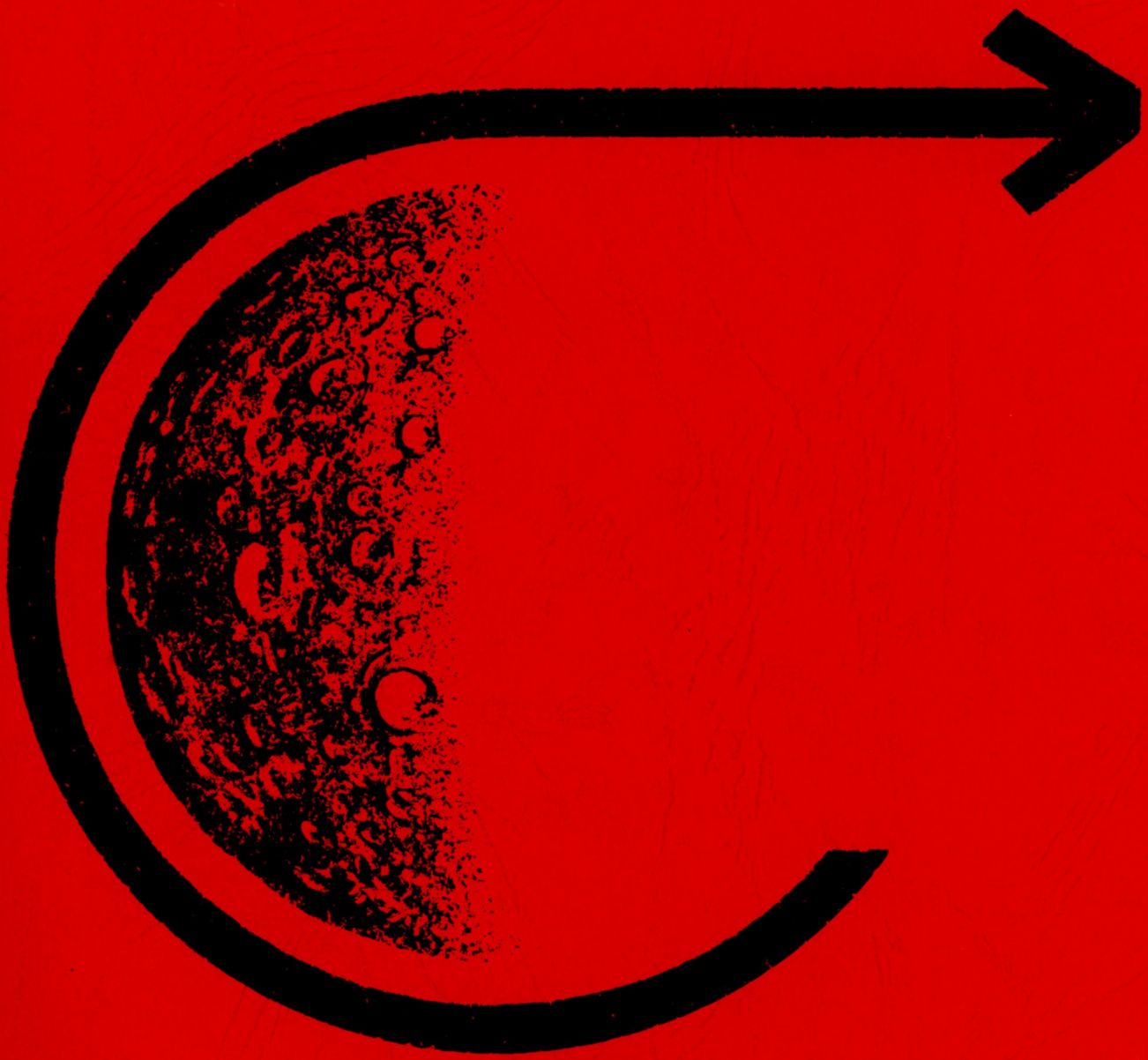
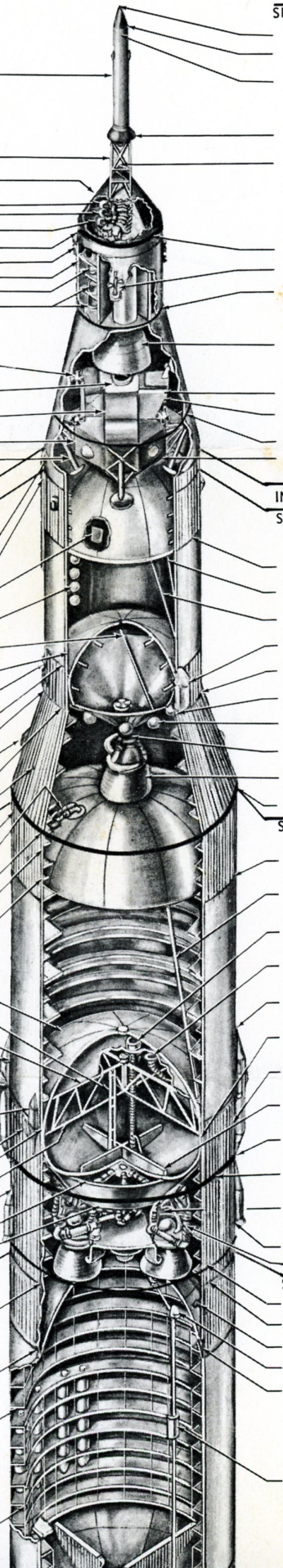


APOLLO SYSTEMS

GENERAL ELECTRI

SPACE DIVISION

TURN V APOLLO FLIGHT CONFIGURATIO



LE STATION IN:	INCHES	METERS
T (NORTH AMERICAN ROCKWELL)		
ETTISON MOTOR & LAUNCH ESCAPE SYSTEM		
AUNCH ESCAPE TOWER		
AND MODULE		
AND PILOT		
R PILOT		
CE MODULE		
ON UMBILICAL	3757.17	95.432
WAY UMBILICAL	3760.92	95.527
SUMP TANK		
YOGENIC STORAGE TANK		
ULE (GRUMMAN)		
HRUSTER ASSEMBLY 4 PLACES		
PPER DOCKING TUNNEL		
SCENT STAGE		
ESCENT STAGE		
ANDING GEAR 4 PLACES		

T UNIT (IBM)				
ONNELL DOUGLAS)			S-IVB INCHES	S-IVB METERS
ANK VENT	3203.56	81.370	657.70	17.188
SS PLATFORM SUPPORT FITTING	3161.56	80.303		
NNAS CENTERLINE	3193.56	81.116		
HELIUM SPHERES (8)				
ANK PROBE				
ANK				
FAIRING LH_2 FILL & DRAIN				
F AFT SKIRT	2832.00	71.933	286.15	7.268
LH_2 FILL AND DRAIN	2760.05	70.105	214.19	5.440
ROCKET (4 PLACES)				
M OF AFT SKIRT	2746.50	69.701	200.05	5.096
SS PLATFORM SUPPORT FITTING	2664.33	67.674		

H AMERICAN ROCKWELL)	INCHES	METERS	XB STA INCHES	XB STA METERS
EMS TUNNEL			938.50	23.837
ENT			942.00	23.926
OP FORWARD SKIRT	2519.00	63.982	955.00	24.257
COMMAND ANTENNA 4 PLACES			923.00	23.444
METRY ANTENNA 4 PLACES			902.00	22.910
ANK				
ROPELLANT MANAGEMENT PROBE				
SLOSH BAFFLE			357.00	9.067
ECIRCULATION SYSTEM 5 PLACES			366.60	9.311
ILL & DRAIN			341.00	8.661
ON OF AFT SKIRT			283.00	7.188
F AFT SKIRT	1890.00	48.006	326.00	8.280
M OF SLOSH BAFFLE			284.00	7.213
LLAGE ROCKET FAIRING MOTOR			176.68	3.725
F THRUST CONE			223.00	5.664
M OF THRUST CONE			112.00	2.844

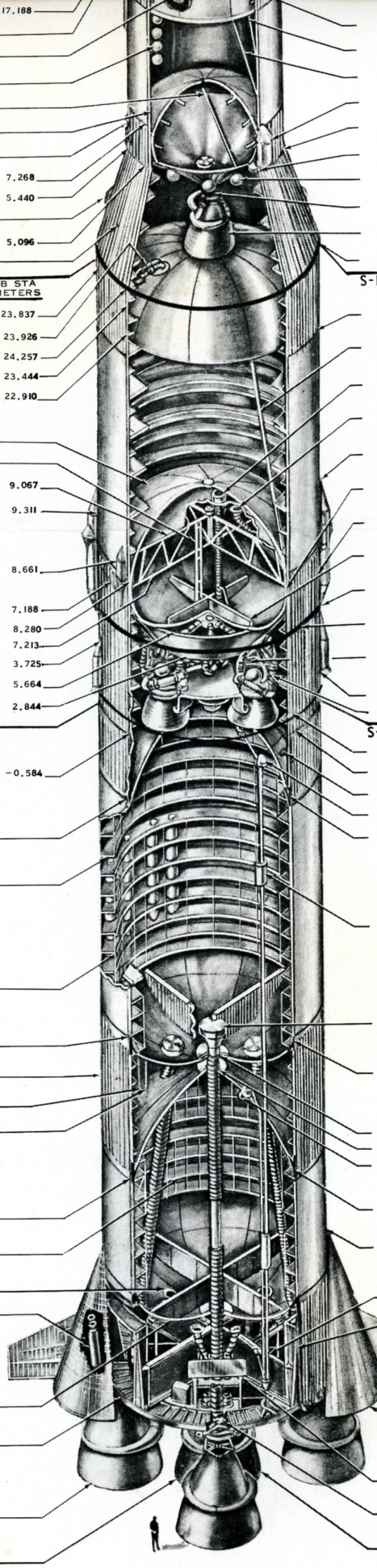
NG)				
ORWARD SKIRT	1541.00	39.141	−23.00	−0.584
R SECTION OF FORWARD SKIRT	1420.30	36.075		
SLOSH BAFFLES				
R SECTION OF HELIUM BOTTLES (4)	946.50	24.041		

VEHICLE STATIONS IN:	INCHES	METERS
SPACECRAFT		
VEHICLE STATION	4240.79	107.716
BASE OF CONARD NOSE CONE	4203.73	106.774
CENTERLINE LAUNCH ESCAPE MOTOR	4185.53	106.312
BOTTOM OF LES SKIRT	3960.03	100.585
TOP OF BOOST COVER	3890.03	98.527
VEHICLE SEPARATION	40.03	97.536
AFT HEAT SHIELD	3749.56	95.239
REACTION CONTROL SYSTEM MODULE	3715.45	94.372
VEHICLE STATION FLIGHT SEPARATION	3594.55	91.301
VEHICLE SEPARATION	3593.50	91.275
PROPULSION MOTOR		
RENDEZVOUS RADAR ANTENNA		
LUNAR MODULE		
L/M FORWARD DOCKING TUNNEL		
VEHICLE SEPARATION	3340.05	84.837
VEHICLE STATION	3285.19	83.443

INSTRUMENT UNIT				
INSTRUMENT UNIT TOP	3258.56	82.767		
INSTRUMENT UNIT BOTTOM	3222.56	81.853		
S-IVB			S-IVB INCHES	S- ME
TOP FORWARD SKIRT			676.70	
BOTTOM OF FORWARD SKIRT	3100.56	78.754	554.70	
FUEL MASS SENSOR PROBE				
INSTRUMENTATION PROBE				
AUXILIARY PROPULSION SYSTEM (APS) (2)				
FLIGHT SEPARATION				
LOX VENT (FAR SIDE)	2759.00	70.078	213.15	
HELIUM SPHERES (9 PLACES)				
TOP J-2 ENGINE	2645.85	67.204	100.00	
J-2 ENGINE				
BOTTOM S-IVB TOP S-II	2519.00	63.982	−26.98	

S-II	INCHES	METERS	XB STA INCHES	XB ME
BOTTOM OF FORWARD SKIRT			823.00	
LH_2 PROPELLANT MANAGEMENT PROBE				
PRESSURIZATION MAST				
LOX VENT LINE				
TOP OF LH_2 FEED FAIRING 5 PLACES			451.75	
LOX TANK EQUATOR	1848	46.939		
LOX FILL & DRAIN (FAR SIDE)			207.00	
CRUCIFORM BAFFLE			173.00	
BOTTOM LH_2 FEED FAIRING			158.00	
FLIGHT SEPARATION	1760.00	44.704	196.00	
GIMBAL PLANE			100.00	
BOTTOM ULLAGE R M FAIRING			−0.44	
J-2 ENGINES (5 PLACES)				

S-IC				
FLIGHT SEPARATION			0.00	
S-II INTERSTAGE BOTTOM	1541.00	39.141	−23.00	
LOX VENT	1521.00	38.633		
GOX LINE	1511.75	38.398		
Y RING	1404.00	35.661		
PRESSURIZATION TUNNEL (2 PLACES)				



NK VENT	3203.56	81.370	657.70	17.188
S PLATFORM SUPPORT FITTING	3161.56	80.303		
NAS CENTERLINE	3193.56	81.116		
ELIUM SPHERES (8)				
NK PROBE				
NK				
AIRING LH_2 FILL & DRAIN				
AFT SKIRT	2832.00	71.933	286.15	7.268
H_2 FILL AND DRAIN	2760.05	70.105	214.19	5.440
ROCKET (4 PLACES)				
M OF AFT SKIRT	2746.50	69.701	200.05	5.096
S PLATFORM SUPPORT FITTING	2664.33	67.674		

AMERICAN ROCKWELL)	INCHES	METERS	XB STA INCHES	XB STA METERS
MS TUNNEL			938.50	23.837
NT			942.00	23.926
P FORWARD SKIRT	2519.00	63.982	955.00	24.257
COMMAND ANTENNA 4 PLACES			923.00	23.444
IETRY ANTENNA 4 PLACES			902.00	22.910
ANK				
ROPELLANT MANAGEMENT PROBE				
LOSH BAFFLE			357.00	9.067
ECIRCULATION SYSTEM 5 PLACES			366.60	9.311
ILL & DRAIN			341.00	8.661
ON OF AFT SKIRT			283.00	7.188
F AFT SKIRT	1890.00	48.006	326.00	8.280
M OF SLOSH BAFFLE			284.00	7.213
LLAGE ROCKET FAIRING MOTOR			176.68	3.725
F THRUST CONE			223.00	5.664
M OF THRUST CONE			112.00	2.844

NG)				
ORWARD SKIRT	1541.00	39.141	−23.00	−0.584
R SECTION OF FORWARD SKIRT	1420.30	36.075		
SLOSH BAFFLES				
R SECTION OF HELIUM BOTTLES (4)	946.50	24.041		
F INTERTANK ASSEMBLY	885.20	22.484		
VENT LINE	696.00	17.678		
SS DOOR (FAR SIDE)				
ILL & DRAIN (FAR SIDE)	794.18	20.172		
ILL & DRAIN (FAR SIDE)	776.18	19.715		
M OF INTERTANK ASSEMBLY	628.80	15.971		
H BAFFLES				
FILL & DRAIN	130.00	3.302		
O ROCKETS (2 EACH 4 PLACES)				
M OF FUEL TANK	225.00	5.715		
OF HEAT SHIELD	112.00	2.844		
M OF F-1 ENGINE (5 PLACES)	−115.36	−2.930		

BOTTOM OF FORWARD SKIRT	3100.56	78.754	554.70	14.
FUEL MASS SENSOR PROBE				
INSTRUMENTATION PROBE				
AUXILIARY PROPULSION SYSTEM (APS) (2)				
FLIGHT SEPARATION				
LOX VENT (FAR SIDE)	2759.00	70.078	213.15	5
HELIUM SPHERES (9 PLACES)				
TOP J-2 ENGINE	2645.85	67.204	100.00	2
J-2 ENGINE				
BOTTOM S-IVB TOP S-II	2519.00	63.982	−26.98	

S-II

	INCHES	METERS	XB STA INCHES	XB ME
BOTTOM OF FORWARD SKIRT			823.00	2
LH_2 PROPELLANT MANAGEMENT PROBE				
PRESSURIZATION MAST				
LOX VENT LINE				
TOP OF LH_2 FEED FAIRING 5 PLACES			451.75	
LOX TANK EQUATOR	1848	46.939		
LOX FILL & DRAIN (FAR SIDE)			207.00	
CRUCIFORM BAFFLE			173.00	
BOTTOM LH_2 FEED FAIRING			158.00	
FLIGHT SEPARATION	1760.00	44.704	196.00	
GIMBAL PLANE			100.00	
BOTTOM ULLAGE R M FAIRING			−0.44	
J-2 ENGINES (5 PLACES)				

S-IC

FLIGHT SEPARATION			0.00	
S-II INTERSTAGE BOTTOM	1541.00	39.141	−23.00	
LOX VENT	1521.00	38.633		
GOX LINE	1511.75	38.398		
Y RING	1404.00	35.661		
PRESSURIZATION TUNNEL (2 PLACES)				
LOX FEED LINE TUNNEL (5 PLACES)				
Y RING	909.00	23.088		
BOTTOM OF LOX TANK	772.00	19.608		
TOP OF FUEL TANK	742.00	18.846		
FUEL PRESSURE LINE	692.80	17.576		
Y RING	605.00	15.367		
TOP OF ENGINE FAIRING	362.00	9.194		
TOP OF THRUST STRUCTURE	345.70	8.780		
INTERCONNECT LOX DRAIN	130.00	3.302		
BOTTOM OF ENGINE FAIRING	48.50	1.231		
BOTTOM OF THRUST STRUCTURE	116.00	2.946		
GIMBAL	100.00	2.540		

POS II

POS III

STAGE ROTATED 45°
TER CLOCKWISE
LARITY

ISOMETRIC SCALE

100 0 100 200 300 400 500 INCHES

2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 METERS

196.85 393.70 511.81

SATURN APOLLO 500 SERIES

THE BOEING COMP
AEROSPACE GROUP SPACE DIVIS
HUNTSVILLE, ALA 3580

SATURN V APOLLO
FLIGHT CONFIGURATION

DRAWING ORIGINATED BY: HUNTSVILLE ENGINEERING

UPDATED

DRAWN BY: DON S

FOR ADDITIONAL COPIES CONTACT

Launch Control and Checkout Equipment (LCCE) - General Electric's Apollo Systems Organization has provided a broad range of equipment used to control and check out the facilities used in launching America's Apollo astronauts. This hardware is known as Launch Control and Checkout Equipment (LCCE), and includes systems which spread over the entire Cape Kennedy Complex. Shown here is a test of the Water Control System used for cooling and quenching the launch site and storage areas before, during, and after a launch.

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Phone: 904-258-3154

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APOLLO SYSTEMS

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FACT SHEET

APOLLO SYSTEMS
Space Division
General Electric Company

CHECKOUT AND GROUND SUPPORT EQUIPMENT FOR APOLLO

- Fifth Largest Apollo Contractor.
- Supplied most of Apollo Ground Support Equipment.
- Supplied Equipment for Pre-Launch Checkout and Control of the Apollo Spacecraft, the Saturn Launch Vehicles, and the Launch Facilities themselves.

APOLLO SYSTEMS DEPARTMENT MISSION AT-A-GLANCE

1. Development of ACCEPTANCE CHECKOUT EQUIPMENT (ACE-S/C) for pre-launch test and checkout of the three Apollo spacecraft modules.
2. Development of ELECTRICAL SUPPORT EQUIPMENT (ESE) for pre-launch checkout and control of the Saturn IB and Saturn V launch vehicles.
3. Development of Launch Control and Checkout Equipment for pre-launch control and checkout of the launch equipment and the launch facilities at the launch complexes.
4. Engineering and technical services, including mission analysis and Reliability and Quality Assessment.

-More-

RESOURCES

The General Electric Apollo Systems Organization (General Manager, Gerald T. Smiley) has about 3,300 employees. It has major facilities in four locations:

1. Daytona Beach, Florida—Organization Headquarters. Major manufacturing facility.
2. Cape Canaveral, Florida—Was responsible for development of launch control and checkout equipment. Provides engineering services to NASA's Kennedy Space Center.
3. Houston, Texas—Primarily concerned with engineering support to NASA's Manned Spacecraft Center. Responsible for ACE-S/C Program.
4. Huntsville, Alabama—Major development and manufacturing facility for ESE equipment. Provides engineering services for NASA's Marshall Space Flight Center.
5. Other—Apollo Systems personnel are also located at major Apollo contractor's facilities in Downey, California, and Bethpage, New York, to provide engineering services in connection with ACE Stations at each location. In addition, the Organization maintains offices in Washington, D.C., and Dayton, Ohio.

HARDWARE FOR APOLLO

APOLLO SPACECRAFT CHECKOUT

- Acceptance Checkout Equipment (ACE).

LAUNCH VEHICLE CHECKOUT AND CONTROL

- Electrical Support Equipment (ESE).

LAUNCH CONTROL AND CHECKOUT EQUIPMENT

- Electrical Launch Support Equipment.
  - Propellants and Gases Systems.
  - ELSE Control Systems.
  - Facility Control Systems.
  - DC Power System.

- Instrumentation System
  - Vehicle Measuring Checkout Systems.
  - Measurements Monitoring and Recording Systems.
  - RF Checkout Equipment.
  - Saturn Telemetry Checkout System.
  - Saturn Abort Advisory System (AAS).
- Power Systems, Cables, and Racks (Design Management).
  - Cables.
  - 60-Hertz Power System.
  - Facilities Grounding System.
- Communications and Photo-Optical Systems (Design Management).
  - Television System.
  - Operational Intercommunications System (OIS).
  - Photo-Optical System.
  - Wideband Transmission System.
  - Paging System.
  - Timing and Countdown Systems.
  - Speciality Operational Television (OTV) and Photo-Lighting Systems.
  - General Telephone, Data, and Special Audio Systems.

RELATED WORK EXPERIENCE

Organized in 1962 to provide equipment and services for the Apollo Program, Apollo Systems has since evolved into other aerospace-defense and industrial work areas.

Apollo Systems is under contract to provide equipment and engineering services for such programs as Minuteman III and Safeguard.

Apollo Systems has also designed and built a Nuclear Power Plant Simulator (NPPS), which is used to train operators for boiling-water reactor plants. This system duplicates in function and appearance a typical nuclear power plant control room and utilizes digital computer techniques and math modeling to simulate all systems external to the control room.

Another simulation system developed by Apollo Systems involves Computed Perspective Image Generation, a technique employing computer-generated color TV-like pictures to simulate such operations as spacecraft docking and landings, aircraft carrier and airport landings and defense oriented applications. A similar technique, called Digital Radar Landmass Simulation, is used to generate a display on a radar scope for use in training navigators.

Apollo Systems has also developed a high-speed information search and retrieval system known as the GESCAN Rapid Search Machine. This system can search natural language information files at speeds of up to one million words per minute.

These products and program activities outside the space field illustrate some of the wide-spread benefits derived from the technological development of our nation's space program.

-30-

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CHECKOUT EQUIPMENT FOR APOLLO SPACECRAFT: ACE-S/C

Houston, Texas—The Apollo Spacecraft will start on its complicated mission only after having received a thorough pre-launch testing from a vast complex of ground checkout equipment provided by the General Electric Company. Designated ACE-S/C, for Acceptance Checkout Equipment-Spacecraft, the system is capable of testing all spacecraft systems automatically. GE's Apollo Systems Organization has fabricated and assembled fourteen of these spacecraft checkout systems.

The widespread use of these stations makes it possible to conduct uniform, standard tests and procedures, and to detect variances in the spacecraft systems while they are still at the factory, and then after they arrive at the Kennedy Space Center.

Six ACE stations are located at NASA facilities at Merritt Island; three are at the North American Aviation plant at Downey, California, where the Command and Service Modules are manufactured; two are at Grumman Aircraft Engineering Corporation in Bethpage, New York, where the Lunar Module is built; and two are at the Manned Spacecraft Center at Houston, where simulated space environmental tests are conducted. One ACE station is located at the Manned Space Flight Center in Huntsville for use on the Skylab Program.

ACE provides NASA with a highspeed, effective means of testing Apollo's key systems—communications, instrumentation, biomedical, environmental control, fuel cell and cryogenics, service propulsion and reaction control, guidance and navigation, stabilization and control, and power and sequential.

-More-

Each ACE station consists of three rooms of electronic equipment—a control room, a computer room, and a terminal facility room. This design allows a staff of key engineers to monitor and control the spacecraft checkout tasks.

Checkout can be handled manually, semi-automatically, or fully automatically. ACE receives data at the rate of approximately 200,000 bits per second, which is equivalent to approximately 25,000 data "words" per second. If all the data compiled on a continuous eight-hour test were printed out and stacked beside the Saturn V, it would stand 65 feet taller than the space vehicle itself.

A systems engineer sitting at an ACE console performs testing on a spacecraft subsystem by sending a "command" signal to the spacecraft on the launch pad. Measurements of spacecraft performance are continuously being sent back to "ACE" for display to the test operator. If the checkout data does not meet prescribed limits, the various display lights, meters, recorders, and indicators will allow the test engineer to immediately note the discrepancy. By this method, engineers can check one tiny circuit deep within a single subsystem or the entire spacecraft.

During launch operations, ACE exchanges key information with a similar system which checks out and controls the Saturn launch vehicles. This system, known as Electrical Support Equipment (ESE), was also designed and manufactured by Apollo Systems.

Together, these two systems—in conjunction with the Launch Control and Checkout Systems—provide the capability for an integrated test for Apollo/Saturn.

-30-

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CHECKOUT AND CONTROL OF LAUNCH VEHICLE OPERATIONS: ESE

Huntsville, Alabama—Saturn V, and Saturn IB, are examined, inspected, tested, and controlled by the largest array of checkout equipment in the Apollo Program.

This booster diagnosis is accomplished through use of Electrical Support Equipment (ESE) developed and built by the Apollo Systems Organization of the General Electric Company. This is the type of equipment seen in the blockhouses and control centers at Cape Kennedy.

ESE is a vast array of ground support equipment that checks out the launch vehicle and its support systems. In addition to operator and launch conductor control and display stations for each stage of the vehicle, ESE consists of a computer complex and associated equipment, the vehicle telemetry system, primary power and distribution equipment and system test equipment.

This equipment permits engineers to check and recheck the circuits of the launch vehicles, such as those for propellants and gases and vehicle components associated with these systems.

ESE sends commands to exercise or control each of the critical components of the various booster stages. It then reports the information from each of the thousands of test points to the engineers conducting the tests so they know at all times, in detail, if the launch stages are operating properly.

ESE, through appropriate interfaces, also supplies operational support to other ground systems and conducts all switching operations required during the final three minutes of countdown.

-More-

At KSC, Electrical Support Equipment is located at the Launch Control Center, the Mobile Launch Facility, and the Vehicle Assembly Building.

General Electric, fifth largest contractor to the National Aeronautics and Space Administration, also provides checkout equipment for the Apollo spacecraft. This spacecraft checkout system is known as ACE-S/C. ESE is functionally similar to ACE, but is about twice as large. ESE is the largest known checkout system in the world.

The Electrical Support Equipment was developed and fabricated by the Apollo Systems Organization at its Center operation in Huntsville, Alabama.

-30-

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LAUNCH CONTROL AND CHECKOUT EQUIPMENT

Cape Kennedy, Florida—The Apollo Systems Organization of General Electric has provided a wide range of equipment and design engineering management to check out and control the launch facilities used in NASA's Apollo Program. This hardware is known as Launch Control and Checkout Equipment (LCCE). Where other GE-provided systems check out and control the Apollo spacecraft and the Saturn launch vehicles, LCCE performs this function for many of the launch facilities, themselves.

The LCCE may be grouped into four main functional system categories:

- Electrical Launch Support Equipment consisting of approximately 800 racks of electrical equipment in twenty-four systems. These racks of equipment are used for propellants and gases control, launch support equipment control, and facility remote control.
- Instrumentation Systems consisting of approximately 650 racks of electrical equipment in thirty-nine systems. These racks of equipment are used for measurements, RF checkout, Telemetry checkout, and abort advisory functions.
- Cables, Racks, and Power Systems including the 115 kilovolt network, the 13.2/13/8 kilovolt substations, and the secondary distribution system to technical loads. Equipment placement drawings for approximately 130,000 cables and 7,000 racks have been provided.
- Communications and Photo-Optical Systems consisting of equipment comprising the Saturn/Apollo Television System, Photo-Optical System, Wideband Transmission System, Operational Intercommunications System, Paging System, Radio Frequency (RF) System, Timing and Countdown System, and the General Telephone, Data, and Special Audio System.

-More-

Specifically, the various systems used for launch control and checkout of the space vehicle perform the following functions:

a. Provide operator controls and displays necessary to remotely service the launch vehicle by loading propellants, provide high and low pressure gases control, vehicle compartment conditioning, and controlling movement of service and holddown arms prior to launch.

b. Provide protection to the space vehicle, pad, and personnel with control and displays of a Firex Water Systems area warning system, purging system, and hazardous gas monitoring system.

c. Provide both visual and oral communications essential in controlling all operations during assembly and checkout of the space vehicle.

d. Provide instrumentation checkout equipment necessary to validate performance and calibrate on-board sensors, transponders, and telemetry equipment.

e. Provide and distribute critical power to all technical equipment and administrative facilities.

The LCCE gives NASA a broad launch support capability for the servicing, protecting, and checking out of the launch vehicle and spacecraft from arrival of the various stages at Kennedy Space Center on through testing and assembly in the Vehicle Assembly Building and Manned Spacecraft Operations Building; and to final flight readiness verification at the pad prior to and during launch.

-30-

GENERAL ELECTRIC

GROUND SUPPORT EQUIPMENT FOR PROJECT APOLLO

APOLLO SYSTEMS DEPARTMENT

The Apollo Systems Department of General Electric Company was organized in 1962 to provide equipment and engineering services to NASA's Apollo project. ASD is the fifth largest contractor in the program, having supplied most of its Ground Support Equipment.

This ground support equipment may be divided broadly into three functional areas:

- Checkout of Spacecraft (ACE-S/C)
- Checkout and control of launch vehicle (ESE)
- Checkout and control of launch facilities (LCCE)

The Apollo Systems Department is headquartered at Daytona Beach, Florida, and has large Center operations at Cape Canaveral, Florida; Houston, Texas; Huntsville, Alabama; and maintains, in addition, a Washington Office. ASD personnel are also located at Apollo contractors' facilities in Downey, California, and Bethpage, New York.

SPACECRAFT CHECKOUT EQUIPMENT (ACE S/C)

Before lift-off, thousands of test points on the Apollo spacecraft must be checked out. This testing is accomplished utilizing check-out equipment built by the Apollo Systems Department of General Electric. This equipment, called "ACE" for Acceptance Checkout Equipment, checks out the three Apollo modules, but not the launch vehicles.

An ACE checkout station consists of two main rooms of equipment--a control room, and a computer room. The computer room contains two high-speed computers. Advanced system design permits centralized, preprogrammed operation.

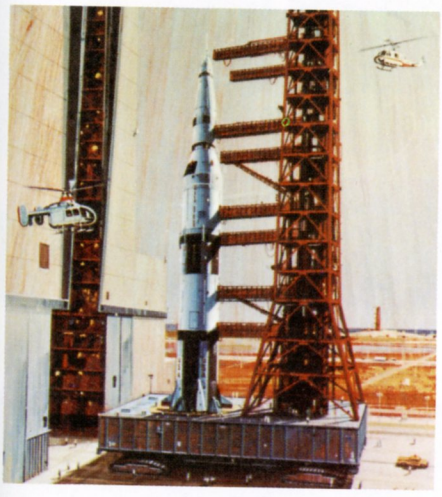
ACE can make tests in three different operating modes - manual, semiautomatic, or fully automatic. ACE checks all spacecraft systems including instrumentation, communications, environmental control, power, stabilization, and control. ACE can test one tiny component buried deep within the spacecraft or the entire, integrated spacecraft.

The 14 ACE stations, manufactured by General Electric, are used from factory to launch pad.

LAUNCH VEHICLE CHECKOUT EQUIPMENT (ESE)

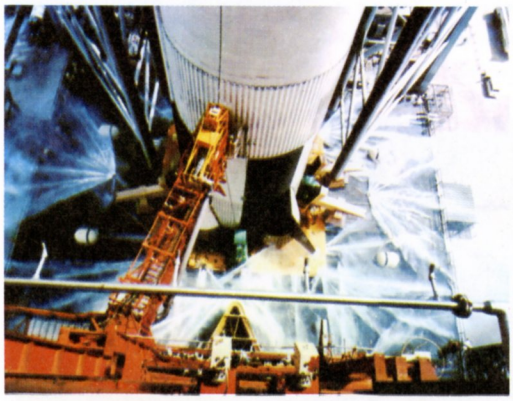
While ACE checks out the Apollo spacecraft, other GE-built equipment checks out the Saturn launch vehicle. Known as ESE, for Electrical Support Equipment, this system contains about 10,000 racks, panels, and control consoles.

ESE is the type of equipment seen in the launch control centers at KSC. It tests all the thousands of checkpoints on Saturn V's three stages manually and automatically. ESE also conducts all switching operations in the final three minutes of countdown.



General Electric also provides equipment to check out and control the launch facilities themselves.

LAUNCH FACILITIES CHECKOUT EQUIPMENT (LCCE)



Water Control Systems Provide Fire Protection, Pad Cooling and Quenching

The launch facilities are controlled and tested by Launch Control and Checkout Equipment (LCCE). This equipment is located throughout the entire launch complex and includes systems used to check and control fueling of the various stages, as well as equipment concerned with communications, telemetry, water control, and other launch complex operations.

General Electric's Ground Support Equipment never leaves the ground..... but without it, neither does anything else.

GENERAL ELECTRIC
MISSILE AND SPACE DIVISION
APOLLO SYSTEMS DEPARTMENT

ASD

DAYTONA BEACH, FLA.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Acceptance Checkout Equipment—Spacecraft (ACE-S/C)—Thousands of system test points on the Apollo spacecraft must be thoroughly checked out before it can be launched. These tests are made using checkout equipment developed and manufactured by General Electric's Apollo Systems Organization. Called ACE-S/C, for Acceptance Checkout Equipment—Spacecraft, this system is capable of testing all the checkpoints on the Apollo modules manually, semiautomatically, or fully automatically. Shown above is the control room of one of the 14 ACE stations manufactured by GE for NASA. Each station also contains a computer room and terminal/switching facility. These ACE stations are in use at locations throughout the nation for checkout of the Apollo modules from factory to launch pad.

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Electrical Support Equipment (ESE)—During the countdown and launch of the Saturn V Rocket which starts American Astronauts on their way to the moon, the giant space vehicle is checked out and controlled by the largest checkout system in the world. Called Electrical Support Equipment (ESE), this system comprises enough racks of electronic equipment to make a column 3 miles high, stacked end on end. ESE also provides operational support to other ground systems and conducts all switching operations in the final three minutes of countdown. ESE was designed and manufactured by General Electric's Apollo Systems Organization at their Center Operation in Huntsville, Alabama.

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