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COLOSSUS MEMO # 277

TO: Distribution
FROM: P. Rye
DATE: 14 July 1970
SUBJECT: Revisions 41 through 45 of ARTEMIS. Revision 45 was GOOD.

These revisions were made primarily to incorporate the Universal Pointing Routine (PCR 1051)*, the SATURN Backup Package (PCR 1050)*, and the Time of Longitude Program P29 (PCR 1054).

PCR 1051 was incorporated into Revisions 41 and 42; PCRs 1050 and 1054 were added in Revisions 43 through 45.

The following changes were made:

1. Universal Pointing (PCR 1051)
   a) Flagword assignments for Universal Pointing:
      UTFLAG (Bit 9 Flag 8), AZIMFLAG (Bit 8 Flag 11), R67FLAG (Bit 2 Flag 8) indicate respectively whether non-rendezvous tracking is chosen in P20, whether 3-axis or VECPOINT maneuvers are desired, and whether R67 (rotation option) is active.
   b) New erasables defined:
      UTSTARNO, R67TIME, OPTNTYPE , AZIMANGL, R63TIME, PLANVCUT, UTPIT, UTYAW.
   c) Changes were made in V37 logic to allow the Universal Pointing program to run in the background, to clear UTFLAG and R67FLAG in P00, and to establish state

*See COLOSSUS MEMO #265 for a detailed description of Universal Pointing, and COLOSSUS MEMO #248 for detailed description of the SATURN DAP backup package.

vector integration if non-rendezvous P20 is running in the foreground. INITSUB code was changed to bypass STOPRATE and resetting of the deadband if R67 is operating.

d) A new restart table entry, 1.13SPOT, was created for R67.

e) Extended verbs 76, 77, and 79 were deleted.

f) Coding was added to V54 and V57 to prevent the selection of the rendezvous marking routines (R23 or R21) if UTFLAG is set.

g) V56 was modified to terminate all tracking by clearing UTFLAG in addition to the existing flags.

h) Noun 78 was added to display yaw angle (R1), pitch angle (R2), and azimuth constraint (R3). The third component of Noun 79 was eliminated. Nouns 95 and 96 (desired CDU angles for preferred and +x axis respectively) were made into spares.

i) Restart logic in R60 was modified to handle non-rendezvous tracking.

j) R67 logic was incorporated into KALCMANU.

k) Coding was added in P21, P22, and P24 to set TRACKFLG. P52 and P54 also set TRACKFLG if P20 option 2 is selected.

l) Use of SAVEDCDU in R61 was deleted since it would interfere with 3-axis solutions.

m) P20 was modified to include the new tracking options.

n) R63 was modified to include various LOS and desired CDU computations according to the selected tracking option.

o) A check was inserted in R22 for RNDVZFLG to prevent R22 during P22 and P24.

p) P20 was changed to use R63TIME as temporary storage rather than P21TIME to avoid erasable conflict during P21.

q) V89 was changed to display Noun 78 (pitch and yaw). The option (via V04N06) to select preferred or +x angles was deleted.

r) R61 was modified to bypass the effect of PCR859 (R61 Rate Drive) for the case of 3-axis tracking.

s) A check for UTFLAG was added in AVEGEND so that the correct restart points will be reestablished for rendezvous or non-rendezvous tracking.

t) Coding was changed to allow P27 if P20 is in the foreground and UTFLAG is on. (See note on page 5)

2. Initialization of interpretive register S1 was added in the W-matrix zeroing loop in P22. (ART-2D-01)

3. The tag P41/DSP was moved to be associated with the correct interpretive instructions since it is referenced in interpretive. (ART-2D-02)

4. SATURN DAP Backup Package:

a) Flagword assignments for SATURN DAP:

ATERFLAG (Bit 7 Flag 7), NLIMFLAG (Bit 5 Flag 7), NOIMUFLG (Bit 10 Flag 11), SAT46FLG (Bit 4 Flag 0), RENITFLG (Bit 11 Flag 11), SATZROFG (Bit 9 Flag 11).

b) Erasable changes:

The following new pad loads were defined: RHCGAIN, S2S4BRT, ORBSATRT, TLISATRT, 1/DELMAX. SATRATE was redefined as a single precision pad load for stick gain.

Other new erasables: IGADOT, SATMODE, SATCYC, ATERX, ATERY, ATERZ, IGAINC, PCDUX, PCDUY, PCDUZ, CDUTEMP, MODETMP, AKT, STKX, STKY, STKZ, RATINDX.

Old erasables deleted: BOOSTEMP, BIASAK, SATSCALE.

c) Noun 04 was defined to display specified address(es) scaled at 180 degrees.

d) Alarm codes 301 (CDU transient during BOOST) and 302 (SATURN DAP not permitted at this time) were defined.

e) Gimbal lock detection code was altered to check for SATURN DAP operating and AVERAGE G on. If these two conditions exist, coarse align is bypassed.

f) Restart logic was incorporated to check SATZROFG to restart CDU glitch recovery if it was in progress.

g) STOPRATE and deadband restoration are bypassed in R00 if SATURN DAP is operating.

h) A new restart point in group 3, 3.17SPOT, was defined to protect ATERJOB. The obsolete 4.51SPOT was made into a spare.

i) Verb 46 coding was modified to accommodate the new SATURN DAP requirements.

j) The NEEDLER routine was modified to set NLIMFLAG and adjust AK's when saturation occurs, to disable SATURN takeover in coarse align, and to allow takeover via 'software cage' (Coarse align and ICDU zero).

k) A new entrance to IMU zeroing, IMUZEROB, was defined for use by glitch recovery routine.

l) P11 was modified to include the new DAP features.

m) A new log section, SATURN DAP, was created. It contains the main body of coding for the DAP package.

5. A tag SUPERRSM was appended in the RESUME coding. Interrupt routines which must restore the original superbank setting should exit via this branch.

6. A check on MODECADR was added in 1/PIPA so that 1/GYRO will not be called if the moding routines are in use. The MODECADR checks in V40, V41, and V42 were moved to be immediately before the moding calls (ACB 116).

7. P29 Time of Longitude (PCR 1054):

   a) New flagword assignments: NEWTFLAG (Bit 10 Flag 5), P29FLAG (Bit 1 Flag 0). Both are cleared in R00.

   b) New erasables defined: PASSTIME, LONGFOR, DELTLONG, FUDGE, MUSUBE, MUSUBC, MUSUBS, MUSUBN, P29BASET, P29 BASER, P29 BASEV.

   c) Coding for P29 was added to the GROUND TRACKING DETERMINATION Log section.

8. References to flagbits by bit names were changed to use the specific flag bit mnemonics References to "STATE" were changed to use appropriate flagword names. This makes usage of flags easier to reference and document. (ACB A-10)

9. One line of code was gained in Bank 31 by changing two lines (STORE, GOTO), to a STCALL instruction. (ACB A-6)

GSOP Changes:

Sections 2, 3, 4, and 5 will be affected by most of the above changes.

Note:

During options 1 and 5 of P20, the uplink activity light when P20 is in the mode lights, will indicate that an R60 maneuver is required. When P27 is in the mode lights, the uplink activity light will be on to indicate actual uplink.