

PREGÃO ELETRÔNICO 07/2023

NUP: 64020.004960/2023-98

Aquisição de materiais do PIT AvEx 2024 para o 4º BavEx e Dst AvEx

VOLUME VI

4º Batalhão de Aviação do Exército
fl. 002

MINISTÉRIO DA DEFESA
EXÉRCITO BRASILEIRO
4º BATALHÃO DE AVIAÇÃO DO EXÉRCITO
ESQUADRÃO CORONEL RICARDO PAVANELLO

TERMO DE ABERTURA DE VOLUME VI

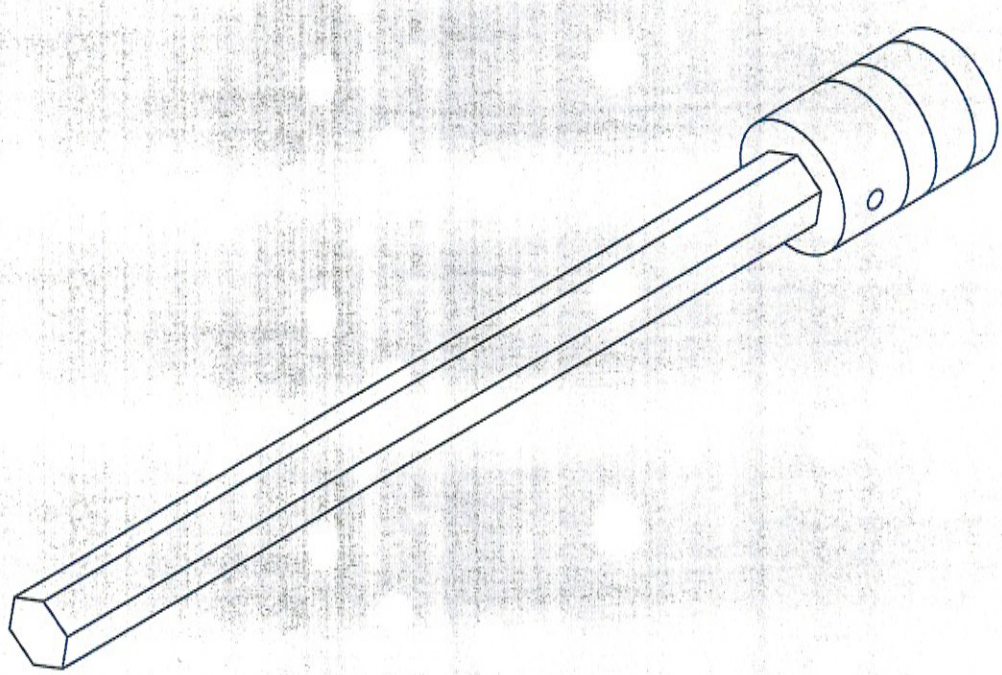
Processo 64020.004690/2023-98

Em conformidade com o disposto na Portaria Normativa MD nº 1243/2006, procedemos a abertura do volume n° VI do Processo Administrativo referente a licitação acima indicada.

Manaus-AM, 23 de fevereiro de 2024.

[redacted] SOUSA – Maj
Chefe da Seção de Aquisições, Licitações e Contratos

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1002



DESCRIPTION: The long hex head wrench is used on helicopter vibration absorbers.

POWER REQUIREMENTS: Not Applicable

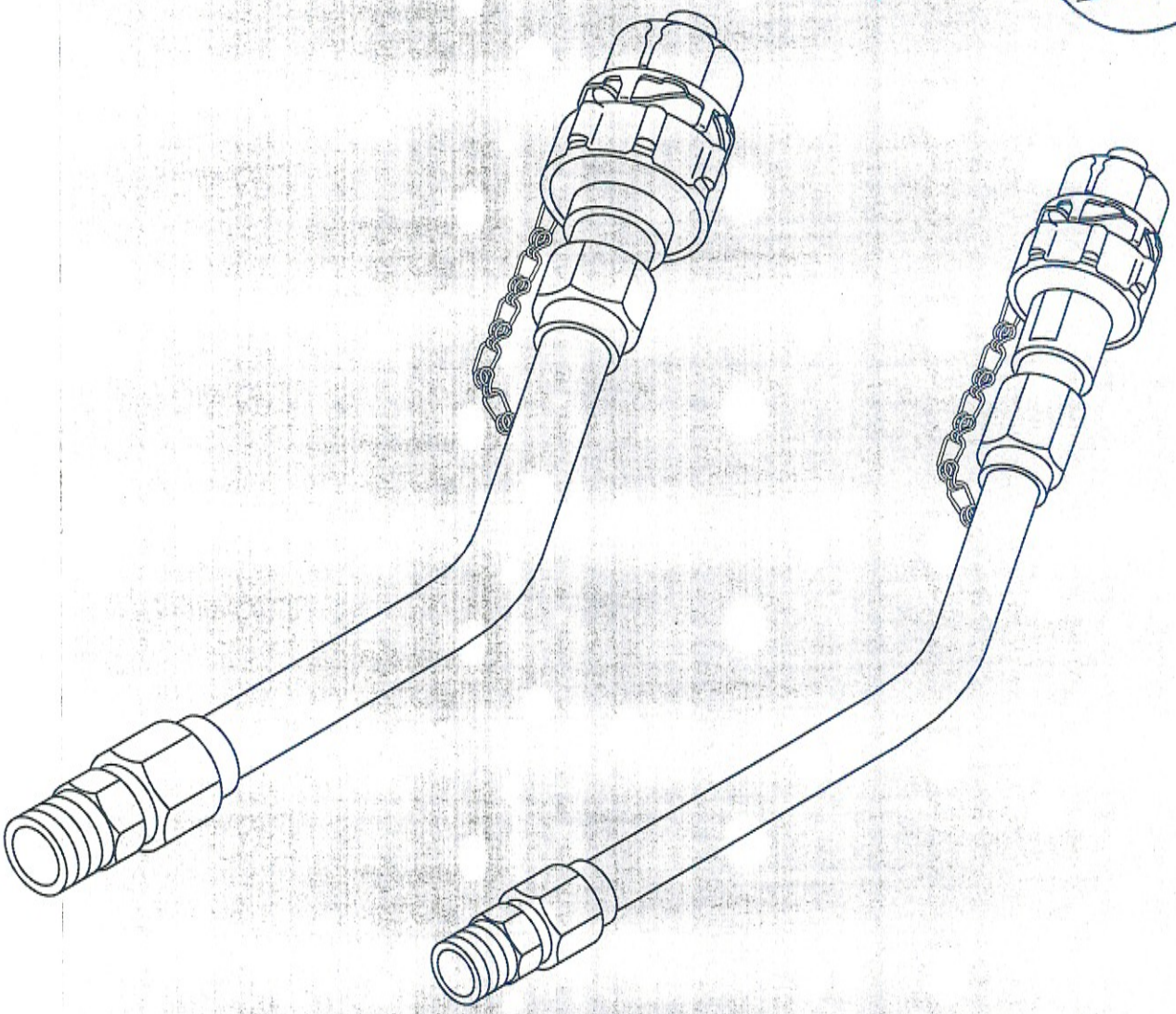
CALIBRATION REQUIREMENTS: Not Applicable

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GA

FIGURE C-29. LONG HEX HEAD WRENCH, FA12L

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1003



DESCRIPTION: The hydraulic cart adapter fittings are used to service the helicopter, and provide hydraulic power to move flight controls. The adapters are for hydraulic pressure and return to the power cart.

POWER REQUIREMENTS: Not Applicable

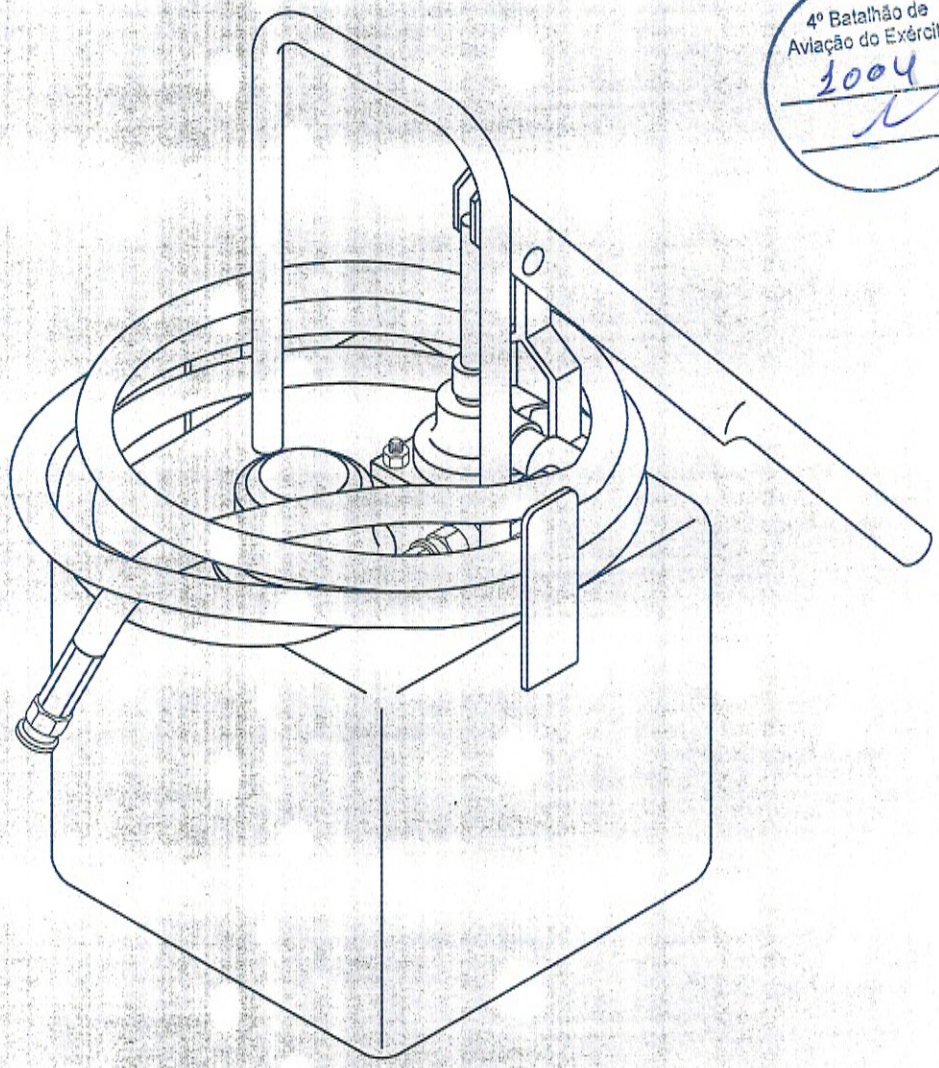
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-30. HYDRAULIC CART ADAPTER FITTINGS, KHC 1004

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1004



DESCRIPTION: The hydraulic filler / bleeder is a pressurized reservoir used to service hydraulic reservior and bleed brake system on helicopter.

POWER REQUIREMENTS: External source of compressed air.

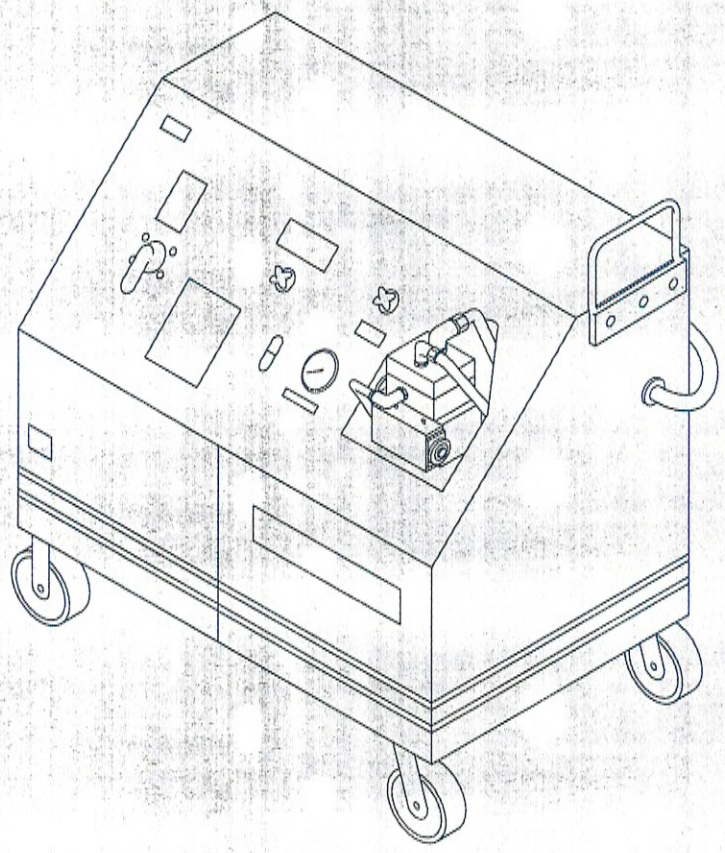
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-31. HYDRAULIC FILLER/BLEEDER, 1102SP

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DESCRIPTION: The hydraulic power unit is electrically powered to provide a source of clean, pressurized hydraulic fluid for performing required helicopter maintenance and servicing.

POWER REQUIREMENTS: 440 volts, 60 Hz

CALIBRATION REQUIREMENTS:

FREQUENCY

Hydraulic power unit must be calibrated every 52 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Hydraulic Hand Pump, model 10 or equivalent.
- Portable Hydraulic Circuit Tester, Model PHS–60–6 or equivalent flow and temperature measuring equipment.
- Standard Oil Service Pressure Gages, 0–2000 and 0–5000 psi.
- Hydraulic Pressure and Return Lines.

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FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 1 OF 4)

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CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES

Inspection

1. Check hydraulic fluid reservoir. Make sure reservoir is at least 1/2 full before starting calibration.
2. Check hoses for damage, cracks, loose or missing connectors, and dirt.
3. Check all gages for broken glass, bent pointers, and dirt.
4. Check drip pan and floor for signs of hydraulic fluid leaks. Repair any leaks.

Calibration

1. Connect pressure and return lines from hydraulic power unit to PHS–60–6, portable hydraulic circuit tester. Return line is larger than pressure line.
2. Place volume range selector on, PHS–60–6 circuit tester in #20 position.
3. Make sure power switch on hydraulic power unit is off. Connect power cord to 440 volt power receptacle.
4. Make sure fittings are capped and output valves are closed. Open by–pass valve on hydraulic power unit. Open load valve of PHS–60–6 circuit tester. Place selector valve on hydraulic unit to STAND RESERVOIR position.
5. Turn on power of hydraulic unit. With pump operating, check for leaks. If leaking, stop pump and repair. Restart pump.
6. Check hydraulic unit and circuit tester gages for high pressure readings. If readings are high, replace filters.
7. Operate controls on hydraulic power unit through full range of flow and full range of pressure. Do not exceed pressure or flow range of circuit tester, PHS–60–6 gages.

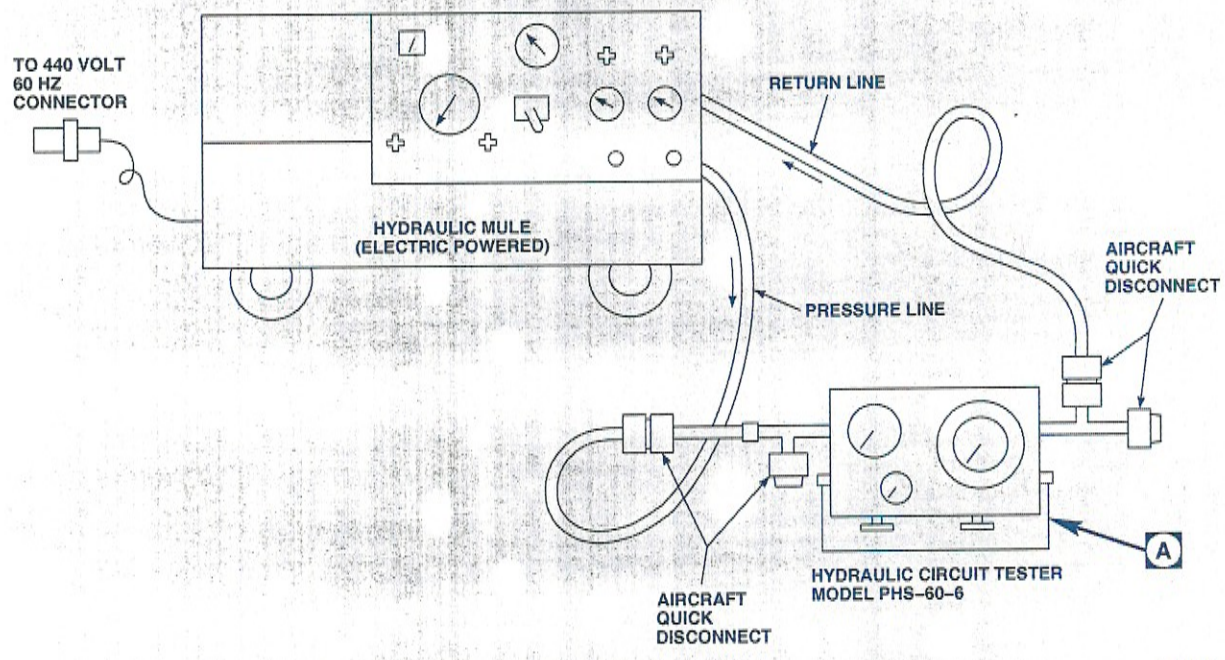
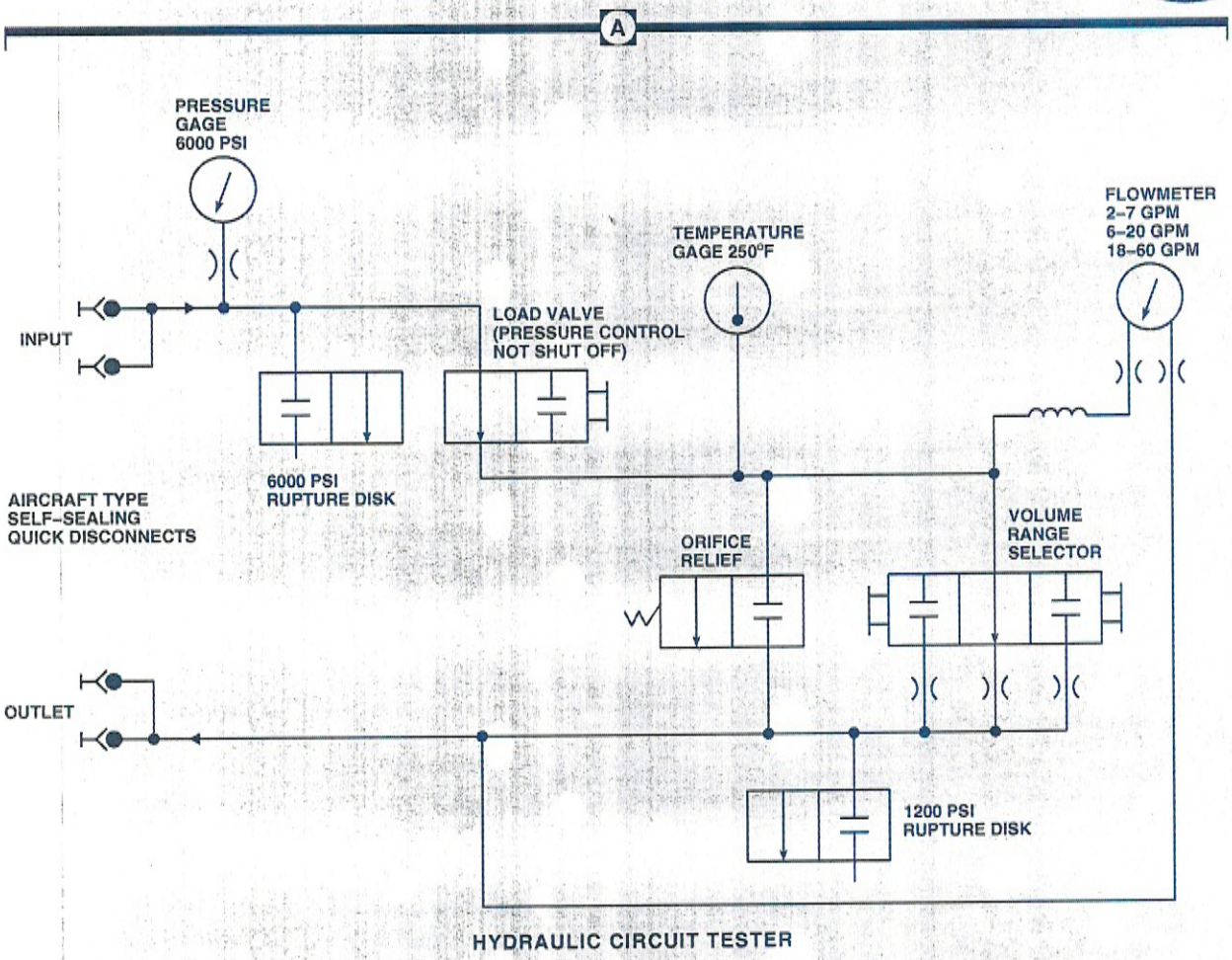


FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 2 OF 4)

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CALIBRATION REQUIREMENTS (CONT)

CALIBRATION PROCEDURES (CONT)

Calibration (CONT)

8. Increase pressure by closing load valve on circuit tester, PHS–60–6. Open by–pass valve and turn off hydraulic power unit. Repair as required.

9. Calibration of pressure gages on hydraulic power unit is checked using external hydraulic hand pump and standard pressure gage. Make sure by–pass valve is open and hydraulic power unit is turned off.

10. Connect hydraulic hand pump and pressure gage to gage port on hydraulic power unit with a high pressure line. Close gage shut off valve and power unit to isolate gage.

11. Increase pressure using hand pump on gage being tested. Make sure pressure on standard gage is not exceeded. Release pressure on hand pump system. Using hand pump increase pressure once more to full scale on gage being tested.

12. Observe pointer of gage being tested, any deviation from smooth operation may indicate worn gears or sector. Remove or repair gage as required.

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FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 3 OF 4)

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CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES (CONT)

Calibration (CONT)

13. Hold pressure at full scale on gage being tested for one minute. Any detectable movement of pointer down scale is a sign of system leak. Check system and repair leaks as required. Release pressure.
14. Increase pressure in system until standard pressure gage reads exactly 50% of full scale on gage being tested. Lightly tap test gage and observe gage reading. Adjust test gage to read exact pressure as on standard gage by adjusting screw or resetting pointer on gage. After adjustment, lightly tap gage and check reading. Reading must be same as standard pressure gage.
15. Release system pressure down to minimum value.
16. Increase pressure in system until standard pressure gage reads 20%, 40%, 60%, and 80% of test gage. Check test gage at each point. Tap test gage and check readings at each point.
17. Adjust test gage, if necessary, to bring the center 2/3 of its span within one scale division on gage.
18. Repeat steps 9 through 17 for any other pressure gages on hydraulic power unit, not used for filter condition monitoring.
19. Remove hydraulic hand pump, pressure hose, and standard pressure gage.
20. Calibration of flow gage on hydraulic power unit is checked using standard flowmeter in circuit tester, PHS–60–6, at an oil temperature of 100°F ±20°F.
21. Make sure by–pass valve is open. Turn on hydraulic power unit. Open load valve on circuit tester to allow flow through system loop. Make sure volume range selector is on #20 position on circuit tester.
22. Adjust flow on hydraulic power unit to full flow. If under 20 GPM, also check flow indication on circuit tester to insure flow is not running over 20 GPM. If full flow can't be reached, open bypass valve and turn off power unit. Repair as required.
23. Check oil flow through system loop, while observing oil temperature on gage of circuit tester, PHS–60–6. Temperature shall read 100°F ± 20°F. Adjust temperature by adding pressure to raise temperature and release pressure to lower temperature.
24. Lower pressure and flow to minimum and place circuit tester range selector to #7.
25. When oil temperature is reasonably stable, adjust flow and pressure to achieve 20% of full flow on power unit gage. Check flow reading on power unit flow meter and compare with circuit tester reading.
26. Make sure oil temperature is 100°F ± 20°F. If necessary, adjust to maintain oil temperature. Bring oil flow and pressure to a minumum, place range selector on circuit tester to #20 position.
27. Check flow readings at 40%, 60%, and 80% on power unit gage with readings on circuit tester, PHS–60–6. Readings shall be within ± 8% indicated, ±1 division of circuit tester gage.
28. Ajust flowmeter, if necessary, and recheck readings. Final adjustment should leave a ±8% difference, ±1 division on flow rate throughout the 25% to 75% scale range.
29. Install limited use calibration sticker to hydraulic power unit.

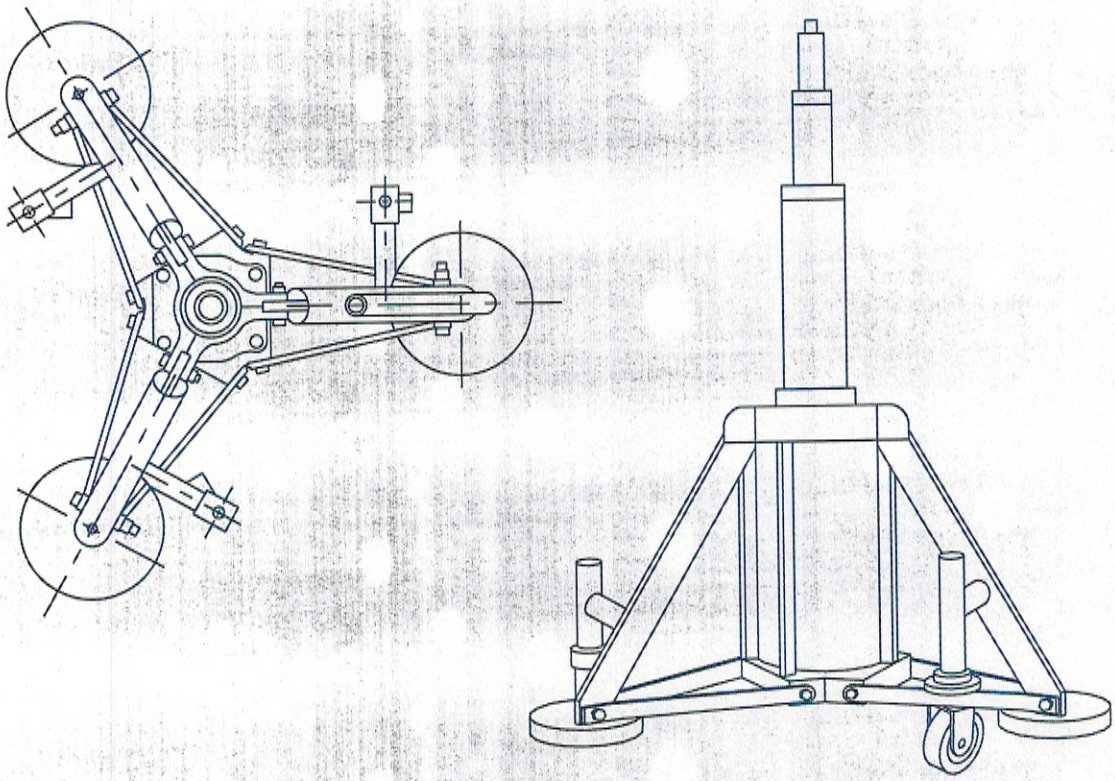
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FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 4 OF 4)

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1008

VERT. CAP.	MIN. CLOSED HEIGHT	HYD. LIFT	SCREW EXT.	MAX. EXTENDED HEIGHT	NET WEIGHT	CRATED WEIGHT
TONS	INCH	INCH	INCH	INCH	LBS	LBS
12	14	23	3	40	100	125



DESCRIPTION: The hydraulic jack has a load capacity of 12 tons, and a hydraulic lift height of 23 inches to a maximum of 40 inches.

POWER REQUIREMENTS: Not Applicable

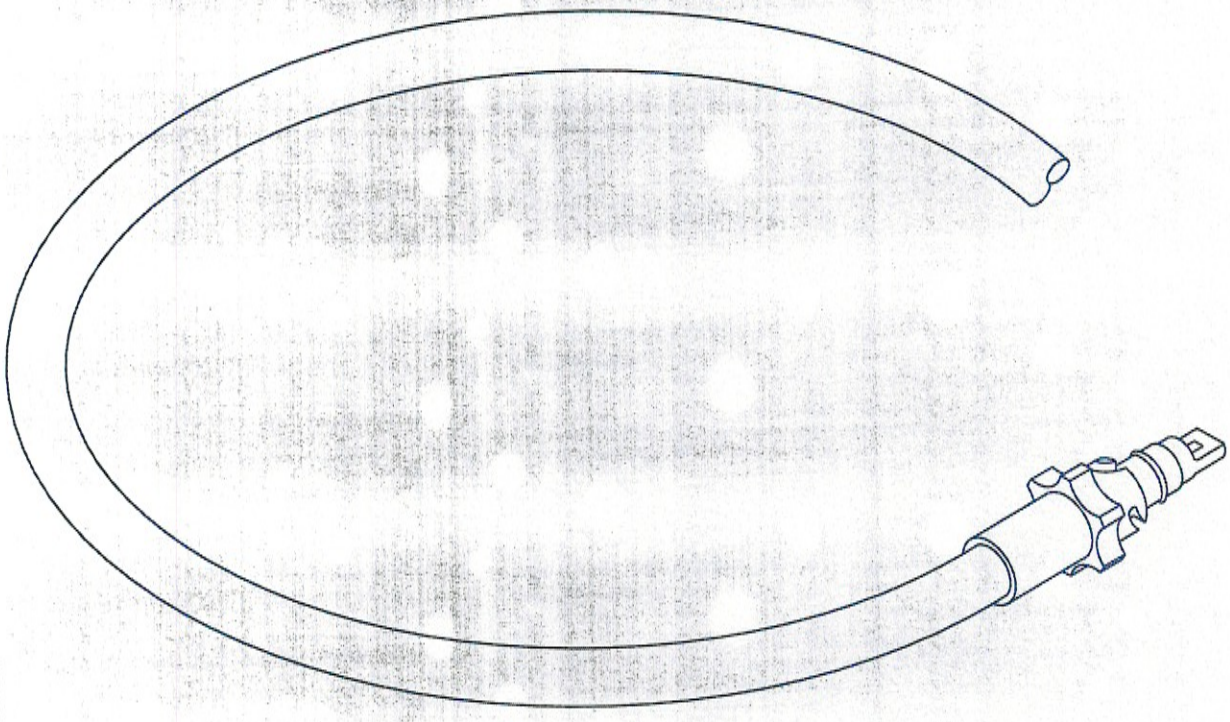
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-33. HYDRAULIC TRIPOD JACK, 12-3-14

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1010



DESCRIPTION: The drain line is used to drain oil from tail gear box and intermediate gear box into container to prevent splashing or spilling.

POWER REQUIREMENTS: Not Applicable

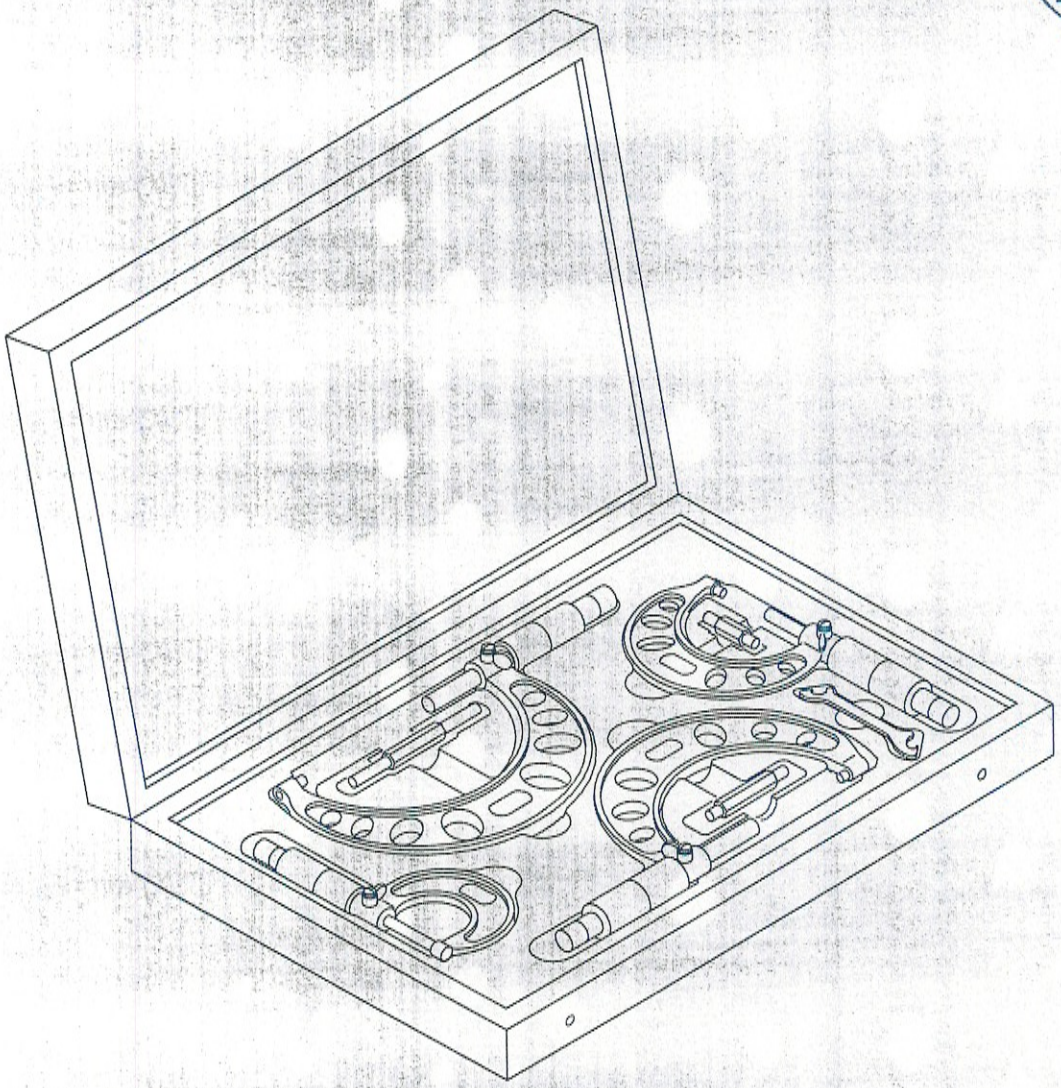
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-34. INTERMEDIATE/TAIL GEAR BOX DRAIN LINE, H538A-3

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DESCRIPTION: The micrometers are used for obtaining precise measurements of an object.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Micrometers must be calibrated every 12 weeks regardless of being used or not.

NOTE

If a micrometer is dropped or knocked against a hard object, it must be recalibrated before it is used again.

EQUIPMENT REQUIRED

- Gage Block Set, Hoke-style, 0.05-4.0-inch ± 0.000010-inch (or equivalent).

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FIGURE C-35. MICROMETER SET, 0 - 4-INCH, PMF114 (SHEET 1 OF 2)

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1012

- Gage Block Set, Hoke-style, 5.0-20.0-in., ± 0.000010-in. (or equivalent).
- Measuring Rods, 1.0-11.0-in., ± 0.000010-in. Browne & Sharp #655 (or equivalent).
- Measuring Rods, 12.0-16.0-in., ± 0.000010-in. Starrett #234 (or equivalent).

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D
- Soap and Water

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean spindle and anvil using Isopropyl Alcohol, Item 72, Appendix D. Wipe dry using Machinery Towel, Item 211, Appendix D.
2. Check that ratchet screw and thimble move freely.
3. Check spindle and anvil surfaces for damage. NONE ALLOWED.

Calibration

1. Loosen ratchet screw and rotate thimble until zero is indicated on scale.

NOTE

Since the actual micrometer adjustment of all test instruments is limited to one in., an additional gage block must be used when calibrating test instruments larger than one in. For example, an additional three-in. block must be used when calibrating a four-in. test instrument.

2. Calibrate the test instruments using the 0.0625, 0.125, 0.25, 0.5, and 1.0-in. gaging blocks. Measurements must be within tolerance given in Table 1. If tolerances cannot be achieved, adjust instrument and recalibrate.

TABLE 1

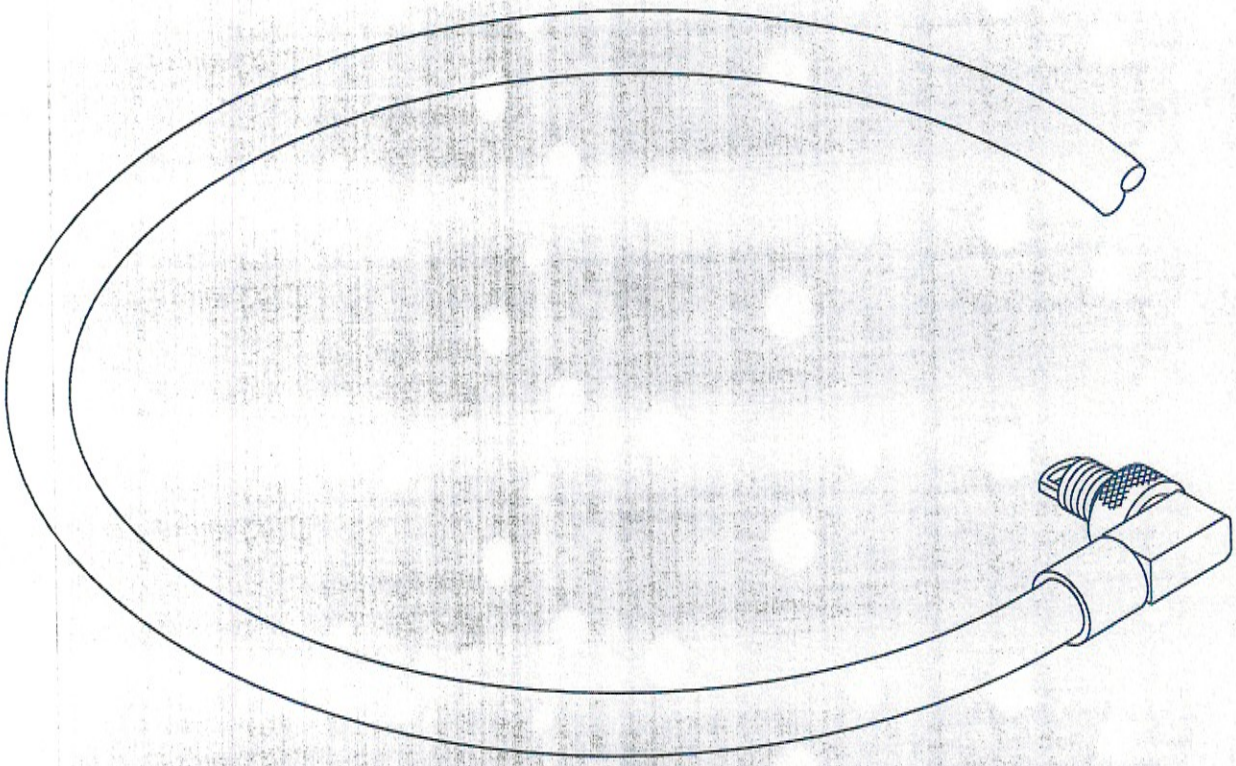
INSTRUMENT RANGE	ACCEPTABLE TOLERENCE
0-1-in.	0.0002-in.
1-2-in.	0.0002-in.
2-3-in.	0.0003-in.
3-4-in.	0.0003-in.
4-5-in.	0.0003-in.
5-6-in.	0.0003-in.
6-7-in.	0.0004-in.
7-8-in.	0.0004-in.
8-9-in.	0.0004-in.
9-10-in.	0.0005-in.
10-11-in.	0.0005-in.
11-12-in.	0.0005-in.
12-18-in.	0.0008-in.
18-20-in.	0.001-in.

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FIGURE C-35. MICROMETER SET, 0 - 4-INCH, PMF114 (SHEET 2 OF 2)

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1013



DESCRIPTION: The drain line is used to drain oil from main transmission into containers preventing splashing or spilling oil.

POWER REQUIREMENTS: Not Applicable

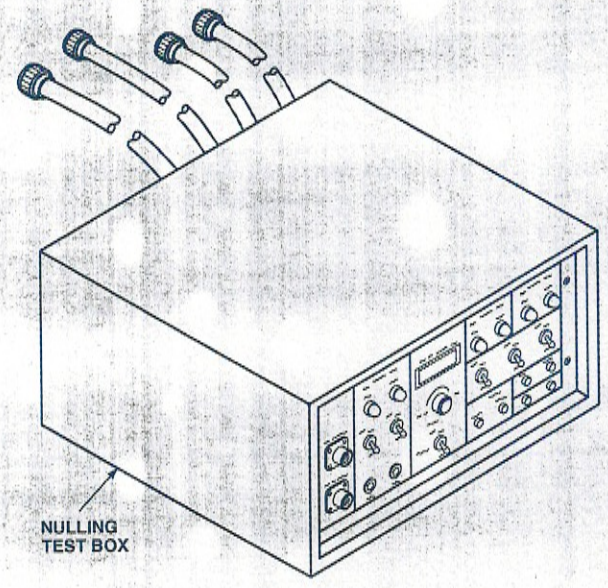
CALIBRATION REQUIREMENTS: Not Applicable

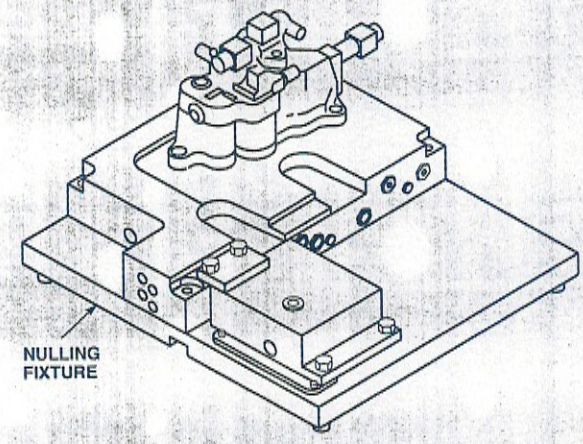
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FIGURE C-36. MAIN GEAR BOX DRAIN LINE, D-730-L

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1014





DESCRIPTION: The nulling fixture is used to operationally test pilot assist module, roll trim, pitch trim and yaw boost servos after repair.

POWER REQUIREMENTS: The nulling fixture operates on 115 volts AC, single phase, 60 Hz, 2 amp and 28 volt DC, 5 amps. Also needed is hydraulic power at a rate of 6 GPM, at 3000 psi.

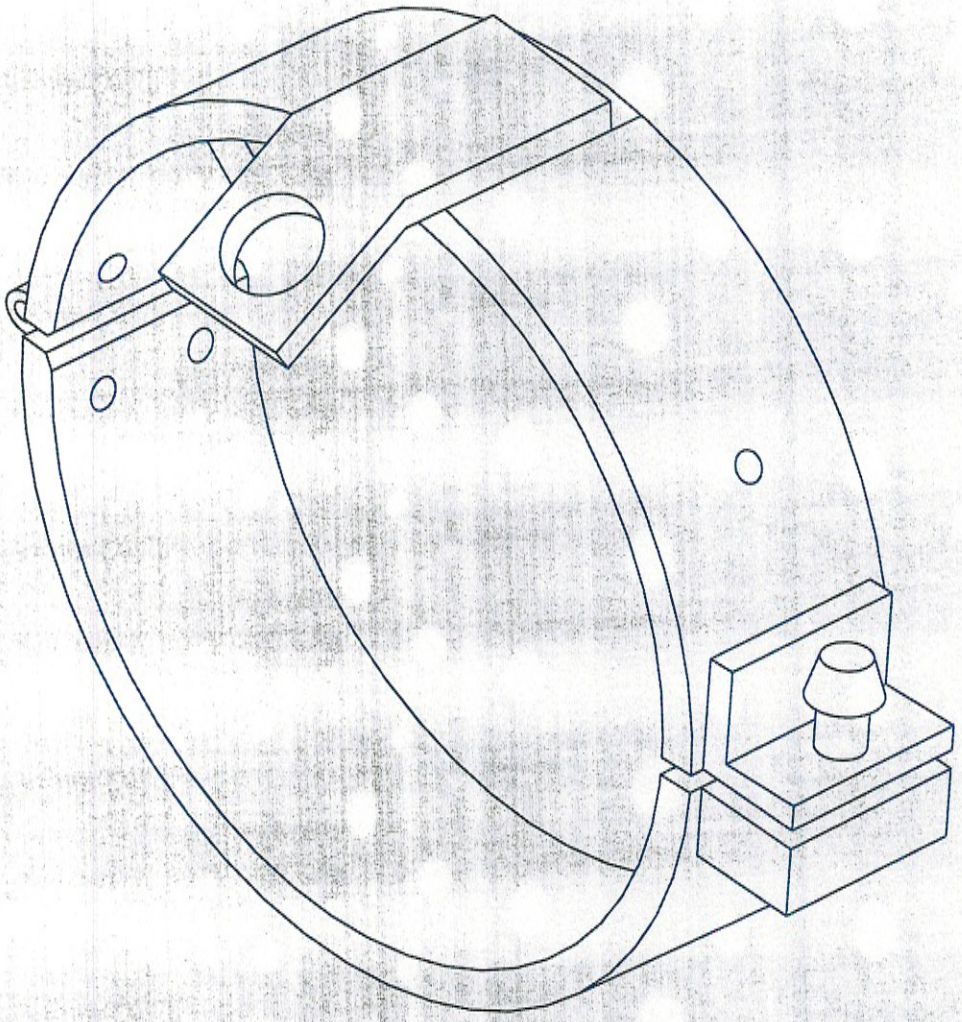
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-37. NULLING FIXTURE, 70700-20675-041

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1015



DESCRIPTION: The photocell bracket is used in balancing engine output shafts. The bracket is attached to forward support tube assembly, to provide a location to install a photocell sensor to measure shaft rotational speed.

POWER REQUIREMENTS: Not Applicable

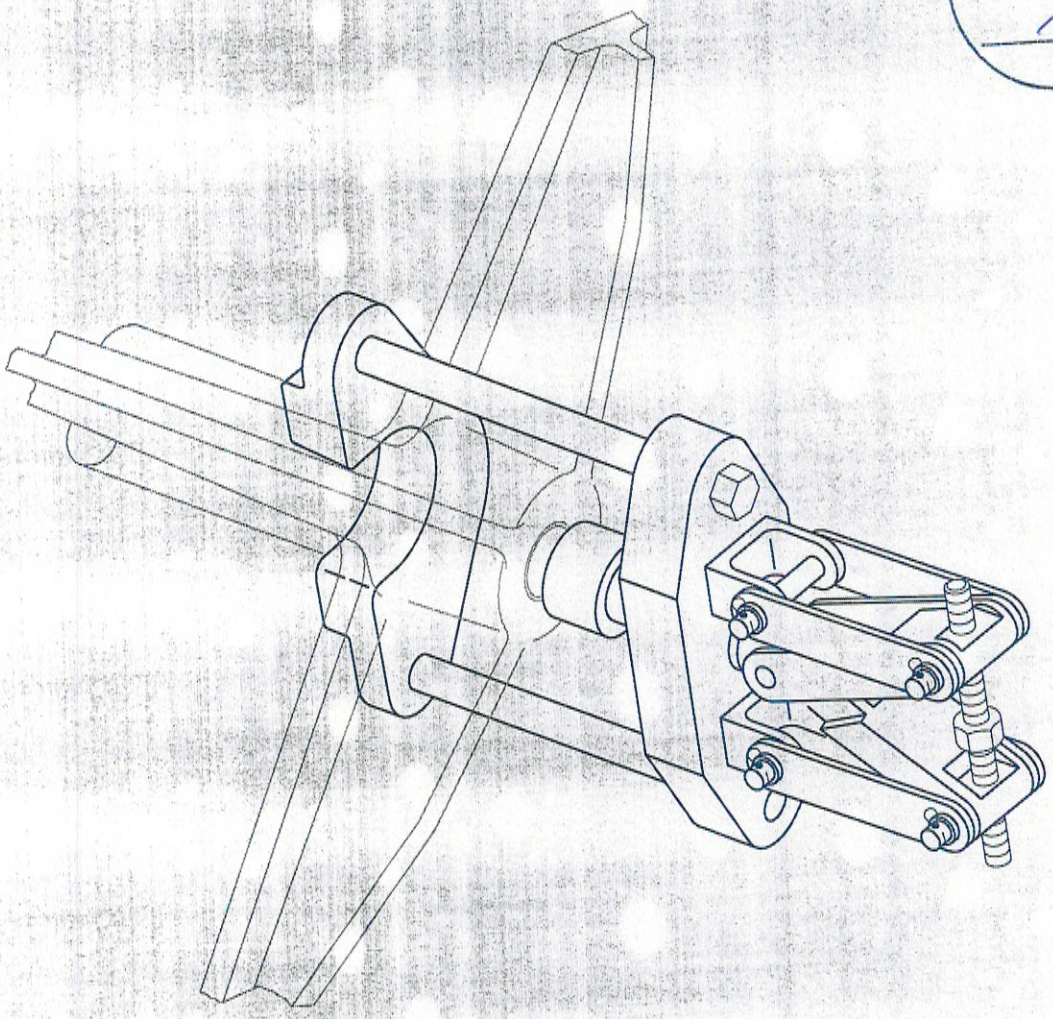
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-38. PHOTOCELL BRACKET, 70700-20114-044

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1016



DESCRIPTION: The pitch beam puller is a mechanical puller, used to remove pitch beam from pitch change shaft on tail gear box.

POWER REQUIREMENTS: Not Applicable

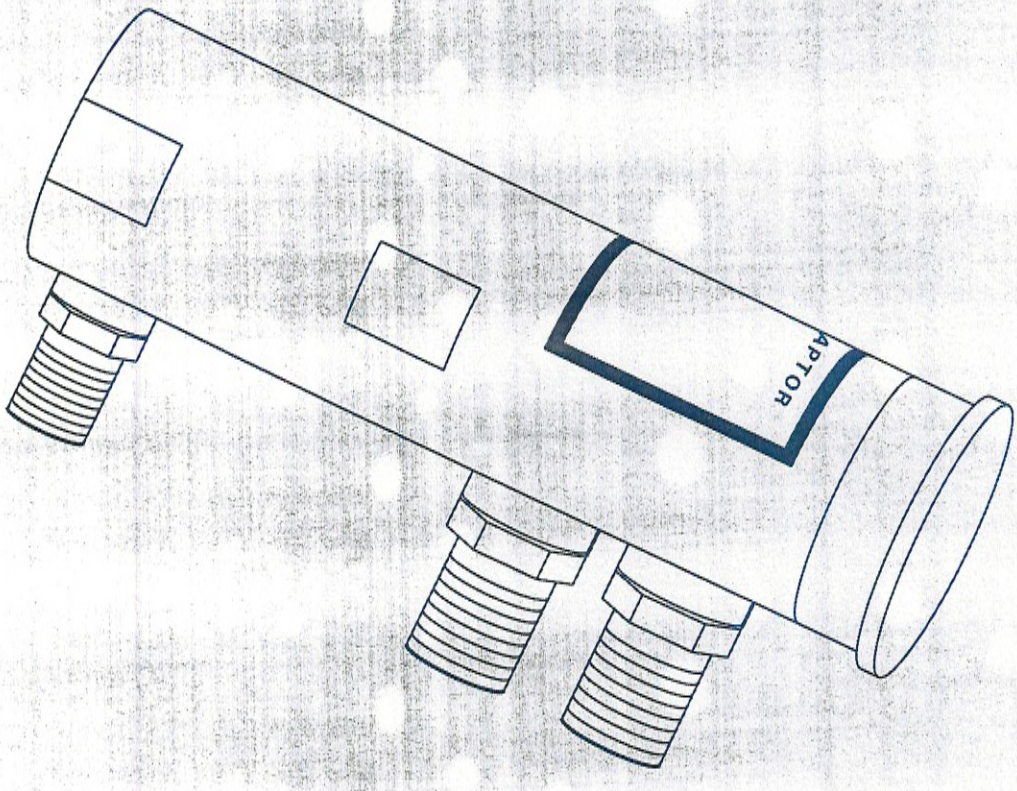
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-39. PITCH BEAM PULLER, 70700-77389-041

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1017



DESCRIPTION: The pitot pressure adapter consists of a pressure sleeve that conforms to the contour of pitot / static heads, with replaceable ring seals to provide air tightness when pressure / temperature test set is installed.

POWER REQUIREMENTS: Not Applicable

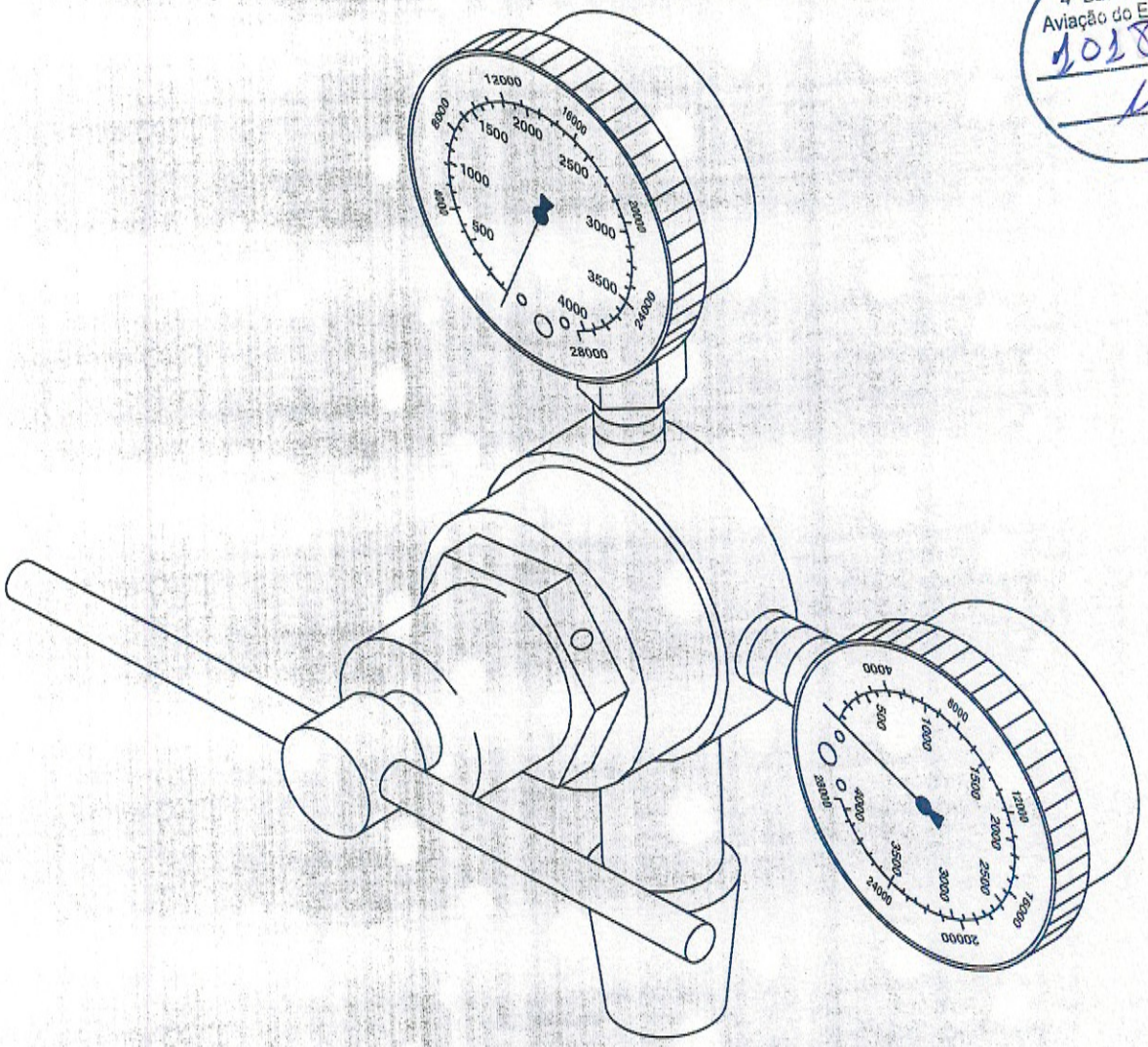
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-40. PITOT PRESSURE ADAPTER, 884DB

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DESCRIPTION: The pressure regulator is used to read servicing pressures when servicing helicopter shock struts, tires, and hydraulic reservoirs.

POWER REQUIREMENTS: Not Applicable

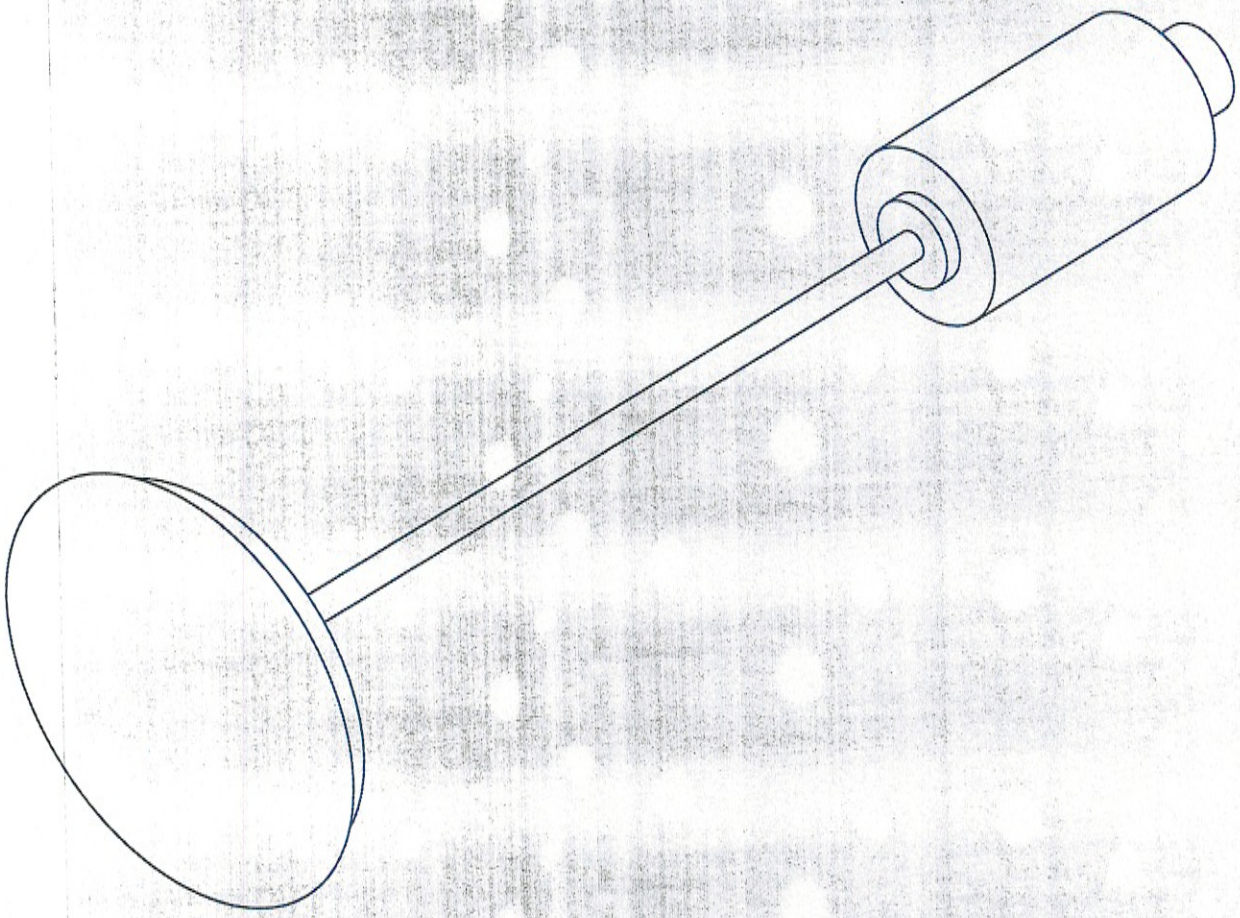
CALIBRATION REQUIREMENTS: Anually.

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FIGURE C-41. PRESSURE REGULATOR, 14-6804-6000

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DESCRIPTION: The APU combustor puller is designed to be used with combustor puller adapter, ST9314 to prevent damage to combustor section during separation of APU combustor.

POWER REQUIREMENTS: Not Applicable

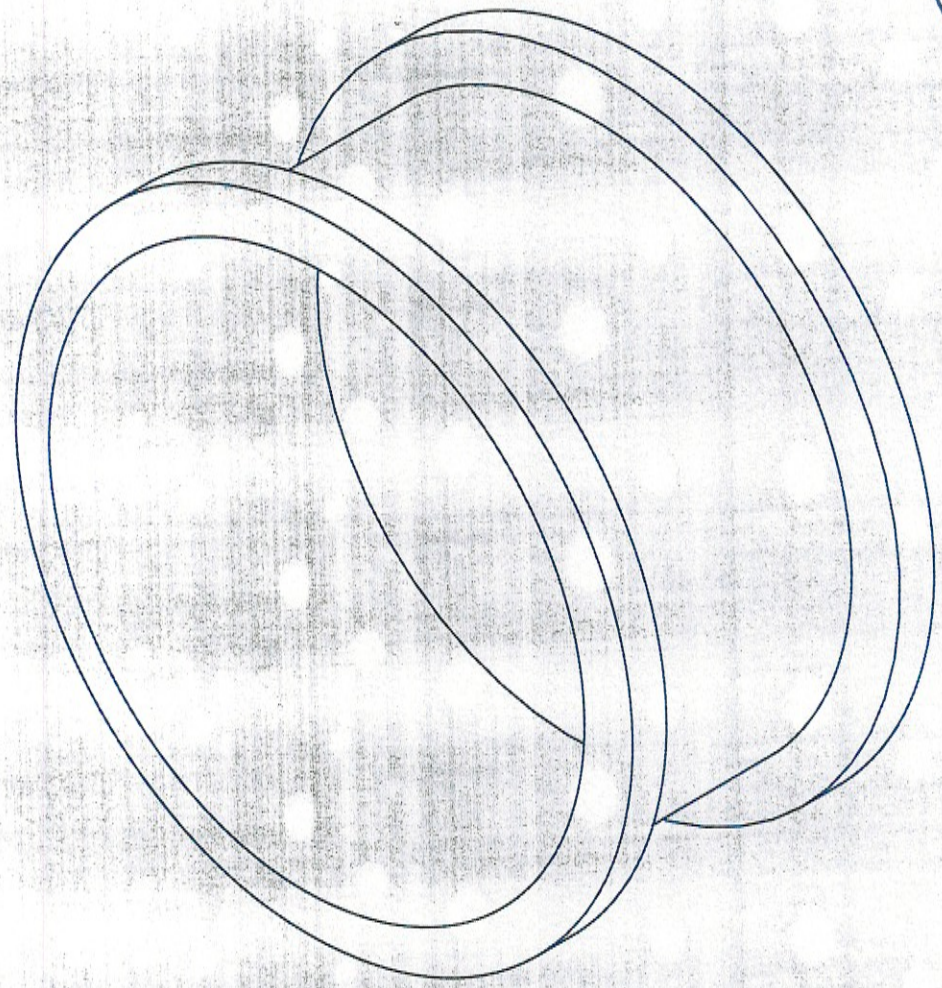
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-42. APU COMBUSTOR PULLER, ST 91125

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DESCRIPTION: The APU combustor adapter is designed to be used with APU combustor puller, ST 91125 to prevent damage to combustor section during separation of APU combustor.

POWER REQUIREMENTS: Not Applicable

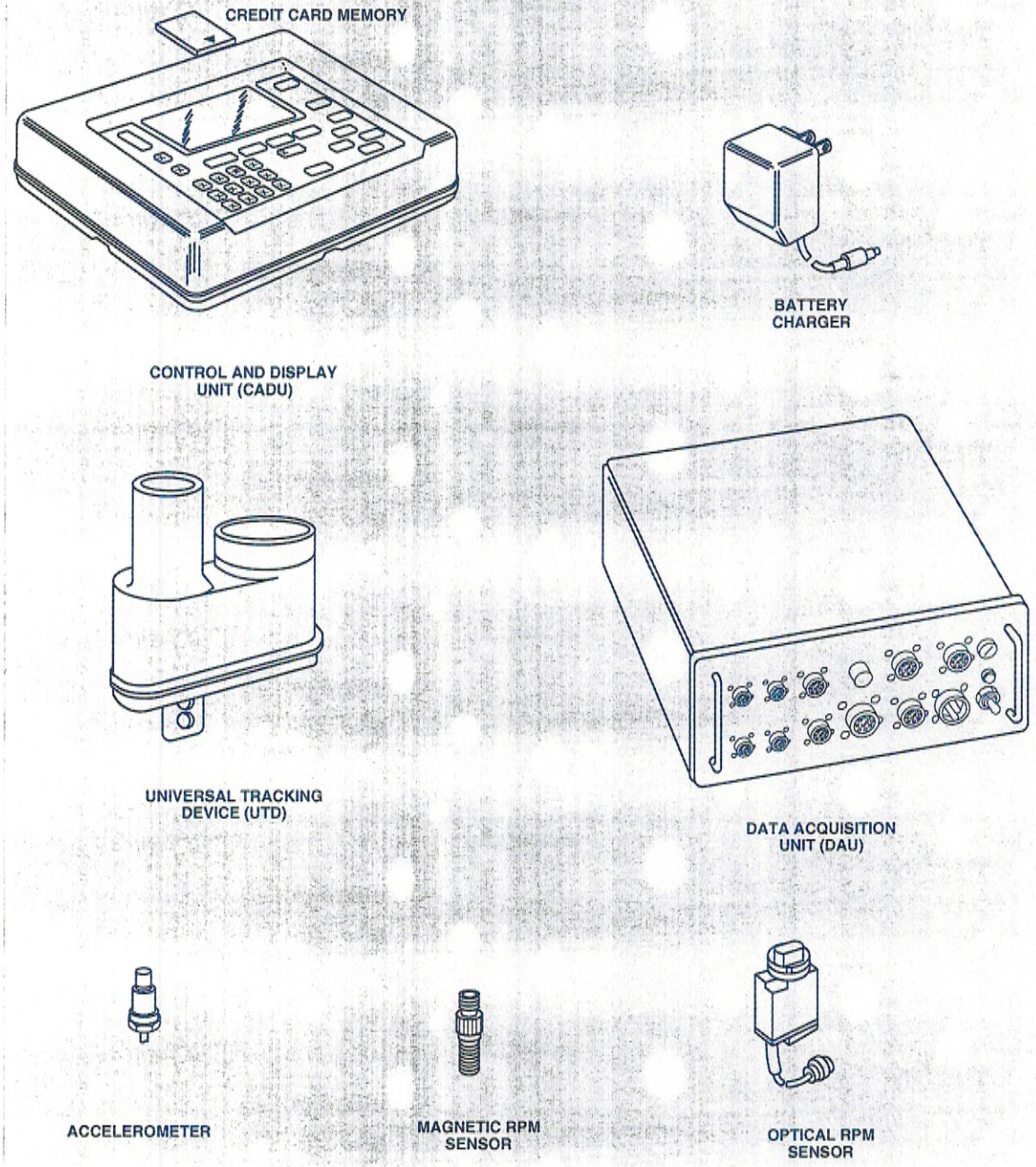
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-43. APU COMBUSTOR ADAPTER, ST 93014

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1022



DESCRIPTION: The RADS–AT is a portable test set, weighing less than 25 pounds, which contains sophisticated measurement technology that operates with a minimum of in–flight control, using fast parallel data acquisition techniques to reduce flight test time. The RADS–AT utilizes a diagnostic programming language in an OS–9 environment to provide a high level, easy to use method of performing rotor vibration analysis. The automatic

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FIGURE C-44. RADS-AT VIB ANALYZER, 29313100 (SHEET 1 OF 2)

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DESCRIPTION: (CONT)

blade tracking is a universal tracking device which can be used in daylight or at night, it contains a data acquisition unit (DAU) which processes the tracker and vibration signals, a handheld control and display unit (CADU), to control data acquisition, display measurements and analysis results, print reports, and transfer data to or receive data from an off-line computer.

POWER REQUIREMENTS: 17-36 VDC (DAU), 12 VDC (CADU)

CALIBRATION REQUIREMENTS:

FREQENCY
The RADS-AT vib analyzer must be calibrated every 24 weeks regardless of being used or not.

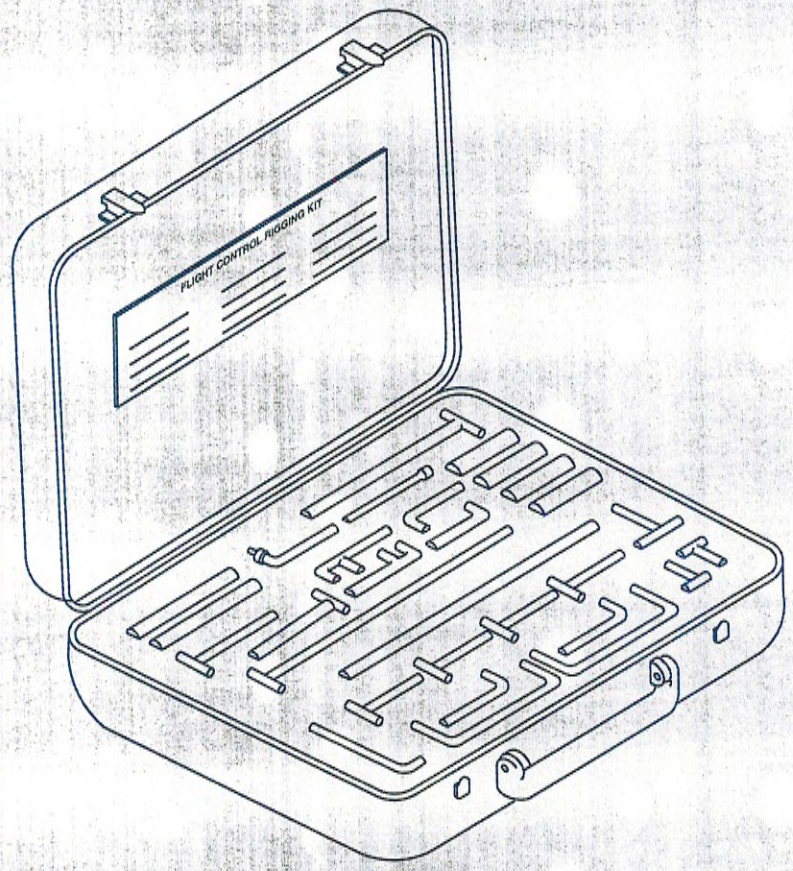
CALIBRATION PROCEDURES
Refer to manufacturer's maintenance manual for calibration procedures.

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FIGURE C-44. RADS-AT VIB ANALYZER, 29313100 (SHEET 2 OF 2)

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1023



DESCRIPTION: The rigging set is used to hold the flight control system at a predetermined position to ensure proper adjustment of controls. The rigging set contains rig pins with red flags attached to ensure removal of all pins and blocks from flight control system.

POWER REQUIREMENTS: Not Appliciable

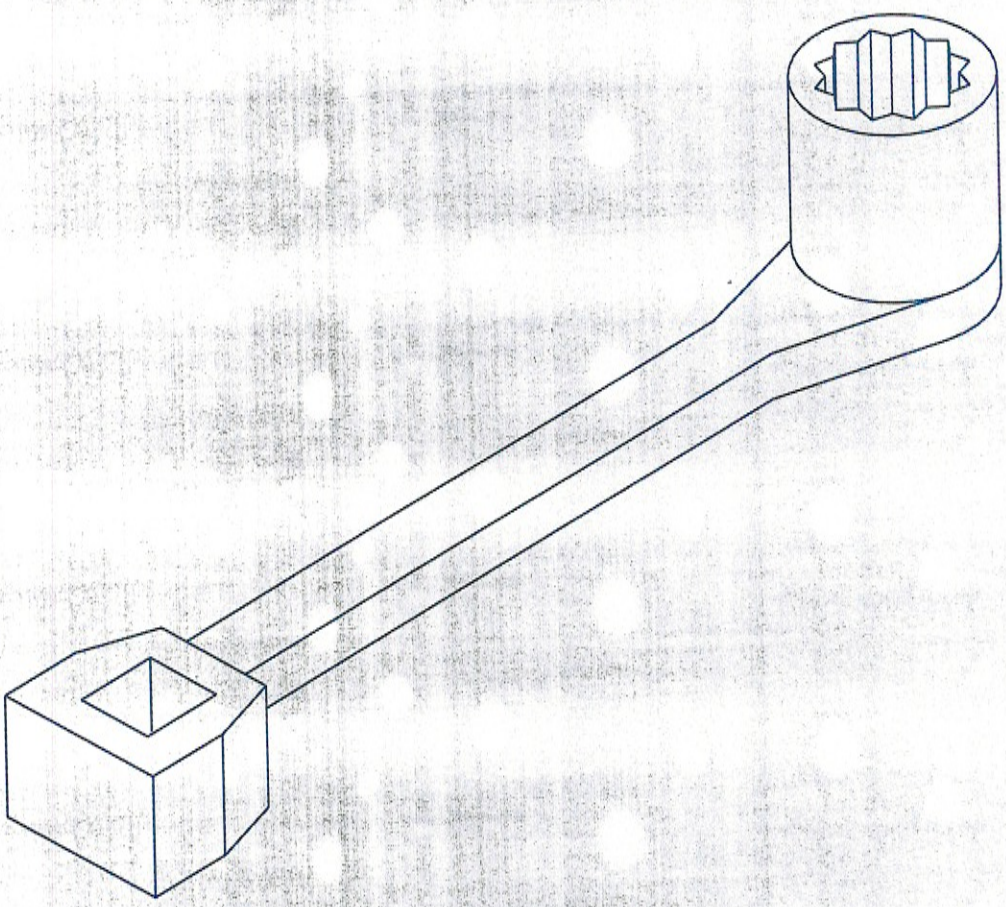
CALIBRATION REQUIREMENTS: Not Appliciable

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FIGURE C-45. FLIGHT CONTROL RIGGING SET, 70700-20389-042

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V



DESCRIPTION: The rotor brake wrench is used to check required torque on mounting nuts, rotor brake to main module, without disassembling a major portion of the rotor brake assembly.

POWER REQUIREMENTS: Not Applicable

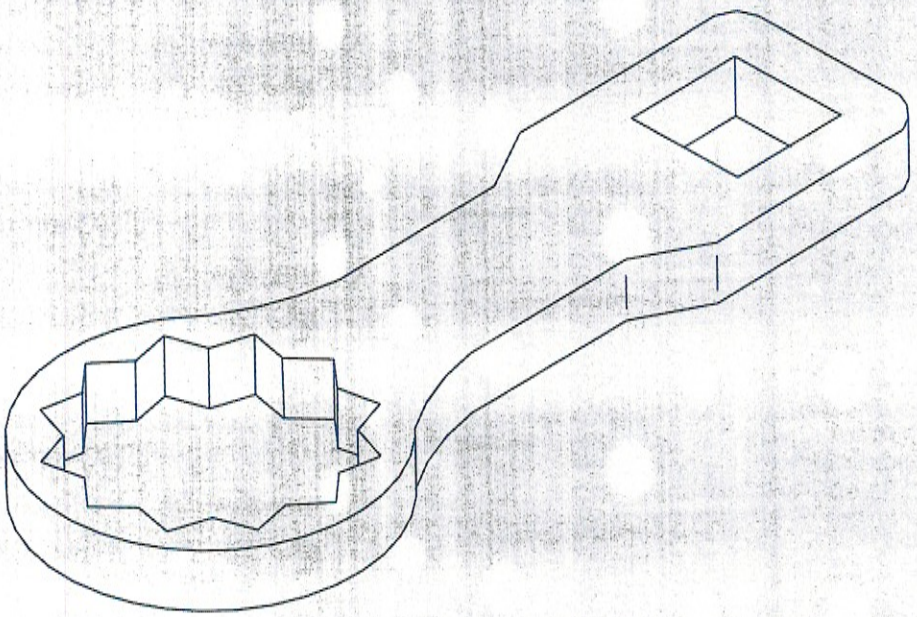
CALIBRATION REQUIREMENTS: Not Applicable

FB1028
SA

FIGURE C-46. ROTOR BRAKE WRENCH, 70700-77117-041

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1025



DESCRIPTION: The main rotor head wrench is a special wrench for torquing the rotor head bolts to 1000 inch–pounds of torque, which exceeds the recommended torque limits of standard crowfoot wrench use.

POWER REQUIREMENTS: Not Applicable

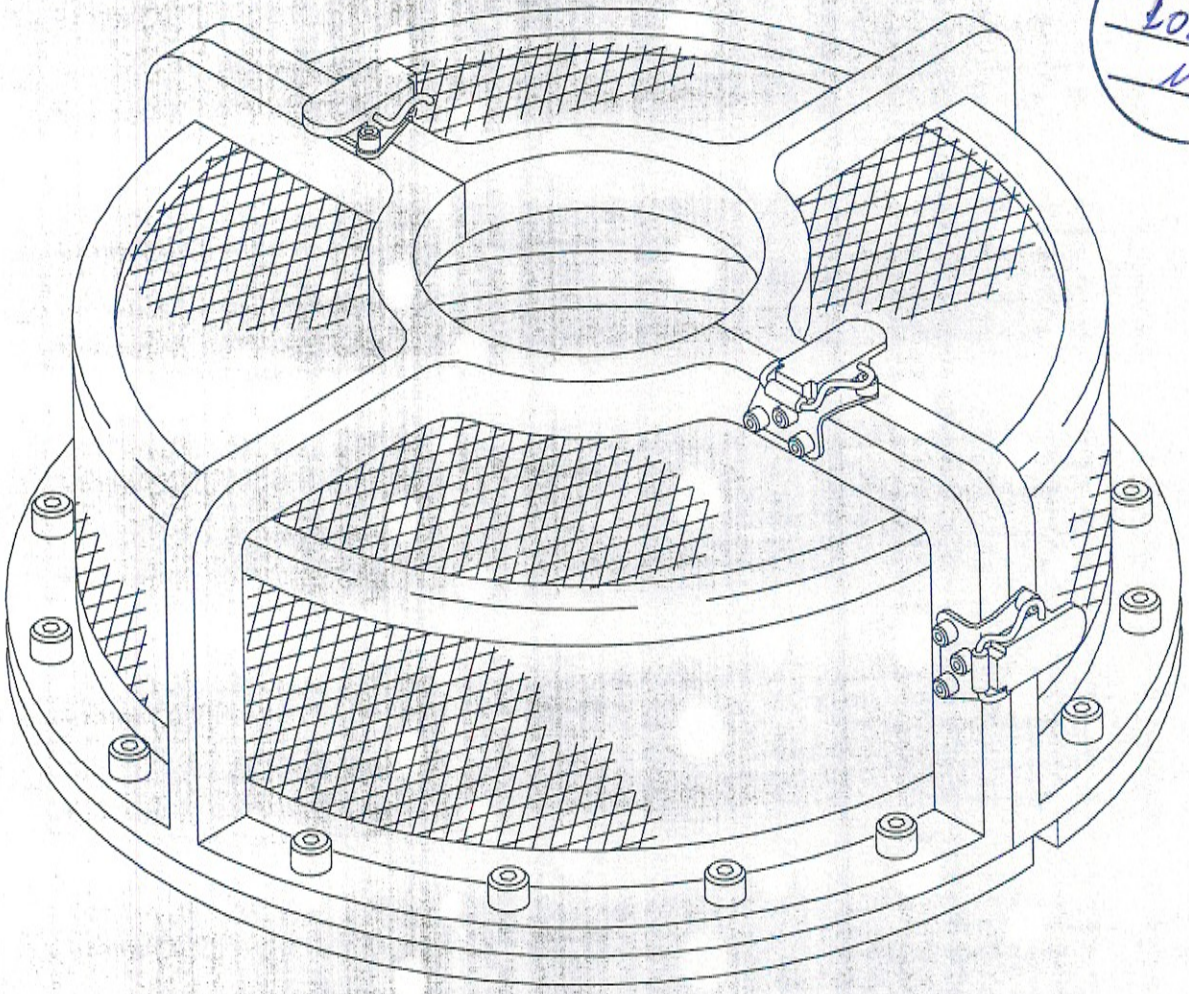
CALIBRATION REQUIREMENTS: Not Applicable

FB1029A
6A

FIGURE C-47. MAIN ROTOR HEAD WRENCH, 70700-20210-101

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DESCRIPTION: The engine inlet screen is used when the engine inlet is removed to expose output shaft when performing shaft balance. The screen assembly is clamped to front of engine to prevent ingestion of foreign objects into engine during run up and balancing of engine output shaft.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

BEFORE-AND-AFTER USE INSPECTION:

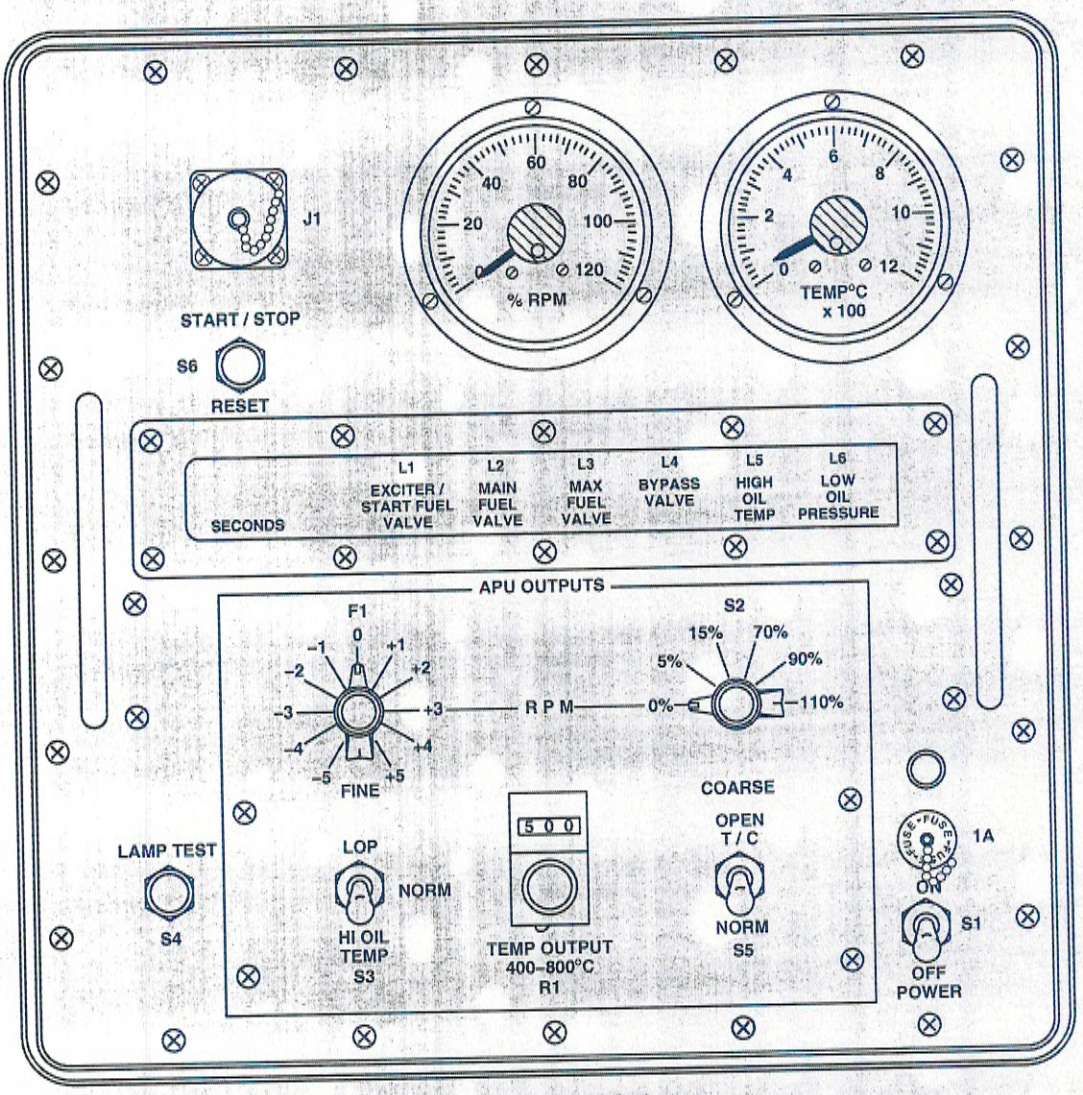
1. Inspect screen for general condition and overall damage.
2. Inspect screen for distortion, delamination, and corrosion.
3. Inspect bolts for security and looseness.
4. Inspect latches for damage and proper function.
5. NO DAMAGE ALLOWED. If damage is evident, repair any damage or replace screen prior to next use.

FB4782
9A

FIGURE C-48. ENGINE INLET SCREEN, 70700-20222-044

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Aviação do Exér
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DESCRIPTION: The APU simulator test set temp / speed, simulates the auxiliary power unit (APU) when statically testing the electronic sequencing unit (ESU) of the helicopter. The test set provides selectable frequency, temperature output signals, contacts to simulate low oil pressure, high oil temperature and open thermo-couple conditions. Six lamps (L1–L6) monitor the closing of six switches in the ESU. The test set also monitors APU temperature and RPM during dynamic testing of the APU.

POWER REQUIREMENTS: 28 volts DC, 1 amp

CALIBRATION REQUIREMENTS:

FREQUENCY
APU simulator test set must be calibrated every 24 weeks regardless of being used or not.

FB1134_1
9A

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 1 OF 6)

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CALIBRATION REQUIREMENTS: (CONT)

EQUIPMENT REQUIRED

- Frequency Generator, Wavetek 130, 0 to 6K Hz (para 5–8), ± 0.05% of setting for 10 minutes
- Frequency Counter, General Radio Co. 1192, dc to 32 megaHz, ±1 count
- Oscilloscope, Hewlett–Packard Co. 1 30C, sweep: 0.1 ms / cm ±3%, vertical: 1v / cm ±3%
- Digital Multimeter, Data Technology Corp. 370, 100 mvdc, ± 0.003% rdng ± 0.004% fsc, 100.000 ohms, ± 0.006% rdng ± 0.004% fsc
- Ice–Bath Reference Junction, Howell Instruments BH14106, ± 0.25°C
- Voltage Reference, General Resistance, 0 to 50 mvdc, ± 0.0025% of setting +5uv

CALIBRATION PROCEDURE

Inspect

1. Inspect test set for physical damage, dirt, loose, and broken knobs. Clean and repair as required.

CALIBRATION

Initial Switch Positions

1. Turn power switch to off, FINE RPM switch to 0, COARSE RPM switch to 0%, OPEN T / C–NORM switch to NORM, and LOP–HI OIL TEMP switch to NORM.

Functional Checks

1. Continuity Tests. Connect a VOM between pins N and K of receptacle J1. VOM shall show continuity when switch S3 is in NOR or HI OIL TEMP positions and shall show an open circuit when switch is in LOP position.
2. Connect VOM between pins N and M of J1. VOM shall show continuity when S3 is in NORM or LOP positions and shall show open circuit when S3 is in HI OIL TEMP position.
3. Use VOM and test cable schematics in Section VI to check cable continuity.
4. Using a 28 VDC power supply rated 1.5 amps or more, apply 28 VDC to terminals shown in Table 1. Corresponding lamps shall light.

Table 1. Lamp Test Table

RECEPTACLE J1 PIN		LAMP	S3 POSITION
+28 VDC	28 VDC RTN		
S	T	L1	NORM
P	T	L2	NORM
R	T	L3	NORM
V	W	L4	NORM
b&c&N	T	L5	HI OIL TEMP
b&c&N	T	L6	LOP

5. Power Up Tests. Connect 28 VDC power supply to J1, N(+) and T(–). Also jumper +28 VDC to pins b and c. Connect a jumper (see note) between J1–B and J1–a.

NOTE:

Jumper should be 1–inch or less in length.

6. Turn POWER switch on. Power lamp shall light.
7. Press LAMP TEST switch. Lamps L1–L6 shall light.
8. Momentarily remove 28 VDC from J1, pin b. L5 shall light.
9. Momentarily remove 28 VDC from J1, pin c. L6 shall light.

FB1134_2B
8A

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 2 OF 6)

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CALIBRATION REQUIREMENTS: (CONT)

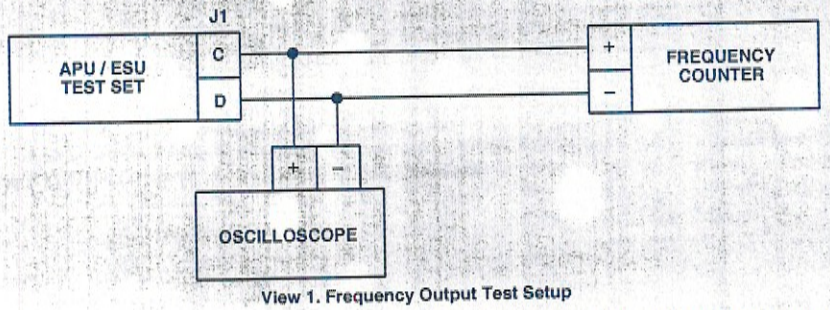
CALIBRATION (CONT)
Accuracy Checks

1. Timer Accuracy. Observe the second hand of a watch and press Start / Stop–Reset switch to start timer. Press switch again to stop timer after 95 seconds have elapsed on watch. Timer shall read 95 ±3 seconds. Press switch again to reset timer. All timer display segments shall be operative.

2. Remove jumper from J1–B to J1–a and connect it from J1–B to J1–X. See note, step 4, power up test.

3. Repeat step 1.

4. Frequency Output Accuracy. Make frequency output test setup as in view 1.



View 1. Frequency Output Test Setup

5. Check output frequencies of Table 2. (4666 Hz = 100% RPM) against the switch positions. Output voltage at 70% rpm shall be at least 8 volts peak–to–peak.

6. Remove jumper from J1–B to J1–X and connect it from J1–B to J1–a. See note, step 4, power up test.

7. Check output frequencies of Table 2 (4800 Hz = 100% RPM) against the switch positions. Output voltage at 70% rpm shall be at least 8 volts peak–to–peak.

8. Frequency Input Accuracy. Jumper J1–Z to J1–Y. See note, step 4, power up test.

9. Disconnect frequency output test setup from test set and make frequency input test setup as in View 2.

10. Check %RPM meter accuracy (4800 Hz = 100% RPM) per Table 3. Lightly tap meter before taking a reading to minimize pointer friction.

Table 2. Frequency Output Test Table

COARSE SWITCH S2	FINE SWITCH F1	OUTPUT FREQUENCY 4666 Hz = 100% RPM (Hz ±TOL)	OUTPUT FREQUENCY 4800 Hz = 100% RPM (Hz ±TOL)
0%	any position	0 ± 0.00	0 ± 0.00
5%	0	233.3 ± 0.47	240 ± 0.48
5%	+5	466.6 ± 0.93	480 ± 0.96
5%	–4	46.66 ± 0.09	48 ± 0.096
5%	–5	46.66 ± 0.09	48 ± 0.096
15%	0	699.9 ± 1.40	720 ± 1.44
70%	0	3266.2 ± 6.53	3360 ± 6.72
90%	0	4199.4 ± 8.40	4320 ± 8.64
110%	0	5132.6 ± 10.27	5280 ± 10.56
110%	–5	4899.3 ± 9.80	5040 ± 10.08
110%	–4	4945.96 ± 9.89	5088 ± 10.18
110%	–3	4992.62 ± 9.99	5136 ± 10.27
110%	–2	5039.28 ± 10.08	5184 ± 10.37
110%	–1	5085.94 ± 10.17	5232 ± 10.46
110%	+1	5179.26 ± 10.36	5328 ± 10.66
110%	+2	5225.92 ± 10.45	5376 ± 10.75
110%	+3	5272.58 ± 10.55	5424 ± 10.85
110%	+4	5319.24 ± 10.64	5472 ± 10.94
110%	+5	5365.9 ± 10.73	5520 ± 11.04

FB1134_3A
8A

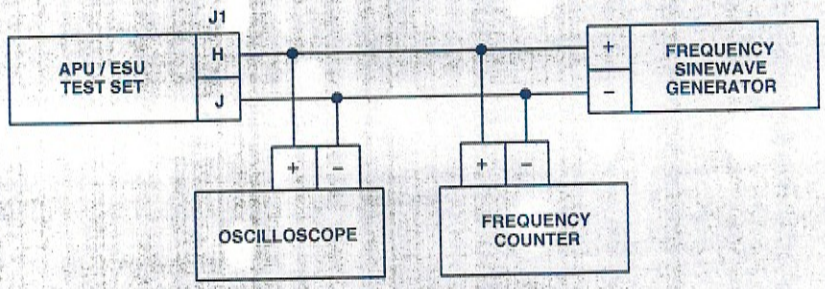
FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 3 OF 6)

This document contains export-controlled information. See WARNING on first page.

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CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION (CONT)
Accuracy Checks (cont)



View 2. Frequency Input Test Setup

11. Remove jumper from J1–Z to J1–Y.

12. Check % RPM meter accuracy (4666 Hz = 100% RPM) per Table 3. Lightly tap meter before taking a reading to minimize pointer friction.

Table 3. Frequency Input Test Table

FREQUENCY 4800 Hz = 100% RPM (3V P–P MIN)	FREQUENCY 4666 Hz = 100% RPM (3V P–P MIN)	% RPM METER (% RPM ± 2% RPM)
0	0	0
480	466.6	10
960	933.2	20
1440	1399.8	30
1920	1866.4	40
2400	2333.0	50
2880	2799.6	60
3360	3266.2	70
3840	3732.8	80
4320	4199.4	90
4800	4666.0	100
5280	5132.6	110

13. Temperature Output Accuracy. Disconnect frequency input test setup from test set and make temperature output test setup as in View 3.

14. Use Table 4 to check the temperature output voltages against the TEMP OUTPUT dial settings.

FB1134_4
8A

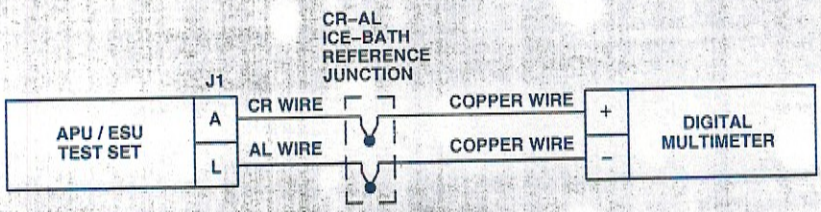
FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 4 OF 6)

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CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION (CONT)
Accuracy Checks (cont)



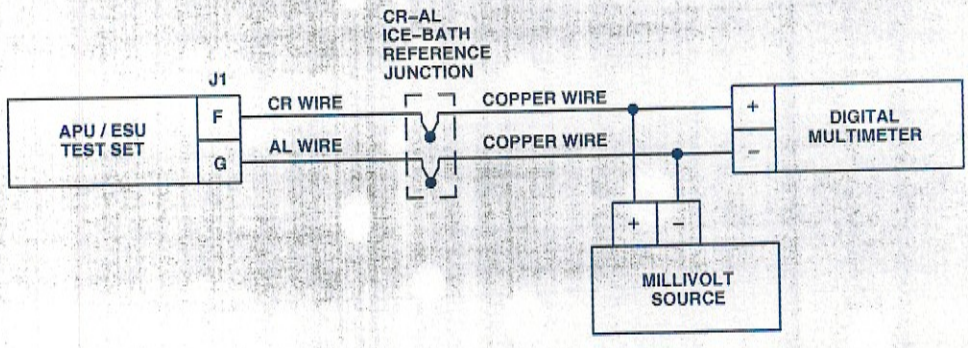
View 3. Temperature Output Test Setup

Table 4. Temperature Output Test Table

TEMP OUTPUT (°C)	TEMPERATURE OUTPUT (MVDC ± 0.21)
400	16.40
500	20.65
600	24.91
700	29.14
800	33.30

15. Momentarily position switch S5 to OPEN T / C position. Digital multimeter shall display 0 mvdc (open circuit).

16. Temperature Input Accuracy. Disconnect temperature output test setup from test set and make temperature input test setup as in View 4.



View 4. Temperature Input Test Setup

FB1134_5
EA

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 5 OF 6)

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CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION (CONT)
Accuracy Checks (cont)

17. Check TEMP °c x 100 meter accuracy per Table 5. Lightly tap meter before taking a reading to minimize pointer friction.

Table 5. Temperature Input Test Table

MILLIVOLT OUPUT (MVDC)	TEMP °C METER (°C ± 20 °C)
0.00	0
4.10	100
8.13	200
12.21	300
16.40	400
20.65	500
24.91	600
29.14	700
33.30	800
37.36	900
41.31	1000
45.16	1100
48.89	1200

18. Set all POWER switches to OFF and disconnect the test set–up.

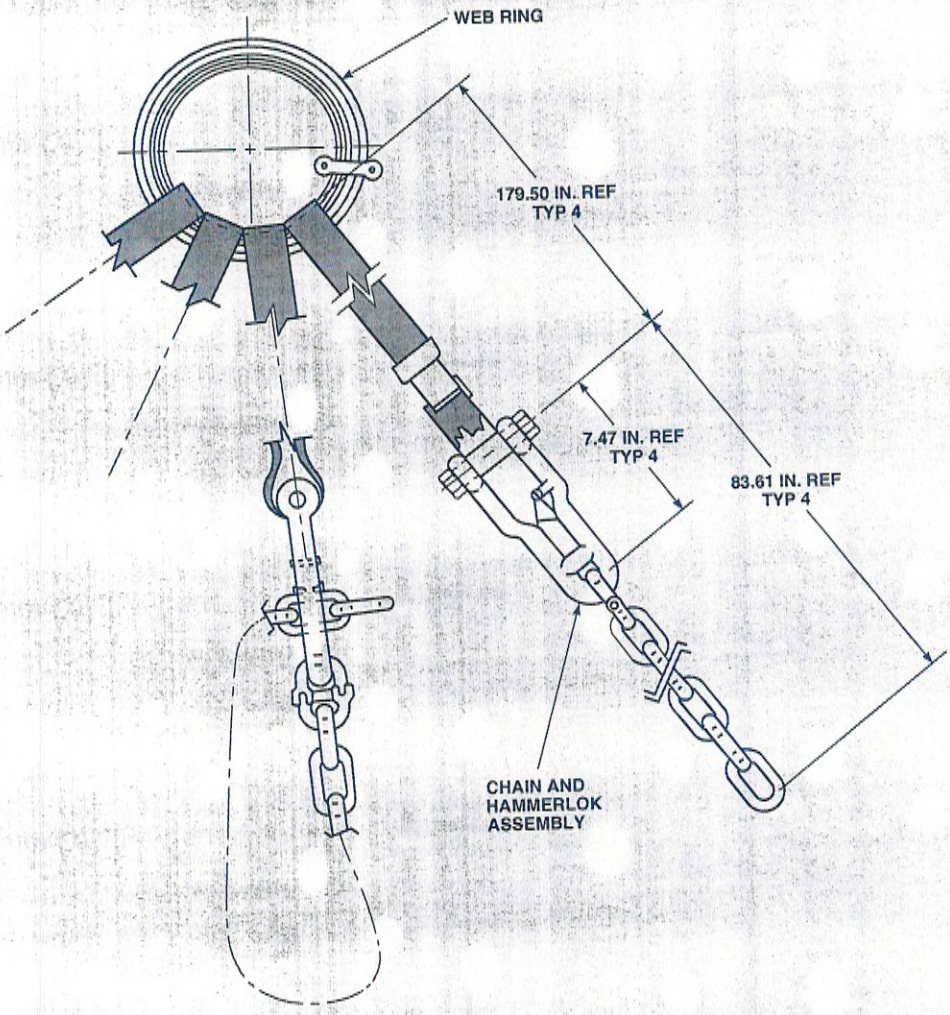
19. Clean and secure test equipment per prescribed lab practice and affix the appropriate calibration label.

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6A

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 6 OF 6)

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DESCRIPTION: The cargo sling assembly is used to transport an external load of cargo or equipment. The cargo sling assembly has a load capacity of 15000 pounds.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

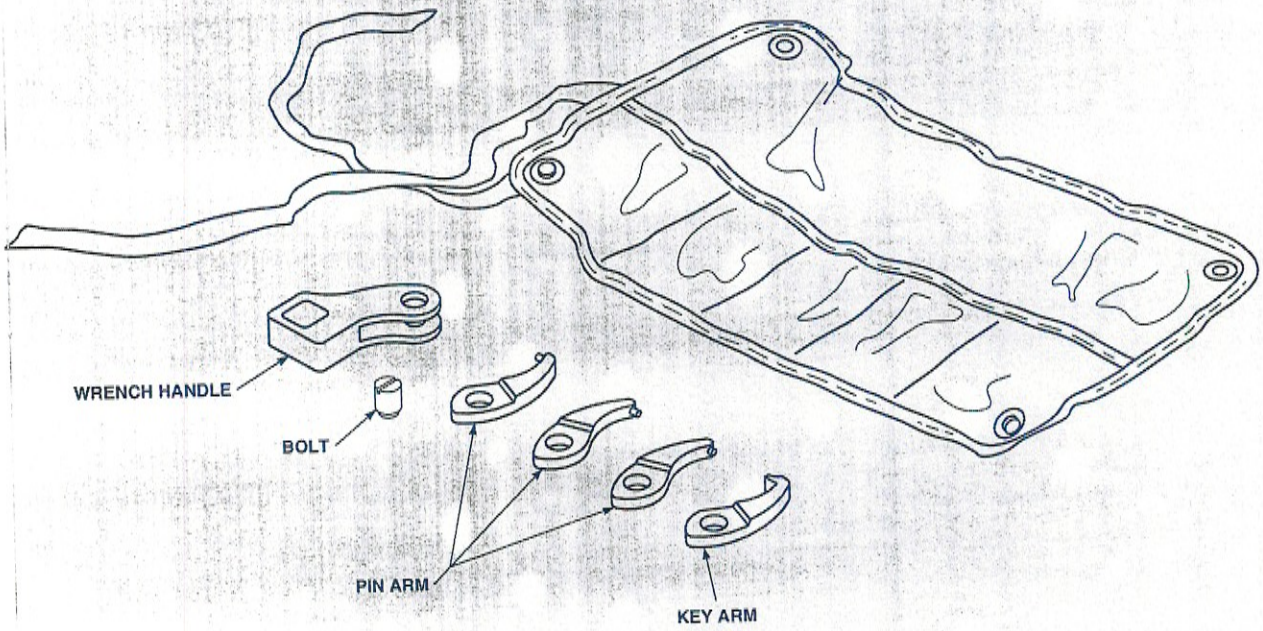
FB1135A
8A

FIGURE C-50. CARGO SLING ASSEMBLY, 3900061 OR XB-4-20-16

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AN PART NO.	ITEM	PIN DIMENSION	
		LENGTH ±.005	DIA ±.003
AN8514–1	COMPLETE SET (AN8514–2 TO AN8514–7 INCL)		
AN8514–2	WRENCH HANDLE		
AN8514–3	BOLT		
AN8514–4	.09 PIN ARM	.060	.089
AN8514–5	.12 PIN ARM	.120	.121
AN8514–6	.19 PIN ARM	.190	.183
AN8514–7	KEY ARM		



DESCRIPTION: The spanner wrench set is used on main gear box and main rotor head to remove bearing seal retaining nuts.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

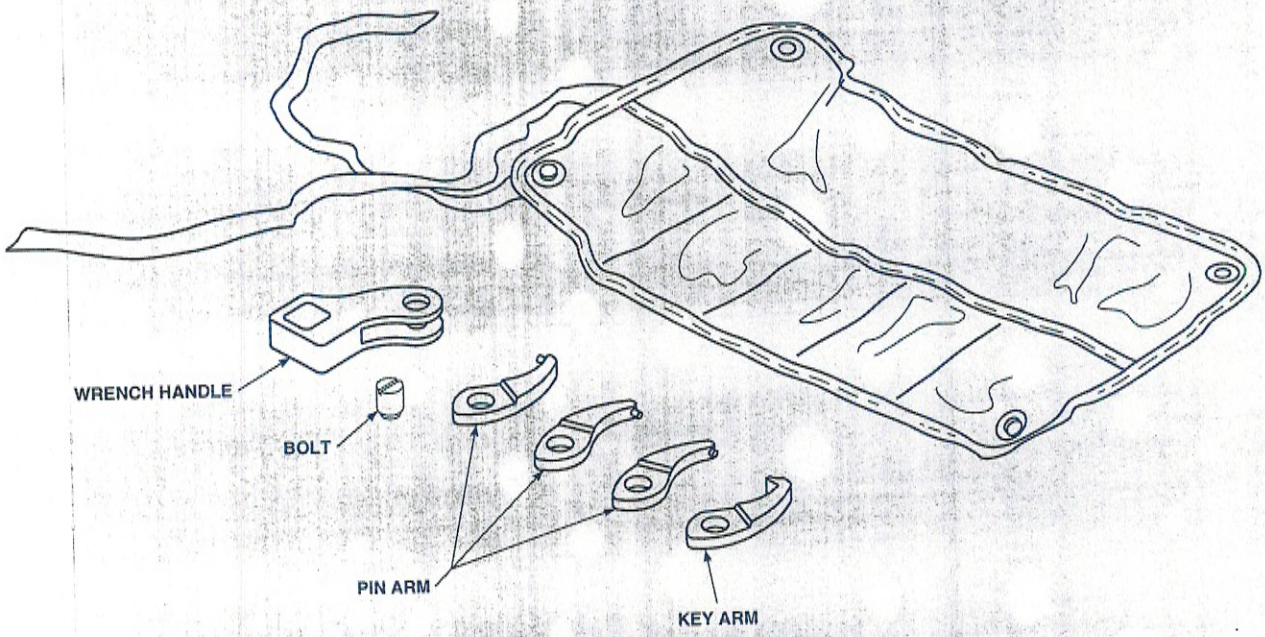
FB1031
6A

FIGURE C-51. SPANNER WRENCH SET, AN8514-1

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AN PART NO.	ITEM	PIN DIMENSION	
		LENGTH ±.005	DIA ±.003
AN8515–1	COMPLETE SET (AN8515–2 TO AN8515–7 INCL)		
AN8515–2	WRENCH HANDLE		
AN8515–3	BOLT		
AN8515–4	.16 PIN ARM	.160	.152
AN8515–5	.25 PIN ARM	.190	.246
AN8515–6	.31 PIN ARM	.250	.308
AN8515–7	KEY ARM		



DESCRIPTION: The spanner wrench set is used on main gear box and main rotor head to remove bearing seal retaining nuts.

POWER REQUIREMENTS: Not Applicable

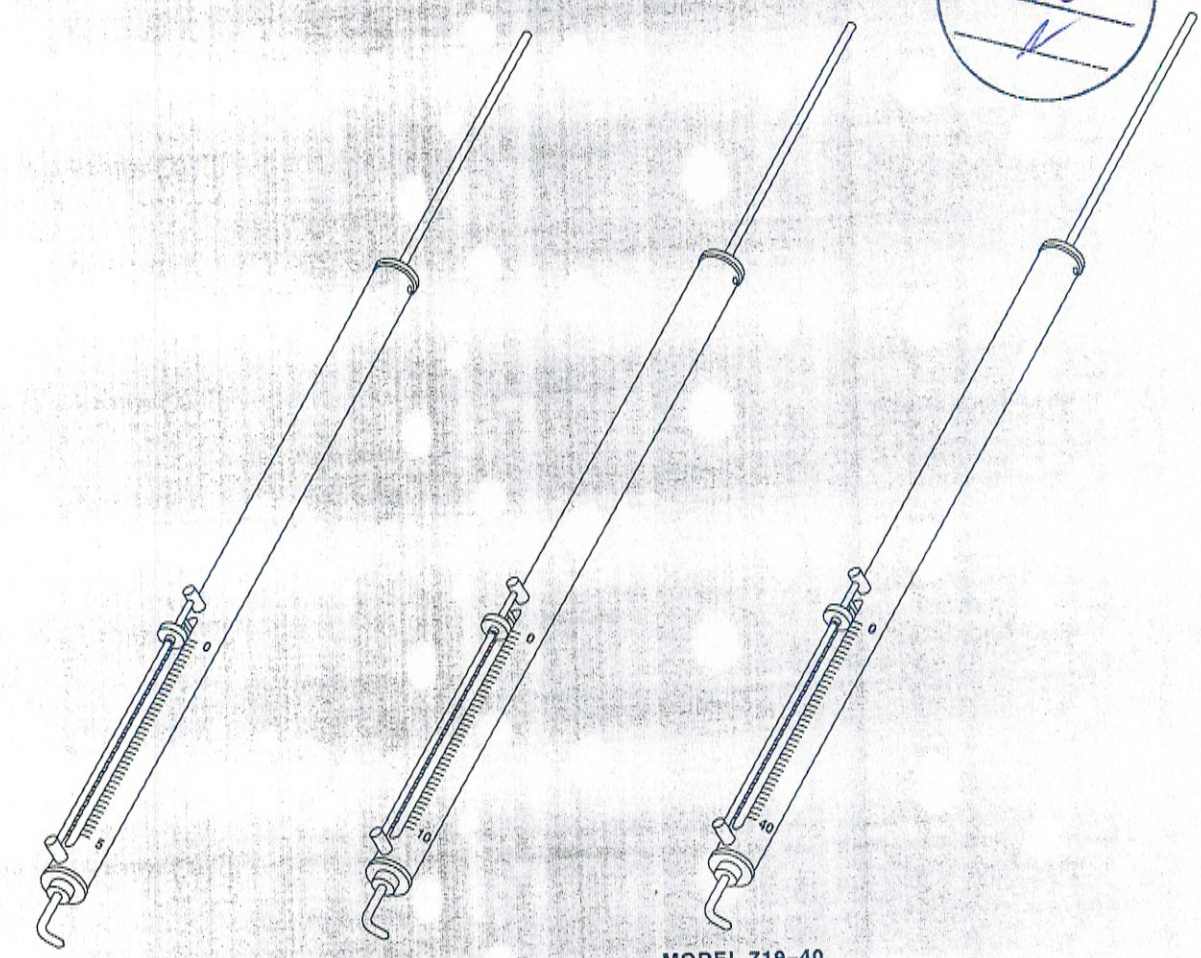
CALIBRATION REQUIREMENTS: Not Applicable

FB1032
8A

FIGURE C-52. SPANNER WRENCH SET, AN8515-1

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MODEL 719-5
0-5 LBS

MODEL 719-10
0-10 LBS

MODEL 719-40
0-40 LBS

DESCRIPTION: The spring testers are portable gages in a variety of sizes, the three described have capacity of 0–5 lbs in graduations of 1 oz., 0–10 lbs in graduations of 2 oz., and 0–40 lbs in graduations of 8 oz. The spring testers are adapted to a variety of uses.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Spring testers must be calibrated every 27 weeks regardless of being used or not.

FB1035_1
8A

FIGURE C-53. SPRING TESTERS, 719-5, 719-10, 719-40 (SHEET 1 OF 2)

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CALIBRATION REQUIREMENTS: (CONT)

EQUIPMENT REQUIRED

- Dead Weights ±.01 LBS.

INSPECTION

Inspect spring tester for any obvious damage, dents, nicks, or missing parts. Check push rod for binding; scale graduations for clear readability.

CALIBRATION

WARNING

Do not load spring tester past its operating range.

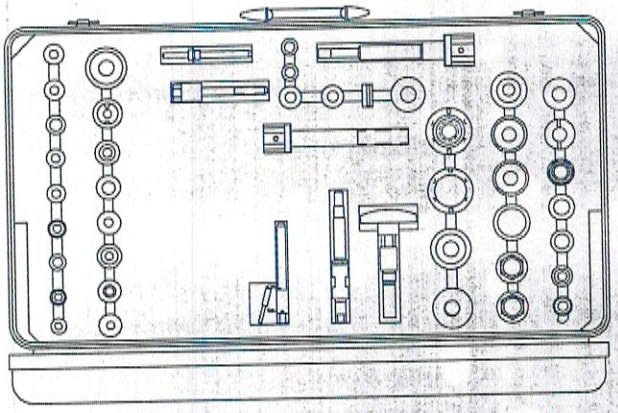
1. Operate spring tester through entire scale range, checking for any binding.
2. Attach dead weights to spring tester and check scale range at five points throughout scale. Scale shall not deviate more than one minor graduation from the dead weight nominal valve. Adjust as required.
3. Adjust spring tester by use of knurled end cap on spring tester. Recheck calibration.

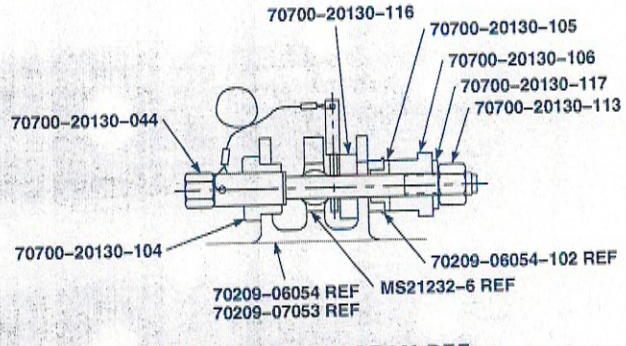
FB1035_2
SA

FIGURE C-53. SPRING TESTERS, 719-5, 719-10, 719-40 (SHEET 2 OF 2)

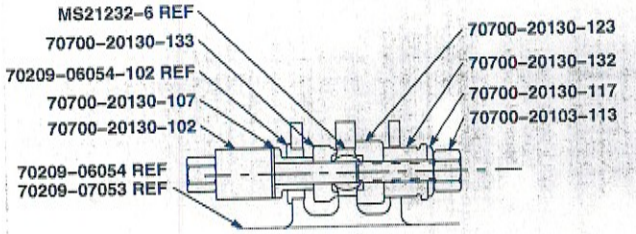
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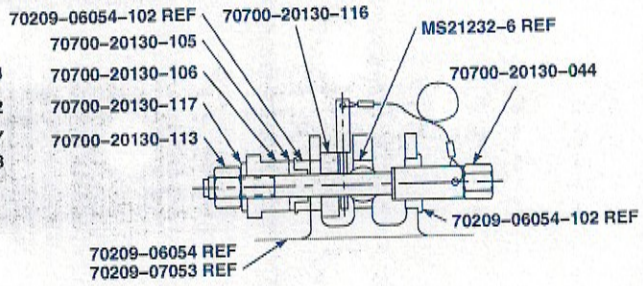




APPLICATION DIAGRAM REF
DUAL BUSHING INSTALLATION 70209-06054-102



APPLICATION DIAGRAM REF
(BEARING STAKING MS21232-6
ONE BUSHING REMOVED)



APPLICATION DIAGRAM REF
(SINGLE BUSHING INSTALLATION 70209-06054-102)

DESCRIPTION: The staking tool kit is used to remove and install bushings in stabilator fittings. The kit contains cutting tools for removing bearings and roll staking tools for installing bearings.

POWER REQUIREMENTS: Not Applicable

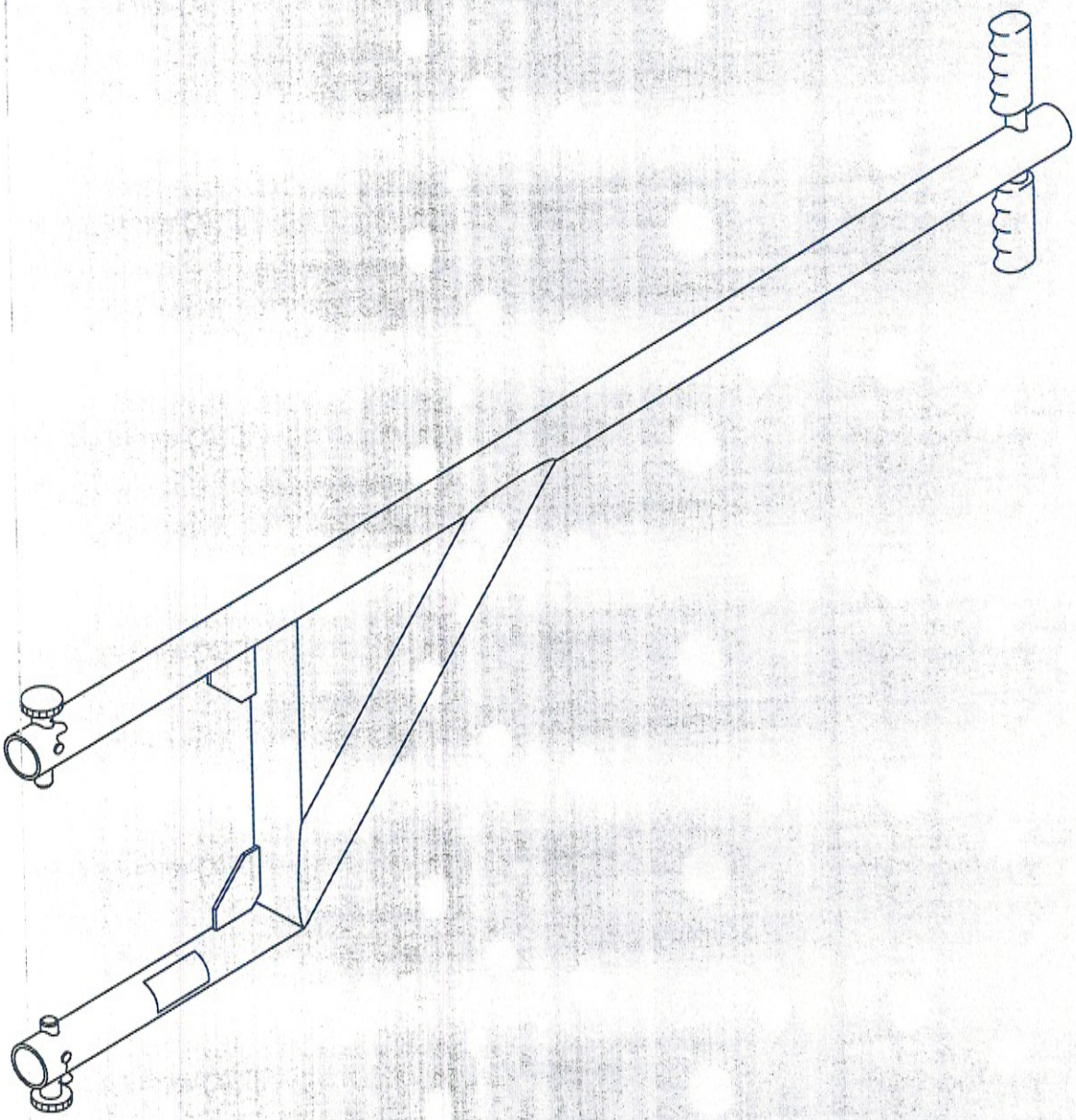
CALIBRATION REQUIREMENTS: Not Applicable

FB1137
SA

FIGURE C-54. STAKING TOOL KIT, STABILATOR FITTINGS, 70700-20129-041

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DESCRIPTION: The steering bar is used by the ground handling crew as a means of maneuvering the helicopter. The steering bar is constructed of welded aluminum tubing with tee handle.

POWER REQUIREMENTS: Not Applicable

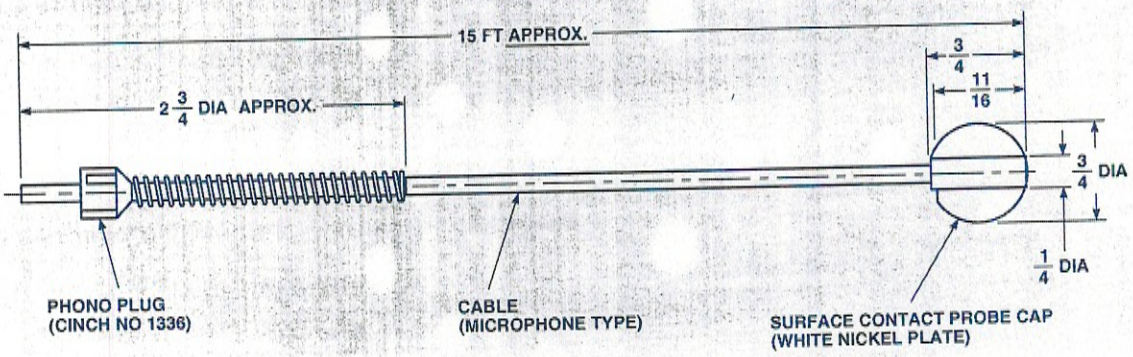
CALIBRATION REQUIREMENTS: Not Applicable

FB1138
SA

FIGURE C-55. STEERING BAR, 70700-20374-041

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DESCRIPTION: The surface probe is used to determine if engine anti-ice and windshield anti-ice are operative within designed temperature limits. The engine inlet cycles between 100°F and 130°F minimum to 196°F maximum in operation. The windshield cycles in low mode 84°F to 110°F, high mode 90°F to 125°F.

POWER REQUIREMENTS: Not Applicable

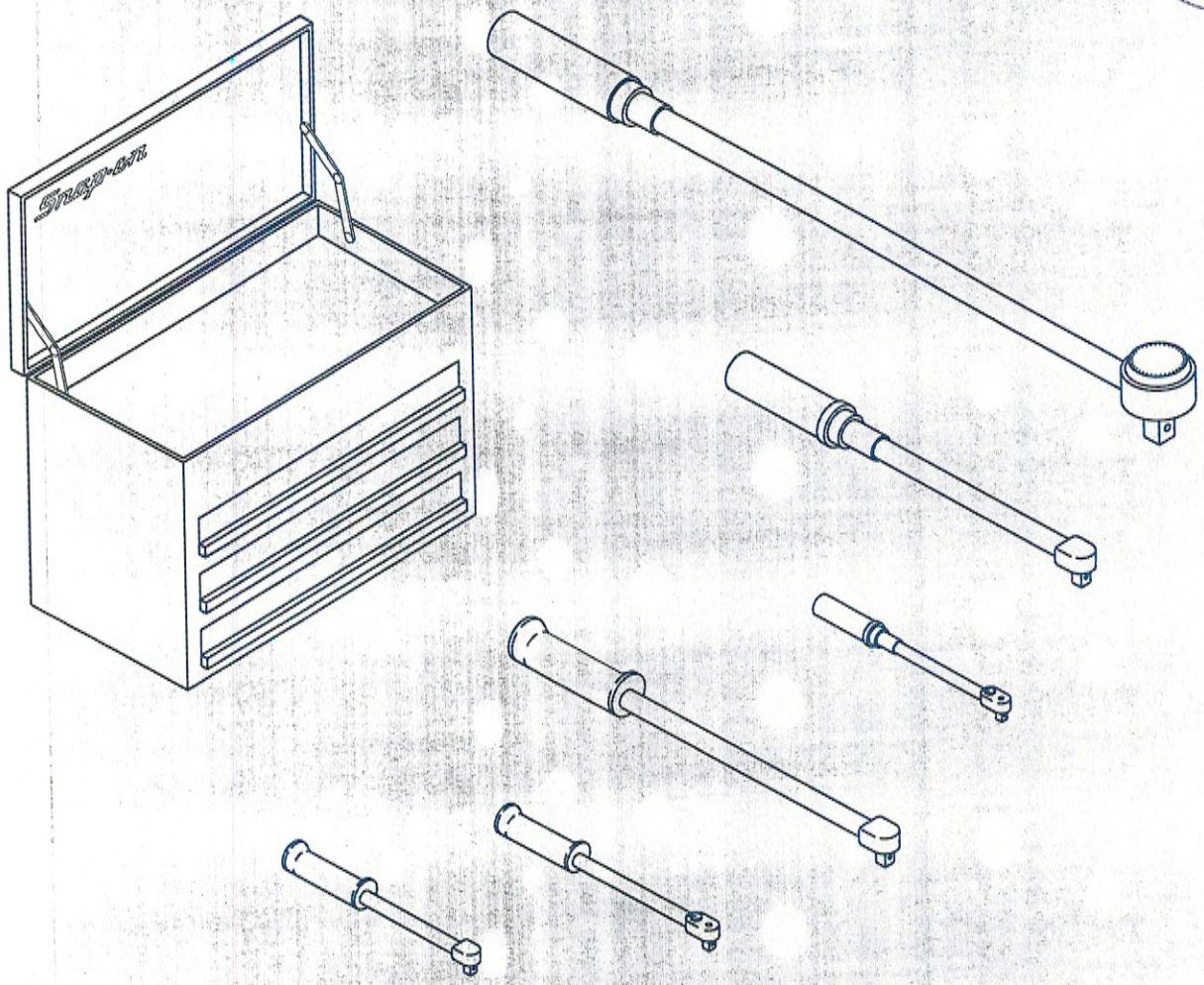
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-56. SURFACE PROBE, 00790

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DESCRIPTION: The torque wrench kit will support all torque requirements to maintain the helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Torque wrenches will be calibrated every 12 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Model 10 Torque Wrench Tester, Chatillon, or similar equipment, provided it has required measuring capabilities.

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FIGURE C-57. TORQUE WRENCH (SHEET 1 OF 2)

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CALIBRATION REQUIREMENTS: (CONT)

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean torque wrench using isopropyl alcohol, Item 72, Appendix D. Wipe dry with machinery towel, Item 211, Appendix D.
2. Inspect torque wrench for any defects or damage. NONE ALLOWED.

Calibration

1. Set up torque wrench tester to zero.
2. Select five equally spaced calibration points on the torque wrench including zero and full scale. Record these values on a calibration work sheet.

NOTE

Acceptable tolerance is ±3% of calibration setting on torque wrench as shown in calibration work sheet example.

CALIBRATION DATA SHEET

TORQUE WRENCH/DRIVER

RANGE: 50–in. lbs ☐

ft lbs ☐

CALIBRATION SETTING	ACTUAL READING	ACCEPTANCE TOLERANCE	ADJUSTED VALUE
10		9.7–10.3	
20		19.4–20.6	
30		29.1–30.9	
40		38.8–41.2	
50		48.5–51.5	

EXAMPLE CALIBRATION WORK SHEET

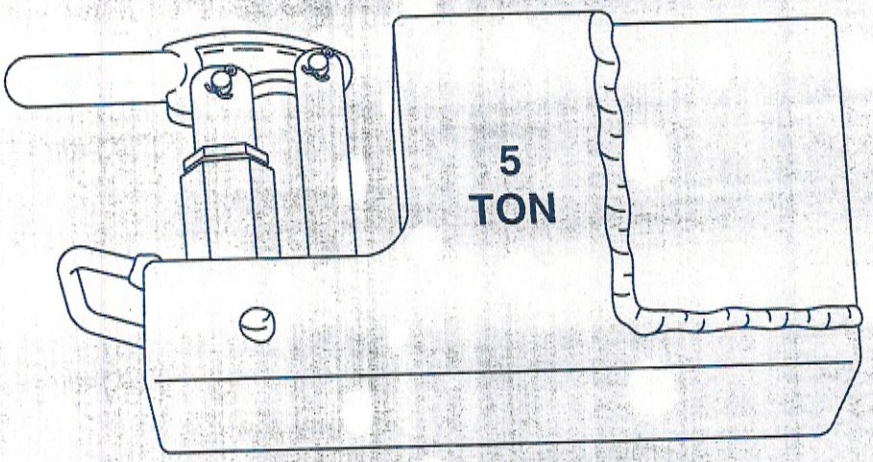
3. Attach torque wrench to appropriate input on torque tester.
4. Pull torque wrench in a clockwise direction until torque wrench indicates first pre–selected calibration point. Record actual readings on calibration work sheet.
5. Remove torque wrench from torque tester and verify torque wrench zero. Adjust torque wrench to zero if required and note adjustment on calibration work sheet.
6. If torque wrench has been adjusted to zero, repeat steps 3 through 6.
7. Check remaining torque wrench calibration points and record on calibration work sheet.
8. Install calibration label on torque wrench after calibration acceptance, identified by acceptance stamp, date of calibration, and scheduled calibration due date.

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FIGURE C-57. TORQUE WRENCH (SHEET 2 OF 2)

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REGENT MODEL NUMBER	VERTICAL CAPACITY (TONS)	MINIMUM CLOSED HEIGHT (INCHES)	HYDRAULIC LIFT (INCHES)	SCREW EXTENSION (INCHES)	MAXIMUM EXTENDED HEIGHT (INCHES)	NET WEIGHT (LBS)	CRATED WEIGHT (LBS)	CUBIC FEET CRATED
1926–010	5	5.5	9	3	17.5	26	37	1.0

DESCRIPTION: The tail wheel jack is a hand carried jack, used for removal and replacement of tail landing gear and tail wheel assemblies.

POWER REQUIREMENTS: Not Applicable

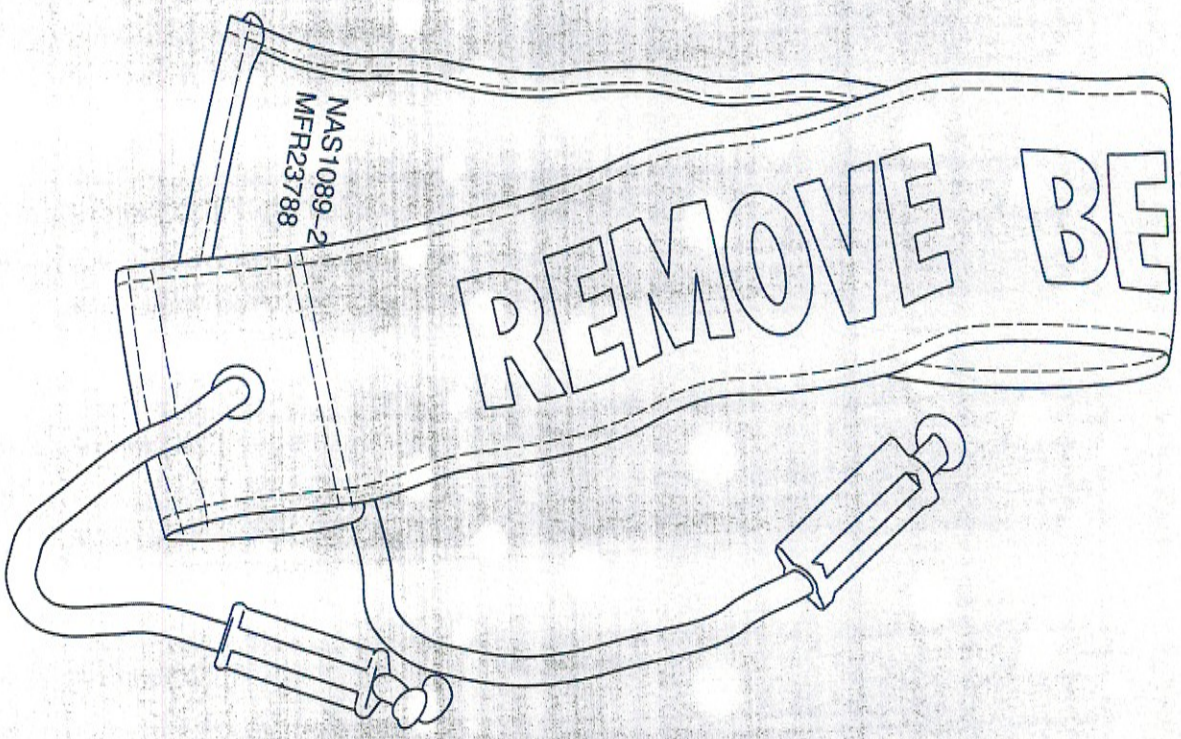
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-58. TAIL WHEEL JACK, 1926-10

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DESCRIPTION: The lockout block is composed ot two phenolic blocks connected by a 16-inch rope knotted at each end, with a red warning flag to remove before flight. The lockout block is used to retain tail rotor spring pressure when rigging tail rotor system.

POWER REQUIREMENTS: Not Applicable

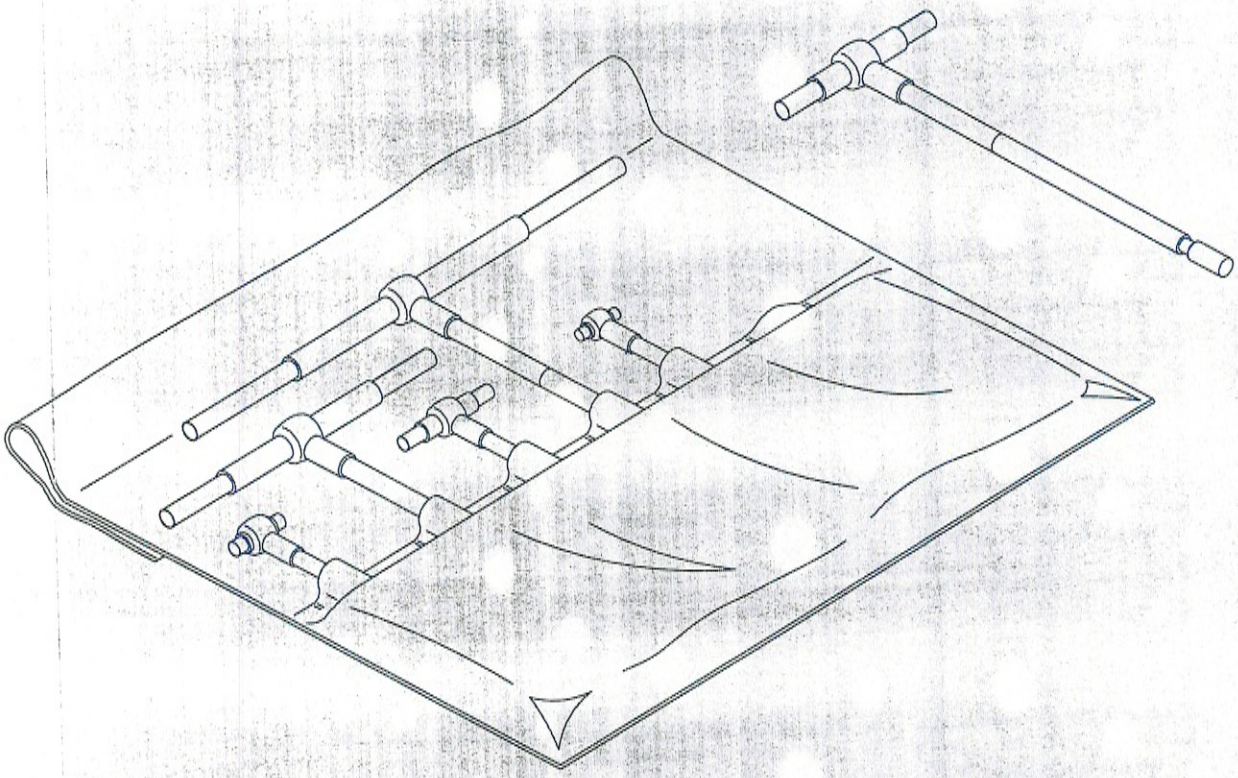
CALIBRATION REQUIREMENTS: Not Applicable

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5A

FIGURE C-59. TAIL ROTOR LOCKOUT BLOCKS, 70700-20463-041

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DESCRIPTION: The telescoping gage set is used for accurate measurements of inside diameters on flight controls, main, and tail rotor head components. The gage set has a measuring range of 5/16 inch to 6 inches and a measurable depth of up to 5 inches. Final hole size is obtained by measuring the contacts of the gage using micrometer or vernier calipers.

POWER REQUIREMENTS: Not Applicable

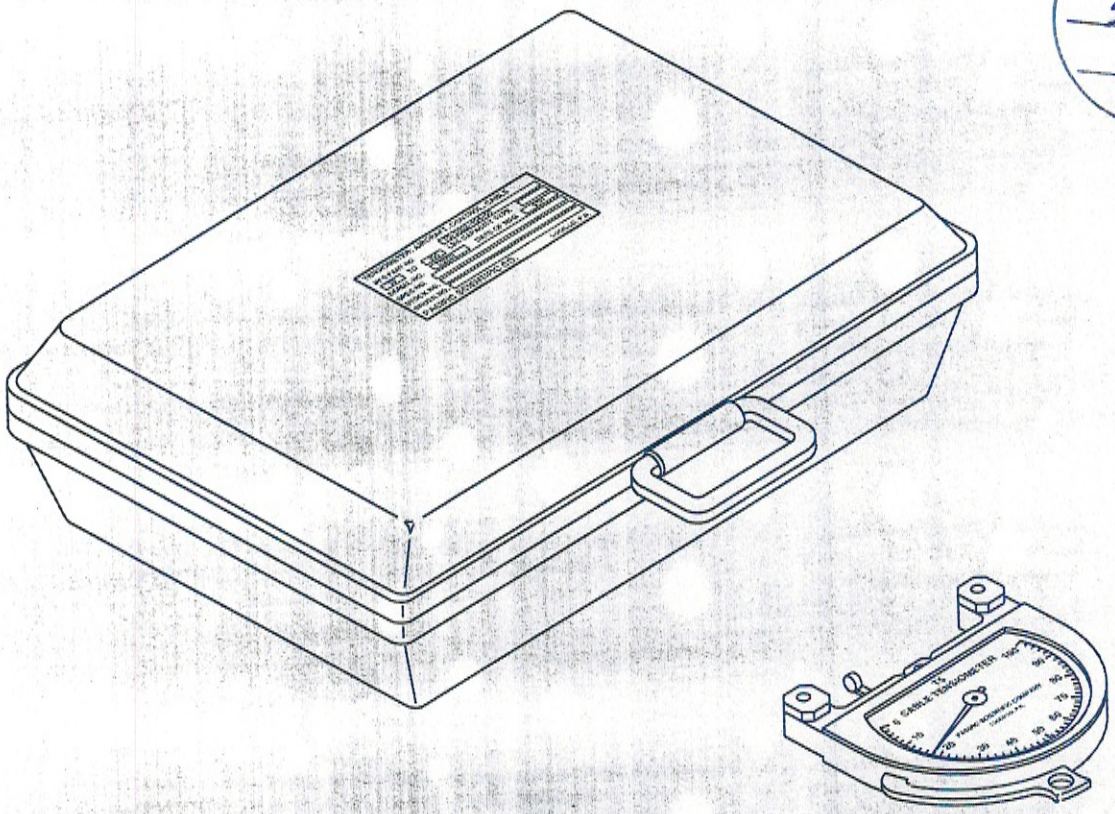
CALIBRATION REQUIREMENTS: Not Applicable

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8A

FIGURE C-60. TELESCOPING GAGE SET, PMF119

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DESCRIPTION: The tensiometer is a small compact unit designed to determine tension on flight control and tail rotor cables when rigging helicopter, or when cables are disconnected for maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Tensiometer shall be calibrated every 6 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Morehouse Dead Weight Calibrating Machine or similar equipment, provided it has required measuring capability.
- 3/32 inch Test Cable
- 3/16 inch Test Cable
- 7/16 inch Test Cable

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FIGURE C-61. TENSIOMETER, T5-2002-104-00 (SHEET 1 OF 2)

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CALIBRATION REQUIREMENTS: (cont)

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean tensiometer with isopropyl alcohol, Item 72, Appendix D. Wipe dry with machinery towel, Item 211, Appendix D.
2. Inspect tensiometer for obvious damage, nicks, broken glass and full indicator range without skipping or binding.

Calibration

1. Make sure temperature in area of calibration performance is within 68°F to 73°F. Calibration equipment should stabilize for 24 hour period.

NOTE

Do not exceed tensiometer range when calibrating. Only one size cable is required for calibration of tensiometer.

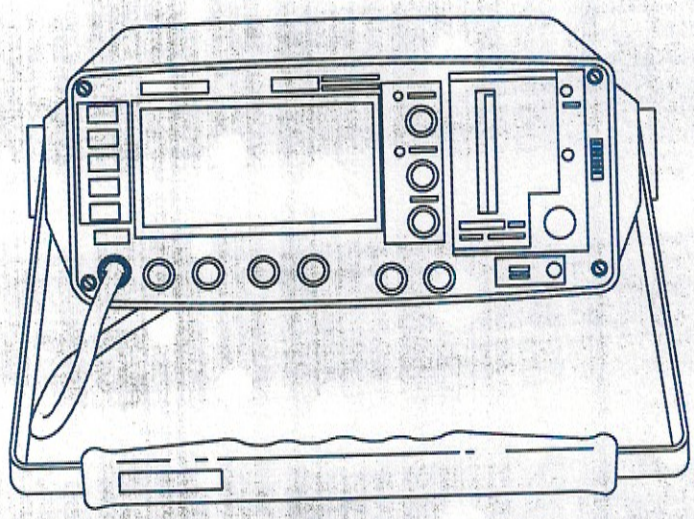
2. Select test cable to match riser available with tensiometer and install test cable in dead weight calibrator.
3. Check tensiometer with dead weight calibrator set at four points. 50 lbs, 100 lbs, 150 lbs and 200 lbs.
4. Attach tensiometer to test cable and check cable tension, refer to tensiometer calibration table enclosed with tensiometer. Compare values specified at 50 lbs, 100 lbs, 150 lbs, and 200 lbs for size test cable used. Values specified shall agree with actual tensiometer indication within ±5 counts on tensiometer.
5. If values are not as specified, adjust tensiometer as required and repeat steps 3 and 4.

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FIGURE C-61. TENSIOMETER, T5-2002-104-00 (SHEET 2 OF 2)

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DESCRIPTION: The reflectometer is designed to check faults in metallic cables such as opens, shorts, crimps, and other defects in metallic cables to lengths of 50,000 feet. Using a process similar to radar, electrical pulses transmitted down cables under test, reflect pulses back to reflectometer, allowing user to determine nature of cable fault.

POWER REQUIREMENTS: Internal battery 12–volt, external ac power 115 / 230 volts.

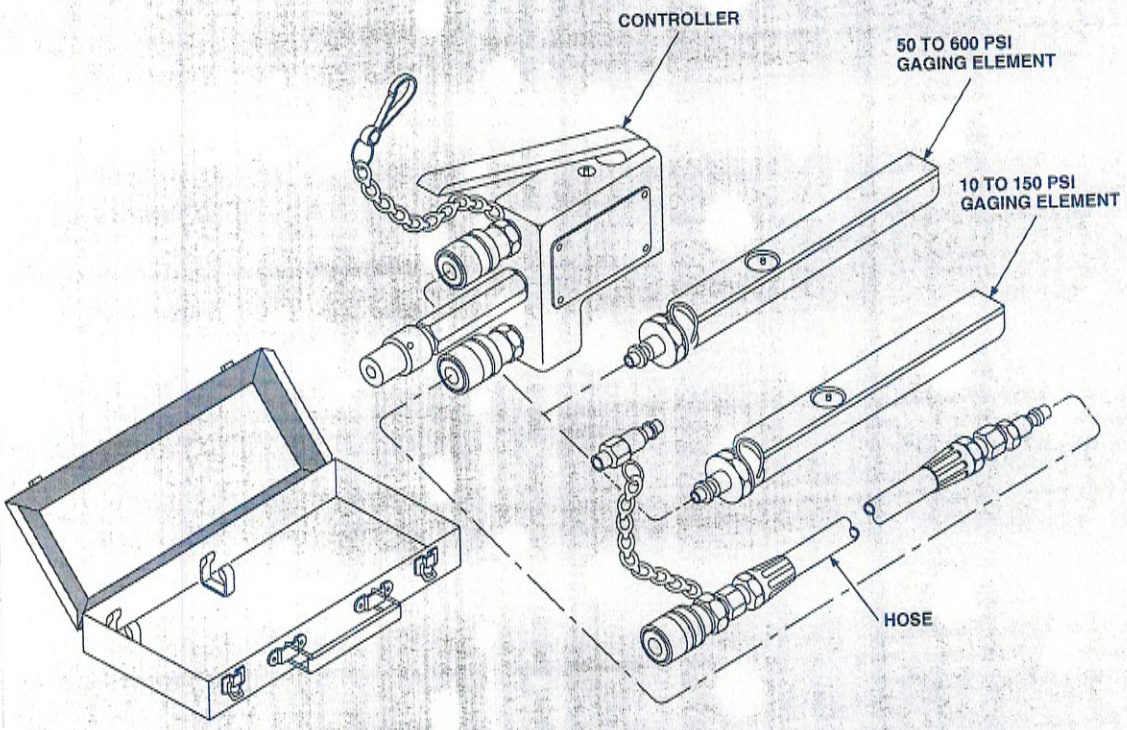
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-62. TIME DOMAIN REFLECTOMETER CABLE TESTER, 1503C

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4º Batalhão de Aviação do Exército
1043



DESCRIPTION: The inflator kit is a remote-controlled, direct-reading pneumatic inflator used on helicopter tires, shock struts, and accumulators having pneumatic pressure requirements of 10 to 600 psi.

POWER REQUIREMENTS: 500 psi Nitrogen Gas Tank

CALIBRATION REQUIREMENTS:

FREQUENCY

Inflator kit shall be calibrated every 6 weeks regardless of being used or not.

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6A

FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 1 OF 4)

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4050

CALIBRATION REQUIREMENTS: (CONT)

EQUIPMENT REQUIRED

- Nitrogen Gas Tank, minimum pressure 500 psi.
- Pressure Regulator, adjustable to 200 psi.
- Inline Pressure Gage, 0–200 psi range.
- Quick Disconnects, male and female.
- Pneumatic Hose, Adapters, Vent valve, and Plugs as required.

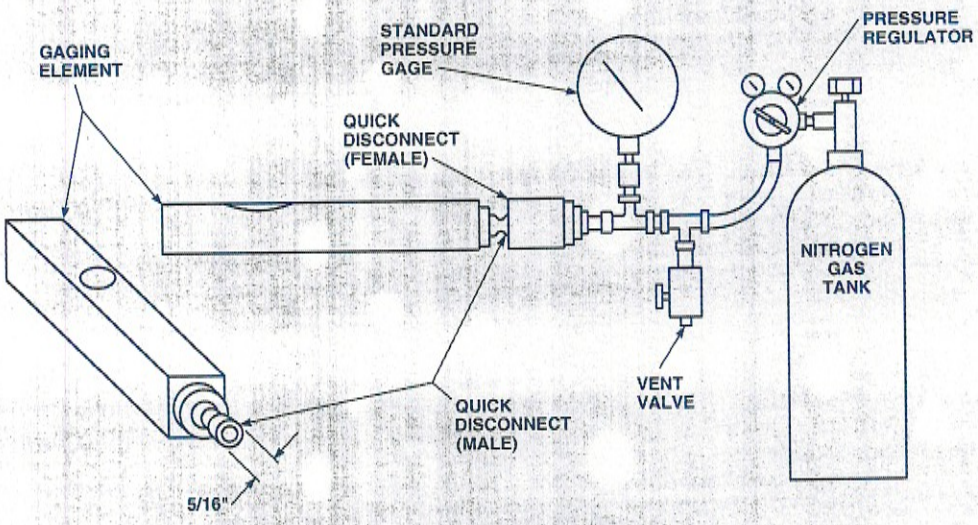
CALIBRATION PROCEDURES

INSPECTION

- Check gaging elements for obvious damage, broken viewing window, inoperative quick disconnects.
- Check that pressure relief hole on adjusting cylinder is not blocked or restricted.
- Check hoses for damage to quick disconnects, cuts or damage to hose.
- Clean and repair as required.

CALIBRATION

1. Set up test equipment as shown in figure below for calibration of gaging elements.



CALIBRATION SETUP FOR GAGING ELEMENT

NOTE:

Make sure all pressure is set to zero and make sure all test equipment controls are set to proper position before making any connections or applying pressure to items being calibrated.

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FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 2 OF 4)

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