# INSTRUCTION MANUAL

# FTV-901R

YAESU MUSEN CO , LTD.

TOKYO JAPAN.

# FTV-901R
# VHF/UHF TRANSVERTER


## GENERAL

The FTV-901R is an all-new transverter for the FT-901DM and FT-101ZD series, capable of operation on the 50, 144, and 430 MHz bands. The basic unit comes equipped with 144 MHz capability, and the 50 and 430 MHz band modules may be added as options. Power input is 20 watts on all three 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-901DM. The operator can transmit on 145 MHz while listening on 29 MHz or 435 MHz, or transmit on 435 MHz while listening on 145 MHz.

The FTV-901R also includes repeater split for 50 and 144 MHz, allowing full use of the FM capability of the FT-901DM. Fully solid state, the FTV-901R 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-901R. With proper care in operation, this equipment should provide many years of trouble-free operation.

# SPECIFICATIONS

**Frequency range:**
50–54 MHz (option)
144–148 MHz
430–440 MHz (option)

**Mode:**
SSB, CW, AM, FM

**Input impedance:**
50–75 ohms

**IF output frequency:**
28–30 MHz

**RF power output:**
10 watts @ 50% duty cycle

**Drive requirements:**
3 V RMS at 28–30 MHz

**Receiver spurious responses:**
Image rejection better than 50 dB.
Internal spurious signals below 1 μV equivalent to antenna input.

**Size:**
210(W) x 157(H) x 352(D) mm

**Weight:**
10 kg

# SEMICONDUCTOR COMPLEMENT

**FET:**

| | | | |
|---|---|---|---|
| 3SK51-03 | 6 | 3SK59Y | 1 |

**Silicon Transistors:**

| | | | |
|---|---|---|---|
| 2SC730 | 2 | 2SC2053 | 2 |
| 2SC784R | 6 | 2SC2166 | 1 |
| 2SC1424 | 5 | 2SC2369 | 2 |
| 2SC1426 | 2 | 2SC235D | 1 |
| 2SC1815Y | 11 | MJE3055 | 1 |
| 2SC1945D | 1 | | |

**Integrated Circuits:**

| | | | |
|---|---|---|---|
| MC1496G | 2 | μPC14308 | 1 |
| 78L08 | 3 | TA7089M | 1 |

**Germanium Diodes:**

| | |
|---|---|
| 1S188FM | 6 |

**Silicon Diodes:**

| | | | |
|---|---|---|---|
| 1S1555 | 46 | 10D1 | 13 |
| MC301 | 2 | S4VB | 1 |
| 1SS53 | 22 | | |

**Schottky Barrier Diodes:**

| | |
|---|---|
| 1SS43 | 4 |

**Zener Diode:**

| | |
|---|---|
| WZ110 | 1 |

**Varactor Diodes:**

| | |
|---|---|
| 1S2209 | 12 |

**Power Modules:**

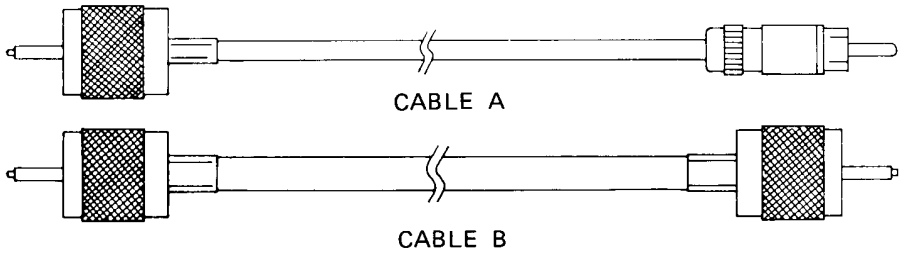
| | | | |
|---|---|---|---|
| VP20BL | 1 | VP07BL | 1 |

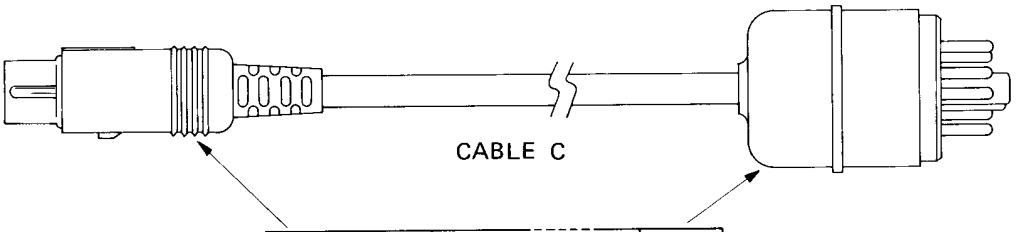
**Light Emitting Diodes:**

| | |
|---|---|
| GD4-203SRD | 9 |

**ACCESSORIES:**

| | | | |
|---|---|---|---|
| Cable A | 1 pc. | RCA plug | 1 pc. |
| Cable B | 1 pc. | Spare fuse | 1 pc. |
| Cable C | 1 pc. | | |

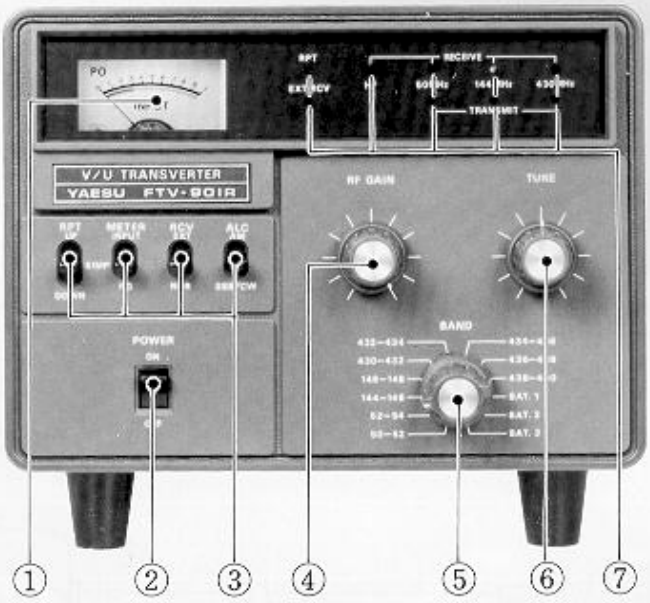



| PIN No. | | COLOR | PIN No. |
|---|---|---|---|
| 1 | HEATER1 | WHITE | 1 |
| 2 | HEATER2 | BLUE | 2 |
| 3 | No. C | | |
| 4 | HEATER1' | | 1 |
| 5 | HEATER2' | | 2 |
| 6 | TX:GND | WHITE/RED | 9 |
| 7 | RX:GND | WHITE/GREEN | 10 |
| GROUND SHELL | EARTH | BLACK | 8 |

Cable C Connections

# FRONT PANEL CONTROLS AND SWITCHES




### (1) METER

Depending on the position of the METER switch, the meter displays the drive level or the relative output level of the transmitter.

### (2) POWER

This is the main ON/OFF switch for the transverter.

### (3) FUNCTION SWITCHES

#### SHIFT (UP/SIMP/DOWN)

For 144 MHz, this switch selects ±600 kHz repeater shift, or simplex operation. When the optional 50 MHz unit is installed, this switch selects ±1 MHz split, or simplex operation.

#### METER

When set to the input position, the METER selects indication of the input level for meter display. In the PO position, relative power output is displayed.

#### RCV

In the NOR position, both transmit and receive functions are accomplished by the FT-901DM or other transceiver. When set to the EXT position, reception is accomplished on an external receiver. This is normally used only for satellite operation.

#### ALC

This switch selects the ALC threshold level. For FM operation, use the SSB/CW position.

### (4) RF GAIN

This control sets the receiver RF gain level for 50 and 144 MHz operation. This control is not used for 430 MHz.

### (5) BAND

For 50 and 144 MHz, two bandswitch positions are used. For 430 MHz, 5 bandswitch positions are assigned. Each bandswitch position tracks 500 kHz, the tuning range of the FT-901DM.

The SAT. 1 position is for OSCAR Mode A: 144 MHz transmit, 28 MHz receive. The SAT. 2 position is for OSCAR Mode B: 430 MHz transmit, 144 MHz receive. The SAT. 3 position is for OSCAR Mode J: 144 MHz transmit, 430 MHz receive.

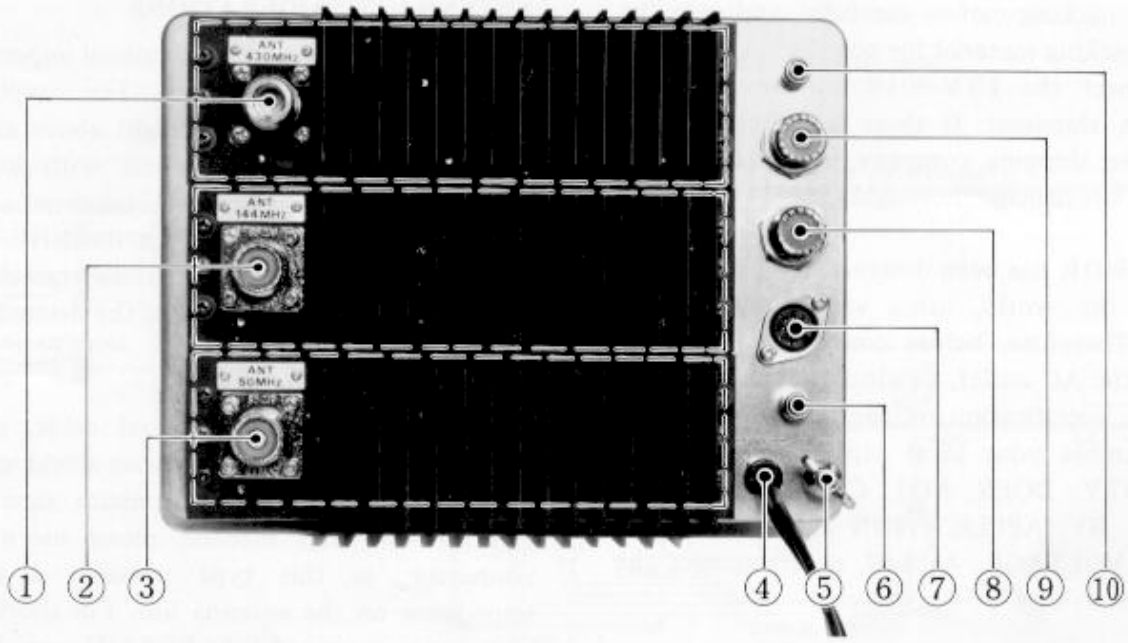
### (6) TUNE

This control peaks the transmitter section of the transverter, on the 50 and 144 MHz bands. This control is not used for 430 MHz.

### (7) INDICATOR LEDs

These light emitting diodes indicate which band is being used for transmit and receive, and also indicate repeater and external receiver operation.

# REAR PANEL




**(1) 430 MHz UNIT and ANTENNA JACK**

When the optional 430 MHz unit is installed, the 430 MHz antenna should be connected here. An N-type connector is utilized, for improved UHF performance.

**(2) 144 MHz UNIT and ANTENNA JACK**

The 144 MHz unit is built in, and the 2 meter antenna should be installed here.

**(3) 50 MHz UNIT and ANTENNA JACK**

When the optional 50 MHz unit is installed, the 50 MHz antenna should be connected to this jack.

**(4) POWER cord**

This is the connection to the AC power line.

**(5) GND**

For best performance, and protection from dangerous electrical shock, a good earth ground should be connected here, using a short, heavy, braided cable.

**(6) RF IN**

This jack should be connected to the FT-901DM RF OUT jack, using the supplied Cable A. Do NOT connect this jack to the FT-901DM ANT jack.

**(7) ACC**

This jack should be connected to the FT-901DM ACC jack, using the supplied Cable C.

**(8) HF ANT**

The HF antenna should be connected to this jack.

**(9) OUTPUT**

This jack should be connected to the FT-901DM ANT jack, using the supplied cable B.

**(10) EXT RCV**

When an external receiver is used, its antenna jack should be connected to this terminal. The connection will be made when the FUNCTION switch is set to EXT RCV. (Connection cable not supplied)

# INSTALLATION

Open the packing carton carefully, and save the box and packing material for possible use at a later date. Inspect the FTV-901R for any signs of damage in shipment. If there is visible damage, contact the shipping company immediately, and document the damage thoroughly.

The FTV-901R has been designed for use in many areas of the world, using various AC supply voltages. Therefore, before connecting the FTV-901R to the AC outlet, be absolutely certain that the power specification on the rear of the transverter matches your local supply voltage. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY APPLICATION OF IMPROPER SUPPLY VOLTAGE. As well, never connect the power cord to a DC power source.

The transverter may be situated 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.

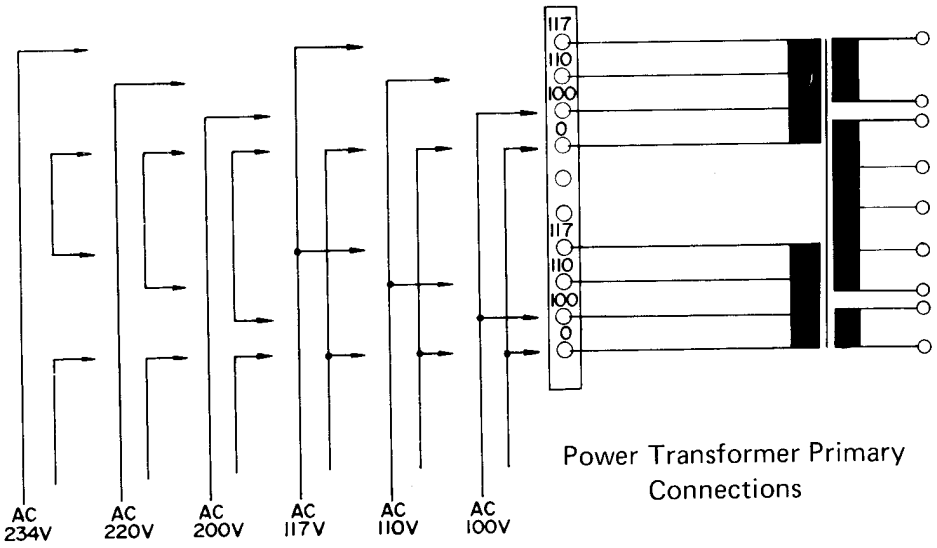
The transverter should be connected to a good earth ground.

Please refer to the drawings for details of correct interconnections between the FTV-901R and the FT-901DM/FT-101ZD and an external receiver, such as the FR-101D.

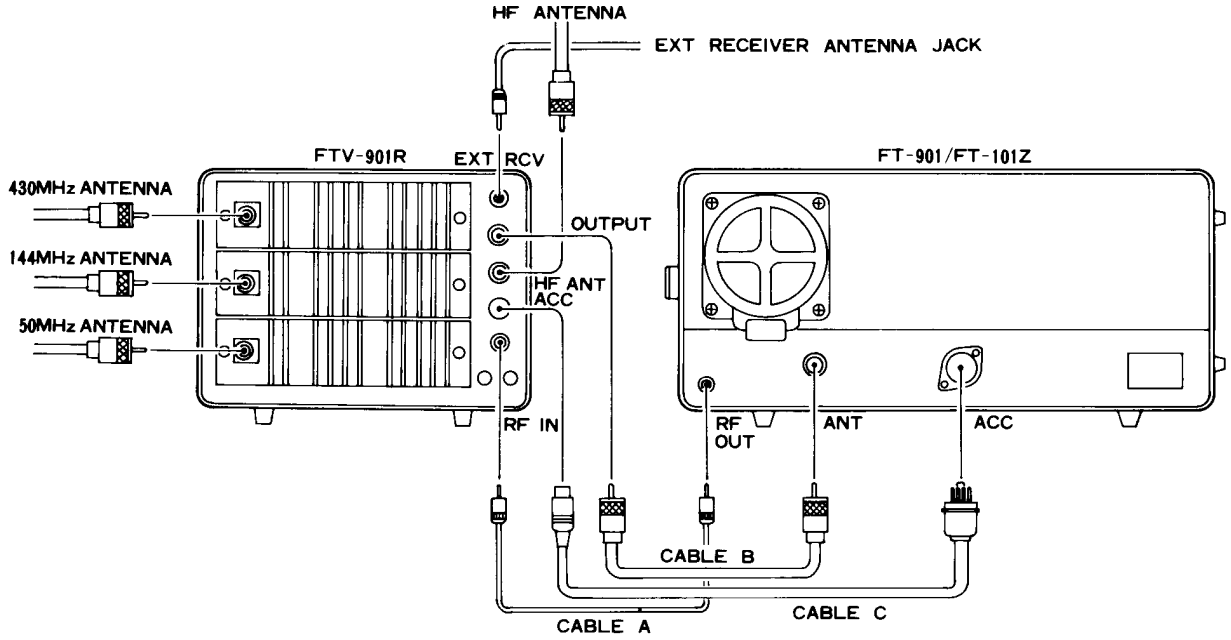
## ANTENNA CONSIDERATIONS

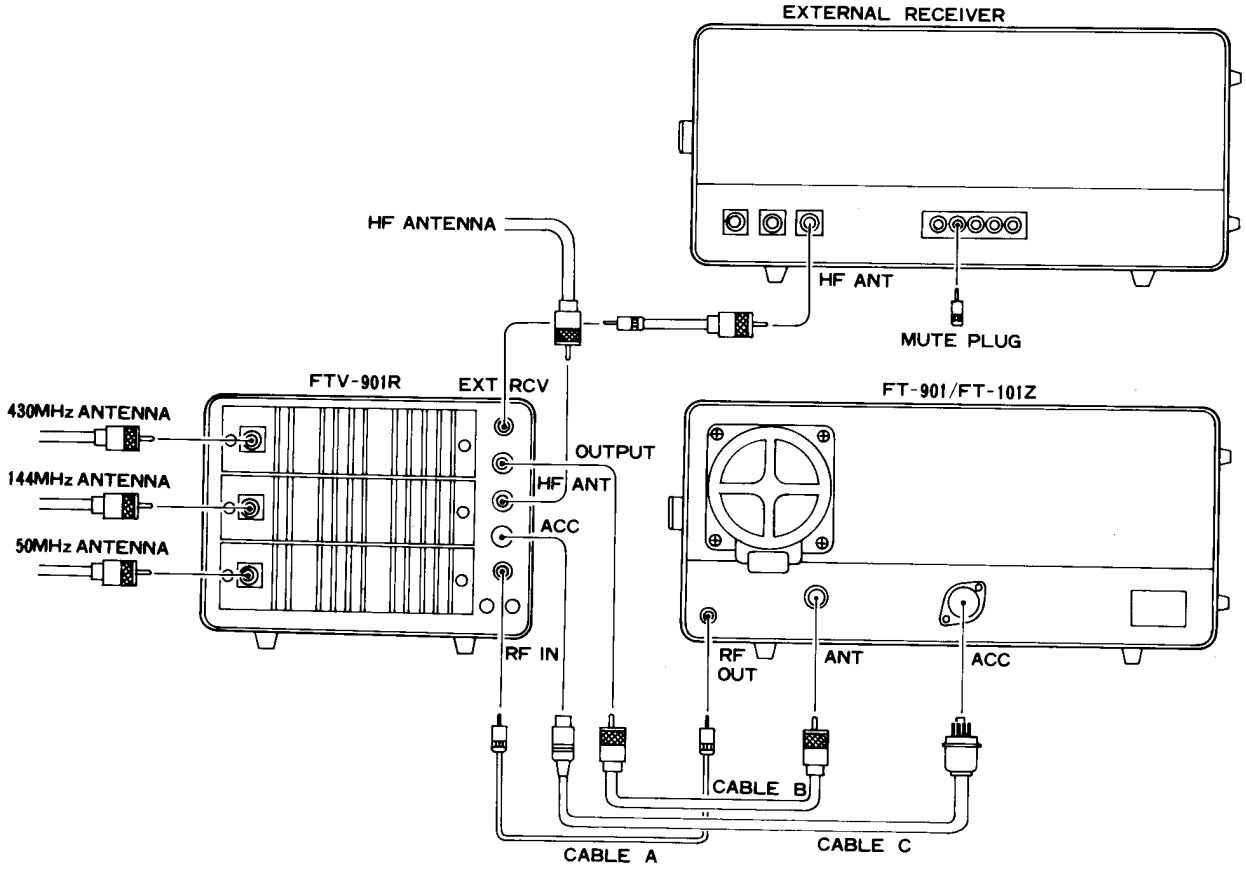
The antenna installation is of critical importance in VHF and UHF installations. For satellite and moonbounce applications, height above ground is not as critical as is the case with local FM installations. A minimum distance of 10 feet should be maintained between the VHF and HF antennas. In all installations, 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, and 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.




Power Transformer Primary Connections


HF ANTENNA
EXT RECEIVER ANTENNA JACK
FTV-901R
EXT RCV
FT-901/FT-101Z
430MHz ANTENNA
144MHz ANTENNA
50MHz ANTENNA
OUTPUT
HF ANT
ACC
RF IN
RF OUT
ANT
ACC
CABLE B
CABLE A
CABLE C


EXTERNAL RECEIVER
HF ANTENNA
HF ANT
MUTE PLUG
FTV-901R
EXT RCV
FT-901/FT-101Z
430MHz ANTENNA
144MHz ANTENNA
50MHz ANTENNA
OUTPUT
HF ANT
ACC
RF IN
RF OUT
ANT
ACC
CABLE B
CABLE A
CABLE C

# OPERATION

The tuning procedure for the FTV-901R transverter is not complicated. However, care should be exercised in tuning so as not to exceed the ratings of the transverter and 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-901R, including the 50 and 430 MHz units. The reader should note that these are optional units on the standard FTV-901R. The word "option" will hereafter be omitted in the interest of brevity.

## INITIAL CHECK

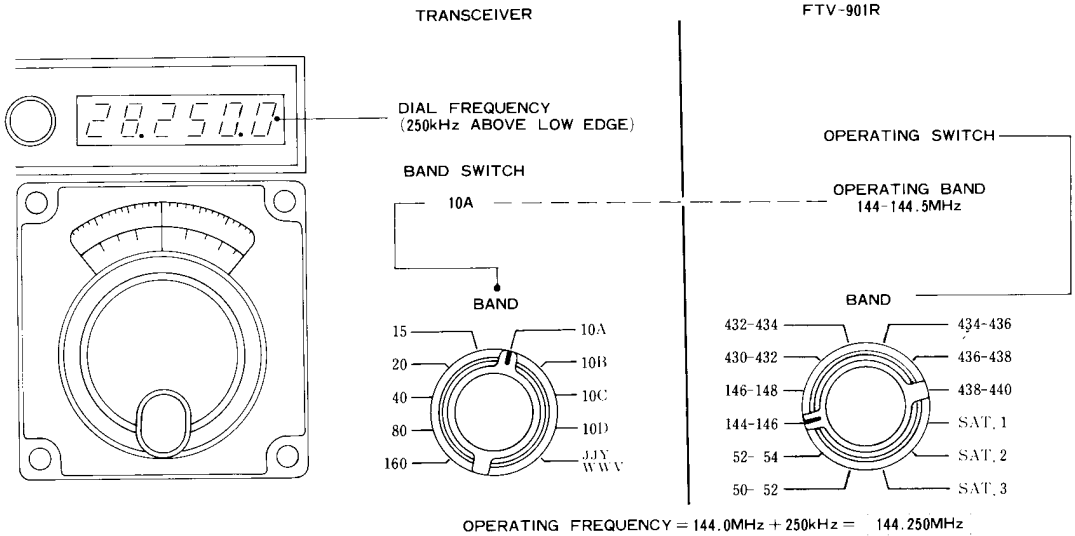
Before connecting the FTV-901R to the power source, confirm that the AC power specification is correct for the supply voltage used, and that a fuse of the proper rating is installed. Check all switches for normal operation. Recheck the interconnections between the HF equipment and the transverter.

## FREQUENCY SELECTION

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

### FREQUENCY COVERAGE CHART

| FTV-901R BANDSWITCH | HF TRANSCEIVER BANDSWITCH | | 10A | 10B | 10C | 10D | |
|---|---|---|---|---|---|---|---|
| | | | 28.0-28.5 | 28.5-29.0 | 29.0-29.5 | 29.5-30.0 | |
| | 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 | | | 29.0-29.5 | | 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 |



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.

Set the external receiver for reception on 29.6–29.7 MHz. The OSCAR 8 Mode J transponder also inverts signals.

Please note that, because of Doppler effect and other reasons, the frequency translation may not be precisely linear, as might be inferred from the above discussion. Some precise zeroing using the external receiver may be necessary.

**Note:** When using the FTV-901R on OSCAR Mode J, along with an FT-101 or FR-101 external receiver, a fairly loud spurious signal may be noted at 29.150 MHz on the external receiver (29.150 MHz receive). This is because the fourth harmonic of the local oscillator (35.02 MHz for band 10C), plus the VFO frequency (5.87 MHz), is precisely the transmitting frequency required (145.950 MHz). We recommend that the local crystal frequency be changed to 35.12 MHz.
We regret this inconvenience to you, but the FT-101 and FR-101 series was produced long before OSCAR 8 was conceived. There should be no problem at all when using the FT-901 series or FT-101ZD, etc.

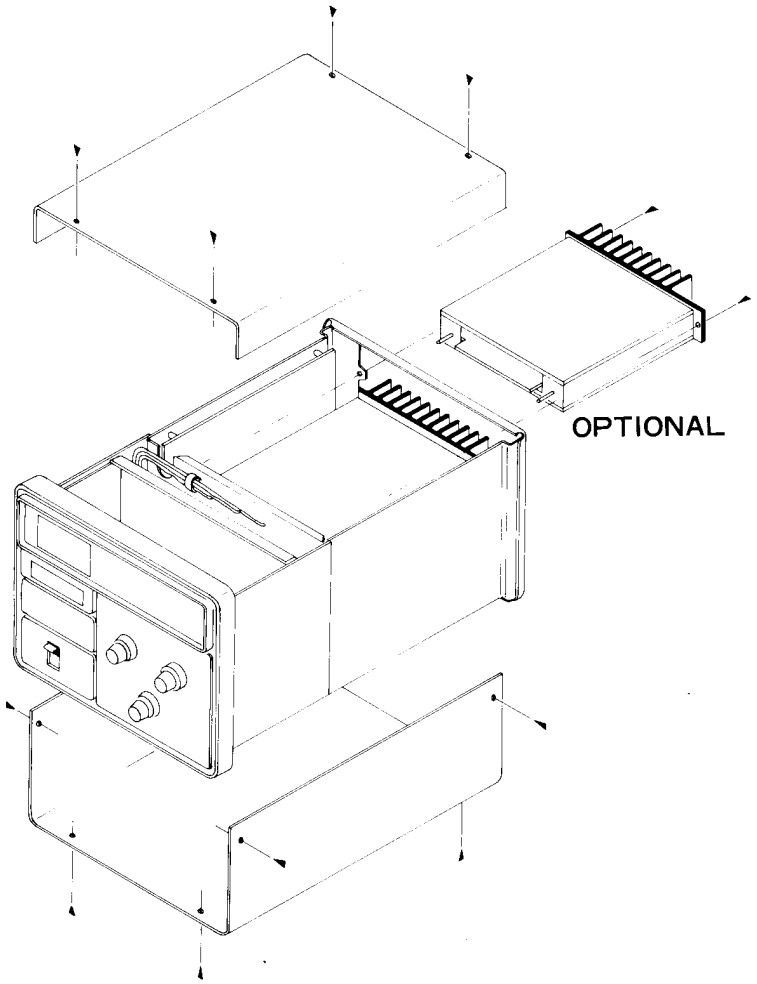
## AUXILIARY REPEATER SPLIT INSTALLATION

Should your locality use a repeater split of other than 1 MHz or 600 kHz for six and two meters, respectively, the correct split can be installed by obtaining an optional crystal (see your Yaesu dealer).

Connect a frequency counter to the cathode of $D_{212}$ (6 meters) of $D_{607}$ (2 meters). Adjust the trimmer capacitors shown in the chart below for the correct frequency.

## 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.



## CRYSTAL DATA FTV-901R

| 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-18/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‥ | 〃 | 〃 | 〃 | 〃 |

| BAND | 50MHz | | 144MHz | |
|---|---|---|---|---|
| RANGE | 50-52 | 52-54 | 144-146 | 146-148 |
| LOCAL FREQUENCY | 22MHz(×1) | 24MHz(×1) | 116MHz(×3) | 118MHz(×3) |
| OSC. FREQUENCY | 22MHz ☆ | 24MHz ☆ | 38.666‥MHz ▲ | 39.333‥MHz ▲ |

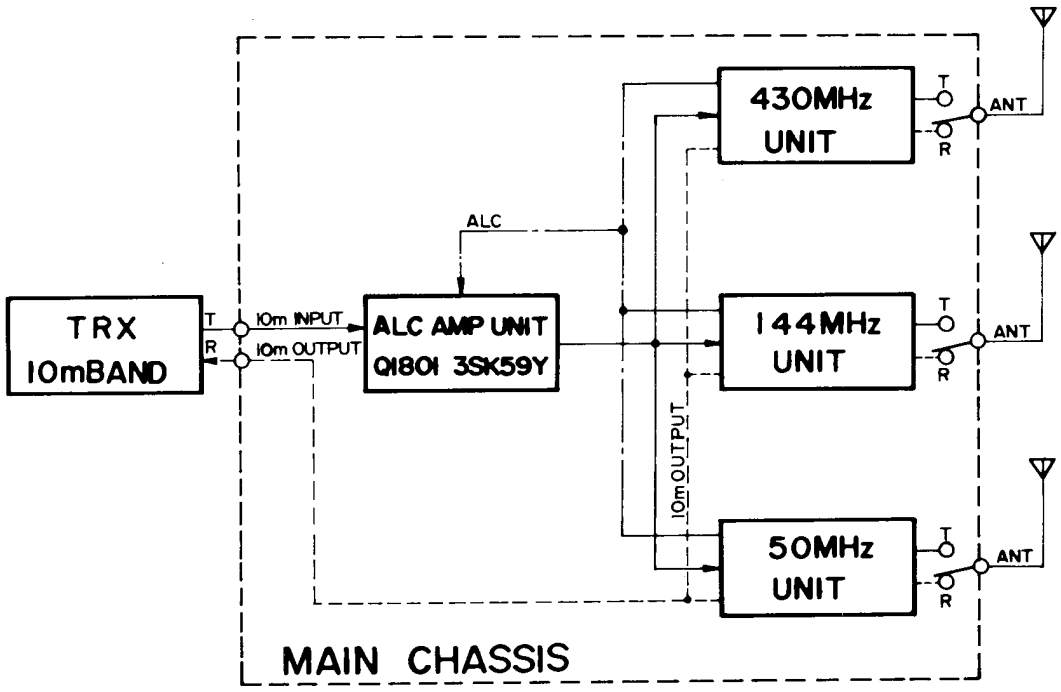
☆FUNDAMENTAL

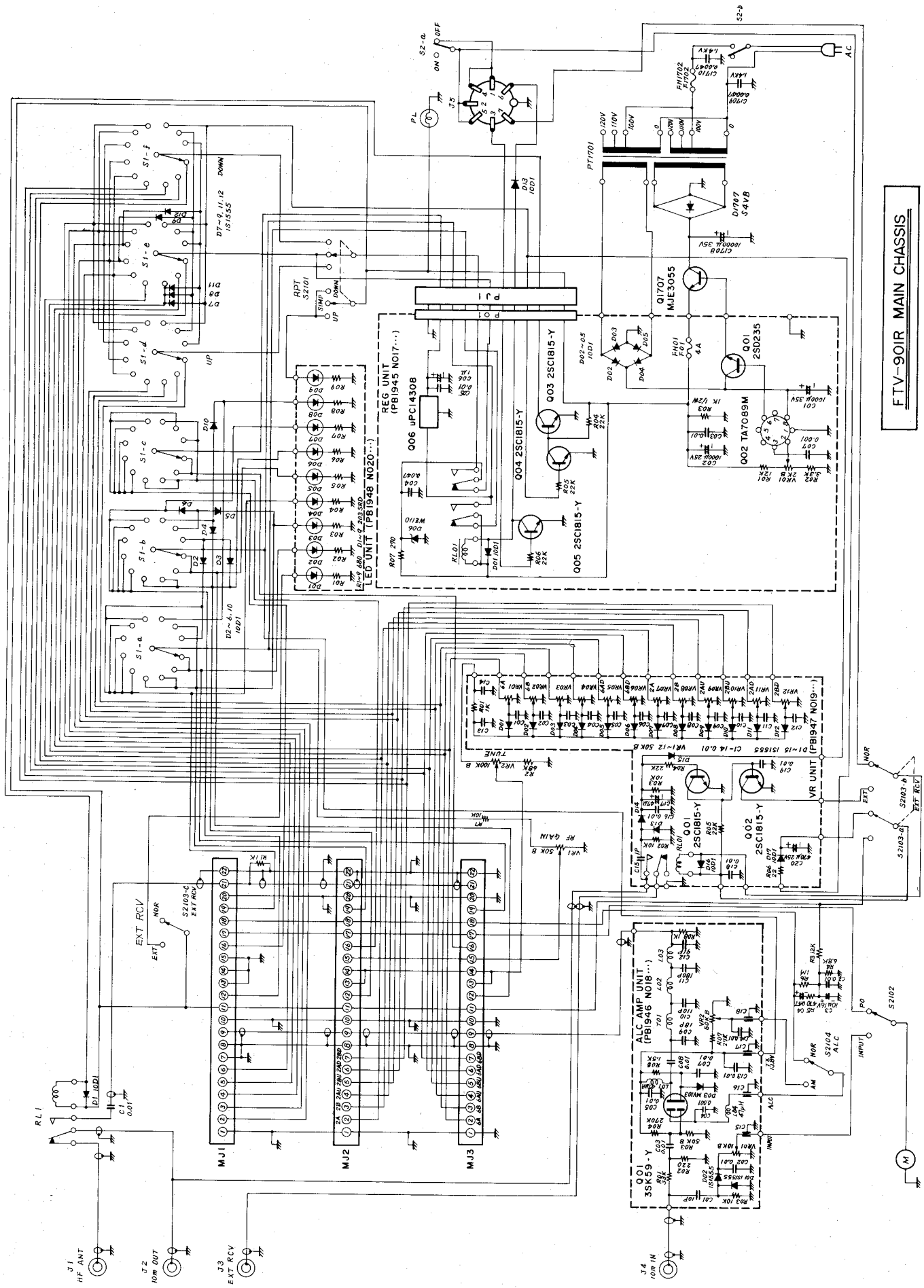
▲THIRD OVERTONE

| BAND | 430MHz | | | | |
|---|---|---|---|---|---|
| RANGE | 430-432 | 432-434 | 434-436 | 436-438 | 438-440 |
| LOCAL FREQUENCY | 402MHz (×3×2) | 404MHz (×3×2) | 406MHz (×3×2) | 408MHz (×3×2) | 410MHz (×3×2) |
| OSC. FREQUENCY | 67.000MHz ▲ | 67.333‥MHz ▲ | 67.666‥MHz ▲ | 68.000MHz ▲ | 68.333‥MHz ▲ |

# CIRCUIT DESCRIPTION

The circuit description to follow should help you understand the operation of the FTV-901R transverter. Follow the block diagrams while reading this discussion, and refer to the schematic dagram for specific details.




FTV-901R MAIN CHASSIS
REG UNIT (PB1945 N017···)
LED UNIT (PB1948 N020···)
VR UNIT (PB1947 N019···)
ALC AMP UNIT (PB1946 N018···)
Q06 μPC14308
Q03 2SC1815-Y
Q04 2SC1815-Y
Q05 2SC1815-Y
Q01 2SD235
Q02 TA7089M
Q1707 MJE3055
Q01 2SC1815-Y
Q02 2SC1815-Y
Q01 3SK59-Y
D1707 S4VB
PT1701
S2-a
S2-b
S1-a
S1-b
S1-c
S1-d
S1-e
S1-f
S2101 RPT
S2102
S2103-a EXT RCV
S2103-b EXT RCV
S2103-c EXT RCV
S2104 ALC
RF GAIN
TUNE
EXT RCV
J1 HF ANT
J2 10m OUT
J3 EXT RCV
J4 10m IN
J5
MJ1
MJ2
MJ3
RL1
PL
AC
INPUT
M

## 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.

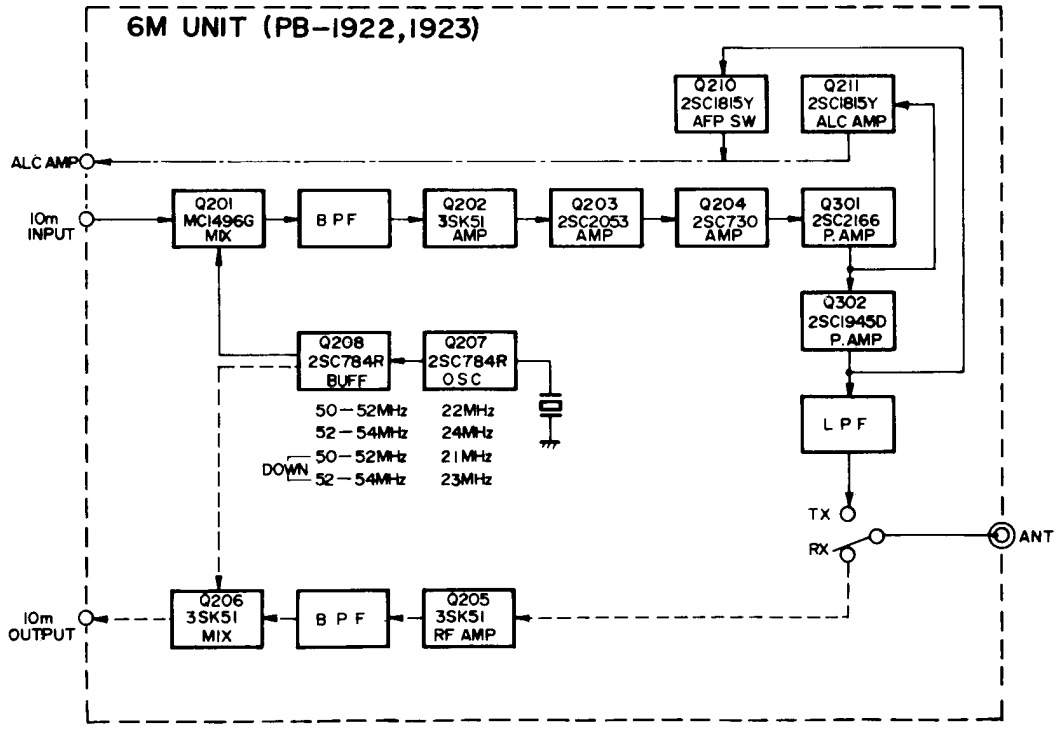
The signal is then fed to the mixer, $Q_{206}$ **(3SK51)**, where the 50–54 MHz signal is mixed with a local signal of 22 or 24 MHz, producing an IF signal of 28–30 MHz which is fed through a diode switch to the 10 M OUTPUT jack.

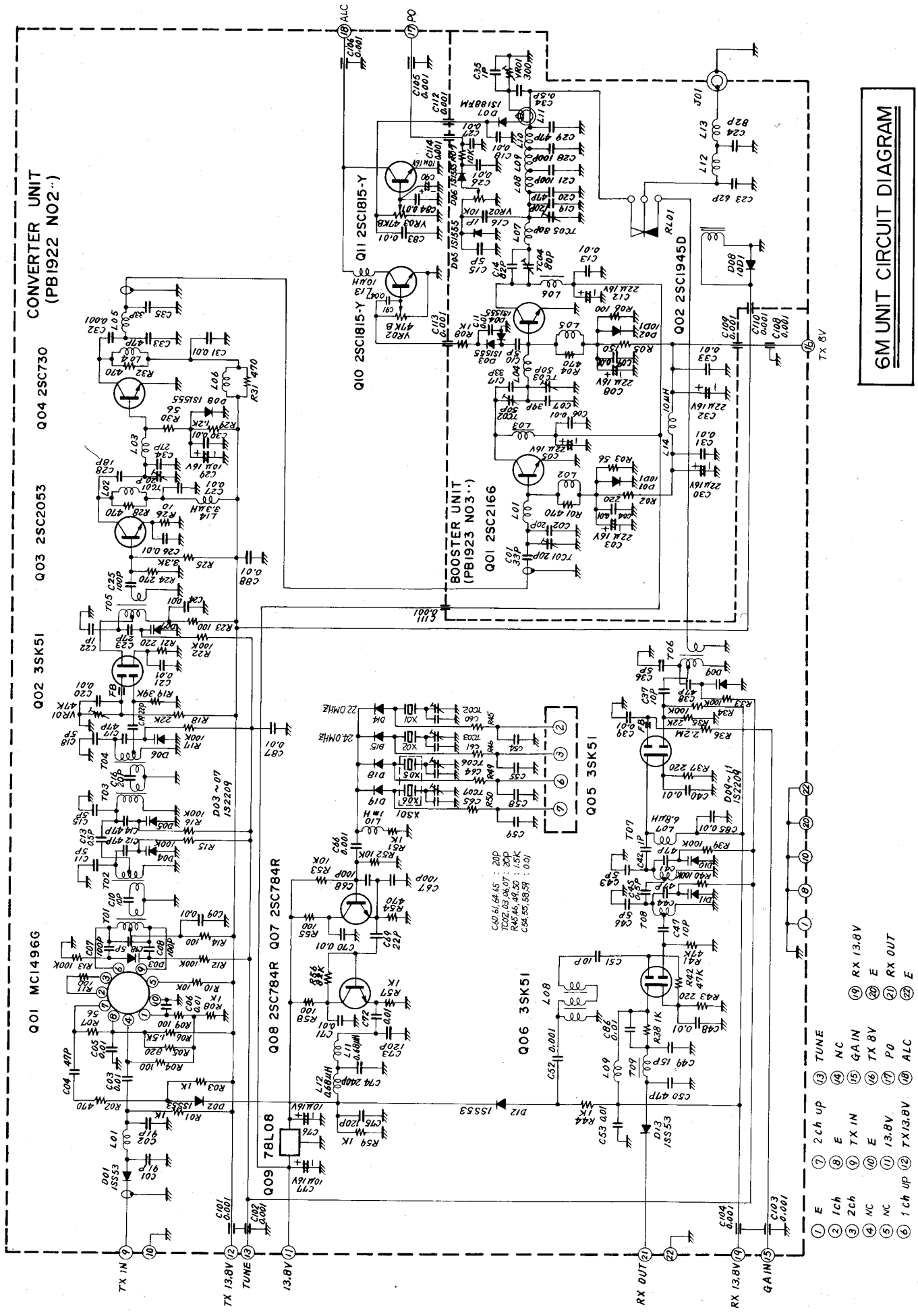
The local signal is generated by crystal oscillator $Q_{207}$ **(2SC784R)**, and amplified by $Q_{208}$ **(2SC784R)**. For repeater operation, the local signal is shifted up or down 1 MHz, according to the position of the front panel RPT switch.

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
CONVERTER UNIT
(PB1922 NO2··)
BOOSTER UNIT
(PB1923 NO3··)
Q01 MC1496G
Q02 3SK51
Q03 2SC2053
Q04 2SC730
Q05 3SK51
Q06 3SK51
Q07 2SC784R
Q08 2SC784R
Q09 78L08
Q10 2SC1815-Y
Q11 2SC1815-Y
Q01 2SC2166
Q02 2SC1945D
TX IN
TX 13.8V
TUNE
13.8V
RX OUT
RX 13.8V
GAIN
TX 8V
1 E
2 1ch
3 2ch
4 NC
5 NC
6 1ch up
7 2ch up
8 E
9 TX IN
10 E
11 13.8V
12 TX13.8V
13 TUNE
14 NC
15 GAIN
16 TX 8V
17 PO
18 ALC
19 RX 13.8V
20 E
21 RX OUT
22 E

## 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.

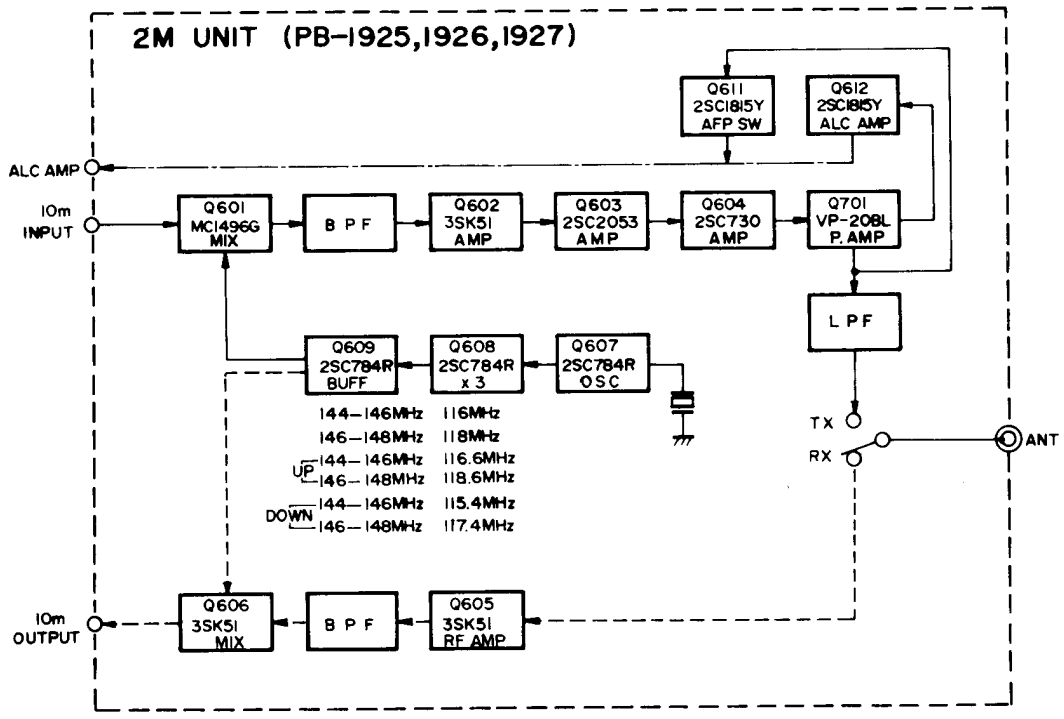
The signal is then fed to the mixer, $Q_{606}$ (**3SK51**), where the incoming signal is heterodyned with a local signal of 116 or 118 MHz, producing an IF signal of 28–30 MHz which is fed through a diode switch to the 10 M OUTPUT jack.

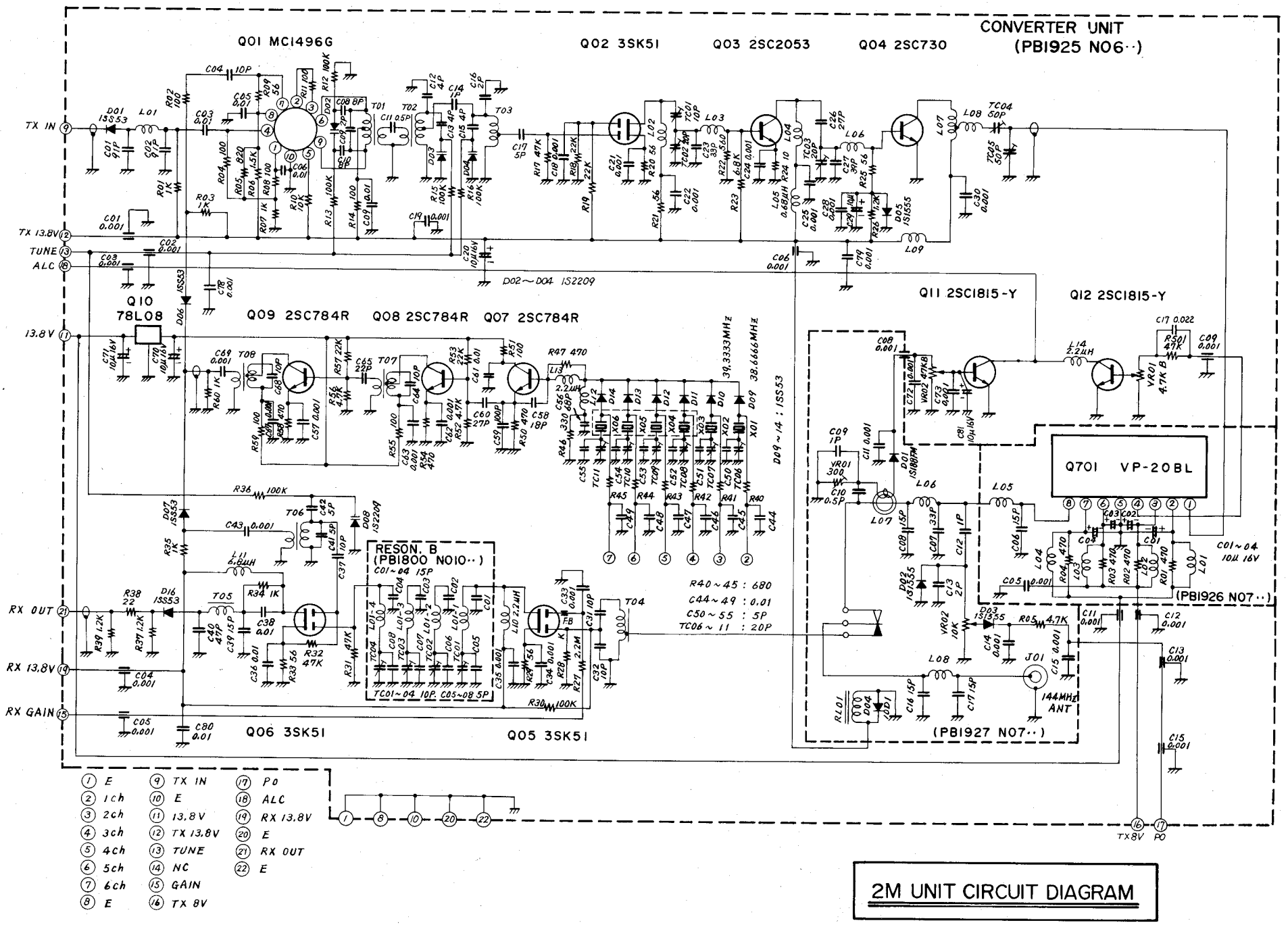
The local signal is generated at 38.666 MHz by $Q_{607}$ (**2SC784R**), then delivered to tripler $Q_{608}$ (**2SC784R**), then delivered through buffer $Q_{609}$ (**2SC784R**) to gate 2 of $Q_{606}$. For repeater operation, the local signal is shifted up or down 600 kHz, depending on the position of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






2M UNIT CIRCUIT DIAGRAM

## 430 MHz UNIT

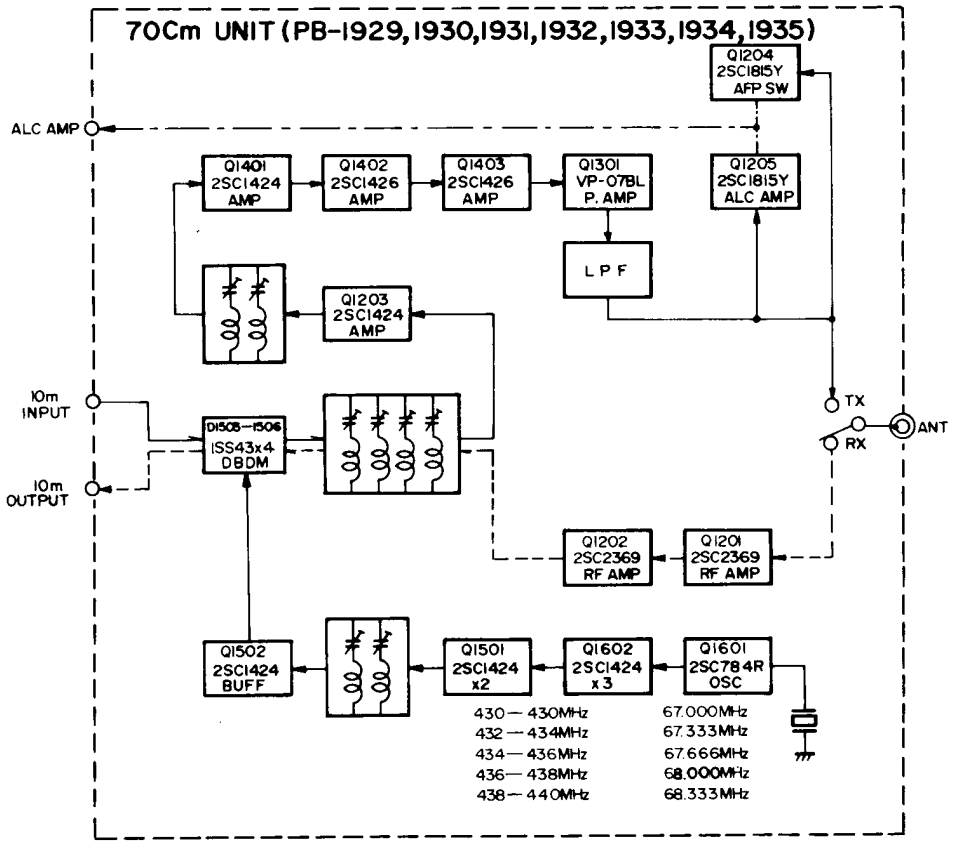
The incoming signal is fed through $RL_{1301}$ to the two stage RF amplifier, consisting of $Q_{1201}$ and $Q_{1202}$ (2SC2369), and then passed through a selective filter to the doubly balanced diode mixer, $D_{1503}$–$D_{1506}$ (1SS43) where the incoming signal is mixed with a 402–410 MHz local signal,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

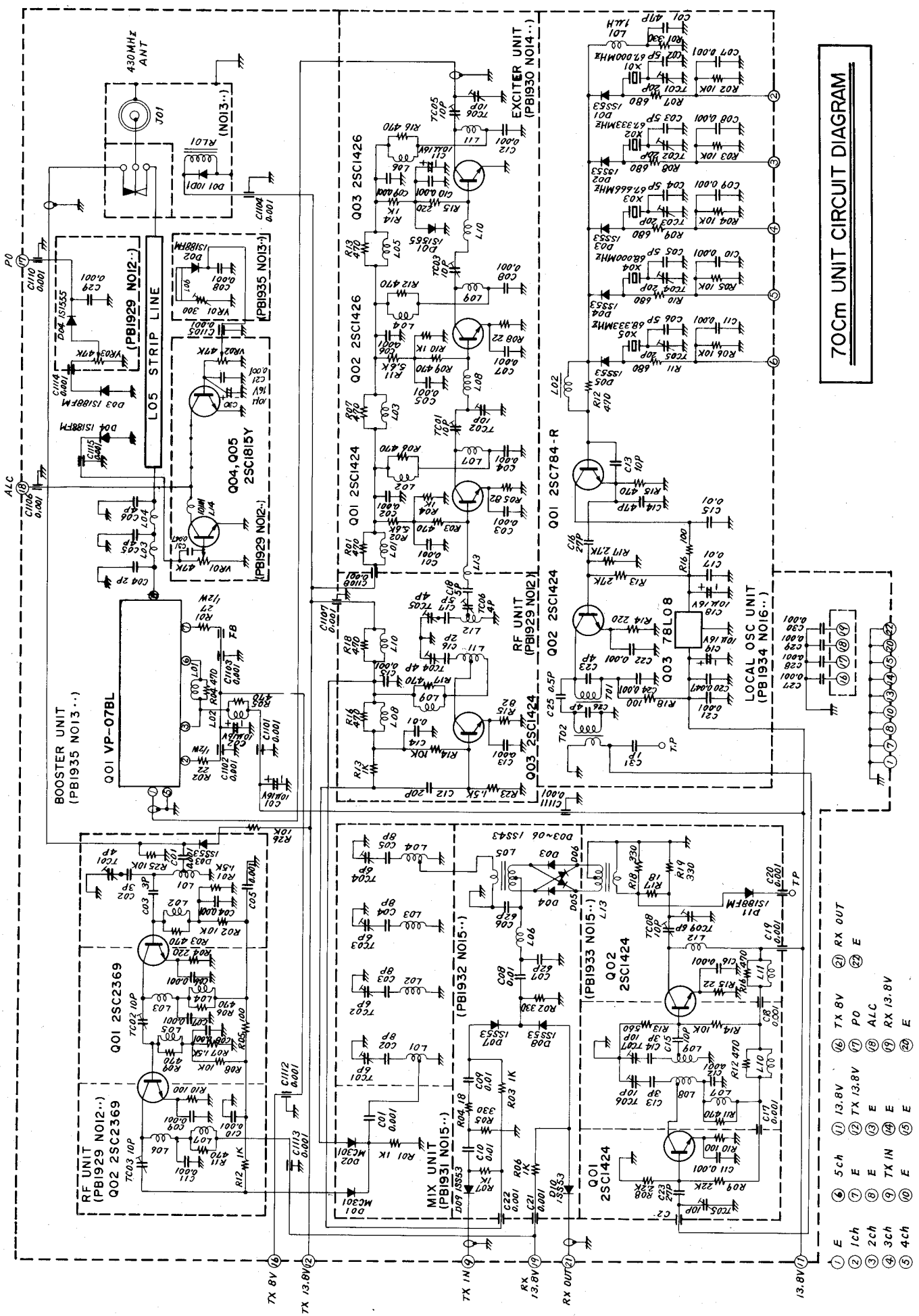
The local signal is generated at 67–68 MHz by oscillator $Q_{1601}$ (2SC784R), then multiplied by $Q_{1602}$ and $Q_{1501}$ (2SC1424). The local signal at 402–410 MHz is then passed through a selective filter to buffer $Q_{1502}$ (2SC1424), for delivery to the mixer.

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 $Q_{1301}$ (VP-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).




70Cm UNIT CIRCUIT DIAGRAM
EXCITER UNIT (PBI930 NO14··)
RF UNIT (PBI929 NO12··)
MIX UNIT (PBI931 NO15··)
(PBI932 NO15··)
(PBI933 NO15··)
LOCAL OSC UNIT (PBI934 NO16··)
BOOSTER UNIT (PBI935 NO13··)
(PBI929 NO12··)
(PBI935 NO13··)
LO5 STRIP LINE
430MHz ANT
Q01 VP-07BL
Q01 2SC784-R
Q02 2SC1424
Q03 78L08
Q03 2SC1426
Q01 2SC1424
Q04,Q05 2SC1815Y
Q01 2SC2369
Q02 2SC2369
TX 8V
TX 13.8V
TX IN
RX 13.8V
RX OUT
13.8V

## 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.

## SWITCHING CIRCUITS

### (1) POWER switch OFF

Heater voltage from the transceiver appears at the ACC connector, when proper connections are made to the FTV-901R. When the transceiver heater switch is ON, and the FTV-901R power switch is OFF, $RL_1$ is set to OFF, and the 10 m OUT jack is connected to the HF ANT jack, permitting normal HF operation. After the transverter is turned off, a warmup time of approximately 1 minute is required to allow the transceiver tubes to reach operating temperature.

### (2) POWER switch ON

When the FTV-901R is turned on, voltage is applied to relay driver $Q_{1703}$ **(2SC1815Y)** turning it on. With the conduction of $Q_{1703}$, $RL_1$ is activated, connecting the 10 meter output to the various units of the transverter, according to the position of the bandswitch. When the heater switch is on, and the FTV-901R is not in use, $RL_{1901}$ switches the external receiver to the HF antenna on receive.

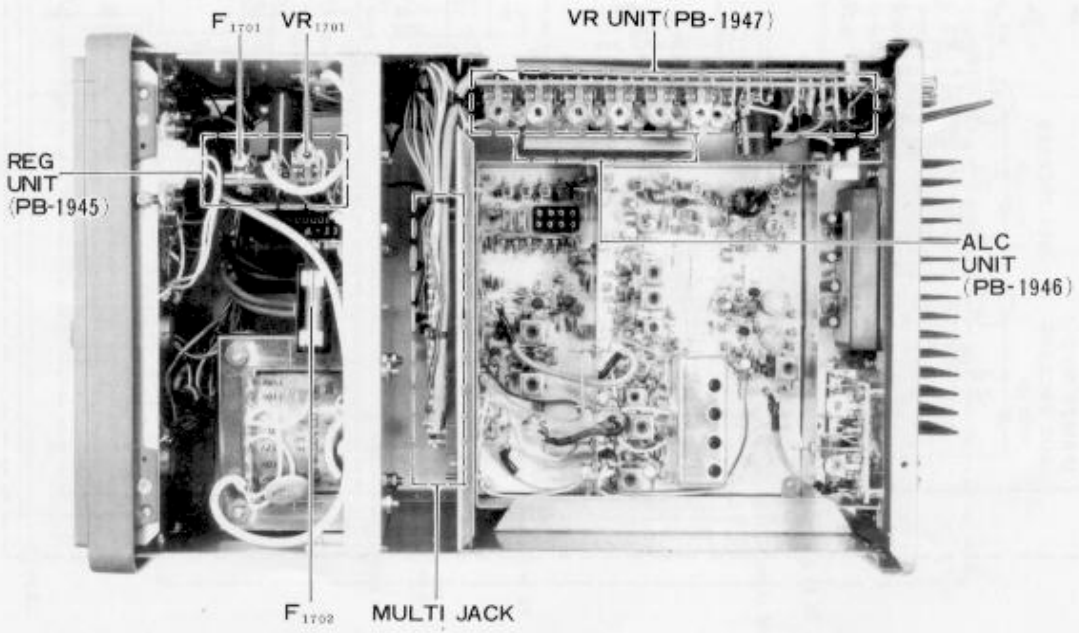
When the heater switch is turned off, $Q_{1902}$ **(2SC1815Y)** is switched on, switching the EXT RCV jack to be in parallel with the HF ANT jack, allowing monitoring on the external receiver. If the external receiver is not normally used for monitoring, the heater switch should always be left on.

## POWER SUPPLY

The AC voltage from the power transformer is rectified by bridge rectifier, and stabilized at 13.8 volts by $Q_{1707}$ **(MJE3055)**, $Q_{1701}$ **(2SD235)**, and $Q_{1702}$ **(TA7089M)**. This voltage is used for the LED UNIT, pilot lamps, and the three converter units.

$D_{1706}$ **(WZ110)** provides 11 volts for the local oscillator diode switch circuits, while $Q_{1706}$ **(μPC14308)** regulates the 13.8 volt line from $RL_{1701}$ for the low voltage circuits.

On the VR UNIT, diode switches $D_{1901}$–$D_{1912}$ **(1S1555)** select voltage regulating potentimeters $VR_{1901}$-$VR_{1912}$, for tuning the varactor-diode-tuned circuits in the various units.



# MAINTENANCE AND ALIGNMENT

The FTV-901R has been carefully aligned and tested at the factory prior to shipment. With normal use, if the unit is not abused, the FT-901R 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.

### REG UNIT (PB-1975)

Connect a DC voltmeter to pin 11 of multijack MJ1, 2, or 3. Adjust $VR_{1701}$ for a reading of 13.8 volts.

### ALC AMP UNIT (PB-1946)

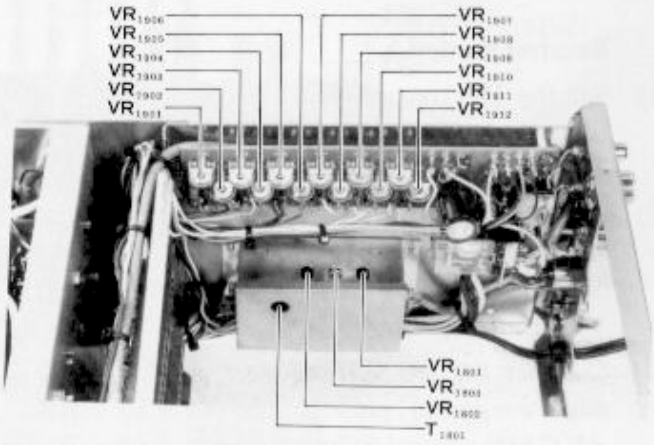
(1) Set the HF transceiver to 29 MHz, CW mode.

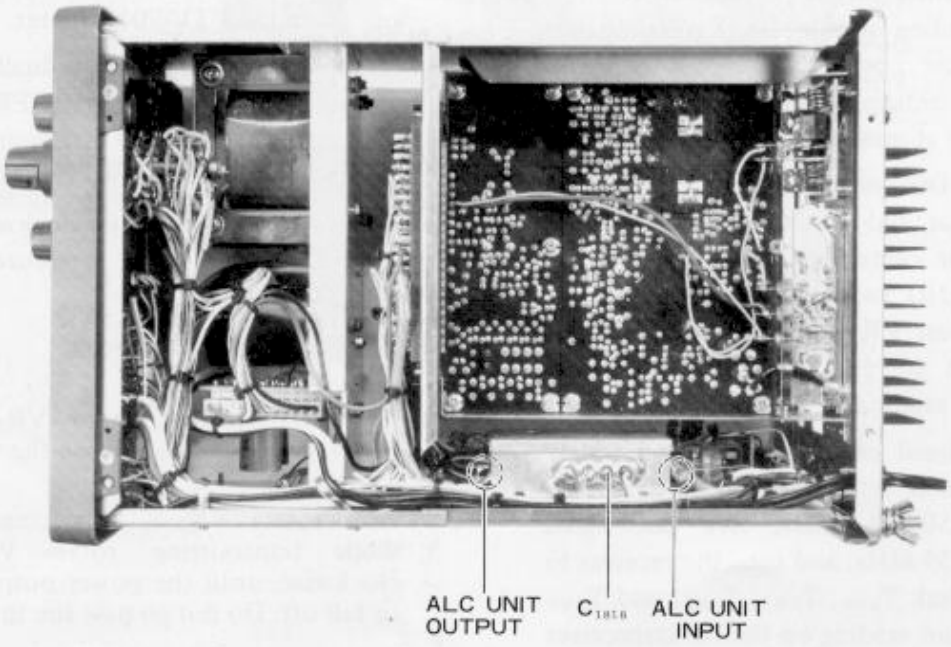
(2) Connect the RF probe of the VTVM to the input of the ALC AMP unit, and adjust the HF transceiver DRIVE or CARRIER control for an output of 3 volts RMS while transmitting.

(3) Connect the DC voltmeter between the hot lead and case of $C_{1818}$. Set the ALC meter to AM. Adjust $VR_{1802}$ 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 $VR_{1803}$ for a maximum VTVM indication (0.7 volts nom.).

(5) Set the FTV-901R meter switch to INPUT. Adjust $VR_{1801}$ for a reading of .2 on the meter.



## 50 MHz UNIT

Please remove the 144 and 430 MHz units, 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 $T_{202}$ 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 to 29 MHz, and peak the preselector against the marker signal for maximum sensitivity.

(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-901R RF GAIN control fully counterclockwise. The voltmeter reading should be 0 volts. In the fully clockwise position, it should be 13.8 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-901R TUNE control to the center position (12 o' clock). With the BAND switch in the 50–52 MHz position, adjust $\mathbf{VR_{1901}}$ for a reading of 4 volts. Switch to 52–54 MHz, and adjust $VR_{1902}$ for a reading of 4 volts.

(5) Connect a signal generator to the 50 MHz ANT jack, and set the FTV-901R 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 pbobe 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 $TC_{201}$, $TC_{202}$, $TC_{203}$, $TC_{204}$, and $TC_{205}$ 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-901R meter switch to the PO position, and set the transceiver DRIVE or CARRIER control for an output of 12 watts from the transverter. Set $VR_{302}$ for a reading of .8 on the FTV-901R 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 12 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.

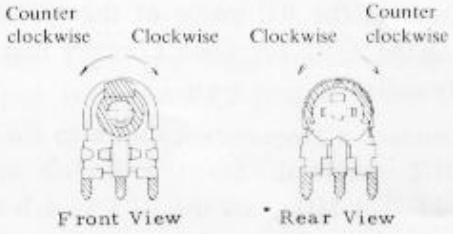
(13) Connect the RF probe of the VTVM to the LOCAL OUT terminal. Set the BAND switch to 50–52 MHz, then switch the repeater switch to UP and DOWN. Confirm that oscillation is taking place. Repeat on 52–54 MHz.

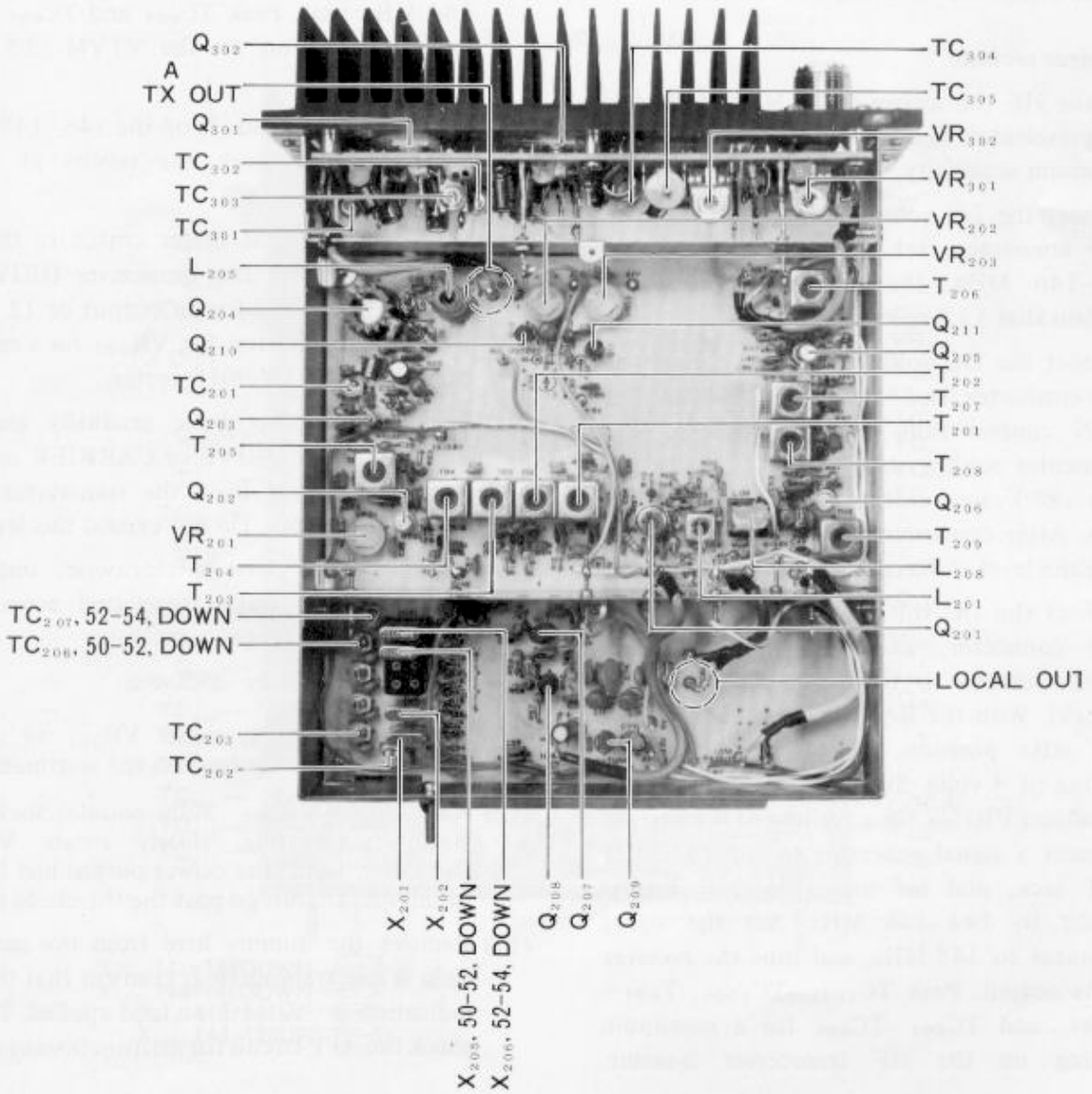
(14) Connect the frequency counter to the LOCAL OUT terminal. Adjust $TC_{204}$–$TC_{206}$ as shown in the chart below.

| 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 | $VR_{1905}$ | MAXIMUM |
| 52-54 | DOWN | $VR_{1906}$ | OUTPUT |



## 144 MHz UNIT

Please remove the 50 and 430 MHz units, if installed, to allow access to test points on the 144 MHz odule.

### 1. Local oscillator circuit

(1) Connect the DC voltmenter to pin 2 of the edge connnector for the 144 MHz unit. Confirm that 11 volts is present, with the BAND switch set to 144–146 MHz. Switch to 146–148 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 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 to 29 MHz, and peak the preselector against the marker signal for maximum sensitivity.

(2) Connect the DC voltmeter to pin 19 of the edge connector, set the BAND switch to 144–146 MHz, the 146–148 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-901R RF GAIN control fully counterclockwise. The voltmenter reading should be 0 volts. In the fully colckwise position, it should be 13.8 volts. After confirming these coltages, please leave the level at maximum gain.

(4) Connect the DC voltmeter to pin 14 of the edge connector, and set the FTV-901R TUNE control to the center position (12 o'clock). With the BAND switch in the 144–146 MHz position, adjust $VR_{1907}$ 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 switdh to 144–146 MHz. Set the signal generator to 145 MHz, and tune the receiver to its output. Peak $TC_{1001}$–$TC_{1004}$, $T_{604}$–$TC_{606}$, and $TC_{601}$–$TC_{604}$ 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 140–148 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-901R 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-901R 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 12 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.

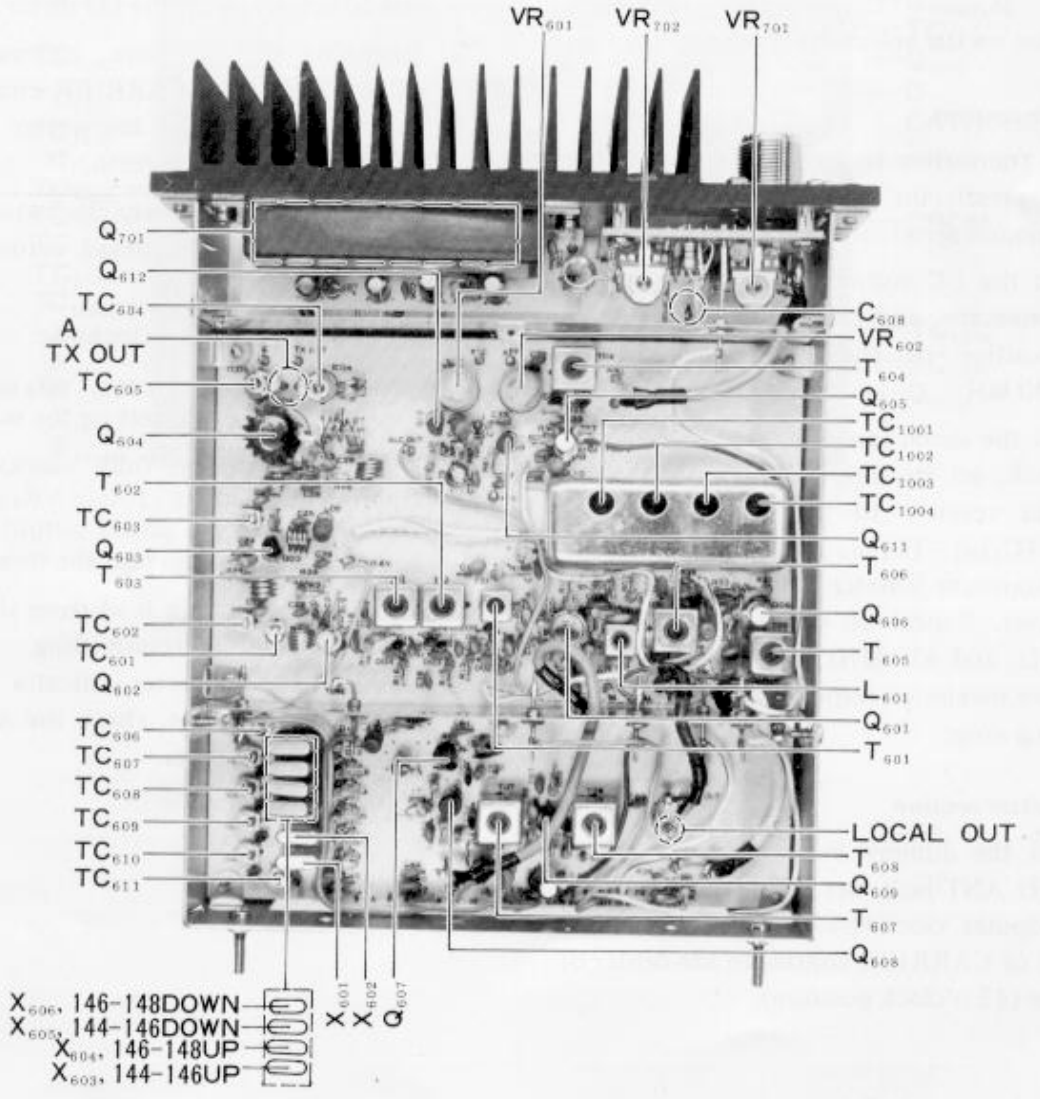
(13) Connect the frequency counter to the LOCAL OUT terminal. Adjust $TC_{608}$–$TC_{611}$ as shown in the chart below.

| 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 | $VR_{1009}$ | MAXIMUM OUTPUT |
| | DOWN | $VR_{1011}$ | |
| 146-148 | UP | $VR_{1010}$ | |
| | DOWN | $VR_{1012}$ | |

(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 and 144 MHz units, 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.

(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 to 29 MHz, and peak the receiver preselector against the marker signal for maximum sensitivity.

(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 $TC_{1201}$–$TC_{1203}$ and $TC_{1501}$–$TC_{1504}$ 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 cathode of $D_{1502}$. Peak $TC_{1501}$–$TC_{1504}$ 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 $TC_{1203}$–$TC_{1206}$ 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 12 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.

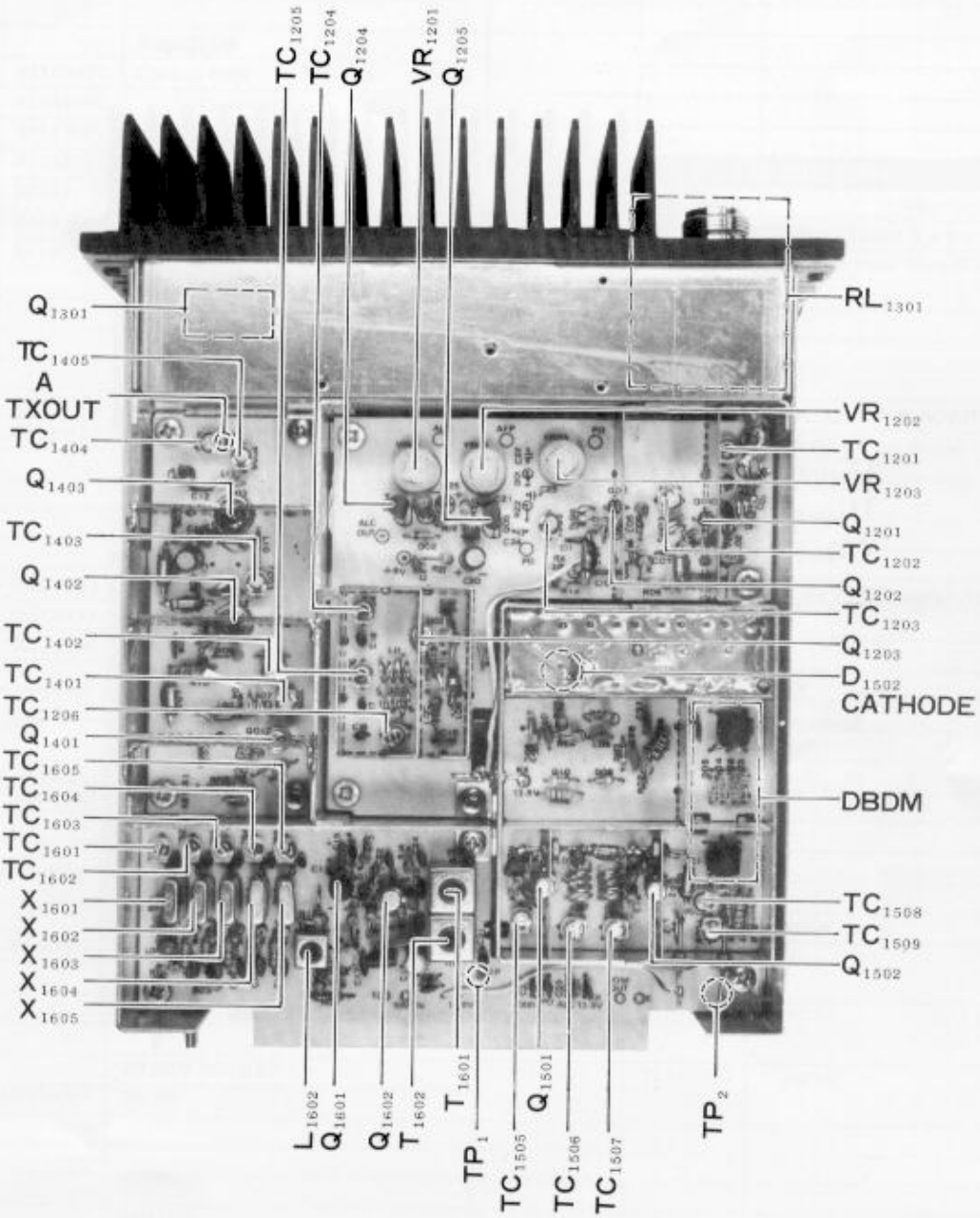
(9) Advance $VR_{1201}$ slowly clockwise until equal power output is achieved across the 430–440 MHz range.

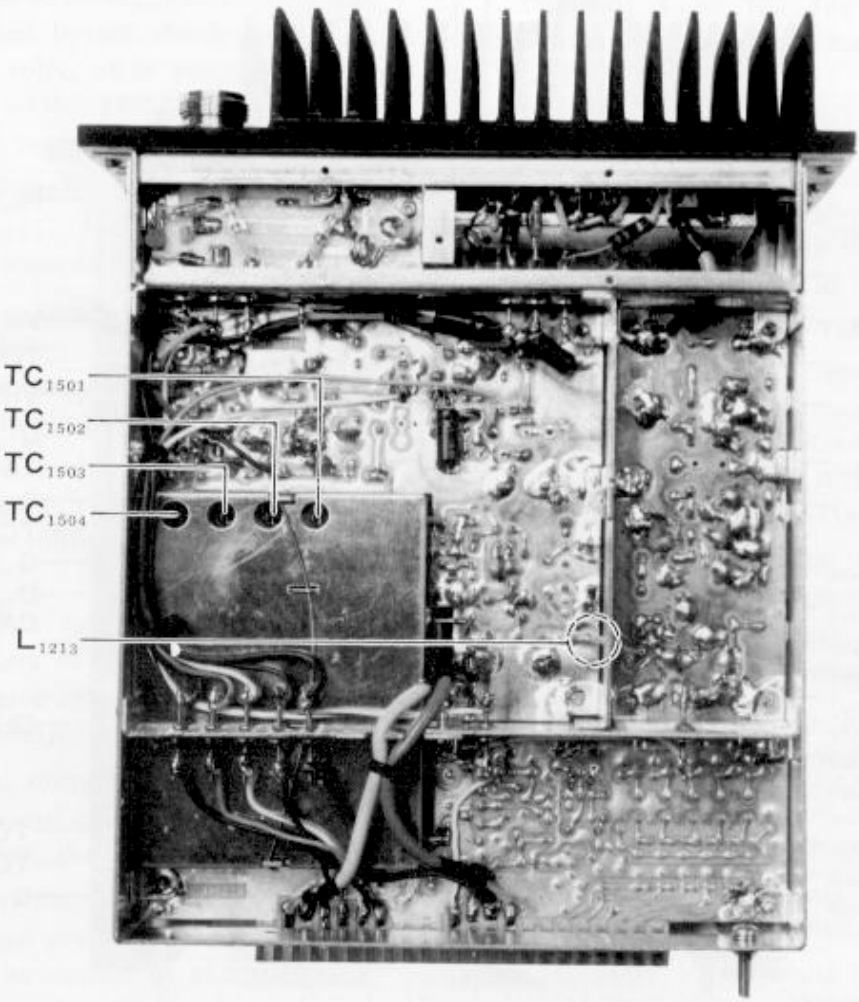
(10) Rotate $VR_{1202}$ fully clockwise.

(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.


TC1205
TC1204
Q1204
VR1201
Q1205
Q1301
TC1405
A
TXOUT
TC1404
Q1403
TC1403
Q1402
TC1402
TC1401
TC1206
Q1401
TC1605
TC1604
TC1603
TC1601
TC1602
X1601
X1602
X1603
X1604
X1605
RL1301
VR1202
TC1201
VR1203
Q1201
TC1202
Q1202
TC1203
Q1203
D1502
CATHODE
DBDM
TC1508
TC1509
Q1502
L1602
Q1601
Q1602
T1602
T1601
TP1
TC1505
Q1501
TC1506
TC1507
TP2


TC1501
TC1502
TC1503
TC1504
L1213

# FTV-901R PARTS LIST

## MAIN CHASSIS

| Symbol No. | Parts No. | Description |
|---|---|---|
| | | **DIODE** |
| D1–6, 10, 13 | 21090011 | Silicon Diode 10D1 |
| D7–9, 11, 12 | 21015550 | " " 1S1555 |
| | | **RESISTOR** |
| R5 | 41143471 | Carbon Film 1/4 TJ 470 Ω |
| R1 | 42144102 | " Composition " GK 1 kΩ |
| R4 | 40143682 | " Film " VJ 6.8 kΩ |
| R7 | 41143103 | " " " TJ 10 kΩ |
| R3 | 40143123 | " " " VJ 12 kΩ |
| R2 | 41143683 | " " " TJ 68 kΩ |
| R6 | 41143105 | " " " " 1 MΩ |
| | | **POTENTIOMETER** |
| VR1 | 49800120 | VM10A50KΩB 50 kΩB |
| VR2 | 49800121 | VM10A100KΩB 100 kΩB |
| | | **CAPACITOR** |
| C1, 2 | 30820103 | Ceramic Disc 50 WV 0.01 μF |
| C4 | 36526474 | Tantalum 35 WV 0.47 μF |
| C3 | 34220106 | Electrolytic 16 WV TW 10 μF |
| | | **METER** |
| M1 | 74000380 | #250035 200 μA |
| | | **RELAY** |
| RL1 | 70000002 | MX-2P 12 V |
| | | **RELAY SOCKET** |
| RLS1 | 69000003 | PX-08 |
| | | **SWITCH** |
| S1 | 61000610 | S21-6612 |
| S2 | 66400003 | WD-2301 |
| | | **RECEPTACLE** |
| J1, 3 | 68000001 | MBR-06B |
| J2, 4 | 68020001 | CN-7017J |
| J5 | 68070027 | D7-701B00 |

| | | |
|---|---|---|
| | | **MULTI JACK** |
| MJ1–3 | 68220003 | 121S-22B-105A |
| | | **PLUG** |
| P1 | 68120006 | 5065-112 with wire #240117 |

## 50 MHz UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| ★★★★★ MAIN CHASSIS ★★★★★ | | |
| C101–106, 108–114 | 32821102 | Ceramic Feed Thru ECK-Y1H102WE |
| ★★★★★ 50 MHz CONVERTER MAIN BOARD ★★★★★ | | |
| PB-1922 | 60419220 | Printed Circuit Board |
| | 019220AZ | PCB with Components |
| | | **IC, FET, TRANSISTOR** |
| Q201 | 25000101 | IC MC1496G |
| Q209 | 25000128 | " 78L08 |
| Q202,205,206 | 23800510 | FET 3SK51 |
| Q203 | 22320530 | Transistor 2SC2053 |
| Q204 | 22307300 | " 2SC730 |
| Q207, 208 | 22307842 | " 2SC784R |
| Q210, 211 | 22318154 | " 2SC1815Y |
| | | **DIODE** |
| D201, 202 212, 213 | 21090113 | Silicon 1SS53 |
| D208, 214–219 | 21015550 | " 1S1555 |
| D203–207, 209–211 | 21022090 | Varactor 1S2209 |
| | | **CRYSTAL** |
| X201 | 71800140 | HC-18/U 22.0 MHz |
| X202 | 71800141 | " 24.0 MHz |
| X203 | 71800142 | " 23.0 MHz |
| X205 | 71800139 | " 21.0 MHz |
| | | **CRYSTAL SOCKET** |
| XS201 | 69010013 | S-14-4P |

| | | RESISTOR | | | | | C273, 275 | 31829121 | Ceramic Disc | 50WV | SL | 120 pF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R226 | 40143100 | Carbon Film | | 1/4S | VJ | 10 Ω | C274 | 31829241 | " | " | " | 240 pF |
| R207, 230 | 40143560 | " | " | " | " | 56 Ω | C232,252,266 | 30820102 | " | " | " | 0.001 μF |
| R204,209,211, 214,223,255, 258 | 40143101 | " | " | " | " | 100 Ω | C205,206,209, 220,221,224, 226,227,230, 231,239,240, 248, 253–259, 270–272, 283–288, 292 | 30820103 | " | " | " | 0.01 μF |
| R221,237,243 | 40143221 | " | " | " | " | 220 Ω | | | | | | |
| R224 | 40143271 | " | " | " | " | 270 Ω | | | | | | |
| R202, 254 | 40143471 | " | " | " | " | 470 Ω | | | | | | |
| R205 | 41143821 | " | " | 1/4 | TJ | 820 Ω | | | | | | |
| R201,203,208, 238,244,251, 257,259 | 40143102 | " | " | 1/4S | VJ | 1 kΩ | | | | | | |
| | | | | | | | C291 | 36825473 | Mylar | 50WV | | 0.047 μF |
| R229 | 40143122 | " | " | " | " | 1.2 kΩ | C229,276,277, 290 | 34220106 | Electrolytic | 16WV | | 10 μF |
| R206, 245–250 | 40143152 | " | " | " | " | 1.5 kΩ | | | | | | |
| R225 | 40143332 | " | " | " | " | 3.3 kΩ | | | | | | |
| R210,252,253 | 40143103 | " | " | " | " | 10 kΩ | | | TRIMMER CAPACITOR | | | |
| R235 | 40143223 | " | " | " | " | 22 kΩ | TC201–207 | 39000011 | ECV1ZW 20 x 53N | | | 20 pF |
| R219 | 40143393 | " | " | " | " | 39 kΩ | | | | | | |
| R241, 242 | 40143473 | " | " | " | " | 47 kΩ | | | | | | |
| R256 | 40143823 | " | " | " | " | 82 kΩ | | | | | | |
| R212,213,215 –217, 220, | 40143104 | " | " | " | " | 100 kΩ | | | TRANSFORMER | | | |
| | | | | | | | T201–208 | 55003309 | | | | #220408 |
| 234,239,240 | | | | | | | T209 | 54141800 | R12-4180, | | | #220166 |
| R222, 233 | 41143104 | " | " | 1/4 | TJ | 100 kΩ | | | | | | |
| R218 | 40143224 | " | " | 1/4S | VJ | 220 kΩ | | | | | | |
| R236 | 40143225 | " | " | " | " | 2.2 MΩ | | | | | | |
| | | | | | | | | | INDUCTOR | | | |
| | | | | | | | L211, 212 | 53020038 | Micro Inductor | FL-4H | | 0.68 μH |
| | | | | | | | L214 | 53020005 | " | " | " | 3.3 μH |
| | | POTENTIOMETER | | | | | L207, 209 | 53020006 | " | " | " | 6.8 μH |
| VR201–203 | 49919473 | SR19RS | | | | 47 kΩB | L213 | 53020033 | " | " | " | 10 μH |
| | | | | | | | L210 | 53020001 | " | " | FL-5H | 1 mH |
| | | | | | | | L208 | 55003174 | | | | #220209 |
| | | | | | | | L202,204,206 | 55003262 | | | | #220324 |
| | | CAPACITOR | | | | | L203 | 55003310 | | | | #220416A |
| C213, 245 | 31829095 | Ceramic Disc | | 50WV | SL | 0.5 pF | L201 | 55003371 | | | | #220535 |
| C222, 242 | 31820010 | " | " | " | CH | 1 pF | L205 | 55003372 | IFT-51S10-H3 | | | |
| C211,215,218, 236,243,246, 278 | 31820050 | " | " | " | " | 5 pF | | | | | | |
| C203, 210 | 31829100 | " | " | " | SL | 10 pF | | | FERRITE BEADS | | | |
| C237,247,251 | 31820100 | " | " | " | CH | 10 pF | | 56000024 | Ri 3 x 3-1 | | | |
| C249 | 31820150 | " | " | " | " | 15 pF | | | | | | |
| C228 | 31829180 | " | " | " | SL | 18 pF | | | | | | |
| C216 | 31829200 | " | " | " | " | 20 pF | | 91100008 | Wrapping Terminal C | | | |
| C219 | 31829220 | " | " | " | " | 22 pF | | | | | | |
| C260–265, 269 | 31820220 | " | " | " | CH | 22 pF | | | | | | |
| C223 | 31820270 | " | " | " | " | 27 pF | | | HEAT SINK | | | |
| C235 | 31829330 | " | " | " | SL | 33 pF | | 95000004 | T0-5, L = 15 mm | | | |
| C204,233,234 | 31829470 | " | " | " | " | 47 pF | | | | | | |
| C212,214,217, 250 | 31820470 | " | " | " | CH | 47 pF | | | | | | |
| C238,241,244 | 31827470 | " | " | " | UJ | 47 pF | ★★★★★ 50 MHz BOOSTER BOARD ★★★★★ | | | | | |
| C201, 202 | 31829910 | " | " | " | SL | 91 pF | PB-1923 | 60419230 | Printed Circuit Board | | | |
| C225 | 31829101 | " | " | " | " | 100 pF | | 019230AZ | PCB with Components | | | |
| C207,208,267, 268 | 31820101 | " | " | " | CH | 100 pF | | | | | | |

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|---|---|---|---|
| | | **TRANSISTOR** | |
| Q301 | 22321660 | Transistor | 2SC2166 |
| Q302 | 22319454 | " | 2SC1945D |
| | | | |
| | | | |
| | | | |
| | | **DIODE** | |
| D301,302,308 | 21090011 | Silicon | 10D1 |
| D307 | 21001880 | Germanium | 1S188FM |
| D303–306 | 21015550 | Silicon | 1S1555 |
| | | | |
| | | | |
| | | | |
| | | **RESISTOR** | |
| R303 | 42124560 | Carbon Composition ½ GK | 56 Ω |
| R306 | 42124101 | " " " " | 100 Ω |
| R305 | 42124151 | " " " " | 150 Ω |
| R302 | 42124221 | " " " " | 220 Ω |
| R301, 304 (L302, 305) | 42124471 | " " " " | 470 Ω |
| R308 | 41143102 | Carbon Film 1/4S TJ | 1 kΩ |
| R307 | 40143103 | " " " VJ | 10 kΩ |
| | | | |
| | | | |
| | | | |
| | | **POTENTIOMETER** | |
| VR301 | 49906301 | EVL-SOAA00B32 | 300 ΩB |
| VR302 | 49906103 | EVL-SOAA00B14 | 10 kΩB |
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| | | | |
| | | **CAPACITOR** | |
| C334 | 31829095 | Ceramic Disc 50WV SL | 0.5 pF |
| C316, 335 | 31829010 | " " " " | 1 pF |
| C310, 315 | 31829050 | " " " " | 5 pF |
| C302 | 31829200 | " " " " | 20 pF |
| C301, 317 | 31829330 | " " " " | 33 pF |
| C307 | 31829390 | " " " " | 39 pF |
| C320, 329 | 31829470 | " " " " | 47 pF |
| C323 | 31829620 | " " " " | 62 pF |
| C314, 324 | 31829820 | " " " " | 82 pF |
| C321, 328 | 31829101 | " " " " | 100 pF |
| C319 | 31829121 | " " " " | 120 pF |
| C304,306,309, 311,313,318, 326,327,331, 333 | 30820103 | " " " | 0.01 μF |
| C303,305,308, 312,330,332 | 36226226 | Electrolytic 16WV TW | 22 μF |
| | | | |
| | | | |
| | | | |
| | | **INDUCTOR** | |
| L314 | 53010001 | Micro Inductor | 10 μH |
| L304, 313 | 55003160 | | #220196 |
| L302, 305 | 55003262 | | #220324 |
| L301 | 55003373 | | #220527 |
| L303, 306 | 55003374 | | #220528 |
| L307 | 55003375 | | #220529 |
| L308–310,312 | 55003376 | | #220530 |

| | | |
|---|---|---|
| L311 | 55003377 | #220584 |
| | | |
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| | | |
| | | **TRIMMER CAPACITOR** |
| TC301 | 39000011 | ECV-1ZW 20 x 40N 20 pF |
| TC302, 303 | 39000009 | ECV-1ZW 50 x 40N 50 pF |
| TC304, 305 | 38820080 | 2222-808-61809 80 pF |
| | | |
| | | |
| | | |
| | | **RELAY** |
| RL301 | 70000031 | FBR-221D012 |
| | | |
| | | |
| | | |
| | | **CONNECTOR** |
| J301 | 68000003 | SO-239 |
| | | |
| | | |
| | 91100008 | Wrapping Terminal C |
| | | |
| | | |
| | 80050741 | Booster Heat Sink |
| | | |
| | | |
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| | | |

## 144 MHz UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | ★★★★★ MAIN CHASSIS ★★★★★ | |
| C501–506, 508, 509, 511–513, 515 | 32821102 | Ceramic Feed Thru ECK-Y1H102WE |
| C517 | 36825223 | Mylar 50WV 0.022 μF |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R501 | 41143473 | Carbon Film 1/4S TJ 47 kΩ |
| | | |
| | | |
| | | |
| | ★★★★★ 144 MHz CONVERTER MAIN BOARD ★★★★★ | |
| PB-1925 | 60419250 | Printed Circuit Board |
| | 019250AZ | PCB with Components |
| | | |
| | | |
| | | |
| | | **IC, FET, TRANSISTOR** |
| Q601 | 25000101 | IC MC-1496G |
| Q610 | 25000128 | " 78L08 |
| Q602,605,606 | 23800510 | FET 3SK51 |
| Q604 | 22307300 | Transistor 2SC730 |
| Q607–609 | 22307842 | " 2SC784R |
| Q611, 612 | 22318154 | " 2SC1815Y |
| Q603 | 22320530 | " 2SC2053 |
| | | |

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|---|---|---|---|---|---|---|---|---|---|
| | | **DIODE** | | | | | | | |
| D601,606,607, 609–614,616 | 21090113 | Silicon | | | 1SS53 | | | | |
| D605 | 21015550 | " | | | 1S1555 | | | | |
| D602–604,608 | 21022090 | Varactor | | | 1S2209 | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | **CRYSTAL** | | | | | | | |
| X601 | 71800144 | HC-18/U | | | 38.6666 MHz | | | | |
| X602 | 71800145 | " | | | 39.3333 MHz | | | | |
| X603 | 71500193 | HC-25/U | | | 38.8666 MHz | | | | |
| X604 | 71500194 | " | | | 39.5333 MHz | | | | |
| X605 | 71500195 | " | | | 38.4666 MHz | | | | |
| X606 | 71500196 | " | | | 39.1333 MHz | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | **CRYSTAL SOCKET** | | | | | | | |
| XS601 | 69010013 | S-14-4P | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | **RESISTOR** | | | | | | | |
| R624 | 40143100 | Carbon Film | | 1/4S | VJ | 10 Ω | | | |
| R638 | 40143220 | " | " | " | " | 22 Ω | | | |
| R609,620,621, 625,633 | 40143560 | " | " | " | " | 56 Ω | | | |
| R604,608,611, 614,651,655, 659 | 40143101 | " | " | " | " | 100 Ω | | | |
| R629 | 40143221 | " | " | " | " | 220 Ω | | | |
| R647 (L613) | 42124471 | " | Composition | | 1/2 GK | 470 Ω | | | |
| R665 | 41143471 | " | Film | 1/4S | TJ | 470 Ω | | | |
| R650,654,658 | 40143471 | " | " | " | VJ | 470 Ω | | | |
| R602, 622 | 40143561 | " | " | " | " | 560 Ω | | | |
| R640–645 | 40143681 | " | " | " | " | 680 Ω | | | |
| R605 | 41143821 | " | " | " | TJ | 820 Ω | | | |
| R601,603,607, 634,635,660 | 40143102 | " | " | " | VJ | 1 kΩ | | | |
| R626,637,639 | 40143122 | " | " | " | " | 1.2 kΩ | | | |
| R606 | 40143152 | " | " | " | " | 1.5 kΩ | | | |
| R652, 656 | 40143472 | " | " | " | " | 4.7 kΩ | | | |
| R623 | 41143682 | " | " | " | TJ | 6.8 kΩ | | | |
| R610, 666 | 40143104 | " | " | " | VJ | 10 kΩ | | | |
| R618,619,628, 653,657 | 40143223 | " | " | " | " | 22 kΩ | | | |
| R617,631,632 | 40143473 | " | " | " | " | 47 kΩ | | | |
| R612,613,615, 616,630,636 | 40143104 | " | " | " | " | 100 kΩ | | | |
| R627 | 40143225 | " | " | " | " | 2.2 MΩ | | | |
| R646 | 40143331 | " | " | " | " | 330 Ω | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | **POTENTIOMETER** | | | | | | | |
| VR601 | 49905472 | SR19RS | | | 4.7 kΩB | | | | |
| VR602 | 49905473 | SR19RS | | | 47 kΩB | | | | |
| | | | | | | | | | |
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|---|---|---|---|---|---|
| | | **CAPACITOR** | | | |
| C614 | 31829059 | Ceramic Disc | 50WV | SL | 0.5 pF |
| C609, 616 | 31820020 | " | " | CH | 2 pF |
| C612 | 31820040 | " | " | " | 4 pF |
| C613, 615 | 31827040 | " | " | UJ | 4 pF |
| C611, 617 | 31829050 | " | " | SL | 5 pF |
| C641,650–655 | 31820050 | " | " | CH | 5 pF |
| C642 | 31827050 | " | " | UJ | 5 pF |
| C608, 610 | 31827080 | " | " | " | 8 pF |
| C604, 637 | 31829100 | " | " | SL | 10 pF |
| C631,632,664, 668 | 31820100 | " | " | CH | 10 pF |
| C639 | 31829150 | " | " | SL | 15 pF |
| C658 | 31820180 | " | " | CH | 18 pF |
| C665 | 31829220 | " | " | SL | 22 pF |
| C626 | 31829270 | " | " | " | 27 pF |
| C660 | 31820270 | " | " | CH | 27 pF |
| C623 | 31829330 | " | " | SL | 33 pF |
| C627 | 31829390 | " | " | " | 39 pF |
| C640 | 31829470 | " | " | " | 47 pF |
| C656 | 31820680 | " | " | CH | 68 pF |
| C601, 602 | 31829910 | " | " | SL | 91 pF |
| C685 | 31829101 | " | " | " | 100 pF |
| C659 | 31820101 | " | " | CH | 100 pF |
| C607,618,619, 621,622,624, 625,628,630, 633–635,643, 657,662,663, 667,669,672, 673,678,679 | 30820102 | " | " | | 0.001 μF |
| C605,606,636, 638,644–649, 661, 680, 682–684 | 30820103 | " | " | | 0.01 μF |
| C620,629,670, 671,681 | 34220106 | Electrolytic | 16WV | TW | 10 μF |
| | | | | | |
| | | | | | |
| | | | | | |
| | | **TRIMMER CAPACITOR** | | | |
| TC601 | 39000010 | ECV-1ZW 10 x 53N | | | 10 pF |
| TC602, 603, 606–612 | 39000011 | ECV-1ZW 20 x 53N | | | 20 pF |
| TC604, 605 | 39000005 | ECV-1ZW 50 x 32N | | | 50 pF |
| | | | | | |
| | | | | | |
| | | | | | |
| | | **INDUCTOR** | | | |
| L605 | 53020038 | Micro Inductor | FL-4H | | 0.68 μH |
| L610,612,614 | 53020004 | " | " | | 2.2 μH |
| L611 | 53020006 | " | " | | 6.8 μH |
| L606, 608 | 55003090 | " | " | | #220193 |
| L602 | 55003092 | " | " | | #220195 |
| L603,604,609 | 55003093 | " | " | | #220196 |
| L613 | 55003120 | " | " | | #220206 |
| L607 | 55003294 | " | " | | #220380 |
| L601 | 5503371 | " | " | | #220535 |
| | | | | | |
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|---|---|---|---|
| | | **TRANSFORMER** | |
| T604 | 54140910 | R12-4091 | #220105 |
| T602, 603, 606–608 | 54141020 | R12-4102 | #220111 |
| T605 | 54141800 | R12-4180 | #220166 |
| T601 | 55003378 | | #220536 |
| | | **HEAT SINK** | |
| | 95000004 | TO-5, L = 15 mm | |
| | | **FERRITE BEADS** | |
| | 56000024 | Ri 3 x 3-1 | |
| | 91100008 | Wrapping Terminal C | |
| ★★★★★ 144 MHz BOOSTER BOARD ★★★★★ | | | |
| PB-1926 | 60419260 | Printed Circuit Board | |
| | 019260AZ | PCB with Components | |
| PB-1927 | 60419270 | Printed Circuit Board | |
| | 019270AZ | PCB with Components | |
| | | **POWER MODULE** | |
| Q701 | 78000002 | | VP-20BL |
| | | **DIODE** | |
| D704 | 21090011 | Silicon | 10D1 |
| D701 | 21001880 | Germanium | 1S188FM |
| D702, 703 | 21015550 | Silicon | 1S1555 |
| | | **RESISTOR** | |
| R705 | 40143472 | Carbon Film 1/4S VJ | 4.7 kΩ |
| R706 | 40143473 | " " " " | 47 kΩ |
| R701 (L702), 704 (L704) | 42124471 | Carbon Composition ½ GK | 470 Ω |
| R702 (L702), 703 (L703) | 42144471 | " " ¼ " | 470 Ω |
| | | **POTENTIOMETER** | |
| VR701 | 49906301 | EVL-SOAA00B32 | 300 ΩB |
| VR702 | 49906103 | EVL-SOAA00B14 | 10 kΩB |
| | | **CAPACITOR** | |
| | 31829059 | Ceramic Disc 50WV SL | 0.5 pF |

| | | |
|---|---|---|
| C710, 712 | 31829010 | Ceramic Disc 50WV SL 1 pF |
| C713 | 31829020 | " " " " 2 pF |
| C708,716,717 | 31829150 | " " " " 15 pF |
| C706 | 31829200 | " " " " 20 pF |
| C707 | 31829330 | " " " " 33 pF |
| C705,711,714, 715 | 30820102 | " " " 0.001 μF |
| C701–704 | 34220106 | Electrolytic 16WV TW 10 μF |
| | | **INDUCTOR** |
| L707 | 55003380 | #220069 |
| L701, 704 | 55003262 | #220324 |
| L706, 708 | 55003306 | #220430 |
| L702, 703 | | #220469 |
| L705 | | L0020654 |
| | | **RELAY** |
| RL701 | 70000035 | FBR-221D012 |
| | | **RECEPTACLE** |
| J701 | 68000003 | SO-239 |
| | 91100008 | Wrapping Terminal C |
| ★★★★★ RESONATOR BOARD ★★★★★ | | |
| PB-1800 | 60418000 | Printed Circuit Board |
| | 018000AZ | PCB with Components |
| | | **CAPACITOR** |
| C1005–1008 | 31820050 | Ceramic Disc 50WV CH 5 pF |
| C1001–1004 | 31820150 | " " " " 15 pF |
| | | **TRIMMER CAPACITOR** |
| T1001–1004 | 39000010 | ECV-1ZW 10x53N 10 pF |
| | | **INDUCTOR** |
| L1001 | 55003381 | #220252 |
| | 80044942 | Resonator Case |
| | 91100008 | Wrapping Terminal C |

## 430 MHz UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | ★★★★★ MAIN CHASSIS ★★★★★ | |
| C1101–1108, 1110–1115 | 32821102 | Ceramic Feed Thru ECK-Y1H102WE |
| | ★★★★★ 430 MHz RF BOARD ★★★★★ | |
| PB-1929 | 60419290 | Printed Circuit Board |
| | 019290AZ | PCB with Components |
| | | **TRANSISTOR** |
| Q1203 | 22314240 | Transistor 2SC1424 |
| Q1204, 1205 | 22318154 | " 2SC1815Y |
| Q1201, 1202 | 22323690 | " 2SC2369 |
| | | **DIODE** |
| D1203 | 21090113 | Silicon 1SS53 |
| D1201 | 21015550 | " 1S1555 |
| | | **RESISTOR** |
| R1215 | 40143820 | Carbon Film 1/4S VJ 82 Ω |
| R1205, 1210 | 40143101 | " " " " 100 Ω |
| R1204 | 40143221 | " " " " 220 Ω |
| R1203(L1202), 1206(L1204), 1209(L1205), 1211(L1207), 1216–1218 (L1208–1210) | 42144471 | Carbon Composition 1/4 GK 470 Ω |
| R1212, 1213 | 40143102 | Carbon Film 1/4S VJ 1 kΩ |
| R1201, 1207, 1223 | 40143152 | " " " " 1.5 kΩ |
| R1202, 1208, 1214, 1225 | 40143103 | " " " " 10 kΩ |
| | | **POTENTIOMETER** |
| VR1201–1203 | 49905473 | SR19RS 47 kΩB |
| | | **CAPACITOR** |
| C1202, 1203 | 31829030 | Ceramic Disc 50WV SL 3 pF |
| C1216, 1218 | 31820050 | " " " CH 5 pF |
| C1212 | 31820200 | " " " " 20 pF |
| C1201, 1221, 1222, 1229 | 30820102 | " " " " 0.001 μF |
| C1204–1211, 1213, 1215, 1228 | 30825102 | " HDC60E102M 0.001 μF |
| C1214, 1226 | 30325103 | " Chip 25 V 0.01 μF |
| C1231 | 36825473 | Mylar 50WV 0.047 μF |
| C1230 | 34220106 | Electrolytic 16WV TW 10 μF |
| | | **TRIMMER CAPACITOR** |
| TC1201, 1204–1206 | 39000016 | ECV-1ZW 04 x 53N 4 pF |
| TC1202, 1203 | 39000010 | ECV-1ZW 10 x 53N 10 pF |
| | | **INDUCTOR** |
| L1214 | 53020033 | Micro Inductor FL-4H 10 μH |
| L1202, 1204, 1205, 1207–1210 | 55003382 | #220469 |
| L1211, 1212 | 55003383 | #220471 |
| L1203, 1206 | 55003384 | #220472 |
| L1213 | 55003385 | #220474 |
| L1201 | 55003386 | #220523 |
| | ★★★★★ 430 MHz BOOSTER BOARD ★★★★★ | |
| PB-1935 | 60419350 | Printed Circuit Board |
| | 019350AZ | PCB with Components |
| | | **POWER MODULE** |
| Q1301 | 78000003 | VP-07BL |
| | | **DIODE** |
| D1301 | 21090011 | Silicon 10D1 |
| D1302–1304 | 21001880 | Germanium 1S188FM |
| | | **RESISTOR** |
| | 42124220 | Carbon Composition 1/2 GK 22 Ω |
| | 42124270 | " " " " 27 Ω |
| R1301(L1308), 1302(L1309), 1304(L1301), 1305(L1302) | 42144471 | " " 1/4 " 470 Ω |
| | | **POTENTIOMETER** |
| VR1301 | 49908506 | EVN-A00B32 300 ΩB |
| | | **CAPACITOR** |
| C1304, 1309 | 31829020 | Ceramic Disc 50WV SL 2 pF |
| C1308 | 30820102 | " " " " 0.001 μF |
| C1301, 1302 | 34220106 | Electrolytic 16WV TW 10 μF |

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|---|---|---|---|---|---|
| | | | | | **CAPACITOR** |
| | | | C1401–1410, 1412 | 30825102 | Ceramic HDC60E102M 0.001 μF |
| | | | C1411 | 34220106 | Electrolytic 16WV TW 10 μF |
| | | **TRIMMER CAPACITOR** | | | |
| TC1301 | | ECV1ZW 06 x 32 6 pF | | | |
| | | | | | **TRIMMER CAPACITOR** |
| | | | TC1401–1403, 1405, 1406 | 39000010 | ECV-1ZW 10 x 53N 10 pF |
| | | **INDUCTOR** | | | |
| L1301, 1302, 1308, 1309 | 55003382 | #220469 | | | |
| L1303, 1304 | 55003392 | #220525 | | | |
| | | | | | **INDUCTOR** |
| | | | L1401–1406 | 55003382 | #220469 |
| | | | L1407 | 55003384 | #220472 |
| | | **RELAY** | L1409, 1411 | 55003388 | #220473 |
| RL1301 | 70000035 | CX-140N (with J1301) | L1408, 1410 | 55003387 | #220522 |
| | | **FERRITE BEADS** | ★★★★★ 430 MHz CONVERTER BOARD ★★★★★ | | |
| | 56000024 | Ri 3 x 3-1 | PB-1931 | 60419310 | Printed Circuit Board |
| | | | | 019310AZ | PCB with Components |
| | | | PB-1932 | 60419320 | Printed Circuit Board |
| | | | | 019320AZ | PCB with Components |
| ★★★★★ 430 MHz EXCITER BOARD ★★★★★ | | | PB-1933 | 60419330 | Printed Circuit Board |
| PB-1930 | 60419300 | Printed Circuit Board | | 019330AZ | PCB with Components |
| | 019300AZ | PCB with Components | | | |
| | | | | | **TRANSISTOR** |
| | | **TRANSISTOR** | Q1501, 1502 | 22314240 | Transistor 2SC1424 |
| Q1401 | 22314240 | Transistor 2SC1424 | | | |
| Q1402, 1403 | 22314260 | " 2SC1426 | | | |
| | | | | | **DIODE** |
| | | | D1503–1506 | 21090152 | Schottky Barrier 1SS43 |
| | | **DIODE** | D1507–1510 | 21090113 | Silicon 1SS53 |
| D1401 | 21015550 | Silicon 1S1555 | D1501, 1502 | 21090142 | " MC-301 |
| | | | D1511 | 21001880 | Germanium 1S188FM |
| | | **RESISTOR** | | | **RESISTOR** |
| R1408 | 40143220 | Carbon Film 1/4S VJ 22 Ω | R1504 | 40143180 | Carbon Film 1/4S VJ 18 Ω |
| R1405 | 40143820 | " " " " 82 Ω | R1517 | 41143108 | " " " TJ 18 Ω |
| R1415 | 40143221 | " " " " 220 Ω | R1515 | 40143220 | " " " VJ 22 Ω |
| R1401(L1401), 1406(L1402), 1407(L1403), 1412(L1404), 1413(L1405), 1416(L1406) | 42144471 | Carbon Composition 1/4 GK 470 Ω | R1510 | 40143101 | " " " " 100 Ω |
| | | | R1518, 1519 | 41143331 | " " " TJ 330 Ω |
| | | | R1502, 1505 | 40143331 | " " " VJ 330 Ω |
| | | | R1511(L1507), 1512(L1510), 1516(L1511) | 42144471 | Carbon Composition 1/4 GK 470 Ω |
| R1409 | 40143471 | Carbon Film 1/4S VJ 470 Ω | | | |
| R1403 | 41143471 | " " " TJ 470 Ω | R1513 | 40143561 | Carbon Film 1/4S VJ 560 Ω |
| R1404, 1410, 1414 | 40143102 | " " " VJ 1 kΩ | R1501, 1506 | 41143102 | " " " TJ 1 kΩ |
| | | | R1503, 1507 | 40143102 | " " " VJ 1 kΩ |
| R1402, 1411 | 41143562 | " " " TJ 5.6 kΩ | R1508 | 40143222 | " " " " 2.2 kΩ |
| | | | R1514 | 41143103 | " " " TJ 10 kΩ |
| | | | R1509 | 41143223 | " " " " 22 kΩ |

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| | | | | | **CRYSTAL** |
| | | | X1601 | 71800146 | HC-18/U 67.000 MHz |
| | | | X1602 | 71800147 | " 67.333 MHz |
| | | **CAPACITOR** | X1603 | 71800148 | " 67.666 MHz |
| C1524, 1525 | 31820059 | Ceramic Disc 50WV CH 0.5 pF | X1604 | 71800149 | HC-25/U 68.000 MHz |
| C1526 | 31820020 | " " " " 2 pF | X1605 | 71800150 | " 68.333 MHz |
| C1513, 1514 | 31820030 | " " " " 3 pF | | | |
| C1502–1505 | 31820080 | " " " " 8 pF | | | |
| C1515 | 31829100 | " " " SL 10 pF | | | |
| C1523 | 31829270 | " " " " 27 pF | | | **RESISTOR** |
| C1506, 1507 | 31820620 | " " " CH 62 pF | R1616 | 40143101 | Carbon Film 1/4S VJ 100 Ω |
| C1511, 1512, 1516 | 30825102 | " HDC60E102M 0.001 μF | R1618 | 41143101 | " " " TJ 100 Ω |
| | | | R1614 | 40143221 | " " " VJ 220 Ω |
| C1517–1522 | 32821102 | " Feed Thru 50WV 0.001 μF | R1601 | 40143331 | " " " " 330 Ω |
| C1501 | 30820102 | " Disc 50WV 0.001 μF | R1612, 1615 | 40143471 | " " " " 470 Ω |
| C1508–1510 | 30820103 | " " " 0.01 μF | R1607–1611 | 41143681 | " " " TJ 680 Ω |
| | | | R1617 | 40143272 | " " " VJ 2.7 kΩ |
| | | | R1602, 1603, 1605, 1606 | 40143103 | " " " " 10 kΩ |
| | | **TRIMMER CAPACITOR** | R1604 | 41143103 | " " " TJ 10 kΩ |
| TC1501–1504, 1509 | 39000017 | ECV-1ZW 06 x 53N 6 pF | R1613 | 40143273 | " " " VJ 27 kΩ |
| TC1505–1508 | 39000010 | ECV-1ZW 10 x 53N 10 pF | | | |
| | | | | | |
| | | | | | **CAPACITOR** |
| | | | C1625 | 31829059 | Ceramic Disc 50WV SL 0.5 pF |
| | | **INDUCTOR** | C1631 | 31820010 | " " " CH 1 pF |
| L1505, 1513 | 55003393 | AT0706HHQ5B252A | C1623, 1626 | 31820040 | " " " " 4 pF |
| L1507, 1510, 1511 | 55003382 | #220469 | C1602–1606 | 31820050 | " " " " 5 pF |
| | | | C1613 | 31820100 | " " " " 10 pF |
| L1506 | 55003389 | #220470 | C1616 | 31820270 | " " " " 27 pF |
| L1501–1504, 1508, 1509 | 55003383 | #220471 | C1601, 1614 | 31820470 | " " " " 47 pF |
| | | | C1607–1611, 1621, 1622, 1624, 1627–1630 | 30820102 | " " " 0.001 μF |
| L1512 | 55003390 | #220476 | | | |
| | | | | | |
| | | | C1615, 1617 | 30820103 | " " " 0.01 μF |
| | | **HERMETIC SEAL** | C1620 | 30820473 | " " " 0.047 μF |
| | 91001102 | A102 | C1618, 1619 | 34220106 | Electrolytic 16WV TW 10 μF |
| | | | | | |
| | | | | | |
| | | | | | |
| ★★★★★ LOCAL BOARD ★★★★★ | | | | | **TRIMMER CAPACITOR** |
| PB-1934 | 60419340 | Printed Circuit Board | TC1601–1605 | 39000011 | ECV-1ZW 20 x 53N 20 pF |
| | 019340AZ | PCB with Components | | | |
| | | | | | |
| | | | | | |
| | | | | | **INDUCTOR** |
| | | **IC, TRANSISTOR** | L1601 | 53020001 | Micro Inductor FL-4H 1 μH |
| Q1603 | 25000128 | IC 78L08 | L1602 | 53030011 | TM-80160 |
| Q1601 | 22307842 | Transistor 2SC784R | | | |
| Q1602 | 22314240 | " 2SC1424 | | | |
| | | | | | |
| | | | | | **TRANSFORMER** |
| | | | T1601, 1602 | 55003394 | MB-80050 |
| | | **DIODE** | | | |
| D1601–1605 | 21090113 | Silicon 1SS53 | | | |
| | | | | 91100008 | Wrapping Terminal C |
| | | | | | |
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## POWER SUPPLY UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | ★★★★★ MAIN CHASSIS ★★★★★ | |
| | | |
| | | |
| | | **TRANSISTOR** |
| Q1708 | 22490003 | MJE3055 |
| | | |
| | | |
| | | |
| | | **DIODE** |
| D1707 | 21090118 | Silicon Bridge S4VB |
| | | |
| | | |
| | | |
| | | **CAPACITOR** |
| C1708 | 34520109 | Electrolytic 35WV TW 10000 μF |
| C1709, 1710 | 30240472 | Ceramic Disc 1.4 KV 0.0047 μF |
| | | |
| | | |
| | | |
| | | **POWER TRANSFORMER** |
| PT1701 | 52000046 | #230025 |
| | | **FUSE** |
| F1702 | 73000002 | (100–117 V) 2A |
| | 73000001 | (200–234 V) 1A |
| | | **FUSE HOLDER** |
| FH1702 | 69030004 | F3292 |
| | | |
| | | |
| | | |
| | | **POWER SUPPLY BOARD** |
| PB-1945 | 60419450 | Printed Circuit Board |
| | 019450AZ | PCB with Components |
| | | |
| | | |
| | | |
| | | **IC, TRANSISTOR** |
| Q1702 | 25000074 | IC TA7089M |
| Q1706 | 25000116 | " μPC14308 |
| Q1703–1705 | 22318154 | Transistor 2SC1815Y |
| Q1701 | 22402353 | " 2SD235-O |
| | | |
| | | |
| | | |
| | | **DIODE** |
| D1701–1705 | 21090011 | Silicon 10D1 |
| D1706 | 21090036 | Zener WZ-110 |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R1707 | 40143121 | Carbon Film 1/4S VJ 120 Ω |
| | 40143271 | " " " " 270 Ω |
| R1703 | 42124102 | Carbon Composition 1/2 GK 1 kΩ |
| R1702 | 40143332 | Carbon Film 1/4S VJ 3.3 kΩ |
| R1701 | 40143123 | " " " " 12 kΩ |
| R1704–1706 | 40143223 | " " " " 22 kΩ |
| | | |
| | | |
| VR1701 | 49906202 | **POTENTIOMETER** EVL-S0AA00B23 2 kΩB |
| | | |
| | | |
| | | |
| | | **CAPACITOR** |
| C1707 | 30820102 | Ceramic Disc 50WV 0.001 μF |
| C1703, 1705 | 30820103 | " " " 0.01 μF |
| C1704 | 30820473 | " " " 0.047 μF |
| C1706 | 34329105 | Electrolytic 25WV TW 1 μF |
| C1702 | 34329108 | " " " 1000 μF |
| C1701 | 34529002 | " 35WV R 1000 μF |
| | | |
| | | |
| | | |
| | | **RELAY** |
| RL1701 | 70000031 | FBR211D012 |
| | | |
| | | |
| | | |
| | | **PLUG** |
| P1701 | 67110001 | 5079-11A |
| | | **FUSE** |
| F1701 | 73000004 | 5A |
| | | **FUSE HOLDER** |
| FH1701 | 69030007 | F3265 |
| | | |
| | | |
| | 91100008 | Wrapping Terminal C |

## ALC AMP UNIT

| Symbol No. | Parts No | Description |
|---|---|---|
| PB-1946 | 60419460 | Printed Circuit Board |
| | 019460AZ | PCB with Components |
| | | |
| | | |
| | | |
| | | **FET** |
| Q1801 | 23800594 | 3SK59Y |
| | | |
| | | |
| | | |
| | | **DIODE** |
| D1801, 1802 | 21015550 | Silicon 1S1555 |
| D1803 | 21090138 | Varistor MV103 |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R1802 | 40143221 | Carbon Film 1/4 VJ 220 Ω |
| R1808 | 40143102 | " " " " 1 kΩ |
| R1806 | 40143152 | " " " " 1.5 kΩ |
| R1803 | 40143103 | " " " " 10 kΩ |
| R1801, 1809 | 40143223 | " " " " 22 kΩ |
| R1807 | 40143273 | " " " " 27 kΩ |

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|---|---|---|---|---|---|
| R1804 | 40143274 | Carbon Film 1/4 VJ 270 kΩ | | | |
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| | | | | | **RESISTOR** |
| | | **POTENTIOMETER** | R1906 | 40143220 | Carbon Film 1/4 VJ 22 Ω |
| VR1801 | 49906103 | EVL-S0AA00B14 10 kΩB | R1901 | 40143102 | " " " " 1 kΩ |
| VR1802, 1803 | 49906503 | EVL-S0AA00B54 50 kΩB | R1902, 1903 | 40143103 | " " " " 10 kΩ |
| | | | R1904, 1905 | 40143223 | " " " " 22 kΩ |
| | | | | | |
| | | | | | |
| | | **CAPACITOR** | | | |
| C1801, 1809 | 31829100 | Ceramic Disc 50WV SL 10 pF | | | **POTENTIOMETER** |
| C1812 | 31829910 | " " " " 91 pF | VR1901–1912 | 49906503 | EVL-S0AA00B54 50 kΩB |
| C1810 | 31829111 | " " " " 110 pF | | | |
| C1811 | 31829181 | " " " " 180 pF | | | |
| C1815–1818 | 32821102 | Ceramic Feed Thru ECK-Y1H102WE | | | |
| C1804 | 30830102 | Ceramic Disc 50WV 0.001 μF | | | **CAPACITOR** |
| C1802, 1803, 1805, 1807, 1808, 1814 | 30820103 | " " " 0.01 μF | C1915 | 31829010 | Ceramic Disc 50WV SL 1 pF |
| | | | C1901–1914, 1916, 1918, 1919 | 30820103 | " " " 0.01 μF |
| | | | C1917 | 34220476 | Electrolytic 16WV TW 47 μF |
| | | | C1920 | 34320477 | " 25WV TW 470 μF |
| | | **INDUCTOR** | | | |
| L1801, 1804 | | Micro Inductor FL-5H 47 μH | | | |
| L1802, 1803 | 55003371 | #220535 | | | |
| | | | | | **RELAY** |
| | | | RL1901 | 70000031 | FBR211D012 |
| | | | | | |
| | | **TRANSFORMER** | | | |
| T1801 | 52000047 | R12-4434 #220180 | | 91100008 | Wrapping Terminal C |
| | | | | | |
| | | | | | |
| | | | | | |
| | | **HERMETIC SEAL** | **LED UNIT** | | |
| | 91001102 | A-102 | Symbol No. | Parts No. | Description |
| | | | PB-1948 | 60419480 | Printed Circuit Board |
| | | | | 019480AZ | PCB with Components |
| | 91100008 | Wrapping Terminal C | | | |
| | | | | | |
| | | | | | |
| | | | | | **LED** |
| | | | Q2001–2009 | 20900140 | GD4-203SRD |
| | | | | | |
| **VR UNIT** | | | | | |
| Symbol No. | Parts No. | Description | | | |
| PB-1947 | 60419470 | Printed Circuit Board | | | **RESISTOR** |
| | 019470AZ | PCB with Components | R2001–2009 | 41143681 | Carbon Film 1/4 TJ 680 Ω |
| | | | | | |
| | | | | | |
| | | | | | |
| | | **TRANSISTOR** | | | |
| Q1901, 1902 | 22318154 | 2SC1815Y | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | **DIODE** | | | |
| D1901–1915 | 21015550 | Silicon 1S1555 | | | |
| D1916, 1917 | 21090011 | " 10D1 | | | |
| | | | | | |

## SW UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| PB-1928 | 6049280 | Printed Circuit Board |
| | 019280AZ | PCB with Components |
| | | |
| | | |
| | | |
| | | **SWITCH** |
| S2101 | 64000101 | SLE-62301 |
| S2102, 2104 | 64000103 | SLE-62251 |
| S2103 | 64000108 | SLE-64251 |

## ACCESSORIES

| Symbol No. | Parts No. | Description |
|---|---|---|
| | | Connection Cable A |
| | | " " B |
| | | " " C |
| | 67020001 | RCA Pin Plug STP-58 |
| | 73000004 | Fuse 5A |
| | 73000002 | " 2A (100–117V) |
| | 73000001 | " 1A (200–234V) |


YAESU