

MAINTENANCE MANUAL
AUDIO BRIDGE MODULE
19D902458G1

TABLE OF CONTENTS	
	<u>Page</u>
SPECIFICATIONS	1
DESCRIPTION	1
CIRCUIT ANALYSIS AND FUNCTIONAL DESCRIPTION	1
ALIGNMENT RECEIVER APPLICATION	1
TEST AND SERVICE	1
Required Test Equipment	1
Status And Led Test	1
Audio Route Test	1
PARTS LIST	3
PRODUCTION CHANGES	3
IC DATA	3
ASSEMBLY DIAGRAM	4
OUTLINE DIAGRAM	5
SCHEMATIC DIAGRAM	6

SPECIFICATIONS

The following tables summarize the specifications of the Audio Bridge Module.

Table 1 - General Specifications

TEMPERATURE	-30C ± 60C
HEIGHT	5.58" (Typical)
DEPTH	5.96" (Typical)
WIDTH	1.42" (Typical)
WEIGHT	10 Oz. (Typical)
VOLTAGE	- 24 V ± 10%
CURRENT	0.1 Ampere Maximum
AUDIO LEVELS	0 dBm Maximum

Table 2 - Power and Ground Connections

CONNECTOR PIN	SIGNAL NAME	VOLTAGE ±5%	CURRENT AMPS MAX
J1-17	GND	0	0.1
J1-49	AUDIO RING	0	0.1
J1-35	-24	-24	0.1

Table 3 - J1 Connector Definitions

CONNECTOR PIN	SIGNAL NAME	INPUT/OUTPUT (Analog)	LEVEL DC-dBm DC-VOLTS
J1-17	GND	-	-24V
J1-20	SITE 1 AUDIO	O	0 dB *
J1-21	SITE 2 AUDIO	O	0 dB *
J1-22	SITE 3 AUDIO	O	0 dB *
J1-23	SITE 4 AUDIO	O	0 dB *
J1-24	SITE 5 AUDIO	-	0 dB *
J1-25	SITE 6 AUDIO	O	0 dB *
J1-26	SITE 7 AUDIO	O	0 dB *
J1-27	SITE 8 AUDIO	O	0 dB *
J1-28	SITE 9 AUDIO	O	0 dB *
J1-29	SITE 10 AUDIO	O	0 dB *
J1-33	EXP AUDIO T	O	0 dB *
J1-34	EXP AUDIO R	O	0 dB *
J1-35	-24	-	- 24 V
J1-49	AUDIO RING	I	0 dB
J1-55	AUDIO TIP	I	0 dB

* Jumper JP1 in 1-2,
-16 dBm in 2-3.

DESCRIPTION

Audio Bridge Module 19D902458G1 plugs into P2 of Analog Processor Shelf #1 (19D902543G1) and is also used in Analog Processor Shelf #2 (19D902544G1). Refer to Maintenance Manuals LBI-38479 and LBI-38480 respectively.

The Audio Bridge Module provides up to ten single ended outputs with one transformer coupled output for expansion. A single Audio Bridge Module provides routing (*bridging*) of Simulcast audio (*analog*) signals to up to ten site locations.

CIRCUIT ANALYSIS AND
FUNCTIONAL DESCRIPTION

Audio **TIP** is applied to connector P1, Pin 55 of the Audio Bridge Module. Audio **RING** is applied to J1, Pin 49. Battery ground (**BAT -V GND (AGND))** is connected to P1, Pin 17 and battery voltage (-24 Volts) is connected to P1, Pin 35 (**BATT -V PWR**).

The audio **TIP** input is connected through capacitor C1 to the input of operational amplifier U2-A, Pin 2 at resistor R2 or R100. Operational Amplifier U2A is an inverting amplifier with a gain of approximately 2 with jumper JP1 in position 1-2 or 0.28 with jumper JP1 in position 2-3. The output (U2-A, Pin 1) is connected to the inputs of eleven unity-gain inverters (U2-B through U4-D). The output of each inverter connects through a **DIP** switch to an associated site (P1, Pin 20, **SITE 1 AUDIO HI**, etc.). An LED circuit is connected to one half of each DIP switch to indicate when it is closed (**ON**).

Battery voltage (-24 volts) at P1, Pin 35 connects through diode D1 to power the LED's (**-V 1**). LED indicator DS1 indicates that -24 volts is present.

The -23 volt input is also connected through resistor R50 to the input of -12 volt regulator circuit U1, Pin 3. The -12 volts output on U1, Pin 2 connects through voltage divider R52 and R53 to provide bias (**BIAS 1**) for operational amplifiers U2 through U4.

Jumper JP1 controls bridge gain. In position 1-2 the bridge is a "unity gain", 0 dBm out., In position 2-3 there is a net loss of 16 dB.

ALIGNMENT RECEIVER
APPLICATION

1. Remove jumper from J1.
2. Move jumper on J2, Pins 2-3 to J2, Pins 1-2.
3. Move jumper on J3, Pins 1-2 to J3, Pins 2-3.
4. Set all dip switches to **OFF** except **SW3-C (NO)**.

The gain of amplifier U2-A is adjustable by setting resistor R102.

TEST AND SERVICE

REQUIRED TEST EQUIPMENT

- Oscilloscope, Tektronix 2230 or equivalent.
- Audio/Digital Function Generator, HP 3312A or equivalent
- Power Supply, Power Design Inc. TP325 or equivalent
- Resistor (Quantity 11), 604 ohm, 1/4 Watt, 1% tolerance
- VOM, Fluke 8050A or equivalent

STATUS AND LED TEST

To verify the LED status, indicating the routing of audio:

1. Place all DIP switches (SW1, SW2 and SW3) in the ON position.
2. Apply power to the Audio Bridge Board as defined in TABLE 2 of the SPECIFICATIONS.
3. Verify that all LED's are ON.
4. Toggle the DIP switches and verify TABLE 4 which follows.
5. Verify that LED DS1 is ON all of the time.

AUDIO ROUTE TEST

Verify bridging (routing) of audio input to up to 10 single ended outputs with one transformer coupled output for expansion.

1. Input a 1000 Hz tone at 0 dBm as the standard test tone to J1, Pin 55 (AUDIO TIP) with J1, Pin 49 (AUDIO RING) as ground for the audio signal. Place JP1 in position 1-2.

J1, Pin 20
J1, Pin 21
J1, Pin 22
J1, Pin 23
J1, Pin 24
J1, Pin 25
J1, Pin 26
2. Install a 604 Ohm resistor between GND and each of the following connector points:

J1, Pin 27
J1, Pin 28
J1, Pin 29
3. Install a 604 Ohm resistor between J1-33 and J1-34
4. Verify the outputs as indicated in TABLE 5.

NOTE

J1, Pin 33 and J1, Pin 34 form a transformer coupled output pair.

Table 4 - Audio LED Status Test

Dip Switch No.	Dip Switch Setting	Only Affected LED	LED Status	LED Function
SW1-1 SW1-1	ON OFF	DS2 DS2	OFF ON	AUDIO 1 AUDIO 1
SW1-2 SW1-2	OFF ON	DS3 DS3	OFF ON	AUDIO 2 AUDIO 2
SW1-3 SW1-3	OFF ON	DS4 DS4	OFF ON	AUDIO 3 AUDIO 3
SW1-4 SW1-4	OFF ON	DS5 DS5	OFF ON	AUDIO 4 AUDIO 4
SW2-1 SW2-1	OFF ON	DS6 DS6	OFF ON	AUDIO 5 AUDIO 5
SW2-2 SW2-2	OFF ON	DS7 DS7	OFF ON	AUDIO 6 AUDIO 6
SW2-3 SW2-3	OFF ON	DS8 DS8	OFF ON	AUDIO 7 AUDIO 7
SW2-4 SW2-4	OFF ON	DS9 DS9	OFF ON	AUDIO 8 AUDIO 8
SW3-1 SW3-1	OFF ON	DS10 DS10	ON OFF	AUDIO 9 AUDIO 9
SW3-2 SW3-2	OFF ON	DS11 DS11	OFF ON	AUDIO 10 AUDIO 10
SW3-3 SW3-3	OFF ON	DS12 DS12	OFF ON	AUDIO EX AUDIO EX

Table 5 - Audio Route Test

Output Point J1	Dip Switch	Switch Position	Output Level dBm ± 1.5
20	SW1-1	ON OFF	0 < -60
21	SW1-2	ON OFF	0 < -60
22	SW1-3	ON OFF	0 < -60
23	SW1-4	ON OFF	0 < -60
24	SW2-1	ON OFF	0 < -60
25	SW2-2	ON OFF	0 < -60
26	SW2-3	ON OFF	0 < -60
27	SW2-4	ON OFF	0 < -60
28	SW3-1	ON OFF	0 < -60
29	SW3-2	ON OFF	0 < -60
33 34	SW3-3	ON OFF	0 < -60

AUDIO BRIDGE MODULE
19D902458G1

SYMBOL	PART NO.	DESCRIPTION
-----CAPACITORS-----		
C1	19A700004P8	Polyester: 1.0 μ F, 63 VDCW.
C4 thru C14	19A703314P3	Electrolytic: 33 μ F, 16 VDCW.
C20	19A703314P10	Electrolytic: 10 μ F, 50 VDCW.
C21	T644ACP410K	Polyester: 0.1 μ F.
C22	19A703314P3	Electrolytic: 33 μ F, 16 VDCW.
C23	T644ACP410K	Polyester: 0.1 μ F.
C24	19A703314P3	Electrolytic: 33 μ F, 16 VDCW.
C25	T644ACP410K	Polyester: 0.1 μ F.
R26 and R27	19A703314P3	Electrolytic: 33 μ F, 16 VDCW.
C28	T644ACP410K	Polyester: 0.1 F.
-----DIODES-----		
D1 DS1 thru DS12	T324ADP1041 19A703595P7	Silicon: Rect. Opto Electric: sim to DIALIGHT 550-5106.
-----CONNECTOR-----		
J1 thru J4	19A704852P2	Printed Wire.
--- PLUGS ---		
P1	19A702104P2	Printed wire.
-----RESISTORS-----		
R1	19A701250P176	Metal Film: 604 ohms.
R2	19A701250P369	Metal Film: 51.1k ohms.
R3	19A701250P401	Metal Film: 100k ohms.
R9 thru R27 R29 and R30	19A701250P401	Metal Film: 100k ohms.
R32	19A701250P401	Metal Film: 100k ohms.
R35 thru R40	19A701250P176	Metal Film: 604 ohms.
R45	19A701250P176	Metal Film: 604 ohms.
R50	19A701250P176	Metal Film: 604 ohms.
R52 and R53	19A701250P401	Metal Film: 100k ohms.
R60	19A701250P301	Metal Film: 10k ohms.
R70 thru R80	19A701250P301	Metal Film: 10k ohms.
R94 thru R97	19A701250P176	Metal Film: 604 ohms.
R100	19A701250P453	Metal Film: 348k ohms.
R101	19A701250P266	Metal Film: 4.7k ohms.
R102	19A700109P5	Variable: 10k ohms.
----- SWITCHES -----		
SW1 thru SW3		GRAYHILL 78F04.

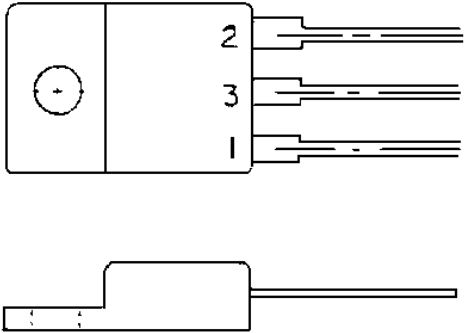
SYMBOL	PART NO.	DESCRIPTION
T1		--- -TRANSFORMER- --- MICROTRAN PM34-M
- - INTEGRATED CIRCUITS- -		
U1	19A134718P2	Linear Voltage Regulator
U2 thru U4	19A704883P1	Quad Operational Amplifier
--- -MISCELLANEOUS- ---		
6	10.09 TELLAB	Front Panel
8	N80P9005B6	Screw
9	A7141225P2	Nut
10	N404P11B6	Lockwasher

PRODUCTION CHANGES

Changes in the equipment to improve or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

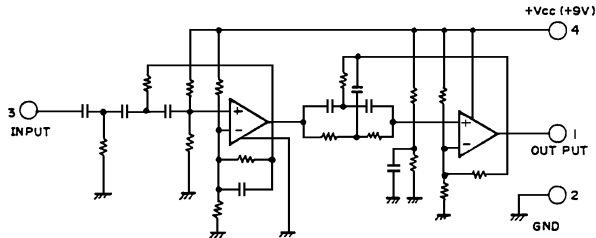
REV. A - **Audio Bridge Module 19D902458G1**
To improve operation. Changed capacitor C20 from 33 μ F, 16 VDCW (19A703314P3) TO 10 μ F, 50 VDCW (19A703314P10).

VOLTAGE REGULATOR U1
19A134718P2

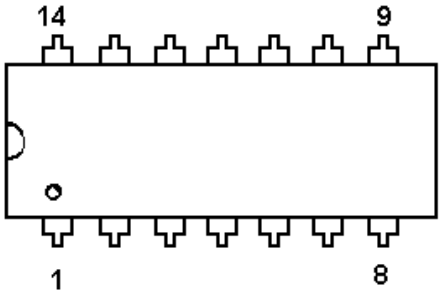


- 1. COMMON
- 2. OUTPUT
- 3. INPUT

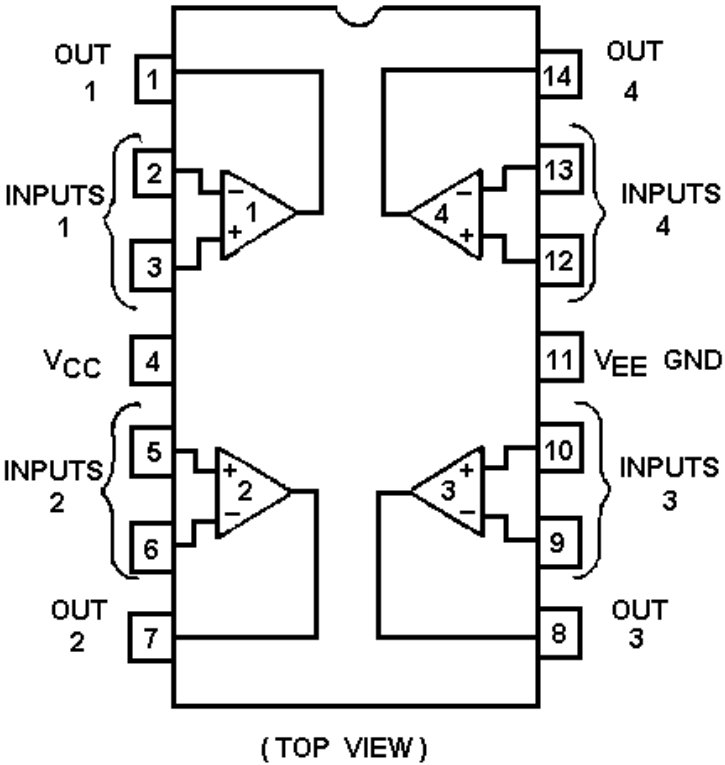
TONE/CODE REJECT FILTER U5
B19/60HF00168

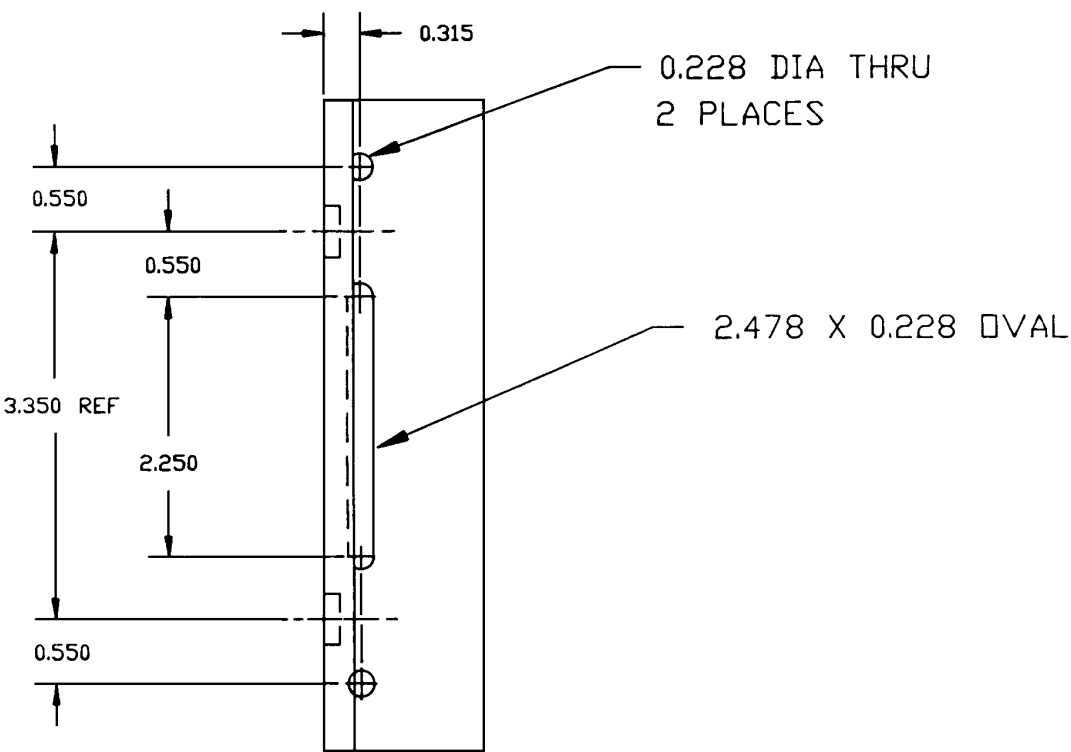


QUAD OPERATIONAL AMPLIFIERS U2, U3, U4
19A704883P1

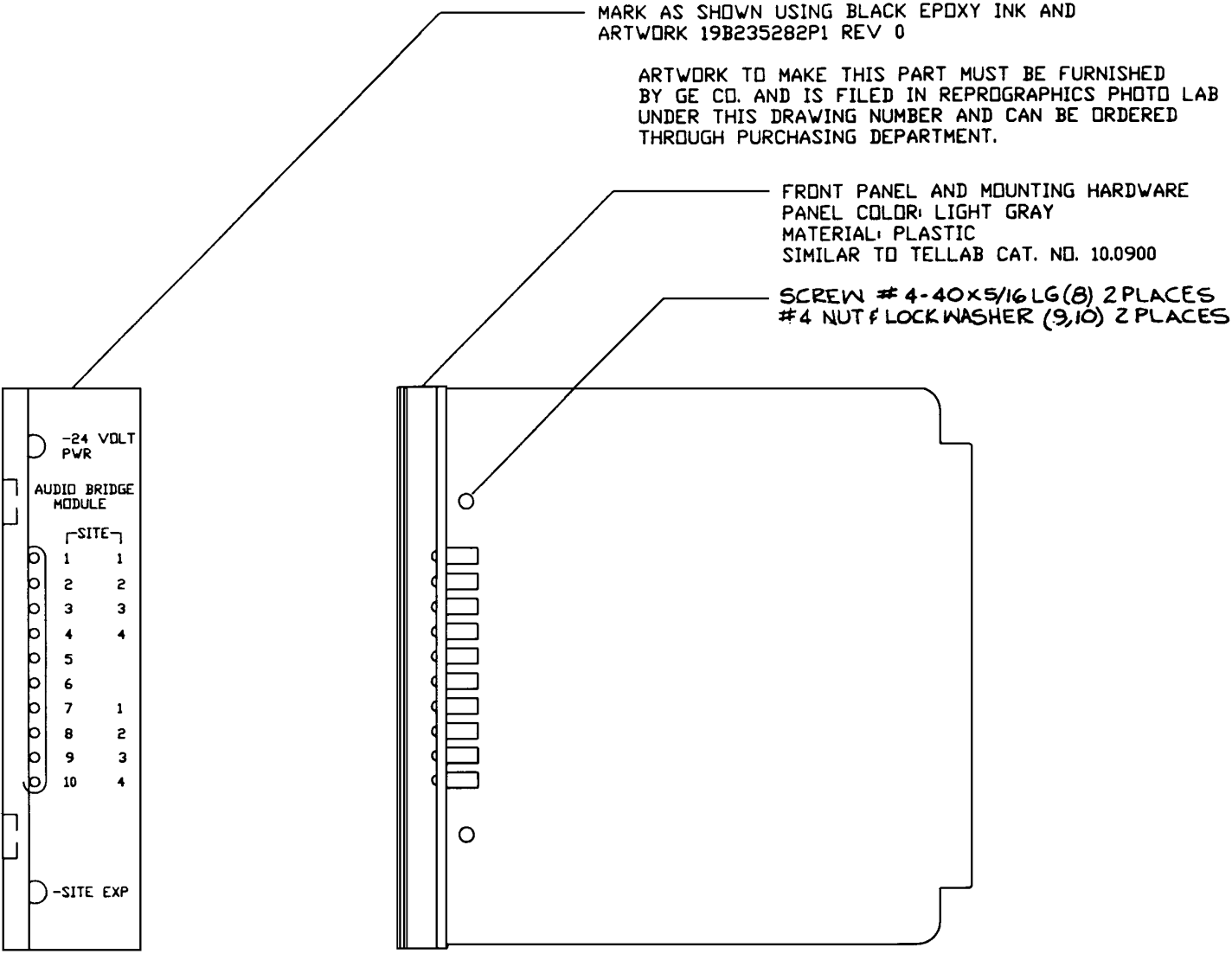


PIN CONNECTIONS





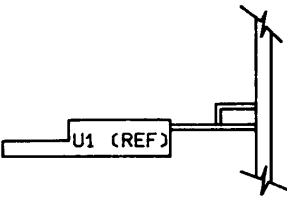
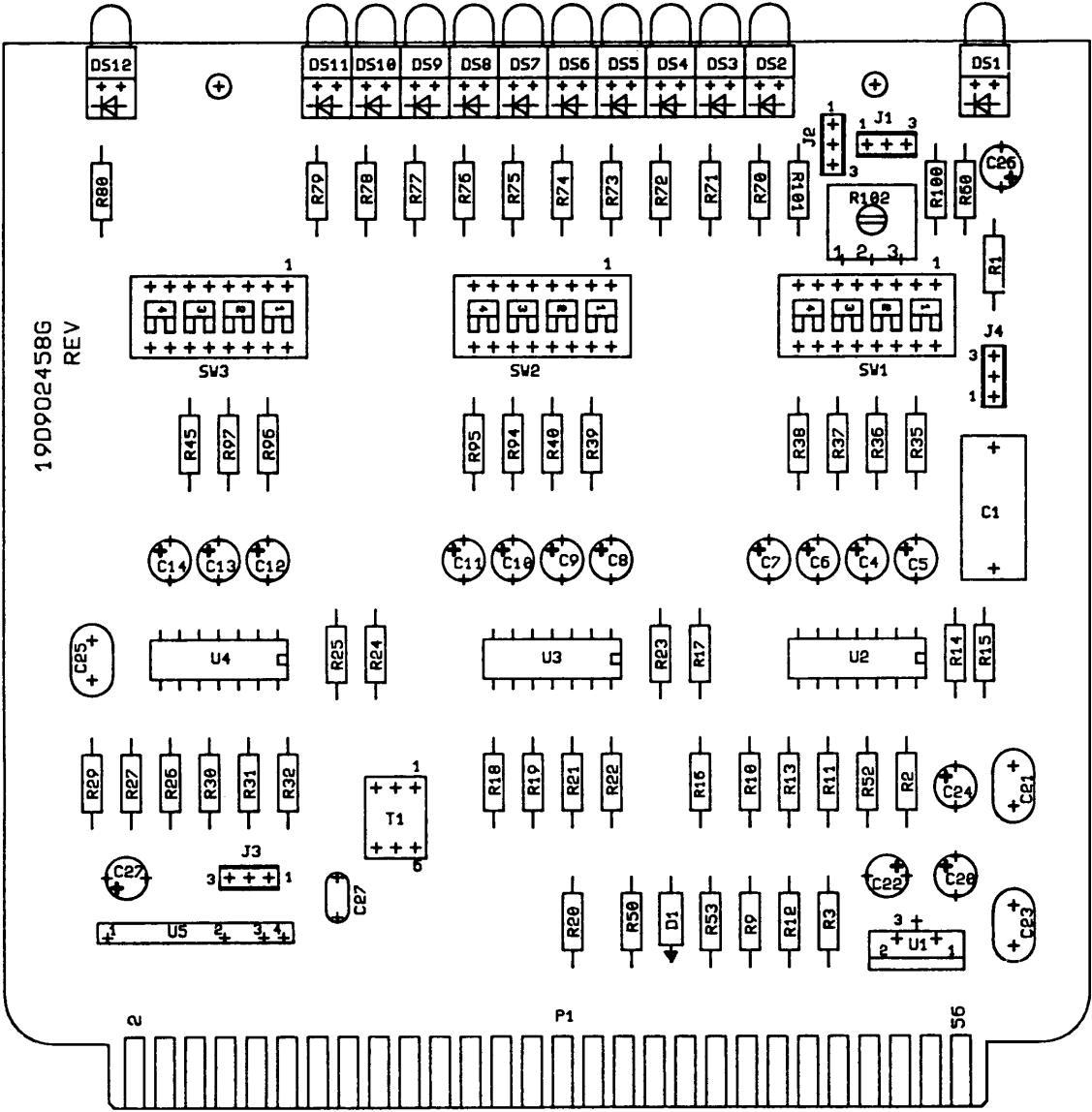
PANEL MODIFICATION



PANEL MARKING

Audio Bridge Module

(19D902458, Sheet 3, Rev. 7)



LEAD FORM PER 19A701294

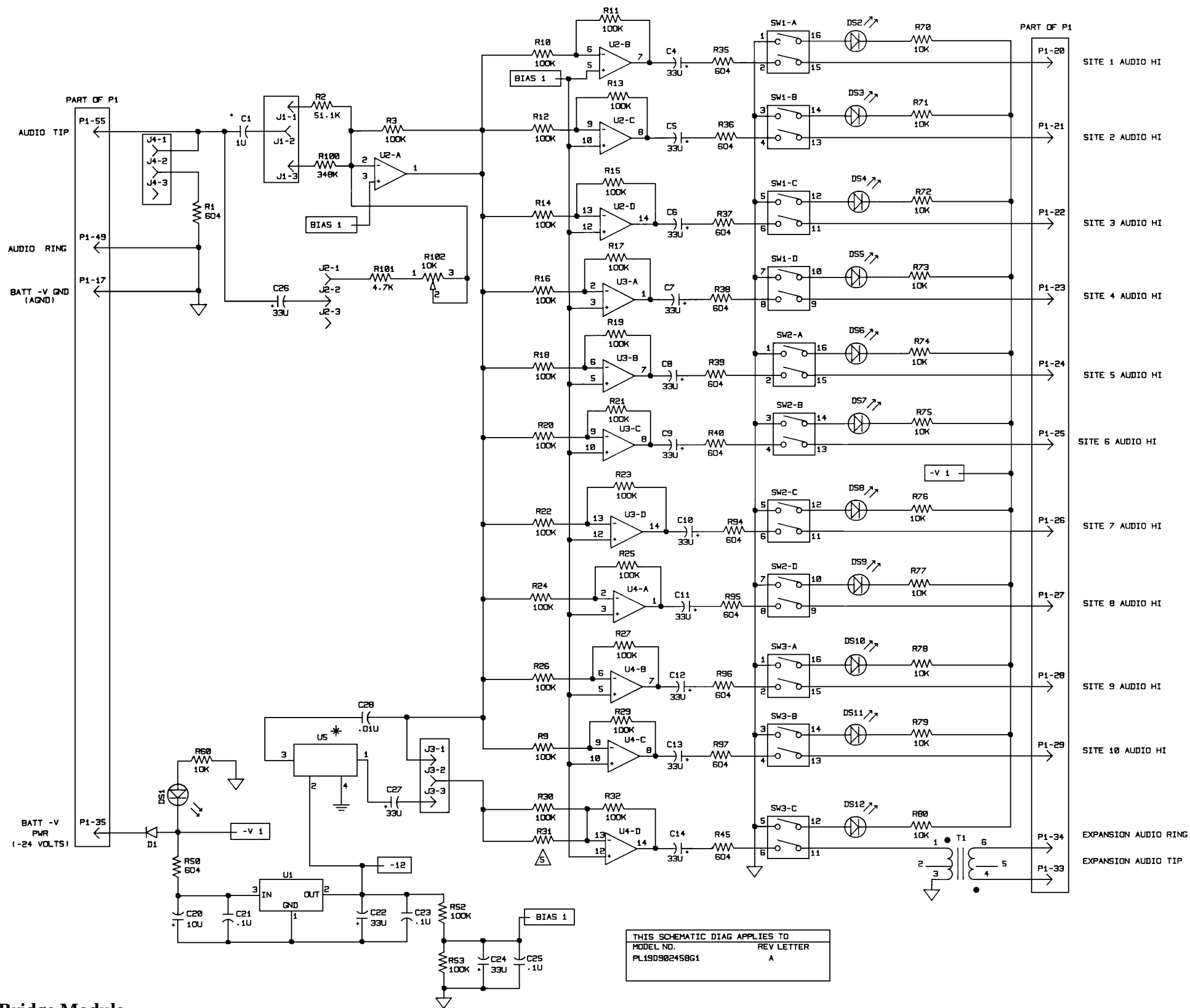
DIP SWITCH DEFINITION		
SWITCH	POSITION	FUNCTION
SW1 1	ON	AUDIO TO SITE 1 ENABLED
	OFF	AUDIO TO SITE 1 DISABLED
SW1 2	ON	AUDIO TO SITE 2 ENABLED
	OFF	AUDIO TO SITE 2 DISABLED
SW1 3	ON	AUDIO TO SITE 3 ENABLED
	OFF	AUDIO TO SITE 3 DISABLED
SW1 4	ON	AUDIO TO SITE 4 ENABLED
	OFF	AUDIO TO SITE 4 DISABLED
SW2 1	ON	AUDIO TO SITE 5 ENABLED
	OFF	AUDIO TO SITE 5 DISABLED
SW2 2	ON	AUDIO TO SITE 6 ENABLED
	OFF	AUDIO TO SITE 6 DISABLED
SW2 3	ON	AUDIO TO SITE 7 ENABLED
	OFF	AUDIO TO SITE 7 DISABLED
SW2 4	ON	AUDIO TO SITE 8 ENABLED
	OFF	AUDIO TO SITE 8 DISABLED
SW3 1	ON	AUDIO TO SITE 9 ENABLED
	OFF	AUDIO TO SITE 9 DISABLED
SW3 2	ON	AUDIO TO SITE 10 ENABLED
	OFF	AUDIO TO SITE 10 DISABLED
SW3 3	ON	AUDIO TO SITE EXPANSION ENABLED
	OFF	AUDIO TO SITE EXPANSION DISABLED
SW3 4		NO FUNCTION

JUMPER CHART			
JACK	(#) AUDIO BRIDGE	AUDIO#2 150 BAUD	AL16N REC.
J1	2-3	1-2	NONE
J2	2-3	2-3	1-2
J3	1-2	1-2	2-3
J4	1-2	1-2	2-3

(#) AS BUILT

Audio Bridge Module

(19C902458, Rev. 7)



NOTES:

1. ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M. CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER U, N OR P INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER M OR U

2. ALL RESISTORS ARE +- 1% TOLERANCES UNLESS FOLLOWED BY % INDICATOR

3.

POWER AND GND TABLE		
DEVICE	AGND	-12
U2	4	11
U3	4	11
U4	4	11
U5	4	11

4.

DIP SWITCH DEFINITION		
SWITCH	POSITION	FUNCTION
SW1-A	ON	AUDIO TO SITE 1 ENABLED
	OFF	AUDIO TO SITE 1 DISABLED
SW1-B	ON	AUDIO TO SITE 2 ENABLED
	OFF	AUDIO TO SITE 2 DISABLED
SW1-C	ON	AUDIO TO SITE 3 ENABLED
	OFF	AUDIO TO SITE 3 DISABLED
SW1-D	ON	AUDIO TO SITE 4 ENABLED
	OFF	AUDIO TO SITE 4 DISABLED
SW2-A	ON	AUDIO TO SITE 5 ENABLED
	OFF	AUDIO TO SITE 5 DISABLED
SW2-B	ON	AUDIO TO SITE 6 ENABLED
	OFF	AUDIO TO SITE 6 DISABLED
SW2-C	ON	AUDIO TO SITE 7 ENABLED
	OFF	AUDIO TO SITE 7 DISABLED
SW2-D	ON	AUDIO TO SITE 8 ENABLED
	OFF	AUDIO TO SITE 8 DISABLED
SW3-A	ON	AUDIO TO SITE 9 ENABLED
	OFF	AUDIO TO SITE 9 DISABLED
SW3-B	ON	AUDIO TO SITE 10 ENABLED
	OFF	AUDIO TO SITE 10 DISABLED
SW3-C	ON	AUDIO TO SITE EXPANSION
	OFF	AUDIO TO SITE EXPANSION
SW3-D	—	NO FUNCTION

△.R31 NOT INSTALLED FOR GROUP 1.

* PRESENT IN ALIGNMENT RECEIVER APPLICATION ONLY.

Audio Bridge Module

(19D902447, Rev. 3)

This page intentionally left blank