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COLOSSUS Memo #60

To: Distribution  
From: M. Hamilton  
Date: 14 May 1968  
Subject: COLOSSUS Revisions 203, 204 and 205

Revision 205 was BAD.

Major Changes Incorporated into Revisions 203, 204 and 205

- 1) GOMANUR was changed to go directly to KALCMAN3 by means of a POSTJUMP instead of calling KALCMAN3 as a JOB. This saves a VAC area during R60. See no. 1 and 2 of contemplated changes.
- 2) A bug was fixed along with the no. 1 change above. KALCMAN3 was called with PRIO26, the same PRIORITY as R22. Now KALCMAN3 has the same PRIORITY as R60.
- 3) Changes were incorporated into INITVEL to eliminate the incompatibility between P34/P35 and P40/P41. (PCN #100)
- 4) The immediate return from GOMANUR was deleted in R60 to go along with change no. 1 above.
- 5) An INHINT was added to ENEMA since all users of ENEMA must be INHINTED.
- 6) DATACALL and USEPRET were deleted from SKIPPER in order to obtain enough FIXED-FIXED locations for LUMINARY.
- 7) POINTEX was conflicting with VVECT during P20. This conflict was resolved by moving POINTEX to share with RDESIRED.
- 8) S22INPUT, MKTIME and S22MARKS were deleted since they are not used.
- 9) LEMMASS and CSMASS were exchanged in erasables to go along with the DOWNLIST.

- 10) 3.5SPOT was zeroed in the RESTART TABLES since it is not used.
- 11) The terminate on the PRIOLARM in R52 was corrected to kill the MARK system and clean out MARK displays in case any were going. This will prevent the problem of the PRIORITY ALARM display going to GOTOPOOH with a MARK display still going instead of the NORMAL V37 display.
- 12) The INHINT was deleted from the start of MASSPROP.
- 13) The roll angle will now be determined by "heads up" in P63 (PCR 155).
- 14) S40.9, TIG -5 and TTG/0 were restarted in the RESTART TABLES with EBANK = to NVWORD1 which used to be in EBANK6. NVWORD1 was moved recently to unswitched erasable thus causing EBANK trouble in P40 restarts. This problem was fixed.
- 15) A fix was put in to bypass the MASS properties calculation when CONFIG = 0 in R03 since MASSPROP values would only be correct for values of 1, 2 or 6.
- 16) R22's restart point 2.7SPOT was corrected to set up a JOB at a PRIORITY of 10 instead of 26. Previously if a tracking program were selected via V37 during P20, R22 would never start up. The reason for this is the tracking programs are started up by a PRIORITY of 13 and R22 at a higher PRIORITY of 26 would check the TRACK flag (which would not be on yet) and go to ENDOFJOB.
- 17) A fix was put into P23 to leave zeroes in the MPACS for the basic logic which converts the TRUNION to 1's complement.
- 18) A bad PHASCHNG was corrected in the V97E part of P40. The PHASCHNG was a variable 04014 which would indicate to RESTARTS to restart a TASK. However the next instruction following this PHASCHNG was TCF ENDOFJOB.
- 19) CALCN85 and TIGNOW were called in P40 and P41 in the wrong EBANK. These errors were corrected.
- 20) The program description was added for P52LS.
- 21) An INHINT was added to TVCZAP -1 for users needing it in TVCZAP.
- 22) Several program descriptions were updated in P20.
- 23) When QUICTRIG was changed to be used not only by an RTB code but by basic routines, it was necessary to change all the TEMs to ITEMPs in order that interrupt users could use QUICTRIG. However, one TEM was left. This bug was corrected.
- 24) A correction was made to R61 to move the R60FLAG check and the 10 degree check above the check for AUTOMODE and the STIKFLAG.

- 25) Several new restart points were added for the new V97 response ENGFAIL logic in P40.
- 26) The V97 responses now turn into TASKS to prevent any interrupts from coming in after a PHASCHNG or other routines which do a RELINT.
- 27) A correction was made to a recent change in the UPDATE programs in the logic which decided on the type of UPDATE to be made. Previously a V73 was selected instead of V70 or V72 and vice versa.
- 28) RSUBM (the constant for the MOON RADIUS) which was off by a factor of 10 was corrected.
- 29) Changes went into P66 to ensure that a lift-vector-up roll altitude is assumed if the CMC computed drag level is below the .05 g level. (PCR 155).\*
- 30) The maneuver and S61.3 were deleted since the maneuver in P61 is no longer required (PCR 50).

#### Known Problems in Revision 205

- 1) N51 has not been hooked up to PINBALL for R05.
- 2) For some reason V83 is setting BIT2 of RASFLAG. First of all BIT2 is not checked by anyone and secondly V83 shouldn't be touching RASFLAG since extended verbs are not restartable.
- 3) INITVEL has been rearranged to allow for different COLOSSUS user entrances. However these changes cause LUMINARY problems in INITVEL.
- 4) Some changes have been implemented by using EBANK definitions such as EBANK = END-E7. This is thought to be dangerous especially in view of the fact that erasables will still be moved around considerably. The EBANK for a section of coding should be set to a variable in the coding that is known to be permanent.
- 5) RM should be moved to follow MARKDOWN for DOWNLINK requirements.
- 6) The vector AXIS is not needed in COLOSSUS and can be deleted along with the coding in Servicer which initializes this vector.

\*Unfortunately PCR 155 is not officially approved by MIT.

- 7) SERVICER is now checking CMOONFLG to determine the contents of MU. Since CMOONFLG is set or reset only in permanent integration this check is invalid. The MU value could be set after MIDTOAV1 when the sphere is known from IX2.
- 8) If the state vectors are uplinked more than 4 time steps in the future, permanent integration will not do anything until the state vectors are within 4 time steps.
- 9) THETA (1) is illegally sharing with RONE in V82.
- 10) RTEVGAM, PBIAS and YBIAS (10 words) are now in fixed memory but the GSOP specifies them as erasables.
- 11) MDOT is an erasable in the AGC but specified as fixed in the GSOP.
- 12) TLS which is never used is using up 2 unshared erasables.
- 13) PINBALL does not wake up displays sleeping due to astronaut use on any loads. Either a change should be made to PINBALL or ASTRONAUT decks will have to be changed.
- 14) If a restart occurs during the maneuver in V49, an IMU ZERO will take place since the IMUSE bit is off. The vehicle could be turning at a high maneuver rate and the DAP would not be controlling it for 13 secs.
- 15) UNITW should be 4 pad loaded erasables, not 6. The coding would need to be changed to go along with this saving of erasables.
- 16) BVECTOR is illegally sharing with DELVTPI and DELVTPF.
- 17) DOWNRUPTS are lost frequently during burns.
- 18) The VHF mark counter should be set in R32 for COLOSSUS only.
- 19) There could be 3 DELAYJOBS going on during P34 with P20 in the background. If V82 were selected at this time an ABORT would result since only 3 DELAYJOBS are allowed at a time and V82 has 1 DELAYJOB. The number of DELAYLOCS should be increased by one.
- 20) The PROCEED on the V16N45 display in P35 does not recompute a new TIG. This coding does not conform to the GSOP.
- 21) Several obsolete flag bits are in COLOSSUS. These should be deleted.
- 22) The new FLAGWRDS should be initialized in FRESH START.
- 23) The terminate on the V51 display in SXTMARK now goes to GOTOPOOH. This leaves extended verbs locked out, MARKSTAT set, etc.
- 24) The two verb lights appear on the DSKY during UPLINK when all displays should be locked out.

- 25) The polynomial fit for T(X) in TFF should be changed to include a wider hyperbolic range.
- 26) If a restart takes place 8 secs after coming out of STANDBY the restart logic will detect the AGC warning light and cause a FRESH START. This logic should be deleted since there is another way of getting a FRESH START (push ERROR RESET and MARK REJECT) if it is needed.
- 27) V46 for a non SATURN DAP should clear Bit 9 of Channel 12 to prevent garbage from going into the SATURN error counters.
- 28) The state of all moon flags after a FRESH START in the MOON vicinity should be looked into. Presently they are reset to indicate earth.
- 29) S11.1 has not been written for a Lunar environment. It has scaling problems now that P47 is using it.

#### Potential Problems

- 1) P22-P23 erasables should not share with CONICS.
- 2) Some of the erasables under the heading RENDEZVOUS GUIDANCE used by the P30s are conflicting with those in R22. It has been assumed that those erasables in the P3Xs are protected by turning off the UPDATFLG in P3X which prevents R22 updates. However, some of the erasables in P3Xs section need protection after the UPDATFLG is back on again.
- 3) Some concern exists over the assumed "safeness" of the present setup of R61 and R52 erasable overlays used during RENDEZVOUS.
- 4) If P20 is selected and the VHFRFLAG is set by V87 to turn on VHF marking it is now necessary to wait for the first mark in P20 (1 min) before selecting a new V37 program since R22 will reset the VHFRFLAG if no marks have been taken.
- 5) The target ID is not being displayed in R1 during marking in P03 (STL Run).
- 6) N92 has the wrong values for shaft and sextant angles during gyro compassing (STL Run).
- 7) During optical verification of gyro compassing, MARK REJECT does not go back to V51 display (STL Run).
- 8) Most V34 responses on displays in P03 hang up with the DSKY blank and P03 in the mode register when V34 should end up at P02 (STL Run).

### Contemplated Changes for Future Revisions

- 1) Change Display routines to call JOBS for GODSPR and GOMARKR as NOVACS instead of FINDVACS. This will save an additional VAC area during R60.
- 2) Get rid of GOMANUR and have R60 BANKCALL to KALCMAN3 directly. This would also require some changes in KALCMAN3.
- 3) Some program changes will be made to P20 in order to make the last 54 registers of the W MATRIX available during RENDEZVOUS. These 54 registers will only be needed during P22. This change will help solve especially the problem of finding room for illegal erasable overlays during P20.
- 4) RASFLAG will be set equal to FLGWRD10. The coding in GOPROG3 will have to be changed to conform to this change since other bits in RASFLAG will now be used for non-integration bits. If ERASTALL is ever used in the future RASFLAG can be unhooked from the flagword.
- 5) ROLLDAP will be changed into a TASK and its INTERPRETIVE calculations will be tied to CLOCKJOB to prevent 1 CORE SET during CLOCKJOB.

### Statistical Summary for COLOSSUS 204

1) Number of modification changes	34
2) Number of cards	1640
3) Total fixed memory changes	+3

### Versions of COLOSSUS

<u>Rev.</u>	<u>Version</u>	<u>Testing Area</u>
202	HUGHEXEC	Executive
200	BURNCOL	P40s
196	RWSCOL	DAP
186	MOLASSES	P40s
186	ZEOSSUS	Lambert
168	JALOSSUS	DAP
190	MARRIAGE	Erasables