

OPERATION AND MAINTENANCE

OWNER MODEL FOR O&M

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SPECIFICATIONS

FREQUENCY RANGES

80 Meters	3.5 to 4 mc.
40 Meters	7.0 to 7.450 mc.
20 Meters	14.0 to 14.450 mc.
15 Meters	21.0 to 21.450 mc.
10 Meters	28.0 to 29.7 mc.

POWER INPUT

Single Sideband, Suppressed Carrier:
550 watts, PEP, minimum on all bands.
CW: 360 watts, dc input on all bands.

connector, Vox connector, Antenna jack, S-Meter zero, Auxiliary relay switching, Outboard VFO connector.

VACUUM TUBE COMPLEMENT

V1	6EW6 VFO Amplifier
V2	12BE6 Transmitter Mixer
V3	6GK6 Driver
V4	6LQ6 Power Amplifier
V5	6LQ6 Power Amplifier
V6	12BZ6 Receiver RF Amplifier
V7	12BE6 Receiver Mixer

A. CIRCUIT THEORY

GENERAL DISCUSSION

The Swan 500CX transceiver provides single sideband, suppressed carrier transceive operation, and generates the single sideband signal by means of a crystal lattice filter. To permit a logical discussion of this mode of operation, certain definitions are necessary. In a normal AM signal, (double sideband with carrier), a radio frequency signal is modulated with an audio frequency signal. This is considered by many to be merely a case of varying the amplitude of the carrier at an audio rate. In fact, however, there are actually sideband frequencies generated, which are the results of mixing the RF and the AF signals. These sidebands are the sum of, and the difference between the two heterodyned signals. In the detection of this conventional AM signal, the two sidebands are mixed with the carrier to recover and reproduce the audio intelligence. This is an inefficient means of transmission, because only 25 percent of the transmitted power is used to transmit intelligence. There are other attendant drawbacks, also. The bandwidth of AM voice transmission is approximately 6 kc, while the actual demodulated audio is only approximately 3 kc. The result is inefficient use of the frequency band, and over half of the allotted band is unusable due to heterodynes, interference, and congestion.

In the single sideband, suppressed carrier mode of transmission, only one of the sideband signals is transmitted. The other sideband and the carrier are suppressed to negligible level. In addition to increasing the transmission efficiency by a factor of four, single sideband effectively doubles the number of stations or channels which can be used in a given band of frequencies.

It should be remembered that in the single sideband, suppressed carrier mode of transmitting, the unwanted sideband and carrier are only suppressed, not entirely eliminated. Thus, with a transmitted signal from a transmitter with 50 db sideband suppression, the other or unwanted sideband will be present, and will be transmitted, but its level will be 50 db below the wanted sideband. When this signal is received at a level of 20 db over S9, the unwanted sideband will be present at a level of approximately S5. The same is true of carrier suppression. With carrier suppression of 60 db, and a signal level of 20 db over S9, carrier will be present at a level of approximately S3 to S4.

In the Model 500CX transceiver, the single sideband suppressed carrier signal is generated by the crystal lattice filter method. For details, refer to the schematic diagram, and to Figures 1, 2, and 3.

SIGNAL GENERATION

When the push-to-talk switch on the microphone is pressed, the transmitter portion of the transceiver is activated, and it generates a single sideband, suppressed

carrier signal in the following manner. Carrier is generated by a crystal oscillator using transistor, Q3. This stage operates in both the transmit and receive modes. When transmitting, the RF output of the oscillator is injected into the control grid of the Balanced Modulator, V13. This balanced modulator is a beam deflection tube, and operates similar to a cathode ray tube in that the electron beam from the cathode is deflected to one output plate or the other by the charge appearing on the deflection plate. The carrier signal fed to the control grid of the balanced modulator appears on both plates of the output. The two plates are connected to Transformer T1301 in push-pull, so the carrier signal cancels itself out in T1301. The deflection plate DC voltages are adjusted by means of the carrier balance control so that the RF being fed to the output plates will cancel out, and the output from T1301 will be zero. Audio signals from the Microphone Amplifier, V15, are applied as a modulating voltage to one deflection plate, and the two sidebands resulting from the sum and difference frequencies of the audio and carrier signals appear in the output of transformer T1301. Carrier suppression is approximately 60 db.

The double sideband, suppressed carrier signal is then coupled from the secondary winding of T1301 to the crystal filter, which suppresses the lower sideband, and permits only the upper sideband to be fed to the First IF Amplifier, V8. The carrier frequency is generated at approximately 5500.0 kc, normal sideband. With the opposite sideband crystal, the carrier crystal frequency will be 5503.3 kc, and this positions the double sideband signal on the other side of the filter response curve, attenuating the upper sideband by at least 50 db. In the single conversion mixing process, these sidebands become inverted on 80 and 40 meters. Thus the Swan-500CX normally operates on lower sideband on 80 and 40, while on 20, 15, and 10 meters normal operation is on upper sideband.

Q1, the VFO 2N706 Oscillator, operates in the common base configuration as a colpitts oscillator. Q2. The Emitter Follower is used for isolation. The extremely good regulation achieved through using the Zener diode regulator D1801 across the bias supply voltage, also contributes to the stability. Bandswitching is accomplished by changing the tank circuit coil. The VFO in the Model 500CX exhibits extremely good stability after the initial warm-up period. Drift from a cold start will be less than 1 kc for the first hour on 80, 40, and 20-meter bands, and less than 20 kc on 10 and 15 meters. After the initial warm-up period, drift will be negligible.

The single sideband, suppressed carrier signal from the first IF Amplifier is fed to the Transmitter.

A. CIRCUIT THEORY (Cont.)

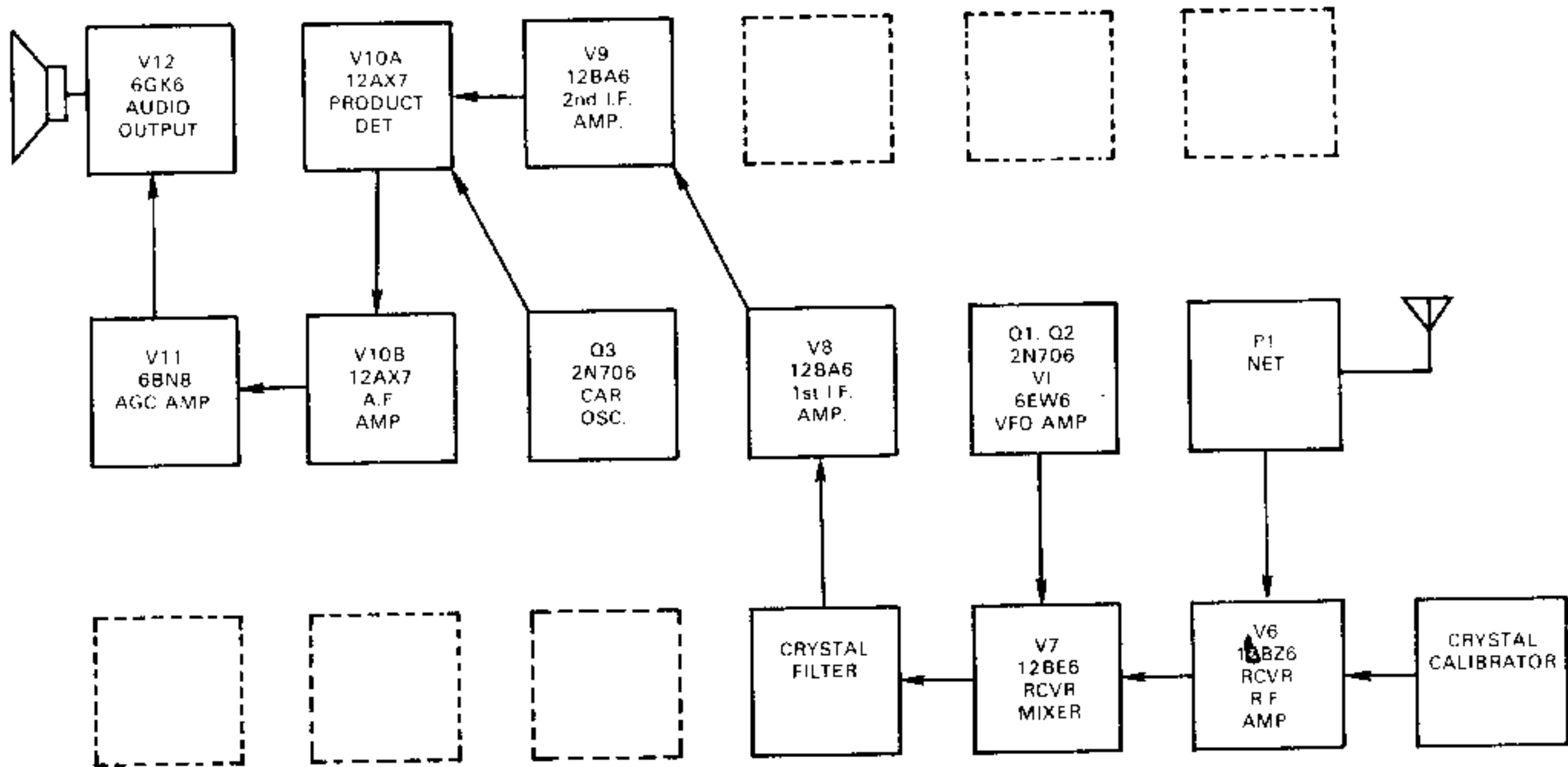


FIGURE 1. BLOCK DIAGRAM, RECEIVE MODE

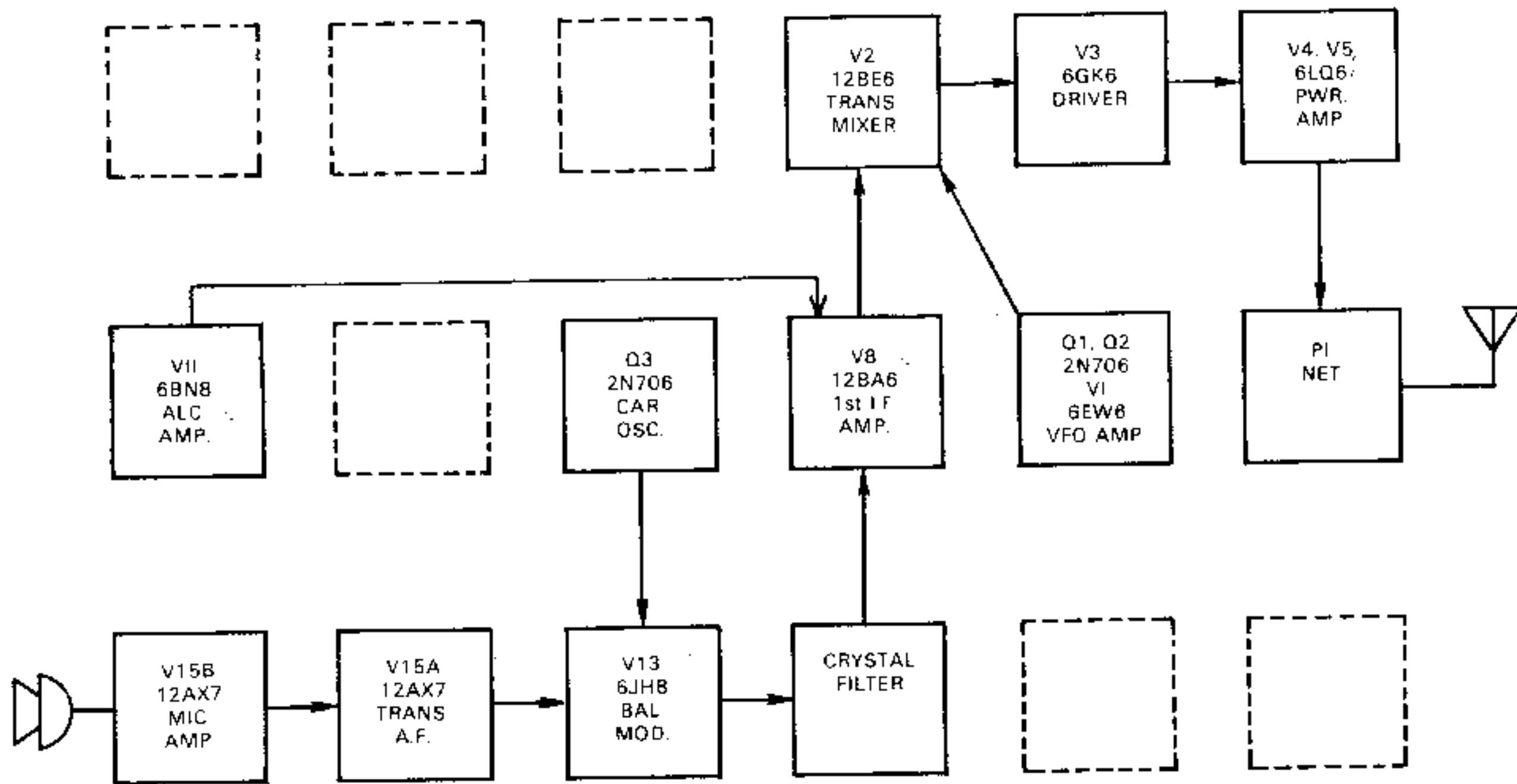


FIGURE 2. BLOCK DIAGRAM, TRANSMIT MODE

SIGNAL GENERATION (Cont.)

Mixer, V2, where it is heterodyned with the VFO signal. The resultant signal at the desired transmit frequency is amplified by the Driver, V3, and the Power Amplifiers, V4 and V5. The signal from the VFO Amplifier is initiated in the transistorized VFO-Emitter Follower circuit Q1 and Q2. The signal from the VFO is routed to the VFO Amplifier, and on 40 and 80 meters, is subtractively mixed with the single sideband signal from the IF Amplifier, and result in LSB operation. On 20, 15, and 10 meters, the frequencies are additively mixed, resulting in output on the upper sideband.

When in TRANSMIT, the gain of the First IF Amplifier, is controlled by an amplified ALC circuit, V7, in response to the average input power to the Power Amplifiers. This ALC system will compensate for extremely strong input signals, but does not completely eliminate the necessity of proper adjustment of the Mic. Gain Control. This feature will help prevent the transmitter from flat topping and spurious emissions, but considerable distortion may occur if the Mic. Gain Control is not properly adjusted. Refer to Operating Instructions.

B. INSTALLATION

POWER SUPPLY

1. **AC Operation.** The Swan Models 117-XC or 230-XC Power Supplies provide all necessary voltages required by the transceiver for AC operation. The supplies come equipped with a pre-wired plug and cable, all ready for plugging into the transceiver.

2. **DC Operation.** The Model 14-117 supply for mobile operation includes all necessary cables, connector plug, fuses, and installation hardware. The Jones plug for connection to the transceiver is furnished with the unit.

Power requirements for the Swan 500-CX are listed in the following table. Pin connections to the Jones type power connector are listed as an aid in connecting other brands or home-brew supplies.

JONES PLUG CONNECTIONS

and 20 meter bands, the efficiency of the station will be greatly increased if a good directional rotary antenna is used. Remember that even the most powerful transmitter is useless without a proper and efficient antenna system.

2. **Mobile Station.** Mobile antenna installations are critical, since any mobile antenna for use on the high frequency bands represents a number of compromises. Many amateurs lose the efficiency of their antenna through improper tuning. Points to remember about the mobile antenna used with the Swan 500-CX are:

a. The "Q" of the antenna loading coil should be as high as possible. There are several commercial models available which use high "Q" coils, including the Swan Model 45 and Model 55 five band "Swantennas."

b. The loading coil must be capable of handling the power of the Model 500-CX without overheating. In TUNE position, the power output of the transceiver may exceed 250 watts. Wide spaced, heavy wire loading coils are essential.

ANTENNA (cont.)

Start out with the antenna whip at about the center of its adjustment range. Set the VFO to the desired operating frequency and then adjust P. A. TUNE for dip, and P. A. LOAD for 100 ma. Then observe the field strength reading. The Field Strength Meter may be set on top of the dash, on the hood, or at an elevated location some distance from the car.

Change the whip length a half inch, or so, at a time, retune the P. A. for 100 ma. loading each time, and check field strength. Continue this procedure until the point of maximum field strength is found. This adjustment will be most critical on 75 meters, somewhat less critical on 40, etc., until on 10 meters the adjustment will be quite broad. After tuning the antenna to resonance, load the P. A. to full power.

MICROPHONE

The microphone input is designed for high impedance microphones only. The choice of microphone is important for good speech quality, and should be given serious consideration. The crystal lattice filter in the transmitter

AUXILIARY SWITCHING

A 3 lug terminal strip on back of the 500-CX provides for switching of external accessories. They are marked R, C, and T. R and C are connected when receiving. C and T are connected when transmitting. In particular, terminals C and T are used when the Swan Mark II Linear Amplifier is used.

V6 OUTPUT

A phono type output jack is provided on back of the 500-CX for connecting the antenna system to an auxiliary receiver. Thus, a separate receiver may be used, if desired, with the same antenna system. V6 is the 12BZ6 R. F. amplifier stage in the 500-CX receiver circuit, and it serves as a pre-amplifier for the auxiliary receiver.

CONTROL FUNCTIONS

On-Off Switch (On AF Gain Knob)

Turns power supply on and off

Cal-Rec-Trans-CW-Tune

CONTROL FUNCTIONS (cont.)

Panel Meter

Reads S-Units in Receive mode, P.A. cathode Ma. in trans. and CW mode, and relative output in TUNE Mode.

Main Bandswitch

Switches plate coils, and associated capacitors of VFO, VFO Amplifier, V1, Transmitter Mixer, V2, and Driver, V3. Also switches tank coil of pi-coupling system and associated capacitors in PA output tank.

Output Level

Adjusts meter reading when in TUNE mode. Note that this control has no effect on power output, but determines only the relative meter reading.

Sideband Selector

Selects Normal Opposite sideband. Normal is LSB on 80 and 40 meters, USB on 20, 15 and 10 meters.

PA Bias (Rear Control)

Adjust idling cathode current of Power AMP.

S-Meter Zero (Rear Control)

Adjusts S-Meter to Zero Reading with antenna disconnect.

PTT-VOX

Switch PTT position for press-to-talk operation Vox position for voice control with VX-2 accessory

ANL

Automatic noise limiter on in right hand position.

CAL. 100KC-25KC

Selects 100KC or 25KC calibration markers.

PA Grid

Controls C1812A and C1812B in plate tanks of transmitter mixer and driver.

PA Tune

Controls C411 on pi-network to tune final power

PA Load, Fine

Controls C412 in pi-network to match impedance of output load. Tunes input to Receiver RF Amplifier.

PA Load, Coarse

Switches in progressively more capacitance in parallel with PA LOAD, Fine.

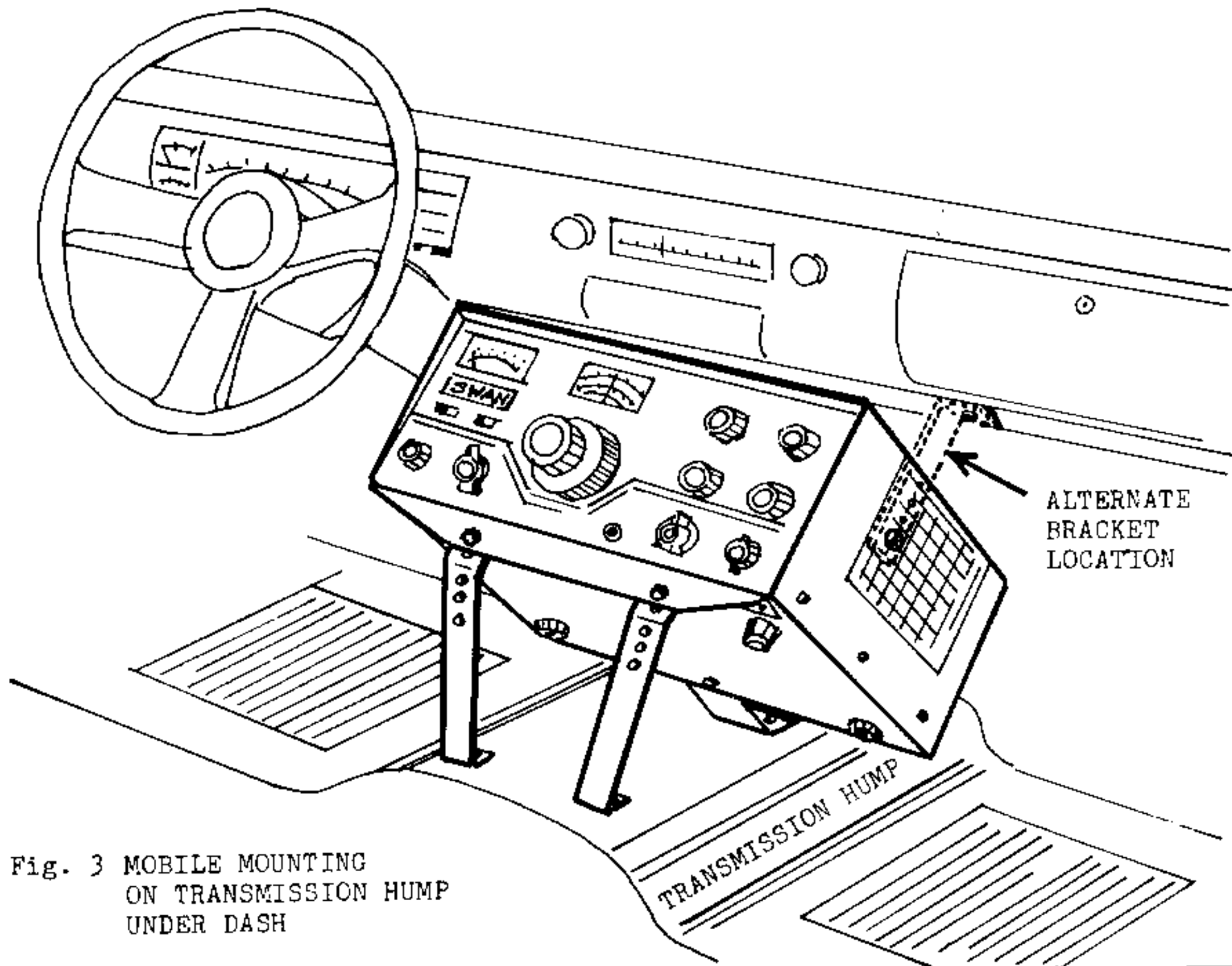
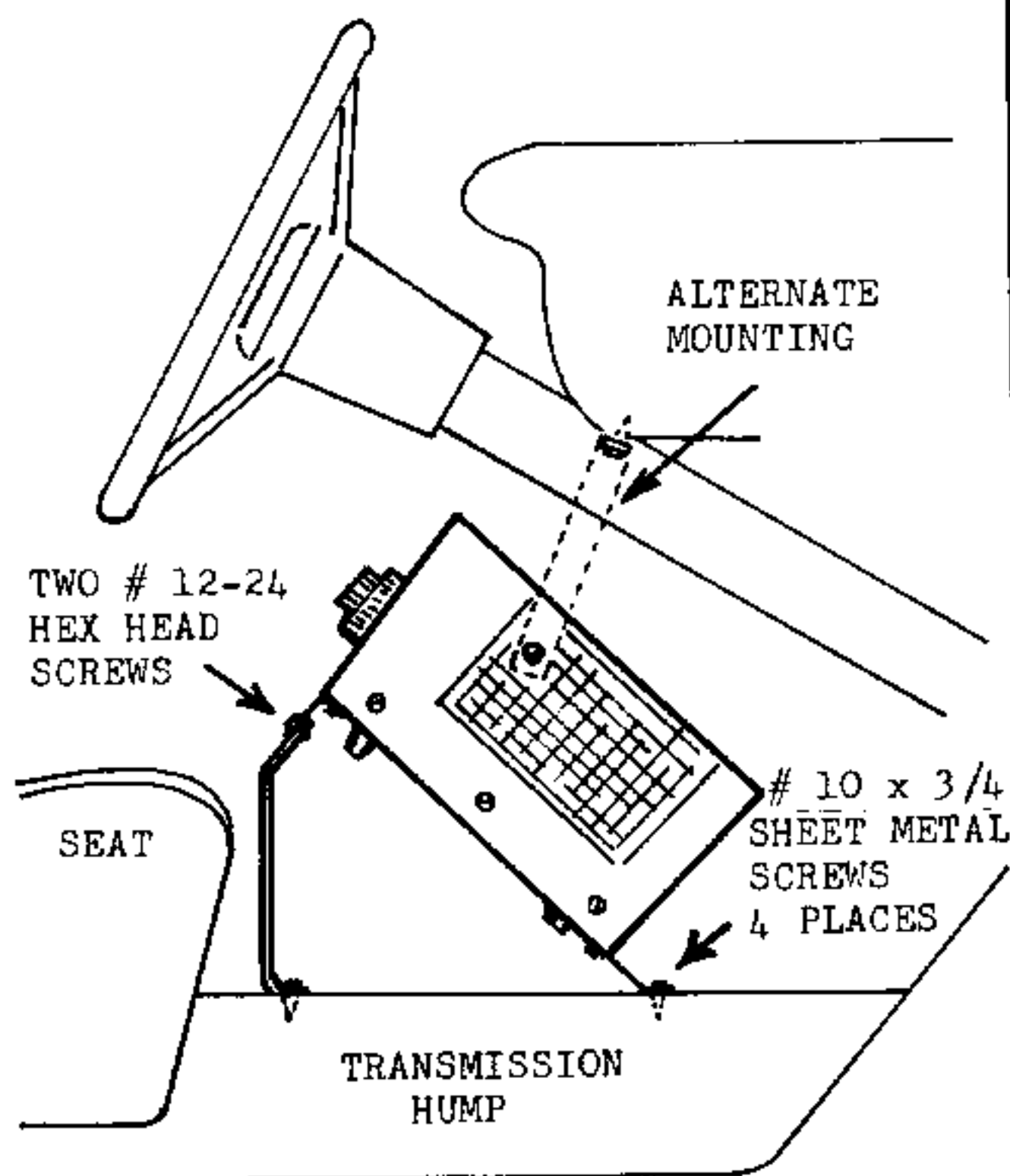
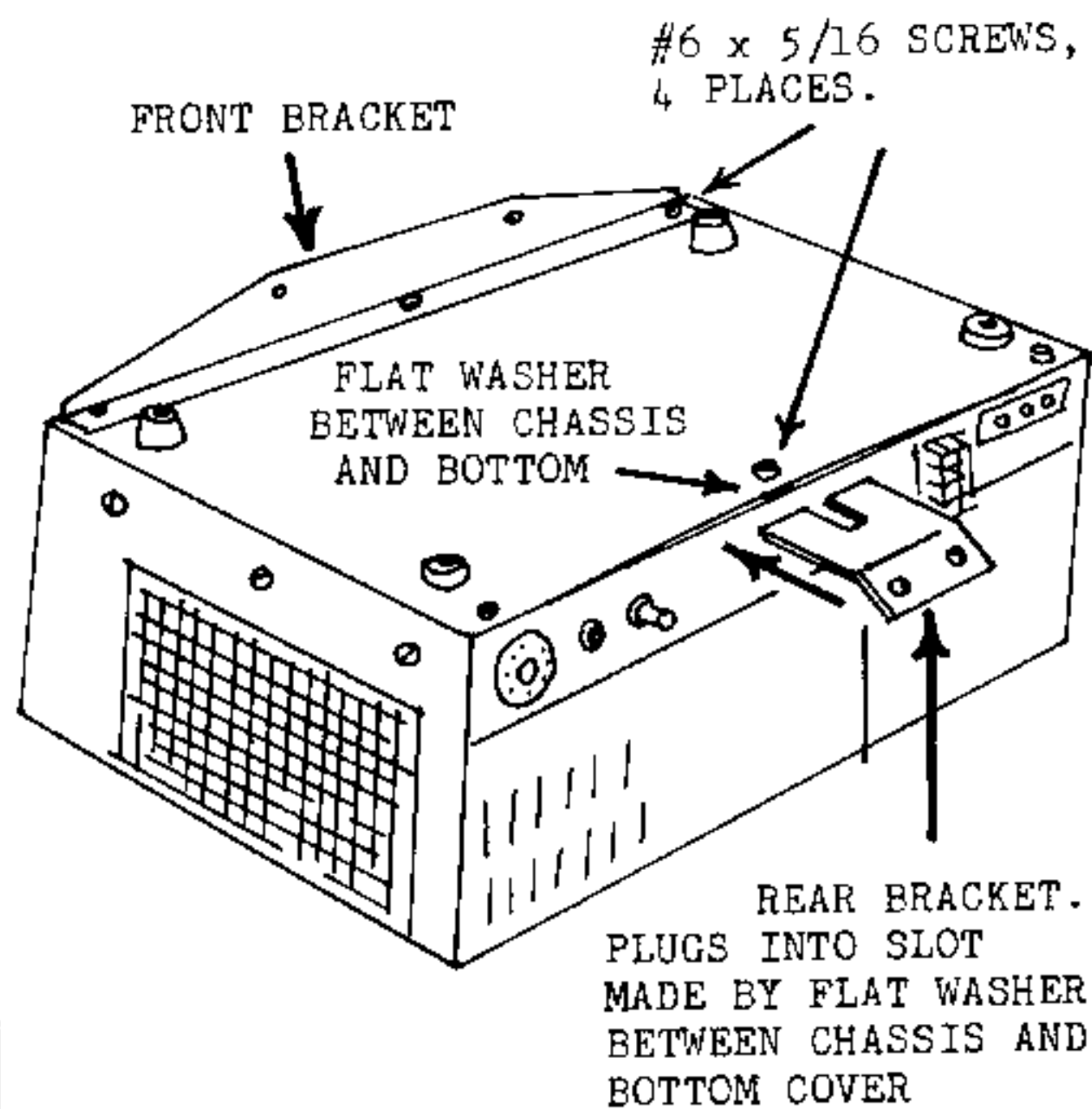


Fig. 3 MOBILE MOUNTING
ON TRANSMISSION HUMP
UNDER DASH



MOBILE MOUNTING, SIDE VIEW



TRANSCIEVER, BOTTOM VIEW

C. OPERATION

Before connecting any cables to the Swan 500-CX perform the following steps:

1. Rotate the CAL-REC-TRANS-CW-TUNE switch on the lower left of the front panel counterclockwise to REC.
2. Rotate the AF GAIN control counterclockwise to OFF.
3. Connect wire from earth ground to ground stud provided on rear of chassis.
4. Connect a 50 to 75 ohm antenna feed-line to the coaxial connector on the rear chassis panel.
5. Connect the power supply cable to the Jones connector on the rear chassis.
6. Connect the power supply to the proper voltage source.

WARNING

Dangerous high voltage is present on the plate of the power amplifier whenever the power supply is energized. Never turn power on when the power amplifier cover is removed. High voltage is also present at Pin eight of the power plug.

RECEIVER

In RECEIVE position, or at any time when the transmitter is not in TRANSMIT, all circuits used in transmitting are disabled through the relay controlled circuits, K1, K2. The relays are energized for transmitting and de-energized for receiving. Relay K2, when de-energized, allows signals from the transmitting tank circuit and antenna to be fed to the receiver RF Amplifier, V6, where they are amplified and then fed to the control grid of the Receiver Mixer, V7. The local oscillator signal from the VFO Amplifier is now used to heterodyne the received signal to the IF frequency. All IF amplification is accomplished at this frequency, nominally 5500.0 kc, through V8 and V9 IF amplifiers. In the Product Detector V10A, the IF signal is heterodyned with the carrier frequency generated by Carrier Oscillator, Q3. The resultant audio signal is then put through a noise clipper network which is in or out of circuit by selection of ANL switch. The signal is then amplified by V10B, which then couples to V11, the AGC Amplifier, and V12, the output audio stage.

RECEIVER OPERATION

1. Rotate the AF GAIN control clockwise to about the 3 o'clock position. The power switch will operate applying filament, relay, bias, medium, and 800 volt high voltage to the transceiver.

2. Wait approximately one minute to allow the tube filaments to reach operating temperature. During this period, perform the following steps:

- a. Rotate the BANDSWITCH to desired band.
- b. Rotate MIC. GAIN fully counterclockwise.
- c. Rotate CAR: BAL. control to the mid-scale position, with white dot on knob aligned with the long index mark on the panel.
- d. Preset PA PLATE control to mid-position.
- e. Preset PA GRID control to mid-position.
- f. Preset PA LOAD FINE to mid-position.
- g. Preset PA LOAD COARSE to position 1.
- h. Set tuning dial to desired frequency.
- i. Set RF GAIN control to approximately 3 o'clock position.

3. Carefully adjust the PA GRID and the PA PLATE controls for maximum receiver noise. NOTE: The PA GRID control resonates the transmitter driver stages and the receiver RF amplifier plate circuit. The PA PLATE and PA LOAD controls adjust the input and output capacitors in the transmitter power amplifier final plate circuit, as well as the receiver RF amplifier grid circuit. Proper adjustment of these controls in the receiver position will result in approximately resonant conditions in the transmitter stages.

RECEIVER TUNING

The tuning dial of the 500-CX has a green tinted scale reading from zero to 450 which is used on 40, 20 and 15 meters. Above the green scale is a separate calibration for 80 meters, reading from 3500 to 4000KC. Below the green scale is the 10 meter scale, reading from 28 to 29.7 MC.

Precise tuning of a single sideband signal is very important. Do not be satisfied to merely tune until the voice can be understood, but take the extra care of setting the dial to the exact spot where the voice sounds natural. Above all, avoid the habit of tuning so that the voice is pitched higher than normal. This is an unfortunate habit practiced by quite a number of operators. The following points help to explain the effects of mistuning:

1. If you tune so the received voice is higher than normal pitch, you will then transmit off frequency, and your voice will sound lower than normal pitch to the other station. He will probably retune his dial to make you sound right. If you keep this up, you will gradually waltz one another across the band. If both of you are mistuning to an unnatural higher pitch, you will waltz across the band twice as fast. (And someone will no doubt be accused of frequency drift.)
2. Mistuning results in serious harmonic distortion on the voice, and should be quite noticeable to the average ear. Some will claim that if they don't know how the other person's voice actually sounds, they can't

RECEIVER TUNING (cont.)

tune him in properly, but this is not true. With a little practice, it is fairly easy to tell. Some voices are relatively rich in harmonics, and are easier to tune in than a person with a "flat" voice. Also, a transmitter which is being operated properly with low distortion will be easier to tune in than one which is being over-

position, and with no modulation, the plate voltage will be 890 volts, the plate current 50 ma, and the power input will be at 45 watts.

Average voice power is from 10 to 20 db below peak voice power. Normally some peak clipping in the power amplifier can be tolerated, and a peak-to-average ratio of only 6 db may sometimes occur. Under such condi-

TRANSMITTER TUNING (cont.)

When in "TUNE" mode, the meter reading is strictly a relative indication of power output.

6. When first tuning the 500CX, you may find the 30 second time limit too short. In that event, switch back to REC mode for a minute or so, and then resume tuning procedures. With experience, transmitter tuning will require only 10 to 15 seconds. Do not tune more often than necessary. You should not have to retune except when changing bands or antennas. The P.A. tubes will last for many months or even years of normal operating, but constant tuning at full grid drive will shorten their life considerably.

7. **Caution:** The 500CX may be tuned to frequencies outside the amateur bands. Do not tune or operate the transmitter unless you are within your permitted band limits.

TUNING STEPS:

1. The Sideband Selector must be in "NORM" position during transmitter tuning procedures. Bandswitch and tuning dial set to desired frequency. MIC. GAIN at minimum, CAR. BAL. straight up, 12 o'clock.

2. Move the function Switch to TRANS. mode, and quickly rotate the CAR. BAL. control for minimum meter reading. If the control has no effect at this time, do not be concerned. The P.A. (Power Amplifier) stage is now "resting" or "idling," and there is no grid drive being applied. The meter is reading "idling" current, which should be about 50 ma. as read on the 800 ma. scale. The permissible idling range is between 40 and 60 ma. If the P.A. is idling above or below this range, adjust the P.A. Bias control on back of the chassis.

3. If this is the first time you are tuning the transmitter, set the COARSE LOAD control to position 4. (After experience in tuning, this control may be set to whatever position has been found optimum on each

a. If the meter goes off scale, use the OUTPUT LEVEL control to bring it back to about midscale.

b. Advance the COARSE LOAD control clockwise a step at a time, readjusting P.A. PLATE each time, until the position for maximum output is found. Use the FINE LOAD control for vernier load adjustment. Each time a change in either load control is made, the P.A. PLATE must be re-tuned.

c. Switch back to REC. position.

d. Once the proper settings have been found, make notes on a card so they can be quickly re-set each time you change bands.

6. **Voice Transmission.** After tuning up as outlined above, switch to TRANS. position and then carefully set the CAR. BAL. control for minimum meter reading. Carrier balance will usually occur with the CAR. BAL. somewhere around mid-range, but the setting is not important or significant, as long as a null can be observed. While speaking into the mike, slowly rotate the MIC. GAIN control until occasional peak readings of 200 to 225 ma. are obtained. With most microphones, the MIC. GAIN control will be set between 9 and 12 o'clock, but it may vary considerably. The amplified ALC circuit will help limit cathode current to about 225 ma., but turning the MIC. GAIN up too high will still produce flat topping and spurious signals, so it is important to hold it down. The meter is quite heavily damped, and its reading with average voice modulation may not look very impressive, but the voice peaks are going well over the 550 watt power rating of your Swan transceiver. **NOTE:** Transceiver will not modulate with Function Switch in CAL. position.

7. AM Operation (Single Sideband With Carrier)

a. Tune transmitter to full output on single sideband as described above.

b. Rotate MIC GAIN control to minimum full

Note: Up to now, the transmitter has been merely "idling," and there has been no particular time limit involved. The following step begins applying grid drive, and requires caution and observation of the recommended 30 second time limit.

4. With the Function Switch still in TRANS. mode:
a. Set the CAR. BAL. control to either 9 o'clock or 3 o'clock. FULL CLOCKWISE POSITION

b. Rotate the P.A. GRID control for maximum

c. With Push-to-talk pressed, rotate CAR. BAL. control until cathode current is approximately 150 ma.

d. While talking in a normal tone of voice into the microphone, increase MIC. GAIN setting until the meter kicks upward slightly. This setting will result in excellent AM transmission.

TRANSMITTER TUNING (cont.)

always necessary. NOTE: PTT-VOX switch must be in PTT position.

c. In Manual CW operation it will be necessary to switch the Function control back to REC. for receiving and then to CW for transmitting.

d. Semi-break-in CW

When the VOX accessory, model VX-2 is used, Break-In operation may be employed. Move the PTT-VOX switch to VOX position, and rotate the Function control to CW mode. Rotate the VOX GAIN and the ANTI-TRIP control on the VX-2 to full counterclockwise position. Press the CW key to transmit. When you stop keying the circuits will automatically switch back to receive mode. Adjust the VX-2 DELAY control to the position which gives the desired delay time in returning to Receive.

e. Off-set CW Transmit Frequency:

While receiving, the carrier oscillator frequency is located 300 cycles outside the passband of the crystal lattice filter, thus providing a single heterodyne note, or "single-signal" for CW reception. When transmitting in CW mode, the carrier frequency is moved approximately 800 cycles higher, placing it well inside the passband. This frequency shift is termed "Off-set CW transmit frequency," and avoids the problems encountered when the receive and transmit frequency are exactly the same. When receiving CW, the receiver must be tuned off frequency several hundred cycles in order to hear an audio beat. By providing this shift automatically in the 500-CX, CW operation is greatly simplified.

Sidetone Oscillator

A sidetone oscillator circuit is included in the 500-CX, and permits CW monitoring. An 800 cycle tone will be heard coming from the speaker or headphones. The strength, or volume of the tone may be changed if desired by changing the resistance value of R1202 in the sidetone circuit. Note that the A.F. GAIN control will have some effect on the sidetone.

Narrow Band CW Filter:

The Swan model AF-800 is available for use with the 500-CX. It is a double toroid, high Q filter tuned to 800 cycles, and installs inside the 117-XC matching power supply. See the accessory section for further information.

9. After tuning for maximum output, it will be useful to know how much cathode current the P.A. is drawing at full power input. This will help indicate condition of the P.A. tubes, as well as the driver stage and other tubes in the transmitter circuitry.

a. This may be done by switching to CW mode, and inserting full carrier with the CAR. BAL. control. The key jack circuit must be closed by a CW key for this test.

b. Alternately, you can check P.A. cathode current by whistling a steady tone into the microphone. It will be found that cathode current is typically 500 ma. or more on the lower bands, but will be somewhat lower on 10 and 15 meters, typically between 400 and 450 ma. Several factors can affect cathode current, including AC input voltage, (or DC voltage in mobile use) tube condition, and circuit alignment. The reading should be used primarily as an indication of gradual change, or deterioration.

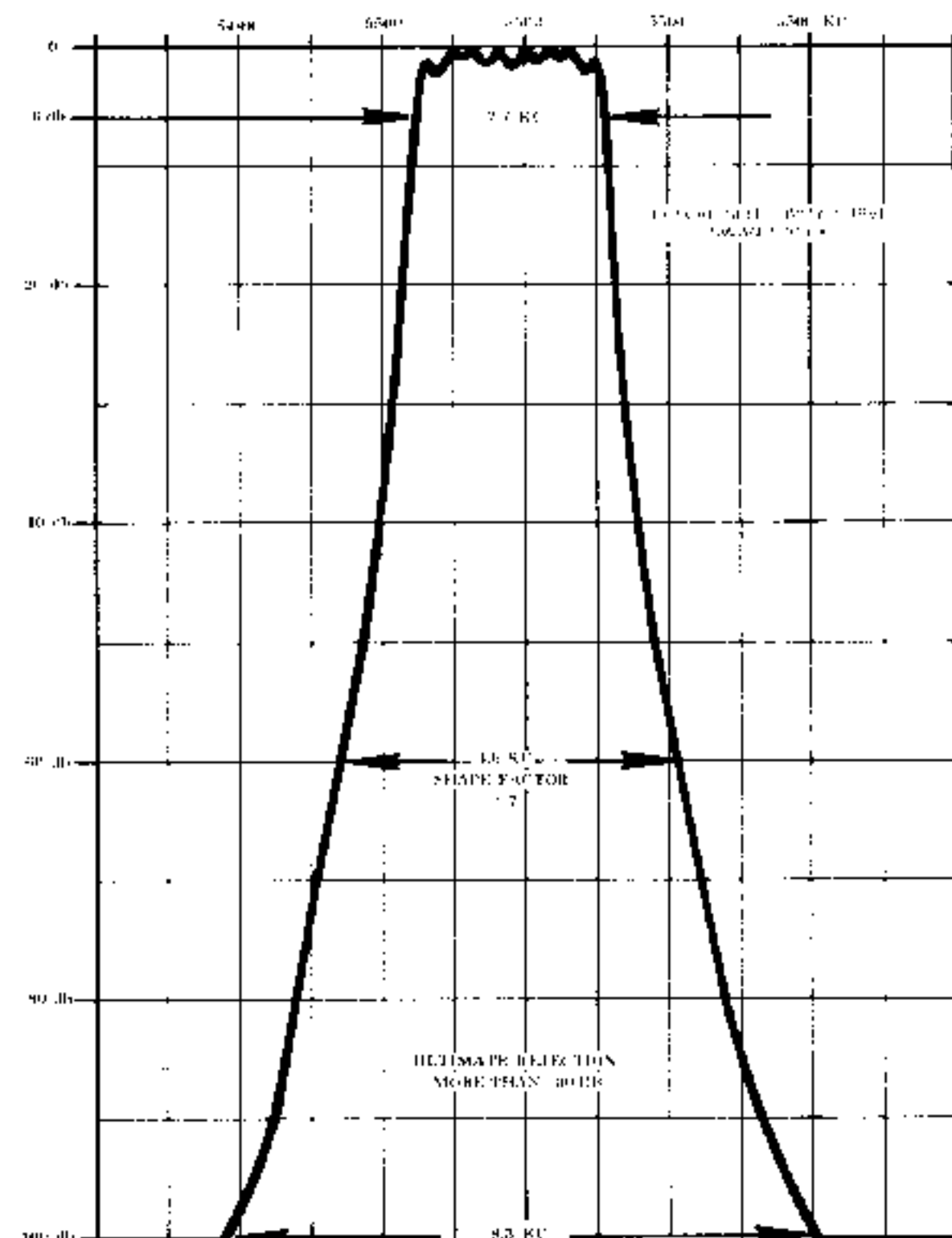


FIG. 4 CRYSTAL FILTER
TYPICAL CHARACTERISTIC

D. ALIGNMENT AND TROUBLESHOOTING

The following procedures are given in the order performed during the factory alignment for the transceiver. For home servicing, only partial alignment may be necessary. Read all procedures carefully before commencing either partial or complete alignment. See figures and for component placement. The following equipment will be required for complete alignment:

2. Loosely couple field strength meter to C308 (off pin 2 of V4) with alligator clip on ceramic capacitor body.
3. Remove screen voltage from V4 and V5 by disconnecting the wire from terminal strip immediately adjacent to V5 base. (Point A, Fig.).
4. Connect VTVM across R401, 1K resistor between pins 1 and 2 of terminal strip, using 25 volt scale. (Points B and C, Fig. 5).

PROCEDURE

Aud to Signal Generator

P.A. NEUTRALIZATION

With P.A. coarse load in position 1, set freq. to 14,150, PA Plate control at 9 o'clock, insert carrier and peak P.A. Grid control, adjusting Car. Bal. control for 200 MA. Turn P.A. control slowly through resonance. Cathode current should dip smoothly and rise to 200 MA on the low capacity side of resonance. If, instead, there is a peak above 200 MA either side of the dip, stop rotation of the P.A. plate control at the peak and adjust C406 to reduce Ip to 200 MA. Repeat above check and re-adjust as necessary to obtain the desired smooth dip. For 10 meters, use above procedure but adjust #C312.

VFO ALIGNMENT

A trimmer condenser is provided for each VFO range. Trimmer adjustment for the five VFO ranges is through top cover of the VFO compartment. An insulated adjusting tool is recommended. Dial tracking has been factory set by pruning the coil, and will not ordinarily require further adjustment.

When dial calibration changes beyond the adjusting range of the front panel dial set control, calibration may be restored by carefully adjusting the trimmer for that range.

EXAMPLE:

The 40 meter band at 7000 KC point is off frequency approximately 8 KC on the high side and cannot be restored by adjusting dial set on front panel.

1. Set dial set to twelve o'clock position.
2. Set VFO at 7008 KC so as to hear 100 KC Calibrator.
3. With an insulated alignment tool in one hand and the VFO dial in the other, rotate the dial a small amount at a time down towards the 7000 KC point, but not enough to lose the 100 KC signal. Now rotate the trimmer so as to zero beat the 100 KC signal. Again rotate the dial a small amount down the band so you still hear the calibrator, stop and with trimmer rezero beat the signal again. Repeat these steps until you have reached 7000 KC point on the dial. Use caution so you do not lose the 100 KC signal. This will prevent you from aligning on the wrong 100 KC note which would put the VFO off frequency by a 100 KC. The following chart lists the actual oscillating frequency of the VFO at band edges.

FREQUENCY CALIBRATION

Frequency calibration of the Model 500-CX is in 5 kc increments on 80-, 40-, 20-, and 15- meters, and 20 kc increments on 10 meters. 80 meters is calibrated directly on the upper dial scale. 40-, 20-, and 15- meters are calibrated from zero to 450 on the green tinted center scale. "EXAMPLE": The dial is set at 200 on the green scale. (On 40 meters this would read 7.2 mc; on 20 meters this would read 14.2 mc, and on 15 meters this would read 21.2 mc.) 10 meters is calibrated directly on the lower dial scale. Dial accuracy and tracking are quite

VFO Frequency Chart

Dial Frequency	Oscillator Frequency
3500 KC	9000 KC
3800	9300
4000	9500
7000	12,500
7200	12,700
7300	12,800
14,000	8500
14,200	8700
14,350	8850
21,000	15,500
21,250	15,750
21,450	15,950
28,000	22,500
28,500	23,000
29,000	23,500
29,700	24,200

good on the 500-CX, but caution must always be observed when operating near band edges. Measuring the frequency with the calibrator when working near band edges is recommended.

DIAL SET

A dial-set control has been provided so that dial adjustment can be made at any 100 or 25 KC point of the dial. With calibrator on, set the dial to any 100 or 25 KC point closest to the frequency you wish to work. Now adjust dial-set control to zero-beat the VFO with the calibrator. This provides greater accuracy of dial read-out.

CAUTION: Care must be exercised when tuning for the 100 or 25 KC harmonics of the calibrator. Spurious image signals may be heard, although they will be somewhat weaker than the actual harmonics.

CRYSTAL CALIBRATOR FREQUENCY ADJUSTMENT

Adjustment of the Crystal Calibrator must be made with an outside source, such as an external receiver that will tune to WWV. Remove transceiver cabinet and bottom. Locate the R.F. Amplifier tube socket, V6. Wrap one end of an insulated wire lead loosely around Pin 1. Connect the other end to the antenna terminal of the external receiver. Tune external receiver to zero beat WWV. Now turn on calibrator in 500-CX (either 100 or 25 KC position) and by listening to it on the external receiver, adjust trimmer capacitor C1603 (located on top of chassis next to 100 KC crystal) to zero beat with WWV.

25 KC MULTIVIBRATOR ADJUSTMENT

The calibrator circuit board, located underneath the chassis has a trimmer type potentiometer which is used to adjust the multivibrator circuit so it divides the 100 KC calibrator output by a factor of 4, thus providing calibration markers every 25 KC. If markers are received every 20 KC, or every 33-1/3 KC, adjustment is required. Use a small screwdriver, and carefully turn the control to the location where calibration markers are properly received. An oscilloscope may also be used as an aid, if available.

S-METER ADJUSTMENT

With antenna disconnected and with RF Gain fully clockwise, set R906, located on rear panel, for zero meter reading. Make sure no local signals are being received.

CARRIER BALANCE

A carrier balance control is provided on the front panel, and is labeled CAR. BAL. This control permits insertion of carrier during CW operation for power control, as

well as carrier insertion for AM operation, and as an aid in tuning the transmitter circuits. In addition to the carrier control, there is another located under the chassis near the balanced modulator tube socket, V 13, the 6JH8. This control is called a "Quadrature control," and is of the screwdriver adjust, trimmer type. It will seldom require adjustment, but is recommended particularly when if the 6JH8 tube is replaced. A dummy load must be connected to the transceiver. Connect a sensitive VTVM across the dummy load, or across the coax. line. First tune for maximum output in normal manner. Then switch to TRANS. mode, and balance carrier with CAR. BAL. panel control. Finally, adjust trimmer, the Quadrature control, for carrier null.

L601 TRAP ADJUSTMENT

Set bandswitch to 14 mc range. Feed strong 11.9 mc signal from signal generator into antenna jack. Tune around 14,225 until signal is found. Adjust L601 for minimum.

E. PARTS LIST

CAPACITORS

C101	.002, 20% 500V Disc	C419	.002, 20% 500V Disc	C1605	.002, 10% 500V Disc
		C420	.01, 80-20% 500V Disc	C1606	50, 5% 500V Mica
		C601	120, 5% 500V Mica	C1701	470, 5% 500V Mica

R207	4.7K - 1 watt	R1304	18K - 2W	L105	10 mtr Rec. Coil
R301	270K	R1305	100K	L201	RFC - 200 uh
R302	100K	R1306	27K	L202	15 mtr Mixer Coil
R303	100 ohms	R1307	5K Car. Bal. Pot.	L203	10 mtr Mixer Coil
R304	10K	R1308	1K	L204	40 mtr Mixer Coil
R305	8.2K	R1309	100K	L205	20 mtr Mixer Coil
R306	10K	R1310	27K	L206	80 mtr Mixer Coil
R401	1K	R1311	27K	L301	10 mtr Driver Coil
R402	10K Bias Pot.	R1401	1K	L302	15 mtr Driver Coil
R403	10K - 1 watt	R1402	1 Meg Mic. Gain Pot.	L303	20 mtr Driver Coil
R404	1 ohm - 5% - 2 watt	R1403	150K	L304	40 mtr Driver Coil
R405	470 ohms - 5%	R1404	270K	L305	80 mtr Driver Coil
R406	680 ohms - 5%	R1405	2.2 Meg	L306	RFC - 200 uh
R407	1 ohm - 5% - 2 watt	R1406	47K	L401	RFC - 100 uh
R408	100 ohms	R1501	18K	L402	RFC - 55 uh
R409	100 ohms	R1502	1.5K - 5%	L403	Final Tanl Coil
R410	1K	R1503	2.2K	L404	RFC - 30 uh
R411	10K	R1504	100 ohms	L601	12 MC Trap Coil
R412	100K Output Level Pot.	R1601	1K	L801	1st IF Amp. Coil
R601	100K	R1602	10K	L901	2nd IF Amp. Coil
R602	56 ohms	R1603	100K	L1501	RFC - 200 uh
R603	47K - 1 watt	R1604	100K	L1701	RFC - 200 uh
R701	47K	R1605	10K	L1702	RFC - 200 uh
R702	27K	R1606	27K	L1703	10 mtr VFO Coil
R703	18K - 2 watt	R1607	68K	L1704	15 mtr VFO Coil
R801	10 Meg	R1608	47K	L1705	20 mtr VFO Coil
R802	33K - 2 watt	R1609	10K 25KC Adjust Pot.	L1706	40 mtr VFO Coil
R803	1K	R1610	470 ohms	L1707	80 mtr VFO Coil
R901	270K	R1611	3.9K	L1801	RFC - .82 uh
R902	100 ohms	R1612	5.6K	L1802	RFC - .82 uh
R903	47 ohms - 5%	R1613	3.9K	L1803	RFC - .82 uh
R904	27K - 1 watt	R1701	1K - 5%	L1804	RFC - 200 uh
R905	100K	R1702	1K - 5%	Z301	Parasitic Suppressor
R906	1K S-Meter Zero Pot.	R1703	1K - 5%	Z401	Parasitic Suppressor
R907	1K	R1704	470 ohms - 5%	Z402	Parasitic Suppressor
R1001	10K	R1705	2.7K		
R1002	47K	R1706	2.7K		
R1003	270 ohms	R1707	470 ohms - 5%		
R1004	270K	R1801	900 ohms - 10 watt		
R1005	1 Meg	R1802	500 ohms - 10 watt		
R1006	10 Meg	R1803	470 ohms		
R1007	47K	R1804	750 ohms - 10 watt		
R1008	100K	R1805	27K		
R1101	6.8K	R1806	27K		
R1102	100K	R1807	470K - 1 watt		
R1103	4.7K	R1808	27K		
R1104	100K	R1809	10K RF Gain Pot.		
R1105	2.2 Meg	R1810	270K		
R1106	2.2 Meg	R1811	10K		
R1107	270K	R1812	470K		
R1201	1 Meg AF Gain Pot.	R1813	270K		
R1202	47 ohms	R1814	470 ohms		
R1203	1 Meg	R1815	1 Meg		
R1204	270K	R1816	470K		
R1205	330K				
R1206	330K				
R1207	33K				
R1208	680K				
R1209	1K				
R1210	27 ohms				
R1301	1K				
R1302	10K				
R1303	10K Quad. Bal. Pot.				
		COILS			
		L101	10 mtr VFO Amp. Coil		
		L102	15 mtr VFO Amp. Coil		
		L103	40 mtr VFO Amp. Coil		
		L104	20-80 mtr VFO Amp. Coil		
				TRANSFORMERS	
				T1301	Bal. Mod.
				T1201	AF Output
				SWITCHES	
				S1A-G	Bandswitch
				S2	PTT - VOX
				S3	ANI.
				S4	PA Coarse Load
				S5	Power ON - OFF
				S6	100KC - 25KC Cal.
				S7	CAL-REC-TRANS- CW-TUNE
				S8	Sideband Selector
				RELAYS	
				K1	4PDT, 12 VDC Coil
				K2	3PDT, 12 VDC Coil

CRYSTALS

Y1501 5503.3KC Car. Osc.
Y1502 5500.0KC Car. Osc.
Y1601 100KC Crystal Cal.

DIODES

D401 1N34A
D701 1N914
D1101 1N34A
D1102 1N34A
D1201 RCA 39804 (1N3195)
D1202 RCA 39804 (1N3195)
D1801 1N2974A Zener
D1802 RCA 39804 (1N3195)
D1803 1N914
D1804 1N914
D1805 1N914

TUBES

V1 6EW6 VFO Amp.
V2 12BE6 Trans. Mixer
V3 6GK6 Driver
V4 6LQ6 Power Amp.
V5 6LQ6 Power Amp.
V6 ~~6BZ6~~ ~~12B76~~ Rec. RF Amp.
V7 12BE6 Rec. Mixer
V8 1st IF Amp.
V9 2nd IF Amp.
V10 12AX7 Prod. Det./Rec. AF
V11 6BN8 AGC/ALC Amp.
V12 6GK6 AF Output
V13 6JH8 Bal. Mod.
V14 12AX7 Trans. AF Amp./Mic. Amp.

TRANSISTORS

Q1 2N706
Q2 2N706
Q3 2N706
Q4 MPS 3693
Q5 MPS 3693
Q6 MPS 3693
Q7 MPS 3693

LIGHTS

B1 GE 47, 6V
B2 GE 47, 6V

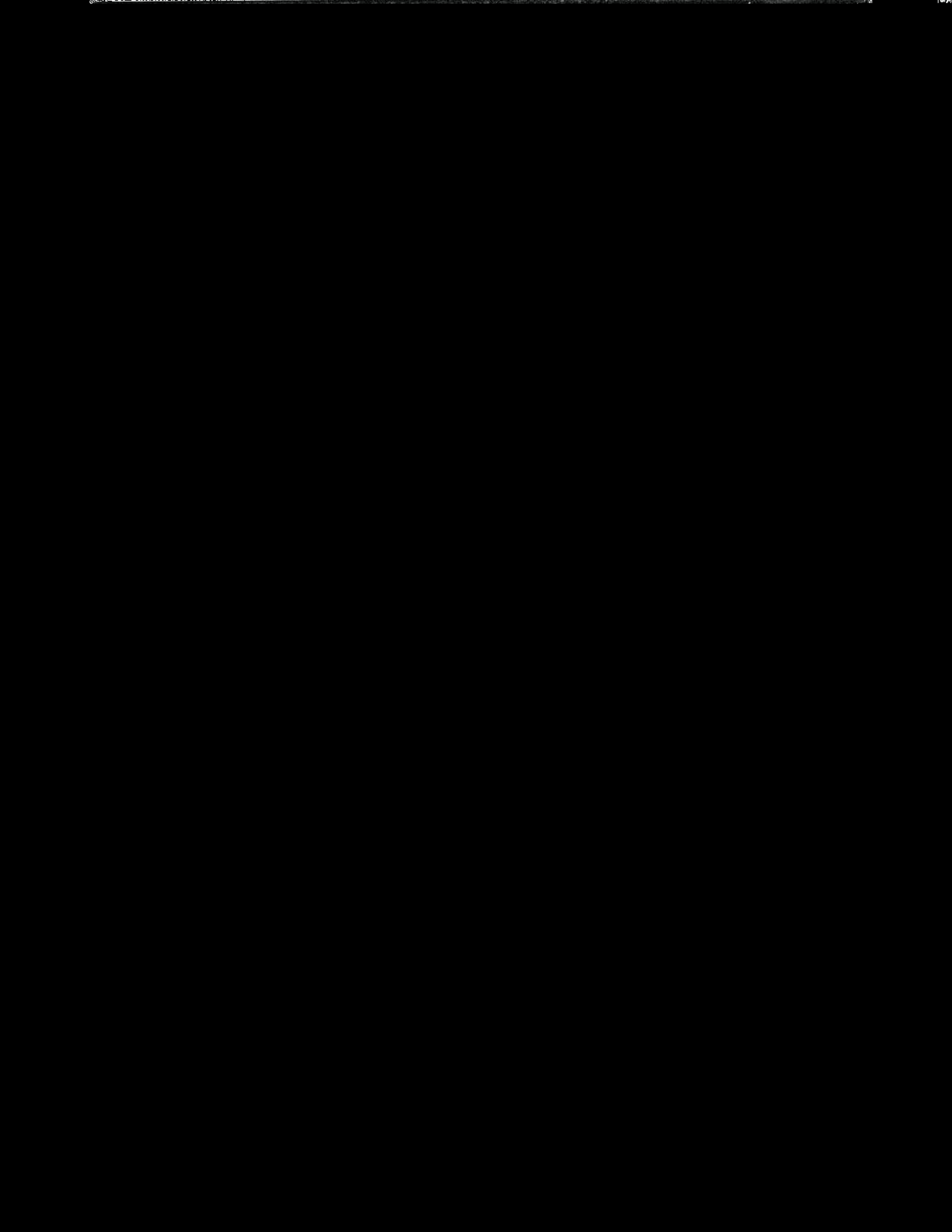
Resistors are ½ watt unless specified. K equals 1000 ohms.

TROUBLESHOOTING GUIDE	
DEFECT	POSSIBLE CAUSE
PA IDLING CURRENT UNSTABLE	<ol style="list-style-type: none"> 1. Defective 6LQ6 2. Defective Bias Potentiometer 3. Defective Bias Supply
INABILITY TO LOAD TO 400-500 MA. (SEE PAGE 10)	<ol style="list-style-type: none"> 1. PA Grid Improperly Tuned 2. Bandswitch Improperly Set 3. Antenna Not Resonant at Frequency 4. Defective Transmission Line 5. Defective Mobile Antenna Coil 6. V2, V3, V4, V5 Defective 7. R409 or R408 Defective
INSUFFICIENT CARRIER SUPPRESSION	<ol style="list-style-type: none"> 1. Carrier Balance Control Improperly Adjusted 2. Defective 6JH8 Balanced Modulator 3. Carrier Oscillator Frequency Incorrect
INSUFFICIENT SIDEBAND SUPPRESSION	<ol style="list-style-type: none"> 1. Excessive MIC. Gain 2. Incorrect PA Load Adjustment 3. Carrier Oscillator Frequency Incorrect
MICROPHONICS IN RECEIVER	<ol style="list-style-type: none"> 1. L901 Improperly Tuned 2. V14, V10, V8, V7, or V6 Defective
LOW RECEIVER SENSITIVITY	<ol style="list-style-type: none"> 1. PA Grid, Plate, or Load Improperly Set 2. Bandswitch Improperly Set 3. K2 Back Contacts Defective 4. V6, V7, V8, V9, V10, V11, V12 Defective

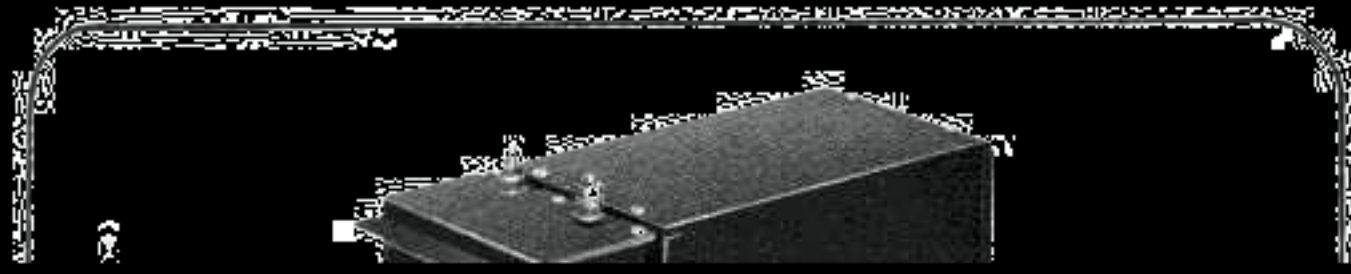
VOLTAGE CHART									
TUBE TYPE	PIN NO.								
	1	2	3	4	5	6	7	8	9
V1-6EW6	R 0	.75	6.3 AC	0	140	130	0		
	T -100	.75	6.3 AC	0	125	125	0		
V2-12BE6	R -28	0	12.6 AC	0	240	215			
	T 0	0	12.6	0	245	100			
V3-6GK6	R 0	-34	0	6.3 AC	0	0	270	270	
	T 0	-6	0	6.3	0	0	270	250	
V4-6LQ6	R 0	-95	--	6.3 AC	0	-95	0	0	0
	T 0	-95	--	6.3	0	-95	250	0	0
V5-6LQ6	R 250	-95	--	6.3 A.C.	12.6 A.C.	95			
	T .5	-95	--	6.3	12.6	95			
V6-6BZ6	R .5	.8	0	12.6 A.C.	270	150	0		
	T -31	0	0	12.6	270	-20	0		
V7-12BE6	R -26	0	12.6 A.C.	0	250	55	1		
	T .5	0	12.6	0	250	-20	3		
V8-12BA6	R .7	0	12.6 A.C.	0	230	130	0		
	T -.05	0	12.6	0	250	150	0		
V9-12BA6	R -.5	0	12.6 A.C.	0	240	125	1.9		
	T 115	0	12.6	0	255	-15	0		
V10-12AX7	R 45	.7	1	12.6 A.C.	0	175	0	1.5	0
	T .5	.7	-.5	12.6	0	245	-90	0	0
V11-6BN8	R 1.6	2.6	.5	6.3 A.C.	12.6 A.C.	1.2	260	0	.5
	T 0	2.6	1.6	6.3	12.6	0	200	0	1.6
V12-6GK6	R 0	--	--	12.6 A.C.	6.3 A.C.	--	270	250	0
	T 12	--	--	12.6	6.3	--	260	250	0
V13-6JH8	R 12	11	0	6.3	0	-100	0	270	250
	T 70	11	64	6.3	0	0	0	260	250
V14-12AX7	R 75	0	0	6.3 A.C.	6.3 A.C.	114	0	7	0
	T 50	0	0	6.3	6.3	100	0	4	0

Voltage Checks Made With 20,000 Ohms Per Volt VTVM





500-CX POWER SUPPLIES AND COMBINATIONS



10
11



GENERAL DESCRIPTION

The Swan Power Supply systems are designed to provide all necessary voltages required by Swan Transceiver models 240, 250, 350, 350-C, 500 and 500-C. This also includes the 300 series and 400 series commercial models. The model 117-X basic A.C. supply is designed for an input of 117 volts at 50 or 60 cycles. The model 230-X is identical except that it operates with 230 volts AC input. By simply changing line cords, it will also operate on 117 volts A.C.

For fixed station use, the 117-X 230-X is installed in a cabinet which matches the Swan transceivers. This cabinet also contains a speaker, phone jack, and indicator light. The complete combination is designated as model 117-XC or 230-XC. The A.C. line cord plugs into the back of the supply. In the 230-XC, choice of 117 or 230 volts input is made by selecting line cords.

12 VOLT D.C. OPERATION

A D.C. Converter attaches to the back of the A.C. supply, and converts it for 12-13.5 volts D.C. input. The model 14-C D.C. Converter is for negative ground systems, the most common type. (For positive ground systems, the model 14-CP D.C. converter is available on special order.) Combination of an A.C. supply with a 14-C Converter is designated as model 14-117 or 14-230 depending on which A.C. supply is used. The positive ground models are designated as model 14P-117 or 14P-230.

With the versatility of this power supply design, a number of advantages become apparent. The 14-117 mobile supply may be operated from a 117 volt A.C. line by detaching the D.C. Converter and plugging in an A.C. line cord.

The matching A.C. supply, model 117-XC or 230-XC, may be converted easily to 12-13.5 volts input by attaching the 14-C D.C. converter to the back. This provides for portable or emergency operation from a 12 volt battery. There may also be times when it will be desirable to operate temporarily in an automobile, such as during a vacation trip, field day, or emergencies. The 117-XC can be set on the floor or front seat, and with the 14-C attached it becomes a 12-volt power supply, complete with speaker.

The D.C. Converter uses two power transistors for switching in a flip-flop oscillator circuit. A large portion of the cost in this unit is in the transistors where no compromise has been made. They are rated at 60 amperes, with a 45 volt rating.

SPECIFICATIONS

Power Rating: 250 watts average, 600 watts peak.

Input:

Model 117-X: 117 volts nominal, 50-60 cycles.

Model 230-X: 230 volts or 117 volts, 50-60 cycles.

Model 14-C: 13.5 volts D.C. nominal, 40 amps. peak.

Output:

800 volts at 240 ma. average, 700 ma. peak.

275 volts at 150 ma. continuous.

110 volts negative bias, at 100 ma.

12 volts D.C. at 200 ma., relay supply.

12.6 volts A.C. at 5.5 amps. (with A.C. input only)

Battery Drain with Swan Transceiver:

Rec: 3.5 amps. Trans: 16 amps. average, 40 amps. peak, plus 5.5 amps. for vacuum tube heaters.

MATCHING CABINET

Ordinarily the A.C. supply will be purchased complete in a matching cabinet as either model 117-XC or 230-XC. However, in some cases an owner may have purchased a 117-X or 230-X basic supply only, perhaps in a D.C. supply combination, and he may wish later on to mount it in a matching cabinet. For this purpose the cabinet with speaker and cables is available separately. The basic A.C. supply mounts inside with three screws, and the pre-wired cable connects as shown in the schematic. Connections to the phone jack and speaker have already been made. Two leads from the indicator light must be run through grommet and soldered to the terminals provided at the bottom of the supply. Refer to the schematic for clarification. The A.C. line cord is also provided with the matching cabinet kit. These line cords are available separately also, and come normally wired and stamped for 117 volts. 230 volt line cords are also available on special order, or the 117 volt line cord may easily be wired for 230 volts by referring to the schematic. Note that the 230 volt line cord will work only with the 230-X basic A.C. supply. The 117 volt line cord will work with either the 117-X or 230-X.

ELECTRICAL DESIGN

Both the A.C. and D.C. sections are conservatively designed for long, reliable service with a minimum failure rate. At the same time, they are designed for easy access and servicing for those times when it is required. Any component can be readily checked out and replaced in a matter of moments. The D.C. Converter and A.C. supply can be detached quickly from one another and tested individually, thus isolating the source of trouble.

The A.C. supply is quite conventional, using a silicon rectifier bridge for the medium voltage, and another for high voltage. The 117-X has a single primary winding for 117 volt input, while the 230-X has a pair of primary windings which connect in parallel for 117 volts, and in series for 230 volts. The switching is taken care of in the A.C. line cord plug.

MOBILE INSTALLATION

Model 14-117 or 14-230.

12-13.5 volts D.C., Negative ground only. (For positive ground systems, the D.C. converter unit must be a model 14-CP, available from your dealer on special order.)

FIG. 8 SWAN MODEL 11.6 DC CONVERTER

FIG. 9 SWAN MODEL 11.6 X 230 V AC POWER

MOBILE INSTALLATION (cont.)

3. Connect a cable from the hot battery terminal to the circuit breaker, keeping this cable as short and direct as possible. Then connect a cable from the circuit breaker to the -12 post on the 14-C converter unit. Next, connect a cable from the negative post of the 14-C unit to the ground terminal of the battery. If possible, drill and tap a hole in the battery post for a contact stud. The more directly the cables are connected to the battery, the less chance there will be for voltage transients to reach the transistors.

4. Run the 10 conductor power cable from the transceiver to the power supply and connect by color code as illustrated in the schematic diagram.

5. There are two ways of wiring the relay circuit in the 14-C converter. The simplest method is to connect a wire jumper from the relay terminal post to the +12 terminal on the 14-C. These posts are just an inch apart, and an 18 gauge bare jumper is sufficient. However, when connected this way, it will be possible for anyone to turn on the transceiver at any time, and for the transceiver to be accidentally left on, running down the battery.

The second wiring method provides for connection to the accessory circuits of the car, so that the ignition key is required in order to turn on the transceiver. To do this an 18 gauge insulated wire must be run from the 14-C relay terminal to the accessory circuit under the dash of the car. This wire may be run alongside the 10 conductor power cable which goes to the transceiver. The accessory circuit will be found on one terminal of the ignition switch. Your service garage can be helpful in locating this. Otherwise, it may be easier to locate the 12 volt input line to the car radio, and splice into this line. Since the 14-C relay draws very little current, tapping into the car radio line will not matter, regardless of which side the car radio fuse is on.

6. **Speaker Connections.** The two conductor lead coming from the Jones plug goes to an external speaker with 3 to 4 ohm voice coil. This speaker may be one already installed in the dash of the car or under the dash, and a selector switch may be installed to switch the speaker over from the car radio to the transceiver. An easier arrangement, however, is to install a 3 x 5 in. speaker inside the transceiver. The 500-CX provides a mounting place on the left side, with terminal lugs on top of the chassis for connection to the speaker. One side of the speaker voice coil connects to the insulated terminal, and the other side connects to the ground terminal.

VOLTAGE REGULATION, MOBILE OPERATION

In D.C. to D.C. converters designed for mobile operation of Transceivers, it is important to note that output voltages will be related directly to the D.C. input voltage. The Swan model 14-117 supply is designed so that when input voltage is 13.5 volts, output voltages will be at nominal ratings, the same as with 117 volts A.C. input.

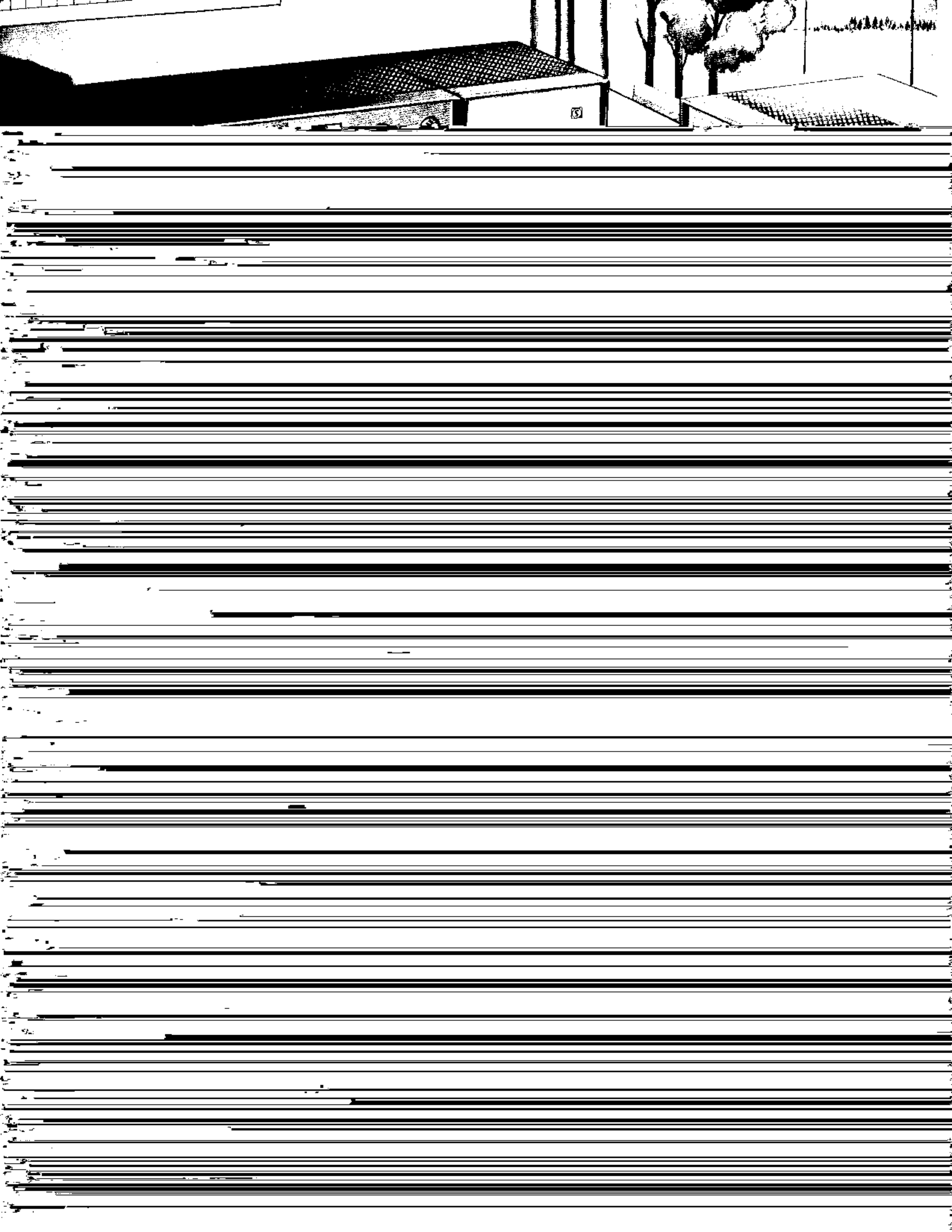
Therefore, when Transceiver Tuning is performed without the engine running, it must be recognized that operating voltages will be considerably lower than normal, and meter readings will be less than with the engine running. In some cases, input voltage without the engine running may be as low as 11.5 volts, resulting in still lower meter readings. If the D.C. supply were designed to deliver normal output voltages at 11.5 or 12 volts input, then they would be dangerously high with the engine running.

The wire size and length of run from the battery to the 14-C converter is also an important factor governing output voltage from the power supply. The voltage drop across these leads should be kept reasonably small. 10 gauge wire is supplied with the 14-C converter, and is heavy enough for average runs of 3 to 4 feet. For longer runs it would be advisable to use 8 gauge, while for trunk mounted power supplies 6 gauge or even 4 gauge is recommended. It should be noted, however, that the really important factor in determining wire size is how much input voltage is delivered to the 14-C module during average voice modulation, when some 16 to 18 amperes are being drawn through the wire. In TUNE position considerably more current is drawn, as much as 35 to 40 amperes, and the voltage drop may be quite high. However, this is not a particular handicap; in fact, drop, since the electrolytic capacitors in the power supply there is a definite safety factor in having a rather poorly regulated input which drops when you switch to TUNE. There is no reason to be unduly concerned about this drop, since the electrolytic capacitors in the power supply have ample storage capacity to provide good dynamic regulation during voice modulation.

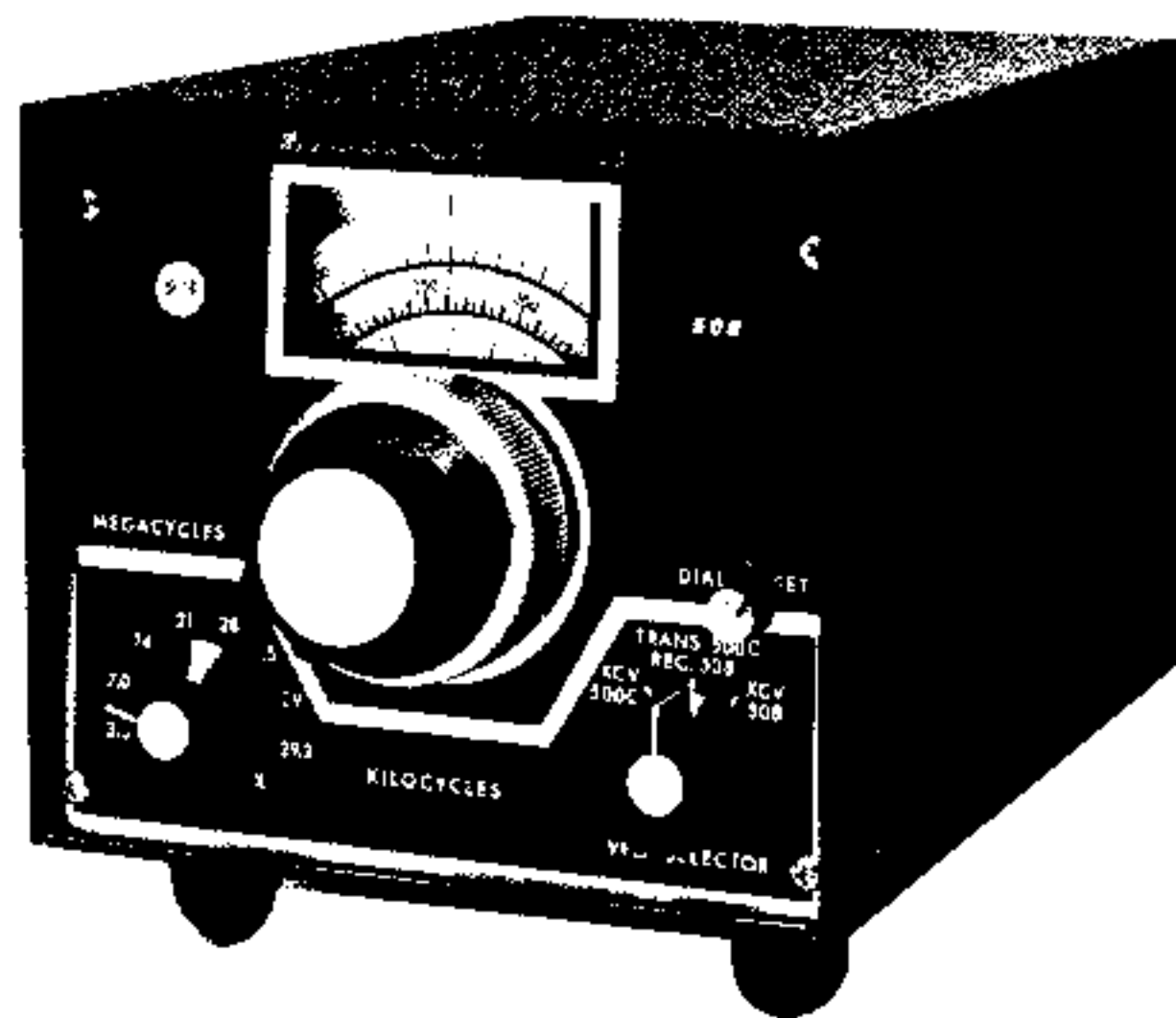
To summarize: the best way of determining if the battery leads are large enough is to measure input voltage at the 14-C terminals while voice modulating. If the voltage drops less than ½ volt when speaking normally into the microphone, the leads are heavy enough. If the drop is more than ½ volt, the leads should be larger. Finally, do not expect full operating power unless the engine is running, and the generator is charging properly.

POWER SUPPLY WARRANTY POLICY

The normal guarantee on your Swan power supply is for a period of 90 days from date of purchase, and covers all components, material and workmanship. In the case of transistor failure, however, the warranty on them will be void if inspection proves that high transient voltages from the automobile were responsible. We will do all in our power to be fair and just in this determination. The warranty card must be filled out and mailed to the factory within 10 days from date of purchase. Do not ship a unit to the factory for servicing without prior authorization. Check with your dealer first, as he may be in a position to handle the service work more quickly. This warranty is void if the equipment has been misused or damaged.



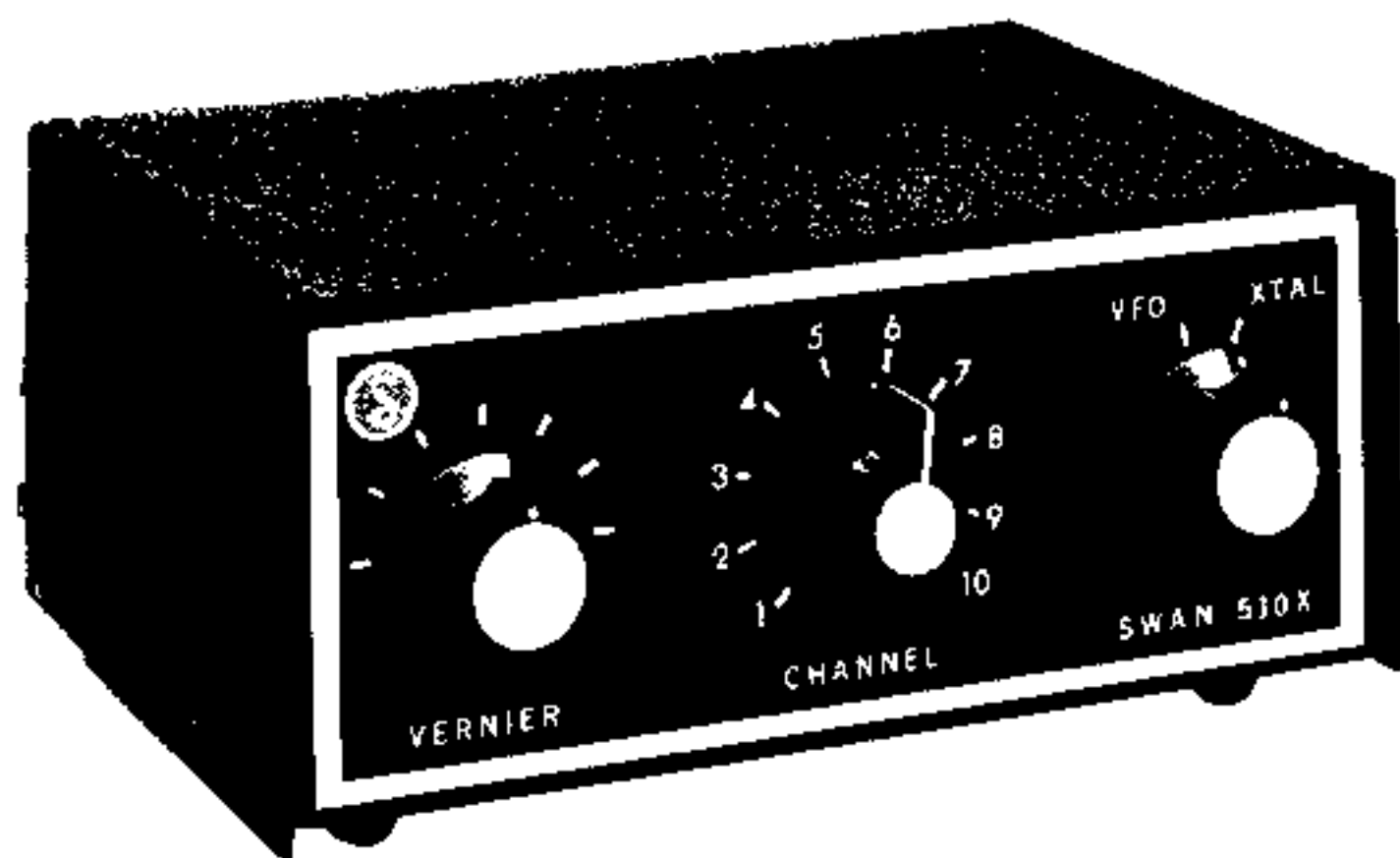
MODEL 508 EXTERNAL VFO



The Swan Model 508 Frequency Control Unit is designed to serve as an external VFO to be used with the Swan 500CX transceiver. The 508 plugs directly into the back of the transceiver after the jumper plug has been removed. The position of the VFO selector switch on the front panel of the Model 508 will determine split-frequency operation, or transceiver operation on the 500CX.

The dial of the Model 508 is calibrated in 5 KC

increments on each range. The 80 meter band is calibrated for direct readout on the dial. Calibration for all other ranges is on a 0-500 KC scale and the reading of this scale would be additive to the megacycle range as selected by the VFO bandswitch. A smaller vernier dial is included and is calibrated in 1 KC increments. An extra position is included on the bandswitch for possible installation of an additional tuning range. WWV reception at 15 mc is also included.



MODEL 510X CRYSTAL OSCILLATOR

The Model 510X oscillator unit provides for added versatility with the Swan 500CX by crystal controlling the operating frequency. Not only does this permit fixed frequency "net" operation in the 80, 40, 20 and 15 meter amateur bands, but the 510X also permits operation outside the amateur bands for MARS, commercial and other services. Vernier frequency adjustment is provided by a panel control, and a selector switch provides for choice of either crystal control of 500CX internal VFO.

A ten position switch allows selection of up to ten crystal frequencies. The Model 500CX will operate within the following ranges without modification:

- 3.5 mc Range: 3.2 to 4.6 mc
- 7 mc Range: 6.5 to 8.2 mc
- 14 mc Range: 13.8 to 15.0 mc
- 21 mc Range: 20.9 to 21.5 mc

NOTE: The 510X will not operate on the 28 mc Range.

PLUG IN VOX AND BREAK-IN CW ACCESSORY, MODEL VX-2

OPERATING INSTRUCTIONS

1. Place the VOX-PTT switch in the PTT position and adjust the transceiver for normal push-to-talk operation.
2. Plug in the VX-2 and rotate the VOX GAIN, ANTI-VOX, and DELAY controls fully counter-clockwise. Attach the top of the VX-2 to the 500C back with a 6-32 screw.
3. Rotate the transceiver MIC. GAIN fully counter-clockwise. This will prevent audio from being transmitted but will not affect VX-2 during initial adjustments.
4. Place the VOX-PTT switch in the VOX position.
5. While speaking into the microphone in a normal manner, slowly rotate the VOX GAIN control clockwise until the VX-2 keys the transmitter. Do not use

6. Increase the receiver gain until receive signals are at a normal volume level. These signals will trip the VOX when picked up by the microphone.

7. With the microphone held in the normal operating position, very slowly increase the ANTI-VOX until received signals do not trip the VOX.

NOTE: Excessive ANTI-VOX gain will cause received signals to gate the VX-2 off so that no amount of sound at the microphone will key the transmitter. Satisfactory balance between the VOX GAIN and ANTI-VOX is easily obtained when the microphone is at least a foot from the speaker.

8. Adjust the DELAY control to hold the transmitter keyed for the desired interval after you stop talking.

NOTE: A little experimenting on the air will reveal that only a small portion of the first spoken syllable is lost when the VX-2 is actuated. Short DELAY settings will result in most efficient operation. See page

more VOX GAIN than necessary to assure positive operation at normal voice levels.

12 (CW OPERATION), for Semi-Break-In instructions.

MARK II LINEAR AMPLIFIER

SPECIFICATIONS

Power Rating:

2000 Watts PEP Input in Single Sideband Mode.
1000 Watts DC input on CW AM or RTTY.

5 Frequency Ranges:

1. 3,400- 4,500 kc
2. 6,000- 9,000 kc
3. 11,000-16,000 kc
4. 16,000-22,000 kc
5. 22,000-32,000 kc

Uses two Eimac 3-500Z Grounded Grid Triodes.

Wide range Pi Output Circuit matches 52 or 75 ohm coax cable or variety of other load impedances.

Dimensions:

13" wide × 7" high × 12" deep.

Weight: 20 lbs.

Power Supply:

Matching unit may be operated next to Amplifier, or with its 4½ foot connecting cable, may be placed on the floor.

Computer grade electrolytic capacitors, 40 mfd. filtering at 250VDC

CW FILTER, MODEL AF-800:

The Model AF-800 CW Filter is available for your 500-CX. It is a double toroid, high Q filter tuned to 800 cycles, and installs inside the 117-XC matching power supply-speaker. A control knob replaces the indicator light on the 117-XC, and switches the CW filter in and

out. Receiver bandwidth with the AF-800 is 400 cycles at the 6 db points, and provides very effective CW selectivity. The filter is operable with either speaker or headphones.

Note: Headphones should be high impedance type.

MOBILE ANTENNAS:

MODEL 35:

For maximum radiation efficiency, our single band design is the best. If you're a one band operator, or don't change bands very often, this is the model for you. Heavy duty construction is of the highest

MODEL 55:

The Model 55 Swantenna is a remotely operated band-switching mobile antenna for use on the 75, 40, 20, 15 and 10 meter amateur radio bands. The band changing mechanism is in the base section of

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



