

# **INSTRUCTION MANUAL**

FT - 277

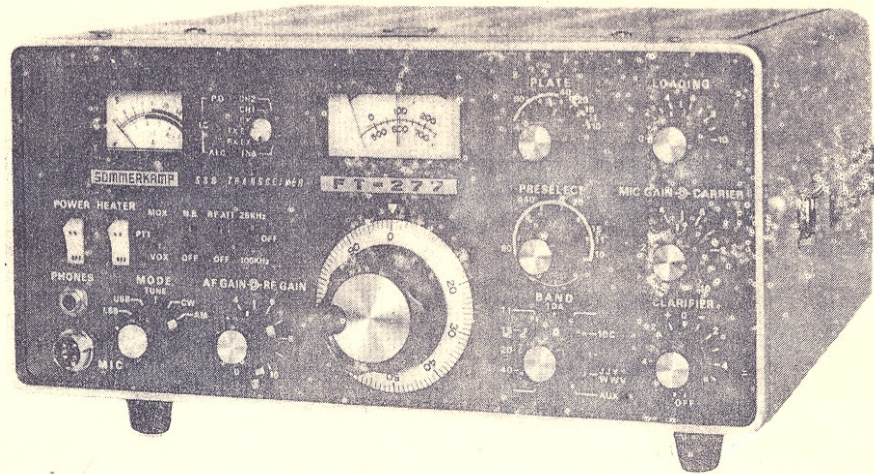
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**SOMMERKAMP ELECTRONICS GMBH**

GERMANY

# FT-277

## SSB TRANSCEIVER



### GENERAL DESCRIPTION

The model FT-277 SSB Transceiver is a precision built, compact high performance transceiver of advanced design providing SSB (USB, LSB selectable), CW and AM modes of operation. The FT-277 operates at an input of 260 watts SSB, 180 watts CW and 80 watts AM on all bands **160** to 10 meters.

All circuits, except the transmitter driver and linear amplifier, are transistorized and composed of standard computer type plug-in modules, permitting easy maintenance.

The FT-277 is self-contained, requiring only an antenna and a power source for home, portable or mobile operation. The FT-277 may be operated from 100/110/117/200/220/234 volts AC when appropriately wired but is normally supplied for 117 volt AC and 12 volt DC operation. The two-way solid state power supply is an integral part of the unit. Two power cords are provided with the transceiver. Selection of AC or DC power source is automatically made when the proper line cord plug is inserted.

For mobile operation a separate switch is provided on

the front panel to turn off the tube heaters while in the receive mode. In this mode the FT-277 draws only 0.5 amp. less than your auto dash lights.

All accessories, such as VOX, break-in CW with side-tone, 25 and 100 KHz calibrators, noise blander, 10 MHz WWV are built-in. In addition, dual VFO adaptor, crystal control adaptor, speaker and clarifier are integral parts of the unit. Provision is made for the installation of 600 Hz crystal filter for the expert CW-DX operator. The CW filter is selected automatically when the transceiver mode switch is placed in the CW position.

The entire transceiver weighs approximately 30 pounds, is 13 1/2" wide, 6" high, 11 1/2" deep. Construction is of heavy-gauge steel which provides an extremely rugged package, virtually immune to the effects of vibration and shock.

The SP277P, combination phone patch and external speaker, is a valuable optional accessory for base operation. The unit features an elliptical type speaker for high quality voice reproduction. Other optional equipment includes the FV277 external VFO and mobile mounting brackets.

## SPECIFICATIONS

Frequency Range .....	<b>1.8</b> -30 MHz amateur bands, <b>160</b> thru 10m) 26.9-27.5 MHz (CB) 10-10.5 MHz (WWV)
Type of Emission .....	USB or LSB (selectable) CW, AM
Power Input .....	SSB 260 Watts PEP CW 180 Watts 50% duty cycle AM 80 Watts (slightly lower on 10 meters)
Carrier Suppression .....	50 db
Sideband Suppression .....	50 db at 1000 Hz
Spurious Radiation .....	Down 40 db or more
Transmitter Frequency Response .....	300 Hz - 2700 Hz $\pm$ 3 db
Distortion Products .....	Down 30 db or more
Antenna Output Impedance .....	50 - 75 ohm unbalanced
Frequency Stability .....	Less than 100 Hz drift in any 30 minute period
Sensitivity .....	0.3 uV S/N 10 db
Selectivity .....	(2.4 KHz at 6 db) SSB, AM, CW (4.5 KHz at 60 db) *(600 Hz at 6 db) CW filter (1.2 KHz at 60 db)
Audio Output .....	3 Watts
Power Consumption .....	AC Receive 35 Watts Transmit 300 Watts Max. DC 12V Standby 0.5 Amp. Transmit 20 Amps. Max.
Dimensions .....	13 1/2" wide, 6" high, 11 1/2" deep
Weight .....	Approx. 30 Pounds

\* Option

NOTE: Local oscillator crystal for 160 meter band is not supplied.

## INSTALLATION

### General ;

The FT-277 Transceiver is designed to provide a complete single unit installation for fixed, portable, or mobile operation. Two prewired plugs are furnished with the unit for AC or DC voltages operation. This system provides the flexibility required for various installations and allows rapid change from fixed to mobile operation.

### Base Station Installation ;

The transceiver is designed for use in many areas of the world using supply voltages that may differ from the operators local supply voltage. Therefore, before connecting the AC cord to the power outlet, be sure that the voltage marked on the rear of the transceiver agrees with the local AC supply voltage.

### CAUTION

**Permanent damage will result if improper AC supply voltage is applied to the transceiver.**

The transceiver should be connected to a good ground. The ground lead should be connected to the terminal marked GND located on the rear panel of the transceiver.

### Mobile Installation ;

The FT-277 Transceiver will operate satisfactorily from any 12 volt negative-ground battery source by connecting the DC power cord to the rear panel receptacle. For under-dash mounting, a special mounting bracket is available from your dealer. A location should be selected clear of heater ducts. No special mounting precautions need be observed if adequate ventilation space is available. A minimum of two inches of air space above the cabinet top and on all sides is recommended to allow proper air flow around the cabinet. Never stack other units above or below the cabinet since the accumulated heat from both units could cause permanent damage.

The transceiver requires an average of 14 amps on transmit and 20 amps on voice peaks. The fuse in the DC power cable should be rated at 20 amps. When making connections to the car battery, be certain that the RED lead is connected to the positive (+) terminal and the BLACK lead to the negative (-) terminal of the battery. Reversed connections could permanently

damage the transceiver. The BLACK lead should run directly to the negative terminal of the battery. Using the car frame as a negative connection or connecting the positive lead at a point such as the ignition switch places the devices creating noise in the same current path as the transceiver and fails to take advantage of the filtering action of the battery. The power cable should be kept away from ignition wires and be as short as possible to minimize voltage drop and to provide a low impedance path from the transceiver to the battery.

Prior to operating the transceiver in a mobile installation, the voltage regulator setting should be checked. In many vehicles, the voltage regulations is very poor and in some cases, the regulator may be adjusted for an excessively high charging voltage. As the battery and regulator age, the maximum voltage while charging can increase to a very high level which is injurious to the battery and could cause damage to the transceiver.

The transceiver is designed to operate from a source voltage range of 11 to 14 volts. It is necessary to carefully set the regulator so that the highest charging voltage does not exceed 14 volts. The transceiver should be switched "OFF" when vehicle is started to prevent voltage transients from damaging power supply transistors.

### Antenna ;

### CAUTION

**Never transmit without having proper antenna or dummy load connected to the transceiver**

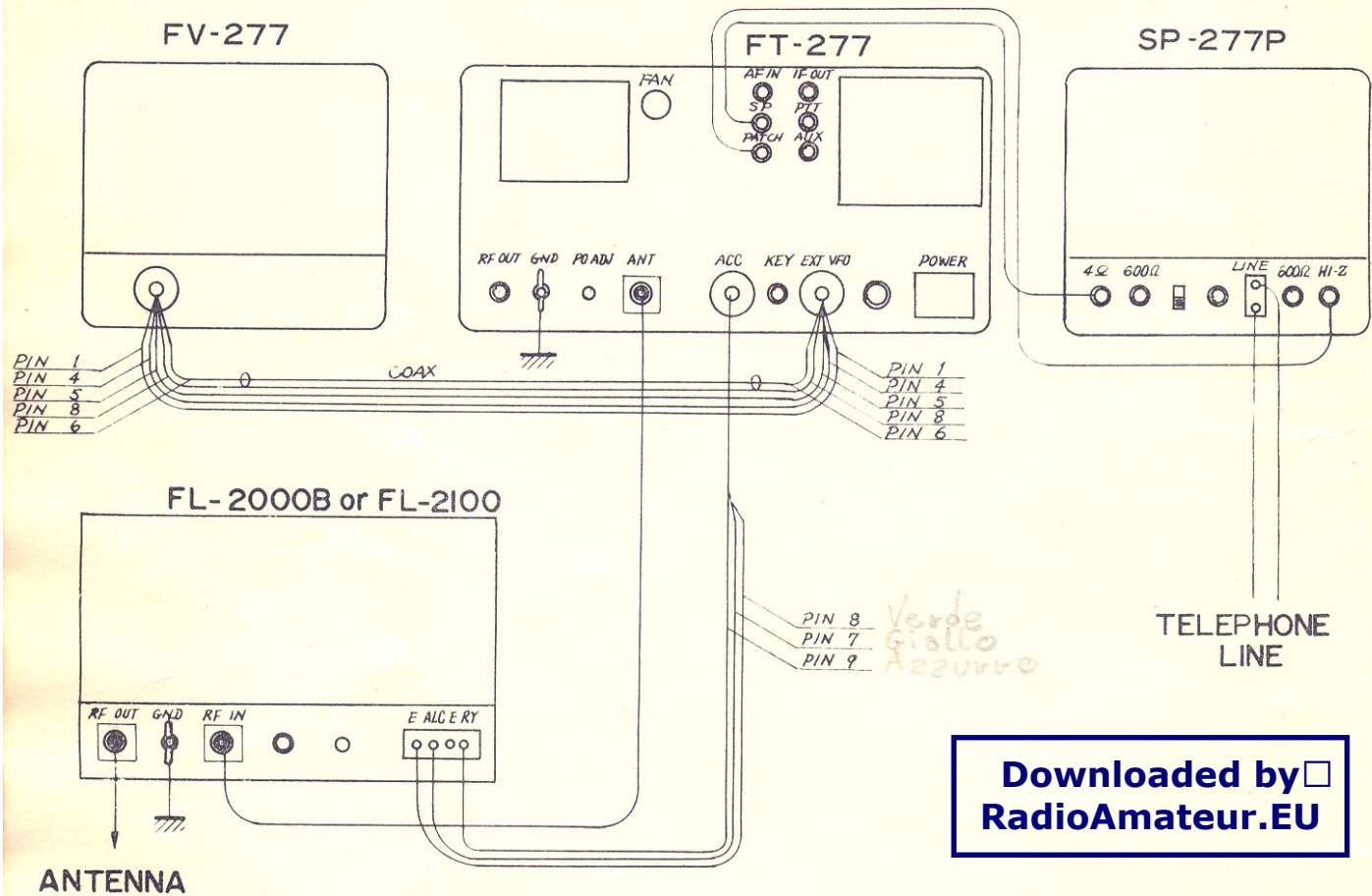
The transceiver is designed for use with resonant antenna having an impedance 50 - 75 ohm resistive load.

The antenna is usually the most critical part of a station installation. Results both in receiving and transmitting will depend on how well the antenna is installed and adjusted. Any of the common antenna systems designed for use on the high frequency amateur bands may be used with the transceiver, provided the input impedance of the antenna system is within the capability of the transceiver pi-matching network (50-75 ohms).

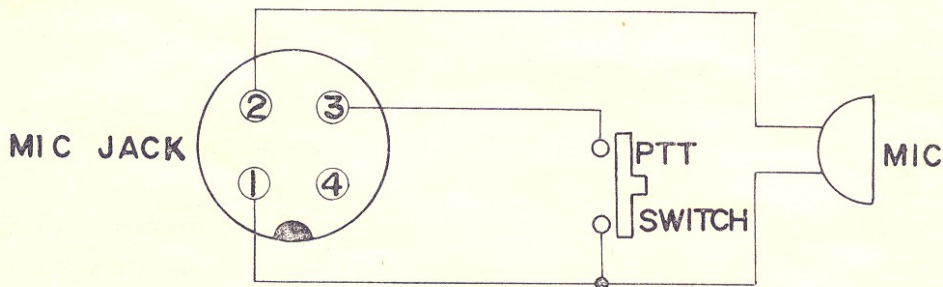
If a tuned open wire transmission line, or a long wire antenna is used, a suitable antenna tuner must be used between the antenna and the transceiver to provide an impedance match between the unbalanced coaxial output of the transceiver and the balanced open-wire feeder or long wire.

For mobile operation, most of the commercially available antennas on the market will give good results with coaxial cable is securely grounded to the chassis of the vehicle at the antenna mount. Adjust the antenna length carefully for minimum SWR after installation.

### INTERCONNECTIONS



### INTERCONNECTION DIAGRAM

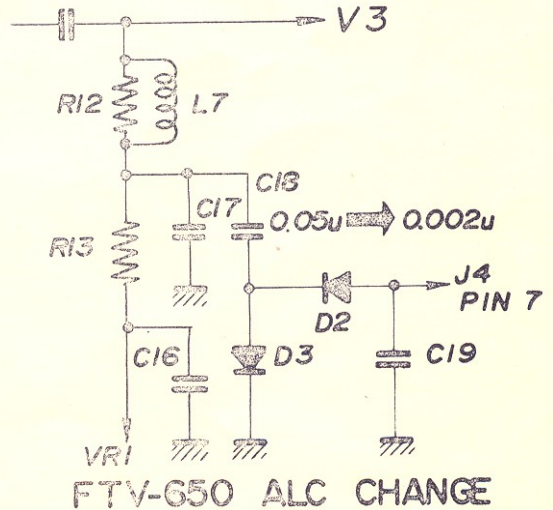
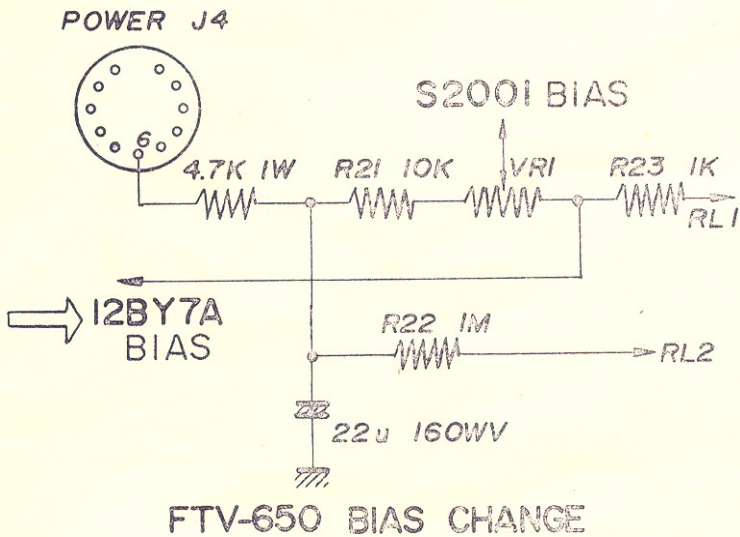
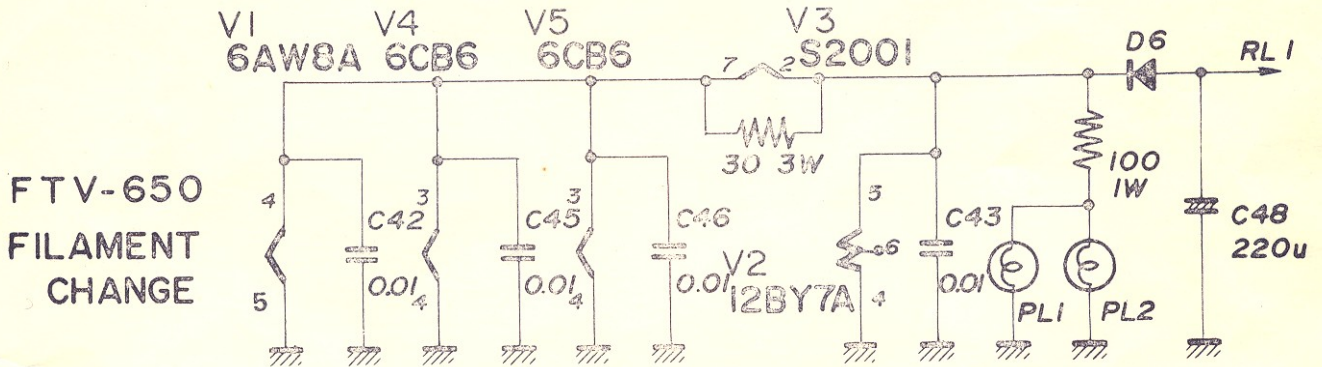
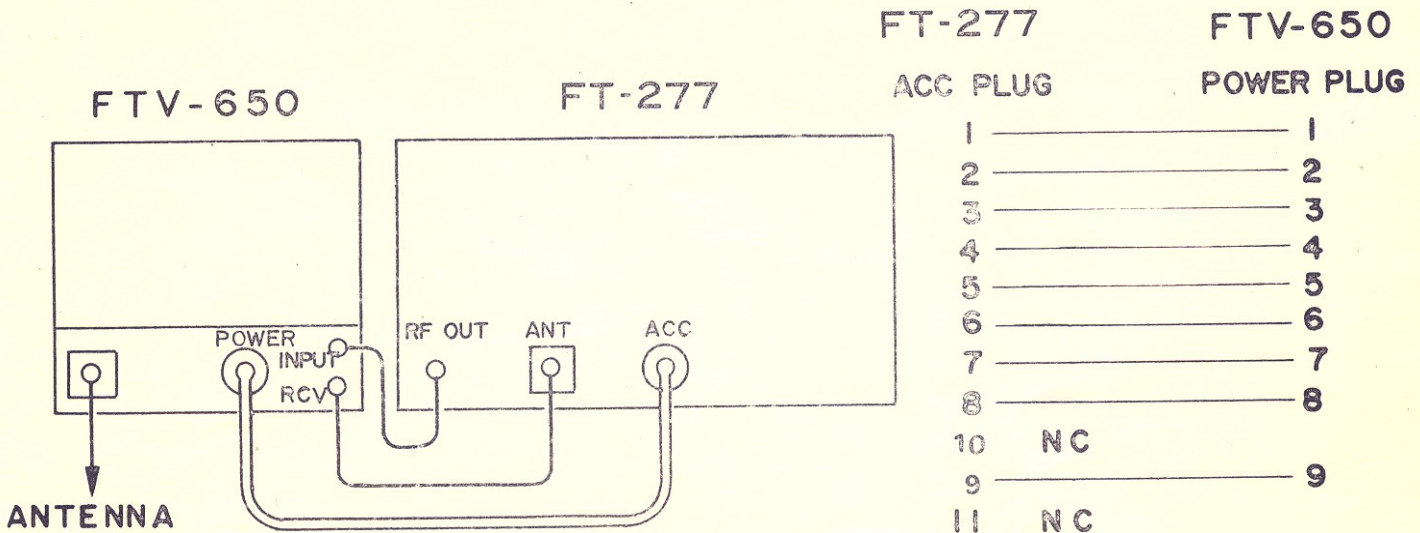


### MICROPHONE CONNECTION

## FTV-650 (6 METER TRANSVERTER)

The FTV-650 transverter is supplied with a 6.3 Volts heater and bias supply for use with other equipment. When the FTV-650 is used in conjunction with

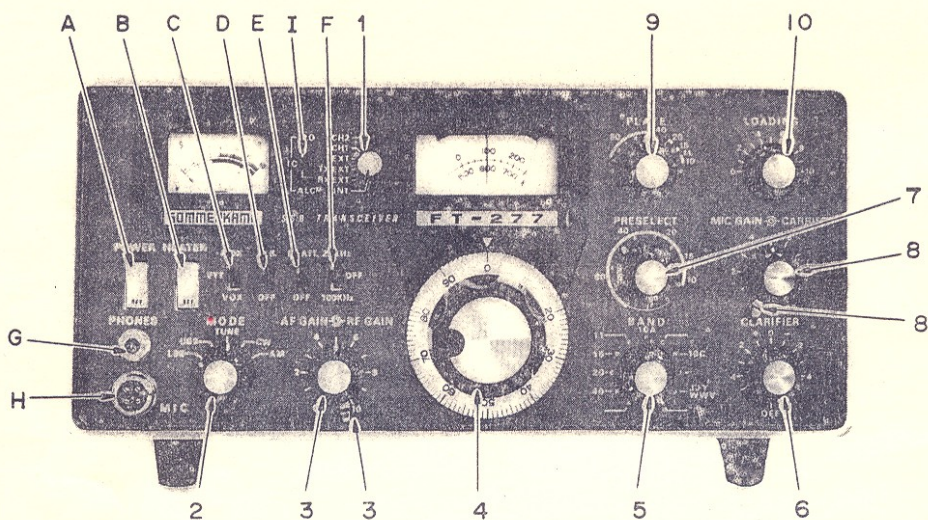
FT-277 transceiver, the modifications shown must be accomplished prior to interconnection of the units.



## CONTROLS AND SWITCHES

The FT-277 Transceiver has been specifically designed for ease of operation and versatility. All controls have been preset at the factory. Several of the controls are unusual in operation, and improper adjustment may result in signals of poor quality. The various front

panel controls and their functions are described in the following section. Be certain that you understand thoroughly the function of each control before operating the transceiver.



### (1) VFO Select Switch ;

This switch provides selection of the companion FV277 external VFO or two fixed crystal oscillator positions. Normal operation of the transceiver VFO requires that the switch be placed in the "INT" position.

INT-- FT-277 VFO controls both transmitter and receiver frequencies

RX EXT--FV277 EXTERNAL VFO controls the receiver frequency and the FT-277 VFO controls transmitter output frequency.

TX EXT--FV277 EXTERNAL VFO controls the transmitter output frequency and the FT-277 VFO controls the receiver frequency.

EXT-- FV277 EXTERNAL VFO controls both transmitter and receiver frequencies.

CH1, CH2--Provides crystal control of the transceiver.

Proper crystals must be installed on PB-1060 crystal oscillator board, for crystal controlled operation.

### (2) Mode Switch ; (LSB-USB-TUNE-CW-AM)

The mode switch is a five-position switch. This switch is used to select the mode of operation ; LSB, USB, AM, CW, or TUNE position. In the AM, CW and TUNE positions, a separate crystal is used to shift the carrier frequency into the filter passband.

### (3) RF GAIN/AF GAIN ;

The RF GAIN/and AF GAIN controls are mounted on concentric shafts. RF GAIN control (lever control) varies the gain of the receiver RF and IF amplifier. Maximum sensitivity is obtained with the control set at 10 (fully clockwise).

The AF GAIN control (round knob) adjusts the audio output level at the speaker and phone jack. Clockwise rotation increases the audio output.

### (4) Tuning Knob

The tuning knob located directly below the main dial window in combination with the band switch determines the actual frequency of operation.

The VFO drive mechanism consists of a precision spring loaded split gear system in combination with a planetary drive unit to provide zero backlash at low tuning rates. Each revolution of the tuning knob results in a frequency change of 16 KHz as indicated on the skirt surrounding the tuning knob.

### (5) BAND Switch ;

The band switch is an eleven-position switch used to select the desired band for receiving or transmitting. The band indication is color coded to guide the operator selecting in the proper frequency scale for each band.

(6) CLARIFIER :

The clarifier control provides a means for tuning the receiver frequency 3 KHz to either side of the transmitting frequency. Thus, it is possible to set the pitch of the voice you are receiving to the most readable point without affecting your transmitting frequency. Its use is particularly valuable in "net" operation where several participants may be transmitting slightly off frequency. The clarifier control may be switched off and the receiver locked to the transmitting frequency by setting the clarifier control to the OFF position. Normally, you will want to keep the clarifier in the OFF position until the initial contact is made. The clarifier control may then be used to zero-in and correct the any drift on the received signal.

(7) PRESELECT :

This control pretunes the signal circuits for both transmit and receive. The preselect circuit provides continuous permeability tuning throughout the frequency range of the transceiver.

(8) MIC GAIN/CARRIER :

The MIC GAIN/CARRIER controls are mounted on concentric shafts. The carrier control (lever control) varies the amount of the carrier in the CW, AM and TUNE modes of operation.

The MIC GAIN control (round knob) varies the audio level from the microphone amplifier stage. The control has sufficient range to permit the use of any high impedance crystal or dynamic microphone. Both controls have maximum gain with the control set at 10 (fully clockwise).

(9) PLATE :

Tunes plate circuit of the final amplifier.

(10) LOADING :

Tunes the output circuit of the pi network to match antenna and feed line impedance.

(A) POWER

Main switch turns transceiver "on" for both AC and DC operation.

(B) HEATER

With this switch in the down position, the transmitter tube heaters are turned off. This reduces battery drain to 0.5 amp and thus permits long periods of listening without excessive battery drain. Pushing the rocker switch to the upper position provides supply voltage to the tube heaters. After a 30 second warm-up, the transmitter is ready for operation. This switch operates

in both DC and AC modes.

(C) MOX-PTT-VOX

This slide switch selects desired transmitter mode for both microphone and key operation.

MOX-(Manual transmit switch position)

Locks transmitter "ON" and must be returned to PTT position for receiver recovery.

PTT-(Push-to-talk)

Locks transmitter "ON" when microphone switch is depressed. Receiver recovers automatically when microphone switch is released.

VOX-(Voice operated transmit or break-in CW operation)

This switch position allows the operator to actuate the transmitter by simply speaking into the microphone. Receiver recovers automatically when the operator stop speaking.

For break-in CW, the VOX system will actuate the transmitter each time the key is depressed, receiver recovers each time key is released.

(D) NB (NOISE BLANKER)

In upper position, the noise blanker is placed in the circuit and eliminates noise pulses caused by auto ignition.

(E) RF ATT (RF Attenuator)

This switch provides insertion of a 20 db attenuator in the incoming signal path to minimize cross modulation which may be caused by extremely strong local signals.

(F) 25 KHz/100 KHz (CALIBRATOR)

The 100 KHz crystal oscillator is used to calibrate the receiver. In the 25 KHz position, the 25 KHz multivibrator generates a marker signal at each 25 KHz point on the dial. Clarifier control must be in the "OFF" position when setting calibration.

(G) PHONE

Headphone may be inserted in this jack for private listening. The internal speaker is disconnected when the headphone plug is inserted. Any high quality headphone may be used.

(H) MIC

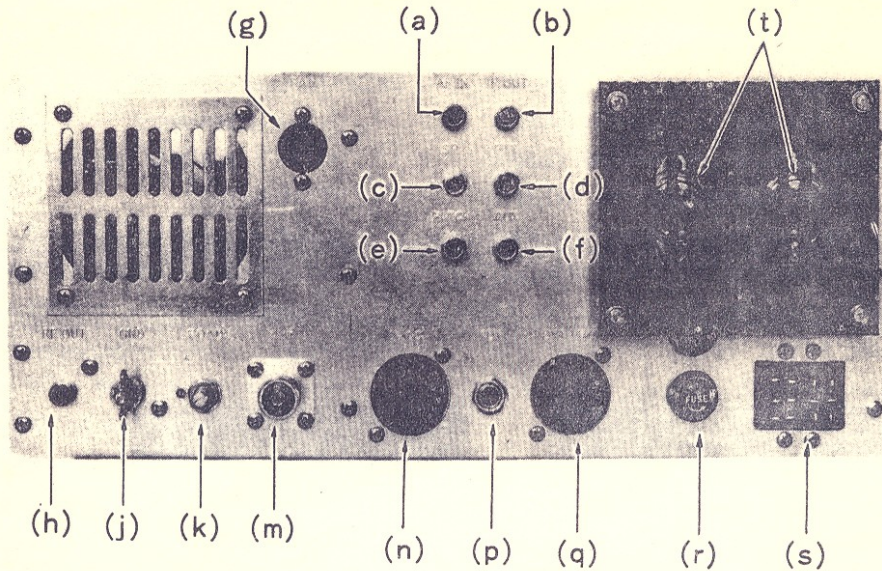
Microphone Jack. Four pin connector is used for microphone input, and push to talk relay actuation.

(I) METER

Selects the meter mode to read PA cathode current (I.C.), relative power output (PO), or ALC feedback voltage.



## REAR APRON CONNECTIONS AND CONTROL



(a) AF-IN ;

Audio input jack for auxiliary station equipment. An FM detector unit, or a high level microphone, may be applied at this point for audio output from the transceiver speaker.

(b) IF OUT ;

3180 KHz IF signal is available from this jack for use with other station equipment such as panoramic adapter, etc.

(c) SP ;

Audio output is provided at this jack for an external speaker. Output impedance is 4 ohms and the internal speaker will be disabled when plug is inserted.

(d) PTT ;

This jack may be used for external actuation of the transmitter. As an example, a foot switch may be inserted into this jack to provide remote control of the transmitter PTT relay.

(e) PATCH ;

Speech input terminal for phone patch connection. Impedance is 50 K ohms.

(f) AUX ;

This jack is connected to the receiver output (4 ohms) to be used for phone patch or other use.

(g) FAN ;

Power outlet for optional cooling fan.

(h) RF OUT

Signal frequency output from the driver stage may be obtained at this jack for use of optional equipment, such as the FTV-650 6 meter transverter.

(j) GND ;

Ground connection.

(k) P. O. ADJUSTMENT ;

Meter sensitivity adjustment for relative power output indication.

(m) ANT ;

Coaxial connection for antenna.

(n) ACC ;

Accessory socket. Provides access to transceiver operating voltages and relay contacts at this outlet.

(p) KEY ;

Key jack for code operation.

(q) EXT VFO ;

Connections for external VFO.

(r) FUSE ;

Fuse holder requires 5 amp fuse for 117 volt or 3 amp fuse for 220 volt operation. D.C. power cord fuse 20 amp.

(s) POWER ;

Power receptacle. Both AC and DC cables are supplied.

## OPERATION

The tuning procedure of the FT-277 Transceiver is not complicated, however, care should be exercised when tuning to insure peak performance of the equipment. The following paragraphs describe the procedure for receiver and transmitter tuning.

### INITIAL CHECK

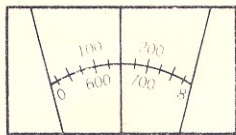
Before connecting the transceiver to a power source, carefully examine the unit for any visible damage. Check that all modules and crystals are firmly in place and that controls and switches are operating normally. Ensure that voltage specification marked on rear panel matches the supply voltage.

### FREQUENCY SELECTION

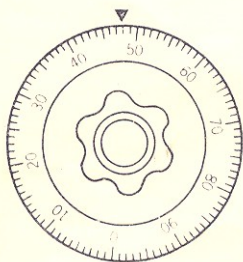
The main tuning dial is color coded with the band selector switch for proper frequency read out. When band selected is marked in Red, the operator reads the Red numbers on the main tuning dial. When band selected is marked in White on transceiver front panel, the operator reads the Black numbers on main tuning dial.

The main tuning dial is marked in 25 KHz increments between each 100 KHz segment. This provides a course frequency setting within the band. The dial skirt surrounding the tuning knob is marked in 1 KHz increments and provides for fine settings of the transceiver operating frequency.

Following the example shown, familiarize yourself with the relationship of main and skirt dial frequency read-out.



For bands 40-20-15-10A-10C read Black scale on main dial. Setting shown in the example would then be 148 KHz plus the starting band edge frequency in MHz. For example, on 40 meters the frequency would be 7.148 MHz. On 20 meters, 14.148 MHz, etc.



For bands ~~160~~80-10B-10D read Red scale on main dial. Settings shown in the example would then read 648 KHz. For example, on 80 meters the frequency would be 3.648 MHz, on 10B, 28.648 MHz, etc.

### RECEIVER CALIBRATION ;

Preset the controls and switches as indicated ;  
VFO Selector ..... INT (internal)  
MOX-PTT-VOX ..... PTT  
POWER ..... ON (upper position)  
RF GAIN ..... Maximum  
AF GAIN ..... As required  
BAND ..... Desired band  
MODE ..... Desired mode  
TUNING ..... 100 KHz point  
PRESELECTOR ..... Desired band segment  
CLARIFIER ..... OFF  
RF ATT ..... OFF  
CALIBRATOR ..... 100 KHz

To calibrate, set the TUNING control to the 100 KHz point on the dial nearest the desired frequency. Tune the preselector for maximum "S" meter deflection. Tune the transceiver to the 100 KHz calibrator signal for zero beat. Two signals may be heard near the 100 KHz point. One of these is a signal feeding through the IF stages. Always calibrate to the stronger of these two signals. To calibrate, hold tuning knob firmly at zero beat point and rotate skirt vernier dial to zero position. The skirt vernier dial surrounds the tuning knob and is held in position by a friction locking device. This dial is easily movable by hand but will retain its position after calibration. The transceiver must be calibrated when changing mode of operation of LSB, USB, AM or CW,

Switch the calibrator to the 25 KHz position and note that the calibrator signal can be heard at every 25 KHz point. The calibrator switch should be in the OFF position in normal use of the transceiver.

## TRANSMITTER TUNE-UP

The following tune-up procedure must be performed prior to selection of desired operating mode, LSB, USB, CW, or AM. See paragraphs relating to the specific mode after basic transmitter tune-up.

Connect dummy load or matched antenna to the coaxial fitting on rear apron, and preset controls as follows :

ROWER ..... OFF  
 HEATER ..... ON  
 MODE ..... TUNE  
 CARRIER ..... 0 (fully counter-clockwise)  
 BAND ..... Desired band  
 TUNING ..... Desired frequency  
 PRESELECTOR ..... Desired band segment  
 PLATE ..... Desired band segment  
 LOADING ..... To position shown in table  
 METER ..... IC  
 VFO SELECT ..... INT  
 MOX-PTT-VOX ..... PTT

### LOADING POSITIONS

BAND	LOADING
80 .....	5
40 .....	5 1/2
20 .....	3 1/2
15 .....	3
10A .....	4
10B .....	4
10C .....	4
10D .....	4

NOTE : Loading positions are nominal. Slight variations from positions shown are to be expected.

With the transceiver turned on, allow 60 seconds for warm-up of the transmitter tubes. Be certain that accessory plug is in the accessory socket. The heater voltage to the final tubes is supplied through pins 1 and 2 of the accessory plug.

Set the "MOX-PTT-VOX" switch to MOX position. Meter will now read Final Amplifier resting cathode current. This should be set at 50 mA with the BIAS control located under the top cover near the rear of the set. Switch the meter to ALC position and adjust ALC control under the top cover for full scale deflection of the meter. Return meter switch to IC position and "MOX-PTT-VOX" switch to PTT position.

### PRE-TUNING

1. Adjust "PRESELECT" for maximum receiver noise level.
2. Place "MOX-PTT-VOX" switch "MOX" position.
3. Rotate "CARRIER" control arm until meter rises just above normal idling current. (50 mA)
4. Adjust "PRESELECT" for maximum meter reading. (Caution: if meter exceeds .1 (100 mA), reduce "CARRIER")
5. Rotate "PLATE" control for minimum meter reading. (Plate Dip)
6. Return "MOX-PTT-VOX" switch to PTT position.

The transmitter is now pretuned to the desired frequency. Final peak tuning is accomplished by carefully following the final tuning procedure.

### FINAL TUNING

Final peak tuning utilizes the meter relative power output position (P.O.). At full transmit power the meter will read approximately one-half to two-thirds full scale into a matched antenna load. If during final tune-up it is noted that the meter indication exceeds full scale, discontinue tune-up. Off scale meter indications are the result of reflected RF due to high VSWR and corrective action should be taken before attempting final tune-up.

### CAUTION

**Exceeding the time limits noted during final tuning may result in destruction of final output tubes.**

1. Set meter switch to P.O. position, rotate "CARRIER" control arm fully clockwise to position 10.
2. Momentarily set "MOX-PTT-VOX" switch to "MOX" (10 second maximum), and rotate "PRESELECT" control for maximum meter reading. Return "MOX" to PTT position.
3. Momentarily set "MOX-PTT-VOX" switch to "MOX" (10 second maximum) and increase or decrease "LOADING" control for maximum meter reading. Return "MOX" to PTT position.
4. Momentarily set "MOX-PTT-VOX" switch to "MOX" (10 second maximum) and increase or decrease "PLATE" control for maximum meter reading. Return "MOX" to PTT position.
5. Repeat steps 3 and 4 until maximum meter reading is obtained.

The transmitter is now tuned for maximum output. Return "CARRIER" control arm fully counter-clockwise to zero position. Return meter switch to IC position and MODE switch to desired operating mode.

NOTE: Moving the "MOX-PTT-VOX" switch to the "MOX" position in the above steps may be eliminated by simply operating the microphone PTT switch when microphone is attached to the transceiver.

### SSB OPERATION

After completion of tuning, set MODE switch to LSB or USB. Set the METER switch to ALC position. Set the "MOX-PTT-VOX" switch to the PTT position and advance the MIC GAIN control until the meter kicks down to midscale of green colored portion when speaking normally into the microphone.

Set the "MOX-PTT-VOX" switch to VOX position. For VOX operation, adjust VOX GAIN potentiometer under the top cover until voice actuates the transceiver. Set the ANTITRIP potentiometer to the minimum point to prevent the speaker output from tripping the VOX. Do not use more VOX gain or ANTITRIP gain than necessary. Adjust the DELAY potentiometer under the top cover for suitable release time.

NOTE: When meter is set to IC, voice modulation peaks will indicate 150-200 mA. Actual peak current, however, is approximately 2 times the indicated value.

NOTE: 160 meter band had not been put into consideration at original design point of FT-101 transceiver. Therefore, it is recommended to limit maximum plate current to 140mA to avoid spurious radiations when it is operated on the frequencies between 1820KHz and 1900KHz.

### C A U T I O N

CARE must be taken to avoid an excessive drive to prevent spurious. Maximum key down current should be kept within 330mA for the bands under 15 meter and 280mA for 10 meter band.

For AM operation, carrier control must be set to give 150mA IC in lieu of 100mA mentioned in the manual.

### CW OPERATION

Upon completion final tuning, insert key plug in jack marked "KEY" on rear apron of the transceiver. Power output from the transmitter is determined by the "CARRIER" control arm position. The operator may select any power output desired by simply rotating the "CARRIER" control within the limits of its range from zero to ten.

The transceiver may be operated manually or break-in by setting the "MOX-PTT-VOX" switch to either MOX (manual) or VOX (break-in) for the desired mode of operation.

NOTE: Insertion of the key plug automatically disconnects the bias supply to the PA tubes, therefore, with the key plug inserted Final Amplifier bias current will not be indicated when meter is in the IC position.

### AM OPERATION

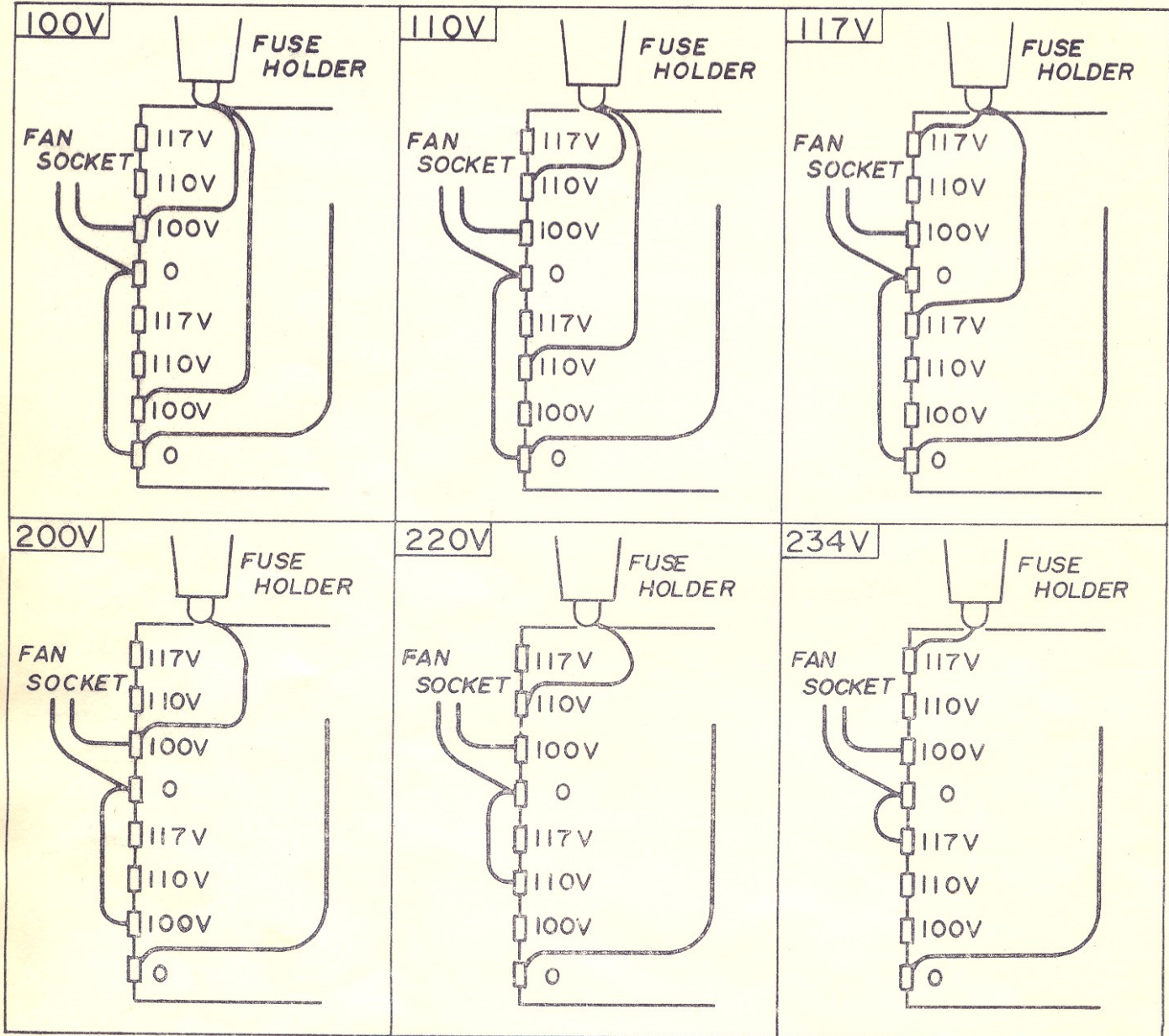
AM operation of the transceiver is accomplished by setting the MODE switch to the AM position and inserting the proper amount of "CARRIER" with the "CARRIER" control.

After completion basic transmitter tune-up, place the MODE switch in the AM position and rotate "CARRIER" control arm until meter reads .1 (100 mA) in the IC position. While speaking into the microphone normally, increase MIC GAIN until the meter indicates very slight movement with voice peaks.

Care must be taken in adjusting MIC GAIN control to assure that the "CARRIER" control arm is not rotated causing an increase in "CARRIER" level. Do not exceed .1 (100 mA) meter indication during AM operation or destruction of the Final Amplifier tubes may result.

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# POWER TRANSFORMER CONNECTIONS



## CRYSTAL CALCULATIONS FOR CRYSTAL CONTROLLED TRANSCEIVER OPERATION WITH THE FV277 VFO OR THE FT-277 INTERNAL FIX OSCILLATOR, PB-1060A.

The crystal holders accept standard HC-6/Utype crystals. All crystal frequencies must fall between 8,700 KHz and 9,200 KHz. A trimmer capacitor has been connected in parallel with each crystal to permit proper frequency adjustment. Adjustment of this trimmer will change the crystal frequency approximately 1 KHz.

The correct crystal frequency for any desired operating frequency, may be determined by the following formula :

$$F_x = (F_1 + F_c) - F_o$$

$F_x = (F_1 + F_c) - F_o$ , where  $F_x$  is the crystal frequency,  $F_o$  is the desired operating frequency, and the constant  $(F_1 + F_c)$  is taken from the table.

**Frequency Table (F1 + Fc)**

Unit : KHz

BAND	LSB	USB	AM/CW
80	12701.5	12698.5	12699.3
40	16201.5	16198.5	16199.3
20	23201.5	23198.5	23199.3
15	30201.5	30198.5	30199.3
11	36201.5	36198.5	36199.3
10A	37201.5	37198.5	37199.3
10B	37701.5	37698.5	37699.3
10C	38201.5	38198.5	38199.3
10D	38701.5	38698.5	38699.3

For Example :

Find the proper crystal for operation at 3900 KHz LSB on the 80 meter band.

From the table find the constant  $(F_1 + F_c)$  for LSB operation on this band. The constant is 12701.5, therefore  $F_x = 12701.5 - 3900$

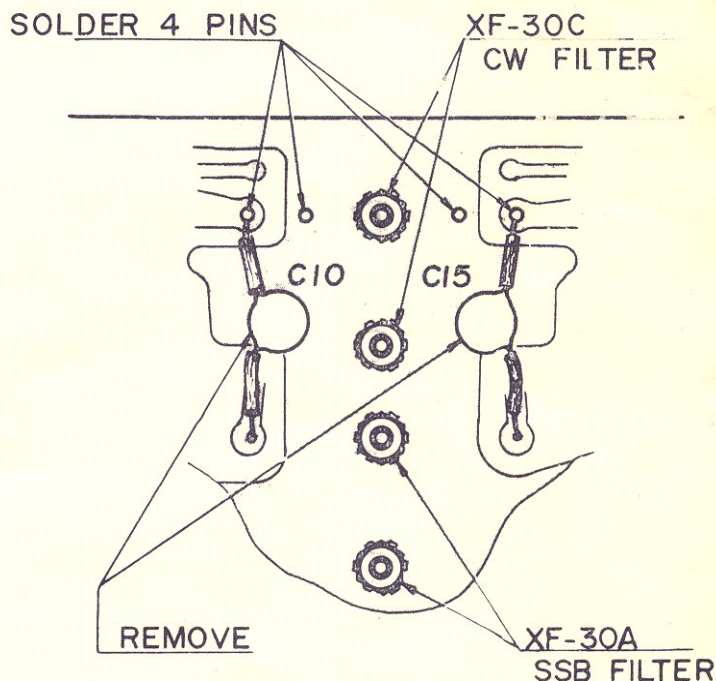
$$= 8801.5 \text{ KHz.}$$

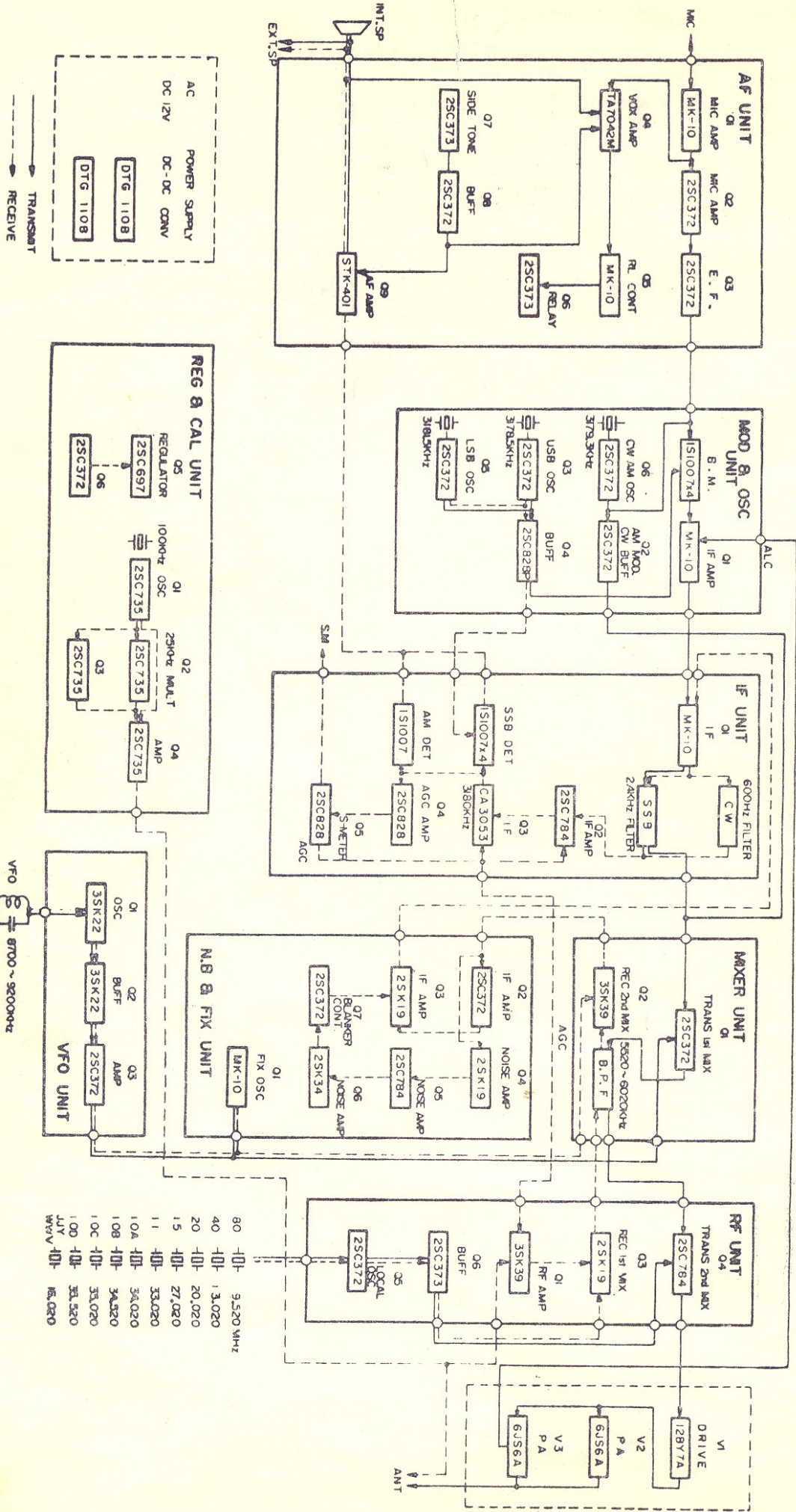
### CW FILTER INSTALLATION

1. Remove top cover of transceiver cabinet and locate printed circuit boards PB-1081C and PB-1080A.
2. Remove two screws holding PB-1081C to the U-shaped bracket. Remove two screws holding the U-shaped bracket to the shield plate, located between the two boards.

3. Remove PB-1081C from the chassis connector receptical. Gently, rock the circuit board out of the connector.
4. Remove the two screws holding the shield plate and lift out of the cabinet.
5. Grasping the U-shaped brackets still attached to PB-1080A, gently, rock the circuit board out of the connector.
6. With PB-1080A removed from the chassis, remove C-10 and C-15 (.01 uF) capacitors from board. Install XF-30C CW filter in position indicated using the nuts and lockwashers provided. Solder the four filter terminals to the board.
7. Re-install PB-1080A into socket, screw shield plate to chassis, and re-install PB-1081C into socket. Replace all attaching screws.

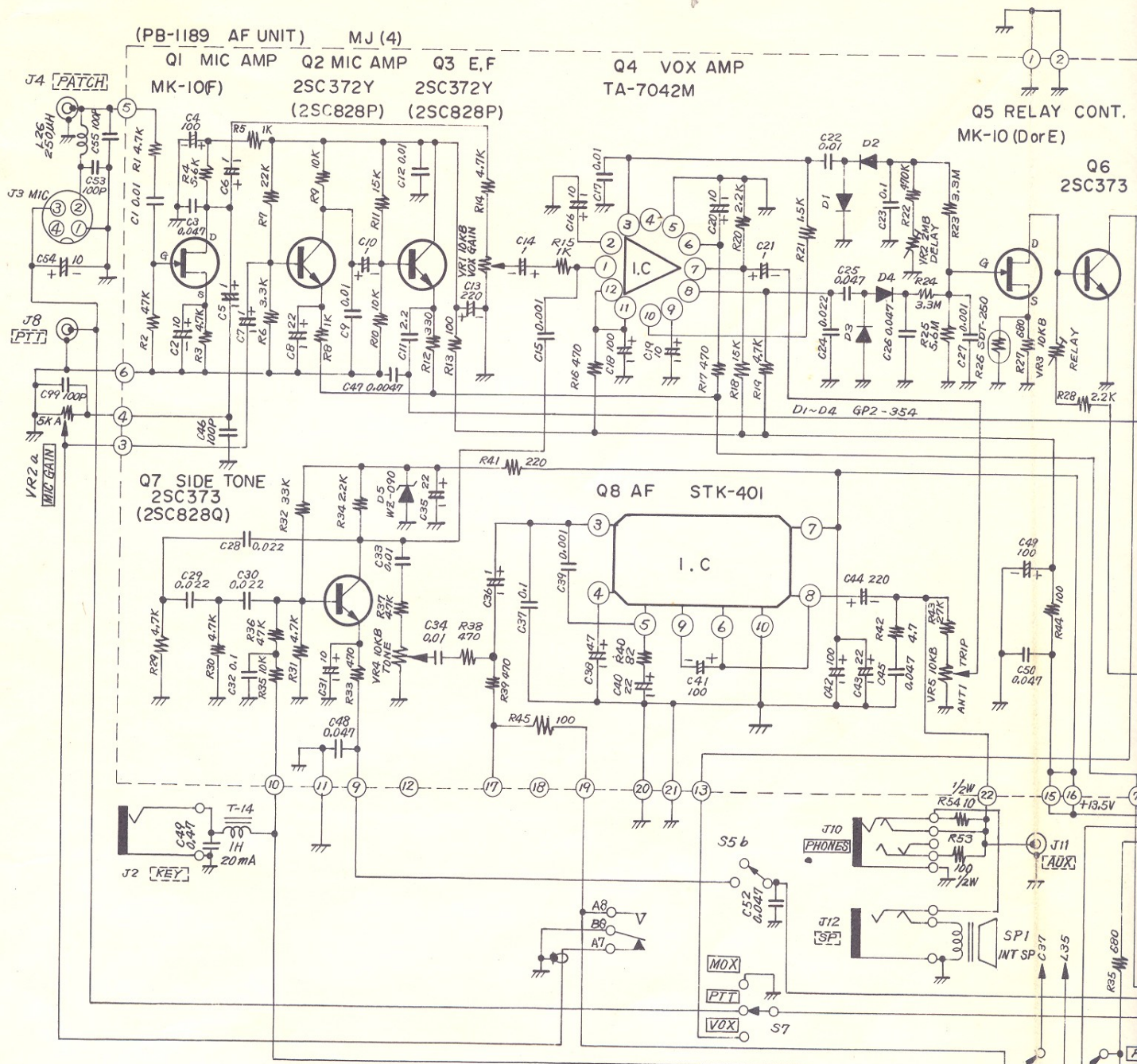
This completes the CW filter installation. The filter provides a 600 Hz bandpass when the mode switch is placed in the CW position. Transceiver alignment is not required for this installation.





80	-10-	9.520 MHz
40	-10-	3.020
20	-10-	20.020
15	-10-	27.020
11	-10-	33.020
10A	-10-	34.020
10B	-10-	34.520
10C	-10-	35.020
10D	-10-	35.520
10E	-10-	36.020

a

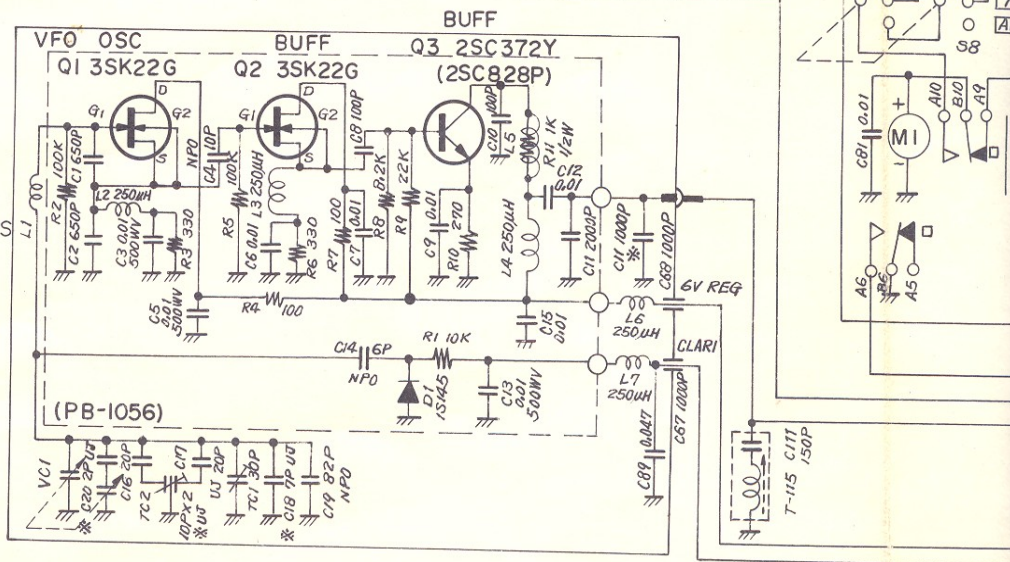


NOTES

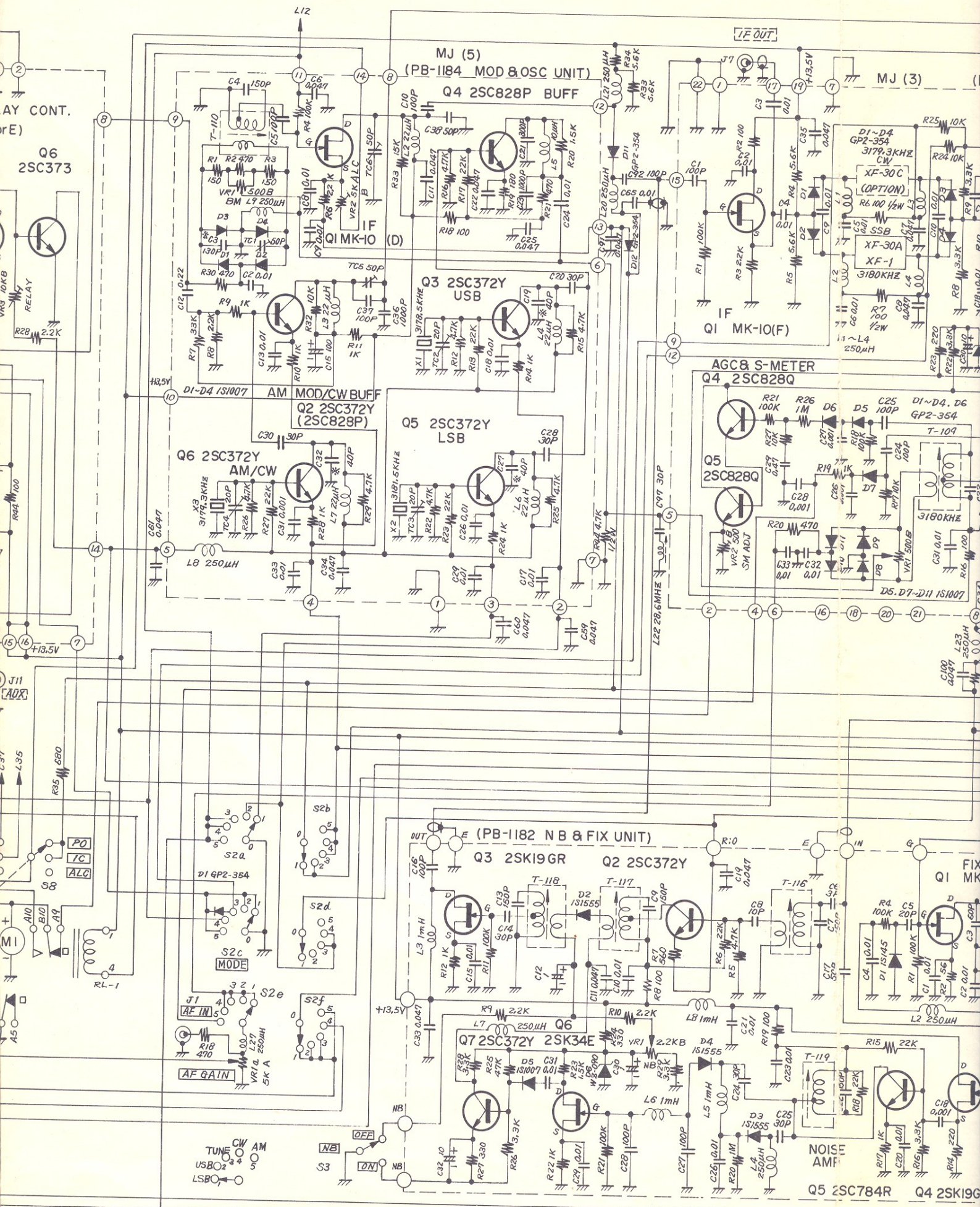
- 1 ALL RESISTORS ARE IN 1/4W UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN  $\mu$ F UNLESS OTHERWISE NOTED.
- 3 ALL ELECTROLYTIC CAPACITORS ARE 16WV UNLESS OTHERWISE NOTED.
- 4 \* VALUE IS NOMINAL.

FT-277  
CIRCUIT DIAGRAM

125001







AY CONT.  
(E)

Q6  
2SC373

J11  
AUX

PO  
IC  
ALC

MI  
S8

TUNE CW AM  
USB 2 3 4 5  
LSB 1

OUT E (PB-1182 NB & FIX UNIT)

Q3 2SK19GR Q2 2SC372Y

Q7 2SC372Y 2SK34E

NOISE AMF

Q5 2SC784R Q4 2SK19G

IF OUT

MJ (3)

IF Q1 MK-10(F)

AGC & S-METER  
Q4 2SC828Q

Q5 2SC828Q

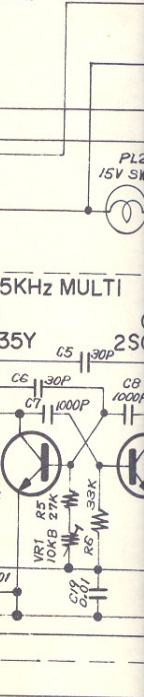
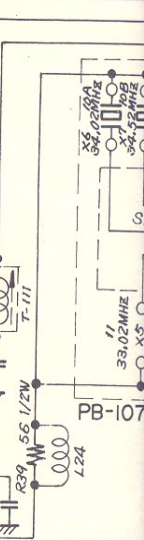
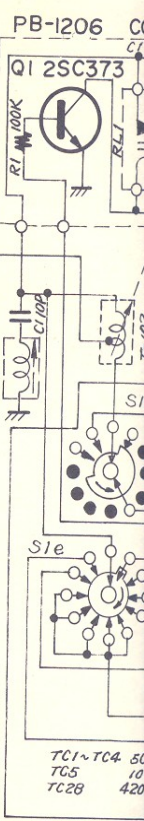
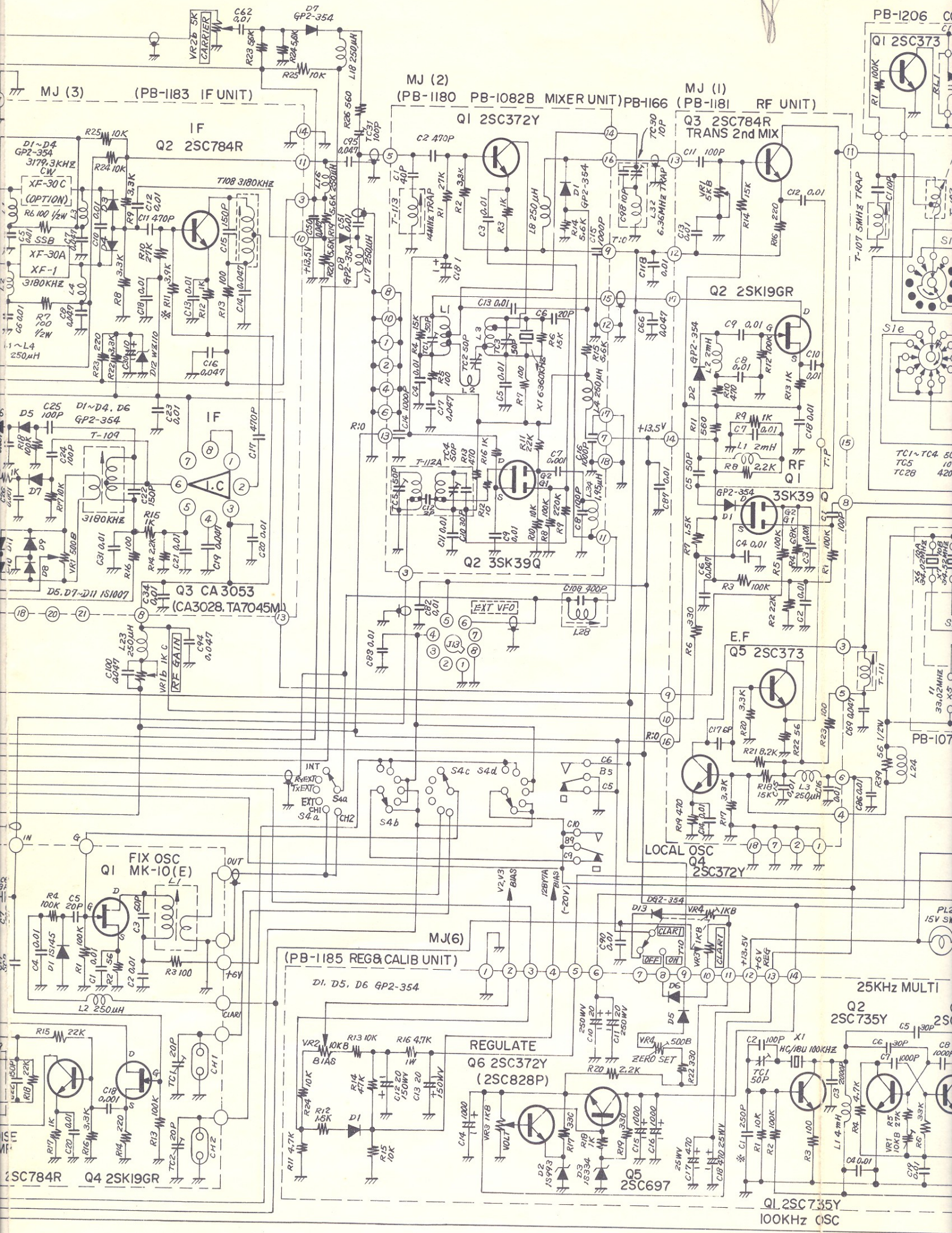
Q3 2SK19GR

Q2 2SC372Y

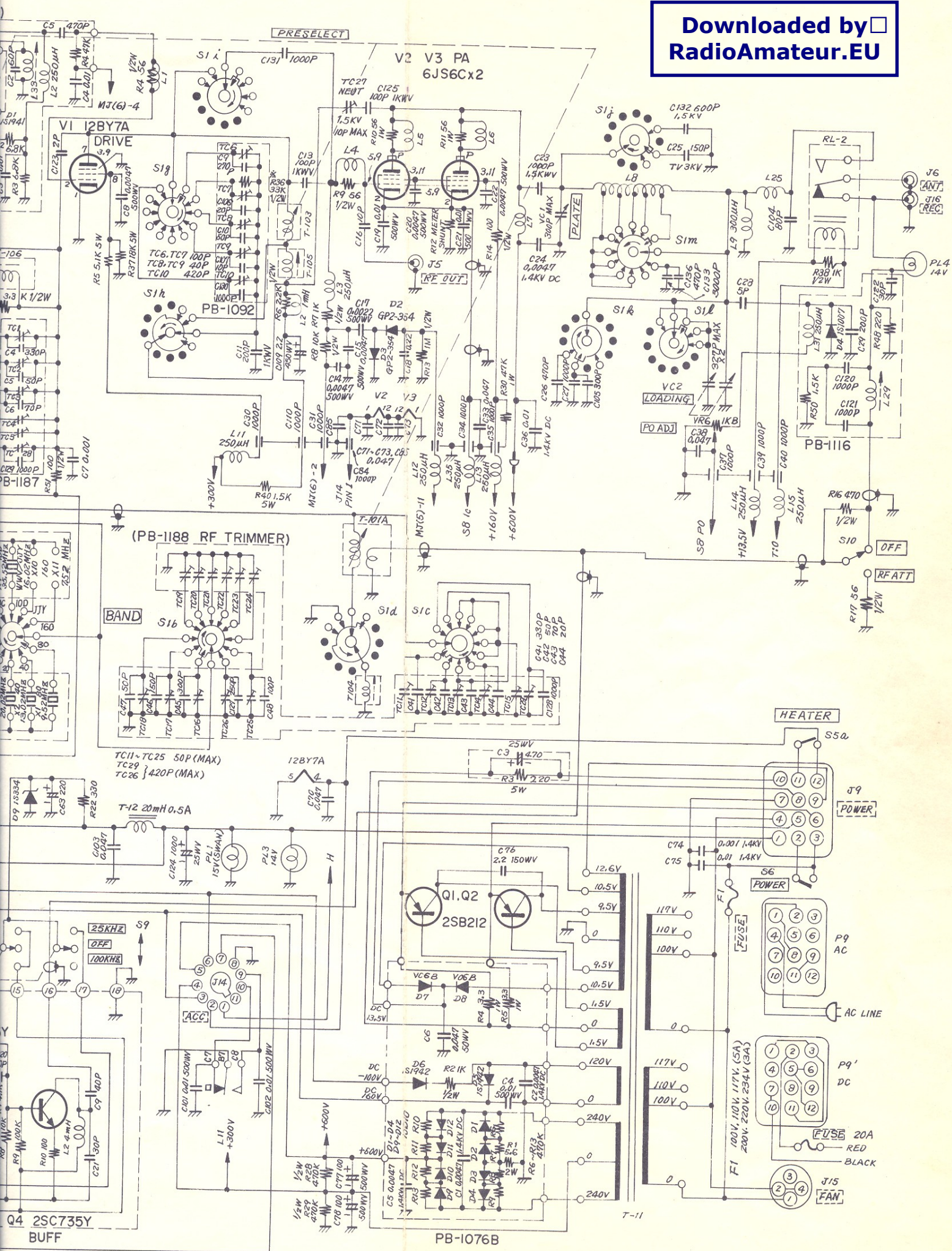
Q7 2SC372Y 2SK34E

NOISE AMF

Q5 2SC784R Q4 2SK19G







DRIVE

V2 V3 PA  
6JS6x2

(PB-1188 RF TRIMMER)

PB-1076B

Q4 2SC735Y  
BUFF

HEATER

J9 POWER

FUSE

P9 AC

P9' DC

FUSE 20A  
RED  
BLACK

J5 FAN

T-11

## FAN INSTALLATION FOR FT-277

### Parts required

1) Fan Motor assembly	: FC-75-B	1 pc.
2) MP Capacitor	: 1 uf 220V AC (none pola)	1 "
3) Plug	: 4 Pin	1 "
4) Packing	:	1 "
5) Washer	:	8 pcs.
6) Screw	: M 3 x 10	4 "
7) Insulating Tube	: 1 m/m	10 cm
8) Insulating Tube	: 4 m/m	20 cm

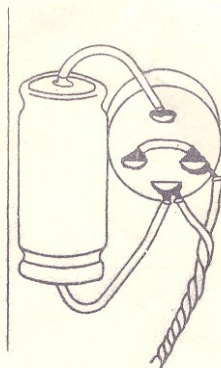
### Installation

#### (1) Capacitor

Open a top cover of the transceiver. Then remove 3 screws on the top cover of final compartment. Remove top cover of the final compartment and locate a socket on rear panel. Use 1 m/m insulating tube for capacitor leads and solder the capacitor as illustrated in Fig.-1.

Fig.-1

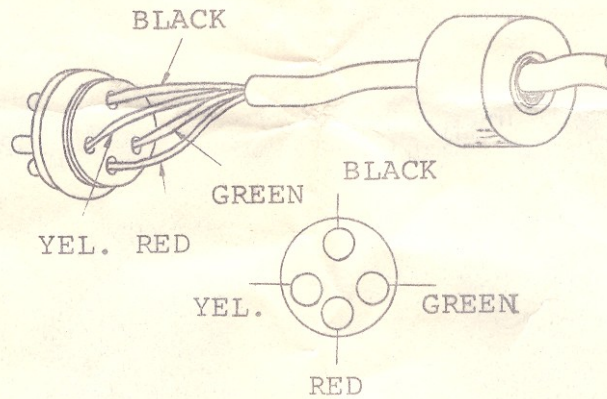
INSIDE REAR PANEL



(2) Power Plug

Insert four wires into 4 m/m insulating tube. Solder these four wires to the plug supplied as illustrated in Fig.-2.

Fig.-2



(3) Fan Motor

Remove four screws from a slit cover on the final compartment of rear panel. And install the fan into the hole as illustrated in Fig.-3.

Insert the power plug into the socket. The fan will turn by power switch on for AC operation and both power and heater switch on for DC operation.

Fig.-3

