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Block II

APM # 1259 Addendum A

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To: J. E. Miller, T. Lawton

From: J. Gilmore

Date: 4 June 1965

Subject: Block II Moding & Programming Requirements

This addendum is intended to update the 20 April Block II "Moding & Programming Requirements" memo to reflect recent changes in "ISS Turn On Proceedures."

With the previously defined turn moding, computer programming proceedures could not assure that IMU gimbal caging control would be maintained throughout the required 90 sec turn on period if a "Fresh Start" or "Restart" occurred. Similarly the possibility of gimbai caging without rate limiting existed during periods of IMU inertial operation when a "Fresh Start" occurred. The revised sections ID, IV B4, and figure 6 below should resolve these difficulties. In addition Section IV 7 should be revised to include the following statement (overlooked in original memo):

[In LEM operations the ISS CDU Zero discrete should be held for a minimum period of 300 millisec.] After removal of the CDU-Zero discrete- - - - -.

Revisions

ID - Turn on Mode (Computer Delay)(Fig 6)

1. The computer in response to the "ISS Turn on Delay Request" discrete from the PSA sends the CDU Zero & Coarse Align Enable discretes followed after a 90 sec delay by the ISS Turn on Delay Complete discrete.

2. The purpose of this mode is to drive the gimbals to their zero positions and hold them there during the IMU Turn-On period. The turn-on mode is required upon closure of the ISS operate circuit breaker and allows for a 90 sec gyro run-up period. When the ISS operate power is turned on the PSA circuitry will automatically operate to cage the IMU gimbals to their zero positions. At the same time the "ISS Turn On Delay Request" discrete will be sent to the computer. The computer will send the "CDU Zero & Coarse Align Enable" discretes to the CDU and then after a 90 sec delay send the "ISS Turn On Delay Complete" discrete. The PSA

circuitry will send the "ISS Turn On Delay Request" discrete until receipt of the computer "ISS Turn On Delay Complete" discrete. Computer Fresh Starts or restarts should only result therefore, in extending the delay period. Upon receipt of the ISS Turn on delay complete discrete the Turn on control relay will be energized and latched in and the IMU will revert to gyro control (Inertial operation). The PSA circuit is reset whenever ISS operate power is turned off.

3. During the 90 sec delay period, the ISS 28V operate power will be routed through the ISS Turn On Control relay (Normally closed when de-energized contacts) to operate the cage and respective coarse align relays. This routes the 1X resolver sine winding to the gimbal servo amplifiers and causes the gimbals to drive to their resolver nulls. The CDU Zero discrete clears the CDU read counters. The Coarse Align Enable discrete provides a redundant means for energizing the coarse align relays.

4) It should be noted that the PSA circuitry also allows for the capability of inhibiting PIPA pulse torquing during the 90 sec. delay. This feature will be implemented if microsyn excitation is transferred to the ISS operate power breaker from the ISS standby breaker. The 90 sec delay would therefore allow for PIPA float centering prior to torquing.

IV B 4 Turn On Mode (computer delay) (Sec I D)

a) Two seconds (Max) after the receipt of the"Iss Turn On Delay Request" discrete send "ISS CDU-Zero and "Coarse Align Enable" for a minimum period of 90 seconds.

b) After the 90 sec delay send the ISS Turn On Delay complete discrete. This discrete should be sent for a minimum period of 50 millisec. Programming and computer logic should also assure that this discrete is off (ie: open) under computer power off, or standby conditions. Similarly, when the computer is turned on or goes from standby to operate, this discrete should be reset to off in less then 3 millisec if the ISS Turn On Request discrete is present. The PSA will discontinue sending the ISS Turn On Request discrete 50 millisec (max) after receipt of the computer ISS Turn On delay complete discrete.

c) After the 90 sec delay and transmission of the ISS Turn On Delay Complete discrete:

1) If it is desired to set the system on inertial (gyro) control remove both the CDU Zero and Coarse Align Enable discretes. Allow 30 milliseconds for the CDU to synchronize to the gimbals.

2) If it is desired to initiate a coarse alignment, remove the ISS CDU Zero discrete and send ISS Error Counter Enable (May be done simultaneously or sequentially). Allow 30 millisec for CDU synchronization and then send incrementing pulses as required (per 3b above and sec IV A 6).

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ISS TURN ON MODING

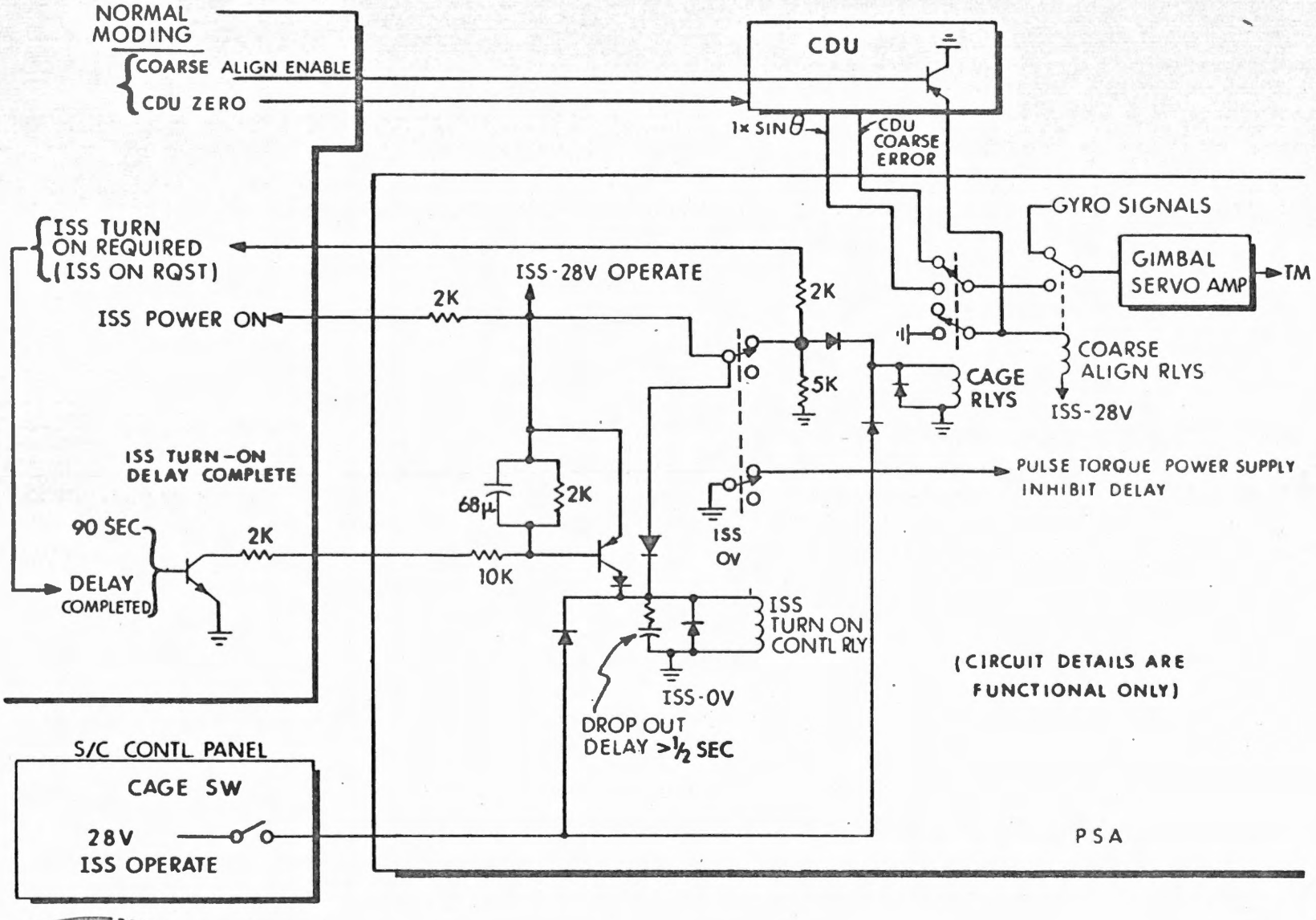

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Fig. 6