

**GRUMMAN AIRCRAFT ENGINEERING CORPORATION
BETHPAGE, L. I., NEW YORK**

SECTION I

Control Mode and Status Discretes

Sig. Ref.	Figure	
A1	1	Automatic Mode
A2	1	Attitude Hold Mode
A3	1	Out of Detent
A4	2	Start Abort Program
A5	2	Start Abort/Stage Program
A6	2	Engine Armed
A7	3	Digital Autopilot in Control
A8	3	In Auto Throttle
A9	4	Rate of Descent Reset
A10	4	Rate of Descent (+)
A11	4	Rate of Descent (-)
A12	5,6,7	Display Inertial Data
A13	5,6,7	Stage Verified
A14	8,9	Thrusters 4d and 4s fail
A15	8,9	Thrusters 3u and 3s fail
A16	8,9	Thrusters 4u and 4f fail
A17	8,9	Thrusters 3d and 3f fail
A18	8,9	Thrusters 1d and 1s fail
A19	8,9	Thrusters 1u and 1f fail
A20	8,9	Thrusters 2u and 2s fail
A21	8,9	Thrusters 2d and 2f fail
A22	10	Mark X
A23	10	Mark Y
A24	10	Reject Mark
A25	10	Mark Reset

For A1-A25: Signal levels, source and load impedances and noise limits are specified with respect to the LGC return (interface connector P/J 222, pin C). LGC isolation resistors are included in the source impedance.

- Noise limits:
1. Switch closed ("1"): Maximum noise amplitude is -50V if noise pulse does not exceed 0.5 milliseconds width at maximum rep. rate of 50 pps.
 2. Switch open ("0"): Maximum noise amplitude is +50V if noise pulse does not exceed 1 millisecond width at maximum rep. rate of 50 pps.

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**ICD NO.
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**REV
D**

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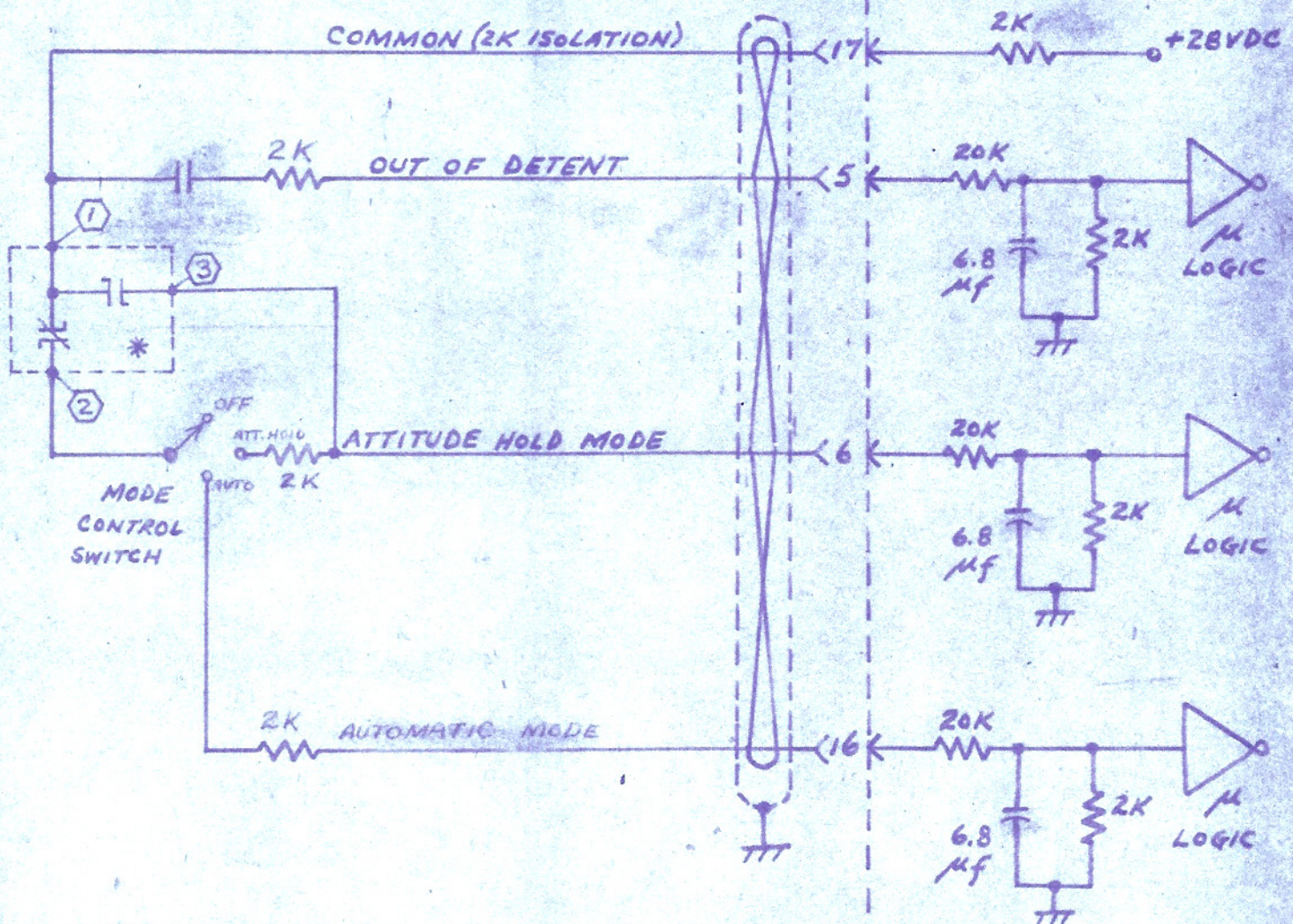


Fig. 1

CONTROL MODE & STATUS DISCRETES

J220 P220
56P6

GAEC ← MIT
(SOURCE) (LOAD)

EFFECTIVITY:

LM-1 & LM-2 AS SHOWN

LTA-8, LM-3 & SUB. CIRCUIT (*)

NOT INSTALLED. ① & ②

SHORTED TOGETHER.

③ LEFT OPEN.

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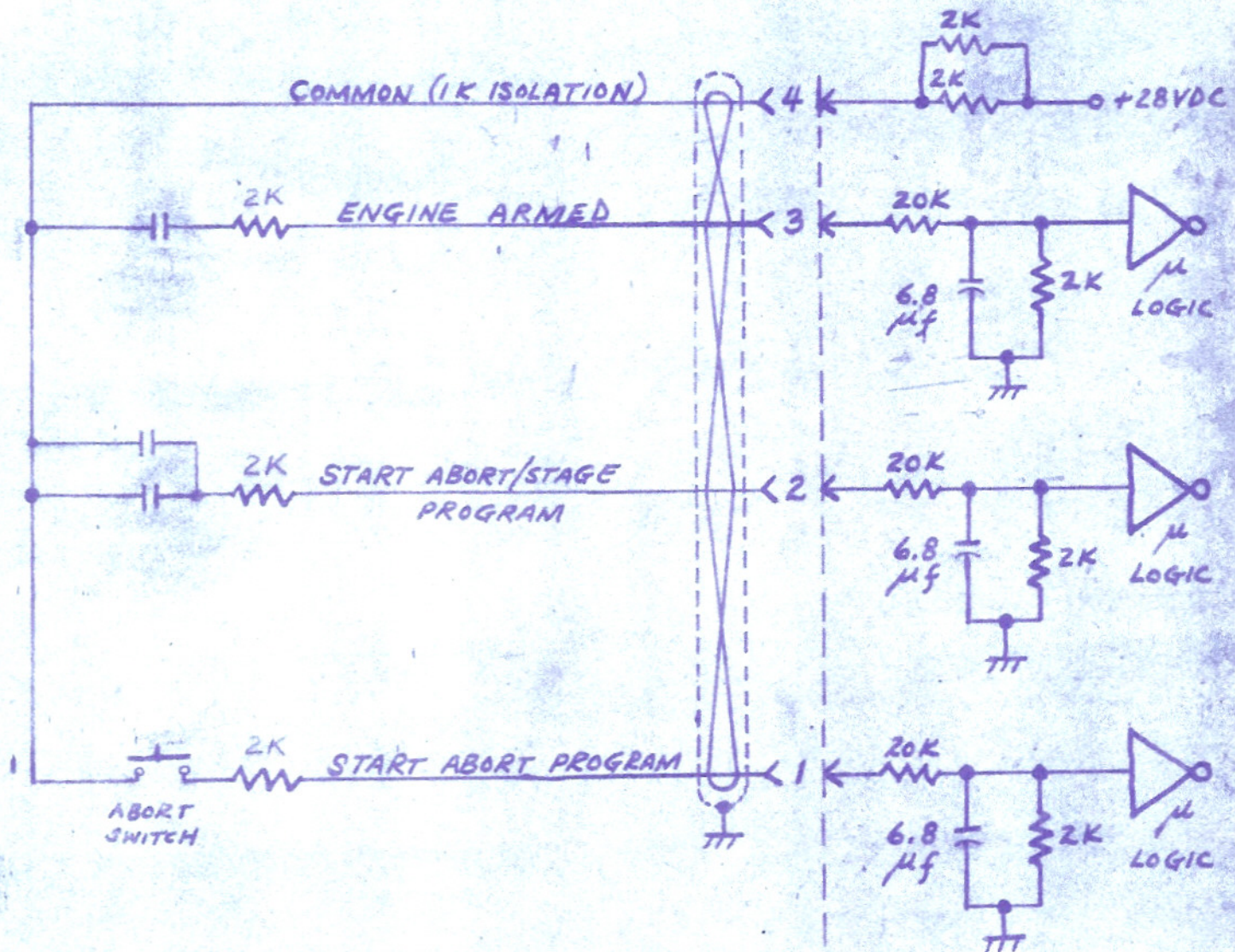


Fig. 2

CONTROL MODE & STATUS DISCRETES

J220 P220
56P6

GAEC (SOURCE) MIT (LOAD)

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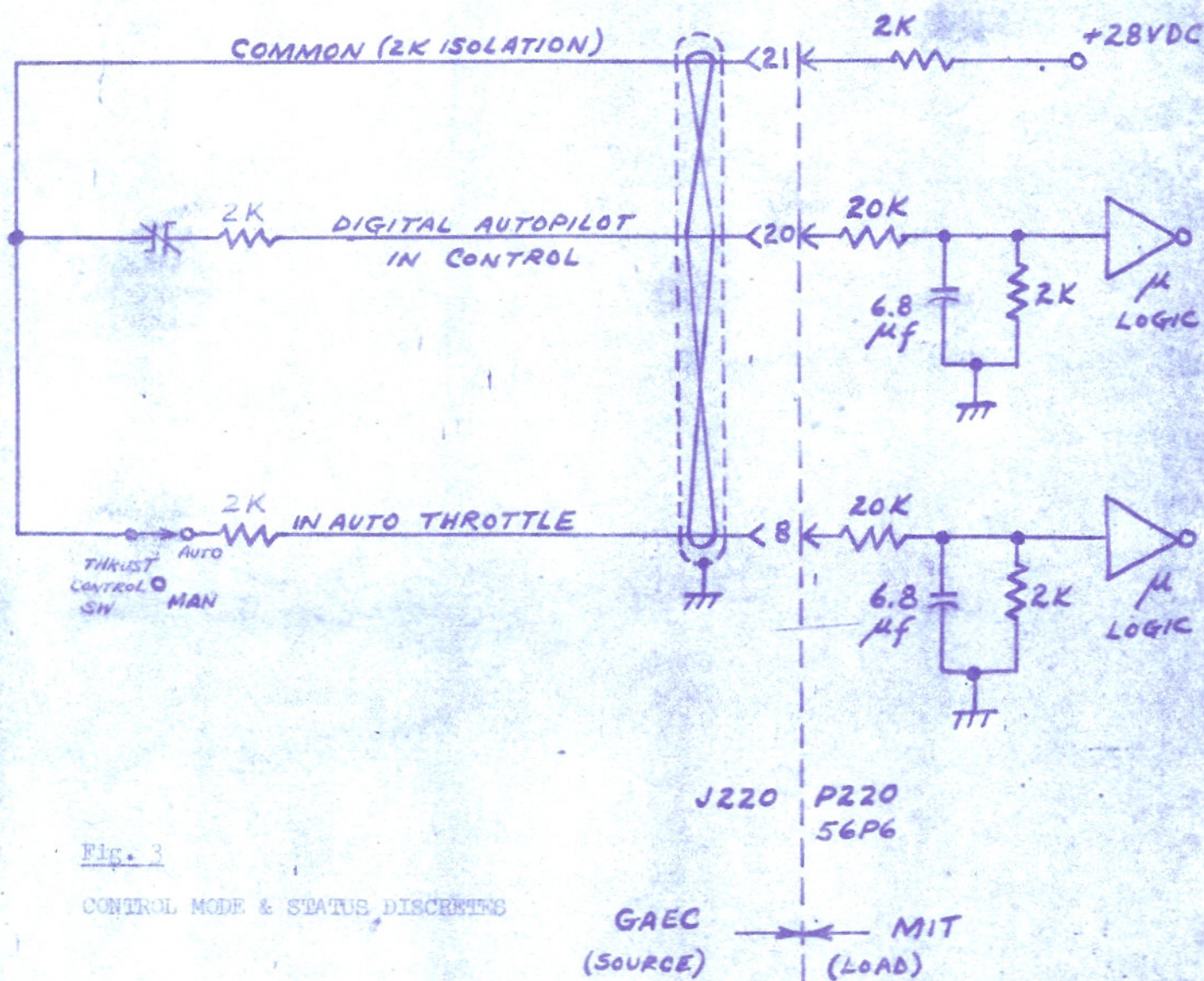


Fig. 3

CONTROL MODE & STATUS DISCRETES

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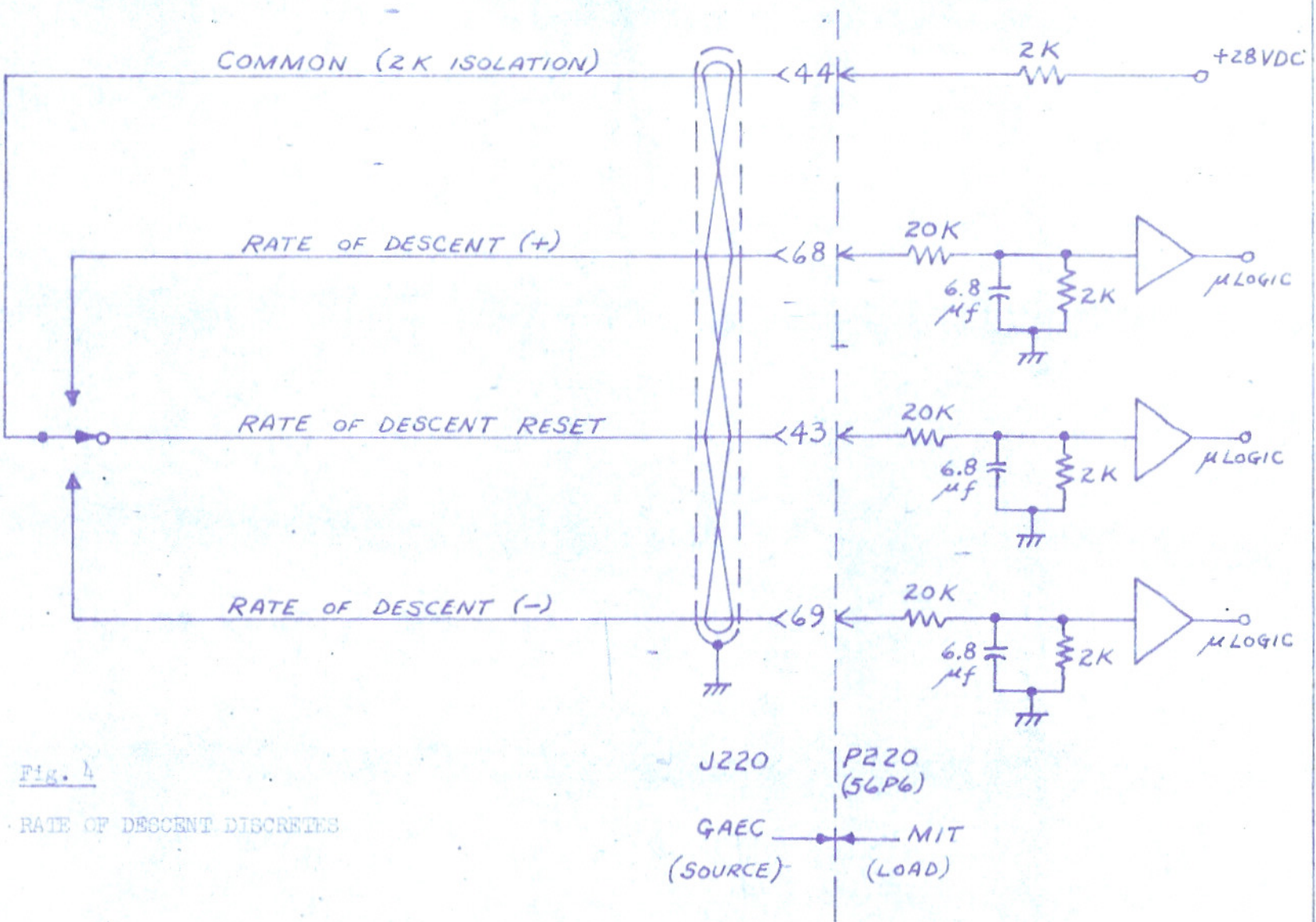


FIG. 4

RATE OF DESCENT DISCRETES

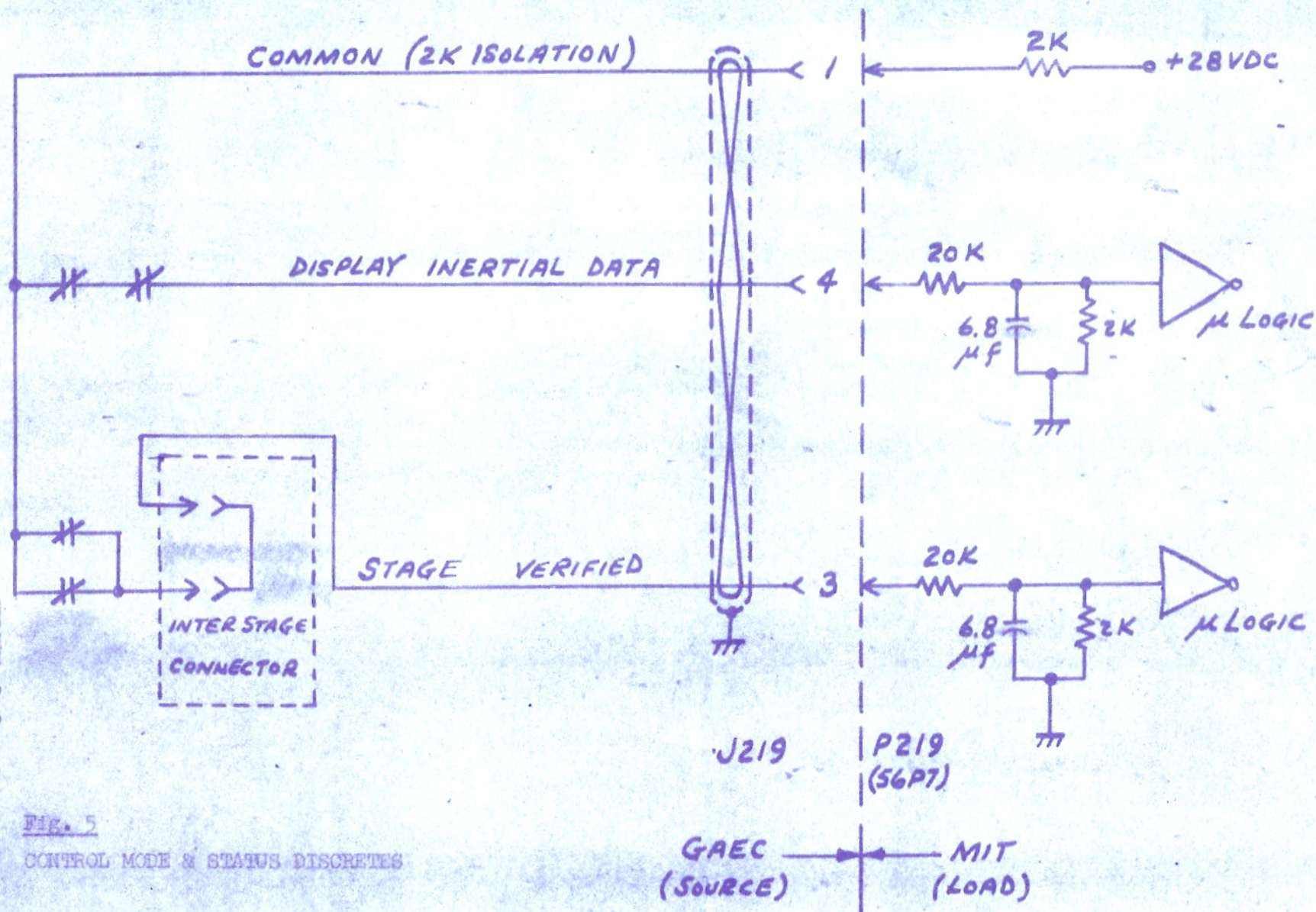


FIG. 5
CONTROL MODE & STATUS DISCRETES

VEHICLE EFFECTIVITY
FOR THIS SHEET:
LTA-8, LM-3 TO LM-15
& SUB.

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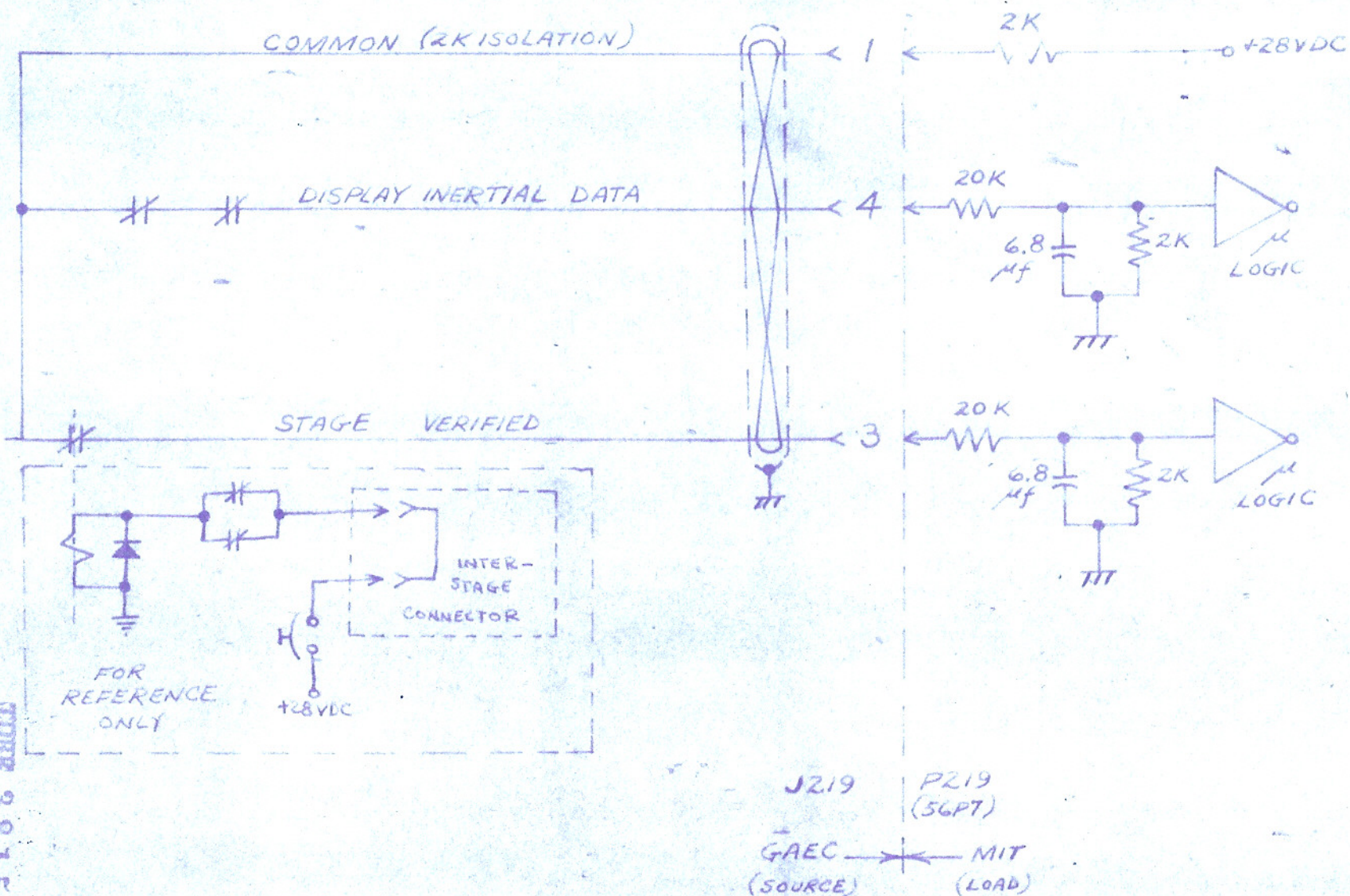


Fig. 6

CONTROL MODE & STATUS DISCRETES

VEHICLE EFFECTIVITY
FOR THIS SHEET:
LM-1 ONLY

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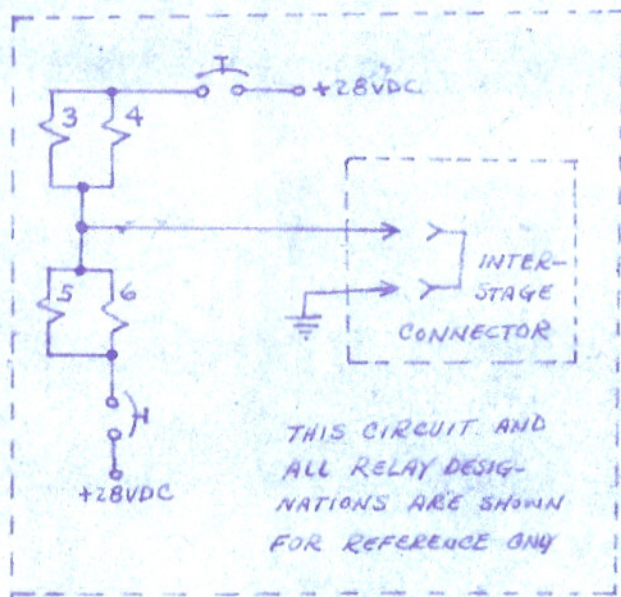
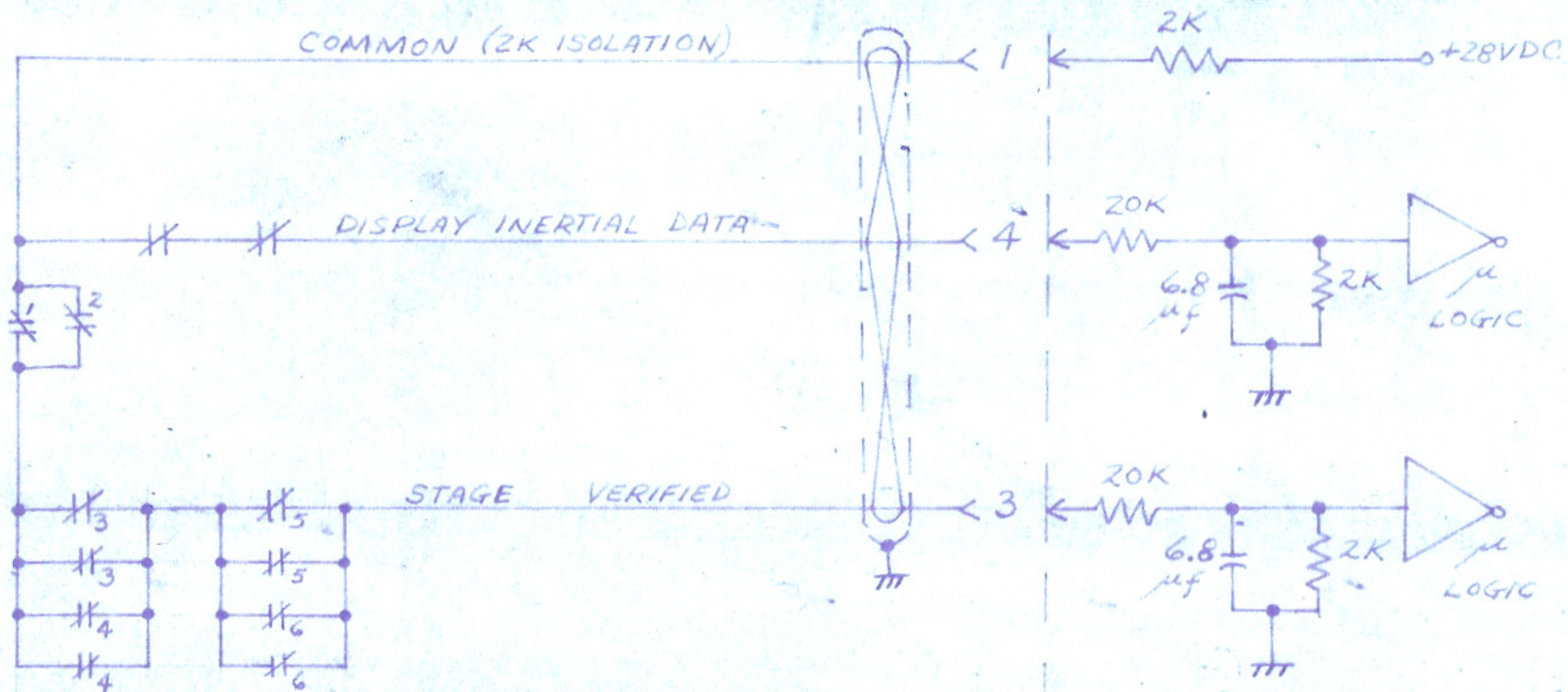
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J219 P219 (56P7)
GAEC (SOURCE) ——— MIT (LOAD)

Fig. 1
CONTROL MODE &
STATUS DISCRETES

VEHICLE EFFECTIVITY
FOR THIS SHEET:
LM-2 ONLY

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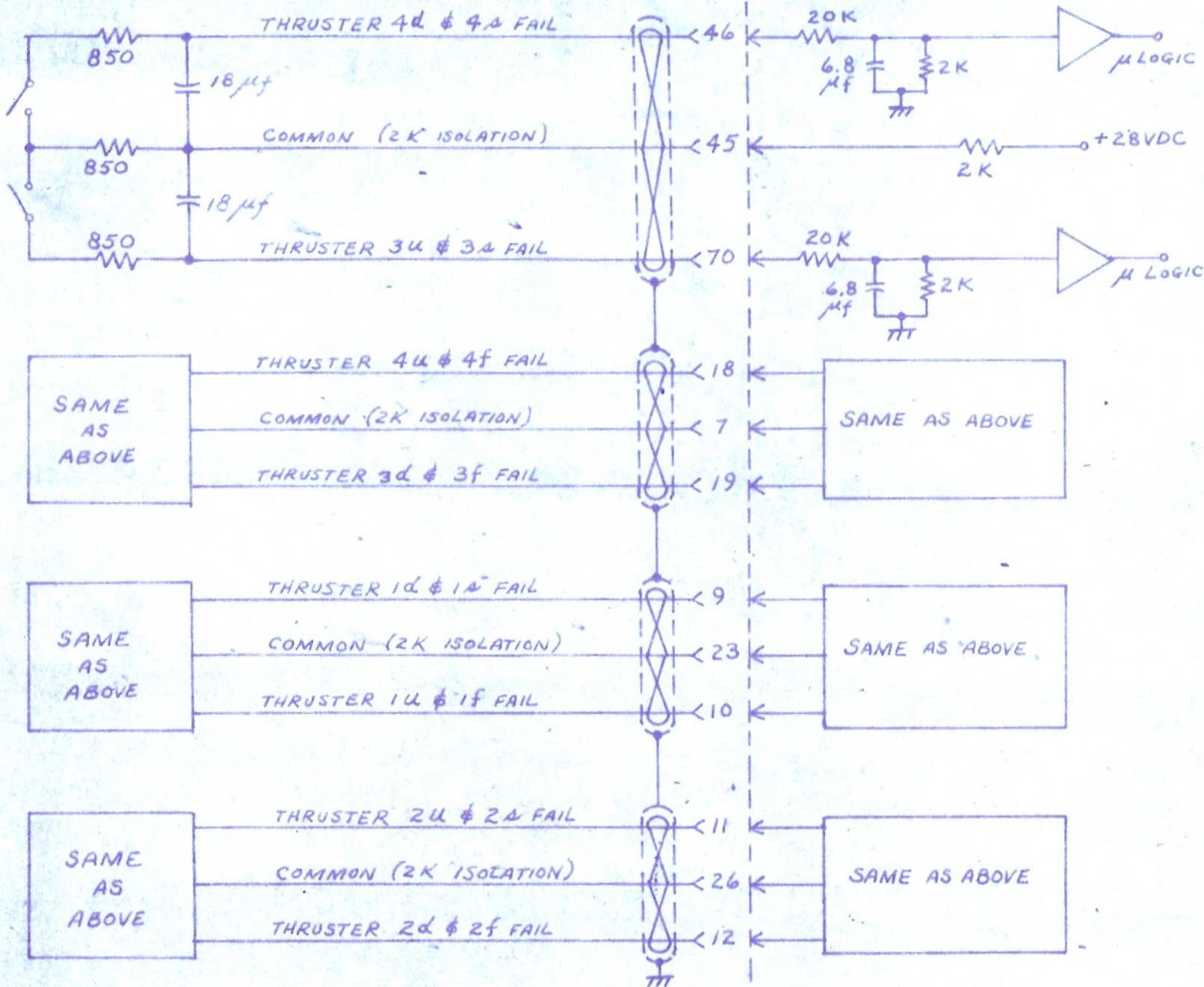


Fig. 8
THRUSTER FAIL DISCRETES

EFFECTIVITY FOR
THIS SHEET:
LTA-8, LM-1 THRU LM-5

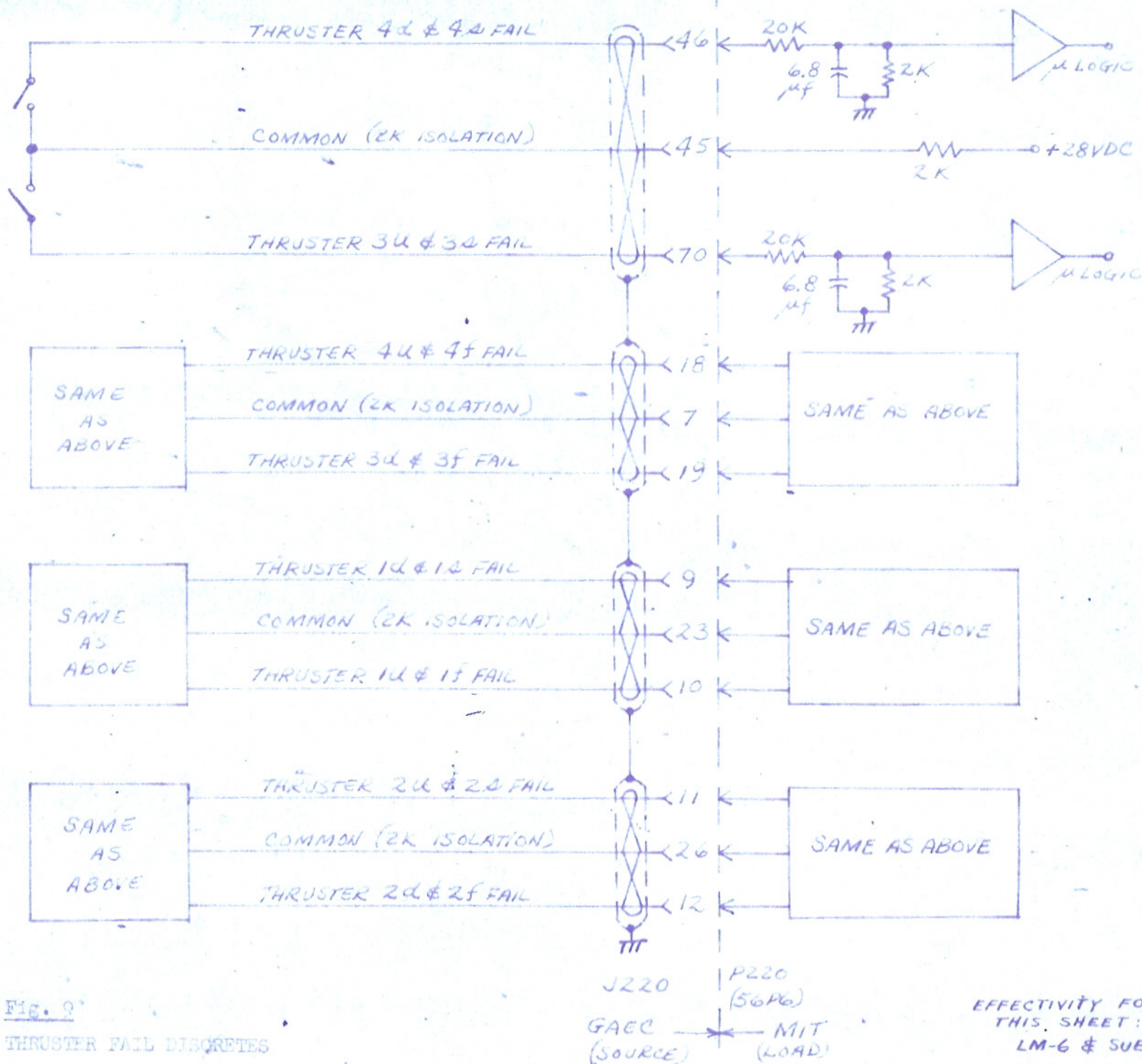


FIG. 9
THRUSTER FAIL DISCRETES

EFFECTIVITY FOR
THIS SHEET:
LM-6 & SUB.

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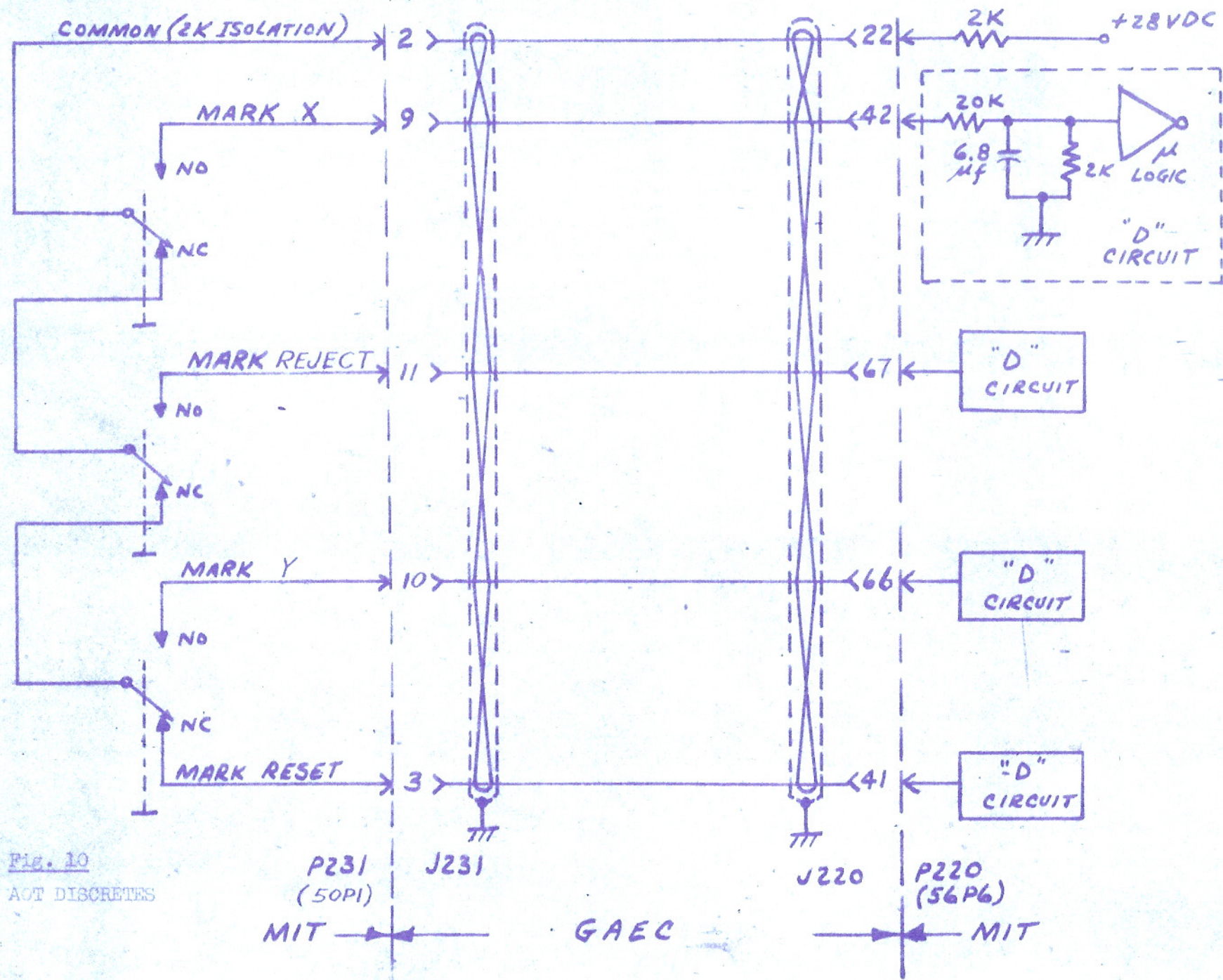


Fig. 10
AOT DISCRETES

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ID	SIGNAL	SIGNAL LEVEL DC VOLTS		Z SOURCE OHMS $\pm 10\%$		Z LOAD OHMS $\pm 10\%$		FUNCTIONAL DESCRIPTION	
		LOGIC	"1"	"0"	"1"	"0"	"1"		"0"
A1	Automatic Mode		28 $\pm$ 11	0 $\pm$ 2	4K	OPEN	22K	22K	The presence of a logic "1" at the interface is a request for the automatic control mode when the PGWCS is in control. (Signal A7 must be present in a logic "1" state).
A2	Attitude Hold Mode		28 $\pm$ 11	0 $\pm$ 2	4K	OPEN	22K	22K	The presence of a logic "1" at the interface is a request for the attitude hold mode when the PGWCS is in control.
A3	Out of Detent		28 $\pm$ 11	0 $\pm$ 2	4K	OPEN	22K	22K	The presence of a logic "1" at the interface is a request to the LGC to accept manual spacecraft rotation commands during attitude hold mode when the PGWCS is in control.
A4	Start Abort Program		28 $\pm$ 11	0 $\pm$ 2	3K	OPEN	22K	22K	The presence of a logic "1" at the interface is a request to initiate the abort program.
A5	Start Abort/Stage Program		28 $\pm$ 11	0 $\pm$ 2	3K	OPEN	22K	22K	The presence of a logic "1" at the interface is a request to initiate the abort stage program with the ascent stage only.

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INTERFACE CONTROL DOCUMENT	ID	SIGNAL	SIGNAL LEVEL		Z SOURCE		Z LOAD		FUNCTIONAL DESCRIPTION
			DC VOLTS		OHMS $\pm 10\%$		OHMS $\pm 10\%$		
		LOGIC	"1"	"0"	"1"	"0"	"1"	"0"	
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	A12	Display Inertial Data	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	The presence of a logic "1" at the interface is a command to the PGNCSS to provide altitude, altitude rate, forward and lateral velocity signals to the LM for display during lunar landing.
	A13	Stage Verified LTA-8, LM-3 to LM-15	0 $\pm$ 2	28 $\pm$ 11	OPEN	2K	22K	22K	The presence of a logic "1" at the interface indicates that the descent stage has separated from the ascent stage.
	A13	Stage Verified LM-1 & LM-2	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	

ID	SIGNAL	SIGNAL LEVEL		Z SOURCE		Z LOAD		FUNCTIONAL DESCRIPTION
		DC VOLTS		OHMS $\pm 10\%$		OHMS $\pm 10\%$		
	LOGIC	"1"	"0"	"1"	"0"	"1"	"0"	
A14	Thrusters 4D & 4S Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	In LTA-8, LM-3 and subseq. the presence of a logic "1" at the interface is an indication to the PGNCs that the propellant valves to these jets are shut off and that these jets are not useable.
A15	Thrusters 3U & 3S Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A16	Thrusters 4U & 4F Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A17	Thrusters 3D & 3F Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A18	Thrusters 1D & 1S Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A19	Thrusters 1U & 1F Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	In LM-1 and LM-2, the presence of a logic "1" at the interface is an indication to the PGNCs that these jets have failed "ON" and the PGNCs should issue an IMP command to shut-off this thruster pair.
A20	Thrusters 2U & 2S Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A21	Thrusters 2D & 2F Fail	28 $\pm$ 11	0 $\pm$ 2	3.7K*	OPEN	22K	22K	
A22	Mark X	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	
A23	Mark Y	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	
A24	Reject Mark	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	Pushbuttons are located on Computer Control and Reticle Dimmer Assy. (CCRD) near AOT.
A25	Mark Reset	28 $\pm$ 11	0 $\pm$ 2	2K	OPEN	22K	22K	
								GAEC provides inter-connecting wiring.
								*LTA-8, LM-1 thru LM-5; 2K for LM-6 and sub.

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