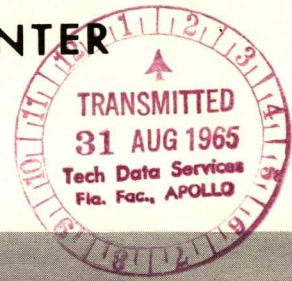




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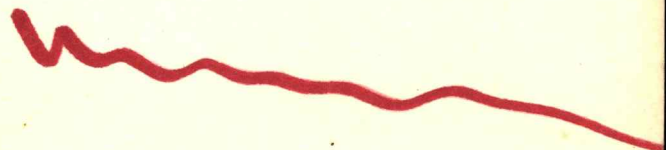
MANNED SPACECRAFT CENTER
FLORIDA OPERATIONS



SPACECRAFT PRELAUNCH TEST PROCEDURE

COMMAND MODULE CLEANING

PREPARED BY





PREPARED BY:
NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

PROJECT: APOLLO

PROCEDURE NO. K-3114-SC009

DATE 18 AUGUST 1965

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TITLE

COMMAND MODULE CLEANING

NAA

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SECTION I GENERAL INFORMATION

- 1.0 TEST OBJECTIVES
- 1.1 TO ENSURE THOROUGH CLEANLINESS OF THE COMMAND
MODULE.

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2.0 LIST OF REFERENCES

2.1 DOCUMENTS..

NUMBER -----	ORIGINATOR -----	TITLE -----
MA0401-0004	NAA	CLEANING PROCEDURE - APOLLO COMMAND AND SERVICE MODULES
MA0201-817	NAA	PROCESS SPECIFICATION - OPERATING INSTRUCTIONS, MODEL A14-014
MA0610-018	NAA	CONTAMINATION CONTROL - APOLLO SPACECRAFT AND ASSOCIATED EQUIPMENT

2.2 DRAWINGS..

NUMBER -----	ORIGINATOR -----	TITLE -----
G16-828009	NAA	CLEANING POSITIONER
G14-818002	NAA	SLING ASSY. S/C (H14-073)

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3.0 LIST OF ABBREVIATIONS

C/M COMMAND MODULE

TPS TEST PREPARATION SHEET

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4.0 TEST SUPPORT REQUIREMENTS

4.1 SPECIAL TOOLS AND TEST EQUIPMENT

NOMENCLATURE -----	MANUFACTURER AND/ OR PART NUMBER -----	APPLICATION -----
TORQUE WRENCH		100-200 INCH POUNDS
TORQUE WRENCH		100-250 FOOT POUNDS
TAG LINES		AS REQUIRED

4.2 GROUND SUPPORT EQUIPMENT

NOMENCLATURE -----	MANUFACTURER AND/ OR MODEL NUMBER -----	APPLICATION -----
CLEANING POSITIONER	A14-014	SUPPORTS C/M DURING CLEANING OPERATIONS
VACUUM CLEANER	A14-035	C/M INTERIOR CLEANING
AUXILIARY CRANE CONTROL	A14-134	PROVIDES HOISTING WITH PRECISION LINEAR MOVEMENT
SPACECRAFT SLING (WITHOUT LES)	H14-073	HANDLING AND TRANSPORTATION
ACCESS PLATFORM	H14-101	ACCESS TO C/M

4.3 SPECIAL SUPPORT

NOMENCLATURE -----	MANUFACTURER AND/ OR PART NUMBER -----	APPLICATION -----

4.4 PERSONNEL

SYSTEM ENGINEERS (NAA AND NASA)
MECHANICAL TECHNICIANS (3 NAA)
QUALITY CONTROL (NAA AND NASA)

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5.0 SAFETY REQUIREMENTS

5.1 SAFETY SHALL BE CONSIDERED IN ALL PLANNING AND SCHEDULING AND IS THE DIRECT RESPONSIBILITY OF NAA AND NASA SUPERVISION. SUPERVISION IS RESPONSIBLE FOR PROVIDING SAFE WORKING CONDITIONS AND OBTAINING PERSONNEL COMPLIANCE WITH ALL NAA AND NASA SPECIAL RULES AND REGULATIONS.

5.2 DEVIATIONS FROM ACCEPTED SAFETY STANDARDS OR WRITTEN SAFETY REGULATIONS WILL BE MADE ONLY WITH THE CONCURRENCE OF NAA AND NASA SAFETY.

5.3 FAMILIARIZATION WITH THE FOLLOWING DOCUMENTS IS REQUIRED OF ALL PERSONNEL CONCERNED.

A. NASA-MILA GENERAL SAFETY PLAN

B. NAA- APPLICABLE SAFETY STANDARD AND SAFETY SUPPORT PLAN

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- 6.0 SPECIAL INSTRUCTIONS
- 6.1 ANY CHANGES IN THE PROCEDURES OF THIS TEST MUST BE ENTERED ON DEVIATION SHEETS WHICH SHALL BE RECORDED IN SECTION IV OF THIS DOCUMENT.
- 6.2 INITIAL RAISING AND FINAL LOWERING OF C/M MUST BE ACCOMPLISHED USING THE CRANE CONTROL REMOTE CONTROL REELS.
- 6.3 HAND (TAG) LINES WILL BE USED DURING ALL LIFTING OPERATIONS.
- 6.4 PRIOR TO OPERATING THE CLEANING POSITIONER, THE EMERGENCY SHUTDOWN PROCEDURE (SECTION V) SHALL BE UNFOLDED AND REMAIN VISIBLE THROUGHOUT ITS OPERATION.

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7.0 COMMUNICATION AND STATION ASSIGNMENTS
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8.0 TEST SET-UP

8.1 VERIFICATION OF A VALID CALIBRATION IS REQUIRED ON
EACH PIECE OF EQUIPMENT WHERE APPLICABLE.

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9.0 SEQUENCE BAR CHART
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SECTION II

OPERATING PROCEDURES

- 1.0 COMMAND MODULE CLEANING
- 1.1 INSTALLING C/M IN CLEANING POSITIONER
 - 1.1.1 ATTACH A14-134 CRANE CONTROL TO OVERHEAD CRANE.
 - 1.1.2 ATTACH H14-073 SLING TO A14-134 CRANE CONTROL.
 - 1.1.3 POSITION H14-073 SLING OVER G16-828124 RING AND VERIFY THAT THE G14-818339 RING SET AND THE NAS669-125 RETAINING RINGS ARE INSTALLED IN THE G14-818329 FITTINGS OF THE H14-073 SLING (3 PLACES).
 - 1.1.4 SECURE H14-073 SLING TO G16-828124 RING USING THE FOLLOWING HARDWARE..

THREE WASHERS - RD153-5002-0014

THREE BOLTS - ME111-8002-0001

TORQUE BOLTS 100 TO 125 FOOT-POUNDS. -----
 - 1.1.5 POSITION G16-828124 RING OVER C/M.
 - 1.1.6 ALIGN G16-828124 RING ATTACH POINTS WITH TOWER WELL FITTINGS LOCATED AT (-Y, -Z), (-Y, +Z) AND (+Y, +Z).
 - 1.1.7 SECURE G16-828124 RING TO C/M (SEE FIGURE 1) USING THE FOLLOWING HARDWARE..

FOUR ADAPTERS - G16-828462

FOUR ADAPTERS - G16-828150

FOUR WASHERS - LD153-0010-0026

FOUR BOLTS - AN14-50A

TORQUE BOLTS 2540 (+/- 240) INCH - POUNDS. -----
 - 1.1.8 VERIFY OR ACCOMPLISH DETACHMENT OF C/M FROM H14-008 SUPPORT BASE.
 - 1.1.9 VERIFY OR ACCOMPLISH REMOVAL OF C/M MAIN ACCESS DOOR.

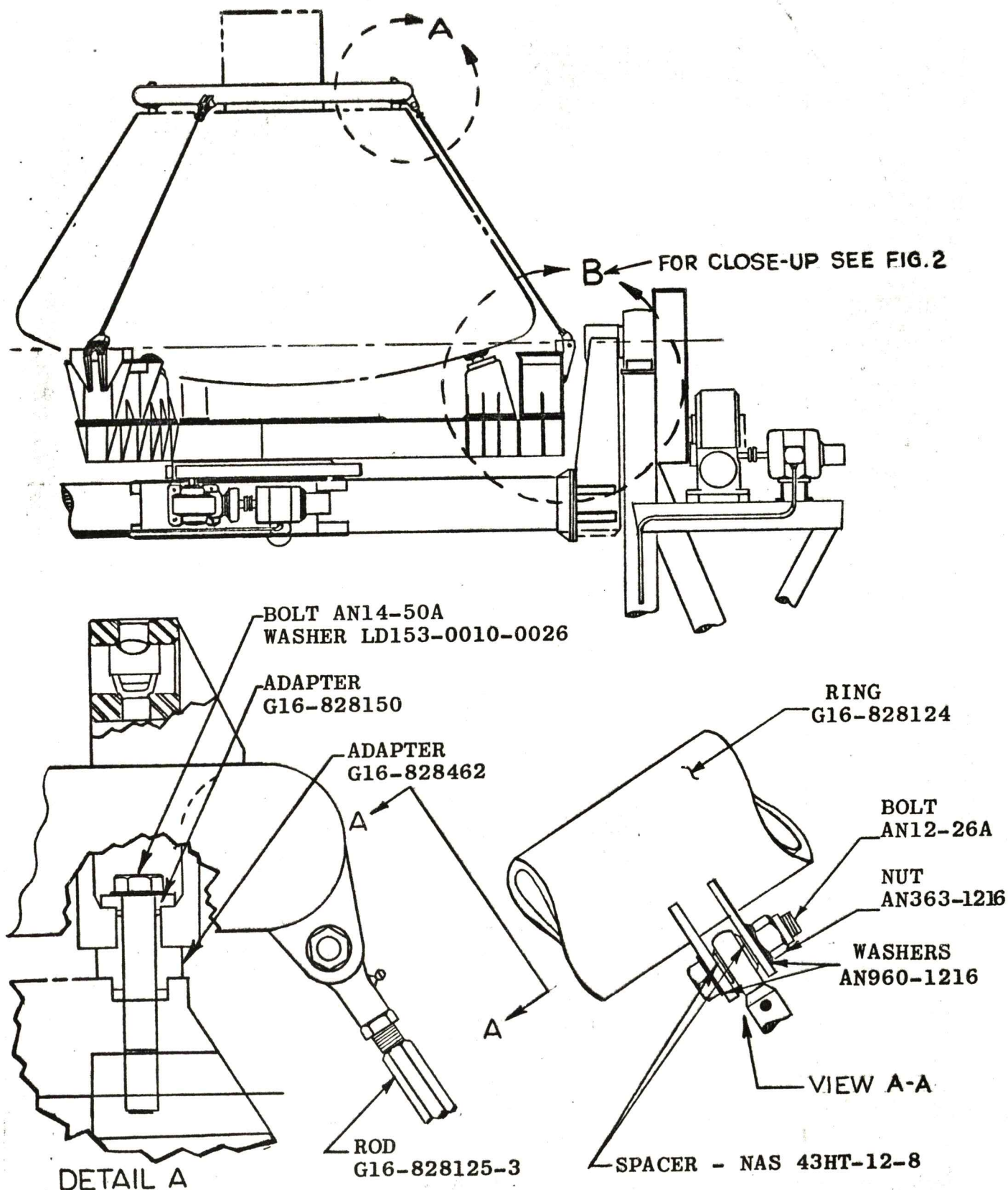


FIGURE 1. INSTALLATION OF C/M IN CLEANING POSITIONER

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- 1.1.10 SLOWLY RAISE C/M AND POSITION OVER A14-014 CLEANING POSITIONER WITH C/M PADS 1, 3 AND 5 ALIGNED WITH PADS 1, 3 AND 5 ON A14-014 CLEANING POSITIONER.
- 1.1.11 SLOWLY LOWER C/M ONTO CLEANING POSITIONER ENSURING THAT G16-828130 SUPPORTS LINE UP WITH C/M SUPPORTS.
- 1.1.12 MAINTAIN FACILITY HOIST ENGAGEMENT BUT ALLOW FULL WEIGHT OF C/M TO BEAR ON CLEANING POSITIONER.
- 1.1.13 ATTACH THREE G16-828125-3 RODS TO G16-828124 RING (SEE FIGURE 1) USING THE FOLLOWING HARDWARE..
- SIX SPACERS - NAS43HT-12-8
- SIX WASHERS - AN960-1216
- THREE BOLTS - AN12-26A
- THREE NUTS - AN363-1216
- 1.1.14 VERIFY SUFFICIENT THREAD ENGAGEMENT OF G16-828125-3 RODS INTO HFFX-126 ROD ENDS BY VISUAL OBSERVANCE OF THREAD INSPECTION HOLES. -----
- 1.1.15 INSERT THREE G16-828125-3 RODS INTO THREE G16-828132 CLEVISSES. SECURE THREE G16-828132 CLEVISSES (SEE FIGURE 2) USING THE FOLLOWING HARDWARE..
- TWELVE WASHERS - AN960-1416
- SIX BOLTS - NAS1014-25A
- SIX NUTS - NAS1021-C14
- TIGHTEN NAS1021-C14 NUTS FULLY, BUT DO NOT TORQUE AS THIS PUTS UNNECESSARY STRESS ON CLEVIS.

CAUTION

TENSION TIE-RODS MUST BE
TIGHTENED SIMULTANEOUSLY.

- 1.1.16 SECURE THREE G16-828125-3 TENSION TIE-RODS TO THREE G16-828132 CLEVISSES WITH THE FOLLOWING

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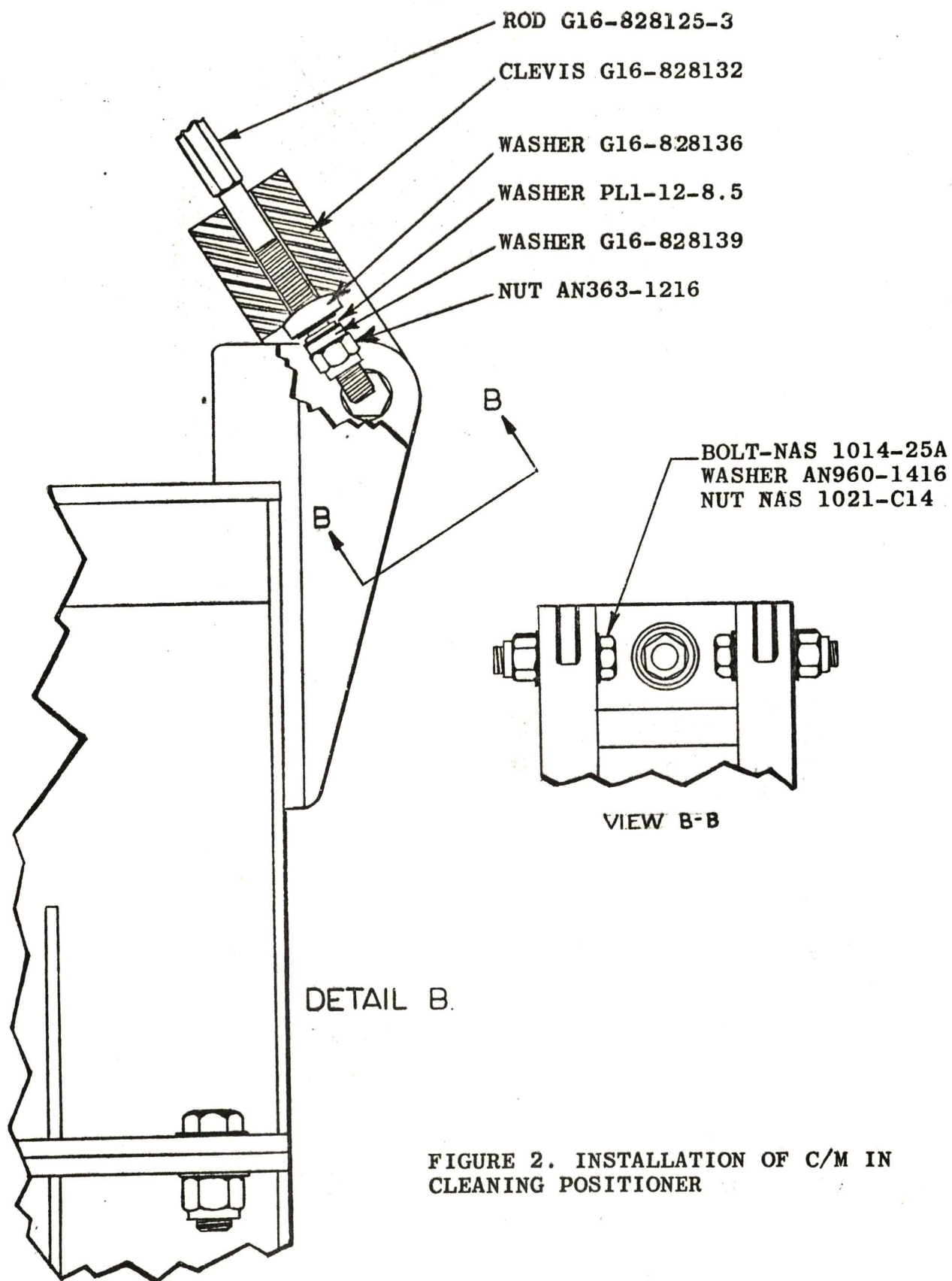


FIGURE 2. INSTALLATION OF C/M IN
CLEANING POSITIONER

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HARDWARE (SEE FIGURE 2)..

THREE WASHERS - G16-828136

THREE WASHERS - PL1-12-8.5

THREE WASHERS - G16-828139

THREE NUTS - AN363-1216

TIGHTEN NUTS UNTIL PRELOAD INDICATING WASHERS ARE COMPRESSED (SEE FOLLOWING STEP).

1.1.17 VERIFY THAT PRESCRIBED PRE-LOAD HAS BEEN INDUCED BY INSERTING PIN IN INSPECTION HOLES IN THE OUTER RING AND MOVING BACK AND FORTH. THE AN363-1216 NUTS SHOULD BE TIGHTENED UNTIL THE OUTER RING CANNOT BE MOVED. WHEN THIS POINT IS REACHED, DO NOT TIGHTEN FURTHER (SEE FIGURE 2). -----

1.1.18 REMOVE H14-073 SLING FROM C/M.

1.2 CLEANING OF C/M

1.2.1 VACUUM C/M.

1.2.2 REMOVE VACUUMING EQUIPMENT.

WARNING

VERIFY ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF H14-014 CLEANING POSITIONER PRIOR TO OPERATION.

1.2.3 PLACE REMOTE SAFETY SWITCH IN OPERATE POSITION.

1.2.4 PRESS PITCH CLOCKWISE BUTTON.

1.2.5 ALLOW C/M TO ROTATE 180 DEGREES.

1.2.6 PRESS PITCH STOP BUTTON.

1.2.7 PLACE REMOTE SAFETY SWITCH IN LOCKED OFF POSITION.

1.2.8 VACUUM LOWER HALF INTERIOR OF C/M, INCLUDING SPACE BETWEEN INNER AND OUTER SHELLS.

1.2.9 REMOVE VACUUMING EQUIPMENT.

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- 1.2.10 RESET REMOTE SAFETY SWITCH TO OPERATE.
- 1.2.11 PRESS PITCH CLOCKWISE BUTTON.
- 1.2.12 ALLOW C/M TO ROTATE 180 DEGREES.
- 1.2.13 PRESS PITCH STOP BUTTON.
- 1.2.14 PLACE REMOTE SAFETY SWITCH IN LOCKED OFF POSITION.
- 1.2.15 VACUUM LOWER HALF INTERIOR OF C/M, INCLUDING SPACE BETWEEN INNER AND OUTER SHELLS.
- 1.2.16 REMOVE VACUUMING EQUIPMENT.
- 1.2.17 SET REMOTE SAFETY SWITCH IN OPERATE POSITION.
- 1.2.18 PRESS PITCH CLOCKWISE BUTTON.
- 1.2.19 ALLOW C/M TO ROTATE 90 DEGREES.
- 1.2.20 PRESS PITCH STOP BUTTON.
- 1.2.21 PRESS ROLL START BUTTON.
- 1.2.22 ALLOW C/M TO ROLL 360 DEGREES.
- 1.2.23 PRESS ROLL STOP BUTTON.
- 1.2.24 PLACE REMOTE SAFETY SWITCH IN LOCKED OFF POSITION.
- 1.2.25 VACUUM LOWER HALF INTERIOR OF C/M, INCLUDING SPACE BETWEEN INNER AND OUTER SHELLS.
- 1.2.26 REMOVE VACUUMING EQUIPMENT.
- 1.2.27 PLACE REMOTE SAFETY SWITCH IN OPERATE POSITION.
- 1.2.28 PRESS PITCH COUNTERCLOCKWISE BUTTON.
- 1.2.29 ALLOW C/M TO ROTATE 90 DEGREES.
- 1.2.30 PRESS PITCH STOP BUTTON.
- 1.2.31 PLACE REMOTE SAFETY SWITCH IN LOCKED OFF POSITION.
- 1.3 REMOVING C/M FROM CLEANING POSITIONER.
 - 1.3.1 VERIFY THAT THE G14-818339 RING SET AND THE NAS 669-125 RETAINING RINGS ARE INSTALLED IN THE

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G14-818329 FITTINGS OF THE H14-073 SLING
(3 PLACES).

- 1.3.2 ATTACH H14-073 SLING TO G16-828124 RING USING THE
FOLLOWING HARDWARE..

THREE WASHERS - RD153-5002-0014

THREE BOLTS - ME111-8002-0001

TORQUE BOLTS 100 TO 125 FOOT-POUNDS. -----

- 1.3.3 REMOVE THREE G16-828125-3 RODS FROM G16-828124
RING.

- 1.3.4 REMOVE THREE G16-828125-3 RODS AND THREE
G16-828132 CLEVISSES FROM A14-014 CLEANING
POSITIONER.

- 1.3.5 SLOWLY RAISE C/M AND POSITION APPROXIMATELY 12
INCHES ABOVE AND DIRECTLY OVER THE H14-008 C/M
SUPPORT BASE/GFP-H 203 C/M TRANSPORT AND
POSITIONING TRAILER. POSITION G16-818064 PADS ON
H14-008 SUPPORT BASE IN RETRACTED POSITION.

- 1.3.6 ALIGN THE AFT HEAT SHIELD PADS WITH THE SUPPORT
PADS OF THE H14-008 C/M SUPPORT BASE. RAISE
PLATFORM OF THE GFP-H-203 TRAILER AND SEAT THE
SUPPORT PADS.

NOTE

THE FULL WEIGHT OF THE C/M IS
TO BE ON THE GFP-H-203 TRAILER.

- 1.3.7 ATTACH THREE G16-818069 BOLTS THROUGH THE
H14-008 C/M SUPPORT BASE AND THREAD THE BOLTS ONTO
THE THREE V16-327280 FITTINGS TO FULL THREAD
ENGAGEMENT.

- 1.3.8 INSTALL ONTO THE G16-818069 BOLTS, ONE EACH IN
THE FOLLOWING ORDER..
G16-818076 WASHER, CL-5-SW WASHER, PL1-12.8.5
CRUSHABLE WASHER, AND MS20500-1216 NUT.
TORQUE EACH MS20500-1216 NUT SIMULTANEOUSLY UNTIL
CENTER RING OF PL1-12.8.5 WASHER DRAGS PERCEPTIBLY
WHEN ROTATED. DO NOT OVER-TORQUE.

- 1.3.9 ADJUST THREE G16-818042 SCREW SHAFTS SUCH THAT

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THE G16-818064 PADS REST AGAINST THE C/M AFT HEAT SHIELD. SNUG NAS1022A20 LOCKNUT TO G16-818042 SHAFTS. REACT THE TORQUE AT THE SQUARE ON THE END OF THE G16-818042 SHAFT.

- 1.3.10 REMOVE G16-828124 RING FROM C/M BY REMOVING THE FOLLOWING HARDWARE..

FOUR ADAPTERS - G16-828462

FOUR ADAPTERS - G16-828150

FOUR WASHERS - LD153-0010-0026

FOUR BOLTS - AN14-50A

- 1.3.11 LOWER G16-828124 RING TO FLOOR.

- 1.3.12 DETACH H14-073 SLING FROM G16-828124 RING BY REMOVING THE FOLLOWING HARDWARE..

THREE BOLTS - ME111-8002-0001

THREE WASHERS - RD153-5002-0014

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- 2.0 POST TEST REQUIREMENTS
- 2.1 REMOVE H14-073 SLING FROM A14-134 CRANE CONTROL.
- 2.2 STOW CRANE CONTROL AND DUST COVER.

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SECTION III

TEST DATA SHEETS

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SECTION IV

1.0 POST-TEST VERIFICATION

1.1 OCP-K-3114 COMMAND MODULE CLEANING HAS BEEN
PERFORMED PER INITIATING TPS NO. -----

AND DEVIATIONS NOTED ON DEVIATION SHEET(S) NO.
-----, -----, -----.

NAA
APPROVED BY..

NASA

SYSTEM ENGINEER

SYSTEM ENGINEER

INSPECTION

INSPECTION

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SECTION V

EMERGENCY SHUTDOWN PROCEDURES

PLACE REMOTE SAFETY SWITCH IN THE LOCKED OFF
POSITION.