

**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.

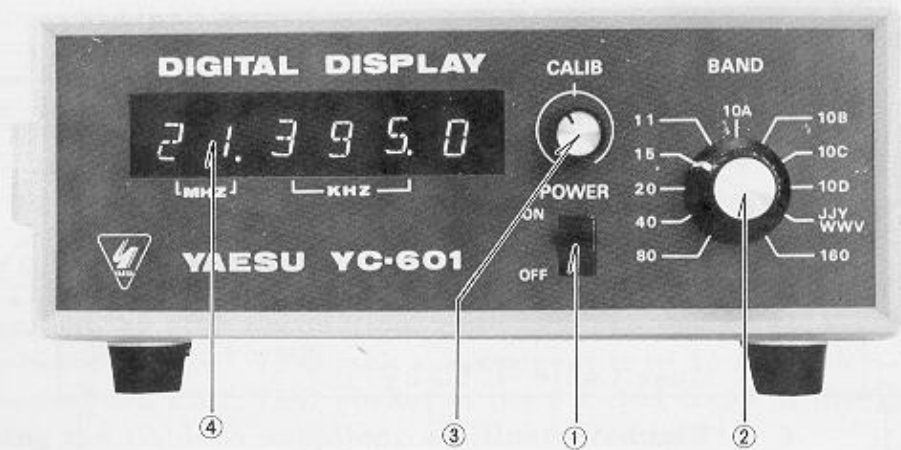
SPECIFICATIONS

| | |
|-------------------|--|
| 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.) |

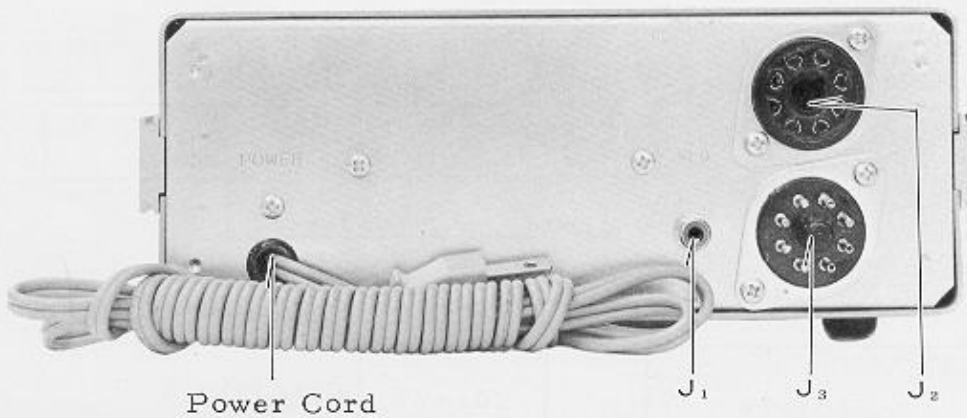
SEMICONDUCTORS

| | | | |
|---|----------|----|---------|
| 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

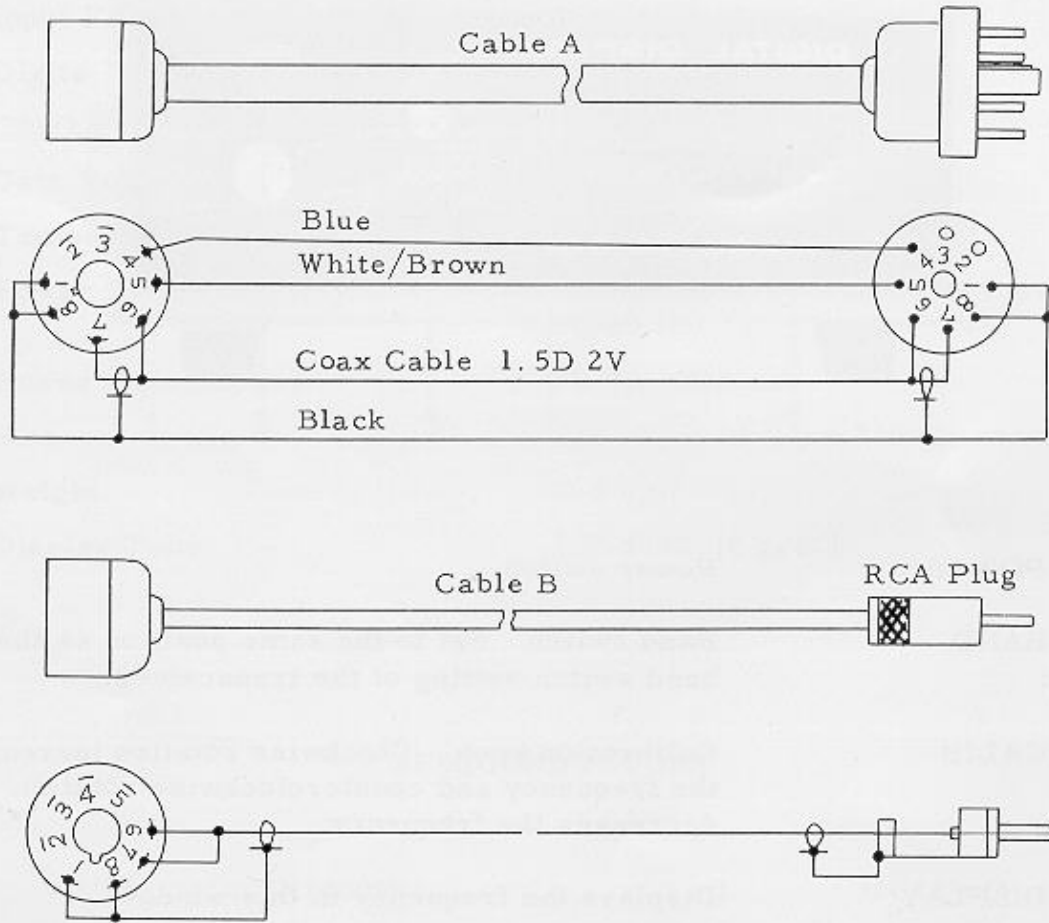


Fig. 1

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.

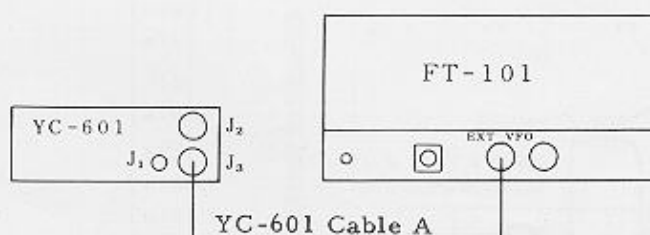


Fig. 2

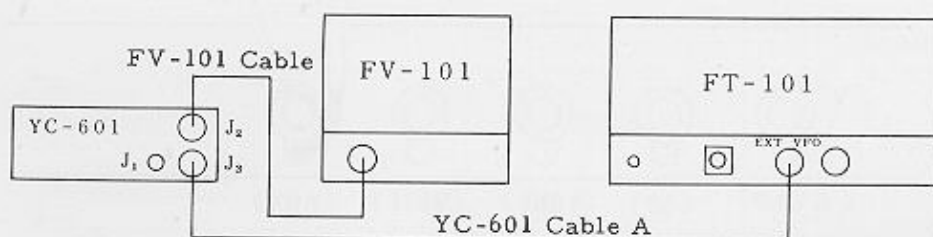


Fig. 3

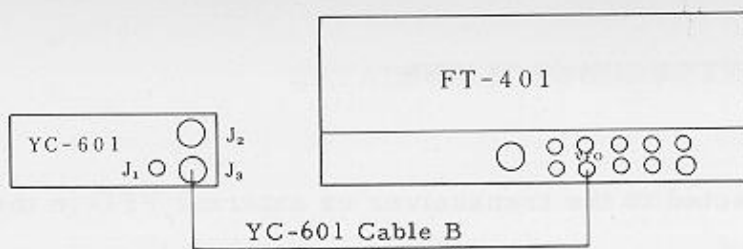


Fig. 4

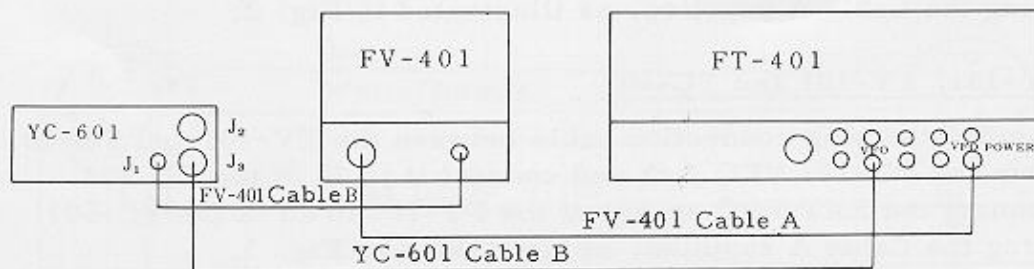


Fig. 5

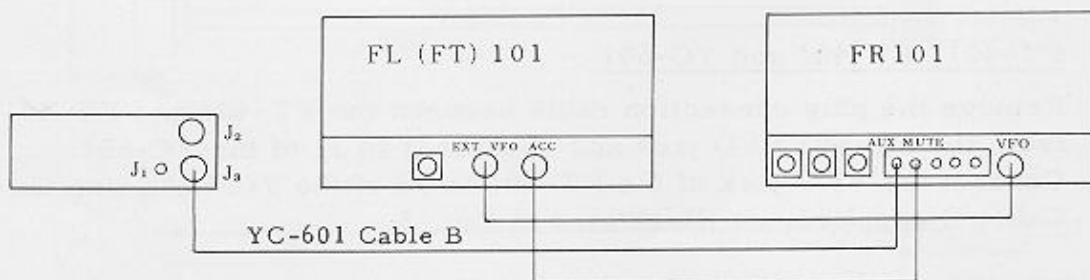


Fig. 6

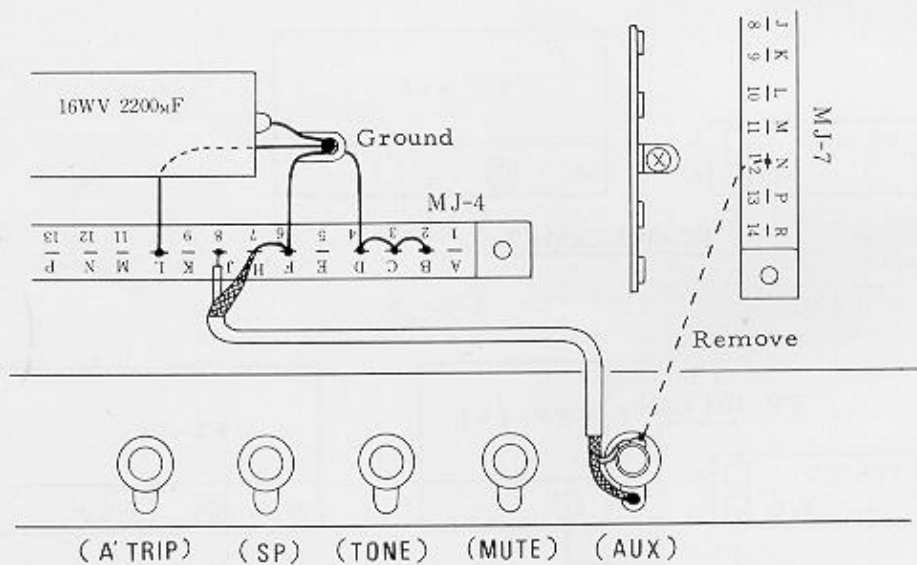
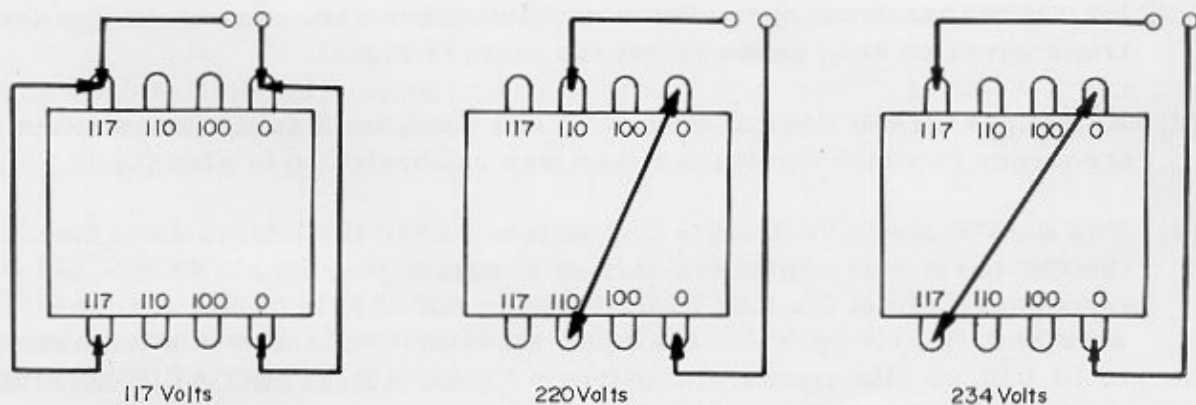


Fig. 7

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 ± 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 inverter 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, μ PB-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, μ PB-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, μ PB-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

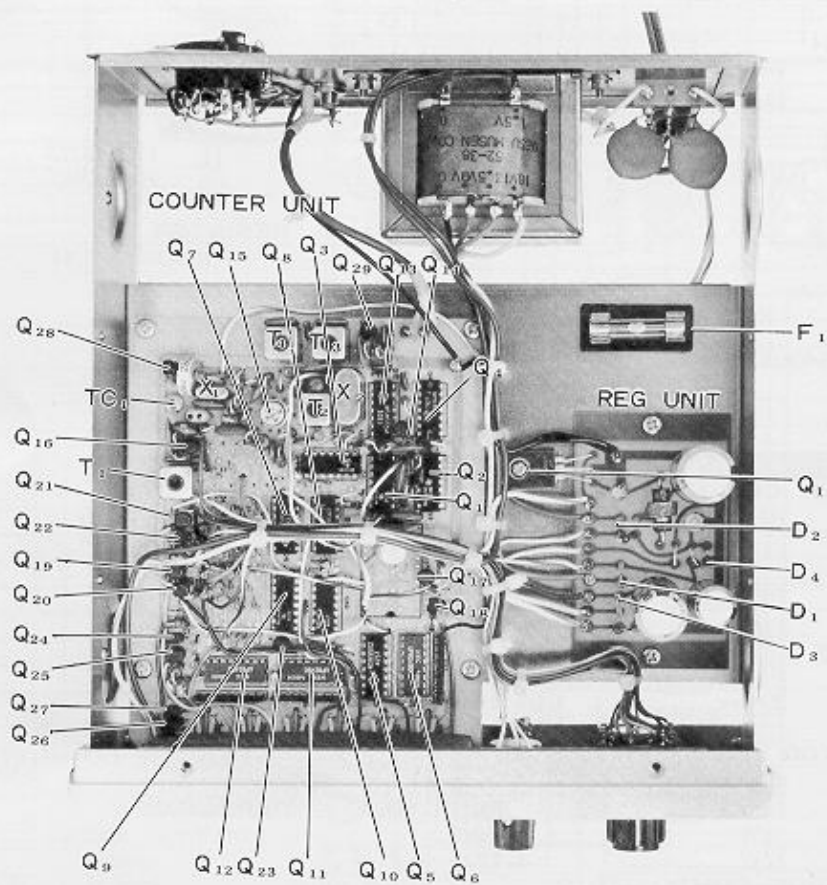
The YC-601 has been carefully aligned and tested at the factory prior to shipment. With normal usage, it should not require other than the usual attention given to electronic equipment.

CAUTION =====

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

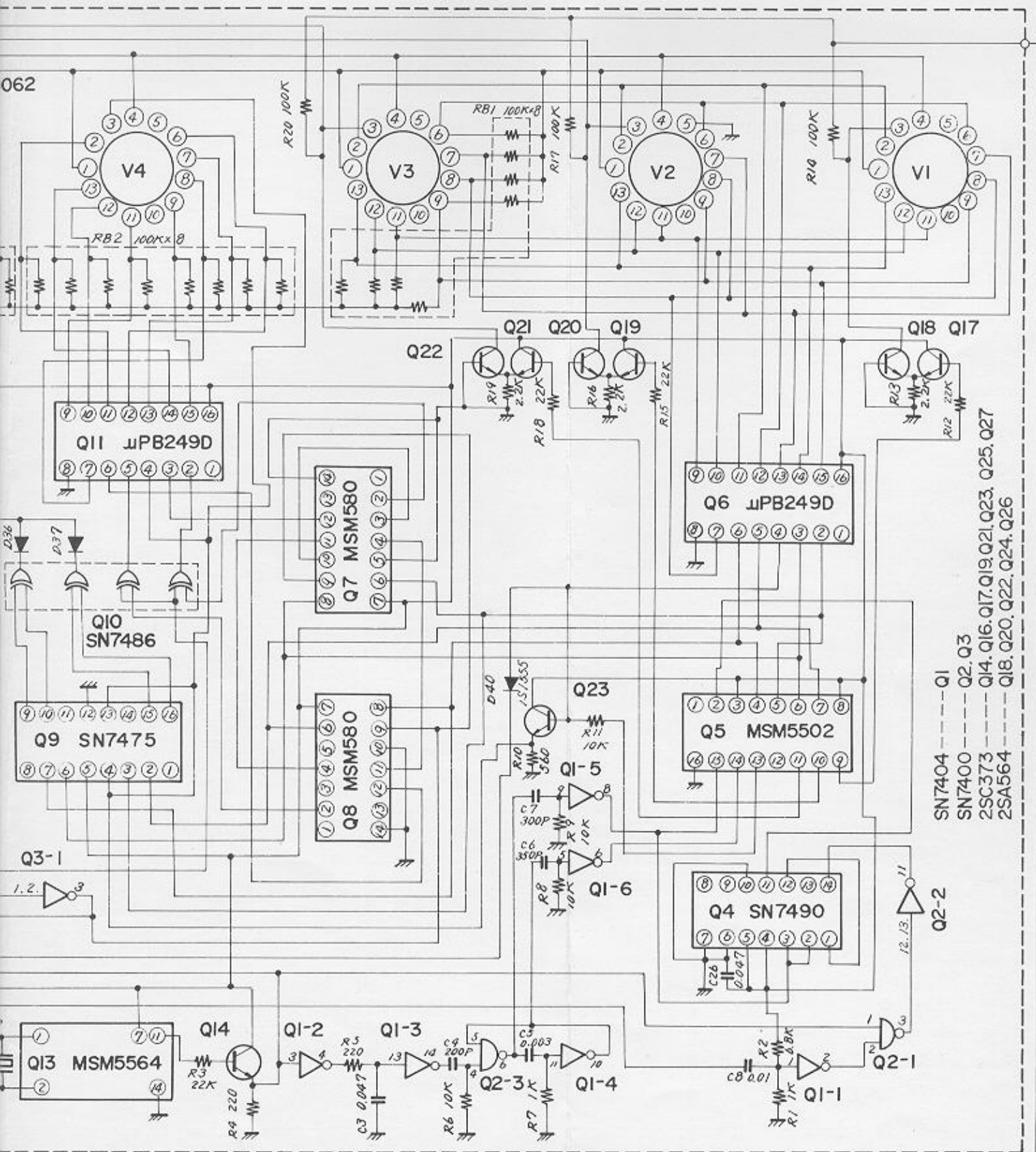
In most case, troubles may be traced to an improper interconnection between the YC-601 and the transceiver.

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

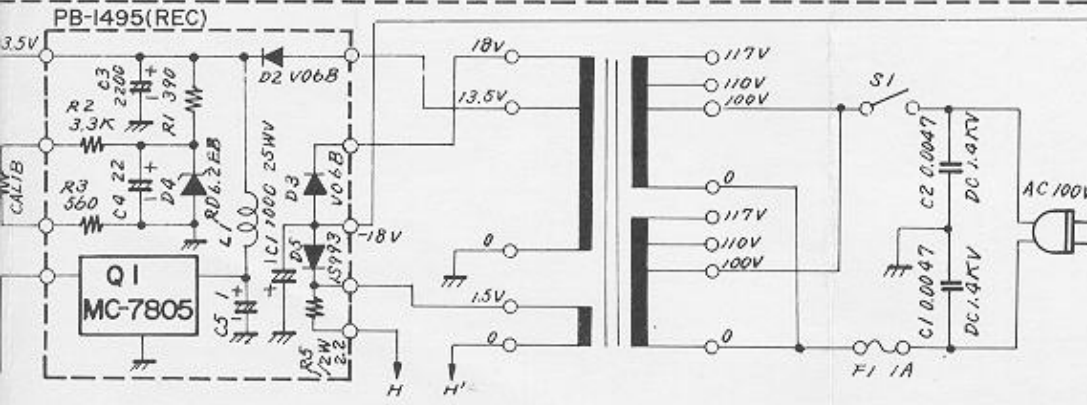


YC-601 PARTS LIST

| MAIN CHASSIS | | | | 5 | C, MOS | MSM5502 |
|--------------|-----------------------|----------------------------|---------------|----------------------------|-------------------|--------------------------|
| VR | POTENTIOMETER | | | 13 | C, MOS | MSM5564 |
| 1 | 16 ϕ | 5K Ω B | | 15 | LINEAR | MC1496G |
| | | | | 28 | FET | 2SK30AY |
| C | CAPACITOR | | | 18, 20, 22, 24, 26 | TR | 2SA564 |
| 1, 2 | 1.4kV | 0.0047 μ F | | 29 | TR | 2SC372Y |
| | | | | 14, 16, 17, 19 | TR | 2SC373 |
| T | TRANSFORMER | | | 21, 23, 25, 27 | | |
| 1 | POWER | 52-46 | | | | |
| | | | | D | DIODE | |
| S | SWITCH | | | 1~39 | Ge | 1N60AM |
| 1 | POWER | MSH-203N | | 40 | Si | 1S1555 |
| 2 | BAND | 1-1-12 | | | | |
| | | | | X | CRYSTAL | |
| J | JACK | | | 1 | HC-18/U | 11.1MHz |
| 1 | VFO JACK A | CN-7017 | | 2 | HC-6/W | 1.31072MHz |
| | VFO JACK B | SI-0507 | | | | |
| | VFO JACK C | SI-0611 | | R | RESISTOR | |
| | | | | | CARBON FILM | |
| F | FUSE | | | 42 | $\frac{1}{4}$ W | 56 Ω |
| 1 | | 1A | | 29, 40, 41 | $\frac{1}{4}$ W | 100 Ω |
| | | | | 27 | $\frac{1}{4}$ W | 180 Ω |
| FS | FUSE HOLDER | | | 4, 5 | $\frac{1}{4}$ W | 220 Ω |
| 1 | | F-3294 | | 39, 45 | $\frac{1}{4}$ W | 470 Ω |
| | | | | 10 | $\frac{1}{4}$ W | 560 Ω |
| | | | | 33 | $\frac{1}{4}$ W | 820 Ω |
| | | | | 1, 7, 34, 36, 37 | $\frac{1}{4}$ W | 1K Ω |
| | | | | 31 | $\frac{1}{4}$ W | 1.2K Ω |
| PB | PRINTED CIRCUIT BOARD | | | 13, 16, 19, 22, 24, 30, 32 | $\frac{1}{4}$ W | 2.2K Ω |
| 1495(A~Z) | REG. CIRCUIT | | | 44 | $\frac{1}{4}$ W | 3.3K Ω |
| | | | | 2 | $\frac{1}{4}$ W | 6.8K Ω |
| Q | IC | | | 6, 8, 9, 11, 21, 23 | $\frac{1}{4}$ W | 10K Ω |
| 1 | REGULATOR | MC-7805P | | 3, 12, 15, 18, 43 | $\frac{1}{4}$ W | 22K Ω |
| | | | | 35, 38 | $\frac{1}{4}$ W | 33K Ω |
| D | DIODE | | | 14, 17, 20, 25, 26, 28 | $\frac{1}{4}$ W | 100K Ω |
| 2, 3 | Si | V06B | | | | |
| 4 | Zener | RD6.2EB | | | | |
| 5 | | 1S993 | | RB | BLOCK RESISTOR | |
| R | RESISTOR | | | 1, 2, 3 | CENTER COMMON | 8 \times 100K Ω |
| | | | | | CARBON FILM | |
| 1 | | | 390 Ω | C | CAPACITOR | |
| 3 | | | 560 Ω | | DIPPED MICA | |
| 2 | | | 3.3K Ω | 31 | 50WV | 15PF |
| | | | | 1, 2, 14, 28 | 50WV | 50PF |
| 5 | | | 2.2 Ω | 11 | 50WV | 60PF |
| | | | | 9 | 50WV | 100PF |
| C | CAPACITOR | | | 10 | 50WV | 150PF |
| 5 | 16WV | 1 μ F | | 4 | 50WV | 200PF |
| 4 | 16WV | 22 μ F | | 30, 32 | 50WV | 250PF |
| 3 | 16WV | 2200 μ F | | 7 | 50WV | 300PF |
| 1 | 25WV | 1000 μ F | | 6 | 50WV | 350PF |
| | | | | | CERAMIC DISC | |
| L | INDUCTOR | | | 8, 13, 15~17 | 50WV | 0.01 |
| 1 | CHOKE | 35 μ H/10K Ω 1W | | 19~22, 27 | | |
| | | | | 3, 12, 18, 24~26 | 50WV | 0.047 μ F |
| | | | | 29, 33 | | |
| | | | | | MYLAR | |
| PB | PRINTED CIRCUIT BOARD | | | 5 | 50WV | 0.0033 μ F |
| 1508(A~Z) | COUNTER CIRCUIT | | | | ELECTROLYTIC | |
| | | | | 23 | 16WV | 100 μ F |
| V | DISPLAY TUBE | | | TC | TRIMMER CAPACITOR | |
| 1~6 | DIGITRON | LD-8062 | | 1 | ECV-1ZW | 20P50 |
| | | | | L | INDUCTOR | |
| Q | IC FET TRANSISTOR | | | 1 | TV-245 | 250 μ H |
| 2, 3 | TTL | SN7400N | | 2 | MICRO INDUCTOR | 10 μ H |
| 1 | TTL | SN7404N | | 3, 4 | MICRO INDUCTOR | 1mH |
| 9 | TTL | SN7475N | | T | TRANSFORMER | |
| 10 | TTL | SN7486N | | 1 | OSC | 1004 |
| 4 | TTL | SN7490N | | 2 | MIX | 1005 |
| 6, 11, 12 | TTL | μ PB249D | | 3, 4 | BAND PASS | 1035 |
| 7, 8 | C, MOS | MSM580 | | | | |



- Q1 SN7404
- Q2, Q3 SN7400
- Q4, Q16, Q17, Q19, Q21, Q23, Q25, Q27 2SC373
- Q5, Q8, Q20, Q22, Q24, Q26 2SA564



- NOTES.
1. ALL RESISTORS IN OHM $\pm 10\%$ UNLESS OTHERWISE NOTED.
 2. ALL CAPACITORS IN μ F UNLESS OTHERWISE NOTED.

+ 16V

YC-601

CIRCUIT DIAGRAM

