ERICSSON

MAINTENANCE MANUAL
EUROPEAN LEASE LINE INTERFACE BOARDS
19D904245G1 AND 19D904744G1

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SPECIFICATIONS*

DC Power Input	13.8V nominal (16V maximum)
Input Current	20 milliamperes typical @13.8V, (25 milliamperes maximum)
Input/Output level:	+5 dBm maximum with 13.8V power supply
Input/Output Impedance	600 ohms
Return Loss at	15 dB minimum against 600 ohms Transformer Port:(200-4000 Hz)
Longitudinal Balance:	55 dB minimum (15-3400 Hz), measured using ANSI/IEEE standard
Distortion	Less than 2% (300-3400 Hz)

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

ERICSSON

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Printed in U.S.A

LBI-38981

DESCRIPTION

The European Telephone Line Interface Board is designed to provide a type approved interface to leased lines in Europe. The design has 4-wire audio/data interfaces with tone control only. DC control and 2-wire (full duplex) lines are not supported.

The interface board circuitry consists of a transformer, amplifier and active filter. The transformer meets the reinforced insulation specification. Using this transrformer and maintaining spacing (5 mm between exposed network and equipment circuits, for example) allows the interface to meet the voltage withstanding requirement. The transformer also meets the longitudinal balance and impedance to ground requirements. The amplifier circuit has a 600 ohm impedance, providing sufficient return loss across the band of interest. The amplifier circuit also has a jumper selected gain to limit the maximum output, if required. The active filter is jumper selected if needed to attenuate out of band signals (Refer to the **SPECIFICATION**).

Each interface board contains four (4) identical circuits. These circuits can be configured independently as either a receiver or a transmitter. A transit filter can be selected, if necessary, to remove any out of band signals. There is also a programmable attenuator to reduce the maximum power to line, if necessary. (Refer to the Block Diagram shown in Figure 1). The interface requires 13.89 Vdc and each board draws about 20 mA.

The attenuator is intended to be used in countries that place a maximum level output capability requirement on the equipment. The filter should not be used for data transmissions, but may be used for voice if the out of band levels are too high. A summary of the jumper function for Line 1 is given in Table 1

Table 1 - Jumper Functions

Receive/Transmit	Tx Filter	Tx Attenuate
Rx: J2 2-3 J4 2-3	**In**: J3, 2-3 **Out**: J3, 1-2	**0 dB**: J5, 1-2 J6, J7, J8, None **10 dB**: J6, 1-2 J5, J7, J8, None
Tx: J2 1-2 J4 1-2		**20 dB**: J7, 1-2 J5, J6, J8, None **30 dB**: J8, 1-2 J5. J6, J7, None

CIRCUIT ANALYSIS

The European Telephone Leased Line Interface Board has four (4) identical telephone interface circuits. The following description is for circuit #1, which is controlled by jumpers J2-J8, but would apply to all four circuits.

Connector J1, Pin 28A and ground are connected to the communications equipment. Connector J1, Pins 3C and 3B is a balanced connection connected to the leased telephone line. Jumpers P2 and P4 control the direction of signal flow. If the jumpers are set for a signal coming from the communications equipment, the signal enters at J1-28A and sees 604 ohm termination resistor R1. Capacitor C6 is a DC blocking capacitor which is necessary since the operational amplifiers are biased up to 1/2 of the supply voltage to eliminate the need for a dual polarity power supply.

Operational amplifier U1.1 and associated components make up an inverting amplifier with possible gains of 6, -4, -14 and -24 dB, selected by jumpers P5-P8. Six (6) dB is lost in 604 ohm resistor R3 which results in net gains of 0, -10, -20 and -30 dB. The 100k ohm resistors R13 and R14 form a voltage divider to bias operational amplifiers U1.1 and U1.2. The signal then goes to the leased line.

Capacitor C1 and resistor R9 make up a high pass filter with a cutoff of approximately 280 Hz. Bias current for U1.2 passes through R9. Capacitor C8 provides an AC ground for R9. Operational amplifier U1.2 and associated components make up a lowpass filter with a cutoff at approximately 3400 Hz. Jumper P3 can be set to bypass the filter.

Blocking capacitor C7 and resistor R3 sets the output impedance of the circuit to approximately 600 ohms. The signal is then fed to international telephone line transformer T1 where it is coupled to the telephone line.

A signal coming from the leased line would come in through transformer T1 and U5.1 to J1-28A and jumpers P2 and P4 to control the direction of flow.

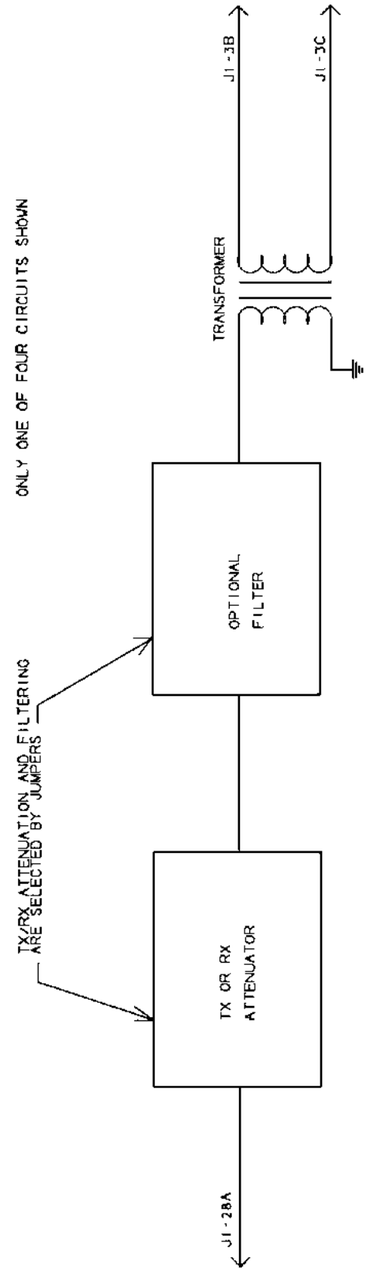


Figure 1 - Block Diagram

LBI-38981

TEST PROCEDURE

TEST EQUIPMENT

- Audio Signal Generator with 600 Ohm output impedance
- AC Voltmeter
- Distortion Analyzer

PROCEDURE

Frequency Response

This is the transmit path with filtering and no attenuation.

1. Set all jumpers as indicated in Table 2.

Table 2 - Jumper Installation

LINE 1	LINE 2	LINE 3	LINE 5	SETTING
J2	J9	J16	J23	1-2
J3	J10	J17	J24	1-2
J4	J11	J18	J25	1-2
J5	J12	J19	J26	1-2
J6	J13	J20	J27	NONE
J7	J14	J21	J28	NONE
J8	J15	J22	J29	NONE

2. Apply 13.8 Vdc ±0.5V to J65, Pin 1 (Pin 3 is ground). Verify that the LED is **ON**. If the LED is not **ON**, check the fuse on the backplane and the fuse on the board. The current should not exceed 25 mA for the board.

3. Connect a 600 ohm load resistor between J2, Pins 1 & 2 (balanced connection). Apply a 0 dBm (775 mV measured across 600 ohms), 100 Hz sine wave to J3, Pin 2 (Pin 3 is ground). Measure the level at the balanced connection, J2, Pins 1 & 2 (across the 600 ohm load resistor) and verify it is within the limits shown in Table 3.

4. Verify that distortion is less than 2% at 300 Hz ±6 Hz and 3400 Hz ±60 Hz.

Table 3 - Level Limits

Frequency (Hz)	Input Level (mA)	Output level (mV)	
		(Max)	(Min)
100 ±2	0	250	350
240 ±4	0	480	630
1300 ±20	0	660	840
3520 ±60	0	470	610
5000 ±100	0	230	320

5. Repeat steps 1, 2 and 3 with the signal applied to J3, Pin 4 (Pin 5 is ground) and a 600 ohm load resistor between J2, Pins 3 & 4 (balanced). This checks line 2.

6. Repeat steps 1, 2 and 3 with the signal applied to J4, Pin 2 (Pin 3 is ground) and a 600 ohm load resistor between J2, Pins 5 & 6 (balanced). The checks line 3.

7. Repeats steps 1 through 5 with the signal applied to J4, Pin 4 (Pin 5 is ground) and a 600 ohm load resistor between J2, Pins 7 & 8 (balanced). This checks line 4.

Attenuation

This is the transmit path, no attenuation and no filtering.

1. Set all jumpers as indicated in Table 4.

Table 4 - Jumper Installation

LINE 1	LINE 2	LINE 3	LINE 4	LINE 5
J2	J9	J16	J23	1-2
J3	J10	J17	J24	1-2
J4	J11	J18	J25	1-2
J5	J12	J19	J26	1-2
J6	J13	J20	J27	NONE
J7	J14	J21	J28	NONE
J8	J15	J22	J29	NONE

2. Apply 13.8 Vdc 0.5V to J65, P1 (Pin 3 is ground). Verify that the LED is **ON**. If the LED is not **ON**, check the fuse on the backplane and the fuse on the board. The current should not exceed 25 mA for the board.

3. Connect a 600 ohm load resistor between J2, Pins 1 & 2 (balanced connection). Apply a 0 dBm (775 mV measured across 600 ohms), 1000 Hz sine wave to J3, Pin 2 (Pin 3 is ground). Measure the level at the balanced connection, J2, Pins 1 & 2 (across the 600 ohm load resistor). Verify it is within the limits shown in Table

4. Repeat steps 1 through 4 with the signal applied to J3, Pin 4 (Pin 5 is ground) and a 600 ohm load resistor between J2, Pins 3 & 4 (balanced).

5. Repeat steps 1 through 4 with the signal applied to J4, Pin 2 (Pin 3 is ground) and a 600 ohm load resistor between J2, Pins 5 & 6 (balanced).

6. Repeat steps 1 through 4 with the signal applied to J4, Pin 4 (Pin 5 is ground) and a 600 ohm load resistor between J2, Pins 7 & 8 (balanced).

Receive Path Test

This procedure checks the receive path with no attenuation and filtering.

1. Set all jumpers as shown in Table 6.

Table 6 - Jumper Installation Receive Path Lines

Lines				
1	2	3	4	Setting
J2	J9	J16	J23	2-3
J4	J11	J18	J25	2-3

2. Apply 13.8 Volts ±0.5V to J1-30A, 30B and 30C (32A, 32B and 32C are ground).

Table 5 - Attenuation

Attenuation	Lines				Jumper	Input Level	Output Level (mV)	
(dB)	1	2	3	4	Settings	(dBm)	(Min)	(Max)
0	J5 J6 J7 J8	J12 J13 J14 J15	J19 J20 J21 J22	J26 J27 J28 J29	1-2 None None None	0	270	880
10	J5 J6 J7 J8	J12 J13 J14 J15	J19 J20 J21 J22	J26 J27 J28 J29	None 1-2 None None	0	180	260
20	J5 J6 J7 J8	J12 J13 J14 J15	J19 J20 J21 J22	J26 J27 J28 J29	None None 1-2 None	0	50.0	80.0
30	J5 J6 J7 J8	J12 J13 J14 J15	J19 J20 J21 J22	J26 J27 J28 J29	None None None 1-2	0	15.0	25.0

3. Verify that the LED is ON. If the LED is not ON check the fuse on the backplane and the fuse on the board. The current should not exceed 25 mA for the board.

4. Connect a 600 ohm load resistor between J1-28A and ground.

5. Apply a 0 dBm (775 mV measured across 600 ohms), 1000 Hz sine wave to J1-3C and 3B (balanced connection). Measure the level at J1-28A and ground (across the 600 ohm load resistor) and verify that it is between 760 and 860 mV.

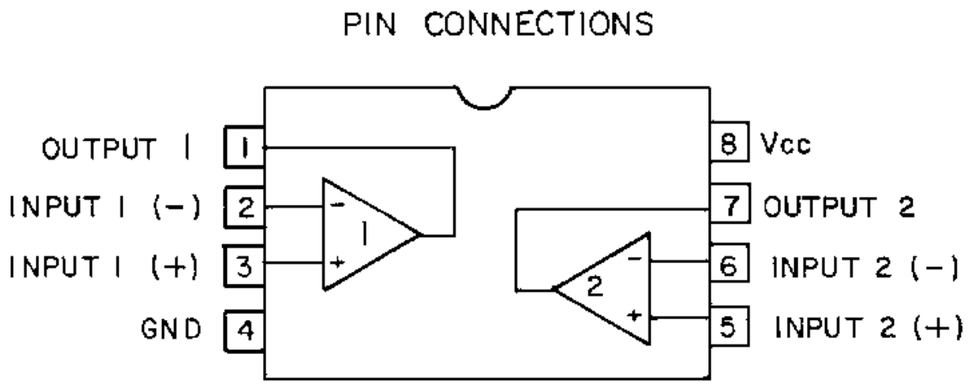
6. Repeat steps 4 and 5 with the signal applied to J1-6C and 6B (balanced) and a 600 ohm load resistor between J1-12C and ground.

7. Repeat steps 4 and 5 with the signal applied to J1-9C and 9B (balanced) and a 600 ohm load resistor between J1-26C and ground.

8. Repeat step 4 and 5 with the signal applied to J1-12C and 12B) and a 600 ohm load resistor between J1-26C and ground.

IC DATA

DUAL OPERATIONAL AMPLIFIER U1 THROUGH U6
19A116297P7



EURO/EDACS
LEASED LINE INTERFACE BOARD
19D904245G1
Issue 1

SYMBOL	PART NO.	DESCRIPTION
		----------CAPACITORS ---------
C1	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C2	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C3	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C4	19A702052P116	Ceramic: 0.015°F ±5%, 50 VDCW.
C5	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C6	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C7 and C8	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C9	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C10	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C11	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C12	19A702052P116	Ceramic: 0.015°F ±5%, 50 VDCW.
C13	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C14	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C15 and C16	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C17	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C18	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C19	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C20	19A702052P116	Ceramic: 0.015°F ±5%, 50 VDCW.
C21	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C22	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C23 and C24	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C25	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C26	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C27	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C28	19A702052P116	Ceramic: 0.015°F ±5%, 50 VDCW.
C29	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C30	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C31 thru C33	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
		----------DIODES ----------
CR1	19A703595P7	Optoelectric: Red LED; sim to HLMP-1340-010.
		----------FUSES ----------
F1	19A134961P8	Cartridge: 0.032 Amps Slow-Action; sim to Littelfuse 218.032.
		----------JACKS ----------
J1	19B801587P7	Connector, DIN: 96 male contacts, right angle mounting; sim to AMP 650887-1.
J2 thru J4	19A704852P29	Connector; sim to: Molex 22-29-2031.
J5 thru J8	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J9 thru J11	19A704852P29	Connector; sim to: Molex 22-29-2031.
J12 thru J15	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J16 thru J18	19A704852P29	Connector; sim to: Molex 22-29-2031.
J19 thru J23	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J24 thru J26	19A704852P29	Connector; sim to: Molex 22-29-2031.
J27 thru J29	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
		----------PLUGS ----------
P2 thru P5	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P9 thru P12	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P16 thru P19	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P23 thru P26	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
		----------RESISTORS ----------
R1	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R2	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R3	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R5	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R6	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R7	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R8	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R9	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R10 thru R12	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R13 and R14	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R15	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R16	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R17	344A3304P6040	Metal film: 604 ohms 1%, 1/10 w.
R19	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R20	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R21	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R22	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R23	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R24 thru R26	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R27 and R28	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R29	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R30	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R31	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R33	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R34	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R35	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R36	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R37	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R38 thru R40	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.

SYMBOL	PART NO.	DESCRIPTION
R41 and R42	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R43	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R44	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R45	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R47	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R48	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R49	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R50	344A3304P6191	Metal film 61.9K ohms ±1%, 1/10w.
R51	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R52 thru R54	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R55 and R56	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R57	344A3304P2211	Metal film: 2210 ohms ±1%, 1/10w.
		---------- TRANSFORMERS --------
T1 thru T4	344A3966P2	Transformer: telephone, 600 ohm primary; 560 ohm secondary; sim to MIDCOM 671-8248.
		-------- INTEGRATED CIRCUITS -------
U1 thru U4	19A116297P7	Linear: Dual Op Amp; sim to MC4558CD.
		------- MISCELLANEOUS ---------
5	19A116688P2	Clip, Fuse: sim to Littelfuse 111501.

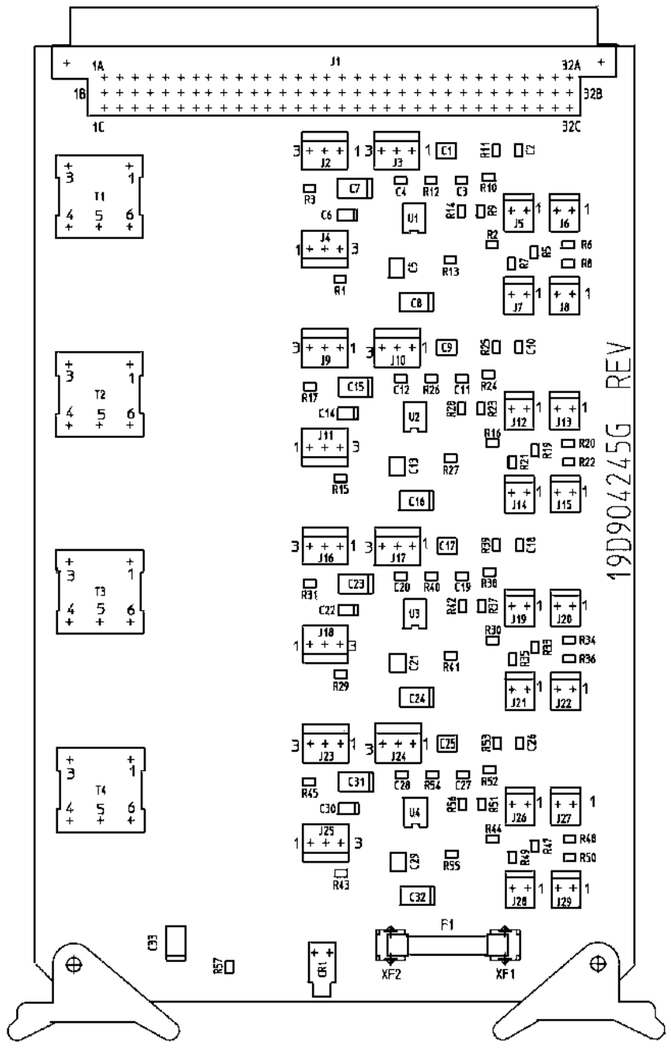
EURO/EDACS
LEASED LINE INTERFACE BOARD
19D904744G1
Issue 1

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ---------
C1	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C2	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C3	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C4	19A702052P16	Ceramic: 0.015°F ±10%, 50 VDCW.
C5	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C6	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C7 and C8	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C9	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C10	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C11	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C12	19A702052P16	Ceramic: 0.015°F ±10%, 50 VDCW.
C13	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C14	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C15 and C16	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C17	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C18	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C19	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C20	19A702052P16	Ceramic: 0.015°F ±10%, 50 VDCW.
C21	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C22	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C23 and C24	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C25	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C26	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C27	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C28	19A702052P16	Ceramic: 0.015°F ±10%, 50 VDCW.
C29	19A702052P26	Ceramic: 0.1°F ±10%, 50 VDCW
C30	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C31 thru C34	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C35	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C36 and C37	19A702052P137	Ceramic: .033°F ±5%, 50 VDCW.
C38	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C39	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C40	19A702052P137	Ceramic: .033°F ±5%, 50 VDCW.
C42	19A705205P2	Tantalum: 1°F, 16 VDCW; sim to Sprague
C41	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C43 thru C45	19A702052P137	Ceramic: .033°F ±5%, 50 VDCW.
C46	19A705205P206	Tantalum: 10.0°F ±20%, 16 VDCW.
C47	19A705205P202	Tantalum: 1.0°F ±20%, 16 VDCW.
C48 and C49	19A702052P137	Ceramic: .033°F ±5%, 50 VDCW.
		---------- DIODES ----------
CR1	19A703595P7	Optoelectric: Red LED; sim to HLMP-1340-010.
		---------- FUSES ----------
F1	19A134961P8	Cartridge: 0.032 Amps Slow-Action; sim to Littelfuse 218.032.

SYMBOL	PART NO.	DESCRIPTION
		---------- JACKS ----------
J1	19B801587P7	Connector, DIN: 96 male contacts, right angle mounting; sim to AMP 650887-1.
J2 thru J4	19A704852P29	Connector; sim to: Molex 22-29-2031
J5 thru. J8	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J9 thru J11	19A704852P29	Connector; sim to: Molex 22-29-2031.
J12 thru J15	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J16 thru J18	19A704852P29	Connector; sim to: Molex 22-29-2031.
J19 thru J22	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
J23 thru J25	19A704852P29	Connector; sim to: Molex 22-29-2031.
J26 thru J29	19A704852P28	Printed wire: 2 contacts rated @ 2.5 amps.
		---------- PLUGS ----------
P2 thru P5	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P9 thru P12	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P16 thru P19	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
P23 thru P26	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
		---------- RESISTORS ----------
R1	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R2	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R3	REP624653/56	RES 5600 ,±1% 0.1W
R4	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R5	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R6	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R7	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R8	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R9	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R10 thru R12	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R13 and R14	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R15	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R16	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R17	REP624653/56	RES 5600 ,±1% 0.1W
R18	REP624653/51	RES 5100, ±1% 0.1W
R19	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R20	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R21	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R22	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R23	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R24 thru R26	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.

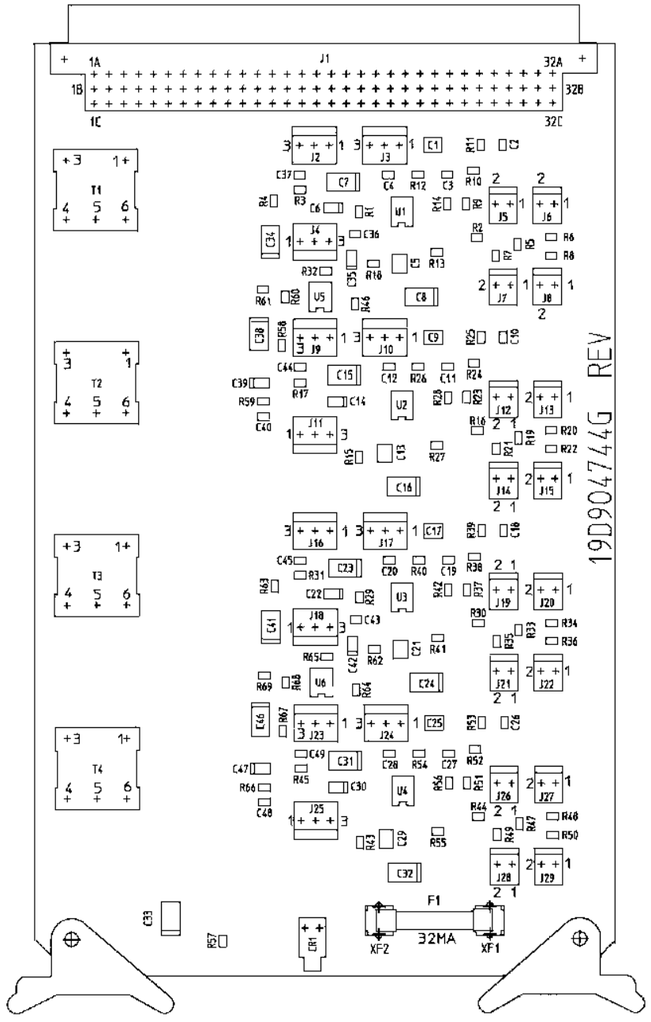
SYMBOL	PART NO.	DESCRIPTION
R27 and R28	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R29	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R30	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R31	REP624653/56	RES 5600, ±1% 0.1W
R32	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R33	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R34	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R35	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R36	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R37	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R38 thru R40	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R41 and R42	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R43	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R44	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R45	REP624653/56	RES 5600, ±1% 0.1W
R46 and R47	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R48	344A3304P6812	Metal film: 68.1K ohms ±1%, 1/10 w.
R49	344A3304P2002	Metal film: 20K ohms ±1%,1/10 w.
R50	344A3304P6191	Metal film: 61.9K ohms ±1%, 1/10w.
R51	344A3304P5621	Metal film: 5.62 ohms ±1%, 1/10w.
R52 thru R54	344A3304P1002	Metal film: 10K ohms ±1%, 1/10 w.
R55 and R56	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R57	344A3304P2211	Metal film: 2210 ohms ±1%, 1/10w.
R58	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R59	REP624653/51	RES 5100, ±1% 0.1W
R60	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R61	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R62	REP624653/51	RES 5100 ,±1% 0.1W
R63	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R64	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R65	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
R66	REP624653/51	RES 5100, ±1% 0.1W
R67	344A3304P6040	Metal film: 604 ohms ±1%, 1/10 w.
R68	344A3304P2493	Metal film: 249K ohms ±1%, 1/10 w.
R69	344A3304P1003	Metal film: 100K ohms ±1%, 1/10 w.
		--------- TRANSFORMERS -------
T1 thru T4	344A3966P1	XFMR, TELE
		-------- INTEGRATED CIRCUITS -------
U1 thru U6	19A116297P7	Linear: Dual Op Amp; sim to MC4558CD.
		---------- FUSE SOCKETS --------
XF1 and XF2	19A116688P2	Clip, Fuse: sim to Littelfuse 111501.

JUMPER CHART	
P2	J2-2&3
P3	J3-1&2
P4	J4-1&2
P5	J5-1&2
P9	J9-2&3
P10	J10-1&2
P11	J11-1&2
P12	J12-1&2
P16	J16-2&3
P17	J17-1&2
P18	J18-1&2
P19	J19-1&2
P23	J23-2&3
P24	J24-1&2
P25	J25-1&2
P26	J26-1&2

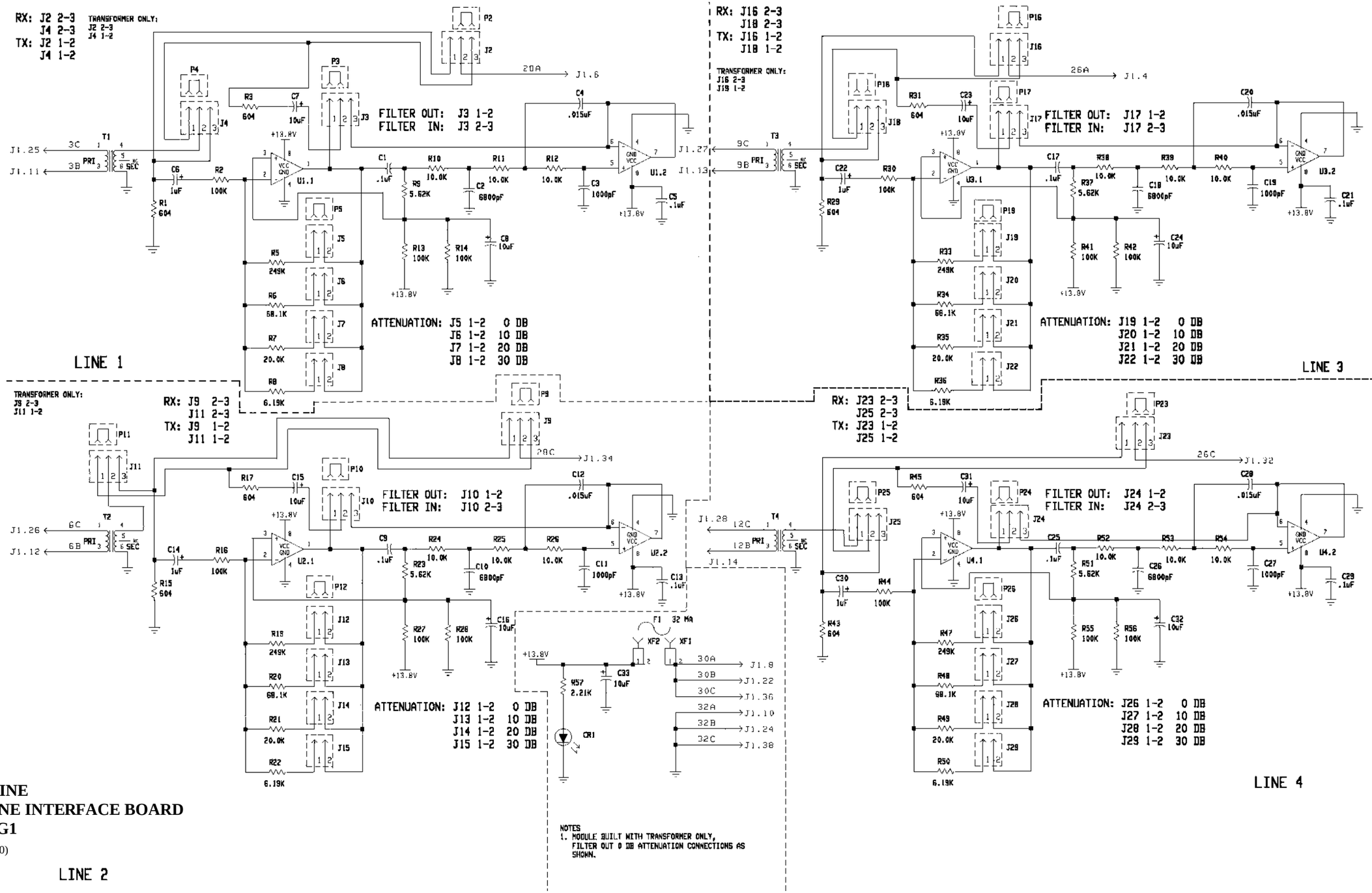


LEASED LINE
TELEPHONE INTERFACE BOARD
19D904245G1
(19D904245, Rev. 1)

JUMPER CHART
P2-2&3
P3-1&2
P4-2&3
P5-1&2
P9-1&2
P10-1&2
P11-1&2
P12-1&2
P16-2&3
P17-1&2
P18-2&3
P19-1&2
P23-1&2
P24-1&2
P25-1&2
P26-1&2

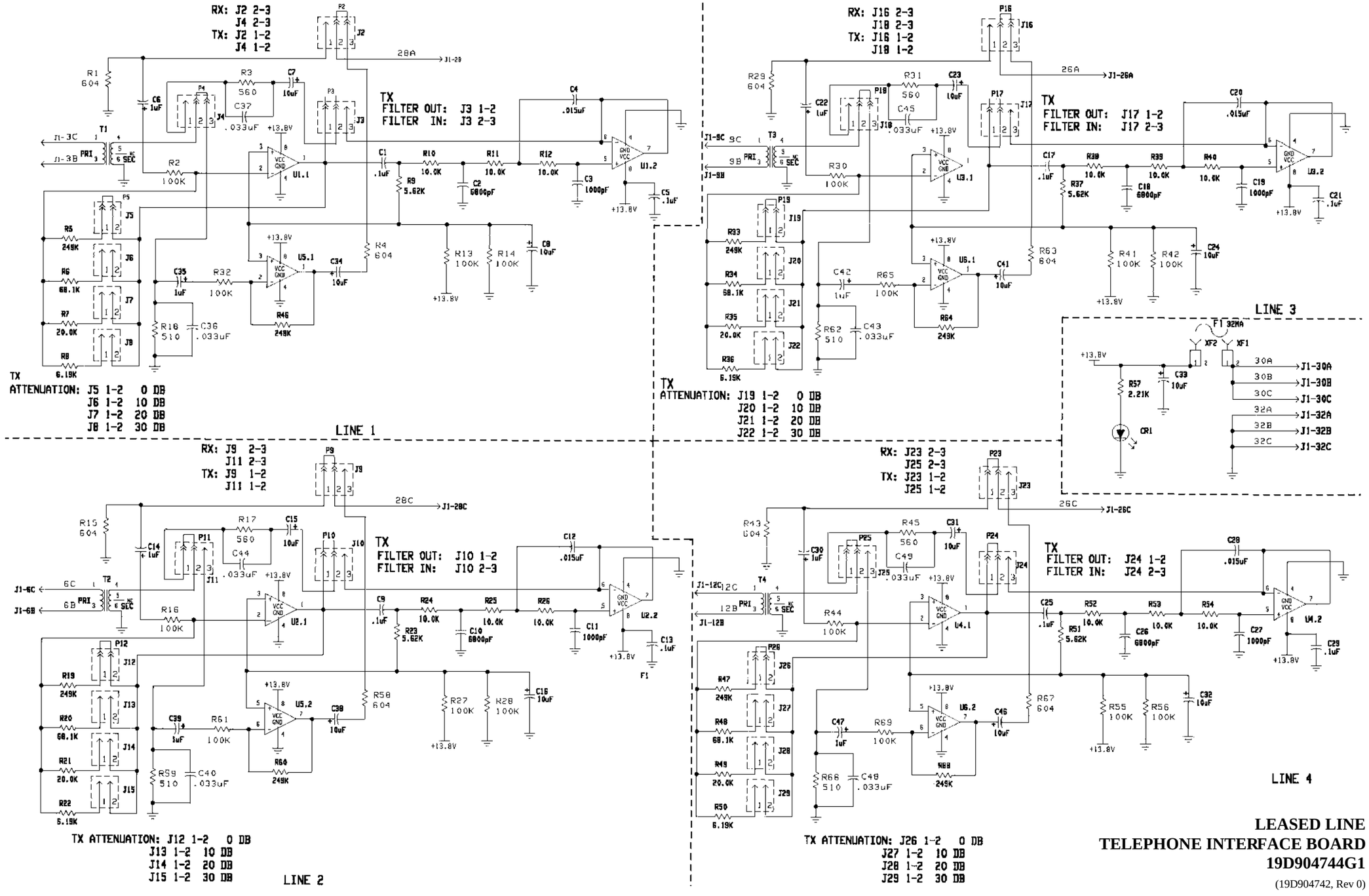


LEASED LINE
TELEPHONE INTERFACE BOARD
19D904744G1
(19D904744, Rev. 0)



LEASED LINE
TELEPHONE INTERFACE BOARD
19D904245G1

(19D904244, Rev 0)



LEASED LINE
TELEPHONE INTERFACE BOARD
19D904744G1

(19D904742, Rev 0)