

Massachusetts Institute of Technology
Charles Stark Draper Laboratory
Cambridge, Massachusetts

COLOSSUS MEMO # 244

TO: Distribution
FROM: P. Rye
DATE: 10 February, 1970
SUBJECT: Contents of ARTEMIS through Revision 19.

Revision 19 of ARTEMIS was GOOD and should be equivalent in performance to Revision 67 of COMANCHE (COLOSSUS 2C).

Major changes incorporated through ARTEMIS Rev. 19:

1. P40-P47 log section was reorganized and modified to save coding and to improve impulsive burn and mass update logic. (ACB 50, 67, PCR 877, 878)

These changes produced the following savings in erasable registers (3 unshared and 2 shared):

- a) EK1VAL (DP), EK2VAL (DP), EK3VAL (SP), FANG (DP) were replaced by EIMP1SEC (SP), EFIMPO1 (SP), EFIMP16 (SP).
- b) CSMMASS was changed from (SP) Single Precision to (DP) Double Precision.
- c) MASSTMP and VCNTRTMP were deleted.

New impulsive burn logic (burn time < 6 secs) was incorporated into S40.13 (see COLOSSUS Memo 189).

Old CSMMASS update logic was deleted from P40, V37, TVCINIT, TVC RESTARTS, and TVCEXEC.

2. All uses of TPAGREE preceded by zeroing of MPAC+2 were replaced by DPAGREE. (ACB 52)
3. PINBALL was reorganized and modified to save coding. (ACB 57, ACB 66)

4. New entrances, VNFLASH and VNFLASHR, were added in Display Interface Routines which return to user's Q on PRO, to redisplay on V32E, and to GOTOPOOH on V34E. (ACB 54, PCR 880)
5. P20 and Measurement Incorporation were reorganized and modified to save coding. (ACB 56, ACB 71, PCR 891)
6. The following code-saving features were incorporated into the Display Interface Routines: (ACB 55)
 - a.) Flag-changing routines UPENT2 and DOWNENT2 were changed to be specific for FLAGWRD4 rather than for any flagword.
 - b.) Unnecessary INHINTS were deleted.
 - c.) PURRS4 was placed in line.
7. Delete GOMANUR - only one user so a direct call and return are possible - saves 3 unswitched erasables and 18 lines in Bank 7. (ACB 62)
8. OPTSTALL and RADSTALL were deleted and IMUSTALL was modified and simplified. (ACB 63)
9. The erasable RADCADR should be deleted in a future revision since it is obsoleted by ACB 63.
10. The routine ERASTAL, which was written as a general purpose routine, was deleted; only the coding specific to INTSTALL remains. The flag bit REINTFLG was changed from Bit 7 Flagword 10 to Bit 13 Flagword 10. (ACB 60, PCR 910)
11. Coding which reset SWTOVER flag in TVC Initialization was deleted since this is done in V37. (ACB 58)
12. Various GENADR's were redefined as equivalent to existing TC instructions. (ACB 61)
13. CCSHOLE abort was deleted; various CCSHOLE exits in CCS coding were filled in with constants. (ACB 61, PCR 1018)

14. Many equivalent constants were redefined by equals. (ACB 68)
15. Many often used verb-nouns were redefined in fixed-fixed. Seldom used verb-nouns were removed from fixed-fixed and redefined in switched banks. (ACB 59)
16. References to the erasable R1SAVE in the Display Interface Routines were obsolete and were deleted, as was the erasable itself and the initialization of it in Fresh Start. (ACB 74)
17. Duplicate coding in R30 and R36 was eliminated by making sub-routines for vehicle option and time selection. Coding in R30 was optimized. Also an erasable OPTIONEV was defined which is contiguous to OPTIONX. OPTIONX was moved to share with DSPTEMX + 1 instead of DSPTEMX. A new erasable VEHRET was defined for return storage. The erasables OPTION82 and OPTIONY are no longer used and were deleted, as was the unused erasable STATEXIT. (ACB 69)
18. R36 was moved from Banks 40, 41, and 42 into Bank 24.
19. A one-line change was made in P03 for code-saving purposes. (ACB 70)
20. Coding was reduced in T4RUPT by counting down from 5 instead of 7 since the T4JUMP table was identical for passes 0-3 and 4-7. (ACB 73)
21. Tests on COMPUTER flag and code exclusively used for LM cases were deleted. (ACB72, PCR 1018)
22. Reference in P11 to MBDYTCTL+2 (value = 0) was changed to use ZERO so that MBDYTCTL could be moved to another bank. (ACB 76)
23. NEWZCOMP subroutine was moved from Bank 14 to Bank 31.
24. Five words in P32 were moved from Bank 14 to Bank 04.
25. Saving of LOC and BANKSET in alarm cases was deleted since these are made available by VAC5STOR. The erasables LOCALARM and

BANKALM were deleted. (ACB 77)

26. Zeroing of RATEINDX and TRKMKCNT was deleted from Fresh Start coding since these are initialized before being used by the DAP and P20 respectively. (ACB 77)
27. Obsolete code in Fresh Start which left Bit 14 of EXTVBACT unchanged was deleted. (ACB 77)
28. A line was saved by rounding down at the beginning of 1/PIPA1 loop instead of subtracting at the end of the loop. (ACB 77)
29. Storing of DELVEET3 in DELVSIN in P38 and in P34 was deleted since the identical erasable location is used for both. (ACB 77)
30. Coding was compacted in the INTERPRETER by reversing the order of a consecutive divide and multiply. (ACB 77)
31. "TCF Q+2" was substituted for "INDEX Q, TC 2" in the EXECUTIVE. (ACB 77)
2. POODOO exit on zero or negative ΔT was included in VARDELAY and FIXDELAY. (ACB 78)
33. Code-saving changes were made in Planetary Inertial Orientation, Conic Subroutines, and Powered Flight Subroutines. (ACB 77)
34. The subroutine entrance MIDGIM and the test of AVFLAG in MIDGIM were deleted since all callers of MIDGIM set AVFLAG. Calls to MIDGIM were changed to go directly to GET.LVC and settings of AVFLAG by callers were deleted. Also the setting and clearing of MGLVFLAG by GET.LVC and GET+MGA were deleted, as was the flagbit itself. (ACB 80, PCR 946, PCR 1018)
35. Several new subroutine entrances were created for users entering with identical parameters: 1SECDLAY for DELAYJOB of 1 sec., NOVAC30 for NOVAC call with PRI030, TWIDBIT1 for TWIDDLE of 1 sec., and FINVAC 20 for FINDVAC call with PRI020. User's coding was changed accordingly. (ACB 64)

36. WAITLIST calls were changed to TWIDDLE's where applicable.
(ACB 64)
37. Use of Bit 9 of OPTMODES was eliminated by making optics mode switching not touch OPTIND. Use of OPTIND by OPTDRIVE is not necessary since OPTDRIVE looks at mode switch. (ACB 81, PCR 947)
38. T4RUPT coding was optimized by changing various subroutines to in-line coding. (ACB 82)
39. Coding was reduced in P30 by eliminating the subroutine CNTNUP30. (ACB 84)
40. P52 was moved from Bank 15 to Bank 14. The star tables were moved from Bank 14 to Bank 15.
41. Coding was changed in several places to use "TCF REQ" in place of "RELINT, TC Q", to use "TCF Q + 1" in place of "INCR Q, TC Q", and to use a new routine, INCRQCK, to increment Q on the basis of accumulator contents. (ACB 83)
42. P23 coding was reorganized so as to save 42 lines. Resetting of TARG2FLG and R57FLG was moved from P23 to the INITSUB logic done in V37 and GOTOPOOH. SAVECFLG is no longer used by P23 and should be deleted in a future revision. (ACB 85, PCR 948, PCR 938)
43. Various changes were made in the Extended Verbs section (ACB 86):
 - a) Coding of V54 and V57 was changed so that the decision as to R23 or R21 marking is made at a different point.
 - b) The check for Noun 20 in V40 was eliminated - IMUZERO is done when V40 is selected regardless of the noun. Coding for noun check in V41 was placed in-line. (PCR 1019)
 - c) EXDAPOFF subroutine was placed in-line in V92.
 - d) Several branches in V46 were placed in-line; DAPFIG, SATSTKON,

RCS DAPUP, and PRESWTCH were moved out of other log sections and into line in V46 code.

e) V66 and V47 were moved to the same bank to save bank switching calls. Basic call to INTWAKE was changed to interpretive call to INTWAKE0.

f) Routines DOWNX and UPX were created for extended verbs which reset or set flag bits and exit via GOPIN.

44. Further code reduction was accomplished in P51-P53 by making duplicate code into a subroutine and by moving the routine PLANET from Bank 16 to Bank 14. (ACB 87)

45. Creation of two new subroutines COMSETUP and PRAMSET resulted in a saving of 13 lines in the conic subroutines. (ACB75)

46. The subroutines E6SETTER and E7SETTER were moved into fixed-fixed so that users other than P40 can use them. New users include R60, P30, P50's, P60's, Entry DAP, Extended Verbs, IMU Calibration, P11, V37. (ACB 89)

47. Special STARTSIM code in Fresh Start which existed for bench test purposes was deleted. (ACB 88)

48. The Alarm routine CURTAINS was deleted. (ACB 92, PCR 1018)

49. Code reduction was effected by (a) utilizing existing exit in SERVICER and (b) moving the table of constants FREETAU in RCS DAP logic to avoid branch around the table. (ACB 94)

50. BADEND and GOODEND checking in ENDIMU coding was compacted. (ACB 93)

51. The Restart Tables were updated. (ACB 95)

52. The subroutine SUPERSW was deleted since there were only two users. Coding was placed in line. (ACB A1)

53. The subroutines EARTIMX and EARTHIL in the ~~Planetary Initial~~ Orientation routines were combined since they are always called in sequence. (ACB 96).
54. Program descriptions were updated to reflect all ~~changes~~ as they were implemented.

The following changes were implemented in Revisions 1 and 2 of ARTEMIS and were reported in COLOSSUS Memos #205 and #215. They are repeated here for convenience:

55. Log section P51-P53 was optimized. (ACB 45)
56. Various unused constants and routines were deleted. Location of some constants was rearranged. (ACB 46, ACB 65, ~~ACB 71~~, ACB 79)
57. SXTMARK was redesigned and coding of SXTMARK users was ~~modified~~. (ACB 47, ACB 51, PCR 875)
58. P22 was optimized. (ACB 49, PCR 879)
59. P30-P31 coding was compacted. (ACB 48)

The following ACB's were implemented in ARTEMIS Rev 1-19:
45 through 89, 92 through 96.

The following PCR's were implemented in ARTEMIS Rev 1 - 19:
875, 877, 878, 879, 880, 891, 910, 938*, 946,
947, 948**, 1018**, 1019.

*PCR 938 is now obsolete by PCR 974.

**PCR 948 and PCR 1018 are not completely implemented in that definitions of SAVECFLG and COMPUTER have not been deleted from the Erasable log section.