INSTRUCTION MANUAL

YC-601

DIGITAL DISPLAY UNIT

YAESU MUSEN CO., LTD.

TOKYO JAPAN.

SERIAL # 6J606768

DIGITAL DISPLAY UNIT

YC-601

For Direct Frequency Readout on
FT-101/277 and 401/505 Series

GENERAL

The model YC-601 Frequency Counter is designed to display the operating frequency on a digital readout for the FT-101/277 and 401/505 series transceivers.

The displayed frequency is indicated in MHz, kHz and 100 Hz ranges on six, digit display tubes.

The YC-601 provides an out of band warning system by automatic flickering of the display tubes when the VFO frequency is outside of its 500 kHz coverage.

SPECIFICATIONS

Frequency Display	1.6 to 30 MHz
Input Frequency	8700 to 9200 kHz
Digits	6
Clock Frequency	1.31072 MHz
Gate Time	0.1 sec.
Temperature	0°C -- 40°C
Power Requirement	100/110/117/200/220/234 V AC 50/60 Hz
Power Consumption	10 VA Nominal
Size	220 (W) x 80 (H) x 235 (D) m/m
Weight	2.5 kg.
Display Tube	LD-8062 (6 pcs.)

SEMICONDUCTORS

2	SN7400N	1	MC1496G
1	SN7404N	1	MC7805P
1	SN7475N	5	2SA564
1	SN7486N	1	2SC372Y
1	SN7490N	8	2SC373
3	μPB-249D	1	2SK30AY
2	MSM580	39	1N60AM
1	MSM5502	1	1S1555
1	MSM5564	3	V06B
		1	RD6.2EB

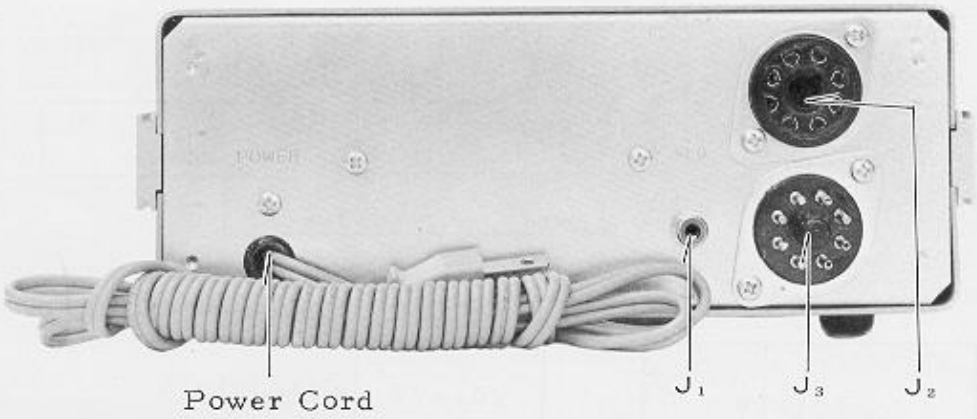
SWITCHES AND CONTROLS

(1) POWER — Power switch.

(2) BAND — Band switch. Set to the same position as the band switch setting of the transceiver.

(3) CALIB — Calibration knob. Clockwise rotation increases the frequency and counterclockwise rotation decreases the frequency.

(4) DISPLAY — Displays the frequency in this window.



DETAIL OF SUPPLIED CABLES

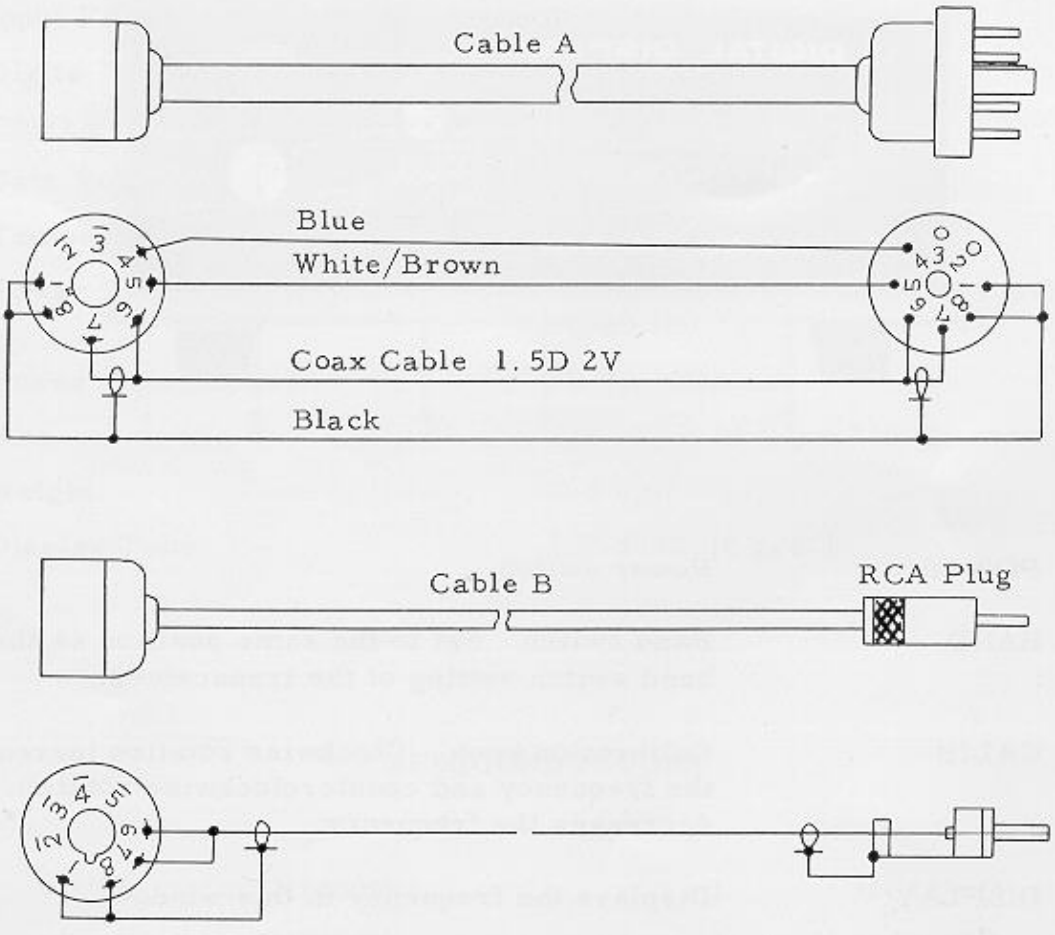


Fig. 1

INTERCONNECTIONS

The YC-601 can be connected to the transceiver or external VFO in the following combinations:

(1) FT-101 and YC-601

Connect the EXT VFO socket of the FT-101 to J3 of the YC-601 using the Cable A supplied, as illustrated in Fig. 2.

(2) FT-101, FV-101 and YC-601

Remove the plug connection cable between the FV-101 and FT-101 from the FT-101 VFO jack and connect it to J2 of the YC-601. Connect the EXT VFO socket of the FT-101 to J3 of the YC-601 using the Cable A supplied, as illustrated in Fig. 3.

(3) FT-401 and YC-601

Connect the VFO jack of the FT-401 to J3 of the YC-601 using the Cable B supplied, as illustrated in Fig. 4.

(4) FT-401, FV-401 and YC-601

Remove the plug connection cable between the FT-401 and FV-401 from the FT-401 VFO jack and connect it to J1 of the YC-601. Connect the VFO jack of the FT-401 to J3 of the YC-601 using the Cable B supplied, as illustrated in Fig. 5.

(5) FR-101 and YC-601

When the FR-101 is used in combination with FT-101 or FL-101, a slight modification is necessary in the FR-101, as illustrated in Fig. 7.

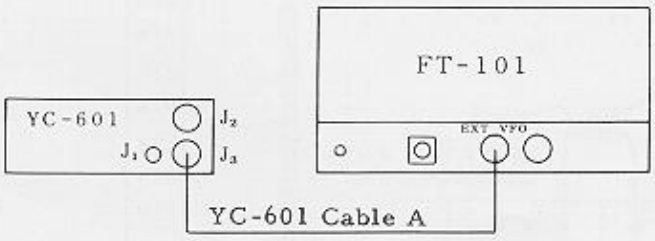


Fig. 2

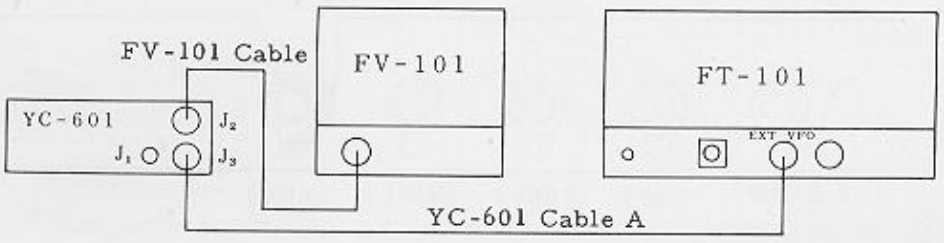


Fig. 3

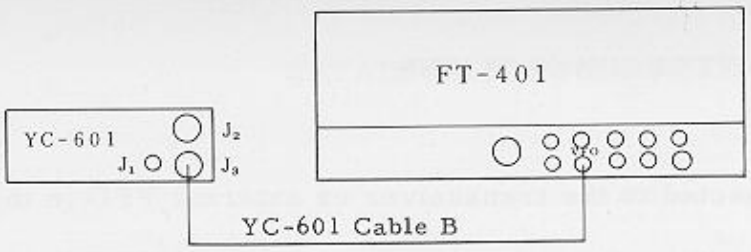


Fig. 4

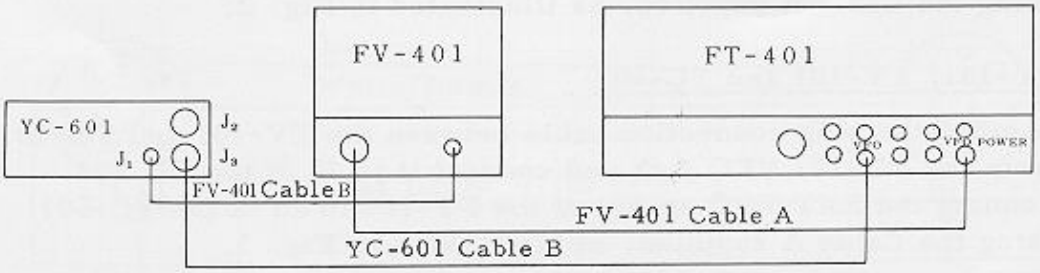


Fig. 5

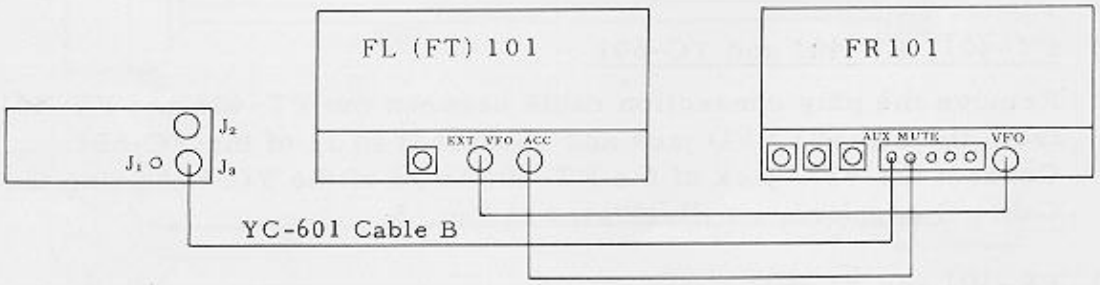


Fig. 6

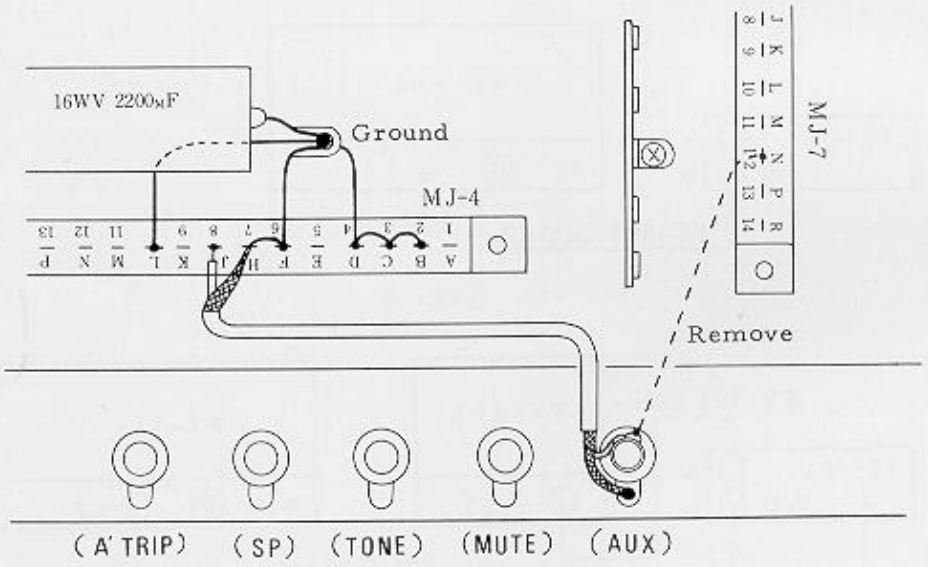
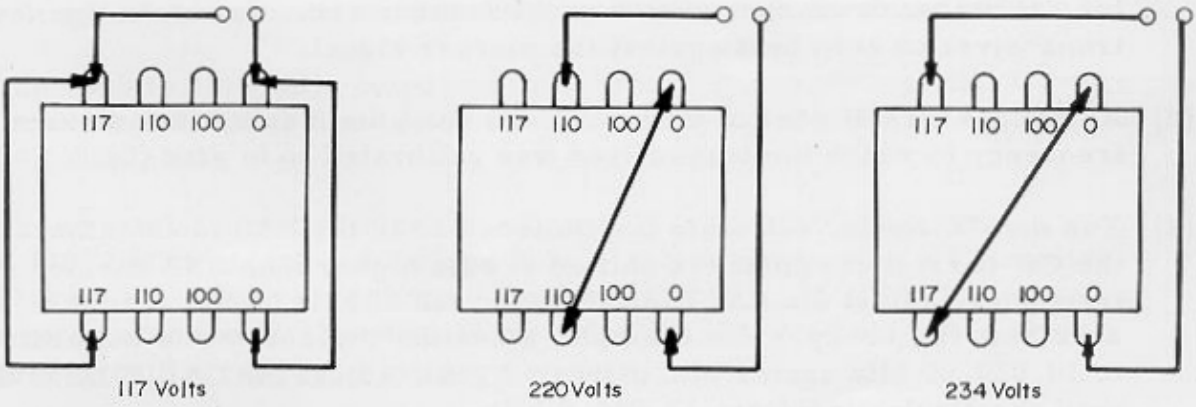


Fig. 7

INSTALLATION AND OPERATION

The YC-601 digital frequency counter may be used in any location, however it is recommended to avoid extremely warm locations such as the top of the transceiver near the final portion. It is not recommended to use any heat buffer between the YC-601 and the transceiver since any heat accumulated in the transceiver may damage it.

The YC-601 is designed to be used in many areas of the world using a supply voltage that may differ from the operator's local voltage source. Therefore, before connecting the AC power cord to the power outlet, be sure that the voltage marked on the rear of the counter agrees with the local AC supply voltage. If not, it is necessary to rewire the transformer connections to conform with the local AC supply voltage. Please refer to the following illustration for the power transformer wiring:



CAUTION

PERMANENT DAMAGE WILL RESULT IF IMPORPER AC SUPPLY VOLTAGE IS APPLIED TO THE YC-601.

Set the switches as follows:

POWER	OFF
BAND	Desired band. Same position as the band switch on the transceiver.

Set the POWER switch to ON. The frequency is indicated directly by the display tubes. The first and second displays indicate MHz, the third, fourth and fifth displays indicate kHz and the sixth display indicates 100 Hz increments.

The accuracy of the frequency readout depends on the tolerance of the transceiver crystals and the mode of operation. It is recommended that the YC-601 be calibrated using the transceiver's internal calibrator as described below:

(1) Set the BAND switch to the same position as that of the transceiver's.

(2) Set the transceiver's MODE switch to the desired mode and turn on the calibrator or marker switch in the transceiver. Calibrate the transceiver to zero beat against the marker signal.

(3) Adjust the CALIB control of the YC-601 until the display shows exact frequency to which the transceiver was calibrated to in step (2).

(4) For the CW mode, calibrate the transceiver in the USB mode. Since the CW carrier frequency is shifted 800 Hz higher than USB carrier frequency, adjust the CALIB control to read 800 Hz higher than the zero beat frequency. For example, when the transceiver is calibrated to 14,050.00 kHz against the marker signal, adjust the CALIB control until the display indicates 14,050.8 kHz.

NOTE : If the antenna system has a high VSWR, the high RF potential picked up by the YC-601 may cause an erratic display.

THEORY OF OPERATION

The MHz range is programmed by the diode matrix circuit consisting of the diodes D1 through D33, and automatically indicates the MHz frequency when the BAND switch is set to the desired band.

The VFO frequency (8700 to 9200 kHz), applied through one of input receptacles J1, J2 or J3 on the YC-601, is amplified by Q29, 2SC372Y. This amplified signal is applied through an 8700 to 9200 kHz band-pass transformer, T3 and T4, to the mixer Q15, MC-1496G. The heterodyne oscillator Q16, 2SC373, oscillates at the second harmonic of the 11.1 MHz crystal, i.e., 22.2 MHz.

This heterodyne signal is applied to the mixer, Q15, where the VFO signal is mixed with the heterodyne signal, producing a 13.0 to 13.5 MHz signal at its output.

The frequency of the heterodyne oscillator is shifted $\pm$4 kHz by varying the capacitance between drain and gate of Q28, 2SK30AY. The drain voltage is varied with the CALIB potentiometer on the front panel.

The 13.0 to 13.5 MHz output signal from T2 is fed through Q1-1, wave form shaper, Q2-1 time gate, Q2-2 invertor and Q4, 10 Hz counter, to Q5, MSM5502.

The crystal controlled clock oscillator Q13, MSM5564, generates a 1.31072 MHz signal and divides it by eighteen generating a 5 Hz pulse. This pulse is delivered through buffer stage Q14, 2SC373, to be used as a gate pulse for Q2-1 and blanking pulse for Q3-2. This pulse also generates the reset and memory signals.

The BCD output from MSM5502 is applied through the driver Q6, μPB-249D, to display tubes V1, V2 and V3. The digit signal from Q5, MSM5502, is also delivered from Q17 through Q22 to the display tubes.

For the bands starting from 500 kHz such as the 80 meter band, 500 kHz should be added to the actual VFO signal display. The BCD output from Q5 is applied to Q7, Q8, MSM580, Q9, SN7475 and Q10, SN7486, to add 500 kHz. This output is then applied through the driver, μPB-249D, to V4. Q10, SN7486, D36, D37, 1N60AM, and Q3-2, SN7400, detect the out of band frequency and supply an out of band blanking signal to the display tubes.

The diode matrix circuit consisting of D1 to D33, 1N60AM, generates a BCD code for the MHz display. The BCD signal drives V5 through Q12, μPB-249D, for a 1 MHz digit, and V6 through Q24 and Q25, for a 10 MHz digit.

Power Supply

The power transformer has a dual primary winding for 100 to 234 volt operation.

One of secondary windings supplies 9, 13.5 and 18 volts AC. These voltages are rectified by D1, D2 and D3, V06B.

The 9 volts DC is regulated to 5 volts with Q1, MC7805P, and supplied to the semiconductors except Q15 and Q29. The 13.5 volts DC is used for Q15, MC1496G, and Q29, 2SC372Y. The 13.5 volts DC is also regulated to 6 volts with RD6.2EB for the calibrator supply voltage.

The 1.5 volts AC from the secondary winding is used for the display tubes filament voltage.

MAINTENANCE

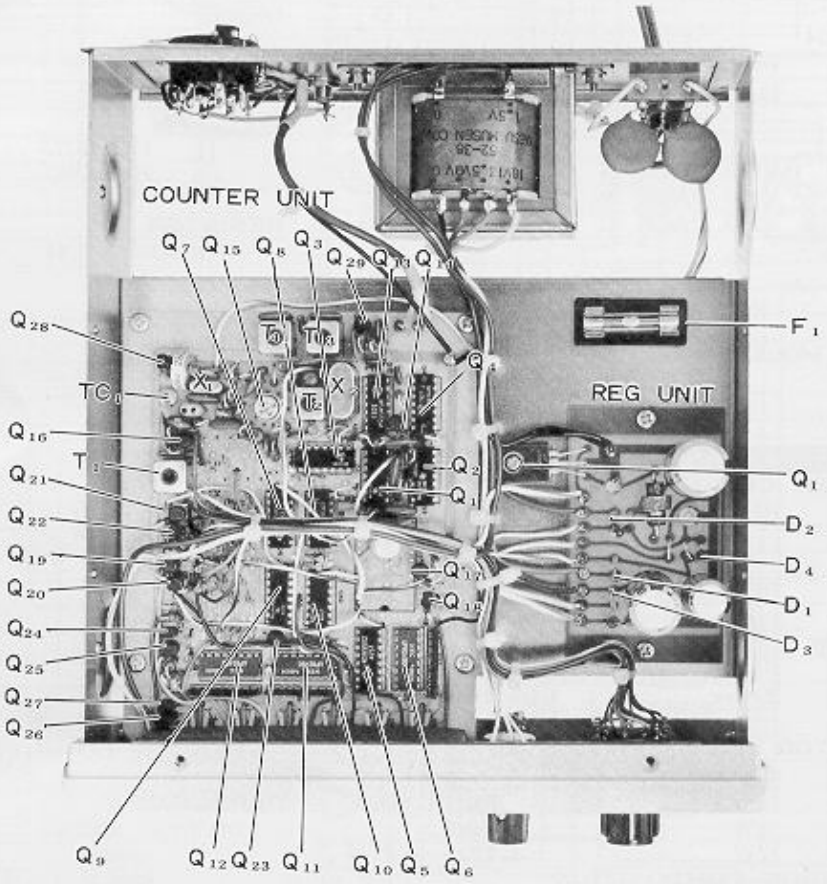
The YC-601 has been carefully aligned and tested at the factory prior to shipment. With normal usage, it should not require other than the usual attention given to electronic equipment.

CAUTION

ANY VOLTAGE OR SIGNALS, OTHER THAN THAT OF OF TRANSCEIVER VFO, THAT ARE APPLIED TO THE INPUT TERMINAL WILL RESULT IN SEVERE DAMAGE.

In most case, troubles may be traced to an improper interconnection between the YC-601 and the transceiver.

The frequency counter section requires specialized test equipment for trouble shooting and, therefore, the equipment should be returned to the dealer for repair.

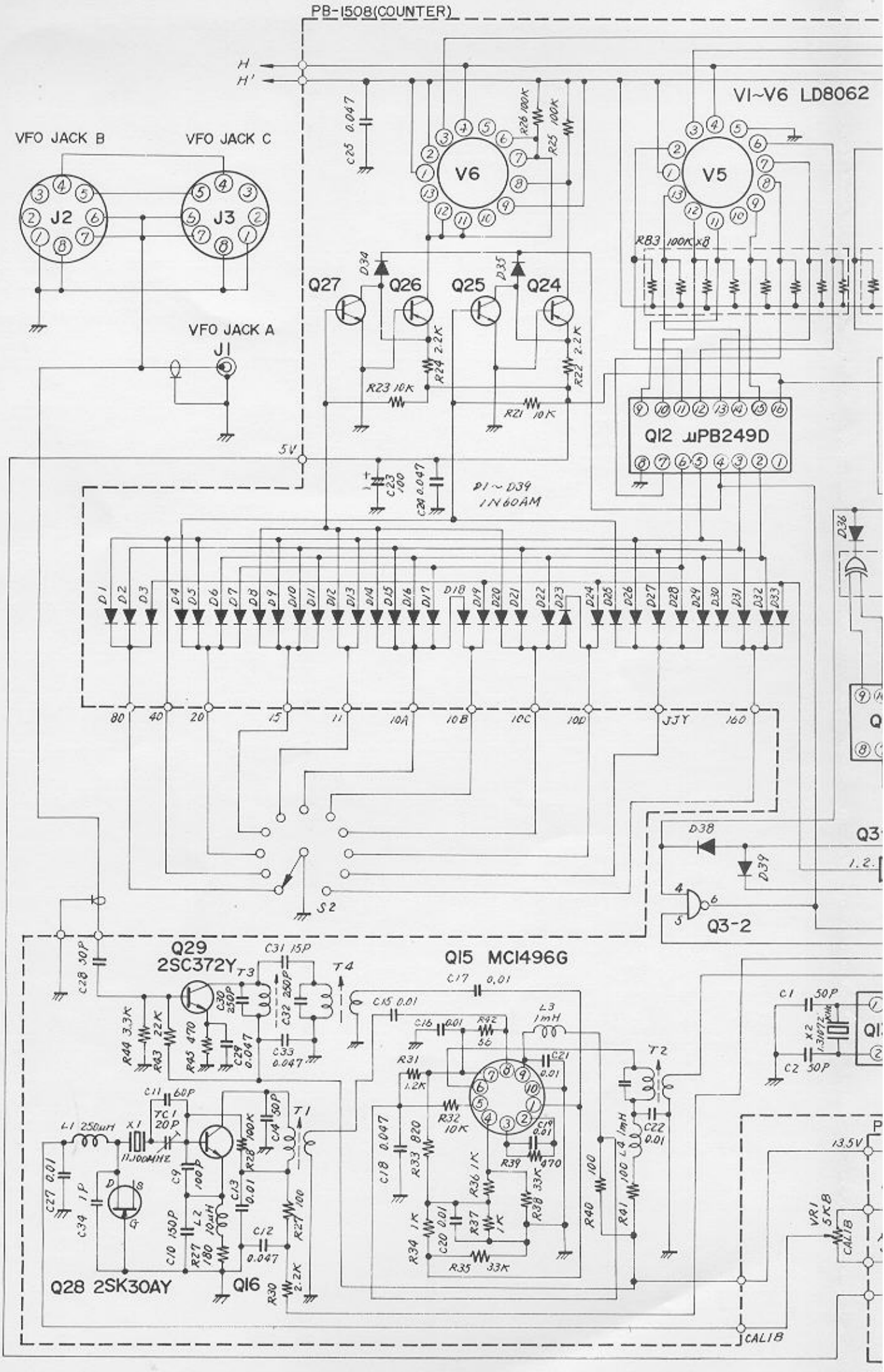

COUNTER UNIT
REG UNIT
Q7 Q15 Q8 Q3 Q29 Q13 Q14
Q28
TC1
Q16
T1
Q21
Q22
Q19
Q20
Q24
Q25
Q27
Q26
Q9
Q12 Q23 Q11 Q10 Q5 Q6
F1
Q4
Q2
Q1
Q17
Q18
Q1
D2
D4
D1
D3

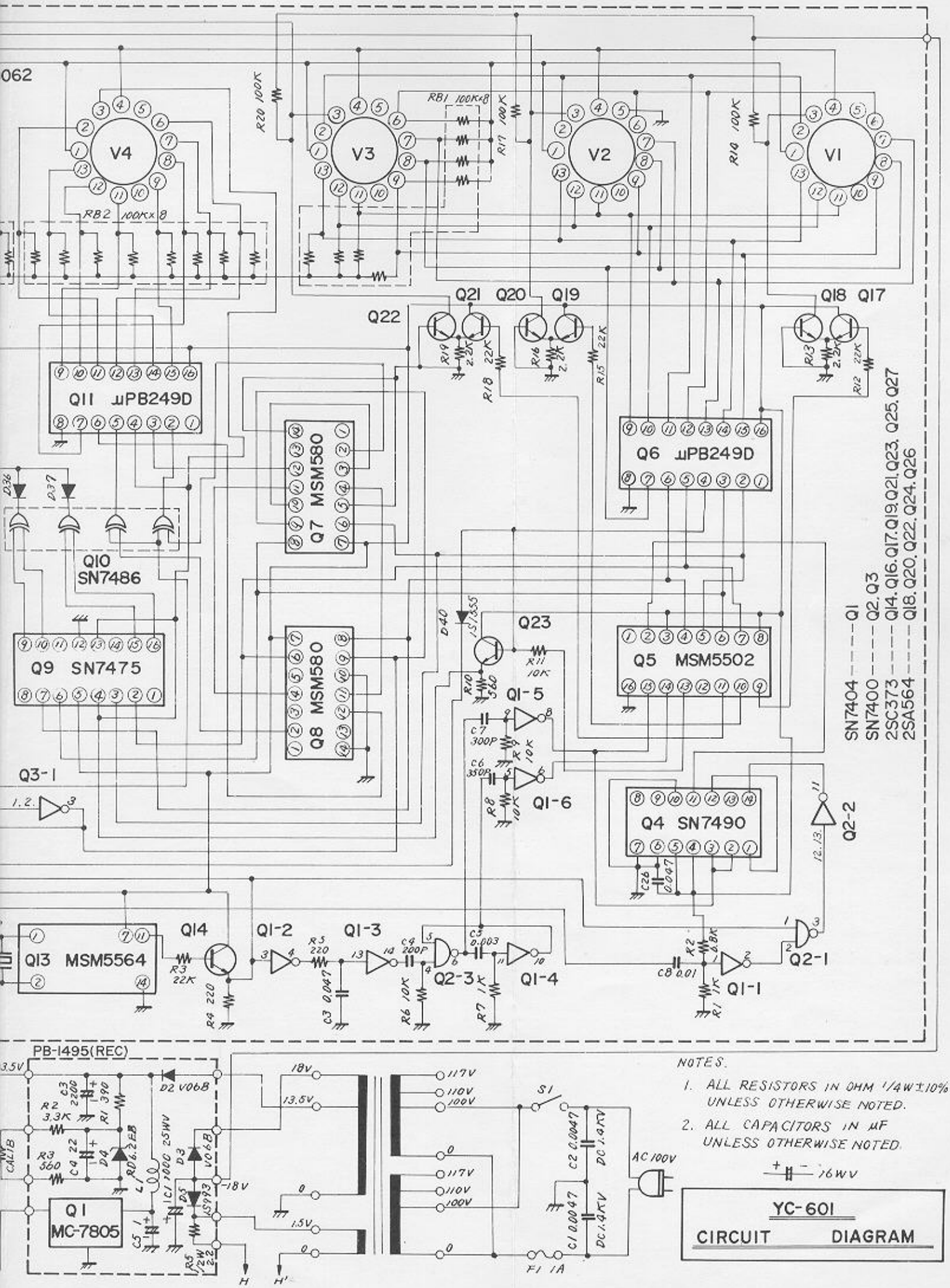
YC-601 PARTS LIST

MAIN CHASSIS		
VR	POTENTIOMETER	
1	16φ	5KΩB
C	CAPACITOR	
1,2	1.4kV	0.0047μF
T	TRANSFORMER	
1	POWER	52-46
S	SWITCH	
1	POWER	MSH-203N
2	BAND	1-1-12
J	JACK	
1	VFO JACK A	CN-7017
	VFO JACK B	SI-0507
	VFO JACK C	SI-0611
F	FUSE	
1		1A
FS	FUSE HOLDER	
1		F-3294

REG UNIT		
PB	PRINTED CIRCUIT BOARD	
1495(A～Z)	REG. CIRCUIT	
Q	IC	
1	REGULATOR	MC-7805P
D	DIODE	
2,3	Si	V06B
4	Zener	RD6.2EB
5	〃	1S993
R	RESISTOR	
	CARBON FILM	
1	¼W	390Ω
3	¼W	560Ω
2	¼W	3.3KΩ
	CARBON COMPOSITION	
5	½W	2.2Ω
C	CAPACITOR	
5	16WV	1μF
4	16WV	22μF
3	16WV	2200μF
1	25WV	1000μF
L	INDUCTOR	
1	CHOKE	35μH/10KΩ1W

COUNTER UNIT		
PB	PRINTED CIRCUIT BOARD	
1508(A～Z)	COUNTER CIRCUIT	
V	DISPLAY TUBE	
1～6	DIGITRON	LD-8062
Q	IC FET TRANSISTOR	
2.3	TTL	SN7400N
1	TTL	SN7404N
9	TTL	SN7475N
10	TTL	SN7486N
4	TTL	SN7490N
6,11,12	TTL	μPB249D
7,8	C, MOS	MSM580
5	C, MOS	MSM5502
13	C, MOS	MSM5564
15	LINEAR	MC1496G
28	FET	2SK30AY
18,20,22,24,26	TR	2SA564
29	TR	2SC372Y
14,16,17,19	TR	2SC373
21,23,25,27		
D	DIODE	
1～39	Ge	1N60AM
40	Si	1S1555
X	CRYSTAL	
1	HC-18/U	11.1MHz
2	HC-6/W	1.31072MHz
R	RESISTOR	
	CARBON FILM	
42	¼W	56Ω
29,40,41	¼W	100Ω
27	¼W	180Ω
4,5	¼W	220Ω
39,45	¼W	470Ω
10	¼W	560Ω
33	¼W	820Ω
1,7,34,36,37	¼W	1KΩ
31	¼W	1.2KΩ
13,16,19,22,24,30,32	¼W	2.2KΩ
44	¼W	3.3KΩ
2	¼W	6.8KΩ
6,8,9,11,21,23	¼W	10KΩ
3,12,15,18,43	¼W	22KΩ
35,38	¼W	33KΩ
14,17,20,25,26,28	¼W	100KΩ
RB	BLOCK RESISTOR	
1,2,3	CENTER COMMON	8×100KΩ
C	CAPACITOR	
	DIPPED MICA	
31	50WV	15PF
1,2,14,28	50WV	50PF
11	50WV	60PF
9	50WV	100PF
10	50WV	150PF
4	50WV	200PF
30,32	50WV	250PF
7	50WV	300PF
6	50WV	350PF
	CERAMIC DISC	
8,13,15～17	50WV	0.01
19～22,27		
3,12,18,24～26	50WV	0.047μF
29,33		
	MYLAR	
5	50WV	0.0033μF
	ELECTROLYTIC	
23	16WV	100μF
TC	TRIMMER CAPACITOR	
1	ECV-1ZW	20P50
L	INDUCTOR	
1	TV-245	250μH
2	MICRO INDUCTOR	10μH
3,4	MICRO INDUCTOR	1mH
T	TRANSFORMER	
1	OSC	1004
2	MIX	1005
3,4	BAND PASS	1035


PB-1508(COUNTER)
H
H'
V1~V6 LD8062
VFO JACK B
VFO JACK C
VFO JACK A
J1
J2
J3
V6
V5
R26 100K
R25 100K
C25 0.047
RB3 100K x8
Q27
Q26
Q25
Q24
D34
D35
R24 2.2K
R22 2.2K
R23 10K
R21 10K
Q12 μPB249D
5V
C23 100
C20 0.047
D1 ~ D39
1N60AM
D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 D30 D31 D32 D33
D36
80
40
20
15
11
10A
10B
10C
10D
JJY
160
S2
D38
D39
Q3-2
Q29
2SC372Y
T3
T4
C31 15P
C30 250P
C32 250P
C33 0.047
C28 30P
R44 3.3K
R43 22K
R45 470
C29 0.047
C17 0.01
C15 0.01
C16 0.01
R42 56
L3 1mH
R31 1.2K
R32 10K
C21 0.01
C19 0.01
R39 470
C18 0.047
R33 820
R36 1K
R38 33K
R34 1K
C20 0.01
R37 1K
R35 33K
R40 100
R41 100
L4 1mH
C22 0.01
T2
C1 50P
X2 13.1072MHz
C2 50P
C11 60P
TC1 20P
L1 250uH
X1
11.100MHz
T1
C4 50P
R28 100K
C9 100P
C13 0.01
L2 10uH
C10 150P
R27 180
C12 0.047
R27 100
C27 0.01
C34 1P
D
G
S
Q28 2SK30AY
Q16
R30 2.2K
13.5V
VR1 5KB
CALIB
CALIB


062
V4
V3
V2
V1
RB1 100K×8
RB2 100K×8
R20 100K
R17 100K
R10 100K
Q21 Q20 Q19
Q22
Q18 Q17
Q11 μPB249D
Q6 μPB249D
Q7 MSM580
Q8 MSM580
Q10 SN7486
Q9 SN7475
Q5 MSM5502
Q4 SN7490
Q13 MSM5564
Q23
Q1-5
Q1-6
Q1-4
Q1-3
Q1-2
Q1-1
Q2-1
Q2-2
Q2-3
Q3-1
SN7404 ----- Q1
SN7400 ----- Q2, Q3
2SC373 ----- Q14, Q16, Q17, Q19, Q21, Q23, Q25, Q27
2SA564 ----- Q18, Q20, Q22, Q24, Q26
PB-1495(REC)
Q1 MC-7805
18V
13.5V
1.5V
-18V
117V
110V
100V
S1
AC 100V
F1 1A
NOTES.
1. ALL RESISTORS IN OHM 1/4W±10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN μF UNLESS OTHERWISE NOTED.
YC-601
CIRCUIT DIAGRAM


YAESU