INSTRUCTION MANUAL

FT-107M

YAESU MUSEN CO., LTD.

YAESU
ALL SOLID STATE HF SSB TRANSCEIVER
FT-107M

GENERAL DESCRIPTION

The FT-107M is a precision-engineered, high-performance HF transceiver of advanced design, featuring all band coverage (160~10 meters) on SSB, CW, AM, and FSK. This transceiver operates at an input power of 240 watts on SSB/CW, and 80 watts on AM/FSK.

The all-solid-state design allows instant band changes, without so much as a preselector adjustment. Digital plus analog frequency display is used in this transceiver, with an advanced LSI frequency counter providing accurate frequency readout without calibration when switching modes. VOX, an RF speech processor, and a built-in SWR meter are included for maximum versatility.

Yaesu's exciting memory circuitry is available as an option, providing up to twelve channels of frequency memory, with clarifier adjustment allowing offset from memory channels. And Yaesu's new Digital Memory Shift (DMS) allows up to 500 kHz offset from any memory channel, in 100 Hz steps programmed by a photo-interrupter control. When the memory option is installed, an optional scanning microphone may be used to provide up/down scanning with finger-tip ease, using pushbuttons on the microphone.

The FT-107M receiver section features a Schottky diode ring mixer, plus individually-tuned input bandpass filter networks, for excellent intercept characteristics. An audio peak/notch filter is also included, in addition to Yaesu's variable IF bandwidth feature, which uses two 8-pole filters to provide continuously variable width of the IF passband from 300 Hz to 2.4 kHz.

Designed for operation from a 13.5 VDC supply, the FT-107M may be used with either the FP-107 internal AC power supply or the FP-107H external AC power supply/speaker console. Either supply will provide excellent regulation, for many years of satisfying operation.

We recommend that you read the following pages carefully, so as to derive maximum enjoyment from the feature-packed FT-107M.

SPECIFICATIONS

GENERAL

Frequency coverage:

160 m 1.8 – 2.0 MHz

Transmitter frequency stability:

±300 Hz after 10 minute warmup; less than 100 Hz after 300 minute warmup

SEMICONDUCTORS

Transistor

2SA564A	2	2SC1674L	1
2SA733	5	2SC1815GR	10
2SA952L	13	2SC1815Y	12
2SC372Y	2	2SC1959Y	4
2SC380Y	25	2SC2290	2
(2SC380TM-Y)		2SC2331	1
2SC535A	1	2SC2395	2
2SC735Y	1	2SD235Y	1
2SC1000GR	3	MPS-A13	1
2SC1583	2	2N4427	2
2SC1589	1		

FET

2SK19GR	17	3SK73	2
3SK51-03	7	J-310	1

IC

μPA54H	1	MSM9520RS	1
μPC324C	1	MC14011B	1
μPC2002H	1	MC14016P	1
TA7060P	1	NJM78L05	1
TA7063P	1	μPC14305	1
SN76514N	1	μPC14308	3
34024P	1		

Germanium Diode

1N270(GB)	18	1S1007(GB)	34

Silicon Diode

10D1	2	1S1555	148
10D10	4		

Schottky Barrier Diode

1SS16	10

Varactor Diode

FC63	1	1S2236	1
1S2209	1		

Zener Diode

YZ-033	1	WZ090	1

LED

LN224RP	7	GD4203SRD	3

LED Display

5082-7623	6

ACCESSORIES

The following accessories are included with your FT-107M

DC Power cord	1
Speaker plug	1
RCA plug	1
DC fuse (20A)	1
Extender legs (30 mm)	2
Pad for legs	2

FT-107 SERIES MODEL CHART

FEATURE	FT-107M
ALL BAND CRYSTALS	○
MEMORY UNIT/DMS	X
CW FILTER	X
AM FILTER	X
RF SPEECH PROCESSOR	○
MICROPHONE (STANDARD)	X
MICROPHONE (SCANNING)	X
AC POWER SUPPLY	X

○ = Standard feature X = Available option

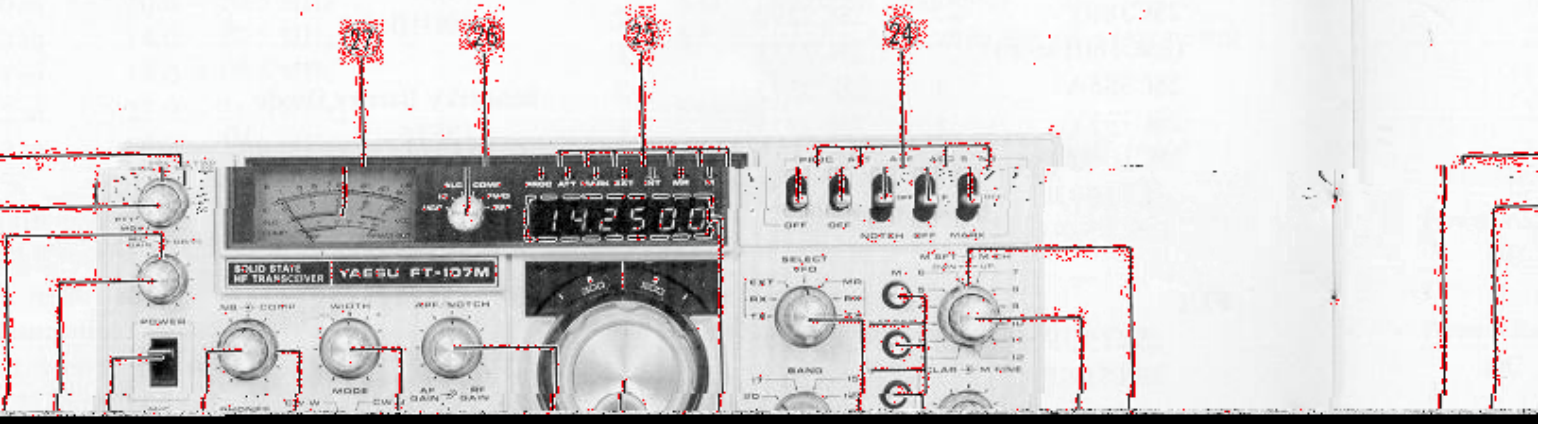
CAUTION

WHEN REPLACING FUSES IN THE DC CABLE, USE ONLY A 20 AMPERE FUSE. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY USE OF AN IMPROPER FUSE. NEVER CONNECT AC POWER DIRECTLY TO THE REAR PANEL DC POWER CONNECTOR.

FRONT PANEL CONTROLS AND SWITCHES

...nsceiver has been specifically designed for ...operation. However, the operator may not ...liar with the function of some of the con... ...nd improper adjustment thereof may de... ...grade transceiver performance. Therefore, be certain that you understand the function of every control and switch before operating the FT-107M.

...This tw... ...case of ... ...be fami... ...trols, a...



(11) WIDTH

This control varies the IF bandwidth (except on AM) from 2.4 kHz down to 600 Hz.

(12) AF GAIN

This control varies the audio output level from the speaker or headphones. Clockwise rotation increases the audio output level.

(13) RF GAIN

This control varies the gain of the receiver RF and IF amplifiers. For proper S-meter operation, this meter should be set fully clockwise.

(14) APF/NOTCH

This control varies the frequency response of the audio peak/notch filter. The peak/notch filter may be varied over the range 300 Hz-1500 Hz.

(15) MAIN TUNING KNOB

This is the main frequency tuning dial for the transceiver.

(16) ANALOG AND DIGITAL DISPLAYS

The analog display is calibrated every 50 kHz, with 1 kHz marks providing finer resolution. The digital display provides resolution to 100 Hz.

(17) BAND

This switch selects the desired band.

(18) SELECT SWITCH

This switch selects the means of frequency control for the transceiver. The details below apply to the fully equipped FT-107M.

TX EXT — The transmit frequency is controlled by the FV-107 external VFO (option), while the receive frequency is controlled by the FT-107M internal VFO.

RX EXT — The receive frequency is controlled by the FV-107 external VFO (option), while the transmit frequency is controlled by the FT-107M internal VFO.

EXT — The transceive frequency is controlled by the FV-107 external VFO (option).

MR — The transceive frequency is controlled by the memory unit and/or the DMS (Digital Memory Shift) control.

RX MR — The receive frequency is controlled by the memory unit and/or DMS, while the transmit frequency is controlled by the internal VFO.

TX MR — The transmit frequency is controlled by the memory unit and/or DMS, while the receive frequency is controlled by the internal VFO.

(19) PUSH SWITCHES (M, M SET, TX CLAR, RX CLAR)

M — Push the M button to store a frequency in memory.

M SET — Push this switch to activate the DMS system.

TX CLAR / RX CLAR — While using the internal VFO or memory, push the TX CLAR switch to provide offset from the TX frequency. Push the RX CLAR button to provide offset of the receive frequency, and push both buttons to provide offset of the transceive frequency from the dial frequency.

(20) CLARIFIER

The CLARIFIER allows offset from the VFO or memory frequency, according to the selection made by pushing the TX CLAR and/or RX CLAR buttons.

(21) M FINE

This control allows fine tuning during memory operation.

(22) M SET

This control activates the DMS system, allowing offset tuning from a memory channel in 100 Hz steps. The M FINE control may, in turn, be used to tune between the 100 Hz steps.

(23) M CH

This control selects the desired memory channel.

(24) LEVER SWITCHES

PROC — This switch activates the RF speech processor.

ATT — This switch activates a 20 dB attenuator in the incoming signal path.

APF/ NOTCH — This control selects either the Audio Peak Filter (APF) or the audio notch filter.

AGC — This switch selects the AGC recovery time constant. Selection of slow, fast, and AGC OFF is possible.

NB/MARK — This switch selects the noise blanker (NB) or the crystal calibrator. The latter feature is useful in receiver servicing, as it provides a signal at the antenna input which will serve as a reference.

(25) INDICATORS (PROC, ATT, MARK, EXT, INT, MR, M)

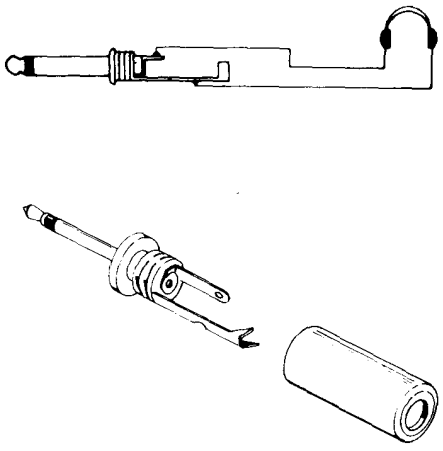
These indicators show the operating condition for the speech processor (PROC), the 20 dB attenuator (ATT), the crystal calibrator (MARK), external or internal VFO (EXT, INT), and the memory system (MR, M).

(26) METER SWITCH

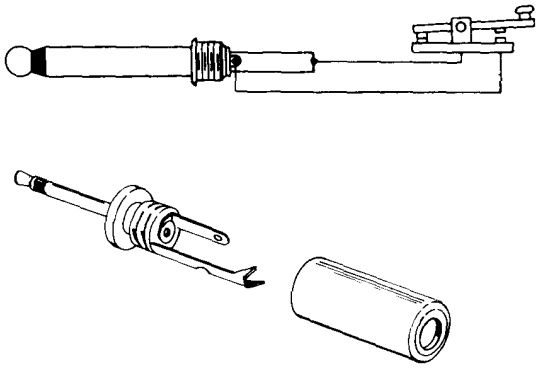
This switch selects meter indication of Vcc, Ic, ALC, compression (COMP), forward relative power (FWD), and reflected relative power (REF).

(27) METER

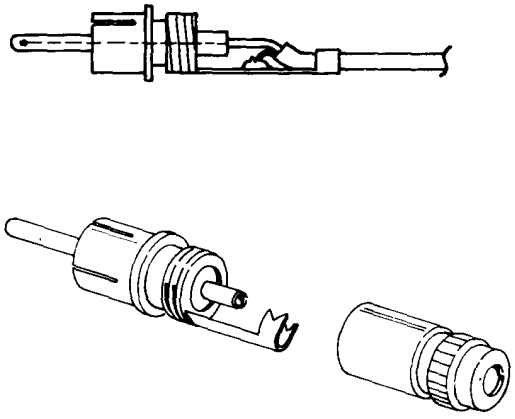
The meter will display transceiver operating conditions, according to the setting of the meter switch.



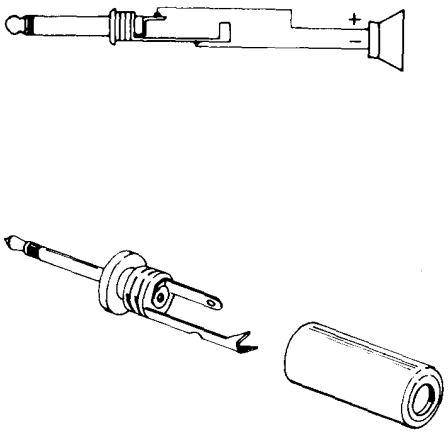
HEADPHONE CONNECTIONS



KEY PLUG CONNECTIONS

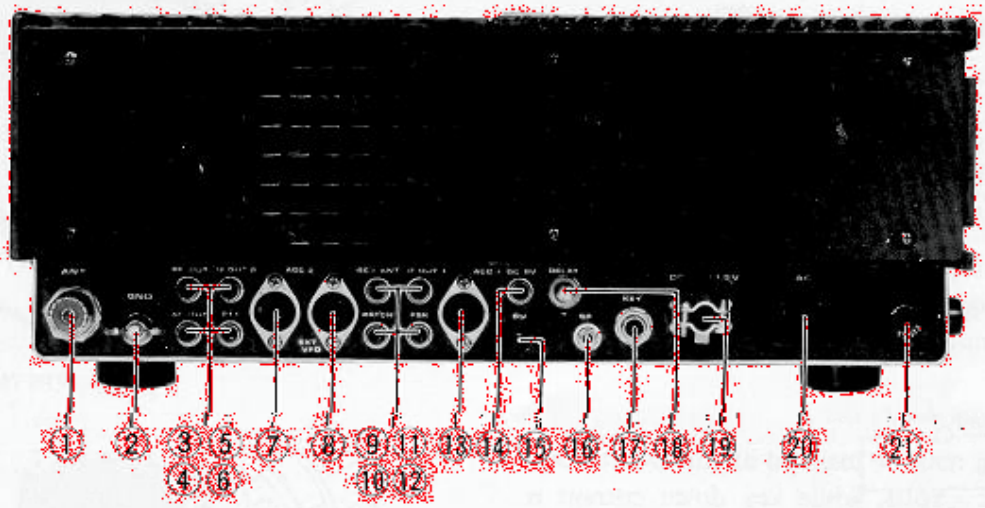


PHONO PLUG CONNECTIONS



EXTERNAL SPEAKER CONNECTIONS

REAR PANEL CONNECTIONS



(1) ANT

This is a standard UHF type female jack for connection to the antenna.

(2) GND

For best performance and safety, a good ground should be connected at this point.

(3) RF OUT

This jack provides 300 mV RMS at 50 ohms for connection to the FTV-107R transverter.

(4) AF OUT

This is an audio output jack, providing 300 mV of audio output for recording purposes. This jack is not disabled by insertion of a headphone or speaker plug into their respective jacks.

(5) IF OUT 2

This is wideband IF output for use with a band scope (such as the YO-901).

(6) PTT

This jack accepts push-to-talk control. When using a footswitch, it should be connected at this point.

(7) ACC 2

This is a 7 pin DIN jack for use with the FTV-107R transverter.

(8) EXT VFO

This is a 6 pin DIN jack for interconnection to the FV-107 external VFO.

(9) RCV ANT

This jack provides for connection of an external receiver to the main station antenna. This jack is switched to the antenna in the receive mode only.

(10) PATCH

This is an auxiliary microphone input for use with a phone patch, etc.

(11) IF OUT 1

This jack provides narrow-band IF output for use with a monitorscope (such as the YO-901).

(12) FSK

This jack provides input for the FSK keying lead from your FSK terminal. The standard shift of 170 Hz is used.

(13) ACC 1

This is a 5 pin DIN jack for connection to a linear amplifier or other station equipment. Included are make and break relay connections, as well as the external ALC line.

(14) +8 V

This is a +8 volt DC line for connection to the FC-107 antenna tuner meter lamp.

(15) BU (BACKUP)

This jack is for connection to an external +3 V DC power source, in order to hold the FT-107M memory circuits when the transceiver is turned off.

(16) SP

This is a miniature phone jack for connection to an external speaker. Insertion of a plug into this jack automatically cuts off the internal speaker.

(17) KEY

Your key plug may be inserted at this point. Key-up voltage is 7 volts, while key down current is 1.5 mA.

(18) DELAY

This control varies the receiver recovery time constant for the VOX circuitry.

(19) DC 13.5 V

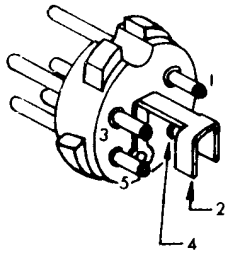
The DC cable should be connected at this point. **Never** connect AC power to the DC cable. Failure to observe this simple precaution will void the warranty. During AC operation with the FP-107, insert the DC dummy plug (supplied with the AC power supply) into this jack.

(20) AC

When using the internal FP-107 AC power supply option, the AC cord is connected at this point. Be certain to observe the proper voltage when using the FT-107.

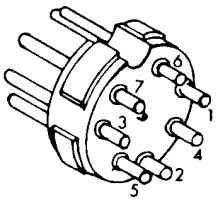
(21) FUSE

When using the FP-107 AC power supply, the AC line fuse is inserted at this point. For 100/110/117 VAC, use only a 10 amp fuse, and for 200/220/234 VAC, use only a 5 amp fuse.



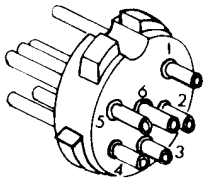
PIN No.	
1	−ALC IN
2	GND
3	TX GND
4	GND
5	RX GND

ACC 1 PLUG CONNECTIONS (FOR LINEAR AMPLIFIER)



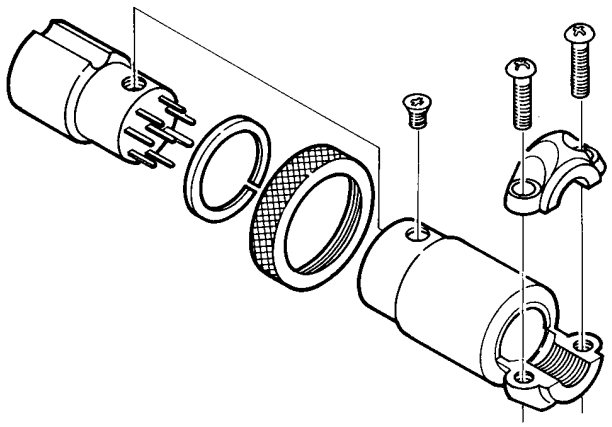
PIN No.	
1	CONTROL
2	8V
3	13.5V
4	CONTROL
5	8V
6	RX GND
7	TX GND

ACC 2 PLUG CONNECTIONS (FOR FTV-107R TRANSVERTER)



PIN No.	
1	EXT VFO IN
2	GND
3	EXT 8V
4	AGC
5	13.5V
6	8V

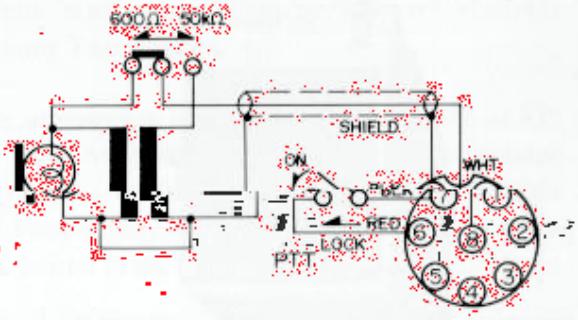
EXT VFO PLUG CONNECTIONS (FOR FV-107 EXTERNAL VFO)



MICROPHONE PLUG

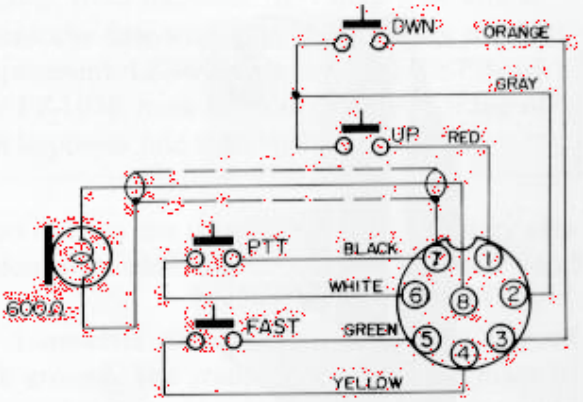
MICROPHONE CONNECTIONS

YM-34



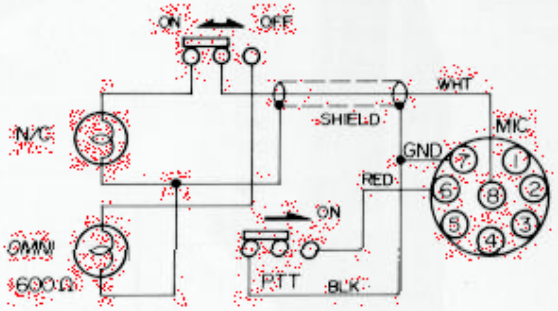
YM-34 MICROPHONE CONNECTIONS

YM-35



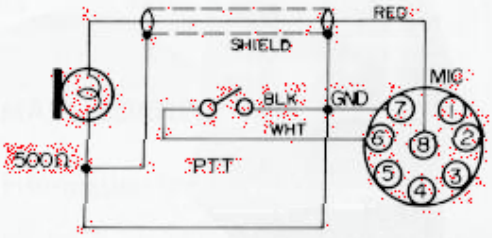
YM-35 MICROPHONE CONNECTIONS

YM-36

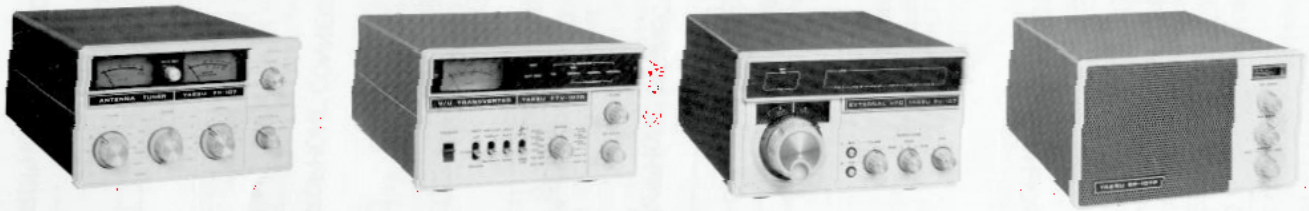


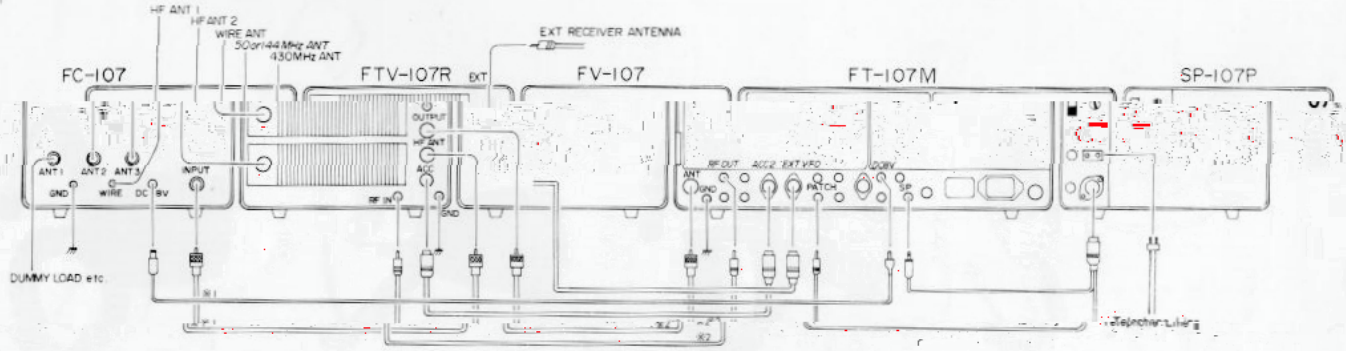
YM-36 MICROPHONE CONNECTIONS

YM-37



YM-37 MICROPHONE CONNECTIONS




HF ANT 1
HF ANT 2
WIRE ANT
50or144MHz ANT
430MHz ANT
EXT RECEIVER ANTENNA
FC-107
FTV-107R
EXT
FV-107
FT-107M
SP-107P
ANT 1
ANT 2
ANT 3
GND
WIRE
DC 8V
INPUT
OUTPUT
HF ANT
ACC
RF IN
GND
RF OUT
ACC2
EXT VFO
DOWN
ANT
GND
PATCH
SP
DUMMY LOAD etc
Telephone Line

INSTALLATION

The FT-107M is designed to be a single-unit transceiver for top-performance base station or mobile operation. For operation from AC mains, the optional FP-107 internal power supply or FP-107E external power supply/speaker are available from your Yaesu dealer. Please read the following sections carefully, so as to understand the important steps required for a successful installation.

supply/speaker console provide this voltage with excellent regulation. These options are available from your Yaesu dealer.

Before attempting operation of the FP-107 or FP-107E from AC mains, check to see that the voltage specification on the rear of the supply matches your local supply voltage. This inspection **must** be made before applying power to the equipment.

FP-107E Installation

Once the power transformer and fuse inspections have been duly completed, connect the AC cable of the FP-107E to the wall outlet. Insert the DC plug from the FP-107E into the FT-107M rear panel DC 13.5 V jack.

FP-107 Installation

The internal FP-107 option can be installed in a matter of minutes.

First remove the black covers from the rear panel. One of these covers the PA heat sink, while another covers the empty space to be occupied by the power supply. Remove the top cover of the FT-107M.

Recheck the wiring of the FP-107 transformer primary.

Connect the four pin female connector (red/black) from the FP-107 to P7 (red/black) of the FT-107M. Connect the large two-pin female connector (white/gray) from the FP-107 to P8 (white/gray) of the FT-107M. Connect the smaller 2 pin female connector (yellow pair) to the SENSOR 1 terminal of the CONTROL Unit. Refer to Figure 3 for details.

Slide the power supply rack into the chamber adjacent to the power amplifier stage. Secure the power supply rack using the four bolts marked "A" in Figure 3. Now install the large rear panel cover supplied with the power supply, using the six bolts used for the previous rear panel covers. These bolts are marked "B" in Figure 3.

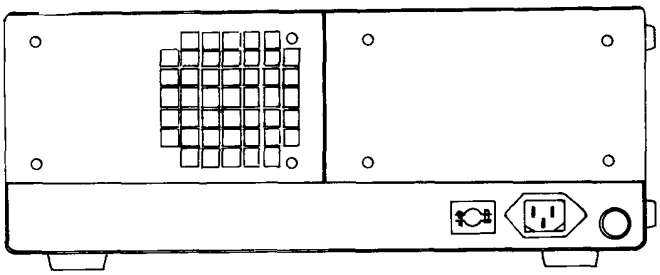


Figure 1
Rear apron before FP-107 installation

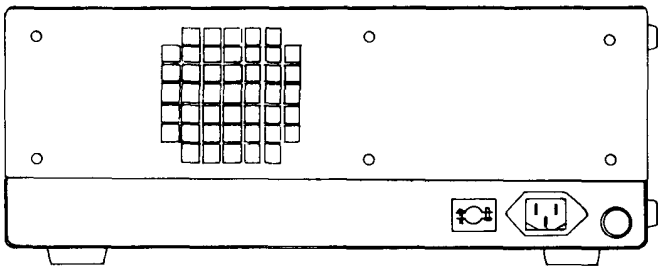


Figure 2
Rear apron after FP-107 installation

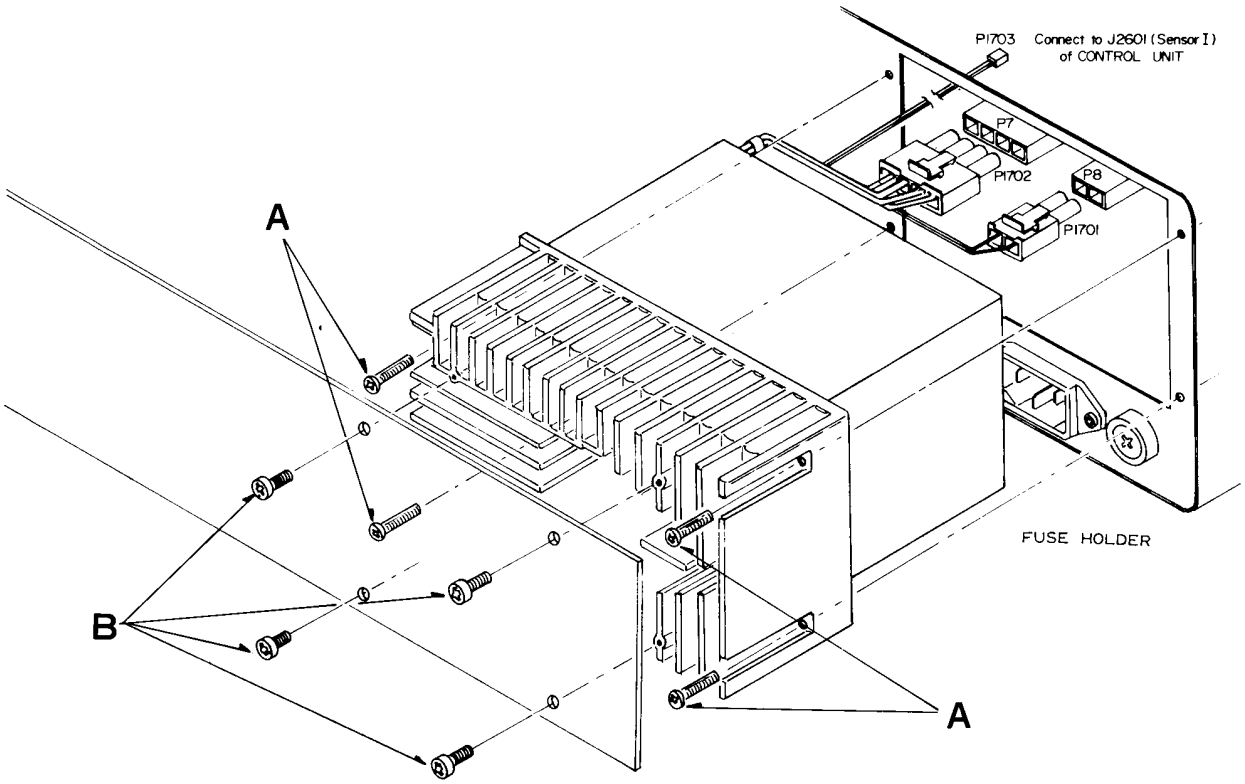


Figure 3

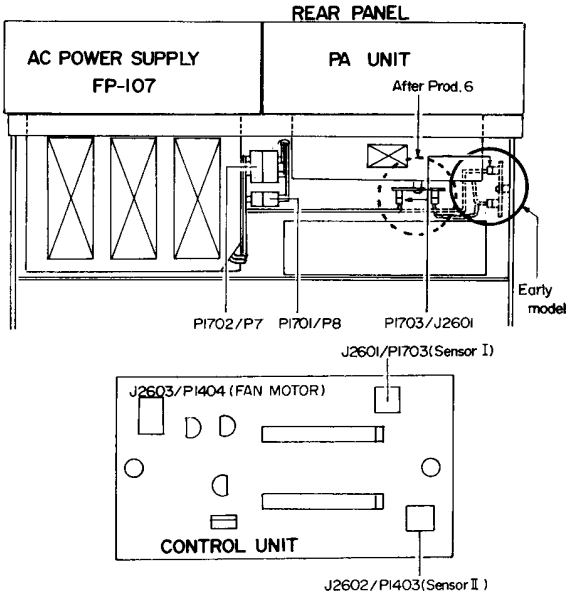


Figure 4

MOBILE INSTALLATION

The FT-107M is designed for operation from 13.5 [redacted]

DIAL CALIBRATION

The FT-107M digital display is a true frequency counter, so no calibration is required. When changing sidebands, the digital display will also change 3 kHz.

Analog Dial Calibration

SSB

(1) Set the MODE switch to the desired mode, USB or LSB.

(2) Set the NB/MARK switch to MARK.

(3) Rotate the VFO dial to the nearest 25 kHz point, as indicated on the digital display. Now align the analog dial skirt so that the bold calibration marking on the skirt is aligned with the vertical calibration point on the subdial window.

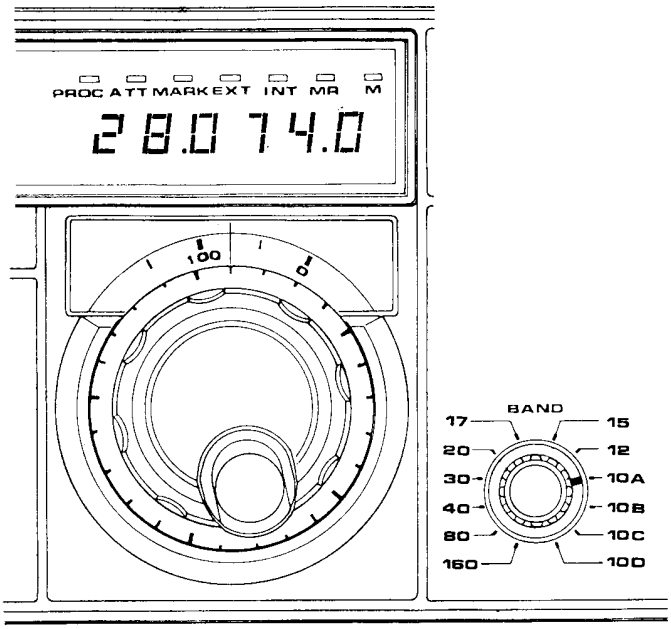
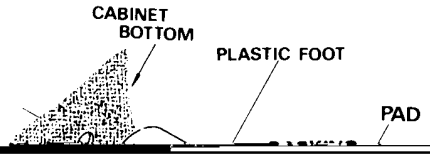


Figure 5.

BOTTOM PANEL FEET

The feet on the bottom panel may be changed, if it is desired to change the viewing angle for the VFO. In the accessory kit for your FT-107M, 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 the drawing for mounting details.



OPERATION

The tuning procedure for this transceiver is not complicated. However, care must be exercised when operating this equipment so that peak performance is obtained. The following paragraphs describe the procedure for operating the FT-107M.

INITIAL CHECK

Before connecting the transceiver to the DC power source, be certain that a fuse of the proper rating is in use. When using the FP-107 or FP-107E AC Power Supply, be certain that the voltage specification for the power supply matches your local AC supply voltage.

FREQUENCY SELECTION

Frequency selection on the FT-107M is by means of a digital as well as an analog display. The digital display reads the true frequency, with accounting for the carrier frequency. Therefore, no recalibration of the display is necessary when changing modes. The calibrator is chiefly useful for making receiver adjustments.

The digital display allows resolution to 100 Hz, while the analog skirt on the main dial allows 1 kHz. One revolution of the main tuning dial corresponds to a frequency change of 25 kHz. The marker signal may be used to set the 5 kHz marking of the analog dial skirt.

A further coarse frequency determination may be made through the main dial window, which contains a sub-dial calibrated every 50 kHz.

RECEIVE OPERATION

(1) Connect a 50 ohm antenna to the rear panel ANT jack. Preset the controls and switches as follows:

POWER ..... OFF
VOX GAIN ..... PTT
NB ..... Fully counterclockwise
MODE ..... Desired mode
WIDTH ..... 12 o'clock position
AF GAIN . Adjust later for comfortable level
RF GAIN ..... Fully clockwise
APF/NOTCH knob ... 12 o'clock position
BAND ..... Desired band
RX CLAR ..... OFF
CLARIFIER ..... 12 o'clock position
M FINE ..... 12 o'clock position
ATT ..... OFF
APF/NOTCH switch ..... OFF
AGC ..... F
NB/MARK switch ..... OFF
METER VCC

(2) Turn the POWER switch ON. The meter lamp and digital display will become illuminated. The meter needle should deflect to within the VCC range at the right side of the meter scale.

(3) Adjust the AF GAIN control for a comfortable listening level. There is no "preselector" or other peaking required for this receiver, because the preselector networks are all preset.

(4) When pulse-type noise is encountered, turn the NB switch ON. NOW, rotate the control clockwise until the noise pulses are eliminated. The best setting of the blanker for overall receiver performance is one that just eliminates the noise pulses, without being advanced too far. No noise blanker will eliminate all types of noise, but the FT-107M blanker is a state of the art design that provides significantly improved blanking capability over earlier designs.

(5) For varying the width of the IF passband, rotate the width control. In the IF, two 8-pole crystal filters are used. One filter is fixed, and presents a boundary for the bandwidth. The center frequency of the IF is then varied across the passband of the second filter, using a mixing technique that results in no change of pitch on the received signal.

The result is continuously variable bandwidth, from 2.4 kHz down to approximately 300 Hz. This system is highly effective in eliminating high-pitched "buckshot" on SSB, as well as interfering CW signals.

The WIDTH system is defeated during AM operation, and the received signal bypasses the second IF filter.

(6) Under conditions of very heavy QRM, while operating CW, the APF (Audio Peak Filter) may be activated. Switch the APF/NOTCH lever to APF, and tune the APF/NOTCH control for maximum enhancement of the desired signal. The operator will observe that the background noise will be reduced dramatically, resulting in excellent signal to noise ratio.

(7) For elimination of an interfering carrier within the AF passband, set the APF/NOTCH switch to NOTCH. Then rotate the APF/NOTCH control carefully for the best nulling of the offending carrier. The notch is extremely sharp, so tuning is critical, but the excellent notch depth is extremely effective in eliminating interference.

(8) The RX CLARIFIER may be used if the incoming signal is drifting. Press the RX CLAR button, and rotate the CLARIFIER control, to activate the receiver offset tuning. The TX button may be pushed to allow offset of the transmit frequency, and both the TX and RX buttons may be pushed together to allow offsetting of the transceive frequency from the dial frequency.

(9) AGC time constant setting may be accomplished by setting the AGC switch for the desired recovery time, slow or fast. The AGC system may also be defeated by setting this switch to OFF.

(10) For extremely strong signals, 20 dB att...

TRANSMITTER OPERATION

The FT-107M transmitter is extremely easy to use, requiring only presetting of the controls and switches. No tuning procedure, other than an initial setting of the mic gain and RF processor level, is required.

When transmitting, it is important that you always have a dummy load or matched antenna connected to the antenna jack. The automatic final protection unit will reduce power if an improper load is connected.
When transmitting, **never** change the position of the MODE, BAND, nor the SELECT switch. It is possible for the final amplifier transistors to be damaged by transients generated by this kind of abuse. Please follow this simple precaution without fail.
The FT-107M contains a heat-sensing protection circuit for the final amplifier. Do not transmit at full power (e.g. key-down CW) for more than 30 seconds. If you have been key down for a 30 second period, we recommend two minutes of standby operation to allow the final transistors to recover to normal operating temperature.

The following paragraphs describe transmitter operation. If our guidelines are followed, the FT-107M will provide many years of trouble-free operation.

PRELIMINARY CHECKS

(1) Preset the controls and switches as follows:

(4) Advance the DRIVE control so that the IC reading on the meter reaches exactly 10 amperes.

the COMP control to the 10 o'clock position, and adjust the DRIVE control so that the ALC meter needle does not go beyond the ALC range of the meter. Now adjust the

(5) For semi-break-in operation, advance the VOX GAIN control to the point where the VOX relay is activated by the sidetone audio signal. The DELAY control, located on the rear panel, may be adjusted to control the VOX relay hang time.

(6) For QRP operation, reduce the level set by the DRIVE control. The power output may be reduced to 0 watts, if desired.

FSK OPERATION

The FT-107M is designed for 170 Hz FSK operation.

(1) Connect the lead from your terminal unit to the rear panel FSK jack.

(2) Set the MODE switch to FSK, and set the VOX GAIN control to MOX. Advance the DRIVE control for a reading of 5 amps on the IC meter. Do **not** operate the FT-107M on FSK at the same power levels as stipulated in the sections regarding SSB and CW operation.

(3) The keying signal from your terminal will now activate the FT-107M transmitter. When using the optional CW filter, the CW filter will automatically be selected during FSK operation.

AM OPERATION

(1) Set the MODE switch to AM, the METER switch to IC, and rotate the MIC GAIN and DRIVE controls fully counterclockwise.

(2) Close the microphone PTT switch, and advance the DRIVE control until the reading on the IC meter reaches 5 amps.

(3) Speak into the microphone in a normal voice, and advance the MIC GAIN control until a

SELECT SWITCHES/MEMORY OPERATION

(Note: The memory unit is an available option for the FT-107M)

Frequency control on the FT-107M is by means of the internal VFO, the memory and DMS circuitry, an external VFO (such as the FV-107), or various combinations of the three. The SELECT switch will determine the circuitry in control of each mode, and the selection procedure is described below:

VFO	This position selects TX/RX operation on the FT-107M internal VFO.
MR	This position selects TX/RX operation on the FT-107M memory system.
RX MR	This position selects RX operation on the memory, with TX operation on the FT-107M internal VFO.
TX MR	This operation selects TX operation on the memory, with RX operation on the FT-107M internal VFO.
EXT	This position selects TX/RX operation on the FV-107 external VFO.
RX EXT	This position selects RX operation on the FV-107, with TX operation on the FT-107M internal VFO.
TX EXT	This position selects TX operation on the FV-107, with RX operation on the FT-107M internal VFO.

In addition, changing of and offset from memory channels is controlled from the front panel. The controls of interest are as follows:

M	This button is used to store a frequency in memory.
M SFT	This button activates the DMS circuit.
RX CLAR	This button selects offset tuning of the receive frequency during VFO

M FINE — The memory fine tuning control provides a very fine tuning adjustment for memory channels. The available offset range is approximately ± 500 Hz, making this control ideal for tuning between the 100 Hz DMS steps.

M SFT — The Digital Memory Shift (DMS)

If DX1DX starts to drift, press the RX CLAR button, and use the clarifier. Alternatively, for slight drifting, use the M FINE control. If DX1DX decides to QSY 10 kHz, press the M SFT button, and rotate the M SFT control to the new frequency (e.g. 7080 kHz). The M SFT control will not affect the transmit frequency, because the SELECT switch is

NOTES ON DMS OPERATION

Tune the main dial to 14195 kHz, set the M CH switch to 1, and push M. Now set the SELECT

CW/AM FILTER (OPTION) INSTALLATION

(1) Remove the top case by removing the mounting screws, as shown in Figure 9.

(2) Remove the FILTER Unit from its mounting position, shown on page 23.

(3) For CW filter installation, remove jumpers "B" from the foil side of the board. For AM filter installation, remove the jumpers marked "A" in Figure 7.

(4) Mount the filter to be installed in the position shown in Figure 7. The CW filter is mounted using a nut, lockwasher, and spring washer. The nut should be tightened so that it is snug, but excessive torque should not be applied. Refer to Figure 8 for mounting details.

(5) When the CW filter is installed, the CW-W position will select CW operation using the SSB filter, while the CW-N position will select operation using the CW filter. The CW filter will also be switched into the line for FSK operation.

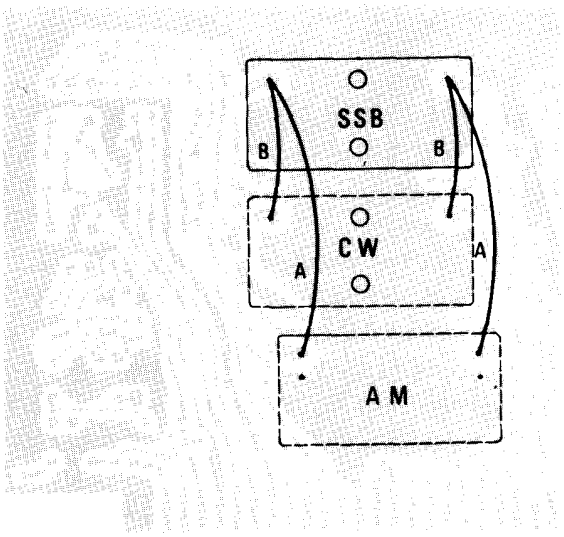


Figure 7.

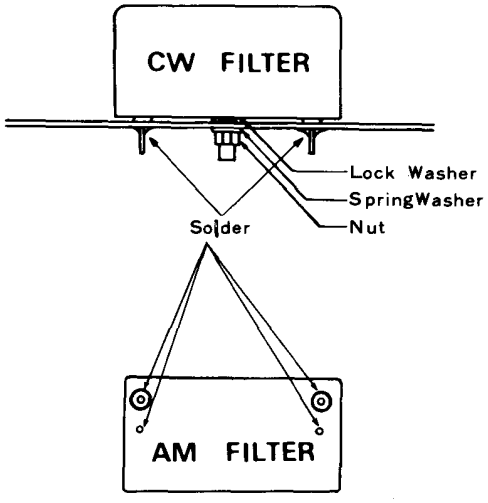
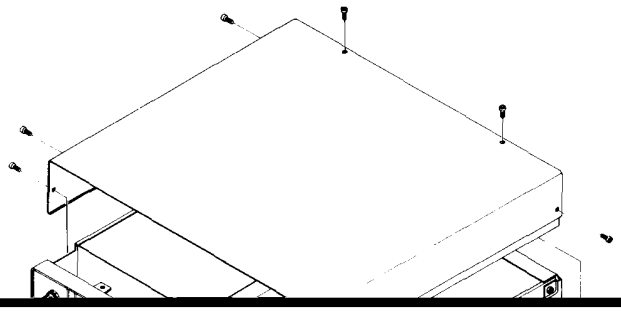


Figure 8.



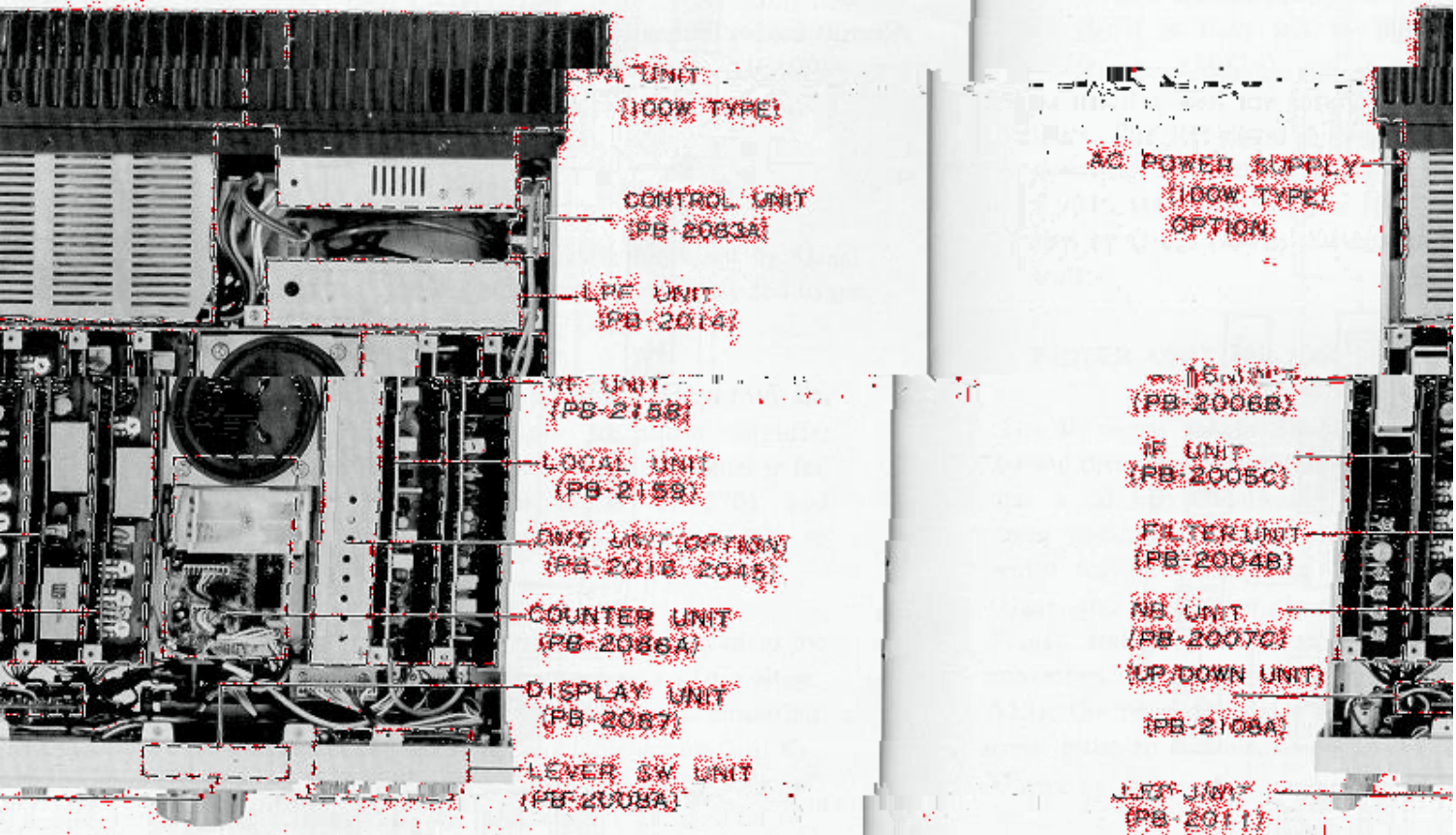
INSTALLATION OF DMS UNIT AND MEMORY BACKUP BATTERIES (OPTION)

Installation of the DMS unit is easily accomplished in minutes. There are no soldered connections required for this installation.

Remove the top cover of the transceiver, as shown in Figure 9.

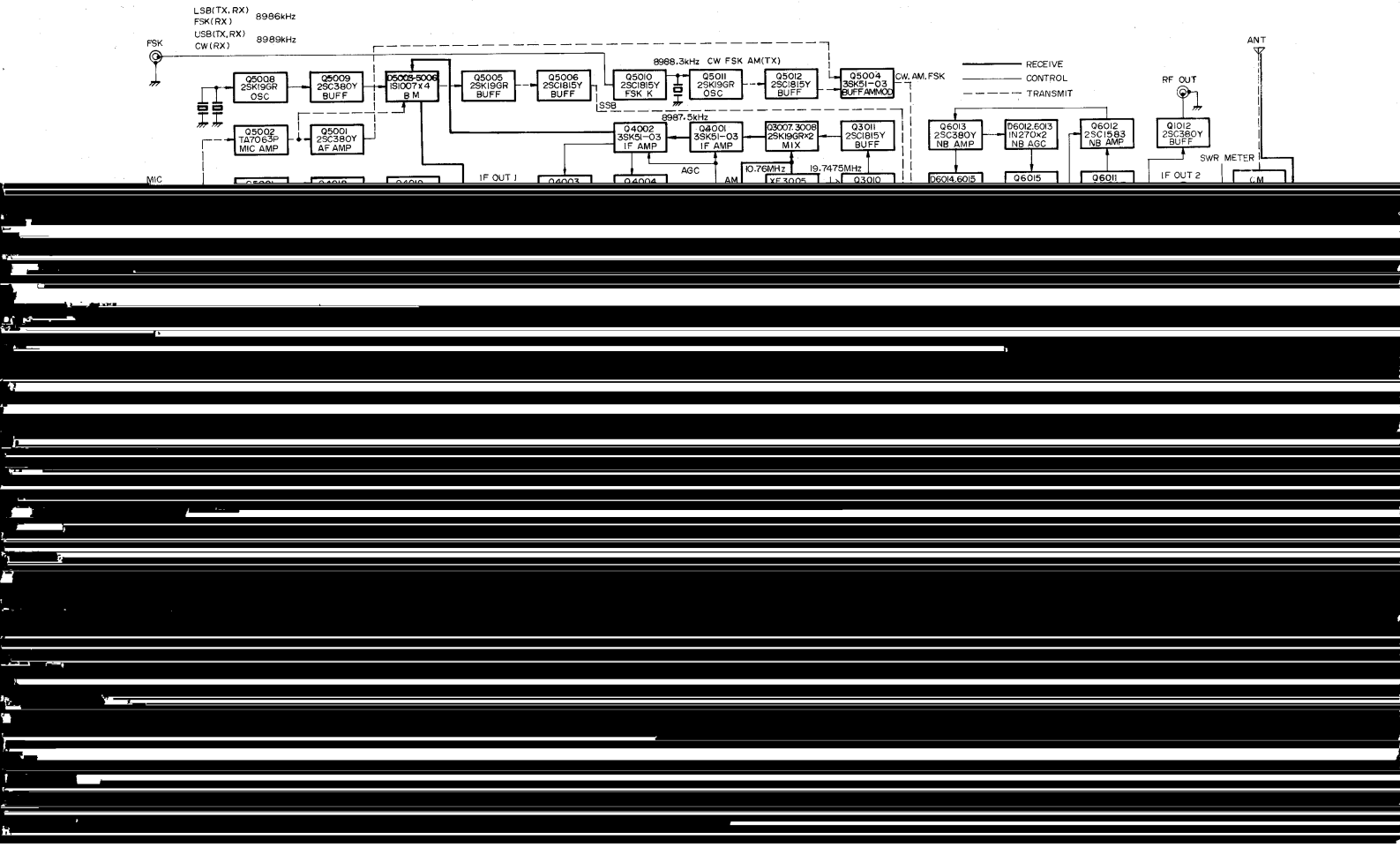
Install the DMS Unit in the position shown in Figure 10. Do not force the connection, but gently [illegible] the circuit board in its slot [illegible] mated with the two [illegible] pressure will easily connector. Secure the circuit with the two screws provided.

The holder for the optional backup battery should be installed in the position shown in Figure 10. Connect the battery connector to the battery holder. "AA" size penlight cells (two required) may then be used to activate the memory backup feature (batteries not supplied). Be certain to observe the proper polarity of the batteries before connecting the connector to the battery holder.



TOP VIEW

Figure 10


LSB(TX, RX)
FSK(RX)
8986kHz
USB(TX, RX)
CW(RX)
8989kHz
FSK
ANT
RECEIVE
CONTROL
TRANSMIT
8988.3kHz CW FSK AM(TX)
Q5008 2SK19GR OSC
Q5009 2SC380Y BUFF
Q5008-5006 IS1007X4 B.M
Q5005 2SK19GR BUFF
Q5006 2SC1815Y BUFF
Q5010 2SC1815Y FSK K
Q5011 2SK19GR OSC
Q5012 2SC1815Y BUFF
Q5004 3SK51-03 BUFF AMMOD
CW. AM. FSK
SSB
8987.5kHz
Q5002 TA7063P MIC AMP
Q5001 2SC380Y AF AMP
Q4002 3SK51-03 IF AMP
Q4001 3SK51-03 IF AMP
Q3007.3008 2SK19GR×2 MIX
Q3011 2SC1815Y BUFF
Q6013 2SC380Y NB AMP
D6012.6013 1N270×2 NB AGC
Q6012 2SC1583 NB AMP
Q1012 2SC380Y BUFF
RF OUT
SWR METER
MIC
IF OUT 1
Q4003
Q4004
AGC
AM
10.76MHz
XF3005
19.7475MHz
Q3010
D6014.6015
Q6015
Q6011
IF OUT 2
C.M

CIRCUIT DESCRIPTION

The block diagram, and the following circuit description, should provide you with a better understanding of the design of the FT-107M. Refer to the schematic diagram for specific component details.

RECEIVER

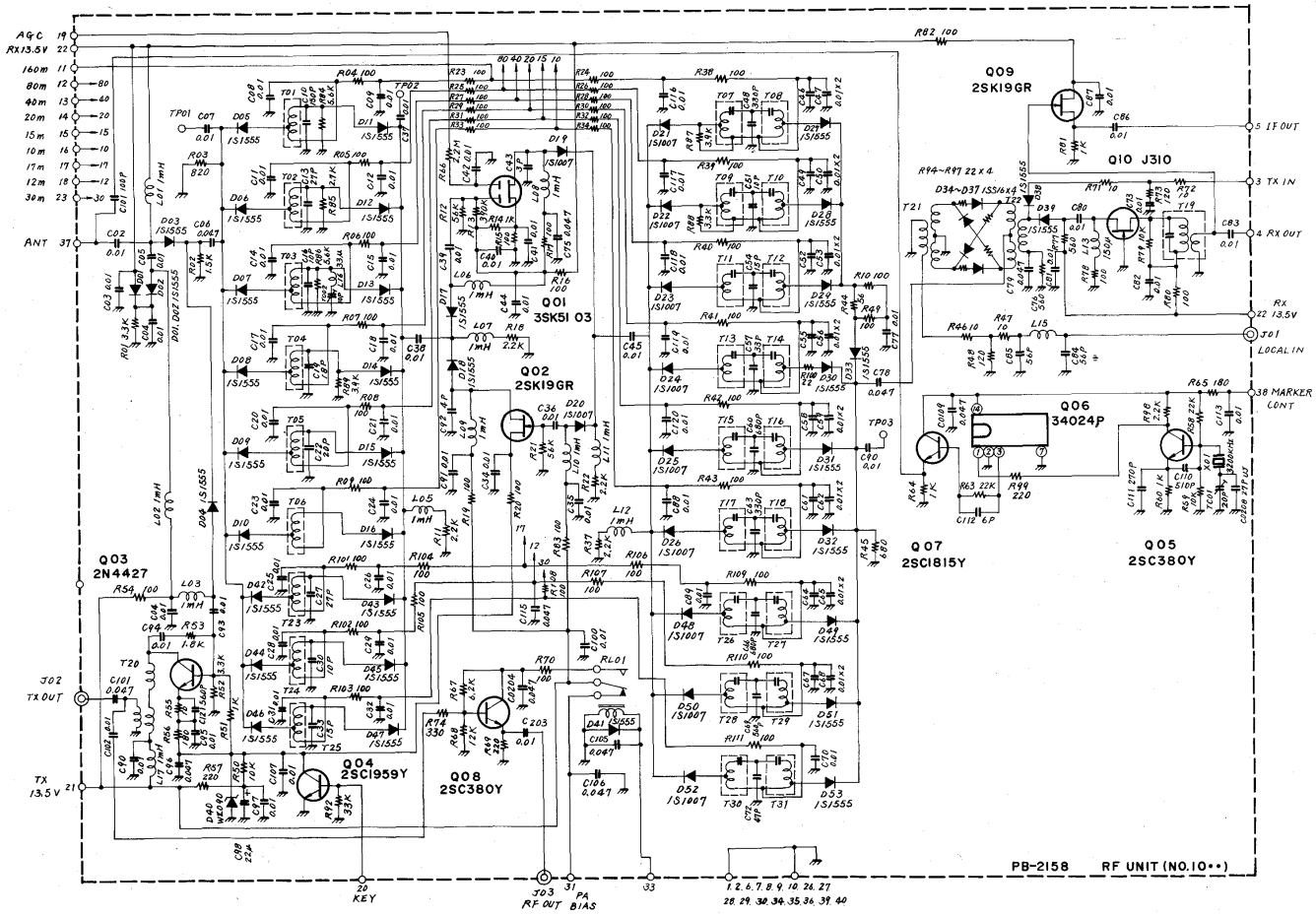
The RF signal from the antenna is passed through antenna relay RL_2, lamp fuse F_{1801}, a high-pass filter (f_c = 1.7 MHz), and delivered to the RF Unit via the RF Mother board.

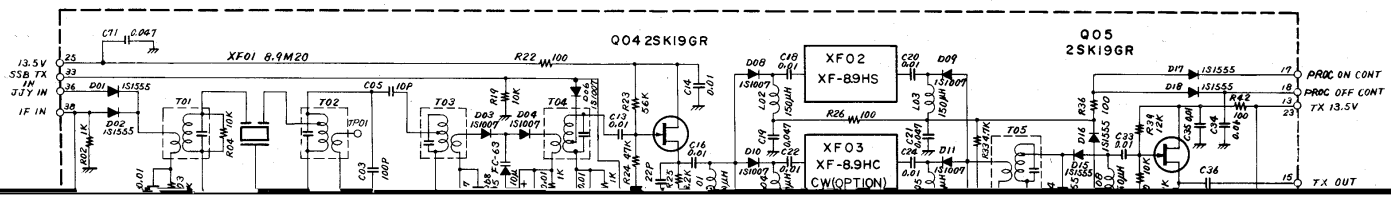
RF UNIT (PB-2158)

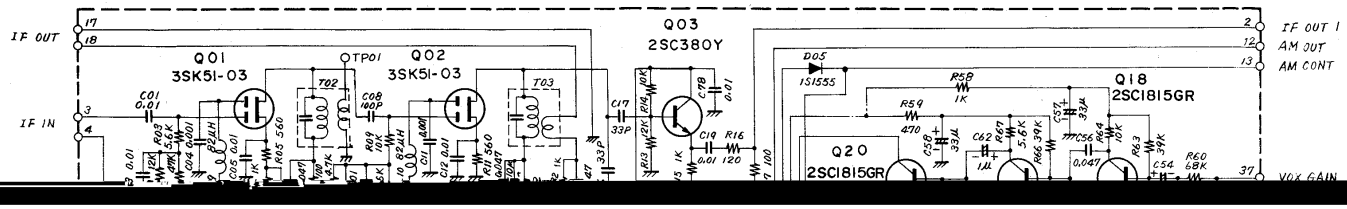
The RF signal is amplified by RF amplifier Q_{1001} **(3SK51-03)**, a dual-gate MOSFET with superior linearity and low noise figure. The input and output of the RF amplifier are protected by preset [illegible]

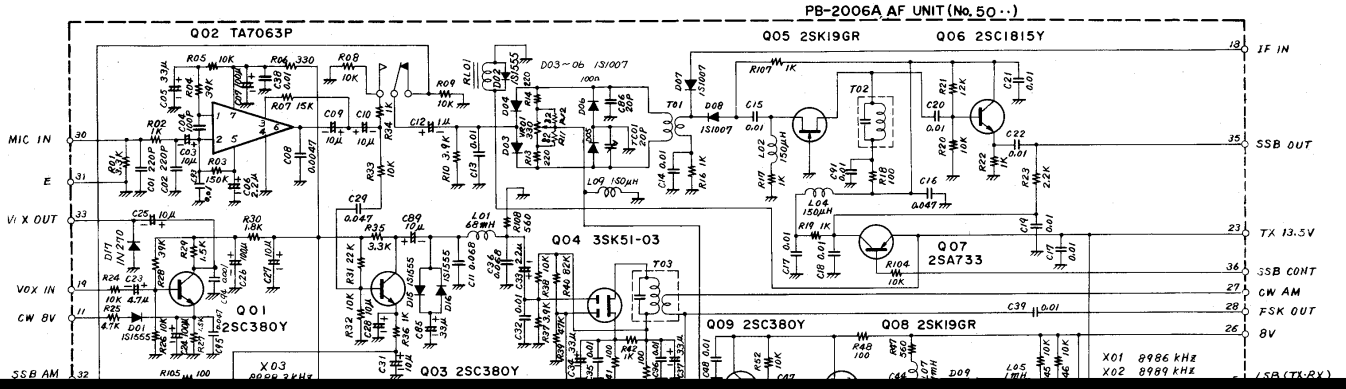
The IF signal is then fed to gate 1 of the IF first mixer, Q_{3006} **(3SK51-03)**, where the IF signal is heterodyned with a 19.7475 MHz ± Δf local signal delivered from crystal oscillator Q_{3010} **(2SC535A)** and buffer amplifier Q_{3012} **(2SC1815Y)**, resulting in a signal of 10.75 MHz ± Δf. The new 10.76 MHz signal is passed through crystal filter XF_{3005}, and delivered to IF second mixer Q_{3007}/Q_{3008} **(2SK19GR)**, where the filtered signal is heterodyned with the 19.7475 ±Δf local signal delivered from Q_{3001} **(2SC1815Y)**, producing an 8.985 MHz IF signal, the same as the original IF.

This process varies the 10.76 MHz IF signal across the passband of XF_{3005}, without producing a change in the main 8.9875 MHz IF. The combination of filters XF_{3002} and XF_{3005} provides continuously variable width of the IF passband. The frequency of crystal oscillator Q_{3001} is con[illegible]


AGC 19
RX13.5V 22
160m 11
80m 12
40m 13
20m 14
15m 15
10m 16
17m 17
12m 18
30m 23
ANT 37
TX 13.5V 21
J02 TX OUT
20 KEY
J03 RF OUT
31 PA BIAS
33
1, 2, 6, 7, 8, 9, 10, 26, 27 28, 29, 30, 34, 35, 36, 39, 40
Q01 3SK51 03
Q02 2SK19GR
Q03 2N4427
Q04 2SC1959Y
Q05 2SC380Y
Q06 34024P
Q07 2SC1815Y
Q08 2SC380Y
Q09 2SK19GR
Q10 J310
D34~D37 1SS16X4
5 IF OUT
3 TX IN
4 RX OUT
RX 22 13.5V
J01 LOCAL IN
38 MARKER CONT
PB-2158 RF UNIT (NO.10••)


Q04 2SK19GR
Q05
2SK19GR
XF01 8.9M20
XF02
XF-8.9HS
XF03
XF-8.9HC
CW(OPTION)
13.5V
SSB TX
IN
JJY IN
IF IN
PROC ON CONT
PROC OFF CONT
TX 13.5V
TX OUT


IF OUT
17
18
IF IN
3
4
Q01
3SK51-03
TP01
Q02
3SK51-03
T02
T03
Q03
2SC380Y
D05
1S1555
R58
1K
Q18
2SC1815GR
R59
470
Q20
2SC1815GR
R67
5.6K
R66
39K
R64
10K
R63
39K
R60
68K
2
12
13
37
IF OUT 1
AM OUT
AM CONT
VOX GAIN


PB-2006A AF UNIT (No. 50 ··)
Q02 TA7063P
Q05 2SK19GR
Q06 2SC1815Y
Q01 2SC380Y
Q03 2SC380Y
Q04 3SK51-03
Q07 2SA733
Q08 2SK19GR
Q09 2SC380Y
MIC IN
E
VOX IN
CW 8V
SSB AM
IF IN
SSB OUT
TX 13.5V
SSB CONT
CW AM
FSK OUT
8V
X01 8986 kHz
X02 8989 kHz

AF UNIT (PB-2006)

The incoming SSB/CW/FSK IF signal is fed through diode switch D_{5007} (**1S1007**), and delivered to the ring demodulator, consisting of D_{5003}–D_{5006} (**1S1007**), which demodulates the IF signal into audio using the carrier signal delivered from Q_{5009} (**2SC380Y**).

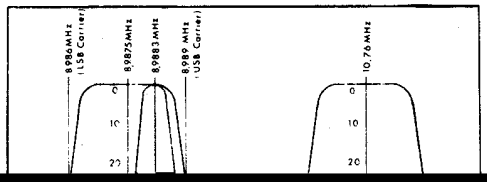
The carrier oscillator, Q_{5008} (**2SK19GR**), oscillates at 8986 kHz for LSB and FSK, and at 8989 kHz

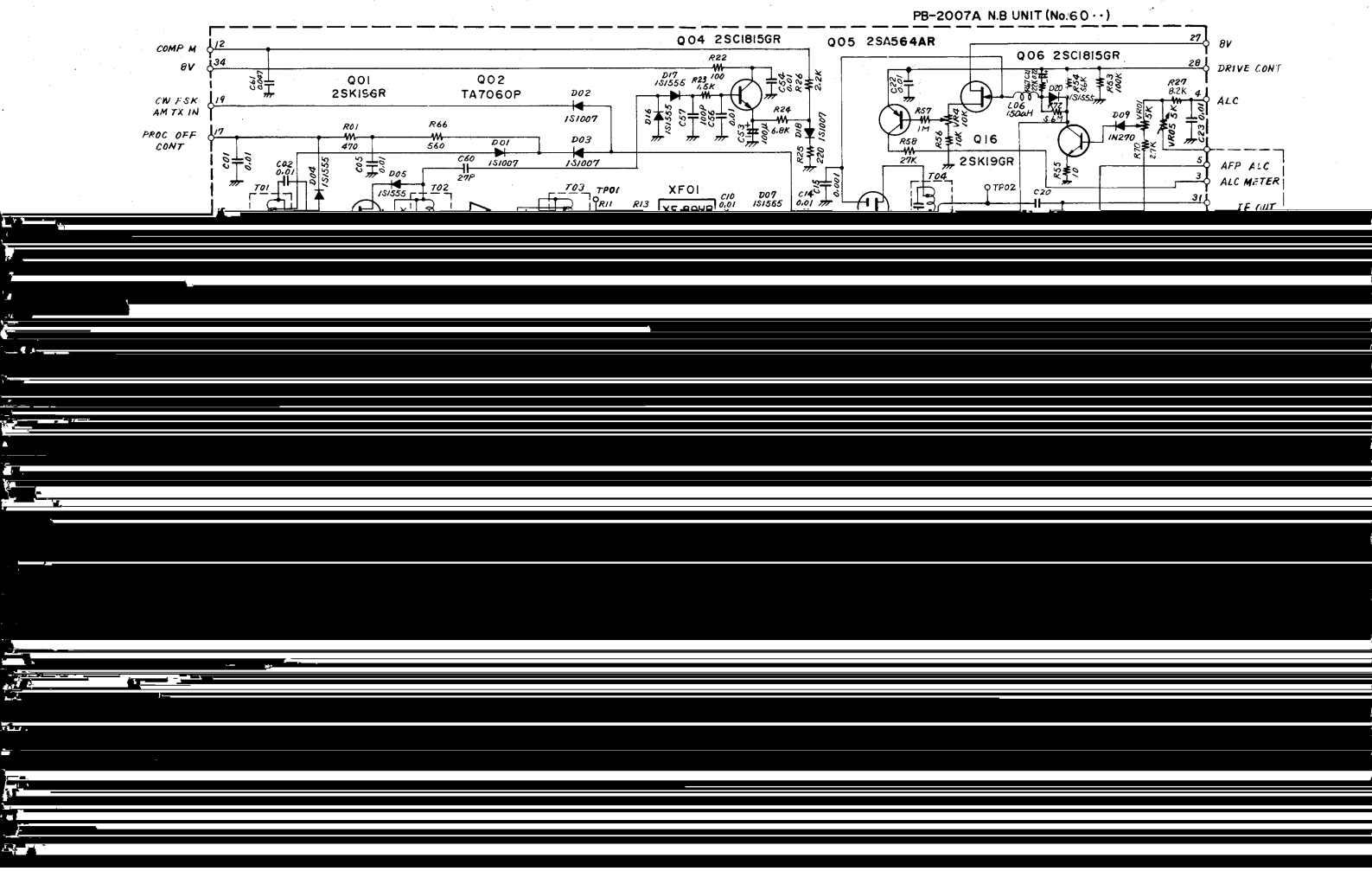
Operational amplifier Q_{5015} (μ**PC324C**) is placed in the audio circuit by the APF/NOTCH switch on the front panel. For APF operation, a selective active filter is formed by two sections of Q_{5015}, and the output is amplified by Q_{5016} (**2SC1000GR**) prior to delivery to Q_{5017}. Two sections of Q_{5015} are also used for the high-Q notch filter. VR_3 provides for adjustment of the center frequency of the audio peak and notch filters.

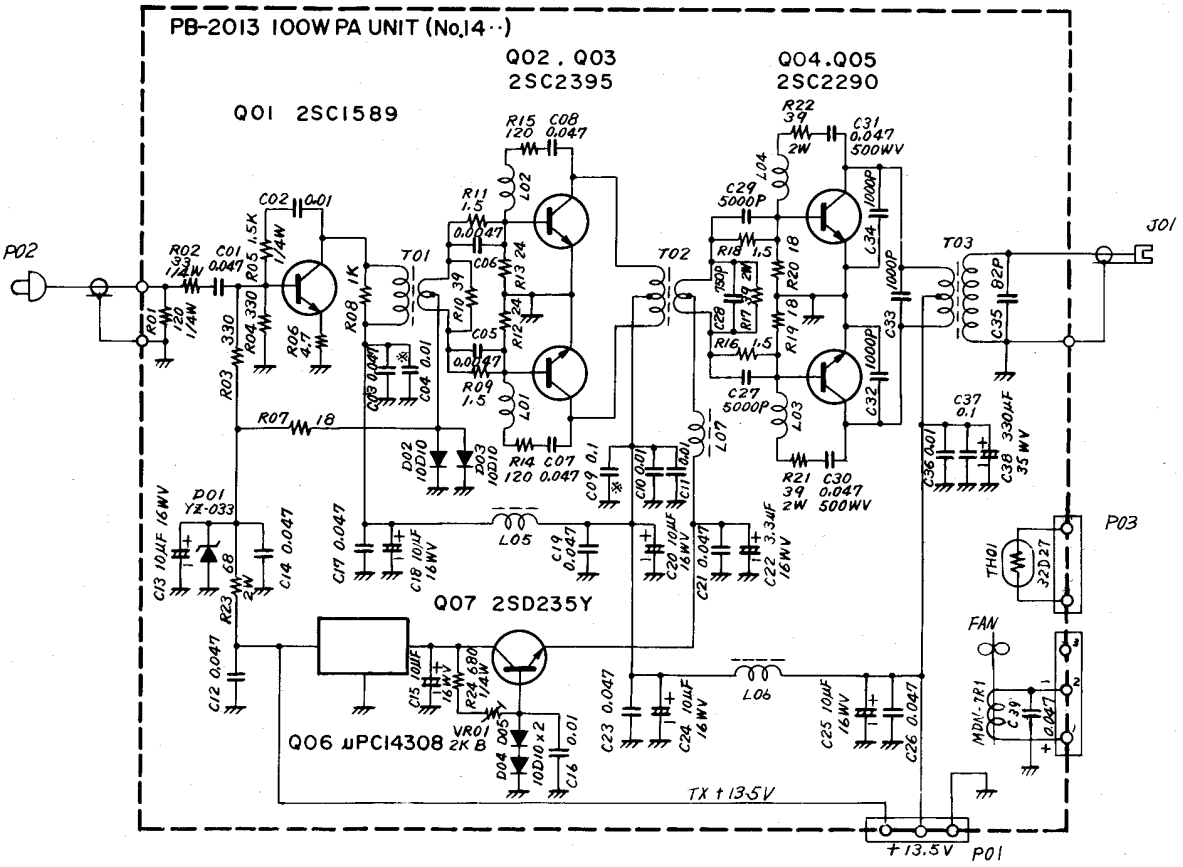
In the AM mode, the output from buffer Q_{4005} is

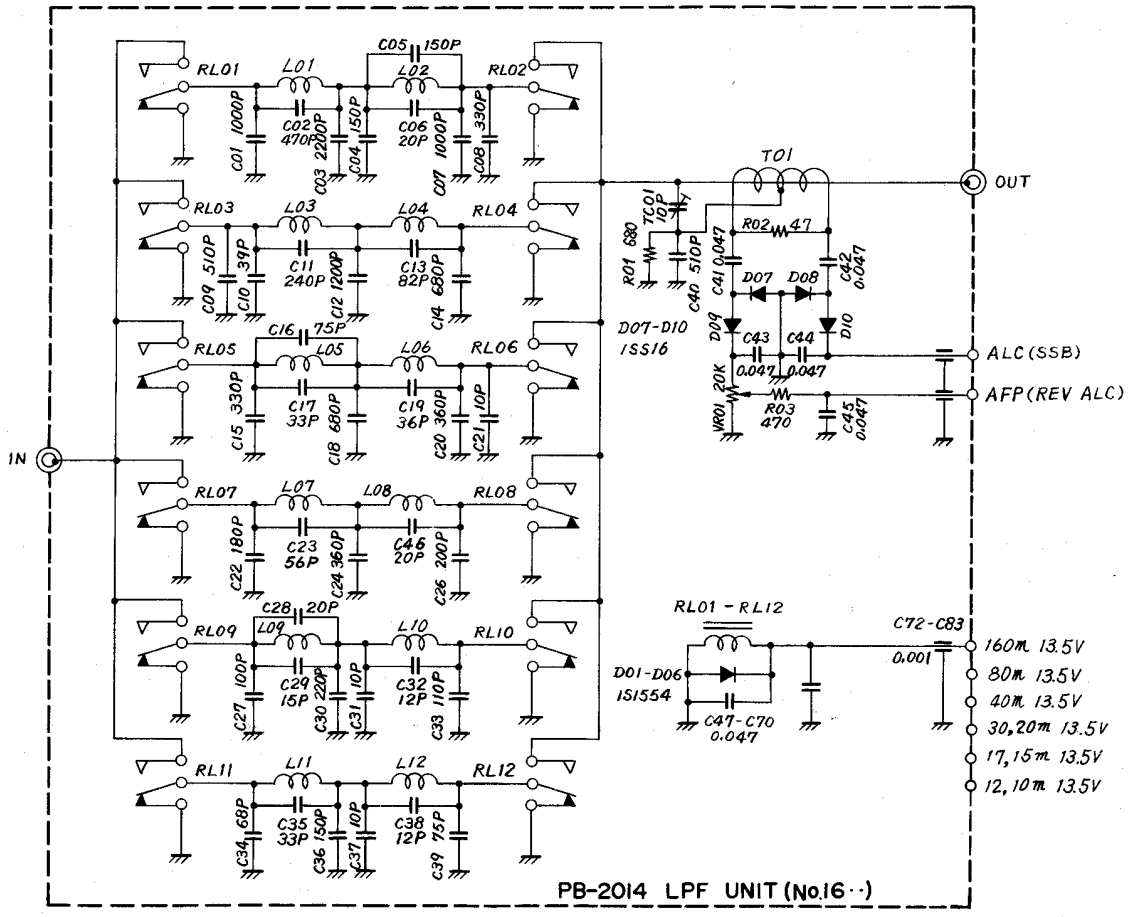
NB UNIT (PB-2007)

After filtering at XF_{3001}, a portion of the 8.9 MHz IF signal is fed through buffer Q_{3002} **(2SC1815Y)**, located on the FILTER Unit, to amplifier Q_{6901} and Q_{6012}, **(2SC1583)**, and further amplified by Q_{6013} **(2SC380Y)**.




PB-2007A N.B UNIT (No.60··)
COMP M
8V
CW FSK
AM TX IN
PROC OFF
CONT
Q01
2SK196R
Q02
TA7060P
Q04 2SC1815GR
Q05 2SA564AR
Q06 2SC1815GR
Q16
2SK19GR
XF01
8V
DRIVE CONT
ALC
AFP ALC
ALC METER
IF UNIT


PB-2013 100W PA UNIT (No.14··)
Q02 . Q03
2SC2395
Q04.Q05
2SC2290
Q01 2SC1589
P02
J01
P03
T01
T02
T03
Q07 2SD235Y
Q06 μPC14308
TX t 13.5V
+13.5V
P01
FAN


PB-2014 LPF UNIT (No.16··)
IN
OUT
ALC(SSB)
AFP(REV ALC)
D07-D10
1SS16
D01-D06
1SI554
RL01 - RL12
C72-C83
160m 13.5V
80m 13.5V
40m 13.5V
30,20m 13.5V
17,15m 13.5V
12,10m 13.5V

TRANSMITTER

SSB MODE

The speech signal from the microphone jack is fed through MIC GAIN control VR6a to pin 30 of the AF Unit.

AF UNIT (PB-2006)

The speech signal is amplified by microphone amplifier Q_{5002} **(TA7063P)** and fed through relay RL_{5001} to the ring modulator, $D_{5003}-D_{5006}$, where the speech signal modulates the carrier signal delivered from Q_{5009}. The resulting double sideband signal is amplified by buffers Q_{5005} **(2SK19CR)** and Q_{5008} **(2SC1815Y)**, and delivered to pin 33 of the FILTER Unit.

FILTER UNIT (PB-2004)

The 8.9875 MHz double sideband signal is amplified by buffer Q_{3004}, and passed through sideband filter XF_{3002} by diode switches D_{3008} and D_{3009}. The filtered SSB signal is then amplified by buffer Q_{3005} **(2SK19GR)** and fed to pin 15 of the NB Unit.

NB UNIT (PB-2007)

When the RF processor is OFF, the SSB IF signal is amplified by Q_{6003} **(3SK51-03)** and delivered to the ring mixer, located on the RF Unit. When the processor switch is ON, the IF signal is amplified by buffer Q_{6001} **(2SK19GR)** and further amplified by limiter Q_{6002} **(TA7060P)**, where signals that exceed a preset clipping level are sliced out.

This highly clipped SSB signal is passed through crystal filter XF_{6001}, which removes RF harmonics

RF UNIT (PB-2158)

The IF signal from pin 3 is delivered to the ring mixer, $D_{1034}-D_{1037}$ **(1SS16)**, where the IF signal is mixed with a local signal delivered from Q_{2013} **(2N4427)**, producing the RF output signal. The RF signal is then amplified by Q_{1002} **(2SK19GR)** and Q_{1003} **(2N4427)** and fed to the 100W PA Unit.

A portion of the output from Q_{1003} is fed through buffer Q_{1012} **(2SC380Y)** to the RF OUT jack, for use with the FTV-107R transverter.

100W PA UNIT

The RF signal from the RF Unit is fed to pre-driver Q_{1401} **(2SC1589)**, amplified by drivers Q_{1402} and Q_{1403} **(2SC2395)**, and amplified by final PA transistors Q_{1404} and Q_{1405} **(2SC2290)**, which provide approximately 100 watts of RF output. Both the driver and final PA stages are operated in a push-pull configuration.

In order to assure high linearity for the amplifier, R_{1414}, R_{1421}, R_{1422}, C_{1407}, C_{1408}, C_{1430}, and C_{1431} provide control voltage for $Q_{1402}-Q_{1405}$. This technique, known as RF negative feedback, assures that 3rd order IMD products will be kept to a minimum.

Bias voltage for $Q_{1401}-Q_{1403}$ is provided by D_{1401} **(YZ033)**, which sets the bias at 3 volts. Thermal compensation for the bias line is provided by D_{1402} and D_{1403} **(10D10)**.

The supply line for the final transistors is regulated at 8 volts by Q_{1406} **(μPC14308)**, while Q_{1407} **(2SD235Y)** and D_{1404}/D_{1405} **(10D10)** provide thermal compensation.

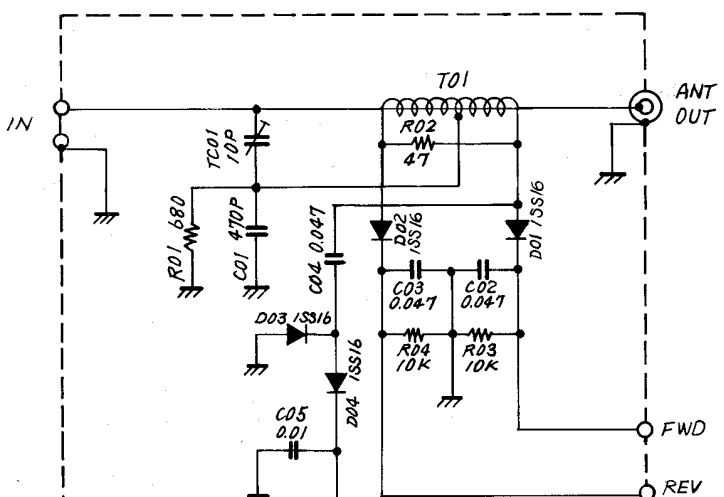
Thermistor TH_{01} senses the operating temperature of the final transistors, for control of the heat

CM COUPLER UNIT (PB-2056)

The output from the LPF Unit is fed to the CM

[redacted]

indication on the front panel meter.



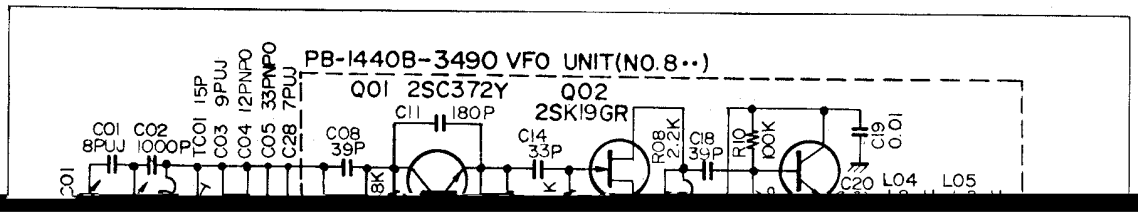
CW MODE

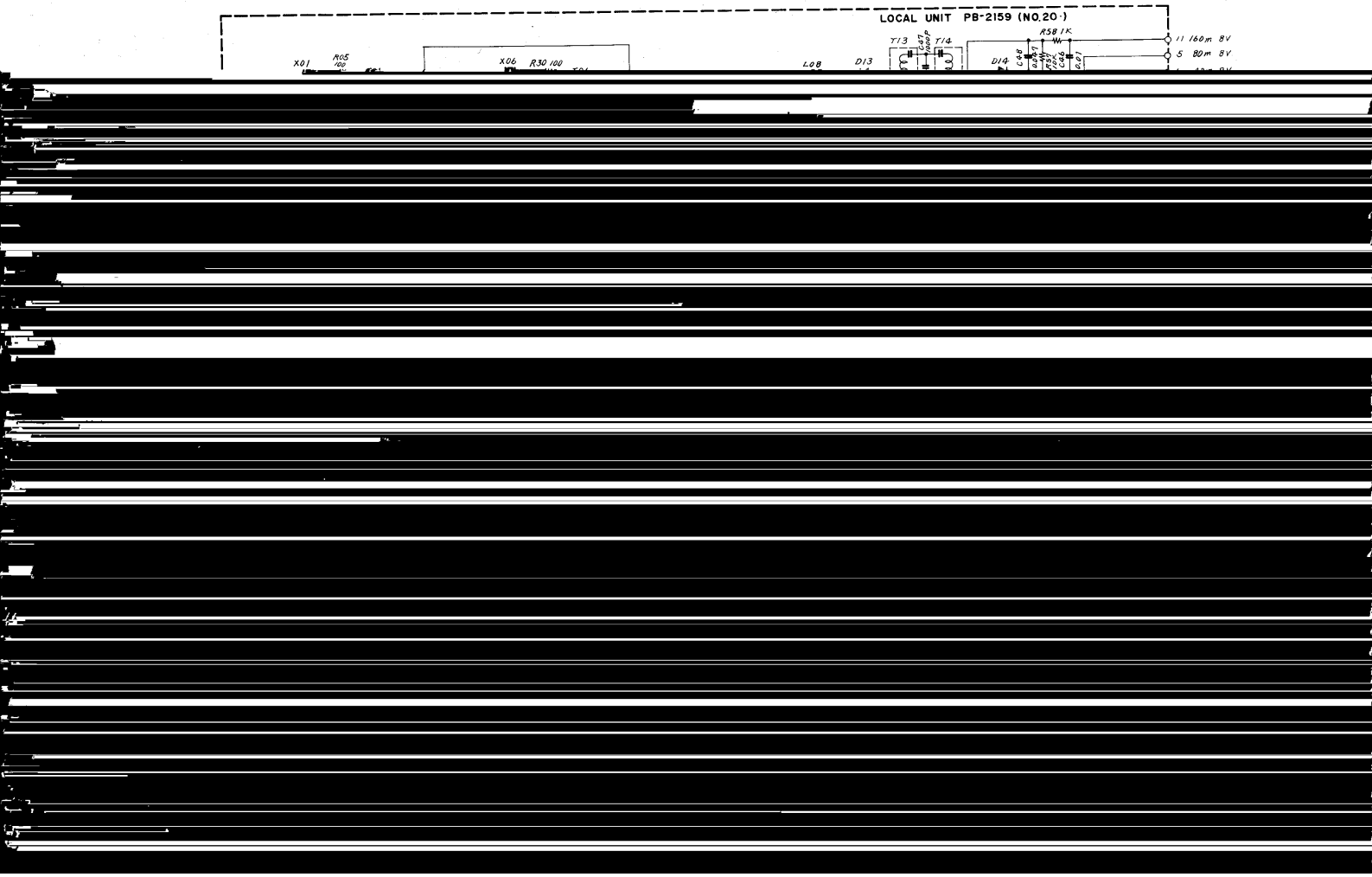
The CW carrier is generated by crystal oscillator Q_{5011} **(2SK19GR)** and amplified by Q_{5011} **(2SC1815Y)** and Q_{5004} **(3SK51-03)**. The carrier signal is then delivered to Q_{6003}, and from there the signal path is identical to that of the SSB signal.

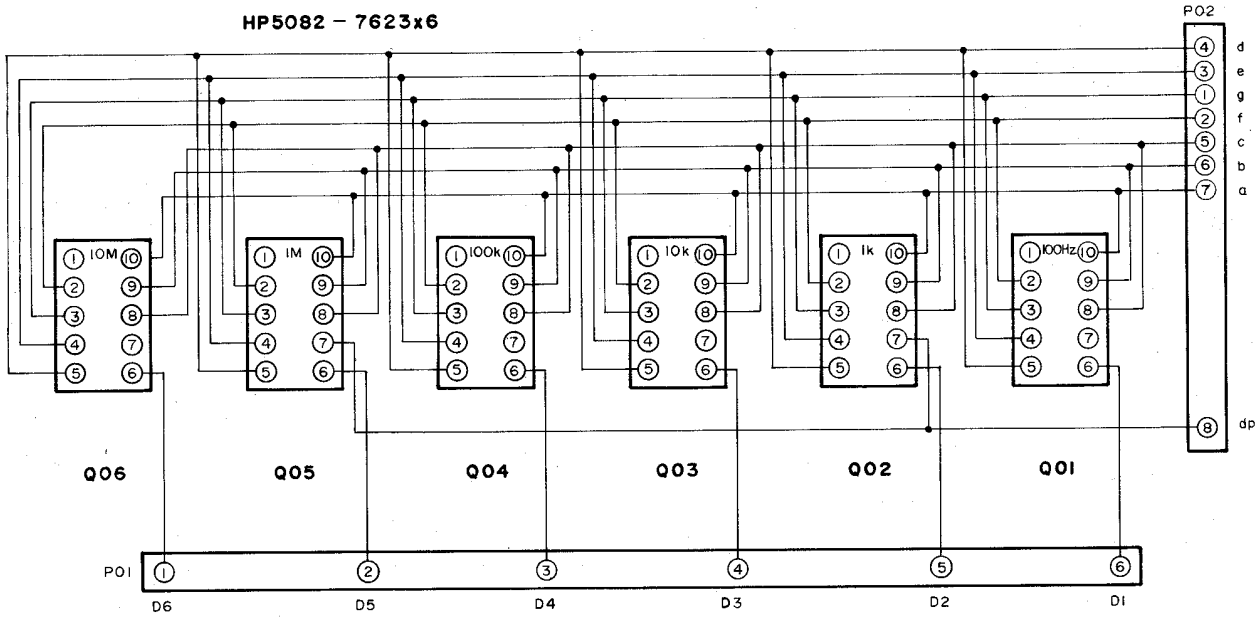
COMMON CIRCUITS

VFO UNIT (PB-1440B-3490)

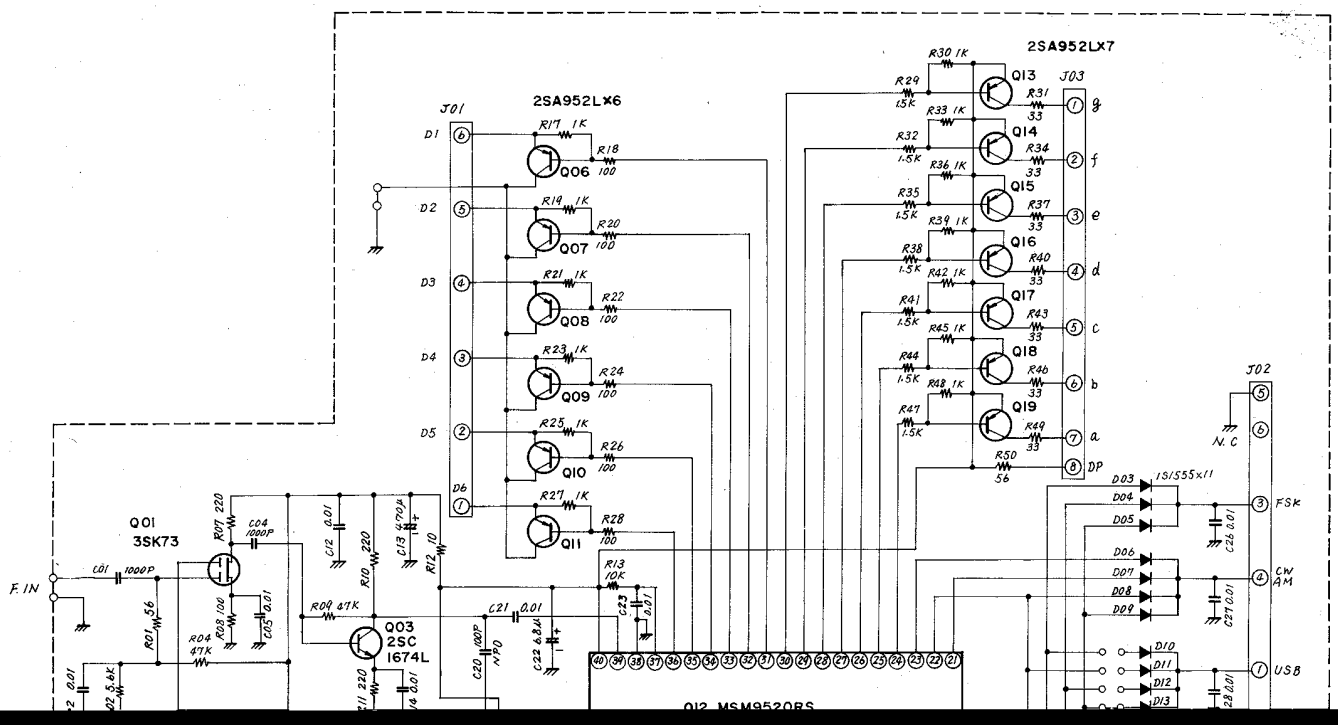
A modified Colpitts-type oscillator is used to generate a 5.0–5.5 MHz VFO signal, resulting in a 500 kHz tuning range. The VFO frequency is varied by VC_{801}, which is geared to a precision dial tuning mechanism. Temperature compensation is provided by the sub-blades of VC_{801}.


PB-1440B-3490 VFO UNIT(NO.8··)
Q01 2SC372Y
Q02
2SK19GR
C01 8PUJ
C02 1000P
TC01 15P
C03 9PUJ
C04 12PNPO
C05 33PNPO
C28 7PUJ
C08 39P
C11 180P
C14 33P
R08 2.2K
C18 39P
R10 100K
C19 0.01
C20
L04
L05
J01
8K
4K


LOCAL UNIT PB-2159 (NO.20-)
X01
R05 100
X06
R30 100
L08
D13
T13
T14
D14
R58 1K
11 160m 8V
5 80m 8V



DISPLAY UNIT PB-2087 (NO.22··)



COUNTER UNIT (PB-2086A/PB-2087)

The local oscillator signal is applied to Large-Scale Integrated Circuit (LSI) chip for display on the front panel digital display.

The premix signal from the LOCAL Unit is applied to the F IN terminal and amplified by Q_{2301} (**3SK73**). The amplified signal is further amplified by Q_{2303} (**2SC1674**) and delivered to the LSI counter chip, Q_{2321} (**MSM9520RS**). A portion of the output

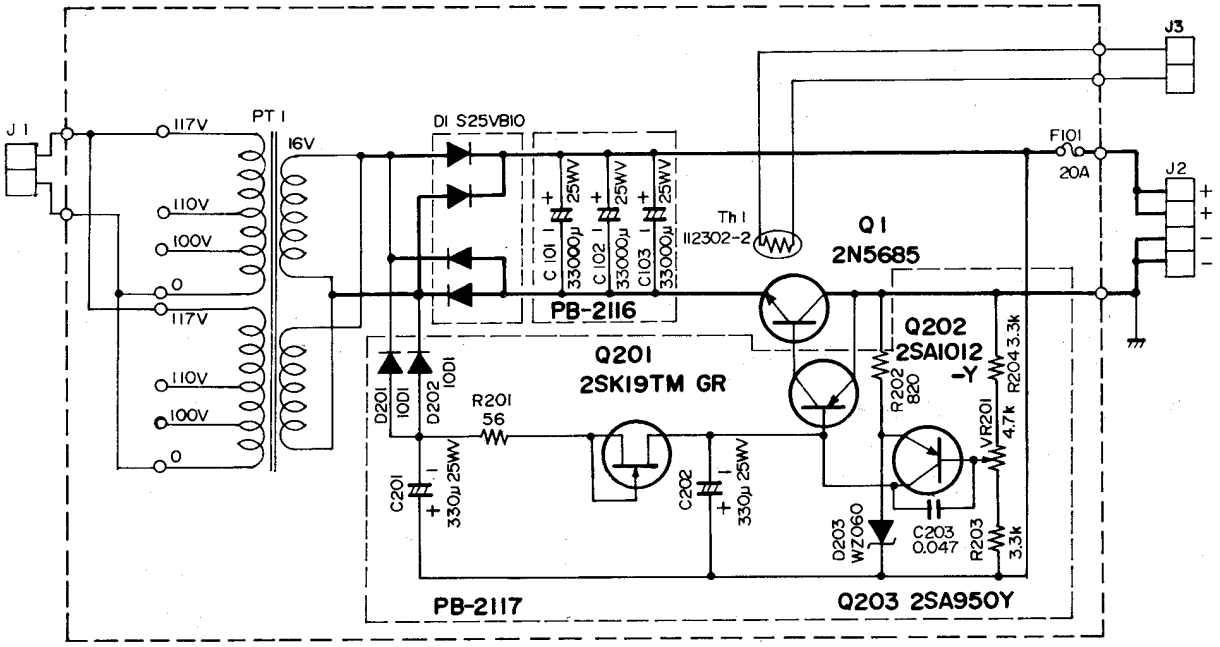
POWER SUPPLY

When the optional FP-107 AC Power Supply is installed, it will provide the required 13.5 VDC at 20 amps for the FT-107M. AC input voltages of 100/110/117/200/220/234 volts at 50/60 Hz may be used.

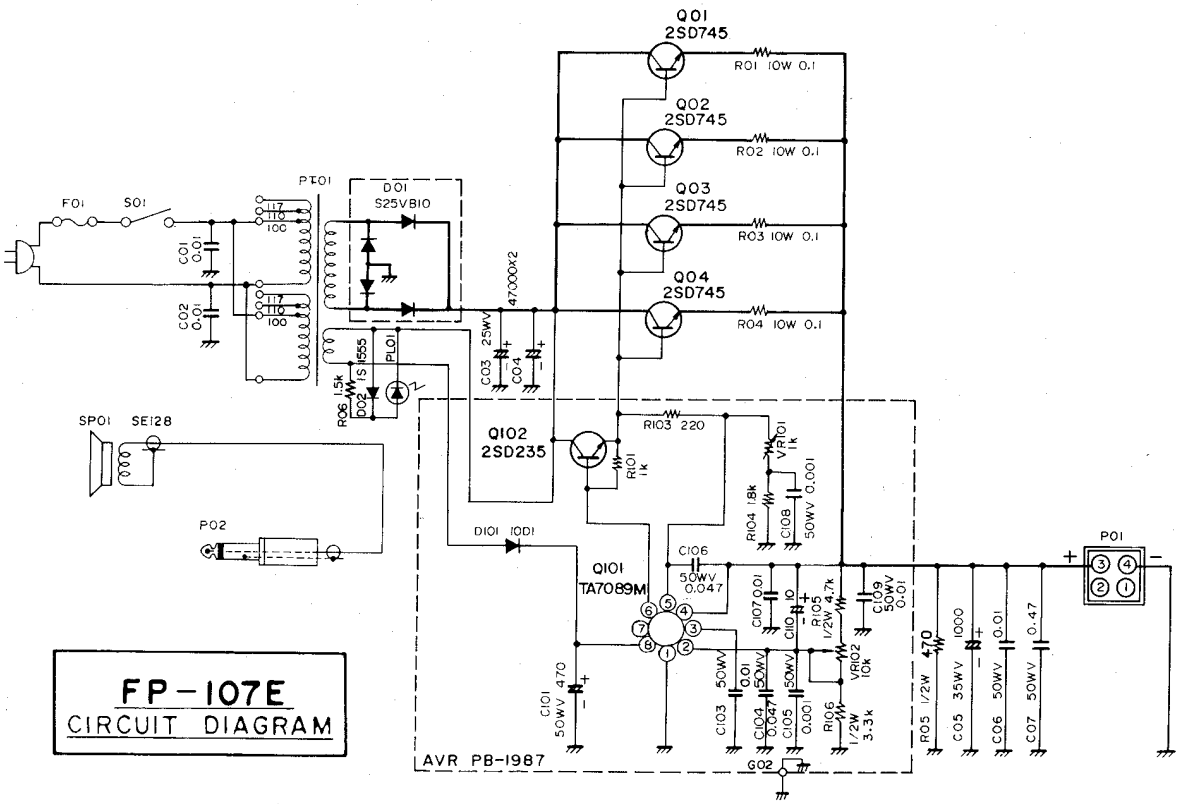
The output from the power transformer is rectified by a full wave bridge rectifier. The rectified voltage is stabilized by a voltage regulator, consisting of Q_1

The 13.5 volt line is stabilized at 8 volts by Q_1 (μPC14308), for use in the transistor circuits. The 8 volt line is further stabilized by Q_2 (μPC-14308) for the VFO circuitry, which requires a highly stable power source.

Transistor switches Q_{6007}/Q_{6008} (2SC1959Y), located on the NB Unit, provide switched 8 volts for the transmit and receive circuits.



FP 107
CIRCUIT DIAGRAM



FP-107E
CIRCUIT DIAGRAM

DMS UNIT

While a complete description of the Digital Memory Shift and memory circuitry is beyond the scope of this manual, reference to the block diagram of the DMS, along with the following description, should provide the owner with a better understanding of this design technique.

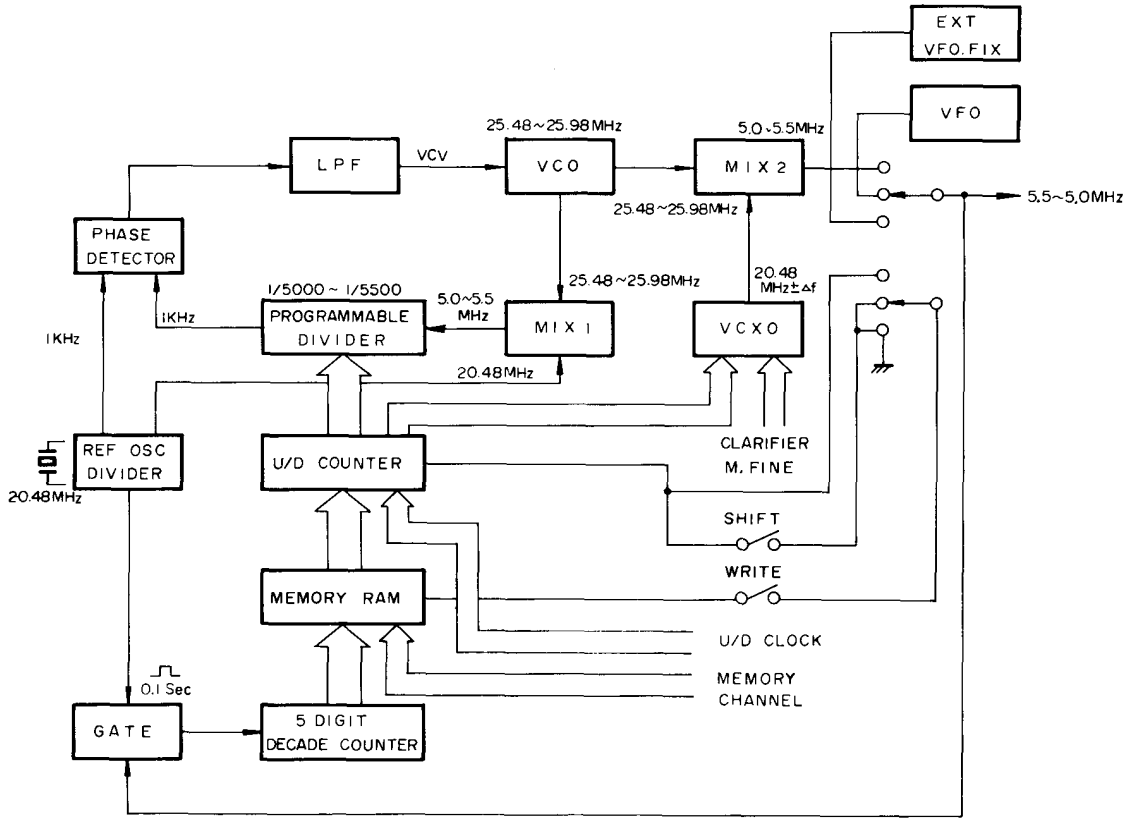
The 5.0–5.5 MHz VFO signal is fed to a counter gate, driven by a crystal controlled clock signal. The pulses which pass through the counter gate are fed to a five digit decade counter, which counts the VFO frequency. The digitally encoded output from the decade counter is delivered to the memory RAM for storage.

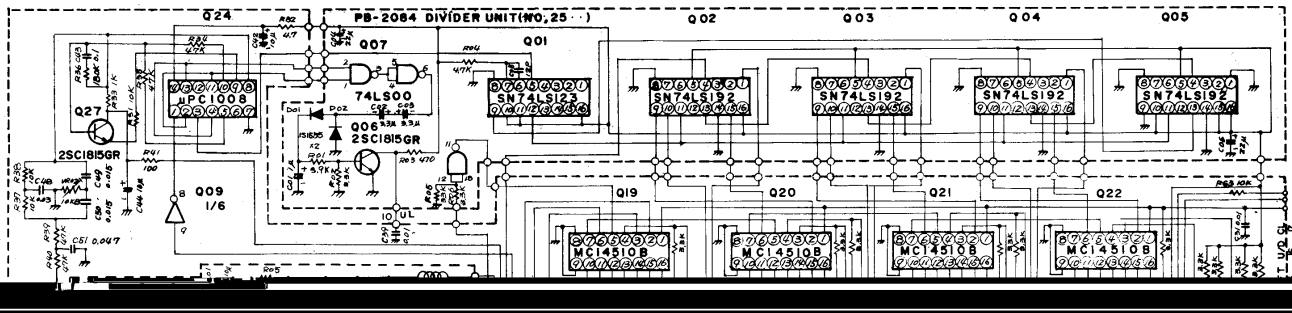
The output from the RAM is fed through an UP/DOWN counter to preset the programmable divider. On the DMS Unit, a 25.48–25.98 MHz signal is produced from the Voltage Controlled Oscillator (VCO). This signal is fed to a mixer, where the VCO signal is mixed with a 20.48 MHz reference signal, producing a 5.0–5.5 MHz signal, which is fed to the programmable divider.

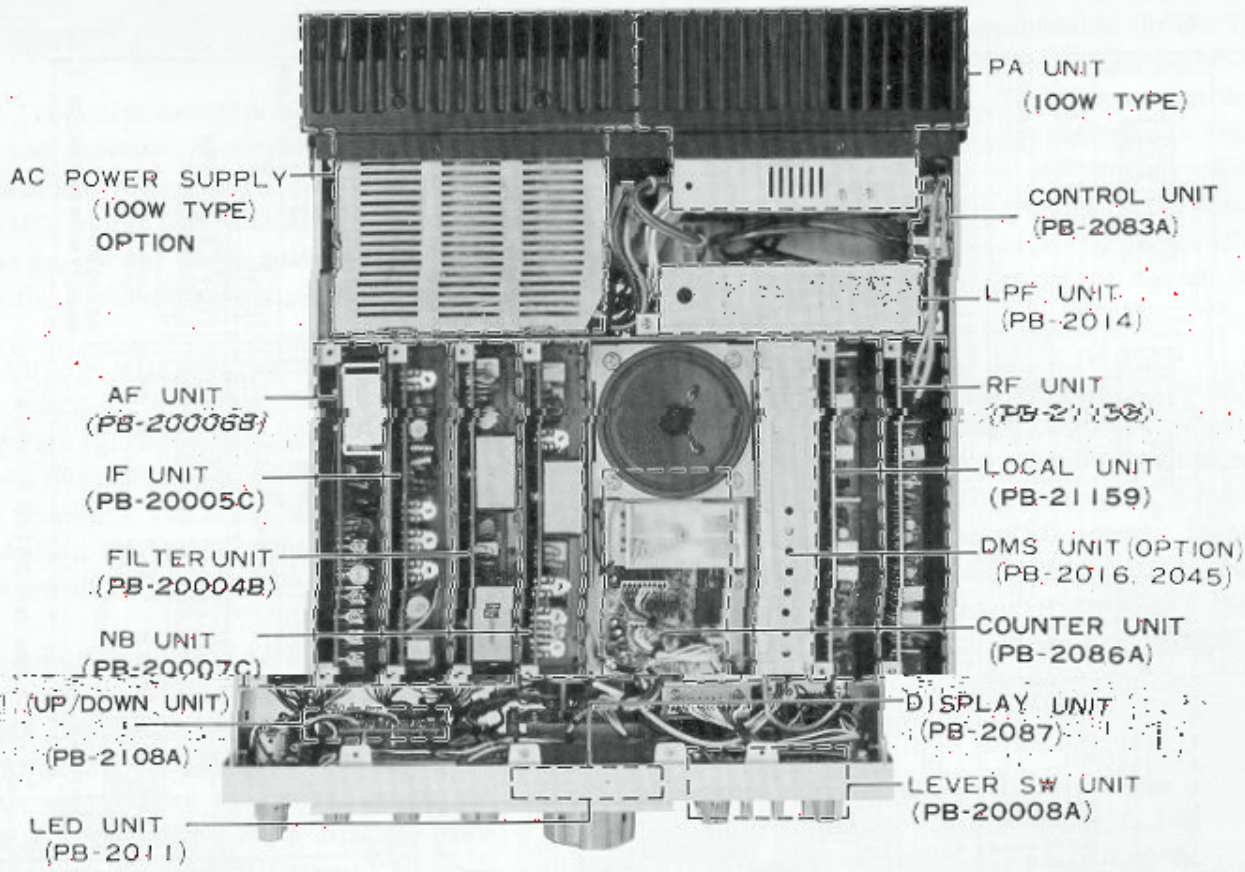
The output from the programmable divider (at approximately 1 kHz) is fed to a phase detector, where the phase of the signal is compared to that of a 1 kHz reference signal, producing an error voltage. The error voltage is fed through a low-pass filter, which removes any ripple on the signal. The error voltage is then used to control varactor diodes in the VCO, locking it on the desired frequency.

When the memory frequency is recalled, the VCO output is fed to another mixer, where the 25.48–25.98 MHz signal is mixed with a 20.48 $\pm\Delta$f signal, resulting in a 5.0–5.5 MHz signal which is fed to the PLL (instead of the VFO signal). During memory fine tuning or clarifier operation (using the memory), the frequency of the 20.48 MHz voltage controlled crystal oscillator (VCXO) is varied, changing the 5.0–5.5 MHz output signal slightly in frequency.

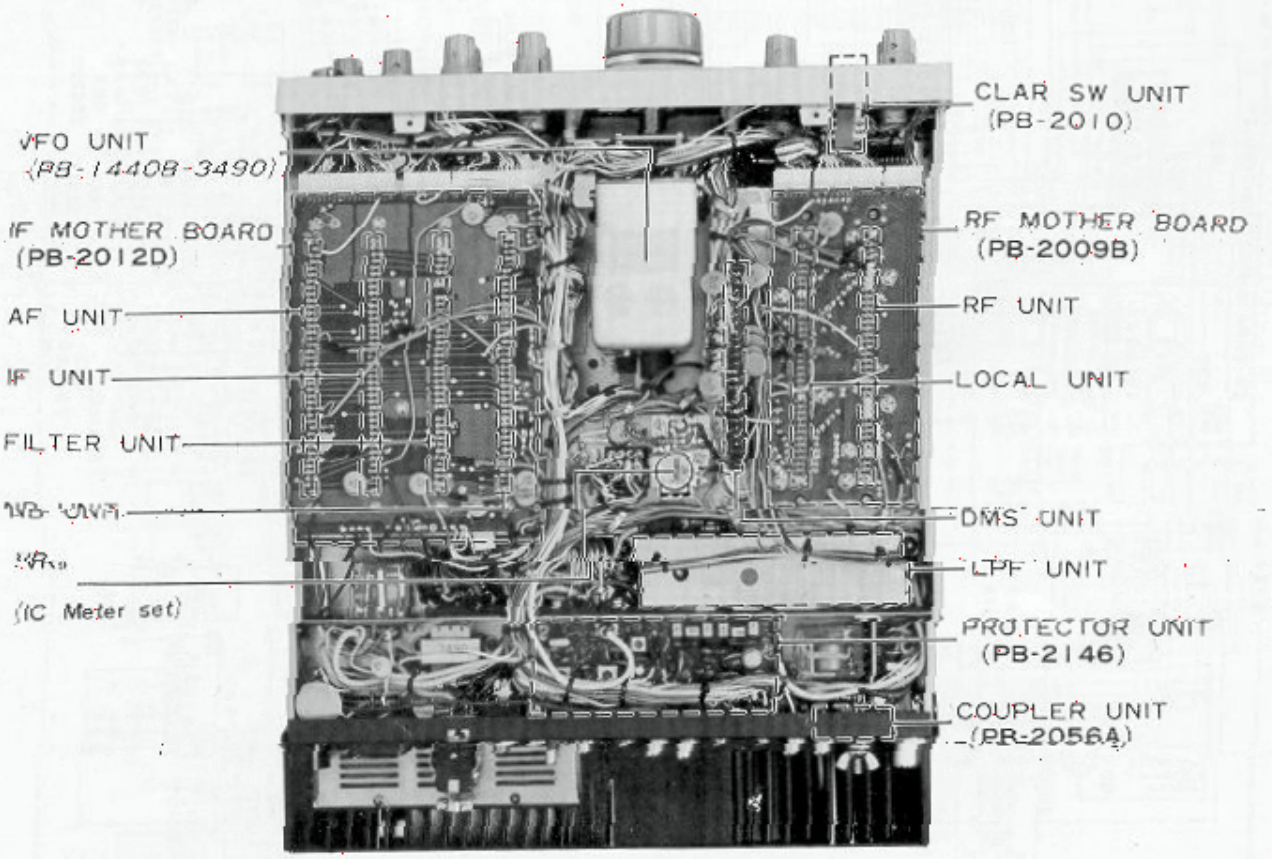
During memory shift operation, the output pulses from the photo-interrupter circuitry are applied to the UP/DOWN so as to preset the programmable divider, thereby shifting the output from the memory RAM so as to provide the desired shifting the memory channel frequency.




PB-2084 DIVIDER UNIT(NO.25···)
Q24
Q07
Q01
Q02
Q03
Q04
Q05
Q27
2SC1815GR
μPC1008
74LS00
Q06
2SC1815GR
SN74LS123
SN74LS192
Q09
1/6
Q19
Q20
Q21
Q22
MC14510B



TOP VIEW



BOTTOM VIEW

MAINTENANCE & ALIGNMENT

GENERAL

This transceiver has been carefully aligned and tested at the factory prior to shipment. With normal use, it should not require other than the usual attention given to electronic equipment.

Service or replacement of a major component may require substantial adjustment; under no circumstances, though, should realignment be attempted unless the operation of the transceiver is fully understood, the malfunction has been carefully analyzed, and the fault has definitely been traced to misalignment. Sudden difficulties are almost always caused by component failure rather than misalignment.

Service work should only be performed by experienced personnel, using the proper test equipment.

CAUTION

Never operate this transceiver in the transmit mode without a matched antenna or dummy load connected to the rear panel antenna receptacle. While the final transistors are protected against high antenna system SWR, accurate testing and evaluation of faults will be impossible if a proper load is not used.

WARNING

DANGEROUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT. USE EXTREME CAUTION WHEN WORKINGS ON THE TRANSCEIVER WITH THE COVERS REMOVED, ESPECIALLY IN THE VICINITY OF THE POWER SUPPLY CIRCUITRY. OBSERVE SAFETY PRECAUTIONS AT ALL TIMES.

EQUIPMENT REQUIRED

(1) RF Signal Generator: Hewlett-Packard Model 606A or equivalent, with one volt output at 50 ohms, and frequency coverage to 30 MHz.

(2) Vacuum Tube voltmeter: Hewlett-Packard Model 410B or equivalent, with an RF probe good to 40 MHz.

(3) Dummy Load/Wattmeter: Yaesu Model YP-150 or equivalent, with 50 ohm non-reactive load impedance, rated to 150 watts average power.

(4) AF Signal Generator: Hewlett-Packard Model 200AB or equivalent.

(5) A general coverage receiver covering 1.8–30 MHz, with a 100 kHz crystal calibrator.

(6) Frequency Counter: Yaesu Model YC-500 or equivalent, with resolution to 0.01 kHz and frequency coverage to 40 MHz.

(7) Oscilloscope: Hewlett-Packard Model 1740A or equivalent.

VOX CIRCUIT ALIGNMENT

1. Antitrip level setting

a) Tune in a signal on the FT-107M receiver, and adjust the AF GAIN control for a normal listening lvel on the speaker. Position the microphone near the speaker, with the MODE switch in the USB or LSB position. Increase the VOX GAIN control on the front panel until the speaker output causes the VOX relay to trip. Now set the ANTITRIP potentiometer, VR_{4003} (located on the IF Unit), to the point where the speaker output does not activate the VOX.

b) Now place the microphone in the normal operating position. Speak into the microphone in a normal voice to see if the VOX relay activates normally. If your voice does not activate the VOX, VR_{4003} may be advanced too far. Do not use more VOX GAIN nor ANTITRIP than needed.

2. VOX relay delay setting

a) Adjust the rear panel DELAY control (VR_8) for the desired VOX relay hang time. This may require a different adjustment for phone and CW operation, owing to different operating techniques. When using a foot-switch, the VOX GAIN control is rotated fully counterclockwise, so no adjustment of the DELAY control is required in this case.

METER ADJUSTMENT

a) Preset the controls and switches as follow:
BAND 20
MODE ..... USB
DIAL ..... 14.250 MHz
RF GAIN ..... fully clockwise
Connect a signal generator to the antenna jack.

b) Adjust VR_{2001} for a 0 reading on the S meter scale with no signal present.

c) Apply a 100 dB signal from the signal generator, and adjust VR_{2002} for a reading at S9+60 dB on the generator signal.

CW SIDETONE ALIGNMENT

a) Adjust VR_{2005}, located on the IF Unit, for the desired CW sidetone output level.

MARKER ALIGNMENT

a) Preset the controls and switches as follows:
BAND 20
MODE ..... AM

b) Tune in the signal from WWV or JJY, and switch on the marker. Adjust TC_{1001}, located on the RF Unit, for a zero beat with the standard frequency station. The zero beat point is that at which the heterodyne beat between the marker signal and WWV/JJY disappears.

c) This alignment may also be made in the SSB mode. When zero-beat occurs on the standard frequency station, adjust TC_{1001} so that the marker frequency is exactly the same as that of the WWV/JJY carrier.

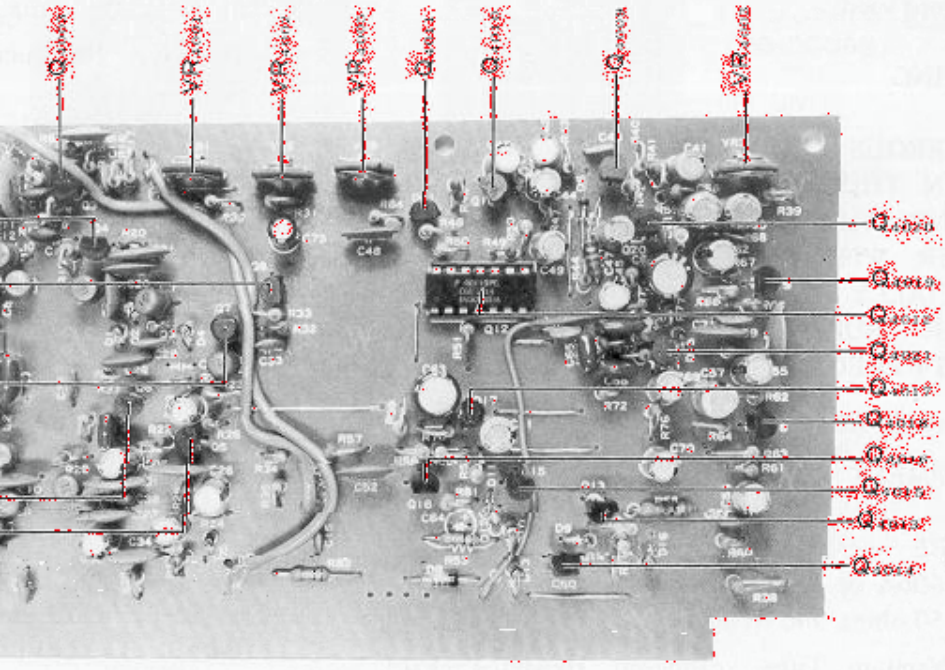
IF WIDTH ALIGNMENT

controls and switches as follows:
..... 20
..... 14.250 MHz
..... Fully clockwise
..... To the 12 o'clock position
..... USB

frequency counter to TP_{2004} the FILTER Unit). Adjust VR_{2003} the CLEAR SW Unit) for a reading 9.745 MHz on the counter.

a) Preset the
BAND ..
DIAL ..
RF GAIN
WIDTH ..
MODE ..

b) Connect
(located on
(located on
of exactly



IF Unit

CARRIER POINT ADJUSTMENT

(1) SSB Carrier Point Alignment

a) Preset the controls and switches as follows:

BAND 20
DIAL ..... 14.250 MHz
MODE ..... LSB

b) Connect an audio oscillator to the microphone jack MIC IN terminal (pin 3) and close the PTT switch. Set the audio oscillator output to 1 kHz, and adjust its level so that the power output reaches 60 watts as indicated on a dummy load wattmeter.

c) Set the audio oscillator frequency to 350 Hz, but do not change its level. Adjust TC_{5001} (FILTER Unit) for a power output of exactly 15 watts. Release the PTT switch.

d) Set the MODE switch to USB, and adjust TC_{5002} (FILTER Unit) for an identical 15 watt output reading on the wattmeter while transmitting.

e) Rotate the RF GAIN control fully clockwise, and set the WIDTH control to the 12 o'clock position. Switch between the USB and LSB modes while listening to the background noise. If there is any difference in the pitch, VR_{501} may require readjustment. See the IF WIDTH ALIGNMENT section above.

(2) Carrier Balance Adjustment

a) Preset the controls and switches as follows:

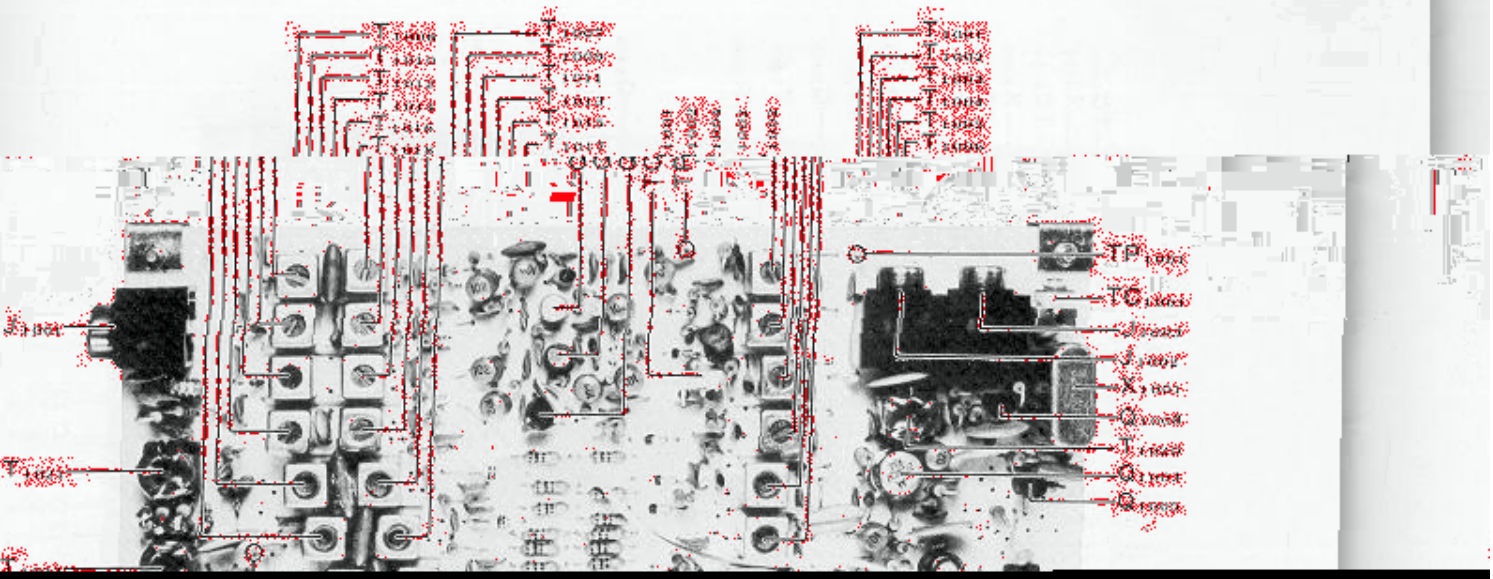
BAND 20
DIAL ..... 14.250 MHz
MODE ..... USB

Remove the audio oscillator and any other equipment from the MIC jack.

b) Connect the RF probe of a VTVM to the antenna jack, and set the VOX GAIN switch to MOX. Adjust VR_{5003} and TC_{5003} (located on the AF Unit) for a minimum reading on the VTVM.

c) If a VTVM is not handy, you may use a communications receiver for this alignment step. Tune the receiver to 14.250 MHz, and set the VOX GAIN control to MOX. With no modulation, adjust VR_{5003} and TC_{5003} for a minimum S-meter reading (or minimum signal level, if no S-meter reading occurs).

d) Switch between USB and LSB, and compare the output levels with no modulation. Some adjustment of VR_{5003} and TC_{5003} may be necessary to achieve good carrier nulling on both modes.



(3) CW/FSK Carrier Point Alignment

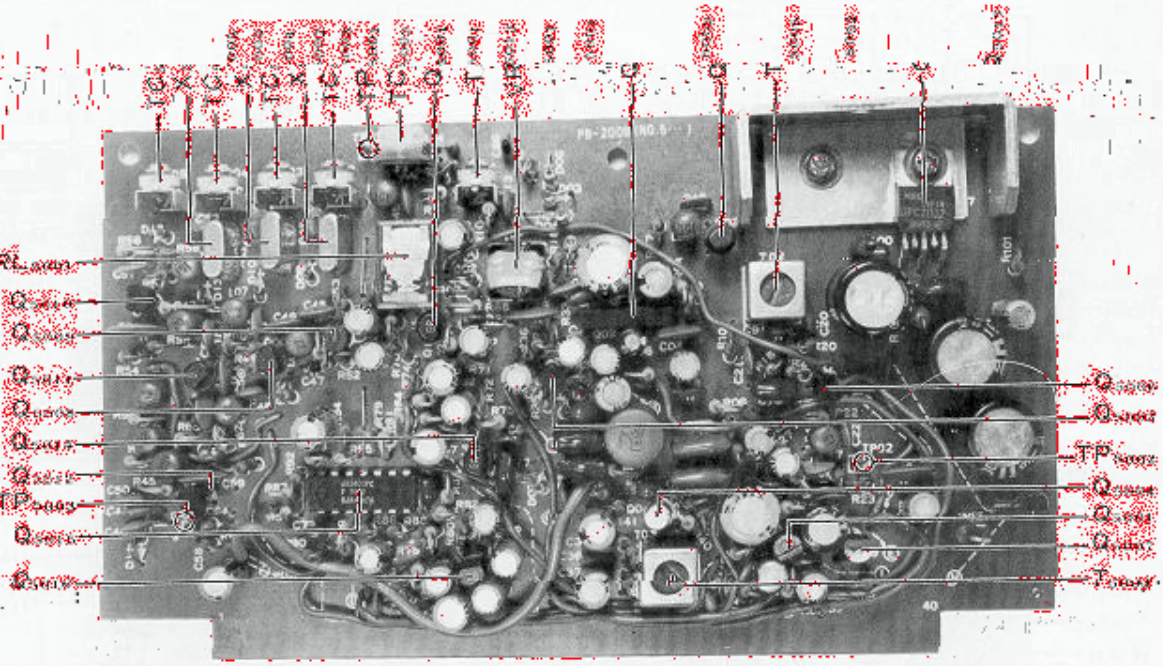
a) Connect a frequency counter to TP$_{4005}$ located on the IF Unit. Set the MODE switch to CW, and adjust TC$_{5004}$ (IF Unit) for a reading of exactly 8038.275 kHz on the counter.

b) Set the MODE switch to FSK, and adjust TC$_{5005}$ (IF Unit) for a reading of exactly 8038.425 kHz on the counter. As there is some interaction of adjustments, set the MODE switch again to CW, and recheck the reading of 8038.275 kHz for that mode. Then again check the FSK reading.

CLARIFIER ALIGNMENT

a) Set the MODE switch to USB, and connect a signal generator to the antenna jack. Apply a signal of about S7 level on any band, and tune the receiver to the generator signal with the clarifier OFF. Set the CLAR control to the 12 o'clock position, and note the beat note of the input signal.

b) Push the CLAR button, and note the beat note of the input signal. If it changes at all in pitch, adjust VR$_{5005}$ (located on the NB Unit) so that the frequency is the same as that noted when the clarifier was off. Switch back and forth between the OFF and ON modes to check the calibration.



RF UNIT

IC METER CALIBRATION

a) Remove P_{1008} from the connector, install an ammeter in the 13.5 volt line between P_{1007} and its jack.

b) Set the BAND switch to 20, and set the MODE switch to CW. Connect a dummy load to the antenna jack.

c) Set the VOX GAIN switch to VOX, and advance the DRIVE control until the current reading on the ammeter reaches 13 amperes.

d) Now, note the reading on the front panel IC meter. If the meter reading is not 13 amperes, remove the case of the transceiver. Remove the internal shields from its mounting position to expose VR_{1}. Again set the VOX GAIN control to VOX, and adjust VR_{1} to a reading of exactly 13 amperes on the meter. This alignment should not be necessary unless you have recently replaced the front panel meter.

ALC ADJUSTMENT

a) On the NB Unit, locate the jumper wire

b) Preset the controls and switches as follows:

BAND 10m
DRIVE ..... Fully counterclockwise
VR_{1008} (NB Unit) ..... Fully clockwise
MODE ..... FSK

c) Close the MOX switch and adjust VR_{1007} for a reading of 12 watts on the meter.

d) Now reinstall the jumper lifted in step (a). Close the MOX switch, and do not touch the DRIVE control. Adjust VR_{1008} for a reading of 110 watts on the wattmeter. Now set the DRIVE control fully clockwise, and adjust VR_{1008} slightly for a reading of 110 watts on the wattmeter.

DIRECTIONAL COUPLER BALANCE (LPF Unit)

a) Set the BAND switch to 20, and set the MODE switch to FSK. Connect a DC connection between pin 3 of P_{10} on the W MOTHER BOARD (API IN) and ground.

b) Close the MOX switch, and adjust the DRIVE

AFP ALIGNMENT

(NOTE: DO NOT ATTEMPT THIS ALIGNMENT UNLESS THE PROPER DUMMY LOADS AND MEASURING EQUIPMENT ARE USED)

(1) Set the BAND switch to 80, and the MODE switch to FSK. Set the DRIVE control for a power output of 100 watts into a 50 ohm dummy load.

(2) Connect three 50 ohm dummy loads in parallel, so as to present a 17 ohm load to the amplifier (a 2:1 SWR with reference to 50 ohms). Close the MOX switch, and adjust $VR_{(60)}$ (DPI Unit) for 75 watts power output as indicated on the wattmeter.

DIRECTION COUPLER BALANCE (COUPLER Unit)

VFO ALIGNMENT

The FT-107M VFO is not a unit that should require servicing. Most cases of "VFO trouble" can be traced to other areas, such as instability in it supply voltage. The frequency determining circuitry of the VFO is extremely critical in its alignment, and for this reason we recommend that all VFO repair cases be handled by an authorized Yaesu representative.

From a service standpoint, the following controls are of interest.

C7 - Sets the upper edge of the VFO range.
C6 - Sets the VFO output level. It should be adjusted for a reading of 150 mV on a VTVM.

PREMIX/LOCAL UNIT ALIGNMENT

(NOTE: THE ALIGNMENT OF THE PREMIX AND LOCAL OSCILLATOR CIRCUITS DIRECTLY AFFECTS THE LEVEL OF SPURIOUS SIGNALS ON BOTH TRANSMIT AND RECEIVE. DO NOT ATTEMPT ANY PORTION OF THIS ALIGNMENT PROCEDURE IF YOU DO NOT HAVE THE PROPER TEST EQUIPMENT)

a) Set the SELECT switch to EXT VFO. Connect a 4.0–6.5 MHz sweep generator to the EXT VFO input jack on the rear panel of the transceiver. Remove the plug connected to P_{2001} (LOCAL Unit), and connect a high-impedance probe of an oscilloscope to the line at P_{2001}. Do not insert a dummy plug at P_{2001}, or else the 50 ohm termination will be removed from the circuit; this termination is desired.

b) Refer to Figure11, and adjust the cores of the transformers shown for a flat response across

BAND	TRANS-FORMER	PASSBAND
160m	T_{2013}, T_{2014}	10.4—11.0(MHz)
80m	T_{2015}, T_{2016}	12.4—13.0
40m	T_{2017}, T_{2018}	15.9—16.5
30m	T_{2029}, T_{2030}	18.9—19.5
20m	T_{2019}, T_{2020}	22.9—23.5
17m	T_{2025}, T_{2026}	26.9—27.5
15m	T_{2021}, T_{2022}	29.9—30.5
12m	T_{2027}, T_{2028}	33.5—34.0
10m	T_{2023}, T_{2024}	36.9—39.0

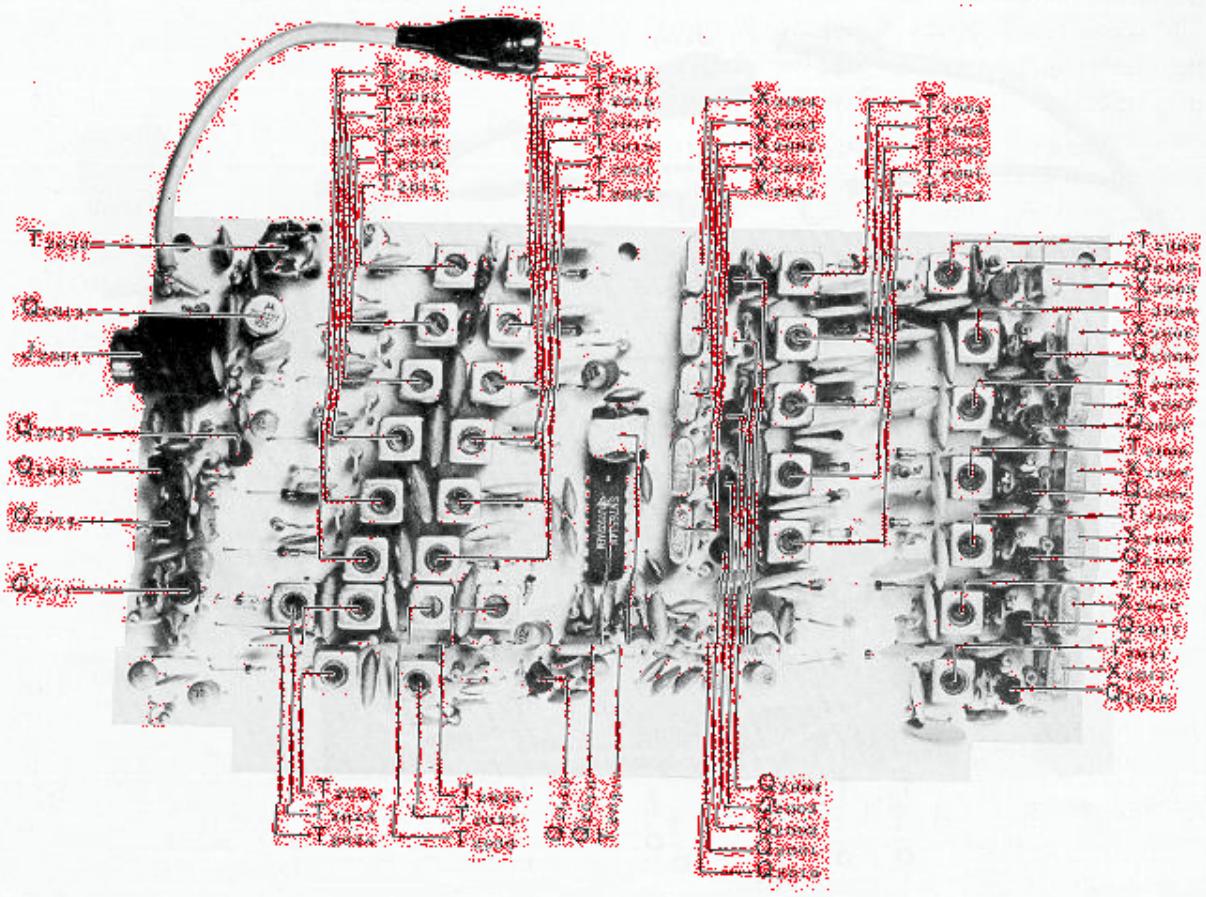
Figure 11

BAND	CRYSTAL	FREQUENCY	TRANS FORMER
160m	X_{2001}	15.9845MHz	T_{2001}
80m	X_{2002}	17.9845MHz	T_{2002}
40m	X_{2003}	21.4845MHz	T_{2003}
30m	X_{2012}	24.4875MHz	T_{2012}
20m	X_{2004}	28.4875MHz	T_{2004}
17m	X_{2010}	32.4875MHz	T_{2010}
15m	X_{2005}	35.4875MHz	T_{2005}
12m	X_{2011}	38.9875MHz	T_{2011}

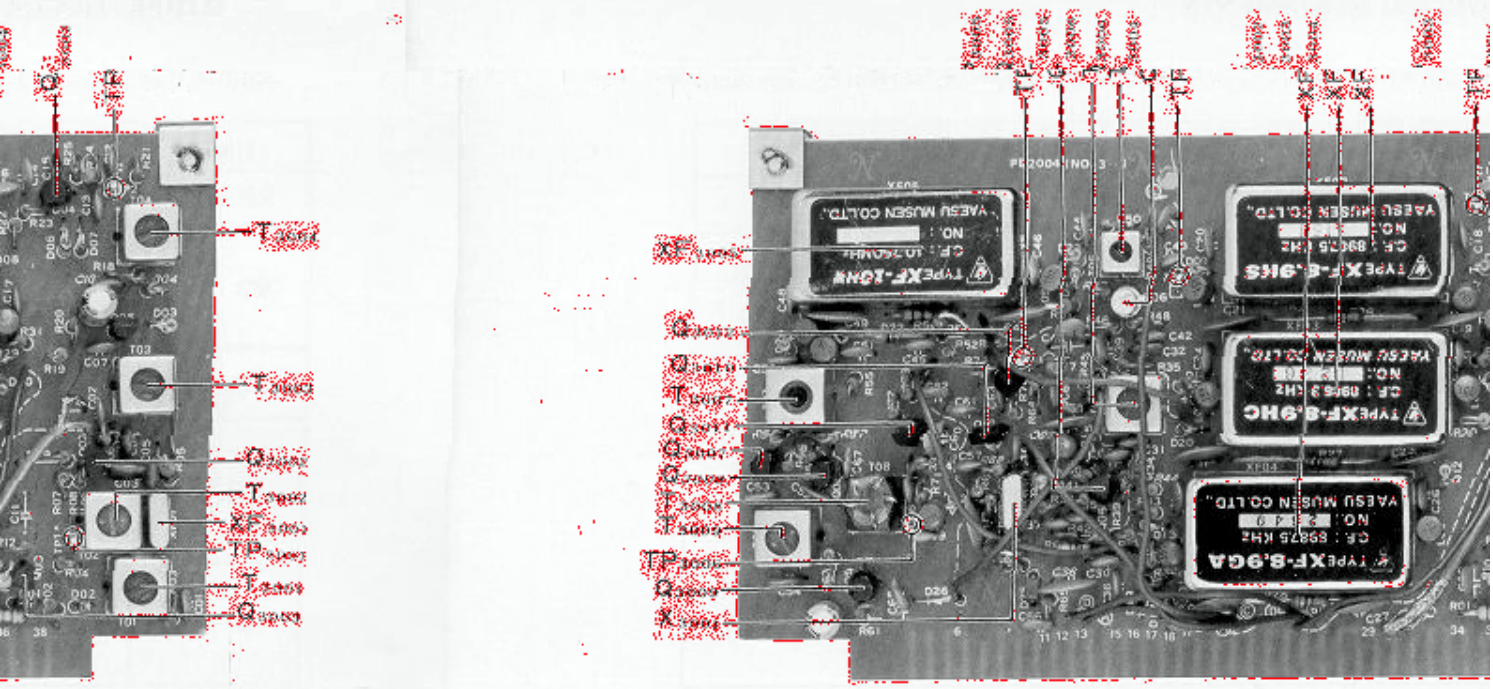
OTHER TRANSFORMER ALIGNMENTS

Adjust the transformers shown in the chart below for the response shown in the chart.

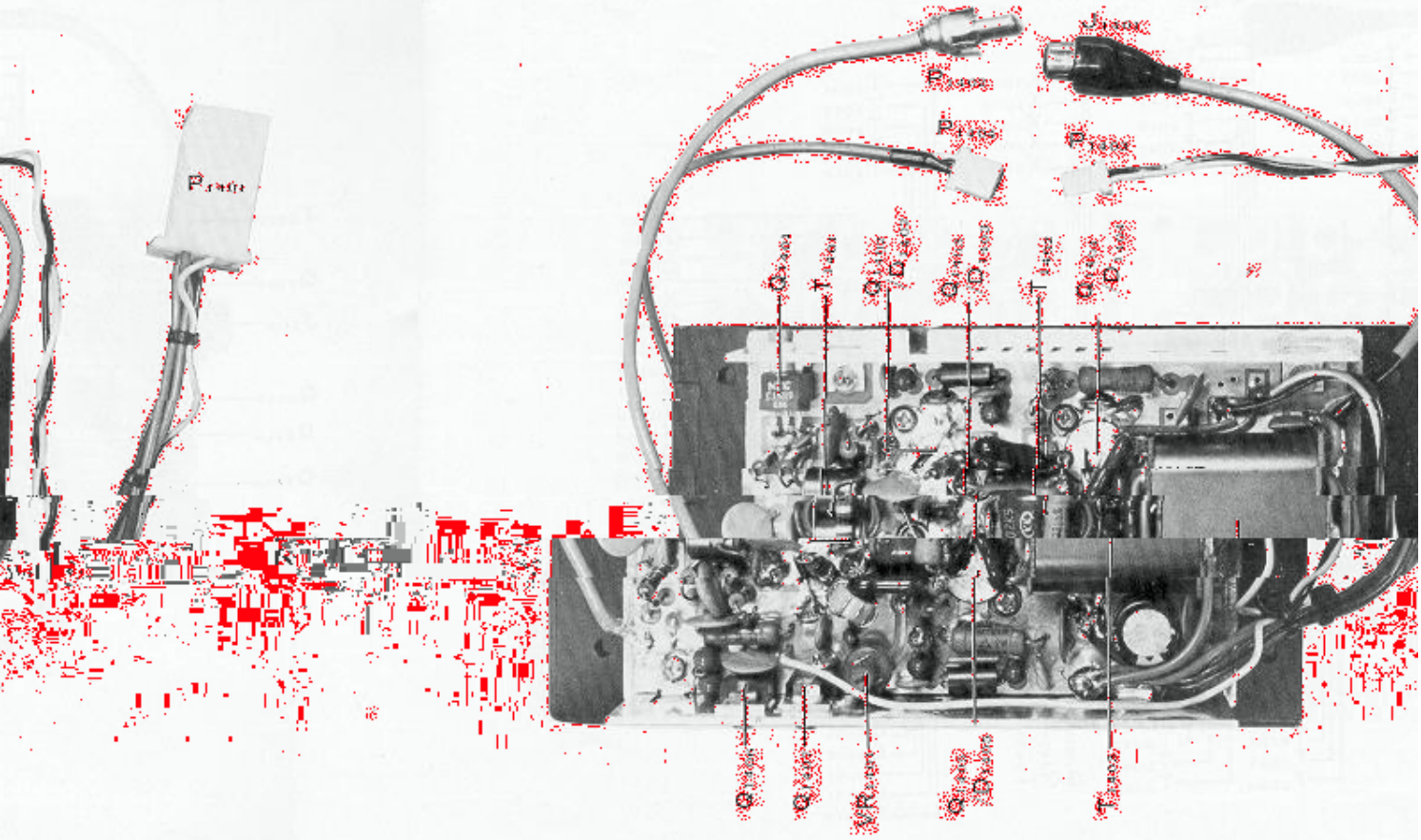
UNIT	TRANSFORMER	ADJUSTMENT
RF	T_{1001}	RX: Max. S-meter reading on marker.
MB	T_{2001}, T_{2002} T_{2003}, T_{2004}	TX SSB, PROC OFF: Max. power output. TX SSB, PROC ON: Max. power output.
IF	T_{3001}, T_{3002}	RX: Max. S-meter reading on marker.
FILTER	T_{3003}, T_{3004}, T_{3005}, T_{3006}, T_{3007}, T_{3008}, T_{3009}, T_{3010}	RX: Max. S-meter reading on marker.
AF	T_{4001} T_{4002}	TX SSB: Max. power output. TX FSK: Max. power output.



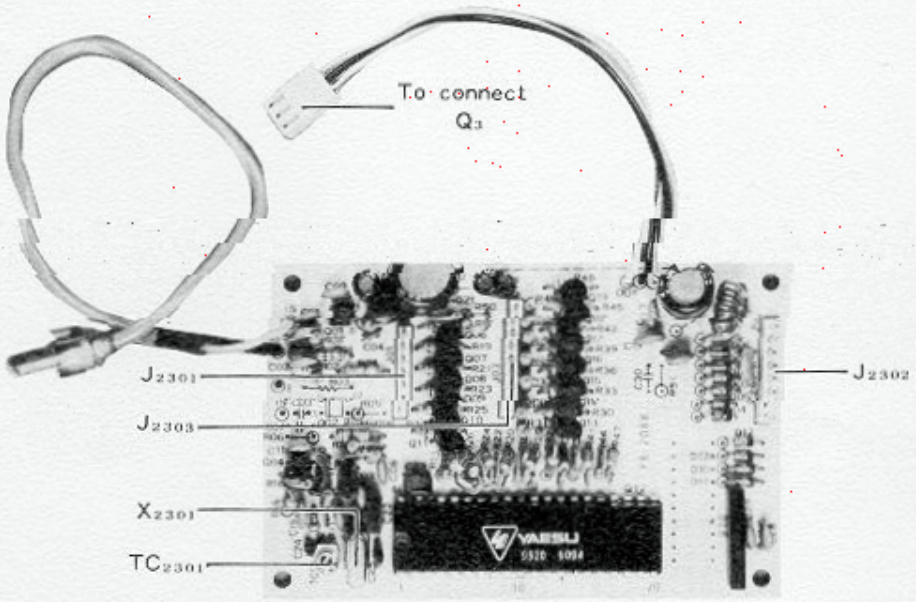
LOCAL UNIT



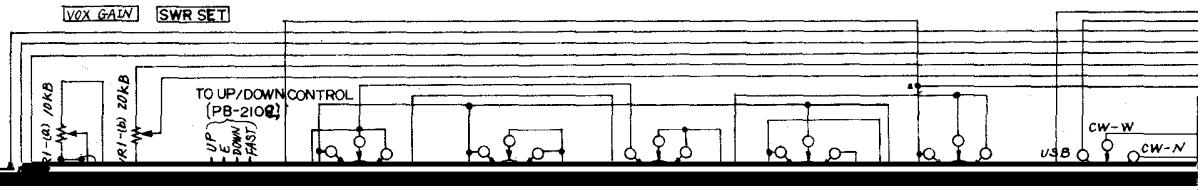
FILTER UNIT

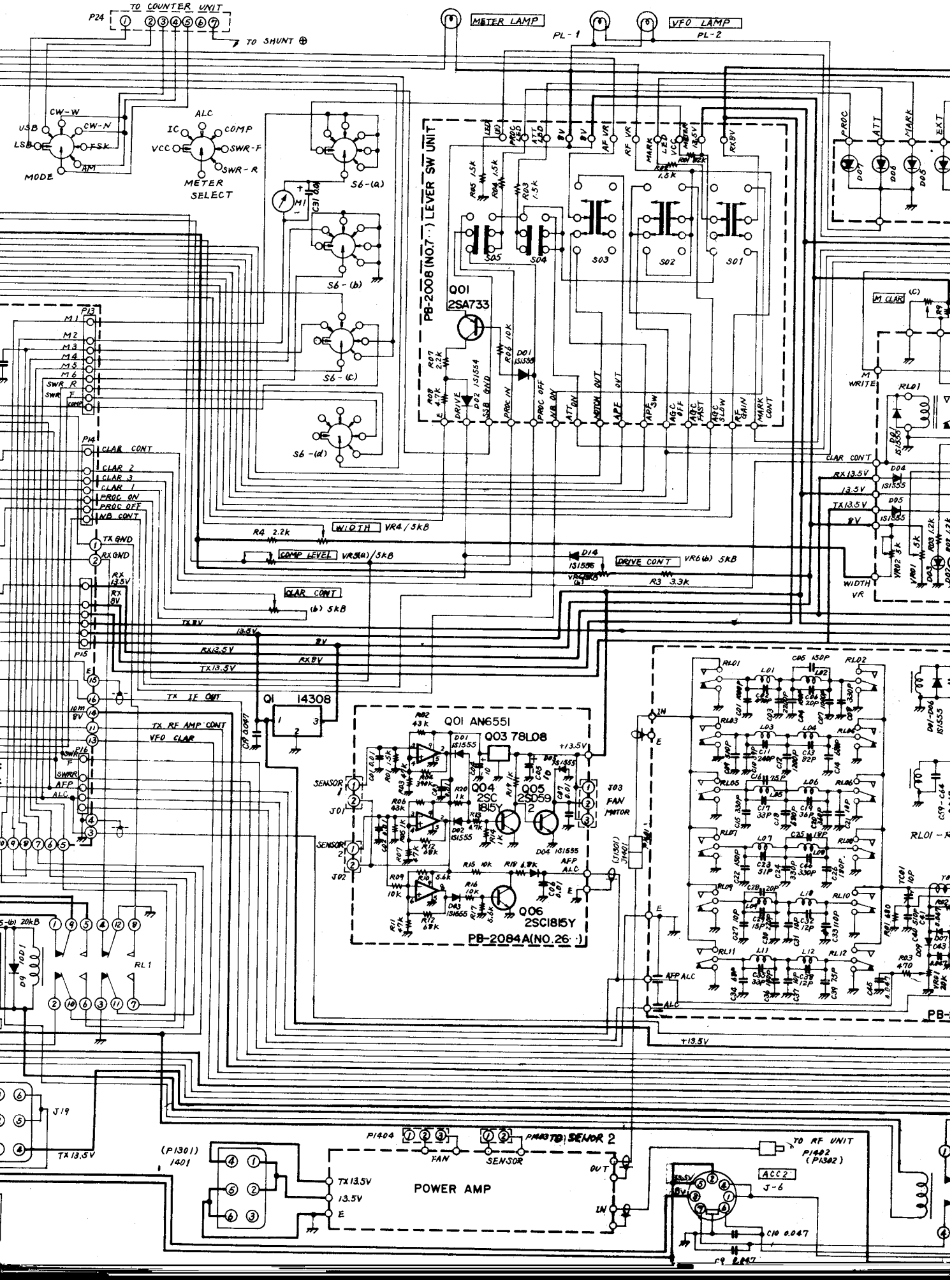


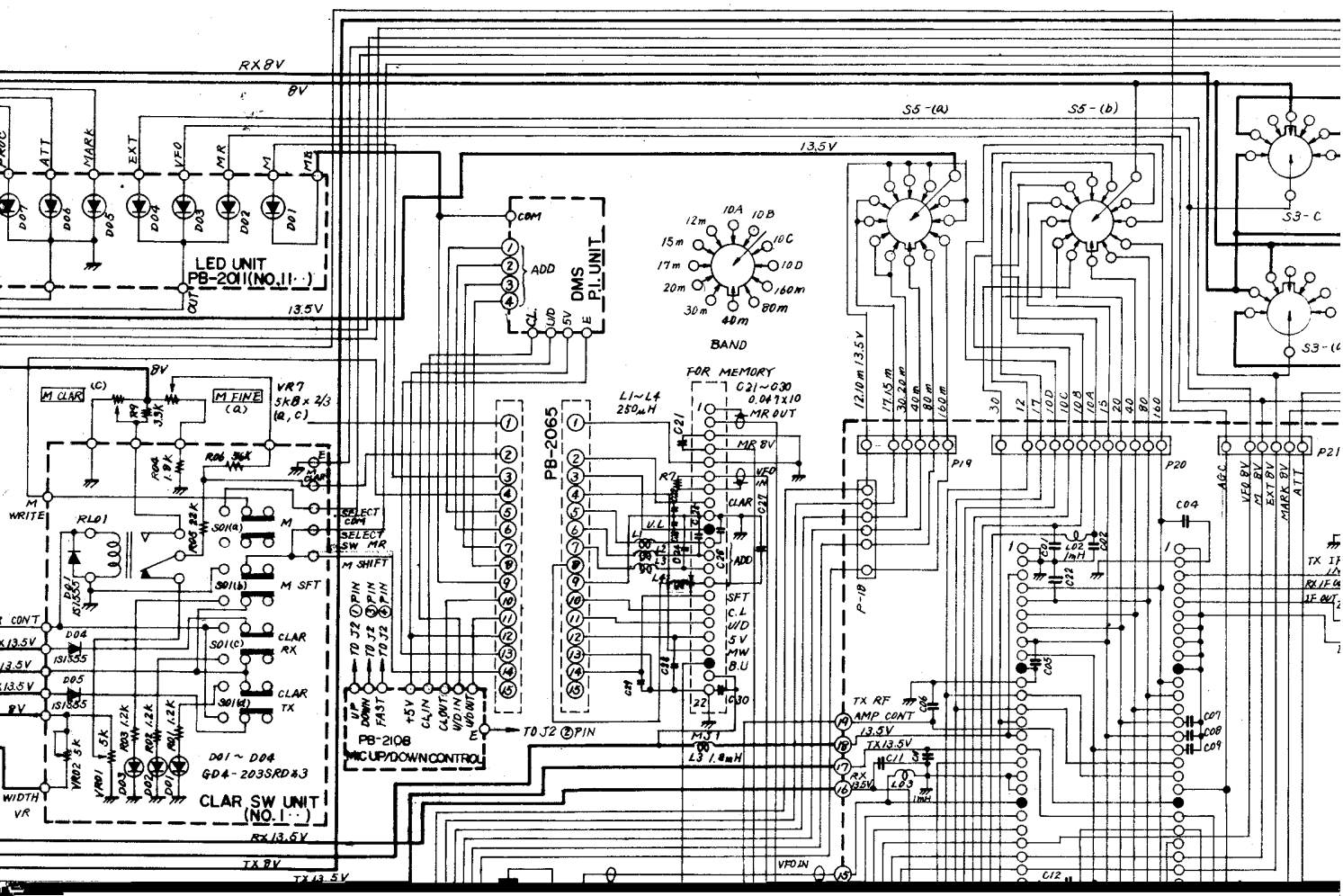
100W PA UNIT

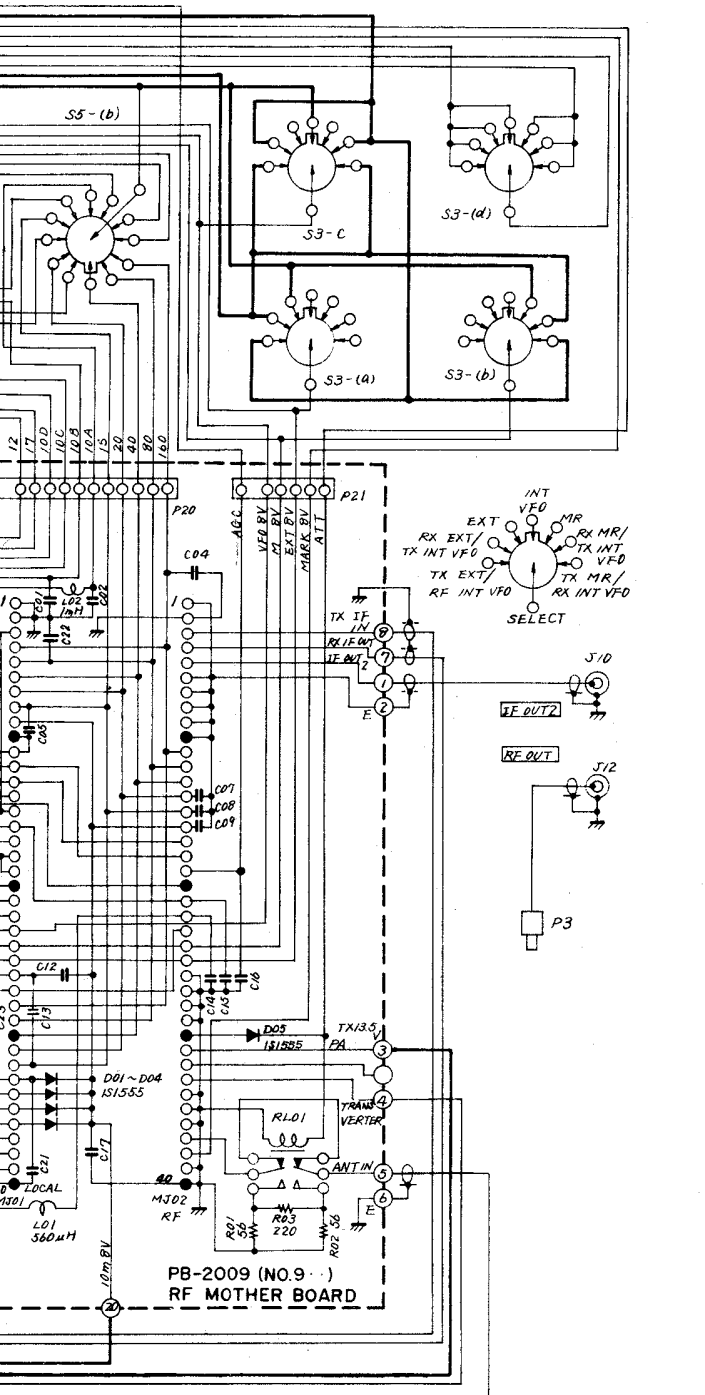


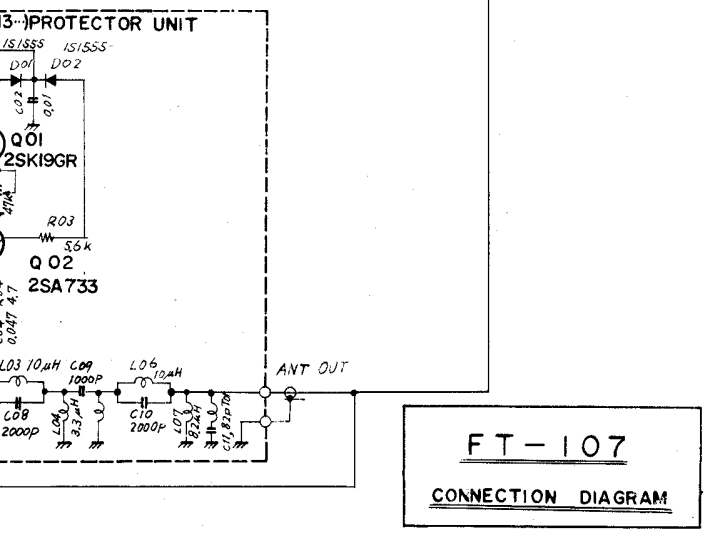
COUNTER UNIT


VOX GAIN
SWR SET
R1-(a) 10KB
R1-(b) 20KB
TO UP/DOWN CONTROL
(PB-2108)
UP
DOWN
FAST
USB
CW-W
CW-N


TO COUNTER UNIT
P24
TO SHUNT ⊕
METER LAMP
PL-1
VFO LAMP
PL-2
MODE
CW-W
CW-N
USB
LSB
FSK
AM
METER SELECT
ALC
COMP
SWR-F
SWR-R
IC
VCC
S6-(a)
S6-(b)
S6-(c)
S6-(d)
M1
C31 0.01
PB-2008(NO.7··) LEVER SW UNIT
Q01 2SA733
S01
S02
S03
S04
S05
PROC
ATT
MARK
EXT
M CLAR
M WRITE
WIDTH VR
CLAR CONT
RX 13.5V
13.5V
TX 13.5V
8V
P13
P14
P15
P16
CLAR 2
CLAR 3
CLAR 1
PROC ON
PROC OFF
NB CONT
TX GND
RX GND
RX 13.5V
RX 8V
TX 8V
TX IF OUT
TX RF AMP CONT
VFO CLAR
SWR R
SWR F
COMP
AFP
ALC
WIDTH VR4/5kB
COMP LEVEL VR5(a)/5kB
CLAR CONT (b) 5kB
DRIVE CONT VR6(b) 5kB
Q1 14308
Q01 AN6551
Q03 78L08
Q04 2SC1815
Q05 2SD59
Q06 2SC1815Y
PB-2084A(NO.26··)
SENSOR
FAN MOTOR
J01
J02
J03
AFP ALC
+13.5V
RL01
RL02
RL03
RL04
RL05
RL06
RL07
RL08
RL09
RL10
RL11
RL12
RL1
J19
(P1301) 1401
P1404
FAN
SENSOR
TO SENSOR 2
POWER AMP
TX 13.5V
13.5V
OUT
IN
TO RF UNIT
P1402 (P1302)
ACC2
J-6
C10 0.047


RX 8V
8V
ATT
MARK
EXT
VFO
MR
M
M5
D07
D06
D05
D04
D03
D02
D01
LED UNIT
PB-2011(NO.11··)
OUT
13.5V
S5-(a)
S5-(b)
S3-C
COM
ADD
CL
U/D
5V
E
DMS
P.I. UNIT
12m
15m
17m
20m
30m
40m
10A
10B
10C
10D
160m
80m
BAND
FOR MEMORY
C21~C30
0.047×10
MR OUT
L1~L4
250μH
PB-2065
MR 8V
VFO
CLAR
ADD
SFT
C.L
U/D
5V
MW
B.U
M SFT
MJ1
L3 1.8mH
C30
12.10m 13.5V
17.15m
30.20m
40m
80m
160m
P19
P18
P20
P21
M CLAR
(C)
M FINE
(a)
VR7
5KB×2/3
(a, c)
R9
3.3K
R04
1.8K
R06
3.3K
M
WRITE
RL01
SELECT
COM
SELECT
SW MR
M SHIFT
S01(a)
S01(b)
S01(c)
S01(d)
CLAR
RX
CLAR
TX
D04
D05
IS1555
R03
1.2K
R02
1.2K
R01
1.2K
5K
VR01
VR02
3K
WIDTH
VR
D01~D04
GD4-203SRD×3
CLAR SW UNIT
(NO.1··)
8V
13.5V
TX 8V
TX 13.5V
TO J2 ① PIN
TO J2 ⑤ PIN
TO J2 ⑥ PIN
UP
DOWN
FAST
+5V
CL IN
CL OUT
U/D IN
U/D OUT
PB-2108
MIC UP/DOWN CONTROL
TO J2 ② PIN
TX RF
AMP CONT
13.5V
TX 13.5V
RX
8.5V
VFO IN
AGC
VFO 8V
M 8V
EXT 8V
MARK 8V
ATT
TX IF
RX IF
IF OUT





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CONNECTION DIAGRAM


YAESU