TEN-TEC

OWNER'S MANUAL

ARGOSY 525

TEN-TEC ARGOSY 525 Owners Manual

1 **OVERVIEW**

1.1 **UNPACKING**

Carefully remove your ARGOSY from the packing carton and examine it for signs of shipping damage. Should any damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. Retain all damaged cartons. Liability for shipping damage rests with the carrier.

It is recommended that you keep the shipping carton and fillers. In the event that storage, moving or reshipment becomes necessary, they come in handy. Accessory hardware, etc. are packed with the ARGOSY. Make sure that you have not overlooked anything.

1.2 **INTRODUCTION**

The ARGOSY 525 is a medium power transceiver employing the latest techniques in solid state technology. Unique balun type transformers couple the RF power stages, insuring efficient energy transfer without the need to resonate or tune. As shipped from the factory, the ARGOSY contains all necessary circuits and crystals for transceiver operation in the 80, 40, 30. 20, 15 and 10 meter amateur bands. A HI-LO power switch selects either a 50 or 5 watt output level. A whole new world of excitement and fun in Amateur Radio opens to you when working QRP. We think you will find it a welcomed change.

Because of its size and basic 12 volts dc transistor circuits, the ARGOSY is equally at home when used as a fixed, mobile or portable station. It operates directly from 12-14 volts dc or from 115/230 volts ac with the optional Model 225 Power Supply.

As you become more familiar with the operation of your ARGOSY you will value the built-in features and conveniences more and more. Instant band changing completely eliminates transmitter tune-up. The panel meter automatically switches from an 'S' meter to an SWR meter when transmitting. QSK, instant break-in CW, turns this mode from a series of monologs into a conversation. These are just a few of the many features that you will enjoy. And a full array of accessories will further enhance the overall enjoyment and flexibility. All in all, the ARGOSY 525 is designed for active, serious amateurs.

1.3 **SPECIFICATIONS**

1.3.1 GENERAL

FREQUENCY COVERAGE: 3.5-4.0, 7.0-7.5, 10.0-10.5, 14.0-14.5, 21.0-21.5, 28.0-28.5, 28.5-29.0, 29.0-29.5, 29.5-30.0 MHz (VFO provides approximately 40 kHz overrun on each band edge.)

TEN-TEC ARGOSY 525 Owners Manual

OPERATING MODES: Normal sideband. reverse sideband, CW.

VFO STABILITY: Less than 20 Hz change per °F averaged over a 40° change from 70° to 110° after a 30 minute warmup. Less than 15 Hz change from 105 to 125 VAC line voltage when using a TEN-TEC power supply.

TUNING RATE: Vernier, 18 kHz per revolution, typical.

DIAL CALIBRATION: ± 2 kHz when zeroed to the nearest 25 kHz marker.

ANTENNA IMPEDANCE: Low impedance unbalanced (coaxial), 50-75 ohms.

POWER REQUIREMENTS: 12-14 Vdc regulated to 5% or better. 500 mA receive; 9 A maximum transmit. Power switch remotely controls power supply.

SEMICONDUCTORS: 42 Transistors. 4 FETs, 10 IC's, 52 Diodes, 3 PIN Diodes, 2 LEDs.

CONSTRUCTION: Rigid steel chassis. Dark painted, molded front panel. Dark painted aluminum back, top and bottom. Stainless steel tilt-up bail.

DIMENSIONS: HWD 4" x 9-1/2" x 12" (bail not extended).

NET WEIGHT: 8 pounds.

1.3.2 RECEIVER

SENSITIVITY: 0.3 uV for 10 dB S+N/N, typical.

SELECTIVITY: 4 pole crystal filter. 2.5 kHz bandwidth, 2.7:1 shape factor @ 6/50 dB.

AUDIO OUTPUT: 1 watt at 8 ohms with less than 2% distortion. Built-in speaker.

IF FREQUENCY: 9.0015 MHz.

NOTCH FILTER: Greater than 50 dB rejection notch, tunable from 200 Hz to 3.5 kHz.

S-METER: Automatically switched on when receiving.

SPURIOUS RESPONSES: More than 50 dB down except 28.980 MHz (which can be eliminated by using low end of 29.0-29.5 MHz band segment).

IF - REJECTION: 60 dB.

OFFSET TUNING: Receiver, ± 3.0 kHz, typical, detent center off.

CRYSTAL CW FILTERS: Optional plug-in accessories. Model 217 has 500 Hz bandwidth, Model 219 has 250 Hz bandwidth.

CRYSTAL SSB FILTER: Optional plug-in accessory. Model 218 has 1.8 kHz bandwidth.

8 POLE CRYSTAL IF FILTER: Optional plug-in accessory,Model 220. 2.4 kHz bandwidth. Used in place of standard plug-in 4 pole SSB filter.

NOISE BLANKER: Optional plug-in accessory, Model 223. IF type, 50 dB blanking range.

AUDIO CW FILTER: Optional plug-in accessory, Model 224. Center frequency 750 Hz. Position ONE has 450 Hz bandwidth down 10 dB at 400 Hz and 1500 Hz. Position TWO has 150 Hz bandwidth, down 40 dB at 400 Hz and 1500 Hz.

CALIBRATOR: Optional plug-in accessory, Model 226. 25 kHz crystal type, pulsed tone.

1.3.3 TRANSMITTER

DC POWER INPUT: 100 or 10 watts, switchable. 100% duty cycle for up to 20 minutes, all bands.

RF POWER OUTPUT: 40-50 watts in HI power position, 4-5 watts in L0 power position.

T/R SWITCHING: PIN diode antenna switch, push-to-talk on SSB, full break-in (QSK) on CW.

CW SIDETONE: Internally generated. Adjustable tone and volume independent of af control. Operates only in CW mode.

SSB GENERATION: 9.0015 MHz 4 pole crystal ladder filter. Balanced modulator. Converts to 8 pole with optional Model 220 filter.

MICROPHONE INPUT: High impedance crystal, ceramic or dynamic.

CARRIER SUPPRESSION: 40 dB minimum.

SIDEBAND SUPPRESSION: 30 dB minimum at 1 kHz tone.

SPURIOUS OUTPUT: Less than -45 dB.

METER: Indicates forward or reverse peak power on transmit, front panel switch.

ALC CONTROL: High power only. LED indicator.

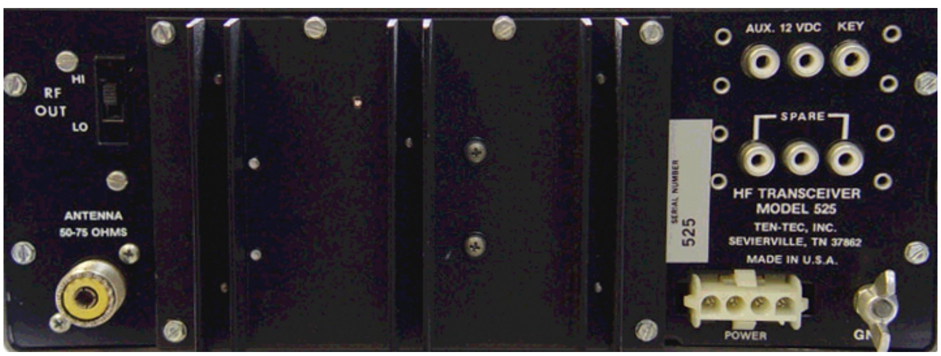
1.3.4 FRONT PANEL CONTROLS

AF gain/POWER (Pull-off); DRIVE: NOTCH; OFFSET (detent center): BAND Switch; Main tuning knob; MODE switch; NB ON/OFF; Meter FWD/REV; CAL ON/OFF: XTAL filter IN/OUT; AF filter IN/OUT; AF filter 1/2: MICrophone jack; PHONES jack.

1.3.5 REAR PANEL CONTROLS AND CONNECTORS

CONTROLS: RF OUT HI/LO.

CONNECTORS: ANTENNA: KEY; POWER input; GND post; SPARE (3); 12 VDC jacks (2 auxiliary)



TEN-TEC ARGOSY 525 Owners Manual

2 **INSTALLATION**

2.1 **GENERAL**

Choose an operating location that is dry and cool. Allow adequate ventilation around the heat sinks on the rear panels of both transceiver and power supply. For normal intermittent transmissions, such as SSB and CW, natural convection cooling is all that is required. When transmitting for long periods of time and with a high duty cycle, such as RTTY and SSTV modes, it is recommended that a small fan be directed at the heat sinks to improve heat flow away from them. During mobile operation, free access to cool air should be available to the heat sink also. Do not direct the outlet vent of the automobile's heater directly at the ARGOSY.

To reduce the possibility of stray RF pickup on interconnecting cables, which may cause parasitic oscillations, and provide a measure of safety to the operator from possible shock in ac powered systems, all station equipment should be well grounded to earth. It is also important to strap the equipment chassis together with short heavy loads, preferably with braid. This procedure brings all metal components that are accessible to touching to the same potential, removing the possibility of shock when touching more than one piece of equipment. Also, the extra strap between transceiver and power supply chassis serves to reduce voltage drop on the negative 12 volt supply lead caused by resistances in the lead and connector contacts. In mobile installation, connect a ground strap between the rear panel GND post and the automobile chassis (dash board if metal). Earth ground leads should be of heavy wire or braid and be as short and direct as possible. (A ground lead that is one quarter wavelength long at the operating frequency will not bring the chassis to ground potential at this frequency, even though it will to do and other frequencies.)

2.2 **FIXED STATION INTERCONNECTIONS POWER REQUIREMENTS**

A supply of 12 to 14 volts dc, capable of supplying 9 amperes, negative ground, is required. The ARGOSY may be operated directly from an automobile type storage battery in fixed locations, provided that the voltage under full 9 amperes drain does not fall below 11 volts. This requirement dictates that the battery be near full charge and that the internal resistance be low (a relatively new battery). It is permissible to connect a slow charger across the battery to maintain the full charge condition. However, if the charger is left across the battery during operation, and if the voltage falls below the minimum of 11 volts due to age, some unfiltered ac ripple from the charger may be supplied to the transceiver, which may cause slight amplitude modulation of the transmitted signal at the line frequency. If relatively short periods of use are common, it is recommended that the charger be disconnected while operating. In all cases of battery operation, Model 1125 Circuit Breaker should be used in series with the +12 volt lead to provide over-current protection.

For 115 or 230 volt ac installation, a well regulated supply is required. The Model 225 nine ampere supply will satisfactorily power the ARGOSY. It features both over-current and over-voltage protection.

2.2.1 POWER CONNECTIONS

Power is supplied to the ARGOSY by means of the four terminal AMP Universal MATE-N-LOC connector. The chassis connector is of the male type and mates directly with the cable connector supplied and attached to the Model 225 supply. It is only necessary to insert Cable connector into chassis receptacle.

When using with the Model 225, the power on/off function is controlled by the front panel POWER switch on the ARGOSY. The POWER switch on the supply must be left in the 'on' position at all times, otherwise the supply will not be energized. The two switches are connected in series with the incoming ac line to the transformer primary winding.

When using a dc source other than a Model 225, it will be necessary to construct a power cable using the accessory AMP connector supplied with the ARGOSY. Wires for carrying the 12 volt current should be at least 14 gauge copper, with 12 gauge recommended. Leads should be kept as short as possible to reduce line voltage drop. Pin connections for the power socket are: Pin 1: GND; Pins 2 and 3 = ON-OFF switch; Pin 4 = +12 to 14 V dc. Pin 1 has a rib on the plastic part of the <u>cable</u> connector and Pin 4 has a rib on the <u>chassis</u> connector.

When using power supplies that do not have remote on/off switching capabilities, Pins 2 and 3 of the connector need not be used. The transceiver must then be turned on and off with the power supply switch. It is required that Model 1125 Circuit Breaker be used in these instances.

With battery installation, the same precautions on wire size and length must be heeded. The switch on the AF control of the ARGOSY is <u>not</u> rated high enough in current carrying capacity to be used to switch the 12 V dc line directly. The Model 1125 breaker can be used as the power on/off switch in these installations. Pins 2 and 3 again need not be used.

The AMP Universal MATE-N-LOC connector is intended for high production with automatic staking of the wire leads to the pin terminals. However, it can be assembled in the field without staking machinery by crimping and soldering the leads to the terminals, and then inserting the terminals into the plastic shell. To do this, refer to the detail drawing and proceed as follows:

1) The terminals are supplied connected to a strip of flat metal. Break the individual connectors from the strip by bending back and forth at the point of narrow attachment, or by clipping them off with diagonals.

2) Wire sizes that can be accommodated range between 12 and 18 gauge. Strip insulation l/4" back from end.

3) Insert stripped end into barrel far enough so that insulation just starts between large thin and small wide tabs.

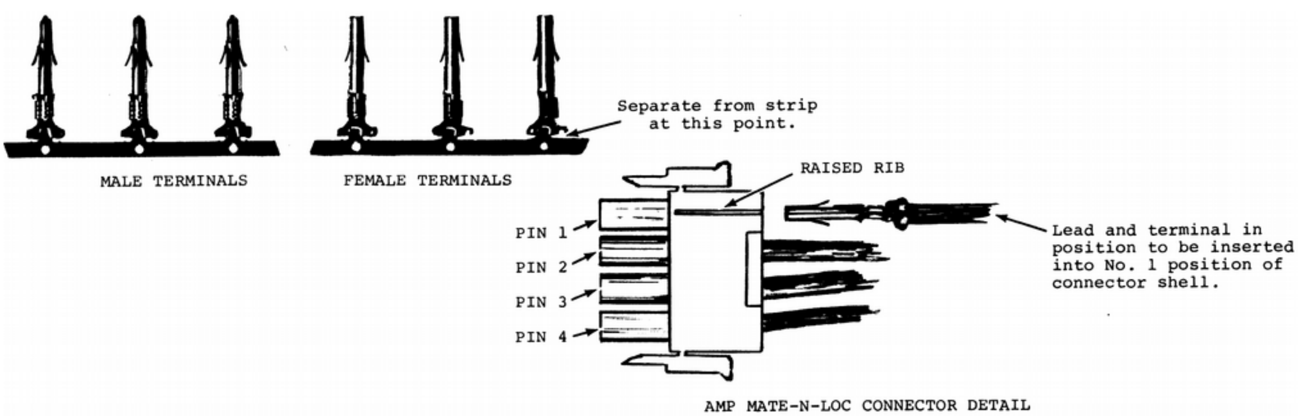
4) With long nose pliers, roll over small wide tabs so that they hold bare wire.

5) Solder leads to rolled tabs by applying iron tip to top of rolled tabs while feeding <u>rosin</u> core solder between wire and tabs. Do not allow solder to run down into hollow tube.

6) After terminals are well soldered, roll large thin tabs down over insulation and crimp with pliers.

7) Insert terminals into plastic shell from solid plastic end so that they finally locate in individual tubes. The terminals will automatically lock into place when inserted to the proper depth. **MAKE ABSOLUTELY CERTAIN THAT TERMINALS ARE INSERTED INTO CORRECT HOLES SINCE REMOVAL IS DIFFICULT**.

To remove terminals, an extractor is necessary to collapse the lanced holding tabs on the sides of each barrel. The extractor can be a metal tube, at least one half inch long, with an outside diameter between 0.125" and 0.135" and an inside diameter of 0.100". Insert the extractor tube into the pin end of the shell, over the terminal to be removed, to a depth of about 1/2". Pull on wire and extract terminal.



Complete the power connections by plugging line cord of power supply into wall socket and interconnect ARGOSY and power supply chassis with short heavy grounding wire or braid.

2.2.2 <u>ANTENNA CONNECTION</u>

Any matched antenna presenting 50 to 75 ohms impedance, one side ground, will load satisfactorily. Random length wire antennas and open wire feed systems will require a matching system such as the Model 227 Antenna Tuner. Use coaxial cable between the ARGOSY and 50 ohm antenna or output side of the tuner. If an antenna tuner is used, locate it as far as is practical from the immediate transceiver location. Do not place tuner on top of transceiver or close to microphone, key or other cables going to the transceiver or associated accessories.

A type PL-259 coaxial connector is required to connect the antenna to the ARGOSY socket marked ANTENNA. The center conductor is connected to the pin and the shield braid to the shell of the connector.

2.2.3 KEY CONNECTIONS

For CW operation a straight key, bug or electronic keyer may be used with the ARGOSY. For proper transmitter operation, the key line requires a very low resistance path to chassis, with no appreciable voltage across it. These conditions are easily met with straight keys and bugs. With electronic keyers however, several precautions must be observed to insure proper keying. First, all keyers with relay output configuration will work satisfactorily. With transistor switched keyers, two conditions must be met. First, the keyer switching circuit must be for low voltage, positive voltage key lines. The ARGOSY line has approximately 2.5 volts, positive, on it in the key-up condition. The switch transistor in the keyer output circuit must be an NPN type. The second condition for proper keying with electronic keyers is that the key-down voltage be very low--on the order of 0.2 volts maximum. Some electronic keyers have diodes in series with the output key line, or high saturation voltage transistors. Either of these conditions raises the key-down voltage to a value higher than the minimum required. Models 645 and 670 Keyers are designed to key the ARGOSY satisfactorily.

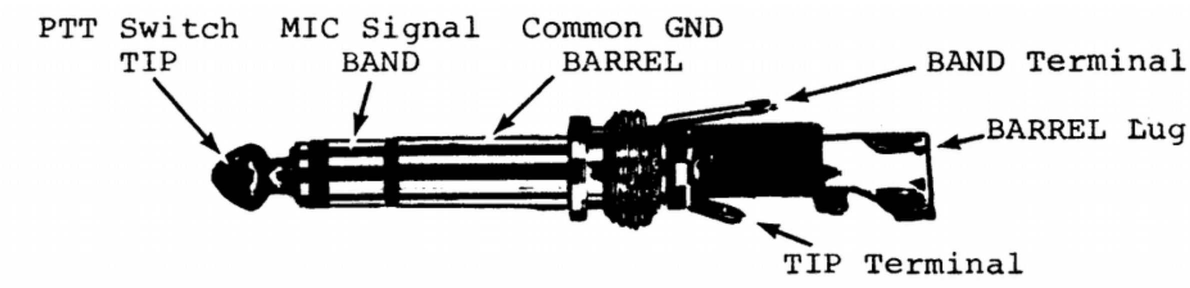
If your keyer does not have the required parameters as outlined above, you still may use it by having it key a reed relay acting as an inteRFace between keyer and ARGOSY.

The KEY jack on the ARGOSY is a RCA phono type connector. Use shielded coaxial cable such as miniature type RG-l74U. In cases where power for the keyer is required, such as for the 645 and 670 models, +12 volts may be obtained from one of the auxiliary +12 VDC jacks located next to the KEY jack. Shielded coaxial cable is recommended for this connection also, if the cable is not already a part of the keyer.

2.2.4 MICROPHONE CONNECTION

The ARGOSY microphone input circuit will accept any high impedance crystal, ceramic or dynamic microphone. Transistorized microphones may also be used, provided that their output levels are adjusted low enough so that the input stage of the first microphone amplifier is not overdriven. Also, this type of microphone is more susceptible to RF pickup and may require better cable, connector and microphone shielding. It is not recommended that plastic cased transistor microphones be used because of this.

The microphone input connector is a standard three wire stereo 1/4” diameter phone plug. Microphone plug connections are shown in the detail drawing below. All leads should be shielded for most reliable and RF-free operation. The signal lead must be shielded in any case.



MICROPHONE CONNECTOR DETAIL

Since the crystal 4 pole filter system is common to both receiver and transmitter circuits, audio signals picked up by the microphone while receiving may be applied to the audio receiver system, causing possible acoustic howl or reverberation. To completely eliminate this in the PTT mode of switching, it is recommended that a SPDT type switch be used in the microphone and that the microphone signal lead be shorted to ground during receive.

The PTT switch works with respect to chassis. When transmitting, the switch is closed. Models 215E and 215PC Microphones have SPDT PTT switches.

If the Model 234 Speech Processor is used with the ARGOSY, make sure that the +12 volts that are required to power the processor are drawn from one of the +12 VDC auxiliary jacks on the ARGOSY rear panel and not from the power supply directly. Failure to observe this requirement will result in instability and distorted audio due to an input groundloop being created in the microphone circuit.

2.3 **MOBILE STATION INTERCONNECTIONS**

2.3.1 POWER CONNECTIONS

Power requirements for mobile operation are the same as those outlined for fixed station installations. When operating mobile, a power input cable will have to be constructed. Since the ARGOSY AF-POWER control switch cannot be used for the on/off function, and since over-current protection is required, the Model 1125 Circuit Breaker, with its attached leads and AMP power connector, will serve both purposes.

The maximum current drain of approximately 9 amperes is substantial enough to warrant special care to keep cable losses to a minimum. A separate set of 12 gauge or larger wires should be run directly from the battery terminals to the ARGOSY, with the circuit breaker in series and located near the transceiver. Only automobile systems with negative ground polarity should be used with the ARGOSY.

Do not rely on the chassis to provide the negative connection, but run a wire directly from the negative terminal of the battery to the ARGOSY power connector.

For temporary installations, power may be drawn from the cigar lighter socket, provided that the fuse for this circuit is rated at 15 amperes or more. A separate ground strap from the ARGOSY to the automobile chassis is recommended even in temporary installations.

2.3.2 ANTENNA CONNECTIONS

Most mobile antennas are designed to provide a near optimum match to a 50 ohms input. In some cases, additional matching components may be required to achieve this match. Since whip mobile antennas use the automobile's body as the ground plane. It is important that the shield of the coaxial cable at the base of the antenna is connected to a good chassis point. Trunk lids and some bumpers may require additional bonding to the main chassis with flexible straps or braid.

Resonating the whip antenna at the operating frequency is relatively easy since the SWR bridge is built into the ARGOSY. With reduced DRIVE - enough to provide some meter deflection - and with the MODE switch in LOCK. the resonant point can be determined by running across the band and noting the dip in meter deflection. The length of the whip can then be altered to bring the dip to the desired frequency. When there, increase DRIVE to the point where the ALC indicator lights, at which point the SWR can be read from the meter. If it is above two to one, a better match can be achieved by connecting a small capacitor across the antenna transmission line at the base of the antenna. For single band operation, the value can be determined and the capacitor permanently soldered in place. For multi-band operation, a rotary switch in a small box can be located near the antenna base, in the trunk for instance, and the proper capacitor selected in this manner. Use mica capacitors with at least 500 volts ratings. Typical values for 80 meters may be in the range of 470 pF to 1000 pF. For 40 meters, 270 to 820 pF, and for the higher bands, proportionately smaller values. Addition of the capacitor will require a small touchup in antenna length.

Although the noise blanker accessory for the ARGOSY is effective in reducing ignition noise, it is best that the installation be such that ignition noise is reduced as much as possible. Use of resistor spark plugs and noise suppressors in the distributor circuits are very effective in reducing inteRFerence. Also, strap the hood to a good chassis point with flexible metal or braid if it is not already well grounded. Locate the antenna as far as is practical from the engine--either on the rear trunk deck or bumper. And since the muffler and exhaust system of most cars are supported and effectively insulated from the chassis with rubber shocked brackets, they may carry ignition noise currents to the antenna location at the rear of the automobile. Strapping the tail pipe or muffler to the chassis at this location with flexible braid may substantially reduce ignition pickup.

The remaining interconnections for microphone, key, etc. in mobile installations are the same as for fixed stations and need not be repeated here.

2.4 **OPERATION**

2.4.1 CONTROLS AND THEIR FUNCTIONS

All operating controls are readily accessible on the front panel. The LED dial pointer zero set control, which only requires occasional adjustment, is accessible on the bottom under the BAND switch. Sidetone level and pitch controls, also of the set-and-forget type, are accessible through the two holes in the right side of the top cover.

2.4.1.1 Frequency Determining Controls

Band Switch: This nine position switch selects the band of operation for both transmit and receive functions. The frequencies designated on the panel, in megahertz, are the low end limits. The high end limits are 500 kHz higher than the frequencies indicated. There is an overrun of the VFO range resulting in an extension on each end of the 500 kHz range of approximately 40 kHz. Operation in these guard bands is possible with the ARGOSY (MARS stations for example).

Main Tuning: The main tuning knob carries a dial skirt marked in 1 kHz increments up to 100 kHz. This scale is used in determining the frequency of operation within the 100 kHz segment noted on the slide rule dial. The lower scale is used when operating on 3.5, 28.5 and 29.5 MHz bands and the upper scale for all others.

Since the VFO tuning shaft is raised from chassis potential to eliminate frequency jumping caused by poor grounding of the shaft, there is a small hand capacity effect on frequency when either the skirt or knob insert is touched. To reduce this effect to negligible proportions, grasp only the plastic portion of the main tuning knob when tuning or use the finger depression.

Dial Pointer Zero Set: When calibrating at any 100 kHz point, the slide rule dial pointer may be set exactly to the scale marking with the aid of the serrated disc knob protruding from the bottom of the case. It is located between the main tuning knob and the BAND switch, on the bottom front edge of the front panel. This adjustment need be made only occasionally as the string system ages, since the pointer is not intended for exact indications of frequency, but rather as a segment indicator telling which 100 kHz segment you are tuned to. Accurate frequency determination is made by use of the 0-100 kHz dial skirt.

2.4.1.2 Mode Selection Controls

MODE Switch: This four position switch selects normal sideband (SB-N), reverse sideband (SB-R), CW or LOCK modes. The normal sideband is lower sideband for the 3.5, 7.0 and 10.0 MHz bands and upper sideband for the 14.0, 21.0 and the 28.0-29.5 MHz bands. When in either of the sideband positions the sidetone circuits are disconnected so that accidental closing of the keyer paddle will not cause the sidetone to activate. When the switch is in the CW position, the microphone PTT switch will key the transmitter on. In CW, the sidetone circuits are activated.

AF-POWER Control: Adjusts level of received audio from speaker or headphones. Does not affect level of sidetone when operating CW. The POWER switch is a push-pull type and shorts Pins 2 and 3 together in the AMP chassis connector when pushed 'in'. It is not connected in the input +12 volts supply lead.

NOTCH Control: This control determines the frequency within the audio spectrum between 200 Hz and 3.5 kHz at which a sharp null in response is inserted. The frequency at which the null occurs increases as the control is rotated clockwise, and in the full clockwise position (OUT) it is beyond the receiver's highest audio limit and is effectively removed from the circuit. The notch is very useful in removing in-channel QRM carriers or inteRFering CW stations, or in reducing in-channel SSB inteRFerence to some degree. Since the null is very sharp and deep, careful adjustment of this control is required for maximum rejection.

OFFSET Control: This control permits moving the receiver frequency approximately 3 kHz above and below the transmitting frequency. Clockwise rotation from the detented center position increases frequency and counterclockwise rotation reduces frequency. When positioned at the detent the receiver and transmitter values are the same. The control is useful in situations where several stations are being worked in a roundtable and all are not exactly on the same frequency. The received station can then be 'zeroed in' with the OFFSET control without upsetting the frequency of your transmissions. Also, it is very useful when working DX stations when they purposefully transmit slightly higher or lower than they receive.

XTAL IN/OUT Switch: This push button switch, when in the IN position, inserts the optional crystal filter that may be installed in the ARGOSYs auxiliary crystal filter socket on the IF/AF assembly in cascade with the crystal filter on the RF MIXER assembly. Any of the four accessory crystal filters, Models 217, 218, 219 or 220 may be used. If no filter is installed, the switch is inoperative.

If one of the accessory filters is installed on the IF/AF assembly, it will not affect the transmitting bandpass characteristics. Only the filter on the RF MIXER assembly functions in both transmitting and receiving modes. Therefore only the ssb crystal filter, Model 220 or the four pole standard filter, should be installed on the RF MIXER assembly.

AF - IN/OUT - 1/2 – Switches: These two push button switches are operative only when the audio CW accessory filter Model 224 is installed in the ARGOSY. The IN/OUT switch either inserts or bypasses the active audio filter in the AF signal path. The 1/2 switch selects either the narrow or wide bandwidth response, respectively.

NB-ON/OFF: This push button switch turns the accessory Model 223 Noise Blanker on or off when installed.

CAL-ON/OFF Switch: Accessory Model 226 Crystal Calibrator is energized by means of this push button switch when installed. The 25 kHz markers produced by the calibrator are pulsed for easy identification. when the MAIN tuning is adjusted to the closest 25 kHz point of the desired operating frequency, and is adjusted for a zero beat note, the main dial skirt can be accurately indexed by holding the large tuning knob and rotating the skirt to read either 0, 25, 50 or 75, depending on what marker is being received.

PHONES Jack: This jack is the external headphones or speaker connection. When employed, the internal speaker is automatically disconnected from the audio amplifier. Although the amplifier is designed for an 8 ohm load, external speakers between 4 and 16 ohms will work satisfactorily.

Headphones of any impedance will also work directly from this jack. However, since the amount of power required to drive headphones to a satisfactory level is much less than for a speaker, it is recommended that an attenuator be used between the PHONES jack and low impedance headphones. The attenuator will greatly reduce residual noise and audio feedthrough when transmitting because the audio amplifier will be operating with a more favorable signal-to-noise setting of the AF control. A simple resistor network consisting of approximately 15 ohms in series with the phones and a shunt resistor of 2.7 to 3.3 ohms across the phones should suffice. The resistors, both l/4 watt types, can be soldered to the phone plug terminals and concealed in the shell of the male plug. The attenuator is not necessary with high impedance headphones due to the self-limiting power aspect of connecting a high impedance across a low impedance, constant voltage line.

2.4.1.3 Transmitter Controls

POWER HI/LO Switch: This slide switch which is located on the rear panel of the ARGOSY selects either a nominal 50 or 5 watt output power. In the LO position the final power amplifier is inoperative and the driver stage is connected to the output circuits directly. Optimum operating conditions are thus achieved for either high power or QRP operation.

FWD/REV Switch: This push button switch selects either the WATTS or SWR scale on the panel meter when transmitting.

DRIVE Control and Indicator ALC LED: The DRIVE control adjusts both the microphone gain and the ow drive to the If amplifier. For SSB HI power operation, advance the control under normal speech operation until the LED indicator lights on voice peaks. For HI power CW, advance the DRIVE control until the LED lights in key-down condition. The setting will be the same for dits, dahs or continuous signal. When operating CW, the DRIVE setting may be made in the LOCK mode switch position. However, this setting does not hold for SSB since microphone type, closeness to your lips and loudness of speech all determine the proper SSB DRIVE setting.

Once the LED begins to light, further advancement of the DRIVE control will not materially increase output power, but will adversely affect CW keying characteristics or SSB intelligibility.

When operating in the QRP LO POWER switch position the ALC LED is not used for DRIVE adjustments. For SSB transmissions increase the DRIVE control so that the meter reads approximately 5 watts on voice peaks with the FWD/REV switch in the FWD position. For CW, the DRIVE is set to the 5 watt meter reading either in the LOCK mode or when sending a series of dashes.

MIC Jack: This is a three wire, two circuit phone jack for microphone input. Connections are outlined in the previous section.

SIDETONE Controls: The two sidetone adjustments, level and pitch, are accessible through the small round holes located in the cover of the ARGOSY. They are printed circuit types mounted vertically side by side. The control farthest to the rear of the ARGOSY is the level adjustment.

2.5 OPERATING HINTS

1) The movable bail is primarily intended to raise the front panel to a convenient slanting position. In this position the speaker output is effectively radiated forward due to the 'V' formed by the ARGOSY bottom and the table.

2) The S-Meter is factory calibrated for a 50 uv input signal reading of S9 on the 14 MHz band.

3) To determine SWR. POWER HI/LO switch to HI,MODE switch to LOCK, FWD/REV switch to REV (push button 'out') and DRIVE so that indicator LED lights. Read SWR on SWR meter scale.

4) Increasing the DRIVE control beyond that required to just light LED will not result in any appreciable increase in power out. However, overdrive may increase SSB distortion and destroy CW keying characteristics.

5) Due to the possibility of high voltage transients being generated in the output RF amplifier during bandswitching, changing hands should not be done while transmitting power to the load. Either place the ARGOSY in the receive mode or be certain of a key-up condition in CW. **YOU RISK THE POSSIBILITY OF DESTROYING THE OUTPUT TRANSISTORS IF THIS PRECAUTION IS NOT OBSERVED**.

6) Although improper antennas will not damage the final, we suggest an SWR below 3 to 1 be achieved for maximum performance. In cases where the antenna cannot be matched to a better SWR, and the power supply repeatedly shuts down due to over-current conditions, the ARGOSY may be operated at reduced output power by rotating the DRIVE control CCW to a position where the rig will operate without tripping the breaker.

7) When operating mobile, always turn ARGOSY 'off' when starting the engine. High voltage transients from the generator may appear on the supply line before the regulator contacts Close.

8) To transmit your CW signal on the same frequency as the incoming signal, set OFFSET control to center position and peak the incoming signal on the S-Meter. The peak will be more discernable if the optional CW audio filter is installed and set to the '2' switch position. Since the filter is centered at 750 Hz and the transmitter frequency in CW is offset 750 Hz from the received frequency, peaking the incoming signal correctly sets up the transmitter.

9) WWV can be received on the 10 MHz band. When its carrier is set to 'zero beat; the dial skirt should be set to the zero marker.

2.6 **AN IMPORTANT MESSAGE**

In order to obtain top performance from your ARGOSY, we feel that you should be briefed on new technology such as solid state no-tune RF amplifiers. Misconceptions sometimes arise from incomplete knowledge which result in erroneous conclusions being drawn that the equipment is faulty, erratic or not performing to specifications. It is the purpose of this message to inform you in these areas so that you can knowledgeably approach and correct any apparent improper performance characteristic.

2.6.1 **TEN POINTS TO OBSERVE WHEN INSTALLING THE ARGOSY**

1) The transmitter will give best performance when properly loaded.

2) Even though the output transistors are resistant to damage from improper loads, they will not operate satisfactorily under all load conditions and will not operate to specifications.

3) The output transistor dissipation will increase if the ARGOSY is not properly loaded.

4) Reactive impedances in the antenna are applied to the transistors and may cause parasitic oscillations.

5) A given SWR reading does not tell you anything about the reactive components and is not accurate unless the load is a pure resistance.

6) A given SWR indicates one of two possible impedances. Each acts differently on the transceiver's performance.

7) The most efficient operating point is when the load is 50 ohms, resistive.

8) The ALC light is not an indication of the input power but of the output power. It may not light even though the power supply is delivering enough current to trip the breaker.

9) If the breaker repeatedly trips, it is an indication that the load is enough removed from the optimum so as to cause high transistor dissipation.

10) It is possible for the power supply regulator to drop out of regulation just prior to its tripping the breaker with low ac line voltages (brown-outs or long ac power runs). Under these conditions, hum modulation will appear on the transmitted signal. with proper load and line voltage, the current drain will be considerably below the tripping point so no hum should appear on the carrier.

2.6.2 **TECHNICAL FACTS OF LIFE**

Although vacuum tubes and transistors can amplify RF power, there are some fundamental differences in how this is accomplished. We are all familiar with vacuum tube principles, but not with those of transistors. A better understanding of what we can expect under various operating conditions will aid in recognizing correct or incorrect performance.

1) **Broadband vs Resonant Tanks:** Almost all tube circuits use resonant tanks in the plate Circuit. The ARGOSY uses a broadband system. In class AB operation, these two approaches act similarly without drive being applied. The idle current is relatively low

and within the device dissipation rating, even though load impedances may range from open to short circuit.

However, with drive applied, the two act very differently. In the case of tubes the dissipation within the tube depends on both the tuning of the tank and the load applied. If the tank is resonated and the load is very light, the internal power dissipated is quite small as indicated by the deep null in plate current which reduces its value to a level approaching that with no drive. Out of resonance, the plate current, and hence dissipation, increases rapidly and may damage the tube from overheating. In resonance, as the load is increased, the null becomes more shallow at a higher plate current. This increase is a result of more power being delivered to the load. As the tank is tuned to resonance, the load impedance which is usually on the order of 50 ohms is transformed to a relatively high impedance of several thousand ohms to match the plate circuit impedance. Small load reactive components - either capacitive or inductive - can usually be balanced out in the tank resonating function.

With transistors, drive applied and with no load, there is no resonant high impedance to limit the collector current, and so power is poured into the circuit (much as the out-of-esonance tank condition). since there is no load, all of the power has to be dissipated in the transistors. So even with no load, the power supply circuit breaker may trip. The broad-band transformer system used with transistors transforms the 50 ohms load impedance not higher but much lower (in the order of 4 or 5 ohms) to match the transistor output impedance. Since this transformation is fixed in design, any reactive component in the load impedance is applied in a transformed way to the collector circuit. Certain reactances at this point, especially inductive, give rise to parasitic oscillations. To correct for this, the antenna impedance should be changed to remove this reactance, or a matching network should be inserted between antenna and transceiver. It is important to remember that any antenna changes its impedance with frequency, so that one that resonates well at one end of the band may well cause oscillations to trip the circuit breaker on the other end. If entire band operation is desired, especially on the lower bands, the adjustable matching network would be the better choice, rather than to try to make the antenna behave over the entire band on a cut-and-try basis.

A final point to bring out regarding broadband vs tank systems is that there is a limit to the amount of current you can draw from an emitting filament, and this saturation current will limit the amount of power drawn from the supply. In the case of transistors, where the collector internal impedance is only a fraction of an ohm, extremely high currents can be demanded from the power supply, especially with mismatched loads well below 50 ohms. Protection is provided with an electronic circuit breaker built into the power supply or with Model 1125 fast acting magnetic breaker. Model 225 Power Supply has a current limiting circuit.

2) **SWR~Two Kinds:** The standing wave ratio is a direct measure of the ratio Between two

impedances, i.e. an SWR of 3 to l tells us that one impedance is three times the other. Therefore, the unknown impedance can be either three times larger or three times smaller than the known one. If the desired impedance that the transceiver wants to see is 50 ohms, an SWR of 3 to l on the line may mean a load impedance of either 150 ohms or one of 17 ohms. If it is 150 ohms, the transmitter will act differently than if it is 17 ohms. In the first case, the power demanded from the supply will be much lower, and will not be large enough to trip the breaker. In the second case, even though the SWR reads the same, the supply may repeatedly trip out. The SWR reading gives no indication of reactive components, nor can it separate the resistive from the reactive components. It is calibrated with a pure resistive load and therefore has its greatest accuracy with a pure resistive load. The SWR bridge should only be used as an indicator when attempting to adjust the antenna system to a pure 50 ohms resistive impedance at the transmitter output point.

3) **Efficiency:** Since transistor amplifiers have a very low value of output impedance, they act more or less as a constant voltage source. That is, the RF output voltage tends to remain at a fixed level regardless of the load impedance. Hence, the output power will vary depending on the value of the load, and increase as the load impedance decreases. It can be seen that a 3 to l SWR on the low side of 50 ohms will ask the amplifier to deliver much more power than a 3 to l SWR on the high side. Since the amplifier does have a finite value of output impedance, the amount of power delivered efficiently to the load will change with load value. Unless the load is near the design value, the transistors will heat up unnecessarily without delivering any more power to the antenna.

4) **Protective Circuitry and ALC -** ALC serves three major functions. It assures the maximum power from the transmitter without careful adjustment of the input drive, it prevents the amplifier from being overdriven into the non—linear, distortion-producing area, and it serves as a power limiting device which protects the output transistors. It does the first two very well, but the third only partially. To absolutely protect the system, we add the current limiting circuitry to the power supply, or a fast acting magnetic circuit breaker in the dc supply line.

   The ALC system senses the power output and adjusts drive accordingly. Note that it does not sense the power into the final. Therefore some load conditions may exist where the ALC system will not limit transistor dissipation. One instance is when there is a highly reactive load. It is not possible to make a purely reactive load absorb power, so the ALC light will not go on, even though high power is being drawn from the supply and being dissipated in the transistors as heat. Under these conditions the power supply protective circuits take over and trip the breaker. So it is very possible that the breaker will repeatedly trip without the ALC indicator going ‘on’. If this occurs, it indicates a change in the antenna system or matching network is needed.

   A final comment regarding this situation ~ when the breaker in the power supply trips, the amount of current drawn from the supply may be high enough to cause the supply to drop out of regulation, especially with low line voltage. The output may become hum modulated. This condition should be rectified by antenna and/or matching changes, or by operating at a lower ALC control setting, since the emitted quality of the signal will be poor.

If the precautions stated above are observed, we are sure that you will be more than delighted with the performance of your ARGOSY.

2.6.3 **RECOMMENDED READING**

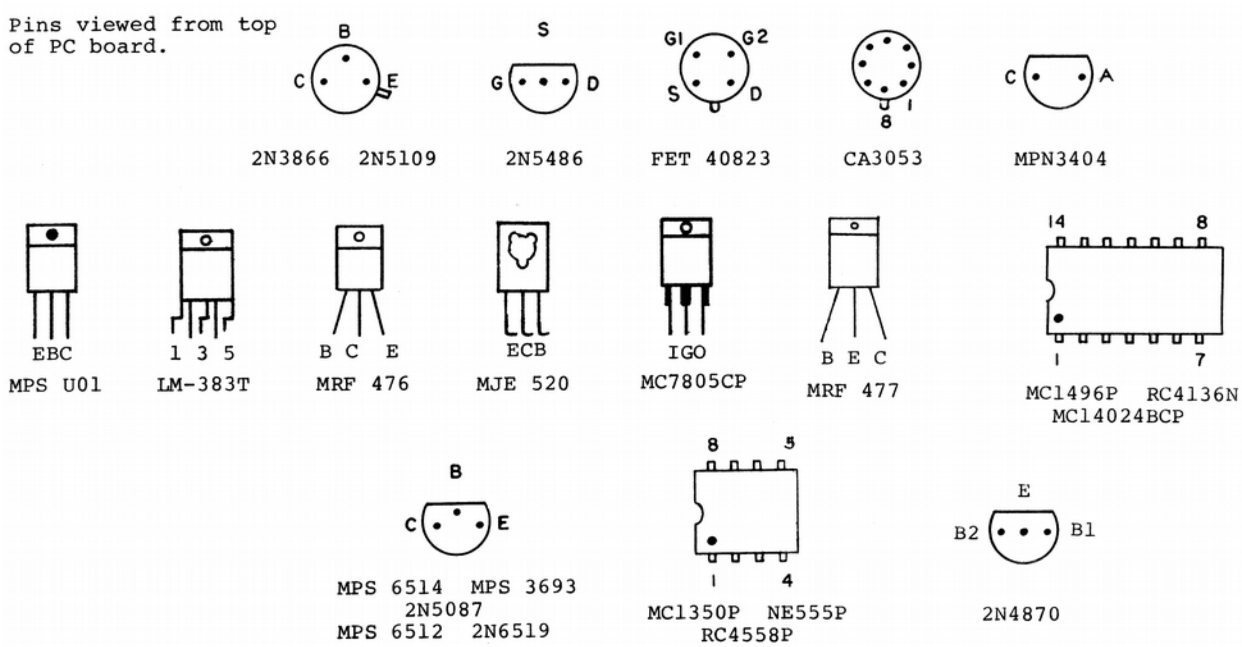
1) ARRL Handbook, Amateur Radio Relay League
2) Antenna Handbook, Ken Glanzer, Cowan Publishing
3) W8NWU Teeter Totter Tuners, Schultz, CQ Magazine, Feb. 1969, Pg. 27

2.7 **TROUBLESHOOTING CHART**

SYMPTOM	POSSIBLE CURE
ARGOSY dead. No meter lamp illumination. Receiver and transmitter inoperative.	Make sure power switch is on. Check power cable from supply or battery. Check supply or battery for proper voltage. Check 10 A fuse inside ARGOSY. (Remove bottom cover. Fuse is on Control Board).
10 Ampere fuse blown.	Check for reverse polarity of 12-14 volt line. Correct cable wires or connector termination.
ARGOSY dead. Meter lamp OK.	Check antenna system.
Set seems alive but received signals are weak.	Check antenna system and cables. Try dummy load to see if problem is in antenna system. Check settings of antenna tuner if used.
No sidetone. Transmits OK.	Check to see if sidetone level control is advanced far enough
Transmitter does not come on in SSB. Normal on CW.	Check PTT switch in microphone. Check microphone cable and plug.
Receiver dead. Transmits OK.	Check to see if headphones are plugged in, disabling speaker. If bottom was removed, make sure speaker cable is intact.

2.8 **SEMICONDUCTOR PIN IDENTIFICATION**

Service information for individual pc boards is in Section III.



3 ALIGNMENT AND SERVICE

3.1 GENERAL

This section is divided into a description of the main chassis and each subassembly. Interconnection and transistor voltages are given for each unit. Readings should be made with a dc voltmeter with at least 20 k ohms-per-volt impedance and should be within 15% of listed values. All readings are dc and positive with respect to chassis GND unless stated otherwise.

When removing an assembly, note the orientation of the board in the chassis and the connectors on the boards. Some can be installed backwards if care is not taken.

To facilitate location of various components that may require adjustment, refer to the table below.

FUNCTIONS	ASSEMBLY	PART NUMBER
Receiver 9 MHz trap.	RF/MIXER	80784
Receiver mixer balance.	RF/MIXER	80784
Transmitter mixer balance.	RF/MIXER	80784
ALC set point.	RF/MIXER	80784
Receiver-Transmitter bandpass adjust.	BPF	80786
S~Meter calibration.	IF/AF	80785
Receiver IF tune.	IF/AF	80785
Band edge set and linearity.	PTO	80803
10-15 meter offset adjust.	OSC/MIX	80787
Local oscillator mixer.	OSC/MIX	80787
Carrier balance.	SSB/GEN	80780
BFO frequency set.	SSB/GEN	80780
Balanced modulator tune.	SSB/GEN	80780
CW transmitter offset.	SSB/GEN	80780
Final & driver bias adjust.	FINAL AMP	80804
Power meter & SWR calibration.	SWR/LP FILTER	80805
SWR null.	SWR/LP FILTER	80805
Offset zero adjust.	CONTROL	80781

3.2 **MAIN CHASSIS**

THE CHASSIS WIRING IS COLOR CODED WHENEVER POSSIBLE.

COLOR	FUNCTION	VOLTAGE, RX	VOLTAGE, TX
BLACK	GND	0	0
RED	+13.0	13.0	13.0
ORANGE	+REG	8.0	8.0
YELLOW	T	0	11.0
BLUE	R	12.0	0.7

3.3 **DISASSEMBLY**

1) **REMOVAL OF TOP**

Remove the upper two screws on each side. Lift the rear edge, pull back and up.

2) **REMOVAL OF BOTTOM**

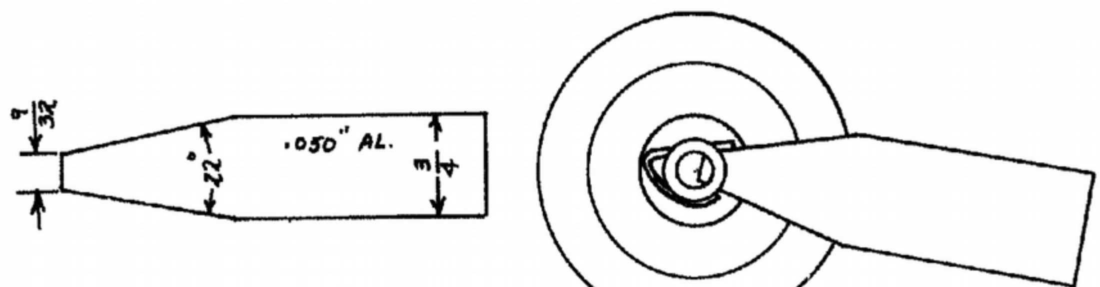
Remove the lower two screws on each side. Set the ARGOSY on its top. Remove two screws in bottom cover. Lift the rear edge and pull back slowly. The Speaker leads are attached to the PHONES jack and must be unsoldered, or the cover carefully laid aside without straining the speaker leads.

3) **REMOVAL OF FRONT PANEL**

Remove all knobs using 4-40 and 6-32 Allen wrenches provided. The dial skirt is a friction fit to the VFO shaft and can be pulled off. Remove Phillips screws at each corner. Unplug the ALC light from its socket. Pull the panel forward and remove.

4) **DIAL SKIRT REPLACEMENT**

To replace the dial skirt, either a specially constructed tool (below), or a screwdriver with a blade width of approximately 9/32" can be used. With the tool, spread the "D" spring on the skirt hub so that the straight portion does not show through in the hub bore. If the tool tip shows in the bore, this is OK for now. Start the skirt on the shaft, with the tool handle pointing downward in relation to the front panel. This puts the handle of the tool out in the open. Push the skirt on the shaft until the tip of the tool in the hub bore hits the brass portion of the two diameter shaft. While maintaining inward pressure on the skirt. Slowly remove the tool from the groove by using a rotational motion on the handle. As the tip is pulled from the hub bore, it will allow the skirt to be pushed on the shaft before the Spring can regain its unstressed condition. Seat the skirt as far as it will go. Replace the felt washers between the knob and skirt. They provide a slight amount of friction to eliminate any backlash between the two.



Dimensional details of insertion tool.

Rear view of dial skirt with tool inserted.

3.4 **ROTARY SWITCH CARE**

Selector switches are specially lubricated by the manufacturer for maximum life. Brushing on or dipping switch in solvents will wash away the special lubricants and shorten the life of the switch. Cleaning rosin from soldered connections is not recommended since there is a hazard of the dissolved rosin running into the switch causing resistance problems. Never use commercial contact cleaners on switches.

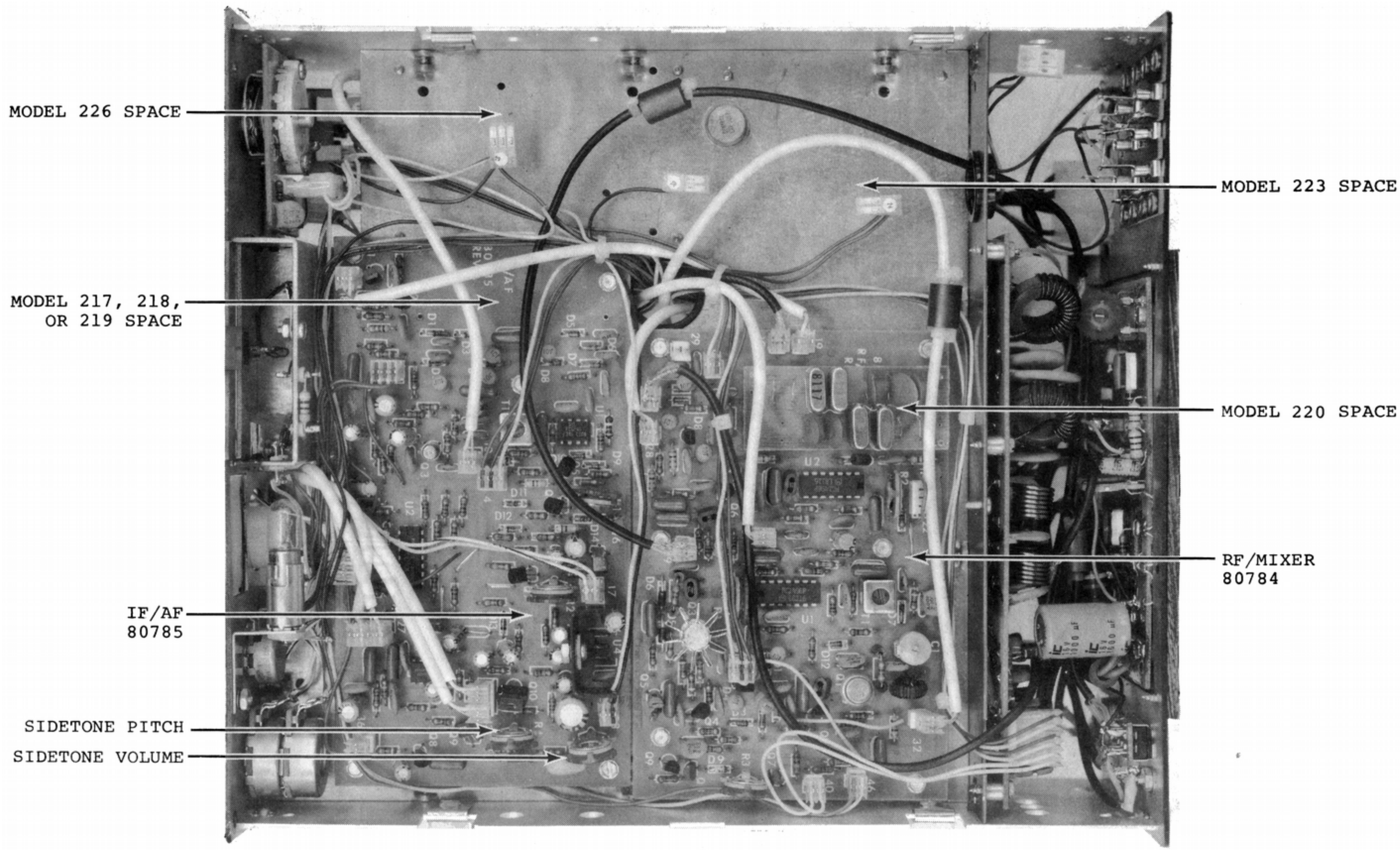
3.5 **METER LAMP REPLACEMENT**

The meter lamp is a 14 volt bayonet type, Nos. 1813 or 1892. Access is by removing top cover. *(2016 – Lamps may be replaced by LEDs)*

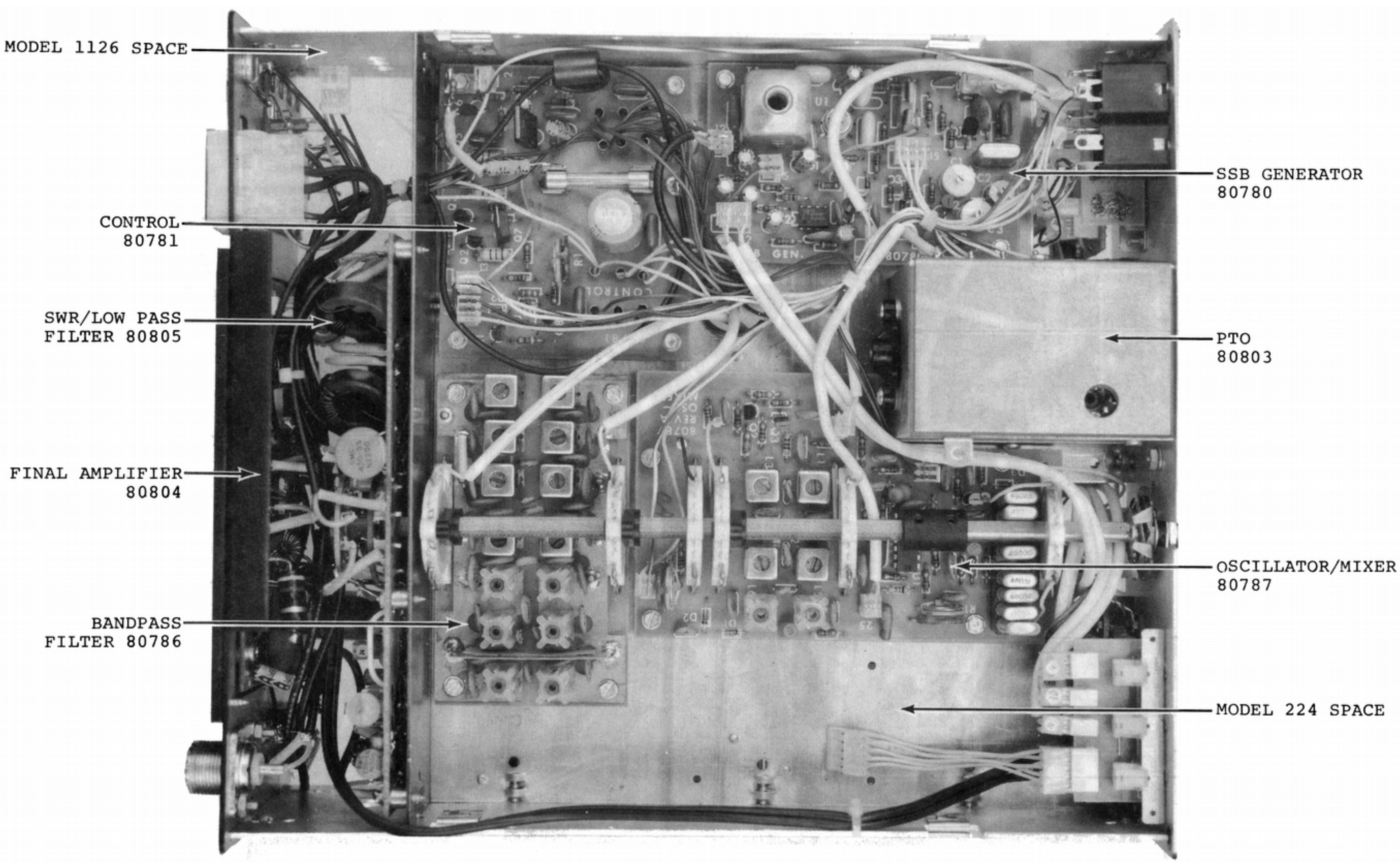
3.6 **FUSE REPLACEMENT**

The reverse polarity fuse is located in the bottom compartment, under the aluminum shield, on the 80781 CONTROL board. Replace with GLH 10, 10 A fast blow.

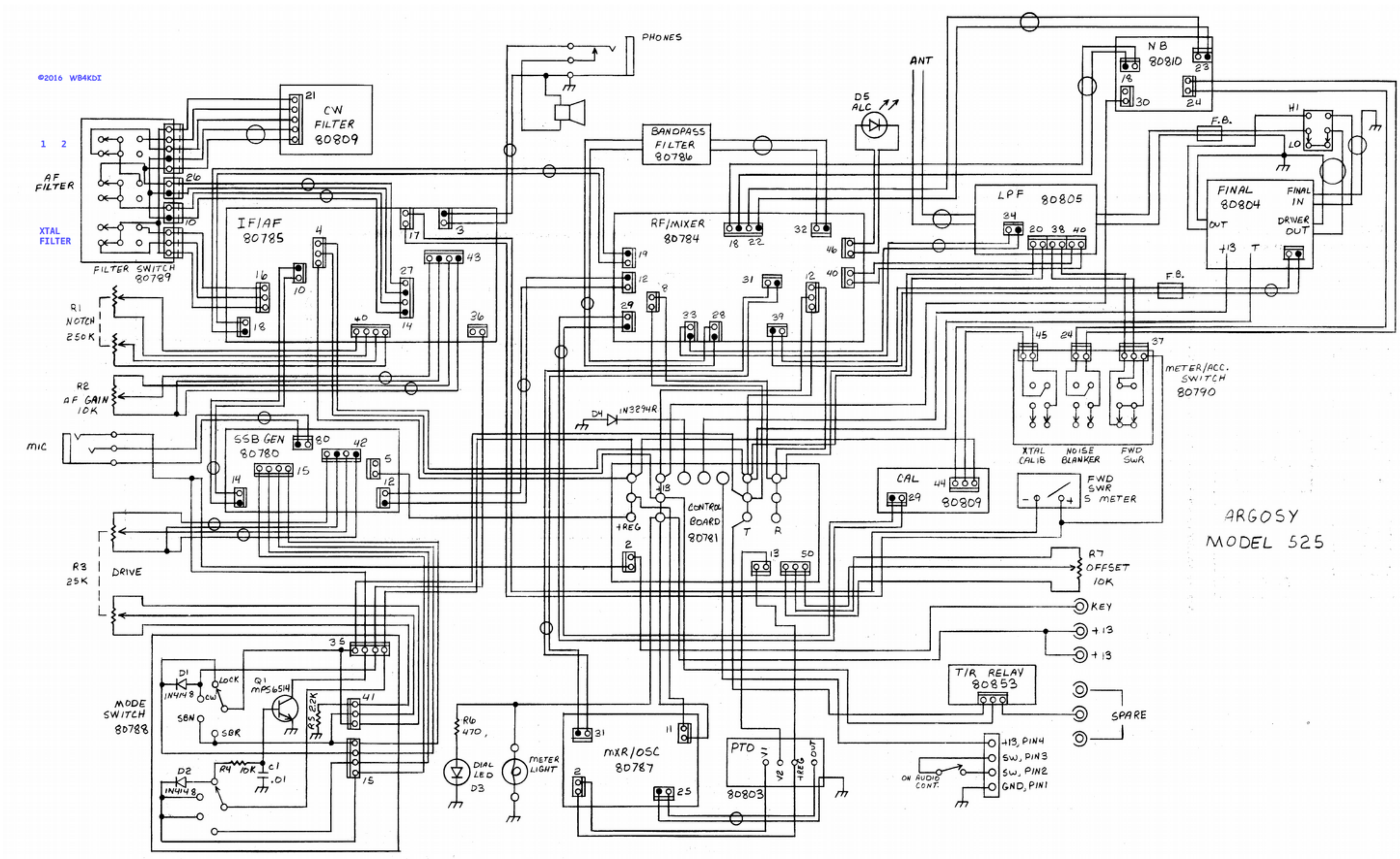
3.7 **TOP VIEW**


MODEL 226 SPACE
MODEL 223 SPACE
MODEL 217, 218, OR 219 SPACE
MODEL 220 SPACE
RF/MIXER 80784
IF/AF 80785
SIDETONE PITCH
SIDETONE VOLUME

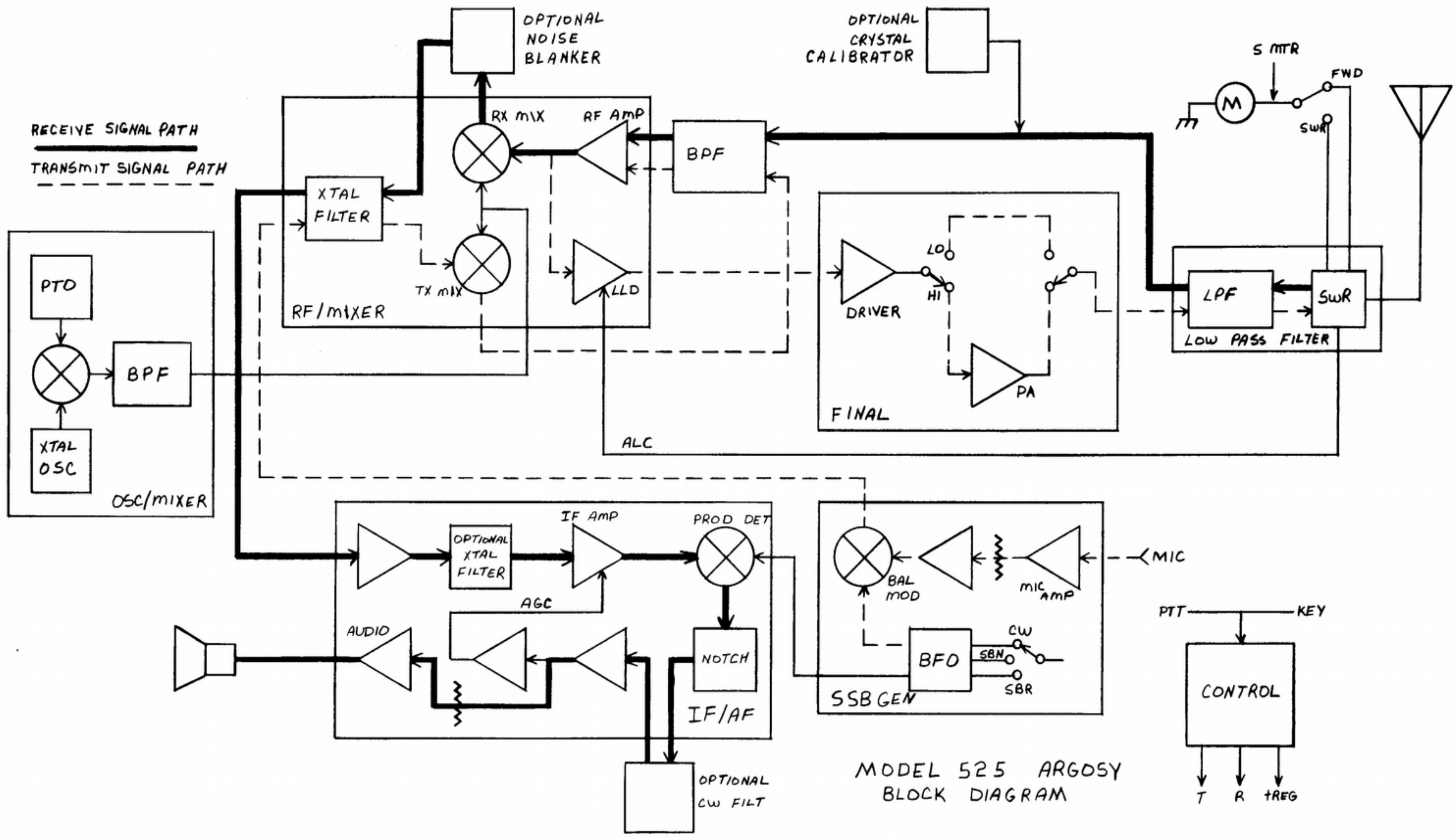
3.8 **BOTTOM VIEW**



3.9 **CHASSIS WIRING DIAGRAM**



3.10 **BLOCK DIAGRAM**



3.11 **DIAL CALIBRATION**

The PTO oscillator dial skirt is attached to the control shaft by means of a friction clutch. By holding the knob firmly, the skirt can be rotated to calibrate it to zero setting when using a crystal calibrator or WWV, as described elsewhere in this manual.

3.12 **DIAL CORD REPLACEMENT**

The dial string mechanism consists of three main parts- a .020" diameter Dacron non-stretchable string, an elastic cord and a dial pointer assembly. The diameter of the Dacron is important for proper pointer readout, since it is wound on the tuning shaft and pulls the pointer across the scale. Replace only with a string of the same diameter. The stretchable section provides string tension. Since the dial scale is compressed, a 3:1 travel reduction is achieved by a pulley arrangement using a two step dial pointer pin. All three parts are available from our Repair Department.

To install, remove front panel as described above. Attach one end of the elastic cord to the #4 solder lug which is secured by the left coil housing mounting screw. With long nose pliers squeeze the lug around the elastic to secure it firmly without severing it. Turn main tuning dial fully counterclockwise. Knot one end of Dacron string around the small pin in the tuning shaft. wind Dacron string counter- clockwise l/2 to 1 full turn (depending on pin position). The string should lead off from the bottom of the shaft and go toward the right. After setting serrated zero adjustment mechanism to its center of travel, run the Dacron string around the small plastic pin on the right side of this mechanism and then up to the upper pulley. Temporarily tape free end of the Dacron string to the top edge of the sub-panel here.

Now run the elastic cord to the left, around the lower left pulley, then up and around the top left pulley. Slide the dial pointer/LED assembly all the way to the left. Stretch the cord one inch and run it to the right and form a loop around the left dial pointer pin, securing it with the small metal band from the old assembly. Temporarily tape the pointer in this leftmost position. Pass the free end of the Dacron string, that was taped to the panel, to the left and around the larger portion of the right dial pointer pin. This should be the part closest to the body of the dial pointer. Run the Dacron string to the right and counterclockwise around the metal pin located to the left of the meter, and then to the left again. There should be 1/2 turn of string around the metal pin. Pass the free end of the string counterclockwise around the smaller diameter of the right dial pointer pin. Make one complete loop around this pin and then securely knot the string here. Cut off any excess string. Remove the tape holding the dial pointer in place.

Make sure string around the main tuning shaft is in the groove and is as close to the panel side of the groove as possible. As the shaft is turned clockwise, the string should wind evenly without one turn going over the other, otherwise indexing will be somewhat off at the top end of the scale. Run the dial pointer up and down the scale to be sure that it travels smoothly.

3.13 **SERVICE INFORMATION**

3.13.1 RF/MIXER 80784

This assembly contains the RF section of the receiver and its mixer, the transmitter mixer and the low level driver stages for the transmitter, including the ALC. Some of the stages are shared between the transmit and receive functions. Also included is the crystal ladder filter which is used both in transmit and receive modes.

REV B: Both mixers use a MC1496 differential double balanced integrated circuit. Trim potentiometer R1 is used to adjust the receiver mixer balance at 21.320 MHz. Transformer T1 is adjusted for maximum received signal on any band.

REV C: The receive mixer uses a matched quad 1N914/1N4148 double balanced diode ring and the transmitter mixer uses a MC1496 differential double balanced integrated circuit. Trim potentiometer R1 and trim capacitor C2 are used to adjust the receiver mixer balance at 21.320 MHz.

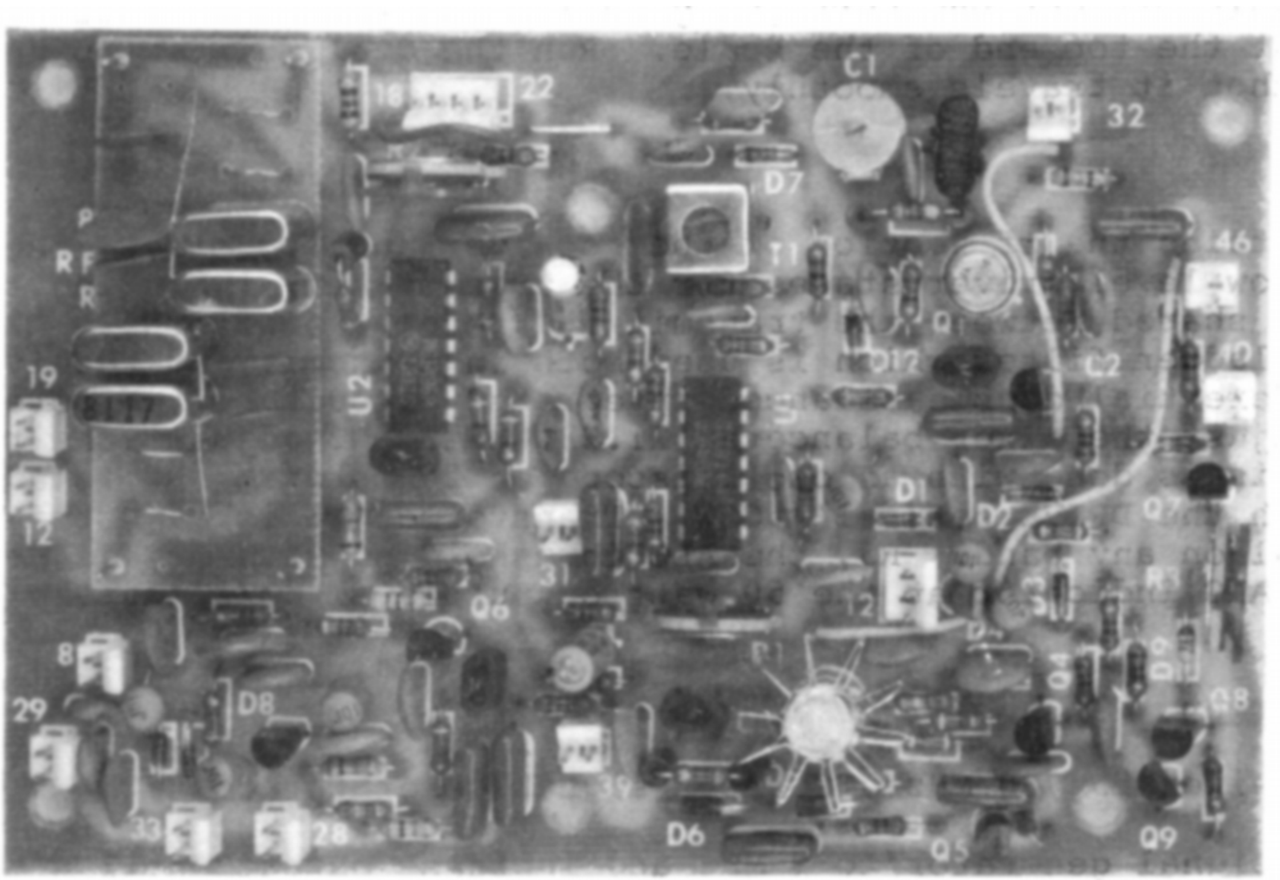
R2 adjusts the transmitter mixer balance. This is done with an oscilloscope on 20 meters. R2 is adjusted for minimum output with the DRIVE set fully CCW. R3, the ALC threshold adjustment, is set to light the front panel ALC indicator at the 50 watt output level on 20 meters into a 50 ohm dummy load.

3.13.1.1 9 MHz Trap Adjustment

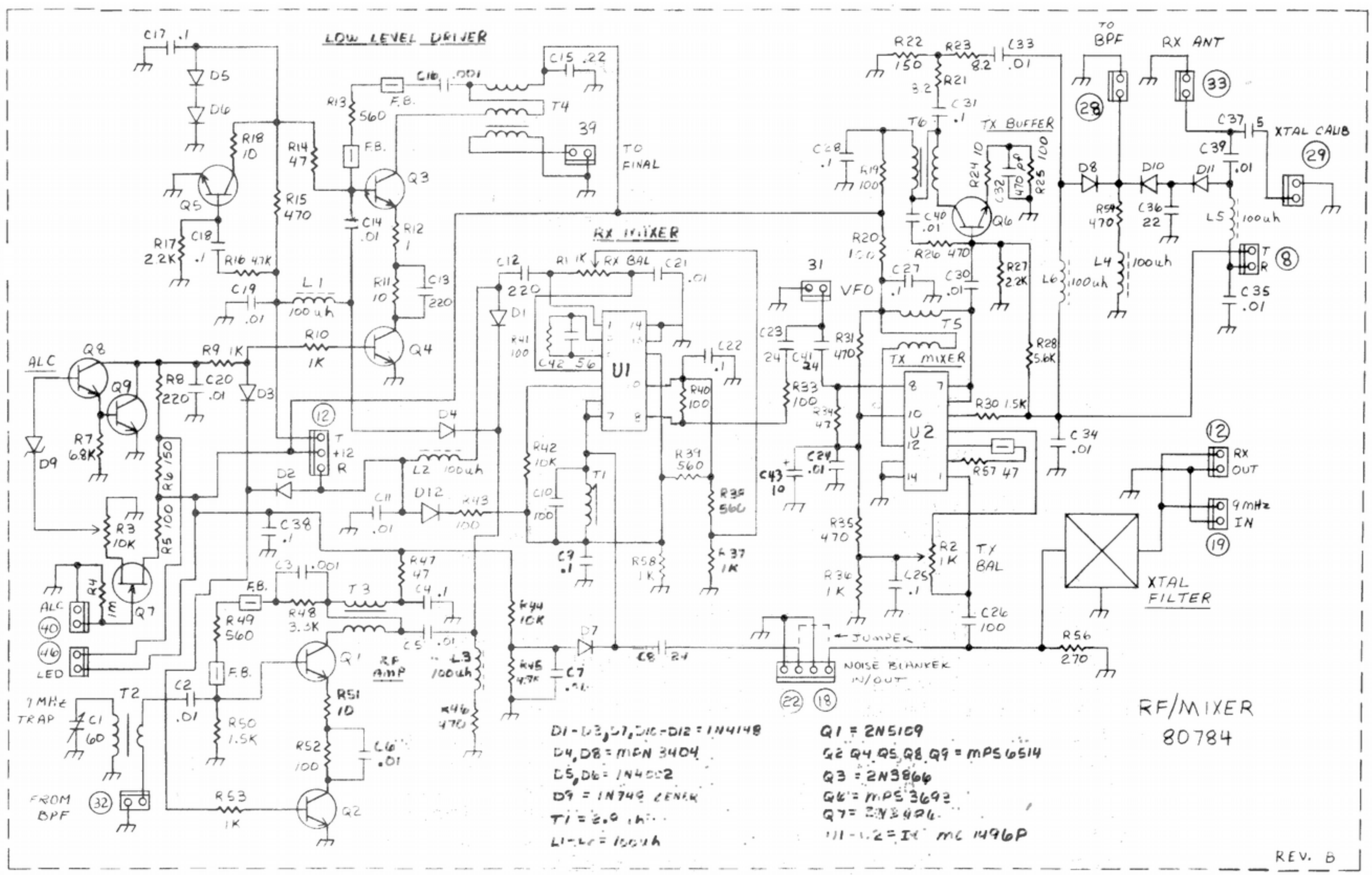
1) Set receiver to 7.0 MHz. Connect signal generator to ANTENNA connector.

2) Adjust signal generator to 9 MHz and increase output until a signal is heard. Tune trimmer capacitor C1 for null. Use insulated tuning wand. Null is very sharp.

3.13.1.2 Rev B PC Board



3.13.1.3 Rev B Schematic



3.13.1.4 Rev B Parts List

C1	23061	CAP-VAR, 5/60 PF, TRIMMER
C10,26	23139	CAP-FXD, 100 PF, 100 V, 5%
C12,13	23137	CAP-FXD, 220 PF, 100 V, 5%
C15	23197	CAP-FXD, .22 MF, 20%, 50 V, EL
C2,5-7,11,14,19,20,21,24,30,33-35,39,40	23132	CAP-FXD, .01 MF, 100 V, CER
C3,16	23133	CAP-FXD, .001 MF, 500 V, CER, 10%
C32	23162	CAP-FXD, 470 PF, 100 V, CER, 5%
C36	23014	CAP-FXD, 22 PF, 50 V, 5%
C37	23173	CAP-FXD, 5 PF, 500 V, CER, 5%
C4,9,17,18,22,25,27,28,31,38	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
C42	23142	CAP-FXD, 56 PF, 100 V, 5%
C43	23222	CAP-FXD, 10 MF, 16 V, EL, VERT
C8,23,41	23123	CAP-FXD, 24 PF, 1 KV, CER, 5%
D1-3,7,10-12	28001	DIODE - 1N4148/1N914, SIL
D4,8	28017	DIODE - PIN, MPN3404
D5,6	28000	DIODE - POWER, 1N4002, SIL
D9	28021	DIODE - ZENER, 3.9 V, 1N748
L1-6	21060	CHOKE-RF, 100 UH, 100 MA
Q1	25079	TRANSISTOR - 2N5109
Q2,4,5,8,9	25054	TRANSISTOR - MPS6514
Q3	25027	TRANSISTOR-RF POWER, 2N3866
Q6	25032	TRANSISTOR-MPS3693
Q7	25060	TRANSISTOR - 2N5486
R1,2	30070	RES-VAR, 1 K, LIN, PC VERT MTG, 30%
R3	30038	RES-VAR, 10 K, LIN, PC MOUNT
T1	21057	COIL-SHIELDED, 2.8 UH
T2	85008	TOROID - RF
T3,5,6	85120	TRANSFORMER - RF, BIFILAR
T4	85134	RF TRANSFORMER - TRIFILAR
U1,2	25047	IC-MC1496P

3.13.1.5 Rev B Voltages

NOTE:

MODE set to CW
XTAL filter OUT
DRIVE control full CCW
NOTCH set to OUT
NO RECEIVED SIGNALS

U1 VOLTAGE

PIN	Receive	Transmit
1	5.28	.37
2	4.57	0
3	4.57	0
4	5.28	.37
5	1.17	.56
6	11.20	.77
7	11.20	.77
8	8.25	.57
9	0	0
10	8.25	.57
11	0	0
12	11.20	.77
13	0	0
14	0	0

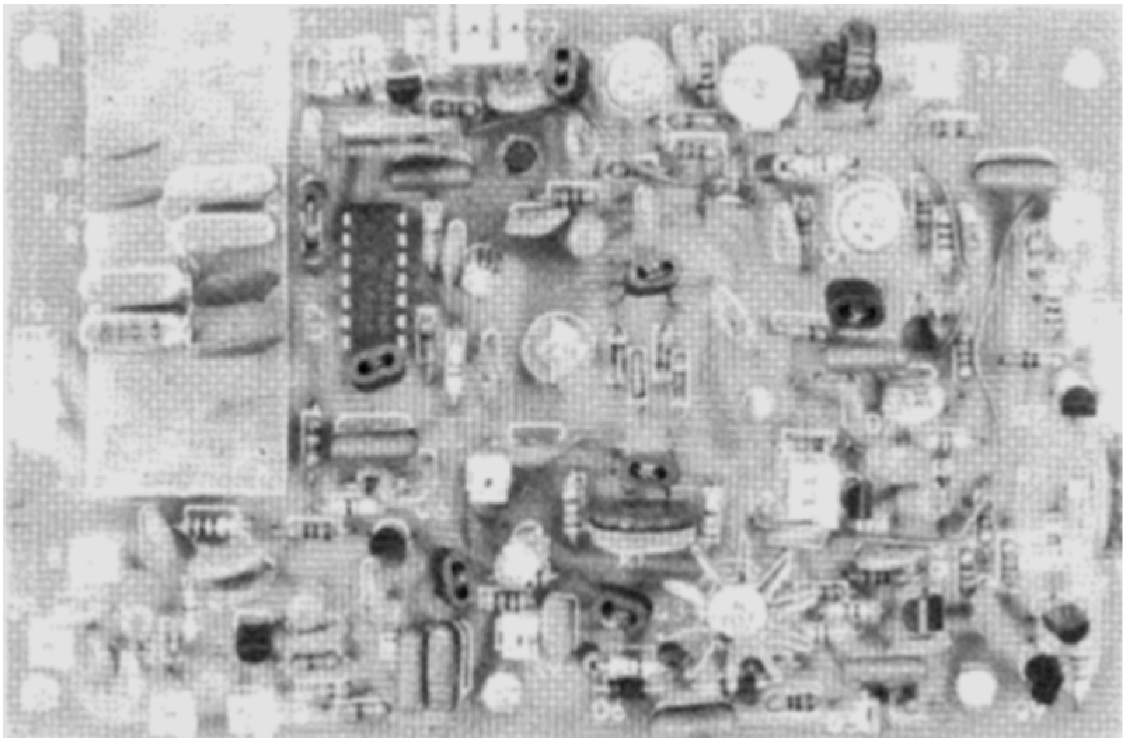
U2 VOLTAGE

PIN	Receive	Transmit
1	7.02	6.67
2	6.52	5.92
3	6.52	5.92
4	7.02	6.67
5	0	3.29
6	13.47	12.95
7	13.47	12.95
8	10.25	9.80
9	0	0
10	10.25	9.80
11	0	0
12	13.47	12.95
13	0	0
14	0	0

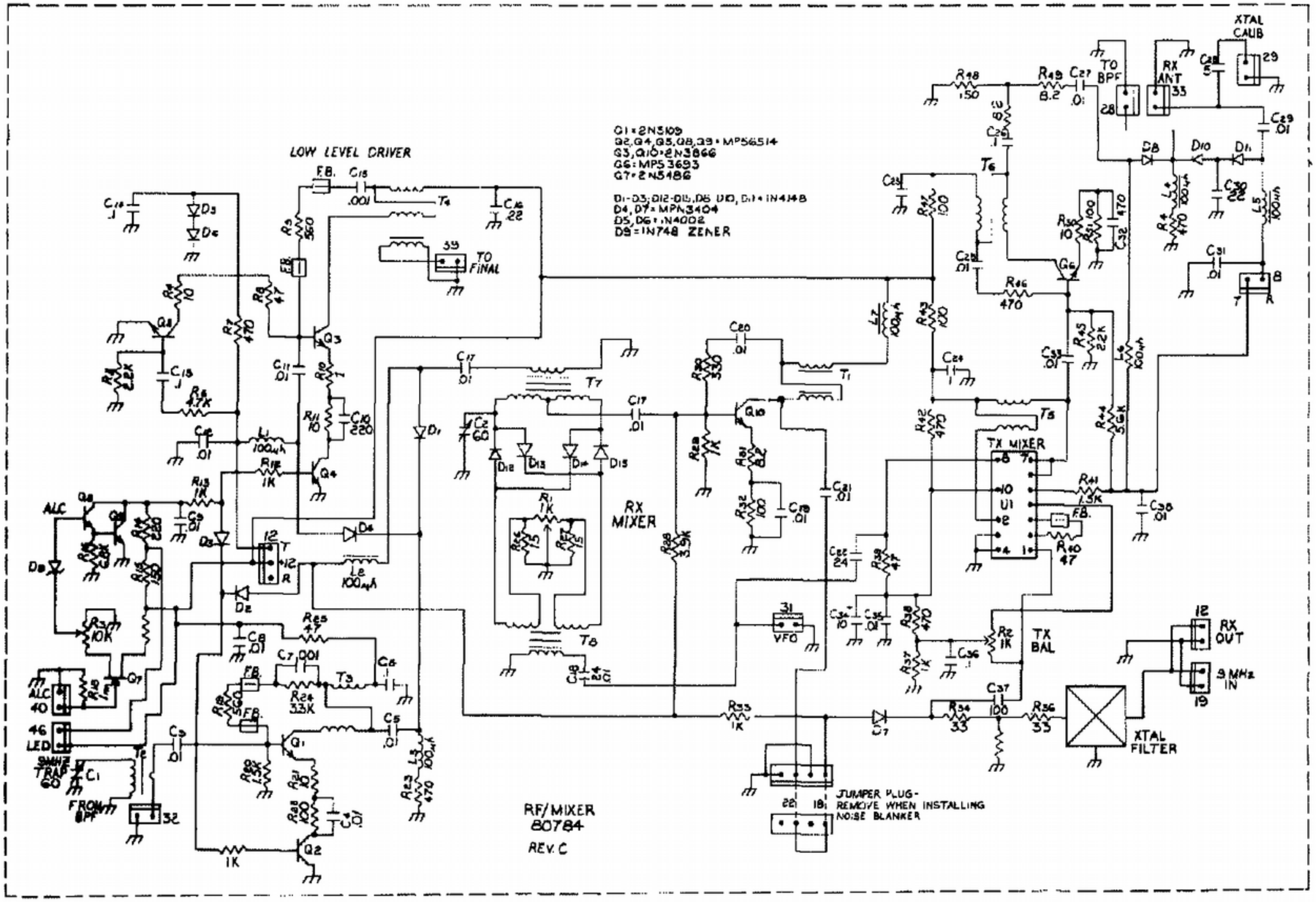
BIPOLAR	**COLLECTOR**		**BASE**		**EMITTER**	
Device	**Receive**	**Transmit**	**Receive**	**Transmit**	**Receive**	**Transmit**
Q1	12.60	12.60	3.24	3.24	2.56	2.56
Q2	.05	.05	.82	.80	0	0
Q3	13.80	13.80	0	1.41	0	.73
Q4	0	.12	.78	.81	0	0
Q5	0	1.41	0	0	0	0
Q6	13.80	10.0	0	2.85	0	2.16
Q8	11.74	11.30	.45	.45	.02	.02
Q9	11.74	11.30	.02	.02	0	0

FET	**DRAIN**		**GATE**		**SOURCE**	
Device	**Receive**	**Transmit**	**Receive**	**Transmit**	**Receive**	**Transmit**
Q7	13.77	13.77	0	0	3.57	3.57

3.13.1.6 Rev C PC Board



3.13.1.7 Rev C Schematic



3.13.1.8 Rev C Parts List

C10	23137	CAP-FXD, 220 PF, 100 V, 5%
C16	23197	CAP-FXD. .22 MF, 20%, 50 V, EL
C2	23051	CAP-VAR, 5/60 PF, TRIMMER
C2	23168	CAP-VAR, 3/22 PF, TRIMMER, VERT
C22	23123	CAP-FXD, 24 PF, 1 KV, CER, 5%
C28	23173	CAF-FXD, 5 PF, 500 V, CER, 5%
C3-5,9,11,12,17-21,25,27,29,31,33,35,38	23132	CAP-FXD, .01 MF, 100 V, CER
C30	23014	CAP-FXD, 22 PF, 50 V, 5%
C32	23162	CAP-FXD, 470 PF, 100 V, CER, 5%
C34	23222	CAP-FXD. 10 MF, 16 V, EL, VERT
C37	23139	CAP-FXD, 100 PF, 100 V, 5%
C6,8,13,14,23,24,26,36	23006	CAP-FXD, 0.1 MF, 250 V FILM, 20%
C7,15	23133	CAP-FXD, .001 MF, 500 V, CER, 10%
D1-3,9-11	28001	DIODE - 1N4148/1N914, SIL
D12-15	98094	PT. NO. 28001 SELECTED SET OF 4
D4,7,8	28017	DIODE - PIN, MPN3404
D5,6	28000	DIODE - POWER, 1N4002, SIL
D9	28021	DIODE - ZENER, 3.9 v, 1N748
L1-7	21060	CHOKE-RF, 100 UH, 100 MA
Q1	25079	TRANSISTOR - 2N5109
Q2,4,5,8,9	25054	TRANSISTOR - MPS6514
Q3,10	25027	TRANSISTOR-RF POWER, 2N3866
Q6	25032	TRANSISTOR-MPS3693
Q7	25060	TRANSISTOR - 2N5486
R1-3	30070	RES-VAR, 1 K, LIN, PC VERT MTG, 30%
T1,3,5,6	85120	TRANSFORMER - RF, BIFILAR
T2	85008	TOROID - RF
T4,7,8	85134	RF TRANSFORMER - TRIFILAR
U1	25047	IC-MC1496P

3.13.1.9 Rev C Voltages

U1

PIN	Receive	Transmit
1	7.02	6.67
2	6.52	5.92
3	6.52	5.92
4	7.02	6.67
5	0	3.29
6	13.47	12.95
7	13.47	12.95
8	10.25	9.80
9	0	0
10	10.25	9.80
11	0	0
12	13.47	12.95
13	0	0
14	0	0

NOTE:

MODE set to CW
XTAL filter OUT
DRIVE control full CCW
NOTCH set to OUT
NO RECEIVED SIGNALS

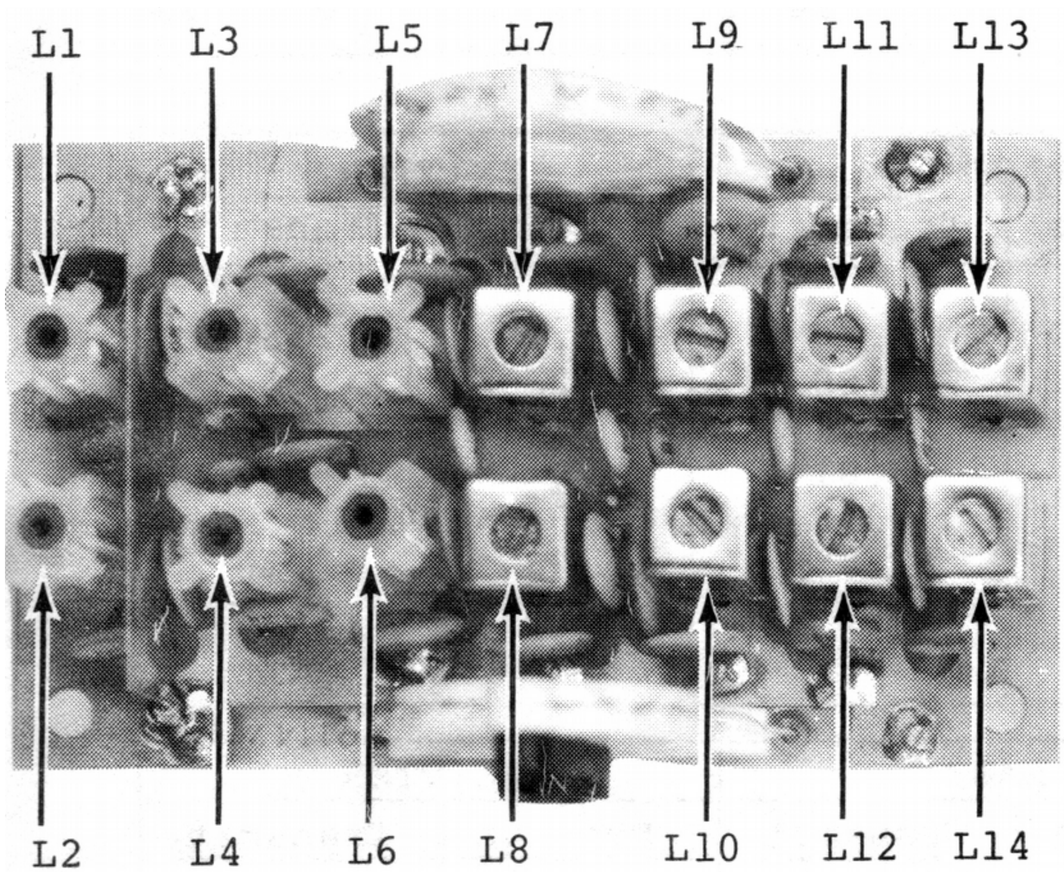
BIPOLAR	COLLECTOR		BASE		EMITTER	
Device	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	12.60	12.60	3.24	3.24	2.56	2.56
Q2	.05	.05	.82	.80	0	0
Q3	13.80	13.80	0	1.41	0	.73
Q4	0	.12	.78	.81	0	0
Q5	0	1.41	0	0	0	0
Q6	13.80	10.0	0	2.85	0	2.16
Q8	11.74	11.30	.45	.45	.02	.02
Q9	11.74	11.30	.02	.02	0	0
Q10	13.47	13.47	2.5	0	1.8	0

FET	DRAIN		GATE		SOURCE	
Device	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q7	13.77	13.77	0	0	3.57	3.57

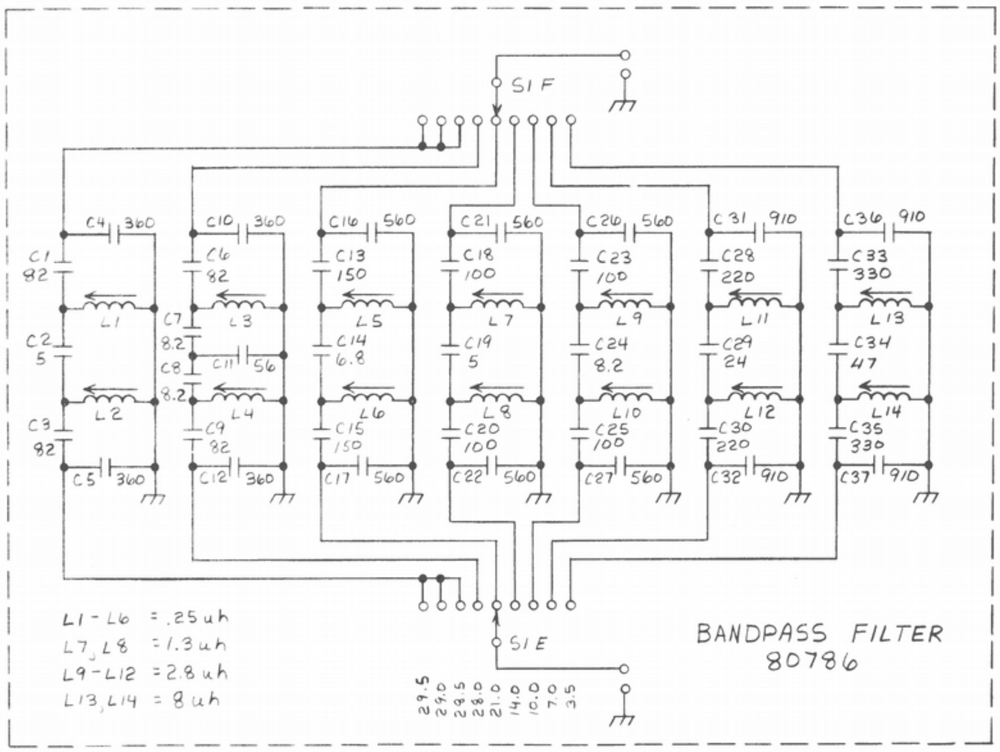
3.13.2 BANDPASS FILTER 80786

This assembly contains individual bandpass filters for each band. They consist of critically or overcoupled tuned circuits, two poles for each band. For maximum selectivity and rejection of images and other spurious responses two separate bandpass filters are used to cover the 10 meter band. Because the tuning of these circuits is critical and they are used both when receiving and transmitting, these resonant circuits are best aligned using a sweep oscillator system. Realignment is seldom necessary except when a tuned circuit component is replaced. Since all of the components are passive, no voltage measurements are required.

3.13.2.1 PC Board



3.13.2.2 Schematic



3.13.2.3 Parts List

C1,3,6,9	23140	CAP-FXD, 82 PF, 100 V, 5%
C11	23142	CAP-FXD, 56 PF, 100 V, 5%
C13,15	23146	CAP-FXD, 150 PF, 100 V, 10%
C14	23112	CAP-FXD, 6.8 PF, CER
C16,17,21,22,26,27	23135	CAP-FXD, 560 PF, 100 V, 5%
C18,20,23,25	23139	CAP-FXD, 100 PF, 100 V, 5%
C2,19	23173	CAP-FXD, 5 PF, 500 V, CER, 5%
C28,30	23137	CAP-FXD, 220 PF, 100 V, 5%
C29	23123	CAP-FXD, 24 PF, 1 KV, CER, 5%
C31,32,36,37	23134	CAP-FXD, 910 PF, 100 V, 5%
C33,35	23136	CAP-FXD, 330 PF, 100 V, 5%
C34	23143	CAP-FXD, 47 PF, 100 V, 5%
C4,5,10,12	23147	CAP-FXD, 360 PF, 100V, 10%
C7,8,24	23116	CAP-FXD, 8.2 PF, CER
L1-6	21059	COIL-UNSHIELDED, .25 UH
L13,14	21055	COIL-SHIELDED, 8 UH
L7,8	21058	COIL-SHIELDED, 1.3 UH
L9-12	21057	COIL-SHIELDED, 2.8 UH

3.13.3 **IF/AF 80785**

This assembly contains only receiver functions. Transistor Q2 is the input buffer which drives the optional crystal ladder filter if installed. Transistor Q1 makes up for any additional loss in the narrow passband optional filter. Integrated circuit U1 is the IF amplifier and AGC control element. The product detector Q3 is a dual gate MOSFET. The notch filter function is peRFormed by U2. An audio preamplifier is one half of U3 and the power amplifier is U4. The AGC system consists of the other section of U3, diodes Dll and D12 and transistors Q4 through Q7. Three adjustments are required on the assembly. First, L1 is peaked for maximum received signal on the S-Meter.

REV A: S-Meter calibration is accomplished by first adjusting Rl until the background noise just begins to drop with no signal applied. R2 is then adjusted for an S9 reading when a 50 microvolt, 14.1 MHz signal is applied to the antenna terminal.

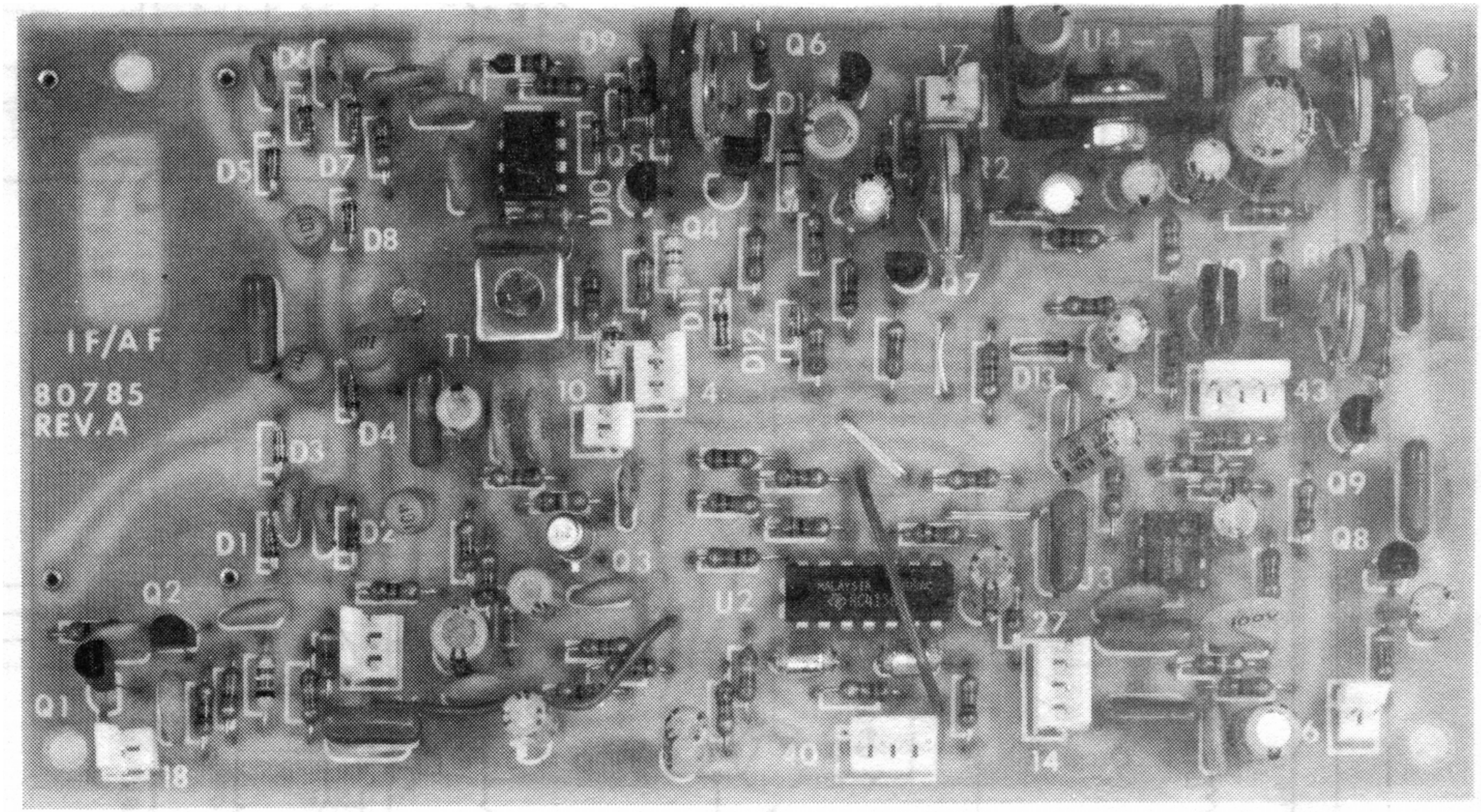
REV B: S-Meter calibration is accomplished by adjusting R2 for an S9 reading when a 50 microvolt, 14.1 MHz signal is applied to the antenna terminal.

This assembly also contains the CW sidetone oscillator Q9, with volume and pitch controls R3 and R4 respectively.

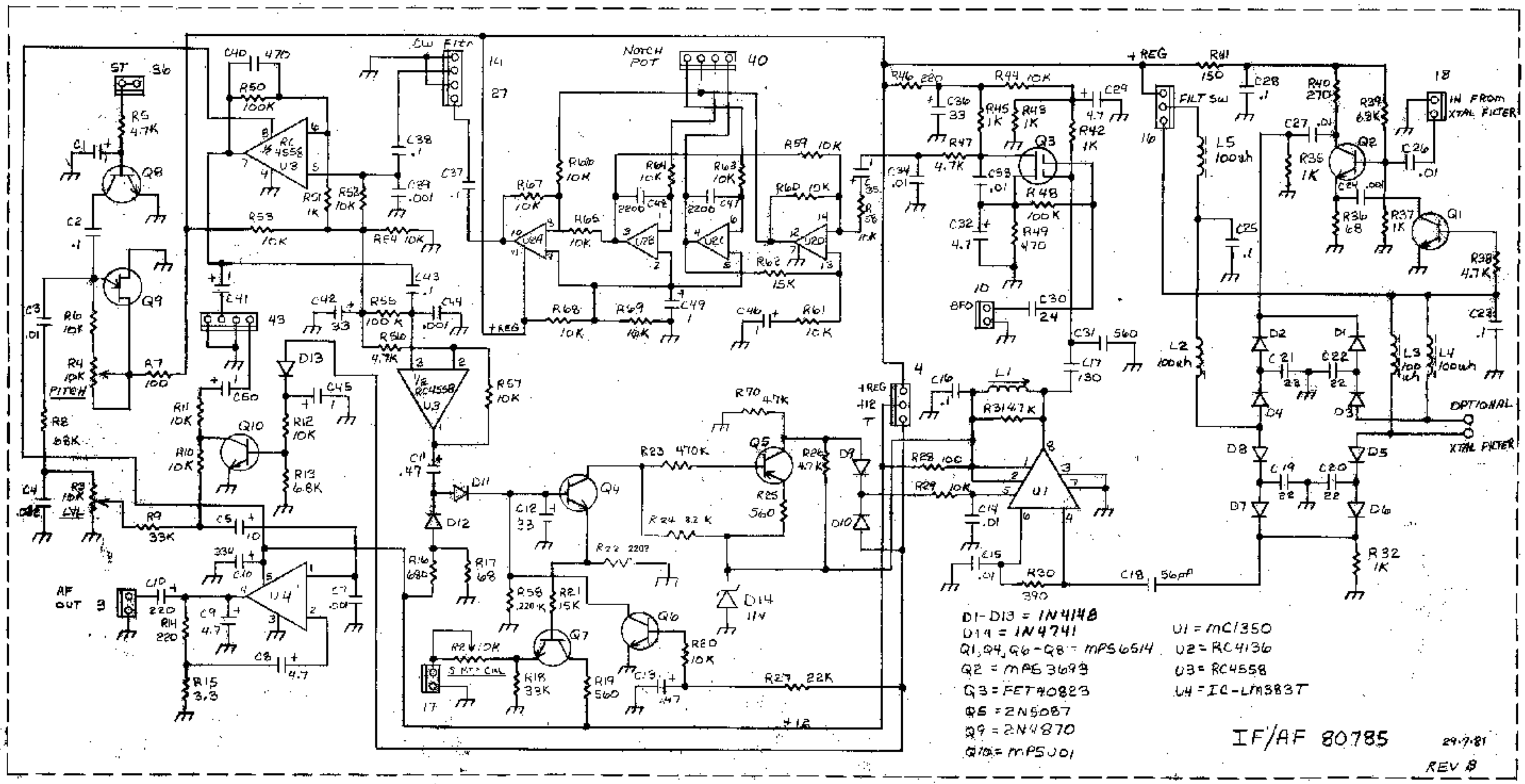
NOTE: Most of the performance improvements for the ARGOSY have been made on this board.

QST, Page 57, November 1983
QST, Page 51, February 1986
Ham Radio Magazine, Pages 38-50, November 1986
QST, Page 89, January 1992

3.13.3.1 Rev A PC Board



3.13.3.2 Rev B Schematic



3.13.3.3 Rev A Parts List

C1,35,41,45,46,49,50	23181	CAP-FXD, 1 MF, 50 V, EL, VERT
C10	23202	CAP-FXD, 220 MF, 16 V, EL, VERT
C11,13	23193	CAP-FXD, .47 MF, 20%, 50 V, EL
C17	23155	CAP-FXD, 130 PF, 500 V, 5%
C18	23142	CAP-FXD, 56 PF, 100 V, 5%
C19-22	23014	CAP-FXD, 22 PF, 50 V, 5%
C2,16,23,25,28,37,38,43	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
C3,14,15,26,27,33,34	23132	CAP-FXD, .01 MF, 100 V, CER
C30	23123	CAP-FXD, 24 PF, 1 KV, CER, 5%
C31	23135	CAP-FXD, 560 PF, 100 V, 5%
C4	23002	CAP-FXD, .022 MF, 250 V, FILM, 20%
C40	23162	CAP-FXD, 470 PF, 100 V, 5%
C47,48	23070	CAP-FXD, 2200 PF, 25 V, FILM, 5%
C5	23222	CAP-FXD, 10 MF, 16 V, EL, VERT
C6,12,36,42	23182	CAP-FXD, 33 MF, 16 V, EL, VERT
C7,24,39,44	23133	CAP-FXD, .001 MF, 500 V, CER, 10%
C8,9,29,32	23188	CAP-FXD, 4.7 MF, 25 V, EL, VERT
D1-14	28001	DIODE - 1N4148/1N914, SIL
D15	28007	DIODE - ZENER, 11 V, 10%, 1N4741
L1	21057	COIL-SHIELDED, 2.8 UH
L2-5	21060	CHOKE-RF, 100 UH, 100 MA
Q10	25053	TRANSISTOR - MPSUO1
Q2	25032	TRANSISTOR - MPS3693
Q3	25022	TRANSISTOR - FET, 40823
Q5	25001	TRANSISTOR - 2N5087
Q9	25034	TRANSISTOR - 2N4870
Ql,4,6-8	25054	TRANSISTOR - MPS6514
R1	30198	RES-VAR, 100 K, LIN, PC VERT, 30%
R2-4	30038	RES-VAR, 10 K, LIN, PC MOUNT
U1	25062	IC-MC1350P
U2	25077	IC-RC4136N
U3	25078	IC-RC4558P
U4	25099	IC-LM383T, 25 v

3.13.3.4 Rev B VOLTAGES

U1

	VOLTAGE	
PIN	Receive	Transmit
1	10.70	10.70
2	10.70	10.70
3	0	0
4	4.10	4.10
5	6.06	6.68
6	4.09	4.09
7	0	0
8	10.70	10.70

U2

	VOLTAGE	
PIN	Receive	Transmit
1	3.72	3.72
2	3.72	3.72
3	3.72	3.72
4	3.72	3.72
5	3.72	3.72
6	3.72	3.72
7	0	0
8	3.72	3.72
9	3.72	3.72
10	3.73	3.73
11	7.53	7.53
12	3.72	3.72
13	3.72	3.72
14	3.72	3.72

U3

	VOLTAGE	
PIN	Receive	Transmit
1	7.09	7.09
2	7.04	7.04
3	6.90	6.90
4	0	0
5	6.97	6.97
6	7.01	7.01
7	7.44	7.44
8	13.80	13.80

U4

PIN	VOLTAGE
1	0.61
2	0.59
3	0
4	7.24
5	13.80

BIPOLAR	COLLECTOR		BASE		EMITTER	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	.07	.07	.08	.08	0	0
Q2	6.28	6.28	.88	.88	.18	.18
Q4	12.86	12.94	.82	.05	.30	0
Q5	5.65	4.40	12.90	12.94	13.54	13.57
Q6	.82	.05	0	.67	0	0
Q7	13.80	13.80	.30	0	0	0
Q8	0	0	0	.74	0	0
Q10	0	0	0	.66	0	0

TRANSISTOR	SOURCE	DRAIN	GATE 1	GATE 2
Q3	1.30	3.66	1.22	1.15

UNIJUNCTION	EMITTER		BASE 1		BASE 2	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q9	1.97	3.42	0	0	7.14	7.34

3.13.4 **PTO 80278**

The permability tuned oscillator (PTO) provides the variable part of the VFO signal in both receive and transmit modes. The PTO operates between 5.0 and 5.5 MHz. The output is mixed with signals from the crystal oscillator for translation to the proper local oscillator frequency. On the 14 MHZ band the 5.0 to 5.5 MHz signal is used directly.

The PTO is housed in the main tuning coil assembly on a separate printed circuit board. The main coil, L3, is shunted by L2 and has L1 in series. Adjustment of these two slug tuned coils, which are both part of the same coil form, determines the linearity and the band edge points.

3.13.4.1 PTO Alignment

1) Set the OFFSET control to the center detent position. Connect a frequency counter with at least 100 mv sensitivity to the rear pin of the VFO housing.

2) Set BAND switch to 14.0 MHZ and power transceiver to receive mode.

3) Set main tuning shaft 40 kHz up from full counterclockwise position as indicated on dial skirt.

4) Observe counter reading and if it is not 5.000 MHz, slightly touch up L2* slug. Slug position in the coil should be such that a clockwise rotation of the slug decreases frequency. The slugs are accessed through a hole in the PTO bottom cover.

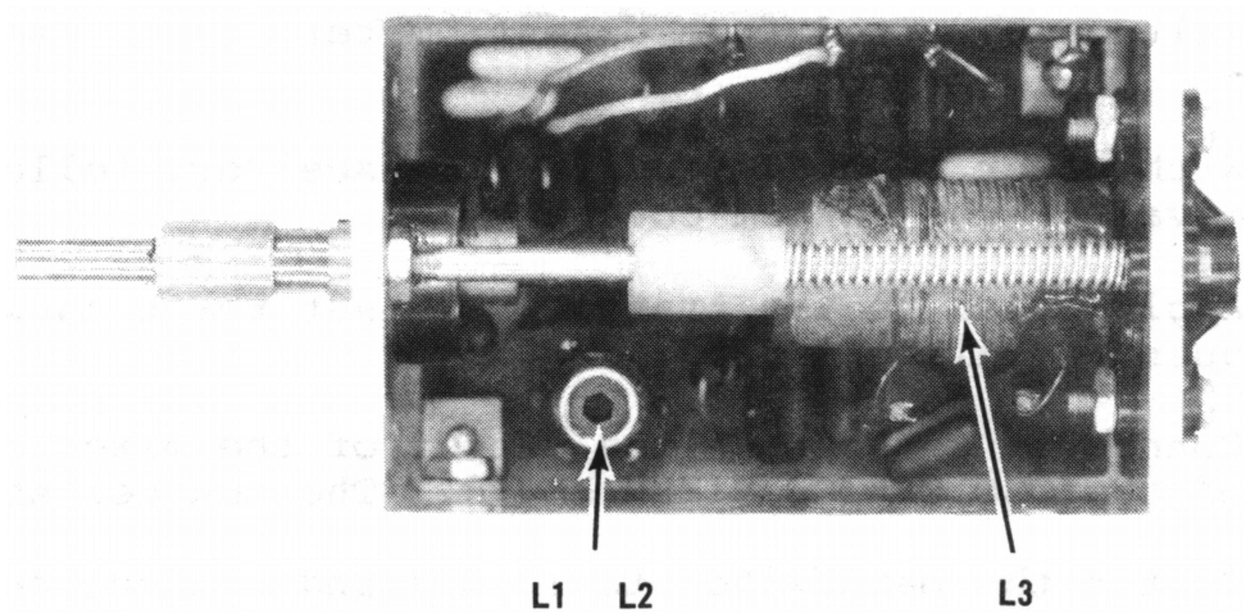
5) Run tuning knob up scale and note counter readings at each 100 kHz of increase. If readings are not within 5 kHz, linearity may be improved: especially if frequency reading at 5.000 MHz is not exactly aligned, or if all deviations from the first setting are in the same direction.

6) If VFO range is compressed, i.e. reading on counter at what should be 5.5 MHZ is less than this, reset tuning to 5.0 position, turn L2 slug a fraction of a turn clockwise and then compensate for this decrease in frequency by turning Ll* slug also clockwise for a 5.0 MHz counter reading. Repeat step 5 to see if correction was sufficient or too much.

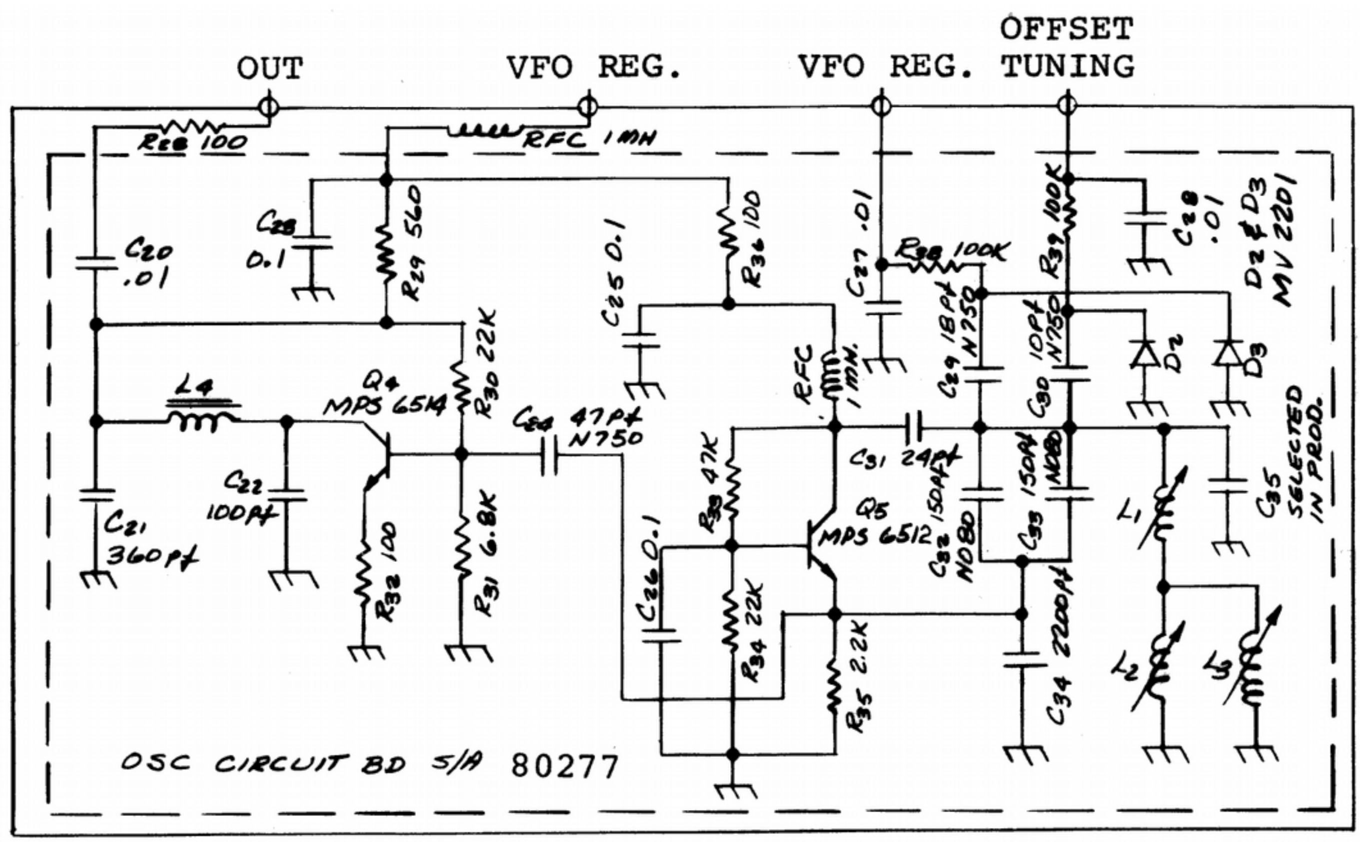
7) If range of VFO is expanded instead of compressed, compensation in the opposite direction is indicated. This is accomplished by turning slugs in opposite direction.

***NOTE**: To reach Ll slug without upsetting position of L2 slug, use the tuning tool with reduced shank that is provided with ARGOSY. Also note that L2 is used to adjust spread of VFO range and L1 to bring frequency to correct value.

3.13.4.2 PTO



3.13.4.3 Schematic



3.13.4.4 Parts List

C20,27,28	23132	CAP-FXD, .01MF, 100V, CER
C21	23147	CAP-FXD, 360PF, 100V, 10%
C22	23139	CAP-FXD, 100PF, 100v, 5%
C23,25,26	23006	CAP-FXD, 0.1MF, 250v, FILM, 20%
C24	23143	CAP-FXD, 47PF, 100v 5%
C29	23091	CAP-FXD, 18PF, CER, N750, 500V
C30	23098	CAP-FXD, 10PF, CER, N750, 5%
C31	23014	CAP-FXD, 22PF, 50V, 5%
C32,33	23097	CAP-FXD, 150PF, CER, N080, 5%
C34	23164	CAP-FXD, 2200PF, 100V, 5%
D2,3	28018	DIODE-VARACTOR, MV2201
L1,2	85151	TRANSFORMER RF, 60T, #36
L3	80136	PTO COIL
L4	85152	TOROID-RF, 17T, #28
L5,6	21007	(RFC) CHOKE-RF, 1 MHY
Q4	25054	TRANSISTOR-MPS6514
Q5	25032	TRANSISTOR-MPS3693

3.13.5 **OSCILLATOR/MIXER 80787**

The circuits on this assembly produce proper injection frequencies for the transmitter and receiver circuits using a 9 MHz IF system. This is accomplished by using the PTO (5.0 to 5.5 MHz) master oscillator for all bands. The output is mixed in a double balanced mixer with the signals from a crystal oscillator. Crystal frequencies are selected by the band switch. The 14 MHz band uses the 5.0 to 5.5 MHz directly. Output from the mixer is filtered for each band with a double tuned resonant circuit, also selected by the bandswitch. The double tuned circuits are connected to the mixer output on all but the 14 MHz band. They are over-coupled resonant circuits that are best aligned using a sweep oscillator system. Because they are wide band, realignment is seldom necessary except when a tuned circuit component is replaced.

To eliminate band edge birdies on the 10, 21 and 28 MHz bands, the crystal oscillator frequencies are chosen 10 kHz lower than what normally would be needed, compared to the other bands. The PTO compensates for this 10 kHz deviation by switching varactor diode D3 into the circuit by means of switch S1D. As a result, the kHz portion of the dial reading will not change when switching from band to band. The amount of capacitance inserted by the varactor diode is controlled by the value of the dc voltage obtained from potentiometer R2. To set this adjustment, procede as follows:

1) With power removed from the transceiver, follow the instructions for removal of the bottom cover.

2) Apply power to the transceiver, set the bandswitch to 14.0 and the frequency dial to 14.000.

3) Connect a counter to the output of the mixer across cable 31 at the rear of the OSCILLATOR/MIXER board. The counter should read 5.000 MHz.

4) Switch the bandswitch to 10 MHz and without moving the setting of the main tuning knob adjust R2 so that the counter reads 19.000 MHz.

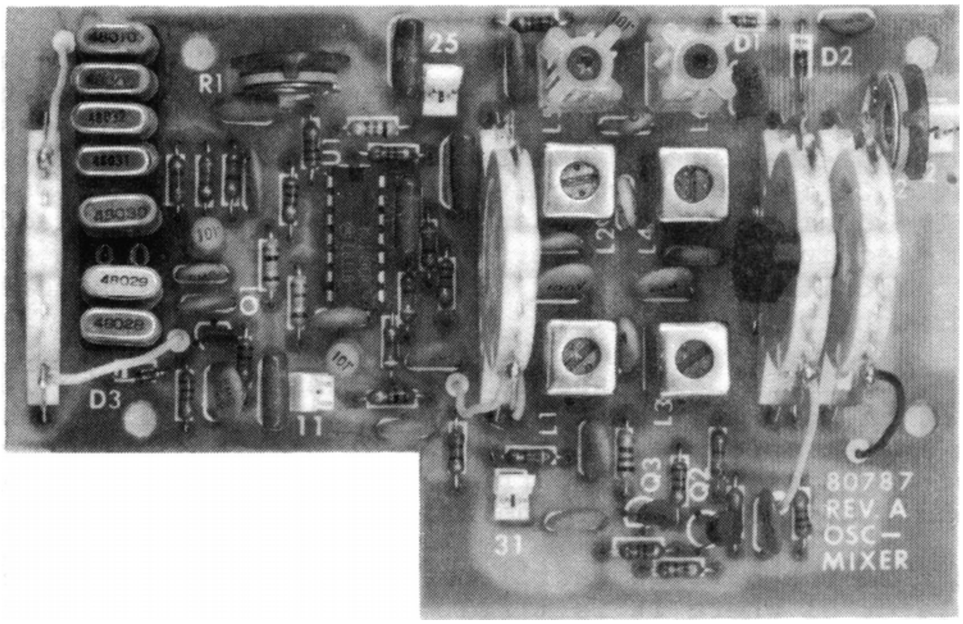
3.13.5.1 Mixer Balance

To balance the mixer output for minimum crystal oscillator feedthrough proceed as follows:

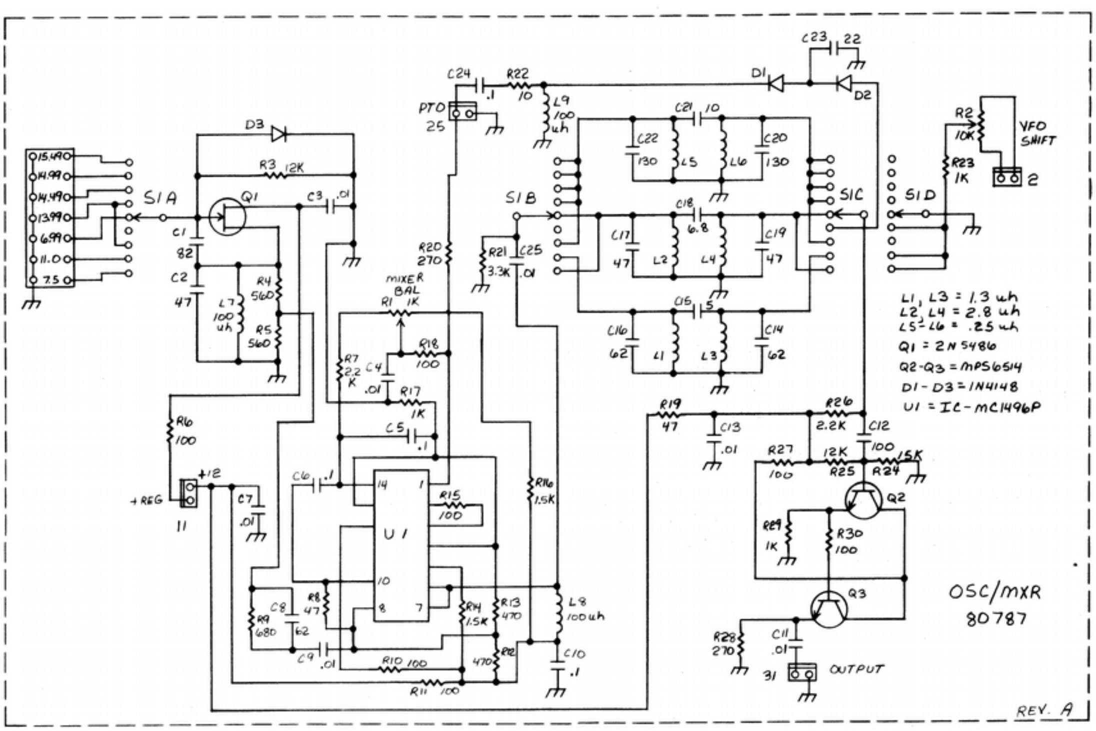
1) Set the bandswitch to 14 MHz. Set DRIVE to zero.

2) Set the MODE switch to LOCK and while observing the output of the transceiver across a 50 ohm dummy load with an oscilliscope, set R1 for minimum transmitted carrier.

3.13.5.2 <u>PC Board</u>



3.13.5.3 <u>Schematic</u>



3.13.5.4 Parts List

C1	23140	CAP-FXD, 82 PF, 100 v, 5%
C12	23139	CAP-FXD, 100 PF, 100 v, 5%
C15	23173	CAP-FXD, 5 PF, 500 v, CER, 5%
C18	23112	CAP-FXD, 6.8 PF, CER
C2,17,19	23143	CAP-FXD, 47 PF, 100 v, 5%
C20,22	23155	CAP-FXD, 13o PF, 500 v, 5%
C21	23044	CAP-FXD, 10 PF, 1 KV, CER, 5%
C23	23014	CAP-FXD, 22 PF, 50 v, 5%
C3,4,7,9,11,13,25	23132	CAP-FXD, .01 MP, 100 v, CER
C5,6,10,24	23006	CAP-FXD, 0.1 MP, 250 v, FILM, 202
C8,14,16	23141	CAP-FXD, 62 PF, 100 V, 5%
D1-3	28001	DIODE-1N4148/1N914, SIL
L1,3	21058	COIL-SHIELDED 1.3 UH
L2,4	21057	COIL-SHIELDED 2.8 UH
L5,6	21059	COIL-UNSHIELDED .25 UH
L7-9	21060	CHOKE-RF 100 UH, 100 MA
Q1	25060	TRANSISTOR-2N5486
Q2,3	25054	TRANSISTOR-MPS6514
R1	30070	RES-VAR, 1 K, LIN, PC VERT MTG, 30%
R2	30038	RES-VAR, 10 K, LIN, PC MOUNT
U1	25047	IC-MC1496P

3.13.5.5 Voltages

U1

PIN	VOLTAGE
1	7.25
2	6.54
3	6.42
4	7.11
5	4.09
6	13.80
7	13.80
8	10.42
9	0
10	10.42
11	0
12	13.16
13	7.11
14	0

TRANSISTOR	DRAIN	GATE	SOURCE
Q1	6.36	0	.02

TRANSISTOR	COLLECTOR	BASE	EMITTER
02	9.86	6.56	5.87
Q3	9.86	5.86	5.16

NOTE:
BAND set to 14.0
OFFSET set to center (detent) position

3.13.6 **SSB GENERATOR 80780**

This assembly contains the carrier (BFO) crystal oscillator, a balanced modulator for SSB generation, and a two stage microphone audio amplifier. 01 is the carrier oscillator operating at approximately 9 MHz. Its exact frequency is determined by which of the three trimmer capacitors, C1, C2 or C3, are placed in the crystal circuit. C2 is in the circuit under all MODE switch conditions and sets the carrier to the desired frequency on the high side of the ladder filter skirt. (This position is used in the SB-R mode.) In this mode, both C1 and C3 are removed from the crystal circuit by transistor switches QZ and Q3 respectively. Their bases are grounded through the MODE switch.

In SB-N, both of these capacitors are inserted in the circuit by removing the base grounds, and the three capacitors in parallel set the oscillator frequency down on the opposite (low frequency) skirt. In the CW mode, C3 is removed by switch Q3 so that the carrier frequency increases 750 Hz into the filter pass band. C1 and C2 determine this setting.

Output from the carrier oscillator is fed to the BFO socket and to the balanced modulator U1 where it is mixed with the audio signal from the microphone amplifier U2. Output in the ssh modes is a double sideband, suppressed carrier signal, whose unwanted sideband is removed by the ladder filter mounted on the RF/MIXER assembly.

For CW operation, the balance of U1 is upset when terminal CWU is grounded through the MODE switch. This also is the case in the LOCK mode. Audio from the microphone channel is eliminated by the same shorting procedure. The amount of 'T' voltage which is controlled by the setting of the DRIVE control in the CW mode, and applied to pin 7 of the balanced modulator, determines the level of the carrier signal applied to the transmit mixer.

3.13.6.1 Carrier Oscillator Alignment

Proper alignment of C1, C2 and C3 requires the use of a frequency counter and either an RF VTVM or Oscilloscope with response to 10 MHz. These capacitors should not be readjusted on general principles but only after it is definitely found that the carrier is not where it should be in the passband curve, or that the CW frequency is not 750 Hz up from the SB-N carrier frequency. To make the adjustments, proceed as follows:

1) Connect the counter to the junction of R2 and R3 in the emitter circuit of Q1. If there is no blocking capacitor in the counter input, connect through a .01 MFD capacitor.

2) Connect either an RF VTVM or oscilloscope to the antenna jack, across a 50 ohm dummy load.

3) Set MODE switch to SB-R position and DRIVE control fully counterclockwise.

4) Unbalance the modulator by setting the carrier balance potentiometer R1 to either extreme.

5) Temporarily set C2 for frequency reading of 9001.500 kHz. (This places the carrier approximately in the center of the passband.)

6) Short the PTT line to chassis to place the unit in the transmit mode.

7) Advance the carrier balance control R1 so that an output of 20 volts RMS is read on the VTVM or 50 volts peak-to-peak is displayed on the oscilloscope.

8) Readjust C2 to decrease the capacitance and increase the frequency to a point were the output decreases to one volt RMS or three volts peak-to-peak on the 'scope. This represents 26 dB down on the skirt of the filter.

   Note and record this frequency. It should be very close to 9003.000 kHz.

9) Set the MODE switch to SB-N. Temporarily set C3 to half capacitance and adjust C1 so that the output is one volt RMS or three volts peakto peak on the 'scope. This frequency should now be on the low skirt.

   Note and record this frequency. It should be very close to 9000.000 kHz.

10) Set the MODE switch to LOCK and adjust C3 so that the frequency is 750 Hz higher than in step 9. The amplitude of the output should return to approximately that in step 7.

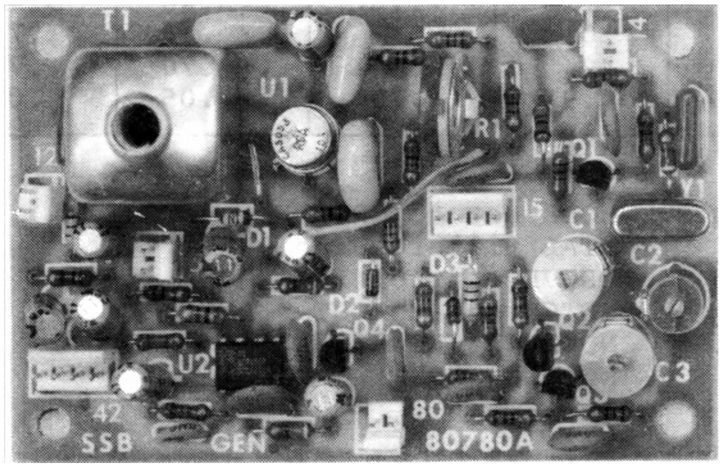
    Note and record this frequency. It should be very close to 9000.750 kHz.

11) Repeat steps 8 through 10 in sequence until no further adjustments are necessary. Cl and C3 both determine low skirt frequency and both have a slight effect on C2. Readjustment of all three is necessary after any one is altered.

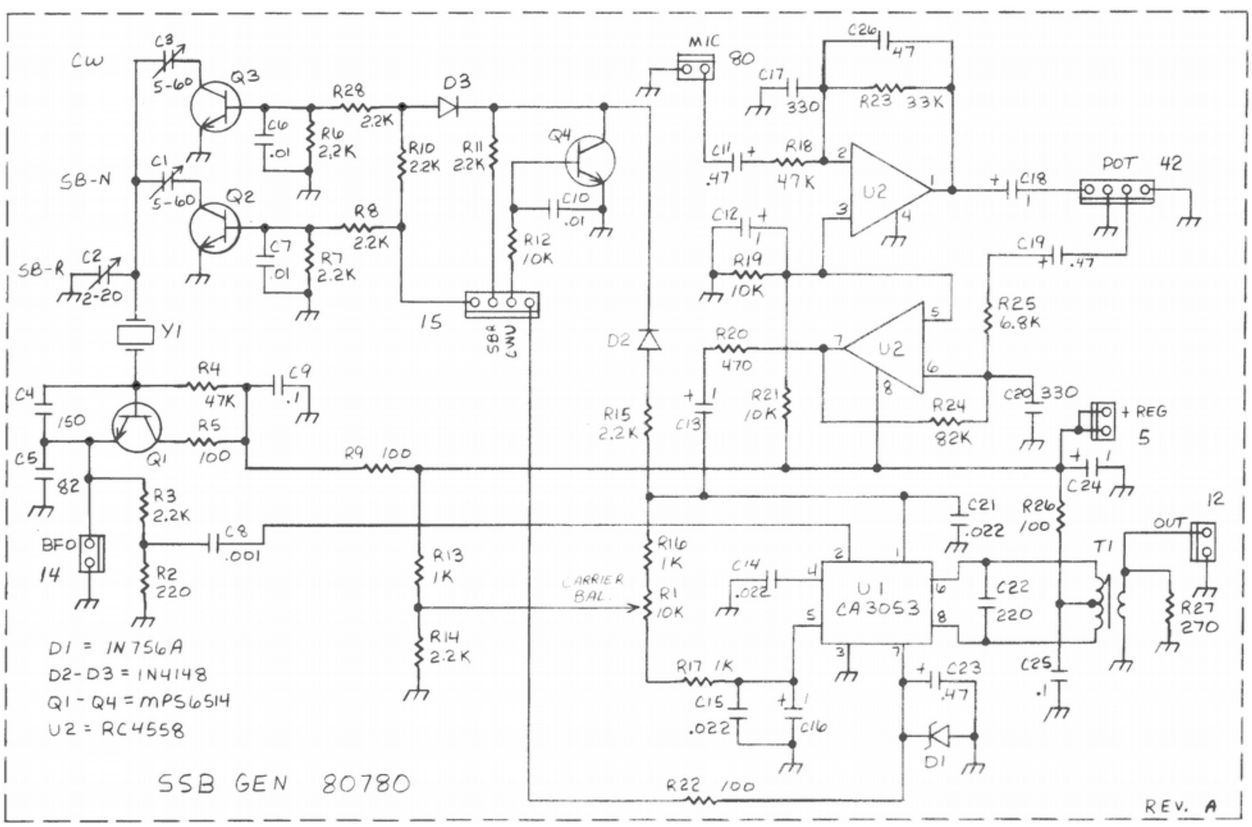
12) With the MODE switch in the SB-N position and without changing the DRIVE setting of the previous steps, increase the sensitivity of the 'scope or VTVM. Null the carrier balance potentiometer R1.

It is easier just to set the carrier generator frequencies as above and then check the passband with a spectrum analyser hooked to the audio output.

3.13.6.2 PC Board



3.13.6.3 Schematic



3.13.6.4 Parts List

C1,3	23061	CAP-VAR, 5/60 PF, TRIMMER
C11,19,23	23193	CAP-FXD, .47 MF, 20%, 50 V, EL
C12,13,16,18,24	23181	CAP-FXD, 1 MF, 50 V, EL, VERT
C14,15,21	23002	CAP-FXD, .022 MF, 250 V, FILM, 20%
C2	23168	CAP-VAR, 3/22 PF, TRIMMER, VERT
C26	23143	CAP-FXD, 47PF, 100V, CER, 5%
C4	23146	CAP-FXD, 150 PF, 100 V, 10%
C5	23140	CAP-FXD, 82 PF, 100 V, 5%
C6,7,10	23132	CAP-FXD, .01 MF, 100 V, CER
C8	23133	CAP-FXD, .001 MF, 500 V, CER, 10%
C9,25	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
Cl7,20	23136	CAP-FXD, 330 PF, 100 V, 5%
D1	28019	DIODE - ZENER, 8.2 V, 1N756A
D2,3	28001	DIODE - 1N4148/1N914, SIL
Q1-4	25054	TRANSISTOR - MP86514
R1	30038	RES-VAR, 10 K, LIN, PC MOUNT
T1	85180	COIL-RF, 10 T, #28, 220 PF
U1	25024	IC-CA3053
U2	25078	IC-RC4558P
Y1	48020	CRYSTAL - QUARTZ, 9 MHZ, CARRIER

3.13.6.5 Voltages

U1

PIN	Receive	Transmit
1	5.18	4.93
2	0	2.79
3	0	0
4	0	2.04
5	5.18	4.93
6	7.54	7.14
7	0	8.29
8	7.54	7.14

U2

PIN	Receive	Transmit
1	3.74	3.74
2	3.74	3.74
3	3.74	3.74
4	0	0
5	3.74	3.74
6	3.74	3.74
7	3.74	3.74
8	7.53	7.53

NOTE:
MODE set to SBN
XTAL filter OUT
DRIVE control full CCW
NOTCH set to OUT
NO RECEIVED SIGNALS
NO MIC INPUT

BIPOLAR	COLLECTOR		BASE		EMITTER	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	7.18	7.18	5.48	5.48	4.91	4.91
Q2	0	0	.74	.74	0	0
Q3	0	0	.70	.70	0	0
Q4	4.93	4.70	.05	.05	0	0

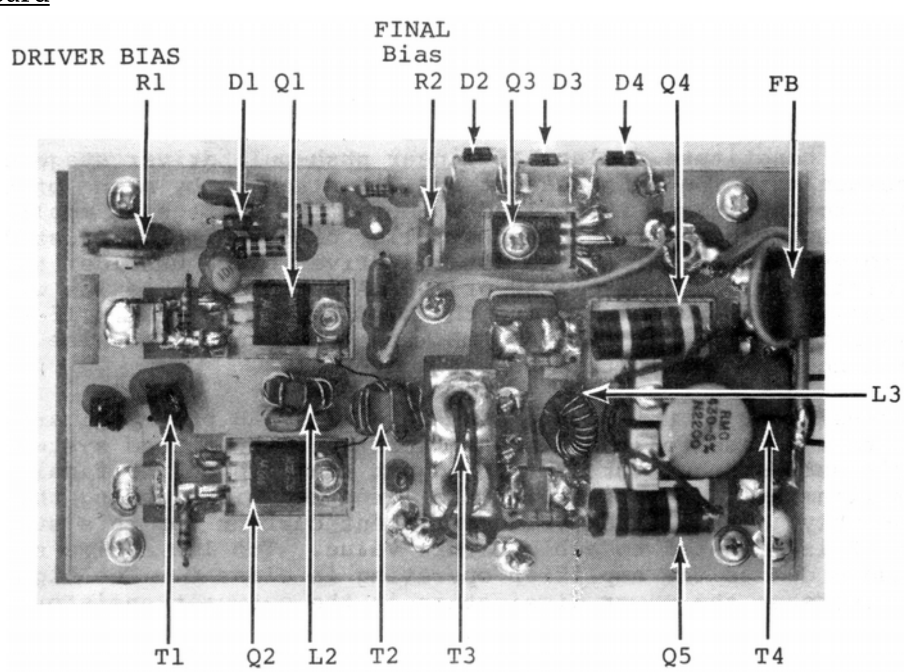
3.13.7 **FINAL AMPLIFIER 80804**

Transistors Q1 and Q2 constitute a class AB linear push-pull driver stage of wideband design. Impedance matching into and out of this stage is by means of transformers T1 and T2. Bias to this stage is applied whenever 'T' voltage is applied to the terminal marked ‘T'. Quiescent current in the collector circuit is adjusted to a value of 30 mA with potentiometer R1. To adjust the driver bias, unsolder the small gray wire from the terminal pin and insert a 50 or 100 mA dc meter in series with it. Set the DRIVE control fully counterclockwise and the MODE switch to LOCK. If the driver collector current is not within four mA of 30 mA, reset current (clockwise to increase current) by rotating the plastic trim potentiometer R1.

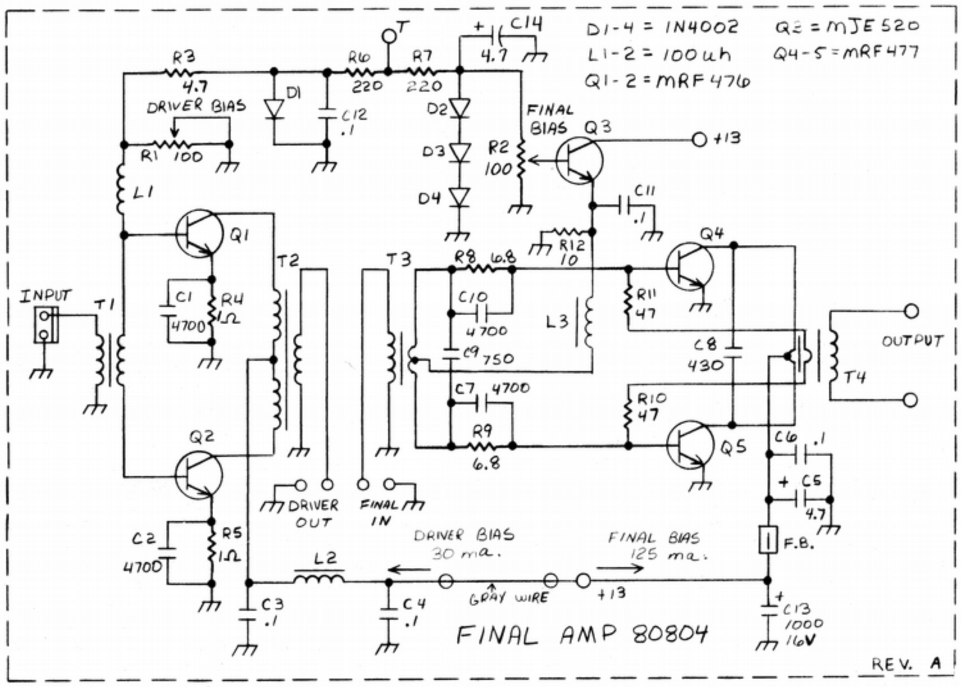
Power amplifier transistors Q3 and Q4 are also in a class AB push-pull arrangement. Bias is applied to the bases of these transistors in a shunt feed system through L3 and L4 from a series regulator Q3. To adjust the bias on the final amplifier stage, insert a milliammeter in series with the large red wire feeding the positive supply to this assembly. The desired value quiescent current for this stage is 125 mA. Potentiometer R2 is adjusted to achieve this value. Too low a bias setting will cause distorted audio due to the amplifier operating in class C. Too high a quiescent current will increase the power dissipation in the output transistors, causing overheating.

Bias for both stages is temperature compensated to maintain a relatively constant operating point by mounting the bias diode in direct contact with the heatsink. D1 controls the driver stage and D2, D3 and D4 control the output stage. In the LO power mode, the driver output is fed directly to the low pass filter and the high power final amplifier is not utilized.

3.13.7.1 PC Board



3.13.7.2 Schematic



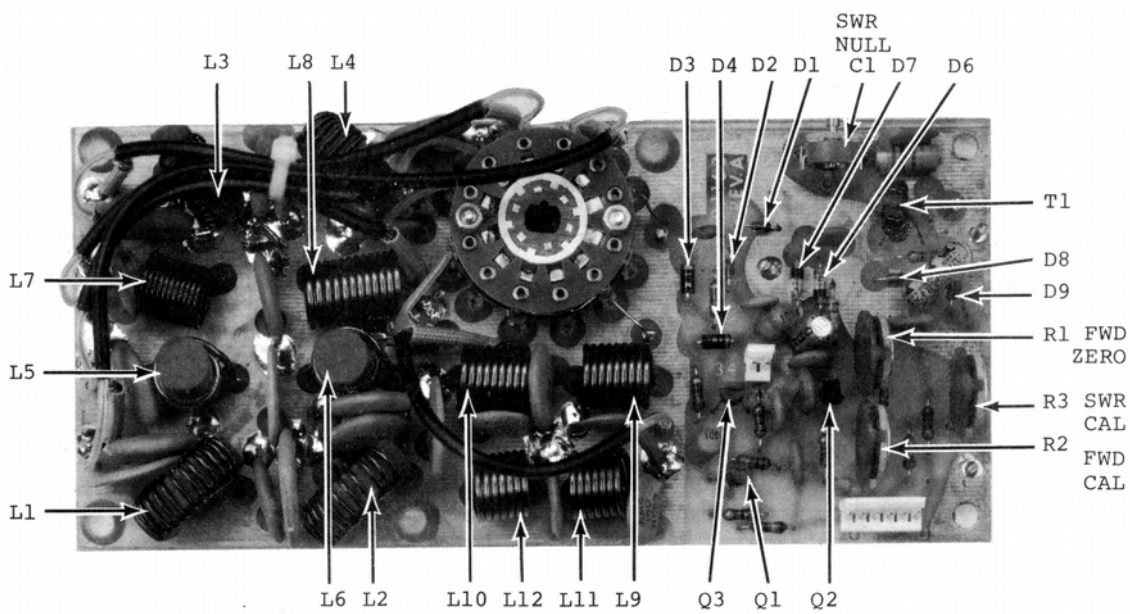
3.13.7.3 Parts List

C1,2,7,10	23167	CAP-FXD, 4700 PF, 100 V, 5%, CER
C13	23200	CAP-FXD, 1000 MF, 16V, EL, VERT
C3,4,11,12	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
C5,14	23188	CAP-FXD, 4.7 MF, 25 V, EL, VERT
C6	23184	CAP-FXD, .1 MF, 20%
C8	23205	CAP-FXD, 430 PF, 5%, l KV, CER
C9	23148	CAP-FXD, 750 PF, 100 V, 10%
D1-4	28000	DIODE - POWER, 1N4002, SIL
F.B.	85177	CHOKE, 2T THRU 21029 BEAD
L1	21060	CHOKE-RF, 100 UH, 100 MA
L2	85181	TOROID - RF, 9 T, #24
L3	85203	TOROID - RF, 12T, #24
Q3	25002	TRANSISTOR - POWER, MJE520
Q4,5	25106	TRANSISTOR – MRF-477
Ql,2	25081	TRANSISTOR – MRF-476
Rl,2	30071	RES-VAR, 100, LIN PC VERT, 30%
T1	85187	TRANSFORMER - RF, 3T, #28 RED, 2T
T2	85182	TRANSFORMER - RF, QUADRIFILAR
T3	21066	CORE - TOROID

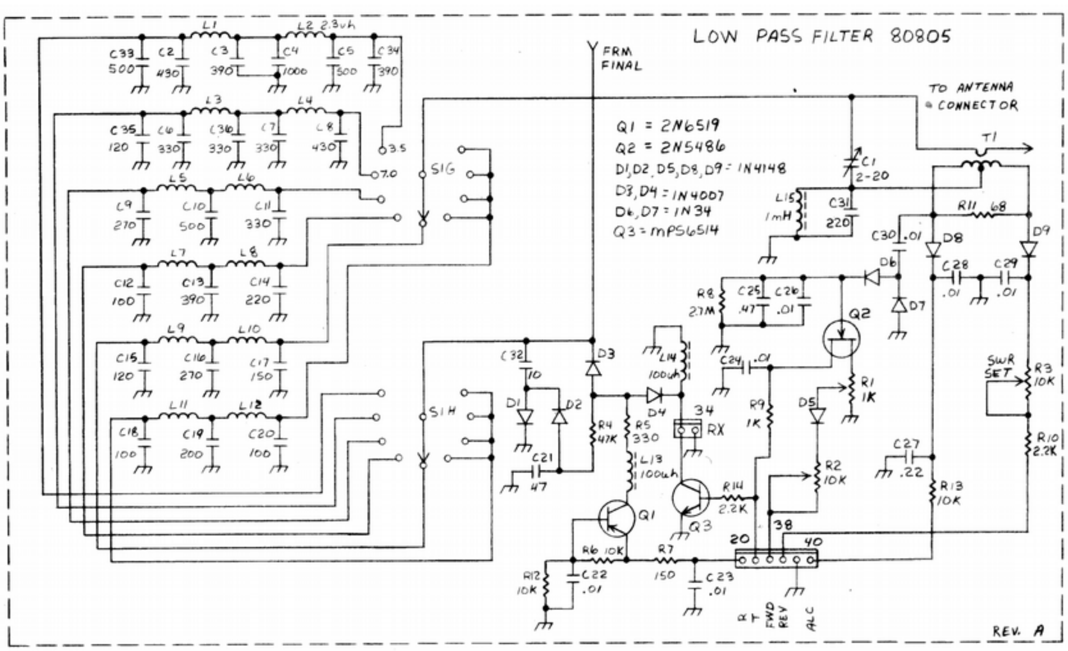
3.13.8 **SWR/LOW PASS FILTER 80805**

This assembly performs three functions, low pass output filter, T/R switching and SWR metering. The output signal from the final RF amplifier contains harmonic components above desirable levels. To attenuate these harmonics to a suitable level, the signal is passed through a set of 5 pole low pass filters before being radiated. The proper filter is selected by the band switch. The switching of the antenna from transmit to receive is performed by diodes D1 through D4 and transistor Q1. This allows extremely fast switching of the antenna and permits full break-in operation on CW. PIN diodes D3 and D4 connect the antenna to the receiver input when receiving, and are back biased by a voltage rectified at D1 and D2 when transmitting. The transmitted signal on its way to the antenna first passes through the primary of transformer T1 in the SWR bridge. This bridge is balanced on 28 MHz by setting the trimmer capacitor so that there is a null on the meter when a 50 ohm resistive dummy load is connected to the antenna jack and the FWD/REV switch is in the REV position. Reflected power is sensed through D9, filtered to a dc component and applied to the meter by way of the REV terminal. R3, in series with this meter, is adjusted for a three to one SWR meter indication when the load is changed to 150 ohms. This adjustment should be made with the DRIVE control set so that the ALC LED lights. Forward power for driving the front panel meter is rectified and converted to a dc control voltage through D3 and D27. This voltage is also fed to the ALC pin on the RF/MIXER board. Transistor Q2 buffers the signal for driving the meter. R1 sets the meter to zero in the FWD switch position, with no drive applied, and R2 sets the 50 watt calibration point on the meter. All adjustments are made in the HI power switch position.

3.13.8.1 PC Board



3.13.8.2 Schematic



3.13.8.3 Parts List

C1	23169	CAP-VAR, 3/22 PF, TRIMMER, HORIZ
C12,18,20	23125	CAP-FXD, 100 PF, 1 KV, CER, 5%
C14	23129	CAP-FXD, 220 PF, 1 KV, CER, 5%
C15,35	23126	CAP-FXD, 120 PF, 1 KV, CER, 5%
C17	23127	CAP-FXD, 150 PF, 1 KV, CER, 5%
C19	23128	CAP-FXD, 200 PF, 1 KV, CER, 5%
C2,8	23205	CAP-FXD, 430 PF, 5%, l KV, CER
C21	23143	CAP-FXD, 47 PF, 100 V, 5%
C22-24,26,28-30	23132	CAP-FXD, .01 MF, 100 V, CER
C25	23193	CAP-FXD, .47 MF, 20%, 50 V, EL
C27	23197	CAP-FXD, .22 MF, 20%, 50 V, EL
C3,13,34	23130	CAP-FXD, 390 PF, 1 KV, CER, 5%
C31	23137	CAP-FXD, 220 PF, 100 V, 5%
C32	23145	CAP-FXD, 10 PF, 100 V, 10%
C4	23160	CAP-FXD, 1000 PF, 500 V, 5%
C5,10,33	23204	CAP-FXD, 500 PF, 5%, 1 KV, CER
C6,7,11,36	23165	CAP-FXD, 330 PF, 1 KV, CER, 5%
C9,16	23175	CAP-FXD, 270 PF, 1 KV, CER
D1,2,5,8,9	28001	DIODE - 1N4148/1N914, SIL
D3,4	28043	DIODE - 1N4007
D6,7	28031	DIODE - 1N34, GE
L1	85205	TOROID-RF, 16 T, #19, on 21024
L11,12	85131	COIL-RF, AIR, 7 T. #16, .375 DIA
L13,14	21060	CHOKE, 100 UH, 100 MA
L15	21007	CHOKE-RF, 1 MHY
L2	85204	TOROID-RF, 15 T, #19, on 21024
L3	85207	TOROID-RF. 10 T, #19, on 21024
L4	85206	TOROID-RF, 8 T, #19, on 21024
L5,6	85184	COIL-RF, 5-1/2 T, #16, on 21061
L7	85186	COIL-RF, AIR, 11 T, #19, .375 DIA
L8	35135	COIL-RF, AIR, 12 T, #16, .375 DIA
L9,10	85144	COIL-RF, 9 T, #16, 5/16" D
Q1	25107	TRANSISTOR - 2N6519
Q2	25060	TRANSISTOR - 2N5486
Q3	25054	TRANSISTOR - MP56514
R1	30070	RES-VAR, 1 K, LIN, PC VERT MTG, 30%
R2,3	30038	RES-VAR, 10 K, LIN, PC MOUNT
T1	85085	TOROID-RF, 8 T, #28 BIFILAR

3.13.8.4 Voltages

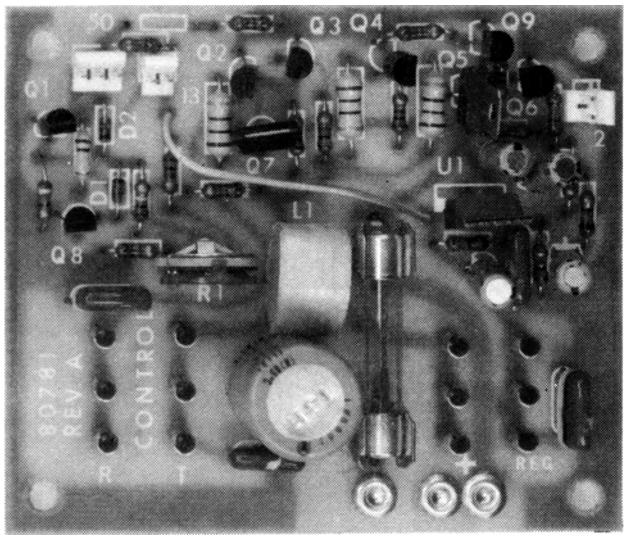
BIPOLAR	COLLECTOR		BASE		EMITTER	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	7.80	-.15	7.96	.35	8.71	.72
Q3	.05	0	0	.79	0	0

FET	DRAIN		GATE		SOURCE	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q2	0	9.25	0	0	0	2.46

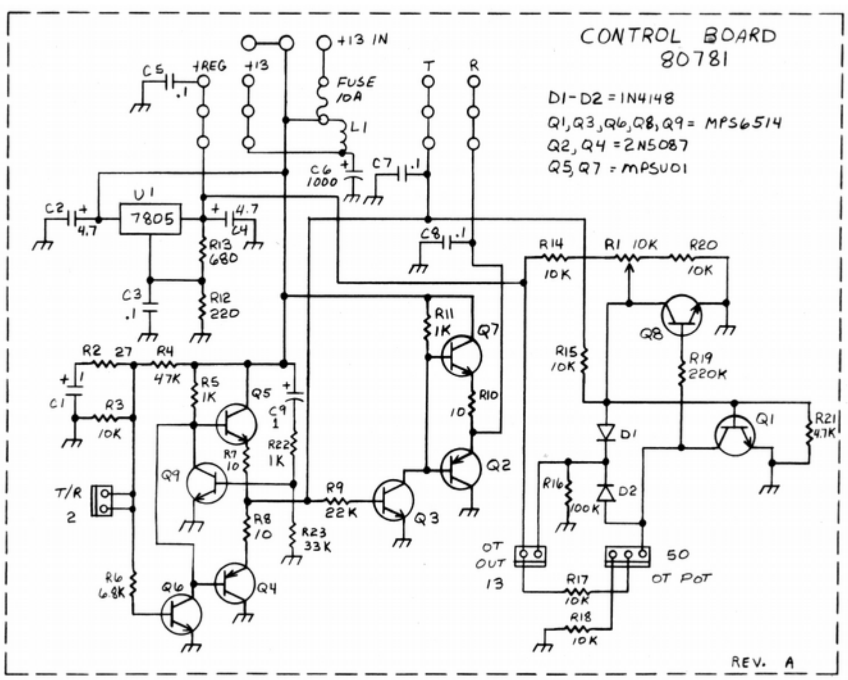
3.13.9 **CONTROL BOARD 80781**

This assembly contains a set of syncronous transistor switches for controlling the 'T' and 'R' voltages that switch the unit from transmit to receive. It also contains an integrated circuit voltage regulator which powers the frequency and voltage sensitive circuits in the VFO, ssb generator, product detector and offset control functions.

3.13.9.1 PC Board



3.13.9.2 Schematic



3.13.9.3 Parts List

C3,5,7,8	23006	CAP-FXD, 0.1 MF, 250 V, FILM, 20%
Cl,9	23181	CAP-FXD, 1 MF 50 V, EL, VERT
C2,4	23188	CAP-FXD, 4.7 MF, 25 V, EL, VERT
C6	23200	CAP-FXD, 1000 MF, 16V, EL, VERT
02,4	25001	TRANSISTOR - 2N5087
Q5,7	25053	TRANSISTOR - MPSUO1
Q1,3,6,8,9	25054	TRANSISTOR - MPS6514
U1	25095	IC-MC7805CP
D1,2	28001	DIODE-1N4148/1N914, SIL
R1	30038	RES-VAR, 10 K, LIN, PC Mount
Ll	85032	COIL-CHOKE, 160 T #26

3.13.9.4 Voltages

BIPOLAR	COLLECTOR		BASE		EMITTER	
TRANSISTOR	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	3.41	.02	0	.70	0	0
Q2	0	0	13.56	.12	12.01	.73
Q3	13.56	.12 0	.74	0	0	
Q4	0	0	.22	13.47	0	11.12
Q5	3.80	13.80	.22	13.47	0	12.80
Q6	.22	13.47	.69	0	0	0
Q7	13.80	13.80	13.56	.12	12.88	.73
Q8	.16	3.47	.64	.02	0	0
Q9	.22	13.47	0	0	0	0

U1

PIN	VOLTAGE
IN	13.80
GND	2.57
OUT	7.53