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JOHN F. KENNEDY  
SPACE CENTER

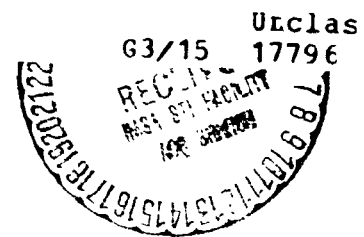


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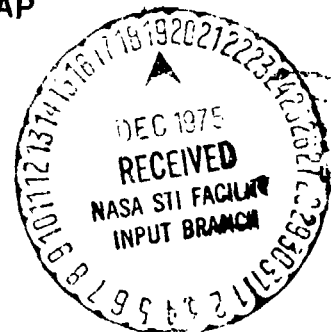
SATURN IB AND SATURN V COMPUTER PROGRAMS,  
SOFTWARE STATUS REPORT

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CHECKOUT AUTOMATION AND  
PROGRAMMING OFFICE  
LV-CAP



JOHN F. KENNEDY SPACE CENTER, NASA

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TR-612  
Revision 13

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SATURN IB AND SATURN V COMPUTER PROGRAMS,  
SOFTWARE STATUS REPORT

by

Checkout Automation and Programming Office

LAUNCH VEHICLE OPERATIONS

July 5, 1972

JOHN F. KENNEDY SPACE CENTER, NASA

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**SATURN IB AND SATURN V COMPUTER PROGRAMS,  
SOFTWARE STATUS REPORT**

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**Checkout Automation and Programming Office**

**ABSTRACT**

This report is prepared by the Checkout Automation and Programming Office (LV-CAP) and is intended to present to NASA elements and Saturn Stage Contractors the progress and development of all requested Saturn IB and Saturn V Computer Programs.

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## INTRODUCTION

The Software Status Report (Saturn IB and Saturn V Computer Programs) is prepared quarterly by the Checkout Automation and Programming Office (LV-CAP), and is intended to present to NASA elements and Saturn Stage Contractors current information on Saturn IB and Saturn V Computer Programs. The information contained in this report was valid as of approximately 15 days prior to its publication date.

The report is divided into two sections. Section I contains on-line, operating system, and test programs and on-line display descriptions. Section II contains the off-line programs, and other supplemental programs.

All programs are listed in tabular form, and those having an Internal Variable (IVAR) are arranged alpha-numerically within each table. The first character of the IVAR represents one of the following:

B.. S-IC/S-IB Stage Propellants	N.. Networks
C.. Flight Control	O.. S-IB Stage ATOLL
D.. Diagnostics	P.. S-II Stage Propellants
E.. S-IVB ATOLL (SIB)	Q.. S-II Stage ATOLL
F.. Flight Computer	T.. Telemetry
G.. Platform (Guidance)	U.. Utility
I.. IB Integration ATOLL	V.. Saturn V Integration ATOLL
J.. ATOLL Training Program	W.. S-IC Stage ATOLL
K.. IU Stage ATOLL (V)	X.. S-IVB Stage ATOLL (V)
L.. IU Stage ATOLL (SIB)	Z.. Postprocessing
M.. Measurements	

The second character of the IVAR (in on-line programs) closely represents the type of computer program described, or adds definition to the first IVAR character. They are as follows:

A.. ATOLL Language Program	T.. Test
E.. Function Executor	U.. Utility
M.. ATOLL Machine Language Subroutine	X.. ATOLL Subroutine
S.. Stand-Alone, or Remote	Z.. ATOLL Language Sub Program

The third and fourth characters of the IVARs may be letters or numbers.

Block diagram of the LC-39 Display System and Computer Complex is illustrated in Figure 1.

The Saturn Display System (Figure 1) is comprised of 15 consoles configured as follows:

<u>Console No.</u>	<u>Rack Position</u>	<u>Primary Function</u>	<u>Resp. Org.</u>
1	Computer Room	System Initialization and Hardware Status	IBM
2	BE8	Software System Status	IBM/NASA
3	BE24	Propellant Monitoring	TBC
4	BD10	Flight Control System Test and Status	IBM
5	BD23	S-IC Swing Arm and Tail Service Mast Testing & Status	TBC
6	BC5	Platform Positioning and Monitoring	IBM
7	BC12	Flight Computer Test, Status, and Operations	IBM
8	BE2	Measuring System Control	IBM
9	BB12	EDS Testing	IBM
10	BB20	S-IVB System Status	MDAC
11	BB26	S-IVB Automatic Testing	MDAC
12	BA5	Linkage Control for Integrated Testing and S-IC Status	TBC

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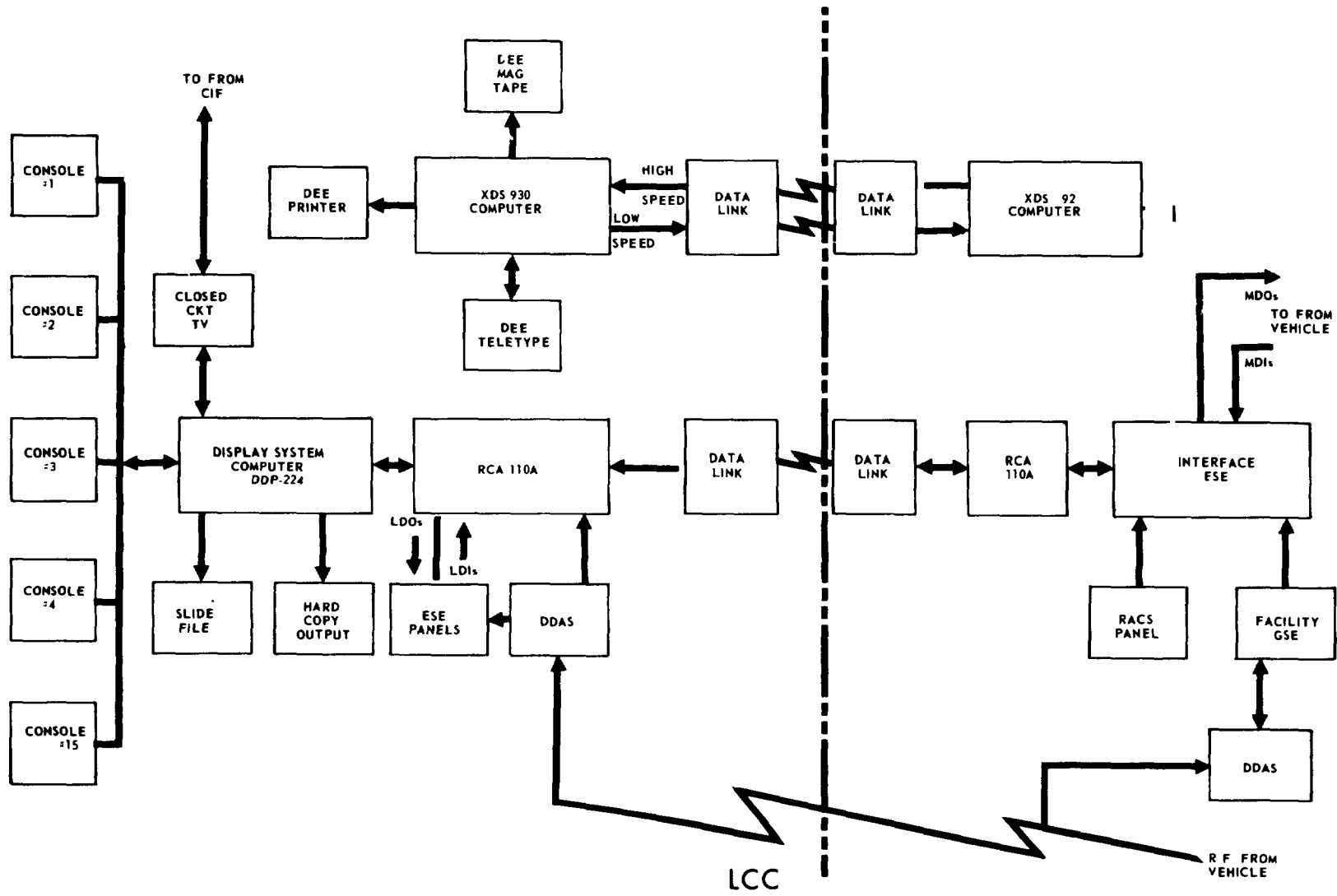


Figure 1. Saturn Computer Complex

<u>Console No.</u>	<u>Rack Position</u>	<u>Primary Function</u>	<u>Resp. Org.</u>
12*	BA5	Linkage Control for Integrated Testing	TBC
13	BA14	S-IC Automatic Testing	TBC
13*	BA14	NASA Operations Engineer (CLE S)	NASA
14	BA20	S-II Mechanical Testing and Status	NAR
14*	BA20	S-IB Mechanical Testing and Status	CCSD
15	BA26	S-II Electrical Testing and Status	NAR
15*	BA26	S-IB Electrical Testing and Status	CCSD

Consoles 1, 2, and 9 are System Masters, and therefore can call or terminate any test program and issue discrettes (MDOs).

Consoles 1, 3, 7, 9, and 12 in the prime firing room may be driven by a backup display computer, in the event the prime display system goes down.

\*Firing Room #3 only (S-IB vehicles)

The responsible contractors are identified in the tables by mnemonic name, and the necessary liaison with the responsible contractors engineering organizations may be arranged through the respective Stage Automation Representatives.

<u>Contractor</u>	<u>Company</u>	<u>Stage Automation Representative</u>	<u>Telephone</u>
BATC	Boeing Atlantic Test Center	J. Smith	867-6565
CCSD	Chrysler Corp Space Division	H. Conrad	867-7003
IBM	International Business Machine	R. Lindner	867-4320
MDAC	McDonnell Douglas Astronautics Co.	H. Lanier	867-7540
NAR	North American Rockwell	Q. Price	867-3516

#### NOTE

Where any discrepancies or errors occur in the scope, format, or content, please notify:

John B. Thompson, Jr., LV-CAP-A, 867-3759  
(Section I, for on-line programs)

LV-CAP-B, 867-3787  
(Section II, for off-line programs)

## SECTION I ON-LINE PROGRAMS

### 1-1 GENERAL

This section lists all the on-line programs for Saturn IB and Saturn V launch vehicles. Information contained in the tabular portion includes IVARs or Call Numbers, Program Titles, Functional Descriptions, hardware/software Interfaces, and program Status (release date, vehicle effectivity, etc.). The following tables appear in this section:

- a. Table 1-1, Saturn IB Operating System and Test Programs; These programs are used in performing Saturn IB vehicle testing operations.
- b. Table 1-2, Saturn IB Major Test Program Matrix; This table supplements Table 1-1 by showing which programs are used during major vehicle testing operations.
- c. Table 1-3, Other Saturn IB Systems Programs; These programs are run on launch complex hardware, but are not used in direct support of vehicle testing.
- d. Table 1-4, Saturn V Operating System and Test Programs; These programs are used in performing Saturn V vehicle testing operations.
- e. Table 1-5, Saturn V Major Test Program Matrix; This table supplements Table 1-4 by showing which programs are used during major vehicle testing operations.
- f. Table 1-6, Other Saturn V Operating Systems and Test Programs; These programs are run on launch hardware, but are not used in direct support of vehicle testing.
- g. Table 1-7, Saturn IB/V Operational DEE-6 Programs; These programs are used in support of vehicle testing operations.
- h. Table 1-8, Saturn V DDP-224 Display OPSY Programs; These programs are the DDP-224 on-line and executive display OPSY programs.
- i. Table 1-9, Saturn Display Descriptions; These descriptions contain the display formats in the display description tape, which are used for communicating between the DDP-224 Operations Display System and the Saturn Operating System.
- j. Table 1-10, Saturn V Masked MDIs; These MDIs are permanently masked in the Saturn V Operating System.
- k. Table 1-11, Machine Language Subroutines; Provide special purpose machine language capability for ATOLL programs.
- l. Table 1-12, ATOLL Sub Programs; Subprograms which extend the capacity of the parent program. S-IB Sub-Programs and "I" Sub-Programs not listed in Table 1-12.

### 1-2 FORMS

Three basic KSC Forms are used to present the data for the on-line programs; KSC Form 16-226, 16-225, and 16-228. An explanation of the significance of the headings and column titles, and guidelines for interpreting the data contained in the tables are presented in 1-2-1 through 1-2-3.

**1-2-1 KSC Form 16-226.** This form is used to present the Saturn IB/V Operating System and Test Programs, Other Saturn IB/V Systems Programs, and the Saturn V DDP-224 Display OPSY Programs. The column headings, on the form, are as follows:

- a. IVAR; The Internal Variable listing in alpha-numerical sequence. (Programs not assigned an IVAR will be listed at the end of each table under the designation of N/A.)
- b. NASA Auth Element and Responsible Contractor; The mail code of the NASA agency (must be preceded by LV), and the mnemonic name of the responsible contractor.
- c. Program Title and Function; The applicable program title, and a short description of its function.



d. Interface; Computer input/output systems are identified in the column titles. An "X" placed in the column under Interface, indicates that the program uses that system, but does not imply that the program uses only the listed systems (on the form). The abbreviations for the system function are as follows:

<u>Abbreviation</u>	<u>System Function</u>
analog	Input or Output Analog functions
DDAS	Digital Data Acquisition System
CDC	Countdown Clock
ISSUES MDO	Issues Mobile Launcher DO or AGCSC DOV
ISSUES SSEL	Issues Switch Selector functions
PRINTER	Line Printer
DISPLAY	Display System
GMT	Greenwich Mean Time

e. Status and/or Remarks; Used to present special status/remarks of applicable programs.

f. Auth. for Vehicle No; When formal authorization by LV-CAP for use of a program occurs on a vehicle basis, the number(s) of the vehicle(s) for which the program is authorized will be entered in the column.

1-2-2 KSC Form 16-225. This form is used to list the Saturn IB and Saturn V Major Test Programs, and the explanation of column headings is as follows:

a. IVAR; The Internal Variable listing, in alpha-numerical sequence. (Programs not assigned an IVAR, will be listed at the end of each table under the designation of N/A.)

b. Test Title; The Major Vehicle or Stage Test Titles are listed in these columns. An "X" placed under a test title signifies that the test program may be used for that test.

c. Remarks; Contains special instructions applicable to the listed IVAR, if required.

1-2-3 KSC Form 16-228. This form is used to list the Saturn V Display Descriptions, and the explanation of column headings is as follows:

a. Display Desc. No.; Numerical sequence of DD numbers. These numbers serve to identify the DD requester, and the numbers are assigned in blocks to each requesting agency. The number block assignments are as follows:

<u>Requesting Organization</u>	<u>DD Numbers</u>	<u>Call Numbers</u>
NASA (KSC)	513-576	001-064
NAR	577-640	065-128
MDAC	641-704	129-192
IBM (KSC)	705-768	193-256
IBM & NASA (MSFC)	769-832	257-320
BATC	833-896	321-384
(Spares)	960-1024	448-512
CCSD	897-959	385-447

b. Call No.; These numbers identify the display location on the DD Tape, and are used by the console operator to call the desired description.

c. Description; Identifies the description by its formal title, and to note the part number or page number for description bearing identical titles.

d. Authorized for Vehicle; The applicable vehicle serial number(s) are listed in the column heading, and an "X" is placed under a given serial number to denote that the description is authorized for use on that vehicle.

Table 1-1. Saturn IB Operating System and Test Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.			
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT		
*BE02	GDC-28 BATC	S-IB PROPELLANT LEVEL MONITORING; Continuously monitors propellant levels in the S-IB stage tanks and the PTCS mass readouts for the S-IB and the S-IVB stages.		X						X	X	Linked by IALK. Other NASA Auth. Elem. LV-MEC-31	206 thru 209       ↓	
*BE03	GDC-28 BATC	S-IB PROPELLANT TEMPERATURE MONITOR; Monitors RP1 + LOX temperature, predicts T-0 temperature, and final FTCS thumbwheel settings.		X	X					X	X	Linked by IALK. Other NASA Auth. Elem. LV-MEC-31		
*BT01	GDC-28 BATC	PROPELLANT MONITOR UPDATE PROGRAM; Provides real time update capability for constants, calibration data, discrete assignments, and measurement addresses in BE02 and BE03.								X	X	X		Linked by IALK. Other NASA Auth. Elem. LV-MEC-31
*CE10	GDC-33 IBM	S-IB AUXILIARY HYDRAULIC PUMP MONITOR; Monitors one (1) to four (4) S-IB hydraulic pumps and shuts down pumps if out of tolerance condition found.		X		X			X	X	X	Called by CTB1, CTB6, CTB7 and CTB9		
*CE40	GDC-33 IBM	S-IVB AUXILIARY HYDRAULIC PUMP MONITOR; Monitors S-IVB hydraulics system and shuts down S-IVB pump if out of tolerance condition found.		X		X			X	X	X	Called by CTB1, CTB6, CTB7 and CTB9		
*CTB1	GDC-33 IBM	GAIN TEST; Performs the A-zero and A-one burn mode gain test for all stages.		X		X	X	X	X	X	X	Linked by IALK		
*CTB2	GDC-33 IBM	CONTROL COMPUTER RELAY REDUNDANCY; Performs continuity checks on redundant relays in the control computers.		X		X			X	X		Linked by IALK		
*CTC3	GDC-33 IBM	CONTROL COMPUTER COMPARATOR TEST; Tolerance-checks the signal that results in a vote from the control computer comparators.		X		X			X	X		Linked by IALK		
*CTC4	GDC-33 IBM	EDS CONTROL RATE GYRO TEST; Verifies calibration of EDS CRG and operation of EDS CRG Excessive rate switches, and the EDS CRG comparators.		X		X	X	X	X	X		Linked by IALK		
*CTC5	GDC-33 IBM	APS GAIN TEST; Checks and displays inputs of the flight computer at threshold and saturation, and verifies spatial amplifier output pulse widths.		X		X	X	X	X	X		Linked by IALK		

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Table I-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
EAPC	GDC-23 MDAC	S-IVB PROPULSION CHECKS; Checks the function and timing of propulsion valves, automatically calls NTDR to check discrete response timing. Makes functional check of S-IVB pressure switches.		X		X	X	X	X	X		206 thru 209
EAPD	GDC-23 MDAC	S-IVB POWER DISTRIBUTION; Verifies all power distribution and control switching circuits, for vehicle and ESE.		X		X	X	X	X	X	Sub Program EZPD; EZPU	↓
EAPF	GDC-23 MDAC	S-IVB PREPS AND FUNCTIONAL; Functionally checks S-IVB systems required to support overall tests through FRT.		X	X	X	X	X	X	X	Sub Program EZPF	
EAPL	GDC-23 MDAC	S-IVB PANEL LAMP SEQUENCER TEST; Provides verification of interface between LCC and panel lamps operated by LDO's.						X	X			
EAPS	GDC-23 MDAC	S-IVB POWER SETUP; Provides a sequential power turnon and turnoff for the vehicle subsystem and stage integrated test.		X		X	X	X	X	X		
EAPU	GDC-23 MDAC	S-IVB PROPELLANT UTILIZATION; Provides semiautomatic means (via SGCC) to determine operational status of S-IVB stage Propellant Utilization (PU) subsystem.		X		X	X	X	X	X		
EAPX	GDC-23 MDAC	S-IVB POWER TRANSFER; Functionally verifies the S-IVB power transfer circuitry.		X		X	X	X	X	X		
EASR	GDC-23 MDAC	S-IVB RANGE SAFETY FUNCTIONAL TEST; Semiautomatically determines the operational capability of critical elements of the Range Safety Subsystem.		X		X	X	X	X	X		

S-1

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

9-1 IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
EASS	GDC-23 MDAC	S-IVB SWITCH SELECTOR RESET; Resets the S-IVB switch selector functions after an input has been made.				X	X	X	X		Linked by FAPS, EAPD	206 thru 209
*FE50	GDC-32 IBM	IU/ACCELEROMETER MONITOR; Scales and monitors the output from the LVDC Accelerometer Monitor Program.						X	X		Called by FT49	
*FTB1	GDC-32 IBM	LVDC TARGETING DATA TEST; Update target information for rendezvous mission of Skylab.						X	X	X		
*FT03	GDC-32 IBM	LVDC/LVDA SWITCH SELECTOR INTERFACE TEST; Provides the capability of verifying the LVDC interface with the switch selectors.					X	X	X	X	Linked by IALK, LASS	
*FT04	GDC-32 IBM	LVDC/POWER ON-OFF AND/OR REDUNDANCY TESTS; Provides the capability of applying or removing power to the LVDC/LVDA, and/or performs checking functions.		X		X	X	X	X		Linked by IALK, LACM, LAPG, LAPW, LART	
*FT05	GDC-32 IBM	LVDC/DATA LOAD AND/OR VERIFY TEST; Provides the capability of loading data into, and/or verifying data within, the LVDC memory from a given point.						X	X		Linked by IALK, LAGC, LAPG	
*FT06	GDC-32 IBM	LVDC/GIMBAL ANGLE READ TEST; Outputs the gimbal angle status, utilizing the Gimbal Angle Monitor Program in the LVDC.						X	X		Linked by IALK, IALL, IATS	
*FT07	GDC-32 IBM	LVDC/SELECTOR DUMP TEST; Commands the printout of LVDC memory sector.						X	X		Linked by LAPG	
*FT08	GDC-32 IBM	LVDC CORE MAP LOAD AND/OR PRINT TEST; Retrieves the Core Map from the LVDC, stores it in the LCC, and prints it on the LCC line printer.						X	X		Linked by IALK, LAPW	
*FT10	GDC-32 IBM	LVDC/LVDA LADDER OUTPUT TEST; Exercises the ladders to prove the LVDA's steering command capability.		X				X	X		Linked by IALK, IALL, LDFC	
*FT20	GDC-32 IBM	LVDC/LVDA SELF-TEST; Performs an error check of the LVDA/LVDC, utilizing, where practical, the LVDC routines to perform the error checking.						X	X		Linked by IALK, LAPW	
*FT23	GDC-32 IBM	LVDC/SECTOR SUM CHECK; Provides the capability of determining if any specified LVDC memory sector has a valid check sum.						X	X		Linked by IALK, LACM, LAPG, LAPW	↓

KSC FORM 16-226 (REV. 5 69)

\*MSFC Delivered Program

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*FT25	GDC-32 IBM	LVDC/LVDA DISCRETE INPUT TEST; Verifies that the LVDC can properly read its discrete inputs.			X	X		X	X		Linked by LADO, LAGC	206 thru 209
*FT27	GDC-32 IBM	SIMULATED FLIGHT MONITOR TEST; Monitors and records the events resulting from the operation of the Flight Simulation Routine in the LVDC.			X	X		X	X		Linked by IATS, LAGC	
*FT31	GDC-32 IBM	LVDC ACCELEROMETER PULSE COUNT TEST; Exercises the Accelerometer Pulse Count Routine of the LVDC to ensure functioning of the accelerometer processor associated with the ST-124M platform accelerometers.						X	X		Linked by IALK, LAST	
*FT33	GDC-32 IBM	LVDC/LVDA DISCRETE OUTPUT TEST; Verifies that the LVDC discrete outputs can be set and reset.						X	X		Linked by IAED, LADO	
*FT35	GDC-32 IBM	LVDC/LVDA DDAS TEST, AGCS/MLC; Verifies proper operation of the interface between the LVDC telemetry buffer and DDAS.				X		X	X		Linked by IALK, LAPW	
*FT37	GDC-32 IBM	SIMULATED FLIGHT INITIALIZE; Provides hardware checks and indicator words to the Simulated Flight Monitor. Commands LVDC to the following modes: a. Preparation to launch without a platform. b. Preparation to launch Simulated Flight with a platform. c. Repeatable Simulated Flight.						X	X		Linked by IALK, IATS, LAPG, LAGC, LAST	
*FT42	GDC-32 IBM	PREPARE TO LAUNCH; Provides hardware checks, LVDC initialization, and SCC initialization for Flight Programs.				X		X	X		Linked by IATS	
*FT43	GDC-32 IBM	LVDC COMPUTER INTERFACE UNIT TEST; Verifies CIU operation within the Instrument Unit System. Test Operation of the Guidance System in addressing and receiving data from the CIU.		X		X		X	X		Linked by IALK, LASS	
*FT45	GDC-32 IBM	LVDC COMMAND SYSTEM TEST; Verifies communication at between Guidance Command System and LVDA/LVDC. Checks signal strength in Guidance Command Receiver and Digital Decoder.		X		X		X	X		Linked by IALK, IALL, LACM, LAGL	
*FT47	GDC-32 IBM	PREFLIGHT COMMAND TEST; Commands the Orbital Routine of the Flight Program to enable communication with the LVDC.				X		X	X		Linked by IALK, IALL, LACM, LAGC	

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Table 1-1. Saturn IB Operating System and Test Programs (Continued)

1-8 IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*FT49	GDC-32 IBM	ACCELEROMETER MONITOR DISPLAY CONTROL; Displays options for and executes FE50.						X	X		Linked by IALL, LAST	206 thru 209
*FT54	GDC-32 IBM	LVDC STEERING TEST; Commands LVDC to enter guidance and control Steering Test and to return LVDC to Mode Sort.						X	X			
*FT55	GDC-32 IBM	LVDC TELEMETRY TEST; Commands the LVDC to enter a telemetry test routine, and loads an input word to specify the rate of telemetry.						X	X		Linked by IALK, LAGC, LAPG	
*FZ01	GDC-32 IBM	SIMULATED FLIGHT POST PROCESSOR TEST; Provides the capability of processing the raw data generated by the overall Simulated Flight Test Program.						X	X			
*GE01	GDC-12 IBM	AZIMUTH POSITIONING AND MONITOR; Monitors the azimuth encoder for drift, positions platform, and calculates plots.		X	X	X		X	X			
*GT16	GDC-12 IBM	IU/AZIMUTH LAYING PROGRAM; Aligns the platform to the firing azimuth.		X	X	X		X	X		Linked by IALL	
IAAR	GDC-33 IBM	ATTITUDE RATE COMMAND TEST; Exercises the attitude rate channels after switching to the S-IB burn mode.		X		X		X	X	X	Linked by IATS	
IAED	GDC-25 IBM	EDS TEST; Simulates and evaluates the vehicle and spacecraft using MDOs to detect.		X		X	X	X	X	X	Sub Programs IZ33, IZEA, IZRE, IZSA, IZML, IZEC	
IAEM	GDC-22 BATC	LSE ELECTROMECHANICAL SYSTEMS TEST; Verifies proper operation and isolation of redundant LSE retraction system, including SA, TSM and HDA.		X		X		X	X	X		
IAFC	GDC-33 IBM	FLIGHT CONTROL UTILITY PROGRAMS; During major tests, it selectively performs S-IB engine null test, S-IVB engine null test, S-IVB coast null test, S-IB not zero test, and spacecraft control checks.		X		X	X	X	X	X	Linked by IALL, LAF1 Sub Programs OZF1, LZ F2	↓

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
IAFU	GDC-2 BATC	L/V SWITCH SELECTOR FUNCTIONAL TEST; Provides a functional check of the L/V Switch Selector by stage.		X		X	X	X	X	X	Linked by IASS	206 thru 209 ↓
IAHD	GDC-25 IBM	L/V EDS TEST; Provides the ability to check out EDS without use of either a S/C or S/C simulator.		X		X	X	X	X	X	Sub Programs IZRC, IZET, IZRT	
IALJ	GDC-4 BATC	LINKING PROGRAM FOR COUNTDOWN; Links all programs from T-83 hrs. to T-75 hrs. in CDDT/CD.		X	X	X		X	X	X	Other NASA Auth. Elem: GDC-3	
IALK	GDC-4 BATC	LINKING PROGRAM FOR COUNTDOWN; Links all programs and performs procedured functions from T-9 hrs. to T-1 hr. 51 min. for CDDT/CD			X	X		X	X	X	Other NASA Auth. Elem: GDC-3	
IALL	GDC-4 BATC	LINKING PROGRAM FOR OVERALL TESTS; Links all programs and performs procedural functions for proposed time period of T-1 hr. 51 min. to T-15 min.			X	X	X	X	X	X	Other NASA Auth. Elem: GDC-3 Sub program: LZTU	
IAMB	INS-21 BATC	RACS RAPID CONTROL BACKUP; Issues RACS commands, as required, for HI, LO, or RUN to any stage, or all stages.				X		X	X	X		
IAMC	INS-21 BATC	MEASURING SYSTEM RAPID RACS CALIBRATION; Issues all stages, all RACS-HIGH, LOW, and RUN.				X		X	X	X	Linked by IATS, IALJ	
IAPX	GDC-2 BATC	L/V INTEGRATED POWER TRANSFER; Checks the external bus voltages and subsequent to power transfer, checks the internal bus voltages, flagging any out-of-tolerance voltages with appropriate error messages.		X		X	X	X	X	X	Linked by IALL, IALJ	
IARS	GDC-4 BATC	RANGE SAFETY PROGRAM; Checks EBW circuits, the range safety system, and monitors when SRO issues cutoff.				X		X	X	X	Linked by IALL, IALK Other NASA Auth. Elem: INS-11	
IASL	GDC-2 BATC	S-IB SWING ARM PRESSURE AND LEVEL; Checks pressure levels in the swing arm at a given time in the CIP.		X		X		X	X	X	Linked by IALL Other NASA Auth. Elem: MEC-11	

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Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
IASP	GDC-22 BATC	SWING ARM SYSTEM POWER UP; Scan all S/A switches and indicators during power up to assure common initial baseline.	X	X					X	X	X	206 thru 209  ↓
IASS	GDC-2 BATC	L/V SWITCH SELECTOR INTERFACE TEST; Provides an interface check of the L/V SWITCH SELECTOR BY STAGE.		X		X		X	X	X	Sub programs OZIT, EZIT, LZIT, IZDS, and IZF1	
IATC	INS-12 BATC	L/V TELEMETRY CALIBRATION; Provides automatic calibration sequence.				X	X	X			Linked by IALL, IALJ	
IATS	GDC-4 BATC	TERMINAL SEQUENCE PROGRAM; Provides linking of all the programs run, and automatically performs procedural functions during terminal countdown sequence. Proposed time period T-15 min to T-0.		X	X	X	X	X	X	X	Other NASA Auth. Elem: GDC-3. Linked by IALL programs IZTT, IZTM, IZGT	
LA01	GDC-25 IBM	IU/POWER UP; IU Ground and Stage Power application; automates the manual commands to apply ground power, stage power, and IU temperature control.		X		X		X	X	X		
LACM	GDC-32 IBM	LVDC COMMAND SYSTEM TEST; Powers up flight computer, and runs Programs FT34, FT08, FT35, FT20, FT23, FT45, and FT47.		X			X	X	X	X	Linked by LALL	
LADO	GDC-32 IBM	LVDC/DA DISCRETE INPUT/OUTPUT TEST; Runs FT25 and FT33 and tests the LVDC discrete input and output registers.					X	X	X			
LAEM	GDC-25 IBM	MISSION EVENTS; Provides automation of the SV elect mate on linking programs FT25, FT33, and FT45 marking tests as required of discretes and allowing delays for special S.C. switches to be operated.		X	X	X		X	X			

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTP ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GWT
LAF2	GDC-33 IBM	FLIGHT CONTROL PREPS; Powers up the Flight Control Computer (FCC) and/or the EDS Control Rate Gyros (CRG). Functionally checks: FCC mode-switching and comparator set; FCC and CRG ramps and power circuits; and the CRG amplitude and comparator circuitry.		X		X		X	X	X	Linked by IALK, IALL, LAF1	206 thru 209
L AFC	GDC-32 IBM	LVDC/LVDA FLIGHT CONTROL SYSTEM INTERFACE; Checks for proper operation between the LVDA and the Flight Control System.		X				X	X	X	Linked by LALL	
LAGC	GDC-32 IBM	LVDC/LVDA GUIDANCE & CONTROL SIMULATED FLIGHT SEQUENCE VERIFICATION; Verifies G&C flight switch selector sequence and verifies CIF TM data reduction.		X				X	X	X	Linked by LALL	
LAGI	GDC-33 IBM	FLIGHT CONTROL GENERAL INVESTIGATION; Provides capability of issuing and observing FCC FUNCTIONS and measurements for Troubleshooting.		X		X		X	X	X		
LALL	GDC-32 IBM	FLIGHT COMPUTER REPERTOIRE PROGRAM; Selects any light computer ATOLL procedure (LAPW, LACM, LASS, LAGC, LAPG, LAST, LART, LAFC).		X				X	X	X		
LAM1	MEC-25 IBM	GAS BEARING SUPPLY SYSTEM OPERATION; Pressurizes the gas bearing sphere for operating the ST124. Vents the sphere 15 minutes after the ST124 is powered down.		X		X		X	X	X		
LAPG	GDC-32 IBM	LVDC PROGRAM LOAD; Loads preflight and flight programs into the LVDC, automatically selecting the best loading sequence by call Programs FT04, FT05, FT07, FT23, FT37, or FT55.		X				X	X	X	Linked by LALL	
LAPW	GDC-32 IBM	LVDC/LVDA POWER ON TEST; Makes a flight control configuration and discrete status checks; (Programs FT04, FT08, FT35, FT20, FT23 will be linked).		X				X	X	X	Linked by LALL, IALL	↓

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GNT	
LART	GDC-32 IBM	LVDC/LVDA REDUNDANCY & TMR OUTPUT DRIVER TEST; Selects appropriate FTB4 options for a given LVDA, i.e., LVDA SN P12 or lower, "TMR channel switching only" -SN P13 and above, "full redundancy checks."		X					X	X	X	Linked by LALL	206 thru 209
LASS	GDC-32 IBM	LVDC/LVDA CIU & SWITCH SELECTOR TEST; Provides the capability to power up and power down the flight computer, and perform Programs FT03 and FT43.		X					X	X	X	Linked by LALL	
LAST	GDC-32 IBM	LVDC/LVDA - ST124 INTERFACE TEST; Checks for proper operation between LVDA and the ST124 platform.		X					X	X	X	Linked by LALL	
LASW	GDC-25 IBM	IU SWITCH SELECTOR TEST; Checks end point of all IU switch selector channels for both true and complement state.		X		X	X	X	X	X	X	Subprograms LZCF, LZSP	
*ME01	INS-21	RACS RAPID CONTROL; Provides immediate control of RACS via Display Console.				X				X			
*MT01	INS-21	MEASUREMENT CALIBRATION TEST; Enables the test engineer to direct the calibration of the RACS Measurement System.		X		X	X	X	X	X	X		
OAAC	GDC-33 CCSD	S-IB HYDRAULIC ACTUATOR CALIBRATION; Generates an actuator calibration table to be used by programs which require actuator position information.	X	X					X	X			
OAEP	MEC-23 CCSD	S-IB ENGINE PURGES; Initiates engine purges and verifies purges are actuated within a specified time limit.		X	X	X			X	X			
OAGS	GDC-33 CCSD	S-IB HYDRAULIC SYSTEM GENERAL SUPPORT; Turns on monitors and shuts down any combination (1 through 4) of the hydraulic systems (used to support other tests).	X	X		X			X	X			
OAHF	GDC-33 CCSD	S-IB ACTUATOR/HYDRAULIC SYSTEM FUNCTIONAL TEST; Performs a functional check of all four hydraulic systems. Cycles actuators by calling LAGI and reads delta l null levels at ambient and at 140°F.	X	X		X			X	X			
OAHS	GDC-33 CCSD	S-IB HYDRAULIC SYSTEM REVERIFICATION SUPPORT; Turns on, monitors and shuts down any of the four hydraulic systems. Contains options to calculate fluid level and or safe the system automatically if out of tolerance conditions occur.	X	X					X	X			

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\*MSFC Delivered Program

Table 1-1. Saturn IB Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
OALB	MEC-23 CCSD	LOX BUBBLING AND PRESSURIZATION; Performs a functional test of the LOX bubbling system. Checks inlet temperature to tolerance. Bubbles the system and verifies proper temperature decrease and checks pressurization cycle to be within its time limit.		X	X	X		X	X		Linked by IALK	206 thru 209 ↓
OALS	GDC-24 CCSD	S-IB LOX CAVITY SEAL TEMPERATURE TEST; Verifies voting logic of LOX cavity seal temperature sensors for each engine by swinging RACS to high, low, and run modes, to simulate high and low temperatures.		X		X		X	X		Linked by IALK	
OAPL	GDC-24 CCSD	S-IB ESE PANEL LAMP AND SWITCH TEST; Provides automatic checkout of all LDO-driven indicator lamps, switch-driven LDI, and associated cabling.						X	X			
OAPU	GDC-24 CCSD	S-IB DAILY POWER ON; Provides the capacity of applying power to the S-IC ESE and stage.		X		X	X	X	X			
OAR1	GDC-24 CCSD	S-IB NETWORKS VERIFICATION TEST; Verifies S-IB stage and ESE circuits to include all stage C/O modes, prevalve timing, power transfer, flight sequence, and stage and ESE redundant circuits.		X		X	X	X	X		Subprograms: OZPV, OZEC, OZTV, OZFS	
OATO	MEC-23 CCSD	THRUST O.K. PRESSURE SWITCH FUNCTIONAL (CALIPS); Automatically initiates the calips console. Logs TOPS data during both ramp up and ramp down. Computes delta pressures and tests for in tolerance pressures.	X		X	X		X	X		Other NASA Auth. Elem: GDC-24 Linked by IALK	
OAT1	GDC-24 CCSD	S-IB FUNCTIONAL TEST; Verify OAT and simulator circuits. To support integrated overall tests.		X		X	X	X	X	X		

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Table 1-2. Saturn IB Major Test Program Matrix

IVAR	TEST TITLE													Remarks
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV S/A OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System	LV Propellant Load All Systems Test *	
BE02	X	X		X					X				X	
BE03	X	X		X					X				X	
BT01	X	X		X					X				X	
CE10	X	X	X	X		X	X	X	X	X			X	
CE40	X	X	X	X		X	X	X	X	X			X	
CTB1	X	X							X	X			X	
CTB2	X	X							X	X			X	
CTC3	X	X							X	X			X	
CTC4	X	X							X	X			X	
CTC5	X	X							X	X			X	
CTB6										X				
CTB7										X		X		
CTB8												X		
CTB9										X				
EADS	X	X		X					X			X	X	
EAEB												X		
EAEC												X		
EAHB														ESE CHECKOUT
EAIC	X	X	X	X	X	X	X	X	X		X	X	X	
EAMC												X		
EAPC												X		
EAPD												X		
EAPF			X	X	X	X	X	X	X					
EAPL												X		

Table 1-2. Saturn IB Major Test Program Matrix (Continued)

IVAR	TEST TITLE													Remarks
	Launch Countdown Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV S/A OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System	LV Propellant Load All Systems Test*		
EAPS	X	X	X	X	X	X	X	X	X		X	X	X	
EAPU	X	X										X	X	
EAPX												X		
EASR												X		
EASS	X	X	X	X	X	X	X	X	X		X	X	X	
FE50	X	X	X	X		X	X		X	X			X	
FTB1														
FT03	X	X							X	X			X	
FT04	X	X	X	X	X	X	X	X	X	X			X	
FT05	X	X			X				X	X			X	
FT06	X	X	X	X		X		X	X	X			X	
FT07										X		X		
FT08	X	X							X	X			X	
FT10	X	X	X	X		X			X	X			X	
FT20	X	X	X	X	X	X	X	X	X	X			X	
FT23	X	X	X	X	X	X	X	X	X	X			X	
FT25	X	X		X	X	X	X	X	X	X			X	
FT27				X	X	X		X	X	X				
FT31	X	X							X	X		X	X	
FT33	X	X		X	X				X	X			X	
FT35	X	X	X	X	X	X	X	X	X	X			X	
FT37	X	X		X	X	X		X	X	X			X	
FT42	X	X	X	X		X		X		X			X	
FT43	X	X							X	X			X	

Table 1-2. Saturn IB Major Test Program Matrix (Continued)

IVAR	TEST TITLE													Remarks
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV S/A OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System	LV Propellant Load All Systems Test *	
FT45	X	X		X	X	X	X	X	X	X			X	
FT47	X	X	X	X	X	X		X	X	X			X	
FT49	X	X	X	X		X			X	X			X	
FT54										X		X		
FT55	X	X		X	X	X		X	X	X			X	
FZ01										X		X		
GE01	X	X		X		X	X	X	X	X			X	
GT16	X	X	X	X	X	X	X	X	X	X			X	
IAAR	X	X	X	X		X		X	X				X	
IAED	X	X		X		X	X	X	X		X		X	
IAEM											X			
IAFC	X	X	X	X		X		X	X				X	
IAFU											X			
IAHD													X	
IALJ	X	X												
IALK	X	X							X				X	
IALL	X	X	X	X		X		X	X				X	
IAMB												X		
IAMC	X	X	X	X		X		X	X				X	
IAPX	X	X	X	X		X		X	X		X		X	
IARS	X	X		X		X		X	X				X	
IASL	X	X						X	X				X	
IASP	X	X	X	X	X				X			X	X	
IASS											X			

Table 1-2. Saturn IB Major Test Program Matrix (Continued)

IVAR	TEST TITLE												Remarks	
	Launch Countdown	Countdown Demonstration Test	S/C Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV S/A OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System		LV Propellant Load All Systems Test *
IATC	X	X	X	X	X	X	X	X	X			X	X	
IATS	X	X	X	X		X		X	X				X	
LA01	X	X	X	X	X	X	X	X	X	X	X	X	X	
LACM										X		X		
LAD0												X		
LAF2	X	X	X	X		X		X	X				X	
L AFC												X		
LAGC												X		
LALL												X		
LAM1												X		
LAPG												X		
LAPW	X	X	X	X	X	X		X	X	X		X	X	
LART												X		
LASS												X		
LAST												X		
LASW	X	X		X		X	X	X	X		X		X	
ME01												X		
MT01	X	X	X		X			X	X				X	
NT94														AS REQUIRED
NT97														AS REQUIRED
NT98	X	X	X	X	X	X	X	X	X	X	X	X	X	
NT99														AS REQUIRED
NTDR												X		AS REQUIRED
OAAC												X		
OAEP	X	X		X		X		X	X			X	X	
OAGS	X	X	X	X	X	X	X	X	X	X		X	X	



Table 1-2. Saturn IB Major Test Program Matrix (Continued)

IVAR	TEST TITLE											Remarks	
	Launch Countdown	Countdown Demonstration Test	S/C Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV S/A OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test		LV Stage or Sub-System
OAHF										X		X	
OAHS												X	
OALB	X	X							X				X
OALS	X	X							X			X	X
OAPL												X	
OAPU	X	X	X	X	X	X	X	X	X	X	X	X	X
OAR1												X	
OATO	X	X							X		X		X
OAT1				X		X		X	X				

Table 1-3. Other Saturn IB Systems Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*ATGT	CAP-A IBM	ATOLL TAPE GENERATOR (ATOLL UTILITY); Provides the capability to update the ATOLL drum index.						X	X	X		
DDTG	CAP-A IBM	DISPLAY DESCRIPTION TAPE GENERATOR; Generates the DD tape from symbolic input.						X				
DE04	GDC-31 IBM	MLC INSTRUCTION TEST, PART 1; Verifies that all but the I/O and some control op codes perform properly.						X	X		Interrelated w/DT13	
DE05	GDC-31 IBM	MLC DRUM TEST; Verifies, in less than certain test, that data can be transferred to and from the drum.						X	X		Interrelated w/DT14	
DE06	GDC-31 IBM	MLC MEMORY TEST; Performs a cursory check of HSM for the LCC.						X	X		Interrelated w/DT15	
DE07	GDC-31 IBM	MLC INSTRUCTION TEST, PART 2; Verifies that all but the I/O and some control op codes perform properly for the LCC.						X	X		Interrelated w/DT13	
DT01	GDC-31 IBM	SGCC GMT MAINTENANCE TEST; Exercises the operation of the GMT clock, while running under the control of the Saturn operating system.						X	X	X		
DT02	INS-13 IBM	SGCC DDAS CURSORY TEST; Provides a cursory test of the DDAS IODC and computer interface unit.		X				X	X	X		
DT12	GDC-31 IBM	RCA-110A/DDP-224 INTERFACE CHECKOUT; Performs an on-line checkout of the RCA-110A IODC-6 and the DDP-224 fully buffered channel and indicates malfunction.						X	X			
DT13	GDC-31 IBM	LCC INSTRUCTION TEST; Verifies that all but the I/O and some control op codes perform properly.						X	X			
DT14	GDC-31 IBM	LCC DRUM TEST; Verifies, in less than certain test, that data can be transferred to and from the drum.						X	X			
DT15	GDC-31 IBM	LCC MEMORY TEST; Performs a cursory check of HSM.						X	X			

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\*MSFC Delivered Program

Table 1-3. Other Saturn IB Systems Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSFL	PRINTER	DISPLAY			GMT	
DTP2	INS-13 IBM	DDAS CURSORY TEST.			X			X	X	X	Interrelated W/DT02		
DTSC	GDC-31 IBM	LCC SELF-CHECK; Monitors the peripheral equipment within the LCC to determine its operational status.						X	X	X			
DT23	GDC-31 IBM	LCC ON-LINE PERIPHERAL EQUIPMENT TEST; Printer, tape stations 1-3, & 2-9 card reader.						X					
ENRS	GDC-31 CAP-B	MLC SLOW SYSTEM RECOVERY BOOT STRAP; Loads MLC UXEX Loader/Modifier from MLC MTS 1-3 or 2-3 (designed for remote, automatic slow system recovery).											
*FU01	GDC-32 IBM	SIMULATED PLUS-TIME TABLE GENERATOR TEST; Runs validity checks on a simulated plus-time card deck for either tower test, station acquisition, or command functions; writes deck.						X	X			Linked by IALL	
*NT94	CAP-A IBM	DCC REMOTE LOAD/UNLOAD; Display control computer load/unload program responds to discretes initiated from discrete panel, and either reloads the DCC or dumps the DCC on printer or log tape.						X	X				
*NT97	CAP-A IBM	DISCRETE ACTIVITY MONITOR TEST; Provides the status and number of LDIs and MDIs not in a prespecified state for one or all stages.						X	X	X			
*NT98	CAP-A IBM	LV DISCRETE INITIALIZATION; Displays and prints the status of all MDIs and LDIs.				X	X	X	X				
*NT99/ NE99	CAP-A IBM	DISCRETE EXEC. TABLE MODIFY; Provides the capability to modify, on line, the Discrete Action Table.						X	X				
*NTDR	CAP-A IBM	L/V DISCRETE RESPONSE TIME; Measures the elapsed time between the issuance of MDO and MDI, or, DDAS discrete talkback.	X		X			X	X	X		Linked by EAPC	

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\*MSFC Delivered Program

Table 1-3. Other Saturn IB Systems Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CYC	SUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*SE88	CAP-A IBM	ANALOG TEST POINT MONITOR; Monitors a specific hardware analog test point, and displays each value read (keyboard entry must be made for each test point to be monitored). Updates for bias, signal range, and description may be entered. SE88 may also be used to delete an active analog slot from the monitor table. Control of the routine is via the display console keyboard.	X					X	X			
*SE89	CAP-A IBM	ALTERNATE MEMORY CHECKER; Function executor used to checkout redundant memory of ML computer.						X	X			
*SE93	CAP-A IBM	DISCRETE MASK/UNMASK ROUTINE; Modifies, by masking or unmasking, the interrupt control word groups. It accepts data which will modify the LCCC or MLC discrete monitor interrupt (MI) control words. If a group is masked, any change in DI status cannot cause an interrupt. If the group is unmasked, an interrupt can be allowed when a DI change is detected. All discrete groups may be unmasked with one keyboard entry.						X	X			
*ST90	CAP-A IBM	MLC RECOVERY CONTROL; This program is the controlling program for MLC System Recovery (SSRP) Options, by allowing either starting of the recovery process or termination. If recovery is started, the program displays tutorial messages to start recovery at the MLC. The LCCC is set to DOWN status, and interrupts are inhibited. Communications with the MLC System Recovery are then begun.						X	X	X		
*ST91 SE91	CAP-A IBM	RECOVERY DUMP RETRIEVAL; Provides the capability to log the MLC binary dump on log tape, and present recovery and the system status.						X	X	X		
*ST92	CAP-A IBM	REMOTE LOAD PRELOAD - LOAD BOOTSTRAP										
*ST95/ SE95	CAP-A IBM	MLC REMOTE LOAD; Initially loads the MLC Operating System from the LCCC system Master Tape, to allow patching of MLC core and drum resident programs, and to load function executor binary card decks.						X	X			
ZT07	CAP-B	ON-LINE DATA RETRIEVAL (POSTPROCESSING); Enables a quick-look discrete data retrieval.						X	X			
*ZT96	GDC-31 IBM	SYSTEM CLOSEOUT; Provides options to dump IOR-2s, core, and drum to a log tape; and/or closes out that log tape.						X	X	X		

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\*MSFC Delivered Program

Table 1-4. Saturn V Operating System and Test Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*BE01	GDC-28 BATC	S-IC PROPELLANT TEMPERATURE MONITOR; Calculates RP-1 and LOX thumbwheel settings from RP-1 temperature and loading tables.		X	X				X	X	Linked by VALJ	512/ 513
*BE02	GDC-28 BATC	S-IC PROPELLANT LEVEL MONITOR; Continuously monitors propellant levels in the S-IC stage tanks, and the PTCS mass readouts for S-IC, S-II, and S-IVB stages.		X					X		Linked by VALJ	
*BT01	GDC-28 IBM	S-IC PROPELLANT MONITOR UPDATE TEST; Processes propellant input data (Loading tables, etc.) for use by function executor BE01 and BE02.						X	X	X	Linked by VALJ	
*CTC1	GDC-33 IBM	GAIN TEST; Performs the A-zero and A-one burn mode gain test for all stages.		X		X	X	X	X		Linked by VALK, KAF1	
*CTC2	GDC-33 IBM	CONTROL COMPUTER RELAY REDUNDANCY TEST; Performs continuity checks on redundant relays in the control computer.		X		X		X	X		Linked by VALK	
*CTC3	GDC-33 IBM	CONTROL COMPUTER COMPARATOR TEST; Tolerance-checks the signal that results in a vote from the control computer comparators.		X		X		X	X		Linked by VALK	
*CTC4	GDC-33 IBM	CONTROL EDS RATE GYRO TEST; Verifies calibration of EDS CRG and operation of EDS CRG Excessive rate switches, and the EDS CRG comparators.		X		X	X	X	X		Linked by VALK, KAF1	
*CTC5	GDC-33 IBM	APS GAIN TEST; Checks and displays inputs of the flight computer at threshold and saturation, and verifies spatial amplifier output pulse widths.		X		X	X	X	X		Linked by VALK, KAF1	
*CTC6	GDC-33 IBM	END-TO-END POLARITY TEST; Performs polarity test on guidance and control steering systems for all stages of the LV.		X		X		X	X			
*FE50	GDC-32 IBM	IU/ACCELEROMETER MONITOR; Scales and monitors the output from the LVDC Accelerometer Monitor Program.						X	X		Called by FT49	
*FT03	GDC-32 IBM	LVDC/LVDA SWITCH SELECTOR INTERFACE TEST; Provides the capability of verifying the LVDC interface with the switch selectors.					X	X	X		Linked by VALK, KASS	

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\*MSFC Delivered Program

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*FT04	GDC-32 IBM	LVDC/POWER ON-OFF AND/OR REDUNDANCY TESTS; Provides the capability of applying or removing power to the LVDC/LVDA, and/or performs checking functions.		X		X		X	X		Linked by VALK, KACM, KAGI, KAPG, KAPW, and KARD	512/ 513
*FT05	GDC-32 IBM	LVDC/DATA LOAD AND/OR VERIFY TEST; Provides the capability of loading data into, and/or verifying data within, the LVDC memory from a given point.						X	X		Linked by VALK, KAGI, and KAPG	
*FT06	GDC-32 IBM	LVDC/GIMBAL ANGLE READ TEST; Outputs the gimbal angle status, utilizing the Gimbal Angle Monitor Program in the LVDC.						X	X		Linked by VALK, VALL, VATS, and VARY	
*FT07	GDC-32 IBM	LVDC/SELECTOR DUMP TEST; Commands the printout of LVDC memory sector.						X	X		Linked by KAPG	
*FT08	GDC-32 IBM	LVDC CORE MAP LOAD AND/OR PRINT TEST; Retrieves the Core Map from the LVDC, stores it in the AGCSC or MLC, and prints it on the LCC line printer.						X	X		Linked by VALK, KACM, and KAPW	
*FT10	GDC-32 IBM	LVDC/LVDA LADDER OUTPUT TEST; Exercises the ladders to prove the LVDA's steering command capability.		X				X	X		Linked by VALK, VALL, KACM, and VARY	
*FT20	GDC-32 IBM	LVDC/LVDA SELF-TEST; Performs an error check of the LVDA/LVDC, utilizing, where practical, the LVDC routines to perform the error checking.						X	X		Linked by VALK, KACM, and KAPW	
*FT23	GDC-32 IBM	LVDC/SECTOR SUM CHECK; Provides the capability of determining if any specified LVDC memory sector has a valid check sum.						X	X		Linked by VALK, VALL, KAPG, and KAPW	
*FT25	GDC-32 IBM	LVDC/LVDA DISCRETE INPUT TEST; Verifies that the LVDC can properly read its discrete inputs.				X		X	X		Linked by KADO, KAGI, and VALJ	
*FT27	GDC-32 IBM	SIMULATED FLIGHT MONITOR TEST; Monitors and records the events resulting from the operation of the Flight Simulation Routine in the LVDC.				X		X	X		Linked by VATS	
*FT31	GDC-32 IBM	LVDC ACCELEROMETER PULSE COUNT TEST; Exercises the Accelerometer Pulse Count Routine of the LVDC to ensure functioning of the accelerometer processor associated with the ST-124M platform accelerometers.						X	X		Linked by VALK	↓

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\*MSFC Delivered Program

Table 1-4. Saturn V Operating System and Test Programs (Continued)

1-24 IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*FT33	GDC-32 IBM	LVDC/LVDA DISCRETE OUTPUT TEST; Verifies that the LVDC discrete outputs can be set and reset.						X	X		Linked by VAED, KADO	512/513
*FT35	GDC-32 IBM	LVDC/LVDA DDAS TEST; Verifies proper operation of the interface between the LVDC telemetry buffer and the DDAS.		X		X		X	X		Linked by VALK, KACM, KAPW	↓
*FT37	GDC-32 IBM	SIMULATED FLIGHT INITIALIZE; Provides hardware checks and indicator words to the Simulated Flight Monitor. Commands LVDC to the following modes: a. Preparation to launch without a platform. b. Preparation to launch Simulated Flight with a platform. c. Repeatable Simulated Flight.						X	X		Linked by VALK, VATS, KAPG	
*FT42	GDC-32 IBM	PREPARE TO LAUNCH; Provides hardware checks, LVDC initialization, and SGCC initialization for Flight Programs.			X			X	X	X	Linked by VATS	
*FT43	GDC-32 IBM	LVDC COMPUTER INTERFACE UNIT TEST; Verifies CIU operation within the Instrument Unit System. Test Operation of the Guidance System in addressing and receiving data from the CIU.		X		X		X	X		Linked by VALK, KASS	
*FT45	GDC-32 IBM	LVDC COMMAND SYSTEM TEST; Verifies communication at AGCSC between Guidance Command System and LVDA/LVDC. Checks signal strength in Guidance Command Receiver and Digital Decoder.		X		X		X	X		Linked by VALK, VALL, KACM, KAG1	
*FT47	GDC-32 IBM	PREFLIGHT COMMAND TEST; Commands the Orbital Routine of the Flight Program to enable communication with the LVDC.				X		X	X		Linked by VALK, VALL, KACM	
*FT49	GDC-32 IBM	ACCELEROMETER MONITOR DISPLAY CONTROL; Displays options for and executes FE50.						X	X		Linked by VALL and VARY	
*FT54	GDC-32 IBM	LVDC STEERING TEST; Commands LVDC to enter guidance and control Steering Test and to return LVDC to Mode Sort.						X	X			
*FT55	GDC-32 IBM	LVDC TELEMETRY TEST; Commands the LVDC to enter a telemetry test routine, and loads an input word to specify the rate of telemetry.						X	X		Linked by VALK, KAPG	

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\*MSFC Delivered Program

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MCO	ISSUE, SSEL	PRINTER	DISPLAY			GNT
*FZC1	GDC-32 IBM	SIMULATED FLIGHT POSTPROCESSOR TEST; Provides the capability of processing the raw data generated by the overall Simulated Flight Test Program.						X	X			512, 513
*GE01	GDC-12 IBM	AZIMUTH POSITIONING AND MONITOR PG; Monitors the azimuth encoder for drift, positions platform, and calculates plot.		X	X	X		X	X	X		
*GT16	GDC-12 IBM	IU/AZIMUTH LAYING PROGRAM; Aligns the platform to the firing azimuth.		X		X		X	X		Linked by VALL and VARY	
KA01	GDC-25 IBM	IU/POWER UP; IU Ground and Stage Power application; automates the manual commands to apply ground power, stage power, and IU temperature control.		X		X		X	X	X	Linked by VALJ	
KACM	GDC-32 IBM	LVDC COMMAND SYSTEM TEST; Powers up flight computer, and runs Programs FT04, FT08, FT35, FT20, FT23, FT45, and FT47.		X				X	X	X	Linked by KALL	
KADO	GDC-32 IBM	LVDC/DA DISCRETE INPUT/OUTPUT TEST; Runs FT25 and FT33 and tests the LVDC discrete input and output registers.						X	X	X		
KAF1	GDC-33 IBM	T-24 HOURS FLIGHT CONTROL LINKING; Links all Flight Control Programs performed between T-24 and T-18 Hours in the CDDT and CD (Programs KAF2, CTC1, CTC4, CTC5, and VAFC).						X	X	X	Linked by VALJ	
KAF2	GDC-33 IBM	FLIGHT CONTROL PREPS; Powers up the Flight Control Computer (FCC) and/or the EDS Control Rate Gyros (CRG). Functionally checks: FCC mode-switching and comparator set; FCC and CRG ramps and power circuits; and the CRG amplitude and comparator circuitry.		X		Y		X	X	X	Linked by VALK, VALL, KAF1	
KAF3	GDC-33 IBM	FLIGHT CONTROL FLIGHT VECTOR; Automatically computes the S-IC Engine Thrust Vector to satisfy the Launch Mission Rules. Redline requirement for holddown post and tower clearance.		X				X	X		Linked by VATS	

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Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY		
K AFC	GDC-32 IBM	LVDC/A FLIGHT CONTROL SYSTEM INTERFACE; Checks for proper operation between the LVDA and the Flight Control System.	X						X X X	Linked by KALL	512/ 513
KAGC	GDC-32 IBM	LVDC/LVDA GUIDANCE & CONTROL SIMULATED FLIGHT SEQUENCE VERIFICATION; Verifies G&C flight switch selector sequence and verifies CIF TM data reduction.		X					X X X	Linked by KALL	↓
KAG1	GDC-32 IBM	FLIGHT COMPUTER SYSTEM CDDT/CD SUPPORT PROGRAM; Links Programs FT45, FT25, FT04, and FT05 that are run between T-20 and T-18 Hours.		X					X X X	Linked by VALJ	
KALL	GDC-32 IBM	FLIGHT COMPUTER REPERTOIRE PROGRAM; Selects any flight computer ATOL procedure (KAPW, KACM, KASS, KAGC, KAPG, KAST, KARD, KAFC).		X					X X X		
KAME	GDC-25 IBM	MISSION EVENTS; Provides automation of S.V. Elect. Mate by linking Programs FT25, FT33, and FT45, making tests as required of discretes and allowing delays for specific S.C. switches to be operated.		X	X	X			X X		
KAM1	MEC-25 IBM	GAS BEARING SUPPLY SYSTEM OPERATION; Pressurizes the gas bearing sphere for operating the ST124. Vents the sphere 15 minutes after the ST124 is powered down.									
KAM2	MEC-25 IBM	MECHANICAL SYSTEM FUNCTIONAL; Checks that IU Pneumatic Console and Thermal Conditioning System is operating properly.		X		X			X X X		
KAPG	GDC-32 IBM	LVDC PROGRAM LOAD; Loads preflight and flight programs into the LVDC, automatically selecting the best loading sequence by calling Programs FT04, FT05, FT07, FT23, FT37, or FT55.		X					X X X	Linked by KALL	
KAPS	GDC-12 IBM	ST124 POWER ON SEQUENCES; Powers on the ST124 and displays all ST124 functions and measurements during power on sequences.		X					X X		
KAPW	GDC-32 IBM	LVDC/LVDA POWER ON TEST; Makes a flight control configuration and discrete status checks; (Programs FT04, FT08, FT35, FT20, FT23 will be linked).		X					X X X	Linked by KALL, VALL, and VALJ	

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT	
KARD	GDC-32 IBM	LVDC/LVDA REDUNDANCY & TMR OUTPUT DRIVER TEST; Selects appropriate FT04 options for a given LVDA, i.e., LVDA SN P12 or lower, "TMR channel switching only" -SN P13 and above, "full redundancy checks."		X					X	X	X	Linked by KALL	512/ 513
KASD	GDC-11 IBM	ST124 PLATFORM SERVO LOOP DAMPING TEST; Tests each gyro and all servo loops.		X		X			X	X	X		
KASS	GDC-32 IBM	LVDC/LVDA CIU & SWITCH SELECTOR TEST; Provides the capability to power up and power down the flight computer, and perform Programs FT03 and FT43.		X					X	X	X	Linked by KALL	
KAST	GDC-32 IBM	LVDC/LVDA - ST124 INTERFACE TEST; Checks for proper operation between LVDA and the ST124 platform.		X					X	X	X	Linked by KALL	
KASW	GDC-25 IBM	IU SWITCH SELECTOR TEST; Checks end point of all IU switch selector channels for both true and complement state.		X		X	X	X	X	X	X		
*ME01	INS-21	RACS RAPID CONTROL; Provides immediate control of RACS via Display Console.				X				X			
*MT01	INS-21	MEASUREMENT CALIBRATION TEST; Enables the test engineer to direct the calibration of the RACS Measurement System.		X		X	X	X	X	X	X	Linked by VALJ	
QAEC	GDC-26 NAR	S-II ENGINE ELECTRICAL CIRCUITRY TEST; Checks engine control logic, verifies engine cutoff CMDS; checks out engine spark system, and performs an engine sequence test without control pressures.		X		X	X	X	X	X	X	Linked by VALJ Sub program QZEC and QZEF	
QAES	MEC-22 NAR	S-II ENGINE SEQUENCE TEST; After verifying start configuration, issues all engine start commands and then verifies that required responses occur within specified limits and time frames. Issues engine cutoff and verifies appropriate functions for shutdown sequence.		X		X	X	X	X	X	X		
QALS	GDC-26 NAR	S-II PROPELLANT LEVEL & DEPLETION SENSORS; Verifies that the level, depletion, fast-fill, and overfill sensors (including logic and timer circuitry) operate properly.		X		X	X	X	X	X	X		

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Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MP <sup>0</sup>	ISSUES SSEL	PRINTER	DISPLAY			GMT
QAMS	MEC-22 NAR	S-II MAINSTAGE CALIPS CHECKOUT; Verifies functional performance of the main-stage calips switches and related circuitry.	X					X	X	X	Linked by VALJ	512/ 513
QAPD	GDC-26 NAR	S-II PROPELLANT DISPERSION SYSTEM FUNCTION TEST; Verifies that, with the proper stimuli, the propellant dispersion system functions properly.		X		X		X	X	X		
QAPL	GDC-26 NAR	S-II PANEL LAMP SEQUENCING; Sequences the panel lamps.						X	X	X		
QAPO	GDC-26 NAR	S-II BUS POWER ON; Brings up S-II stage power after checking switch and hardware configuration. Verifies bus levels to be within tolerance and scans stage discrete status.		X		X		X	X	X	Linked by VALJ	
QAPS	MEC-22 NAR	S-II PRESSURIZATION COMPONENTS CHECKOUT; Verifies pre-test configuration and functional performance of LOX & LH2 vent valves, and the 23 psia and tank high pressure switches.	X	X		X	X	X	X	Y		
QAPU	GDC-26 NAR	S-II PROPELLANT UTILIZATION SYSTEM FUNCTIONAL; Verifies PU system temperature levels and stability; verifies bridge slew operation, and verifies MRCV control logic.		X		X	X	X	X	X		
QAS2	GDC-26 NAR	S-II/SWITCH SELECTOR FUNCTIONAL; Verifies capability of receiving and verifying receipt, and of issuing S-II commands.		X		X	X	X	X	X	Sub program QZ02	
QASP	GDC-26 NAR	S-II/SEPARATION SYSTEM FUNCTIONAL; Verifies that the system will, upon command from the IU (via the S-II switch selector), provide the following ordnance functions: S-II ordnance arm, S-II second plane separation, S-II/S-IVB ordnance arm, and S-II/S-IVB separation and retro rocket fire. Also, it verifies proper EBW firing unit response to these commands.		X		X	X	X	X	X		512

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
QATM	LV-INS-12 NAR	S-II TELEMETRY SYSTEM FUNCTIONAL; Verifies PCM, TDM, RASM and RDSM sync and encoding accuracy; checks out power supplies calibration accuracy and sequencing; diagnostically checks out digital submultiplexer, DDAS assembly, and discrete measurement subsystem; and provides capability for isolating instabilities in digital submultiplexers and PCM DDAS assembly.		X		X	X	X	X	X	Sub programs QZT1 QZT2	512/ 513
VAAR	GDC-33 IBM	ATTITUDE RATE COMMAND TEST; Exercises the attitude rate channels after switching to the SIC burn mode.		X		X	X	X	X	X	Linked by VATS	
VAED	GDC-25 IBM	EDS TEST; Stimulates and evaluates the vehicle and spacecraft using MDOs to detect emergency conditions.		X		X	X	X	X	X	Sub programs VZ33, VZEA, VZRE, VZSA, VZML Linked by VALL, VALJ	
VABC	INS-11 BATC	RECEIVER BAND WIDTH CHECK; Demonstrates the capability to checkout RF components.		X				X	X	X		NVA
VAFC	GDC-33 BATC	FLIGHT CONTROL UTILITY PROGRAMS; During major tests, it performs S-IC engine null test, S-II engine null test, S-IVB engine null test, S-IC coast null test, S-IC not zero test, and spacecraft control checks.		X		X		X	X	X	Linked by VALL, KAF1 Sub program WZF1, KZF2	512/ 513
VAFU	GDC-2 BATC	L/V SWITCH SELECTOR FUNCTIONAL TEST; Provides a functional check of the L/V Switch Selector by stage.		X		X	X	X	X	X	Linked by VASS	
VALI	GDC-2 BATC	L/V LIFTOFF INTERLOCK VERIFICATION; Verifies the proper operation of the interlock circuitry.		X			X	X	X	X		
VALJ	GDC-4 BATC	T-24 HR 45 MIN TO 18:30 HRS LINKER; Links all programs run in time period.		X	X	X		X	X	X		

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
VALK	GDC-4 BATC	LINKING PROGRAM FOR COUNTDOWN; Provides linking of all programs (where possible) and normally run between approximately T-9 hours and T-1 hour and 51 min.			X	X		X	X	X	Other NASA Auth. Elem: GDC-3	512/ 513
VALL	GDC-4 BATC	LINKING PROGRAM FOR OVERALL TESTS; Links all programs and performs procedural functions between T-1 hour 50 minutes and T-27 minutes; operationally links VATS to T-0.			X	X	X	X	X	X	Other NASA Auth. Elem: GDC-3	↓
VAMB	INS-21 BATC	RACS RAPID CONTROL BACKUP; Issues RACS commands, as required, for HI, LO or RUN to any stage (S-IC, S-II, S-IVB, or IU), or all stages.				X		X	X	X		
VAMC	INS-21 BATC	MEASURING SYSTEM RAPID RACS CALIBRATION; Issues all stages, all RACS-HIGH, LOW, and RUN.				X		X	X	X	Linked by VATS, VARY, VALJ	
VAOW	GDC-25 IBM	OWS SWITCH SELECTOR TEST; Test will issue all OWS switch selector channels, in the true, then in the compliment form.		X			X	X	X	X		
VAPX	GDC-2 BATC	LV/INTEGRATED POWER TRANSFER; Checks the external bus voltages and subsequent to power transfer, checks the internal bus voltages, flagging any out-of-tolerance voltages with appropriate error messages.		X		X	X	X	X	X	Linked by VALL and VALJ	
VARS	GDC-4 BATC	RANGE SAFETY PROGRAM; Checks EBW circuits, the range safety systems, and monitors when SRO issues cutoff.		X		X		X	X	X	Linked by VALL, VALK, VARY Other NASA Auth. Elem: GDC-3	
VARY	GDC-4 BATC	RECYCLE PROGRAM; Recycles to T-22 minutes, VAMC run as part of recycle.				X		X	X	X		

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
VASS	GDC-2 BATC	L/V SWITCH SELECTOR INTERFACE TEST; Provides an interface check of the L/V switch selector by stage.		X		X		X	X	X	Sub programs WZIT, QZIT, XZIT, KZIT, VZDS, and VZF1	512/ 513
VATC	INS-12 BATC	L/V TELEMETRY CALIBRATION; Provides automatic calibration sequence.				X	X	X	X	Linked by VALL, VARY, VALJ		
VATS	GDC-4 BATC	TERMINAL SEQUENCE PROGRAM; Provides linking of all the programs run between T-24 and T-0 minutes, and automatically performs procedural functions during this time period.	X	X	X	X	X	X	X	Other NASA Auth Elem GDC-3 Linked by VALL and VARY. Sub program VZTS, VZTT, VZTM, VZGT subroutine VMTS		
VAVS	GDC-2 BATC	L/V SIMULATED FLIGHT PREPS; Issues selected MDOs and checks for proper response.	X		X		X	X	X	Linked by VATS		
WACR	GDC-24 BATC	S-IC CUTOFF RELAYS TEST; Verifies proper operation and responses of S-IC cutoff sensors for thrust-not-ok cutoff, LOX and fuel depletion cutoff, cutoff of adjacent engines; and checks the redundancy of all cutoff circuitry.	X		X	X	X	X	X	Sub programs WZCR, and WZRB - (WZCR is linked by WASV		
WAES	MEC-23 BATC	F-1 ENGINE SEQUENCE TEST; Verifies correct operational sequence and respective allowable time limits of the F-1 engine valve timing.			X		X	X				
WAPO	GDC-24 BATC	S-IC DAILY POWER ON; Provides the capability of applying power to the S-IC ESE and stage.	X		X		X	X	X	Sub program WZPO Linked by VALJ		
WAPX	GDC-24 BATC	S-IC POWER TRANSFER FUNCTIONAL; Verifies S-IC power transfer circuitry, rapidly and reliably, prior to LV and S/V overall test.	X		X		X	X	X	Linked by WASV		
WASL	GDC-2 BATC	S-IC SWING ARM PRESSURE & LEVEL; Checks operation of S/A ESE by bleeding down hydraulic pressure in the actuators and checking for ESE low level sensing and replenish.	X		X		X	X	X	Linked by VALL; Other NASA Auth Elem MEC-11		

Table 1-4. Saturn V Operating System and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND GR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	GDC	ISSUES MDC	ISSUES SSEL	PRINTER	DISPLAY			GMT	
WASP	GDC-22 BATC	SWING ARM POWER UP; Scans all swing arm switches and indications during systematic power up of the system.		X		X		X	X	X	Linked by VALJ	512/ 513	
WASS	GDC-2 BATC	S-IC SWITCH SELECTOR TEST; Verifies proper response to the S-IC switch selector commands with both stage buses or either bus on.		X		X	X	X	X	X		↓	
WAST	MEC-33 BATC	S-IC PNEUMATIC CHECKOUT RACK SWITCH TEST; Provides checkout of the pneumatic racks and recording of the necessary data for realtime analysis.	X			X		X	X	X	Other NASA Auth. Elem: GDC-2		
WASV	GDC-24 BATC	S-IC OAT PREPS; Verifies the status of various S-IC stage electronic subsystems.		X		X	X	X	X	X	Sub program WZEB		
WATL	GDC-2 BATC	S-IC TAIL SERVICE MAST PRESSURE & LEVEL; Checks operation of TSM ESE by bleeding down TSM hydraulic pressure and checking for ESE low level sensing and replenish.		X		X		X	X	X	Linked by VALL Other NASA Auth Elem: MEC-12		
XADA	GDC-23 MDAC	S-IVB DDAS AUTOMATIC SCAN; Provides automatic checkout of individual DDAS measurements on S-IVB stage.		X		X		X	X	X	Sub programs XZCM, XZDM, XZFM, and XZMM		512
XADS	GDC-23 MDAC	S-IVB COUNTDOWN DISCRETE SCAN; Verifies the S-IVB discrete baseline at critical times.		X				X	X	X	Linked by VALK, VARY		
XAEB	GDC-23 MDAC	S-IVB EBW TEST; Provides capability to verify operation of EBW associated with UR ignition and UR jettison ordnance functions.		X		X	X	X	X	X			
XAEC	GDC-23 MDAC	S-IVB ENGINE CONTROL ASSY FUNCTIONAL, ENGINE COMPONENT & LADDER TEST; Functionally verifies the engine control assembly by checking the engine ladder functions and cutoff logic. Verifies engine component test and engine ladder functions are operational.		X		X	X	X	X	X			
XAIC	GDC-23 MDAC	S-IVB INITIAL CONDITION SCAN; Verifies prepower scan, ground power scan, and vehicle power scan for proper configuration.		X				X	X	X	Linked by XAPS Sub program XZIC		
XAHB	GDC-23 MDAC	S-IVB ESE HIGH BAY QUALIFICATION; Verifies S-IVB ESE high bay prior to vehicle stacking.		X		X		X	X	X	Linked by XAPL and calls 17 Sub- programs.		

Table I-4. Saturn V Operating System and Test Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	IF VES SSEL	PRINTER	DISPLAY			GMT
XAMC	INS-21 MDAC	S-IVB ENGINE & APS MEASUREMENT CALIBRATION CHECKS; Scans specified measurements with special calibration data, average the readings and compare against specified limits.		X					X	X	X	512 ↓
XAPC	MEC-24 MDAC	S-IVB PROPULSION CHECKS; Checks the function and timing of propulsion valves, automatically calls NTDR to check discrete response timing. Makes functional check of S-IVB pressure switches.		X		X	X	X	X	X		
XAPD	GDC-23 MDAC	S-IVB POWER DISTRIBUTION; Verifies all power distribution and control switching circuits; for vehicle and ESE.		X		X	X	X	X	X	Sub programs XZPD and XZPU	
XAPF	GDC-23 MDAC	S-IVB PREPS AND FUNCTIONAL; Functionally checks S-IVB systems required to support overall tests through FRT.		X	X	X		X	X	X	Sub program XZPF	
XAPL	GDC-23 MDAC	S-IVB PANEL LAMP TEST; Verification of lamps on MDAC S-IVB panels by cycling discretes with manual identification.						X	X	X	Linked by XAHB	
XAPS	GDC-23 MDAC	S-IVB POWER SETUP; Provides a sequential power turnon and turnoff for the vehicle subsystem and stage integrated test.		X		X	X	X	X	X	Linked by VALJ	
XAPU	GDC-23 MDAC	S-IVB PROPELLANT UTILIZATION; Provides functional check and means of calibrating S-IVB stage Propellant Utilization (PU) subsystem.		X		X	X	X	X	X		
XAPX	GDC-23 MDAC	S-IVB POWER TRANSFER; Functionally verifies the S-IVB power transfer circuitry.		X		X	X	X	X	X		
XARS	GDC-23 MDAC	S-IVB RANGE SAFETY FUNCTIONAL TEST; Semiautomatically determines the operational capability of critical elements of the Range Safety Subsystem.		X		X	X	X	X	X		
XASS	GDC-23 MDAC	S-IVB SWITCH SELECTOR RESET; Resets the S-IVB switch selector functions after an input has been made.		X			X	X	X		Linked by XAPS	
XAUE	MEC-24 MDAC	S-IVB ULLAGE ENGINE FIRING TEST; Verifies proper firing and chamber pressures of the S-IVB engines.		X		X	X	X	X	X		
*N/A	CAP-A IBM	SATURN V OPSYS; Controls and executes Launch Vehicle Test and Monitor Programs either under the automatic linking capability of ATOLL or upon individual requests from the system engineer(s).	X	X	X	X	X	X	X	X	512/ 513	

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Table 1-5. Saturn V Major Test Program Matrix

IVAR	TEST TITLE											Remarks	
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No 1 (Plugs in)	S/V Electrical Mate	LV Swing Arm OAT	Malfunction OAT	LV G & C Checks	LV Electrical Systems Test		LV Stage or Sub-System
BE01	X	X		X								X	
BE02	X	X		X								X	
BT01	X	X		X								X	
CTC1	X	X								X			
CTC2	X	X								X			
CTC3	X	X								X			
CTC4	X	X								X			
CTC5	X	X								X			
CTC6										X			
FE50	X	X	X	X		X	X			X			
FT03	X	X								X			
FT04	X	X	X	X	X	X	X	X	X	X			
FT05	X	X			X					X			
FT06	X	X	X	X		X		X	X	X			
FT07										X		X	
FT08	X	X								X			
FT10	X	X	X	X		X			X	X			
FT20	X	X	X	X	X	X	X	X	X	X			
FT23	X	X	X	X	X	X	X	X	X	X			
FT25	X	X		X	X	X	X	X	X	X			
FT27				X	X	X		X	X	X			
FT31	X	X								X		X	
FT33	X	X		X	X				X	X			
FT35	X	X	X	X	X	X	X	X	X	X			
FT37	X	X		X	X	X		X	X	X			
FT42	X	X	X			X				X			
FT43	X	X								X			

Table 1-5. Saturn V Major Test Program Matrix (Continued)

IVAR	TEST TITLE													Remarks
	Launch Countdo.in	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV Swing Arm OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System		
FT45	X	X		X	X	X	X	X	X	X				
FT47	X	X	X	X	X	X		X	X	X				
FT49	X	X	X	X		X				X				
FT54										X		X		
FT55	X	X		X	X	X		X	X	X				
FU01			X	X	X	X		X	X	X				
FZ01										X		X		
GE01	X	X	X	X	X	X	X	X	X	X				
GT16	X	X	X	X	X	X	X	X	X	X				
KA01												X		
KACM										X		X		
KAD0														
KAF1	X	X										X		
KAF2	X	X	X	X		X		X	X					
KAF3	X	X												
KAFC												X		
KAGC												X		
KAG1	X	X												
KALL												X		
KAME										X				
KAM1												X		
KAM2												X		
KAPG												X		
KAPW	X	X	X	X	X	X		X	X	X		X		
KARD												X		
KASD												X		
KASS												X		

Table 1-5. Saturn V Major Test Program Matrix (Continued)

IVAR	TEST TITLE											Remarks	
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV Swing Arm OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test		LV Stage or Sub-System
KAST												X	
KASW	X	X		X		X	X	X	X		X		
ME01												X	
MT01	X	X	X		X			X	X				
NES4												X	
NT94												X	
NT97	X	X		X		X	X	X	X	X	X	X	
NT98	X	X	X	X	X	X	X	X	X	X	X	X	
NT99	X	X	X	X		X	X	X	X	X	X	X	
NTDR	X	X		X		X	X	X	X	X	X	X	
QAEC	X	X										X	
QAES	X	X										X	
QA'S	X	X		X								X	
QAMS	X	X										X	
QAPD												X	
QAPL												X	
QAP0	X	X	X	X	X	X	X	X	X	X	X	X	
QAPS												X	
QA1 U	X	X		X								X	
QAS2												X	
QASP	X	X										X	
QATM												X	
VAAR	X	X	X	X		X		X	X	X			
VABC												X	
VAED	X	X		X		X	X	X	X		X	X	
VAFC	X	X	X	X		X		X	X				

Table 1-5. Saturn V Main Test Program Matrix (Continued)

IVAR	TEST TITLE											Remarks	
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV Swing Arm OAT	Malfunction OAT	LV G&C Checks	LV / Electrical Systems Test		LV Stage or Sub-System
VAFU											X		
VALI													
VALJ	X	X											
VALK	X	X											
VALL	X	X	X	X		X		X					
VAMB												X	
VAMC	X	X	X	X		X		X	X				
VAPX	X	X		X		X		X	X		X		
VARS	X	X		X		X		X	X				
VARY	X	X	X	X		X		X	X				
VASS											X		
VATC	X	X	X	X		X		X	X				
VATS	X	X	X	X		X		X	X				
VAVS			X	X	X	X		X	X				
WACR	X	X	X	X	X	X		X	X			X	
WAES												X	
WAPO	X	X	X	X	X	X		X	X			X	
WAPX			X	X		X		X	X		X	X	
WASL	X	X						X					
WASP	X	X						X				X	
WASS												X	
WAST	X	X										X	
WASV	X	X	X	X	X	X		X	X			X	
WATL	X	X						X					
XADA												X	
XADS	X	X		X								X	
XAEB												X	

Table 1-5. Saturn V Major Test Program Matrix (Continued)

IVAR	TEST TITLE												Remarks
	Launch Countdown	Countdown Demonstration Test	S/V Back Up Guidance Test	Flight Readiness Test	LV Flight Systems Redundancy Test	S/V OAT No. 1 (Plugs In)	S/V Electrical Mate	LV Swing Arm OAT	Malfunction OAT	LV G&C Checks	LV Electrical Systems Test	LV Stage or Sub-System	
XAEC												X	ESE CHECKOUT
XAHB													
XAIC	X	X	X	X	X	X	X	X	X		X	X	
XAMC												X	
XAPC												X	
XAPD												X	
XAPF			X	X	X	X		X	X				
KAPL												X	
XAPS	X	X	X	X	X	X	X	X	X		X	X	
XAPU	X	X										X	
XAPX												X	
XARS												X	
XASS	X	X	X	X	X	X	X	X	X		X	X	
XAUE										X		X	
ZT96			X			X						X	

Table 1-6. Other Saturn V Operating Systems and Test Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*ATGT	CAP-A IBM	ATOLL TAPE GENERATOR (ATOLL UTILITY); Provides the capability to update the ATOLL drum index.						X	X	X		512/ 513
DDTG	CAP-A IBM	DISPLAY DESCRIPTION TAPE GENERATOR; Generates Display Description tape from symbolic inputs.						X				
DT01	GDC-27/31 IBM	SGCC GMT MAINTENANCE TEST; Exercises the operation of the GMT clock, while running under the control of the Saturn operating system (BHC).						X	X	X		
DT02	INS-13 IBM	SGCC DDAS CURSORY TEST; Provides a cursory test of the DDAS IODC and computer interface unit.		X				X	X	X		
DT12	GDC-31 IBM	RCA-110A/DDP-224 INTERFACE CHECKOUT; Performs an on-line checkout of the RCA-110A IODC-6 and the DDP-224 fully buffered channel and indicates malfunction.						X	X			
DT13	GDC-31 IBM	LCC INSTRUCTION TEST; Verifies that all but the I/O and some control op codes perform properly.						X	X			
DE04	GDC-31 IBM	MLC INSTRUCTION TEST, PART 1; Verifies that all but the I/O and some control op codes perform properly.						X	X		Interrelated w/DT13	
DE07	GDC-31 IBM	MLC INSTRUCTION TEST, PART 2; Verifies that all but the I/O and some control op codes perform properly for the LCC.						X	X		Interrelated w/DT13	
DT14	GDC-31 IBM	LCC DRUM TEST; Verifies, in less than certain test, that data can be transferred to and from the drum.						X	X			
DE05	GDC-31 IBM	MLC DRUM TEST; Verifies, in less than certain test, that data can be transferred to and from the drum.						X	X		Interrelated w/DT14	
DT15	GDC-31 IBM	LCC MEMORY TEST; Performs a cursory check of HSM.						X	X			
DE06	GDC-31 IBM	MLC MEMORY TEST; Performs a cursory check of HSM for the LCC.						X	X		Interrelated w/DT15	

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Table 1-6. Other Saturn V Operating Systems and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*NTDR	CAP-A IBM	L/V DISCRETE RESPONSE TIME; Measures the elapsed time between the issuance of MDO and MDI, or, DDAS discrete talkback.		X		X		X	X		Linked by XAPC	512/ 513
*SE88	CAP-A IBM	ANALOG TEST POINT MONITOR; Monitors a maximum of three specific hardwire analog test points per execution cycle, and displays each analog value read (keyboard entry must be made for each test point to be monitored). Updates for bias, signal range, and description may be entered. SE88 may also be used to delete an active analog slot from the monitor table. Control of the routine is via the display console keyboard.						X	X			
*SE89	CAP-A IBM	ALTERNATE MEMORY CHECKER.						X	X			
*ST90	CAP-A IBM	MLC RECOVERY CONTROL; This program is the controlling program for MLC System Recovery (SSRP) Options, by allowing either starting of the recovery process or termination. If recovery is started, the program displays tutorial messages to start recovery at the MLC. The LCCC is set to DOWN status, and interrupts are inhibited. Communications with the MLC System Recovery are then begun.						X	X	X		
*ST91	CAP-A IBM	RECOVERY DUMP RETRIEVAL; Provides the capability to log the MLC binary dump on log tape, and present recovery and the system status.						X	X	X		
*ST95	CAP-A IBM	MLC REMOTE LOAD; Initially loads the MLC Operating System from the LCCC system Master Tape, to allow patching of MLC core and drum resident programs, and to load function executor binary card decks.						X	X			
*SE93	CAP-A IBM	DISCRETE MASK/UNMASK ROUTINE; Modifies, by masking or unmasking, the interrupt control word groups. It accepts data which will modify the LCCC or MLC discrete monitor interrupt (MI) control words. If a group is masked, any change in DI status cannot cause an interrupt. If the group is unmasked, an interrupt can be allowed when a DI change is detected. All discrete groups may be unmasked with one keyboard entry.						X	X			



Table 1-6. Other Saturn V Operating Systems and Test Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY		
ZT07	CAP-B	ON-LINE DATA RETRIEVAL (POSTPROCESSING); Enables a quick-look discrete data retrieval.						X	X		512/ 513
*ZT96	GDC-31 IBM	SYSTEM CLOSEOUT; Provides options to dump IOR-2s, core, and drum to a log tape; and/or closes out that log tape.						X	X		512/ 513

XSC FORM 16-736 (REV. 3/69)

\*MSFC Delivered Program

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Table 1-7. Saturn V Operational DEE-6 Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			CDC	DDAS	DISPLAY	GMT	PRINTER	TELETYPE	TAPE PUNCH			TAPE READ
*SC61	GDC-27 IBM	OPERATING SYSTEM; Provides control to load and execute DEE-6 Programs and accomplishes all W channel output.			X	X	X	X	X	X		512/ 513/ 206 ↓
*SC62	GDC-27 IBM	SCAN PROGRAM - PART 1; Inputs discrete status changes from the Remote Scanner, and records these changes and the time of occurrence on various output media.	X				X	X	X	X		
*SC63	GDC-27 IBM	SCAN PROGRAM - PART 2; Inputs discrete status changes from the Remote Scanner, and records these changes and the time of occurrence on various output media.	X				X	X	X	X		
*SC64	GDC-27 IBM	REMOTE SCANNER OPERATIONAL PROGRAM - PART 1; Loads the Remote Scanner Operational Program - Part 2.										
*SC65	GDC-27 IBM	XDS 930 REMOTE SCANNER LOADER/RECOVERY PROGRAM; Loads, patches, and dumps the Remote Scanner computers.						X	X	X		
*SC66	GDC-27 IBM	SCAN TABLE GENERATOR; Constructs the Discrete ID Table Matrix for a specific Discrete ID Table.						X		X		
*SC67	GDC-27 IBM	OS 92 DUMP UTILITY; Sub-routine of the Operating System used to dump the core contents of the Remote Scanner computer(s) to the line printer and/or magnetic tape.					X					
*SC68	GDC-27 IBM	OS PATCH UTILITY; Sub-routine of the Operating System used to patch the core memory of the XDS 930 computer.					X	X	X			
*SC69	GDC-27 IBM	OS 930 DUMP UTILITY; Sub-routine of the Operating System used to dump the core contents of the XDS 930 computer to the line printer and/or magnetic tape.						X		X		
*SC70	GDC-27 IBM	REMOTE SCANNER OPERATIONAL PROGRAM - PART 2; Detects status changes of 4320 discrete input lines from a Saturn V Vehicle and transmits this change information to the XDS 930 computer via a H/S Data Link for subsequent processing.	X			X						
*SC71	GDC-27 IBM	FRANKLIN PRINTER SPIRAL TEST; Sub-routine of the Operating System used to print a spiral test pattern on all stage printers.					X					

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KSC FORM 16-226 (REV. 5. 69)

\*MSFC Delivered Program

Table 1-8. Saturn V DDP-224 Display OPSY Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
*CC	CAP-A IBM	COMMON AND CONSOLE INPUT ANALYSIS; Reads in and processes the input data from the consoles.									See Note	
*DF	CAP-A IBM	DISPLAY DIAGNOSTIC ROUTINE; Executes diagnostic tests on the computer, refresh memories and the displays, and periodically checks the various error indicators in the system and proves the error printouts on the computer typewriter.									See Note	
*DN	CAP-A IBM	DATA LINK ROUTINE; Provides a means for two-way communications between the DDP-224 Control Computer (DCC) and the Saturn V RCA-110A computer.									See Note	
*DQ	CAP-A IBM	DISPLAY AND PERIPHERAL OUTPUT ROUTINE; Writes data into and from refresh memories, and controls the operation of the digital switch, hard copy, and the CCTV transmitter.									See Note	
*FO	CAP-A IBM	FORMATTER ROUTINE; Processes and formats all data received from the RCA-110A computer.									See Note	
*IV	CAP-A IBM	INPUT TRANSLATOR ROUTINE; Translates English language control statements into compact messages for the RCA-110A computer, and/or performs certain special display control functions.									See Note	
*LL	CAP-A IBM	DECU/IODC TEST ROUTINES; Performs the checkout of the data exchange control unit (DECU) and the input/output data channel number 6 (IODC 6).									See Note	
		NOTE:  The INTERFACE and AUTH for VEHICLE information for the programs listed do not apply.										

KSC FORM 16-226 (REV. 5/69)

\*MSFC Delivered Program

Table 1-9. Saturn V Display Descriptions

DISPLAY DESC. NO.	CALL. NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
<u>NASA DISPLAY DESCRIPTION</u>						
523	11	OPERATIONS LIST CONSOLE 1	X	X	X	
524	12	OPERATIONS LIST CONSOLE 2	X	X	X	
525	13	OPERATIONS LIST CONSOLE 3	X	X	X	
526	14	OPERATIONS LIST CONSOLE 4	X	X	X	
527	15	OPERATIONS LIST CONSOLE 5	X	X	X	
528	16	OPERATIONS LIST CONSOLE 6	X	X	X	
529	17	OPERATIONS LIST CONSOLE 7	X	X	X	
530	18	OPERATIONS LIST CONSOLE 8	X	X	X	
531	19	OPERATIONS LIST CONSOLE 9	X	X	X	
532	20	OPERATIONS LIST CONSOLE 10	X	X	X	
533	21	OPERATIONS LIST CONSOLE 11	X	X	X	
534	22	OPERATIONS LIST CONSOLE 12	X	X	X	
535	23	OPERATIONS LIST CONSOLE 13	X	X	X	
536	24	OPERATIONS LIST CONSOLE 14	X	X	X	
537	25	OPERATIONS LIST CONSOLE 15	X	X	X	
538	26	OPERATIONS LIST CONSOLE 17	X	X	X	
539	27	SYSTEM CONFIGURATION	X	X	X	
540	28	DDAS SYNC & CAL WORDS	X	X	X	
541	29	DMON INSTRUCTION	X	X	X	
542	30		X		X	
543	31	DDAS INTERFACE CHECK, S-II, PART I	X	X		
544	32	DDAS INTERFACE CHECK, S-II, PART II	X	X		
545	33	DDAS INTERFACE CHECK, S-IC, PART I	X	X	X	
546	34	DDAS INTERFACE CHECK, S-IC, PART II	X	X	X	
547	35	DDAS INTERFACE CHECK, ESE, PART I	X	X	X	
548	36	DDAS INTERFACE CHECK, ESE, PART II		X	X	

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
549	37	DDAS INTERFACE CHECK, IU, PART I	X	X	X	
550	38	DDAS INTERFACE CHECK, IU, PART II	X	X	X	
551	39	DDAS INTERFACE CHECK, S-IVB, PART I	X	X	X	
552	40	DDAS INTERFACE CHECK, S-IVB, PART II	X	X	X	
553	41	IU REDLINES TCS 1	X	X	X	
554	42	IU REDLINES TCS 2	X	X	X	
555	43	IU REDLINES TCS 3	X	X	X	
556	44	OPTIONS WHEN IN AUTO	X	X	X	
557	45	OPTIONS WHEN IN SEMI MODE	X	X	X	
558	46	VEHICLE MEASURING	X	X	X	
559	47	CRITICAL LIMITS AT LIFTOFF	X	X	X	
560	48	S-IC PRESSURE FUEL TANK ULLAGE	X	X	X	
561	49	LONGITUDINAL ACCELERATION	X	X	X	
562	50	ENGINE INLET LH2 TEMPERATURE	X	X	X	
<u>S-II DISPLAY DESCRIPTIONS</u>						
577	65	S-II E+1, AND TEMPS-PG 1	X	X		
578	66	S-II GRND PNEUMATICS S7-41, UNIT -A	X	X		
579	67	S-II GRND PNEUMATICS S7-41, UNIT -B	X	X		
580	68	S-II GRND PNEUMATICS S7-41, UNITS C, D	X	X		
581	69	S-II STAGE PRESS SYSTEM	X	X		
582	70	S-II INT. DRY TEST DISCRETES	X	X		
583	71	S-II ENGINE SYSTEM	X	X		
584	72	S-II ENGINE PUMP INLET TEMPS & PR.	X	X		
585	73	S-II SINGLE ENGINE MONITOR	X	X		
586	74	S-II LH RECIRC SYS DISCRETES	X	X		

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
587	75	S-II LOX RECIRC SYS DISCRETES	X	X		
588	76	S-II EAS MEASUREMENTS	X	X		
589	77	S-II PURGE AND VACUUM PRESSURE	X	X		
590	78	S-II FIRE & LEAK DETECTION	X	X		
591	79	S-II ENG TCH JACKET TEMPS	X	X		
592	80	S-II HEAT EXCH CONT (DISCRETES)	X	X		
593	81	S-II HEAT EXCH PURGE/INERT (DISCRETES)	X	X		
594	82	S-II HEAT EXCH ANALOGS	X	X		
595	83	S-II RECIRC SYS/HEL INJ/ACCUM FILL	X	X		
596	84	S-II ENG LOX VLV DISCRETES	X	X		
597	85	S-II ENG LH2 AND GG VLV DISCRETES	X	X		
598	86	S-II E & I AND PU TEMPS (OAT)	X	X		
599	87	S-II E & I AND PU TEMPS (CDDT & LAUNCH)	X	X		
600	88	S-II PROPELLANT LOAD	X	X		
601	89	OPEN	X	X		
602	90	S-II SYSTEMS READY	X	X		
603	91	ENG MISC PRESS	X	X		
604	92	S-II MISC DISCRETES	X	X		
605	93	S-II MISC TEMPS	X	X		
606	94	S-II MISC PRESSURES AND TEMPS	X	X		
607	95	S-II OPEN	X	X		
608	96	S-II SYSTEM BY-PASS/BY-PASS INHIBIT, PAGE 1	X	X		
609	97	S-II SYSTEM BY-PASS/BY-PASS INHIBIT, PAGE 2	X	X		
610	98	S-II PREPS COMPLETE, PAGE 1	X	X		
611	99	S-II PREPS COMPLETE, PAGE 2	X	X		
612	100	S-II PREPS COMPLETE, PAGE 3	X	X		

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
613	101	S-II STAGE PRESS LIST	X	X		
614	102	S-II STAGE TEMP LIST	X	X		
615	103	S-II STAGE DISCRETE LIST A	X	X		
616	104	S-II STAGE DISCRETE LIST B	X	X		
617	105	GRD DDAS MEAS LIST	X	X		
		<u>S-IVB DISPLAY DESCRIPTIONS</u>				
641	129	S-IVB HYDRAULIC SYSTEM	X	X	X	
642	130	S-IVB PROPELLANT LOADING	X	X	X	
643	131	S-IVB PROPULSION TERMINAL COUNT	X	X	X	
644	132	S-IVB APS MODE	X	X	X	
645	133	S-IVB POWER DISTRIBUTION	X	X	X	
646	134	S-IVB PREPS COMPLETE	X	X	X	
647	135	S-IVB PREPS COMPLETE, APS, HYDR, MEAS, PU, AND HEX	X	X	X	
648	136	S-IVB PREPS COMPLETE, PRESS RECIRC	X	X	X	
649	137	S-IVB PREPS COMPLETE, ENGINE CO ORD	X	X	X	
650	138	S-IVB READY LOGIC	X	X	X	
651	139	S-IVB DAILY POWER SUPPORT	X	X	X	
652	140	S-IVB DMON & SWITCH SELECTOR REF	X	X	X	
653	141	BATTERY MONITOR AND POWER TRANS. SUPPORT	X	X	X	
654	142	S-IVB FUEL TANK He BTL REPRESS D20	X	X	X	GRAPH
655	143	S-IVB AMBIENT HELIUM SPHERE D-236	X	X	X	GRAPH
656	144	S-IVB COLD HELIUM SPHERES D-261	X	X	X	GRAPH
657	145	S-IVB G AND E SYSTEMS	X	X	X	

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
		<u>IU DISPLAY DESCRIPTIONS</u>				
708	196	IU ELECT & MECH MEASUREMENTS PART II	X	X	X	
710	198	GUIDANCE & ST-124 MEASUREMENTS	X	X	X	
711	199	IU MECH. SYSTEMS PART I	X	X	X	
713	201	IU VOLT/CURRENT MEASUREMENTS	X	X	X	
714	202	GYRO-STAB	X	X	X	
715	203	AUX POWER MONITOR	X	X	X	
716	204	FCC INPUT/OUTPUT PARAMETERS	X	X	X	
717	205	CSP INPUT/OUTPUT PARAMETERS	X	X	X	
718	206	FLIGHT CONTROL END/END DIM	X	X	X	
		<u>S-IC DISPLAY DESCRIPTIONS</u>				
833	321	GROUND HYDRAULIC UNIT MONITOR	X	X		
834	322	ENGINE HEATER MONITOR	X	X		
835	323	S-IC PNEUMATIC SUPPLY MONITOR	X	X		
836	324	S-II LH2 PRECONDITIONING TEMPS	X	X		
837	325	S-IC EMERGENCY TEMP MONITOR	X	X		
838	326	S-IC STAGE BUS MONITOR	X	X		
839	327	S-IC ESE BUS MONITOR	X	X		



Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 DP	
840	328	S-IC POGO HELIUM SUPPLY PRESSURE	X	X		
841	329	ECS L/V AND CANISTER TEMPS	X	X		
842	330	F1 ENGINE HYD PRESS MONITOR	X	X		
843	331	S-IC PREVALVE TEMPERATURE	X	X		
844	332	S-IC THRUST OK PRESS SWITCH MONITOR	X	X		
845	333	S/A PRESS, PART I	X	X		
846	334	S/A PRESS, PART II	X	X		
847	335	TSM/LA STATUS	X	X		
848	336	BATT and S/A 10	X	X		
849	337	S-IC FLIGHT MONITOR	X	X		
850	338	S-IC LOX TANK LOAD	X	X		
851	339	S-IC CALS. SEC I AND II	X	X		
852	341	S-IC CALS. SEC VI	X	X		
853	341	S-IC CALS. SEC VI	X	X		
854	342	S-IC CALS. SEC VII AND XII	X	X		
855	343	S-IC CALS. SEC XIII	X	X		
856	344	S-IC CALS. SEC XIV	X	X		
857	345	S-IC CALS. SEC XV PART I	X	X		
858	346	S-IC CALS. SEC XV PART II	X	X		
859	347	S-IC CALS. SEC XVII	X	X		
860	348	S-IC CALS. SEC XVIII	X	X		
861	349	S-IC RP-1 LOADING STATUS	X	X		
862	350	LSE LMR ALTERNATE ITEMS	X	X		

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
		<u>S-IB DISPLAY DESCRIPTION</u>				
919	407	VEHICLE BUS MONITOR			X	
920	408	VEHICLE EDS MONITOR			X	
921	409	CUT OFF MONITOR			X	
922	410	FLIGHT CONTROL			X	
923	411	MEASURING - THRU A7-12			X	
924	412	MEASURING - THRU C10-6			X	
925	413	MEASURING - THRU XC89-L			X	
926	414	MEASURING - THRU XC528-12			X	
927	415	MEASURING - THRU C542-1			X	
928	416	MEASURING - THRU D1-1			X	
929	417	MEASURING - THRU D14-1			X	
930	418	MEASURING - THRU VXD29-1			X	
931	419	MEASURING - THRU XD35-1			X	
932	420	MEASURING - THRU E251-9			X	
933	421	MEASURING - THRU VM42-400			X	
934	422	MEASURING - THRU S21-01			X	
935	423	MEASURING - THRU K81-F2			X	
936	424	MEASURING - THRU K100-1			X	
937	425	MEASURING - THRU K134-11			X	
938	426	MEASURING - THRU K171-1			X	

Table 1-9. Saturn V Display Descriptions (Continued)

DISPLAY DESC. NO.	CALL NO.	DESCRIPTION	AUTHORIZED FOR VEHICLE			REMARKS
			512	513	206 UP	
943	431	MEASURING - EMERGENCY TEMPS			X	
944	432	MEASURING - DYNAMIC MEAR			X	
945	433	MEASURING - ENGINE TEMPS			X	
946	434	MEASURING - ENGINE PRESS			X	
947	435	MEASURING - PRESS, HYDRAULICS			X	
948	436	MECHANICAL - PRESS, LOX/FUEL			X	
949	437	MECHANICAL - HYDRAULIC SYSTEMS			X	
950	438	MECHANICAL - TEMPS, LOX PUMPS			X	

Table 1-10. Saturn V Permanently Masked MDIs

<u>IODC Number</u>	<u>Word Number</u>	<u>MDI Numbers</u>
7	32	2256 thru 2279
7	33	2280 thru 2303
7	37	2376 thru 2399
7	38	2400 thru 2423
7	39	2424 thru 2447
7	40	2448 thru 2471
7	41	2472 thru 2495
7	42	2496 thru 2519
7	58	2880 thru 2903
7	59	2904 thru 2927
7	60	2928 thru 2951
7	61	2952 thru 2975
7	62	2976 thru 2999
7	63	3000 thru 3024

NOTE

The LDOs associated with the above MDIs are updated every 12 seconds.

Table 1-11. Machine Language Subroutines

1-54

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGR # TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
VMTS	CAP-A IBM	CHILLDOWN SUBROUTINES; Provides ATOLL with the capability of solving equations, tolerance checking, recording GMT and CDC, and display results.			X			X	X	X	Other Entry Points: ALOP, TEST, and DSPY	512/ 513

Table 1-12. ATOLL Sub Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
KZAT	GDC-25 IBM	SWITCH TEST; Test the start and reset switches on the EDS prep panel, that advance or recycle the program.						X	X			512/ 513
KZF2	GDC-33 IBM	FCC S/C INPUT TEST; Utilizes the CCIS test inputs to verify the flight control computer dc amplifier gain changes from 3.75 to 10.0 when S/C control mode is selected.		X		X		X	X	X	Main Program VAFC	512/ 513
KZIT/ LZIT	GDC-2 BATC	IU INTERFACE TEST; Sets up predetermined bit patterns in the address register and checks responses via the verify register (other indication).		X		X		X	X	X	Main Program VASS/ IASS	512/ 513
LZTU	GDC-4 BATC	S-IB TARGET UPDATE SUBROUTINE; Provides options for target update parameters to be entered into LVDC.			X			X	X	X	Main Program IALL	206 thru 209
OZIT	GDC-2 BATC	S-IB INTERFACE TEST; Set up predetermined bit patterns in the address register and checks responses via the verify register.		X		X		X	X	X	Main Program IASS	
OZPT	GDC-22 CCSD	S-IB POWER TRANSFER; Transfer S-IB Stage Power and verifies results.		X		X		X	X	X	Main Program OAR1	
OZPV	GDC-24 CCSD	PRE-VALVE TIMING; Checks SIB pre-valve opening and closing per Spec. and criteria.		X		X		X	X	X	Main Program OAR1	
OZEC	GDC-22 CCSD	S-IB ESE CUTOFF; Checks SIB ESE cutoff circuit and performs Redundancy Test.		X		X		X	X	X	Main Program OAR1	
OZTV	GDC-33 CCSD	S-IB TOPS VOTING; Verify 2 out of 3 voting in Thrust Low Cutoff Circuits.		X		X		X	X	X	Main Program OAR1	
OZFS	GDC-33 CCSD	S-IB FLIGHT SEQUENCE; Verifies all SIB Stage Flight Sequence functions.									Main Program OAR1	↓
QZEC	GDC-26 NAR	S-II ENG CIRCUIT; Performs second part of Engine Control Tests, Spark System Component Test, and Engine Start Sequence and ECA cutoff test.		X		X	X	X	X	X	Main Program QAEC	512/ 513

1-55

Table 1-12. ATOLL Sub Programs (Continued)

1-56

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT	
QZEF	GDC-26 NAR			X			X	X	X	X	X	Main Program QAEC	512/ 513
QZFC	GDC-26 NAR	S-II ENG CIRCUIT; Performs third part of eng control tests.											
QZIT	GDC-2 BATC	S-II INTERFACE TEST; Sets up predetermined bit patterns in the address register and checks responses via the verify register (other indication).		X			X	X	X	X	X	Main Program VASS	512/ 513
QZ02	GDC-26 NAR	S-II SWITCH SEL FUNCTION; Issues and verifies proper responses to the following: S-II Switch Selector Commands: Channels 7, 12, 14, 19, 20, 32, 38, 48, 49, 56, 58, 59, 60, 61, 88, and 99.		X			X	X	X	X	X	Main Program QAS2	512/ 513
QZT1	INS-21 NAR	S-II COMPL DISCRETE; Verifies that 112 discrete measurements (56 Pairs) are in a complementary state. Errors detected indicate failure of a digital submultiplexer, DDAS assembly, or discrete measurement subsystem.		X				X	X	X	X	Main Program QATM	512/ 513
QZT2	INS-21 NAR	S-II DISCRETE STABLIZER; Provides a diagnostic routine to detect and assist in isolating any instabilities which may occur in the two remote digital submultiplexers or in the PCM DDAS assembly.		X				X	X	X	X	Main Program QATM	512/ 513
VZ33/ IZ33	GDC-25 IBM	LVDA/DC D.O. TEST; Checks the LVDA discrete outputs. DO4 turns on the LV GUID light in the S/C. DO6 turns on the LV RATE light in the S/C when rate abort is enabled. DO12 checks the Firing Commit enable interlock in the IU ready for launch chain. DO13 checks the Firing Commit inhibit in the IU. 24v for launch chain.		X			X	X	X	X	X	Main Program VAED/ IAED	512/ 513/ 206 thru 209
VZDS/ IZDS	GDC-2 BATC	DUAL SELECT TEST; Issues read commands to provide a register test output, and to verify ESE inhibits.		X			X	X	X	X	X	Main Program VASS/ IASS	↓

Table 1-12. ATOLL Sub Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT	
VZEA/ IZEA	GDC-25 IBM	ENGINE OUT ABORT TEST; Verifies the engine thrust circuitry and associated enable and abort circuitry by simulating the engine thrusts with discretes issued by the computer. Permutates thrust signals to simulate one and two engines out, and to verify the associated voting circuitry. Simulates the thrust sensors of the S-II and S-IVB engines.  The program provides a second feature; if Flag 17 is set, it selects the \$PR3, 5, or 6 Option in VAED; all program stops are bypassed.		X		X	X	X	X	X	Main Program VAED/ IAED	512/ 513 206 thru 209	
VZEC/ IZEC	GDC-25 IBM	ENGINE CUTOFF TEST; Is run during wet portion of CDDT. Checks out the Range Safety C/O to the S-IC and S-II stages and EDS output to the S-IC, S-II, and S-IVB. The EDS cutoff is accomplished by cycling the 6D91, 6D92, and 6D93 buses on and off in pairs. C/O A is obtained by turning off the 6D92 and 6D93 buses. C/O B is obtained by turning off the 6D91 and 6D93 buses.		X		X	X	X	X	X	Main Program VAED/ IAED		
VZF1/ IZF1	GDC-2 BATC	A FLOATING "ONES" TEST; Functional check of switch selector.		X		X	X	X	X	X	Main Program VASS/ IASS		
VZGT	CAP-A BATC	VATS TERM GE01/FE50; Used to terminate these two function executors at an appropriate time in the running of VATS (computer internal operation).							X	X	X	Main Program VATS	
VZML	GDC-25 IBM	VAED MLSR LOAD;				X		X	X	X	Main Program VAED IAED		
VZRE/ IZRE	GDC-25 IBM	RATE EXCESSIVE ABORT TEST; Checks the YAW, PITCH, and ROLL Excessive Rates, the Enables and Disables, and the associated Excessive Rates AUTO-ABORT Voting Logic.		X		X	X	X	X	X	Main Program VAED/ IAED	206 thru 209	
VZSA/ IZSA	GDC-25 IBM	SPACE VEHICLE ABORT TEST; Checkout of the automatic and manual sequence and control of the L/V and S/C Abort Systems under simulated emergency conditions. During this test, all manual abort inhibits and Enable circuitry is verified along with S/C cutoffs to the vehicle.		X		X	X	X	X	X	Main Program VAED/ IAED		



Table 1-12. ATOLL Sub Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.	
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT
VZTM	CAP-A BATC	VATS VMTS LOAD; Loads machine language subroutine VMTS as required in VATS following execution of each appropriate machine language test program (computer internal operation).									Main Program VATS	512/ 513
VZTS	CAP-A BATC	SEGMENT 1 OF VATS; Sets flags to indicate switch scan failures and performs other VATS functions from VATS start to T-18 minutes.		X	X	X	X	X	X	X	Main Program VATS	512/ 513
VZTT	CAP-A BATC	SEGMENT 2 OF VATS; Same function as segment 1 from approximately T-16:30 to T-10:30.		X	X	X	X	X	X	X		
WZCR	GDC-24 BATC	CUTOFF RELAYS FUNCTIONAL; Short functional test of cutoff circuitry used to verify circuitry prior to each individual integrated test.		X		X		X	X	X	Main Program WACR	512/ 513
WZEB	GDC-24 BATC	EBW CHARGE FIRE; Tests for retro and separation EBW firing unit charging and firing under proper and improper conditions.	X	X		X		X	X	X	Main Program WASV	512/ 513
WZF1	GDC-33 IBM	S-IC ENG NOT ZERO TEST; Torques the EDS/CRG to ascertain the S-IC engine (not - zero) indication set levels.		X		X		X	X	X	Main Program VAFC	512/ 513
WZIT	GDC-2 BATC	S-IC INTERFACE TEST; Sets up predetermined bit patterns in the address register and checks responses via the verify register (other indication).		X		X		X	X	X	Main Program VASS	512/ 513
WZPO	GDC-24 BATC	SWITCH SCAN; Scans S-IC panels for proper switch positions.						X	X	X	Main Program WAPO	512/ 513
WZRB	GDC-24 BATC	CUTOFF RELAYS REDUNDANT BUS TEST; Isolates redundant buses and verifies individual bus capability to give cutoff.		X		X		X	X	X	Main Program WACR	512/ 513
WZSP	GDC-22 BATC	SWING ARM POWER UP; Firing power 43D100 and 43D200.										
XZCM	GDC-23 MDAC	S-IVB DDAS AUTOMATIC SCAN		X		X		X	X	X	Main Program XADA	512
XZDM	GDC-23 MDAC	S-IVB DDAS AUTOMATIC SCAN		X		X		X	X	X	Main Program XADA	512
XZFM	GDC-23 MDAC	S-IVB DDAS AUTOMATIC SCAN		X		X		X	X	X	Main Program XADA	512

Table 1-12. ATOLL Sub Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE & FUNCTION	INTERFACE							STATUS AND/OR REMARKS	AUTH. FOR VEHICLE NO.		
			ANALOG I/O	DDAS	CDC	ISSUES MDO	ISSUES SSEL	PRINTER	DISPLAY			GMT	
XZIC/ EZIC	GDC-23 MDAC	S-IVB INITIAL CONDITION SCAN		X					X	X	X	Main Program XAIC/ EAIC	512/ 206 thru 209 ↓
XZIT/ EZIT	GDC-2 BATC	S-IVB INTERFACE TEST; Sets up predetermined bit patterns in the address register and checks responses via the verify register (other indication).		X					X	X	X	Main Program VASS/ IASS	
XZMM	GDC-23 MDAC	S-IVB DDAS AUTOMATIC SCAN		X		X			X	X	X	Main Program XADA	512
XZPD	GDC-23 MDAC	S-IVB POWER DISTRIBUTION; Verifies power distribution and control switching circuits.		X		X			X	X	X	Main Program XAPD	512
XZPU	GDC-23 MDAC	S-IVB PROPELLANT UTILIZATION							X	X	X	Main Program XAPD (for 512) Main Program XAPU (for 512)	512

65-1

## SECTION II OFF-LINE PROGRAMS

### 2-1 GENERAL

This section lists all the off-line programs for the Saturn IB and Saturn V launch vehicle operations. Information contained in the tabular portion includes IVARS, Program Titles and Function Descriptions, Listing and Document Revision levels, and Release Dates (or change document status for unreleased programs). The following tables appear in this section:

- a. Table 2-1, RCA-110A Supplemental Diagnostic Programs; These programs are used for preventative maintenance and problem isolation within the RCA-110A and its peripheral equipment.
- b. Table 2-2, RCA-110A Supplemental Utility Programs; These programs perform functions common to all applications.
- c. Table 2-3, RCA-110A Supplemental Postprocessing Programs; These programs are used for retrieving discrete and non-discrete data logged on the Saturn System Log tapes.
- d. Table 2-4, DDP-224 Supplemental Programs; These programs are used for DDP-224 maintenance and DDP-224/RCA-110A interface.
- e. Table 2-5, DEE-6C/E Supplemental Diagnostic Programs; These programs are used for preventative maintenance and problem isolation on the DEE-6C/E (SDS 930/092) computers.
- f. Table 2-6, DEE-6C/E Supplemental Utility and Postprocessing Programs; These programs are used to reduce the data recorded by the DEE-6C/E scan programs.

### 2-2 KSC FORM 16-226A

All programs listed in paragraph 2-1 use the same KSC form to present the associated information for each program. An explanation of the significance of headings and column titles, and guidelines for interpreting the tables are as follows:

- a. IVAR; The Internal Variable listing in alphanumerical sequence (programs not assigned an IVAR will appear at the end of the table as N/A).
- b. NASA Auth Element and Responsible Contractor; The mail code symbol (must be preceded by LV) of the NASA agency, and the mnemonic name of the responsible contractor.
- c. Program Title and Function; The title of the program and a short description of its function.
- d. Rev.; The LISTING and/or the DOCUMENT columns indicate the latest revision level for both listings and documents.
- e. Last Release Date; Indicates the date of the latest revision of the program.
- f. Unreleased Program Status, or Open Change Documents (CPCR-PTR); Used to indicate an unreleased program, program being released, or general remarks, as required.

Table 2-1. RCA-110A Supplemental Diagnostic Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
AJT	GDC-31 IBM	ALARM JUMP TEST; Checks the operation of the RCA-110A jump circuitry.	1	I	02/25/71	
CPU1	GDC-31 IBM	CENTRAL PROCESSOR 1; Checks operation of the RCA-110A instruction repertoire and indicates any failures incurred, along with a possible cause of failure.	0	C	10-01-68	
CPU2	GDC-31 IBM	CENTRAL PROCESSOR 2; Completes verification of the RCA-110A instruction repertoire and augments central processor diagnostic (Test A).	8	C	3-11-69	
CPU3	GDC-31 IBM	BANK 2 OF CPU2;	8	C	3-11-69	
DEMP	GDC-31 IBM	DISCRETE EVENTS MONITOR; Verifies the proper operation of the ML RCA-110A computer/LVDC interface unit prior to LVDC installation.	1	A	10-28-69	
DDT	GDC-31 IBM	DAILY DISCRETE TEST; Verifies the proper operation of the discrete output circuitry and the Discrete Control Equipment.	0	0	6-9-69	
DICP	GDC-31 IBM	RCA-110A/DDP 224 INTERFACE (110A SIDE); Checks the IODC-6/DECV for sense bit patterns and block data transfer.	13	3	05/12/72	
DLIT	GDC-31 IBM	DATA LINK INTERFACE; Tests data link between BH/LCC and AGCS/ML RCA-110A Computers (diagnostic).	2	2A	5-13-70	
DLIS	GDC-31 IBM	BANK 2 OF DLIT;	3	2A	5-13-70	Interrelated w/DLIT
DOIT	GDC-3 IBM	DISCRETE OUTPUT/INPUT; Tests the DCE in Cabinet 8 by issuing off-line DOs plugged to the IODCs; induces MTOAD and exclusivity failure checks the DCE response.	0	None	N/A	
DRUM	GDC-31 IBM	DRUM ANALOG; Writes and reads cycling drum patterns for scoping signals.	1	1	4-04-69	
DS06	GDC-31 IBM	DISCRETE INPUT MONITOR; Verifies discrete interface by logging and comparing monitored discretess-in.	6	4E	12/03/70	

Table 2-1. RCA 110A Supplemental Diagnostic Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)	
			LISTING	DOCUMENT			
DS36	GDC-31 IBM	PART II OF DS06:	6	4E	12/03/70	Interrelated w/DS06	
DS10	GDC-31 IBM	REMOTE MEMORY DIAGNOSTIC; Provides diagnostic analysis of the RCA-110A high-speed memory for the unmanned ML. (Program is designed for slow system recovery.)	1	A	12-10-68		
DS11	GDC-31 IBM	REMOTE PROCESSOR, TEST A; Checks operation of 27 MLC or AGCSC RCA-110A operation codes, indicating any failures incurred, along with a possible cause of failure. (Program is designed for slow system recovery.)	2	A	12-10-68		
DS14	GDC-31 IBM	TAPE SYSTEM DIAGNOSTIC TAPES II, PART I; Performs 20 start-small, logic and mechanical tests on selected MTS to isolate failures.	3	F	2-22-72		
TAP2	GDC-31 IBM	TAPE SYSTEM DIAGNOSTIC TAPES II, PART II;	3	F	2-22-72		Interrelated w/DS14
DS17	GDC-31 IBM	DRUM DIAGNOSTIC; Tests ability to read and write on the RCA-110A drum without parity error.	8	D	4-6-72		
DS19	GDC-31 IBM	REMOTE DRUM DIAGNOSTIC; Tests the ability to read and write on the unmanned ML or AGCSC RCA-110A drum without parity error. (Program is designed for slow system recovery.)	A	B	5-21-69		
DS21	GDC-31 IBM	REMOTE PROCESSOR, TEST B; Checks operation of 45 MLC or AGCSC RCA-110A operation codes, indicating any failures incurred, along with a possible cause of failure. (Program is designed for slow system recovery.)	2	B	5-11-69		
DS23	GDC-31 IBM	IODC COMPATIBILITY TEST; Ensures proper operation between IODCs and associated input/output devices.	0	0	7-24-68		
DS24	GDC-31 IBM	ANALOG SYSTEM CALIBRATION; Calibrates analog system using input control data via sense switch control.	A	A	10-01-68		
DS25	GDC-31 IBM	MAGNETIC TAPE ANALOG CHECKOUT; Checks the magnetic tape analog circuits by reading and writing different magnetic patterns.	1	A	2-28-69		

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Table 2-1. RCA-110A Supplemental Diagnostic Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
DS26	INS-13 IBM	DDAS INTERFACE ACCEPTANCE; Functionally checks the operation of the DDAS CIT-11 system.	2	2A	1-20-72	
DSP6	INS-13 IBM	SECOND BANK OF DS26;	3	2A	1-20-72	Interrelated w/DS26
DS28	GDC-31 IBM	CLOCK OVERALL TEST; Combines the 3-PIT, RTC, CDC, and GMT maintenance tests into one consolidated time test.	22	22	9-30-71	
DP28	GDC-31 IBM	SELF PROGRAM FOR DS28;	10	22	9-30-71	Interrelated w/DS26
DS38	GDC-31 IBM	IOR AND TPC TEST; Performs predefined tests of TPC register to insure it is operational prior to vehicle support.	0	0	2-7-72	
MEM1	GDC-31 IBM	MEMORY DIAGNOSTIC; Provides diagnostic analysis of the RCA-110A high speed memory.	9	E	11-2-70	
SCP		SENSE CONTROL PANEL CHECKOUT; Checks for parity, exclusivity and MTOAD errors.	0	0	11-27-68	
SVDP		DCE SELF TEST;	5	A	3-27-69	
NTST		DCE SELF TEST TABLES; Tables for use with SVDP.	3	A	3-27-69	Interrelated w/SVDP

Table 2-2. RCA-110A Supplemental Utility Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR.PTR)
			LISTING	DOCUMENT		
ATOM	CAP-A	ACTION TABLE OPERATIONAL MAINTENANCE; Generates action tables and listings for operating system tapes as required due to action table changes.	5E	5F	10-2-70	
BOOT	CAP-B	UXEX BOOTSTRAP LOADER; Prints instructions for loading UXEX then loads the appropriate routines.	0	4A	1-12-70	
CDAC	CAP-B	CARD DUPE AND/OR COMPARE; Duplicates and/or compares cards, lists BCD cards, and dumps binary cards.	0	0	7-14-69	
DDMG	CAP-B	DISPLAY DESCRIPTION BINARY TAPE MERGE; Merges stage binary display description tapes into a master binary display description tape.	0	0	7-28-69	
FU02	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 1; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC Vehicle Test Program (VTP).	11		7-14-69	
FU03	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 2; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC VTP.	13		7-14-69	
FU04	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 3; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC VTP.	10		7-14-69	
FU05	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 4; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC VTP.	4		7-14-69	
FU06	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 5; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC VTP.	0		9-16-68	
FU07	MSFC	LVDC NON-FLIGHT TAPE LIST/EDIT, BANK 6; Provides a list function for sequencing and an edit function for updating the variable tables within the LVDC VTP.	2		7-14-69	
MU03	CAP-A IBM	L/V GSE VEHICLE MEASUREMENT CARD VALIDATOR; Runs a precheck on all measurements cards prior to their being released, to be used for generating the measurement tables.	1		10-25-67	
TCAC	CAP-B	TAPE COPY AND/OR COMPARE; Copies and/or compares card decks or tapes in BCD or binary, packed or unpacked, with any combination of input/output.	0	0	6-30-71	

Table 2-2. RCA-110-A Supplemental Utility Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
TLST	CAP-B	UTILITY TAPE DUMP; Prints BCD formatted tapes or dumps tapes of any format, namely binary or symbolic.	2	2	1-19-71	Listing Date 1-11-71
UP20	CAP-B IBM	SATURN V ATOLL VALIDATOR; Tests the ability of the ATOLL processor to detect invalid validator operators.	0	3	1-12-72	Preliminary Release
UPMP	CAP-B	110A/DEE-6 TABLES MERGE PROGRAM; Merges DEE-6 OPS System PA tables with DEE-6 Monarch ID tables for input to UP26.	1	1	3-8-71	
UPTA	CAP-B	MAG TAPE VERIFY; Operates as an off-line utility program to verify that the magnetic tapes to be used for operational support logging are of such quality to give favorable results.	1A	1A	11-18-69	
UPTA	CAP-B	CARD IMAGE TAPE EDITOR/GENERATOR; Performs all purpose card image edits, also edits DEE-6 point question tables.	2	2	3-9-72	
UVSS	CAP-B	110A/DEE-6 UTILITY PACKAGE; Controls peripheral equipment for off-line utility programs.	26	0	4-1-71	
UXED	CAP-B	110A OFF-LINE EDITOR; Edits off-line programs being maintained on the UXEX system tape as well as loading and/or executing programs that are in assembler object, raw binary form (cards or tape), or DAP binary decks, to be added to the system tape.	5	5	9-24-70	
UXEX	CAP-B	110-A OFF-LINE EXECUTIVE; Controls the loading and executing of off-line programs under its control.	10	5	9-24-70	
UXML	CAP-B	110A MINI LOADER PROGRAM; Provides a binary card loader capable of loading SLAP, TAME, or pure binary.	2	2	7-28-69	
YSAC	CAP-A	PRECOMPILATION ATOLL VALIDATOR; Reduces program checkout time via scrutinization of program impulse operators prior to on-line checkout.	0	4	7-01-70	
YSAE	CAP-A	ATOLL/TRANSLATOR SYSTEM LOADER	0	2	5-10-72	
YSAT	CAP-A	ALPHA TABLE GENERATOR FOR THE YSLT SYSTEM	0	2	5-10-72	
YSCP	CAP-A	ICD TAPE COMPARE AND UPDATE; Consists of 5 sub-programs combined to form 1 program. They are the update program, YSCP, high speed list, LIST, card list, CREAD, character title check, DEEC, and tape compare, COMP.	3	3	10-02-70	
YSCT	CAP-A	IVAR CARD TITLING; This program searches the ICD tape and prints the discrete names for the ATOM IVAR cross-reference cards supplied as program input.	0	3	10-02-70	



Table 2-2. RCA-110-A Supplemental Utility Programs (Continued)

2-6A IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
YSL1	CAP-A	ATOM/YSCP BOOTSTRAP LOADER; This program loads YSL2 via the preload/load switch on the control panel.	0	3	10-02-70	
YSL2	CAP-A	ATOM/YSCP LOADER AND CONTROL; This is the loader and control program for YSCP and ATOM.	0	3	7-01-70	
YSLT	CAP-A	ATOLL TO ENGLISH TRANSLATOR SYSTEM LOADER	0	2	5-10-72	
YSMC	CAP-A	ATOLL MLSR COMPARE PROGRAM; Will compare the MLSR in the ATOLL program to the released baseline MLSR and identify differences, if any.	0	0	7-01-70	
YSPT	CAP-A	MESSAGE OUTPUT/IODC CONTROL FOR THE YSLT SYSTEM.	0	3	5-10-72	
YSVR	CAP-A	VERBAGE RETRIEVAL FOR THE YSLT SYSTEM.	0	2	5-20-72	

Table 2-3. RCA-110A Supplemental Postprocessing Programs

IVAR	NASA APT ELEMENT RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
*FU00	GDC-32 IBM	TAPE CONVERTER; Converts data coming from a specified input tape and then writes the converted data on a second tape.	0		1-06-69	
*FUDD	GDC-32 IBM	DDAS DIGITAL TAPE GENERATOR; Reads DDAS and writes the data from the special address on a digital tape that can be read by any digital computer.	1		1-06-69	
*FUNN	GDC-32 IBM	TM DIGITAL TAPE POSTPROCESSOR; Provides the capability to read a digital tape in the specified format and output the requested data on the line printer.	5		1-06-69	
SDDR	CAP-B	OFF-LINE DISCRETE RETRIEVAL;	0	0	10-28-69	
ZV02	CAP-B	OFF-LINE QUICK-LOOK DISCRETE DATA RETRIEVAL; Provides a means of retrieving the logged discrete data on the Saturn V system log tape.	7	7	1-14-71	
ZVAT	CAP-B	ATOLL TRACE DATA/FLIGHT COMPUTER DATA RETRIEVAL; Retrieves data logged under the ATCO or FLV1 headers.	1	1	12-23-70	
ZVET	CAP-B	EVENTS TRAIL; Provides a time history of events which occurred during a Saturn V test or launch.	3	3	9-09-71	
ZVMS	CAP-B	ZVMT SYSTEM MESSAGE PACKAGE;	0	1	12-13-71	Interrelated w/ZVMT
ZVMT	CAP-B	MT01 TAPE POST PROCESSOR; Processes each DDAS sample logged by MT01 and gives the output in volts or engineering units.	1	1	12-13-71	
ZVRE	CAP-B	NON-DISCRETE DATA RETRIEVAL; Retrieves, formats, and lists selected data from the SV log tapes and can provide an octal dump of the log tape with header information decoded.	12	12	12-06-71	
SUBP	CAP-B	SUBROUTINE PACKAGE FOR ZVRE ONLY;	5	12	12-06-71	Interrelated w/ZVRE
ZVSS	CAP-B	I/O SUBROUTINE PACKAGE; Controls all peripheral equipment for Saturn V postprocessing programs	2	2	12-27-71	

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Table 2-4. DDP-224 Supplemental Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
DICP	GDC-31 IBM	RCA-110A/DDP-224 INTERFACE (224 Side); Checks the IODC-6/DECV for sense bit patterns and block data transfer.	13	3	5-12-72	
DSAT	GDC-31 IBM	DDP-224 ARITHMETIC FUNCTIONAL TEST; Tests all arithmetic logic.	0	0	5-11-72	
DSCP	GDC-31 IBM	DDP-224 CENTRAL PROCESSOR TEST; Verifies proper operation of the DDP-224 logic elements with emphasis on the instruction repertoire.	01	01	9-15-69	
DSDP	GDC-31 IBM	DIGITAL SWITCH CHECKOUT; Tests the options and controls of the digital switch.	0	0	10-10-69	
DSMD	GDC-31 IBM	DDP-224 MEMORY DIAGNOSTIC; Verifies the operation of all DDP-224 memory locations and diagnoses any failures encountered.	B	B	2-24-70	
DSRM	GDC-31 IBM	REFRESH MEMORY DIAGNOSTIC; Performs a complete test of refresh memories, data patches, and control units, and then transfer of data from refresh memories to consoles.	5	3B	1-12-70	
DSSS	GDC-31 IBM	SENSE SWITCH TEST; Continuously checks the status of the DDP-224 sense switches.	0	0	1-5-71	
DSTA	GDC-31 IBM	DDP-224 CONSOLE ALIGNMENT TEST; Provides console displays and controls to aid in aligning and troubleshooting display console equipment.	1	C	7-27-70	
DSTO	GDC-31 IBM	TYPEWRITER OUTPUT TEST; Performs predefined tests on the typewriter to insure it is operational prior to vehicle testing.	0	0	1-5-71	

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Table 2-5. DEE-6C/E Supplemental Diagnostic Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR.PTR)
			LISTING	DOCUMENT		
DD51/ DH51	GDC-27 IBM	SYSTEM TEST; Performs a function test of cycle flip-flops, interrupts, comparator counter, clock, remote panel inputs, Franklin Printers, and the remote power indicator. (DD51 - XDS 930) (DD51/DH51 XDS 930/Remote XDS 092)	0/0	0/0	10-29-71	CPCR 8863 8854 8853
DD53	GDC-27 IBM	PAPER TAPE PUNCH TEST; Verifies that the performance of the XDS 930 punch is within tolerance, and that the reader is functioning properly.	1	1	2-30-70	
DD54	GDC-27 IBM	PHOTO-READER TEST; Performs a functional test of the XDS 930 paper tape reader.	1A	1A	10-1-70	
DD55	GDC-27 IBM	TELETYPE TEST; Performs a test of the XDS 930 teletype input acceptance and interpolation, output validity, and output timing.	1	1	2-3-70	
DD59	GDC-27 IBM	W-BUFFER LINE PRINTER ACCEPTANCE TEST; Verifies the functioning of the alphanumeric line printer, when connected locally to the XDS 930.	2	2	3-31-70	
DD60	GDC-27 IBM	MAGNETIC TAPE UNIT DIAGNOSTIC; Isolates to PC modules and/or mechanical/electrical components, within the XDS 930 Magnetic Tape Control Unit, Magnetic Tape Unit, or Magnetic Tape Deck.	2	2	6-2-70	
DD61/ DH61	GDC-27 IBM	HI/LOW SPEED DATA LINK DIAGNOSTIC; Performs a complete diagnostic check of the redundant, high and low speed data link system, between the Remote Programmable Scanner (XDS-092) in the Mobile Launcher and the DEE-6 Computers (XDS-930) in the LCC.	1	1	12-10-71	
DD62	GDC-27 IBM	TIME MULTIPLEX COMMUNICATION CHANNEL DIAGNOSTIC; Isolates any hardware failure within the XDS 930 Time Multiplex Communication Channel (TMCC) circuitry.	3	3	3-17-72 3-26-70	

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\* Deleted Programs

Table 2-5. DEE-6C/E Supplemental Diagnostic Programs (Continued)

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
DD63/ DH63	GDC-27 IBM	SCAN SYSTEM LOGIC DIAGNOSTIC; Isolates any hardware failure within the scan system logic circuitry. (DD13 Remote XDS 930) (DD61/DH61 Remote XDS 092)	0	0	6-29-71	CPCR 8837 PTR-K236
DD64	GDC-27 IBM	MEMORY UNIT DIAGNOSTIC; Performs a detailed verification of the main frame memory.	3A	3A	10-1-70	
DD65	GDC-27 IBM	CENTRAL PROCESSOR UNIT DIAGNOSTIC; Performs a detailed verification of the Central Processor Unit (CPU) for all proper machine instruction execution.	2	2	10-1-70	
DD66/ DH66	GDC-27 IBM	DEE-6 REMOTE I/O CHANNEL DIAGNOSTIC; Performs a detailed test of all circuitry in the DMC and TMCC associated with the XDS-092 Remote Computer System.	1	1	12-17-72	
DD68/ DH68	GDC-27 IBM	REMOTE MEMORY DIAGNOSTIC; Performs a detailed verification of the XDS-092 remote programmable scanner memory.	2	2	3-3-72	
DD69/ DH69	GDC-27 IBM	REMOTE CENTRAL PROCESSOR UNIT DIAGNOSTIC; Performs a detailed verification of the central processor unit of the Remote Programmable Scanner (XDS-092).	1	1	12-31-71	
DD70	GDC-27 IBM	XDS DIAGNOSTIC CONTROLLER; XDS memory, instruction, P&S tests plus executive.	0	0	1-25-71	
UDED	GDC-27 IBM	DEE-6 SYSTEM TAPE EDITOR; Functions as an editor for the UDEX System Tape by building the Diagnostic System Test Tape.	1	1	7-15-70	
UDEX	GDC-27 IBM	DEE-6 DIAGNOSTIC SYSTEM EXECUTIVE; Performs executive functions for the diagnostic system programs that reside on the maintenance test tape. It includes an automatic program sequence capability.	1A	1A	8-12-70	

Table 2-6. DEE-6C/E Supplemental Utility and Postprocessing Programs

IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
UD02	CAP-B	TAPE DUPLICATOR; Copies BCD or binary tape to paper tape; duplicates paper tape.	2	2	11-5-69	
UD04	CAP-B	SYMBOLIC TAPE EDITOR; Edits DEE-6 symbolic tapes	2	2	6-30-71	
UD05	CAP-B	DEBUG AID; Provides such debugging functions as - address modification, core dumps - instruction traces - loop controls etc., for maintenance and development of DEE-6 programs.	A	A	12-3-71	
UD06	CAP-B	FORTRAN DUMP PROGRAM; Used to dump all FORTRAN programs to paper tape or magnetic tape in SYMBOL or META-SYMBOL format.	A	A	12-3-71	
UD07	CAP-B	RT FORTRAN II MONARCH TAPE EDITOR PROGRAM; Builds and edits MONARCH tapes for the DEE-6 system by adding records from magnetic or paper tape or omitting records from magnetic tape.	3	3	3-18-71	
UD08	CAP-B	DEE-6 TAPE LIST PROGRAM; Lists SYMBOL and META-SYMBOL list tapes on the 160 column lineprinter.	0	0	11-6-70	
UD09	CAP-B	DEE-6 PAPER TAPE GENERATOR; Generate paper tape output on the DEE-6/XDS 930.	1	1	5-21-71	
UDTR	CAP-B	SC63 OPERATIONAL SCAN PROGRAM SIMULATOR; Lists stored discrete events from a simulation test profile relative to clock parameters to simulate vehicle malfunctions and occurrences for launch crew training.	1	0	5-7-71	
UP23	CAP-B	TAPE LIST DUMP; Dumps DEE-6 symbol and formatted symbol list tapes and alphanumeric tapes.	4	4	11-18-69	
UP24	CAP-B	TAPE EDITOR; Provides a means of editing DEE-6 system tapes, and comparing and generating DEE-6 ID tables from the G.E. ICD tape via ATOM on the RCA-110A computer.	41	9	6-30-72	Subroutines UVSS

Table 2-6. DEE-6 C/E Supplemental Utility Postprocessing Programs (Continued)

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IVAR	NASA AUTH. ELEMENT AND RESPONSIBLE CONTRACTOR	PROGRAM TITLE AND FUNCTION	REV.		LAST RELEASE DATE	UNRELEASED PROGRAM STATUS, OR OPEN CHANGE DOCUMENTS (CPCR-PTR)
			LISTING	DOCUMENT		
UP26	CAP-B	RCA-110/DEE-6 SEQUENCE TABLE GENERATOR PROGRAM; Generates, edits, sorts, lists, and performs maintenance functions for sequence compare tables for the 092/930 DEE-6 system.		2	4-12-72	
ZDAD	GDC-27 CAP-B	DATA PROCESSOR; Provides the capability of processing all data on the log tape(s) produced by the DEE-6 Scan Program and outputting the data on teletype, alphanumeric printer, or Franklin Printer. It produces an "All Data" print tape(s) for permanent data storage at the CIF.	2	2	7-6-71	
ZDIT	GDC-27 CCSD	INTERVAL TIMING; Provides complete point-to-point time and tolerance check in seconds between discrete/switch selector functions by Boolean expressions.	4	4	7-6-71	
ZDTM	GDC-27 CAP-B	TAPE MERGE; Merges 24 characters of alphanumeric description to Discrete Data from DEE-6 Scan Log Tapes to the fewest possible tapes for permanent storage. For input to ZD/D, ZDIT, and ZDCY.	6	6	5-7-71	
ZDSC	CAP-B	OFF-LINE SEQUENCE COMPARE PROGRAM; Performs DEE-6 Sequence Compare against post test history tapes to provide a means to validate sequence table and obtain sequence compare off-line.	1	1	3-26-71	