# URGENT

***TB 1-1520-243-20-25**

# DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

# OIL DEBRIS DETECTION SYSTEM (ODDS) CLEAN-UP MESSAGE FOR ALL AH-1 AND UH-1 SERIES AIRCRAFT

**Headquarters, Department of the Army, Washington, D.C.**

**12 November 1997**



**NOTE**

THIS PUBLICATION IS EFFECTIVE UNTIL RESCINDED OR SUPERCEDED.

**1. Priority Classification. URGENT.**

**a. Aircraft in Use.** Upon receipt of this TB the condition status symbol of the cited aircraft will be changed to a red horizontal dash. The red horizontal dash may be cleared when the inspection of paragraph 8. below is completed. The affected aircraft shall be inspected, as soon as practical but no later than the task/inspection suspense date. Failure to comply with the requirements of this TB within the time frame will cause the status symbol to be upgraded to a red X.

**b. Aircraft in Depot Maintenance.** Aircraft will not be issued until compliance with this TB has been completed.

**c. Aircraft Undergoing Maintenance.** Aircraft will not be released until compliance with this TB has been completed.

**d. Aircraft in Transit.**

(1) Surface/Air Shipment. Prior to first flight.

(2) Ferry Status. Inspect at final destination.

**e. Maintenance Trainers (Category A and B).** N/A.

***This TB supersedes USAAMCOM Aviation Safety Action Messages 201509Z, OCT 97, AH-1-98-ASAM-01 and 201509Z, OCT 97, UH-1-98-ASAM-01.**

**f. Component/Parts in Stock at all Levels (Depot and Others) Including War Reserves.** N/A.

**g. Components/Parts in Work (Depot level and Others).** N/A

**2. Task Inspection/Suspense Date.** Within next 30 flight hours or 60 calendar days, whichever occurs first.

**3. Reporting Compliance Suspense Date.** No later than 7 Nov 97 IAW Paragraph 14.a. of this TB.

**4. Summary of Problem.**

**a.** Since the ODDS was fielded, several problems have surfaced with the installation, operation, and manual references. Experience with the ODDS provided practical information, which needs to be disseminated to ODDS users. This TB addresses the following topics:

**(1)** ATCOM provided maintenance procedures for ODDS equipped aircraft via UH-1-95-ASAM-03 (TB 1-1520-243-20-23). Reference 13.b. requires further update to include all of the essential information of UH-1-95-ASAM-03 (TB 1-1520-243-20-23) and this message. Those procedures used to troubleshoot the ODDS system when an Engine or Transmission chip segment light illuminates or when debris is found on the pre-ODDS Chip Detectors have been modified.

**(2)** Units shall conduct oil sampling of the Engine and Main Transmission every twenty-five flight hours. These interval samplings will allow more accurate trending capability of component failures than is possible with current procedures. Sampling data will be used to establish a baseline database for ODDS-equipped components, and will provide a basis for further improvements in the oil analysis process (such as increasing sampling intervals, or developing improved oil analysis techniques). Sampling also allows physical property testing using new oil lab analysis techniques. Replacement of lubricant will be based on testing, therefore the oil change interval for the Transmission and Engine is eliminated.

**(3)** ATCOM has received reports of improperly seated V-Band Clamps used to secure the Transmission and Engine Oil Filter Assembly. As the oil system pressurizes, the filter bowl can leak or become totally disengaged from the assembly housing.

**(4)** The published installation torque of the ODDS Chip Detector Valve on the 42-Degree And 90-Degree Gearboxes (45-55 inch pounds) is incorrect. The correct torque value should be 90-110 inch pounds.

**(5)** (UH-1 only) ATCOM has received reports that the wire for the Engine Chip Detector, located on the firewall mounted Lubriclone Filter Assembly, was routed in such a way as to expose it to damage from routine maintenance. The wire should be routed and secured in an area that is protected from incidental damage.

**(6)** The Power Module provides the voltage to the Chip Detectors for fuzz bum off. Some Power Modules were installed with reverse electrical polarity (positive and negative reversed). The Power Module will not function when installed with reverse polarity because the capacitors bum out immediately. Frequent chip lights may occur if the Power Module is not functioning properly. Current maintenance does not require regular inspection of the Power Module unless required by troubleshooting procedures. The TM will be changed to add an inspection for correct polarity of the Power Module connections for future Power Module replacements. Another problem reported with the Power Module is leaking capacitors in the Power Modules, which cause corrosion inside the Power Module and lead to failure of the module. Leaking capacitors can only be found by removing the cover to the Power Module. The ODDS manufacturer can replace leaking capacitors with more reliable capacitors without requiring total replacement of the Power Module.

**(7)** ATCOM received reports of Chip Detectors for both the Engine and Transmission having chips with no corresponding chip segment light. This TB establishes a continuity inspection of the Chip Detector Circuit at each phase to resolve this issue. The phase manuals will be changed to reflect this inspection.

**(8)** (UH-1 Only) TM 55-1520-210-23P-1 shows a 90-Degree Fitting and a Quick Disconnect Fitting Assembly at the Engine Deck on the Oil Hose Assembly leading from the firewall Mounted Lubriclone Filter Assembly. Some ODDS equipped aircraft have the 90-Degree fitting installed and some do not. In either case, a solid 45-Degree bulkhead fitting shall be installed to replace the engine deck quick disconnect fitting and the 90-Degree fitting, if it is installed.

**(9)** Implement a recurring inspection of the pre-ODDS Main Transmission and Engine Accessory GearBox (AGB) Chip Detectors on ODDS equipped UH-1 helicopters and the Engine AGB Chip Detector on AH-1 helicopters.

**(10)** Clarify maintenance requirements related to repeated Chip Segment Light illumination on newly overhauled components.

**(11)** The ODDS Chip Detectors used on the Engine Lubriclone, the 42-Degree Gearbox, and the 90-Degree Gearbox are secured by slots in the Chip Detector housing and pins in the base. Worn slots and loose pins may cause leakage in this area. A recurring inspection of these items is required.

**b. For Manpower/Downtime and Funding Impacts** see Paragraph 12.

**c. The purpose of this TB** is to correct deficiencies associated with the ODDS installation and provide maintenance information and requirements for the ODDS.

**5. End Items To Be Inspected.** All UH-1 and AH-1 series aircraft equipped with ODDS (reference 13.d. and 13.j.). This TB does not affect those UH-1 aircraft not equipped with ODDS.

**6. Assembly Components To Be Inspected.**

**a. UH-1 Oil Debris Detection System (ODDS).**

| NOMENCLATURE | PART NO. | NSN |
|---|---|---|
| Engine Assembly | 1-000-060-22 | 2840-00-134-4803 |
| Transmission Assembly | 204-040-016-5 | 1615-00-183-0834 |
| 42-Degree Gearbox | 204-040-003-37 | 1615-00-918-2676 |
| 90-Degree Gearbox | 204-040-012-13 | 1615-00-918-2677 |

**b. AH-1 Oil Debris Detection System (ODDS).**

| NOMENCLATURE | PART NO. | NSN |
|---|---|---|
| Engine Assembly | 1-000-060-23 | 2840-00-621-1860 |
| Transmission Assembly | 212-040-001-39 | 1615-01-014-6006 |
| 42-Degree Gearbox | 212-040-003-23 | 1615-01-015-0584 |
| 90-Degree Gearbox | 212-040-004-9 | 1615-01-008-7748 |

**7. Parts To Be Inspected.**

| NOMENCLATURE | PART NO. | NSN |
|---|---|---|
| Wire (UH-1 Only) | #W16A18 | N/A |
| Wire (UH-1 Only) | #W18B20 | N/A |
| Wire (UH-1 Only) | #W18C18 | N/A |
| Wire (UH-1 Only) | #W19A20 | N/A |
| 45-Degree Fitting (UH-1 Only) | AN837-12D | 4730-00-194-1081 |
| Chip Detector (UH-1 Only) | 1B845 | 2995-01-336-8929 |

| | | |
|---|---|---|
| Body (UH-1 Only) | 600609 | 4730-01-326-1388 |
| Power Module (UH-1 & AH-1) | E1131C | 1615-01-330-5148 |
| Chip Detector (UH-1 & AH-1) | 1B833 | 1650-01-322-6652 |

**8. Inspection Procedures.**

**NOTE**

Procedures applicable to a specific MDS will have paragraph titles identified (UH-1 Only) or (AH-1 Only). Unmarked paragraphs are applicable to both aircraft. Paragraphs 8.e., 8.f., 8.h. and 8.i. (3) apply only to UH-1 aircraft.

**a. Chip Light illumination and/or Debris Evaluation Procedures.** See Paragraph 9.a.

**b. Oil Sampling and Oil Change Interval.** See Paragraph 9.b.

**c. V-Band Coupling. See paragraph 9.c.**

**d. Chip Detector Torque Value. See paragraph 9.d.**

**e. (UH-1 Only) Engine Chip Detector Wire.**

**(1)** Locate and gain access to wire number W16A18, which is connected to the Chip Detector for the firewall mounted Lubriclone Filter Assembly. This is the wire that runs from the Chip Detector on the Oil Separator (Lubriclone), along the firewall, joining the wire bundle above and inboard of the Oil Filter Assembly.

**(2)** As it leads from the Chip Detector, this wire should be routed in the space between the firewall and the firewall mounted Lubriclona/Filter Assembly, secure with loop clamps, and secure to the wire bundle with nylon zip ties. It should not loop around aft of the Filter Assembly or sag below the Filter Assembly. If the wire is not properly routed and secured, follow correction procedure of paragraph 9.e.

**f. (UH-1 Only) Power Module.**

**(1)** Gain access to the Power Module.

**(2)** Disconnect the Power Module Connector (M83723/86R-1212N) from the Power Module.

**(3)** Energize battery or apply external DC power.

**(4)** Obtain a digital voltmeter or similar device and set it to a minimum of 35 vdc. Connect the negative (black) terminal of a digital voltmeter or similar device to pin 2 (corresponding to wire number TDC102A20N). Connect the positive lead of the digital voltmeter or similar device to pin 1 (corresponding to wire number TDC101A20).

**(5)** Energize the ODDS circuit breaker in the overhead DC circuit breaker panel. The voltmeter should read a positive polarity of approximately 28 volts. If the polarity is reversed, proceed with corrective actions of paragraph 9.f. If the polarity is correct, de-energize the circuit and continue with the Power Module inspection.

**NOTE**

To ensure proper m-assembly, mark position of cover on mounting base with a grease pencil prior to removing cover.

**(6)** Remove mounting bolts (item 167, figure 226, TM 55-1520-210-23P-2) in cabin ceiling.

**NOTE**

Do not completely remove the Power Module cover retaining screws. They are designed to be retained in the base for re-assembly.

**(7)** Loosen the four large phillips screws (do not remove the small screws) located on back of Power Module just enough to allow the cover to be removed.

**NOTE**

Capacitors in old Power Modules will have a silver and/or dark gray color capacitor. The repaired Power Modules (with the "R" suffix) will have silver or blue tinted capacitors, Any discoloration of capacitors requires troubleshooting.

**(8)** Visually inspect capacitors for evidence of leakage. White powdery deposits and corrosion on the inside of the cover or on capacitor leads is evidence of leakage.

**(9)** If leakage is evident, correct IAW paragraph 9.f.

**(10)** If no leakage is found, carefully replace cover, reinstall Power Module, and reinstall electrical connector making sure polarity is correct IAW paragraph 8f(4).

**g. Chip Detector/Debris Monitor Continuity Check.**

**NOTE**

If the Chip Detector or Debris Monitor is covered with debris and the corresponding segment light does not illuminate, call the technical POC before continuing with this inspection.

**(1)** Remove all Chip Detectors (42-Degree Gearbox, 90-Degree Gearbox, Engine Lubriclone Debris Monitor, and Transmission Debris Monitor) for inspection.

**(2)** Inspect Chip Detector and Debris Monitor for debris. Evaluate debris IAW appropriate debris classification chart and paragraph 9.a.

**(3)** Perform a continuity check.

**(a)** Clean all debris and oil from the Chip Detector and/or Debris Monitor. Energize battery or apply external power. Turn on the caution panel. Pull circuit breaker to turn the ODDS Power Module off. Energize the Caution Panel Test Switch to verify operation. Replace caution panel or segment light if necessary. With test switch off, observe the status of the corresponding segment light (Engine Chip Det or Xmsn Chip Detector). If the corresponding segment light is illuminated, call the technical POC in paragraph 16.a. If the corresponding light is not illuminated, proceed to next step.

**(b)** Push the circuit breaker in. Apply a short across the Chip Detector/Debris Monitor to force illumination of the light. If the light illuminates, then the wiring to the caution panel is functional.

**(c)** If the segment light does not illuminate after shorting the Chip Detector/Debris Monitor, the wiring or the Chip Detector is not functional and requires troubleshooting.

**h. (UH-1 Only) 90-Degree Engine Deck Fitting.** See Paragraph 9.h.

**NOTE**

If a 45-Degree Bulkhead Fitting (AN837-12D) is not available, the aircraft status symbol shall remain a red horizontal dash until a fitting is available and the corrective action is accomplished IAW paragraph 9.d.

**i. Chip Detector Visual and Resistance Check.**

**NOTE**

This inspection pertains only to the pre-ODDS UH-1 and AH-1 Engine AGB and the UH-1 Main Transmission Sump Chip Detectors. Do not remove the ODDS Transmission Debris Monitor or Engine Lubriclone Chip Detectors for this inspection.

**NOTE**

A large amount of debris (small particles, fuzz, etc.) may be present the first time the old Chip Detector is inspected. The amount of debris present will depend on the length of time the component has been in operation since the Chip Detector was last removed. Initially, inspect for large particles only. Determination of particle size is a subjective decision, which can be aided by use of the debris classification charts in the appropriate TM. If no large particles are present, wipe the debris from the Chip Detector and install. If large particles are present or if you have questions concerning the size of the particles, contact the technical POC.

**(1)** For the initial inspection, remove the pre-ODDS Chip Detector in the Transmission Sump and in the Engine AGB. As applicable, inspect for debris.

**(2)** If any large particles are found, contact the technical POC in paragraph 16.a. If no debris is found, reinstall the Chip Detectors.

**(3) (UH-1 Only)** for subsequent Transmission Sump Chip Detector inspections, remove the Chip Detector and inspect for debris. Analyze the debris IAW the appropriate TM classification chart and paragraph 9.a. If no debris is found, reinstall the Chip Detector.

**(4)** For the initial inspection, check the resistance of the Engine AGB Chip Detector IAW reference 13.e., task 5-9. If resistance is less than 400,000 ohms, replace the Chip Detector.

**(5)** For subsequent Engine AGB Chip Detector inspection, check the resistance of the Chip Detector IAW reference 13.e., task 5-9. If resistance is less than 400,000 ohms remove the Chip Detector and inspect for debris. Analyze debris IAW the appropriate TM debris classification chart and paragraph 9.a. If resistance is greater than 400,000 ohms, the Chip Detector does not need to be removed. The inspection is complete.

**j. Repetitive Chip Light Illuminations.** Wear in particles and debris from the manufacturing process of newly overhauled assemblies can cause repetitive (three or more) chip light indications until the particles and debris are flushed from the system. If repetitive chip light indications occur after the installation of newly overhauled components, perform the correction procedures of paragraph 9.j.

**k. (UH-1 Only) Chip Detector Wear.**

**(1)** Gain access to the Engine Chip Detector on the Lubriclone, the 90-Degree Gearbox Chip Detector, and the 42-Degree Gearbox Chip Detector.

**(2)** Remove the Chip Detector (item 3, figure 98C, TM 55-1520-210-23P-1), and the probes (item 5C, figure 181, and item 3D, figure 184).

**(3)** Inspect the three mounting grooves for wear at the detent. Using a caliper, or similar measuring device, measure the wall thickness at the bottom of the detent. The minimum wall thickness should be 0.030 inch.

**(4)** If the wall thickness of the detent is less than 0.030 inch, proceed with the correction of paragraph 9.k.

**(5)** Check the 3 pins located in the Chip Detector body (item 5, figure 98C), and both of the Chip Detector valves (item 58, figure 181, and item 3C, figure 184) for security.

**(6)** If the pins are loose, proceed with the correction of paragraph 9.k.

**9. Correction Procedures.**

**NOTE**

A flickering or intermittent chip light may result when the Chip Detector bum off feature is activated by the presence of debris on the Chip Detector gap. When debris bridges the gap, a small charge is released in an attempt to clear the gap of any insignificant-sized particles. In some instances several bum-off events occur before the gap is cleared. These multiple events may cause the chip light to flicker. If the gap is successfully cleared of debris, the light will remain off. If flickering occurs but the chip light remains off, no further action is required.

**a. Chip Light Illumination and/or Debris Evaluation Procedures.** The following changes apply to the procedures used in the event of a Chip Detector segment light illumination, or when chips are found on the pre-ODDS Transmission Sump and Engine AGB Chip Detectors on ODDS equipped aircraft. The procedures outlined in TM 55-1520-210-23-1 (reference 13.b.) should be appended with these changes.

**(1)** Rescind the requirement to discard the Oil Cooler when debris is found.

**NOTE**

Although debris on a Chip Detector may be present in sufficient quantities to bridge the Chip Detector gap and cause a chip light, there may not be sufficient debris to provide electrical continuity. The continuity check (paragraph 8.g.) is the authorized method for determining if the Chip Detector is functioning property.

**NOTE**

Document the findings on DA Form 2408-20, Block 7 [amount of debris (light or medium) and type of debris] using description on Oil Debris Classification Chart.

**(2) (UH-1 Only)** When evaluating Transmission debris, remove the pre-ODDS Chip Detector in the Transmission Sump, Transmission Debris Monitor and screen, and oil filter to inspect for debris.

**(3)** When evaluating engine debris, remove the Engine Cyclonic Debris Monitor, both engine filters (Engine Mounted Filter and Airframe Mounted 3 Micron Filter), and oil strainers to inspect for debris. Remove the pre-ODDS Engine AGB Chip Detector only if required after performing the resistance check IAW paragraph 8.i. (4). See paragraph 9.a. (7) for procedures at remote sites.

**(4)** For 42-Degree and 90-Degree Gearbox chip segment light illumination. Remove the Chip Detector to inspect for debris. Drain the oil from the 42-Degree or 90-Degree Gearbox through clean cheesecloth to recover debris.

**(5)** Conduct debris analysis IAW the appropriate TM criteria on all debris found, regardless of the source (e.g. debris from Chip Detector, filter, screen, etc.).

**(6)** If debris exceeds any of the limits in the appropriate TM Oil Debris Classification Chart, replace the component. if the debris does not exceed these limits, perform a serviceability check to determine if continued operation of the component is likely to result in continued debris generation. Serviceability checks for the 42-Degree and 90-Degree Gearboxes and for ODDS-equipped Main Transmissions and Engines should be performed as follows:

**(a)** Rescind the requirement to change the Engine or Main Transmission oil before performing the serviceability check.

**(b)** The oil in the 42-Degree and 90-Degree Gearboxes shall be drained and replaced.

**(c)** Check filter for bypass, if applicable.

**(d)** Clean and reinstall all screens, Chip Detectors, and debris monitors after debris has been collected. Service components if required.

**(e)** Start and operate the Engine at flight idle until component oil temperatures stabilize,

**(f)** Hover the aircraft for 30 minutes. See paragraph 9.a. (7) for procedures at remote sites.

**(g)** If the chip segment light illuminates during the hover check, replace the component.

**(h)** If no chip light indications occur, remove all filters, screens, Chip Detectors, and debris monitors to inspect for debris.

**(i)** If the amount of debris found after the hover check is noticeably less than the original amount of debris, and no chip light occurs, return the aircraft to service.

**(j)** If the amount of debris after the hover check is the same or increases, replace the component.

**(7)** Should the illumination of a chip segment light result in a precautionary landing at a remote site, perform a serviceability check IAW paragraph 9.a. (6) to clear the aircraft for a one-time flight to base. Reduce the hover time of paragraph 9.a. (6)(f) to ten minutes. Safety wire removed for the inspection at the remote site need not be reinstalled for the one-time flight. Install safety wire upon arrival at base. if any maintenance requirement of paragraph 9.a. (6) cannot readily be accomplished at the remote site, remove only the debris monitors and/or Chip Detectors. Conduct a complete serviceability check IAW paragraph 9.a. (6) upon return to base.

**b. Oil Sampling and Oil Change interval.**

**(1)** Oil sampling is required for ODDS equipped Main Transmission and Engines at a 25 flight hour interval. Sampling shall be accomplished IAW reference 13.f. using the same location and techniques as for Non-ODDS components. Units shall indicate, in the remarks section of DD Form 2026, that the component has ODDS installed.

**(2)** Rescind the scheduled oil change intervals for the Main Transmission or Engine oil. Oil changes should only be accomplished when required as the result of other maintenance actions. Initiate oil sampling of the Engine and Main Transmission every 25 flight hours. When laboratory results indicate component removal, contact the technical POC listed in paragraph 16.a. prior to removing component.

**c. V-Band Clamp.** TM 55-1520-210-23-1 (Reference 13.b.) will be changed to add the following caution directly before the installation procedures of the V-Band Clamps for the Engine and Transmission Oil Filter Assemblies:

**CAUTION**

Ensure that the V-Band Coupling is property seated for the full circumference of the filter bowl and filter head flange. The V-Band Coupling should not appear cocked. Improperly installed clamps will result in damage to the filter head, filter bowl, and coupling, resulting in leaks.

**d. Chip Detector Torque Value.**

**(1)** Gain access to 42-Degree and 90-Degree Gearbox ODDS Chip Detectors.

**(2)** Disconnect connector and wire and remove lockwire.

**(3)** Torque Chip Detector Valve to 90-110 inch pounds.

**(4)** Install new lockwire. Reconnect connector and wire.

**e. (UH-1 Only) Engine Chip Detector Wire.**

**(1)** Locate Chip Detector wire (W16A18) in the space between the firewall and the Oil Separator Lubriclone Filter Assembly. Depending on its current routing, it may be necessary to temporarily disconnect the connector at the Chip Detector and loosen or remove the loop clamps, if installed.

**(2)** The Chip Detector wire may need to be shortened after it is relocated. Excess wire could be damaged during maintenance.

**(3)** Reconnect the connector at the Chip Detector and install or reinstall the appropriate size loop clamps. Secure the chip detector wire to the wire bundle using nylon zip ties, if not already installed.

**f. (UH-1 Only) Power Module.**

**NOTE**

Remove and repair or replace the Power Module if found inoperable. The aircraft shall be reported as fully mission capable until the Power Module is replaced or repaired. The caution panel Chip Detector segment lights may display frequent chip lights due to fuzz on the Chip Detectors during this period.

**(1)** If the inspection results show that the polarity to the Power Module is reversed or, that the capacitors have leaked, replace the current Power Module with a serviceable Power Module IAW the procedure described in paragraph 9.f. (4) and reinstall.

**(2)** Ensure the correct wire numbers are inserted into the correct connector pin numbers. Check the wiring from the connector to the circuit breaker panel and TB2. The proper connections are as follows:

| WIRE NO. | ODDS CONNECTOR PIN NO. | CONNECTED TO |
|---|---|---|
| TDC101A20 | 1 | ODDS Circuit Breaker |
| TDC102A20N | 2 | TB2 |

**NOTE**

Correct wiring configuration discrepancies as necessary.

**(3)** Reconnect connector to new Power Module.

**(4)** Replace Power Module IAW the following procedure:

**(a)** Call Mr. Mike Tiemey at TEDECO (610) 583-9400, extension 349.

**(b)** Coordinate shipment, repairs, and return directly with TEDECO.

**(c)** Total cost of shipment and repair is $725.00. The unit is responsible for the cost of shipment and repair.

**(d)** After repair, the Power Module part number will be annotated with an "R" suffix to identify that new capacitors were installed.

**g. Chip Detector/Debris Monitor Continuity Check.** Troubleshoot Chip Detector/Debris Monitor circuit if required by the inspection of paragraph 8.g. After initial compliance with this ASAM, perform the continuity check at each phase inspection.

**h. (UH-1 Only) 90-Degree Engine Deck Fitting.** The item and figure numbers listed in the following paragraphs refer to TM 55-1520-210-23P-1.

**NOTE**

Oil lines, which have been installed, exposed to heat and stress for any length of time, may take a natural set. it may be difficult to bend the hose for proper alignment. Cap lines when disconnected to prevent contamination.

**(1)** Gain access to left side of engine.

**(2)** Locate oil line (P/N 222517) running from firewall mounted Lubriclone filter assembly to the quick disconnect fitting at the engine deck.

**(3)** Drain oil from the oil line (P/N 2Z2517, item 172B figure 98, TM 55-1520-210-23P-1) by loosening the B-nut at the Oil Fitter Assembly and removing the Oil Line (item 32, figure 122) on the underside of the Engine Deck at the Bulkhead Quick Disconnect Fitting to prevent spillage during replacement. if needed, replenish oil reservoir after procedure is completed.

**(4)** Remove stand-offs (made up of items 172C D, E, V, and 218). Disconnect the Oil Line (P/N 222517) from the Bulkhead Quick Disconnect Fitting (PIN 205-063-602-5, item 168) at the Engine Deck.

Remove and discard any 90-degree fittings (P/N AN939D12, item 170) if installed between the oil line and the quick disconnect.

**(5)** Remove and discard the Bulkhead Quick Disconnect Fitting.

**(6)** Using existing nut and washer, install 45-Degree Bulkhead Fitting (P/N AN837-12D) at the Engine deck. Do not tighten nut. The fitting should be free to rotate for final alignment.

**(7)** To allow for proper positioning of the oil line (item 172B, figure 98), loosen the 45-Degree Fitting (P/N AN837-12D, item 172Q) at the firewall mounted Lubriclone Filter Assembly so that it is free to rotate.

**(8)** Connect oil line (item 172B) to the Engine Deck 45 Degree Bulkhead Fitting. Adjust the 45-degree fittings to position the hose in such a way to prevent twisting or kinks. Make sure that the hose is clear of ail obstructions (e.g. the Engine Mount Tube, throttle linkage, etc.)

**(9)** Reinstall standoffs (made up of items 172C, D, E, V, and 218) if needed.

**(10)** Tighten all hose connections and fittings to proper torque values. Attach Oil Line (item 32, figure 122) beneath Engine deck to the bulkhead fitting and torque. If needed, replenish oil reservoir after procedure is complete.

**(11)** TM 55-1520-210-23P-1 will be changed to delete all reference to items 167, 168, 169, 170, and 171 in figure 98, and replaced with Elbow 45-Degree, item 172Q. Item 25 in figure 122 will be deleted and replaced with Elbow 45-Degree (same as item 172Q in figure 98.)

**i. Chip Detector Visual and Resistance checks.** Replace components if required due to the results of the paragraph 8.i. inspection. Ensure the new Chip Detector resistance is greater than 400,000 ohms. After initial compliance with this TB perform this inspection every 25 flight hours only on helicopters equipped with the ODDS.

**j. Repetitive Chip Light Illuminations.** If chip lights occur after installation of newly overhauled assemblies perform the following procedure:

**(1)** Monitor the amount of debris found on the Chip Detector.

**(2)** If the amount of debris increases or the cause of the debris is unclear, contact the technical POC in paragraph 16.a. for assistance.

**(3)** If the amount of debris decreases, which indicates that wear in particles and debris from the overhaul process is diminishing, the assembly may be left in service.

**(4)** Perform a drain and flush of the lubrication system for the affected assembly IAW appropriate TM procedures.

**(5)** If the Engine lubrication system is drained and flushed, draining of the Lubriclone is required as follows:

**NOTE**

Removal of the entire drain valve is required to remove all residual sludge in the bottom of the Lubriclone.

**(a)** Remove the lockwire securing the drain valve (item 9, figure 98C, TM 55-1520-210-23P-1; item 9, figure 53D, TM 55-1520-236-23P-1).

**(b)** Use a small container to catch the oil, remove the entire drain valve from the Lubriclone assembly. This will drain the assembly.

**(c)** Install drain valve. Torque drain valve to 16-20 inch pounds. Install lockwire.

**k. (UH-1 Only) Chip Detector Wear.**

**(1)** Replace any Chip Detector, Chip Detector body, Chip Detector probe, or Chip Detector valve, which fails the inspection of paragraph 8.k.

**(2)** Repeat this inspection at each phase inspection.

**10. Supply/Parts and Disposition.**

**a. Parts Required.** Items cited in paragraphs 6. and 7. may be required to replace defective items.

**b. Requisitioning Instructions.** Requisition replacement parts using normal supply procedures.

**c. Bulk and Consumable Materials.** N/A.

**d. Disposition.**

**(1)** If ODDS Chip Detectors are found defective call the logistics POC in paragraph 16.b.

**(2)** Dispose of other removed parts/components using normal supply procedures. A QDR is not required.

**e. Disposition of Hazardous Material.** In accordance with (IAW) Environmental Protective Agency directives as implemented by your servicing environmental coordinator (AR 200-1).

**11. Special Tools and Fixtures Required.** As required.

**12. Application.**

**a. Category of Maintenance.** AVUM. Aircraft downtime will be charged to AVUM.

**b. Estimated Time Required.**

**(1)** Maximum total of 8 man-hours using 1 persons.

**(2)** Total of 8 hours downtime for one end item.

**c. Estimated Cost Impact to the Field.** N/A.

**d. TB/MWOs to be applied prior to or concurrently with this Inspection.** TB 1-1520-243-20-23.

**e. Publications which Require Change as a Result of this Inspection.** The following publications shall be changed to reflect this TB. A copy of this TB shall be inserted in the appropriate TM as authority to implement the change until the printed change is received.

**(1)** TM 55-1520-210-23P Series.

**(2)** TM 55-1520-210-23 Series.

**(3)** TM 55-1520-210-PM.

**(4)** TM 55-1520-236-23P Series.

**(5)** TM 55-1520-236-23 Series.

**(6)** TM 55-1520-244-PM

**13. References.**

**a.** TM 55-1520-210-23P Series.

**b.** TM 55-1520-210-23-1.

**c.** TM 55-1520-210-PM.

**d.** MWO 1-1520-242-50-2.

**e.** TM 55-2840-229-23-1.

**f.** TB 43-0106.

**g.** TM 55-1520-236-23P Series.

**h.** TM 55-1520-236-23 Series.

**i.** TM 55-1520-244-PM.

**j.** MWO 1-1520-236-50-30.

**k.** TB 1-1520-243-20-23.

**14. Recording and Reporting Requirements.**

**a. Reporting Compliance Suspense Date (Aircraft).** Upon entering requirements of this TB on DA Form 2408-13-1 on all subject MDS aircraft, forward a priority message, datafax or e-mail to commander, AMCOM, ATTN: AMSAM-SF-A (SOF Compliance Officer), IAW AR 95-1. Datafax number is DSN 897-2111 or (205) 313-2111. E-mail address is <safeadm@redstone.army.mil>. The report will cite this TB number/message number, date of entry in DA Form 2408-13-1, the aircraft mission design series and serial numbers of aircraft in numerical order.

**b. Task/Inspection Reporting Suspense Date (Aircraft).** Upon completion of inspection, units will forward a priority message to: Commander, AMCOM, ATTN: AMSAM-AR-E-P-D (Mark Jeude), fax DSN 788-7061 or (205) 842-7061, E-mail is <jeude-mj@redstone.army.mil>. The report will cite this TB number, message number, and date of inspection, aircraft serial number, aircraft and component hours, and results of the inspection. Inspection and reports will be completed no later than 10 days after task/inspection suspense date.

**c. Reporting Message Receipt (Spares).** N/A.

**d. Task/Inspection Reporting Suspense Date (Spares) for Materiel in Wholesale Depot or Retail Storage.** N/A.

**e. The Following Forms are Applicable and are to be Completed in Accordance with DA PAM 738-751, 15 JUN 92.**

**(1)** DA Form 2408-13, Aircraft Status Information Record.

**(2)** DA Form 2408-13-1, Aircraft Inspection and Maintenance Record.

**(3)** DA Form 2408-15, Historical Record for Aircraft.

**(4)** DA Form 2408-18, Equipment Inspection List.

**f. The Following are instruction for Users of Manual Forms and Records DA Form 2408-18:**

**(1)** Add inspections for 25 Flight Hour Engine Oil Sample, 25 Hour Main Transmission Oil Sample, and 25 Flight Hour Chip Detector Check IAW paragraph 8.b. and 9.i. of this TB.

**(2)** The Chip Detector Continuity Check (paragraph 9.g.) due at each subsequent phase inspection will be listed here until the change is included in reference 12.e.

**(3)** Delete the requirement for Main Transmission and Engine Oil Changes.

**g. The Following are instructions for Users of ULLS-A DA Form 2408-18:**

**(1)** Use inspection number A45 for the 25 Flight Hour Engine Oil Sample (paragraph 8.b.).

**(2)** Use inspection number A41 for the 25 Flight Hour Main Transmission Oil Sample (paragraph 8.b.).

**(3)** Use an 800 inspection number for the Chip Detector Continuity Check (paragraph 9.g.) due at each subsequent 150 Hour Phase Inspection. Delete this after the check is added to reference 12.e.

**(4)** Use inspection number A60 for the 25 Flight Hour Chip Detector Check (paragraph 8.i.).

**(5)** Delete inspection numbers A308 (Main Transmission Oil Change) and A310 (Engine Oil Change) IAW paragraph 9.b..

**15. Weight and Balance. N/A.**

**16. Points of Contact.**

**a.** Technical point of contact for this TB is Mr. Mark Jeude, AMSAM-AR-E-P-D, DSN 788-7061 or (205) 842-7061. Datafax is DSN 746-3356 or (205) 876-3356. E-mail is <jeude-mj@redstone.army.mil>.

**b.** Logistical point of contact for UH-1 Aircraft is Mr. Charles Elkins, AMSAM-DSA-UH-U, DSN 645-0073 or (205) 955-0073. Datafax is DSN 645-6590 or (205) 955-6590. E-Mail is <elkins-ce@redstone.army.mil>. Logistical point of contact for AH-1 Aircraft is Mr. Joe Dewitt, AMSAM-DSA-CO, DSN 645-9551 or (205) 955-9551, Datafax is DSN 645-0974 or (205) 955-0974. E-Mail is <dewitt-jh@redstone.army.mil>.

**c.** Forms and Records point of contact for this TB is Ms. Ann Waldeck, AMSAM-MMC-RE-F, DSN 876-5564 or (205) 876-5564. Datafax number is DSN 746-4904. E-mail is <waldeck-ab@redstone.army.mil>.

**d.** Safety point of contact for this TB is Mr. Robert Brock, AMSAM-SF-A, DSN 788-8632 or (205) 842-8632. Datafax is DSN 897-2111 or (205) 313-2111. E-mail is <brock-rd@redstone.army.mil>.

**e.** Foreign Military Sales (FMS) recipients requiring clarification of action advised by this TB should contact Mr. Ronnie W. Sammons, AMSAM-SA-CS-NF, DSN 897-0869 or (205) 313-0869. Datafax is DSN 897-0411. E-mail is <sammons-rw@redstone.army.mil>. (Huntsville is GMT minus 6 hrs).

**f.** After hours contact AMCOM Command Operations Center (COC) DSN 897-2066/2067 or commercial (205) 313-2066/7.

**17. Reporting of Errors and Recommending Improvements.** You can help improve this TB. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-LS-LP, Redstone Arsenal, Al 35898-5230. A reply will be furnished to you.

You may also send in your comments electronically to our E-mail address: is-lp@redstone.army.mil or by fax (205) 842-6546/DSN 788-6546.

By Order of the Secretary of the Army:

DENNIS J. REIMER
*General, United States Army*
*Chief of Staff*

Official:

JOEL B. HUDSON
*Administrative Assistant to the*
*Secretary of the Army*
03857

**DISTRIBUTION:**

To be distributed in accordance with Initial Distribution Number (IDN) 313720 requirements for TB 1-1520-243-20-25.

## ELECTRONIC DA FORM 2028 INSTRUCTIONS

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever"<whomever@avma27.army.mil>
To: ls-lp@redstone.army.mil
Subject: DA Form 2028
1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** AL
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub No:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. Change Number. 7
12. Submitter Rank: MSG
13. ***Submitter Fname:*** Joe
14. Submitter Mname: T
15. ***Submitter Lname:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

*THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.*

## SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

| PUBLICATION NUMBER | PUBLICATION DATE | PUBLICATION TITLE |
|---|---|---|
| | | |

BE EXACT PIN-POINT WHERE IT IS

| PAGE NO. | PARA-GRAPH | FIGURE NO. | TABLE NO. |
|---|---|---|---|
| | | | |

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

| PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER | SIGN HERE |
|---|---|
| | |

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

# THE METRIC SYSTEM AND EQUIVALENTS

## 'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

## 'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

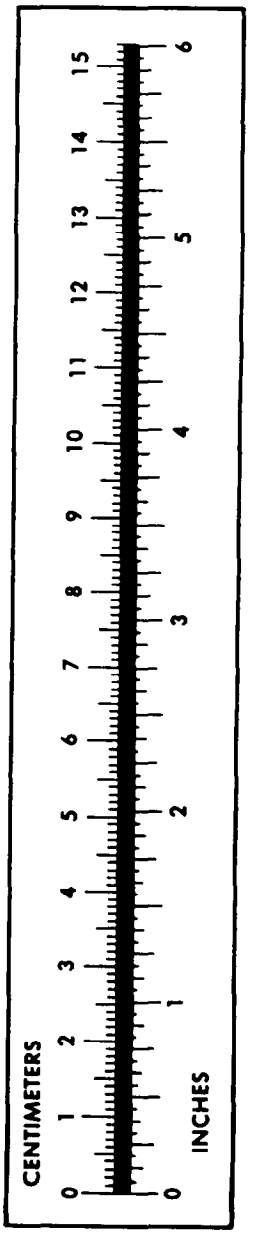
## TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

## APPROXIMATE CONVERSION FACTORS

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Inches | Centimeters | 2.540 |
| Feet | Meters | 0.305 |
| Yards | Meters | 0.914 |
| Miles | Kilometers | 1.609 |
| Square Inches | Square Centimeters | 6.451 |
| Square Feet | Square Meters | 0.093 |
| Square Yards | Square Meters | 0.836 |
| Square Miles | Square Kilometers | 2.590 |
| Acres | Square Hectometers | 0.405 |
| Cubic Feet | Cubic Meters | 0.028 |
| Cubic Yards | Cubic Meters | 0.765 |
| Fluid Ounces | Milliliters | 29.573 |
| ıts | Liters | 0.473 |
| arts | Liters | 0.946 |
| allons | Liters | 3.785 |
| Ounces | Grams | 28.349 |
| Pounds | Kilograms | 0.454 |
| Short Tons | Metric Tons | 0.907 |
| Pound-Feet | Newton-Meters | 1.356 |
| Pounds per Square Inch | Kilopascals | 6.895 |
| Miles per Gallon | Kilometers per Liter | 0.425 |
| Miles per Hour | Kilometers per Hour | 1.609 |

| TO CHANGE | TO | MULTIPLY BY |
|---|---|---|
| Centimeters | Inches | 0.394 |
| Meters | Feet | 3.280 |
| Meters | Yards | 1.094 |
| Kilometers | Miles | 0.621 |
| Square Centimeters | Square Inches | 0.155 |
| Square Meters | Square Feet | 10.764 |
| Square Meters | Square Yards | 1.196 |
| Square Kilometers | Square Miles | 0.386 |
| Square Hectometers | Acres | 2.471 |
| Cubic Meters | Cubic Feet | 35.315 |
| Cubic Meters | Cubic Yards | 1.308 |
| Milliliters | Fluid Ounces | 0.034 |
| Liters | Pints | 2.113 |
| Liters | Quarts | 1.057 |
| ers | Gallons | 0.264 |
| ms | Ounces | 0.035 |
| ograms | Pounds | 2.205 |
| Metric Tons | Short Tons | 1.102 |
| Newton-Meters | Pounds-Feet | 0.738 |
| Kilopascals | Pounds per Square Inch | 0.145 |
| lometers per Liter | Miles per Gallon | 2.354 |
| meters per Hour | Miles per Hour | 0.621 |



**PIN: 076008-000**