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PRELIMINARY

HARDWARE LIST

Research and Development for Project

Apollo Spacecraft

23 February 1962

Contract NAS9-150 Report No. SID62-58

4.5.3.5

CLASSIFICATION CHANGE

To UNCLASSIFIED

By authority of [illegible] Date [illegible]

Changed by [illegible]

Classified Document Master Control Station, NASA

Scientific and Technical Information Facility

APPROVED BY:

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Vice President and Apollo Program Manager

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(NASA-CR-111216) PRELIMINARY HARDWARE LIST - RESEARCH AND DEVELOPMENT FOR PROJECT APOLLO SPACECRAFT (North American Aviation, Inc.) 56 p

N79-76382

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(ACCESSION NUMBER) (THRU)

56 (PAGES)

(CODE)

NASA-CR-111216 (NASA CR OR TMX OR AD NUMBER)

(CATEGORY)

FF No. 602(A)

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FORWARD

Presentation of the North American Aviation Hardware List of the Apollo Spacecraft in accordance with NASA's Statement of Work, Part 4, Paragraph 4.4.2, dated 18 December 1961, in support of Contract NAS9-150 Apollo Project.

[redacted]

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INTRODUCTION

This Preliminary Hardware List is a document which identifies all deliverable hardware (Boilerplates, Prototype Spacecraft, GFAE, GFP, GFE, GSE, Trainer Requirements and Spares) in support of the research and development for Project Apollo Spacecraft. Delivery dates shown are reflective of when the items are required to support the testing program. This document is considered Type I with respect to format and content, other than quantities and delivery dates. Approvals for quantities and schedules are gained through other contractual documents. This report consists of the following five sections:

Section I

This section identifies boilerplate and prototype spacecraft to be utilized in accomplishing test objectives.

Section II

This section identifies Government Furnished Equipment (GFE), Government Furnished Property (GFP) and Government Furnished Aeronautical Equipment (GFAE) required to accomplish test objectives.

Section III

This section identifies Ground Support Equipment (GSE) required in support of the Boilerplate and Prototype Spacecraft.

Section IV

This section identifies trainer requirements in support of the training program including the associated Ground Support Equipment.

Section V

This section identifies all spares required in support of the deliverable hardware identified in Sections I, III and IV.

The elements of data reflected in this Hardware List are al follows:

Revision Code:	The revision code will be utilized for a particular revision and will be dropped with each succeeding revision to the page. Revisions to the Hardware List will be made on a page for page basis as required. The legend for all applicable changes or revisions is: IN - Item Number SN - Stock Number PN - Part Number N - Nomenclature M - Manufacturer's Code Q - Quantity D - Delivery Date R - Remarks and/or Justification MC - Multiple Change PA - Part Added PD - Part Deleted ID - Identification Data
Item Number:	The number assigned by the Contractor for internal use to maintain sequential line item control.
Stock Number:	Previously assigned stock numbers will appear in this column.
Part Number:	The actual manufacturer's part number which appears on the drawing will be listed. In those instances where part numbers have not been assigned, this document will be revised and part numbers added when they become available.

Nomenclature:	The article's name as contained in Cataloging Handbook H6-1 or the name assigned by the manufacturer when an applicable item name is not contained in the handbook.
Manufacturer's Code:	The Federal supply code for manufacturers as contained in Cataloging Handbook H4-1. When a manufacturer's code is not available, the manufacturer's name and address will appear in the "Nomenclature" column.
Quantity:	The quantity required to accomplish test objectives.
Delivery Date:	Delivery dates shown in this document are reflective of when the items are required to support the testing program.
Remarks and/or Justification:	A brief justification and/or comments pertinent to the item listed.

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END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	1			BOILERPLATE NUMBER 1 C/M Land Impact Test	03953	1	Jul 1962	A simulated module for pre-development and developmental tests leading to the design of a prototype module.
	2			BOILERPLATE NUMBER 2 C/M Land Impact Test	03953	1	Oct 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	3			BOILERPLATE NUMBER 3 Pre-Qual Flight Drop	03953	1	Sep 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	4			BOILERPLATE NUMBER 4 C/M Water Impact Test	03953	1	Aug 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	5			BOILERPLATE NUMBER 5 Pre-Qual Flight Drop	03953	1	Nov 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.

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END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	6			BOILERPLATE NUMBER 6 Pad Abort Test Article	03953	1	Nov 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	7			BOILERPLATE NUMBER 7 C/M Water Impact Test	03953	1	Dec 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	8			BOILERPLATE NUMBER 8 Recovery Aid Test Article	03953	1	Feb 1963	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	9			BOILERPLATE NUMBER 9 Dynamic Test Article	03953	1	Sep 1962	A boilerplate command module, service module, spacecraft adapter and escape tower for incorporation of dynamic tests to be performed at MSFC with a launch vehicle.

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END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	10			BOILERPLATE NUMBER 10 C/M Water Egress and Floatation Test	03953	1	Mar 1963	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	11			BOILERPLATE NUMBER 11 Logistics Equipment Recovery Test Article	03953	1	Mar 1963	A simulated module for pre-developmental and developmental tests leading to the design of prototype module.
	12			BOILERPLATE NUMBER 12 S/C for Little Joe II	03953	1	Jan 1963	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	13			BOILERPLATE NUMBER 13 SA-5	03953	1	Mar 1963	The first orbital spacecraft consisting of a boilerplate command module, service module, spacecraft adapter and escape tower.
	14			BOILERPLATE NUMBER 14 House Spacecraft Number 1	03953	1	Feb 1963	A test platform for the mounting of primary systems to evaluate systems compatibility.

APOLLO — HARDWARE LIST — END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	15			BOILERPLATE NUMBER 15 SA-6	03953	1	May 1963	The second orbital spacecraft consisting of a boilerplate command module, service module, spacecraft adapter and escape tower.
	16			BOILERPLATE NUMBER 16 SA-7	03953	1	Jun 1963	The first super orbit velocity recoverable spacecraft consisting of a boilerplate command module, and command module adapter.
	17			BOILERPLATE NUMBER 18 SA-8	03953	1	Aug 1963	The second super orbital velocity orbit recoverable spacecraft consisting of a boilerplate command module, and command module adapter.
	18			BOILERPLATE NUMBER 19 Pre-Qual Flight Drop	03953	1	Oct 1962	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.

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END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	19			BOILERPLATE NUMBER 20 Pad Abort Test Article	03953	1	Jan 1963	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	20			BOILERPLATE NUMBER 21 S/C for Little Joe II	03953	1	Feb 1963	A simulated module for pre-developmental and developmental tests leading to the design of a prototype module.
	21			PROPULSION SPACECRAFT AFRM #001	03953	1	May 1963	To verify propulsion systems operations for normal and emergency flight environments.
	22			MAX "Q" ABORT (SPACECRAFT) AFRM #002	03953	1	Jul 1963	For early qualification of launch escape system at Max "Q" Abort.
	23			HI-ALTITUDE, ATMOSPHERE ABORT AFRM #003	03953	1	Nov 1963	For early qualification of launch escape system at Hi-Altitude Atmosphere Abort.

APOLLO HARDWARE LIST END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	24			NUMBER 1 STATIC TEST ARTICLE AFRM #004	03953	1	May 1963	To verify structural stiffness and integrity from prelaunch through simulated lunar landing conditions.
	25			NUMBER 2 STATIC TEST ARTICLE AFRM #005	03953	1	Jun 1963	To verify structural stiffness and integrity during re-entry and recovery phases.
	26			HOUSE SPACECRAFT NUMBER 2 AFRM #006	03953	1	May 1963	To verify systems performance and compatibility in and between major modules and associated GSE.
	27			SA-9 AFRM #007	03953	1	Sep 1963	For qualification of a complete orbital spacecraft for manned orbit and recovery flight.
	28			ENVIRONMENTAL PROOF SPACE-CRAFT AFRM #008	03953	1	Jul 1963	To verify the design adequacy of the complete spacecraft under simulated mission environments.
	29			VERY HI-ALTITUDE ATMOSPHERE ABORT (SPACECRAFT) AFRM #009	03953	1	Sep 1963	For early qualification of launch escape system at very hi-altitude atmosphere abort.

APOLLO HARDWARE LIST END ARTICLES

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	30			SA-10 AFRM #010	03953	1	Dec 1963	For qualification of a complete orbital spacecraft for manned orbit and recovery flight.
	31			SA-111 AFRM #011	03953	1	Feb 1964	To verify feasibility for multimanned orbital space flight and safe earth recovery.
	32			SA-112 AFRM #012	03953	1	Dec 1963	To verify feasibility for multimanned orbital space flight and safe earth recovery.

The Government Furnished Equipment (GFE), Government Furnished Property (GFP), and Government Furnished Aeronautical Equipment (GFAE) required to support the Project Apollo Spacecraft are identified in Report SID61-299, Preliminary GFP/GFAE Requirements for Project Apollo Spacecraft.

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GSE

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	1			ELECTRIC POWER SYSTEM (C/M) C/O Group	03953	18	Sep 1962 through May 1963	Will provide electrical power control and checkout of C/M Batteries and Power Converters.
	2			BAROMETRIC C/C Group		14	Feb 1963 through May 1963	Will provide checkout capabilities and stimuli generation for all Barometric Devices aboard the Spacecraft in its atmospheric envelope including control and Display Devices required for checkout.
	3			NAVIGATION & GUIDANCE SYSTEM C/O Group		14	Feb 1963 through May 1963	Will provide measurements and tests of the Gyro, Accelerometers, Platform, guidance computer and optical star sighting system.
	4			ALTITUDE AND RENDEZVOUS RADAR SYSTEM C/O Group		14	Feb 1963 through May 1963	Will provide functional test of the Antenna System, Data Processing and Readout Devices and the Beacon transmitting and Receiving Equipment.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	5			STABILIZATION AND CONTROL SYSTEM C/O Group		14	Feb 1963 through May 1963	Test Group comprising the required equipment needed to supply stimuli and make diagnostic measurements of the S/C stabilization and control systems.
	6			ENVIRONMENTAL CONTROL SYSTEM C/O Group		14	Feb 1963 through Feb 1963	Shall be capable of C/O of S/C Temperature Control System, Humidity Control, CO_2 Removal, Noxious gas removal either locally or remotely through the test conductor test group.
	7			RECOVERY SYSTEMS (Earth Ldg.) C/O Group		15	Sep 1962 through Feb 1963	Will provide checkout capabilities for Parachute Control, impact Attenuation and Sequence Control subsystems. In Addition, emergency and manual over-rides will be checked out.
	8			TELECOMMUNICATION SYSTEM C/O Group		18	Sep 1962 through May 1963	Will provide checkout capabilities for the VHF/UHF transmitters and receivers, television, telemetry and recording systems and intercommunication equipment. Operation may be manual, semi-automatic or automatic.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	9			CREW SYSTEMS C/O Group	03953	14	Feb 1963 through May 1963	Will provide checkout of the Bio-medical and life sustenance devices, including C/O of personal equipment (oxygen, supply, human hygiene apparatus, survival gear, pressure suits, etc.) Mechanical, man-machine and electrical subsystems shall be used to perform the C/O.
	10			LAUNCH ESCAPE SYSTEM C/O Group	03953	17	Nov 1962 through May 1963	Will provide test and checkout capabilities for the pressurization system, control and ignition systems and the electro-mechanical control of the thrust Vector Control System.
	11			C/M REACTION CONTROL SYSTEM C/O Group	03953	14	Feb 1963 through May 1963	Test group providing the required signals for checkout of engine readiness, oxidizer pressure and temperature, fuel quantity and condition, engine gimbal position, propellant malfunction and fire and emergency warning systems.
	12			SPECIAL DEVICES C/O Group	03953	13	Feb 1963 through May 1963	Shall be capable of checking out the periscope, T.V. systems, mid-course and lunar sighting.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	13			EXPLOSIVE DEVICES C/O Set	03953	13	Feb 1963 through May 1963	Will provide checkout capabilities of all pyrotechnic systems and components including all redundant circuits.
	14			CHECKOUT COMPUTER		7	Feb 1963 through May 1963	A G/P, serially operated, digital computer with inherent high speed, memory and branching capacity and providing control, measurement, computation and decision making capabilities for S/C systems check-out.
	15			CHECKOUT COMPUTER ACCESSORY		7	Feb 1963 through May 1963	The checkout group shall include the necessary signal conditioning for analog signals, digitizing, for computer use, buffering, input and output storage registers, manual control and display, data recording, signal selection and additional memory storage as required for use with the checkout computer.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	16			IN-FLIGHT TEST AND MAINTENANCE PROGRAMER AND CONVERTER	03953	16	Feb 1963 through May 1963	A "carry-on" GSE Plug-in unit providing the electrical monitoring and launch checkout of the S/C systems prior to crew entry. This unit programs the switching of the GSE Test Points and digitizes these test voltages for GSE use.
	17			IN-FLIGHT TEST AND MAINTENANCE SYSTEM CHECKOUT GROUP		16	Feb 1963 through May 1963	Shall provide checkout and control of the in-flight test and maintenance system including the signal switching and normalizing circuits, the display systems and also checkout of the carry-on programer and converter.
	18			TEST CONDUCTOR GROUP	03953	13	Feb 1963 through May 1963	This test group shall control the combined and/or individual system tests with the aid of separate check-out equipment. In addition, it contains information display devices and will be capable of manual or automatic operation.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	19			RECORDING GROUP	03953	17	Nov 1962 through May 1963	Will provide high speed digital (magnetic tape), low speed (printer, typewriter), analog signals and on-off signal data recording capabilities for test and launch activities.
	20			TELEMETRY GROUND STATION (Van)		4	Sep 1962 through May 1963	Shall consist of NASA furnished, mobile type equipment, van mounted. Shall have capability of supporting all boilerplate test articles TM checkout equipment requirements.
	21			TELEMETRY GROUND STATION (ARIN)	03953	14	Jan 1963 through May 1963	Shall utilize the S/C PCM T/M system to augment GSE checkout of the S/C systems. Shall consist of basic equipment required for a T/M ground station.
	22			RADAR COMMUNICATION CHECKOUT GROUP		1	Jan 1963	The checkout group shall consist of NASA furnished equipment and shall be utilized to checkout and calibrate the radar communications equipment on Boilerplate No. 13.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	23			HF/VHF COMMUNICATIONS CHECKOUT GROUP		2	Apr 1963 through May 1963	Shall provide checkout and calibration facilities for Boilerplate No. 16 and No. 18 communicative equipment furnished by NASA
	24			BOILERPLATE INSTRUMENTATION Checkout Group	03953	7	Jul 1962 through May 1963	For checkout and calibration of boilerplate test articles.
	25			ELECTRICAL JUNCTION BOX SET	03953	12	Nov 1962 through May 1963	Shall be a permanent installation at the Downey Acceptance Area, AMR Hangar area and the AMR Launch Area and will consist of terminals, circuit breakers, etc., for power distribution.
	26			CABLE SET	03953	25	Jul 1962 through May 1963	Required to provide electrical interconnection between GSE, facility power, portable power and S/C.
	27			POWER DISTRIBUTION GROUP	03953	16	Feb 1963 through May 1963	This group shall supply all power to the Spacecraft. Overload protection and necessary loads shall be provided for the Spacecraft electrical system.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	28			PROTOTYPE RADAR TELEMETRY Checkout Group	03953	7	Sep 1963 through Jul 1964	Used to checkout the S-Band Radar System, TM/VHF transmitter, and C-Band and Minitrack beacons furnished by NASA for prototype test articles.
	28.A			X-RAY Checkout Group		2	Nov 1962 through May 1963	A portable x-ray machine that will provide a visual checkout of all ordnance and pyrotechnic devices. It will perform checkout of the condition of explosive load and bridge wire systems, and it will supply a permanent record of items and lot numbers.
	29			COMMAND MODULE ELECTRICAL POWER BENCH MAINTENANCE EQUIPMENT	03953	6	Feb 1963 through May 1963	Will be capable of testing and trouble-shooting the C/M batteries and power converters.
	30			NAVIGATION AND GUIDANCE SYSTEM BENCH MAINTENANCE EQUIPMENT		6	Feb 1963 through May 1963	Will be capable of testing and trouble shooting the gyro, accelerometers, platform servo system and level platform, guidance computer and optical star sighting system.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	31			ALTIMETER AND RENDEZVOUS RADAR SYSTEM Bench Maintenance Equipment		6	Feb 1963 through May 1963	Will be capable of testing and trouble-shooting the antenna system, data processing and readout devices and the beacon transmitting and receiving equipment. Will also be capable of performing general alignment functions.
	32			STABILIZATION AND CONTROL SYSTEM Bench Maintenance Equipment		6	Feb 1963 through May 1963	Will be capable of testing and trouble-shooting the attitude control system, gyros and other components of the stabilization and control system.
	33			ENVIRONMENTAL CONTROL SYSTEM Bench Maintenance Equipment		6	Feb 1963 through May 1963	Will be capable of testing and trouble-shooting the temperature control, humidity control, CO_2 systems of the S/C Environmental Control System.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	34			RECOVERY SYSTEM (Earth Landing) Bench Maintenance Equipment		6	Feb 1963 through May 1963	The test set shall provide laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical component parts of the parachute deployment control, impact attenuchute, sequencing control, location aids and associated GSE.
	35			TELECOMMUNICATIONS SYSTEM Bench Maintenance Equipment		6	Feb 1963 through May 1963	The test set shall provide laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical component parts of the RF systems, antennas, spacecraft T.V. systems and associated GSE.
	36			CREW SYSTEMS Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	The test set shall be laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical component parts of the bio-medical, personal equipment, life sustenance and survival equipment, and associated GSE.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	37			LAUNCH ESCAPE SYSTEM Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall provide laboratory installed equipment to fault isolate, repair and maintain electrical and mechanical components of the escape sensing, sequencing and control of the launch escape system and associated GSE.
	38			COMMAND MODULE REACTION CONTROL SYSTEM Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Will be capable of testing and trouble-shooting the removable components of the engine readiness system, fuel and oxidizer pressure and temperature system, engine gimbal system and the fire and emergency warning system.
	39			SPECIAL DEVICES Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall provide laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of the periscope and other optical viewing devices and their GSE.
	40			EXPLOSIVE DEVICES Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall provide laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of all exploding release or squib controlled mechanisms and related mechanisms and associated GSE.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	41			IN-FLIGHT TEST AND MAINTENANCE SYSTEM Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall consist of laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of the systems, including the carry-on signal programer and converter and all other associated GSE.
	42			TELEMETRY SYSTEM GROUP Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	The Telemetry System Bench Maintenance equipment shall be capable of detailed functional test and malfunction isolation on all T/M equipment not included in the Telecommunications Systems.
	43			RADAR COMMUNICATIONS TELEMETRY GROUP Bench Maintenance Equipment	03953	2	Feb 1963 through May 1963	The Radar Communications test set consists of test equipment capable of functionally testing the Radar Communications system and its subsystems. Capability malfunction isolation and location will also be provided.
	44			COMMAND MODULE SIMULATOR Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall consist of laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical isolation and location will also be provided.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	45			CALIBRATION UNIT	03953	7	Feb 1963 through May 1963	Will use secondary standards to calibrate the transducers, pressure switches, gages, relief valves and similar equipment in the spacecraft systems.
	46			ELECTRICAL CABLE TESTER		6	Feb 1963 through May 1963	Will be capable of testing the various cable assemblies for shorts, opens, insulation resistance, leakage current, and other electrical properties.
	47			COMMAND MODULE ELECTRICAL POWER SYSTEM Monitor Equipment	03953	16	Feb 1963 through May 1963	This monitoring equipment shall be used for monitoring selected parameters of each individual system during combined systems, prelaunch, launch, and early flight operations. The information displayed will allow an operator to assess the overall system performance. Limit comparators will be provided to continuously monitor selected critical parameter for an out-of-tolerance condition. Controls will be provided for selection of data to be displayed and insertion of comparator limits.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	48			NAVIGATION AND GUIDANCE SYSTEM Monitor Equipment	03953	16	Feb 1963 through May 1963	Justification: Reference Item Number 47
	49			ALTITUDE AND RENDEZVOUS RADAR SYSTEM Monitor Equipment		14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	50			STABILIZATION AND CONTROL SYSTEM Monitor Equipment		14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	51			ENVIRONMENTAL CONTROL SYSTEM Monitor Equipment		14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	52			EARTH RECOVERY SYSTEM EARTH LANDING Monitor Equipment		14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	53			TELECOMMUNICATION SYSTEM Monitor Equipment		16	Feb 1963 through May 1963	Justification: Reference Item Number 47

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	54			CREW SYSTEM Monitor Equipment	03953	14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	55			LAUNCH ESCAPE SYSTEM Monitor Equipment	03953	16	Feb 1963 through May 1963	Justification: Reference Item Number 47
	56			COMMAND MODULE REACTION CONTROL SYSTEM Monitor Equipment	03953	14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	57			SPECIAL DEVICES Monitor Equipment	03953	14	Feb 1963 through May 1963	Justification: Reference Item Number 47
	58			IN-FLIGHT TEST AND MAINTENANCE SYSTEMS Monitor Equipment	03953	16	Feb 1963 through May 1963	Justification: Reference Item Number 47
	59			TELEMETRY SYSTEM Monitor Equipment	03953	12	Feb 1963 through May 1963	Justification: Reference Item Number 47

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	60			RADAR COMMUNICATIONS SYSTEM Monitor Equipment		1	Feb 1963	Justification: Reference Item Number 47
	61			HF/VHF COMMUNICATIONS SYSTEM Monitor Equipment		3	Feb 1963 through May 1963	Justification: Reference Item Number 47
	62			CLOSED CIRCUIT TELEVISION GROUP		16	Feb 1963 through May 1963	The general requirements of the closed circuit television group are to televise activities such as crew motions and reactions, static and dynamic engine firings, and other activities in remote or dangerous areas. The television cameras will require remote controls to change camera position or lens characteristics. Sufficient monitor screens shall be provided to enable the required activities to be viewed during all complete spacecraft systems tests, and during static and environmental tests.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	63			COMMAND MODULE SLING	03953	19	Jul 1962 through May 1963	A sling to handle and position the C/M in the vertical attitude without excessive tipping.
	64			LAUNCH ESCAPE TOWER SLING	03953	13	Nov 1962 through May 1963	A sling to handle and position the Launch Escape Tower in either a vertical or horizontal attitude.
	65			LAUNCH ESCAPE SYSTEM MOTOR SLING	03953	13	Nov 1962 through May 1963	A sling to handle and position the Launch Escape Motor. The sling will incorporate an adjustable spreader for balancing the motor about the center of gravity.
	66			LAUNCH ESCAPE SYSTEM ASSEMBLY HORIZONTAL HANDLING SLING	03953	13	Nov 1962 through May 1963	A sling to handle and position the complete Launch Escape System Assembly in the horizontal attitude.
	67			LAUNCH ESCAPE SYSTEM ASSEMBLY VERTICAL HANDLING SLING	03953	13	Nov 1962 through May 1963	A sling to handle and position the complete Launch Escape System Assembly in the vertical attitude.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	68			COMMAND MODULE AUXILIARY SLING	03953	21	Jul 1962 through May 1963	A sling used in conjunction with hoisting and rail type adapters to raise the command module from a horizontal to a vertical position.
	69			COMMAND MODULE DOLLY		17	Nov 1962 through May 1963	A welded tubular platform on castered wheels to be used to move the Command Module to different stations in the work area.
	70			AIRCRAFT JACK ADAPTER SET	03953	10	Feb 1963 through May 1963	A frame constructed jack pad table, mounted on a spacecraft adapter and standard aircraft jacks to provide a means of positioning the spacecraft during horizontal mating.
	71			COMMAND MODULE HANDLING ADAPTER	03953	27	Jul 1962 through May 1963	A Command Module attachment to form a mounting platform which may be attached to the bed of a transport trailer.
	72			COMMAND MODULE RAIL ADAPTER	03953	15	Nov 1962 through May 1963	Slides and clamps to provide for secure attachment to the C/M and subsequent mounting on standard workstands or dollies.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	73			COMMAND MODULE WORKSTAND		15	Nov 1962 through May 1963	A standard rail type stand for use with dollies, adapters and associated equipment used to support the Command Module during servicing and maintenance.
	74			ESCAPE SYSTEM MOTOR WORKSTAND		11	Nov 1962 through May 1963	A standard rail type stand for use with dollies, adapters and associated equipment used to support the Escape System Motor during servicing and maintenance.
	75			RAIL TRANSFER WORKSTAND		15	Nov 1962 through May 1963	A standard rail type stand with castered wheels to move modules to different stations in the work area.
	76			CROSS COUNTRY TRANSPORTER		9	Jul 1963 through May 1963	Used to transport the entire spacecraft assembly or any one of the modules cross country or from one facility to another and during land recovery operations to pick up and transport the spacecraft.
	77			TELEMETRY VAN		1	Nov 1962	A mobile vehicle to transport and protect telemetering equipment during the test phase of the spacecraft.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	78			MODULE ALIGNMENT AND WEIGHING FIXTURE	03953	3	Oct 1962 through May 1963	A fixture of welded construction to be used to determine weight, alignment and center of gravity of modules.
	79			ESCAPE TOWER WEIGHING FIXTURE	03953	3	Oct 1962 through May 1963	A series of load cells on a portable work stand used to determine the weight and center of gravity of the escape system tower.
	80			SPACECRAFT WEIGHT AND BALANCE FIXTURE	03953	3	Oct 1962 through May 1963	A fixture used to determine weight and center of gravity of the assembled spacecraft.
	81			ESCAPE TOWER SYSTEM SUPPORT	03953	14	Nov 1962 through May 1963	Will be utilized to support the escape tower in a horizontal position during transportation and storage.
	82			COMMAND MODULE HANDLING RING	03953	21	Jul 1962 through May 1963	Provides a method of connecting a hoisting sling to the escape system tower mounts.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	83			SPACECRAFT CREW LOADING CAPSULE	03953	3	Jan 1963 through May 1963	Will be an enclosure providing test crew entrance into the command module under a "white-room" environment.
	84			MODULE LEAK TEST UNIT	03953	17	Feb 1963 through May 1963	Is provided to leak test the spacecraft C/M.
	85			N_2O_4 TRANSFER UNIT	03953	5	Feb 1963 through May 1963	A pump and control system used for transferring N_2O_4 from ground storage tanks to the spacecraft and returning it to the storage tanks.
	86			MASS SPECTROMETER LEAK TESTER		11	Feb 1963 through May 1963	Is provided for performing leakage detection of the spacecraft systems with a high degree of accuracy
	87			KOH TRANSFER UNIT		12	Feb 1963 through May 1963	Is provided for transferring potassium hydroxide from storage to the spacecraft power fuel cells.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	88			H_2O TRANSFER UNIT		12	Feb 1963 through May 1963	A pump and control system to transfer portable water from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	89			RE-ENTRY OXYGEN SUPPLY UNIT		12	Feb 1963 through May 1963	Is provided to charge the super-critical storage receivers of the C/M with breathable oxygen.
	90			EXTENDED STORAGE DESSICANT SYSTEM		9	Feb 1963 through May 1963	Provides means for recovering and storage of the dessicant utilized by the tank dessicant system.
	91			50-50 UDMH-N_2H_4 TRANSFER UNIT	03953	6	Jan 1963 through May 1963	A pump and control system used for transferring LH_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	92			HELIUM TRANSFER UNIT		6	Jan 1963 through May 1963	Provides for transfer of helium at the required temperature and pressure to the spacecraft.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	93			ATMOSPHERE GROUND SUPPLY UNIT		16	Feb 1963 through May 1963	Provides refrigeration, heating and humidification for maintaining the required atmospheric conditions during ground operations of the spacecraft.
	94			AIR-LOCK CHECKOUT UNIT	03953	11	Feb 1963 through May 1963	Provided to operate and record the performance of the air lock.
	95			FLUID DISTRIBUTION AND CABLE SYSTEM #1 SWING ARM	03953	13	Feb 1963 through May 1963	Provides elevated positioning of fluid lines and cables in the vertical checkout area.
	96			FLUID DISTRIBUTION AND CABLE SYSTEM #2 SWING ARM	03953	12	Feb 1963 through May 1963	Provides elevated positioning of fluid lines and cables in the assembly area.
	97			FLUID DISTRIBUTION SYSTEM FACILITY	03953	12	Feb 1963 through May 1963	A fluid system link between the GSE systems and the spacecraft to provide for safe handling and transmission of fluids required for checkout and servicing the spacecraft.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	98			BATTERY CHARGING UNIT		13	Feb 1963 through May 1963	Provides for charging the silver-zinc batteries.
	99			WELDING AND BRAZING FIELD REPAIR UNIT		5	Feb 1963 through May 1963	A portable item provided to perform welding and brazing field repairs in the assembly and check-out areas.
	100			WELD STRENGTH TEST UNIT		5	Feb 1963 through May 1963	A portable item for performing proof tests of welded field repairs.
	101			FREON SUPPLY UNIT		16	Feb 1963 through May 1963	A freon supply and heat exchanger loop to cool the spacecraft during ground operations and testing.
	102			ETHYLENE GLYCOL WATER TRANSFER UNIT		16	Feb 1963 through May 1963	Provides for transferring of Ethylene Glycol-water from ground storage to the spacecraft.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	103			WASTE MANAGEMENT VACUUM SUPPLY	03953	8	Feb 1963 through May 1963	Provides for transfer and control of human waste, in a vapor state, from the spacecraft after habitation.
	104			INERTING AND SAFING RECOVERY UNIT	03953	6	Feb 1963 through May 1963	For use at the recovery site to remove hazardous fluid from the spacecraft and purge the storage tanks for safety.
	105			HELIUM BOOSTER UNIT		6	Feb 1963 through May 1963	A compressor and heat exchanger system to maintain ambient temperature and to increase the pressure of the helium received in commercial bottles to the high pressures required for spacecraft usage.
	106			HELIUM TANK DESSICANT SYSTEM		16	Feb 1963 through May 1963	Will be a transportable dessicating system to maintain spacecraft (He) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	107			WASTE MANAGEMENT DISPOSAL UNIT	03953	8	Feb 1963 through May 1963	Provides means for handling and disposing of human waste during recovery operations of the spacecraft.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	110			LAUNCH ESCAPE TOWER SYSTEM SIMULATOR	03953	16	Feb 1963 through May 1963	The simulator shall provide, to the S/C command module, an interface that is electrically similar to that of the launch escape tower system. It shall include provisions to receive and measure signals and impulses from the command module.
	111			COMMAND MODULE SIMULATOR	03953	17	Feb 1963 through May 1963	The simulator shall provide an interface that is electrically similar to the S/C command module. The simulator shall facilitate the complete functional checkout of the service module system.
	112			EXPLOSIVE DEVICES SIMULATOR SET	03953	16	Feb 1963 through May 1963	The simulator shall facilitate complete checkout of the S/C explosive devices circuitry. It shall provide a means of measuring the magnitude of the firing impulses as a method of determining that the S/C explosive devices would have fired, and also provide firing circuit monitoring to circumvent accidental or premature firing.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	113			INTERSTAGE ILLUMINATION SET		15	Nov 1962 through May 1963	The illumination set shall provide internal and external illumination, as required, of the S/C.
	114			WARNING STREAMER SET	03953	15	Nov 1962 through May 1963	The warning streamer set shall provide a protective covering for protuberances and aperatures and shall be utilized before and after maintenance operations. They shall include warning streamers marked "Remove Before Flight".
	115			CHECKOUT CONTROL INTER-COMMUNICATION SET		16	Nov 1962 through May 1963	The intercommunication system will provide voice communication between personnel, switching capability to obtain two or more independent networks, or merge all stations into one net. It shall be connected to an existing base network with a central control station. It will also serve as a public address system.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	116			OPTICAL ALIGNMENT SET	03953	10	Nov 1962 through May 1963	A fixture used to determine the alignment of the spacecraft motor and structure in the horizontal position.
	117			SIMULATOR - GUIDANCE SYSTEM	03953	6	Feb 1963 through May 1963	Will supply the weight, center of gravity, signals and functions of the guidance system.
	118			SPACECRAFT ADAPTER COVER	03953	15	Nov 1962 through May 1963	A weathertight, waterproofed cover to protect the spacecraft adapter during transportation and storage.
	119			COMMAND MODULE COVER	03953	15	Nov 1962 through May 1963	A weathertight, waterproofed contoured cover to protect the command module during transportation and storage.
	120			TRANSPORT COVER SET	03953	13	Nov 1962 through May 1963	A weathertight, waterproofed contoured cover to protect the spacecraft equipment during transportation and storage.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	120.A			C/M DEBRIS TUMBLER	03953	2	Sep 1963 through Jan 1964	Purpose - To tumble C/M to dislodge any debris left by Manufacture or loosen during transport.
	121			SERVICE MODULE ELECTRICAL POWER SYSTEM CHECKOUT GROUP	03953	16	Feb 1963 through May 1963	Will be used for testing and controlling the servicing of the S/M fuel cells utilizing with both manual operation from a local panel or automatic control from the Test Conductor Console.
	122			SERVICE MODULE PROPULSION SYSTEM CHECKOUT GROUP	03953	14	Feb 1963 through May 1963	Will provide checkout capabilities for engine readiness, oxidizer pressure and temperature, engine gimbals, the propellant malfunction system and the fire and emergency warning system.
	122.A			S/M REACTION CONTROL C/O Group	03953	14	Feb 1963 through May 1963	Justification: Reference Item Number 122
	123			PROPULSION TEST CONTROL GROUP	03953	5	Feb 1963 through May 1963	Will provide propulsion and reaction system control and monitoring during developmental and static firings.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	123.A			PROTRACTOR SET		10	Feb 1963 through May 1963	The protractor set shall be used in conjunction with the Stabilization and Control Checkout Group and shall provide a means of measuring engine angular position for alignment and checkout of the Service Module propulsion engine(s). The test group shall be capable of measuring angles within the accuracy required for verification of engine position instrumentation.
	124			SERVICE MODULE ELECTRICAL POWER SYSTEM Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Will be capable of testing and troubleshooting the Service Module fuel cells.
	125			SERVICE MODULE PROPULSION SYSTEM EQUIPMENT Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall provide laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of engines, fuel systems, pressurization, warning, emergency and related items within the propulsion system and associated.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	125.A			S/M REACTION CONTROL SYSTEM Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Justification: Reference Item Number 125
	126			SERVICE MODULE SIMULATOR Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall provide laboratory installed equipment to fault isolate, repair and maintain electrical and mechanical components of the Simulator.
	127			SPACECRAFT ADAPTER SIMULATOR Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall consist of laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of the spacecraft adapter simulator.
	128			LAUNCH VEHICLE SIMULATOR Bench Maintenance Equipment	03953	6	Feb 1963 through May 1963	Shall consist of laboratory installed equipment to fault isolate, repair and maintain the electrical and mechanical components of the Launch Vehicle Simulator.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	129			SERVICE MODULE ELECTRICAL POWER SYSTEM Monitoring Equipment	03953	16	Feb 1963 through May 1963	This monitoring equipment shall be used for monitoring selected parameters of each individual system during combined system, pre-launch launch and early flight operations. Limit comparators will be provided to continuously monitor selected critical parameters for an out-of-tolerance condition. Controls will be provided for selection of data to be displayed and insertion of comparator limits. Each item of monitoring equipment shall be capable of performing the above description.
	130			SERVICE MODULE PROPULSION SYSTEM Monitoring Equipment	03953	16	Feb 1963 through May 1963	Justification: Reference Item Number 129
	130.A			S/M REACTION CONTROL SYSTEM Monitor Equipment	03953	16	Feb 1963 through May 1963	Justification: Reference Item Number 129

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	131			DATA ACQUISITION GROUP Control Equipment		1	Feb 1963	The control equipment will be used to receive, condition and record or display responses of the spacecraft reaction and propulsion systems. The group will contain all of the necessary receivers for telemetry, signal equipment, tape and strip recorders and display systems required for immediate evaluation. Critical system parameters will require real time displays, and equipment will be required for quick-look data reproduction.
	132			DATA ACQUISITION GROUP BUNKER EQUIPMENT		1	May 1963	The Data Acquisition Group, Bunker Equipment shall provide the necessary instrumentation devices to convert over 300 signal sources to electrical signals during spacecraft static firing tests. The signals will be routed through terminal racks and cables to the control room for recording. The equipment shall provide the necessary calibration and power supplies to maintain the instrumentation. The bunker equipment

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	132 (Continued)							(Cont'd) group will also provide the necessary special facility propellant controls.
	133			SERVICE MODULE SLING	03953	14	Oct 1962 through May 1963	A sling to handle and position the S/M in the vertical attitude without excessive tipping.
	134			SPACECRAFT ADAPTER SLING	03953	14	Oct 1962 through May 1963	A sling to handle and position the S/C Adapter in either a vertical or horizontal attitude.
	135			SERVICE MODULE PROPULSION MOTOR SLING	03953	14	Oct 1962 through May 1963	A sling to handle and position the S/M propulsion motor in and out of the S/M. The sling will incorporate an adjustable spreader for balancing the motor about the center of gravity.
	136			SERVICE MODULE ADAPTER SLING	03953	14	Oct 1962 through May 1963	A sling to handle and position the S/M and permit attitude control of the Adapter from the horizontal to the vertical position.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	137			SPACECRAFT ADAPTER DOLLY		11	Oct 1962 through May 1963	A welded tubular platform on castered wheels to be used to move the spacecraft to different stations in the work area.
	138			SERVICE MODULE DOLLY		14	Oct 1962 through May 1963	A welded tubular platform on castered wheels to be used to move the Service Module to different stations in the work area
	139			SPACECRAFT ADAPTER RAIL ADAPTER	03953	14	Oct 1962 through May 1963	Slides and clamps to provide for secure attachment to the spacecraft adapter and subsequent mounting on standard workstands or dollies.
	140			SERVICE MODULE HOISTING ADAPTER	03953	14	Oct 1962 through May 1963	A pair of welded tubular assemblies mounted on the S/M to form mounts for hoisting, roll over and transport trailer attachments.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	141			SERVICE MODULE RAIL ADAPTER	03953	14	Oct 1962 through May 1963	Slides and clamps to provide for secure attachment to the S/M and mounting on standard workstands or dollies.
	142			SPACECRAFT HOISTING ADAPTER	03953	11	Feb 1963 through May 1963	A pair of welded tubular assemblies mounted on the spacecraft adapter to form mounts for hoisting, roll over and transport trailer attachments.
	143			SERVICE MODULE WORKSTAND		11	Feb 1963 through May 1963	A standard rail type stand for use with dollies, adapters and associated equipment used to support the Service Module during servicing and maintenance.
	144			SPACECRAFT ADAPTER WORKSTAND		11	Feb 1963 through May 1963	A standard rail type stand for use with dollies, adapters and associated equipment used to support the Spacecraft Adapter during servicing and maintenance.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	145			SERVICE MODULE CRADLE	03953	11	Feb 1963 through May 1963	A wheel equipped cradle to be attached to the S/M to form a mounting platform to fit on workstands and dollies.
	146			SPACECRAFT ASSEMBLY POSITIONER		12	Feb 1963 through May 1963	A trailer-type vehicle with a self-powered cradle to raise the spacecraft assembly to a vertical attitude.
	147			SPACECRAFT ADAPTER PALLET	03953	11	Feb 1963 through May 1963	A welded tubular platform with castered wheels to support the spacecraft adapter for moving to different stations in the work area.
	148			SPACECRAFT VERTICAL TRANSPORT VEHICLE	03953	7	Jan 1963 through May 1963	Provides the means for transporting the assembled spacecraft, in the vertical position from the assembly area to the launch pad.

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Save Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	149			SERVICE MODULE FIRING STAND ADAPTER	03953	4	Jan 1963 through May 1963	Shall provide the support required to adapt the Service Module to the static firing stands.
	150			LH_2 TANK DESSICANT SYSTEM		14	Feb 1963 through May 1963	A transportable dessicating system to maintain spacecraft (LH_2) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.
	151			LH_2 TRANSFER UNIT		7	Feb 1963 through May 1963	A pump and control system used for transferring LH_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	152			N_2O_4 TANK DESSICANT SYSTEM		14	Feb 1963 through May 1963	A transportable dessicating system to maintain spacecraft (N_2O_4) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	153			N_2H4 TANK DESSICANT SYSTEM		14	Feb 1963 through May 1963	A transportable dessicating system to maintain spacecraft (N_2H4) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.
	154			LN_2 TANK DESSICANT SYSTEM		14	Feb 1963 through May 1963	A transportable dessicating system to maintain spacecraft (LN_2) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.
	155			LN_2 TRANSFER UNIT		13	Feb 1963 through May 1963	A pump and control system used for transferring LN_2 from the ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	156			LO_2 TANK DESSICANT SYSTEM		14	Feb 1963 through May 1963	A transportable dessicating system to maintain spacecraft (LO_2) storage tanks in a dry condition during periods of spacecraft transportation and maintenance.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	157			LO_2 TRANSFER UNIT		6	Feb 1963 through May 1963	A pump and control system used for transferring LO_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	158			N_2 PRESSURE UNIT	03953	16	Feb 1963 through May 1963	Provides for supplying and maintaining the required gaseous nitrogen source for actuating and stimulating spacecraft components during tests.
	159			SERVICE MODULE SIMULATOR	03953	7	Feb 1963 through May 1963	The Simulator, when used in conjunction with the S/C Adapter Simulator and the Launch Vehicle Simulator, shall enable checkout to be performed on the S/C Command Module without utilizing a service module. When used with the S/C Adapter Simulator and Command Module Simulator, the Service Module Simulator shall enable checkout of the Launch Vehicle.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	160			SPACECRAFT ADAPTER SIMULATOR	03953	5	Feb 1963 through May 1963	The simulator shall supply, at its interfaces, the signals and functions supplied by the adapter module to the S/C and Launch Vehicle.
	161			LAUNCH VEHICLE SIMULATOR	03953	5	Feb 1963 through May 1963	The simulator shall present to the Service Command Module combination an interface electrically similar to the Launch Vehicle. The simulator shall generate and receive the required signals for complete functional checkout of the Service Command Module function.
	162			UMBILICAL DISCONNECT SET	03953	19	Nov 1962 through May 1963	The Umbilical Disconnect Set shall provide a grouped connection configuration for the servicing facilities of the S/C.
	163			SERVICE MODULE COVER	03953	16	Oct 1962 through May 1963	A weathertight, waterproofed contoured cover to protect the Service Module during transportation and storage.

This section of the Hardware List will exhibit all spares required to support the Apollo test objectives and training program. It will be developed on a progressive basis as spare requirements are identified.

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TRAINER

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	1		7125-860001	APOLLO MISSION SIMULATOR	03953	2	Jan 1964 and Jul 1964	The Mission Simulator will utilize a complete task, crew training complex to provide complete mission training for the spacecraft crew.
	2		7125-860002	ATTITUDE CONTROL TRAINER	03953	2	Jul 1963 and Nov 1963	The Attitude Control Trainer is a part task trainer to provide crew training in attitude orientation of the C/M during applicable phases of a simulated mission profile.
	3		7125-860003	PROPULSION CONTROL TRAINER	03953	2	May 1963 and Sep 1963	The Propulsion Control Trainer is a part task trainer to provide crew training in propulsion control for the applicable propulsion system during associated mission phases.
	4		7125-860004	EARTH RE-ENTRY TRAINER	03953	2	Jul 1963 and Dec 1963	A part task trainer to provide crew training in earth approach and re-entry mission phases.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	5		7125-86005	EARTH ORBITAL TRAINER	03953	2	Jun 1963 and Oct 1963	A part task trainer to provide crew training in pre-launch, launch and parking orbit mission phases with abort capabilities.
	6		7125-86006	MID-COURSE CORRECTION TRAINER	03953	2	Aug 1963 and Feb 1964	A part task trainer to provide crew training in celestial navigation and guidance and attitude control for trans-lunar and trans-earth mission phases.
	7		7125-860024	NAVIGATION AND GUIDANCE SYSTEM TRAINER	03953	1	May 1963	Maintenance Trainers representing eleven major spacecraft systems will be used individually or combined with other associated trainers to familiarize ground and/or mission crews with the major spacecraft systems.
	8		7125-860025	STABILIZATION AND CONTROL SYSTEM TRAINER	03953	1	May 1963	Justification: Reference Item Number 7

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	9		7125-960015	SERVICE MODULE PROPULSION SYSTEM TRAINER	03953	1	Apr 1963	Justification: Reference Item Number 7
	10		7125-960016	COMMAND MODULE REACTION CONTROL SYSTEM TRAINER	03953	1	Feb 1963	Justification: Reference Item Number 7
	11		7125-960017	SERVICE MODULE REACTION CONTROL SYSTEM TRAINER	03953	1	Feb 1963	Justification: Reference Item Number 7
	12		7125-960018	LAUNCH ESCAPE SYSTEM TRAINER	03953	1	Feb 1963	Justification: Reference Item Number 7
	13		7125-960019	EARTH LANDING SYSTEM TRAINER	03953	1	Jan 1963	Justification: Reference Item Number 7
	14		7125-960020	ENVIRONMENTAL CONTROL SYSTEM TRAINER	03953	1	Mar 1963	Justification: Reference Item Number 7
	15		7125-960021	ELECTRICAL POWER SYSTEM TRAINER	03953	1	Mar 1963	Justification: Reference Item Number 7

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	16		7125-860022	COMMUNICATIONS SYSTEM TRAINER	03953	1	Jun 1963	Justification: Reference Item Number 7
	17		7125-860023	INSTRUMENTATION SYSTEM TRAINER	03953	1	Mar 1963	Justification: Reference Item Number 7
	18		7125-860007	EGRESS TRAINER	03953	2	Apr. 1963 and Aug 1963	A part task trainer to provide crew training in egress procedures including water recovery.
	19		7125-860008	MOON BASE OPERATION SIMULATOR	03953	1	May 1963	A part task simulator utilizing a full scale mock-up of the C/M, S/M and lunar landing module on a simulated partial moon surface to provide crew training on equipment and procedures related to lunar surface entry.
	20		7125-860009	WEIGHTLESS PROCEDURES TANK TRAINER	03953	1	Apr 1963	A part task trainer utilizing a full scale mock-up of the C/M in a water filled tank to provide crew training in simulated weight-less procedures.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg Code	Qty.	Delivery Date	Remarks and/or Justification
	21			ELECTRIC POWER SYSTEM (C/M) C/O Group	03953	1	Aug 1962	Will provide electrical power control and checkout of C/M Batteries and Power Converters.
	22			NAVIGATION & GUIDANCE SYSTEM Checkout Group		1	Nov 1962	Will provide measurements and tests of the Gyro, Accelerometers, Platform, guidance computer and optical star sighting system.
	23			ALTITUDE AND RENDEZVOUS RADAR SYSTEM Checkout Group		1	Feb 1963	Will provide functional test of the Antenna System, Data Processing and Readout Devices and the Beacon transmitting and Receiving Equipment.
	24			STABILIZATION AND CONTROL SYSTEM Checkout Group		1	Dec 1962	Test Group comprising the required equipment needed to supply stimuli and make diagnostic measurements of the S/C stabilization and control systems.

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Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	25			TELECOMMUNICATION SYSTEM Checkout Group		1	Sept 1962	Will provide checkout capabilities for the VHF/UHF transmitters and receivers, television, telemetry and recording systems and intercommunication equipment. Operation may be manual, semi-automatic or automatic.
	26			N_2O_4 TRANSFER UNIT	03953	1	Feb 1963	A pump and control system used for transferring N_2O_4 from ground storage tanks to the spacecraft and returning it to the storage tanks.
	27			50-50 UDMH-N_2H_4 TRANSFER UNIT	03953	1	Jan 1963	A pump and control system used for transferring LH_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	28			SERVICE MODULE ELECTRICAL POWER SYSTEM CHECKOUT GROUP	03953	1	Feb 1963	Will be used for testing and controlling the servicing of the S/M fuel cells utilizing with both manual operation from a local panel or automatic control from the Test Conductor Console.

APOLLO

HARDWARE LIST

TRAINER

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	29			SERVICE MODULE PROPULSION SYSTEM CHECKOUT GROUP	03953	1	Oct 1962	Will provide checkout capabilities for engine readiness, oxidizer pressure and temperature, engine gimbals, the propellant malfunction system and the fire and emergency warning system.
	30			S/M REACTION CONTROL C/O Group	03953	1	Feb 1963	Justification: Reference Item Number 29
	31			LH_2 TRANSFER UNIT		1	Feb 1963	A pump and control system used for transferring LH_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.
	32			LN_2 TRANSFER UNIT		1	Feb 1963	A pump and control system used for transferring LN_2 from the ground storage tanks to the spacecraft and returning it to the ground storage tanks.

APOLLO HARDWARE LIST TRAINER

Rev. Code	Item Number	Stock Number	Part Number	Nomenclature	Mfg. Code	Qty.	Delivery Date	Remarks and/or Justification
	33			LO_2 TRANSFER UNIT		1	Feb 1963	A pump and control system used for transferring LO_2 from ground storage tanks to the spacecraft and returning it to the ground storage tanks.

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