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MCR-70-425

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GSDRP

DEVELOPMENT OF A TEST AND FLIGHT ENGINEERING ORIENTED LANGUAGE

CIRCULATION COPY

PHASE III PRESENTATION

MAY 18 1971

W. F. Kamsler
C. W. Case
E. L. Kinney
J. Gyure

JOHN F. KENNEDY SPACE CENTER

Martin Marietta Corporation
Denver Division
P. O. Box 179
Denver, Colorado 80201

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16. Abstract

This booklet contains the material used during the oral presentation to describe the work done in Phase III of the development of a Test and Flight Engineer Oriented Computer language.

Based on an analysis of previously developed test oriented languages (Phase I) and a study of test language requirements (Phase II) a high order language has been designed to enable test and flight engineers to checkout and operate the proposed Space Shuttle and other NASA vehicles and experiments.

The language is called ALOFT:

A Language Oriented to Flight Engineering and Testing

The report describes the language, compares its terminology to similar terms in other test languages, and discusses its features and utilization.

The Phase III report is published as Martin Marietta document MCR-70-424.

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Test Oriented Language Space Shuttle Computer Controlled Test Equipment ALOFT	

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MARTIN MARIETTA
DENVER DIVISION

DEVELOPMENT OF A TEST AND FLIGHT ENGINEER ORIENTED LANGUAGE

for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

KENNEDY SPACE CENTER, FLORIDA

CONTRACT NAS10-7308

PHASE III ORAL PRESENTATION

17 DECEMBER 1970

MEMBERS OF THE STUDY TEAM

MARTIN MARIETTA
DENVER DIVISION

WILLIAM F. KAMSLER - PROGRAM MANAGER

C. WILLIAM CASE

J. GYURE

EDMUND L. KINNEY

STUDY PHASES

MARTIN MARIETTA
DENVER DIVISION

PHASE I

REVIEW THE PAST AND CURRENT DEVELOPMENT EFFORT RELATED TO SPACE VEHICLE AUTOMATIC CHECKOUT LANGUAGE

PHASE II

DEVELOP THE NEEDED CHARACTERISTICS FOR A SPACE SHUTTLE AND FLIGHT ENGINEER ORIENTED LANGUAGE

PHASE III

PRODUCE A LIST OF LANGUAGE REQUIREMENTS (A SPECIFICATION) FOR THE BASIC DESIGN OF THE LANGUAGE

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A LANGUAGE ORIENTED TO FLIGHT ENGINEERING AND TESTING

A L O F T

TEST ORIENTED CAPABILITIES FOR:

- TEST INITIATION
- APPLICATION OF STIMULUS
- MEASUREMENT OF OUTPUT
- COMPARISON OF RESULTS
- MAN/MACHINE INTERFACES
- RECORDS AND LOGS WITH TIME TAGS
- MONITORING
- CLOCK AND TIME CONTROLLED ACTIONS
- SYSTEM, SUBSYSTEM, AND UNIT TESTING

INDEPENDENCE WITH RESPECT TO TESTING EQUIPMENT VIA:

- DICTIONARY DATA BANKS
- COMMON CHARACTER SET
- FREE FORM WITH RESPECT TO INPUT MEDIA
- → NO INTERACTION WITH OPERATING SYSTEM
- TEST WRITER-CREATED SAFING FEATURES

FLEXIBILITY PROVIDED BY:

- FULL ARITHMETIC AND RELATIONAL OPERATOR SET
- THIRTY-TWO CHARACTER DATA NAMES
- ARRAY AND STRUCTURE CAPABILITY
- SIMPLE LOOP CAPABILITY
- SUBROUTINES
- INTEGER, FIXED POINT, BOOLEAN, TEST, BINARY, AND TIME DATA
- SIMPLE NUMERIC AND BOOLEAN ASSIGNMENT STATEMENTS
- UNCONDITIONAL AND SIMPLE CONDITIONAL TRANSFERS
- INTERRUPT INITIATED ROUTINES

FEATURES

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ENGINEERING READER ORIENTATION WITH

ENGLISH WORDS FOR PRIMITIVES

NATURAL ENGLISH FORMS AS DELIMITERS

NATURAL STATEMENT STRUCTURE

COMMENTS EASILY ACCOMMODATED

CONCURRENT TEST EXECUTION PROVISIONS:

- INITIATED VIA LANGUAGE PRIMITIVES
- SYNCHRONIZATION CAPABILITY
- MEANING DEPENDENT ON LANGUAGE PROCESSOR IMPLEMENTATION

SELF-EXTENSION THROUGH:

MACRO DEFINITION CAPABILITY

OTHER LANGUAGE CAPABILITY

PROGRAMMER ABILITY TO CREATE NEW PRIMITIVES FROM EXISTING CORE SET AND CREATE SPECIALIZED SUBROUTINES IN OTHER LANGUAGES.

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SPECIAL COMMUNICATIONS REQUIREMENTS:

COMPUTER TO COMPUTER

COMPUTER TO DATA BUS

CAMPARISON OF TYPICAL TEST ORIENTED LANGUAGE OPERATORS

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TEST ACTION OPERATORS

ACTION	ATOLL	ATLAS	OTHER	RECOMMENDED
1. Apply or turn on: a. an analog stimulus b. a discrete stimulus c. a digital stimulus	 N/E* SSEL, DISO, MDSO N/E	 APPLY APPLY APPLY	 STIMULATE (7, 8)** TURN-ON (4, 5) APPLY (7, 8) LINK (8)	 APPLY, SET, TURN, or SEND
2. Acquire the value of: a. an analog parameter b. a discrete parameter c. a digital parameter	 DELY, TEST, READ DELY, TEST, SCAN DELY, TEST	 MEASURE MEASURE MEASURE	 CHECK/ANALOG (7, 8) CHECK/DISCRETE (7,8) LINK (8)	 MEASURE, READ
3. Open the circuit connecting the Unit-Under-Test (UUT) and the test system	N/E	OPEN	TURN ON (5) SET (7, 8)	SET----OPEN
4. Close the circuit connecting the UUT and the test system	N/E	CLOSE	TURN OFF (5) RESET (7, 8)	SET----CLOSED
5. Select connection for routing signals between test system equipment UUT test points	N/E	CONNECT	CONNECT (6, 7, 8)	[Connection included in APPLY and MEASURE statements]
6. Remove connection for routing signals between test system and UUT test points	N/E	DISCONNECT	DISCONNECT (6) RESET (7, 8)	[Removal of connection included in APPLY and MEASURE statement]
7. Vary signal input until measurement satisfies required condition	N/E	ADJUST	N/E	[Macro capability will satisfy requirement when needed]
8. Determine acceptability of acquired values	N/E	COMPARE	IF (4, 5)	IF
9. Acquire and compare	SCAN	VERIFY	CHECK/ANALOG (7, 8) CHECK/DISCRETE (7, 8) CHECK/PCM (7, 8) IF (4, 5)	VERIFY

Notes: *N/E - No equivalent

**
1. ATOLL
2. ATLAS
3. CLASP
4. ATOLL-II
5. MOLTOL
6. TOOL
7. CTL
8. VTL
9. ADAP
10. ASEP
11. STOL

COMPARISON OF TYPICAL TEST ORIENTED LANGUAGE OPERATORS

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	ACTION	ATOLL	ATLAS	OTHER	RECOMMENDED
	10. Repetitively acquire and evaluate - - display if no-go and branch (single values or multiparameters)	MNTR DELY	MONITOR and DISPLAY (only) VERIFY	DO and DI MNTR (4) MONITOR (4, 5)	EVERY (time units) VERIFY (function)
	11. Acquire the value of several samples of a parameter and store	N/E	N/E	SAMPLE (4, 5)	N/E
	12. Perform arithmetic operations	N/E	CALCULATE	Arithmetic Assignment Statements (3, 4, 5) CHECK/ANALOG (7, 8) ADD, SUBT, MULT, & DIV	LET (variable reference equal numeric formula)
OUTPUT OPERATORS	13. Display tutorial, informational, or error messages	DPLY DPYM DFLG RECD DMON RGMT RCDC	DISPLAY INDICATE	DISPLAY (4, 5) DISPLAY (7, 8) PRESENT (5)	DISPLAY (variable) INDICATE (fixed)
	14. Display descriptions and associated slides to operator	DMON	N/E	DISPLAY MA (6) DISPLAY (4)	DISPLAY [Canned Message]
	15. Record output on line printer or typewriter	RECD RDY RLP	PRINT	DEVICE - PRINT (5) PRINT (4)	PRINT
	16. Record output on magnetic tape, drum, or disc	RECD RDY RMT	RECORD	DEVICE - TAPE (5) RECORD (4)	RECORD
	17. Save data for later high speed retrieval	READ RGMT RCDC SETT	SAVE	READ (5) SAMPLE (4) SAVE (7)	READ
PROGRAM INITIATION	18. Invoke or call a test program	EXEC CALL EXEM	N/E	START (3) BEGIN (4, 5) SEQUENCE (7, 8) EXECUTE (4)	PERFORM PROGRAM
TRANSFER OF CONTROL	19. Conditional transfer	INCX TFLG MTFG TEST SCAN DELY	GO TO----IF	MEASURE (7, 8) CK/ANALOG (7, 8) CK/DISC (7, 8) IF----THEN (4, 5)	IF----THEN

COMPARISON OF TYPICAL TEST ORIENTED LANGUAGE OPERATORS

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	ACTION	ATOLL	ATLAS	OTHER	RECOMMENDED
	20. Unconditional transfer	GO TO	GO TO	GO TO (3, 4, 5) RETURN (4, 5)	GO TO
	21. Transfer control to the operator	SEMI SEMI-R	WAIT FOR (operator intervention)	HOLD, STOP, HALT (4, 5) INTERROGATE (4) REQUEST (5) (part of operating system) (7)	REQUEST
	22. Repeat step or group of steps imbedded in program	EXEC SEMI (operator choice)	REPEAT	REPEAT (7, 8)	REPEAT
MULTIPLE TEST	23. Provisions for concurrent testing	N/E	N/E	START (4, 5, 6)	CONCURRENTLY PERFORM
	24. Provisions for synchronizing two separately conducted test programs	N/E	N/E	SYNC (4, 5)	SYNCHRONIZE
OTHER LANGUAGES	25. Exit from present program temporarily to provide for other languages	EXEM CALL	LEAVE and RESUME	ENTER ASSEMBLY CODE (4, 5) DIRECT and END (3)	LEAVE and RESUME
INTERRUPT PROVISIONS	26. Identify a routine to be executed as a result of an interrupt	TERM	N/E	POST (4, 5) ON (3) INTERRUPT (10) POST SIM (11)	WHEN INTERRUPT (interrupt name) OCCURS PERFORM (program name)
	27. Enable/disable interrupts	N/E	N/E	POST SIM (11)	ENABLE DISABLE
DELAY PROVISIONS	28. Postpone execution until time event or value occurs	DELY 1. time 2. event 3. value	DELY WAIT FOR	DEFER/KEY (7) DEFER/TIME (7) DELAY (4, 5, 8, 10) WAIT (4, 5)	WHEN (time) AFTER (time) VERIFY (event or value) ----WITHIN (time)
	29. Return system to quiescent state prior to additional testing	N/E	FINISH	N/E	[Black box approach of airlines makes this operator attractive for their application]
	30. Change program statement	N/E	ALTER	N/E	[Undersirable from an operational viewpoint]

COMPARISON OF TYPICAL TEST ORIENTED LANGUAGE OPERATORS

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	ACTION	ATOLL	ATLAS	OTHER	RECOMMENDED
TIME CRITICAL	31. Establish a series of statements to be accomplished within a specific time period	N/E	PREPARE & EXECUTE	PROC and EXECUTE (4, 5) IMMED UNTIL (4)	WHEN (time critical subroutine) (See para 3.18)
DIGITAL COMMUNICATION	32. Communication between two or more digital machines	N/E	N/E	REQUEST and TRANSMIT (4) DISPATCH (5) LINK (8) DIRECT (3)	SEND and READ
PROGRAM DELIMITERS	33. Subroutine delimiters	BEGIN and RETN	DEFINE and END	PROC and EXIT (3) BEGIN and END (4) PROC and END (5)	BEGIN and END
	34. Program delimiters	NAME and END	BEGIN and TERMINATE	START and TERMINATE (3)	BEGIN PROGRAM and PROGRAM COMPLETE
DECLARATIONS	35. Provide standard values for one or more characteristics of a signal type	N/E	SPECIFY	N/E	N/E
	36. Assign a name to a specific function or signal	DECL	DEFINE	DECLARE (4, 5)	SPECIFY REPLACE (substitute an abbreviation)
	37. Declare lists, tables, or names, for stored parameters	RGMT RCDC PROB PROC	N/E	DECLARE ARRAYS, LISTS, & STRINGS (4, 5)	DECLARE
MACRO	38. Include a block of common statements or routines into the program as desired	MLSR	N/E	INCORP (4, 5)	[Macro capability provides this capability]
PROCESSOR DIRECTIVES	39. Predetermined lists of discretes which will be legal during program run	DISA	N/E	DOMASK (4)	[Identify in dictionary data bank]
	40. Specify which display consoles will be enabled to effect program operation	CODE	N/E	CONSOLE (4) LEGAL (10)	[Test operation and program can be structured to ignore inadvertent console action]
PROFILES	41. Remove or add specific or all discretes from a monitor profile	PREM PROC	N/E	DOMASK (4) DIMASK (4) RELEASE MONITOR (4, 5)	ACTIVATE DEACTIVATE RELEASE

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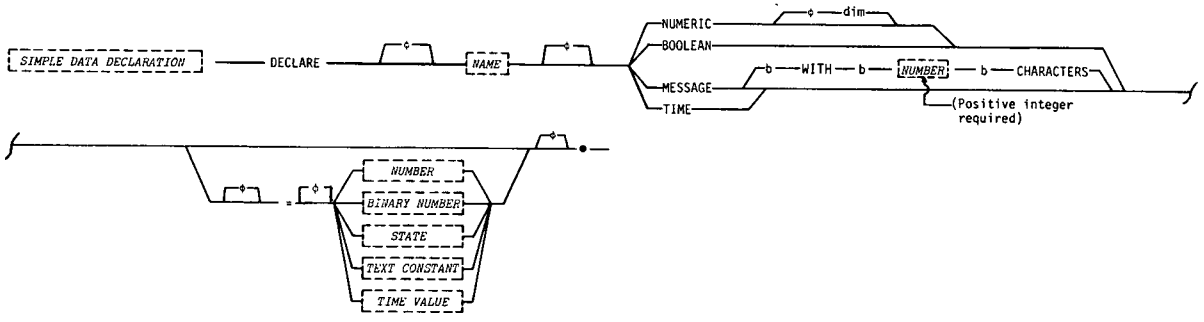
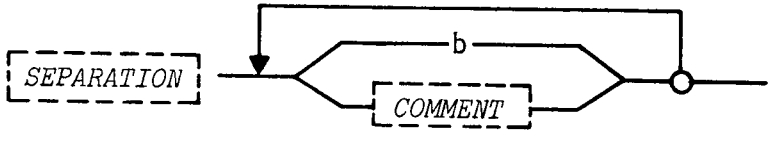
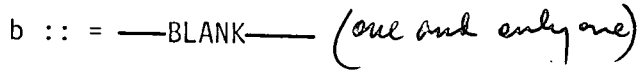
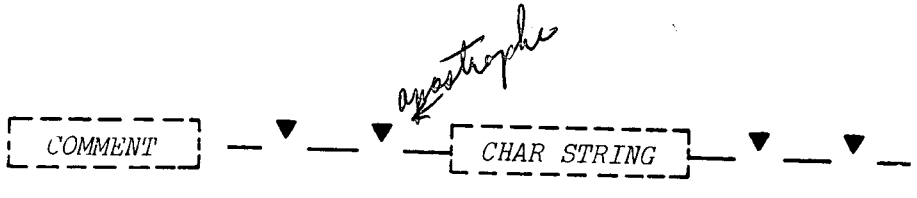
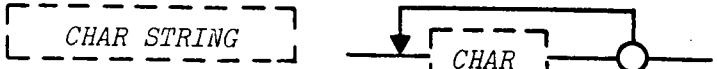
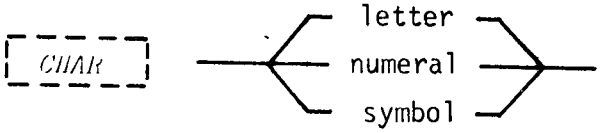






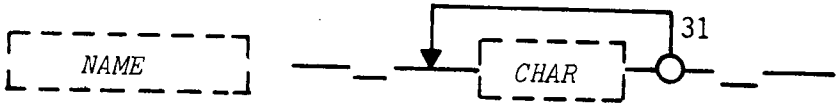






letter :: = A through Z
numeral :: = 0 through 9
symbol :: = + - * / ( ) . , _ ' = ?
BLANK

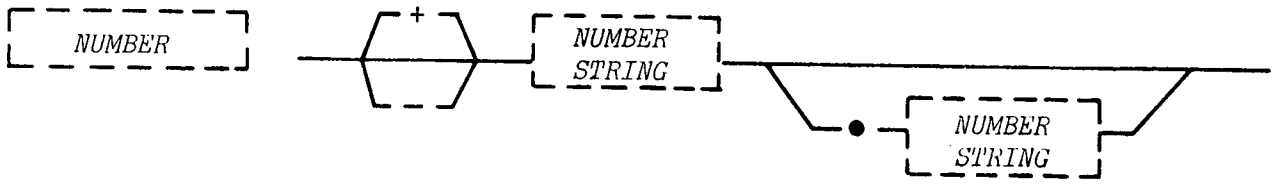
ϕ = non executable

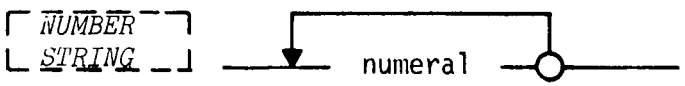


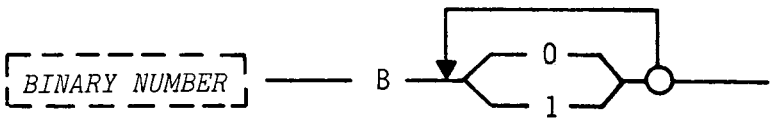
Total of 32 characters

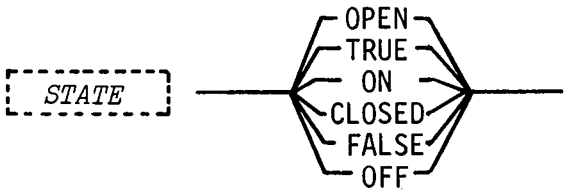
dim :: = any of the dimensions listed in the matrix below.

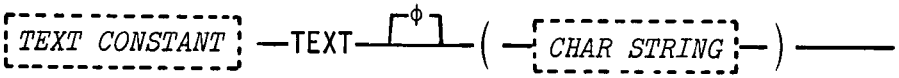
FUNCTION TYPE	BASIC UNIT	$X10^{0}$	$X10^{3}$	$X10^{6}$	$X10^{9}$	$X10^{-3}$	$X10^{-6}$	$X10^{-9}$	$X10^{-12}$
volts ac/dc	volt	V				MV	UV		
current ac/dc	ampere	A				MA	UA		
frequency	hertz	HZ	KHZ	MHZ	GHZ				
	pulses per second	PPS	KPPS						
time	day	DAY							
	hour	HR							
	minute	MIN							
	second	SEC				MSEC	USEC		
resistance	ohm	OHM	KOHM	MOHM					
inductance	henry	H				MH	UH		
capacitance	farad	FD					UFD		PFD
power*	watt	W	KW			MW	UW		
	voltage, current or power	DB							
ratio	percent	PCT							
pressure	pounds per square inch	PSI							
	millimeters of mercury	MMHG							
	inches of mercury	INHG							
	millibars								
distance	inch								
	fe								

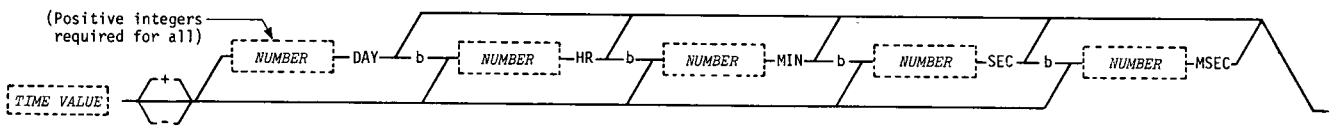

NUMBER
+
NUMBER STRING
NUMBER STRING


NUMBER STRING
numeral


BINARY NUMBER
B
0
1


STATE
OPEN
TRUE
ON
CLOSED
FALSE
OFF

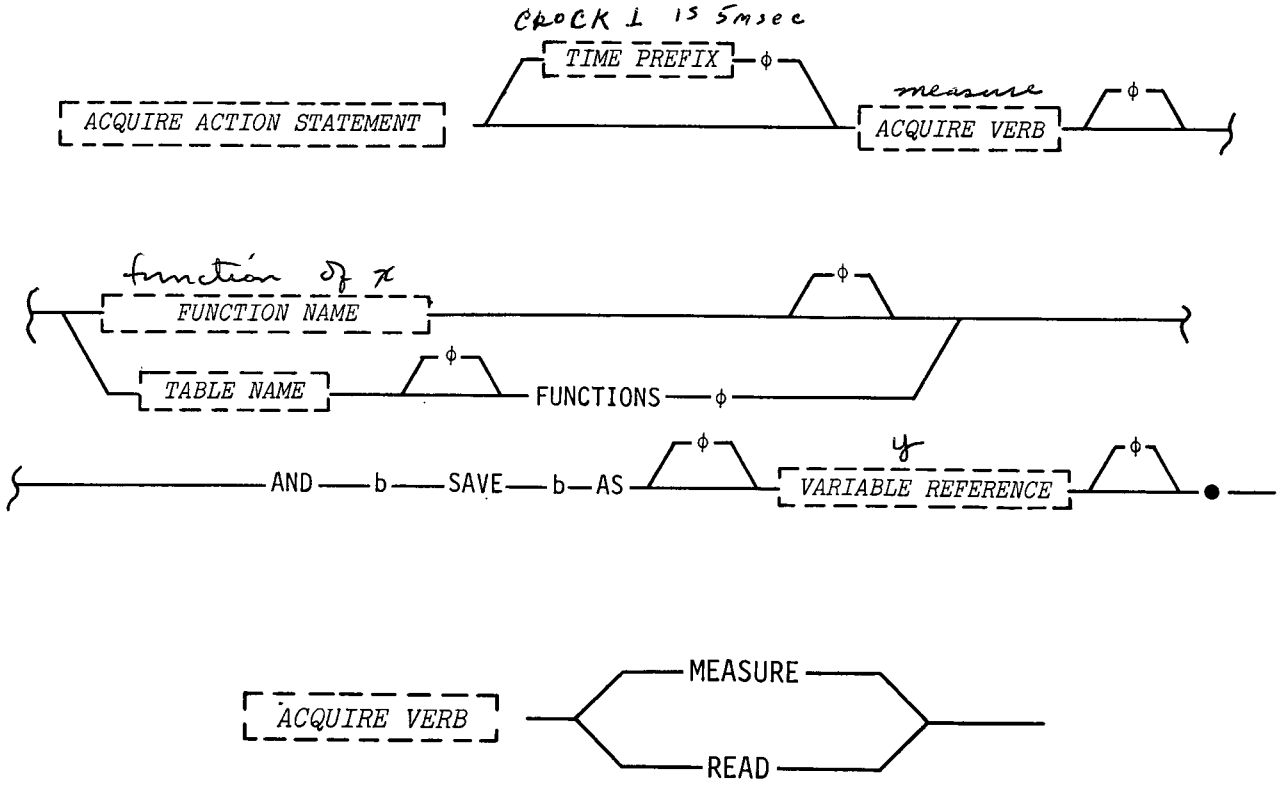

TEXT CONSTANT
TEXT
ϕ
(
CHAR STRING
)

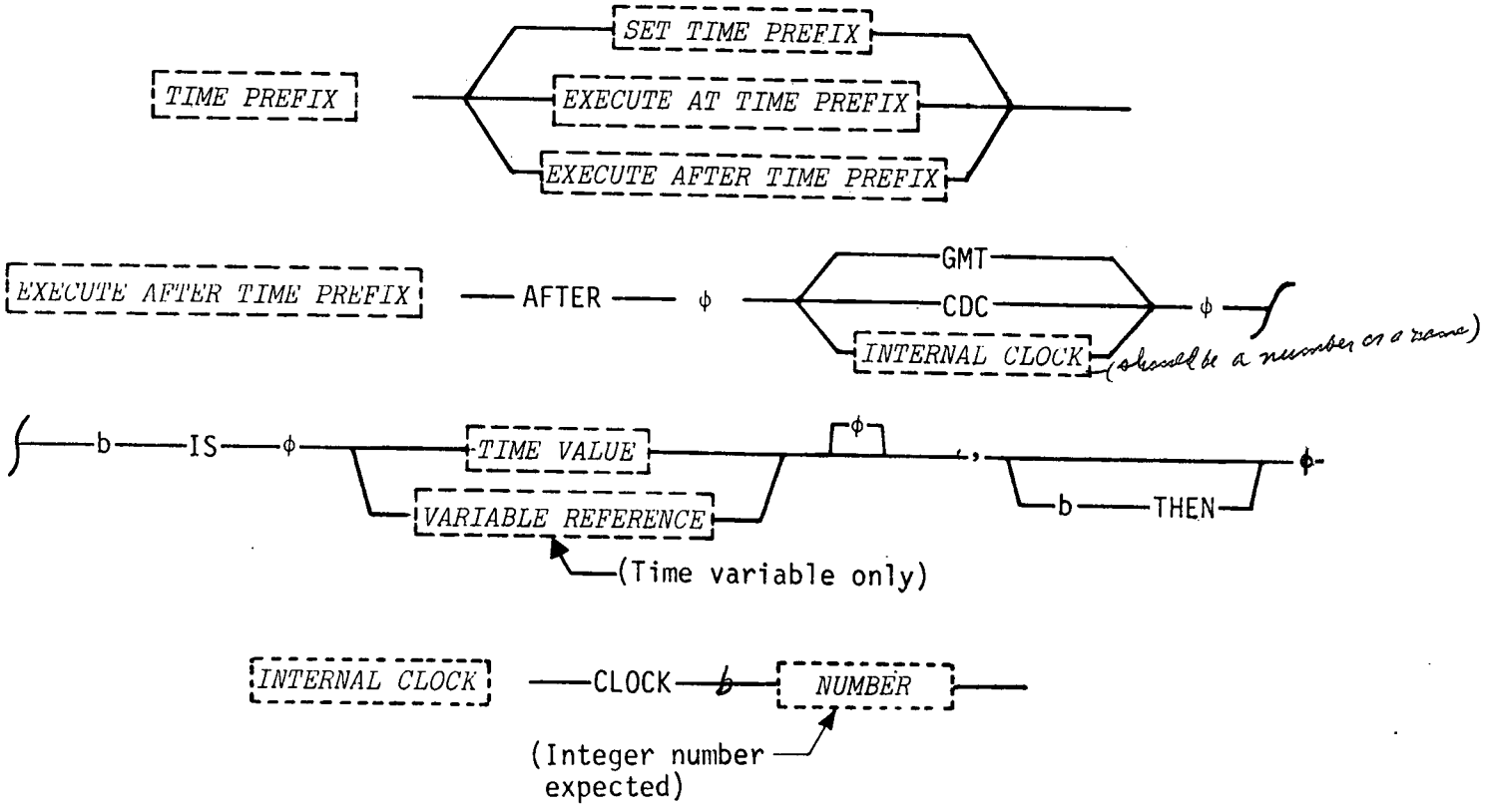

(Positive integers required for all)
TIME VALUE
+
-
NUMBER
DAY
b
NUMBER
HR
b
NUMBER
MIN
b
NUMBER
SEC
b
NUMBER
MSEC

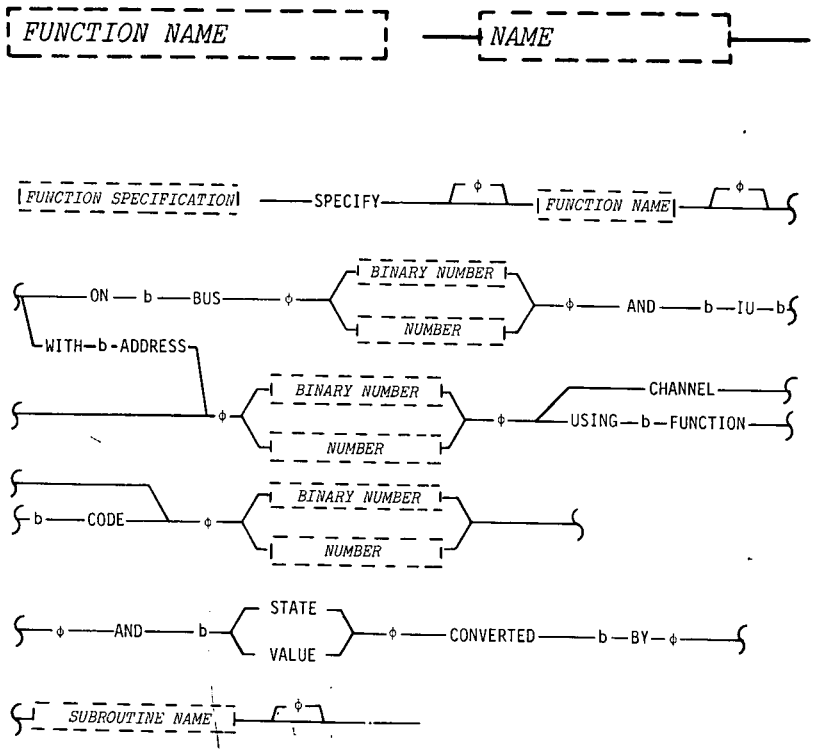
```
DECLARE_T2_TIME.

DECLARE_FLAG 1_BOOLEAN = OFF.

DECLARE "INPUT"_VALUE OF X_NUMERIC.

DECLARE_OUTPUT DATA_"FOR CRT 1"

     MESSAGE = TEXT (END OF TEST.).
```

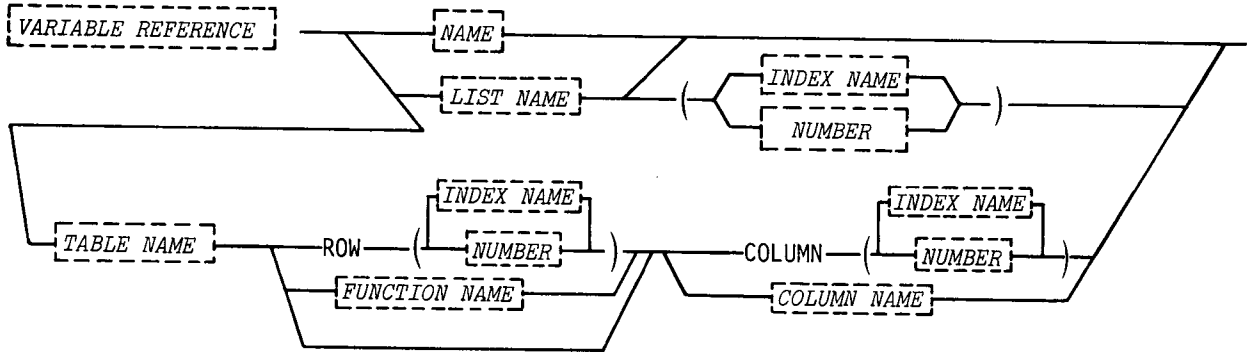
AFTER CLOCK 1 IS 5MSEC,

MEASURE_FUNCTION OF X_AND SAVE AS_Y_.


CLOCK 1 IS 5msec
ACQUIRE ACTION STATEMENT
TIME PREFIX
ϕ
measure
ACQUIRE VERB
ϕ
function of x
FUNCTION NAME
ϕ
TABLE NAME
ϕ
FUNCTIONS
ϕ
AND
b
SAVE
b
AS
ϕ
y
VARIABLE REFERENCE
ϕ
ACQUIRE VERB
MEASURE
READ


TIME PREFIX
SET TIME PREFIX
EXECUTE AT TIME PREFIX
EXECUTE AFTER TIME PREFIX
EXECUTE AFTER TIME PREFIX
AFTER
GMT
CDC
INTERNAL CLOCK
(should be a number or a name)
b
IS
TIME VALUE
VARIABLE REFERENCE
(Time variable only)
b
THEN
INTERNAL CLOCK
CLOCK
NUMBER
(Integer number expected)


FUNCTION NAME
NAME
FUNCTION SPECIFICATION
SPECIFY
FUNCTION NAME
ON
b
BUS
BINARY NUMBER
NUMBER
AND
IU
WITH
ADDRESS
CHANNEL
USING
FUNCTION
CODE
STATE
VALUE
CONVERTED
BY
SUBROUTINE NAME


VARIABLE REFERENCE
NAME
LIST NAME
INDEX NAME
NUMBER
TABLE NAME
ROW
INDEX NAME
NUMBER
FUNCTION NAME
COLUMN
INDEX NAME
NUMBER
COLUMN NAME

ATOLL COMPARISON TEST

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```
000100 NAME                    ILAFF
000200 CODE                    A4
001000 DISA                    MDO,123
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
001400 DISO1                   MDO,123
001500 DELY1                   10 MDI111,B003100
                                  ↑
001600 SEMI1           *BATTERY TRANSFER CONTROL NO GO REF 0015*
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
003100 TFLG1                   F14,B999999
   :
999999 END
```

```
BGNA    BEGIN BATT.TEST
        DECLARE EXTERNAL DOV(BATT.TRANS.CONT=D213)
        DECLARE EXTERNAL VDI(BATT.TRANS.IND=D512)
        CONSOLE=A4

C102    TURN ON BATT.TRANS.CONT,ELSE GO TO BTNG
        DELAY 10 MS
        IF BATT.TRANS.IND IS ON,THEN GO TO NEXTEST,
C       ELSE CONTINUE
BTNG    HALT $ BATTERY TRANSFER IS NO GO C102 $

NEXTEST ---
ENDA    END BATT.TEST
```

```
BEGIN DICTIONARY DATA BANK_BATTERY FUNCTIONS_.

        SPECIFY_BATTERY TRANSFER CONTROL_ON BUS 1 AND IU 1

                USING FUNCTION CODE B0101000000

                AND CONVERTED BY_BATTOUT_.

        SPECIFY_BATTERY TRANSFER INDICATOR_ON BUS 2 AND IU 2

                USING FUNCTION CODE B1101000000

                AND CONVERTED BY_BATTIN_.

        SPECIFY_CRT1, LINE 1_ON BUS 3 AND IU 3

                USING FUNCTION CODE B0000010001

                AND CONVERTED BY_CHARCONV_.

        SPECIFY_CRT1, LINE 2_ON BUS 3 AND IU 3

                USING FUNCTION CODE B0000010010

                AND CONVERTED BY_CHARCONV_.

DICTIONARY DATA BANK_BATTERY FUNCTIONS_COMPLETE.
```

"ALOFT COMPARISON TEST FOR PHASE 1 SAMPLE PROBLEM."

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```
BEGIN PROGRAM_BATTERY TEST_.
      USE DICTIONARY DATA BANK_BATTERY FUNCTIONS_.
      DECLARE_RESPONSE_MESSAGE WITH 1 CHARACTER.
-------------------------------------------------------------------
            TURN_BATTERY TRANSFER CONTROL_ON.
            VERIFY_BATTERY TRANSFER INDICATOR_WITHIN 10MSEC THEN
                 GOTO STATEMENT 10.
            DISPLAY TEXT (BATTERY TRANSFER IS NOGO.)  ON_CRT1, LINE 1_.
-------------------------------------------------------------------
STATEMENT 20  REQUEST TEXT (TYPE Y TO CONTINUE, N TO END TEST.) ON
                    _CRT1, LINE 2_AND SAVE INPUT AS_RESPONSE_.
            IF_RESPONSE_IS EQUAL TO TEXT (Y) THEN GOTO STATEMENT 10.
            IF_RESPONSE_IS EQUAL TO TEXT (N) THEN GOTO STATEMENT 100.
            DISPLAY TEXT (INPUT ERROR.) ON_CRT1, LINE 1_.
            GOTO STATEMENT 20.
STATEMENT 10  "PROGRAM CONTINUES"
                 .
                 .
STATEMENT 100 PROGRAM_BATTERY TEST_COMPLETE.
```

SUMMARY

MARTIN MARIETTA
DENVER DIVISION

A LANGUAGE ORIENTED TO FLIGHT ENGINEERING AND TESTING (ALOFT)

- INCORPORATES KNOWLEDGE OF PREVIOUSLY DESIGNED TEST LANGUAGES
- INCORPORATES KNOWLEDGE OF SPACE SHUTTLE CONFIGURATION
- INCORPORATES KNOWLEDGE OF THE GENERAL TEST AND CHECKOUT PROBLEM

ALOFT PROVIDES:

- EASE OF READING, LEARNING, AND USE
- POWERFUL CAPABILITIES FOR MATCHING ANY TEST ENVIRONMENT
- INTERNAL GROWTH WITHOUT REDESIGN OF THE LANGUAGE
- POTENTIAL LONG TERM USE

MCR-70-425

APPENDIX A

SPECIFICATION OF A L O F T

A LANGUAGE ORIENTED TO FLIGHT ENGINEERING AND TESTING

(The specification for ALOFT appears as Appendix A of the Phase III Report, MCR-70-424; and has been separately prepared as MCR-70-450.)

A-1

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
Specification for ALOFT	December 17, 1970
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
W. F. Kamsler, C. W. Case, J. Gyure, E. L. Kinney	MCR-70-450

9. Performing Organization Name and Address	10. Work Unit No.
MARTIN MARIETTA CORPORATION Denver Division P. O. Box 179 Denver, Colorado 80201	11. Contract or Grant No. NAS10-7308
12. Sponsoring Agency Name and Address	13. Type of Report
National Aeronautics and Space Administration Kennedy Space Center Florida 32899	Specification
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This booklet contains the specification for ALOFT, A Language Oriented to Flight Engineering and Testing.

ALOFT provides the language characteristics needed to test and operate the Space Shuttle and other NASA space vehicles and experiments. Using the good features of previously developed test-oriented languages and correcting for their faults; ALOFT has been designed to operate in a multidisciplined environment, independent of the test system. These important features should ensure wide acceptance by its users and permit structuring tests long before the test system is finalized.

The ALOFT language is readily learned, easy to write, and its English-like nonambiguous statements ensure that the readers will understand the test procedures.

ALOFT was conceived during work on contract NAS10-7308 for the Development of a Test and Flight Engineer Oriented Computer Language.

Criteria for the design of ALOFT is documented in Martin Marietta reports MCR-70-327, MCR-70-365, and MCR-70-424.

17. Key Words (Selected by Author(s))	18. Distribution Statement
ALOFT Test Oriented Language Computer Controlled Test Equipment Aerospace Ground Equipment	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	42	

MCR-70-425

APPENDIX B

KAF2 FLIGHT CONTROL PREPS PROGRAM

WRITTEN IN A T O L L

(Phase III Presentation Material NAS10-7308)

```
ST-PRØGRAM CØMPILE ØF IVAR  KAF2          SERIES o AS509          REVISIØN o 0000          DATE
 ØAT PREPS AS509 6/10/70 REV 0

    1  NAME                                          IKAF2
  *F/C ØAT PREPS AS509 6/10/70 REV 0
    2  CØDE                                          A4,A12,B12,A13
    3  DISA                                          MDØ,378,379,408,409,410,480,
                                                     694,695,1790,1799,1801,1803,
                                                     1807,1819,1823,1903,1904,1905,
                                                     1906,1907,1909,1910,2006,2007,
                                                     2008,2009,1789,1800,1802,1804,
                                                     1805,1806
    4  DECL                                          S-1C/BURN,DP1A0-12J10-01,
                                                     S-2/BURN,DP1A0-12J07-06,
                                                     S-4B/BURN,DP1A0-12J02-01,
                                                     P/SERVØ/CØMP,DP1A0-12J03-01,
                                                     Y/SERVØ/CØMP,DP1A0-12J04-01,
                                                     P/SPAT/CØMP,DP1A0-12J06-01,
                                                     R-Y1/SP/CØMP,DP1A0-12J05-01,
                                                     R-Y2/SP/CØMP,DP1A0-12J07-01,
                                                     FCC/ØN/+6D11,DP1A0-12J01-03,
                                                     FCC/ØN/+6D31,DP1A0-12J01-04,
                                                     FCC/ØN/+6D41,DP1A0-12J01-05,
                                                     RØLL/CØMP,DP1A0-12J08-02,
                                                     YAW/CØMP,DP1A0-12J08-03,
                                                     PITCH/CØMP,DP1A0-12J08-04,
                                                     REF/RØLL,DP1A0-03-05-00,
                                                     REF/YAW,DP1A0-03-04-00,
                                                     REF/PITCH,DP1A0-03-06-00,
                                                     CMD/RØLL,CP1A0-03-03-00,
                                                     CMD/YAW,CP1A0-03-02-00,
                                                     CMD/PITCH,CP1A0-03-01-00,
                                                     CSP/PØWER/ØN,DP1A0-12J01-06,
                                                     WH/SP/GR-1,DP1A0-12J08-05,
                                                     WH/SP/GR-2,DP1A0-12J08-06,
                                                     WH/SP/GR-3,DP1A0-12J08-07
    5  TERM                                          MDØ-480,MDØ-694,MDØ-695,
                                                     MDØ-1790,MDØ-1799,MDØ-1801,
                                                     MDØ-1803,MDØ-1807,MDØ-1819,
                                                     MDØ-1904,MDØ-1905,MDØ-1906,
                                                     MDØ-1907,MDØ-1910,MDØ-2006,
                                                     MDØ-2007,MDØ-2008,MDØ+2009,
                                                     MDØ-2009,MDØ+373,MDØ+410,
                                                     MDØ-378,MDØ-410,MDØ-1909
  *          CLEAR ALL STØRAGE TABLES USED IN THIS PRØGRAM
    6  RECDC                                         SCØV
    7  RECDC                                         SCØW
    8  RECDC                                         SCØX
    9  RECDC                                         SCØY
   10  RECDC                                         SCØZ
   11  PREM                                          LDIA,LDI,ALL
 1150  PREM                                          LDØA,LDØ,ALL
  *          SET ALL FLAGS USED IN THIS PRØGRAM TØ ZERØ
   12  MSFG                                          F,-1,-2,-3,-4,-5,-6,-7,-8,-9,
                                                     -10,-11,-12,-13,-14
```

```
*            IF NØT CALLED BY LINKER BRANCH TØ MANUAL ØPTIØN SELECT      019300
 13   TFLG0                                  F47,B100000                  019400
*            *START FLAG SET UP RØUTINE                                   019500
 14   MTFG                                   F,-25,-26,-27,-28,B002400    019600
 15   TFLG0                                  F25,B001700                  019700
 16   SFLG1                                  F1                           019800
 17   TFLG0                                  F26,B001900                  019900
 18   SFLG1                                  F2                           020000
 19   TFLG0                                  F27,B002100                  020100
 20   SFLG1                                  F3                           020200
 21   TFLG0                                  F28,B003500                  020300
 22   SFLG1                                  F4                           020400
 23   GØTØ                                   B003500                      020500
 24   MTFG                                   F,-37,-38,-39,B003400        020600
 25   TFLG0                                  F37,B002800                  020700
 26   MSFG                                   F,1,2,4.                     020800
 27   GØTØ                                   B003500                      020900
 28   TFLG0                                  F38,B003100                  021000
 29   MSFG                                   F,1,2,3                      021100
 30   GØTØ                                   B003500                      021200
 31   TFLG0                                  F39,B003400                  021300
 32   MSFG                                   F,1,2,3,4                    021400
 33   GØTØ                                   B003500                      021500
 34   MSFG                                   F,1,2                        021600
*            BUILD SCAN TABLES                                            021700
 35   TFLG0                                  F1,B003800                   021800
*            BUILD FCC SCAN TABLES                                        021900
 36   PRØB0                                  LDIA,LDI,378,480,481,2570,   022000
                                             2572,2573,2590,2591,2592,2593,  022100
                                             2594,2595,2596,2598,2599,2600,  022200
                                             2602,2604,2606,2607,2630,2631,  022300
                                             2662,2664,3004,3005,3006,3007,  022400
                                             3008,3010,3011,2639          022500
 3650PRØB0                                   LDØA,LDØ,1705,1855,1937      022600
 37   TFLG0                                  F2,B003900                   022700
*            BUILD EDS/CRG SCAN TABLE                                     022800
 38   PRØB0                                  LDIA,LDI,410,694,695,2799,   022900
                                             2800,2801,2802,2803,2804,2805,  023000
                                             2806,2807,2810,2811,2812,2813   023100
*            SCAN PANEL SWITCH CØNFIGURATIØN                              023200
 39   SCAN                                   B103500,LDIA,LDØA            023300
*            IF FCC ØPTIØN NØT SELECTED BRANCH TØ CSP PØWER ØN SEQ.       023400
 40   TFLG0                                  F1,B004600                   023500
*            IF FCC PWR IS ØN BRANCH TØ TEST ØF ØTHER BUSSES              023600
 41   TEST1                                  PFCC/ØN/+6D11,B104000        023700
*            STØRE GMT INTØ SCØV                                          023800
 42   RGMT                                   SCØV                         023900
*            ISSUE FCC PØWER ØN                                           024000
 43   DISØ1                                  MDØ,1823                     024100
 4350DPLY               FCC PØWER ØN                                      024200
*            SET FLAG 6,INDICATES FCC PØWERED ØN BY PRØGRAM               024300
 44   SFLG1                                  F6                           024400
```

```
 *              IF EDS/CRG ØPTIØN NØT SELECTED BRANCH TØ FCC PANEL SET UP          024500
                                                                                   024600
   45  TFLGO                                   F2,B005200                          024700
 *              IF CSP PWR IS ØN BRANCH TØ TEST ØF WHEEL SPEED INDICATIØNS.        024800
   46  TEST1                                   PCSP/PØWER/ØN,B104500               024900
   4650BLØK                                                                        025000
 *              SET TIME CELL B,USED FØR UP TØ SPEED INDICATIØNS                   025100
   47  SETT                                    TCB                                 025200
 *              STØRE GMT INTØ SCØW                                                025300
   48  RGMT                                    SCØW                                025400
 *              ISSUE CSP PØWER ØN                                                 025500
   49  DISØ1                                   MD0,1903                            025600
   4950DPLY              GYRØ PØWER ØN                                             025700
 *              SET FLAG 5,INDICATES CSP PØWERED ØN BY PRØGRAM                     025800
   50  SFLG1                                   F5                                  025900
 *              IF FCC ØPTIØN NØT SELECTED BRANCH TØ EDS/CRG PANEL SET UP          026000
   51  TFLG0                                   F1,B006300                          026100
 *              ZERØ FCC RAMPS                                                     026200
   52  DISØ1                               100MDØ,378                              026300
 *              ISSUE ST-124M SUB AND YAW AXIS ØFF, CRG SUB ØN                     026400
   53  MDSØ                                    MDØ,-1789,1790,-1799                026500
 *              ISSUE RØLL AXIS,TEST INPUT A,AND ALL TEST MØDES ØFF,PITCH          026600
 *              AXIS,TEST INPUT B,AND STEP ENABLE ØN                               026700
   54  MDSØ                                    MDØ,-1800,1801,-1802,1803,          026800
                                               -1804,-1805,-1806,-1807,1819        026900
 *              ISSUE S-II,S-IVB BURN AND CØAST MØDES ØFF                          027000
   55  MDSØ                                    MDØ,-2007,-2008,-2009               027100
   5550DPLY              FCC MØDE CHECKS IN PRØGRESS                               027200
 *              ISSUE S-1C BURN MØDE ØN                                            027300
   56  DISØ1                               100MDØ,2006                             027400
 *              TEST FCC PØWER BUSS +6D11                                          027500
   57  TESTO                                   PFCC/ØN/+6D11,B105100               027600
 *              TEST FCC PØWER BUSS +6D31                                          027700
   58  TESTO                                   PFCC/ØN/+6D31,B105100               027800
 *              TEST FCC PØWER BUSS +6D31A                                         027900
   59  TESTO                                   PFCC/ØN/+6D41,B105100               028000
 *              TEST S-1C BURN MØDE                                                028100
   60  TESTO                                   PS-1C/BURN,B105300                  028200
 *              ISSUE S-II BURN MØDE ØN                                            028300
   61  DISØ1                                   MDØ,2009                            028400
 *              IF EDS/CRG ØPTIØN IS NØT SELECTED BRANCH TØ FCC MØDE CHECK         028500
   62  TFLGO                                   F2,B006700                          028600
 *              TEST CSP PØWER                                                     028700
   63  TESTO                                   PCSP/PØWER/ØN,B105500               028800
   6350DPLY              GYRØ RAMP EXERCISE AND CØMPARATØR SET IN PRØGRESS         028900
 *              ZERØ EDS/CRG RAMPS                                                 029000
   64  DISØ1                               100MDØ,410                              029100
 *              ISSUE YAW AND RØLL AXIS,SPARE ØFF,REF,CMD,AND PITCH AXIS ØN        029200
   65  MDSØ                                    MDØ,-1904,-1905,1906,1907,          029300
                                               1909,-1910                          029400
 *              IF FCC ØPTIØN NØT SELECTED BRANCH TØ WHEEL SPEED TEST              029500
   66  TFLGO                                   F1,B007500                          029600
 *              TEST S-II BURN MØDE
```

```
67  TESTO        o                      PS-2/BURN,B105700
         ISSUE S-II BURN MØDE ØFF,S-IVB BURN MØDE ØN
68  MDSØ                                MDØ,2007,-2009
         SET INDEX REGISTER 3 TØ 7
69  SETX      7                         X3
         TEST FØR TCB +8 SECØNDS
70  TEST                            8000TCB,B007200
         IF TCB +8 SECØNDS EXPIRED BRANCH TØ WHEEL SPEED TEST
71  GØTØ                                B007400
         ISSUE CCIS RAMP PØSITIVE FØR 1 SEC.
72  DISØ1                           1000MDØ,480
         DECREMENT INDEX REGISTER 3
73  INCX     -1       2                 X3,B007000
         IF EDS/CRG ØPTIØN NØT SELECTED BRANCH TØ FCC CØMPARATØR CK
74  TFLG0                               F2,B011600
         IF CSP NØT TURNED ØN BY PRØGRAM BYPASS WHEEL SPEED TEST
75  TFLG0                               F5,B009100
         HAS GR-1 UP-TØ-SPEED DATA ALREADY BEEN TAKEN
76  TFLG1                               F7,B008000
         TEST GR-1 UP-TØ-SPEED INDICATIØN
77  TESTO                               PWH/SP/GR-1,B008000
         STØRE GMT IN SCØX
78  RGMT                                SCØX
         SET FLAG 7,INDICATES GR-1 UP-TØ-SPEED DATA TAKEN
79  SFLG1                               F7
         HAS GR-2 UP-TØ-SPEED DATA ALREADY BEEN TAKEN
80  TFLG1                               F8,B008400
         TEST GR-2 UP-TØ-SPEED INDICATIØN
81  TESTO                               PWH/SP/GR-2,B008400
         STØRE GMT IN SCØY
82  RGMT                                SCØY
         SET FLAG 8,INDICATES GR-2 UP-TØ-SPEED DATA TAKEN
83  SFLG1                               F8
         HAS GR-3 UP-TØ-SPEED DATA ALREADY BEEN TAKEN
84  TFLG1                               F9,B008800
         TEST GR-3 UP-TØ-SPEED INDICATIØN
85  TESTO                               PWH/SP/GR-3,B008900
         STØRE GMT IN SCØZ
86  RGMT                                SCØZ
         SET FLAG 9,INDICATES GR-3 UP-TØ-SPEED DATA TAKEN
87  SFLG1                               F9
         ARE ALL GRØUPS UP-TØ-SPEED
88  MTFG                                F,7,8,9,B009100
         TEST TCB +20 SECØNDS
89  TEST                           20000TCB,B007600
         IF TCB +20 SECØNDS EXPIRED BRANCH TØ ERRØR MESSAGE
90  GØTØ                                B106000
         ISSUE EDS/CRG RAMP PØSITIVE FØR 3 SECØNDS
91  DISØ1                           3000MDØ,694
         TEST REF.PITCH FØR +2 TØ +6 DEG/SEC
92  TESTN 3.25    0.25  0.75 VDC        PREF/PITCH,B106200
         READ REF.PITCH INTØ TAB 1
```

```
 93   READ                      VDC        PREF/PITCH,TAB1
  *         TEST CMD PITCH FØR +/- 0.4 DEG/SEC.ØF REF.
 94   TESTN TAB1     0.10  0.10 VDC        PCMD/PITCH,B106400
  *         ZERØ EDS/CRG RAMPS
 95   DIS01                           100MDØ,410
  *         DELAY UNTIL RAMP AT ZERØ ØR 10 SEC.EXPIRES
 96   DELY0                         10000MDI635
  *         ISSUE EDS/CRG RAMP NEGATIVE FØR 3 SECØNDS
 98   DIS01                          3000MDØ,695
  *         TEST REF.PITCH FØR -2 TØ -6 DEG/SEC
 99   TESTN  1.75    0.75  0.25 VDC        PREF/PITCH,B106600
  *         READ REF.PITCH INTØ TAB 1
100   READ                      VDC        PREF/PITCH,TAB1
  *         TEST CMD.PITCH FØR +/- 0.4 DEG/SEC.ØF REF.
101   TESTN  TAB1    0.10  0.10 VDC        PCMD/PITCH,B106800
  *         DESELECT REF.GYRØ
102   DIS00                                MDØ,1907
  *         ISSUE EDS/CRG RAMP PØSITIVE ØN
103   DIS01                                MDØ,694
  *         DELAY UNTIL EDS/CRG PITCH CØMP.SETS ØR 3 SECØNDS EXPIRES
104   DELY1                          3000PPITCH/CØMP.
  *         ISSUE EDS/CRG RAMP PØSITIVE ØFF
105   DIS00                                MDØ,694
  *         IF EDS/CRG PITCH CØMP.NØT SET BRANCH TØ ERRØR MESSAGE
106   TESTO                                PPITCH/CØMP,B107000
  *         ISSUE CMD.GYRØ ØFF,SPARE GYRØ ØN
10650MDS0                                  MDØ,-1909,1910
  *         ISSUE EDS/CRG RAMP PØSITIVE FØR 3 SECØNDS
107   DIS01                          3000MDØ,694
  *         TEST SPARE PITCH FØR +2 TØ +6 DEG/SEC.
108   TESTN 3.25     0.25  0.75 VDC        PCMD/PITCH,B107200
  *         ZERØ EDS/CRG RAMPS
109   DIS01                           100MDØ,410
  *         DELAY UNTIL EDS/CRG RAMP AT ZERØ ØR 10 SECØNDS EXPIRES
110   DELY0                         10000MDI635
  *         ISSUE EDS/CRG RAMP NEGATIVE FØR 3 SECØNDS
112   DIS01                          3000MDØ,695
  *         TEST SPARE PITCH FØR -2 TØ -6 DEG/SEC
113   TESTN  1.75    0.75  0.25 VDC        PCMD/PITCH,B107400
  *         ZERØ EDS/CRG RAMPS
114   DIS01                           100MDØ,410
  *         IF FCC ØPTIØN NØT SELECTED BRANCH TØ EDS/CRG YAW RAMP CHECK
115   TFLG0                                F1,B012700
11550DPLY         .  FCC CØMPARATØR SET RØUTINE IN PRØGRESS
  *         ISSUE FCC CØAST TEST MØDE ØN
116   DIS01                                MDØ,1807
  *         TEST S-IVB BURN MØDE
117   TESTO                                PS-4B/BURN,B107600
  *         DECREMENT INDEX REGISTER 3
118   INCX    -1       2                   X3,B107800
  *         DELAY UNTIL FCC PITCH SERVØ CØMP.SETS ØR 3 SECØNDS EXPIRES
119   DELY1                          3000PP/SERVØ/CØMP,B012100
```

```
          IF DELAY EXPIRES BRANCH TØ ERRØR MESSAGE                              040100
120  GØTØ                                8108100                                040200
          ISSUE CCIS YAW AXIS ØN                                                040300
121  DISØ1                               MDØ,1799                               040400
          ISSUE CCIS PITCH AXIS ØFF                                             040500
122  DISØ0                               MDØ,1801                               040600
          DELAY UNTIL FCC YAW SERVØ CØMP.SETS ØR 3 SECØNDS EXPIRES              040700
123  DELY1                       3000PY/SERVØ/CØMP,8012500                      040800
          IF DELAY EXPIRES BRANCH TØ ERRØR MESSAGE                              040900
124  GØTØ                                8108300                                041000
          ISSUE S-IVB BURN MØDE AND CØAST TEST MØDE ØFF                         041100
125  DISØ0                               MDØ,1807,2007                          041200
          IF EDS/CRG ØPTIØN NØT SELECTED BRANCH TØ FCC SPAT.CØMP.CHECK          041300
126  TFLG0                               F2,8015600                             041400
          ISSUE PITCH AXIS AND SPARE ØFF,YAW AXIS,REF.AND CMD ØN                041500
127  MDSØ                                MDØ,1905,-1906,1907,1909,-1910         041600
          DELAY UNTIL EDS/CRG RAMP AT ZERØ ØR 10 SECØNDS EXPIRES                041700
128  DELY0                       10000MDI635                                    041800
          ISSUE EDS/CRG RAMP PØSITIVE FØR 3 SECØNDS                             041900
130  DISØ1                        3000MDØ,694                                   042000
          TEST REF.YAW FØR +2 TØ +6 DEG/SEC.                                    042100
131  TESTN  3.25    0.25   0.75 VDC      PREF/YAW,8108500                       042200
          READ REF.YAW INTØ TAB 1                                               042300
132  READ                   VDC          PREF/YAW,TAB1                          042400
          TEST CMD YAW FØR +/- 0.4 DEG/SEC.ØF REF.                              042500
133  TESTN  TAB1    0.10   0.10 VDC      PCMD/YAW,8108700                       042600
          ZERØ EDS/CRG RAMPS                                                    042700
134  DISØ1                         100MDØ,410                                   042800
          DELAY UNTIL EDS/CRG RAMP AT ZERØ ØR 10 SECØNDS EXPIRES                042900
135  DELY0                       10000MDI635                                    043000
          ISSUE EDS/CRG RAMP NEGATIVE FØR 3 SECØNDS                             043100
137  DISØ1                        3000MDØ,695                                   043200
          TEST REF.YAW FØR -2 TØ -6 DEG/SEC                                     043300
138  TESTN  1.75    0.75   0.25 VDC      PREF/YAW,8108900                       043400
          READ REF.YAW INTØ TAB 1                                               043500
139  READ                   VDC          PREF/YAW,TAB1                          043600
          TEST CMD.YAW FØR +/- 0.4 DEG/SEC.ØF REF.                              043700
140  TESTN  TAB1    0.10   0.10 VDC      PCMD/YAW,8109100                       043800
          DESELECT REF.GYRØ                                                     043900
141  DISØ0  -                            MDØ,1907                               044000
          ISSUE EDS/CRG RAMP PØSITIVE ØN                                        044100
142  DISØ1                               MDØ,694                                044200
          DELAY UNTIL EDS/CRG YAW CØMPARATØR SETS ØR 3 SECØNDS EXPIRES          044300
143  DELY1                        3000PYAW/CØMP                                 044400
          ISSUE EDS/CRG RAMP PØSITIVE ØFF                                       044500
144  DISØ0                               MDØ,694                                044600
          IF EDS/CRG YAW CØMP. NØT SET BRANCH TØ ERRØR MESSAGE                  044700
145  TEST0                               PYAW/CØMP,8109300                      044800
          ISSUE CMD.GYRØ ØFF,SPARE GYRØ ØN                                      044900
146  MDSØ                                MDØ,-1909,1910                         045000
          ISSUE EDS/CRG RAMP PØSITIVE ØN FØR 3 SECØNDS                          045100
147  DISØ1                        3000MDØ,694                                   045200
```

```
-PRØGRAM CØMPILE ØF IVAR  KAF2        SERIES ø AS509        REVISIØN ø 0000      DATE
AT PREPS AS509 6/10/70 REV 0

                                                                                045300
 *          TEST SPARE YAW FØR +2 TØ +6 DEG/SEC.                                045400
 148  TESTN  3.25   0.25  0.75 VDC          PCMD/YAW,B109500                     045500
 *          ZERØ EDS/CRG RAMPS                                                  045600
 149  DIS01                          100MD0,410                                 045700
 *          DELAY UNTIL EDS/CRG RAMPS AT ZERØ ØR 10 SECØNDS EXPIRES             045800
 150  DELY0                        10000MD1635                                  045900
 *          ISSUE EDS/CRG RAMP PØSITIVE FØR 3 SECØNDS                           046000
 152  DIS01                          3000MD0,695                                046100
 *          TEST SPARE YAW FØR -2 TØ -6 DEG/SEC.                                046200
 153  TESTN  1.75   0.75  0.25 VDC          PCMD/YAW,B109700                     046300
 *          ZERØ EDS/CRG RAMPS                                                  046400
 154  DIS01                          100MD0,410                                 046500
 *          IF FCC ØPTIØN NØT SELECTED BRANCH TØ EDS/CRG RØLL RAMP CHECK        046600
 155  TFLG0                          F1,B016900                                 046700
 *          ISSUE FCC CØAST TEST MØDE ØN                                        046800
 156  DIS01                          MD0,1807                                   046900
 *          DELAY UNTIL FCC R-Y 1 SPATIAL CØMP.SETS ØR 3 SECØNDS EXPIRES        047000
 157  DELY1                          3000PR-Y1/SP/CØMP,B015900                  047100
 *          IF DELAY EXPIRES BRANCH TØ ERRØR MESSAGE                            047200
 158  GØTØ                           B109900                                    047300
 *          DELAY UNTIL FCC R-Y 2 SPATIAL CØMP.SETS ØR 3 SECØNDS EXPIRES        047400
 159  DELY1                          3000PR-Y2/SP/CØMP,B016100                  047500
 *          IF DELAY EXPIRES BRANCH TØ ERRØR MESSAGE                            047600
 160  GØTØ                           B110100                                    047700
 *          ISSUE CCIS PITCH AXIS ØN                                            047800
 161  DIS01                          MD0,1801                                   047900
 *          ISSUE CCIS YAW AXIS ØFF                                             048000
 162  DIS00                          MD0,1799                                   048100
 *          DELAY UNTIL FCC PITCH SPATIAL CØMP.SETS ØR 3 SECØNDS EXPIRES        048200
 163  DELY1                          3000PP/SPAT/CØMP,B016500                   048300
 *          IF DELAY EXPIRES BRANCH TØ ERRØR MESSAGE                            048400
 164  GØTØ                           B110300                                    048500
 *          ZERØ CCIS RAMP                                                      048600
 165  DIS01                          100MD0,378                                 048700
 *          ISSUE CCIS CRG SUB ØFF                                              048800
 166  DIS00                          MD0,1790                                   048900
 *          ISSUE PITCH AXIS,TEST INPUT B,CØAST TEST AND STEP ENABLE ØFF        049000
 167  MDS0                           MD0,-1801,-1803,-1807,-1819                049100
 *          IF EDS/CRG ØPTIØN NØT SELECTED BRANCH TØ FCC SECURING               049200
 168  TFLG0                          F2,B021100                                 049300
 *          ISSUE YAW AXIS AND SPARE ØFF,RØLL AXIS,REF.AND CMD.ØN               049400
 169  MDS0                           MD0,1904,-1905,1907,1909,-1910             049500
 *          DELAY UNTIL EDS/CRG RAMP AT ZERØ                                    049600
 170  DELY0                        10000MD1635                                  049700
 *          ISSUE EDS/CRG RAMP PØSITIVE ØN FØR 3 SECØNDS                        049800
 172  DIS01                          3000MD0,694                                049900
 *          TEST REF.RØLL FØR +2 TØ +6 DEG/SEC                                  050000
 173  TESTN  3.25   0.25  0.75 VDC          PREF/RØLL,B110500                    050100
 *          READ REF.RØLL INTØ TAB 1                                            050200
 174  READ                     VDC         PREF/RØLL,TAB1                       050300
 *          TEST CMD.RØLL FØR +/- 0.4 DEG/SEC.ØF REF.                           050400
 175  TESTN  TAB1   0.10  0.10 VDC          PCMD/RØLL,B110700
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*         ZERØ EDS/CRG RAMPS
176  DIS01                                100MDØ,410
*         DELAY UNTIL EDS/CRG RAMPS AT ZERØ ØR 10 SECØNDS EXPIRES
177  DELY0                              10000MDI635
*         ISSUE EDS/CRG RAMP NEGATIVE FØR 3 SECØNDS
179  DIS01                               3000MDØ,695
*         TEST REF.RØLL FØR -2 TØ -6 DEG/SEC
180  TESTN  1.75   0.75   0.25 VDC        PREF/RØLL,B110900
*         READ REF.RØLL INTØ TAB 1
181  READ                      VDC        PREF/RØLL,TAB1
*         TEST CMD.RØLL FØR +/- 0.4 DEG/SEC.ØF REF.
182  TESTN  TAB1   0.10   0.10 VDC        PCMD/RØLL,B111100
*         DESELECT REF.GYRØ
183  DIS00                                   MDØ,1907
*         ISSUE EDS/CRG RAMP PØSITIVE ØN
184  DIS01                                   MDØ,694
*         DELAY UNTIL EDS/CRG RØLL CØMP.SETS ØR 3 SECØNDS EXPIRES
185  DELY1                               3000PRØLL/CØMP
*         ISSUE EDS/CRG RAMP PØSITIVE ØFF
186  DIS00                                   MDØ,694
*         IF EDS/CRG RØLL CØMP.NØT SET BRANCH TØ ERRØR MESSAGE
187  TEST0                                   PRØLL/CØMP,B111300
*         ISSUE CMD GYRØ ØFF,SPARE GYRØ ØN
188  MDSØ                                    MDØ,-1909,1910
*         ISSUE EDS/CRG RAMP PØSITIVE ØN FØR 3 SECØNDS
189  DIS01                               3000MDØ,694
*         TEST SPARE RØLL FØR +2 TØ +6 DEG/SEC.
190  TESTN  3.25   0.25   0.75 VDC        PCMD/RØLL,B111500
*         ZERØ EDS/CRG RAMPS
191  DIS01                                100MDØ,410
*         DELAY UNTIL EDS/CRG RAMPS AT ZERØ ØR 10 SECØNDS EXPIRES
192  DELY0                              10000MDI635
*         ISSUE EDS/CRG RAMP NEGATIVE FØR 3 SECØNDS
194  DIS01                               3000MDØ,695
*         TEST SPARE RØLL FØR -2 TØ -6 DEG/SEC.
195  TESTN  1.75   0.75   0.25 VDC        PCMD/RØLL,B111700
*         ZERØ EDS/CRG RAMP
196  DIS01                                100MDØ,410
*         IF PRØGRAM DID NØT TURN ØN CSP BYPASS WH. SP. DATA ØUTPUT
197  TFLG0                                   F5,B020900
*         WHEEL SPEED DATA ØUTPUT RØUTINE
198  DPLY               *EDS/CRG SYSTEM PØWER APPLICATIØN
199  RECDC                                   SCØW,RDY
200  TFLG0                                   F7,B020300
201  DPLY               *GRØUP 1,UP TØ SPEED
202  RECDC                                   SCØX,RDY
203  TFLG0                                   F8,B020600
204  DPLY               *GRØUP 2,UP TØ SPEED
205  RECDC                                   SCØY,RDY
206  TFLG0                                   F9,B020900
207  DPLY               *GRØUP 3,UP TØ SPEED
208  RECDC                                   SCØZ,RDY
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TEST-PROGRAM COMPILE OF IVAR  KAF2       SERIES = AS509        REVISION = 0000      DA
/C OAT PREPS AS509 6/10/70 REV 0

     *          ISSUE REF,CMD,SP,PITCH,YAW,AND ROLL AXIS OFF.                    05570
     209  MDS0                                MD0,-1904,-1905,-1906,-1907,       05580
                                              -1909,-1910                        05590
     *          IF FCC OPTION NOT SELECTED BRANCH TO EDS/CRG COMP.RESET           05600
     210  TFLG0                               F1,B022000                         05610
     *          IF PROGRAM DID NOT TURN ON FCC BYPASS POWER ON DATA OUTPUT        05620
     211  TFLG0                               F6,B021400                         05630
     *          FCC POWER ON DATA OUTPUT                                         05640
     212  DPLY          *FCC SYSTEM POWER APPLICATION                           05650
     213  RECDC                               SC0V,RDY                           05660
     214  DPLY          *FCC PREPS PERFORMED                                    05670
     *          IF FCC COMP.SET OPTION SELECTED,BYPASS COMP.RESET                05680
     215  TFLG1                               F3,B021800                         05690
     *          RESET FCC COMPARATORS                                            05700
     216  DIS01                          100MD0,379                            05710
     217  GOTO                                B021900                            05720
     218  DPLY          *FCC COMPARATORS REMAINED SET                           05730
     219  TFLG0                               F2,B022500                         05740
     220  DPLY          *EDS/CRG PREPS PERFORMED                                05750
     *          IF EDS/CRG COMP.SET OPTION SELECTED,BYPASS COMP.RESET            05760
     221  TFLG1                               F4,B022400                         05770
     *          RESET EDS/CRG COMPARATORS                                        05780
     222  DIS01                          100MD0,409                            05790
     223  GOTO                                B022500                            05800
     224  DPLY          *EDS/CRG COMPARATORS REMAINED SET                       05810
     *          CLEAR ALL FLAGS USED                                             05820
     225  MSFG                                F,-1,-2,-3,-4,-5,-6,-7,-8,-9       05830
     *          CLEAR ALL TABLES USED                                            05840
     226  RECDC                               SC0V                               05850
     227  RECDC                               SC0W                               05860
     228  RECDC                               SC0X                               05870
     229  RECDC                               SC0Y                               05880
     230  RECDC                               SC0Z                               05890
     231  PREM                                LDIA,LDI,ALL                       05900
     232  DPLY          KAF2 COMPLETE                                           05910
     233  RGMT1                                                                 05920
     234  GOTO                                B999998                            05930
     *          KAF2 MANUAL OPTION SELECT ROUTINE                                05940
    1000  DPLY          KAF2-PRIMARY OPTIONS. ENTER SPR AND OPTION DESIRED       05950
                            1. FCC AND EDS/CRG PREPS                            05960
                            2. FCC PREPS ONLY                                   05970
                            3. EDS/CRG PREPS ONLY                               05980
    1001  SEMIR                               4,B100200,B100500,B100800,         05990
                                              B101100                            06000
    1002  DPLY          OPTION ENTERED 1                                        06010
    1003  MSFG                                F,1,2                              06020
    1004  GOTO                                B101300                            06030
    1005  DPLY          OPTION ENTERED 2                                        06040
    1006  SFLG1                               F1                                 06050
    1007  GOTO                                B101300                            06060
    1008  DPLY          OPTION ENTERED 3                                        06070
    1009  SFLG1                               F2                                 06080
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1010  GØTØ                                B101300                    060900
1011  SEMI                                                           061000
1012  GØTØ                                B101100                    061100
1013  DPLY        SECØNDARY ØPTIØNS. ENTER SPR AND ØPTIØN DESIRED    061200
                      1. FCC AND EDS/CRG CØMPARATØRS RESET            061300
                      2. FCC CØMPARATØRS SET                          061400
                      3. EDS/CRG CØMPARATØRS SET                      061500
                      4. FCC AND EDS/CRG CØMPARATØRS SET              061600
1014  SEMIR                               5,B101500,B101800,B102300, 061700
                                          B102800,B101100            061800
1015  DPLY        ØPTIØN ENTERED 1                                    061900
1016  DPLY1                                                          062000
1017  GØTØ                                B003500                    062100
1018  DPLY        ØPTIØN ENTERED 2                                    062200
1019  TFLGØ                               F1,B102100                 062300
1020  SFLG1                               F3                         062400
1021  DPLY1                                                          062500
1022  GØTØ                                B003500                    062600
1023  DPLY        ØPTIØN ENTERED 3                                    062700
1024  TFLGØ                               F2,B102600                 062800
1025  SFLG1                               F4                         062900
1026  DPLY1                                                          063000
1027  GØTØ                                B003500                    063100
1028  DPLY        ØPTIØN ENTERED 4                                    063200
1029  TFLGØ                               F1,B103100                 063300
1030  SFLG1                               F3                         063400
1031  TFLGØ                               F2,B103300                 063500
1032  SFLG1                               F4                         063600
1033  DPLY1                                                          063700
1034  GØTØ                                B003500                    063800
*           KAF2 ERRØR RØUTINES                                      063900
*           ERRØR RØUTINE FØR LDI SCAN FAILURE                       064000
1035  DPLY                ***ERRØR***                                064100
                  CØNFIGURATIØN SCAN UNSUCCESSFUL:                   064200
1036  EXEC                                IVXF3,B185000              064300
1037  TFLGØ                               F14,B022500                064400
1038  SFLGØ                               F14                        064500
1039  GØTØ                                B003900                    064600
1040  TESTØ                               PFCC/ØN/+6D31,B104300      064700
1041  TESTØ                               PFCC/ØN/+6D41,B104300      064800
1042  GØTØ                                B004500                    064900
1043  DPLY        **FCC PØWER,+6D11,+6D31,+6D41 NØT IN SAME STATE    065000
1044  GØTØ                                B004500                    065100
1045  TESTØ                               PWH/SP/GR-1,B104900        065200
1046  TESTØ                               PWH/SP/GR-2,B104900        065300
1047  TESTØ                               PWH/SP/GR-3,B104900        065400
1048  GØTØ                                B005100                    065500
1049  DPLY        **ALL EDS/CRG UP TØ SPEED INDICATIØNS NØT ØN       065600
1050  GØTØ                                B005100                    065700
1051  DPLY        **FCC PØWER INDICATIØN DID NØT CØME ØN             065800
1052  GØTØ                                B006000                    065900
1053  DPLY        **S-1C BURN MØDE INDICATIØN DID NØT CØME ØN        066000
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EST-PRØGRAM CØMPILE ØF IVAR  KAF2         SERIES o AS509         REVISIØN o 0000     DAT
 ØAT PREPS AS509 6/10/70 REV 0

  1054  GØTØ                               B006100                                   066100
  1055  DPLY               **CSP SYSTEM PØWER INDICATIØN DID NØT CØME ØN              066200
  1056  GØTØ                               B006400                                   066300
  1057  DELY1                          5000PS-2/BURN,B006800                         066400
  1058  DPLY               **S-II BURN MØDE INDICATIØN DID NØT CØME ØN                066500
  1059  GØTØ                               B006800                                   066600
  1060  DPLY               **ALL UP TØ SPEED IND.DID NØT CØME ØN WITHIN 20 SEC        066700
  1061  GØTØ                               B009100                                   066800
  1062  DPLY               **REF.PITCH PØS.NØT WITHIN +2 TØ +6 DEG/SEC.               066900
  1063  GØTØ                               B009300                                   067000
  1064  DPLY               **CMD.PITCH PØS.NØT WITHIN 0.4 DEG/SEC.ØF REF.             067100
  1065  GØTØ                               B009500                                   067200
  1066  DPLY               **REF.PITCH NEG.NØT WITHIN -2 TØ -6 DEG/SEC.               067300
  1067  GØTØ                               B010000                                   067400
  1068  DPLY               **CMD.PITCH NEG.NØT WITHIN 0.4 DEG/SEC.ØF REF.             067500
  1069  GØTØ                               B010200                                   067600
  1070  DPLY               **EDS/CRG PITCH CØMPARATØR DID NØT SET.                    067700
  1071  GØTØ                               B010650                                   067800
  1072  DPLY               **SPARE PITCH PØS.NØT WITHIN +2 TØ +6 DEG/SEC.             067900
  1073  GØTØ                               B010900                                   068000
  1074  DPLY               **SPARE PITCH NEG.NØT WITHIN -2 TØ -6 DEG/SEC.             068100
  1075  GØTØ                               B011400                                   068200
  1076  DPLY               **S-IVB BURN MØDE INDICATIØN DID NØT CØME ØN.              068300
  1077  GØTØ                               B011800                                   068400
  *              INCREMENT RØUTINE FØR FCC TEST INPUTS .                             068500
  1078  DIS01                          1000MDØ,480                                   068600
  1079  INCX      -1      1                X3,B107800                                068700
  1080  GØTØ                               B011900                                   068800
  1081  DPLY               **FCC PITCH SERVØ CØMPARATØR DID NØT SET.                  068900
  1082  GØTØ                               B012100                                   069000
  1083  DPLY               **FCC YAW SERVØ CØMPARATØR DID NØT SET.                    069100
  1084  GØTØ                               B012500                                   069200
  1085  DPLY               **REF.YAW PØS.NØT WITHIN +2 TØ +6 DEG/SEC.                 069300
  1086  GØTØ                               B013200                                   069400
  1087  DPLY               **CMD.YAW PØS.NØT WITHIN 0.4 DEG/SEC.ØF REF.               069500
  1088  GØTØ                               B013400                                   069600
  1089  DPLY               **REF.YAW NEG.NØT WITHIN -2 TØ -6 DEG/SEC.                 069700
  1090  GØTØ                               B013900                                   069800
  1091  DPLY               **CMD.YAW NEG.NØT WITHIN 0.4 DEG/SEC.ØF REF.               069900
  1092  GØTØ                               B014100                                   070000
  1093  DPLY               **EDS/CRG YAW CØMPARATØR DID NØT SET.                      070100
  1094  GØTØ                               B014600                                   070200
  1095  DPLY               **SPARE YAW PØS.NØT WITHIN +2 TØ +6 DEG/SEC.               070300
  1096  GØTØ                               B014900                                   070400
  1097  DPLY               **SPARE YAW NEG.NØT WITHIN -2 TØ -6 DEG/SEC.               070500
  1098  GØTØ                               B015400                                   070600
  1099  DPLY               **FCC R-Y 1 SPATIAL CØMPARATØR DID NØT SET.                070700
  1100  GØTØ                               B015900                                   070800
  1101  DPLY               **FCC R-Y 2 SPATIAL CØMPARATØR DID NØT SET.                070900
  1102  GØTØ                               B016100                                   071000
  1103  DPLY               **FCC PITCH SPATIAL CØMPARATØR DID NØT SET.                071100
  1104  GØTØ                               B016500                                   071200
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1105  DPLY          **REF.RØLL PØS.NØT WITHIN +2 TØ +6 DEG/SEC.          071300
1106  GØTØ                        B017400                              071400
1107  DPLY          **CMD.RØLL PØS.NØT WITHIN 0.4 DEG/SEC.ØF REF.        071500
1108  GØTØ                        B017600                              071600
1109  DPLY          **REF.RØLL NEG.NØT WITHIN -2 TØ -6 DEG/SEC.          071700
1110  GØTØ                        B018100                              071800
1111  DPLY          **CMD.RØLL NEG.NØT WITHIN 0.4 DEG/SEC.ØF REF.        071900
1112  GØTØ                        B018300                              072000
1113  DPLY          **EDS/CRG RØLL CØMPARATØR DID NØT SET.               072100
1114  GØTØ                        B018800                              072200
1115  DPLY          **SPARE RØLL PØS.NØT WITHIN +2 TØ +6 DEG/SEC.       072300
1116  GØTØ                        B019100                              072400
1117  DPLY          **SPARE RØLL NEG.NØT WITHIN -2 TØ -6 DEG/SEC.        072500
1118  GØTØ                        B019600                              072600
*          VXF3-SUBRØUTINE WHICH ØFFERS RETRY ØR TERMINATE ØNLY         072700
185000BEGN                        IVXF3,B189998                        072800
185200DPLY          ***PRØGRAM CANNØT CØNTINUE WITH THIS ERRØR          072900
                    ***CØNDITIØN.PRØGRAM WILL TERMINATE AFTER 10        073000
                    ***SECØND DELAY UNLESS THE S-IC BURN MØDE SWITCH    073100
                    ***IS PLACED IN THE ØFF PØSITIØN BEFØRE DELAY       073200
                    ***EXPIRES.WHEN S-IC BURN MØDE SWITCH IS PLACED     073300
                    ***BACK IN AUTØ PØSITIØN,PRØGRAM WILL ENTER A RETRY 073400
185300DELY1                   10000LDI3005,B185500                    073500
135400GØTØ                        B189998                              073600
185500DPLY1         ***PRØGRAM BEING DELAYED BY CCIS PANEL ØPERATØR.     073700
                    ***PRØGRAM WILL RETRY THE FAILED CØNDITIØN WHEN     073800
                    ***THE S-IC BURN MØDE SWITCH IS RETURNED TØ AUTØ.   073900
135600SFLG1                       F14                                  074000
185700DELY0                   10000LDI3005,B185900                    074100
185800GØTØ                        B185300                              074200
185900DPLY          PRØGRAM IS RETESTING FAILED CØNDITIØN              074300
189998RETN                        IVXF3                                074400
189999SEMI          ***TEST STEP SUBSEQUENT TØ THE RETURN ØPERATØR      074500
                    ***ØF SUBRØUTINE VXF3 HAS BEEN EXECUTED.PRØGRAM     074600
                    ***IS NØW IN UNRESTRICTED SEMI.                     074700
999998TERM                                                             074800
999999END                                                              074900
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MCR-70-425

APPENDIX C

KAF2 FLIGHT CONTROL PREPS PROGRAM

WRITTEN IN A L O F T

(Phase III Presentation Material NAS10-7308)

C1

C-1

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** ST PROGRAM *KAF2* FLIGHT CONTROL PREPARATIONS FOR AS509 IMPLEMENTED USING **
     ** ALOFT___*A LANGUAGE ORIENTED TO FLIGHT ENGINEERING AND TESTING* **
                          ** DECEMBER 17,1970 **

BEGIN DICTIONARY DATA BANK _ KAF2 DISC OUTPUTS TO VEH _ .

SPECIFY _ IU ZERO COMMAND ON _ WITH ADDRESS **MD0A** AND   CHANNEL **MD0378**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ COMPARATOR RESET _ WITH ADDRESS **MD0A** AND   CHANNEL **MD0379**
       AND CONVERTED BY _ MDC CONVERSION _ .
SPECIFY _ COMMAND FCC MATRIX ENABLE _ WITH ADDRESS **MD0A** AND CHANNEL
     **MD04C8** AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ EDS COMP MNTR RESET _ WITH ADDRESS **MD0A** AND CHANNEL **MD0409**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ EDSRG  ZERO TORQUE CMD ON _ WITH ADDRESS **MD0A** AND CHANNEL
     **MD0410** AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU RAMP POSITIVE ON _ WITH ADDRESS **MD0A** AND CHANNEL **MD0480**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU RAMP POS _ WITH ADDRESS **MD0A** AND CHANNEL **MD0694**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU RAMP NEG _ WITH ADDRESS **MD0A** AND CHANNEL **MD0695**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU ST 124M _ WITH ADDRESS **MD0A** AND CHANNEL **MD01789**
       AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU CONTROL RATE GYRO _ WITH ADDRESS **MD0A** AND CHANNEL
     **MD01790** AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU YAW SELECT _ WITH ADDRESS **MD0A** AND CHANNEL **MD01799**
       AND CONVERTED BY _ MDO CONVERSION _ .
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SPECIFY _ IU ROLL SELECT _ WITH ADDRESS **MDOA** AND CHANNEL **MD01800**
AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU PITCH SELECT _ WITH ADDRESS **MDOA** AND CHANNEL **MD01801**
AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU TEST INPUT A _ WITH ADDRESS **MDOA** AND CHANNEL **MD01802**
AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU TEST INPUT B _ WITH ADDRESS **MDOA** AND CHANNEL **MD01803**
AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU SIC BURN TEST _ WITH ADDRESS **MDOA** AND CHANNEL
MD01804 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU SII BURN TEST _ WITH ADDRESS **MDOA** AND CHANNEL
MD01805 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU SIVB BURN TEST _ WITH ADDRESS **MDOA** AND CHANNEL
MD01806 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU SIVB COAST TEST _ WITH ADDRESS **MDOA** AND CHANNEL
MD01807 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU STEP ENABLE _ WITH ADDRESS **MDOA** AND CHANNEL **MD01819**
AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU FCC SYSTEM PWR _ WITH ADDRESS **MDOA** AND CHANNEL
MD01823 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU EDS RG SYS POWER _ WITH ADDRESS **MDOA** AND CHANNEL
MD01903 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU EDS RG ROLL AXIS SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MD01904 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU EDS RG YAW AXIS SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MD01905 AND CONVERTED BY _ MDO CONVERSION _ .

SPECIFY _ IU EDS RG PITCH AXIS SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MDO1906 AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU EDS RG REF GYRO SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MDO1907 AND CONVERTED BY _ MDO CONVERTION _ .
SPECIFY _ IU EDS RG CMD GYRO SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MDO1909 AND CONVERTED BY _ MDO CONVERTION _ .
SPECIFY _ IU EDS RG SPARE GYRO SEL _ WITH ADDRESS **MDOA** AND CHANNEL
MDO191C AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU SIC BURN SUB _ WITH ADDRESS **MDOA** AND CHANNEL **MDO2006**
AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU SIVB BURN SUB _ WITH ADDRESS **MDOA** AND CHANNEL
MDO2007 AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU SIVB COAST SUB _ WITH ADDRESS **MDOA** AND CHANNEL
MDO2008 AND CONVERTED BY _ MDO CONVERSION _ .
SPECIFY _ IU SII BURN SUB _ WITH ADDRESS **MDOA** AND CHANNEL **MDO2009**
AND CONVERTED BY _ MDO CONVERSION _ .

DICTIONARY DATA BANK _ KAF2 DISC OUTPUTS TO VEH _ COMPLETE .

```
BEGIN DICTIONARY DATA BANK _ DDAS SIGNAL FUNCTIONS _ .

SPECIFY _ S1C/BURN _ WITH ADDRESS **DP1A0-12J10-01** AND CHANNEL **12J10**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ S2 BURN _ WITH ADDRESS **DP1A0-12J07-06** AND CHANNEL **12J07**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ S4B BURN _ WITH ADDRESS **DP1A0-12J02-01** AND CHANNEL **12J02**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ P/SERVO/COMP _ WITH ADDRESS **DP1A0-12J03-01** AND CHANNEL **12J03**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ Y/SERVO/COMP _ WITH ADDRESS **DP1A0-12J04-01** AND CHANNEL **12J04**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ P/SPAT/COMP _ WITH ADDRESS **DP1A0-12J06-01** AND CHANNEL **12J06**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ R-Y1/SP/COMP _ WITH ADDRESS **DP1A0-12J05-01** AND CHANNEL **12J05**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ R-Y2/SP/COMP _ WITH ADDRESS **DP1A0-12J07-01** AND CHANNEL **12J07**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ FCC/ON/+6D11 _ WITH ADDRESS **DP1A0-12J01-03** AND CHANNEL **12J01**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ FCC/ON/+6D31 _ WITH ADDRESS **DP1A0-12J01-04** AND CHANNEL **12J01**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ FCC/ON/+6D41 _ WITH ADDRESS **DP1A0-12J01-05** AND CHANNEL **12J01**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
SPECIFY _ ROLL/COMP _ WITH ADDRESS **DP1A0-12J08-02** AND CHANNEL **12J08**
          AND STATE CONVERTED BY _ DDAS CONVERSION _ .
```

SPECIFY _ YAW/COMP _ WITH ADDRESS **DP1AC-12J08-03** AND CHANNEL **12J08**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ PITCH/COMP _ WITH ADDRESS **DP1AC-12J08-04** AND CHANNEL **12J08**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ REF/ROLL _ WITH ADDRESS **DP1AC-03-05-00** AND CHANNEL **03-05**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ REF/YAW _ WITH ADDRESS **DP1AC-03-04-00** AND CHANNEL **03-04**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ REF/PITCH _ WITH ADDRESS **DP1AC-03-06-00** AND CHANNEL **03-06**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ CMD/ROLL _ WITH ADDRESS **CP1AC-03-03-00** AND CHANNEL **03-03**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ CMD/YAW _ WITH ADDRESS **CP1AC-03-02-00** AND CHANNEL **03-02**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ CMD/PITCH _ WITH ADDRESS **CP1AC-03-01-00** AND CHANNEL **03-01**
AND VALUE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ CSP/POWER/ON _ WITH ADDRESS **DP1AC-12J01-06** AND CHANNEL **12J01**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ WH/SP/GR-1 _ WITH ADDRESS **DP1AC-12J08-05** AND CHANNEL **12J08**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ WH/SP/GR-2 _ WITH ADDRESS **DP1AC-12J08-06** AND CHANNEL **12J08**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

SPECIFY _ WH/SP/GR-3 _ WITH ADDRESS **DP1AC-12J08-07** AND CHANNEL **12J08**
AND STATE CONVERTED BY _ DDAS CONVERSION _ .

DICTIONARY DATA BANK _ DDAS SIGNAL FUNCTIONS _ COMPLETE .

```
BEGIN DICTIONARY DATA BANK_DISCRETE I/O FROM ESE PANELS_.

SPECIFY_IU ZERO COMD LDI_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI0378''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU RAMP POSITIVE LDI_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI0480''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU RAMP NEGATIVE LDI_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI0481''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU ST-124M ON_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2570''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU CONTROL RATE GYRO ON_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2572''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU CONTROL RATE GYRO OFF_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2573''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU YAW SELECT ON_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2590''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU YAW SELECT OFF_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2591''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU ROLL SELECT ON_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2592''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU ROLL SELECT OFF_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2593''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU PITCH SELECT ON_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2594''
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU PITCH SELECT OFF_WITH ADDRESS ''LDIA'' AND CHANNEL ''LDI2595''
       AND CONVERTED BY _LDI CONV_.
```

```
SPECIFY_IU TEST INPUT A ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2596**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU TEST INPUT B ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2598**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU TEST INPUT B OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2599**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IC BURN TEST ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2600**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-II BURN TEST ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2602**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IVB BURN TEST ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2604**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IVB COAST TEST ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2606**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IVB COAST TEST OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2607**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU STEP ENABLE ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2630**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU STEP ENABLE OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2631**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU GUIDANCE FAILURE SUB ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2662**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU SPACECRAFT CONTROL ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2664**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IC BURN SUB ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI3004**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IC BURN SUB OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI3005**
       AND CONVERTED BY _LDI CONV_.
```

```
SPECIFY_IU S-IVB BURN SUB ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI3006**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IVB BURN SUB OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI3007**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-IVB COAST SUB ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI3008**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-II BURN SUB ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI3010**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU S-II BURN SUB OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI3011**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU FCC SYSTEM PWR OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2639**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IVB AUX HYD PUMP POWER_WITH ADDRESS **LDOA** AND CHANNEL **LDO1705**
       AND CONVERTED BY _LDO CONV_.
SPECIFY_IVB APS 2 ENG VALVE PWR_WITH ADDRESS **LDOA** AND CHANNEL **LDO1855**
       AND CONVERTED BY _LDO CONV_.
SPECIFY_IVB APS 1 ENG VALVE PWR_WITH ADDRESS **LDOA** AND CHANNEL **LDO1937**
       AND CONVERTED BY _LDO CONV_.
SPECIFY_IU EDSRG ZERO TORQUE CMD LDI_WITH ADDRESS **LDIA** AND CHANNEL
       **LDI0410** AND CONVERTED BY _LDI CONV_.
SPECIFY_IU RAMP POS LDI_WITH ADDRESS **LDIA** AND CHANNEL **LDI0694**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU RAMP NEG LDI_WITH ADDRESS **LDIA** AND CHANNEL **LDI0695**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU EDS RG SYSTEM POWER OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2799**
       AND CONVERTED BY _LDI CONV_.
SPECIFY_IU EDS RG ROLL AXIS SEL ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2800**
       AND CONVERTED BY _LDI CONV_.
```

SPECIFY_IU EDS RG ROLL AXIS SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL
LDI2801 AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG YAW AXIS SEL ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2802**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG YAW AXIS SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2803**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG PITCH AXIS SEL ON_WITH ADDRESS **LDIA** AND CHANNEL
LDI2804 AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG PITCH AXIS SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL
LDI2805 AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG REF GYRO SEL ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2806**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG REF GYRO SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2807**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG CMD GYRO SEL ON_WITH ADDRESS **LDIA** AND CHANNEL **LDI2810**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG CMD GYRO SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL **LDI2811**
AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG SPARE GYRO SEL ON_WITH ADDRESS **LDIA** AND CHANNEL
LDI2812 AND CONVERTED BY _LDI CONV_.

SPECIFY_IU EDS RG SPARE GYRO SEL OFF_WITH ADDRESS **LDIA** AND CHANNEL
LDI2813 AND CONVERTED BY _LDI CONV_.

```
SPECIFY_FLAG 25_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 26_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 27_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 28_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 37_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 38_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 39_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.
SPECIFY_FLAG 47_WITH ADDRESS **FLAG** USING FUNCTION CODE **STATE**
        AND STATE CONVERTED BY_FLAG CONVERSION_.

SPECIFY _TERMINATE_ WITH ADDRESS XXXXXX USING FUNCTION CODE YYYYYY   AND STATE
        CONVERTED BY _ INTERRUPT _.

DICTIONARY DATA BANK_DISCRETE I/O FROM ESE PANELS_COMPLETE.
```

```
BEGIN DICTIONARY DATA BANK _ INPUT/OUTPUT DEVICES _.

SPECIFY  _CRT 1.LINE 1_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 2_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 3_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 4_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 5_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 6_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 7_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 8_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY  _CRT 1.LINE 9_ WITH ADDRESS XXXXXX USING FUNCTION CODE  A12   AND VALUE
       CONVERTED BY _ CRT DISPLAY _ .
SPECIFY _CRT 1.LINE 10_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _.
SPECIFY _CRT 1.LINE 11_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _.
SPECIFY _CRT 1.LINE 12_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _.
SPECIFY _CRT 1.LINE 13_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _.
```

C12


```
SPECIFY _CRT 1•LINE 14_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 15_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 16_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 17_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 18_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 19_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 20_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 21_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _CRT 1•LINE 22_ WITH ADDRESS XXXXXX USING FUNCTION CODE A12 AND VALUE
       CONVERTED BY _ CRT DISPLAY _•
SPECIFY _PRINTER_ WITH ADDRESS XXXXXX USING FUNCTION CODE YYYYYY AND VALUE
     CONVERTED BY _PRINTER FORMAT_•
SPECIFY _MAG TAPE_ WITH ADDRESS XXXXXX USING FUNCTION CODE YYYYYY AND VALUE
     CONVERTED BY _MAG TAPE FORMAT_•

DICTIONARY DATA BANK _ INPUT/OUTPUT DEVICES _ COMPLETE•
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C14

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BEGIN PROGRAM_KAF2_**FLIGHT CONTROL PREPARATIONS FOR AS509**.

    USE DICTIONARY DATA BANK_ KAF2 DISC OUTPUTS TO VEH _.
                           _ DDAS SIGNAL FUNCTIONS _.
                           _DISCRETE I/O FROM ESE PANELS_.
                           _ INPUT/OUTPUT DEVICES _.

    DECLARE _CSP POWER ON TIME_ TIME.                          **SCOW**
    DECLARE _GR-1 UP-TO-SPEED INDICATION TIME_ TIME.           **SCOX**
    DECLARE _GR-2 UP-TO-SPEED INDICATION TIME_ TIME.           **SCOY**
    DECLARE _GR-3 UP-TO-SPEED INDICATION TIME_ TIME.           **SCOZ**
    DECLARE _FCC POWER ON TIME_ TIME.                          **SCOV**
    DECLARE _T2_ TIME.
    DECLARE _TEST COMPLETE TIME_ TIME.
    DECLARE _PR1_ NUMERIC.
    DECLARE _PR2_ NUMERIC.
    DECLARE _PR3_ NUMERIC.
    DECLARE _PR4_ NUMERIC.
    DECLARE _PR5_ NUMERIC.
    DECLARE _PR6_ NUMERIC.
    DECLARE _INDEX_ NUMERIC.

    REPLACE _T1_ FOR _FCC POWER ON TIME_.
```

DECLARE TABLE_FC PREPS SCAN_ WITH 4 COLUMNS INDEXED BY_CN_LABELED ROW NUMBER• FUNCTION• UNITS• _STATE_BOOLEAN HAVING ROWS INDEXED BY_RN_WITH ENTRIES

••	LDI NO.	FCC SCAN LDIS			••
1•	••0378••_IU	ZERO COMD LDI_•	ON/OFF•	OFF	AND
2•	••0480••_IU	RAMP POSITIVE LDI_•	ON/OFF•	OFF	AND
3•	••0481••_IU	RAMP NEGATIVE LDI_•	ON/OFF•	OFF	AND
4•	••2570••_IU	ST-124M ON_•	ON/OFF•	OFF	AND
5•	••2572••_IU	CONTROL RATE GYRO ON_•	ON/OFF•	OFF	AND
6•	••2573••_IU	CONTROL RATE GYRO OFF_•	ON/OFF•	OFF	AND
7•	••2590••_IU	YAW SELECT ON_•	ON/OFF•	OFF	AND
8•	••2591••_IU	YAW SELECT OFF_•	ON/OFF•	OFF	AND
9•	••2592••_IU	ROLL SELECT ON_•	ON/OFF•	OFF	AND
10•	••2593••_IU	ROLL SELECT OFF_•	ON/OFF•	OFF	AND
11•	••2594••_IU	PITCH SELECT ON_•	ON/OFF•	OFF	AND
12•	••2595••_IU	PITCH SELECT OFF_•	ON/OFF•	OFF	AND
13•	••2596••_IU	TEST INPUT A ON_•	ON/OFF•	OFF	AND
14•	••2598••_IU	TEST INPUT B ON_•	ON/OFF•	OFF	AND
15•	••2599••_IU	TEST INPUT B OFF_•	ON/OFF•	OFF	AND
16•	••2600••_IU	S-IC BURN TEST ON_•	ON/OFF•	OFF	AND
17•	••2602••_IU	S-II BURN TEST ON_•	ON/OFF•	OFF	AND
18•	••2604••_IU	S-IVB BURN TEST ON_•	ON/OFF•	OFF	AND
19•	••2606••_IU	S-IVB COAST TEST ON_•	ON/OFF•	OFF	AND
20•	••2607••_IU	S-IVB COAST TEST OFF_•	ON/OFF•	OFF	AND

•

21.	**2630**_IU STEP ENABLE ON_.	ON/OFF.	OFF	AND
22.	**2631**_IU STEP ENABLE OFF_.	ON/OFF.	OFF	AND
23.	**2662**_IU GUIDANCE FAILURE SUB ON_.	ON/OFF.	OFF	AND
24.	**2664**_IU SPACECRAFT CONTROL ON_.	ON/OFF.	OFF	AND
25.	**3004**_IU S-IC BURN SUB ON_.	ON/OFF.	OFF	AND
26.	**3005**_IU S-IC BURN SUB OFF_.	ON/OFF.	OFF	AND
27.	**3006**_IU S-IVB BURN SUB ON_.	ON/OFF.	OFF	AND
28.	**3007**_IU S-IVB BURN SUB OFF_.	ON/OFF.	OFF	AND
29.	**3008**_IU S-IVB COAST SUB ON_.	ON/OFF.	OFF	AND
30.	**3010**_IU S-II BURN SUB ON_.	ON/OFF.	OFF	AND
31.	**3011**_IU S-II BURN SUB OFF_.	ON/OFF.	OFF	AND
32.	**2639**_IU FCC SYSTEM PWR OFF_.	ON/OFF.	OFF	AND

** LDO NO. FCC SCAN LDOS **

33.	**1705**_IVB AUX HYD PUMP POWER_.	ON/OFF.	OFF	AND
34.	**1855**_IVB APS 2 ENG VALVE PWR_.	ON/OFF.	OFF	AND
35.	**1937**_IVB APS 1 ENG VALVE PWR_.	ON/OFF.	OFF	AND

	LDI NO.	EDS/CRG SCAN LDIS			
36.	** 410**	_IU EDSRG ZERO TORQUE CMD LDI_.	ON/OFF.	OFF	AND
37.	** 694**	_IU RAMP POS LDI_.	ON/OFF.	OFF	AND
38.	** 695**	_IU RAMP NEG LDI_.	ON/OFF.	OFF	AND
39.	**2799**	_IU EDS RG SYSTEM POWER OFF_.	ON/OFF.	OFF	AND
40.	**2800**	_IU EDS RG ROLL AXIS SEL ON_.	ON/OFF.	OFF	AND
41.	**2801**	_IU EDS RG ROLL AXIS SEL OFF_.	ON/OFF.	OFF	AND
42.	**2802**	_IU EDS RG YAW AXIS SEL ON_.	ON/OFF.	OFF	AND
43.	**2803**	_IU EDS RG YAW AXIS SEL OFF_.	ON/OFF.	OFF	AND
44.	**2804**	_IU EDS RG PITCH AXIS SEL ON_.	ON/OFF.	OFF	AND
45.	**2805**	_IU EDS RG PITCH AXIS SEL OFF_.	ON/OFF.	OFF	AND
46.	**2806**	_IU EDS RG REF GYRO SEL ON_.	ON/OFF.	OFF	AND
47.	**2807**	_IU EDS RG REF GYRO SEL OFF_.	ON/OFF.	OFF	AND
48.	**2810**	_IU EDS RG CMD GYRO SEL ON_.	ON/OFF.	OFF	AND
49.	**2811**	_IU EDS RG CMD GYRO SEL OFF_.	ON/OFF.	OFF	AND
50.	**2812**	_IU EDS RG SPARE GYRO SEL ON_.	ON/OFF	OFF	AND
51.	**2813**	_IU EDS RG SPARE GYRO SEL OFF_.	ON/OFF.	OFF	.

DECLARE_FC FLAG TABLE_WITH 9 COLUMNS INDEXED BY_SC_AND LABELED ROW NUMBER, FUNCTION, UNITS,_ST1_BOOLEAN,_ST2_BOOLEAN,_ST3_BOOLEAN,_ST4_BOOLEAN,_ST5_BOOLEAN,_ST6_BOOLEAN, HAVING 8 ROWS INDEXED BY_FR_WITH ENTRIES

**FR	FUNCTION	UNITS	ST1	ST2	ST3	ST4	ST5	ST6	**
1,	_FLAG 25_,	ON/OFF,	ON,	OFF,	OFF,	OFF,	OFF,	OFF	AND
2,	_FLAG 26_,	ON/OFF,	OFF,	ON,	OFF,	OFF,	OFF,	OFF	AND
3,	_FLAG 27_,	ON/OFF,	OFF,	CFF,	OFF,	OFF,	OFF,	OFF	AND
4,	_FLAG 28_,	ON/OFF,	OFF,	OFF,	OFF,	OFF,	OFF,	OFF	AND
5,	_FLAG 37_,	ON/OFF,	OFF,	OFF,	OFF,	ON,	OFF,	OFF	AND
6,	_FLAG 38_,	ON/OFF,	OFF,	OFF,	OFF,	OFF,	ON,	OFF	AND
7,	_FLAG 39_,	ON/OFF,	OFF,	OFF,	OFF,	OFF,	OFF,	ON	AND
9,	_FLAG 47_,	ON/OFF,	ON,	ON,	ON,	ON,	ON,	ON	.

```
DECLARE_FLAG 1_BOOLEAN = OFF.
DECLARE_FLAG 2_BOOLEAN = OFF.
DECLARE_FLAG 3_BOOLEAN = OFF.
DECLARE_FLAG 4_BOOLEAN = OFF.
DECLARE_FLAG 5_BOOLEAN = OFF.
DECLARE_FLAG 6_BOOLEAN = OFF.
DECLARE_FLAG 7_BOOLEAN = OFF.
DECLARE_FLAG 8_BOOLEAN = OFF.
DECLARE_FLAG 9_BOOLEAN = OFF.
DECLARE_FLAG 10_BOOLEAN = OFF.
DECLARE_FLAG 11_BOOLEAN = OFF.
DECLARE_FLAG 12_BOOLEAN = OFF.
DECLARE_FLAG 13_BOOLEAN = OFF.
DECLARE_FLAG 14_BOOLEAN = OFF.
```

DECLARE TABLE _KAF2 TERM FUNCTIONS_ WITH 4 COLUMNS INDEXED BY_KN_ LABELED

ROW NUMBER.	FUNCTION.	UNITS.	_STATE_ BOOLEAN	
HAVING 24 ROWS INDEXED BY_FN_ WITH ENTRIES				
** 1	MDO NO. 2	3	4	**
1.	**0480**_ IU RAMP POSITIVE ON _.	ON/OFF.	OFF	AND
2.	**0694**_ IU RAMP POS _.	ON/OFF.	OFF	AND
3.	**0695**_ IU RAMP NEG _.	ON/OFF.	OFF	AND
4.	**1790**_ IU CONTROL RATE GYRO _.	ON/OFF.	OFF	AND
5.	**1799**_ IU YAW SELECT _.	ON/OFF.	OFF	AND
6.	**1801**_ IU PITCH SELECT _.	ON/OFF.	OFF	AND
7.	**1803**_ IU TEST INPUT B _.	ON/OFF.	OFF	AND
8.	**1807**_ IU SIVB COAST TEST _.	ON/OFF.	OFF	AND
9.	**1819**_ IU STEP ENABLE _.	ON/OFF.	OFF	AND
10.	**1904**_ IU EDS RG ROLL AXIS SEL _.	ON/OFF.	OFF	AND
11.	**1905**_ IU EDS RG YAW AXIS SEL _.	ON/OFF.	OFF	AND
12.	**1906**_ IU EDS RG PITCH AXIS SEL _.	ON/OFF.	OFF	AND
13.	**1907**_ IU EDS RG REF GYRO SEL _.	ON/OFF.	OFF	AND
14.	**1910**_ IU EDS RG SPARE GYRO SEL _.	ON/OFF.	OFF	AND
15.	**2006**_ IU SIC BURN SUB _.	ON/OFF.	OFF	AND
16.	**2007**_ IU SIVB BURN SUB _.	ON/OFF.	OFF	AND
17.	**2008**_ IU SIVB COAST SUB _.	ON/OFF.	OFF	AND
18.	**2009**_ IU SII BURN SUB _.	ON/OFF.	ON	AND
19.	**2009**_ IU SII BURN SUB _.	ON/OFF.	OFF	AND
20.	**0378**_ IU ZERO COMD ON _.	ON/OFF.	ON	AND
21.	**0410**_ IU EDSRG ZERO TORQUE CMD ON _.	ON/OFF.	ON	AND
22.	**0378**_ IU ZERO COMD ON _.	ON/OFF.	OFF	AND
23.	**0410**_ IU EDSRG ZERO TORQUE CMD ON _.	ON/OFF.	OFF	AND
24.	**1909**_ IU EDS RG CMD GYRO SEL _.	ON/OFF.	OFF	.

```
BEGIN_RETRY OR TERMINATE_.**IVXF3**

        DISPLAY TEXT
        (***PROGRAM CANNOT CONTINUE WITH THIS ERROR)          ON_CRT 1,LINE 1_.
        DISPLAY TEXT
        (***CONDITION. PROGRAM WILL TERMINATE AFTER 10)       ON_CRT 1,LINE 2_.
        DISPLAY TEXT
        (***SECOND DELAY UNLESS THE SIC BURN MODE SWITCH)     ON_CRT 1,LINE 3_.
        DISPLAY TEXT
        (***IS PLACED IN THE OFF POSITION BEFORE DELAY)       ON_CRT 1,LINE 4_.
        DISPLAY TEXT
        (***EXPIRES. WHEN SIC BURN MODE SWITCH IS PLACED)     ON_CRT 1,LINE 5_.
        DISPLAY TEXT
        (***BACK IN AUTO POSITION, PROGRAM WILL ENTER A RETRY.)ON_CRT 1,LINE 6_.
S185300 VERIFY_IU SIC BURN SUB OFF_IS ON WITHIN 10SEC                **LDI3005**
             OTHERWISE GOTO S189998.
        DISPLAY_CRT 1 CLEAR_.
        DISPLAY TEXT
        (***PROGRAM BEING DELAYED BY CCIS PANEL OPERATOR.)    ON_CRT 1,LINE 1_.
        DISPLAY TEXT
        (***PROGRAM WILL RETRY THE FAILED CONDITION WHEN)     ON_CRT 1,LINE 2_.
        DISPLAY TEXT
        (***THE SIC BURN MODE SWITCH IS RETURNED TO AUTO.)    ON_CRT 1,LINE 3_.
```

```
S185600 ASSIGN_FLAG 14_ON.
S185700 VERIFY_IU SIC BURN SUB OFF_IS OFF WITHIN 10SEC                **LDI3005**
             OTHERWISE GOTO S185300.
        DISPLAY TEXT
        (PROGRAM IS RETESTING FAILED CONDITION) ON_CRT 1.LINE 4_.

S189998 END_RETRY OR TERMINATE_.

S189999 REQUEST TEXT (***TEST STEP SUBSEQUENT TO THE RETURN OPERATOR***) ON
          _CRT 1.LINE 1_.
        REQUEST TEXT (***OF SUBROUTINE VXF3 HAS BEEN EXECUTED. PROGRAM***) ON
          _CRT 1.LINE 2_.
        REQUEST TEXT (***IS NOW IN UNRESTRICTED SEMI***) ON _CRT 1.LINE 3_.
```

```
S000100 BEGIN CRITICAL _TERMINATION SUBROUTINE_ WITH INPUT _TERM TABLE_.
S000200 APPLY _TERMINATION TABLE_ FUNCTIONS _STATE_.
S000300 DISPLAY _PROG NAME_, TEXT (HAS BEEN FORCIBLY TERMINATED) ON
            _CONSOLE CODE_.
S000400 END CRITICAL _TERMINATION SUBROUTINE_.
```

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S100000 WHEN INTERRUPT _TERMINATE_ OCCURS THEN PERFORM _TERMINATION SUBROUTINE_
            WITH INPUT  _KAF2 TERM FUNCTIONS_.

S100100 ENABLE _TERMINATE_.

**STEPS 6 THRU 12 IN KAF2 ATOLL PROG NOT REQUIRED IN ALOFT AS TABLES AND FLAGS
    ARE NOT DEDICATED STORAGE LOCATIONS . FLAGS*SET*IN ATOLL ARE*ASSIGNED*IN
    ALOFT . EXTERNAL FLAGS MUST BE SPECIFIED WHILE INTERNAL FLAGS MUST BE
    DECLARED . **

S100200 DISPLAY _CRT 1. CLEAR_.

        **START FLAG SET UP ROUTINE**

        VERIFY_FLAG 47_IS ON OTHERWISE GO TO S101000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST1_THEN GO TO S201000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST2_THEN GO TO S202000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST3_THEN GO TO S203000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST4_THEN GO TO S204000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST5_THEN GO TO S205000.
        VERIFY_FC FLAG TABLE_FUNCTIONS ARE EQUAL TO_ST6_THEN GO TO S206000.
```

```
S101000 DISPLAY TEXT
          (KAF2 MANUAL OPTION SELECT ROUTINE) ON_CRT 1,LINE 1_.
        DISPLAY TEXT
          (       KAF2 PRIMARY OPTIONS. ENTER OPTION DESIRED) ON_CRT 1,LINE 2_.
        DISPLAY TEXT
          (              1. FCC AND EDS/CRG PREPS) ON_CRT 1,LINE 3_.
        DISPLAY TEXT
          (              2. FCC PREPS ONLY) ON_CRT 1,LINE 3_.
        DISPLAY TEXT
          (              3. EDS/CRG PREPS ONLY) ON_CRT 1,LINE 4_.
S102000 REQUEST TEXT
          (                    TYPE 1, 2, OR 3) ON_CRT 1,LINE 5_
          AND SAVE AS_PRIME OPTION_.
        DISPLAY_CRT 1,LINE 6 CLEARED_.
        IF_PRIME OPTION_IS EQUAL TO 1 THEN GO TO S105000.
        IF_PRIME OPTION_IS EQUAL TO 2 THEN GO TO S106000.
        IF_PRIME OPTION_IS EQUAL TO 3 THEN GO TO S107000.
        DISPLAY TEXT
          (                    INPUT ERROR) ON_CRT 1,LINE 6_.
        GO TO S102000.
S105000 DISPLAY TEXT
          (              OPTION 1 SELECTED) ON_CRT 1,LINE 6_.
        ASSIGN_FLAG 1_ON.
        ASSIGN_FLAG 2_ON.
        GO TO S110000.
```

```
S106000 DISPLAY TEXT
          (              OPTION 2 SELECTED) ON_CRT 1.LINE 6_.
        ASSIGN_FLAG 1_ON
        GO TO S110000.
S107000 DISPLAY TEXT
          (              OPTION 3 SELECTED) ON_CRT 1.LINE 6_.
        ASSIGN_FLAG 2_ON
        GO TO S110000.
S110000 DISPLAY TEXT
          (       KAF2 SECONDARY OPTIONS. ENTER OPTION DESIRED) ON_CRT 1.LINE 8_
        DISPLAY TEXT
          (              1. FCC AND EDS/CRG COMPARATORS RESET) ON_CRT 1.LINE 9_.
        DISPLAY TEXT
          (              2. FCC COMPARATORS SET) ON_CRT 1.LINE 10_.
        DISPLAY TEXT
          (              3. EDS/CRG COMPARATORS SET) ON_CRT 1.LINE 11_.
        DISPLAY TEXT
          (              4. FCC AND EDS/CRG COMPARATORS SET) ON_CRT 1.LINE 12_.
S112000 REQUEST TEXT
          (                    TYPE 1, 2, 3, OR 4) ON_CRT 1.LINE 13_AND
        SAVE AS_SECONDARY OPTION_.
        DISPLAY_CRT 1.LINE 14 CLEARED_.
        IF_SECONDARY OPTION_IS EQUAL TO 1 THEN GO TO S115000.
        IF_SECONDARY OPTION_IS EQUAL TO 2 THEN GO TO S116000.
        IF_SECONDARY OPTION_IS EQUAL TO 3 THEN GO TO S117000.
        IF_SECONDARY OPTION_IS EQUAL TO 4 THEN GO TO S117000.
        DISPLAY TEXT
          (                    INPUT ERROR) ON_CRT 1.LINE 14_.
        GO TO S112000.
```

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```
S115000 DISPLAY TEXT
          (                SECONDARY OPTION 1 ENTERED) ON_CRT 1•LINE 13_•
        GO TO S300000•
S116000 DISPLAY TEXT
          (                SECONDARY OPTION 2 ENTERED) ON_CRT 1•LINE 13_•
        IF_FLAG 1_IS OFF GO TO S300000•
        ASSIGN_FLAG 3_ON•
        GO TO S300000•
S117000 DISPLAY TEXT
          (                SECONDARY OPTION 3 ENTERED) ON_CRT 1•LINE 13_•
        IF_FLAG 2_IS OFF GO TO S3000000•
        ASSIGN_FLAG 4_ON•
        GO TO S300000•
S118000 DISPLAY TEXT
          (                SECONDARY OPTION 4 ENTERED) ON_CRT 1•LINE 13_•
        IF_FLAG 1_IS OFF GO TO S118400•
        ASSIGN_FLAG 3_ON•
S118400 IF_FLAG 2_IS OFF GO TO S300000•
        ASSIGN_FLAG 4_ON•
        GO TO S300000•
S201000 ASSIGN_FLAG 1_ON•
        GO TO S300000•
S202000 ASSIGN_FLAG 2_ON•
        GO TO S300000•
S203000 ASSIGN_FLAG 1_ON•
        ASSIGN_FLAG 2_ON•
        GO TO S300000•
```

Too many characters

```
S204000 ASSIGN_FLAG 1_ON.
        ASSIGN_FLAG 2_ON.
        ASSIGN_FLAG 4_ON.
        GO TO S300000.
S205000 ASSIGN_FLAG 1_ON.
        ASSIGN_FLAG 2_ON.
        ASSIGN_FLAG 3_ON.
        GO TO S300000.
S206000 ASSIGN_FLAG 1_ON.
        ASSIGN_FLAG 2_ON.
        ASSIGN_FLAG 3_ON.
        ASSIGN_FLAG 4_ON.
```

```
S300000 ACTIVATE_FC PREPS SCAN_ALL.
S300100 IF_FLAG 1_IS ON GO TO S300500.
        LET_RN_=1.
S300110 DEACTIVATE_FC PREPS SCAN_ROW(_RN_).
        LET_RN_=_RN_+1.
        IF_RN_IS LESS THAN 36 THEN GO TO S300110.
        GO TO S300600.
S300500 IF_FLAG 2_IS ON GO TO S300600.
        LET_RN_=36.
S300510 DEACTIVATE_FCC PREPS SCAN_ROW(_RN_).
        LET_RN_=_RN_+1.
        IF_RN_IS LESS THAN 52 GO TO S300510.
S300600 VERIFY_FC PREPS SCAN_FUNCTIONS ARE EQUAL TO_STATE_OTHERWISE GO TO
          S600000.
S300700 IF_FLAG 1_ IS OFF THEN GO TO S301500.
S300800 VERIFY _ FCC/ON/+6011 _ IS OFF OTHERWISE GOTO S327200.
S300900 READ GMT INTO _FCC POWER ON TIME_.
S301000 TURN _ IU FCC SYSTEM PWR _ ON.                          **MD01823**
S301100 DISPLAY _CRT 1 CLEAR_.
S301200 DISPLAY TEXT ( IU FCC SYSTEM PWR ON ) ON  _CRT 1.LINE 1_.
S301300 ASSIGN _FLAG 6_ **FCC POWERED ON BY PROGRAM** ON.
S301400 IF_FLAG 2_ IS OFF THEN GOTO S302100.
S301500 VERIFY _ CSP/POWER/ON _ IS OFF OTHERWISE GOTO S327700.
S301600 READ GMT INTO _CSP POWER ON TIME_.
S301700 TURN _ IU EDS RG SYS POWER _ ON.                        **MD01903**
S301800 DISPLAY TEXT (IU EDS RG SYS POWER ON) ON _CRT 1.LINE 2_.
S301900 ASSIGN _FLAG 5_ **CSP POWERED ON BY PROGRAM** ON.
S302000 IF_FLAG 1_ IS OFF THEN GOTO S304500.
```

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```
S302100 TURN _ IU ZERO COMMAND _ ON FOR 100MSEC.                    **MD0378**
S302200 TURN _ IU ST-124M _ OFF.                                    **MD01789**
S302300 TURN _ IU CONTROL RG _ ON.                                  **MD01790**
S302400 TURN _ IU YAW SELECT _ OFF.                                 **MD01799**
S302500 TURN _ IU ROLL SELECT _ OFF.                                **MD01800**
S302600 TURN _ IU PITCH SELECT _ ON.                                **MD01801**
S302700 TURN _ IU TEST INPUT A _ OFF.                               **MD01802**
S302800 TURN _ IU TEST INPUT B _ ON.                                **MD01803**
S302900 TURN _ IU SIC BURN TEST _ OFF.                              **MD01804**
S303000 TURN _ IU SII BURN TEST _ OFF.                              **MD01805**
S303100 TURN _ IU SIVB BURN TEST _ OFF.                             **MD01806**
S303200 TURN _ IU SIVB COAST TEST _ OFF.                            **MD01807**
S303300 TURN _ IU STEP ENABLE _ ON.                                 **MD01819**
S303400 TURN _ IU SIVB BURN SUB _ OFF.                              **MD02007**
S303500 TURN _ IU SIVB COAST SUB _ OFF.                             **MD02008**
S303600 TURN _ IU SII BURN SUB _ OFF.                               **MD02009**
S303700 DISPLAY TEXT (FCC MODE CHECKS IN PROGRESS) ON _CRT 1•LINE 3_.
S303800 TURN _ IU SIC BURN SUB _ ON FOR 100MSEC.                    **MD02006**
S303900 VERIFY _ FCC/ON/•6011 _ IS OFF THEN GOTO S328300.
S304000 VERIFY _ FCC/ON/•6031 _ IS OFF THEN GOTO S328300.
S304100 VERIFY _ FCC/ON/•6041 _ IS OFF THEN GOTO S328300.
S304200 VERIFY _ SIC BURN SUB _ IS OFF THEN GOTO S328500.
S304300 TURN _ IU SII BURN SUB _ ON.                                **MD02009**
S304400 IF _FLAG 2_ IS OFF THEN GOTO S305600.
S304500 VERIFY _ CSP/POWER/ON _ IS OFF THEN GOTO S328700.
S304600 DISPLAY TEXT (GYRO RAMP EXERCISE AND COMPARATOR SET IN PROGRESS) ON
          _CRT 1•LINE 4_.
```

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```
S304800 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.          **MD0410**
S304900 TURN _ IU EDS RG ROLL AXIS SEL _ OFF.                       **MD01904**
S305000 TURN _ IU EDS RG YAW AXIS SEL _ OFF.                        **MD01905**
S305100 TURN _ IU EDS RG PITCH AXIS SEL _ ON.                       **MD01906**
S305200 TURN _ IU EDS RG REF GYRO SEL _ ON.                         **MD01907**
S305300 TURN _ IU EDS RG CMD GYRO SEL _ ON.                         **MD01909**
S305400 TURN _ IU EDS RG SPARE GYRO SEL _ OFF.                      **MD01910**
S305500 IF_FLAG 1_ IS OFF THEN GOTO S306700.
S305600 VERIFY _ S2 BURN _ IS OFF THEN GOTO S328900.
S305700 TURN _ IU SIVB BURN SUB _ ON.                               **MD02007**
S305800 TURN _ IU SII BURN SUB _ OFF.                               **MD02009**
S305900 LET _INDEX_ = 1.
S306000 READ GMT INTO _T2_.
S306100 IF _T2_ IS LESS THAN _T1_ + 8SEC THEN GOTO S306300.
S306200 GOTO S306600.
S306300 TURN_ IU RAMP POSITIVE _ ON FOR 1SEC.                       **MD0480**
S306400 LET _INDEX_=_INDEX_+ 1.
S306500 IF_INDEX_+1 IS LESS THAN 6 THEN GOTO S306100.
S306600 IF_FLAG 2_ IS OFF THEN GOTO S329200.
S306700 IF_FLAG 5_ IS OFF THEN GOTO S308600.
S306800 IF_FLAG 7_ IS ON THEN GOTO S307200.
S306900 VERIFY _ WH/SP/GR-1 _ IS ON OTHERWISE GOTO S307200.
S307000 READ GMT INTO _GR-1 UP-TO-SPEED INDICATION TIME_.
S307100 ASSIGN _FLAG 7_ **GR-1 UP-TO-SPEED DATA TAKEN** ON.
S307200 IF_FLAG 8_ IS ON THEN GOTO S307600.
S307300 VERIFY _ WH/SP/GR-2 _ IS ON OTHERWISE GOTO S307600.
S307400 READ GMT INTO _GR-2 UP-TO-SPEED INDICATION TIME_.
S307500 ASSIGN _FLAG 8_ **GR-2 UP-TO-SPEED DATA TAKEN** ON.
S307600 IF_FLAG 9_ IS ON THEN GOTO S308000.
```

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S307700 VERIFY _ WH/SP/GR-3 _ IS ON OTHERWISE GOTO S308400.
S307800 READ GMT INTO _GR-3 UP-TO-SPEED INDICATION TIME_.
S307900 ASSGN _FLAG 9_ **GR-3 UP-TO-SPEED DATA TAKEN** ON.
S308000 IF_FLAG 7_ IS OFF GOTO S308400.
S308100 IF_FLAG 8_ IS OFF THEN GOTO S308400.
S308200 IF_FLAG 9_ IS ON THEN GOTO S308600.
S308300 READ GMT INTO _T3_.
S308400 IF _T3_ IS LESS THAN _T1_+20SEC   THEN GOTO S306800.
S308500 GOTO S329200.
S308600 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC.                    **MD0694**
S308700 VERIFY _ REF/PITCH _ IS BETWEEN 3.00VDC AND 4.00VDC OTHERWISE
            GOTO S329400.      **VOLTS CONVERTED TO DEGREES/SEC BY SUBROUTINE**
S308800 READ _ REF/PITCH _ AND SAVE AS _PR1_.
S308900 IF _ CMD/PITCH _ IS NOT BETWEEN _PR1_+0.10V AND _PR1_-0.10V THEN
          GO TO S329500.
S309000 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.        **MD0410**
S309100 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ = 0 WITHIN 10SEC OTHERWISE
            GOTO S309200.                                         **MD0635**
S309200 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC.                    **MD0695**
S309300 VERIFY _ REF/PITCH _ IS NOT BETWEEN 1.00V AND 2.00V THEN GOTO S329800.
S309400 READ _ REF/PITCH _ AND SAVE AS _PR2_.
S309500 IF _ CMD/PITCH _ IS NOT BETWEEN _PR2_+0.10V AND _PR2_-0.10V THEN
            GO TO S330000.
S309600 TURN _ IU EDS RG REF GYRO SEL _ OFF.                      **MD01907**
S309700 TURN _ IU RAMP POSITIVE _ ON.                             **MD0694**
S309800 VERIFY _ PITCH/COMP _IS ON WITHIN 3SEC OTHERWISE GOTO S309900.
S309900 TURN _ IU RAMP POSITIVE _ OFF.                            **MD0694**
S310000 VERIFY _ PITCH/COMP _ IS OFF THEN GOTO S330200.
```

```
S310100 TURN _ IU EDS RG CMD GYRO SEL _ OFF.                          **MD01909**
S310200 TURN _ IU EDS RG SPARE GYRO SEL _ ON.                         **MD01910**
S310300 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC.                        **MD0694**
S310400 VERIFY _ CMD/PITCH _ IS NOT BETWEEN 3.00VOLTS AND 4.00VOLTS THEN
            GOTO S330400.
S310500 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.            **MD0410**
S310600 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC OTHERWISE
            GOTO S310700.                                             **MD1635**
S310700 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC.                        **MD0695**
S310800 VERIFY _ CMD/PITCH _ IS NOT BETWEEN 1.00VOLT AND 2.00VOLTS THEN
            GOTO S330600.
S310900 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.            **MD0410**
S311000 IF_FLAG 1_ IS OFF THEN GOTO S312300.
S311100 DISPLAY TEXT (FCC COMPARATOR SET ROUTINE IN PROGRESS) ON _CRT 1.LINE 5_.
S311200 TURN _ IU S-IVB COAST TEST _ ON.                              **MD01807**
S311300 VERIFY _ S4B BURN _ IS OFF THEN GOTO S330800.
S311400 LET _INDEX_=_INDEX_+1.
S311500 IF_INDEX_+1=6 THEN GOTO S331000.
S311600 VERIFY _ P/SERVO/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S331400.
S311700 TURN _ IU YAW SELECT _ ON.                                    **MD01799**
S311800 TURN _ IU PITCH SELECT _ OFF.                                 **MD01801**
S311900 VERIFY _ Y/SERVO/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S331600.
S312000 TURN _ IU S-IVB COAST TEST _ OFF.                             **MD01807**
S312100 TURN _ IU SIVB BURN SUB _ OFF.                                **MD02007**
S312200 IF _FLAG 2_ IS OFF THEN GOTO S315400.
```

S312300 TURN _ IU EDS RG YAW AXIS SEL _ ON. **MD01905**

S312400 TURN _ IU EDS RG PITCH AXIS SEL _ OFF. **MD01906**

S312500 TURN _ IU EDS RG REF GYRO SEL _ ON. **MD01907**

S312600 TURN _ IU EDS RG CMD GYRO SEL _ ON. **MD01909**

S312700 TURN _ IU EDS RG SPARE GYRO SEL _ OFF. **MD01910**

S312800 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MDI635**
OTHERWISE GOTO S312900.

S312900 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC. **MD0694**

S313000 VERIFY _ REF/YAW _ IS NOT BETWEEN 3.00V AND 4.00V THEN GOTO S331800.

S313100 READ _ REF/YAW _ AND SAVE AS _PR3_.

S313200 VERIFY _ CMD/YAW _ IS NOT BETWEEN _PR3_+0.10 AND _PR3_-0.10 THEN GOTO
S332000.

S313300 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC. **MD0410**

S313400 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MDI635**
OTHERWISE GOTO S313500.

S313500 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC. **MD0695**

S313600 VERIFY _ REF/YAW _ IS NOT BETWEEN 1.00V AND 2.00V THEN GOTO S332200.

S313700 READ _ REF/YAW _ AND SAVE AS _PR4_.

S313800 VERIFY _ CMD/YAW _ IS NOT BETWEEN _PR4_+0.10 AND _PR4_-0.10 THEN GOTO
S332400.

S313900 TURN _ IU EDS RG REF GYRO SEL _ OFF. **MD01907**

S314000 TURN _ IU RAMP POSITIVE _ ON. **MD0694**

S314100 VERIFY _ YAW/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S314200.

S314200 TURN _ IU RAMP POSITIVE _ OFF. **MD0694**

S314300 VERIFY _ YAW/COMP _ IS OFF THEN GOTO S332600.

S314400 TURN _ IU EDS RG CMD GYRO SEL _ OFF. **MD01909**

S314500 TURN _ IU EDS RG SPARE GYRO SEL _ ON. **MD01910**

S314600 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC. **MD0694**

S314700 VERIFY _ CMD/YAW _ IS NOT BETWEEN 3.00V AND 4.00V THEN GOTO S332800.

S314800 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC. **MD0410**

S314900 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MDI635**
OTHERWISE GOTO S315000.

S315000 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC. **MD0695**

S315100 VERIFY _ CMD/YAW _ IS NOT BETWEEN 1.00V AND 2.00V THEN GOTO S333000.

S315200 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC. **MD0410**

S315300 IF _FLAG 1_ IS OFF THEN GOTO S316700.

S315400 TURN _ IU S-IVB COAST TEST _ ON. **MD01807**

S315500 VERIFY _ R-Y1/SP/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S333200.

S315600 VERIFY _ R-Y2/SP/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S333400.

S315700 TURN _ IU PITCH SELECT _ ON. **MD01801**

S315800 TURN _ IU YAW SELECT _ OFF. **MD01799**

S315900 VERIFY _ P/SPAT/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S333600.

S316000 TURN _ IU ZERO COMMAND _ ON FOR 100MSEC. **MD0378**

S316100 TURN _ IU CONTROL RG _ OFF. **MD01790**

S316200 TURN _ IU PITCH SELECT _ OFF. **MD01801**

S316300 TURN _ IU TEST INPUT B _ OFF. **MD01803**

S316400 TURN _ IU SIVB COAST TEST _ OFF. **MD01807**

S316500 TURN _ IU STEP ENABLE _ OFF. **MD01819**

S316600 IF _FLAG 2_ IS OFF THEN GOTO S322500.

S316700 TURN _ IU EDS RG ROLL AXIS SEL _ ON. **MD01904**

S316800 TURN _ IU EDS RG YAW AXIS SEL _ OFF. **MD01905**

S316900 TURN _ IU EDS RG REF GYRO SEL _ ON. **MD01907**

S317000 TURN _ IU EDS RG CMD GYRO SEL _ ON. **MD01909**

S317100 TURN _ IU EDS RG SPARE GYRO SEL _ OFF. **MD01910**

S317200 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MDI635**
OTHERWISE GOTO S317300.

S317300 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC. **MD0694**

S317400 VERIFY _ REF/ROLL _ IS NOT BETWEEN 3.00V AND 4.00V THEN GOTO S333800.

```
S317500 READ _ REF/ROLL _ AND SAVE AS _PR5_.
S317600 VERIFY _ CMD/ROLL _ IS NOT BETWEEN _PR5_+0.10V AND _PR5_-0.10V THEN
            GOTO S334000.
S317700 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.          **MD0410**
S317800 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MD1635**
            OTHERWISE GOTO S317900.
S317900 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC.                       **MD0695**
S318000 VERIFY _ REF/ROLL _ IS NOT BETWEEN 1.00V AND 2.00V THEN GOTO S334200.
S318100 READ _ REF ROLL _ AND SAVE AS _PR6_.
S318200 VERIFY _ CMD/ROLL _ IS NOT BETWEEN _PR6_+0.10V AND _PR6_-1 THEN
            GOTO S334400.
S318300 TURN _ IU EDS RG REF GYRO SEL _ ON.                          **MD01907**
S318400 TURN _ IU RAMP POSITIVE _ ON.                                **MD0694**
S318500 VERIFY _ ROLL/COMP _ IS ON WITHIN 3SEC OTHERWISE GOTO S318600.
S318600 TURN _ IU RAMP POSITIVE _ OFF.                               **MD0694**
S318700 VERIFY _ ROLL/COMP _ IS OFF THEN GOTO S334600.
S318800 TURN _ IU EDS RG CMD GYRO SEL _ OFF.                         **MD01909**
S318900 TURN _ IU EDS RG SPARE GYRO SEL _ ON.                        **MD01910**
S319000 TURN _ IU RAMP POSITIVE _ ON FOR 3SEC.                       **MD0694**
S319100 VERIFY _ CMD/ROLL _ IS NOT BETWEEN 3.00V AND 4.00V THEN GOTO S334800.
S319200 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.          **MD0410**
S319300 VERIFY _ IU EDS RG ZERO TORQUE COMMAND _ IS OFF WITHIN 10SEC **MD1635**
            OTHERWISE GOTO S319400.
S319400 TURN _ IU RAMP NEGATIVE _ ON FOR 3SEC.                       **MD0695**
S319500 VERIFY _ CMD/ROLL _ IS NOT BETWEEN 1.00V AND 2.00V THEN GOTO S335000.
S319600 TURN _ EDS/RG ZERO TORQUE COMMAND _ ON FOR 100MSEC.          **MD0410**
S319700 IF _FLAG 5_ IS OFF GOTO S321700.
```

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S319800 DISPLAY TEXT (EDS/CRG SYSTEM POWER APPLICATION) ON _CRT 1,LINE 6_
S319900 DISPLAY_CSP POWER ON TIME_ ON _CRT 1,LINE 7_.
S320000 PRINT TEXT (EDS/CRG SYS PWR APP), _CSP POWER ON TIME_ ON _PRINTER_.
S320100 RECORD TEXT (EDS/CRG SYS PWR APP), _CSP POWER ON TIME_ ON _MAG TAPE_.
S320200 IF _FLAG 7_ IS OFF GOTO S320700.
S320300 DISPLAY TEXT (GROUP 1,UP TO SPEED) ON _CRT 1,LINE 8_.
S320400 DISPLAY_GR-1 UP-TO-SPEED INDICATION TIME_ ON _CRT 1,LINE 9_.
S320500 PRINT TEXT (GROUP 1 UP-TO-SPEED), _GR-1 UP-TO-SPEED INDICATION TIME_
          ON _PRINTER_.
S320600 RECORD TEXT (GROUP 1 UP-TO-SPEED), _GR-1 UP-TO-SPEED INDICATION TIME_
          ON _MAG TAPE_.
S320700 IF _FLAG 8_ IS OFF THEN GOTO S321200.
S320800 DISPLAY TEXT (GROUP 2, UP TO SPEED) ON _CRT 1,LINE 9_.
S320900 DISPLAY _GR-2 UP-TO-SPEED INDICATION TIME_ ON _CRT 1,LINE 10_.
S321000 PRINT TEXT (GROUP 2,UP-TO-SPEED TIME), _GR-2 UP-TO-SPEED INDICATION
            TIME_ ON _PRINTER_.
S321100 RECORD TEXT (GROUP 2, UP-TO-SPEED TIME), _GR-2 UP-TO-SPEED INDICATION
            TIME_ ON _MAG TAPE_.
S321200 IF _FLAG 9_ IS OFF THEN GOTO S321700.
```

```
S321300 DISPLAY TEXT (GROUP 3,UP TO SPEED) ON _CRT 1,LINE 11_.
S321400 DISPLAY _GR-3 UP-TO-SPEED INDICATION TIME_ ON _CRT 1,LINE 12_.
S321500 PRINT TEXT (GROUP 3,UP-TO-SPEED TIME), _GR-3 UP-TO-SPEED INDICATION
             TIME_ ON _PRINTER_.
S321600 RECORD TEXT (GROUP 3 UP-TO-SPEED TIME), _GR-3 UP-TO-SPEED INDICATION
             TIME_ ON _MAG TAPE_.
S321700 TURN _ IU EDS RG ROLL AXIS SEL _ OFF.                    **MD01904**
S321800 TURN _ IU EDS RG YAW AXIS SEL _ OFF.                     **MD01905**
S321900 TURN _ IU EDS RG PITCH AXIS SEL _ OFF.                   **MD01906**
S322000 TURN _ IU EDS RG REF GYRO SEL _ OFF.                     **MD01907**
S322100 TURN _ IU EDS RG CMD GYRO SEL _ OFF.                     **MD01909**
S322200 TURN _ IU EDS RG SPARE GYRO SEL _ OFF.                   **MD01910**
S322300 IF_FLAG 1_IS OFF THEN GOTO S323600 .**FCC OPTION NOT SELECTED**
```

```
                        **DID PROGRAM TURN ON FCC?**
S322500 IF_FLAG 6_IS OFF THEN GOTO S322900 .**NO**
S322600 DISPLAY TEXT (*FCC SYSTEM POWER APPLICATION) ON_CRT 1.LINE 1_.
S322700 DISPLAY_FCC POWER ON TIME_ON_CRT 1.LINE 2_.
S322800 LET_FCC POWER ON TIME_EQUAL 0.
S322900 DISPLAY TEXT (*FCC PREPS PERFORMED) ON_CRT 1.LINE 3_.
                        **IS FCC COMP.SET OPTION SELECTED?**
S323100 IF_FLAG 3_IS ON THEN GOTO S323400 .**YES**
S323200 TURN _ COMPARATOR RESET _ ON FOR 100MSEC.                    **MD0379**
S323300 GOTO S323500 .
S323400 DISPLAY TEXT (*FCC COMPARATORS REMAINED SET) ON_CRT 1.LINE 4_.
S323500 IF_FLAG 2_IS OFF THEN GOTO S324100 .
S323600 DISPLAY TEXT (*EDS/CRG PREPS PERFORMED) ON_CRT 1.LINE 5_.
        **IS EDS/CRG COMP.SET OPTION SELECTED?**
S323700 IF_FLAG 4_IS ON THEN GOTO S324000 .**YES**
S323800 TURN _ EDS COMP MNTR RESET _ ON FOR 100MSEC.                 **MD0409**
S323900 GOTO S324100 .
S324000 DISPLAY TEXT (*EDS/CRG COMPARATORS REMAINED SET) ON_CRT 1.LINE 6_.
S324100 ASSIGN_FLAG 1_OFF.
S324200 ASSIGN_FLAG 2_OFF.
S324300 ASSIGN_FLAG 3_OFF.
S324400 ASSIGN_FLAG 4_OFF.
S324500 ASSIGN_FLAG 5_OFF.
S324600 ASSIGN_FLAG 6_OFF.
S324700 ASSIGN_FLAG 7_OFF.
S324800 ASSIGN_FLAG 8_OFF.
S324900 ASSIGN_FLAG 9_OFF.
```

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C.41

```
S325000 LET_FCC POWER ON TIME_EQUAL 0.
S325100 LET_CSP POWER ON TIME_EQUAL 0.
S325200 LET_GR1 UP TO SPEED INDICATION TIME_EQUAL 0.
S325300 LET_GR2 UP TO SPEED INDICATION TIME_EQUAL 0.
S325400 LET_GR3 UP TO SPEED INDICATION TIME_EQUAL 0.
S325500 LET_RN_EQUAL 1.
S325600 DEACTIVATE_FC PREPS SCAN_ROW(_RN_).
S325700 LET_RN_EQUAL_RN_+1.
S325800 IF_RN_IS LESS THAN 36 THEN GOTO S325600 .
S325900 DISPLAY_CRT 1 CLEAR_.
S326000 DISPLAY TEXT (KAF2 COMPLETE) ON_CRT 1,LINE 1_.
S326100 READ GMT INTO_TEST COMPLETE TIME_.
S326200 DISPLAY TEXT (AT TIME ),_TEST COMPLETE TIME_ON_CRT 1,LINE 2_.
S326300 PRINT TEXT (KAF2 COMPLETE AT TIME ),_TEST COMPLETE TIME_ON_PRINTER_.
S326400 RECORD TEXT (KAF2 COMPLETE AT TIME ),_TEST COMPLETE TIME_ON_MAG TAPE_.
S326500 PROGRAM_KAF2_COMPLETE.
```

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KAF2 ERROR ROUTINES

```
S326600 DISPLAY _CRT 1 CLEAR_.
S326700 DISPLAY TEXT (CONFIGURATION SCAN UNSUCCESSFUL) ON _CRT 1,LINE 1_.
S326800 PERFORM _RETRY OR TERMINATE_.
S326900 IF _FLAG 14_ IS OFF THEN GO TO S324100.
S327000 ASSIGN _FLAG 14_ OFF.
S327100 GOTO S300000.
S327200 VERIFY _ FCC/ON/+6D31 _ IS OFF THEN GOTO S327500.
S327300 VERIFY _ FCC/ON/+6D41 _ IS OFF THEN GOTO S327500.
S327400 GOTO S301400.
S327500 DISPLAY TEXT (FCC POWER,+6D11,+6D31,+6D41 NOT IN SAME STATE) ON
            _CRT 1,LINE 2_.
S327600 GOTO S301400.
S327700 VERIFY _ WH/SP/GR-1 _ IS OFF THEN GOTO S328100.
S327800 VERIFY _ WH/SP/GR-2 _ IS OFF THEN GOTO S328100.
S327900 VERIFY _ WH/SP/GR-3 _ IS OFF THEN GOTO S328100.
S328000 GOTO S302000.
S328100 DISPLAY TEXT (ALL EDS/CRG UP TO SPEED INDICATIONS NOT ON) ON
            _CRT 1,LINE 3_.
S328200 GOTO S302000.
S328300 DISPLAY TEXT (FCC POWER INDICATION DID NOT COME ON) ON _CRT 1,LINE 4_.
S328400 GOTO S304200.
S328500 DISPLAY TEXT (SIC BURN MODE INDICATION DID NOT COME ON) ON
            _CRT 1,LINE 5_.
S328600 GOTO S304300.
```

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```
S328700 DISPLAY TEXT (CSP SYSTEM POWER INDICATION DID NOT COME ON) ON
            _CRT 1•LINE 6_•
S328800 GOTO S304800•
S328900 VERIFY _ S2 BURN _ IS ON WITHIN 5SEC THEN GOTO S305700•
S329000 DISPLAY TEXT (SII BURN MODE INDICATION DID NOT COME ON) ON
            _CRT 1•LINE 7_•
S329100 GOTO S305800•
S329200 DISPLAY TEXT (ALL UP TO SPEED IND• DID NOT COME ON WITHIN 20SEC) ON
            _CRT 1•LINE 8_•
S329300 GOTO S308600•
S329400 DISPLAY TEXT (REF PITCH POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1•LINE 9_•
S329500 GOTO S308800•
S329600 DISPLAY TEXT (CMD PITCH POS NOT WITHIN 0•4 DEG/SEC OF REF) ON
            _CRT 1•LINE 10_•
S329700 GOTO S309000•
S329800 DISPLAY TEXT (REF PITCH NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1•LINE 11_•
S329900 GOTO S309400•
S330000 DISPLAY TEXT (CMD PITCH NEG NOT WITHIN 0•4 DEG/SEC OF REF) ON
            _CRT 1•LINE 12_•
S330100 GO TO S309600•
S330200 DISPLAY TEXT (EDS/CRG PITCH COMPARATOR DID NOT SET) ON _CRT 1•LINE 13_•
S330300 GOTO S329700•
```

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```
S330400 DISPLAY TEXT (SPARE PITCH POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1,LINE 14_.
S330500 GOTO S310500.
S330600 DISPLAY TEXT (SPARE PITCH NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1,LINE 15_.
S330700 GOTO S310900.
S330800 DISPLAY TEXT (SIVB BURN MODE INDICATION DID NOT COME ON) ON
            _CRT 1,LINE 16_.
S330900 GOTO S311500.
```

```
                    ****INCREMENT ROUTINE FOR FCC TEST INPUTS*****

S331000 TURN _ IU RAMP POSITIVE _ ON FOR 1SEC.                          **MD0480**
S331100 LET _INDEX_=_INDEX_+1.
S331200 IF _INDEX_+1=7 THEN GOTO S331000.
S331300 GOTO S311600.
S331400 DISPLAY TEXT (FCC PITCH SERVO COMPARATOR DID NOT SET) ON
            _CRT 1.LINE 17_.
S331500 GOTO S311700.
S331600 DISPLAY TEXT (FCC YAW SERVO COMPARATOR DID NOT SET) ON _CRT 1.LINE 18_.
S331700 GOTO S312100.
S331800 DISPLAY TEXT (REF YAW POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1.LINE 19_.
S331900 GOTO S313100.
S332000 DISPLAY TEXT (CMD YAW POS NOT WITHIN 0.4 DEG/SEC OF REF) ON
            _CRT 1.LINE 20_.
S332100 GOTO S313300.
S332200 DISPLAY TEXT (REF YAW NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1.LINE 2_.
S332300 GOTO S313700.
S332400 DISPLAY TEXT (CMD YAW NEG NOT WITHIN 0.4 DEG/SEC OF REF) ON
            _CRT 1.LINE 3_.
S332500 GOTO S313900.
S332600 DISPLAY TEXT (EDS/CRG YAW COMPARATOR DID NOT SET) ON _CRT 1.LINE 4_.
S332700 GOTO S314500.
S332800 DISPLAY TEXT (SPARE YAW POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1.LINE 5_.
S332900 GOTO S314800.
```

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```
S333000 DISPLAY TEXT (SPARE YAW NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1,LINE 6_.
S333100 GOTO S315200.
S333200 DISPLAY TEXT (FCC R-Y1 SPATIAL COMPARATOR DID NOT SET) ON
            _CRT 1,LINE 7_.
S333300 GOTO S315600.
S333400 DISPLAY TEXT (FCC R-Y2 SPATIAL COMPARATOR DID NOT SET) ON
            _CRT 1,LINE 8_.
S333500 GOTO S315700.
S333600 DISPLAY TEXT (FCC PITCH SPATIAL COMPARATOR DID NOT SET) ON
            _CRT 1,LINE 9_.
S333700 GOTO S316000.
S333800 DISPLAY TEXT (REF ROLL POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1,LINE 10_.
S333900 GOTO S317500.
S334000 DISPLAY TEXT (CMD ROLL POS NOT WITHIN 0.4 DEG/SEC OF REF) ON
            _CRT 1,LINE 11_.
S334100 GOTO S317700.
```

```
S33420D DISPLAY TEXT (REF ROLL NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1,LINE 12_.
S3343   GOTO S318100.
S3344   DISPLAY TEXT (CMD ROLL NEG NOT WITHIN 0.4 DEG/SEC OF REF) ON
            _CRT 1,LINE 13_.
S3345   GOTO S318300.
S3346   DISPLAY TEXT (EDS/CRG ROLL COMPARATOR DID NOT SET) ON _CRT 1,LINE 14_.
S3347   GOTO S318800.
S3348   DISPLAY TEXT (SPARE ROLL POS NOT WITHIN +2 TO +6 DEG/SEC) ON
            _CRT 1,LINE 15_.
S3349   GOTO S319200.
S3350   DISPLAY TEXT (SPARE ROLL NEG NOT WITHIN -2 TO -6 DEG/SEC) ON
            _CRT 1,LINE 16_.
S3351   GOTO S319600.
S33520D DISABLE _TERMINATE_.

S33530D PROGRAM _KAF2_ **FLIGHT CONTROL PREPARATIONS AS509** COMPLETE.
```

MCR-70-425

APPENDIX D

ILLUSTRATION OF USE OF SUBROUTINES AND MACROS IN A L O F T

D1

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```
**THE PORTION OF AN ALOFT PROGRAM WHICH FOLLOWS DEFINES A SUBROUTINE WHICH
  IS USED TO ILLUSTRATE THE DIFFERENCES BETWEEN THE USE OF A SUBROUTINE AND
  THE USE OF A MACRO.**

BEGIN_ADJUST_WITH INPUTS_VALUE OF X_,_FINAL VALUE_,_ADJUST FUNCTION_
            AND_FUNCTION OF X_AND OUTPUT_RESULT_.

        DECLARE_Y_NUMERIC.
        DECLARE_VALUE OF X_NUMERIC.
        DECLARE_FINAL VALUE_NUMERIC.
        DECLARE_RESULT_NUMERIC.

             LET_RESULT_EQUAL 0.
             SET CLOCK 1 TO 0MSEC. AND
             SEND_ADJUST FUNCTION_**THE**_VALUE OF X_.
             AFTER CLOCK 1 IS 5MSEC.
             MEASURE_FUNCTION OF X_AND SAVE AS_Y_.
             IF_Y_IS GREATER THAN OR EQUAL TO_FINAL VALUE_ THEN
                  LET_RESULT_EQUAL_VALUE OF X_.
END_ADJUST_.
```

D2


```
**THE FOLLOWING IS A PORTION OF THE PROGRAM USING THE PREVIOUSLY DEFINED
  SUBROUTINE_ADJUST_* AS IT WOULD BE WRITTEN AND AS IT WOULD APPEAR ON A
  FINAL LISTING.  DECLARATIONS AND SPECIFICATIONS REQUIRED ARE ASSUMED.**
                          **OTHER
                          STATEMENTS**
            LET_START_EQUAL 5.0V.
STATEMENT 100 PERFORM_ADJUST_WITH INPUTS_START_*55.0DEG*_POSITION DRIVER_
                          AND_POSITION_AND OUTPUT_VOLTIN_.
            IF_VOLTIN_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 101.
            LET_START_EQUAL_START_+1.0V.
            GOTO STATEMENT 100.
STATEMENT 101 **PROGRAM CONTINUES**
                          **OTHER
                          STATEMENTS**
            LET_VALUE SENT_EQUAL 24.0INHG.
STATEMENT 200 PERFORM_ADJUST_WITH INPUTS_VALUE SENT_*110.0DEGF*_PRESSURE_
                          AND_TEMPERATURE_AND OUTPUT_TOTAL PRESS_.
            IF_TOTAL PRESS_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 201.
            LET_VALUE SENT_EQUAL_VALUE SENT_+2.0INHG.
            GOTO STATEMENT 200.
STATEMENT 201 **PROGRAM CONTINUES**

**AT EACH PERFORM_ADJUST_STATEMENT CONTROL WOULD BE TRANSFERRED TO THE
  PREVIOUSLY DEFINED_ADJUST_SUBROUTINE WITH THE APPROPRIATE INFORMATION
  AS INDICATED IN THE PERFORM STATEMENT.  WHEN THE SUBROUTINE IS COMPLETE,
  CONTROL IS RETURNED TO THE STATEMENT FOLLOWING THE PERFORM STATEMENT.
  THIS ACTIVITY OCCURS AT RUN TIME.**
```

D3

D-3

```
**THE PORTION OF AN ALOFT PROGRAM WHICH FOLLOWS DEFINES A MACRO WHICH IS
  USED TO ILLUSTRATE THE DIFFERENCE BETWEEN THE USE OF A SUBROUTINE AND
  THE USE OF A MACRO.**

MACRO ADJUST_VALUE OF X_._FINAL VALUE_._ADJUST FUNCTION_._FUNCTION OF X_
          AND_RESULT_.

            LET_RESULT_EQUAL 0.
            SET CLOCK 1 TO 0MSEC. AND
            SEND_ADJUST FUNCTION_**THE**_VALUE OF X_.
            AFTER CLOCK 1 IS 5MSEC.
            MEASURE_FUNCTION OF X_AND SAVE AS_Y_.
            IF_Y_IS GREATER THAN OR EQUAL TO_FINAL VALUE_THEN
                 LET_RESULT_EQUAL_VALUE OF X_.
END.
```

```
**THE FOLLOWING IS A PORTION OF THE PROGRAM USING THE PREVIOUSLY DEFINED
  MACRO ADJUST. AS IT WOULD BE WRITTEN.  DECLARATIONS AND SPECIFICATIONS
  REQUIRED ARE ASSUMED.**

                          **OTHER
                          STATEMENTS**
            LET_START_EQUAL 5.0V.
STATEMENT 100 EXECUTE ADJUST_START_.55.0DEG._POSITION DRIVER_.
                          _POSITION_AND_VOLTIN_.
            IF_VOLTIN_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 101.
            LET_START_EQUAL_START_+1.0V.
            GOTO STATEMENT 100.
STATEMENT 101 **PROGRAM CONTINUES**
                          **OTHER
                          STATEMENTS**
            LET_VALUE SENT_EQUAL 29.0INHG.
STATEMENT 200 EXECUTE ADJUST_VALUE SENT_.110.0DEGF._PRESSURE_.
                          _TEMPERATURE_AND_TOTAL PRESS_.
            IF_TOTAL PRESS_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 201.
            LET_VALUE SENT_EQUAL_VALUE SENT_+2.0INHG.
            GOTO STATEMENT 200.
STATEMENT 201 **PROGRAM CONTINUES**

**AT EACH EXECUTE ADJUST STATEMENT THE LANGUAGE PROCESSOR WOULD INSERT
  THE ACTUAL BODY OF THE MACRO WITH THE APPROPRIATE INFORMATION SUB-
  STITUTED INTO THE MACRO BODY.  THIS ACTIVITY OCCURS AT SOURCE
  STATEMENT PROCESSING TIME.**
```

D5


```
**THE FOLLOWING IS THE PORTION OF THE PROGRAM PREVIOUSLY WRITTEN USING
  THE EXECUTE ADJUST. AS IT WOULD APPEAR ON A FINAL LISTING.**
                          **OTHER
                          STATEMENTS**
             LET_START_EQUAL 5.0V.
STATEMENT 100 LET_VOLTIN_EQUAL 0.
             SET CLOCK 1 TO 0MSEC. AND
             SEND_POSITION DRIVER_**THE**_START_.
             AFTER CLOCK 1 IS 5MSEC.
             MEASURE_POSITION_AND SAVE AS_Y_.
             IF_Y_IS GREATER THAN OR EQUAL TO 55.0DEG THEN
                  LET_VOLTIN_EQUAL_START_.
             IF_VOLTIN_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 101.
             LET_START_EQUAL_START_+1.0V.
             GOTO STATEMENT 100.
STATEMENT 101 **PROGRAM CONTINUES**
```

```
                    **OTHER
                    STATEMENTS**
            LET_VALUE SENT_EQUAL 2*.0INHG.
STATEMENT 200 LET_TOTAL PRESS_EQUAL 0.
            SET CLOCK 1 TO 0MSEC. AND
            SEND_PRESSURE_**THE**_VALUE SENT_.
            AFTER CLOCK 1 IS 5MSEC.
            MEASURE_TEMPERATURE_AND SAVE AS_Y_.
            IF_Y_IS GREATER THAN OR EQUAL TO 110.0DEGF THEN
                LET_TOTAL PRESS_EQUAL_VALUE SENT_.
            IF_TOTAL PRESS_IS NOT EQUAL TO 0 THEN GOTO STATEMENT 201.
            LET_VALUE SENT_EQUAL_VALUE SENT_+2.0INHG.
            GOTO STATEMENT 200.
STATEMENT 201 **PROGRAM CONTINUES**
**EACH EXECUTE ADJUST STATEMENT HAS BEEN REPLACED BY THE BODY OF THE MACRO
  AND THE APPROPRIATE INFORMATION HAS BEEN SUBSTITUTED INTO THE MACRO
  BODY AT LANGUAGE PROCESSOR TIME.  AT RUN TIME ONLY THE RESULTING
  STATEMENTS (APPEARING ABOVE) ARE RECOGNIZED AND EXECUTED.**
```