



For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

THE MANNED SPACE FLIGHT NETWORK

Volume 5, Number 17

Goddard Space Flight Center

September 3, 1968

Apollo Ship CDP Performs Many And Varied Functions

The Central Data Processor (CDP) for Apollo ships is a modified Univac 642B computer that functionally replaces the tracking data processor at USB stations and the computer and other equipment for processing tracking data at C-band sites. But, in addition to this job, the CDP performs other functions, such as, navigation and antenna positioning.

The CDP receives ship's position and attitude data, timing system signals, antenna pedestal flexure data, control signals, target acquisition information, and real-time tracking data. It processes the received information to provide data for antenna pointing, ship's position and attitude, trajectory data recording and display, plotting board tracing, target acquisition, and data transmission. Primary operations are accomplished in standby, acquisition, and tracking modes.

Standby mode is used during count-down prior to acquisition and during

the period following tracking mode operation if a subsequent pass of the orbiting vehicle is to be supported. During standby mode, navigation is the principle function handled to prepare the ship for the tracking mission.

The main function of the acquisition mode is to enable the tracking system antennas to acquire the target and begin tracking.

After the target is acquired by the C-band or USB system and sufficient valid data is selected to compute the target's apparent position and velocity, the tracking mode is entered automatically from the acquisition mode.

In the tracking mode computer procedures correct tracking data for ship attitude and errors caused by:

. . . Antenna zero offset, servo lag, droop, and misalignment as computed from balloon tracking tests

. . . Antenna mount flexure due to pitch or roll of ship.

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Changes Announced For Apollo Program

NASA Acting Administrator Thomas O. Paine announced that Lunar Module operations will be dropped from the first manned Apollo-Saturn V flight, Apollo 8 (AS-503).

Dr. Paine also stated that the NASA Office of Manned Space Flight will begin planning for an alternate manned Command and Service Module mission for launch in December.

Dr. Paine emphasized that no final decision will be made on the precise mission plan for the alternate flight until after the AS-205 mission (Apollo 7) next month. Apollo 7 is a mission of up to 10 days' duration to complete flight qualification of the Command and Service Modules.

To assure greatest value from the mission, planning and training for Apollo 8 must begin in the period before the Apollo 7 mission is flown but the final content of the mission plan will be selected only after Apollo 7 mission results are evaluated.

Lunar Module 3, which has been delayed in checkout, will be flown next year on the fourth Saturn V (AS-504) with Command and Service Modules No. 104. This decision is based on preliminary studies which indicate that many Apollo program objectives scheduled for later flights can be attained by utilizing the Apollo 8 Command Service Module mission.

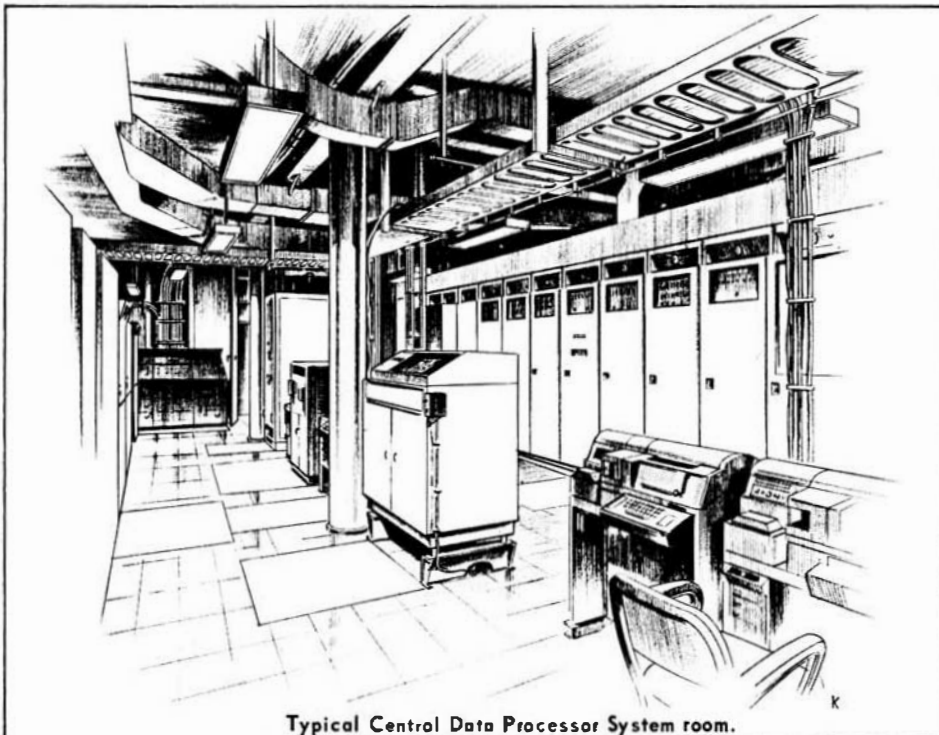
Lt. Gen. Samuel Phillips, Apollo Program Director, said one very important advantage of flying Apollo 8 this year is the opportunity for earlier experience in the operation of the Saturn V and Command and Service Modules than can otherwise be obtained.

Two problems previously experienced in the Saturn Apollo systems -- vertical oscillation or "Pogo effect" in the first stage of the Saturn V and the rupture of small propellant lines in the upper stages -- have been corrected and the solutions verified.

Contract Awarded

NASA has awarded TRW, Inc., TRW Systems Group, Redondo Beach, Calif., a contract for work on the mission trajectory control program and Apollo spacecraft systems analysis program for MSC.

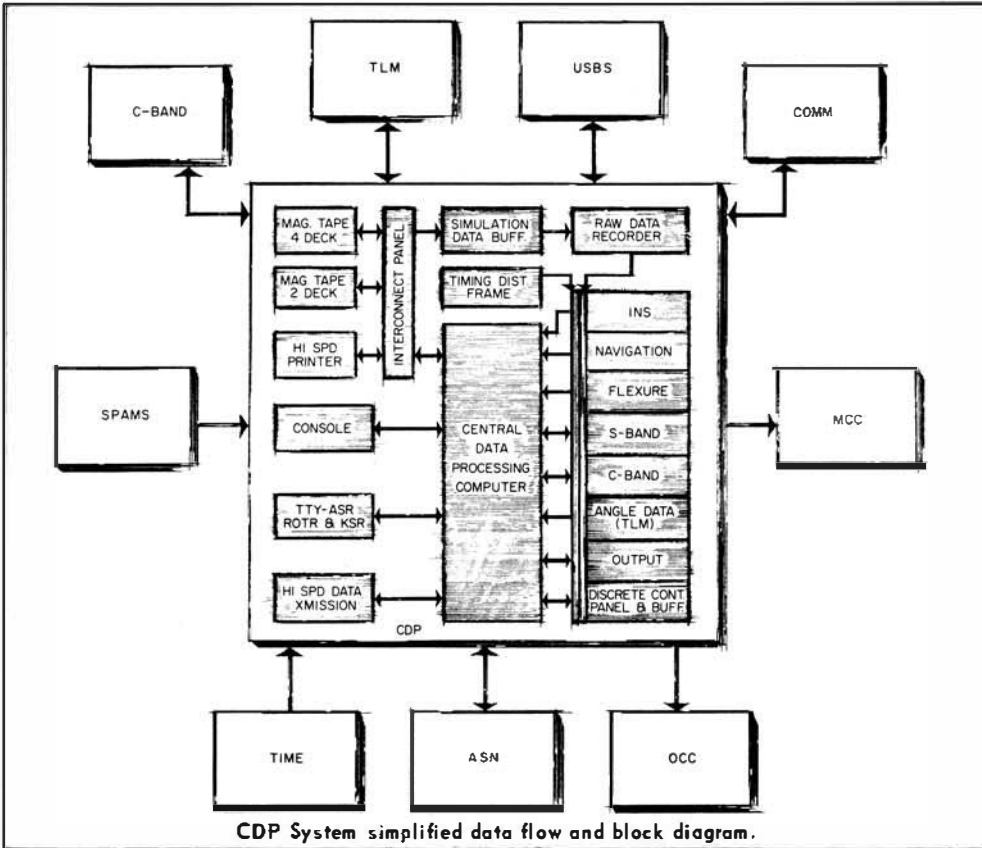
Under the contract, TRW provides work in the areas of flight control computer program development, trajectories, orbital maneuvers, range safety analysis, and mission error analysis for the mission planning and analysis division at MSC.



Typical Central Data Processor System room.

Apollo Ship CDP

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... Doppler errors. This procedure computes a correction for the doppler measurement reported by the S-band radar to compensate for the motion of the antenna while tracking the spacecraft.

The C-band radar is assisted by feed-forward stabilization signals from the CDP. The computer filters the roll pitch and heading data received from the attitude reference source and determines the rates of change. These rates are transferred to antenna bearing and elevation rates and are then transmitted to the C-band radar system as anticipatory corrections to reduce the servo lags.

The CDP has the capability to process C-band and USB tracking data simultaneously (dual ephemeris) and multiplex it into one 600 bit block for transmission to Mission Control Center.

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Ship Support For AS-205 Mission

For the AS-205 mission the four Apollo ships will serve several purposes.

They will be used to support launch abort contingencies, to act as orbital gap fillers, and to monitor the early part of the reentry phase.

The Vanguard will be positioned about 1000 miles east of Bermuda (32.7° North - 48° West) and will assist that station in covering the insertion of the spacecraft into orbit. It will also be used to supply data in case of an abort.

The Redstone and the Mercury will serve as orbital gap fillers. The Redstone will be positioned about 3600 miles south of Los Angeles (25° South - 118° West), and the Mercury will be located approximately 90 miles east of Taiwan (25° North - 125° East). In this position the Mercury will be able to support the alternate reentry area in the Pacific Ocean.

Covering the deorbit burn phase of reentry will be the primary tracking function of the Huntsville. For other parts of the mission, the Huntsville will be used to receive and record USB telemetry and for air-to-ground voice remoting. The Huntsville will be positioned 1200 miles west of Los Angeles (25° North - 136° West).

The course schedule at the Network Test and Training Facility GSFC, for the last six months of 1968 is as follows:

No.	Course Title	Period	Starting Date
110	MSFTP-2 PCM Decom	9 weeks	July 8 Sept 30
200	642B Computer System	8 weeks	June 3 Aug 12 Oct 28
210	1218 Computer System	8 weeks	Aug 12
230	RSDP Peripheral Equipment	6 weeks	July 29 Oct 7
510	MSFN Records	5 weeks	July 8 Sept 30
520	Apollo Timing System	4 weeks	Aug 12 Nov 4
610	Digital Devices	2 weeks	June 24 July 29 Sept 16 Oct 14 Nov 18
320	USB Land Antenna System	6 weeks	July 8 Oct 28
330	USB Receiver Exciter System	7 weeks	July 8 Sept 30
340	USB Power Amplifier Group	7 weeks	Aug 12 Oct 28
350	USB Ranging	5 weeks	July 8 Sept 30
360	USB Tracking Data Handling	7 weeks	Aug 12 Oct 28
372	USB Systems II	3 weeks	June 24 Sept 30
400	Teletype Operations	2 weeks	June 24 Aug 12
410	Teletype Maintenance	5 weeks	Oct 28 Aug 26 Nov 11
430	Apollo Data Modems	3 weeks	July 8 Aug 12 Oct 28
640	MSFN Operations Center	1 week	July 15 Aug 19 Sept 23 Nov 18
132	Network Data Flow	1 week	July 8 Aug 12 Sept 16 Nov 11
600	Apollo Program	1 week	July 1 July 22 Aug 5 Sept 9 Oct 7 Oct 21 Nov 4
620	M&S Supervisors	2 weeks	July 22 Sept 30 Nov 25

Ops Doc Status

Operations Documentation for the Manned Space Flight Network recently published includes:

AS-205 Mission Supplements to the NOD (launch scheduled 4th quarter, 1968)--Distributed July 9. (Supporting stations ACN, ANG, BDA, CAL, HSK, CNV, CRO, CYI, GBM, GDS, GYM, GWM, HAW, KSC, MER, MIL, PRE, RED TAN, TEX, WHS, VAN, MAD, ARIA 1-5).

Goddard Operations Manual for MSFN activities--Distributed July 26.

Permission Documentation Change No. 1 (Section 61) to the AS-205 Supplements to the NOD--Distributed August 13.

Permission Documentation Change No. 2 (Section 57) to the AS-205 Supplements to the NOD--Distributed August 13.

Permission Documentation Change No. 3 (Section 58) to the AS-205 Supplements to the NOD -- Distributed August 13.