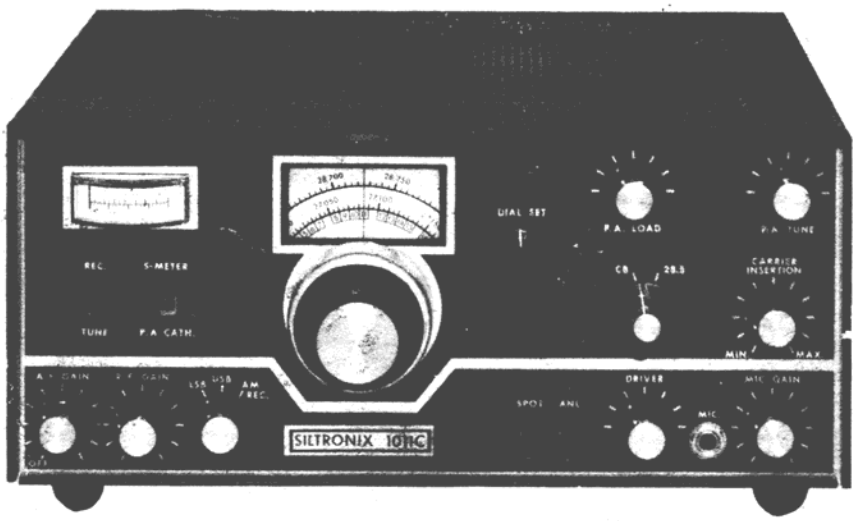
Siltronix Model 1011C Owner's Manual

INSTALLATION
OPERATION AND MAINTENANCE



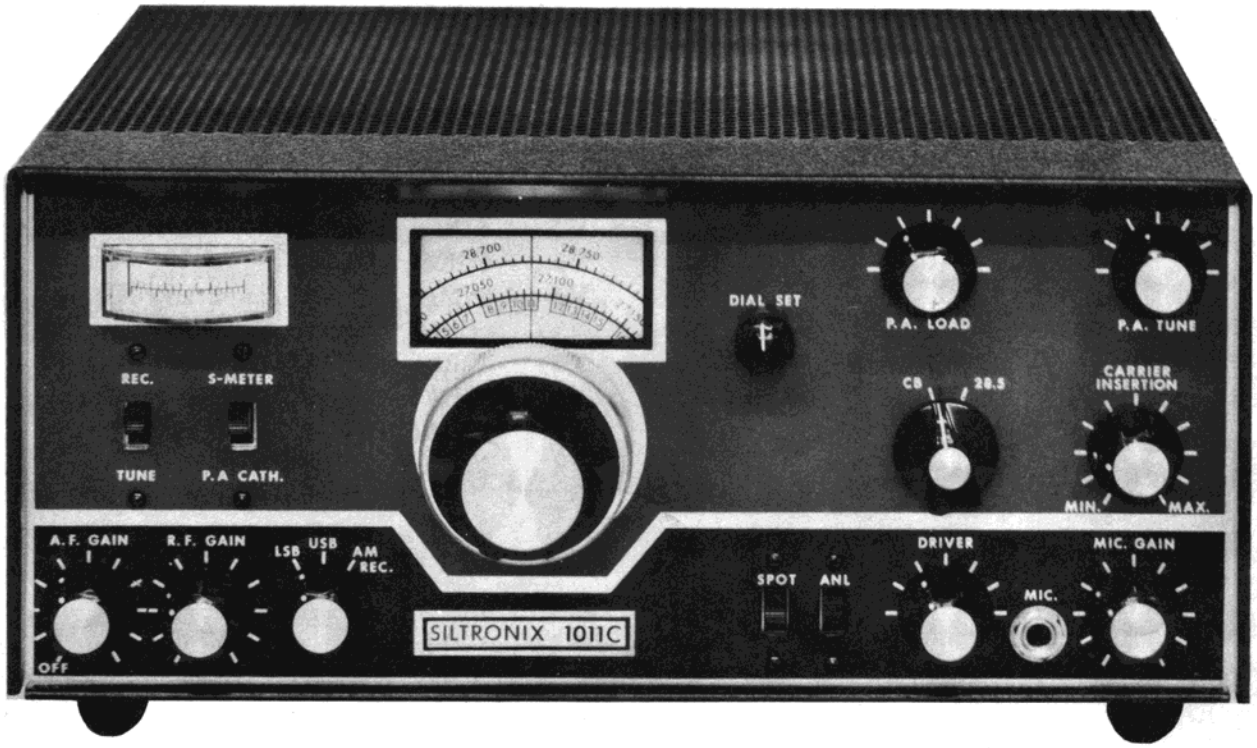
SILTRONIX MODEL 1011C

SILTRONIX

269 AIRPORT RD

OCEANSIDE, CALIFORNIA 92054

INSTALLATION OPERATION AND MAINTENANCE SILTRONIX MODEL 1011C



INTRODUCTION

The Siltronix Model 1011C Single Sideband Transceiver is designed to be used in SSB or AM modes in the 10-meter amateur radio band. In addition, the 1011C is also a tunable receiver in the CB band.

Power input exceeds 300 watts, P.E.P., on single sideband and 60 watts on AM. The Model 1011C includes automatic gain control (AGC), and automatic level control (ALC).

The internal AC power supply permits fixed station or portable operation wherever 117 volts, 50-60 Hertz is available.

Export models for 208-220-240 volts are available on special order.

For 12-14 volts DC operation in mobile, marine or portable applications, a DC converter unit, Model 14A is available. It attaches to the back of the 1011C in place of the AC power cord connector. Its dimensions are only 1½ x 3 x 4 in.

The Model 1011C generates a single sideband signal by means of a crystal lattice filter, and the transceive operation automatically tunes the transmitter to the received frequency. Provisions are included in the transceiver for operation on either upper or lower sideband.

SPECIFICATIONS

FREQUENCY RANGES
28.5-29.0 MHz
26.86-27.36 MHz (Receive only)

POWER INPUT
Single Sideband, Suppressed Carrier:
300 watts, P.E.P. minimum
AM: (Single Sideband with Carrier):
60 watts DC input

DISTORTION
Distortion products down approx. 30 db.

UNWANTED SIDEBAND SUPPRESSION
Unwanted sideband down more than 50 db.

CARRIER SUPPRESSION
Carrier suppression greater than 50 db.

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

AUDIO OUTPUT AND RESPONSE
Audio output, 3 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 resistive loads from 50 to 75 ohms.

METERING
Power amplifier cathode current 0-400 ma. on transmit, S-Meter 0-70 db over S9 on receive, Relative Output in TUNE.

FRONT PANEL CONTROLS
A.F. GAIN, R.F. GAIN, Sideband Selector, Function Switch (REC. TUNE), Meter Switch, Tuning Dial, Dial Set, SPOT Switch, ANL Switch, P.A. LOAD, P.A. TUNE, Band Switch, CARRIER INSERTION, DRIVER Control, MIC jack, MIC GAIN.

REAR PANEL CONTROLS AND CONNECTIONS
P.A. BIAS Potentiometer, HEADPHONES jack, Fuse Holder, Antenna Connector, Jones plug Power connector, S-Meter Zero.

OTHER CONTROLS AND CONNECTIONS
Carrier Balance Control – Located on bottom Cover.

VACUUM TUBE COMPLEMENT

V1	12BA6	VFO Amplifier
V2	12BE6	Transmitter Mixer
V3	6GK6	Driver
V4	8950	Power Amplifier
V5	6CB6A	Receiver RF Amplifier
V6	12BE6	Receiver Mixer
V7	12BA6	First IF Amplifier
V8	12BA6	Second IF Amplifier
V9	12AX7	Product Detector/Receive Audio
V10	6AV6	AGC Amplifier/Rectifier
V11	6GW8	AF Output
V13	6JH8	Balanced Modulator
V14	12AX7	Microphone Amplifier

TRANSISTOR COMPLEMENT

Q1	2N706	Oscillator
Q2	2N5130	Buffer
Q3	2N706	Carrier Oscillator

POWER REQUIREMENTS
117 VAC, 50-60 Hz at 4 amps. (208-220-240 volt, 50-60 Hz at 2.5 amps., export model). 12-14 volts DC operation with model 14-A converter unit plugged into back of 1011C. Current drain: 8 amps, receive mode. 12 amps average with voice modulation, 25 amps maximum in TUNE position.

DIMENSIONS

Height	5½ in.
Width	13 in.
Depth	11 in.

WEIGHT
Weight 24 lbs.

INSTALLATION

GENERAL

The installation of the Siltronix 1011C is not at all difficult, and it involves only the placement of the transceiver in its operational area (fixed or mobile); connection of power (either 117 volts AC, or 12 volts DC); and the connection of an antenna. The following paragraphs are therefore devoted to the installation requirements involving microphones, fixed and mobile operation, and recommended antenna types. Before actual installation, be sure to check for possible shipment damage. Remove the cabinet (three screws on each side), and check to make sure that all tubes are firmly in place. Remove packing from around the P.A. tube.

FIXED INSTALLATION

Locate the 1011C in an area which is well ventilated and which provides complete operational freedom of the front panel controls. Connect the AC power cord to the 12 pin Jones connector on the rear panel. If the 1011C is a 117 volt model, plug the power cord into a standard 117 volt 50-60 Hz outlet having a capacity of at least 10 amps. If the 1011C is an Export model, it should be first set to the proper voltage tap: 208, 220, or 240 volts, 50-60 Hz. Remove the cabinet, and locate the terminal strip near the top of the power transformer. There are 3 terminal lugs and a decal which indicates the voltage tap for each. Connection has been made to the 220 volt tap at the factory. If your supply voltage is 208 or 240 volts, unsolder the red wire and move it accordingly.

FIXED ANTENNA

A standard PL 259 coax connector plug will fit the antenna connector on the rear panel of the 1011C. For feed line runs up to 50 feet, RG58 or RG59 is recommended. For longer runs, RG8 or RG11 produces less line loss, particularly on 10 meters.

Any of the common antenna systems designed for use on the 10-meter amateur band will work well with the 1011C. However, the amateur should consider an antenna system which best fits his operational requirements. For example, a rotatable beam antenna is usually best suited for DX operation. Methods for constructing antennas and antenna tuners are described in detail in the ARRL Antenna Handbook and similar publications. It is recommended that these publications be consulted during the design of any antenna system.

MOBILE INSTALLATION

Many different methods of mobile installation are possible, and it is expected that hams will find methods which are best suited for their installation requirements. Siltronix has available a Mobile Mounting Kit which is suitable for under-the-dash installations. Figure 1 shows the recommended mounting methods using this kit.

DC CONVERTER, MODEL 14A

For 12-14 volt DC operation in mobile installations, it will be necessary to use the 14A converter, which plugs directly into the back of the 1011C in place of the AC power cord.

MOBILE ANTENNAS

The standard type mobile antennas designed for 10 meters or CB band will perform well with the 1011C. Generally speaking, a full length 8 or 9 foot whip will be more efficient than the shorter inductively loaded types.

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 ¼ in. diameter three contact type. The tip connection is for push-to-talk relay control, the ring connector is the microphone terminals, and the sleeve is the common chassis ground. The microphone manufacturer's instructions should be followed in connecting the microphone cable to the plug. Either hand-held or desk type microphone with push-to-talk control will provide a suitable installation.

TUNE – Transmitting circuits are energized. C1502 is disconnected from ground, shifting the carrier frequency into the filter passband. Carrier is fully inserted. P.A. cathode resistor, R406 is switched in the circuit, reducing input power. Transmitter is tuned in this position.

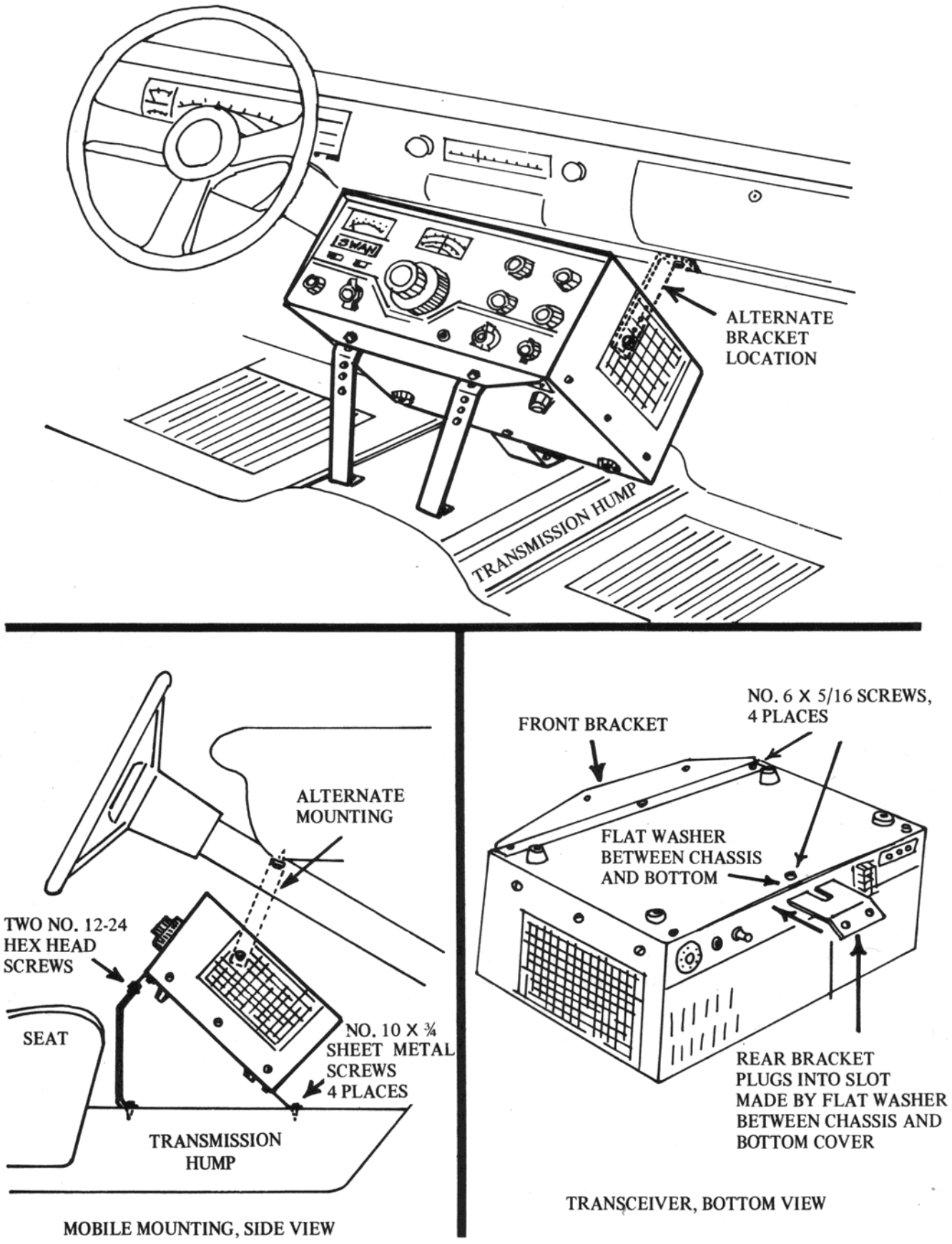


FIGURE 1. MOBILE MOUNTING ON TRANSMISSION HUMP UNDER DASH

MIC. GAIN
Controls potentiometer R1404 in the grid of V14A, and controls amount of audio to the balanced modulator.

R.F. GAIN
Controls variable resistor R505, common in the grids of Receiver Mixer, V6; RF amplifier, V5; I.F. Amplifiers, V7 and V8.

A.F. GAIN
Controls potentiometer R1101 in grid circuit of AF output, V11, and controls audio volume.

MAIN TUNING
Controls C1608 in frequency determining tank circuit of VFO.

DRIVER
Controls C2A and C2B in plate tanks of transmitter Mixer and Driver.

P.A. TUNE
Controls C407 in Pi-network to tune final power amplifier plate to resonance.

P.A. LOAD
Controls C408 in Pi-network to match impedance of output load. Tunes input to Receiver R.F. Amplifier.

BAND SWITCH
Switches tank coils and associated capacitors in VFO, VFO Amplifier, Driver, and Transmit Mixer.

Sideband Selector Switch
LSB – Receive and Transmit on Lower Sideband.
USB – Receive and Transmit on Upper Sideband.
AM REC. – Receive AM signals. (Insert carrier with Carrier Insertion control to transmit.)

ANL Switch
Automatic Noise Limiter

SPOT Switch
Inserts carrier for AM tuning in REC position.

Meter Switch
Reads cathode current in P.A. CATHODE position. Reads S-UNITS in S-METER position. Reads RELATIVE OUTPUT in S-METER position when Function Switch is in TUNE position.

DIAL SET
Dial adjustment can be made at any point with a frequency standard or marker generator.

MIC.
Microphone plugs into this jack.

CONTROL FUNCTIONS, REAR PANEL

P.A. BIAS
Adjust idling current for P.A. Tube. (40 ma.)

ANTENNA
Antenna feedline (50-75 ohm) plugs into this connector.

FUSE HOLDER
4 amp fuse.

HEADPHONES
Headphones plug into this jack. Disconnects internal speaker.

S-METER ZERO
Adjust S-Meter to zero with antenna disconnected.

POWER CONNECTOR
AC power cord plugs into this connector. Model 14A DC converter plugs into this connector for mobile operation.

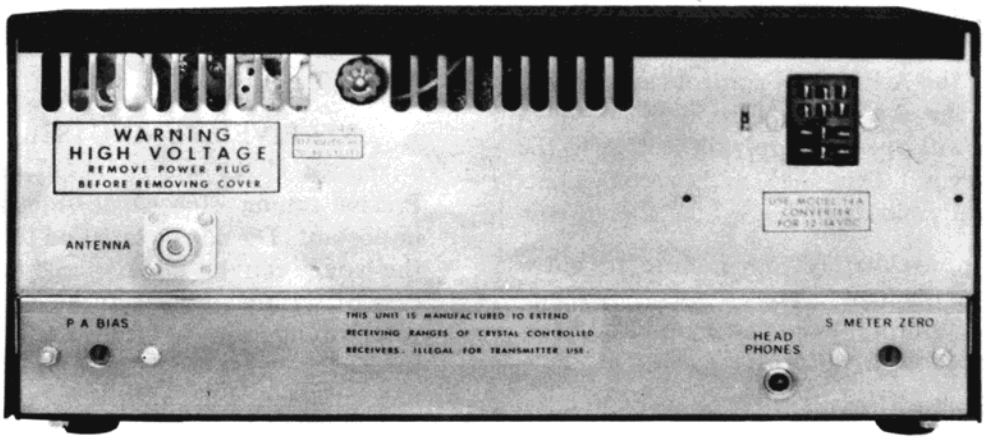


FIGURE 2. SILTRONIX MODEL 1011C, REAR VIEW

OPERATION

Before connecting any cables to the Siltronix 1011C transceiver, perform the following steps:

① Locate the P.A. compartment and remove the packing material from the P.A. tube.

② Rotate the A.F. GAIN control counter clockwise to operate the power switch to the OFF position.

③ Rotate the CARRIER INSERTION control full counter clockwise to the minimum position.

CONNECTIONS

① Connect a wire from earth ground to the ground stud located on the rear of the chassis. This is not essential, but is strongly recommended.

② Connect a 50 or 75 ohm antenna feed-line to the coaxial connector on rear panel. A 50 ohm dummy load may also be used.

③ Connect the AC power cable to the Jones connector on the rear panel.

④ Connect the AC power cable to the proper voltage source.

WARNING

Dangerous high voltage is present on the plate of the power amplifier whenever the power supply is energized.

RECEIVE OPERATION

① Rotate the A.F. GAIN control clockwise to about the 3 o'clock position. The power switch will operate, applying voltage to the transceiver. The dial and meter lights should illuminate.

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

a. Rotate Frequency Range switch to desired range.

b. Rotate Tuning Dial to desired frequency.

c. Rotate MIC. GAIN fully counter clockwise.

d. Set P.A. TUNE control to 12 o'clock position.

e. Set DRIVER control to 12 o'clock position.

f. Set P.A. LOAD control to 12 o'clock position.

g. Rotate R.F. GAIN control to 3 o'clock position.

h. Place SIDEBAND SELECTOR switch in USB mode.

③ Carefully adjust the DRIVER and the P.A. TUNE controls for maximum receiver noise.

NOTE

The DRIVER control resonates the transmitter driver stages and the receiver RF amplifier plate circuit. The P.A. TUNE and P.A. 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 receive position will result in approximately resonant conditions in the transmitter stages.

RECEIVER TUNING (SSB)

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

The following points help to explain the effects of mistuning:

1. If you tune so the received voice is higher than normal pitch, you will then transmit off frequency, and your voice will sound lower than normal pitch to the other station. He will probably retune his dial to make you sound right. If you keep this up, you will gradually waltz one another across the band. If both of you are mistuning to an unnatural higher pitch, you will waltz across the band twice as fast. (And someone will no doubt be accused of frequency drift.)

2. Mistuning results in serious harmonic distortion on the voice, and should be quite noticeable to the average ear. Some will claim that if they don't know how the other person's voice actually sounds, they can't 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 that 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. Your Siltronix 1011C will automatically transmit on exactly the same frequency as the one to which you are listening.

4. If it is desired to receive on Lower Sideband, rotate the SIDEBAND SELECTOR switch to the LSB position.

RECEIVER TUNING (AM)

Refer to the RECEIVE OPERATION paragraph above, and perform all the steps.

(1) After adjusting the DRIVER and the P.A. TUNE controls for maximum receiver noise, rotate the SIDEBAND SELECTOR switch to the AM REC. mode.

(2) Rotate the tuning dial until an AM signal is heard.

(3) Place the SPOT switch in the ON (up) position. This removes the bias from the carrier oscillator, allowing the carrier to be heard in the receiver.

(4) Zero beat the carrier with the tuning dial.

(5) Turn off the SPOT switch.

(6) The AM station should be on frequency, with excellent voice reception.

TRANSMITTER TUNING

CAUTION

READ CAREFULLY. BE SURE THAT YOU UNDERSTAND AND REMEMBER THESE NOTES WHEN TUNING THE TRANSMITTER.

1. The most important detail to keep in mind when tuning the transmitter portion of your Siltronix 1011C is that the P.A. TUNE control must be resonated as quickly as possible.

2. The P.A. tube is dissipating all the power input when it is not in resonance, and can be permanently damaged in just a few seconds.

3. Once resonance has been established, the P.A. tube can operate at full power input for quite a while, although we recommend 30 seconds as a safe maximum. But it is most important to realize that the 30-second limit assumes that the P.A. TUNE control has been immediately resonated. This rule applies generally to all transmitters.

4. Do not tune more often than necessary. The P.A. tube will last for many months, or even years, with normal operation, but excessive tuning will shorten tube life.

TRANSMITTER TUNING STEPS

(1) Make the following preliminary adjustments:

a. Sideband selector switch in USB position.

b. Tuning dial to desired frequency.

c. MIC. GAIN at minimum

d. Carrier Insertion to full CCW (MIN) position.

e. Meter Switch in P.A. CATHODE position.

f. Function Switch in REC position.

g. P.A. BIAS control on rear panel to full CCW position.

h. Microphone with press-to-talk switch plugged into MIC jack on front panel.

(2) Press the Mic switch and observe the meter for any reading. Meter should read approximately 0. If the meter does not read approximately 0, it incidates that the CARRIER is not completely balanced out. Locate the CARRIER BAL hole on the bottom cover. With the Mic switch pressed, use an alignment tool and adjust the carrier balance pot until the meter "dips" at its lowest reading. This adjustment should not be required often.

(3) Press the Mic switch and with a screwdriver, adjust the P.A. BIAS control located on the rear panel, until the meter reads approximately 40 ma. P.A. Idling current. This point is indicated on the meter scale by a small triangular symbol. The permissible idling current range is 30 to 50 ma. If the idling current tends to creep upward slightly with warm-up, set it at 30 ma. Excessive creep indicates that the P.A. tube is gassy, and may need to be replaced soon. This adjustment should not be required often.

(4) If this is the first time you are tuning the transmitter, set DRIVER control, P.A. LOAD control, and P.A. PLATE control to the straight up (12 o'clock) position. After gaining experience in tuning these controls, they may be pre-set to previously determined positions.

NOTE

UP TO NOW THE TRANSMITTER HAS BEEN "IDLING" AND THERE HAS BEEN NO PARTICULAR TIME LIMIT INVOLVED. THE FOLLOWING STEPS APPLY GRID DRIVE, AND REQUIRE CAUTION. OBSERVE THE RECOMMENDED 30-SECOND TIME LIMIT.

(5) Set METER SWITCH to the S-METER position, FUNCTION SWITCH to the TUNE position and:

a. Rotate DRIVER control for maximum meter reading.

b. IMMEDIATELY rotate P.A. TUNE control for maximum meter reading. This is the critical "resonating" adjustment which must be done quickly to preserve P.A. tube life.

c. Rotate P.A. LOAD control for maximum.

d. Re-adjust P.A. TUNE control for maximum. This adjustment should be repeated each time the P.A. load control is adjusted.

NOTE

With the Meter switch in the S-Meter position, and the Function Switch in the TUNE-position, the meter is reading *RELATIVE OUTPUT*. This RELATIVE OUTPUT reading has no relationship with the true output of the transmitter. To obtain a true indication of the transmitter output, place the Meter switch in P.A. CATHODE, and push the Function Switch to TUNE. Normally, when the transmitter is in resonance, the meter reading should be approximately 300 ma. or higher. With high line voltage and new tubes it may read as high as 400 ma. Note that the 1011C operates at reduced power in the TUNE-position. The P.A. cathode bias resistor, R-406, is in the circuit during TUNE operation. In voice mode, the bias resistor is shorted out, and the 1011C operates at full P.E.P. input rating.

(6) The preceding steps complete the Transmitter Tuning procedure for SSB. Return Function Switch to the REC. position.

VOICE TRANSMISSION (SSB)

After tuning up as outlined above, with the Function Switch in the REC. position, place the Meter Switch in the P.A. CATH position. Press the microphone press-to-talk switch, and while speaking into the microphone, slowly rotate the MIC. GAIN control until occasional peak readings of 100 to 125 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 ALC circuit will help limit cathode current, but turning the MIC. GAIN up too high will still produce flat-topping and spurious signals, so it is important to hold it down. The meter is quite heavily damped, and its reading with average voice modulation may not look very impressive, but the voice peaks are going well over the 300 watt input power rating of your Siltronix transceiver.

AM TRANSMITTER TUNING

1. Tune the transmitter to full output as you would for SSB transmitter tuning.
2. Rotate MIC. GAIN control to full CCS (minimum) position.
3. Place the SIDEBAND SELECTOR switch in the AM REC. position.
4. Place the Meter Switch in the P.A. CATHODE position.
5. With the microphone press-to-talk switch pressed, rotate the CARRIER INSERTION control until cathode current is approximately 125 ma.
6. While talking in a normal tone of voice into the microphone, increase the MIC. GAIN control setting until the meter barely kicks upward. This setting will result in excellent AM transmissions.

CIRCUIT THEORY

GENERAL DISCUSSION

This Siltronix 1011C 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 KHz, while the actual demodulated audio is only approximately 3 KHz. The result is inefficient use of the frequency band, and over half of the allotted band is unusable due to heterodynes, interference, and congestion.

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

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

a signal level of 20 db over S9, carrier will be present at a level of approximately S3 to S4.

For the following discussion refer to the schematic diagram, and to Figures 3, 4, and 5.

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 Q3 Carrier Oscillator, which is a Pierce oscillator with the crystal operating in parallel resonance. 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 T1301. The deflection plate DC voltages are adjusted by means of the carrier balance control, R1305, so that the RF being fed to the output plates will cancel out, and the output from T1301 will be zero. Audio signals from the Microphone Amplifier, V14, are applied as a modulating voltage to one deflection plate, and the two sidebands resulting from the sum and difference frequencies of the audio and carrier signals appear in the output of transformer T1301. Carrier suppression is approximately 60 db down. The Carrier Insertion control limits the amount of carrier that can be inserted in AM and thus protects the final amplifier from being over driven.

The double sideband, suppressed carrier signal is then coupled from the secondary winding of T1301 to the crystal filter, which suppresses the lower sideband, and permits only the upper sideband to be fed to the First IF Amplifier V7. The carrier frequency is generated at approximately 5500.0 KHz, normal sideband. With the opposite sideband crystal, the carrier crystal frequency will be 5504.6 KHz, and this positions the double sideband signal on the other side of the filter response curve, attenuating the upper sideband by at least 50 db.

Q1, the VFO 2N706 Oscillator, operates in the common base configuration as a Colpitts oscillator. Q2, the buffer, is used for isolation. The extremely good regulation achieved through using the Zener diode regulator D1712 across the bias supply voltage, also contributes to the stability.

The VFO in the Model 1011C exhibits extremely good stability after the initial warm-up period. Drift from a cold start will be less than 2 KHz during the first hour. 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 Transmit 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 Amplifier, V4. The signal from the VFO Amplifier is initiated in the transistorized VFO/ Buffer circuit Q1 and Q2. The signal from the VFO is routed to the VFO Amplifier, and is mixed with the single sideband from the IF amplifier, resulting in output in the 10 meter band. When the transceiver is in the TRANSMIT mode, the gain of the First IF Amplifier is controlled through the Automatic Level Control (ALC) network (using the AGC Amplifier V10) to control the gain of the stage in response to the average input power to the Power Amplifier. This ALC system will compensate for any extremely strong input signals, but does not completely eliminate the necessity of proper adjustment of the MIC. GAIN control. This feature will help prevent the transmitter from flat topping and spurious emissions, but considerable distortion may occur if the MIC. GAIN control is not properly adjusted. Refer to Operating Instructions.

TUNE OPERATION

Normally, the frequency of the carrier oscillator is approximately 300 Hertz outside the 6 db passband of the crystal lattice filter. In TUNE position, the frequency of the carrier oscillator is moved approximately 800 Hertz to place it well within the passband of the crystal lattice filter.

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. The relay is energized for