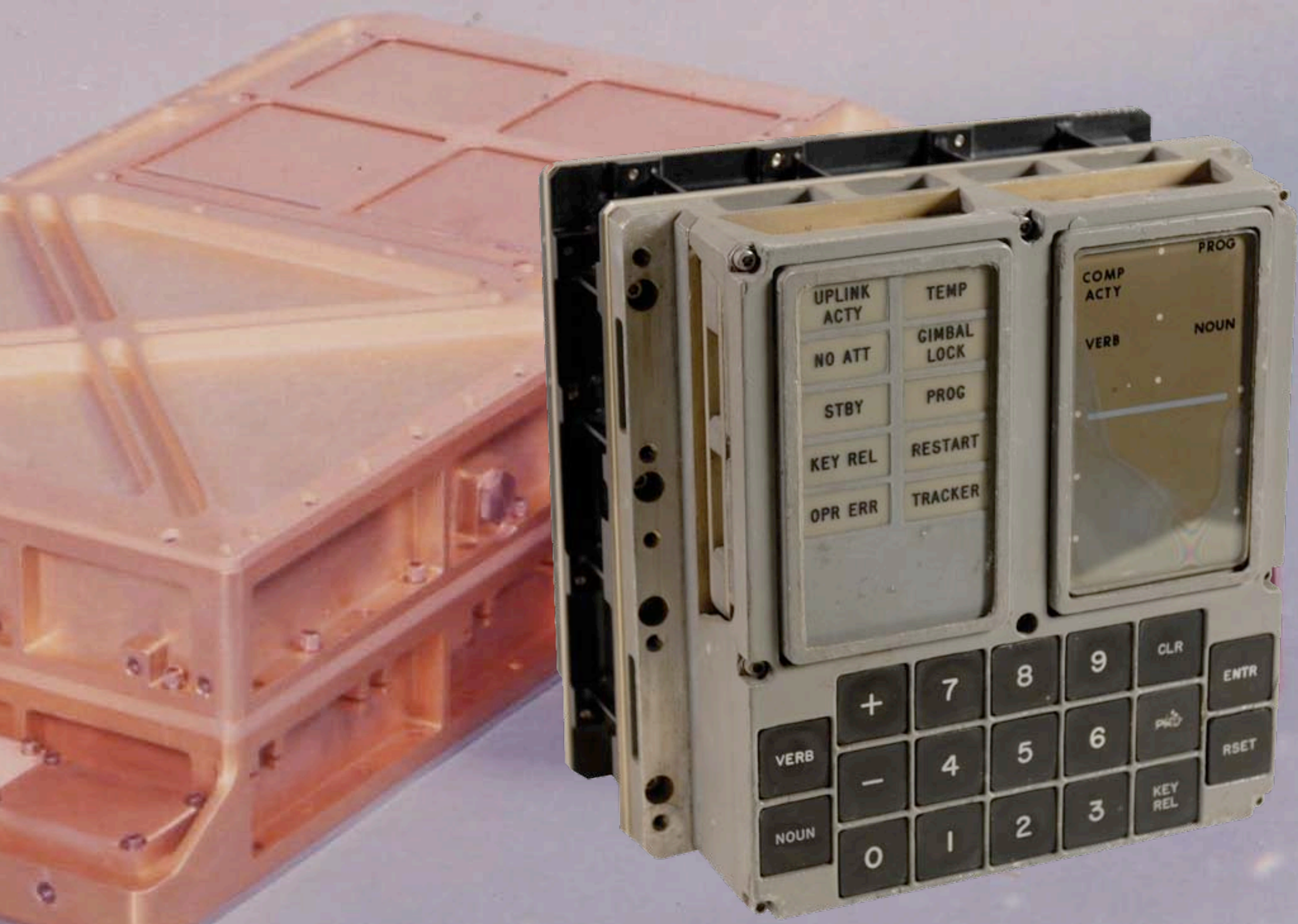
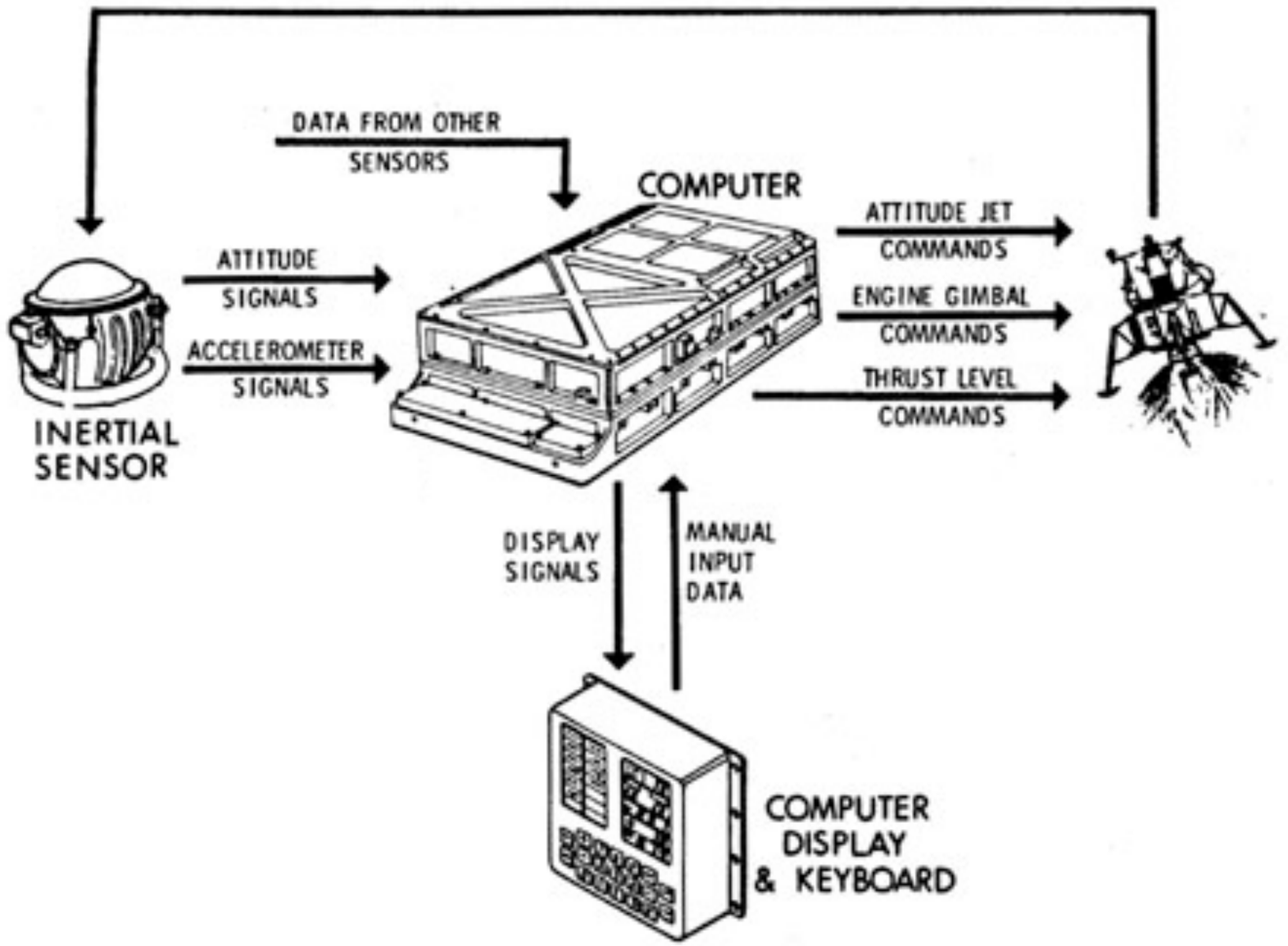
Apollo

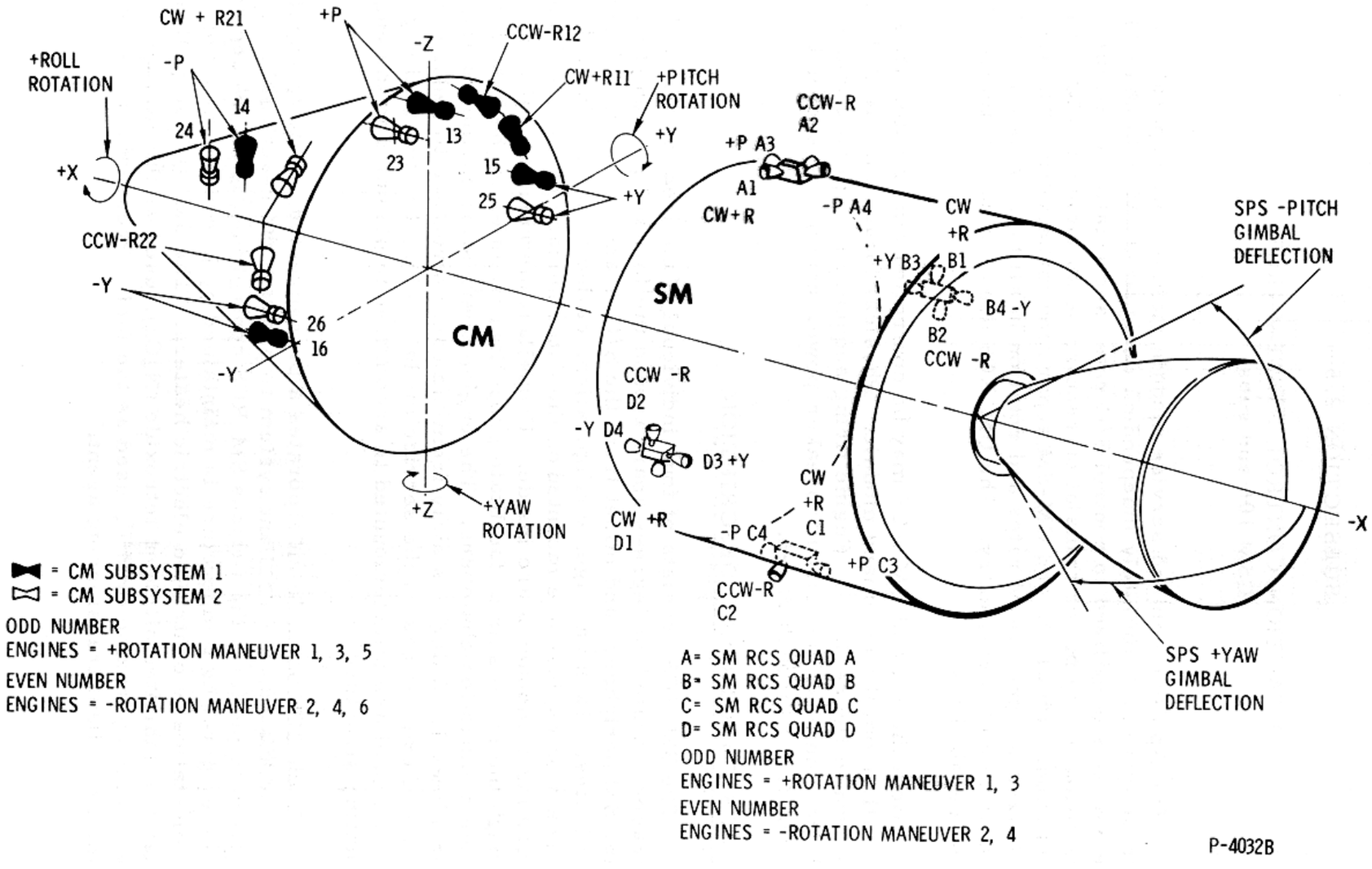
Modellierung und Simulation eines Raumschiffs


UPLINK ACTY
TEMP
NO ATT
GIMBAL LOCK
STBY
PROG
KEY REL
RESTART
OPR ERR
TRACKER
COMP ACTY
PROG
VERB
NOUN
CLR
ENTR
RSET
KEY REL
VERB
NOUN
+
7
8
9
4
5
6
−
0
1
2
3

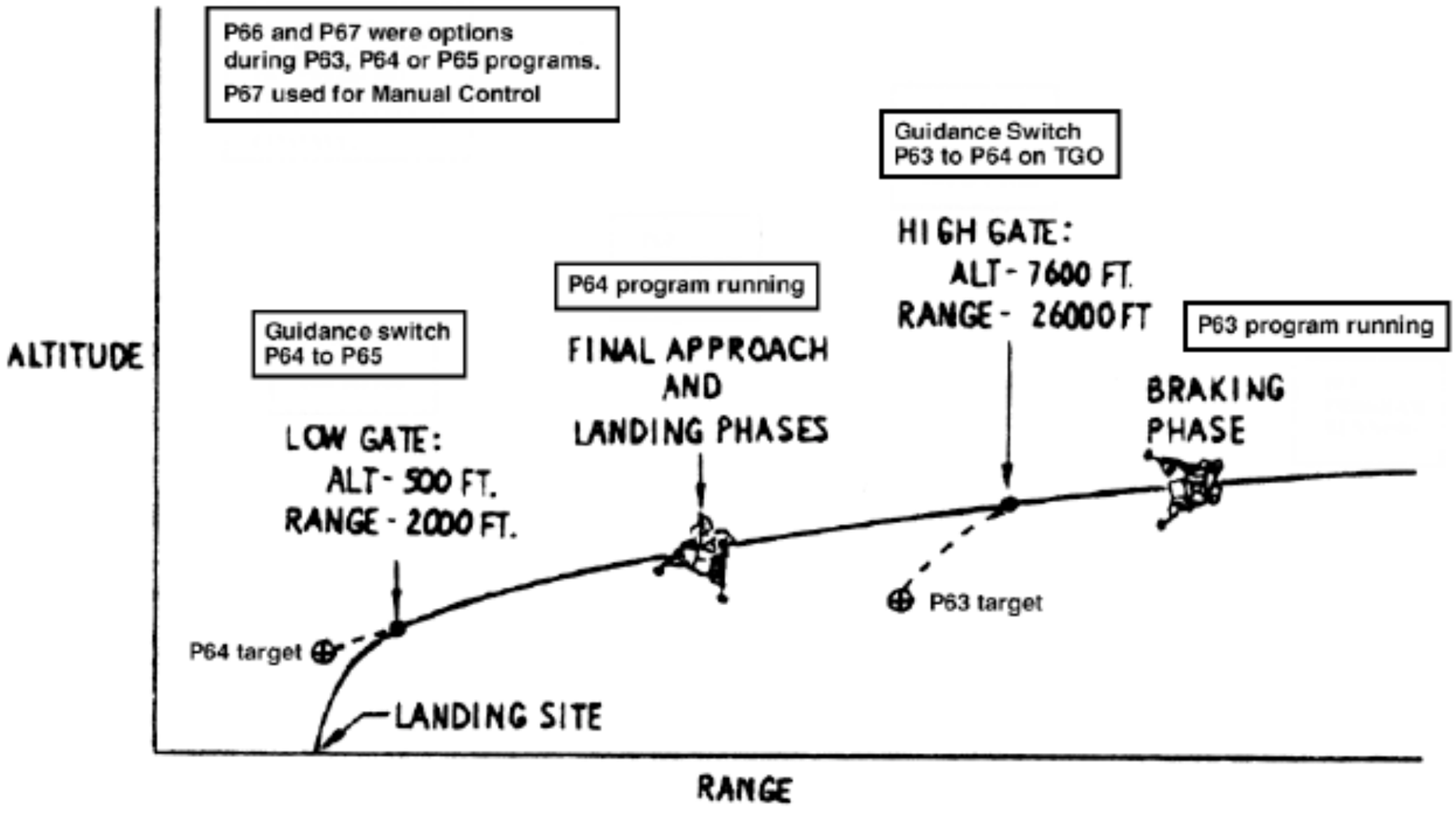
Apollo Guidance Systems

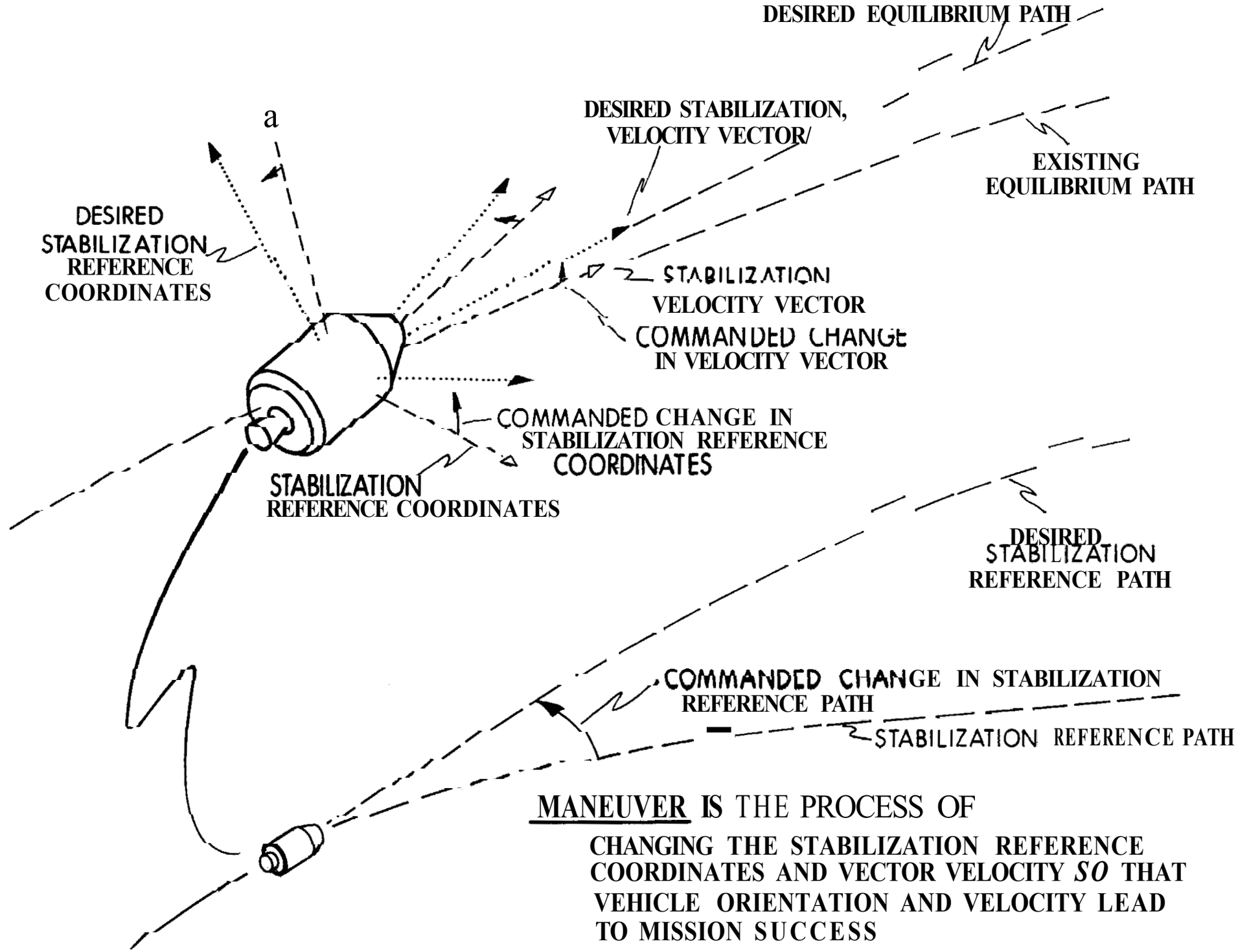


Modellerstellung



Flugphasen


P66 and P67 were options during P63, P64 or P65 programs.
P67 used for Manual Control
Guidance Switch P63 to P64 on TGO
HIGH GATE:
ALT - 7600 FT.
RANGE - 26000 FT
P64 program running
Guidance switch P64 to P65
FINAL APPROACH AND LANDING PHASES
P63 program running
BRAKING PHASE
LOW GATE:
ALT - 500 FT.
RANGE - 2000 FT.
P63 target
P64 target
LANDING SITE
ALTITUDE
RANGE



MANEUVER IS THE PROCESS OF

CHANGING THE STABILIZATION REFERENCE COORDINATES AND VECTOR VELOCITY *SO* THAT VEHICLE ORIENTATION AND VELOCITY LEAD TO MISSION SUCCESS

L INTERPRETER USER'S PAGE NO. 22 E0 S3

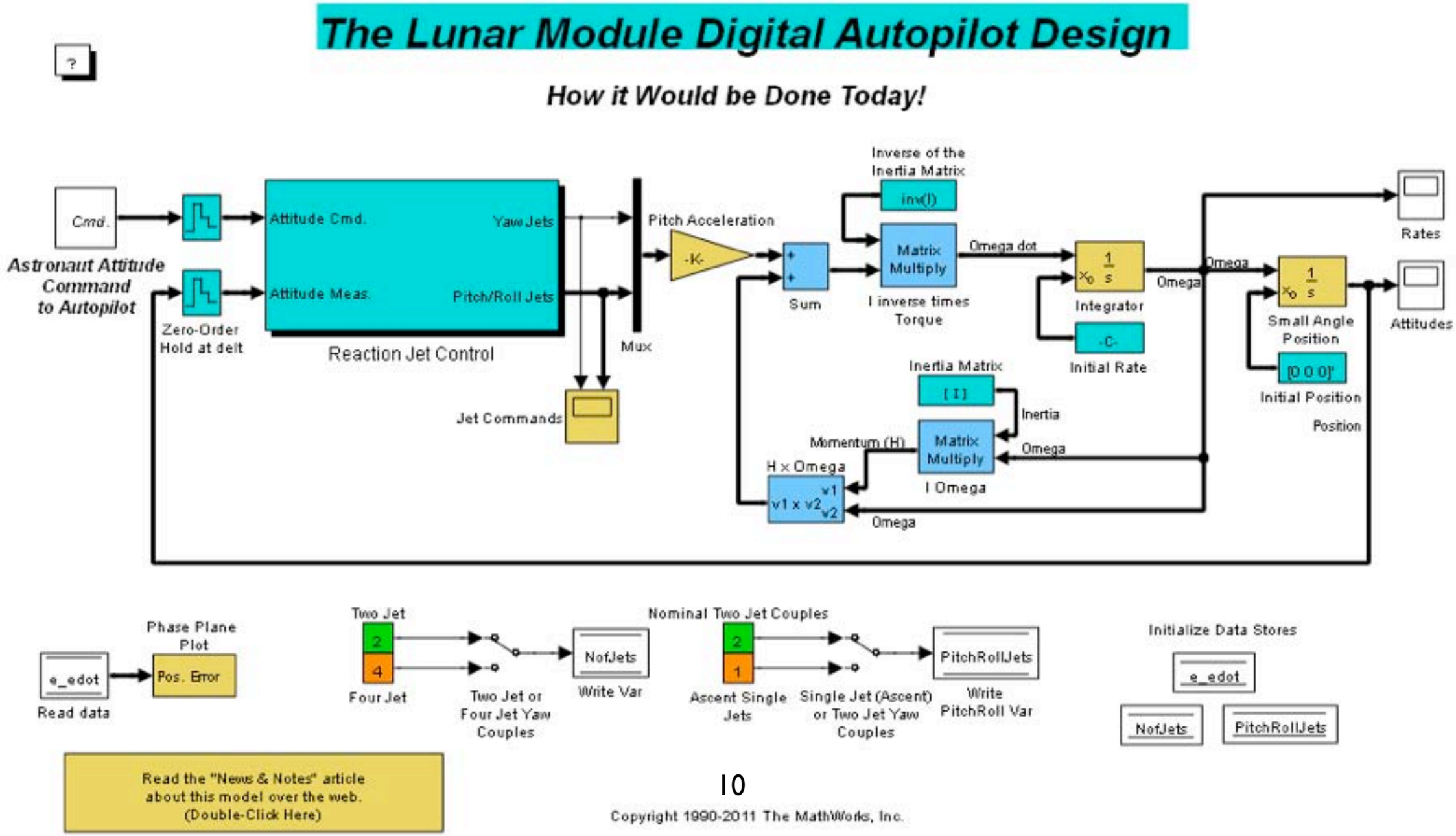
P0495 SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

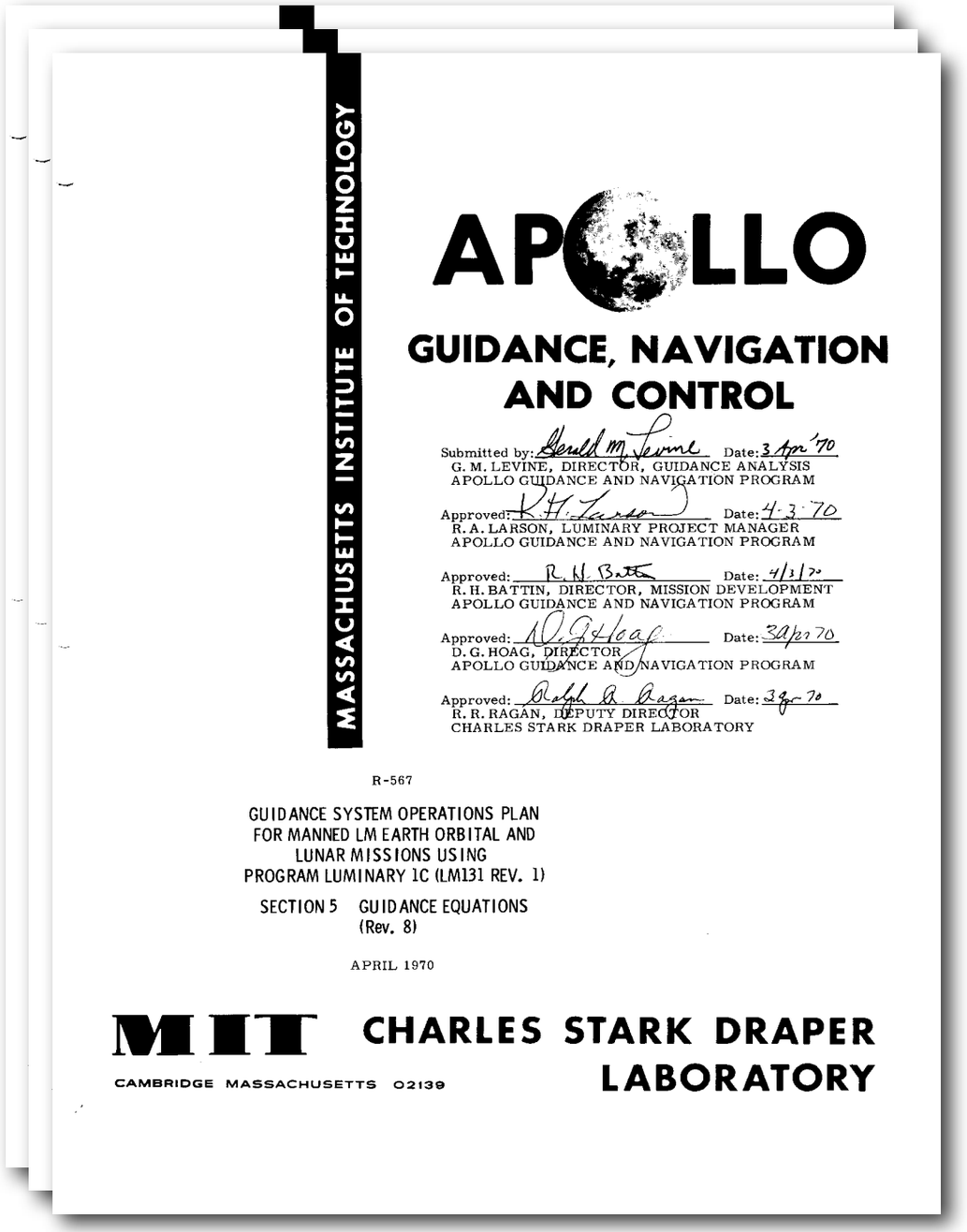
R0496 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498 1. GOTO GO TO.
R0499 2. CALL CALL SUBROUTINE SETTING QPRET.
R0500 3. CGOTO COMPUTED GO TO.
R0501 4. CCALL COMPUTED CALL.
R0502 7. BPL BRANCH IF MPAC POSITIVE OR ZERO.
R0503 8. BZE BRANCH IF MPAC ZERO.
R0504 9. BMN BRANCH IF MPAC NEGATIVE NON-ZERO.

```
 0505  REF  20  LAST 1021     6626  24 164 1  CCALL   INCR   LOC       MAINTAIN LOC FOR QPRET COMPUTATION.
 0506  REF  21  LAST 1023     6627  50 164 1          INDEX  LOC
 0507                        6630  3 0000 1           CAF    0         GET BASE ADDRESS OF CADR LIST.
 0508  REF  39  LAST 1021     6631  50 116 1          INDEX  ADDRWD
 0509                        6632  6 0000 1           AD     0         ADD INCREMENT.
 0510  REF  16  LAST 1014     6633  54 004 1          TS     FBANK     SELECT DESIRED CADR.
 0511  REF  17  LAST 1006     6634  7 5012 0          MASK   LOW10
 0512  REF 323  LAST 1016     6635  50 000 1          INDEX  A
 0513                        6636  3 2000 0           CAF    10000
 0514  REF   7  LAST 1009     6637  54 117 1          TS     POLISH

 0515  REF   5  LAST 1014     6640  3 0165 0  CALL    CA     BANKSET   FOR ANY OF THE CALL OPTIONS. MAKE UP THE
 0516  REF   2  LAST 1010     6641  7 4350 1          MASK   BANKMASK  ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0517  REF   3  LAST 1023     6642  6 4350 0          AD     BANKMASK  CODE AND LEAVE IT IN QPRET.  NOTE THAT
 0518  REF  22  LAST 1023     6643  6 0164 1          AD     LOC       BANKMASK = -(2000 - 1).
 0519  REF  44  LAST 1016     6644  50 120 1          INDEX  FIXLOC
 0520  REF  10  LAST  939     6645  54 052 1          TS     QPRET

 0521  REF   8  LAST 1023     6646  3 0117 0  GOTO    CA     POLISH    BASIC BRANCHING SEQUENCE.
 0522  REF   3  LAST 1006     6647  7 7742 0   +1     MASK   HIGH4
 0523                        6650  0 0006 1           EXTEND
 0524  REF   1                6651  1 6662 1           BZF    GOTOERS   SEE IF ADDRESS POINTS TO FIXED OR ERAS.
 0525  REF   6  LAST 1023     6652  3 0165 0   +4      CA     BANKSET   SET EBANK PART OF BBANK. NEXT. SET UP
 0526  REF  27  LAST 1003     6653  54 006 0           TS     BBANK     FBANK. THE COMBINATION IS PICKED UP &
 0527  REF   9  LAST 1023     6654  3 0117 0           CA     POLISH    PUT INTO BANKSET AT INTPRET +2.
 0528  REF  17  LAST 1023     6655  54 004 1           TS     FBANK
 0529  REF  18  LAST 1023     6656  7 5012 0           MASK   LOW10
 0530  REF   2  LAST 1006     6657  6 4741 1           AD     2K
 0531  REF  23  LAST 1023     6660  54 164 0           TS     LOC
 0532  REF 223  LAST 1002     6661  1 6042 0           TCF    INTPRET +3

 0533                    E3,1400                      EBANK= 1400      SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

 0534  REF  10  LAST 1023     6662  3 0117 0  GOTOERS CA     POLISH    THE GIVEN ADDRESS IS IN ERASABLE - SEE
 0535  REF   2  LAST 1005     6663  6 6251 1          AD     -ENDVAC   IF RELATIVE TO THE WORK AREA.
 0536  REF 324  LAST 1023     6664  10 000 0          CCS    A
 0537  REF  11  LAST 1023     6665  3 0117 0          CA     POLISH    GENERAL ERASABLE.
 0538  REF   1                6666  1 6675 1          TCF    GOTOGE
```

Simulink-Modell




MASSACHUSETTS INSTITUTE OF TECHNOLOGY
APOLLO
GUIDANCE, NAVIGATION AND CONTROL
Submitted by: Gerald M. Levine Date: 3 Apr '70
G. M. LEVINE, DIRECTOR, GUIDANCE ANALYSIS
APOLLO GUIDANCE AND NAVIGATION PROGRAM
Approved: R. H. Larson Date: 4-3-70
R. A. LARSON, LUMINARY PROJECT MANAGER
APOLLO GUIDANCE AND NAVIGATION PROGRAM
Approved: R. H. Battin Date: 4/3/70
R. H. BATTIN, DIRECTOR, MISSION DEVELOPMENT
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Approved: D. G. Hoag Date: 3 Apr 70
D. G. HOAG, DIRECTOR
APOLLO GUIDANCE AND NAVIGATION PROGRAM
Approved: Ralph R. Ragan Date: 3 Apr 70
R. R. RAGAN, DEPUTY DIRECTOR
CHARLES STARK DRAPER LABORATORY
R-567
GUIDANCE SYSTEM OPERATIONS PLAN
FOR MANNED LM EARTH ORBITAL AND
LUNAR MISSIONS USING
PROGRAM LUMINARY 1C (LM131 REV. 1)
SECTION 5 GUIDANCE EQUATIONS
(Rev. 8)
APRIL 1970
MIT CHARLES STARK DRAPER LABORATORY
CAMBRIDGE MASSACHUSETTS 02139


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mit Übungen und Lösungen
3. Auflage
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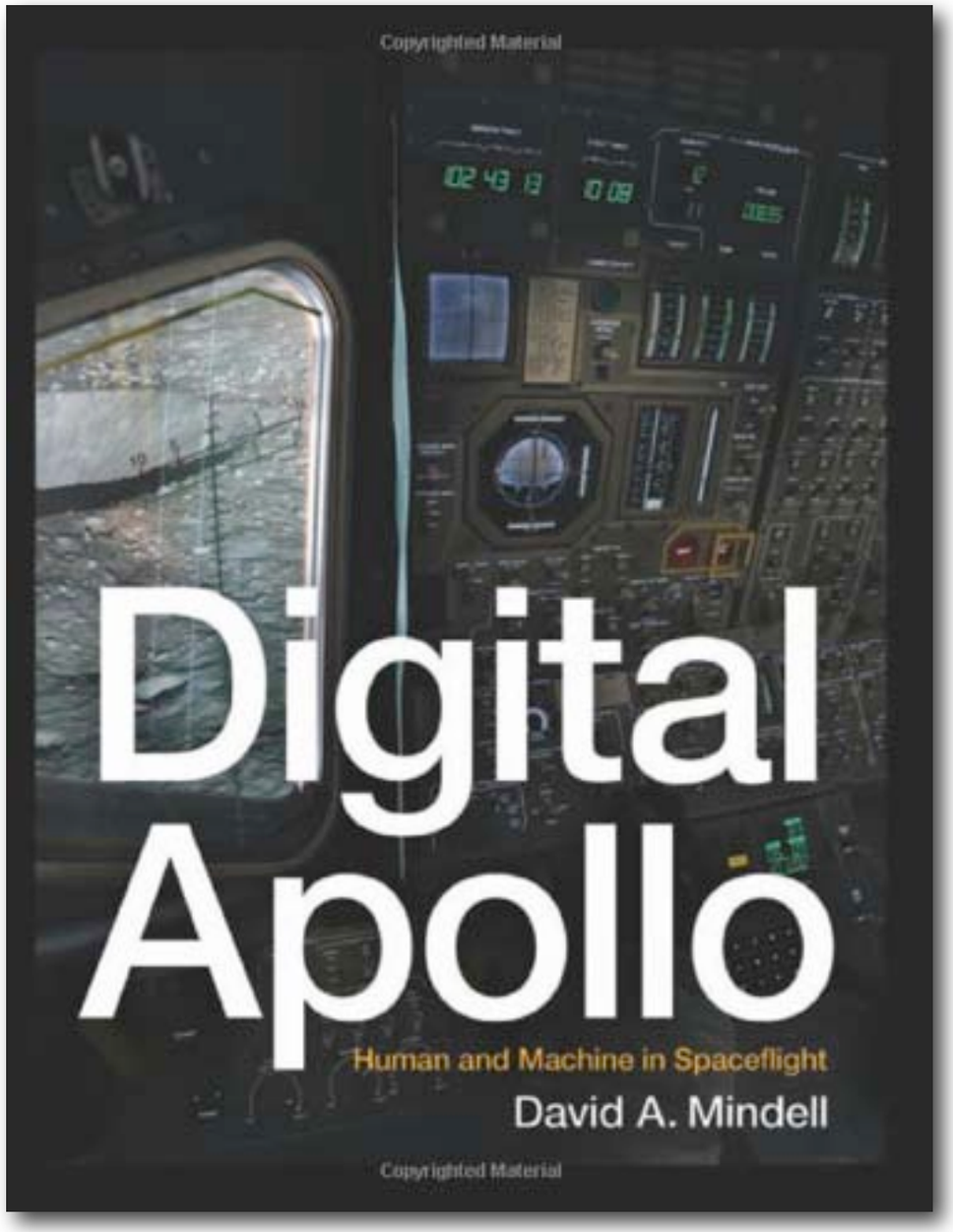
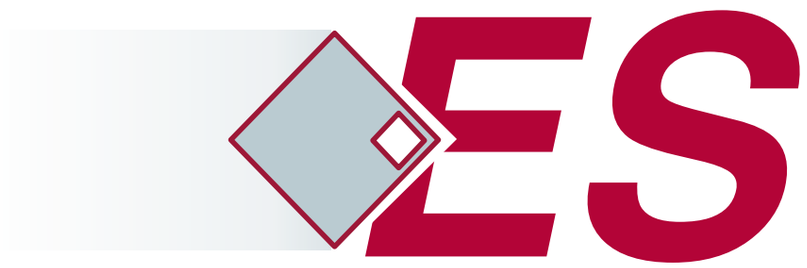


David A. Mindell

20. bis 24. Mai in Ulm



Institut für eingebettete Systeme
Echtzeitsysteme Universität Ulm

Prof. Dr.-Ing. Frank Slomka
www.uni-ulm.de/in/esys

Donnerstag, 18. April
16 Uhr
O27/312