Aerospace Systems Division

Crew Engineering Test Plan for Evaluation of the Array E Antenna Aiming Mechanism	[illegible]
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	DATE 6/30/71

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Date: July 2, 1971

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PURPOSE

To determine if a pressure-suited deployment of the Array E Antenna Aiming Mechanism would present any handling and/or adjustment problems to the crew.

DESCRIPTION

The primary concern in the Array E Antenna Aiming Mechanism evaluation testing is the astronaut handling, adjustment, and reach parameter. For deployment purposes there shall be easy attachment between the aiming mechanism, the antenna mast, and the antenna. All aiming mechanism controls should be located to be easily accessible to the standing astronaut and within his line-of-sight during leveling and aiming adjustment. The controls should also accommodate the dexterity constraints imposed by the thermal gloves.

This plan provides a means for evaluating and recording the activities associated with the deployment of the Array E Antenna Aiming Mechanism. Prior to the pressure-suited deployment test the Antenna Aiming Mechanism and the suited subject will be required to complete a "shirtsleeve dry run" of the deployment test. Crew Engineering personnel will ensure that the Array E Antenna Aiming Mechanism Engineering Model is as close as possible to an exact mechanical simulation of the Array E Flight Configuration Model and duplicates the handling and manipulative features of the flight unit.

EQUIPMENT REQUIRED

1. Array E Antenna Aiming Mechanism Engineering Model with housing and foam packaging.
2. Simulated Central Station with antenna mast.
3. Simulated Helical Antenna.
4. 24" Parabolic Reflector and Light Source 1000 watts (Sun Simulator).

TEST SCHEDULE

Currently scheduled for week of 5 July 1971.

TEST FACILITIES

Crew Engineering Laboratory, Plt 2.

PERSONNEL

1. Test Coordinator, L. Marrus, T. Kuechenmeister

2. Suited subject with latest Apollo Blk II pressure suit with PGA gloves, R. Redick.

TEST PROCEDURE

The following procedure is recommended as per current task procedure description:

1. Install aiming mechanism housing on antenna mast, remove housing and foam packaging and discard.

2. Retrieve antenna and install on aiming mechanism.

3. Enter Longitude offset (In actual flt will be pre-aligned). The longitude adjustment shall be made with either of two adjustment knobs. The mechanism is properly aligned in longitude when the dial angle indicator and vernier counter indicate the longitude of the deployment site. The vernier counter is used in conjunction with the dial angle indicator to provide the required adjustment accuracy.

   The longitude adjustment has a disengagement mechanism which allows the astronaut to override the worm gear system. The disengagement of the mechanism is accomplished with 90° CCW rotation of the longitude adjustment lock lever. When disengaged the antenna aiming mechanism can be positioned manually and the dial angle indicator will be used to indicate the proper setting. Engagement of the mechanism is accomplished with 90° CW rotation of the longitude adjustment lock lever.

4. Enter Latitude Offset (In actual flt. will be pre-aligned).
The latitude adjustment is made with just one adjustment knob. The mechanism is properly aligned in latitude when the dial angle indicator and vernier counter indicate the latitude of the deployment site. The latitude setting is made prior to sun compass setting to allow proper orientation of the gnomon and should always be made in a direction toward the lunar equator. The latitude adjustment also has a disengagement mechanism which allows the astronaut to override the worm gear system.

5. Observing bubble levels, adjust leveling adjustment knobs.
Leveling adjustments are accomplished with a thumbwheel and screw on each axis. The levelness of each axis is indicated by a tubular (linear) bubble level which is in a position to be read from the vertical.

6. Observing sun compass, adjust the shadow adjustment knob.
The sun compass has a two way gnomon attached to the latitude gimbal such that proper latitude adjustment tilts the gnomon into the lunar equatorial plane. Once tilted into the lunar equatorial plane, the sun compass adjustment is independent of apparent sun angle; requiring only matching of the gnomon shadow to the reference for proper east-west alignment of the mechanism.

With the engagement lever in the disengaged position, the aiming mechanism can be rotated about the axis by hand to the desired position, re-engaged, and locked within 5 degrees of the desired setting. Operation in the override mode is a contingency operation only.

TEST DATA

1. The total time for a pressure-suited astronaut assembly of the aiming mechanism to the mast and the antenna to the aiming mechanism will be measured.

2. The time for a pressure-suited astronaut to aim, to level, and to align the aiming mechanism to the Alphonsus deployment site (13^{o} 54' S, 4^{o} 6' W) will be measured.

3. The time for a pressure-suited astronaut to set the longitude and latitude from their zero settings to their extreme settings will be measured (Longitude - 0° to 60°, Latitude - 0° to 45°).

4. Various longitude and latitude settings as well as the worst case setting will be inserted in order to demonstrate glove clearance from the edges of all adjustment knobs and the ease of torquing required to adjust the knobs to the desired settings.

5. Various sun angles will be simulated with the use of the parabolic reflector and light source in order to demonstrate the ability of the aiming mechanism to be properly aligned.

6. The ability of the pressure-suited astronaut to set the aiming mechanism manually in latitude, longitude and align the sun compass manually (override mechanism disengaged) will be demonstrated.

TEST RESULTS

The results of the deployment test will be reported in BxA ATM format.