

MEMO

To: M. Johnston
From: G. L. Silver
Date: 12 December 1969
Subject: Use of V35 and PIP Bias Changes With IMU Operate On.

A Verb 35 (Lamp Test) creates a LGC or CMC Warning which causes the PIP loops to be opened for approximately 10 seconds. The loops then close using the reduced current closure mode (PVR delay). One* uncertainty in bias can result when a different torquer is used to close the loop (and at a slightly different temperature) than the original** turn on sequence. The change at "one" Gravity can be in the .1 to .4 cm/sec² range. The change in 1/6 "G" is some proportion of the 1 "G" value, but no data presently exists to define that proportion.

Suggest that the V35 be done with the computer power on (LGC Dsky CB), but before the IMU operate power is applied.

In space CSM use of V35, with the IMU always on, might also be weighed as to information gained versus confidence in PIP data, although the opening of the loops in zero G should not cause the same magnitude changes as "one" G.

*Other significant bias error sources are "AC hysteresis" and "position memory" (See ISS Memo No. 517 and Memo Bukow to Silver dated 10 December 1969.)

**Earth (Ground) operations in the S/C always turn on the IMU from a common position. i. e. ; IMU parked with Y up and X & Z horizontal. Bias repeatability has been excellent. (See the Inertial Component history distributed by ACED.) All V35's are done in a IMU operate "Off" condition.


George L. Silver
System Test Group

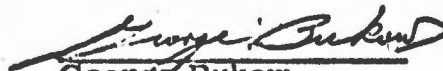
GLS/df

MEMO

To: George L. Silver
From: George Bukow
Date: 10 December 1960

AC Hysteresis is a term applied to bias variations caused by suspension fluxes coupling through fringe portions of the rotor when the float is allowed to rotate to an angular stop. Typical bias variations due to the effect are in the order of 0.2 cm/sec^2 . The bias change is not permanent, and the bias will slowly return to its original value in a period of 6 to 8 hours.

The AC Hysteresis effect is due to a phenomenon called disaccommodation. Disaccommodation is a time varying permeability due to cation migration within the metallic lattice. This cation migration is caused by a change in magnetic field linking with the magnetic material.


George Bukow

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Instrumentation Laboratory
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GROUP 7

TO: John Miller
FROM: George Bukow
DATE: 6 March 1968
SUBJECT: Notes on Position Memory

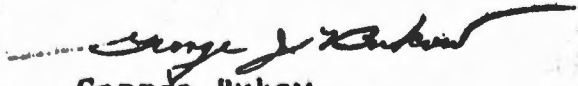
ISS Memo #517

Position memory is an acceleration sensitive bias phenomenon obtained with electromagnetic torquers of the type used in the Apollo 16 PIP Mod D. The exact cause of position memory is still under investigation.

Position memory causes a bias build-up within the PIP which is opposite to the direction of the applied acceleration input. The size of the bias variation obtained is dependent on both the magnitude and the duration of the input.

Typical position memory bias shifts for both LEM and Block II PIPA's are shown in Figs. 1 & 2. The shifts shown are relative to a normalized, or neutral, state and represent position memory effects in the absence of biasing or perturbing influences.

In general, position memory effects are characterized by both short term and long term phenomena. The short term phenomena are as indicated in Figs. 1 & 2. The long term phenomena are essentially non-reversible and can be removed only by degaussing. A long term bias build-up can apparently be "washed out" by applying to the PIPA the opposite polarity input. However, what really is happening is that the bias is building up on the opposite side in opposition to the original bias set.


George Bukow

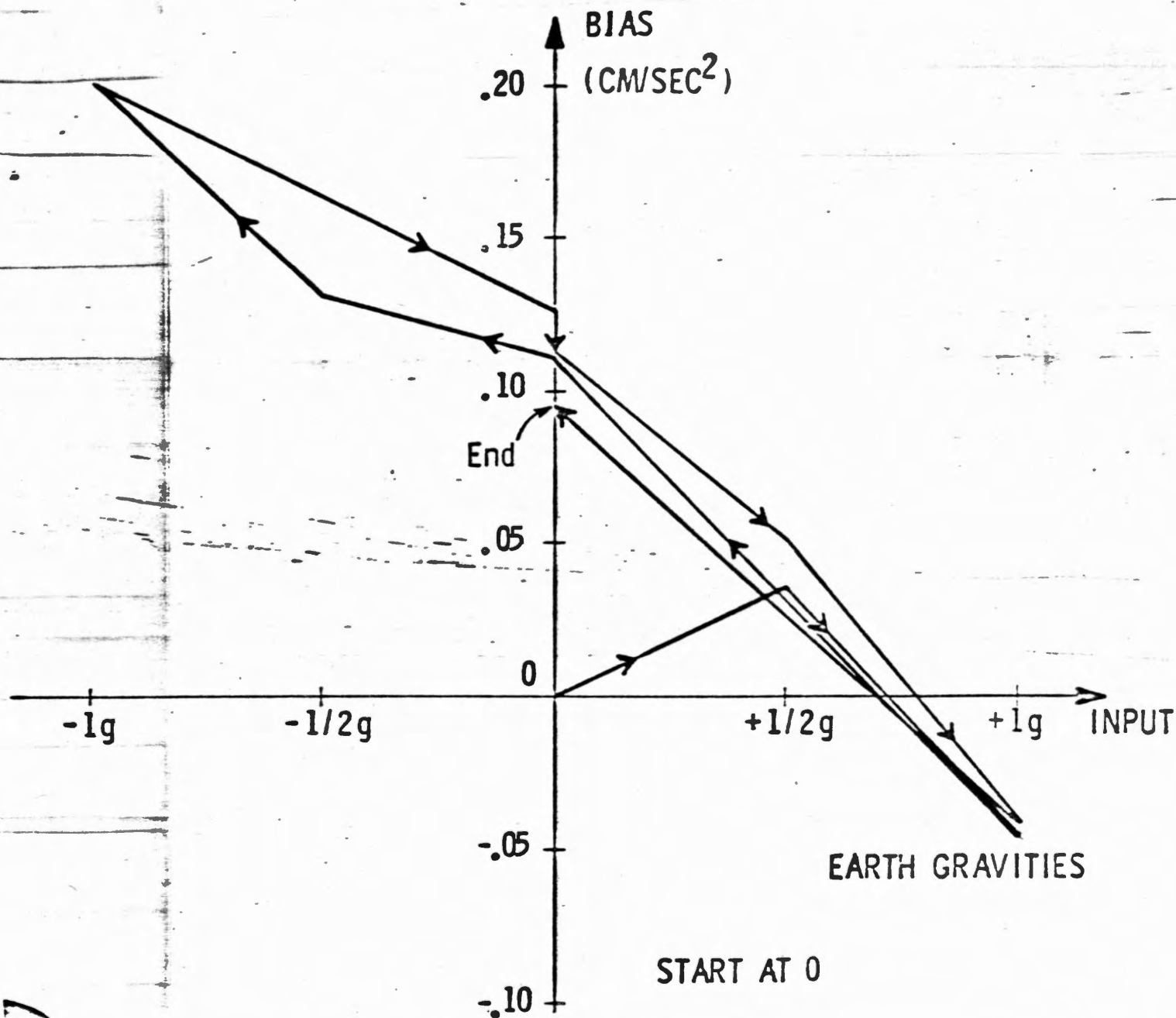
etc

6 March 1968

ISS Memo #517

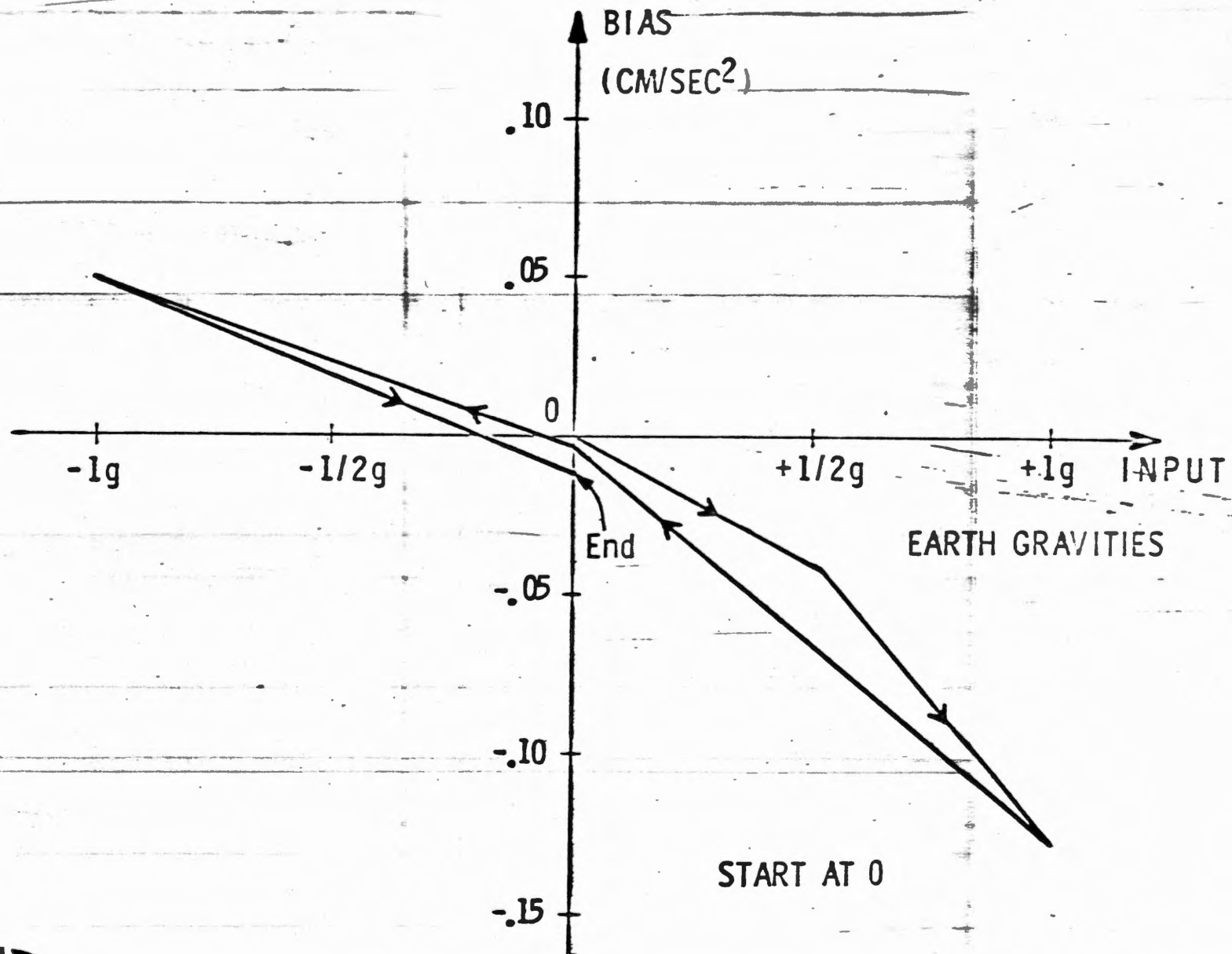
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PIP #231 TEST
DATE- 2/15/68

BL. II



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