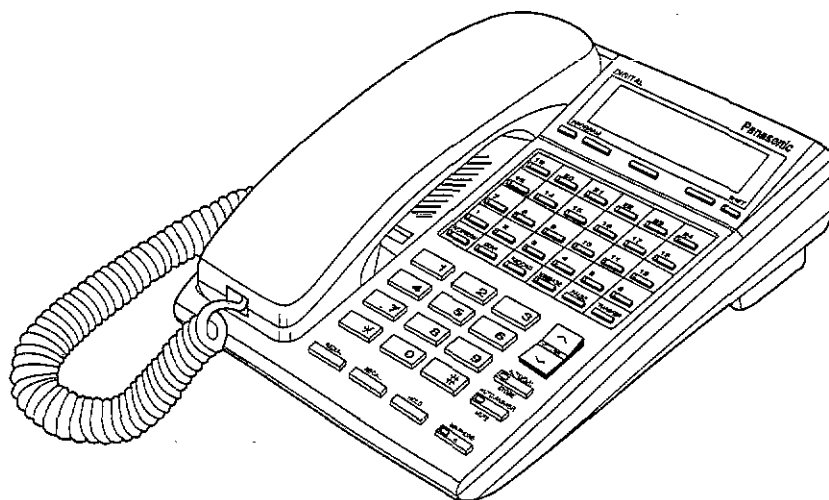


Service Manual

and Technical Guide
DIGITAL PROPRIETARY TELEPHONE
FOR DIGITAL SUPER HYBRID SYSTEM

KX-T7230E

(for United Kingdom)



■ SPECIFICATIONS

Station Loop Limit:	40 ohms
Cabling Method:	2 pair wire
Jacks:	EMSS, Handset/Headset
Display:	16 digits (max.)
Dimensions:	190 (W)×90 (H)×240 (D) mm with handset
Weight:	950 g (2 lb. 2 oz.)

Design and specifications are subject to change without notice.

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic

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When you mention the serial number, write down the 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	2
LOCATION OF CONTROLS	3
CONNECTION	4
FOR SERVICE TECHNICIANS	4
DISASSEMBLY INSTRUCTIONS	5
IC DATA	6~9
BLOCK DIAGRAM	10
CIRCUIT OPERATIONS	11~22
TROUBLESHOOTING GUIDE	23~27
TERMINAL GUIDE OF IC'S TRANSISTORS, AND DIODES	28
PRINTED CIRCUIT BOARD	29~32,36
SCHEMATIC DIAGRAM	33~35
HOW TO REPLACE FLAT IC'S	37
EXTENSION CORD CONNECTING METHOD	39
ACCESSORIES AND PACKING MATERIALS.....	39
CABINET AND ELECTRICAL PARTS LOCATION ...	40
REPLACEMENT PARTS LIST	41~44

LOCATION OF CONTROLS

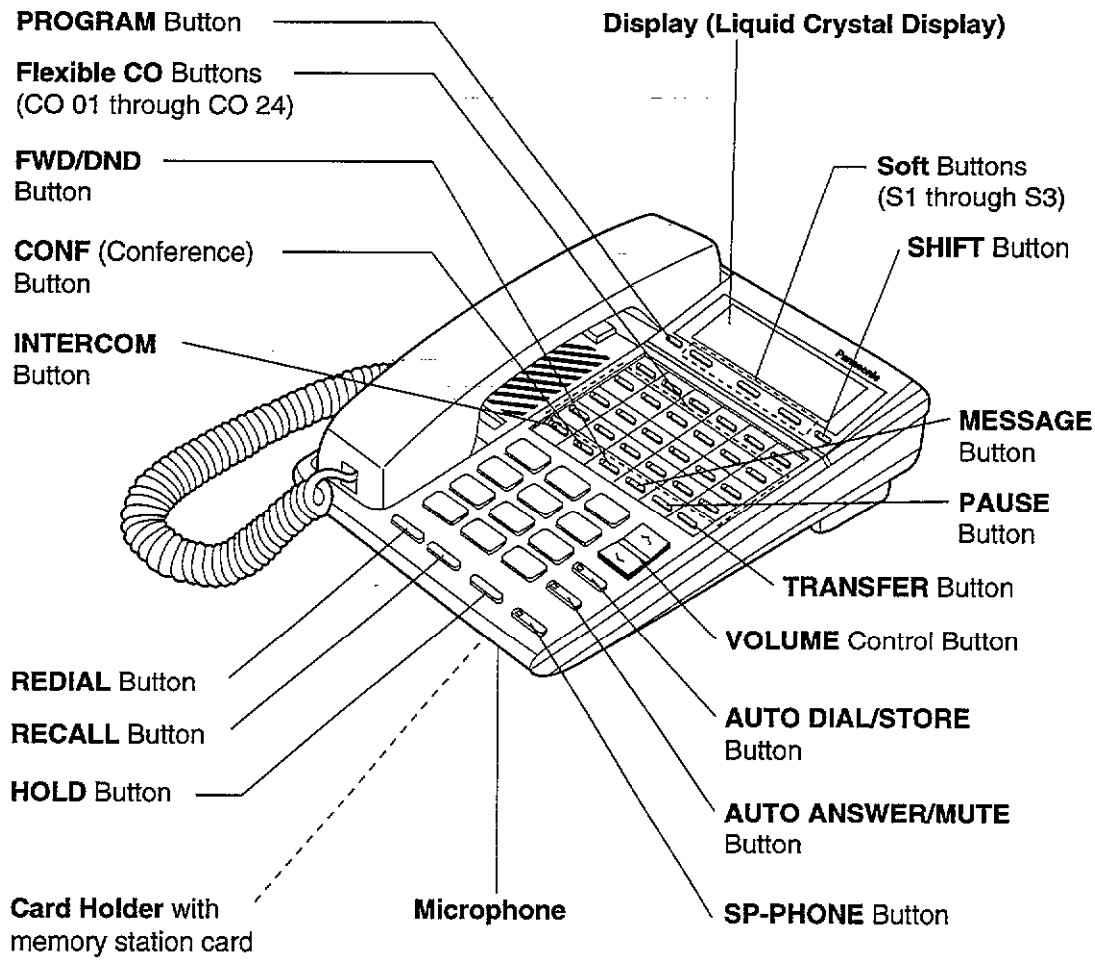
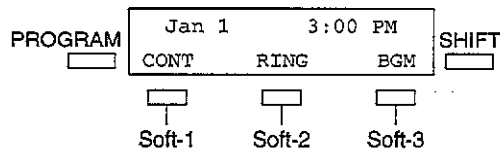


Fig. 1

The Display and Buttons

Initial Menu



CONNECTION

Connect as shown.

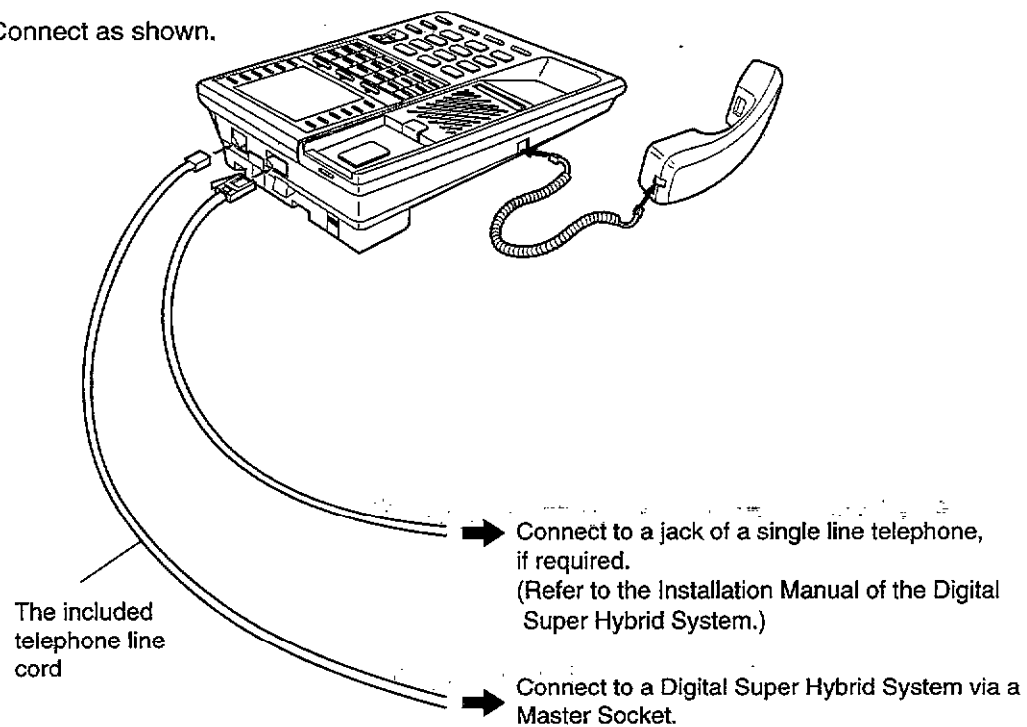


Fig. 2

FOR SERVICE TECHNICIANS

Note the following items when exchanging the LEDs (Ref. No. D200-D301) of Dial P.C. Board.

1. Do not use LED again which is removed from P.C. Board.
2. Use soldering iron (less than 15 W) for exchanging LED.
3. Do not heat LED more than 2 seconds.
4. Do not move LED after solder.

DISASSEMBLY INSTRUCTIONS

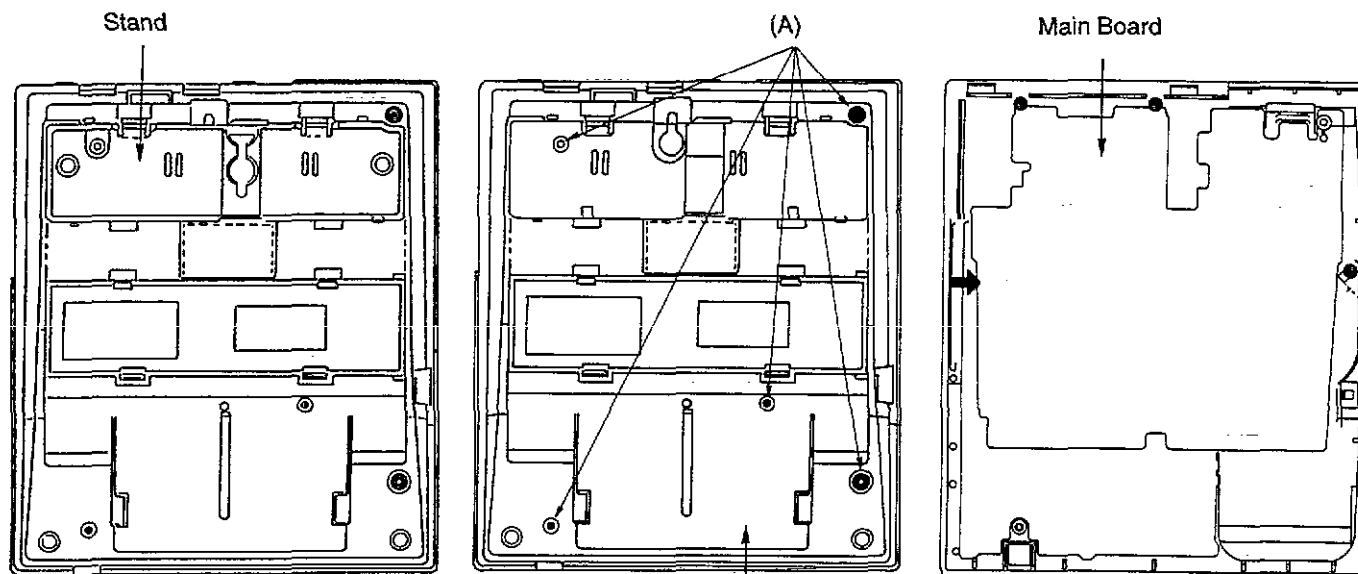
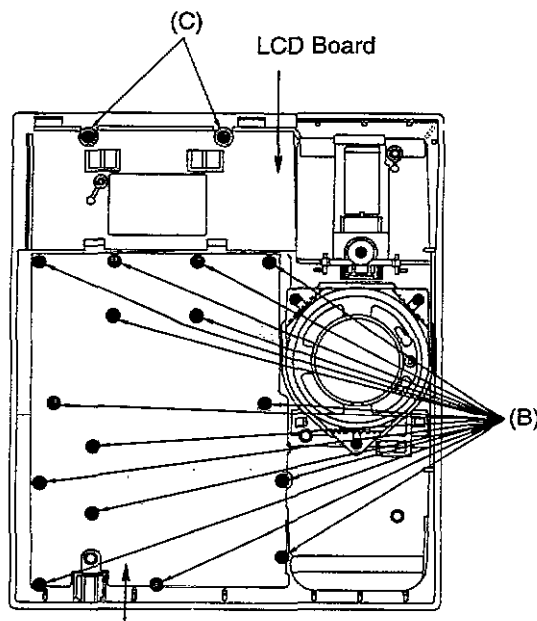


Fig. 3

Lower Cabinet
Fig. 4

Fig. 5

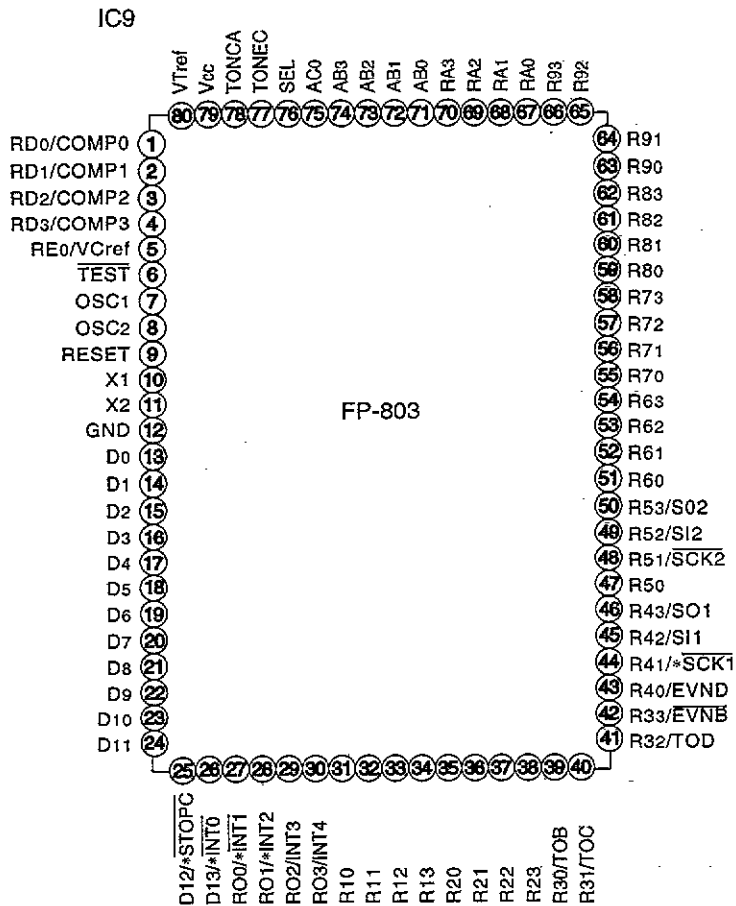
Operation Board
Fig. 6

Ref. No.	Procedure	Shown in Fig. —.	To remove —.	Remove —.
1	1	4	Stand	
2	1,2	5	Lower Cabinet	Screw (3×16) (A)×5
3	1~5	6	Main Board	Remove the Main Board.
4	1~4	7	Operation Board	Screw (2.6×10) (B)×15
5				Remove the Operation Board.
6	1~3, 6	7	LCD Board	Screw (2.6×10) (C)×2

Note 1:

When removing the Main Board, remove from direction of the arrow.

IC DATA

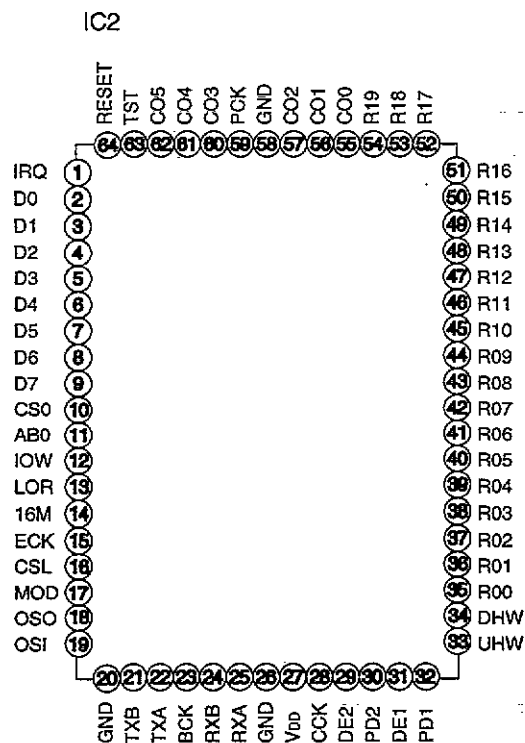


IC9: PQVI4638A10F
 Program Rom: 8K Byte (4 bit)
 Internal RAM: 4K bit
 Clock Frequency: 4 MHz
 Power Supply Voltage: 2.7~6V

Pin No.	Pin No.	Function	High	Low
1	RD ₀ /COMP0	DTMF Data Input	Normal	Active
2	RD ₁ /COMP2	Hook Data Input	Off-Hook	On-Hook
3	RD ₂ /COMP3	Model Data Input	—	7230
4	RD ₃ /COMP4	Not used	—	—
5	RE ₀ /VCref	Not used	—	—
6	*TEST	Not used (Connect to Vcc)	—	—
7	OSC1	System Clock	—	—
8	OSC2	System Clock	—	—
9	RESET	System Reset Input	Active	Normal
10	X1	Not used	—	—
11	X2	Not used	—	—
12	GND	Ground	—	—
13	D0	Data Bus	—	—
14	D1	Data Bus	—	—
15	D2	Data Bus	—	—
16	D3	Data Bus	—	—
17	D4	LCD Chip Select Output	Normal	Active
18	D5	LCD Reset Output	Normal	Active
19	D6	LCD Register Select Output	Inst Reg	Data Reg
20	D7	Not used	—	—
21	D8	Data Bus	—	—
22	D9	Data Bus	—	—
23	D10	LCD Contrast Control Output	Normal	Active
24	D11	LCD Contrast Control Output	Normal	Active
25	D12/*STOPC	Not used	—	—
26	D13/*INT0	G/A Interrupt Input	Normal	Active
27	R00/*INT1	Data Bus	—	—

Pin No.	Pin No.	Function	High	Low
28	R01/INT1	Data Bus	—	—
29	R02/INT2	Signal to Select Read and Write	Read	Write
30	R03/INT3	LCD Chip Enable Output	Read	Write
31	R10	I/O (G/A) Read Output	Normal	Active
32	R11	I/O (G/A) Write Output	Normal	Active
33	R12	I/O (G/A) Address Output	—	—
34	R13	I/O (G/A) Chip Select Output	Normal	Active
35	R20	I/O (G/A) Data Bus	—	—
36	R21	I/O (G/A) Data Bus	—	—
37	R22	I/O (G/A) Data Bus	—	—
38	R23	I/O (G/A) Data Bus	—	—
39	R30/TOB	Key Scan Column Input	Normal	Active
40	R31/TOC	Key Scan Column Input	Normal	Active
41	R32/TOD	Key Scan Column Input	Normal	Active
42	R33/*EVNB	Key Scan Column Input	Normal	Active
43	R40/EVND	Key Scan Column Input	Normal	Active
44	R41/*SCK1	LED Clock Output	—	—
45	R42/SI1	Key Scan Column Input	Normal	Active
46	R43/SO1	Key Scan Column Input	Normal	Active
47	R50	Key Scan Row Input	Normal	Active
48	R51/*SCK2	Key Scan Row Input	Normal	Active
49	R52/SI2	Key Scan Row Input	Normal	Active
50	R53/SO2	Key Scan Row Input	Normal	Active
51	R60	Key Scan Row Input	Normal	Active
52	R61	Key Scan Row Input	Normal	Active
53	R62	Key Scan Row Input	Normal	Active
54	R63	Key Scan Row Input	Normal	Active
55	R70	CODEC Mu/A Select Output	Mu-law	A-law
56	R71	Not used	—	—
57	R72	Speaker Tone Switch 1	Active	Normal
58	R73	DTMF Tone Control	ON	OFF
59	R80	Key Tone Control Output	ON	OFF
60	R81	Speaker Tone Switch 2	ON	OFF
61	R82	Handset Mute Output	Mute	Normal
62	R83	Handset Receive Volume 1	ON	OFF
63	R90	Handset Receive Volume 2	ON	OFF
64	R91	Handset Power Control	OFF	ON
65	R92	Not used	—	—
66	R93	Speaker Receive Mute	Mute	Normal
67	RA0	Transmit Level	ON	OFF
68	RA1	MIC Mute Output	Mute	Normal
69	RA2	Speakerphone Volume 1	OFF	ON
70	RA3	Ringer Volume 1	ON	OFF
71	RB0	Speakerphone Volume 3	OFF	ON
72	RB1	Speaker Volume	ON	OFF
73	RB2	Ringer Volume 2	ON	OFF
74	RB3	Speakerphone Volume 2	OFF	ON
75	RC0	Speakerphone IC Chip Select	Disable	Enable
76	SEL	Not used (Connect to Vcc)	—	—
77	TONEC	DTMF Signal Column Output	—	—
78	TONER	DTMF Signal Row Output	—	—
79	Vcc	Power Supply	—	—
80	Vtref	Not used (Connect to Vcc/2)	—	—

GATE ARRAY: IC2



IC2: PQVIPD656021
 Clock Frequency: 16.384 MHz
 Power Supply Voltage: 5 V±10%

Pin No.	Pin No.	Function	High	Low
1	IRQ	Interrupt Output	Normal	Active
2-9	D0-D7	Data Bus	—	—
10	CS0	Chip Select Input	Normal	Active
11	ABO	Address Bus	—	—
12	IOW	I/O Write	Normal	Active
13	IOR	I/O Read	Normal	Active
14	16M	Not used (Connect to Ground)	—	—
15	ECK	LED Clock Input	—	—
16	CSL	Not used	—	—
17	MOD	Not used	—	—
18	OSO	System Clock	—	—
19	OSI	System Clock	—	—
20	GND	Ground	—	—
21	TXB	Transmit Analog Output	—	—
22	TXA	Transmit Analog Output	—	—
23	BCK	(512 kHz) Clock Output	—	—
24	RXB	Receive Analog Input	—	—
25	RXA	Receive Analog Input	—	—
26	GND	Ground	—	—
27	VDD	Power Supply	—	—
28	CCK	Transmit/Receive Data Clock Output	—	—

Pin No.	Pin No.	Function	High	Low
29	DE2	Transmit/Receive Data Enable Output	—	—
30	PD2	CODEC Power Down Output	Normal	Active
31	DE1	Transmit/Receive Data Enable Output	—	—
32	PD1	CODEC Power Down Output	Normal	Active
33	DHW	Receive Digital Data Output	—	—
34	UHW	Transmit Digital Data Input	—	—
35~54	R00~R19	LED Row Control Output	Normal	Active
55~57	C00~C02	LED Column Control Output	Normal	Active
58	GND	Ground	—	—
59	PCK	Not used	—	—
60~62	C03~C05	LED Column Control Output	Normal	Active
63	TEST	Not used (Connect to Ground)	—	—
64	RESET	System Reset Input	Normal	Active

BLOCK DIAGRAM

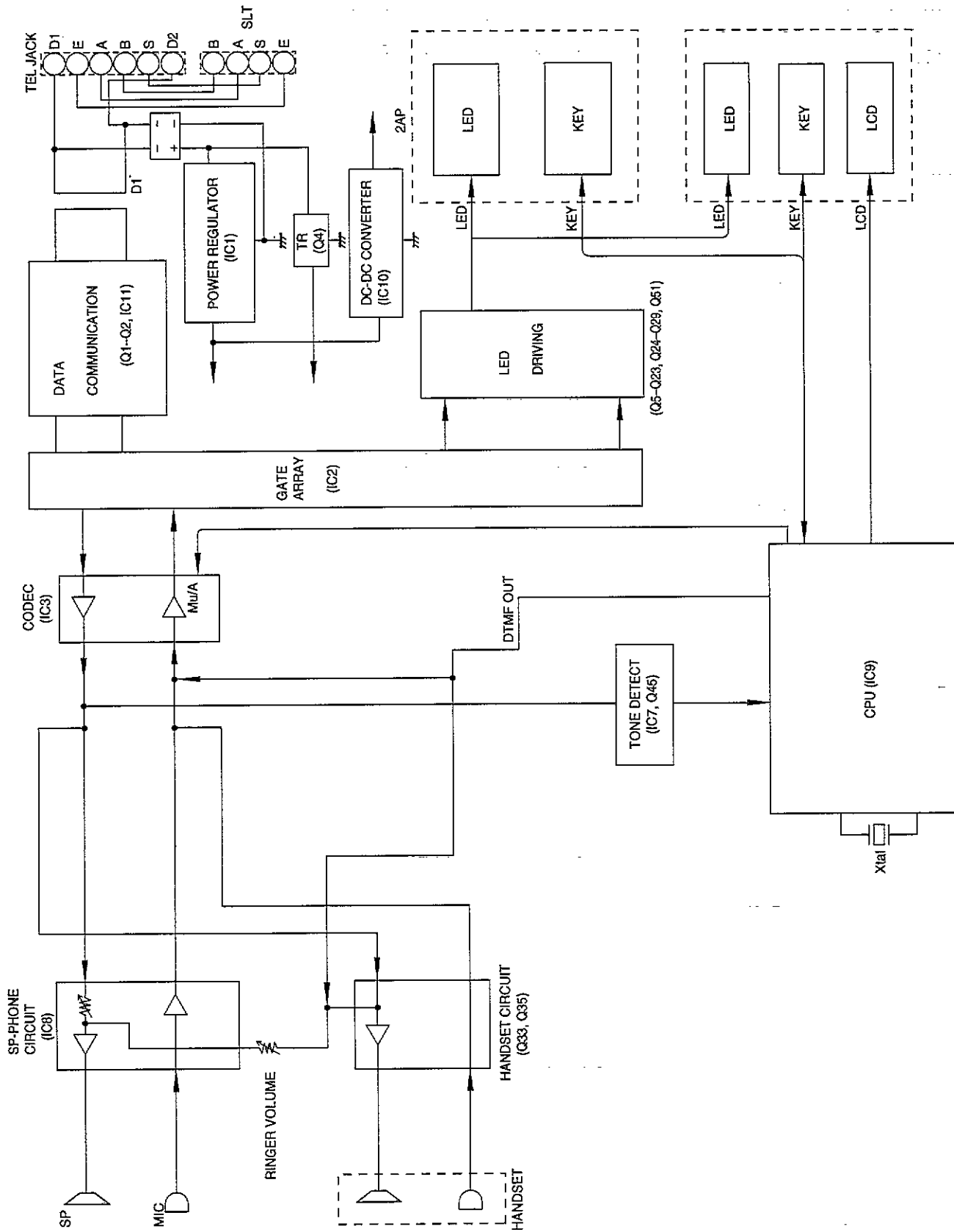


Fig. 7

CIRCUIT OPERATIONS

■ Key INPUT CONTROL CIRCUIT

Sequential input information (negative logic) from the EMSS proprietary telephone is executed by dynamic scanning. The ports R30 to R33, R40, R42 and R43 of IC9 are brought to low status consecutively.

If a key is pressed, the input of key-in information is executed by ports R50 to R53, R60 to R63.

Circuit Diagram

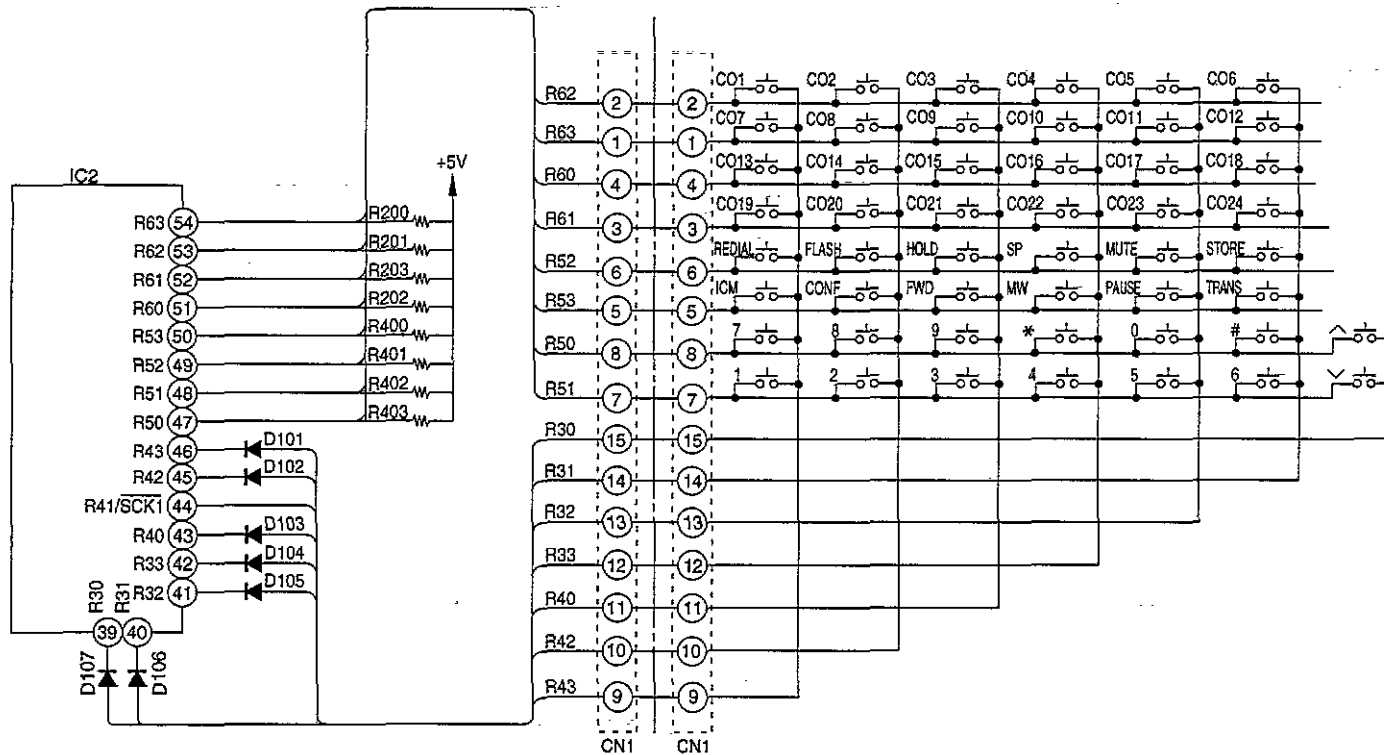


Fig. 8

Key Input Control Timing Chart

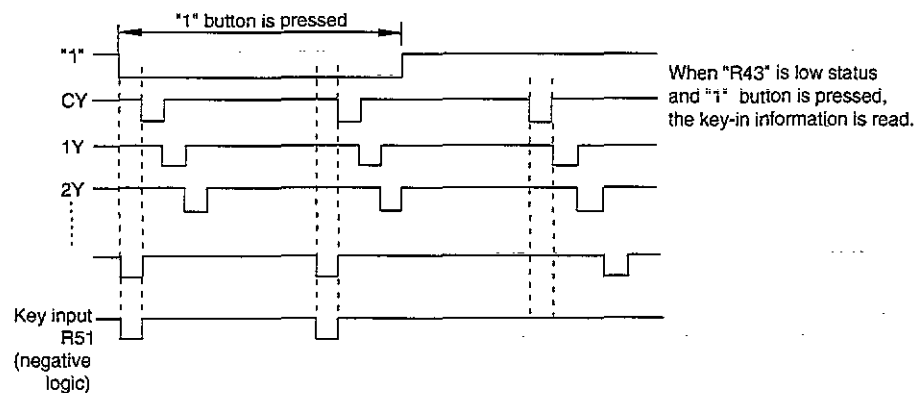


Fig. 9

■ LCD CONTROL CIRCUIT

Circuit Operation:

The LCD data is outputted from pins 13 to 16 of IC9.

LCD contrast adjustment is performed by the circuit composed of Q70, Q71, R184, R186, and R188.

The contrast is determined only by the voltage level between V5 of IC301 and +5 V, and higher potential makes the contrast high.

Circuit Diagram

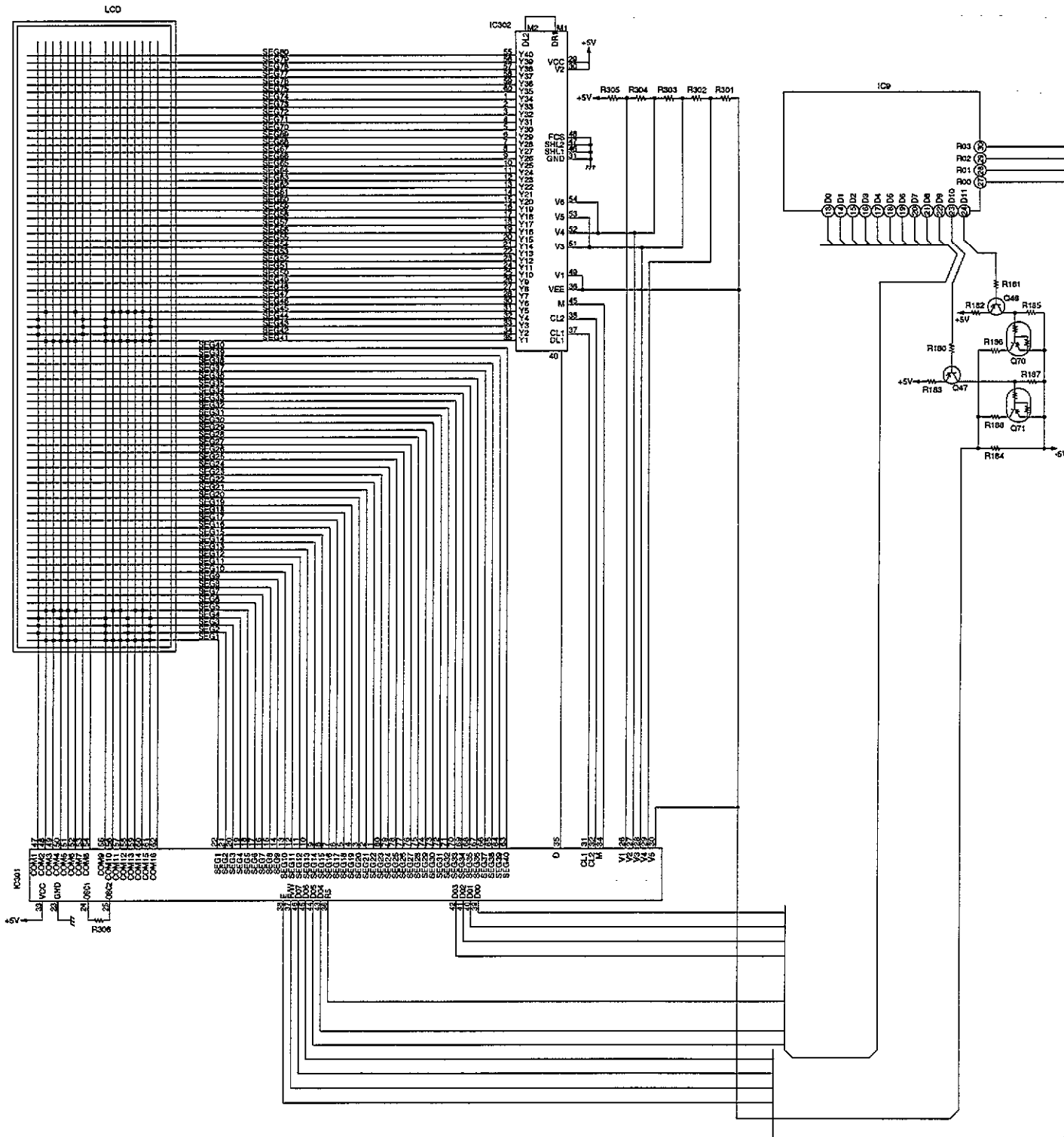


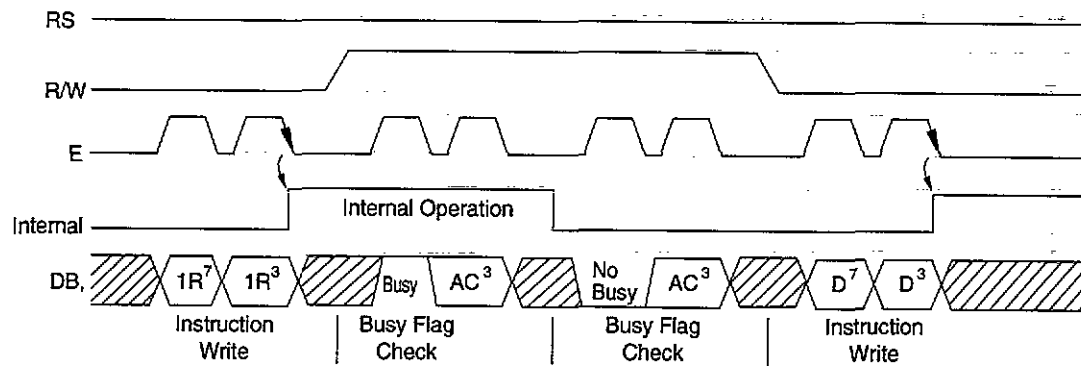
Fig. 10

LCD Contrast Control

CONTRAST	IC9 Pin 23	IC9 Pin 24
HIGH	H	L
MIDDLE	L	H
LOW	H	H

Fig. 11

4-bit Data Transfer Timing Sequence



(Note) IR7, IR3 : Instruction 7th bit, 3rd bit
 AC3 : Address Counter 3rd bit

Fig. 12

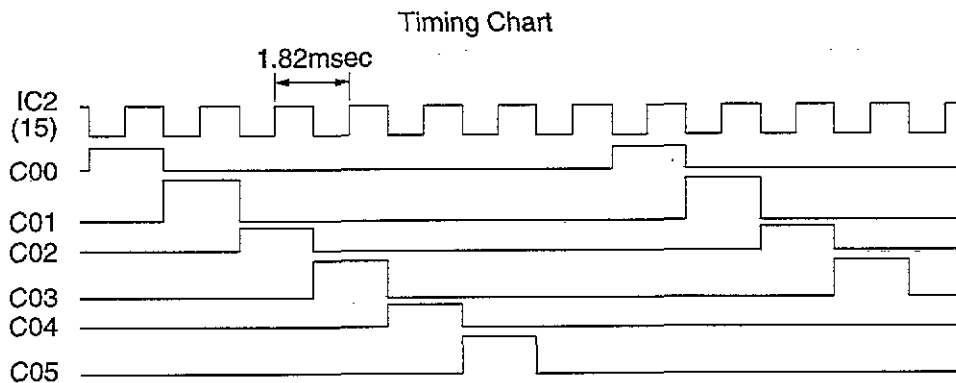
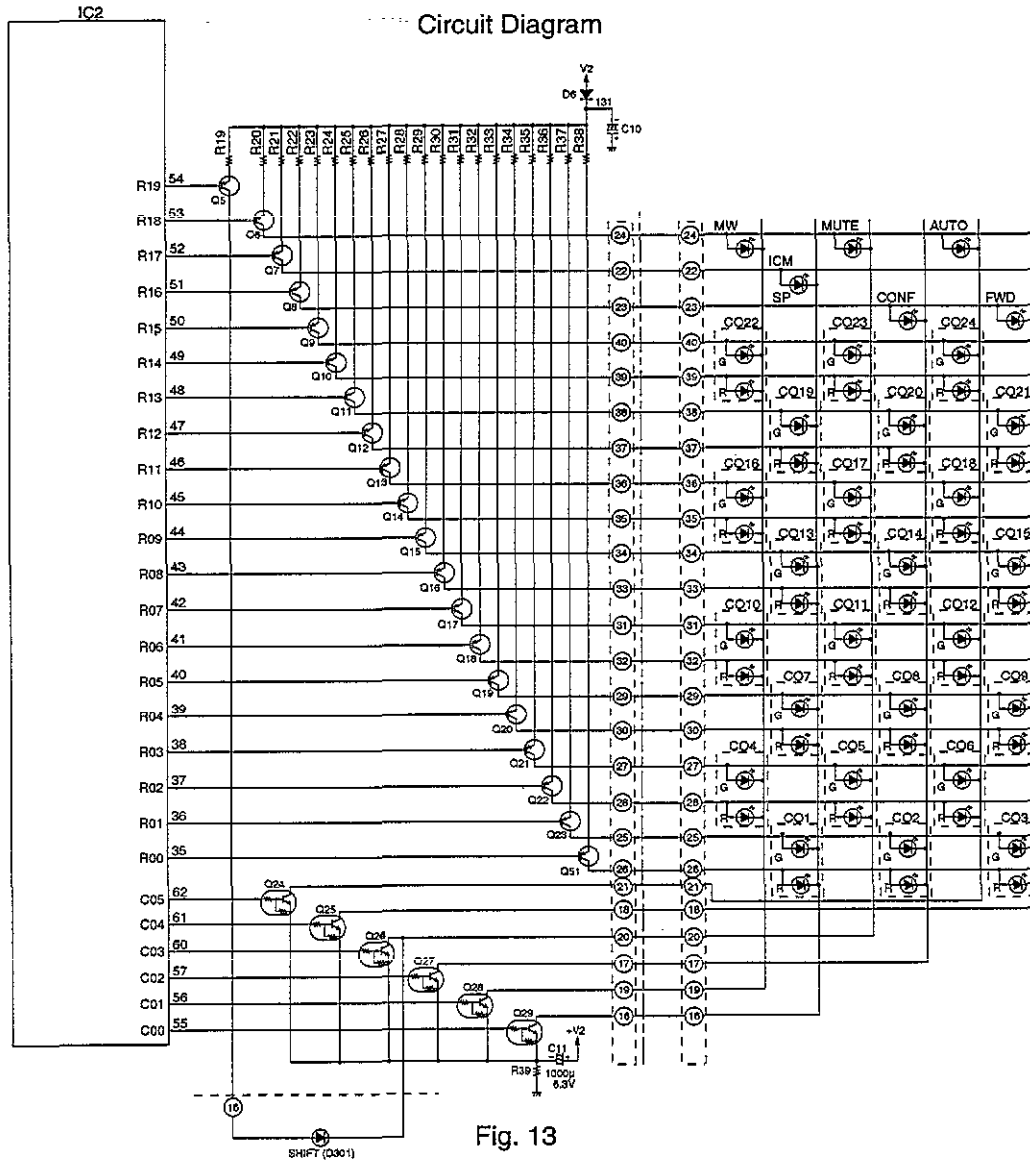
■ LED CIRCUIT

Circuit Operation:

The LED executes dynamic lighting for the status indicators, and control is executed by the output ports C00 to C05 (column) and R00 to R19 (row) of IC2.

A fixed pulse (T=1.82 msec) is output continuously from the/SCK1 terminal of IC9, and this pulse is counted, and the output of IC2 is shifted sequentially from C00 to C05.

R00 to R18 of IC2 also output pulses, and the lighting of the LED is controlled by the timing of the output ports C00 to C05.



■ DATA COMMUNICATION CIRCUIT

Function:

The data communication circuit serves the following functions:

Information exchanger between the EMSS and EMSS proprietary telephone, key input information as well as data for the LED control, LCD control, etc, this information is continuously exchanged at all times.

Circuit Operation:

When the EMSS proprietary telephone receives an IRQ signal from the EMSS and after sending the key input information to the EMSS and receiving data for LED control, etc. The EMSS proprietary telephone will return to the EMSS an acknowledge signal.

1) Reception

The data from the EMSS is received via the D1 and D2 line along the path shown below.

D1, D2 Line → T1 → IC11 Pin 5, 10 → IC2 Pin 24, 25 → IC2 Pin 31, 33 → IC3 Pin 14, 15

2) Transmission

The data to the EMSS proprietary telephone is transmitted along the following path.

IC3 Pin 10, 11 → IC2 Pin 31, 34 → IC2 Pin 21, 22 → Q1, Q2 → T1 → D1, D2 Line

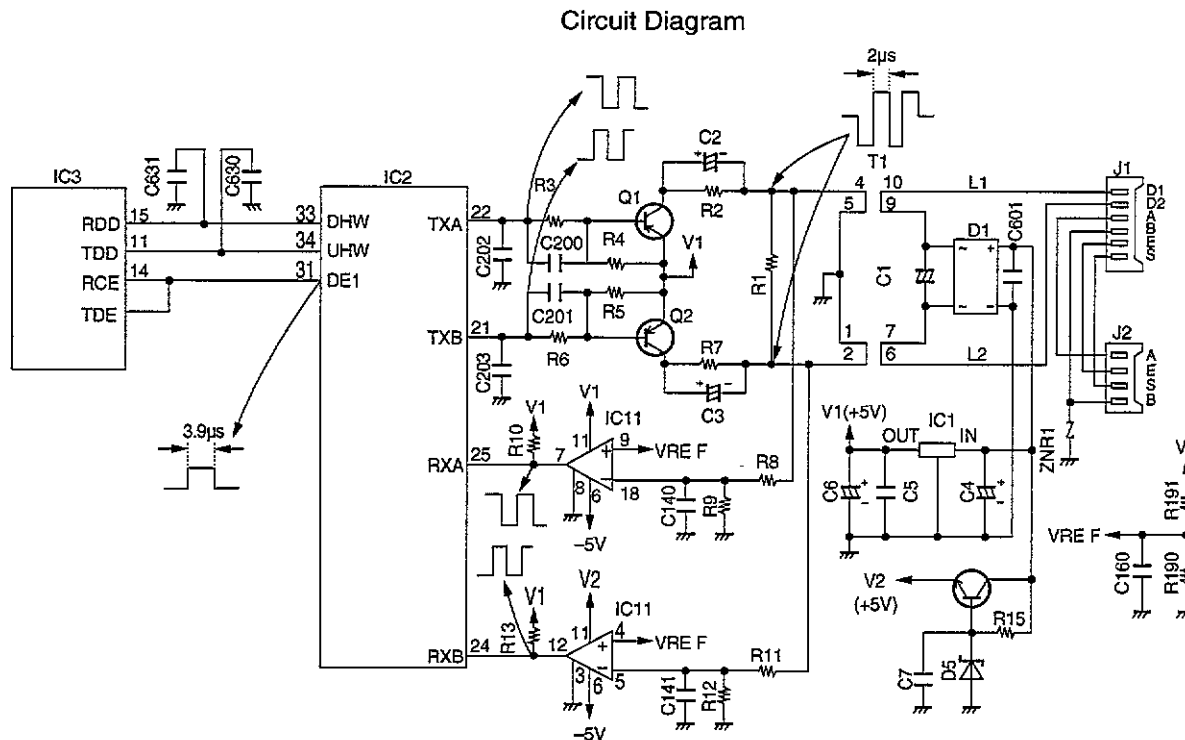


Fig. 15

■ RESET CIRCUIT

Circuit Operation:

This circuit is used for transmission of reset pulse to the CPU (IC9) at the following times, connecting the telephone line jack and circuit operation.

The timing chart is shown below.

Power ON → Q43 OFF → IC9 (Pin 9) high level → Q43 ON → IC9 (Pin 9) low level
 → Q44 → ION → Q44 OFF → IC2 (Pin 64) high level

Circuit Diagram

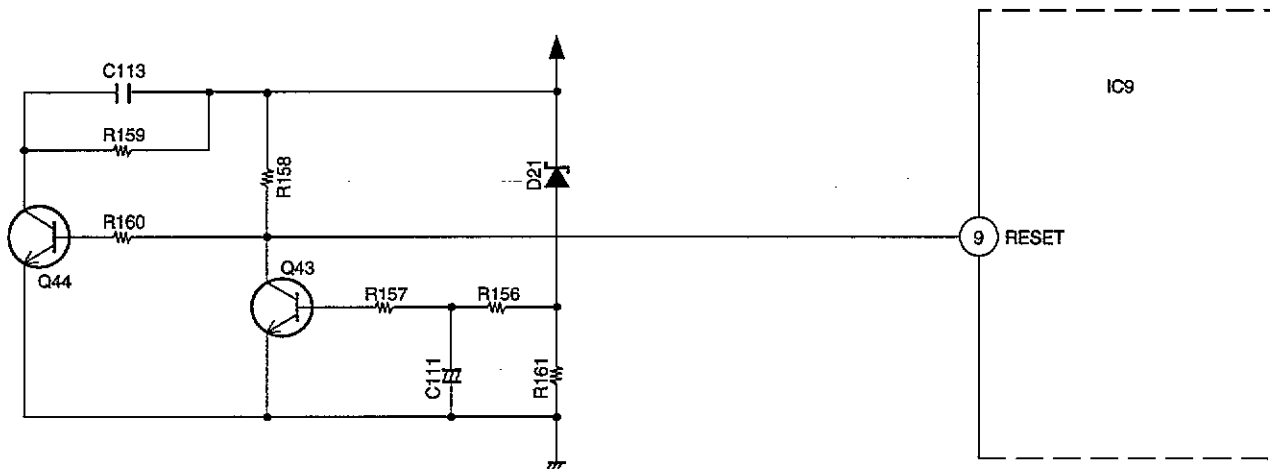


Fig. 16

Timing Chart

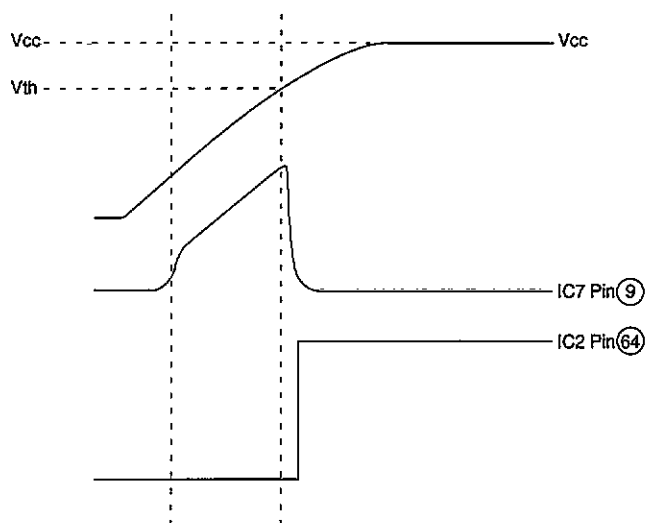


Fig. 17

■ TONE GENERATION CIRCUIT

Function:

All system tones including COL, extension, busy, DTMF signal and key-in tones are sent from the Pins ⑦⑦ and ⑦⑧ of IC9, and controls the path by the Analog Switch (IC6).

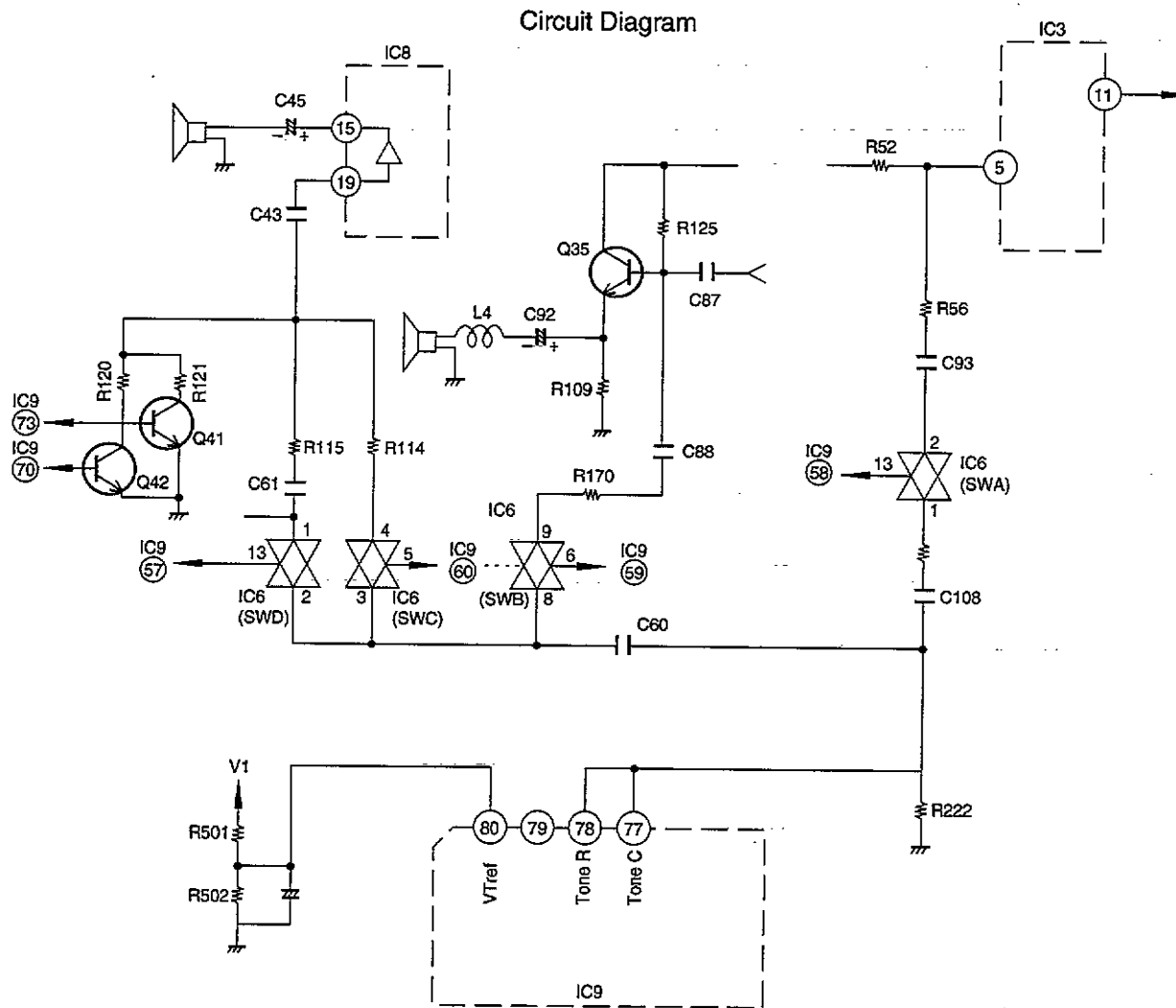


Fig. 18

1) Calling Tones from COL and EXT.

For a calling tone from a CO line or extension, the single row tone signal is outputted from Pin 78 of IC9 and the tone volume is controlled by transistors, Q41 and Q42.

IC Pin 78 → IC6 Pin 2~1 → C43 → IC8 Pin 19 → IC8 Pin 15 → C45 → SP

Ringer Volume Control

Level Transistor	OFF	LOW	MIDDLE	HIGH
Q41	ON	ON	OFF	OFF
Q42	ON	OFF	ON	OFF

Fig. 19

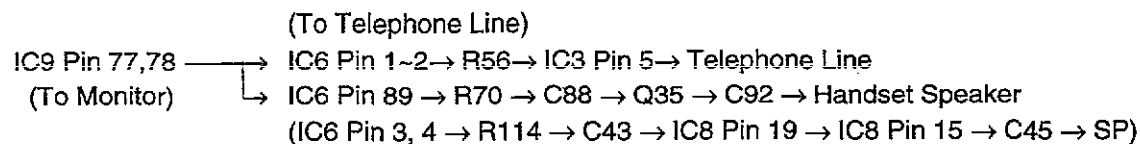
2) Busy Station Calling Tone

852 Hz and 697 Hz signals are outputted from Pin 78 of IC9 alternately at intervals of 60 ms. The signal flow is shown below.

IC9 Pin 78 → IC6 Pin 3~4 → R114 → C43 → IC8 Pin 19 → IC8 Pin 15 → C45 → SP

3) DTMF Signal

DTMF tone is generated by IC9 and the signal flow is shown below.



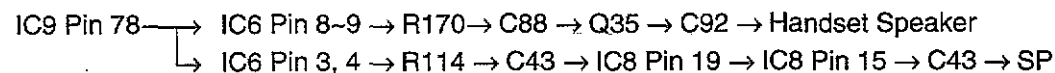
DTMF Frequency Table

		High Group (IC9 Pin 77)		
		1209 Hz	1336 Hz	1477 Hz
Low Group (IC9 Pin 78)	697 Hz	1	2	3
	770 Hz	4	5	6
	852 Hz	7	8	9
	941 Hz	*	0	#

Fig. 20

4) Key-in Tone

An 852 Hz single tone is used as the key-in tone. A tone is generated from IC9 and is heard at the speaker. The signal flow is shown below.



CONDITION	IC6 SWA	IC6 SWB	IC6 SWC	IC6 SWD
Ringling	OFF	OFF	OFF	ON
Call Waiting	OFF	OFF	ON	OFF
Tone Dial (Handset)	ON	ON	OFF	OFF
Tone Dial (Speakerphone)	ON	OFF	ON	OFF

Fig. 21

■ HANDSET CIRCUIT**1) Transmission Signal Path**

The analog input signal for the handset microphone is changed to digital signal and sent through the telephone line via the following path:

Handset MIC → C85 → R103 → C84 → Q33 → R124 → C80 → R52 → IC3 → IC2 → R3,R6 → Q1,Q2 → R2,R13 → T1 → Telephone Line

2) Reception Signal Path

The digital input signal from the telephone line is changed to analog signal by IC3 and sent to the receiver through the following path:

Telephone Line → T1 → R8,R11 → Q3,Q4 → IC2 → IC3 → R106 → C86 → C87 → Q35 → C92 → Handset Speaker

Circuit Diagram

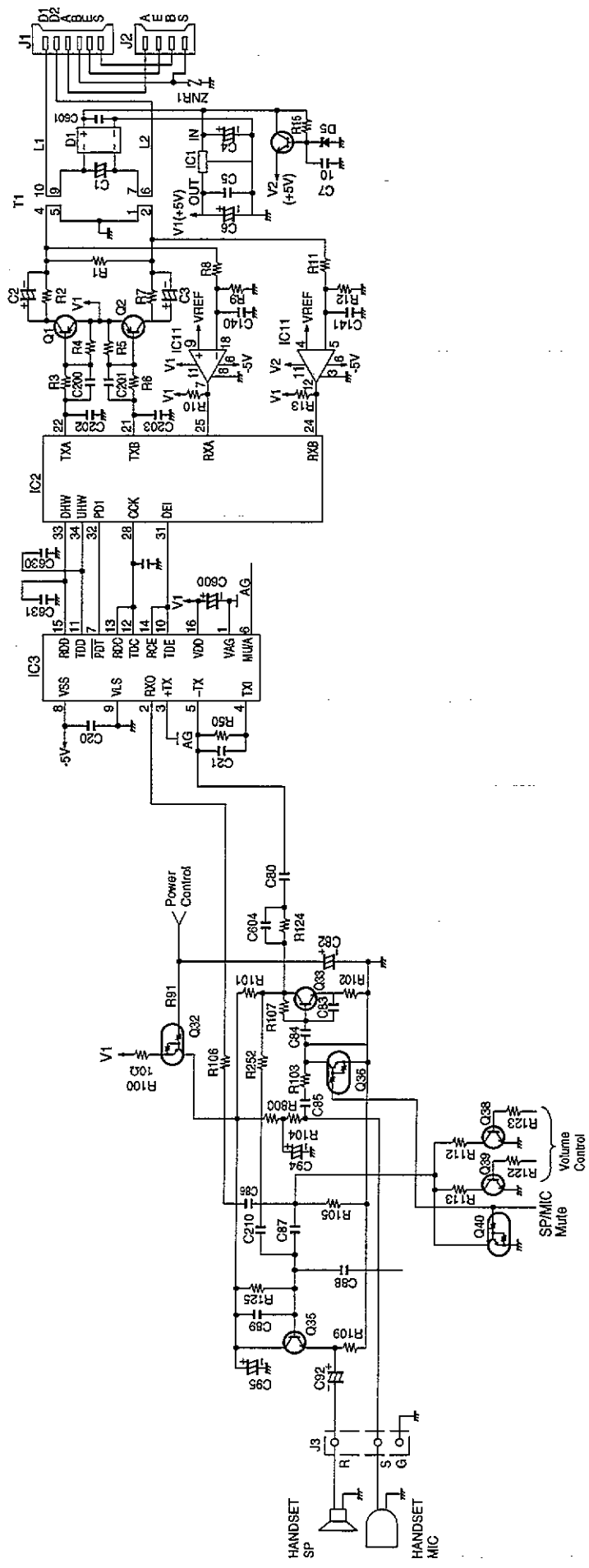


Fig. 22

■ SPEAKERPHONE CIRCUIT

Function:

This circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

Circuit Operation:

The speakerphone can only provide a one-way communication path.

In other words, it can either transmit an outgoing signal or receive an incoming signals.

This switching circuit is contained in IC8 and consists of a Voice Detector, Tx Attenuator, Rx, Attenuator, Comparator and Attenuator Control. The circuit analyzes whether the Tx (transmit) or the Rx (receive) signal is louder, and then it processes the signals such that the louder signal is given precedence.

The Voice Detector provides a DC input to the Attenuator Control corresponding to the Tx signal. The Comparator receives a Tx and Rx signal, and supplies a DC input to the Attenuator Control corresponding to the Rx signal. The Attenuator Control provides a control signal to the Tx and the Rx Attenuator to switch the appropriate signals ON and OFF. The Attenuator Control also detects the level of the volume control to automatically adjust for changing ambient conditions.

1) Control Signal Path

Control signals for transmission and reception are input to IC8 via the following path:

(Transmission Control Signal Path)

MIC → IC8 Pin 9 → IC8 Pin 10 → IC8 Pin 3 → IC8 Pin 4 → IC8 Pin 5

(Reception Control Signal Path)

D1/D2 Line → IC3 Pin 2 → R63 → IC8 Pin 7

2) Transmission/Reception Switching

The comparison result between Tx and Rx output as a DC level at IC8 Pin 23.

Tx level is high..... Pin 23=Pin 20-6mV

Rx level is high Pin 23=Pin 20-150mV

The comparator output is connected to the attenuator control inside IC8.

3) Voice Detector

The output of the mic amp (Pin 10 of IC8) is supplied to Pin 13 of IC8 as a control signal for the voice detector.

4) Attenuator Control

The attenuator control detects the setting of the volume control through Pin 24 of IC8 and automatically adjusts for changing ambient conditions.

5) Transmission Signal Path

The input signal from the microphone is sent through the circuit via the following path:

MIC → C55 → IC8 Pin 9 → IC8 Pin 10 → IC8 Pin 3 → IC8 Pin 4 → R71 → C33 → IC3 Pin 5 → C31 → IC3 Pin 11 → D1/D2 Line

6) Reception Signal Path

Signals received from the telephone line are output at the speaker via the following path:

D1/D2 Line → IC2 Pin 33 → IC3 Pin 2 → R57 → R63 → C37 → IC8 Pin 27 → IC8 Pin 26 → C42 → IC8 Pin 19 → IC8 Pin 15 → SP

7) Busy Tone Detector Circuit

The busy tone detection for the automatic redialing is executed as follow:

D1/D2 Line → IC2 Pin 33 → IC3 Pin 2 → R140 → IC7 Pin 6,7 → IC7 Pin 2,1 → D20 → Q45 → IC9 Pin 1

Circuit Diagram

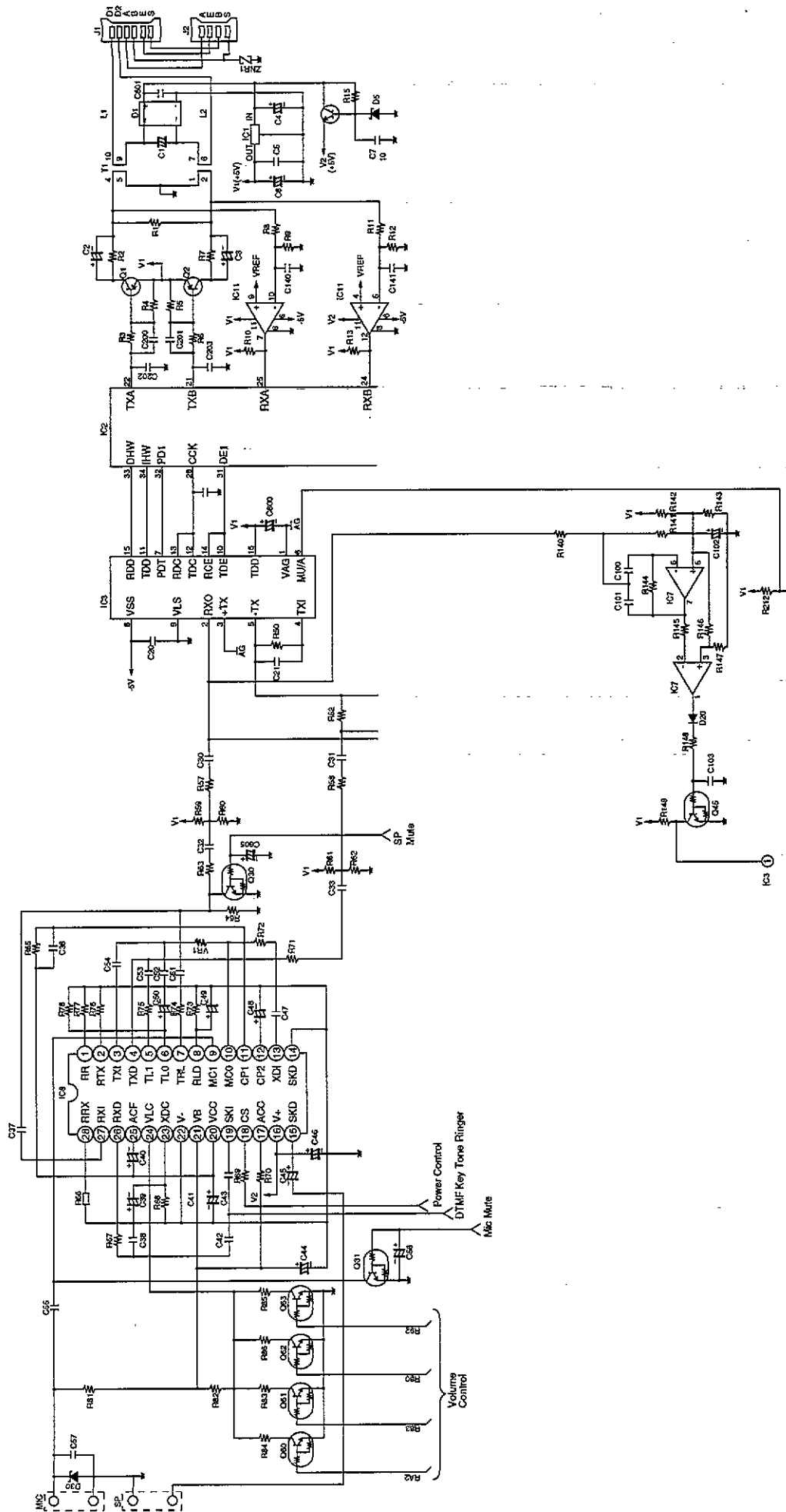
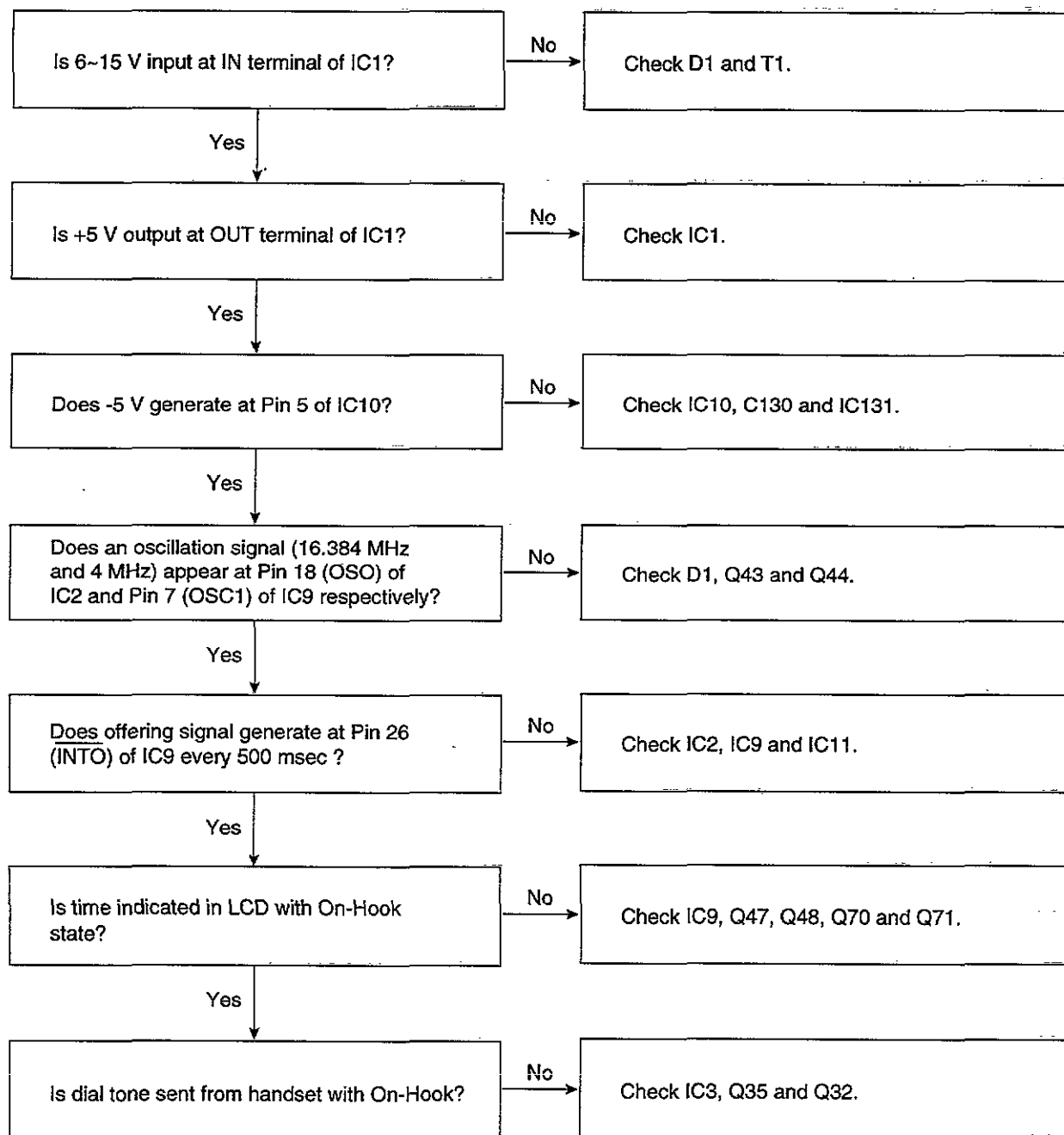


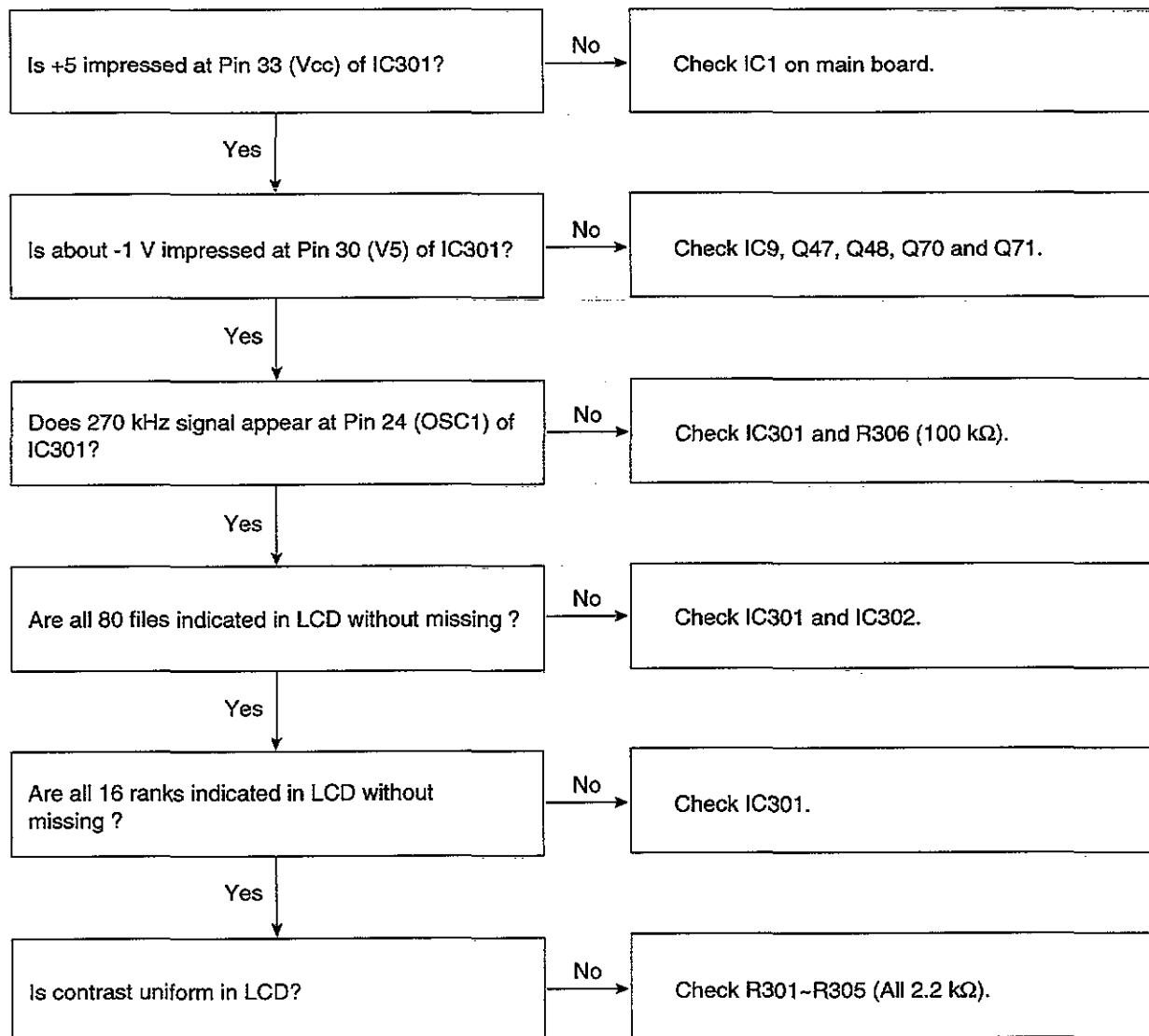
Fig. 23

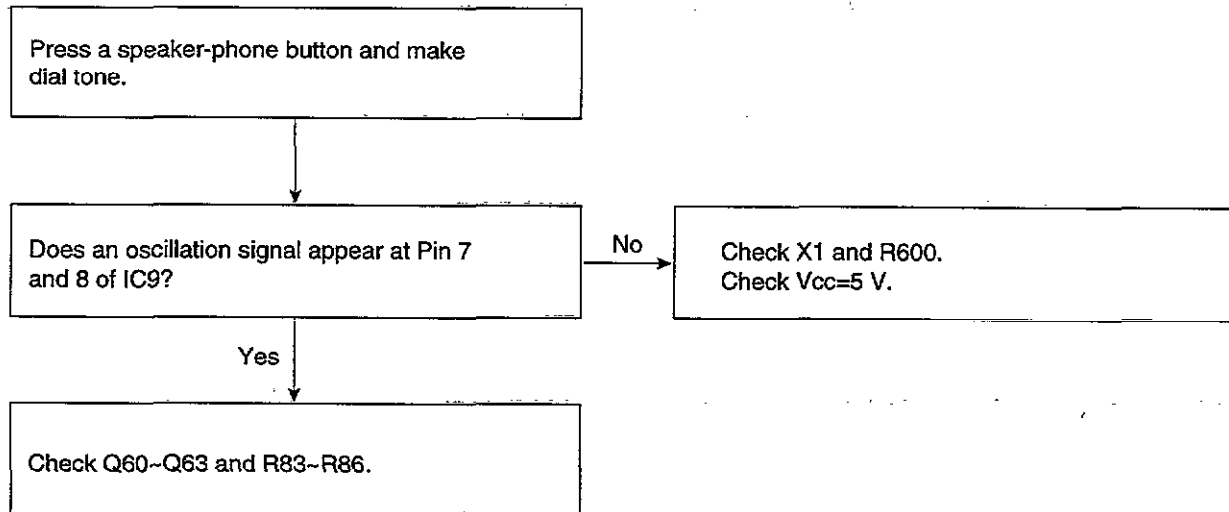
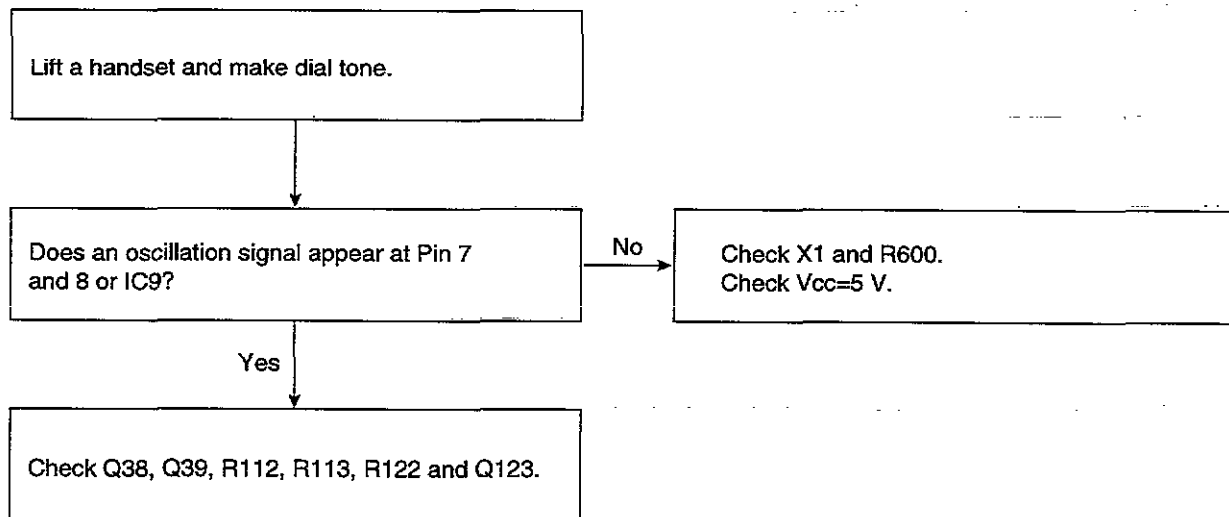
TROUBLESHOOTING GUIDE

1. No operation

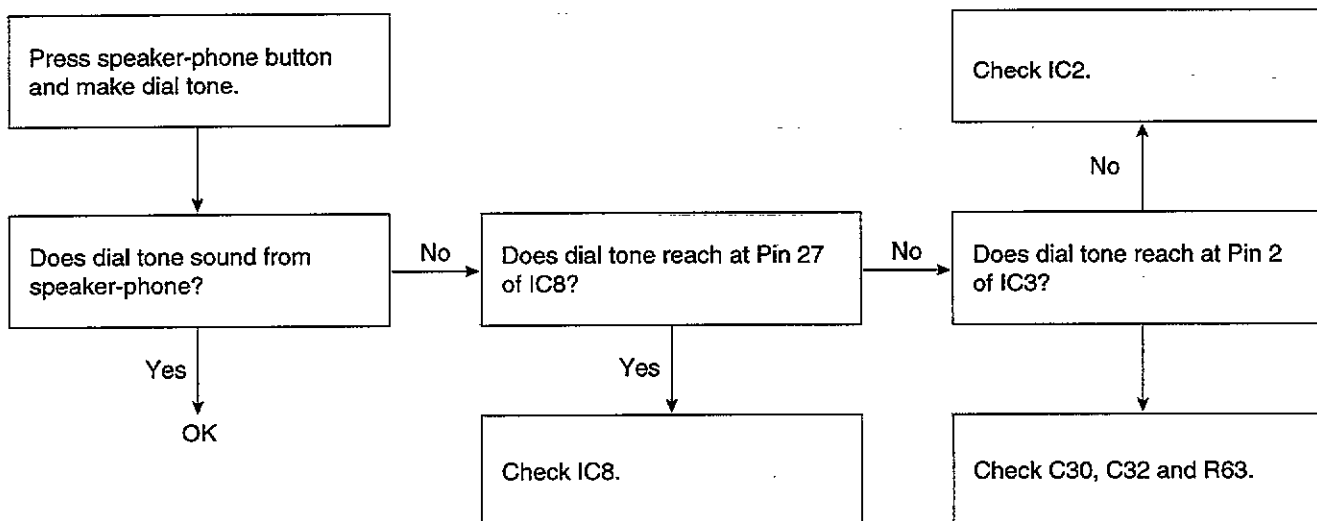


2. LCD does not operate

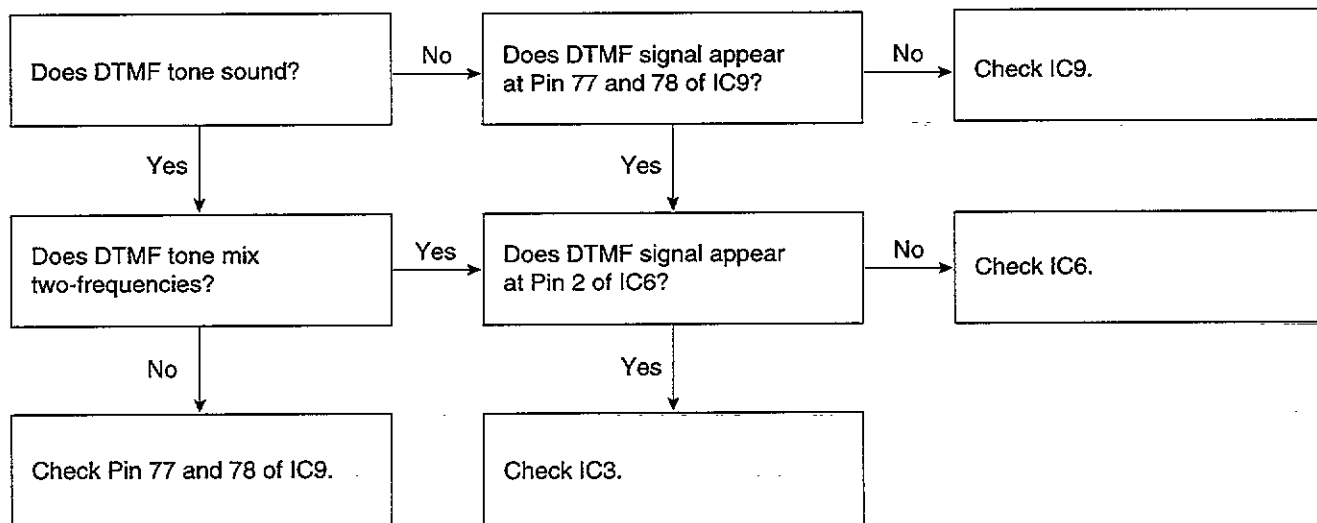


3. Electronic volume of speaker-phone does not work**4. Electronic volume of handset does not work**

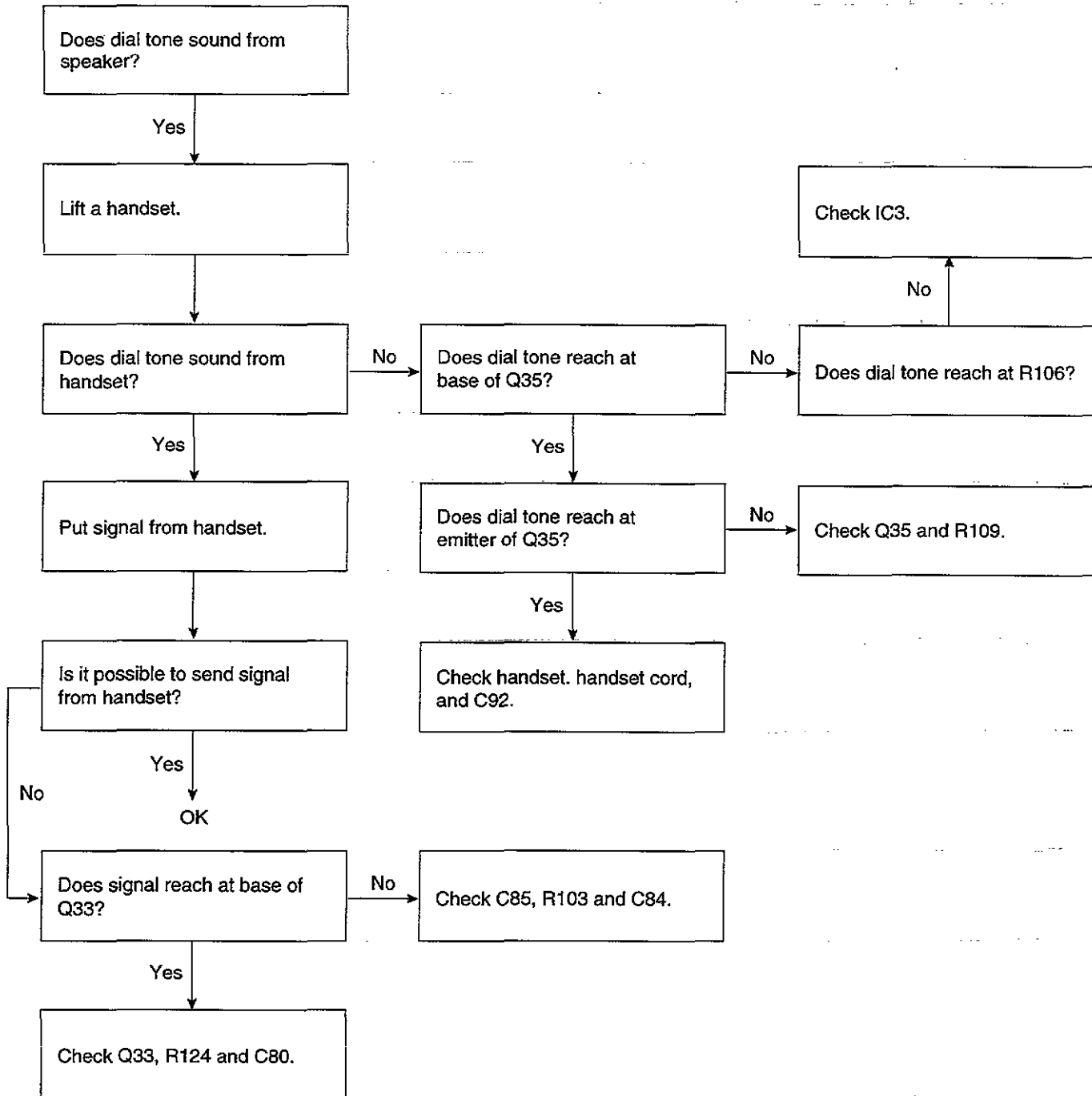
5. Trouble of speaker-phone



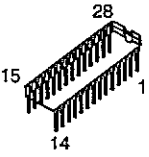
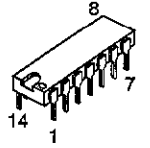
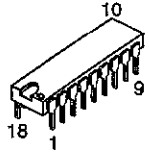

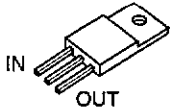
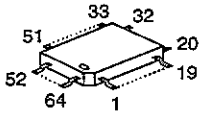
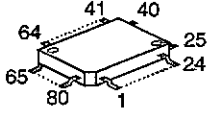
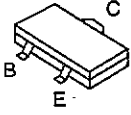
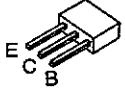
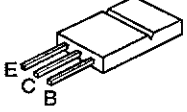
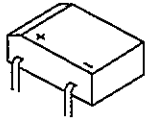
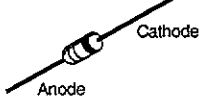
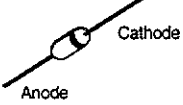
6. Trouble of tone dial



7. Trouble of Handset



TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

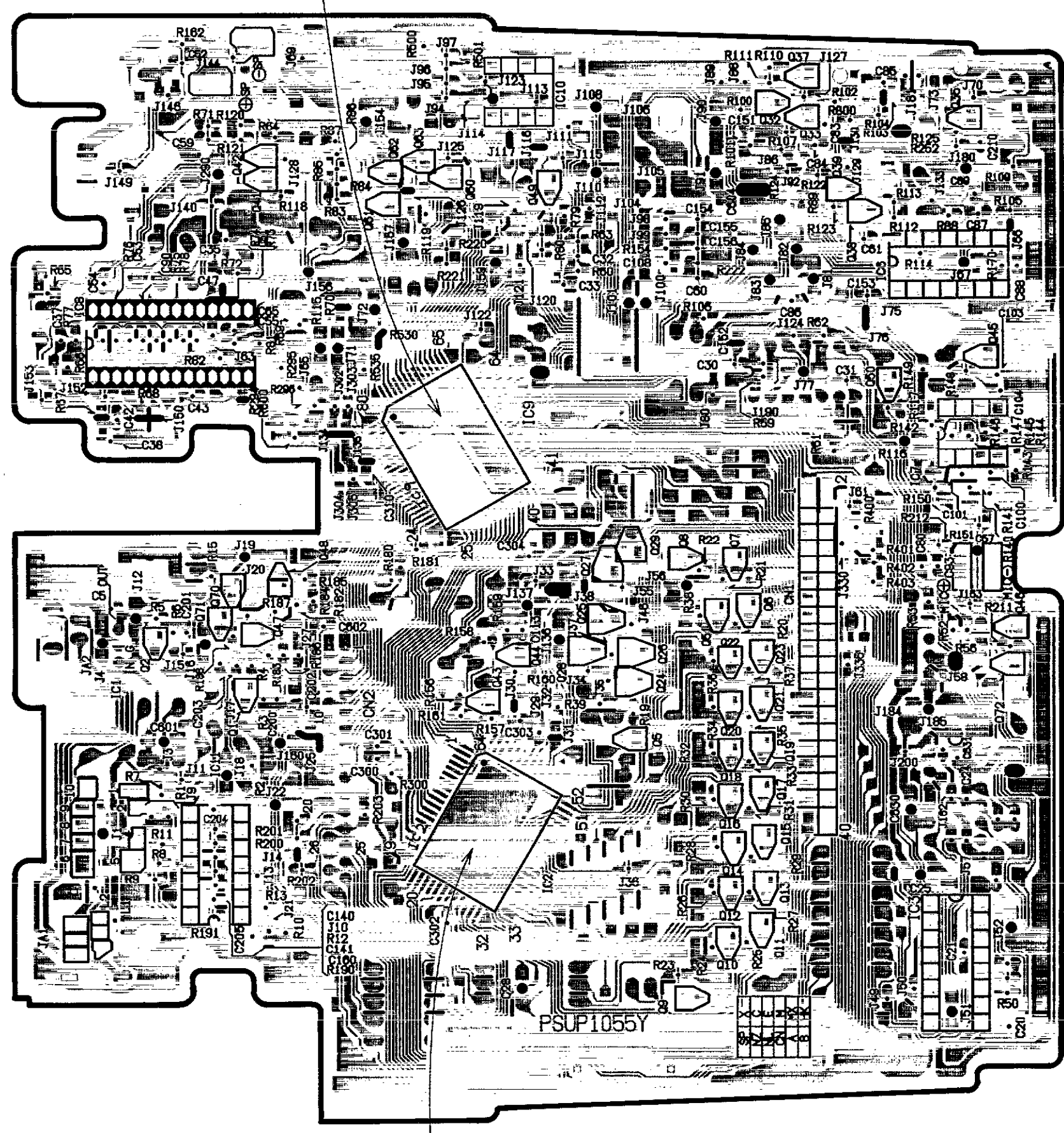
 <p>PQVISC77655S</p>	 <p>PQVITC4066BP PQVINJM319D</p>	 <p>PQVIMC45503P</p>	 <p>PQVINJU7660D PQVIUPC358C</p>	 <p>PQVIJ293005</p>
 <p>PQVIPD656021</p>	 <p>PQVI4638A10F</p>	 <p>PQVTDTA143XU PQVITD133HK 2SB1218A, 2SD1819A UN5213</p>	 <p>PQVTBB1J3P</p>	 <p>2SD2136</p>
 <p>PQVD0R5G4B42</p>	 <p>MA4039, MA4068 MA4056</p>	 <p>1SS131</p>		

PRINTED CIRCUIT BOARD (MAIN BOARD)

1 2 3 4 5 6 7 8 9 10 11 12

A B C D E F G H

(BOTTOM VIEW)



IC9

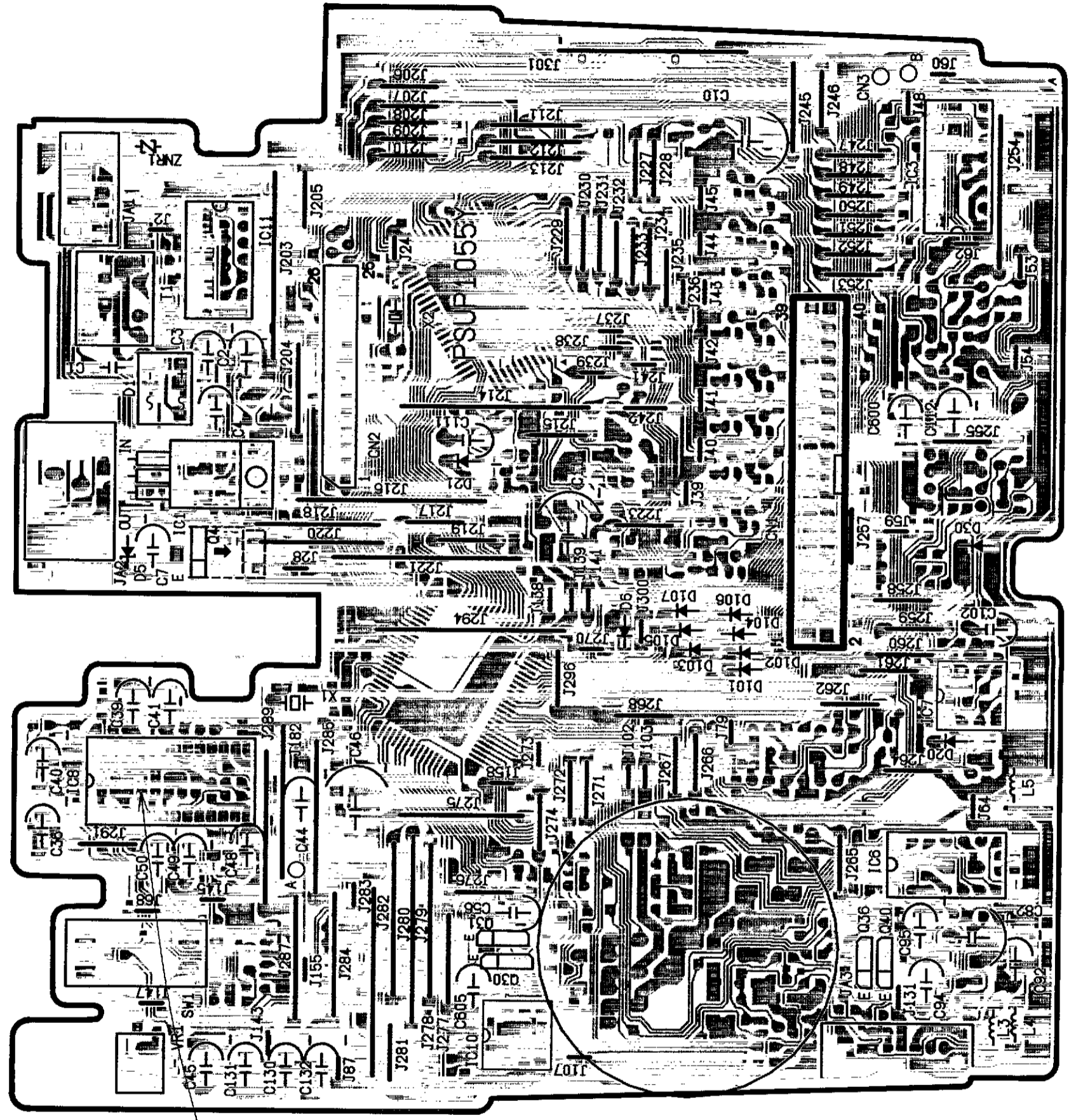
Pin No.	Voltage (V) & Waveform
1, 2	—
3	0
5, 6	5V
7	2.3V
8	2.4V
9	0
10	0.8V
11	1.3V
12	0
13-17	—
18	5V
19, 20	—
21	5V
22	—
23, 24	5V
26	0
27-32	—
33	5V
34, 35	—
36	4.9V
37-43	—
44	0
45, 46	—
48-54	5V
55-63	—
66-75	—
76	5V
77, 78	—
79	5V
80	2.5V

IC2

Pin No.	Voltage (V) & Waveform
1	0
2	—
3	4.9V
4, 5	—
10	—
11	5V
12, 13	—
15	0
18	2.8V
19	2.7V
21, 22	0
24, 25	0
28	0
31	0
32, 33	0
34	0
35-54	0
55-57	0
60-62	0

PRINTED CIRCUIT BOARD (MAIN BOARD)

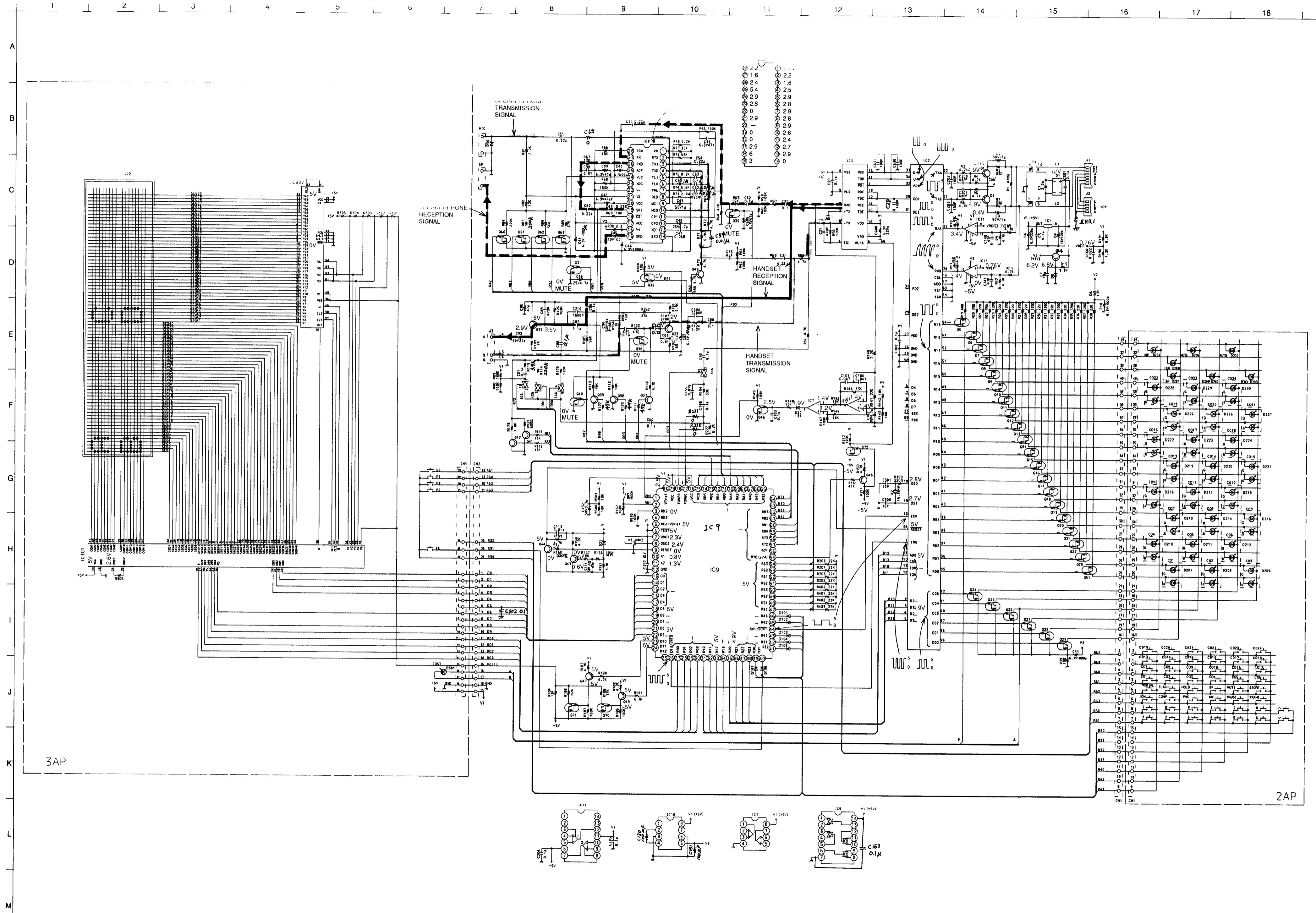
1 2 3 4 5 6 7 8 9 10 11 12



(COMPONENT VIEW)

IC8	Pin No.	Voltage (V)
	1, 2	2.2V
	3	1.6V
	4	2.5V
	5	2.9V
	6	2.8V
	7	2.9V
	8	2.8V
	9	2.9V
	10	2.8V
	11	2.4V
	12	2.7V
	13	2.9V
	14	0V
	15	3V
	16	6V
	17	2.9V
	18, 19	0V
	20	—
	21	2.9V
	22	0V
	23	2.8V
	24	2.9V
	25	5.4V
	26	2.4V
	27	1.6V
	28	2.2V

SCHEMATIC DIAGRAM

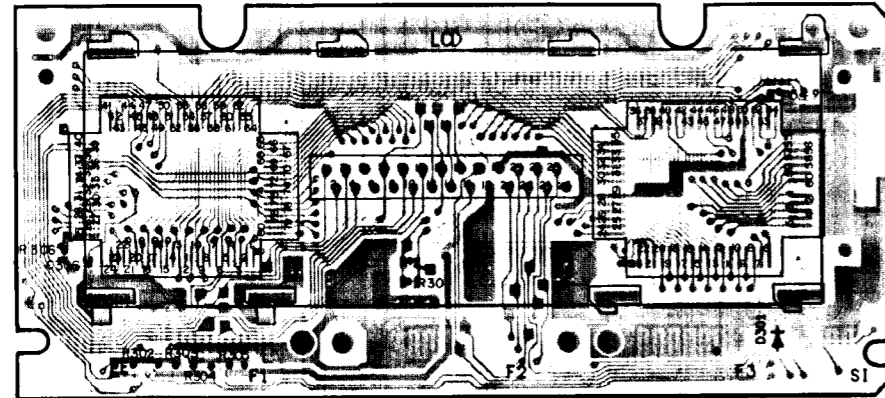


PRINTED CIRCUIT BOARD

1 2 3 4 5 6

A

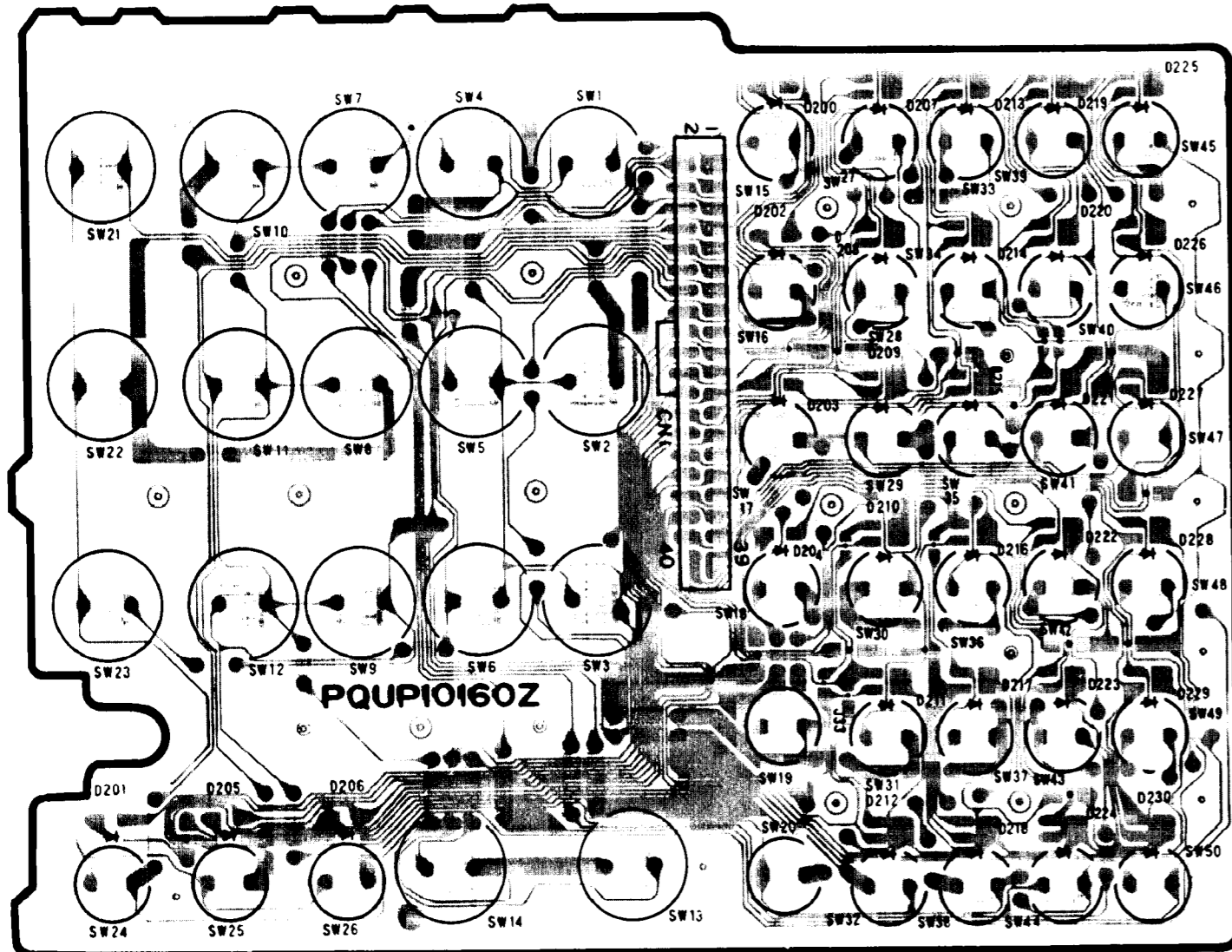
(LCD BOARD)



B

C

(OPERATION BOARD)



D

E

F

G

H

HOW TO REPLACE FLAT PACKAGE IC

■ PREPARATION

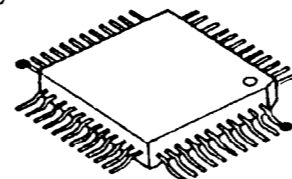
- SOLDER - - - - - Sparkle Solder 115A-1, 115B-1
OR
Almit Solder KR-19, KR-19RMA
- Soldering iron - - - - - Recommended power consumption will be between 30 W to 40 W.
Temperature of Copper Rod 662 ± 50 ·F (350 ± 10°C)

(An expert may handle 60~80 W iron, but a beginner might damage the foil by overheating.)
- Flux - - - - - HI115 Specific gravity 0.863

(Original flux will be replaced daily.)

■ PROCEDURE

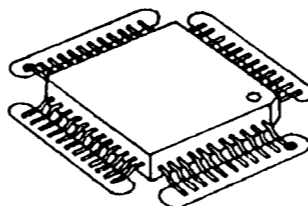
1. Temporary fix the FLAT PACKAGE IC by soldering on two marked 2 pins.



● - - - - - Temporary soldering point.

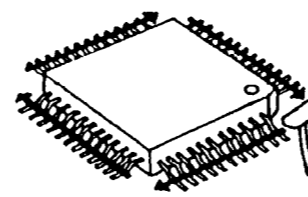
*Accurate setting of the IC to the corresponding soldering foil is vital.

2. Apply flux to the all pins of the FLAT PACKAGE IC.



○ - - - - - Flux

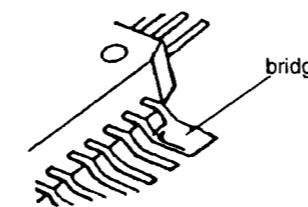
3. Solder the specified solder in the direction of the arrow, while sliding the soldering iron.



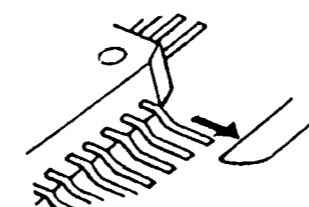
Soldering iron
Specified solder

■ MODIFICATION PROCEDURE OF BRIDGE

1. Re-solder slightly on bridged portion.
2. Remove any remaining solder along the pins using a soldering iron as shown below.



bridge



EXTENSION CORD CONNECTING METHOD

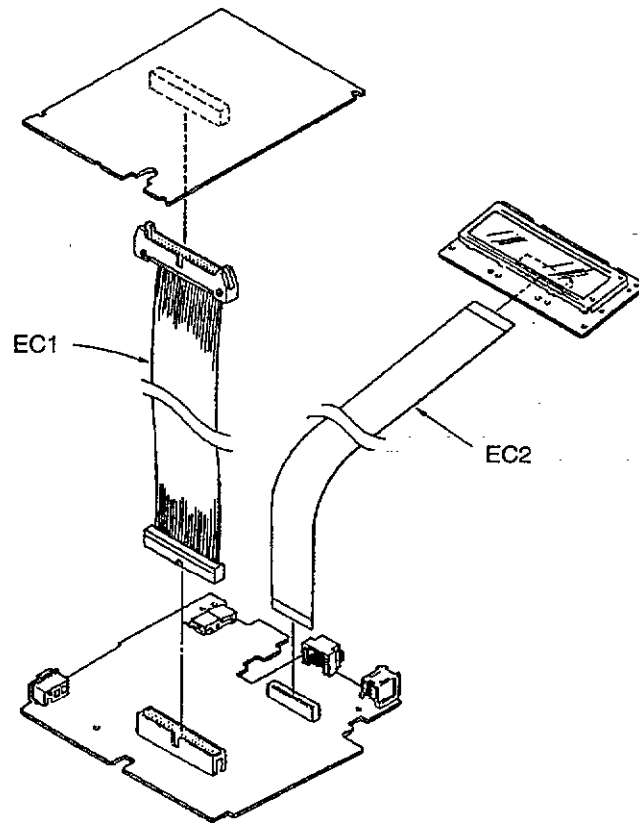


Fig. 24

ACCESSORIES AND PACKING MATERIALS

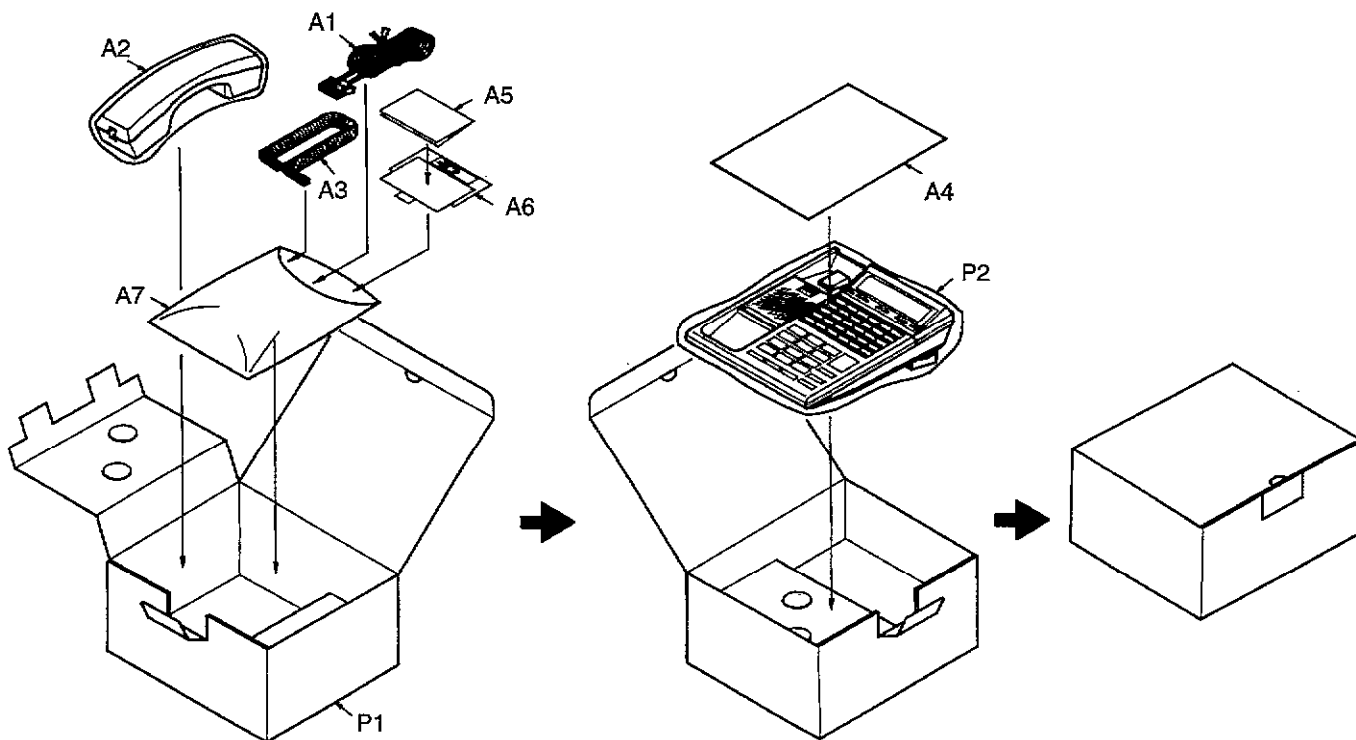
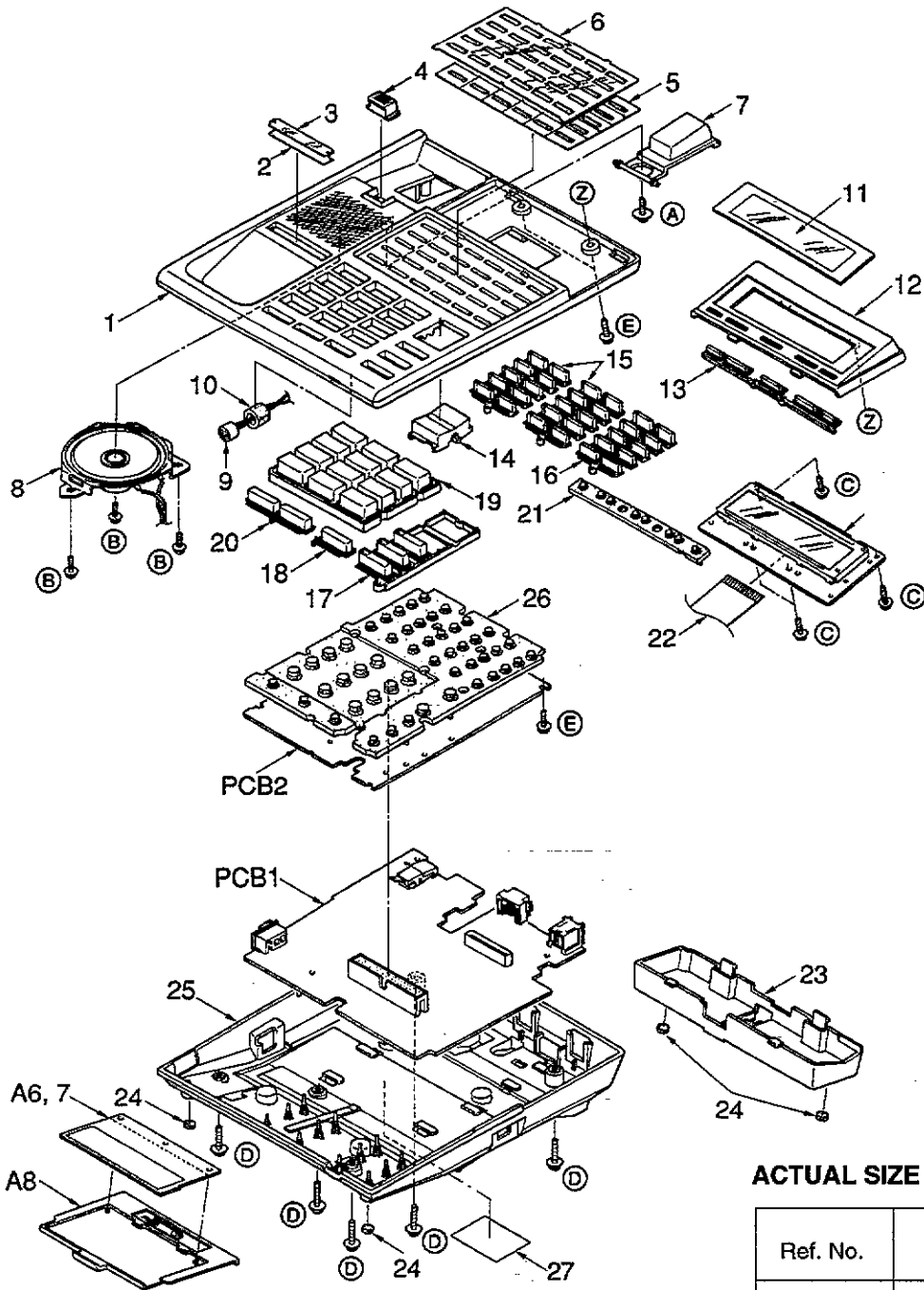


Fig. 25

CABINET AND ELECTRICAL PARTS LOCATION



ACTUAL SIZE OF SCREWS

Ref. No.	Figure	Part No.
(A)		PJHE5065Z
(B)		XTW3+S10P
(C)		XTW26+8F
(D)		XTW3+S14P
(E)		XTW26+10E

Fig. 26

This replacement parts list is for UK version only.

Refer to the simplified manual (cover) for other arens.

REPLACEMENT PARTS LIST

Model KX-T7230E

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.
2. Important safety notice.
Components identified by the Δ mark special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.

4. RESISTORS & CAPACITORS

Unless otherwise specified.

All resistors are in ohms (Ω) k=1000 Ω , M=1000k Ω All capacitors are in MICRO FARADS (μ F) P= μ F

*Type & Wattage of Resistor

Type

ERC:Solid	ERX: Metal Film	PQ4R: Carbon
ERD: Carbon	ERG: Metal Oxide	ERS: Fusible Resistor
PQRD: Carbon	ER0: Metal Film	ERF: Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W
------------	------------	---------	------	------	------

*Type & Voltage of Capacitor

Type

ECFD: Semi-Conductor	ECDD, ECKD, ECBT, PQCBC : Ceramic
ECQS: Styrol	ECQE, ECQV, ECQG : Polyester
PQCUV: Chip	ECEA, ECSZ : Electrolytic
ECQMS: Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others		
1H: 50V	05: 50V	0F: 3.15V	0J :6.3V	1V :35V	
2A: 100V	1: 100V	1A: 10V	1A :10V	50, 1H: 50V	
2E: 250V	2: 200V	1V: 35V	1C :16V	1J :63V	
2H: 500V		0J: 6.3V	1E, 25: 25V	2A :100V	

Ref. No.	Part No.	Part Name & Description (Value)	Pcs
A7	XZB15X25A01	PROTECTION COVER (FOR ACCESSORY)	1
P1	PQPK11052Z	GIFT BOX	1
P2	XZB26X40A01	PROTECTION COVER (FOR SET)	1

MAIN BOARD PARTS

Ref. No.	Part No.	Part Name & Description (Value)	Pcs
PCB1	PSWP1T7230SP	MAIN BOARD ASS'Y(RIL)	1
IC1	PQVJ293005	(ICs) IC	1
IC2	PQVIPD656021	IC	1
IC6	PQVITC4066BP	IC	S 1
IC7	PQVIUPC358C	IC	S 1
IC8	PQVISC77655S	IC	1
IC9	PQVI4638A54F	IC	1
IC10	PQVINJU7660D	IC	1
IC11	PQVINJM319D	IC	1
Q1,2	2SB1218A	(TRANSISTOR) TRANSISTOR(SI)	S 2
Q4	2SD2136	TRANSISTOR(SI)	1
Q5-23	PQVTDTA143XU	TRANSISTOR(SI)	19
Q24-29	PQVDTD133HK	TRANSISTOR(SI)	6
Q30	PQVTBB1J3P	TRANSISTOR(SI)	1
Q31	PQVTBB1J3P	TRANSISTOR(SI)	1
Q32	PQVTDTA143XU	TRANSISTOR(SI)	1
Q33	2SD1819A	TRANSISTOR(SI)	S 1
Q35	2SD1819A	TRANSISTOR(SI)	S 1
Q36	PQVTBB1J3P	TRANSISTOR(SI)	1
Q37-39	2SD1819A	TRANSISTOR(SI)	S 3
Q40	PQVTBB1J3P	TRANSISTOR(SI)	1
Q41-44	2SD1819A	TRANSISTOR(SI)	S 4
Q45	UN5213	TRANSISTOR(SI)	S 1
Q46-48	2SB1218A	TRANSISTOR(SI)	S 1
Q49	2SD1819A	TRANSISTOR(SI)	S 1
Q50	2SD1819A	TRANSISTOR(SI)	S 1
Q51	PQVTDTA143XU	TRANSISTOR(SI)	1
Q60-63	UN5213	TRANSISTOR(SI)	S 4
Q70-72	UN5213	TRANSISTOR(SI)	S 3
D1	PQVD0R5G4B42	(DIODES) DIODE(SI)	1
D5	MA4068	DIODE(SI)	1
D6	1SS131	DIODE(SI)	1
D20	1SS131	DIODE(SI)	1
D21	MA4039	DIODE(SI)	1
D30	MA4056	DIODE(SI)	1
D101-107	1SS131	DIODE(SI)	7
HOOK SWITCH	ESE14A211	(SWITCH) SWITCH, HOOK	1
T1	ETE13K79AY	(TRANSFORMER) TRANSFORMER	1
ZNR1	ERZC03DK241	(VARISTOR) VARISTOR	S 1
VR1	EVNDXAA03B24	(VARIABLE RESISTOR) VARIABLE RESISTOR	1
X1	PQVBT4.0G2	(CERAMIC FILTER & CRYSTAL OSCILLATOR) CERAMIC FILTER	1
X2	PQVCJ16384N8	CRYSTAL OSCILLATOR	1

CABINET AND ELECTRICAL PARTS

Ref. No.	Part No.	Part Name & Description (Value)	Pcs
1	PQKM10052U1	UPPER CABINET	1
2	PQHP532X	TEL NO CARD (SMALL)	1
3	PQHR576Z	TRANSPARENT PLATE (TEL NO. CARD(SMALL))	1
4	PQKE82Z1	HANGER	1
5	PQGD10124Y	TEL NO CARD (LARGE)	1
6	PQGV10008Z	TRANSPARENT PLATE (TEL NO. CARD(LARGE))	1
7	PQBH10007Z1	BUTTON, HOOK	1
8	PQAS65P28Z	SPEAKER	1
9	RJM142Z	BUILT-IN-MICROPHONE	S 1
10	PQHG503Z	RUBBER PARTS, MIC COVER	1
11	PQGP10034Y1	PANEL FOR LCD	1
12	PQGG10017Z1	GRILLE	1
13	PQBX10083Y1	BUTTON, SOFT	1
14	PQBC10059Z1	BUTTON, VOLUME	1
15	PQBX10084Z1	BUTTON, FLEXIBLE CO	2
16	PQBX10085Z1	BUTTON, FAETURE	1
17	PQBX10079Z1	BUTTON, AUTO/SP-PHONE	1
18	PQBC10058Z1	BUTTON, HOLD	S 1
19	PQBX10141Z2	BUTTON, DIAL	1
20	PQBX10089Z1	BUTTON, REDIAL/RECALL	1
21	PQSE10010Z	SWITCH, LCD	1
22	PQJE10018Z	FLAT CABLE	1
23	PQKL10006Z1	CABINET STAND	1
24	PQHG335Z	RUBBER PARTS, FOOT	4
25	PQKF10042R1	LOWER CABINET	1
26	PQSE10009Z	KEY SWITCH	1
27	PQGT11666Y	NAME PLATE	Δ 1
ACCESSORIES AND PACKING MATERIALS			
A 1	PQJA214Y	HAND CORD	1
A 2	PQJX2PSL01Z	HANDSET ASS'Y	S 1
A 3	PSJA1001Z	TELEPHONE CORD	Δ 1
A 4	PSQX1030Z	INSTRUCTION BOOK	Δ 1
A 5	PQHP5107Z	MEMORY CARD	1
A 6	PQHR10143Z1	COVER (FOR MEMORY CARD)	1

This replacement parts list is for UK version only.				Refer to the simplified manual (cover) for other aens.			
Ref. No.	Part No.	Part Name & Description (Value)	Pcs	Ref. No.	Part No.	Part Name & Description (Value)	Pcs
		(CAPACITORS)					
C 1	ECEA1HN2R2S	2.2	1	C200	PQCUV1H680JC	68P	1
C 2	ECEA1HKS010	1	1	C201	PQCUV1H680JC	68P	1
C 3	ECEA1HKS010	1	1	C202	PQCUV1H101JC	100P	1
C 4	ECEA1CK101	100	1	C203	PQCUV1H101JC	100P	1
C 5	PQCUV1E104MD	0.1	1	C204	PQCUV1E104MD	0.1	1
C 7	ECEA1CK100	10	1	C205	PQCUV1E104MD	0.1	1
C10	ECEA0JU102	1000	1	C300	PQCUV1H150JC	15P	1
C11	ECEA0JU102	1000	1	C301	PQCUV1H120JC	12P	1
				C302	PQCUV1E104MD	0.1	1
C20	PQCUV1E104MD	0.1	1	C310	PQCUV1E104MD	0.1	1
C21	PQCUV1H471JC	470P	1	C600	ECEA1AU221	220	1
C28	ECUV1H101JC	100P	1	C601	ECUV1H104MD	0.1	S 1
C30	PQCUV1E104MD	0.1	1	C602	PQCUV1E104MD	0.1	1
C31	PQCUV1C224ZF	0.22	S 1	C604	ECUV1H562MD	0.0056	S 1
C32	PQCUV1E104MD	0.1	1	C605	ECEA1CK5470	47	1
C33	PQCUV1E104MD	0.1	1				
C36	ECEA1CK5470	47	S 1				
C37	PQCUV1C224ZF	0.22	1				
C39	ECEA1VKS4R7	4.7	S 1				
						(RESISTORS)	
C40	ECEA0JKS220	22	S 1	C65	PQ4R10XJ000	0	1
C41	ECEA1CK5470	47	S 1	C210	PQ4R10XJ000	0	1
C42	PQCUV1C224ZF	0.22	1	R 1	PQ4R10XJ471	470	1
C43	PQCUV1H333JC	0.033	S 1	R 2	PQ4R10XJ330	33	1
C44	ECEA1CK101	100	1	R 3	PQ4R10XJ472	4.7K	1
C45	ECEA1CK101	100	1	R 4	PQ4R10XJ472	4.7K	1
C46	ECEA0JU102	1000	1	R 5	PQ4R10XJ472	4.7K	1
C47	PQCUV1C683MD	0.068	1	R 6	PQ4R10XJ472	4.7K	1
C48	ECEA1VKS4R7	4.7	S 1	R 7	PQ4R10XJ330	33	1
C49	ECEA1HKS010	1	S 1	R 8	PQ4R10XJ472	4.7K	1
C50	ECEA1HKS010	1	S 1	R 9	PQ4R10XJ472	4.7K	1
C51	PQCUV1C683MD	0.068	1	R10	PQ4R10XJ472	4.7K	1
C52	PQCUV1H153KB	0.015	S 1	R11	PQ4R10XJ472	4.7K	1
C53	PQCUV1E104MD	0.1	1	R12	PQ4R10XJ472	4.7K	1
C54	PQCUV1C224ZF	0.22	1	R13	PQ4R10XJ472	4.7K	1
C55	PQCUV1C224ZF	0.22	1	R15	PQ4R10XJ332	3.3K	1
C56	ECEA1VKS4R7	4.7	S 1	R19	PQ4R10XJ680	68	1
C59	PQCUV1H103KB	0.01	S 1				
C60	PQCUV1E104MD	0.1	1	R20	PQ4R10XJ390	39	1
C61	PQCUV1E104MD	0.1	1	R21	PQ4R10XJ220	22	1
C80	PQCUV1E104MD	0.1	1	R22	PQ4R10XJ390	39	1
C82	ECEA0JU102	1000	1	R23	PQ4R10XJ121	120	1
C83	PQCUV1H103KB	0.01	S 1	R24	PQ4R10XJ220	22	1
C84	PQCUV1C224ZF	0.22	S 1	R25	PQ4R10XJ121	120	1
C85	PQCUV1E104MD	0.1	1	R26	PQ4R10XJ220	22	1
C86	PQCUV1E104MD	0.1	1	R27	PQ4R10XJ121	120	1
C87	PQCUV1E104MD	0.1	1	R28	PQ4R10XJ220	22	1
C88	PQCUV1E104MD	0.1	1	R29	PQ4R10XJ121	120	1
C89	PQCUV1H471JC	470P	S 1	R30	PQ4R10XJ220	22	1
C92	ECEA0JKS220	22	S 1	R31	PQ4R10XJ121	120	1
C93	PQCUV1E104MD	0.1	1	R32	PQ4R10XJ220	22	1
C94	ECEA1CK5100	10	S 1	R33	PQ4R10XJ121	120	1
C95	ECEA1CK5470	47	S 1	R34	PQ4R10XJ220	22	1
C100,101	PQCUV1E473MD	0.047	2	R35	PQ4R10XJ121	120	1
C102	ECEA1VKS4R7	4.7	1	R36	PQ4R10XJ220	22	1
C103	PQCUV1E104MD	0.1	1	R37	PQ4R10XJ121	120	1
C108	PQCUV1E104MD	0.1	1	R38	PQ4R10XJ220	22	1
C111	ECEA1CK5100	10	S 1	R39	PQ4R10XJ100	10	1
C112	ECEA1CK5470	47	S 1	R50	PQ4R10XJ124	82K	1
C113	PQCUV1H103KB	0.01	S 1	R52	PQ4R10XJ472	4.7K	1
C130	ECEA1CK101	100	S 1	R56	PQ4R10XJ472	4.7K	1
C131	ECEA1CK101	100	S 1	R59	PQ4R10XJ104	100K	1
C132	ECEA1HKS3R3	3.3	S 1	R60	PQ4R10XJ104	100K	1
C140	PQCUV1H470JC	47P	1	R61	PQ4R10XJ104	100K	1
C141	PQCUV1H470JC	47P	1	R62	PQ4R10XJ104	100K	1
C152	PQCUV1E104MD	0.1	1	R63	PQ4R10XJ153	15K	1
C153	PQCUV1E104MD	0.1	1	R65	PQ4R10XJ104	100K	1
C155	PQCUV1H153KB	0.015	1	R66	PQ4R10XJ183	18K	1
C160	PQCUV1H223KB	0.022	S 1	R67	PQ4R10XJ120	12	1
				R68	PQ4R10XJ154	150K	1
				R69	PQ4R10XJ103	10K	1
				R70	PQ4R10XJ3R3	3.3	1
				R71	PQ4R10XJ682	6.8K	1
				R72	PQ4R10XJ472	4.7K	1
				R73	PQ4R10XJ275	2.7M	1

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Ref. No.	Part No.	Part Name & Description (Value)	Pcs	Ref. No.	Part No.	Part Name & Description (Value)	Pcs
R74	PQ4R10XJ562	5.6K	1	R211	PQ4R10XJ104	100K	1
R75	PQ4R10XJ822	8.2K	1	R212	PQ4R10XJ104	100K	1
R76	PQ4R10XJ683	68K	1	R220	PQ4R10XJ000	0	1
R77	PQ4R10XJ303	30K	1	R221	PQ4R10XJ000	0	1
R78	PQ4R10XJ225	2.2M	1	R222	PQ4R10XJ822	8.2K	1
R79	PQ4R10XJ472	4.7K	1	R252	PQ4R10XJ273	27K	1
				R296	PQ4R10XJ104	100K	1
R80	PQ4R10XJ473	47K	1				
R81	PQ4R10XJ222	2.2K	1	R300	PQ4R10XJ221	220	1
R82	PQ4R10XJ123	12K	1				
R83	PQ4R10XJ124	200K	1	R400	PQ4R10XJ223	22K	1
R84	PQ4R10XJ224	220K	1	R401	PQ4R10XJ223	22K	1
R85	PQ4R10XJ273	27K	1	R402	PQ4R10XJ223	22K	1
R86	PQ4R10XJ563	56K	1	R403	PQ4R10XJ223	22K	1
R88,89	PQ4R10XJ104	100K	2				
				R500	PQ4R10XJ103	10K	1
R100	PQ4R10XJ100	10	1	R501	PQ4R10XJ103	10K	1
R101	PQ4R10XJ392	3.9K	1	R530	PQ4R10XJ104	100K	1
R102	PQ4R10XJ680	68	1				
R103	PQ4R10XJ471	470	1	R600	PQ4R10XJ105	1M	1
R104	PQ4R10XJ102	1K	1	R800	PQ4R10XJ151	150	1
R105	PQ4R10XJ563	56K	1				
R106	PQ4R10XJ333	33K	1	J 1	PQ4R18XJ000	0	1
R107	PQ4R10XJ274	270K	1	J 3	PQ4R10XJ000	0	1
R109	PQ4R10XJ102	1K	1	J 4	PQ4R18XJ000	0	1
				J 9	PQ4R10XJ000	0	1
R110	PQ4R10XJ472	4.7K	1				
R111	PQ4R10XJ473	47K	1	J10	PQ4R10XJ000	0	1
R112	PQ4R10XJ103	10K	1	J11	PQ4R10XJ000	0	1
R113	PQ4R10XJ153	15K	1	J12	PQ4R18XJ000	0	1
R114	PQ4R10XJ224	220K	1	J13-15	PQ4R10XJ000	0	3
R115	PQ4R18XJ392	3.9K	1	J16	PQ4R18XJ000	0	1
R116	PQ4R18XJ473	47K	1	J17	PQ4R10XJ000	0	2
R117	PQ4R10XJ473	47K	1	J18	PQ4R18XJ000	0	1
R118	PQ4R10XJ473	47K	1	J19	PQ4R18XJ000	0	1
R119	PQ4R10XJ473	47K	1				
				J20	PQ4R10XJ000	0	1
R120	PQ4R10XJ182	1.8K	1	J21	PQ4R10XJ000	0	1
R121	PQ4R10XJ681	680	1	J22	PQ4R18XJ000	0	1
R122	PQ4R10XJ473	47K	1	J25	PQ4R10XJ000	0	1
R123	PQ4R10XJ473	47K	1	J27	PQ4R10XJ000	0	1
R124	PQ4R18XJ822	8.2K	1	J29	PQ4R10XJ000	0	1
R125	PQ4R10XJ104	100K	1				
				J30	PQ4R10XJ000	0	1
R140	PQ4R10XJ222	2.2K	1	J31-38	PQ4R10XJ000	0	8
R141	PQ4R10XJ223	22K	1				
R142	PQ4R10XJ183	18K	1	J46	PQ4R10XJ000	0	1
R143	PQ4R10XJ103	10K	1	J49	PQ4R10XJ000	0	1
R144	PQ4R10XJ333	33K	1				
R145	PQ4R10XJ103	10K	1	J50	PQ4R10XJ000	0	1
R146	PQ4R10XJ103	10K	1	J51	PQ4R18XJ000	0	1
R147	PQ4R10XJ104	100K	1	J52	PQ4R18XJ000	0	1
R148	PQ4R10XJ103	10K	1	J55	PQ4R10XJ000	0	1
R149	PQ4R10XJ104	100K	1	J56	PQ4R18XJ000	0	1
				J58	PQ4R18XJ000	0	1
R150	PQ4R10XJ472	4.7K	1	J57	PQ4R10XJ000	0	1
R151	PQ4R10XJ473	47K	1				
R154	PQ4R10XJ393	39K	1	J61	PQ4R10XJ000	0	1
R156	PQ4R10XJ183	18K	1	J63	PQ4R10XJ000	0	1
R157	PQ4R10XJ103	10K	1	J65,66	PQ4R10XJ000	0	2
R158	PQ4R10XJ472	4.7K	1	J67	PQ4R18XJ000	0	1
R159	PQ4R10XJ472	4.7K	1	J69	PQ4R10XJ000	0	1
R160	PQ4R10XJ224	220K	1	J70	PQ4R10XJ000	0	1
R161	PQ4R10XJ392	3.9K	1	J71,72	PQ4R18XJ000	0	2
R162	PQ4R10XJ104	100K	1	J73	PQ4R10XJ000	0	1
				J75	PQ4R10XJ000	0	1
R170	PQ4R10XJ124	120K	1	J76	PQ4R10XJ000	0	1
				J77	PQ4R18XJ000	0	1
R180	PQ4R10XJ472	4.7K	1				
R181	PQ4R10XJ472	4.7K	1	J80	PQ4R10XJ000	0	1
R182	PQ4R10XJ472	4.7K	1	J81-85	PQ4R18XJ000	0	5
R183	PQ4R10XJ472	4.7K	1	J86	PQ4R10XJ000	0	1
R184	PQ4R10XJ123	12K	1	J88,89	PQ4R10XJ000	0	2
R185	PQ4R10XJ104	100K	1				
R186	PQ4R10XJ333	33K	1	J90	PQ4R18XJ000	0	1
R187	PQ4R10XJ104	100K	1	J91	PQ4R18XJ000	0	1
R188	PQ4R10XJ823	82K	1	J92	PQ4R10XJ000	0	1
				J94-98	PQ4R10XJ000	0	5
R190	PQ4R10XJ122	1.2K	1	J99	PQ4R10XJ000	0	1
R191	PQ4R10XJ682	6.8K	1	J100,101	PQ4R18XJ000	0	2
				J104-106	PQ4R18XJ000	0	3
R200	PQ4R10XJ223	22K	1	J108,109	PQ4R18XJ000	0	2

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Ref. No.	Part No.	Part Name & Description	Pcs	Ref. No.	Part No.	Part Name & Description	Pcs								
J110	PQ4R18XJ000	0	1	OPERATION BOARD PARTS											
J111-J113	PQ4R10XJ000	0	3	PCB2	PQWP2T7230C	OPERATION BOARD ASS'Y (RTL)	1								
J114	PQ4R18XJ000	0	1												
J115-117	PQ4R10XJ000	0	3												
J119	PQ4R10XJ000	0	1												
J120-J129	PQ4R10XJ000	0	10					D200	PQVDPY1102	(DIODES)	1				
J130	PQ4R10XJ000	0	1					D201-206	PQVDBR1102W	DIODE(SI)	S 6				
J133-135	PQ4R10XJ000	0	3					D207-230	PQVDPY1204	DIODE(SI)	S 24				
J136,137	PQ4R18XJ000	0	2					(RESISTORS)							
J140	PQ4R10XJ000	0	1					J 1	PQ4R10XJ000	0	1				
J144	PQ4R10XJ000	0	1					J 5	PQ4R10XJ000	0	1				
J146	PQ4R10XJ000	0	1					J15	PQ4R10XJ000	0	1				
J149	PQ4R10XJ000	0	1					J16	PQ4R18XJ000	0	1				
J150	PQ4R10XJ000	0	1					J19	PQ4R18XJ000	0	1				
J152,153	PQ4R10XJ000	0	2					J21,22	PQ4R10XJ000	0	2				
J154	PQ4R18XJ000	0	1					J23-25	PQ4R18XJ000	0	3				
J155,157	PQ4R18XJ000	0	2					J27,28	PQ4R18XJ000	0	2				
J159	PQ4R18XJ000	0	1					J31	PQ4R18XJ000	0	1				
J160	PQ4R18XJ000	0	1					J32-34	PQ4R10XJ000	0	3				
J162	PQ4R10XJ000	0	1					J36-38	PQ4R18XJ000	0	3				
J163	PQ4R10XJ000	0	1					J40,41	PQ4R10XJ000	0	2				
J180	PQ4R18XJ000	0	1					J42	PQ4R18XJ000	0	1				
J181	PQ4R10XJ000	0	1					(CONNECTOR)							
J184	PQ4R18XJ000	0	1					CN1	PQJS40X33Y	CONNECTOR, 40P	1				
J185	PQ4R10XJ000	0	1					LCD BOARD PARTS							
J190	PQ4R10XJ000	0	1					PCB3	PQWP3T7230C	LCD BOARD ASS'Y (RTL)	1				
J200	PQ4R10XJ000	0	1												
J290	PQ4R18XJ000	0	1												
J302-305	PQ4R10XJ000	0	4									IC301	PQVIHD44780	(IC's)	1
J330	PQ4R10XJ000	0	1									IC302	PQVIHD44100H	IC	1
L1,2	PQLQR1LT	(COIL)	2									D301	PQVDBR1102W	(DIODE)	S 1
L3-5	PQLE106	COIL	3									(RESISTOR)			
CN1	PQJP40D30Y	(CONNECTORS & JACKS)	1									R301-305	PQ4R10XJ222	2.2K	5
CN2	PQJS26X54Z	CONNECTOR, 40P	1									R306	PQ4R10XJ104	100K	1
CN3	PQJP18ZA	CONNECTOR, 26P	1									(CONNECTOR)			
JA1	PQJ1TC5Z	CONNECTOR	1									FFC	PQJS26X53Z	CONNECTOR, 26P	1
JA2	PQJ1TB26Z	TEL JACK	1									(LCD)			
JA3	PQJ1TB10Z	TEL JACK	1					LCD	PQWP3T7230C	LCD BOARD ASS'Y (RTL)	1				
		JACK,HANDSET	1					FIXTURE AND TOOL							
								EC1	PQZZ40K1Z	EXTENSION CORD, 40P	1				
								EC2	PQZZ26F1Z	EXTENSION CORD, 26P	1				
				Note: Extension Cords are useful for servicing. (They make servicing easy.)											