

Silver
MIT/IL
Apollo Guidance and Navigation
System Test Group Memo No. 824

To: Leonard S. Wilk
From: George Silver
Date: 2 August 1966
Subject: Changes made to AURORA 85 Program for Re - release as
AURORA 88

AURORA 88 was released to Raytheon on 15 July 1966 for manufacture of Sets 6 through 9 of the AURORA TEST ROPES. The following changes or corrections were made to AURORA 85 which was then released as AURORA 88.

1. T 4 RUPT

- a. The absolute state of pip fail will be indicated after start up. If a pip fail has occurred during start-up, the program alarm will display pip fail after pip fail inhibit bit is removed if the fail is still present.
- b. The NO ATT light was programmed to indicate IMU coarse align is commanded.
- c. Gimbal lock protection was strengthened by addition of a routine such that $MGA > \pm 85^\circ$ equals Coarse Align.

2. IMU MODE SWITCHING

The waitlist time to allow for CDU to Gimbal read out synchronization was changed from 3 to 4 seconds. Needed to allow the CDU registers to reach the correct value when the Gimbal angles are between 135° and 180° . The ambiguity circuit forces the CDU to go the long way to reach 135° .

3. EXTENDED VERBS

- a. The entry the operator inserts for the VERB 57 requests will be rejected if it is zero or larger than octal 15. The operator will be asked to reload the test required.
- b. Prepare for Standby and Recover from Standby Verbs were included. Prepare for Standby, VERB 60 ENTR, stores the Scaler and TIME 1 TIME 2 Registers, enables the Dsky pushbutton and places the IMU (if ON) in Coarse Align. Recover from Standby, VERB 61 ENTER, reads the Scaler, computes the standby time period and updates and reloads the TIME 1 and TIME 2 register. The Standby pushbutton is then disabled. The IMU is left in Coarse Align.

MIT/IL
STG Memo No. 824
page 2

4. AGC Self Test

- a. Corrections made to ERASECHK which insures that the contents of the eraseable registers being summed will not be changed during the self test process if a restart occurs.
- b. Show Bank Sum (VERB 56) can now be terminated with a VERB 34 and self test started without need for a VERB 36.
- c. Calling the routine Show Banksum will terminate self test without causing a restart or program alarm.

5. RADAR

- a. Changed trunnion direction during a remode of the Rendezvous Radar Antenna.
- b. Changed Landing Radar altitude scale factor per GAEC ICD information for Noun 55 displays.
- c. Time to re-position Landing Radar Antenna changed per GAEC ICD information. Data used 1 sec after position bit is received if data Good present. 22 seconds maximum re-position time allowed before alarm 523 displayed.
- d. Provisions for Landing Radar Velocity Bias Change included.

6. AOT MARK

Added compensation for AOT reticule tilt as seen when sighting on targets near Detent Positions 1 or 3.

7. SYSTEMS TESTS

- a. Added Earthrate torquing between pip data display and start of vertical drift test. Time to start vertical drift test after pip test no longer critical.
- b. Shortened positioning select routines for drift and pip tests.
- c. Added section to Gyro Scale Factor tests to check the size of the entry made by the operator. Reload requested if illegal entry made. Gyros also released if test ended in alarm.
- d. Semi-automatic mode test CDU accuracy test changed for 135° and 225° sections by returning the MG to 0° before repeating accuracy test. Done to remove multiplication effect of Earth rate on the OG & IG. A delay was

MIT/IL
STG Memo No. 824
page 3

added in the IMU CDU Fail test to allow the fail bit to be set in Channel 30 before the program reads CH 30.

The extraneous 3 second delay was removed from the CDU Repeating Accuracy Tests. This delay was not needed and lead to additional earth rate induced errors.

The Radar Command Accuracy portion of the Semi-automatic Mode Test was not changed. A manual procedure for this test has been written by R. Gilbert AC/MIT. The Radar designate routines are not written to be used as this test attempts to use them while connected to a Resolver Circuit Tester in the Laboratories. The test will work with Radar if the designate signals are available to ACE.

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GLS:dfh
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