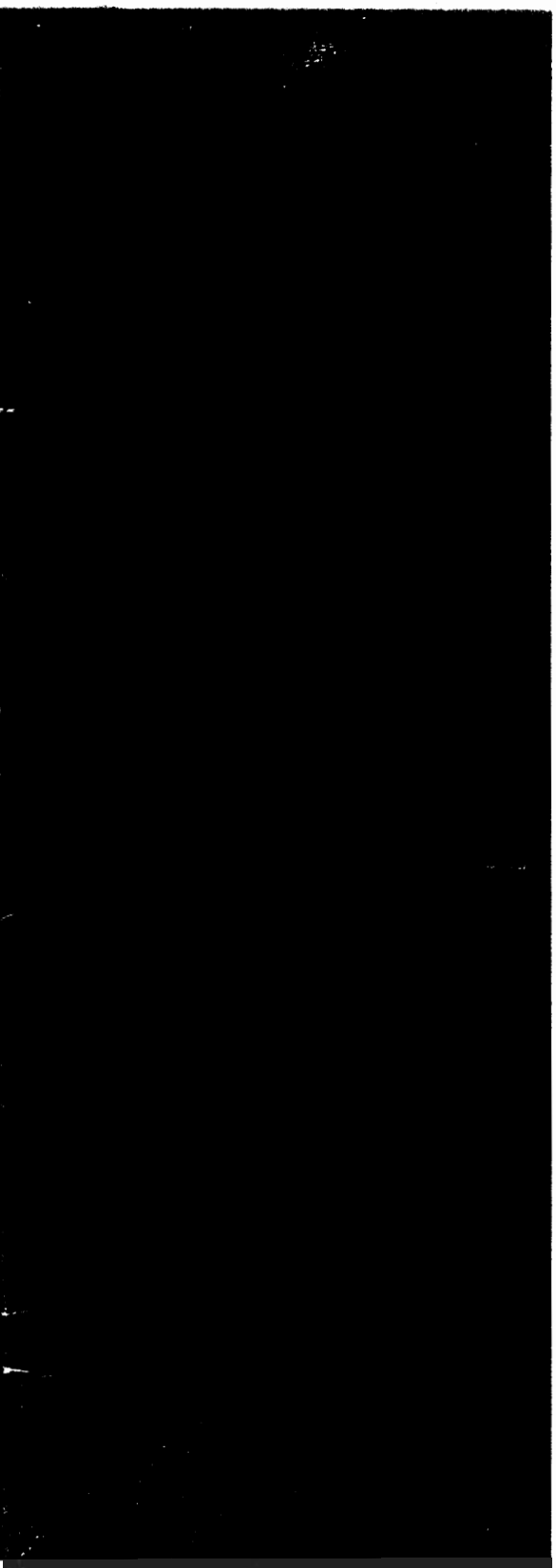


INSTRUCTION MANUAL

FTV-107R

YAESU MUSEN CO , LTD.

TOKYO JAPAN.

IMPORTANT NOTE

Your Yaesu equipment is backed by a warranty that guarantees your set to be free of defects. Take a few minutes to read the warranty card carefully. Make certain that you fill out the card completely, and mail it at once, in order to qualify for warranty service.

Warranty service is to be performed by the dealer from whom the equipment was purchased. Do not return the equipment to Yaesu for servicing without first getting a service authorization from the Yaesu Service Center. Estimates of the approximate cost to repair are available upon request.

TABLE OF CONTENTS

SPECIFICATIONS

TRANSMITTER:

Input frequency:
28 MHz to 30 MHz

Input level:
0.22 volts (rms) max.

Input impedance:
50 ohms

Power input:
20 watts DC (SSB, CW, FSK)
5 watts DC (AM)

Transmit frequency range:
50 MHz to 54 MHz*
144 MHz to 148 MHz*
430 MHz to 440 MHz*

Output impedance:
50 ohms

Spurious radiation:
Better than 60 dB down

RECEIVER:

Receiver frequency range:
50 MHz to 54 MHz*
144 MHz to 148 MHz*
430 MHz to 440 MHz*

Antenna input impedance:
50 ohms

Sensitivity:
0.25 μV for S/N 10 dB (SSB, CW, FSK)**
1.0 μV for S/N 10 dB (AM)**

Output frequency range:
28 MHz to 30 MHz

Output impedance:
50 ohms

POWER SUPPLY:

Current consumption:
3.5 amps

GENERAL:

Size:
216 (W) x 129 (H) x 370 (D) mm

Weight:
4.5 kg. (with 2 units installed)

*50, 144, 430 MHz units optional. 430 MHz and 50 MHz or 144 MHz units may be installed. 50 MHz and 144 MHz units may not be installed together in FTV-107R.
**When used with FT-107M.

YAESU
FTV-107R
VHF/UHF TRANSVERTER

GENERAL

The FTV-107R is an all-new transverter for the FT-107M series, capable of operation on the 50, 144, and 430 MHz bands. The basic unit comes equipped with all control circuitry, and the 430 MHz and either the 50 MHz or 144 MHz unit may be installed as options. Power input is 20 watts DC on all bands.

For satellite operators, three satellite bands are provided, allowing full duplex operation through the transverter, using an external receiver in addition to the FT-107M. The operator may transmit on 145 MHz while listening on 29 MHz or 435 MHz, or transmit on 435 MHz while listening on 145 MHz.

The FTV-107R includes repeater split on all repeater bands within its operating range, for operation on the many SSB repeaters that are emerging. Fully solid state, the FTV-107R includes protection for the final amplifier transistors against damage caused by high SWR. Spurious radiation is at least 60 dB down.

The owner is urged to read this manual in its entirety, so as to become better acquainted with the exciting new FTV-107R. With proper care in operation, this equipment will provide many years of trouble-free operation.

SEMICONDUCTORS

MAIN CHASSIS:

FET:

3SK59Y	1

Transistor:

2SA733	1
2SC380TMY	1
2SC945P	2
2SC1815Y	4

IC:

MC14016BP	3
μPC14308	1

Germanium diode:

1S188FM	2

Silicon diode:

10D1	10
1S1555	18

Varistor diode:

MV103	1

Zener diode:

WZ090	1

LED:

LN224RP	9

50MHz UNIT

FET:

3SK51-03	3

Transistor:

2SC730	1
2SC784R	2
2SC1815Y	2
2SC1945D	1
2SC2053	1
2SC2166	1

IC:

MC1496G	1
78L08	1

Germanium diode:

1S188FM	1

Silicon diode:

1S1556	12
1SS53	4
10D1	3

Varator diode:

1S2209	8

144MHz UNIT

FET:

3SK51-03	3

Transistor:

2SC730	1
2SC784R	3
2SC1815Y	2
2SC2053	1

IC:

MC1496G	1
78L08	1

Power module:

VP-20BL	1

Germanium diode:

1S188FM	1

Silicon diode:

1S1555	3
1SS53	11
10D1	1

Varactor diode:

1S2209	4

435MHz UNIT

Transistor:

2SC784R	1
2SC1424	5
2SC1426	1
2SC1815Y	2
2SC2369	2

IC:

78L08	1

Power module:

UP-07BL	1

Germanium diode:

1S188FM	4

Silicon diode:

1S1555	2
M1301	3
1SS53	10
10D1	1

Schottky barrier diode:

1SS97	4

Specifications subject to change without notice.

ACCESSORIES

The following accessories are included with your FTV-107R:

Cable "A"	1 pc.
Cable "B"	1 pc.
Cable "C"	1 pc.
Ground Cable "D"	1 pc.
RCA Plug	1 pc.
DC Fuse (5A)	2 pcs.
Extender Feet	2 pcs.
Extender Foot Pads	2 pcs.

BOTTOM PANEL FEET

The feet on the bottom panel may be changed, if it is desired to change the viewing angle for the FTV-107R. In the accessory kit for your FTV-107R, there are two extender feet with mounting pads. These may be installed either in front or in back, according to the requirements of your station. Refer to Figure 1 for mounting details.

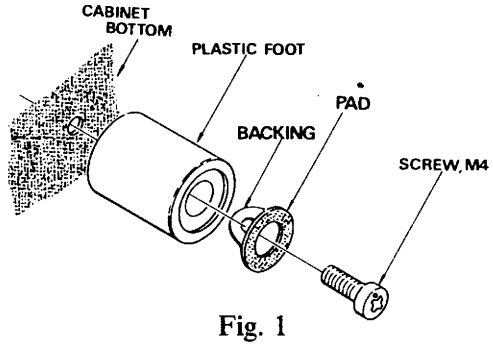
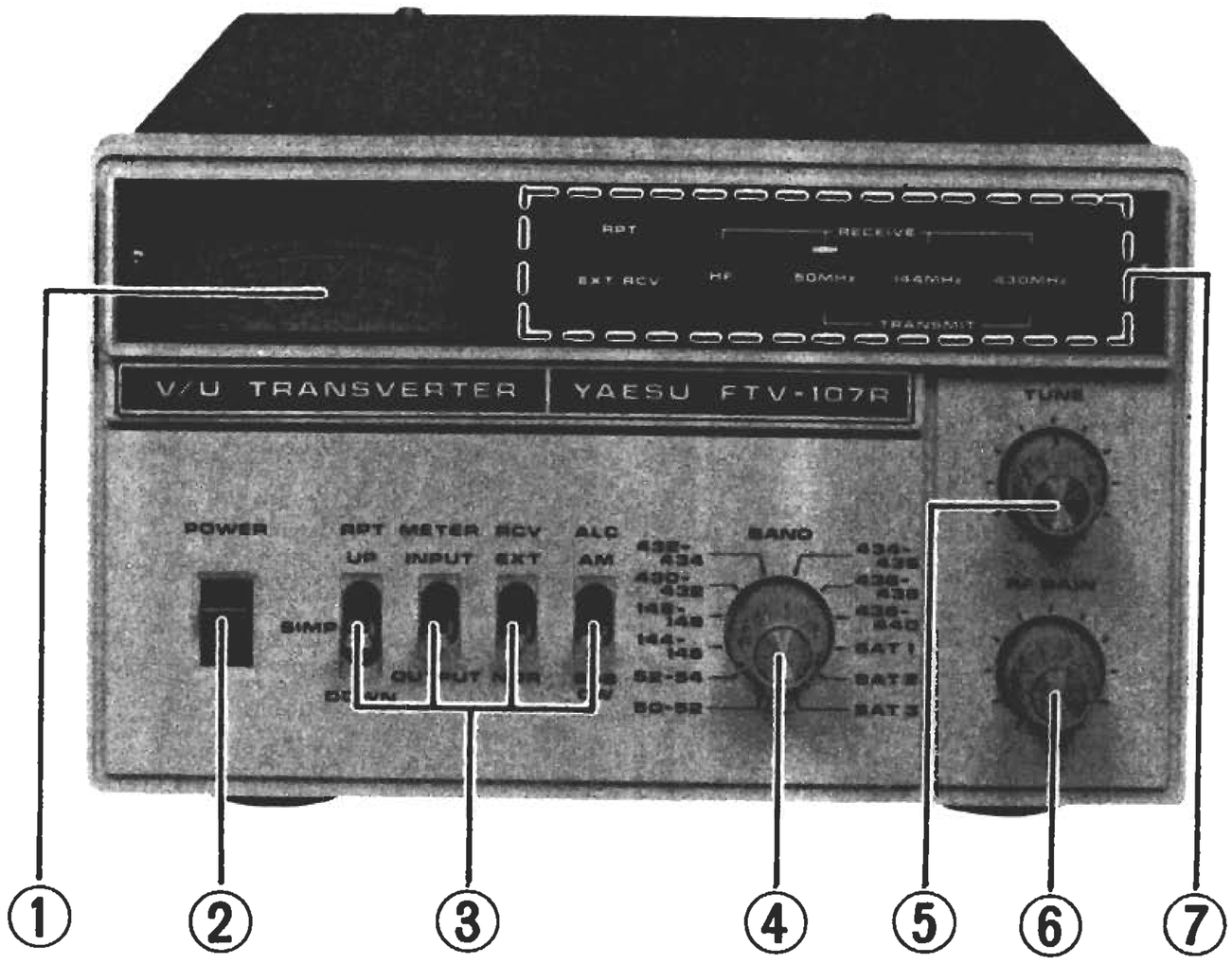


Fig. 1

FRONT PANEL CONTROLS AND SWITCHES



(1) METER

According to the position of the METER switch, the front panel meter displays either the input or output relative power level.

(2) POWER

This is the main power ON/OFF switch. When the switch is set to OFF, the HF antenna is automatically fed through to the transceiver.

(3) FUNCTION SWITCHES

SHIFT—This switch selects UP or DOWN repeater shift, or simplex operation. See the "OPERATION" section for details.

METER—The METER switch selects indication of the relative input or output power level on the front panel meter.

RCV—This switch allows selection of receive operation using the FT-107M transceiver (NOR) or an external receiver (EXT) (for satellite work, etc.).

ALC—This switch selects the proper ALC action for the mode in use. For SSB and CW, use the lower position, and for AM use the upper position.

(4) BAND

For six or two meter operation, two bands are provided. These allow 4 MHz of coverage in conjunction with the four 500 kHz ranges of the FT-107M 10 meter band. For 430 MHz operation, 5 bands are provided, allowing operation on 10 MHz of the band (430–440 MHz).

The SAT. 1 band is used for OSCAR Mode A, with TX on 145 MHz, and RX on 29 MHz. The SAT. 2 band is used for OSCAR Mode B, with TX on 435 MHz and RX on 145 MHz. The SAT. 3 band is for OSCAR Mode J, with TX on 145 MHz and RX on 435 MHz.

(5) TUNE

For 50 or 144 MHz operation, this control peaks the transmit and receive circuits for maximum performance. On 430 MHz, the tuned circuits of the transverter are preset, and no tuning is required.

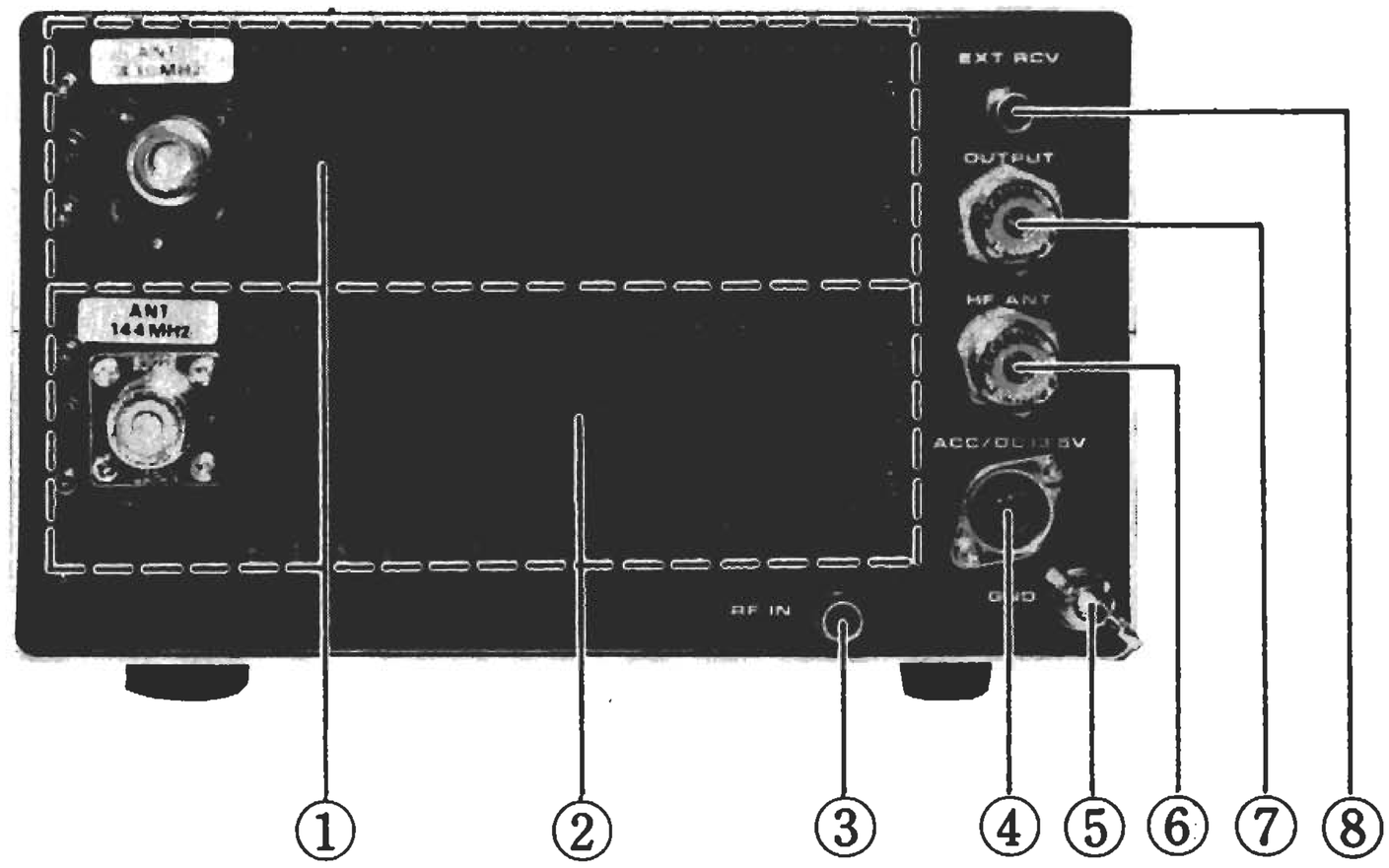
(6) RF GAIN

For 50 or 144 MHz operation, this control varies the gain of the RF amplifier stage.

(7) INDICATORS

These lamps indicate the band and mode of operation, in conjunction with the selection performed by the front panel switches.

REAR APRON



(1) 430 MHz UNIT (OPTION)

When the optional 430 MHz unit is obtained, it must be installed in the upper rack of the FTV-107R.

(2) 50/144 MHz UNIT (OPTION)

The bottom rack is for installation of either the 50 MHz Unit or the 144 MHz Unit. The 50 MHz Unit and the 144 MHz Unit cannot both be installed in the same FTV-107R.

(3) RF IN

This RCA jack is for connection to the FT-107R RF OUT jack. Use the supplied "Cable A" for this connection.

(4) ACC/DC 13.5V

This jack is for connection to the FT-107M ACC 2 jack. Use the supplied "Cable C" for this connection.

(5) GND

Connect a good earth ground to this terminal, using a heavy braided cable for connection to the station ground buss.

(6) HF ANT

Connect your HF antenna to this jack. When using a linear amplifier for the HF bands, connect a coaxial cable between this jack and the amplifier RF input jack. The switching circuitry is not designed to handle the high power output from an amplifier.

(7) OUTPUT

This jack should be connected to the FT-107M ANT jack. When the transverter is turned off, the transceiver output will be fed through to the HF antenna.

(8) EXT RCV

This RCA jack is for connection to the antenna connector of an external receiver. When the RCV switch is set to EXT, the 28–30 MHz output from the receive converters will be fed through to the external receiver, allowing full duplex operation for satellite work.

INSTALLATION

Open the packing carton carefully, and save the packing material for possible use at a later date. Inspect the FTV-107R for any signs of damage in shipment. If there is visible damage, contact the shipping company immediately, and document the damage thoroughly.

Refer to the drawings for details of the proper interconnection procedure for the FTV-107R and your station equipment. Note that the input impedance for the FTV-107R is 50 ohms, and the maximum permissible input level is 0.22V RMS. Therefore, if you are using a transmitter other than the FT-107M, be certain not to exceed these specifications.

The transverter may be installed in any position without loss of performance. The only constraints regarding installation involve air circulation: the transverter should be located where there is free passage of air around the cabinet and heat sinks.

The FTV-107R must be connected to a good earth ground. Use the shortest possible lead for the connection to the station ground buss, and use only a heavy, braided cable for the ground connection. The supplied "Cable D" may be used for connection between the FTV-107R and the FT-107M. The transceiver may, in turn, be connected to the station ground buss.

When using a linear amplifier for HF operations, please use the relay contacts provided on the ACC 1 jack for relay control. The ACC 2 jack will then be used for transverter control, as shown in the drawings.

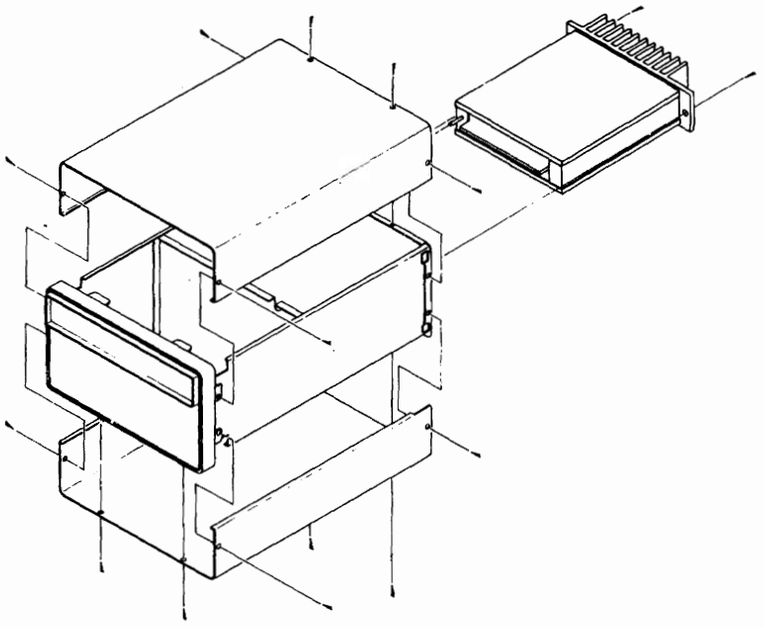
ANTENNA CONSIDERATIONS

The antenna installation is of critical importance in VHF and UHF installations. For satellite and moonbounce applications, height above ground is not as critical as is the case with local FM communications. A minimum distance of ten feet should be maintained between HF and VHF antennas. In all installations, the antenna should be clear of surrounding objects, if the desired pattern is to be obtained.

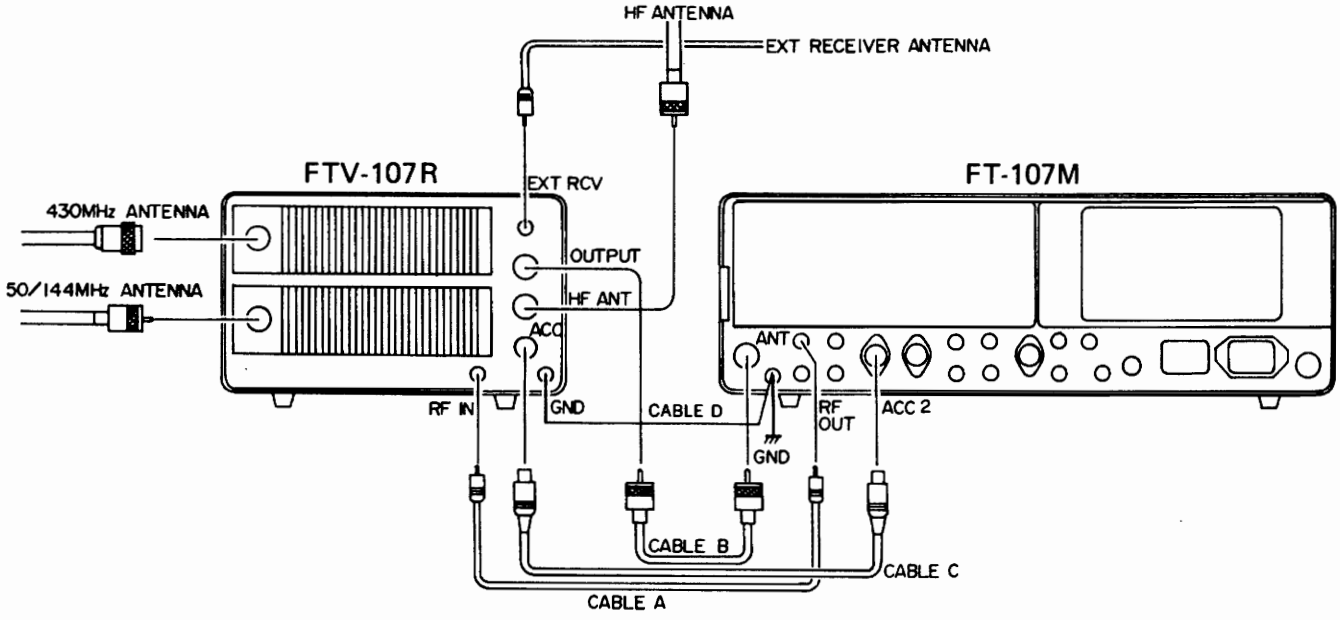
Do not economize on coaxial cable, as some "bargain" cables have very poor shield coverage. This may degrade performance significantly. For the 430 MHz antenna, please use a type N connector, as this type provides a constant impedance on the antenna line. For short coaxial runs, we recommend type RG8A/U coax. For very long runs, type RG-17A/U, aluminum-jacketed "foamflex" coax, or air-dielectric "heliax" cables may be used, owing to their very low losses. The SWR on the feedline should be kept below 2:1 at all times, to minimize feedline losses.

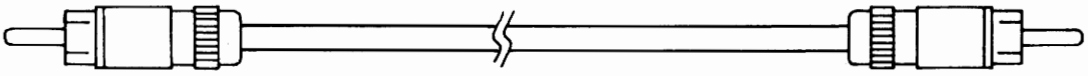
INSTALLATION OF OPTIONAL MODULES

1. Remove the top and/or bottom cover of the transverter, to allow precise insertion of the unit to be installed.
2. Carefully slide the module into the correct position Do not force the connection.
3. Replace the cabinet covers. Installation is now complete. The module has been carefully aligned at the factory.

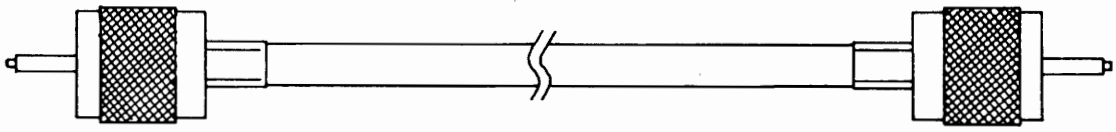


INTERCONNECTIONS





CABLE A



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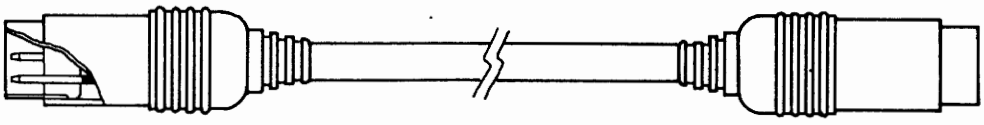
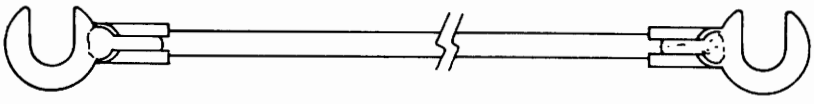


CABLE C



CABLE D

OPERATION

The tuning procedure for the FTV-107R is not complicated. However, care should be observed in operation, so as not to exceed the ratings of the transverter and the HF transceiver. It is assumed that the proper interconnections have been performed, as described on page 7.

The following discussion is tailored to a fully-equipped FTV-107R, with both units installed. The reader should note that the plug-in units are optional on the standard FTV-107R. The word "option" will hereafter be omitted in the interest of brevity.

INITIAL CHECK

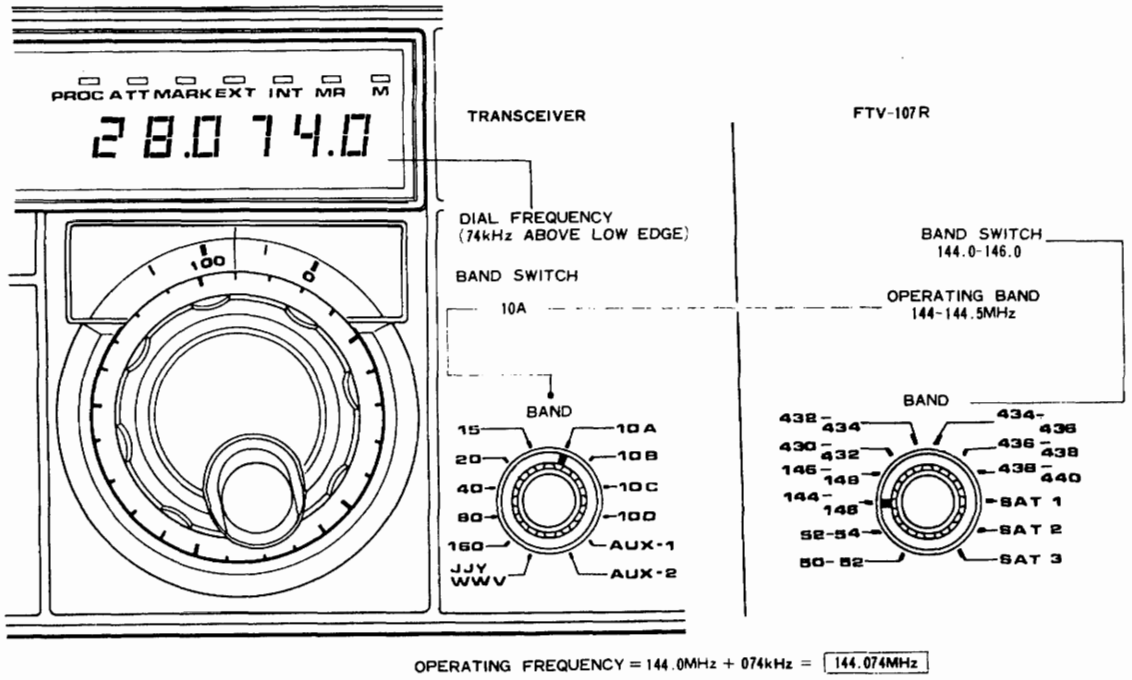
Before turning the FTV-107R and FT-107M on, check all switches for normal, smooth action. Recheck the interconnections between the HF equipment, the antenna system, and the transverter.

FREQUENCY SELECTION

The operating frequency is determined by the position of the main tuning dial and bandswitch of the transceiver, as well as the position of the transverter bandswitch. Please refer to the frequency chart below.

FREQUENCY COVERAGE CHART

	HF TRANSCEIVER		10A	10B	10C	10D	
	BANDSWITCH		28.0-28.5	28.5-29.0	29.0-29.5	29.5-30.0	
FTV-107R BANDSWITCH	50-52		50.0-50.5	50.5-51.0	51.0-51.5	51.5-52.0	
	52-54		52.0-52.5	52.5-53.0	53.0-53.5	53.5-54.0	
	144-146		144.0-144.5	144.5-145.0	145.0-145.5	145.5-146.0	
	146-148		146.0-146.5	146.5-147.0	147.0-147.5	147.5-148.0	
	430-432		430.0-430.5	430.5-431.0	431.0-431.5	431.5-432.0	
	432-434		432.0-432.5	432.5-433.0	433.0-433.5	433.5-434.0	
	434-436		434.0-434.5	434.5-435.0	435.0-435.5	435.5-436.0	
	436-438		436.0-436.5	436.5-437.0	437.0-437.5	437.5-438.0	
	438-440		438.0-438.5	438.5-439.0	439.0-439.5	439.5-440.0	
	SAT. 1	TX	144.0-144.5	144.5-145.0	145.0-145.5	145.5-146.0	USB
		RX	28.0-28.5	28.5-29.0	29.0-29.5	29.5-30.0	USB
	SAT. 2	TX	432.0-432.5	432.5-433.0	433.0-433.5	433.5-434.0	USB
		RX	144.0-144.5	144.5-145.0	145.0-145.5	145.5-146.0	LSB
	SAT. 3	TX	144.0-144.5	144.5-145.0	145.0-145.5	145.5-146.0	USB
		RX	434.0-434.5	434.5-435.0	435.0-435.5	435.5-436.0	LSB



OPERATING FREQUENCY = 144.0MHz + 074kHz = 144.074MHz

For example, with the FT-107M bandswitch set to 10A, and the FTV-107R bandswitch set to 144–146, operation will take place on 144.0–144.5 MHz. By setting the FT-107M main tuning dial to 28.250 MHz, operation will take place on 144.250 MHz. See the section on satellite operation for frequency determination on the satellite bands.

NORMAL TUNE UP

(1) Set the FTV-107R SHIFT switch to SIMP, the RCV switch to NOR, the METER switch to INPUT, the ALC switch to SSB/CW, and the BAND switch to the desired band. Set up the FT-107M for operation on the section of the 10 meter band appropriate for the VHF or UHF frequency to be worked.

(2) Set the FTV-107R POWER switch to ON.

(3) Set the transceiver DRIVE control fully counterclockwise, and close the PTT switch. For 50 or 144 MHz operation, apply a key-down signal, and advance the transceiver DRIVE control until the input meter needle reaches the right-hand side of the input scale (the input scale is the lowermost range on the meter). Now set the FTV-107R METER switch to OUTPUT, and rotate the TUNE control for maximum power output as indicated on the transverter meter.

(4) For 430 MHz operation, there is no peaking procedure for the transverter. The only adjustment that must be made is to set the input level to the transverter. As with 50 or 144 MHz operation, the drive level should be adjusted so that the meter needle rests within the input scale on the meter.

(5) For CW operation, set the ALC switch to SSB/CW. Do not advance the DRIVE control of the FT-107M so that the input meter needle goes beyond the input scale on the meter.

(6) For SSB operation, adjust the FT-107M MIC GAIN so that the meter needle stays within the input meter scale on voice peaks.

(7) For AM operation, set the ALC switch to AM. Set the METER switch to OUTPUT, and advance the FT-107M DRIVE control until the meter needle reaches 3 on the output scale. Now advance the transceiver MIC GAIN control until the output meter just begins to move on voice peaks.

(8) Advancement of the drive level beyond that stated above will not increase the power output. However, component life will be shortened drastically if these input levels are exceeded.

(9) For 50 or 144 MHz operation, rotation of the FTV-107R RF GAIN control will provide adjustment of the receive converter gain level. For 430 MHz operation, this control has no effect, as the converter is always set for maximum gain.

REPEATER OPERATION

For operation on SSB repeaters, standard repeater shifts are provided on the FTV-107R. Alternatively, when using a transceiver equipped for FM operation, FM repeater operation is possible. Note that the FT-901DM transceiver may not be used directly with the FTV-107M, because the RF OUT jack on the FT-901DM is connected to the control grid of the final amplifier tubes, thus presenting a high impedance at the RF OUT jack. The FTV-107R requires a 50 ohm input from the transceiver.

For 50 MHz, repeater splits of ±1 MHz are provided, while on 144 MHz, splits of 600 kHz are provided. For 70 cm, 1.6 MHz down shift will occur on the 434.6–434.825 MHz European band, or 7.6 MHz down shift can be provided on the 438.6–439.05 MHz European band (note that only one shift capability can be installed in the FTV-107R). The 70 cm repeater shift crystal is an option, available from your Yaesu dealer. The 6 and 2 meter crystals are included with all plug-in units for those bands.

SATELLITE OPERATION

Operation on the amateur satellites is possible, using an external receiver in addition to the FT-107M transceiver. The FT-107M provides the transmit signal, while the external receiver monitors the downlink, on full duplex.

For example, with the FT-901DM bandswitch set to 10A, and the FTV-901R bandswitch set to 144–146, operation will take place on 144.0–144.5 MHz. By setting the FT-901DM main tuning dial to 28.250.0, operation will take place on 144.250 MHz. See the section on satellite operation for frequency determination on the SAT. bands.

NORMAL TUNE UP

(1) Set the FTV-901R RPT switch to NOR, the METER switch to INPUT, the RCV switch to NOR, the ALC switch to SSB/CW, and the BAND switch to the desired band. The POWER switch should be OFF.

(2) With the transverter off, peak the preselector on the FT-901DM against the marker signal. Be certain that the FT-901DM HEATER switch is ON.

(3) Set the FTV-901R POWER switch to ON.

(4) For 50 or 144 MHz tuning, set the FT-901DM CARR control fully counterclockwise. Push the TUNE button, and slowly advance the CARR control until the FTV-901R meter enters the green zone. Now switch the FTV-901R METER switch to PO, and rotate the TUNE control for a maximum meter reading.

(5) For 430 MHz, there is no peaking procedure for the transverter. With the FT-901DM preselector peaked, the only adjustment that must be made is to set the drive level correctly.

(6) For FM and CW operation, set the ALC switch to SSB/CW. The transceiver CARRIER control may be advanced to the point where the PO does not increase further.

(7) For SSB operation, set the FT-901DM MIC GAIN level so that the FTV-901R INPUT level on the meter does not go past the green zone on the meter scale on voice peaks.

(8) For AM operation, set the ALC switch to AM, and set the METER switch to PO. Advance the transceiver CARRIER control until the meter indicates .3 on the scale. Advance the transceiver MIC GAIN control until the PO meter just begins to move on voice peaks.

(9) Advancement of any of the drive levels beyond the point stipulated in steps (6) through (8) will not increase the power output; component life may, however, be shortened drastically if these input levels are exceeded.

(10) For 6 and 2 meters, rotation of the FTV-901R RF GAIN control will provide adjustment of the gain of the receive converter section. For 430 MHz, this control has no effect, as the converter is always set for maximum gain.

REPEATER OPERATION

When using the FT-901DM transceiver, FM operation on repeaters on 6 and 2 meters is provided. For repeater split, set the RPT switch to the DOWN position for shift of –1 MHz on 6 meters, or –600 KHz for 2 meters. For a shift of +1 MHz or /600 kHz, set the RPT switch to UP.

SATELLITE OPERATION

Operation on the amateur satellites is possible, using an external receiver in addition to the FT-901DM transceiver. The FT-901DM transceiver. The FT-901DM provides the transmit signal, while the external receiver monitors the downlink, on full duplex.

For OSCAR Mode A, transmission takes place on 145.850–145.950 MHz, with reception on 29.400–29.500 MHz. Set the FTV-901R band switch to the SAT. 1 position. Set the FT-901DM band switch to 10D, and tune to 29.850–29.950 MHz. Set the external receiver for reception on 29.400–29.500 MHz.

For OSCAR Mode B, the uplink is 432.125–43.175 MHz, and the downlink is 145.975–145.925 MHz. Set the FTV-901R band switch to the SAT. 2 position. Set the FT-901DM band switch to 10A, and tune to 28.125–28.175 MHz. Set the external receiver for reception on 29.925 MHz. The OSCAR 7 Mode B transponder inverts signals, so an upper sideband signal on the uplink becomes a lower sideband signal on the downlink. Set the mode switches on the FT-901DM and the external receiver appropriately.

For OSCAR Mode J, the uplink is 145.900–146.000 MHz, while the downlink is 435.100–435.200 MHz. Set the FTV-901R band switch to the SAT. 3 position. Set the FT-901DM band switch, to 10D and tune to 29.900–29.999 MHz.

CRYSTAL DATA : FTV-107R

FUNCTION		HOLDER	RANGE (MHz)	MODE	LOAD C	EFFECTIVE RESISTANCE	DRIVE LEVEL
50 MHz	X_{201}	HC-18/U	22.0	Fundamental	19 pF	15 Ω	2 mW
	X_{202}	"	24.0	"	"	"	"
	X_{203}	HC-25/U	23.0	"	"	"	"
	X_{205}	"	21.0	"	"	"	"
144 MHz	X_{601}	HC-18/U	38.666··	3rd overtone	15 pF	25 Ω	"
	X_{602}	"	39.333··	"	"	"	"
	X_{603}	HC-25/U	38.866··	"	"	"	"
	X_{604}	"	39.533··	"	"	"	"
	X_{605}	"	38.466··	"	"	"	"
	X_{606}	"	39.133··	"	"	"	"
430 MHz	X_{1601}	HC-25/U	67.000	"	23.5 pF	40 Ω	0.5 mW
	X_{1602}	"	67.333··	"	"	"	"
	X_{1603}	"	67.666··	"	"	"	"
	X_{1604}	"	68.000	"	"	"	"
	X_{1605}	"	68.333··	"	"	"	"
	X_{1606} (1.6MHz DOWN)	"	67.400	"	"	"	"
	X_{1606} (7.6MHz DOWN)	"	67.066··	"	"	"	"

BAND	50MHz			
RANGE	50–52	52–54	50–52 (1MHz DOWN)	52–54 (1MHz DOWN)
LOCAL FREQUENCY	22MHz (x1)	24MHz (x1)	23MHz (x1)	21MHz (x1)
OSC. FREQUENCY	22MHz ☆	24MHz ☆	23MHz ☆	21MHz ☆

BAND	144MHz					
RANGE	144–146	146–148	144–146 (600kHz UP)	144–146 (600kHz DOWN)	146–148 (600kHz UP)	146–148 (600kHz DOWN)
LOCAL FREQUENCY	116MHz (x3)	118MHz (x3)	116.6MHz (x3)	115.4MHz (x3)	118.6MHz (x3)	117.4MHz (x3)
OSC. FREQUENCY	38.666···MHz ▲	39.333···MHz ▲	38.866···MHz ▲	38.466···MHz ▲	39.533···MHz ▲	39.133···MHz ▲

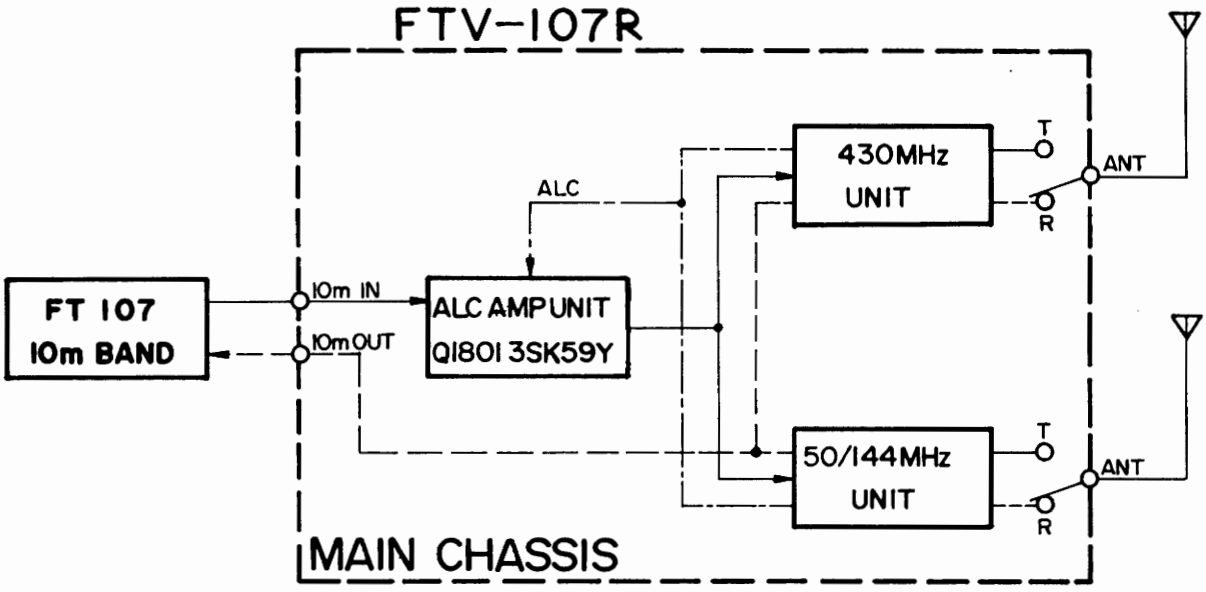
BAND	430MHz						
RANGE	430–432	432–434	434–436	436–438	438–440	434–436 (1.6MHz DOWN)	438–440 (7.6MHz DOWN)
LOCAL FREQUENCY	402MHz (x3x2)	404MHz (x3x2)	406MHz (x3x2)	408MHz (x3x2)	410MHz (x3x2)	404.4MHz (x3x2)	402.4MHz (x3x2)
OSC. FREQUENCY	67.000MHz ▲	67.333···MHz▲	67.666···MHz▲	68.000MHz ▲	68.333···MHz▲	67.400MHz ▲	67.066···MHz▲

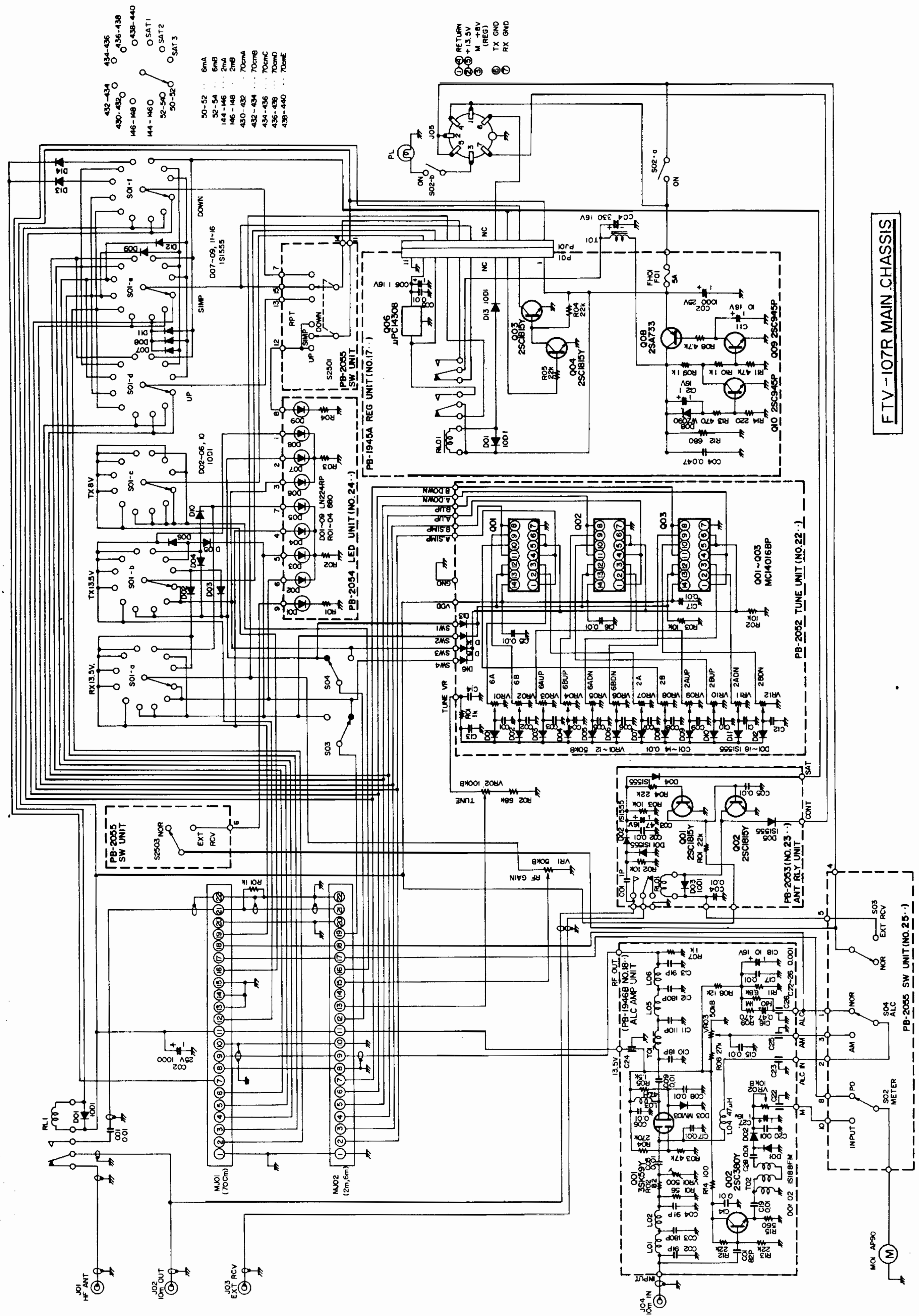
☆ FUNDAMENTAL

▲ THIRD OVERTONE

CIRCUIT DESCRIPTION

The circuit description to follow should help you understand the operation of the FTV-107R transverter. Follow the block diagrams while reading this discussion, and refer to the schematic dagram for specific details.




FTV-107R MAIN CHASSIS
PB-1945A REG UNIT (NO.17··)
PB-2055 SW UNIT
PB-2054 LED UNIT (NO.24··)
PB-2052 TUNE UNIT (NO.22··)
PB-2053 (NO.23··) ANT RLY UNIT
(PB-1946B NO.18··) ALC AMP UNIT
PB-2055 SW UNIT (NO.25··)
Q01~Q03 MC14016BP
MJ01 (70Cm)
MJ02 (2m,6m)
J01 HF ANT
J02 10m OUT
J03 EXT RCV
J04 10m IN
M01 AP90
1-4 RETURN
2-5 +13.5V
3 M +8V (REG)
6 TX GND
7 RX GND
50-52 ... 6mA
52-54 ... 6mB
144-146 ... 2mA
146-148 ... 2mB
430-432 ... 70cmA
432-434 ... 70cmB
434-436 ... 70cmC
436-438 ... 70cmD
438-440 ... 70cmE

50 MHz UNIT

The 50 MHz signal from the antenna is fed through a low-pass filter, consisting of C_{323}, C_{324}, L_{312}, and L_{313}, to RL_{301}. On receive, the signal is amplified by Q_{205} **(3SK51)** and fed through a selective bandpass filter, which is tuned to the operating frequency by varactor diodes D_{210} and D_{211} **(1S2209)**. The second gate of Q_{205} is connected through a large resistor to the front panel RF GAIN control, allowing variation in the gain of the RF amplifier.

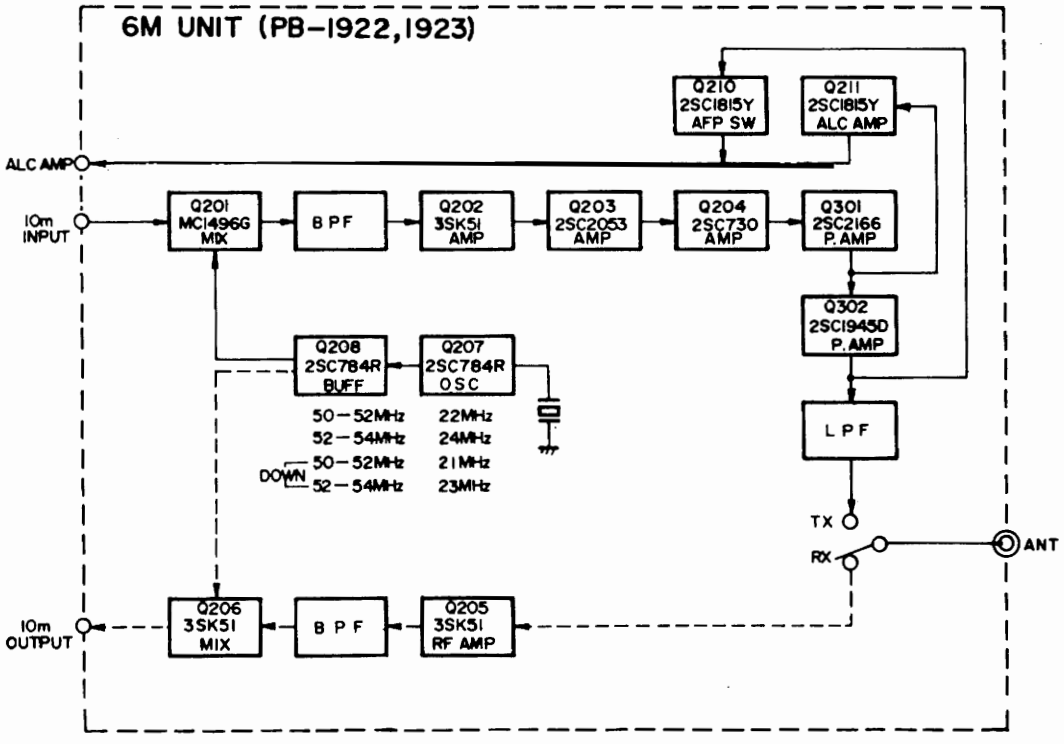
The signal is then fed to the mixer, Q_{206} **(3SK51)**, where the 50–54 MHz signal is mixed with a local signal of 22 or 24 MHz, producing an IF signal of 28–30 MHz which is fed through a diode switch to the 10 M OUTPUT jack.

The local signal is generated by crystal oscillator Q_{207} **(2SC784R)**, and amplified by Q_{208} **(2SC784R)**. For repeater operation, the local signal is shifted up or down 1 MHz, according to the position of the front panel RPT switch.

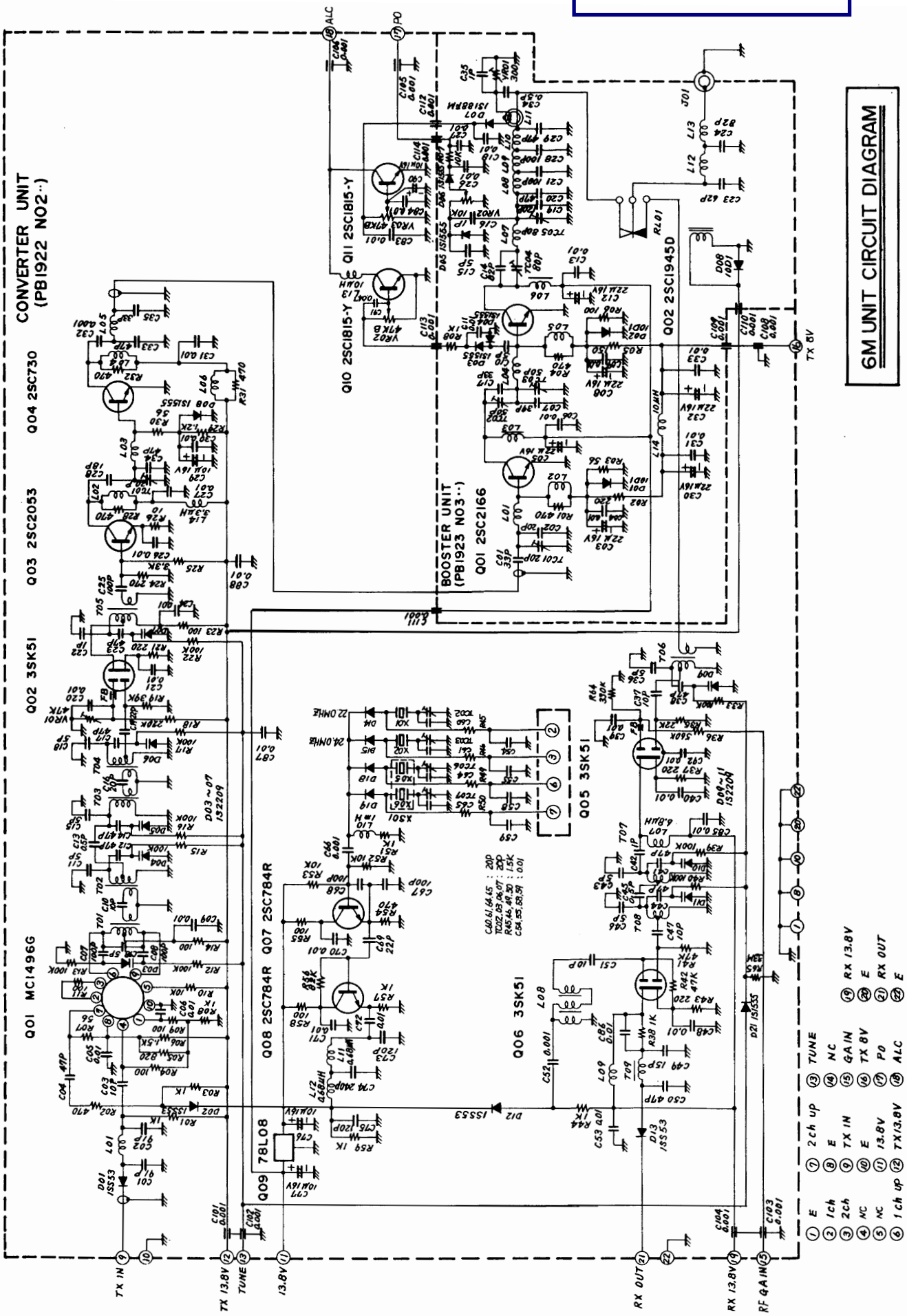
For transmission, the 28–30 MHz output signal from the transceiver is fed to the balanced mixer, Q_{201} **(MC1496G)**, where it is mixed with the local signal delivered from Q_{208}. The 50–54 MHz signal is then passed through a selective bandpass filter, which effectively eliminates spurious signals. The signal is then amplified by the amplifier chain, consisting of Q_{202} **(3SK51)**, Q_{203} **(2SC2053)**, Q_{204} **(2SC730)** Q_{301} **(2SC2166)**, and Q_{302} **(2SC1945D)**. The output signal of approximately 10 watts is then fed, via a low pass filter, to the ANT jack.

A portion of the output from Q_{301} is detected by D_{303} and D_{304} **(1S1555)**, and the resulting DC voltage is amplified by Q_{211} **(2SC1815Y)** for ALC purposes. A portion of the output from L_{311} is detected by D_{306} and fed to the base of Q_{211}, controlling the bias of Q_{211} and Q_{302}. Q_{210} **(2SC1815Y)** works as a switch for the automatic final protection circuit, which will reduce the gain of the amplifier transistors in case of high SWR. A further portion of the output is detected by D_{305} **(1S1555)** and fed to the meter, for an indication of relative power output.

Q_{309} **(78L08)** regulates the supply voltage at 8 volts for the transistors.



6M UNIT CIRCUIT DIAGRAM



144 MHz UNIT

The incoming 144 MHz signal is fed through a low-pass filter, consisting of L_{708}, C_{716}, and C_{717}, to RL_{701}. On receive, the signal is amplified by Q_{605} (**3SK51**). The output from Q_{605} is fed through a 4-stage bandpass filter. Gate 2 of the RF amplifier is connected through a large resistor to the front panel RF GAIN control.

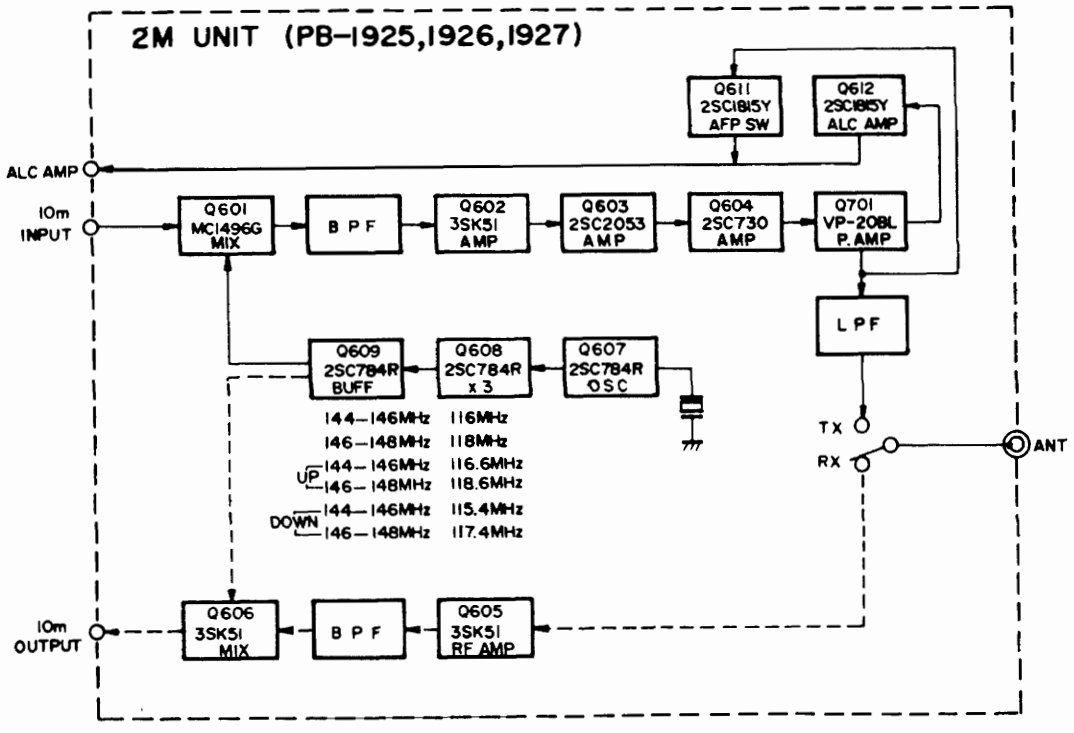
The signal is then fed to the mixer, Q_{606} (**3SK51**), where the incoming signal is heterodyned with a local signal of 116 or 118 MHz, producing an IF signal of 28–30 MHz which is fed through a diode switch to the 10 M OUTPUT jack.

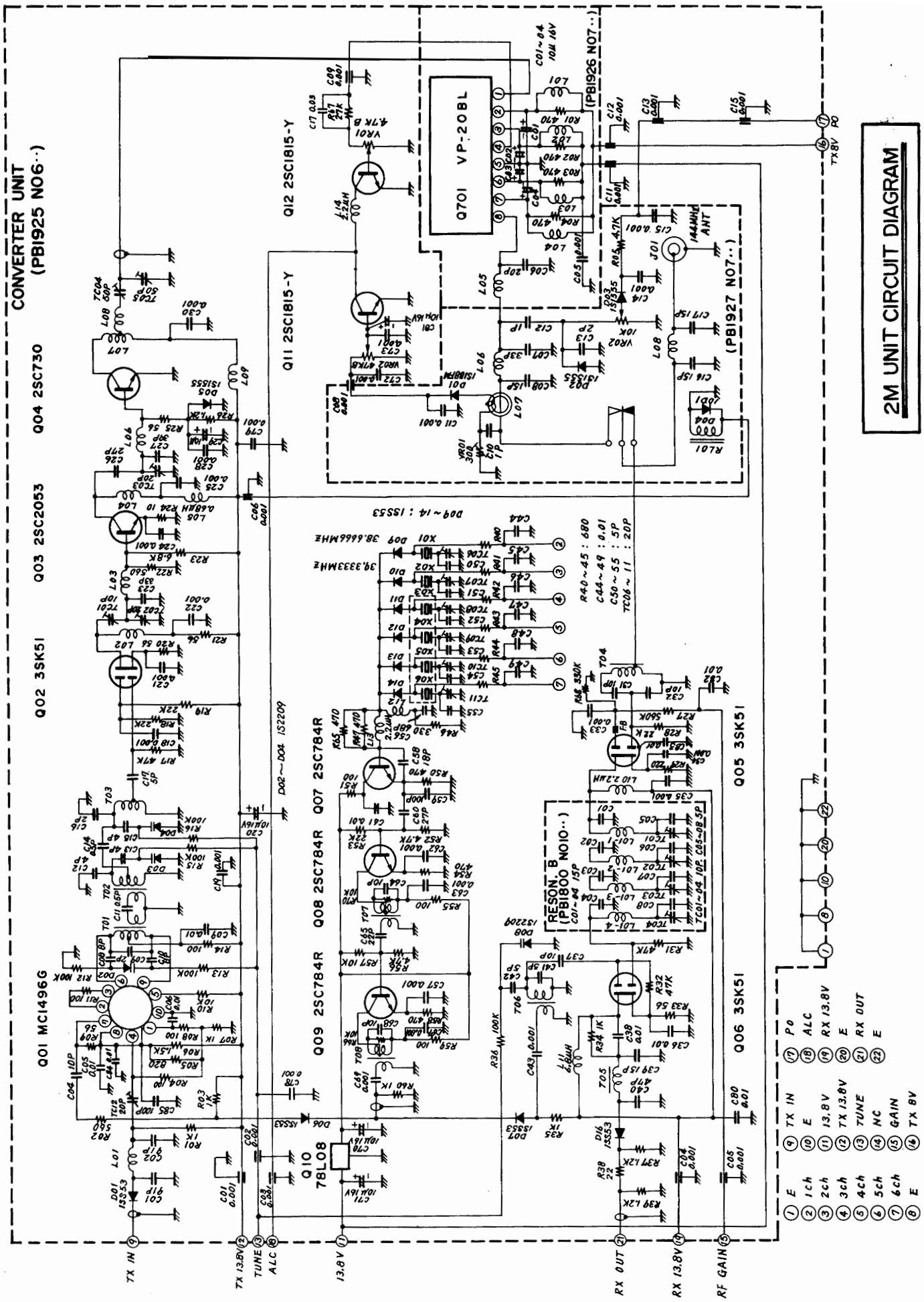
The local signal is generated at 38.666 MHz by Q_{607} (**2SC784R**), then delivered to tripler Q_{608} (**2SC784R**), then delivered through buffer Q_{609} (**2SC784R**) to gate 2 of Q_{606}. For repeater operation, the local signal is shifted up or down 600 kHz, depending on the position of the front panel RPT switch.

For transmission, the 28–30 MHz input signal is fed to Q_{601} (**MC1496G**), where it is mixed with the local signal delivered from Q_{609}. The 144–148 MHz signal is then fed through a selective bandpass filter, which is tuned to the operating frequency by varactor diodes D_{602}, D_{603}, and D_{604} (**1S2209**), thus effectively eliminating spurious responses. The signal is then amplified by the amplifier chain, consisting of Q_{602} (**3SK51**), Q_{603} (**2SC2053**), and Q_{604} (**2SC730**), and delivered to the final amplifier, Q_{701} (**VP-20BL**).

A portion of the output signal at the power module is amplified by Q_{612} (**2SC1815Y**) for ALC purposes. A portion of the output signal is also fed to Q_{611} (**2SC1815Y**), which acts as a switch for the AFP circuit, which will protect Q_{701} from damage caused by high SWR. A further portion of the output is detected by D_{702} (**1S1555**) and fed to the meter, for an indication of relative power output.

The supply voltage is regulated at 8 volts by Q_{510} (**78L08**).





430 MHz UNIT

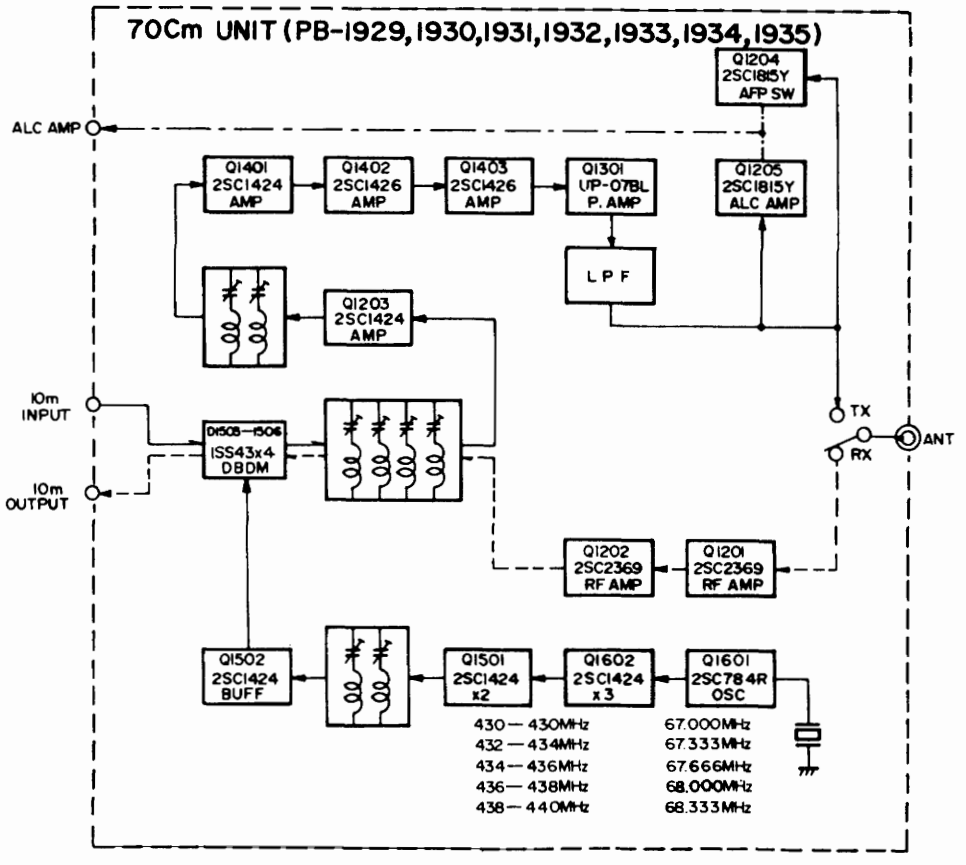
The incoming signal is fed through RL_{1301} to the two stage RF amplifier, consisting of Q_{1201} and Q_{1202} (2SC2369), and then passed through a selective filter to the doubly balanced diode mixer, D_{1503}–D_{1506} (1SS43) where the incoming signal is mixed with a 402–410 MHz local signal, producing a 28–30 MHz output signal which is fed to the 10 M OUTPUT jack.

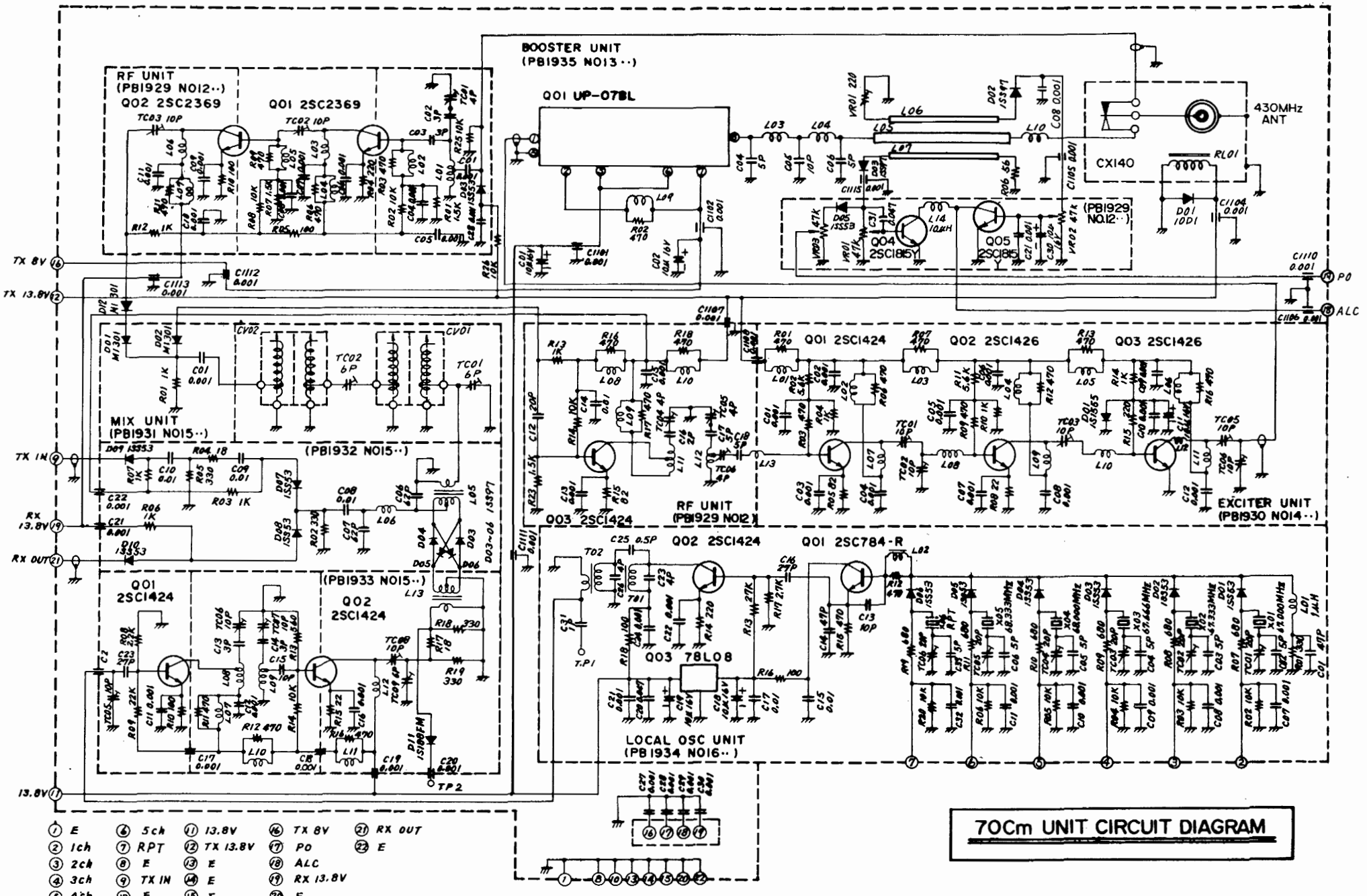
The local signal is generated at 67–68 MHz by oscillator Q_{1601} (2SC784R), then multiplied by Q_{1602} and Q_{1501} (2SC1424). The local signal at 402–410 MHz is then passed through a selective filter to buffer Q_{1502} (2SC1424), for delivery to the mixer.

For transmission, the output from the transceiver is delivered to the diode ring mixer, where it is heterodyned with the local oscillator signal, resulting in a signal of 430–440 MHz. The signal is then fed through a selective filter, which effectively eliminates spurious responses. The signal is then amplified by Q_{1203} (2SC1424), fed through another selective filter, then amplified by the amplifier chain, consisting of Q_{1401} (2SC1424), Q_{1402} (2SC1426), Q_{1403} (2SC1426), and final amplifier Q_{1301} (UP-07BL). The output signal from Q_{1301} is fed through a stripline filter, via RL_{1301}, to the ANT jack.

A portion of the output from L_{1306} is detected by D_{1302} (1S188FM) and fed to the base of Q_{1205} (2SC1815Y), for control of the bias applied to Q_{1301}. Q_{1204} (2SC1815Y) acts as a switch for the automatic final protection circuit. A further portion of the output signal is rectified by D_{1303} (1S188FM) and fed to the meter, providing indication of relative power output.

The supply voltage is regulated at 8 volts by Q_{1603} (78L08).

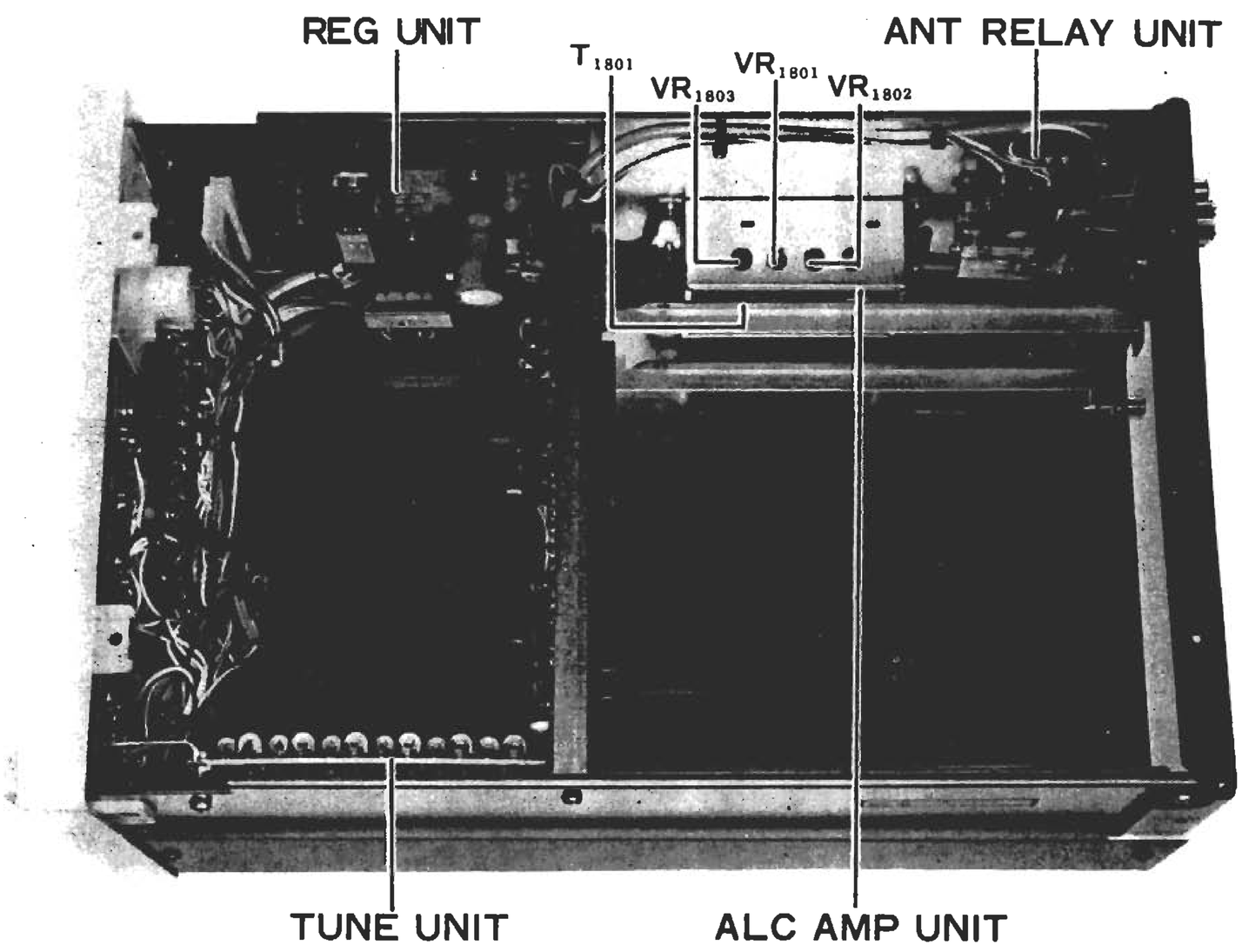


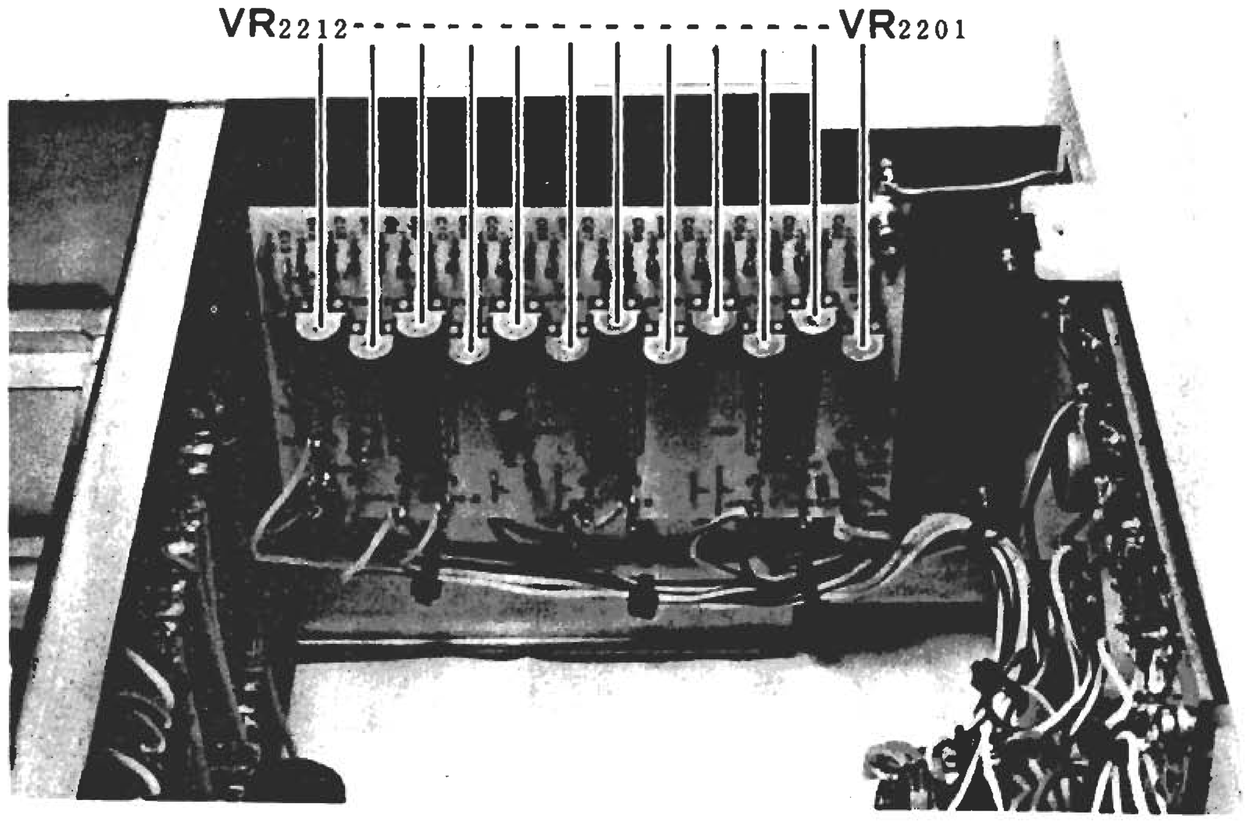

BOOSTER UNIT
(PB1935 NO13··)
Q01 UP-07BL
RF UNIT
(PB1929 NO12··)
Q02 2SC2369
Q01 2SC2369
430MHz
ANT
CX140
RL01
Q04
2SC1815Y
Q05
2SC185
(PB1929
NO12··)
TX 8V
TX 13.8V
P0
ALC
MIX UNIT
(PB1931 NO15··)
(PB1932 NO15··)
TX IN
RX
13.8V
RX OUT
Q01 2SC1424
Q02 2SC1426
Q03 2SC1426
RF UNIT
(PB1929 NO12··)
Q03 2SC1424
EXCITER UNIT
(PB1930 NO14··)
Q01
2SC1424
(PB1933 NO15··)
Q02
2SC1424
Q02 2SC1424
Q01 2SC784-R
Q03 78L08
LOCAL OSC UNIT
(PB1934 NO16··)
13.8V
TP2
T.P1
70Cm UNIT CIRCUIT DIAGRAM
① E
② 1ch
③ 2ch
④ 3ch
⑤ 4ch
⑥ 5ch
⑦ RPT
⑧ E
⑨ TX IN
⑩ E
⑪ 13.8V
⑫ TX 13.8V
⑬ E
⑭ E
⑮ E
⑯ TX 8V
⑰ P0
⑱ ALC
⑲ RX 13.8V
⑳ E
㉑ RX OUT
㉒ E

ALC CIRCUIT

The 28 MHz input signal from the transceiver is fed to the ALC AMP unit, where it is amplified by Q_{1801} (**3SK59Y**). Gate 1 receives the RF signal, while gate 2 is connected to the ALC voltage supplied from the various modules. The ALC voltage is used to control the gain of Q_{1801}. In the AM mode, the ALC level is fixed, and no connection is made to the modules for the individulal bands.

A portion of the input signal is detected by D_{1801} and D_{1802} (**1S1555**), for an indication of the input level on the meter.





MAINTENANCE AND ALIGNMENT

The FTV-107R has been carefully aligned and tested at the factory prior to shipment. With normal use, if the unit is not abused, the FTV-107R will provide many years of trouble-free operation.

Sudden difficulties are usually the result of parts failures, rather than alignment problems. Therefore, alignment should not be undertaken unless the operation of the transverter is completely understood, the fault has been throughly diagnosed, and the trouble has been definitely traced to misalignment rather than part failure. Attempts to align this equipment by other than an experienced technician are discouraged.

For alignment purposes, a VTVM with RF probe good to 450 MHz is required. Also, a signal generator good to 450 MHz, and a frequency counter good to 250 MHz are required. A dummy load and wattmeter good to 450 MHz are also required.

ALC AMP UNIT (PB-1946)

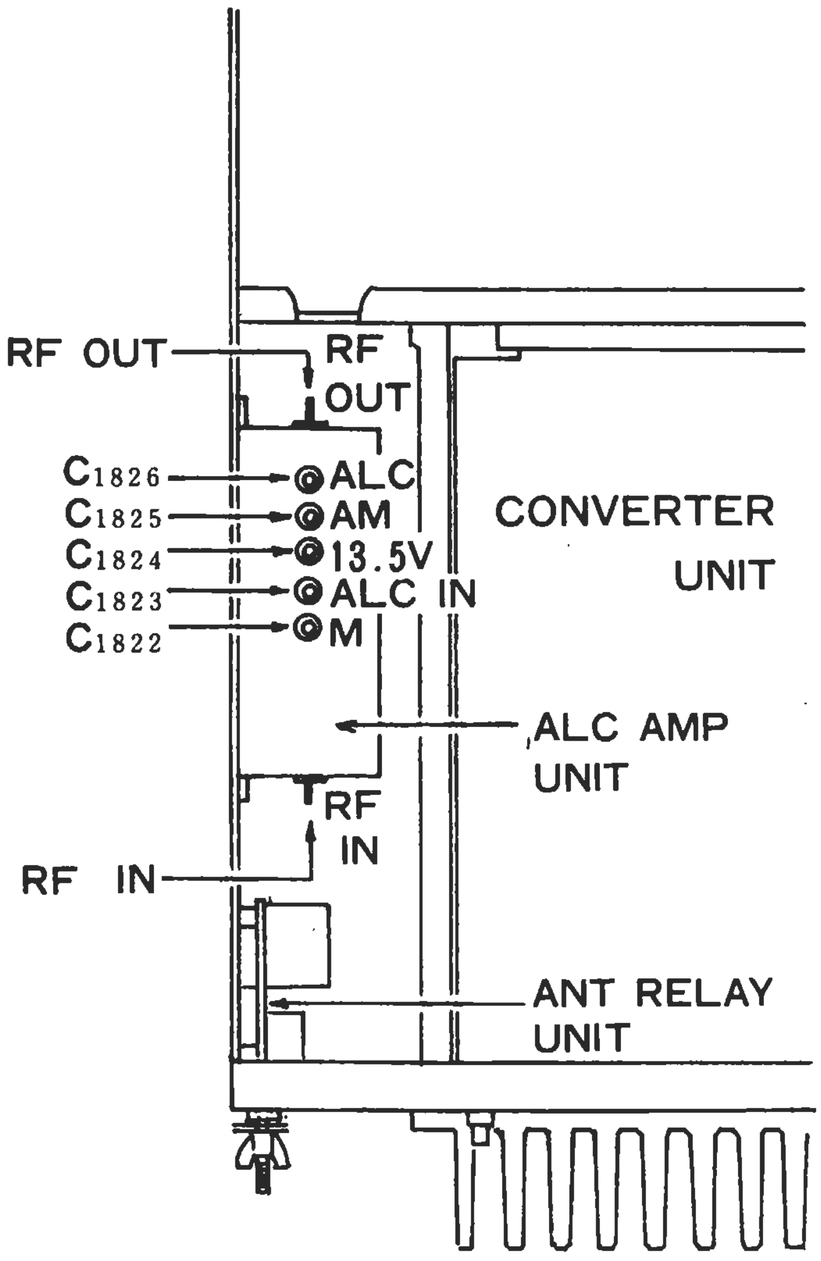
(1) Set the HF transceiver to 29 MHz, CW mode.

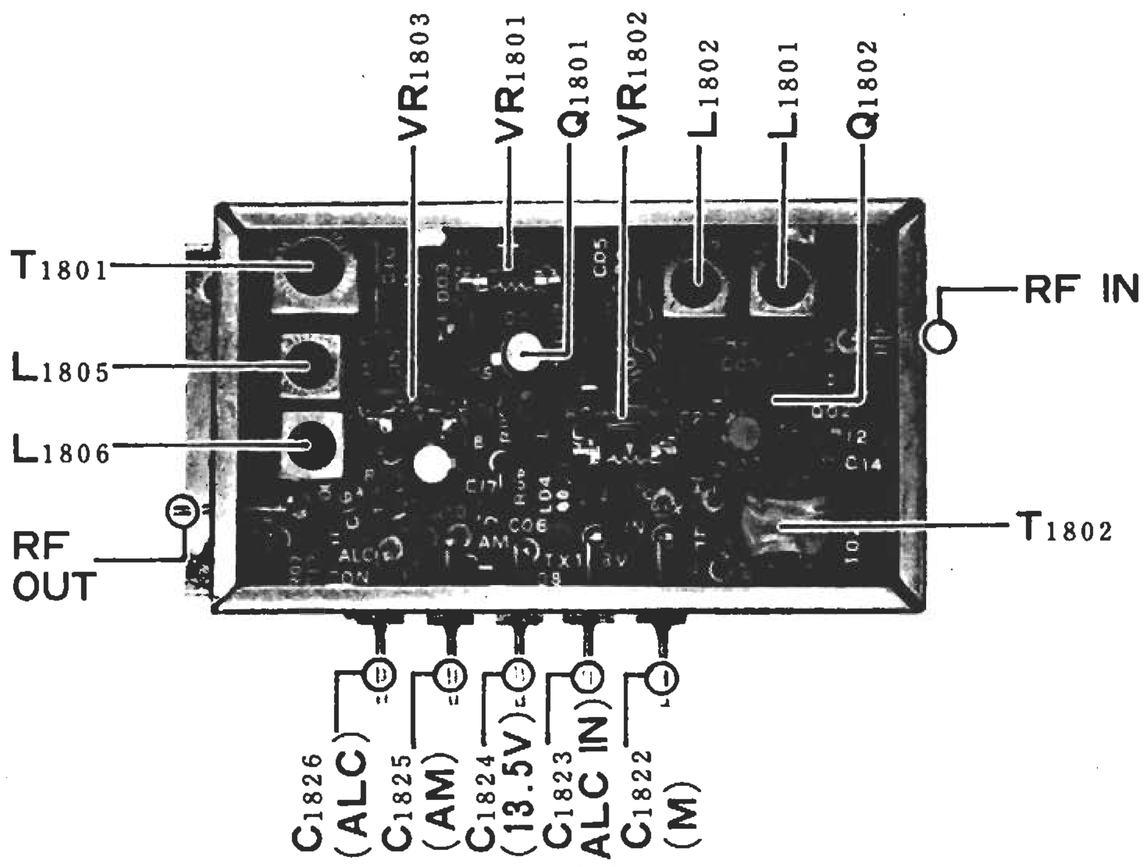
(2) Connect the RF probe of the VTVM to the input of the ALC AMP unit, and adjust the HF transceiver DRIVE or CARRIER control for an output of 0.22 volts RMS while transmitting.

(3) Connect the DC voltmeter between the hot lead and case of C_{1825}. Set the ALC meter to AM. Adjust VR_{1803} for a reading of 5 volts on the voltmeter.

(4) Connect the RF probe of the VTVM to the output of the ALC AMP unit. Adjust T_{1801} for a maximum VTVM indication. Adjust VR_{1801} for a maximum VTVM indication (0.27 volts nom.).

(5) Set the FTV-901R meter switch to INPUT. Adjust VR_{1802} for a reading of 7 on the meter.





50 MHz UNIT

Please remove the 430 MHz unit, if installed, to allow access to test points on the 50 MHz module.

1. **Local oscillator circuit**

(1) Connect the DC voltmeter to pin 2 of the edge connector for the 50 MHz unit. Confirm that 11 volts is present, with the BAND switch set to 50–52 MHz. Switch to 52–54 MHz, and check for 11 volts at pin 3 of the edge connector.

(2) Connect the RF probe of the VTVM to the LOCAL OUT terminal. Confirm that the unit is oscillating.

(3) Connect a frequency counter to the LOCAL OUT terminal. Set the BAND switch to 50–52 MHz, set the RPT switch to SIMP, and adjust TC_{202} for a reading of exactly 22.0 MHz. Switch to 52–54 MHz, and adjust TC_{203} for a reading of 24.0 MHz.

2. **Receiver section**

(1) Set the HF transceiver up for operation on 29 MHz.

(2) Connect the DC voltmeter to pin 19 of the edge connector, set the BAND switch to 50–52 MHz, then 52–54 MHz, and confirm that 13.8 volts is present.

(3) Connect the DC voltmeter to pin 15 of the edge connector, and rotate the FTV-107R RF GAIN control fully counterclockwise. The voltmeter reading should be 0 volts. In the fully clockwise position, it should be 11 volts. After confirming these voltages, please leave the level at maximum gain.

(4) Connect the DC voltmeter to pin 14 of the edge connector, and set the FTV-107R TUNE control to the center position (12 o' clock). With the BAND switch in the 50–52 MHz position, adjust VR_{2201} for a reading of 4 volts. Switch to 52–54 MHz, and adjust VR_{2202} for a reading of 4 volts.

(5) Connect a signal generator to the 50 MHz ANT jack, and set the FTV-107R BAND switch to 50–52 MHz. Set the signal generator to 51 MHz, and tune the receiver to its output. Peak T_{206}, T_{207}, T_{208}, and T_{209} for a maximum reading on the HF transceiver S-meter. Reduce the signal generator output, if necessary, to secure easy viewing of the peak point. Switch to the 52–54 MHz band, set the signal generator output to 53 MHz, and repeak these transformers again while tuned to the generator frequency. Then recheck the results at 51 MHz.

3. **Transmitter section**

(1) Connect a dummy load/wattmeter to the 50 MHz ANT jack. Set VR_{202} and VR_{203} fully counterclockwise. Set the HF transceiver DRIVE or CARRIER control to the center its range (12 o'clock). Set the BAND switch to 50–52 MHz.

(2) Connect the RF probe of the VTVM to the collector of Q_{203}. While transmitting, peak T_{201}, T_{202}, T_{203}, T_{204}, and T_{205} for a maximum reading on the VTVM (0.4 volts RMS nom.).

(3) Connect the RF probe to terminal A on the 50 MHz unit. Peak TC_{201} and L_{205} for a maximum reading on the VTVM (4 volts RMS nom.).

(4) While transmitting, peak TC_{301}, TC_{302}, TC_{303}, TC_{304}, and TC_{305} for a maximum power output indication on the wattmeter.

(5) Repeat steps (2) through (4) on the 52–54 MHz band. Then recheck the results at 50–52 MHz.

(6) Set the FTV-107R meter switch to the PO position, and set the transceiver DRIVE or CARRIER control for an output of 10 watts from the transverter. Set VR_{302} for a reading of 8 on the FTV-107R meter.

(7) Beginning at zero drive, gradually increase the transceiver DRIVE or CARRIER control until the output from the transverter does not increase more. Do not exceed this level.

(8) Rotate VR_{202} slowly clockwise, until an output of 10 watts is secured across the 50–54 MHz range.

(9) Set VR_{203} fully clockwise.

(10) While transmitting, rotate VR_{301} to secure maximum power output on the wattmeter.

(11) Now rotate VR_{203} fully counterclockwise. While transmitting, rotate VR_{203} slowly clockwise, until the power output just begins to fall off. Do not go past the threshold point.

(12) Remove the dummy load from the antenna jack. While transmitting, confirm that the PO indication is .2 with no load applied. If not, check the AFP circuit for malfunctioning part.

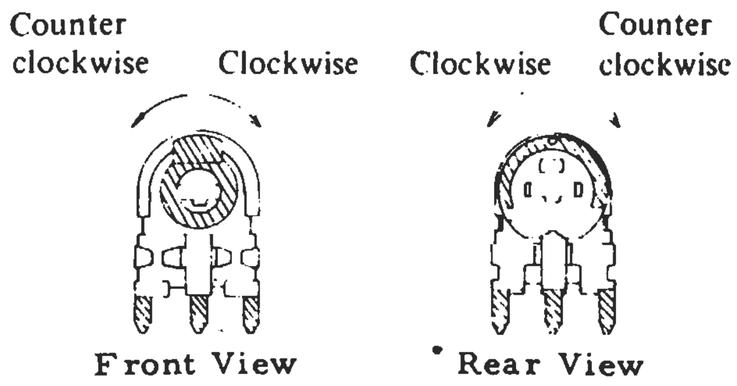
(13) Connect the RF probe of the VTVM to the LOCAL OUT terminal. Set the BAND switch to 50–52 MHz, then switch the repeater switch to UP and DOWN. Confirm that oscillation is taking place. Repeat on 52–54 MHz.

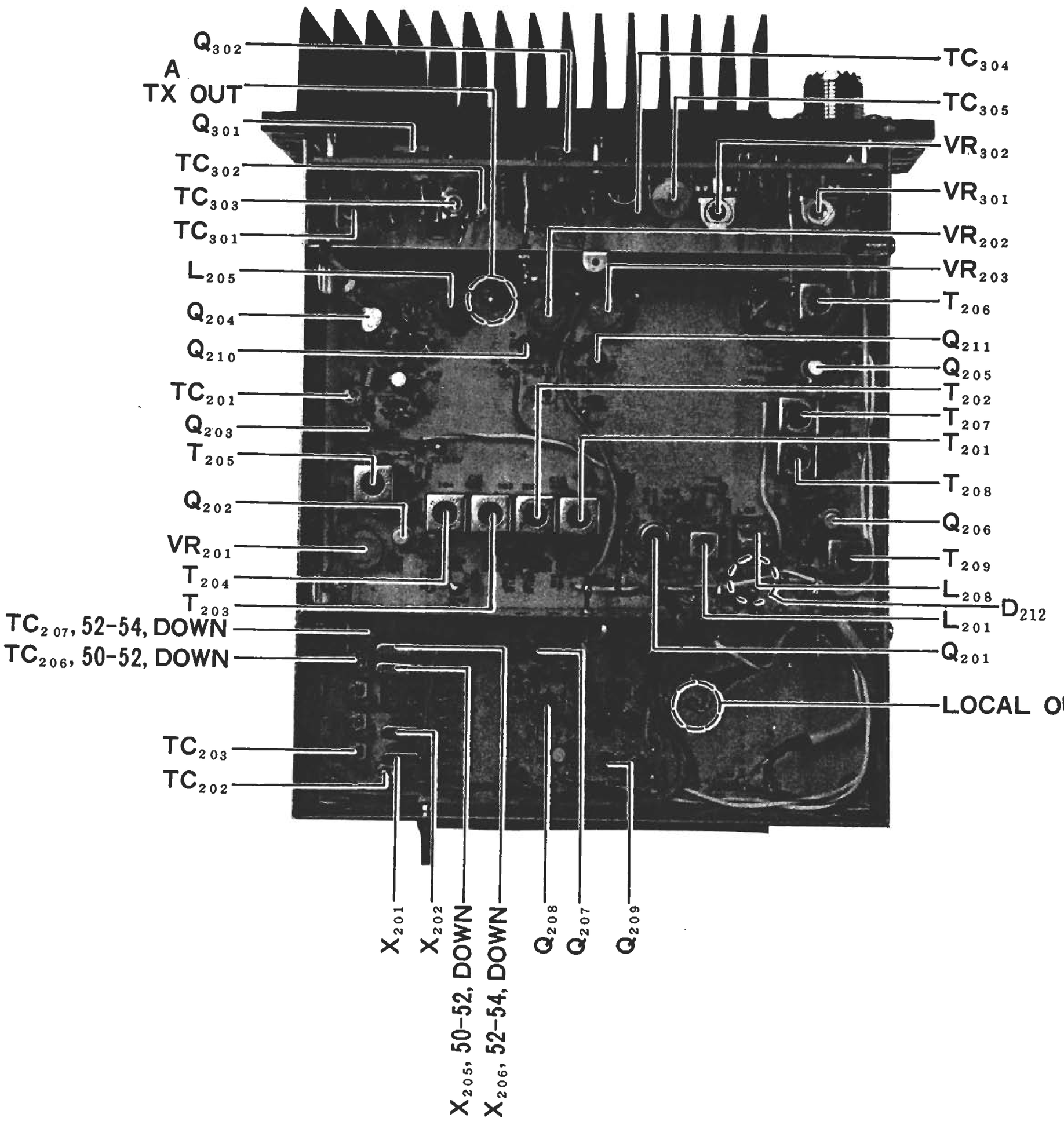
(14) Connect the frequency counter to the LOCAL OUT terminal. Adjust TC_{204}–TC_{206} as shown in the chart below.

BAND SWITCH	RPT SWITCH	ADJUST	FREQUENCY
50–52	DOWN	TC_{206}	21.0MHz
52–54	DOWN	TC_{207}	23.0MHz

(15) Set the TUNE control to the center of its range. Adjust the potentiometers for maximum power output while transmitting into the dummy load, as shown in the chart below.

BAND SWITCH	RPT SWITCH	ADJUST	RESULT
50–52	DOWN	VR_{2205}	MAXIMUM OUTPUT
52–54	DOWN	VR_{2206}	





144 MHz UNIT

Please remove the 430 MHz unit, if installed, to allow access to test points on the 144 MHz module.

1. Local oscillator circuit

(1) Connect the DC voltmeter to pin 2 of the edge connnector for the 144 MHz unit. Confirm that 13.5 volts is present, with the BAND switch set to 144–146 MHz. Switch to 146–148 MHz, and check for 13.5 volts at pin 3 of the edge connector.

(2) Connect the RF probe of the VTVM to the LOCAL OUT terminal. Adjust T_{607} and T_{608} for a reading of 0.15 V RMS on the VTVM.

(3) Connect a frequency counter to the LOCAL OUT terminal. Set the BAND switch to 144–146 MHz, set the RPT switch to SIMP, and adjust TC_{606} for a reading of exactly 116.0 MHz. Switch to 146–148 MHz, and adjust TC_{607} for a reading of 118.0 MHz.

2. Receiver section

(1) Set the HF transceiver up for operation on 29 MHz.

(2) Connect the DC voltmeter to pin 19 of the edge connector, set the BAND switch to 144–146 MHz, then 146–148 MHz, and confirm that 11 volts is present.

(3) Connect the DC voltmeter to pin 15 of the edge connector, and rotate the FTV-107R RF GAIN control fully counterclockwise. The voltmeter reading should be 0 volts. In the fully clockwise position, it should be 13.5 volts. After confirming these voltages, please leave the level at maximum gain.

(4) Connect the DC voltmeter to pin 14 of the edge connector, and set the FTV-107R TUNE control to the center position (12 o'clock). With the BAND switch in the 144–146 MHz position, adjust VR_{2207} for a reading of 4 volts. Switch to 146–148 MHz, and adjust VR_{1908} for a reading of 4 volts.

(5) Connect a signal generator to the 144 MHz ANT jack, and set the FTV-901R BAND switch to 144–146 MHz. Set the signal generator to 145 MHz, and tune the receiver to its output. Peak TC_{1001} – TC_{1004} and T_{604} – T_{606} for a maximum reading on the HF transceiver S-meter.

Reduce the signal generator output, if necessary, to secure easy viewing of the peak point. Switch to the 146–148 MHz band, set the signal generator output to 147 MHz, and repeak these transformers again while tuned to the generator frequency. Then recheck the results at 145 MHz.

3. Transmitter section.

(1) Connect a dummy load/wattmeter to the 144 MHz ANT jack. Set VR_{601} and VR_{602} fully counterclockwise. Set the HF transceiver DRIVE or CARRIER control to the center of its range (12 o'clock). Set the BAND switch to 144–146 MHz.

(2) Connect the RF probe of the VTVM to the collector of Q_{603}. While transmitting, peak T_{601} – T_{603}, TC_{601}, and TC_{602} for a maximum reading on the VTVM (0.9 volts RMS nom.).

(3) Connect the RF probe to terminal A on the 144 MHz unit. Peak TC_{604} and TC_{605} for a maximum reading on the VTVM (2.5 volts RMS nom.).

(4) Repeat steps (2) and (3) on the 146–148 MHz band. Then recheck the results at 144–146 MHz.

(5) Set the FTV-107R meter switch to the PO position, and set the transceiver DRIVE or CARRIER control for an output of 12 watts from the transverter. Set VR_{702} for a reading of .8 on the FTV-107R meter.

(6) Beginning at zero drive, gradually increase the transceiver DRIVE or CARRIER control until the output from the transverter does not increase more. Do not exceed this level.

(7) Rotate VR_{601} slowly clockwise, until an output of 10 watts is secured across the 144–148 MHz range.

(8) Rotate VR_{602} fully clockwise.

(9) While transmitting, rotate VR_{701} to secure maximum power output on the wattmeter.

(10) Now rotate VR_{602} fully counterclockwise. While transmitting, slowly rotate VR_{602} clockwise, until the power output just begins to fall off. Do not go past the threshold point.

(11) Remove the dummy load from the antenna jack. While transmitting, confirm that the PO indication is .2 with no load applied. If not, check the AFP circuit for malfunctioning parts.

(12) Connect the RF probe of the VTVM to the LOCAL OUT terminal. Set the BAND switch to 144–146 MHz, then switch the repeater switch to UP and DOWN. Confirm that oscillation is taking place. Repeat on 146–148 MHz.

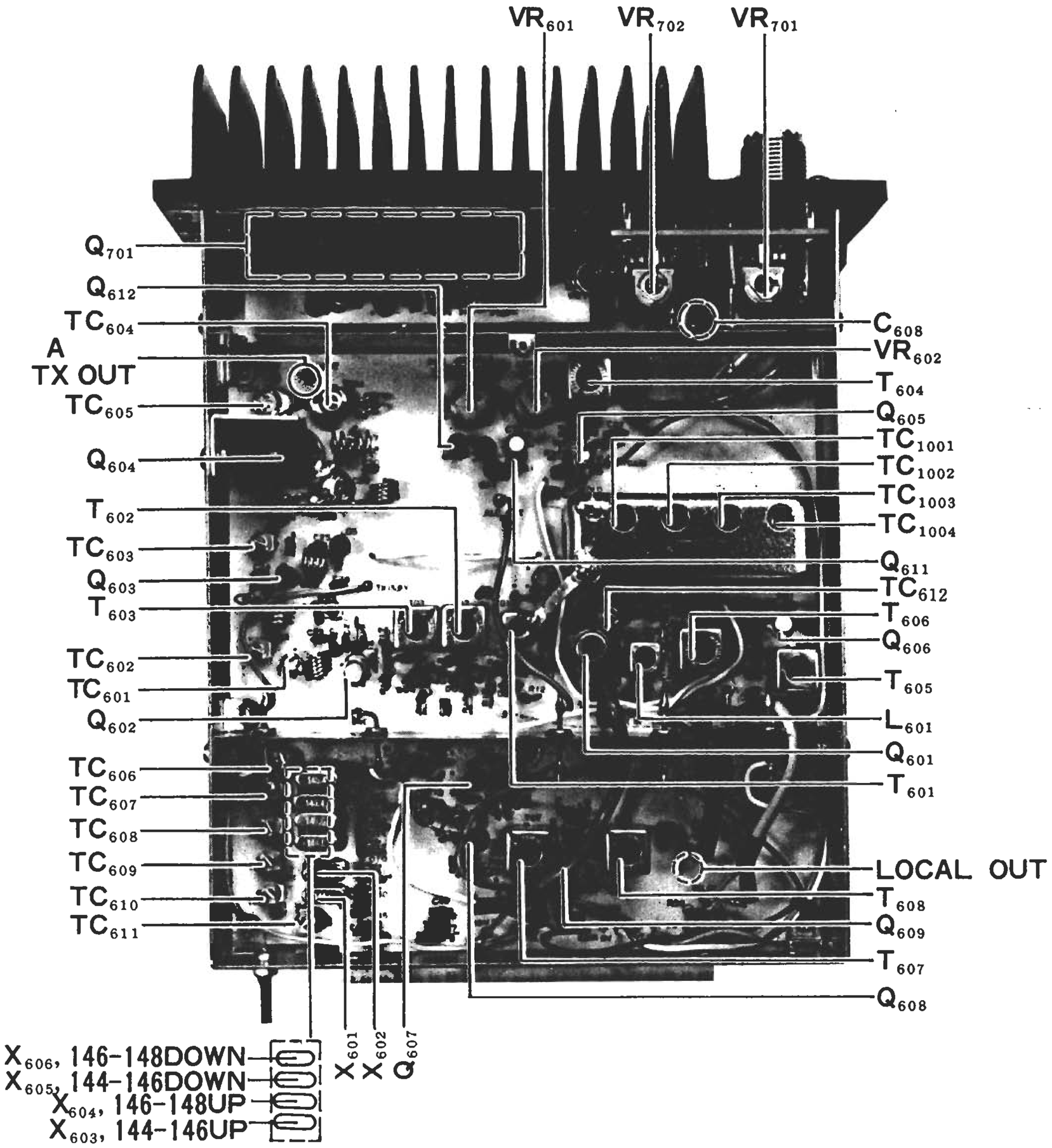
(13) Connect the frequency counter to the LOCAL OUT terminal. Adjust TC_{608}–TC_{611} as shown in the chart below.

BAND SWITCH	RPT SWITCH	ADJUST	FREQUENCY
144–146	UP	TC_{608}	116.6MHz
	DOWN	TC_{610}	115.4MHz
146–148	UP	TC_{609}	118.6MHz
	DOWN	TC_{611}	117.4MHz

(14) Set the TUNE control to the center of its range. Adjust the potentiometers for maximum power output while transmitting into the dummy load, as shown in the chart below.

BAND SWITCH	RPT SWITCH	ADJUST	RESULT
144–146	UP	VR_{2209}	MAXIMUM OUTPUT
	DOWN	VR_{2211}	
146–148	UP	VR_{2210}	
	DOWN	VR_{2212}	

(15) Adjust T_{607} and T_{608} for identical power output with the RPT switch in the UP and DOWN positions.



430 MHz UNIT

Please remove the 50/144 MHz unit, if installed, to allow access to test points on the 430 MHz unit.

1. Local oscillator circuit

(1) Connect a DC voltmeter to pin 2 of the edge connector for the 430 MHz unit. Set the BAND switch to 430–432, and confirm that 11 volts is present. In turn, check pins 3, 4, 5, and 6 for 11 volts, while switched to the 432–434, 434–436, 436–438, and 438–440 MHz bands, respectively.

(2) Connect the RF probe of the VTVM to TP_1, and adjust L_{1602}, T_{1601}, and T_{1602} for maximum indication on the VTVM.

(3) Connect the frequency counter to TP_1. Refer to the chart below, and adjust TC_{1601}–TC_{1605} for local output readings as shown for the various positions of the BAND switch.

BAND	TRIMMER	FREQ.
430–432	TC_{1601}	201 MHz
432–434	TC_{1602}	202 MHz
434–436	TC_{1603}	203 MHz
436–438	TC_{1604}	204 MHz
438–440	TC_{1605}	205 MHz

(4) Connect the DC voltmenter to TP_2, and adjust TC_{1505}–TC_{1509} for maximum indication on the voltmeter (1 volt nom.).

2. Receiver section

(1) Set the transceiver up for operation on 29 MHz.

(2) Connect the DC voltmeter to pin 19 of the edge connector, and check for 13.8 volts at each position of the BAND switch over 430–440 MHz.

(3) Connect the signal generator to the 430 MHz ANT jack, set its output to 431 MHz, and tune the receiver to the generator signal. Adjust TC_{1201}–TC_{1203}, TC_{1501}–TC_{1504}, and CV_{1501}/CV_{1502} for a maximum S-meter indication on the HF transceiver. Repeat on 433 MHz, 435 MHz, 437 MHz, and 439 MHz. Recheck the results to ensure maximum response across the entire operating range.

3. Transmitter section

(1) Connect the dummy load/wattmeter to the 430 MHz ANT jack. Set VR_{1201} and VR_{1202} fully counter clockwise. Set the transceiver DRIVE or CARRIER control to the center of its range (12 o'clock position).

(2) Connect the RF probe of the VTVM to the anode of D_{1502}. Peak TC_{1501}–TC_{1504} and CV_{1501}/CV_{1502} for a maximum indication on the VTVM while transmitting.

(3) Connect the RF probe of the VTVM to the hot side of L_{1213}. Peak TC_{1204} – TC_{1206} for a maximum indication on the VTVM.

(4) Connect the RF probe of the VTVM to terminal A on the 430 MHz unit. Peak TC_{1401}–TC_{1406} for a maximum indication on the VTVM.

(5) Confirm the results in steps (2) through (4) on the wattmeter.

(6) Repeak the points in steps (2) through (5) on each position of the BAND switch, then recheck the results to ensure maximum performance over the entire range 430–440 MHz.

(7) Set the meter switch to PO. Set the transceiver DRIVE or CARRIER control for an output of 10 watts. Adjust VR_{1203} for an indication of .8 on the PO meter.

(8) Beginning at zero drive, increase the level of the DRIVE or CARRIER control on the transceiver until the transverter power output does not increase further.

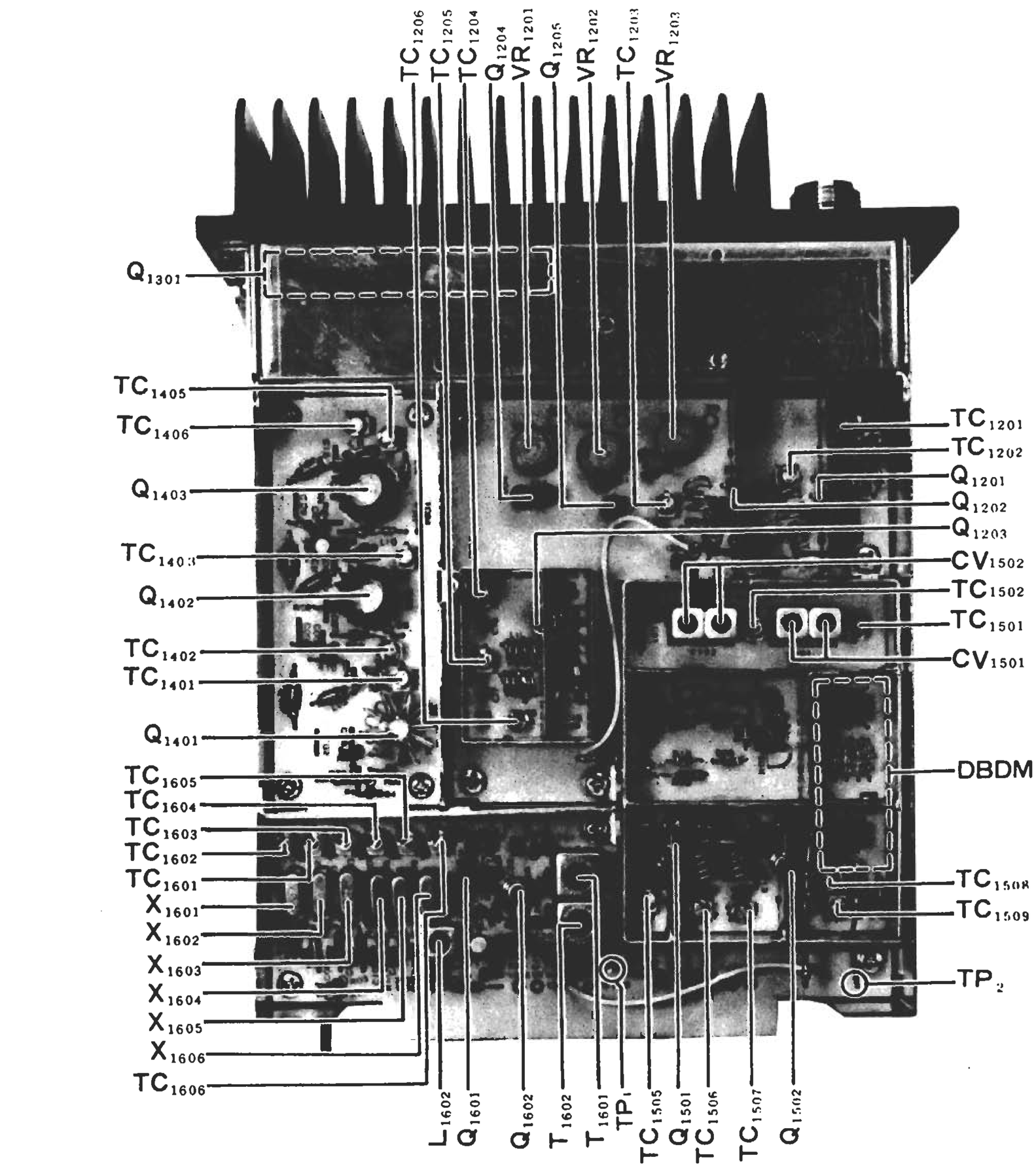
(9) Advance VR_{1201} slowly clockwise until equal power output is achieved across the 430–440 MHz range.

(10) Rotate VR_{1202} fully clockwise.

(11) While transmitting, rotate VR_{1301} to secure maximum power output on the wattmeter.

(12) Now rotate VR_{1202} fully clockwise. While transmitting, slowly rotate VR_{1202} counter-clockwise, until the power output just begins to fall off. Do not go past the threshold point.

(13) Remove the dummy load from the 430 MHz ANT jack. While transmitting, check to be sure that the PO meter indicates .2 with no load applied. If not, check the AFP unit for malfunctioning parts.


TC1206
TC1205
TC1204
Q1204
VR1201
Q1205
VR1202
TC1203
VR1203
Q1301
TC1405
TC1406
Q1403
TC1403
Q1402
TC1402
TC1401
Q1401
TC1605
TC1604
TC1603
TC1602
TC1601
X1601
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X1603
X1604
X1605
X1606
TC1606
TC1201
TC1202
Q1201
Q1202
Q1203
CV1502
TC1502
TC1501
CV1501
DBDM
TC1508
TC1509
TP2
L1602
Q1601
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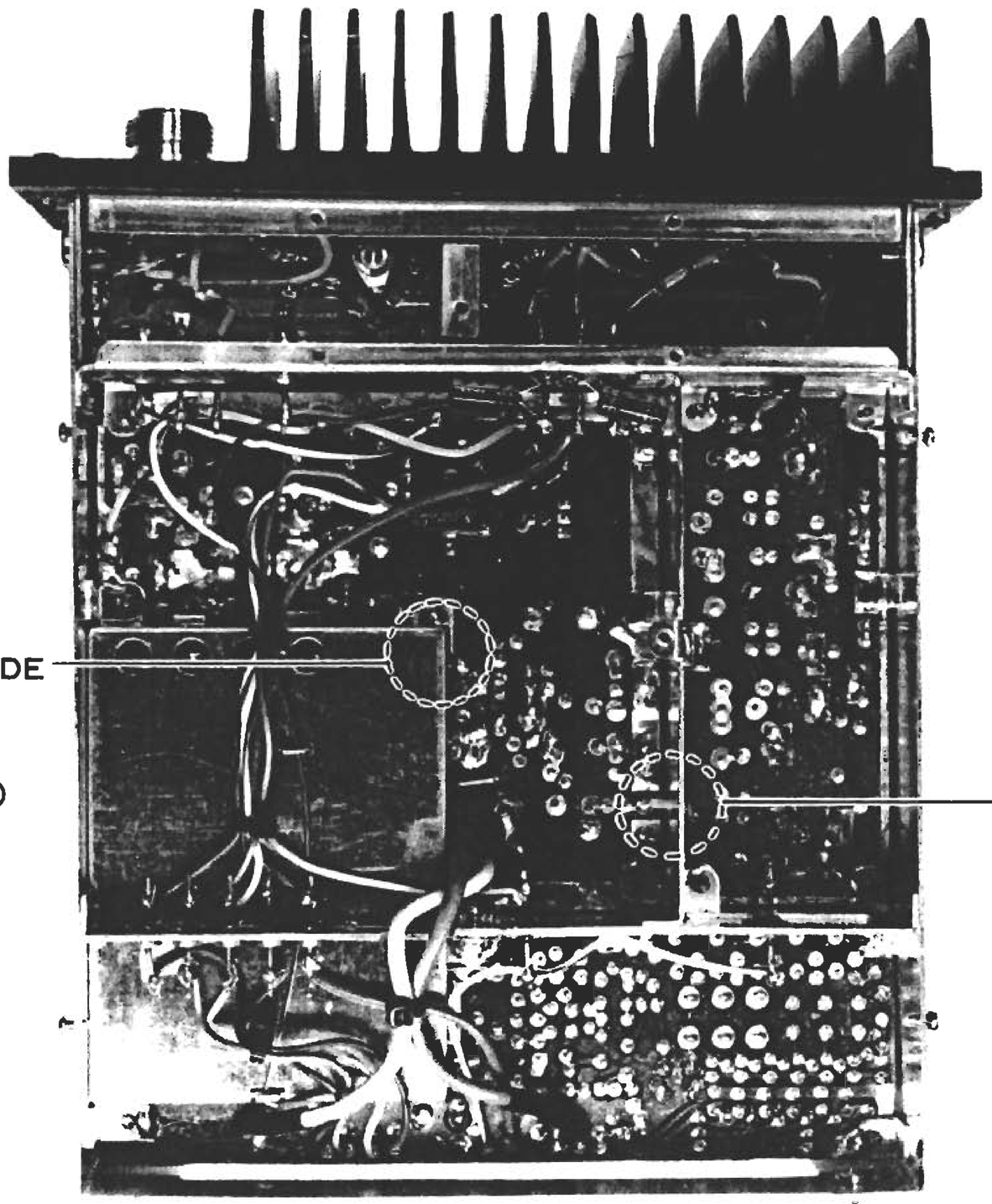
T1602
T1601
TP1
TC1505
Q1501
TC1506
TC1507
Q1502


D1502
ANODE
L1213

R212,213, 215–217, 220,239,240	J00245104	Carbon film 1/4WVJ 100kΩ	T209	L0020166	R12-4180
R222,233	J01245104	" " " TJ 100kΩ			**INDUCTOR**
R218	J00245224	" " " VJ 220kΩ	L211,212	L1190004	Micro inductor FL-4H 0.68μH
R264	J01245334	" " " TJ 330kΩ	L214	L1190009	" " " 3.3μH
R236	J00245564	" " " VJ 560kΩ	L207,209	L1190013	" " " 6.8μH
R265	J00245335	" " " " 3.3MΩ	L213	L1190014	" " " 10μH
			L210	L1190017	" " FL-5H 1mH
			L208	L0020209	
			L202,204,206	L1020324	
			L203	L0020416A	
			L201	L0020535	
		POTENTIOMETER	L205	L0190003	IFT-51S10-H3
VR201–203	J51723473	SR19RS 47kΩB			
					FERRITE BEADS
		CAPACITOR		L9190001	Ri 3 x 3-1
C213,245	K00179001	Ceramic disc 50WV SL 0.5pF			
C222,242	K02279001	" " " CH 1pF			
C211,215,218, 236,243,246, 278	K02172050	" " " " 5pF		Q5000025	Wrapping terminal A
C203,210	K00173100	" " " SL 10pF			**HEAT SINK**
C237,247,251	K02173100	" " " CH 10pF		R5047915B	T0-5, L = 20 mm
C249	K02175150	" " " " 15pF			
C228	K00175180	" " " SL 18pF			
C216	K00179005	" " " " 20pF			
C219	K00175220	" " " " 22pF			
C260–265,269	K02179009	" " " CH 22pF			
C235	K00175330	" " " SL 33pF	★★★★★ 50 MHz BOOSTER BOARD ★★★★★		
C204,233,234	K00175470	" " " " 47pF	PB-1923	F0001923A	Printed circuit board
C212,214,217, 250	K02175470	" " " CH 47pF		C9019230A	PCB with components
C223,238,241, 244	K06175470	" " " UJ 47pF			**TRANSISTOR**
			Q301	G3321660	Transistor 2SC2166
C201,202	K00179013	" " " SL 91pF	Q302	G3319450D	" 2SC1945D
C225	K00175101	" " " " 100pF			
C207,208,267, 268	K02175101	" " " CH 100pF			
					DIODE
C273,275	K00175121	" " " SL 120pF	D301,302,308	G2090001	Silicon 10D1
C274	K00179020	" " " " 240pF	D307	G2001880F	Germanium 1S188FM
C232,252,266	K12171102	" " " " 0.001μF	D303–306	G2015550	Silicon 1S1555
C205,206,209, 220,221,224, 226,227,230, 231,239,240, 248, 253–259, 270–272, 283–288,292	K14170103	" " " " 0.01μF			
					RESISTOR
			R303	J10276560	Carbon composition 1/2WGK 56Ω
			R306	J10276101	" " " " 100Ω
			R305	J10276151	" " " " 150Ω
			R302	J10276221	" " " " 220Ω
C291	K50177473	Mylar 50WV 0.047μF	R301,304 (L302,305)	J10276471	" " " " 470Ω
C229,276,277, 290	K40120106	Electrolytic 16WV 10μF			
			R308	J01245102	Carbon film 1/4WTJ 1kΩ
			R307	J00245103	" " " VJ 10kΩ
					POTENTIOMETER
			VR301	J50702301	EVL-SOAA00B32 300ΩB
		TRIMMER CAPACITOR	VR302	J50702103	EVL-SOAA00B14 10kΩB
TC201–207	K91000029	ECV1ZW 20 x 53N 20pF			
					CAPACITOR
		TRANSFORMER	C334	K00179001	Ceramic disc 50WV SL 0.5pF
T201–208	L0020408		C316,335	K00172010	" " " " 1pF

C310,315	K00172050	Ceramic disc 50WV SL 5pF		C9019250A	PCB with components
C302	K00179005	" " " " 20pF			
C301,317	K00175330	" " " " 33pF			**IC, FET, TRANSISTOR**
C307	K00175390	" " " " 39pF	Q601	G1090061	IC MC-1496G
C320,329	K00175470	" " " " 47pF	Q610	G1090123	" 78L08
C323,329	K00179011	" " " " 62pF	Q602,605,606	G4800510C	FET 3SK51-03
C314,324	K00175820	" " " " 82pF	Q604	G3307300	Transistor 2SC730
C321,328	K00175101	" " " " 100pF	Q607–609	G3307840R	" 2SC784R
C319	K00175121	" " " " 120pF	Q611,612	G3318150Y	" 2SC1815Y
C304,306,309, 311,313,318, 326,327,331, 333	K14170103	" " " " 0.01μF	Q603	G3320530	" 2SC2053
					DIODE
C303,305,308, 312,330,332	K40120226	Electrolytic 16WV TW 22μF	D601,606,607, 609–614,616	G2090027	Silicon 1SS53
			D605	G2015550	" 1S1555
			D602–604,608	G2022090	Varactor 1S2209
		INDUCTOR			**CRYSTAL**
L314	L1190003	Micro inductor 10μH	X601	H0101380	HC-18/U (600SHIFT) 38.6666MHz
L304,313	L0020196		X602	H0101390	" " 39.3333MHz
L302,305	L0020324		X603	H0101405	HC-25/U " 38.8666MHz
L301	L0020527		X604	H0101420	" " 39.5333MHz
L303,306	L0020528		X605	H0101410	" " 38.4666MHz
L307	L0020529		X606	H0101430	" " 39.1333MHz
L308~310,312	L0020530		X603★	H0101405	HC-25/U (700kHz SHIFT) 38.9000MHz
L311	L0020584				
			X604★	H0101406	" (" ") 38.4333MHz
			X605★	H0101407	" (" ") 39.5666MHz
		TRIMMER CAPACITOR	X606★	H0101408	" (" ") 39.1000MHz
TC301	K91000020	ECV-1ZW 20 x 40N 20pF			
TC302,303	K91000023	ECV-1ZW 50 x 40N 50pF			**CRYSTAL SOCKET**
TC304,305	K91000058	2222-808-61809 80pF	XS601	P3090029	S-19-4P
					RESISTOR
		RELAY	R624	J00245100	Carbon film 1/4WVJ 10Ω
RL301	M1190006	FBR-221D012	R638	J00245220	" " " " 22Ω
			R609,620,621, 633	J00245560	" " " " 56Ω
		CONNECTOR	R625	J00245680	" " " " 68Ω
J301	P1090026	SO-239	R604,608,611, 614,651,655, 659	J00245101	" " " " 100Ω
	Q5000025	Wrapping terminal A	R629	J00245221	" " " " 220Ω
			R646	J00245331	" " " " 330Ω
			R647 (L613)	J10276471	" composition 1/2WGK 470Ω
	R4050740	Booster heat sink	R665	J01245471	" film 1/4WTJ 470Ω
			R650,654,658	J00245471	" " " VJ 470Ω
			R602,622	J00245561	" " " " 560Ω
			R640–645	J00245681	" " " " 680Ω
			R605	J01245821	" " " TJ 820Ω
144 MHz UNIT (OPTION)			R601,603,607, 634,635,660	J00245102	" " " VJ 1kΩ
Symbol No.	Parts No.	Description			
	C0019250A	144MHz UNIT	R626,637,639	J00245122	" " " " 1.2kΩ
★★★★★ MAIN CHASSIS ★★★★★			R606	J00245152	" " " " 1.5kΩ
C501~506, 508,509, 511~513,515	K21170002	Ceramic feed thru ECK-Y1H102WE	R652,656	J00245472	" " " " 4.7kΩ
			R623	J01245682	" " " TJ 6.8kΩ
			R610,666,670	J00245103	" " " VJ 10kΩ
C517	K50177223	Mylar 50WV 0.022μF	R618,619,628, 653,657	J00245223	" " " " 22kΩ
			R617,631,632	J00245473	" " " " 47kΩ
			R612,613,615, 616,636	J00245104	" " " " 100kΩ
			R668	J00245334	" " " " 330kΩ
★★★★★ 144 MHz CONVERTER MAIN BOARD ★★★★★			R627	J00245564	" " " " 560kΩ
PB-1925A	F0001925A	Printed circuit board			

		POTENTIOMETER	L601	L0020535	Micro inductor FL-4H #220535
VR601	J51723472	SR19RS 4.7kΩB			
VR602	J51723473	SR19RS 47kΩB			
					TRANSFORMER
			T604	L0020105	R12-4091
		CAPACITOR	T602,603, 606–608	L0020111	R12-4102
C614	K00179001	Ceramic disc 50WV SL 0.5pF			
C609	K02179001	" " " CH 1pF	T605	L0020166	R12-4180
C612,616	K02172020	" " " " 2pF	T601	L0020536	
C613,615	K06172040	" " " UJ 4pF			
C611,617	K00172050	" " " SL 5pF			
C641,650–655	K02172050	" " " CH 5pF			**HEAT SINK**
C642	K06172050	" " " UJ 5pF		R5047915B	TO-5, L = 20 mm
C608,610	K06173080	" " " " 8pF			
C604,637	K00173100	" " " SL 10pF			
C631,632,664, 668	K02173100	" " " CH 10pF			**FERRITE BEADS**
				L9190001	Ri 3 x 3-1
C639	K00175150	" " " SL 15pF			
C658	K02175180	" " " CH 18pF			
C665	K00175220	" " " SL 22pF		Q5000025	Wrapping terminal A
C626	K00175270	" " " " 27pF			
C660	K02179011	" " " CH 27pF			
C623	K00175330	" " " SL 33pF			
C627	K00175390	" " " " 39pF			
C640	K00175470	" " " " 47pF			
C656	K02175680	" " " CH 68pF	★★★★★ 144 MHz BOOSTER BOARD ★★★★★		
C601,602	K00179013	" " " SL 91pF	PB-1926	F0001926	Printed circuit board
C685	K00175101	" " " " 100pF		C9019260	PCB with components
C659	K02175102	" " " CH 100pF	PB-1927	F0001927	Printed circuit board
C607,618,619, 621,622,624, 625,628,630, 633–635, 643,657,662, 663,667,669, 672,673,678, 679	K12171102	" " " " 0.001μF		C9019270	PCB with components
					POWER MODULE
			Q701	G1090216	VP-20BL
					DIODE
			D704	G2090001	Silicon 10D1
C605,606,636, 638, 644–649, 661,680, 682–684	K13170103	" " " " 0.01μF	D701	G2001880F	Germanium 1S188FM
			D702,703	G2015550	Silicon 1S1555
					RESISTOR
C620,629,670, 671,681	K40120106	Electrolytic 16WV TW 10μF	R705	J00245472	Carbon film 1/4WVJ 4.7kΩ
			R701 (L701), 704 (L704)	J10276471	Carbon composition 1/2W GK 470Ω
			R702 (L702), 703 (L703)	J10246471	" " 1/4W " 470Ω
		TRIMMER CAPACITOR			
TC601	K91000028	ECV-1ZW 10 x 53N 10pF			**POTENTIOMETER**
TC602,603, 606–612	K91000029	ECV-1ZW 20 x 53N 20pF	VR701	J50702301	EVL-SOAA00B32 300ΩB
			VR702	J50702103	EVL-SOAA00B14 10kΩB
TC604,605	K91000016	ECV-1ZW 50 x 32N 50pF			
					CAPACITOR
		INDUCTOR	C710,712	K00172010	Ceramic disc 50WV SL 1pF
L605	L1190004	Micro inductor FL4H 0.68μH	C713	K00172020	" " " " 2pF
L610,612,614	L1190008	" " " 2.2μH	C708,716,717	K00175150	" " " " 15pF
L611	L1190013	" " " 6.8μH	C706	K00179005	" " " " 20pF
L606,608	L0020193	" " "	C707	K00175330	" " " " 33pF
L602	L0020195	" " "	C705,711,714, 715	K12171102	" " " " 0.001μF
L603,604,609	L0020196	" " "			
L613	L0020206	" " "	C701–704	K40120106	Electrolytic 16WV TW 10μF
L607	L0020380	" " "			

		INDUCTOR	Q1201,1202	G3323690	Transistor 2SC2369
L707	L0020069				
L701,704	L1020324				
L706,708	L0020430				**DIODE**
L702,703	L1020469		D1203	G2090027	Silicon 1SS53
L705	L0020654		D1201	G2015550	Silicon 1S1555
		RELAY			**RESISTOR**
RL701	M1190006	FBR-221D012	R1215	J00245820	Carbon film 1/4WVJ 82Ω
			R1205,1210	J00245101	" " " " 100Ω
			R1204	J00245221	" " " " 220Ω
		RECEPTACLE	R1203(L1202), 1206(L1204), 1209(L1205), 1211(L1207), 1216–1218 (L1208–1210)	J10246471	Carbon composition " GK 470Ω
J701	P1090026	SO-239			
	Q5000025	Wrapping terminal A			
			R1212,1213	J00245102	Carbon film " VJ 1kΩ
			R1201,1207, 1223	J00245152	" " " " 1.5kΩ
			R1202,1208, 1214,1225	J00245103	" " " " 10kΩ
★★★★★ **RESONATOR BOARD** ★★★★★					
PB-1800	F0001800	Printed circuit board			
	C9018000	PCB with components			
					POTENTIOMETER
		CAPACITOR	VR1201–1203	J51723473	SR19RS 47kΩB
C1005–1008	K02172050	Ceramic disc 50WV CH5pF			
C1001–1004	K02175150	" " " " 15pF			
					CAPACITOR
			C1202,1203	K00172030	Ceramic disc 50WV SL 3pF
		TRIMMER CAPACITOR	C1216,1218	K02172050	" " " CH5pF
T1001–1004	K91000028	ECV-1ZW 10 x 53N 10pF	C1212	K02179008	" " " " 20pF
			C1201,1221, 1229	K12171102	" " " " 0.001μF
		INDUCTOR	C1204–1211, 1213,1215, 1228	K22170001	" HDC60E102M 0.001μF
L1001	L0020409				
			C1214,1226	K23140001	" Chip 25V 0.01μF
	R0044940A	Resonator case	C1231	K50177473	Mylar 50WV 0.047μF
			C1230	K40120106	Electrolytic 16WV TW 10μF
	Q5000011	Wrapping terminal C			
					TRIMMER CAPACITOR
			TC1201, 1204–1206	K91000059	ECV-1ZW 04 x 53N 4pF
			TC1202,1203	K91000028	ECV-1ZW 10 x 53N 10pF

430 MHz UNIT (OPTION)

Symbol No.	Parts No.	Description
	C0019290	430MHz UNIT
★★★★★ **MAIN CHASSIS** ★★★★★		
C1101–1108, 1110–1115	K21170002	Ceramic feed thru ECK-Y1H102WE
★★★★★ **430 MHz RF BOARD** ★★★★★		
PB-1929	F0001929	Printed circuit board
	C9019290	PCB with components
		TRANSISTOR
Q1203	G3314240	Transistor 2SC1424
Q1204,1205	G3318150Y	" 2SC1815Y

L1214	L1190014	Micro inductor FL-4H 10μH	
L1202,1204, 1205, 1207–1210	L1020469		
L1211,1212	L0020471		
L1203,1206	L0020472		
L1213	L0020474		
L1201	L0020523		
	Q5000011	Wrapping terminal C	

★★★★★ 430 MHz BOOSTER BOARD ★★★★★					
PB-1935A	F0001935A	Printed circuit board	R1408	J00245220	Carbon film 1/4WVJ 22Ω
	C9019350A	PCB with components	R1405	J00245820	" " " " 82Ω
			R1415	J00245221	" " " " 220Ω
		POWER MODULE	R1401(L1401), 1406(L1402), 1407(L1403), 1412(L1404), 1413(L1405), 1416(L1406)	J10246471	Carbon composition " GK 470Ω
Q1301	G1090217	UP-07BL			
		DIODE			
D1301	G2090001	Silicon 10D1			
D1302–1304	G2001880F	Germanium 1S188FM	R1403,1409	J00245471	Carbon film " VJ 470Ω
			R1404,1410, 1414	J00245101	" " " " 1kΩ
		RESISTOR	R1402,1411	J01245562	" " " TJ 5.6kΩ
R1301(L1308), 1302(L1309), 1304(L1301), 1305(L1302)	J10246471	Carbon composition 1/4 GK 470Ω			
					CAPACITOR
			C1401–1410, 1412	K22170001	Ceramic HDC60E102M 0.001μF
			C1411	K40120106	Electrolytic 16WV TW 10μF
		POTENTIOMETER			
VR1301	J50702301	EVN-A00B32 300ΩB			
					TRIMMER CAPACITOR
			TC1401–1403, 1405,1406	K91000028	ECV-1ZW 10 x 53N 10pF
		CAPACITOR			
C1304,1309	K00172020	Ceramic disc 50WV SL 2pF			
C1308	K12171102	" " " " 0.001μF			
C1301,1302	K40120106	Electrolytic 16WV TW 10μF			**INDUCTOR**
			L1401–1406	L1020469	
			L1407	L0020472	
		TRIMMER CAPACITOR	L1409,1411	L0020473	
TC1301	K91000068	ECV1ZW 06 x 32 6pF	L1408,1410	L0020522	
		INDUCTOR		R5047914B	Heat sink L = 15 mm
L1301,1302, 1308,1309	L1020469				
				S5000015	" " NF-201AP
L1303,1304	L0020525A				
			★★★★★ 430 MHz CONVERTER BOARD ★★★★★		
		RELAY	PB-1931	F0001931	Printed circuit board
RL1301	M1590001	CX-140N (with J1301)		C9019310	PCB with components
			PB-1932A	F0001932A	Printed circuit board
				C9019320A	PCB with components
	Q4000003	Hermetic seal A350	PB-1933	F0001933	Printed circuit board
				C9019330	PCB with components
					TRANSISTOR
			Q1501,1502	G3314240	Transistor 2SC1424
★★★★★ 430 MHz EXCITER BOARD ★★★★★					
PB-1930A	F0001930A	Printed circuit board			**DIODE**
	C9019300A	PCB with components	D1503–1506	G2090118	Schottky barrier 1SS97
			D1507–1510	G2090027	Silicon 1SS53
			D1501,1502, 1512	G2090033	" MI-301
		TRANSISTOR			
Q1401	G3314240	Transistor 2SC1424	D1511	G2001880F	Germanium 1S188FM
Q1402,1403	G3314260	" 2SC1426			
					RESISTOR
		DIODE	R1504	J00245180	Carbon film 1/4WVJ 18Ω
D1401	G2015550	Silicon 1S1555	R1517	J01245180	" " " TJ 18Ω
			R1515	J00245220	" " " VJ 22Ω
			R1510	J00245101	" " " " 100Ω
			R1518,1519	J01245331	" " " TJ 330Ω

R1502,1505	J00245331	Carbon film 1/4WVJ 330Ω			**CRYSTAL**
R1511(L1507), 1512(L1510), 1516(L1511)	J10246471	Carbon composition " GK 470Ω	X1601	H0101220	HC-18/U 67.000MHz
			X1602	H0101230	" 67.333MHz
			X1603	H0101240	" 67.666MHz
R1513	J00245561	Carbon film " VJ 560Ω	X1604	H0102251	HC-25/U 68.000MHz
R1501,1506	J01245102	" " " TJ 1kΩ	X1605	H0102252	" 68.333MHz
R1503,1507	J00245102	" " " VJ 1kΩ	★X1606(OPTION)	H0102253	" (1.6MHz DOWN) 67.400MHz
R1508	J00245222	" " " " 2.2kΩ	★X1606(OPTION)	H0102254	" (7.6MHz DOWN) 67.066MHz
R1514	J01245103	" " " TJ 10kΩ			**RESISTOR**
R1509	J01245223	" " " " 22kΩ	R1616	J00245101	Carbon film 1/4S VJ 100Ω
			R1618	J01245101	" " " TJ 100Ω
			R1614	J00245221	" " " VJ 220Ω
		CAPACITOR	R1601	J00245331	" " " " 330Ω
C1524,1525	K00179001	Ceramic disc 50WV SL 0.5pF	R1612,1615	J00245471	" " " " 470Ω
C1526	K02172020	" " " CH 2pF	R1607–1611	J01245681	" " " TJ 680Ω
C1513,1514	K02172030	" " " " 3pF	R1617	J00245272	" " " VJ 2.7kΩ
C1502–1505	K02173080	" " " " 8pF	R1602,1603, 1605,1606	J00245103	" " " " 10kΩ
C1515	K00173100	" " " SL 10pF			
C1523	K00175270	" " " " 27pF	R1604	J01245103	" " " TJ 10kΩ
C1506,1507	K02179017	" " " CH 62pF	R1613	J00245273	" " " VJ 27kΩ
C1511,1512, 1516	K22170001	" HDC60E102M 0.001μF			
C1517–1522	K21170002	" feed thru 50WV 0.001μF			**CAPACITOR**
C1501	K12171102	" disc 50WV 0.001μF	C1625	K00179001	Ceramic disc 50WV SL 0.5pF
C1508–1510	K13170103	" " " 0.01μF	C1631	K02173010	" " " CH 1pF
			C1623,1626	K02172040	" " " " 4pF
			C1602–1606	K02172050	" " " " 5pF
		TRIMMER CAPACITOR	C1613	K02173100	" " " " 10pF
TC1501–1504, 1509	K91000055	ECV-1ZW 06 x 53N 6pF	C1616	K02179011	" " " " 27pF
			C1601,1614	K02175470	" " " " 47pF
TC1505–1508	K91000028	ECV-1ZW 10 x 53N 10pF	C1607–1611, 1621,1622, 1624, 1627–1630	K12171102	" " " " 0.001μF
		INDUCTOR			
L1505,1513	L0020720	FKMA070PB01-BR	C1615,1617	K14170103	" " " " 0.01μF
L1507,1510, 1511	L1020469		C1620	K14170473	" " " " 0.047μF
			C1618,1619	K40120106	Electrolytic 16WV TW 10μF
L1506	L0020470				
L1501–1504, 1508,1509	L0020471				
					TRIMMER CAPACITOR
L1512	L0020476		TC1601–1605	K91000029	ECV-1ZW 20 x 53N 20pF
		HERMETIC SEAL			**INDUCTOR**
	Q4000001	A102	L1601	L1190005	Micro inductor FL-4H 1μH
			L1602	L0020417	TM-80160
					TRANSFORMER
			T1601,1602	L0020510	MB-80050
★★★★★ LOCAL BOARD ★★★★★					
PB-1934B	F0001934B	Printed circuit board			
	C9019340B	PCB with components		Q5000011	Wrapping terminal C
		IC, TRANSISTOR			
Q1603	G1090123	IC 78L08			
Q1601	G3307840R	Transistor 2SC784R			
Q1602	G3314240	" 2SC1424			
			POWER SUPPLY UNIT		
			Symbol No.	Parts No.	Description
		DIODE	PB-1945B	F0001945B	Printed circuit board
D1601–1605	G2090027	Silicon 1SS53		C0019450B	PCB with components
					IC & TRANSISTOR
			Q1706	G1090070	IC μPC14308

Q1708	G3107330	Tr	2SA733			**RESISTOR**	
Q1709,1710	G3309450P	"	2SC945P	R1801	J00245560	Carbon film 1/4W VJ	56Ω
Q1703,1704	G3318150Y	"	2SC1815Y	R1814	J00245101	" " " "	100Ω
				R1802,1809	J00245471	" " " "	470Ω
				R1815	J00245561	" " " "	560Ω
		DIODE		R1807	J00245102	" " " "	1kΩ
D1701,1713	G2090001	Silicon	10D1	R1805	J00245152	" " " "	1.5kΩ
D1708		Zener	WZ090	R1811	J00245682	" " " "	6.8kΩ
				R1808	J00245123	" " " "	12kΩ
				R1803	J00245153	" " " "	15kΩ
		RESISTOR		R1812,1813	J00245223	" " " "	22kΩ
R1714	J00245221	Carbon film 1/4W VJ	220Ω	R1806	J00245273	" " " "	27kΩ
R1713	J00245471	" " " "	470Ω	R1804	J00245274	" " " "	270kΩ
R1709,1710	J00245102	" " " "	1kΩ	R1810	J00245105	" " " "	1MΩ
R1708,1711	J00245472	" " " "	4.7kΩ				
R1704,1705	J00245223	" " " "	22kΩ				
						POTENTIOMETER	
				VR1801	J50702501	EVL-SOAA00B52	500ΩB
		CAPACITOR		VR1802	J50702103	"	10kΩB
C1703,1705	K14170103	Ceramic 50WV	0.01μF	VR1803	J50702503	"	50kΩB
C1704	K14170473	" "	0.047μF				
C1706,1712	K40170105	Electrolytic 50WV	1μF				
C1711	K40120106	" 16WV	10μF			**CAPACITOR**	
C1702	K40140108	" 25WV	1000μF	C1810	K02175180	Ceramic 50WV CH	18pF
				C1801	K00175820	" " SL	82pF
				C1802,1804, 1813	K02179019	" " CH	91pF
		RELAY					
RL1701	M1190006	FBR221D012		C1811	K02179020	" " "	110pF
				C1803,1812	K02179023	" " "	180pF
				C1807	K14179001	" " "	0.001μF
		PLUG		C1805,1806, 1808,1809, 1814,1815, 1817,1819, 1820,1828	K14170103	" " "	0.01μF
P1701	P0090111	5066-11A					
		FUSE					
F1701	Q0000005	5A		C1816	K70167474	Tantalum 35WV	0.47μF
				C1827	K40170105	Electrolytic 50WV	1μF
				C1818	K40120106	" 16WV	10μF
		FUSE HOLDER		C1822−1826	K21170002	Ceramic feed thru	
FH1701	P2000004	F3265				ECK-Y1H102WE	
	Q5000011	Wrapping terminal C				**INDUCTOR**	
				L1803,1804	L1190029	Micro inductor FL-5H	47μH
	R0019510A	Heat sink		L1801,1802, 1805,1806	L0020535	LOW PASS COIL	
						TRANSFORMER	
				T1801	L0020180		
ALC AMP UNIT				T1802	L0020210		
Symbol No.	Parts No.	Description					
PB-1946B	F0001946B	Printed circuit board				**HERMETIC SEAL**	
	C0019460B	PCB with components			Q4000001	A102	
		FET & TRANSISTOR					
Q1801	G4800590Y	FET	3SK59Y		Q5000011	Wrapping terminal C	
Q1802	G3303800Y	Tr	2SC380TMY				
		DIODE					
D1801,1802	G2001880F	Germanium	1S188FM				
D1803	G9090005	Varistor	MV103				

TUNE UNIT

Symbol No.	Parts No.	Description
PB-2052	F0002052	Printed circuit board
	C0020520	PCB with components
		IC
Q2201–2203	G1090124	MC14016BP
		DIODE
D2201–2216		Silicon 1S1555
		RESISTOR
R2201		Carbon film 1/4W VJ 1kΩ
R2202,2203		" " " " 10kΩ
		POTENTIOMETER
VR2201–2212	J50716503	RV8FAS 50kΩ
		CAPACITOR
C2201–2217	K14170103	Ceramic 50WV 0.01μF
	Q5000011	Wrapping terminal C

ANT RELAY UNIT

Symbol No.	Parts No.	Description
PB-2053	F0002053	Printed circuit board
	C0020530	PCB with components
		TRANSISTOR
Q2301,2302	G3318150Y	2SC1815Y
		DIODE
D2301,2302, 2304,2305	G2015550	Silicon 1S1555
D2303	G2090001	" 10D1
		RESISTOR
R2302,2303	J00245103	Carbon film 1/4W VJ 10kΩ
R2301,2304	J00245223	" " " " 22kΩ
		CAPACITOR
C2301	K00172010	Ceramic 50WV SL 1pF
C2302,2304, 2305	K14170103	" 50WV 0.01μF
C2303	K40120476	Electrolytic 16WV 47μF
		RELAY
RL2301	M1190002	FBR211D012
	Q5000011	Wrapping terminal C

LED UNIT

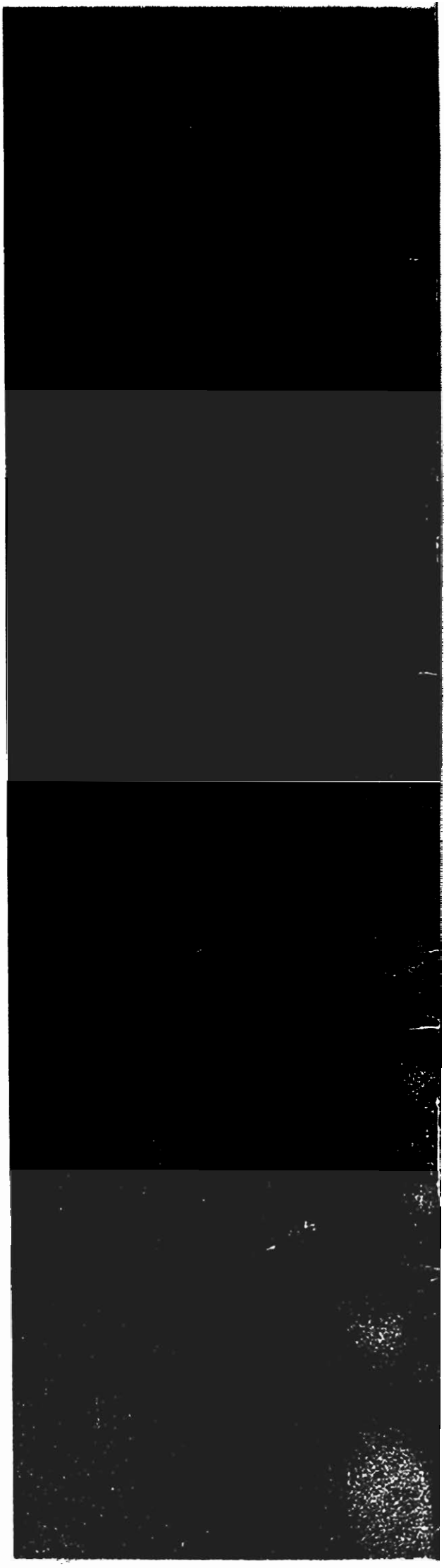
Symbol No.	Parts No.	Description
	F0002054	Printed circuit board
	C0020540	PCB with components
		LED
D2401–2409	G2090094	LN224RP
		RESISTOR
R2401–2404	J01245681	Carbon film 1/4W TJ 680Ω

SW UNIT

Symbol No.	Parts No.	Description
PB-2055	F0002055	Printed circuit board
	C0020550	PCB with components
S2501	N3090002	SLE62301
S2502~2504	N3090004	SLE62251

ACCESSORIES

Symbol No.	Parts No.	Description
	T9100071A	Connection cable A
	T9100160A	" " B
	T9101230	" " C
	T9100852	" " D
	P0090018	RCA PIN PLUG CN7017P
	Q0000005	FUSE 5A
	R3054620	Foot L=30mm



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