

Frequency Counter

FC-754A

FC-756

INSTRUCTION MANUAL

 **TRIO**



FEATURES

- ★ Highly sensitive and dependable frequency counter permits direct readouts of any frequencies of 10 Hz to 60 MHz. The built-in prescaler circuit extends the reading range to 50 MHz ~ 250 MHz in FC-754A and to 50 MHz ~ 500 MHz in FC-756.
- ★ Because of the use of zero blanking circuit, all unnecessary 0s are not displayed while signal is present; only the 0 of the last digit is displayed at no-signal time.
- ★ Input impedance is switchable to 1M ohms or 50 ohms to minimize the effect of impedance on the instrument to be measured.
- ★ Six-digit indicator with light emitting diodes for utmost ease of readouts. The last digit indicates frequencies in 100 Hz unit while measuring frequencies in MHz unit.
- ★ Sampling rates during MHz and kHz display are 0.5 sec. and 1.1 sec. respectively, thus frequencies can be easily read.

- ★ Very accurate measurements of frequencies with adoption of high quality crystals.
- ★ Light emitting diode flickers to indicate overflow in the counter, eliminating errors in readouts.

You are now the proud owner of our new product, FC-754A, 756, Frequency Counter. The models feature prescaler circuit for reading frequency Counter. The models feature prescaler circuit for reading frequencies up to 250 MHz in FC-754A and 500 MHz in FC-756 in utmost accuracy. It is compact and unique in design, and should give you dependable performance for many years. Please read this instruction booklet carefully before using your new FC-754A, 756.

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SPECIFICATIONS

Display system: Decimal system, 6-digits
Display method: Light emitting diodes with memory, zero blanking system
Display hold-on time: MHz 0.5 sec.
kHz..... 1.1 sec.
Counting time: MHz..... 10 mS
kHz 1 sec.

DIRECT READOUT:

Measuring range: 10 Hz to 60 MHz
Input impedance: 1M ohm (less than 40pF)
50 ohm
Input attenuator: 1/1, 1/10 and 1/100
Input sensitivity: 10 Hz to 10 MHz, 50 mV rms or over
10 MHz to 60 MHz, 100 mV rms or over

Maximum input voltage: 50V rms (Input impedance 1M ohm)
3V rms (Input impedance 50 ohm)

PRESCALER READOUT:

Measuring range: 50 MHz to 250 MHz(FC-754A)
50 MHz to 500 MHz (FC-756)
Input impedance: 50 ohm
Input sensitivity: 50 MHz to 150 MHz, 50 mV rms or over
150 MHz to 250 MHz, 100 mV rms or over (FC-754A)

150 MHz to 500 MHz, 100 mV rms or over (FC-756)

Maximum input

voltage: 3V rms

Measuring accuracy: Internal time base accuracy ± 1 digit

Time base:

Internal time base

frequency: 1 MHz

Frequency accuracy: $\pm 3 \times 10^{-5}$ (0 ~ 40°C)
 $\pm 1 \times 10^{-6}$ (AC 230V $\pm 10\%$)

Frequency stability: 1×10^{-6} /month

Operating temper-

ature range: 0 to 40°C

Power requirement: AC 230/117/100V ($\pm 10\%$),
50/60 Hz

Power consumption: Less than 22W

Dimensions: Width 210 mm (230 mm)
Height 70 mm (85 mm)
Depth 280 mm (304 mm)
Figures in () indicate maximum size.

Weight: 3.0 kg

Accessories: Input cord (CA-41 BNC with alligator clips) 1
Instruction manual 1
Fuse: 1A 2
0.5A 2

CIRCUIT DESCRIPTION

Refer to the block diagram (Fig. 1) and the schematic diagram (page 14, 15).

PRESCALER CIRCUIT:

This circuit is used for measurement of frequencies of 50 MHz to 250 MHz in FC-754A and 50 MHz to 500 MHz in FC-756.

A signal fed through the input to the prescaler is amplified by Q401 thru Q403 and, with its impedance changed, applied to IC401 where the frequency is divided into 1/10.

INPUT AMPLIFIER CIRCUIT:

Input signal is attenuated to an appropriate level by ATT and amplified by Q101 thru Q106 with its impedance changed. This signal is then fed to the waveform shaping circuit. Trigger level is adjusted by VR101.

WAVEFORM SHAPING, GATE AND COUNTER CIRCUITS:

A signal from the input amplifier is shaped into a square wave signal by the Schmidt circuit consisting of IC101c and IC101d and is fed to the gate circuit (IC102a). The signal passing through the gate circuit is counted by the counter circuit composed of IC102a, IC102b, IC103a, IC103b and IC109 thru IC113. The circuit composed of IC109 thru IC113 is MSI including such units as the counter, the latch, the decoder and the driver units.

LATCH, DECODER AND INDICATOR CIRCUITS:

The counted result is stored in the latch circuit utilizing the latch pulses obtained from the control circuit. The decoder

circuit converts the counted result into a signal that lights up the light emitting diodes.

OSCILLATOR, FREQUENCY DIVIDER AND CONTROL CIRCUITS:

The circuit consisting of IC105a and IC105b produces an accurate 1 MHz signal. This signal is frequency divided by IC118 thru IC123 to obtain a signal that switches the gate circuit through the circuit consisting of IC117a thru IC117c, IC106b, IC115b and IC116. Using this signal as a reference signal, latch pulses and reset pulses that clear the counter circuit are produced by the circuit consisting of IC105c through IC105d and IC104a through IC104f.

ZERO BLANKING AND OVERFLOW INDICATION CIRCUITS:

Zero blanking during no signal time or blanking of unnecessary 0s of higher digits is accomplished by the circuit composed of IC115a and IC124b which detects the presence or absence of signals in the counter circuit. When an overflow occurs in the counter circuit, it is detected by IC124a and IC124b and output of the frequency divider circuit IC105 is fed to Q111 to light the overflow light emitting diode D301.

POWER SUPPLY CIRCUIT:

The power supply circuit produces stabilized +5V through Q1, Q109 and IC125, and stabilized -7.8V through Q107 and Q108. A line filter is provided on the primary side of the transformer to minimize the line noise.

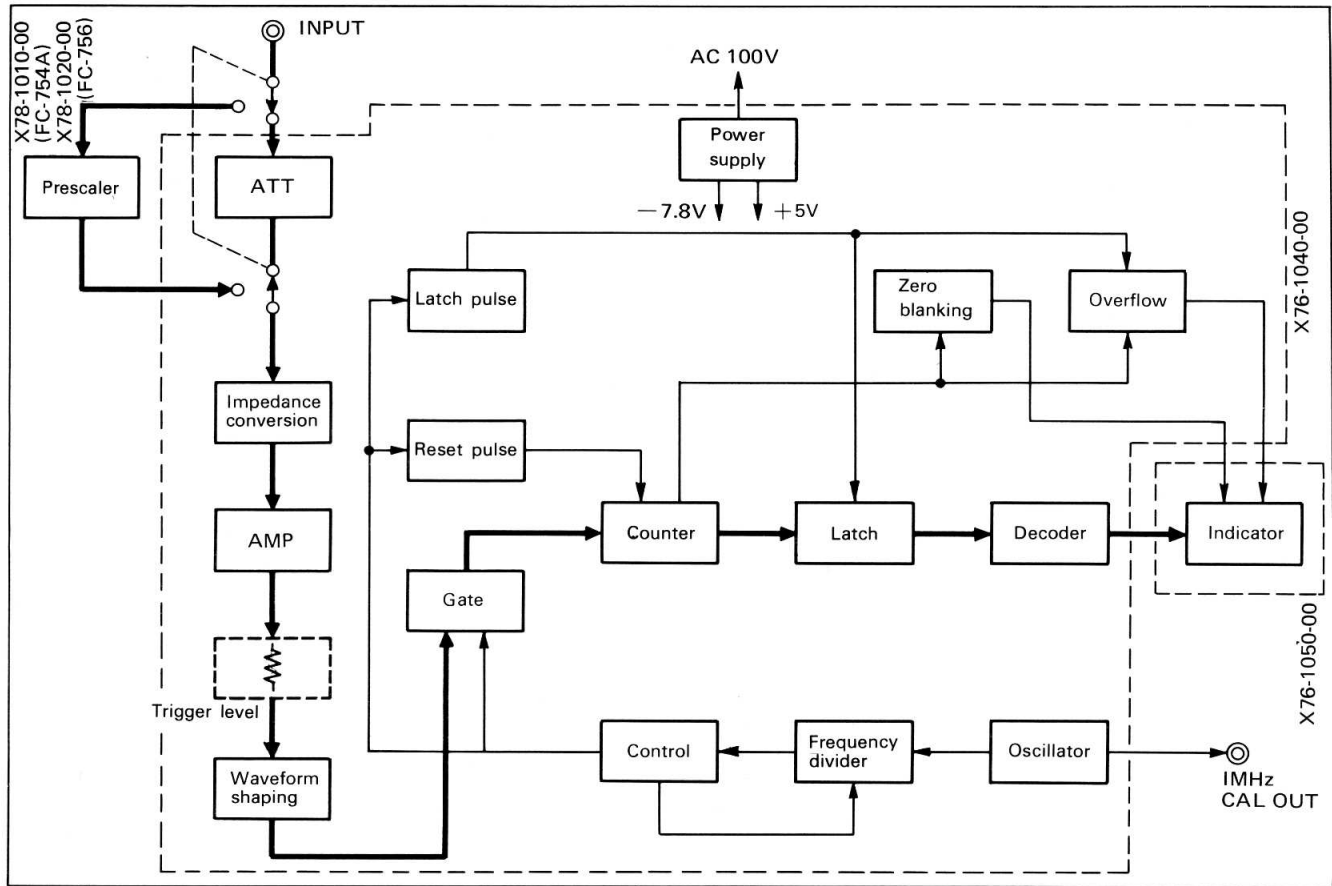


Fig. 1 Block Diagram

PANEL CONTROLS AND THEIR FUNCTIONS

FRONT PANEL:

1. POWER ON-OFF

Power switch to turn on and off the power.

2. INPUT

Input signal terminal.

3. ATT

Input signal attenuator. Input signal level can be adjusted in 3 steps.

4. FREQ. RANGE

Frequency ranges can be selected according to the frequency of input signal. With the range set to "50 ~ 250 MHz", input signal is connected to the prescaler.

5. IMPEDANCE

This switch selects input impedance when FREQ. RANGE (4) is set to "10 Hz ~ 60 MHz".

6. kHz-MHz

This switch is used to select the readout unit.

7. OVER

When the counter overflows, this lamp is illuminated.

8. GRIP

As shown in Fig. 2, push the grip in the direction of the arrow and fix (lock) for easy reading.

10. HEAT SINK

11. POWER CORD

12. GROUND TERMINAL: should be grounded.

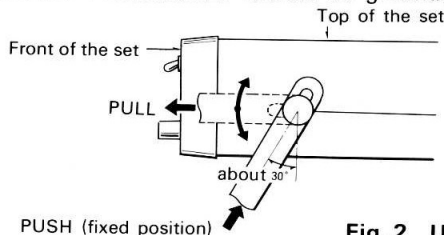
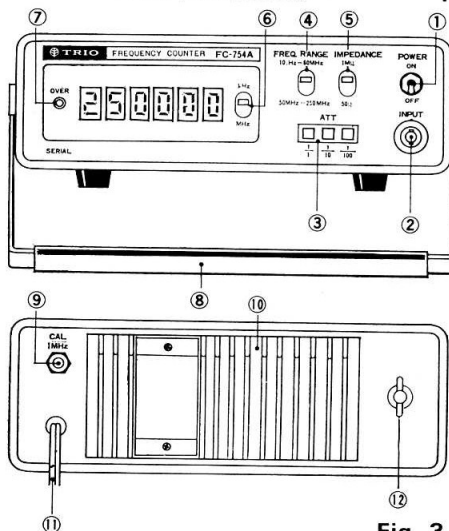


Fig. 2 Use of Grip



Note:
For the FC-756, frequency range (4) indication differs from that for the FC-754A.

Fig. 3 External View
(FC-754A)

REAR PANEL:

9. CAL 1 MHz

Output terminal for 1 MHz reference oscillator that is used for self-check of the counter.

OPERATING INSTRUCTIONS

SELF-CHECK:

1. Turn on the POWER switch (1).
2. Set ATT (3) to 1/1 and FREQ. RANGE (4) to "10 Hz ~ 60 MHz".
3. Connect the supplied BNC cord to INPUT (2); the alligator clip (red) should be connected to CAL 1 MHz (8) on the rear panel. When connected, the counter will indicate as shown in Table 1.

FREQUENCY MEASUREMENT:

When input signal is 10 Hz ~ 60 MHz, proceed as follows:

1. Turn on the POWER switch (1).
2. Set ATT (3) to 1/100 and FREQ. RANGE (4) to "10 Hz ~ 60 MHz".

Also, set the kHz-MHz switch (6) to "kHz" position.

3. Apply input signal to the INPUT terminal (2).
4. If the counter indicates "0" or the indication differs largely, the input voltage is too small. When this happens, set ATT (3) to 1/10 or 1/1.
5. If the overflow lamp flickers, change the position of the kHz-MHz switch to "MHz".

★ If the Impedance (5) is switched to 50 ohm, do not attempt to apply an input voltage exceeding 3V rms.

When input signal are 50 MHz ~ 250 MHz in FC-754A and 50 MHz ~ 500 MHz in FC-756, proceed as follows:

1. Turn on the POWER switch (1).
 2. Set FREQ. RANGE (4) to "50 MHz ~ 250 MHz" or 50 MHz ~ 500 MHz and the kHz ~ MHz switch (6) to "MHz".
- ★ At this time, the input impedance is switched to 50 ohm and ATT is disabled. Do not attempt to apply an input voltage exceeding 3V.
3. Apply input signal to the INPUT terminal (2).

Table 1

kHz—MHz Selector switch	Overflow Indication	Indication
MHz	—	□ 1.0000
kHz	Flickering	000.000

□ : Blanking

MAINTENANCES

REMOVING THE CASE

1. Remove the four screws from the sides of the panel with a Phillips head screwdriver.
2. The top and bottom halves of the case can then be separated from the counter by pulling up and downward, respectively (Refer to Fig. 4)

SWITCHING LINE VOLTAGE

Power voltage can be switched between 100, 117 and 230V AC by replacing the wiring pins contained in the case as follows:

1. **Be sure to disconnect the power cord from the outlet before attempting to switch power voltage.**
2. Remove the case.
3. The wiring pins are located beside the power transformer as viewed from the face of the printed circuit board in Fig. 5. Pins 1 and 4 are jumpered for 230V AC. To switch to 117V AC, disconnect the wire clip from pin 4 and replace it to pin 3. Replace it to pin 2 for 100V AC.

For 117V or 100V operation a 1A fuse should be used.

FUSE REPLACEMENT

1. Remove the case.
2. Be sure to disconnect the power plug from the power outlet before attempting operation.
3. Replace the fuse on the printed circuit board with new one.

4. If the new fuse blows soon, we recommend you to send the counter to your nearest service shop for repair.
5. With 230 volt power supply, use 0.5A fuse; with 117 volt power supply, use 1A fuse. Be sure to use the fuse of correct ampere rating.

CAUTIONS:

1. Avoid exposure of the counter to direct sun beam while it is used. Direct sun beam produces abnormally high heat in the counter, making counter operation unstable or the transistors and ICs heat-damaged.
2. High ambient temperature and humidity are also harmful to the counter.
3. Devices and equipment producing strong vibration and electric shock will produce an adverse effect on the transistors, ICs and display tubes when the counter is placed near them.
4. To switch to another voltage (100V AC or 117V AC), perform switching operation on the case-contained printed circuit board as described in second paragraph of MAINTENANCES. Switching to 117V requires replacement of the existing fuse by a 1A fuse. Similarly, switching to 230V requires the use of a 0.5A one.
5. Maximum allowable input voltage is 50V rms for direct readouts (10 Hz ~ 60 MHz) and 5V rms for prescaler readouts (50 MHz ~ 250 MHz in FC-754A and 50 MHz ~ 500 MHz in FC-756). Be sure to keep the input voltage below this limit.
6. This counter operates immediately after power is turned on, however, to obtain correct measurement use this

counter 20 minutes after preheating.

7. To prevent electrical shock, be sure to ground the ground terminal (12). (Refer to the external views on page 6.)

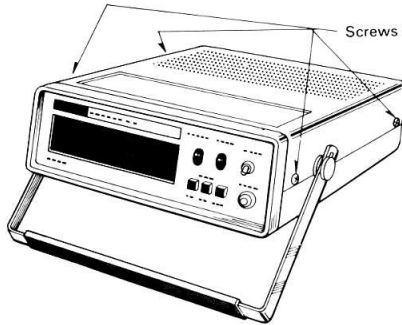


Fig. 4 Removal of Cabinet Case

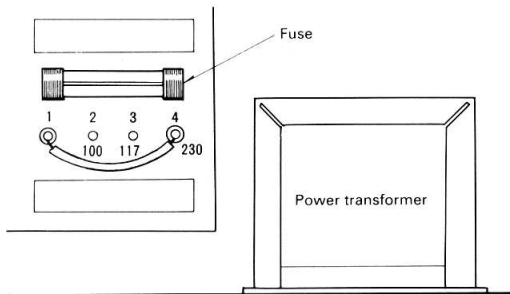


Fig. 5 Voltage Conversion

Parts List of FC-754A, FC-756

Ref. No.	Parts No.	Description
—	A01-0198-13	Case 1
—	A01-0199-13	Case 2
—	A10-0477-21	Chassis
—	A20-0997-03	Panel
—	B01-0064-23	Escutcheon
—	B07-0105-04	Bush escutcheon
—	B19-0187-04	Filter
—	E30-1824-05	BNC cord
—	B40-0765-04	Name plate
—	B41-0094-14	Caution plate (Power supply 220V~240V)
—	B41-0111-04	Caution plate (Power supply 110V~120V)
—	B50-1450-00	Instruction manual
—	E04-0251-05	BNC receptacle
—	E13-0102-05	1P pin jack
—	E23-0018-04	Solder lug
—	E23-0015-04	Grounding lug
J1	E30-0559-05	Lead with 10P connector
K4	E30-0560-05	Lead with 12P connector
J5	E30-0561-05	Lead with 11P connector
—	E30-0545-05	Line cord with plug
—	F01-0232-04	Heat sink
—	F07-0305-04	Heat sink cover
—	F05-5013-05	Fuse (0.5A)
—	F05-1023-05	Fuse (1.0A)
—	F19-0207-04	Blind plate
—	F20-0066-05	Mica plate

Parts List of X78-1010-00 (FC-754A)

Ref. No.	Parts No.	Description
—	G13-0702-04	Cushion
—	H01-1496-04	Packing case
—	H10-0701-13	Packing material, foamed styrene
—	H20-0343-04	Protection cover
—	H25-0029-04	Polyethylene bag
—	J03-0003-04	Rubber leg
—	J19-0275-04	Line cord winding
—	J40-0016-04	Bush
—	J41-0006-00	Line cord bushing
—	J61-0049-05	Cable wrapping band
—	K01-0061-03	Grip
—	K21-0807-04	Knob
—	K23-0147-04	Knob
—	L02-0077-05	Power transformer
S5	S44-1006-05	Toggle switch
Q001	2SD188	Transistor
—	X76-1040-22	Counter amplifier unit
—	X76-1050-00	Indicator unit
—	X77-1010-00	Switch unit
—	X78-1010-00	Pre-scaler unit (FC-754A)
—	X78-1020-00	Pre-scaler unit (FC-756)

Ref. No.	Parts No.	Description
RESISTOR		
R401	RD14BY2H560J	Carbon 56Ω ±5% 1/2W
R402	RD14BY2H220J	Carbon 22Ω ±5% 1/2W
R403	RD14BB2E153J	Carbon 15kΩ ±5% 1/4W
R404	RD14BB2E271J	Carbon 270Ω ±5% 1/4W
R405	RD14BB2E123J	Carbon 12kΩ ±5% 1/4W
R406	RD14BB2E103J	Carbon 10kΩ ±5% 1/4W
R407,408	RD14BB2E101J	Carbon 100Ω ±5% 1/4W
R409	RD14BB2E391J	Carbon 390Ω ±5% 1/4W
R410	RD14BB2E331J	Carbon 330Ω ±5% 1/4W
R411	RD14BB2E472J	Carbon 4.7kΩ ±5% 1/4W
R412	RD14BB2E121J	Carbon 120Ω ±5% 1/4W
R413	RD14BB2E221J	Carbon 220Ω ±5% 1/4W
CAPACITOR		
C401	CK45D2H102M	Cermic 1000pF ±20%
C402	CC45SL1H101J	Ceramic 100pF ±5%
C403	CC45SL1H150J	Ceramic 15pF ±5%
C404	CC45SL1H221J	Ceramic 220pF ±5%
C405,406	CC45SL1H100D	Ceramic 10pF ±0.5pF
C407~411	CQ93M1H103M	Mylar 0.01μF ±20%
SEMICONDUCTOR		
IC401		Integrated circuit, 95H90DC
Q401~403		Transistor, 2SC387A
Q404		Transistor, 2SA495Y
D401,402		Diode, 1N60

Ref. No.	Parts No.	Description
MISCELLANEOUS		
VR401	R12-0004-05	Semi-fixed resistor
—	R92-0150-05	Jumper resistor
TH401.402		Thermister, SDT-20

Parts List of X78-1020-00 (FC-756)

Ref. No.	Parts No.	Description
RESISTOR		
R401	RD14BB2E560J	Carbon 56Ω ±5% 1/4W
R402	RD14BB2E220J	Carbon 22Ω ±5% 1/4W
R403	RD14BB2E272J	Carbon 2.7kΩ ±5% 1/4W
R404	RD14BB2E332J	Carbon 3.3kΩ ±5% 1/4W
R405	RD14BB2E151J	Carbon 150Ω ±5% 1/4W
R406	RD14BB2E271J	Carbon 270Ω ±5% 1/4W
R407	RD14BB2E272J	Carbon 2.7kΩ ±5% 1/4W
R408	RD14BB2E182J	Carbon 1.8kΩ ±5% 1/4W
R409,410	RD14BB2E221J	Carbon 220Ω ±5% 1/4W
R411	RD14BB2E331J	Carbon 330Ω ±5% 1/4W
R412	RD14BB2E123J	Carbon 12kΩ ±5% 1/4W
R413	RD14BB2E102J	Carbon 1kΩ ±5% 1/4W
R414	RD14BB2E221J	Carbon 220Ω ±5% 1/4W
R415	RD14BB2E560J	Carbon 56Ω ±5% 1/4W
R416	RD14BB2E151J	Carbon 150Ω ±5% 1/4W

Ref. No.	Parts No.	Description
CAPACITOR		
C401	CC45SL2H030D	Ceramic 3pF ±0.5pF
C402	CC45SL2H101K	Ceramic 100pF ±10%
C403	CC45SL2H220J	Ceramic 22pF ±5%
C404	CK45D1H332M	Ceramic 3300pF ±20%
C405~407	CC45SL1H101K	Ceramic 100pF ±10%
C408	CK45D1H103M	Ceramic 0.01μF ±20%
C409	CC45SL1H101K	Ceramic 100pF ±10%
C410	CK45D1H103M	Ceramic 0.01μF ±20%
C411	CK45D1H102M	Ceramic 1000pF ±20%
C412	CC45SL1H101K	Ceramic 100pF ±10%
C413~415	CK45D1H103M	Ceramic 0.01μF ±20%
C416	CE04W1E100	Electrolytic 10μF 25WV
C417	CK45D1H103M	Ceramic 0.01μF ±20%
C418	CC45SL1H010D	Ceramic 1pF ±0.5pF
SEMICONDUCTOR		
IC401		Integrated circuit MC12013P
Q401~403		Transistor 2SC2026
D401.402		Diode 1SS16
MISCELLANEOUS		
	E23-0046-04	Terminal
	J25-2826-03	Printed circuit board

Parts List of X77-1010-00

Ref. No.	Parts No.	Description
R201	PD14BB2E560J	Carbon resistor, 56Ω ±5% 1/4W
C201	C90-0021-05	Mylar capacitor 0.1μF 600V
J1	E30-0559-15	Lead wire w/10P connector
—	J25-1328-13	Printed circuit board
S3	S36-2026-15	Lever switch
S4.5	S37-2006-05	Lever switch

Parts List of X76-1050-00

Ref. No.	Parts No.	Description
D301		Light emitting diode TLR-104
D30~307		Light emitting diode TLR-313
P301~303	E40-1211-05	12P connector
P304	E40-1111-05	11P connector
—	J25-1327-13	Printed circuit board

Parts List of X76-1040-22

Ref. No.	Parts No.	Description
RESISTOR		
R101	RN14BK2H994F	Metal film 990kΩ ±1% 1/2W
R102	RN14BK2H1012F	Metal film 10.1kΩ ±1% 1/2W
R103	RD14BY2E100J	Carbon 10Ω ±5% 1/4W
R104	RN14BK2H904F	Metal film 900kΩ ±1% 1/2W
R105	RN14BK2H1113F	Metal film 111kΩ ±1% 1/2W
R106	RD14BB2E100J	Carbon 10Ω ±5% 1/4W
R107	RD14BB2E105F	Metal film 1MΩ ±1% 1/2W
R108	RD14BB2E154J	Carbon 150kΩ ±5% 1/4W
R109	RD14BB2E470J	Carbon 47Ω ±5% 1/4W
R110	RD14BB2E222J	Carbon 2.2kΩ ±5% 1/4W
R111	RD14BB2E332J	Carbon 3.3kΩ ±5% 1/4W
R112,113	RD14BB2E101J	Carbon 100Ω ±5% 1/4W
R114	RD14BB2E331J	Carbon 330Ω ±5% 1/4W
R115	RD14BB2E102J	Carbon 1kΩ ±5% 1/4W
R116	RD14BB2E151J	Carbon 150Ω ±5% 1/4W
R117	RD14BB2E102J	Carbon 1kΩ ±5% 1/4W
R118	RD14BB2E222J	Carbon 2.2kΩ ±5% 1/4W
R119	RD14BB2E182J	Carbon 1.8kΩ ±5% 1/4W
R120	RD14BB2E562J	Carbon 5.6kΩ ±5% 1/4W
R121	RD14BB2E331J	Carbon 330Ω ±5% 1/4W
R122	RD14BB2E151J	Carbon 150Ω ±5% 1/4W
R123	RD14BB2E681J	Carbon 680Ω ±5% 1/4W
R124	RD14BB2E100J	Carbon 10Ω ±5% 1/4W
R125	RD14BB2E331J	Carbon 330Ω ±5% 1/4W
R126	RD14BB2E271J	Carbon 270Ω ±5% 1/4W
R127,128	RD14BB2E681J	Carbon 680Ω ±5% 1/4W
R129	RD14BB2E122J	Carbon 1.2kΩ ±5% 1/4W
R130	RD14BB2E102J	Carbon 1kΩ ±5% 1/4W
R131	RD14BB2E152J	Carbon 1.5kΩ ±5% 1/4W

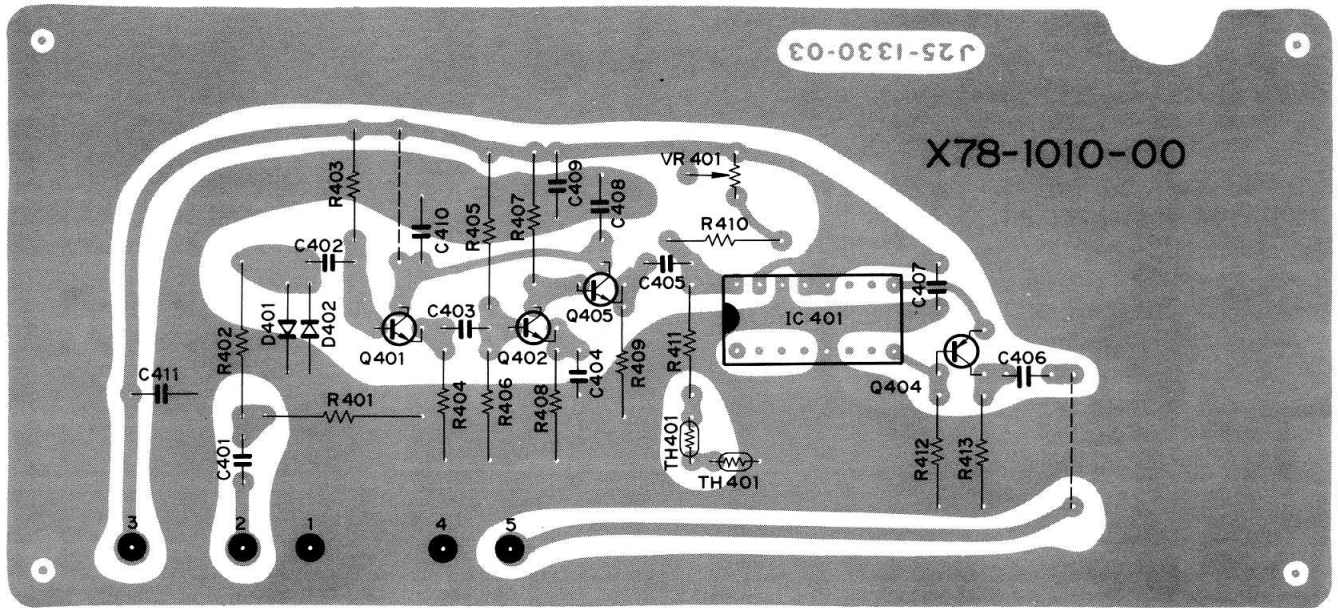
Ref. No.	Parts No.	Description			
R132	RD14BB2E182J	Carbon	1.8kΩ	±5%	1/4W
R133	RD14BB2E512J	Carbon	5.1kΩ	±5%	1/4W
R134	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R135	RD14BB2E330J	Carbon	33Ω	±5%	1/4W
R136	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R137	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R138	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R139	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R140	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R141.142	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R143~145	RD14BB2E331J	Carbon	330Ω	±5%	1/4W
R146	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R147	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R148	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R149	RD14BB2E121J	Carbon	120Ω	±5%	1/4W
R150	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R151	RD14BB2E182J	Carbon	1.8kΩ	±5%	1/4W
R152	RD14BB2E221J	Carbon	220Ω	±5%	1/4W
R153	RD14BB2E561J	Carbon	560Ω	±5%	1/4W
R154~159	R90-0109-05	Composite	330Ω	±10%	
R160	RD14BB2E122J	Carbon	1.2kΩ	±5%	1/4W
R161	RD14BB2E100J	Carbon	10Ω	±5%	1/4W
CAPACITOR					
C101	CC45SL2H030D	Ceramic	3pF	±0.5pF	
C102	CK45D1H122M	Ceramic	1200pF	±20%	
C103	CC45SL2H030D	Ceramic	3pF	±0.5pF	
C104	CC45SL1H680J	Ceramic	68pF	±5%	
C105	CK45D2H331M	Ceramic	330pF	±20%	
C106	CE04W1A470	Electrolytic	47μF	10WV	
C107~109	CK45D1H103M	Ceramic	0.01μF	±20%	
C110	CE04W1A470	Electrolytic	47μF	10WV	

Ref. No.	Parts No.	Description			
C111	CK45D1H103M	Ceramic	0.01μF	±20%	
C112	CE04W1H3R3	Electrolytic	3.3μF	50WV	
C113	CK45D1H103M	Ceramic	0.01μF	±20%	
C114	CE04W1A470	Electrolytic	47μF	10WV	
C115	CK45D1H103M	Ceramic	0.01μF	±20%	
C116	CE04W1A470	Electrolytic	47μF	10WV	
C117	CK45D1H103M	Ceramic	0.01μF	±20%	
C118	CE04W1A470	Electrolytic	47μF	10WV	
C119~121	CK45D3D103M	Ceramic	0.01μF	±20%	(2000V)
C122	CK45D1H103M	Ceramic	0.01μF	±20%	
C123	CE04W1C102	Electrolytic	1000μF	16WV	
C124	CK45D1H103M	Ceramic	0.01μF	±20%	
C125	CE04W1C221	Electrolytic	220μF	16WV	
C126	CK45D1H222M	Ceramic	2200pF	±20%	
C127	CK45D1H103M	Ceramic	0.01μF	±20%	
C128	CE04W1H010	Electrolytic	1μF	50WV	
C129	CE04W1A101	Electrolytic	100μF	10WV	
C130	CK45D1H103M	Ceramic	0.01μF	±20%	
C131.132	CE02W1C222	Electrolytic	2200μF	10WV	
C133	CK45D1H102M	Ceramic	1000pF	±20%	
C134	CE02W1A101	Electrolytic	100μF	10WV	
C135	CK45D1H103M	Ceramic	0.01μF	±20%	
C136	CE04W1A101	Electrolytic	100μF	10WV	
C137	CK45D1H103M	Ceramic	0.01μF	±20%	
C138	CE04W1H010	Electrolytic	1μF	50WV	
C139	CK45D1H331M	Ceramic	330pF	±20%	
C140	CQ93M1H103K	Mylar	0.01μF	±10%	
C141	CK45D1H102M	Ceramic	1000pF	±20%	
C142	CQ93M1H332K	Mylar	3300pF	±10%	

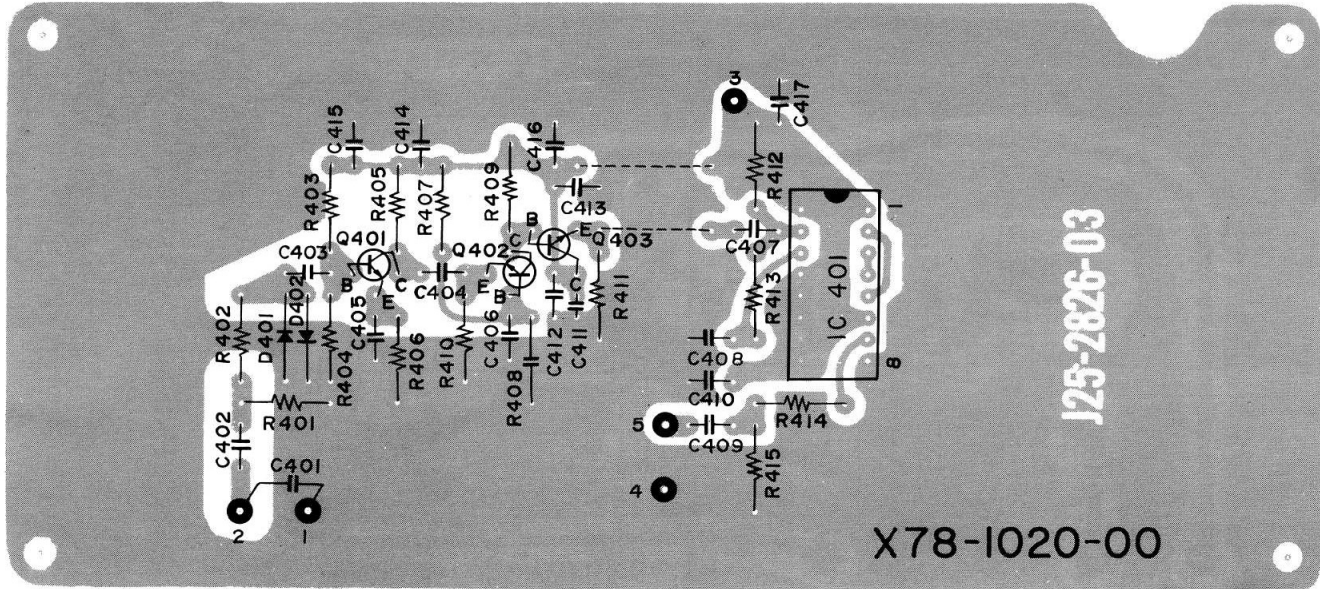
Ref. No.	Parts No.	Description
C143.144	CK45D1H331M	Ceramic 330pF $\pm 20\%$
C145	CE04W1A101	Electrolytic 100 μ F 10WV
SEMICONDUCTOR		
Q101		FET 2SK19GR
Q102~106		Transistor 2SC387A
Q107		Transistor 2SA755
Q108		Transistor 2SA733(Q)
Q109		Transistor 2SD235(Y)
Q110		Transistor 2SC458(C)
D101~103		Diode 1S1555
D104.105		Diode U05B
D106.107		Diode V06B
TH101.102		Thermister SDT-20
IC101		Integrated circuit SN74S00N
IC102		Integrated circuit SN74S112N
IC103		Integrated circuit SN74H103N
IC104		Integrated circuit M53204P
IC105		Integrated circuit M53200P
IC106		Integrated circuit M53273P
IC107		Integrated circuit M53275P
IC108		Integrated circuit M53247P
IC109~113		Integrated circuit SN74143N
IC114		Integrated circuit SN7432N
IC115		Integrated circuit SN74H73N
IC116		Integrated circuit M53321P
IC117		Integrated circuit M53200P
IC118~123		Integrated circuit M53290P

Ref. No.	Parts No.	Description
IC124		Integrated circuit SN7474N
IC125		Integrated circuit RC723T
MISCELLANEOUS		
—	E02-2401-05	IC socket
P101	E40-1011-05	10P connector
P102	E40-0803-05	8P connector
P103	E40-0703-05	7P connector
P104	E40-1211-05	12P connector
P105	E40-1111-05	11P connector
J101.102	E40-1216-05	12P socket
—	E23-0046-04	Terminal
—	E30-0436-05	1P lead wire
—	F05-1023-05	Fuse (1A)
—	F05-5013-05	Fuse (0.5A)
—	J25-1326-22	Printed circuit board
L101	L33-0263-05	Line filter
L102~105	L40-1525-04	Ferri-inductor
—	L77-0233-05	Crystal oscillator
S2	S42-3009-05	Push switch
VR101	R12-1003-05	Semi-fixed resistor 2.2k Ω
VR102	R12-0003-05	Semi-fixed resistor 470 Ω
TC101	C05-0013-15	Trimmer capacitor

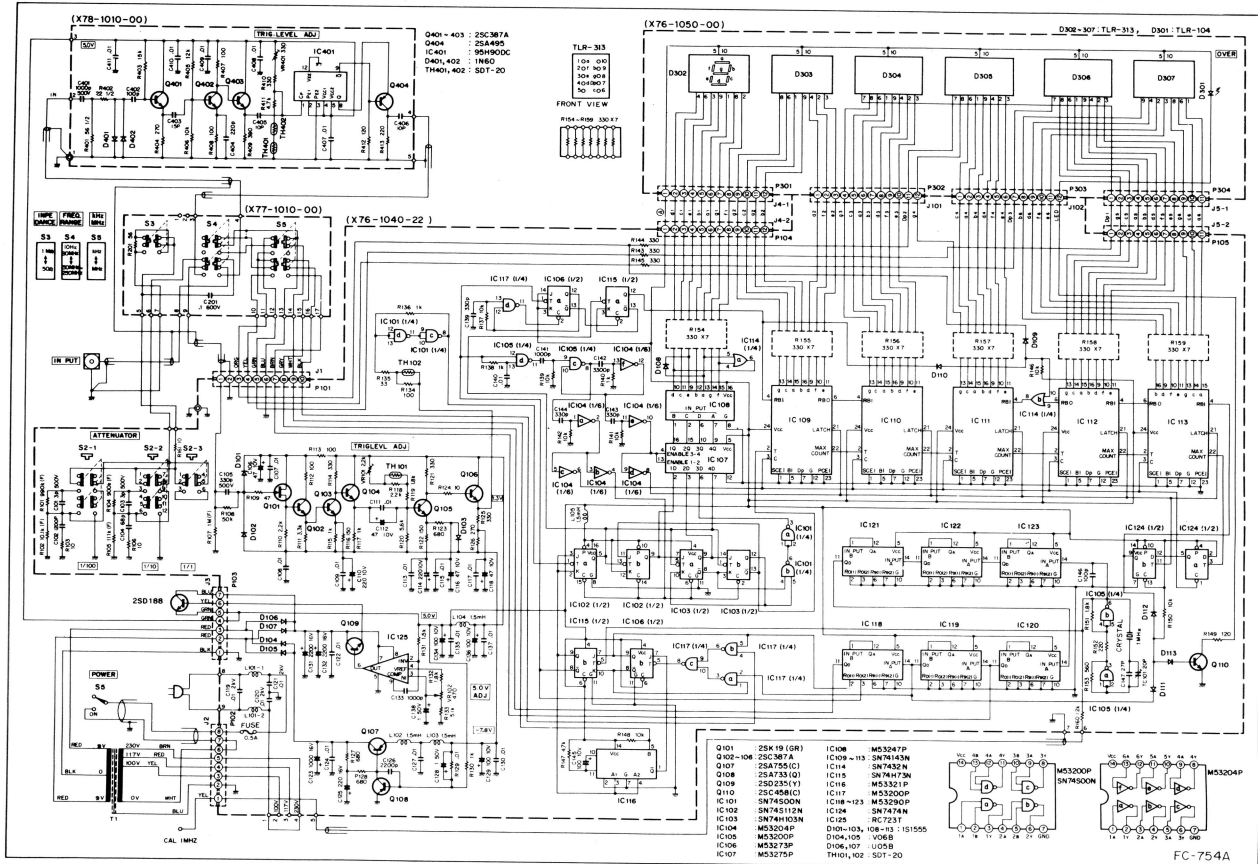
PC BOARD (X78-1010-00) (FC-754A)



PC BOARD (X78-1020-00) (FC-756)

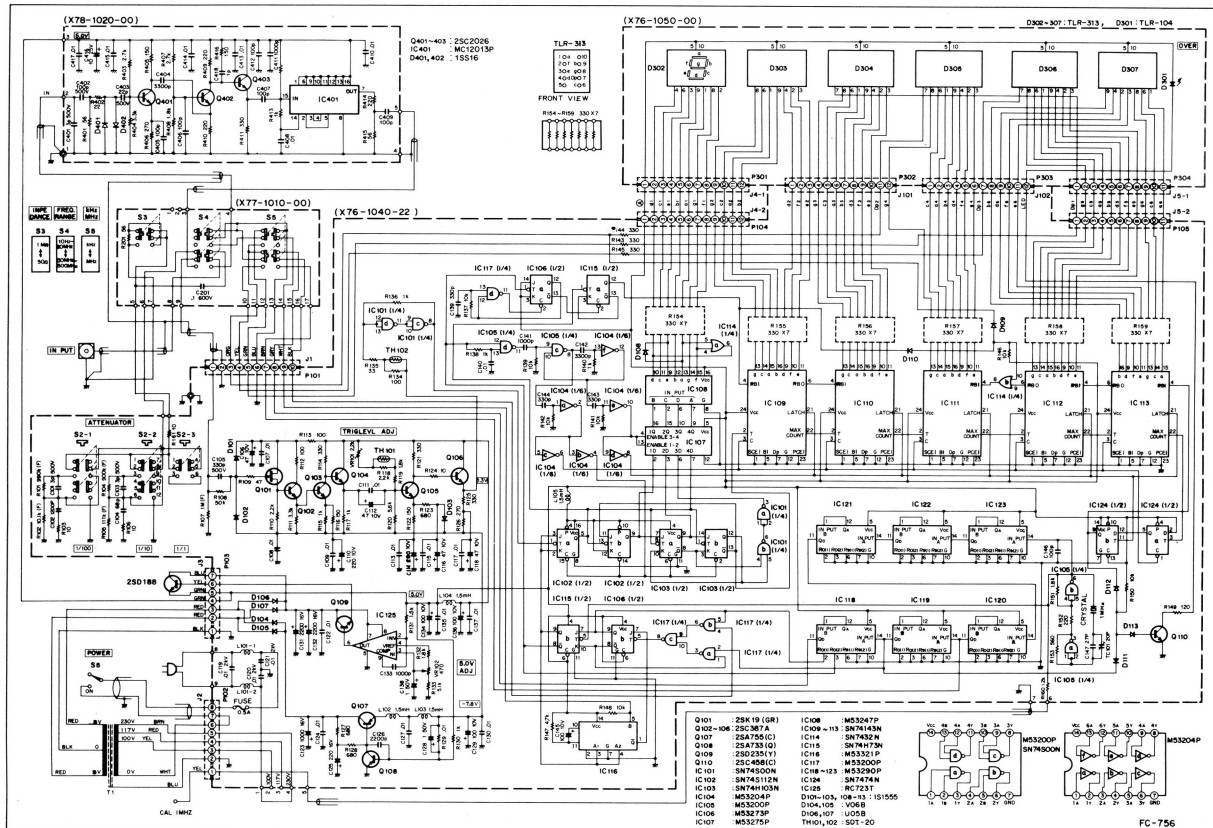


SCHEMATIC DIAGRAM (FC-754A)



* The above schematic diagram is subject to change without notice for further improvement.

SCHEMATIC DIAGRAM (FC-756)



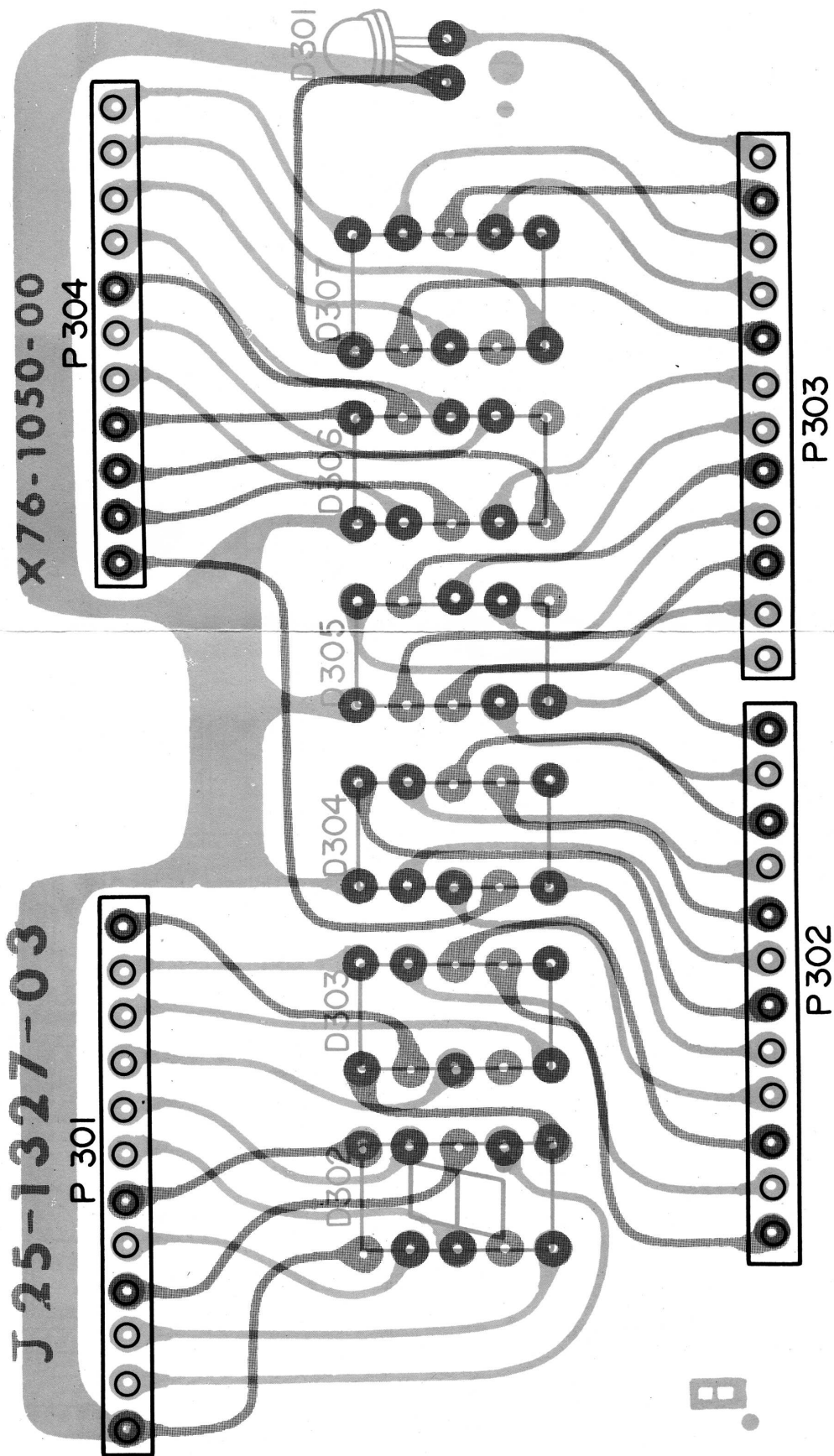
* The above schematic diagram are subject to change without notice for further improvement.



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PC BOARD (X76-1050-00)



PC BOARD (X76-1040-21)

