"WELCOME ABOARD" NASA's Manned Space Flight Network Tracking Station, Corpus Christi, Texas. This station, code name TEXAS, provided support for both the Mercury and Gemini programs, and is now configured to support the Apollo earth orbital and lunar missions. TEXAS is one of fourteen world wide ground stations in the Manned Space Flight Network. Goddard Space Flight Center, Greenbelt, Maryland, is responsible for implementation and operation of the Network.

The TEXAS Station utilizes a 30 foot Unified "S" Band dish. This antenna system, with its peripheral data processing equipment, provides ranging, voice, telemetry, command, and television data links between the Apollo Spacecraft and the Manned Spacecraft Center, Houston.

INTRODUCTION

The Apollo program is significantly more complex than either the Mercury or Gemini programs and has consequently presented a corresponding increase in the complexity of the support required from the Manned Space Flight Network (MSFN). This has affected the quantity of data that must be handled, the geographic areas that must be covered, and the technical capability of equipment. For the first time, the network is required to provide reliable tracking and communications to lunar distance. This has required the incorporation of the **Unified S-Band** (USB) system into the network. Since the USB system will be the only means of tracking and communicating with the spacecraft during the lunar phases of the mission, it is mandatory that it be installed, checked out, and proven operational during the early Apollo missions.

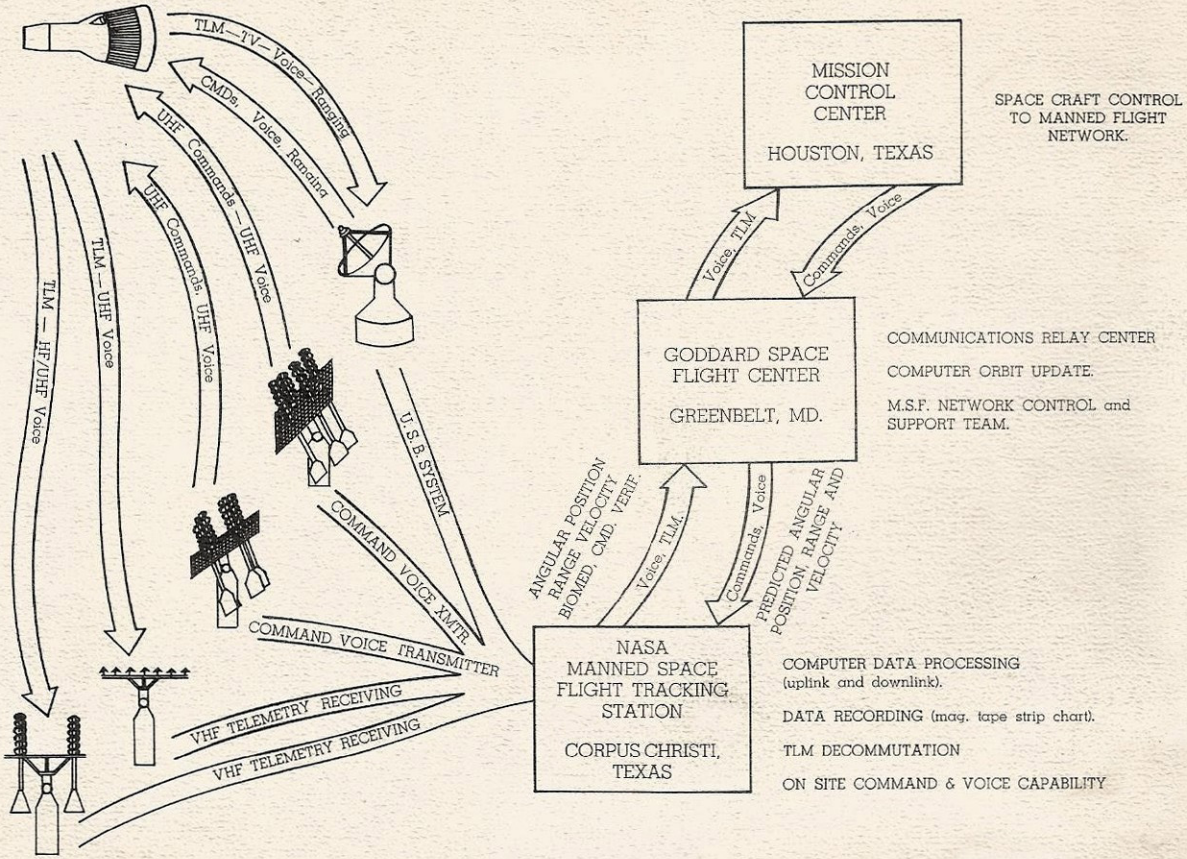
FUNCTIONAL DESCRIPTION OF USB SYSTEM

The USB system utilizes a single radio frequency carrier in each direction to provide all data links between the Apollo spacecraft and the ground stations. Perhaps the first thing that should be discussed is why the unified system approach was adopted rather than extending the range of the existing network equipment. It was adopted primarily because it was considered to offer a superior technical solution with a minimum of new development. The design of the USB system is based on a coherent doppler and the pseudo-random range system. The ground USB station has the inherent capability of receiving telemetry, voice, ranging, and extracting Doppler on a single PM modulated carrier from the spacecraft. In addition, command data, ranging and voice can be combined on a single PM carrier for transmission to the spacecraft.

INTEGRATION OF USB SYSTEM INTO MSFN

Much of the network equipment is the same which was utilized for the Gemini program. The USB system has been designed so that the data inputs and outputs into the network are identical to those of the Gemini equipment. This approach was selected to allow the USB system to be integrated into the MSFN without disrupting the normal network operations or requiring equipment changes or modifications. Tracking and communications with the spacecraft during the lunar missions will be provided by three primary manned space flight facilities, employing 85 foot antennas, spaced at approximately equal intervals of longitude around the earth to provide the continuous coverage of the lunar missions. Three of the Deep Space Instrumentation Facilities (DSIF) located adjacent to the primary sites, will be equipped to serve as backup stations to the manned space flight network.

In addition to the stations with the 85 foot antennas, a number of other stations, employing 30 foot antenna systems, were implemented as a result of a study of the gain and tracking accuracy requirements and comparative costs of several systems. The 30 foot systems must provide data in earth orbit as well as during the realignment of the spacecraft during the lunar phases of the missions. During lunar missions, these systems should be capable of tracking the spacecraft to a range of approximately 15,000 nautical miles, using the spacecraft omni-directional antenna. This represents the most stringent requirement and comes about because it is desirable to complete the spacecraft transposition prior to deployment of the directional antennas. These systems will also be capable of providing tracking data at lunar distance.


TLM.—TV—Voice—Ranging
CMDs. Voice, Ranging
UHF Commands—UHF Voice
UHF Commands, UHF Voice
TLM — UHF Voice
TLM — HF/UHF Voice
U.S.B. SYSTEM
COMMAND VOICE XMTR.
COMMAND VOICE TRANSMITTER
VHF TELEMETRY RECEIVING
VHF TELEMETRY RECEIVING
MISSION CONTROL CENTER
HOUSTON, TEXAS
SPACE CRAFT CONTROL TO MANNED FLIGHT NETWORK.
Voice, TLM
Commands, Voice
GODDARD SPACE FLIGHT CENTER
GREENBELT, MD.
COMMUNICATIONS RELAY CENTER
COMPUTER ORBIT UPDATE.
M.S.F. NETWORK CONTROL and SUPPORT TEAM.
ANGULAR POSITION RANGE VELOCITY BIOMED. CMD. VERIF.
Voice, TLM.
Commands, Voice
PREDICTED ANGULAR POSITION RANGE AND VELOCITY
NASA MANNED SPACE FLIGHT TRACKING STATION
CORPUS CHRISTI, TEXAS
COMPUTER DATA PROCESSING (uplink and downlink).
DATA RECORDING (mag. tape strip chart).
TLM DECOMMUTATION
ON SITE COMMAND & VOICE CAPABILITY