MAINTENANCE MANUAL
RADIO
FRONT ASSEMBLY
19D902177G1 (2 Channels)
19D902177G2 (8 Channels)

TABLE OF CONTENTS

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DESCRIPTION

The Radio Front Assembly (19D902177) for the PCS™ Personal Synthesized Radio consists of the following:

- Front Cap Assembly 19D902180G1
- Audio/Logic Board 19D902142G1/G2
- Metal Over Elastomer (MOE) Connector 19A705662P1 and Holder 19B801570P2

The Front Cap Assembly consists of a **LEXAN™** front housing, a control assembly and a speaker. The control assembly houses all operator switches, Liquid Crystal Display (LCD) and microphone. The Metal Over Elastomer Connector interfaces the printed runs on the control assembly to the printed runs on the Audio/logic board.

FRONT CAP ASSEMBLY

Front Cap Assembly 19D902180G1, for the General Electric **PCS™** Personal Radio, consists of a molded plastic circuit board (Control Frame), a Liquid Crystal Display (LCD) assembly, switches for the basic radio functions and a User Device Connector (UDC) all mounted in a plastic front housing. The Assembly Diagram listed in the Table of Contents shows two views: a pictorial view of the Control Assembly and a view of the Control Assembly mounted into the radio front housing. The Control Frame acts like a three dimensional printed circuit board. The base material is "ULTEM" which is a molded plastic with a two layer printed circuit pattern on the outside perimeter of the frame. This structure interfaces several electrical components as follows:

- Control Switches
- Liquid Crystal Display (LCD)
- Microphone
- Speaker
- User Device Connector (UDC)
- Microprocessor
- EEPROM
- RX Audio Processing
- TX Audio Processing
- Regulators and Special Circuits

AUDIO/LOGIC BOARD

Audio/Logic Board 19D902142 mounts in Front Cap Assembly 19D902180G1 as shown in Figure 1. All Front Cap switch operations are connected to the Audio/Logic Board through the MOE interface connector. A microprocessor on the Audio/Logic Board interprets these commands and issues commands to the Audio/Logic circuits, the RF circuits and the LCD module on the control assembly. The MOE is again the transmission path between assemblies. The Microphone and speaker audio is also transferred through the MOE path (Refer to Figure 2 for a block diagram of the microprocessor and associated circuitry and Figure 3 for a block diagram of the audio paths).

The Audio/Logic Board consists primarily of the following:

CIRCUIT ANALYSIS

FRONT CAP ASSEMBLY

Control Switches

A "**Dome**" switch pad adheres to the control frame. These switches are domed metal switches which makes direct contact with runs on the control frame. The switches include the PTT, monitor, channel up, volume up and volume down controls. Refer to the Schematic Diagram listed in the Table of Contents for switch operation. A rubber keypad fits over the switch assembly for operator interface and weather protection.

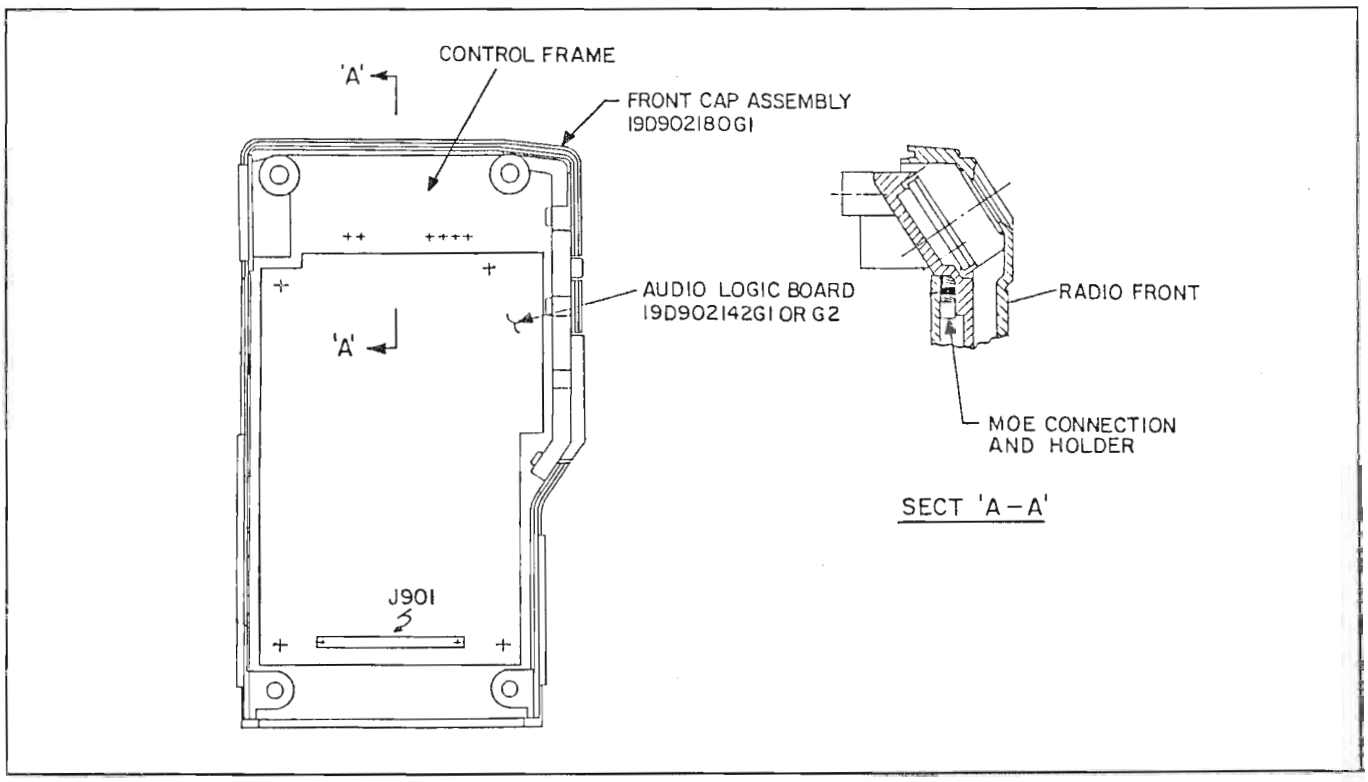

Figure 1 - Radio Front Assembly

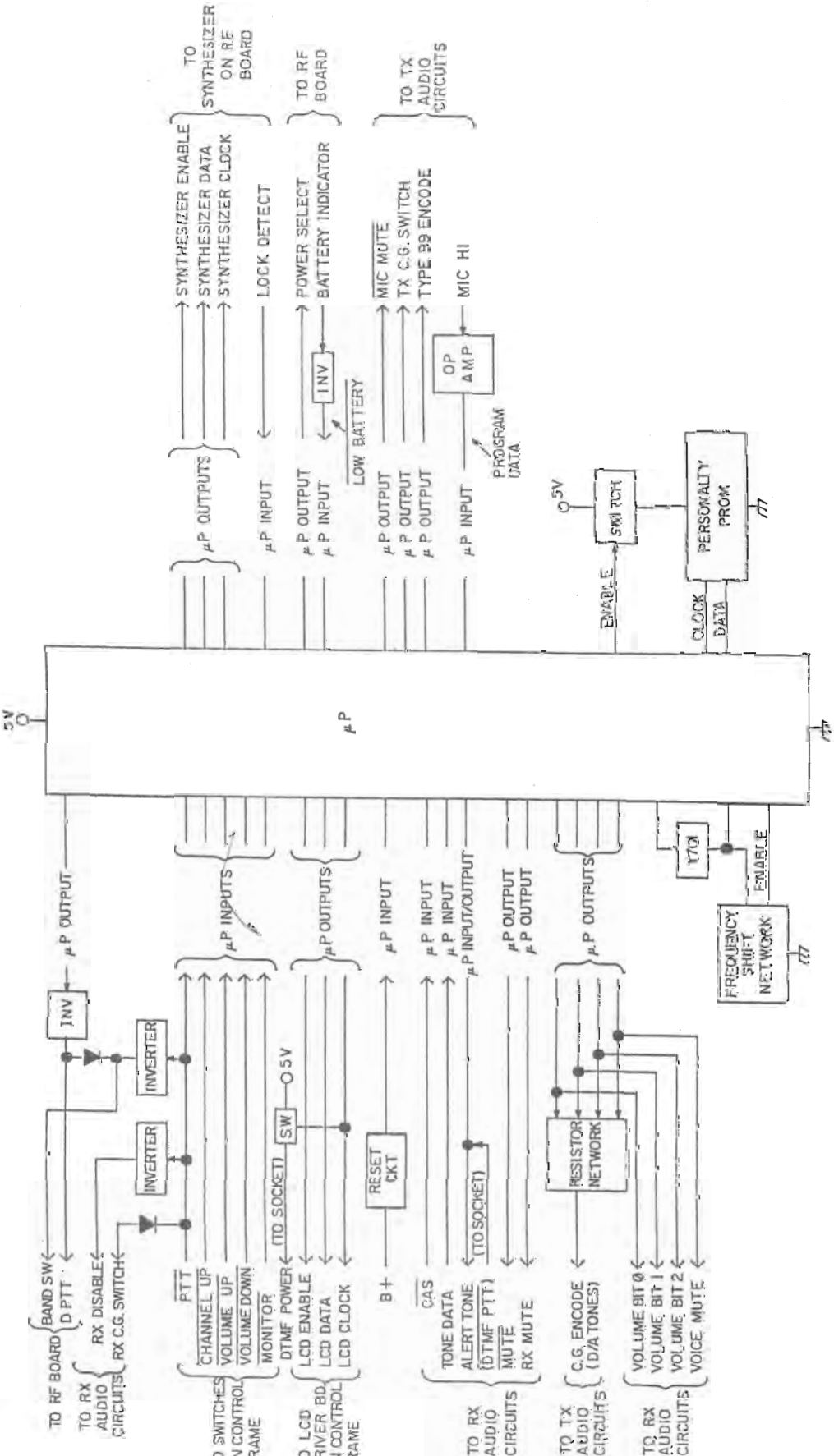

Figure 2. Microprocessor Block Diagram

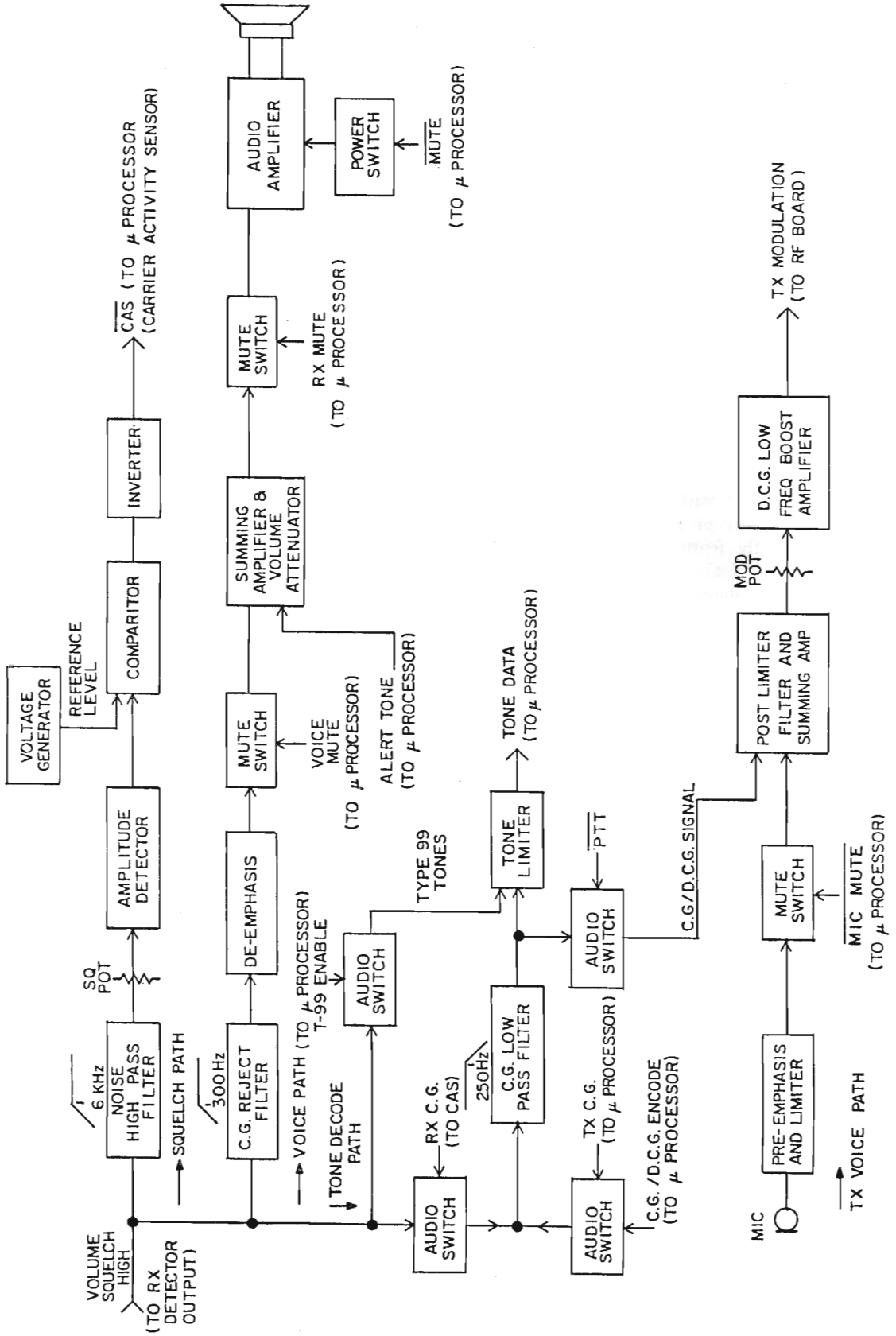

Figure 3 - Audio Paths Block Diagram

FRONT ASSEMBLY

Liquid Crystal Display (LCD)

The LCD assembly consist of LCD driver board A1, a diffuser, two zebra strips, the LCD and a lens. This assembly is held together by the lens. The primary function of this board is to light LCD segments as controlled by the radio microprocessor located on the Audio/Logic Board. Another function of this board is to provide backlighting of the LCD module. This is accomplished by using four LED devices (D1 - D4). These LED's are turned on by **LCD DAT/LT** line and powered by a voltage switching circuit consisting of chip transistors Q1 and Q2. The diffuser placed immediately above the LED's evenly distributes the light. The zebra strips connect the driver board to the LCD. This entire assembly is soldered to the control frame through six pins.

Microphone And Speaker

The microphone (B901) mounts directly onto the control frame (HL1 and HL2). The control assembly, when placed into the Radio Front Assembly, is located in the correct position for receiving voice when used. The speaker, mounted in the front housing, connects to the control frame (HL3 and HL4) through two wires. A protective grill cloth is placed in the front housing before the speaker is mounted to screen out foreign material.

User Device Connector (UDC)

Part of the control frame forms UDC connector U901 for customer programming and for connecting external options. The speaker leads, mic high and $\overline{\text{PTT}}$ are all brought to this connector along with ground. The mic lead and one of the speaker leads are switched to the UDC only when microswitches S1 and S2 are operated. These switches are activated by plungers on compatible PCS Personal Radio options. A rubber boot is placed over this connector for weather protection.

AUDIO/LOGIC BOARD

Microprocessor (80C51)

An 8-bit microprocessor is used to provide all of the control signals required by the radio. The microprocessor also generates Channel Guard tones and detects Channel Guard and Type 99 tones.

The microprocessor (U1) is located on Spur Filter Board A701. This board consist of RC filters on each port of the processor and a metal can soldered on top of the board to reduce the effect of microprocessor-generated spurious signals.

Microprocessor Port Pin Definitions

Port Pins **I** = Input
O = Output
I/O = Bidirectional

P0.0 (O)	Channel Guard encode bit 0/ Volume attenuator bit 0
P0.1 (O)	CG encode bit 1/Volume attenuator bit 1
P0.2 (O)	CG encode bit 2/Volume attenuator bit 2
P0.3 (O)	CG encode bit 3/Voice mute
P0.4 (I)	$\overline{\text{Low Battery}}$ indication (active low)
P0.5 (O)	Transmit CG switch (active high)
P0.6 (O)	$\overline{\text{Delayed PTT}}$ (active low)
P0.7 (O)	$\overline{\text{Mute}}$ (active low)
P1.0 (I)	$\overline{\text{Monitor}}$ (active low)
P1.1 (I)	$\overline{\text{Vol Up}}$ (active low)
P1.2 (I)	$\overline{\text{Vol Dn}}$ (active low)
P1.3 (I)	$\overline{\text{Ch Up}}$ (active low)
P1.4 (I)	$\overline{\text{CAS}}$ (active low)
P1.5 (O)	Xtal switch (active high)
P1.6 (O)	$\overline{\text{Mic mute}}$ (active low)
P1.7 (O)	Power select
P2.0 (O)	LCD enable
P2.1 (O)	LCD data
P2.2 (O)	LCD clock
P2.3 (O)	Receive mute (active high)
P2.4 (O)	Type 99 enable (active high)
P2.5 (O)	Synthesizer clock
P2.6 (O)	Synthesizer data
P2.7 (O)	Synthesizer enable
RXD(I)	Programmer data in
TXD(I/O)	Programmer data out/$\overline{\text{PTT}}$

P3.2 (I) Tone data in

P3.3 (I) Lock detect (active high)

P3.4 (O) Alert tone

P3.5 (O) EEPROM power enable

P3.6 (O) EEPROM clock

P3.7 (I/O) EEPROM data

EEPROM

The 512 X 8 - bit **EEPROM** (U701), commonly referred to as the personality **PROM**, stores customer information as follows:

- Customer frequencies
- Customer tones
- Customer Options

Using this **EEPROM** provides the convenience of programming without opening the radio.

Programming of the **EEPROM** is accomplished by driving the **MIC HI** lead. This lead is connected to operational amplifier circuit U302-B. With no external signal connected to **MIC HI**, a voltage level of approximately 2.25 volts is at **MIC HI**. This causes the output of U302-B, the program data line, to be high. If the **MIC HI** is pulled low, the program Data line is pulled low. If this line remains low for 20 milliseconds or greater, the microprocessor is put in the programming mode. Once in this mode, the radio will not operate or respond to any front case button. The radio must be turned off and then back on to get the processor out of this mode. If programming is actually done, the processor will be taken out of the programming mode by the proper character from the personal computer programmer.

Rx Audio Processing

Voice Path

Received audio enters the Audio/Logic Board at J801, Pin 10. Frequencies below 300 Hz are attenuated by the Channel Guard reject filter consisting of U602A and associated circuitry.

The output from the CG reject filter is coupled through voice mute switch transistor Q603 to the volume attenuator circuit U602B and resistors R632 through R640. Here the 500 Hz Alert tone, generated by the microprocessor, can be added to the received audio. The volume attenuator has a range of 48 dB. The attenuator output is coupled through **RX MUTE** switching transistor Q606 to audio amplifier transistor U604. Power is supplied to the audio amplifier by transistor Q605 and controlled by the **MUTE** line from the microprocessor. Amplifier U604 drives the speaker with differential outputs, which are also connected to the accessory connector through the Control Assembly.

A 6 dB/octave de-emphasis is provided by capacitor C615 and resistor R628 in the CG reject filter. Capacitor C622 and resistor R645 provide additional roll-off at higher frequencies.

Squelch Path

The squelch circuit operates on the noise components contained in the discriminator output. The signal at J801, Pin 10 is applied to a high-pass filter consisting of U601B and associated circuitry. The output of U601B is noise in a band around 6 kHz. The gain of the high-pass filter is determined by squelch potentiometer R608.

The output of U601B is rectified by U601A, resistors R610 through R612 and capacitors C607 and C608. This DC signal is then input to comparator U601D. If the rectified noise is more than approximately 0.20 V DC the **CAS** line is high and the microprocessor mutes the audio. Resistor R613 and R615 provide about 2 dB of hysteresis. Resistors R614, R662, R663 and thermistor R664 are used for temperature compensation or the threshold level.

The threshold level is temperature compensated at cold temperatures only. This is necessary because of a drop in the **VOL/SQ. HI** noise level. ThermisterorR664 has a negative temperature coefficient. At 25°C and above, the thermistor has little effect on the threshold voltage level at U601B, Pin 12. At temperatures below 25°C, the resistance increases exponentially, thereby causing a drop in the threshold voltage. This voltage drop approximately tracks the voltage drop at the detected noise terminal, U601B, Pin 13.

Limited Tone Data Path

Limited Tone Data is the 5 Volts (Peak-to-Peak) representation of a received tone and is fed to the microprocessor where the actual tone decoding occurs. This circuit consists of a low-pass filter for voice rejection and a voltage comparator.

The low-pass filter consists of U606A and associated circuitry. This filter is used for both Channel Guard encoding and decoding. The filter has a breakpoint at 210 Hz. Type 99 decoding is done by bypassing the low-pass filter and going directly to comparator U606B.

TX Audio Processing

Audio from the microphone is applied to a 6 dB/octave pre-emphasis network consisting of capacitor C301 and resistor R306 and then to amplifier-limiter U301A. The output of U301A is coupled through mic mute switch U605C to the post-limiter filter consisting of U302A and associated circuitry. Transmit Channel Guard tones are added to the microphone audio at the post-limiter filter.

The transmit signal is applied to the low-frequency boost circuit U303A, U303B and associated circuitry. The transmit deviation is set by MOD potentiometer R321.

The low frequency boost circuitry provides an increasing output level as the input frequency decreases below 20 Hz. The shape of the response curve is shown in Figure 4. This shape is intended to be the mirror image of the synthesizer frequency response curve. The combined result of these two curves provide relatively flat modulation below 5 Hz. This is necessary for Digital Channel Guard modulation.

Regulator and Special Circuitry

+ 5 Volt Regulator

A +5 volt regulator (U802) supplies power to the microprocessor and all other circuitry requiring + 5 volts. A voltage divider provides the input to U601-C to generate a 2.25 volt reference for operational amplifier biasing.

Low Voltage Reset

Voltage detector U801 along with transistor Q803 provides the micrioprocessor with the necessary reset signal during the power up routine and also resets the microprocessor when the battery falls below approximately 4.75 volts (Refer to Figure 5).

Low Battery Indicator

When the battery voltage drops to approximately 6.3 volts, the **BATT IND** line from the RF board is sufficiently high to turn on transistor Q802. The output of Q802, the low battery line, drives a microprocessor port. This action turns on the **BAT** pixel on the LCD.

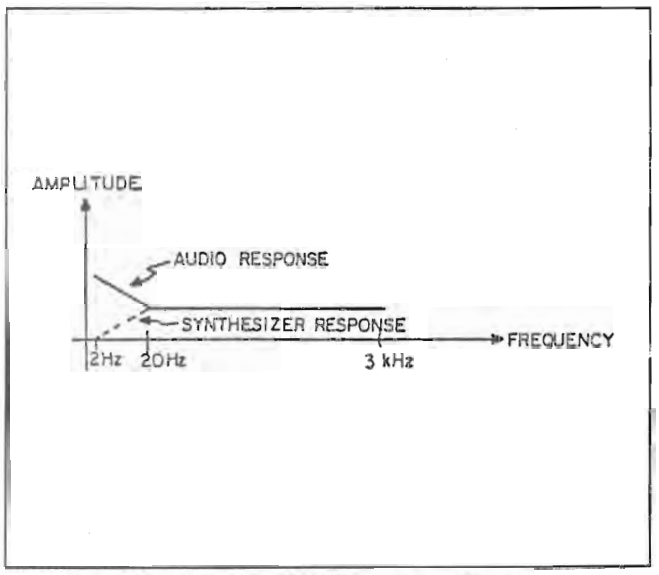

Figure 4 - Audio Response Curve

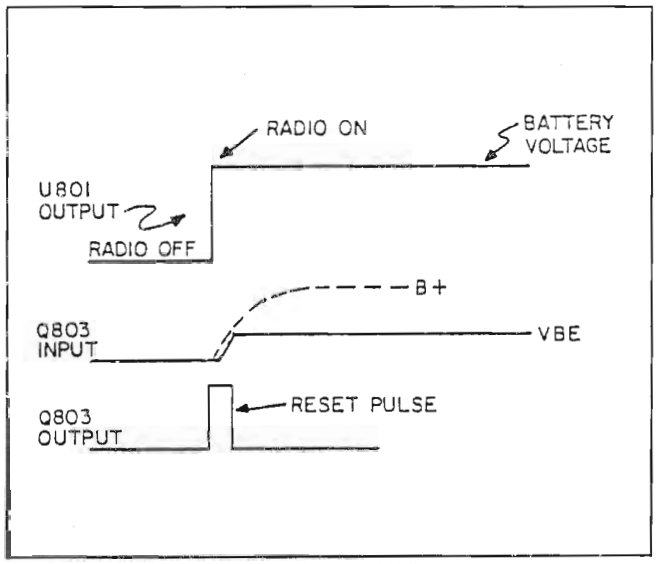

Figure 5 - Voltage Waveforms

User Input

Control assembly connector J901, located on the Audio/Logic Board, provides and interface between the user and the radio. By pressing buttons on the switch panel, the user may change the volume level or channel, monitor a channel, or key the transmitter. The LCD is updated to reflect the current status of the radio. The microprocessor configures the LCD through **LCD EN** (P2.0), **LCD DAT** (P2.1) and **LCD CLK** (P2.2).

Synthesizer Programming

After a reset, when toggling between transmit and receive, and any time a new channel is selected, the microprocessor must reprogram the synthesizer through **SYN CLK** (P2.5), **SYN DAT** (P2.6) and **SYN EN** (P2.7). When locked, the **LOCK DET** line (J9801-11) is high.

Alert Tone

The microprocessor generates a 500 Hz alert tone (P3.4) used to signal the user of critical events. These events include synthesizer out of lock and activation of the volume up, volume down and channel up buttons. The alert tone can be disabled by the programmer.

Microprocessor Xtal Frequency Pull

Port P1.5 of the microprocessor is used to switch a 33 pf capacitor (C701) into the crystal oscillator circuit. The effect of adding this capacitor is to move or pull the xtal frequency approximately 250 ppm. This is done to keep harmonics of the microprocessor **ALE** line away from the receive channel frequency.

The programming at this point happens automatically when channel frequencies are initially programmed.

FRONT ASSEMBLY

ERICSSON

Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

Printed in U.S.A.

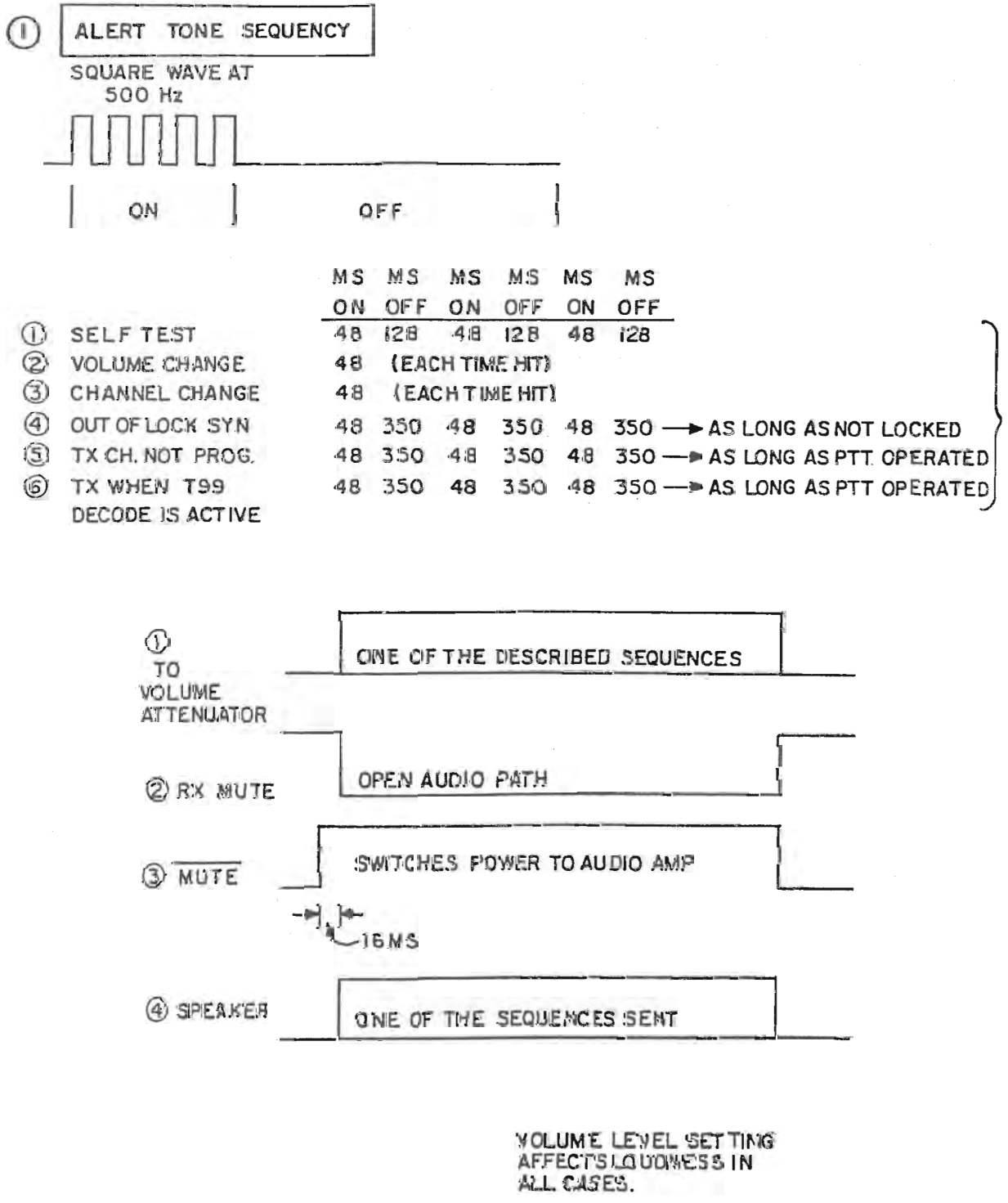

Figure 6–Alert Tone Sequences

② RX — SQUELCH OPERATION

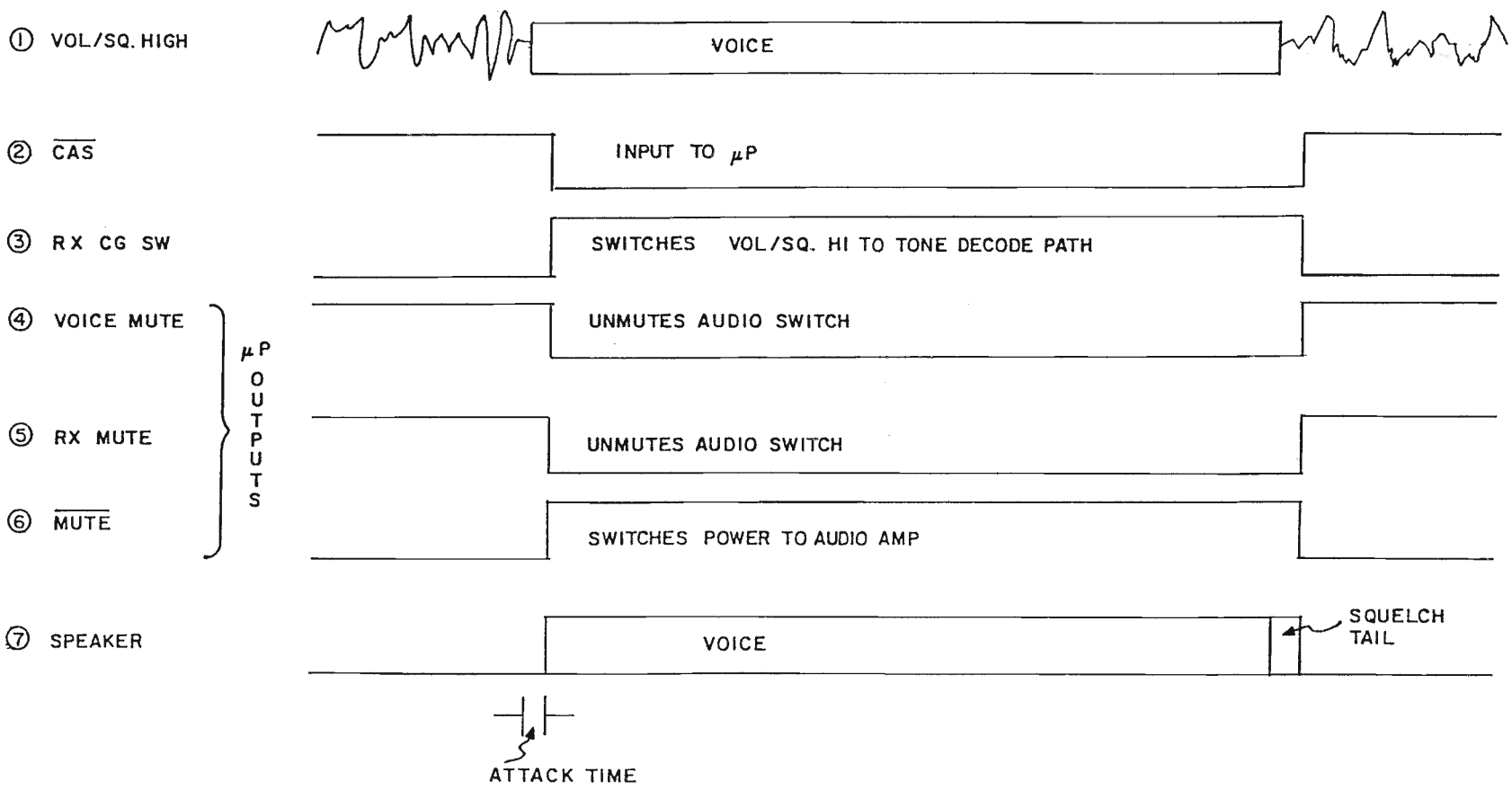

Figure 7 - RX Squelch Operation

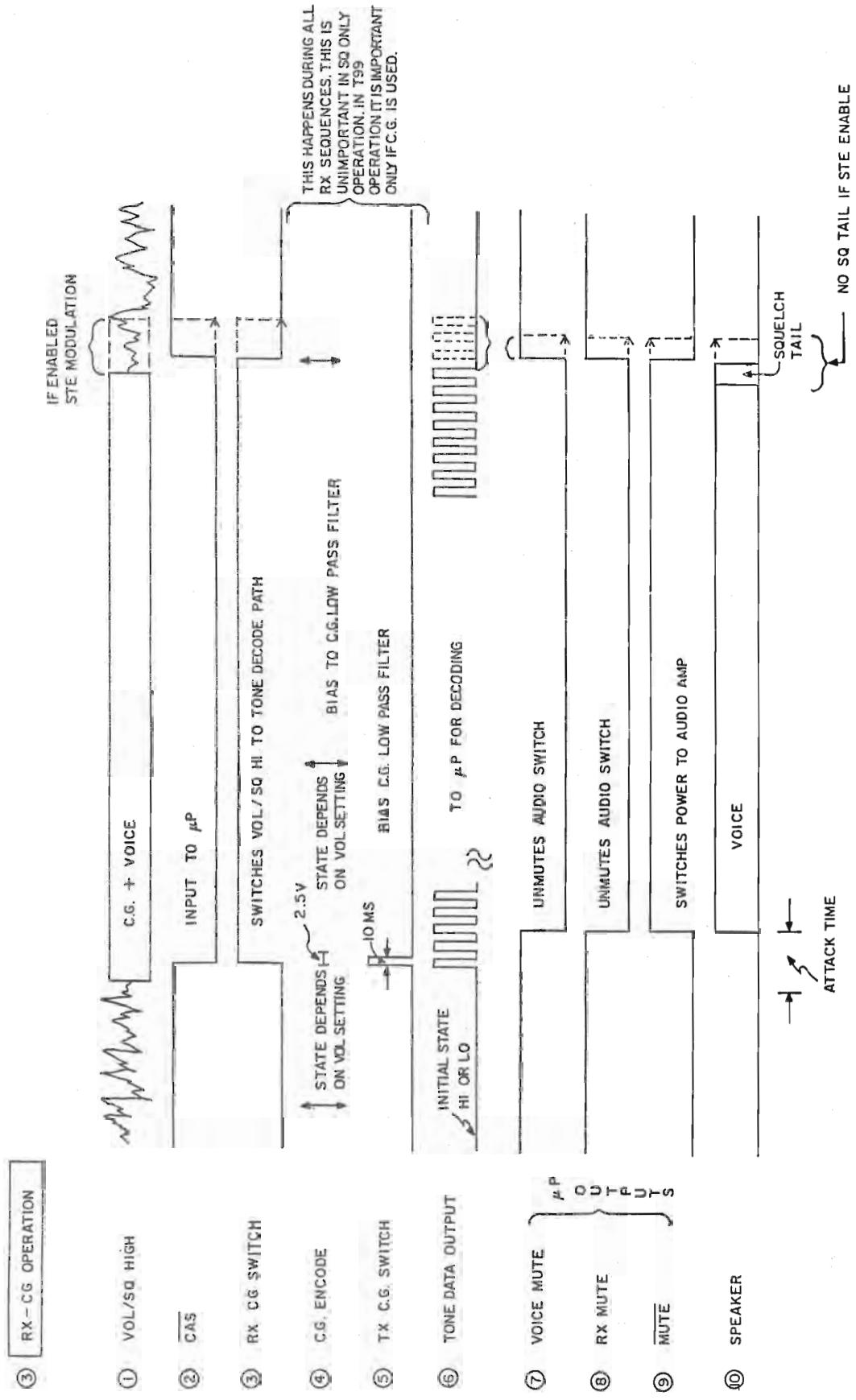

Figure 8 - RX Channel Guard Operation

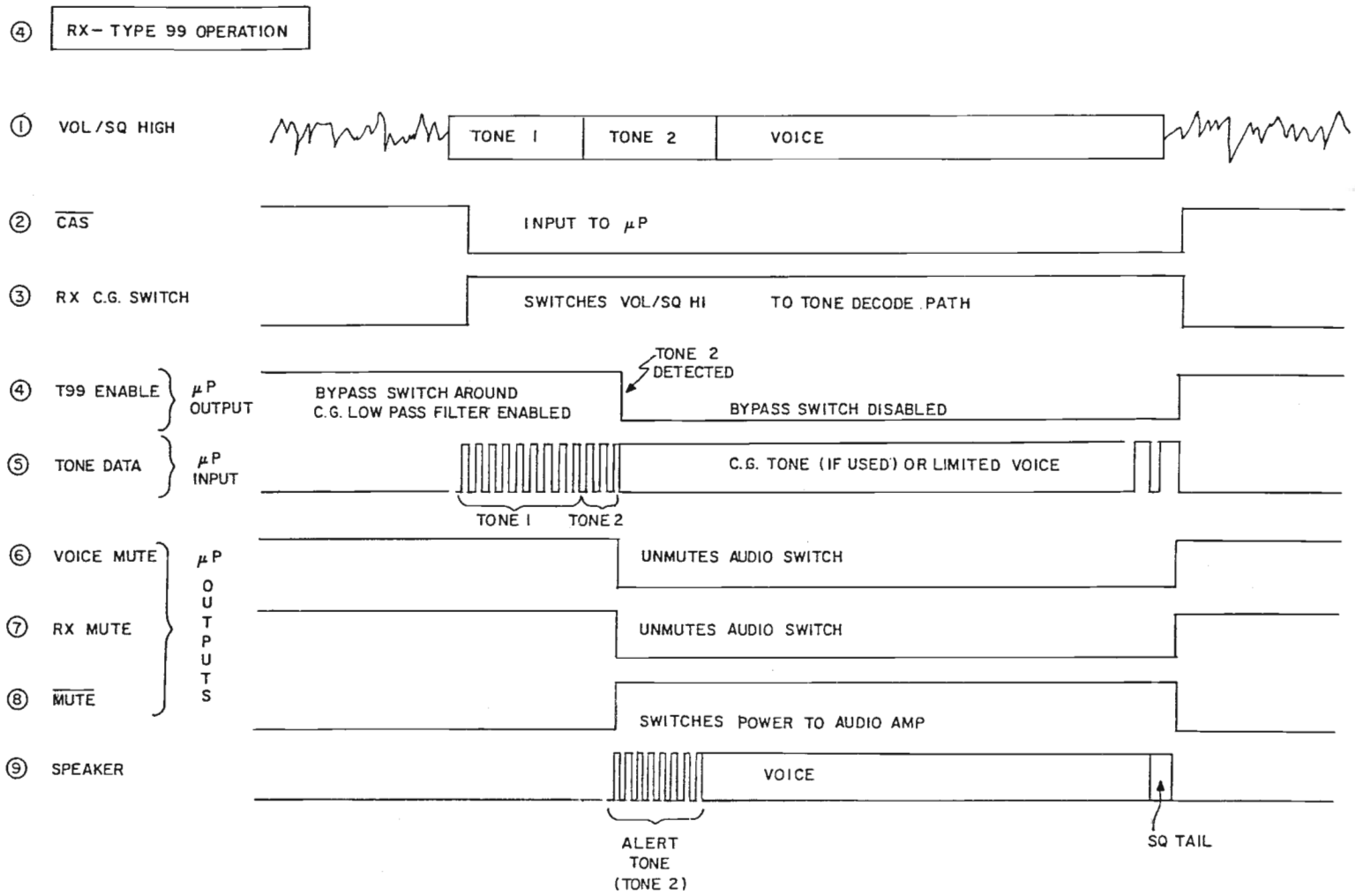

Figure 9 - RX Type 99 Operation

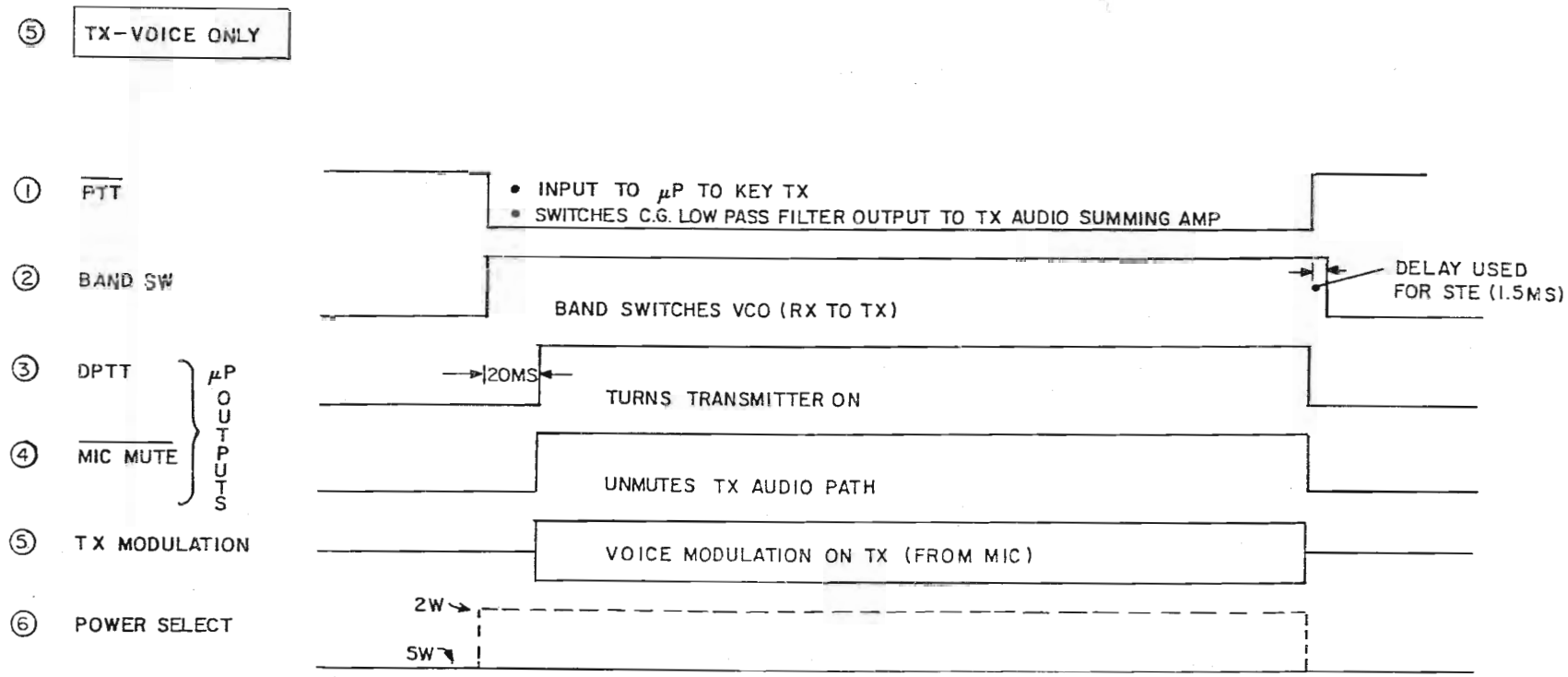

Figure 10 - TX Voice Only Operation

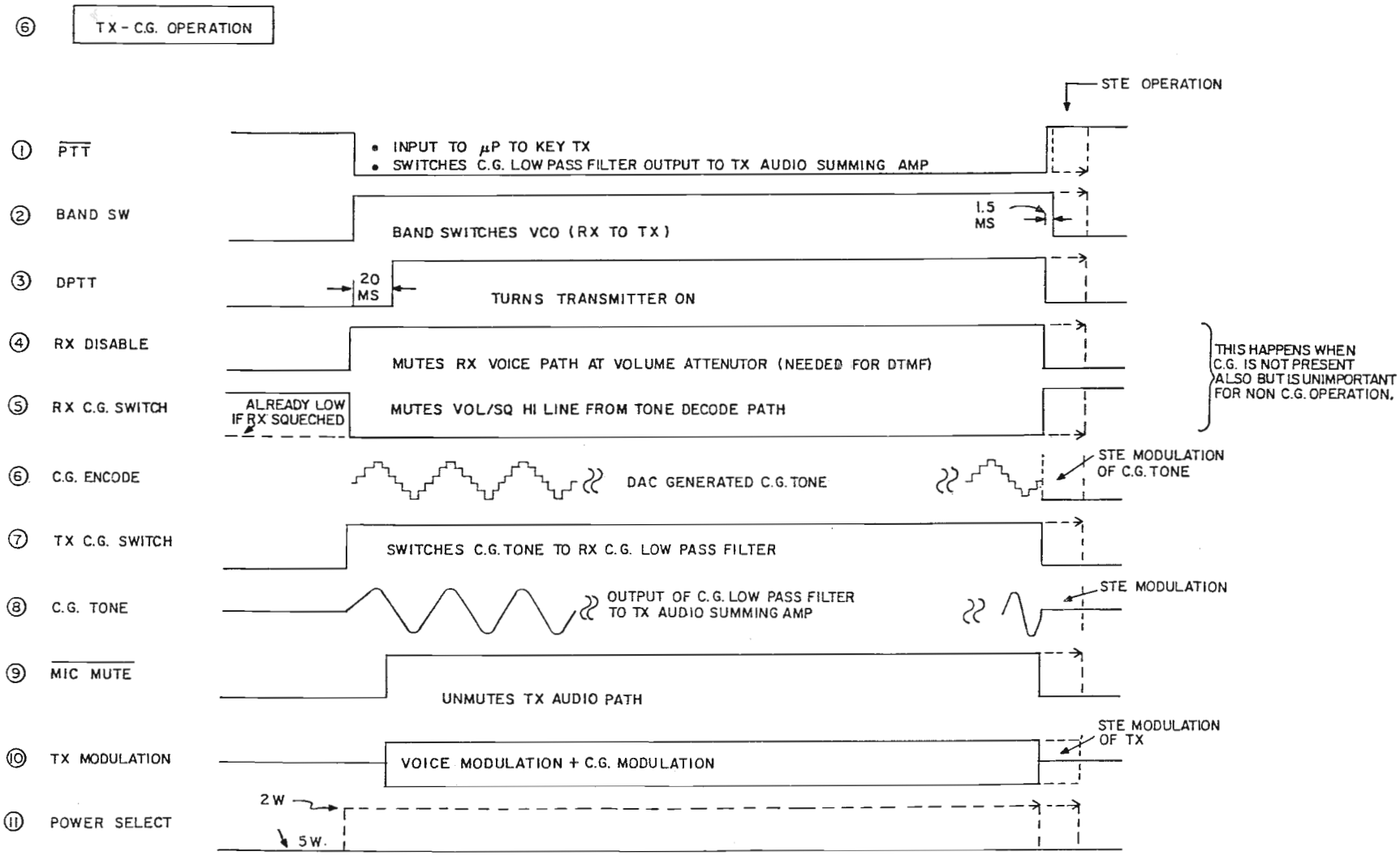

Figure 11 - TX Channel Guard Operation

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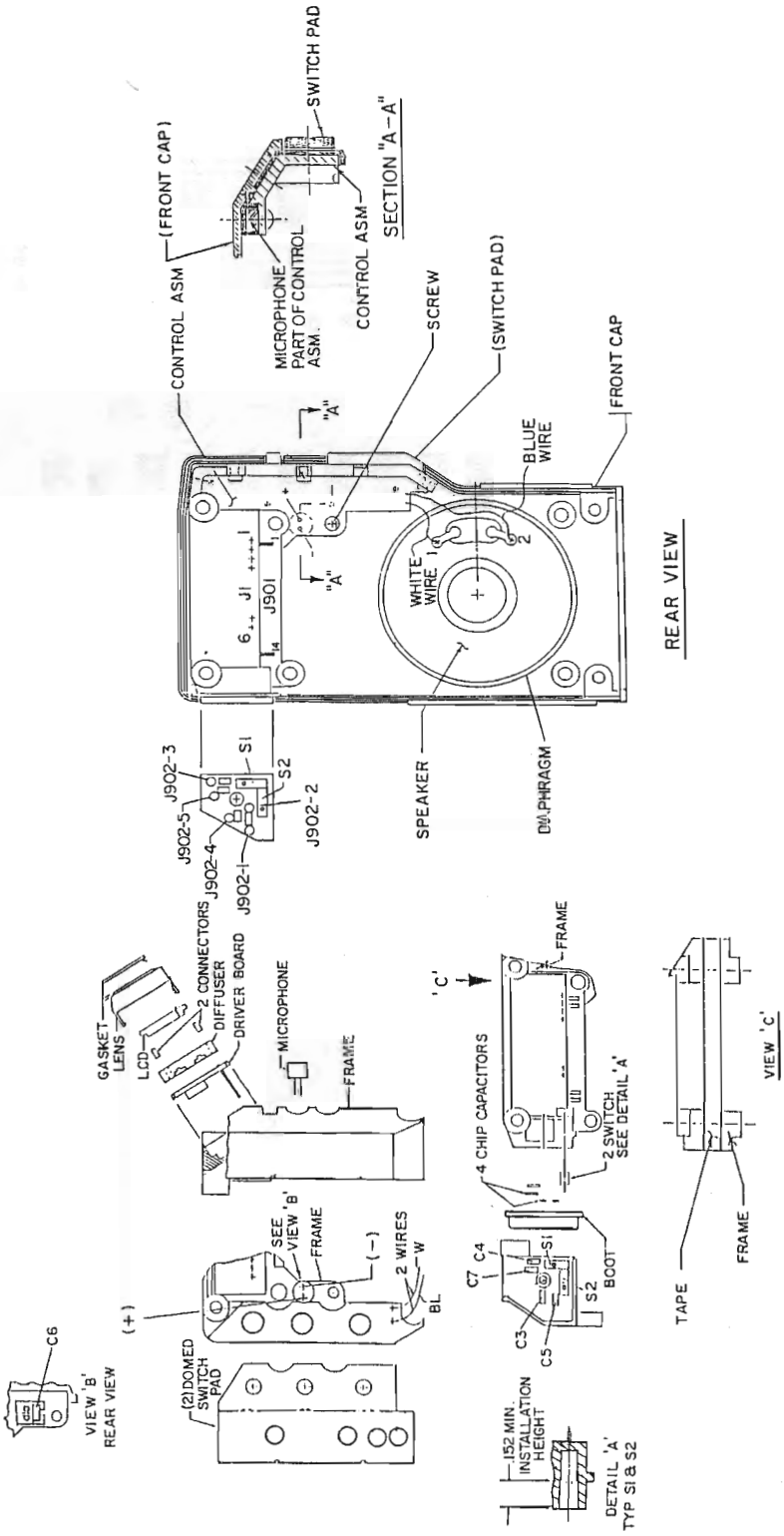
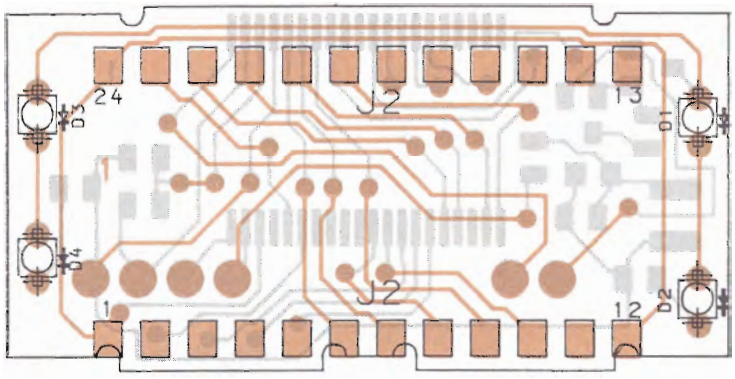


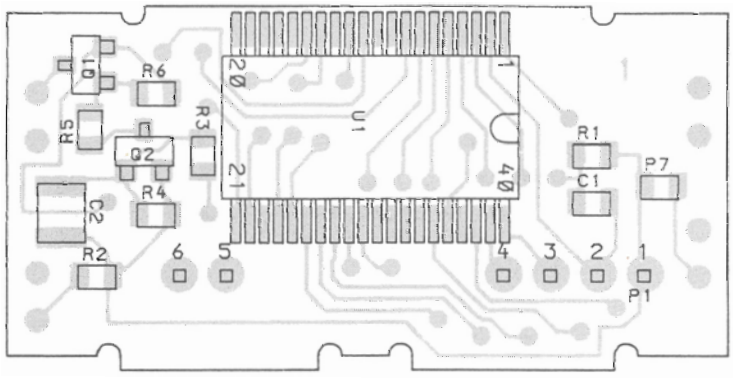
FRONT CAP ASSEMBLY
19D902180G1

COMPONENT SIDE

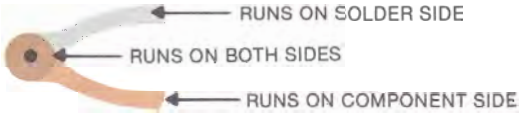


(19C851720, Rev. 0)
(19C851721, Component Side, Rev. 1)
(19C851721, Solder Side, Rev. 1)

SOLDER SIDE

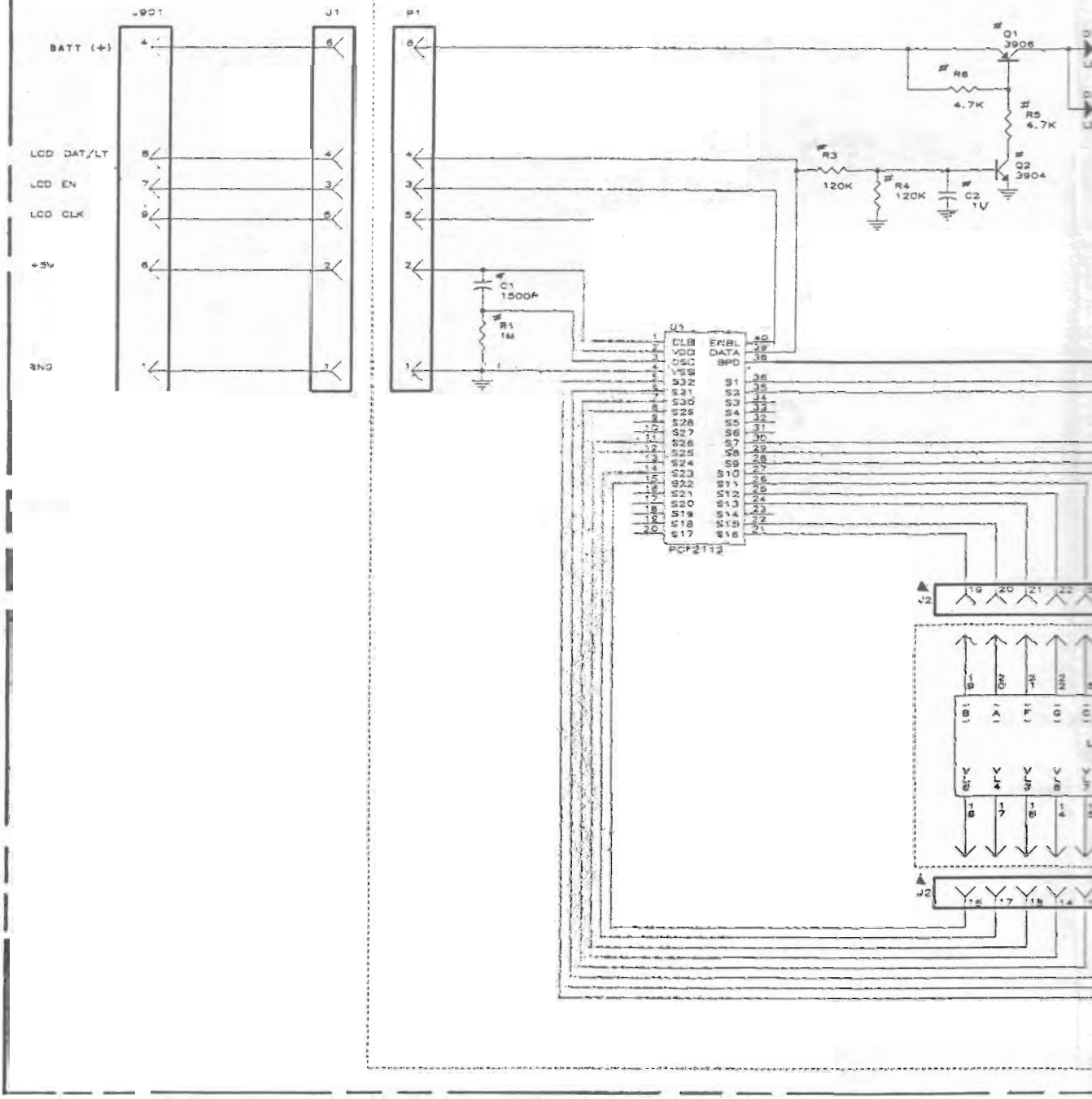


(19C851721, Solder Side, Rev. 1)



LCD BOARD
19C851720G1

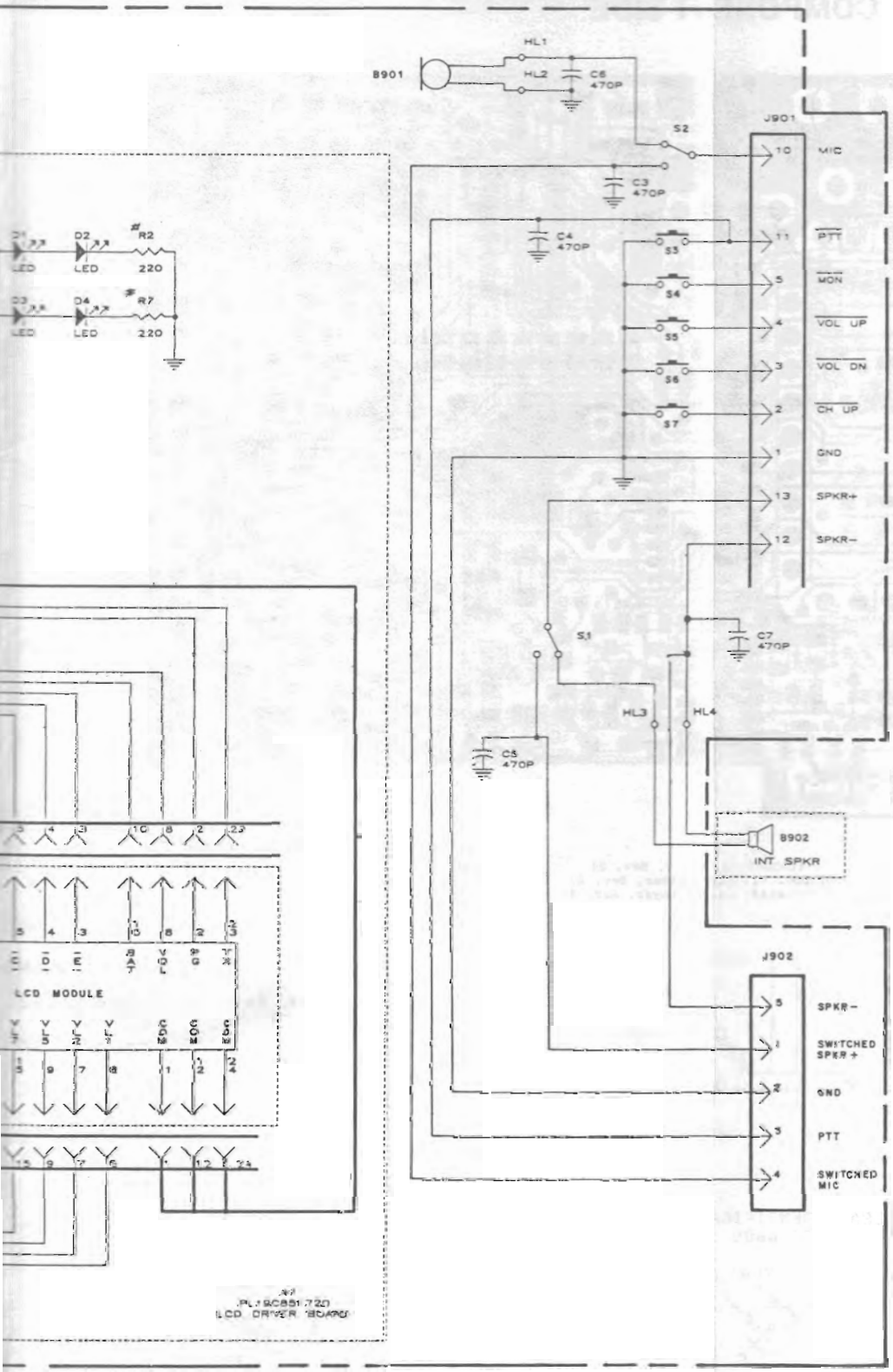
CONTROL ASM
19A705090



NOTES:
1. ALL RESISTORS ARE 1/4W UNLESS OTHERWISE SPECIFIED.
   RESISTOR VALUES IN EXCESS FOLLOWED BY MULTIPLIER K OR M.
   CAPACITOR VALUES IN EXCESS FOLLOWED BY MULTIPLIER U,N OR P.
   INDUCTANCE VALUES IN EXCESS FOLLOWED BY MULTIPLIER M OR U.

2. * INDICATES CHIP COMPONENTS.

3. ▲ PART OF PWB.

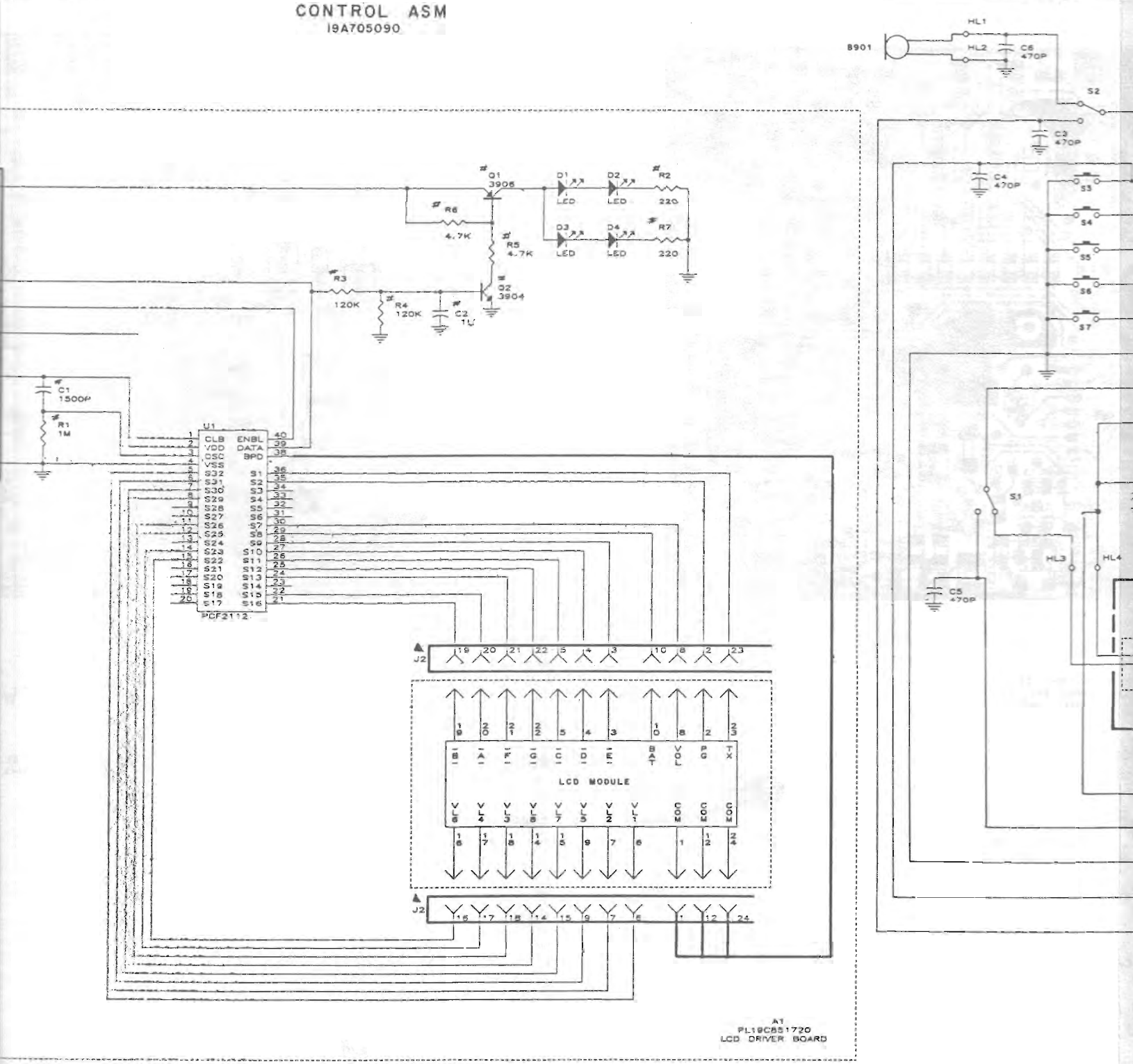


MODEL NO.	REV. LETTER
19D902180P1	
19A705090P1	A

FRONT ASSEMBLY

FRONT CAP ASSEMBLY
19D902180G1
(19D902216, Rev. 2)

CONTROL ASM
19A705090



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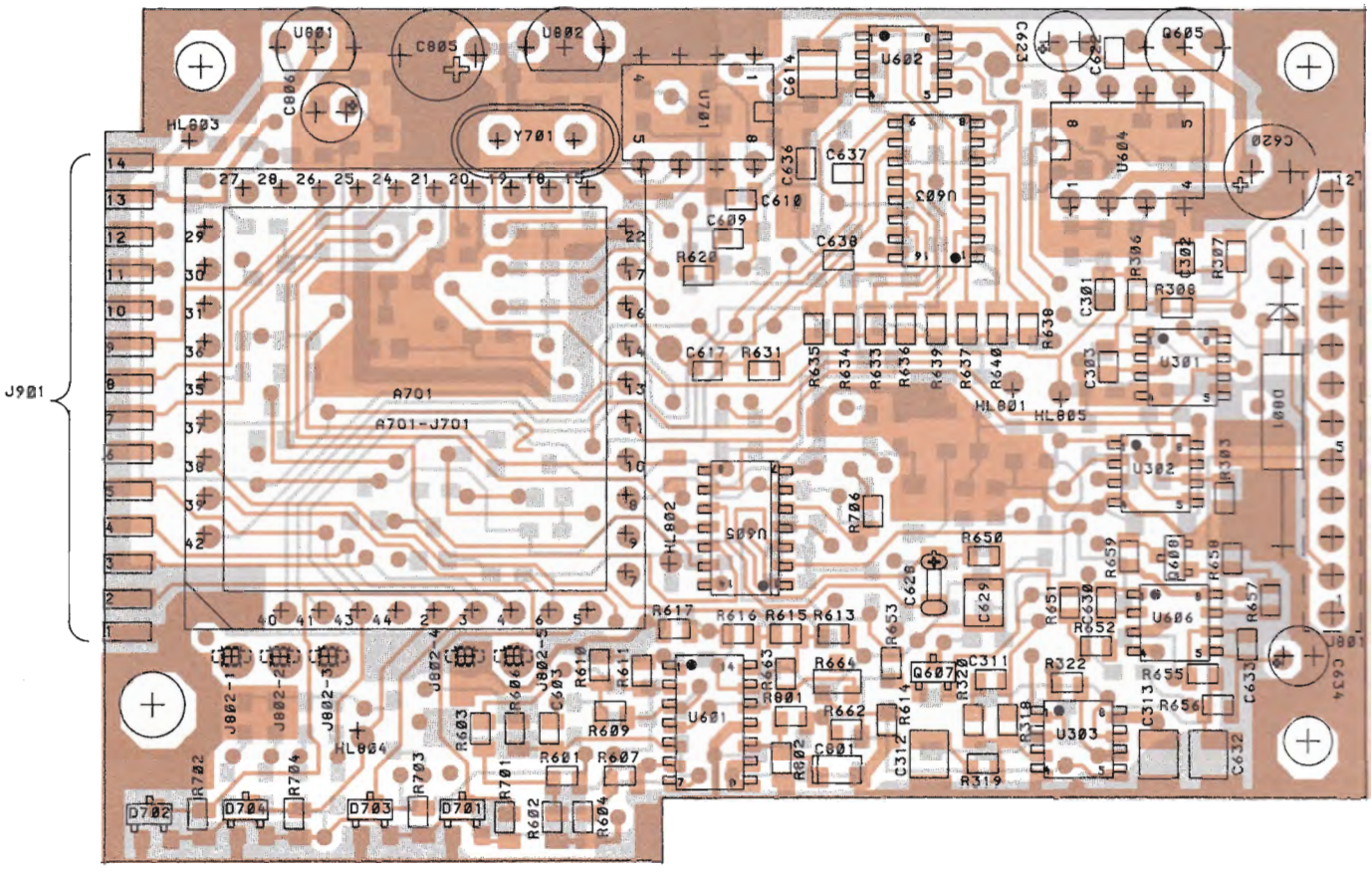
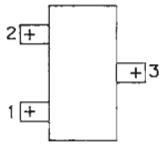
COMPONENT SIDE

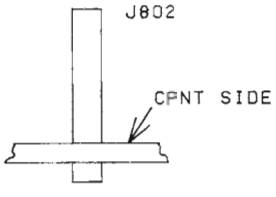


(19D902142, Sh. 2, Rev. 2)
(19D902141, First Layer, Rev. 2)
(19D902141, Fourth Layer, Rev. 2)

LEAD IDENTIFICATION FOR
D601 & D701-D707
(SOT) DIODES

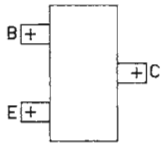
(TOP VIEW)



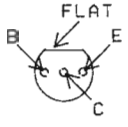


LEAD IDENTIFICATION FOR
Q601-Q608, Q701, Q702, Q704-Q706
Q801-Q803
(SOT) TRANSISTORS

(TOP VIEW)



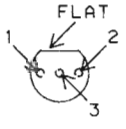
LEAD IDENTIFICATION
FOR Q605



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR U802



IN-LINE
TOP VIEW

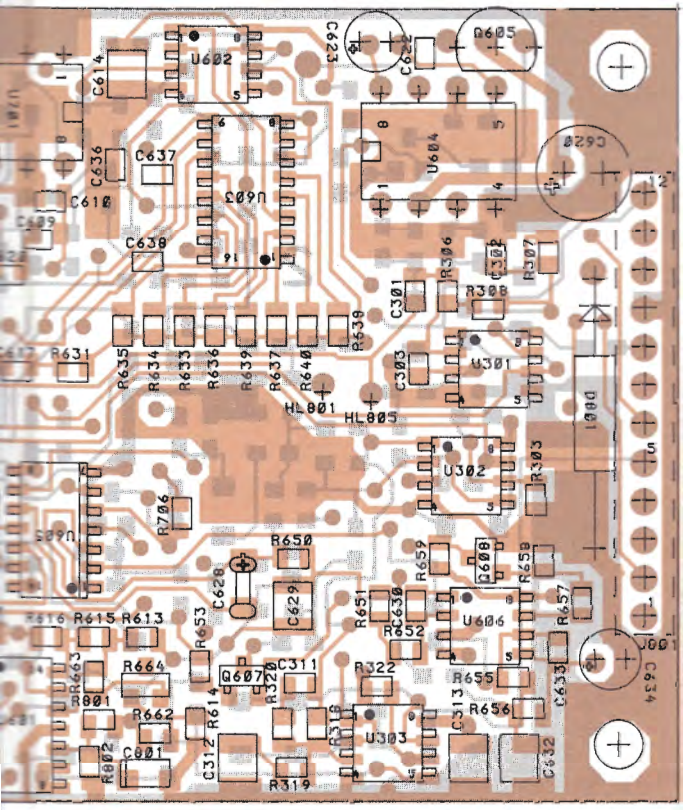
NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

AUDIO/LOGIC BOARD 19D902142G1 AND G2

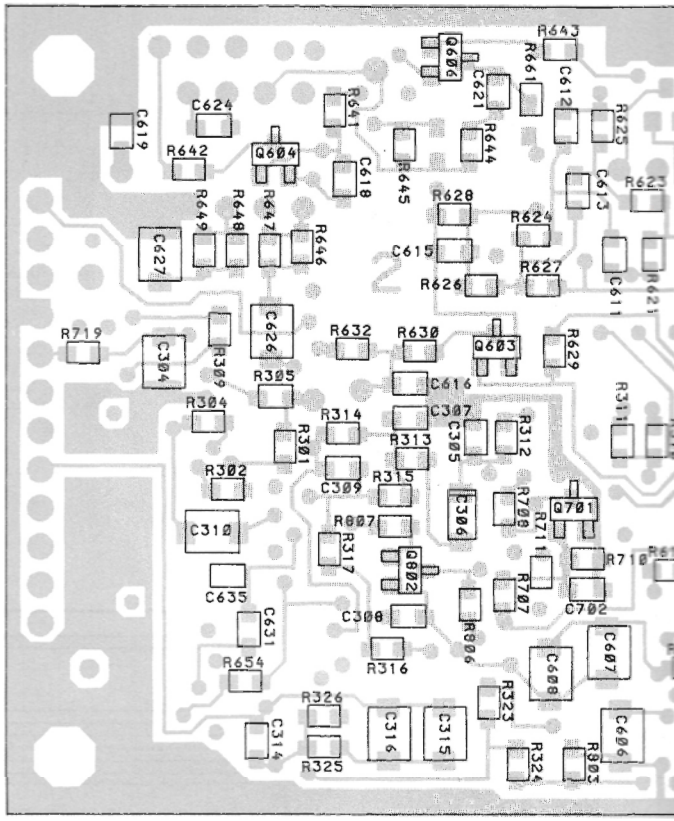
(19D902142 Rev. 5)

DIAGRAM

ENT SIDE



SOLDER



42, Sh. 2, Rev. 2)
First Layer, Rev. 2)
Fourth Layer, Rev. 2)

BACKVIEW

802

CPNT SIDE

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

(19D902142, Sh
(19D902141, Fourth

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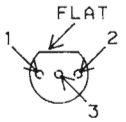
EAD IDENTIFICATION.

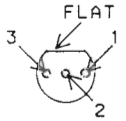
LEAD IDENTIFICATION
FOR U802



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR U801

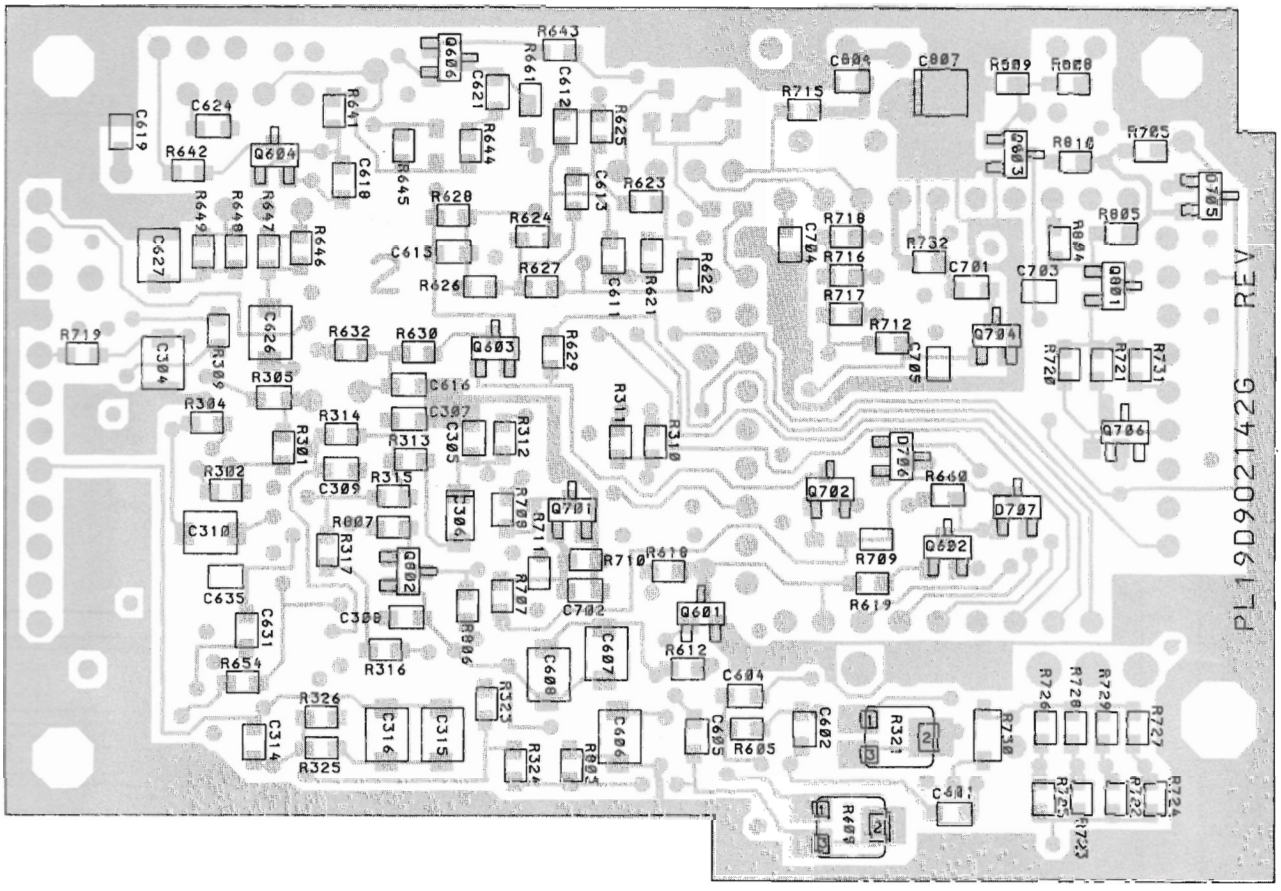


IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(IRC

SOLDER SIDE



BACKVIEW OF BOARD

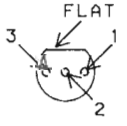
ON SOLDIER SIDE

IDES

ON COMPONENT SIDE

(19D902142, Sh. 2, Rev. 2)
(19D902141, Fourth Layer, Rev. 1)

LEAD IDENTIFICATION
FOR U801

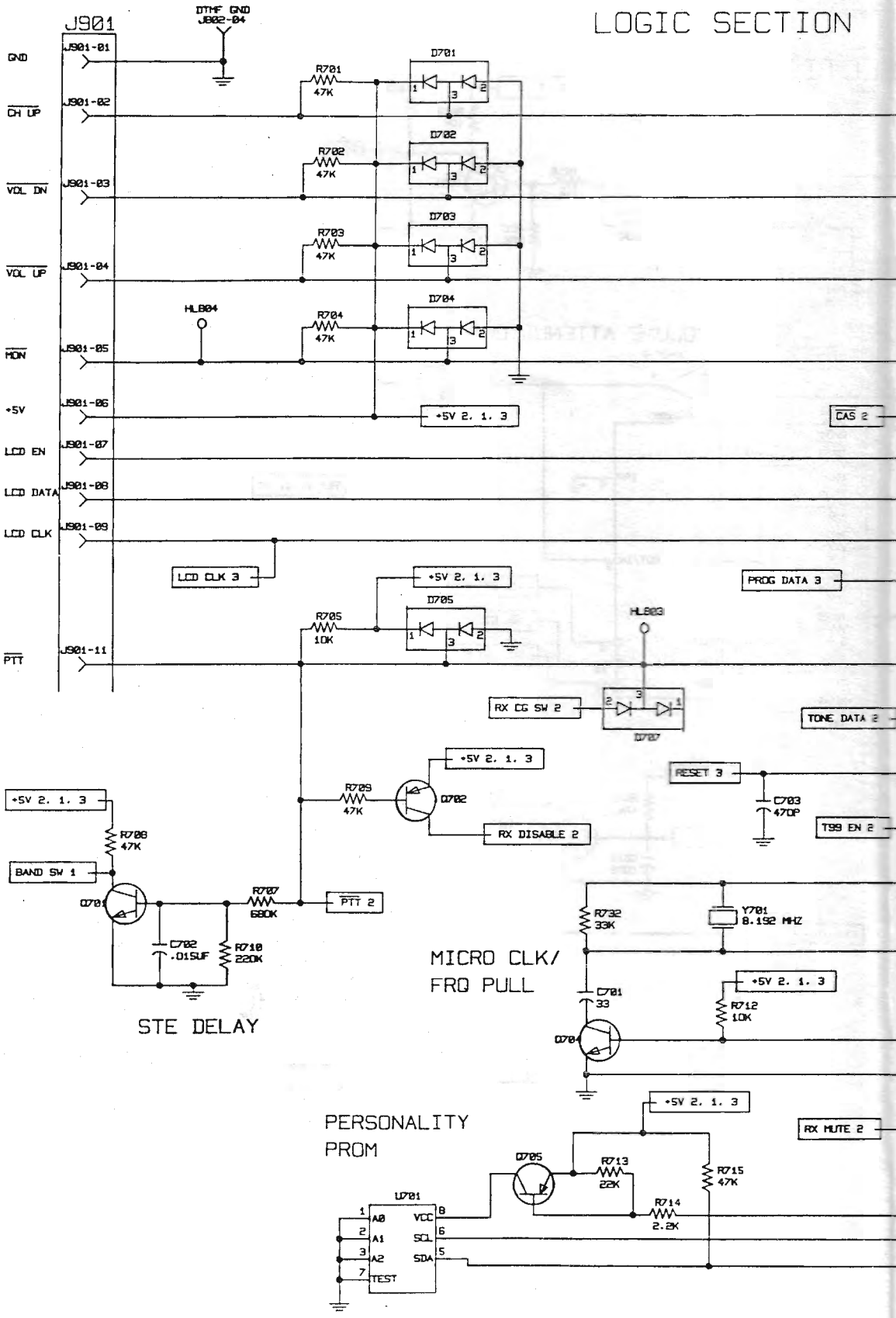


IN-LINE
TOP VIEW

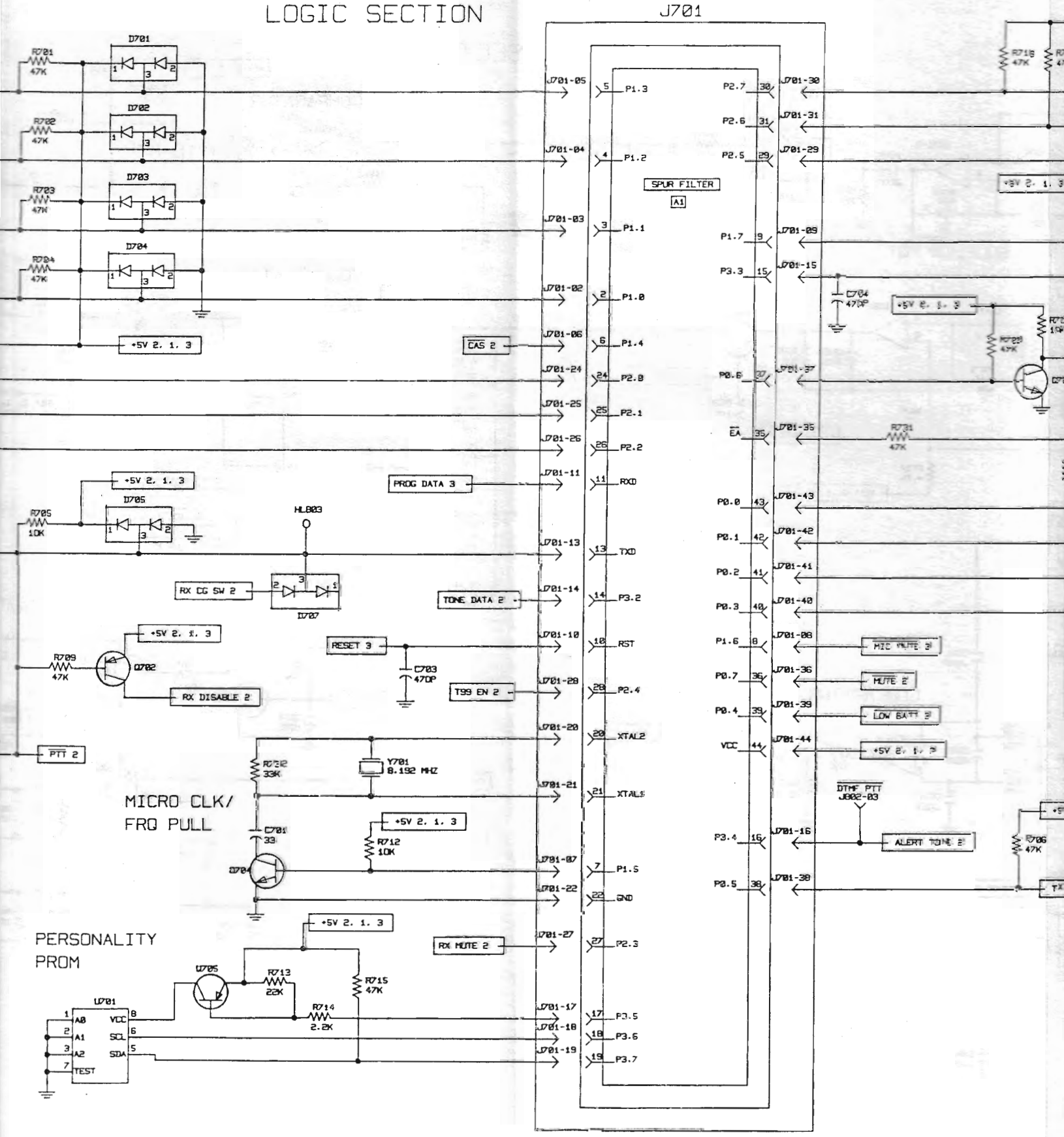
NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

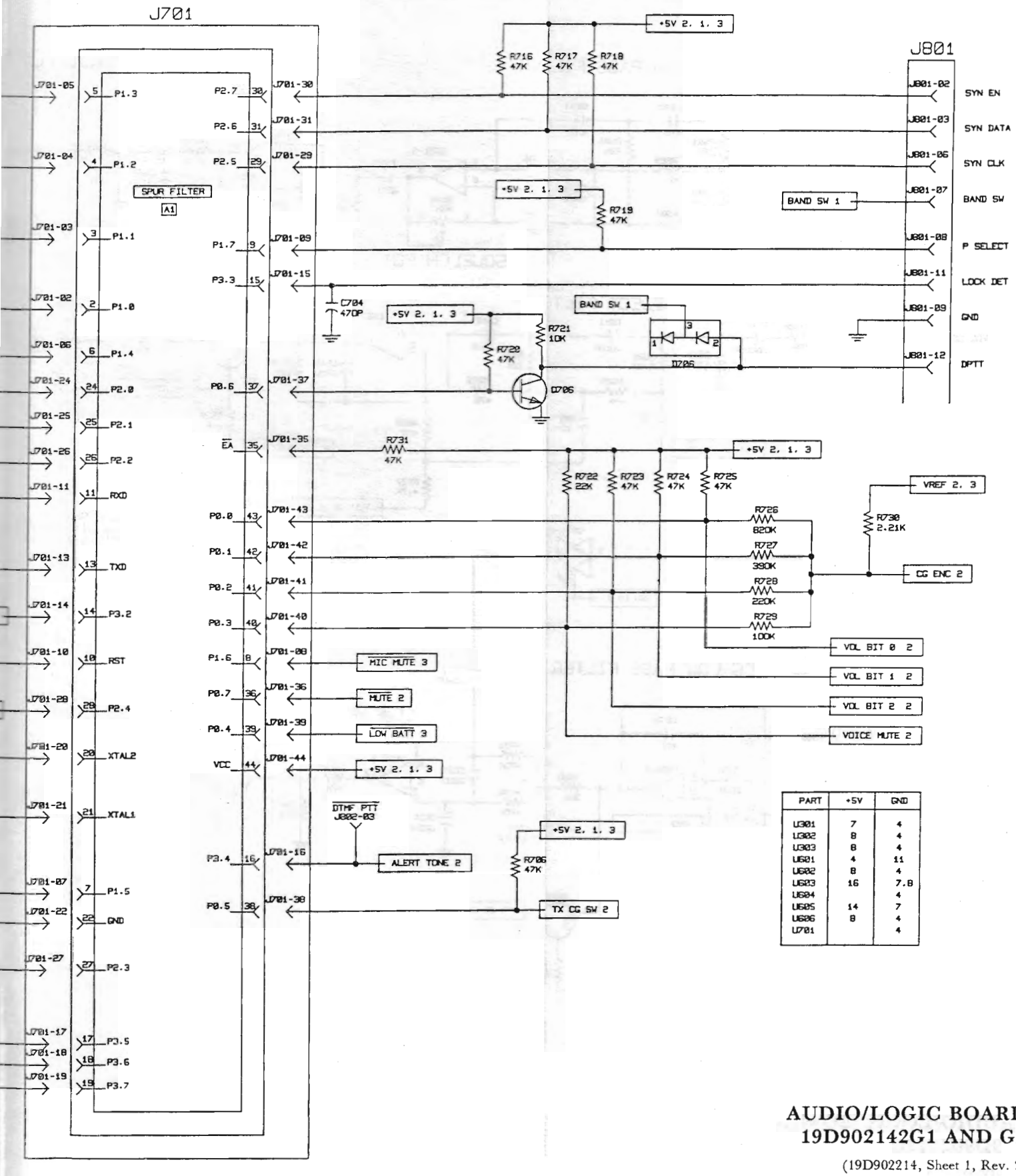
(RC-7263 Made From 19D902142, Rev. 5)

LOGIC SECTION



LOGIC SECTION



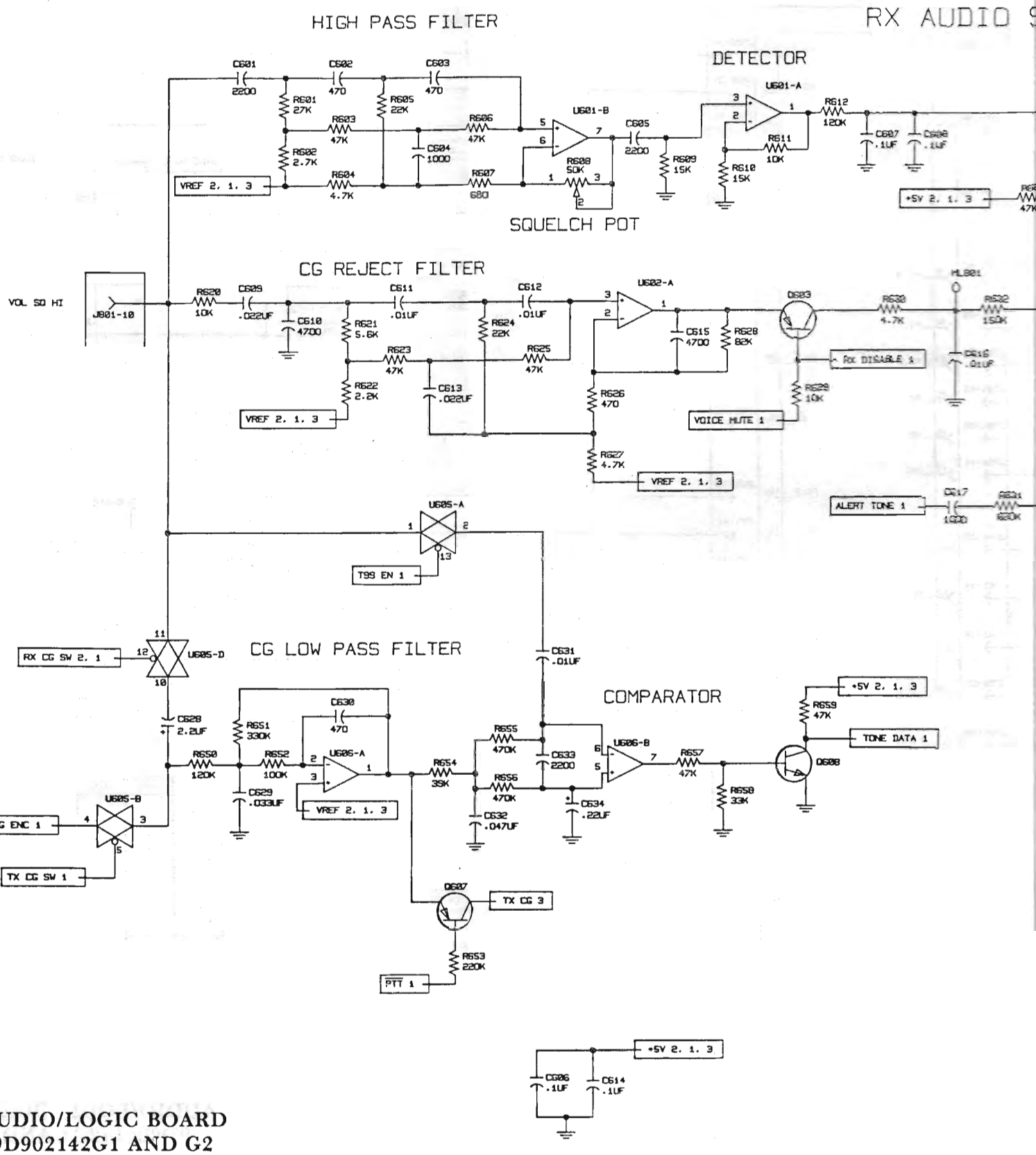


PART	+5V	GND
U301	7	4
U302	8	4
U303	8	4
U601	4	11
U602	8	4
U603	16	7.8
U604		4
U605	14	7
U606	8	4
U701		4

AUDIO/LOGIC BOARD
19D902142G1 AND G2

(19D902214, Sheet 1, Rev. 2)

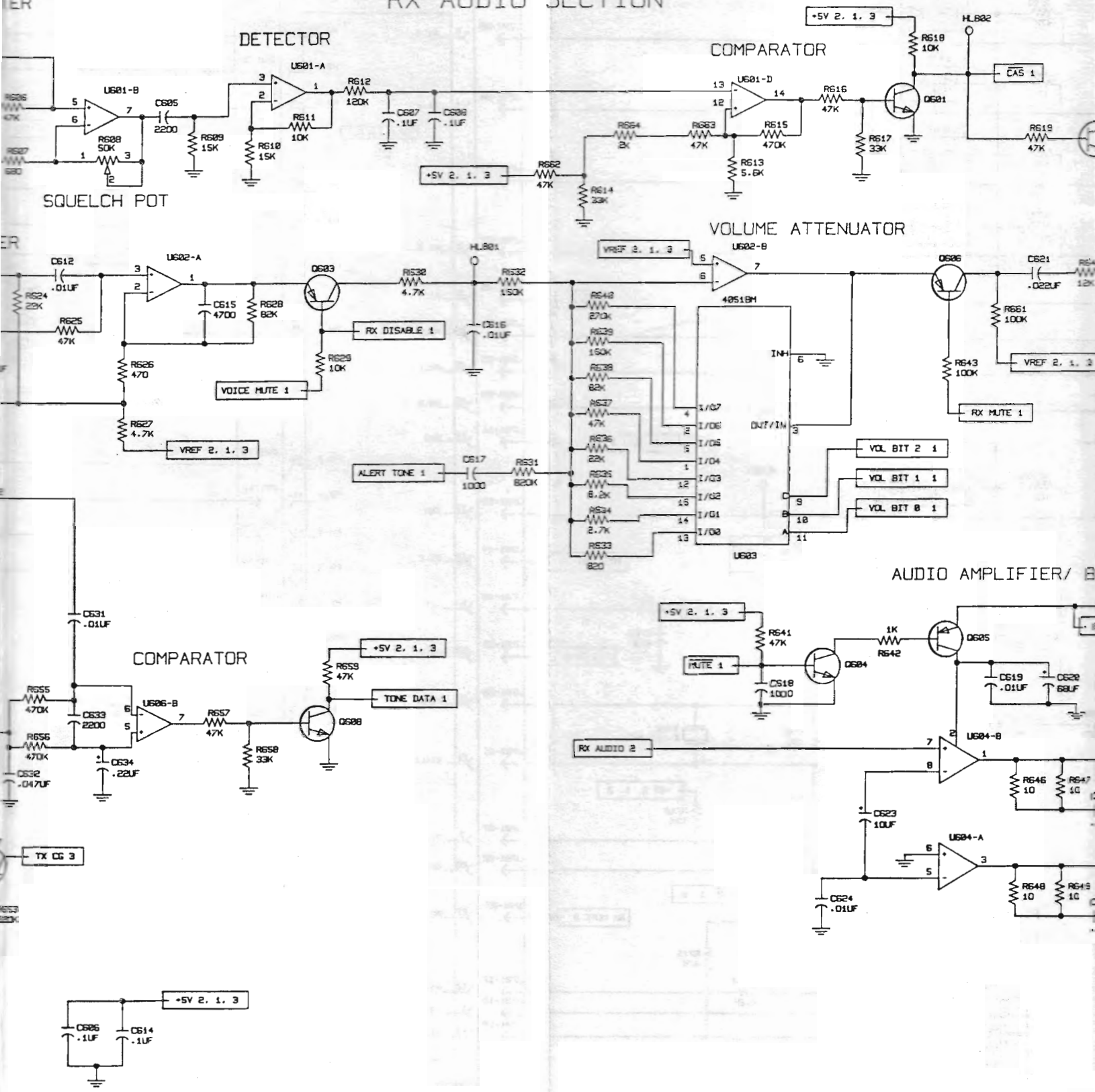
FRONT ASSEMBLY



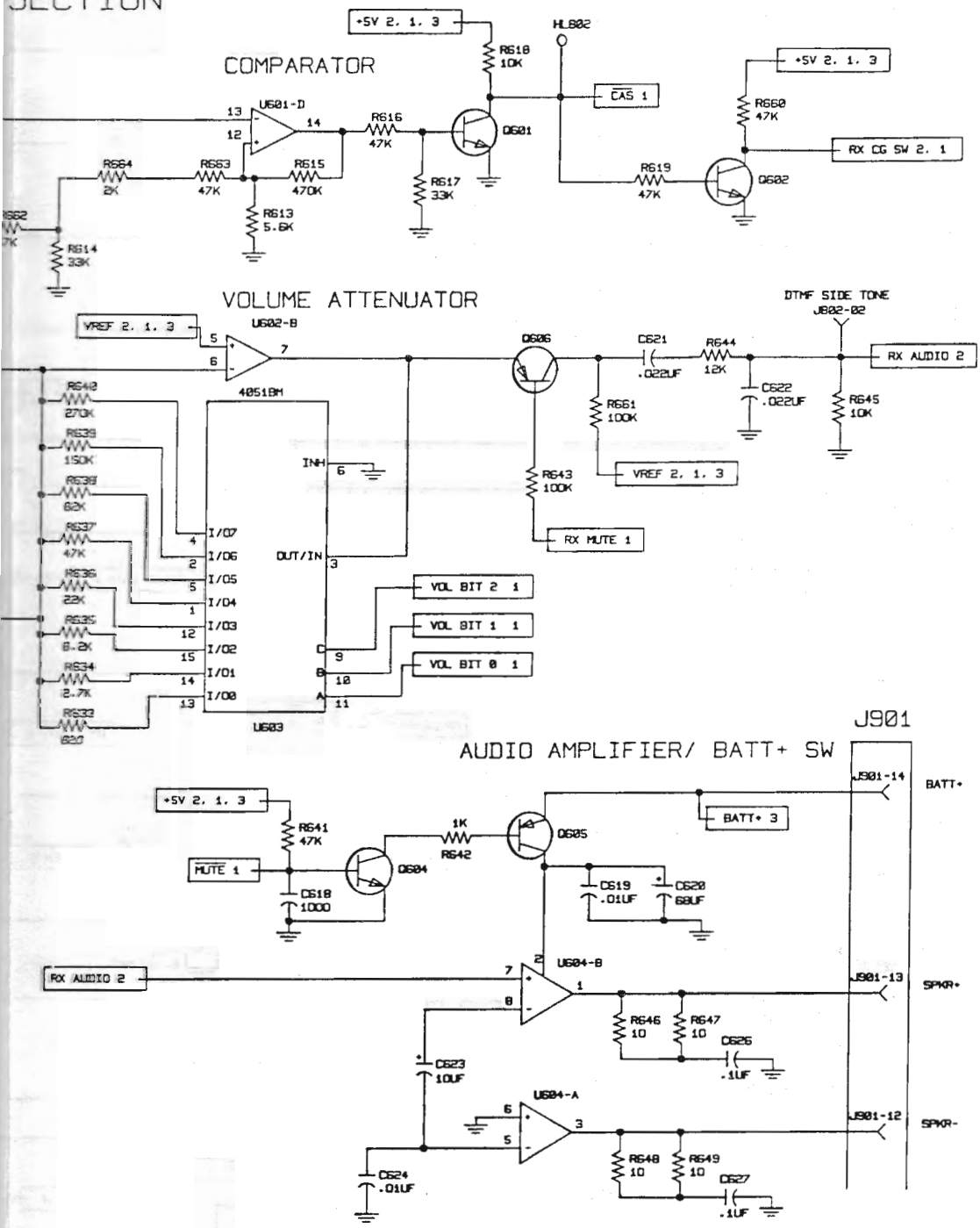
AUDIO/LOGIC BOARD 19D902142G1 AND G2

(19D902214, Sheet 2, Rev. 3)

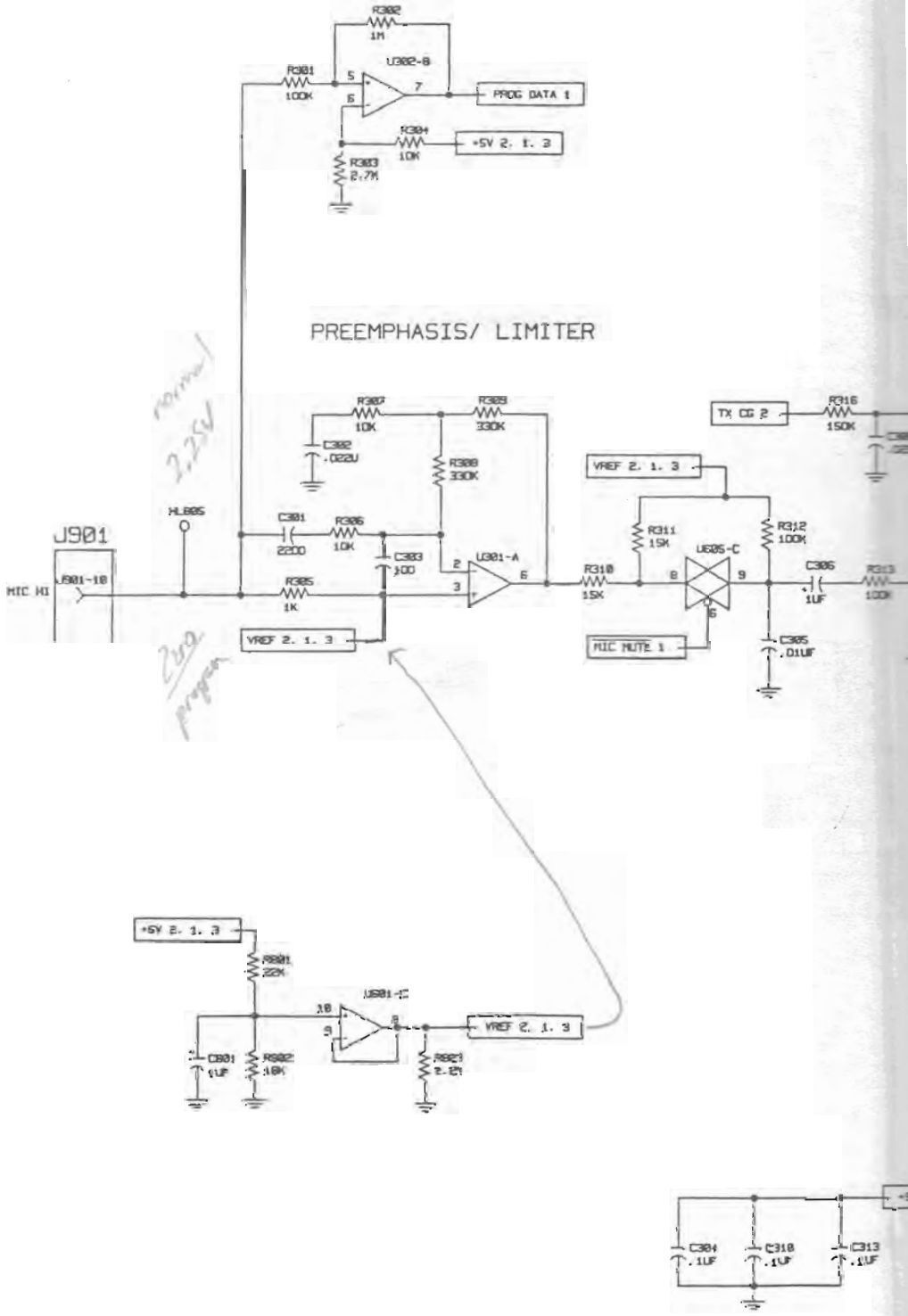
RX AUDIO SECTION



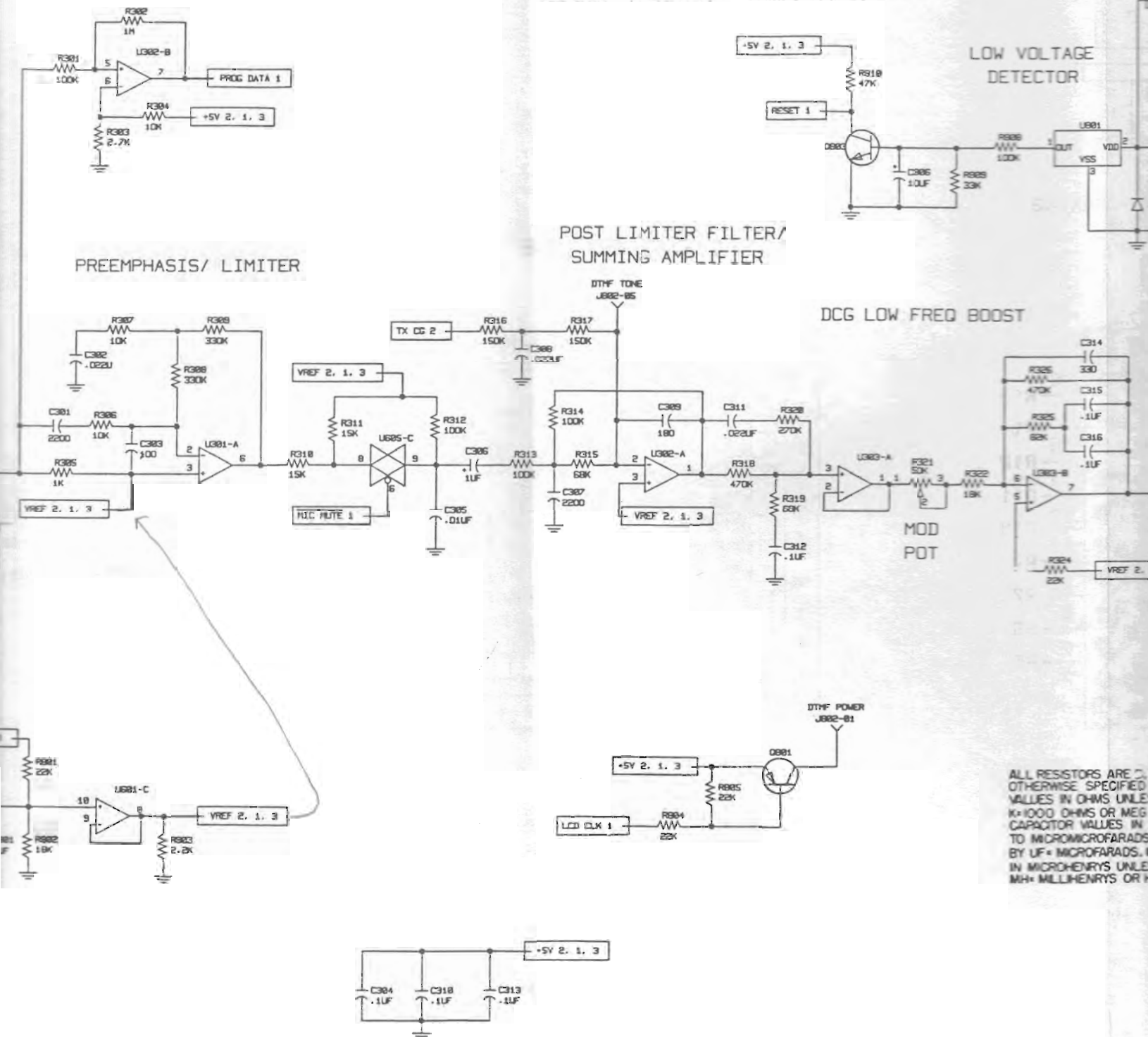
SECTION

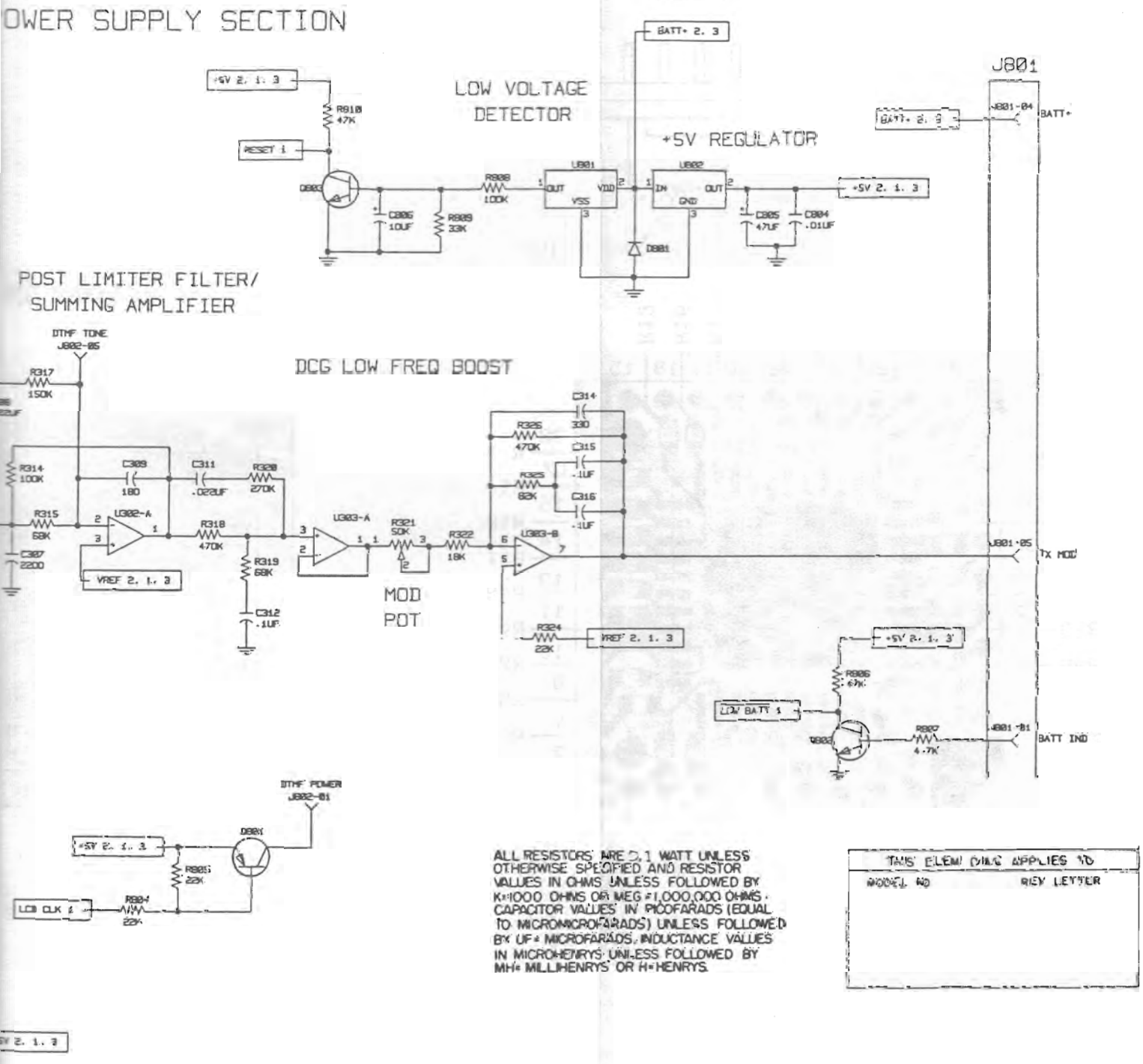

COMPARATOR
+5V 2. 1. 3
HL802
R618 10K
CAS 1
+5V 2. 1. 3
R660 47K
RX CG SW 2. 1
U601-D
R616 47K
Q601
R619 47K
Q602
R614 33K
R617 33K
R613 5.6K
R615 470K
R683 47K
R684 2K
VOLUME ATTENUATOR
VREF 2. 1. 3
U602-B
4051BM
DTMF SIDE TONE
J802-02
Q606
C621 .022UF
R644 12K
RX AUDIO 2
C622 .022UF
R645 10K
R661 100K
R643 100K
VREF 2. 1. 3
RX MUTE 1
R640 270K
R639 150K
R638 82K
R637 47K
R636 22K
R635 8.2K
R634 2.7K
R633 820
INH
OUT/IN
I/07
I/06
I/05
I/04
I/03
I/02
I/01
I/00
VOL BIT 2 1
VOL BIT 1 1
VOL BIT 0 1
U603
J901
AUDIO AMPLIFIER/ BATT+ SW
+5V 2. 1. 3
R641 47K
MUTE 1
Q604
1K
R642
Q605
BATT+ 3
J901-14
BATT+
C618 1000
C619 .01UF
C620 68UF
RX AUDIO 2
U604-B
J901-13
SPKR+
R646 10
R647 10
C626 .1UF
C623 10UF
U604-A
J901-12
SPKR-
R648 10
R649 10
C627 .1UF
C624 .01UF

TX AUDIO/ P


R302
1M
R301
100K
U302-B
PROG DATA 1
R304
10K
+5V 2. 1. 3
R303
2.7K
PREEMPHASIS/ LIMITER
normal
2.25V
R307
10K
R309
330K
C302
.022U
R308
330K
TX CO 2
R316
150K
VREF 2. 1. 3
J901
HLB05
C301
2200
R306
10K
C303
100
U301-A
R311
15K
U605-C
R312
100K
MIC HI
J901-10
R305
1K
R310
15K
C306
.1UF
R313
100
VREF 2. 1. 3
MIC MUTE 1
C305
.01UF
2nd
proper
+5V 2. 1. 3
R301
22K
U301-C
VREF 2. 1. 3
C301
.1UF
R302
10K
C304
.1UF
C310
.1UF
C313
.1UF

TX AUDIO/ POWER SUPPLY SECTION



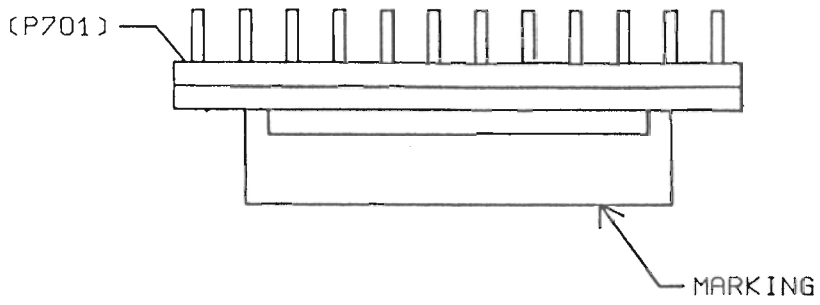


FRONT ASSEMBLY

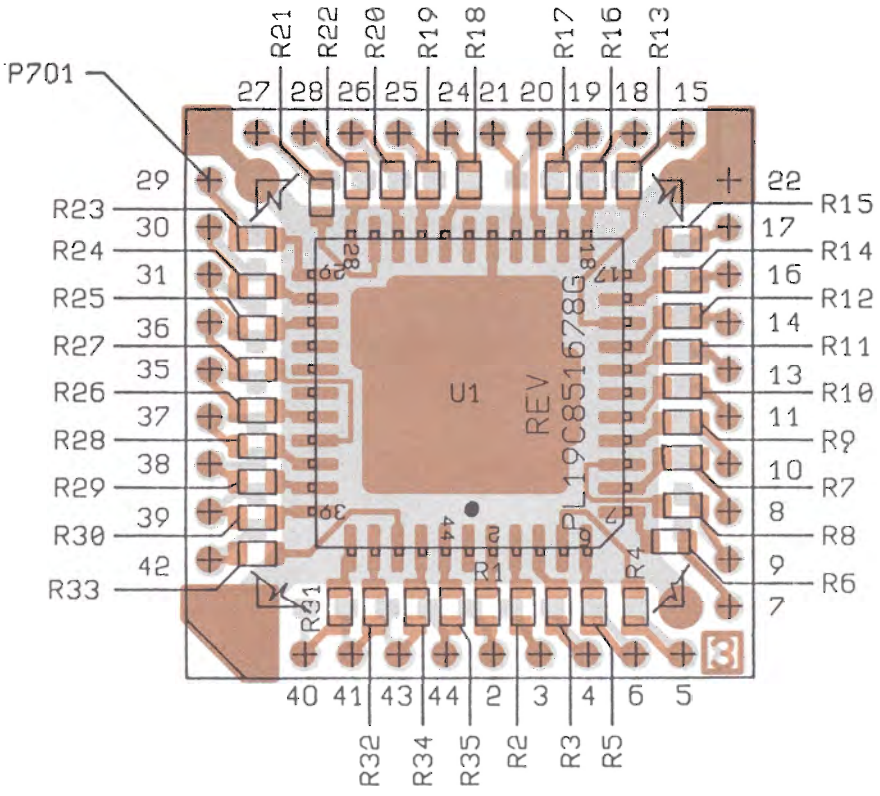
AUDIO/LOGIC BOARD
19D902142G1 AND G2

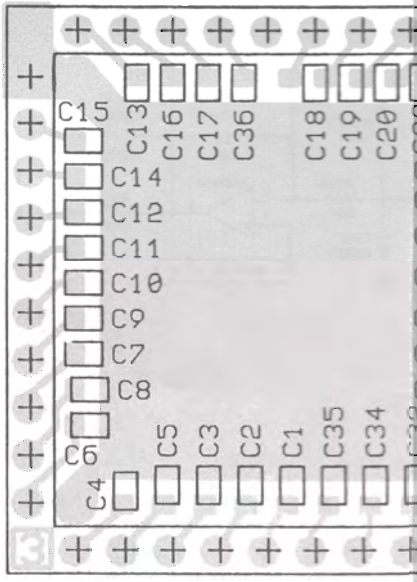
(19D902214, Sheet 3, Rev. 3)

COMPONENT SIDE



SOLDER SIDE





VIEW FROM SOLDER SIDE

(RC-7264)

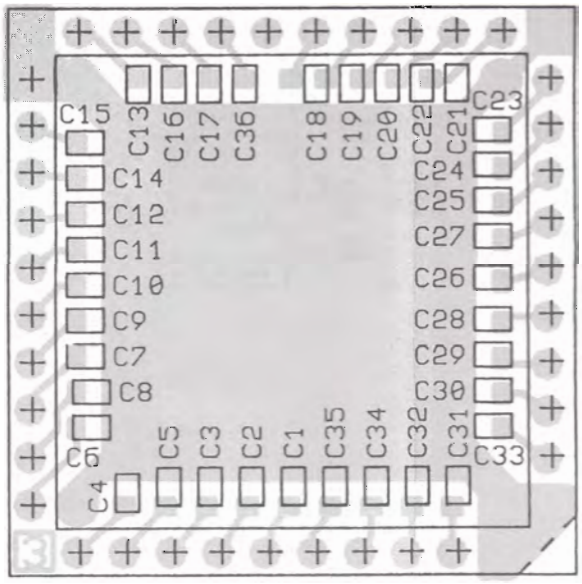
(RC-7264 Made From 19C851678, Rev. 1)

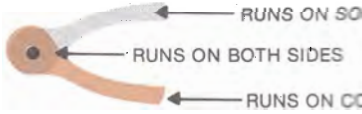
SPUR FILTER BOARD
19D851678G1 AND G2

(RC-7264)
((19C851679, Component Side, Rev. 3)
(19C851679, Solder Side, Rev. 3)

ARKING

SOLDER SIDE

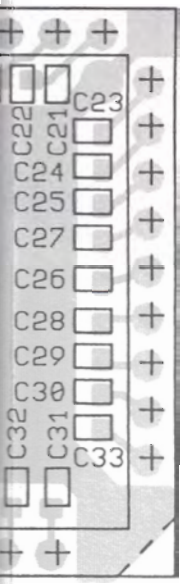


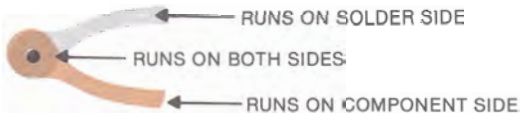


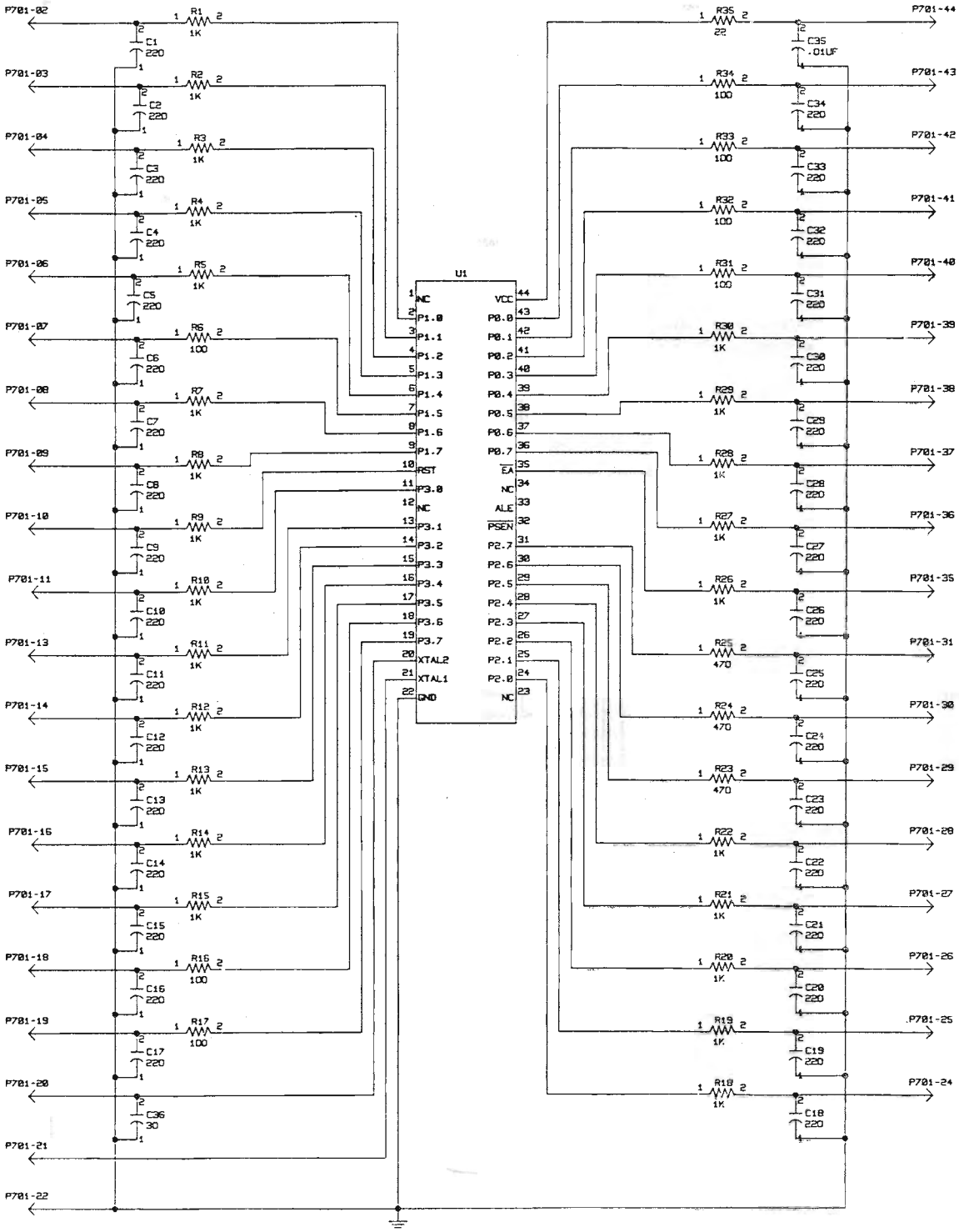
VIEW FROM SOLDER SIDE

(RC-7264)

(RC-7264 Made From 19C851678, Rev. 1)


C23
C22
C21
C24
C25
C27
C26
C28
C29
C30
C32
C31
C33


RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE



FRONT ASSEMBLY

SPUR FILTER BOARD 19C851678G1 AND G2

(19D902215, Rev. 4)

PARTS LIST

RADIO FRONT ASSEMBLY
19D902177G1 - G2
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
A2		AUDIO/LOGIC BOARD 19D902142G1 (Used in G1). 19D902142G2 (Used in G2).
A701		MICROPROCESSOR BOARD 19C851678G1 (Used in G1). 19C851678G2 (Used in G2).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C34	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C35	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C36	19A702061P35	Ceramic: 30 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701	19B801573P1	Connector.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R2 and R3	19B801251P101	Metal film: 100 ohms ±5%, 1/10 w.
R4 and R5	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R6	19B801251P101	Metal film: 100 ohms ±5%, 1/10 w.
R7 thru R14	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R15 thru R17	19B801251P101	Metal film: 100 ohms ±5%, 1/10 w.
R18 thru R22	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R23 thru R25	19B801251P471	Metal film: 470 ohms ±5%, 1/10 w.
R26 thru R30	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R31 thru R34	19B801251P101	Metal film: 100 ohms ±5%, 1/10 w.
R35	19B801251P220	Metal film: 22 ohms ±5%, 1/10 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A704345P4	Microprocessor. (Used in G1).
U1	19A704345P5	Microprocessor. (Used in G2).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C301	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C302	19A702052P30	Ceramic: 0.022 uF ±10%, 50 VDCW.
C303	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C304	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C305	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C306	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C307	19A702052P107	Ceramic: 2200 pF ±5%, 50 VDCW.
C308	19A702052P30	Ceramic: 0.022 uF ±10%, 50 VDCW.
C309	19A702061P67	Ceramic: 180 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C310	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C311	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C312 and C313	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C314	19A702061P73	Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C315 and C316	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C601	19A702052P107	Ceramic: 2200 pF ±5%, 50 VDCW.
C602	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C603	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C604	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C605	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C606 thru C608	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C609	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C610	19A702052P10	Ceramic: 6700 pF ±10%, 50 VDCW.
C611 and C612	19A702052P114	Ceramic: 0.01 uF ±5%, 50 VDCW.
C613	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C614	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C615	19A702052P10	Ceramic: 6700 pF ±10%, 50 VDCW.
C616	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C617	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C618	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C619	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C620	19A704879P14	Electrolytic: 68 uF ±20%, 10 VDCW.
C621 and C622	19A702052P30	Ceramic: 0.022 uF ±10%, 50 VDCW.
C623	19A704879P5	Electrolytic: 10 uF ±20%, 16 VDCW.
C624	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C626 and C627	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C628	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C629	19A702052P30	Ceramic: 0.022 uF ±10%, 50 VDCW.
C630	19A702061P3	Ceramic: 470 pF ±10%, 50 VDCW.
C631	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C632	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C633	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C634	19A704879P12	Electrolytic: 0.22 uF ±20%, 50 VDCW.
C701	19A702061P37	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C702	19A702052P16	Ceramic: 0.015 uF ±10%, 50 VDCW.
C703	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C704	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C801	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C804	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C805	19A704879P5	Tantalum: 47 uF ±20%, 6.3 VDCW.
C806	19A704879P5	Electrolytic: 10 uF ±20%, 16 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D701 thru D704	19A700053P2	Silicon: 2 Diodes in Series; sim to BAV99.
D705 thru D707	19A700053P2	Silicon: 2 Diodes in Series; sim to BAV99.
D801	19A116585P1	Silicon, fast recovery, 600 mA, 50 PIV.
J701		
J801		
J802		
J901		
Q601 and Q602		
Q603		
Q604		
Q605		
Q606		
Q607		
Q608		
Q701		
Q702		
Q704		
Q705		
Q706		
Q801		
Q802 and Q803		
R301		
R302		
R303		
R306		
R305		
R306 and R307		
R308		
R309		
R310 and R311		
R312 thru R314		
R315		
R316 and R317		
R318		
R319		
R320		
R321		
R322		
R324		
R325		
R326		
R601		
R602		
R603		
R604		
R605		
R606		
R607		
R608		

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
C310	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C311	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C312 and C313	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C314	19A702061P73	Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C315 and C316	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C601	19A702052P107	Ceramic: 2200 pF ±5%, 50 VDCW.
C602	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C603	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C604	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C605	19A702052P7	Ceramic: 2500 pF ±10%, 50 VDCW.
C606 thru C608	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C609	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C610	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C611 and C612	19A702052P114	Ceramic: 0.01 uF ±5%, 50 VDCW.
C613	19A702052P130	Ceramic: 0.022 uF ±5%, 50 VDCW.
C614	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C615	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C616	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C617	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C618	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C619	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C620	19A704879P14	Electrolytic: 68 uF ±20%, 10 VDCW.
C621 and C622	19A702052P30	Ceramic: 0.022 uF ±10%, 50 VDCW.
C623	19A704879P5	Electrolytic: 10 uF ±20%, 16 VDCW.
C624	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C625 and C627	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C628	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C629	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C630	19A702052P3	Ceramic: 470 pF ±10%, 50 VDCW.
C631	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C632	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C633	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C634	19A704879P12	Electrolytic: 0.22 uF ±20%, 50 VDCW.
C701	19A702061P37	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C702	19A702052P16	Ceramic: 0.015 uF ±10%, 50 VDCW.
C703	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C704	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C801	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C804	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C805	19A701534P9	Tantalum: 47 uF ±20%, 6.3 VDCW.
C806	19A704879P5	Electrolytic: 10 uF ±20%, 16 VDCW.
		- - - - - - - - - - - - DIODES - - - - - - - - - - - -
D701 thru D704	19A700053P2	Silicon: 2 Diodes in Series; sim to BAV99.
D705 thru D707	19A700053P2	Silicon: 2 Diodes in Series; sim to BAV99.
D801	19A116585P1	Silicon, fast recovery, 600 mA, 50 PIV.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J701		Part of printed wiring board.
J801	19A705482P1	Connector, printed wiring.
J802	19A209648P1	Contact, electrical.
J901		Part of printed wiring board.
		- - - - - - - - - - - - TRANSISTORS - - - - - - - - - - - -
Q601 and Q602	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q603	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q604	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q605	19A700026P2	Silicon, PNP: sim to BC369.
Q606	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q607	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q608	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q701	19A114739P2	Silicon, NPN.
Q702	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q704	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q705	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q706	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q801	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q802 and Q803	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
		- - - - - - - - - - - - RESISTORS - - - - - - - - - - - -
R301	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R302	19B801251P105	Metal film: 1M ohms ±5%, 1/10 w.
R303	19B801251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
R304	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R305	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R306 and R307	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R308	19B801251P334	Metal film: 330K ohms ±5%, 1/10 w.
R309	19B801251P334	Metal film: 330K ohms ±5%, 1/10 w.
R310 and R311	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.
R312 thru R314	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R315	19B801251P683	Metal film: 68K ohms ±5%, 1/10 w.
R316 and R317	19B801251P154	Metal film: 150K ohms ±5%, 1/10 w.
R318	19B801251P474	Metal film: 470K ohms ±5%, 1/10 w.
R319	19B801251P683	Metal film: 68K ohms ±5%, 1/10 w.
R320	19B801251P274	Metal film: 270K ohms ±5%, 1/10 w.
R321	19A705496P6	Resistor, variable.
R322	19B801251P183	Metal film: 18K ohms ±5%, 1/10 w.
R324	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R325	19B801251P823	Metal film: 82K ohms ±5%, 1/10 w.
R326	19B801251P474	Metal film: 470K ohms ±5%, 1/10 w.
R601	19B801251P273	Metal film: 27K ohms ±5%, 1/10 w.
R602	19B801251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
R603	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R604	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R605	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R606	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R607	19B801251P681	Metal film: 680 ohms ±5%, 1/10 w.
R608	19A705496P6	Resistor, variable.

SYMBOL	GE PART NO.
R609 and R610	19B801251P153
R611	19B801251P103
R612	19B801251P224
R613	19B801251P562
R614	19B801251P133
R615	19B801251P474
R616	19B801251P473
R617	19B801251P133
R618	19B801251P103
R619	19B801251P473
R620	19B801251P103
R621	19B801251P562
R622	19B801251P223
R623	19B801251P473
R624	19B801251P223
R625	19B801251P473
R626	19B801251P471
R627	19B801251P473
R628	19B801251P823
R629	19B801251P103
R630	19B801251P472
R631	19B801251P824
R632	19B801251P154
R633	19B801251P821
R634	19B801251P272
R635	19B801251P822
R636	19B801251P223
R637	19B801251P473
R638	19B801251P823
R639	19B801251P154
R640	19B801251P274
R641	19B801251P473
R642	19B801251P102
R643	19B801251P104
R644	19B801251P123
R645	19B801251P103
R646 thru R649	19B801251P100
R650	19B801251P124
R651	19B801251P334
R652	19B801251P104
R653	19B801251P224
R654	19B801251P393
R655 and R656	19B801251P474
R657	19B801251P473
R658	19B801251P333
R659	19B801251P473
R660	19B801251P473
R661	19B801251P104
R662 and R663	19B801251P473
R664	19A701864P5
R701 thru R704	19B801251P473
R705	19B801251P103

GE PART NO.	DESCRIPTION
	- - - - - - - - - - - JACKS - - - - - - - - - - -
	Part of printed wiring board.
5482P1	Connector, printed wiring.
9648P1	Contact, electrical.
	Part of printed wiring board.
	- - - - - - - - - - TRANSISTORS - - - - - - - - - -
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
0026P2	Silicon, PNP: sim to SC369.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
4739P2	Silicon, NPN.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
0059P2	Silicon, PNP: sim to MMBT3906, low profile.
0076P2	Silicon, NPN: sim to MMBT3904, low profile.
	- - - - - - - - - - RESISTORS - - - - - - - - - -
1251P104	Metal film: 100K ohms ±5%, 1/10 w.
1251P105	Metal film: 1M ohms ±5%, 1/10 w.
1251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
1251P103	Metal film: 10K ohms ±5%, 1/10 w.
1251P102	Metal film: 1K ohms ±5%, 1/10 w.
1251P103	Metal film: 10K ohms ±5%, 1/10 w.
1251P334	Metal film: 330K ohms ±5%, 1/10 w.
1251P334	Metal film: 330K ohms ±5%, 1/10 w.
1251P153	Metal film: 15K ohms ±5%, 1/10 w.
1251P104	Metal film: 100K ohms ±5%, 1/10 w.
1251P683	Metal film: 68K ohms ±5%, 1/10 w.
1251P154	Metal film: 150K ohms ±5%, 1/10 w.
1251P474	Metal film: 470K ohms ±5%, 1/10 w.
1251P683	Metal film: 68K ohms ±5%, 1/10 w.
1251P274	Metal film: 270K ohms ±5%, 1/10 w.
5496P6	Resistor, variable.
1251P183	Metal film: 18K ohms ±5%, 1/10 w.
1251P223	Metal film: 22K ohms ±5%, 1/10 w.
1251P823	Metal film: 82K ohms ±5%, 1/10 w.
1251P474	Metal film: 470K ohms ±5%, 1/10 w.
1251P273	Metal film: 27K ohms ±5%, 1/10 w.
1251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
1251P473	Metal film: 47K ohms ±5%, 1/10 w.
1251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
1251P223	Metal film: 22K ohms ±5%, 1/10 w.
1251P473	Metal film: 47K ohms ±5%, 1/10 w.
1251P681	Metal film: 680 ohms ±5%, 1/10 w.
5496P6	Resistor, variable.

SYMBOL	GE PART NO.	DESCRIPTION
R609 and R610	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.
R611	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R612	19B801251P124	Metal film: 120K ohms ±5%, 1/10 w.
R613	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R614	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R615	19B801251P474	Metal film: 470K ohms ±5%, 1/10 w.
R616	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R617	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R618	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R619	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R620	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R621	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R622	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R623	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R624	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R625	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R626	19B801251P471	Metal film: 470 ohms ±5%, 1/10 w.
R627	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R628	19B801251P823	Metal film: 82K ohms ±5%, 1/10 w.
R629	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R630	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R631	19B801251P824	Metal film: 820K ohms ±5%, 1/10 w.
R632	19B801251P154	Metal film: 150K ohms ±5%, 1/10 w.
R633	19B801251P821	Metal film: 820 ohms ±5%, 1/10 w.
R634	19B801251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
R635	19B801251P822	Metal film: 8.2K ohms ±5%, 1/10 w.
R636	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R637	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R638	19B801251P823	Metal film: 82K ohms ±5%, 1/10 w.
R639	19B801251P154	Metal film: 150K ohms ±5%, 1/10 w.
R640	19B801251P274	Metal film: 270K ohms ±5%, 1/10 w.
R641	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R642	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R643	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R644	19B801251P123	Metal film: 12K ohms ±5%, 1/10 w.
R645	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R646 thru R649	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R650	19B801251P124	Metal film: 120K ohms ±5%, 1/10 w.
R651	19B801251P334	Metal film: 330K ohms ±5%, 1/10 w.
R652	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R653	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R654	19B801251P393	Metal film: 39K ohms ±5%, 1/10 w.
R655 and R656	19B801251P474	Metal film: 470K ohms ±5%, 1/10 w.
R657	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R658	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R659	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R660	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R661	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R662 and R663	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R664	19A701864P5	Thermal: 2K ohms ±10%, sim to Midwest Components 2H-202.
R701 thru R704	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R705	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.

SYMBOL	GE PART NO.	DESCRIPTION
R706	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R707	19B801251P684	Metal film: 680K ohms ±5%, 1/10 w.
R708 and R709	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R710	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R712	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R713	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R714	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R715 thru R720	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R721	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R722	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R723 thru R725	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R726	19B801251P824	Metal film: 820K ohms ±5%, 1/10 w.
R727	19B801251P394	Metal film: 390K ohms ±5%, 1/10 w.
R728	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R729	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R730	19A702931P234	Metal film: 2210 ohms ±1%, 200 w.
R731	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R732	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R801	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R802	19B801251P183	Metal film: 18K ohms ±5%, 1/10 w.
R803	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R804 and R805	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R806	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R807	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R808	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R809	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R810	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U301	19A705450P3	Operational Amplifier, sim to MC3403.
U302 and U303	19A702293P3	Linear: Dual Op Amp; sim to LM358.
U601	19A702293P2	Linear: Quad Op Amp; sim to LM324.
U602	19A702293P3	Linear: Dual Op Amp; sim to LM358.
U603	19A702705P3	Digital: 8-Channel Analog Multiplexer; sim to MC14051BM.
U604	19A705452P1	Linear: Audio Amplifier; sim to TDA2822.
U605	19A702705P4	Digital: Quad Analog Switch/Multiplexer; sim to MC14066BM.
U606	19A702293P3	Linear: Dual Op Amp; sim to LM358.
U701	19A704724P1	Digital: 512 x 8 EEPROM (serial 2-wire bus); sim to Xicor X2404P.
U801	19A705454P1	Voltage Detector, sim to Seiko S-80945CNP.
U802	19A702536P1	Linear positive voltage regulator; sim to National LM2931AZ-5.
		- - - - - - - - - - - CRYSTALS - - - - - - - - - - -
Y701	19A702511G30	Crystal, quartz: 8.192 MHz.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A702364P310	Machine screw, TORX Drive: No. 2-56 x 3/16 inch.
	19B801570P2	Connector holder.
	19A705662P1	Connector, Elastomeric.
	19A702364P304	Machine screw, TORX Drive: No. 2-56 x 1/4 inch.

SYMBOL	GE PART NO.	DESCRIPTION
R706	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R707	19B801251P684	Metal film: 680K ohms ±5%, 1/10 w.
R708 and R709	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R710	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R712	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R713	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R714	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R715 thru R720	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R721	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R722	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R723 thru R725	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R726	19B801251P824	Metal film: 820K ohms ±5%, 1/10 w.
R727	19B801251P394	Metal film: 390K ohms ±5%, 1/10 w.
R728	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R729	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R730	19A702931P234	Metal film: 2210 ohms ±1%, 200 VDCW, 1/8 w.
R731	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R732	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R801	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R802	19B801251P183	Metal film: 18K ohms ±5%, 1/10 w.
R803	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R804 and R805	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R806	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R807	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R808	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R809	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R810	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U301	19A705450P3	Operational Amplifier, sim to MC34071.
U302 and U303	19A702293P3	Linear: Dual Op Amp; sim to LM358D.
U601	19A702293P1	Linear: Quad Op Amp; sim to LM324D.
U602	19A702293P3	Linear: Dual Op Amp; sim to LM358D.
U603	19A702705P3	Digital: 8-Channel Analog Multiplexer; sim to 4051BM.
U604	19A705452P1	Linear: Audio Amplifier; sim to TDA 2822M.
U605	19A702705P4	Digital: Quad Analog Switch/Multiplexer; sim to 4066BM.
U606	19A702293P3	Linear: Dual Op Amp; sim to LM358D.
U701	19A704724P1	Digital: 512 x 8 EEPROM (serial I/O); sim to XICOR X2404P.
U801	19A705454P1	Voltage Detector, sim to Seiko S 8054ALO.
U802	19A702531P1	Linear positive voltage regulator; sim to LM2931AZ-5.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y701	19A702511G30	Crystal, quartz: 8.192 MHz.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A702364P310	Machine screw, TORX Drive: No. M3-0.5 x 10.
	19B801570P2	Connector holder.
	19A705662P1	Connector, Elastomeric.
	19A702364P304	Machine screw, TORX Drive: No. M3-0.5 x 4.

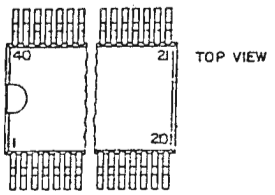
SYMBOL	GE PART NO.	DESCRIPTION
		FRONT CAP ASSEMBLY 19D902180G1
		- - - - - - - - - - MODULE - - - - - - - - - -
B1	19A705651P1	Loud speaker.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A702364P304	Screw.
	19A705861P1	Diaphram.
	19C851636P1	Switch Pad. Gray PAD
	19D901978P1	Front Cover.
	19A116318P4	Foil, Magnetic Shielding: 1.50 inches wide.
	19A705664P1	Gasket.
	19A149926P3	Insert.
	19A705090P1	Control Assembly Special. (Includes the following:)
		CONTROL ASSEMBLY, SPECIAL 19A705090P1
		CONTROL FRAME
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3 thru C7	19A702052P3	Ceramic: 470 pf ±10%, 50 VDCW.
		- - - - - - - - - - JACKS - - - - - - - - - -
J1 and J3		Part of 19A705733P1 Control Frame.
J901		Part of 19A705733P1 Control Frame.
		- - - - - - - - - - MICROPHONES - - - - - - - - - -
M1	19A701301P3	Microphone.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A705712P1	Switch, subminiature.
S2	19A705712P2	Switch, subminiature.
S3 thru S7		Part of 19A705733P1 Control Frame.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A705733P1	Control Frame, circuitized.
	19B801571P3	Switch, domed.
	19C851722P1	Boot, Auxiliary jack.
		LCD ASSEMBLY
	19C851719P1	Lens.
	19B801569P1	Diffuser.
	19A703685P3	Connector.
	19A705664P1	Gasket.
	19A702787P3	Tape.
	19C851660P1	LCD.
		LCD DRIVER BOARD 19C851720G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702052P6	Ceramic: 1500 pf ±10%, 50 VDCW.
C2	19A702052P26	Ceramic: 0.1 µf ±10%, 50 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1 thru D4	19A705713P1	LED, subminiature.
		- - - - - - - - - - JACKS - - - - - - - - - -
J2		Part of 19A705733P1 Control Frame.

SYMBOL	GE PART NO.	DESCRIPTION
		FRONT CAP ASSEMBLY 19D902180G1
		- - - - - - - - - - - - MODULE - - - - - - - - - - - -
B1	19A705651P1	Loud speaker.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A702364P304	Screw.
	19A705861P1	Diaphram.
	19C851636P1	Switch Pad. Gray PAD
	19D901978P1	Front Cover.
	19A116318P4	Foil, Magnetic Shielding: 1.50 inches wide.
	19A705664P1	Gasket.
	19A149926P3	Insert.
	19A705090P1	Control Assembly Special. (Includes the following:)
		CONTROL ASSEMBLY, SPECIAL 19A705090P1
		CONTROL FRAME
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3 thru C7	19A702052P3	Ceramic: 470 pf ±10%, 50 VDCW.
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J1 and J3		Part of 19A705733P1 Control Frame.
J901		Part of 19A705733P1 Control Frame.
		- - - - - - - - - - MICROPHONES - - - - - - - - - -
M1	19A701301P3	Microphone.
		- - - - - - - - - - - - SWITCHES - - - - - - - - - - - -
S1	19A705712P1	Switch, subminiature.
S2	19A705712P2	Switch, subminiature.
S3 thru S7		Part of 19A705733P1 Control Frame.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A705733P1	Control Frame, circuitized.
	19B801571P3	Switch, domed.
	19C851722P1	Boot, Auxiliary jack.
		LCD ASSEMBLY
	19C851719P1	Lens.
	19B801569P1	Diffuser.
	19A703685P3	Connector.
	19A705664P1	Gasket.
	19A702787P3	Tape.
	19C851660P1	LCD.
		LCD DRIVER BOARD 19C851720G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702052P6	Ceramic: 1500 pf ±10%, 50 VDCW.
C2	19A702052P26	Ceramic: 0.1 µf ±10%, 50 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1 thru D4	19A705713P1	LED, subminiature.
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J2		Part of 19A705733P1 Control Frame.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - - PLUGS - - - - - - - - - - - -
P1-A	19B801235P3	Terminal Strip.
P1-B	19B801235P13	Terminal Strip.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A700059P2	Silicon, PNP.
Q2	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
		- - - - - - - - - - - - RESISTORS - - - - - - - - - - - -
R1	19B801251P105	Metal film: 1M ohms ±5%, 1/10 w.
R2	19B801251P221	Metal film: 220 ohms ±5%, 1/10 w.
R3 and R4	19B801251P124	Metal film: 120K ohms ±5%, 1/10 w.
R5 and R6	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R7	19B801251P221	Metal film: 220 ohms ±5%, 1/10 w.
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
U1	19A705714P1	Chip, LCD Driver.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A702364P310	Machine screw, TORX Drive: No. M3-0.5 x 10.
	19B801570P2	Connector holder.
	19A705662P1	Connector.

FRONT ASSEMBLY

LCD DRIVER U1
19A705714P1



PINNING

SUPPLY

2 V_{DD} POSITIVE SUPPLY

4 V_{SS} NEGATIVE SUPPLY

INPUTS

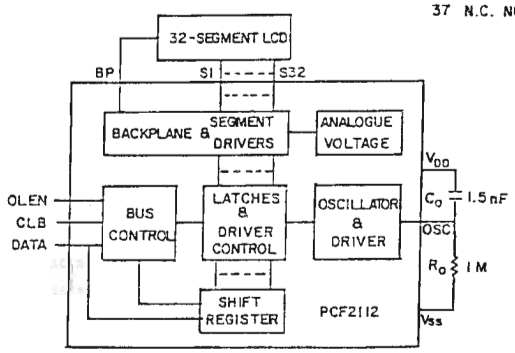
3 OSC OSCILLATOR INPUT
39 DATA DATA LINE
40 DLEN DATA LINE ENABLE
1 CLB CLOCK BURST
} CBUS

OUTPUTS

38 BP BACK PLANE DRIVER (COMMON OF LCD)

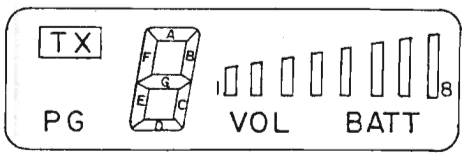
5 TO 36 LCD DRIVER OUTPUTS (S32 TO S1)

37 N.C. NOT CONNECTED



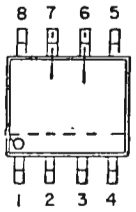
BLOCK DIAGRAM

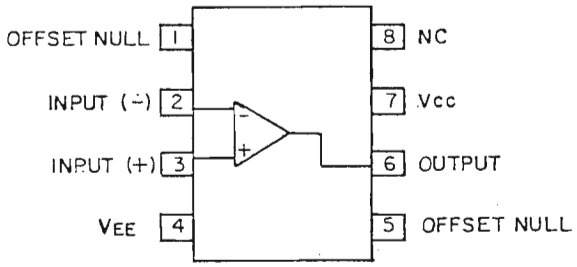
LCD
19C851660P1



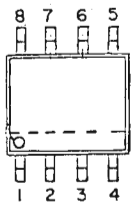
PIN	OUT		
1	COM	13	—
2	PG	14	BAR 8
3	1E	15	BAR 7
4	1D	16	BAR 6
5	1C	17	BAR 4
6	BAR 1	18	BAR 3
7	BAR 2	19	1B
8	VOL	20	1A
9	BAR 5	21	1F
10	BAT	22	1G
11	—	23	TX
12	COM	24	COM

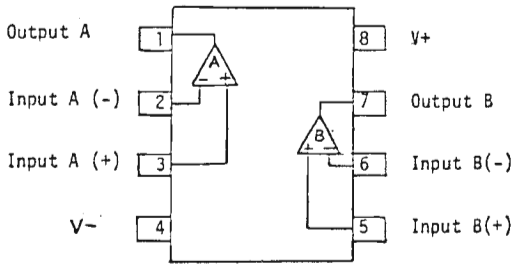
OPERATIONAL AMPLIFIER U301
19A705450P3



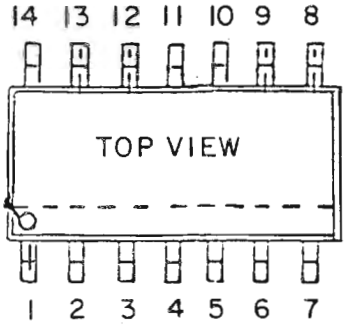


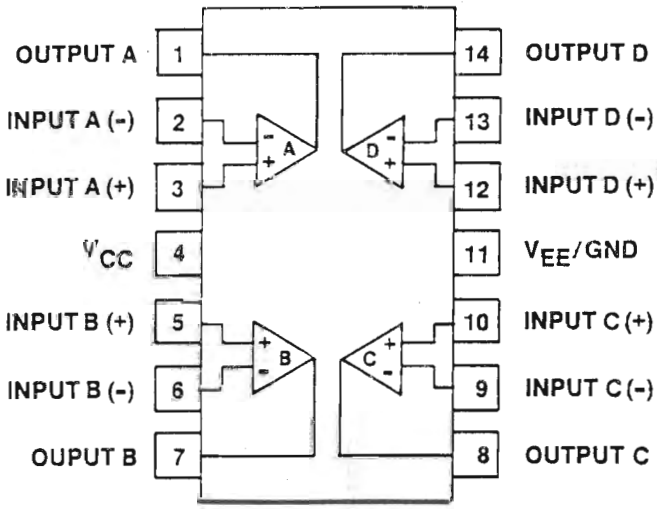
OPERATIONAL AMPLIFIER
U302/U703/U602
19A702293P2





OPERATIONAL AMPLIFIER U601
19A702293P1

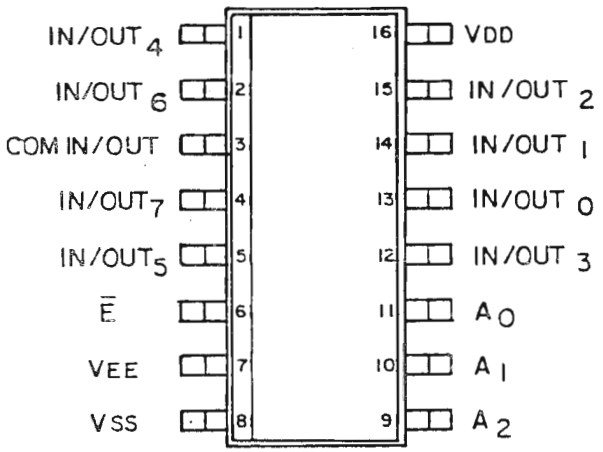




PIN 1 MAY BE IDENTIFIED BY INDENT OR CHAMFER

BILATERAL SWITCH U603
19A702705P3

PIN CONFIGURATION

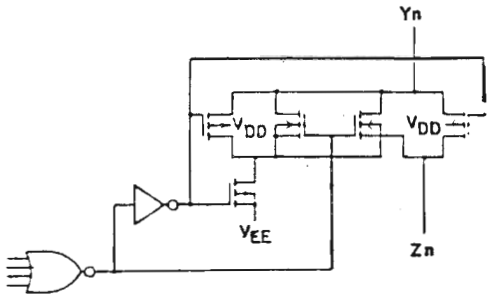


FUNCTION TABLE

INPUTS				CHANNEL ON
E	A_2	A_1	A_0	
L	L	L	L	Y_0-Z
L	L	L	H	Y_1-Z
L	L	H	L	Y_2-Z
L	L	H	H	Y_3-Z
L	H	L	L	Y_4-Z
L	H	L	H	Y_5-Z
L	H	H	L	Y_6-Z
L	H	H	H	Y_7-Z
H	X	X	X	NONE

H=HIGH STATE (THE MORE POSITIVE VOLTAGE)
L= LOW STATE (THE LESS POSITIVE VOLTAGE)
X=STATE IS IMMATERIAL

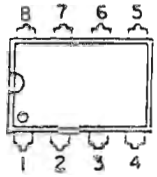
LOGIC DIAGRAM

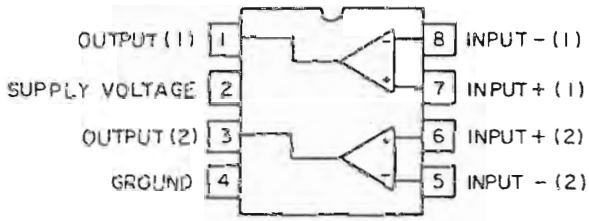


(ONLY 1/8 OF DEVICE SHOWN)

FRONT ASSEMBLY

AUDIO AMPLIFIER U604
19A705452P1

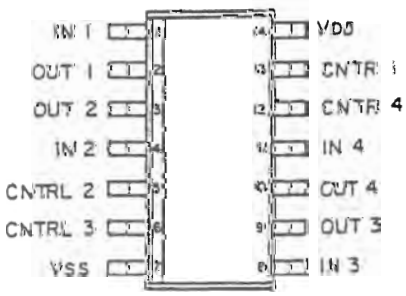




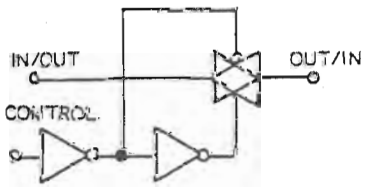
(TOP VIEW)

BILATERAL SWITCH U605
19A702705P1

PIN CONFIGURATION



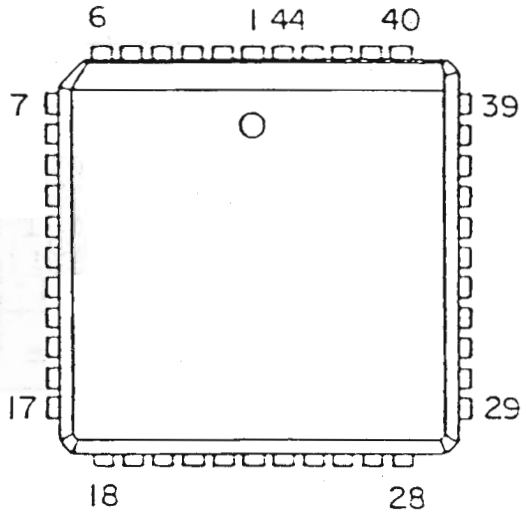
LOGIC DIAGRAM



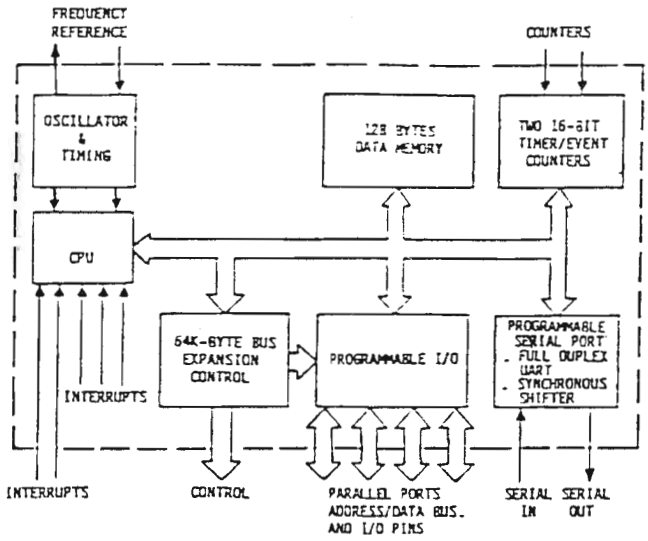
(1/4 OF DEVICE SHOWN)

CONTROL	SWITCH
0	OFF
1	ON

MICROPROCESSOR U1 (80C51)
19A704345P2 & P3

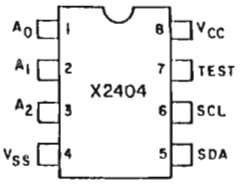


BLOCK DIAGRAM



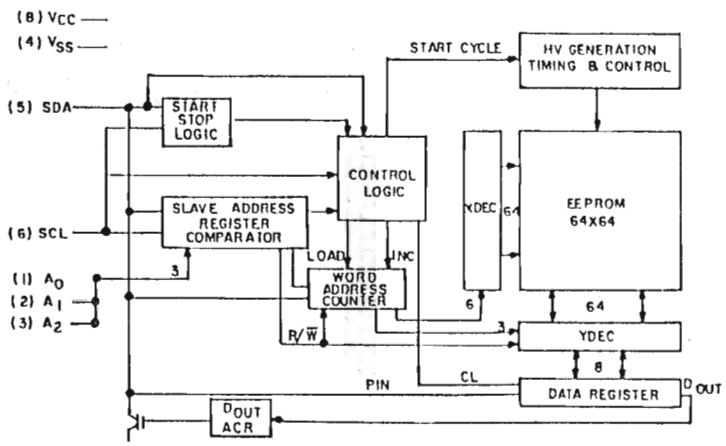
EEPROM U701
19A704724P1

PIN CONFIGURATION

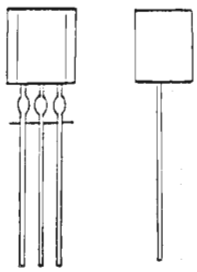


1 A_0 → TO V_{SS}
2 AND 3 A AND A ADDRESS INPUTS
4 V_{SS}
5 SDA SERIAL DATA — I^2C
6 SCL SERIAL CLOCK — BUS
7 TEST INPUT — TO V_{SS}
8 V_{CC}

FUNCTION DIAGRAM



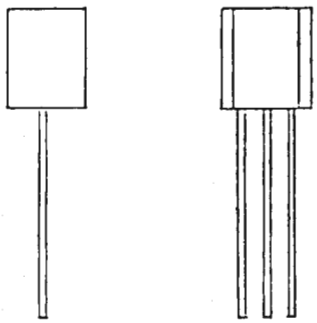
VOLTAGE DETECTOR U801
19A705454P1



BOTTOM VIEW

TO 92 PACKAGE
PIN 1 - OUT
PIN 2 - V_{DD}
PIN 3 - V_{SS}

VOLTAGE REGULATOR U802
19A702536P1



BOTTOM VIEW

PIN 1 INPUT
PIN 2 OUTPUT
PIN 3 GROUND