

UNITED STATES GOVERNMENT

Memorandum

TO: Director, Apollo Support Branch

DATE:

10 JULY 1968
EC9618/1576

FROM: EGO/Head, Crew Provisions Section

SUBJECT: Cable short circuit in spacecraft 101 C²F²

The suit wiring cable that shorted in spacecraft 101 C²F² causing a shock to the astronaut was a harness that was delivered to ILC for lab tests early in the Block II suit program. This harness should never have been associated with the suit delivered for the C²F². This harness was wired and configured for Block I spacecraft and was in general completely worn out. It was connected to a Block II bioinstrumentation harness delivered GFE with the signal conditions. An analysis of the particular harness was made by the Bioinstrumentation Section at KSC by Mr. Wayne Cochran and his findings are as follows:

First the shock could only be caused by two separate malfunctions of the cable harness. Both of these malfunctions were evident in the cable. They were (1) the shield on the power lead was broken open and (2) the "hot" lead of the power was shorted to the shield past the opening on the "astronaut" side. As Block II bioharness is presently wired this shield lead is common throughout the system and terminates on the astronaut through the biomed electrode. When conditions exist such as described above, the bioinstrumentation is inoperative and allowing a potential of +28 VDC to be applied to the chest cavity of the astronaut. When this occurs, any time he touches ground potential he will feel a shock. This shock hazard exists any time the Block II bioinstrumentation harness, GFE, is used, but the likelihood of it occurring again are quite remote.

The shock hazard can be removed completely by adopting the "proposed" schematic. This will allow the astronaut's body to be at signal ground rather than shield ground. The "proposed" schematic is almost identical to the Block I with the exception that it will allow the use of Block II signal conditions and it will interface with the ILC suit furnished Block II torso harness.

Schematics on various configurations are included in this memo.

Procurement action has been initiated to rebuild the Block II bioinstrumentation harness in order to remove the in-line filters that have been in these harnesses, and in light of recent decisions to use Block I and Block II signal conditions on the Block II program it would be no effort to wire the harness as the Block I harnesses are wired and eliminate the hazard completely.



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Attention is made that the above change be incorporated into Block II harnesses. A proposed CCA is being prepared for the Apollo Support Branch Configuration Control Board.

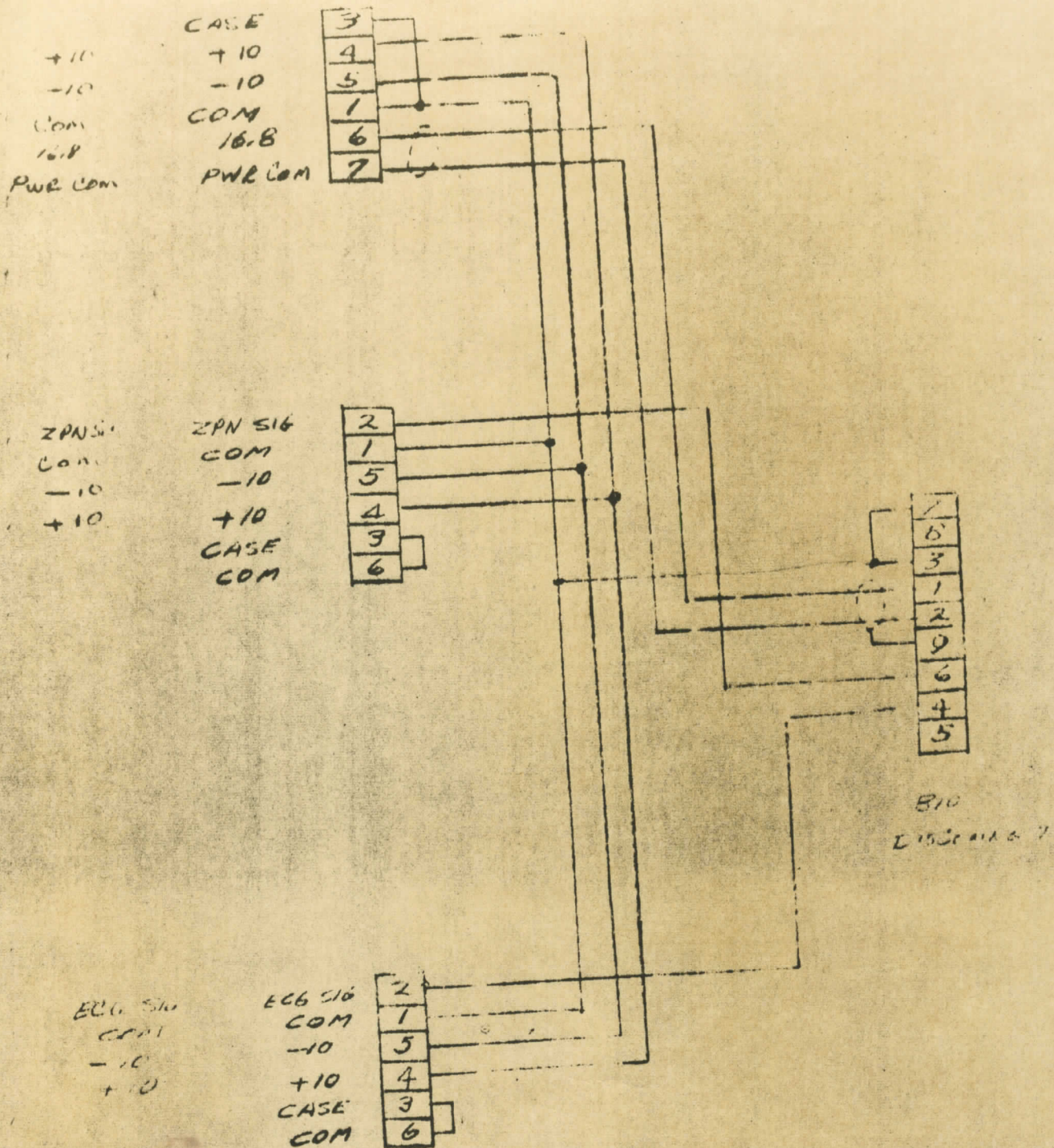
It is further recommended that the ground electrode be eliminated from the instrumentation system. In doing this, a further shock hazard is eliminated in that if he should come in contact with a hot wire with his hand he would have a body ground at his chest with the present Block I or revised Block II wiring harness.

Fred A. McAllister

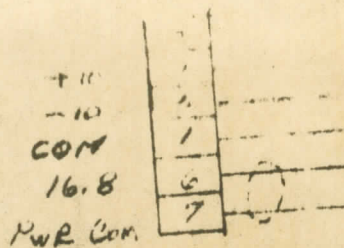
Enclosures 2

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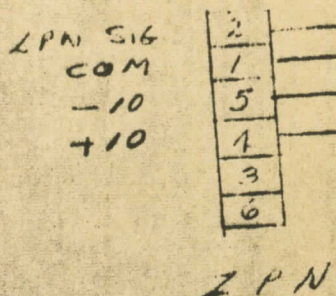
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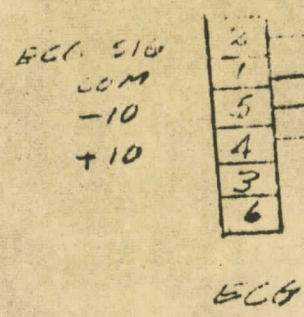
Proposed



DC-DC
CONVERTER



F.
Driver



Wired I am now to show

CASE
 + 10
 - 10
 COM
 1608
 PWR COM

DC DC
 CONV

ZPN SIG
 COM
 - 10
 + 10
 CASE
 COM

ZPN

ECG SIG
 COM
 - 10
 + 10
 CASE
 COM

ECG

BIO
 LOGIC

EXISTING
 BLOCK II BIOLOGICAL UNIT