INSTRUCTIONS FOR

GE-MARC V•E CLASSIC II HANDSET

19A704295

TABLE OF CONTENTS

SPECIFICATIONS*

POWER SUPPLY	
Regulated	8.5 ±0.5 VDC
CURRENT DRAIN	
CU Power	Less than 80 mA
OPERATING TEMPERATURE RANGE	
Nominal	25°C
Operating Range	-30°C to +70°C
VCC VOLTAGE	At 25°C, 5.0 VDC to 5.4 VDC typical At 30°C, 5.5 VDC to 5.9 VDC typical At 70°C, 5.0 VDC - 4.6 VDC typical
CLOCK FREQUENCY	28.800 kHz ±0.1 Hz at 25°C 28.800 kHz ±10 PPM at -20°C to +50°C
WATCH DOG FREQUENCY	2 to 4 Hz at 25°C

* These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

DESCRIPTION

The General Electric Classic II Handset consists of a telephone numeric keypad with special function keys, a liquid crystal display, and two circuit boards; the Interface Board (A1) containing the handset microphone, microphone preamplifier, earpiece driver, and handset earpiece; the Logic Board (A2) containing the keypad switches, a microprocessor, receive and transmit buffers, and the clock generator. A PTT switch is provided for simplex operation.

INTERFACE BOARD A1

Audio from the electret microphone (B101) is amplified by U101A and passed to the transmit audio path of the radio. Audio from the radio receiver is amplified by U101B and passed to the earpiece driver Q101 and Q102. The output of the driver is connected to the earpiece B102.

LOGIC BOARD A2

The 4-bit microprocessor (U3) scans the keypad and provides output control to the display driver. The microprocessor also provides control of the display backlighting. When a key is closed on the keypad, an ASCII code is generated by the microprocessor and sent to the radio-logic circuits over a 2-wire asynchronous serial bus. The logic unit in the radio interprets the code and returns an appropriate response to the microprocessor which in turn, completes the command.

Backlighting of the display and keypad is provided by four LEDs (H2-H5). Control for the backlighting is provided by a pulsed signal from the microprocessor to the LED driver Q5. The duty cycle determined by the microprocessor establishes the intensity of the backlighting. By pressing the function (RCL) key together with the VOLUME "up" or "down" key adjusts the backlighting intensity (when connected to the radio). A fifth LED is provided to indicate when the radio is transmitting.

The eight-digit liquid crystal display is driven by the multiplexed output of the microprocessor. Due to the broad operating temperature range requirement for the LCD, the driving signal must be temperature compensated to maintain good contrast and operating speed. This compensation is provided by temperature compensating regulator U102 and D103-D109.

TEST SPECIFICATIONS

MICROPHONE

1. Sensitivity

   An input level of 97 dB $_{SPL}$ will produce an output of 35 mVrms $\pm$5 dB.

   ($dB_{SPL} = 20 \text{ LOG}_{10} (P/Po)$ where P is the RMS sound pressure in Pascals and Po = $2X10^{-5}$ Pascal.)

2. Distortion

   For an input signal of <1% distortion, the output distortion will not exceed 3% from 300 Hz to 3000 Hz.

RECEIVER

1. Offhook Sensitivity

   A 1 kHz, 50 mVrms input signal will produce an output level of 94 $\pm$3 dB $_{SPL}$, as measured at the artificial ear (approximately 26 mVrms across the DH52 speaker).

2. Distortion

   For an input signal of 50 mVrms with less than 1% distortion, the output distortion is less than 5% as measured at the artificial ear, from 300 to 3000 Hz.

3. Ear Protection

   An audio limiter is provided to ensure that the maximum acoustic output does not exceed 120 dB.

HOOK CONDITION

The hook condition is created by a hanger containing a magnet to actuate a reed switch. The hook condition must operate as follows:

1. Off Hook: 0.2 VDC max., 0.6 mA sink min.
2. On Hook: (Properly mounted on the hanger): Open collector (high impedance)

SERIAL DATA

The serial data format is a pseudo RS-232 format. Specifically, it is an asynchronous serial bus operating between Vcc and 0 volts.

Baud Rate:	300 ±5%
Bit Pattern:	1 start, 2 stop, 8 data (no parity check)
Format:	0 to Vcc inverted (Vcc is the "No Data" condition)
Vcc:	4.5 to 6.0 VDC
Keypad Data:	High - Open Collector
	Low - 0.2 VDC, 1 mA sink
Display Data:	High - Open collector drive <50 uA current drain
	Low - 0.8V max.

KEYPAD/DISPLAY

To test the handset by itself, loop the output to the input by connecting P1-10 to P1-15 on a test connector. Also apply +8.5 VDC to P1-4 and ground P1-1 on the test connector. Connect the handset cord to the test connector. Operation of the keypad will now cause changes in the display according to the following:

1. Numerical keys, pressed individually, will display the number entered. If more than eight digits are entered, the digits will disappear to the left in the order they were entered.

2. When the control keys (orange) are pressed individually, either a character will be displayed or there will be no reaction from the display.

Single Key Entries

Key	Display
AR	No reaction
VOL ↑	⌐
VOL ↓	-
GRP	⌐
SPC	No reaction
RCL	No reaction
CLR	=
*	=
#	Space
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0

EXTRA FUNCTIONS

To execute the following commands, hold the first key down while pressing the second key.

1. To clear the display at any time, press "SPC" first and simultaneously press "VOL".

2. Commands used to display specific functions are:

Displayed Function	To Display		To Clear	
	First Key	Second Key	First Key	Second Key
--LLLL --(1)	AR	7	SPC	VOL
In Use	AR	8	AR	9
No Serv (2)	AR	VOL	AR	VOL
Roam	AR	GRP	AR	CLR
Horn	AR	*	AR	#

3. Commands used to backlight the keys and the display are:

Function	First Key	Second Key
Increment the Backlight	AR	3
Decrement The Backlight	AR	4

The backlight has eight levels of intensity; therefore, it can be incremented eight times and decremented eight times. The second key can be pressed more than eight times but it will stay at its highest level when incrementing and will stay off while decrementing.

(1) To display any other functions, this one must be cleared off the display first. All other functions can be displayed together.

(2) No Service.

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WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

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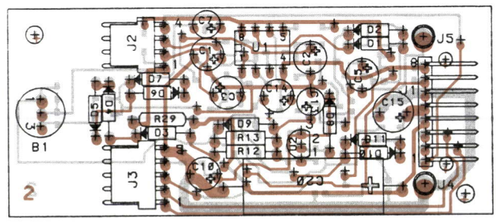
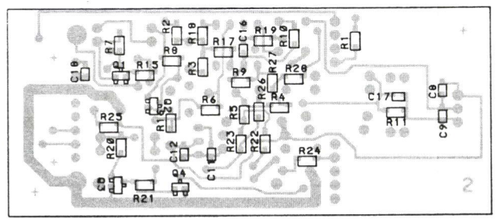
INTERFACE BOARD



(19D901029, Rev. 2)
(19A703331, Sh. 1, Rev. 2)
(19A703331, Sh. 2, Rev. 2)

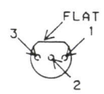
(All components are 100 series.
Example. Parts list C120 = C20)



BOTTOM VIEW OF BOARD

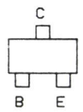
(19D901029, Rev. 2)
(19A703331, Sh. 2, Rev. 2)

LEAD IDENTIFICATION
FOR U2



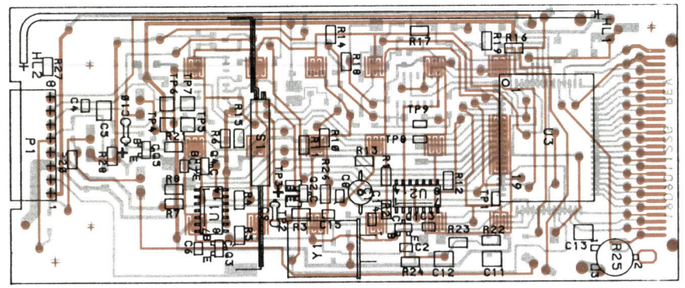
IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING
FACTOR FOR LEAD IDENTIFICATION.

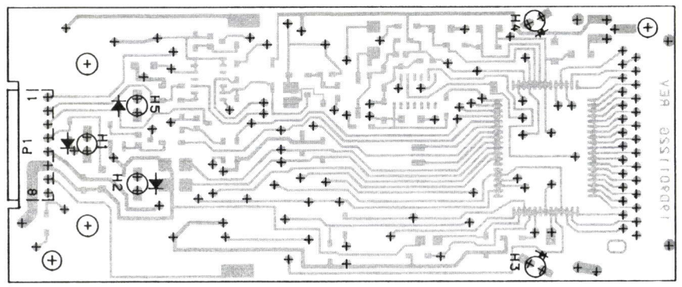


LEAD IDENTIFICATION FOR:
Q1-Q4

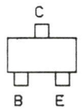
LOGIC BOARD



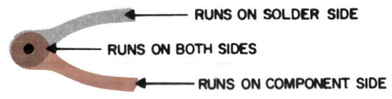
(19D901175, Rev. 0)
(19A703251, Sh. 1, Rev. 0)
(19A703251, Sh. 2, Rev. 0)



(19D901175)
(19A703251, Sh. 2, Rev. 0)

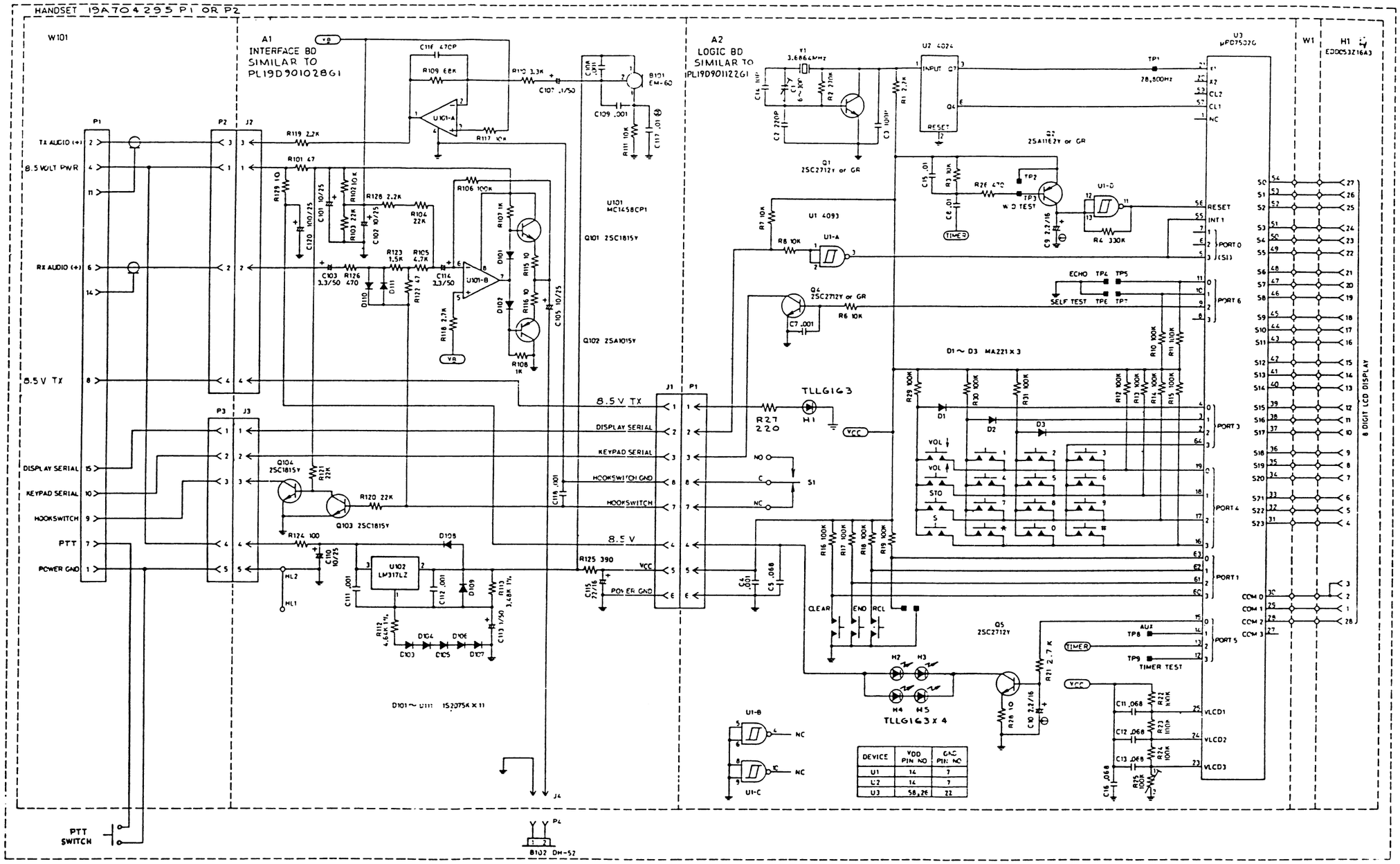


LEAD IDENTIFICATION FOR:
Q1-Q5



OUTLINE DIAGRAM

INTERFACE & LOGIC BOARDS



CHANGES REQ'D TO CONVERT EXISTING HANDSET (DIAG, SCHEM 19D901381)
TO GE MARC CLASSIC II HANDSET:

1. ADDED PTT SWITCH
2. W101 P1-8 FUNCTION WAS "ON/OFF."
3. W101 P1-7 FUNCTION WAS "CU POWER HOT."
4. DELETED R127 (220K), Q3, C6 (.001) & R5 (10K).
5. VALUE OF R27 WAS 820Ω & WAS CONNECTED TO "CU POWER."
6. DELETED R20 (10Ω). R20, H2, H3, H4 & H5 WERE CONNECTED IN SERIES.
7. R102 WAS 15K, R129 WAS 68, R21 WAS 3.9K, R28 WAS 22.

(19D901463)

SCHEMATIC DIAGRAM

CELLULAR HANDSET
19D901463

Issue 1

PARTS LIST

GE-MARC V●E CLASSIC II HANDSET
19A704295P1 BLACK KEYPAD HOUSING
19A704295P2 PEBBLE BEIGE KEYPAD HOUSING
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
A1		INTERFACE BOARD
		- - - - - - - - - - CARTRIDGES - - - - - - - - - -
B101	19J706041P1	Microphone cartridge: 200-850 ohms output imp., 1.5 to 10 VDC; sim to Primo EM-60.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	19A701534P10	Tantalum: 10 uF ±20%, 25 VDCW.
C102	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C103	19A701534P15	Tantalum: 3.3 uF ±20%, 35 VDCW.
C105	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C107	19A701534P1	Tantalum: 0.1 uF ±20%, 35 VDCW.
C108 and C109	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C110	19A701534P10	Tantalum: 10 uF ±20%, 25 VDCW.
C111 and C112	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C113	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C114	19A701534P15	Tantalum: 3.3 uF ±20%, 35 VDCW.
C115	19A701534P8	Tantalum: 0.47 uF ±20%, 35 VDCW.
C116	19A702052P3	Ceramic: 470 pF ±10%, 50 VDCW.
C117	19A701052P14	Ceramic: .01 uF ±10%, 50 VDCW.
C118	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C120	19A700064P4	Electrolytic: 100 uF, -10+150%, 250 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D101 thru D111	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - - JACKS - - - - - - - - - -
J101	19B801146P1	Ceramic: 6-25 pF, 150 VDCW; sim to Johanson 9636SL.
J102	19A700072P134	Printed Wire
J103	19A700072P135	Printed wire: 5 contacts rated at 2.5 amps; sim to Molex 22-05-3051.
J104 and J105	19A115834P10	Contact, electrical; sim to AMP 1-380-737-0.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q101	19A700076P1	Silicon, NPN.
Q102	19A700059P1	Silicon, PNP.
Q103 and Q104	19A700076P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	19B800607P470	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 w.
R102	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R103 and R104	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R105	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R106	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R107 and R108	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R109	19B800607P683	Metal film: 68K ohms ±5%, 200 VDCW, 1/8 w.
R110	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R111	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R112	19A701250P265	Metal film: 4.6K ohms ±1%, 1/4 w.
R113	19A701250P253	Metal film: 3.48K ohms ±1%, 1/4 w.
R115 and R116	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R117	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R118	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R119	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R120 and R121	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R122	19B800607P470	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 w.
R123	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R124	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R125	19B800607P391	Metal film: 390 ohms ±5%, 200 VDCW, 1/8 w.
R126	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R128	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R129	19A700019P13	Deposited carbon: 10 ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U101	19A700086P4	Operation Amplifier, Dual OP AMP; sim to 4558 Type.
U102	19A701999P3	POSITIVE VOLTAGE REGULATOR; sim to LM317T.
A2		LOGIC BOARD
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19B800873P10	Ceramic: 6-25 pF, 150 VDCW; sim to Johanson 9636SL.
C2	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C3	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C4	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C5	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C7	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C8	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C9 and C10	19A701779P13	Tantalum: 2.2 uF ±20%, 10 VDCW.
C11 thru C13	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C14	19A702061P13	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C15	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
H1 thru H5	19A703595P3	Optoelectronic: green; sim to Hewlett Packard HLMP-1540
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A700041P82	Printed wiring: 8 circuits; sim to Molex 22-01-2085.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A700076P1	Silicon, NPN.
Q2	19A700059P1	Silicon, PNP.
Q4 and Q5	19A700076P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P274	Metal film: 270K ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P334	Metal film: 330K ohms ±5%, 200 VDCW, 1/8 w.
R6 thru R8	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R10 thru R19	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R21	19B800607P392	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 w.
R22 thru R24	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R25	19A700016P7	Variable, cermet: 10K to 100K ohms ±10%, 1/2 w.
R26	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R27	19B800607P221	Metal film: 220 ohms ±5%, 200 VDCW, 1/8 w.
R28	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A701942P1	Relay: red, rated at 1 amp 200 v.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A703614P1	CMOS QUADRUPLE-2 INPUT-NAND SCHMITT TRIGGER; SIM TO 4093B5 ON 4093BM.
U2	19A702989P2	CMOS 7 STAGE BINARY COUNTER; sim to 4024BT.
U3	19A703399P1	CMOS LCD DRIVER; sim to 7502.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1	19A702511G9	Crystal Unit, 3.6864 MHz.
		ASSOCIATED PARTS
	19B801157P1	8 digit LCD.
	19D901084P1	Cable handset.
	19A702460P1	Speaker lead.
	19B801029P1	LCD support.
	19B801085P1	Striker plate.
	19B801086P1	Speaker support.
	19A137410P1	Busing nut.
	19A703685P1	LCD connector.
	19D901022P1	18 button key pad.
	19B801087P1	Mike support.
	19C851151P1	Plastic window.
	19C851166G1	Housing handset. (Black).
	19D901080P1	Frame handset. (Black).
	19D901195G1	Lightpipe.
	19B801051P2	Nameplate.
	19A703545P1	Speaker.
	19A702364P310	Screw, TORX®Drive: No. M3 x 10.
	19A702362P206	Machine screw: M2.5-.45 x 6.
	19A703917P1	Card holder - Telephone number.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES