GP-592
REVISION 33
JANUARY 6 1975

JOHN F. KENNEDY
SPACE CENTER

Addenda on DRA

(NASA-TM-X-72438) LAUNCH VEHICLE CATALOG OF TESTS AND OPERATIONS (NASA) 124 p
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Unclas
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LAUNCH VEHICLE
CATALOG OF TESTS AND OPERATIONS

JAN 1975
RECEIVED
NASA STI FACILITY
INPUT BRANCH

LAUNCH VEHICLE OPERATIONS

Prepared By
THE BOEING COMPANY
SATURN -LAUNCH OPERATIONS

CHANGE LOG

CHANGES TO THE ORIGINAL DOCUMENT ARE LISTED BELOW:

REVISION		ISSUE DATE
19	COMPLETE REVISION	01/05/72
20	PARTIAL REVISION	03/02/72
21	" "	05/23/72
22	" "	07/24/72
23	" "	10/16/72
24	" "	01/01/73
25	" "	02/09/73
26	" "	03/16/73
27	" "	06/01/73
28	" "	08/03/73
29	" "	09/06/73
30	" "	12/10/73
31	" "	06/03/74
32	" "	10/04/74
33	" "	01/06/75

CATALOG OF TESTS AND OPERATIONS

GP-592

CHANGE SUMMARY — REV 33

TEST CATALOG SHEET	CONTRACTOR	CHANGE				NOTES
		NEW	REVISED	CANCELLED	DELETED	
V-20026	IBM		X			
V-20066	IBM		X			
V-20109	TBC					PAGE REPLACEMENT
V-20120	TBC					PAGE REPLACEMENT
V-20144	IBM		X			
V-20146			X			
V-20147			X			
V-20148			X			
V-20149			X			
V-20153			X			
V-21096			X			
V-21371			X			
V-21541			X			
V-23169			X			
V-23199			X			
V-23214			X			
V-23224			X			
V-23246	IBM		X			
V-26533	CCSD				X	CANCELLED IN REV 32
V-27064	IBM		X			
V-28003	NASA				X	CANCELLED IN REV 32
V-28004	NASA				X	CANCELLED IN REV 32
V-28008	NASA				X	CANCELLED IN REV 32

CATALOG OF TESTS AND OPERATIONS
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CHANGE SUMMARY — REV 33

TEST CATALOG SHEET	CONTRACTOR	CHANGE				NOTES
		NEW	REVISED	CANCELLED	DELETED	
V-28009	NASA				X	CANCELLED IN REV 32
V-28049	IBM		X			
V-28050			X			
V-28051			X			
V-28072	IBM		X			
V-28150	NASA				X	CANCELLED IN REV 32
V-28184	TBC				X	CANCELLED IN REV 32
V-28213	IBM		X			
V-28214	CCSD		X			
V-28217			X			
V-28220			X			
V-28221	CCSD		X			
V-28230	IBM		X			
V-30050	TBC				X	CANCELLED IN REV 32
V-30115					X	
V-30148					X	
V-30149					X	
V-30166					X	
V-30274					X	
V-30361					X	
V-30419					X	
V-30452	TBC				X	CANCELLED IN REV 32
V-31119	IBM		X			

CATALOG OF TESTS AND OPERATIONS

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CHANGE SUMMARY — REV 33

TEST CATALOG SHEET	CONTRACTOR	CHANGE				NOTES
		NEW	REVISED	CANCELLED	DELETED	
V-31126	IBM		X			
V-33032	IBM		X			
V-33055	IBM				X	CANCELLED IN REV 31

LIST OF DELETED PAGES	DATE 1/6/75		DOCUMENT GP-592	REVISION 33	PAGE A

TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.
V-20025	D								
V-20026	I								
V-20066	F								
V-20109	B								
V-20119	C								
V-20143	-								
V-20145	-								
V-20147	-								
V-20149	A								
V-20153	B								
V-21096	G								
V-21371	H								
V-21541	-								
V-23169	F								
V-23199	E								
V-23214	A								
V-23224	-								
V-23245	-								
V-26532	C								
V-27064	J								
V-28003	C								
V-28005	C								
V-28009	B								
V-28048	A								
V-28049	I								
V-28050	H								
V-28051	I								
V-28072	D								
V-28150	C								
V-28182	-								
V-28212	A								
V-28214	B								
V-28217	-								
V-28219	-								
V-28221	A								
V-28229	-								
V-30049	-								
V-30115	A								
V-30147	-								
V-30149	A								
V-30166	B								
V-30270	A								
V-30361	B								
V-30416	-								
V-30452	B								
V-31118	B								
V-31126	-								
V-33030	E								
V-33055	A								

NOTE: REVISION INSTRUCTIONS APPEARING ON PAGE III OF THE ORIGINAL DOCUMENT SHOULD BE CLOSELY FOLLOWED.

LIST OF ADDED PAGES	DATE 1/6/75		DOCUMENT GP-592	REVISION 33	PAGE B

TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.	TEST NO.	REV.
V-20025	D								
V-20026	J								
V-20066	G								
V-20109	B								
V-20119	C								
V-20143	-								
V-20145	-								
V-20147	A								
V-20149	B								
V-20153	C								
V-21096	H								
V-21371	I								
V-21541	B								
V-23169	G								
V-23199	F								
V-23214	B								
V-23224	A								
V-23245	-								
V-26532	C								
V-27064	K								
V-28005	C								
V-28048	A								
V-28049	J								
V-28050	I								
V-28051	J								
V-28072	E								
V-28152	B								
V-28182	-								
V-28212	A								
V-28214	C								
V-28217	A								
V-28219	-								
V-28221	B								
V-28229	-								
V-30049	-								
V-30147	-								
V-30150	-								
V-30270	A								
V-30362	-								
V-30416	-								
V-30454	-								
V-31118	B								
V-31126	B								
V-33030	E								

NOTE: REVISION INSTRUCTIONS APPEARING ON PAGE III OF THE ORIGINAL DOCUMENT SHOULD BE CLOSELY FOLLOWED.

APOLLO/SATURN V INDEX OF LAUNCH VEHICLE
TEST AND OPERATIONS CATALOG SHEETS

TEST NUMBER	REVISION LEVEL	INDEX CHANGE EFFECTIVE	
V-20004	E	8/9/71	H
V-20010	J	8/3/73	H
V-20017	P	8/3/73	H
V-20022	M	8/3/73	H
V-20025	D	7/24/72	-
V-20026	J	1/6/75	-
V-20032	G	8/3/73	H
V-20037	H	8/3/73	H
V-20038	C	8/3/73	H
V-20048	N	8/3/73	-
V-20049	J	8/3/73	H
V-20052	A	4/15/69	-
V-20056	B	3/25/71	H
V-20060	X	8/3/73	H
V-20062	C	1/1/73	-
V-20064	C	2/9/73	H
V-20066	G	1/6/75	-
V-20067	G	1/1/73	H
V-20070	H	8/3/73	-
V-20072		7/21/69	-
V-20074		8/12/69	H
V-20076	B	3/2/72	-
V-20077		9/17/70	H
V-20078	-	8/3/73	H
V-20079	A	8/3/73	H
V-20080	B	1/5/72	H
V-20081	B	8/3/73	H
V-20083	A	10/4/74	H
V-20084	A	10/4/74	-
V-20085	A	10/4/74	H
V-20086	A	10/4/74	H
V-20100	B	10/4/74	-
V-20101	D	10/4/74	-
V-20102	B	10/4/74	H
V-20103	H	10/4/74	H
V-20104	C	10/4/74	-
V-20105	C	10/4/74	-
V-20106	F	10/4/74	H
V-20107	E	10/4/74	H
V-20108	E	10/4/74	H
V-20109	B	10/4/74	H
V-20110	B	10/4/74	H
V-20111	C	10/4/74	H
V-20112	E	10/4/74	H
V-20113	A	10/4/74	H
V-20114	C	10/4/74	-

V-20115	C	10/4/74	H
V-20116	E	10/4/74	H
V-20117	H	10/4/74	H
V-20118	A	10/4/74	-
V-20119	C	10/4/74	H
V-20120	E	10/4/74	H
V-20121	B	6/1/73	H
V-20122	B	8/3/73	H
V-20126	B	10/4/74	-
V-20127	D	10/4/74	H
V-20128	D	10/4/74	H
V-20129	B	10/4/74	H
V-20130	H	10/4/74	H
V-20131	C	10/4/74	H
V-20132	E	10/4/74	H
V-20133	A	10/4/74	H
V-20141		5/23/72	-
V-20142		5/23/72	H
V-20143		5/23/72	-
V-20144	B	1/6/75	H
V-20145		5/23/72	-
V-20146	B	1/6/75	-
V-20147	A	1/6/75	H
V-20148	A	1/6/75	-
V-20149	B	1/6/75	H
V-20150		5/23/72	-
V-20151	B	10/5/72	H
V-20152	A	6/1/73	-
V-20153	C	1/6/75	-
V-20154		5/23/72	H
V-20155		5/23/72	-
V-20156		5/23/72	-
V-20157		5/23/72	-
V-20158		5/23/72	H
V-21002	C	2/9/70	-
V-21005	H	1/5/72	-
V-21006	F	9/17/70	-
V-21007	G	7/24/72	-
V-21008	A		H
V-21009	B		H
V-21010	D	1/5/72	H
V-21012	B		H
V-21013	C	9/17/70	H
V-21014	A	1/5/72	H
V-21015	D	1/5/72	H
V-21018	D	4/10/70	H
V-21019	A	8/9/71	H
V-21020			-
V-21022	F	1/1/73	H
V-21023	C	11/5/70	-
V-21028	C	6/17/70	-
V-21032	A		-
V-21034	C	8/9/71	-

V-21035	B	11/5/70	-
V-21036	A	5/27/69	-
V-21037	A		-
V-21038	C	2/9/70	-
V-21065	F	6/17/70	-
V-21067	B	5/23/72	-
V-21072	E	8/9/71	-
V-21075	E	6/1/73	-
V-21083	A	8/12/69	-
V-21084	J	3/2/72	-
V-21096	H	1/6/75	-
V-21097	C	4/10/70	-
V-21100	D	5/23/72	-
V-21101	H	1/1/73	H
V-21103	E	11/5/70	-
V-21105	B	3/2/72	-
V-21107	C	7/24/72	-
V-21109	C	2/9/70	-
V-21110	C	1/30/69	-
V-21111	D	1/1/73	-
V-21124	A	1/5/72	-
V-21152	D	1/5/72	-
V-21153	A	1/5/72	-
V-21158	C	1/5/72	-
V-21159	C	1/5/72	-
V-21161	C	3/25/71	-
V-21162	C	1/5/72	-
V-21163	C	1/5/72	-
V-21164	C	1/5/72	-
V-21165	C	1/5/72	-
V-21166	C	1/5/72	-
V-21174			-
V-21176	C	1/5/72	-
V-21191	C	6/17/70	-
V-21194	B	6/20/69	-
V-21196			-
V-21203	B	2/9/70	-
V-21204	L	8/9/71	H
V-21205	B	2/9/70	-
V-21210			-
V-21214	H	5/23/72	-
V-21222	D	5/23/72	-
V-21223	I	10/4/74	-
V-21225	A	3/25/71	-
V-21227	C	5/23/72	-
V-21230	A		-
V-21241	B	8/9/71	-
V-21243	E	3/2/72	-
V-21245	B	2/9/73	-
V-21247			-
V-21249	C	2/9/70	-
V-21255	F	10/4/74	-
V-21259	E	1/5/72	-

V-21260	F	6/1/73	-
V-21261	E	7/24/72	-
V-21262	E	5/23/72	-
V-21263	E	5/23/72	-
V-21264	F	8/9/71	-
V-21266	B	5/23/72	-
V-21267	C	12/10/73	-
V-21272			-
V-21273	A	1/5/72	-
V-21274	F	6/1/73	-
V-21285	D	12/10/73	-
V-21290	A	3/25/71	-
V-21292	B	1/5/72	-
V-21293			-
V-21294			-
V-21295	A	8/9/71	-
V-21296	C	4/10/70	-
V-21297	B		-
V-21301	F	6/1/73	-
V-21311	A		-
V-21315	C	5/23/72	H
V-21320			H
V-21321	A	1/5/72	H
V-21322	G	3/2/72	H
V-21323	I	6/1/73	H
V-21324	I	6/1/73	H
V-21326	A	11/26/69	-
V-21327	C	1/5/72	-
V-21332	C	3/2/72	H
V-21333			-
V-21334			-
V-21337	A	1/5/72	-
V-21343	G	5/23/72	-
V-21345			-
V-21348	E	3/25/71	-
V-21349	B		-
V-21363	C	1/5/72	-
V-21371	I	1/6/75	-
V-21376	D	3/25/71	-
V-21379	A		-
V-21380	D	6/1/73	-
V-21386	B	10/5/72	H
V-21391			-
V-21392			-
V-21393			-
V-21394			-
V-21395			-
V-21398	E	3/25/71	-
V-21400	A	5/23/72	-
V-21406	B	6/17/70	-
V-21409	A	11/5/70	-
V-21411	C	5/23/72	-
V-21412	C	5/23/72	-

V-21413	G	3/16/73	-
V-21416			-
V-21418			-
V-21419	D	5/23/72	-
V-21420		1/30/69	-
V-21425	A	5/27/69	-
V-21426	B	4/10/70	-
V-21429	A	8/9/71	-
V-21430		4/15/69	-
V-21432	D	2/9/70	-
V-21434	B	10/5/72	-
V-21435	B	5/23/72	-
V-21437	A	2/9/70	H
V-21438	B	1/1/73	-
V-21439		8/22/69	-
V-21440		8/22/69	-
V-21441	A	11/5/70	-
V-21443	A	3/25/71	-
V-21444	A	3/25/71	-
V-21445	A	6/17/70	-
V-21446	D	5/23/72	-
V-21447		2/9/70	-
V-21448	C	5/23/72	-
V-21449	A	9/17/70	-
V-21450	B	3/25/71	-
V-21452	B	7/24/72	-
V-21453	A	8/9/71	-
V-21454	A	1/5/72	H
V-21455		9/17/70	-
V-21456		9/17/70	-
V-21457		9/17/70	-
V-21458	D	3/16/73	H
V-21459	B	1/5/72	-
V-21460	C	5/23/72	-
V-21462		11/5/70	-
V-21464	A	5/23/72	-
V-21465		1/21/71	-
V-21466	A	8/9/71	-
V-21467		3/25/71	-
V-21468		3/25/71	-
V-21469		3/25/71	-
V-21470	A	3/16/73	-
V-21471		3/25/71	-
V-21472		3/25/71	-
V-21473		3/25/71	-
V-21474	A	5/23/72	-
V-21478	D	10/4/74	-
V-21479	D	10/4/74	H
V-21480	A	6/1/73	-
V-21481	A	12/10/73	-
V-21482		8/9/71	-
V-21483		8/9/71	-
V-21484		8/9/71	-

V-21485		8/9/71	-
V-21486		8/9/71	-
V-21487		8/9/71	-
V-21488		1/5/72	-
V-21489	A	3/2/72	-
V-21490	D	6/1/73	-
V-21491		1/5/72	-
V-21492		1/5/72	-
V-21493	A	3/2/72	-
V-21494		1/5/72	-
V-21495		1/5/72	-
V-21496		1/5/72	-
V-21497	B	10/4/74	H
V-21498	A	3/2/72	-
V-21500	B	7/24/72	H
V-21501	A	6/1/73	-
V-21502	A	7/24/72	-
V-21503	A	7/24/72	-
V-21504	B	10/5/72	-
V-21505	B	7/24/72	-
V-21506	A	7/24/72	-
V-21507	B	3/16/73	-
V-21508	C	6/1/73	-
V-21509	B	7/24/72	-
V-21510	A	7/24/72	-
V-21511	B	3/16/73	-
V-21513	B	5/23/72	-
V-21514	D	6/1/73	-
V-21515	E	6/1/73	-
V-21516		1/5/72	-
V-21517	B	10/5/72	-
V-21518	A	2/9/73	-
V-21519	E	6/1/73	-
V-21520	A	6/1/73	-
V-21522		1/5/72	-
V-21523	A	5/23/72	-
V-21524	B	2/9/73	-
V-21525	A	7/24/72	-
V-21526	A	7/24/72	-
V-21527	A	5/23/72	-
V-21528		3/2/72	-
V-21529	B	6/1/73	H
V-21530	B	6/1/73	H
V-21531		3/2/72	H
V-21532	D	3/16/73	H
V-21533		3/2/72	-
V-21534		3/2/72	-
V-21535		3/2/72	-
V-21536	A	10/4/74	-
V-21537	A	10/4/74	-
V-21538	A	3/16/73	-
V-21539		3/2/72	-
V-21540		3/2/72	-

V-21541	B	1/6/75	-
V-21542		3/2/72	-
V-21543		3/2/72	-
V-21544		5/23/72	-
V-21545		5/23/72	-
V-21546	D	12/10/73	-
V-21553	A	6/1/73	H
V-21554		10/5/72	-
V-21555	B	2/9/73	-
V-21556		10/5/72	-
V-21557		10/5/72	-
V-21558		10/5/72	-
V-21559		10/5/72	-
V-21560	A	1/1/73	-
V-21561		10/5/72	-
V-21562		10/5/72	H
V-21563		10/5/72	-
V-21564	B	10/4/74	-
V-21565		1/1/73	-
V-21566		1/1/73	-
V-21568		1/1/73	-
V-21569	A	8/3/73	-
V-21570		1/1/73	-
V-21571		1/1/73	-
V-21572		1/1/73	-
V-21574	A	10/4/74	-
V-21575			-
V-21576			-
V-21582		6/1/73	-
V-21583		10/4/74	H
V-21584		10/4/74	-
V-22005	A	3/2/72	-
V-22006	D	10/5/72	-
V-22013	B	5/23/72	-
V-22014	D	5/23/72	-
V-22015		5/23/72	-
V-23011	B	2/9/70	-
V-23012	A		-
V-23013	F	10/5/72	-
V-23014	I	3/2/72	-
V-23015	B		-
V-23017	B	2/9/70	-
V-23018	C	8/22/69	H
V-23025	C	4/10/70	-
V-23026			-
V-23027			-
V-23028	B	5/23/72	-
V-23029	K	1/5/72	-
V-23030	I	10/4/74	-
V-23048	F	12/10/73	-
V-23049	F	8/3/73	-
V-23059	E	5/23/72	-
V-23061	F	5/23/72	-

V-23062	E	5/23/72	-
V-23066	G	5/23/72	-
V-23068	G	5/23/72	-
V-23069	D	8/9/71	-
V-23123	E	1/5/72	H
V-23124	B	3/2/72	H
V-23125	E	5/23/72	H
V-23126	A	8/22/69	H
V-23137	B	8/12/69	-
V-23143			-
V-23144	A		-
V-23145	A	1/30/69	-
V-23146	A		-
V-23147	A		-
V-23148	A		-
V-23150	A		-
V-23153	J	5/23/72	-
V-23155	F	10/4/74	-
V-23159	A		-
V-23160	C	1/5/72	-
V-23169	G	1/6/75	-
V-23171	G	7/21/69	-
V-23173			-
V-23178	D	5/23/72	-
V-23179	A		-
V-23180	B	7/24/72	-
V-23181	B	11/1/69	-
V-23182	B	11/1/69	-
V-23183	C	2/9/70	-
V-23185	E	10/5/72	-
V-23187	B	2/9/70	-
V-23188	C	2/9/70	-
V-23190	E	12/10/73	-
V-23191			-
V-23192			-
V-23195	A	8/9/71	-
V-23197	A	5/23/72	-
V-23198	B	10/4/74	-
V-23199	F	1/6/75	-
V-23200	C	8/3/73	-
V-23212		3/25/71	-
V-23213	A	12/10/73	H
V-23214	B	1/6/75	-
V-23215	A	5/23/72	-
V-23217	B	8/9/71	-
V-23218	A	6/3/74	-
V-23219	A	6/3/74	-
V-23220	A	6/3/74	-
V-23221	A	10/4/74	-
V-23222	A	10/4/74	-
V-23223	A	10/4/74	-
V-23224	A	1/6/75	-
V-23225	A	10/4/74	-

V-23226	A	10/4/74	-
V-23227		8/9/71	-
V-23228		8/9/71	-
V-23229	A	12/10/73	-
V-23230	A	5/23/72	-
V-23232	A	8/9/71	-
V-23234		4/10/70	-
V-23235	B	5/23/72	-
V-23236		8/9/71	-
V-23237	B	6/3/74	-
V-23238	A	1/5/72	-
V-23239		8/9/71	-
V-23240		8/9/71	-
V-23241		8/9/71	-
V-23242		8/9/71	-
V-23243		8/9/71	-
V-23244	A	12/10/73	-
V-23245		8/9/71	-
V-23246	A	1/6/75	-
V-23247	B	12/10/73	-
V-23248	B	12/10/73	-
V-23249	A	12/10/73	-
V-23250	A	12/10/73	-
V-23251	A	12/10/73	-
V-23252		8/9/71	-
V-23253		8/9/71	-
V-23254	B	12/10/73	-
V-23255		8/9/71	-
V-23256	A	12/10/73	-
V-23257		8/9/71	-
V-23258	A	3/2/72	-
V-23259	B	3/16/73	-
V-23260	A	10/4/74	-
V-23261	B	10/4/74	-
V-23262	A	10/4/74	-
V-23263	A	10/4/74	-
V-23264	A	1/5/72	-
V-23265	A	7/24/72	-
V-23266	B	10/4/74	-
V-23267	A	10/4/74	-
V-23268	A	10/4/74	-
V-23269	A	10/4/74	-
V-23270	C	6/1/73	H
V-23271		1/5/72	-
V-23272		1/5/72	-
V-23273		1/5/72	-
V-23274		1/5/72	-
V-23275	A	10/4/74	-
V-23276	D	10/4/74	H
V-23277		1/5/72	-
V-23278		5/23/72	-
V-23279	B	10/4/74	-
V-23280	A	10/4/74	-

V-23281	B	10/4/74	-
V-23282	C	10/4/74	-
V-23283		5/23/72	-
V-23284		5/23/72	-
V-23285		5/23/72	-
V-23286		5/23/72	-
V-23287		5/23/72	-
V-23288	B	3/16/73	-
V-23289	A	8/3/73	-
V-23290		10/5/72	-
V-24000			-
V-24001	B		H
V-24002	A		H
V-24003	A		H
V-24004	A		H
V-24005	A		H
V-24006	B		H
V-24009	C	5/27/69	H
V-24010	B		H
V-24011	B		H
V-24012	A		H
V-24014	A		H
V-24016			-
V-24017	A		H
V-24018	E	1/5/72	H
V-24019	H	3/2/72	H
V-24020	D	9/17/70	H
V-24022	C	3/25/71	-
V-24024	E	3/25/71	H
V-24025	A		H
V-24026	F	9/17/70	H
V-24028	B	3/25/71	H
V-24029	B	3/25/71	H
V-24030	B	3/25/71	H
V-24032	B	3/25/71	H
V-24034	C	3/25/71	H
V-24035	B	1/5/72	-
V-24036	A		H
V-24038	C	3/25/71	-
V-24039	C	3/25/71	-
V-24040	F	1/5/72	-
V-24044	D	10/5/72	H
V-24045	D	3/25/71	H
V-24048	D	3/25/71	H
V-24049	E	1/5/72	H
V-24065	C	8/9/71	H
V-24073	B	8/9/71	H
V-24076	C	8/9/71	H
V-24078	C	8/9/71	-
V-24080	C	8/9/71	-
V-24081	C	8/9/71	H
V-24083	B	8/9/71	H
V-24084	C	11/5/70	H

V-24086	D	5/23/72	-
V-24088	C	5/23/72	H
V-24091	D	1/5/72	-
V-24092	G	3/16/73	-
V-24095	D	1/5/72	H
V-24098	G	12/10/73	H
V-24100	C	5/23/72	H
V-24101	D	8/9/71	H
V-24106	H	1/5/72	-
V-24107	G	1/5/72	-
V-24109	D	5/23/72	H
V-24110	G	3/25/71	-
V-24111	C	3/25/71	H
V-24113	D	8/12/69	H
V-24115	D	8/9/71	H
V-24116	G	9/17/70	-
V-24120	D	8/9/71	H
V-24124	G	3/2/72	H
V-24125	J	7/24/72	-
V-24126	G	5/23/72	-
V-24153	A		H
V-24154			H
V-24160	F	2/9/70	-
V-24167	A	1/5/72	H
V-24168	A	3/10/69	H
V-24177	B	8/9/71	H
V-24180	B	3/25/71	H
V-24181	A		H
V-24182	B	8/9/71	H
V-24183	C	8/9/71	H
V-24184	C	8/9/71	H
V-24185	C	2/9/73	-
V-24186	H	1/5/72	H
V-24189	G	1/5/72	H
V-24190	B	8/9/71	H
V-24192	D	3/25/71	H
V-24193	B	3/16/73	-
V-24201	C	3/16/73	-
V-24202	C	3/16/73	-
V-24203	B	3/25/71	-
V-24204	B	3/25/71	-
V-24223	F	10/4/74	H
V-24225			H
V-24228	K	10/4/74	-
V-24235	D	3/25/71	H
V-24236	C	3/25/71	H
V-24237	E	7/24/72	H
V-24238	E	7/24/72	H
V-24240	A	3/25/71	H
V-24243	F	10/5/72	H
V-24244	H	6/17/70	-
V-24245	E	3/25/71	-
V-24246	H	6/1/73	H

V-24247	E	3/16/73	H
V-24248	G	3/25/71	H
V-24250	H	3/25/71	H
V-24253	B	6/17/70	H
V-24254	B	6/17/70	H
V-24257	F	3/2/72	-
V-24258	C	2/9/70	H
V-24260	A		-
V-24261	G	3/25/71	-
V-24263	F	7/24/72	H
V-24266	C	2/9/70	-
V-24267	D	3/25/71	H
V-24269	A	8/9/71	H
V-24270	H	2/9/73	-
V-24271	A	3/25/71	-
V-24273	B	3/25/71	H
V-24275	B	9/17/70	H
V-24276	F	1/1/73	-
V-24295	D	8/9/71	-
V-24298	F	10/4/74	H
V-24299	G	10/4/74	H
V-24300	E	1/5/72	-
V-24303	F	10/5/72	-
V-24304			-
V-24305	D	3/16/73	H
V-24307	B		H
V-24308	C	5/27/69	H
V-24309	E	3/25/71	-
V-24310	D	3/25/71	H
V-24311	F	3/25/71	H
V-24312	E	3/25/71	H
V-24314	B	3/25/71	H
V-24316	C	5/27/69	H
V-24317	C	1/5/72	H
V-24318	D	3/25/71	-
V-24319	C	8/12/69	-
V-24320	B	8/12/69	-
V-24321	D	3/25/71	H
V-24322	A	11/1/69	H
V-24324	E	5/23/72	-
V-24326	G	5/23/72	-
V-24327	E	3/16/73	H
V-24329	A	8/9/71	H
V-24331	C	3/25/71	H
V-24332	B	3/25/71	H
V-24334	C	8/9/71	H
V-24335	B	8/9/71	H
V-24336	A	8/9/71	-
V-24337	C	2/9/73	H
V-24338	C	5/23/72	H
V-24340	H	1/5/72	H
V-24341	C	1/1/73	-
V-24342	C	3/25/71	H

V-24343	B	8/9/71	H
V-24344	K	3/16/73	-
V-24345	B	8/9/71	H
V-24347			-
V-24348	G	1/1/73	H
V-24352	C	3/25/71	H
V-24356	B	8/9/71	H
V-24357	F	3/2/72	H
V-24359			H
V-24361	I	3/2/72	H
V-24362	A	8/22/69	H
V-24363	D	1/5/72	H
V-24364	A	3/2/72	H
V-24367	A	3/2/72	H
V-24368	B	8/9/71	-
V-24369	C	5/23/72	H
V-24370	D	5/23/72	H
V-24372	A		H
V-24373	D	5/23/72	H
V-24374	C	5/23/72	H
V-24375	A	6/1/73	H
V-24376	A	3/25/71	H
V-24377	B	6/1/73	H
V-24378	B	8/9/71	-
V-24379		1/30/69	H
V-24380	A	8/12/69	H
V-24381	A	8/9/71	H
V-24382	B	8/9/71	H
V-24383	A	5/23/72	H
V-24386	D	3/25/71	-
V-24387	B	1/5/72	-
V-24388	B	8/9/71	-
V-24389	C	3/2/72	-
V-24390	B	8/9/71	H
V-24391	E	10/4/74	-
V-24392	C	8/9/71	H
V-24396	C	8/9/71	H
V-24397	A	8/9/71	H
V-24398	C	8/9/71	-
V-24401	A	3/25/71	H
V-24402	E	5/23/72	H
V-24403	A	5/23/72	-
V-24404	B	7/24/72	-
V-24405		4/10/70	H
V-24406		4/10/70	H
V-24407	E	10/4/74	-
V-24408	D	10/4/74	-
V-24409		6/17/70	H
V-24410	D	7/24/72	H
V-24411	A	3/25/71	-
V-24412	A	9/17/70	-
V-24415	A	9/17/70	H
V-24416		9/17/70	H

V-24417	E	2/9/73	H
V-24418	A	1/5/72	-
V-24419	A	3/2/72	H
V-24420	D	6/1/73	H
V-24421	C	5/23/72	H
V-24422	B	10/4/74	-
V-24424	A	3/25/71	H
V-24425	B	8/3/73	H
V-24426	A	6/1/73	-
V-24427	B	6/1/73	-
V-24428	F	5/23/72	-
V-24429	B	7/24/72	H
V-24430		3/25/71	H
V-24431		3/25/71	-
V-24432		8/9/71	H
V-24433		8/9/71	H
V-24434		8/9/71	H
V-24435	B	10/4/74	-
V-24436	A	7/24/72	H
V-24437	C	10/4/74	H
V-24438		8/9/71	H
V-24439		8/9/71	H
V-24440	A	5/23/72	H
V-24441	A	5/23/72	H
V-24442	A	7/24/72	H
V-24443	B	10/4/74	-
V-24444	A	7/24/72	H
V-24445	B	10/4/74	-
V-24446	A	1/5/72	H
V-24447		8/9/71	-
V-24448		8/9/71	H
V-24449	A	7/24/72	H
V-24452	C	6/3/74	H
V-24453	A	5/23/72	-
V-24454	B	5/23/72	H
V-24455	B	6/3/74	-
V-24456	D	6/3/74	H
V-24457	A	5/23/72	-
V-24458		1/5/72	H
V-24459		1/5/72	-
V-24460		1/5/72	H
V-24461		1/5/72	-
V-24462	F	12/10/73	H
V-24464		1/5/72	H
V-24465		1/5/72	H
V-24466	A	5/23/72	H
V-24467	B	6/1/73	-
V-24468	E	6/1/73	H
V-24469	E	6/1/73	-
V-24470	B	2/9/73	H
V-24471	B	2/9/73	H
V-24472	A	3/16/73	H
V-24473	B	6/1/73	H

V-24474		1/5/72	-
V-24475	A	12/10/73	H
V-24476		1/5/72	-
V-24477		1/5/72	-
V-24478	A	5/23/72	-
V-24479	A	5/23/72	-
V-24480	A	5/23/72	-
V-24481	A	5/23/72	-
V-24482	A	5/23/72	-
V-24483	A	5/23/72	-
V-24484	A	5/23/72	-
V-24485	B	5/23/72	-
V-24486	A	5/23/72	-
V-24487	B	6/3/74	H
V-24489		3/2/72	H
V-24491		3/2/72	H
V-24492	A	7/24/72	H
V-24493	B	6/1/73	H
V-24494	A	7/24/72	H
V-24495		3/2/72	H
V-24497	D	10/4/74	-
V-24498	A	1/1/73	-
V-24499	E	10/4/74	H
V-24500	A	7/24/72	-
V-24501	A	2/9/73	H
V-24502	B	1/1/73	-
V-24503	D	1/1/73	-
V-24504	B	7/24/72	H
V-24505	A	6/1/73	H
V-24506	B	6/1/73	-
V-24507	A	5/23/72	-
V-24508	B	7/24/72	-
V-24509	A	6/1/73	-
V-24510	D	3/16/73	-
V-24511	B	3/16/73	-
V-24512		3/2/72	-
V-24513	B	1/1/73	-
V-24514		3/2/72	-
V-24515	B	6/1/73	H
V-24516	A	5/23/72	-
V-24517	B	2/9/73	-
V-24518		3/2/72	-
V-24519	A	5/23/72	-
V-24520	C	8/3/73	H
V-24521	A	3/16/73	H
V-24522	F	10/4/74	-
V-24523	B	1/1/73	-
V-24525	A	5/23/72	-
V-24526		3/2/72	-
V-24527	D	10/4/74	-
V-24528		3/2/72	H
V-24529		3/2/72	H
V-24530		3/2/72	H

V-24531	A	7/24/72	H
V-24532	C	6/1/73	H
V-24534	A	5/23/72	-
V-24535		3/2/72	H
V-24536	D	6/1/73	-
V-24537	B	10/4/74	H
V-24538		3/2/72	-
V-24539		3/2/72	H
V-24540	A	6/3/74	H
V-24541	B	7/24/72	H
V-24542		3/2/72	H
V-24543		3/2/72	H
V-24544	A	3/16/73	H
V-24545		3/2/72	H
V-24546	B	6/3/74	H
V-24547		5/23/72	-
V-24548	C	6/1/73	-
V-24549	A	7/24/72	-
V-24550	A	7/24/72	-
V-24551	A	7/24/72	H
V-24552	C	12/10/73	-
V-24553		5/23/72	H
V-24554	A	8/3/73	-
V-24555		5/23/72	-
V-24556		5/23/72	H
V-24559	B	8/3/73	-
V-24560		7/24/72	-
V-24561	B	10/4/74	-
V-24562		7/24/72	H
V-24563	A	12/10/73	-
V-24564	B	12/10/73	-
V-24568	A	8/3/73	H
V-24570		8/3/73	H
V-24571		12/10/73	H
V-24572		12/10/73	H
V-24573		12/10/73	H
V-24574		6/3/74	-
V-24575		6/3/74	H
V-24576		6/3/74	H
V-24577	A	6/3/74	-
V-24578		6/3/74	-
V-24579		10/4/74	-
V-25000	E	9/17/70	H
V-25001	C	5/23/72	-
V-25002	D	6/1/73	H
V-25003	B		-
V-25004	C		H
V-25005	D	1/5/72	-
V-25006	B		-
V-25007	B		H
V-25009	B	11/5/70	H
V-25010	B		-
V-25011	B		-

V-25012	B		
V-25013	E	5/23/72	H
V-25014			
V-25015	A		
V-25016	B		
V-25017	A		
V-25018	D	5/23/72	
V-25019	B		
V-25020	B		
V-25021	B		
V-25023	B		
V-25025	B		
V-25026			
V-25028	C	3/25/71	
V-25029	C	3/2/72	H
V-25030			
V-25032	C		H
V-25033	C	3/2/72	H
V-25034	B		H
V-25035	B	5/27/69	H
V-25036	C		H
V-25037	B		
V-25041	B		
V-25042	B		
V-25044	B		
V-25076	A		
V-25077	B		
V-25078	A		
V-25090	A		
V-25091	A		
V-25092	A		
V-25093	A		
V-25094	A		
V-25095	A		
V-25098	A		
V-25101	C	8/3/73	
V-25102	B		
V-25103	B		
V-25104	B		
V-25113	E	3/16/73	
V-25119	G	10/5/72	
V-25120	D	10/5/72	
V-25128	C	10/5/72	
V-25141			
V-25142	B		
V-25143	B		
V-25144	A	3/2/72	H
V-25146	E	5/23/72	H
V-25148	E	3/25/71	
V-25149	C	2/9/70	
V-25151	F	5/23/72	
V-25152			
V-25153	A	5/23/72	H

V-25154	A	2/9/70	
V-25155			
V-25156			
V-25157	A	5/23/72	
V-25159	D	6/17/70	
V-25160	B		
V-25164	J	5/23/72	H
V-25167	A		
V-25171	A		
V-25172	B	10/5/72	
V-25173	A		
V-25174	D	10/5/72	
V-25177	C	5/23/72	
V-25178	B	1/5/72	
V-25179	E	1/5/72	H
V-25180	E	11/17/70	H
V-25184	C		
V-25186	B	7/21/69	
V-25188	C	1/5/72	
V-25242	F	3/25/71	H
V-25252	D	1/1/73	
V-25258	A		
V-25260	A		
V-25271	D	3/2/72	H
V-25274	A		
V-25276	C	3/2/72	
V-25277	B	7/24/72	H
V-25279	C	3/2/72	H
V-25281	C	3/2/72	H
V-25282	B	3/2/72	
V-25283	B	7/24/72	H
V-25284	C	3/2/72	
V-25291	B		
V-25296	A		
V-25301	C	1/5/72	
V-25302	A		
V-25305	B	3/10/69	
V-25311	F	1/5/72	
V-25312	D	10/5/72	H
V-25318	C	11/5/70	
V-25319	B		
V-25320	C	2/9/70	H
V-25321	C	2/9/70	
V-25322	C	3/2/72	
V-25323	C	3/2/72	
V-25324	C	7/24/72	
V-25325	C	9/17/70	
V-25326	C	9/17/70	
V-25327	C	6/17/70	
V-25328	D	8/9/71	H
V-25329	C	4/10/70	H
V-25330	C	11/5/70	H
V-25331	D	2/9/70	H

V-25332	C	6/17/70	-
V-25334	D	7/24/72	H
V-25335	C	1/21/71	H
V-25336	B		H
V-25337	C	9/17/70	H
V-25338	C	1/21/71	H
V-25339	B		-
V-25340	B		H
V-25341	D	7/24/72	H
V-25342	B		H
V-25343	D	10/5/72	-
V-25344	C		-
V-25345	B		H
V-25347	B*	3/2/72	H
V-25348	A		-
V-25351	B	5/23/72	-
V-25353	B	10/5/72	-
V-25354			-
V-25355	C	10/5/72	-
V-25357	B	1/30/69	-
V-25358			-
V-25359	B		H
V-25363	A	1/30/69	-
V-25364	B	10/5/72	-
V-25365	C	10/5/72	-
V-25370	A	1/30/69	-
V-25371	B	10/5/72	-
V-25373	C	10/5/72	-
V-25374	A	3/10/69	-
V-25385	F	7/24/72	H
V-25386	C	10/5/72	-
V-25388	A		-
V-25389	G	3/2/72	H
V-25393			-
V-25394	C	2/9/70	H
V-25395	C	2/9/70	H
V-25396	C	7/24/72	H
V-25397	C	4/10/70	H
V-25398	A	7/24/72	H
V-25399	A	6/3/74	H
V-25400	A	8/3/73	H
V-25401	B	1/5/72	-
V-25402			-
V-25405			-
V-25406	F	1/5/72	H
V-25407	B	5/23/72	H
V-25408		8/2 /69	H
V-25409	B	10/5/72	-
V-25410	A	1/21/71	H
V-25411		1/5/72	-
V-25412		1/5/72	-
V-25413	A	5/23/72	H
V-25414		1/5/72	-

V-25415		1/5/72	-
V-25416		1/5/72	-
V-25417		1/5/72	-
V-25418	A	1/1/73	-
V-25420		3/2/72	-
V-25421		3/2/72	-
V-25422	A	10/5/72	H
V-25423	A	10/5/72	H
V-25424		3/2/72	-
V-25425		3/2/72	-
V-25427	A	10/5/72	-
V-25428	A	10/5/72	-
V-25429	A	10/5/72	-
V-25433	A	10/5/72	-
V-25434	A	10/5/72	-
V-25435	A	10/5/72	-
V-25436	A	10/5/72	-
V-25437	A	10/5/72	-
V-25438	A	10/5/72	-
V-25439	A	10/5/72	-
V-25440		5/23/72	-
V-25441		5/23/72	-
V-25442	A	1/1/73	-
V-25443		5/23/72	-
V-25444		5/23/72	H
V-25445		7/24/72	-
V-25446		10/5/72	-
V-25447		1/1/73	-
V-26001	B		-
V-26002	E	7/24/72	H
V-26003	H	7/24/72	H
V-26019			H
V-26025	B		H
V-26026			H
V-26031	B		H
V-26033	A	7/24/72	H
V-26034	A	7/24/72	H
V-26037	A	6/1/73	-
V-26038	A	1/5/72	-
V-26040	A		H
V-26045	A		H
V-26046	C	8/22/69	H
V-26047			-
V-26049			H
V-26050	A	1/30/69	H
V-26057			H
V-26062	B		H
V-26064			-
V-26070	A		H
V-26071	B		H
V-26072	B		H
V-26092			H
V-26093			H

V-26107	C	8/12/69	H
V-26108	B		-
V-26109	C	5/27/69	-
V-26110	B		-
V-26111	B		-
V-26112	B		-
V-26113	C	5/27/69	H
V-26115	E	5/23/72	H
V-26116	B	1/5/72	H
V-26118	D	5/23/72	-
V-26122	C	11/5/70	H
V-26125			H
V-26133			H
V-26138			-
V-26139	B	10/5/72	-
V-26165	B	8/9/71	H
V-26169	A		H
V-26178	C	5/23/72	H
V-26183			-
V-26184			-
V-26186			-
V-26196			H
V-26197	A	3/16/73	H
V-26198	A		H
V-26199	C	5/23/72	H
V-26200	C	5/23/72	H
V-26201	C	5/23/72	H
V-26202	E	5/23/72	H
V-26203	C	11/5/70	H
V-26204	F	5/23/72	H
V-26207	A	1/5/72	H
V-26209	A	11/5/70	H
V-26217	A	6/20/69	H
V-26218	C	10/5/72	H
V-26222	A	10/5/72	H
V-26223	A	1/5/72	H
V-26235	E	3/25/71	-
V-26243	C	5/23/72	H
V-26245	A		H
V-26247	D	8/12/69	H
V-26250			H
V-26261	C	6/3/74	H
V-26266			H
V-26267	A	3/2/72	-
V-26274	E	6/17/70	H
V-26276	G	3/2/72	-
V-26317	A	8/9/71	H
V-26323			-
V-26324	A		-
V-26327	C		-
V-26329	B	1/5/72	H
V-26333	C	5/23/72	-
V-26334	A	1/5/72	-

V-26336	A	1/5/72	H
V-26346	F	6/17/70	H
V-26351	C	2/9/73	H
V-26352			-
V-26353	B	9/17/70	H
V-26360	A		-
V-26362	A		-
V-26363	A		-
V-26365	A		-
V-26373	A		-
V-26377	B	1/30/69	H
V-26378			H
V-26379	A		H
V-26380	A	8/22/69	H
V-26381	A	8/22/69	H
V-26382	A	8/22/69	H
V-26383	A	8/22/69	H
V-26384	A	8/22/69	H
V-26386	B	5/27/69	H
V-26387	B	7/24/72	H
V-26388	A		H
V-26389	B	7/24/72	H
V-26390	A	5/27/69	H
V-26391	A	5/27/69	H
V-26394	B	8/12/69	-
V-26396	A	10/5/72	-
V-26399	A		H
V-26400	E	5/23/72	-
V-26401	G	8/9/71	H
V-26402	E	3/25/71	H
V-26403	E	3/25/71	H
V-26404	F	3/25/71	H
V-26405	E	3/25/71	H
V-26406	D	8/9/71	H
V-26407	F	3/25/71	H
V-26408	E	3/25/71	H
V-26409	E	3/25/71	H
V-26410	F	3/25/71	H
V-26411	E	3/25/71	H
V-26412	F	8/9/71	H
V-26413	B	1/30/69	-
V-26414	A		-
V-26415	A		-
V-26416	A		-
V-26417	F	3/25/71	H
V-26418	E	3/25/71	H
V-26419	E	3/25/71	H
V-26420	F	8/9/71	H
V-26421	F	3/25/71	H
V-26422	E	3/25/71	H
V-26423	E	3/25/71	H
V-26424	E	3/25/71	H
V-26431	B	1/5/72	H

V-26432			H
V-26433			H
V-26434			-
V-26435	A		H
V-26436			-
V-26437	B	3/25/71	-
V-26438	C	3/25/71	H
V-26439			-
V-26441	D	5/23/72	H
V-26442			H
V-26443	A	11/5/70	-
V-26444			-
V-26445	A	6/17/70	-
V-26446			-
V-26448			H
V-26449	D	3/2/72	-
V-26451			-
V-26452			-
V-26453			-
V-26454			H
V-26458			-
V-26459			-
V-26460	A	1/5/72	-
V-26461	C	2/9/73	-
V-26462	A	10/5/72	-
V-26463	B	3/25/71	H
V-26464	B	3/25/71	H
V-26465	B	3/2/72	H
V-26467	C	1/5/72	H
V-26468	C	1/5/72	H
V-26469	D	8/9/71	-
V-26470	B	3/25/71	-
V-26472	B	11/5/70	H
V-26473	C	3/25/71	-
V-26474	E	8/9/71	-
V-26475	B	1/5/72	H
V-26476	A	1/5/72	-
V-26478	A	6/17/70	H
V-26479	A	1/5/72	H
V-26480		5/27/69	H
V-26481	A	1/5/72	-
V-26482	B	1/5/72	H
V-26483	B	6/17/70	H
V-26484		8/12/69	-
V-26485		8/22/69	-
V-26486		11/26/69	H
V-26487		11/26/69	H
V-26488	B	3/25/71	-
V-26491	D	10/4/74	-
V-26492	D	10/4/74	-
V-26493	A	11/5/70	H
V-26494	B	6/1/73	H
V-26495		6/17/70	H

V-26496	B	1/5/72	H
V-26497	E	10/4/74	
V-26500		9/17/70	H
V-26501		9/17/70	
V-26502		9/17/70	
V-26503		9/17/70	
V-26504		9/17/70	
V-26505		9/17/70	
V-26506	A	7/24/72	
V-26507		1/21/71	H
V-26508		1/21/71	H
V-26509	A	5/23/72	
V-26510	A	5/23/72	H
V-26511	A	8/9/71	H
V-26512		3/25/71	
V-26513	A	8/9/71	
V-26514	A	1/5/72	
V-26515	C	7/24/72	H
V-26516	A	7/24/72	H
V-26517	B	5/23/72	
V-26519	C	3/2/72	
V-26520	C	8/9/71	
V-26521	C	8/9/71	
V-26522	B	8/9/71	H
V-26523	C	8/9/71	
V-26524	B	8/9/71	H
V-26525	C	8/9/71	
V-26526	C	5/23/72	
V-26527		1/5/72	H
V-26528	B	3/16/73	
V-26529	A	7/24/72	H
V-26530	B	7/24/72	
V-26531	A	7/24/72	H
V-26532	C	6/1/73	
V-26534		8/9/71	H
V-26535		8/9/71	
V-26536	A	5/23/72	
V-26537		8/9/71	H
V-26538	A	3/16/73	
V-26539		8/9/71	
V-26540	A	8/9/71	
V-26541	B	1/5/72	
V-26542	A	1/5/72	
V-26543		8/9/71	
V-26544		8/9/71	
V-26545	A	5/23/72	
V-26546		1/5/72	H
V-26547	A	10/4/74	H
V-26548	C	10/4/74	
V-26549	D	10/4/74	H
V-26550	A	1/5/72	H
V-26551	A	1/5/72	
V-26552	A	7/24/72	

V-26553		1/5/72	-
V-26554	B	6/1/73	H
V-26555	A	7/24/72	H
V-26556	A	7/24/72	H
V-26557		1/5/72	-
V-26558		1/5/72	-
V-26559	A	1/5/72	-
V-26560		1/5/72	-
V-26561	B	2/9/73	-
V-26562		1/5/72	-
V-26564		1/5/72	H
V-26565		1/5/72	H
V-26566		1/5/72	H
V-26567		1/5/72	H
V-26568	A	7/24/72	-
V-26569	A	7/24/72	-
V-26570	A	7/24/72	-
V-26571	A	7/24/72	-
V-26572	A	7/24/72	-
V-26573	A	7/24/72	-
V-26574	A	1/1/73	H
V-26575		1/5/72	H
V-26577	A	7/24/72	-
V-26578	A	7/24/72	-
V-26579	A	3/2/72	H
V-26580	A	3/2/72	H
V-26581	A	3/2/72	H
V-26582	A	3/2/72	H
V-26583		1/5/72	-
V-26584		1/5/72	-
V-26585		1/5/72	-
V-26586	A	3/2/72	H
V-26587	A	3/2/72	H
V-26588	A	7/24/72	H
V-26589	A	7/24/72	-
V-26590	A	7/24/72	-
V-26591		1/5/72	H
V-26592		1/5/72	H
V-26593		1/5/72	-
V-26594		1/5/72	-
V-26595	A	7/24/72	-
V-26598	A	6/1/73	H
V-26599	A	8/3/73	H
V-26600	B	12/10/73	H
V-26601		3/2/72	H
V-26602	A	1/1/73	H
V-26603		3/2/72	H
V-26605	A	6/1/73	H
V-26606	A	5/23/72	H
V-26608		5/23/72	-
V-26609	A	6/1/73	H
V-26612		5/23/72	-
V-26614		5/23/72	H

V-26615		5/23/72	H
V-26616		5/23/72	H
V-26617	A	8/3/73	-
V-26618		5/23/72	H
V-26620		5/23/72	H
V-26622		7/24/72	-
V-26624	A	12/10/73	-
V-26625		2/9/73	H
V-26627		2/9/73	H
V-26628		2/9/73	-
V-26629	A	6/1/73	H
V-26630		6/1/73	H
V-26631		6/1/73	H
V-26632		6/1/73	H
V-26633		6/1/73	H
V-26634		6/1/73	H
V-26635		6/1/73	H
V-26636		6/1/73	H
V-26637		6/1/73	H
V-26638		6/1/73	H
V-26639		6/1/73	-
V-26640		6/1/73	-
V-26641		6/1/73	-
V-26642		6/1/73	-
V-26643		6/1/73	H
V-26644		6/1/73	H
V-26645		6/1/73	H
V-26646		6/1/73	H
V-26647		6/1/73	H
V-26648		6/1/73	H
V-26649	A	12/10/73	H
V-26650		6/1/73	H
V-26651		6/1/73	H
V-26652		6/1/73	H
V-26653	A	12/10/73	H
V-26654		6/1/73	H
V-26655		6/1/73	H
V-26656		6/1/73	H
V-26657		6/1/73	H
V-26658		6/1/73	H
V-26659		6/1/73	H
V-26660		6/1/73	H
V-26661	A	12/10/73	H
V-26662		6/1/73	H
V-26663		6/1/73	H
V-26664		6/1/73	H
V-26665		6/1/73	H
V-26666		6/1/73	H
V-26667		6/1/73	H
V-26668		6/1/73	H
V-26669		6/1/73	H
V-26670		6/1/73	H
V-26671		6/1/73	H

V-26672		6/1/73	H
V-26673		6/1/73	H
V-26674		8/3/73	H
V-26675		8/3/73	H
V-26676		8/3/73	H
V-26677		8/3/73	H
V-26678		8/3/73	-
V-26679		8/3/73	-
V-26680		6/3/74	H
V-26681	A	6/3/74	H
V-26682	A	6/3/74	H
V-26683	B	10/4/74	H
V-27009	A	9/17/70	-
V-27021	B	8/12/69	-
V-27025	B	7/24/72	-
V-27027	B	8/12/69	-
V-27029	G	3/2/72	-
V-27030	A	9/17/70	-
V-27031	A	9/17/70	-
V-27032	A	9/17/70	-
V-27033	A	9/17/70	-
V-27034	A	9/17/70	-
V-27035	B	9/17/70	-
V-27036	A	9/17/70	-
V-27038	C	9/17/70	-
V-27040	C	3/16/73	-
V-27047	B	9/17/70	-
V-27056	I	3/16/73	-
V-27058	H	3/16/73	-
V-27060	J	3/16/73	-
V-27061	H	3/16/73	-
V-27062	I	3/16/73	-
V-27063	J	3/16/73	-
V-27064	K	1/6/75	-
V-27065	J	3/16/73	-
V-27066	J	3/16/73	-
V-27067	G	5/23/72	-
V-27068	I	2/9/73	-
V-27071	A	9/17/70	-
V-27077	B	12/10/73	-
V-27079	B	7/24/72	-
V-27087	C	3/2/72	-
V-27092	A		-
V-27093	E	7/24/72	-
V-27094	D	3/25/71	-
V-27095	B	8/9/71	-
V-27096	A	8/9/71	-
V-27098	A	1/21/71	-
V-27099	A	8/9/71	-
V-27104	C	7/24/72	-
V-27104	E	7/24/72	-
V-27110			-
V-27111	B	2/9/70	-

V-27112	B	2/9/70	-
V-27113	E	5/23/72	-
V-27114	C	3/25/71	-
V-27115	E	2/9/73	-
V-27118	A	8/22/69	-
V-27122	B	2/9/70	-
V-27137	B	9/17/70	-
V-27138	B	9/17/70	-
V-27139	E	7/24/72	-
V-27143	B	8/9/71	-
V-27145	F	5/23/72	-
V-27148	E	2/9/73	-
V-27149	E	3/25/71	-
V-27151	D	3/25/71	H
V-27153	B		-
V-27154	B	9/17/70	-
V-27156	D	8/9/71	-
V-27166	A	8/9/71	-
V-27167	A	8/9/71	-
V-27169	A	8/9/71	-
V-27170	A	8/9/71	-
V-27171	A	8/9/71	-
V-27172	A	8/9/71	-
V-27173	A	8/9/71	-
V-27175	C	1/5/72	-
V-27183	B	11/01/69	-
V-27184	A	3/25/71	H
V-27185	A	3/25/71	H
V-27188	A	3/25/71	H
V-27189	A	3/25/71	-
V-27190	E	3/2/72	H
V-27191	E	12/10/73	-
V-27193	B	1/5/72	-
V-27194			-
V-27195	D	3/25/71	-
V-27196	D	7/24/72	-
V-27197	G	2/9/73	-
V-27198	B	1/5/72	-
V-27199	D	3/2/72	-
V-27200	A	2/9/70	-
V-27201	A	8/9/71	-
V-27202	C	1/5/72	-
V-27203	B	6/17/70	H
V-27204	A	9/17/70	-
V-27206	E	1/5/72	-
V-27208	A	3/2/72	-
V-27209	A	1/5/72	-
V-27211	A	9/17/70	-
V-27212	A	9/17/70	-
V-27213	B	5/23/72	-
V-27214	A	2/9/70	-
V-27215		7/21/69	-
V-27219	C	3/16/73	-

V-27222		4/10/70	-
V-27223	C	2/9/73	-
V-27224	A	3/25/71	-
V-27225	A	5/23/72	-
V-27226		9/17/70	-
V-27227		11/5/70	-
V-27228		11/5/70	-
V-27229		8/9/71	-
V-27230	B	3/16/73	-
V-27231		8/9/71	-
V-27232	A	1/1/73	-
V-27233	B	10/5/72	-
V-27234		1/5/72	-
V-27235		1/5/72	-
V-27236	A	12/10/73	-
V-27237	A	7/24/72	-
V-27238	A	12/10/73	-
V-27239		1/5/72	-
V-27240		1/5/72	-
V-27241		1/5/72	-
V-27242		1/5/72	-
V-27244		1/5/72	-
V-27245		3/2/72	-
V-27246	A	2/9/73	H
V-27247		3/2/72	-
V-27248	A	5/23/72	-
V-27249	B	8/3/73	-
V-27250	B	10/4/74	-
V-27251		10/5/72	-
V-28005	C	10/4/74	-
V-28011	D	2/9/70	-
V-28012	D	8/12/69	-
V-28013	E	1/21/71	-
V-28014	G	8/12/69	-
V-28016	E	9/17/70	-
V-28019			-
V-28023	C	5/27/69	H
V-28024	A		-
V-28027			-
V-28029	E	4/10/70	-
V-28031	E	3/25/71	-
V-28032	A		-
V-28035	D	6/1/73	-
V-28037	I	6/3/74	-
V-28044	C	8/9/71	-
V-28046	C	5/23/72	-
V-28047	C	2/9/73	-
V-28048	A	8/22/69	-
V-28049	J	1/6/75	-
V-28050	I	1/6/75	-
V-28051	J	1/6/75	-
V-28053	E	9/17/70	-
V-28054	D	10/4/74	-

V-28055	E	10/4/74	-
V-28056	G	10/4/74	-
V-28059	E	1/21/71	-
V-28060	C	6/20/69	-
V-28061	B	6/20/69	-
V-28062	C	6/20/69	-
V-28063	D	1/1/73	-
V-28065	B	5/27/69	-
V-28067	C	1/21/71	-
V-28068	B	1/5/72	-
V-28069	B	3/25/71	-
V-28070	D	10/4/74	-
V-28072	E	1/6/75	-
V-28074	G	10/5/72	-
V-28083	C	1/1/73	-
V-28085	B	5/23/72	-
V-28086	C	3/16/73	-
V-28088	A	5/23/72	-
V-28089	A	5/23/72	-
V-28090	A	5/23/72	-
V-28091	A	5/23/72	-
V-28092	B	5/23/72	-
V-28098	B	1/5/72	-
V-28102	B	3/25/71	-
V-28105	H	5/23/72	-
V-28106	A	2/9/70	-
V-28109			-
V-28120	D	1/1/73	H
V-28121	F	2/9/73	-
V-28126	C	3/25/71	-
V-28127	D	1/5/72	-
V-28128	D	8/9/71	-
V-28135	B	8/9/71	-
V-28138	C	8/9/71	-
V-28139	C	3/25/71	-
V-28140	C	3/25/71	-
V-28141	C	3/25/71	-
V-28142	G	3/2/72	-
V-28144	B	11/5/70	-
V-28145	C	3/25/71	-
V-28146	R	12/10/73	-
V-28147	A	9/17/70	-
V-28152	B	6/1/73	-
V-28153	B	3/25/71	-
V-28154	A	8/9/71	-
V-28156	A	8/9/71	-
V-28160	A	8/9/71	-
V-28161	A	8/9/71	-
V-28162	A	8/9/71	-
V-28163	A	8/9/71	-
V-28164	B	8/9/71	-
V-28165	A	8/9/71	-
V-28167	A	8/9/71	-

V-28168	A	8/9/71	-
V-28169	A	8/9/71	-
V-28170	A	8/9/71	-
V-28171	C	3/25/71	-
V-28172	B	1/5/72	-
V-28175	B	3/25/71	H
V-28177	C	8/12/69	-
V-28180			-
V-28181	A	10/5/72	-
V-28182		3/10/69	-
V-28185	B	5/23/72	-
V-28186	B	9/17/70	-
V-28187	E	5/23/72	-
V-28188	B	5/23/72	-
V-28189		9/17/70	-
V-28190		9/17/70	-
V-28191		9/17/70	-
V-28193		11/10/71	-
V-28194	A	5/23/72	-
V-28195	A	5/23/72	-
V-28196	A	5/23/72	-
V-28197	A	1/1/73	-
V-28198	A	10/5/72	-
V-28199	B	6/3/74	-
V-28200	A	10/5/72	-
V-28201		1/5/72	-
V-28202	A	7/24/72	-
V-28203	B	10/4/74	-
V-28204	A	6/1/73	-
V-28205	A	10/4/74	-
V-28206		1/5/72	-
V-28207		1/5/72	-
V-28208		1/5/72	-
V-28209	A	6/1/73	-
V-28210	A	7/24/72	-
V-28211	B	6/3/74	-
V-28212	A	6/3/74	-
V-28213	B	1/6/75	-
V-28214	C	1/6/75	-
V-28215		1/5/72	-
V-28216		1/5/72	H
V-28217	A	1/6/75	-
V-28218	B	10/4/74	-
V-28219		1/5/72	-
V-28220	A	1/6/75	-
V-28221	B	1/6/75	-
V-28222		3/2/72	-
V-28223	B	10/4/74	-
V-28224	A	6/1/73	-
V-28225		3/2/72	-
V-28226	A	2/9/73	-
V-28227		5/23/72	-
V-28228	A	7/24/72	-

V-28229		7/24/72	-
V-28230	A	1/6/75	-
V-28231		7/24/72	-
V-28232	A	10/4/74	-
V-28233	A	10/4/74	-
V-28234	A	1/1/73	-
V-28235		7/24/72	-
V-28236		7/24/72	-
V-28237		7/24/72	-
V-28238		10/5/72	-
V-28239		10/5/72	-
V-28240		1/1/73	-
V-28241		1/1/73	-
V-28243		2/9/73	-
V-28250		8/3/73	H
V-29000	A		H
V-29001	A		H
V-29002	A		H
V-29003	B		H
V-29005			H
V-29020	C	3/25/71	H
V-29021	C	3/25/71	H
V-29023	D	2/9/73	H
V-29024	C	3/25/71	H
V-29027	H	2/9/73	H
V-29028	J	1/1/73	H
V-29029	D	1/1/73	-
V-29030	E	11/5/70	-
V-29033	D	6/1/73	H
V-29037	I	10/5/72	H
V-29038	E	2/9/73	-
V-29048	E	3/25/71	-
V-29049	D	2/9/73	H
V-29050	C	3/25/71	H
V-29053	D	7/24/72	H
V-29054	B	7/24/72	-
V-29054	C	5/23/72	-
V-29056	C	1/5/72	H
V-29058	B	3/25/71	H
V-29059	C	5/23/72	H
V-29060	D	7/24/72	-
V-29061	B	3/25/71	H
V-29062		8/12/69	H
V-29063	C	3/25/71	-
V-29064		9/17/70	-
V-29065	B	7/24/72	H
V-29113	E	3/2/72	H
V-29114	D	5/23/72	H
V-29115		3/25/71	-
V-29116	A	7/24/72	-
V-29117	A	7/24/72	-
V-29118	A	7/24/72	H
V-29119	A	6/1/73	H

V-29121		5/23/72	H
V-29122		1/5/72	H
V-29126		1/5/72	H
V-29128	A	2/9/73	H
V-29129		1/5/72	H
V-29130	C	6/1/73	H
V-29132		3/2/72	H
V-29133	D	12/10/73	-
V-29137	B	1/1/73	-
V-29138	B	1/1/73	-
V-29139	A	1/1/73	-
V-29140		6/1/73	H
V-29141		8/3/73	H
V-30003	H	1/21/71	-
V-30005	H	5/23/72	-
V-30008	D	6/1/73	-
V-30024	H	8/9/71	H
V-30026	A		H
V-30030	D	2/9/73	-
V-30032			-
V-30043	A		H
V-30046			-
V-30047			H
V-30048			H
V-30049			H
V-30051	A		H
V-30052			H
V-30055			H
V-30057			H
V-30058	A		H
V-30059	A		H
V-30060	A		H
V-30061			H
V-30062	B		H
V-30063			H
V-30065			H
V-30066			H
V-30069			H
V-30071			H
V-30072			H
V-30073	A	11/5/70	-
V-30075	A	9/17/70	-
V-30076			H
V-30077			H
V-30078			H
V-30079	A		H
V-30081	A		H
V-30082			H
V-30083	A		H
V-30088	A		H
V-30090	B		H
V-30092			H
V-30093			H

V-30094	B	7/24/72	H
V-30095			H
V-30096			H
V-30097	A		H
V-30098			H
V-30100	A		H
V-30101			H
V-30103			H
V-30105			H
V-30106			H
V-30108	A	1/5/72	H
V-30111			H
V-30112			H
V-30117			H
V-30118			H
V-30119	A		H
V-30120	A		H
V-30121	A		H
V-30122	A		H
V-30124	A		H
V-30126	A		H
V-30127			H
V-30129			H
V-30130	A		H
V-30132			H
V-30134			H
V-30135	A	1/30/69	H
V-30141	A		H
V-30142	A		H
V-30143	A	3/10/69	H
V-30146	A		H
V-30147			H
V-30150			H
V-30151	A		H
V-30152	A		H
V-30153	A	11/5/70	H
V-30154	A	11/5/70	H
V-30156			H
V-30157	A	11/5/70	H
V-30158	A	9/1/70	H
V-30160			H
V-30161			H
V-30164			H
V-30170			H
V-30171	A		H
V-30174	A		H
V-30175	A		H
V-30180	A		H
V-30183			H
V-30184			H
V-30188			H
V-30189			H
V-30191			H

V-30198			H
V-30201	A		H
V-30210			H
V-30211			H
V-30215	A		H
V-30216	A	7/21/69	H
V-30217	A	7/24/72	H
V-30219			H
V-30220			H
V-30223			H
V-30224			H
V-30225			H
V-30227			H
V-30228			H
V-30230			H
V-30231	A	3/10/69	H
V-30233	A	1/5/72	H
V-30234			H
V-30235			H
V-30239			H
V-30244			H
V-30246			H
V-30247			H
V-30248			H
V-30249	A		H
V-30250			H
V-30251			H
V-30253	A		H
V-30255			H
V-30258	A		H
V-30262			H
V-30265	B	1/5/72	H
V-30267			H
V-30268			H
V-30269			H
V-30270	A		H
V-30275	A		H
V-30280			H
V-30281			H
V-30282	A	1/5/72	H
V-30284			H
V-30288			H
V-30289			H
V-30291			H
V-30292			H
V-30294			H
V-30295	A		H
V-30299			H
V-30302			H
V-30305	A	3/25/71	H
V-30307	B	1/5/72	H
V-30309			H
V-30310	A		H

V-30312	A		H
V-30314	A		H
V-30315	A		H
V-30316	A		H
V-30317	A		H
V-30318	A		H
V-30319	B	1/5/72	H
V-30320	B	1/5/72	H
V-30321	A		H
V-30322	B	1/5/72	H
V-30325			H
V-30329			H
V-30330			H
V-30333			H
V-30342			H
V-30345			H
V-30346	B		H
V-30347			H
V-30348			H
V-30351	A		H
V-30352			H
V-30353			H
V-30358			H
V-30359			H
V-30362			H
V-30369			H
V-30375	A		H
V-30377	A	6/3/74	H
V-30379			H
V-30381	A		H
V-30382			H
V-30383	A		H
V-30385			H
V-30386			H
V-30387			H
V-30393	A		H
V-30395	A		H
V-30396			H
V-30397			H
V-30398	A	1/5/72	H
V-30399			H
V-30400	A		H
V-30402	A		H
V-30404	A	1/5/72	H
V-30406	B	1/5/72	H
V-30407	A		H
V-30408	A		H
V-30410	A		H
V-30412			H
V-30416			H
V-30420	B	6/3/74	H
V-30421	A		H
V-30423			H

V-30424	A		H
V-30425	A		H
V-30426	B		H
V-30428			H
V-30434	A		H
V-30436	A		H
V-30438	A		H
V-30439			H
V-30442	A		H
V-30443	A		H
V-30444			H
V-30446			H
V-30447			H
V-30448			H
V-30454			H
V-30455			H
V-30457	A		H
V-30458			H
V-30459	B		H
V-30460			H
V-30461			H
V-30462			H
V-30463			H
V-30464			H
V-30466			H
V-30467			H
V-30469			H
V-30470			H
V-30478			-
V-30479	A	11/5/70	H
V-30482			-
V-30484			H
V-30485	A	1/5/72	H
V-30487	A		H
V-30490			H
V-30494	C	5/23/72	-
V-30495	E	1/5/72	-
V-30499	C	3/25/71	-
V-30502			H
V-30503			H
V-30504			H
V-30506			H
V-30508	A		H
V-30509			H
V-30510			H
V-30512			H
V-30514	A	1/30/69	H
V-30515			H
V-30517			H
V-30524			H
V-30526			H
V-30527			H
V-30528			H

V-30529			H
V-30530			H
V-30531	A	1/5/72	H
V-30532	A	1/5/72	H
V-30533	A	1/5/72	H
V-30534	C	9/17/70	H
V-30535	B	1/5/72	H
V-30539	I	3/2/72	H
V-30540			H
V-30541			H
V-30542			H
V-30543			H
V-30544	E	10/5/72	H
V-30545			H
V-30546			H
V-30547			H
V-30548			H
V-30550			H
V-30552			H
V-30553			H
V-30557		3/10/69	H
V-30558		3/10/69	H
V-30560	B	9/17/70	H
V-30563	A	8/12/69	H
V-30564	B	3/2/72	H
V-30565		6/20/69	H
V-30569		8/12/69	H
V-30571	A	1/5/72	H
V-30572		6/17/70	H
V-30573		6/17/70	H
V-30574		11/5/70	H
V-30575	B	3/25/71	H
V-30576	B	1/5/72	H
V-30577		1/21/71	H
V-30578		1/5/72	H
V-30579		1/5/72	H
V-30590	D	5/23/72	H
V-30593		3/2/72	H
V-30594		5/23/72	H
V-30602		5/23/72	H
V-30603		5/23/72	H
V-30604		5/23/72	H
V-30605		5/23/72	H
V-30606	A	8/3/73	H
V-30607		5/23/72	H
V-30608		5/23/72	H
V-30609		5/23/72	H
V-30610	D	6/3/74	H
V-30611		1/1/73	H
V-30613		2/9/73	H
V-31011	E	10/4/74	H
V-31012	G	5/23/72	H
V-31015	B	11/5/70	H

V-31025	E	8/9/71	H
V-31026	E	8/9/71	H
V-31028	C	3/2/72	H
V-31031	A	1/1/73	-
V-31032	C	1/5/72	-
V-31042	E	3/25/71	-
V-31045	D	1/5/72	-
V-31046	B	6/17/70	-
V-31047	D	1/5/72	-
V-31048			-
V-31049			-
V-31052	D	2/9/73	H
V-31056	C	8/9/71	-
V-31057	A	1/5/72	-
V-31062	C	9/17/70	H
V-31063	D	2/9/73	-
V-31064		6/17/70	-
V-31065		6/17/70	-
V-31066		6/17/70	-
V-31067	A	3/25/71	-
V-31108	D	10/4/74	-
V-31109		1/5/72	-
V-31110		1/5/72	H
V-31112	D	12/10/73	H
V-31114	A	1/1/73	-
V-31115		1/5/72	-
V-31116	A	7/24/72	-
V-31117	D	6/1/73	-
V-31118	B	3/16/73	H
V-31119	A	1/6/75	H
V-31120		3/2/72	-
V-31121		5/23/72	-
V-31122		5/23/72	-
V-31123		5/23/72	-
V-31124		5/23/72	-
V-31125	A	1/1/73	-
V-31126	B	1/6/75	-
V-31127		7/24/72	-
V-31129	B	2/9/73	-
V-31130		10/5/72	-
V-31131		10/5/72	-
V-31133	A	2/9/73	-
V-31134		10/5/72	-
V-31135		10/5/72	-
V-31138	A	3/16/73	-
V-32000	A	3/2/72	-
V-32001	C	3/16/73	H
V-32045		10/5/72	-
V-33011	G	5/23/72	-
V-33013	F	8/3/73	-
V-33021	H	2/9/73	-
V-33029	C	11/26/69	-
V-33030	E	1/5/72	-

V-33032	E	1/6/75	-
V-33033	D	10/5/72	-
V-33034	D	5/23/72	-
V-33035	A	7/24/72	-
V-33036	A	7/24/72	-
V-33037	A	7/24/72	-
V-33053			-
V-34008	E	9/17/70	H
V-34010	C	3/2/72	-
V-34011	C	3/2/72	-
V-34012			H
V-34013	B	6/17/70	-
V-34014	K	2/9/73	H
V-34015			-
V-34016	C	1/5/72	H
V-34017	E	10/4/74	-
V-34030	C	1/5/72	H
V-34041	E	1/5/72	-
V-34044	A	3/2/72	-
V-34045	C	5/23/72	-
V-34046	F	10/4/74	H
V-34047	I	10/4/74	-
V-34048	B	3/25/71	-
V-34050	A	5/23/72	-
V-34051	A	5/23/72	-
V-34052	B	7/24/72	H
V-34053	B	10/4/74	-
V-34054	A	5/23/72	-
V-34055	A	5/23/72	-
V-34056		5/23/72	-
V-35002	B		-
V-35003	B		-
V-35004	B		-
V-35015	D	8/3/73	H
V-35017		6/17/70	-
V-35018		9/17/70	-
V-35019		9/17/70	-
V-35020	A	6/1/73	-
V-36000			-
V-36001	E	1/5/72	H
V-36003	D	8/22/69	H
V-36004	B	4/15/69	H
V-36011			-
V-36014			-
V-36015			-
V-36023		3/10/69	-
V-36025			-
V-36026	B	1/5/72	-
V-36028	A		-
V-36029	C		H
V-36030	C	7/24/72	-
V-36031	A	1/5/72	-
V-36032	A	1/5/72	-

V-36033			H
V-36034			H
V-36035			H
V-36036			H
V-36037			H
V-36038	G	10/4/74	-
V-36039	C	1/5/72	H
V-36040	B	3/10/69	H
V-36042			H
V-36043	E	10/5/72	-
V-36044			-
V-36045	C	3/10/69	H
V-36046	C	10/4/74	-
V-36048	C	5/23/72	H
V-36052	A		-
V-36053	B	1/5/72	
V-36053	D	7/24/72	-
V-36054	B	1/5/72	-
V-36055	B	1/5/72	-
V-36057	B	1/5/72	-
V-36063	C	10/5/72	H
V-36064	B	10/5/72	-
V-36065	C	8/9/71	-
V-36066	C	8/9/71	-
V-36068	B	7/24/72	-
V-36069	C	1/5/72	H
V-36070	A		H
V-36071	C	7/24/72	-
V-36073	E	1/5/72	-
V-36074	D	1/5/72	H
V-36077	C	1/5/72	-
V-36078	C	1/5/72	-
V-36079	A		-
V-36080	C	1/5/72	-
V-36081	C	1/5/72	-
V-36082	C	1/5/72	-
V-36084	C		-
V-36085	B		H
V-36086	C	1/5/72	-
V-36087	B	1/5/72	-
V-36093			-
V-36094	B	1/5/72	-
V-36095			-
V-36096			-
V-36098			-
V-36100	F	8/3/73	H
V-36102	A	1/5/72	H
V-36103			-
V-36104			-
V-36105			-
V-36106			-
V-36107			-
V-36107	A	7/24/72	-

V-36108			
V-36109			
V-36110			
V-36111			
V-36113	D	1/5/72	H
V-36114		11/26/69	
V-36115		2/9/70	H
V-36116		6/17/70	
V-36117		6/17/70	
V-36118		6/17/70	
V-36119	A	1/5/72	
V-36120		6/17/70	
V-36121		6/17/70	
V-36122		6/17/70	
V-36123		6/17/70	
V-36124		6/17/70	
V-36125		6/17/70	H
V-36126		9/17/70	
V-36127		9/17/70	H
V-36128		9/17/70	
V-36129		9/17/70	
V-36130		9/17/70	
V-36131		9/17/70	
V-36132		9/17/70	H
V-36133		11/5/70	H
V-36134	A	3/25/71	H
V-36136	A	7/24/72	H
V-36137	A	5/23/72	H
V-36138	A	7/24/72	H
V-36139	A	7/24/72	
V-36141		8/9/71	
V-36142	A	1/5/72	H
V-36143		1/5/72	
V-36144		1/5/72	
V-36145		1/5/72	
V-36146		1/5/72	
V-36150		1/5/72	H
V-36152		5/23/72	
V-36153		5/23/72	
V-36154		5/23/72	
V-36155		5/23/72	
V-36156		5/23/72	
V-36160		5/23/72	
V-36161		5/23/72	
V-36163		7/24/72	
V-36165		7/24/72	
V-36167		10/5/72	
V-36800	A	3/25/71	H
V-36802	A	8/9/71	
V-36803	A	8/9/71	
V-36804	A	8/9/71	
V-36805	A	3/25/71	
V-36807	A	3/25/71	H

V-36808	A	3/25/71	H
V-36809	B	10/5/72	H
V-36810		3/2/72	-
V-36811	A	3/25/71	-
V-36812	A	3/25/71	H
V-36813	A	3/25/71	H
V-36814	A	3/25/71	H
V-36815	A	3/25/71	H
V-36816	A	3/25/71	H
V-36818	A	3/25/71	H
V-36819	A	8/9/71	-
V-36821	A	3/25/71	H
V-36822		12/10/73	H
V-36823	A	3/2/72	-
V-36826		3/2/72	H
V-36827	A	3/25/71	-
V-36828	A	3/25/71	-
V-36829	A	3/25/71	H
V-36837	A	8/9/71	-
V-36838	A	3/25/71	H
V-36839	A	1/5/72	H
V-36840	A	1/5/72	H
V-36842	A	8/9/71	-
V-36844	A	1/5/72	H
V-36846	A	12/10/73	H
V-36848		3/25/71	-
V-36849	A	3/25/71	-
V-36850	A	3/25/71	-
V-36851	A	3/25/71	H
V-36852	B	3/25/71	H
V-36853	A	3/25/71	H
V-36854	A	3/25/71	-
V-36856	A	3/25/71	-
V-36857	A	3/25/71	-
V-36862	A	3/25/71	H
V-36863	A	3/25/71	H
V-36864	A	3/25/71	H
V-36866	A	1/5/72	H
V-36871	A	3/25/71	-
V-36872	A	8/9/71	H
V-36873	A	3/25/71	-
V-36875	A	3/25/71	-
V-36876	A	3/25/71	H
V-36877	A	1/5/72	-
V-36880		1/1/73	H
V-36883		1/5/72	H
V-36884		3/2/72	H
V-36885		8/3/73	H
V-36887	A	3/25/71	H
V-36888	A	3/25/71	H
V-36891		8/9/71	H
V-36892	A	8/9/71	-
V-36893	A	3/25/71	H

V-36896	B	12/10/73	-
V-36900	A	1/5/72	H
V-36901	A	3/25/71	-
V-36905	A	3/25/71	-
V-36906	A	3/25/71	H
V-36908	A	8/9/71	-
V-36912	A	3/25/71	-
V-36913	A	3/25/71	-
V-36914		6/17/70	H
V-36916		1/1/73	-
V-36922	A	3/25/71	-
V-36923	A	3/25/71	-
V-36924	B	3/25/71	-
V-36925	A	3/25/71	-
V-36926	A	3/25/71	-
V-36927	A	3/25/71	H
V-36928	A	3/25/71	-
V-36930	A	3/25/71	-
V-36931	A	3/25/71	-
V-36932	A	3/25/71	-
V-36933	A	3/25/71	-
V-36934	A	3/25/71	-
V-36935	A	6/1/73	H
V-36936	A	8/3/73	-
V-36937	B	8/3/73	H
V-36939		6/1/73	-
V-36940		6/1/73	-
V-36941		6/1/73	H
V-36942		12/10/73	-
V-36943		12/10/73	H
V-36944		12/10/73	-
V-36945		12/10/73	H
V-36946		6/3/74	-
V-37015		1/5/72	-
V-37027	A		-
V-37038			H
V-38000	A		-
V-38001	B	2/9/70	-
V-38006		1/5/72	H
V-38007		1/5/72	-
V-38008		1/5/72	-
V-38009		1/5/72	-
V-38010	A	10/4/74	-
V-38011		1/5/72	-
V-39000	C	3/25/71	H
V-39001	E	7/24/72	H
V-39002	C	3/25/71	H
V-39003	C	3/25/71	H
V-39004	D	7/24/72	H
V-39005	C	3/25/71	H
V-39007	C	7/24/72	H
V-39008	A	7/24/72	H
V-39009	A	7/24/72	H

V-39010	A	7/24/72	H
V-39011	A	6/1/73	H
V-39012	C	6/1/73	H
V-39013	B	6/1/73	H
V-39014	B	6/1/73	H
V-39015	A	2/9/73	H
V-39016	B	12/10/73	H
V-39017	A	2/9/73	H
V-39018	B	3/16/73	H
V-39019		1/5/72	H
V-39020	A	2/9/73	H
V-39021	B	8/3/73	H
V-39022	B	8/3/73	H
V-39023	A	2/9/73	H
V-39024		3/2/72	H
V-39025		3/2/72	H
V-39026	A	2/9/73	H
V-39027		3/2/72	H
V-39028		3/2/72	H
V-39029		3/2/72	H
V-39030		3/2/72	H
V-39031		5/23/72	H

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

TEST TITLE: ELECTRICAL INTERFACE MATE TEST (ESE-GSE)

TEST NUMBER: V-20025

VEHICLE: AS-503 THRU 512, AS-206 & SUBS

TEST DESCRIPTION

THIS TEST IS DESIGNED TO ELECTRICALLY MATE THE SPACECRAFT ESE WITH THE LAUNCH VEHICLE ESE AND VERIFY INTERFACE.

TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES XX DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST IS INCORPORATED IN NAR TEST PROCEDURE K-0039.

THE IU/SPACECRAFT INTERFACE WILL BE CONNECTED THROUGH FUSE BOXES TO THE SLA SUBSTITUTE BOX. GROUND POWER WILL BE APPLIED. THE S/C ESE TO L/V ESE INTERFACES WILL BE VERIFIED BY UTILIZING THE FUSED JUMPER PANELS IN THE ESE. THE INTERFACE LINES WILL BE VERIFIED BY CLOSING THE FUSED JUMPER SWITCHES ACROSS THE CONTACTS USED ON THE INTERFACE LINES. THE RESPECTIVE INDICATIONS WILL BE VERIFIED TO ENSURE PROPER MATING.

CONFIGURATION

THE LAUNCH VEHICLE WILL BE MECHANICALLY AND ELECTRICALLY MATED ON THE ML. THE S/C ESE TO L/V ESE INTERFACES WILL BE MATED THROUGH FUSE BOXES. THE IU AND SPACECRAFT INTERFACES WILL BE CONNECTED TO THE SLA SUBSTITUTE BOX THROUGH FUSE BOXES. THE SLA SUBSTITUTE BOX WILL BE REMOVED AFTER THIS TEST.

PHASE: IV	SATURN IB TEST REQUIREMENTS	SATURN V TEST REQUIREMENTS
	MSFC: TM-011-001-2H	MSFC: TM-010-002-2H
	B.7.0.1	B.8.0.1
	B.7.0.2	B.8.0.2

REV	DATE	REASON	Contractor Approval	KSC Approval
D	5/2/2	EFF. CHANGE, REVISE BLKS. 5, 16	[illegible]	[illegible]
C	11/3/0	REVISE BLOCKS 5, 16	S/W. BAKER	S/F. BRYAN
B	11/9/0	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
A	6/6/9	UPDATE BLOCKS 5, 15, 16 & 17	S/W. BAKER	S/T. RIGELL

7. CONTRACTOR APPROVAL: S/ D. E. SCHMIDT	8. ORGANIZATION: IBM - 929	9. DATE: SEPTEMBER 26, 1967
10. KSC APPROVAL: S/ T. RIGELL	11. ORGANIZATION: IV INC.	12. APPROVAL DATE: NOVEMBER 11, 1967

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

TEST TITLE: ELECTRICAL INTERFACE MATE TEST (ESE-GSE)

TEST NUMBER: V-20025

VEHICLE: AS-503 THRU 512, AS-206 & SUBS

LC 34	N/A	4 HOURS

TEST REQUIREMENTS

INTERSTAGE:	IU GROUND POWER
CRYO-COMPLEX:	TONE LINK
CCS-COMPLEX:	110A COMPUTER DDAS DEC-6 TIMING QUALITY ASSURANCE

THEN APPLICABLE REFERENCE DOCUMENTATION

40M05484A ICD SATURN V VEHICLE ESE TO SPACECRAFT ESE

ITEMS OMITTED

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: SPACE VEHICLE ELECTRICAL INTERFACE MATE TEST

2. KSC TEST NUMBER: V-20026

3. EFFECTIVITY: AS-503 THRU 512, AS-206 & SUBS

4. TEST OBJECTIVES

THIS TEST IS DESIGNED TO ELECTRICALLY MATE THE SPACECRAFT WITH THE LAUNCH VEHICLE AND VERIFY THE INTERFACE.

5. TEST DESCRIPTION, EQUIPMENT STATUS, CONFIGURATION

THIS TEST DOES XX DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST IS INCORPORATED IN NAR TEST K-0004.

1. LAUNCH CONTROL CHECKS - THIS PORTION OF THE TEST IS TO VERIFY THE SLA/IU INTERFACE. IT IS PERFORMED BY PHYSICALLY INSERTING AND REMOVING FUSES ON THE SPECIFIC INTERFACE LINES.
2. MESC SAFE AND ARM INDICATIONS - THIS PORTION OF THE TEST IS PERFORMED BY ARMING THE LOGIC AND PYRO BUSES AND VERIFYING THE ARM AND SAFE CONFIGURATION.
3. FUEL PRESSURE INDICATOR CALIBRATION CHECKS - THIS PORTION OF THE TEST IS TO VERIFY SIVB FUEL PRESSURE INDICATIONS BOTH IN THE L/V ESE AND SPACECRAFT.
4. G AND N INTERFACE CHECKS - THIS PORTION OF THE TEST IS TO VERIFY THE S/C CONTROL OF SATURN SPACE VEHICLE CIRCUITRY. VERIFICATION WILL BE ACCOMPLISHED BY SELECTING S/C CONTROL OF SATURN AND SENDING S/C COMMANDS TO THE LAUNCH VEHICLE STAGES. STAGE HYDRAULICS ARE REQUIRED. THIS TEST ALSO VERIFIES S/C DISCRETE INPUTS TO THE LVDC/LVDA AND S/C CONTROL OF SATURN ENABLE DUE TO AN IU GUIDANCE FAILURE.
5. EMERGENCY DETECTION SYSTEM TEST - THIS TEST WILL CHECK OUT THE EDS WITHIN THE SPACE VEHICLE WITH THE EXCEPTION OF THE Q-BALL AND RF ABORT REQUEST CIRCUITRY.
6. Q-BALL CALIBRATION AND STRAY VOLTAGE CHECKS - DURING THIS PORTION OF THE TEST DELTA PITCH, DELTA YAW, PRIMARY AND REDUNDANT VECTOR SUM MEASUREMENTS ARE CHECKED BY APPLYING KNOWN PRESSURES TO THE TRANSDUCERS AND COMPARING OUTPUTS TO THE ASSOCIATED CALIBRATION CURVE. STRAY VOLTAGE CHECKS ARE MADE TO ENSURE COMPATABILITY BETWEEN THE LAUNCH VEHICLE AND SPACECRAFT CIRCUITRY.

PHASE: VA

TEST REQUIREMENTS
SEE BLOCK 18

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE CONTINUATION SHEET FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/ S. HAYS	IBM - 929	11 DECEMBER 1967
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/ I. RIGELL	LV-ENG	13 DECEMBER 1967

KSC FORM 33.938 (7/67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

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1. TEST TITLE: SPACE VEHICLE ELECTRICAL INTERFACE MATE TEST

2. KSC TEST NUMBER: V-20026

3. EFFECTIVITY: AS-503 THRU 512, AS-206 & SUBS

12. LOCATION: LC 39

14. COMPUTER PROC. IDENTIFICATION: SEE BLOCK 18

18. EST. TEST TIME: 8 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: L/V GROUND AND STAGE POWER, SPACECRAFT SUPPORT, SIC AND SII HYDRAULICS (SATURN V), AND SIB HYDRAULICS (SATURN IB)

OFF-COMPLEX: TONE LINK

ON-COMPLEX:
110A COMPUTER
DDAS
MEASURING & TM
DEE-6
TIMING
BACKUP
ABORT ADVISORY SYSTEM

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

40M05484A ICD SAT V VEHICLE ESE TO SPACECRAFT ESE
40M37543 ICD ESE CHECKOUT SCHEMATICS
40M37521 ICS IU CSM INTERFACE

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5)

SATURN IB TEST REQUIREMENTS

MSFC: 7921601
0.3.1.2.0.3.1
0.3.1.2.0.6.1.1
0.3.4.0.1

TM-011-001-2H
B.1.1.1.1.3
B.1.1.1.2
B.1.4.1.1
B.1.6.1.5.2
B.7.0.1
B.7.0.2

SATURN V TEST REQUIREMENTS

MSFC: 7916404
0.3.4.0.1
TM-010-002-2M
B.1.1.1.2
B.1.5.1.1
B.1.7.3.2
B.8.0.1
B.8.0.2

(CONTINUED FROM BLOCK 14)

VZRE, VZEC, FT25, FT33, FT45, VAED, VZ33, VZSA, VZEA, KAME, IAED, IZ33, IZSA, IZEA, IZRE, IZEC, LAME

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET)

PAGE 3 OF 3

1. TEST TITLE: SPACE VEHICLE ELECTRICAL INTERFACE MATE TEST

2. KSC TEST NUMBER: V-20026

3. EFFAS1205 & SUBS AS-503 THRU 512

ITEM CONTINUATION

REVISION HISTORY

REV	DATE	REASON	CONT. APPR.	KSC APPR.
A	4/3/8	ADDITION OF MSFC REQUIREMENTS	S/S. HAYS	S/I. RIGELL
B	8/20/8	UPDATE MSFC REQUIREMENTS	S/S. HAYS	S/I. RIGELL
C	6/3/9	REV. MSFC REQ'S & BLOCKS 5, 4, 14, 16, 17	S/W. BAKER	S/I. RIGELL
D	9/11/9	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
E	10/2/9	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
F	1/8/70	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
G	8/20/70	UPDATE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
H	9/13/70	REVISE BLOCKS 5, 14, 16, 18	W. Baker	Frank 9/28 Bryan
I	5/2/72	EFFECTIVITY CHANGE, REVISE BLOCKS 5, 14, 16	W. Baker	Frank 5/18/72 Bryan
J	9/25/74	REVISE MSFC REQUIREMENTS	SCWitt 9/20/74	Frank 9-11-74 Bryan

KSC FORM 23-238A (7/67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

TEST TITLE: L/V ORDNANCE INSTALLATION IN VAB

2. KSC TEST NUMBER: V-20032

3. EFFECTIVITY: AS-509 & SUBS

TEST OBJECTIVES

TO ENSURE SAFE AND ORDERLY INSTALLATION OF LAUNCH VEHICLE ORDNANCE COMMENSURATE WITH THE PRESCRIBED SCHEDULE.

TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

TEST DESCRIPTION

TASK 1 (LIGHT ORDNANCE) NO OTHER WORK WILL BE PERFORMED ON THE WORK LEVEL(S) WHERE ORDNANCE INSTALLATION IS IN PROGRESS, AND ONLY PERSONNEL ENGAGED IN ORDNANCE INSTALLATION WILL BE PERMITTED IN THESE AREAS. NO POWER WILL BE APPLIED TO THE STAGE(S) DURING ORDNANCE INSTALLATION.

TASK 1 ORDNANCE INSTALLATION COMPRISES:
S-IC RETRO IGNITION CDF AND PDS CDF
S-II PDS CDF
S-II RETRO IGNITION CDF

(CONTINUED ON PAGE 2)

TEST REQUIREMENTS
MSFC: N/A

REV.	DATE	REASON	Contractor Approval	KSC Approval
G	7-24-72	DELETED BEN-SV 82065, CHANGED RD 40030 TO RD 40030A AND ADDED RD 40030B.	R.A. English 7-25-72	C.W. Dowling 7/24/72
F	3-15-71	REVISE TEST DESCRIPTION, UPDATE EST. TIME, & REVISE VEHICLE EFFECTIVITY AND TEST NUMBER	/s/ R. A. ENGLISH	/s/ C. W. DOWLING
E	6-17-70	REVISE TEST DESCRIPTION, UPDATE EST. TIME, SR & VEH. EFF.	/s/ R. A. ENGLISH	/s/ F. BRYAN
D	6-4-69	UPDATE EST. TIME & REF. DOCUMENTS	/s/ J. A. LATHEROW	/s/F. BRYAN FOR I. RIGELL
C	11-27-68	CHANGE RD 40092 TO RD 40030	/s/ O. V. RUHL	/s/F. BRYAN FOR I. RIGELL
B	3-12-68	UPDATE SR & REF. DOCUMENTS	/s/ M. J. PLOMER	/s/ I. RIGELL
A	10-24-67	EFFECTIVITY REVISION	/s/ M. J. PLOMER	/s/ I. RIGELL

CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
/s/ O. D. WOODALL	MDAC	APRIL 24, 1967
9. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
/s/ I. RIGELL W. E. BACKUS	LV-TOM-1	APRIL 25, 1967

KC FORM 28-928 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

TEST TITLE: L/V ORDNANCE INSTALLATION IN VAB

2. KSC TEST NUMBER: V-20032

3. EFFECTIVITY: AS-509 & SUBS

13. LOCATION: VAB HIGH BAY

14. COMPUTER PROC. IDENTIFICATION: N/A

15. EST. TIME: 16 HOURS - TASK I; 24 HOURS - TASK II

16. SUPPORT REQUIREMENTS

RD 40030A
RD 40030B

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

AFM 127-100, EXPLOSIVES SAFETY MANUAL
K-V-053, GROUND SAFETY PLAN
RD 40030
KMI-1710.1 & ATTACH. A, KSC SAFETY PROGRAM
GP 469, EXPLOSIVE SAFETY HANDBOOK

18. ITEM CONTINUATION

ITEM #5 (CONTINUED)
TEST DESCRIPTION (CONTINUED)

TASK 2 (HEAVY ORDNANCE) NO OTHER OPERATIONS WILL BE PERFORMED IN THE APPLICABLE HIGH BAY AND ALL PERSONNEL NOT ENGAGED IN THIS TASK WILL BE EVACUATED FROM THE HIGH BAY AND ADJACENT TOWERS. RF SILENCE WILL BE IMPOSED, AND NO POWER WILL BE APPLIED TO THE SPACE VEHICLE EXCEPT S/C IMU HEATER POWER.

TASK 2 ORDNANCE INSTALLATION COMPRISES:
S-IC RETRO ROCKETS AND PDS LSC
S-II 1ST AND 2ND PLANE SEPARATION LSC
S-II RETRO ROCKETS
S-II PDS LSC
S-IVB SEPARATION MDF, ULLAGE ROCKET IGNITION AND JETTISON CDF, PDS LSC & CDF AND ULLAGE ROCKETS

DETAILED INSTALLATION PROCEDURES ARE THOSE OF THE COGNIZANT STAGE CONTRACTOR. HAZARD AREA BADGING IS REQUIRED FOR ALL ORDNANCE OPERATIONS.

EQUIPMENT STATUS/CONFIGURATION

ONLY EQUIPMENT NECESSARY TO SUPPORT THE INSTALLATION TASK SHALL BE OPERATED. SUPPORT EQUIPMENT REQUIREMENTS ARE DEFINED WITHIN THIS PROCEDURE. THE LAUNCH VEHICLE SHALL BE VERTICAL ON ITS MOBILE LAUNCHER IN THE VAB.

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: APS GAIN TEST (CTC5)

2. KSC TEST NUMBER: V-20066

3. EFFECTIVITY: 506 THRU 512, 206 & SUBS

4. TEST OBJECTIVES

TO VERIFY THE FLIGHT CONTROL PSI (A_0) AND PHI DOT (A_1) APS GAINS USING ATTITUDE ERROR/ ATTITUDE RATE COMMANDS AND APS ENGINE RELAY DUTY CYCLES FOR SIVB BURN AND COAST MODES. THE A_1 GAINS AND POLARITY WILL BE EVALUATED FOR ACTIVE CONTROL/EDS RATE GYROS ONLY. HOWEVER, BOTH ACTIVE AND SPARE FLIGHT CONTROL COMPUTER CHANNELS WILL BE EVALUATED.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. THE STEPS NECESSARY TO PREPARE FLIGHT CONTROL SYSTEM FOR AUTOMATIC OPERATION ARE DETAILED.

B. THE STEPS NECESSARY TO LOAD AND EXECUTE APS GAIN TEST (CTC5) FROM SANDERS DISPLAY STATION ARE DETAILED.

C. THE ATTITUDE ERROR INPUTS TO FLIGHT CONTROL COMPUTER WILL BE RECEIVED FROM LVDC/ LVDA SUBSYSTEM.

D. ANGULAR RATE INPUTS TO FLIGHT CONTROL COMPUTER WILL BE SIMULATED USING TORQUER COIL INPUTS TO CONTROL/EDS RATE GYRO SUBSYSTEM.

E. THIS TEST WILL BE PERFORMED WITH FLIGHT CONTROL COMPUTER IN SIVB BURN MODE AND IN SIVB COAST MODE (UNDER PROGRAM CONTROL).

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED: SIVB APS VALVE SIMULATOR AND CRP FUSE BOX MAY BE CONNECTED DURING SUPPORT EXCEPT FOR CDDT AND LAUNCH.

B. THE FOLLOWING PROCEDURES/TESTS MUST BE COMPLETED PRIOR TO PERFORMING THIS TASK: (SATURN V/IB)
1. V-20061/V-20148 - FUNCTIONAL, POLARITY AND MEASURING CALIBRATION OF SIVB CRP AND FCC IV CURRENT
2. V-23153 - CONTROL/EDS RATE GYRO RAMP GENERATOR CALIBRATION
3. V-23187 - LVDC/LVDA FLIGHT CONTROL SYSTEM INTERFACE TEST

CONFIGURATION: GUIDANCE AND CONTROL SUBSYSTEMS INSTALLED IN LAUNCH VEHICLE.

PHASE: III

TEST REQUIREMENTS
SEE BLOCK 18

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE BLOCK 18 FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/ W. BAKER	IBM - 929	DECEMBER 12, 1968
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/F. BRYAN FOR I. RIGELL	LV-ENG	DECEMBER 16, 1968

KSC FORM 24-338 (9 67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: APS GAIN TEST (CTC5)

2. KSC TEST NUMBER: V-20066

3. EFFECTIVITY: 506 THRU 512, 206 & SUBS

13. LOCATION: LC-39

14. COMPUTER PROC. INDENTIFICATION: CTC5

19. EST. TEST TIME: 6 MEN - 1 HOUR

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU GROUND AND STAGE POWER
SIVB STAGE POWER

OFF-COMPLEX: N/A

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)
LVDC/LVDA SYSTEM

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5)

SATURN IB TEST REQUIREMENTS

MSFC: 7921601 — TM-011-001-2H
0.3.1.2.0.1.1 ✗ — B.1.1.1.1.3 ✗
0.3.1.2.0.3.1 ✗
0.3.1.2.2.2 THRU 0.3.1.2.2.2.1.3

TEST REQUIREMENTS S-V

MSFC: 7916404 — TM-010-002-2H
0.3.1.2.0.1.1 — B.1.1.1.1.3
0.3.1.2.0.3.1 — B.1.1.1.1.4
0.3.1.2.2.1.1 THRU 0.3.1.2.2.2.1.3 — B.1.1.1.1.5

(CONTINUED FROM BLOCK 6)

REVISION HISTORY

A	6/3/9	REVISE MSFC REQ'MTS & BLOCKS 4, 5	S/W. BAKER	S/I. RIGELL
B	9/17/9	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/I. RIGELL
C	10/15/9	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/I. RIGELL
D	1/8/0	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/I. RIGELL
E	2/4/1	REVISE BLOCKS 4, 5	S/E. WITT	S/F. BRYAN
F	4/26/2	EFF. CHANGE, REVISE BLOCKS 4, 5, 16	W. Baker 9/26/74	9-26-74
G	9/25/74	REVISE MSFC REQUIREMENTS	SCCUST	DIB 9-26-74 Frank Bryan

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: FLIGHT CONTROL SYSTEMS GAIN TEST (CTC1)

2. KSC TEST NUMBER: V-20067

3. EFFECTIVITY: AS-506 & SUBS

4. TEST OBJECTIVES

TO VERIFY FLIGHT CONTROL SYSTEM A_0 AND A_1 GAINS USING ATTITUDE ERROR/ATTITUDE RATE COMMANDS AND ENGINE ACTUATOR POSITIONS FOR ALL STAGES, AXES AND SWITCH POINTS.

TO VERIFY PROPER OPERATION OF ENGINE CANT CIRCUITRY.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST X *DOES* ___ *DOES NOT CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. THE STEPS NECESSARY TO PREPARE THE FLIGHT CONTROL SYSTEM FOR AUTOMATIC OPERATION ARE DETAILED.

B. THE STEPS NECESSARY TO LOAD AND EXECUTE THE GAIN TEST (CTC1) FROM THE SANDERS DISPLAY STATION ARE DETAILED.

C. ENGINE CANT INITIATION ISSUED AND S-IC ACTUATOR POSITIONS VERIFIED.

D. THE ATTITUDE ERROR INPUTS TO THE FLIGHT CONTROL COMPUTER WILL BE RECEIVED FROM THE LVDC/LVDA SUBSYSTEM.

E. ANGULAR RATE INPUTS TO THE FLIGHT CONTROL COMPUTER WILL BE SIMULATED USING TORQUER COIL INPUTS TO THE CONTROL/EDS RATE GYRO SUBSYSTEM.

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED: N/A

B. THE FOLLOWING PROCEDURES/TESTS MUST BE COMPLETED PRIOR TO PERFORMING THIS TASK:

1. V-23153 - CONTROL/EDS RATE GYRO RAMP GENERATOR CALIBRATION
2. V-23187 - LVDC/LVDA FLIGHT CONTROL SYSTEM INTERFACE CHECKS
3. V-23029 - FLIGHT CONTROL COMPUTER SUBSYSTEM TEST

CONFIGURATION: GUIDANCE AND CONTROL SUBSYSTEMS INSTALLED IN THE LAUNCH VEHICLE

SEE CONTINUATION SHEET FOR REVISION HISTORY

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S. W. BAKER	IBM 929	DECEMBER 12, 1968
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/ F. BRYAN FOR I. RIGELL	LV-ENG	DECEMBER 16, 1968

KSC FORM 23-788 (7-68)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: FLIGHT CONTROL SYSTEMS GAIN TEST (CTC1)

2. KSC TEST NUMBER: V-20067

3. EFFECTIVITY: AS-506 & SUBS

13. LOCATION: LC 39

14. COMPUTER PROG IDENTIFICATION: CTC1

15. EST. TEST TIME: 6 MEN - 2.5 HOURS

16. SUPPORT REQUIREMENTS

RD 41450 SECTION Q

INTERSTAGE: IU GROUND AND STAGE POWER
S-IC STAGE POWER
S-IC HYDRAULIC POWER
S-II STAGE POWER
S-II HYDRAULIC POWER

OFF-COMPLEX: N/A

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)
LVDC/LVDA SYSTEM

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5)

PHASE III

TEST REQUIREMENTS

7916404	TM-010-002-2H
0.3.1.2.0.1.1	B.1.1.1.1.1
THRU	B.1.1.1.1.2
0.3.1.2.0.3.1	B.1.1.1.1.3
0.3.1.2.0.7.1	B.1.1.1.1.4
	B.1.1.1.1.5
	SID-66-1465-7
	2.5.2.1.3
	2.5.2.1.5

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE CONTROL PROCEDURE FOR TRANSFER OF S/V TO THE PAD

2. KSC TEST NUMBER: V-20109

3. EFFECTIVITY: AS-206 AND SUBS

4. TEST OBJECTIVES

THE OBJECTIVE OF THIS PROCEDURE IS TO PRESENT LAUNCH VEHICLE OPERATIONS REQUIRED TO ACHIEVE THE FOLLOWING TASKS: (1) PREPARE THE LAUNCH VEHICLE FOR TRANSFER TO PAD, (2) RECONFIGURE THE LAUNCH VEHICLE FOR PAD OPERATIONS UPON COMPLETION OF TRANSFER, (3) CLOSE THE MOBILE SERVICE STRUCTURE (MSS) TO THE ML/VEHICLE, (4) TRANSFER ML & SV/LV FROM ONE HIGH BAY TO ANOTHER.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

HAZARDOUS OPERATIONS:

A. ORDNANCE INSTALLATION
B. CRAWLER HIGH PRESSURE HYDRAULICS & CRAWLER OPERATION
C. PLATFORM RETRACTION & EXTENSION
D. HANDLING
E. ELECTRICAL STORM HAZARDS
F. WORK AT HEIGHTS

THE LAUNCH VEHICLE CONTROL PROCEDURE FOR TRANSFER TO THE PAD IS IN ACCORDANCE WITH THE OVERALL GUIDELINES OF THE DLO TRANSFER PLAN. THE PROCEDURE CONSISTS OF THE PRE-OPERATING STEPS AND OPERATING STEPS. THE PRE-OPERATING STEPS SECTION OF THIS PROCEDURE PROVIDES A CHECKLIST OF PRE-MOVE CONDITIONS AND REQUIREMENTS FOR THE LAUNCH VEHICLE AND GSE WALK-AROUND INSPECTIONS.

PART I OF THE OPERATING STEPS STARTS WITH PREPARATIONS FOR TRANSFER AND ENDS WITH THE LAUNCH VEHICLE TRANSFER TO PAD.

PART II OF THE OPERATING STEPS STARTS WITH ARRIVAL OF LAUNCH VEHICLE AT THE PAD AND INCLUDES ML SECURING OPERATIONS AND HOOK-UP OF PNEUMATICS AND HARDLINE CABLES AT THE PAD.

PART III OF THE OPERATING STEPS PROVIDES LAUNCH VEHICLE TASKS ASSOCIATED WITH MSS FINAL CLOSING TO THE ML/VEHICLE.

SPECIAL RELEASES FOR ROLL AROUND PROVIDE STEPS REQUIRED TO PREPARE & SECURE ML & LV FOR ROLL OUT FROM ONE HIGH BAY AND ROLL INTO ANOTHER HIGH BAY.

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	3/5/74	ASTP UPDATE	D Owens 3/5/74	4/22 F Bryan
A	11/14/72	ADD REQUIREMENTS	D Owens 11/14/72	11/15/72

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
D Owens	5-8571	August 31, 1971
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Frank Bryan	LV-ENG	9/13/71

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE CONTROL PROCEDURE FOR TRANSFER OF S/V TO THE PAD

2. KSC TEST NUMBER: V-20109

3. EFFECTIVITY: AS-206 AND SUBS

13. LOCATION	14. COMPUTER PROC. IDENTIFICATION	15. EST. TEST TIME
LC-39	N/A	28 HOURS

16. SUPPORT REQUIREMENTS

KSC PAD SAFETY
SECURITY POLICE
FIRE FIGHTING
MEDICAL
GSE MEASURING (LVO)
GSE MEASURING (INS)
LCC MEASURING (INS)
LCC MEASURING (LVO)
SERVICE STRUCTURE MEASURING
SPACE VEHICLE ECS
FACILITY TV (OTV)
FACILITY COMM. (OIS)
SEARCH LIGHTS
WEATHER FORECAST

RD-25003

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

5. TEST DESCRIPTION (CONTINUED)

TEST REQUIREMENTS:

(LV) TM-011-001-2H 8.0.1, 8.0.3, 9.0.1.1, 9.0.1.2

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE CONTROL PROCEDURE FOR RETURN OF S/V TO THE VAB

2. KSC TEST NUMBER: V-20110

3. EFFECTIVITY: AS-206 AND SUBS

4. TEST OBJECTIVES

THE OBJECTIVE OF THIS PROCEDURE IS TO PRESENT OPERATIONS REQUIRED TO ACHIEVE THE FOLLOWING TASKS: 1) PREPARE THE LAUNCH VEHICLE FOR RETURN OF THE S/V FROM THE PAD TO THE VAB, 2) RETRACTION OF THE MOBILE SERVICE STRUCTURE (MSS) FROM THE LUT/VEHICLE, 3) PREPARE LAUNCH VEHICLE FOR TEMPORARY STAY IN THE VAB.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

HAZARDS:
A. CRAWLER HIGH PRESSURE HYDRAULICS & CRAWLER OPERATION
B. PLATFORM RETRACTION & EXTENSION
C. HIGH WIND HAZARDS
D. WORK AT HEIGHTS
E. ELECTRICAL STORM HAZARDS

THE LAUNCH VEHICLE CONTROL PROCEDURE FOR RETURN OF THE SV TO THE VAB IS IN ACCORDANCE WITH THE OVERALL GUIDELINES OF THE DLO TRANSFER PLAN. THIS PROCEDURE CONSISTS OF PRE-TRANSFER CONDITIONS AND OPERATING STEPS. THE PRE-TRANSFER CONDITIONS SECTION OF THIS PROCEDURE PROVIDES A CHECK LIST OF PRE-MOVE CONDITIONS AND REQUIREMENTS FOR THE LAUNCH VEHICLE AND GSE.

PART I OF THE OPERATING STEPS STARTS WITH PREPARATIONS FOR THE TRANSFER AND ENDS WITH THE LAUNCH VEHICLE TRANSFER TO THE VAB.

PART II OF THE OPERATING STEPS STARTS WITH ARRIVAL OF LAUNCH VEHICLE AT THE VAB AND ENDS WITH THE COMPLETION OF SECURING OPERATIONS AND CONNECTION OF ECS.

TEST REQUIREMENTS

NONE

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	9/5/74	ASTP UPDATE	per J D Owens 9/3/74	F. Lyon 9/22
A	11/14/72	CHANGE PART I, ADD RD NO.	J D Owens 11/14/72	C.W. Darling 11/15/72

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
J.D. Owens	5-8571	August 31, 1971
10. NASA/KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Frank Lyon	LV-ENG	9/13/71

KSC FORM 20-840C (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE CONTROL PROCEDURE FOR RETURN OF S/V TO THE VAB

2. KSC TEST NUMBER: V-20110

3. EFFECTIVITY: AS-206 AND SUBS

13. LOCATION	14. COMPUTER PROC. IDENTIFICATION	15. EST. TEST TIME
LC-39	N/A	22 HOURS

16. SUPPORT REQUIREMENTS

KSC PAD SAFETY
SECURITY POLICE
FIRE FIGHTING
MEDICAL
LCC MEASURING (LVO)
LCC MEASURING (INS)
GSE MEASURING (LVO)
GSE MEASURING (INS)
SERVICE STRUCTURE MEASURING
SPACE VEHICLE ECS
FACILITY TV (OTV)
FACILITY COMMUNICATIONS (OIS)
SEARCH LIGHTS
WEATHER FORECAST

RD-25003

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC FORM 20-840C (7-67)

REV 32

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: SATURN IB BACKUP GUIDANCE SIMULATED FLIGHT TEST

2. KSC TEST NUMBER: V-20119

3. EFFECTIVITY: AS-207 AND SUBS

4. TEST OBJECTIVES

1. TO VERIFY PROPER SPACECRAFT AND LAUNCH VEHICLE GUIDANCE INTERFACE OPERATION.
2. TO VERIFY SPACECRAFT/LAUNCH VEHICLE GUIDANCE ELECTRICAL COMPATIBILITY AFTER A SIMULATED LV ATTITUDE REFERENCE FAILURE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

A. GIMBALLING OF ENGINES IS A HAZARDOUS CONDITION.

THE TEST WILL BE CONDUCTED IN THREE PARTS TO VERIFY THE FOLLOWING:

PART I - TILT AND ROLL SWITCHOVER CHARACTERISTICS - THE POLARITY OF TILT AND ROLL COMMANDS FROM THE S/C GUIDANCE TO THE S-IB ENGINE ACTUATORS, ALONG WITH THE SIGNAL CHARACTERISTICS OF S/C GUIDANCE COMMANDS AT SWITCHOVER, WITH BOTH LV AND S/C COMMANDS BEING NON-ZERO, ARE TO BE DEMONSTRATED IN A SINGLE RUN.

PART II - END TO END POLARITY TEST - THE POLARITY BETWEEN THE COUPLING DATA UNITS AND THE S-IB ENGINE ACTUATORS WILL BE DEMONSTRATED BY SIMULATED TORQUING OF THE IPIGS BY MEANS OF A SPECIAL K-START TEST PROGRAM.

PART III - SIMULATED FLIGHT
PLUS TIME SEQUENCE TEST OBJECTIVES - THE PURPOSE OF THIS TEST IS TO VERIFY THE BACKUP GUIDANCE COMPATIBILITY BETWEEN THE SPACECRAFT AND LAUNCH VEHICLE. IMMEDIATELY AFTER LIFTOFF AND DURING THE FIRST BOOST PHASE OF THE FLIGHT, A LAUNCH VEHICLE ATTITUDE REFERENCE FAILURE WILL BE SIMULATED. THE SINGLE SYSTEM FAILURE WILL BE SIMULATED PRIOR TO LVDC TIME-TILT PROFILE GENERATION AND IN SUFFICIENT TIME TO VERIFY PROGRAM LOCKOUTS OF ATTITUDE REFERENCE SWITCHOVER. DURING THE S-IB BURN MODE, S/C CONTROL WILL BE ENABLED, THE S/C CONTROL OF SATURN SWITCH WILL BE PLACED IN THE CMC POSITION, AND ROLL AND PITCH ERROR SIGNALS WILL BE GENERATED BY THE S/C GUIDANCE POLY-NOMINAL. DURING THE S-IVB BURN AND COAST MODES, MANUAL CONTROL OF SATURN WILL BE INITIATED AND HAND CONTROL CHECKS WILL BE PERFORMED. THE RESPONSE AND NON-RESPONSE OF THE LAUNCH VEHICLE TO MCC-H WILL BE VERIFIED, BOTH IN MINUS TIME AND DURING THE SIMULATED FLIGHT.

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
C	11/5/9	ASTP UPDATE	Saturn 11/5/9	F Bryan 9/22
B	5/30/73	ADD HFLT PARTICIPATION.	J D Owens 6/1/3	Bryan 6/4
A	1/31/73	ADD MSFC REQ, UPDATE COMPUTER PROG LIST	S/J.D.OWENS	S/F.BRYAN

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/J. D. OWENS	5-8771	SEPT. 2, 1971
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/FRANK BRYAN	LV-ENG	2/14/72

KSC FORM 23-339B 7/071

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET 2

PAGE 2 OF 2

1. TEST TITLE: SATURN IB BACKUP GUIDANCE SIMULATED FLIGHT TEST

V-20119

AS-207 AND SUBS

13. LOCATION: LC-39

EAIC,EAPF,EAPS,EASS, FT06,FT10,FT20,FT23,FT42,FT49,FT81,GT16,IAAR,

7 HOURS

16. SUPPORT EQUIPMENT

GROUND POWER	DTS
S-IB STAGE POWER	LCC MEASURING (LVO)
S-IVB POWER	LCC DATA DISPLAY
IU POWER	DDAS
SM POWER	DDAS TAPE RECORDING
BACKUP BATTERIES	SERVICE STRUCTURE MEASURING
COUNTDOWN CLOCK	RCA 110A COMPUTERS
OAT EQUIPMENT	DEE-6
DEE-3	LCC TM STATION (MONITOR)
CM POWER	LCC TM RECORDING
GMIL	RD 26006
HFLT	

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

14. COMPUTER PROC. IDENTIFICATION (CONTINUED)

IAFC,IALL,IAMC,IAPX,IATC,IATS,LA01,LAF2,LAPW,NT98,NT99,OAPU,OATT,CE10, FE50,FT27,FT37,GE01,LZTU,ZT96,FT55,FT47,FT45

5. TEST DESCRIPTION (CONTINUED)

TEST REQUIREMENTS:

(LV) TM-011-001-2H 1.1.1.2, 1.1.1.3, 1.1.1.4.1, 1.5.1 THRU 1.5.2, 7.0.1, 7.0.2

(IU) 7921601 0.3.5.2.5.3, 0.3.7.1.4

KSC FORM 23-339C 7/071

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE OPERATIONS FOR FLIGHT READINESS TEST

2. KSC TEST NUMBER: V-20120

3. EFFECTIVITY: AS-209 AND SUBS

4. TEST OBJECTIVES

TO ASSURE THAT THE VEHICLE, IN A CONFIGURATION AS NEAR AS POSSIBLE TO LAUNCH CONFIGURATION, IS FUNCTIONING PROPERLY WHEN OPERATED WITH ALL THE PAD GSE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☒ *DOES* ☐ *DOES NOT CONTAIN HAZARDOUS OPERATIONS.*

HAZARDOUS OPERATIONS:

(A) APPLICATION OF HYDRAULICS AND PNEUMATICS
(B) VENTING OF TANKS
(C) GIMBALING OF ENGINES

THE FLIGHT READINESS TEST WILL BE PERFORMED WITH THE SPACE VEHICLE IN LAUNCH CONFIGURATION EXCEPT FOR USE OF MINIMUM AMOUNT OF OAT EQUIPMENT REQUIRED FOR PERFORMANCE OF THE TEST.

THE LAUNCH VEHICLE WILL COMPLETE A FULL DURATION MISSION SIMULATION. PROPELLANT LOADING WILL BE SIMULATED IN THIS TEST. UMBILICAL EJECTION, SERVICE ARM RETRACTION, HOLDDOWN ARM RELEASE AND LIFTOFF WILL BE SIMULATED. PROPELLANT MAST RETRACT CYLINDERS WILL BE ACTIVATED, AND LAUNCH WATER VALVES OPERATED.

RADAR BEACON TRANSPONDER AND IU COMMAND RECEIVERS WILL BE INTERROGATED AND READ OUT BY RANGE OPERATIONS GROUND STATIONS.

MCC (HOUSTON) COMMANDS TO IU AND RANGE SAFETY COMMANDS TO S-IB AND S-IVB WILL BE ISSUED AND VERIFIED IN PLUS TIME.

5. REV.	DATE	REASON	Contractor Approval	KSC Approval
E	9/5/74	ASTP UPDATE	J. D. Owens 9/5/74	9/22 F. Bryan
D	11/5/73	UPDATE MSFC REQUIREMENTS	J. D. Owens 11/5/73	F. Bryan
C	2/21/73	UPDATE MSFC REQUIREMENTS	J. D. Owens 2/22/73	R. Frank Bryan
B	10/27/72	UPDATE REQUIREMENTS	J. D. Owens 10/27/72	R. F. Bryan
A	8/16/72	UPDATE REQUIREMENTS	J. D. Owens 8/16/72	R. F. Bryan 8/16/72

7. CONTRACTOR APPROVAL: J. D. OWENS — 8. ORGANIZATION: S-8771 BATC — 9. DATE: Feb-2, 1972

10. NASA-KSC APPROVAL: R. Frank Bryan — 11. ORGANIZATION: LV-ENG — 12. APPROVAL DATE: 2/14/72

KSC FORM 21-1748 (7/67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: SATURN IB LAUNCH VEHICLE OPERATIONS FOR FLIGHT READINESS TEST

2. KSC TEST NUMBER: V-20120

3. EFFECTIVITY: AS-209 AND SUBS

12. LOCATION: LC-39 PAD B

14. COMPUTER PROC IDENTIFICATION: (SEE BLOCK 18)

15. EST. TEST TIME: 16 HOURS

16. SUPPORT REQUIREMENTS

GROUND POWER	DDAS TAPE RECORDING
S-IB STAGE POWER	SERVICE STRUCTURE MEASURING
S-IVB STAGE POWER	RCA 110A COMPUTERS
IU POWER	DEE-6
SM POWER	LCC TM STATION (MONITOR)
BACK-UP BATTERIES	LCC TM RECORDING
COUNTDOWN CLOCK	USB STATION (GMIL)
OAT EQUIPMENT DEE-3 CM POWER	CIF (DATA CORE MODULE #1)
DTS	RANGE RADAR (C-BAND)
LCC MEASURING (LVO)	RANGE COMMAND RADAR (IU CMD SYS)
LCC DATA DISPLAY	RD 25002
DDAS	

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

14. COMPUTER PROC. IDENTIFICATION

BE02	EAPS	FT08	FT35	FU01	IALL	IZEA	LA01
BE03	EASS	FT10	FT37	GE01	IAMC	IZRE	OAPU
BT01	FE50	FT20	FT45	GT16	IAPX	IZSA	OAT1
EADS	FTB1	FT23	FT47	IAAR	IARS	IZ33	NT98
EAIC	FT04	FT27	FT49	IAED	IATC	LAPW	NT99
EAPF	FT06	FT33	FT55	IAFC	IATS	LAF2	ZT96

5. TEST DESCRIPTION (CONTINUED)

TEST REQUIREMENTS

LV	TM-011-001-2H	1.1.1.2, 1.1.1.3, 1.4.1.1, 1.4.1.2, 1.5.1 THRU 1.5.1.2.2 2.0.1.1, 2.0.1.2, 2.0.1.3, 2.0.1.4, 1.1.1.4.1, 1.8.1, 2.0.1.5, 2.0.1.6, 7.0.1, 7.0.2,
IU	7921601	0.3.4.2.3.2, 0.3.7.1.3, 0.3.5.2.2.3.2, 0.3.5.2.2.3.1 0.3.4.0.1
S-IVB	1B86721	NONE
S-IB	60C06050	NONE

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: TACS GAIN TEST (CTC5)

2. KSC TEST NUMBER: V-20143

3. EFFECTIVITY: AS-513 & 515

4. TEST OBJECTIVES

TO VERIFY THE FLIGHT CONTROL PSI (A0) AND PHI DOT (A1) TACS GAINS USING ATTITUDE ERROR/ATTITUDE RATE COMMANDS AND TACS ENGINE RELAY DUTY CYCLES FOR COAST MODE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [XX] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. THE STEPS NECESSARY TO PREPARE FLIGHT CONTROL SYSTEM FOR AUTOMATIC OPERATION ARE DETAILED.

B. THE STEPS NECESSARY TO LOAD AND EXECUTE TACS GAIN TEST (CTC5) FROM SANDERS DISPLAY STATION ARE DETAILED.

C. THE ATTITUDE ERROR INPUTS TO FLIGHT CONTROL COMPUTER WILL BE RECEIVED FROM LVDC/LVDA SUBSYSTEM.

D. ANGULAR RATE INPUTS TO FLIGHT CONTROL COMPUTER WILL BE SIMULATED USING TORQUER COIL INPUTS TO CONTROL/EDS RATE GYRO SUBSYSTEM.

E. THIS TEST WILL BE PERFORMED WITH FLIGHT CONTROL COMPUTER IN COAST MODE (UNDER PROGRAM CONTROL).

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED: N/A

B. THE FOLLOWING PROCEDURES/TESTS MUST BE COMPLETED PRIOR TO PERFORMING THIS TASK:
1. V-20141- FUNCTIONAL MEASURING CALIBRATION OF FCC IV CURRENT AND TACS RELAY CURRENTS.
2. V-23153- CONTROL/EDS RATE GYRO RAMP GENERATOR CALIBRATION
3. V-23187- LVDC/LVDA FLIGHT CONTROL SYSTEM INTERFACE TEST

CONFIGURATION: GUIDANCE AND CONTROL SUBSYSTEMS INSTALLED IN LAUNCH VEHICLE.

PHASE: III

TEST REQUIREMENTS (CONTINUED IN BLK 18)

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM 929	4-24-72
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Frank Bryan	LV-ENG	4-24-72

KSC FORM 23.838 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: TACS GAIN TEST (CTC5)

2. KSC TEST NUMBER: V-20143

3. EFFECTIVITY: AS-513 & 515

13. LOCATION: LC 39

14. COMPUTER PROC. INDENTIFICATION: CTC5

15. EST. TEST TIME: 6 MEN - 1 HOUR

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU GROUND AND STAGE POWER

OFF-COMPLEX: N/A

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)
LVDC/LVDA SYSTEM

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(BLOCK 5 CONTINUED FROM PAGE 1)

TEST REQUIREMENTS

TM-010-002-2H MSFC: 7916404

B.1.1.1.1.1
B.1.1.1.1.2
B.1.1.1.1.4
B.1.1.1.1.5
B.1.1.1.1.6

0.3.1.2.0.1.1
0.3.1.2.0.3.1
0.3.1.2.2.1.1
0.3.1.2.2.2
0.3.1.2.2.2.1
0.3.1.2.2.2.1.1
0.3.1.2.2.2.1.2
0.3.1.2.2.2.1.3
0.3.1.2.2.4.1

REV 33

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
END TO END POLARITY TEST (CTB6)

2. KSC TEST NUMBER
V-20144

3. EFFECTIVITY
AS-206 & SUBS

4. TEST OBJECTIVES

TO VERIFY CORRECT G&C SYSTEMS POLARITY IN RESPONSE TO ST-124M PLATFORM GIMBAL ANGLES RESULTING FROM ESE TORQUER COMMANDS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. THE STEPS NECESSARY TO PREPARE FLIGHT CONTROL SYSTEM FOR AUTOMATIC OPERATION ARE DETAILED.

B. THE STEPS NECESSARY TO LOAD AND EXECUTE END TO END POLARITY TEST (CTB6) FROM SANDERS DISPLAY STATION ARE DETAILED.

C. INPUTS TO FLIGHT CONTROL COMPUTER WILL BE ACCOMPLISHED BY TORQUING ST-124M PLATFORM TO PREDETERMINED VALUES.

D. PROPER POLARITY OF SIB AND SIVB ENGINE ACTUATORS WILL BE VERIFIED.

E. PROPER POLARITY OF SIVB APS SYSTEM WILL BE VERIFIED.

F. SYSTEM NULLS WILL BE VERIFIED.

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED: N/A

B. THE FOLLOWING PROCEDURES/TESTS MUST BE COMPLETED PRIOR TO PERFORMING THIS TASK:

1. V-23281 FLIGHT CONTROL COMPUTER SUBSYSTEM TEST.
2. V-23155 CONTROL/EDS RATE GYRO AND CONTROL SIGNAL PROCESSOR POLARITY TEST.

(SEE BLOCK 18, PAGE 2)

6. REV	DATE	REASON	Contractor Approval	KSC Approval
B	9/25/74	REVISE MSFC REQUIREMENTS	[illegible] 9/26/74	[illegible]
A	7/18/2	REVISE TEST REQUIREMENTS	[illegible]	[illegible]

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	[illegible]	4 26 72

10. NASA/KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
Frank Engen	[illegible]	5/1/72

KSC FORM [illegible]

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
END TO END POLARITY TEST (CTB6)

2. KSC TEST NUMBER
V-20144

3. EFFECTIVITY
AS -206 & SUBS

13. LOCATION
LC-39

14. COMPUTER PROC. INDENTIFICATION
CTB6

15. EST. TEST TIME
1 HOUR

16. SUPPORT REQUIREMENTS

INTERSTAGE: RD 21010
SIB ENGINE ACTUATION SYSTEM HYDRAULICS
SIVB STAGE POWER
IU GROUND AND STAGE POWER

OFF-COMPLEX: N/A

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5)

CONFIGURATION: A. ALL GUIDANCE AND CONTROL SUBSYSTEMS MUST BE INSTALLED IN THE LAUNCH VEHICLE.

B. LVDC/LVDA PROGRAM MUST USE THE SAME PLATFORM GIMBAL READ ROUTINE AND SAME PROCESSING TECHNIQUE AS FINAL FLIGHT PROGRAM.

PHASE: III

TEST REQUIREMENTS

TM-011-001-2H B.1.1.1.1.2 x	MSFC: 7921601 0.3.1.2.0.3.1 x
IB 86712 0.2.4.1.3.4	60C06050 3.1.2.8.1 x 3.1.2.8.2 x

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: LAUNCH VEHICLE EDS SINGLE STEP TEST (SATURN IB)

2. KSC TEST NUMBER: V-20145

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

THIS TEST IS DESIGNED TO CHECKOUT THE EMERGENCY DETECTION SYSTEM WITHIN THE LAUNCH VEHICLE. WITH THE EXCEPTION OF THE Q-BALL, RF ABORT REQUEST, AND THE S/C CONTROL OF SATURN CIRCUITRY, WHICH WILL BE CHECKED IN OTHER TESTS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST WILL BE RUN IN A SINGLE STEP MODE BY USE OF THE RCA 110A COMPUTER SYSTEM. THE COMPUTER WILL ISSUE COMMANDS TO THE LAUNCH VEHICLE CIRCUITRY, AND THEN COMPARE THE RESPONSES AGAINST A TABLE OF PREDICTED RESPONSES. ALL TESTS ARE RUN IN A CLOSED LOOP CONFIGURATION.

THIS TEST CONSISTS OF THREE PARTS AS FOLLOWS:

1. SPACE VEHICLE ABORT TEST. THIS PORTION OF THE TEST IS DESIGNED TO CHECKOUT 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 ENABLES CIRCUITRY IS VERIFIED ALONG WITH S/C CUTOFFS TO THE LAUNCH VEHICLE. S-IB AND S-IVB RSCR CUTOFFS ARE CHECKED. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

2. ENGINE OUT ABORT TEST. THIS PORTION OF THE TEST IS DESIGNED TO VERIFY THE ENGINE THRUST CIRCUITRY, AND ASSOCIATED ENABLE AND ABORT CIRCUITRY. THIS IS PERFORMED BY SIMULATING THE ENGINE THRUSTS WITH DISCRETES ISSUED BY THE COMPUTER. THE THRUST SIGNALS ARE PERMUTED TO SIMULATE ONE AND TWO ENGINES OUT AND TO VERIFY THE ASSOCIATED VOTING CIRCUITRY. THIS TEST ALSO SIMULATES THE THRUST SENSORS OF THE S-IB AND S-IVB ENGINES. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

3. RATE EXCESSIVE TEST. THIS PORTION OF THE TEST SIMULATES THE YAW, PITCH, AND ROLL EXCESSIVE RATES, THE ENABLES AND DISABLES AND THE ASSOCIATED EXCESSIVE RATES AUTO-ABORT VOTING LOGIC.

(CONTINUED ON PAGE 2, BLOCK 18)

PHASE: III, IV

TEST REQUIREMENTS
MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM 929	4/26/72

10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
Frank [illegible]	LL-ENG	5/1/72

KSC FORM 23-330 (7/69)

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APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: LAUNCH VEHICLE EDS SINGLE STEP TEST (SATURN IB)

2. KSC TEST NUMBER: V-20145

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: LC-39

14. COMPUTER PROG. INDENTIFICATION: IAED, IZSA, IZEA, IZRE

15. EST. TEST TIME: 5 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE:	GROUND AND STAGE FOR S-IB, S-IVB, IU
OFF-COMPLEX:	N/A
ON-COMPLEX:	110A COMPUTER DDAS MEASURING AND TELEMETRY DEE-6 TIMING BACK-UP BATTERIES QUALITY ASSURANCE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

40M67617	ICD EDS CHECKOUT SCHEMATICS
40M05484A	ICD SATURN VEHICLE ESE TO S/C ESE

18. ITEM CONTINUATION

(BLOCK 5, CONTINUED FROM PAGE 1)

CONFIGURATION:

THE LAUNCH VEHICLE, S-IB, S-IVB, AND IU WILL BE MECHANICALLY AND ELECTRICALLY MATED AND POSITIONED ON THE MOBILE LAUNCHER. THE APOLLO SIMULATOR WILL BE SUBSTITUTED FOR THE SPACECRAFT.

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: LAUNCH VEHICLE EDS TEST (SATURN IB)

2. KSC TEST NUMBER: V-20146

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

THIS TEST IS DESIGNED TO CHECKOUT THE EMERGENCY DETECTION SYSTEM WITHIN THE LAUNCH VEHICLE, WITH THE EXCEPTION OF THE Q-BALL, RF ABORT REQUEST, AND THE S/C CONTROL OF SATURN CIRCUITRY, WHICH WILL BE CHECKED IN OTHER TESTS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST WILL BE RUN IN AN AUTOMATIC MODE BY USE OF THE RCA 110A COMPUTER SYSTEM. THE COMPUTER WILL ISSUE COMMANDS TO THE LAUNCH VEHICLE CIRCUITRY, AND THEN COMPARE THE RESPONSES AGAINST A TABLE OF PREDICTED RESPONSES. ALL TESTS ARE RUN IN A CLOSED LOOP CONFIGURATION.

THIS TEST CONSISTS OF FIVE PARTS AS FOLLOWS:

1. LVDA DISCRETE OUTPUT TEST: THIS PORTION OF THE TEST IS DESIGNED TO CHECKOUT THE LVDA DISCRETE OUTPUTS AND THEIR ASSOCIATED INTERFACES WITH THE SPACECRAFT INDICATIONS AND LV ESE.

2. SPACE VEHICLE ABORT TEST: THIS PORTION OF THE TEST IS DESIGNED TO CHECKOUT 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 ENABLES CIRCUITRY IS VERIFIED ALONG WITH S/C CUTOFFS TO THE LAUNCH VEHICLE. S-IB AND S-IVB RSCR CUTOFFS ARE CHECKED. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

3. ENGINE OUT ABORT TEST: THIS PORTION OF THE TEST IS DESIGNED TO VERIFY THE ENGINE THRUST CIRCUITRY, AND ASSOCIATED ENABLE AND ABORT CIRCUITRY. THIS IS PERFORMED BY SIMULATING THE ENGINE THRUSTS WITH DISCRETES ISSUED BY THE COMPUTER. THE THRUST SIGNALS ARE PERMUTED TO SIMULATE ONE AND TWO ENGINES OUT AND TO VERIFY THE ASSOCIATED VOTING CIRCUITRY. THIS TEST ALSO SIMULATES THE THRUST SENSORS OF THE S-IB AND S-IVB ENGINES. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

4. RATE EXCESSIVE TEST: THIS PORTION OF THE TEST SIMULATES THE YAW, PITCH, AND ROLL EXCESSIVE RATES, THE ENABLES AND DISABLES, AND THE ASSOCIATED EXCESSIVE RATES AUTO-ABORT VOTING LOGIC.

(CONTINUED ON PAGE 2, BLOCK 18)

6. REV	DATE	REASON	Contractor Approval	KSC Approval
B	9/25/74	REVISE MSFC REQUIREMENTS	[illegible] 9-26-74	[illegible]
A	9/25/72	REVISED TEST REQUIREMENTS	[illegible]	[illegible]

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM 429	4/26/72

10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
Frank [illegible]	LV-ENG	5/1/72

KSC FORM 23-336 (7 67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: LAUNCH VEHICLE EDS TEST (SATURN IB)

2. KSC TEST NUMBER: V-20146

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: LC-39

14. COMPUTER PROC. IDENTIFICATION: IAED, IZ33, FT33, IZSA, IZEA, IZRE, IAHD, IZRC, IZET, IZRT.

15. EST. TEST TIME: 3 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: GROUND AND STAGE S-IB, S-IVB, IU

OFF-COMPLEX: N/A

ON-COMPLEX: 110A COMPUTER
DDAS
MEASURING AND TELEMETRY
DLE-6
TIMING
BACKUP BATTERIES
QUALITY ASSURANCE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

40M67617 ICD EDS CHECKOUT SCHEMATICS

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5, PAGE 1)

5. ENGINE CUTOFF TEST: THIS PORTION OF THE TEST CHECKS THE RANGE SAFETY CUTOFF TO THE S-IB AND S-IVB STAGES AND THE EDS CUTOFF TO THE S-IB AND SIVB STAGES. THE NON-SPACECRAFT RELATED CIRCUITRY IN THE EDS DISTRIBUTOR WILL BE VERIFIED AS WELL. NO LIFTOFF WILL BE ISSUED TO THE SPACECRAFT.

CONFIGURATION: THE LAUNCH VEHICLE, S-IB, SIVB, AND IU WILL BE MECHANICALLY AND ELECTRICALLY MATED AND POSITIONED ON THE MOBILE LAUNCHER. THE APOLLO SIMULATOR WILL BE SUBSTITUTED FOR THE SPACECRAFT.

PHASE: III AND IV

TEST REQUIREMENTS

MSFC: 7921001
0.3.4.2.3.2 ✓
0.3.4.2.5 ✓
0.3.6.0 ✓
0.3.6.1 ✓
0.3.6.1.1 ✓
0.3.6.1.2 ✓
0.3.6.1.2.1 ✓
0.3.6.2.1 ✓
0.3.6.3.1 ✓
0.3.6.4.1 ✓
0.3.6.5.1 ✓
0.3.6.2.2

60C06050
3.5.4.3 ✓

TM-011-001-2H
B.1.6.1.1.1 ✓ B.7.0.1 ✓
B.1.6.1.1.2 ✓ B.7.0.2 ✓
B.1.6.1.1.3 ✓
B.1.6.1.1.4 ✓
B.1.6.1.2.1 ✓
B.1.6.1.2.2 ✓
B.1.6.1.2.3 ✓
B.1.6.1.2.4 ✓
B.1.6.1.3.1 ✓
B.1.6.1.3.2 ✓
B.1.6.1.4.1 ✓
B.1.6.1.5.1 ✓
B.1.6.1.5.2 ✓
B.13.2.1.2.9

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: SPACECRAFT/LAUNCH VEHICLE MATE AND DEMATE (SATURN IB)

2. KSC TEST NUMBER: V-20147

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

A. TO MECHANICALLY MATE THE SPACECRAFT TO THE LAUNCH VEHICLE.

B. TO MECHANICALLY DE-MATE THE SPACECRAFT FROM THE LAUNCH VEHICLE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS OPERATION IS DIVIDED INTO TWO PARTS:

A. THE INSTRUMENT UNIT FORWARD MATING SURFACE IS PREPARED FOR MATING THE SPACECRAFT. ALL PROTECTIVE DEVICES OVER THE INSTRUMENT UNIT ARE REMOVED. THE SPACECRAFT IS POSITIONED OVER THE IU, THEN LOWERED AND MATING HARDWARE IS INSTALLED AND TORQUED.

B. THE HOISTING SLING IS ATTACHED TO THE SPACECRAFT. THE MATING HARDWARE IS REMOVED AND THE SPACECRAFT IS THEN REMOVED FROM THE LAUNCH VEHICLE.

CONFIGURATION:

PART A. LAUNCH VEHICLE STACKED.
PART B. LAUNCH VEHICLE AND SPACECRAFT STACKED.

TEST REQUIREMENTS

PHASE: II, IV

MSFC: 7921601 TM-011-001-2H
0.3.3.3 B.1.3.1 x
0.3.3.3.1 x B.1.3.2 x

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	9/25/74	REVISE MSFC REQUIREMENTS	9/26/74	

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM - 929	4/26/72
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Frank Bryan	LV-ENG	5/1/72

KSC FORM 22-338 (5-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: SPACECRAFT/LAUNCH VEHICLE MATE AND DEMATE (SATURN IB)

2. KSC TEST NUMBER: V-20147

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: VAB

14. COMPUTER PROC. INDENTIFICATION: N/A

15. EST. TEST TIME: 17 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NR
SIVB MECH

OFF-COMPLEX: N/A

ON-COMPLEX: IBM QA, PLATFORMS, KSC SAFETY, FIREMEN, SWING ARMS, 750/75 TON CRANE, SECURITY

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NR PROC. K3117, K-V-053, 13M50303B, MIL-C-5541, 10M15003, 60C18206, 60C18256

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

1. TEST TITLE
FUNCTIONAL, POLARITY, AND MEASURING CALIBRATION OF S-IVB CRP AND FCC IV CURRENT (SATURN IB)

2. KSC TEST NUMBER
V-20148

3. EFFECTIVITY
AS-206 & SUBS

4. TEST OBJECTIVES

A. TO VERIFY PROPER OPERATION OF THE CONTROL RELAY PACKAGES.

B. TO ACHIEVE THE FOLLOWING:

1. S-IVB TELEMETRY CALIBRATION.
2. CALIBRATION OF S-IB AND S-IVB ENGINE DEFLECTION PANEL SERVO VALVE CURRENT METERS, S-IVB ENGINE DEFLECTION PANEL RELAY MONITOR AND VALUE MONITOR METERS, AND LCC FLIGHT CONTROL RECORDERS. (CONTINUED ON PAGE 2, BLOCK 18).

5. TEST DESCRIPTION, EQUIPMENT STATUS, CONFIGURATION

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

DESCRIPTION:

A. THE CONTROL RELAY PACKAGE WILL BE VISUALLY INSPECTED PRIOR TO CONNECTING THE TEST EQUIPMENT.

B. RELAY OPERATION RESULTING FROM CONTROL COMPUTER TEST RAMPS WILL BE MONITORED AT TEST CONNECTOR J-4 WITH APS TEST SET.

C. WHEN PROPER RELAY OPERATION IS VERIFIED FOR A GIVEN INPUT, THE S-IVB ENGINE DEFLECTION PANEL RELAY MONITOR AND VALVE MONITOR METERS, THE LCC FLIGHT CONTROL RECORDER APS RELAY CURRENT AND APS VALVE CURRENT CHANNELS, AND TELEMETRY ARE CALIBRATED.

D. CONTROL RATE GYRO SUBSTITUTE RAMPS ARE USED AS INPUTS TO THE CONTROL COMPUTER TO PRODUCE THE REQUIRED SERVO VALVE CURRENT OUTPUTS. THE S-IB AND S-IVB ENGINE DEFLECTION PANEL SERVO VALVE CURRENT METERS, THE LCC FLIGHT CONTROL RECORDER SERVO VALVE CURRENT CHANNELS, AND TELEMETRY ARE CALIBRATED.

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED:

1. APS TEST SET AND ASSOCIATED CABLES.
2. APS VALVE SIMULATOR AND ASSOCIATED CABLES
3. CONTROL RELAY PACKAGE FUSE BOX.
4. US2P0228 INTERRUPT BOX (OR EQUIVALENT).

CONFIGURATION:

FLIGHT CONTROL COMPUTER INSTALLED IN VEHICLE AND IN OPERATING CONDITION TO PROVIDE APS AND SERVO VALVE CURRENT SIGNALS.

TEST REQUIREMENTS

PHASE: III

MSFC: 7921601 - 0.3.1.2.0.4.1 x TM-011-001-2H B.7.0.2

REV	DATE	REASON	Contractor Approval	KSC Approval
A	8/27/74	REVISED MSFC REQUIREMENTS		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
		9/6/72

10. NASA/KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
		9/1/72

13. REVISION (Y/N)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

1. TEST TITLE
FUNCTIONAL, POLARITY, AND MEASURING CALIBRATION OF S-IVB CRP AND FCC IV CURRENT (SATURN IB)

2. KSC TEST NUMBER
V-20148

3. EFFECTIVITY
AS-206 & SUBS

13. LOCATION
LC-39

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
7 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: S-IVB GROUND AND STAGE POWER
IU GROUND AND STAGE POWER
S-IVB MEASURING
IU MEASURING

OFF COMPLEX: N/A

ON COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(BLOCK 4, CONTINUED FROM PAGE 1)

3. VERIFICATION OF THE TEST (J-4), OUTPUT (J-2), INPUT (J-1) AND TELEMETRY (J-3) CONNECTORS OF THE CONTROL RELAY PACKAGE.

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REV 33

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: TILT AND ROLL PROGRAM CHECK (SATURN IB)

2. KSC TEST NUMBER: V-20149

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

TO VERIFY THAT THE PROGRAMMED TILT AND ROLL PROFILE WILL PROVIDE STEERING COMMANDS OF THE PROPER POLARITY TO THE S-IB ENGINE ACTUATORS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

THE ST-124M IS ALIGNED TO THE FLIGHT AZIMUTH. THE COUNT CLOCK IS STARTED AT T-10 MINUTES AND S-IB HYDRAULICS ARE ENERGIZED AT T-3 MINUTES. THE ACTUAL FLIGHT OPTION OF THE GUIDANCE PROGRAM IS SELECTED AND GUIDANCE RELEASE ALERT IS SIMULATED AT APPROXIMATELY MINUS 22 SECONDS. GUIDANCE REFERENCE RELEASE IS SIMULATED AT APPROXIMATELY MINUS 17 SECONDS. S-IB HYDRAULICS ARE TURNED OFF WHEN THE ENGINE ACTUATORS REACH 6 DEGREES. THE GUIDANCE PLUS TIME PROFILE IS TERMINATED AT APPROXIMATELY PLUS 3 MINUTES.

EQUIPMENT STATUS:

THE FOLLOWING TEST EQUIPMENT WILL BE USED: FLIGHT CONTROL COMMAND BOX (PKKB)

CONFIGURATION:

A. THE FINAL LVDC/LVDA FLIGHT PROGRAM IS REQUIRED FOR THIS TEST.

B. ALL GUIDANCE AND CONTROL SUBSYSTEMS MUST BE INSTALLED IN THE LAUNCH VEHICLE.

PHASE: V

TEST REQUIREMENTS

MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	9/25/74	REVISE MSFC REQUIREMENTS		
A	3/17/72	REVISE BLOCK 5		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM 929	4/26/72

10. NASA-KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
	LC-Engineering	5/1/72

KSC FORM 28-338 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: TILT AND ROLL PROGRAM CHECK (SATURN IB)

2. KSC TEST NUMBER: V-20149

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: LC-39

14. COMPUTER PROC. INDENTIFICATION: FT06, FT25, FT42

15. EST. TEST TIME: 15 MEN -- 2 HRS EACH

16. SUPPORT REQUIREMENTS

RD 21009

INTERSTAGE: S-IB ENGINE ACTUATOR SYSTEM HYDRAULICS
S-IVB STAGE POWER
IU GROUND AND STAGE POWER
S-IB GROUND AND STAGE POWER

OFF-COMPLEX: RD 21009 (CIF COUNT CLOCK DISPLAY)

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
FLIGHT CONTROL SYSTEM FREQUENCY RESPONSE TEST (SATURN IB)

2. KSC TEST NUMBER
V-20150

3. EFFECTIVITY
AS-206 & SUBS

4. TEST OBJECTIVES

1. PROVIDE DATA FOR EVALUATION OF THE FILTER CHARACTERISTICS OF THE FLIGHT CONTROL COMPUTER.
2. DETERMINE EXTENT OF NULL AND NOISE AT THE SERVO AMPLIFIER OUTPUTS, WITH AND WITHOUT INPUT SENSORS CONNECTED.
3. TO VERIFY IMPEDANCE MISMATCH DOES NOT EXIST BETWEEN THE FLIGHT CONTROL COMPUTER SERVO AMPLIFIER AND THE S-IB SERVO VALVE COILS.

5. TEST DESCRIPTION, EQUIPMENT, STATUS, CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

1. SENSOR INPUTS WILL BE APPLIED TO THE FLIGHT CONTROL COMPUTER THROUGH USE OF THE "SYSTEM RESPONSE TESTER" AT PRESELECTED FREQUENCIES AND AMPLITUDES. THE SERVO AMPLIFIER OUTPUTS WILL BE MONITORED ALONG WITH THE INPUT SIGNALS IN ORDER TO PROVIDE PHASING AND AMPLITUDE RESPONSE INFORMATION FOR EVALUATION OF THE FILTER CHARACTERISTICS.
2. THE SERVO AMPLIFIER OUTPUTS WILL BE RECORDED WITH AND WITHOUT THE FLIGHT CONTROL SENSORS CONNECTED TO THE FLIGHT CONTROL COMPUTER IN ORDER TO OBSERVE OUTPUT NULLS AND NOISE CHARACTERISTICS.
3. THE S-IB ACTUATOR SERVO VALVES ARE ELECTRICALLY CONNECTED THROUGH THE VEHICLE HARNESS TO THE FLIGHT CONTROL COMPUTER. OSCILLATING INPUTS ARE APPLIED USING THE SYSTEM RESPONSE TESTER TO EACH SERVO AMPLIFIER AND AT LEAST THREE (3) FULL CYCLES OF EACH SERVO OUTPUT ARE RECORDED AND OBSERVED FOR IMPEDANCE MISMATCH.

THE FOLLOWING TEST EQUIPMENT IS REQUIRED TO PERFORM THIS TEST:

1. SYSTEM RESPONSE TESTER 7919528-1
2. RECORDER ASSEMBLY RACK 7919528-1
3. DAC PART NO. 1B62199-1 FOR EACH OF TWO S-IVB ACTUATORS.
4. S-IB SERVO VALVE DUMMY LOAD (ACTUATOR) B-15 FOR EACH ACTUATOR.

CONFIGURATION: THE CONTROL COMPUTER, CONTROL ACCELEROMETERS, CONTROL/EDS RATE GYROS, AND CONTROL SIGNAL PROCESSOR HAVE BEEN INSTALLED IN IU.

PHASE: III

TEST REQUIREMENTS
MSFC: 7921601
0.3.1.2.0.5
0.3.1.2.0.5.1

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM 929	4/26/72
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Frank [illegible]	LO-ENG	5/1/72

KSC FORM 29-328 (7-69)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
FLIGHT CONTROL SYSTEM FREQUENCY RESPONSE TEST (SATURN IB)

2. KSC TEST NUMBER
V-20150

3. EFFECTIVITY
AS-206 & SUBS

13. LOCATION
LC-39

14. COMPUTER PROG. INDENTIFICATION
NOT REQUIRED

15. EST. TEST TIME
6 MEN - 12 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU GROUND AND STAGE POWER
S-IVB STAGE POWER AND VEHICLE NETWORKS
S-IB VEHICLE NETWORKS

OFF-COMPLEX: N/A

ON-COMPLEX: QUALITY ASSURANCE
FACILITY COMMUNICATIONS (OIS)
TIMING
IU VEHICLE NETWORKS
CDAS

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: G2 GAIN AND CONTROL ACCELEROMETER LINEARITY TEST (CTB7)

2. KSC TEST NUMBER: V-20153

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

TO VERIFY FLIGHT CONTROL SYSTEM G2 GAINS USING CONTROL ACCELEROMETER COMMANDS AND S-IB ACTUATOR POSITIONS. TO VERIFY CONTROL ACCELEROMETER OUTPUT LINEARITY AND C.A.T. PROFILE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. THE CONTROL ACCELEROMETER WILL BE ELECTRICALLY CONNECTED.

B. THE FLIGHT CONTROL COMPUTER WILL BE ELECTRICALLY CONNECTED.

C. THE CONTROL ACCELEROMETERS (PITCH AND YAW) ARE TORQUED VIA DRG #3 AND LINEARITY IS VERIFIED.

D. THE CONTROL ACCELEROMETERS ARE TORQUED TO A CONSTANT OUTPUT AND THE FCC C.A.T. IS STARTED. THE C.A.T. PROFILE IS VERIFIED VIA THE IV'S/ACTUATORS.

EQUIPMENT STATUS:

THE FOLLOWING TEST EQUIPMENT WILL BE USED: N/A

CONFIGURATION:

THE CONTROL ACCELEROMETERS AND FLIGHT CONTROL COMPUTER SUBSYSTEMS INSTALLED IN THE LAUNCH VEHICLE.

TEST REQUIREMENTS
SEE BLOCK 18

PHASE: III

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
C	9/25/74	REVISE MSFC REQUIREMENTS	[illegible] 9/24/74	[illegible]
B	6/25/72	CHANGE HAZARDOUS LEVEL	[illegible]	[illegible]
A	7/10/72	REVISE TEST REQUIREMENTS	[illegible]	[illegible]

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	[illegible]	9/26/72

10. NASA-KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
[illegible]	[illegible]	5/1/72

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: G2 GAIN AND CONTROL ACCELEROMETER LINEARITY TEST (CTB7)

2. KSC TEST NUMBER: V-20153

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: LC39

14. COMPUTER PROC. IDENTIFICATION: CTB7

15. EST. TEST TIME: 1 HOUR

16. SUPPORT REQUIREMENTS

INTERSTAGE:	IU STAGE POWER S-IB STAGE POWER S-IB HYDRAULIC POWER S-IVB STAGE POWER
OFF-COMPLEX:	N/A
ON-COMPLEX:	Q.A. FACILITY COMMUNICATIONS (OIS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

N/A

18. ITEM CONTINUATION

TEST REQUIREMENTS

MSFC:	7921601	TM-011-001-2H
	0.3.1.2.0.1.1	B.1.1.1.1.1
	0.3.1.2.0.2.1 ✗	B.1.1.1.1.2
	0.3.1.2.0.2.1.3 ✗	B.1.1.1.1.6 ✗
	0.3.1.2.0.3.1	
	0.3.1.2.3.3.3	60C06050
		3.1.2.8.2 ✗
		3.1.2.8.5 ✗

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1 TEST TITLE: FAS/LAUNCH VEHICLE MATE AND DEMATE

KSC TEST NUMBER: V-20154

3 EFFECTIVITY: AS-513, 515

4 TEST OBJECTIVES

A. TO MECHANICALLY MATE THE FAS TO THE LAUNCH VEHICLE.

B. TO MECHANICALLY DE-MATE THE FAS FROM THE LAUNCH VEHICLE.

5 EFFECTS ON EQUIPMENT STATUS CONFIGURATION

THIS TEST X DOES DOES NOT CONTAIN HAZARDOUS OPERATIONS.

THIS OPERATION IS DIVIDED INTO TWO PARTS:

A. THE INSTRUMENT UNIT FORWARD MATING SURFACE IS PREPARED FOR MATING THE FAS. ALL PROTECTIVE DEVICES, EXCEPT CABLE TRAY COVERS, OVER THE INSTRUMENT UNIT ARE REMOVED. THE FAS IS POSITIONED OVER THE IU, THEN LOWERED AND MATING HARDWARE IS INSTALLED AND TORQUED.

B. THE HOISTING SLING IS ATTACHED TO THE FAS. THE MATING HARDWARE IS REMOVED AND THE FAS IS THEN REMOVED FROM THE LAUNCH VEHICLE.

CONFIGURATION:

PART A. LAUNCH VEHICLE STACKED.
PART B. LAUNCH VEHICLE AND FAS STACKED.

TEST REQUIREMENTS

PHASE: II, IV

MSFC: 7916404
0.3.3.1
TM-010-002-2H
B.1.4.1
B.1.4.3.3

6 REV.	DATE	REASON	Contractor Approval	KSC Approval

7 CONTRACTOR APPROVAL	8 ORGANIZATION	9 DATE
[illegible]	IBM - 929	4/26/72
10 NASA/KSC APPROVAL	**11 ORGANIZATION**	**12 APPROVAL DATE**
Frank [illegible]	LV-ENG	5/1/72

KSC FORM 33-338 (1-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1 TEST TITLE: FAS/LAUNCH VEHICLE MATE AND DEMATE

2 KSC TEST NUMBER: V-20154

3 EFFECTIVITY: AS-513, 515

13 LOCATION: VAB

14 COMPUTER PROC. IDENTIFICATION: N/A

15 EST. TEST TIME: 17 HOURS

16 SPECIAL REQUIREMENTS

INTERSTAGE: OWS MECH.

OFF-COMPLEX: N/A

ON-COMPLEX: IBM QA, PLATFORMS, KSC SAFETY, FIREMEN, SWING ARMS, 750/75 TON CRANE, SECURITY

17 OTHER APPLICABLE REFERENCE DOCUMENTATION

K-V-053	13M50303	10M15131	10M15123
MDAC TCP KM-3000	MIL-C-5541	10M1511X	10M1512X

18 ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

1. TEST TITLE: EDS OVERALL AND COUNTDOWN TEST

2. KSC TEST NUMBER: V-21096

3. EFFECTIVITY: AS-503 THRU 512, AS-206 & SUBS

4. TEST OBJECTIVES

THIS TEST IS DESIGNED TO CHECK OUT THE EMERGENCY DETECTION SYSTEM WITHIN THE SPACECRAFT AND LAUNCH VEHICLE WITH THE EXCEPTION OF THE Q-BALL CIRCUITRY WHICH IS CHECKED IN OTHER TESTS. THIS TEST IS TO DEMONSTRATE END-TO-END COMPATIBILITY AND OPERATION OF THE SPACE VEHICLE EMERGENCY DETECTION SYSTEM.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES XX DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST IS INCORPORATED IN NAR TEST K-0042. THIS TEST WILL BE RUN IN AN AUTOMATIC MODE BY USE OF THE RCA 110A SYSTEM. THE COMPUTER WILL ISSUE COMMANDS TO THE SPACE VEHICLE CIRCUITRY AND THEN COMPARE THE RESPONSES AGAINST THE TABLES OF EXPECTED RESPONSES.

THIS TEST CONSISTS OF FIVE PARTS AS FOLLOWS:

1. LVDA DISCRETE OUTPUT TEST - THIS PORTION OF THE TEST IS DESIGNED TO CHECK OUT THE LVDA DISCRETE OUTPUTS AND THEIR ASSOCIATED INTERFACES WITH THE SPACECRAFT INDICATIONS AND LV ESE.

2. SPACE VEHICLE ABORT TEST - THIS PORTION OF THE TEST IS DESIGNED TO CHECK OUT 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 ENABLES CIRCUITRY ARE VERIFIED ALONG WITH S/C CUTOFFS TO THE LAUNCH VEHICLE. RSCR CUTOFFS ARE CHECKED. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

3. ENGINE OUT ABORT TEST - THIS PORTION OF THE TEST IS DESIGNED TO VERIFY THE ENGINE THRUST CIRCUITRY, AND ASSOCIATED ENABLE AND ABORT CIRCUITRY. THIS IS PERFORMED BY SIMULATING THE ENGINE THRUSTS WITH DISCRETES ISSUED BY THE COMPUTER. THE THRUST SIGNALS ARE PERMUTED TO SIMULATE ONE AND TWO ENGINES OUT AND TO VERIFY THE ASSOCIATED VOTING CIRCUITRY. THIS TEST ALSO SIMULATES THE THRUST SENSORS OF THE ENGINES. COMMAND MODULE INDICATIONS WILL BE VERIFIED.

4. RATE EXCESSIVE TEST - THIS PORTION OF THE TEST CHECKS OUT THE ENABLES AND DISABLES AND THE ASSOCIATED EXCESSIVE RATES AUTO-ABORT VOTING LOGIC. THE YAW, PITCH AND ROLL EXCESSIVE RATES ARE SIMULATED VIA RCA 110A COMPUTER DISCRETES.

5. ENGINE CUTOFF TEST - THIS PORTION OF THE TEST CHECKS RANGE SAFETY CUTOFF TO THE L/V STAGES AND EDS CUTOFF TO THE L/V STAGES. THE NON-SPACECRAFT RELATED CIRCUITRY IN THE EDS DISTRIBUTOR WILL BE VERIFIED AS WELL. NO LIFTOFF WILL BE ISSUED TO THE SPACECRAFT.

(CONTINUED IN BLOCK 18)

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE CONTINUATION SHEET FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/ R. L. MONTECALVO	IBM - 929	

10. NASA-KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
S/ I. RIGELL	LV-ENG	

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

1. TEST TITLE: EDS OVERALL AND COUNTDOWN TEST

2. KSC TEST NUMBER: V-21096

3. EFFECTIVITY: AS-503 THRU 512, AS-206 & SUBS

13. LOCATION: LC 39

14. COMPUTER PROC. IDENTIFICATION: VAED, VZSA, VZEA, VZ33, FT33, VZEC, IAED, IZ33, IZSA, IZEA, IZRE, IZEC

15. EST. TEST TIME: .5 HOURS

15. SUPPORT REQUIREMENTS

INTERSTAGE:	L/V GROUND AND STAGE POWER SPACECRAFT SUPPORT
OFF-COMPLEX:	TONE LINE
ON-COMPLEX:	110A COMPUTER DDAS MEASURING & TM ABORT ADVISORY SYSTEM DEE-6 TIMING BACKUP BATTERIES

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

40M37543 ICD EDS CHECKOUT SCHEMATICS
40M67617 ICD EDS CHECKOUT SCHEMATICS

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 5)

CONFIGURATION: THE SPACE VEHICLE IS MECHANICALLY AND ELECTRICALLY MATED ON THE ML. THE VEHICLE WILL BE POSITIONED AT THE PAD.

PHASE: VA, VB, VI

SATURN IB TEST REQUIREMENTS

MSFC: 7921601	TM-011-001-2H
	B.1.6.1.1.1 *
0.3.4.2.3.2 *	B.1.6.1.1.2 *
0.3.4.2.5 *	B.1.6.1.1.3 *
0.3.6.0 *	B.1.6.1.1.4 *
0.3.6.1 *	B.1.6.1.2.1 *
0.3.6.1.1 *	B.1.6.1.2.2 *
	B.1.6.1.2.3 *
0.3.6.1.2 *	B.1.6.1.2.4 *
0.3.6.1.2.1 *	B.1.6.1.3.1 *
	B.1.6.1.3.2 *
0.3.6.2.1 *	B.1.6.1.4.1 *
0.3.6.2.2 *	B.1.6.1.5.1 *
	B.1.6.1.5.2 *
0.3.6.3.1 *	B.7.0.1 *
	B.7.0.2 *
0.3.6.4.1 *	B.13.2.1.2.9
0.3.6.5.1 *	

SATURN V TEST REQUIREMENTS

MSFC: 7916404	SID 1465-7
0.3.4.0.1	2.3.1.1.1
0.3.4.2.3.2	2.3.1.1.3*
0.3.4.2.5	2.3.1.1.4*
0.3.6.0	2.3.1.1.5*
0.3.6.1	
0.3.6.1.1	TM-010-002-2H
0.3.6.1.2	B.1.7.3.1
0.3.6.1.2.1	B.1.7.3.2
	B.8.0.1
0.3.6.2.1	B.8.0.2
0.3.6.3.1	
0.3.6.4.1	
0.3.6.5.1	

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET) — PAGE 3 OF 3

1. TEST TITLE: EDS OVERALL AND COUNTDOWN TEST

2. KSC TEST NUMBER: V-21096

3. EFFECTIVITY: AS-206 & SUB AS-503 THRU 512

ITEM CONTINUATION

REVISION HISTORY

REV	DATE	REASON	CONT. APPR.	KSC APPR.
A	8/1/9	UPDATE MSFC REQUIREMENTS	S/S. HAYS	S/I. RIGELL
B	6/3/9	REV. MSFC REQ'S & BLOCKS 5, 16, AND 17	S/W. BAKER	S/I. RIGELL
C	10/1/9	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
D	1/8/70	REVISE MSFC REQUIREMENTS	S/W. BAKER	S/F. BRYAN
E	9/13/71	REVISE BLOCKS 5, 14, 15, 16, AND 18	[illegible]	Frank 9/22 Bryan '71 [illegible]
F	5/2/72	REVISE BLOCKS 5, 14, 16, 17 AND EFFECTIVITY	[illegible]	Frank Bryan [illegible]
G	1/12/73	REVISE BLOCK 18	[illegible]	Frank Bryan 1-15/73
H	9/25/74	REVISE MSFC REQUIREMENTS	[illegible] 9/26/74	Frank Bryan [illegible]

KSC FORM 23-233A (7-67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE
IU ESE SYSTEM HARDLINE SAFING FUNCTIONAL TEST

2. KSC TEST NUMBER
V-21371

3. EFFECTIVITY
AS-206 & SUBS AS-512 & SUBS

4. TEST OBJECTIVES
THE PURPOSE OF THIS PROCEDURE IS TO VERIFY THE PROPER OPERATION OF THE HARDWIRE SAFING CIRCUITS FROM THE LCC TO THE ML (IU ESE AND EDS).

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

PART I

WITH THE GROUND COMPUTER SUPPORTING SWITCH ACTIONS AND THE HARDWIRE SAFING BUS OFF PROPER OPERATION OF COMPUTER DATA LINK WILL BE VERIFIED FOR THOSE SWITCH ACTIONS THAT ARE ALSO HARDWIRED.

PART II

WITH THE HARDWIRE SAFING BUS ENERGIZED AND THE ML DCE IN THE MANUAL MODE OF OPERATION, SAFING FUNCTIONS WILL BE INITIATED FROM THE IU ESE PANELS IN THE LCC AND PROPER OPERATIONS WILL BE VERIFIED.

PART III

WITH 20D135 AND 20D235 POWER ON AND 6D110 POWER OFF, THE EDS HARDWIRE FUNCTIONS ARE CHECKED FROM THE EDS PANEL. DLO SUPPORT IS REQUIRED FOR CVTS/LOM ABORT REQUEST.

PART IV

THE VEHICLE SINGLE POINT GROUND FOR ESE CABLE SHIELDING WILL BE DISCONNECTED FROM IU. RESISTANCE READINGS WILL BE TAKEN AT CROSSOVER DISTRIBUTOR, OR FROM UMBILICAL CABLE, TO DETERMINE IF ANY UNKOWN GROUNDS ARE ON THE CIRCUIT. IF ANY ARE FOUND, FURTHER INVESTIGATION WILL BE UNDERTAKEN.

CONFIGURATION:
N/A

TEST REQUIREMENTS
N/A

PHASE:
ID, II V

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE PAGE 3 FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL S/G.E. LECKIE	8. ORGANIZATION IBM - K73	9. DATE FEBRUARY 20, 1968
10. NASA-KSC APPROVAL S/L.R. DAVIS	11. ORGANIZATION LV-GDC-25	12. APPROVAL DATE FEBRUARY 20, 1968

KSC FORM 23 (JUL 1 67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE
IU ESE SYSTEM HARDLINE SAFING FUNCTIONAL TEST

2. KSC TEST NUMBER
V-21371

3. EFFECTIVITY
AS-206 & SUBS/AS-512 & SUB

13. LOCATION
LC-39 A & B

14. COMPUTER PROGRAM IDENTIFICATION
N/A

15. EST. TEST TIME
7 MEN - 4 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF-COMPLEX: NONE

ON-COMPLEX: IBM QUALITY
IBM GROUND COMPUTER
IBM GROUND NRTWORKS
IBM DDAS
IBM MECHANICAL
DLO (LOM OR CVTS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

APPLICABLE DOCUMENTATION	AS-512 & SUBS	AS-206 & SUBS
SYSTEM INT/ESE	40M13780	40M67796
IU ESE	40M14490	40M67793
EDS ESE	40M13162	40M67794
IU POWER	40M13604	40M67707

APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET) — PAGE 3 OF 3

1. TEST TITLE: IU ESE SYSTEM HARDLINE SAFING FUNCTIONAL TEST

2. KSC TEST NUMBER: V-21371

3. EFFECTIVITY: SL-206 & SUB, AS-512 & SUB

ITEM CONTINUATION

REVISION HISTORY

REV	DATE	REASON	CONTR. APP.	KSC APP.
A	7/19/8	DEPT. CHANGE & CONFIGURATION MODIFICATION	S/B.CRAVEY	S/L.DAVIS
B	12/6/8	MODIFY BLOCK 5	S/B.CRAVEY	S/L.DAVIS
C	7/25/9	CHANGE EFFECTIVITY FROM AIRBORNE TO GSE	S/D.HEINS	S/L.DAVIS
D	1/9/70	REVISE MSFC REQUIREMENTS	S/J.PEURRUNG	S/L.DAVIS
E	3/16/1	MODIFY BLOCKS 4, 5, 15, 16	S/G.LECKIE	S/L.DAVIS
F	12/13/1	MODIFY BLOCK 5	S/G.LECKIE	S/L.DAVIS
G	3/1/2	MODIFY BLOCKS 3, 13, 16, 17	S/G.LECKIE	S/L.DAVIS
H	3/14/3	REVISE BLOCKS 5, 16	G. Leckie 3-14-73	L.R. Davis 3-21-73
I	10/30/74	REVISED BLOCK 5	J.E. Fraser 10-30-74	L.R. Davis 10/30/74

KSC FORM 23-328A (7/67)

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE
SWITCH SELECTOR BENCH TEST AND TEST SET VALIDATION PROCEDURE

2. KSC TEST NUMBER
V-21541

3. EFFECTIVITY
LAB

4. TEST OBJECTIVES
THIS PROCEDURE PROVIDES THE NECESSARY INSTRUCTIONS FOR CONNECTING SWITCH SELECTOR TO SWITCH SELECTOR TEST SET AND OPERATION OF THE SWITCH SELECTOR THROUGH VARIOUS MODES OF TESTING TO VERIFY THAT A SWITCH SELECTOR IS OPERATIONAL.

PROVIDES THE NECESSARY DIRECTIONS FOR VERIFYING THE SWITCH SELECTOR TEST SET IS OPERATIONAL AND VALIDATING TEST SET, UTILIZING A STANDARD SWITCH SELECTOR.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

PART I

A. PROVIDES THE NECESSARY STEPS FOR CONNECTING THE SWITCH SELECTOR TO SWITCH SELECTOR TEST SET TO PERFORM VARIOUS MODES OF TESTING, WHICH ARE:

1. CONTINUITY CHECKS
2. AUTO-SLOW TEST
3. AUTO-FAST TEST
4. MANUAL TEST

SEE ITEM 18 FOR CONTINUATION

PHASE: 1A THRU VI

TEST REQUIREMENTS
MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	9/23/74	CHANGE EFFECTIVITY	9-25-74	10/1/74
A	3/2/72	REVISED BLOCKS 2 & 3	5-22-72	5-22-72

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM/K73	2/15/72

10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
	LV-EAE-25	2/16/72

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE
SWITCH SELECTOR BENCH TEST AND TEST SET VALIDATION PROCEDURE

2. KSC TEST NUMBER
V-21541

3. EFFECTIVITY
LAB

13. LOCATION
VAB 25E

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
PT I-1 HR; PT II-2 HRS.

16. SUPPORT REQUIREMENTS

1. INTERSTAGE REQUIREMENTS - EACH STAGE CONTRACTOR WILL PROVIDE PERSONNEL TO MONITOR TESTING OF THEIR SWITCH SELECTOR. IBM WILL PERFORM TEST ON SWITCH SELECTORS.

2. IBM QUALITY ASSURANCE AND OTHER STAGE QUALITY PERSONNEL WILL BOTH STAMP QV POINTS.

OFF COMPLEX SUPPORT - NONE

ON COMPLEX SUPPORT - NONE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE PAGE 3 ITEM CONTINUATION

18. ITEM CONTINUATION

CONTINUED FROM BLOCK 5

B. 1. CONTINUITY CHECKS VERIFY NO SHORTS OR OPENS EXIST ON VARIOUS CONTROL AND POWER LINES AND ARE TO BE PERFORMED PRIOR TO APPLYING POWER TO SWITCH SELECTOR.

2. AUTO-SLOW STEPS THROUGH ALL CHANNELS SEQUENTIALLY VERIFYING PROPER CHANNEL SELECTION AND WILL STOP AT COMPLETION OF CYCLE.

3. AUTO-FAST IS ESSENTIALLY SAME AS AUTO-SLOW TEST BUT STEPS SEQUENTIALLY THROUGH TEST CYCLE AT A 10 HZ RATE, APPROXIMATELY 30 SECONDS.

4. MANUAL TEST PERMITS TESTING PROPER OUTPUT VOLTAGE LEVEL FOR EACH CHANNEL SELECTED, PROPER TELEMETRY VALUE AND PROPER LOAD CURRENT. ALL OR ONLY DESIRED SWITCH SELECTOR CHANNELS MAY BE SELECTED AND TESTED FOR ALL PARAMETERS

PART II

A. PROVIDES NECESSARY DIRECTION FOR VERIFYING PROPER OPERATION OF THE SWITCH SELECTOR TEST SET USING A STANDARD SWITCH SELECTOR.

B. PROVIDES STEPS FOR ADJUSTING AND CHECKING SWITCH SELECTOR TEST SET.

C. AFTER INITIAL CHECKS OF SWITCH SELECTOR TEST SET, THE CONTINUITY TEST, AUTO-SLOW TEST, AUTO-FAST TEST AND MANUAL TEST OF PART I ARE PERFORMED USING THE STANDARD SWITCH SELECTOR.

APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET)	PAGE 3 OF 3
1. TEST TITLE SWITCH SELECTOR BENCH TEST AND TEST SET VALIDATION PROCEDURE	2. KSC TEST NUMBER V-21541 3. EFFECTIVITY LAB

ITEM CONTINUATION

BLOCK 17 CONTINUED

1. ELECTRONIC COMMUNICATIONS, INC. DOCUMENT NO. 65-00044-00-SWITCH SELECTOR TEST SET OPERATION MANUAL.

2. SWITCH SELECTOR TEST SET, CALIBRATION PROCEDURE FOR IBM, DOCUMENT NO.7907391.

3. SWITCH SELECTOR MODEL II, RECEIVING TEST PROCEDURE FOR, IBM DOCUMENT NO. 7907390.

KSC FORM 25-836A (7/67)

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: FLIGHT CONTROL COMPUTER COMPARATOR TEST (CTC3)

2. KSC TEST NUMBER: V-23169

3. EFFECTIVITY: 512 & SUBS, 206 & SUBS

4. TEST OBJECTIVES

A. TO DETAIL THE STEPS NECESSARY TO PREPARE THE FLIGHT CONTROL COMPUTER AND COMPUTER INPUT SUBSTITUTE PANELS FOR AUTOMATIC OPERATION.

B. DETAIL THE STEPS NECESSARY TO LOAD AND EXECUTE THE AUTOMATIC COMPARATOR TEST FROM THE SANDERS DISPLAY STATION.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

A. ALL DISCRETE SWITCHES ON THE FLIGHT CONTROL COMPUTER INPUT SUBSTITUTE PANELS ARE PLACED IN THE AUTO POSITION.

B. FLIGHT CONTROL RECORDERS ARE MADE READY TO RECORD THE AUTOMATIC TEST COMMANDS.

C. AUTOMATIC FLIGHT CONTROL COMPUTER COMPARATOR TEST (CTC3) IS REQUESTED, LOADED AND EXECUTED FROM THE GROUND COMPUTER SANDERS DISPLAY CONSOLE (NO. 4).

D. FLIGHT CONTROL COMPUTER INPUT STIMULUS WILL BE SUPPLIED FROM THE ML ESE COMPUTER SUBSTITUTE RAMPS A AND B TO DETERMINE THE SWITCHING CHARACTERISTICS OF THE SERVO AND SPATIAL COMPARATORS.

EQUIPMENT STATUS:

A. THE FOLLOWING TEST EQUIPMENT WILL BE USED: N/A

B. THE FOLLOWING PROCEDURES/TEST MUST BE COMPLETED PRIOR TO PERFORMING THIS TASK: (SATURN V/IB)
1. V-23029/V-23281 - FLIGHT CONTROL COMPUTER SUBSYSTEM TEST
2. V-23160/V-23280 - FLIGHT CONTROL COMPUTER RAMP GENERATOR CALIBRATION

CONFIGURATION: A. FLIGHT CONTROL COMPUTER INSTALLED IN LAUNCH VEHICLE.
B. SIVB HYDRAULIC POWER MUST BE OFF FOR THIS TEST.

PHASE: III	TEST REQUIREMENTS S-IB	TEST REQUIREMENTS
	MSFC: 7921601	TM-011-001-2H
	0.3.1.2.2.3.1 *	
	0.3.1.2.2.4.1 *	B.7.0.1

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE BLOCK 18 FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/ D. A. CREMINS	IBM - 918	10 JANUARY 1968
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/ G. W. ELY	LV-GDC-33	18 JANUARY 1968

KSC FORM 23-338 (7 67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: FLIGHT CONTROL COMPUTER COMPARATOR TEST (CTC3)

2. KSC TEST NUMBER: V-23169

3. EFFECTIVITY: 512 & SUBS, 206 & SUBS

13. LOCATION: LC-39

14. COMPUTER PROC. IDENTIFICATION: CTC3

15. EST. TEST TIME: 4 MEN - 1 HOUR

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU GROUND AND STAGE POWER
SIVB STAGE POWER

OFF-COMPLEX: N/A

ON-COMPLEX: FACILITY COMMUNICATIONS (OIS)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

(CONTINUED FROM BLOCK 6)

REVISION HISTORY

A	6/10/8	UPDATE MSFC REQUIREMENTS	S/D. CREMINS	S/G. ELY
B	7/26/8	ADDITION OF MSFC DOCUMENT NUMBER	S/D. CREMINS	S/G. ELY
C	11/1/8	UPDATE TO MEET REQ'MENTS OF PD 2-02	S/J. BOSTICK	S/G. ELY
D	5/29/9	REVISE MSFC REQUIREMENTS	S/G. WEAKLEY	S/G. ELY
E	2/10/1	REVISE BLOCKS 5, 16	S/D. CREMINS	S/G. ELY
F	4/26/2	REVISE EFF., BLOCK 5	[illegible]	[illegible]
G	9/23/74	REVISED MSFC REQUIREMENTS	C. R. Ramey 9/23/74	[illegible]

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: AUTOMATIC LVDC/LVDA MULTIPLE INTERFACE CHECKOUT AND UTILITY PROCEDURE

2. KSC TEST NUMBER: V-23199

3. EFFECTIVITY: 206 & SUBS, 512 & SUBS

4. TEST OBJECTIVES

A. TO VERIFY HARDWARE INTERFACE WITH LVDA

B. PERFORM PROGRAM LOADS AND UTILITY FUNCTIONS

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS TEST CONSISTS OF ATOLL PROGRAMS THAT WILL CHECK OUT THE BELOW GUIDANCE COMPUTER INTERFACES AND PERFORM UTILITY FUNCTIONS.

A. LVDC POWER ON FUNCTION CHECKS
B. LVDC/DA COMMAND SYSTEM INTERFACE (KACM DELETED 513 ONLY)
C. LVDC/DA SWITCH SELECTOR CIU TEST
D. G&C SIM FLIGHT (KAGC DELETED 513 ONLY)
E. LVDC/DA PROGRAM LOAD
F. LVDC/DA ST124M INTERFACE TEST
G. LVDC/DA REDUNDANCY TEST
H. LVDC/DA FLIGHT CONTROL INTERFACE TEST
I. LVDC/DA DISCRETE INTERFACE TEST (KADO DELETED 513 ONLY)

THIS TEST IS AN INDEPENDENT PROCEDURE CONTAINING A PREPARATION SECTION AND A POWER OFF SECTION THAT MAY BE COMPLETED AT TEST'S END.

THE FLIGHT COMPUTER SYSTEMS PERSONNEL WILL DETERMINE THE GUIDANCE INDEPENDENT PARAMETERS OF THE TEST. THE FOLLOWING ARE PREREQUISITES TO THIS PROCEDURE: V-23179 - GUIDANCE CONSOLE CALIBRATION TEST AND V-23180 - LVDC/LVDA INITIAL POWER ON TEST.

CONFIGURATION: IU STACKED, LOCATION - VAB OR PAD.

PHASE: III

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
F	9/25/74	REVISED MSFC REQUIREMENTS	E.M. Tomokiyo 9-25-74	[illegible]
E	9/25/72	REVISED BLOCKS 5, 16, & 17	D.A. Cremins 9/25/72	[illegible]
D	6/22/2	REVISE BLOCKS 1, 5, 13, & 18	D.A. Cremins 6/22/72	[illegible]
C	11/12/1	REVISE BLOCK 5 (SEE BLOCK 18)	S/D.CREMINS	S/J.PERKINSON
B	4-15-1	REVISE EFFECT., BLOCKS 5, 14, 15 AND 16	S/D.CREMINS	S/J.PERKINSON
A	1-8-70	REVISE MSFC REQUIREMENTS	S/R.LAVIN	S/J.PERKINSON

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/ R.D. LAVIN	IBM - 968	AUGUST 22, 1969
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/ J.A. PERKINSON	IN-GDC-32	AUGUST 26, 1969

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE: AUTOMATIC LVDC/LVDA MULTIPLE INTERFACE CHECKOUT AND UTILITY PROCEDURE

2. KSC TEST NUMBER: V-23199

3. EFFECTIVITY: 206 & SUBS, 512 & SUBS

13. LOCATION: LC 39

14. COMPUTER PROC. IDENTIFICATION: SEE BLOCK 18

15. EST. TEST TIME: SEE BLOCK 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: ALL STAGES POWER FOR KASS, KAGC AND KARD. FOR 206 & SUBS, USE LASS, LAGC, LARD

OFF-COMPLEX: CIF, LVDC REAL-TIME REDUCTION PROGRAM, PATCHING FOR MEASUREMENT H60-603 FROM LCC TO CIF; CIF GROUND STATION, OIS PATCHING FROM APPROPRIATE FIRING ROOM TO CIF, RANGE CODED TIMING (1PPS).

ON-COMPLEX: IU STAGE POWER (V-21223) & (V-21243)
OAT POWER ON (KAGC, KARD & DADO)
OAT TEST CABLE OPERATIONAL ARM
COMPUTER DISCRETE SWITCH ON
IU NETWORKS (PULL FUSES SPECIFIED FOR FT25)
DDAS RECORDING
BACKUP BATTERIES 6D100 & 6D200
S/C SIMULATOR ON (FOR FT25)
COUNTDOWN CLOCK (KAGC)
QUALITY ASSURANCE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

512 & 514 RD40092-3BJ
206 & SUBS AND AS-513 SID 23199I

18. ITEM CONTINUATION

BLOCK 15 (CONTD)

JOB AS-5XX	JOB AS-2XX	MEN	PREP TIME HOURS	TEST TIME HOURS	DATA EVAL HOURS	TOTAL HOURS
KAGC	LAGC	5	1.0	6.0	1.0	8.0
KAPG	LAPG	5		3.5		3.5
KAST	LAST	5	1.0	6.0	1.0	8.0
KAFC	LAFC	5		1.0	1.0	2.0
KADO	LADO	5	1.0	2.0	1.0	4.0
KAPW	LAPW	5	.2	.3		.5
KACM	LACM	5	1.0	1.0	1.0	3.0
KASS	LASS	5	1.0	1.0	1.0	3.0
						32.0 TOTAL HOURS

BLOCK 14 (CONTD)

KAPW, KACM, KASS, KAGC, KAPC, KAST, KARD, KAFC, KALL, KADO.
FOR AS-206 & SUBS CHANGE TO LAPW, LACM, LASS, LAGC, LAPC, LAST, LARD, LAFC, LALL, LADO.

REV 33

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET) — PAGE 3 OF 3

1. TEST TITLE: AUTOMATIC LVDC/LVDA MULTIPLE INTERFACE CHECKOUT AND UTILITY PROCEDURE

2. KSC TEST NUMBER: V-23199

3. EFFECTIVITY: 206 & SUBS, 512 & SUBS

ITEM CONTINUATION

BLOCK 5 (CONTINUED)

TEST REQUIREMENTS

512: MSFC: 7916404	513: MSFC: 7916404	MSFC 7921601
0.3.1.1.0.1 THRU 0.3.1.1.1.11.1.1	0.3.1.1.0.1 THRU 0.3.1.1.0.2.6	0.3.1.1.0.1 THRU 0.3.1.1.1.1.1.1
0.3.1.1.1.11.2.3	*0.3.1.1.0.3 THRU	
0.3.2.1.3.5	*0.3.1.1.0.3.2 (V-23186/189)	
0.3.2.1.3.6	0.3.1.1.1.1 THRU 0.3.1.1.1.5.1.2	0.3.1.1.1.1.2 THRU 0.3.1.1.1.7.4
0.3.4.3.1.1 THRU 0.3.4.3.2.1	*0.3.1.1.1.5.1.2.1 (V-23184)	
0.3.7.0 THRU 0.3.7.1.2	*0.3.1.1.1.5.1.2.2 (V-23184)	
0.3.7.2 THRU 0.3.7.2.2	0.3.1.1.1.5.2 THRU 0.3.1.1.1.8.3.3	0.3.1.1.1.8.1.1 THRU 0.3.1.1.1.8.1.3
	*0.3.1.1.1.9 (V-23184)	
	*0.3.1.1.1.9.1 (V-23184)	
	0.3.1.1.1.10.1	0.3.1.1.1.8.3 THRU 0.3.1.1.1.11.1.1 ✗
	*0.3.1.1.1.10.2 (V-23184)	
	*0.3.1.1.1.11 THRU (V-23189)	
	*0.3.1.1.1.11.2.3 (V-23189)	0.3.2.1.3.5 ✗
	0.3.2.1.3.6	0.3.2.1.3.6 ✗
	0.3.4.3.1.1 THRU 0.3.4.3.2.1	0.3.4.3.1.1 ✗ THRU 0.3.4.3.2.1 ✗
	0.3.7.0 THRU 0.3.7.1.2	
	0.3.7.2.1 THRU 0.3.7.2.2	0.3.7.1 THRU 0.3.7.1.3
		0.3.7.2 ✗ THRU 0.3.7.2.2 ✗

*NOTE: THESE SPECS DELETED FROM V-23199 AND SATISFIED BY PROCEDURE AS LISTED FOR AS-513 ONLY.

KSC FORM 89-238A (7/67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
LAUNCH VEHICLE DIGITAL COMPUTER (LVDC) MEMORY LOAD

2. KSC TEST NUMBER
V-23214

3. EFFECTIVITY
LAB

4. TEST OBJECTIVES
TO LOAD INTO THE LVDC MEMORY IN THE LABORATORY THOSE MYLAR PUNCHED TAPE PROGRAMS DESIGNATED AS THE AUTHORIZED PRELAUNCH, LAUNCH, AND ORBITAL PROGRAMS FOR SUPPORTING LAUNCH PAD TEST SUPPORT ACTIVITIES.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

AUTHORIZED PRELAUNCH, LAUNCH AND ORBITAL PROGRAMS FOR SUPPORTING LAUNCH PAD TEST SUPPORT ACTIVITIES ARE LOADED AND VERIFIED IN THE LVDC MEMORY. THE LVDC/ME IS USED TO LOAD AND VERIFY THE PROGRAMS, WITH OPERATOR MANUAL DELIBERATION AS TO PROPER LOAD OF SELECTED MEMORY ADDRESS LOCATIONS. ALSO, A MEMORY DUMP IS OBTAINED UTILIZING THE PTC, 1443 PRINTER.

THE RECORDING OF PROGRAMS LOADED, AUTHORIZATION DOCUMENTATION, WORK AUTHORITY AND OTHER PERTINENT INFORMATION IN THE BODY OF PROCEDURE IS MADE TO PROVIDE A HISTORY OF FINAL MEMORY LOAD PROGRAM DATA IN LABORATORY.

CONFIGURATION: ASTEC & LVDC/ME

PHASE: II

TEST REQUIREMENTS	TEST REQUIREMENTS
MSFC: 7921601	MSFC: 7916404
0.3.1.1.1.2 THRU	0.3.1.1.1.2 THRU
0.3.1.1.1.2.1.3	0.3.1.1.1.2.1.3
0.3.1.1.1.4 THRU	0.3.1.1.1.4 THRU
0.3.1.1.1.4.2.2	0.3.1.1.1.4.2.2
0.3.1.1.1.6	0.3.1.1.1.6

6 REV.	DATE	REASON	Contractor Approval	KSC Approval
B	11/6/74	REVISED MSFC REQUIREMENTS	E.M. Tompkins 11-7-74	11-13-74
A	8/10/73	REV. BLOCKS 1, 5, 16	E.M. Tompkins 8-20-73	8-21-73

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
Robert D. Lewis	IBM - 968	2/14/71
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Peter A. Pentimonia	LV-GDC-32	2-22-71

KSC FORM 23-308 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
LAUNCH VEHICLE DIGITAL COMPUTER (LVDC) MEMORY LOAD

2. KSC TEST NUMBER
V-23214

3. EFFECTIVITY
LAB

13. LOCATION
LAB - 1M10

14. COMPUTER PROC. INDENTIFICATION
ASTEC FLT MONITOR

15. EST. TEST TIME
2 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE REQUIREMENTS: N/A

OFF-COMPLEX REQUIREMENTS: N/A

ON-COMPLEX REQUIREMENTS: QUALITY ASSURANCE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION
PRELAUNCH TEST PROGRAM LISTING
FLIGHT PROGRAM LISTING
ORBITAL PROGRAM LISTING
STANDARD PROCEDURE MANUAL

18. ITEM CONTINUATION

149

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: OPTICAL INSTRUMENT VALIDATION PROCEDURE - MANUAL

2. KSC TEST NUMBER: V-23215

3. EFFECTIVITY: AS REQUIRED

4. TEST OBJECTIVES

TO VERIFY LABORATORY THEODOLITES, LEVELS AND CLINOMETERS ARE WITHIN MANUFACTURER'S SPECIFICATIONS

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION (REPLACES IV-23183)

THIS TEST ☐ DOES ☒ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THE THEODOLITE UNDER TEST IS GIVEN A FUNCTIONAL CHECK, FOLLOWED BY COLLIMATION AND TRUNNION AXIS VERIFICATION, ELEVATION AND OPTICAL PLUMMET CHECK.
LEVELS AND CLINOMETERS UNDER TEST ARE GIVEN A FUNCTIONAL CHECK FOLLOWED BY A HORIZONTAL LEVEL VERIFICATION.

CONFIGURATION: N/A

PHASE: N/A

TEST REQUIREMENTS

MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	4-11-72	REVISED BLOCKS 1, 4 & 5	D. T. Buchanan	S. Ball 4/17/72

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
D. T. Buchanan	IBM - 960	3/5/71
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S. Ball	LV-LOC-1V	3/10/71

KSC 1 ORM 23-338 (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: OPTICAL INSTRUMENT VALIDATION PROCEDURE - MANUAL

2. KSC TEST NUMBER: V-23215

3. EFFECTIVITY: AS REQUIRED

13. LOCATION: STAB SYS LAB

14. COMPUTER PROC. INDENTIFICATION: N/A

15. EST. TEST TIME: 1 MAN -- 1 HOUR EACH

16. SUPPORT REQUIREMENTS

INTERSTAGE : NONE

OFF COMPLEX: NONE

ON COMPLEX : QI

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
ST-124M STABILIZED PLATFORM SYSTEM PRELIMINARY OPERATIONS FOR LABORATORY TESTING (STANDBY)

2. KSC TEST NUMBER
V-23224

3. EFFECTIVITY
AS REQUIRED

4. TEST OBJECTIVES

TO PERFORM RECEIVING INSPECTION AND TO PREPARE THE SYSTEM FOR ELECTRICAL TESTING.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION (REPLACES IV-23176)

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

UNPACK EQUIPMENT AND PERFORM EXTERNAL AND INTERNAL INSPECTIONS. INSTALL IN TEST STAND. CONNECT PNEUMATIC LINE TO PLATFORM AND ADJUST PRESSURE TO MEET PLATFORM REQUIREMENTS. CONNECT THE TEST CONSOLE CABLES AND INTERCONNECTING SYSTEM CABLES. PERFORM COOLANT SYSTEM CONTAMINATION CHECKS AND PREPARE FOR OPERATIONS.

UNDER NORMAL CONDITIONS, THE COVER WILL NOT BE REMOVED.

GN2 SUPPLY TO PLATFORM WITHIN PROPER PURITY SPECIFICATIONS. LABORATORY AREA CLEANED AND PREPARED FOR RECEIVING THE ST-124M STABILIZED PLATFORM SYSTEM.

CONFIGURATION: N/A

TEST REQUIREMENTS

MSFC: 7921601

PHASE 1A, 1B, & II

0.3.5.2.6.1.5

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	10/17/74	REVISED MSFC REQUIREMENTS	[illegible]	M C Rampke

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
T. A. Buchanan	IBM - 960	4/30/71
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
[illegible]	[illegible]	5/4/71

KSC FORM 4-178 7-69

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
ST-124M STABILIZED PLATFORM SYSTEM PRELIMINARY OPERATIONS FOR LABORATORY TESTING (STANDBY)

2. KSC TEST NUMBER
V-23224

3. EFFECTIVITY
AS REQUIRED

13. LOCATION	14. COMPUTER PROC. INDENTIFICATION	15. EST. TEST TIME
LAB-VAB-1M6	N/A	4 MEN - 4.0 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF COMPLEX: NONE

ON COMPLEX: Q.I.

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

NONE

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: LABORATORY PNEUMATIC TEST OF THE ST-124M STABILIZED PLATFORM SYSTEM (STANDBY)

2. KSC TEST NUMBER: V-23225

3. EFFECTIVITY: AS REQUIRED

4. TEST OBJECTIVES

A. TO VERIFY THAT THE STABILIZED PLATFORM PNEUMATIC PERFORMANCE IS WITHIN SPECIFIED FLOW AND PRESSURE TOLERANCES DURING SIMULATED FLIGHT CONDITIONS.
B. TO CALIBRATE THE INTERNAL AMBIENT PRESSURE TRANSDUCER.
C. TO DETERMINE PLATFORM, PEA, ASC, AND AC POWER SUPPLY LEAK RATE.
D. TO VERIFY THAT THE PLATFORM PURGE SYSTEM PERFORMANCE IS WITHIN SPECIFIED FLOW AND PRESSURE TOLERANCES.

5. TEST EQUIPMENT STATUS CONFIGURATION (REPLACES IV-23177)

THIS TEST ___ DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

A. ENERGIZE ELECTRICAL, PNEUMATIC, AND COOLING GSE AND ALLOW PLATFORM TO REACH OPERATING TEMPERATURE. REGULATE INLET GAS SUPPLY PRESSURE THROUGHOUT TEST TO MAINTAIN A PRESCRIBED DIFFERENTIAL PRESSURE WITH REFERENCE TO INTERNAL AMBIENT PRESSURE. APPLY A VACUUM AT THE ORIFICE TO SIMULATE EXTERNAL AMBIENT PRESSURE CONDITIONS AFTER LIFTOFF. RECORD INLET, INTERNAL AMBIENT, DIFFERENTIAL, AND EXTERNAL AMBIENT PRESSURE VALUES, AND FLOW IN S.L./MIN.

B. ADJUST THE INTERNAL AMBIENT PRESSURE AND CHECK THE INTERNAL AMBIENT PRESSURE TRANSDUCER THROUGHOUT ITS OPERATING RANGE.

C. PRESSURIZE PLATFORM AND ASSOCIATED EQUIPMENT, AND CHECK FOR LEAKS.

D. ADJUST THE PURGE ORIFICE INLET PRESSURE WITHIN A SPECIFIED RANGE UNTIL THE INTERNAL AMBIENT PRESSURE AND PURGE ORIFICE FLOW RATE FALL WITHIN PRESCRIBED LIMITS. RECORD VALUES.

ELECTRICAL, PNEUMATIC AND COOLING GSE CONNECTED. NO SUPPORT REQUIRED.

CONFIGURATION: N/A

TEST REQUIREMENTS

MSFC: 7921601
0.3.1.1.2.2
THRU
0.3.1.1.2.2.3

PAGE 1A, 1B & 1I

REV	DATE	REASON	Contractor Approval	KSC Approval
A	5/7/74	REVISE TEST AND SUPPORT REQUIREMENTS	[signature]	[signature]

7. CONTRACTOR APPROVAL: [signature]	8. ORGANIZATION: IBM - 960	9. DATE: 4/30/71
10. NASA-KSC APPROVAL: [signature]	11. ORGANIZATION: W-60-4	12. APPROVAL DATE: 5/4/71

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: LABORATORY PNEUMATIC TESTS OF THE ST-124M STABILIZED PLATFORM SYSTEM (STANDBY)

2. KSC TEST NUMBER: V-23225

3. EFFECTIVITY: AS REQUIRED

13. LOCATION: LAV-VAB-1M6

14. COMPUTER PROC. IDENTIFICATION: N/A

15. EST. TEST TIME: 4 MEN - 24.3 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF-COMPLEX: NONE

ON-COMPLEX: Q.A.

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

ST-124M STABILIZED PLATFORM SYSTEM PRELIMINARY OPERATIONS FOR LAB TESTING.

18. ITEM CONTINUATION

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
LAUNCH VEHICLE DATA ADAPTER (LVDA) PREPARATION FOR IU INSTALLATION

2. KSC TEST NUMBER
V-23245

3. EFFECTIVITY
LAB

4. TEST OBJECTIVES
THE LVDA IS PREPARED FOR IU INSTALLATION BY CLEANING EXTERNAL SURFACES, INSTALLING DUST COVERS ON ALL CONNECTORS, AND INSTALLING ON THE IU INSTALLATION FIXTURE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* (REPLACES IV-23198)

1. THE LVDA IS VISUALLY INSPECTED FOR EXTERNAL DAMAGE AND CLEANED OF ALL EXTERNAL DIRT AND DUST.
2. PROTECTIVE DUST COVERS ARE INSTALLED ON ALL LVDA ELECTRICAL AND LIQUID COOLANT CONNECTORS.
3. THE LVDA IS TRANSFERRED FROM THE LABORATORY EQUIPMENT TEST STAND TO THE IU INSTALLATION FIXTURE AND TRANSPORT CART THROUGH THE USE OF A LABORATORY HANDLING FIXTURE AND PORTABLE HOIST ASSEMBLY.

CONFIGURATION: EQUIPMENT TO BE LOCATED ON TEST STAND

TEST REQUIREMENT

MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
Donald A. Cremin	IBM - 968	5-4-71
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
Robert A. Pedersen	LV-GOC-32	5-5-71

KSC FORM 23-350 (9-69)

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APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
LAUNCH VEHICLE DATA ADAPTER (LVDA) PREPARATION FOR IU INSTALLATION

2. KSC TEST NUMBER
V-23245

3. EFFECTIVITY
LAB

13. LOCATION
LAB 1M10

14. COMPUTER PROC. INDENTIFICATION
N/A

15. EST. TEST TIME
1 MAN - 2 HOURS

16. SUPPORT REQUIREMENTS

1. INTERSTAGE REQUIREMENTS: N/A
2. OFF-COMPLEX: N/A
3. ON-COMPLEX: QAI

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

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REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
TEMPERATURE-MODULATOR (TEMP-MOD) PURGE AND FILL WITH COOLANT

2. KSC TEST NUMBER
V-23246

3. EFFECTIVITY
LAB

4. TEST OBJECTIVES
PURGE THE TEMP-MOD PLUMBING AND LIQUID COOLANT RESERVOIR WITH COMPRESSED GN2 TO REMOVE ANY RESIDUAL COOLANT(S) AND DRY THOROUGHLY. THEN FILL WITH COOLANT OF ACCEPTABLE PURITY LEVEL.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* (REPLACES 1V-23201)

TEMP-MOD PLUMBING AND LIQUID COOLANT RESERVOIR IS PURGED WITH COMPRESSED GN2 THROUGH USE OF THE PURGE CART TO REMOVE ANY RESIDUAL COOLANT(S) AND DRIED THOROUGHLY. COOLANT OF AN ACCEPTABLE PURITY LEVEL FROM THE PURGE CART IS THEN FLUSHED THROUGH THE TEMP-MOD PLUMBING AND RESERVOIR UNTIL A SAMPLE OBTAINED FROM THE TEMP-MOD IS DETERMINED TO BE AT AN ACCEPTABLE LEVEL.

CONFIGURATION: TEMP-MOD & PURGE CART.

TEST REQUIREMENTS

MSFC: 7921601 0.3.5.2.6.1.5 MSFC: 7916404 0.3.5.2.6.1.5

PHASE: II

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	11/6/74	REVISED MSFC REQUIREMENTS.	11-27-74	11-13-74

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
Donald B. Brown	IBM - 968	5-7-71
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
CLH	[illegible]	5/10/71

KSC FORM 21-319 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
TEMPERATURE-MODULATOR (TEMP-MOD) PURGE AND FILL WITH COOLANT.

2. KSC TEST NUMBER
V-23246

3. EFFECTIVITY
LAB

13. LOCATION	14. COMPUTER PROC. INDENTIFICATION	15. EST. TEST TIME
LAB 1M10	N/A	1 MAN - 3 HOURS

16. SUPPORT REQUIREMENTS

1. INTERSTAGE REQUIREMENTS: BENDIX FOUR GALLONS ORONITE 7919372-1
2. OFF-COMPLEX: N/A
3. ON-COMPLEX: QAI

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

LO-968-713

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
S-IB HOLDDOWN ARM QUALIFICATION TEST

2. KSC TEST NUMBER
V-26532

3. EFFECTIVITY
206 & Subs

4. TEST OBJECTIVES

THE OBJECTIVE OF THIS TEST IS TO VERIFY THE ENTIRE HDA SYSTEM IS FUNCTIONALLY ACCEPTABLE TO SUPPORT LAUNCH.

5. TEST DESCRIPTION, EQUIPMENT STATE, CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT CONTAIN HAZARDOUS OPERATIONS.

PART I

The separator flex hoses are plugged and the panel is actuated from the firing accessories control console, in the LCC, to verify panel operation and to leak check the final panel connections.

PART II

The HDA pneumatic system is connected in such a way as to check the reverse flow in the separator check valves. The release valves are operated independantly to verify proper operation. The primary and secondary pneumatic drops are performed from the firing accessories control console, the release valve and arm release times are recorded and final leak checks achieved.

PART III

The final drop is considered a flight configuration drop. All explosives are simulated and all times recorded. The system is returned to a standby configuration ready for testing and launch.

CONFIGURATION: Vehicle is in a vertical mated position.

TEST REQUIREMENTS
MSFC - N/A

REV	DATE	REASON	Contractor Approval	KSC Approval
[illegible]	8-12-78	Deletion of explosive release changes the hazard level	[illegible]	[illegible]
B	5/15/78	Explosive Release Requirement Deleted	[illegible]	[illegible]
A	10/29/76	Effectivity changed per TL-2-17, RevF	S/A L. H. Childers	S/A [illegible]

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/A Gene P. Gorrell	CCSD	5-24-71
10. KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/A J. H. Robinson	LV-MEC-12	5-25-71

KSC FORM 23-334 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
S-IB Holddown Arm Qualification Test

2. KSC TEST NUMBER
V-26532

3. EFFECTIVITY
206 & Subs

13. LOCATION	14. COMPUTER PROC. IDENTIFICATION
ML	N/A

15. [illegible]
[illegible]

16. SUPPORT REQUIREMENTS

DEE-6

Vehicle Networks

RCA 110A Computer

Ground Networks

OIS

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

TM-627 HOLDDOWN ARM O&M MANUAL
75M01821 HOLDDOWN ARM ASSEMBLY

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: VOLTAGE, CURRENT, AND FREQUENCY MEASUREMENTS TEST

2. KSC TEST NUMBER: V-27064

3. EFFECTIVITY: AS-206 & SUBS, AS-503 & SUBS

4. TEST OBJECTIVES

1. TO VERIFY PROPER OPERATION OF VOLTAGE, CURRENT AND FREQUENCY MEASUREMENTS.
2. TO CALIBRATE ASSOCIATED SIGNAL CONDITIONERS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

SIGNAL CONDITIONERS ARE TESTED AND THEIR OUTPUTS ARE COMPARED WITH ASSOCIATED CALIBRATION CURVE.

MEASUREMENTS ARE FUNCTIONALLY CHECKED DURING VEHICLE SYSTEMS TEST.

CONFIGURATION: IU MATED TO VEHICLE.

TEST REQUIREMENTS

MSFC:	7916404A	7921601
	0.3.2.0.0	0.3.2.1.0
	0.3.2.2.0	0.3.2.2.0
	0.3.2.2.1	0.3.2.2.1
	0.3.2.2.1.1	0.3.2.2.1.1
	0.3.2.2.1.2	0.3.2.2.1.2
	0.3.2.2.1.2.7	0.3.2.2.1.2.7
	0.3.2.2.2	0.3.2.2.2
	0.3.2.2.2.4	0.3.2.2.2.3
	0.3.2.2.2.5	0.3.2.2.2.4
	0.3.2.2.3	0.3.2.2.2.5
	0.3.2.2.3.1	0.3.2.2.3
	0.3.4.2.4	0.3.2.2.3.1
	0.3.4.2.4.2	0.3.4.2.4
		0.3.4.2.4.2

PHASE: III, IV, V, VI

SEE CONTINUATION SHEET FOR REVISION HISTORY

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/W. PRICE	IBM - 967	12-1-67
10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
S/E.O. RALEY	LV-INS-21	12-1-67

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE: VOLTAGE, CURRENT, AND FREQUENCY MEASUREMENTS TEST

2. KSC TEST NUMBER: V-27064

3. EFFECTIVITY: AS-206 & SUBS, AS-503 & SUBS

13. LOCATION: VAB OR PAD

14. COMPUTER PROC. INDENTIFICATION: N/A

15. EST. TEST TIME: SEE BLOCK 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU STAGE POWER
S-IVB STAGE POWER (NOT REQUIRED FOR SATURN V SKYLAB)
S-IVB PCM GROUP POWER (NOT REQUIRED FOR SATURN V SKYLAB)

OFF-COMPLEX: N/A

ON-COMPLEX: IBM QA, ROOM 27E15 VAB
MILA CODED TIMING 1PPM AND 2PPS ROOM 27E15 VAB
IU CTS
FACILITY COMM (OIS)
IBM STABILIZER
IBM FLIGHT COMPUTER
INSTRUMENTATION CRT KEYBOARD

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK 15:

PREP TIME	2 MEN -- 1.0 HOURS EACH
TEST TIME PER MEAS.	2 MEN -- 0.2 HOURS EACH
TEAR DOWN	2 MEN -- 1.0 HOURS EACH

BLOCK 17:

EQUIPMENT SPECIFICATIONS

TEST AND CHECKOUT REQUIREMENTS, SPECIFICATIONS AND CRITERIA 7916404A & 7921601

MAINTENANCE AND INSTRUCTION MANUALS

MEASURING AND TELEMETRY SYSTEMS DESCRIPTION IBM 67-966-0008
MEASURING RACK AND MEASURING RACK SELECTOR IBM 66-966-0017

ELECTRICAL SCHEMATICS

IU ELECTRICAL SCHEMATICS

OTHER

IU IP&C LIST
IU MEASUREMENT CALIBRATION CURVES

APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET)

1. TEST TITLE
VOLTAGE, CURRENT, AND FREQUENCY MEASUREMENTS TEST

2. KSC TEST NUMBER
V-27064

3. EFFECTIVITY AS-206 & SUBS
AS-503 & SUBS

ITEM CONTINUATION

BLOCK 6 CONTINUED

REV	DATE	REASON	CONTR. APPR.	KSC APPR.
A	2/16/8	UPDATING BLOCKS 5 AND 16	S/D.D. BROOKS	S/E. RALEY
B	7/30/8	UPDATE MSFC REQUIREMENTS	S/D.D. BROOKS	S/E. RALEY
C	9/10/8	ADDITION OF MSFC TEST REQUIREMENT	S/D.D. BROOKS	S/E. RALEY
D	11/5/8	UPDATE MSFC REQUIREMENTS	S/D.D. BROOKS	S/E. RALEY
E	5/23/9	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/E. RALEY
F	1/8/70	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/E. RALEY
G	4/7/70	REVISE BLOCKS 16 AND 17	S/D.D. BROOKS	S/E. RALEY
H	10/14/70	REVISE BLOCKS 1,4,5,8,13,16, & 18	L.E. Washburn	for E. Raley
I	5/22/72	REVISE BLOCKS 3,5 , 16 & 18	L.E. Washburn	for E. Raley
J	2/1/73	REVISE MSFC REQ'MTS & BLK 17	L.E. Washburn	for E. Raley
K	11-6-74	REVISE MSFC REQUIREMENTS	[illegible]	E. Raley

KSC FORM 23-398A (7-67)

REV 32

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: Tape Recorder Test

4. KSC TEST NUMBER: V-28005

3. EFFECTIVITY: GSE

4. TEST OBJECTIVES

To verify proper operation of Telemetry Checkout Equipment tape recorders.

5. TEST DESCRIPTION EQUIPMENT STATUS/CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The following tests will be performed:

Capstan speed , wow and flutter, and tape transport control operation.

Operation of reproduce heads and amplifiers.

Operation of record heads and amplifiers.

System performance in recording and reproducing test signals.

Verify bi-directional operation capability.

Normal switching and patching operations will be exercised.

This procedure is performed prior to processing each launch vehicle.

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
C	9/10/74	Pelease for ASTP	9-10-74 Steven H. Dodge	9-9-74 L. C. Blanchard

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
s/Steven H. Dodge	LV-INS-12	1/03/72
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
s/L. C. Blanchard	LV-INS-12	2/22/72

KSC FORM 23-238B (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: Tape Recorder Test

2. KSC TEST NUMBER: V-28005

3. EFFECTIVITY: GSE

13. LOCATION: LCC 39

14. COMPUTER AREA IDENTIFICATION:

15. EST. TEST TIME: 80 manhours

16. SUPPORT REQUIREMENTS

LCC Telemetry Checkout Equipment

LCC TCE Magnetic Tape Recording

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC FORM 23-238C (7/67)

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: S-IC TELEMETRY SYSTEM SPARES CHECKOUT

2. KSC TEST NUMBER: V-28011

3. EFFECTIVITY: As required REV D.

4. TEST OBJECTIVES:

To verify proper performance and operational readiness of the S-IC Telemetry System spares.

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [ ] DOES [XX] DOES NOT CONTAIN HAZARDOUS OPERATIONS. It is classed a standby.

Prime test organization is S-IC Stage

The following S-IC telemetry subsystems shall be tested individually to verify that all components are functioning properly and all subsystem parameters are within specified limits.

P1 Model 270 MUX, RDSM, Model 301 PCM/DDAS Assy, and PCM/RF Assy
F1 PAM/FM T/M Assy. and RF Assy.
A/B TM Calibrator and DC Isolator
COAXIAL SWITCH
MULTICOUPLER
RF TERMINATION
POWER DIVIDER

Test Requirements
MSFC: NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
D	1-9-70	ADDITION OF SPARE ITEMS FOR TEST		
C	5/23/9	Changed effectivity from 503 & Subs to As Required. Removed items not applicable to 506 & On.		5-23-69
B	1/14/9	Deleted the following portions of the test because they are not required after AS-505: S1 Model 245 MUX. SS/FM TM and Top Deck Assy, & RF Assy; S2 Model 245 MUX, SS/FM TM and Top Deck Assy, & RF Assy; F2 PAM/FM T/M Assy and RF Assy; F3 PAM/FM TM Assy and RF Assy; A/B Tape Recorder	s/Jack Smith D.M.Vevera	s/L.C. Blanchard
A	1/11/68	Revise effectivity	s/W.E.Estes/ J.S.Clements	s/LCB

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
s/H.L.Burton/J.S.Clements	BATC S-8521/5-8531	11/7/67
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
s/L. C. Blanchard	LV-INS-12	11/7/67

KSC FORM 24-888 (7/67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: S-IC TELEMETRY SYSTEM SPARES CHECKOUT

2. KSC TEST NUMBER: V-28011

3. EFFECTIVITY: As Required

13. LOCATION: LCC

14. COMPUTER PROC. INDENTIFICATION: NA

15. EST. TEST TIME: 24 Hrs.

16. SUPPORT REQUIREMENTS

Timing
LCC Telemetry Checkout Equipment
LCC TCE Recording
RF Clearance

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
(R012) DIGITAL RANGE SAFETY COMMAND (DRSC) SYSTEMS TESTS - CLOSED LOOP AT PAD

2. KSC TEST NUMBER
V-28048

3. EFFECTIVITY
AS-507 & Subs

4. TEST OBJECTIVES

To verify proper operation of the DRSC System.
To support Range Test Operations at the PAD.

5. TEST DESCRIPTION, EQUIPMENT STATUS, CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The S-II DRSC System is to be prepared and tested prior to Range DRSC tests.

The following tests shall be performed:

1. Verification of receipt of commands.
2. Receiver Telemeter Signal Strength.
3. Audio level at MLF DRSC Station.
4. System RF Sensitivity.
5. System Deviation Sensitivity.

This TCP complies with applicable portions of SID 66-1465-7, Saturn V, Paragraphs 2.6.1.1.1, 2.6.1.1.3, 2.6.1.1.5, 2.6.1.1.7.

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	7/22/69	Revision to Test Requirements Document	C. J. Lanier	7-31-69

7. CONTRACTOR APPROVAL: J. C. Ciolino
8. ORGANIZATION: North American Rockwell 10/31/67
9. DATE: 5 October 1967
10. NASA/KSC APPROVAL
11. ORGANIZATION: LV-IAS-11
12. APPROVAL DATE: 11-1-67

KSC FORM 23-238B (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
(R012) DIGITAL RANGE SAFETY COMMAND (DRSC) SYSTEMS TESTS - CLOSED LOOP AT PAD

2. KSC TEST NUMBER
V-28048

3. EFFECTIVITY
AS-507 & Subs

13. LOCATION
MLF DRSC STA.

14. COMPUTER PROC. INDENTIFICATION

15. EST. TEST TIME
10 Hours

16. SUPPORT REQUIREMENTS

1. Ground Power
2. S-II Stage Power
3. RF Silence Off
4. Range Frequency Clearance
5. S-II ECS
6. LCC Measuring (LVO)
7. DDAS
8. RCA-110A Computers
9. LCC TM Sta. (Monitor)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC FORM 23-238C (7/67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE
TM RF PWR OUT AND ANTENNA VSWR TEST

2. KSC TEST NUMBER
V-28049

3. EFFECTIVITY AS-206 & SUBS
AS-504 & SUBS

4. TEST OBJECTIVES

TO VERIFY POWER OUTPUT OF RF ASSEMBLIES AND VSWR OF TM ANTENNA SYSTEM.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THE FOLLOWING WILL BE VERIFIED TO LAUNCH CHECKOUT SPECIFICATIONS.

1. FORWARD AND REFLECTED POWERS AT RF ASSEMBLIES.
2. FORWARD AND REFLECTED POWERS AT THE POWER DIVIDER OUTPUT PORTS.

CONFIGURATION: IU MATED TO VEHICLE.

TEST EQUIPMENT

WATTMETER, BIRD MOD 43 WITH 5 WATT,
10 WATT, AND 25 WATT, 200-500 MHZ PLUG-INS
ADAPTER CABLE, 50 OHM COAX

PHASE: III, IV, V, VI

TEST REQUIREMENTS

MSFC: 7916404
0.3.2.1.0
0.3.2.1.0.1
0.3.2.1.2.3
0.3.2.1.2.3.2
0.3.2.1.2.3.3
0.3.2.1.2.3.4
0.3.2.1.3.3
0.3.2.1.3.3.1.3
0.3.2.1.3.3.1.4
0.3.2.1.3.3.1.5

MSFC: 7921601
0.3.2.1.0
0.3.2.1.0.1
0.3.2.1.2.3
0.3.2.1.2.3.2
0.3.2.1.2.3.3
0.3.2.1.2.3.4
0.3.2.1.3.3
0.3.2.1.3.3.1.3
0.3.2.1.3.3.1.4
0.3.2.1.3.3.1.5

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
		SEE CONTINUATION SHEET FOR REVISION HISTORY		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/W. LEAF FOR W.A. PRICE	IBM-967	12-6-67
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/L.C. BLANCHARD	LV-INS-12	12-6-67

KSC FORM 23-138 (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE
TM RF POWER OUT AND ANTENNA VSWR TEST

2. KSC TEST NUMBER
V-28049

3. EFFECTIVITY AS-206&SUBS
AS-504 & SUBS

13. LOCATION
VAB OR PAD

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST TEST TIME
SEE BLOCK 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU STAGE POWER

OFF-COMPLEX: RF RADIATION CLEARANCE FOR F1 RF AND P1 RF.

ON-COMPLEX:
FACILITY COMM. (OIS)
IU MEASURING AND TRACKING PANEL
IBM QA ROOM 27E15 VAB AND IU
IU STAGE ACCESS
IU CTS
MILA CODED TIMING 1PPM AND 2PPS IN ROOM 27E15 VAB
IU VEHICLE NETWORKS
IU VEHICLE MECHANICAL

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK 15 CONTINUED

PREP TIME	2 MEN - 2.0 HOURS EACH
TEST TIME	3 MEN - 3.0 HOURS EACH
TEAR DOWN	2 MEN - 1.0 HOURS EACH

BLOCK 17 CONTINUED

EQUIPMENT SPECIFICATIONS

MOD II RF ASSEMBLY 50M60085
TEST AND CHECKOUT REQUIREMENTS, SPECIFICATION, AND CRITERIA FOR USE AT KSC 7916404 & 7921601

MAINTENANCE AND INSTRUCTION MANUALS

MOD II RF ASSEMBLY 50M66515
MEASURING AND TELEMETRY SYSTEM DESCRIPTION 67-966-0008

ELECTRICAL SCHEMATICS

IU ELECTRICAL SCHEMATICS
IU ESE ELECTRICAL SCHEMATICS
IU CABLE INTERCONNECT DIAGRAM

OTHER

IU IP AND C
IU MEASUREMENT CALIBRATION CURVES

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET) — PAGE 3 OF 3

1. TEST TITLE: TM RF POWER OUT AND ANTENNA VSWR TEST

2. KSC TEST NUMBER: V-28049

3. EFFECTIVITY: AS-206 & SUBS, AS-504 & SUBS

ITEM CONTINUATION

BLOCK 6 CONTINUED

REV.	DATE	REASON	CONTR. APPV.	KSC APPV.
A	2-16-68	UPDATING BLOCK 5-CHANGE OF EFFECTIVITY	S/W. HAHS	L. BLANCHARD
B	7-30-68	CHANGE EFFECTIVITY & UPDATE MSFC REQ.	S/D.D. BROOKS	L. BLANCHARD
C	7-30-68	UPDATE MSFC REQUIREMENTS	S/D.D. BROOKS	L. BLANCHARD
D	11-22-68	REVISED BLOCK 5 & 16	S/D.D. BROOKS	L. BLANCHARD
E	5-23-9	REVISED MSFC REQUIREMENTS	S/D.D. BROOKS	W.B. GLASER
F	1-8-70	UPDATE MSFC REQUIREMENTS	S/D.D. BROOKS	L. BLANCHARD
G	4-22-70	CHANGED BLOCKS 5, 16, & 17	S/D.D. BROOKS	L. BLANCHARD
H	10-13-71	REVISED BLOCKS 4,5,8,13,15,16,17, & 18	L. E. Washburn	L. Blanchard 12-9-71
I	5-16-72	REVISED BLOCKS 3, 5 & 18	L. E. Washburn	L. Blanchard 05-31-72
J	10-17-74	REVISED BLOCK 16	[illegible]	L. Blanchard 10-17-74

KSC FORM 23-330A (7-67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: TELEMETRY, PCM/DDAS FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28050

3. EFFECTIVITY: AS-206 & SUBS, AS-503 & SUBS

4. TEST OBJECTIVES

TO VERIFY PROPER OPERATION OF PCM/DDAS TELEMETRY SYSTEM.

5. TEST DESCRIPTION, EQUIPMENT STATUS, CONFIGURATION

THIS TEST DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THE FOLLOWING SUBSYSTEMS WILL BE VERIFIED TO LAUNCH CHECKOUT SPECIFICATIONS.

		TEST REQUIREMENTS
1.	P1 RF ASSEMBLY	MSFC: 7916404
	A. CENTER FREQUENCY	0.3.2.1.1
	B. CARRIER DEVIATION	0.3.2.1.1.2.1
		0.3.2.1.1.2.2
2.	PCM/DDAS (MOD 301)	0.3.2.1.3.1
	A. BIT RATE	0.3.2.1.3.2
	B. ENCODING ACCURACY	0.3.2.1.3.3.1.1
	C. FRAME AND MASTER FRAME SYNC WORD	0.3.2.1.3.3.1.2.1
	D. PROGRAMMING	0.3.2.1.3.3.1.2.2
	E. 600 KHZ VCO	0.3.2.1.3.3.3.1
	(1) POWER OUTPUT	0.3.2.1.3.4.1
	(2) DEVIATION	0.3.2.1.3.4.2
	(3) CENTER FREQUENCY	0.3.2.1.3.4.3
3.	MODEL 270 MULTIPLEXERS	0.3.4.2.4.2
	CALIBRATION SEQUENCE	

CONFIGURATION: IU MATED TO VEHICLE.

PHASE: III, IV, V, VI

TEST REQUIREMENTS

MSFC: 7921601

TM-011-001-2H	0.3.2.1.1	0.3.2.1.3.3.1.2.2 *
	0.3.2.1.1.2.1 *	0.3.2.1.3.3.3.1 *
	0.3.2.1.1.2.2 *	0.3.2.1.3.4.1 *
B.1.1.1.4.1	0.3.2.1.3.1 *	0.3.2.1.3.4.2 *
B.1.2.2.4	0.3.2.1.3.2 *	0.3.2.1.3.4.3 *
B.13.2.1.1.6	0.3.2.1.3.3.1.1 *	0.3.4.2.4.2 *
B.13.2.1.1.8	0.3.2.1.3.3.1.2.1 *	
B.13.3.1.1		

SEE CONTINUATION SHEET FOR REVISION HISTORY

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/W.D. LEAF FOR W. PRICE	IBM - 967	12-6-67
10. NASA/KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/L.C. BLANCHARD	LV-INS-12	12-6-67

KSC FORM 23-336 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE: TELEMETRY, PCM/DDAS FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28050

3. EFFECTIVITY: AS-206 & SUBS, AS-503 & SUBS

13. LOCATION: VAB OR PAD

14. COMPUTER PROC. INDENTIFICATION: N/A

15. EST. TEST TIME: SEE BLOCK 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU POWER
S-IVB STAGE POWER
S-IVB PCM GROUP POWER

OFF-COMPLEX: RF RADIATION CLEARANCE FOR P1 RF

ON-COMPLEX: FACILITY COMM (OIS)
TCE/CIF (291) STAGE MODULE
TCE/CIF (291) COMM MODULE
TCE/CIF (2P12) LCC
IU MEASURING AND TRACKING PANEL
IU CTS
IBM QA ROOM 2P12 LCC
IBM QA ROOM 291 CIF
MILA CODED TIMING 1PPM AND 2PPS IN ROOM 27E15 VAB AND ROOM 291 CIF

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK 15 CONTINUED

PREP TIME	2 MEN - 1.0 HOURS EACH
TEST TIME	3 MEN - 2.0 HOURS EACH
TEAR DOWN	2 MEN - 1.0 HOURS EACH

BLOCK 17 CONTINUED

EQUIPMENT SPECIFICATIONS

TEST AND CHECKOUT REQUIREMENTS, SPECIFICATIONS, AND CRITERIA FOR USE AT KSC 7916404 & 7921601
MODEL 301 PCM/DDAS TM ASSEMBLY 50M60067
MODEL 270 TIME DIVISION MULTIPLEXER 50M60061
MODEL II PCM/RF TRANSMITTER ASSEMBLY 50M60263

MAINTENANCE AND INSTRUCTION MANUALS

MODEL 301 PCM/DDAS 50M66512
MODEL 270 MULTIPLEXER 50M66506
MODEL II PCM/RF ASSEMBLY 50M66516
MEASURING AND TELEMETRY SYSTEM DESCRIPTION IBM 67-966-0008

ELECTRICAL SCHEMATICS

IU ELECTRICAL SCHEMATICS
IU CABLE INTERCONNECT DIAGRAMS
IU ESE ELECTRICAL SCHEMATICS

OTHER

IU IP&C LIST
IU MEASUREMENT CALIBRATION CURVES

REV 33

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET)	PAGE 3 OF 3
1 TEST TITLE TELEMETRY, PCM/DDAS FUNCTIONAL TEST	2 KSC TEST NUMBER V-28050 3 EFFECTIVITY AS-206 & SUBS AS-503 & SUBS

ITEM CONTINUATION

BLOCK 6 CONTINUED

REV	DATE	REASON	CONTR. APPR.	KSC APPR.
A	2/16/68	UPDATING BLOCK 5; CHANGE OF EFFECTIVITY	S/W. HAHS	S/L. BLANCHARD
B	7/30/68	CHANGE EFFECTIVITY; UPDATE MSFC REQUIRE	S/D.D. BROOKS	S/L. BLANCHARD
C	11/27/68	MODIFY BLOCK 5	S/D.D. BROOKS	S/L. BLANCHARD
D	5/23/69	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/W. GLASER
E	1/8/70	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/L. BLANCHARD
F	4/7/70	REVISE BLOCKS 16 & 17	S/D.D. BROOKS	S/L. BLANCHARD
G	11/7/70	REVISE BLOCKS 4,5,8,13,15,16,17,& 18	[illegible]	[illegible]
H	5/15/72	REVISE BLOCKS 3,5,16,& 18	[illegible]	[illegible]
I	5/27/74	REVISED MSFC REQUIREMENTS & BLOCK 16	[illegible]	[illegible]

KSC FORM 27-338A (7-67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 3

1. TEST TITLE: TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28051

3. EFFECTIVITY: AS-206 & SUBS, AS-504 & SUBS

4. TEST OBJECTIVES

TO VERIFY PROPER OPERATION OF FM/FM TELEMETRY SYSTEM.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ___ DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THE FOLLOWING SUBSYSTEMS WILL BE VERIFIED TO LAUNCH CHECKOUT SPECIFICATIONS:

1. FI TELEMETER ASSEMBLY
   - A. SCO CENTER FREQUENCY
   - B. SCO BANDWIDTH
   - C. SCO PRE-EMPHASIS
   - D. PREFLIGHT/INFLIGHT CALIBRATION
2. FI RF ASSEMBLY
   - A. CENTER FREQUENCY
   - B. CARRIER DEVIATION

CONFIGURATION: IU MATED TO VEHICLE.

PHASE: III, IV, V, VI

TEST REQUIREMENTS MSFC: 7916404	TEST REQUIREMENTS MSFC: 7921601	TM 011-001-2H
0.3.2.1.1	0.3.2.1.1	
0.3.2.1.1.1.1	0.3.2.1.1.1.1	B.1.2.3.1
0.3.2.1.2.1	0.3.2.1.2.1	B.1.2.3.2
0.3.2.1.2.2	0.3.2.1.2.2	B.1.2.3.3
0.3.2.1.2.3.1	0.3.2.1.2.3.1	B.13.2.1.1.6
0.3.2.1.2.4.1	0.3.2.1.2.4.1	B.13.2.1.1.8
0.3.2.1.2.4.2	0.3.2.1.2.4.2	B.13.3.1.1
0.3.4.2.4.2	0.3.4.2.4.2	

SEE SHEET 3 FOR REVISION HISTORY

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/W.D. LEAF FOR W.A. PRICE	IBM - 96/	12-7-67
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/L. BLANCHARD	LV-INS-12	12-7-67

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 3

1. TEST TITLE: TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28051

3. EFFECTIVITY: AS-206 & SUBS, AS-504 & SUBS

13. LOCATION: VAB OR PAD

14. COMPUTER PROC. IDENTIFICATION: N/A

15. EST. TEST TIME: SEE ITEM 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU STAGE POWER

OFF-COMPLEX: RF RADIATION CLEARANCE FOR FI RF

ON-COMPLEX:
- IBM QA IN ROOM 2P12 LCC, AND IN VEHICLE
- IBM QA IN ROOM 291 CIF
- MILA CODED TIMING 1PPM AND 2PPS IN ROOM 291 CIF
- IU NETWORKS SWITCH SELECTOR PANEL
- IU MEASURING AND TRACKING PANEL
- FACILITY COMM (OIS)
- TCE/CIF (291) STAGE MODULE
- TCE/CIF (291) CONTROL MODULE
- TCE/CIF (2P12) LCC
- IU STAGE ACCESS
- IU CTS
- INSTRUMENTATION CRT KEYBOARD

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK 15 CONTINUED

PREP TIME	2 MEN — 1.0 HOURS EACH
TEST TIME	3 MEN — 2.0 HOURS EACH
TEAR DOWN	2 MEN — 1.0 HOURS EACH

BLOCK 17 CONTINUED

EQUIPMENT SPECIFICATIONS:

TEST AND CHECKOUT REQUIREMENTS, SPECIFICATIONS, AND CRITERIA FOR USE AT KSC 7916404 & 7921601

TELEMETRY OSC. ASSY. MOD B1	50M60102
RF TRANSMITTER MOD II	50M60085

MAINTENANCE AND INSTRUCTION MANUALS:

TELEMETRY OSC. ASSY. MOD B1	50M66503
RF TRANSMITTER MOD II	50M66515

MEASURING AND TELEMETRY SYSTEMS DESCRIPTION 67-966-0008

ELECTRICAL SCHEMATICS:

- IU ELECTRICAL SCHEMATICS
- IU CABLE INTERCONNECT DIAGRAM
- IU ESE ELECTRICAL SCHEMATICS

OTHER:

- IU IPSC
- IU MEASUREMENT CALIBRATION CURVES

APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET (CONTINUATION SHEET)

1 TEST TITLE: TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST

2 KSC TEST NUMBER: V-28051

3 EFFECTIVITY: AS-206 & SUBS, AS-504 & SUBS

ITEM CONTINUATION

BLOCK 6 CONTINUED

REV.	DATE	REASON	CONTR. APPR.	KSC APPR.
A	2/16/68	UPDATE BLOCK 5 AND CHANGE EFFECTIVITY	S/W.R. HAHS	S/L. BLANCHARD
C	7/13/68	UPDATE MSFC REQUIREMENTS	S/D.D. BROOKS	S/L. BLANCHARD
D	5/23/69	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/L. BLANCHARD
E	1/8/70	REVISE MSFC REQUIREMENTS	S/D.D. BROOKS	S/L. BLANCHARD
F	3/4/70	REVISE BLOCKS 16 & 17	S/D.D. BROOKS	S/L. BLANCHARD
G	10/15/71	REVISE BLOCKS 4,5,8,13,15,16,17, & 18	[illegible]	[illegible]
H	5/22/72	REVISE BLOCKS 3,5,16 & 18	[illegible]	[illegible]
I	9/29/72	REVISE MSFC TEST REQUIREMENTS	[illegible]	[illegible]
J	8/27/74	REVISED MSFC REQUIREMENTS & BLOCK 16	[illegible]	[illegible]

KSC FORM 23-3398 (1-67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
IU STAGE MODULE TCE/CIF SETUP AND OPERATION

2. KSC TEST NUMBER
V-28072

3. EFFECTIVITY
GSE LC 39A,B,C

4. TEST OBJECTIVES

TO VERIFY PROPER OPERATION AND PATCHING OF THE TCE PRIOR TO TEST SUPPORT.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

1. APPLY POWER TO ALL STAGE MODULE EQUIPMENT.
2. RF SIGNAL GENERATOR DEVIATION VERIFICATION.
3. RECEIVER AND DISCRIMINATOR VERIFICATION.
4. 600 KC FM DEMODULATOR VERIFICATION.
5. PATCHING VERIFICATION.
6. INTEGRATED TEST SUPPORT OPERATIONS
7. STAGE TEST SUPPORT OPERATIONS.
8. DATA REDUCTION SUPPORT.
9. CAL ERROR TROUBLESHOOTING.
10. SYNC ERROR TROUBLESHOOTING.

CONFIGURATION: IU STAGE MODULE TCE/CIF ROOM 291

PHASE: III, IV, VA, VB, VI

TEST REQUIREMENTS
MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
F	10-17-74	REVISED BLOCKS 1, 5, 13 AND 16	[signature] 10-25-74	[signature] 10-25-74
D	5-4-70	COMPLETE REVISION	[signature] 5-7-70	[signature]
C	8/1/8	CHANGE EFFECTIVITY	D.D. BROOKS	L.BLANCHARD
A	2/16/8	UPDATE BLOCK 5	S/W.R.HAHS	L.BLANCHARD

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/W.D. LEAF FOR W.A. PRICE	IBM M81	12-6-67
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/L.BLANCHARD	LV-INS-12	12-6-67

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
IU STAGE MODULE TCE/CIF SETUP AND OPERATION

2. KSC TEST NUMBER
V-28072

3. EFFECTIVITY
GSE LC 39A,B,C

13. LOCATION
LCC 2P12 CIF 291

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
40 MANHOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU STAGE POWER
S-IVB STAGE POWER

OFF-COMPLEX: RF RADIATION CLEARANCE FOR F1 RF AND P1 RF.

ON-COMPLEX: FACILITY COMM (OIS)
TCE/CIF COMMON MODULE
TCE/CIF IU STAGE MODULE
MILA CODED TIMING 1PPM AND 2PPS IN CIF 291
IU MEASURING AND TRACKING PANEL
IU MEASURING STATION

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION FROM BLOCK 17

EQUIPMENT SPECIFICATIONS:

PRELAUNCH CHECKOUT SPECIFICATION AND CRITERIA

MAINTENANCE AND INSTRUCTION MANUALS

MEASURING AND TELEMETRY SYSTEMS DESCRIPTION 67-966-0008
TCE SYSTEMS MANUAL

OTHER:

IU IP&C
IU MEASUREMENT CALIBRATION CURVES

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KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: (X013) - TRANSMITTER POWER AND FM/FM SYSTEMS

2. KSC TEST NUMBER: V-28074

3. EFFECTIVITY: AS-512 & SUBS

4. TEST OBJECTIVES

TO VERIFY ACCEPTABLE PERFORMANCE OF TRANSMITTER POWER OUTPUT AND FM/FM (BF1, BF2) SYSTEMS.

5. TEST DESCRIPTION, EQUIPMENT STATUS, CONFIGURATION

THIS TEST __ DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

APPLY POWER TO FM/FM TELEMETER & RF SYSTEMS. RECEIVE SIGNALS IN TCE STATION & CHECK TRANSMITTER CENTER FREQUENCIES.

APPLY A 50 PERCENT CALIBRATION VOLTAGE TO SCO'S DEMODULATE RF SIGNALS AND CHECK SCO PRE-EMPHASIS OF EACH TELEMETER LINK ON CALIBRATED TMI, & SCO PRE-EMPHASIS METERS.

APPLY CALIBRATION VOLTAGES OF 0.00V, 1.25V, 2.50V, 3.75V, & 5.00V TO EACH SCO ON STAGE TLM SYSTEMS. READ AND RECORD DISCRIMINATOR BANDPASS FILTER OUTPUT FREQUENCY, VERIFY UPPER & LOWER BANDEGES ARE WITHIN TOLERANCE, AND VERIFY SCO LINEARITY.

RECORD DISCRIMINATOR OUTPUTS, WHILE SENDING INFLIGHT CALIBRATION COMMANDS, TO VERIFY SCO INFLIGHT CALIBRATION SEQUENCE & ACCURACY.

MEASURE TRANSMITTER POWER AT OUTPUT OF RF DISTRIBUTION SYSTEM AND AT RF COUPLER.

VERIFY VSWR AT RF COUPLER.

THIS TCP COMPLIES WITH APPLICABLE PORTIONS OF SID66-1465-7, SATURN V, S-II STAGE TEST AND CHECK-OUT REQUIREMENTS, SPECIFICATIONS AND CRITERIA FOR USE AT KSC S-II-7 AND SUBS, PARAGRAPHS 2.4.2.2, 2.4.2.2.1, 2.4.2.2.2, 2.4.2.2.2.1, 2.4.2.2.2.2, 2.4.2.2.3*, 2.4.2.2.4, 2.4.2.2.5, 2.4.2.2.5.1, 2.4.2.2.5.2, 2.4.2.2.6, 2.4.2.2.7, 2.4.2.1.1, 2.4.2.1.2, 2.7.2.4.1.1, 2.4.2.2.8, 2.4.2.2.10, 2.4.2.3.7, 2.4.2.3.8, 2.4.2.1.6.

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
G	8-15-72	CHANGE SECONDARY REQ. TO PRIMARY REQ.	D. R. Ellerbeck for H. Simmons	9-6-72 F. O. Bierbaum
F	4-25-72	ADD NEW TESTING.	H. Simmons	4-26-72 H. Blanchard
E	2-15-71	REVISED SID66-1465-7.	H. Simmons	2-17-71 H. Blanchard

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
/S/ R. R. PODGORSKI	/S/ J. F. NIEBLA NORTH AMERICAN ROCKWELL	30 NOVEMBER 1967
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
/S/ L. C. BLANCHARD	LV-INS-12	12/01/67

KSC FORM 23-338 (7-67)

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APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: (X013) - TRANSMITTER POWER AND FM/FM SYSTEMS

2. KSC TEST NUMBER: V-28074

3. EFFECTIVITY: AS-512 & SUBS

13. LOCATION: VAB/LCC

14. COMPUTER KSC IDENTIFICATION

15. EST. TEST TIME: 3 HOURS

16. SPECIAL REQUIREMENTS

1. GROUND POWER
2. S-II STAGE POWER
3. TIMING
4. RANGE CLEARANCE (RF)
5. S-II/ECS
6. ACCESS TO INST. CONTAINER
7. LCC MEASURING (LVO)
8. RCA-110A COMPUTERS
9. TCE S-II STAGE MODULE
10. TCE COMMON MODULE
11. RD 41062-4C

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

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KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1 TEST TITLE

DDAS PREVENTATIVE MAINTENANCE

2 KSC TEST NUMBER
V-28152

3 EFFECTIVITY
GSE 39 A,B,C

4 TEST OBJECTIVES

TO PROVIDE INSTRUCTIONS FOR PERFORMANCE OF PREVENTATIVE MAINTANANCE ON THE DDAS SYSTEM.

5 TEST DEPENDENT ON EQUIPMENT STATE CONFIGURATION

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

THIS PROCEDURE CONTAINS INSTRUCTIONS FOR PERIODIC CLEANING, PHYSICAL INSPECTION, ELECTRICAL CHECKOUT, AND ADJUSTMENT NECESSARY TO INSURE RELIABLE OPERATION OF THE DDAS SYSTEM.

THE PROCEDURE IS DIVIDED INTO THREE SECTIONS, WHICH MAY BE CONDUCTED ON A PERIODIC OR ELAPSE TIME BASIS. AN APPENDIX SECTION IS FOR SPECIAL CLEANING AND MECHANICAL PIN PUSH CHECKS.

1. MONTHLY/400 HR.
2. QUARTERLY/1200 HR.
3. SEMI-ANNUALLY/2400 HR.

PHASE: N/A

TEST REQUIREMENTS

MSFC: NONE

REV	DATE	REASON	Contractor Approval	KSC Approval
D	4/27/73	REVISED BLOCK 16		
A	[illegible]	REVISED BLOCKS 5 & 15		

7 APPROVAL	8 ORGANIZATION	9 DATE
	IBM 908	
10 APPROVAL	11 ORGANIZATION	12 APPROVAL DATE
	[illegible]	

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

1 TEST TITLE

DDAS PREVENTATIVE MAINTENANCE

2 KSC TEST NUMBER
V-28152

3 EFFECTIVITY
GSE 39 A,B,C

14 LOCATION
LC-39

15 SUPPORT REQUIREMENTS

1. INTERSTAGE REQUIREMENTS: NONE
2. OFF COMPLEX SUPPORT: NONE
3. ON COMPLEX SUPPORT:
   A. GROUND POWER
   B. DDAS
   C. RCA 110-A
   D. CSC-CLEAN FILTERS
   E. IBM QAI

16 OTHER APPLICABLE REFERENCE DOCUMENTATION

V-28086-GSE THROUGH V-28000 - GSE INCLUSIVE
VENDORS MANUAL, VR3600 MAGNETIC TAPE RECORDER.

18 ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: G124 TELEMETRY CHECKOUT EQUIPMENT PRE_EMPHASIS TOLERANCE TEST

2. KSC TEST NUMBER: V-28182

3. EFFECTIVITY: GSE/506 & subs

4. TEST OBJECTIVES

1. To establish FM channel pre-emphasis meter tolerance.
2. To establish/verify TMI pre-emphasis curve.
3. To establish BPIF output voltage tolerances (RMS).
4. To establish pre-emphasis DC voltage tolerances.

8. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The RF Signal Generator is adjusted to the FM/FM RCVR frequency and fed to the RCVR input. The RCVR video output is fed to the discriminators. The five-point calibrator is used to deviate the RF Signal Generator at each IRIG frequency for Channels 5 thru 18. Each channel is deviated at the standard pre-emphasis level and at ± 15% of standard pre-emphasis level.

The FM channel pre-emphasis meter readings, BPIF output voltage (RMS) readings, and pre-emphasis DC voltage reading for each channel at each deviation level are recorded for future reference. The TMI pre-emphasis curve is established or verified to be correct.

This test will be performed as required prior to checking or troubleshooting the S-II A/B FM/FM telemeter system.

FM/FM TCE in System Configuration.

Test Requirements

MSFC: Not Applicable

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
K. M. Kell 1-16-69	North American Rockwell	1-17-69
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
59 L. O. Blanchard	LV-INS-12	1-17-69

KSC FORM 23-336B (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: G124 TELEMETRY CHECKOUT EQUIPMENT PRE-EMPHASIS TOLERANCE TEST

2. KSC TEST NUMBER: V-28182

3. EFFECTIVITY: GSE 506 & Subs

13. LOCATION: TCE,LCC,2P10A

14. COMPUTER PROC. INDENTIFICATION: N/A

15. EST. TEST TIME: 1.5 Hours

16. SUPPORT REQUIREMENTS

LCC TM Sta. (Monitor)

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC FORM 23-336C (7/67)

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
PREVENTIVE MAINTENANCE, AIRBORNE TELEMETRY TEST EQUIPMENT

2. KSC TEST NUMBER
V-28212

3. EFFECTIVITY
GSE LC-39

4. TEST OBJECTIVES

TO VERIFY AND/OR INSURE THAT THE PHYSICAL CONDITION AND ELECTRICAL INTEGRITY OF THE AIRBORNE TELEMETRY TEST EQUIPMENT IS MAINTAINED IN A SATISFACTORY MANNER.

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT CONTAIN HAZARDOUS OPERATIONS.

Periodic inspection is made of the Airborne Telemetry Test Equipment for indications of rust and corrosion. Switches, meter faces, jacks, mounting bolts and nuts, are examined for loose or broken parts, dirt and discoloration. Inspection and calibration stickers are verified for valid dates and unbroken state as specified in Preventive Maintenance Requirements, Ground Support Equipment, CCSD.

TEST REQUIREMENTS
MSFC - N/A
KSC - N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	3/28/74	270 Checkout Box Replaced	R. Koby	R.L.C. Blanchard 12-2-71

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
K. J. Hawkins	CCSD	12-2-71

10. NASA-KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
R.L.C. Blanchard	LV-TNS-17	12-6-71

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
PREVENTIVE MAINTENANCE, AIRBORNE TELEMETRY TEST EQUIPMENT

2. KSC TEST NUMBER
V-28212

3. EFFECTIVITY
GSE LC-39

13. LOCATION
CIF

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
4 Hours

16. SUPPORT REQUIREMENTS

NONE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK #17

1. 301 Checkout Box K-VE2-03040
2. 270 Checkout Box LVO-13-10077-1
3. Telemetry C/O Console K-VE2-03037
4. Digital Data C/O Box K-VE2-03038

REV 31

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: TELEMETRY ANTENNA RADIATION TEST

2. KSC TEST NUMBER: V-28213

3. EFFECTIVITY: AS-511 & SUBS AS-206 THRU AS-209

4. TEST OBJECTIVES

TO VERIFY IU TM ANTENNAS ARE RADIATING PROPERLY.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

PICKUP LOOPS WITH R. F. DETECTORS WILL BE ATTACHED TO EACH TM ANTENNA TO VERIFY BOTH ANTENNAS ARE RADIATING PROPERLY.

CONFIGURATION: IU MATED TO VEHICLE

TEST EQUIPMENT

PORTABLE CHART RECORDER - 2 CHANNEL MINIMUM
2 PICKUP LOOPS
2 R. F. DETECTORS, MICRO LAB XP-10 OR EQUIVALENT
VOLTAGE CALIBRATOR, FLUKE 313A OR EQUIVALENT
AC ADAPTER, CROUSE - HINDS M54 OR EQUIVALENT
100 FOOT OF AC EXTENSION CABLE
2 COAXIAL CABLES APPROXIMATELY 40 FEET LONG

PHASE: III, IV, V, VI

TEST REQUIREMENTS
MSFC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	11/7/74	CHANGE EFFECTIVITY		11-11-74
A	5/23/2	CHG. EFFECTIVITY, UPDATE BLOCK 17		6-5-72

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM - 967	12/9/71
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
	11-TNS-12	12-9-71

KSC FORM 23-338 (7 67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: TELEMETRY ANTENNA RADIATION TEST

2. KSC TEST NUMBER: V-28213

3. EFFECTIVITY: AS-511 & SUBS AS-206 THRU AS-209

13. LOCATION: VAB OR PAD

14. COMPUTER PROC. INDENTIFICATION: NOT REQUIRED

15. EST. TEST TIME: SEE BLOCK 18

16. SUPPORT REQUIREMENTS

INTERSTAGE: IU STAGE POWER

OFF-COMPLEX: RF RADIATION CLEARANCE FOR F1 RF AND P1 RF - OPEN LOOP.

ON-COMPLEX:
FACILITY COMM. (OIS)
IU MEASURING AND TRACKING PANEL
IBM QA, ROOM 2P10 LCC AND 260 FT LEVEL OF LUT
TCE STAGE MODULE
TCE COMMON MODULE
MILA CODED TIMING 1PPM AND 1PPS IN ROOM 2P10 LCC

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SEE BLOCK 18

18. ITEM CONTINUATION

BLOCK 15 CONTINUED

PREP TIME	3 MEN 1.5 HOURS EACH
TEST TIME	3 MEN 1.0 HOURS EACH
TEAR DOWN	3 MEN 1.5 HOURS EACH

BLOCK 17 CONTINUED

MAINTENANCE AND INSTRUCTION MANUALS:

MEASURING AND TELEMETRY SYSTEMS DESCRIPTION 67-966-0008

ELECTRICAL SCHEMATICS:

IU ELECTRICAL SCHEMATICS
IU CABLE INTERCONNECT DIAGRAM
IU ESE ELECTRICAL SCHEMATICS

OTHER:

IU IPGC
IU MEASUREMENT CALIBRATION CURVES

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28214

3. EFFECTIVITY: 206 & Subs LC-39

4. TEST OBJECTIVES

The objective of this test is to verify the performance of the FM/FM telemeter system. This is accomplished by measuring the SCO output signal deviation, center frequencies, and bandedge frequencies, confirming that proper preflight/inflight calibrations are received and by measuring transmitter center frequency.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The FM RF transmitter center frequency is computed and recorded at TCE/CIF (2P12). An RF signal generator source is used to obtain a receiver reference Pre-D frequency. The difference between the reference Pre-D and the actual Pre-D frequency during FM RF reception is computed as the ΔF_c.

The SCO operational parameters are measured and recorded at TCE/CIF (291). Preflight calibration levels of 50% are selected and the FM/FM carrier deviation schedule is compared to the recorded discriminator reference levels. Center frequencies of the SCO's are verified at the preflight calibration level of 50%. Preflight levels of 0% and 100% are selected, and the SCO's are checked for bandedge frequencies. The SCO channels are stripped-out on an oscillograph to verify proper reception and programming of preflight and inflight calibrations. An SCO channel that receives an inflight calibration is displayed on the Mini-Mod Recorder with an A_0 and B_0 mux channel to verify proper TM calibrator sequencing.

The S-IB Stage shall be in a vertical, mated configuration.

TEST REQUIREMENTS
MSFC: 3.2.1.1, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.5.1; 3.2.3.1, 3.2.3.2 & KSC: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
C	10-24-74	To reflect TCE relocation & reconfiguration	[illegible]	[illegible]
B	3-23-73	To reflect deletion of MSFC Test Requirement 3.2.1.5.4	3-23-73 J. R. Howard	L. C. Blanchard
A	1-23-73	To reflect complete MSFC Test Requirement 3.2.3.1 and 3.2.3.2	J. R. Howard	L. C. 2-7-73 Blanchard

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
s/J. R. Howard JWB JDM	CCSD	12-8-71

10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
s/L. C. Blanchard	LV-INS-12	12-10-71

KSC FORM 23 338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST

2. KSC TEST NUMBER: V-28214

3. EFFECTIVITY: 206 & Subs LC-39

13. LOCATION: VAB

14. COMPUTER PROG. INDENTIFICATION: N/A

15. EST. TEST TIME: 4 Hours

16. SUPPORT REQUIREMENTS

1. Range Frequency Clearance (240.2 MHZ)
2. Stage Power
3. CIF/TCE (2P12 & 291)
4. Access to Instrumentation Compartment #13.
5. ECS
6. RCA-110A Computer Complex

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

1. Instrumentation Program and Components List
2. S-IB Stage Cable Interconnection Diagram
3. S-IB Stage Electrical Schematics

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1 TEST TITLE
TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST (SPARE)

2 KSC TEST NUMBER
V-28217

3 EFFECTIVITY
206 & Subs LC-39

4 TEST OBJECTIVES

The objective of this test is to verify the performance of the spare FM/FM telemeter system. This is accomplished by measuring the SCO deviation of the RF carrier, SCO center frequencies and bandedge frequencies, confirming that preflight inflight calibrations are received, and by measuring RF assembly power output and transmitter center frequency. Proper calibration sequence of the TM calibrator is verified.

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS

The Telemeter System is connected to the TM checkout rack and the TCE stage module. Reference levels for SCO carrier deviation are obtained from the TCE stage module pretest preparations. The receiver pre-D signal is utilized through the 450 KHZ demodulator. Power is applied to the telemeter. Preflight calibration level of 50% is selected and the FM/FM carrier deviation schedule is compared to the recorded discriminator reference levels. Center frequencies of the SCO's are verified at the preflight calibration level of 50%. Preflight levels of 0% and 100% are selected, and the SCO's are checked for bandedge frequencies. The RF transmitter power output and center frequency are measured and verified to be within tolerable limits. The telemeter is checked for reception of preflight calibration and inflight calibration assignment, as observed on the oscillograph stripout.

FM/FM System (Spare) is verified in a Laboratory Test.

TEST REQUIREMENTS:
MSFC - N/A KSC - N/A

6 REV.	DATE	REASON	Contractor Approval	KSC Approval
A	10-24-74	Reconfiguration of TCE Station Equipment		

7 CONTRACTOR APPROVAL JDM JWB	8 ORGANIZATION	9 DATE
s/J. R. Howard	CCSD	12-6-71
10 NASA/KSC APPROVAL	11 ORGANIZATION	12 APPROVAL DATE
s/L. C. Blanchard	LV-INS-12	12-15-71

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1 TEST TITLE
TELEMETRY, FM/FM SYSTEM FUNCTIONAL TEST (SPARE)

2 KSC TEST NUMBER
V-28217

3 EFFECTIVITY
206 & Subs LC-39

13 LOCATION
TCE/CIF 291

14 COMPUTER PROGRAM IDENTIFICATION
N/A

15 EST. TEST TIME
4 Hours

16 SUPPORT REQUIREMENTS

1. Range frequency clearance (240.2 MHZ), closed loop
2. CIF/TCE 291

17 OTHER APPLICABLE REFERENCE DOCUMENTATION

1. Instrumentation Program and Components List
2. Telemeter Checkout Rack Drawing

18 ITEM CONTINUATION

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

TEST TITLE: TELEMETRY, PCM SYSTEM FUNCTIONAL TEST

TEST NUMBER: V-28218

VEHICLE: 206 & Subs LC-39

The objective of this test is to verify acceptable performance of the PCM FM System. Parameters measured during this test are:

1. 600 KHZ VCO-Power Output and VCO Deviation
2. Transmitter Center Frequency and Deviation
3. Bit Rate and Encoding Accuracy of PCM/DDAS Assembly
4. Multiplexer Inflight Calibration Levels and Sequence
5. Frame and Master Frame Time Slot and Bit Pattern
6. Multiplexer Programming Verification

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS

The VCO Power Output is determined by observing the VCO line driver input measurement on ESE. The voltage read is compared to a calibration curve for the ESE channel and VCO power is then determined. At the CIF/TCE (2P12) the GP1 Transmitter and VCO 600 KHZ center frequency and frequency deviation are obtained by zero beating each signal with a test oscillator frequency. A circular Lissajous pattern is obtained and the corresponding test oscillator frequency is read from a frequency counter.

The PCM bit rate is determined by monitoring the clock output. The Model 270 multiplexers are checked for reception of inflight and single point calibrations. Frames 9 & 10, Channel 28, of both multiplexers are observed for encoding accuracy of zero and five volts, respectively. Proper bit configuration and time slots for the frame and master frame sync words are verified by observing bit indications on the D/A Converter (Call-Up) Panel.

Multiplexer inflight levels and sequence are verified by observing calibration levels of each representative multiplexer channel as displayed on CIF/TCE (291) Chart Recorder.

The S-IB Stage shall be in a vertical, mated configuration.

TEST REQUIREMENTS
MSFC: 3.2.2.1 thru 3.2.2.8.1; 3.2.3.1 or 3.2.3.2
KSC: N/A

REV	DATE	REASON	Contractor Approval	KSC Approval
B	7-16-74	To reflect new locations of TM Checkout Equipments	J. R. Howard	L. C. Blanchard
A	2-6-73	Revised Measuring method for VCO Frequency and Deviation		

CONTRACTOR APPROVAL	ORGANIZATION	DATE
J. R. Howard (KRA JDM)	CCSD	12-7-71

NASA KSC APPROVAL	ORGANIZATION	APPROVAL DATE
L. C. Blanchard	LV-INS-12	12-15-71

KSC FORM 25-138 (7-69)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

TEST TITLE: TELEMETRY, PCM SYSTEM FUNCTIONAL TEST

TEST NUMBER: V-28218

VEHICLE: 206 & Subs LC-39

LOCATION: VAB

TEST EQUIPMENT/FACILITY IDENTIFICATION: N/A

TOTAL TEST TIME: 6 Hours

SPECIAL REQUIREMENTS

1. Range Frequency Clearance is required (256.2 MHZ)
2. S-IB Stage Power
3. CIF/TCE (2P12 & 291)
4. N/A
5. RCA-110A Computer Complex
6. Access to Instrumentation Compartment #13

OTHER APPLICABLE REFERENCE DOCUMENTATION

1. Instrumentation Program and Components List
2. S-IB Stage Cable Interconnection Diagram
3. S-IB Stage Electrical Schematics

ITEM CONTINUATION

102

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
TELEMETRY, RF POWER OUTPUT AND VEHICLE ANTENNA SYSTEM VSWR TEST

2. KSC TEST NUMBER
V-28219

3. EFFECTIVITY
206 & Subs LC-39

4. TEST OBJECTIVES
The objective of this test is to verify acceptable performance of the Telemetry RF System. Parameters measured during this test are:

1. RF Power Output of the TM RF Assemblies
2. The insertion loss of the Antenna Systems from the RF Power Amplifiers to the Antennas
3. Vehicle Antennas VSWR for lowest, midrange and highest frequencies radiated.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

With the Telemeter System Power Off, the RF output power of each telemeter is measured by connecting a RF wattmeter and 50 ohm load to the output of each RF telemeter assembly. Power is applied to each telemeter individually and after a sufficient warmup period the wattmeter reading is recorded. The telemeter power is then turned off.

The insertion loss of the antenna systems, for each telemeter, is determined by connecting a RF wattmeter and 50 ohm load to one output of the power divider. The other output of the power divider is terminated with a 50 ohm load. Power is applied to each telemeter individually and after a sufficient warmup period the wattmeter reading is recorded. The insertion loss for one antenna system is then computed. This procedure is repeated for each telemeter frequency. The insertion loss procedure is repeated for the other antenna system.

With the telemeter system power off, a standing wave indicator is connected to the canister 13 bulkhead connector of one telemeter antenna. A modulated RF signal generator output is fed to the VSWR indicator and VSWR readings are taken for the lowest, midrange and highest frequencies to be radiated by the antenna. The procedure is repeated for the second telemeter antenna. The antenna cables are reconnected and radiation from each antenna is verified.
The S-IB Stage shall be in a vertical, mated configuration.

TEST REQUIREMENTS
MSFC: 3.2.1.5.2
3.2.2.8.2
3.2.4.1
3.2.4.2
KSC: N/A

REV	DATE	REASON	Contractor Approval	KSC Approval

7. INITIAL FOR APPROVAL	8. ORGANIZATION	9. DATE
	CCSD	12
11. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
	LV-INS-12	12-16-71

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
TELEMETRY, RF POWER OUTPUT AND VEHICLE ANTENNA SYSTEM VSWR TEST

2. KSC TEST NUMBER
V-28219

3. EFFECTIVITY
206 & Subs LC-39

13. LOCATION
LC-39

14. COMPUTER PROC. INDENTIFICATION
N/A

15. EST. TEST TIME
4 Hours

16. SUPPORT REQUIREMENTS

1. Range frequency clearance is required (240.0, 240.2, 248, 256.0, and 256.2 MHZ).
2. SIB Stage Power
3. N/A
4. Access to Instrumentation Compartment #13
5. RCA-110A Computer Complex

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

1. SIB Stage Cable Interconnection Diagram
2. SIB Stage Electrical Schematics

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1 TEST TITLE
TELEMETRY, PCM/DDAS DIGITAL DATA CHANNEL VERIFICATION (SPARE)

2 KSC TEST NUMBER
V-28220

3 EFFECTIVITY
206 & Subs LC-39

4 TEST OBJECTIVES

The objective of this test is to verify that the PCM digital data bits applied to the remote digital submultiplexer accurately appear in the assigned bit time slots of the PCM/DDAS output format.

5 TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The Remote Digital Submultiplexer (RDSM) 9A700 is connected with a spare PCM/DDAS Assembly, 301 Checkout Box, Digital Data Checkout Box and with the S-IB Stage Module at CIF/TCE 291. Power is applied to the system and the decommutated 600 KHZ DDAS output is transmitted to the S-IB Decom station where Sync Lock status is verified.

The ten digital bits of each RDSM word are toggled sequentially and are observed at the Stage Module D/A Converter Quick Look Display. All bits of the first word are then stimulated simultaneously and the adjacent words are examined for crosstalk. This procedure is repeated until all digital words are on simultaneously to verify absence of a loading effect.

TEST REQUIREMENTS
MSFC - N/A
KSC - N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	11-6-74	TCE Station Reconfiguration		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
J. R. Howard JWB JDM	CCSD	12-16-71

10. NASA-KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
L. C. Blanchard	LV-INS-12	12-16-71

KSC FORM 20-201 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1 TEST TITLE
TELEMETRY, PCM/DDAS DIGITAL DATA CHANNEL VERIFICATION (SPARE)

2 KSC TEST NUMBER
V-28220

3 EFFECTIVITY
206 & Subs LC-39

13 LOCATION
CIF/TCE (291)

14 COMPUTER PROC. IDENTIFICATION
N/A

15 EST. TEST TIME
4 Hours

16 SUPPORT REQUIREMENTS

1. CIF/TCE (291)

17 OTHER APPLICABLE REFERENCE DOCUMENTATION

Instrumentation Program and Components List

18 ITEM CONTINUATION

REV 33

REV 33

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1 TEST TITLE: TELEMETRY, PCM SYSTEM FUNCTIONAL TEST (SPARE)

2 KSC TEST NUMBER: V-28221

3 EFFECTIVITY: 206 & Subs LC-39

4 OBJECTIVES

The objective of this test is to verify the performance of the spare PCM/FM System. Parameters measured during this test are:

1. 600 KHZ VCO Power Output and VCO Deviation
2. PCM RF Assembly Power Output, Transmitter Center Frequency & Deviation
3. Bit rate and encoding accuracy of PCM/DDAS assembly
4. Multiplexer inflight calibration levels and channel verification
5. Frame and master frame time slot and bit pattern

5 TEST DESCRIPTION AND INFORMATION

THIS TEST DOES X DOES NOT CONTAIN HAZARDOUS OPERATIONS.

The 270 Multiplexers, PCM/DDAS assembly and the PCM/RF assembly are interconnected with portable test equipment and the S-IB Stage Module at the TCE/CIF (291).

The VCO power output is determined from the minimum peak-to-peak voltage reading of the 600 KHZ signal as observed on the oscilloscope.

The transmitter and VCO center frequency and deviation are obtained by zero-beating each signal with a test oscillator frequency. A circular lissajous pattern is obtained on the oscilloscope at each bandedge. The corresponding test oscillator frequency is read from a frequency counter. The transmitter power output is obtained from a wattmeter indication.

The PCM bit rate is determined by monitoring the S-IB Decom's "Bit Sync Clock" output at the S-IB Mod Patch Panel with a frequency counter. The Model 270 multiplexers are checked for reception of inflight and single point calibrations. Frames 5 & 10, Channel 28, of both multiplexers are observed for encoding accuracy of zero and five volts, respectively. Proper bit configuration and time slots for the frame and master frame sync words are verified by observing bit indications on the D/A Converter (Call-Up) Panel. Strip Chart recordings are analyzed to verify proper multiplexer operation for calibration and channel simulation verification.

The spare PCM system checkout is performed in a laboratory test.

TEST REQUIREMENTS
MSFC - N.A KSC - N/A

REV.	DATE	REASON	Contractor Approval	KSC Approval
B	10-31-74	GSE TCE Station Reconfigured	J. R. Howard	L. C. Blanchard
A	2-6-73	Revised VCO Frequency and Deviation Measuring Method	J. R. Howard	L. C. Blanchard

7 CONTRACTOR APPROVAL		8 ORGANIZATION	9 DATE
s/ J. R. Howard	JWB JDM	CCSD	12-16-71

10 NASA-KSC APPROVAL	11 ORGANIZATION	12 APPROVAL DATE
s/ L. C. Blanchard	LV-INS-12	12-26-71

KSC FORM 22-238 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1 TEST TITLE: TELEMETRY, PCM SYSTEM FUNCTIONAL TEST (SPARE)

2 KSC TEST NUMBER: V-28221

3 EFFECTIVITY: 206 & Subs LC-39

13 LOCATION: TCE/CIF (291)

14 COMPUTER PROG. IDENTIFICATION: N/A

15 EST. TEST TIME: 4 Hours

16 SUPPORT REQUIREMENTS

1. Range frequency clearance is required (256.2 MHZ), Closed Loop.
2. TCE/CIF (291).

17 OTHER APPLICABLE REFERENCE DOCUMENTATION

Instrumentation Program and Components List

18 ITEM CONTINUATION

105

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
AIRBORNE COMMAND SIMULATOR/IU COMMAND COMPARATOR EQUIPMENT SPARES OPERATIONAL CHECK

2. KSC TEST NUMBER
V-28222

3. EFFECTIVITY
AS REQUIRED

4. TEST OBJECTIVES

ESTABLISH A PROCEDURE TO VERIFY SATISFACTORY OPERATION OF SPARE AIRBORNE COMMAND SIMULATORS AND IU COMMAND COMPARATORS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

TEST EQUIPMENT:
POWER SUPPLY, LAMBDA LH-125FM
OSCILLOSCOPE, TEKTRONIX 545B
OSCILLOSCOPE PLUG-IN, TEKTRONIX TYPE CA
THREE TEST LEADS, PAMONA TYPE WITH BANANA JACKS
THREE CONNECTOR PIN TO BANANA JACK ADAPTERS
SPECIAL TEST CABLE FOR AIRBORNE COMMAND SIMULATOR

THE AIRBORNE COMMAND SIMULATOR IS TESTED FOR ITS ABILITY TO GENERATE A 35 BIT DIGITAL COMMAND WORD IN MANUAL OPERATION AND PRESENT IT TO THE IU COMMAND COMPARATOR IN PSK FORM.

THE AIRBORNE SIMULATOR IS ALSO TESTED FOR ITS ABILITY, IN COMPUTER OPERATION, TO COMBINE A 18 BIT WORD, NORMALLY GENERATED BY A COMPUTER WITH 17 ADDITIONAL BITS GENERATED WITHIN THE SIMULATOR, TO INTERSPERSE THESE BITS INTO CORRECT CODED FORM TO GENERATE A 35 BIT DIGITAL COMMAND WORD, AND PRESENT IT TO THE IU COMMAND COMPARATOR IN PSK FORM.

THE AIRBORNE COMMAND SIMULATOR IS FURTHER USED IN THIS TEST AS A SIGNAL SOURCE FOR THE OPERATIONAL TESTING OF THE IU COMMAND COMPARATOR

CONFIGURATION: N/A

TEST REQUIREMENTS

MSFC: N/A

PHASE: N/A

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM - 967	12-20-71
10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
[illegible]	[illegible]	12-23-71

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
AIRBORNE COMMAND SIMULATOR/IU COMMAND COMPARATOR EQUIPMENT SPARES OPERATIONAL CHECK

2. KSC TEST NUMBER
V-28222

3. EFFECTIVITY
AS REQUIRED

13. LOCATION	14. COMPUTER PROG. IDENTIFICATION	15. EST. TEST TIME
LC-39	N/A	1 MAN - 4 HOURS

16. SUPPORT REQUIREMENTS

IBM QA

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

MSFC MAN 231
MSFC MAN 230

18. ITEM CONTINUATION

BLOCK 5 CONT'D

THE IU COMMAND COMPARATOR IS TESTED FOR ITS ABILITY TO RECEIVE A 35 DIGITAL WORD IN PSK FORM FROM THE AIRBORNE COMMAND SIMULATOR, TO DETECT THE PSK, CHANGE THE WORD INTO DIGITAL FORM, AND INDICATE THE DIGITAL CONDITION OF EACH BIT BY VISUAL READOUT (LAMPS).

THE IU COMMAND COMPARATOR IS FURTHER USED AS A DECODER/INDICATOR FOR TESTING OPERATIONAL FUNCTIONS OF THE AIRBORNE COMMAND SIMULATOR.

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: IU COMMAND CLOSED LOOP TEST

2. KSC TEST NUMBER: V-28229

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

TO VERIFY THAT THE OPERATING PARAMETERS OF THE IU COMMAND SYSTEM ARE WITHIN TOLERANCE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST __ DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION:

THE UNMODULATED SIGNAL GENERATOR OUTPUT LEVEL IS ADJUSTED FOR A LO TM OUTPUT OF 2.0 VDC; THE GENERATOR OUTPUT IS INCREASED 3DB AND ITS FREQUENCY IS VARIED ABOVE AND BELOW 450 MHZ TO 2.0V OUTPUT. THE TWO FREQUENCIES MEASURED ARE RECEIVER UPPER AND LOWER BANDEDGE; THE AVERAGE OF THE TWO IS RECEIVER CENTER FREQUENCY, THE DIFFERENCE IS RECEIVER 3DB BANDWIDTH. A 60DB BANDWIDTH TEST IS MADE IN A SIMILAR MANNER. RECEIVER QUIETING IS DETERMINED BY MEASURING THE AUDIO OUTPUT DIFFERENCE BETWEEN NO SIGNAL AND A 10UV SIGNAL. SYSTEM SENSITIVITY IS DETERMINED BY DECREASING THE UPLINK SIGNAL LEVEL TO THE POINT OF 100% AVP THRESHOLD. RECEIVER INPUT IS SET TO -90DBM AND FREQUENCY VARIED ABOVE AND BELOW 450 MHZ TO AVP THRESHOLD; THIS DETERMINES SYSTEM UPPER AND LOWER BANDEDGES. SYSTEM DEVIATION SENSITIVITY IS TESTED BY DECREASING THE UPLINK DEVIATION TO 100% AVP THRESHOLD. SYSTEM PHASE SHIFT IS MEASURED BY VARYING THE PHASE DIFFERENCE BETWEEN THE 1 & 2 KHZ TO AVP THRESHOLD AND THEN MEASURING THE PHASE DIFFERENCE VIA AN OSCILLOSCOPE.

THE DECODER IS TESTED BY SEQUENTIALLY COMPLEMENTING EACH ADDRESS BIT AND VERIFYING ABSENCE OF AVP; AND BY THE PERFORMANCE OF AUTO PROGRAM FT45 WHICH CHECKS THE DATA BITS. ADDITIONAL FT45 PROGRAMS CHECK IU AND LUT GSE COMPATIBILITY.
CONFIGURATION: VEHICLE IN VAB; PLATFORMS CLOSED; IU ERECTED; ALL FLIGHT EQUIPMENT MUST BE ACCESSIBLE; VEHICLE & GSE ATTENUATION AND DELAY MEASUREMENTS COMPLETE.

PHASE: III

TEST REQUIREMENTS
MSFC: 7921601
0.3.2.4.4
THRU
0.3.2.4.4.1.9

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
Fitz E. Washburn	IBM - 967	6-5-72
10. NASA KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
[illegible]	LV-INS-11	6-19-72

KSC FORM 23-008 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: IU COMMAND CLOSED LOOP TEST

2. KSC TEST NUMBER: V-28229

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: VAB 26E7, MB-1

14. COMPUTER PROC. IDENTIFICATION: FT-45

15. EST. TEST TIME: 3 MEN - 16 HOURS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF-COMPLEX: FREQUENCY CLEARANCE FOR 450 MHZ

ON-COMPLEX: GROUND POWER, IU POWER, IU NETWORKS, FACILITY POWER, IBM MEASURING, DDAS, RCA 110A, FACILITY COMMUNICATIONS (OIS), TM RECORDS AND QUALITY INSPECTOR.

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

MSFC #III-5-509-8; III-5-510-17; III-5-510-26

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: IU COMMAND OPEN LOOP TEST

2. KSC TEST NUMBER: V-28230

3. EFFECTIVITY: AS-206 & SUBS

4. TEST OBJECTIVES

TO DEMONSTRATE THE CAPABILITY OF THE IU COMMAND SYSTEM TO RECEIVE A SIGNAL FROM A REMOTE TRANSMITTER WITH THE SERVICE STRUCTURE IN PLACE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST DOES X DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

DESCRIPTION

THE GSE IN 26E7 VAB RADIATES SIGNALS TO THE IU AT PAD B. THE UNMODULATED SIGNAL GENERATOR OUTPUT LEVEL IS ADJUSTED FOR A LO IM OUTPUT OF 2.0VDC; THE GENERATOR OUTPUT IS INCREASED 3DB AND ITS FREQUENCY IS VARIED ABOVE AND BELOW 450 MHZ TO 2.0V OUTPUT. THE TWO FREQUENCIES MEASURED ARE RECEIVER UPPER AND LOWER BANDEDGE; THE AVERAGE OF THE TWO FREQUENCIES IS RECEIVER CENTER FREQUENCY; THE DIFFERENCE IS RECEIVER BANDWIDTH. RECEIVER QUIETING IS DETERMINED BY MEASURING THE AUDIO OUTPUT DIFFERENCE BETWEEN NO SIGNAL AND A 10UV SIGNAL. SYSTEM SENSITIVITY IS DETERMINED BY DECREASING THE UPLINK SIGNAL LEVEL TO THE POINT OF 100% AVP THRESHOLD. RECEIVER INPUT IS SET TO -90DBM AND THE FREQUENCY VARIED ABOVE AND BELOW 450 MHZ TO AVP THRESHOLD; THIS DETERMINES SYSTEM UPPER AND LOWER BANDEDGES. SYSTEM DEVIATION SENSITIVITY IS TESTED BY DECREASING THE UPLINK DEVIATION TO 100% AVP THRESHOLD. SYSTEM PHASE SHIFT IS MEASURED BY VARYING THE PHASE DIFFERENCE BETWEEN THE 1 AND 2 KHZ TO AVP THRESHOLD AND THEN MEASURING THE PHASE DIFFERENCE VIA AN OSCILLOSCOPE.

THE DECODER IS TESTED BY SEQUENTIALLY COMPLEMENTING EACH ADDRESS BIT AND VERIFYING ABSENCE OF AVP; AND BY THE PERFORMANCE OF AUTO-PROGRAM FT-45 WHICH CHECKS THE REMAINING BITS.

TO VERIFY IU COMPATABILITY WITH THE LUT, THE FT-45 COMMANDS ARE SENT VIA LUT GSE.

CONFIGURATION: VEHICLE AT PAD B WITH RERADIATING SYSTEM CONNECTED.

PHASE: VB

TEST REQUIREMENTS
MSFC: 7921601
0.3.2.4.4.1
THRU
0.3.2.4.4.1.7
0.3.2.4.4.1.9

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	9/23/74	REVISED MSFC REQUIREMENTS		

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM - 967	6-5-72
10. KSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
	KO-IBM-N	6-15-72

KSC FORM 1-1-1-67

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: IU COMMAND OPEN LOOP TEST

2. KSC TEST NUMBER: V-28230

3. EFFECTIVITY: AS-206 & SUBS

13. LOCATION: LC-39B, VAB

14. COMPUTER PROC. IDENTIFICATION: FT-45

15. EST. TEST TIME: 4 MEN - 16 HOURS

16 SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF-COMPLEX: FREQUENCY CLEARANCE FOR 450 MHZ WITH PROTECTION

ON-COMPLEX: GROUND POWER, IU POWER, IU NETWORKS, DDAS, RCA 110A, FACILITY COMMUNICATIONS (OIS), QUALITY INSPECTION, IBM MEASURING

17 OTHER APPLICABLE REFERENCE DOCUMENTATION

MSFC # 111-5-509-8; III-5-510-17; III-5-510-26

18 ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE ____ OF ____

1. TEST TITLE
MAINTENANCE AND REPAIR OF MANSFIELD AND GREEN MODEL 10 HYDRAULIC PRESSURE TEST UNIT

2. KSC TEST NUMBER
V-30049

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES
TO MAINTAIN, REPAIR AND FUNCTIONALLY TEST THE HYDRAULIC PRESSURE TEST UNIT.

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* IT IS CLASSED A STANDBY

PRIME TEST ORGANIZATION IS MECHANICAL SYSTEMS LABORATORY

TEST PARTS ARE - DISASSEMBLY
INSPECTION
CLEANING
LUBRICATION
REASSEMBLY
FUNCTIONAL TEST
PACKAGING

TEST REQUIREMENTS
NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL [signature]	8. ORGANIZATION BATC 5-8534	9. DATE 10/25/67
10. NASA-KSC APPROVAL [signature]	11. ORGANIZATION LV-MECH-1	12. APPROVAL DATE 2 NOV 67

KSC FORM 23-336 (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF MANSFIELD AND GREEN MODEL 10 HYDRAULIC PRESSURE TEST UNIT

2. KSC TEST NUMBER
V-30049

3. EFFECTIVITY
GSE

13. LOCATION
VAB 1K

14. COMPUTER PROC. IDENTIFICATION
NA

15. EST. TEST TIME

16. SUPPORT REQUIREMENTS

GN_2
GHE
SPARE PARTS
SPECIAL TOOLS AS REQUIRED
CLEANING REQUIREMENT
FUNCTIONAL TEST EQUIPMENT
ENVIRONMENTALLY CONTROLLED AREA

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF MANIFOLD, LOADING, SOLENOID OPERATED, DELUGE WATER SYSTEM, NASA P/N 64-K-F-364, SHEETS 9, 15 AND 16, GROVE VALVE AND REGULATOR COMPANY, P/N M-14003-D

2. KSC TEST NUMBER
V-30147

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES
TO DESCRIBE THE MAINTENANCE, REPAIR AND FUNCTIONAL TESTING OF THE WATER SYSTEM:

NASA P/N	VENDOR P/N
64-K-F-364, SHEETS 9, 15 AND 16	M-14003-D

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [XX] DOES [ ] DOES NOT CONTAIN HAZARDOUS OPERATIONS. It is classed a standby.

Prime test organization is Mechanical Systems Laboratory.

Test parts are - Disassembly
Inspection
Cleaning
Lubrication
Functional Test
Packaging

Test Requirements NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL
F. L. [illegible]

8. ORGANIZATION
BATC 5-[illegible]34

9. DATE
11/13/67

10. NASA-KSC APPROVAL
D. A. [illegible]coville

11. ORGANIZATION
LV-MEC-1

12. APPROVAL DATE
11/14/67

KSC FORM 23-330 (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF MANIFOLD, LOADING, SOLENOID OPERATED, DELUGE WATER SYSTEM, NASA P/N 64-K-F-364, SHEETS 9, 15 AND 16, GROVE VALVE AND REGULATOR COMPANY, P/N M-14003-D

2. KSC TEST NUMBER
V-30147

3. EFFECTIVITY
GSE

12. LOCATION
VAB 1K 11

14. COMPUTER PROC. IDENTIFICATION
NA

15. EST. TEST TIME
24 hours

16. SUPPORT REQUIREMENTS
GN2
GHe
Spare parts
Special tools as required
Cleaning equipment
Functional test equipment
Environmentally controlled area

17. OTHER APPLICABLE REFERENCE DOCUMENTATION
6-BLGSEV-3689

18. ITEM CONTINUATION

110

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF VALVE, BALL, MANUAL, 1" WATER METHANOL SYSTEM, (SERVICE ARMS), NASA P/N 75M07192-1, KOEHLER AIRCRAFT PRODUCTS COMPANY, P/N 3-116815-16

2. KSC TEST NUMBER
V-30150

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES

TO DESCRIBE THE MAINTENANCE, REPAIR AND FUNCTIONAL TESTING OF THE VALVE:

NASA P/N	VENDOR P/N
75M07192-1	3-116815-16

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [XX] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* It is classed a standby.

Prime test organization is Mechanical Systems Laboratory.

Test parts are - Disassembly
Inspection
Cleaning
Lubrication
Functional test
Packaging

Test Requirements NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL F. L. Kutch	8. ORGANIZATION BATC 5-8534	9. DATE 11/13/67
10. NASA-KSC APPROVAL D. A. Tuttle	11. ORGANIZATION LV-MEC-1	12. APPROVAL DATE 11/14/67

KSC FORM

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF VALVE, BALL, MANUAL, 1" WATER METHANOL SYSTEM, (SERVICE ARMS), NASA P/N 75M07192-1, KOEHLER AIRCRAFT PRODUCTS COMPANY, P/N 3-116815-16

2. KSC TEST NUMBER
V-30150

3. EFFECTIVITY
GSE

13. LOCATION
VAB 1K 11

14. COMPUTER PROC. INDENTIFICATION
NA

15. EST. TEST TIME
24 hours

16. SUPPORT REQUIREMENTS

GN2
GHe
Spare parts
Special tools as required
Cleaning equipment
Functional test equipment
Environmentally controlled area

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

6-BLGSEV-3694

18. ITEM CONTINUATION

111

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF RELIEF VALVE,NASA P/N B10437799-1, 2, 3, STEWART-WARNER CORP. P/N 117B1300-1, -2, -3

2. KSC TEST NUMBER
V-30270

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES

To maintain, repair and functionally test the following valve:

NASA P/N	VENDOR P/N
B10437799-1, 2, 3	117B1300-1, -2, -3

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT CONTAIN HAZARDOUS OPERATIONS. It is classed a standby.

Prime test organization is Mechanical Systems Laboratory.

Test Parts are - Disassembly
Inspection
Cleaning
Lubrication
Reassembly
Functional Test
Packaging

Test Requirements NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	5-3-68	MERGER CHANGES VENDOR NAME FROM CORNELIUS CO. CORRECT VENDOR P/N	J. A. Etling	Donald Scoville

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
F. L. Kutch	BATC 5-8534	11/14/67
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
D. A. Scoville	LV-MEC-1	11/16/67

KSC FORM 23-336 (7/67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF RELIEF VALVE, NASA P/N B10437799-1, 2, 3, STEWART-WARNER CORP. P/N 117B1300-1, -2, -3

2. KSC TEST NUMBER
V-30270

3. EFFECTIVITY
GSE

12. LOCATION
VAB LK11

14. COMPUTER PROC. IDENTIFICATION
NA

15. EST. TEST TIME
24 hours

16. SUPPORT REQUIREMENTS

GN2
GHe
Spare Parts
Special tools as required
Cleaning requirement
Functional test equipment
Environmental controlled area

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

6-BLGSEV-3533

18. ITEM CONTINUATION

112

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF VALVE, GASEOUS NITROGEN SYSTEM. CALMEC MAFG CO., P/N C-188-B1, NASA P/N 75M51352

2. KSC TEST NUMBER
V-30362

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES

To maintain, repair and functionally test the following valve:

NASA PN	Vendor PN
75M51352	C-188-B1

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST XX DOES ___ DOES NOT CONTAIN HAZARDOUS OPERATIONS. It is classed a standby

Prime test organization is Mechanical Systems Laboratory

Test parts are - Disassembly
Inspection
Cleaning
Lubrication
Reassembly
Functional Test
Packaging

Test Requirements

NA

A. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL
Fred Kutch

8. ORGANIZATION
BATC 5-8534

9. DATE
11/15/67

10. NASA APPROVAL
George Gamble
Huntsville

11. ORGANIZATION
LV-MEC-1

12. APPROVAL DATE
11/16/67

KSC FORM 1-1-67

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF VALVE, GASEOUS NITROGEN SYSTEM, CALMEC MFG. CO., P/N C-188-B1, NASA P/N 75M51352

2. KSC TEST NUMBER
V-30362

3. EFFECTIVITY
GSE

13. LOCATION
VAB 1K 11

14. COMPUTER PROC. IDENTIFICATION
NA

15. EST. TEST TIME
24 hours

16. SUPPORT REQUIREMENTS

GN2
GHe
Spare Parts
Special tools as required
Cleaning requirement
Functional test equipment
Environmentally controlled area

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

6- BLGSEV-3516

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF CHECK VALVE, PNEUMATIC, HYDRO-PNEUMATIC SYSTEM, JAMES, POND, AND CLARK, INC., P/N 299T1-SERIES, NASA P/N 10430233

2. KSC TEST NUMBER
V-30416

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES
To maintain, repair, and functionally test the following valve.

NASA P/N	VENDOR P/N
10430233	299T1-SERIES

5. TEST DESCRIPTION EQUIPMENT STATUS/CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* It is classed a standby.

Prime test organization is Mechanical Systems Laboratory.

Test parts are - Disassembly
Inspection
Cleaning
Lubrication
Reassembly
Functional Test
Packaging

Test Requirements

NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
T. L. Kutch	BATC 5-8534	11/15/67
10. NASA APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
[illegible]	LV-MMC-1	11/16/67

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF CHECK VALVE, PNEUMATIC, HYDRO-PNEUMATIC SYSTEM, JAMES, POND, AND CLARK, INC., P/N 299T1-SERIES, NASA P/N 10430233

2. KSC TEST NUMBER
V-30416

3. EFFECTIVITY
GSE

13. LOCATION
VAB 1K11

14. COMPUTER PROC. IDENTIFICATION
NA

15. EST. TEST TIME
24 hours

16. SUPPORT REQUIREMENTS

GN_2
GHe
Spare Parts
Special tools as required
Cleaning requirement
Functional test equipment
Environmental controlled area

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

6-BLGSEV-3794

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF NASA P/N 75M08814-1, -2
HYDRAULIC ACCUMULATOR, SERVICE ARM SYSTEM
AMERICAN BOSCH ARMA CORPORATION, P/N EHS41-414, -415

2. KSC TEST NUMBER
V-30454

3. EFFECTIVITY
GSE

4. TEST OBJECTIVES

TO MAINTAIN, REPAIR AND FUNCTIONALLY TEST THE ACCUMULATOR.

5. TEST DESCRIPTION/EQUIPMENT STATUS/CONFIGURATION

THIS TEST [X] DOES [ ] DOES NOT *CONTAIN HAZARDOUS OPERATIONS.* IT IS CLASSED A STANDBY.

PRIME TEST ORGANIZATION IS MECHANICAL SYSTEMS LABORATORY.

TEST PARTS ARE - DISASSEMBLY
INSPECTION
CLEANING
LUBRICATION
REASSEMBLY
FUNCTIONAL TEST
PACKAGING

TEST REQUIREMENTS
NA

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL F. L. KUTCH	8. ORGANIZATION BATC 5-8534	9. DATE NOVEMBER 15, 1967
10. NASA KSC APPROVAL D. A. SCOVILLE	11. ORGANIZATION LV-MEC-1	12. APPROVAL DATE 11/16/67

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
MAINTENANCE AND REPAIR OF NASA P/N 75M08814-1, -2
HYDRAULIC ACCUMULATOR, SERVICE ARM SYSTEM
AMERICAN BOSCH ARMA CORPORATION P/N EHS41-414, -415

2. KSC TEST NUMBER
V-30454

3. EFFECTIVITY
GSE

13. LOCATION	14. COMPUTER PROC. IDENTIFICATION	15. EST. TEST TIME
VAB 1K11	NA	24 HOURS

16. SUPPORT REQUIREMENTS

GN_2
GHE
SPARE PARTS
SPECIAL TOOLS AS REQUIRED
CLEANING EQUIPMENT
FUNCTIONAL TEST EQUIPMENT
ENVIRONMENTALLY CONTROLLED AREA

17. OTHER APPLICABLE REFERENCE DOCUMENTATION
6-BLGSEV-3919

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
INSTALLATION AND REMOVAL OF SIB FLIGHT BATTERIES

2. KSC TEST NUMBER
V-31118

3. EFFECTIVITY
206 & Subs

4. TEST OBJECTIVES

TO INSTALL AND ELECTRICALLY CONNECT FLIGHT BATTERIES TO THE SIB STAGE. TO ELECTRICALLY DISCONNECT AND REMOVE FOR NORMAL AND EMERGENCY CONDITIONS.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST X DOES ___ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

A. The SIB batteries shall be installed and electrically connected. Proper indications will be verified at the SIB Networks Panel.
B. Instructions to disconnect and remove the flight batteries from the SIB stage for normal removal.
C. Instructions for recording voltage, current and temperature after battery installation.
D. Instructions for emergency removal of a SIB battery with an internal failure.

TEST REQUIREMENTS:
MSFC - 3.5.1.2.10.1
3.5.1.3.1

3.5.1.3.3
3.5.1.3.4

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	2-21-73	To Add 3.5.1.2.10.1 To Delete 3.5.1.3.2. To Test Requirements	[illegible]	[illegible]
A	11-20-72	To add 3.5.1.3.4 to Test Requirements	R O'Donald	R.F. Clay

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	CCSD	12-2-71
10. KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
R.F. Clay	LV-GDC-24	12-9-71

KSC FORM 23-338 (7-67)

APOLLO SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
INSTALLATION AND REMOVAL OF SIB FLIGHT BATTERIES

2. KSC TEST NUMBER
V-31118

3. EFFECTIVITY
206 & Subs

13. LOCATION
LC-39

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
45 Minutes

16. SUPPORT REQUIREMENTS

1. KSC Pad Safety
2. Facility Comm. (OIS)
3. OIS Recording
4. Standby Fire Support

17. OTHER APPLICABLE REFERENCE DOCUMENTATION
KMI 1710.1B/SF - The KSC Safety Program
K-V-053 - Apollo/Saturn (IB, V) Skylab Ground Safety Plan
60C11402 - Instrument Installation, Unit 12

18. ITEM CONTINUATION
60C11358 - Cable Installation, Unit 12

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
IBM SUPPLEMENTAL TO SATURN IB S/V CDDT AND CD

2. KSC TEST NUMBER
V-31119

3. EFFECTIVITY
AS-206 & SUBS

4. TEST OBJECTIVES
THIS PROCEDURE PROVIDES THOSE PREPARATIONS, OPERATING STEPS, AND POST OPERATIONS REQUIRED BY VEHICLE AND GSE/ESE IN SUPPORT OF THE TEST.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST XX DOES ___ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

THIS PROCEDURE IS WRITTEN FOR SATURN IB CDDT/CD TO SUPPORT LV ELECTRICAL SUPPORT EQUIPMENT SYSTEMS OPERATIONS, IU STAGE POWER APPLICATION AND OTHER SYSTEMS TESTING.

EVENTS ARE TIMED SEQUENCED IN CONFORMANCE WITH TIMES SPECIFIED IN THE CDDT AND COUNTDOWN PROCEDURE.

CONFIGURATION: IU STAGE ELECTRICALLY AND MECHANICALLY MATED IN A LAUNCH CONFIGURATION.

PHASE VI

	TEST REQUIREMENTS
	MSFC: 7921601
TM-011-001-2H	0.3.3.2.1 *
B.1.3.4 *	0.3.3.2.2 *
B.1.4.1.1 *	0.3.4.0.3 *
B.1.7.1.2 *	0.3.5.2.5.2 *
B.5.0.1	0.3.5.2.5.3
	0.3.5.2.1.3.1
	0.3.5.2.7
	0.3.5.2.8
	0.3.5.3.1.2
	0.3.5.3.2
	0.3.5.3.4

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
A	9/25/74	REVISE MSFC REQUIREMENTS	9/26/74	

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
	IBM 929	2-1-72
10. NASA KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
	LV-GDC-25	2-1-72

KSC FORM 21-218 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
IBM SUPPLEMENTAL TO SATURN IB S/V CDDT AND CD

2. KSC TEST NUMBER
V-31119

3. EFFECTIVITY
AS-206 & SUBS

13. LOCATION
PAD B

14. COMPUTER PROC. INDENTIFICATION
N/A

15. EST. TEST TIME
CDDT: 7 DAYS
LCD: 6 DAYS

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

ON-COMPLEX: IU QUALITY ASSURANCE

OFF-COMPLEX: NONE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SATURN IB S/V CDDT & CD TEST PROCEDURE V-20130

18. ITEM CONTINUATION

REV 33

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
IBM SUPPLEMENTAL TO SATURN IB L/V ELECTRICAL SYSTEMS TEST
V-20101

2. KSC TEST NUMBER
V-31126

3. EFFECTIVITY
-206 & SUBS

4. TEST OBJECTIVES
THIS PROCEDURE PROVIDES THOSE PREPARATIONS, OPERATING STEPS, AND POST OPERATIONS REQUIRED BY VEHICLE AND GROUND ESE IN SUPPORT OF THE TEST, INCLUDING IU INITIAL POWER APPLICATION.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT CONTAIN HAZARDOUS OPERATIONS.

PART I — PREPARATIONS AND FUNCTIONALS
SPECIFIES OAT EQUIPMENT, SPECIAL TEST BOXES, AND FUSED JUMPER INSTALLATION REQUIRED TO SUPPORT TEST. PROVIDES THOSE FUNCTIONAL SEQUENCES REQUIRED TO ACCOMPLISH IU INITIAL POWER APPLICATION.

PART II — OPERATING STEPS
PROVIDES THOSE STAGE PECULIAR OPERATING STEPS REQUIRED PRIOR TO L/V ELECTRICAL SYSTEMS TEST OPERATING STEPS. DEFINES STEPS REQUIRED TO RECONFIGURE THE STAGE BETWEEN PLUGS IN AND PLUGS OUT POWER TRANSFER SECTIONS.

PART III — POST OPERATIONS
CONTAINS THOSE FUNCTIONS AND STEPS REQUIRED TO ESTABLISH STAGE CONFIGURATION FOR NORMAL TESTING AND SUPPORT.

CONFIGURATION

PART I — THE FOLLOWING PROCEDURES WILL BE RUN PRIOR TO THIS TCP:

V-21228 IU ESE/VEHICLE INTERCONNECT CONTINUITY CHECKS
V-21285 LCC IU LAMP MONITOR CALIBRATIONS
V-21369 IU ESE POSTLAUNCH CHECKS

PART II — IU STAGE AND GROUND POWER REQUIRED.

PART III — IU STAGE AND GROUND POWER REMOVED, UNLESS SPECIFIED

PHASE: III

TEST REQUIREMENTS
(SEE BLOCK 18)

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
B	10/15/74	REVISED MSFC REQUIREMENTS	SCWitt 10/15/74	R. Bruce
A	9/25/74	REVISE MSFC REQUIREMENTS	SCWitt 9/26/74	R. Bruce 9/27/74

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
[illegible]	IBM 955	4-6-72
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
[illegible]	KV-CAC-25	4-6-72

KSC FORM 23-338 (2-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
IBM SUPPLEMENTAL TO SATURN IB L/V ELECTRICAL SYSTEMS TEST
V-20101

2. KSC TEST NUMBER
V-31126

3. EFFECTIVITY
-206 & SUBS

13. LOCATION
VAB

14. COMPUTER PROC. IDENTIFICATION
N/A

15. EST. TEST TIME
58 MEN-29 HRS.

16. SUPPORT REQUIREMENTS

INTERSTAGE: NONE

OFF-COMPLEX: NONE

ON-COMPLEX: AUXILIARY POWER
IU POWER
BACKUP BATTERIES FOR 6D100 & 6D200 (TBC)
LCC MEAS.
DDAS
110A COMPUTERS
FACILITY COMM (OIS)
IBM QA
IBM MECHANICAL (CLOSED LOOP)

IBM TM
DEE-6
NASA REPRESENTATIVE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

SATURN IB L/V ELECTRICAL SYSTEMS TEST V-20101

18. ITEM CONTINUATION

BLOCK 5 (CONT'D)

MSFC: 7921601 — TM-011-001-2H

0.3.4.1.2.1 — B.1.4.1.1
0.3.4.1.3.1

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: IBM SUPPLEMENTAL TO PAD VERIFICATION TEST V-20082

2. KSC TEST NUMBER: V-31127

3. EFFECTIVITY: AS-513 & AS-515

4. TEST OBJECTIVES

This procedure provides those preparations, operating steps, and post operations required by Vehicle and Grd ESE in support of the test.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ___ DOES XX DOES NOT CONTAIN HAZARDOUS OPERATIONS.

This procedure is written in three parts:

Part I - Pretest Preparations
Specifies OAT equipment, special test boxes, and fused jumper installation required to support test.

Part II - Pre-Operating Step
Sequentially lists operating steps of functions required prior to performance of operating steps in Procedure V-20082.

Part III - Post Operations
Contains those functions and steps required to establish base configuration for normal testing and removal of equipment.

Configuration

Part I - IU Stage Grd Pwr Removed.

Part II - IU Stage Grd Pwr Required.

Part III - IU Stage and Grd Pwr Removed, unless specified.

TEST REQUIPEMENTS
MSFC: N/A

PHASE: V

6. REV.	DATE	REASON	Contractor Approval	KSC Approval

7. CONTRACTOR APPROVAL: [illegible] 6/25/72	8. ORGANIZATION: IBM	9. DATE: 6/25/72
10. NASA-KSC APPROVAL: [illegible]	11. ORGANIZATION: LV-GDC-25	12. APPROVAL DATE: 6/28/72

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: IBM SUPPLEMENTAL TO PAD VERIFICATION TEST V-20082

2. KSC TEST NUMBER: V-31127

3. EFFECTIVITY: AS-513 & AS-515

13. LOCATION	14. COMPUTER PROC. INDENTIFICATION	15. EST. TEST TIME
PAD	N/A	6 HRS

16. SUPPORT REQUIREMENTS

INTERSTAGE - NONE

ON COMPLEX SUPPORT - IU ELECTRICAL NETWORKS
IU QUALITY ASSURANCE

OFF COMPLEX SUPPORT - NONE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

PAD VERIFICATION TEST PROCEDURE V-20082

18. ITEM CONTINUATION

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KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE
S-IC FLIGHT CONTROL SYSTEMS PREPARATIONS FOR INTEGRATED TEST AND LAUNCH

2. KSC TEST NUMBER
V-33030

3. EFFECTIVITY Revision E
511 & Subs

4. TEST OBJECTIVES

To verify the S-IC Stage Flight Control Components are in proper configuration during integrated tests and Launch.

5. DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST [ ] DOES [X] DOES NOT CONTAIN HAZARDOUS OPERATIONS. It is classed a subtask.

Prime test organization is S-IC Stage.

This test shall be part of the S-IC Stage preparations for all integrated tests and Launch involving the S-IC stage Flight Control System. It shall be performed to verify that all S-IC Flight Control components are in proper electrical configuration, the S-IC Engine Actuators are in proper mechanical configuration and that the S-IC Engine Actuator Position Indicators are in proper configuration.

Test Requirements

T.M.-010-002-2H: B.1.1.1.1.1
B.1.1.1.1.2
B.1.1.1.1.4
B.1.1.1.1.5

66B136188 4.2.5.3.2

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
E	11/10/71	Add 66B136188 Test Reqmt. Para.	for D. Hoage 11-11-71	H.W. Ely 11/15/72
D	3/20/70	Added T.M.-010-002-2H Requirements	J.L. McCraney 7-20-70	H.W. Ely 7-20-70
C	10/18/8	Revise to Non-Hazardous. Support of Hazardous TCP V-24025 has been removed.	S/J.A.Smith, B.Nelson for J.McCraney	S/G.W.Ely
B	9/19/8	Revise to hazardous. Requires support of hazardous TCP V-24025.	S/W.Estes, J.Skowron	S/G.W.Ely
A	1/8/68	To clarify intent of test.	S/W.Estes, J. Skowron	S/G.W.Ely

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/H.L.Burton/J.L.McCraney	BATC S-8521/S-8531	11/7/67
10. NASA/MSC APPROVAL	11. ORGANIZATION	12. APPROVAL DATE
S/G.W. Ely	LV-GDC-33	11/14/67

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE
S-IC FLIGHT CONTROL SYSTEMS PREPARATIONS FOR INTEGRATED TESTS AND LAUNCH

2. KSC TEST NUMBER
V-33030

3. EFFECTIVITY Revision E
511 & SUBS

13. LOCATION
VAB, PAD

14. COMPUTER PROC. INDENTIFICATION
NA

15. EST. TEST TIME
4 Hours

16. SUPPORT REQUIREMENTS

RD 40092-1DY

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

KSC OPERATIONS
APOLLO/SATURN TEST AND OPERATIONS CATALOG SHEET

PAGE 1 OF 2

1. TEST TITLE: LVDC/LVDA SUPPORT OPERATIONS FOR OVERALL TESTS

2. KSC TEST NUMBER: V-33032

3. EFFECTIVITY: 206 & SUBS, 512 & SUBS

4. TEST OBJECTIVES

THIS SUBTASK PROCEDURE IS USED TO SUPPORT ALL VEHICLE OVERALL TESTS EXCEPT LAUNCH COUNTDOWN AND COUNTDOWN DEMONSTRATION. TESTING IS PERFORMED IN THE OPERATING STEPS TO OBTAIN A READINESS FOR RUNNING SIMULATED FLIGHT OR FLIGHT OPTION. THE PARTICULAR OPTIONS FOR EACH SIMULATED FLIGHT ARE DEFINED IN THE BODY OF THIS PROCEDURE.

5. TEST DESCRIPTION EQUIPMENT STATUS CONFIGURATION

THIS TEST ☐ DOES ☒ DOES NOT *CONTAIN HAZARDOUS OPERATIONS.*

SUPPORT REQUIREMENTS WILL BE DEFINED IN THE OVERALL PROCEDURE. THE BODY OF THIS SUB-TASK PROCEDURE CONTAINS ONLY THE REQUIRED STEPS FOR OPERATING THE GUIDANCE CONSOLE.

THE FLIGHT COMPUTER SYSTEMS PERSONNEL WILL DETERMINE GUIDANCE INDEPENDENT PARAMETERS OF THE TEST.

THE FOLLOWING PROCEDURES ARE PREREQUISITES TO THIS PROCEDURE: V-23179, V-23180, V-23199.

CONFIGURATION: IU STACKED, LOCATION - VAB & PAD.

PHASE: IV, V, VI

TEST REQUIREMENTS

7921601	TM-010-002-2H	TM-011-001-2H	
0.3.7.1.4	B.1.1.1.3 (512 & 514 ONLY)	B.1.1.1.3 ×	B.2.0.1.5
	B.1.6.1	B.1.5.1 ×	
	B.1.6.1.1	B.1.5.1.1 ×	
	B.1.6.1.2	B.1.5.1.2 ×	
	B.1.6.1.2.1	B.1.5.1.2.1 ×	
	B.1.6.1.2.2	B.1.5.1.2.2 ×	
	B.1.6.2	B.1.5.2 ×	
	B.2.0.1	B.2.0.1 ×	
	B.2.0.1.1	B.2.0.1.1 ×	
	B.2.0.1.2	B.2.0.1.2 ×	
	B.2.0.1.3	B.2.0.1.3 ×	
	B.2.0.1.4	B.2.0.1.4 ×	

6. REV.	DATE	REASON	Contractor Approval	KSC Approval
D		SEE BLOCK 18 FOR REV. CONTINUATION		
C	6/22/2	REVISE BLOCKS 3, 5, 16 & 17	D.A. Quinn 6/22/72	C.A. Kitson
B	10-15-9	REVISE MSFC REQ'MTS	S/R.LAVIN	S/J.PERKINSON
A	10-07-8	ADDITION OF REQUIREMENT DOCUMENT NO.	S/J.WASHBURN	S/J.PERKINSON

7. CONTRACTOR APPROVAL	8. ORGANIZATION	9. DATE
S/J. WASHBURN	IBM - 968	JULY 31, 1968
10. NASA-KSC APPROVAL	**11. ORGANIZATION**	**12. APPROVAL DATE**
S/J. PERKINSON	LV-GDC-32	AUGUST 27, 1968

KSC FORM 23-338 (7-67)

APOLLO/SATURN TEST AND OPERATIONS CATALOG (SHEET 2)

PAGE 2 OF 2

1. TEST TITLE: LVDC/LVDA SUPPORT OPERATIONS FOR OVERALL TESTS

2. KSC TEST NUMBER: V-33032

3. EFFECTIVITY: 206 & SUBS, 512 & SUBS

13. LOCATION: LC 39

14. COMPUTER PROC. IDENTIFICATION: FT PROG. AS SPECIFIED BY FLT. COMPT. SYS.

15. EST. TEST TIME: 70 HOURS

16. SUPPORT REQUIREMENTS

AS DEFINED IN OVERALL TEST PROCEDURE

17. OTHER APPLICABLE REFERENCE DOCUMENTATION

18. ITEM CONTINUATION

BLOCK 6 (CONTINUED)

REV.	DATE	REASON	CONTR. APP.	KSC APP.
E	9/23/74	REVISED MSFC REQUIREMENTS	9-26-74 E.M. Zapalac	J.R. Lampich
D	9/25/72	REVISED BLOCK 5	D.A. Quinn 9/25/72	C.A. Kitson

JOHN F. KENNEDY SPACE CENTER
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BUCHANAN, D.D.	DD	1
PARSONS, W.	DD-SED	1
COONCE, J.M.	IN-OMO	5
FIKE, J.W.	IN-QAL	1
LIBRARY	IS-DOC-1L	2
ARBIC, R.G.	LA-PLN-2	1
KECK, J.E.	LO-PRO-1	1
MEDLOCK, J.R.	LV-CAP	1
LEALMAN, R.E.	LV-GDC	1
CHAMBERS, M.	LV-GDC-1	1
CHANDLER, W.O.	LV-GDC-2	1
WHITESIDE, C.A.	LV-GDC-3	1
HUFFMAN, B.	LV-INS-1	1
FITZGERALD, J.J.	LV-INS-2	1
O'HARA, A.	LV-OMO	1
MARIANI, T.	LV-OMO-1	6
HORNE, C.V.	LV-QAL	1
BISHOP, E.	TS-NTS-1	1
SCHEALER, R.B.	TS-OSM	1

GELZER, J.R.	CHRY-13/VAB 16E21	15
HAYES, W.W.	IBM-922/VAB 2N11	12
NICHOLS, H.	MDAC/VAB 3L4	5
ANDERSON, B.C.	ROC-2/VAB 3N9	2
BOYETTE, M.	BOFM-49/VAB 3N1	15
WEINBERG, D.B.	BOFM-35/VAB 2L3	5 PLUS ORIGINALS & EXTRAS

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

VA23	KEYES	1
VA50	RAINS	1
VA70	FERRELL	1
VA80	GALEY	1
VA60	LAHATTE	1
ET41	HUGHES	3
EG21	HILL	3

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