MAINTENANCE MANUAL

FOR

WALL MOUNT STATION SYSTEM BOARD

19D901553G1

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SPECIFICATIONS

INPUT VOLTAGE	13.8 Volts DC
INPUT CURRENT	125 milliamperes
OUTPUT VOLTAGE	10 Volts DC ±0.5 Volt
OUTPUT CURRENT @ 10 VOLTS	50 milliamperes
AUDIO LEVELS	
Input	300 millivolts from radio 100 millivolts RMS at 1 kHz with 3 kHz deviation from Remote Board
Output	100 millivolts to radio 250 millivolts to DC Remote Board
DISTORTION	Less than 3%
TEMPERATURE RANGE	-30°C to 60°C (-22°F to +140°F)

GENERAL ELECTRIC

DESCRIPTION

System board 19D901553G1 is used in the Wall Mount station to provide the system interface between the Delta two-way radio and the station controls and options. The board provides the following controls for servicing and testing:

- Local frequency control
- Intercom on-off
- Speaker on-off
- Channel Guard monitor on-off

Connectors are also provided for the remote board, service microphone, speaker, and a programming jack for the radio.

NOTE

Programming jumper P8 must be moved from J8-2 and J8-3 to J8-1 and J8-2 for serial programming of the radio from programming jack J4. Move P8 back to J8-2 and J8-3 when programming is completed.

CIRCUIT ANALYSIS

When no signal is being received and no Push-To-Talk (PTT) or keyboard switches are pressed, all control inputs are high except the RX MUTE input (low). Activating any keyboard, PTT or monitor function applys a low (approximately ground potential) to the selected control line.

$\overline{\text{RX MUTE}}$

The receiver mute input is low (<1 volt) until a carrier is received. When a carrier is received, the noise content of the input signal at VOL/SQ HI (J2-3) decreases. The decrease in noise causes the RX MUTE line to go high (>3.5 volts), turning on bilateral switch U31D. Turning on U7D couples the received audio through receiver audio amplifier and station speaker.

A high on the RX MUTE line also is applied to inverter U4C, NOR gates U4A and U4D, which applies a low to the base of Q10, turning it off. Turning off Q10 applies the 10-Volt collector voltage to the remote line audio switch, enabling the audio path in the remote receiver.

AUDIO SWITCHING

All of the station audio paths are controlled by bi-lateral switches. When the control input is low, the switch is turned off. When the control input goes high, the switch is turned on to allow audio to be applied to the selected circuit. The function of each audio switch is described in the following paragraphs. A Block Diagram of the audio circuits is shown in Figure 1.

U7B - passes audio from the local microphone to the transmitter when the service microphone PTT switch is pressed (PTT).

U7A - passes remote audio to the transmitter except when local intercom or local microphone switch is activated.

U7C - passes audio from the local microphone to the remote when the local intercom or PTT switch is pressed.

U5C - passes remote audio to the service speaker through the volume control when there is no RX MUTE signal, and PTT is inactive.

U5B - passes received audio to the remote except when the PTT switch is pressed.

U7D - passes received audio to the service speaker whenever a signal is received.

LOCAL CONTROL

Pressing the Push-To-Talk (PTT) switch on the service microphone applys a ground to J1-3, causing the output of NOR gate U2D-11 to go high. The high at U2D-11 causes the output of U2C-10 to go low, and the output of U2A-3 to go high. The high output at U2A-3 turns on PTT switch Q9, keying the transmitter. The high at U2D-11 enables audio switch U7B in the service microphone audio path so that audio can be applied to the transmitter from J2-2 (MIC HI).

The high output at U2D-11 is also applied to NOR gate U4C, causing U4C-10 to go low. This low output disables U5B and U7A to prevent any remote audio from being transmitted. The low at U4C-10 is also applied to inverter U3A, causing its output to go high. This high output enables switch U7C which allows audio from the service microphone to be heard at the remote. The high output of U3A is also applied to NOR gate U4B, causing its output to go low. The low output at U4B-4 disables switch U5C, preventing any remote intercom function. The high at U3A-2 also causes U4D-11 to go low, turning off RUS switch Q10. When Q10 is turned off, +10 volts is applied to the DC remote board to allow remote audio to be heard in the station speaker.

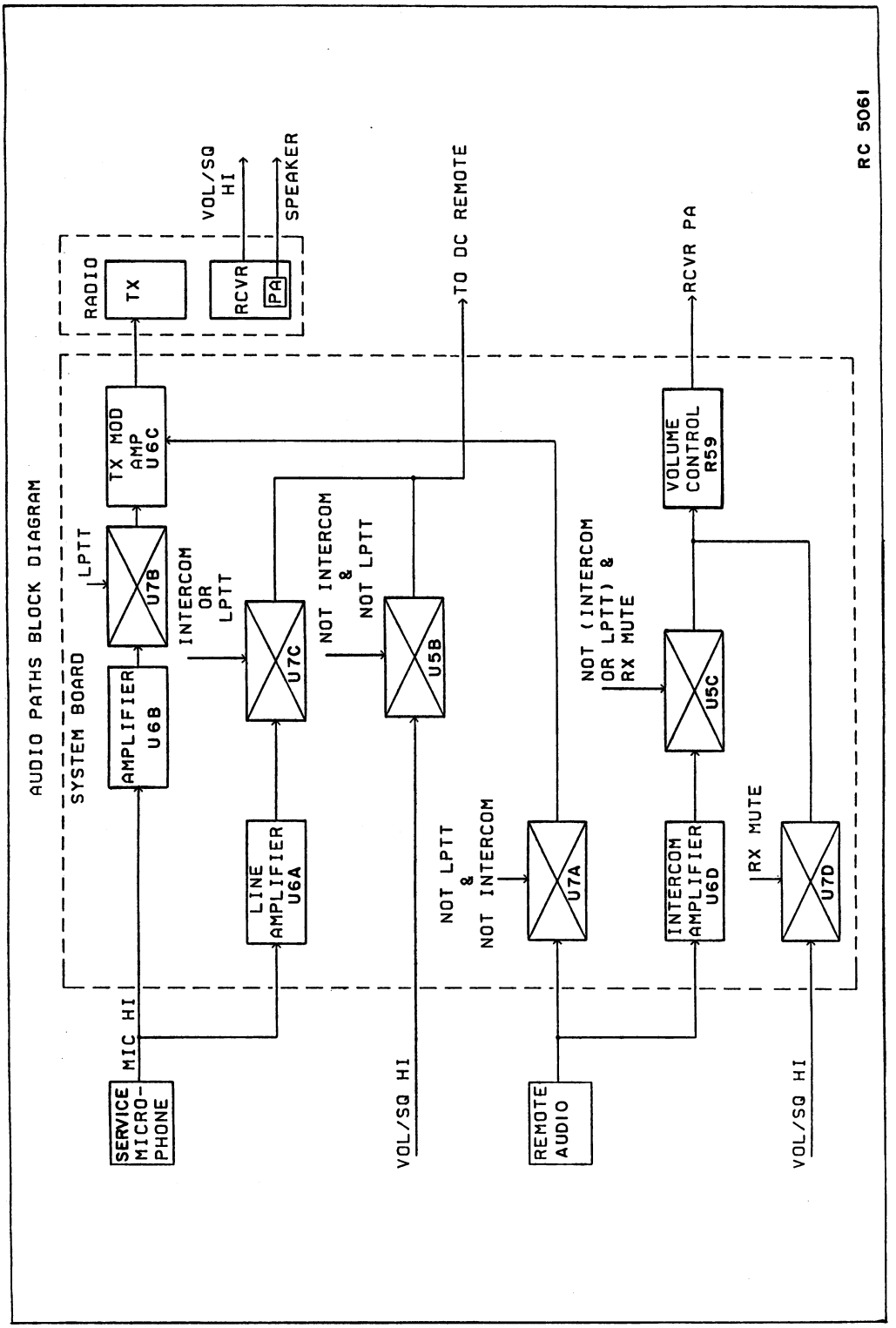

Figure 1 - Station Audio Block Diagram

Audio from the service microphone is coupled through TX MIC ADJUST R45 to amplifier U6B. The output of U6B is coupled through switch U7B and TX MOD ADJUST R40 to amplifier U6C, and then applied to the transmitter exciter.

A second output is coupled through LINE MIC control R50, line amplifier U6A and audio switch U7C and applied to the remote VOL HI input (J6-9).

REMOTE CONTROL

Keying a remote microphone causes the output at U2B-4 to go high, the output at U2C-10 to go low, and the output at U2A-3 to go high. The high output at U2A-3 turns on PTT switch Q9, keying the transmitter. The high at U2B-4 is also applied to U4A, causing U4A-3 to go low. This causes the output of U4B-4 to go high, turning on RUS switch Q10. Turning on Q10 shunts the 10-Volt RUS voltage to ground, disabling the remote audio circuit.

Audio from the remote microphone is applied to the system board at J6-1. One audio signal is coupled through INTERCOM VOLUME control R33, amplifier U6D, audio switch U5C and station VOLUME control R59 to the station audio PA. The PA output is applied to the service speaker. In the second audio path, the remote audio is coupled through switch U7A, TX MOD control R40, and amplifier U6C to the transmitter.

NOTE

Bilateral switches U5C, U7D, U7A and U5B are enabled whenever the microphone is not keyed.

VOL/SQ HI

The audio output of the station receiver is applied to the system board at J2-3 (VOL/SQ HI). One audio path is through U7D and VOLUME control R59 to the receiver PA and service speaker. The second audio signal path is coupled from U5B-4 to U5B-3, and then to the remote receiver. The receiver mute (RX MUTE) line goes high, turning off RUS switch Q10 to open the remote receiver.

CHANNEL SELECT

The channel select and display circuitry consists of:

- Channel select switch S2
- Tri-state buffer U9
- Transistor switches Q6, Q7 and Q8
- BDC-to-7 segment converter U1
- Channel display diode array H1

The wall mount station may be equipped for one- or multi-frequency operation. In single frequency stations, jumper P9 is connected from J9-1 to J9-2. P9 is removed for multi-frequency operation.

NOTE

If the station is ordered from the factory with no frequency programming, jumper P9 is shipped connected for single-frequency operation. The jumper must be removed if the station is to be used in a multi-frequency application.

Channel select switch must be set to position 5 for remote frequency control. Placing switch S2 in position 5 grounds pin 1 of tri-state buffer U9, turning the buffer on. This permits the binary select codes from the remote to light the channel indicator on the station control panel. The channel select codes are also applied to the radio through J3-7, J3-8 and J3-9 (FB1, FB2 and FB3).

Placing the switch in the channel 1-4 position turns off buffer U9. The station channels can be selected for servicing. For example, selecting channel 2 applies a ground to the base of Q7, turning it off. This causes the collector of Q7 to go high, and applies 13 volts to the "B" input (U1-1) of BCD converter/driver U1. The binary output of U1 (0-1-0) switches channel display indicator to "2".

INTERCOM

Placing Intercom slide switch S3 in the INCOM position disables (opens) the PTT lead so that the transmitter can not be keyed. All audio and switching functions can then be operated in the intercom mode.

CG MONITOR

Placing Channel Guard monitor switch in the MON position grounds the CG MON lead to the receiver. Grounding the CG MON lead disables the station Channel Guard only, permitting all signals applied to the radio to be heard. The CG MON lead does not disable the receiver squelch circuit.

VOLTAGE REGULATORS

The system board utilizes two regulator circuits to supply the ICs. The regulators are powered by 13 Volts from the power supply or the optional battery standby supply. Power is applied to the system board through J3-3 (13 VDC) and J3-8 (GND).

10-Volt Regulator

The 13-Volt output of the power supply is applied to U8-3. The regulated 10 Volts is applied to the ICs on the system board to the remote board through J6-5, and to the 5-Volt regulator.

5-Volt Regulator

Supply voltage from 10-Volt regulator U8 is applied to pin 3 of 5-Volt regulator U10. The regulated 5-Volt output is applied to the system board op-amps U6A through U6D.

TROUBLESHOOTING PROCEDURE

This Troubleshooting Procedure assumes that the Delta radio in the station is in satisfactory working condition.

SYMPTOM	PROCEDURE
1. Microphone does not key transmitter	Check mic PTT switch, U2D, U2C, U2A or Q9.
2. Remote does not key transmitter	Check remote board PTT output. Check U2B, U2C.
3. No mic audio to transmitter	Check U6B, U7B, U6C. Feed 100 mv into J1-2 and check for 100 mv on J2-2.
4. No mic to line audio	Feed 100 mv into J1-2 and check for output on J6-9. Check U6A, U7C. Check Remote board telephone line.
5. No remote transmit audio	Feed audio signal into the telephone line input on the remote control board. Check remote board output at J6-1. Check U7A.
6. No receive audio	Check for 300 mv at J2-3 with an on channel RF signal of 1 kHz at 3 kHz deviation. Check U7D.
7. No audio from remote	Set up per step 5. Check U6D, U5C.
8. No receive audio to line	Set up per step 6. Check U5B, check remote board.
9. No channel control	Check U9.
10. No 10 volts	Check U8.
11. No 5 volts	Check U10.

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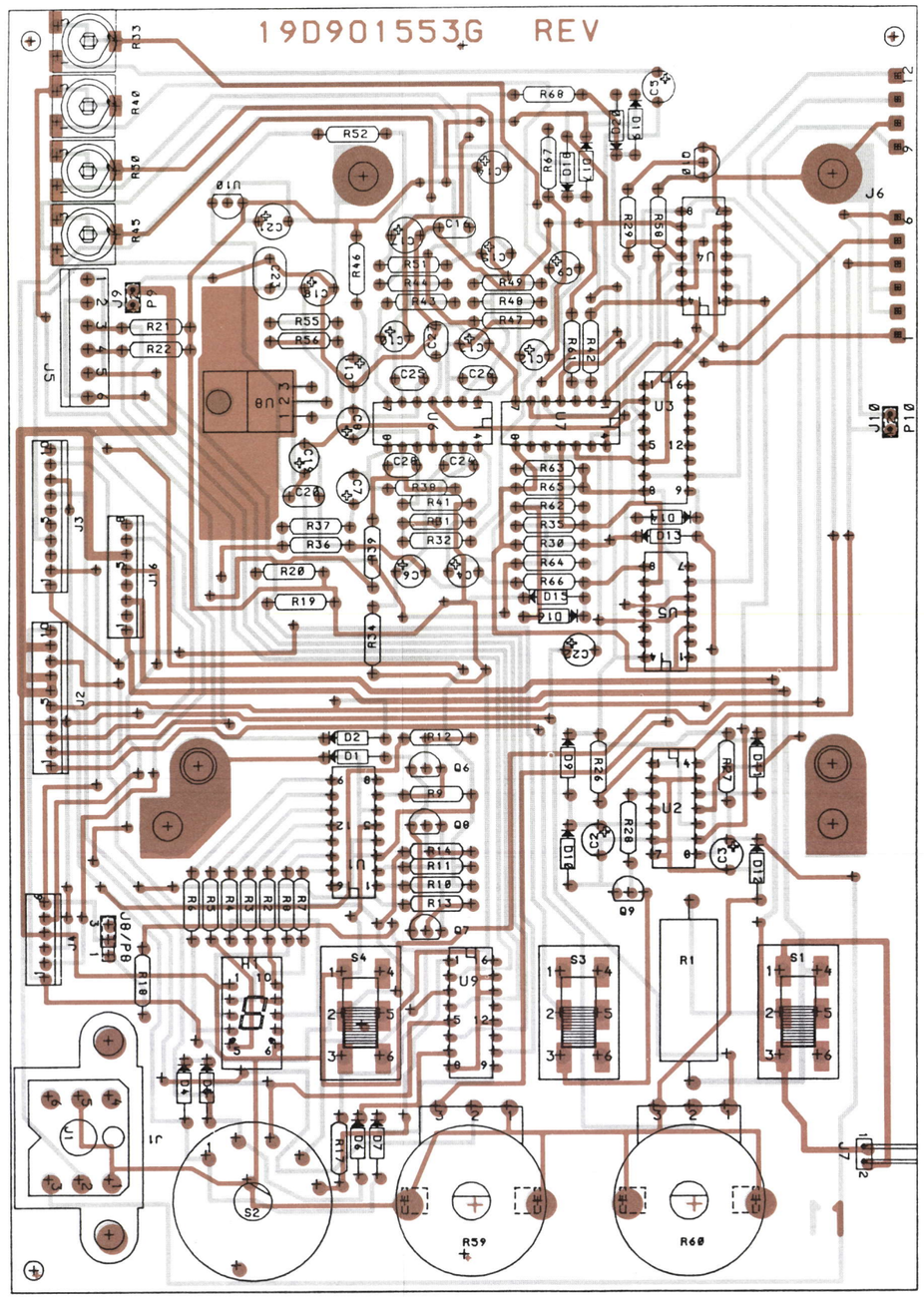
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

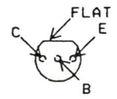
GENERAL ELECTRIC* U.S.A.

LBI31452



MODEL NO.	REV. LETTER
PL19D901553G1	

LEAD IDENTIFICATION
FOR Q6-Q10

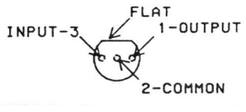


IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER µ,n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR µ.

LEAD IDENTIFICATION
FOR U10

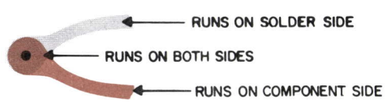


IN-LINE
TOP VIEW

PWR AND GROUND CONNECTIONS

DEVICE	V+(13V) PIN NO	V+(10V) PIN NO	V+(5V) PIN NO	GND PIN NO
U1	16			8
U2		14		7
U3		1		8
U4		14		7
U5		14		7
U6		4		11
U7		14		7
U8				
U9			16	8

NOTES:
1. MOVE P8 FROM J8-2 & 3 TO 1 & 2 FOR SERIAL PROGRAMMING OF RADIO THROUGH J4. MOVE P8 BACK TO J8-2 & 3 AFTER PROGRAMMING.
2. REMOVE P9 FOR MULTI-FREQUENCY OPERATION.

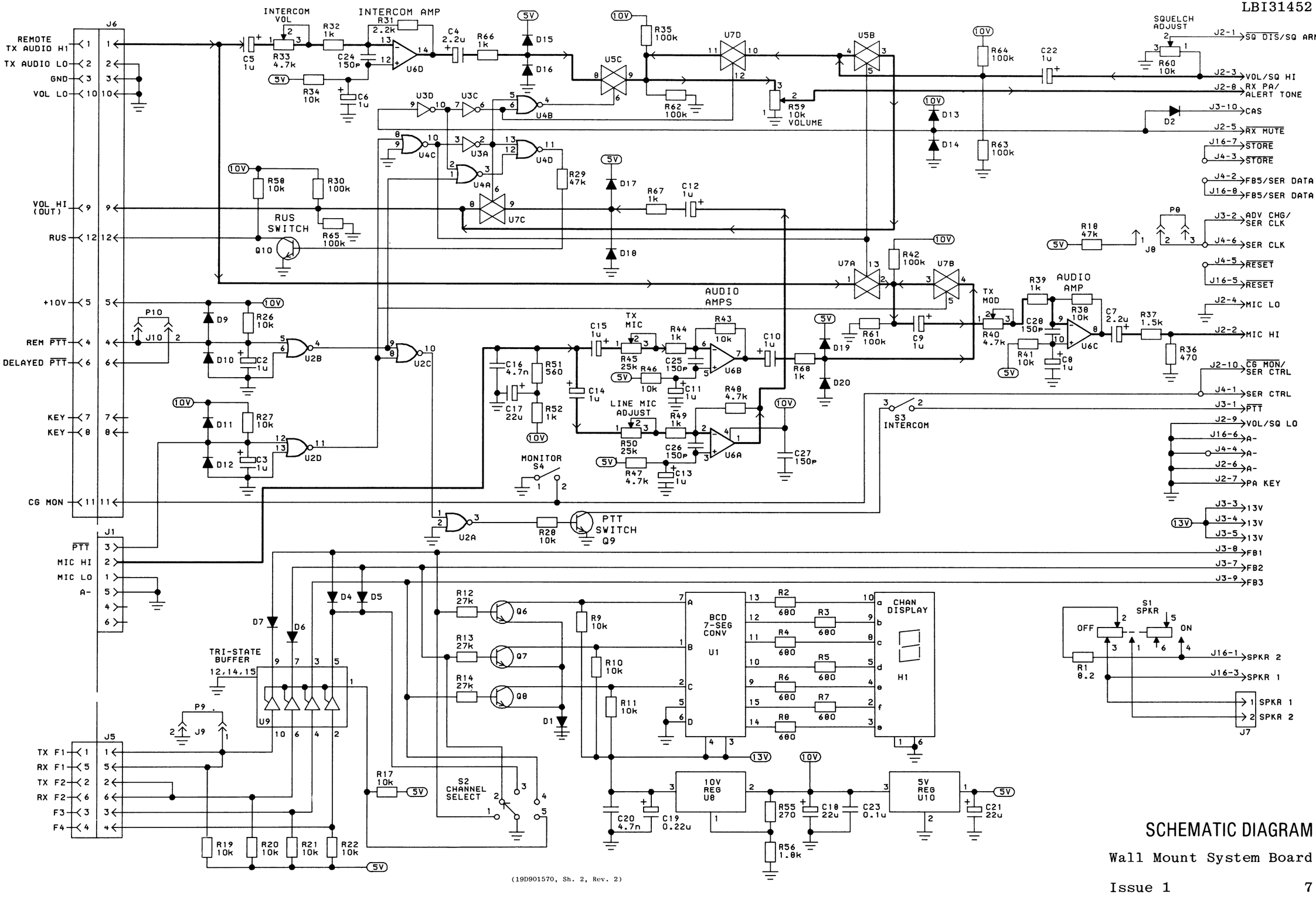


(19D901570, Sh. 1, Rev. 0)

OUTLINE DIAGRAM

Wall Mount System Board

(19D901554, Sh. 1, Rev. 0)
(19A704438, Sh. 1, Rev. 1)
(19A704438, Sh. 2, Rev. 1)



(19D901570, Sh. 2, Rev. 2)

SCHEMATIC DIAGRAM

Wall Mount System Board

PARTS LIST

SYSTEM BOARD (WALL MOUNT)
19D901553G1

ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2 and C3	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C4	19A703314P7	Electrolytic: 2.2 uF - 10 + 50%, 50 VDCW; sim to Panasonic LS Series.
C5 and C6	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C7	19A703314P7	Electrolytic: 2.2 uF - 10 + 50%, 50 VDCW; sim to Panasonic LS Series.
C8 and C9	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C10	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C11	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C12 and C13	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C14 and C15	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C16	19A700234P5	Polyester: 4700 pF ±10%, 50 VDCW.
C17 and C18	19A703314P5	Electrolytic: 22 uF -10+50% tol, 25 VDCW; sim to Panasonic LS Series.
C19	19A701534P2	Tantalum: 0.22 uF ±20%, 35 VDCW.
C20	19A700234P5	Polyester: 4700 pF ±10%, 50 VDCW.
C21	19A703314P5	Electrolytic: 22 uF -10+50% tol, 25 VDCW; sim to Panasonic LS Series.
C22	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C23	19A702250P113	Polyester: 0.1 uF ±10%, 50 VDCW.
C24 thru C28	19A700233P2	Ceramic, disc: 100 pF ±20%, 50 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1 and D2	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D4 thru D7	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D9 thru D14	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D15 thru D20	19A700047P1	Silicon, 100 mW continous dissapation.
H1	19A134712P5	Optoelectronic display: green; sim to HOSP 3603.
		- - - - - - - - - - JACKS - - - - - - - - - -
J1	19B219627G1	Connector: 6 contacts.
J2 and J3	19A700072P36	Printed wire: 10 contacts; sim to Molex 22-27-2101.
J4	19A700072P32	Printed wire: 6 contacts rated at 2.5 amps; sim to Molex 22-27-2061.
J5	19A116659P105	Connector, printed wiring: 6 contacts rated at 5 amps; sim to Molex 09-60-1061.
J6	19A701785P1	Contact, electrical; sim to Molex 08-50-0404. (Quantity 10).
J7	19A700072P151	Printed wire: 2 contacts rated at 2.5 amps; sim to Molex 22-05-2021.
J8	19A700072P2	Printed wire: 3 contacts rated @ 2.5 amps; sim to Molex 22-03-2031.
J9 and J10	19A700072P1	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-03-2021.
J16	19A700072P34	Printed wire: 8 contacts rated at 2.5 amps; sim to Molex 22-27-2081.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P8 thru P10	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q6 thru Q10	19A700023P2	Silicon, NPN: sim to 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5493035P52	Wirewound: 8.2 ohms ±10%, 5 w; sim to Hamilton Hall Type HR-5
R2 thru R8	19A700019P35	Deposited carbon: 680 ohms ±5%, 1/4 w.
R9 thru R11	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R12 thru R14	19A700019P54	Deposited carbon: 27K ohms ±5%, 1/4 w.
R17	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R18	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R19 thru R22	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R26 thru R28	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R29	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R30	19A700019P61	Deposited carbon: 0.1M ohms ±5%, 1/4 w.
R31	19A700019P41	Deposited carbon: 2.2K ohms ±5%, 1/4 w.
R32	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R33	19A700185P3	Variable: 5000 ohms ±20%, temp coef -450+150 PPM, 1/3 w; sim to CTS Series 268.
R34	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R35	19A700019P61	Deposited carbon: 0.1M ohms ±5%, 1/4 w.
R36	19A700019P33	Deposited carbon: 470 ohms ±5%, 1/4 w.
R37	19A700019P39	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R38	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R39	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R40	19A700185P3	Variable: 5000 ohms ±20%, temp coef -450+150 PPM, 1/3 w; sim to CTS Series 268.
R41	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R42	19A700019P61	Deposited carbon: 0.1M ohms ±5%, 1/4 w.
R43	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R44	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R45	19A700185P5	Variable: 22K ohms ±20%, 1/3 w.
R46 and R47	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R48	19A700019P45	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R49	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R50	19A700185P5	Variable: 22K ohms ±20%, 1/3 w.
R51	19A700019P34	Deposited carbon: 560 ohms ±5%, 1/4 w.
R52	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R55	19A700019P30	Deposited carbon: 270 ohms ±5%, 1/4 w.
R56	19A700019P40	Deposited carbon: 1.8K ohms ±5%, 1/4 w.
R58	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R59	19B209535P2	Variable: 10K ohms ±20%, 500 VDCW, 1/4 w.
R60	19B209535P1	Variable: 10K ohms ±20%, 500 VDCW, 1/2 w.
R61 thru R65	19A700019P61	Deposited carbon: 0.1M ohms ±5%, 1/4 w.
R66 thru R68	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B209261P14	Slide: DPDT, contacts rated 1/2 amp VDC or 3 amp VAC 125 V; sim to Switchcraft 11A-1413.
S2	19B801334P1	Rotary, single pole, 5 position; sim to A10514RNCBE.
S3 and S4	19B209261P14	Slide: DPDT, contacts rated 1/2 amp VDC or 3 amp VAC 125 V; sim to Switchcraft 11A-1413.
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
U1	19A700029P204	Digital: BCD-TO-SEVEN SEGMENT LATCH/DECODER/DRIVER.
U2	19A700029P2	Digital. QUAD 2 INPUT NOR GATE.
U3	19A700176P1	Digital. HEX BUFFER/CONVERTER (INVERTING).
U4	19A700029P2	Digital. QUAD 2 INPUT NOR GATE.
U5	19A700029P44	Digital: BILATERAL SWITCH.
U6	19A700086P1	DUAL OP AMP; sim to Type 1458.
U7	19A700029P44	Digital: BILATERAL SWITCH.
U8	19A701199P1	Linear, Positive Voltage Regulator; sim to LM317T.
U9	19A700029P229	Digital: HEX 3-STATE BUFFER.
U10	19J706031P1	Linear: POSITIVE VOLTAGE REGULATOR.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES