Bendix

Aerospace Systems Division

Impact of Open Lines in Experiment Cables

NO. EATM-54

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The purpose of this EATM is to answer the questions raised at the PSEP CDR regarding cutting the unused experiment cables. It is shown that there will be no impact on system performance as a result of cutting these unused cables.

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In order to convert the Data Subsystem of ALSEP Flight System 2 for use on the PSEP mission, it is planned to sever the three unused experiment cables at the locations shown in Figure 1 and the cable to the astronaut switches.

All the lines being cut are to be insulated from one another with the exception of the two lines from astronaut switch no. 1 (which are to be shorted together). It is the purpose of this memo to describe the impact of operating PSEP with these lines open. As can be seen in Figure 1, the circuits terminating in these cables can be classified in one of the following groups.

- Primary power circuits
- Digital synchronizing circuits
- Digital data circuits
- Control circuits

Note that no analog data input circuits are involved when experiments 2, 3 and 4 are deleted from ALSEP Flight Model 2. In the following paragraphs the effects on system operation of unloading each of these circuits are described.

a. Power Circuits

The power balance in the PSEP system is predicated on these lines being open-circuited. Hence, cutting these wires has no adverse effect; in fact, it is a design requireme that these lines be open-circuited. Consequently, it is important that the manner of insulating the ends of the wires in the severed cables (e.g. shrink tubing, etc.) guarantee wire-to-wire isolation under operating conditions. This is being accomplished with the shrink tubing on each wire.

b. Digital Synchronizing Circuits

The driving circuits in the Data Processor which provide the various timing and synchronizing pulses to the experiments have been designed to withstand both open-circuit and closed-circuit loading without permanent damage or functional effect The verification of this design feature is provided by the fact

that the timing lines to all 8 ALSEP experiments are brought to the central terminal strip and the Data Processor normally operates with 4 of the 8 experiment circuits open.

c. Digital Data Circuits

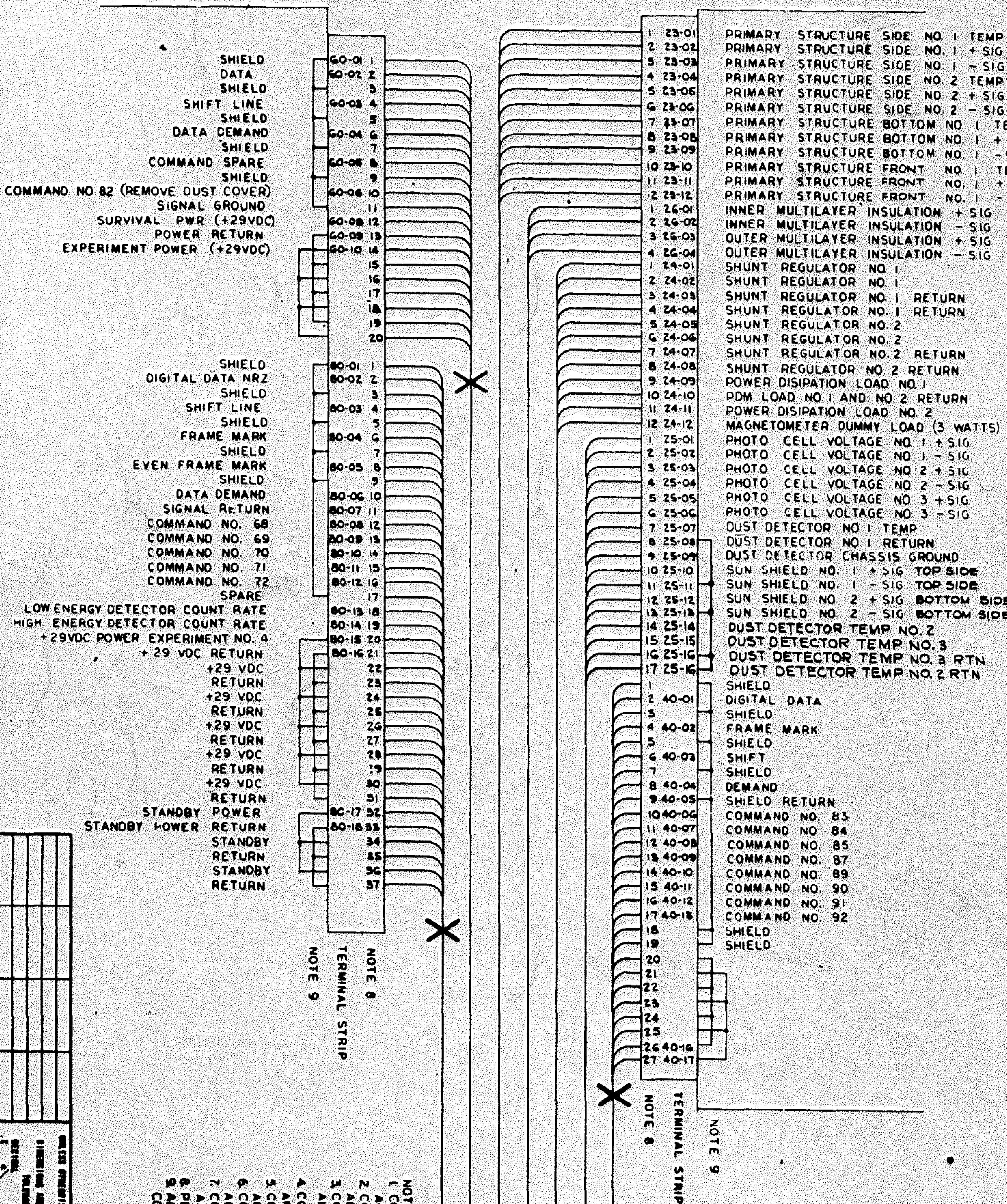
Any digital data lines which are open and not grounded will yield a digital "1" output in all bits. Although a digital "1" is normally indicative of a logic level of +2.5 to ±5.5 volts at the digital data processor input, an open, ungrounded line will provide this kind of an input condition.

d. Control Circuits

The function of astronaut switches 2 and 3 is to simulate a specific set of commands to the Power Distribution Unit. Since the astronaut will not be performing this function on PSEP these cables can be deleted. The active state of a command is simulated by these switches by a momentary grounding of the appropriate command line(s). If these control lines from the switches are open-circuited, the function is effectively removed from the system.

Conclusions

It is therefore evident from the above analysis that the operations of the Data Subsystem is unaffected by leaving the cables assigned to experiments 2, 3 and 4 and astronaut switches open-circuited. This conclusion has been verified many times during ALSEP system tests when the system has operated, with no adverse effects, with one or more experiments disconnected.



NOTES:
1. CONNECTOR J23 IS 095-9036-0012 AND CONNECTS TO P23 095-9035-0011
2. CONNECTOR J24 IS 095-9036-0012 AND CONNECTS TO P24 095-9035-0011
3. CONNECTOR J25 IS 2331210-7 AND CONNECTS TO P25 2331210-2
4. CONNECTOR J40 IS 2331210-9 AND CONNECTS TO P40 2331210-4
5. CONNECTOR J60 IS 2331210-8 AND CONNECTS TO P60 2331210-3
6. CONNECTOR J80 IS 2331210-9 AND CONNECTS TO P80 2331210-4
7. CONNECTOR J26 IS 095-9032-0017 AND CONNECTS TO P26 095-9031-0015
8. PIN ASSIGNMENTS ON TERMINATING CONNECTORS
9. ALL JUMPER SHOWN ARE ON THE CENTRAL STA[...] CONNECTORS AND NOT ON THE TERMINAL BOARD

CONTRACT NO. NAS9-5829

SIZE D 07038

SCALE NONE

WIRING CENTR[...] (CONNECT[...]