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HEADQUARTERS, DEPARTMENT OF THE ARMY
TECHNICAL BULLETIN

ARMY OIL ANALYSIS PROGRAM

(AOAP)

Guide for Leaders and Users

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FOREWORD

The Army Oil Analysis Program (AOAP) is part of a Department of Defense program to detect impending equipment component failures and determine lubricant condition through on-line and laboratory evaluation of oil samples. Through application of laboratory non-destructive analytical techniques, flight safety is improved, equipment readiness is enhanced, and resources can be conserved. Program Manager (PM) AOAP provides operational management of the oil analysis program. The objectives, policies, and the responsibilities of commands participating in the AOAP are prescribed in AR 750-1, Army Materiel Maintenance Policy. This technical bulletin must not be interpreted to mean AOAP minimizes the need to employ good maintenance practices and strong maintenance discipline. AOAP is an effective maintenance diagnostic tool and not a maintenance substitute.

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SECTION I

GENERAL

1-1. Purpose. This technical bulletin identifies equipment enrolled in the AOAP, provides instructions on taking oil samples, and provides guidance for installation and unit management of AOAP operations. This publication also informs the equipment maintainer what supplies to obtain, how to prepare forms, where AOAP laboratories are located, and where to seek assistance when unusual situations are encountered and appropriate information is not contained herein.

1-2. Scope. These instructions are applicable to all commands, units (including US Army National Guard and US Army Reserve), installations, and activities that operate or provide maintenance support to Army aeronautical and nonaeronautical equipment. As outlined in AR 750-1, AOAP is mandatory for all AOAP enrolled equipment listed in appendices A (Aeronautical) and B (Nonaeronautical).

1-3. Abbreviations and Terms. Abbreviations and special terms used in this bulletin are explained in appendix E.

1-4. Program Description.

a. AOAP is an Army program using machine condition-monitoring technologies to analyze lubricant samples extracted from enrolled components on a scheduled basis. Worldwide laboratories equipped with advanced diagnostic instruments can detect and measure damaging part-wear particulate before it becomes visible to the human eye. The AOAP includes industry standard condition monitoring technologies, such as spectrometric oil analysis, ferrography, and online/in-line fault analysis, to determine the internal condition of engines, gearboxes, transmissions, and other lubricated systems or components. Like other maintenance tools, it must be used properly to be effective.

b. It doesn't take long to sample the lubricants in a piece of equipment, and that action can save hours of maintenance downtime through early detection of such problems as faulty air-induction systems, leaking cooling systems, loose crossover fuel lines, and abnormal wear rates of moving metal parts. That sample also allows laboratory technicians to determine the quality of the lubricant or hydraulic fluid, and that translates to savings through laboratory-recommended oil changes (on-condition). A sample, properly taken and sent to the laboratory, gives the commander information about equipment condition and maintenance quality. That is an investment in readiness, and it takes the cooperation of all concerned to make it pay off. Close contact among the laboratories, USAMC Logistics Assistance Office (LAO) representatives, and maintenance personnel concerning AOAP-identified equipment problems has improved maintenance throughout the Army. Equipment reliability is improved through AOAP. Design changes and product improvements have been made on the basis of oil analysis findings. By detecting the signs of impending failure at an early stage, maintenance can be performed at a lower level, thereby reducing the number of catastrophic failures and associated rebuild costs. In the short run, this decreases maintenance support costs. In the long run, it improves readiness by

reducing the number of not mission capable (NMC) equipment items and enhances safety.

c. Training/Familiarization Video.

(1) To assist commanders, equipment-owning units, and maintainers in understanding the AOAP mission and operations, PM AOAP, has produced a videotape covering everything from sampling to laboratory operations. The videotape is available through your installation training and audiovisual support center. Request video:

Army Oil Analysis Program (TVT 22-136/PIN 711439)

(2) The AOAP video may also be ordered through the Defense Visual Information web page at http://dodimagery.afis.osd.mil/. Once the web page has been accessed, select Central DoD Production Databases @ DAVIS/DITIS. Enter the word AOAP in the search box and the search will display available training videos. Select video 'Army Oil Analysis Program' (PIN 711439), dated 25 Jul 2002.

(3) The AOAP training video may also be viewed through the Internet by accessing the AOAP homepage at: https://weblog.logsa.army.mil/aoap/relpub.htm. Select 'AOAP training program video' and the video can be viewed online using a computer media player or downloaded to a unit computer.

SECTION II
RESPONSIBILITIES

2-1. Commanders. Commanders of Major Army Commands (MACOM), equipment units, and PM AOAP, responsibilities are defined in AR 750-1. The oil analysis program is a maintenance diagnostics process that will enhance crew safety, increase readiness, and conserve lubricant resources. Through the use of the expertise your AOAP personnel provide, and informative maintenance data available on monthly reports provided by the laboratory, you have the capability to ensure the success of the AOAP. You should emphasize and actively promote the program and display firm command interest in this vital maintenance management tool. One of the most important tasks you have is to appoint a command representative to monitor the AOAP within assigned units. This command representative plays a key role.

2-2. Installation/Command AOAP Monitor.

a. Develop supplemental command directives and procedures applicable to subordinate units and activities.

b. Serve as the Commander's primary point of contact for coordination with the supporting AOAP regional laboratory and the AOAP Program Management Office.

c. Each unit, from company through division/installation, should have a monitor appointed by the appropriate commander. At company level, it might be the motor sergeant, although any responsible person can be given the job.

d. Assist unit AOAP monitors and equipment users to understand and comply with procedures, operations, and requirements of the AOAP.

e. Experience has shown the effectiveness of your program depends on you. Reports produced by the Oil Analysis Standard Interservice System (OASIS), (See Section XI) at the laboratory provide an excellent record of what is going on at your installation. Make sure your units receive the reports on time and use them in their daily routine.

f. You ensure the laboratory promptly notifies units of possible abnormal conditions by telephone and documented follow up. Make sure the laboratory has your name, address, and phone number. You, in turn, should maintain a complete list of the names, addresses, and phone numbers of the unit monitors in your support area. Work with the laboratory and your maintenance support facilities to make sure laboratory-recommended maintenance is being performed and feedback supplied.

g. Organize formal training for AOAP monitors and make AOAP performance part of your command inspection programs. You and your commander are the people who can make the program work for you.

2-3. Unit AOAP Monitor.

a. Serve as the Commander's representative to assure the AOAP is implemented within the equipment unit/organization.

b. Ensure AOAP designated equipment is enrolled in the program and component oil samples are submitted at the prescribed intervals. Equipment enrolled in the AOAP is listed in appendices A (Aeronautical) and B (Nonaeronautical).

c. Ensure oil samples are dispatched to the laboratory by the most expeditious means on the same day the sample is taken (do not hold or batch individual samples for long periods of time, waiting for the organization to take all samples). Oil samples held for long periods of time will allow the metal content in the oil to settle and may not be detected during some analytical tests.

d. Assure each AOAP sample submitted to the laboratory has a completed Oil Analysis Request form, DD Form 2026 or DA Form 5991-E, accompanying the oil sample. (See samples of forms at appendix D, figures 7 and 8). Forms are available through normal publications channels or the automated Unit Level Logistics System (ULLS).

e. Ensure information recorded on DD Form 2026 or DA Form 5991-E is complete and accurate. Incomplete information may cause laboratory tests to be matched to the wrong component, adversely influence test findings, and may be returned for incomplete information.

f. Assure units are reporting AOAP laboratory recommendations to maintenance personnel.

2-4. Unit Commander. As unit commander, you will be relying heavily on your maintenance officer and AOAP monitor, so your first job is to ensure you have well-trained personnel in those slots. Command actions that ensure success**:**

a. AOAP training is being performed.

b. Adequate samplings supplies are maintained.

c. Samples are taken as scheduled.

d. Samples are being forwarded either by courier or 1st class mail.

e. Prompt/proper action is taken when a report of a potential problem is received.

f. Maintenance feedback is being provided to the laboratory.

g. Proper forms are sent to support maintenance units for equipment being repaired.

2-5. Unit Maintenance Officer.

a. As maintenance officer, ensure your maintenance personnel review and comply with all AOAP publications and unit standing operating procedures, as they apply to the program.

b. When maintenance is performed on components at the recommendation of the laboratory, be sure your unit has entered deficiencies found and actions taken on the DA Form 3254-R. The form must be sent to the laboratory within 5 days of work completion.

c. When laboratory-recommended maintenance is above your level, be sure to properly annotate DA Forms 3254-R and 2407 or ULLS DA Form 5990-E accompany the equipment to the next higher level of maintenance. If the component is placed in a container, AOAP labels (provided by the laboratory) should also be affixed to two opposite sides of the container for easy identification.

2-6. Unit Equipment Oil Sampler.

a. As the person taking the oil sample, you are the heart of the program. The success of the program at your unit rests squarely on your shoulders. It is your job to sample the equipment at prescribed intervals. Always take a reliable sample that is free from outside contamination. (NOTE: Make sure you observe all safety precautions when taking a sample.)

b. Requisition and maintain on hand adequate oil sampling kits and supplies. (See Section IV, Tables 1 and 2, for a list of AOAP sampling supplies).

c. Take oil samples IAW procedures outlined in Section VII.

d. In the remarks section of the Oil Analysis Request form, record any repairs affecting oil-lubricated parts of selected components and the odometer reading of the end-item in which the component is installed.

e. Complete a DD Form 2026 or ULLS DA Form 5991-E for each component sampled. Your TAMMS clerk should send your sample to the laboratory the same day it is taken. If the laboratory detects a problem, you may need to schedule samples at intervals shorter than normal to monitor its condition. If the laboratory requests a resample, follow laboratory instructions and get another sample to the servicing laboratory within 72 hours.

f. Your TAMMS clerk will clearly indicate your resample is a special AOAP sample by banding the sample bottle with red tape and marking the borders of the DD Form 2026 or ULLS DA Form 5991-E in red.

g. Writing SPECIAL in the Remarks block of the DD Form 2026/ULLS DA Form 5991-E.

h. Ensure laboratory recommendations are passed to maintenance personnel as soon as possible.

i. Attach a copy of the laboratory report, DA Form 3254-R, Oil Analysis Recommendation and Feedback, to DA Form 2407/DA Form 5990-E, Maintenance Request, when AOAP enrolled components are evacuated to support maintenance, based on an AOAP laboratory maintenance recommendation. (See sample of maintenance forms, appendix D, figure 10).

j. Affix AOAP labels to the components evacuated to support maintenance as a result of laboratory recommendations. The AOAP label will provide the means for ensuring logistics control of components removed as a result of oil analysis detection of impending failure. Two AOAP labels shall be affixed to different conspicuous areas of the component. If the component is placed in a container, labels shall be posted on two opposite sides of the container for easy identification. (See Section VI).

2-7. Maintenance Supervisor.

a. Your job is to make sure the people you assign to sample the oil know how to sample and do it in accordance with prescribed intervals. You check the entries made on the DD Form 2026 or ULLS DA Form 5991-E. Items especially important are hours since the last oil change, unit identification code, component and end item serial numbers, and usage.

b. If you have been notified some laboratory-recommended maintenance needs to be performed, make sure it is done. If the needed maintenance is performed at your level, be sure you inform the laboratory by returning the completed DA Form 3254-R within 5 days of finishing the work.

c. If maintenance is performed above your level, be sure the DA Forms 3254-R and 2407 or ULLS DA Form 5990-E are sent along with the equipment to support maintenance. Attach two AOAP labels to different conspicuous parts of the component.(Labels are provided by the laboratory along with the DA Form 3254-R.) If the component is placed in a container, labels should also be affixed to two opposite sides of the container for easy identification.

2-8. Support Unit Maintenance Officer.

a. Support maintenance shops get all AOAP repair actions that can't be accomplished at unit level. When repairs are made, be sure a copy of the completed DA Form 3254-R is sent back to the laboratory and the owning unit. List all discrepancies found and repairs made.

b. If the component is not reparable at your level, ensure AOAP labels are affixed to the component and the container in which it is being shipped. Your task is to be sure DA Forms 3254-R and 2407 or ULLS DA Form 5990-E have been shipped with the equipment.

c. When the repairs are completed, return the component to stock or send it back to the user. Annotate the two forms and note all discrepancies found and repairs completed.
Send the DA Form 3254-R to the supporting laboratory and a copy to the owning unit.

d. The DA Form 3254-R report provides the materiel developer, engineers, and equipment manufacturer what material problems were actually found during maintenance repair. When necessary, support maintenance personnel are encouraged to contact the laboratory technician directly for further explanation or clarification of test findings.

2-9. AOAP Regional Laboratory.

a. Personnel at your AOAP laboratory are there to help you, so get your sample to them as

quickly as possible.

b. In the case of normal samples, the DD Form 2026 or ULLS DA Form 5991-E will be returned to the unit stamped NORMAL.

c. The laboratory uses this priority sequence for analyzing samples:

- **SPECIAL AIRCRAFT**
- **ROUTINE AIRCRAFT**
- **SPECIAL NONAERONAUTICAL**
- **ROUTINE NONAERONAUTICAL**

d. If sample analysis indicates a problem, the laboratory will request another sample by telephone or fax and then return the annotated DD Form 2026 or ULLS DA Form 5991-E. When an impending failure is indicated, the laboratory will promptly notify the unit. Then they'll send a DA Form 3254-R in the mail. Units not on the same installation as the laboratory also receive a priority message as documentation. U.S. Army, Europe (USAREUR) units receive a message in DA Form 3254-R format.) NOTE: Priority messages are not needed for Army Reserve and National Guard nonaeronautical equipment.

e. Units participating in the AOAP are assigned to a specific laboratory by the AOAP Program Management Office. Laboratory designations will be based on location and workload of available facilities. Laboratories and areas of support are listed in Section X.

f. Laboratories provide customer/units with available computer generated reports containing information to assist units to manage internal AOAP operations and show the status of unit equipment serviced by the laboratory. Customer/units may log on to https://aoapserver.logsa.army.mil and view and print thier computer generated AOAP reports.

g. Request special samples from the unit when analyses indicate an apparent abnormal equipment condition, there is an inadequate amount of lubricant to conduct tests, or the source of the lubricant is suspected to be from a component other than the one identified for testing.

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SECTION III
EQUIPMENT ENROLLMENT AND REMOVAL

3-1. Initial Weapon System/Component Enrollment. Enrollment of a weapon system or component in the AOAP will be recommended by the MACOM commander/materiel developer, and approved by PM AOAP. Enrollment responsibilities are listed in AR 750-1 and procedures are outlined in DA Pam 738-750, Functional Users Manual for The Army Maintenance Management System (TAMMS) and DA Pam 738-751, Functional Users Manual for The Army Maintenance Management System-Aviation (TAMMS-A).

3-2. Newly Assigned Equipment. When a unit is assigned an item of equipment already participating/enrolled in the AOAP and needs to register the equipment with their assigned AOAP support laboratory, complete an Oil Analysis Request form (DD Form 2026) and indicate in the 'Remarks' block the equipment is a newly assigned piece of equipment.

3-3. Equipment Removal from the AOAP. Equipment will be removed from the AOAP in accordance with procedures outlined in AR 750-1.

3-4. Enrolled Equipment Transferred. AOAP enrolled equipment is tracked and tested by the serial number of the tested item and the serial number of the end-item it is installed in. When an item of equipment is transferred from the unit, ensure the regional AOAP laboratory is notified.

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SECTION IV
AOAP SAMPLING SUPPLIES

4-1. Supplies. The equipment unit shall maintain an adequate supply of oil sampling stock on hand to meet routine and deployment requirements. The recommended AOAP supply items and sampling kit items are listed in Tables 1 and 2 below. For a sample of forms, see appendix D.

4-2. Sampling Tubes. Sampling tubes are polyethylene tubes sealed on both ends to prevent contamination. Three sizes are utilized to meet the requirements of the various equipment components. Tubes are issued in bags of 25.

4-3. Sampling Bottle. The aeronautical sampling bottle is a 5-dram (5/8 ounce) bottle with a plastic screw cap**.** The non-aeronautical sampling bottle is a 3-ounce plastic bottle**.**

Table 1. Aeronautical AOAP Sampling Kit

Item	NSN	Unit of Issue	Source
Sampling Tube, Plastic 15" long X 3/8" outside diameter	4710-00-933-4415	BG	S9C
Sampling Tube, Plastic 20" long X 3/8" outside diameter.	4710-00-933-4416	BG	B17
Sampling Tube, Plastic 30" long X 3/8" outside diameter	4710-01-087-1629	BG	B17
Sample Bottle, Glass	8125-00-933-4414	GR	S9I
Sack, Shipping 6" X 10" (250 ea per)	8105-00-290-0340	BX	GSA
Labels 3 ½" X 15/16" (5000 ea per)	7530-00-082-2661	BX	GSA
Bag, Plastic (1000 ea per)	8105-00-837-7754	MX	GSA

Table 2. Nonaeronautical Sampling Kit

Item	NSN	Unit of Issue	Source
Sample Bottle Plastic	8125-01-082-9697	BX	S9I
Vampire Pump	4930-01-119-4030	EA	S9I
Nonmetallic Tubing (1/4” outside diameter/1000 ft/roll)	4720-00-964-1433	RL	S9C
Shipping Sack	8105-00-290-0340	BX	GSA
Plastic Bag	8105-00-837-7754	MX	GSA
Mailer Kit (24 each nonaeronautical sampling bottles, plastic shipping sacks and mailing cartons)	8125-01-193-3440	BX	S9I

SECTION V
WHAT TO SAMPLE

5-1. AOAP participants will use this technical bulletin as the source reference for equipment components required to have lubricant samples analyzed in oil analysis laboratories. Refer to appendices A and B for equipment components and systems enrolled in the AOAP.

5-2. PM AOAP, will maintain a listing of enrolled equipment on the Internet at: https://weblog.logsa.army.mil/index.shtml. At the WebLog index, select AOAP Air Equipment or AOAP Ground Equipment in the Maintenance Management window.

5-3. The hydraulic fluid in sealed recoil mechanism/gun mounts on combat equipment is NOT to be sampled.

5-4. Reserve and National Guard equipment not operated for 180 days or more will be considered in a temporary inactive status. This equipment will not be sampled until removed for use. At that time, a sample will be taken and then normal AOAP sampling intervals will apply. A sample will also be taken before equipment is put back in an inactive status.

5-5. Warranty Items. For equipment under manufacturer's warranty, the schedule for oil service outlined in the warranty agreement will be complied with. However, if the laboratory recommends an oil change, the recommendation should be followed. The organization will also change oil at the appropriate hard time interval in order to keep the warranty valid. If the laboratory recommends that a warranty component have maintenance performed, the AOAP monitor will report the information to the supporting warranty control office and comply with the course of action outlined by that office.

5-6. Equipment in storage or has very low usage.

a. While equipment is in storage or has very low usage, no sampling is required. A sample must be taken before the equipment goes into storage and when it is scheduled to return to operational use. Equipment with very low usage/OPTEMPO, such as those stored at equipment concentration sites, are not required to be sampled. Low usage is defined in DA Pam 738-750 and DA Pam 738-751, under Administrative Storage.

b. Army prepositioned stock (APS) materiel. Refer to TM 38-470 for instructions as to what APS stored materiel will have AOAP oil samples taken and tested.

c. When equipment is used as a development item, a training aid, or as a static display, authorization to discontinue AOAP sampling or to sample at longer intervals may be granted by the appropriate major command. One copy of the written authorization should be submitted to PM AOAP.

d. Source oil. AOAP laboratories may request a sample of the source lubricant or new lubricant used to service the component under test, to verify the source lubricant is not the cause for abnormalities detected in test findings.

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SECTION VI

WHEN TO SAMPLE

6-1. Routine Oil Samples. AOAP enrolled components will be sampled in accordance with the sampling interval indicated for the component in appendices A and B. The oil-sampling interval schedule for equipment will begin when the equipment was most recently sampled. Equipment owning units may use DD Form 314 (see Chapter 3, DA Pam 738-750 for preparation and disposition instructions) to schedule enrolled equipment for oil sampling.

6-2. Stored or Preserved Equipment. When aeronautical or nonaeronautical equipment is placed in storage, no sampling is required. The following procedures will apply.

a. Equipment scheduled for storage and /or preservation will have an oil sample taken before the equipment is placed in storage and/or preservation.

b. Equipment enrolled in AOAP that is removed from storage or a preserved state will be operated until normal operating temperatures are reached. At that point, an oil sample will be taken and submitted to the laboratory for analysis.

c. Army Prepositioned Stock (APS) stored materiel. The schedule for AOAP oil sampling and testing of APS equipment lubricants is outlined in TM 38-470.

6-3. Special Samples and Laboratory Requested Samples. Special samples and laboratory requests for a sample (resample) will not be considered as a basis for removal of a component from service, recording the equipment as non-mission capable or as indication the aircraft is in any danger. Special samples shall be submitted to the laboratory under the following circumstances:

a. At the discretion of the maintenance officer at any time a component malfunctions or is suspected of being operated under abnormal conditions, which may adversely impact the normal operation of the component.

b. After an aircraft accident or incident, regardless of the cause. Oil samples from all components enrolled in the AOAP shall be taken and submitted for immediate analysis.

c. Prior to oil change, with a notation of the component operating hours at the time of the oil change and the reason for the oil change. A sample shall be taken after an oil change, following maintenance operational checks are made and the equipment has been operated at normal operating temperature.

d. Immediately following any flight that results in a maintenance event recorded in the flight log, such as an in-flight failure, an overboost, or overspeed. Oil samples should also be taken when any abnormal flight condition or malfunction is suspected to have affected an oil or grease lubricated part.

e. After any indication of internal damage to an oil or grease lubricated component, such as the presence of metal particles on the magnetic plug, oil filter, or oil screen. Contaminants

should be removed, placed in a clean sample bottle, and forwarded with oil sample to assist in evaluation.

f. Prior to performing maintenance on enrolled components and immediately after maintenance has been completed. The repairs and change of oil will establish a new pattern or rate of part-wear. This includes repair, replacement, or installation of any time-change parts or components enrolled in the AOAP.

g. Prior to a component removal, regardless of the reason for removal.

h. After engine overhaul/rework and at the completion of a test cell run, test track operation, or functional check flight.

i. Prior to transfer of equipment or overseas deployment of the components.

j. Special samples should be very clearly marked "SPECIAL" and banded with red tape or marked in some other conspicuous manner in order that they may be easily identified by the laboratory and processed on a priority basis

k. Special samples will satisfy requirement for routine sampling and will begin a new oil sampling interval schedule for the component. Care must be taken to assure the next scheduled sample is taken without exceeding the allowable range guidelines specified in paragraph 6-4.

l. Laboratory requested sample shall be submitted upon request. Resamples are requested either as a result of a sharp increase in the wear metal content in the lubricant or because of the amount of dirt and/or sludge in the lubricant indicates the sample was not taken properly.

NOTE: When unprotected aircraft are exposed to rain or high humidity for prolonged periods, a special sample may be sent for analysis at the discretion of the maintenance personnel.

6-4. Sample Interval Variation.

a. Appendices A and B prescribe the specific interval for each component. Samples should be taken as near the prescribed interval as possible. Owing to the difficulty of sampling at the precise interval, the following variation guidelines shall be used to plan when to sample:

Table 3 - Operating Hours

SAMPLING INTERVAL	ALLOWABLE RANGE
5 hours	4-6 hours
10 hours	8 - 12 hours
12 ½ hours	10 - 15 hours
25 hours	22 - 28 hours
30 hours	27 - 33 hours
50 hours	46 - 54 hours
100 hours	95-105 hours

Table 4 - Calendar Days

SAMPLING INTERVAL	ALLOWABLE RANGE
60 Days	54 - 66 Days
90 Days	81 - 99 Days
180 Days	162 - 198 Days
365 Days	329 - 401 Days

b. Occasionally, the laboratory will request samples be submitted more frequently in order to maintain a component under closer surveillance. When a special sampling interval has been instituted, it should be followed until the laboratory informs the operating unit to return the component to the normal sampling interval.

c. The allowable range above should not interfere with sampling on a scheduled basis. Scheduling should be established in accordance with the sampling intervals listed in appendices A and B. This should normally reduce equipment downtime by permitting sampling of components while performing other scheduled inspections or services. Scheduling will permit the operator, crew, AOAP monitor, and other interested individuals to easily determine when the next AOAP sampling is required.

d. If the equipment does not have a functioning hour meter use the formula, 10 miles or 16 kilometers = 1 hour of operation to calculate operating time. For example, a truck should be sampled every 90 days or 100 hours, you should sample every 90 days or 1,000 miles if there is no hour meter. (The sampling interval varies for different categories of equipment.)

6-5. Mailing and Delivery Instructions. When samples are to be mailed and the number is four or less, use the shipping sack. Insert the oil sample bottle(s) into the plastic bag and seal. Place the completed Oil Analysis Request forms into the shipping sack along with the plastic bag(s). Send it by first-class mail to your supporting laboratory. Do not use bulk mail or parcel post. When the number of samples is five or more, use the boxes from which the empty bottles came in. Place the Oil Analysis Request forms in a plastic bag and lay it on top of the bottles. When delivering a sample directly to the laboratory, fold the completed Oil Analysis Request form in half, wrap it around the sample bottle and secure it with a rubber band.

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SECTION VII
HOW TO SAMPLE

7-1. General. The success and effectiveness of the AOAP are dependent upon the testing and analysis of reliable oil and grease samples. A reliable sample is one that is truly representative of the lubricant oil in the component being evaluated. Special care is needed to ensure oil samples are not contaminated, either by external dirt or other foreign material.

a. Samples taken from a component immediately after the addition of new lubricant will not become representative of the oil system until complete mixing of the old and new lubricant has taken place.

b. The value of an oil sample is wholly dependent on whether the lubricant has circulated in the component long enough to accumulate and mix wear metal concentrations uniformly.

c. Always take aircraft samples while a component is still warm. Samples shall be taken within 15 minutes of an engine shutdown or aircraft landing. If a sample is to be taken from an aircraft that is cold, run the system until it reaches normal operating temperature; then shut off the system and sample it. If it is impossible to operate the system, as in the case of an aircraft that is down for maintenance, indicate that the sample is a “cold” sample on the accompanying DD Form 2026 and explain the circumstances.

d. Nonaeronautical equipment will be sampled under normal operating temperature for a “hot” sample. This applies to both routine and special samples.

e. Store unused sampling supplies in a clean, closed container. Remove them only when you are going to take a sample.

f. Avoid contamination of cut tubing and the inside of bottle caps by keeping them sealed until needed.

g. Use a new sampling tube to fill each sample bottle; discard tube after sampling.

h. Take the sample from approximately the same depth in the reservoir each time.

i. Do not use mouth suction to draw oil into a sampling tube.

j. To prevent contamination of the oil sample, avoid letting the sampling tube touch the sides and bottom of the oil reservoir.

k. Take special precautions at all times to avoid dropping sampling equipment into oil reservoirs since damage and failure may result.

7-2. Sampling Techniques.

a. Valve Method. (See appendix C, figure 2) To make sampling easier, many components in AOAP are equipped with a special sampling valve to simplify sample taking. These valves are installed according to instructions found in the equipment technical manual. To take a sample with a valve, you may need to start the engine to pressurize the system. Once the oil starts to flow, flush a small amount of oil from the line to clear out contamination. Then fill the sample bottle from the valve.

b. Pump Method. (See appendix C, figure 3)

(1) Sampling from equipment that has no sampling valve takes more time. First, cut the tubing about 10 inches longer than the dipstick (See appendix C, figure 4).

(2) Loosen the T-handle on the pump. Insert the plastic tubing about 2 inches into the bottle. Tighten the T-handle just enough to grip the tubing firmly.

(3) Remove the filler cap or dipstick from the oil reservoir. Insert the tubing into the reservoir, but **be careful not to let tubing touch bottom.** If the tube touches the bottom, sludge will be picked up, and the laboratory will request another sample.

(4) Pull the pump handle out slowly. Oil should flow into the sample bottle. Fill the sample bottle to the bottom of the neck or about 1/2 inch from the top of the bottle.

(5) Push the vacuum release button when you have enough oil. Do not let oil get into the pump. If oil does get into the pump, take the pump apart and clean each piece thoroughly with appropriate cleaning solvent. **Let it air dry.**

(6) Remove the tubing from the dipstick opening. Unscrew the sample bottle and replace the bottle cap. Use a clean rag or tissue to wipe off any oil on the tip of the tube. Then pull the tube out of the pump head and discard the tubing.

(7) Whether you take your sample by valve or pump, enter the end item and component serial numbers on the sample bottle and complete the DD Form 2026 or ULLS DA Form 5991-E. Then get the sample, along with the form, to the TAMMS clerk for processing. The TAMMS clerk will see that it is sent to your laboratory by the fastest means available.

(8) Replacement parts for the oil-sampling pump are provided in table 5**.**

Table 5. Oil Sampling Pump Parts

Item	NSN	Unit of issue
Replacement O-Rings for the Oil Sampling Pump are:		
Old-Style Pump (with stand)		
O-Ring	5331-00-579-8156	EA (1)
O-Ring	5331-01-231-5216	EA (1)
New-Style Pump (no stand)		
O-Ring	5331-00-579-8156	EA (1)
O-Ring	5331-01-133-5858	EA (1)
O-Ring	5331-01-226-8750	EA (1)
O-Ring	5331-01-231-5216	EA (1)

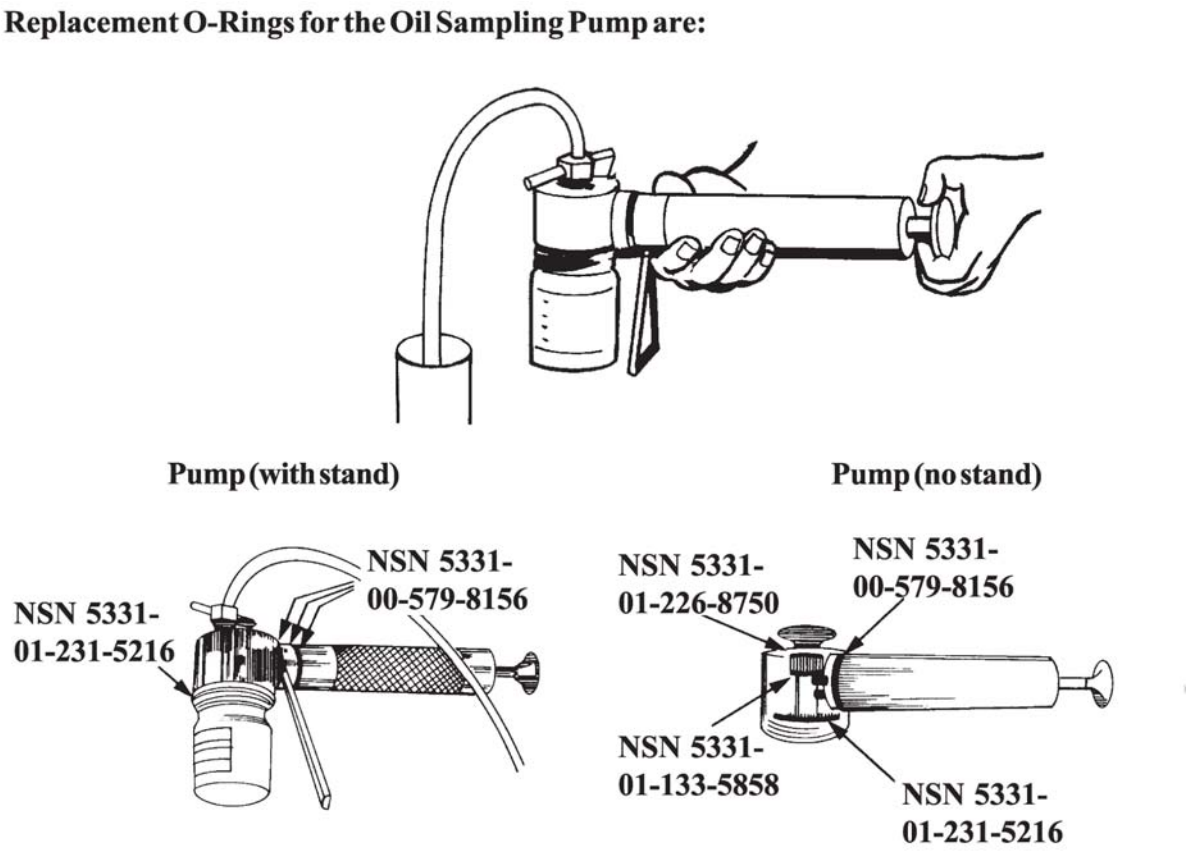

Figure 1. Oil Sampling Pump O-ring seals

c. Tube Method. (See appendix C, figure 5)

(1) Procedure is normally used in taking an aeronautical oil sample, but may be used for other equipment.

(2) A plastic tube for sampling aeronautical equipment oil is preferred. The tube is used through the oil filler neck or dipstick hole. Insert the tube into the reservoir. Be careful not to let the tube touch bottom. Allow the tube to fill with oil. Place a finger over the tip of the tube and withdraw it from the reservoir. The tube will be partially filled with oil. Insert the tube into the sample bottle. Release the oil by removing your finger from the top of the tube. Repeat until the bottle is filled within 1/2 inch of the top of the 5/8 ounce (5 dram) glass sample bottle.

NOTE: Replenish the fluid drained from the component with clean fluid.

(3) Enter the aircraft type/model/serial number, operating hours on the component, component serial number/type/model, type and grade of lubricant used, and date and time sample taken on the label of your oil sample bottle. Complete DD Form 2026 or ULLS DA Form 5991-E. Place the sample and the form in a plastic bag and send to the laboratory by the fastest means available; e.g., First Class mail or courier. Certain aircraft components require grease sampling (identified in appendix A). Grease samples will be submitted ONLY in the 3 ounce nonaeronautical plastic sampling bottle. To obtain grease samples, adhere to the individual aircraft technical manuals.

d. Drain Method. Use this method if a sampling valve is not installed or the tube method is not practicable. (See appendix C, figure 6)

(1) Obtain a bottle, a label, a DD Form 2026 or DA Form 5991-E, and a quart size waste oil container.

NOTE: A quart size container, such as a coffee can, can be fitted with a locally fabricated wire bracket designed to hold the sample bottle at the top of the can. This will allow the sample to be taken with one hand and will free the other hand to replace the drain plug.

(2) Open the sample bottle. Place the bottle cap on a clean surface with the open end up to avoid contaminating the inside of the cap.

(3) With the container underneath the drain point, open the drain plug and allow the initial stream of oil to flow into the quart can. This will eliminate obtaining oil that has been trapped at the drain port and may not be representative of the oil normally flowing through the component. (See appendix C, figure 6A)

(4) Allow about one pint of oil to drain into the container to obtain oil representative of the system. Allow the oil to drain into the sample bottle to within ½ inch of top. CAUTION: The oil sample may easily be contaminated with sludge or water if approximately one pint of oil is not drained prior to sampling. (See appendix C, figure 6B)

(5) After the sample bottle is filled to the required level, close the drain. Allow any excess or overflow to drain into the 'catch can'. (See appendix C, figure 6C)

(6) Replace and tighten cap on sample bottle.

(7) Replenish the quantity of oil drained from the component with clean new oil, if necessary.

(8) Complete the Oil Analysis Request form in accordance with the instructions in Section VIII.

(9) Wrap it around the oil sample bottle. Secure with a rubber band and send sample to the laboratory the same day as the sample is taken.

7-3. Special Sampling.

a. Hydraulic Systems. If an oil-sampling valve is not installed, one of following three locations may be used to sample hydraulic systems. They are listed in order of preference.

(1) Use the tube method to sample the reservoir, provided the reservoir is part of the circulating system.

(2) Use the drain method to drain the oil sample from the filter housing.

(3) Draw the sample from a line that circulates fluid. Be careful while disconnecting the line in order to avoid contamination of the fluid.

b. Transmissions and Gearboxes. These can be sampled using the tubing method with the following variations:

(1) Remove the magnetic plug and insert one end of the tubing into a clean sample bottle.

(2) Displace the check valve with the other end of the tube and draw off enough oil through the tube to fill the bottle.

c. Swashplate Assembly.

(1) Disconnect the scissors and sleeve drive links from the swashplate outer ring assembly. Lift the drive link out of the way and secure it.

(2) Using a soft, clean, lint-free cloth dampened with cleaning solvent, clean the inner and outer ring assembly at the upper shield. Ensure all surface grit, sand, and other foreign materials are removed. This will ensure an uncontaminated grease sample.

(3) Using a grease gun with a flexible hose to purge and lubricate the swashplate at approximately 30-degree intervals until the assembly has rotated one full turn (360 degrees) to

ensure thorough purging of the bearing. Ensure all the old grease is purged from the assembly. Immediately collect a swab of the purged grease using a tongue depressor and a sampling bottle. The sampling bottle should be filled from one half to full for an adequate sample. Failure of a swashplate to accept grease requires investigation and correction prior to releasing aircraft for flight.

(4) Once the sample is taken, the bottle label should be filled out as completely as possible to avoid confusion with other grease samples.

(5) Submit the grease sample to the AOAP laboratory with a completed DD Form 2026 or DA Form 5991-E.

(6) Record the AOAP sampling action on DA Form 2408-20, Oil Analysis Log, maintained for the swashplate, in accordance with DA Pamphlet 738-751.

d. Scissors and Sleeve Assembly. Visually inspect parts of the scissors hub assembly and boot for signs of heat. Any heat discoloration or distortion of components should be reported immediately to maintenance personnel. After the visual inspection, follow the same procedures outlined above for the swashplate.

e. New Oil Samples. When a unit begins to use a new ‘lot’ or batch number of oil, a sample of the clean, new oil shall be submitted to the AOAP laboratory for analysis. This will enable the laboratory to make adjustments for any changes in the lubricant chemical formulation of metallic compounds that may have been introduced at the refinery as oil additives. Indicate on the accompanying Oil Analysis Request form that the sample is new oil and not a sample from a component. Also indicate which operating units will be using the new oil supply.

SECTION VIII
AOAP FORMS

8-1. Oil Analysis Request, DD Form 2026 or DA Form 5991-E (Automated ULLS Form).

a. The DD Form 2026 (See appendix D, figure 7) is the standard Department of Defense form used to request an oil sample be analyed. The DA Form 5991-E, ULLS, may be used to request oil sample analysis for Army aeronautical and nonaeronautical oil sample analysis

b. DA Form 5991-E is an automated form produced by the unit ULLS system. This form requires no soldier entries, though it should be routinely checked for accuracy.

c. Aeronautical or nonaeronautical equipment departing from home station on an extended mission will be accompanied with a completed Oil Analysis Record (reverse side of DD Form 2026) (see appendix D, figure 8). Prior to departing from home station, the backside of the form will be completed by equipment user with assistance from the AOAP laboratory. The form will be included in the aeronautical and nonaeronautical equipment folders for use when the equipment is scheduled for an AOAP sample during the mission.

d. DD Form 2026 Preparation Instructions:

BLOCK NUMBER

(1) To: Oil Analysis Lab. Enter the name of the laboratory supporting your unit.

(2) From:

(a) Major Command. Enter the Major Army Command the equipment-owning unit is assigned to.

(b) Operating Activity. Enter the full unit designation, address, UIC, and telephone number.

(3) Equipment Model/APL. Enter nomenclature and model number of the component from which the oil sample was extracted; e.g. #2Engine (NHC-250) X msn, 40 Degree Gearbox, etc.

(4) Equipment Serial No. Enter the complete serial number of the component.

(5) End Item Model/Hull No. Enter the complete model number of the end item; e.g.; c.

(6) End Item Serial No./EIC. Enter the complete serial number of the end item.

(7) Date sample taken (Day, Mo, Yr). Enter the day, month, and year; e.g.; 23 Feb 01.

(8) Local Time Sample Taken. Not applicable to Army units.

(9) Hours/Miles Since Overhaul. Enter cumulative number of hours on the component since last overhaul or if applicable delete the word “overhaul” and pencil in the word “new.”

(10) Hours/Miles Since Oil Change. Enter the number of operating hours since last oil change for the component.

(11) Reason for Sample. Check the block that is applicable. When the reason is 'other', explain in the 'Remarks' block; e.g.; prior to oil change, loss of engine power, metal on plug or screen, excessive vibration, etc.

(12) Oil Added Since Last Sample. Enter the amount of oil added since the last oil change. Designate number of pints, quarts, or gallons.

(13) Action Taken. Leave blank.

(14) Discrepant Item. Leave blank.

(15) How Malfunctioned. Leave blank.

(16) How Found. Leave blank.

(17) How Taken. Indicate by checking appropriate block whether sample was taken by drain or tube and indicate whether sample was hot or cold. Record the type of oil.

(18) Remarks/Misc.

(a) Record the end item odometer or hour-meter at the time the oil sample was taken. Indicate whether the reading represents miles (MI), hours (HR), or kilometers (KM). Do not convert readings from miles to kilometers or kilometers to miles. For aircraft, enter the airframe hours of the aircraft.

(b) If the end item has both an odometer and hour-meter, only record the odometer reading.

(c) If the hour-meter/odometer has been replaced, make sure total operating time between oil samples is shown; i.e., the current meter reading plus usage from replaced meter. DD Form 314 (REMARKS block) should indicate if the equipment had a meter replaced and the usage from the old meter.

NOTE: If the component is not installed in an end item, enter "uninstalled". Odometer/hour-meter entries are **NOT REQUIRED** for end items not having meters installed.

(d) Use this block to explain reason for sample, when "other' in the Reason for Sample block (para d(11) above)is selected, and any field maintenance performed since last sample that may affect the laboratory evaluation.

(Reverse Side of DD Form 2026 - See appendix D, figure 8)

(19) The reverse side of DD Form 2026 will be completed when the equipment deploys away from home station and must have an oil sample analyzed enroute or service may be provided by a non-automated oil analysis laboratory. When equipment historical data is electronically transferred to an automated AOAP laboratory servicing the deployment site, the reverse side of the form need not be filled out.

(20) Assigned Oil Analysis Laboratory. Enter the complete message address of assigned support AOAP laboratory.

(21) Laboratory Telephone No. Self-explanatory.

(22) End Item Model/Serial No. Self-explanatory.

(23) Equipment Model/Serial No. Self-explanatory.

(24) Enter the last three analytical AOAP results in designated columns. If required, the AOAP regional laboratory may be contacted for technical data and assistance.

(25) Date Departed. Home station will enter date aircraft departs on transient mission.

NOTE: Transient laboratories will enter subsequent analytical results and ensure DD Forms 2026 and DA Forms 5991-E are returned to home station with equipment. However, if the equipment unit departs prior to completion of DD Form 2026 or DA Form 5991-E, it shall be mailed to the home station.

8-2. Oil Analysis Log, DA Form 2408-20

a. A semi-permanent historical record of oil/grease samples taken and results of the laboratory tests for all equipment components in the AOAP.

b. Each oil sample extracted from the component and the results received from the AOAP laboratory will be recorded on DA Form 2408-20 (Refer to DA Pam 738-750 or DA Pam 738-751 for preparation and disposition instructions) for both aviation and nonaeronautical equipment.

c. Unless directed by local requirements, AOAP participating units receiving and maintaining OASIS laboratory reports with data normally listed on DA Form 2408-20, are not required to maintain DA Form 2408-20.

8-3. Oil Analysis Recommendation and Feedback; DA Form 3254-R. AOAP laboratory technicians initiate this form when they detect a potentially serious component problem.

a. AOAP laboratories will use this form to recommend performance of maintenance on oil-or grease-lubricated components. The laboratory shall prepare and forward one copy of the DA Form 3254-R (see appendix D, figure 9) to the following:

(1) The AOAP customer/unit submitting the oil sample for analysis.

(2) (AMSAM-MMC-AV-CCP) (STOP 55), 308 Crecy Street, Corpus Christi Army Depot, Corpus Christi, TX 78419-5260 for Aeronautical components “ONLY”.

(3) Army Oil Analysis Program Office, (AMXLS-MO), USAMC Logistics Support Activity, Building 3661. Redstone Arsenal, AL 35898-7466.

b. After the field unit or maintenance activity has accomplished the laboratory recommended inspection or maintenance action, the unit completing the action shall complete the lower block of DA Form 3254-R. Record what evaluation actions were taken, what problems were discovered, and what maintenance actions were taken to return the equipment to service. Be as specific and complete as possible in describing what action was taken. If a component was removed and sent to a depot overhaul/rework facility, DA Form 3254-R shall accompany it.

c. Depot facilities shall record the results of teardown investigation, findings, and repairs accomplished on the accompanying DA Form 3254-R (block 14). The completed form should be returned to the originating AOAP laboratory and one copy should be forwarded to PM AOAP. For aeronautical equipment, one copy should be sent to CCAD within five workdays of completion of the maintenance action.

d. DA Form 3254-R may be locally reproduced on 8 ½" by 11" paper.

e. Feedback to the laboratory is essential to refine evaluation criteria, increase the accuracy of laboratory predictions, and to recommend design changes in those major components showing an abnormal failure rate through AOAP.

f. Instructions for completing DA Form 3245-R.

BLOCK NUMBER:

(1) through (11) To be completed by the laboratory technicians.

(12) No entry required.

(13) Record "aviation" QDR number prepared as a result of this maintenance recommendation.

(14) Feedback.

(a) Explain any diagnostics performed, discrepancies found, and actions taken to return the component to a serviceable condition.

(b) Include in this block the following information, when applicable, the Quality Deficiency Report (QDR)/ Equipment Improvement Report (EIR) number and/or the Maintenance Request (DA Form 2407) number.

(15) From. The Field Depot Maintenance representative preparing the report will enter his/her signature in this block.

(16) Date. Enter the calendar date (DDMMMYY) the report was completed.

(17) To. Enter the address of AOAP regional laboratory. In addition, a copy of reports on aviation equipment will be sent to Corpus Christie Army Depot (address on right side of block).

8-4. Maintenance Feedback Data. Success of the oil analysis program is measured with the maintenance feedback information provided by the unit and maintenance activities. Maintenance findings validate laboratory test ‘alarm’ levels and indicators, thereby avoiding unnecessary maintenance actions or equipment servicing. Establishment or refinement of normal and abnormal wear-metal trending patterns is an ongoing process as the fleet matures and is completely dependent on the correlation of test data with actual part conditions found in the inspection of the engine, transmission, or other component at disassembly.

8-5. Maintenance Request, DA Form 2407 or DA Form 5990-E (ULLS).

a. When a Maintenance Request form is prepared to request support from a higher level of maintenance for an AOAP recommended evaluation, attach the DA Form 3254-R, Oil Analysis Recommendation and Feedback, to the request. (See appendix C, figure 10)

b. Enter "'See attached DA Form 3254-R" in the 'Remarks' block of the Maintenance Request.

c. Refer to DA Pam 738-750, DA Pam 738-751, or ULLS Manual for preparation and disposition instructions.

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SECTION IX
AOAP LABELS

9-1. Instructions for Use of AOAP Labels. AOAP pressure sensitive labels shall be affixed to component containers sent to overhaul or tear down analysis facilities as a result of a laboratory recommendation.

9-2 AOAP laboratories:

a. Provide the equipment unit a minimum of four AOAP labels with every DA Form 3254-R containing a laboratory recommendation for the removal of a component for overhaul or repair actions.

b. Instruct the equipment unit to affix two AOAP labels on different conspicuous areas of the component to be overhauled and two AOAP labels on opposite sides of the outside of the shipping container.

9-3. Maintenance/Overhaul/Rework activity:

a. Remove the "AOAP" labels from the outside of the shipping container only when the component is unpacked for overhaul so that the shipping container can be reused.

b. Prior to inspection and maintenance, review AOAP DA Form 3254-R for laboratory test and analytical findings indicating impending failure.

c. After maintenance inspections and actions, complete the lower portion of the form and mail one copy of DA Form 3254-R to the originating laboratory, one copy to PM AOAP. AERONAUTICAL ONLY, send one copy to (AMSAM-MMC-AV-CCP) (STOP 55), 308 Crecy Street, Corpus Christi Army Depot, Corpus Christi, TX 78419-5260.

9-4. Teardown Inspection and Analysis Activity (CCAD) (AERONAUTICAL ONLY):

a. Correlate equipment maintenance/overhaul analysis from components recommended for maintenance by AOAP.

b. Submit findings and conclusions to the appropriate AMCOM engineering authority.

c. Advise PM AOAP, of conclusions or findings.

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SECTION X
LABORATORIES

10-1. AOAP Laboratory Service Locations.

a. The AOAP has 20 laboratories located at worldwide locations. Six of the laboratories are located in CONUS, seven are in OCONUS, three are Depot labs, one is a CEG-A lab, one is a joint Navy operated lab and 2 mobile laboratories are maintained by the US Army National Guard on standby to be deployed to areas of contingency operations. Additional laboratories shall be established as required.

b. In accordance with AR 700-132, Joint Oil Analysis Program (JOAP), Army equipment may be tested in Navy and Air Force oil analysis program laboratories. Due to the limitations of technology in some JOAP laboratories, PM AOAP will advise Army units which JOAP laboratories have the appropriate technology and are approved to test Army equipment. Inter-service oil analysis support will be limited to those joint service laboratories to accomplish the necessary testing for Army equipment. Army laboratories have the capability to test equipment from all military departments.

c. In CONUS mobile AOAP laboratories and selected (CONUS) laboratories are limited to providing oil analysis only to selected command customers. Routine oil analysis service is available at the following AOAP locations for the geographic areas indicated:

Table 6. AOAP Laboratories

	LABORATORY	GEOGRAPHIC AREA OF SUPPORT	LABORATORY ADDRESS
1.	Fort Bragg, NC	North Carolina, Maine, Vermont, New Hampshire, Massachusetts, Delaware, Rhode Island, Connecticut, New Jersey, New York, Pennsylvania, Maryland, District of Columbia, Virginia, South Carolina and Florida	(AFZA-RBC-LM-AOAP) Army Oil Analysis Lab XVIII Airborne Corps and Fort Bragg Building Y5015, Door 59 P.O. Box 70539 Fort Bragg, NC 28310
2.	Fort Campbell, KY	Wisconsin, Michigan, Illinois, Indiana, Ohio, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana and West Virginia	Petroleum Lab Fort Campbell (AFZB-RB-AD) 4th Street and F Avenue Building 7137 RBC Aviation Division Fort Campbell, KY 42223-5128
3.	Fort Carson, CO	Colorado, Montana, North Dakota, South Dakota, Minnesota, Wyoming, Iowa, Utah, Nebraska, Kansas and Missouri	Dept of The Army DOL, ATTN: Oil Analysis Lab 2400 O'Connell Blvd Bldg 8000 Door 44 Fort Carson, CO 80913-2526

4.	Fort Hood, TX	Arizona, New Mexico, Oklahoma and Texas	**Mail:** AOAP Laboratory (AFZF-DL-IMM) P.O. Box 968 Killeen, TX 76540-0968 Fort Hood, TX 76544 **FedEx/UPS:** DOL Maintenance Division Building 7046 at Hood Army Airfield Fort Hood, TX 76544
5.	Fort Lewis, WA	Washington, Idaho, Oregon, California and Nevada	Director of Logistics (AFZH-DLP-O), MS-18, Box 339500, Building 9500, Door #12 Fort Lewis, WA 98433-9500
6.	Fort Richardson, AK	Alaska	Director of Logistics Attention: APVR-RDL (AOAP) 724 Postal Service Loop #7000 Fort Richardson, AK 99505-7000
7.	Fort Rucker, AL	Alabama, Georgia (units only west of I-75 will mail their samples to the Fort Rucker lab)	AOAP Laboratory (ATZQ-DOL-M) US Army Aviation Center and Fort Rucker Building 800, N Avenue Fort Rucker, AL 36362-5115
8.	Goose Creek, SC	Goose Creek (Goose Creek's mission only)	South Carolina Army National Guard 792D QM TM, AOAP Laboratory 103 Guidance Road , Bldg 318 Goose Creek, SC 29445-6060
9.	Anniston Army Depot, AL	Station Equipment and Depot QA mission only.	Anniston Army Depot, (AMSTA-AN-PEWL JOAP Lab), 7 Frankford Avenue, Building 140, Anniston, AL 36201-4199
10.	Corpus Christi Army Depot, TX	Station Equipment and Depot QA mission only.	Chemical Materiel Process Branch (SIOCC-MA-QM-CM (Stop 27)) Corpus Christi Army Depot, Building 8, 308 Crecy Street, Corpus Christi, TX 78419-5260
11.	Red River Army Depot, TX	Station Equipment and Depot QA mission only.	Environmental Division (AMSTA-RR-OL), Red River Army Depot, Building 300, 100 Main Drive, Texarkana, TX 75507-5000
12.	Bamberg, Germany	Nonaeronautical equipment only.	Bamberg Activity (AERSC-ML-BA), Mannheim Laboratory Center, Unit 27535 Box 23661, APO AE 09139-7535

13.	Coleman Barracks, Germany	Aeronautical in theater. Nonaeronautical in western portion of theater	(AERSC-MLC), (Coleman Bks Bldg 50), Mannheim Laboratory Center, Unit 29702, Box 301, CMR 418, APO AE 09028
14.	Eagle Base, Bosnia	Area of operation	AOAP Laboratory, Bosnia Operation Joint Forge/Eagle Base, APO AE 09789
15.	Camp Bondsteel, Kosovo	Area of operation	FSB AMC-LSE ATTN: AOAP Laboratory Task Force Falcon Camp Bondsteel, Kosovo APO AE 09340
16.	Camp Humphreys, Korea	Korea and Japan	8th US Army AOAP Laboratory Attn: EANC-MSC-MJ Unit #15564 APO AP 96271-0761
17.	Pearl Harbor Navy Shipyard, Hawaii (JOAP Lab)	Alaska, Hawaii and Eastern Pacific Region	Commander (Code 134.5) Pearl Harbor NSY & IMF 667 Safeguard Street, Suite 100 Pearl Harbor, HI 96860
18.	Camp Arifjan, Kuwait	Area of operation	AMC-LSE-SWA AOAP Lab COM-EL Bldg 462 Camp Arifjan, Kuwait APO AE 09366
19.	Mobile Lab 1	Area of operation	Contact: AOAP PM Office
20.	Mobile Lab 2	Area of operation	Contact: AOAP PM Office

10-2 Pearl Harbor Navy Shipyard. The US Navy oil analysis laboratory at Pearl Harbor, Hawaii, provides joint service oil analysis support to Army units in the South Pacific region.

10-3. Assignments. PM AOAP shall make AOAP laboratory regional support area assignments. Units with equipment enrolled in the AOAP shall be supported by the laboratory assigned to support the region the unit is located. When necessary, PM AOAP, will coordinate with joint service oil analysis program managers for additional support.

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SECTION XI
OIL ANALYSIS STANDARD INSTERSERVICE SYSTEM (OASIS)

11-1. Each AOAP laboratory is equipped with a computer network as part of the OASIS data system (Army and Navy). The system interfaces with all test instruments, testing parameters, and unit equipment administrative files. The OASIS speeds up the sample processing cycle and contains a limited onsite data bank of laboratory and equipment information.

11-2. With AOAP history information onsite, each laboratory is currently providing commanders and maintenance personnel at all levels computer-generated reports on a monthly basis and upon request. Customer/units may log on to the AOAP website at https://aoapserver.logsa.army.mil to view and print their reports.

11-3. Most communication between the unit, the laboratory, and various maintenance echelons is with forms and computer-generated monthly reports.

11-4**.** Laboratory equipment files and test data can be transferred between laboratories electronically or provided to the equipment-owning unit on electronic media.

11-5. Correctly completed forms are the essential requirement for accurate monthly reports. These reports help manage equipment participation in the program more efficiently. Units should contact the AOAP laboratory for more information on what reports are available and the frequency they are produced.

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SECTION XII
FREQUENTLY ASKED QUESTIONS

12-1. Q. How do I know if my equipment is enrolled in the AOAP?

A. If it is listed in this technical bulletin, or authorized by the PM, AOAP.

12-2. Q. If enrolled, what is the next step for submitting samples for my equipment?

A. Submit a sample and a completed DD Form 2026 or ULLS DA Form 5991-E to your supporting laboratory.

12-3. Q. Can I sample equipment not listed in appendix A or B?

A. Only equipment/components listed in this technical bulletin, or other equipment/components authorized by the PM AOAP, will be sampled. Exceptions to sampling policy will be through letters of authorization from the PM, AOAP.

12-4. Q. Who should take the sample?

A. Anyone may take samples. For best results, a local SOP should provide for training and designating of sampling teams at unit level.

12-5. Q. How much oil do I put in the sample bottle?

A. The bottle should be filled to the bottom of the neck (1/2 inch from top of bottle).

12-6. Q. Do I always have to take a routine sample at the scheduled date, hour, or miles?

A. You should always try to sample as near the prescribed interval as possible. If it is not possible, a 10 percent variance prior to or after the schedule date, hour, or miles for sampling is permissible for nonaeronautical equipment. For example, the engine in your M1074 is to be sampled every 90 days. If this falls on 1 Apr, you may sample that component up to 9 days (10 percent of 90 days) prior to 1 Apr or up to 9 days after 1 Apr and still be within prescribed guidance. (see Section IV, Tables 3 and 4)

12-7. Q. Is there a sampling interval variance for aeronautical equipment?

A. Yes. An example of aeronautical allowable tolerance is if the sampling interval is 25 hours, the allowable sampling range is 22-28 hours. When sampling hour intervals are performed within the plus or minus allowable range, the schedule for the next sampling intervals will not be affected. For example, a sample with a 25 hour interval, due at 100 aircraft hours and taken at 97 hours or 103, the next sample will still be due at 125 hours. However, when the plus or minus range is exceeded, scheduling of the next sample will be affected. That is, a sample with the oil analysis request is already filled out. This reduces the chance of submitting incorrect management information to the laboratory. Always file your most recently processed DD Form 2026 or ULLS DA Form 5991-E, the one with laboratory results, and discard the previous one. (see Section IV, Tables 3 and 4)

12-8. Q. Must I always take a “hot” sample?

A. Yes. You need to bring the equipment to operating temperature for a “hot” sample. This applies to both routine and special samples. If the weather is cold, the oil in your equipment may be too thick for the oil sampling pump to draw oil into the sample bottle or for the oil to flow freely through the sampling valve into the sample bottle.

12-9. Q. What is laboratory response time?

A. The laboratory response time for routine samples, excluding weekends and holidays, is the interval of time that begins when the laboratory gets the oil sample and ends when the unit that submitted the oil sample gets the results.

12-10. Q. Should sampling be a part of scheduled routine maintenance services.

A. Yes, for both aeronautical and nonaeronautical equipment.

12-11. Q. How long does it actually take to obtain a sample?

A. That depends on the method used. In general, the only method that should take more than 5 minutes is the tube method.

12-12. Q. Why and how long should I hold onto a processed DD Form 2026 or ULLS DA Form 5991-E after I receive it from the laboratory?

A. The processed DD Form 2026 or ULLS DA Form 5991-E is your proof that a sample has been taken and analyzed (as of a certain date). It contains accurate maintenance information, such as the component/end item model/serial number/hours since overhaul and oil change. When it is time to take your oil sample, simply pull out your old DD Form 2026 or ULLS DA Form 5991-E, copy the end item and update the hours since overhaul and oil change on a new form. That way half of the form is already filled out. This reduces the chance of submitting incorrect management information to the laboratory. Always file your most recent DD Form 2026 or ULLS DA Form 5991-E, the one with laboratory results, and discard the previous one.

12-13. Q. What is the sample turn-around time?

A. Sample turn-around time is the interval of time that begins when the oil sample is taken and includes sample delivery, analysis, evaluation of analytical results, and ends when the submitting unit is notified of sample results (normal or abnormal). NOTE: Laboratory response time (receipt, analysis, evaluation and notification) is a part of the sample turn-around time.

12-14. Q. If a tactical wheeled vehicle is scheduled for a mission, which would cause it to exceed its 100 hrs/1000 miles sampling interval, when should the equipment be sampled?

A. An oil sample should be taken before departure and submitted to your regularly assigned laboratory with a note in the remarks block of the DD Form 2026 or ULLS DA Form 5991-E requesting priority analysis. The laboratory will provide your unit with the results and an oil

analysis historical record. Prior to departure your unit should coordinate its oil analysis requirements with the laboratory nearest its destination. Upon arrival at your destination, if your 1,000-mile interval has been reached, send an oil sample (and the component's oil analysis historical record) to the new servicing laboratory.

Put a note in the remarks block of the DD Form 2026 or ULLS DA Form 5991-E stating that your vehicle is on a mission away from its home station and that priority consideration is requested in the analysis. The AOAP laboratory will provide you with an oil analysis record for your deployed vehicle. This procedure should be reversed when returning to home base. The oil analysis records should be turned in to your regular laboratory.

12-15. Q. Can the laboratory 'dead line' a vehicle?

A. A laboratory recommendation to remove equipment from service is administrative in nature. The removal from service gives maintenance the chance to evaluate the condition of the suspect component. The decision to deadline a vehicle is the responsibility of the unit commander.

12-16. Q. What happens if we do not comply with laboratory recommendations?

A. Laboratory recommendations are not made unless something serious appears to be wrong with your equipment. Maintenance should make every effort to investigate the potential problems noted in the AOAP test findings and review those findings with the unit commander. It is possible you might lose an engine or have an aircraft system or component/module failure and possibly increase the safety risk to equipment crews.

12-17. Q. Can the laboratory detect if maintenance is performed?

A. Yes. When the oil is changed, for example, the concentration of wear elements is cut approximately in half for some components. When air induction system leaks are fixed, dirt levels decrease. If several samples are taken from the same piece of equipment or from an oil drum instead of from the equipment, resamples will be requested since the combination of wear elements won't match previous samples.

12-18. Q. Are DA Forms 3254-R issued for resamples and oil changes.

A. No. DD Forms 2026 or ULLS DA Form 5991-E are used for this purpose.

12-19. Q. When are DA Forms 3254-R issued?

A. When maintenance actions are recommended such as to clean/service air filters, inspect/repair fuel injection nozzles, inspect/repair engine and transmission assemblies, etc.

12-20. Q. What if an item of ground equipment has no hour meter? How do I schedule my samples and report usage to the laboratory?

A. Use the formula, 10 miles or 16 kilometers = 1 hour of operation. For example, a truck should be sampled every 90 days or 100 hours, you should sample every 90 days or 1,000 miles if there is no hour meter. (The sampling interval varies for different categories of equipment.)

12-21. Q. May we hold samples until we get a full box?

A. No. The sooner the laboratory gets your sample, the better, especially aircraft samples. If you are experiencing delays beyond your control, contact your installation AOAP monitor.

12-22. Q. Just how important is the installation AOAP monitor?

A. The monitor is very important. That role is critical to a successful program. The installation monitor is the point of contact between the command group and the laboratory. From a management point of view, the AOAP monitor means the difference between an effective and an ineffective program. Monitoring the AOAP process at an installation is a full-time job.

12-23. Q. Should equipment be sampled if it is not used? Equipment in administrative storage, for example.

A. No. AOAP is for operational equipment. Equipment should be sampled prior to storage and immediately before activation for use.

12-24. Q. How do I mark a special sample?

A. Band the bottle with red tape or something similar, as instructed in paragraph 2-7. Mark the border of the DD Form 2026 or ULLS DA Form 5991-E with red felt tip marker and write SPECIAL in the remarks block. This gives a sample priority at the laboratory.

12-25. Q. Who can I contact for assistance and improvements for AOAP operations at my command?

A. The most readily available source for information and assistance is your local AOAP installation monitor. If additional information is needed, call the AOAP Program Management Office Hot Line at DSN 645-0869 or Commercial (256) 955-0869. You may also send an email to: aoap@logsa.redstone.army.mil .

APPENDIX A
AERONAUTICAL EQUIPMENT

General. Aeronautical routine sampling intervals are provided below. For variation from the listed sampling intervals and additional sampling requirements, see Section 6 (When to Sample).

Rotary Wing		Sampling Interval	
Aircraft Designation	Component Model	Hours	Days
AH-64A	Main Transmission	25	
	Nose Gearbox (2)	25	
	APU	100	
	Hyd Sys 1	50	0
	Hyd Sys 2	50	0
AH-64D	Main Transmission	25	
	Nose Gearbox (2)	25	
	APU	100	
	Hyd Sys 1	50	0
	Hyd Sys 2	50	0
CH-47D	Engine (T55-L712/714) (2)	50	
	Engine Mech Transmission (2)	50	
	Combining Transmission	50	
	Forward Transmission	50	
	Aft Trans	50	
	APU	100	
	Hyd Sys 1	50	100
	Hyd Sys 2	50	100
	Hyd Sys Util	50	100
CH-47F	Engine (T55-L712/714) (2)	50	
	Engine Mech Transmission (2)	50	
	Combining Transmission	50	
	Forward Transmission	50	
	Aft Transmission	50	
	APU	100	
	Hyd Sys 1	50	100
	Hyd Sys 2	50	100
	Hyd Sys Util	50	100
EH-60A	Main Transmission (-073, -074, -076 only) 3 micron filter	500	Physical Properties Only
	Main Transmission (all others)	50	
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	
EH-60L	Main Transmission (all)	500	Physical Properties Only
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	

Rotary Wing		Sampling Intervals	
Aircraft Designation	Component Model	Hours	Days
HH-60L	Main Transmission (all)	500	Physical Properties Only
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	
MH-47D	Engine (T55-L712/714) (2)	50	
	Engine Mech Transmission (2)	50	
	Combining Transmission	50	
	Forward Transmission	50	
	Aft Transmission	50	
	APU	100	
	Hyd Sys 1	50	100
	Hyd Sys 2	50	100
	Hyd Sys Util	50	100
MH-47E	Engine (T55-L712/714) (2)	50	
	Engine Mech Transmission (2)	50	
	Combining Transmission	50	
	Forward Transmission	50	
	Aft Transmission	50	
	APU	100	
	Hyd Sys 1	50	100
	Hyd Sys 2	50	100
	Hyd Sys Util	50	100
MH-6H	Main Transmission	100	365
	90/Tail Gearbox	100	365
MH-6J	Main Transmission	100	365
	90/Tail Gearbox	100	365
MH-6N	Main Transmission	100	365
	90/Tail Gearbox	100	365
MH-60L	Main Transmission (all)	500	Physical Properties Only
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	
MH-60K	Main Transmission (all)	500	Physical Properties Only
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	
OH-58A	T63-A-720 with 3 micron filter	0	
	T63-A-720	50	
	Main Transmission	25	
	90/Tail Gearbox	25	
OH-58C	T63-A-720 with 3 micron filter	0	
	T63-A-720	50	
	Main Transmission	25	
	90/Tail Gearbox	25	
OH-58D Remove All AOAP	Sampling Requirements Except:		
	Hydraulic System	40	

Rotary Wing		Sampling Interval	
Air Designation	Component Model	Hours	Days
TH-67	Main Xmsn	25	0
	90/Tail Gbx	25	0
	250-C-30	13	0
	Hyd Sys	40	0
UH-1	Engine (T53-l-703/13B) With ODDS	250	Physical Properties Only
	Engine (T53-l-703/13B) Without ODDS	25	
	Main Transmission With ODDS	250	Physical Properties Only
	Main Transmission Without ODDS	50	
	Intermediate Gearbox	50	
	Tail Rotor Gearbox	50	
UH-60A	Main Transmission (-073, -074, -076 only) 3 micron filter	500	Physical Properties Only
	Main Transmission (all others)	50	
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU (T62T-40-1)	100	
UH-60L	Main Transmission (all)	500	Physical Properties Only
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	
UH-60Q	Main Transmission (-073, -074, -076 only) 3 micron filter	500	Physical Properties Only
	Main Transmission (all others)	50	
	Intermediate Gearbox	35	
	Tail Gearbox	35	
	APU	100	

Fixed Wing		Sampling Intervals	
Air Designation	Component Model	Hours	Days
C-12	PT6A-27	100	365
	PT6A-34	100	365
	PT6A-38	100	365
	PT6A-41	100	365
	PT6A-42	100	365
C-12C	PT6A-41	100	365
C-12D	PT6A-41	100	365
C-12J	PT6A-65B	100	365
O-5A	PT6A-50	100	365
RC-12D	PT6A-41	100	365
RC-12G	PT6A-41	100	365
RC-12K	PT6A-67	100	365
RF-8G	J57-P-420	100	365
U-21F	PT6A-28	100	365

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APPENDIX B
NONAERONAUTICAL EQUIPMENT

General. Routine sampling intervals are provided below. For variation from the listed sampling intervals and additional sampling requirements, see Section 6 (When to Sample).

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M1	Tank, Combat, Full	AGT-1500	25	60	25	180
		X1100-3B	75	90	75	180
		HYD SYS		365		365
M1 IP	Tank, Combat, Full	AGT-1500	25	60	25	180
		X1100-3B	75	90	75	180
		HYD SYS		365		365
M1A1	Tank, Combat, (Mine Sweeper Panther)	AGT-1500	25	60	25	180
		X1100-3B	75	90	75	180
		HYD SYS		365		365
M1A2	Tank, Combat, Full	AGT-1500	25	60	25	180
		X1100-3B	75	90	75	180
		HYD SYS		365		365
M1059	Carrier, Smoke Generator	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M1059A3	Carrier, Smoke Generator	DD6V53T	25	60	25	180
		X200-4	25	60	25	180

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M1064	Carrier, Mortar	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M1064A3	Carrier, Mortar	DD6V53T	25	60	25	180
		X200-4	25	60	25	180
M1068	Carrier, Standardized, Integrated Command Post	DD6V53T	25	60	25	180
		TX-100	25	60	25	180
M1068A3	Carrier, Standardized, Integrated Command Post	DD6V53T	25	60	25	180
		X200-4	25	60	25	180
M106A1	Self Propelled Howitzer	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M106A2	Carrier, Mortar	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M109A4	Howitzer, Medium SP	DD8V71T	25	60	25	180
		XTG-411-2A	25	60	25	
		HYD SYS		365		365

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M109A6	Self Propelled Howitzer	DD8V71T	25	60	25	180
		XTG-411-4	25	60	25	180
		HYD SYS		365		365
M113A2	Personnel Carrier	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M113A3	Personnel Carrier	DD6V53T	25	60	25	180
		DD6V53	25	60	25	180
		X200-4	25	60	25	180
		TX-100-1	25	60	25	180
M113A3BMP-2	Personnel Carrier	DD6V53T	25	60	25	180
		X200-4	25	60	25	180
M2	Infantry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-B	25	60	25	180

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M2A1	Infantry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-B	25	60	25	180
M2A2	Infantry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-3TE	25	60	25	180
M2A3	Infantry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500-3EC	25	60	25	180
M270	Carrier, Multiple Launch Rocket System (MLRS)	VTA-903T	25	60	25	180
		HMPT-500-3EC	25	60	25	180
		HYD SYS		365		365
M3	Cavalry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-B	25	60	25	180
M3A1	Cavalry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-B	25	60	25	180

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M3A2	Cavalry Fighting Vehicle	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-3TE	25	60	25	180
M3A3	Cavalry Righting Vehicle	VTA-903T	25	60	25	180
		HMPT-500-3EC	25	60	25	180
M4	Carrier, Command and Control (C2V)	VTA-903T	25	60	25	180
		6BT5.9	25	60	25	180
		HMPT-500-3E	25	60	25	180
M48A5		1790-2A	25	60	25	180
		1790-2DA	25	60	25	60
		HYD SYS		365		365
M48A5AVLB	Armored Vehicle, Launcher Bridge (AVLB)	AVDS-1790-2DA	25	60	25	180
		CD850-6A	25	60	25	180
		CD850-6A1	25	60	25	180
		HYD SYS		365		365
M548	Cargo Carrier	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M548A1	Cargo Carrier	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M548A3	Cargo Carrier	DD6V53T	25	60	25	180
		X200-4	25	60	25	180

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M551A1	Armor Reconnaissance Vehicle	DD6V53T	25	60	25	180
		DD6V53	25	60	25	180
		G250-1A	25	60	25	180
M5510PFOR	Armor Reconnaissance Vehicle	DD6V53T	25	60	25	180
		G250-1A	25	60	25	180
M577A2	Personnel Carrier, Command Post	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M577A3	Personnel Carrier, Command Post	DD6V53T	25	60	25	180
		X200-4	25	60	25	180
M578	Tank, Recovery Vehicle	DD8V71T	25	60	25	180
		XTG-411-2A	25	60	25	180
		HYD SYS		365		365
M58	Carrier, Personnel, Full Tracked, Smoke	DD6V53T	25	60	25	180
		X200-4A	25	60	25	180
M6	Linebacker Air Defense Carrier	VTA-903T600	25	60	25	180
		HMPT-500-3EC	25	60	25	180
M60A1AVLB	Tank, Combat, Full	AVDS-1790-2DA	25	60	25	180
		CD850-6A	25	60	25	180
		CD850-6A1	25	60	25	180
		HYD SYS		365		365

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M60A3	Tank, Combat, Full	AVDS-1790-2C	25	60	25	180
		CD850-6A	25	60	25	180
		CD850-6A1	25	60	25	180
		HYD SYS		365		365
M7	BFIST, Fire SPT TM VEH	VTA-903T	25	60	25	180
		HMPT-500-3	25	60	25	180
M88A1	Tank, Recovery Vehicle	1790-2DR	25	60	25	180
		XT-1410-4	25	60	25	180
		HYD SYS		365		365
M88A2	Tank, Recovery Vehicle (HERCULES)	1790-8CR	25	60	25	180
		XT-1410-5A	25	60	25	180
		HYD SYS		365		365
M901 M901A1	Combat, Vehicle Combat, Vehicle, TOW	DD6V53	25	60	25	180
		DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M93A1FOX	Nuclear-Biological-Chemical Reconnaissance System	OM402A	25	60	25	180
		HP500 TYPE 6	25	60	25	180
		HYD SYS		365		365
M981	Fire Support Team Vehicle (FIST-V)	DD6V53	25	60	25	180
		TX-100-1	25	60	25	180
M981A1	Fire Support Team Vehicle (FIST-V) Carrier, Personnel	DD6V53T	25	60	25	180
		TX-100-1	25	60	25	180

Combat Vehicles			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
M981A3	Fire Support Team Vehicle (FIST-V) Carrier, Personnel	DD6V53T	25	60	25	180
		X200-4	25	60	25	180
M992A2	20 T, FAASV, Carrier, Ammunition	DD8V71TLHR	25	60	25	180
		XTG-411-4	25	60	25	180
		HYD SYS		365		365
M993	Carrier, Multiple Launch Rocket System (MLRS)	VTA-903T	25	60	25	180
		HMPT-500	25	60	25	180
		HMPT-500-3	25	60	25	180
		HMPT-500-3E	25	60	25	180
		HMPT-500-B	25	60	25	180
Panther Mine		AGT-1500	25	60	25	180
		X1100-38	75	90	75	180
		HYD SYS		365		365
XM93FOX	Nuclear-Biological-Chemical Reconnaissance System (NBCRS)	OM402A	25	60	25	180
		HP500 TYPE 6	25	60	25	180
		HYD SYS		365		365
XM104	Armored Vehicle, Heavy Assault Bridge (Wolverine)	AGT-1500	75	90	75	180
		X1100-3B	75	90	75	180
		HYD SYS		365		365

Locomotives			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/ NG Hours	Reserves/ NG Days
LOCO100T	100 T, Locomotive,	EMD8-567B	25	90	25	90
	Diesel Electric	AMER 539	25	90	25	90
LOCO10T	10 T, Locomotive, Diesel Electric	DD3080	25	90	25	90
LOCO115T	115T, Locomotive, Diesel Electric	AMER 539S	25	90	25	90
LOCO120T	120 T, Locomotive, Diesel Electric	BALDWIN 606A	25	90	25	90
		38D-81/8	25	90	25	90
		FM-H12-44	25	90	25	90
		EMD16-567B	25	90	25	90
		AMER 244F	25	90	25	90
		EMD16-645E	25	90	25	90
LOCO25T	25 T, Locomotive, Crane	HBI-600	25	90	25	90
LOCO44T	44 T, Locomotive, Diesel Electric	CAT-D17000	25	90	25	90
LOCO45T	45 T, Locomotive, Diesel Electric	HBI-600	25	90	25	90

Locomotives			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/NG Hours	Reserves/NG Days
LOCO60T	60 T, Locomotive, Diesel Electric	CAT-D397	25	90	25	90
		CAT-3508	25	90	25	90
LOCO80T	80 T, Locomotive, Diesel Electric	NTA-855L4	25	90	25	90
		LI-600	25	90	25	90
LOCO80T-470	80 T, Locomotive, Diesel Electric	NHBIS-600	25	90	25	90
LOCO80T-550	80 T, Locomotive, Diesel Electric	NHBIS-600	25	90	25	90
RAIL C 25T	25 T, Crane	D13,000	25	90	25	90
RAIL C 40T	40 T, Crane	DD671	25	90	25	90

Watercraft			Sampling Intervals			
End Item Model	Nomenclature	Component	Active Army Hours	Active Army Days	Reserves/NG Hours	Reserves/NG Days
BBEUSCSBMK1	Boat Bridge Erection, USCSBMK1	SABRE 212	100	90	50	180
		10-18-002	100	90	50	180
BBEUSCSBMK2	Boat Bridge Erection, USCSBMK2	SABRE 212	100	90	50	180
		10-18-002	100	90	50	180
BD-264B	100 T, Crane, Barge, Design 264B	CO-GAB4	100	90	50	180
		CO-6EN668	100	90	50	180
		CO-DSM-6	100	90	50	180
		FM-31A6	100	90	50	180
		CO-5EN668	100	90	50	180
BD-6802	115 T, Barge, Derrick	NTA-855-63	100	90	50	180
		KTA-38-G2	100	90	50	180
		HYD SYS ANC1		365		365
		HYD SYS ANC2		365		365
		HYD SYS ANC3		365		365
		HYD SYS		365		365
BP	Boat Picket	4003	100	90	50	180
BP	Boat Picket	4002	100	90	50	180

Watercraft			Sampling Intervals			
End Item Model	Nomenclature	Component	Active Army Hours	Active Army Days	Reserves/NG Hours	Reserves/NG Days
LCM8	Landing Craft, Mechanized, 69 FT.	671LD63A	100	90	50	180
		DD12V71T	100	90	50	180
		671LB63A	100	90	50	180
		671RD63A	100	90	50	180
		671RB63A	100	90	50	180
LCM8MOD1	Landing Craft, Mechanized, 69 FT.	DD12V71T	100	90	50	180
LCM8MOD1SL	Landing Craft, Mechanized, 69 FT.	DD12V71T	100	90	50	180
LCM8-SLEP	Landing Craft, Mechanized	7122	100	90	50	180
		7000	100	90	50	180
LCU2000	Landing Craft, Utility	KTA-50M	100	90	50	180
		NTA-855	100	90	50	180
		4B3.9	100	90	50	180
		NT-855-M	100	90	50	180
		WAV850PT	100	90	50	180
		WAV850SB	100	90	50	180

Watercraft			Sampling Intervals			
End Item Model	Nomenclature	Component	Active Army Hours	Active Army Days	Reserves/NG Hours	Reserves/NG Days
LSV	Logistics Support Vessel	EMD16-645E6	100	90	50	180
		3406-B	100	90	50	180
		3304-B	100	90	50	180
		3306-B	100	90	50	180
		MG509	100	90	50	180
		WAV630-2240	100	90	50	180
LT	Large Tug 1200 Horsepower	LS6DRT	100	90	50	180
		HS400-3	100	90	50	180
		EMD12645F7B	100	90	50	180
		3408DITAJW	100	90	50	180
		CAT-3304NA	100	90	50	180
		CAT-3306TA	100	90	50	180
LVTC-7A1	Landing Craft, Assault Vehicle	VT-400	100	90	50	180
		HS400-3	100	90	50	180
LVTP-7A1	Landing Craft, Assault Vehicle	VT-400	100	90	50	180
		HS400-3	100	90	50	180
LVTR-7A1	Landing Craft, Assault Vehicle	VT-400	100	90	50	180
		V903	100	90	50	180
		HS400-3	100	90	50	180
ST	Tug 200 Horsepower	320	100	90	50	180
ST-TUG-200	Tug 200 Horsepower	6DCMR 1879	100	90	50	180
TUG-900	Tug 900 Horsepower, Series 900, 60 Feet	6B5.9-G1	100	90	50	180
		KTA19-M3	100	90	50	180

Support Equipment			Sampling Intervals			
End Item Model	Nomenclature	Components	Active Army Hours	Active Army Days	Reserves/NG Hours	Reserve NG Days
DV-100	Deployable Universal Combat Earthmover (DEUCE)	CAT-3126	50	90	50	180
		Powershift	50	90	50	180
		HYD SYS		365		365
M9 (ACE)	Armored Combat Earthmover	V903	50	90	50	180
		13.5 HR 3610-2	50	90	50	180
		HYD SYS		365		365
MEP-360A P-713	30 KW, AC 400 HZ, Power Unit Aviation Multi-Output GTED (APGU)	GTCP36-50 (H)		180		180
		HDY SYS		30		30

APPENDIX C
AOAP ILLUSTRATED SAMPLING

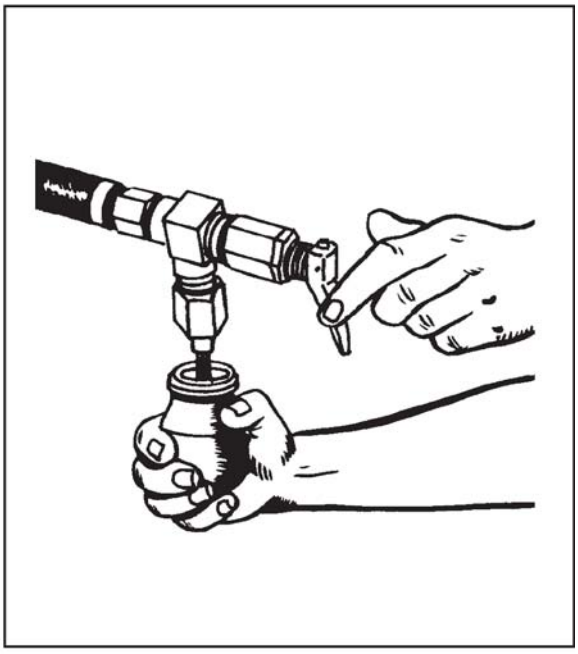

Figure 2 - Oil Sampling Valve

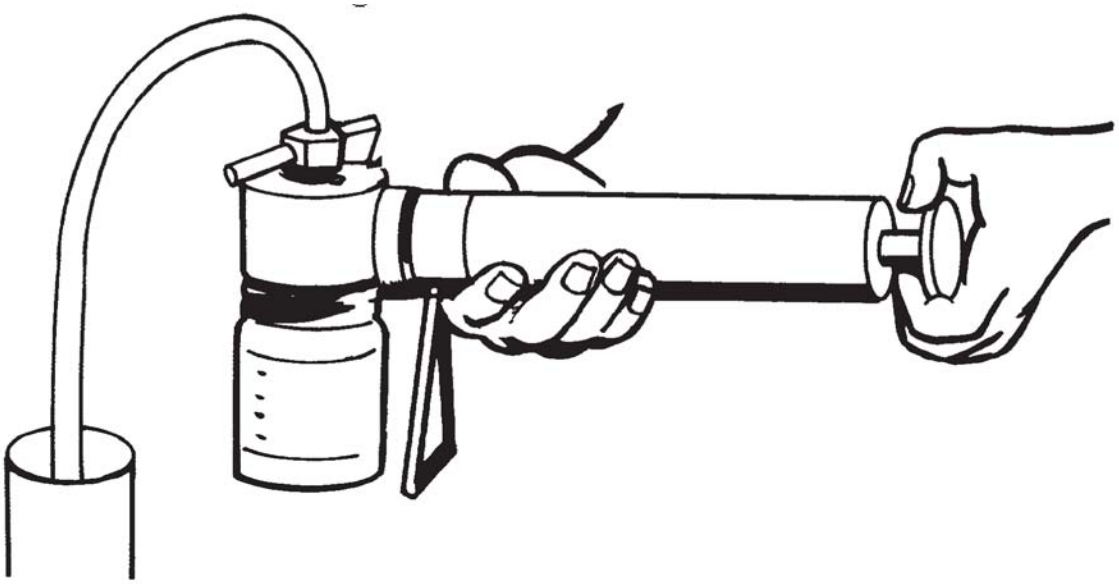

Figure 3 - Oil Sampling Pump

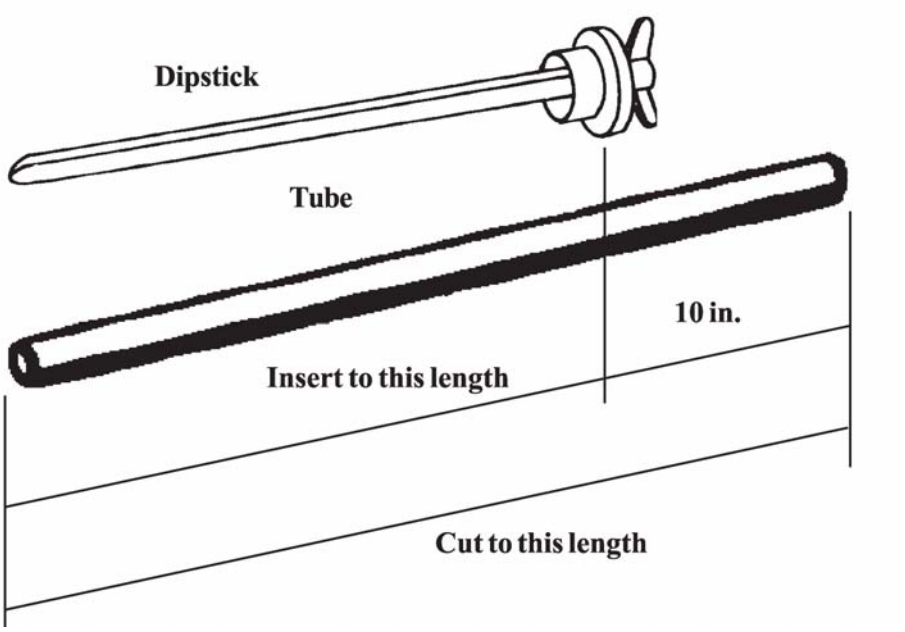

Figure 4 - Oil Sampling Tube

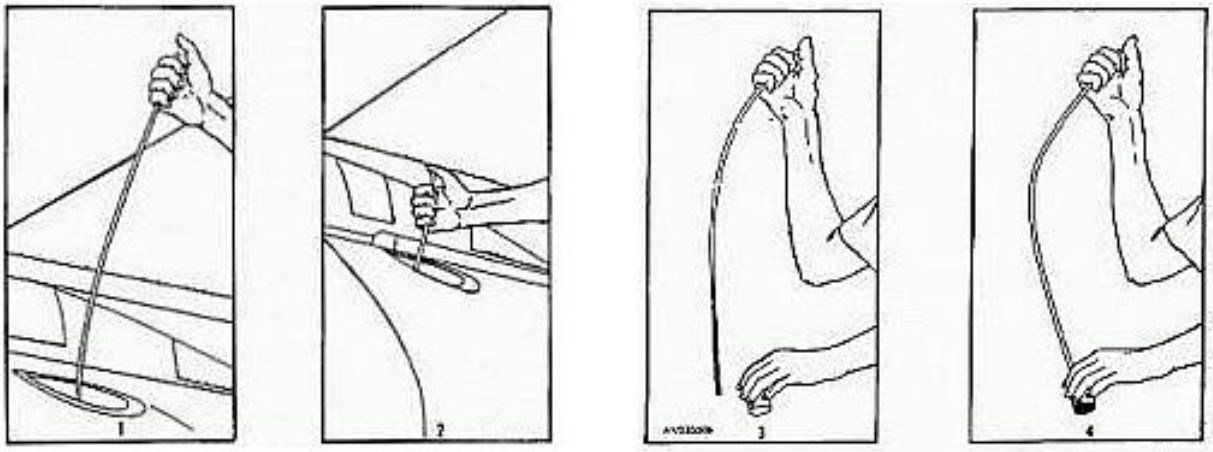

Figure 5 - Aviation Tube Sampling Method

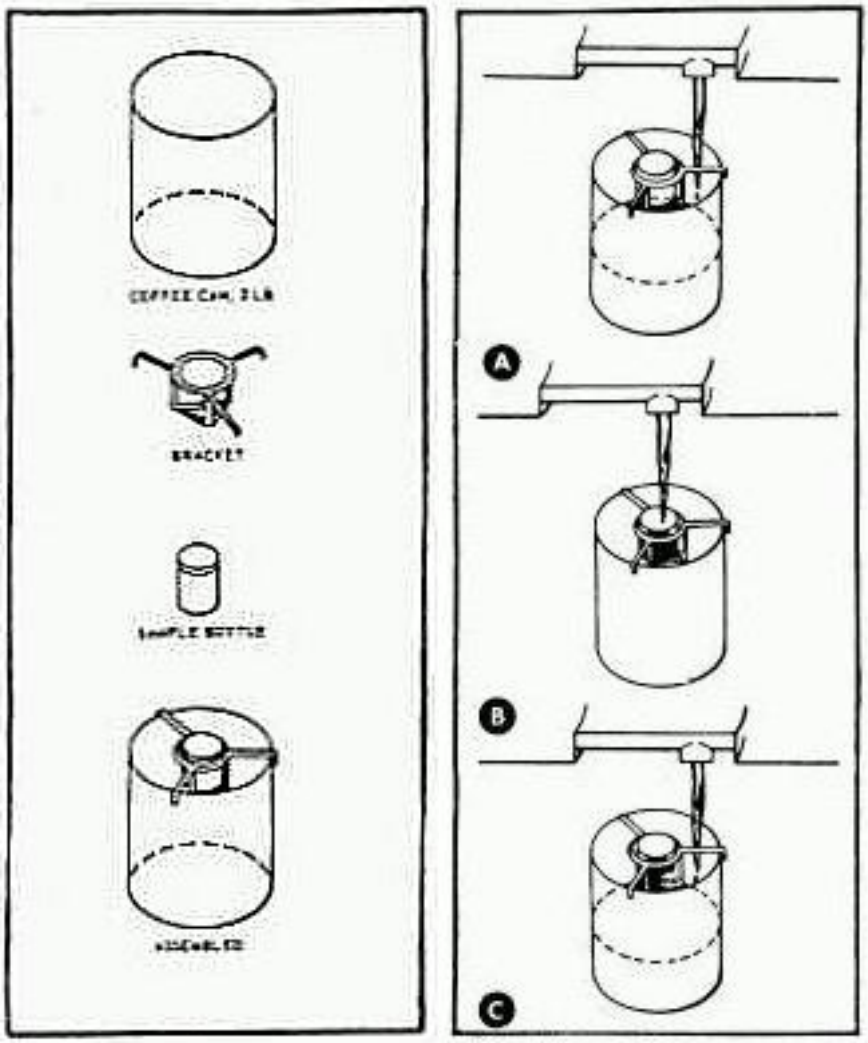

Figure 6 - Oil Analysis Drain Method

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APPENDIX D
AOAP FORMS

OIL ANALYSIS REQUEST

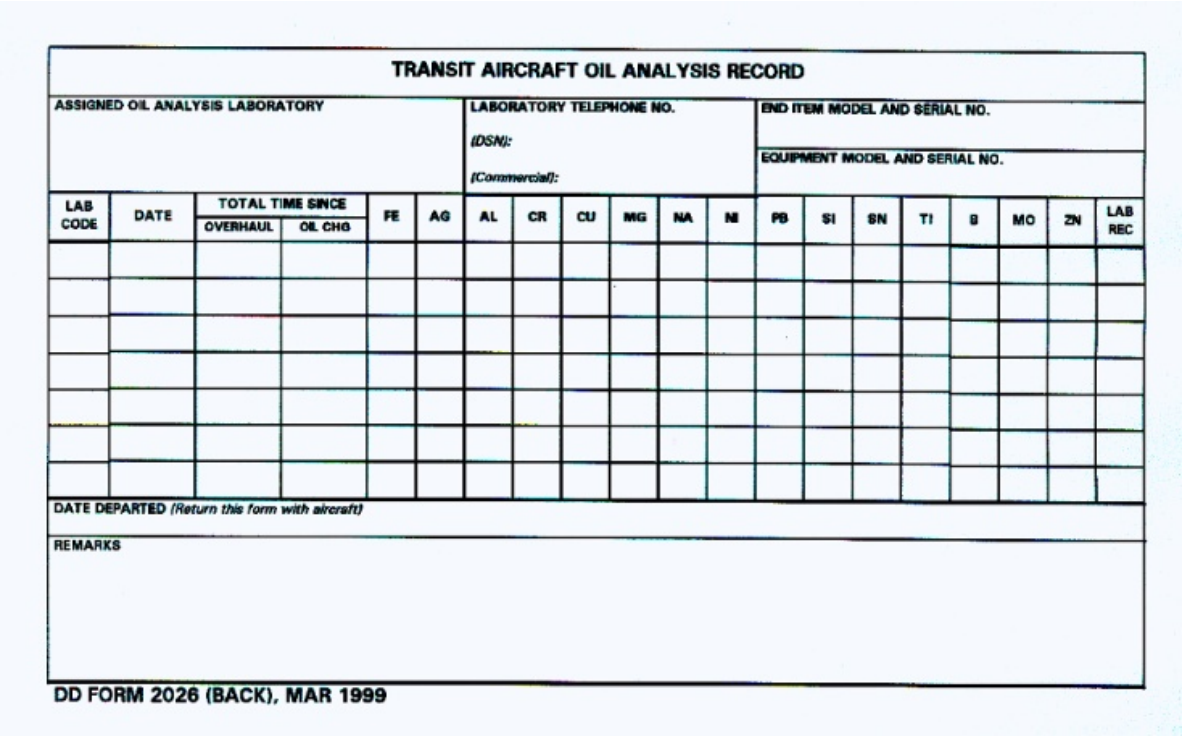
TO	OIL ANALYSIS LABORATORY	Ft. Hood
FROM	MAJOR COMMAND	FORSCOM
FROM	OPERATING ACTIVITY *(Include ZIP Code/APO/UIC)*	Hq Co 1/66 Armor, 2AD (WADST0) Ft. Hood, TX 76544 685-3908
	EQUIPMENT MODEL	Engine AVDS 1790-2D
	EQUIPMENT SERIAL NUMBER	A0606
	END ITEM MODEL/HULL NUMBER	Tank M60A1
	END ITEM SERIAL NUMBER	6486
	DATE SAMPLE TAKEN *(Day, Mo., Yr)*	15 Mar 02
	LOCAL TIME SAMPLE TAKEN	
	HOURS/MILES SINCE OVERHAUL	346
	HOURS/MILES SINCE OIL CHANGE	67
	REASON FOR SAMPLE	[X] ROUTINE [ ] LAB REQUEST [ ] TEST CELL [ ] OTHER *(Specify)*
	OIL ADDED SINCE LAST SAMPLE *(Oz, Pts, Qts, Gals)*	1 Gal
	ACTION TAKEN	
	DISCREPANT ITEM	
	HOW MALFUNCTIONED	
	HOW FOUND	[ ] LAB REQUEST [ ] AIR OR GROUND CREW
	HOW TAKEN	[X] DRAIN [ ] TUBE
	SAMPLE TEMPERATURE	[X] HOT [ ] COLD
	TYPE OIL	OE 30
	ENGINE POSITION:	
	REMARKS/MISC:	MI 4761
	NAME: James J. Lin	
	PHONE: 685-3908	
	EMP NO: Sgt	
	SIGNATURE:	James J. Lin

FOR LABORATORY USE ONLY

SAMPLE RESPONSE TIME						
FE	AG	AL	CR	CU	MG	NA
NI	PB	SI	SN	TI	B	MO
ZN	LAB RECOMMENDATION					
SAMPLE NUMBER(S)					FILE MAINT	DATA SEQ

DD FORM 2026, MAR 1999 (EG) PREVIOUS EDITION MAY BE USED.
WHS/DIOR, Mar 99

Figure 7 - Oil Analysis Request
DD Form 2026
(See paragraph 8-1 for preparation instructions)



TRANSIT AIRCRAFT OIL ANALYSIS RECORD

ASSIGNED OIL ANALYSIS LABORATORY	LABORATORY TELEPHONE NO. *(DSN):* *(Commercial):*	END ITEM MODEL AND SERIAL NO. EQUIPMENT MODEL AND SERIAL NO.

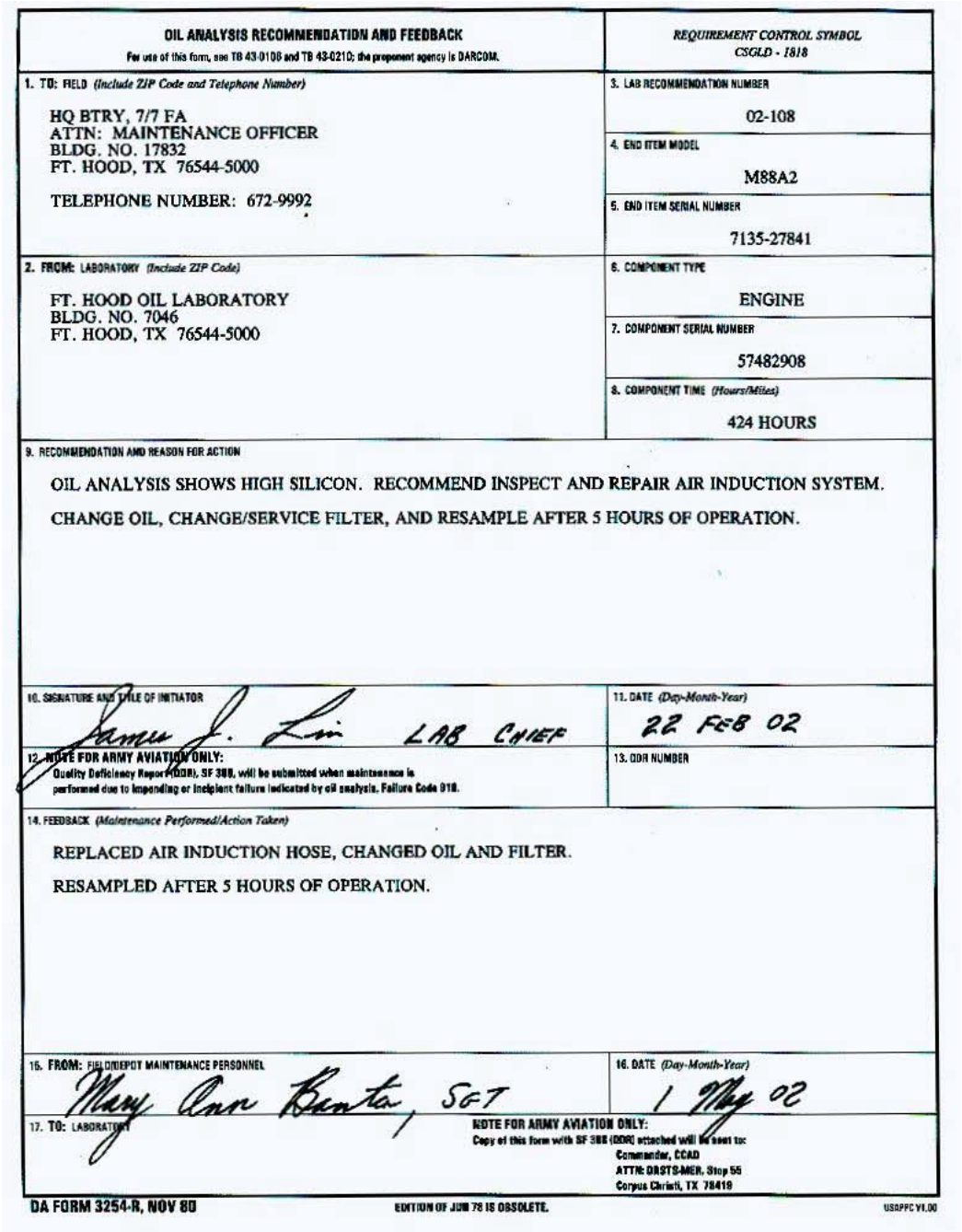
LAB CODE	DATE	TOTAL TIME SINCE		FE	AG	AL	CR	CU	MG	NA	NI	PB	SI	SN	TI	B	MO	ZN	LAB REC
		OVERHAUL	OIL CHG																

DATE DEPARTED *(Return this form with aircraft)*

REMARKS

DD FORM 2026 (BACK), MAR 1999

Figure 8 - Oil Analysis Request
DD Form 2026 (Reverse Side)
(See paragraph 8-1 for preparation instructions)



OIL ANALYSIS RECOMMENDATION AND FEEDBACK
For use of this form, see TB 43-0106 and TB 43-0210; the proponent agency is DARCOM.

REQUIREMENT CONTROL SYMBOL
CSGLD - 1818

1. TO: FIELD *(Include ZIP Code and Telephone Number)*

HQ BTRY, 7/7 FA
ATTN: MAINTENANCE OFFICER
BLDG. NO. 17832
FT. HOOD, TX 76544-5000

TELEPHONE NUMBER: 672-9992

3. LAB RECOMMENDATION NUMBER: 02-108

4. END ITEM MODEL: M88A2

5. END ITEM SERIAL NUMBER: 7135-27841

2. FROM: LABORATORY *(Include ZIP Code)*

FT. HOOD OIL LABORATORY
BLDG. NO. 7046
FT. HOOD, TX 76544-5000

6. COMPONENT TYPE: ENGINE

7. COMPONENT SERIAL NUMBER: 57482908

8. COMPONENT TIME *(Hours/Miles)*: 424 HOURS

9. RECOMMENDATION AND REASON FOR ACTION

OIL ANALYSIS SHOWS HIGH SILICON. RECOMMEND INSPECT AND REPAIR AIR INDUCTION SYSTEM.

CHANGE OIL, CHANGE/SERVICE FILTER, AND RESAMPLE AFTER 5 HOURS OF OPERATION.

10. SIGNATURE AND TITLE OF INITIATOR: James J. Lin LAB CHIEF

11. DATE *(Day-Month-Year)*: 22 FEB 02

12. NOTE FOR ARMY AVIATION ONLY:
Quality Deficiency Report (QDR), SF 368, will be submitted when maintenance is performed due to impending or incipient failure indicated by oil analysis. Failure Code 918.

13. QDR NUMBER

14. FEEDBACK *(Maintenance Performed/Action Taken)*

REPLACED AIR INDUCTION HOSE, CHANGED OIL AND FILTER.

RESAMPLED AFTER 5 HOURS OF OPERATION.

15. FROM: FIELD/DEPOT MAINTENANCE PERSONNEL: Mary Ann Bunta, SGT

16. DATE *(Day-Month-Year)*: 1 May 02

17. TO: LABORATORY

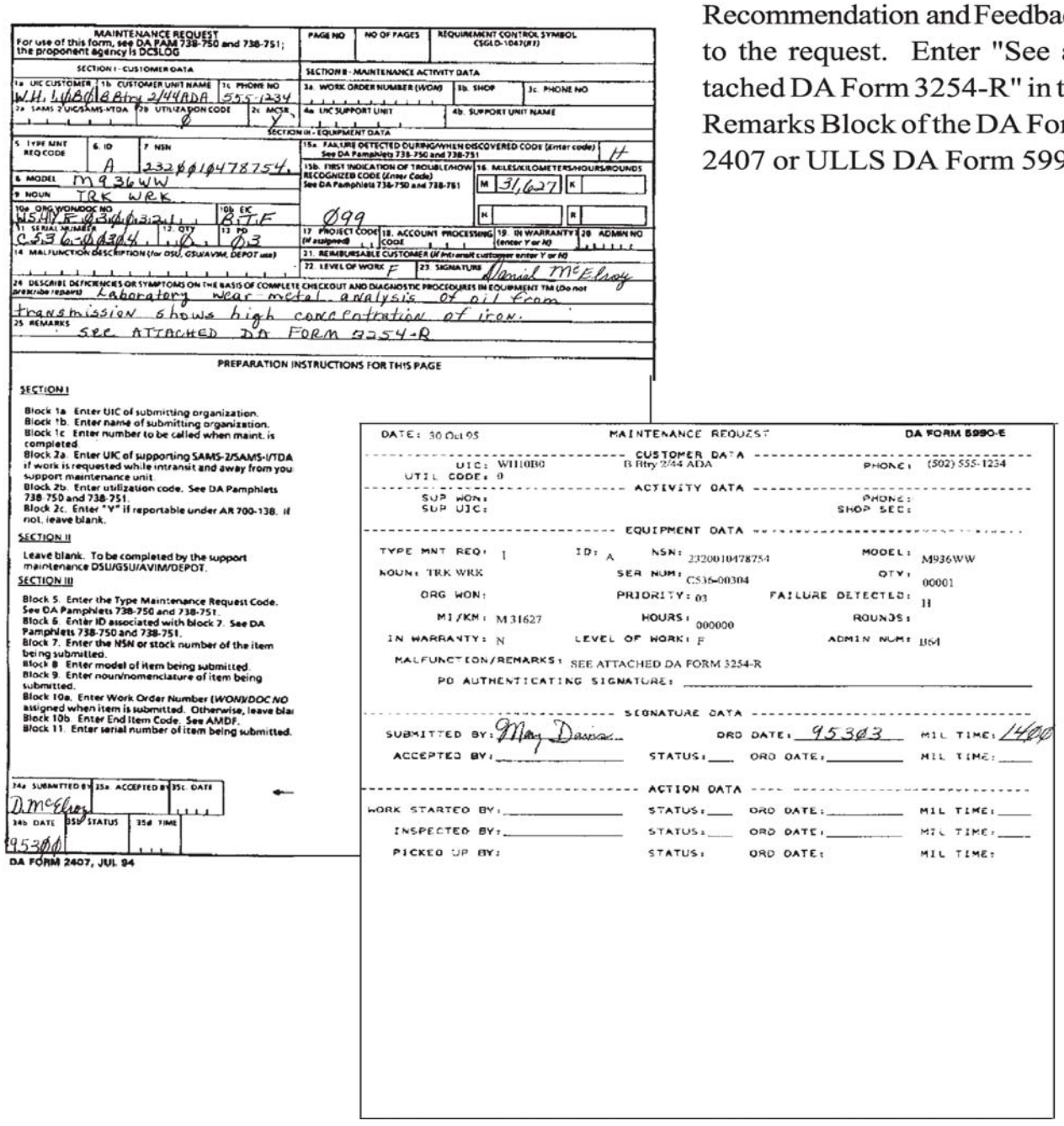
NOTE FOR ARMY AVIATION ONLY:
Copy of this form with SF 368 (QDR) attached will be sent to:
Commander, CCAD
ATTN: DRSTS-MER, Stop 55
Corpus Christi, TX 78419

DA FORM 3254-R, NOV 80 EDITION OF JUN 78 IS OBSOLETE. USAPPC V1.00

Figure 9 - Oil Analysis Recommendation and Feedback
(See paragraph 8-3 for preparation instructions)

DA FORM 2407 OR ULLS DA FORM 5990-E, Maintenance Request

When a DA Form 2407 or ULLS DA Form 5990-E, Maintenance Request, is prepared by the unit to request support from a higher level of maintenance for an AOAP recommendated evaluation, attach the DA Form 3254-R, Oil Analysis Recommendation and Feedback, to the request. Enter "See attached DA Form 3254-R" in the Remarks Block of the DA Form 2407 or ULLS DA Form 5990-E.



MAINTENANCE REQUEST
For use of this form, see DA PAM 738-750 and 738-751; the proponent agency is DCSLOG

PAGE NO | NO OF PAGES | REQUIREMENT CONTROL SYMBOL CSGLO-1047(R1)

SECTION I - CUSTOMER DATA

1a. UIC CUSTOMER: WH1UB0 | 1b. CUSTOMER UNIT NAME: B Bfry 2/44ADA | 1c. PHONE NO: 555-1234
2a. SAMS 2 UIC/SAMS-I/TDA | 2b. UTILIZATION CODE: 0 | 2c. MCSR: Y

SECTION II - EQUIPMENT DATA

5. TYPE MNT REQ CODE: A | 6. ID | 7. NSN: 2320010478754
6. MODEL: M936WW
9. NOUN: TRK WRK
10a. ORG WON/DOC NO: W5HYF03A0324 | 10b. EIC: B1F
11. SERIAL NUMBER: C536-00304 | 12. QTY: 00001 | 13. PD: 03
14. MALFUNCTION DESCRIPTION (for DSU, GSU/AVSM, DEPOT use)
15a. FAILURE DETECTED DURING/WHEN DISCOVERED CODE (See DA Pamphlets 738-750 and 738-751): H
15b. FIRST INDICATION OF TROUBLE/HOW RECOGNIZED CODE (See DA Pamphlets 738-750 and 738-751): Ø99
16. MILES/KILOMETERS/HOURS/ROUNDS: M 31,627 | K | H | R
17. PROJECT CODE (If assigned) | 18. ACCOUNT PROCESSING CODE | 19. IN WARRANTY (enter Y or N) | 20. ADMIN NO
21. REIMBURSABLE CUSTOMER (If Yes enter customer enter Y or N)
22. LEVEL OF WORK: F | 23. SIGNATURE: Daniel McElroy
24. DESCRIBE DEFICIENCIES OR SYMPTOMS ON THE BASIS OF COMPLETE CHECKOUT AND DIAGNOSTIC PROCEDURES IN EQUIPMENT TM (Do not prescribe repairs): Laboratory wear metal analysis of oil from transmission shows high concentration of iron.
25. REMARKS: SEE ATTACHED DA FORM 3254-R

PREPARATION INSTRUCTIONS FOR THIS PAGE

SECTION I

Block 1a. Enter UIC of submitting organization.
Block 1b. Enter name of submitting organization.
Block 1c. Enter number to be called when maint. is completed.
Block 2a. Enter UIC of supporting SAMS-2/SAMS-I/TDA if work is requested while intransit and away from you support maintenance unit.
Block 2b. Enter utilization code. See DA Pamphlets 738-750 and 738-751.
Block 2c. Enter "Y" if reportable under AR 700-138. If not, leave blank.

SECTION II

Leave blank. To be completed by the support maintenance DSU/GSU/AVIM/DEPOT.

SECTION III

Block 5. Enter the Type Maintenance Request Code. See DA Pamphlets 738-750 and 738-751.
Block 6. Enter ID associated with block 7. See DA Pamphlets 738-750 and 738-751.
Block 7. Enter the NSN or stock number of the item being submitted.
Block 8. Enter model of item being submitted.
Block 9. Enter noun/nomenclature of item being submitted.
Block 10a. Enter Work Order Number (WON/DOC NO assigned when item is submitted. Otherwise, leave bla
Block 10b. Enter End Item Code. See AMDF.
Block 11. Enter serial number of item being submitted.

24a. SUBMITTED BY: D.McElroy | 25a. ACCEPTED BY | 25c. DATE
24b. DATE: 95300 | 25b. STATUS | 25d. TIME

DA FORM 2407, JUL 94

DATE: 30 Oct 05 — MAINTENANCE REQUEST — DA FORM 5990-E

CUSTOMER DATA
UIC: WH1UB0 — B Bfry 2/44 ADA — PHONE: (502) 555-1234
UTIL CODE: 0

ACTIVITY DATA
SUP WON: — PHONE:
SUP UIC: — SHOP SEC:

EQUIPMENT DATA
TYPE MNT REQ: I — ID: A — NSN: 2320010478754 — MODEL: M936WW
NOUN: TRK WRK — SER NUM: C536-00304 — QTY: 00001
ORG WON: — PRIORITY: 03 — FAILURE DETECTED: H
MI/KM: M31627 — HOURS: 000000 — ROUNDS:
IN WARRANTY: N — LEVEL OF WORK: F — ADMIN NUM: 1164
MALFUNCTION/REMARKS: SEE ATTACHED DA FORM 3254-R
PD AUTHENTICATING SIGNATURE: _____

SIGNATURE DATA
SUBMITTED BY: Mary Davies — ORD DATE: 95303 — MIL TIME: 1400
ACCEPTED BY: _____ — STATUS: ___ — ORD DATE: _____ — MIL TIME: ____

ACTION DATA
WORK STARTED BY: _____ — STATUS: ___ — ORD DATE: _____ — MIL TIME: ____
INSPECTED BY: _____ — STATUS: ___ — ORD DATE: _____ — MIL TIME: ____
PICKED UP BY: — STATUS: — ORD DATE: — MIL TIME:

Figure 10 - Maintenance Request, DA Form 2407, ULLS DA Form 5990-E (See DA Pams 738-750 (Ground) or 738-751 (Air) for preparation instructions)

APPENDIX E
ABBREVIATIONS AND TERMS

ABBREVIATIONS

AOAP - Army Oil Analysis Program

CCAD - Corpus Christie Army Depot

JOAP - Joint Oil Analysis Program

SOP - Standing Operating Procedure

ULLS - Unit Level Logistics System

TERMS

AOAP Monitor. The organization or unit representative assigned to coordinate oil analysis within the organization and with the regional AOAP laboratory.

Component. Within the AOAP, this term refers to all parts, major assemblies, and secondary items enrolled in the oil analysis program for test and analysis.

Ferrography. An instrument and testing process which determines the size, shape, and type of large wear metal particles being generated by a piece of equipment, to include the method of wear (e.g.; spalling, rubbing, and cutting). Ferrography is used as the primary grease analysis test and as a supplemental oil analysis test to analyze wear metals too large to be examined by spectrometric analysis. Generally, these particles are large enough to be seen by the human eye and may be indications of advanced stages of internal part wear.

Fourier Transform Infrared (FT-IR). An analytical instrument used to examine the physical properties of lubricants for contamination and to determine if the lubricant is still serviceable or should be replaced.

Laboratory Analysis. Oil and grease analyses used to evaluate the internal condition of engines, gearboxes, transmission, and other lubricated systems or components. It is a test or series of tests that provide indications of equipment component condition by applying methods of precision detection and quantitative measurement of wear metals and contaminants in oil

Laboratory Response Time. The AOAP standard interval of time that begins when the laboratory receives the oil or grease sample and ends when the customer unit has been advised of the test results. For aeronautical samples, the maximum laboratory response time is 24 clock hours (one work day) and 72 clock hours (three work days) for nonaeronautical oil samples.

Oil Sample. A representative amount of grease or oil extracted from the enrolled equipment component. Under special circumstances, a sample may be required from new source oil to

compare with oil in the equipment or determine if unusual metal content in the sample is the result of lubricant chemical composition.

On-Condition Oil Change. An AOAP process where the oil in enrolled components will not be changed in accordance with the equipment Lubrication Order. While oil samples from the enrolled component are being tested in the laboratory for internal part wear, the laboratory will also test the oil sample to determine if it has been contaminated. Component system lubricants will be changed when the AOAP laboratory notifies the unit the oil is no longer serviceable. Equipment under warranty will still comply with all requirements of the warranty.

Resample. An additional or follow-up oil sample requested by the laboratory to confirm test findings indicating potentially serious conditions, when the oil sample appears to have been contaminated or there is insufficient lubricant to conduct the required testing.

Special Samples. AOAP samples submitted to the laboratory for analysis, other than routine or laboratory requested samples.

Spectrometric Analysis. A test used to detect concentrations of various wear metals, which are smaller than the human eye can see in oil samples. The friction of moving parts initiates wear in mechanical systems, producing metal particles of microscopic size. These metal particles enter the oil stream and are uniformly dispersed and suspended throughout the lubricating oil system. Spectroscopy detects the kinds and quantities of the different metallic particles in the sample. Analyses identify the wear-metal elements aiding in the determination of the rate of part wear and source of wear. Through scheduled sampling and testing of the oil from the mechanical system, abnormal wear levels can be easily detected. The worn parts can be repaired or replaced before they cause damage to the entire assembly or mechanical system.

Viscosity. Viscosity is the ‘rate of flow’ of lubricating fluid that can be affected by high temperatures, contamination, and aeration during service, which promotes oxidation. Oxidation, if allowed to continue, leads to increased viscosity and the formation of varnish and sludge. Viscosity decreases are usually attributed to fuel dilution or contamination by coolant. The viscosity of used lubricating fluids is determined by a viscometer. These readings may be compared to new oil viscosity specifications and provide an indication of used oil condition. When the lubricant viscosity in equipment no longer meets factory specifications, it may no longer be able to lubricate, cool, and protect the internal parts of a component.

Wear Metals. Minute metal particles produced by friction of internal moving parts in components, suspended in used oil or grease.

APPENDIX F

References

Required Publications

AR 750-1
Army Materiel Maintenance Policy

DA Pam 738-750
Functional Users Manual for the Army Maintenance Management System (TAMMS)

DA Pam 738-751
Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS-A)

Related Publications

AR 700-132
Joint Oil Analysis Program (JOAP)

TM 38-470
Storage and Maintenance of Army Prepositioned Stock Materiel

Prescribed and Related Forms

DA Form 2408-20
Oil Analysis Log (Prescribed in DA Pam 738-750 and DA Pam 738-751)

DA Form 3254-R
Oil Analysis Recommendation and Feedback (Prescribed in DA Pam 738-750 and DA Pam 738-751)

DD Form 2026
Oil Analysis Log (Prescribed in DA Pam 738-750 and DA Pam 738-751)

DD Form 314
Preventive Maintenance Scheduled and Record

--NOTES--

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army

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