 volts to one of the decoupling resistors R151 through R154.

During receive operation one end of the clarifier control is connected to +9 volts and the other end is connected to the up-gate. The wiper is connected to pin B of printed circuit board PC-100. Connected in this manner, the cathode of diode CR118 varies between 0 and +9 volts while the anode is returned to ground. The capacitance of diode CR118 is determined by the clarifier control. At the same time, the cathode

of diode of CR119 is returned to +9 volts while the anode is at ground potential through resistors R155 and R158 and the up-gate causing diode CR119 to exhibit minimum capacitance.

During transmit the up-gate goes to +9 volts dc and the conditions for receive are effectively reversed for transmit. The clarifier now has +9 volts on each end and diode CR118 exhibits a low level of capacitance. The up-gate potential is now +9 volts and is applied through pin J on printed circuit board PC-100 across resistors R157 and R158 which form a voltage divider having approximately 5 volts at their junction. This voltage is applied to the diode CR119 through resistor R155, thereby, establishing the capacitance of this diode at mid-range.

5-8 Audio Amplifier

The audio amplifier consists of a transistor pre-amplifier, transistor Q114, driving a single power transistor, transistor Q115, which in turn drives a push-pull complementary class B output stage consisting of transistors, Q116 and Q117. With this configuration, no transformers are required to drive the speaker. Resistors R181 and R182 provide emitter degeneration and prevent thermal runaway at high voltage and high temperatures. The barrier potential of diodes CR122 and CR123 provide forward bias for transistor Q116. The collector of transistor Q115 is connected to the base of transistor Q117. The collector of Q117 is connected to ground and acts as a complementary resistor to resistor R180. Transistor Q115 is so biased that its collector to ground resistance is exactly 680 ohms. This resistance completes the balance of the class B output stage and the voltage at the junction of resistors R181 and R182 is 6 volts and the supply is 12 volts. As audio is applied to transistor Q115, it changes its internal resistance from a very low value to a very high value which unbalances the class B output stage at an audio rate. The audio signal is coupled to the speaker through capacitor C169 to cause speaker operation. The forward bias for the second pre-amplifier transistor Q115 is obtained at the junction of the resistors R181 and R182. This provides a dc feedback loop and affords excellent dc stability in the presence of high temperature or varying supply voltages.

5-9 Carrier Oscillator

Transistor Q113 functions as the carrier oscillator and is crystal controlled to 1.65 MHz by means of crystal Y105. The exact frequency of the re-inserted carrier may be adjusted by varying capacitor C158. In transmit condition the carrier energy is coupled to the balanced modulator product detector through C132. The balanced modulator suppresses the carrier in transmit mode and re-injects the carrier in the receive mode.

5-10 TRANSMIT MODE

5-11 Sideband Generation

In the transmit mode when the push-to-talk switch on the microphone is pressed, relay K201 is energized causing the up-gate to go to +9 volts dc and an audio signal is applied to the balanced modulator from the microphone amplifier. The carrier signal from carrier oscillator transistor Q113 is applied to the balanced modulator through the carrier balance

potentiometer R132. When this potentiometer and capacitor C123 are perfectly balanced, the carrier voltage appearing across the secondary of transformer T103 is supressed by as much as 60 dB. When speech information is applied to the balanced modulator the bridge formed by the diode bridge CR110 through CR113 becomes unbalanced and the two sidebands appear across transformer T103. This signal is coupled to the input of the i-f amplifier for elimination of the unwanted sideband.

5-12 Audio Input

The microphone incorporates a dynamic variable reluctance element. The voltage developed by the microphone is amplified by transistor Q112 to modulate the balanced modulator. The audio voltage from the microphone is coupled to the microphone amplifier by resistor R144. The amplified signal is applied to the balanced modulator through resistor R171 and capacitor C131. This audio signal modulates the balanced modulator at an audio rate generating the double sideband suppressed carrier component.

5-13 I-F Amplifier

A double sideband signal is fed to the emitter of transistor Q120 through transformer T103. The output of Q120 is then fed to the filter input through a tap on the secondary winding of transformer T101. The signal passes from transformer T101 to the filter through resistors R106 and R107. As the double sideband signal passes through the filter one of the sidebands is removed. From the filter, the signal is coupled by resistors R109 and R110 to the base of transistors Q102 and Q103. Transistors Q102 and Q103 select the filter desired. The unwanted transistor is biased off providing up to 50 dB of isolation between the two filters.

5-14 Transmitter Mixer

The 1.65 MHz i-f signal is coupled to transistor Q110 through capacitor C154. Transistor Q110 is a mixer with the local oscillator input injected into the emitter. The output of Q110 is disabled on receive by the up-gate. The channel module amplifies and passes the desired signal to the transmitter preamplifier.

5-15 Linear Amplifier

Following the channel module, the signal is amplified by a broadband two-stage preamplifier. Transistor Q201 operates as a class A amplifier and is forward biased by resistors R202 and R203. Transformer T201 is an impedence matching device to couple the output of the channel module to the low input impedence of transistor Q201. Transformer T202 converts the single ended output of transistor Q201 to a push-pull signal suitable for driving the class B amplifier stages consisting of transistors Q202 and Q203. Transistors Q202 and Q203 provide sufficient rf energy to drive the power amplifiers, transistors Q204 and Q205 to the 30 watt output level. The amplified signal appears across capacitors C216 through C219. The output capacitor value is fixed at the correct

value for matching to a 50 ohm transmission line. The output signal passes through the antenna section of relay K201 and the current sampling transformer T205. A pickup coil wound on the core receives induced rf voltage which is rectified by diode C201 and filtered by capacitor C220. This voltage is used to actuate the meter on transmit and indicates proportional antenna current. As the operating frequency goes higher, more coupling occurs and the meter will read higher than it does at the lower frequencies.

5-16 Tone Oscillator

A tone oscillator is installed in the SSB-20A and SSB-20MA to facilitate tuning the antenna and for CW operation. This circuit consists of phase shift oscillator Q108 and emitter follower Q107. The phase shift network, consisting of capacitors C136, C137 and C138 and resistor R141, R142 and R143, creates a phase shift of 180° at 1,000 Hz. This, coupled with the 180° phase shift in transistor Q108 causes the circuit to oscillate at a frequency of approximately 1,000 Hz. The signal is applied to the base of transistor Q107 which matches the tone oscillator to the microphone circuit. Through the SSB modulating process the tone is converted to a pure CW note which is radiated by the antenna.

A sidetone is taken from the output of the tone oscillator emitter follower stage and fed into the audio amplifier so that the CW signal may be monitored on the loudspeaker. Potentiometer R136 adjusts the level of audio going into the balanced modulator establishing the power output for CW and tune operation. To operate the SSB-20A on CW, it is necessary to rotate the function switch to CW position to transmit, and back to USB (or LSB, if lower sideband is used) for receive.

5-17 Function Switch

Section A of SW1 connects the meter to measure battery voltage in the BATT position. Resistor R1 converts the meter to read 15 volts full scale. In positions 2-5, the meter reads antenna current on transmit and relative signal strength on receive. Section C of SW1 determines which sideband is received by the application of bias to either the USB, or LSB transistor amplifier. This switch section is wired to transmit CW on upper sideband; that is, the CW note is displaced approximately 1,000Hz above the suppressed carrier frequency. If lower sideband CW is desired on a USB/LSB equipped set, (or with LSB only), this switch must be reconnected, as shown by the dotted lines in the schematic diagram. Section B of SW1 connects the relay K201 coil, to the minus buss in TUNE and CW position. In all other positions, the relay coil goes to the microphone connector for keying by the microphone. SW1 section is the audio selector switch for AM (if installed), or SSB (USB, or LSB). SW1 section switches the voltage to the carrier oscillator (Q113). Section F of SW1 allows the tone oscillator to be keyed in CW position and keys the tone oscillator on in TUNE position.

SECTION 6

MAINTENANCE AND REPAIR

6-1 GENERAL MAINTENANCE PROCEDURES

It is not recommended that the SSB-20A/20MA be frequently dismantled for inspection. Experience has shown that most failures result from unnecessary handling. Therefore, unless the set has been submitted to severe environmental conditions, the following procedures constitute a satisfactory inspection. These inspections should be carried out either monthly or weekly depending on usage.

(1) Inspect exterior of the equipment. Clean dirt and moisture from equipment surface. Use a clean cloth slightly dampened with water.

(2) Inspect controls for normal operation and for looseness. When tightening knob retainer screws, hold knob firmly so that torque is not transmitted through shaft.

(3) Inspect antenna for breaks, loose antenna connections or evidence of strain.

(4) Check battery condition.

(5) Insure that microphone connection is tight.

Most problems encountered with the SSB-20A/20MA result from one of following conditions:

(1) Loose or disconnected power connections.

(2) Improperly connected or damaged antenna.

(3) Improperly connected microphone.

(4) Improper tuning.

These conditions occur most frequently with items that receive heavy use in the field.

6-2 PRINTED CIRCUIT REPAIR AND TRANSISTOR REPLACEMENT

The base material in Stoner printed circuit boards is epoxy fiberglass and is virtually indestructable. The board is made by etching away metal and not by printing, as the common name "printed circuit" implies. The advantage of such construction is ruggedness, elimination of wiring errors reproducibility and accessibility of components.

Replacing components on the board is not difficult but care must be exercised to avoid overheating the thin plated copper foil. If the lines which form the circuit get too hot, they will overheat the bonding material and separate from the board. After completing repairs, check the reworked circuit boards to see that solder has not splashed and bridged two or more circuit lines.

Replace two lead components (such as resistors or capacitors) by alternately heating the two wire leads while simultaneously pulling on the part with needle nose pliers.

The same technique should be used on three or four lead components (such as transistors or coils). Rocking the part while heating the terminals will usually speed the removal process. Integrated circuits may be removed by using a piece of small wire braid to "wick" the solder from the foil on the back of the board where the integrated circuit leads pass through. Do not use excessive heat as the foil may be lifted from the board.

The hole in the circuit board, through which the lead has passed should be cleaned out with a sharp pointed instrument to facilitate insertion of the replacement part.

If the foil is lifted due to excessive heat, it can be repaired by cutting off the loose section and carefully replacing it with a jumper wire. A break in the foil may be repaired in a similar manner. Lay a piece of wire across the break in the foil and flow solder around the conductor.

Although it seldom happens with epoxy fiberglass circuit boards, occasionally fine hairline cracks can appear on the foil due to excessive stress on the board. This condition usually causes intermittent operation. These cracks are difficult to locate even with a magnifying glass. Continuity testing with an ohmmeter and flexing of the board will reveal the defect. When the break is located, it can be repaired in the same manner as with a more visible crack.

A similar trouble can also be caused by a poor solder joint where the wire passes through the board. This type of circuit defect is also not very likely, however, since the circuit board undergoes many separate visual inspections and electrical tests.

Use caution when making voltage measurements to avoid shorting a transistor element to ground or adjacent circuitry.

Most important, verify that a defective component in the circuit did not cause the original transistor failure.

Never remove or insert a transistor with power applied to the circuit. Current or voltage surges can damage transistors.

Solder and unsolder transistors quickly to avoid damage due to excessive heat. Use a small iron such as a quick heat gun or small pencil iron.

Be careful to insert the replacement transistor correctly. Reversing leads can destroy a good transistor due to reversed polarity or excessive voltage.

6-3 FAULT ISOLATION

Most fault isolation procedures require that the top and bottom covers of the transceiver be removed. Prior to removal of these covers, verify that all connections are properly connected.

6-4 PRELIMINARY PROCEDURES

(1) Remove four screws on each side of the cover and pull cover toward front of transceiver slightly and lift up at rear to remove.

(2) Visually inspect top of set for obvious damage, such as burned resistors or capacitors or other apparent damage.

(3) Turn set upside down and remove screws holding bottom cover in place and remove cover.

(4) Visually inspect interior of bottom of set for obvious damage such as burned resistors or capacitors or other apparent faults.

(5) Repair or replace any faulty parts observed in steps 2 and 4.

6-5 Equipment Required for Fault Isolation

(1) Signal generator terminated with 50 ohm resistor.

(2) Volt/ohm meter, 20,000 ohms per volt (VOM).

(3) Vacuum-tube voltmeter (VTVM).

6-6 Polarity Protection and Leakage Check

(1) Set volt/ohm meter to R X 100 scale.

(2) Disconnect transceiver power cable from power source.

(3) Rotate VOLUME ON-OFF control clockwise to turn set on.

(4) Connect the positive lead of the volt/ohm meter to the red clip on the power cable. Connect the negative lead of the volt/ohm meter to chassis ground. Indication should be greater than 3K ohms.

6-7 Voltage Checks

(1) Connect test power cable to 12V dc power supply.

(2) Place FUNCTION switch in BATT position and note meter reads near center of green portion of scale. Return FUNCTION switch to USB (or LSB, if LSB only) position.

Application Data
Stoner Communications, Inc.
8751 Industrial Lane
Cucamonga, California 91730 USA

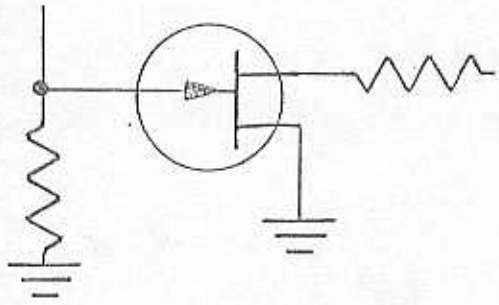
MARCH 1969

MANUAL AFFECTED: Maintenance Manual Model SSB-20A and SSB20MA

SUBJECT: INCREASE IN AUDIO FIDELITY:

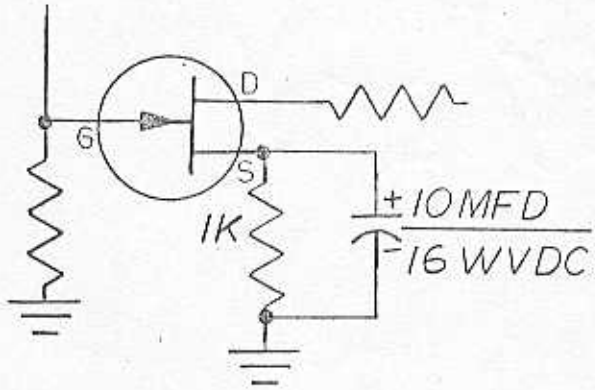
It has been found that a increase in audio fidelity can be achieved with the following change.

MPF-103 (Q112)



CHANGE TO MPF-106/2N5484

Requires adding 1k resistor and 10mf/16v capacitor.



To install, cut foil between source and ground. Drill holes across break with 1/2" spacing, wrap leads and insert. Alternately drill 4 holes and mount side by side.

ECO 1040

INTEGRATED CIRCUIT VOLTAGE CHART

RECEIVER

	1	2	3	4	5	6	7	8
Q 105	0	0	1.5	1	1.5	8.5	8.5	8.5
Q 118	6.5	6.5	6.5	6	6.5	12	12	12

INTEGRATED CIRCUIT VOLTAGE CHART

TRANSMIT

	1	2	3	4	5	6	7	8
Q 105	1.5	1.5	0	1	0	8.5	7.75	8
Q 118	6.5	6.5	6.5	6	6.5	12	12	12

FET VOLTAGE CHART IN RECEIVE POSITION

	S	D	G
Q 112	0	0	0

FET VOLTAGE CHART IN TRANSMIT POSITION

	S	D	G
Q 112	0	4	0

S = Source
D = Drain
G = Gate

TRANSISTOR VOLTAGE CHART

RECEIVE POSITION

	E	B	C
Q 101	.5	.8	6
Q 102	1.1	1.7 USB	7.00
Q 103	1.1	~~1.7~~ .1 LSB	7.00
Q 104	1.75 *	2. *	7.8 * (note * with vol full on only)
Q 105	SEE INTEGRATED CHART		
Q 106	~~.59~~ 1	~~.35~~ 1	~~6.25~~ 0–9 v w vol control adj.
Q 107	3.5	4	8.5
Q 108	1	1.5	4
Q 109	1.8	1.75	8.5
Q 110	0	0	0
Q 111	12.6	11.6	9.00
Q 112, FET	0	0	0
Q 113	1.50	1.5	8.
Q 114	1.25	1.9	6.25
Q 115	1	1.5	6
Q 116	7	7.5	12
Q 117	7	6.2	0
Q 118	SEE INTEGRATED CHART		

TRANSISTOR VOLTAGE CHART

TRANSMIT POSITION

	E	B	C
Q 101	0	0	0
Q 102	1.5	3.5	6.75
Q 103	1.5	0	6.75
Q 104	2	2.5	7.50
Q 105	SEE INTEGRATED CHART		
Q 106	.8	.2	8
Q 107	3.75	4	8.5
Q 108	1	1.5	4
Q 109	1.2	1.75	8.5
Q 110	0.40	1.	7.4
Q 111	12.6	12	9.0
Q 112, FET	0	0	4
Q 113	1.5	1.5	8
Q 114	0 1.15	1.55 0	6.65 0
Q 115	.8	1.5	6
Q 116	6.75	7.25	12
Q 117	6.75	6	0

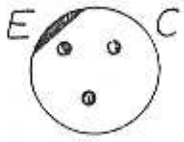
All readings taken with minus lead of voltmeter to terminal 3 on rear of SSB-20A or pin 1 or power plug on front of SSB-20MA.

SECTION 11

TEST DATA

Transistor connections as viewed from top of PC board.

SE 2350

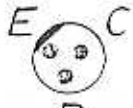


NPN TRANSISTOR

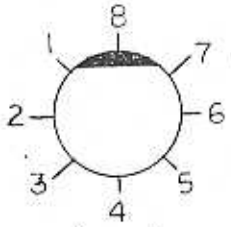
SE 2351

PNP TRANSISTOR

SE 2349



NPN TRANSISTOR



(IC)

INTEGRATED CIRCUIT

YELLOW Q105

BLUE Q118

(FET)

FIELD EFFECT TRANSISTOR

E = EMITTER
B = BASE
C = COLLECTOR

ON SSB20MA READINGS ARE MADE FROM FRONT PLUG

GND. = PIN 1
+ = PIN 2

(3) Measure voltage at collector of transistor Q121. Voltage measured should be 9.5 volts dc ±0.2 volts.

(4) Measure voltage at junction of C169, R181 and R182. It should measure 6 volts, ±1.0 volts.

(5) Connect ac probe of VTVM to emitter lead of transistor Q113. The meter should read at least 0.5 volts.

(6) Connect ac probe of VTVM to Pin #4 of circuit board connector. The meter should read at least 0.5 volts on all channels.

(7) Check voltage at junction of R101 (10K) and C102. Turn CHANNEL switch through all functioning channels. The voltage should not be less than 7.0 volts.

(8) Measure voltage on cathode lead of the output diode of any transmit channel module. Turn bandswitch through all functioning channels. The voltage should not be less than 7.0 volts.

6-8 Quick Checks

Once the polarity protection, leakage and voltage checks have been completed, the following quick checks will give a comprehensive indication of performance of several circuits.

(1) Hold the metal part of a screwdriver and touch one of the leads of capacitor C133. A buzz or click should be heard in the speaker. This indicates that the audio stages are working.

(2) Hold the metal part of a screwdriver and touch one end of resistor R109 or R110 and rotate the volume control to full clockwise position. If the i-f stages are working properly, several broadcast stations or considerable static should be heard in the speaker.

(3) Insert screwdriver in antenna jack J1. The transceiver is sufficiently sensitive to pick up static or stations with no more antenna than this. By following the fault isolation procedures outlined in the previous paragraphs and by studying the theory of operation section, a technician should be able to isolate any problem that would be likely to occur in the SSB-20A/20MA transceiver.

6-9 ALIGNMENT PROCEDURES

6-10 Required Test Equipment

The following equipment is necessary to perform alignment procedures on the SSB-20A/20MA transceiver:

(1) Frequency Counter - Monsanto Model 100A or equivalent.

(2) Oscilloscope - Tektronix Model 515A or equivalent.

(3) Signal Generator - Clemens Model SG-83A terminated with 50 ohm resistor.

(4) Termination Wattmeter - 50 ohms, Waters No. 334 or equivalent.

(5) Two-Tone audio generator - Stoner Model TE-10 - or equivalent.

(6) Vacuum tube voltmeter (VTVM) - HP Model 410B or equivalent.

6-11 RECEIVER ALIGNMENT

The following procedure must be accomplished for proper alignment of the SSB-20A/20MA receiver section:

6-12 I-F Alignment

(1) Connect AC probe of VTVM to the plus end of capacitor C169 and chassis ground.

(2) Set VTVM to 3 volts AC scale.

(3) Rotate VOLUME control ON-OFF switch to full clockwise position.

(4) Connect signal generator in CW mode to base of transistor Q101 through capacitor C102. Signal generator case must be connected to chassis ground.

CAUTION

Do not connect signal generator directly to base of Q101.

(5) Connect frequency counter to junction of resistor of R169 and capacitor C132 on circuit board PC-100.

(6) Adjust variable capacitor C158 to obtain an indication of 1650.00 KHz plus or minus 10 Hz (this is the carrier frequency).

(7) Connect frequency counter to plus end of capacitor C169 and chassis ground.

(8) Set signal generator to approximately 1650 KHz and adjust for a 1000 Hz audio note as indicated in the frequency counter.

(9) Adjust coils of i-f transformers T101, T102, T103, and T104 for a maximum reading on the VTVM. (Reduce signal generator output as necessary to keep VTVM reading at 1 volt or less).

(10) Disconnect all test equipment.

6-13 RF Alignment

(1) Rotate VOLUME control to the full clockwise position.

(2) Rotate AVC set control, potentiometer R128 to the fully clockwise position to disable AVC.

(3) Connect signal generator to antenna connector J1.

(4) Connect VTVM and frequency counter to plus side of capacitor C169.

(5) Adjust signal generator to channel 1 frequency for an audio note of 1000Hz and an audio output of 1 volt on VTVM.

(6) Adjust transformers L501, L502 and L503 on channel 1 module for a maximum reading on VTVM (reduce signal generator output level as necessary to keep reading at one volt on VTVM).

6-14 Sensitivity Verification

(1) Adjust signal generator output for 1 uV and set the frequency to produce a beat note of approximately 1000 Hz.

(2) Adjust VOLUME control to obtain a reading of 1 volt on VTVM.

(3) Detune signal generator and note that the VTVM indication drops to less than .3 volts.

6-15 Image Verification

(1) Adjust the signal generator and VOLUME control as in the previous procedure.

(2) Tune signal generator 3.3 MHz higher than the channel frequency.

(3) Increase signal generator output as required to locate signal, then reduce audio output to 1 volt. The signal generator should read greater than 1 mV. (plus 60 db).

6-16 A.G.C. Adjustment

(1) Connect oscilloscope between positive end of capacitor C169 and chassis ground.

(2) Adjust oscilloscope for an audio frequency display (1m sec/cm).

(3) Adjust the signal generator for a 0.1 volt signal at the channel frequency with a tone frequency of approximately 1000 Hz.

(4) Turn VOLUME control to the full clockwise position.

(5) Adjust AGC potentiometer R128 for 2.8V audio output on the VTVM.

(6) Verify that oscilloscope wave form is not distorted.

(7) Remove oscilloscope and adjust signal generator to the 1.0 uV level.

(8) Verify that VTVM reading has not dropped below 1 volt.

(9) Apply a 4 uV signal and note audio output level.

(10) Increase signal generator to 0.1 uV. The audio output should not rise above 2.8V (plus 10 dB).

6-17 Clarifier Control Verification

Rotate CLARIFIER control and note that audio pitch changes in frequency.

6-18 Sideband Suppression Verification (USB and LSB filters installed)

(1) Place FUNCTION switch on USB position.

(2) Set signal generator for 1 uV and vary the generator frequency for a beat note of 1000 Hz.

(3) Adjust VOLUME control for a reading of 1 volt on VTVM.

(4) Increase signal generator output by 40 dB and switch to LSB. The VTVM reading should drop to less than 1 volt.

(5) Reduce signal generator output by 40 dB.

(6) Retune signal generator for 1000 Hz beat note and reset VOLUME control for 1 volt on VTVM.

(7) Increase signal generator output to +40 dB and switch to USB. The VTVM should read less than 1 volt.

6-19 Sideband Suppression Verification (One filter installed)

(1) Set signal generator for 1 uV and vary signal generator frequency for a beat note of 1000 Hz.

(2) Adjust VOLUME control for a reading of one volt on VTVM.

(3) Increase signal generator output by plus 40 dB.

(4) Slowly detune the signal generator through 0 beat to the area of the opposite sideband and set frequency for a beat note of 1000 Hz. The VTVM should read less than 1 volt.

6-20 Additional Channels

Repeat alignment procedures for each channel. Remove all test equipment upon completion of receiver alignment.

6-21 TRANSMITTER ALIGNMENT

6-22 Procedures Using Two-Tone Generator

(1) Connect a 52 ohm dummy load to the antenna connector of the SSB-20A/20MA.

(2) Connect two-tone generator to microphone input connector across pin 1 (high) and pin 2 (low) and set level of each tone to 40 mV rms.

(3) Connect VTVM and oscilloscope to T fitting installed on wattmeter.

(4) Connect jumper across pin 3 and pin 2 of microphone connector J2 to key transceiver.

(5) Tune transformers T601, T602, T603 and adjust R605 on the transmit channel 1 module as well as the power amplifier resonating capacitor (C216 for channel 1) for maximum indication on the oscilloscope and wattmeter. If wattmeter power indication exceeds 6 watts, detune T602 for less than a 6 watt indication until other adjustments are optimized. Finally, set power level or wattmeter at 6 watts by adjustment of T602. Repeat procedure for each active channel.

(6) Remove two-tone generator and adjust both carrier balance controls R132 and C128 for null on the VTVM.

NOTE

It may not be possible to completely balance out carrier due to excessive module gain. If the carrier cannot be reduced to less than 0.3V rms, it indicates that the transceiver is self oscillating due to excessive module gain. Detune center coil of channel module to reduce the reading to below 0.5V rms.

6-23 Procedures Without Two-Tone Generator

For correct transmitter tuning, a two-tone test signal must be used. This is simulated by inserting carrier along with the built-in test tone signal as follows:

(1) Connect VTVM to wiper of TUNE LEVEL potentiometer R136.

(2) Place CHANNEL switch on channel 1 and FUNCTION switch in TUNE position.

(3) Adjust potentiometer R136 for 0.3 volts rms.

NOTE

Tune level adjustment should be adjusted in a blank channel position (Remove channel module if necessary).

(4) Adjust transformer T602 in a clockwise direction for a reading of 6 watts power output.

(5) Tune transmitter power amplifier resonating capacitor (C216 for channel 1) for maximum output.

(6) Readjust T602, if necessary, to maintain 6 watts power output.

(7) Repeat steps 4 through 6 on all installed channels then return to channel 1.

(8) When power amplifier tuning is complete reduce power output to 3 watts by adjusting T602.

(9) Place FUNCTION switch in USB position (or LSB, if LSB only).

(10) Depress push-to-talk button and unbalance carrier for a reading of 3 watts.

(11) Release push-to-talk button and place FUNCTION switch in TUNE position.

(12) Synchronize two-tone pattern on oscilloscope and adjust transmitter power output on the wattmeter. The wattmeter should read 4 to 5 watts indicating a peak envelope power of 10-12 watts. The waveform while slightly distorted (due to tone oscillator output being distorted) should show no evidence of regeneration or flat-topping. Whistling into the microphone should produce over 12W on wattmeter.

6-24 Carrier Balance Verification

(1) Connect jumper across pins 3 and 2 of microphone connector J2.

(2) Balance out carrier by alternately adjusting the potentiometer R132 and capacitor C128.

(3) Disconnect jumper, disconnect oscilloscope from T connector on rear of wattmeter, and connect VTVM to the T.

(4) Reconnect jumper across pins 3 and 2 of microphone connector J2 and note that the residual noise output is less than 0.3 volts rms.

6-25 AM Adjustment (if AM filter is installed)

(1) Place FUNCTION switch on AM position and depress push-to-talk button.

(2) Adjust carrier insertion control R135 for a wattmeter reading of 3 watts, on channel 1.

(3) Verify that AM carrier output is the same on the other installed channels.

(4) Return switch to USB position (or LSB, if LSB only).

6-26 CW Operation

(1) Connect key to terminals 1 and 2 of TB1(in jack on SSB-40MA) and place FUNCTION switch in CW position.

(2) Depress key and note a wattmeter reading of approximately 5 watts. A sidetone should be heard in the handset and/or speaker.

(3) Short the key connections (terminals 1 and 2 of TB1) on the rear apron to verify CW operation.

6-27 Microphone

(1) Press push-to-talk button and speak into microphone. With normal speech and lips two inches away from microphone, the peaks of the rf envelope should start to clip on the oscilloscope wave form. The wattmeter should jump to 3-4 watts on voice peaks. Whistling into the microphone should produce over 12 watts on the wattmeter.

6-28 Channel Frequency Adjustment

(1) Unbalance carrier by adjusting potentiometer R132 for approximately three watts power output.

(2) Connect frequency counter through isolating resistor (approximately 6-8 K) to T fitting on rear of wattmeter.

(3) Press push-to-talk button on microphone.

(4) Adjust frequency netting capacitors C146 through C149 to correct channel frequency for each channel within 20 Hz.

(5) Re-adjust potentiometer R132 to rebalance carrier.

NOTE

Measured frequency is actual channel frequency (not crystal frequency which is 1650 KHz higher).

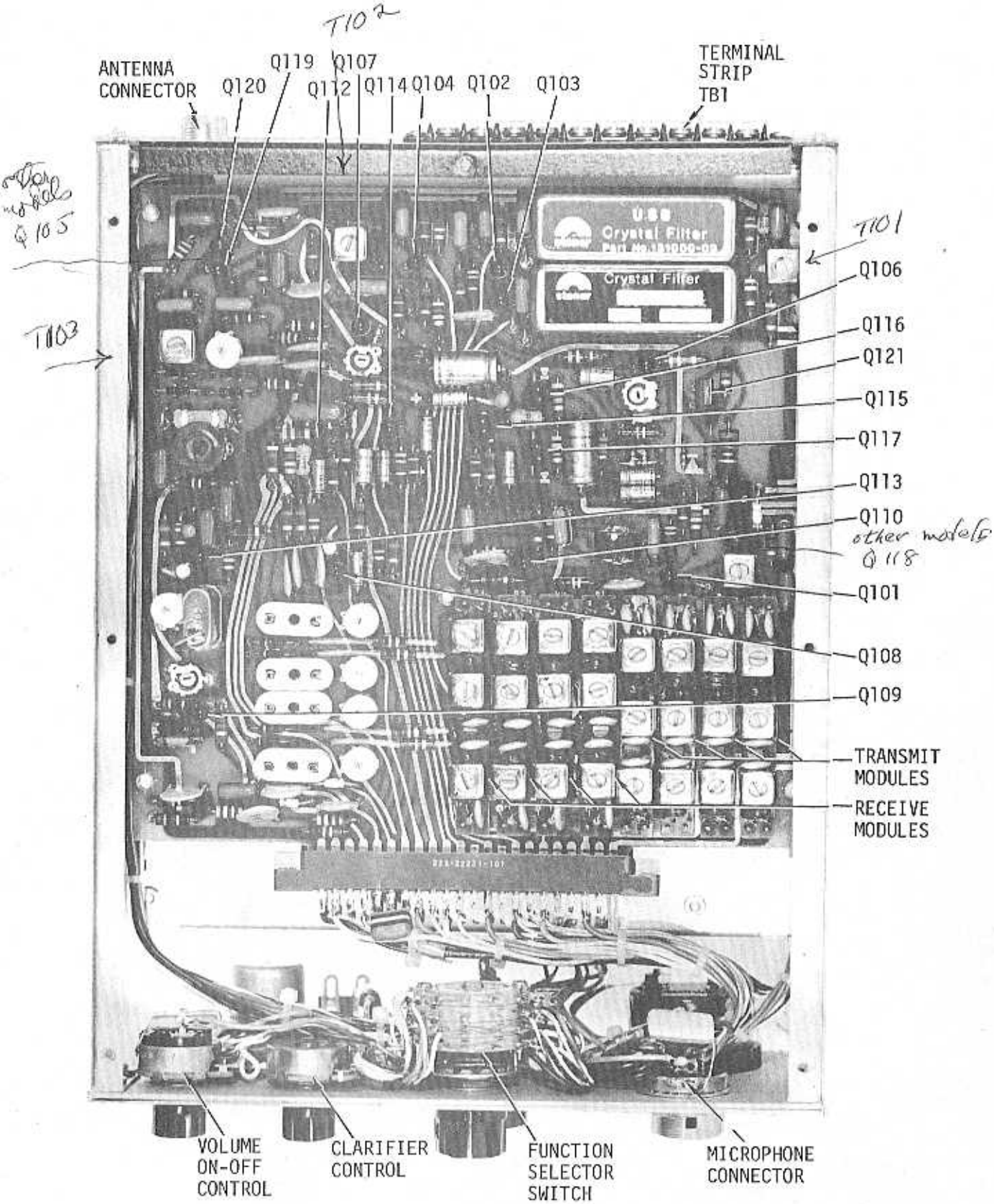


FIGURE 3 - FRONT AND REAR PANEL AND RF, IF, AUDIO ASSEMBLY COMPONENTS

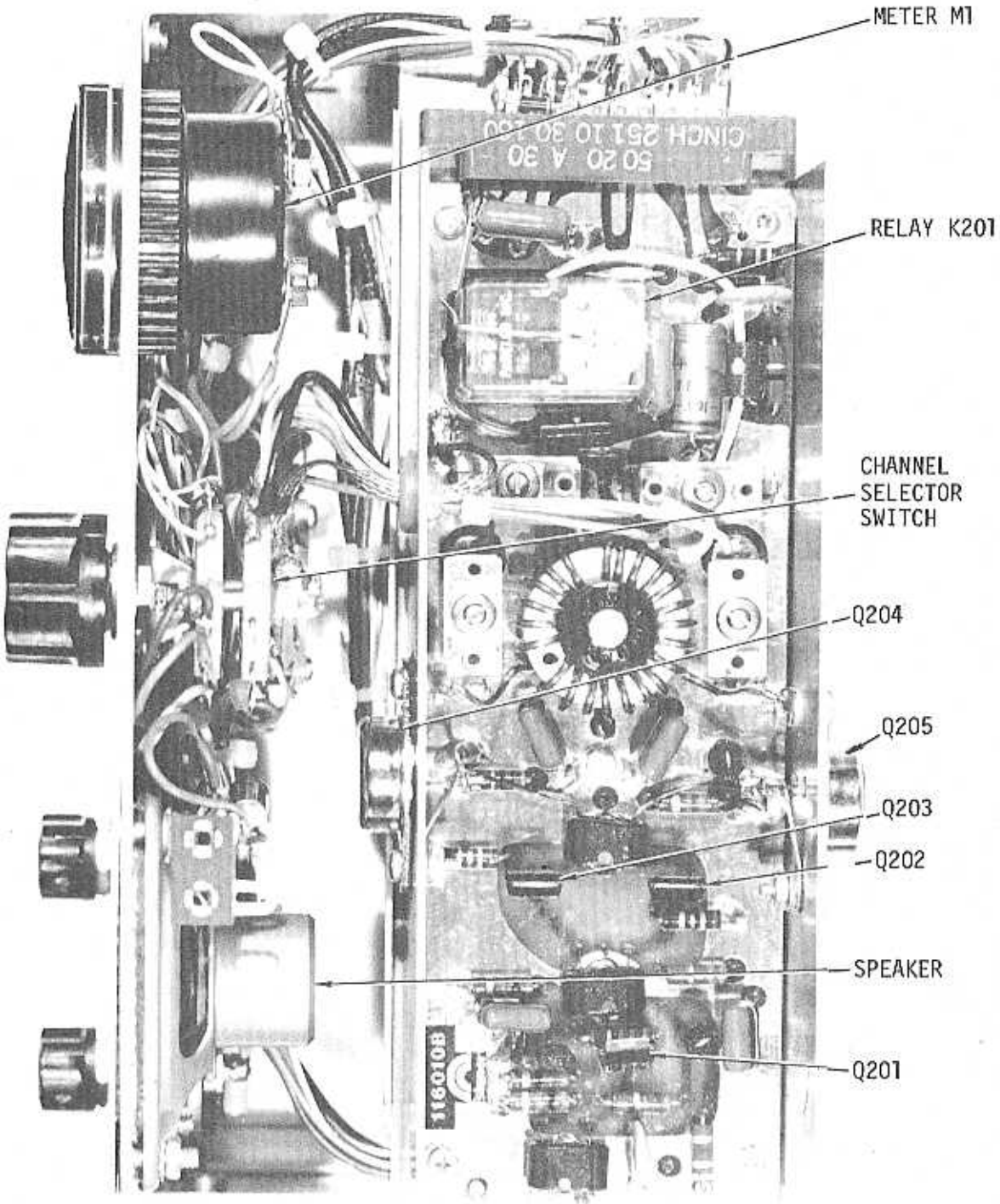
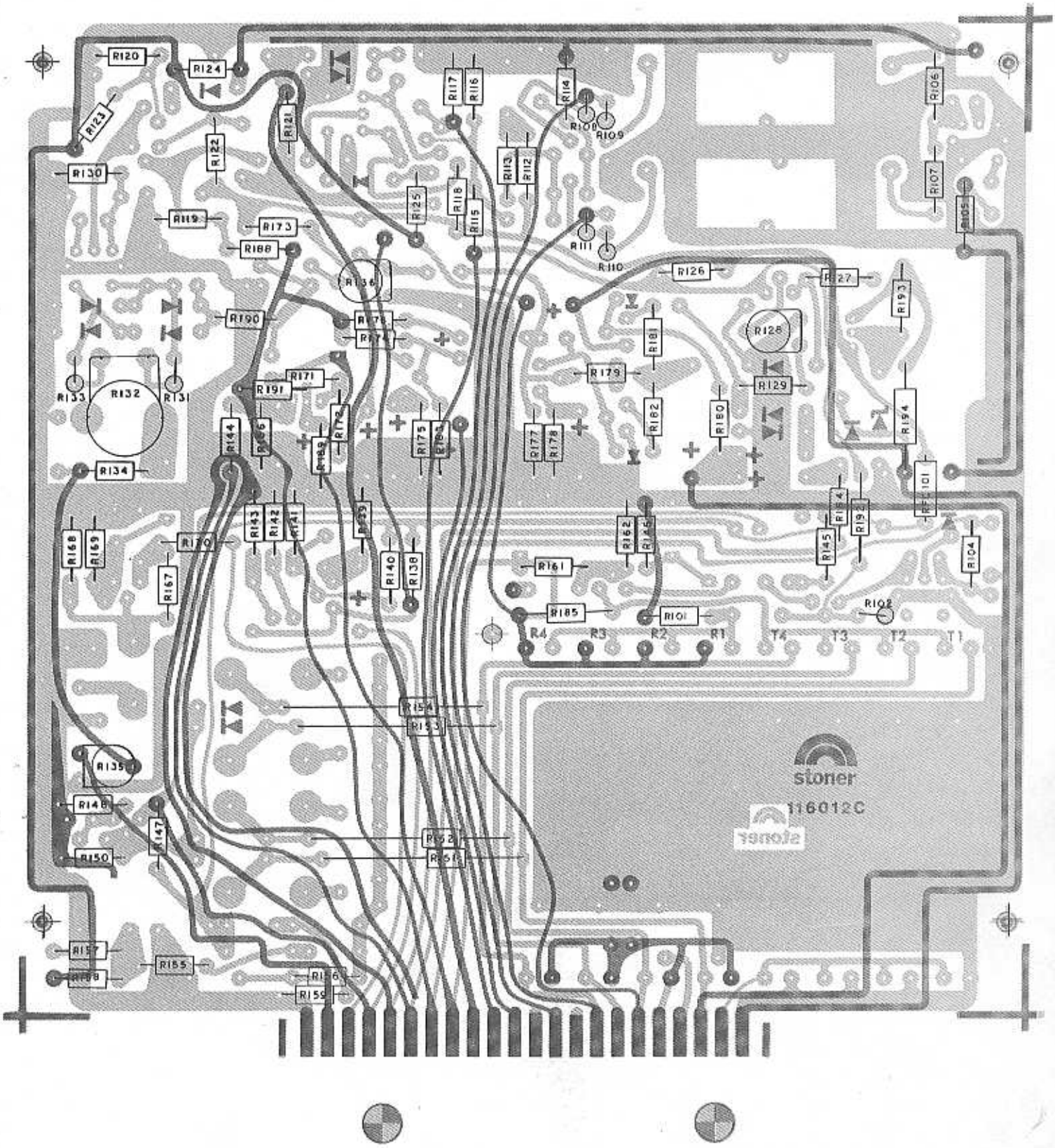


FIGURE 4 - FRONT PANEL AND TRANSMITTER
ASSEMBLY COMPONENTS

FIGURE 5

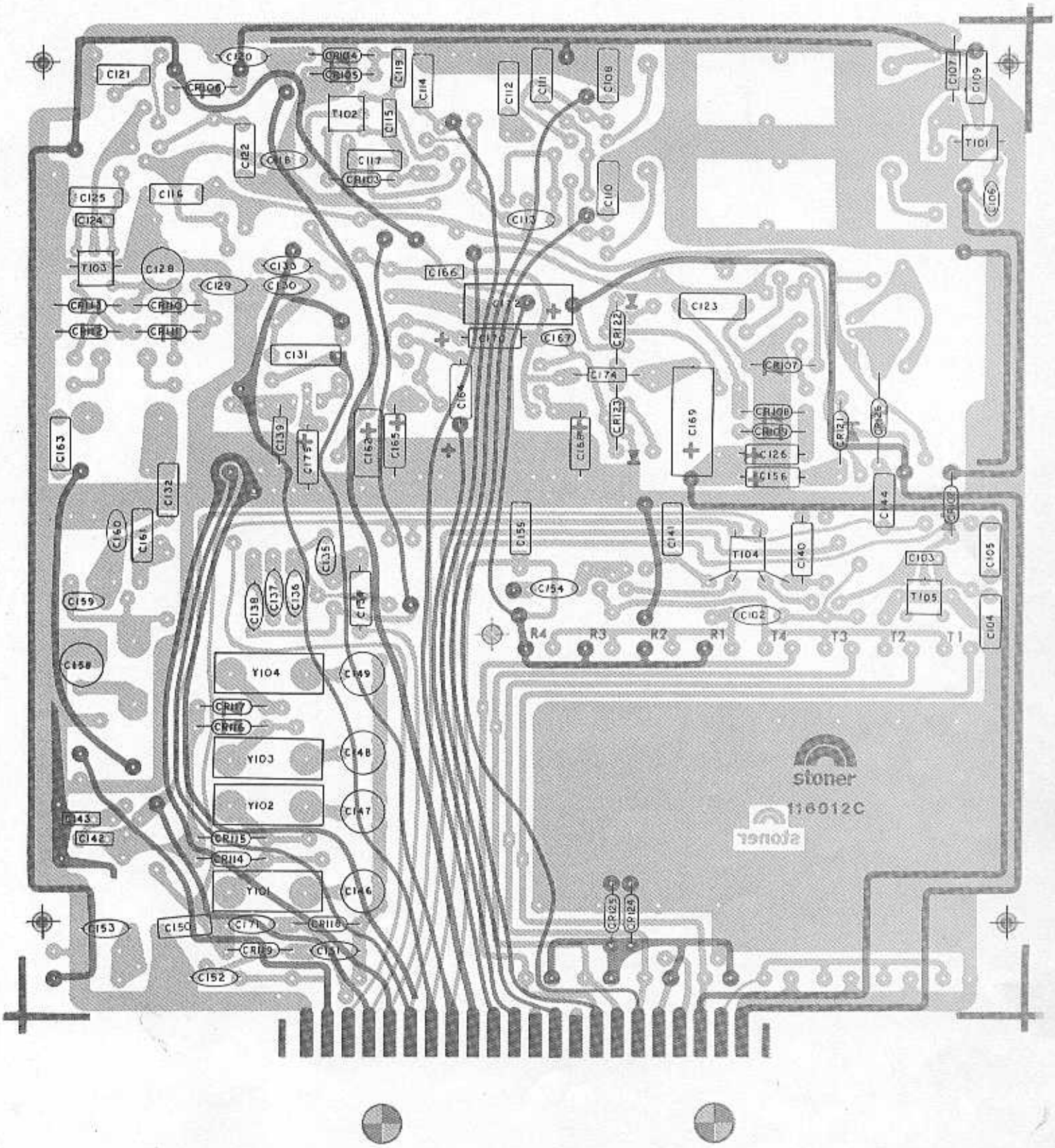
(Viewed from component side
Darker traces on component side)



CIRCUIT BOARD PC 100 RESISTORS

FIGURE 6

(Viewed from component side
Darker traces on component side)



CIRCUIT BOARD PC 100 DIODES, CAPACITORS AND CRYSTALS

The following components shown on Figure 7 are not installed in the SSB-20A or SSB-20MA.

C234

RFC204

SECTION 7

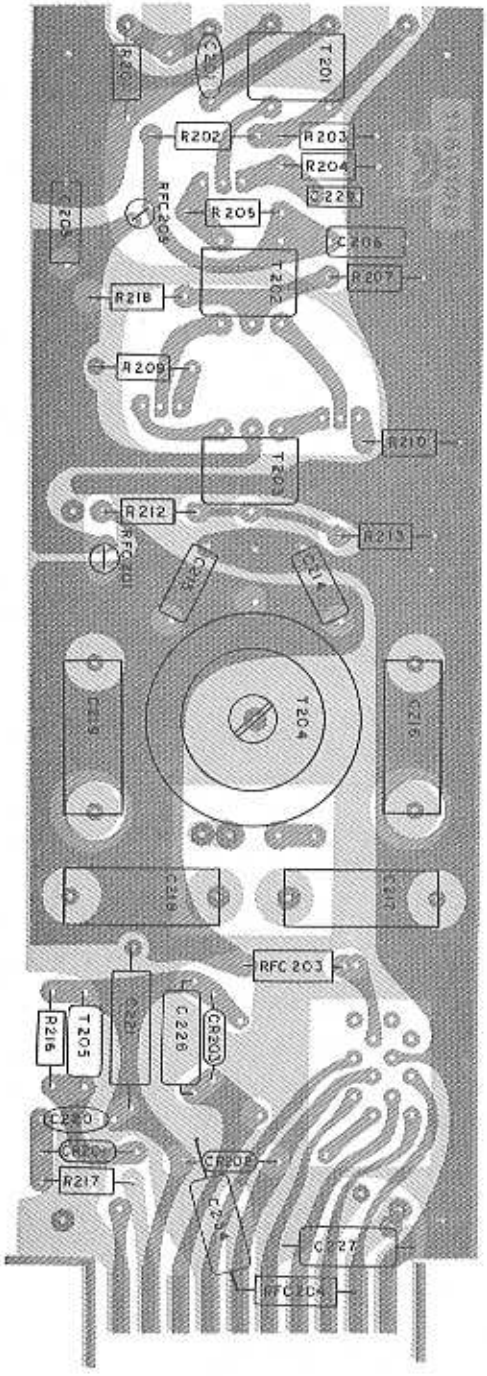
SSB-20A

REPLACEABLE PARTS LIST

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
FRONT AND REAR PANEL COMPONENTS		
C1	Capacitor Elec. 2.5 uF 16Vdcw +50 -10%	4952-205
C2	Not used	
C3	Capacitor Flat Foil .33 uF 250Vdcw 20%	4926-334
C4	Not used	
C5	Not used	
C6	Capacitor Flat Foil .33uF 250Vdcw 20%	4926-334
C7	Capacitor Flat Foil .1 uF 250Vdcw 20%	4926-104
CR1	Diode, Silicon	5410-031
CR2	Diode, Silicon	5410-031
CB1	Circuit Breaker Assy 4 Amp. (for dc version)	126005
CB1	Circuit Breaker Assy 2 Amp. (for ac version)	116053
J1	Connector UHF, Chassis Mount	5110-024
J2	Connector, Plug 8-pin (SSB-20MA only)	5110-029
J3	Connector Microphone Female	5110-031
J4	Phone Jack (SSB-20MA only)	5110-040
J5	Phone Jack (SSB-20MA only)	5110-040
M1	Meter 0-1 MA DC	6110-015
P1	Connector 22 Pin PC Double Row	5110-019
P2	Connector 10 Pin PC Double Row	5110-021
R1	Resistor Comp. 14.3K ohm 1/2W 1%	6335-143
R2/SW4	Potentiometer 100K ohm W/switch	6321-104
R3	Potentiometer 25K ohm Round Shaft	6310-253
R4	Resistor Comp 680 ohm 1/2W 10%	6320-681
RFC1	Choke RF 200 uH	5010-024
SPK1	Speaker 2 1/2" Sq. 16 ohm Mylar	6410-010
SW1	Function Switch Assy	116059
SW2	Switch, Rotary 4 pole 4 pos	6520-002
SW3	Not used	
SW4	See R2	

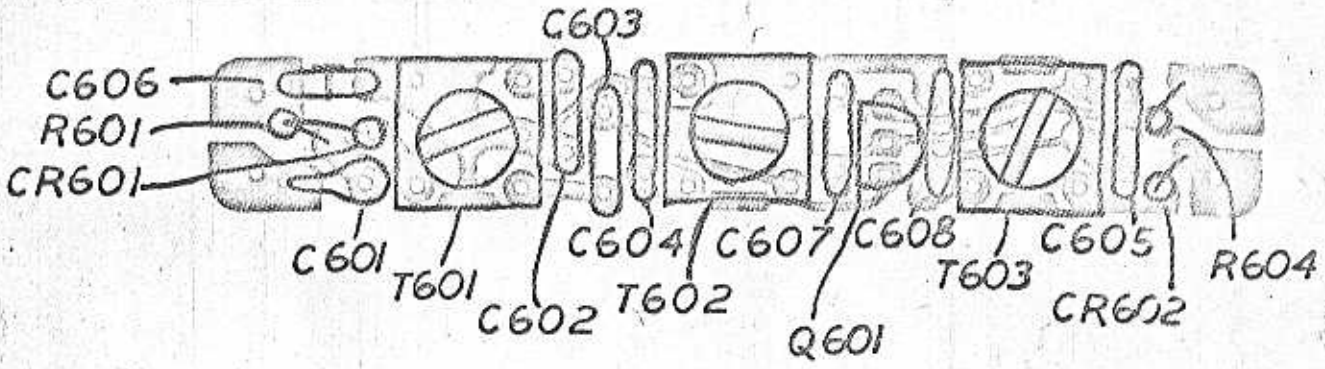
FIGURE 7.

(Viewed from component side
Darker traces on component side)

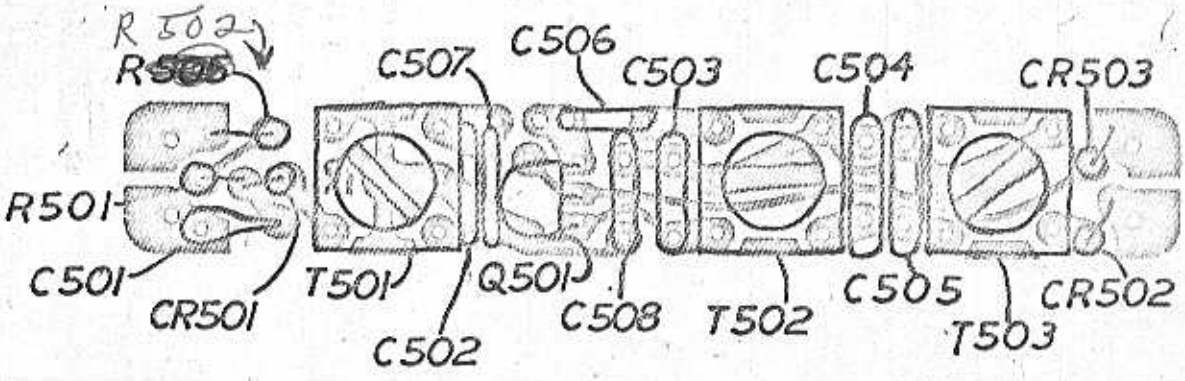


CIRCUIT BOARD PC 200 DETAIL PARTS

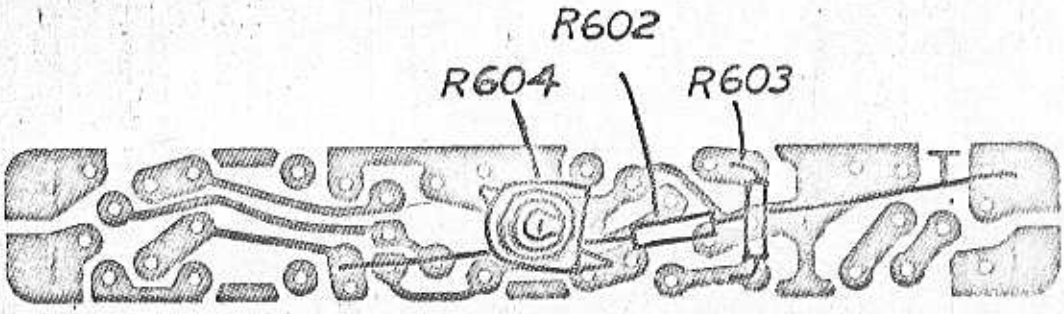
TOP VIEW CHANNEL TRANSMIT MODULE



TOP VIEW CHANNEL RECEIVE MODULE



BOTTOM VIEW CHANNEL TRANSMIT MODULE



BOTTOM VIEW CHANNEL RECEIVE MODULE

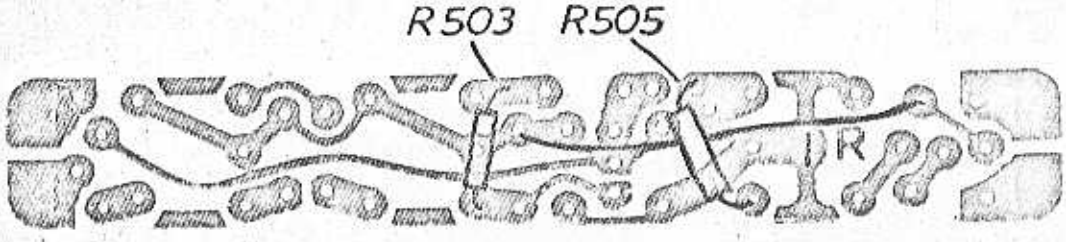


FIGURE 8 - TRANSMIT AND RECEIVE CHANNEL MODULE PARTS LOCATIONS

7-6

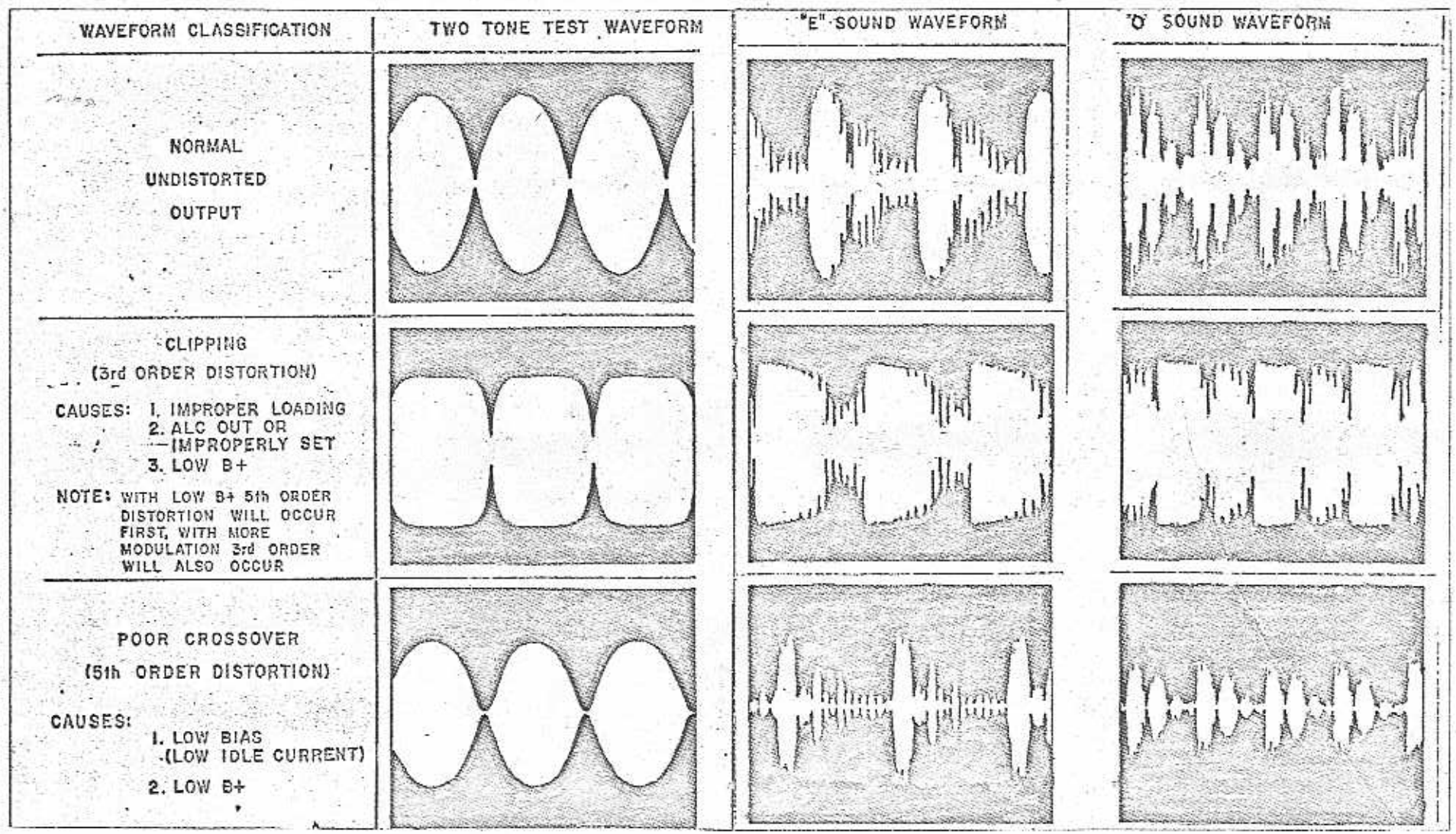


FIGURE 10 - WAVEFORMS

Note TI 1N914B = Stoner 1N662

REPLACEABLE PARTS LIST

REFERENCE DESIGNATION	DESCRIPTION				STONER PART NO.
TB1	Barrier Terminal Block 10 Terminal				6600-010
RF, IF AND AUDIO BOARD					
C101	Not used				
C102	Capacitor Disc. .01 uF	100V	20%		4997-103
C103	Capacitor Mica 250 pF	500V	10%		4910-251
C104	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C105	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C106	Capacitor Disc. .001 uF	500V	20%		4946-102
C107	Capacitor E Filmite .0027uF	200V	10%		4935-272
C108	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C109	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C110	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C111	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C112	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C113	Capacitor Disc. .01uF	100V	20%		4947-103
C114	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C115	Capacitor Mica 250 pF	500V	10%		4910-251
C116	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C117	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C118	Capacitor Disc. .01 uF	100V	10%		4947-103
C119	Capacitor Mica 20 pF	500V	10%		4910-200
C120	Capacitor Disc. .01 uF	100V	20%		4947-103
C121	Capacitor Flat Foil .1 uF	250V	20%		4726-104
C122	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C123	Capacitor Elect. 20 uF	16V	-10	+50%	4952-020
C124	Capacitor Mica 270 pF	500V	10%		4910-271
C125	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C126	Capacitor Elect. 10 uF	16V	-10	+50%	4952-010
C127	Not used				
C128	Capacitor Trimmer 5-60 pF	50V			5000-060
C129	Capacitor Disc. .01 uF	100V	20%		4947-103
C130	Capacitor Disc. .01 uF	100V	20%		4947-103
C131	Capacitor Flat Foil .22 uF	250V	20%		4926-224
C132	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C133	Capacitor Disc. .01 uF	100V	20%		4947-103
C134	Capacitor Elect. 10 uF	16V	-10	+50%	4952-010
C135	Capacitor Ceramic 470 pF	500V	-20	+50%	4920-477
C136	Capacitor Disc. .01 uF	100V	20%		4947-103
C137	Capacitor Disc. .01 uF	100V	20%		4947-103
C138	Capacitor Disc. .01 uF	100V	20%		4947-103
C139	Capacitor E Filmite .0022uF	200V	10%		4935-222
C140	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C141	Capacitor Flat Foil .1 uF	250V	20%		4926-104
C142	Capacitor Mica 250 pF	500V	10%		4910-251
C143	Capacitor Mica 450 pF	500V	10%		4910-451
C144	Capacitor Flat Foil .1 uF	250V	20%		4926-104

REFERENCE DESIGNATION	DESCRIPTION			STONER PART NO.
C145	Not used			
C146	Capacitor Trimmer 5-60 pF	50V		5000-060
C147	Capacitor Trimmer 5-60 pF	50V		5000-060
C148	Capacitor Trimmer 5-60 pF	50V		5000-060
C149	Capacitor Trimmer 5-60 pF	50V		5000-060
C150	Capacitor Flat Foil .1 uF	250V	20%	4926-104
C151	Capacitor Disc. .01 uF	100V	20%	4947-103
C152	Capacitor Disc. .01 uF	100V	20%	4947-103
C153	Capacitor Disc. .01 uF	100V	20%	4947-103
C154	Capacitor Disc. .01 uF	100V	20%	4947-103
C155	Capacitor Flat Foil .1 uF	250V	20%	4726-104
C156	Capacitor Elect. 10 uF	16V	-10 +50%	4952-010
C157	Not used			
C158	Capacitor Trimmer 5-60 pF	50V		5000-060
C159	Capacitor Ceramic 470 pF	500V	-20+50%	4920-477
C160	Capacitor Ceramic .001 pF	500V	-20+50%	4920-108
C161	Capacitor Flat Foil .1 uF	250V	20%	4926-104
C162	Capacitor Elect. 20 uF	16V	-10+50%	4952-020
C163	Capacitor Flat Foil .1 uF	250V	20%	4926-104
C164	Capacitor Elect. 10 uF	16V	-10+50%	4952-010
C165	Capacitor Elect. 40 uF	2.5V	-10+50%	4950-050
C166	Capacitor Mica 620 pF	500V	20%	4910-621
C167	Capacitor Ceramic 2200pF	500V	-20+50%	4920-228
C168	Capacitor Elect. 40 uF	2.5V	-10+50%	4950-040
C169	Capacitor Elect. 125 uF	16V	-10+50%	4952-125
C170	Capacitor Elect. 10 uF	16V	-10+50%	4952-010
C171	Capacitor Disc. .01 uF	100V	20%	4947-103
C172	Capacitor Elect. 125 uF	16V	-10+50%	4952-125
C173	Not used			
C174	Capacitor Foil Film .0022uF	200V	10%	4935-222
C175	Capacitor Elect. 10 uF	16V	-10+50%	4952-010
CR101	Not used			
CR102	Diode Silicon 50 PIV 1 Amp.			5410-031
CR103	Diode Silicon			5410-051
CR104	Diode Germanium			5410-041
CR105	Diode Germanium			5410-041
CR106	Diode Silicon			5410-051
CR107	Diode Silicon 50 PIV 1 Amp.			5410-031
CR108	Diode Silicon			5410-051
CR109	Diode Silicon			5410-051
CR110	Diode Germanium			5410-041
CR111	Diode Germanium			5410-041
CR112	Diode Germanium			5410-041
CR113	Diode Germanium			5410-041
CR114	Diode Silicon			5410-044
CR115	Diode Silicon			5410-044
CR116	Diode Silicon			5410-044
CR117	Diode Silicon			5410-044
CR118	Diode Silicon			5410-031

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
CR119	Diode Silicon	5410-031
CR120	Not used	
CR121	Diode Silicon	5410-051
CR122	Diode Silicon	5410-031
CR123	Diode Silicon	5410-031
CR124	Diode Silicon	5410-051
CR125	Diode Silicon	5410-051
CR126	Diode Zener 10V 1W	5410-018
FL101	Filter USB	131000-02
FL102	Filter LSB	131100-02
PC100	Printed Circuit Board	116012
Q101	Transistor NPN Silicon	6910-020
Q102	Transistor NPN Silicon	6910-020
Q103	Transistor NPN Silicon	6910-020
Q104	Transistor NPN Silicon	6910-020
Q105	Not used	
Q106	Transistor NPN Silicon	6910-020
Q107	Transistor NPN Silicon	6910-020
Q108	Transistor NPN Silicon	6910-020
Q109	Transistor NPN Silicon	6910-030
Q110	Transistor NPN Silicon	6910-020
Q111	Not used	
Q112	Transistor FET	6910-106
Q113	Transistor NPN Silicon	6910-020
Q114	Transistor NPN Silicon	6910-020
Q115	Transistor NPN Silicon	6910-021
Q116	Transistor NPN Silicon	6910-021
Q117	Transistor PNP Silicon	6910-022
Q118	Not used	
Q119	Transistor NPN Silicon	6910-020
Q120	Transistor NPN Silicon	6910-020
Q121	Transistor NPN Silicon	6910-038
R101	Resistor Comp. 10K ohm .50W 10%	6320-103
R102	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R103	Not used	
R104	Resistor, Comp. 1 K ohm .50W 10%	6320-102
R105	Resistor, Comp. 3.3K ohm .50W 10%	6320-332
R106	Resistor, Comp. 3.9K ohm .50W 10%	6320-392
R107	Resistor, Comp. 3.9K ohm .50W 10%	6320-392
R108	Resistor, Comp. 15 K ohm .50W 10%	6320-153
R109	Resistor, Comp. 3.9K ohm .50W 10%	6320-392

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
R110	Resistor, Comp. 3.9K ohm .50W 10%	6320-392
R111	Resistor, Comp. 15 K ohm .50W 10%	6320-153
R112	Resistor, Comp. 470 ohm .50W 10%	6320-471
R113	Resistor, Comp. 1 K ohm .50W 10%	6320-102
R114	Resistor, Comp. 1 K ohm .50W 10%	6320-102
R115	Resistor, Comp. 47 K ohm .50W 10%	6320-473
R116	Resistor, Comp. 2.2K ohm .50W 10%	6320-223
R117	Resistor, Comp. 2.7K ohm .50W 10%	6320-272
R118	Resistor, Comp. 1 K ohm .50W 10%	6320-102
R119	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R120	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R121	Resistor Comp. 2.2K ohm .50W 10%	6320-222
R122	Resistor Comp. 100 ohm .50W 10%	6320-101
R123	Resistor Comp. 27K ohm .50W 10%	6320-273
R124	Resistor Comp. 2.2K ohm .50W 10%	6320-222
R125	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R126	Resistor Comp. 3.9K ohm .50W 10%	6320-392
R127	Resistor Comp. 3.3K ohm .50W 10%	6320-332
R128	Potentiometer 100K ohm (Horz.)	6318-104
R129	Resistor Comp. 100K ohm .50W 10%	6320-104
R130	Resistor Comp. 1K ohm .50W 10%	6320-102
R131	Resistor Comp. 330 ohm .50W 10%	6320-331
R132	Potentiometer 200 ohm (Horz.)	6309-201
R133	Resistor Comp. 330 ohm .50W 10%	6320-331
R134	Resistor Comp. 100Kohm .50W 10%	6320-104
R135	Potentiometer 10K ohm (Horz.)	6308-103
R136	Potentiometer 4.7K ohm (Horz.)	6308-472
R137	Not used	
R138	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R139	Resistor Comp. 1K ohm .50W 10%	6320-102
R140	Resistor Comp. 100K ohm .50W 10%	6320-104
R141	Resistor Comp. 22K ohm .50W 10%	6320-223
R142	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R143	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R144	Resistor Comp. 4.7K ohm .50W 10%	6320-472
R145	Resistor Comp. 470 ohm .50W 10%	6320-471
R146	Resistor Comp. 330 ohm .50W 10%	6320-331
R147	Resistor Comp. 220 ohm .50W 10%	6320-221
R148	Resistor Comp. 330 ohm .5CW 10%	6320-331
R149	Not used	
R150	Resistor Comp. 8.2K ohm .50W 10%	6320-822
R151	Resistor Comp. 22K ohm .50W 10%	6320-223
R152	Resistor Comp. 22K ohm .50W 10%	6320-223
R153	Resistor Comp. 22K ohm .50W 10%	6320-223
R154	Resistor Comp. 22K ohm .50W 10%	6320-223
R155	Resistor Comp. 39K ohm .50W 10%	6320-393
R156	Resistor Comp. 39K ohm .50W 10%	6320-393
R157	Resistor Comp. 10K ohm .50W 10%	6320-103
R158	Resistor Comp. 5.6K ohm .50W 10%	6320-562

REPLACEABLE PARTS LIST

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
R159	Resistor Comp. 10K ohm .50W 10%	6320-103
R160	Not used	
R161	Resistor Comp. 47K ohm .50W 10%	6320-473
R162	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R163	Not used	
R164	Not used	
R165	Not used	
R166	Resistor Comp. 470K ohm .50W 10%	6320-474
R167	Resistor Comp. 18K ohm .50W 10%	6320-183
R168	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R169	Resistor Comp. 330 ohm .50W 10%	6320-331
R170	Resistor Comp. 100 ohm .50W 10%	6320-101
R171	Resistor Comp. 2.2K ohm .50W 10%	6320-222
R172	Resistor Comp. 4.7K ohm .50W 10%	6320-472
R173	Resistor Comp. 470 ohm .50W 10%	6320-471
R174	Resistor Comp. 22K ohm .50W 10%	6320-223
R175	Resistor Comp. 470 ohm .50W 10%	6320-471
R176	Resistor Comp. 1K ohm .50W 10%	6320-102
R177	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R178	Resistor Comp. 100 ohm .50W 10%	6320-101
R179	Resistor Comp. 15K ohm .50W 10%	6320-153
R180	Resistor Comp. 680 ohm .50W 10%	6320-681
R181	Resistor Comp. 3.3 ohm .50W 10%	6320-033
R182	Resistor Comp. 3.3 ohm .50W 10%	6320-033
R183	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R184	Resistor Comp. 2.2K ohm .50W 10%	6320-222
R185	Resistor Comp. 1K ohm .50W 10%	6320-102
R186	Not used	
R187	Not used	
R188	Resistor Comp. 27K ohm .50W 10%	6320-273
R189	Resistor Comp. 1K ohm .50W 10%	6320-102
R190	Resistor Comp. 330 ohm .50W 10%	6320-331
R191	Resistor Comp. 5.6K ohm .50W 10%	6320-562
R192	Resistor Comp. 47K ohm .50W 10%	6320-473
R193	Resistor Comp. 100 ohm .50W 10%	6320-101
R194	Resistor Comp. 5.6 ohm 1 W 10%	6325-056
RFC101	Choke RF	182006
T101	Transformer	6810-015
T102	Transformer	6810-020
T103	Transformer	6810-020
T104	Transformer	182005
T105	Transformer	6810-020

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
Y101	Channel Crystal To customer frequency	
Y102	Channel Crystal To customer frequency	
Y103	Channel Crystal To customer frequency	
Y104	Channel Crystal To customer frequency	
Y105	Channel Crystal 1650.0 KHz IF	5114-165
None	Crystal Socket	5110-060
	Crystal Socket	5110-060
	Crystal Socket	5110-060
	Crystal Socket	5110-060
None	Connector Pins	5110-011
TRANSMITTER ASSY		
C201	Capacitor Disc. .01 uF 100V 20%	4947-103
C202	Not used	
C203	Not used	
C204	Not used	
C205	Capacitor Flat Foil .1 uF 250V 20%	4926-104
C206	Capacitor Flat Foil .1 uF 250V 20%	4926-104
C207	Not used	
C208	Not used	
C209	Not used	
C210	Not used	
C211	Not used	
C212	Not used	
C213	Not used	
C214	Capacitor Flat Foil .1 uF 250V 20%	4926-104
C215	Capacitor Flat Foil .1 uF 250V 20%	4926-104
C216	Capacitor Trimmer Value Determined by frequency	
C217	Capacitor Trimmer Value Determined by frequency	
C218	Capacitor Trimmer Value Determined by frequency	
C219	Capacitor Trimmer Value Determined by frequency	
C220	Capacitor Disc. .01 uF 100V 20%	4947-103
C221	Capacitor Elec. 125 uF 16V -10+50%	4952-125
C222	Capacitor Mica Value Determined by frequency	
C223	Capacitor Mica Value Determined by frequency	
C224	Capacitor Mica Value Determined by frequency	
C225	Capacitor Mica Value Determined by frequency	
C226	Not used	
C227	Capacitor Flat Foil .22 uF 250V 20%	4926-224
C228	Capacitor Flat Foil .22 uF 250V 20%	4926-224
C229	Capacitor Ceramic 1000 pF 500V -20+50%	4920-108
C230	Not used	

REFERENCE DESIGNATION	DESCRIPTION				STONER PART NO.
C231	Not used				
C232	Not used				
C233	Capacitor Ceramic	1000 pF	500V	-20+50%	4920-108
CR201	Diode Germanium				5410-041
CR202	Diode Silicon 50 PIV 1 Amp.				5410-031
CR203	Diode Silicon 50 PIV 1 Amp.				5410-031
K201	Relay 12V dc, 5 Amp, 4PDT				5140-025
None	Relay Socket				5140-026
PC200	Printed Circuit Board				116010
Q201	Transistor NPN Silicon				6910-038
Q202	Transistor NPN Silicon				6910-038
Q203	Transistor NPN Silicon				6910-038
Q204	Transistor NPN Silicon Power				6910-024
Q205	Transistor NPN Silicon Power				6910-024
R201	Resistor Comp.	3.3K ohm	.50W	10%	6320-332
R202	Resistor Comp.	1.5K ohm	.50W	10%	6320-152
R203	Resistor Comp.	100 ohm	.50W	10%	6320-101
R204	Resistor Comp.	12 ohm	.50W	10%	6320-120
R205	Resistor Comp.	680 ohm	.50W	10%	6320-681
R206	Not used				
R207	Resistor Comp.	100 ohm	.50W	10%	6320-101
R208	Not used				
R209	Resistor Comp.	2.7 ohm	.50W	10%	6320-027
R210	Resistor Comp.	2.7 ohm	.50W	10%	6320-027
R211	Not used				
R212	Resistor Comp.	270 ohm	.50W	10%	6320-271
R213	Resistor Comp.	10 ohm	.50W	10%	6320-100
R214	Not used				
R215	Not used				
R216	Resistor Comp.	15 ohm	.50W	10%	6320-150
R217	Resistor Comp.	470 ohm	.50W	10%	6320-471
R218	Resistor Comp.	1.8K ohm	.50W	10%	6320-182
RFC201	Choke RF				182007
RFC202	Not used				
RFC203	Choke RF				182009
RFC204	Not used				
RFC205	Choke RF				182007

REFERENCE DESIGNATION	DESCRIPTION	STONER PART NO.
T201	Transformer RF	182020
T202	Transformer RF	182002
T203	Transformer RF	182004-01
T204	Transformer Toroid	182017-01
T205	Transformer Sampling	182010
SW201	Switch Wafer 2 Pole 4 Pos.	6520-028
	Power Cable Assy.	116024
	Power Cable Assy. (40MA only)	120007
CHANNEL MODULE 142002 (RECEIVER)		
C501	Capacitor Ceramic 220 pF 500V 20%	4920-227
C502	Capacitors See Table 3-1	
C503	Capacitors See Table 3-1	
C504	Capacitors See Table 3-1	
C505	Capacitors See Table 3-1	
C506	Capacitor Mica 5 pf 500V 10%	4910-050
C507	Capacitor Disc. .01 uF 100V 20%	4946-103
C508	Capacitor Disc. .01 uF 100V 20%	4946-103
CR501	Diode Silicon	5410-051
CR502	Diode Silicon	5410-051
CR503	Diode Silicon	5410-051
R501	Resistor Composition 3.3K ohm 1/4W 10%	6315-332
R502	Resistor Composition 150 ohm 1/4W 10%	6315-151
R503	Resistor Composition 27K ohm 1/4W 10%	6315-273
R504	Resistor Composition 27K ohm 1/4W 10%	6315-273
R505	Resistor Composition Value determined by gain	
Q501	Transistor FET 2N5484	6910-106
T501	Transformer I-F	6810-020
T502	Transformer I-F	6810-020
T503	Transformer I-F	6810-020

REFERENCE DESIGNATION	DESCRIPTION				STONER PART NO.
CHANNEL MODULE #142004 . (TRANSMITTER)					
C601	Capacitor Ceramic	220 pF	500V	20%	4920-227
C602	See Table 3-1				
C603	See Table 3-1				
C604	See Table 3-1				
C605	See Table 3-1				
C606	Capacitor Disc.	.01 uF	100V	20%	4946-103
C607	Capacitor Disc.	.001 uF	500V	10%	4946-102
C608	Capacitor Disc.	.01 uF	100V	20%	4946-103
CR601	Diodes Silicon				5410-051
CR602	Diodes Silicon				5410-051
Q601	Transistor FET 2N5484				6910-106
R602	Resistor Composition	150 ohm	1/4W	10%	6315-151
R603	Resistor Composition	47K ohm	1/4W	10%	6315-473
R604	Resistor Composition	1K ohm	1/4W	10%	6315-102
R605	Potentiometer PC	100K ohm			6318-104
T601	Transformer I-F				6820-020
T602	Transformer I-F				6820-020
T603	Transformer I-F				6820-020

REPLACEABLE PARTS LIST

PS-20/2 AC POWER SUPPLY

SCHEMATIC DESIGNATION	DESCRIPTION			STONER PART NO.
C801	Capacitor Elect.	4200 uF	40V	4950-422
C802	Capacitor Elect.	20 uF	16V	4952-020
C803	Capacitor Elect.	500 uF	50V +150-10%	4957-501
CR801	Diode Bridge	6.0 Amp.	50V	5410-001
CR802	Diode Zener		14V 10W	5410-028
R801	Resistor, W/W	40 ohm	20W 10%	6328-003
R802	Resistor, Comp.	4.7K ohm	1/2W 10%	6320-472
T801	Transformer			126021
TB800	Terminal Block, 10 terminal			6600-010

APPENDIX A

115/230V AC POWER SUPPLY

PS-20/2

SSB-20A

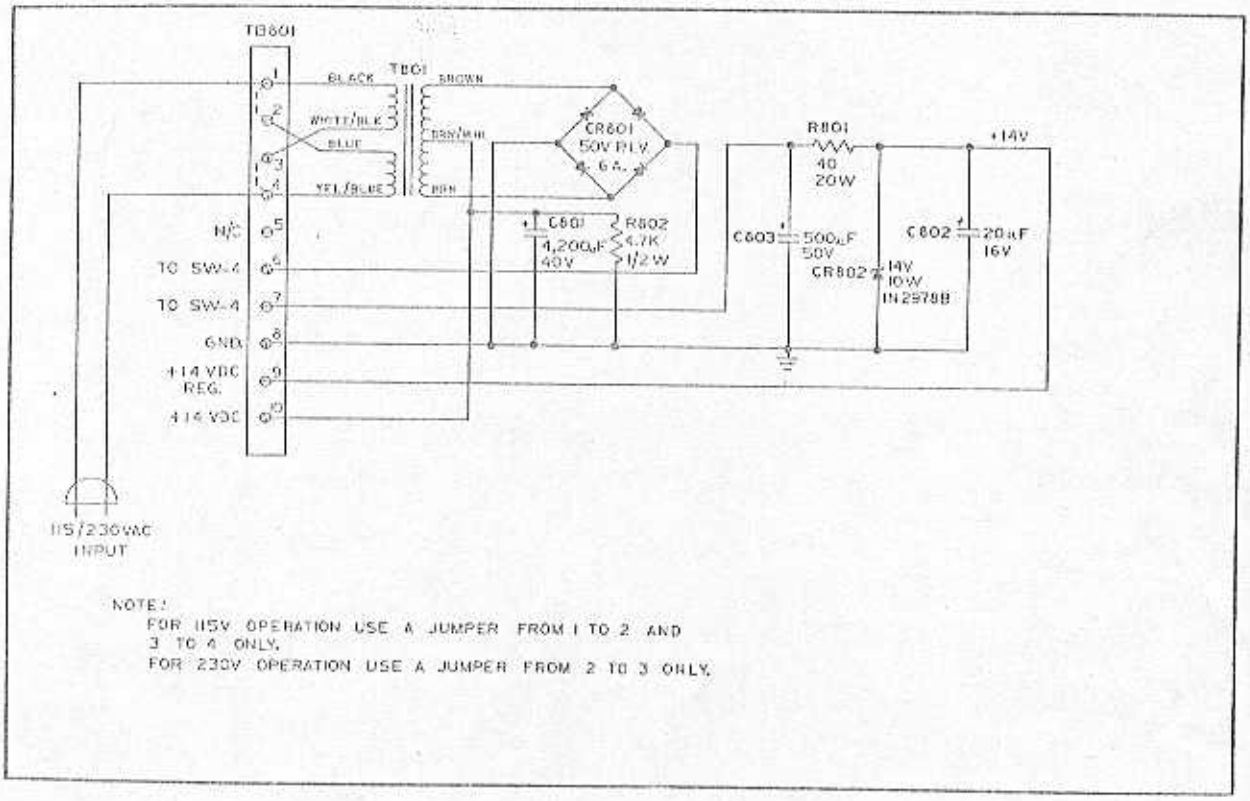
PS-20/2 AC POWER SUPPLY

A-1 GENERAL

The PS-20/2 ac power supply that is used with the 115/230V ac version of the SSB-20A converts the applied main ac voltage to the +14V dc power required for operation of the radiotelephone. The power supply is mounted on the top of the radiotelephone main chassis directly behind the transmitter section.

A-2 THEORY OF OPERATION

The 115V ac or 230V ac power is applied to the primary windings of transformer T801. The applied voltage is dropped in the transformer to provide 14 volts output from the tapped secondary windings. This output is applied to diode bridge CR801 where it is rectified. The 14V dc output from the bridge is filtered by a capacitor network for application to the transmitter section. This output is also regulated by zener diode CR802 for use in the rf, i-f and audio sections of the transceiver.



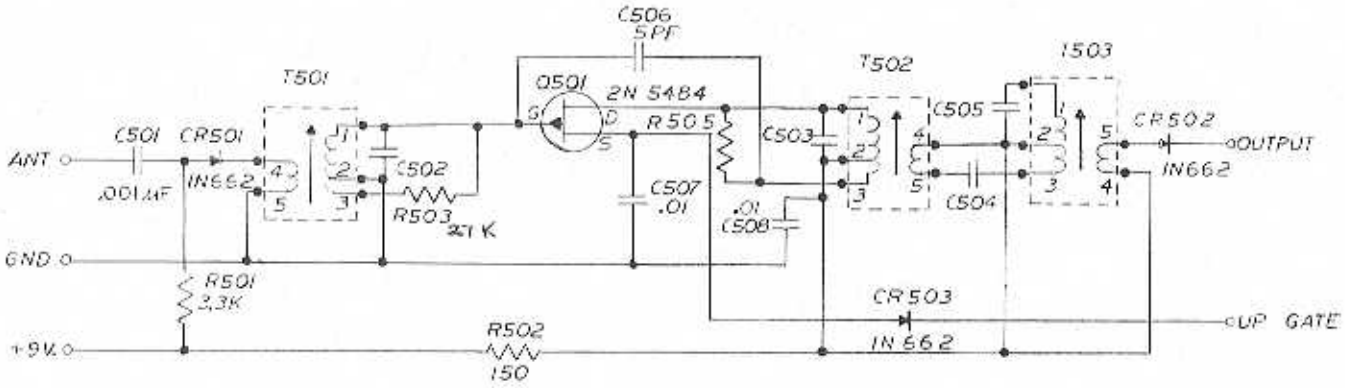
NOTE:
FOR 115V OPERATION USE A JUMPER FROM 1 TO 2 AND 3 TO 4 ONLY.
FOR 230V OPERATION USE A JUMPER FROM 2 TO 3 ONLY.

PS-20/2
AC POWER SUPPLY

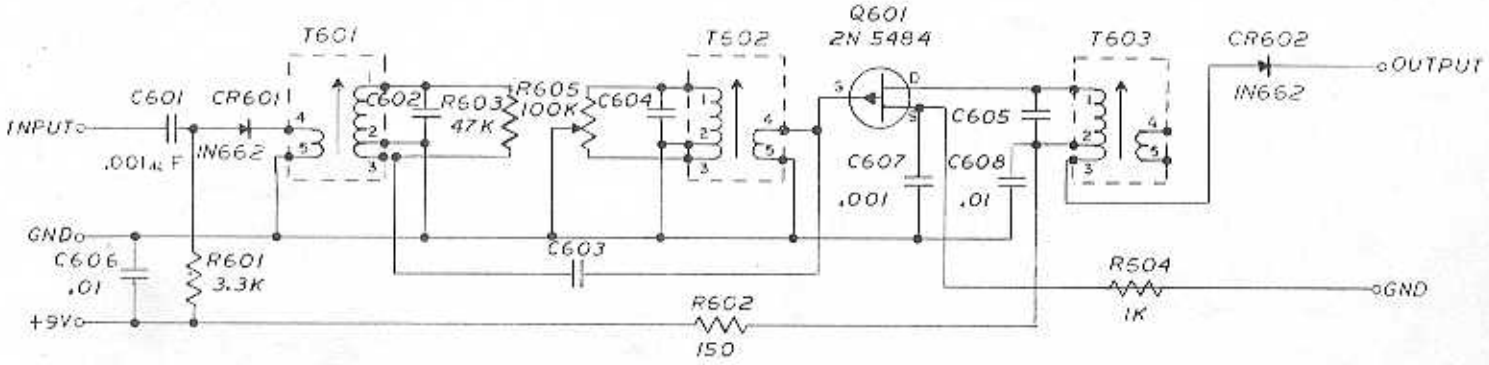
Resistors R503 and R505 in the Receive Channel Module and resistor R603 in the Transmit Channel Module may vary in value from 18K ohms to 47K ohms for additional gain in the channel module, also, in some cases potentiometer R605 in the Transmit Channel Module may be omitted for the same reason.

The Transmit and Receive Channel Module for frequencies above 8 MHz shown on the CHANNEL MODULE SCHEMATIC DIAGRAMS sheet is not used with the SSB-20A or SSB-20MA radios.

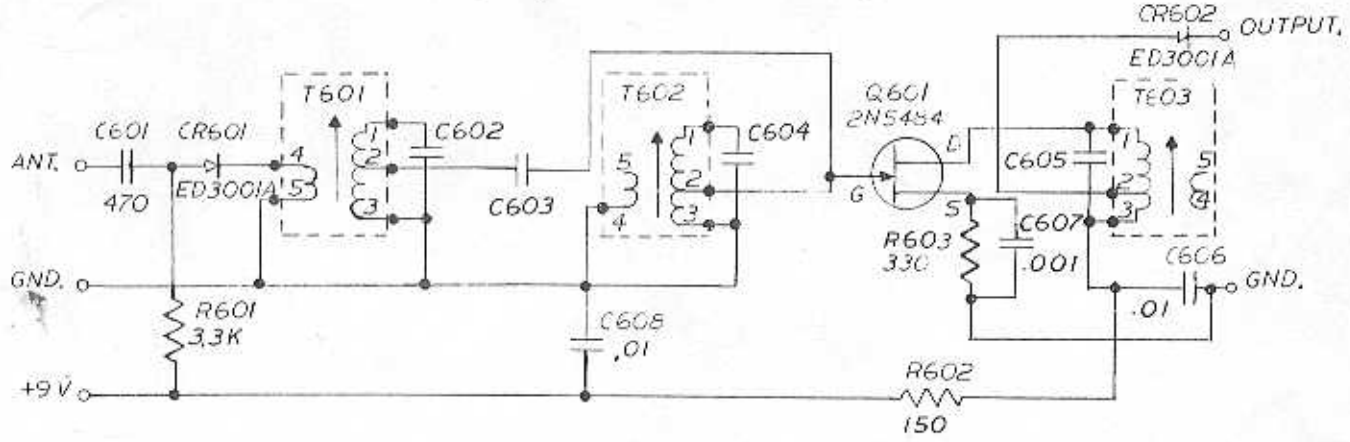
RECEIVE CHANNEL MODULE
(Frequencies Below 8 MHz.)



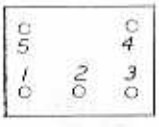
TRANSMIT CHANNEL MODULE
(Frequencies Below 8 MHz.)



TRANSMIT & RECEIVE CHANNEL MODULE
(Frequencies Above 8 MHz.)

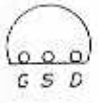


BOTTOM VIEW
COIL BASE



BOTTOM VIEW
CHANNEL MODULES

2N5484
BOTTOM VIEW



OPTIONAL ACCESSORY EQUIPMENT LIST

OPTIONAL ACCESSORY EQUIPMENT (SSB-20A)

The optional accessories that are available for the SSB-20A consists of the following items:

(1) AC-27 Antenna Selector unit for selecting single channel dipoles.

(2) AC-108A/1 - Dipole: Single Channel (specify frequency)
AC-108A/2 - Two Channel (specify frequency)
AC-108A/3 - Single Channel with 100' coax cable (specify frequency)
AC-108A/4 - Two Channel with 100' coax cable (specify frequency)

(3) AC-111A/1 - Mobile Whip Antenna, single channel, body mount and spring; for operation in the 2 - 3 MHz frequency range.
AC-111A/2 - Mobile Whip Antenna; same as AC-111A/1 except for operation in 3 - 4 MHz frequency range.
AC-111A/3 - Mobile Whip Antenna; same as AC-111A/1 except for operation in 4.6 - 7.5 MHz frequency range.
AC-111A/4 - Mobile Whip Antenna; same as AC-111A/1 except for operation in the 7.5 - 12 MHz frequency range.
AC-111A/5 - Additional channel loading coil and whip assembly; for operation in 2 - 3 MHz frequency range.
AC-111A/6 - Same as AC-111A/5 except for operation in 3 - 4 MHz frequency range.
AC-111A/7 - Same as AC-111A/5 except for operation in 4.6 - 7.5 MHz frequency range.
AC-111A/8 - Same as AC-111A/5 except for operation in 7.5 - 12 MHz frequency range.

(4) AT-125A/1 or /3 Mobile 4-Channel Antenna System: Whip antenna and tuning unit.

(5) AT-150/1 or /2 Base Station 4-Channel Antenna System

(6) AT-5 Portable Reel Tape Dipole.

(7) AC-105/1 Battery Charger for auto battery: 115V ac
AC-105/2 Battery Charger for auto battery: 230V ac
AC-105/3 Battery Charger for auto battery: 115/230V ac

(8) PS-3/1 Regulated AC Power Supply.

(9) AC-103A Telephone Adaptor.

(10) AC-114A Telephone Handset.

(11) AC-119 Headphones.

(12) M-3/1 or /2 Desk Microphone.

(13) J-47/1 Telegraph Key.

(14) AC-26/1 Mobile Mounting Kit.

(15) AC-110 Noise Suppression Kit.

(16) AC-121 Spares Kit, 2 years, 1 to 4 units.

OPTIONAL ACCESSORY EQUIPMENT (SSB-20MA)

The optional accessory equipment available for the SSB-20MA consists of the following items:

(1) AC-108A/1 - Dipole: Single Channel (specify frequency).
AC-108A/2 - Two Channel (specify frequency).
AC-108A/3 - Single Channel with 100' coax cable (specify frequency).
AC-108A/4 - Two Channel with 100' coax cable (specify frequency).

(2) AC-111A/1 - Mobile Whip Antenna, single channel, body mount and spring; for operation in the 2 - 3 MHz frequency range.
AC-111A/2 - Mobile Whip Antenna; same as AC-111A/1 except for operation in 3 - 4 MHz frequency range.
AC-111A/3 - Mobile Whip Antenna; same as AC-111A/1 except for operation in 4.6 - 7.5 MHz frequency range.
AC-111A/4 - Mobile Whip Antenna; same as AC-111A/1 except for operation in the 7.5 - 12 MHz frequency range.
AC-111A/5 - Additional channel loading coil and whip assembly; for operation in 2 - 3 MHz frequency range.
AC-111A/6 - Same as AC-111A/5 except for operation in 3 - 4 MHz frequency range.
AC-111A/7 - Same as AC-111A/5 except for operation in 4.6 - 7.5 MHz frequency range.
AC-111A/8 - Same as AC-111A/5 except for operation in 7.5 - 12 MHz frequency range.
AC-111A/9 Heavy duty base mounting adaptor.

(3) AT-1/2 Whip Antenna, permeability tuned.

(4) AT-2 Quick-to-erect Portable Dipole.

(5) AT-5 Portable Reel Tape Dipole.

(6) AC-24B Battery Pack, Rechargeable.

(7) AC-24D D-cell battery pack.

(8) PS-3/3 Regulated AC Power Supply.

(9) PS-3/4 Battery Charger.

(10) AC-114A Telephone Handset.

(11) AC-119 Headphones.

(12) J-47/2 Telegraph Key.

(13) AC-26/2 Mobile Mounting Kit.

(14) AC-30 Carrying Case.

(15) AC-110 Noise Suppression Kit.

(16) AC-121 Spares kit, 2 years, 1 - 4 units.

WARRANTY

STONER COMMUNICATIONS, INC., warrants all equipment manufactured by it to be free from defects in material and workmanship. Our obligation includes service or adjustment and parts replacement should a unit become defective in normal service. The warranty liability specifically excludes equipment which has been damaged in shipment and equipment which malfunctions due to misuse or mishandling. The Warranty is effective for a period of one year from the date of original purchase.

This Warranty is expressly in lieu of all other warranties expressed or implied and other obligations or liabilities on the part of STONER COMMUNICATIONS, INC., and no person including any dealer, agent; or representative of STONER COMMUNICATIONS, INC., is authorized to assume for STONER COMMUNICATIONS, INC., any liability on its behalf, or in its name, except to refer purchasers to this Warranty.

Should a unit require service, advise your STONER COMMUNICATIONS, INC., dealer immediately. He has complete facilities for servicing this equipment. Defective units may also be returned to STONER COMMUNICATIONS, INC., prepaid for repair at no charge within the warranty period. It is not necessary to obtain permission to return the equipment, but notification by mail of shipment is essential.

Include complete information to assist our service department, and pack the equipment properly to avoid damage in shipment. Upon completion of repairs, the equipment will be returned via the same routing as received, freight collect.

stoner communications, inc. 8751 Industrial Lane, Cucamonga, California 91730 USA (714) 987-4624