

# Service Manual

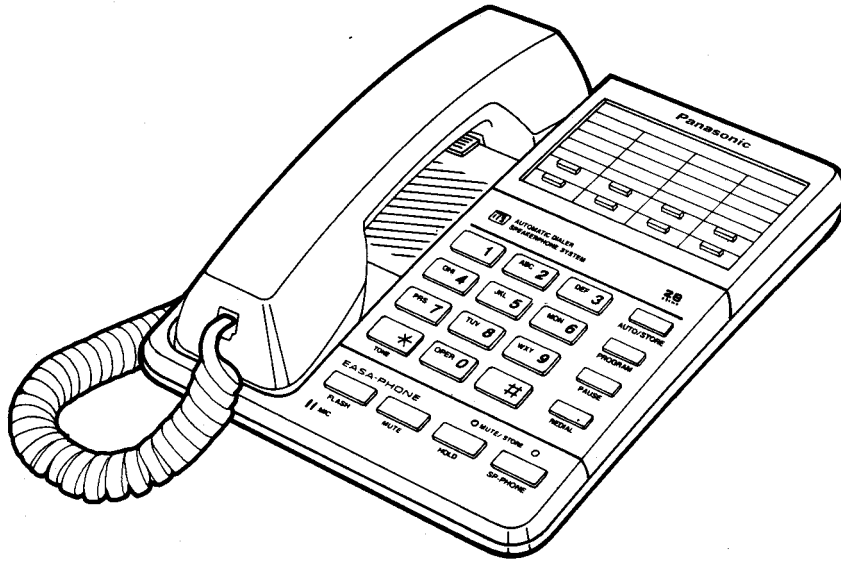
## and Technical Guide

EASA-PHONE®



Integrated  
Telephone System

Telephone Equipment  
**KX-T2315**



### SPECIFICATIONS

### CPU DATA

### TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

### IC BLOCK DIAGRAM

### ADJUSTMENT

### SCHEMATIC DIAGRAM

### ACCESSORIES AND PACKING MATERIALS

### CABINET AND ELECTRICAL PARTS LOCATION

### REPLACEMENT PARTS LIST

# Panasonic

Matsushita Services Company  
Division of Matsushita Electric  
Corporation of America  
50 Meadowland Parkway,  
Secaucus, New Jersey 07094

Matsushita Electric  
of Canada Limited  
5770 Ambler Drive, Mississauga,  
Ontario, L4W 2T3

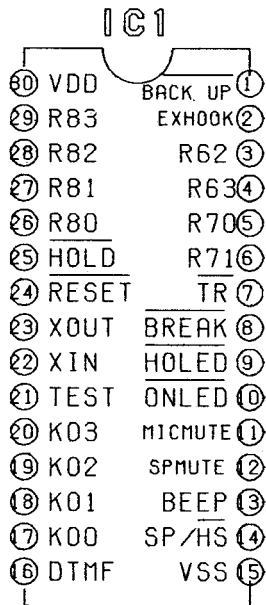
Panasonic Sales Company,  
Division of Matsushita Electric  
of Puerto Rico, Inc.  
San Gabriel Industrial Park  
65th Infantry Ave. Km.9.5  
Carolina, Puerto Rico 00630

## ■ SPECIFICATIONS

Power Source:	Telephone line voltage
Memory Capacity:	28 telephone numbers, up to 16 digits for each station
Dial Speed:	Tone (DTMF)/Pulse (10 pps)
Redial:	Last dialed telephone number
Pause:	3.5sec
Speaker:	Handset; 3 cm (1 <sup>3</sup> / <sub>16</sub> " ) PM dynamic type receiver unit, 150Ω
Microphone:	Electret condenser microphone
Dimensions:	167 (W) × 70 (H) × 220 (D) mm (6 <sup>9</sup> / <sub>16</sub> "×2 <sup>3</sup> / <sub>4</sub> "×8 <sup>21</sup> / <sub>32</sub> " )
Weight:	910 g (2 lb 0.1 oz)

Design and specifications are subject to change without notice.

# CPU DATA



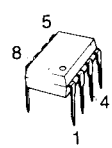
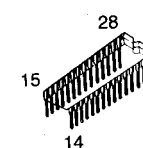
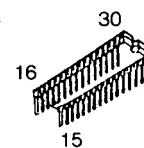
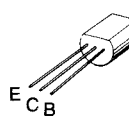
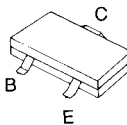
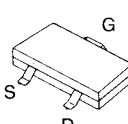
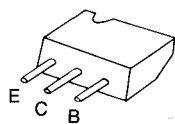
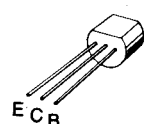
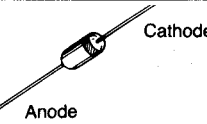

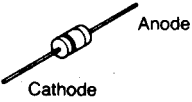
IC1: PQV1451N9965  
 Memory: 16 digit 28 station  
 Clock Frequency: 480 kHz  
 Power Supply Voltage: 2.2~6 V

Pin No.	Mark	Function	High	Low
1	Back Up	Back Up Output	Set Standby	Active
2	Ex-Hook	Extention TEL Hook Inputt	Active	Normal
3	R62	Key Scan Input	Disable	Enable
4	R63	Key Scan Input		
5	R70	Key Scan Output	Normal	Active
6	R71	Key Scan Output		
7	TR	Line Catch Output	Normal	Active
8	DP	Dial Pulse Output	Make	Break
9	LED1	Hold/Memory LED	OFF	ON
10	LED2	SP-Phone LED Output	OFF	ON
11	Mic-Mute	Mic-Mute Output	Active	Normal
12	SP-Mute	SP-Mute Output		
13	Key Tone	Key Tone Signal	SP-Phone	Handset
14	SP/HS	SP-Phone/Handset Output		
15	Vss	GND		
16	DTMF	DTMF Signal	Active	Normal
17	K00	Key Scan Input	Disable	Enable
18	K01	Key Scan Input		
19	K02	Key Scan Input		
20	K03	Key Scan Input		Normal
21	TEST			
22	X in	System Clock		
23	X out	System Clock		
24	Reset	Reset Input	Normal	Active
25	HOLD	LINE POWER INPUT	Active	
26	R80	Key Scan Output	Disable	Enable
27	R81	Key Scan Output		
28	R82	Key Scan Output		
29	R83	Key Scan Output		
30	VDD	+ Power Source Terminal		

### Circuit Operation:

- Pin ① outputs a low level while the set is working and a High level while the set is not working.
- Pin ② inputs the hold cancellation signal. When the hold switch is cancelled, it inputs a high level.
- Pin ③~⑥, ⑰~⑳, ㉔~㉘ input/output port the scanning signal to the Key-#, Auto/Store, Program, Pause, Redial, ON/OFF, Mute, Hold, Flash, Tone/Pulse SW, M1~8 HOOK SW.
- Pin ⑦ outputs the SP phone on and hold control signal.  
During SP phone on and hold its outputs is a low level.
- Pin ⑧ is an output to control the Make/Break of the pulse. During Break its output is a low level.
- Pin ⑨ is multi indicator control signal. While the LED lights, the outputs are at the low level.
- Pin ⑩ is ON/OFF LED control signal. The ON/OFF LED lights up while a low level is outputted.
- Pin ⑪ is Mic. Mute control signal. It outputs a high level and the MUTE LED lights up during muting.
- Pin ⑫ is the SP Mute control signal. During muting, its output is a high level.
- Pin ⑬ outputs a square wave to Key Tone signal.
- Pin ⑭ outputs SP/HS Switching signal. (SP-Phone: at high level, HS: at low level)
- Pin ⑯ is the terminal for the D/A change and the DTMF signal outputs.
- Pin ㉒ inputs the reset signal to IC. When reset, inputs low level.
- Pin ㉓ inputs the standby signal to IC. When standby, inputs low level.
- When the signal is sent from pin ④ to pin ㉗ via the diode, the single DTMF tone will be outputted.

## TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

 <p>PQVIBA8205</p>	 <p>PQVISC79054A</p>	 <p>PQVI451N9965</p>	 <p>2SA1625</p>	 <p>2SD1819A 2SB1218A</p>
 <p>2SK1228</p>	 <p>2SD662B DTC144A</p>	 <p>2SC2120</p>	 <p>Anode Cathode</p> <p>PQVD05AZ6R2 PQVD05AZ3.0 PQVDS5688G 1SS131 MA161</p>	 <p>Cathode Anode</p> <p>LN28RPL</p>
 <p>Anode Cathode</p> <p>MA4150 MA4300</p>				

# IC BLOCK DIAGRAM

IC2 PQVISC79054A

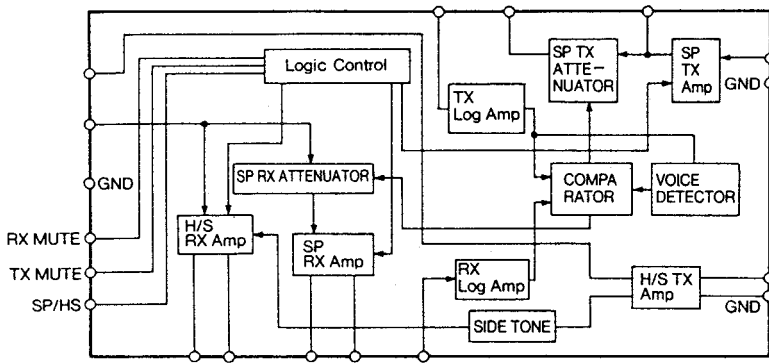


Fig. 5

IC3 PQVIBA8205

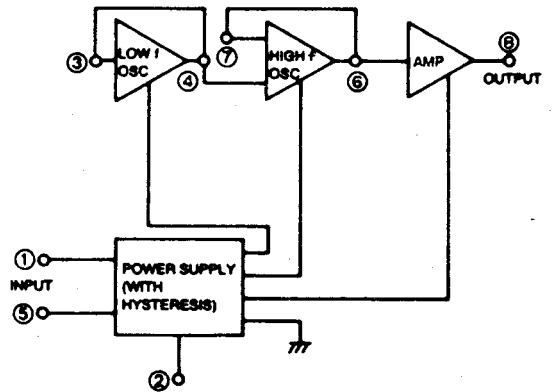


Fig. 6

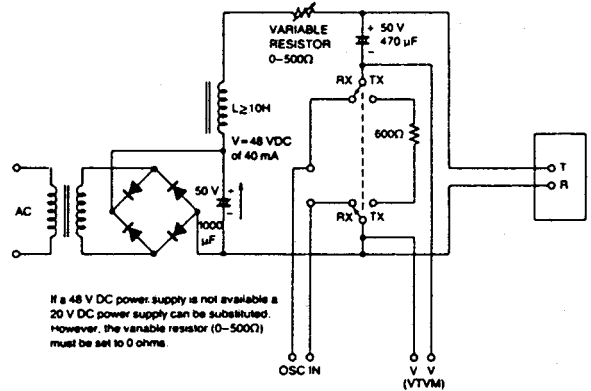
## ADJUSTMENT

Perform the following adjustment after replacing IC2 and VR2.

<b>Test Equipment:</b>
Loop Simulator RC Oscillator VTVM
<b>Preparation:</b>
<ol style="list-style-type: none"> <li>Set the unit's controls as follows: <ol style="list-style-type: none"> <li>SP-PHONE SWITCH—"ON"</li> <li>VOLUME CONTROL—"MAX"</li> <li>MUTE SWITCH—"ON"</li> </ol> </li> <li>Disconnect microphone.</li> <li>Set the variable resistor of the loop simulator to maximum resistance (fully counterclockwise).</li> <li>Connect the unit to the loop simulator.</li> <li>Make adjustment in a quiet room.</li> <li>After adjustment are made, connect microphone.</li> </ol>
<b>Reception Level:</b>
<ol style="list-style-type: none"> <li>Set the loop simulator selector switch to "RX"</li> <li>Set RC Oscillator to 1 kHz, -40 dBm with a VTVM.</li> <li>Connect the VTVM to Test Points ▼ (-) - ▼ (+).</li> <li>Adjust VR2 for a reading of -13 dBm <math>\pm</math> 0.5 dBm on the VTVM.</li> </ol>

Please refer to the Circuit Board and wiring Connection Diagram which is located at the test points (▼).

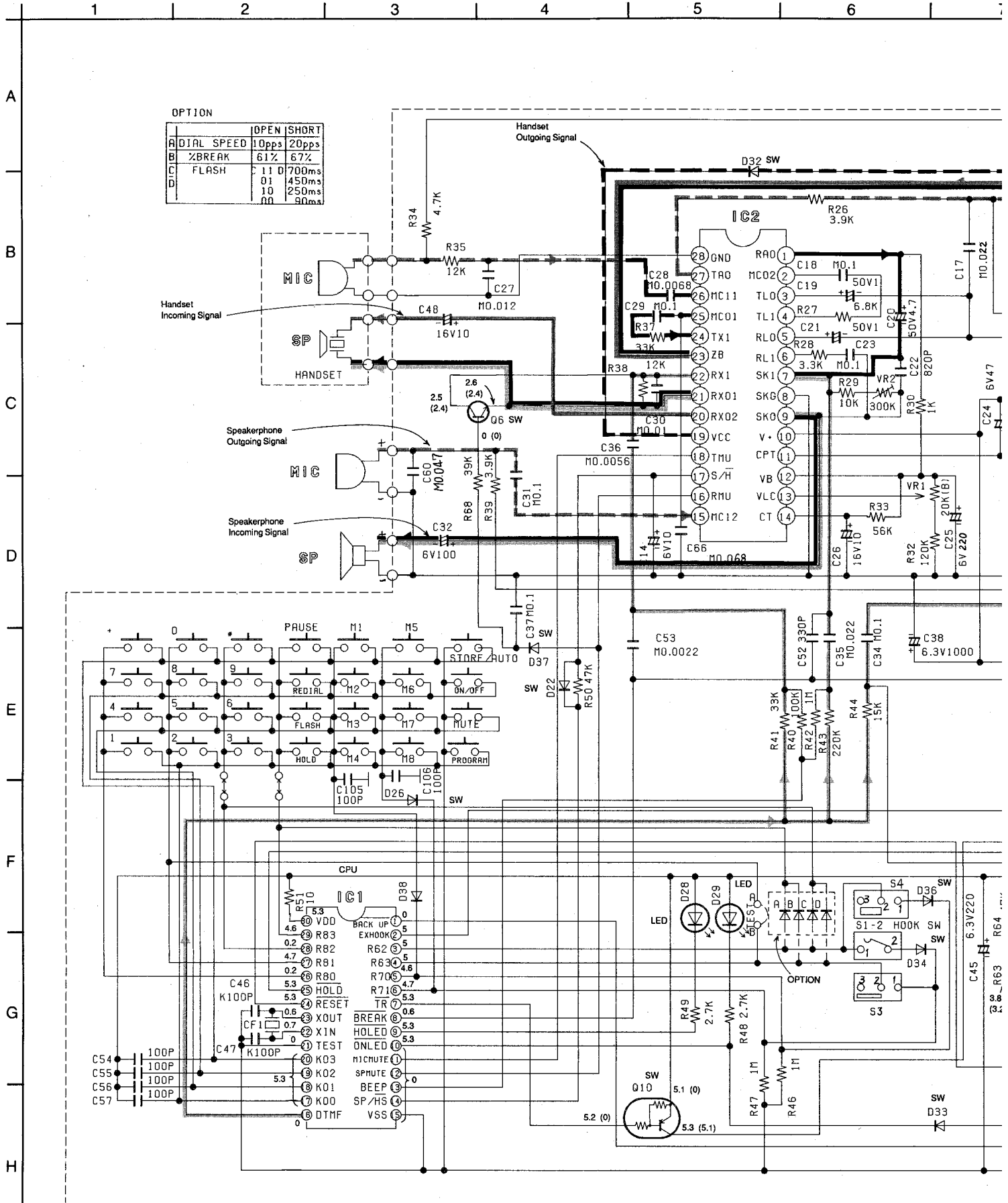
Schematic Diagram of Loop Simulator



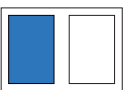
If a 48 V DC power supply is not available a 20 V DC power supply can be substituted. However, the variable resistor (0-500Ω) must be set to 0 ohms.

Fig. 7

# SCHEMATIC DIAGRAM



OPTION		
	OPEN	SHORT
A	DIAL SPEED	10pps 20pps
B	%BREAK	61% 67%
C	FLASH	0 1 0 700ms
D		0 1 450ms
		10 250ms
		00 90ms



# TIC DIAGRAM

7

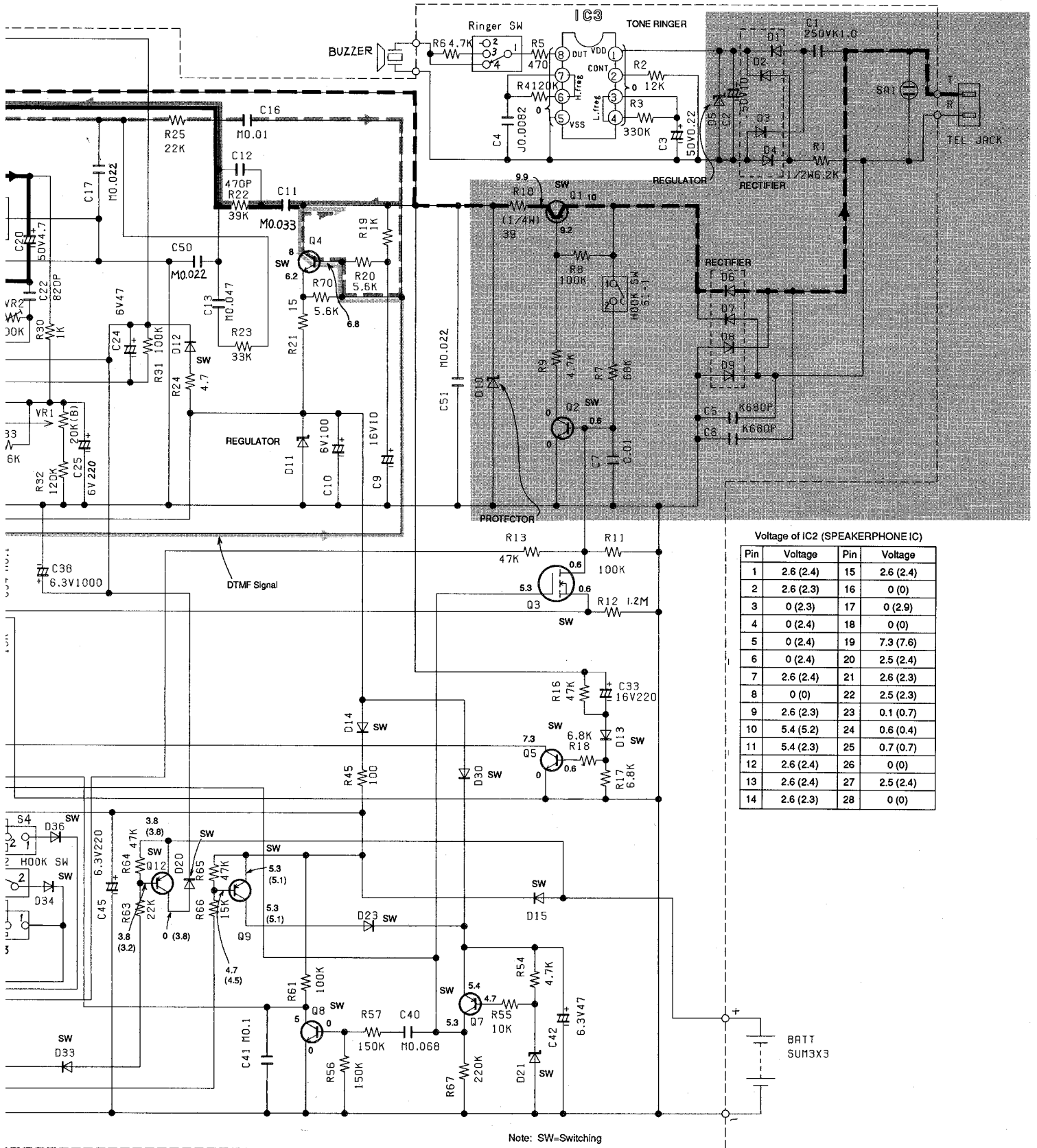
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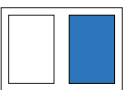
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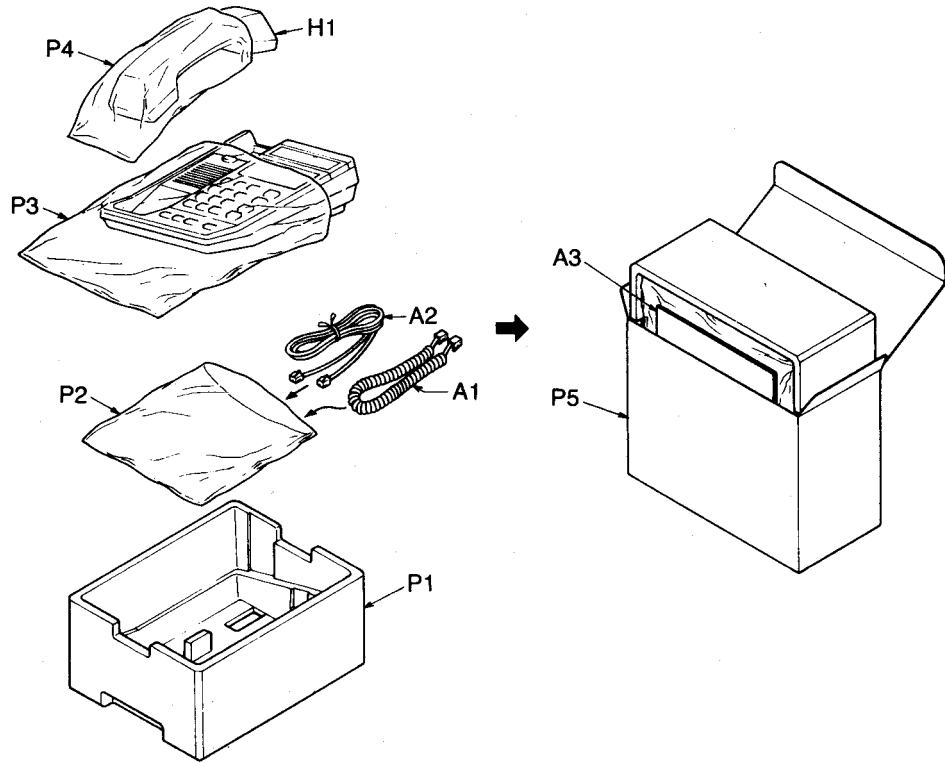


Voltage of IC2 (SPEAKERPHONE IC)

Pin	Voltage	Pin	Voltage
1	2.6 (2.4)	15	2.6 (2.4)
2	2.6 (2.3)	16	0 (0)
3	0 (2.3)	17	0 (2.9)
4	0 (2.4)	18	0 (0)
5	0 (2.4)	19	7.3 (7.6)
6	0 (2.4)	20	2.5 (2.4)
7	2.6 (2.4)	21	2.6 (2.3)
8	0 (0)	22	2.5 (2.3)
9	2.6 (2.3)	23	0.1 (0.7)
10	5.4 (5.2)	24	0.6 (0.4)
11	5.4 (2.3)	25	0.7 (0.7)
12	2.6 (2.4)	26	0 (0)
13	2.6 (2.4)	27	2.5 (2.4)
14	2.6 (2.3)	28	0 (0)



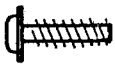

# ACCESSORIES & PACKING MATERIALS





# CABINET AND ELECTRICAL PARTS LOCATION

## ACTUAL SIZE OF SCREWS

Part No.	
XTW3+S12P	
XTW3+S8P	

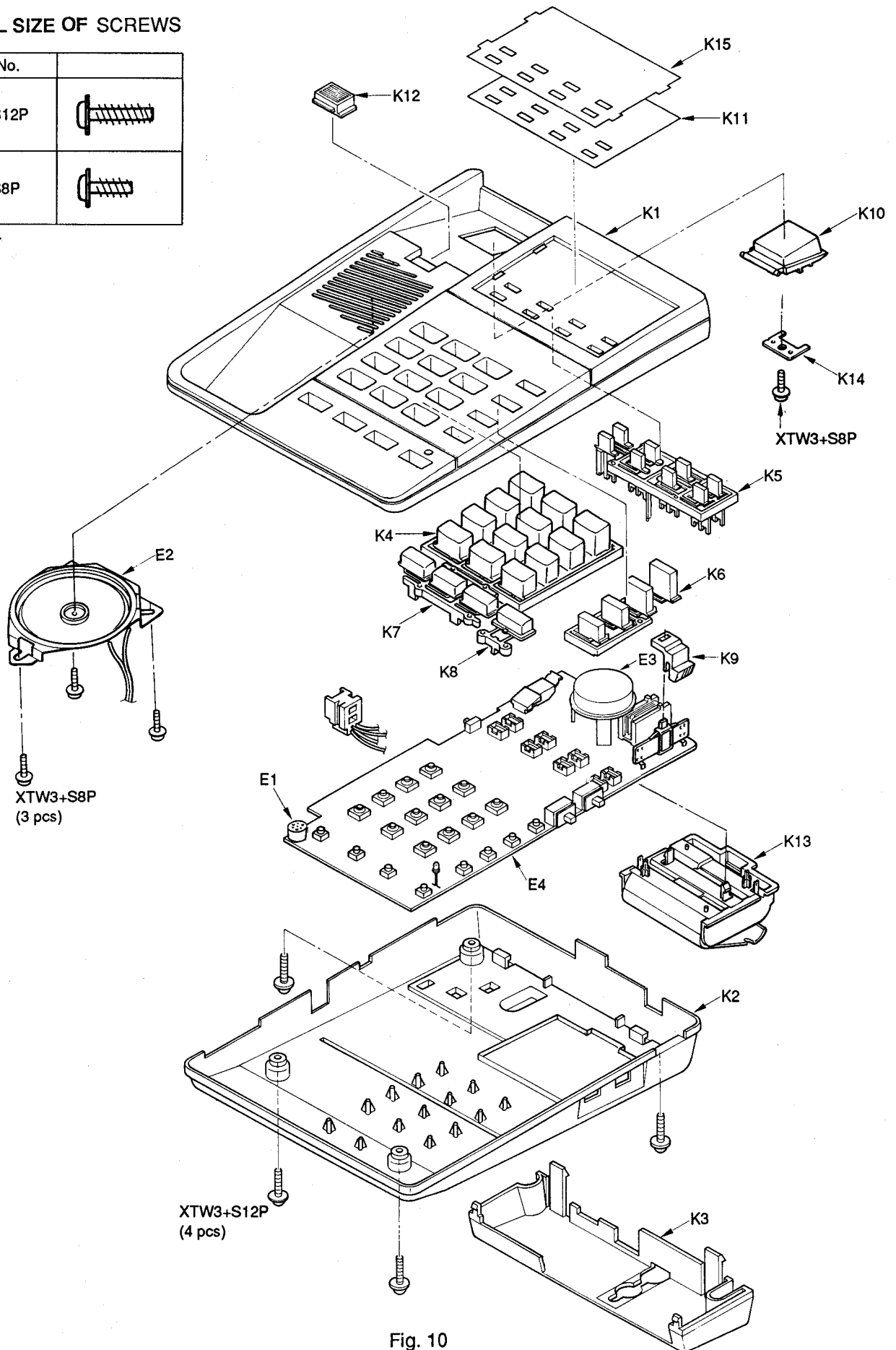


Fig. 10

**REPLACEMENT PARTS LIST**

Model KX-T2315

Notes:

- Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.
- Important safety notice.  
Components identified by the  $\Delta$  mark special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- The S mark indicates service standard parts and may differ from production parts.
- RESISTORS & CAPACITORS**  
Unless otherwise specified.  
All resistors are in ohms(  $\Omega$  ) k=1000 $\Omega$ , M=1000k $\Omega$   
All capacitors are in MICRO FARADS(  $\mu$ F ) P=  $\mu$ F  
\*Type & Wattage of Resistor

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, S1, 50:1/2W	1:1W	2:2W	3:3W

*Type & Voltage of Capacitor	
Type	
ECFD: Semi-Conductor	ECCD, 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	Pcs
<b>SWITCHES</b>			
S1	ESE14A211A	SWITCH, HOOK	1 $\Delta$
S2	POSS2A27Y	SWITCH, RINGER	1
S3	POSS3A17Y	SWITCH, DIALING	1
S4	PQSS2A16Y	SWITCH, LOCAL CALL ONLY	1
S5~12	PQSH1A36Z	SWITCH, DIRECT CALL	8
S13~23, 32	PQSH1A33Z	SWITCH, DIALING	12
S24~31	EVQ12405K	SWITCH, FLASH, HOLD etc.	8

<b>CABINET PARTS</b>			
K1	PQKM186Z	UPPER CABINET	1
K2	PQYFT2315M	LOWER CABINET ASSEMBLY	1
K3	PQYLT2315M	STAND ASSEMBLY	1
K4	PQBCX155Y	BUTTON, DIALING	1
K5	PQBCX156Z	BUTTON, DIRECT CALL	1
K6	PQBCX157Z	BUTTON, AUTO, PROG., PAUSE, REDIAL	1
K7	PQBCX158Z	BUTTON, FLASH, MUTE, HOLD	1
K8	PQBC249Z	BUTTON, SPEAKERPHONE	1
K9	PQBD146Z	KNOB, VOLUME	1
K10	PQBE33Z	BUTTON, HOOK	1
K11	PQHPS080Z	TELEPHONE CARD	1
K12	PQKE46Y2	HANDSET HUNGER	1
K13	PQWBT2315M	BATTERY CASE ASSEMBLY	1
K14	PQUL142Z	METAL PARTS, HOOK BOTTON	1
K15	PQHR5269Z	TRANSPARENT PLATE	1

<b>ELECTRICAL PARTS</b>			
E1	PQJM122Z	MICROPHONE	1
E2	PQAS65P06V	SPEAKER	1
E3	PQWH2T3110M	BUZZER ASSEMBLY	1
E4	PQWPT2315M	PRINTED CIRCUIT BOARD (NLA)	1

<b>HANDSET PART</b>			
H1	PQJX2PS409Z	HANDSET ASSEMBLY (CAN'T BE ASSEMBLED.)	1

<b>OTHERS</b>			
CF1	PQVBB480E2	CERAMIC FILTER	1
SA1	PQVDSAE310F1	VARIATOR	1 $\Delta$
VR1	PQVAL204B24A	VARIABLE RESISTOR, 20K $\Omega$	1
VR2	EVNDXAA03B35	VARIABLE RESISTOR, 300K $\Omega$	1

<b>ACCESSORIES</b>			
A1	PQJA59Y	TELEPHONE CORD	S 1
A2	PQJA193M	HANDSET CORD	1
A3	PQOX6122Z	INSTRUCTION BOOK	1

<b>PACKING MATERIALS</b>			
P1	PQPK995Z	GIFT BOX	1
P2	PQPN1080Z	CUSHION	1
P3	PQPP34Z	PROTECTION COVER (for HANDSET)	1
P4	XZB26X40A01	PROTECTION COVER (for SET)	1

Ref. No.	Part No.	Part Name & Description	Pcs
<b>INTEGRATED CIRCUITS, TRANSISTORS &amp; DIODES</b>			
IC1	POVI451N9962	IC	1
IC2	PQVISC79054A	IC	1
IC3	PQVIBA8205	IC	1
Q1	2SA1625	TRANSISTOR(SI)	S 1 $\Delta$
Q2	2SD662B	TRANSISTOR(SI)	S 1 $\Delta$
Q3	2SK1228	TRANSISTOR(SI)	1
Q4	2SC2120	TRANSISTOR(SI)	S 1
Q5, 6, 8	2SD1819A	TRANSISTOR(SI)	S 3
Q7, 9, 12	2SB1218A	TRANSISTOR(SI)	S 3
Q10	DTC144A	TRANSISTOR(SI)	S 1
D1~4, 12~15, 20, 22, 23, 26, 30, 33, 34, 36~38	1SS131	DIODE(SI)	S 18 $\Delta$
D5	MA4300	DIODE(SI)	S 1 $\Delta$
D6~9	PQVDS5688G	DIODE(SI)	S 4 $\Delta$
D10	MA4150	DIODE(SI)	1 $\Delta$
D11	PQVD05AZ6R2	DIODE(SI)	1
D21	PQVD05AZ3.0	DIODE(SI)	1
D28, 29	LN28RPL	LED	2
D32	MA161	DIODE(SI)	S 1
<b>JACKS</b>			
JJ1	PQJ1TA11Z	JACK, TELEPHONE	$\Delta$ 1
JJ2	PQJ1TB2Y	JACK, HANDSET	1

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
<b>RESISTORS</b>					
R1	ERDS1TJ622	6.2K $\Delta$	R36	Not Used	
R2	ERDS2TJ123	12K	R37	PQ4R10XJ333	33K
R3	ERDS2TJ334	330K	R38	PQ4R10XJ123	12K
R4	PQ4R10XJ124	120K	R39	PQ4R10XJ392	3.9K
R5	PQ4R10XJ471	470	R40	PQ4R10XJ104	100K
R6	PQ4R10XJ472	4.7K	R41	PQ4R10XJ333	33K
R7	PQ4R10XJ683	68K $\Delta$	R42	PQ4R10XJ105	1M
R8	PQ4R10XJ104	100K $\Delta$	R43	PQ4R10XJ224	220K
R9	ERDS2TJ472	4.7K $\Delta$	R44	PQ4R10XJ153	15K
R10	ERDS2TJ390	39 $\Delta$	R45	PQ4R10XJ101	100
R11	PQ4R10XJ104	100K	R46	PQ4R10XJ105	1M
R12	ERDS2TJ125	1.2M	R47	PQ4R10XJ105	1M
R13	PQ4R10XJ473	47K	R48	ERD25TJ272	2.7K
R14	Not Used		R49	ERDS2TJ272	2.7K
R15	Not Used		R50	PQ4R10XJ473	47K
R16	PQ4R10XJ473	47K	R51	ERDS2TJ100	10
R17	PQ4R10XJ682	6.8K	R52	Not Used	
R18	PQ4R10XJ682	6.8K	R53	Not Used	
R19	PQ4R10XJ102	1K	R54	PQ4R10XJ472	4.7K
R20	PQ4R10XJ562	5.6K	R55	PQ4R10XJ103	10K
R21	ERDS2TJ150	15	R56	PQ4R10XJ154	150K
R22	PQ4R10XJ393	39K	R57	PQ4R10XJ154	150K
R23	PQ4R10XJ333	33K	R58	Not Used	
R24	PQ4R10XJ4R7	4.7	R59	Not Used	
R25	PQ4R10XJ223	22K	R60	Not Used	
R26	ERDS2TJ392	3.9K	R61	PQ4R10XJ104	100K
R27	PQ4R10XJ682	6.8K	R62	Not Used	
R28	PQ4R10XJ332	3.3K	R63	PQ4R10XJ223	22K
R29	PQ4R10XJ103	10K	R64	PQ4R10XJ473	47K
R30	PQ4R10XJ102	1K	R65	PQ4R10XJ473	47K
R31	PQ4R10XJ104	100K	R66	ERDS2TJ153	15K
R32	PQ4R10XJ124	120K	R67	PQ4R10XJ224	220K
R33	PQ4R10XJ563	56K	R68	ERD25TJ393	39K
R34	PQ4R10XJ472	4.7K	R69	Not Used	
R35	PQ4R10XJ123	12K	R70	PQ4R10XJ562	5.6K
<b>CAPACITORS</b>					
C1	ECQE2E105KZ	1 $\Delta$	C36	PQCUV1H562KB	0.0056
C2	ECEA1HU100	10 $\Delta$	C37	PQCUV1E104ZF	0.1
C3	ECEA1HUR22	0.22	C38	ECEA0JU102	1000
C4	ECQG1H822JZ	0.0082	C39	Not Used	
C5	ECKD2H681KB	680P $\Delta$	C40	PQCUV1C683MD	0.068
C6	ECKD2H681KB	680P $\Delta$	C41	PQCUV1E104ZF	0.1
C7	PQCUV1H103KB	0.01 $\Delta$	C42	ECEA0JKS470	47
C8	Not Used		C43	Not Used	
C9	ECEA1HU100	10	C44	Not Used	
C10	ECEA0JKS101	100	C45	ECEA1AU221	220
C11	ECUV1H333JC	0.033	C46	PQCUV1H101JC	100P
C12	PQCUV1H471JC	470P	C47	PQCUV1H101JC	100P
C13	ECUV1H473MD	0.047	C48	ECEA1HU100	10
C14	ECEA1HU100	10	C49	Not Used	
C15	Not Used		C50	PQCUV1H223KB	0.022
C16	PQCUV1H103KB	0.01	C51	PQCUV1H223KB	0.022
C17	PQCUV1H223KB	0.022	C52	PQCUV1H331JC	330P
C18	PQCUV1E104ZF	0.1	C53	PQCUV1H222KB	0.0022
C19	ECEA1HU010	1	C54	PQCUV1H101JC	100P
C20	ECEA1HU4R7	4.7	C55	PQCUV1H101JC	100P
C21	ECEA1HU010	1	C56	ECUV1H101JC	100P
C22	PQCUV1H821JC	820P	C57	PQCUV1H101JC	100P
C23	PQCUV1E104ZF	0.1	C58	Not Used	
C24	ECEA1EU470	47	C59	Not Used	
C25	ECEA1HU221	220	C60	PQCUV1E473MD	0.047
C26	ECEA1HU100	10	C61	Not Used	
C27	PQCUV1H123MD	0.012	C62	Not Used	
C28	PQCUV1H682KB	0.0068	C63	Not Used	
C29	PQCUV1E104ZF	0.1	C64	Not Used	
C30	PQCUV1H103KB	0.01	C65	Not Used	
C31	PQCUV1E104ZF	0.1	C66	PQCUV1C683MD	0.068
C32	ECEA1AU101	100			
C33	ECEA1CU221	220	C105	PQCUV1H101JC	100P
C34	ECUV1H104MD	0.1	C106	PQCUV1H101JC	100P
C35	PQCUV1H223KB	0.022			