FT-757GX

TECHNICAL SUPPLEMENT

YAESU MUSEN CO., LTD.
C.P.O. BOX 1500
TOKYO, JAPAN

SERVICE AND ALIGNMENT

The FT-757GX is carefully designed to allow the knowledgeable operator to make all adjustments required for various station conditions, modes and operator preferences simply from the controls on the front and rear panels, without opening the case of the transceiver. These adjustments are described in the FT-757GX Operating Manual.

The following procedures cover the sometimes critical and tedious adjustments that are not normally required once the transceiver has left the factory. We recommend that these adjustments be made only by authorized Yaesu service representatives, as many are interdependent and difficult to perform correctly without prior experience with FT-757GX alignment. Without such experience and the proper test equipment, any attempt to make internal adjustments is likely to cause degraded transceiver performance, the correction of which is not covered by the warranty policy when caused by unauthorized internal adjustments.

In the unlikely event that a sudden failure occurs during normal operation, do not attempt realignment. Such failures are almost always due to the failure of a component, often in an external accessory, or a problem with the antenna system. Once the external connections have all been checked, if the transceiver is still suspect, the Yaesu representative through whom the transceiver was originally purchased should be contacted immediately for instructions regarding repair. Authorized Yaesu service technicians automatically perform complete performance checks and realignment of all circuits that may be affected once a faulty component has been replaced.

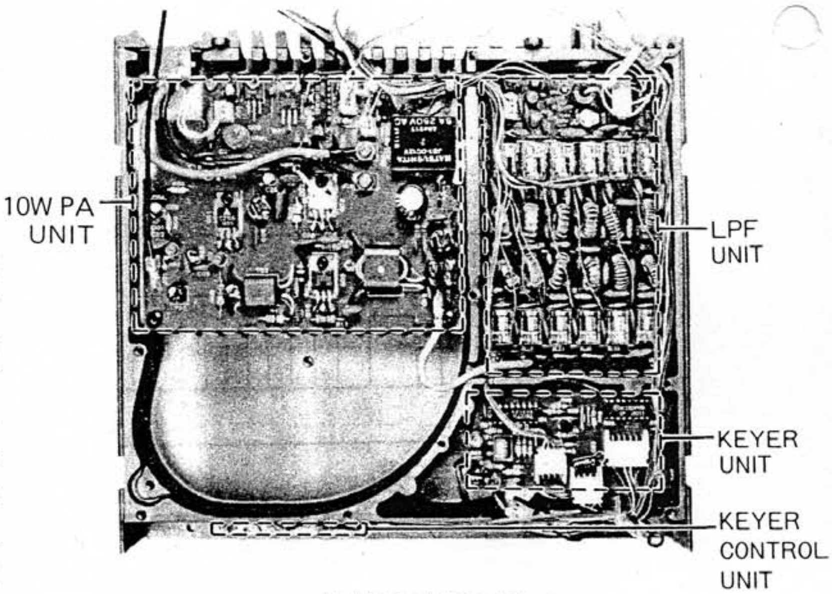
Those who do undertake any of the following alignments are cautioned to proceed only at their own risk. Yaesu must reserve the right to change circuits and alignment procedures in the interest of improved performance, without notifying owners. Under no circumstances should any realignment be attempted unless the normal function and operation of the transceiver are clearly understood, the malfunction has been carefully analyzed and any faulty components replaced, and the need for a specific realignment determined to be absolutely necessary. Procedures not involving adjustments are termed checks, and are included for troubleshooting purposes.

The following test equipment (and thorough familiarity with its use) is required for complete alignment. While most steps do not require all of the equipment listed, the interactions of such adjustments may require that more complex adjustments be performed afterwards. Do not attempt to perform only a single step unless it is clearly isolated electrically from all other steps. Rather, have all test equipment ready before beginning, and follow all of the steps in the order that they are given in each section.

During all of the following procedures that call for the transmitter to be activated, a 50-ohm dummy load must be connected to the antenna jack, except where specifically stated otherwise.

Also, the WIDTH/SHIFT controls must be set to the 12 o'clock position, the RF gain control must be fully clockwise, and the SQL control must be fully counterclockwise, unless stated otherwise.

After completing one step, read the following step to determine whether the same test equipment will be required. If not, remove the test equipment (except dummy load and wattmeter) before proceeding.



FT-757SX (10 W)
Underside of Heatsink

Alignment Equipment

Frequency counter with accuracy of 0.1 ppm to 100 MHz

DC voltmeter with at least 10-Megohm input impedance

RF voltmeter with at least 5% accuracy to 100 MHz, high impedance, and ranging from 10 mV to 3 Vrms

AF millivoltmeter

DC milliammeter ranging to 500 mA

X-Y oscilloscope with 60 MHz bandwidth

RF in-line wattmeter

Resistive dummy load, 50 ohms, 150W; three required for SWR Turndown alignment

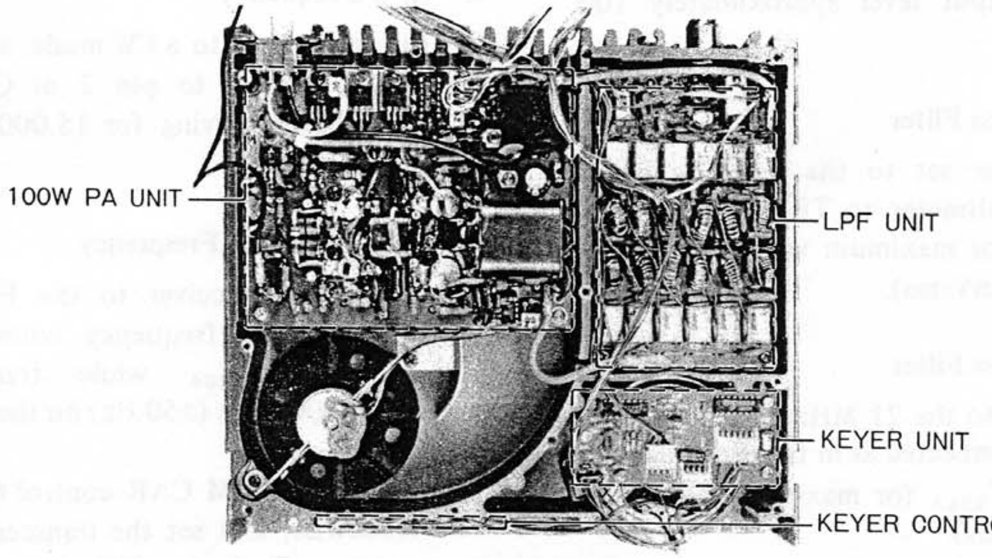
RF signal generator covering 1-30 MHz, with calibrated output levels from 5 dBμ to 100 dBμ

AF signal generator with calibrated output levels from 1 mV to 25 mV

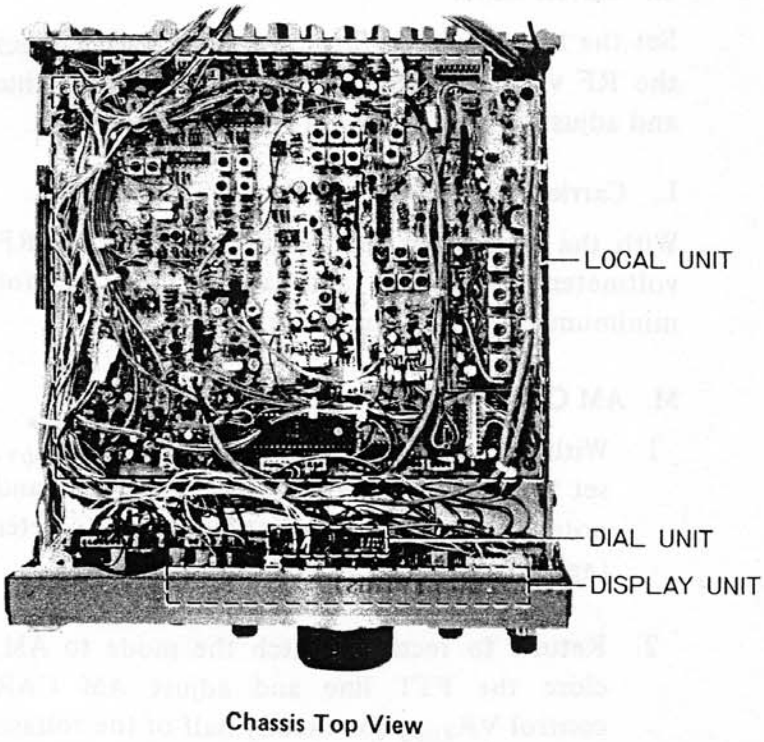
FM deviation meter/SINADer and RF sampling coupler ("T") for FM modulator alignment

Monitor scope for transmitter output display

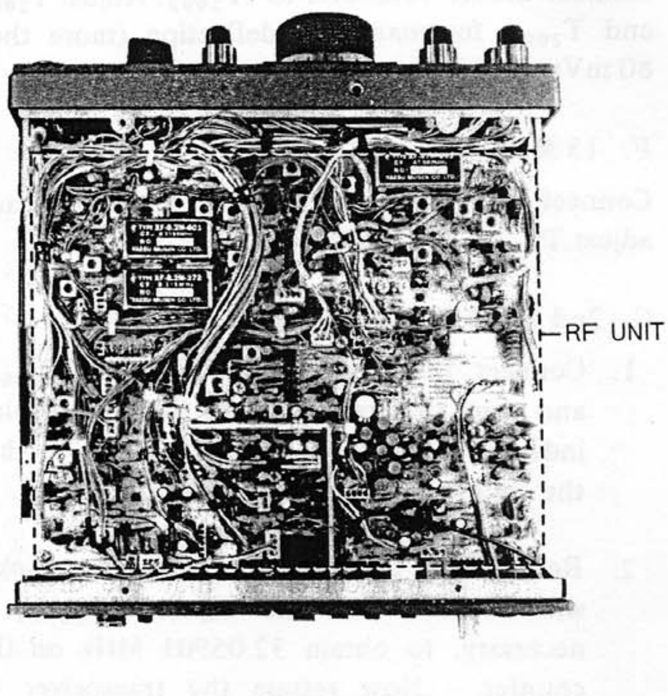
Linear detector for 1-30 MHz



FT-757GX
Underside of Heatsink



Chassis Top View



Chassis Bottom View

ALIGNMENT

LOCAL Unit

A. Third LO BPF

Remove P_{17} and connect a 50-ohm load across 3rd LO OUT jack J_{2008}, along with the RF voltmeter. Set the transceiver to a CW mode, and while receiving, adjust T_{2001} and T_{2002} for maximum deflection on the voltmeter (50 mVrms nominal).

B. SSB, AM, CW RX LO Level

Connect the RF voltmeter to pin 2 of Q_{2012} and adjust TC_{2002} so that the difference in level between CW transmit and receive is less than 5 mVrms at this point (output level approximately 100 mVrms).

C. 45 MHz Bandpass Filter

With the transceiver set to the 14 MHz band, connect the RF voltmeter to TP_{2006} and adjust T_{2009} and T_{2010} for maximum voltmeter deflection (more than 80 mVrms).

D. 60 MHz Bandpass Filter

Set the transceiver to the 21 MHz band, and with the RF voltmeter connected as in the previous step, adjust T_{2011} and T_{2012} for maximum deflection (more than 80 mVrms).

E. 45 MHz Tripler

Return the transceiver to the 14 MHz band, and connect the RF voltmeter to TP_{2002}. Adjust T_{2006} and T_{2007} for maximum deflection (more than 80 mVrms).

F. 15 MHz Reference Frequency

Connect the frequency counter to TP_{2002} and adjust TC_{2006} for 45 MHz ±20 Hz.

G. 2nd Local Oscillator Frequency

1. Connect the frequency counter to TP_{2007}, and tune the transceiver so that the display indicates 14.000.00. Adjust VR_{2006} so that the counter shows 32.06000 MHz ± 20 Hz.

2. Retune the transceiver so that the display shows 13.999.99, and adjust VR_{2014}, if necessary, to obtain 32.05901 MHz on the counter. Now retune the transceiver to 14.000.00 and check that the difference in the frequencies shown on the counter are within 990 Hz ±5 Hz.

H. Carrier Point

Connect the frequency counter to J_{2008} and adjust the component indicated in the corresponding mode for the frequency shown below:

MODE	ADJUST	COUNTER FREQUENCY
LSB	TC_{2005}	8213.400 kHz (±50 Hz)
CW	TC_{2004}	8215.900 kHz (±10 Hz)
USB	VR_{2005}	8216.600 kHz (±50 Hz)

I. BFO Frequency

Set the transceiver to a CW mode, and connect the frequency counter to pin 2 of Q_{2012}. Adjust TC_{2001} while receiving for 15.000700 MHz (±10 Hz) on the counter.

J. FM/AM Carrier Frequency

1. Set the transceiver to the FM mode, and connect the frequency counter to J_{2007}. Adjust VR_{2004} while transmitting for 8.215000 MHz (±50 Hz) on the counter.

2. Rotate the AM CAR control (VR_{2008}) fully clockwise, and set the transceiver to the AM mode. Close the PTT line and check the counter for 8.215000 MHz ±300 Hz.

K. Carrier Level

Set the transceiver to the LSB mode, and connect the RF voltmeter to TP_{2001}. Close the PTT line and adjust TC_{2003} for 90 mVrms (±5 mV).

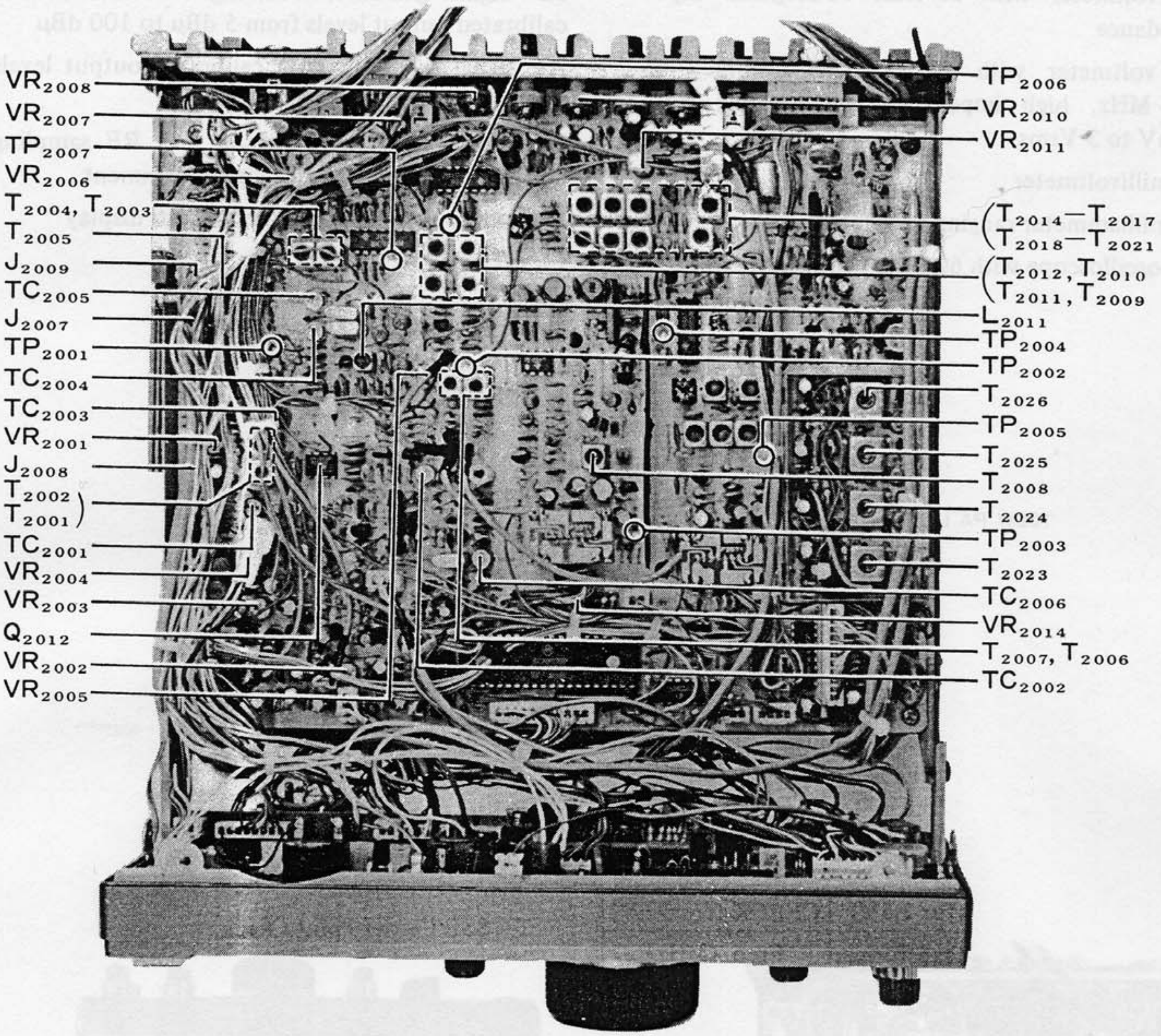
L. Carrier Balance

With the transceiver set to LSB, connect the RF voltmeter to J_{2007} and adjust VR_{2001} for minimum voltage on the meter.

M. AM Carrier Level

1. With the RF voltmeter connected to J_{2007}, set the mode to CW, key the transmitter, and note the voltage indicated on the meter (approx. 200 mVrms).

2. Return to receive, switch the mode to AM, close the PTT line and adjust AM CAR control VR_{2008} for exactly half of the voltage noted in the previous step.



Chassis Top View: LOCAL Unit
Adjustment Locations

N. PLL Subloop (PLL-1) VCC

1. Connect the hi-Z DC voltmeter to TP_{2003} and tune the transceiver for 14.499.00 on the display. Adjust T_{2008} for 5.5 V on the meter.

2. Retune the transceiver for a display of 14.500.00, and check for 2 to 3 volts on the meter.

O. 41 and 56 MHz Bandpass Filters

1. Connect the RF voltmeter to TP_{2004} and tune the transceiver for 14.250.00 on the display. Adjust T_{2014} through T_{2017} for maximum deflection on the voltmeter (more than 60 mVrms).

2. Retune the transceiver to 21.250 MHz, and adjust T_{2018} through T_{2021} for maximum deflection on the voltmeter (more than 60 mVrms).

P. Main PLL (PLL-2) VCC

1. Connect the hi-Z DC voltmeter to TP_{2005} and tune the transceiver to the frequencies shown in the following chart, adjusting the corresponding transformer for 1.5 V on the meter. Then retune the transceiver to the corresponding "check" frequency, and check for 5 to 6 V on the meter.

ADJUSTMENT (for 1.5V)		CHECK (for 5-6V)
Freq. (MHz)	Transformer	Freq. (MHz)
0.500	T_{2023}	7.499
7.500	T_{2024}	14.499
14.500	T_{2025}	21.499
21.500	T_{2026}	29.999

2. Check for proper VCC control by tuning between the adjustment and check frequencies in each of the above four ranges, using the tuning knob or microphone scanning buttons, and watching the DC voltmeter for smooth voltage change. If the voltage changes unevenly, or jumps, a fault is indicated.

Q. 2nd Local Level

Connect the RF voltmeter to J_{2009}. Adjust T_{2003} through T_{2005} for maximum RF voltage on the meter (at least 110 mVrms).

R. IF Shift Zero Point Set

1. Connect the frequency counter to J_{2009}, and with the Shift and Width controls centered, note the counter frequency while receiving. Then key the transmitter and adjust VR_{2007}, if necessary, so that the frequency shown on the counter is within 50 Hz of that shown while receiving.

2. While receiving, check the total adjustment range of the Shift control in USB, LSB and CW, which should be approximately ±1.3 kHz as shown on the counter. If not, adjust L_{2011} (not more than 90° in either direction), and then repeat adjustments H, I and J (Carrier Point, BFO Frequency and FM/AM Carrier Frequency), and then this check again.

S. VOX Gain Preset

1. Preset VR_{2011} fully clockwise, and set the VOX GAIN control on the rear panel fully clockwise. Connect the AF signal generator to the PATCH jack, and apply a 1 kHz signal at 1 mV to check to see if the transmitter activates.

2. Now rotate the VOX GAIN control fully counterclockwise, and slowly adjust VR_{2011} counterclockwise to the point where the transceiver returns to receive, and then a little further counterclockwise from this point.

T. SSB Carrier Point Check

1. With the AF generator connected as in the previous step, set the transceiver to the 14 MHz band, USB mode. Close the PTT line and adjust the MIC gain control for 100 watts output (into the dummy load/wattmeter). For the 10-watt model FT-757SX, divide all power outputs by 10.

2. Reduce the frequency of the audio generator while watching the wattmeter, to obtain 25 watts output. Check that the audio frequency is below 350 Hz.

3. Now increase the frequency of the AF generator so that the power output rises to full power and then down to 25 watts again above 2 kHz. Check that the audio frequency is now above 2900 Hz.

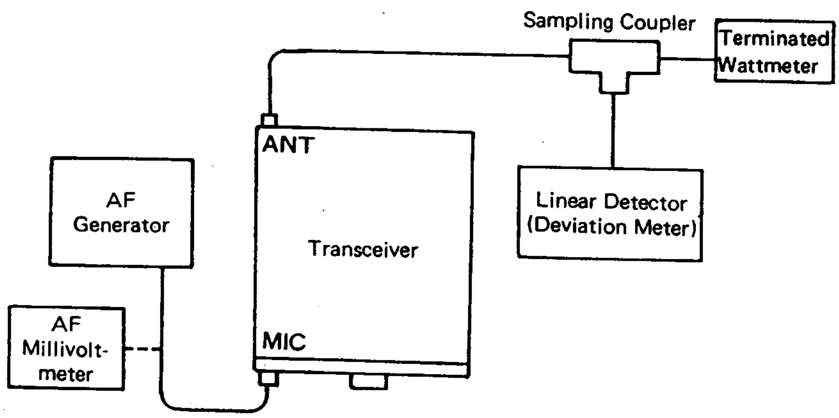
4. Return to receive, switch to LSB, and repeat the above checks in this mode. If 25 watts output is not obtained outside the specified frequency in any of these checks, repeat the Carrier Point (H) and then the IF Shift Zero Point (R) procedures.

U. FM Modulation

1. With the test equipment connected as shown in the following diagram, preset VR_{2002} fully clockwise, and set the AF generator for 10 mV output at 1 kHz. Set the transceiver to FM.

2. Adjust VR_{2003} for ±5 kHz deviation (±100 Hz), and then reduce the AF generator output level to 1.5 mV, and adjust VR_{2002} for ±3.5 kHz deviation (±100 Hz).

3. Recheck deviation with 10 mV audio, and repeat the above steps until deviation is within the specified ranges for both audio levels.



A. 3rd Local Buffer

Connect the RF voltmeter to the emitter of Q_{1028} and adjust T_{1019} for maximum RF voltage (0.7 to 0.9 Vrms).

B. 2nd Local Buffer

Connect the RF voltmeter to the jumper between T_{1006} and T_{1023} on the component side of the board, and adjust T_{1022} for maximum RF voltage (0.25 to 0.35 Vrms).

C. Width Oscillator (Coarse)

1. Connect the frequency counter through a 0.01 uF capacitor to pin 1 of Q_{1022}. Set the WIDTH control to the 12 o'clock position, and adjust L_{1044} for 8.670 MHz ±100 Hz on the counter (coarse adjustment).

2. Connect the RF voltmeter to gate two of Q_{1016} and adjust T_{1019} for maximum RF voltage (0.5 to 0.6 Vrms).

D. RX IF Transformers

Preset VR_{1001} fully clockwise and adjust VR_{1010} to the point where the S-meter just begins to deflect. Apply a 60 dB signal at 14.000 MHz from the RF signal generator to the antenna jack, and adjust T_{1016} through T_{1010} and T_{1007} through T_{1004}, in that order, for maximum S-meter deflection. Reduce the signal generator level as necessary to keep the meter below full scale.

E. Width Oscillator (Fine)

With the WIDTH and SHIFT controls both set to the 12 o'clock position, switch the mode back and forth between LSB and USB, adjusting L_{1044} for the same noise pitch.

F. IF Gain and S-Meter Sensitivity

1. Apply a 6 dB signal at 14.000 MHz from the RF signal generator to the antenna jack, and adjust VR_{1001} for an S-meter deflection of S-1.

2. Increase the RF signal level to 100 dB and adjust VR_{1011} so that the S-meter indicates just to full scale.

G. Noise Blanker

Connect the DC voltmeter to gate two of Q_{1013}, and with the RF signal generator connected as above, set the RF level to 40 to 60 dB at 14.000 MHz. With the NB button depressed, adjust T_{1008} and T_{1009} for minimum DC voltage on the meter.

H. FM 3rd Local

With the RF signal generator connected to the antenna jack, apply a 40 to 60 dB signal at 14.000 MHz, modulated with a 1 kHz tone at ±3.5 kHz deviation. Connect the AF voltmeter across the speaker terminals; set the SQL control fully counterclockwise, and adjust T_{1017} for maximum AF voltage on the meter.

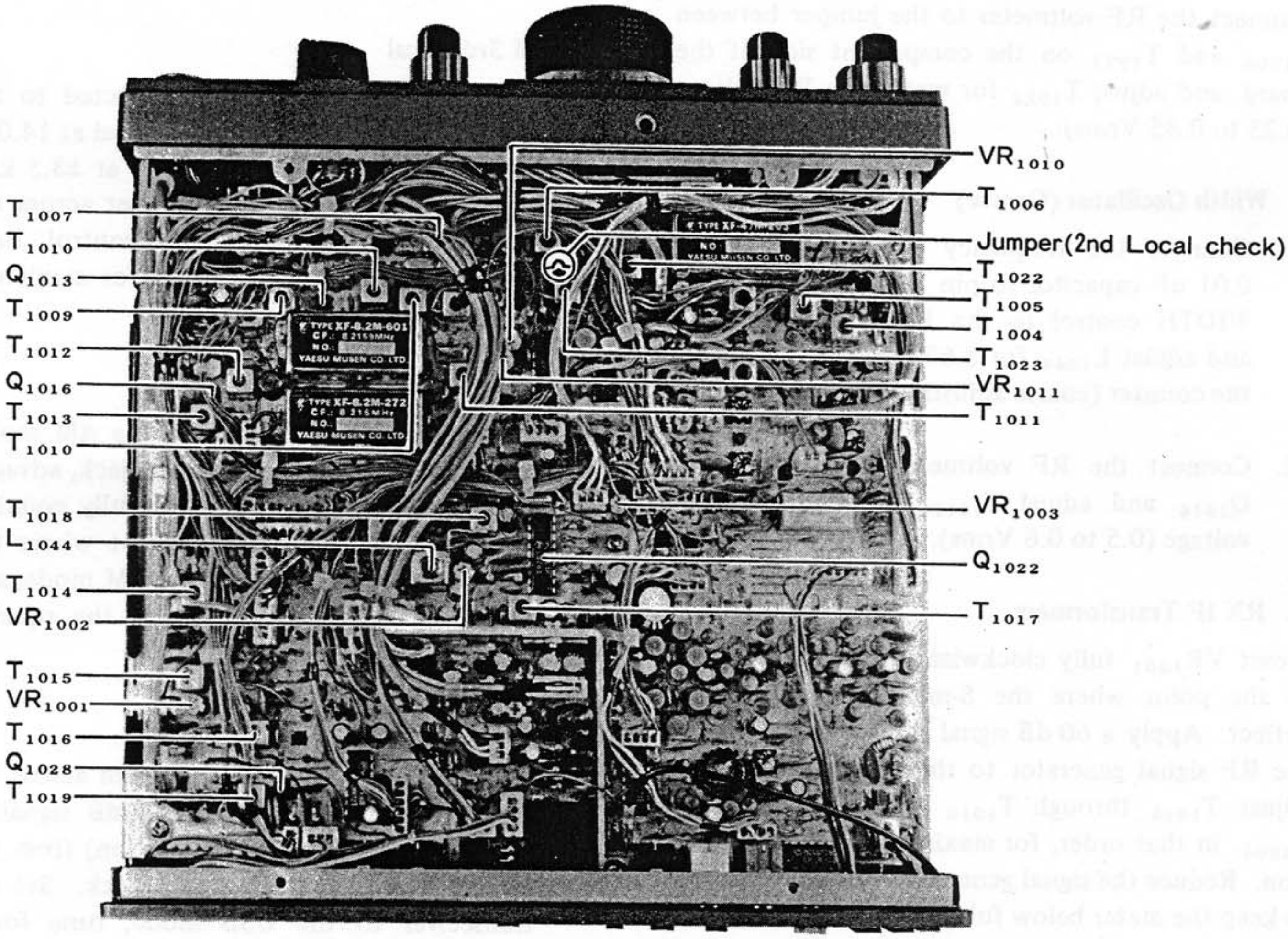
I. Squelch Threshold

Beginning with the transceiver in the AM mode, with no signal applied at the antenna jack, advance the SQL control gradually from the fully counter-clockwise position just to the point where the squelch closes. Then switch to the FM mode, and adjust VR_{1003} to the point where the squelch again just closes.

J. FM RX AF Output Level

1. With the AF voltmeter connected across the speaker terminals, apply a 40 dB signal at 14.000 MHz (with no modulation) from the RF generator to the antenna jack. Set the transceiver to the USB mode, tune for a heterodyne, and adjust the AF gain control for 0.1 V on the AF voltmeter.

2. Switch to the FM mode and modulate the RF signal with 1 kHz at ±3.5 kHz deviation, without changing the generator output level. Adjust VR_{1002} for 0.1 V on the AF voltmeter.



Chassis Bottom View: RF Unit
RX Adjustment Locations

RF Unit: Transmitter Circuits

A. ALC Meter Zero Set

With the transceiver tuned to 14 MHz, USB mode, and with no microphone input, key the transmitter and adjust VR_{1008} to the threshold point where ALC just starts to produce meter deflection (METER switch in ALC position).

B. TX IF Transformers

At 14 MHz, CW mode, with the METER switch set to ALC, preset VR_{1006} to the center of its range. Press the MOX switch and adjust T_{1020}, T_{1021} and T_{1023} through T_{1025} for maximum deflection on the ALC meter. If no deflection is found at first, set the METER switch to PO and the rear panel FWD/REV switch to FWD. Return the METER switch to ALC when the PO indication is maximum. If the ALC indication is overscale, reduce the setting of the DRIVE control.

C. TX Power

At 14 MHz, CW mode, adjust VR_{1006} for 100 watts output (10 watts for FT-757SX).

D. PO Meter

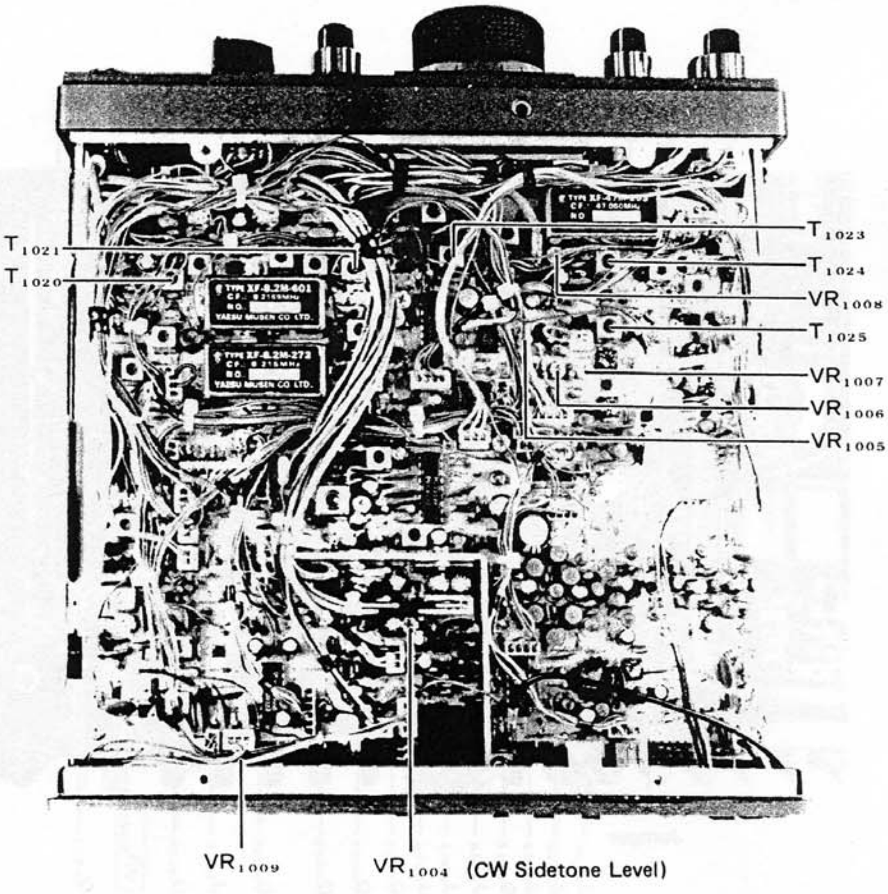
At 14 MHz, CW mode, press the MOX button and adjust the DRIVE control for 100 watts output on the external wattmeter. Set the rear panel FWD/REV switch to FWD, and with the front panel METER switch set to PO, adjust the FWD SET control for internal PO meter indication of 100 watts.

E. SWR Turndown (Automatic Final Protection)

At 14 MHz, CW mode, connect a 16.6-ohm dummy load (three 50-ohm loads in parallel) and a thru-type wattmeter to the antenna jack. Rotate the DRIVE control fully clockwise, press the MOX button, and adjust VR_{1007} to the point where power indication on the wattmeter just begins to drop.

F. CW Sidetone Level

With the AF voltmeter connected across the speaker terminals, in a CW mode with a key connected, close the key and adjust VR_{1004} for 0.3 V sidetone output on the meter.



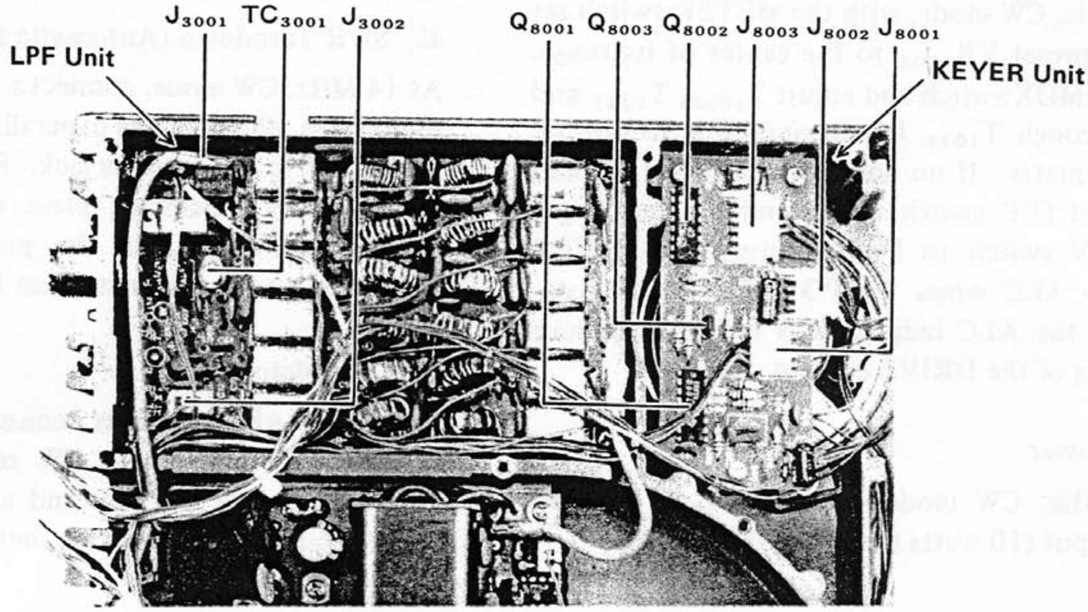
Chassis Bottom View: RF Unit
TX Adjustment Locations

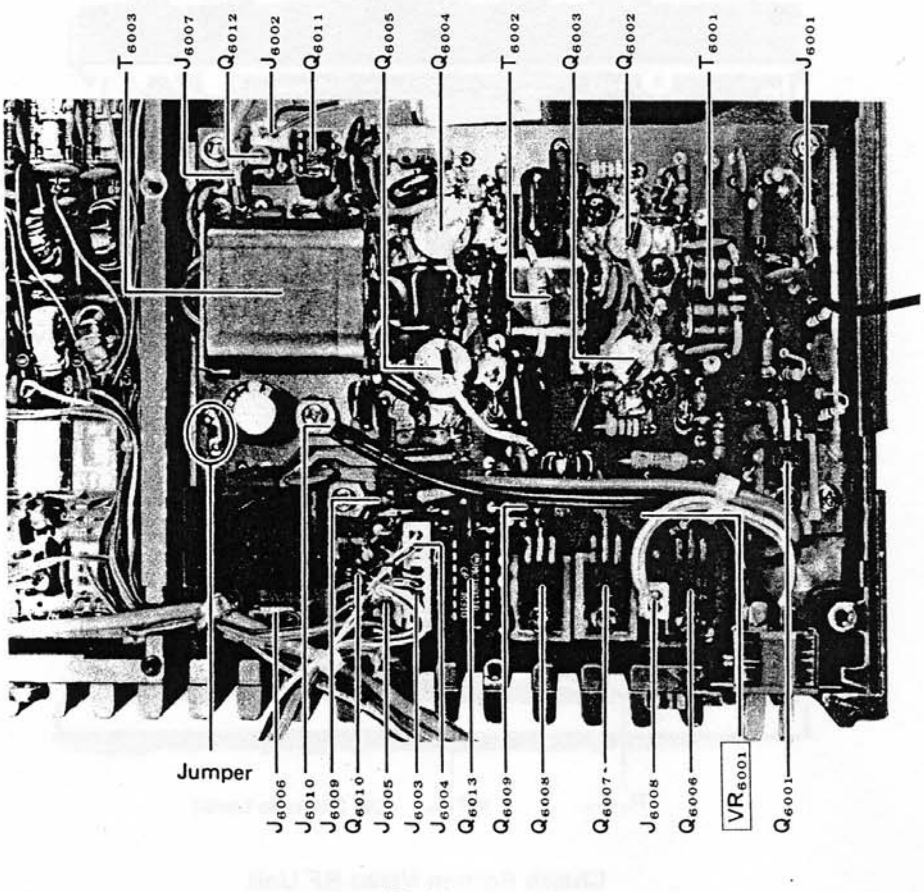
LPF Unit: Directional CM Coupler Balance

Set the METER switch to PO and the rear panel FWD-REV switch to REV. Set the transceiver to the CW mode, and transmit a 14 MHz carrier into the dummy load. Adjust TC_{3001} for minimum deflection on the meter.

PA Unit: Idling Current

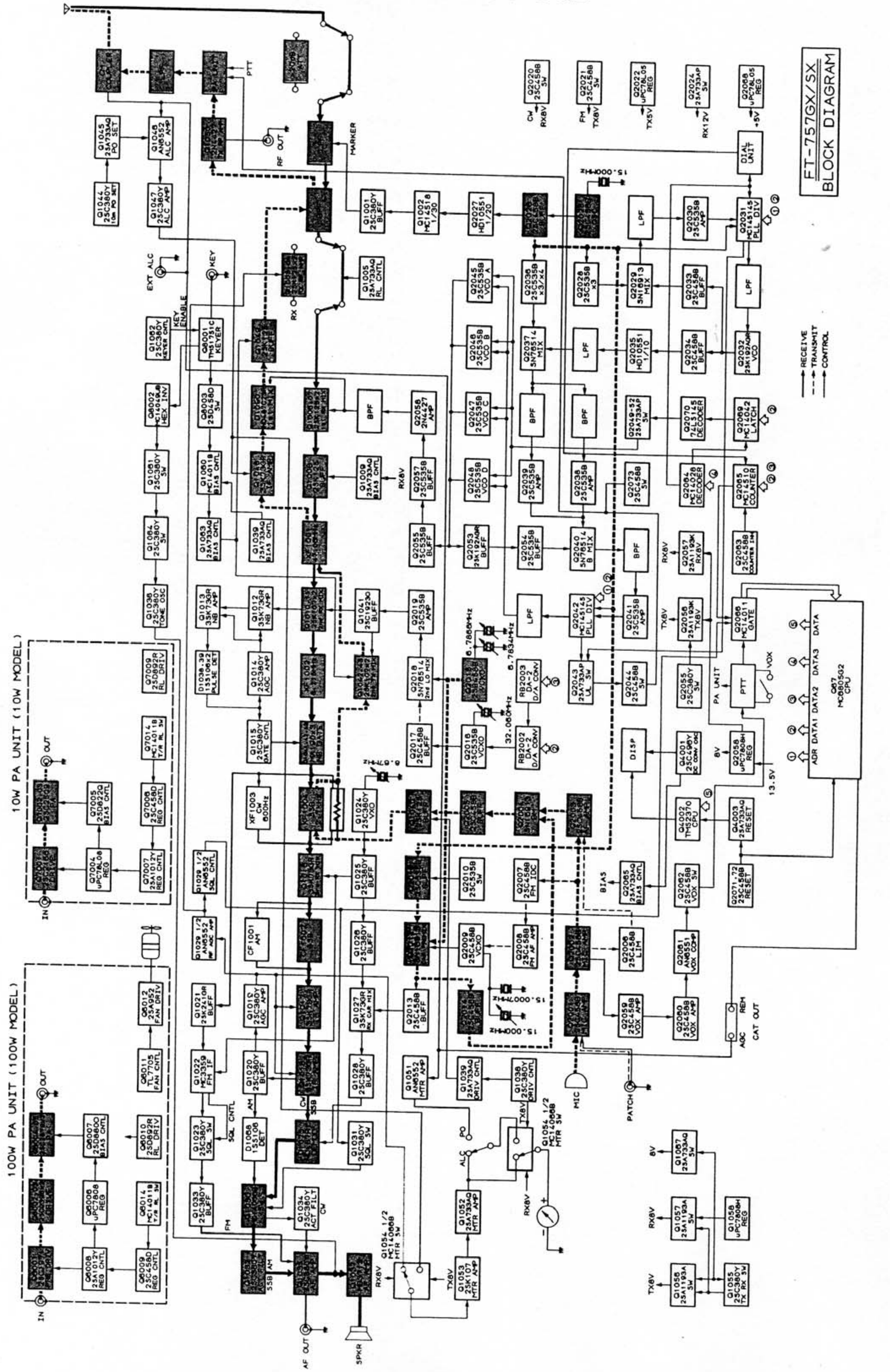
Remove the jumper shown in the following figure, and connect the DC milliammeter (500 mA range) in place of the jumper. With the transceiver set to an SSB mode and with no audio applied to the transmitter, close the PTT line and adjust VR_{6001} for 250 mA (±100 mA) on the ammeter. Replace the jumper after the adjustment. For the FT-757SX, adjust VR_{7001} for 150 mA (±50 mA).



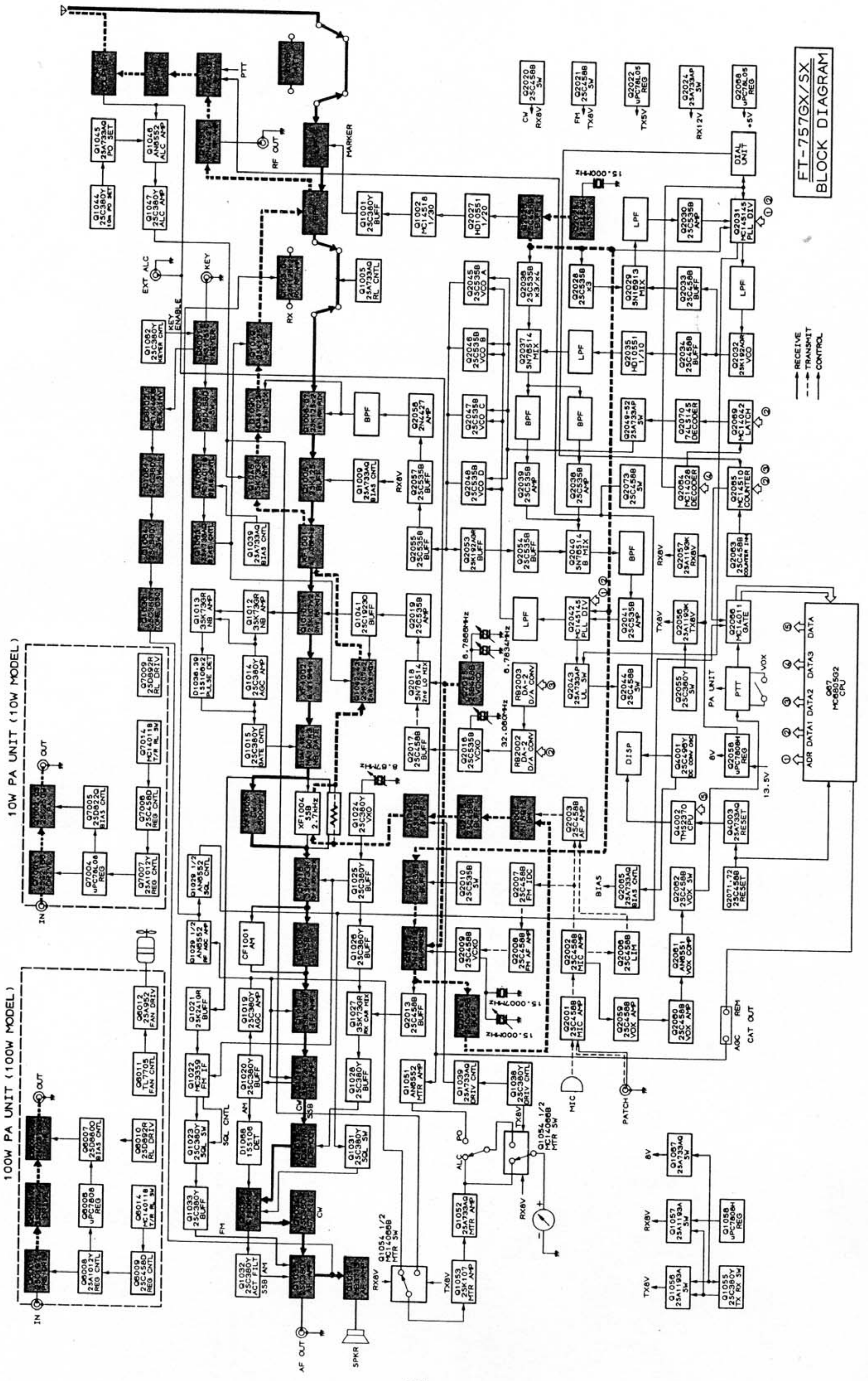


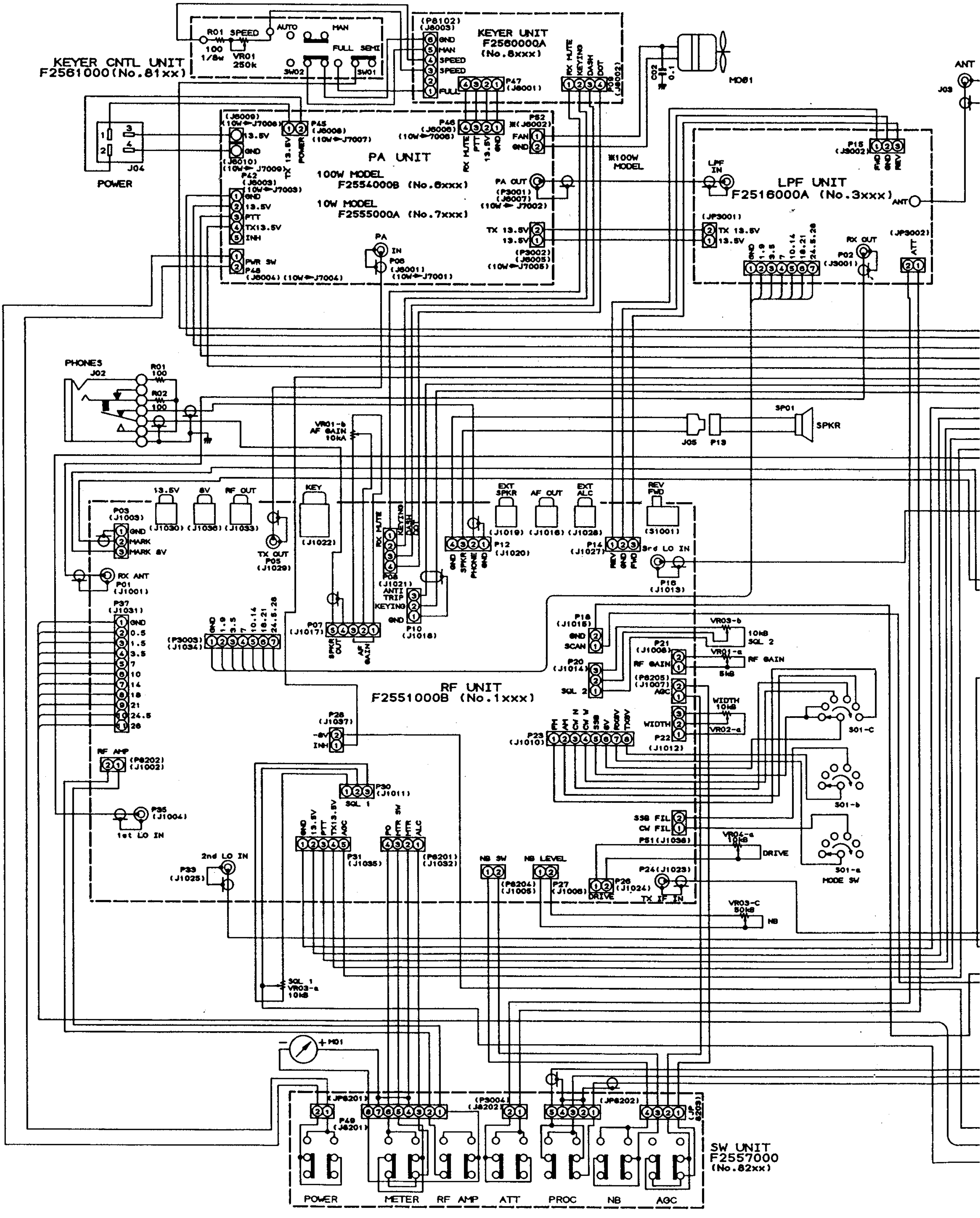
PA Unit

SIGNAL PATHS : SSB

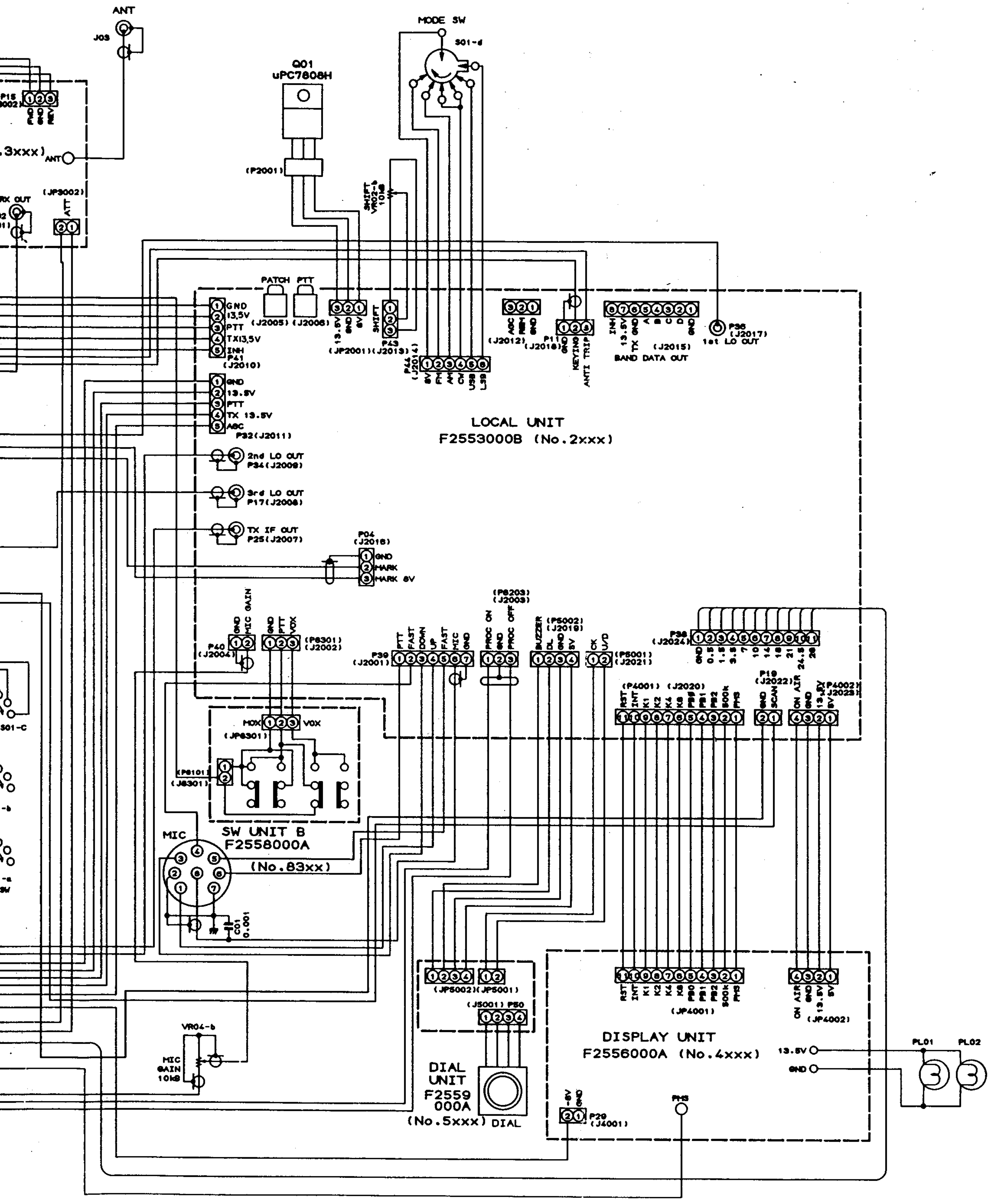


SIGNAL PATHS : CW




KEYER CNTL UNIT
F2561000(No.81xx)
KEYER UNIT
F2560000A
(No.8xxx)
PA UNIT
100W MODEL
F2554000B (No.6xxx)
10W MODEL
F2555000A (No.7xxx)
LPF UNIT
F2516000A (No.3xxx)
POWER
PHONES
SPKR
RF UNIT
F2551000B (No.1xxx)
MODE SW
SW UNIT
F2557000
(No.82xx)
POWER
METER
RF AMP
ATT
PROC
NB
AGC

CTION DIAGRAM

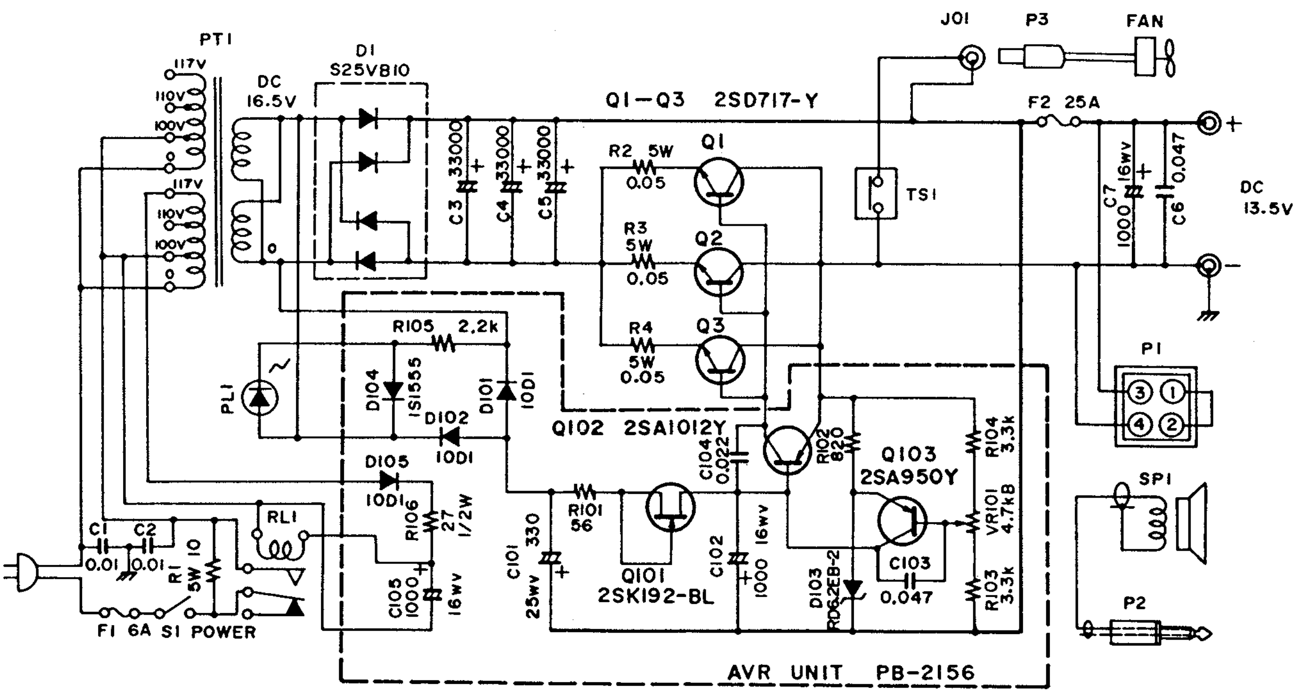


FT-757
CONNECTION DIAGRAM

KEYER UNIT

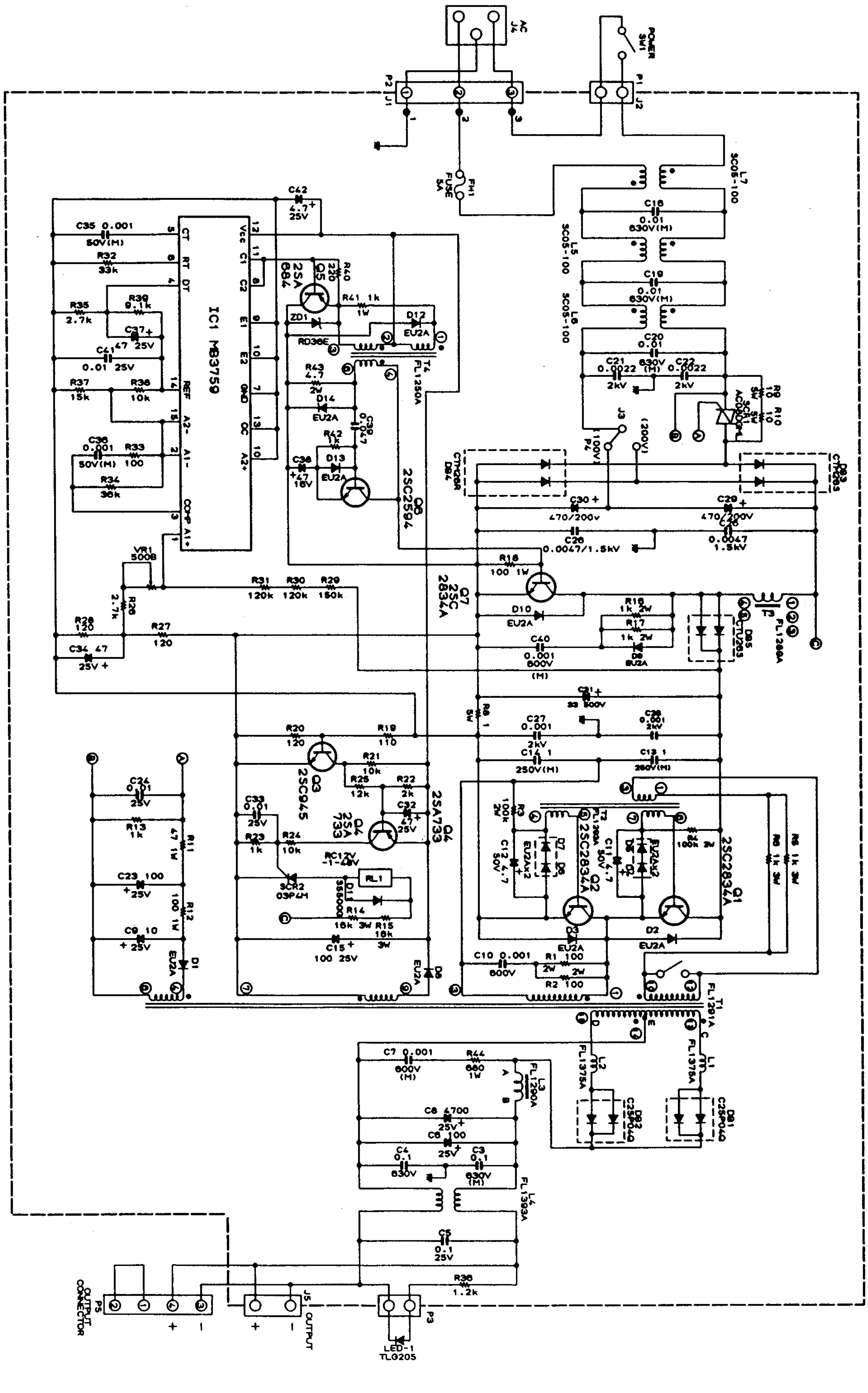
LOCATION	NOMENCLATURE	TYPE	APPLICATION
Q8001	TMS1751C	4-bit CPU	Keyer Microprocessor
Q8002	MC14049UBCP	HEX Inverter	Monostable Multivibrator
Q8003	2SC458D	NPN Si TR	Keying Line Driver
D8001	RD5.1EB	Zener Diode	Vcc Regulator
D8002	1SS106	Schottky Barrier Diode	Clamp
CO8001	CSA1.00MK	Ceramic Resonator	1MHz Clock Oscillator

FP-757HD SCHEMATIC DIAGRAM



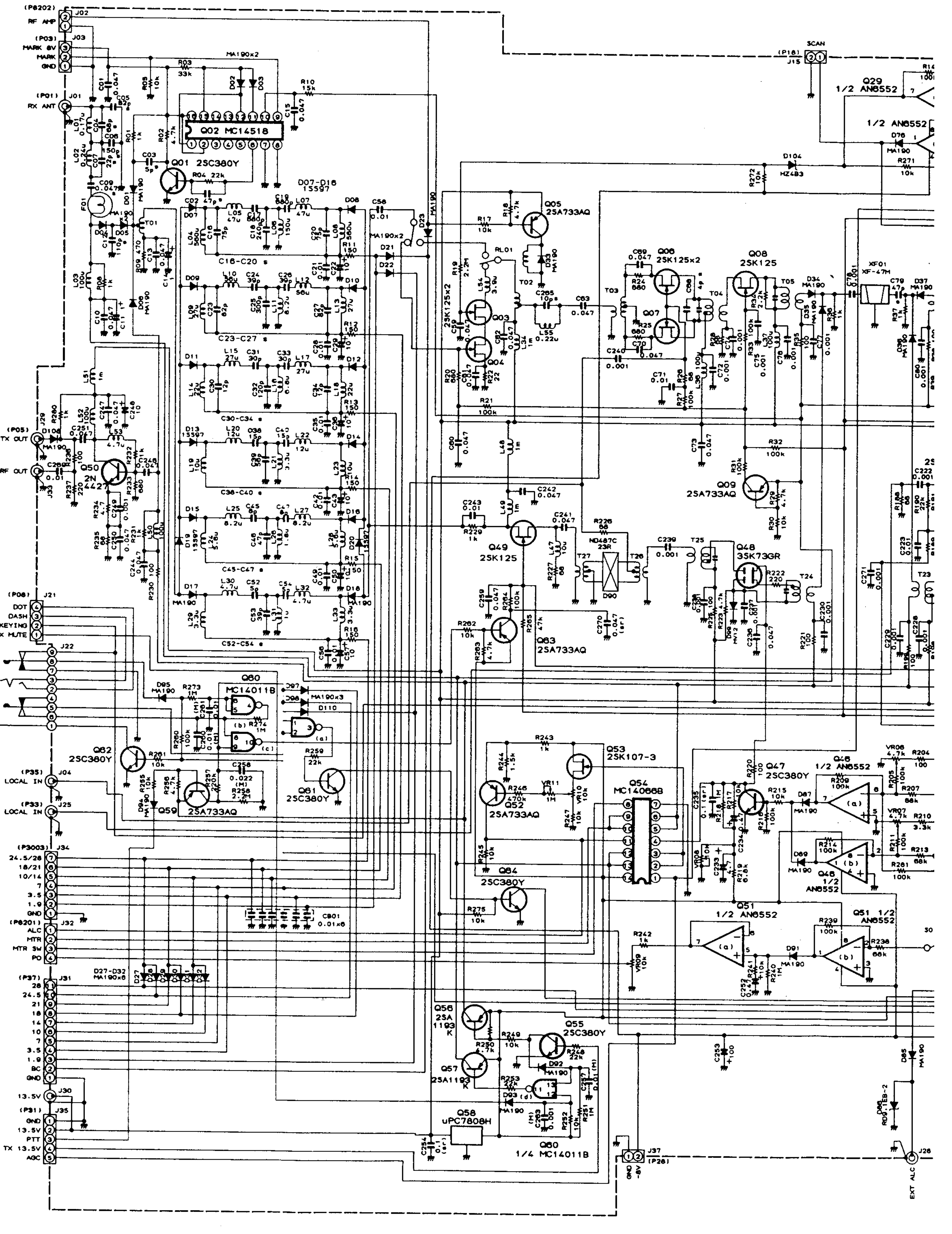
FP-757HD
CIRCUIT DIAGRAM

FP-757GX SCHEMATIC DIAGRAM

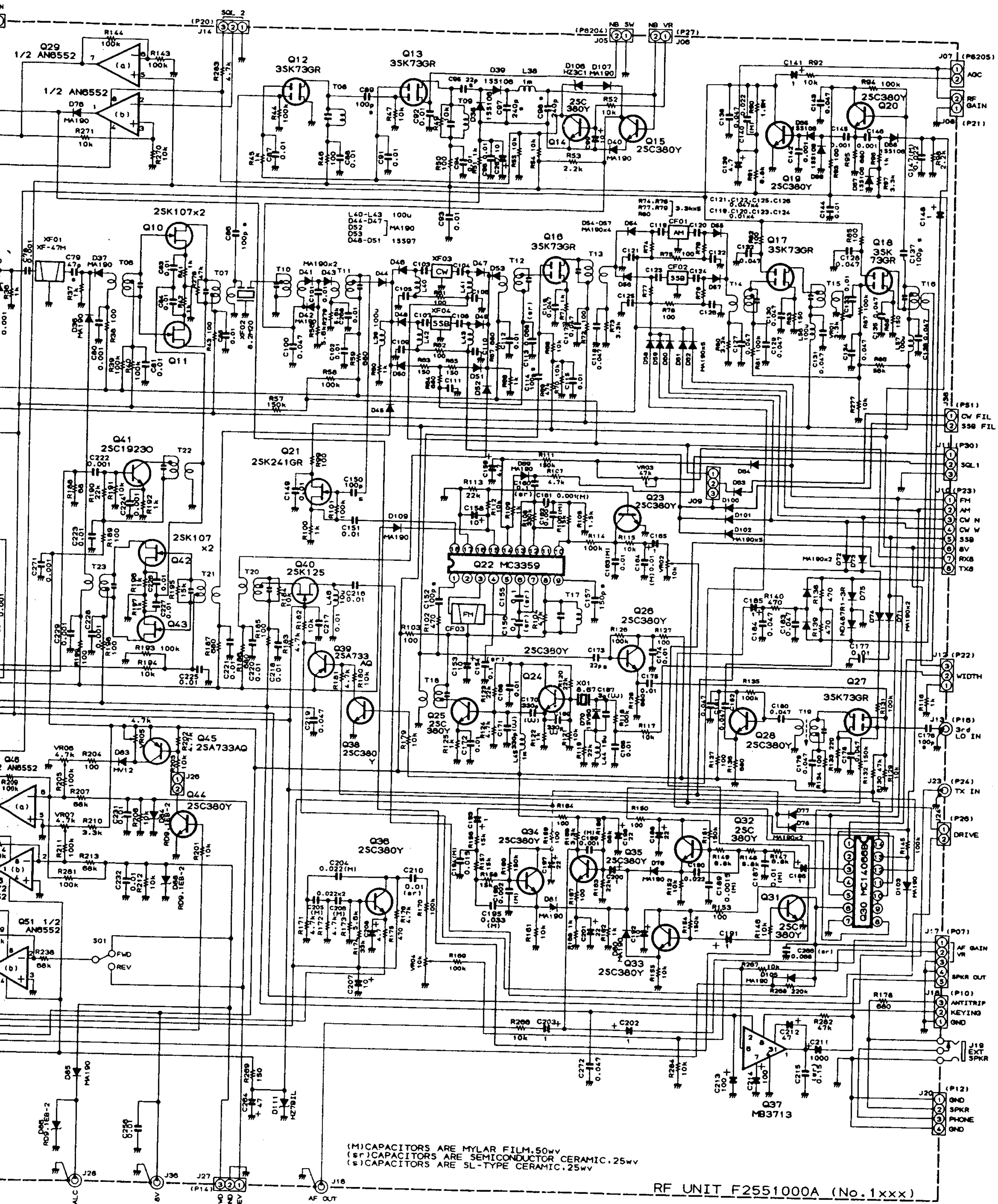


FP-757GX CIRCUIT DIAGRAM

RF UNIT SCHEMATIC DIAGRAM



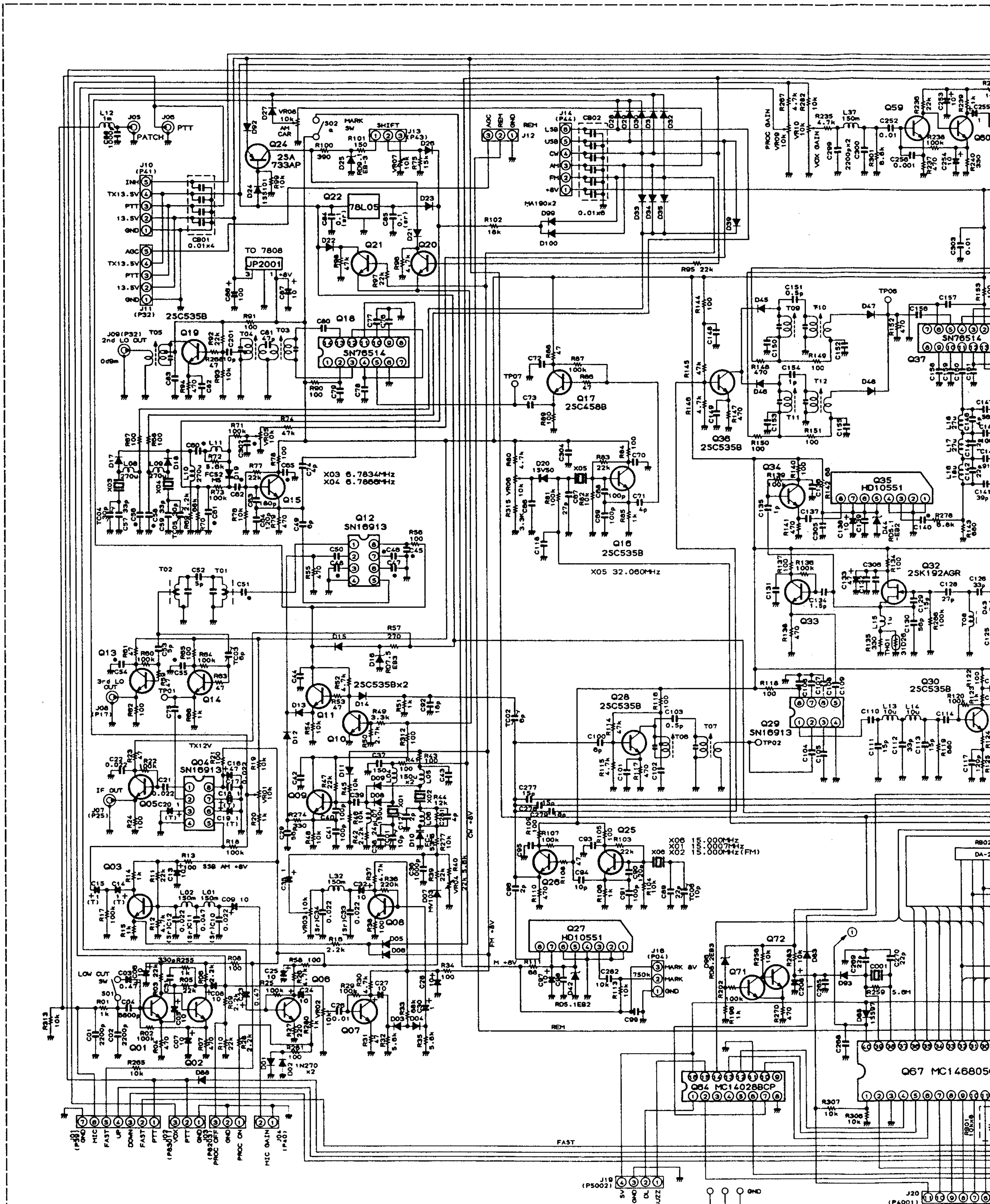
DIAGRAM



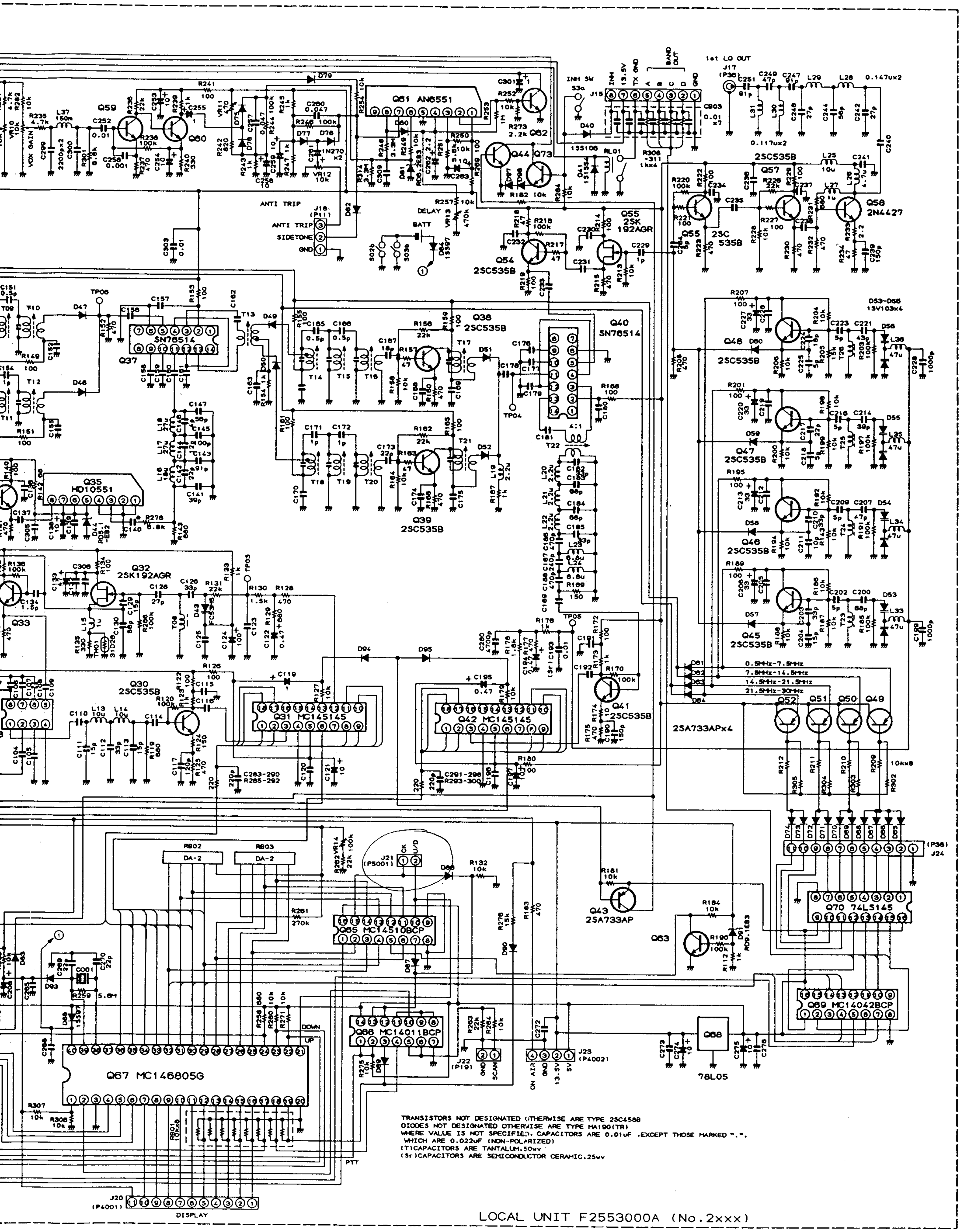
(M)CAPACITORS ARE MYLAR FILM.50wv
(sr)CAPACITORS ARE SEMICONDUCTOR CERAMIC.25wv
(s)CAPACITORS ARE SL-TYPE CERAMIC.25wv

RF UNIT F2551000A (No.1xxx)

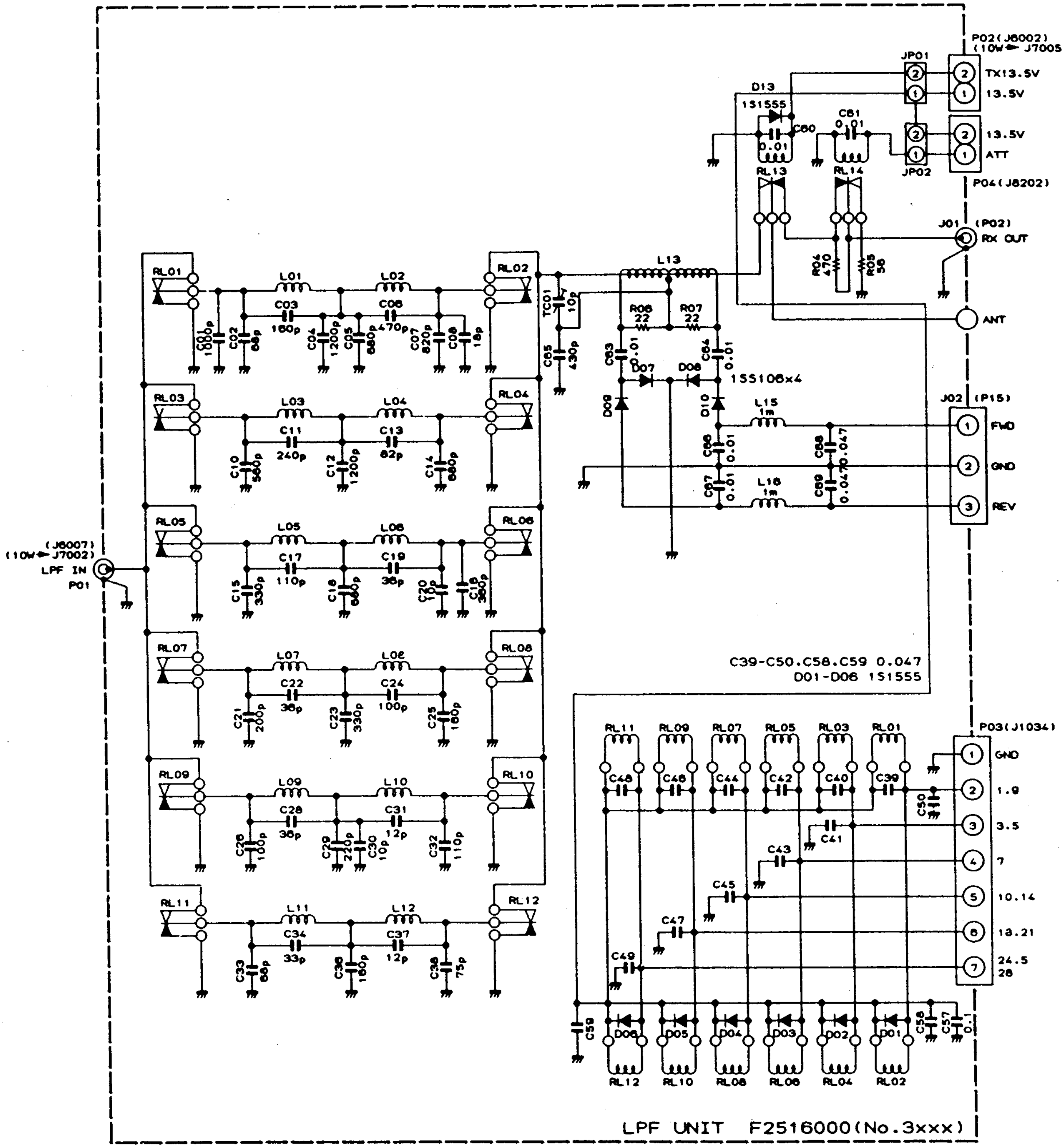
LOCAL UNIT SCHEMRTIC DIAGRAM



C DIAGRAM



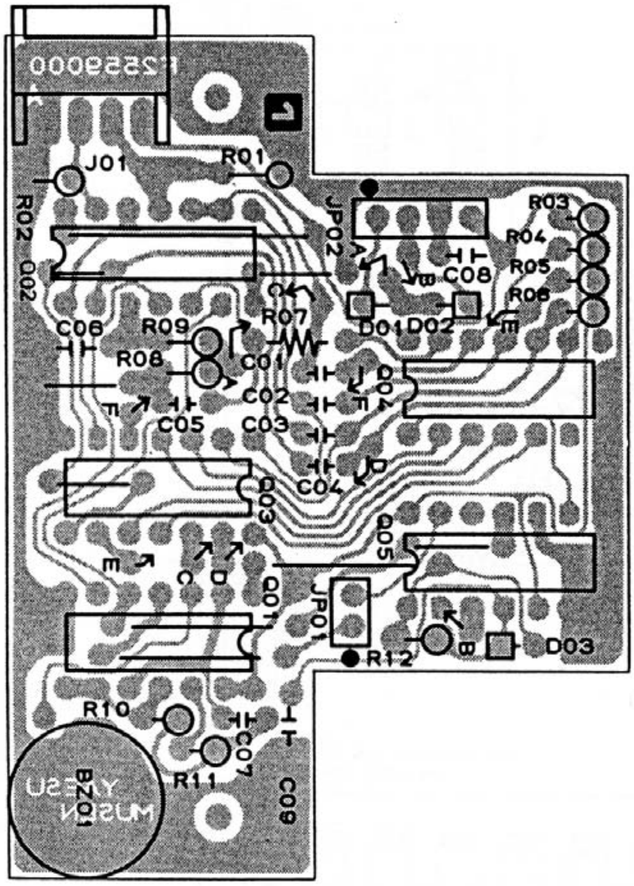
LOCAL UNIT F2553000A (No.2xxx)



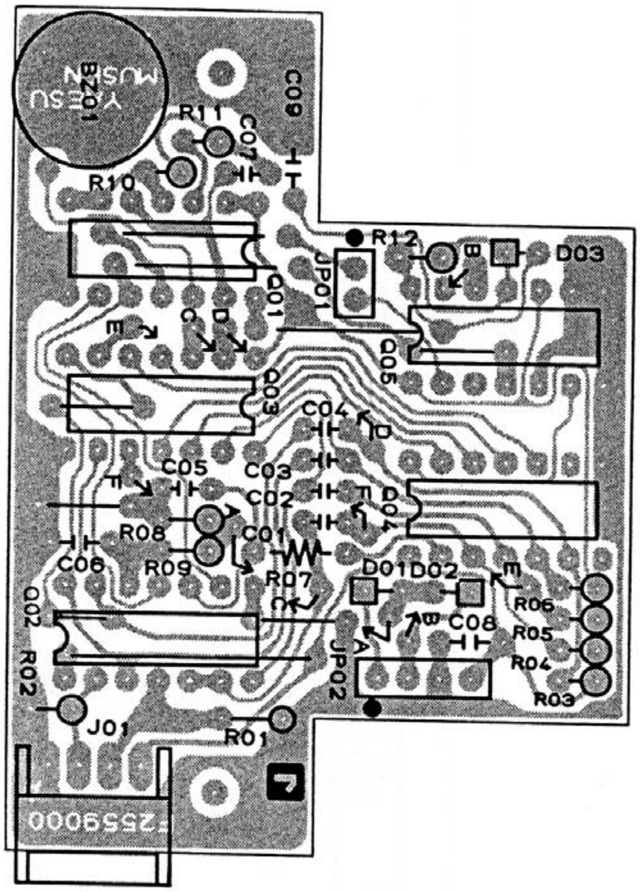
LPF UNIT F2516000(No.3xxx)
P02(J6002)
(10W→J7005)
TX13.5V
13.5V
ATT
JP01
JP02
P04(J8202)
D13
1S1555
C60
C61
0.01
RL13
RL14
J01 (P02)
RX OUT
R04 470
R05 56
ANT
L13
TC01
10p
R06 22
R07 22
C65 430p
C63 0.01
C64 0.01
D07
D08
D09
D10
1SS106x4
L15 1m
L16 1m
C66 0.01
C67 0.01
C68 0.047
C69 0.047
J02 (P15)
FWD
GND
REV
(J6007)
(10W→J7002)
LPF IN
P01
RL01
RL02
L01
L02
C01 1000p
C02 68p
C03 150p
C04 1200p
C05 680p
C06 470p
C07 820p
C08 18p
RL03
RL04
L03
L04
C10 560p
C11 240p
C12 1200p
C13 82p
C14 680p
RL05
RL06
L05
L06
C15 330p
C17 110p
C18 680p
C19 36p
C20 10p
C16 390p
RL07
RL08
L07
L08
C21 200p
C22 36p
C23 330p
C24 100p
C25 180p
RL09
RL10
L09
L10
C26 100p
C28 36p
C29 220p
C30 10p
C31 12p
C32 110p
RL11
RL12
L11
L12
C33 68p
C34 33p
C36 180p
C37 12p
C38 75p
C39-C50.C58.C59 0.047
D01-D06 1S1555
P03(J1034)
GND
1.9
3.5
7
10.14
18.21
24.5
28
C39
C40
C41
C42
C43
C44
C45
C46
C47
C48
C49
C50
C56
C57 0.1
C59
D01
D02
D03
D04
D05
D06

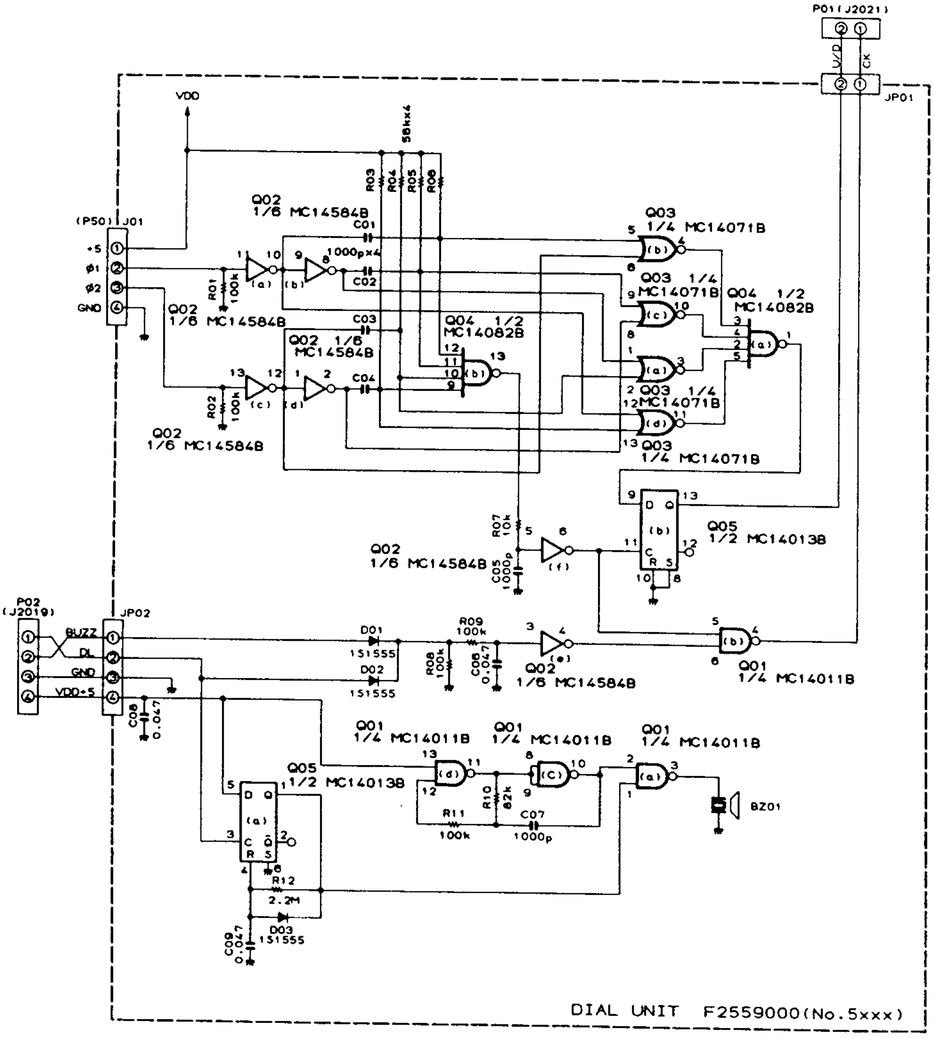
DIAL UNIT PARTS LAYOUT

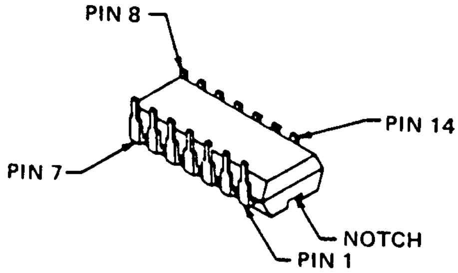
Component Side



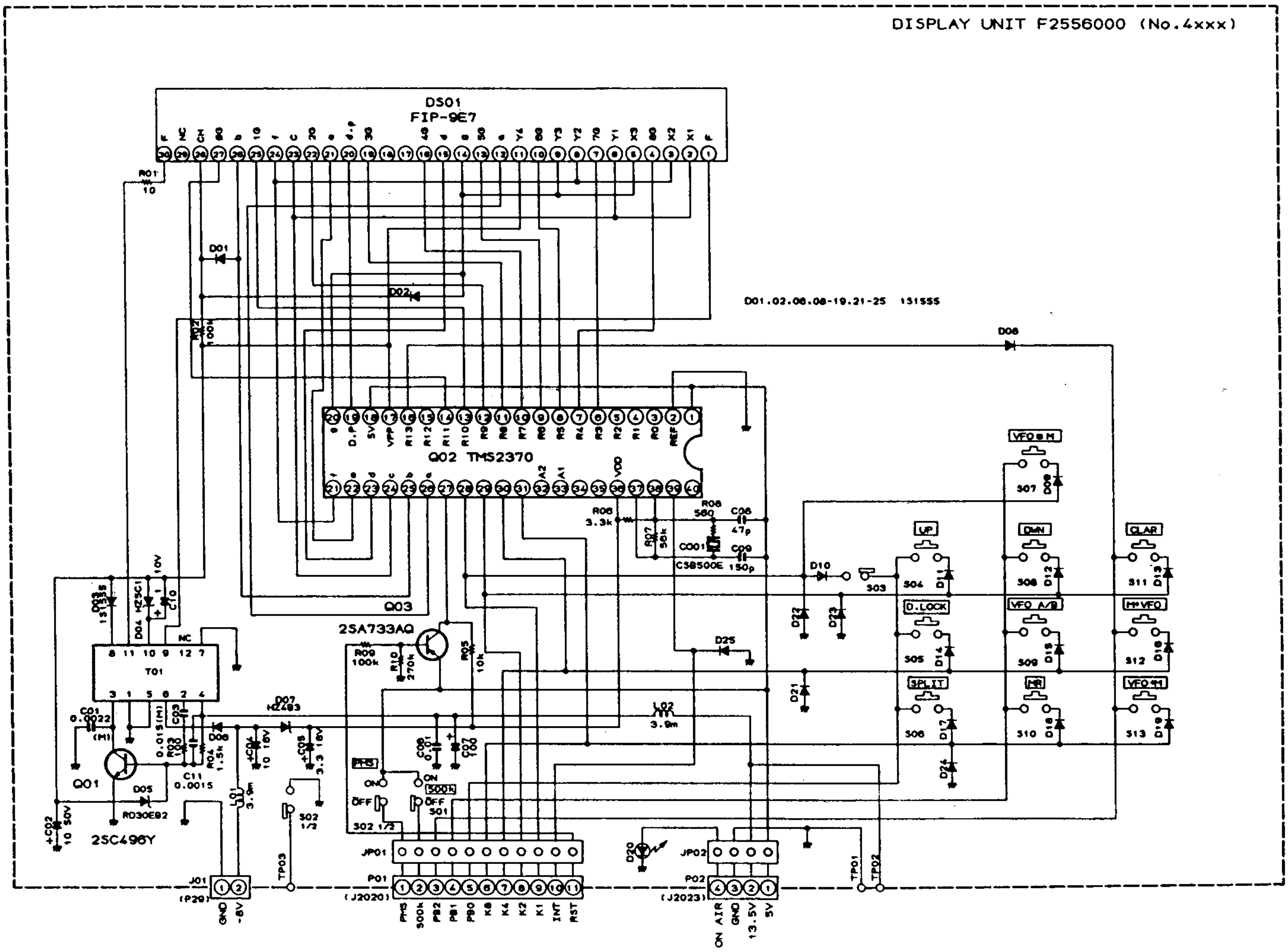
Solder Side

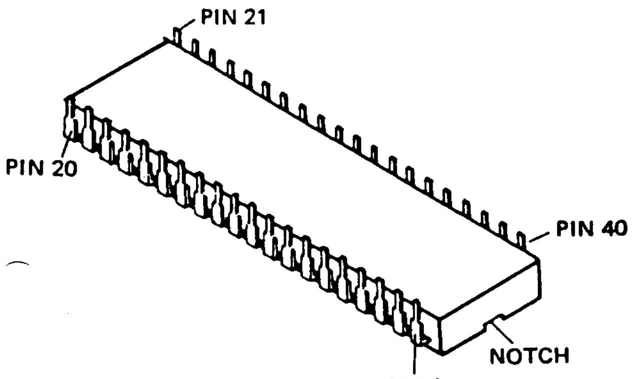




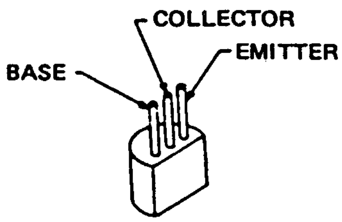


MC14011BCP
MC14013BCP
MC14071BCP
MC14584BCP

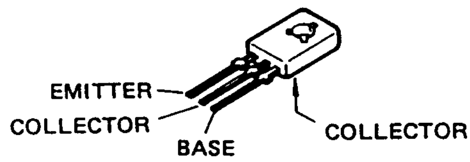




TMS2370



2SA733AQ

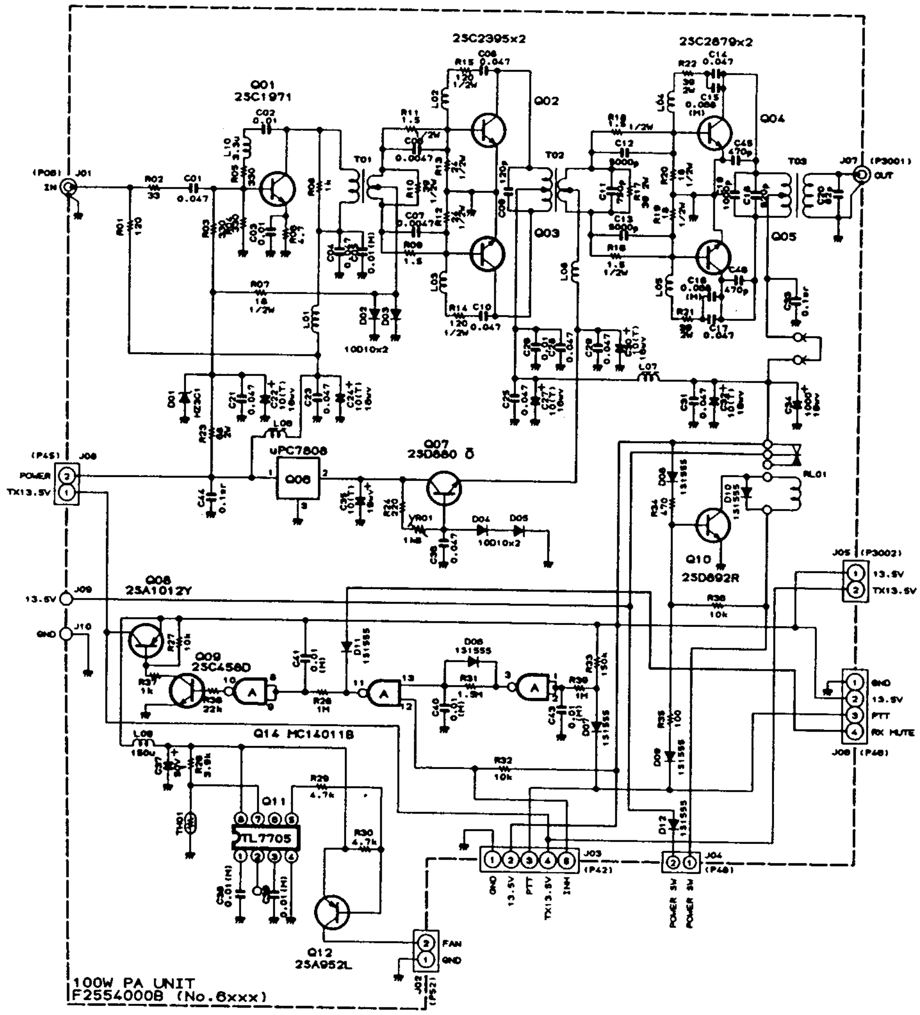


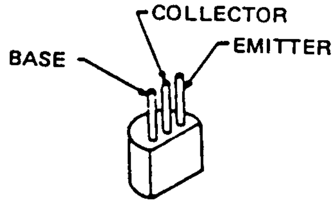
2SC496Y

DISPLAY UNIT VOLTAGE CHART

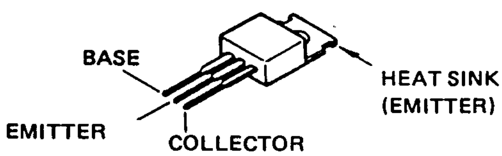
(DC VOLTS)

	E	(S)	C	(D)	B (	(G_1)
	R	T	R	T	R	T
Q4001	0	0	13.4	−13.4	− 0.5	− 0.5
Q4003	5.1	5.1	− 4.2	− 4.2	7.8	7.8

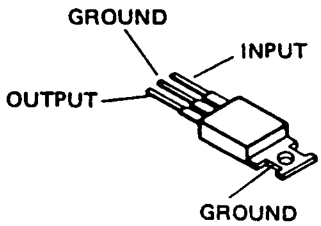




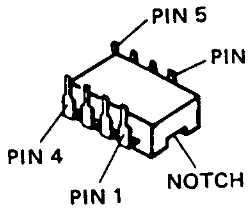
2SA952L
2SC458D
2SD892R



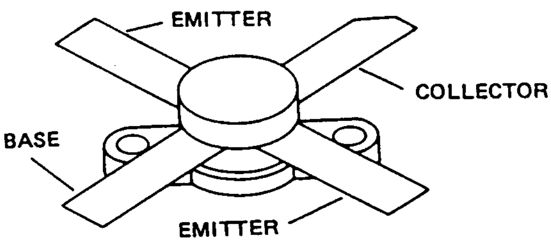
2SC1971



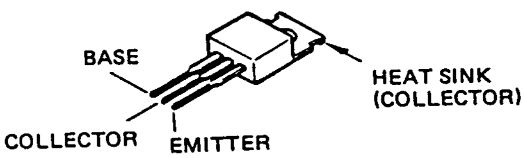
μPC7808H



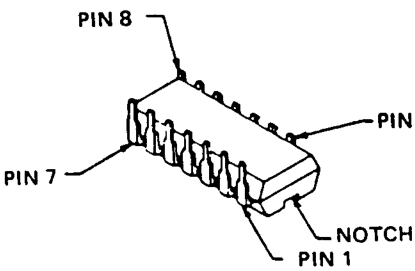
TL7705



2SC2395
2SC2879



2SD880O



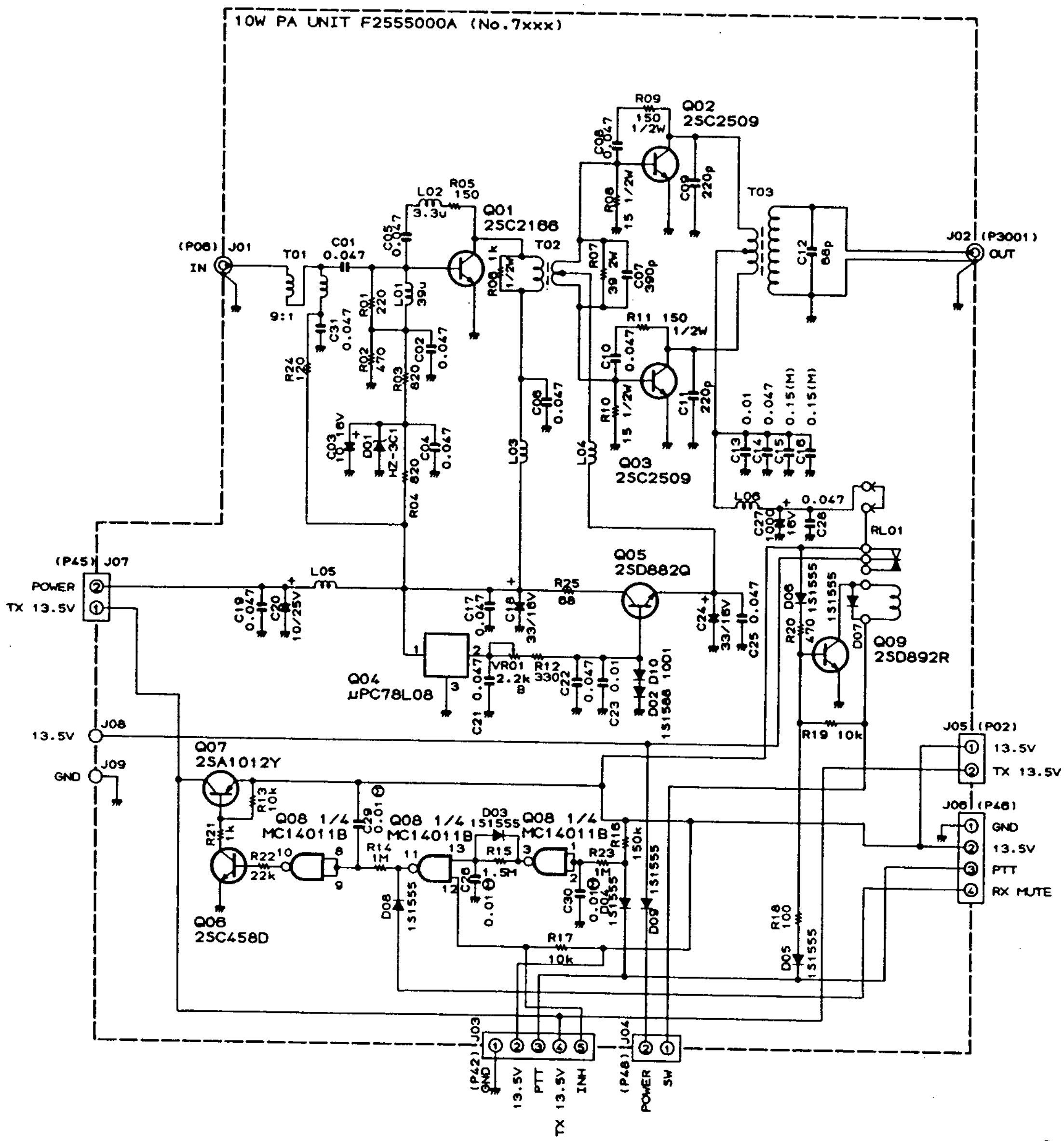
MC14011BCP

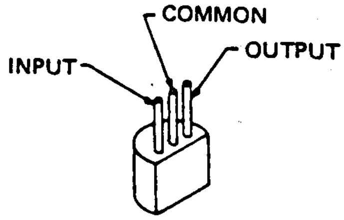
100W PA UNIT VOLTAGE CHART (DC VOLTS)

	E	(S)	C	(D)	B	(G_1)
	R	T	R	T	R	T
Q6001	—	0.4	—	13.5	—	1.2
Q6002	—	0	—	13.5	—	0.7
Q6003	—	0	—	13.5	—	0.7
Q6004	—	0	—	13.5	—	0.7
Q6005	—	0	—	13.5	—	0.7
Q6006	IN 13.4	IN 13.4	OUT 8.1	OUT 8.1		
Q6007		0.7		8.1		1.4
Q6008	13.5	13.5	0	13.5	13.5	13.1
Q6009	0	0	13.5	0	0	0.8
Q6010	0	0	13.0	0.7	0.7	1.5
Q6012	13.5	13.5	0	9.9	13.5	13.1

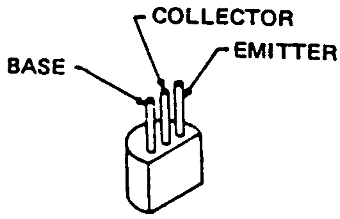
PA UNIT IC VOLTAGE CHART (DC VOLTS)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14			REMARKS
Q6011	—	1.2	—	0	13.5	—	8.4	13.5									FAN STOP
Q6014	12.3	12.3	0	—	—	—	0	12.4	12.4	0	13.5	13.5	0	13.5			RX
Q6014	0.5	0.5	13.5	—	—	—	0	0.1	0.1	13.5	0.1	13.5	11.8	13.5			TX

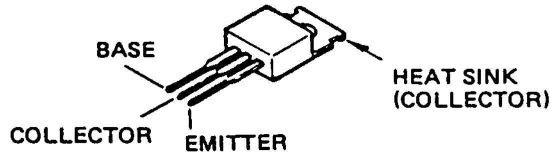




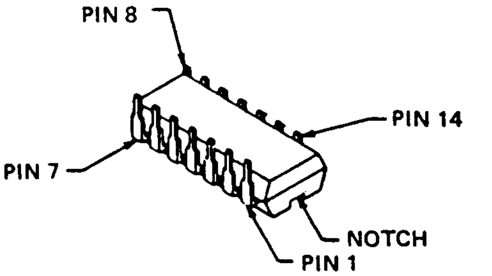
µPC78L08



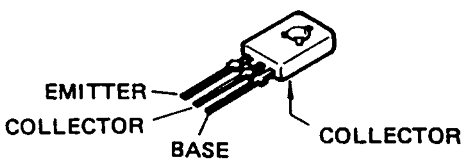
2SC458D
2SD892R



2SA1012Y
2SC2166
2SC2509



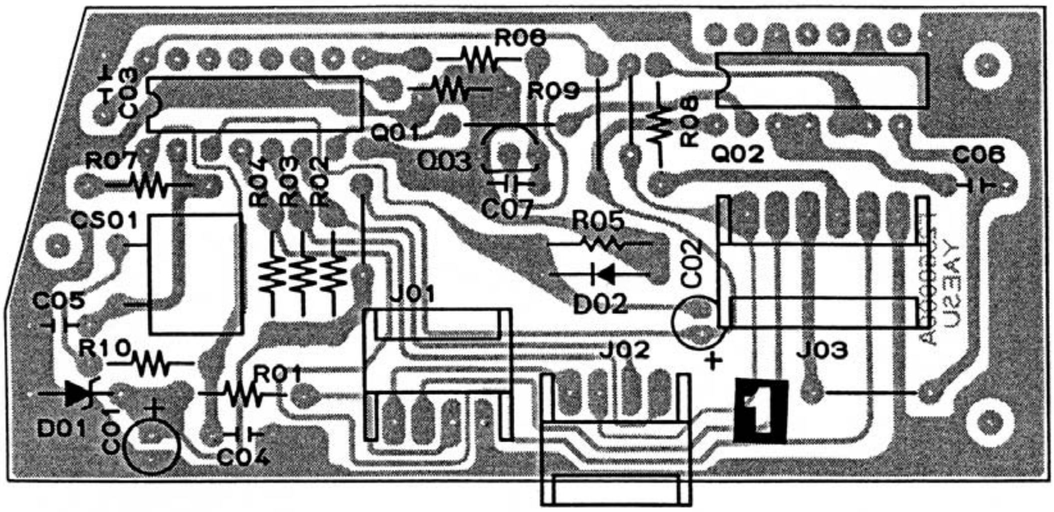
MC14011BCP

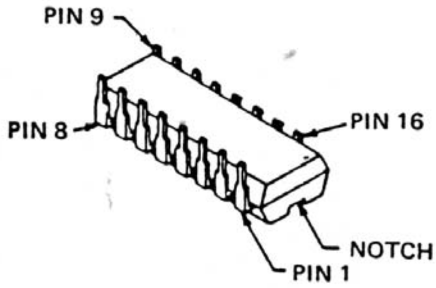


2SD882Q

KEYER UNIT PARTS LAYOUT

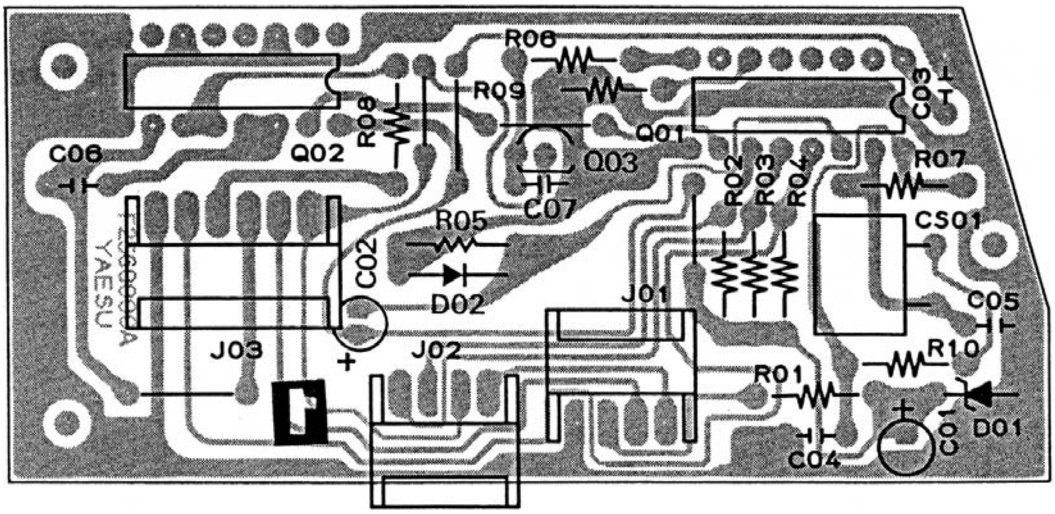
Component Side

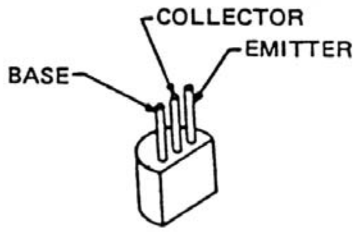




MC14049UBCP
TMS1751C

Solder Side





2SC458D

KEYER UNIT VOLTAGE CHARTS (DC VOLTS)

	E	(S)	C	(D)	B	(G_1)
	MARK	SPACE	MARK	SPACE	MARK	SPACE
Q8003	0	0	0	6.8	0.7	0

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Q8001 AUTO	—	—	—	0	—	—	—	—	—	—	—	—	—	—	—	5.0
Q8001 MANUAL	—	—	—	4.5	—	—	—	—	—	—	—	—	—	—	—	5.0
Q8001 SPACE	—	—	—	—	0	0	—	—	0	—	0	—	—	—	—	5.0
Q8001 MARK	—	—	—	—	4.5	4.5	—	—	4.8	—	4.8	—	—	—	—	5.0
Q8002	4.9	—	—	—	—	—	—	0	0	—	0	—	—	0	—	—