

OWNER'S
MANUAL

Corsair

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SECTION I

INTRODUCTION

Carefully remove your Model 560 CORSAIR from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event that storage, moving, or reshipment becomes necessary, they come in handy. An accessory packet, warranty card and manual are packed with the CORSAIR. Make sure that you have not overlooked anything.

The CORSAIR is a medium power transceiver employing the latest techniques in solid state technology. It features digital frequency readout which inherently contains a crystal oscillator for accuracy.

As shipped from the factory, the CORSAIR contains all necessary crystals for transceiver operation in the 160, 80, 40, 30, 20, 17, 15, 12 and 10 meter bands.

The CORSAIR is extremely versatile. Although essentially a fixed station, it is equally at home when used mobile or portable. It operates from 12-14 volts dc or from 115/230 volts ac with an external power supply.

As you become familiar with the operation of your CORSAIR, you will value the built-in operating conveniences more and more. Broad band circuitry eliminates tuneup. The normal sideband is selected, whether it be upper or lower, according to the band in use. Indicator light emitting diodes (LEDs) are provided for various functions. These are just a few of the many features you will enjoy. All in all, the CORSAIR is designed for active, serious amateurs.

CONDENSED OPERATING INSTRUCTIONS

The following instructions will enable the operator to quickly place the CORSAIR into operation. For a more detailed description of the controls and their functions, refer to SECTION II.

FRONT PANEL CONNECTIONS

MIC - For ssb operation, plug a dynamic, ceramic, crystal or electret microphone, such as the TEN-TEC Model 214 or 700-C, into this jack. Amplified microphones can be used if the output level is adjusted to a low enough value to prevent the microphone channel from overloading.

REAR PANEL CONNECTIONS

POWER - Use a 12 to 14 V dc power source capable of delivering 18 amperes, well regulated. When powering from a TEN-TEC power supply such as the Model 260 or 280, interconnect units with the cable attached to the supply. When other supplies or a battery are used, pin connections to the power socket are:

Pin 1, Bottom - Negative 12-14 volts (GND)
Pins 2 & 3 - Power Switch
Pin 4, Top - Positive 12-14 volts.

Power Switch contacts, Pins 2 and 3, should not be used to switch the high current dc directly, due to switch contact ratings and voltage drop across the switch. If it is desired to switch power on and off from the front of the transceiver, use these pins to switch the primary ac voltage in cases where an ac power pack is used, or to actuate an intermediate relay such as the Guardian 200 Series or Potter Brumfield PR3DY0, either of which have sufficient current handling contact ratings in 12-14 V dc installations.

For minimum cable loss, use number 12 or 14 gauge wire for the plus and minus leads. Smaller gauge wire can be used for the switch leads.

When operating the CORSAIR fixed, portable, or mobile with an external power supply or any source other than a TEN-TEC power supply, the protective circuitry for the final amplifier, being in the ac power supplies, is not present. In order to protect the final amplifier, it is necessary to limit any over-current that may be caused by excessive drive or improper antenna matching. This may be accomplished by inserting Model 1140 Circuit Breaker in series with the twelve volt supply line. The circuit breaker will also function as an external on/off switch.

ANTENNA - Connect a 50 ohm, unbalanced resonant antenna, such as a beam, dipole, or vertical. Balanced antennas and those with higher impedances should be matched with an antenna tuner such as the Model 227 Antenna Tuner.

RECEIVE-TRANSCIVE SWITCH - For normal transceiver operation, position this switch in the TRANSCEIVE position. If an external amplifier or a separate receiving antenna is to be used, refer to the detailed instructions in SECTION II. (Use a small probe to actuate switch. Raised bezel prevents accidental throwing of switch.)

KEY - For cw operation, connect a straight key, bug, or electronic keyer such as Model 645 ULTRAMATIC to this jack. When using other electronic keyers, they should be configured for positive keying - not "grid block" or negative.

FRONT PANEL CONTROLS

INITIAL RECEIVER CONTROL SETTINGS

- 1.) Select desired band and frequency.
- 2.) Rotate RF control fully clockwise and push knob in.
- 3.) Advance AF control to suitable audio level.
- 4.) Rotate NOTCH control fully clockwise.
- 5.) Set XTAL switch to position 3.
- 6.) Set MODE switch to CW or SB-N.

INITIAL TRANSMITTER CONTROL SETTINGS

- 1.) Select desired band or band segment with band switch.
- 2.) Tune dial to frequency of operation.
- 3.) Set ALC control fully clockwise.
- 4.) Push POWER switch, located on RF control, in.
- 5.) Rotate MODE switch to LOCK position.
- 6.) Rotate DRIVE control until ALC light glows.
- 7.) Observe SWR reading on meter. For efficient operation, SWR should be less than 2 to 1. If it isn't, make alteration to antenna system to reduce SWR.
- 8.) Switch MODE switch to desired mode -- SB-N or CW. In SB-N, select either VOX or PTT switch position. For cw operation, the setting of the DRIVE control in the LOCK mode, step 6 above, is correct setting. In ssb, DRIVE control setting should be readjusted so that the ALC indicator just lights on voice peaks.

CORSAIR SPECIFICATIONS

GENERAL

FREQUENCY COVERAGE: 1.8-2.3, 3.5-4.0, 7.0-7.5, 10.0-10.5, 14.0-14.5, 18.0-18.5, 21.0-21.5, 24.0-24.5, 28.0-30.0 MHz transceive. (VFO provides approximately 40 kHz overrun on each band edge.)

VFO STABILITY: Less than 15 Hz change per F° averaged over a 40° change from 70° to 110° F after 30 minutes warmup. Less than 10 Hz change from 105 to 125 V ac line voltage when using a TEN-TEC power supply.

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

READOUT: 6 digit, 0.3" LED numerals.

ACCURACY: ± 100 Hz.

SEMI-CONDUCTORS: 1 LSI, 20 IC's, 94 transistors, 107 diodes, 6 LED readouts.

PC BOARDS: 22 PC assemblies with plug-in cables.

CONSTRUCTION: Rigid aluminum chassis. Dark painted aluminum front and rear panels, textured top and bottom. Snap-up, steel bail.

POWER REQUIRED: 12-14 V dc., 850 mA receive, 18.5 A max transmit.

DIMENSIONS: HWD 5- $\frac{1}{8}$ " x 15" x 14" (13 x 38 x 36 cm), bail retracted.

NET WEIGHT: 14 lbs (6.4 kg).

RECEIVER

SENSITIVITY: 0.25 uV for 10 dB S+N/N, all bands. 0.8 uV typical with RF amplifier off.

SELECTIVITY: 12-pole crystal ladder filtering. 2.4 kHz bandwidth, 1.7 to 1 shape factor at 6/60 dB. Three position switch selects standard ssb filter, optional 1.8 kHz ssb filter, 500 Hz cw filter, or 250 Hz cw filter.

NOTCH FILTER: Greater than 50 dB notch tunable between 200 Hz and 3.5 kHz.

CW SPOT: With 750 Hz reference tone.

I-F FREQUENCIES: 9 MHz and 6.3 MHz.

ANTENNA INPUT: Low impedance, unbalanced.

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

SPURIOUS RESPONSES: All below equivalent 10 dB S+N/N signal except 1.838 MHz (less than 15 dB S+N/N), 21.300 MHz (less than 20 dB S+N/N), and 28.980 MHz (which can be eliminated by using low end of 29.0-29.5 MHz band segment).

NOISE BLANKER: Built-in, adjustable blanking threshold.

I-F REJECTION: Greater than 60 dB.

S-METER: Automatically switched on when receiving. Calibrated to 50 uV at S9, ± 3 dB.

DYNAMIC RANGE: 90 dB, typical.

OFFSET TUNING: Dual range, MAX ± 4 kHz; MIN ± 500 Hz, typical.

TRANSMITTER

DC POWER INPUT: Maximum 200 watts @ 14 V dc cw and ssb. 100% duty cycle for up to 20 minutes.

RF POWER OUTPUT: 85-100 watts, typical.

OUTPUT IMPEDANCE: 50 ohms, unbalanced.

MICROPHONE INPUT: High impedance. Accepts high or low impedance microphones with 5 mV output. Polarizing voltage available for electrets.

T/R SWITCHING: VOX or PTT on ssb. Instant break-in or semi-break-in on cw.

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

SSB GENERATION: 9 MHz, 4-pole crystal ladder filter. Balanced modulator.

CARRIER SUPPRESSION: 60 dB typical.

UNWANTED SIDEBAND SUPPRESSION: 45 dB typical at 1.5 kHz tone.

SPURIOUS OUTPUT: Better than -45 dB relative to full output.

METER: Forward power, collector current, SWR, processing level. Selectible 4 position switch.

CW OFFSET: 750 Hz, automatic.

ALC CONTROL: Front panel adjustable. 30 to 100 Watts output, LED indicator.

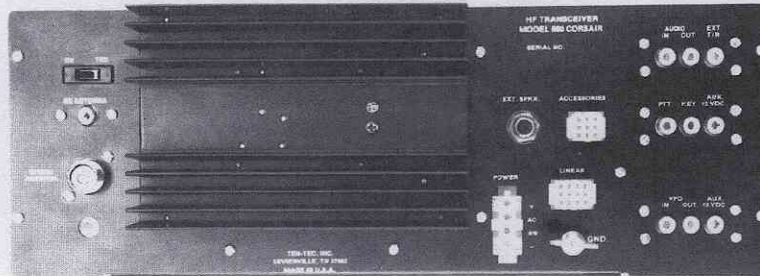
FRONT PANEL CONNECTIONS AND CONTROLS

PBT; OFFSET; AF-RF AMP; RF-POWER; NOTCH; DRIVE; Bandswitch; Main Tuning Knob; MODE; METER switch; VOX GAIN; VOX DELAY; PROCESS level; N.B. LEVEL; ALC threshold; QSK/VOX switch; AGC switch; XTAL switch; OFFSET SELECT switches (2); SPOT push-button; PHONES; MIC.

REAR PANEL CONNECTIONS AND CONTROLS

EXT. T/R jack; AUDIO IN jack, AUDIO OUT jack; AUX. 12 VDC jacks (2); KEY jack; PTT jack; VFO IN jack; VFO OUT jack; ACCESSORIES socket; LINEAR socket; GND terminal; EXT. SPKR. jack; POWER socket; 50 OHM ANTENNA connector (SO-239); RX ANTENNA jack; RX-TRX switch.

SECTION II
DETAILED OPERATING INSTRUCTIONS
REAR PANEL CONNECTIONS



POWER SOCKET

A supply of 12 to 14 V dc capable of supplying 18 amperes, negative ground, is required. The CORSAIR may be operated in mobile installations having 12 volt negative ground systems or powered from an ac supply, such as Model 260 or Model 280.

For battery operation, as well as operation with any power source other than a KW TEN-TEC power supply, it is recommended that a cable of at least 12 gauge conductors be run directly from the battery or power source to the transceiver through a circuit breaker of sufficient rating, such as Model 1140. DO NOT depend on a fuse for protection since its reaction time is too slow.

For fixed station installation, cable length from the power supply should be as short as possible and made from 12 gauge wire or larger. The chassis should be strapped to a good earth ground system as should all other equipment, both as a personal hazard precaution and for optimum performance.

A power switch is located on the rf control and is wired only to Pins 2 and 3 of the four pin power socket on the rear apron. The switch is not in series with the power input leads. The switch need not be used for ac operation if on-off switching is desired at the power supply location. Or, the switch may be connected in series with the 115/230 volt primary lead to the supply if switching function is desired from the front panel. In this case, the power supply switch should permanently be positioned in the "on" position. The Models 260 and 280 power supplies, which are designed for use with the CORSAIR already have provisions for this mode of switching.

For dc operation, the contact rating of the switch on the RF-POWER control is NOT sufficiently high to carry the 18 amperes required. Switch contact resistance will result in an appreciable voltage drop across the switch. The insertion of Model 1140 Circuit Breaker in series with the 12 V dc supply line will protect the final amplifier from over-current conditions and provide an external on-off switch.

Pin connections for the power socket are: Pin 1, bottom of rig = GND; Pins 2 and 3 = ON-OFF switch; Pin 4 = +12-14 V dc. Pin 1 has a rib on the plastic part of the cable connector and Pin 4 has a rib on the chassis connector.

The +12 volt line is internally fused with a 20 ampere fast-blo fuse, and a high power diode is connected across the line to ground in a normally reverse-biased polarity. Under these circumstances, the diode does not conduct. If reverse polarity is applied, the diode conducts heavily and blows the fuse, thereby protecting the transistors and electrolytic capacitors.

GROUND STRAP

To reduce the possibility of stray rf pickup on interconnecting cables which may cause parasitic oscillations, all station equipment should be well grounded to earth. It is also important to strap all equipment chassis together with short, heavy leads, preferably with braid. The strap between the power supply and the transceiver also serves to reduce voltage drop on the negative 12 volt lead caused by resistance in the wire and connector contacts. In mobile installations, connect a ground strap between the rear panel ground lug and the automobile chassis.

ANTENNA

Any antenna presenting 50 to 75 ohms impedance will load satisfactorily. Random length antennas and open wire feed systems will require a matching system such as Model 227 Antenna Tuner. Most popular mobile antennas will operate at their resonant frequency without special matching. When they are used as portable antennas, a good ground system or counterpoise should be provided. The CORSAIR is designed for use with an unbalanced feed system. Coaxial shield is connected to the shell and the center conductor to the pin of the PL-259 connector.

EXT T/R

This jack is intended to actuate a high power linear amplifier. It is derived from a set of normally open contacts on the auxiliary relay located on the Control Board. One side of this switch is also at ground potential and therefore should not be used to switch the 115/230 volt line. When operating cw, a drop-out delay is incorporated in the relay circuit and is adjustable with a thumb potentiometer located on the CONTROL BOARD. When operating ssb, this drop-out delay is switched out of the circuit. Since this relay does not control any of the internal functions of the transceiver, delay is factory set to an average value when shipped. It should be adjusted for suitable delay only when external equipment is controlled by this relay.

CAUTION: There are two potentiometers located on the CONTROL BOARD. It is very important that the setting of the offset adjust potentiometer not be disturbed. Improper setting of this control may possibly result in out-of-band operation. Refer to the CONTROL BOARD description in Section III for the location of these controls.

KEY

The key actuates a series of circuits on the CONTROL BOARD assembly that supply operating voltages to various transmitter and receiver circuits. When the key is closed, voltage is removed from the receiver stages and applied to the transmitter. The receiver antenna circuit is also disconnected during transmit. There is a small time constant in the audio muting circuit to eliminate clicks from the speaker while keying, but it is not long enough to interfere with the complete break-in feature. The cw sidetone and key operate only when the MODE switch is in the cw position. Sidetone volume is independent of the af volume control. It may be set to the desired level with the thumb potentiometer accessible through the hole in the bottom plate. A second potentiometer adjacent to the level control adjusts sidetone pitch over approximately one octave.

The key line is POSITIVE. Keyers designed for "grid block" circuits (negative key line) will not work. The key line is a fairly high impedance circuit and requires very little current to actuate it.

AUX 12 VDC

Either of these jacks may be used to power external equipment such as an electronic keyer or external VFO. The Model 645 ULTRAMATIC Keyer and Model 263 External VFO are two such items available as accessories to the CORSAIR.

Each of these jacks is connected to the +12 V dc line after the protective fuse and is rated at a maximum of 2 amperes. If an ac power supply is employed, its current capacity must be great enough to supply the transceiver requirements plus that of any equipment powered through either or both of the AUX 12 V dc jacks.

ACCESSORIES SOCKET

A nine pin female chassis-mounted MOLEX connector is available for interfacing an external VFO or other peripheral equipment with the CORSAIR. Refer to main chassis schematic diagram for pin identifications. As shipped from the factory, a jumper is plugged into this socket which connects the PTO enable to the + regulated line. This jumper is necessary for proper operation unless the Model 263 External VFO is being used.

LINEAR

This socket consists of a twelve pin female chassis-mounted MOLEX connector for front panel bandswitching of the Model 444 linear amplifier or antenna relays. Nine band positions corresponding to the 1.8, 3.5, 7.0, 10.0, 14.0, 18.0, 21.0, 24.5 and four 10 meter segments of the switch, a common terminal for the switch, a ground, and "T" voltage are all available. Refer to main chassis schematic diagram for pin identifications.

AUDIO IN-OUT

These jacks provide connections to the microphone and speaker for an external phone patch or for a RTTY terminal unit.

The AUDIO-OUT jack may also be used for driving an external speaker without disabling the internal speaker.

RECEIVE ANTENNA

2-1

This jack provides an antenna connection directly to the receiver input at all times by placing the RECEIVE-TRANSCEIVE switch to the RECEIVE position. This also allows for the use of an external receiver when the switch on the rear panel is placed in the TRANSCEIVE position and the external receive antenna input is connected to the jack.

RECEIVE-TRANSCEIVE SWITCH

This switch, in the RECEIVE position, connects the receiver antenna terminal to the RECEIVE ANTENNA jack directly. It is used when an instant break-in linear or separate receiving antenna is used. In the TRANSCEIVE position, the receiver input is connected to the ANTENNA socket for normal transceiver operation.

VFO IN-OUT

These jacks provide means to switch the internal PTO signal on and off when using Model 263 Remote VFO accessory. As shipped from the factory, these two jacks are connected externally with a U shaped jumper pin.

PTT

This jack is in parallel with the push-to-talk line on the microphone jack. It may be used as an external transmit/receive station switch and is operable only in the ssb mode.

EXTERNAL SPEAKER

Phone jack, for connecting external speaker. Using this jack disconnects the internal speaker.

FRONT PANEL CONTROLS

RF-POWER

The RF-POWER control varies the bias to the i-f amplifiers. It is used to reduce susceptibility to overload in the presence of extremely strong signals. The AGC is dependent on the setting of the RF-POWER control. The push-pull switch shorts Pins 2 and 3 of the four pin power connector when pushed in.

AF-RF AMP

The AF-RF AMP control varies the speaker or headphone level. When this control is pulled out the rf amplifier and RF AMP LED indicator are turned off, and a 10 dB attenuator is inserted in place of the rf amplifier. The effect is a 20 dB reduction in signal to the rf mixer but with more dynamic range and greater sensitivity than would be the case with a simple 20 dB rf attenuator.

NOTE: The push-pull switch located on the AF-RF AMP control activates the rf amplifier and RF AMP LED indicator when pushed in. When pulled out, a 10 dB attenuator is inserted in place of the rf amp. The effect is a 20 dB reduction in signal to the rf mixer but with increased dynamic range and better sensitivity than would be the case with a simple 20 dB attenuator.

METER SWITCH

In receive mode, the meter will automatically read 5 units when the METER switch is in any position except IC. When transmitting the meter indicates the following:

IC position measures the current drawn by the final amplifier module. Use the scale marked 0 to 20 amperes.

SWR position provides a reading of power reflected from the antenna. When the forward power is 100 watts, the SWR can be read from the scale marked SWR.

FWD position measures forward power to the antenna. In this position, a peak reading circuit is automatically selected so PEP output can be measured in the ssb mode. Use the FWD scale marked 0 to 100 watts.

PROCESS position displays the level of compression applied to the MIC input when the PROCESS control is turned ON.

MODE SWITCH

The SB-N setting of this switch is used for ssb transmissions on the normal side of the carrier frequency. It will provide lower sideband signals on 160, 80, 40, 30 and 17 meters, and upper sideband on 20, 15, 12 and 10 meters. This is accomplished by using either the sum or the difference frequencies in the mixer. The opposite or reverse sideband can be selected by rotating the MODE switch to the SB-R position. In the ssb modes, the transmitter can only be energized by shorting the PTT line to chassis. The cw key line is disconnected.

In the CW position, the sidetone signal is fed to the audio system. Its level and pitch can be adjusted with the two adjacent thumb potentiometers, accessible through the large hole in the bottom plate.

In cw, the transmitted frequency is automatically offset 750 Hz from the receiver setting. This compensates for the 750 Hz beat note of the received signal and puts the transmitter exactly on the received frequency. This 750 Hz frequency was selected as the offset to correlate with the center frequency of the cw filters. When the received signal matches the tone heard when the SPOT button is depressed, the beat note will be 750 Hz.

The transmitter can be switched on only by shorting the KEY jack to chassis in the cw mode. PTT lines in the MIC jack and the external PTT jack are disconnected.

The LOCK position of the MODE switch is used for system checks and SWR measurements. It energizes the transmitter on the cw frequency but does not key the sidetone oscillator.

BAND SWITCH

The band switch selects the amateur bands of 1.8, 3.5, 7.0, 10.0, 14.0, 18.0, 21.0, 24.5 and 28.0 to 30.0 MHz. With approximately 600 kHz range per band. The marine band in the 1.8 to 2.3 MHz range is covered.

MAIN TUNING

In the Model 560, megahertz, kilohertz, and hundreds of hertz are displayed on the six digit LED display. Hundreds of hertz are in green to easily separate the fraction of kHz from the rest of the reading. When using Model 263 Remote VFO, the display will read the frequency in use at the time. The counter can be accurately set to WWV as outlined in SECTION III. The main tuning knob skirt has 1 kHz markings to facilitate quick, relatively small fraction excursions, such as used when QSYing to avoid QRM, or when passing traffic in net operation. (Up or down 5 or 10 kHz is easily accomplished without having to read the digital display.)

Since the VFO shaft is raised from chassis potential to eliminate frequency jumping caused by poor sliding contacts, there is a very small hand capacity effect on frequency when either dial skirt or knob insert are touched. To eliminate this effect grasp only the plastic portion of the main tuning knob, or use the finger spinner when fine tuning the VFO.

PASSBAND TUNING

The PBT control adjusts the position of the second i-f crystal filter in relation to the fixed first i-f filter. When the filter selected by the XTAL switch is wide, i.e. 2.4 or 1.8 kHz, the PBT control essentially becomes a variable bandwidth control. CCW rotation reduces the bandwidth towards the low side, CW rotation reduces the bandwidth toward the high side. This is a great advantage on ssb since it permits adjusting the passband to reject adjacent channel interference on either side. When a narrower filter is selected, i.e. 500 or 250 Hz, the PBT control is used in the normal passband tuning sense.

Our PBT circuit produces the effect of varying the BFO, changing the pitch of signals passing through the narrow filter to separate signals which are very close together. On RTTY, it can place the narrow filter to pass only the 2295 and 2125 Hz tones for superior rejection of adjacent signals. The PBT control has no effect on the transmitter frequency or bandwidth.

OFFSET TUNING

The OFFSET control allows independent control of the receive or transmit frequency, through two selectable excursion ranges, as determined by the position of the OFFSET SELECT switches. Clockwise rotation from the center position increases the frequency, counterclockwise rotation decreases the frequency.

Offset tuning is advantageous when several stations are being worked in a roundtable, and all are not exactly on the same frequency. The received stations can be "zeroed in" with the OFFSET control without upsetting your transmit frequency. This is termed RECEIVE offset tuning and is engaged by placing the OFFSET SELECT switch in the RX position. Transmit offset is useful when a station calling CQ says "listening 2 kHz up". Without changing the VFO, select RX offset, tune OFFSET control 2 kHz higher then select TX offset. The original frequency will be returned and the transmit frequency will be 2 kHz higher than that indicated during receive. Transceiver offset, TRX on the OFFSET SELECT switch, permits excursions away from a set frequency. For instance, moving away from a net frequency for traffic to a specific station.

The offset tuning has two selectable range choices, MIN and MAX, plus an OFF position. In the MAX position, excursion is about ± 4 kHz. In the MIN position, excursion is about ± 500 Hz, for fine tuning. No matter what position the OFFSET control is in or what type of offset is selected, moving the selector switch to the OFF position will defeat all OFFSET functions.

The OFFSET LED indicator lights whenever the offset circuitry is on. For instance, if TX offset is selected the OFFSET LED will be on only during transmit. Also, the digital frequency display will show the actual frequency including the offset when in use.

NOTCH

The NOTCH filter control adjusts the frequency of the audio notch across the passband. The NOTCH depth is at least 50 dB and will reduce carrier interference by this amount or more since the notch is inside the AGC loop. The notch circuit is effectively removed by turning the control fully cw.

VOX-QSK SWITCH

This switch selects either the internal VOX (voice operated transmitter) or manual PTT (push-to-talk) circuitry. Also controlled is the recovery speed of the receiver. In the VOX position, the VOX circuit controls the T/R switching (sideband only), recovery is fast. In the FAST position, PTT controls the T/R, recovery is fast. In the SLOW position, PTT controls the T/R, recovery is slow. In the cw mode, the key controls the T/R, PTT and VOX are inactive, and only the recovery is affected.

VOX OPERATION

The VOX GAIN and VOX DELAY controls, located to the right of the digital display, are adjusted to suit the individual operator's needs. To adjust, proceed as follows:

- 1.) Adjust the af gain control to a comfortable listening level.
- 2.) While speaking into the mic at normal level, adjust the VOX GAIN for reliable T/R switching.
- 3.) Adjust the VOX delay so the T/R switching does not occur between words when speaking into the microphone.

The anti-vox level is internally set and should not normally need adjustment unless the VOX will not trip with gain at maximum or it trips with all gain settings. Refer to Section III, VOX-PROC board description for adjustment procedures.

AGC SWITCH

This switch selects the recovery time of the hang AGC system, 0.2 seconds FAST, 2 seconds in SLOW, or defeats the AGC, OFF. When the AGC is off, the i-f gain is controlled by the rf gain control and the S-meter will be inoperative.

XTAL SWITCH

This switch selects the optional crystal filters installed on the PBT board. If none are installed, this switch must remain in position 3. The switch position numbers are proportional to bandwidth; 3 is widest. There are four possible filters: 2.4, 1.8, 0.5 and 0.25 kHz. The first three, if installed, are selectable in ssb mode, the last three are selectable in cw mode. The 2.4 kHz filter is standard while the 1.8 kHz (Model 288), 500 Hz (Model 285) and 250 Hz (Model 282) are optional.

PROCESS

The PROCESS control/switch activates the speech processor and determines the processing level. The processor increases the average speech power and allows a greater range of voice levels to attain peak ALC level. When the processor is on, the PROCESS LED indicator will light and the process level will be displayed on the meter when the METER switch is in the process position. Proper level is indicated with a half scale reading on the meter. The level of processing will affect the DRIVE to some extent. To set the processor, turn it off and while speaking into the mic in a normal voice, advance the drive until the ALC LED lights on voice peaks. Turn the PROCESS control on and advance it until the ALC LED again lights on voice peaks. This should be approximately at mid-rotation of the control. More processing can be had by further clockwise rotation but the DRIVE control must be reduced to keep the ALC action constant. Severe voice distortion, objectionable background noise and transmitted splatter will occur if the DRIVE control is not kept just to the point where the ALC LED lights on voice peaks.

NOISE BLANKER LEVEL

This control sets the blanking threshold. When fully CCW, the blanker is essentially off. CW rotation increases the blanker sensitivity. This permits fine adjustment of blanking and prevents the blanker from overloading.

SPOT

When this pushbutton is pressed, the offset circuit is placed in its selected transmit condition, i.e., if receive offset is being used, pressing the SPOT button will turn it off. Also, a 750 Hz audio tone will be generated which can be beat against the desired cw signal. The tuning is then adjusted so the signal is the same as the tone. This will place the transmitted signal exactly on top of the desired signal, zero beat.

DRIVE

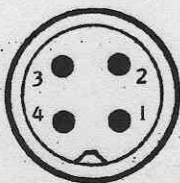
Both microphone gain and cw level are adjusted with the DRIVE control. For ssb, advance control under normal speech operation until ALC indicator lights on voice peaks. For cw, advance the control until ALC indicator lights on key-down. For cw, the DRIVE setting can be made in the LOCK position also. However, this setting does not hold for ssb operation since microphone type, closeness to lips, and loudness of speech all affect the ssb DRIVE setting.

ALC CONTROL

This control sets the threshold level at which the automatic level control starts. When fully clockwise, input power is factory adjusted for 200 watts on the least efficient band when the ALC indicator just starts to light. Power can be reduced below this level to approximately 80 watts input when control is fully counter-clockwise. A change in ALC setting requires a readjustment of the DRIVE setting.

MICROPHONE

The microphone input circuit has been designed for high or low impedance microphones with maximum 5 mV output. Transistorized microphones may also be used, providing their output level is set so that the input stage is not overdriven. The cable, which preferably should provide shielding for all leads, is terminated with a standard 4 pin microphone plug. The shield and/or ground lead are connected to pin 2, the PTT switch to pin 3, and the microphone signal lead to pin 1. Pin 4 is a polarizing voltage for electret heads. Failure to shield both microphone and PTT leads may result in rf getting into the audio circuits.



FRONT VIEW

PIN ASSIGNMENTS:

- 1 MIC
- 2 GND
- 3 PTT
- 4 +V FOR ELECTRET

MICROPHONE CONNECTOR DETAIL

The PTT switch operates with respect to ground. When transmitting, the switch is closed.

PHONES

This jack is provided for use with headphones, either high or low impedance type. When in use, the internal speaker or external speaker plugged into the rear panel jack will be disconnected. Since the power level required to drive headphones is much less than for a speaker, an attenuator network is incorporated in this circuit. This permits the audio amplifier to operate at its optimum signal to noise setting.

WWV

Broadcasts of WWV may be received on 10 MHz for checking the accuracy of the time base oscillator in the CORSAIR. In addition, WWV broadcasts propagation reports and time verification.

- 1.) Set BAND switch to 10.0 MHz.
- 2.) Rotate Main Tuning Knob so that frequency readout is 10.0000 MHz.
- 3.) Set XTAL switch to 2.4.
- 4.) Set MODE switch to SB-N.
- 5.) Zero beat the WWV signal. The digital readout should read 10.0000. If it does not, the time base oscillator may be adjusted as outlined in SECTION III.

MOBILE OPERATION

The CORSAIR is ideally suited for mobile operation in a car, boat, plane, or other vehicle. It operates directly from a 12 volt battery source and is self-contained except for key, microphone, and antenna. When operating from any power source other than a TEN-TEC power supply, the protective circuitry for the final amplifier is not present. Model 1140 Circuit Breaker is required in series with the +12 volt supply line. The Model 1140 Circuit Breaker will function as both an external on-off switch and an over-current protection device for the final amplifier.

The SWR meter is especially useful in setting mobile whip antenna lengths to the operating frequency.

When using an alternator charged battery, start and stop the vehicle's engine with the CORSAIR turned off. This prevents any high voltage transients, caused by momentarily open regulator contacts, from being applied to the transceiver circuits.

FIXED STATIONS

The CORSAIR, with conventional antennas, will perform with distinction in any ham shack. With a linear, power can be increased to any value desired up to the legal limit. For an emergency or stand-by station, it will operate for long periods of time with a 12 volt automobile storage battery. Increased operating time can be achieved by setting the ALC control down from its maximum position.

BAIL STAND

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 transceiver bottom and the table top.

The bail may also be used as a carrying handle, but care should be taken to prevent deforming it.

OPERATING HINTS

- 1.) When setting up the station, provide adequate ventilation for the heat sinks on the transceiver and power supply. Do not confine units to a small volume without forced ventilation to circulate cool air around the heat sinks.
- 2.) When operating RTTY, SSTV, or other high duty-cycle modes, it is recommended that a small fan be directed on the heat sink. The sink temperature may reach as high as 200° Fahrenheit, which is still within the rating for the transistors, but certainly hot enough to cause a serious burn if touched.
- 3.) The CORSAIR may be operated as a QRPp transceiver simply by adjusting the DRIVE control downward. To determine input power, observe the collector current meter, IC. For every ampere increase over the no-drive quiescent level in the LOCK position of the MODE switch, the power input to the final amplifier is increased by about 13 watts. For example, assuming that the quiescent current is 2 amperes, a 4 ampere reading on the ammeter indicates 26 watts input.
- 4.) The S-Meter will be accurate only when rf control is fully clockwise. The meter is factory calibrated for a 50 uV reading at S9 on the 14 MHz band.
- 5.) To determine SWR, set MODE switch to LOCK position, ALC control fully clockwise, and advance DRIVE control until ALC indicator lights. Read SWR on lower scale with METER switch in SWR position.
- 6.) Sidetone level and pitch controls are accessible through finger hole located on bottom plate.

- 7.) In the cw mode, the indicated frequency is the received frequency. To accurately read an incoming frequency, therefore, it is necessary to zero beat the signal, not peak it on the S Meter. This holds true no matter where the OFFSET control is set. When transmitting cw, the indicated frequency will be 750 Hz removed from the true transmitted frequency due to the BFO shift to bring the oscillator into the filter pass band. This shift will be in the same direction as the shift when working the SB-R mode, i.e. the indicated frequency will be higher than the transmitted frequency for the frequencies below 14 MHz, and lower for frequencies of 14 MHz and above. Due to the 750 Hz switch in frequency, every time the key is actuated when using the CORSAIR, an accurate transmitted frequency count cannot be made while sending code. To accurately determine the transmitted frequency, make the reading in LOCK or key-down condition and either add or subtract 750 Hz from the reading, depending on the band in use. (Example: To set up a transmitting frequency of 3.545 0 MHz, place MODE switch in LOCK position and adjust tuning for a reading of 3.545 7 MHz. For 14.062 0 MHz, set readout to 14.061 3 MHz.)
- 8.) Increasing the DRIVE setting over that required to just light ALC indicator will not result in any appreciable increase in power out. However, overdrive may increase ssb distortion products and destroy cw keying characteristics.
- 9.) In order to eliminate the internal, spurious 28.980 MHz signal found in the 28.5 to 29.0 band segment, change BAND switch to 29.0 to 29.5 band segment and tune below the lower edge of this band segment for 28.980 MHz.
- 10.) The VFO oscillator, like any LC tuned oscillator, may be adversely affected by ac magnetic fields cutting the coil turns. The oscillator output is frequency modulated at the line frequency, causing a "dirty" cw note and/or poor ssb quality in both transmit and receive modes. When installing the CORSAIR, locate any ac operated equipment which may generate magnetic fields, such as power supplies, electric clocks, keyers, rotator controls, and other station accessories as far as possible from it. Since the VFO is located front and center, the most common cause of FMing is from placing these accessories on top of the unit. A check of purity of a received cw signal should be made at the time of installation.
- 11.) Due to the possibility of high voltage transients being generated in the output rf amplifier during bandswitching, changing bands should not be done while transmitting power to the load. Either place the CORSAIR 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.**
- 12.) Although improper antennas will not damage the final, we suggest an SWR below 2 to 1 be achieved for maximum performance. In cases where the antenna cannot be matched to a better SWR, and the TEN-TEC Power Supply repeatedly shuts down due to over-current conditions, the CORSAIR can be operated at reduced input power by rotating the ALC control counterclockwise to a position where the supply does not trip out. Be sure to readjust DRIVE control after reducing the ALC control.

AN IMPORTANT MESSAGE

To obtain top performance from your CORSAIR, 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 results 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.

Ten Points To Observe When Installing The CORSAIR

- 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 CORSAIR is not properly loaded.
- 4.) Reactive impedance components 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 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 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.

Technical Facts of Life

Although vacuum tubes and transistors both can be made to amplify rf power, there are some fundamental differences in how this is accomplished. 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 CORSAIR 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 with load impedance variations 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 null which reduces plate current almost to the level 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 as a result of the 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 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-resonance tank condition). Since there is no load power, all has to be dissipated in the transistor. So even with no load, the power supply circuit breaker may trip. The broad-band transformer system used with transistors transforms the 50 ohm 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 oscillation. 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 that 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 of the power supply, especially with mismatched loads well below 50 ohms. A fuse is provided in the CORSAIR for protection when operating from a power source that is not limited.

- 2.) SWR - Two Kinds - The standing wave ratio is a direct measure of the ratio between two impedances, i.e. a SWR of 3 to 1 tells us that one impedance is three times the other. Therefore, the unknown impedance can be either three times as large or three times as small as the known one. If the desired impedance that the transceiver wants to see is 50 ohms, SWR of 3 to 1 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 power supply will be much lower, and will not be large enough to trip the supply. 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 pure resistive loads. The SWR bridge should be used only as an indicator when attempting to adjust antenna system to a pure 50 ohm 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 value regardless of the load impedance. Hence, the output power will vary depending on the value of the load, and increase as the load impedance goes down. It can be seen that a 3 to 1 SWR on the low side of 50 ohms will ask the amplifier to deliver much more power than a 3 to 1 SWR on the high side. Since the amplifier does have a finite value of output impedance, the amount of power delivered to the load with efficiency will change with load. Unless the load is near the design value, the transistors will heat up unnecessarily without delivering any more power to the antenna.

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 the transistor dissipation. One instance is where 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 supplied to the final in the way of internal dissipation.

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 light going on. If this occurs, it indicates a change in the antenna system or matching network is needed.

A final comment regarding the 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 voltages. Under these conditions, the output may become hum modulated. The output light on the power supply will also start to dim a bit. This condition should be rectified by antenna and/or matching changes since the emitted quality of the signal will be poor. (Whereas the breaker will trip in the LOCK position, it probably will not with cw or ssb, even though the regulator drops out and produces poor quality signals.)

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

Recommended Reading

- 1.) ARRL HANDBOOK
- 2.) Antenna Handbook, Ken Glanzer, Cowan Publishing

SECTION III

ALIGNMENT AND SERVICE

GENERAL

This section covers maintenance and service of the CORSAIR transceiver. It includes information on trouble analysis, signal tracing and alignment procedures. Connector and transistor voltages are given for each unit. Readings should be within 15% of the listed value when measured with a dc voltmeter with at least 20,000 ohms-per-volt impedance. All readings are dc and positive with respect to the chassis ground unless stated otherwise. Accept for occasional touch up to compensate for possible component aging, alignment normally will be necessary only if frequency determining components have been replaced.

When removing a particular assembly, note the orientation of the board in the chassis so that it can be replaced correctly. Many assemblies can be inadvertently inserted incorrectly if care is not taken. Figures 3-1 and 3-2 show correct placement of each assembly. To remove a board unplug all connectors and then remove the screws fastening it to the chassis. Note the number of connectors present and their orientation within the wiring harness. All chassis connectors are keyed for proper insertion but can be forced incorrectly. Each cable connector is numbered along with its corresponding connector on the board.

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

<u>FUNCTION</u>	<u>ASSEMBLY</u>	<u>LOCATION</u>
Rx input coils	.BPF, 80976	Bottom
Mixer balance	RF-MIXER, 80987	Bottom
Passband tuning center	PBT, 80979	Top
Rx i-f amp	IF/AF, 80984	Bottom
S-meter adjust	IF/AF, 80984	Bottom
SPOT pitch & level	IF/AF, 80984	Bottom
Sidetone pitch & level	IF/AF, 80984	Bottom
Counter calibration	TIMEBASE, 80974	Top
OFFSET zero adjust	CONTROL BOARD, 80978	Bottom
Carrier null	DSB, 80980	Top
CW TX offset	DSB, 80980	Top
ALC 100 w set	LOW LEVEL DRIVER, 81037	Top
SWR null	SWR, 80970	Bottom
SWR calibrate	SWR, 80970	Top
FWD power calibrate	SWR, 80970	Top
External t/r relay delay	CONTROL, 80878	Bottom
Final amp bias set	FINAL BIAS, 80575	Top
Driver bias set	FINAL AMP, 80565	Bottom
ALC LED threshold	LOW LEVEL DRIVER, 81037	Top
Collector current calibrate	SHUNT, 80987	Bottom
10/15 Meter offset	OSCILLATOR/MIXER, 80975	Bottom
L.O. mixer null	OSCILLATOR/MIXER, 80975	Bottom
Anti VOX Gain	VOX, 80981	Top
PROCESSOR Gain	VOX, 80981	Top
PROCESS meter calibrate	VOX, 80981	Top

PARTS LISTS

Below most schematics is a list of the main parts on each circuit board. Common parts such as fixed resistors, which are readily available, are not listed.

REMOVAL OF TOP COVER

Remove the upper two of the four Phillips screws located on each side. Slide the top back and out from under the rear lip of the extruded aluminum frame.

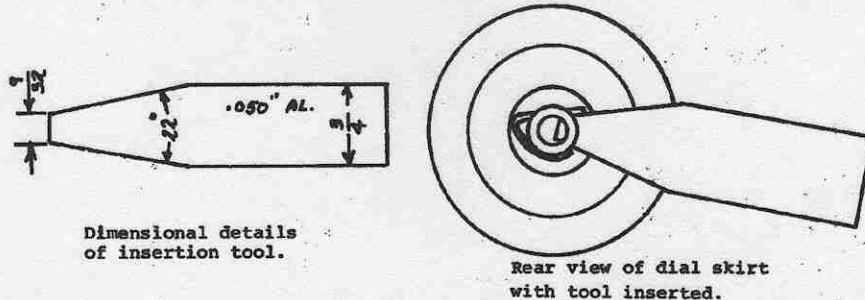
REMOVAL OF BOTTOM COVER

Remove the lower two of four Phillips screws located on each side. Remove the single Phillips head screw nearest the rear panel, on the bottom surface. With the unit upside down and front panel facing towards you, slide the bottom cover out from underneath the rear lip of the extruded aluminum frame. **CAUTION:** Speaker wires will limit removal of the bottom cover. Unsolder the speaker cable at the speaker terminals before removing the bottom cover.

DIAL SKIRT REMOVAL AND REPLACEMENT

The main tuning dial skirt is friction mounted to the shaft and can be easily removed by pulling it straight off the shaft after the plastic knob is removed. The felt washers between knob and skirt provide a slight amount of friction to eliminate any backlash between the two.

To replace the dial skirt, either a specially constructed tool as shown below, or a screwdriver with a blade width of approximately $9/32$ " can be used. With the tool, spread the "D" spring in 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 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.



REMOVAL OF THE FRONT PANEL

First remove the top. Remove the bandswitch knob using the 6-32 allen wrench provided. Then remove the main tuning knob, dial skirt and remaining knobs using the 4-40 allen wrench. Remove the small control knobs by pulling forward. Using an appropriate wrench or a large pair of pliers, remove the nuts from the PHONES and MIC jacks. Now remove the four screws holding the front to the sub-panel. Be sure to save the black decorative washers that are in front of the 5 toggle switches. Remove the decorative nut around the spot switch. Unplug the meter from the socket on the meter switch.

PILOT LAMP REPLACEMENT

The CORSAIR uses a single pilot lamp mounted behind the meter. It is a standard 14 volt bayonet type #1892. Access to this bulb is by removing the top cover.

FUSE REPLACEMENT

The fuse is located on the inside of the low pass filter compartment and protects the CORSAIR from heavy overload and reverse polarity conditions. Replace with a type 3AG fast-blo 20 ampere type.

ROTARY SWITCH CARE

The bandswitch wafers are specially lubricated by their manufacturer for maximum useful life. Brushing on or dipping or spraying the switch with solvents will wash away the special lubricant and dramatically shorten the life of the switch. Cleaning rosin from soldered connections is not recommended since there is a hazard of the desolved resin flowing into the switch causing intermittent problems. Never use commercial contact cleaners on these switches unless proper lubrication is restored. In almost all cases, intermittent switch connection problems can be traced to improper switch shaft alignment or loose shaft couplings.

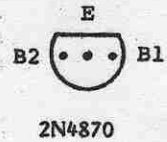
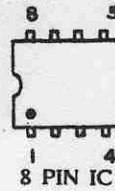
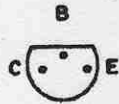
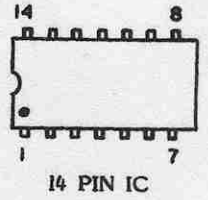
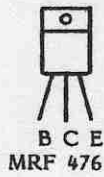
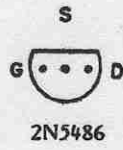
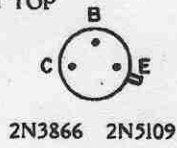
MAIN CHASSIS

The chassis wiring is color coded wherever possible.

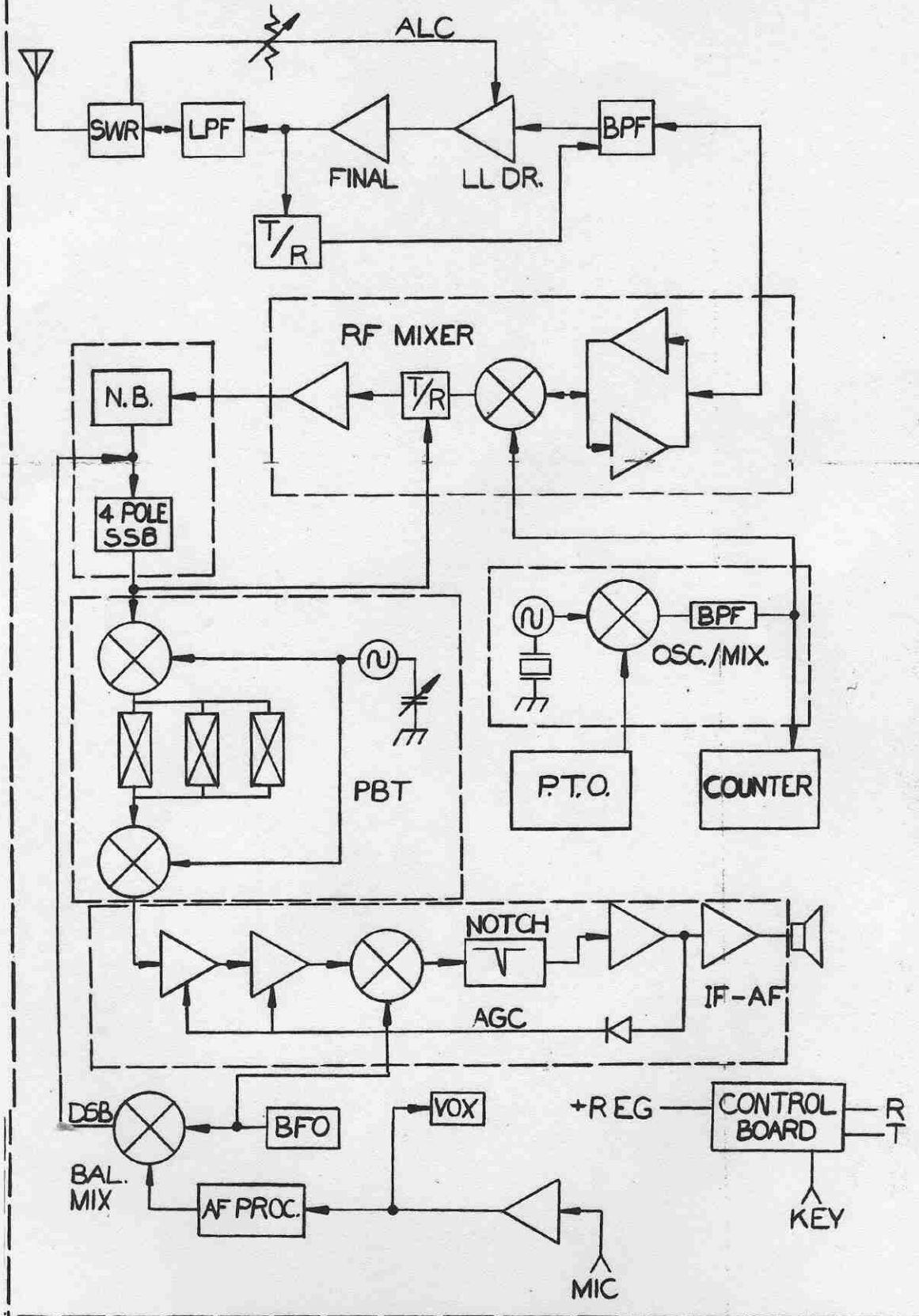
COLOR	FUNCTION	VOLTAGE,RX	VOLTAGE, TX
Black	GND	0	0
Red	+13	13.0	13.0
Orange	+REG	7.9	7.9
Yellow	R	12.0	0
Blue	T	0	12.0

SEMICONDUCTOR PIN IDENTIFICATION

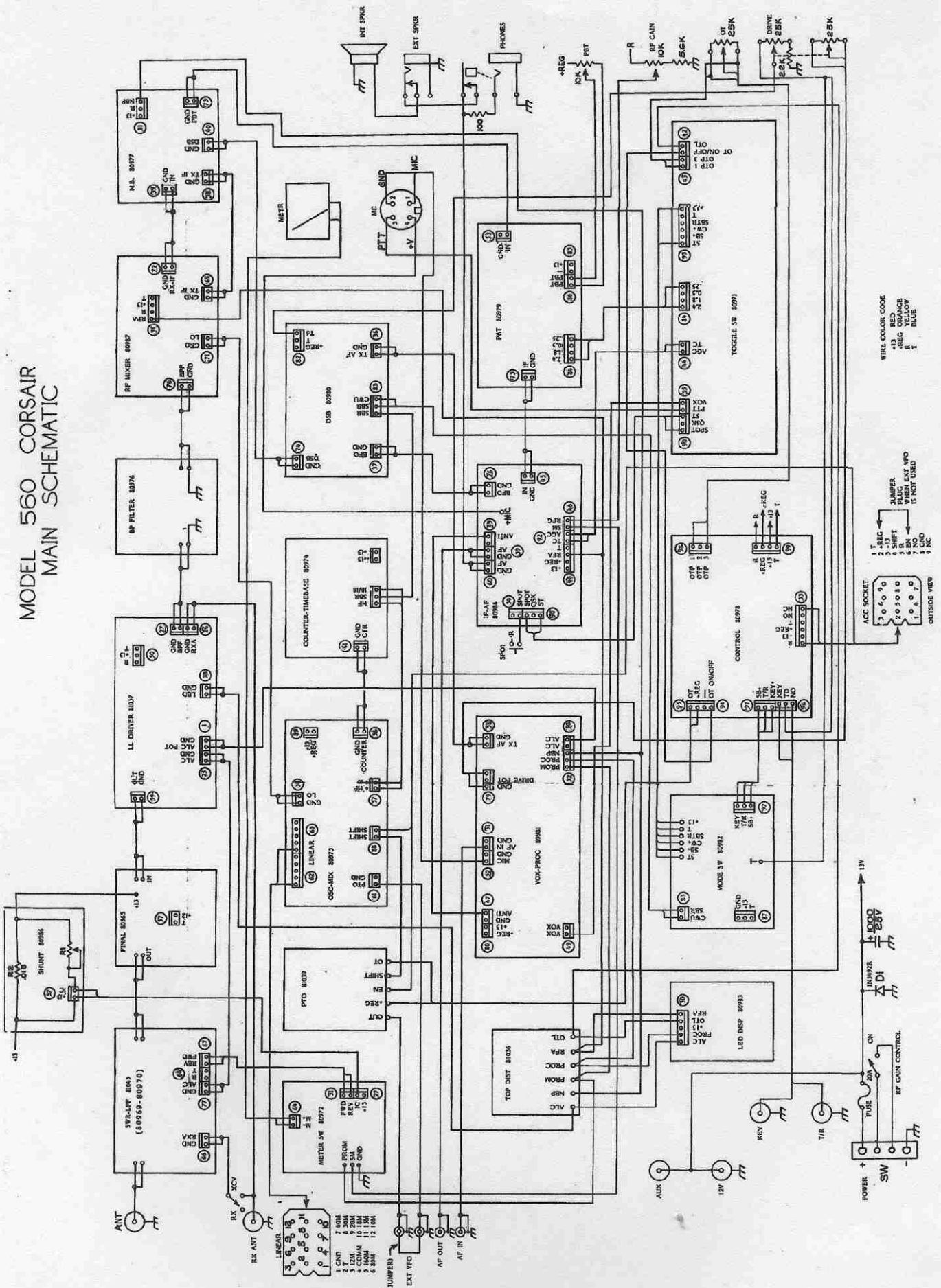
PINS VIEWED FROM TOP
OF PC BOARD.



BLOCK DIAGRAM - MODEL 560

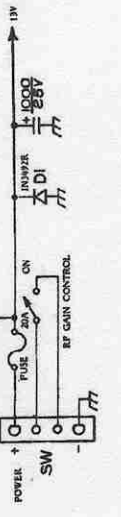


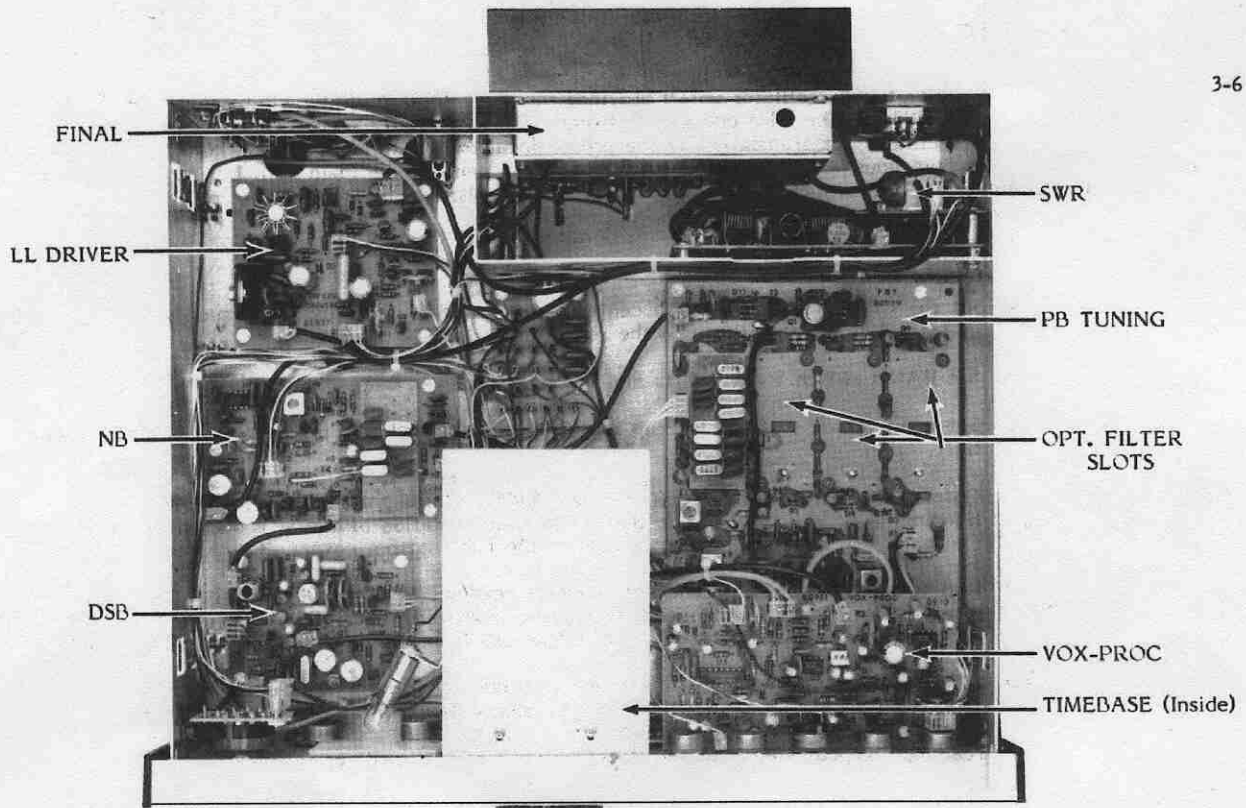
MODEL 560 CORSAIR MAIN SCHEMATIC



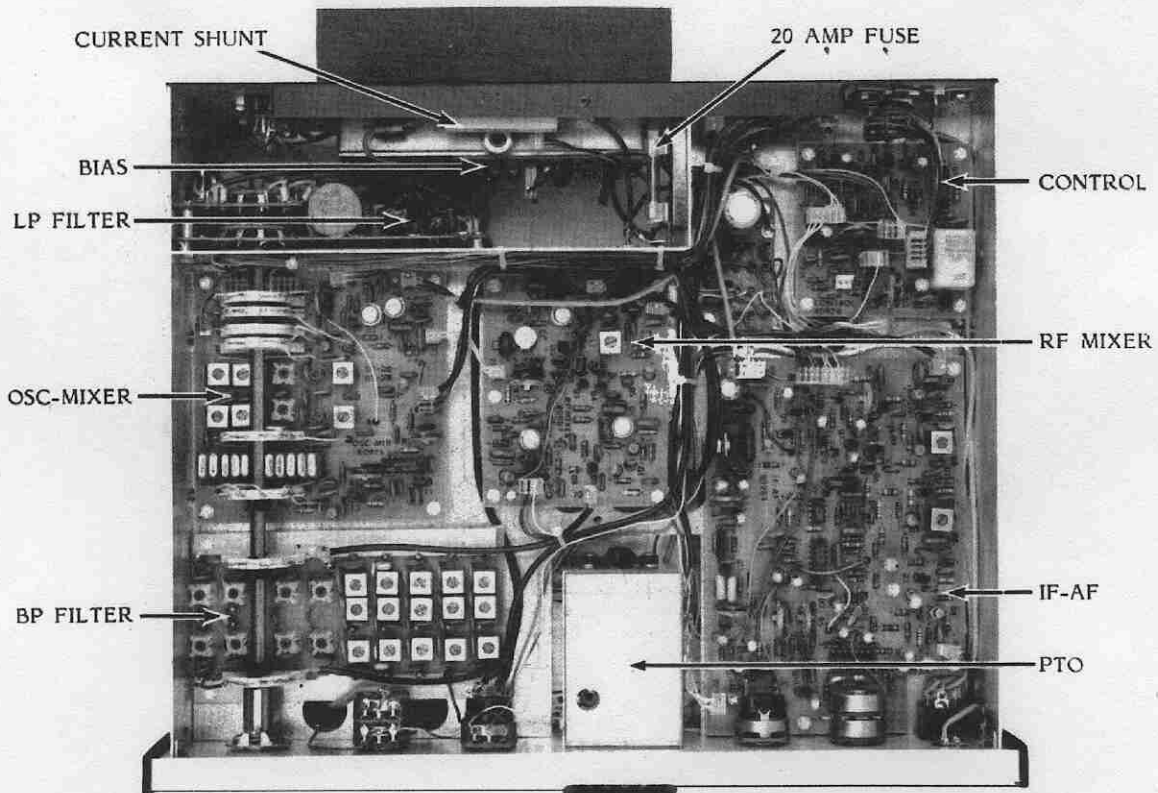
WIRE COLOR CODE
 RED
 BLUE
 GREEN
 YELLOW
 BLACK
 WHITE
 PURPLE
 BROWN
 GREY
 SILVER
 GOLD

ACC SOCKET
 1 +REG
 2 -REG
 3 SHFT
 4 JUMPER
 5 +REG
 6 -REG
 7 NO
 8 GND
 9 GND
 10 GND
 11 GND
 12 GND
 13 GND
 14 GND
 15 GND
 16 GND
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 99 GND
 100 GND





MODEL 560 TOP VIEW



MODEL 560 BOTTOM VIEW

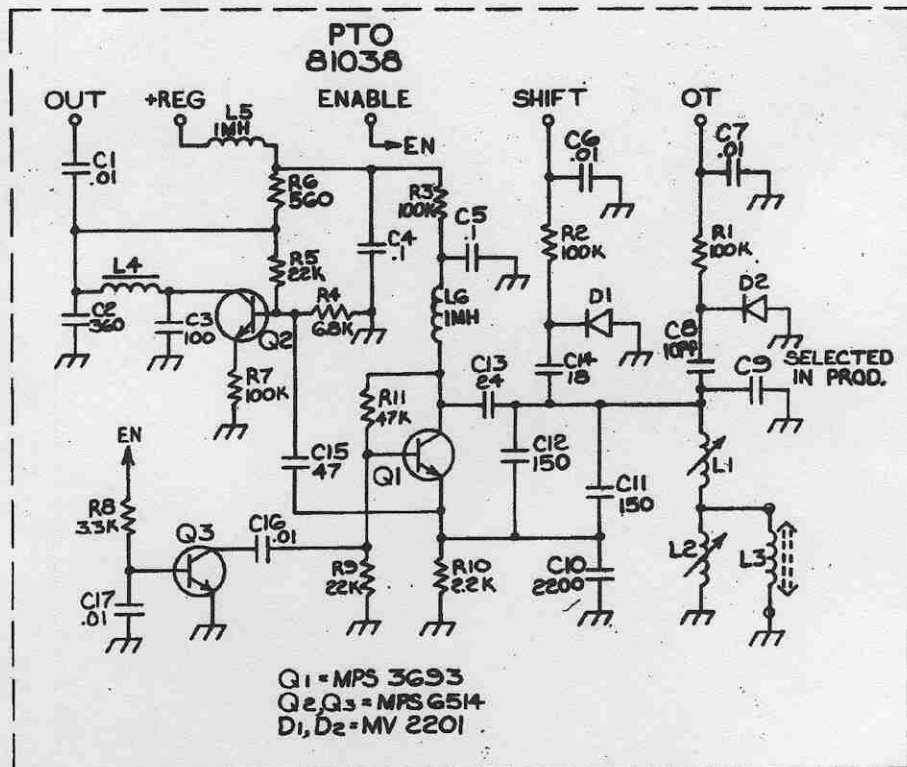
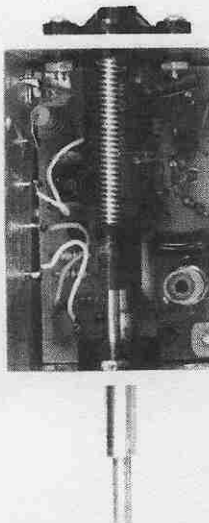
PTO 81038

The permeability tuned oscillator (PTO) provides the variable part of the VFO signal in both the receive and transmit modes. The PTO operates between 5.0 and 5.5 MHz. The output is mixed with signal from the crystal oscillator for translation to the proper local oscillator frequency. The PTO is housed in an extruded aluminum housing and mounted to the front sub panel. 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 band edge points.

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



OSCILLATOR MIXER 80975

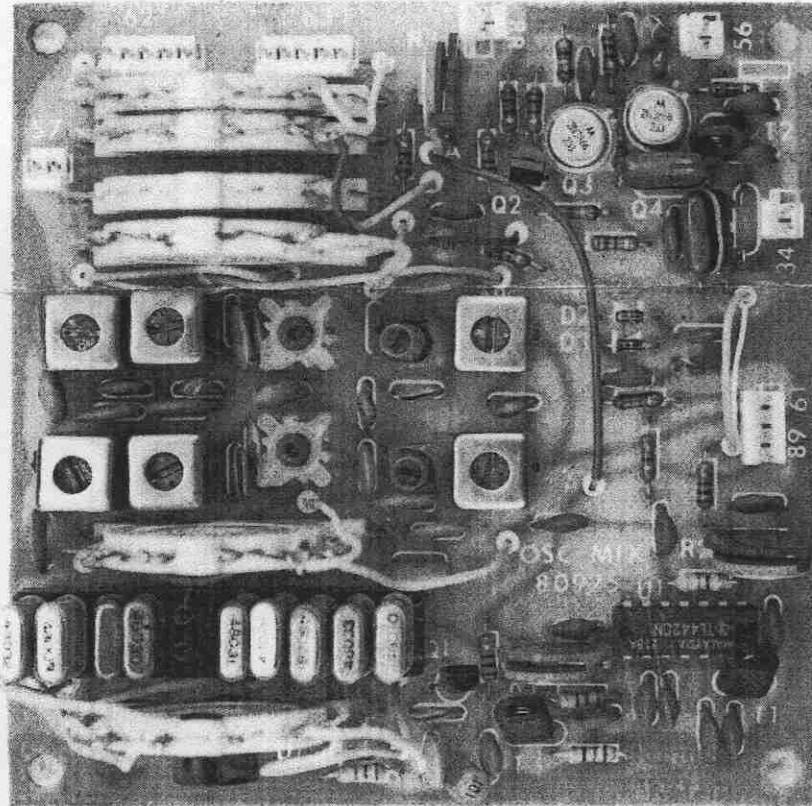
The circuits on this assembly produce proper injection frequencies for the transmitter and receiver circuits using a 9 MHz i-f system. This is accomplished by using the PTO 5.0 to 5.5 MHz master oscillator for all bands. The PTO is mixed in an integrated circuit double balanced mixer, U1, with signals from a crystal oscillator. Crystal frequencies are selected by the bandswitch. The 14 MHz band uses the 5.0 to 5.5 MHz PTO signal 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 overcoupled 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.

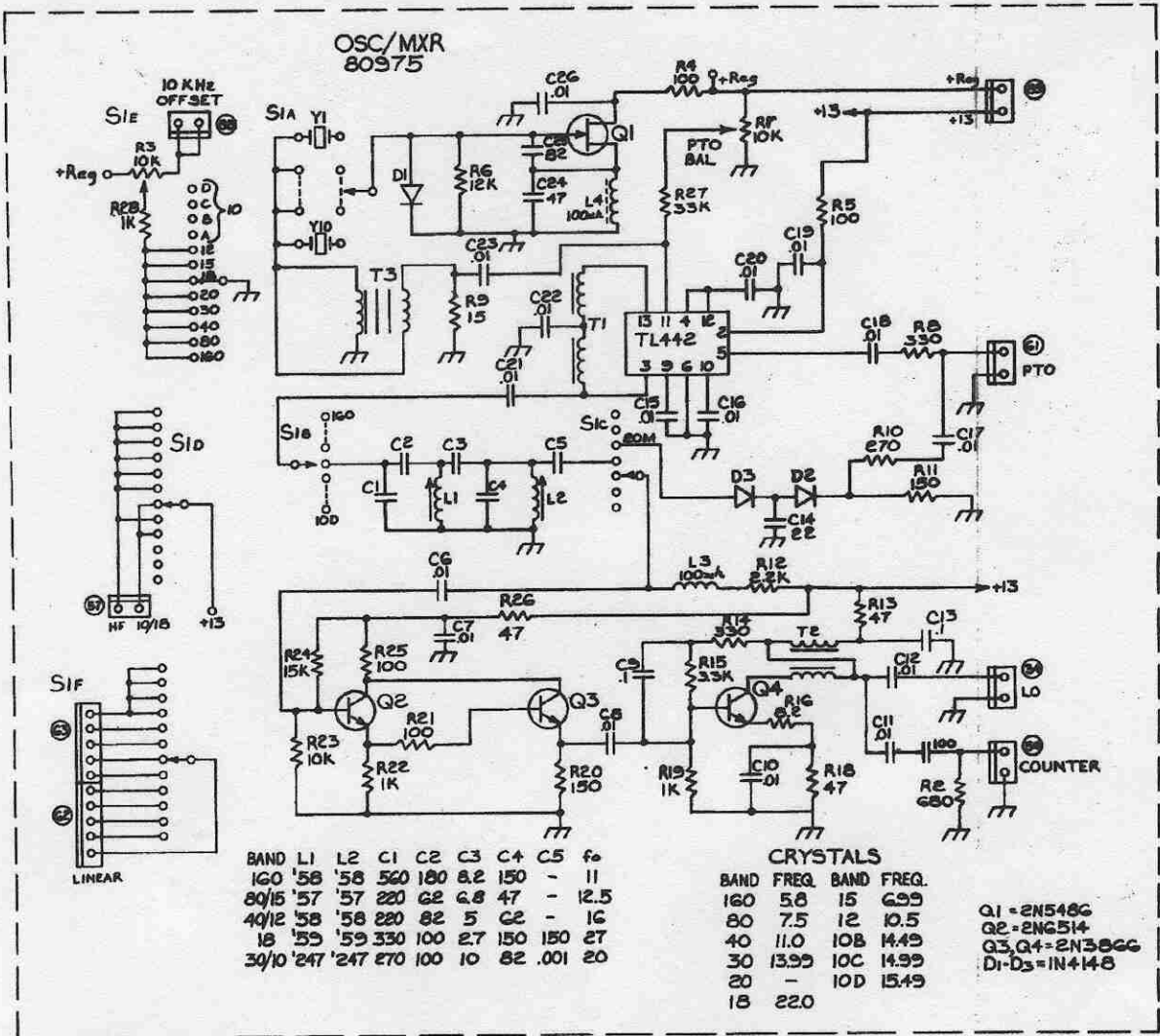
To eliminate band edge birdies on the 10, 21 and 28 MHz bands, the crystal oscillator frequencies are chosen 10 kHz lower than what normally would be needed, compared to the other bands. The PTO compensates for this 10 kHz deviation by changing the bias on a varactor diode in the PTO circuit by means of switch S1E. 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 R3. To set this adjustment, proceed as follows:

- 1.) With power removed from the transceiver follow the instruction for removal of the bottom cover and remove the cover from the oscillator mixer itself.
- 2.) Apply power to the transceiver and set the bandswitch to 10.0 and the frequency dial to 10.0000.
- 3.) Switch the bandswitch to 14 MHz and without touching the main tuning dial adjust R3 so that the display says 14.0000.

To balance the mixer for minimum PTO feedthrough proceed as follows:

- 1.) Set the bandswitch to 1.8 MHz and tune to 1.950 MHz. 2.) If a "birdie" or tone is heard, adjust R1 for a null in the tone. It should be possible to null this to less than 10 dB signal + noise audio output.





UI

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	4.9	4.8
2	12.5	12.0
3	10.0	10.0
4	6.1	6.1
5	4.1	4.1
6	0	0
7	0	0
8	0	0
9	4.2	4.2
10	6.2	6.2
11	6.2	6.2
12	6.3	6.3
13	10.0	10.0
14	10.0	10.0

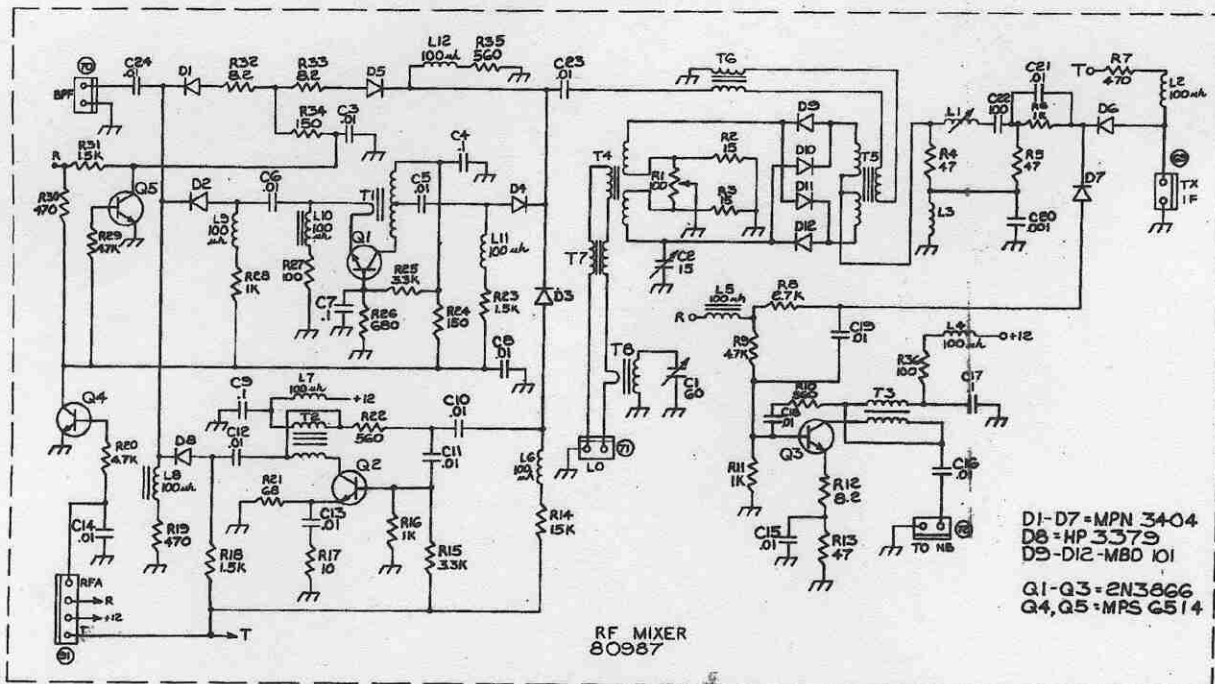
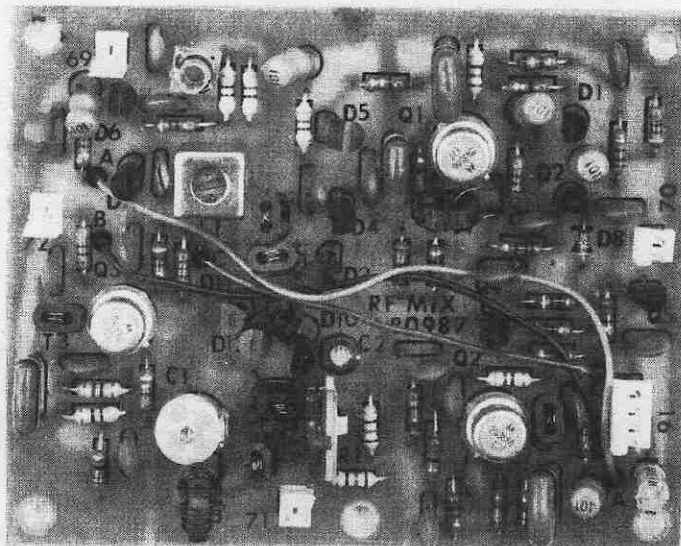
TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	7.4	7.4	.2	.2	0	0
Q2	9.2	9.2	4.4	4.4	4.1	4.1
Q3	9.2	9.2	3.9	3.8	3.2	3.2
Q4	11.75	11.75	2.2	2.2	1.5	1.5

RF MIXER 80987

This assembly contains the rf section of the receiver, its mixer and the first i-f amplifier, the transmitter mixer and its first low level amplifier stage. The selection of these amplifiers and the direction in which the signals flow is determined by the R and T voltages applied to the pin diodes. Amplifiers Q1 and Q3 are used on receive, and Q2 is used on transmit. Transistors Q4 and Q5 are switches which determine whether the rf amplifier or the attenuator is switched in on receive.

The mixer balance controls are adjusted as follows: 1.) Set the band switch to 21 MHz and dial to 21.320. 2.) Center the balance control C1, C2 and R1. Terminate the antenna jack with a 50 ohm dummy load. 3.) Adjust in order R1, C1 and C2 to reduce the strength of any birdie that is received at this frequency.

Coil L1 is peaked on receive for maximum received signal.



RF MIXER 80987

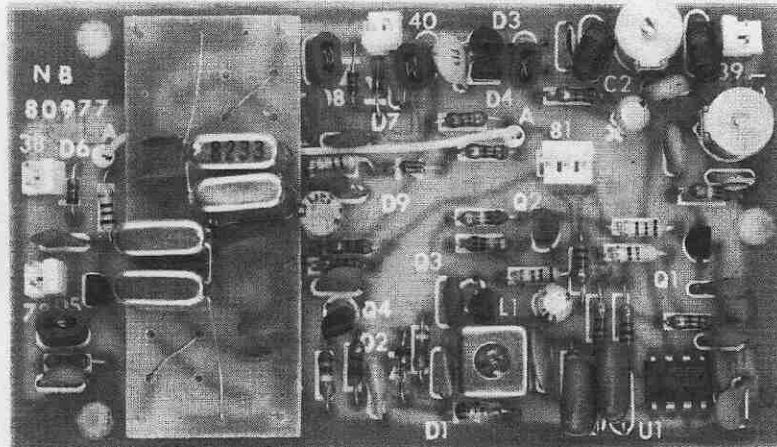
TRANSISTOR	COLLECTOR		BASE		EMITTER	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	5.8	0	1.0	0	.3	0
Q2	13.0	13.0	0	2.1	0	1.35
Q3	11.0	13.0	1.8	0	1.3	0
Q4						
Q5						

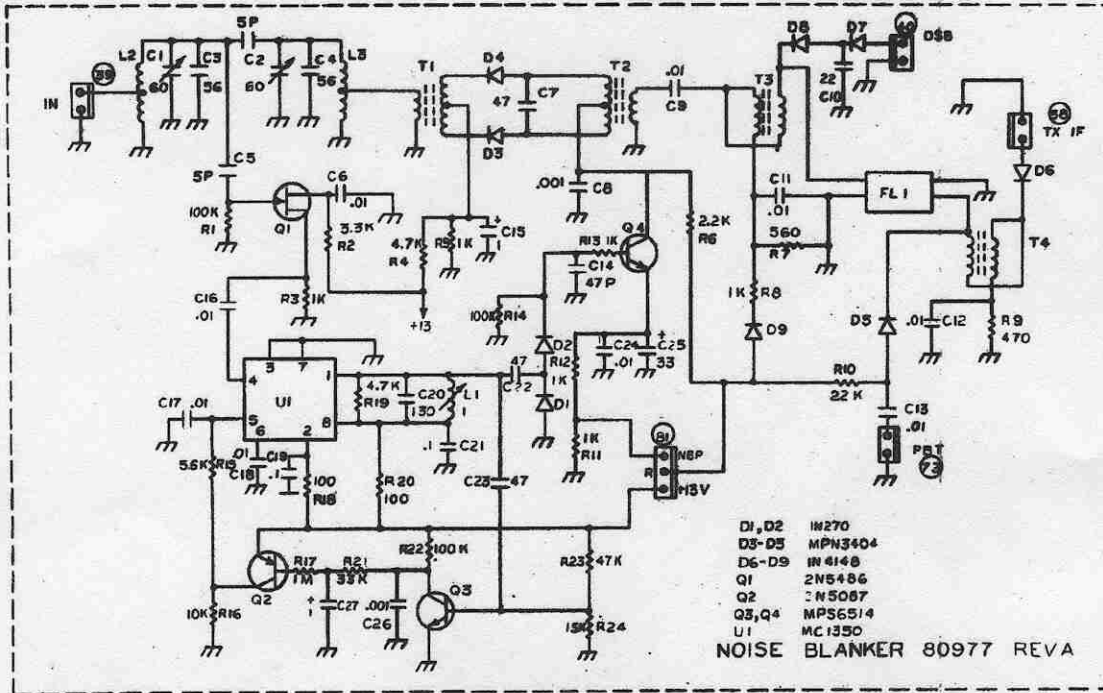
NOISE BLANKER 80977

The noise blanker is inserted in the receive i-f channel ahead of the high selectivity crystal filter. The signal is split into two paths, one for noise detection, the other for noise processing. Coils L2 and L3 form a bandpass filter which reject out of band signals and provide some signal delay for equalizing the noise detector delay characteristics. The filter feeds the signal input of a balanced noise gate formed by T1, D3, D4 and T2. The noise is detected and shaped by Q1 and U1 and transistor Q4 drives the blanker gate. Threshold action is obtained by varying the bias on transistor Q4. Transistors Q2 and Q3 comprise a direct coupled AGC amplifier whose control voltage is applied to Pin 5 and U1.

The bandpass filter can be aligned by tuning in the receive birdie at $27.980 \pm$ MHz. With the blanker control turned fully counterclockwise, peak C1 and C2 for maximum S-meter reading. With the blanker control turned fully clockwise, tune L1 for maximum AGC voltage at Pin 5 of U1.

This board also contains the first i-f crystal filter. As supplied by the factory, this filter is a 4-pole lattice type. More first i-f selectivity and consequently greater rejection of adjacent channel signals can be obtained by replacing this filter with the Model 220, 8-pole crystal filter. For ease in removal, this filter is mounted in sockets on the board.





UI

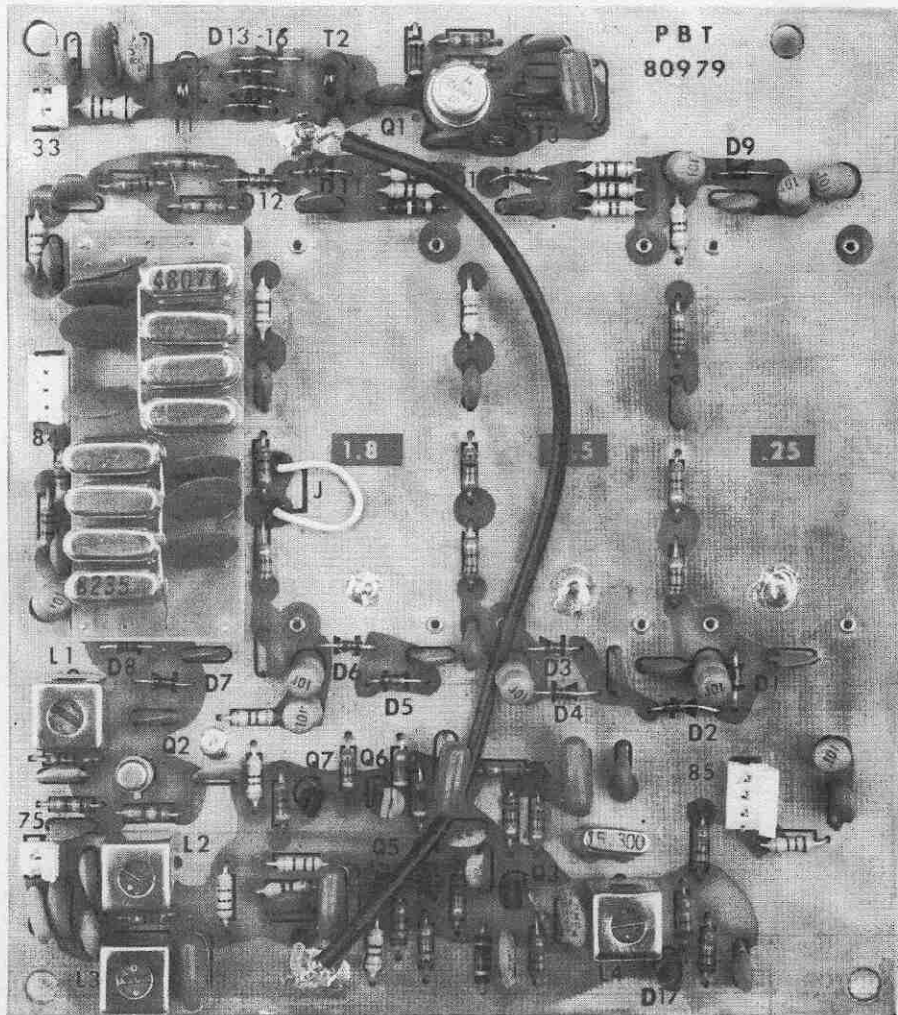
PIN	RECEIVE	TRANSMIT
1	12.5	12.5
2	12.25	12.25
3	0	0
4	4.0	4.0
5	5.2	5.0
6	4.0	4.0
7	0	0
8	12.5	12.5

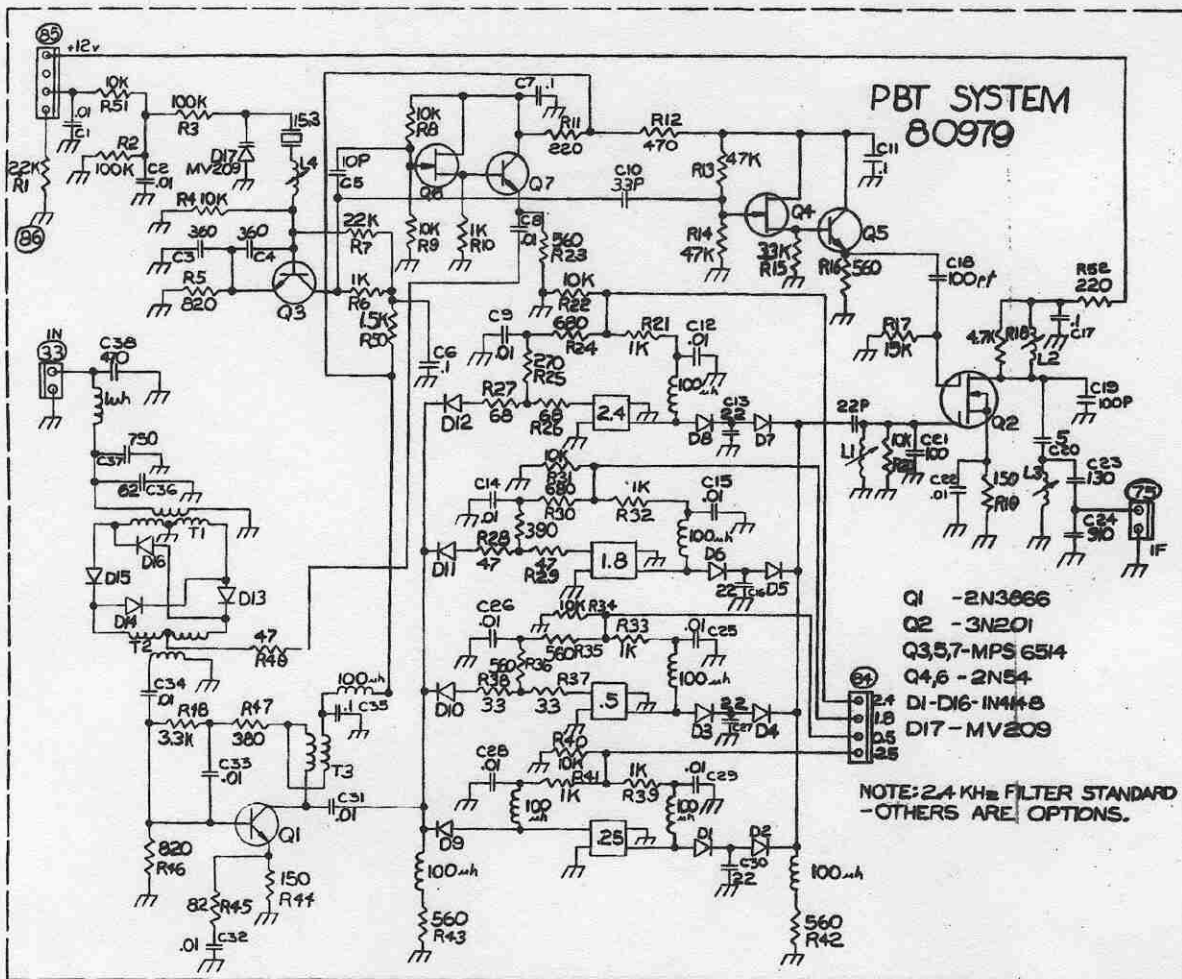
TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	12.75	12.75	0	0	1.75	1.75
Q2	3.2	3.2	12.5	12.5	13.0	13.0
Q3	8.9	8.9	0	0	0	0
Q4	0	0	0	0	0	0

PBT, PASS BAND TUNING 80979

This board allows the operator to move one of the filters mounted on this board across the passband of the receiver. The filters are electronically switched. Each filter has an associated matching pad which keeps the attenuation through this board at a constant level. Coils L1, L2 and L3 are adjusted for maximum signal as monitored on the S-meter. Coil L4 determines the passband centering. To adjust this, turn the PBT control on the front panel to the center detent. While switching from sideband normal to sideband reverse, adjust coil L4 so the background hiss is approximately the same in either case. The adjustment of this coil is not critical.

When installing the Model 288, 1.8 kHz optional filter, be sure to remove the jumper on the top of the board. This jumper is located in the center of the 1.8 kHz socket.





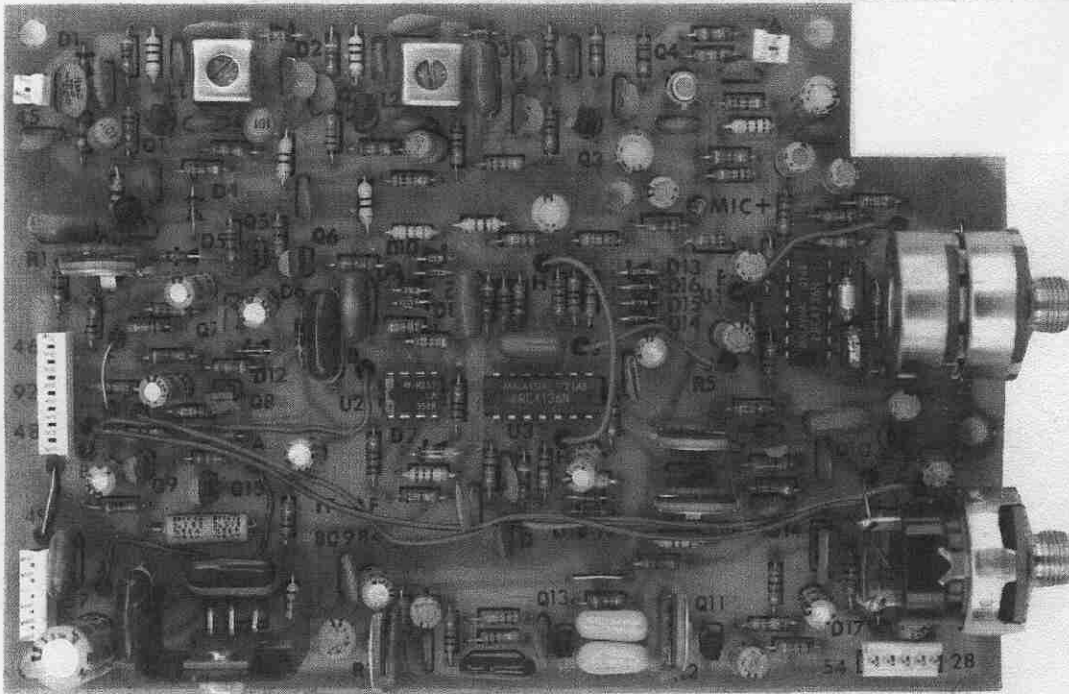
PBT 80979

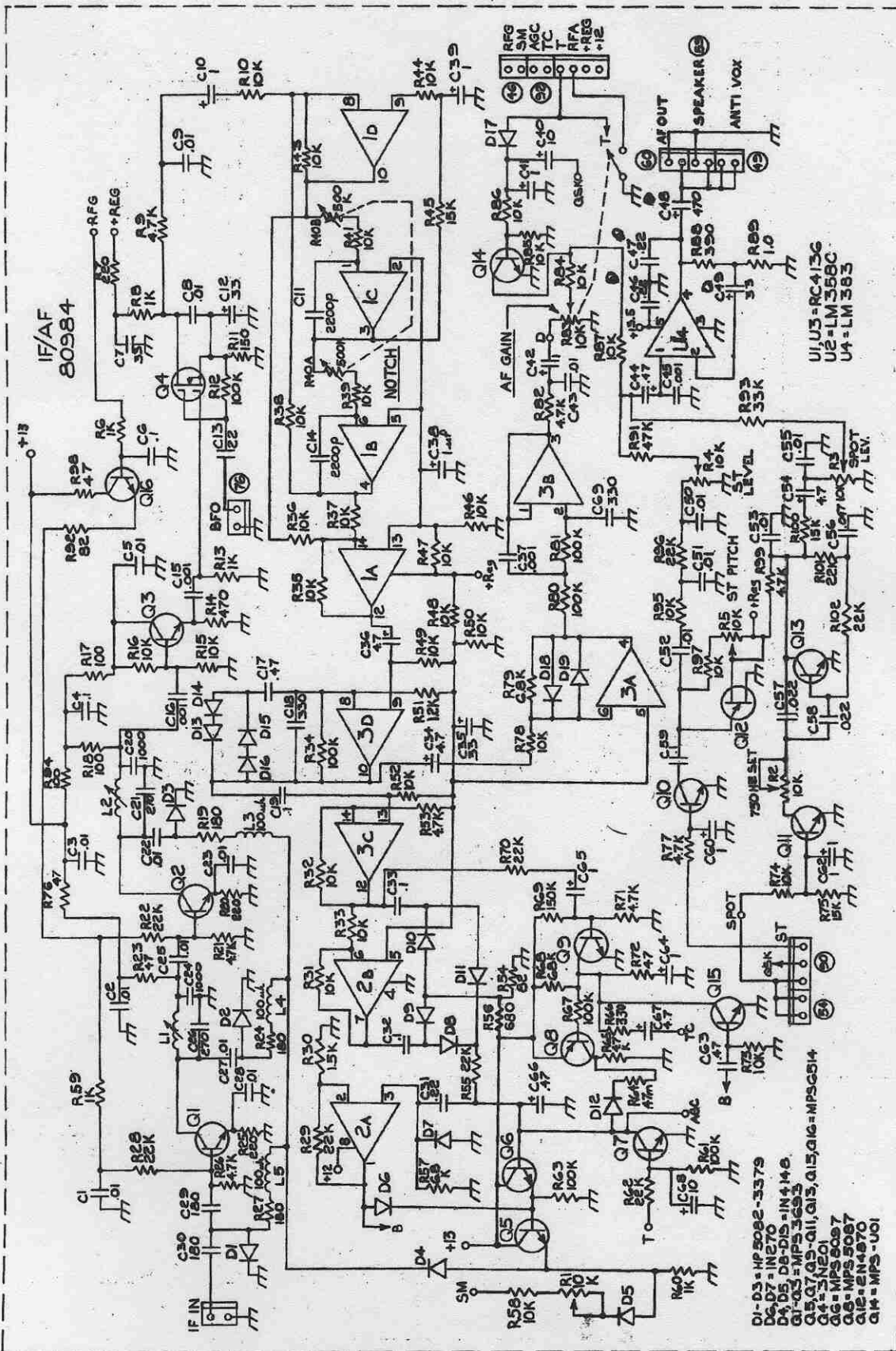
TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	13.0	12.95	.56	.56	1.55	1.55
Q3	5.7	5.7	2.6	2.6	2.1	2.1
Q4	9.5	9.4	4.8	4.8	5.7	5.7
Q5	9.5	9.4	5.7	5.7	5.2	5.2
Q6	8.0	8.0	4.0	4.0	6.0	6.0
Q7	8.0	8.0	6.0	6.0	5.1	5.1

TRANSISTOR	SOURCE		DRAIN		GATE 1		GATE 2	
	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q2	.27	.27	13.	13.	.25	.25	0	0

IF-AF BOARD 80984

This board contains only receive functions: The i-f amplifier Q1, Q2 and Q3, the product detector Q4, the notch filter U1, the audio pre-amp circuit U3, audio power amplifier U4, AGC detector U2, and the spot and sidetone circuits. There are three adjustments on this board. First, L1 and L2 are peaked for maximum receive signal on the S-meter. This should be done with as low an input signal level as possible. S-meter calibration is accomplished by adjusting R1 for an S9 reading on the meter when a 50 μ V, 14.0 MHz signal is applied to the antenna terminal with the RF AMP control on. With an audio frequency counter connected at the speaker, adjust R2 for 750 Hz indicated when the spot button is depressed. Adjust R3 for a comfortable listening level. R5 and R4 set the pitch and level of the sidetone on cw. These controls can be adjusted through the hole in the bottom cover.





U1

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	3.8	3.8
2	3.7	3.7
3	3.8	3.8
4	3.8	3.8
5	3.7	3.7
6	3.8	3.8
7	0	0
8	3.8	3.8
9	3.5	3.5
10	3.8	3.8
11	7.5	7.5
12	3.8	3.8
13	3.7	3.7
14	3.8	3.8

U3

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	3.8	3.8
2	2.0	2.0
3	3.8	3.8
4	3.8	3.8
5	3.7	3.7
6	3.8	3.8
7	0	0
8	3.8	3.8
9	3.4	3.4
10	7.5	7.5
11	3.8	3.8
12	3.8	3.8
13	3.7	3.7
14	3.8	3.8

U2

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	0	0
2	0	0
3	0	0
4	0	0
5	3.7	3.7
6	3.8	3.8
7	3.8	3.8
8	7.5	7.5

U4

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	.4	.4
2	.55	.55
3	0	0
4	6.5	6.5
5	13.0	13.0

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	12.0	12.5	1.7	0	1.0	0
Q2	10.5	11.5	1.7	0	1.0	0
Q3	10.0	10.5	4.5	4.8	3.9	4.2
Q5	13.0	13.0	.4	0	0	0
Q6	13.0	13.0	.65	0	.4	0
Q7	.65	0	0	.65	0	0
Q8	0	0	12.5	12.5	13.0	13.0
Q9	12.0	12.0	.35	.35	0	0
Q10	0	0	0	0	0	0
Q11	0	0	0	.25	0	0
Q13	1.0	1.0	.65	.65	0	0
Q14	0	0	0	.65	0	0
Q15	12.2	12.2	0	0	0	0
Q16	13.0	13.0	11.5	0	11.0	0

TRANSISTOR	SOURCE		DRAIN		GATE 1		GATE 2	
	Receive	Transmit	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q4	.35	.35	4.7	4.7	.1	.1	0	0

TRANSISTOR	EMITTER		BASE 1		BASE 2	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q12	1	1	0	0	1.8	1.8

VOX - PROCESSOR 80981

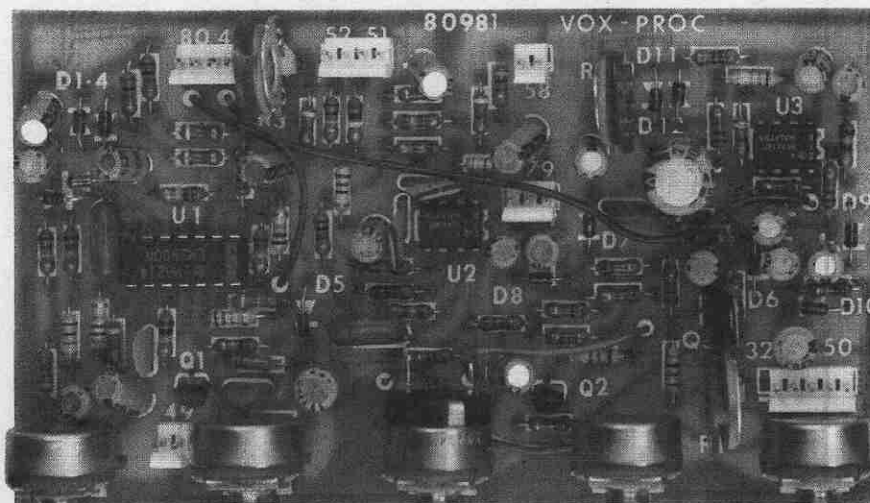
This board provides amplification of the microphone or patch-TU audio signal for the transmitter. U2A is the input buffer which drives both the VOX circuits (UI A,B,D) and the processor. The VOX produces a positive voltage signal from the microphone and a negative voltage signal from the ANTI VOX (speaker) input. Each is applied to the summing point and compared in UID with a fixed reference. When the reference is exceeded, the VOX is activated.

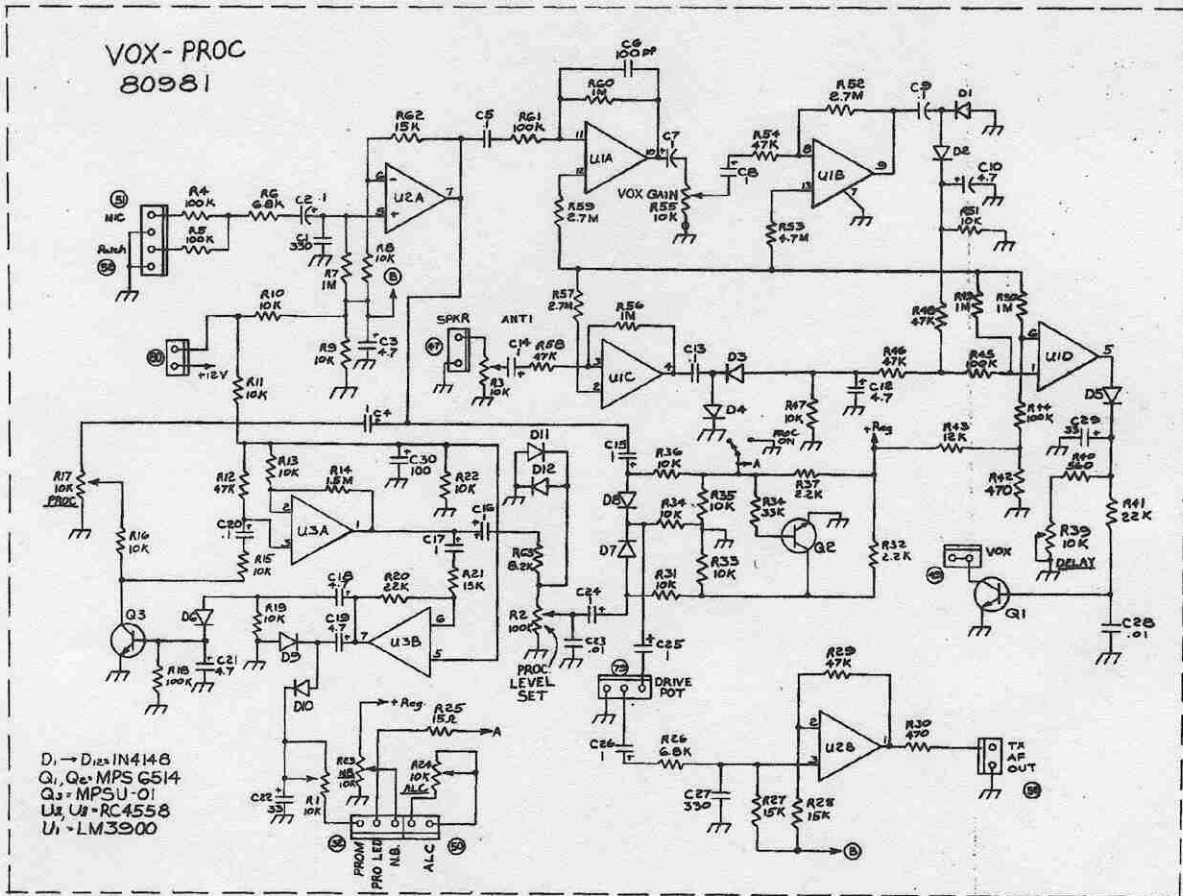
When adjusting the VOX, always start with the minimum VOX GAIN necessary to assure reliable switching, and use a moderate level of audio gain for the receiver. The ANTI VOX, R3, is set for a typical installation and should not need further adjustment. If speaker signals tripping the VOX occur too frequently, decrease the AF gain, move the microphone further away from the speaker, or decrease the VOX gain slightly. If this fails to produce proper VOX action, increase R3 slightly. Keep in mind that VOX GAIN, AF GAIN and ANTI all interact and changing one affects the others.

The speech processor is an AF peak clipper and compressor. This combination permits a higher processing level than either method by itself. The processor is switched in and out electronically by a two diode switch. Transistor Q3 is the shunt element of the compressor, and D11 and D12 are the clipping elements.

To adjust the internal processing level controls:

1. With the processor off and using a normal voice, adjust the DRIVE control for proper ALC action.
2. Turn the PROCESSOR on and advance it to center position.
3. Using the same voice, adjust R2 for equal ALC action.
4. Then adjust R1 for a reading in the center of the PROCESS area of the meter (meter switch in PROCESS position).





U1

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	.3	.3
2	.15	.15
3	.2	.2
4	.3	.3
5	.1	.1
6	.25	.25
7	0	0
8	.1	.1
9	4.5	4.5
10	3.0	3.0
11	.2	.2
12	.15	.15
13	.1	.1
14	7.5	7.5

U2

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	3.7	3.7
2	3.95	3.95
3	3.5	3.5
4	0	0
5	.3	.3
6	4.2	4.2
7	4.6	4.6
8	7.5	7.5

U3

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	8.	8.1
2	6.1	6.1
3	5.2	5.2
4	0	0
5	6.3	6.3
6	6.5	6.4
7	4.45	6.4
8	13.0	13.0

TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	0	0	0	0	0	0
Q2	5.7	5.7	0	0	0	0
Q3	0	0	0	0	0	0

DOUBLE SIDEBAND GENERATOR 80980

This assembly contains the carrier (BFO) crystal oscillator and a balanced modulator for double sideband generation. Transistor Q1 is the carrier oscillator 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. C1 is in the circuit at all times and sets the carrier to the desired frequency on the high side of the crystal filter skirt. This position is used in the SB-R mode. In this mode, both C2 and C3 are removed from the crystal circuit by the transistor switches Q4 and Q3 respectively.

In the SB-N mode, both of these capacitors are inserted into the circuit by the MODE switch, and the three capacitors in parallel set the oscillator frequency down to the opposite (low frequency) side of the passband filter skirt. In the cw mode, C3 is removed by switch Q3 so that the carrier frequency increases by 750 Hz into the filter passband. The settings of C1 and C2 together determine this frequency.

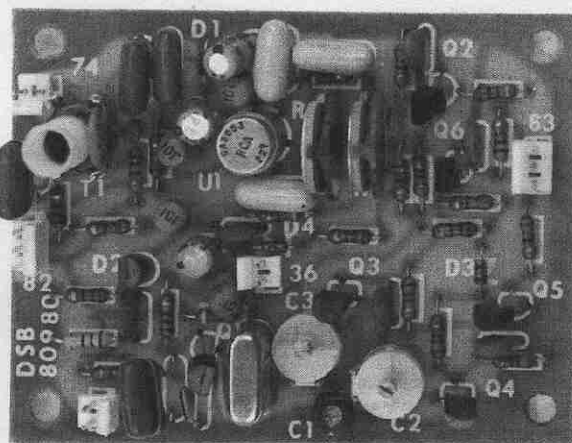
Output from the carrier oscillator is fed to the BFO socket and to the balanced modulator U1 where it is mixed with the audio signal from the VOX board 80981. Output in the ssb mode is a double sideband, suppressed carrier signal, whose unwanted sideband is removed by the ladder filter on the noise blanker module.

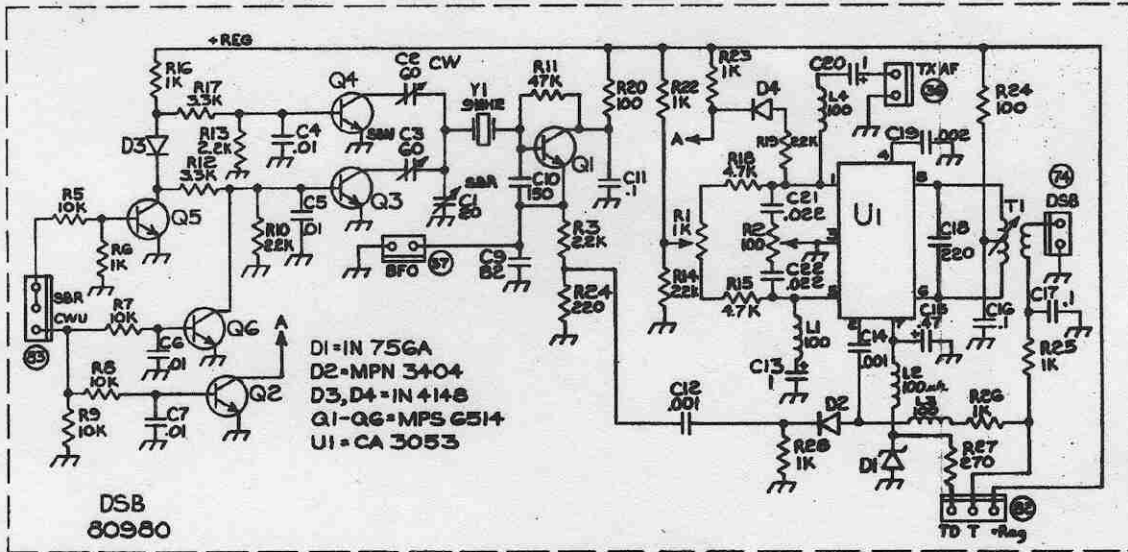
For cw transmit operation, the balance of U1 is upset when the terminal CWU receives T voltage through the MODE switch. This is also the case in the LOCK mode. Audio from the microphone channel is eliminated by the same shorting procedure. The amount of T voltage, which is controlled by the setting of the DRIVE control in cw mode and applied to Pin 7 of the balanced modulator integrated circuit, determines the level of the carrier signal applied to the transmit mixer.

Carrier Oscillator Alignment: Proper alignment of C1, C2 and C3 requires the use of a frequency counter. These capacitors should not be readjusted on general principles but only after it has been determined that the carrier is not where it should be on the passband curve, or the cw frequency is not 750 Hz up from the sideband normal carrier position. To make these adjustments proceed as follows:

- 1.) Connect the counter to the junction R3 and R4 in the emitter of Q1.
- 2.) Set the MODE switch to the SB-R position and DRIVE control fully counterclockwise. Adjust C1 for a frequency reading of 9.00300.
- 3.) Set the MODE switch to the LOCK position and adjust C2 so that the frequency is 9.000750.
- 4.) Set the MODE switch to the SB-N position and adjust capacitor C3 for a frequency of 9.00000.
- 5.) Return to step 2 and check the frequencies again because the adjustments interact to some extent.

Carrier Null Adjustment: With the MODE switch in SB-N, DRIVE control at full counterclockwise, and no microphone inserted in the microphone jack, alternately adjust R1 and R2 for minimum transmitted carrier, after adjusting T1 for maximum output signal.





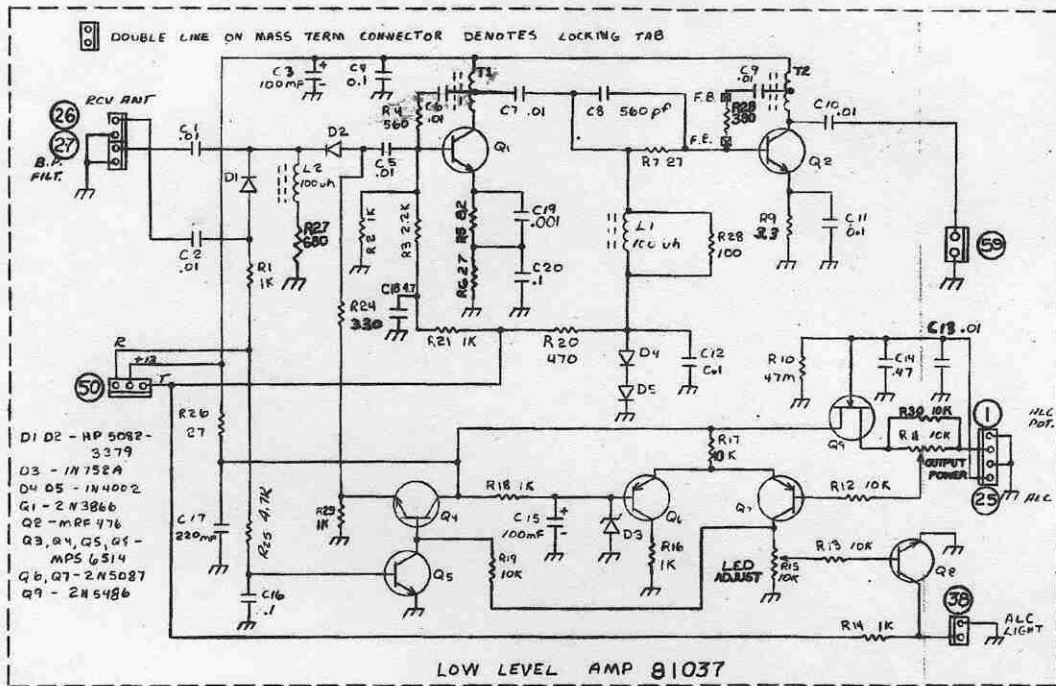
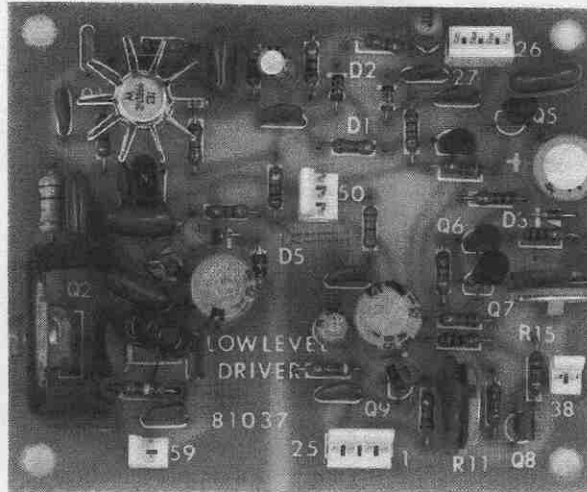
U1

PIN	RECEIVE	TRANSMIT
1	5.0	1.0
2	0	.25
3	0	0
4	0	0
5	5.0	4.5
6	7.5	7.5
7	0	.7
8	7.5	7.5

TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	7.4	7.4	4.5	5.0	4.95	5.0
Q2	7.5	0	0	.7	0	0
Q3	0	1.2	.65	0	0	0
Q4	0	0	.7	.7	0	0

LOW LEVEL DRIVER 81037

This assembly contains the transmit low level amplifier and the ALC circuit. Also, the signal into the bandpass filter is determined by the switching of PIN diodes D1 and D2. To adjust the action of the ALC LED indicator, place the MODE switch in the LOCK position and DRIVE control at full counterclockwise. Adjust R15 to a point just below where the LED begins to light. Using a wattmeter and dummy load, advance the DRIVE control until 100 watts is indicated on 14.05 MHz. Adjust the front panel ALC control for full clockwise rotation and then adjust R11 so that the LED is fully bright with 100 watts output.



TRANSISTOR	COIL (drain)		BASE (gate)		EMITTER (source)	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	13.0	13.0	0	2.0	0	1.4
Q2	13.0	13.0	0	1.27	0	.6
Q4	13.0	13.0	0	4.2	0	4.5
Q5	0	4.5	.75	0	0	0
Q6	0	0	5.4	5.4	3.8	5.1
Q7	3.8	5.1	3.2	4.4	3.8	5.1
Q8	0	.25	.61	.54	0	0
Q9	2.5	2.6	0	0	13.0	13.0

FINAL AMPLIFIER ASSEMBLY 80565

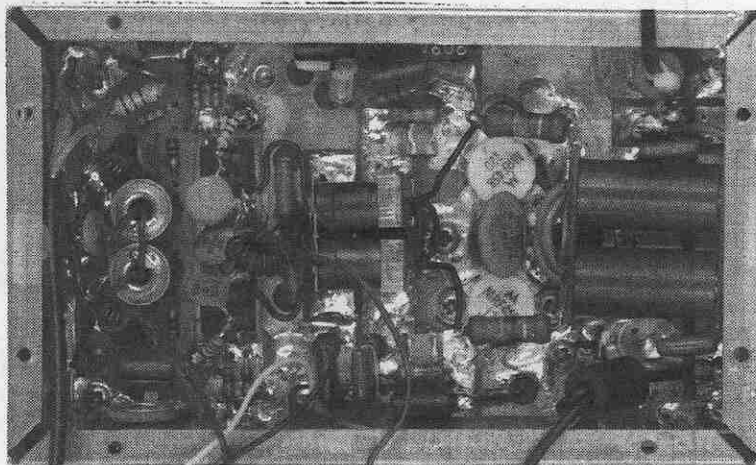
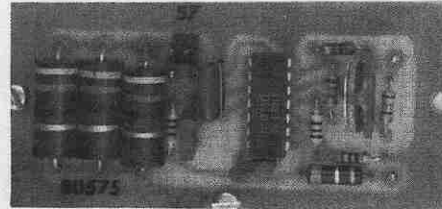
The high power rf amplifier and its push-pull drive stage are housed in a metal box which is an integral part of the heat sink assembly. The unit is attached to the back panel with four screws.

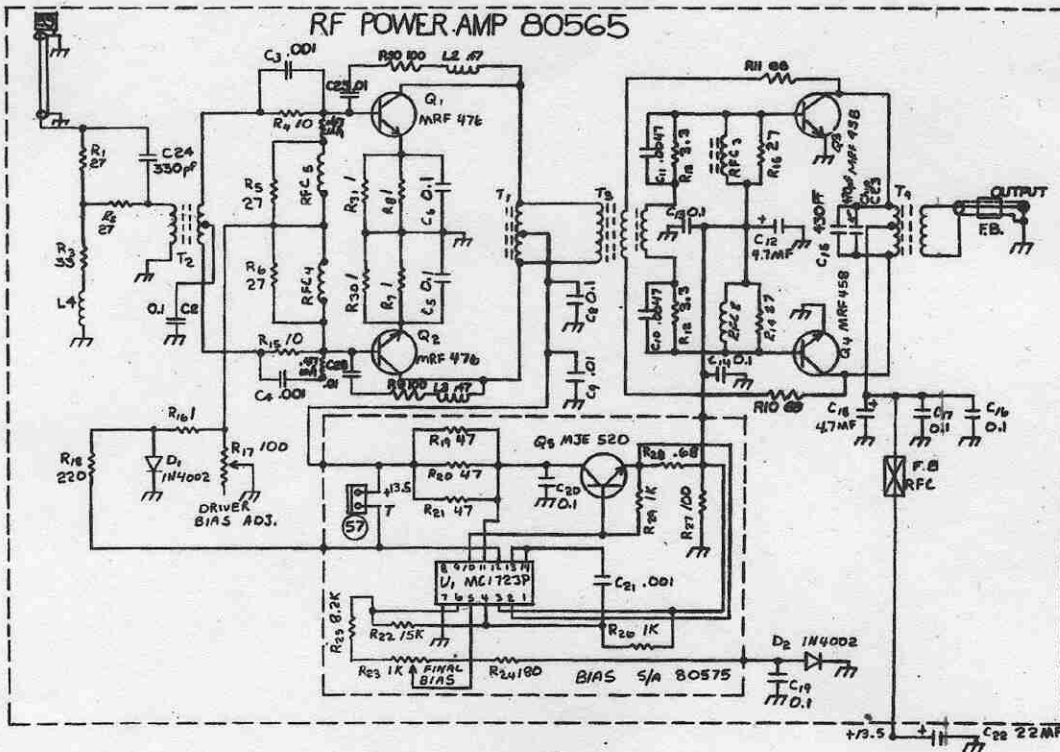
Q1 and Q2 constitute a Class AB linear push-pull driver stage of wide band design. Impedance matching into and out of this stage is by means of transformers T1 and T2. Bias is applied whenever "T" voltage is applied to the terminal so marked, and quiescent current in the collector circuit is adjusted to a value of between 4 and 8 mA with potentiometer R11. Access to this control is by means of the small hole in the brass box as shown on Figure 1 of this section. To adjust bias, unsolder the small jumper red wire connecting the second small feed through terminal to the large +12 volt lug. Insert a dc milliammeter between the two, set DRIVE control fully CCW and MODE switch to LOCK position. If driver collector current is not between the recommended limits, readjust trimpot (clockwise to increase current) by rotating the trimpot plastic serrated knob through the shield box hole with the aid of a small awl type probe.

Power amplifier transistors Q3 and Q4 are also in a Class AB push-pull arrangement. Bias is applied to the bases in a shunt feed system through L2 and L3. Bias is fed to this stage from a regulated and controlled supply on the cover of the amplifier box.

Bias for both stages is temperature compensated to maintain a relatively constant operating point by mounting the bias diodes in direct contact with the heat sink. D1 controls the driver stage and D2 the output stage.

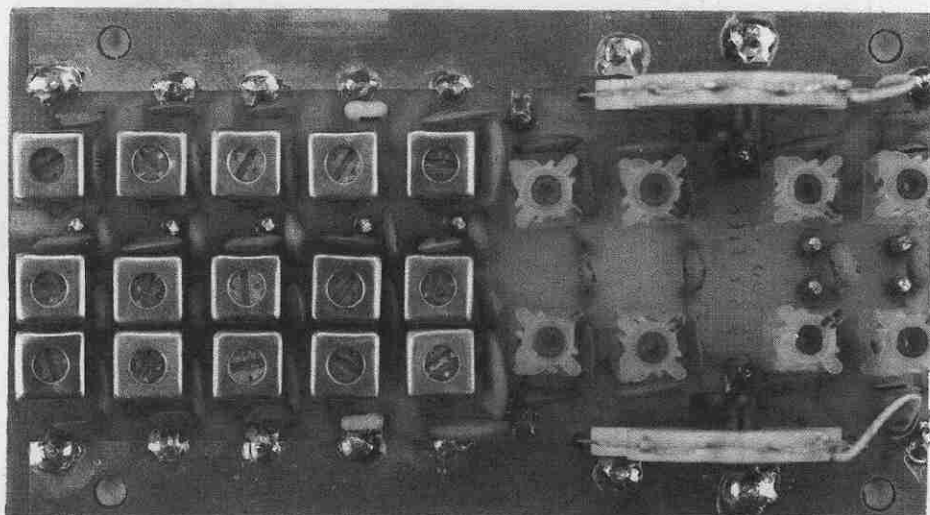
Final amplifier bias is adjusted by R23. To adjust bias, place a DC ammeter in the +13 V dc supply lead. Load into a dummy load, set MODE switch to LOCK position and DRIVE control fully counterclockwise. Note the current reading and then slowly rotate R23 in the direction that decreases the current reading. After determining which direction decreases current, set the control fully in this direction. This will cut off the final transistors. Note the current reading and then advance R23 so that the reading increases by $\frac{1}{2}$ ampere-no more. This value should be approximately $1\frac{1}{2}$ amperes total. Too low a bias setting will cause distorted audio in sideband due to amplifier operating class C. Too high a quiescent current will increase power dissipation in the output transistors.

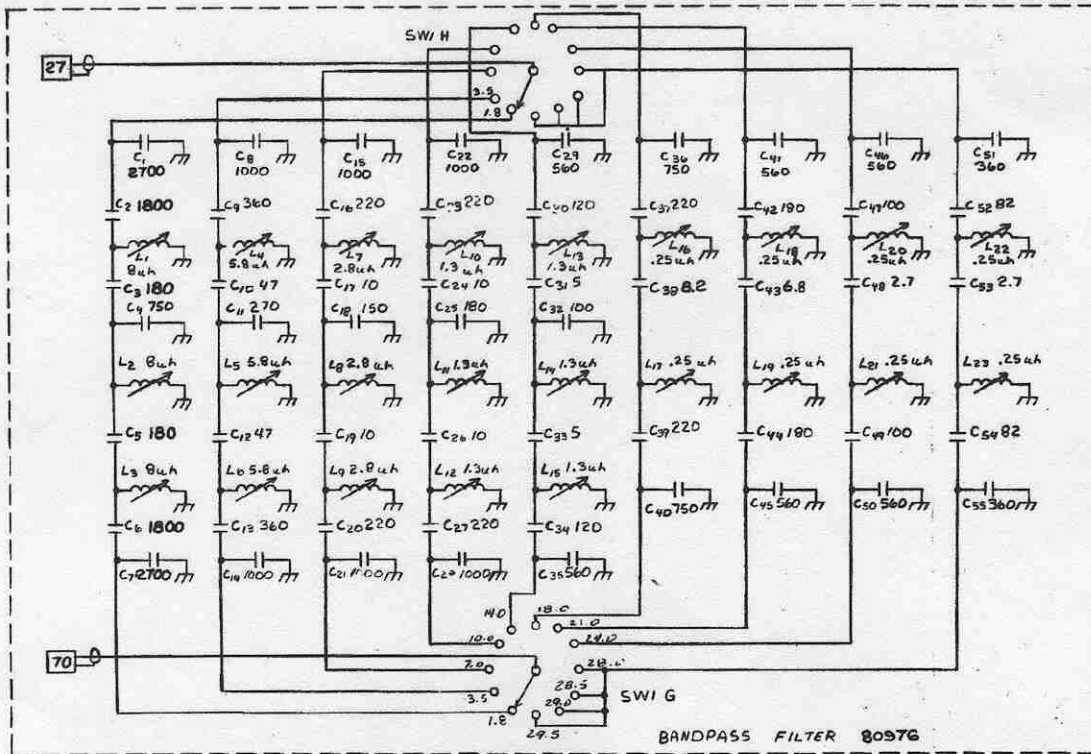




BANDPASS FILTER 80976

This assembly contains individual bandpass filters for each band. They consist of critically or over-coupled tuned circuits, 3 poles on each band except 10 and 15 meters. 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 has been replaced. Since all of the components are passive, no voltage measurements are required.



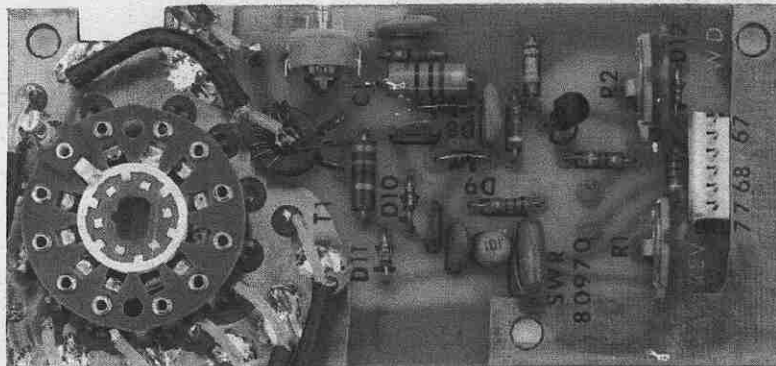


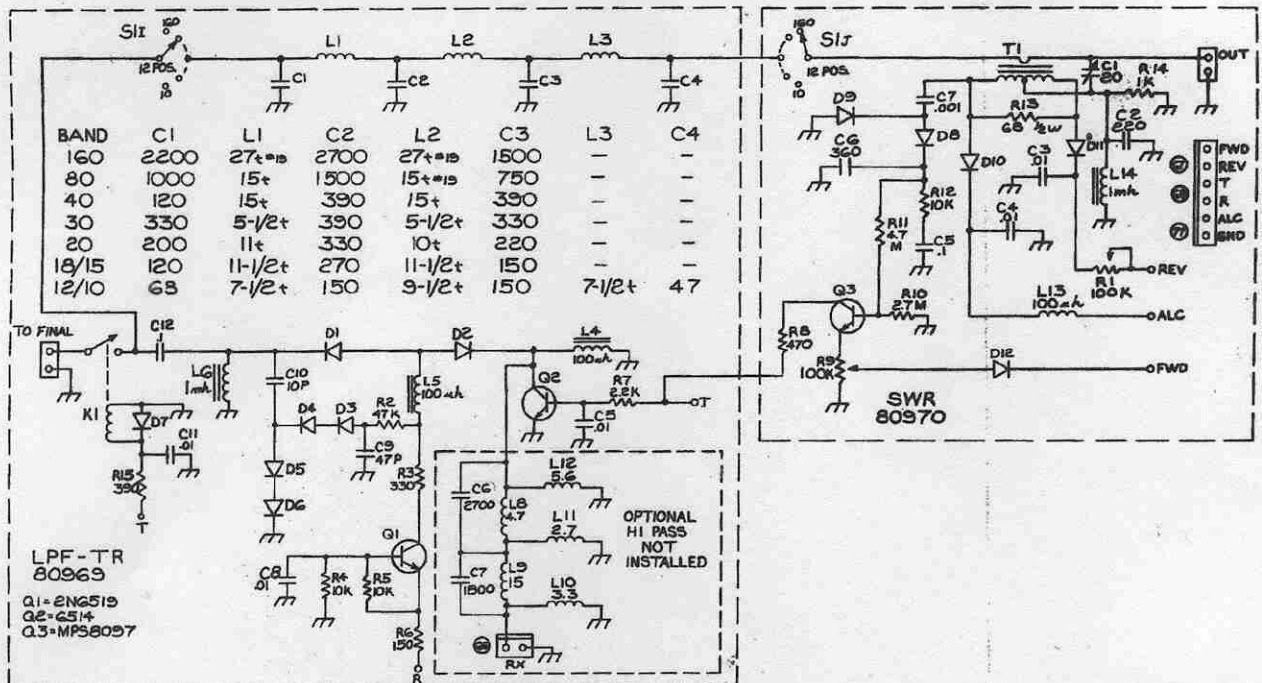
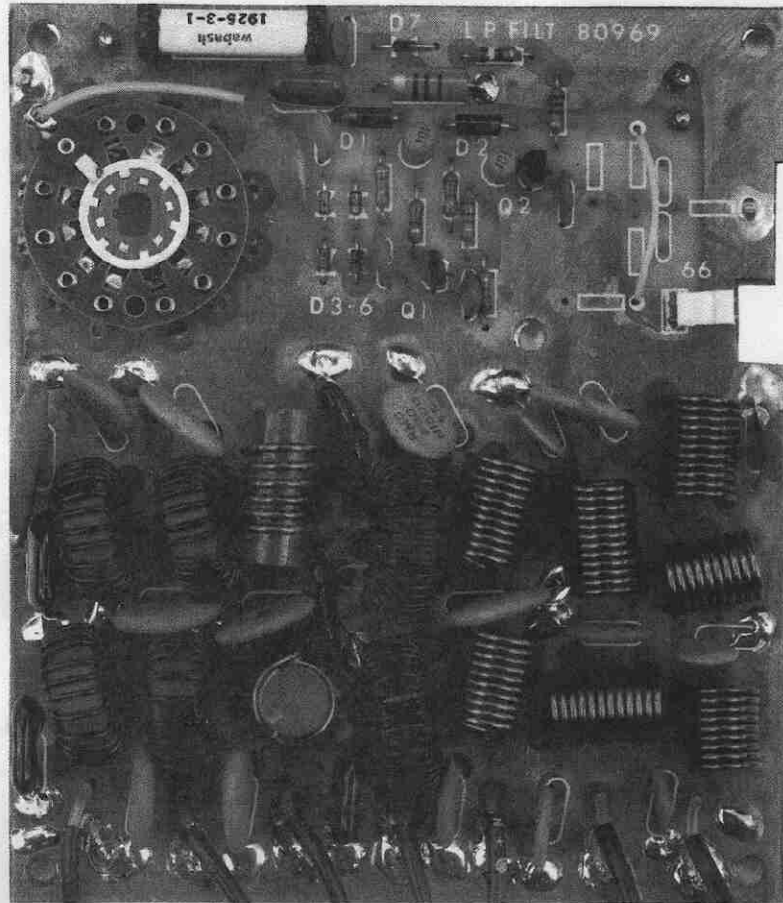
LOW PASS FILTER 80969

This assembly contains the low pass output filters and the electronic TR switch. The output signal from the final rf amplifier contains harmonic components above the desired level. To attenuate these harmonics to a suitable level, the signal is passed through a 5 pole low pass filter before being radiated. The proper filter is selected by the bandswitch. The final amplifier is disconnected from the antenna circuit during receive by relay K1. Switching of the receive antenna is performed by switch Q1 and diodes D1 and D2. This allows extremely fast switching of the antenna and permits full break-in operation on cw. PIN diodes D1 and D2 connect the antenna to the receiver input when receiving, and are back biased by a voltage rectified by D3 through D6 on transmit. There are no user adjustments on this board.

SWR BOARD 80970

This board contains the SWR, power, and ALC sensing circuits. The bridge balance control, C1, is adjusted through an access hole on the right side panel. The SWR meter is calibrated by placing an additional 50 ohm load in parallel with an existing 50 ohm load and adjusting R1 for an SWR meter reading of 2:1. With the meter switch in the forward power setting, adjust R2 to agree with an external calibrated wattmeter.





TRANSISTOR	COLLECTOR		BASE		EMITTER	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1 2N6519	7.80	-.15	7.96	.35	8.71	.72
Q2 2N6514	.05	0	0	.79	0	0
Q3 MPS8097	0	10.5	0	0	0	0

DIGITAL READOUT

The frequency counter and digital display section of the CORSAIR consists of two interconnected printed circuit assemblies located in an aluminum enclosure which is secured to the front subpanel. The large scale integrated circuit, display interface circuitry, a 10-1 prescaler, and a 5 volt regulator are mounted on the counter logic board 80973. The remaining circuits for the counter timebase and pre-amp are mounted on the pre-amp board 80974.

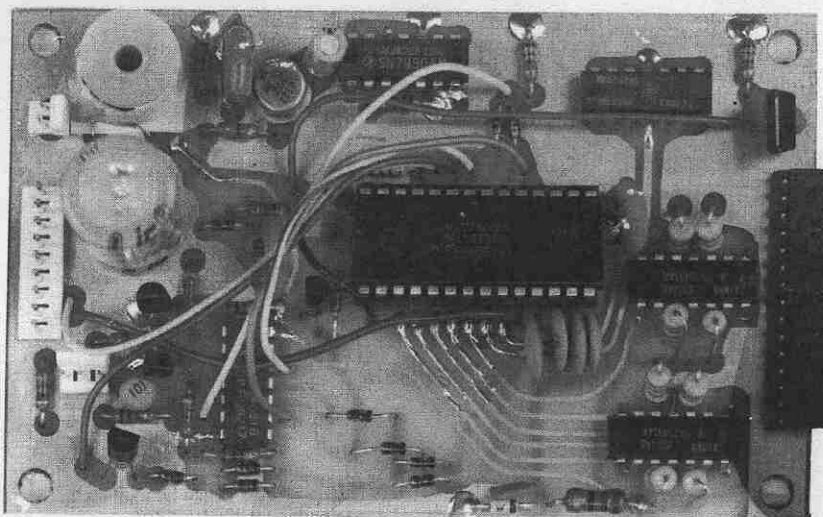
This portion of the transceiver is highly complex and contains MOS and CMOS integrated circuits that are susceptible to damage from static burnout if improperly handled. There are no user servicable components inside.

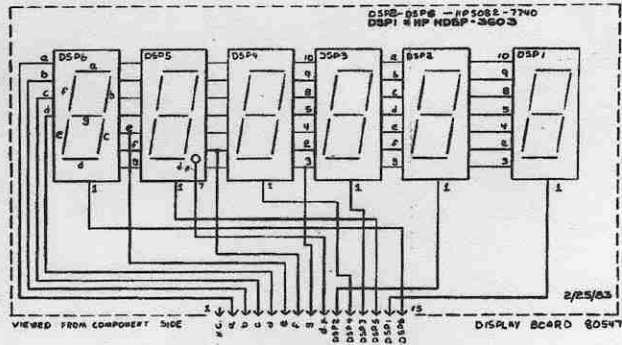
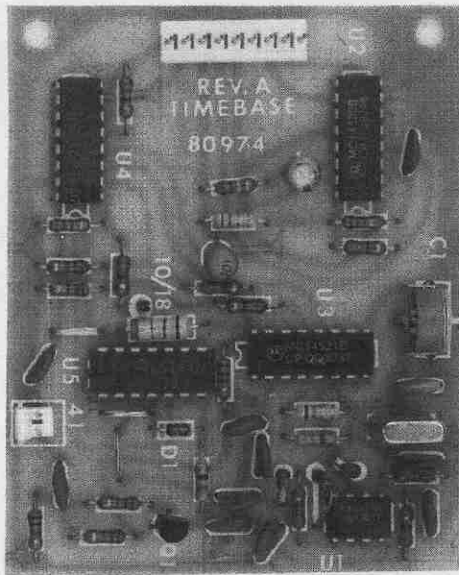
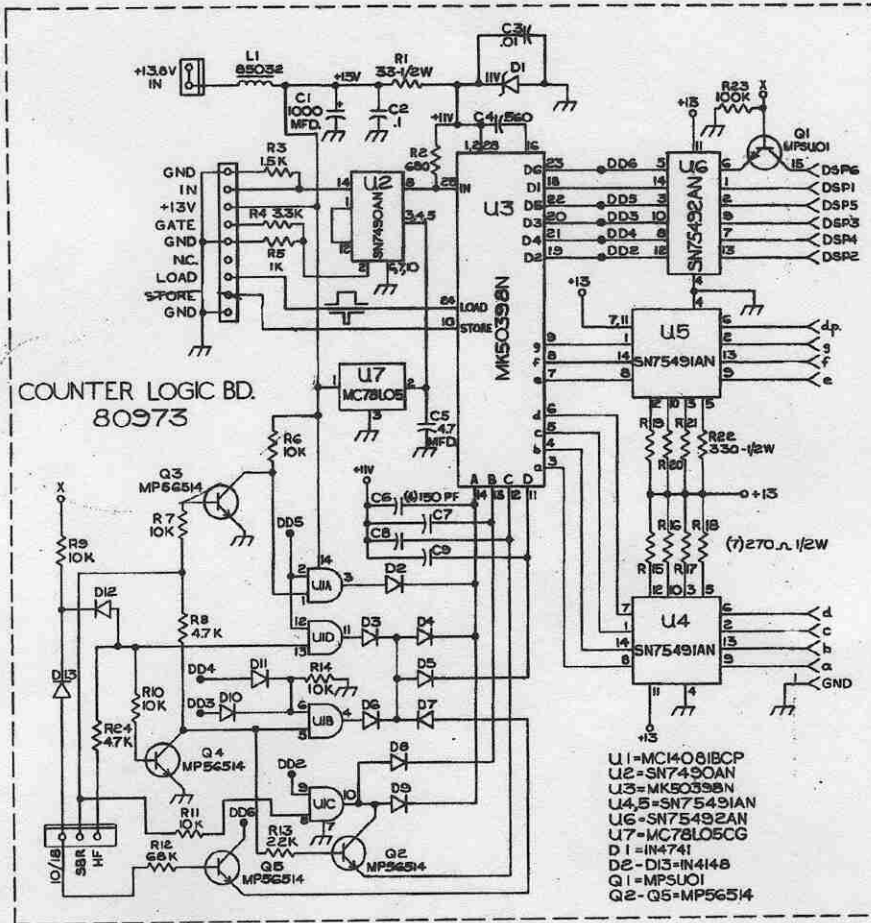
The counter counts the actual VFO frequency being applied to the first mixer, and assumes that the BFO frequency is either 9 or 9.003 MHz. This is the case for sideband normal and sideband reverse, respectively. Since the VFO signal is either 9 MHz above or 9 MHz below the output frequency, the counter must understand which band is being used and make the appropriate arithmetic correction. If the frequency of the BFO is properly set, and the counter is properly preset, the resulting frequency displayed will be within ± 100 Hz of the actual frequency after proper adjustment of the counter timebase. The counter preset can be checked by removing the VFO jumper and comparing the preset information with that in the table below.

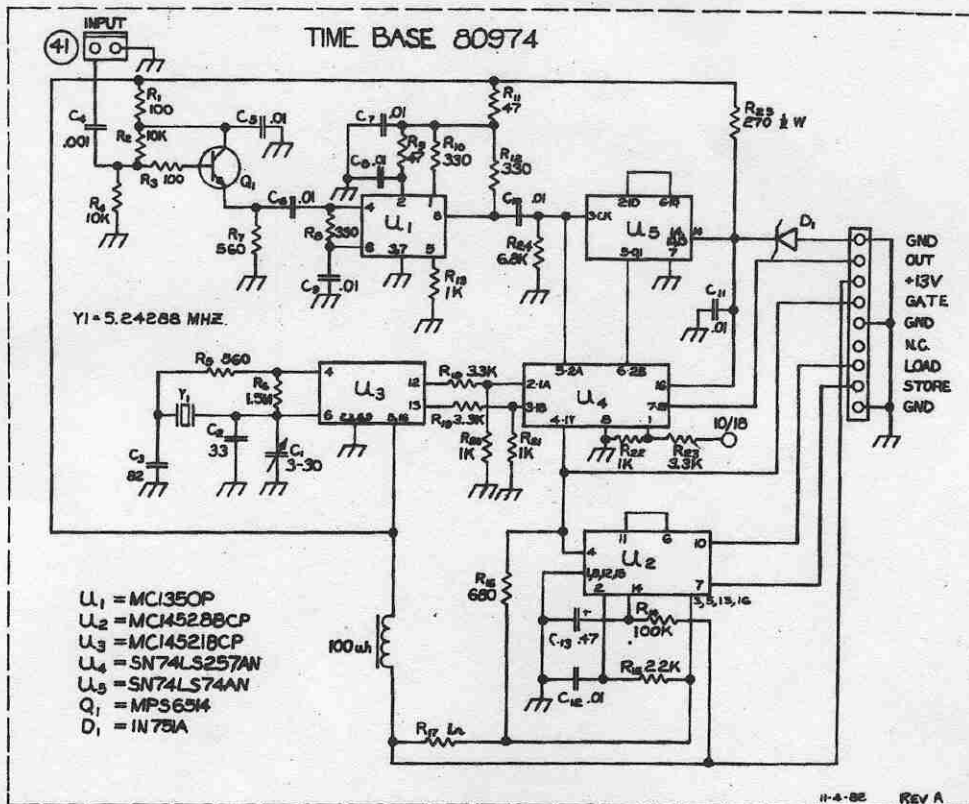
COUNTER PRESETS (VFO jumper removed)

<u>BAND</u>	<u>MODE</u>	<u>DISPLAY</u>
1.8, 3.5, 7.0	SBN	-1.000 0
	SBR	-0.997 0
10, 18	SBN	91.000 0
	SBR	90.997 0
14, 21, 24.5 28-30	SBN	09.000 0
	SBR	09.003 0

To adjust the counter timebase, turn the bandswitch to 10 MHz and adjust the WWV at 10.0000 MHz. Tune the signal for maximum voice clarity during the time announcement. After adjusting the tuning, if the frequency display in SB-N mode is not 10 MHz exactly, then adjust capacitor C1 through the access hole on the left side of the counter enclosure to adjust the display so it reads 10.000.0 MHz.







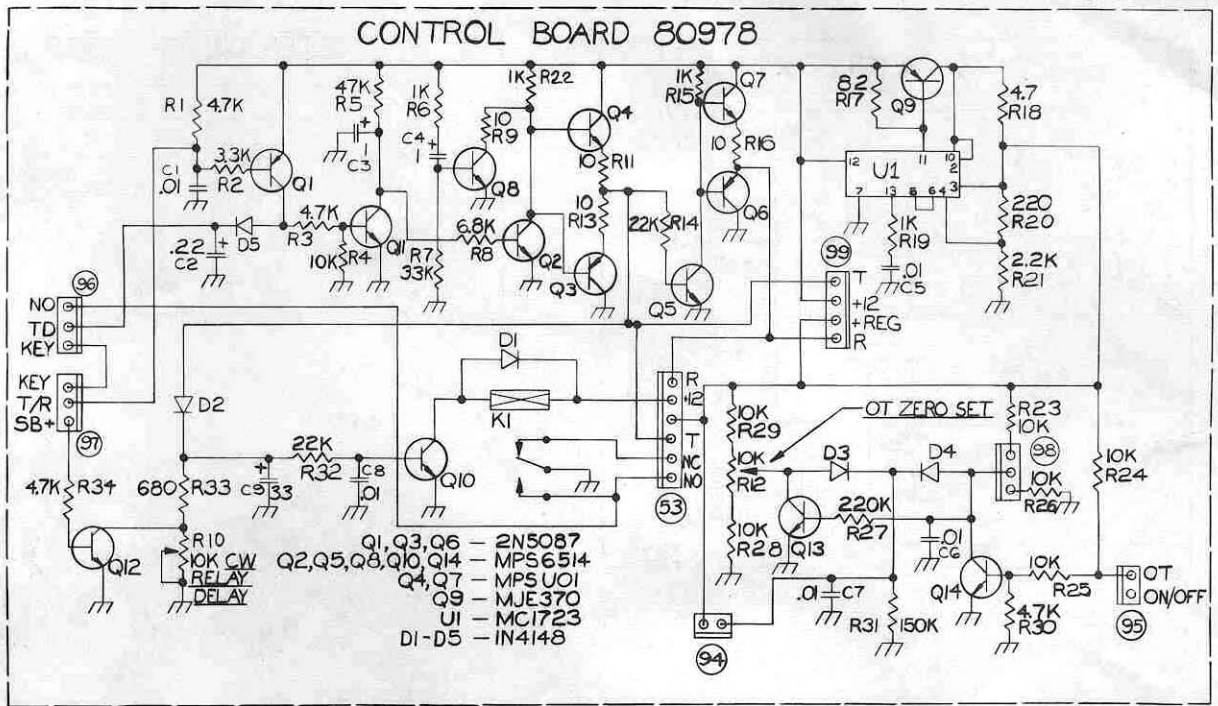
CONTROL BOARD 80978

This assembly contains a set of synchronous transistor switches for controlling the "T" and "R" voltages that switch the unit from transmit to receive mode. It also contains an integrated circuit voltage regulator which powers the frequency and voltage sensitive circuits in the VFO, sideband generator, product detector, and offset control circuits.

Transistors Q1 through Q5 and Q11 generate the T and R voltages. Transistor Q9 and U1 are the voltage regulator. Transistors Q13 and Q14 plus diodes D3 and D4 perform the offset tuning switch functions.

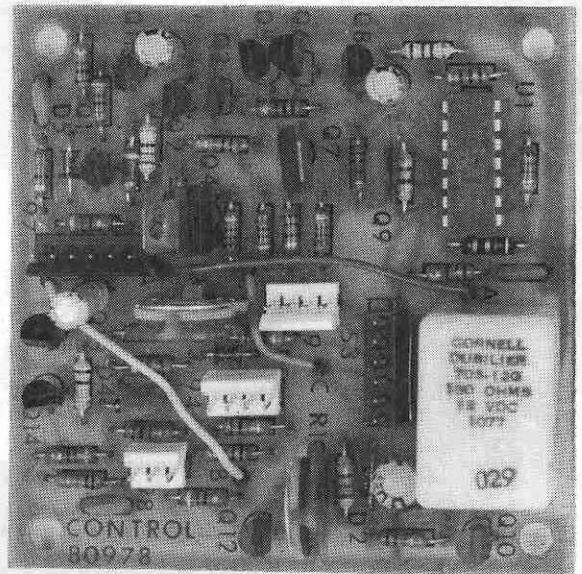
Control relay K1 is operated by T voltage and provides external control of accessory equipment such as an external linear amplifier. In the cw mode only, the delay of this relay is controlled by the setting of R10. In ssb mode the "hang" of this relay is determined by the VOX delay control on the front panel.

The offset tuning zero adjustment is accomplished by centering the offset tuning control and noting the frequency display. Turn the offset select switch to off and adjust the potentiometer R12 so the display returns to its former state. Final adjustment of this control can be made by alternately switching from OFF to MIN and back again while adjusting R12 for no change in received signal pitch.

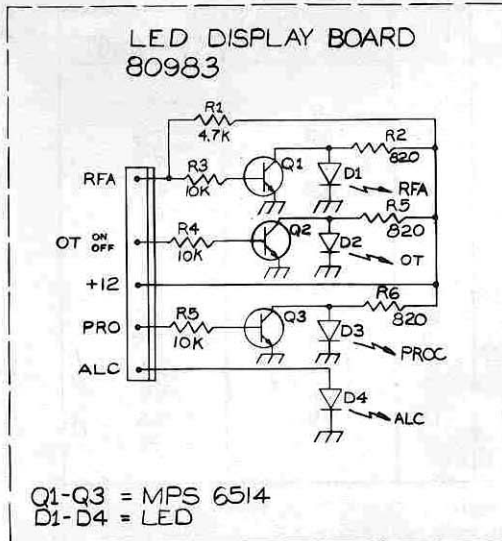
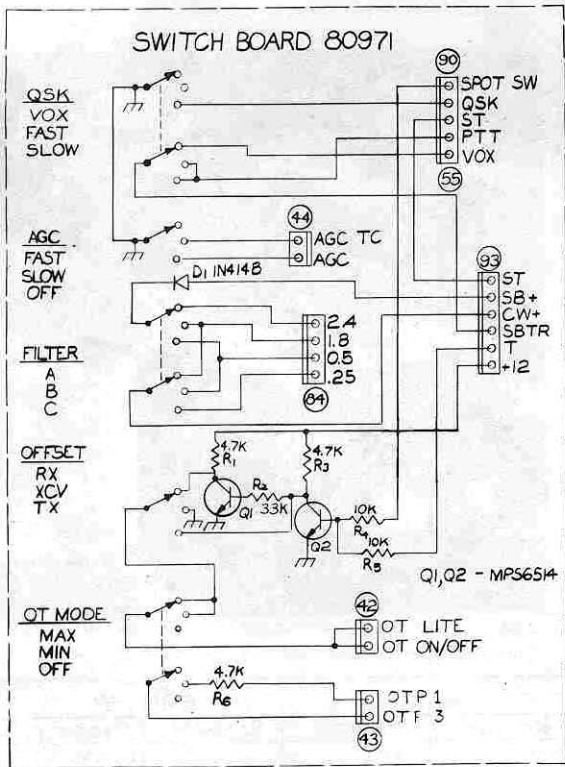
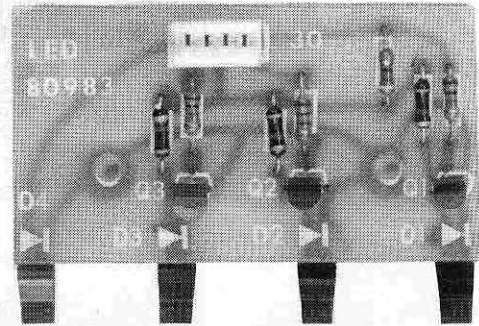
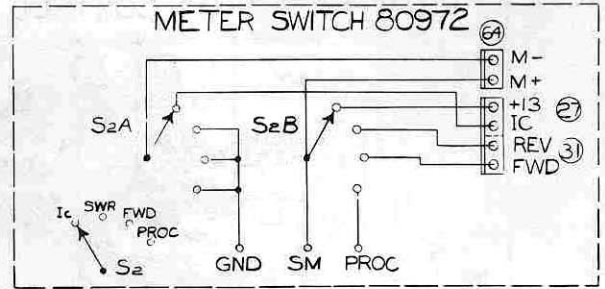
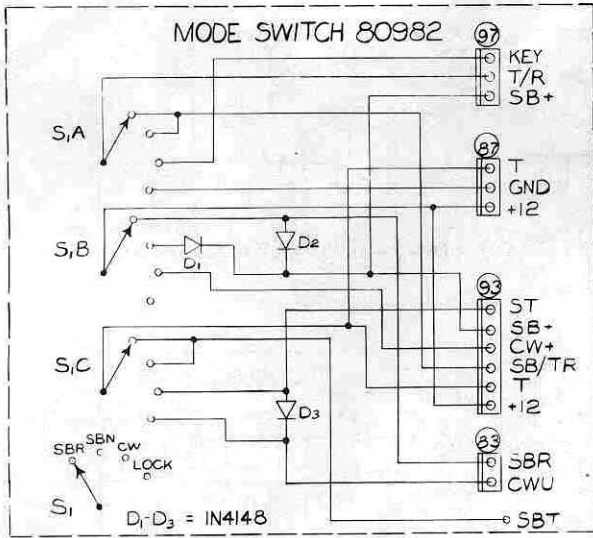


U1

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	0	0
2	7.9	7.9
3	7.5	7.5
4	6.7	6.7
5	6.7	6.7
6	6.7	6.7
7	0	0
8	0	0
9	2.0	2.0
10	7.8	7.8
11	13.0	13.0
12	13.0	13.0
13	9.0	9.0
14	0	0



TRANSISTOR	COLLECTOR		BASE		EMITTER	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	0	13.0	13.0	12.5	13.0	13.0
Q2	.2	13.0	.7	0	0	0
Q3	0	0	0	12.5	0	10.0
Q4	13.0	13.0	0	12.5	0	12.0
Q5	13.0	0	0	.75	0	0
Q6	0	0	13.0	0	12.0	0
Q7	13.0	13.0	13.0	0	12.5	0
Q8	0	12.5	0	0	0	0
Q9	7.8	7.8	12.5	12.5	13.0	13.0
Q10	13.0	2.8	0	.75	0	0
Q11	2.0	0	0	.75	0	0
Q12	0	8.7	.75	0	0	0
Q13	3.2	3.2	0	0	0	0
Q14	0	0	.65	.65	0	0



SW-2 80971

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	Receive	Transmit	Receive	Transmit	Receive	Transmit
Q1	0	13	.7	0	0	0
Q2	9	0	0	.1	0	0

PARTS LISTS

<u>Circuit Board</u>	<u>Ten-Tec Part #</u>	<u>Description</u>	<u>Circuit Board</u>	<u>Ten-Tec Part #</u>	<u>Description</u>
<u>81039</u>			<u>80981</u>		
<u>PTO</u>			<u>VOX</u>		
Q1	25032	MPS-3693	Q1,Q2	25054	MPS-6514
Q2,Q3	25054	MPS-6514	Q3	25053	MPS-UO1
D1,D2	28018	MV-2201	U1,U2	25078	RC4558
L1-L2	85016	Transformer 32-13t	U3	25068	LM3900
L4	85152	Torroid 17t#28	D1-D12	28001	IN4148
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<u>80975</u>			<u>80980</u>		
<u>OSC-MIXER</u>			<u>DSB</u>		
Q1	25060	2N5486 J-FET	Q1-Q6	25054	MPS-6514
Q2-Q4	25027	2N3866	U1	25024	CA3053
U1	25109	TL-442 CN	D1	28006	IN754A 6.8v
T1-T3	85120	Transformer, Bi-filar	D2	28017	MPN-3404
<hr/>			<hr/>		
<u>80987</u>			<u>81037</u>		
<u>RF MIXER</u>			<u>LL DRIVER</u>		
Q1-Q3	25027	2N3866	Q1	25027	2N3866
Q4-Q5	25054	MPS-6514	Q2	25081	MRF476
D1-D7	28017	MPN-3404 PIN	Q3-Q5,Q8	25054	MPS-6514
D8	28020	HP-3379 PIN	Q6,Q7	25001	2N5087
D9-D12	28013	MBD-101 hot carrier	Q9	25060	2N5486 J-FET
<hr/>			<hr/>		
<u>80977</u>			<u>80565</u>		
<u>NOISE BLANKER</u>			<u>FINAL AMP</u>		
Q1	25060	2N5486 J-FET	Q1,Q2	25081	MRF-476
Q2	25001	2N5087	Q3,Q4	25080	MRF-458
Q3,Q4	25054	MPS-6514	Q5	25002	MJE-520
U1	25062	MC-1350	U1	25050	MC1723P
D1,D2	28031	IN270	D1,D2	28000	IN4002
D3-D5	28017	MPN-3404	<hr/>		
D6 -D9	28001	IN4148	<u>80969-80970</u>		
FL1	48057	4 pole, 9MHz filter	<u>SWR/LPF</u>		
T1,T2	85134	Transformer, Trifilar	Q1	25107	2N6519
T3,T4	85120	Transformer, Bifilar	Q2	25054	MPS-6514
L2,L3	85224	27:4 Transformer	Q3	25000	MPS-8097
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<u>80979</u>			<u>80973</u>		
<u>PBT</u>			<u>COUNTER LOGIC</u>		
Q1	25027	2N3866	Q1	25053	MPS-UO1
Q2	25119	3N201 IG-FET	Q2-Q5	25054	MPS-6514
Q3,Q5,Q7	25054	MPS-6514	U1	25118	MCI4081 BCP
Q4,Q6	25060	2N5486 J-FET	U2	25056	SN7490 AN
D1-D16	28001	IN4148	U3	98049	MK50398 N
D17	28050	MV-209	U4,U5	25074	SN75491 AN
T1,T2	85134	Transformer, Bifilar	U6	25071	SN75492 AN
T3	85120	Transformer, Trifilar	U7	25072	MC78L05 CG
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<u>80984</u>			<u>80974</u>		
<u>IF-AF</u>			<u>COUNTER TIMEBASE</u>		
Q1-Q3	25032	MPS-3693	Q1	25054	MPS-6514
Q4	25099	3N201 IG-FET	U1	25062	MCI350P
Q5,Q7,Q9-11, Q13,Q15,Q16	25054	MPS-6514	U2	25059	MCI4528CP
Q6	25000	MPS-8097	U3	25058	MCI4521CP
Q8	25001	MPS-5087	<hr/>		
Q12	25034	2N4870 UJT	<u>80974</u>		
Q14	25053	MPS-UO1	<u>COUNTER TIMEBASE</u>		
D1-D3	28020	HP 5082-3379 PIN	Q1	25054	MPS-6514
D4,5,D8-D19	28001	IN4148	U1	25062	MCI350P
D6,D7	28031	IN270	U2	25059	MCI4528CP
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PARTS LISTS contd.

<u>Circuit Board</u>	<u>Ten-Tec Part #</u>	<u>Description</u>
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80547 <u>COUNTER DISPLAY</u>		
DISPI-DISP6	28028	HP-7740

80978 <u>CONTROL BOARD</u>		
Q1,Q3,Q6	25001	2N5087
Q2,Q5,Q10-		
Q14	25054	MPS-6514
Q4,Q7,Q8	25053	MPS-U01
Q9	25105	MJE-370
U1	25050	MCI723P
DI-D5	28001	IN4148

80983 <u>LED DISPLAY</u>		
Q1-Q3	25054	MPS-6514
DI-D4	28036	HMLP-3033 LED

LIMITED WARRANTY AND SERVICE POLICY

GENERAL

TEN-TEC, Inc. warrants all products to be free from defects in material and workmanship for a period of one year after date of purchase, under these conditions:

- 1.) Registration: The warranty card must be returned promptly to establish the warranty period unless otherwise stated on the card. Our card file also serves as a check on stolen equipment which may be sent in for repair. Please notify us immediately if your TEN-TEC equipment is stolen.
- 2.) Original Purchaser: This warranty applies only to the original purchaser. Your warranty card listing from whom purchased establishes you as the original purchaser.
- 3.) Communication with the Factory: If trouble develops, contact the TEN-TEC dealer from whom you purchased the unit. He is obligated to try to correct the malfunction or return the unit to us. If he is unable to correct the fault, you or the dealer should contact the factory by mail or by telephone (615-428-0364), giving serial number if assigned, symptoms of fault and conditions under which they appear. You will be advised whether to return the unit to us or to try a replacement plug-in assembly that will be sent to you. To facilitate service calls, please use our direct Repair Department telephone number, 615-428-0364. (NO COLLECT CALLS, PLEASE.)
- 4.) In-Warranty Field Repairs: To expedite repairs TEN-TEC will send replacement assemblies prior to receiving the suspected defective one from you. The replacement will be billed on a 30 day memo, and credit will be issued when the defective unit is returned to us. No remittance or deposit is required. If the defective assembly is not returned within 30 days, you will be billed. Unit will be shipped to you, transportation paid by TEN-TEC. Shipping charges to the factory are to be borne by you.
- 5.) Return to Non-Selling Dealer: If you return the in-warranty unit to an authorized TEN-TEC dealer who did not sell the unit to you, he may, at his option, repair the unit or handle the return to the factory. Under these conditions TEN-TEC will repair or replace all defective components without charge, but reasonable labor charges may be levied by the servicing dealer. TEN-TEC is not liable for labor charges under these conditions.
- 6.) Proper Delivery: If the unit is returned to the factory, it must be adequately packed. A note should be included outlining the problem, conditions under which it appears, and attempted remedies. The more specific you are, the better the possibility of a complete fix. Shipping charges to the factory are to be borne by you. Unit will be returned transportation paid by TEN-TEC.
- 7.) Exclusions: This warranty does not apply to damage caused by mishandling, lightning, voltages in excess of rating, reverse polarity of DC supply, or changes in circuits. Claims for damage in transit should be filed with the carrier. This warranty, however, is NOT voided for attempted repairs of defective units or for incorporation of additional components such as switches, etc. when there is no change in the basic circuit. Under no circumstances is TEN-TEC liable for consequential damage to person or property by use of this unit.
- 8.) TEN-TEC reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvements in its previously manufactured products.
- 9.) This warranty is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF U.S.A.

- 1.) Service Centers: The policies listed in this warranty do not necessarily apply outside the U.S.A. Many overseas TEN-TEC dealers are qualified service centers. Contact the dealer nearest you for warranty service information.
- 2.) Transportation: In the event that you deal directly with TEN-TEC, Inc., all shipping charges to and from the factory are to be borne by you.

TRANSCEIVERS

- 1.) Extended Pro-Rata Warranty on Models 546/560 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years2 to 3 Years3 to 5 Years

\$12.00 each

\$15.00 each

\$18.00 each

(Two transistors per transceiver. Labor not included.)

- 2.) Warranty on Models 515/525 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike.

LINEAR AMPLIFIERS

- 1.) Model 444 Warranty Exceptions: The Amplifier and Power Supply units are both covered under the GENERAL conditions stated above, with the following exceptions:
- The warranty is void if the amplifier is powered by any source other than an approved TEN-TEC power supply.
 - The warranty is void if any of the factory sealed internal adjustments are altered.
 - The warranty is void if any of the protective circuits are disabled.
 - If used with other than a TEN-TEC transceiver the warranty may not apply. A list of approved transceivers is included with the amplifier. If your transceiver is not listed, contact the factory.
- 2.) Extended Pro-Rata Warranty on Model 444 Output Transistors: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years2 to 3 Years3 to 5 Years

\$30.00 each

\$35.00 each

\$40.00 each

(Four transistors per amplifier. Labor not included.)

- 3.) Proper Delivery: If the unit is returned to the factory it must be adequately packed. If the power supply section is to be returned, remove the power transformer. The transformer may be retained or returned separately as indicated.

OUT-OF-WARRANTY REPAIRS

- 1.) Field Repairs: New circuit boards or discrete components can often be supplied to eliminate the cost and bother of shipping the complete unit to us. A nominal charge will be made for the material sent. Certain assemblies integral with the main chassis, such as VFO assemblies and rack tuning mechanisms, are not field replaceable.
- 2.) Returned Units: Along with the unit, please submit a complete report on the nature of the malfunction and the conditions under which it occurs. This will enable our service department to pay special attention to your problem area and reduce overall labor costs. No matter what the malfunction is, every unit will be given a complete alignment and operational check before being returned.
- 3.) Quotations: Quotations on repair work will be given on request, after examination of the unit. The amount quoted will be firm for the specific work outlined in the quotation. Should additional material or labor requirements come to light after the repair is initiated, you will be contacted for approval before this phase of the repair is started.
- 4.) Repair Charge Payment: Charges below the \$25.00 level will be billed to you after completion of the work and at the time of re-shipment. A report of all work done and parts used will accompany the bill. For charges greater than \$25.00, prepayment will be required before the unit is returned. One of three methods of payment may be selected. 1.) Upon completion of the work the billing will be made but the unit will be held here. Upon receipt of the payment, the unit will be shipped. 2.) The unit will be returned to you on a COD basis, with COD charges borne by you. 3.) The repair charges may be paid by either MasterCard or VISA. Approval for COD or charge card options can be given either at the time the unit is submitted to us (in the accompanying letter) or when contacted upon completion of the repair. Please submit all raised information on your charge card when paying by this means.
- 5.) Transportation Charges: Units should be returned, transportation and insurance charges prepaid. Return transportation and insurance charges will be billed to you with other costs.