



**Aerospace
Systems Division**

GAUTHIER

ALSEP
One-Man Deployment Task Sequence

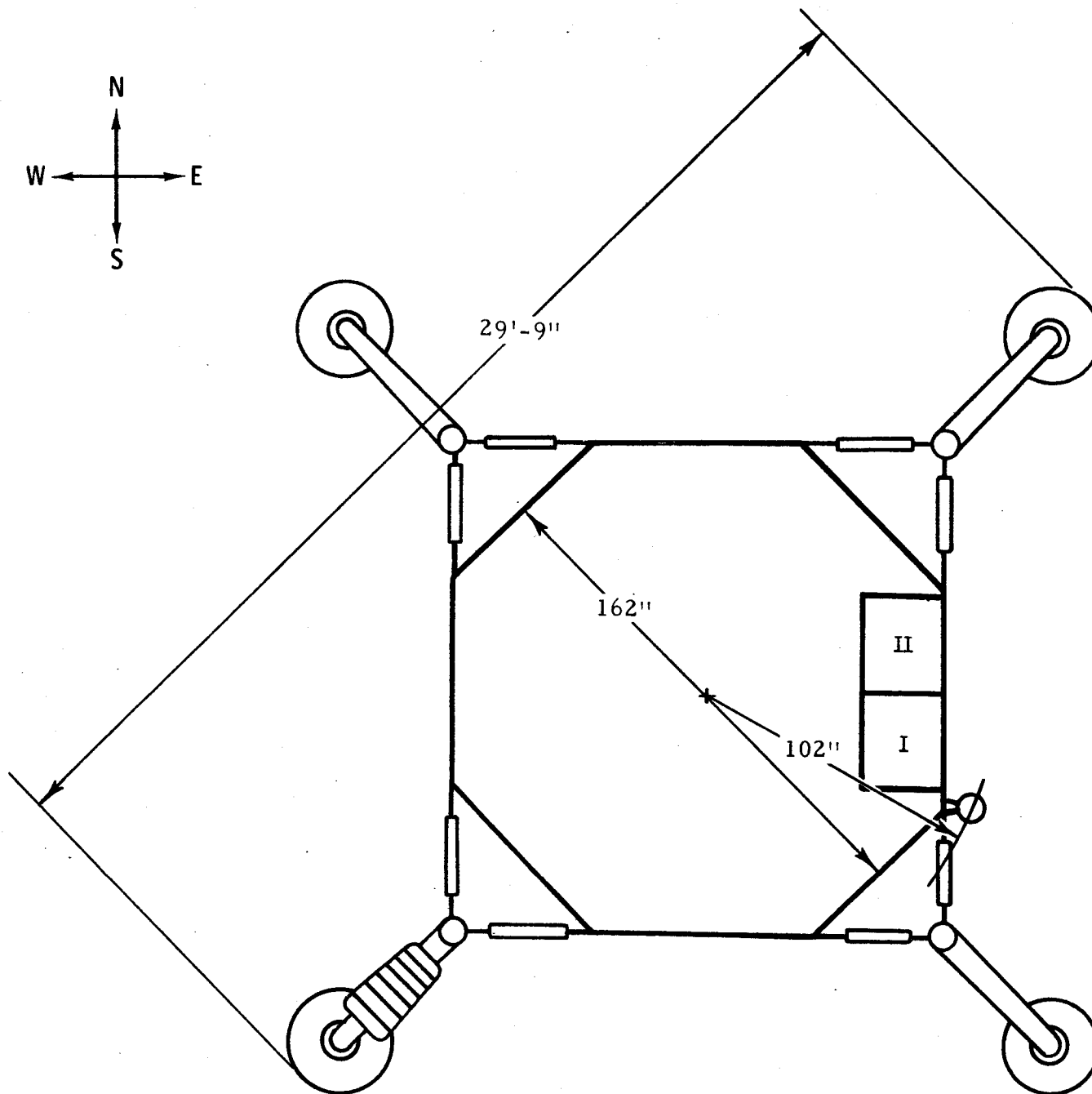
NO.	REV. NO.
ATM-739	
PAGE <u>1</u>	OF <u>1</u>
DATE 27 May 1968	

The Apollo Lunar Surface Experiments Package (ALSEP) one-man deployment task sequence, based on current flight configurations and design, is incorporated in this ATM. The following assumptions and conditions are applicable to this deployment sequence.

1. The sequence is for ALSEP Flight 1, Configuration A.
2. The sequence is for the one-man deployment capability required for ALSEP.
3. The Lunar Module (LM) is oriented on the lunar surface with the Scientific Equipment Bay (SEQ) facing the sun (lunar east) and the boom release system is used to lower Packages No. 1 and No. 2 to the lunar surface.
4. The Commander, who remains inside the LM, maintains constant voice contact with the LM Pilot while the LM Pilot is deploying ALSEP.
5. The voice link between LM Pilot during ALSEP deployment and Mission Control Center (MCC) is through the LM directly to MCC.
6. The LM Pilot is pressurized to 3.75 psi in the Extravehicular Mobility Unit (EMU) during ALSEP deployment.
7. Two 26.5 inch Universal Handling Tools (UHT) are available for use during ALSEP deployment, which combine the functions of experiment handling and fastener release.
8. The ALHT is removed after Package No. 2 is lowered to the lunar surface.
9. The latest ALSEP design incorporates the latest sunshield curtain modifications, cask lanyard configuration, Boyd bolts, an integrated fuel transfer tool, UHT's, back support structure and power cable reel, tool stowage bracketry on the Subpallet, tool stowage sockets near the carry handles on Packages No. 1 and No. 2, and a carry socket on the Subpallet.
10. The times in hours, minutes and seconds are based on part-task tests conducted with previous crew engineering mockups. A whole-task sequence deployment of ALSEP using the Interim Trainer was performed to validate the time to deploy this latest ALSEP configuration by one man.

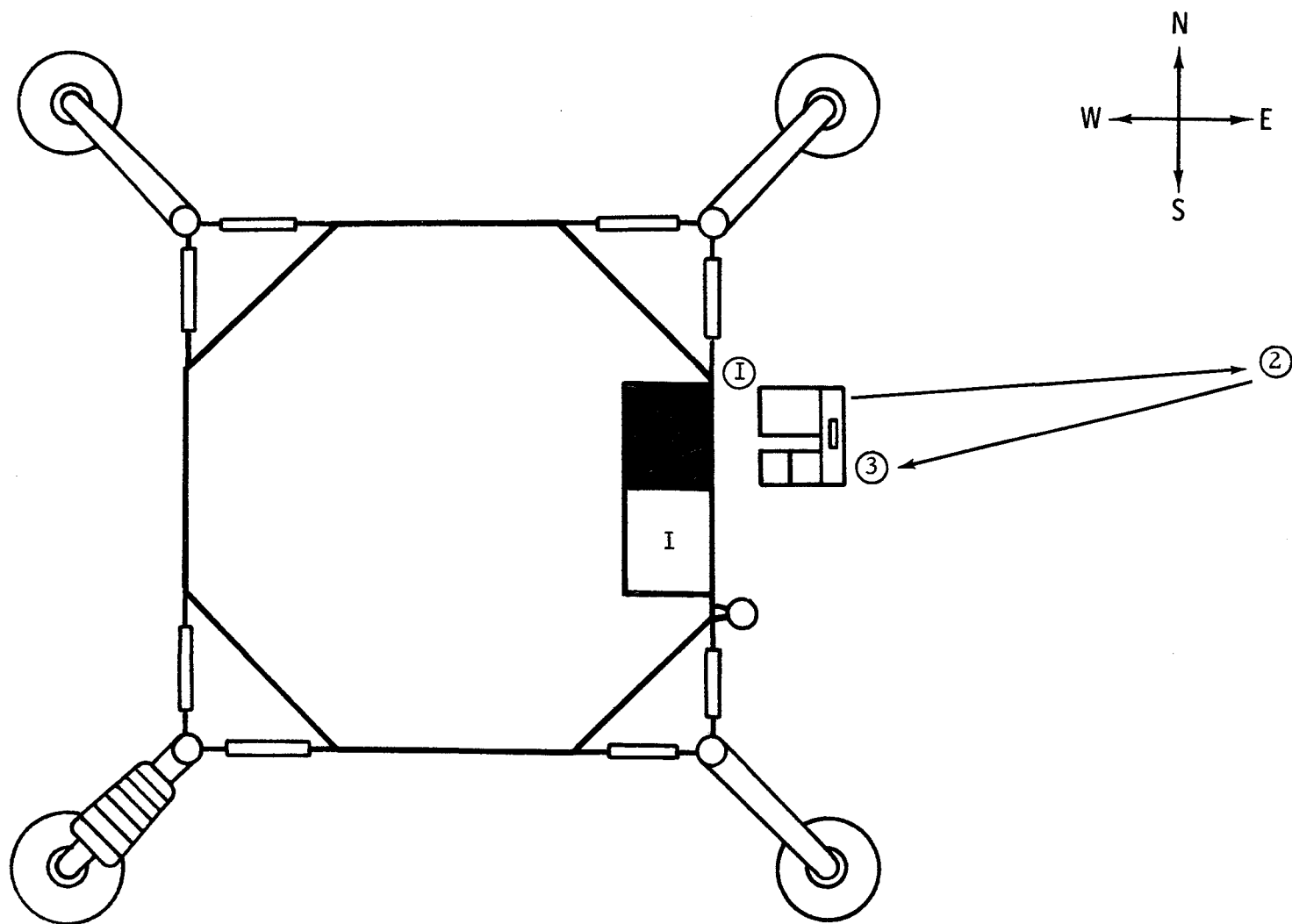
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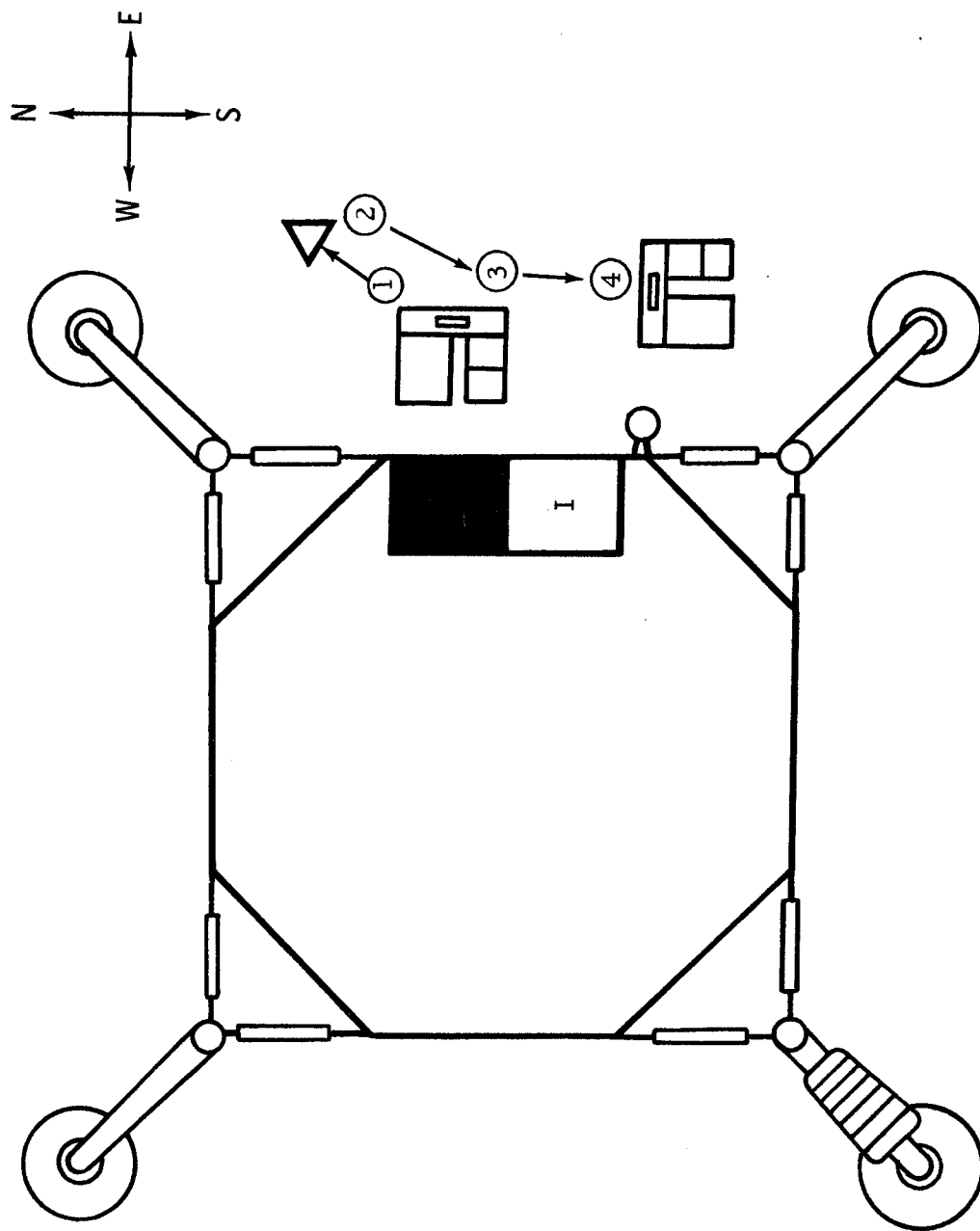
Configuration Before ALSEP Deployment

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
1.0	REMOVE PACKAGE NO. 2 (Total Time = 1:48)						
1.1	Pull "right pin" removal lanyard.	00:00:05	00:00:05				
1.2	Retrieve Package No. 2 deployment lanyards.	00:00:20	00:00:25				
1.3	Walk 10 feet from LM.	00:00:10	00:00:35				
1.4	Pull boom/Package No. 2 out of SEQ Bay.	00:00:15	00:00:50				
1.5	Lower Package No. 2 to lunar surface.	00:00:20	00:01:10				
1.6	Walk to Package No. 2.	00:00:08	00:01:18				
1.7	Pull pin to separate Package No. 2 from boom attachment assembly.	00:00:05	00:01:23				
1.8	Restow boom.	00:00:25	00:01:48				



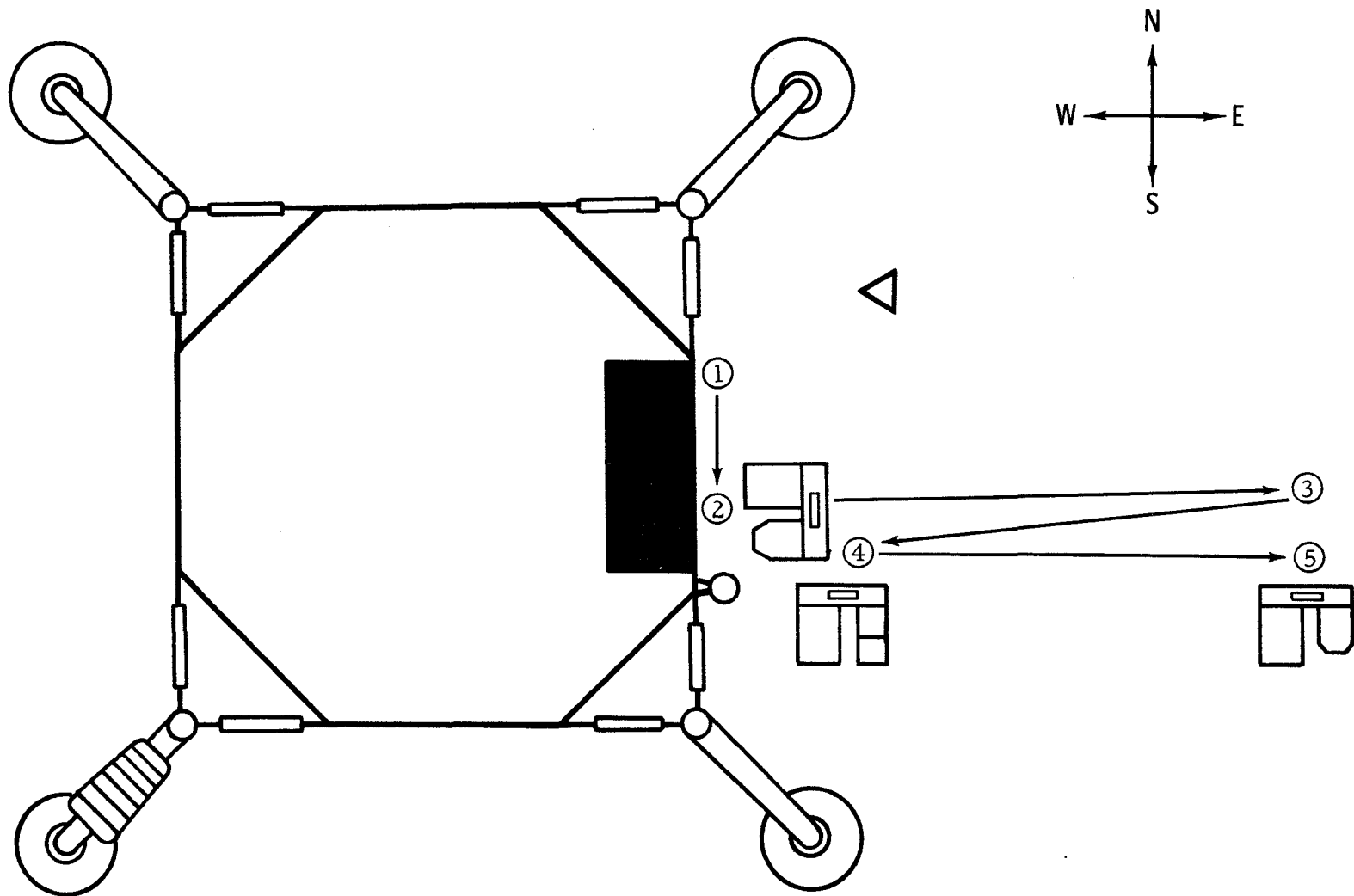
Task No. 1—Remove Package No. 2

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
2.0	REMOVE ALHT (Total Time = 0:40)						
2.1	Remove two ALHT-restraining pull pins and discard.	00:00:08	00:01:56				
2.2	Release two quarter-turn fasteners.	00:00:06	00:02:02				
2.3	Grasp ALHT, push to stop position, and then lift upward to remove ALHT from Package No. 2.	00:00:06	00:02:08				
2.4	Expand ALHT and lower to lunar surface.	00:00:10	00:02:18				
2.5	Lift Package No. 2, carry to a point next to astronaut protection door, and lower to lunar surface.	00:00:10	00:02:28				



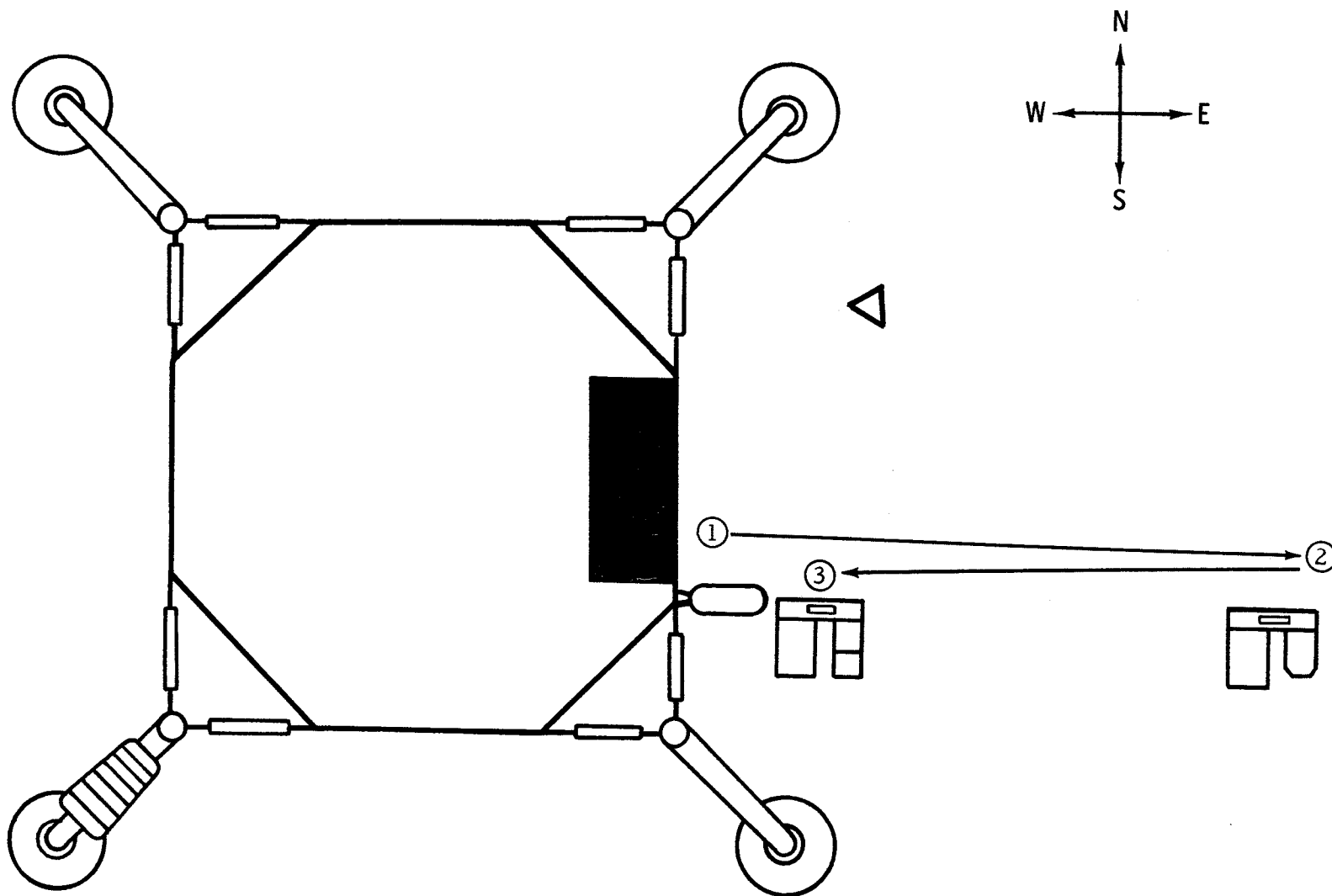
Task No. 2—Remove ALHT

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
3.0	REMOVE PACKAGE NO. 1 (Total Time = 2:13)						
3.1	Approach SEQ Bay Compartment II and pull "left pin" removal lanyard.	00:00:10	00:02:38				
3.2	Walk to SEQ Bay Compartment I.	00:00:05	00:02:43				
3.3	Retrieve Package No. 1 deployment lanyards.	00:00:20	00:03:03				
3.4	Walk 10 feet from LM.	00:00:10	00:03:13				
3.5	Pull boom/Package No. 1 out of SEQ Bay.	00:00:15	00:03:28				
3.6	Lower Package No. 1 to lunar surface.	00:00:20	00:03:48				
3.7	Walk to Package No. 1.	00:00:08	00:03:56				
3.8	Pull pin to separate Package No. 1 from boom attachment assembly.	00:00:05	00:04:01				
3.9	Restow boom.	00:00:25	00:04:26				
3.10	Lift Package No. 1, carry to a point near Package No. 2, and lower to lunar surface.	00:00:10	00:04:36				
3.11	Walk to astronaut protection door.	00:00:05	00:04:41				



Task No. 3—Remove Package No. 1

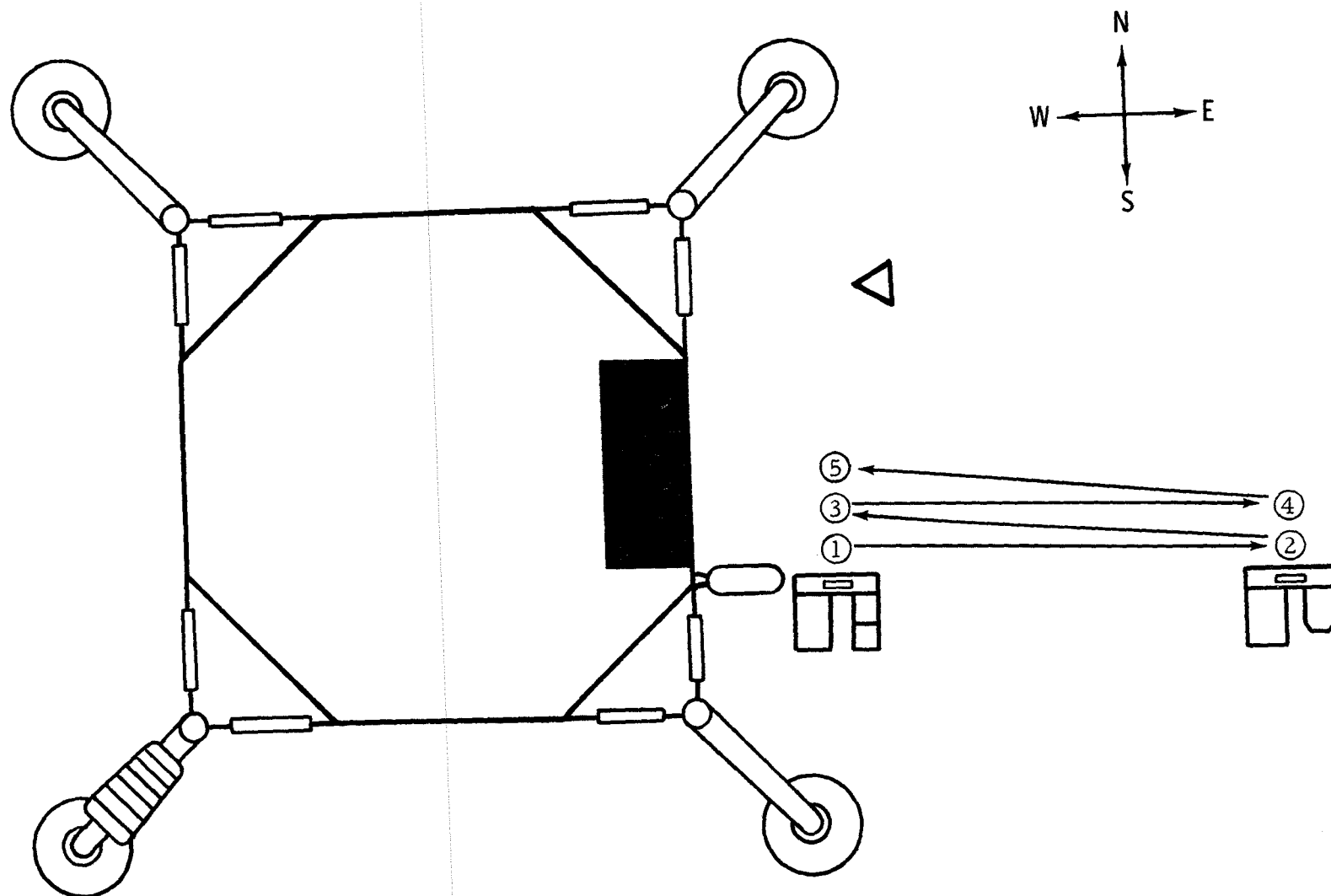
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
4.0	POSITION CASK FOR FUEL TRANSFER (Total Time = 0:58)						
4.1	Retrieve cask lanyard.	00:00:08	00:04:49				
4.2	Walk 13 feet from LM.	00:00:13	00:05:02				
4.3	Pull trunnion pins and spline.	00:00:15	00:05:17				
4.4	Continue pulling cask lanyard until cask is tilted to correct fuel transfer attitude.	00:00:10	00:05:27				
4.5	Discard cask lanyard.	00:00:02	00:05:29				
4.6	Walk to Package No. 2.	00:00:10	00:05:39				



Task No. 4—Position Cask For Fuel Transfer

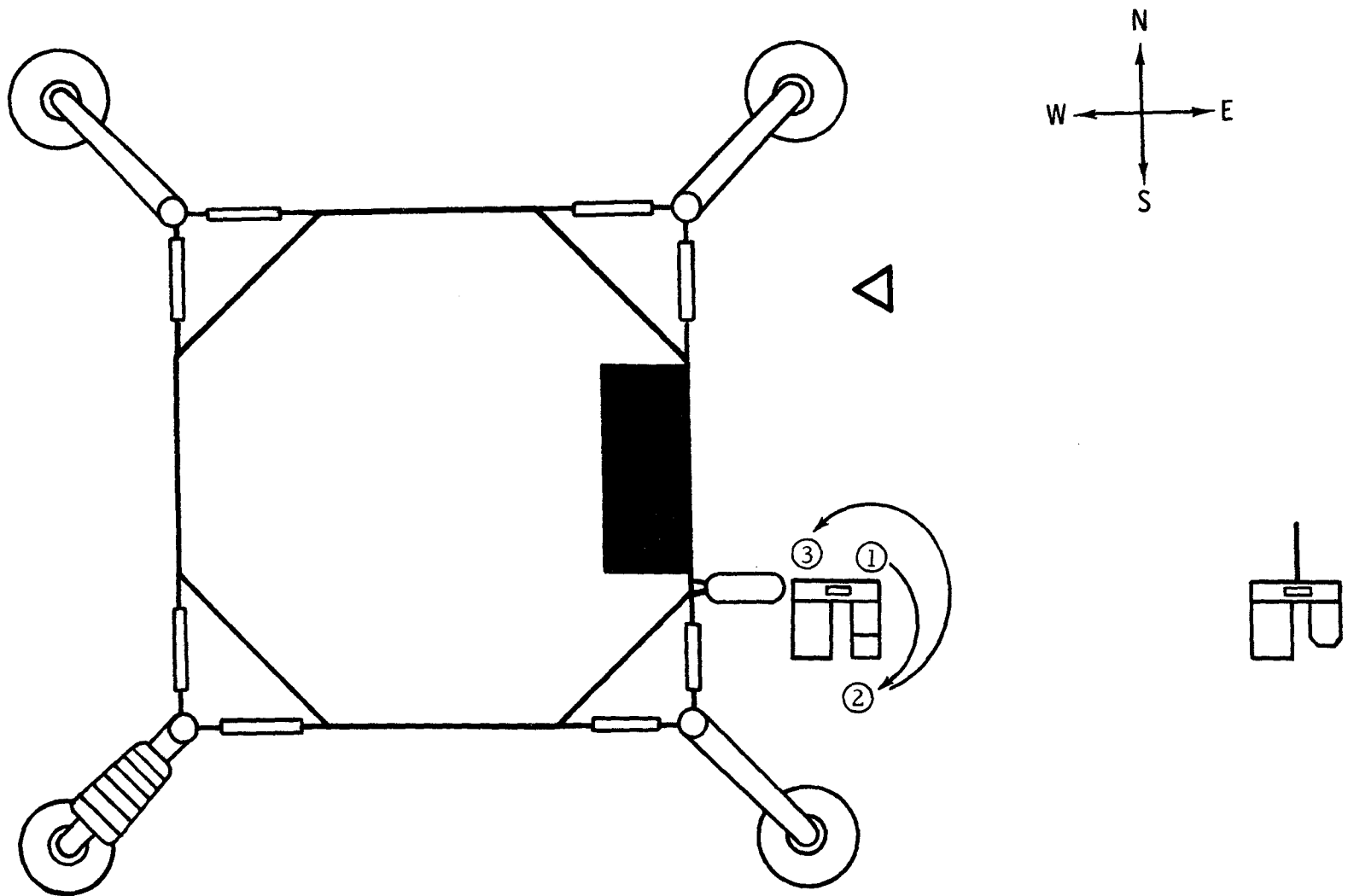
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
5.0	REMOVE AND DEPLOY TOOLS AND ANTENNA MAST SECTIONS (Total Time = 1:32)						
5.1	Remove four tool-restraining pull pins and discard.	00:00:20	00:05:59				
5.2	Remove first Universal Handling Tool (UHT).	00:00:05	00:06:04				
5.3	Engage UHT in Package No. 2 temporary stowage fitting.	00:00:05	00:06:09				
5.4	Remove second UHT.	00:00:05	00:06:14				
5.5	Walk to Package No. 1.	00:00:05	00:06:19				
5.6	Engage UHT in Package No. 1 temporary stowage fitting.	00:00:05	00:06:24				
5.7	Return to Package No. 2.	00:00:05	00:06:29				
5.8	Remove tool bracket assembly and discard.	00:00:05	00:06:34				
5.9	Remove first antenna mast/carry bar section.	00:00:05	00:06:39				
5.10	Remove second antenna mast/carry bar section.	00:00:07	00:06:46				
5.11	Mate two antenna mast/carry bar sections.	00:00:05	00:06:51				

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
5.12	Walk to Package No. 1.	00:00:05	00:06:56				
5.13	Install carry bar in fitting on Package No. 1.	00:00:10	00:07:06				
5.14	Return to Package No. 2.	00:00:05	00:07:11				



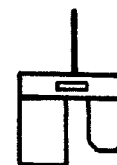
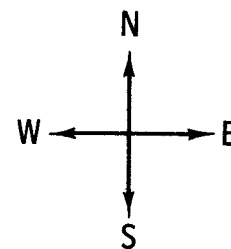
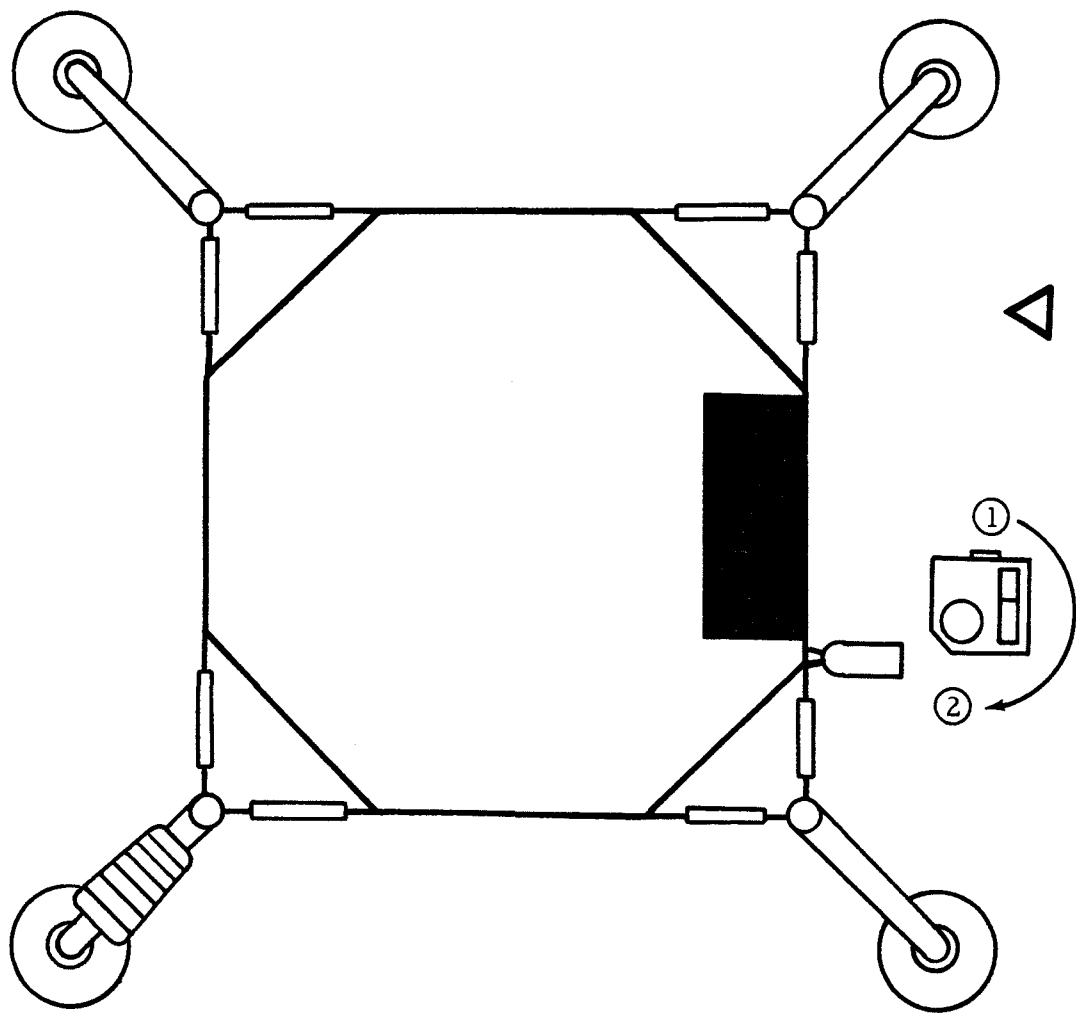
Task No. 5—Remove and Deploy Tools and Antenna Mast Sections

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
6.0	PREPARE CASK FOR FUEL TRANSFER (Total Time = 0:50)						
6.1	Remove Dome Removal Tool (DRT).	00:00:05	00:07:16				
6.2	Walk to fuel cask.	00:00:05	00:07:21				
6.3	Mate DRT with dome locking mechanism.	00:00:10	00:07:31				
6.4	Press inward on DRT and rotate dome locking mechanism 90° counterclockwise.	00:00:05	00:07:36				
6.5	Pull outward on DRT and rotate dome 60° clockwise.	00:00:10	00:07:46				
6.6	Remove dome and discard DRT/ dome.	00:00:10	00:07:56				
6.7	Return to Package No. 2.	00:00:05	00:08:01				



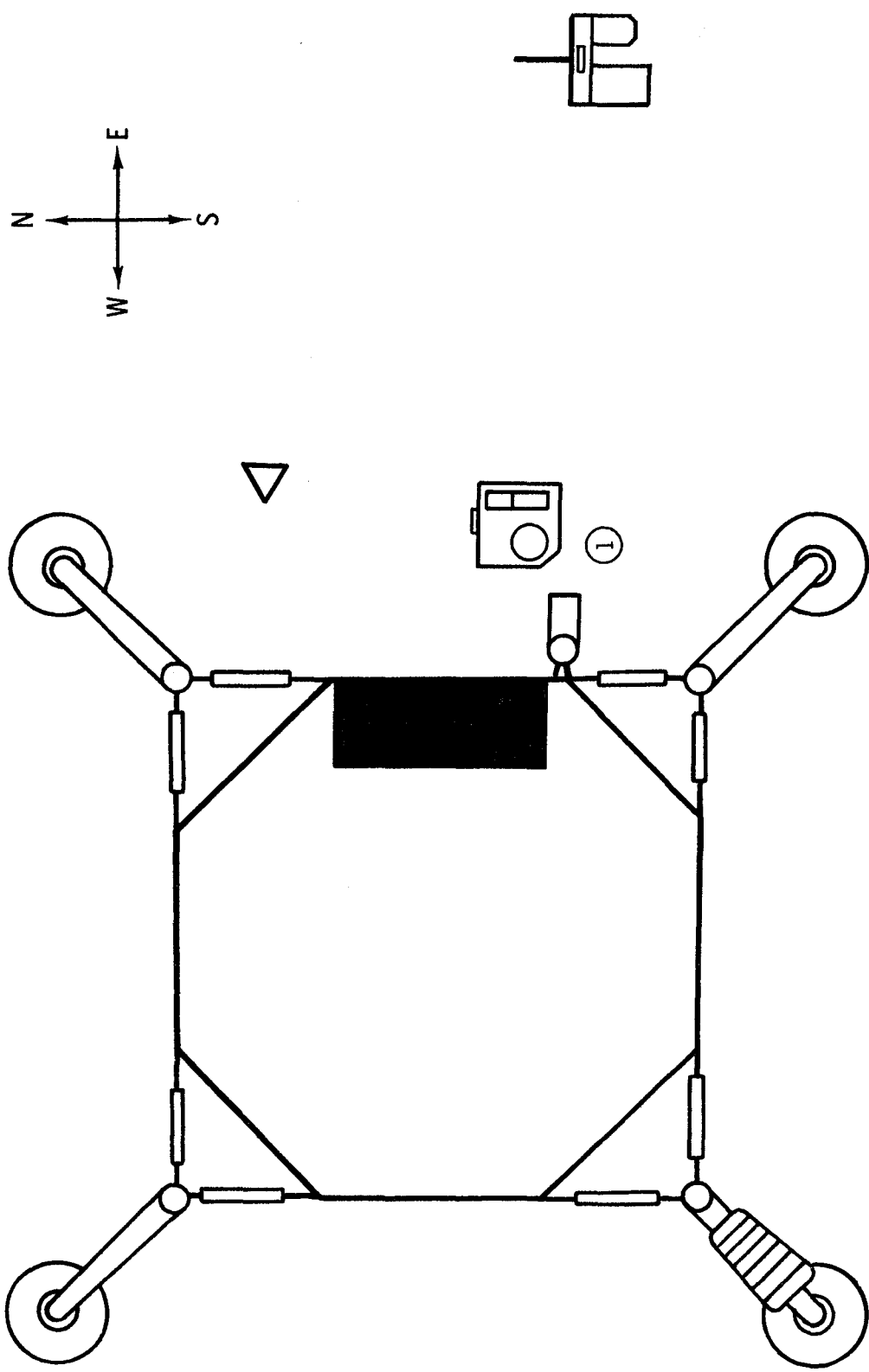
Task No. 6—Prepare Cask for Fuel Transfer

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
7.0	PREPARE PACKAGE NO. 2 FOR FUEL TRANSFER (Total Time = 0:20)						
7.1	Remove Fuel Transfer Tool (FTT).	00:00:10	00:08:11				
7.2	Use stowed UHT as a handle to rotate Package No. 2 to the fueling position.	00:00:05	00:08:16				
7.3	Walk to fuel cask.	00:00:05	00:08:21				



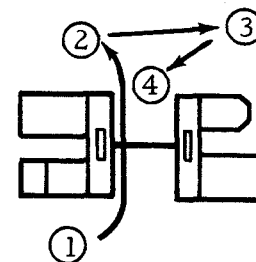
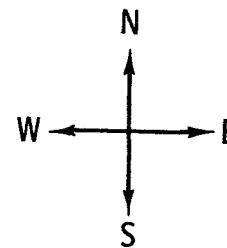
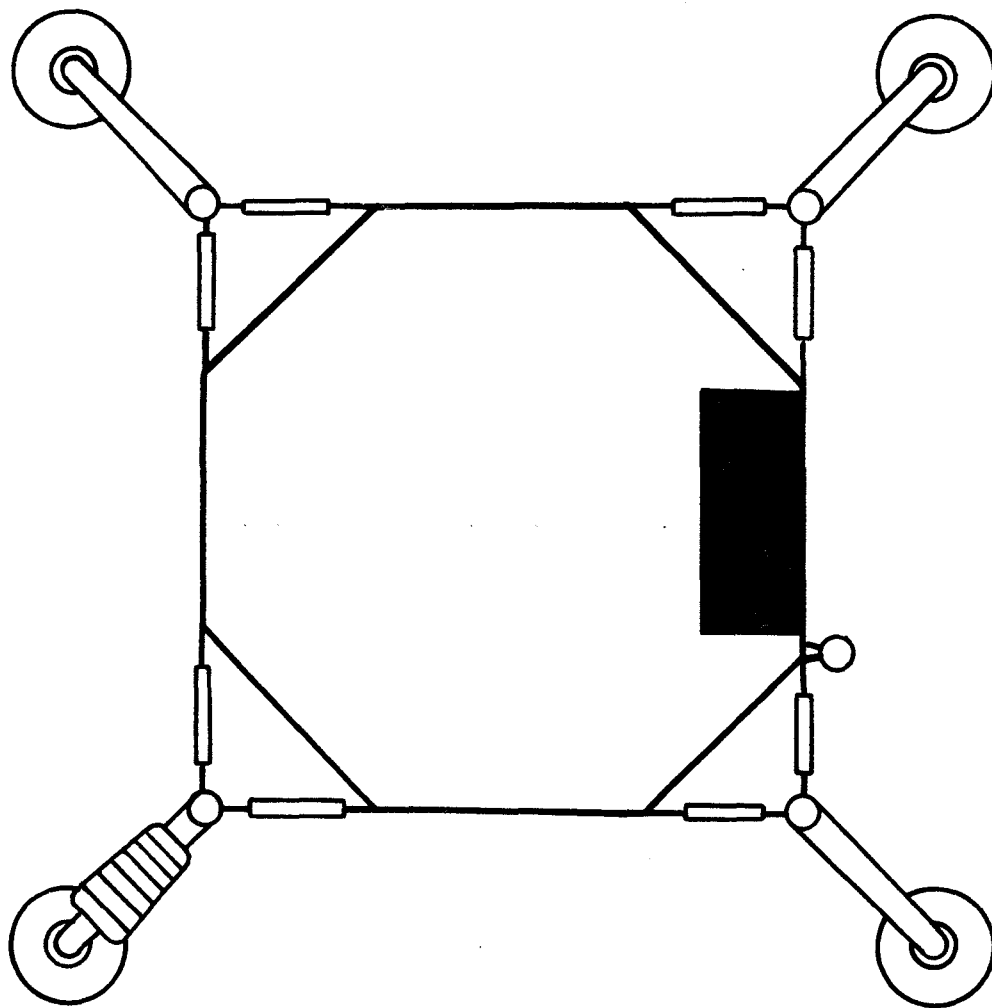
Task No. 7—Prepare Package No. 2 for Fuel Tranfer

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
8.0	TRANSFER FUEL CAPSULE (Total Time = 1:07)						
8.1	Insert FTT fingers into fuel capsule head.	00:00:15	00:08:36				
8.2	Engage FTT fingers in fuel capsule head by rotating knob clockwise.	00:00:15	00:08:51				
8.3	Withdraw fuel capsule from fuel cask.	00:00:10	00:09:01				
8.4	Turn to Package No. 2.	00:00:05	00:09:06				
8.5	Lower fuel capsule into Radio-isotope Thermoelectric Generator (RTG).	00:00:05	00:09:11				
8.6	<u>Report RTG fueled.</u>	00:00:02	00:09:13				
8.7	Disengage FTT fingers from fuel capsule head by counter-rotation of knob.	00:00:10	00:09:23				
8.8	Discard FTT.	00:00:05	00:09:28				



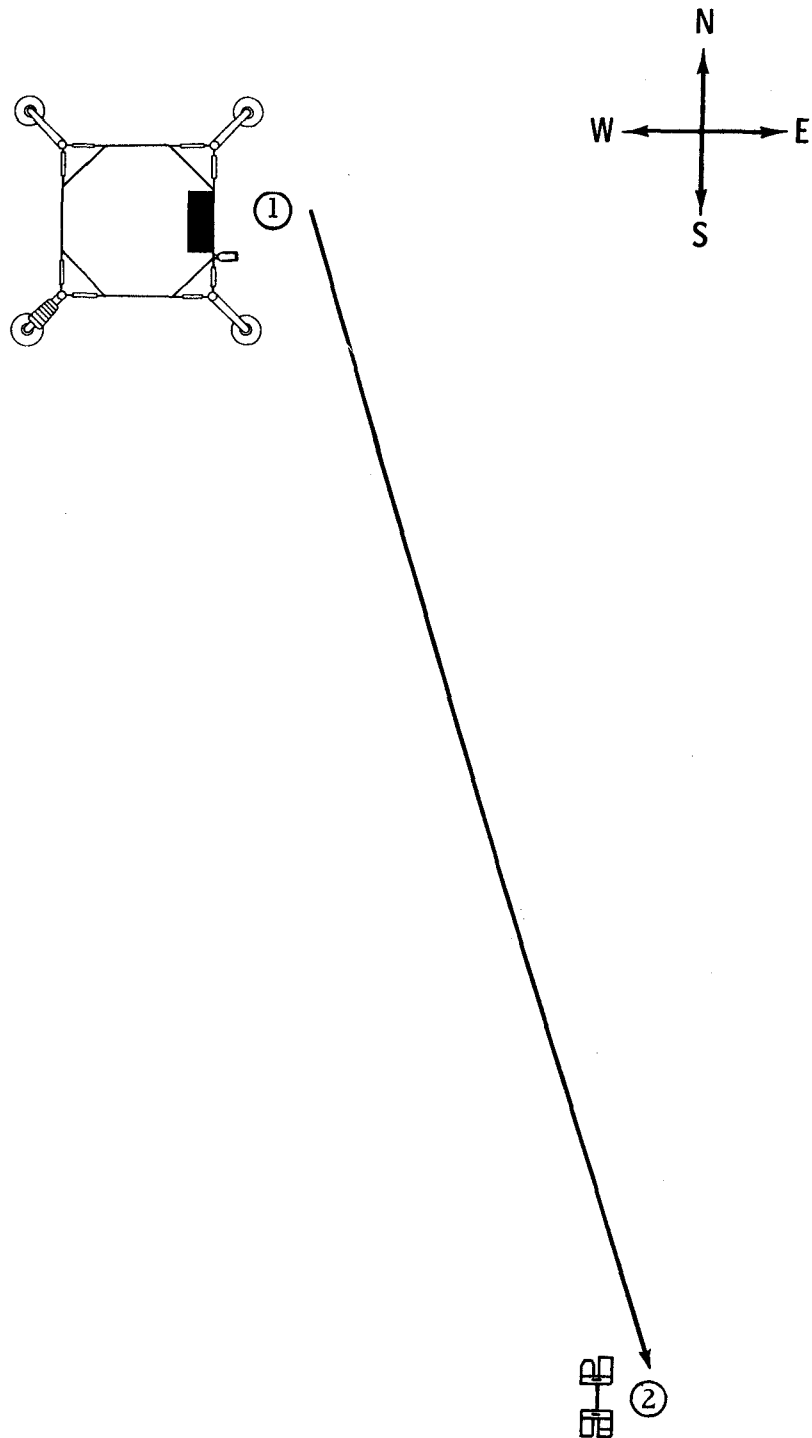
Task No. 8—Transfer Fuel Capsule

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
9.0	PREPARE FOR TRAVERSE (Total Time = 0:40)						
9.1	Walk to other side of Package No. 2	00:00:05	00:09:33				
9.2	Use stowed UHT as a handle to rotate and re-orient Package No. 2 to the carrying position.	00:00:10	00:09:43				
9.3	Walk to Package No. 1.	00:00:05	00:09:48				
9.4	Reposition Package No. 1.	00:00:10	00:09:58				
9.5	Install carry bar in fitting on Package No. 2.	00:00:10	00:10:08				



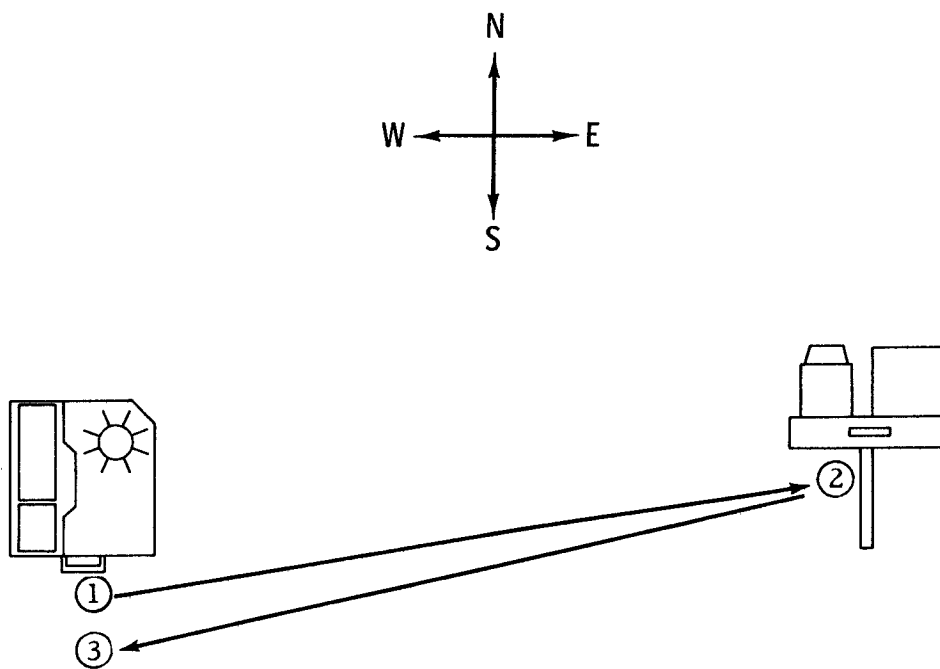
Task No. 9—Prepare For Traverse

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
10.0	TRAVERSE TO DEPLOYMENT SITE (Total Time = 9:45)						
10.1	Use carry bar to lift ALSEP packages, walk 300 feet from LM to deployment site, and lower ALSEP to lunar surface on N-S axis.*	00:09:45	00:19:53				
*NOTE: Rest time of 4:00 is provided within 9:45 total sequence time.							



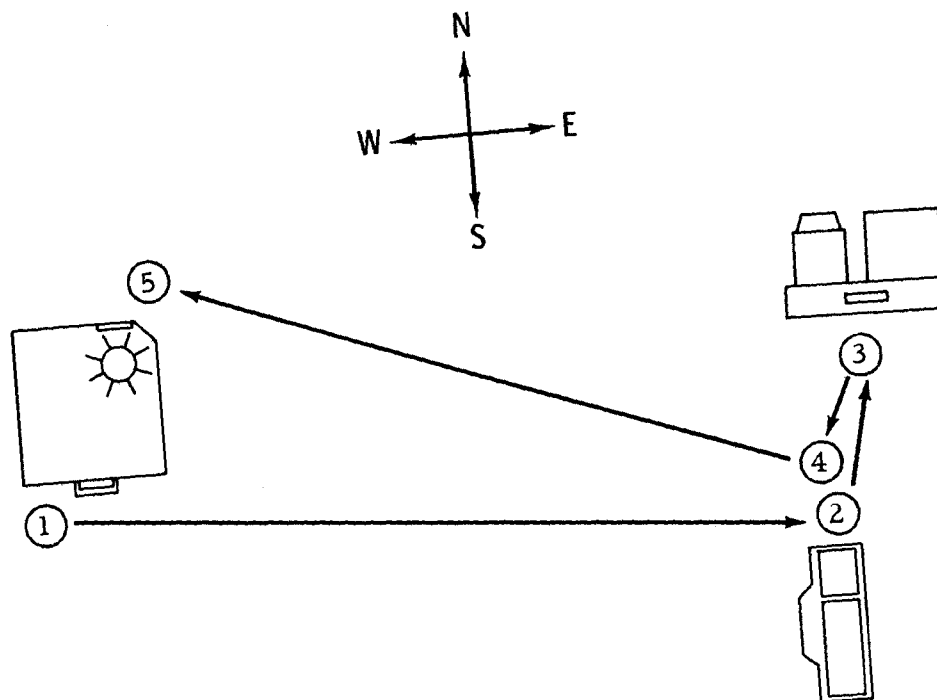
Task No. 10—Traverse to Deployment Site

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
11.0	EMPLACE PACKAGE NO. 2 (Total Time = 0:45)						
11.1	Disengage carry bar from Package No. 2.	00:00:10	00:20:03				
11.2	Lift Package No. 1 and emplace 10 feet east of Package No. 2 on E-W axis.	00:00:15	00:20:18				
11.3	Return to Package No. 2.	00:00:10	00:20:28				
11.4	Use stowed UHT as a handle to rotate Package No. 2 to the deployed position and align on E-W axis.	00:00:10	00:20:38				



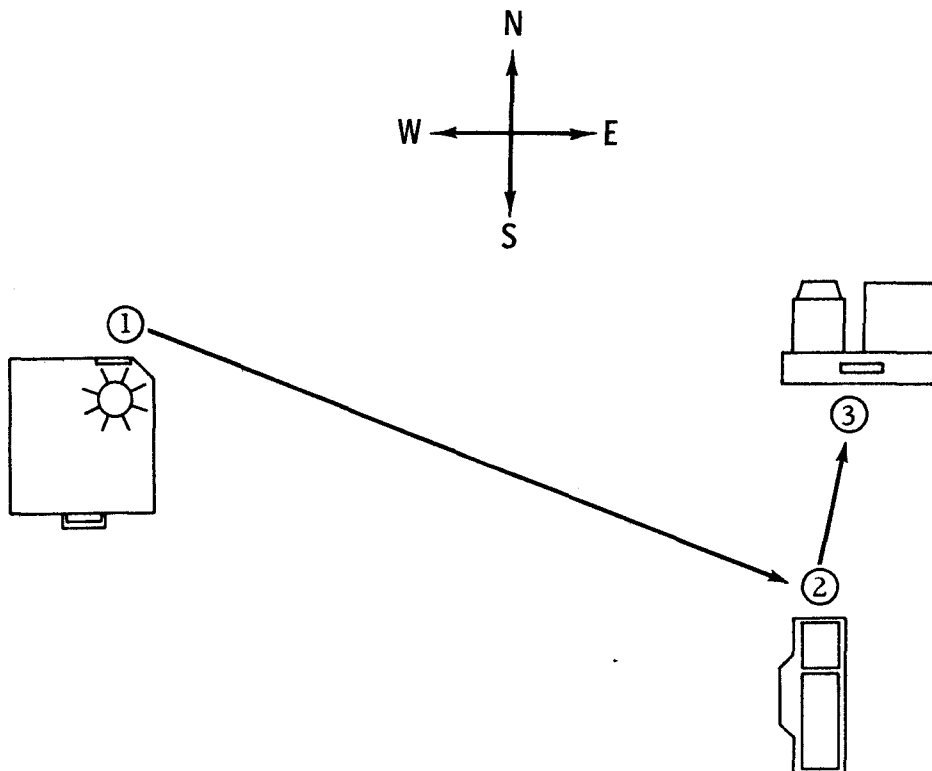
Task No. 11—Emplace Package No. 2

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
12.0	REMOVE SUBPALLET (Total Time = 1:04)						
12.1	Disengage UHT from temporary stowage fitting.	00:00:05	00:20:43				
12.2	Use UHT to release two Boyd bolts on Subpallet.	00:00:12	00:20:55				
12.3	Engage UHT in Subpallet carry socket.	00:00:05	00:21:00				
12.4	Use UHT to remove Subpallet from Package No. 2, walk to the southwest corner of Package No. 1, and lower Subpallet to lunar surface.	00:00:15	00:21:15				
12.5	Walk to Package No. 1.	00:00:02	00:21:17				
12.6	Disengage carry bar from Package No. 1.	00:00:05	00:21:22				
12.7	Walk to Subpallet.	00:00:02	00:21:24				
12.8	Disengage UHT from Subpallet.	00:00:05	00:21:29				
12.9	Stow antenna mast/carry bar on Subpallet temporary stowage fitting.	00:00:05	00:21:34				
12.10	Return to Package No. 2.	00:00:08	00:21:42				



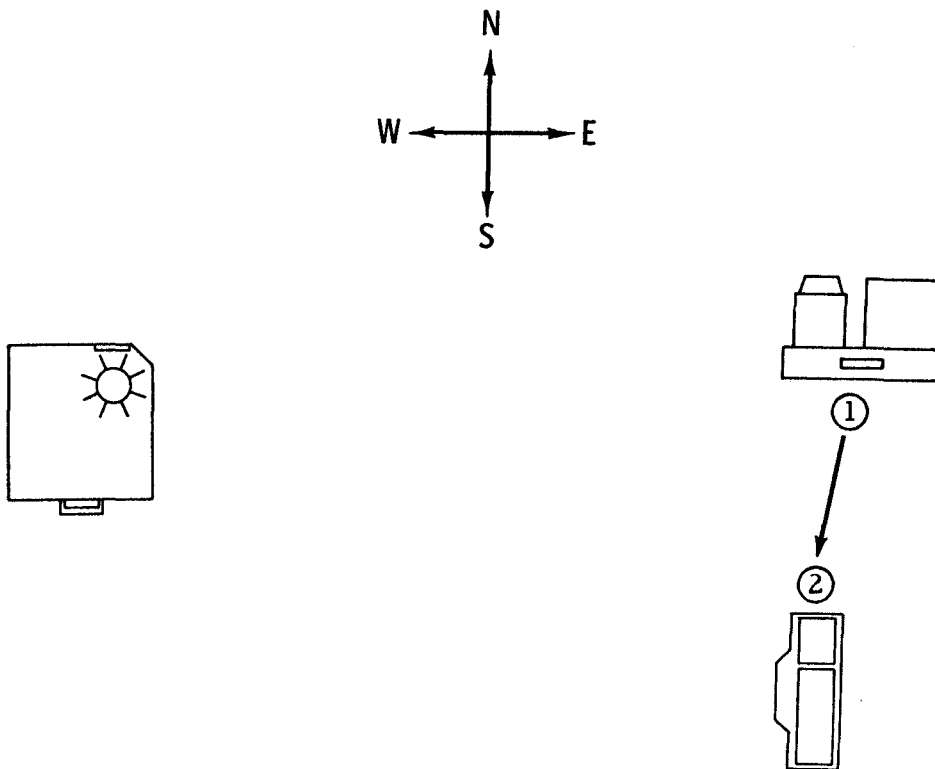
Task No. 12—Remove Subpallet

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
13.0	GAIN ACCESS TO POWER CABLE (Total Time = 0:52)						
13.1	Use UHT to release three Boyd bolts on RTG cable reel.	00:00:18	00:22:00				
13.2	Engage UHT in RTG cable reel carry socket.	00:00:05	00:22:05				
13.3	Use UHT to remove RTG cable reel from Package No. 2 and walk to Subpallet, deploying power cable.	00:00:10	00:22:15				
13.4	Remove pull pin and discard.	00:00:05	00:22:20				
13.5	Grasp shorting switch assembly.	00:00:02	00:22:22				
13.6	Disengage UHT from RTG cable reel and discard cable reel.	00:00:05	00:22:27				
13.7	Engage UHT in SIDE/CCIG carry socket.	00:00:05	00:22:32				
13.8	Walk to Package No. 1.	00:00:02	00:22:34				



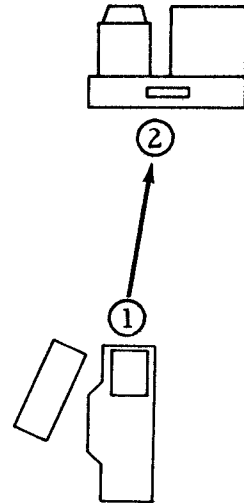
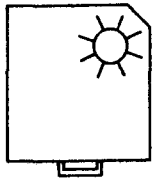
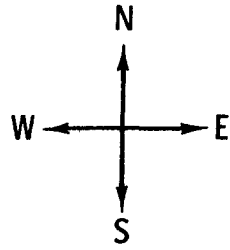
Task No. 13—Gain Access to Power Cable

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
14.0	INTERCONNECT RTG TO CENTRAL STATION (Total Time = 0:18)						
14.1	<u>Report ammeter reading and preparation for plug-in.</u>	00:00:05	00:22:39				
14.2	Remove shorting switch assembly dust cover and discard.	00:00:03	00:22:42				
14.3	Remove Central Station connector dust cover and discard.	00:00:03	00:22:45				
14.4	Mate power cable to Central Station.	00:00:05	00:22:50				
14.5	Return to Subpallet.	00:00:02	00:22:52				



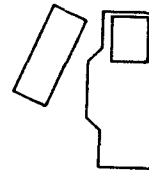
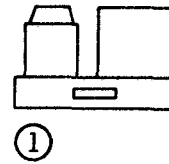
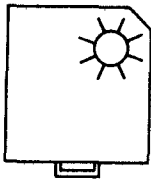
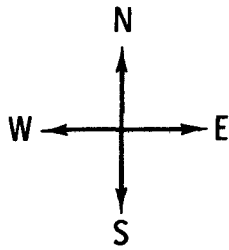
Task No. 14 --Interconnect RTG to Central Station

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
15.0	OFFLOAD SIDE/CCIG (Total Time = 0:57)						
15.1	Disengage UHT from SIDE/CCIG.	00:00:05	00:22:57				
15.2	Use UHT to release four Boyd bolts on SIDE/CCIG.	00:00:24	00:23:21				
15.3	Use UHT to release Deutsch fastener on CCIG retention bracket.	00:00:06	00:23:27				
15.4	Use UHT to remove pull pin on SIDE/CCIG cable cradle and discard pull pin.	00:00:06	00:23:33				
15.5	Engage UHT in SIDE/CCIG carry socket.	00:00:05	00:23:38				
15.6	Use UHT to remove SIDE/CCIG from Subpallet.	00:00:02	00:23:40				
15.7	Pull SIDE/CCIG connector to separate it from SIDE/CCIG, deploy cable, and to pull leg release pin.	00:00:05	00:23:45				
15.8	Lower SIDE/CCIG to lunar surface.	00:00:02	00:23:47				
15.9	Walk to Package No. 1.	00:00:02	00:23:49				



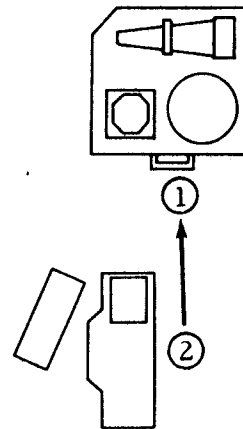
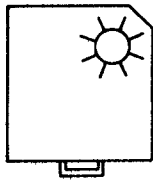
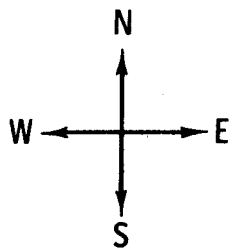
Task No. 15—Offload Side/CCIG

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
16.0	INTERCONNECT SIDE/CCIG TO CENTRAL STATION (Total Time = 0:18)						
16.1	Remove SIDE/CCIG connector dust cover and discard.	00:00:03	00:23:52				
16.2	Remove Central Station connector dust cover and discard.	00:00:03	00:23:55				
16.3	Mate SIDE/CCIG cable to Central Station.	00:00:05	00:24:00				
16.4	Actuate shorting switch assembly pushbutton.	00:00:05	00:24:05				
16.5	<u>Report opening of shorting switch.</u>	00:00:02	00:24:07				



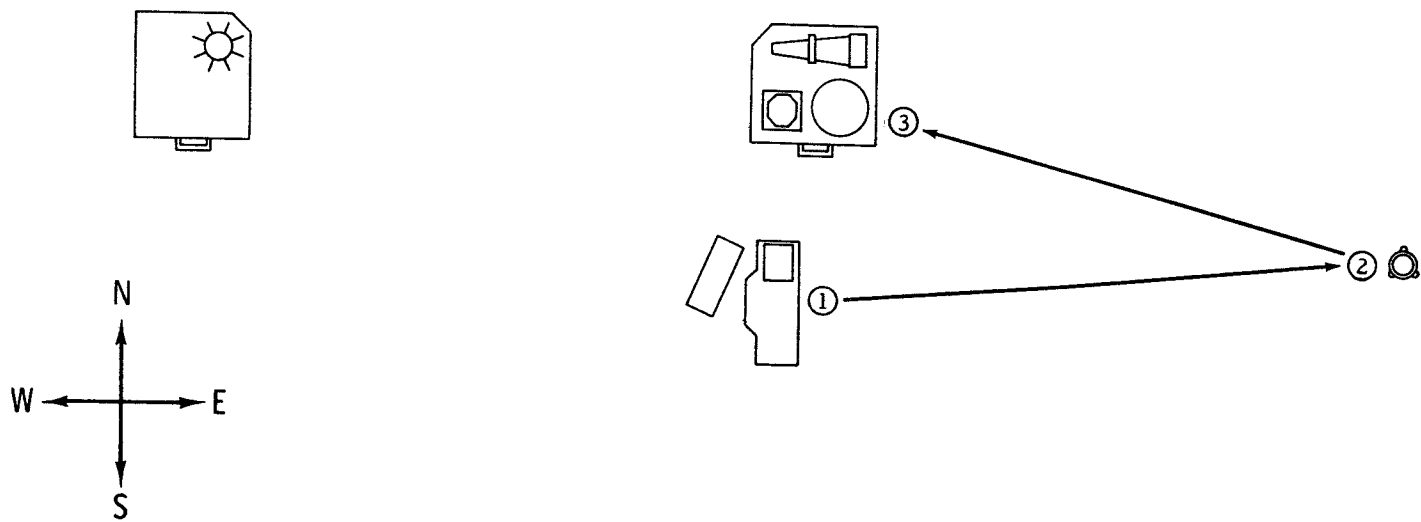
Task No. 16—Interconnect Side/CCIG to Central Station

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
17.0	EMPLACE PACKAGE NO. 1 (Total Time = 0:12)						
17.1	Use stowed UHT as a handle to rotate Package No. 1 to the deployed position and align on E-W axis.	00:00:10	00:24:17				
17.2	Walk to Subpallet.	00:00:02	00:24:19				



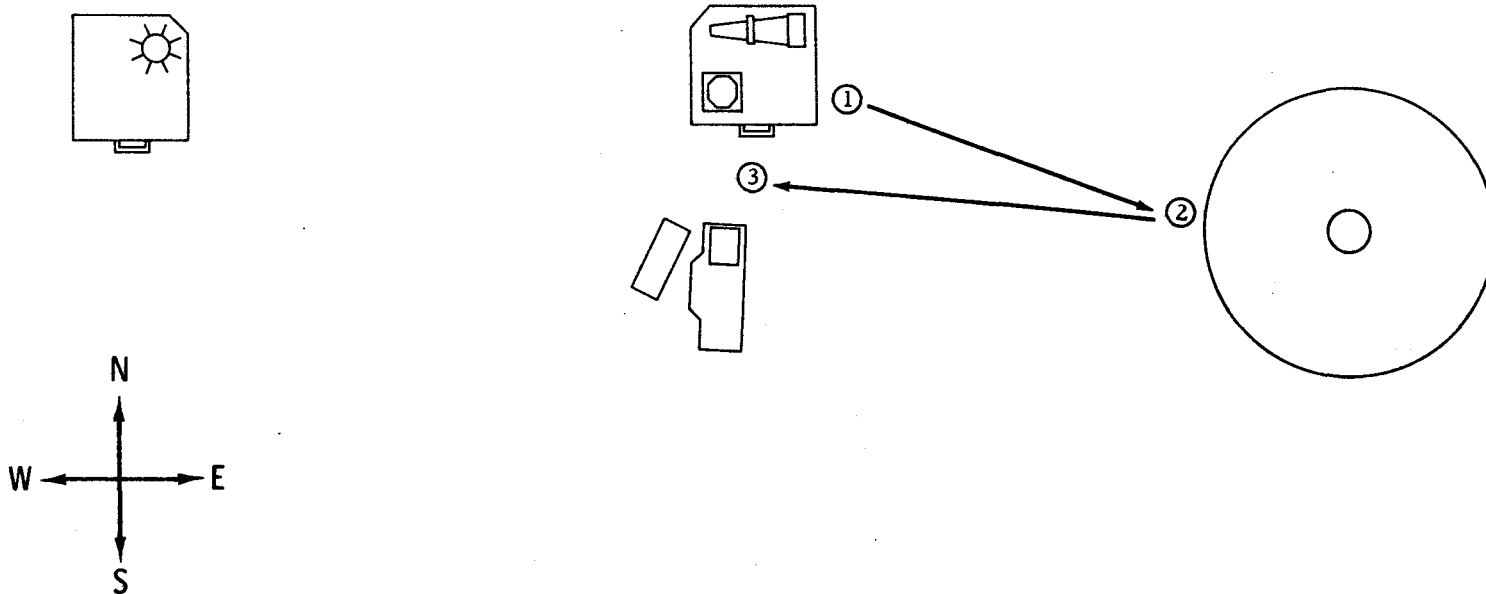
Task No. 17—Emplace Package No. 1

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
18.0	REMOVE AND DEPLOY PSE LEVELING STOOL (Total Time = 0:50)						
18.1	Disengage UHT from SIDE/CCIG.	00:00:05	00:24:24				
18.2	Use UHT to remove pull pin on PSE leveling stool and discard pull pin.	00:00:10	00:24:34				
18.3	Engage UHT in PSE leveling stool socket.	00:00:05	00:24:39				
18.4	Use UHT to remove PSE leveling stool from Subpallet, walk 10 feet east of Central Station, and lower leveling stool to lunar surface.	00:00:15	00:24:54				
18.5	Disengage UHT from PSE leveling stool.	00:00:05	00:24:59				
18.6	Return to Central Station.	00:00:10	00:25:09				



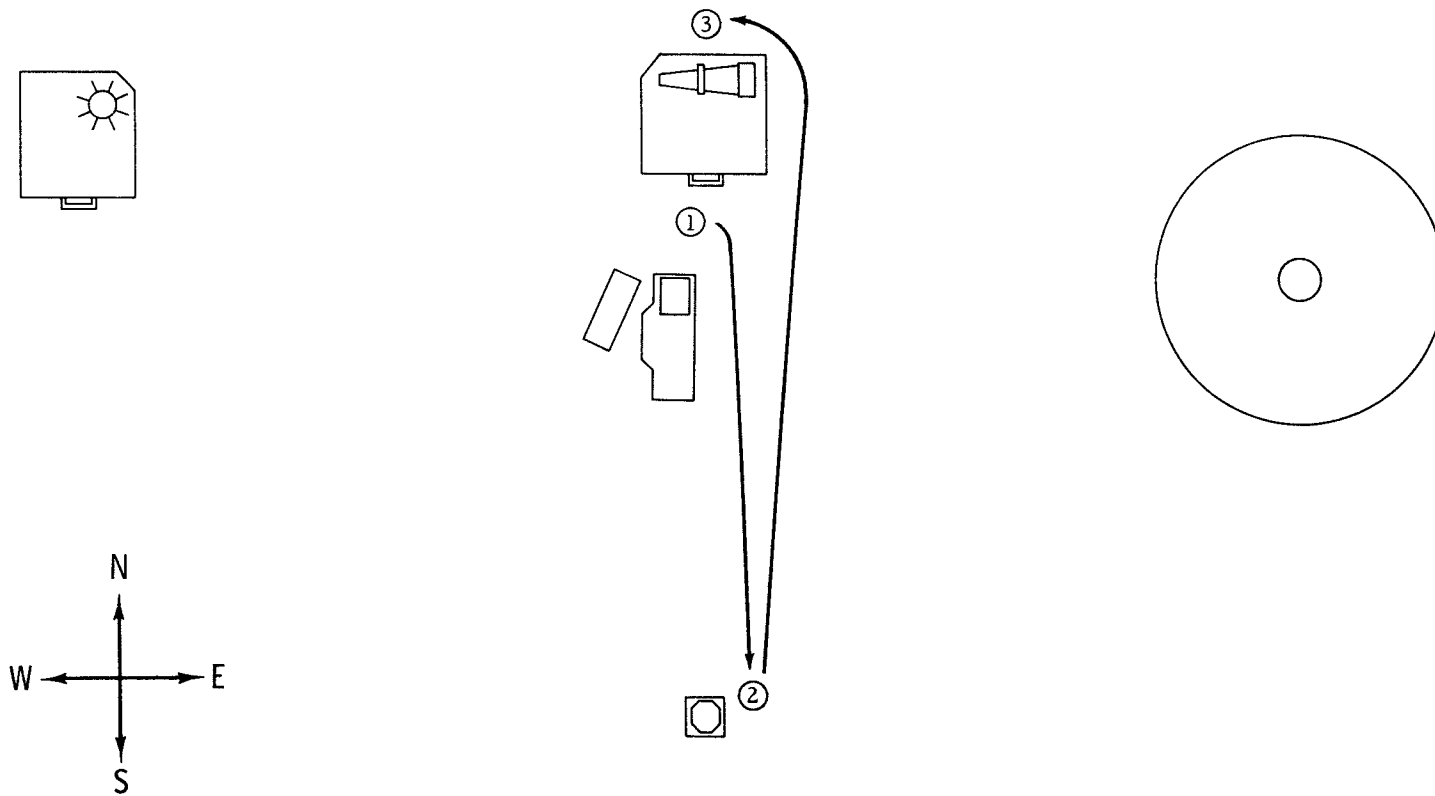
Task No. 18—Remove and Deploy PSE Leveling Stool

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
19.0	REMOVE AND DEPLOY PSE (Total Time = 2:11)						
19.1	Use UHT to release four Boyd bolts on PSE.	00:00:24	00:25:33				
19.2	Engage UHT in PSE carry socket.	00:00:05	00:25:38				
19.3	Use UHT to remove PSE from sunshield and carry PSE to leveling stool.	00:00:12	00:25:50				
19.4	Remove PSE girdle and discard.	00:00:05	00:25:55				
19.5	Emplace PSE on leveling stool.	00:00:05	00:26:00				
19.6	Disengage UHT from PSE.	00:00:05	00:26:05				
19.7	Use UHT to deploy thermal shroud.	00:00:45	00:26:50				
19.8	Use UHT to level PSE.	00:00:15	00:27:05				
19.9	<u>Report alignment.</u>	00:00:05	00:27:10				
19.10	Return to Central Station.	00:00:10	00:27:20				



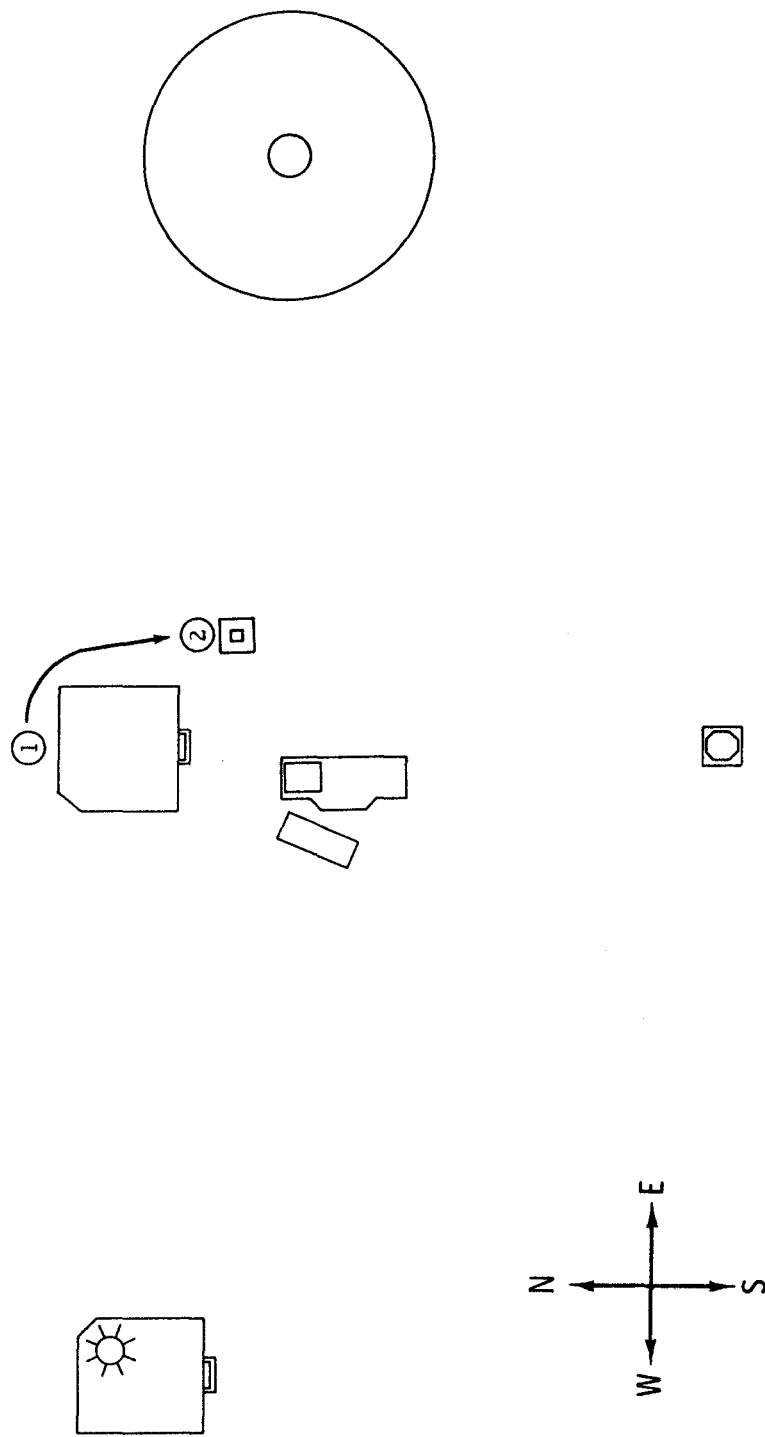
Task No. 19—Remove and Deploy PSE

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
20.0	REMOVE AND DEPLOY SWS (Total Time = 1:34)						
20.1	Use UHT to release four Boyd bolts on SWS.	00:00:24	00:27:44				
20.2	Engage UHT in SWS carry socket.	00:00:05	00:27:49				
20.3	Use UHT to remove SWS from sunshield and carry SWS 13 feet south of Central Station.	00:00:15	00:28:04				
20.4	Extend four leveling legs.	00:00:15	00:28:19				
20.5	Emplace SWS on lunar surface and align by observing shadow cast on sensor head.	00:00:15	00:28:34				
20.6	Disengage UHT from SWS.	00:00:05	00:28:39				
20.7	Return to Central Station.	00:00:15	00:28:54				



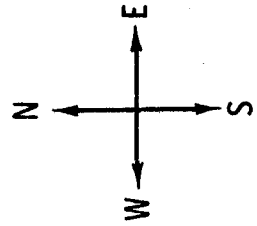
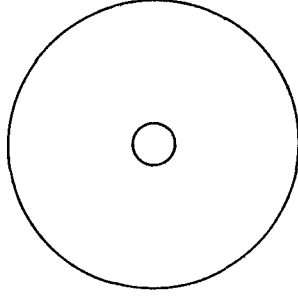
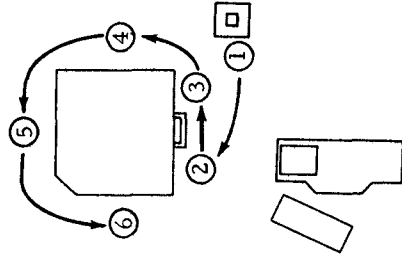
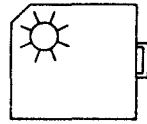
Task No. 20—Remove and Deploy SWSE

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
21.0	OFFLOAD LSM (Total Time = 0:54)						
21.1	Use UHT to release two Boyd bolts on LSM.	00:00:12	00:29:06				
21.2	Stow UHT in center guide cup.	00:00:02	00:29:08				
21.3	Pull handle of upper support bracket fully upward, and then forward.	00:00:05	00:29:13				
21.4	Continue to lift upper support bracket/brace assembly clear of LSM and discard.	00:00:05	00:29:18				
21.5	Grasp lift-off handle, pull fully upward, and remove LSM from sunshield.	00:00:15	00:29:33				
21.6	Grasp carry handle and rotate LSM to the vertical position.	00:00:05	00:29:38				
21.7	Grasp handle of lower part of upper support bracket, pull free of LSM, and discard.	00:00:05	00:29:43				
21.8	Walk to southeast side of Central Station and lower LSM to lunar surface.	00:00:05	00:29:48				



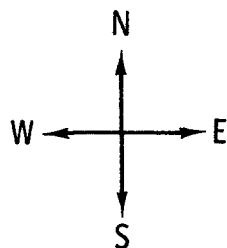
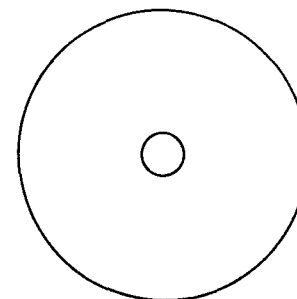
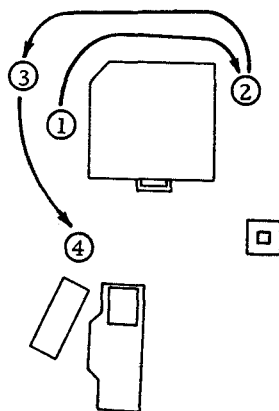
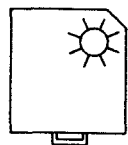
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
22.0	RELEASE SUNSHIELD BOYD BOLTS (Total Time = 2:25)						
22.1	Walk to southwest side of Central Station and retrieve UHT from center guide cup.	00:00:04	00:29:52				
22.2	Use UHT to release Boyd bolt on SIDE/CCIG connector.	00:00:04	00:29:56				
22.3	Use UHT to release five Boyd bolts on south side of Central Station.	00:00:30	00:30:26				
22.4	Use UHT to release four Boyd bolts on east side of Central Station.	00:00:24	00:30:50				
22.5	Use UHT to release four Boyd bolts on north side of Central Station.	00:00:24	00:31:14				
22.6	Use UHT to release antenna cable restraint and deploy cable.	00:00:08	00:31:22				
22.7	Use UHT to release two Boyd bolts on antenna.	00:00:15	00:31:37				
22.8	Use UHT to release two north-most, interior sunshield Boyd bolts.	00:00:12	00:31:49				

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
22.9	Use UHT to release three Boyd bolts on west side of Central Station.	00:00:18	00:32:07				
22.10	Use UHT to release center Boyd bolt.	00:00:06	00:32:13				



Task No. 22--Release Sunshield Boyd Bolts

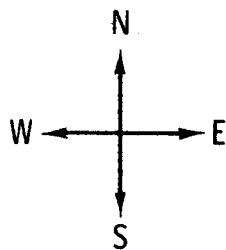
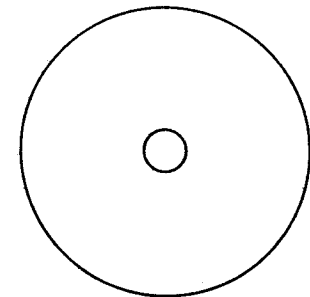
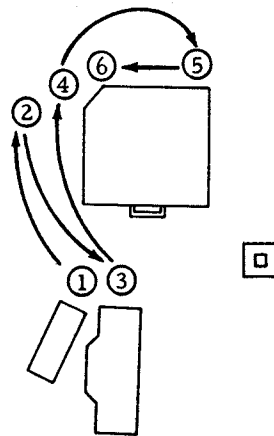
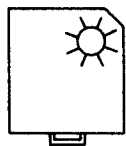
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
23.0	DEPLOY SUNSHIELD (Total Time = 0:39)						
23.1	Use UHT to control sunshield deployment and leave UHT in center guide cup.	00:00:10	00:32:23				
23.2	Complete sunshield deployment, using manual assist.	00:00:15	00:32:38				
23.3	Remove three sunshield curtain covers and discard.	00:00:12	00:32:50				
23.4	Walk to Subpallet.	00:00:02	00:32:52				



Task No. 23—Deploy Sunshield

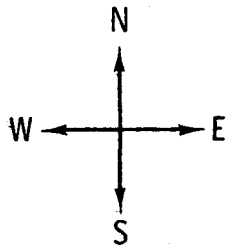
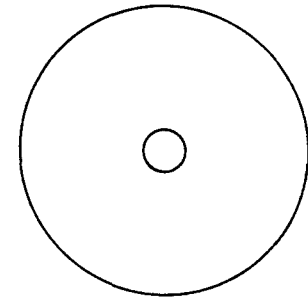
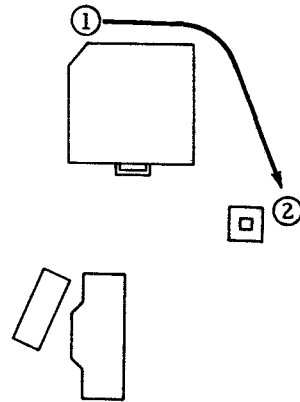
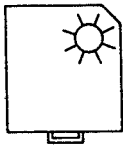
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
24.0	ASSEMBLE ANTENNA (Total Time = 2:20)						
24.1	Retrieve antenna mast from Subpallet.	00:00:03	00:32:55				
24.2	Return to Central Station.	00:00:02	00:32:57				
24.3	Install antenna mast on Central Station.	00:00:30	00:33:27				
24.4	Retrieve UHT from center guide cup.	00:00:02	00:33:29				
24.5	Walk to Subpallet.	00:00:02	00:33:31				
24.6	Use UHT to release two Boyd bolts on aiming mechanism housing.	00:00:12	00:33:43				
24.7	Engage UHT in aiming mechanism housing carry socket.	00:00:05	00:33:48				
24.8	Use UHT to remove aiming housing from Subpallet and return to Central Station.	00:00:06	00:33:54				
24.9	Remove cover from aiming mechanism housing and discard.	00:00:10	00:34:04				
24.10	Install aiming mechanism on antenna mast.	00:00:06	00:34:10				
24.11	Disengage UHT from aiming mechanism housing.	00:00:05	00:34:15				

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
24.12	Stow UHT on sunshield.	00:00:02	00:34:17				
24.13	Remove aiming mechanism housing and packaging and discard.	00:00:30	00:34:47				
24.14	Rotate antenna tie-down brackets, retrieve antenna and install on aiming mechanism.	00:00:25	00:35:12				



Task No. 24—Assemble Antenna

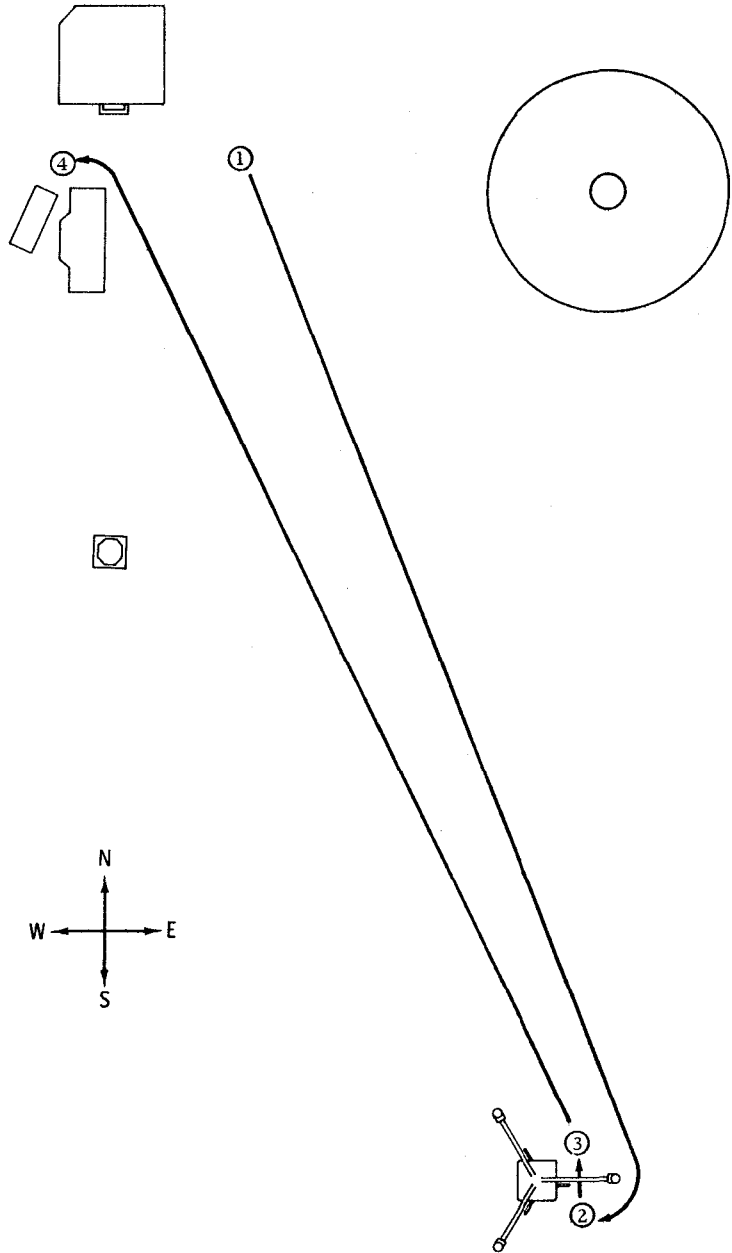
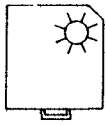
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
25.0	ORIENT ANTENNA (Total Time = 2:40)						
25.1	Enter azimuth offset.	00:00:30	00:35:42				
25.2	Enter elevation offset.	00:00:30	00:36:12				
25.3	Observing bubble level, adjust leveling knobs.	00:01:00	00:37:12				
25.4	Observing sun compass, adjust alignment knob.	00:00:30	00:37:42				
25.5	Recheck level and walk to LSM.	00:00:10	00:37:52				



Task No. 25—Orient Antenna

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
26.0	DEPLOY LSM (Total Time = 3:48)						
26.1	Grasp carry handle and lift LSM from lunar surface.	00:00:03	00:37:55				
26.2	Grasp lift-off handle and rotate LSM to the horizontal position.	00:00:04	00:37:59				
26.3	Retrieve UHT from sunshield.	00:00:02	00:38:01				
26.4	Carry LSM 50 feet southeast of Central Station.	00:00:50	00:38:51				
26.5	Grasp carry handle and rotate LSM to the vertical position.	00:00:04	00:38:55				
26.6	Use UHT to deploy three lunar support legs.	00:00:10	00:39:05				
26.7	Rotate LSM so color-coded Z-lunar support leg is oriented eastward and lower LSM to lunar surface.	00:00:05	00:39:10				
26.8	Use UHT to remove and discard foam packaging.	00:00:15	00:39:25				
26.9	Use UHT to extend Y-sensor arm.	00:00:10	00:39:35				
26.10	Use UHT to extend Z-sensor arm.	00:00:10	00:39:45				
26.11	Use UHT to extend X-sensor arm.	00:00:10	00:39:55				
26.12	Use UHT to remove and discard PRA covers.	00:00:10	00:40:05				
26.13	Observing bubble level, use UHT to level LSM.	00:00:30	00:40:35				

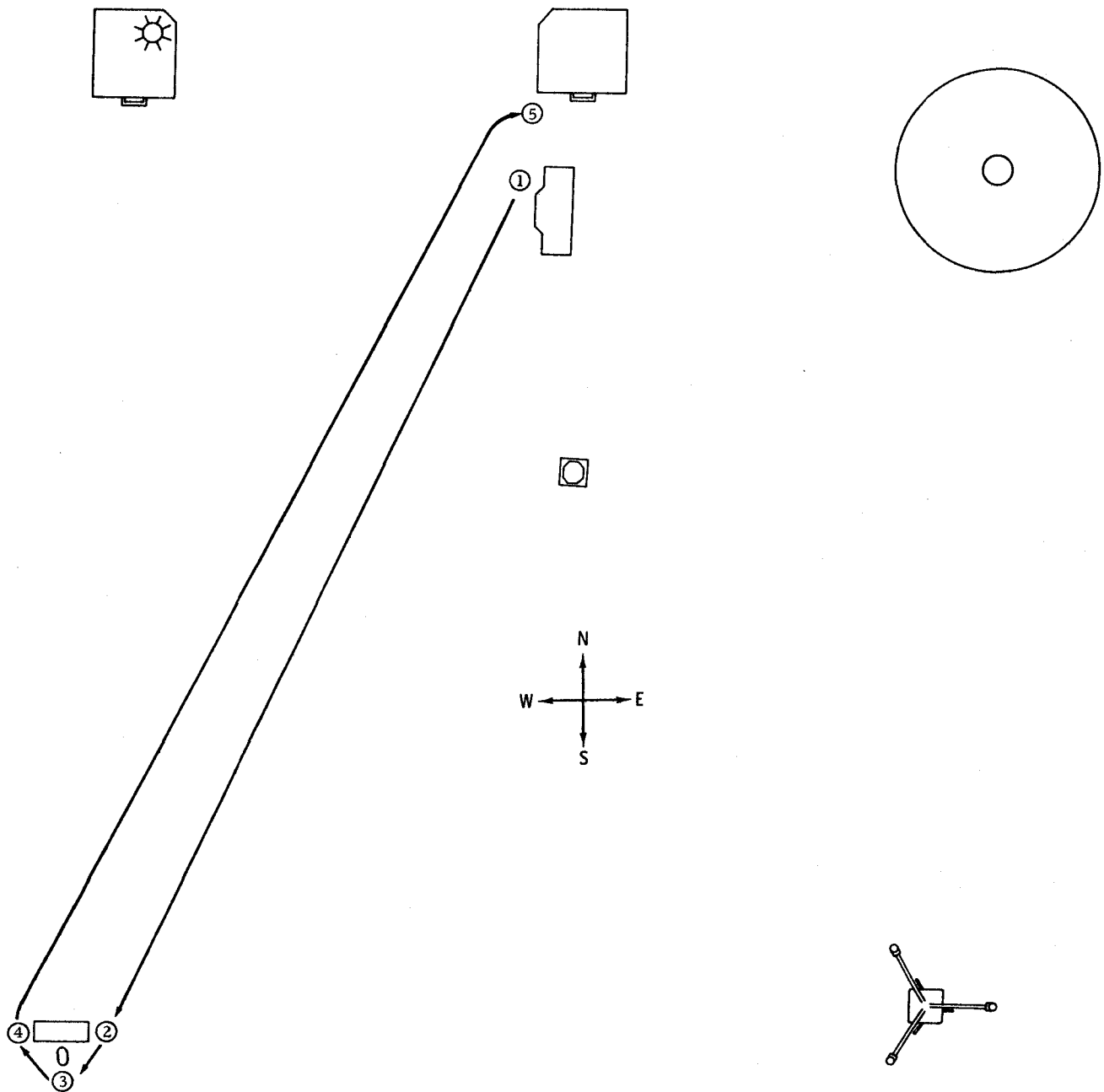
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
26.14	Observing shadowgraph, align LSM.	00:00:10	00:40:45				
26.15	Check bubble level and shadow- graph for level and alignment, and <u>report alignment to within 1° of</u> <u>azimuth orientation.</u>	00:00:05	00:40:50				
26.16	Return to SIDE/CCIG.	00:00:50	00:41:40				



Task No. 26—Deploy LSM

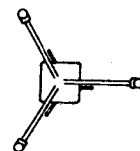
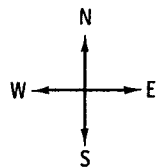
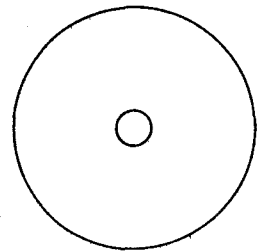
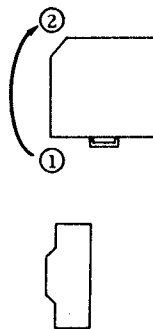
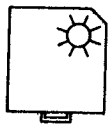
Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
27.0	DEPLOY SIDE/CCIG (Total Time = 3:07)						
27.1	Engage UHT in SIDE/CCIG carry socket.	00:00:05	00:41:45				
27.2	Use UHT to lift SIDE/CCIG, walk 55 feet southwest of Central Station, and lower SIDE/CCIG to lunar surface.	00:00:59	00:42:44				
27.3	Disengage UHT from SIDE/CCIG.	00:00:05	00:42:49				
27.4	Engage UHT in ground screen socket.	00:00:05	00:42:54				
27.5	Rotate UHT clockwise and lift ground screen from ground screen tube.	00:00:07	00:43:01				
27.6	Check ground screen cable deployment.	00:00:02	00:43:03				
27.7	Emplace ground screen on lunar surface.	00:00:05	00:43:08				
27.8	Disengage UHT from ground screen.	00:00:05	00:43:13				
27.9	Engage UHT in SIDE/CCIG carry socket.	00:00:05	00:43:18				
27.10	Use UHT to lift SIDE/CCIG.	00:00:02	00:43:20				

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
27.11	Remove CCIG cover assembly and discard.	00:00:08	00:43:28				
27.12	Use lanyard to remove CCIG from stowage cavity.	00:00:05	00:43:33				
27.13	Emplace SIDE on ground screen with respect to subearth point.	00:00:02	00:43:35				
27.14	Use lanyard to lower CCIG to lunar surface.	00:00:05	00:43:40				
27.15	Orient CCIG orifice and release cable.	00:00:05	00:43:45				
27.16	Check SIDE bubble level.	00:00:02	00:43:47				
27.17	Disengage UHT from SIDE and discard UHT.	00:00:05	00:43:52				
27.18	Return to Central Station.	00:00:55	00:44:47				



Task No. 27—Deploy Side/CC1G

Task No.	LM Pilot Activity	ALSEP Task Time	ALSEP Time (Cumulative)	PLSS Time (Cumulative)	Lunar Mission Time (Cumulative)	Energy Expenditure (BTU's) (Cumulative)	Oxygen Consumption (Grams) (Cumulative)
28.0	COMPLETE DEPLOYMENT (Total Time = 1:16)						
28.1	Disengage UHT from temporary stowage fitting.	00:00:05	00:44:52				
28.2	Use UHT to turn on Astronaut Switch No. 1.	00:00:05	00:44:51				
28.3	<u>Request transmitter turn-on.</u>	00:00:02	00:44:59				
28.4	Check antenna orientation.	00:01:00	00:45:59				
28.5	Receive confirmation of receipt of RF signal and useful data.	00:00:02	00:46:01				
28.6	Discard UHT.*	00:00:02	00:46:03				
<p>*NOTE: ALSEP tasks terminate at this point. Crew man returns to LM or collects samples as required by Apollo mission.</p>							



Task No. 28—Complete Deployment