CHAPTER 95 — INSTRUMENT SYSTEM

CONTENTS — MAINTENANCE PROCEDURES

CONTENTS — MAINTENANCE PROCEDURES (Cont)

FIGURES

INSTRUMENT SYSTEM

95-1. INSTRUMENT SYSTEM.

Maintenance information for flight, navigation, propulsion and hydraulic and miscellaneous instruments installed in model 212 helicopter is presented in the following sections. All instruments, with the exceptions of the standby magnetic compass, engine hourmeter, and free air temperature indicator, are mounted in the instrument panel. For instrument panel illustration, see figure 95-1 or figure 95-2 , as applicable.

95-2. TROUBLESHOOTING — INSTRUMENT SYSTEM.

Pitot-static system troubleshooting procedures are covered as portions of the airspeed indicator, altimeter, and vertical speed indicator. Refer to paragraph 96-12 for pitot-static system. Electrically operated instruments are covered in Chapter 96 .

95-3. INSTRUMENTS.

The following instrument maintenance information is basically applicable to all instruments; therefore, general procedures are given in the following steps.

95-4. REMOVAL — INSTRUMENTS.

CAUTION

ENSURE ALL ELECTRICAL POWER IS OFF.

NOTE

General procedures for removing instruments from the instrument panel are applicable to all panel mounted instruments; therefore, only a typical procedure is given. Some instruments are front mounted, other instruments are back mounted. They are secured either by screws through mounting flanges or by clamps with clamp adjusting screws accessible on the panel face.

1. Disconnect electrical leads and/or instrument piping, as applicable, from back of instrument. Necessary access may be gained through nose access door.

2. Protect ends with electrical tape and cap open piping, if applicable, and cap openings on instrument.

3. Remove mounting screws or loosen mounting clamp screw. Carefully lift instrument out of panel.

95-5. INSPECTION — INSTRUMENTS.

1. Inspect for loose, missing or improperly installed hardware, loose or cracked cover glasses, and security of mounting.

2. Inspect instrument for legibility of range markings and faulty decals.

95-6. REPAIR OR REPLACEMENT — INSTRUMENTS.

NOTE

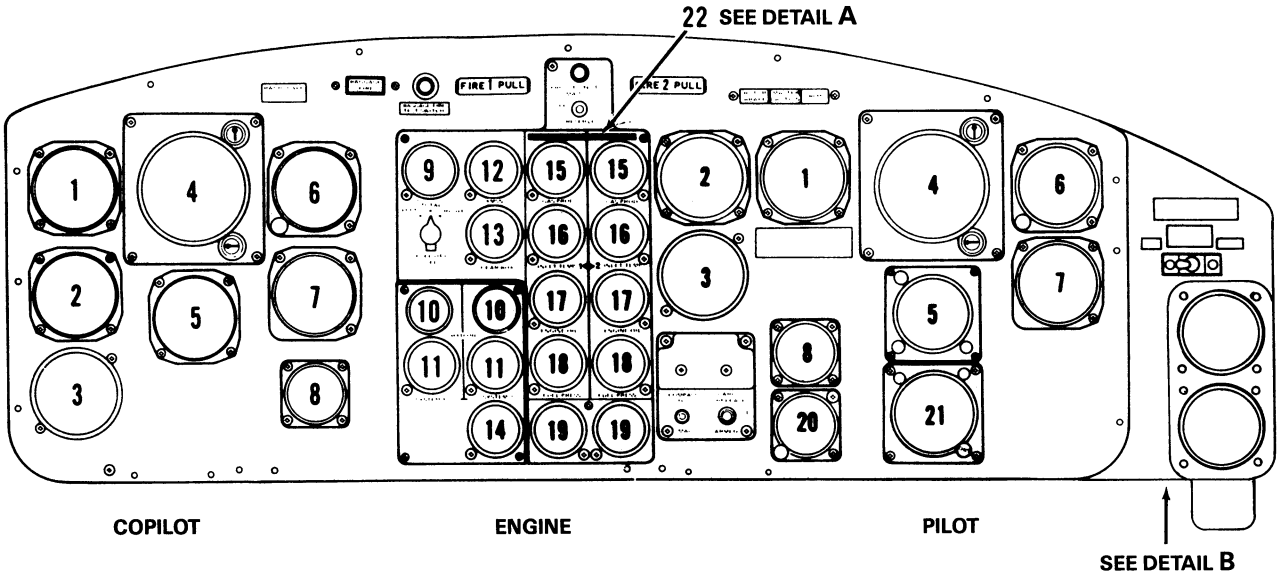
All repairs, with the exception of replacing instruments or instrument range markings, must be conducted by an authorized instrument repair station.

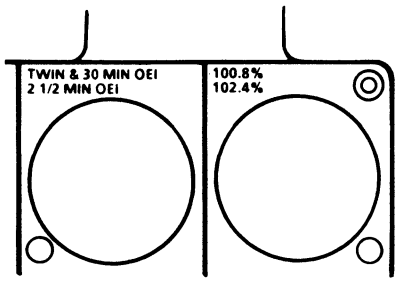
1. Replace any inoperative, defective, or damaged instrument.

2. Replace instrument if cover glass is loose, cracked, or broken.

3. Replace instrument range markings as follows:

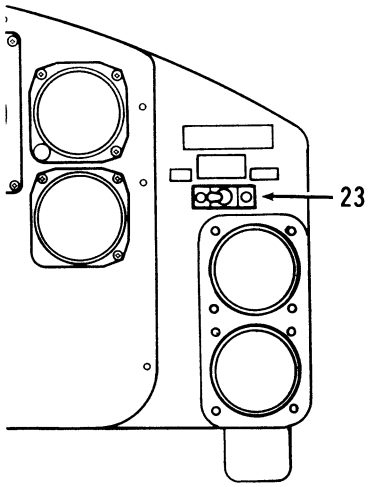
a. Refer to Flight Manual for range. Index cover glass to case with stripe of white lacquer.





DETAIL A

1. Airspeed indicator
2. Triple tachometer
3. Dual torque pressure indicator
4. Attitude indicator
5. Course indicator
6. Altimeter
7. Vertical speed indicator
8. Turn and slip indicator
9. Fuel quantity indicator
10. Hydraulic oil temperature indicator
11. Hydraulic pressure indicator
12. Transmission oil temperature and pressure indicator
13. Gearbox oil temperature and pressure indicator
14. Dual DC ammeter
15. Gas producer tachometer indicator
16. Interturbine temperature indicator
17. Engine oil temperature and pressure indicator
18. Fuel pressure indicator
19. Dual AC and DC voltmeter
20. Clock
21. Course deviation indicator
22. Typical for PT6T-3B engines
23. Static source switch



DETAIL B
ALTERNATE STATIC AIR SOURCE
(IF INSTALLED)

212-M-95-1
212-070-150L
212-070-129C

Figure 95-1. Instrument panel (S/N 30504 through 30596)

b. Use prepared decals, suitable lacquer or tape for markings and apply accurately to cover glass. Protect markings with a light coat of clear adhesive varnish or lacquer.

95-7. INSTALLATION — INSTRUMENTS.

CAUTION

ENSURE ALL ELECTRICAL POWER IS OFF.

NOTE

The general procedures for installing instruments into the instrument panel are applicable to all panel mounted instruments; therefore, only a typical procedure is given. Some instruments are front mounted and other instruments are back mounted in the panel. The instruments are secured either by screws through mounting flanges or by clamps with clamp adjusting screws accessible on the panel face.

1. Carefully position instrument in panel and install mounting screws or tighten screw of mounting clamp.

CAUTION

DO NOT TIGHTEN CLAMPS MORE THAN NECESSARY TO HOLD INSTRUMENT. EXCESSIVE TENSION MAY DEFORM INSTRUMENT CASE AND CAUSE ERRONEOUS READING OR CRACKED GLASS.

2. Remove protective tape, caps and covers, as necessary, from electrical leads, piping and openings on instrument.

3. Connect electrical leads and/or instrument piping, as applicable, to back of instrument.

95-8. INSTRUMENT PANEL.

Instrument panel contains all flight, propulsion, navigation and miscellaneous instruments except standby magnetic compass, engine hourmeter, and free air temperature indicator. For information on various switches, warning lights and fire pull handles, refer to Chapter 96 .

95-9. REMOVAL — INSTRUMENT PANEL.

1. Disconnect battery quick-disconnect.

2. Disconnect instrument piping and all electrical connectors from back of panel and protect ends of electrical leads with electrical tape and cap open piping, if applicable, and cap openings on instrument.

3. Disconnect the two adjustment tube assemblies from behind the right side of panel.

4. Remove mounting screws from glareshield and carefully remove glareshield from forward side of panel.

5. Remove remaining mounting screws from panel and carefully remove instrument panel.

95-10. INSTALLATION — INSTRUMENT PANEL.

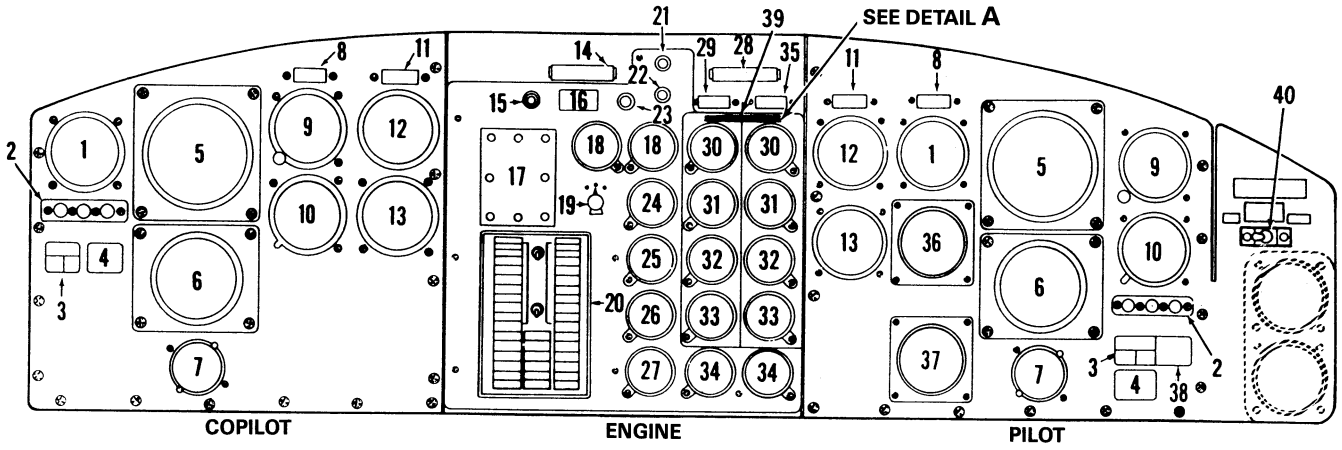
1. Position instrument panel in place and install mounting screws.

2. Install glareshield on forward side of panel.

3. Connect two adjustment tube assemblies to right side of panel.

4. Remove protective caps, covers and tape and connect instrument piping and all electrical connectors, as applicable.

5. Connect battery quick-disconnect.



DETAIL A

1. Airspeed indicator
2. Marker beacon light
3. NAV CMD CPLT PLT light
4. PITCH ROLL YAW light
5. Attitude indicator
6. Horizontal situation indicator
7. Clock
8. Master caution light
9. Altimeter
10. Vertical speed indicator
11. RPM caution light
12. Triple tachometer
13. Dual torque pressure indicator
14. Fire 1 pull handle
15. Cargo release — armed indicator
16. Baggage compartment fire indicator
17. Airspeed limits — typical
18. Hydraulic temperature and pressure indicator
19. Fuel quantity selector switch
20. Master caution panel
21. Fire extinguisher test switch
22. Fire extinguisher selector switch
23. Baggage compartment fire test switch
24. Fuel quantity indicator
25. Transmission oil temperature and pressure indicator
26. Gearbox oil temperature and pressure indicator
27. Dual DC ammeter
28. Fire 2 pull handle
29. Engine 1 out indicator
30. Gas producer tachometer indicator
31. Inter turbine temperature indicator
32. Engine oil temperature and pressure indicator
33. Fuel pressure indicator
34. Dual AC and DC voltmeter
35. Engine 2 out indicator
36. DME indicator
37. Radar altimeter indicator
38. NAV fail lights
39. Panel typical to PT6T-3B engines
40. Static source switch

NOTES

1. Helicopter S/N 31125 and subsequent
2. Helicopters with alternate static air.

212-M-95-2
212-075-718K
212-075-043B

Figure 95-2. Instrument panel (S/N 30597 and subsequent)

95-11. ADJUSTMENT — INSTRUMENT PANEL.

Two adjustment tube assemblies located behind the right side of instrument panel may be adjusted to eliminate or minimize instrument panel vibration.

PITOT-STATIC SYSTEM

95-12. PITOT-STATIC SYSTEM.

Pitot system consists of pitot tube, tubing and necessary hardware to connect to the pilot airspeed indicator. The pitot tube is mounted on the fuselage right nose section and supplies impact air through the pitot line to airspeed indicator. The pitot tube is equipped with an electrical heating element, pitot heater (HR1), for anti-icing function. Any accumulation of moisture in the pitot line will drain by gravity, therefore no drain plugs are installed. For information on the pitot heater electrical system, refer to Chapter 96 . The static system consists of two static ports, static lines and necessary hardware to supply static pressure to the pilot airspeed, altimeter and vertical speed indicators. The static ports are flush mounted on the fuselage section, one on each side, at station 24.44 and waterline 28.25, just forward of each cabin entrance door (figure 95-3).

Helicopters with alternate static air kit installed will have an alternate static air source provided by a pneumatic valve installed in right side of pilot instrument panel. Tubing and fittings are included to connect pneumatic valve to pilot static ports and instruments. With the toggle of the pneumatic valve set to PRI, static air is supplied to instruments from the outside pilot static air ports. With the toggle set to ALTN, an alternate static air source (inside cabin air) is selected and the outside static ports are shut off.

95-13. OPERATIONAL CHECK — PITOT STATIC SYSTEM.

SPECIAL TEST EQUIPMENT

TYPE OR MODEL	NOMENCLATURE
MB-1 (Tactair) or Equivalent	Static Field Tester

NOTE

Perform the following procedure in its entirety for the pilot pitot-static system and altimeter, vertical speed, and airspeed indicators. Repeat the procedure for the copilot system and indicators, when applicable.

NOTE

For helicopters with alternate static air kit installed, when checking pilot pitot-static system, ensure STATIC SOURCE switch is in PRI position.

1. Connect static field tester hoses to pitot and static connections on test set. Connect appropriate hoses to pitot tube and one of the two static ports on the helicopter, using proper adapters. Seal remaining static port on system under test with removable tape. Check all connections for tightness.

2. Open both vent valves to allow pressure in lines to equalize. Close all five valves on test set and check that each is completely closed.

3. Set barometric pressure dials on the helicopter and test set altimeter to barometric pressure at test site, if known, or to 29.92 inches Hg. Check that helicopter altimeter reads the same as test set altimeter within 20 feet. If readings do not agree, perform one of the following adjustments:

a. When 29.92 inches Hg is set, adjust helicopter altimeter to agreement with test set altimeter.

b. When ambient pressure is set, adjust helicopter altimeter to the actual test site altitude, if known. If not, set to agree with test set.

4. Pump pressure into pressure tank on test set until sufficient pressure for test is indicated on pressure dial (approximately 50 inches Hg or 170 kPa).

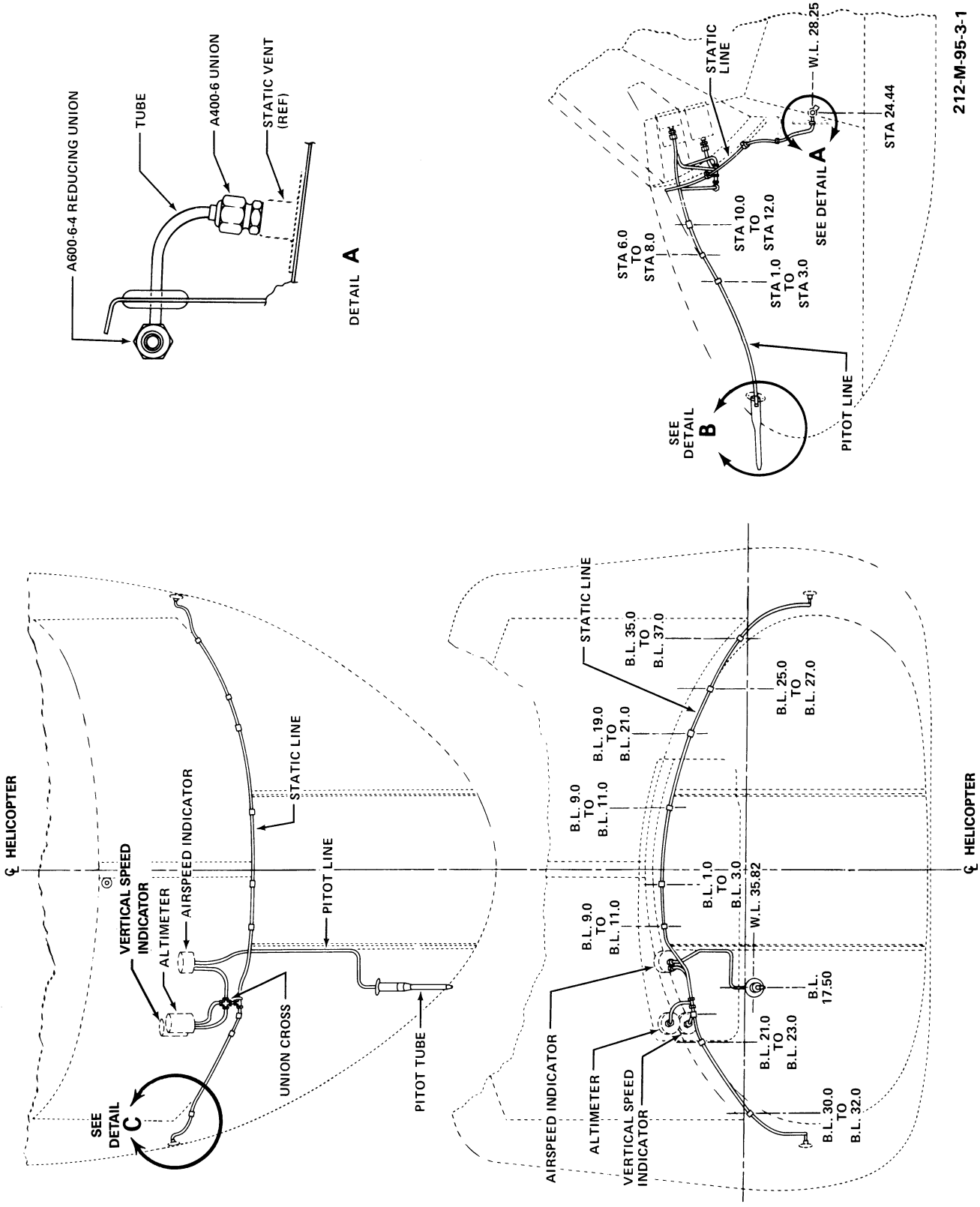


Figure 95-3. Pitot-static system (Sheet 1 of 2)

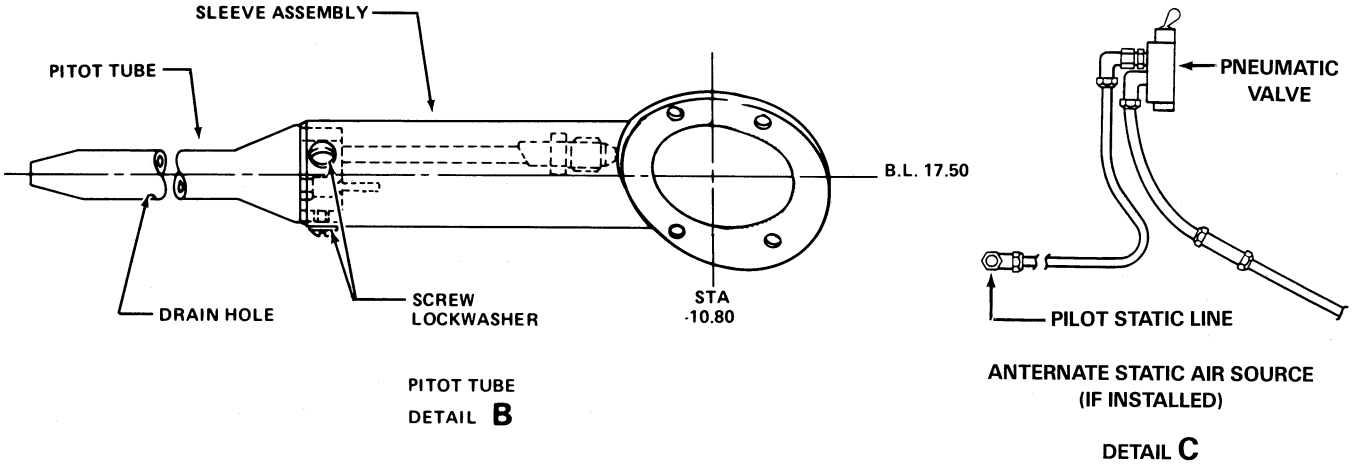


Figure 95-3. Pitot-static system (Sheet 2)

CAUTION

VALVES ON TEST SET ARE SENSITIVE AND SHOULD BE OPERATED SLOWLY AND WITH CARE TO AVOID POSSIBLE DAMAGE TO INSTRUMENTS. THESE INSTRUMENTS ARE EASILY DAMAGED BY IMPROPER MANIPULATION OF THE VALVES ON THE TEST SET.

NOTE

Pressure in tank may be replenished as required for test.

5. Open pressure vent valve approximately one quarter turn. Slowly open pressure source valve. Close pressure vent valve. Leave pressure source valve open until airspeed indicator on test set reads 150 MPH (130.2 knots), then close pressure source valve. Maintain this pressure by manipulation of pressure source valve, as required. Gently tap on helicopter and test set airspeed indicators and check that helicopter airspeed indicator reads 130 ± 4 knots.

6. Close pressure source valve with helicopter airspeed indicator reading 130 ± 4 knots. After five minutes, check that airspeed indication has not dropped more than 10 knots.

7. Slowly open pressure vent valve. Check that airspeed indication returns to minimum limit.

CAUTION

DO NOT DISCONNECT A LINE OR REMOVE A FITTING TO VENT SYSTEM WHILE UNDER TEST AS DAMAGE TO INSTRUMENTS MAY OCCUR.

8. Pump vacuum side until sufficient vacuum for test is indicated on vacuum dial (approximately 20 inches Hg or 68 kPa).

NOTE

Tank vacuum may be replenished, as required, for test.

9. Slowly and gradually open vacuum source valve. Check that both altimeter and airspeed indicator readings increase and that vertical speed indicator (VSI) shows a positive rate of climb.

CAUTION

VALVES OF TEST SET MUST BE MANIPULATED SLOWLY AND CAREFULLY TO AVOID POSSIBLE INSTRUMENT DAMAGE. CLOSELY MONITOR BOTH HELICOPTER AND TEST SET INSTRUMENTS TO ENSURE THAT NO INDICATOR MAXIMUM LIMIT IS EXCEEDED.

10. Slowly increase airspeed to approximately 138 MPH and close vacuum source valve and pressure vent valve. Hold airspeed at 138 MPH and increase altitude indications by manipulation of the crossfeed and vacuum source valves. When helicopter altimeter reads 2000 feet, close crossfeed and vacuum source valves. Tap gently on helicopter and test set altimeters and check that after 1 minute the loss in indicated altitude does not exceed 100 feet. Check VSI indication is zero or negative, not exceeding 100 fpm.

11. Slowly open vacuum vent valve to gradually decrease vacuum. Check VSI indicates a negative rate of climb.

12. Slowly decrease vacuum until test set altimeter reads 1000 feet. Maintain this reading by manipulation of vacuum source valve, as required. Gently tap on test set and helicopter altimeters and check helicopter indicator reads within ± 20 feet of test set indicator.

CAUTION

CARE IS REQUIRED IN MANIPULATION OF TEST SET VALVES TO ENSURE NO INSTRUMENT IN SYSTEM BECOMES DAMAGED. NEVER BREAK A LINE OR REMOVE A FITTING TO VENT SYSTEM DURING TEST.

13. Slowly open vacuum vent valve and observe helicopter and test set altimeters return to approximate ground level indication.

14. For pilot pitot-static system, check pneumatic valve for leaks as follows:

a. Remove test set hose and adapter from static port.

b. Remove the seal placed on static ports.

c. Connect hose and appropriate adapter to IN port of pneumatic valve. Check all connections for tightness.

d. Set STATIC SOURCE switch to ALTN.

e. Repeat steps 8 through 13.

f. If any requirement of operational check is not met, replace pneumatic valve. Repeat substeps c. through e.

g. Set STATIC SOURCE switch to PRI.

15. Open both pressure and vacuum vent valves. After system pressures are equalized, remove test set from helicopter.

95-14. INSPECTION — PITOT-STATIC SYSTEM.

1. Inspect pitot tube for clogged or obstructed inlet opening.

2. Inspect pitot tube for clogged drain hole on bottom of tube.

3. Inspect pitot and static lines for leaks and chafing.

4. Visually inspect pitot and static lines, accessories and instruments of the pitot static system and replace defective components.

95-15. STATIC SYSTEM.

95-16. DRAIN INSTRUCTIONS — STATIC SYSTEM.

1. Disconnect static lines from airspeed, altimeter, and vertical speed indicators. Cap openings in indicators.

2. Blow static lines clean with dry, filtered, compressed air.

3. Uncap openings in indicators and reconnect lines.

95-17. PITOT TUBE.

95-18. REMOVAL — PITOT TUBE.

1. Ensure all electrical power is off.

2. Disconnect pitot line from airspeed indicator and cap opening on indicator and cap open piping.

3. Open clamps securing pitot line and create slack at base of pitot support by pulling line through grommet and clamps until connector is 1 to 2 inches (25.4 to 50.8 mm) from grommet.

4. Remove screws and lockwashers attaching pitot tube to support and carefully pull tube from support until electrical connector is exposed. Disconnect and cap ends of connector to prevent entrance of foreign material.

NOTE

Ensure adequate slack in electric wire before pulling pitot tube.

5. Continue pulling pitot tube, until pitot line coupling is exposed. Disconnect and cap or cover openings in line.

95-19. INSTALLATION — PITOT TUBE.

1. Remove caps or covers from pitot lines and connect coupling.

2. Remove caps from ends of electrical connector attached to pitot head, connect electrical connector and while guiding pitot line and electrical wire with other hand through the pitot base from inside of nose compartment, carefully place pitot tube in place in pitot support.

3. Install attaching screws and lockwashers attaching pitot tube to pitot support.

4. Carefully pull pitot line through grommet and open clamps to connect line to airspeed indicator.

5. Remove caps on pitot line and airspeed indicator and connect pitot line to indicator.

6. Adjust pitot line through grommet and open clamps to ensure adequate slack with no binding and close and secure clamps to pitot line.

FLIGHT INSTRUMENTS

95-20. FLIGHT INSTRUMENTS.

Flight instruments consist of airspeed, altimeter, attitude, turn and slip, and vertical speed indicators.

95-21. AIRSPEED INDICATOR.

Airspeed indicators (pilot M30 and copilot M35) are standard pitot-static instruments single scaled and calibrated in knots. The indicators provide an indicated airspeed of the helicopter at any time during forward flight by measuring the difference between impact air pressure from pitot tube and static air pressure from the static ports.

95-22. ALTIMETER.

Altimeters (pilot M32 and copilot M33) furnish direct reading of helicopter height in feet above sea level. The altimeters are connected by static lines to the static pressure ports to sense atmospheric pressure. An external adjustment knob is provided to make compensation for variations of prevailing barometric pressure.

95-23. ATTITUDE INDICATOR.

On helicopters prior to S/N 30597, pilot attitude indicator (M2) displays flight attitude of the helicopter relative to the earth. Pitch attitude is indicated by motion of the sphere with respect to miniature airplane. Roll attitude is indicated by motion of roll pointer with respect to fixed roll scale located at top of display. The indicator sphere can be adjusted to zero indication by pitch trim knob which is located on face of instrument in lower right corner, and a roll trim located on face of instrument in upper right corner. Power OFF flag, located in the lower left portion on display, will indicate any interruption of indicator power and the flag will be exposed. Horizontal markings indicate the degree of dive or climb, while bank (roll) angles are read from the semi-circular scale located on upper half of indicator face.

On helicopters S/N 30597 and subsequent, pilot and copilot attitude indicators (M2 and M1) provide overall aircraft flight attitude information by means of the following individual displays:

1. The spheroid displays pitch attitude by vertical motion with respect to fixed reference aircraft symbol and roll attitude by rotational motion of roll pointer with respect to fixed roll scale at top of display. The attitude spheroid can be adjusted to zero indication by pitch trim and roll trim knobs.

2. The glide slope pointer displays helicopter deviation from the glide slope beam center. The pointer represents the position of beam center in relation to helicopter.

3. The warnings flags — attitude (ATT), glide slope (GS), and rate of turn (RT) — provide visual indication of system malfunctions. A warning flag comes into view whenever a malfunction occurs in the respective system circuit.

4. The rate-of-turn pointer indicates in which direction and at what rate the helicopter is turning.

5. The inclinometer indicates when the helicopter is in balance, either in a turn or in straight and level flight. If the helicopter is yawing or slipping, the ball will be off center.

95-24. TURN AND SLIP INDICATOR (S/N 30504 THROUGH 30596).

Pilot turn and slip indicator (M10) consists of a rate-of-turn pointer and an inclinometer (ball) which operate independently of each other. An indicator gyro is self-contained in the indicator. The rate-of-turn pointer, controlled by self-contained electrically actuated gyro, indicates in which direction and at what rate the helicopter is turning. The inclinometer (ball) indicates when the helicopter is in directional balance either in a turn or in straight and level flight. If helicopter is yawing or slipping, the ball will be off

center. The power adequacy light (DS34) indicates loss of power to the indicator and contains press-to-test and dimming features.

95-25. VERTICAL SPEED INDICATOR.

Pilot vertical speed indicator (M31) and copilot vertical speed indicator (M34) register ascent and descent speed of the helicopter in feet per minute. The vertical speed indicators are connected to static air system to sense the rate of atmospheric pressure change.

NAVIGATION INSTRUMENTS

95-26. NAVIGATION INSTRUMENTS.

The navigation instruments consist of the pilot course indicator (RMI) (ID-998/ASN) and standby magnetic compass (M28).

95-27. COURSE INDICATOR (S/N 30504 THROUGH 30596).

The pilot course indicator (RMI) ID-998/ASN (figure 95-4) is a dual pointer, moving dial type indicator. The dial rotates under the fixed index reference mark to indicate compass heading information from the gyromagnetic compass set AN/ASN-43.

Radio pointers 1 and 2 display bearing of ADF and/or VOR radio signals when ADF (ARN-83) navigation system kit and/or omni (ARN-82) navigation system kits are installed. Refer to Service Instruction No. 219-9 for additional information on the ADF (ARN-83) navigation system kit and Service Instruction No. 212-8 for additional information on the omni (ARN-82) navigation system kit.

The course indicator also contains a push-to-set synchronizing knob on lower right corner, which is manually rotated to null the annunciator, on upper right corner, and to synchronize (electrically and mechanically align) gyromagnetic compass set AN/ASN-43. The SET HDG knob, on lower left corner, moves the heading select cursor, on indicator face, to the desired heading. The ADF/VOR knob selects ADF or VOR signal for pointers 1 and 2.

95-28. STANDBY MAGNETIC COMPASS.

The standby magnetic compass (M28) is mounted on right side of helicopter over the windshield. This standard magnetic type compass is used in conjunction with compass correction card located on windshield center post.

On helicopter S/N 30597 and subsequent, the copilot is provided with a standby magnetic compass (M41).

95-29. REPLACEMENT — STANDBY MAGNETIC COMPASS.

1. Remove mounting screws from mounting bracket while holding compass in place.

2. Carefully remove compass from bracket.

3. Carefully position compass on mounting bracket and install mounting screws.

4. Tap edge of case lightly to check that compass card is free.

5. Perform compensation adjustment. Standby magnetic compass is compensated concurrently with the gyromagnetic compass set (Chapter 97).

95-30. HORIZONTAL SITUATION INDICATOR (S/N 30597 AND SUBSEQUENT).

Pilot and copilot horizontal situation indicators (HSI) (figure 95-5) provide overall navigational information by means of the following individual displays:

1. The rotating azimuth dial (compass card) presents heading data received from the 3-axis reference sensor. Helicopter heading is read under the upper lubber line.

2. The command heading marker is a movable reference point which indicates selected command heading. It is set to a selected heading by the heading set knob. When helicopter is flying the selected heading, the command heading marker will be aligned on the lubber line. The marker moves with the azimuth dial except when being mechanically positioned by the heading set knob.

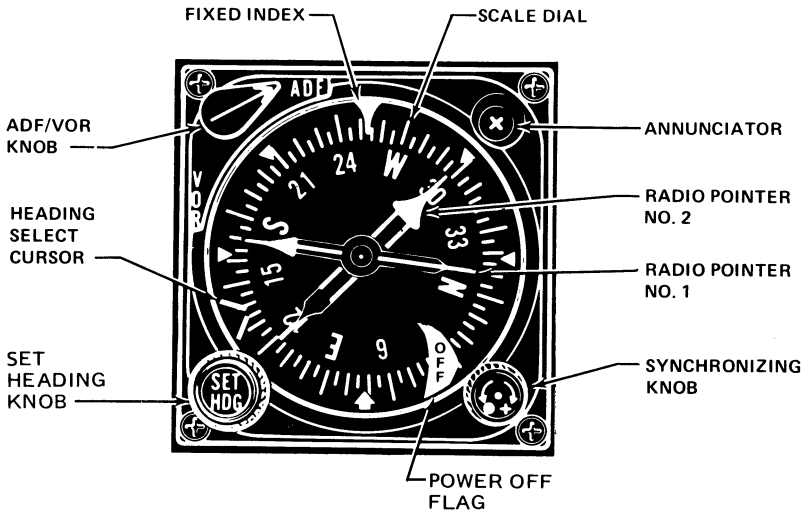


Figure 95-4. Course indicator (S/N 30504 through 30596)

3. The command course pointer is a movable reference point indicating the selected command radio course. It is set to a selected course with course set knob. When helicopter is flying selected course, course pointer will be aligned on lubber line.

4. The digital course readout presented in course window is set by course set knob and corresponds to the setting of command course pointer.

5. The deviation bar depicts the relationship of selected radio beam centerline with respect to present navigation situation. The fixed aircraft symbol represents helicopter and deviation bar depicts radio beam position in respect to helicopter. When helicopter is on the selected radio course, deviation bar will be aligned with course pointer and fixed aircraft symbol.

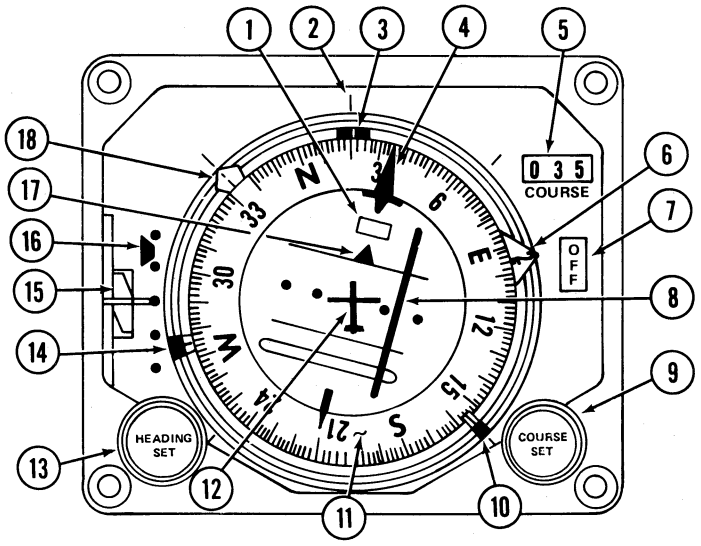
6. The To-From pointer depicts location of selected VOR station with respect to helicopter position. TO pointer is displayed at nose of fixed aircraft symbol and FROM pointer is displayed at tail of fixed aircraft symbol.

7. The glide slope pointer displays helicopter deviation from the glide slope beam center. The pointer represents position of beam center in relation to helicopter.

8. Bearing pointer 1, prior to helicopter S/N 30680, indicates relative bearing of selected VOR radio station as determined by either VOR/LOC receiver 1, VOR/LOC receiver 2 or ADF receiver, depending upon selection of HSI controller switches. The pointer is read against azimuth dial.

9. Bearing pointer 2, prior to helicopter S/N 30680, indicates relative bearing of unselected VOR radio station. The pointer is read against azimuth dial.

10. Two warning flags — power (OFF) and deviation flag (red flag) — provide visual indication of system malfunctions. A warning flag will come into view whenever a malfunction occurs.



1. VOR/LOC warning flag — Provides a visual indication when the VOR/LOC signal is unreliably weak or when navigation system malfunctions.
2. Lubber line — Represent centerline of helicopter forward.
3. Heading marker — Movable reference marker set to a selected heading with the HEADING SET knob. Heading marker will be aligned on the lubber line when flying the selected heading. The marker moves with compass card except while being mechanically positioned by the heading set knob.
4. Course pointer — Movable reference point indicating the selected course. Rotating the COURSE SET knob corresponds with the COURSE window digital readout. Course pointer will be aligned on the lubber line when flying the selected course.
5. Course window — The digital course readout set by the COURSE SET knob, presents selected course in the COURSE window setting of the course pointer.
6. Bearing pointer No. 2 — Indicates ADF bearing to the received station and is read against the compass card.
7. Compass OFF flag — Provides a visual indication of system malfunction, and will come into view whenever the HSI or the gyromagnetic compass set is not receiving 115 VAC input power.
8. Course deviation bar — Indicates deviation from the selected VOR radial or localizer path. The deviation bar will be aligned with the course pointer and the fixed aircraft symbol when on the selected VOR course.
9. Course set knob — Selects course indicated by course pointer and COURSE window digital readout.
10. Reciprocal bearing pointer No. 1 — Indicates 180 degrees from the received VOR/LOC station.
11. Compass card (azimuth dial) — Presents heading data received from the compass system and is read under the lubber line.
12. Aircraft symbol — Represent aircraft in relation to the compass heading.
13. Heading set knob — Selects heading indicated by heading marker.
14. Reciprocal bearing pointer No. 2 — Indicates 180 degrees from the received ADF station.
15. Glide slope warning flag — Provides a visual indication of a malfunction in the glide slope system, or when the glide slope signal is unreliably weak.
16. Glide slope pointer — Displays aircraft deviation above or below the glidepath. The pointer represents the position of the beam center in relation to the aircraft.
17. To-from pointers — Indicates whether flying to or from the selected VOR station. The trianglular pointers appear at the head or tail of the course pointer to indicate to or from, respectively.
18. Bearing pointer No. 1 — Indicates the bearing to the VOR/LOC received station and is read against the compass card. If dual VOR is installed, the No. 1 pointer displays either NAV 1 or NAV 2 bearing as selected by the appropriate pilot or copilot BRG PTR No. 2 switch.

212-M-95-5

Figure 95-5. Horizontal situation indicator (S/N 30597 and subsequent)

95-31. DISTANCE MEASURING EQUIPMENT INDICATOR (S/N 30597 AND SUBSEQUENT).

Pilot DME indicator, used with DME navigation set, presents slant distance digital readout of helicopter to selected VORTAC or VOR-DME station in nautical miles, groundspeed in knots, and time-to-station in minutes.

95-32. MARKER BEACON INDICATORS (S/N 30597 AND SUBSEQUENT).

Pilot and copilot marker beacon indicators, used with glide slope-marker beacon set, provide visual indication, in addition to audio tones of passage over beacon stations located on airways and ILS approach courses. Each indicator consists of three indicator lights (white, blue, and amber). The white indicator light (airways indicator) illuminates steady while helicopter is over fan marker beacon station. During ILS operation, the blue indicator light will flash on/off at the rate of two flashes per second when helicopter passes over the outer marker beacon station. The amber light flashes dot/dash when helicopter passes over middle marker beacon during ILS approach.

PROPULSION AND HYDRAULIC INSTRUMENTS

95-33. PROPULSION AND HYDRAULIC INSTRUMENTS.

Propulsion and hydraulic instruments consist of dual torque pressure, engine oil temperature and pressure, fuel pressure, fuel quantity, gas producer tachometer, gearbox oil temperature and pressure, hydraulic pressure, hydraulic oil temperature, transmission oil temperature and pressure, triple tachometer, and interturbine temperature indicators.

95-34. DUAL TORQUE PRESSURE INDICATOR.

Pilot dual torque pressure indicator (M20) simultaneously displays torque output on both engines on inner dial and torque to transmission (combined torque of both engines) on outer dial. The indicator receives torque indications from engine 1 and 2 torque pressure transmitters. All indications are in percent of allowable torque.

95-35. ENGINE OIL TEMPERATURE AND PRESSURE INDICATORS.

Engine 1 and 2 oil temperature and pressure indicators (M5 and M6) are dual type indicators registering temperature (degrees Celsius) and pressure (psig) for each engine. Temperature portion receives temperature indications from an electrical resistance-type bulb and pressure portion receives pressure indications from an engine oil pressure transmitter. Temperature portion is 28 volt dc powered and pressure portion is 26 volt ac powered.

95-36. FUEL PRESSURE INDICATORS.

Engine 1 and 2 fuel pressure indicators (M3 and M4) register fuel pressure (psig) from indications received from fuel pressure transmitters. System is powered from 26 volt ac bus 1 and 26 volt ac bus 2.

95-37. FUEL QUANTITY INDICATOR.

The fuel quantity indicator (M25) provides readings of fuel supply quantity in total pounds as determined by position of fuel quantity selector switch (LEFT, TOTAL or RIGHT). System is powered from 115 volt ac bus 1 on helicopter S/N 30504 through 30596 and from ac bus 2 on helicopter S/N 30597 and subsequent.

95-38. GAS PRODUCER TACHOMETER INDICATORS.

Engine 1 and 2 gas producer tachometer indicators (M17 and M18) register percent of rpm of engine 1 and 2 gas producer speeds. Gas producer tachometer generators, one on each engine, send voltage signals to respective indicator proportional to engine 1 and 2 gas producer speed. Gas producer tachometer indicator system is self-generating.

95-39. GEARBOX OIL TEMPERATURE AND PRESSURE INDICATOR.

The gearbox oil temperature and pressure indicator (M15) is a dual type indicator registering temperature (degrees Celsius) and pressure (psig) of oil in the reduction gearbox. The temperature portion receives temperature indications from an electrical resistance-type bulb and pressure portion receives pressure indications from oil pressure transmitter. The temperature portion is powered by 28 volt dc buses 1 and 2, and pressure portion is powered by 26 volt ac bus 2.

95-40. HYDRAULIC PRESSURE INDICATORS (S/N 30504 THROUGH 30596).

Hydraulic system 1 and 2 oil pressure indicators (M37 and M36) register hydraulic pressure (psig) from pressure indications received from two hydraulic pressure transmitters. The system is powered by 26 volt ac buses 1 and 2.

95-41. HYDRAULIC TEMPERATURE INDICATORS (S/N 30504 THROUGH 30596).

Hydraulic system 1 and 2 temperature indicators (M39 and M38) register hydraulic temperatures (degrees Celsius) from indications received from electrical resistance-type temperature bulbs. System is powered by 28 volt dc bus 2 on helicopter S/N 30504 through 30553. On helicopter S/N 30554 through 30596, 28 volt dc bus 1 powers No. 1 hydraulic temperature indicator and 28 volt dc bus 2 powers No. 2 hydraulic temperature indicator.

95-42. HYDRAULIC PRESSURE AND TEMPERATURE INDICATORS (S/N 30597 AND SUBSEQUENT).

Hydraulic system 1 and 2 temperature and pressure indicators (M36 and M37) are dual type indicators registering hydraulic oil temperature (degrees Celsius) and hydraulic pressure (psig). Pressure portion, powered by 26 volt ac buses 1 and 2, registers indications received from two hydraulic pressure transmitters.

95-43. TRANSMISSION OIL TEMPERATURE AND PRESSURE INDICATOR.

Transmission oil temperature and pressure indicator (M16) is a dual type indicator registering temperature (degrees Celsius) and pressure (psig) of oil in the transmission. Temperature portion receives temperature indications from an electrical resistance-type bulb and pressure portion received pressure indications from the oil pressure transmitter. Temperature portion is powered by 28 volt dc bus 2 and pressure portion is powered by 26 volt ac bus 1.

95-44. TRIPLE TACHOMETER INDICATOR.

Pilot triple tachometer indicator (M12) contains three pointers and simultaneously registers engine 1 and engine 2 power turbine and main rotor rpm in percentage. Power is provided by three tachometer generators, mounted on engine 1, 2, and transmission respectively, and these systems are self-generating.

95-45. INTERTURBINE TEMPERATURE (ITT) INDICATORS.

Engine 1 and 2 interturbine temperature indicators (M23 and M24) register power turbine inlet air temperature received from bayonet-type thermocouples mounted between gas producer turbine and power turbine. The temperature indications are in degrees Celsius.

MISCELLANEOUS INSTRUMENTS

95-46. MISCELLANEOUS INSTRUMENTS.

Miscellaneous instruments consist of clock, dual ac and dc voltmeters, dual dc ammeter, free air temperature indicator, and engine hourmeter.

95-47. CLOCK.

Pilot clock (M29) and the copilot clock (M40) are 8-day type clocks with added stopwatch feature for elapsed time. Each clock has a sweep-second pointer and a minute-totalizer pointer, to indicate elapsed time up to one hour. A control knob on the case starts the pointers when pressed, stops both pointers when pressed a second time and resets both pointers to 12 when pressed a third time. A second control knob winds and sets clock.

95-48. DUAL AC AND DC VOLTMETERS.

Dual ac and dc voltmeters (M21 and M22) monitor and simultaneously indicate ac and dc bus voltage. Dual voltmeter 1 indicates voltage present on 115 volt ac and 28 volt dc 1 buses and dual voltmeter 2 indicates voltage present on 115 volt ac and 28 volt dc buses. The dual voltmeters do not control the power source and are used as components of both dc and ac power systems.

95-49. DUAL DC AMMETER.

The dual dc ammeter (M13) indicates output in amperes of generators 1 and 2 by monitoring the current flow at each respective shunt.

95-50. FREE AIR TEMPERATURE INDICATOR.

The bi-metallic probe-type free air temperature indicator is mounted at top of right windshield (figure 95-6) just to right of center post. The probe portion is exposed to outside temperatures through the windshield and is protected by a sunshield. The indicator provides a direct reading of outside air temperature in degrees Celsius.

95-51. REMOVAL — FREE AIR TEMPERATURE INDICATOR.

1. Unscrew and remove sunshield, dished washer and one case washer from outside of windshield (figure 95-6).

2. Remove indicator and other case washer from inside of windshield.

95-52. INSTALLATION — FREE AIR TEMPERATURE INDICATOR.

1. Place rubber washer over probe of thermometer with flat side of washer next to indicator case. Insert probe through mounting hole from inside windshield (figure 95-6).

2. Place rubber washer, flat side out, on probe outside windshield. Seat washer shoulders in mounting hole. Install steel dished washer, with outside edge curving toward windshield. Position temperature indicator scale correctly.

3. Place sunshield over probe and tighten securely.

95-53. ENGINE HOURMETER.

Engine hourmeter (M26) is mounted on right side of pedestal near the floor. Hourmeter clock mechanism is calibrated in hours and registers engine operating hours under flight power.

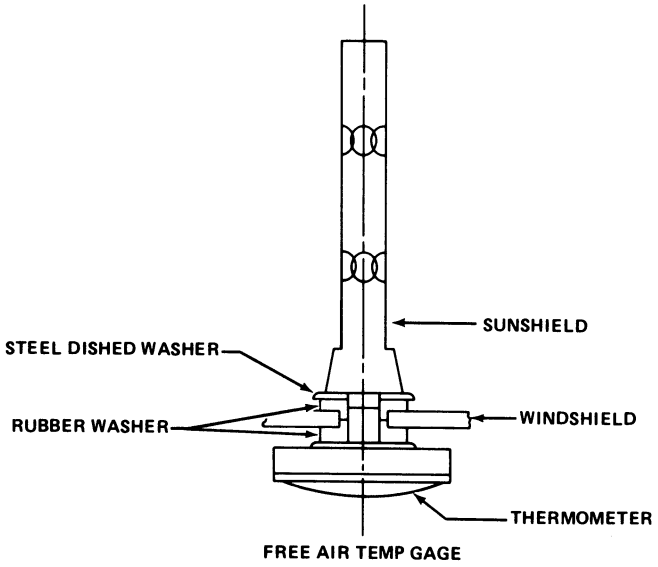


Figure 95-6. Free air temperature indicator