MAINTENANCE MANUAL
CONSOLE INTERFACE BOARD 19D438451G1
FOR
EDACS® VOTER APPLICATIONS

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DESCRIPTION

The Console Interface board is mounted behind the Analog Voter (Refer to LBI-38676) and contains a 2175 Hz tone detector and line interfaces. This board allows routing of voted and console audio with the proper Secur-it/hold tone. A block diagram of the Console Interface board is shown in Figure 1.

The board detects the 2175 Hz tone which is required to provide the dispatch console override feature in EDACS voting. In normal voter operation, 2175 Hz is generated and bridged across the voted audio phone line going to the station control panel. The tone acts as a transmit keep-alive signal which lets the station know the condition of the control link.

When the console operator wishes to preempt a transmission in progress, the console is keyed on the group transmission. The 2175 Hz tone that is superimposed on the console audio is detected by the Console Interface board, and activates the carrier-operated relay (COR) in the Analog Voter. This relay switches the audio lines going to the control panel.

ERICSSON

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Printed in U.S.A.

2175 HZ TONE DETECTOR

The detector senses the audio line coming from the console and, upon detecting a 2175 Hz tone, will control the carrier-operated relay (COR) of the Analog Voter. This causes console audio (in place of voter audio) to be routed to the main site. The digital voter selector also monitors the COR control line, and therefore knows when the console has preempted the line.

Audio input from the dispatch console comes through J1-9 and J1-10 (PHONE IN). Surge suppression is provided by E1 and E2. The console audio is coupled to a bandpass filter (U3A & U3B) through transformer T1. The two-pole bandpass filter has a broad bandwidth centered at 2175 Hz. This provides prefiltering and overload protection for the high-Q filter which follows. The output from the filter is coupled through unity-gain buffer U3C which drives the active bandpass filter (AR1 and FL1). Recovered 2175 Hz from the filter is present at test point TP3.

Transistor Q2 provides a gain of three and buffers the filter output. The amplified signal is ac coupled through C10 to the base of Q3. Transistor Q3 acts as a positive-peak detector. When the base of Q3 is driven positive, the transistor conducts discharging C12 which is at a quiescent 10-volt level. During periods of non-conduction, C12 charges through R28 and R29.

At a certain level of Q3 conduction, the average voltage on C12 will be low enough to turn on Q4 through R27 and voltage divider R28/R29.

When Q4 conducts, the base of Q3 is biased higher, increasing conduction. This provides a snap-action pick up or hysteresis. One input of comparator U3D is tied through R31 to capacitor C12. The other input (U3D-12) is held at 5 volts by voltage divider R30/R32. When the voltage level on C12 drops below 5 volts, the output of the comparator (U3D-14) will go high indicating detection of 2175 Hz tone and causing the TONE DETECT (J1-04) line to go high. Inverter Q7 provides an inverted TONE DETECT signal (J1-08) that is used in some applications. Jumper P2 allows Q7 to be used as an independent inverter.

POWER DISTRIBUTION

The Console Interface board obtains 25 Vdc power from the Analog Voter through J1-5. The 25-volt supply feeds the input of a 10-volt linear regulator (U2). Resistors R62 and R63 bias U2 for 10-volt regulation at U2-2. The 10-volt regulated output is used to supply power to most of the circuitry on the board. A 5-volt reference is obtained from the 10-volt line through voltage divider R36/R37. The reference is used to bias op-amp U3.

TEST AND TROUBLESHOOTING

The test procedure contained in this section should be used to verify proper operation of the Console Interface board. The test may also be used as an aid in troubleshooting to isolate a problem to a stage or component.

Equipment Required

The following equipment is required for performing the test procedure.

Power Supply, 25 ± 1 Vdc, 50 mA
Distortion Analyzer
Voltmeter
Signal Generator, 2175/2460/1970 ± 3 Hz
Jumpers

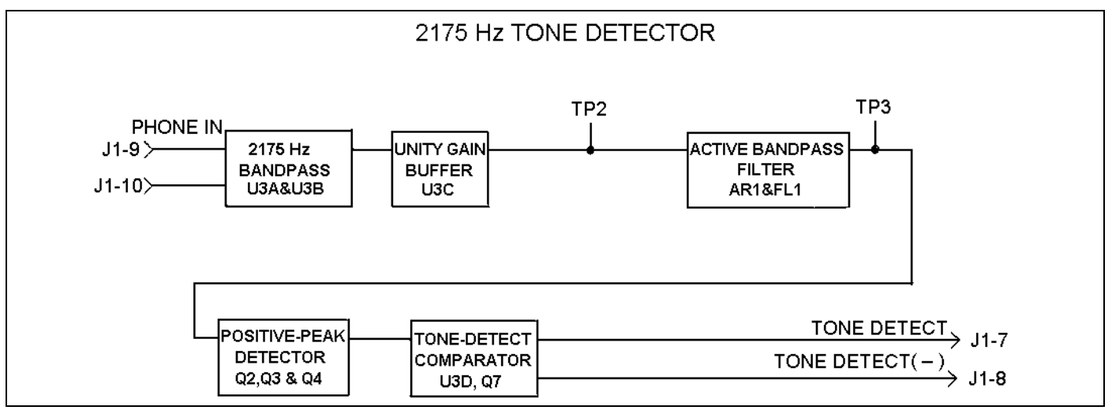


Figure 1 - Console Interface Board Block Diagram

Test Procedure

Set up the Console Interface board under test as shown in Figure 2. Follow the test procedure in Table 1.

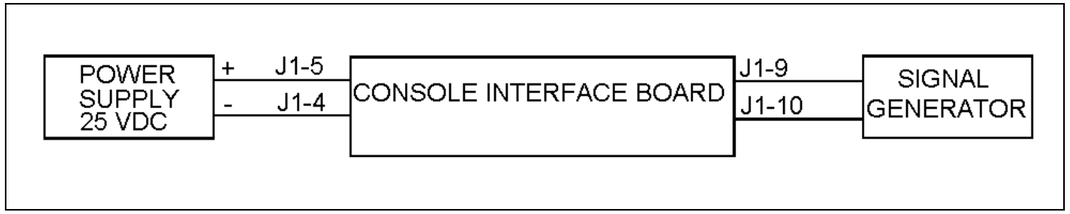
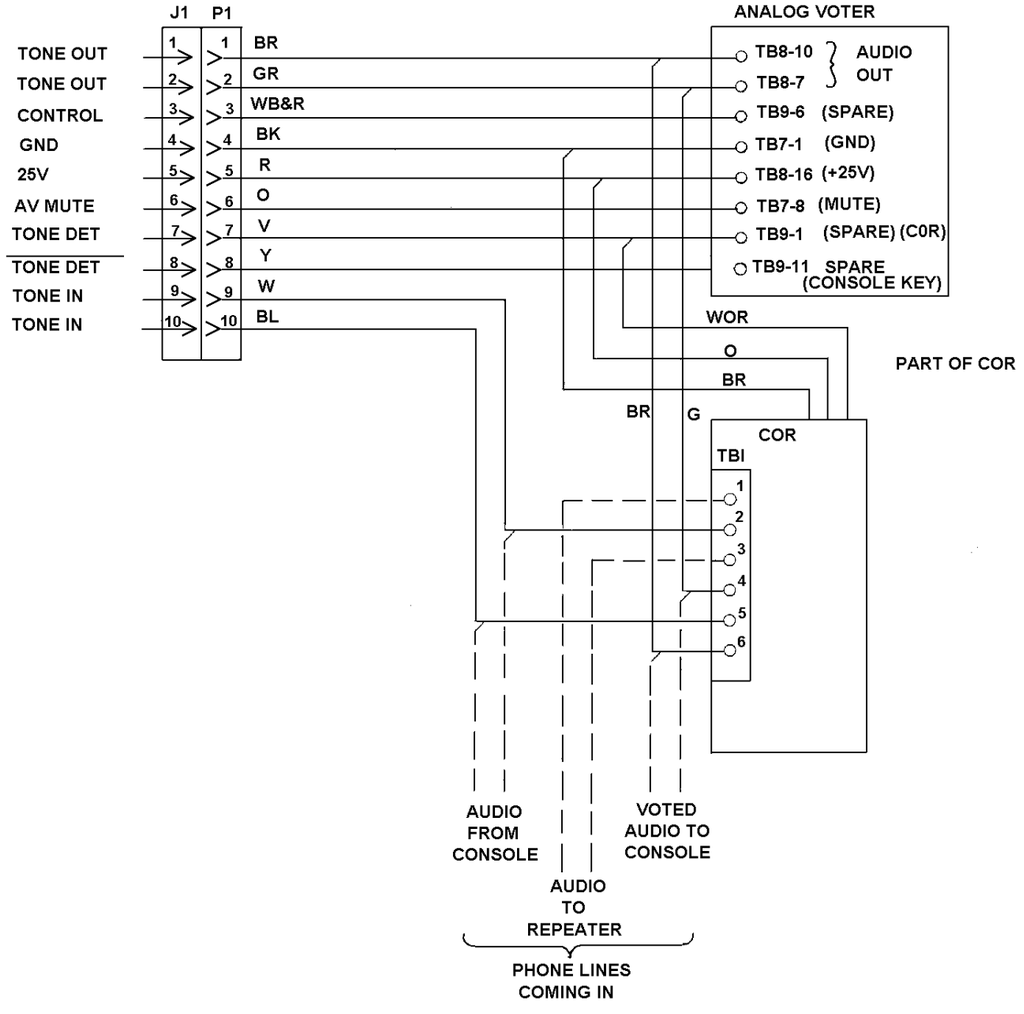


Figure 2 - Preliminary Test Set Up

Table 1 - TEST PROCEDURE

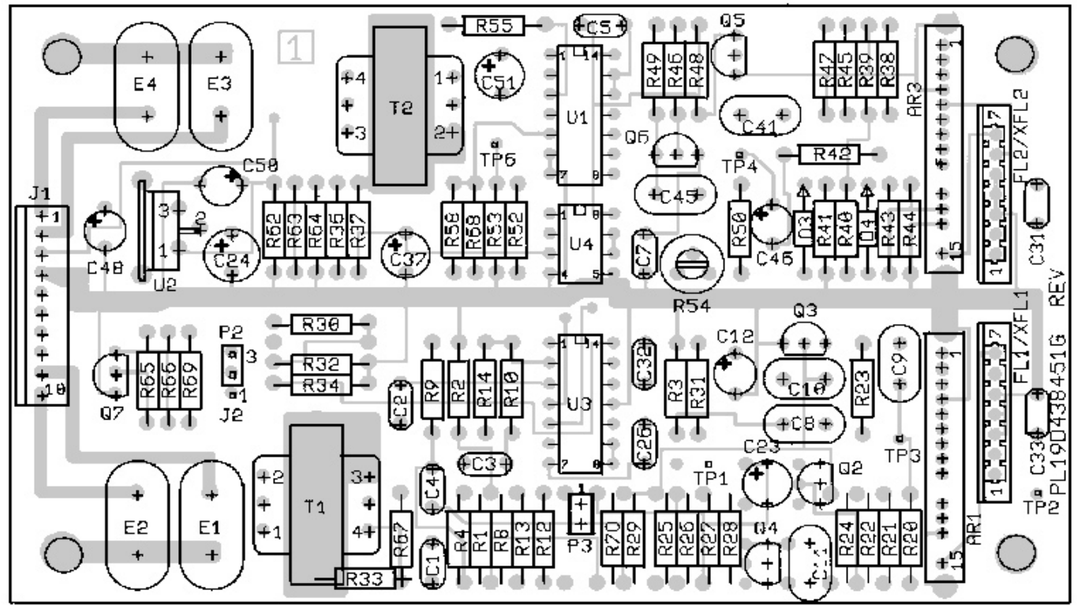
NO.	STEP	MEASUREMENT	CORRECTIVE ACTION
1.	Connect test equipment as shown in Figure 2.		
2.	Apply 25 ±1 Vdc power to the board under test.		
3.	Measure power supply current.	< 50 mA	a. Check for shorts b. Check for loading on 10 V bus.
4.	Measure the regulated voltage at U2-2.	10 ±0.3 Vdc	Check U2 and associated components.
5.	Apply a 2175 ± 3 Hz tone at a -40 dBm level across J1-9 and J-10.		
6.	Measure the voltage at J1-7.	> 7 Vdc	Check jumper P2, R69, U3D, and detector circuit components.
7.	Measure the voltage at J1-8.	< 0.5 Vdc	Check jumper P2, Q7, and associated components.
8.	Decrease the 2175 Hz tone level to -70 dBm.		
9.	Measure the voltage at J1-7.	< 0.5 Vdc	Check Q2, Q3, Q4, U3D, and associated components of detector circuit.
10.	Measure the voltage at J1-8.	> 7 Vdc	Check Q7 and associated components.
11.	Change the signal generator frequency to 2460 ±5 Hz at -20 dBm.		
12.	Measure the voltage at J1-7.	< 0.5 Vdc	a. Check U3A, U3B, U3C, and associated components. b. Check AR1, FL1, Q2, and associated components. c. Check U3D and associated components.
13.	Change the signal generator frequency to 1970 ±5 Hz.		
14.	Measure the voltage at J1-7.	< 0.5 Vdc	a. Check U3A, U3B, U3C, and associated components. b. Check AR1, FL1, Q2, and associated components. c. Check U3D and associated components.



CIB INTERCONNECT HARNESS
19B235004G8 (Refer to LBI-38420)

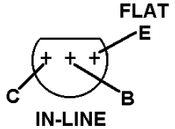
(19C336922, Sh. 1, Rev. 0)

COMPONENT SIDE



(19D438450, Rev. 2A)

LEAD IDENTIFICATION FOR Q1 - Q7



IN-LINE
TOP VIEW

NOTE:
CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION

CONSOLE INTERFACE BOARD
19D438451G1

(19D438451, Sh. 1, Rev. 4)

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING

ELECTROSTATIC SENSITIVE DEVICES

CONSOLE INTERFACE BOARD
19D438451G1
ISSUE 4

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
AR1		Selective Amplifier. 19D417092G2
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	T644ACP310J	Polyester: .010 uF + or -5%, 50 VDCW.
C3	T644ACP310K	Polyester: .010 uF + or -10%, 50 VDCW.
C4	T644ACP310J	Polyester: .010 uF + or -5%, 50 VDCW.
C8 thru C11	T644ACP410K	Polyester: 0.1 uF + or -10%, 50 VDCW.
C12	19A701534P4	Tantalum: 1 uF + or - 20%, 35 VDCW.
C23	19A701534P15	Tantalum: 3.3 uF + or -20%, 35 VDCW.
C24	19A701534P8	Tantalum: 22 uF + or -20%, 16 VDCW.
C26	T644ACP310K	Polyester: .010 uF + or -10%, 50 VDCW.
C32 and C33	T644ACP310K	Polyester: .010 uF + or -10%, 50 VDCW.
C37	19A701534P6	Tantalum: 4.7 uF + or -20%, 35 VDCW.
C48	19A701534P4	Tantalum: 1 uF + or - 20%, 35 VDCW.
C50	19A701534P4	Tantalum: 1 uF + or - 20%, 35 VDCW.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 and E2	19A705677P1	ARRS, surge suppressor.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19C320291G17	Hybrid tone network.
		- - - - - - - - - - JACKS - - - - - - - - - -
J1	19A704852P36	Printed wire, two part: 10 contacts, sim to Molex 22-29-2101.
J2	19A703248P11	Post: Gold Plated, 10 mm length.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color White)
P3	19A704852P1	Printed wire, two part:: 2 contacts; sim to MOLEX 22-10-2021
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q2 and Q3	19A700023P2	Silicon, NPN: sim to 2N3904.
Q4	19A700022P2	Silicon, PNP: sim to 2N3906.
Q7	19A700023P2	Silicon, NPN: sim to 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A701250P390	Metal film: 84.5K ohms + or -1%, 1/4 w.
R2	19A701250P289	Metal film: 8.25K ohms + or -1%, 250 VDCW, 1/4 w.
R3	H212CRP247C	Deposited carbon: 4.7K ohms + or -5%, 1/4 w.
R4	19A701250P288	Metal film: 8060 ohms + or -1%, 250 VDCW, 1/4 w.
R8	H212CRP322C	Deposited carbon: 22K ohms + or -5%, 1/4 w.
R9	19A701250P279	Metal Film: 6.49K ohms + or - 1%, 1/4 w.
R10	19A701250P237	Metal film: 2.37K ohms + or -1%, 1/4 w.
R12	H212CRP333C	Deposited carbon: 33K ohms + or -5%, 1/4 w.
R13	H212CRP347C	Deposited carbon: 47K ohms + or -5%, 1/4 w.
R14	19A701250P201	Metal film: 1K ohms + or -1%, 250 VDCW, 1/4 w.
R20	19A701250P356	Metal film: 37.4K ohms + or -1%, 1/4 w.
R21	19A701250P418	Metal film: 150K ohms + or -1%, 1/4 w.
R22	H212CRP415C	Deposited carbon: 0.15M ohms + or -5%, 1/4 w.
R23	H212CRP322C	Deposited carbon: 22K ohms + or -5%, 1/4 w.
R24 and R25	H212CRP410C	Deposited carbon: 100K ohms + or -5%, 1/4 w.
R26	H212CRP527C	Deposited carbon: 2.7M ohms + or -10%, 1/4 w.
R27	H212CRP310C	Deposited carbon: 10K ohms + or -5%, 1/4 w.
R28	H212CRP382C	Deposited carbon: 82K ohms + or -5%, 1/4 w.
R29	H212CRP322C	Deposited carbon: 22K ohms + or -5%, 1/4 w.
R30 thru R32	H212CRP347C	Deposited carbon: 47K ohms + or -5%, 1/4 w.
R33	H212CRP468C	Deposited carbon: 0.68M ohms + or -5%, 1/4 w.
R34	H212CRP310C	Deposited carbon: 10K ohms + or -5%, 1/4 w.
R36 and R37	H212CRP310C	Deposited carbon: 10K ohms + or -5%, 1/4 w.
R62	19A701250P223	Metal Film: 1.69K ohms + or - 1%, 1/4 w.
R63	19A701250P138	Metal film: 243 ohms + or -1%, 250 VDCW, 1/4 w.
R64	H212CRP222C	Deposited carbon: 2.2K ohms + or -5%, 1/4 w.
R65	H212CRP310C	Deposited carbon: 10K ohms + or -5%, 1/4 w.
R66	H212CRP347C	Deposited carbon: 47K ohms + or -5%, 1/4 w.
R67	H212CRP212C	Deposited carbon: 1.2K ohms + or -5%, 1/4 w.
R69	H212CRP310C	Deposited carbon: 10K ohms + or -5%, 1/4 w.
R70	H212CRP315C	Deposited carbon: 15K ohms + or -5%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T1	19A705720P1	Transformer, Audio.
		- - - - - - - - - - TEST POINTS - - - - - - - - -
TP1 thru TP4	19A703248P11	Post: Gold Plated, 10 mm length.
TP6	19A703248P11	Post: Gold Plated, 10 mm length.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U2	19A701999P1	Linear: Voltage Regulator; sim to LM317T.
U3	19A701789P1	Linear: Quad Op Amp; sim to LM324.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	19C320299G1	Connector. Includes: 19D416714P1 Shell. 19B219681P1 Contact, electrical.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232901P2	Support.
	N80P9005B6	Machine screw, pan head, steel, No. 4-40UNC x 5/16".
	N404P11B6	Lockwasher, internal tooth: No. 4.
	7141225P2	Nut, Hex: 4-40.

* COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

Changes in the equipment performance 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 the descriptions of parts affected by these revisions.

REV. A - Console Interface Board 19D438451G1

To improve tone detection, capacitor C12 was changed from 0.1 µF to µF.

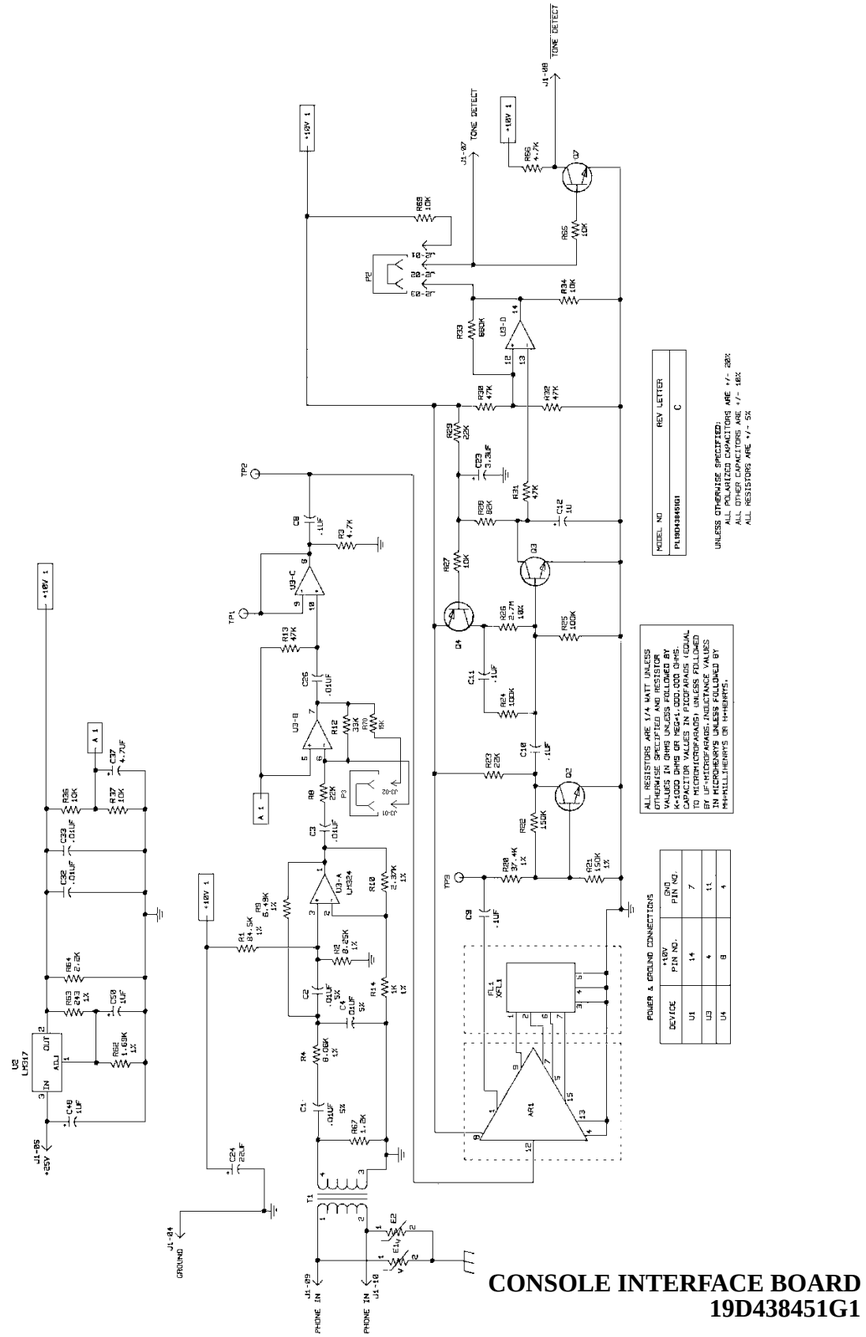
Old part number was: T644ACP410K.

REV. B - Console Interface Board 19D438451G1

In some applications, the main level on the line input from the switch may cause the COR of the analog voter to chatter. A jumper option is provided to allow a gain reduction of 10 dB.
R70 was added (H212CRP315C).
P3 was added (19A704852P1).

REV. C - Console Interface Board 19D438451G1

To remove unused circuitry.



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19D438451G1

(19D438449, Sh. 1, Rev. 4)