Price $1.50

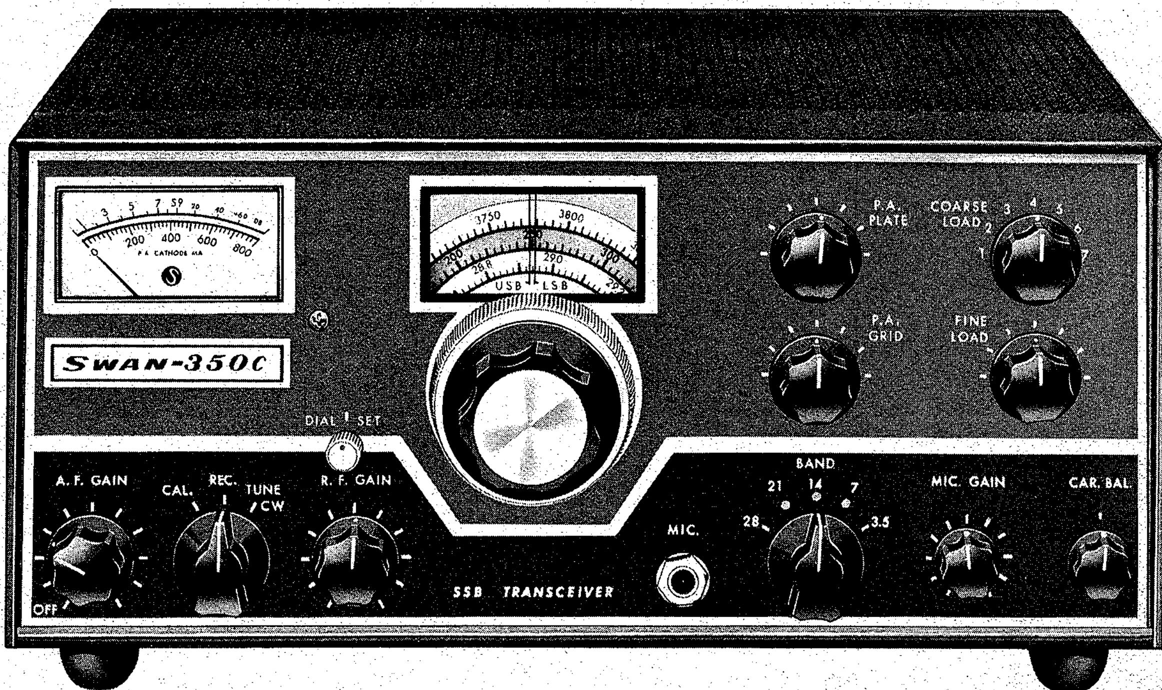
OPERATION AND MAINTENANCE

SWAN MODEL 350-C

SWAN
ELECTRONICS
Oceanside, California
A Subsidiary of Cubic Corporation

OPERATION AND MAINTENANCE SWAN MODEL 350-C

Single Sideband Transceiver



INTRODUCTION

The Swan Model 350C Single Sideband Transceiver together with its accessories and optional equipment, is designed to be used in either CW or SSB modes on all portions of the 80-, 40-, 20-, 15-, and 10 meter amateur radio bands. MARS frequencies may also be covered by using the Model 405X oscillator accessory.

The model 350C generates a single sideband signal by means of crystal lattice filter, and the transceive operation automatically tunes the transmitter to the received frequency.

Basic circuitry of the single conversion design has been proven in several thousand of the popular Swan transceivers. Mechanical, electrical, and thermal stability is exceptionally high. All oscillators are temperature compensated and voltage regulated. Push-to-talk operation is standard with provision for plugging in the Model VX-2 accessory Vox unit for automatic voice control and CW break-in.

The Model VX-2 accessory VOX unit for automatic voice control and CW break-in may be added by first installing and wiring the socket in the place provided on back of the 350C. Instructions for this modification will be found on page 27, 30 and 31.

The basic transceiver provides coverage of all portions of the 80 through 10-meter amateur bands. In addition to this, the amplifier circuits will tune to most MARS frequencies near the 80-, 40-, and 20-meter bands. By using the Model 405X crystal oscillator accessory, MARS operation is thus possible.

With a suitable power supply, operation may be fixed, portable, or mobile. Power input on all bands exceeds 520 watts, PEP, on single sideband, 360 watts on CW, and 125 watts on AM. The model 350C includes automatic gain control, (AGC) and grid block keying with CW.

Part I of the instruction manual covers the basic transceiver. Part II covers the recommended power supplies, Model 117-XC for ac operation and Model 14-117 for 12-volt dc operation. Part III provides information on various accessories.

A 100kc calibrator kit is available for installation in the 350C. The "CAL." position of the function switch is inoperative unless this kit is installed.

CONTENTS:

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:
520 watts, PEP, minimum on all bands.
CW:
360 watts, dc input on all bands.
AM (Single Sideband with Carrier):
125 watts dc input on all bands.

DISTORTION

Distortion products down approx. 30 db.

UNWANTED SIDEBAND SUPPRESSION

Unwanted sideband down more than 50 db.

CARRIER SUPPRESSION

Carrier suppression greater than 60 db.

RECEIVER SENSITIVITY

Less than 0.5 microvolt at 50 ohms impedance for signal-plus-noise ratio of 10 db.

AUDIO OUTPUT AND RESPONSE

Audio output, 4 watts to 3.2 ohm load. Response essentially flat from 300 to 3000 cps in both receive and transmit.

TRANSMITTER OUTPUT

Wide-range Pi-network output matches antennas essentially resistive from 15 to 500 ohms impedance, with coarse and fine load adjustment.

METERING

Power amplifier cathode current 0-800 ma on transmit, S-Meter 0-70 db over S9 on receive.

FRONT PANEL CONTROLS

CAL-Rec-Tune/CW, AF-RF Gain, Mic. Gain, Bandswitch, Carrier Balance, PA Plate Tune, PA Grid Tune, PA Load Course, PA Load Fine, Dial set.

REAR PANEL CONTROLS AND CONNECTIONS

Bias potentiometer, CW key jack, Jones plug power connector, Antenna jack, S-Meter zero, Auxilliary relay switching.

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
V8	6EW6 First IF Amplifier
V9	12BA6 Second IF Amplifier
V10	12AX7 Product Detector/Receive Audio
V11	6BN8 AGC Amp./Rect.
V12	6GK6 Audio Amplifier
V13	6JH8 Balanced Modulator
V15	12AX7 Mic. Amplifier/Transmit Audio

DIODE AND TRANSISTOR COMPLEMENT

Q1	2N706 Oscillator
Q2	2N706 Emitter Follower
Q14	2N706 Carrier Oscillator
D1601	1N2974A Zener voltage regulator
D1603	AGC Charging bypass

POWER REQUIREMENTS

Filaments	12.6 volts, 5.2 amps, ac or dc
Relay	12 volts dc, 250 ma.
Bias	-110 volts dc, 100 ma.
Med. voltage	275 volts dc, 150 ma.
High voltage	800 volts dc, 550 ma. Peak Trans.

DIMENSIONS AND WEIGHT

Height	5-1/2 in.	Depth	11 in.
Width	13 in.	Weight	17-1/4 lb.

A. CIRCUIT THEORY

GENERAL DISCUSSION

The Swan 350C 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 pesent 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 350C 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 the Carrier Oscillator, which is a transistorized circuit using a 5500kc quartz crystal and a 2N706 silicon transistor. 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 plates. 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 Z1301 in push-pull, so the carrier signal cancels itself out in Z1301. 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 Z1301 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 Z1301. Carrier suppression is approximately 60 db.

The double sideband, suppressed carrier signal is then coupled from the secondary winding of Z1301 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 5500.0 kc. In the single conversion mixing process, these sidebands become inverted on 80 and 40 meters. Thus the Swan 350C operates on lower sideband on 80 and 40, while on 20, 15, and 10 meters operations 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 D1601 across the bias supply voltage, also contributes to the stability. Bandswitching is accomplished by changing the tank circuit coil. The VFO in the Model 350C 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 2 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.

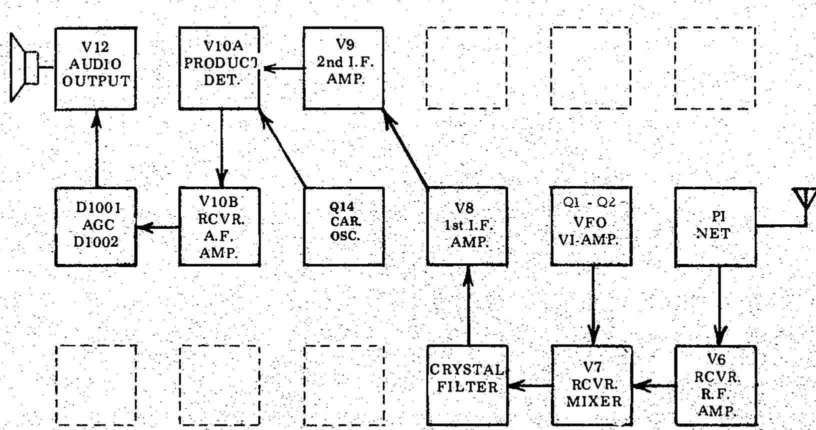


FIGURE 1 BLOCK DIAGRAM, RECEIVE MODE

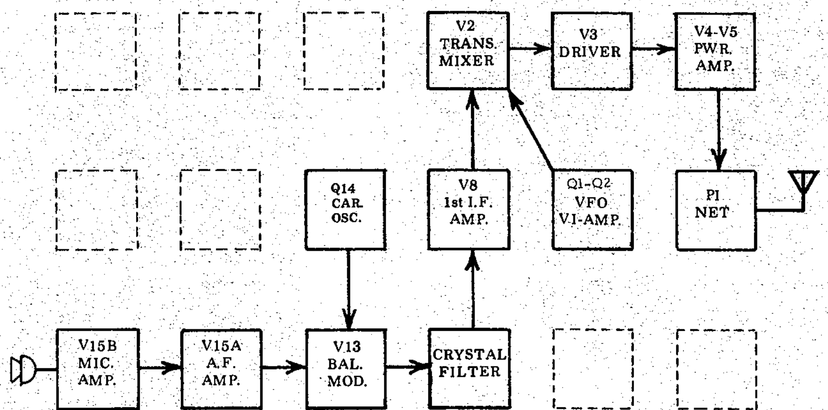


FIGURE 2 BLOCK DIAGRAM, TRANSMIT MODE

A. Circuit Theory (Cont)

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.

TUNE AND CW OPERATION

(See page 9 for Tuning Instructions)

Normally, the frequency of the carrier oscillator is approximately 300 cps outside the 6 db passband of the crystal lattice filter. In TUNE position, the frequency of the carrier oscillator is moved approximately 500 cps to place it well within the passband of the crystal lattice filter. A similar procedure is followed for CW to allow full carrier output during CW operation. During CW operation, the cathode of V15A is disconnected from ground. This allows CW operation with no accidental audio modulation from the microphone.

RECEIVE

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, Q14. The resultant audio signal is then amplified by V10B, which then couples to V12, the output audio stage.

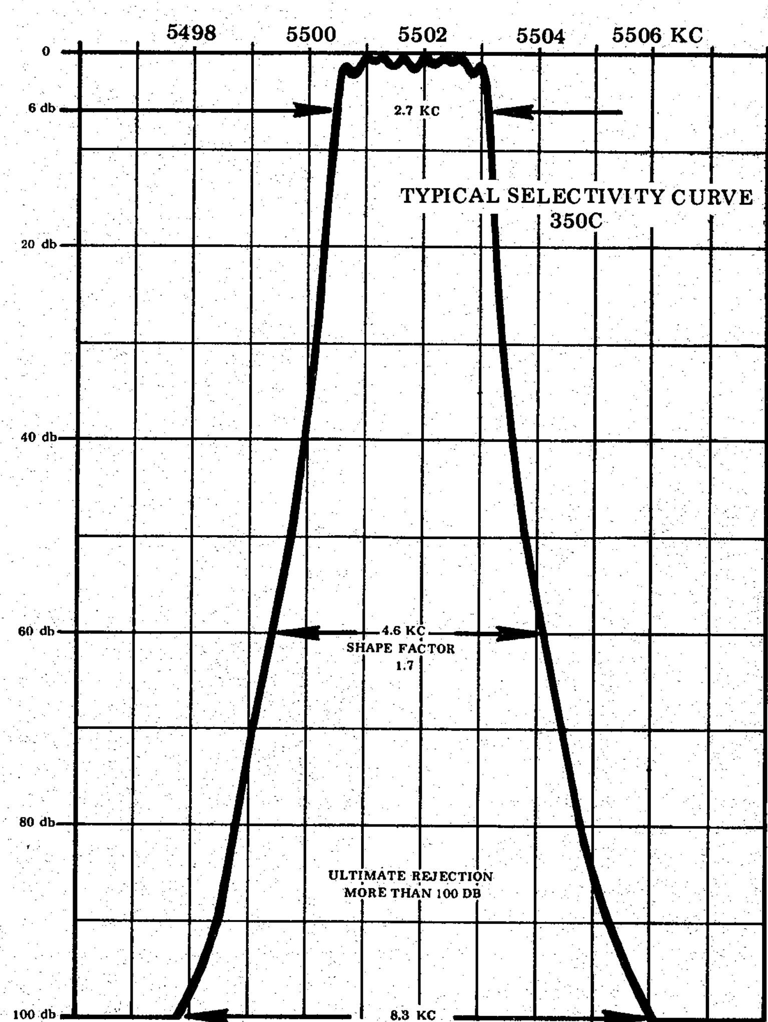


FIGURE 3 CRYSTAL FILTER, TYPICAL CHARACTERISTIC

FREQUENCY CALIBRATION

Frequency calibration of the Model 350C is in 5 kc increments on 80-,40-,20-, and 15-meters, and in 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 very good on the 350C, but caution must always be observed when operating near band edges. A 100 kc calibrator kit is available for installation in the 350C, and is useful for checking band edges.

DIAL SET

A dial-set has been provided so that dial adjustment can be made at any 100 kc point of the dial.

TRANSMIT AND RECEIVE SWITCHING

Transmit and receive switching is performed by relays K1 and K2. In TRANSMIT position, only those tubes that operate in the transmit mode are operative, all others being biased to cutoff through the relay contacts. In the RECEIVE position, with the relays de-energized, the tubes that are used only in transmit are cut off in the same manner. Relay K2 when de-energized, feeds signals from the output pi-network to the receiver, and is used also to control external switching circuits. In transmit position the meter indicates the combined cathode current of the two power amplifiers. In receive position, it indicates the voltage across R903 in the screen grid of the Second IF Amplifier, V9, which is inversely proportional to the AGC voltage used to control the gain of the tube. Thus, the meter indicates the relative strength of received signals.

POWER RATING

The Swan 350C is capable of 400 watts, PEP input under steady state two-tone test conditions, when operated with any of the recommended power supplies. The peak envelope power, when voice modulated, is considerably greater, typically 550 watts, or more.

A. Circuit Theory (Cont)

Recommended power supplies produce a no-load plate voltage of approximately 925 volts. Under TUNE conditions, or CW operation, this voltage will drop to approximately 720 volts. Under steady state two-tone modulation, the voltage will drop to approximately 750 volts. If the power amplifier idling current is 50 ma, and the two-tone current, just before flat-topping, is 400 ma, the peak two-tone current will be 600 ma. Under these conditions the PEP input will be 750 volts times 600 ma = 450 watts. Under voice modulation, because average power is considerably less, the power amplifier plate and screen voltages will be maintained higher, even during voice peaks, by the power supply filter capacitors. Peak plate current will therefore also be higher than with two-tone test conditions. Under typical operating conditions, peak plate current before flat-topping will be 675 ma at 800 volts, to result in an input of 540 watts, PEP. Readings of cathode current will not reflect this 540 watt power input, however, because of the damping in the cathode current meter. Cathode current readings under normal voice input should not exceed approximately 165 to 200 ma.

POWER AMPLIFIER PLATE DISSIPATION

There is often a misunderstanding about the plate dissipation of tubes operated as AB1 amplifiers under voice modulation. In the Swan 350C, while in the transmit position, and with no modulation, the plate voltage will be 890 volts, the plate current 50 ma, and the power input will be 45 watts.

Authorities agree that the average voice power is 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 conitions, the average power input will be 125 watts, and average plate current will be 156 ma. With power amplifier efficiency of 65 percent, plate dissipation will be 44 watts, or 22 watts per tube. The 6LQ6 is rated at 30 watts, continuous duty cycle, in normal TV service. Thus it can be seen that under normal operating conditions, the power amplifier tubes in the Swan 350C are not being driven very hard. Note, however, that proper modulation level must be maintained by correct setting of Mic. Gain, and that the length of time in TUNE position must be limited to not more than 30 sec. at a time.

B. INSTALLATION

GENERAL

The Swan 350C transceiver has been designed to provide the utmost in ease of operation, stability, versatility, and enjoyment. Maximum enjoyment from your Swan will depend to a great extent on the installation. For fixed station or portable use, operation with the Model 117-XC power supply provides a compact arrangement with maximum ease of operation. All switching is performed in the transceiver. For mobile installations, the Model 14-117 supply provides similar switching arrangements, and speaker output may be fed to an optional 3 x 5 speaker with mounting provisions on the inside of 350C cabinet. Alternately, the speaker output may be fed through the car broadcast radio speaker.

POWER SUPPLY

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. 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 350C 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

	Pin	Nominal	Minimum	Maximum
High Voltage	8	800 VDC 550 MA	600 VDC Low Pwr.	1200 VDC Hi. Power
Medium Voltage	10	275 VDC 150 MA	225 VDC	325 VDC
Bias Voltage	3	-110 VDC 100 MA	-100 VDC	-130 VDC
Filament Voltage	4	12.6 V* 5.2 amp	11.5 V	14.5 V
Relay Voltage	5	12 VDC 250 MA	10 VDC	14.5 VDC
*AC or DC				

EXTERNAL SWITCHING

On the rear of the 350C chassis is a three lug terminal connection for external switching. These connections are marked "R" (receive), "C" (common), and "T" (transmit). When in the receive position the "R" and "C" terminals are connected and in transit the "T" and "C" terminals are connected. These connections are made through relay K2 and are used for switching an antenna relay, a final amplifier, etc.

EXTERNAL SPEAKER CONNECTIONS

Audio output from the transceiver is provided at pin 12 of the Jones plug, and to a terminal lug located near V12 audio output tube on top of chassis for optional "3 x 5" internal speaker. The other speaker lead goes to the common chassis ground at pin 6 of Jones plug or to ground terminal at the terminal strip. For mobile installations, mounting a "3 x 5" internal speaker makes the installation simple. In case you wish to use the car broadcast radio speaker a DPDT selector switch should be installed to select either the broadcast radio or transceiver output. Provisions for headphones will be found on front of AC Power Supply. It is recommended that high impedance phones be used for best results.

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 transceiver provides all the restriction necessary on audio response, and further restriction in the microphone is not required. It is more important to have a microphone with a smooth, flat response throughout the speech range. The microphone plug must be a standard 1/4 in. diameter three-contact type. The tip connection is for push-to-talk relay control, the ring connector is the microphone terminal, and the sleeve is the common chassis ground. The microphone manufacturer's instructions should be followed in connecting the microphone cable to the plug. With many microphones, the push-to-talk button must be pressed to make the microphone operative. For VOX operation, this feature may be disabled, if desired, by opening the microphone case and permanently connecting the contacts which control the microphone.

ANTENNA

Any of the common antenna systems designed for use on the high frequency amateur bands may be used with the Swan transceiver, provided the input impedance of the transmission line is not outside the capability of the pi-output matching network. The transmission line should be of the coaxial cable type. An antenna system which shows a standing wave ratio of less than 4:1 when using 50 or 75 ohm coaxial transmission line, or a system that results in a transmission line input impedance that is essentially resistive, and between 15 and 500 ohms will take power from the transceiver with little difficulty. If open-wire or balanced type transmission line is used with the antenna, a suitable antenna tuner is recommended between the transreceiver and the feedline. Methods of constructing and operating such tuners are described in detail in the ARRL Antenna Handbook, and similar publications. For operation on the 75- and 40- meter bands, a simple dipole antenna, cut to resonate in the most used portion of the band, will perform satisfactorily. For operation on the 10, 15, 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.

MOBILE ANTENNA

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 350C are:

1. 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 55,5 band "Swantennas".
2. The loading coil must be capable of handling the power of the Model 350C without over heating. In TUNE position, the power output of the transceiver may exceed 250 watts. Wide spaced, heavy wire loading coils are essential.
3. The SWR bridge is a useful instrument, but unfortunately it is quite often misunderstood, and over rated in importance. Basically, the SWR bridge will indicate how closely the antenna load impedance matches the transmission line. With long transmission lines, such as will be used in many fixed station installations, it is desirable to keep the impedance match fairly close in order to limit power loss. This is particularly true at the higher frequencies. The longer the line, and the higher the frequency, the more important SWR becomes. However, in mobile installations the transmission line seldom exceeds 20 feet in length, and an SWR of even 4 to 1 adds very little to power loss. The only time SWR will indicate a low figure is when the antenna presents a load close to 50 ohms, but many mobile antennas will have a base impedance as low as 15 or 20 ohms at their resonant frequency. In such a case, SWR will indicate 3 or 4 to 1, and yet the system will be radiating efficiently.
4. The really important factor in your mobile antenna is that it should be carefully tuned to resonance at the desired frequency. The fallacy in using an SWR bridge lies in the fact that it is sometimes possible to reduce the SWR reading by detuning the antenna. Field strength may actually be reduced in an effort to bring SWR down. Since field strength is the primary goal, we recommend a Field Strength Meter for antenna tuning.

5. For antenna adjustments, the Swan-350C may be loaded lightly to about 100 ma. cathode current instead of the usual 500 ma. This will limit tube dissipation during adjustments, and will also help reduce interference on the frequency. In any case, do not leave the transmitter on for very long at one time. Turn it on just long enough to tune and load, and get a field strength reading.

   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.

CONTROL FUNCTIONS

ON-OFF SWITCH (On AF Gain Knob)	Turns power supply on and off
CAL-REC-TUNE-CW	
Calibrate	**All voltages are applied to transceiver. Grounds cathode of V17 if calibrator kit has been installed. Removes ground from cathode of V15A.**
Receive	All voltages are applied to transceiver.
Transmit (Push-to-Talk)	12 volt dc circuit through relay K1 and K2 is completed, and tubes used only in receive are biased to cutoff.
Tune-CW	**All circuits for transmit are energized, as above. Capacitor C1401 in the carrier oscillator is removed from ground.**
MIC. GAIN	Contols potentiometer R1503 in the grid of V15A and controls amount of audio to the balanced modulator.
CAR. BALANCE	Controls potentiometer R1305 in the balanced modulator deflection plate circuit, and permits nulling out the carrier.
RF GAIN	Controls variable resistor R609, common in the grids of receiver mixer V7, RF Amplifier, V8 and V9 IF Amplifiers.
AF GAIN	Controls potentiometer R1201 in grid circuit of V12 AF Output, and controls audio volume.
MAIN TUNING	Controls C1706 in frequency determining tank circuit of VFO.
PA GRID	Controls CIA and CIB in plate tanks of transmitter mixer and driver.
PA TUNE	Controls C417 on pi-network to tune final power amplifier plate to resonance.
PA LOAD, Fine	Controls C420 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.
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.

C. OPERATION

Before connecting any cables to the Swan 350C perform the following steps:

1. Rotate the PA BIAS control on the rear chassis apron, fully counter clockwise.
2. Rotate the CAL-REC-TUNE-CW on the lower left of the front panel counter clockwise to REC.
3. Rotate the AF GAIN Control counter clockwise to operate the power switch to OFF.

POWER SUPPLY, ANTENNA AND GROUND CONNECTIONS

1. Connect wire from earth ground to ground stud provided on rear of chassis.
2. Connect a 50 to 75 ohm antenna feed-line to the coaxial connector on the rear chassis panel.
3. Connect the power supply cable to the Jones connector on the rear chassis apron.
4. Connect the power supply to the proper voltage source.

The Swan Model 350C may be operated from 117 volts, ac, 50 - 60 cycle power with the Model 117-XC power supply, or from 230 volts, 50 - 60 cycles with the Model 230-XC. The Model 350C may be operated from a 12 volt dc source with the Swan Model 14-117 power supply.

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.

RECEIVE 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 counter-clockwise.
   (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 operating 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 350C 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 4000 KC. Below the green scale is the 10 meter scale, reading from 28 to 29.7 MC. The dial window retains the familiar Swan double index lines which serve to indicate the passband of the transceiver, that is, the portion of the spectrum to which you are listening and in which you are transmitting. Actual carrier frequency is indicated by the left hand index line for upper sideband, and by the right hand line lower sideband. In other words, when using upper sideband the carrier is the left hand index line and you are transmitting and receiving side band information above this frequency, and up to the right hand line. On lower sideband the opposite takes place.

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'll gradually waltz one another across the band. If both of you are mistuning to an unnatural higher pitch, you'll 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 tune him in properly, but this is not true. With a little practice, it will be 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-driven and is generating excessive distortion. There is no mistaking when you have a station tuned right on the nose. It will sound just like "AM", so to speak. Mainly, avoid the habit of tuning so everyone sounds higher than normal pitch, or like Donald Duck. This is incorrect, unnecessary, and sounds terrible.
3. A vernier control for receive frequency, sometimes referred to as "incremental tuning", is not available on the Swan-350C. Such a device is not necessary if proper tuning habits are exercised.
4. Your Swan-350C will automatically transmit on exactly the same frequency as the one to which you are listening. There is no adjustment for making them the same, since by using the same oscillator for both send and receive, it happens automatically. If separation of receive and transmit frequency control is desired, the model 406C or 410C VFO unit may be used. In this case, the model 22 dual VFO adaptor must be installed in the 350C.

TRANSMITTER TUNING

CAUTION:

The Model 350C covers several frequency ranges outside the amateur bands. Care must be exercised not to transmit on these frequencies.

Tuning of the transmitter is not complicated, provided the few simple steps are followed in the correct order. Do not attempt initial tuneup without first performing the procedures for Receive operation described above. The following procedures assume that the unit has been checked out in Receive position, and a high impedance push-to-talk microphone is inserted in the MIC. JACK.

1. Press Push-to-Talk to place unit in TRANSMIT, read the cathode current on the meter.
2. Quickly rotate the CAR. BAL. control on the front panel until the meter reads minimum cathode current.
3. Next, adjust the PA BIAS control on the rear of the chassis until the meter reads 50 ma.
4. If this is the first time the transceiver is being tuned to this band, set the COARSE LOAD switch to position 2. After experience in tuning up, the control may be set to whatever position has been found to be optimum on each respective band. Now, in rapid succession:
   (a) Turn the CAR. BAL. control clockwise until a slight increase in meter reading is obtained.
   (b) Rotate the PA GRID control for maximum meter reading.
   (c) Rotate the PA PLATE control for minimum meter reading.
   (d) Adjust CAR. BAL. for a reading of 150 ma.

   IMPORTANT — Tuning the PA PLATE for minimum, or "dip," is known as "resonating" the power amplifier plate circuit, and is very important to preserving tube life. If the transceiver is held in Transmit or TUNE position for more than a few seconds while out of resonance and with some grid drive, the 6LQ6 tubes may be severely damaged. For this reason we repeat: CAUTION—Do not hold the transceiver in Transmit or TUNE position for any length of time without "dipping" the PA PLATE control. The PA GRID must first be "peaked" as in (b), above, and this requires some carrier supplied as described in (a), so it can be seen that these steps must be performed quickly. If the COARSE LOAD control is too far clockwise, it may not be possible to find a "dip" with the PA PLATE control. For this reason, be sure to observe the first sentence in this section, Step 4.

5. Now rotate the CAL-REC. TUNE-CW switch to the TUNE position. Quickly check the P.A. PLATE control for "dip" or minimum reading. If the meter dips to less than 500 ma., increase loading by rotating the PA LOAD controls clockwise. After each increase in PA LOAD resonate the PA PLATE again; that is, adjust it for dip. Continue increasing PA LOAD until the PA PLATE dips to 500-550 ma. Then switch back to RECEIVE. NOTE: For 10 meter operation it will be necessary first to repeak the PA grid control for maximum output in the tune position.

CAUTION: Do not hold the transceiver in

TUNE position for more than 30 seconds at a time, even though PA PLATE is resonated. With full grid drive to the 6LQ6 PA tubes, which you have in TUNE position, they are dissipating considerably more power than they do during normal voice transmission, so a short tuning period must be observed.

6. Under some conditions, it may not be possible to load up to 550 ma. This may occur with lower than normal line voltage or tubes not quite up to par, particularly on 10 and 15 meters. The current increases when tuning the plate circuit off reasonance will provide a clue as to how far the power amplifier can be loaded. If the meter swings up to 600 or 700 ma. on either side of resonance, it will be easy to load up to 550 or even more. But, if the tubes draw just 550 ma. off resonance, you can only load to 450 or 500 ma. This is not necessarily a sign that you have a problem. Peak input power with voice modulation will still be 400 watts when you load to 400 ma. in TUNE position. A new pair of PA tubes may allow you to load higher, or possibly a new driver tube will help. Primarily, the level to which you can load will serve as an indication of when tubes are deteriorating. If you can load to 550 ma. when the set is new, and after a few months of operating you cannot get above 400 ma., or so, it is probably time to replace the 6LQ6 tubes, and possibly the 6GK6 driver. The other tubes should also be checked at that time.

7. AVERAGE PA LOAD SWITCH POSITIONS. The following positions are for a 50 ohms non-inductive load, and indicate approximately where the PA LOAD switch will end if the antenna and coaxial cable are well matched.

BAND	PA LOAD SWITCH
80	POS. 4
40	5
20	6
15	6
10	7

A large deviation from these positions indicates a possible matching problem, although operation may still be quite satisfactory. PA LOAD switch positions below 4 will generally be needed only with very low impedance loads, such as a 75 meter mobile antenna with center loading coil.

8. VOICE TRANSMISSION. After tuning up as outlined above, press the Push-to-Talk button on the mike and carefully set the CAR. BAL. control for minimum meter reading. 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 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 520 watt power rating of your Swan transceiver, and signal reports will verify this fact. NOTE: Transceiver will not modulate with Function Switch in CAL. position.

9. TRANSMITTER TUNING WITH SWR BRIDGE OR FIELD STRENGTH METER. If either of these instruments is available, they are highly recommended as a better method of tuning the PA Amplifier, since they provide a direct indication of relative output. With the SWR Bridge in Forward position, or with the Field Strength Meter set to pick up a portion of the radiated power, simply adjust the PA TUNE and PA LOAD controls for maximum output. This must be done quickly, limited to about 30 seconds, to limit tube dissipation as previously mentioned. This method will result in maximum possible output and efficiency, as well as maximum linearity. You will probably find that cathode current readings end up somewhat less than 500 ma. on 10 meters because grid drive is the least on this band. On 80 meters where grid drive is the greatest, maximum output will be reached at more than 550 ma. These are a normal condition.

NOTE—The cathode current level to which the PA is loaded will have no bearing on tube life. When transmitting with normal voice modulation, average power input will be the same regardless of how high or low the PA was loaded while tuning. Peak output, linearity, and lowest distortion will go along with maximum loading. In other words, you will not extend tube life by loading to a lesser degree. The secret to long tube life is simply to keep TUNE-up periods short and not too frequent.

AM OPERATION (Single Sideband With Carrier)

1. Tune transmitter to full output on single sideband as described above.
2. Rotate MIC GAIN control to minimum full CCW.
3. With Push-to-Talk pressed, rotate CAR. BAL. control until cathode current is approximately 150 ma.
4. 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.

ALIGNMENT AND TROUBLESHOOTING

[illegible]ERAL

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 4 and 5 for component placement.

Equipment Required

1. Calibrated audio frequency signal generator, range 200 to 5000 cps.
2. 500 watt dummy load with output meter
3. Vacuum tube voltmeter
4. Walsco 2543 coil adjustment tool
5. Field strength meter
6. Calibrated RF Signal Generator

Pre-Alignment Conditions

1. Neutralizing capacitors C413 set to mid-point and C315 set to approximately 3/4 turn from full compression.
2. Peak IF transformers for maximum background noise with AF and RF gain full clockwise (either bottom or top core adjustment).
3. Loosely couple field strength meter to C318 (off pin 9 of V4) with alligator clip on ceramic capacitor body.
4. Transmit bias potentiometer full counter-clockwise (maximum bias).

VFO AMPLIFIER PLATE CIRCUIT ALIGNMENT

With VTVM from pin 1 of V7, Receiver Mixer, to ground, on -15 volt scale, adjust VFO Amplifier Plate coils for peak VTVM heading as follows:

Band	VFO Frequency (kc)	Dial Frequency (kc)	Coil
80	9,300	3,800	L104
40	12,225	7,125	L103
15	15,725	21,225	L102
10	23,000	28,500	L101

TRANSMITTER MIXER AND DRIVER PLATE CIRCUIT ALIGNMENT

1. Remove screen voltage from V4 and V5 by disconnecting the wire from terminal strip immediately adjacent to V5 base. (A, Fig. 5).
2. Connect VTVM across 402,1K resistor on terminal strip, using 50 volt scale. (Points B and C, Fig. 5)

Procedure:

Adjust band switch and P.A. Grid as shown, and adjust coils for peak VTVM reading as follows, with function switch in Tune position:

Band	P.A. Grid	Dial Freq. (kc)	Adjust
80	12 o'clock	3,800	L205, L305
40	11 o'clock	7,150	L204, L304
20	11 o'clock	14,150	L203, L303
15	2 o'clock	21,450	L202, L302
10	2:30 o'clock	29.7	L201, L301

*Note: If VTVM and field strength meter exceed full scale reading, switch to REC. position, actuate push-to-talk circuit, and insert carrier with carrier balance control to keep reading on scale. Field strength meter and VTVM must both peak at same time since it is possible to tune the coils to the VFO frequency on 10 meters. Care must be taken that the coils be tuned properly.

Following the above procedures, replace screen wire to pin 1 of terminal strip adjacent to V5.

CW - FUNCTION AND OPERATION

In the RECEIVE mode the carrier oscillator frequency is approximately 300 cycles outside the 6 db passband of the crystal lattice filter. In the TUNE-CW mode, the carrier frequency is moved approximately 800 cycles higher, placing it well inside the passband. This not only provides full driving power for the CW transmission, but also results in "off-set" frequency while transmitting so that if two stations in contact are both using transceivers they will hear on 800 cycle tone instead of being zero beat.

CW OPERATING STEPS

1. Tune transmitter to full output, the same as for SSB operation.
2. Insert a CW key into the key jack provided on back of the 350C. Use a standard 1/4 inch diameter 2 circuit phone plug.
3. Switch to TUNE-CW position to transmit. Back to RECEIVE for receiving.

BREAK-IN CW KEYING AND SIDETONE OSCILLATOR

These features may be added to the 350C if desired. Refer to pages 27, 28, 29 and 30 for modification data.

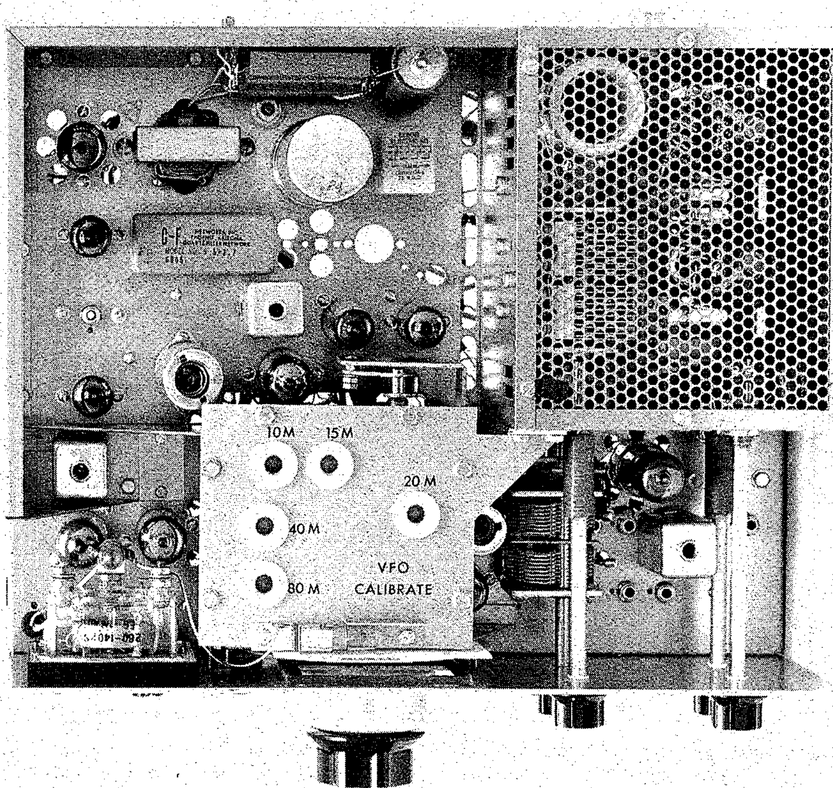


FIGURE 4
TOP VIEW,
MODEL 350C
TRANSCEIVER

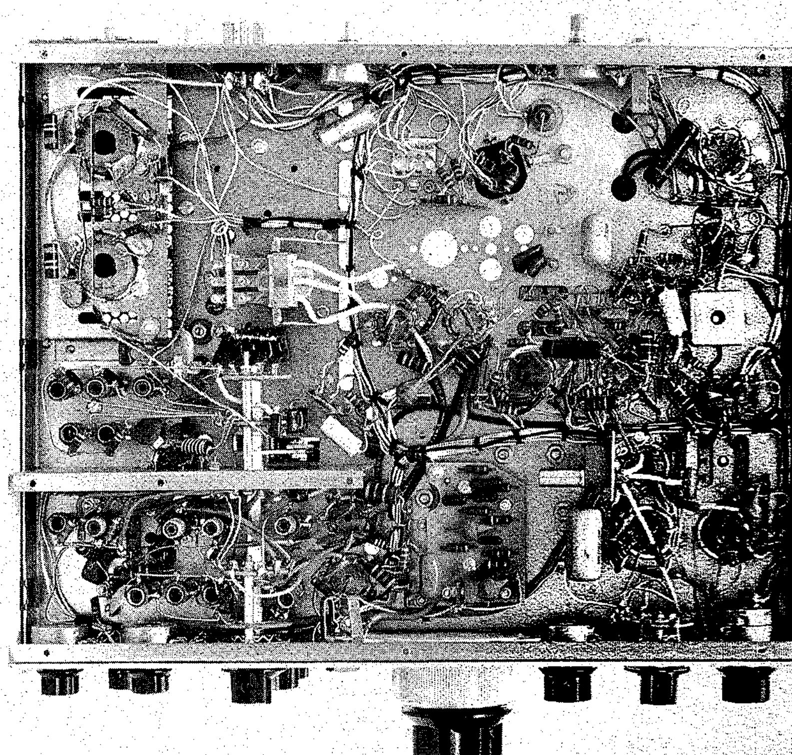


FIGURE 5
BOTTOM VIEW,
MODEL 350C
TRANSCEIVER

ADJUSTMENT OF CARRIER FREQUENCY

A. With dummy load and output meter attached, tune transceiver for maximum output.

B. Null out carrier with PTT pressed and set resting plate current to 50 ma with bias pot.

C. Connect AF generator to MIC JACK, adjust MIC. GAIN full CCW.

Procedure:

1. With AF generator at 1500 cps, increase MIC. GAIN to produce a 100 ma. reading on the meter.
2. Adjust Z801 for maximum meter reading.
3. Adjust both top and bottom cores of Z1301 for maximum meter reading.
4. Adjust MIC. GAIN for meter reading of 300 ma.
5. Set AF generator to 300 cps. Adjust C1402 for meter reading of 75 ma.

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 PA 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 PA plate control at the peak and adjust C413 to reduce Ip to 200 MA. Repeat above check and readjust as necessary to obtain the desired smooth dip. For 10 meters, use above procedure but adjust #C 315.

S-METER ADJUSTMENT

With antenna disconnected and with RF Gain fully clockwise, set R907, located on rear panel, for zero meter reading. Make sure no local signals are being received. It will be noticed that a slight change in S-meter zero setting will change when switching from band to band. Also, when using the ANL circuit there will be a decrease in the S-Meter reading. This is normal.

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.

Dial Frequency	Oscillator Frequency
3500	9000
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

VOLTAGE CHART

TUBE TYPE		PIN NO.											
		1	2	3	4	5	6	7	8	9	10	11	12
V1 6EW6	R	0	.75	6.3	0	130	130	0					
	T	0	.75	6.3	0	125	125	0					
V2 12BE6	R	-90	0	12.6	0	245	240	-90					
	T	-2.0	0	12.6	0	245	100	0					
V3 6GK6	R	0	-30	0	6.3	0	0	255	255	0			
	T	0	-6.0	0	6.3	0	0	250	250	0			
V4 6LQ6	R	6.3	—	—	0	-75	0	—	0	-75	0	—	0
	T	6.3	—	—	.12	-75	215	—	215	-75	.12	—	0
V5 6LQ6	R	12.6	—	—	0	-75	0	—	0	-75	0	—	6.3
	T	12.6	—	—	.12	-75	215	—	215	-75	.12	—	6.3
V6 12BZ6	R	-.05	.8	0	6.3	230	140	0					
	T	-.5	0	0	6.3	230	-20	0					
V7 12BE6	R	-3.0	0	12.6	0	235	75	.1					
	T	-3.0	0	12.6	0	210	-20	.3					
V8 6EW6	R	-.1	.5	12.6	6.3	230	130	0					
	T	-.1	0.5	12.6	6.3	205	120	0					
V9 12BA6	R	-.05	0	12.6	0	230	105	3.2					
	T	-.5	0	12.6	0	220	-15	0					
V10 12AX7	R	110	-.05	1	12.6	0	160	0	1.5	6.3			
	T	40	-.25	-.5	12.6	0	155	-100	5	6.3			
V11 6BN8	R	0.2	2.5	0.2	12.6	6.3	0	200	.4	70			
	T	0	2.3	0	12.6	6.3	-.3	100	.2	40			
V12 6GK6	R	0	-4	—	12.6	6.3	—	240	230	0			
	T	0	-4	—	12.6	6.3	—	250	220	0			
V13 6JH8	R	12	11	0	6.3	0	-100	0	270	270			
	T	12	11	0	6.3	0	0	0	190	190			
V15 12AX7	R	95	0	0.8			70	0.2	0	0			
	T	50	0	0.3	6.3	-6.3	50	0.2	0	0			
V17 12BA6	R	0	0	12.6	0	240	240	70					
	T	0	0	12.6	0	240	240	70					

All Voltage Measurements Made With Simpson 260, 20 K Ohms per Volt, Or Equivalent

TROUBLESHOOTING GUIDE

DEFECT	POSSIBLE CAUSE
PA IDLING CURRENT UNSTABLE	1. Defective 6LQ6 — See NOTE 2. Defective Bias Potentiometer 3. Defective Bias Supply
INABILITY TO LOAD TO 400-500 MA. (SEE PAGE 10)	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. R407 or R408 Defective
INSUFFICIENT CARRIER SUPPRESSION	1. Carrier Balance Control Improperly Adjusted 2. Defective 6JH8 Balanced Modulator 3. Carrier Oscillator Frequency Incorrect
INSUFFICIENT SIDEBAND SUPPRESSION	1. Excessive MIC. Gain 2. Incorrect PA Load Adjustment 3. Carrier Oscillator Frequency Incorrect
MICROPHONICS IN RECEIVER	1. Z901 Improperly Tuned 2. V10, V8, V7, or V6 Defective
LOW RECEIVER SENSITIVITY	1. PA Grid, Plate, or Load Improperly Set 2. Bandswitch Improperly Set 3. K2 Back Contacts Defective 4. V6, V7, V8, V9, V10, V12 Defective

NOTE:
It is recommended that the final tubes be replaced with RCA tubes.

CAPACITORS

C101	.002, 20% 1 KV Disc
C102	.01, +80-20%, 500V Disc
C103	.002, 20% 1 KV Disc
C104	.01, +80-20%, 500V Disc
C106	.01, +80-20%, 500V Disc
C107	10, 5% 500V Mica
C201	01, +80-20%, 500V Disc
C202	40-30-20 Mfd. 450-450-25 WV Elect. 40-40 Mfd 450 WVDC
C203	.002, 20% 1KV Disc
C204	.001, 5% 500V Mica
C205	100, 5% 500V Mica
C207	120, 5% 500V Mica
C209	20, 5% 500V Mica
C210	20, 5% 500V Mica
C211	50, 5% 500V Mica
C213	3.3 pf 10% 500V Ceramic
C214	.1 mf 10% 200V Mylar
C301	.01 +80-20%, 500V Disc
C302	.01 +80-20%, 500V Disc
C303	120 5% 500V Mica
C304	100 5% 500V Mica
C305	100, 5% 500V Mica
C306	24, 5% 500V Mica
C307	50, 5% 500V Mica
C308	.002, 20% 1 KV Disc
C309	510. 5% 500V Disc
C310	540, 5% 500V Mica
C311	100, 5% 500V Mica
C312	680, 5% 500V Mica
C313	50, 5% 500V Mica
C314	91, 5% 500V Mica
C315	1.5-20 pf Mica Trimmer
C316	15, 20% 3 KV Disc
C317	220, 5% 500V Mica
C318	.002, 20% 1 KV Disc
C401	.002, 20% 1 KV Disc
C403	.01, +80-20%, 500V Disc
C404	.01, +80-20%, 500V Disc
C405	.01, +80-20%, 500V Disc
C407	.01, +80-20%, 500V Disc
C408	.01, +80-20%, 500V Disc
C409	.01, +80-20%, 500V Disc
C412	.002, 20% 2 KV Disc
C413	20 pf P.A. Neut, Trimmer
C414	15, 20% 3 KV Disc
C415	270, 5% 2500V Mica
C416	270, 5% 2500V Mica
C417	360 pf P.A. Tune
C418	50 10% 6 KV Disc
C419	100 10% 6 KV Disc
C420	410 pf P.A. Fine Load
C421	Two 150-5% 1000 WV Mica
C422	Two 150-5% 1000 WV Mica
C423	330, 10% 500V Mica
C424	330, 10% 500V Mica
C425	330, 10% 500V Mica
C426	330, 10% 500V Mica
C432	.01 Disc SM
C601	.01 +80-20%, 500V Disc
C602	.01 +80-20%, 500V Disc
C603	.01 +80-20%, 500V Disc
C701	30, 10% 1 KV Disc
C702	30, 10% 1 KV Disc
C703	.01 +80-20%, 500V Disc
C704	220 5% 500V Mica
C705	430 5% 500V Mica
C709	.01, +80-20% 500V Disc
C802	.01, +80-20% 500V Disc
C803	.01, +80-20% 500V Disc
C804	10, 10% 1 KV Disc
C805	.01, +80-20% 500V Disc
C806	50 5% N750 Disc
C807	50 5% N750 Disc
C901	.01 +80-20% 500V Disc
C902	.01 +80-20% 500V Disc
C903	.01 +80-20% 500V Disc
C904	.01 +80-20% 500V Disc
C1001	150, 5% 500V Mica
C1002	220, 20% 1 KV Disc
C1003	.002, 20% 1 KV Disc
C1004	.22-200V
C1005	.002, 20% 1 KV Disc
C1006	.002 20% 1 KV Disc
C1101	.001 20% 1 KV Disc
C1201	.01 +80-20% 500V Disc
C1202	220 20% 1 KV Disc
C1203	.0047 10% 1000V Mylar
C1301	.01 +80-20% 500V Disc
C1302	220 20% 1 KV Disc
C1303	.01 + 80-20% 500V Disc
C1304	.002 20% 1 KV Disc
C1305	.01 +80-20% 500V Disc
C1306	.01 +80-20% 500V Disc
C1401	10, 5% 500V Mica
C1402	270, 5% 500V Mica
C1403	270, 5% 500V Mica
C1404	.01 +80-20% 500V Disc
C1405	6-30 pf Ceramic Trimmer
C1501	.01, 400V Mylar
C1502	.01 +80-20% 500V Disc
C1503	.01 +80-20% 500V Disc
C1504	100, 20% 1 KV Disc
C1505	.01 +80-20% 500V Disc
C1601	80 mf, 150 WV Electrolytic
C1602	.01 +80-20% 500V Disc
C1603	1MF 50V
C1604	2 MF 50V
C1701	270, 5% SM
C1702	470, 5% SM
C1703	430, 2% SM
C1704	27, 5% SM
C1705	430, 2% SM
C1706	5-12 Main Tuning
C1707	.01, 500V Disc
C1708	11.6 pf Trimmer
C1709	22, NEG Disc Selected
C1710	10, NPO Disc
C1711	5, NEG Disc Selected
C1712	11.6 pf Trimmer
C1713	10, NEG Disc Selected
C1714	30 NPO Disc
C1715	11.6 pf Trimmer
C1716	.01 500V Disc
C1717	2 pf Dial Set
C1718	10 NEG Disc Selected
C1719	10 NPO Disc
C1720	20, NEG Disc Selected
C1721	39, NPO Disc
C1722	11.6 pf Ceramic Trimme
C1723	2.5 NEG Disc Selected
C1724	6.7 pf Ceramic Trimmer

RESISTORS

R101	82 ohms
R102	56 ohms
R103	47K - 1 watt
R104	12K - 2 watt
R201	27K
R202	18K - 2 watt
R203	4.7K - 1 watt
R204	6.8K
R205	6.8K
R206	6.8K
R207	27K
R301	100K
R302	270K
R303	100 ohms
R304	6.8K
R305	6.8K
R306	10K
R402	1K
R403	100 ohms
R404	100 ohms
R405	Selected
R406	470-5% - 1/2W
R408	1 ohm-5% - 1 watt
R409	1 ohm-5% - 1 watt
R140	10K Bias Pot.
R411	10K - 1 watt
R601	100K
R602	56 ohms
R603	47K - 1 watt
R604	1K
R701	27K
R702	22K - 1 watt
R703	1K
R801	470 ohms
R802	56 ohms
R803	47K
R804	1K
R805	1K
R902	100 ohms
R903	27K - 1 watt
R904	47 ohms
R905	100K
R906	100K-5%
R907	1K S Meter Zero
R1001	10K
R1002	1K
R1003	100K
R1004	270K

R1005	1 Meg.
R1006	2.7 K
R1007	100 K
R1101	1K
R1201	1 Meg. A.F. Gain Pot
R1203	270K
R1301	47K
R1302	47K
R1303	150K
R1304	1K
R1305	5K CAR.BAL. Pot.
R1306	47K
R1307	47K
R1308	100K
R1309	100K
R1310	27K
R1401	18K
R1402	1.5K
R1403	2.2K
R1404	100
R1501	150K
R1502	1K
R1503	1 Meg. MIC Gain Pot.
R1504	270K
R1505	2.2 Meg.
R1506	47K
R1601	500 - 10 watt
R1602	900 - 10 watt
R1603	27K
R1604	27K
R1605	750 - 10 watt
R1608	100K
R1609	470K - 1 watt
R1610	270K
R1611	270K
R1612	10K RF Gain Pot.
R1613	270K
R1614	27K
R1701	1K, 5%
R1702	1K, 5%
R1703	1K, 5%
R1704	470 ohms 5%
R1705	2.7K
R1706	2.7K
R1707	470 ohms 5%

COILS

L101	23 mc-2 uh
L102	16 mc-4 uh
L103	12 mc-7 uh
L104	9 mc-4 uh
L201	28 mc-2 uh
L202	21 mc-2 uh
L203	14 mc-3.2 uh
L204	7 mc-3.6 uh
L205	4 mc-11 uh
L206	RFC - 200 uh
L301	28 mc-2 uh
L302	21 mc-2 uh
L303	14 mc-3.2 uh
L304	7 mc-3.6 uh
L305	4 mc-11 uh
L306	RFC - 200 uh
L401	14 mc-0.8 uh
L402	4 mc-6 uh
L403	RFC - 30 uh
L404	RFC - 100 uh
L405	RFC - 55 uh
L601	5500 kc - 90 uh
L701	RFC - 200 uh
L1001	RFC - 200 uh
L1701	80M-VFO Coil
L1702	40M-VFO Coil
L1703	20M-VFO Coil
L1704	15M-VFO Coil
L1705	10M-VFO Coil
L1706	RFC - 200 uh
L1707	RFC - 200 uh

TRANSFORMERS

Z301	Parasitic Suppressor
Z401	Parasitic Suppressor
Z501	Parasitic Suppressor
Z801	5500 kc I. F. Trans.
Z901	5500 kc I. F. Trans.
Z1301	5500 kc BAL. MOD. Trans.
T1201	A.F. Output Trans.

SWITCHES

S-1	Power On-Off (part of AF Gain Control)
S-2	CAL REC-TUNE-CW
S-4	A-B-C-D-E-F Bandswitch
S-5	PA Coarse Load
S-4G	OSC. Selector

DIODES

D1601	IN2974A Zener
D1603	IN5213 AGC Charging bypass

RELAYS

K1	4PDT Relay, 12 VDC Coil
K2	PDT Relay, 12 VDC Coil

CRYSTALS

Y1401	5500 KC Car. Osc.

TUBES

V1	6EW6 VFO Amplifier
V2	12BE6 Trans. Mixer
V3	6GK6 P.A. Drive
V4	6LQ6 Power Amplifier
V5	6LQ6 Power Amplifier
V6	12BZ6 Rec. R. F. Amp.
V7	12BE6 Rec. Mixer
V8	6EW6 1st I. F. Amp.
V9	12BA6 2nd I.F. Amp.
V10	12AX7 Prod. Det./Rec. A. F.
V11	6BN8 AGC Amp./Rect.
V12	6GK6 A. F. Output Amp.
V13	6JH8 Bal. Mod.
V15	12AX7 Mic. Amplifier

TRANSISTORS

Q1	2N706
Q2	2N706
Q14	2N706

C1101	.001 20% 500V Disc

R1101	470K
R1102	1K
R1103	47K
R1104	2.7K
R1105	270K

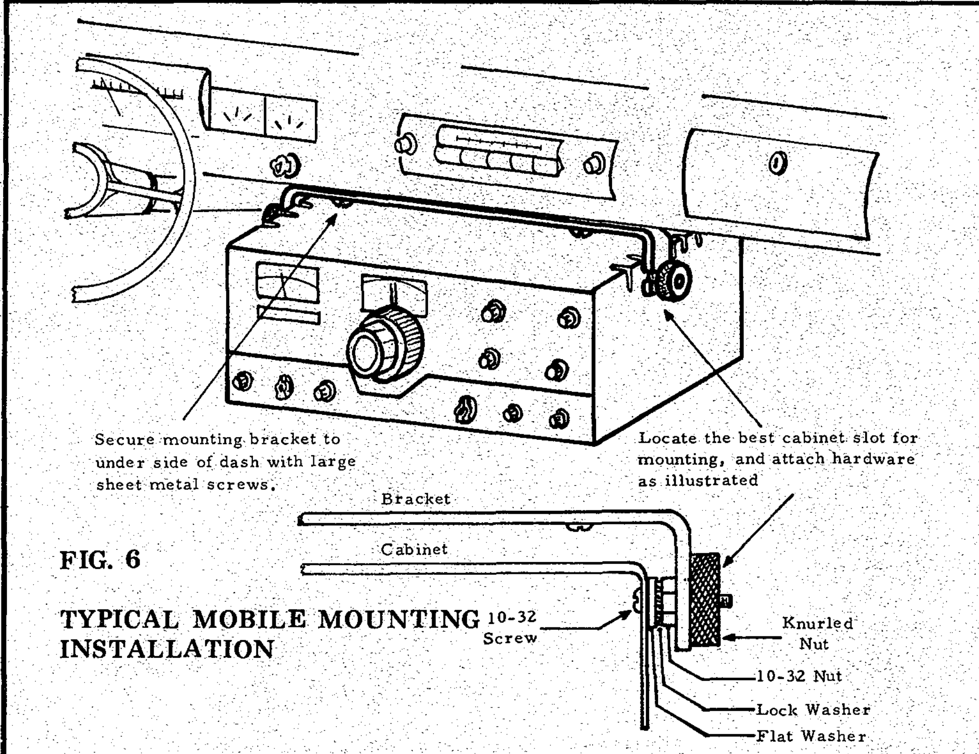


FIG. 6

TYPICAL MOBILE MOUNTING INSTALLATION

OUTBOARD VFO OPERATION WITH THE 350C

Various outboard VFO operations are possible with the Swan 350C.

SPLIT FREQUENCY OPERATION

For those desiring to work split frequency, transmit on one — receive on another, the model 22 DUAL VFO ADAPTOR is required. (See page 21.) Complete instructions are also supplied with each model 22. The 22 adaptor plugs into the VFO accessory socket which must be installed on back of the 350C. See page 20

SWAN-405X CRYSTAL CONTROLLED OSCILLATOR (See also page 19)

The model 405X crystal oscillator has been designed for crystal control operation on NET and MARS frequencies. Provision is made on back of the 350C for addition of a VFO accessory socket. The 405X may be plugged into this socket, or into the Model 22 Adaptor if it is used.

The Model 405X oscillator unit provides for added versatility with Swan transceivers by crystal controlling the operating frequency. Not only does this permit fixed frequency "net" operation in the 80, 40, and 20 meter amateur bands, but the 405X also permits operation outside the amateur bands for MARS, commercial, and other services.

The Model 350C will tune 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 mc

These ranges can be adjusted either up or down quite readily in the field or at the factory, if necessary.

NOTE: Frequencies between 5.1 and 5.9 mc cannot be used because of proximity to the 5500 kc I.F. system.

DUAL VFO ADAPTOR, Model 22 (See also page 21.)

If separate control of receive and transmit frequency is desired, the Model 22 Dual VFO adaptor is required. With the Model 22 adaptor plugged into the back of the 350C, the 405X plugs into the 22. The Model 22 adaptor has a selector switch which provides complete flexibility. Its position #1 provides transceive operation on the frequency of oscillator "A", (oscillator "A" is the internal VFO). In position #2 transmission will be on the frequency of oscillator "A" and reception on the frequency of oscillator "B" . . . Position #3 provides transceive operation on the frequency of oscillator "B".

405X CRYSTAL CONTROLLED EXTERNAL OSCILLATOR

For MARS operation, Net and other fixed channel operations.

SPECIAL NOTE: If both Upper and Lower Sideband operation is required on a given frequency channel, it will require two crystals in the 405X. This is because the I.F. carrier frequency moves 3 kc when the transceiver sideband selector control is switched. A corresponding 3 kc shift is required in the 405X in order to stay on the same frequency channel. Thus, if both sidebands are required, it will take two of the five crystal positions in the 405X. Upper and lower sideband on another channel will take up two more positions, leaving one more position available. Information is provided further on in these instructions for calculating crystal frequency. It is very important to remember that two controls must always be switched when changing sidebands. One is the sideband selector switch on the transceiver, and the other is the channel selector on the 405X.

(B) CALCULATION OF CRYSTAL FREQUENCIES.

1 - **For operation between 3200 and 4600 kc, (3.5 mc band):**

Lower Sideband (Normal): Channel frequency Plus 5500 kc
Upper Sideband (Opposite): Channel frequency Plus 5503.3 kc

2 - **For operation between 6800 and 8000 kc,**

Lower Sideband (Normal): Channel frequency Plus 5500 kc
Upper Sideband (Opposite): Channel frequency Plus 5503.3 kc

3 - **For operation between 13,800 and 15,000 kc, (14 mc band):**

Upper Sideband (Normal): Channel frequency Minus 5500 kc
Lower Sideband (Opposite): Channel frequency Minus 5503.3 kc

4 - **For operation between 20,900 and 21,500 kc, (21 mc band):**

Upper Sideband, (Normal): Channel frequency Minus 5500 kc
Lower Sideband, (Opposite): Channel frequency Minus 5503.3 kc

(C) INSTRUCTIONS FOR ORDERING CRYSTALS:

NOTE: Swan Electronics does not supply crystals for the 405X oscillator. They must be ordered direct from a crystal manufacturer in the following typical manner:

Name & Address of
Crystal Manufacturer

Gentlemen:

Please ship the following crystal(s) in the HC-6/U type holder with .093 inch diam. pins:

Quantity Frequency, plus or minus .0025 per cent, parallel resonance at 20 pf shunt capacity, 25 deg. cent.

.... kc

.... kc

.... (as calculated) .... kc

.... kc

.... kc

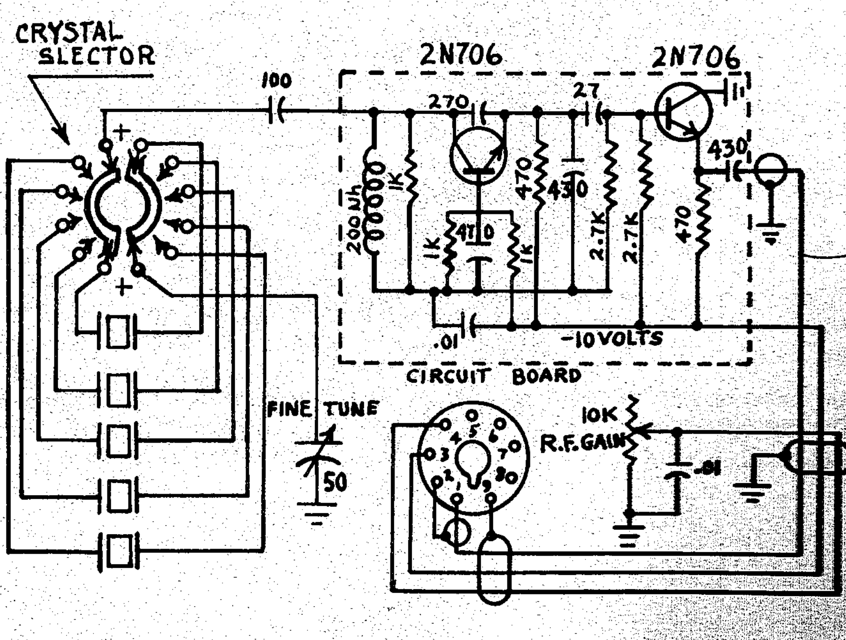


Fig. 7
Schematic
Model 405X

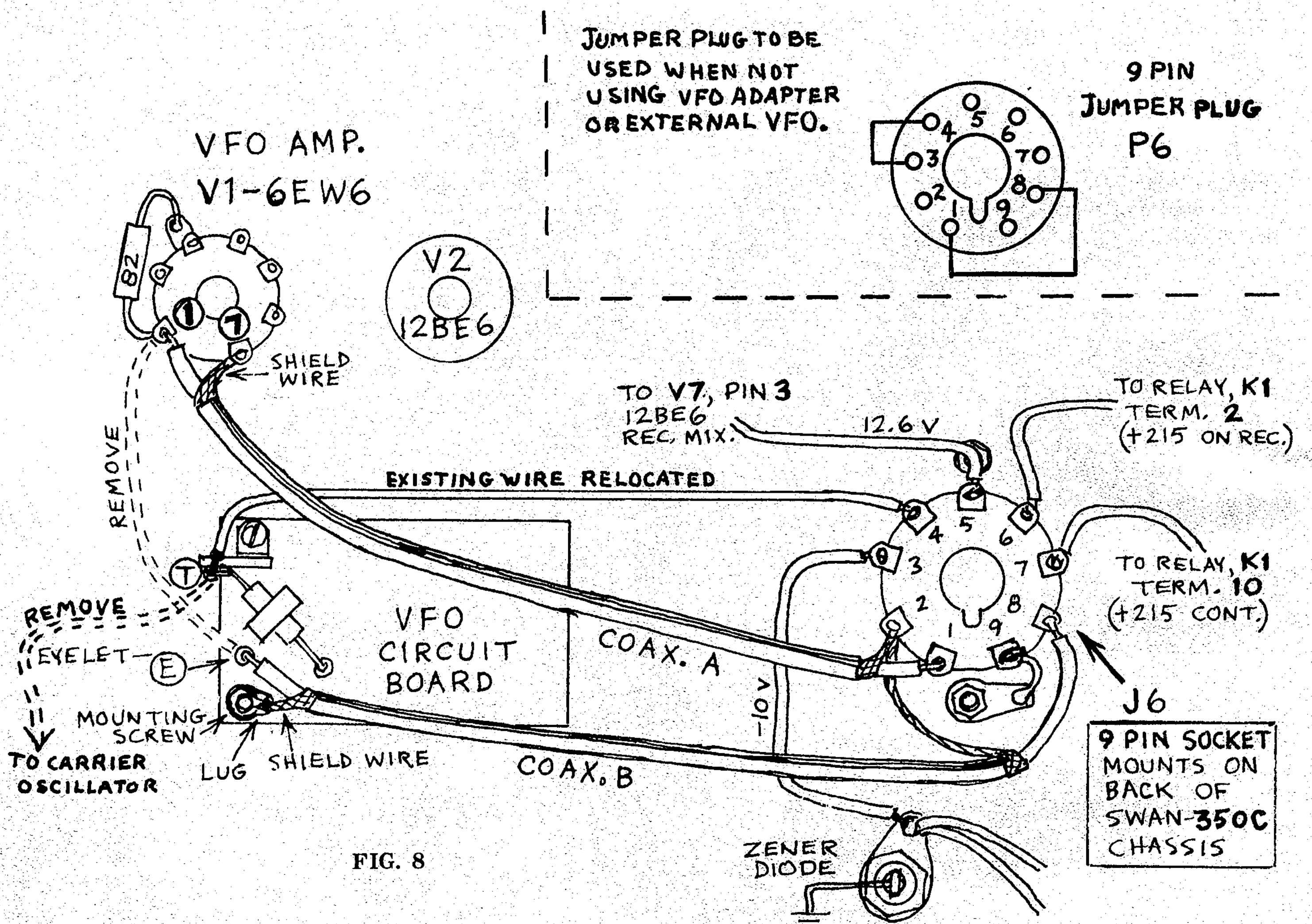


FIG. 8

MODIFICATION INSTRUCTIONS, for installation of VFO adaptor socket in Swan 350C transceiver.

1. Install the 9 pin socket J6 in the accessory location on the back of the 350C. Be sure to orient the socket keyway so the Model 22B adaptor, if used, will plug in correctly. Secure the mounting screws tightly. See Fig. 8.

2. Remove the wire from pin 1 of tube socket V1, the 6EW6 VFO amp. Connect coax (A) to pin 1 instead, and its shield to pin 7, which is grounded. Be sure to leave the 82 ohm resistor connected from pin 1 to ground. Coax cable may be either RG-58, 59, or 174/U.

3. Solder coax (B) to eyelet (E) on the VFO circuit board, and attach its shield wire to the grounded mounting screw with a solder lug.

4. Locate existing wire at lug "T" that routes to zener diode. Disconnect diode end and reroute to pin 4 of J6 plug, as illustrated.

5. Also at lug "T" locate the wire going to carrier oscillator, Q14. Remove this wire and run a longer wire from carrier oscillator directly to Zener diode.

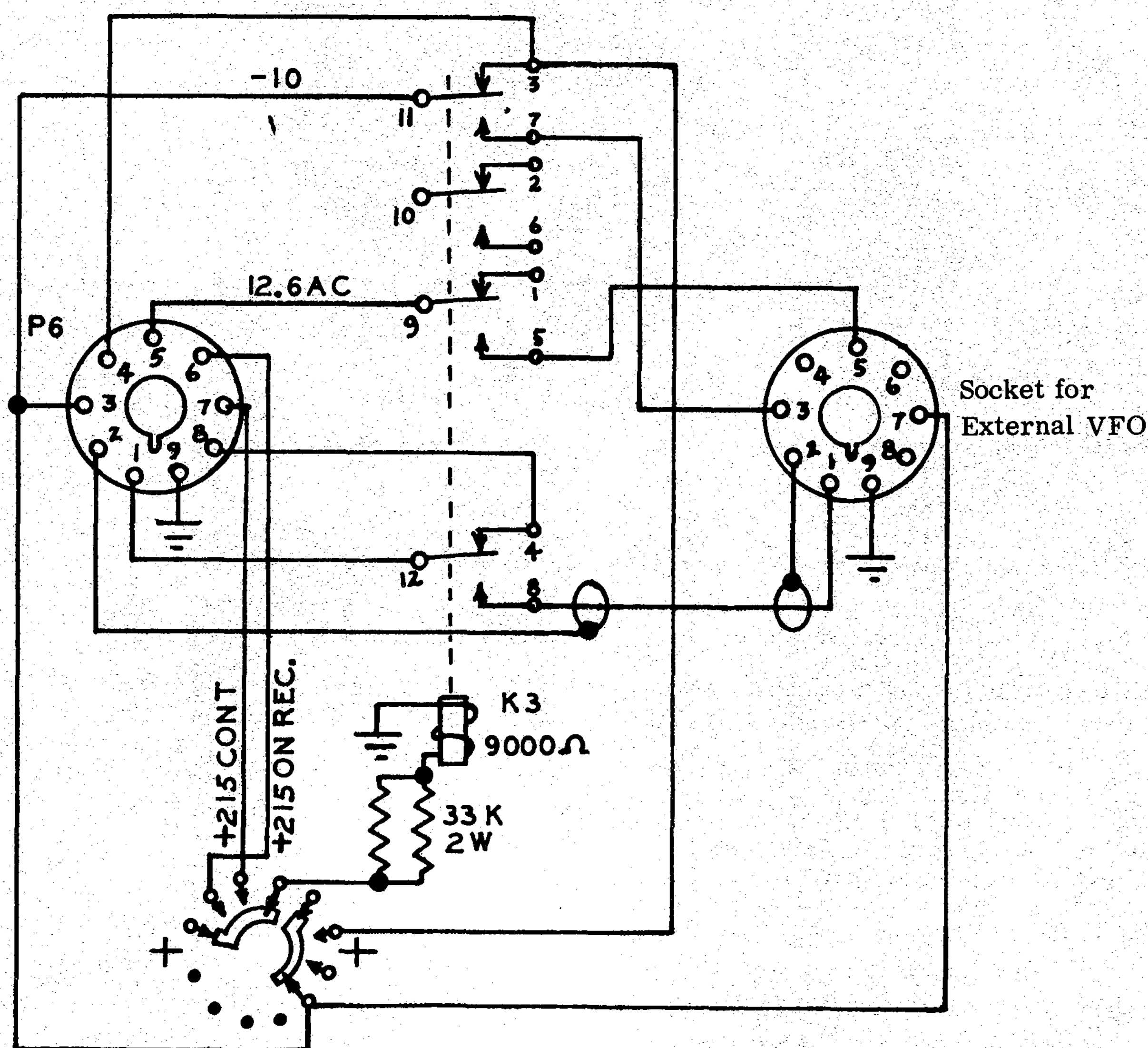
6. Connect the other 4 wires to J6 as illustrated.

7. The Model 22B adaptor may now be plugged into J6. Secure it to the back panel of the 350C with the screw which is provided. The external VFO plugs into the 22B adaptor.

* Special Note:

(a) After the above modifications have been made, an external VFO may be plugged directly into J6 without using the Model 22B, (CAUTION) See page 99. Read VFO instructions before plugging VFO directly into Transceiver.

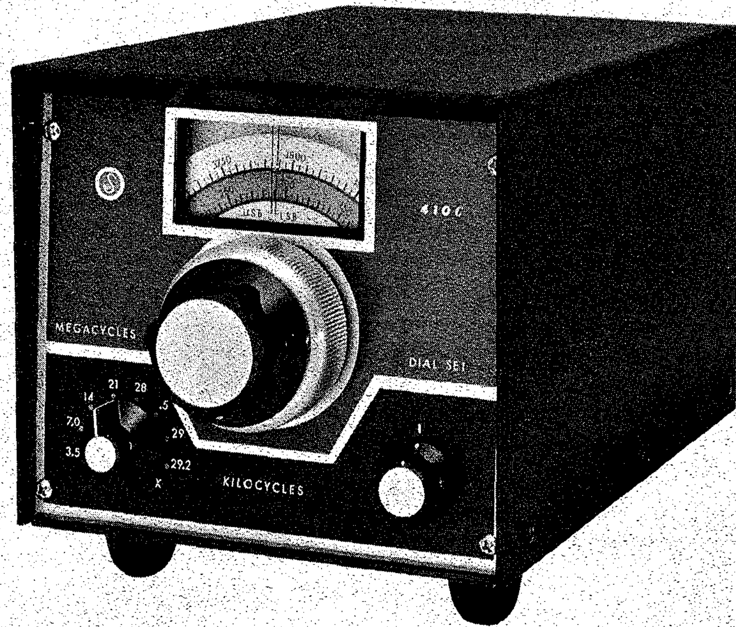
(b) The internal VFO can be made operational without plugging the 22B adaptor in by using a jumper plug as illustrated.



VFO Selectro Switch

Pos. 1 - Transceive on VFO "A", (internal).
Pos. 2 - Transmit on VFO "A", Receive on VFO "B".
Pos. 3 - Transceive on VFO "B", (external).

FIG. 9 SWAN MODEL—22B DUAL **VFO ADAPTOR**



SWAN MODEL 410C FREQUENCY CONTROL UNIT

The Model 410C Frequency Control Unit is designed to serve as an external VFO to be used with the 350C transceiver. It matches the 350C in height, depth and styling.

In order to use the 410C with the 350C, the accessory VFO socket must be installed on back of the 350C. (See page 20.) When used in this way, the 410C becomes the tuning control for transceive operation and the internal VFO of the 350C is inoperative.

For dual VFO control, the model 22 adaptor (see page 21) is required. It plugs into the back of the 350C and the 410C then plugs into the 22 adaptor. This arrangement then provides for transmit on one frequency while listening to another in the same band.

410C CIRCUIT THEORY

Q1, the 2N706 Oscillator operates in the common base configuration, as a Colpitts oscillator. See Figure 11. Capacitors C1801, C2001, and C2003 effectively tap the oscillator across only about 10 percent of the tank circuit. This results in exceptional stability. Q2, and Q3 are used for matching the impedance of the coaxial cable to the transceiver, as well as for isolation. The bandswitch selects the appropriate coil and trimmer for each range. Dial tracking is adjusted with the coil and trimmer.

DIAL SET

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

VFO ALIGNMENT

A trimmer condenser is provided for each VFO range. Trimmer adjustment for the five VFO ranges is from the top of VFO chassis which can be reached by removing the cabinet cover.

Dial tracking has been 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 18 KC on the high side and can not be restored by adjusting dial set on front panel.

1. Set dial set to twelve o'clock position.
2. Set VFO at 7018 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 as 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 that 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's.

The following chart lists the actual oscillating frequency of the VFO at band edges.

410 FREQ. RANGE	OSC. FREQ. (kc)	COIL	ADJUST CAP.
3.5— 4.0	9,000 - 9,500	L1801	C1805
7.0— 7.5	12,500 - 13,000	L1802	C1807
14.0—14.5	8,500 - 9,000	L1803	C1809
21.0—21.5	15,500 -16,000	L1804	C1811
28.0—28.5	22,500 - 23,000	L1805	C1813
28.5—29.0	23,000 - 23,500	L1806	C1815
29.0—29.5	23,500 - 24,000	L1807	C1817
29.2—29.7	23,700 - 24,200	L1808	C1819

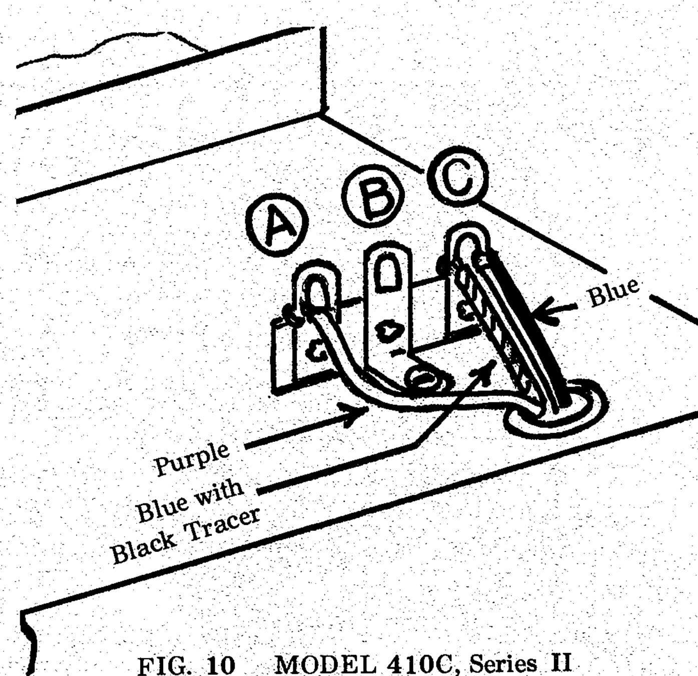


FIG. 10 MODEL 410C, Series II

The Series I model of the 410C VFO is the original circuit design. It may be plugged directly into the Model 350C transceiver, or into the Model 22 Dual VFO Adaptor.

With dual VFO operation, and in the Series I design of the 410C, the receiving oscillator is turned off while transmitting. A slight frequency shift is encountered when switching back to receive. This shift lasts several seconds while the transistor junction is warming up, and may be annoying to some operators.

This problem has resulted in the **Series II design**, which keeps the receiver oscillator going during transmit, and switches off only the transistor buffer stage. This design change eliminates the frequency shift problem. However, the Series II circuit will work only with the Model 22 Adaptor, and **CANNOT** be plugged directly into the 350C. The wiring change from a Series I to a Series II is quite simple, and is described and illustrated below. The following outline will help clarify the usage of Series I and Series II Models:

Model 410C Series I:
- (a) Plugs directly into Model 350C Transceiver.
- (b) Plugs into the Model 22 Adaptor.

Model 410C, Series II:
- (a) Plugs only into the Model 22 Adaptor.
- (b) Series II **CANNOT** be plugged directly into Model 350C.

Modification Instructions to change a Series I Model 410C to a Series II.

- (a) Remove cabinet from 410C and locate 3 lug terminal strip on top of the chassis. See drawing for terminal location. Drawing shown in Series II configuration, **FIG. 10.**
- (b) Remove blue wire with black tracer from terminal "A" and connect to terminal "C" with blue wire as illustrated.

Follow these instructions in reverse to change from Series II to Series I.

MODEL 22 DUAL VFO ADAPTOR:

Current production of the Model 22 Adaptors are being wired for use with the **Series II, 410C. Earlier models must be modified as follows:**

- (a) Connect a wire to the **gray wire on selector** switch to Pin 7 of socket "A".
- (b) Connect a wire from **Pin 7 of socket "A" to Pin** 7 of socket "B".

NOTE: When using **external VFO, and transmitting** on VFO "A" the pilot **lamp in VFO "B" will be out.** In receive the pilot **lamp in VFO "B" will be lit. This** helps in remembering **which VFO is in operation.**

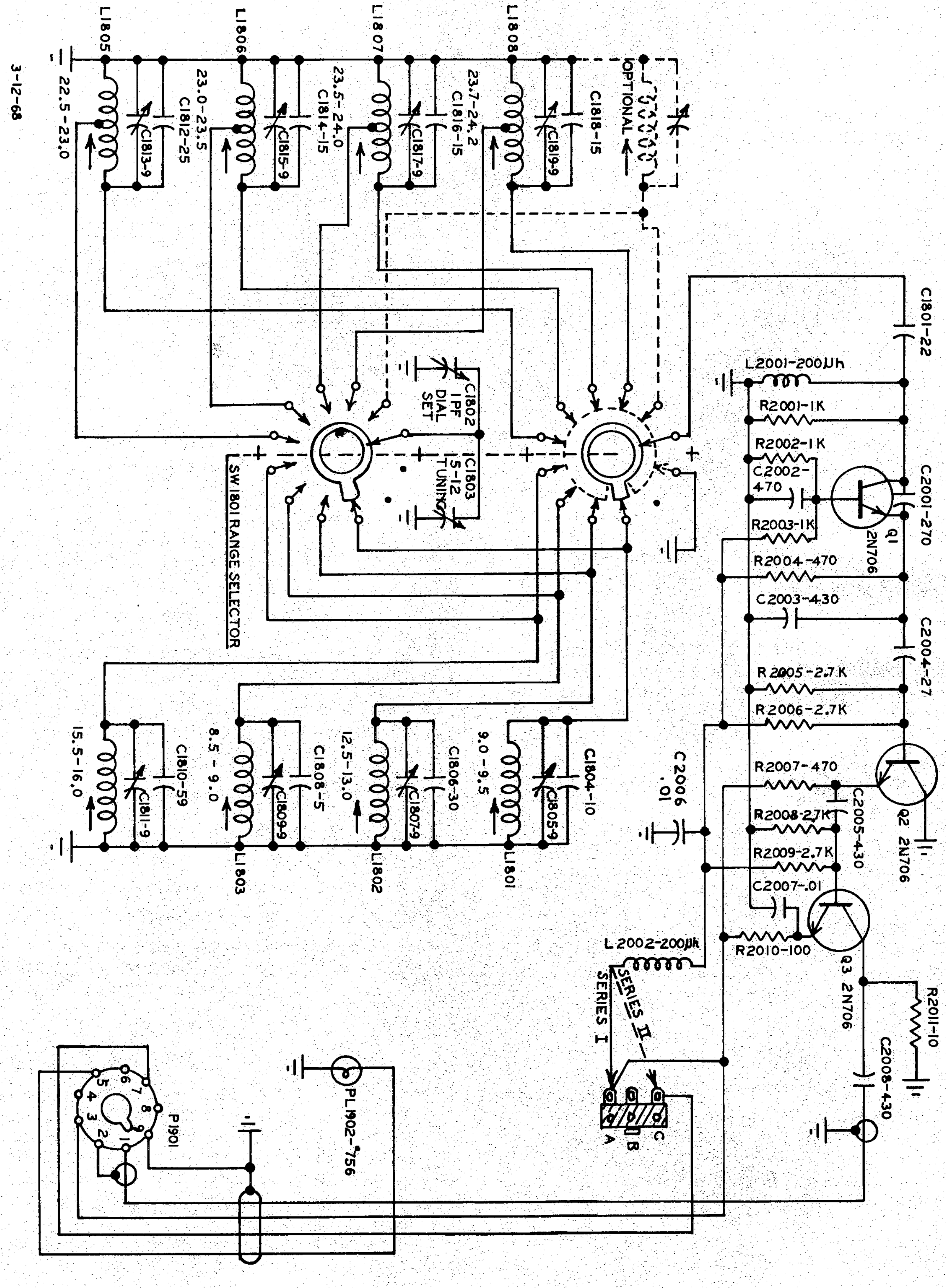


FIG.11 MODEL 410C VARIABLE FREQUENCY OSCILLATOR

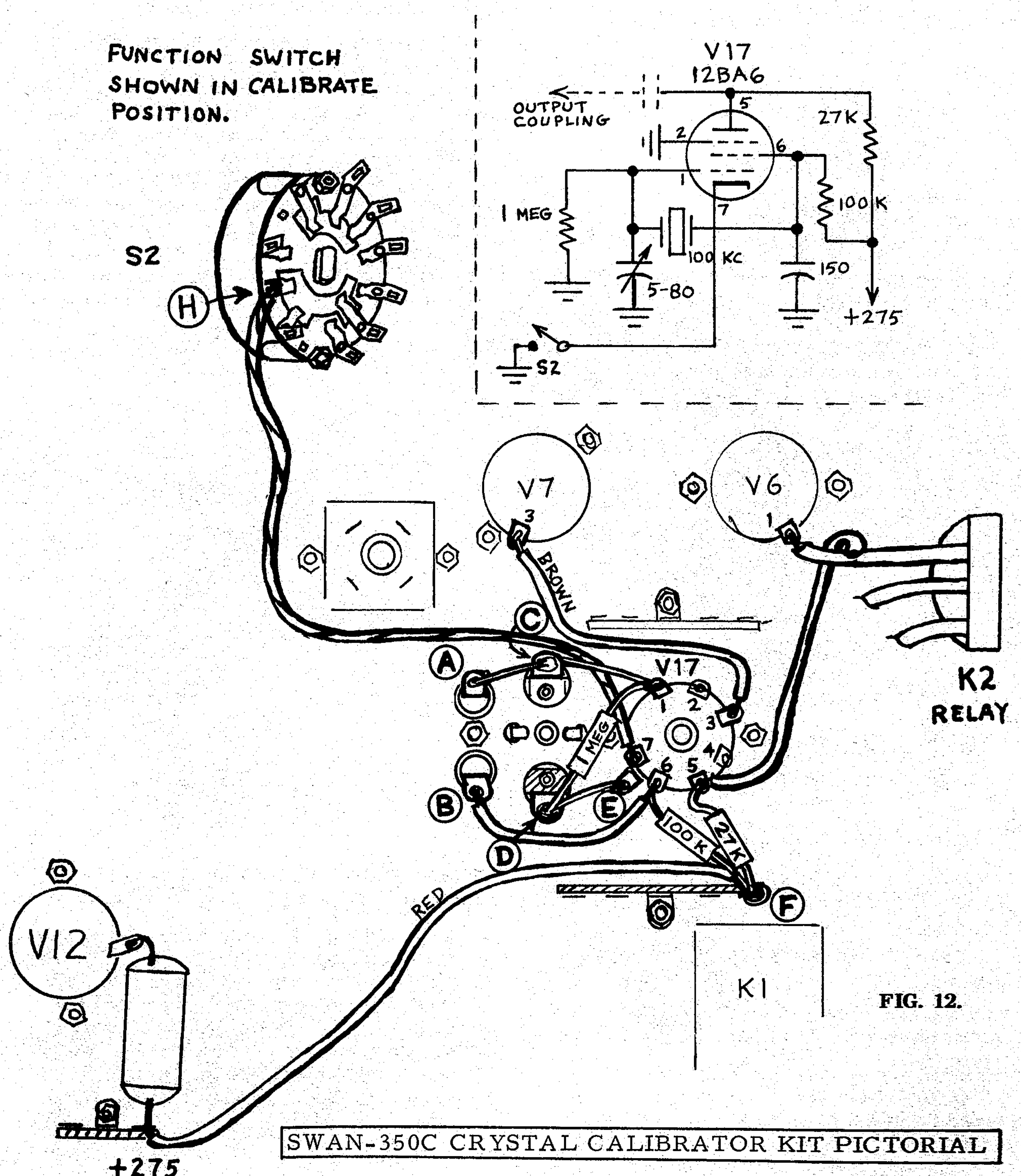


FIG. 12.

SWAN-350C CRYSTAL CALIBRATOR KIT PICTORIAL

SWAN 350C, CRYSTAL CALIBRATOR KIT. INSTALLATION INSTRUCTIONS.

PARTS LIST: 1 - Pre-wired tube socket V17
2 - Mica trimer
3 - Crystal Socket
4 - 12BA6 tube
5 - 100 KC crystal
6 - Red and Green-Black wires
7 - Three 4-40 screws, nuts, washers

1. Locate the empty tube socket hole in the 350C chassis. Mount the pre-wired socket in this hole, positioned as shown in the illustration Fig. 12.
2. Mount the mica trimmer in the chassis holes as illustrated. Make sure the ground end of the trimmer goes to "D" as shown. This is the end of the trimmer with the most metal showing on the bottom, and goes to the top compression leaf. Bend the tabs over firmly to hold the trimmer in place.
3. Mount the crystal socket with a 4-40 screw and nut.
4. Connect the bare wire from Pin 1 of V17 to lug "C" of the trimmer and lug "A" of the crystal socket. Solder both connections.
5. Connect the bare wire from ground lug at "E" to trimmer lug "D". Do not solder.
6. Locate the 1 meg. resistor which comes connected to Pin 1 of the tube socket. Connect its other end to trimmer lug "D". Solder connections at "D".
7. Connect the sleeved wire from Pin 6 of the tube socket to lug "B" of the crystal socket. Solder at lug "B".
8. Connect the new red wire from terminal "F" to +275 volts as illustrated.
9. Connect the 100K resistor from Pin 6 of the tube socket to terminal "F". Do not solder.
10. Connect the 27K resistor from Pin 5 of the tube socket to terminal "F". Solder terminal "F".
11. Connect the brown wire from Pin 3 of the tube socket to Pin 3 of V7. Solder at V7. (12.6 volt heater lead).
12. Loop the sleeved wire from Pin 5 of the tube socket around the lead from K2 relay that goes to Pin 1 of V6. Do not actually connect the wire. A very small amount of capacity is all that is required at this point for coupling.
13. Locate function switch (S2) looking at switch from rear, connect wire to contact "H" that comes from Pin 7 of tube socket. As illustrated. Contact "H" is only grounded in calibrate position.
14. Dress the Green-Black wire from "H" on the switch neatly across the chassis and to Pin 7 of tube socket. Solder.
15. Plug the 12BA6 and 100 KC crystal into their respective sockets. To turn on the calibrator, place function switch in CAL. position.
16. The frequency of the 100 KC crystal can be adjusted exactly by tuning in WWV on a general coverage receiver, and heterodyning the 100 KC harmonic. This can be done by running a pick-up lead from the general coverage receiver antenna terminal over to the transceiver, and wrapping it around the 12BA6, 100 KC oscillator tube. Then with the 350C in receive position, turn on the 100 KC calibrator. Then adjust the mica trimmer which has just been installed for zero beat with WWV at 5, 10, or 15 mc. This can be done most easily during the 2 minutes of each 5 minute period when WWV is not transmitting a steady tone.

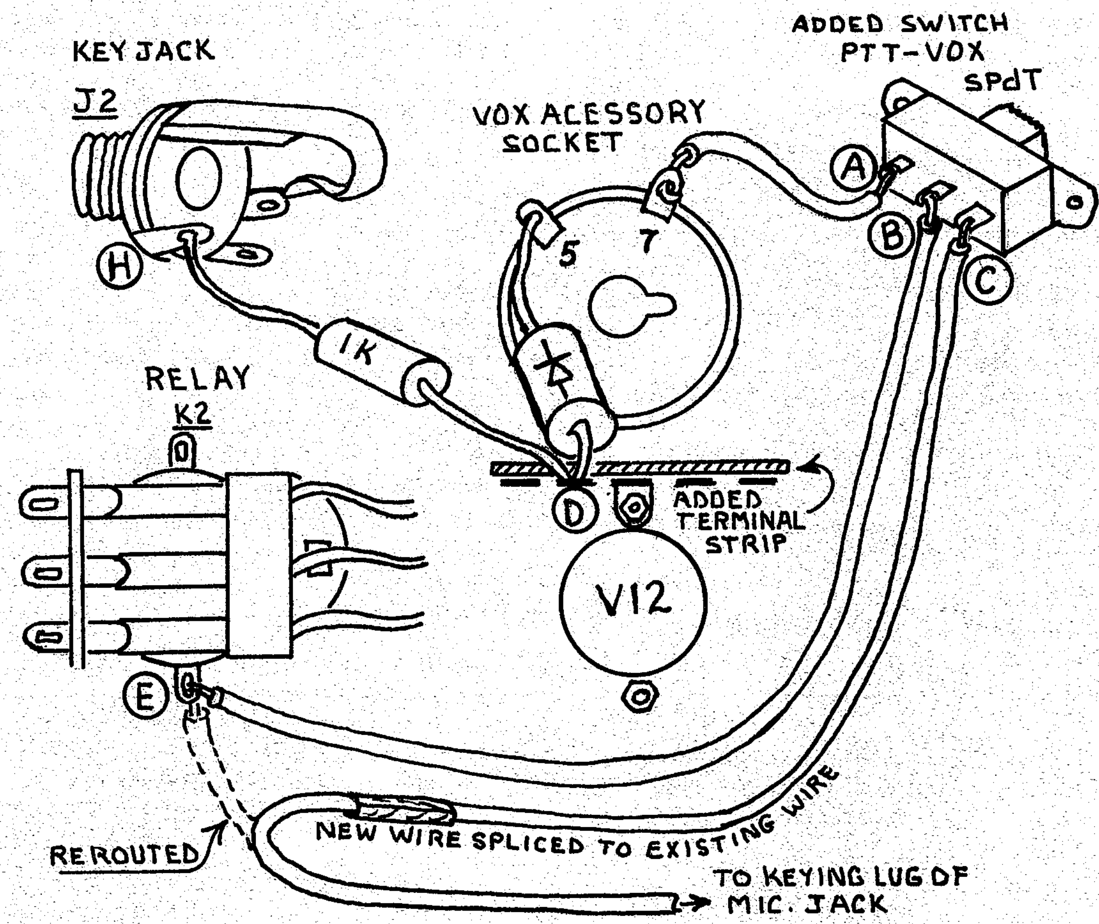


FIG. 13.

MODIFICATION INSTRUCTIONS, for installation of **BREAK-IN CW in Swan 350C Transceiver.**

1. The VOX unit is required for Break-In operation. The VX-2 can be plugged directly into the VOX receptacle. See VOX accessory page 31. The VX-1, VOX Unit, can be up-dated to the VX-2 configuration by the addition of a wire from pin 5 of the VOX plug to the base of Q-5 the 2N1302 transistor. This transistor is located on the printed circuit board adjacent to the VOX relay.
2. For Break-In CW a spdt switch will have to be installed. This switch can be located on back of chassis or on the front panel, this will be left to your own discretion,
3. From key jack (J2) route a 1K 1/2W resistor to terminal strip lug "D" as shown in illustration Fig. 13. This is an added terminal strip which was added for the CW monitor. If monitor is not used add a two lug strip utilizing screw mounting the tube socket (V12).
4. Connect a diode (anode end) from lug "D" of new terminal strip to pin "5" of Vox accessory socket. RCA #38679 or equivalent.
5. Locate existing wire as shown in illustration connected to lug "E" of K2 relay. Disconnect this wire and splice an additional length of wire so as to route to lug "C" of added PTT-VOX switch.
6. Connect a wire from lug "B" of PTT-VOX switch to lug "E" of K2 relay.
7. From lug "A" of PTT-VOX switch route a wire to pine 7 of accessory socket.

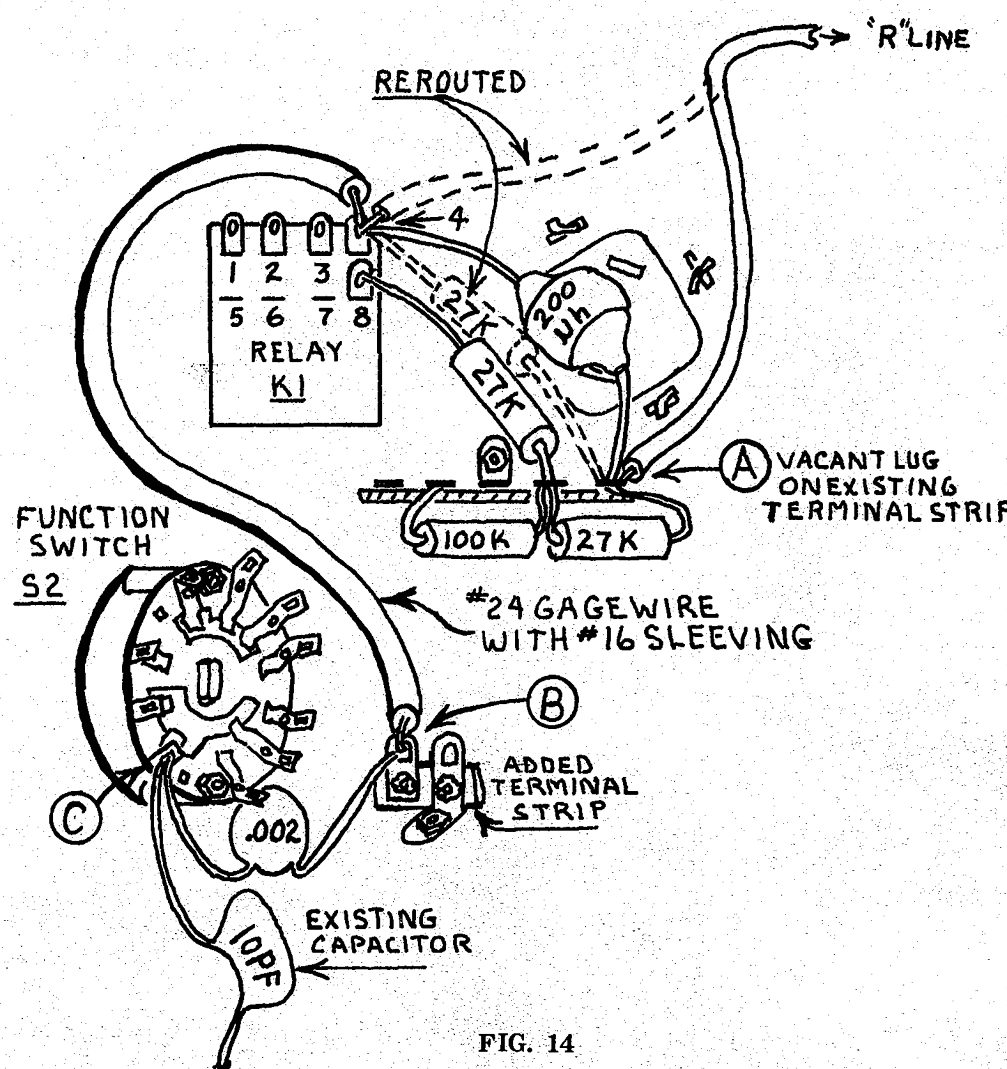


FIG. 14

MODIFICATION INSTRUCTIONS, for shifting of CARRIER OSCILLATOR during CW-BREAK IN of K2 relay.

1. From pin 4 of K1 relay Fig 14. Disconnect the 27K resistor and the one wire going to that pin. Reroute and connect to vacant lug "A" shown in illustration.
2. Add a 200 microhenry choke from pin 4 of K1 relay to lug "A" of terminal strip.
3. Add a two lug terminal strip close to function switch S2 to provide a tie point for the .002 capacitor to the function switch.
4. From pin 4 of relay K1 connect a new wire #24 gauge, covered with #16 sleeving routed close to chassis (under existing harness) and away from VFO printed circuit board to added terminal strip lug "B".
5. From lug "B" of terminal strip, connect a .002 capacitor to lug "C" with existing 10 pf capacitor on function switch S2.

OPERATION:

1. Install Vox unit and rotate Vox gain control fully clockwise and anti-trip fully counter-clockwise. Delay control will be set for the desired amount of hold in time after completion of keying.
2. Place PTT-VOX in PTT position and with CW key removed or closed load transmitter up for normal cathode current as outlined on page 99. Monitor signal will be heard when the unit is switched to the TUNE-CW position.
3. Insert CW key and place PTT-VOX switch in the Vox position.
4. Turn function switch to the TUNE-CW position. Receiver should continue to operate at this time. Closing the key will automatically switch the unit to the CW transmit mode and monitor signal will be heard from speaker.

CW - FUNCTION AND OPERATION

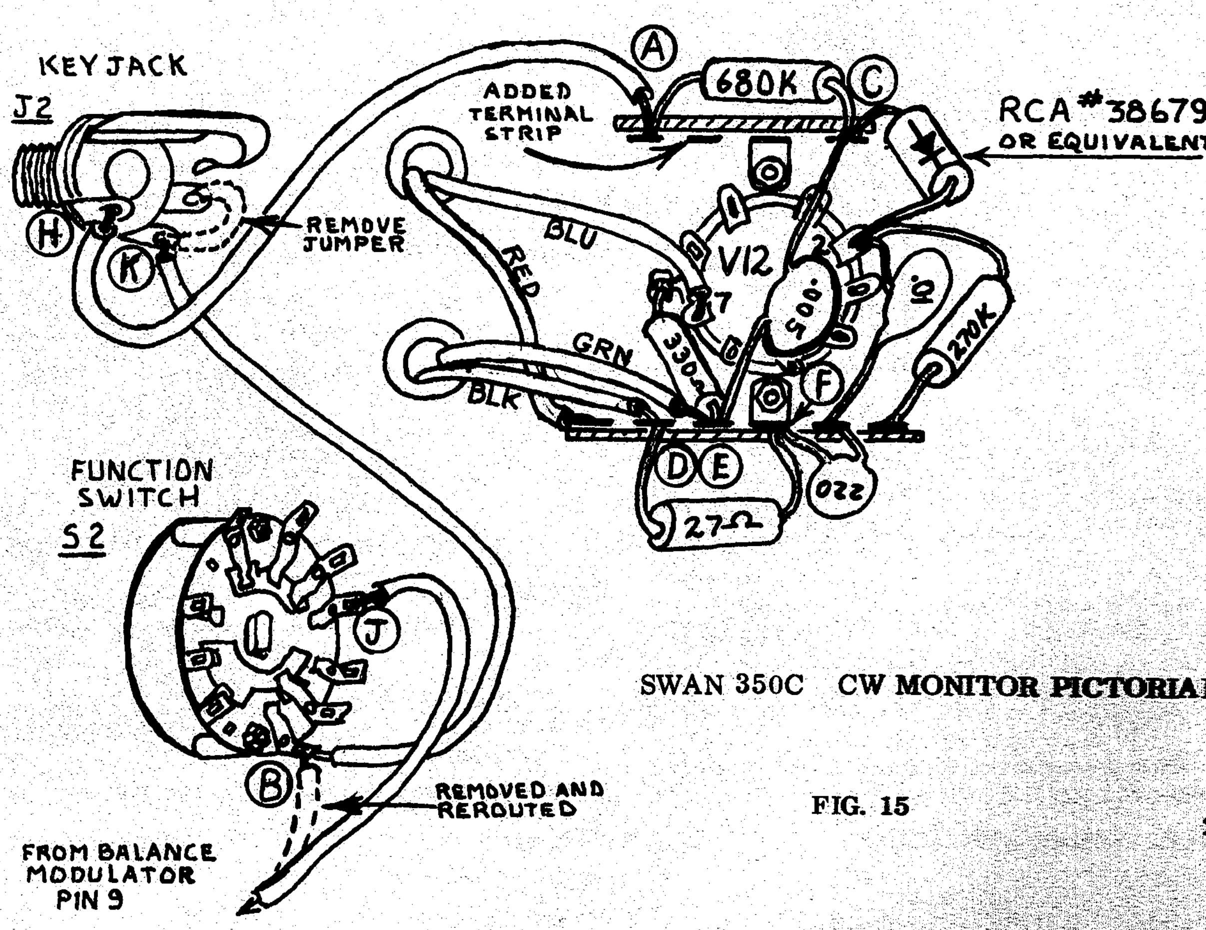
FUNCTION - During Receive, the carrier oscillator is approximately 300 cps outside the 6 db. passband of the crystal filter. In the TUNE-CW position the frequency of the carrier oscillator is moved approximately 800 cps to place it well into the passband of the crystal lattice filter.

OPERATION-

1. Tune transmitter to full output the same as for SSB operation.
2. Insert CW Key into Key Jack provided on the back of 350C. Use standard 1/4 inch diameter 2 circuit phone plug.
3. Rotate to TUNE-CW position to transmit. Back to RECEIVE for receiving.

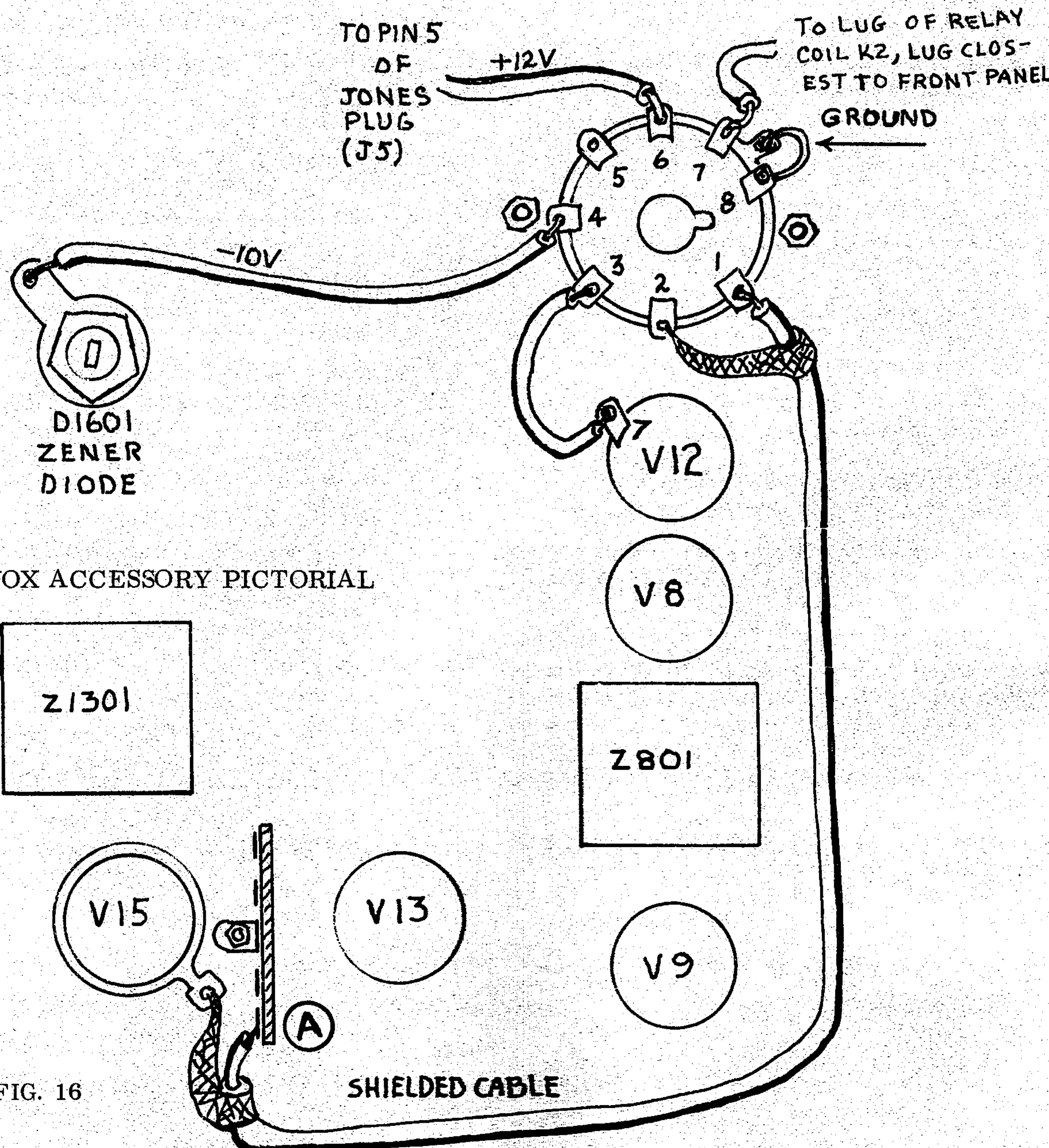
MODIFICATION INSTRUCTIONS, for installation of CW Monitor in Swan 350C Transceiver

1. Install a four lug terminal strip utilizing screw holding tube socket (V15) as shown in illustration. Fig. 15.
2. Locate green and black wires coming from top of chassis through grommet to terminal strip. Reverse these two wires so that green wire is on lug E and the black wire is connected to lug D. NOTE: If monitor does not work, first try reversing these wires back to their original configuration.
3. Locate key jack (J2) and remove jumper wire as illustrated in pictorial.
4. Connect a wire from Lug "H" and route to Lug "A" of new terminal strip, (do not solder).
5. Connect a 680K-1/2W resistor from Lug "A", (solder), to Lug "C" of same terminal strip. (Do not solder).
6. From terminal Lug "C" connect a diode (anode-end) RCA #38679 or equivalent (do not solder), to pin 2 of V12 tube socket, (solder).
7. From Lug "E" of terminal strip connect a .005 capacitor to terminal strip Lug "C" and solder. The value of this capacitor was picked for a 800 to 900 cycle tone.
8. From Lug "E" connect a 330 ohm 1/2 W resistor to ground Lug on tube socket as illustrated. Raising and lowering the value of this resistor will also change the frequency of the tone oscillator.
9. Connect a 27 ohm 1/2W resistor from Lug "D" of terminal strip to ground lug "F" of same terminal strip.
10. Locate function switch (S2) and reroute existing wire on Lug "B" to Lug "J". The other end of this wire goes to the balance modulator. See illustration.
11. Connect a wire to Lug "K" of key jack (J2) and neatly dress this wire over to function switch (S2) and connect to Lug B.
12. This completes the installation of the CW monitor. It should be noted that the monitor will be heard during the normal tune-up procedure.



SWAN 350C CW MONITOR PICTORIAL

FIG. 15



SWAN 350C VOX ACCESSORY PICTORIAL

FIG. 16

MODIFICATION INSTRUCTIONS, for installation of VOX accessory socket in Swan 350C Transceiver.

1. Install 8 pin socket (J5) in accessory location on the back of the 350C. Be sure to orient the socket keyway so the VOX unit will plug in correctly. Secure mounting screws tightly. See Fig. 16.
2. Connect a shielded wire, its center conductor to pin 1 and the shield to pin 2 of the 8 pin socket. Route its other end to center conductor to Lug "A" and the shield to ground Lug of V15 socket as illustrated.
3. Route a wire from pin 3 of 8 pin socket to tube socket V12 pin 7.
4. Locate the zener diode (D1601). Route a wire from the diode to pin 4 of the 8 pin socket as shown in illustration.
5. Connect a wire from pin 6 of 8 pin socket to pin 5 of Jones Plug (J5).
6. Route a wire from pin 7 of 8 pin socket to Lug of relay coil closest to front panel of K2 relay.

NOTE: The Swan 350C does not include a VOX-PTT switch for switching from VOX operation to push-to talk operation. This can be done by rotating the VOX Gain Control fully counter clockwise.

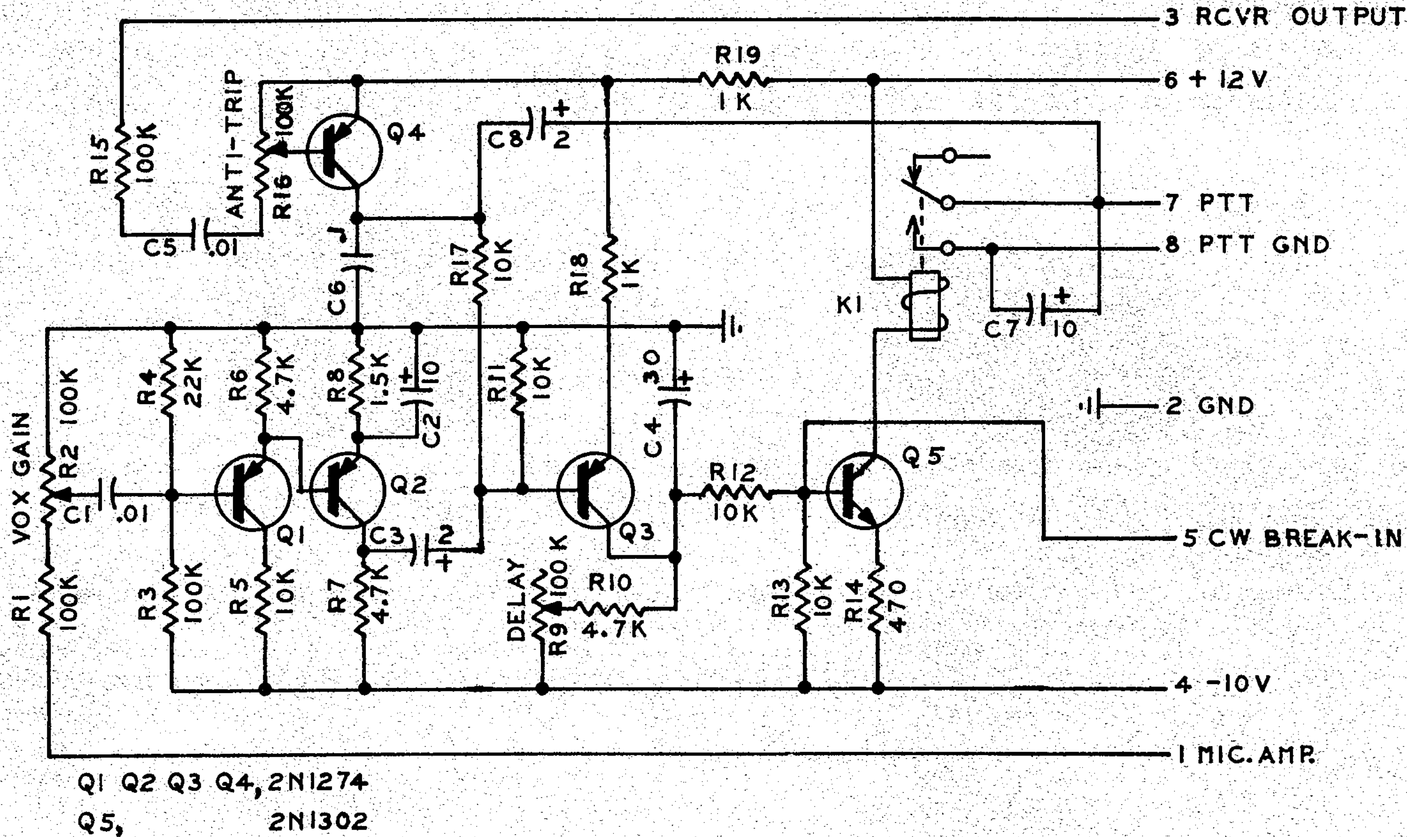


FIG. 17 SWAN VOICE CONTROL TRANSMIT ACCESSORY

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

OPERATING INSTRUCTIONS

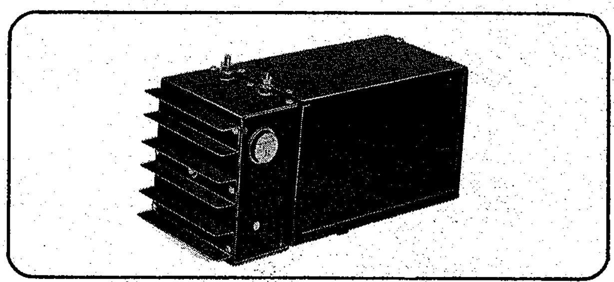
1. Place the VOX-PTT switch in the PTT position and adjust the transceiver for normal push-to-talk operation.
2. Plug in the VX-2 and rotate the VOX GAIN, ANTI-VOX, and DELAY controls fully counter-clockwise. Attach the top of the VX-2 to the 350C back with a 6-32 screw.
3. Rotate the transceiver MIC. 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 more VOX GAIN than necessary to assure positive operation at normal voice levels.
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 12 (CW OPERATION), for Semi-Break-In instructions.

350-C POWER SUPPLIES AND COMBINATIONS



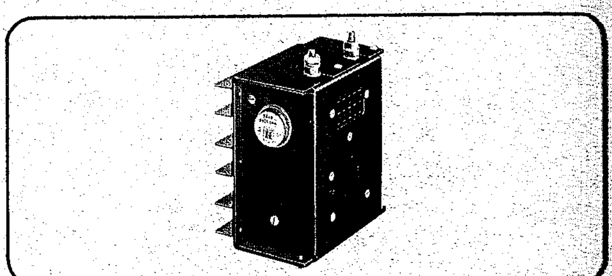
COMPLETE 12 VOLT D.C. SUPPLY

MODEL 14-117

Consists of a 117-X A.C. supply and a 14-C D.C. Converter. For 12-13.5 volt mobile or portable operation. Includes 8 ft. cable and plug pre-wired for connection to transceiver, primary cables, circuit breaker, and mounting hardware. 5 in. wide, 5 in. high, 12-1/4 in. long. Weight: 16-1/2 lbs.
Net Price. $130

MODEL 14-230. Same as above but with 230-X A.C. unit. Net Price. $140

Model 14-117 and 14-230 D.C. supplies will operate on A.C. input by detaching the 14-C unit and attaching an A.C. line cord, thus providing added versatility. 117 volt and 230 volt A.C. line cords available at $8 each.

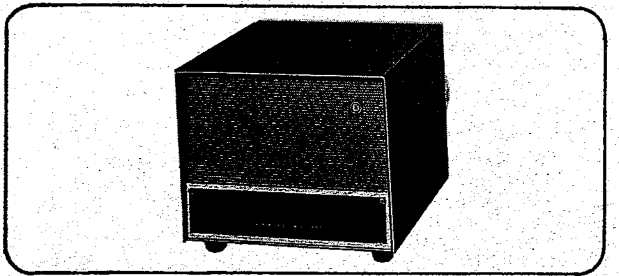


D.C. CONVERTER MODULE

MODEL 14-C

Transistorized Unit attaches to 117-X or 230-X power supply, converting them to 12-13.5 volt D.C. input for mobile or portable operation. For negative ground systems. Includes cables, plugs, circuit breaker, and mounting hardware. Average current drain: 9 amps. receive. 22 amps. transmit.
Dimensions: 5 x 5 x 3-1/2 in. Weight: 2-1/2 lbs.
Net Price: $65

MODEL 14-CP. Same as above but for positive ground system. Available on special order. . . . $75



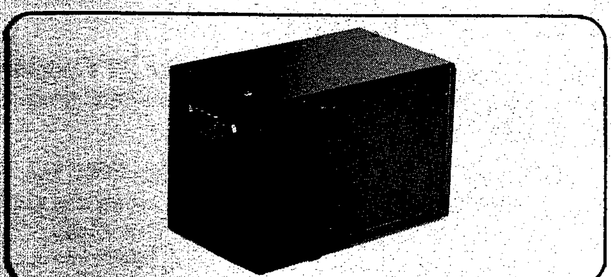
COMPLETE MATCHING A.C. SUPPLY

MODEL 117-XC

Consists of a 117-X power supply in a cabinet which matches Swan transceiver. Includes speaker, phone jack, and indicator light. Come with A.C. line cord, and power cable ready to plug into transceiver. 8 in. wide, 5-1/4 in. high, 11 in. deep.
Weight: 21 lbs. Net Price: $105

MODEL 230-XC. Same as above but with 230-X supply for dual 117 or 230 volt A.C. input. Comes with 230 volt line cord, unless otherwise specified.
Net Price: $115

Model 117-XC and 230-XC A.C. supplies will operate on 12-13.5 volts D.C. input by attaching a 14-C Converter Unit in place of the A.C. line cord, thus providing added versatility for portable or emergency operation from a 12 volt battery.



BASIC A.C. POWER SUPPLY

MODEL 117-X

Operates with 117 volts, 50-60 cycle input. Supplies all voltages required to operate Swan transceiver. Does not include matching cabinet, speaker or cables. Average power consumption: 125 watts, receive; 325 watts, transmit.
Dimensions: 5 x 5 x 8-3/4 in. Weight: 14 lbs.
Net Price: $65

MODEL 230-X. Same as above but with dual primary winding for either 117 or 230 volt 50-60 cycle input. $75

A.C. line cords for above supplies, with fuse, ready to plug in. Specify for 117 or 230 volts, each. . . $8

8 ft. 10 conductor cable with pre-wired plug for connecting A.C. supply to transceiver, each $6

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 or 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.

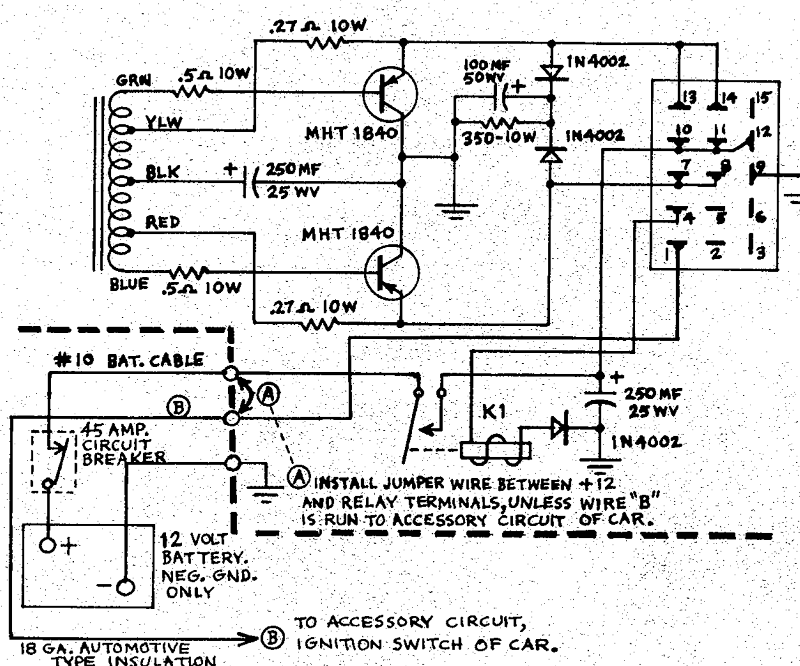
SPECIFICATIONS:

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.

SWAN MODEL 14-C D.C. CONVERTER FIG. 1



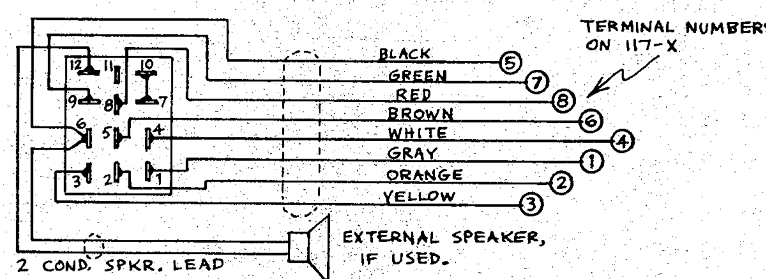


FIG. 2 PREWIRED PLUG AND CABLE, SUPPLIED WITH 14-C

Output:

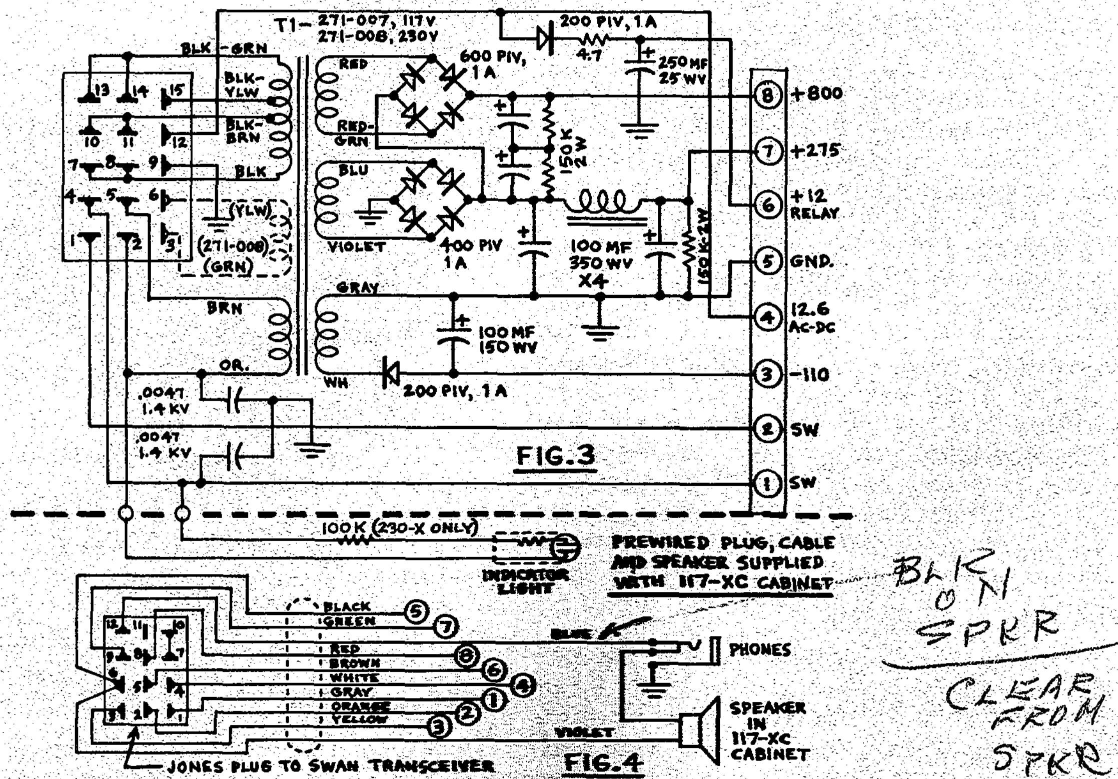
- 800 volts at 250 ma. average, 700 ma. peak.
- 275 volts at 150 ma. continuous.
- 110 volts negative bias, at 100 ma.
- 12 volts D.C. at 200 ma., relay supply.
- 12.6 volts A.C. at 5.5 amps. (with A.C. input only)

Battery Drain with Swan Transceiver

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

The D.C. Converter uses two power transistors for switching in a flip-flop oscillator circuit. A large

SWAN MODEL 117-X (230-X) A.C. POWER SUPPLY



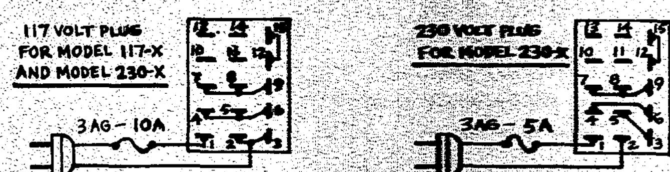


FIG. 5

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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.

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.)

(A) Preliminary Steps. The D.C. electrical system in an automobile will sometimes generate high voltage transients. This can be caused by the starter motor, the alternator or generator, or loose wiring, and can represent a serious hazard to the transistors in your DC power supply. By selecting the best transistors available for the application, your Swan supply is capable of absorbing a good deal of abuse, but there is a limit to what even the best transistors can take and for this reason we strongly urge that you read the following notes completely, and follow them carefully. When this is done, you will find that youı Swan power supply is extremely rugged and reliable. Field problems with the 14-117 supply are exceptionally low. But, first observe the following steps.

(1) Clean and tighten the battery terminals and clamps.

(2) Tighten battery cables where they attach to the starter solenoid and engine block.

(3) Inspect battery cables for corrosion or wear. Replace them if they look questionable.

(4) Check battery condition frequently. If the cells do not hold a similar charge or water level, replace the battery.

(5) Check alternator, (or generator), and regulator connections for tightness. Also, primary ignition wiring, horn wiring, lights, etc.

(6) Measure the charging voltage from the alternator. Often the regulator is misadjusted, and the voltage setting may be excessive. It should not read more than 14.5 volts at normal engine speeds.

(B) Locate the power supply under the hood in a reasonably clear spot as close to the battery as is practical, and away from the engine. Particularly, keep it clear of the engine manifold, and away from the high tension ignition wiring. On many cars there will be a good spot at the front and to one side of the radiator. The power supply may mount in any position, and is quite well protected against normal splashing and dirt. The 117-X unit attaches to the car with three sheet metal screws. Remove the 117-X cover, and locate the three mounting holes. The 14-C Converter attaches to the 117-X with the long machine screw.

In some cars it may be impossible to find room enough under the hood for the 14-117 assembly. If necessary, the 14-C and 117-X units can be separated 2 or 3 feet, and connected electrically with appropriate Jones plugs. 10 gauge wire is then required between terminals.

In other cases, it may be advantageous to install the 14-117 under the dash, or in the trunk of the car. Heavy battery leads with adequate automotive type insulation must be used. For trunk mounting, at least 6 gauge cables are recommended. In all installations the circuit breaker must be mounted close to the battery. Never run a long cable from the hot battery terminal to the power supply without a fuse or circuit breaker close to the battery. Failure to observe this rule will result in a serious fire hazard!

(C) 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.

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

(E) 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 the battery down.

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.

(F) 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-C 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, 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 1/2 volt when speaking normally into the microphone, the leads are heavy enough. If the drop is more than 1/2 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.

WARRANTY POLICY

SWAN ELECTRONICS CORPORATION WARRANTS THIS EQUIPMENT AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP, EXCEPT FOR TUBES, TRANSISTORS, AND DIODES, UNDER NORMAL SERVICE FOR A PERIOD OF ONE YEAR FROM DATE OF ORIGINAL PURCHASE. TUBES, TRANSISTORS, AND DIODES ARE COVERED UNDER THE WARRANTY POLICY FOR A PERIOD OF 90 DAYS. THIS WARRANTY IS VALID ONLY IF THE ENCLOSED CARD IS PROPERLY FILLED IN AND MAILED TO THE FACTORY WITHIN TEN DAYS OF DATE OF PURCHASE. DO NOT SHIP TO THE FACTORY WITHOUT PRIOR AUTHORIZATION. THIS WARRANTY IS LIMITED TO REPAIRING OR REPLACING ONLY THE DEFECTIVE PARTS, AND IS NOT VALID IF THE EQUIPMENT HAS BEEN TAMPERED WITH, MISUSED OR DAMAGED.