

IBM

Saturn Instrument Unit

S-IU-502 STATUS AT COMPLETION
of MODIFICATIONS and SYSTEMS

CHECKOUT RETEST



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I. INTRODUCTION

The System Checkout retest of Instrument Unit S-IU-502 was performed at the IBM Space Systems Center test facility in Huntsville, Alabama, utilizing the Saturn V checkout complex.

This is the first Saturn V Instrument Unit to be retested with this checkout complex. The pre-Instrument Unit testing program consisted of Station Validation Tests to verify the station update. These tests were utilized to validate each sub-system and system of the checkout complex.

Prior to and during System Checkout retest, the checkout complex was updated concurrently with the Instrument Unit to maintain compatibility between the latest configuration of the Instrument Unit and the Electrical Support Equipment. This update was accomplished by means of MSFC approved work orders.


The System Checkout Retest of Instrument Unit S-IU-502 was started on February 20, 1967 and was completed on March 10, 1967.

The purpose of this document is to provide the status of the Instrument Unit S-IU-502 at the completion of System Checkout Retest.

II. STATUS OF INSTRUMENT UNIT S-IU-502 AT COMPLETION OF S-IU-502 SYSTEM CHECKOUT RETEST.

Based upon the evaluation of the information contained in this document, Instrument Unit S-IU-502 is considered to have been satisfactorily retested after rework and modifications were performed. All System Checkout retest requirements have been completed and the Instrument Unit can be returned to Manufacturing to prepare for shipment.

Date March 10, 1967


James H. Frizzell
Test Conductor
S-IU-502 Retest

JHF:na

III CRITERIA FOR COMPLETION OF INSTRUMENT UNIT S-IU-502
SYSTEM CHECKOUT RETEST.

Checkout Complex

Attachment

A. Checkout Complex Status

The Station Update for S-IU-502 was completed on February 19, 1967. A total of seven work orders were incorporated to update the ESE to the S-IU-502 Retest configuration. Refer to Attachment "A".

B. Station Validation Tests Status

All Station Validation Retests that are required to be performed prior to Instrument Unit Hookup, have been completed. The Test Compliance Documents (TCD) have been signed for all the tests performed with the exception of the three Networks Tests. Refer to Attachment "B".

Instrument Unit

C. Assembled Stage Test Status

A total of 39 Assembled Stage Test Procedures were prepared and used for the retest of S-IU-502. Test Procedures at the S-IU-502 and S-IU-503 configuration were updated to reflect the changes incorporated in the Instrument Unit.

D. System Test UCR Log

During the original System Checkout phase, 59 Unsatisfactory Condition Reports (UCR) were prepared on the Instrument Unit components. During the first retest period, two UCR's were written. During the second retest, four UCR's were written. These and all previous UCR's have been satisfactorily dispositioned, concurred with by MSFC (RMO) and closed.

E. Outstanding Engineering Orders and Rework/Defects

There are no outstanding Engineering Orders (E.O.'s) and as of 3/10/67, there are 6 open Defect Items. A Quality Inspection of the Instrument Unit is in process and additional defects may be written.

F. ECP Status for System Checkout Retest

A total of ten (10) ECP's were installed completely and one partially installed which will be completed at KSC.

Six ECP's were verified during S-IU-502 Retest, one ECP was verified prior to November 30, 1966. Three ECP's did not require retesting. Refer to Attachment "F".

G. ECR Status for System Checkout Retest

A total of eight ECR's were installed in the Instrument Unit. All of the ECR's were verified during S-IU-502 retest except one which no retest was required.

H. ECP/ECR's To Be Kitted to KSC

A total of 5 ECP/ECR's will be mod kitted to KSC after System Checkout Retest. Refer to Attachment "H".

J. Replaced Components List

After System Testing and when the Instrument Unit was being modified by installation of ECR/ECP's, many components were removed. All components were returned to the Instrument Unit for System Checkout Retest. For a complete list of these replaced components and the reason for replacement, see Attachment "J".

K. Non-Flight Components List

All flight components were tested during System Checkout Retest and there were no non-flight components installed.

L. Missing Components List

The flight Batteries were not utilized during System Checkout Retest and are to be installed at KSC.

M. Component Qualification Status

A total of 13 components for which IBM has qualification responsibility are still unqualified. There are a total of 2 components the MSFC has the qualification responsibility. A list of these components and their qualification schedule is contained in Attachment "M".

N. Shipping Data Package Table of Contents

The contents of the Shipping Data Package are outlined in Attachment "N".

SYSTEM CHECKOUT COMPLEX STATUS

WORK ORDER NUMBER	UCR NUMBER	E.O. NUMBER	DESCRIPTION	DATE COMPLETE
5-053			To provide ESE test capability for addition of (7) coolant plate heaters to the IU.	2-24-67
5-054			To put Saturn V IU c/o complex in the S-IU-502 Retest configuration.	2-17-67
5-056	H 5234		Patching error in 601-620A1	2-10-67
5-057			Vehicle change (change in channel assignments for VK 137 and VK 138)	2-17-67
5-058			Pin reassignment to accommodate S-IU-502 retest	2-17-67
5-059	H5241		Buss change on vehicle not picked up on S-IU-502 retest update.	3-1-67
5-061	H5243		Design error on S-IU-503 station update.	3-1-67

S-IU-502 RETEST
ASSEMBLED STAGE TEST STATUS
STATION VALIDATION

ITEM	TEST NAME and NUMBER	EFFECTIVITY	TCD	REMARKS
1.	Power Distribution and Control (1-A001)	502 Updated		Test Run on 2-23-67 and data submitted to RMO for evaluation. Test Run on 2-23-67 and data submitted to RMO for evaluation.
2.	General Networks (1-A002)	502 Updated		
3.	Signal Conditioner 1504A1A5 (5-722)	502	3-6-67	
4.	Pre-Vehicle ESE Functional (5-733)	502	3-2-67	
5.	NSTS Validation (5-750)	502	3-3-67	
6.	Emergency Detection Systems (7-A101)	502 Updated		Test Run on 2-21-67 and data submitted to RMO for evaluation.

S-IU-502 RETEST
ASSEMBLED STAGE TEST STATUS
VEHICLE

Revised 3/14/67

Item	Test Name	Number	Effectivity	TCD	Remarks
1.	Power Distribution and Control	1-A001	502 Updated		Test Completed 2/24/67*
2.	General Networks Test	1-A002	502 Updated		Test Completed 2/24/67*
3.	Instrumentation Hookup	2-001	502	3/2/67	
4.	DC Amplifier Calibration Test (Replaced Amplifiers Only)	2-002	503	3/2/67	
5.	Temperature Measurements Test	2-005	503	3/2/67	
6.	Vibration Measurements Test (Test only replaced amplifiers per ECR- ACUE-357)	2-008	502	3/2/67	
7.	AC Amplifier Test (Test only replaced amplifiers per ECR-ACUE-357)	2-009	502	3/2/67	
8.	Single Sideband Test (Part III, Steps 014, 015, and 016; Part IV - All)	3-009	502		Test not performed as 245 MUX MOD, ECR 454 not installed.
9.	TM Antenna Subsystem Test	4-001	503	2/26/67	
10.	RF Power Output Test (TM)	4-003	502	2/28/67	
11.	C-Band Radar Antenna Subsystem	4-011	503	3/16/67	
12.	C-Band Radar RF System Test	4-021	502	3/16/67	
13.	CCS RF Systems Test	4-024	503	3/8/67	
14.	Stabilizer Functional (Parts I, III, IV)	5-A102	503	3/3/67	
15.	Measurement Identification	5-201	503		Test Completed 3/2/67 *
16.	LVDC/LVDA Switch Selector	5-A203	503		Test Completed 3/1/67 *
17.	Power and/or Redundancy (Options A, B, C, D, F, H, and I)	5-A204	503		Test Completed 3/2/67 *
18.	LVDC/LVDA Accelerometer Processor	5-A207	503		Test Completed 3/1/67 *

Attachment C

S-IU-502 RETEST
ASSEMBLED STAGE TEST STATUS
VEHICLE

Item	Test Name	Number	Effectivity	TCD	Remarks
19.	LVDC/LVDA Ladder Output	5-A210	503		Test Completed 3/1/67 *
20.	LVDC/LVDA Self Test	5-A220	503		Test Completed 3/1/67 *
21.	LVDC/LVDA Discrete Input	5-A225	503		Test Completed 3/1/67 *
22.	LVDC/LVDA Discrete Output	5-A233	503		Test Completed 3/1/67 *
23.	LVDC/LVDA DDAS Test	5-A235	503		Test Completed 3/1/67 *
24.	LVDC/LVDA CIU	5-A243	503		Test Completed 3/1/67 *
25.	Command Systems	5-A245	503		Test Completed 3/1/67 *
26.	LVDA Pin Function	5-246	503		Test Completed 2/28/67 *
27.	A ₁ Gain	5-A301	503		Disapproved pending specification change
28.	Control Computer APS	5-A303	503	3/2/67	
29.	Control Computer Comparator	5-A306	503		Disapproved pending specification change
30.	Control System ESE/Vehicle Comp.	5-311	503	3/2/67	
31.	Control Computer Relay Redundancy	5-A321	503	3/2/67	
32.	Engine Deflection	5-A501	503	3/3/67	
33.	A ₀ Gain	5-A502	503	3/2/67	
34.	Control System Null	5-A503	503	3/2/67	
35.	Stabilizer Integrated (Zero Reference and ASAAP Sections only)	5-A506	503	3/10/67	
36.	Gas Bearing Subsystem Test (Part III and IV only)	6-13	503		Test Completed 3/4/67 *
37.	EDS Less Overage Switch Test Option	7-A101	502 Updated		Test Completed 3/6/67 *
38.	Simulated Plug/Flight Pre-Lift-Off	7-A104	502 Updated		Test Completed 3/8/67 *
39.	Simulated Plug Drop Test	7-A102	502 Updated		Test Completed 3/8/67 *

* TCD submitted to RMO, awaiting approval.

Attachment C

S-IU-502 UCR AND IR LOG

UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
00961	Antenna, 50Z12504-1, 603A577 S/N 002 Cable, 603W134 S/N 003A.	System VSWR exceeded 1.7:1 limit of System Test specification 7907824.	Cable 601W134 rebuilt.
00962	Coax cable, 7908927-001, 602W136 S/N 003.	During electrical phasing of TM cables they were found to be out of specification. Cable 602W136 was 5.5 cm too long.	Cable rebuilt - now 7908927-005.
00963	Coax cable, 7908972-3, 601W143 S/N 003.	Cable 601W143 P1 had a loose connector.	Replace connector at P1.
00964	Coax cable, 7910686-001, 603W171 S/N002.	Cable 603W171 had loose connectors at P1 and P2.	Tighten connector jam nut and verify VSWR.
00965	Coax cable, 7910687-001, 603W172 S/N 002.	Cable 603W172 had loose connector at P2.	Tighten connector jam nut and verify VSWR.
00966	PCM Coax Switch, 50M13016-001, 603A630 S/N 14.	The PCM Coax Switch was labeled wrong. Port J2 should be labeled J4 Port J4 should be labeled J2.	Label ports properly and use as is.
00967	CCS Coax Switch, 50M13016-001, 603A629 S/N 15.	The CCS Coax Switch was labeled wrong. Port J2 should be labeled J4 Port J4 should be labeled J2.	Label ports properly and use as is.
00968	UHF RF Assembly, 50M13013-001, 603A601 A/N 5.	The UHF RF assembly Power Output does not meet System Test specification 15 watts minimum. Measured and recorded to be 11.5 watts.	Retesting of this unit revealed there was no problem.

Attachment D

S-IU-502 UCR AND IR LOG

UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
00969	Coax Cable, 7910682-001, 603W167 S/N 001A.	During RF sub-system test cable 603W167 was found to exceed system VSWR specification 1.5:1.	Inproper assembly of the coax connector. Cable replaced. Removed cable submitted for failure analysis.
00970	Gas Bearing GN ₂ Supply System.	Pressure decay of subject system was not within the limits given in the Test Specifications.	System Test Specification, 7907824, is in error. Corrected by EO-237-274-7907824.
00971	Latch Relay, 40M37496, K42.	Relay failed to operate.	Removed 603A2 Distributor and replaced defective relay.
00972	Instrument Unit	Three invalid discrete measurements were received via DDAS which were caused by random noise in the IU. Similar indications have been seen on previous IU's (Ref. UCR 0136, 0148 and 0206 on IU-202; UCR 1063 on IU-204).	These are known conditions which are not considered major discrepancies and which are in the process of being corrected (Reference UCN 5130).
00977	Auxiliary Power Distributor, 7910420-023, 601A33 S/N 021.	Measurement lines for new coolant pump control circuitry have a 12 K resistor in series with the measurement.	The resistors were removed by the following EO's: 237-273-7910278 WL 237-272-7910661-023
00978	Schematic, 7910138	1.) Sheet 89 - 603A2 S3/a, J3/b, J3/d have wrong nomenclature. 2.) Sheet 89 - Relay contacts K 41-2 in module A8 should be shown as latch relay contacts.	Expedited ECP to make necessary changes to IU Electrical Schematics and the IU/ESE ICD.

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UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
00979	Control Distributor, 7910417, 603A2 S/N 12.	Due to the configuration of the control circuitry for the PCM and CCS Coax Switches, it is possible to program a malfunction condition into the coax switches.	<p>For the following reasons it is not advisable to change 501, 502 and 503:</p> <ol style="list-style-type: none"> 1.) Shortage of diodes in control distributor. 2.) Programming definition for operation of coax switches has been verified. 3.) No operational problems. 4.) Incorrect operation during checkout will not harm equipment. 5.) Impact on Huntsville Checkout, KSC and programming to modify 501 and 502. <p>IBM Engineering recommends use as is for 501, 502 and 503 and will redesign for 504.</p>
00980	LVDC Switch Selector Routine (Software).	Constant which checks Switch Selector Stage Select Bits contains no S-II Bit.	Correction has been made by patch loading at this location.
00982	Meas. Distributor, 7910415-23, 602A4 S/N 21.	<p>The Actuator Position Measurements (VG) when read over DDAS were 50 to 56 millivolts higher than the same measurements read on hardwire (DVM) in 13 of the 18 VG measurements.</p> <p>The 50 mv potential between the two Measuring Distributors was caused by the voltage monitor boards in the ground station.</p>	Voltage monitor boards removed from the ESE.

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UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
00983	Flight Control Computer, 50M35300, S/N 502.	<ol style="list-style-type: none"> 1. The threshold and saturation points on the I_{III} spatial amplifier were out of tolerance. 2. The threshold pulse width of spatial amplifiers are out of tolerance. 3. The voting point of the S-IVB Yaw Servo Comparator is out of tolerance. 4. The S-IC/S-II 4 Pitch and Yaw valve current nulls drift excessively. 	IBM was directed by RMO to use as is and return the unit to MSFC after checkout. This is a non-flight item.
00984	Control Signal Processor, 50M35500-7, S/N 114.	The Group #2 Roll Analog output was out of specifications.	IBM was directed by RMO to use as is.
00985	Orbital Program (Software).	The constants used in this program to select TM multiplexers is selecting "MUX B" and it should be selecting "MUX A".	The program for IU-502 was changed by the use of patch cards.
00986	ST-124M Stabilizer, 50M22100, S/N 012.	The Y (coarse) Attitude Sensor (1:1 resolver) angle to the Y Vehicle Angle is greater than the maximum allowable error. (30 arc minutes).	IBM was directed to use as is and change the specification to 1 degree instead of 30 seconds.
00987	Prepare to Launch Routine.	The Gimble Angle Reasonableness Constants in the Prepare To Launch Routine were not loaded correctly.	A Patch was loaded to the Prepare To Launch Routine for S-IU-502.
00988	LVDA 50M35011, 603A29, S/N 6140300.	Buffer Register P-11, Position #15 fails to output the correct signal level to the CIU, DDAS, and ESE.	MSFC Personnel replaced the defective module with the LVDA mounted on the IU.

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S-IU-502 UCR AND IR LOG

UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
00989	ST-124M Stabilizer 50M22100-5 603A19, S/N 012.	The "Z" Accelerometer Servo Output goes into oscillation at approximately 10^0 about the "Z" Axis.	IBM was directed by RMO to allow MSFC Personnel to wipe the slip ring.
03002	Computer Interface Unit, 50Z13007-001, 603A605 S/N 004.	Output data not holding steady.	Refer UCR #03012 - Condition corrected by change to Network Cable 7908985-3.
03003	DC Amplifiers, 50Z12400-093, NHA 602A409 S/N 83.	DC Amplifiers installed with wrong range cards.	Replace 50Z12400-093 with 50Z12400-117 amplifiers.
03004	DC Amplifier, 50Z12400-061, NHA 602A407 S/N 75.	DC Amplifier has incorrect output at M 8 and M 6 measurements.	M 8 and M 6 labeled incorrectly. Labels exchanged and installed in proper channels.
03007	DC Amplifiers, 50Z12400-081, NHA 602A406 S/N 79.	DC Amplifiers installed with wrong range cards.	Replaced 50Z12400-081 with 50Z12400-129 amplifiers.
03008	Measuring Rack, 50Z12667-029, 603A669 S/N 011.	R-36; R-37; R-38 measurements missing.	Install amplifiers for measurements.
03009	DC Amplifiers 50Z12400-067 (25 ea).	Amplifiers do not have the correct range cards in accordance with the IP & C list Per E.O. 300.	Comply with ECR #170.
03010	P1 MUX ASSY, 50Z13002-005, 602A593 S/N 409.	Resistors missing from input of Channel 14 frames 1 through 10.	Rework measuring distributors 602A3 and 602A4.
03011	Accelerometer Cable, 50Z12367, NHA 603A524 S/N 2142.	Cable wired incorrectly.	Replaced cable.

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UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
03012	Computer Interface Unit, 50Z13007-001, 603A605 S/N 8.	Output Data not holding steady.	Refer UCR #03002. Condition corrected by change to network cable 7908985-3.
03015	S1 TM, 50Z13004-003, 602A596.	S1 TM common reference missing in the cable to the S1 TM on the vehicle and in the prints.	An expedited ECP submitted and approved to make the required changes to the vehicle.
03016	DC Amplifier, 50Z12400-109, NHA 602A406.	No output from amplifier.	Replaced amplifier.
03017	DC Amplifier, 50Z12400-061, NHA 602A407 S/N 75.	Incorrect outputs in run made of operation of M 6 and M 8 amplifiers.	Reidentified M 6 and M 8 amplifiers and installed in proper channel. Refer UCR # 03004.
03019	Temperature Gauge, 50Z10666, 602A480 S/N 55.	Cannot hook-up cable to temperature gauge because a manifold clamp is in the way.	Remove top half manifold clamp, engage connector to temperature probe and re-install manifold clamp half.
03020	DC Amplifier, 50Z12400-041, NHA 602A407 S/N 75.	Incorrect reading in Low Cal channel 3.	Adjusted bias in component test. System test OK.
03021	270 Multiplexer (P1) 50Z13002-005 602A593 S/N 409	An excessive voltage level was applied while troubleshooting.	Multiplexer was removed and replaced with a spare.
03023	UHF RF ASSY. 50M13013-1, 603A601, S/N 5.	The Transmitter Frequency Deviation was out of specification.	ASSY. removed and returned to MSFC for bench check. New ASSY. was installed 10-13-66.

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S-IU-502 UCR AND IR LOG

UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
03024	F1 RF ASSY. 50Z13011-001, 602A589 S/N 406.	No RF Output.	Removed and replaced with spare.
03026	ST-124M, 50Z22100-5, 603A19 S/N 12.	The Internal Ambient Reference Port on the ST-124M Platform was labeled - ST-124M Purge Line.	The Purge Inlet was properly labeled.
03027	Pressure Switch, 20Z42016-001, S/N 17.	The deactuation pressure is below 900 PSIA Specification.	Replaced by S/N 17.
03028	Solonoid Valve, 20Z42034-001, S/N 119.	Measurement VG-5, closed position, was not being received at the DDAS ground station, VG-6, open, is being received constantly.	Unit replaced.
03025	Servo Accelerometer 50Z12365-1, S/N 4.	Incorrect Bias and Output Levels.	Returned to Component Test and Recalibrated.
03029	ST-124M Stabilizer 50M2210-5, S/N 12.	The Internal Ambient Pressure was too high.	IBM was directed by MSFC to use as is.
03030	Instrument Unit 10Z22501-1, S/N 502.	Flowrates through the FCC and the LVDA/LVDC were too low.	Orifices were removed and replaced with new items.
03039	Control Signal Processor.	The EDS Group 1, 2, and 3 Roll Rate Switches are operating improperly during application of power.	IBM was directed by MSFC to further investigate the problem.
03042	Cable Assembly, 7910670-001, 603W154, S/N 001.	Cable exceeded VSWR specification 1.5:1.	Replaced with new cable.

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UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
03043	Cable Assembly, 7909146-001, 601W126, S/N 2.	Cable had loose connector.	Replaced with new cable.
03044	Cable Assembly, 7909159-001, 603W125, S/N 2.	Cable had bad connector.	Replaced connector.
03045	Cable Assembly, 7909163-001, 603W140, S/N 2.	Cable had bad connector.	Replace connector.
03046	Coax Cable, 7908927-001, 602W136, S/N 003.	Refer UCR 00962. Cable was reworked. When checked it did not meet System Test specifications.	Replaced by new cable 3.0 cm longer.
03047	Coax Cable, 7900671-001, 603W155, S/N 001.	Cable did not meet System Test specifications.	Replaced by new cable.
03049	Power Amplifier 50M12673, 603A637, S/N 1002.	The RF Output was too low.	Returned to MSFC for repair. Replaced on IU.
03050	CCS Antenna Subsystem.	The Attenuation of the CCS Receive System was too high.	Problem was restated and new information supplied on UCR #03056.
03051	Cable ASSY. (Coax) 7910673-001, 603W157, S/N 001.	Cable Attenuation was too high.	Cable was removed and replaced with a rebuilt one.
03054	Cable ASSY. 7909004-005, 602W39, S/N 2.	The connector at P-11 of 602W39 will not mate with the J-2 Connector on 603A601.	Connector at P-11 was replaced with PT06CE-10-6S-SR.

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S-IU-502 UCR AND IR LOG

UCR NO.	ASSEMBLY OR COMPONENT	DESCRIPTION OF DEFECT	DISPOSITION and/or REPAIR ACTION
03056	CCS Antenna System.	Attenuation of CCS Receive Path does not meet the System specification. (See UCR #03050).	Use a value of 0.1 db attenuation per connector when arriving at a calculated value. When this is considered the system is within specifications.
03057	CCS Transponder 50M13017-001, 603A636, S/N 7.	The Transponder Static Phase Error Telemetry Output does not meet specification.	IBM was directed by MSFC to use as is.
03061	Computer Interface Unit 50Z13007-001, 603A605, S/N 008.	The Data Ready Signal from the CIU was missing occasionally.	Returned to Component Test for verification, then replaced.
03062	D. C. Amplifier 50Z12400-047, S/N 00008.	Amplifier Reading is out of tolerance in Hi Cal with all of the TM RF ASSYS. On and radiating into the antenna.	Amplifier was removed and rebuilt.
03076	Aux. Power Distributor, 7910421-023, S/N 23.	A momentary ground was applied to the contacts of relay K17 during troubleshooting, which causes an excessive amount of current to be drawn through the relay.	The relay was replaced and the associated conductors retested.
03095	Flight Program, Level 1.	The cutoff time of the S-IVB second burn phase did not occur when expected.	This time cannot be predicted accurately enough to meet the specified time limits due to the variations of the initial burn phase.

Attachment D

S-IU-502 UCR AND IR LOG

UCR No.	Assembly or Component	Description of Defect	Disposition and/or Repair Action
03009	DC Amplifiers.	Twenty-five (25) amplifiers do not have the range cards given in the IP & C List.	Comply with ECR-170 Closed 11/30/66
03022	Discrete Measurements VK 123-602, VK124-602, VK 125-602.	These measurements are in the IP & C List but have been deleted from the IU.	Measurements Deleted by EO 237-331- 600947 3/6/67.
03048	DC Amplifier 50Z12400-047, S/N 1540.	AZUSA Transponder TM Output for measurement J1-603 and the corresponding amplifier, are incompatible.	Reference ECRP-0363 to ECR-ACUE-398 IBM recommended change not be made 11/1/66.
0096	DC Amplifier; 50Z12400-035	No output in Hi, lo, or run mode of operation.	Repaired Component Lab and retested satisfactorily.
0097	Instrument Unit; 10Z22501-1; S/N 502.	Low flow rates for IU Flowrate, Total Flow rate for S-IVB & IU stages, and LVDA/LVDC Flow rate when redundant pump is used.	Approval of DAR 161 was obtained. This recommended the system be used as is since the system was out of specification 0.11 gpm or less.
00179 3-1-67	Flight Control Computer 50M35300-11 S/N 506	The FCC Pitch Spatial Comparator does not meet specifications.	Use as is, responsible areas are requesting a specification modification.
00186 3-1-67	Gas Bearing Panel 20Z42023 S/N 009	GN ₂ Leak at the "K" seal between the fitting (20Z42053-1) and the 2 ft. ³ Sphere (20Z32013-1).	Rework completed closed 3/9/67.

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UCR No.	Assembly or Component	Description of Defect	Disposition and/or Repair Action
01652 3-7-67	LVDA 50M35011 S/N P14	EMR Indicated that TD1 (Transient Detector) Fired during Interruption of Primary Power to LVDA. At the time of the EMR Indication, the ESE Supply 6D200 went down and the backup batteries came on. The +28 VDC Input to the LVDA cycled from 28 VDC down to 25 VDC and up to 33.5 VDC. After normal power was restored, self test was completed successfully.	The disposition from MSFC (RMO) is to, Use as is. The LVDA performed exactly as it was designed to if the 33.5 VDC was seen at the LVDA Input for 64 milliseconds or longer. Therefore, the LVDA P14 did not display unsatisfactory performance.

OUTSTANDING REWORK/DEFECTS

Item	Ir. No.	Part No.	Description of Defect	Disposition
cloud 1.	50285 2/13/67	50M10436 S/N 2104	F/N 83 - Microphone. No Dash, S/B 001	
cloud 2.	50287 2/20/67	10Z22501-1	F/N's 78, 79, 80 and 81 accelerometers failed electrical bond check. Readings of .0045 to .0070.	
3.	50288 2/23/67	50Z12340-1 S/N 3	During venting of GN ₂ after Leak Check, flow-meter was operated at 385 pulses/sec. for approximately 3 seconds. MEI 511007 states maximum pulses/sec. is 100.	
cloud 4.	50290 2/28/67	50M35010	Paint scratched and peeling in several places over outside surface of component. (LVDC)	
5.	50289 2/28/67	10Z22501-001	ST-124 Casting: The spotface of casting through holes (for mounting casting to structure) are too small. Spotface Measurement .510, washer size .531.	
cloud 6.	WX 062 3/2/67	MEI 501003	MEI not signed by MSFC (In Use) to remove GN ₂ two cubic sphere and panel from IU-502.	

S-IU-502 Instrument Unit Rework/Modification Status
Retest

ECP No.	UCN No.	Description	Equipment Affected	Remarks
0233-1E 0233-2E	4995	Multiple fasteners on Umbilical Door.	11Z00037-1 Bracket 11Z00036-1 Bracket 30Z13100-1 IU Assy	No Retest Required
0234-1E 0234-2E	4709	Redesign Methanol/Water Temperature Gauge.	50Z10666-001 (22 each) Temperature Gauge Assy.	Verified during S-IU-502 Retest
0235-1E 0235-2E	4958	Mandatory Changes to ST-124M Mounting Frame.	10Z22265-003 Mounting Frame, ST-124M. 7914509-001 Washer, Flat, Epoxy Resin Gloss.	No Retest Required
0313-E	5811	Connector Change on C-Band Cables.	602W35 Cable Assy. 603W134 Cable Assy. Change Connector GRFF-2014A to GRFF-2014B. Change Connector UG-21B/U to UG-1185A/U.	Verified during S-IU-502 Retest.
0352-1E 0352-2E	5998	Capacitor Change to Non-Polarized Type.	50Z12400-123 Sig. Cond. Assy. -125 -127 -129 50Z12400-131 Sig. Cond. Assy. 50Z12400-117 Sig. Cond. Assy.	Verified prior to November 30, 1966.
0357-1 0357-2	6047	"FIX" For Qualification Test Failures.	TM Antenna 50Z12500-1 TM Pwr Divider 50Z12495-1 TM Pwr Divider 50Z12495-3	Verified during S-IU-502 Retest.

S-IU-502
Retest

Instrument Unit Rework/Modification Status

ECP No.	UCN No.	Description	Equipment Affected	Remarks
0446-1 0446-2	6180	Eliminate Single Point Failure For indication of J2 Shutdown.	Control Distributor 7910417-23 EDS Distributor 7910418-23	Verified during S-IU-502 Retest
0465	6323	Remove Diode CRI from Auxiliary Power Distributor	Auxiliary Power Distributor 7910420-23.	Verified during S-IU-502 Retest.
0494-1 0494-2	6500	Thermal Modifications of the Instrument Unit.	Cable 601W37 Cable 602W39 Power Dist. 601A1 Aux. Pwr. Dist. 601A33 Aux. Pwr. Dist. 602A34 Wrap Cold Plates & Components with low emissivity tape. Install (7) cold plate Heaters.	Electrical Changes verified during S-IU-502 Retest. Heaters installed and partial component wrapping with tape completed. Remaining wrap and shrouds to be Kitted to KSC.
0596E	6960	Change Spotface size on Control Signal Processor (CSP) Mounting Feet.	Control Signal Processor.	No Retest Required.
0431	6045	Secondary Coolant Loop Change.	Tube 10Z22293-001	Verified during S-IU-502 Retest.

S-IU-502 Instrument Unit Rework/Modification Status
Retest

ECR No.	UCN No.	Description	Equipment Affected	Remarks
ABUE-0441	6376	Re-channel Measurements VK137-603 and VK138-603.	Cable 602W67 Remove two wires and add two wires.	Verified During S-IU-502 Retest.
ABUE-0443	6378	Remove one wire to disable Guidance Failure.	EDS Dist. 7910418-23.	Verified During S-IU-502 Retest.
ABUE-0448	6455	Remove 3 EDS Switch Point monitor measurements. VK123, 124 & 125-603.	Measuring Dist. 602A4.	No Retest Required.
ACUE-0356	5309	Change (J2) coolant temperature measurements to read 0 to 30° C, C16 through C26 & C29.	DC Amplifiers 50Z12400-001 12 total.	Verified During S-IU-502 Retest.
ACUE-0357	5308	Change (1) acoustic measurement and 17 vibration measurements.	AC Amplifier 50Z12335-009 AC Amplifier 50Z12335-005 Microphone Assy. (B1-601)	Verified During S-IU-502 Retest.
ACUE-382-2	5984	Change measurement range for VH10-603, VH11-603 & VH12-603.	DC Amplifier 50Z12400-151 (Three Total)	Verified During S-IU-502 Retest.
ACUE-0417	6057	Change range cards to properly analyze the operation of the heat exchanger, accumulator and cold plate coolant.	50M67740-7 Range Card 50M67740-9 Range Card	Deleted Measurements E4, E5 and E6-603. Verified During S-IU-502 Retest.
BCUM-002	4789	Acceptance testing of Gas Bearing Regulator and 1st Stage Regulator.	Gas Bearing Reg. 20Z42012 1st Stage Reg. 20Z42013	Verified During S-IU-502 Retest

ECP/ECR'S TO BE KITTED TO KSC

Revised 3/14/67

ECP	ECR	DESCRIPTION
295		Modified VSWR Units as result of Qualification failures.
494		Thermal Modification (Partial). Twelve shrouds to be installed at KSC.
	ABUE-454	ST-124 Vibration (Partial).
	BCUM-005	Water/Methanol Accumulator Redesign.
	ACUE-383-454	Change TM Channels and Multiplexer rework.
	66-0309	Spacers for Umbilical.
	66-293-1	Skin Temperature Measurements.
	ABUE-439	CCS/PCM Antenna Switching
	BCUM-005	Redesign W/M Accumulator
561-1,2		Range Card Change.
734E		5 Volt System Noise Bias.
431		Coolant Loop Flex Hoses (Ground Side only)

Table H-1. S-IU-502 Replaced Components List After 12-01-67

Revised 3/14/67

Component Assembly	Reason	Original		Replacement		Date
		Part No.	S/N	Part No.	S/N	
Telemeter Power Divider	ECP-0357-1, 2	50Z12495-003	013	50Z12495-003	021	Note 1
Temperature Gauge (C6-601)	ECP-0234-1E, 2E	50Z10666	45	50Z10666-005	128	
Temperature Gauge (C9-601)	ECP-0234-1E, 2E	50Z10666	46	50Z10666-005	161	
Microphone (B1-601)	ECR-ACUE-0357	50M10436	930	50M10436	2104	
Temperature Gauge (C10-601)	ECP-0234-1E, 2E ↑ ↓	50Z10666	47	50Z10666-005	160	
Temperature Gauge (C11-601)		50Z10666	48	50Z10666-005	158	
Temperature Gauge (C12-601)		50Z10666	67	50Z10666-005	156	
Temperature Gauge (C13-601)		50Z10666	50	50Z10666-005	155	
Temperature Gauge (XC15-601)		50Z10666	52	50Z10666-005	154	
Temperature Gauge (C19-601)		50Z10666	56	50Z10666-005	150	
Temperature Gauge (C20-601)		50Z10666	57	50Z10666-005	149	
Temperature Gauge (C26-601)		50Z10666	63	50Z10666-005	143	
Temperature Gauge (ZC35-601)		ECP-0234-1E, 2E	66	50Z10666-005	241	
1st Stage Pressure Regulator	ECR-BCUM-002	20Z42013	055	20Z42013	062	
Flight Control Computer	Flight Item	50M35300	502	50M35300-007	506	
Temperature Gauge (C18-602)	ECP-0234-1E, 2E	50Z10666	55	50Z10666-005	151	
Temperature Gauge (C22-602)		50Z10666	59	50Z10666-005	147	
Temperature Gauge (C25-602)		50Z10666	62	50Z10666-005	144	
Command Decoder		Class A Reject	50M12264	50M12264	008	
Temperature Gauge (C16-603)	ECP-0234-1E, 2E ↑ ↓	50Z10666	53	50Z10666-005	151	
Temperature Gauge (C21-603)		50Z10666	54	50Z10666-005	148	
Temperature Gauge (C17-603)		50Z10666	58	50Z10666-005	152	
Temperature Gauge (C23-603)		50Z10666	60	50Z10666-005	146	
Temperature Gauge (C24-603)		50Z10666	61	50Z10666-005	145	
Temperature Gauge (C29-603)		ECP-0234-1E, 2E	74	50Z10666-005	142	Note 1




Table H-1. S-IU-502 Replaced Components List

Component Assembly	Reason	Original		Replacement		Date
		Part No.	S/N	Part No.	S/N	
Temperature Gauge (C30-603)	ECP-0234-1E,2E	50Z10666	64	50Z10666-005	141	Note 1
Temperature Gauge (XC31-603)	ECP-0234-1E,2E	50Z10666	65	50Z10666-005	242	Note 1
CCS Transponder	MSFC Letter I-I/1B-UR-152-67	50M13017	7	50M13017	9	2/13/67
Gas Bearing Pressure Regulator	ECR-BCUM-002	20Z42012-001	055	20Z42012-003	061	Note 1
Frequency Measuring Adapter	MSFC Letter I-I/1B-UR-316-67	50M12399-001	12	50M12399-001	16	
CCS Power Amplifier	MSFC Letter I-I/1B-UR-152-67	50M12673-001	1002	50M12673-001	1006	3/8/67
A. C. Amplifiers	ECR-ACUE-357	50Z12335-001	066B	50Z12335-009	00010	See Note # 1
		50Z12335-005	00029	50Z12335-011	00002	
		50Z12335-003	00007	50Z12335-005	00072	
		50Z12335-005	00028	50Z12335-011	0001	
		50Z12335-005	00035	50Z12335-013	0002	
		50Z12335-005	00034	50Z12335-013	0001	
		50Z12335-005	00040	50Z12335-011	0003	
		50Z12335-005	00041	50Z12335-013	0005	
		50Z12335-005	00043	50Z12335-013	0006	
		50Z12335-005	00042	50Z12335-011	0004	
		50Z12335-005	00045	50Z12335-011	0005	
		50Z12335-005	00036	50Z12335-013	0003	
		50Z12335-005	00037	50Z12335-013	0004	
	ECR66-ACUE383	50Z12335-005	00024	Deleted		
	ECR66-ACUE383	50Z12335-005	00025	Deleted		

Table H-1. S-IU- 502 Replaced Components List

Component Assembly	Reason	Original		Replacement		Date
		Part No.	S/N	Part No.	S/N	
A. C. Amplifiers	ECR66-ACUE383	50Z12335-005	00026	Deleted		Note 1
	ECR66-ABUE454	50Z12335-005	00030			
		50Z12335-005	00037			
		50Z12335-005	00032			
		50Z12335-005	00033	Deleted		
A. C. Amplifiers						
D. C. Amplifiers	ACUE 356	50Z12400-011	00011	50Z12400-001	00013	
		50Z12400-011	00012	50Z12400-001	00014	
		50Z12400-009	00010	50Z12400-001	00015	
		50Z12400-011	00014	50Z12400-001	00016	
		50Z12400-011	00013	50Z12400-001	00017	
		50Z12400-011	00016	50Z12400-001	00018	
		50Z12400-011	00015	50Z12400-001	00019	
		50Z12400-011	00017	50Z12400-001	00020	
		50Z12400-011	00018	50Z12400-001	00021	
		50Z12400-009	00012	50Z12400-001	00022	
		50Z12400-009	00013	50Z12400-001	00023	
		50Z12400-011	00019	50Z12400-001	00024	
	ACUE 417	50Z12400-009	00008	50Z12400-155	00006	
		50Z12400-009	00009	50Z12400-155	00007	
		50Z12400-009	00011	50Z12400-155	00008	
	ACUE 382-2	50Z12400-041	00014	50Z12400-151	0004	
		50Z12400-041	00015	50Z12400-151	0005	
D. C. Amplifiers		50Z12400-041	00016	50Z12400-151	0006	Note 1

Table H-1. S-IU-502 Replaced Components List

Component Assembly	Reason	Original		Replacement		Date
		Part No.	S/N	Part No.	S/N	
IU Heater Assembly	New Component	40M37641-001	12	N/A	N/A	Note 1
		40M37641-001	11	N/A	N/A	
		40M37641-001	16	N/A	N/A	
		40M37641-001	13	N/A	N/A	
		40M37641-001	15	N/A	N/A	
		40M37641-001	9	N/A	N/A	
		40M37641001	14	N/A	N/A	
IU Heater Assembly						
NOTE # 1 Components replaced prior to S-IU-502 Retest.						

NON-FLIGHT COMPONENTS

PART NOMENCLATURE	PART NO.	F/N	QTY	STATUS
NONE				

MISSING COMPONENTS

PART NOMENCLATURE	PART NO.	F/N	QTY	STATUS
Batteries	40Z20780-001		4ea	Install at KSC
Flex Hose *	20Z42133-27		1ea	Install at KSC
Quick Disconnect*	20Z42006-5		1ea	Install at KSC
AC Amplifier	50M1233S-011		5ea	Install at KSC
AC Amplifier	50M12335-013		4ea	Install at KSC
245 Multiplexer	50Z13003-5		1ea	Install at KSC
* SHIPPED SEPERATELY - ARE AVAILABLE				

UNQUALIFIED COMPONENTS ON S-IU-502 AFTER SYSTEM CHECKOUT RATES
MSFC QUALIFICATION RESPONSIBILITY

Item	Component	Part No.	Criticality		Qual. Test Completion
			Design	IU-502	
1.	Control Computer	50M35300	2	2	Note 1
2.	Coolant Pump	20Z42001	2	2	3/15/67 3/17/67
Note 1 completed test. Awaiting COQ.					

UNQUALIFIED COMPONENTS ON S-IU-502 AFTER SYSTEM CHECKOUT RETEST
IBM PROCUREMENT AND QUALIFICATION RESPONSIBILITY

Item	Component	Part No.	Criticality		Qual. Test Completion
			Design	IU-502	
1.	56 Volt Power Supply	40Z20807-1	2	2	2/24/66 *
2.	Measuring Distributor	7910415-23	3	3	4/29/66 *
3.	Measuring Distributor	7910416-23	3	3	4/29/66 *
4.	Control Distributor	7910417-23	1	2	6/15/66 *
5.	EDS Distributor	7910418-23	1	2	6/15/66 *
6.	Power Distributor	7910419-23	1	2	3/17/66 *
7.	AUX. Power Distributor	7910420-23	1	2	3/25/66 *
8.	AUX. Power Distributor	7910421-23	1	2	3/25/66 *
9.	C-Band Transponder	50Z12574-003	3	3	2/17/67
10.	Batteries	40Z20780-001	1	2	3/3/67
* Qualification test complete. Failed RFI test. Certificates of Qualification and request for waiver submitted to MSFC on IBM Letter #SAH-167-147 dated January 16, 1967.					

S-IU-502 SHIPPING DATA PACKAGE
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THE FOLLOWING CHANGES WILL BE KITTED TO KSC:

ECR 66-ABUE-454
ECP 494 (Part 2 of 2)
ECR 66-0309

Add Vibration Meas. to ST-124 Mounting Struct. (Partial)
12 Shrouds (Partial)
Spacers for Umbilical

ECP 295-2
ECR 66-293-1
ECP 561- 1 & 2
ECP 734E
ECR-66-ABUE-439
ECP 431
ECR-66-BCUM-005

Replace VSWR Assy.
Skin Temperature Meas.
Range Cards Change
5 Volt System Noise Bias
Change to Control Distributors (CCS/PCM Switching)
Coolant Loop Ground Side (Flex Hoses)
Water Methanol Accumulator

Kit Availability

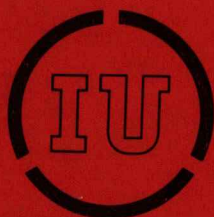
(Projected Shipping date from plants)

June 1, 1967
April 1, 1967
Parts Avail. Must Instl.
at KSC-GSE
March 31, 1967
April 1, 1967
June 20, 1967
March 24, 1967
March 16, 1967
March 20, 1967
March 20, 1967



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