TECHNICAL BULLETIN

CONVERSION OF AIRCRAFT TO FIRE RESISTANT HYDRAULIC FLUID

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CONVERSION OF AIRCRAFT TO FIRE RESISTANT HYDRAULIC FLUID

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1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Section I	1-1/1-2	1-1/1-2
Section II	2-1 thru 2-3/2-4	2-1 thru 2-3/2-4

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WASHINGTON, DC *2 May 1975*

CONVERSION OF AIRCRAFT TO FIRE RESISTANT HYDRAULIC FLUID

Section I. GENERAL

1-1. Introduction.

a. MIL-H-5606 is a petroleum base hydraulic fluid and is presently specified for use in most A my rotary wing and fixed wing aircraft. Because of its relatively low flashpoint (200°F), it has been considered a safety hazard. In an effort to remove the vulnerability of aircraft systems and related support equipment to accidental or combat-incurred fires, hydraulic fluid MIL-H-83282 has been developed as a directly interchangeable fluid which is significantly less susceptible to fire (flashpoint 400°F).

b. MIL-H-83282 consists of a synthetic hydrocarbon base and contains additives which provide superior anti-wear characteristics and inhibit oxidation and corrosion MIL-H-83282 has an operational high temperature limit of 400°F as compared to 275°F for MIL-H-5606. These factors should provide significantly improved reliability. Flashpoint, fire point, and spontaneous ignition temperatures of MIL-H-83282 exceed that of MILH-5606 by greater than 200°F, and tests show that MIL-H-83282 extinguishes itself when the external source of flame or heat is removed. MIL-H-83282 s compatible with all materials used in systems presently employing hydraulic fluid MIL-H-5606 and may be combined with the latter fluid with no adverse effect except a degradation of its fire-resistant properties. However, the presence of MILH-5606 in amounts exceeding 3 percent by volume will compromise the fire-resistant performance of MIL-H-83282. Although MIL-H-83282 exceeds the performance of MIL-H-5606 at normal temperatures, the viscosity of MIL-H-83282 increases at low temperatures, therefore use of MIL-H-83282 must be within the limitations set forth In Section IV of this technical bulletin.

1-2. Purpose.

The purpose of this TB is to provide instructions for converting hydraulic systems from MIL H-5606 to MIL-H-83282 hydraulic fluid. The TB also provides instructions for testing the hydraulic fluid in converted systems to determine the adequacy of flushing procedures.

1-3. Definitions.

For the purpose of this bulletin, the following definitions will apply:

a. Flashpoint. The lowest temperature at which the fluid will give off sufficient vapor to ignite momentarily when a flame is applied to the vapor.

b. Fire point. The lowest temperature at which the vapor given off will burn continuously after the source of ignition is removed.

c. Spontaneous ignition temperature. The temperature at which the fluid ignites without an external flame or spark.

d. Closed and/or dead end components. These are hydraulic components that are self contained and have little or no circulation of hydraulic fluid. These components may be a part of a basic hydraulic system but may be "closed" from the basic system until actuation of the component is required, (e.g., closed system, lag dampeners and shock struts; dead end component, cargo hook emergency release).

e. Viscosity. The measure of the resistance to flow of a liquid at specific temperatures

1-4. Report of Equipment Publication Improvements.

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Aviation Systems Command, ATTN: AMSAV-MMD, 4300 Goodfellow Blvd., St. Louis, MO 63120.

1-5. Scope.

a. This technical bulletin Is published to provide field personnel with specific instructions for initial conversion of Army aircraft and ground servicing equipment from MIL-H-5606 hydraulic fluid to MIL-H-83282, a fire resistant hydraulic fluid. Once conversion of aircraft Is complete, essential information from this TB will be Incorporated in the aircraft maintenance manuals, and this TB will be cancelled.

b. Deleted.

Section II. INITIAL CONVERSION OF HYDRAULIC SYSTEMS

2-1 Applications of MIL-H-83282.

The fire hazards of MIL-H-5606 are greatest in light control systems which are under high pressure and which have a relatively large volume of fluid. At the present time, only the following aircraft hydraulic systems and components will be converted from MIL-H-5606 to MIL-H-83282.

AIRCRAFT	APPLICATION
OH-58A	Flight Control System
UH-18B/D/H	Flight Control System Armament System M6 Additional Armament Systems for UH-IB, M16 and M21
UH-IC/M	Hydraulic Systems No. 1and 2 Armament System M6, 16, 21
AH-1 Series	Hydraulic Systems No. 1 and 2 Armament Turret System
CH-47 A/B/C	Flight Control Systems No. 1 and 2 Utility Hydraulic System
OV-I	Main Hydraulic System
UH-60A	Hydraulic Systems No. 1, 2, and 3
CH-54A	First Stage Hydraulic System, Second Stage Hydraulic System Utility Hydraulic System Cargo Hoist Hydraulic System
CH-54B	First Stage Hydraulic System Second Stage Hydraulic System Utility Hydraulic System

NOTE

CH-54B aircraft based in Alaska will retain MIL-H-5606. All CONUS based CH-54 aircraft will be converted to MI L-H-83282.

Servicing Equipment	
AF5, D5 Series, D6 MSU-I	Hydraulic dispensers and test stands will be converted to MIL-H-83282 to provide ground support to aircraft converted to MIL-H-83282.

2-2 Non-Applicability of MIL-H-83282.

The following components will retain MIL-H5606 hydraulic fluid. These components cannot be readily serviced by field personnel or have not been tested for MIL-H-83282. In the event that the temperature limitations in Section III are exceeded, field personnel will be unable to change these components from MIL-H-83282 back to Ml IL-H-5606.

AIRCRAFT	COMPONENT
UH-1 B/C/D/H/M	Stabilizer-bar dampers
AH-1 Series	Pylon dampers
CH-47 A/B/C	Lag dampeners Landing gear shock struts
OV-1	Propeller control system and landing gear pneudraulic struts
CH-54A/B	Landing Gear Shock Struts
	Rotor Brake System
	Main Rotor Blade Damper System

NOTE

CH-54B aircraft based in Alaska will retain MIL-H-5606. All CONUS based CH-54 aircraft will be converted to MIL-H-83282.

OH-6	Landing Gear Dampers Uni-lock
UH-60A	Landing Gear Struts, Wheel Brake System, Main Rotor Dampers

2-3. Availability of MIL-H-83282.

MIL-H-83282 may be obtained through normal supply channels using the following information:

NATIONAL STOCK NUMBER	UNIT OF ISSUE	SOURCE
9150-00-149-7431	Qt Can	S9G
9150-00-149-7432	Gal Can	
9150-00-180-6290	55-Gal Drum	

Because of its recent development, MIL-H-83282 has just recently been distributed in the Army Supply System. Initial stock supplies of MIL-H83282 are expected by the 4th Quarter of FY 75, and total conversion from MIL-H-5606 to MIL-H83282 will take approximately 1-1/2 years. Conversion of aircraft from MIL-H-5606 to MIL-H83282 should be based on availability of MIL-H83282 for conversion and follow on support.

NOTE

MIL-H-83282 must be of the latest revision which is dyed red. If the stock of MIL-H-83282 received is not dyed, return it; the red dye is needed to locate leaks.

NOTE

Since distribution of initial quantities of MIL-H-83282 will be limited to the activities listed in para 5-1, servicing of converted aircraft with MIL-H-83282 during cross country flight at stopover points may be impossible. To avoid mixing of MIL-H-5606 and MIL-H-83282, it is advisable to include a small supply of MIL-H-83282 on board the aircraft for servicing during cross country flights.

2-4. Conversion Procedures.

a. Perform conversion procedures at Direct Support or higher levels of maintenance unless otherwise directed by reference to a specific level of maintenance manual

b. The following procedures refer to a specific number of flushings prior to final servicing with MIL-H-83282. Numbers may be more or less depending upon the test in Section III. All flushings will be accomplished with MIL-H-83282 hydraulic fluid.

(1) OH-58A. Convert hydraulic flight control system in accordance with procedures in Appendix A.

(2) CH-47A/B/C. Hydraulic flight control systems No. 1 and No. 2, and the utility hydraulic system will be drained, and flushed one time, then filled with MIL-H-83282 in accordance with existing instructions in the Organizational Maintenance Manuals. Before flushing insure ground test stand has been serviced with MIL-H-83282. The closed and/or dead end components (e.g., lag dampeners and shock struts) will not be reserviced with MIL-H-83282: these items will retain MIL-H-5606 hydraulic fluid

(3) AH-1G/Q/S, Series/UH-1C/M. Convert the hydraulic systems on these aircraft in accordance with the instructions in Appendix B. The pylon dampers on the AH-1G and the stabilizer bar dampers on the UH-1C/M will re main serviced with MIIH-5606.

{4) UH-1B/D/H. Convert the hydraulic system on these aircraft in accordance with the instructions in Appendix C. The stabilizer bar dampers on the UH-1B/D/H will remain serviced with MIL-H-5606.

NOTE

Armament sub-systems utilized on the UH-1 and AH-1 aircraft may contain residual amounts of MIL-H-5606. When the hydraulic systems of these aircraft are converted to MIL-H-83282, it is important to remove all residual amounts of MIL-H-5606 remaining in these subsystems.

(5) OV-I. Convert the hydraulic system on these aircraft in accordance with the Instructions in Appendix G. The propeller control system and the pneudraulic struts will retain MIL-H-5606.

(6) CH-54A/B. Conversion of hydraulic systems on CH-54A/B will be In accordance with Special Service Instructions No. 168, Procedures for Converting Hydraulic Systems from MIL-H-5606 to MIL-H-83282, Fire Resistant Hydraulic Fluid for CH-54A/B Helicopters.

(7) Servicing Equipment. Convert the JD5 series hand D6 hydraulic test stands in accordance with instructions contained in Appendix D. Convert the MSU test stand in accordance with the instructions contained in Appendix E. Convert the AF5 hydraulic dispenser in accordance with the instructions contained in Appendix F.

NOTE

Determine adequacy of the conversion by hydraulic fluid samples tested in accordance with Section III, para 3, of this TB.

2-5. Servicing Components.

All components that require servicing with MtLH-6083 for storage and shipment will follow the procedures prescribed in the maintenance manuals. When components filled with MIL-H-6083 are received for installation on an aircraft containing MIL-H-5606, standard procedures for draining and servicing apply. When the aircraft has been converted to MIL-H-83282, the component must be drained, flushed and serviced with MIL-H-83282 for installation. Before installing a component that contains MIL-H-5606 personnel should determine what fluid the aircraft has. If the. aircraft has been converted to MIL-H-83282, the component must be drained, flushed and serviced with MIL-H83282 before installation.

2-6. Servicing Equipment.

a. Following conversion of hydraulic servicing equipment, annotate the appropriate historical maintenance records to reflect the change of hydraulic fluid. Boldly mark the equipment to alert field personnel that the equipment has been converted from MIL-H-5606 to MIL-H-83282. Stencil in lettering one inch high on the access panel to the fill point for the hydraulic fluid reservoir on test stand. Stencil dispensers on top of the tank. Use lusterless black lacquer, MIL-L-19538, shade No. 37038 to mark, equipment. The marking should include the following information: SERVICE ONLY WITH MIL-H-83282 HYDRAULIC FLUID. Paint over or delete any existing markings on converted equipment that pertain to MIL-H-5606 hydraulic fluid.

b. Because MIL-H-83282 hydraulic fluid is restricted by the temperature limitations in Section IV, operating units Should determine the number of servicing equipment and hydraulic dispensers to remain serviced with MIL-H-5606 hydraulic fluid. Consider temperature changes of the area and volume of aircraft.

2-7. Marking of Aircraft.

After an aircraft has been converted from MILH-5606 to MIL-H-83282 hydraulic fluid, annotate the aircraft maintenance records to reflect which systems and/or components have been converted. Stencil the fill point for the converted hydraulic system with lusterless black lacquer (MIL-L19538, Shade No. 37038) to indicate "Service with MIL-H-83282 above xx°F and MIL-H-5606 below xx°F." Use information in para 4-1 for specific temperatures.

2-8. Recording and Reporting.

Record and report accomplishment of this TB in accordance with the procedures prescribed in DA PAM 738-751. The following forms are applicable.

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

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

(3) DA Form 2407, Maintenance Request Form.

NOTE

Precautionary measures shall be taken to prevent hydraulic fluid waste from contaminating lakes and streams. Disposal of fluid shall be accomplished under the direction of the installation facility engineer and MEDDAC Health and Environment Activity in accordance with applicable directives, and in a manner that will not result in violation of local, state and federal pollution criteria. Guidelines for disposal are cited in AR 700-1 and TM 5-814-6.

AMCR 11-5 also contains technical assistance regarding the use of waste oils in heating plants. Disposal personnel should consult AMCR 11-5 for instructions covering treatment of hydraulic fluid waste oil. Because the temperature in oil burners exceeds 1000F, both MtL-H-5606 and MIL-H-83282 waste oil can be added to new fuel oil and used in heating plants. Disposal personnel should adhere closely to the guidelines set forth in AMCR 11-5 for the use of hydraulic fluid waste oil in heating plants.

If the facility-encounters difficulty in the disposal of waste. fluid, contact the General Materials and Petroleum Activity, New Cumberland Army Depot, ATTN: STSGP, New Cumberland, PA f7070.

Section III. SAMPLING AND TESTING

3-1. General.

Hydraulic fluid, MIL-H-83282 loses its fire resistant properties rapidly if it is diluted with more than 3 percent by volume of MIL-H-5606 hydraulic fluid. Mixing of the two hydraulic fluids requires determining the flash point of the resultant mixture. The flash point should be no lower than 3800F. This section covers sampling and testing procedures.

3-2. Sampling Techniques.

a. Methods of Sampling. Take fluid samples from hydraulic systems for flash point testing. Use one of the following methods:

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

(2) Drain the sample from the filter housing.

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

b. Preferred Method. The use of plastic flexible tubing for obtaining oil samples is the preferred method and will be used whenever possible. (See para 3-3.) The tube is used to take samples through the hydraulic system filler neck or through the dipstick hole. Samples obtained by this method are less likely to contain sludge and dirt than drain samples. The procedure is as follows:

(1) Obtain a sample bottle and sampling tube of proper length and diameter for each assembly.

(2) Remove the filler cap or dipstick from the hydraulic fluid reservoir.

(3) Place sample bottle cap on a clean surface with edges up to keep them clean.

(4) Cut both ends off sample tube if it has fused ends or remove protective end caps.

Carefully insert tubing into reservoir. Do not allow the tube to touch the sides or bottom of the reservoir when taking a sample. Fluid samples are taken from approximately the same depth in the reservoir each time.

CAUTION

Do not drop tubes or sampling equipment Into reservoir.

(5) Allow the tube to fill with fluid.

CAUTION

Do not use mouth suction.

(6) Place a finger over the top of the tube blocking the hole and withdraw the tube from the reservoir. The tube will be partially filled with fluid.

(7) Insert the bottom of the tube into the sample bottle, then release the fluid by removing the finger from the top of the tube.

(8) Repeat, until the fluid sample bottle is filled to a height of 2-1/2 inches from the bottom.

(9) Replace and tighten the cap on the sample bottle.

(10) Replace the tank filler cap or other access covering and discard the sampling tube.

c. Labeling. The following information should accompany the hydraulic fluid sample. Secure this information to the sample bottle with a rubber band.

(1) Type aircraft and serial number.

(2) Hydraulic system from which sample was taken.

(3) Date on which sample was taken.

(4) Return address and AUTOVON contact.

3-3. Where to Take Fluid Samples. The following table consists of information on how and where to sample components.

Aircraft	Components	How To Sample	Where to Sample
UH-1, AH-1	Hydraulic System(s)	15" x 3/8" tubing	Filler neck
OH-58	Hydraulic System	15" x 3/8" tubing	Filler neck
CH-47	Flight Control Systems (2)	15" x 3/8" tubing	Filler neck
	Utility Hydraulic System	Drain into sample bottle	Bleed valve of Utility hydraulic system return line
CH-54	First Stage System Second Stage System Utility System Cargo System	15" x 3/8" Tubing	Filler Neck
OV-1 UH-60A	Hydraulic System See TM 55-1520-237-23-4	15" x 3/8" tubing	Filler neck
Servicing Equipment	Hydraulic Test Stands	15" x 3/8" tubing	Filler neck

NOTE

If proper procedures are followed for conversion of hydraulic dispensers (app. F), there is no requirement of fluid sampling. If the presence of MIL-H-5606 is suspected in a converted system, a sample can be drawn by pressing the red button valve and draining the fluid into a sampling bottle.

3-4. Sampling Supplies.

a. Sampling Tubes. Sampling tubes are polyethylene tubes which have been sealed on both ends to prevent contamination. Size, source, and National Stock Numbers (NSN) are listed below. Tubes are issued in bags of 25.

NATIONAL STOCK NUMBER	SIZE	SOURCE
4710-00-933-4415	15" long x 3/8" OD	B-17

b. Sampling Bottle. The sampling bottle is a 4-oz, polyethylene, screw cap bottle. The National Stock Number and source are listed below.

NATIONAL STOCK NUMBER	TYPE	UNIT OF ISSUE	SOURCE
8125-00-174-0855	Polyethylene	Each	S9G

c. Sack, Shipping. The mailing bag is the air insulated sack listed below:

NATIONAL STOCK NUMBER	SIZE	UNIT OF ISSUE	SOURCE
8105-00-290-0340	6" x 10"	250 each per carton	GKO

3-5. Sampling Intervals.

a. Flash point testing is required after one hour of flight time, or one hour of engine ground time for aircraft with engine driven hydraulic pumps, or one hour of operation for ground support equipment, following initial conversion of hydraulic system from MIL-H-5606 to vMIL-H-83282. This testing is required to determine the adequacy of conversion procedures. Residual amounts of MIL-H-5606 may remain in the hydraulic system and lower the fire resistance of MIL-H-83282. If in an emergency it becomes necessary to add MILH-5606 to a hydraulic system already converted to MIL-H-83282. The flash point should be redetermined. Redetermine flash point on converted hydraulic system that is suspected of containing MI L-H-5606.

b. Any conversion procedure that requires circulation of hydraulic fluid from an aircraft that is being converted into a test stand that has been converted will require flash point testing of the fluid in the test stand.

NOTE

If any of the above tests result in a flash point of less than 380°F, drain the affected hydraulic system and reservice with MIL-H-83282.

3-6. Method of Testing.

Determine the flash point of hydraulic fluid samples by the Cleveland Open Cup Method. Directions for the Cleveland Open Cup Method are in the standards of the American Society for Testing and Materials (ASTM), Designation: ASTM D92. This method is also a standard of the Institute of Petroleum (IP), Designation: IP 36.

3-7. Testing Equipment.

a. Due to the large number of hydraulic fluid samples that will require flash point testing, it is recommended that aircraft installations acquire the flash point tester. By performing their own flash point testing, installations can avoid the time lag created when samples must be sent to outlying laboratories. Qualified personnel are needed to effectively perform the tests; that is, personnel familiar with handling procedures for chemical/ petroleum products (e.g. Military Occupational Specialty (MOS) 92C, Petroleum Lab Specialist).

b. The equipment required for testing by means of the Cleveland Open Cup Method may be obtained under NSN 6630-00-359-9787. The kit consists of the following items:

1 refractory board
1 gas burner test flame
1 thermometer clamp
1 platform cup
1 refractory disk
1 automatic heater with built-in autotransformer
1 thermometer hook
1 cast iron plate
1 thermometer, 20° to 760° F

c. In the event that an installation cannot obtain a flash point tester or does not have qualified personnel, hydraulic fluid samples should be forwarded to the facilities listed in para 3-8. As a final option these installations can contact the facilities listed in para 3-8 for the possibility of obtaining testing equipment and personnel on a loan basis.

3-8. Location of Testing Facilities.

When shipment of fluid samples are required, place sample bottles in the shipping sack described in para 3-4c, and air mail them to the nearest testing facility listed below:

Chief,
US Army General Materials and Petroleum Activity
Petroleum Field Office West
ATTN: SPSGP-PW
Sharpe Army Depot
Lathrop, CA 95330

Chief
US Army General Material and Petroleum Activity
Petroleum Field Office East
ATTN: STSGP-PE
New Cumberland Army Depot
New Cumberland, PA 17070

Director
Petroleum and Field Services Department
US Army Quartermaster School
ATTN: ATSM-TEX-PF
Ft. Lee, VA 23801

Commander
US Army Aviation Center
ATTN: ATZQ-DI-S
Ft. Rucker, AL 36360

Commander
260th QM Battalion
ATTN: Petroleum Mobile Lab
Ft. Stewart, GA 31313

Commander
Corpus Christi Army Depot
ATTN: AMXAD-QLD
Corpus Christi, TX 78419

Commander
101st Airborne Div
Air Fuel Surveillance Lab
Ft. Campbell, KY 42233

Commander
3rd Corp Lab
DIO
Ft. Hood, Texas 76544

Commander
US Army Japan
Okiiiawa Support Command
APO San Francisco 96331

Commander
US Army Depot, Thailand
ATTN: SATTAHIP-THAILAND
APO San Francisco 96233

Commander
US Army Petroleum Distribution System, Korea
APO San Francisco 96301

Commander
US Army, Alaska
ATTN: AFZI-DI-LQ(PETRO DIV)
Ft. Richardson, AK 99505
Commander
993 Quartermaster Detachment
Petroleum Products Lab Base
APO New York 09227

Commander
97 Quartermaster Battalion
Laboratories Section
APO New York 09035

Chief
Frankfurt Procurement Laboratory
ATTN. Chemical Laboratory
APO New York 09028

3-9. Laboratory Actions.

Laboratories will not report the test results of hydraulic fluid samples when the flash point is 380°F or above. Only when the flash point is below this value, will the laboratories advise the field. In this case, the field unit may submit another sample to confirm the flash point of the fluid in the affected system. After the second test, any flash point below 380°F requires reservicing of the affected hydraulic system. Simple drain and refill procedures will apply to systems with a flash point above 300°F. Any sample with flash point below 300°F requires reservicing of hydraulic system in accordance with Section II.

3-10. Status of Aircraft.

Do not ground aircraft while awaiting results from flash point tests unless other conditions warrant grounding of aircraft.

Section IV. COLD WEATHER OPERATION

4-1. Operating Temperature Limitations.

a. Although MIL-H-83282 operates well under normal temperatures, the viscosity of the fluid increases as the temperature decreases. Therefore, the following minimum ambient operating temperatures have been established for the use of M I L-H-83282.

Aircraft	Minimum Temperature
UH-1	-30° F -35° C
OH-58	-25° F -32° C
CH-47	-50° F -46° C
OV1	-40° F -40° C
AH-1	-50° F -46° C
CH-54	See note below
Servicing Equipment	
D5A,D5B,D6	-20° F -29° C
MSU-1	-25° F -32° C
AF5	-25° F -32° C
UH-60A	-40° F -40° C

NOTE

CH-54B aircraft based in Alaska will retain MIL-H-5606. All CONUS based CH-54 aircraft will be converted to MIL-H-83282.

The above temperatures are outside air temperatures (OAT), measured at ground level prior to engine start.

b. The above temperature limitations are based on a cold soak of the hydraulic fluid at low temperatures. Aircraft that are sheltered or preheated prior to engine start should not have any problems with stiff or sluggish flight controls. Unless the sheltered areas are at or below the above temperatures in para 4-1, the viscosity of MIL-H83282 will not create any difficulty. Once the aircraft is started and warms, the hydraulic fluid temperature should stabilize within normal operating limits.

4-2 Low Temperature Procedures.

a. If, at any time during low temperature operation, initial flight control movement is sluggish or stiff, cycling of the flight controls may alleviate the problem. Agitation of the fluid under pressure and radiant heat from engines and transmissions may warm MIL-H-83282 sufficiently to allow satisfactory operation of flight controls.

b. If the temperature drops below the limitations in para 4-1, and the procedures in para 42A are unsuccessful, follow procedures given below:

(1) OH-58A Drain the MIL-H-83282 hydraulic fluid from the flight control system, and service with MIL-H-5606.

(2) AH-1G Drain the MIL-H-83282 hydraulic fluid from hydraulic systems No. 1 and 2, and service with MIL-H-5606.

(3) UH-1 Drain the MIL-H-83282 hydraulic fluid from the hydraulic system(s) and service with MIL-H-5606.

(4) CH-47 Drain the MIL-H-83282 hydraulic fluid from the hydraulic systems and components, and service with MIL-H-5606.

(5) OV-1 Drain the MIL-H-83282 hydraulic fluid from the hydraulic system, and service with MIL-H-5606.

(6) UH-60A See TM 55-1520-237-23-4.

Section V. PRIORITY LOCATIONS FOR CONVERSION

5-1. Facilities.

The following facilities will be given priority during initial distribution of MIL-H-83282. These facilities have the highest density of aircraft, therefore, accidents and hydraulic fires are more likely to occur at these facilities:

Fort Rucker
Fort Hood
Fort Campbell
Fort Bragg
Fort Lewis
Overhaul Depots

5-2. Depots.

Depots that are overhauling aircraft should receive MIL-H-83282 to support converted aircraft coming through for overhaul. Aircraft that contain MIL-H-5606 will not be converted to MIL-H-83282 unless it can be determined that the aircraft being overhauled is going to one of the facilities listed in para 5-1 above, aircraft that are going to the listed facilities will be converted to MIL-H-83282 in accordance with this TB. This limitation for conversion to MIL-H-83282 will be in effect until sufficient quantities of MIL-H-83282 are distributed to all Army Aviation units to support converted aircraft. Overhaul of individual hydraulic components that are approved for use with MIL-H-83282 will be performed utilizing MIL-H-83282.

APPENDIX A
CONVERTING THE OH-58A HYDRAULIC SYSTEM FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

A-1. Following procedures in TM 55-1520-2282u, remove and clean in solvent the following parts of the hydraulic system:

a. Reservoir

b. Pump inlet hose

c. Pump outlet hose

d. Return hose from filter to reservoir

e. Pump case drain hose.

A-2. Remove and drain hydraulic pump by turning splined shaft by hand. Turn shaft until fluid no longer drains from pressure and return ports. Fill pump through return port with MIL-H-83282 and repeat the above procedures.

A-3. Cap or plug all openings.

A-4. Remove filter elements and reinstall filter bowl.

A-5. Connect ground test stand pressure line to quick disconnect at filter. Insure ground test stand has been serviced with MIL-H-83282.

A-6. Connect a hose to the return filter of sufficient length to reach a container overboard for contaminated fluid.

A-7. Start test stand and adjust pressure to 600 psi.

A-8. Cycle the collective full-up to full-down 10 times. With collective full-down, move the cyclic in a circle 10 times. When fluid appears clean, shut down test stand. Connect test stand return line to helicopter, start test stand, and cycle controls again a minimum of 10 times.

A-9. Remove test stand connections; install clean filter elements and all lines and components removed in step 1.

A-10. Fill hydraulic pump through return port with MIL-H-83282 and install pump.

A-11. Fill reservoir with MIL-H-83282.

APPENDIX B
CONVERTING THE AH-1G/UH-1C/M HELICOPTER HYDRAULIC SYSTEMS FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

B-1. Ground Servicing Equipment Required.

AH-1G/Q/S, series/UH-1C/M helicopter hydraulic systems from MIL-H-5606 to MIL-H-83282 hydraulic fluid.

B-2. Items to be Manufactured.

Drain line from ground test coupling (return) on the aircraft.

B-3. Removal of Components.

a. Disconnect the suction hose from the reservoir to the hydraulic pump, # 1 System, at the pump. Allow the fluid from the reservoir to drain into a receptacle. Repeat the above for the I# 2 system hydraulic pump.

NOTE

Drain the fluid from each system reservoir sump using the drain plugs at the bottom of the reservoirs,

b. Disconnect all remaining hoses at the pumps and remove the pumps. Drain all hydraulic hoses of fluid.

c. Remove filter elements (4) from the hydraulic modules. Clean and reinstall the bowls without the filter elements.

d. Discharge the accumulator and disconnect hose at the accumulator, loosen holdown nuts and remove accumulator. Drain hydraulic hose of fluid.

e. Disconnect and drain hydraulic hoses from main rotor servo cylinders (3).

f. Disconnect and drain hydraulic hoses from anti-torque servo cylinder.

B-4. Component Flushing.

a. To drain all hydraulic fluid from both hydraulic pumps turn the splined shaft while pump is inverted. Turn shaft until fluid no longer drains from pressure and return ports in the pump body. Fill pump through return port with MIL-H-83282 and repeat the above procedure with both pumps.

b. Disconnect the control tube from each control cylinder at the swashplate. Actuate the piston on each cylinder four full strokes to discharge residual fluid from the cylinder.

c. Disconnect the tail rotor servo at the control tube and actuate the piston four full strokes to discharge residual fluid from the cylinder.

d. Drain all hydraulic fluid from the emergency accumulator. Refill the accumulator with MIL-H-83282, slosh fluid and drain.

B-5. Component Replacement.

a. Install both hydraulic pumps. Fill pumps with MIL-H-83282 through the case drain port. Install all remaining hoses to the pumps.

b. Install pressure and return hoses to the hydraulic servo cylinders.

CAUTION

Do not Inter-connect hydraulic hoses from one cylinder to the other.

c. Connect control rods to the swashplates.

d. Install pressure and return hoses to the anti-torque servo cylinder. Connect the control rod to the piston rod.

e. Install the accumulator and hydraulic hose to the accumulator. Charge the accumulator with nitrogen.

B-6. Filling, Bleeding and Functional Testing.

Refer to Appendix D or E for specific instructions concerning conversion of ground servicing units.

a. Disconnect the return hose to the reservoir at the ground test coupling, #1 system, and allow the hose to drain.

b. Connect drain line to the ground test coupling and place unattached end in an open container.

c. Attach pressure hose from hydraulic ground servicing unit to ground test coupling (pressure) #1 system.

d. Bring hydraulic pressure to 1000 psi and meter hydraulic fluid into the aircraft hydraulic system while actuating the cyclic, collective, and

anti-torque controls. Turn on power to SAS and after lights go out switch on each individual cylinder. Leave switches on and actuate controls until fluid from drain line runs in an unbroken stream.

e. Turn off power to SAS and switch off individual cylinders. Relieve pressure from #1 system. Disconnect pressure hose and drain hose from ground test couplings. Connect return hose from reservoir to ground test coupling (return) and cap ground test coupling (pressure).

f. Disconnect the return hose to the reservoir at the ground test coupling, #2 system, and allow hose to drain. Connect drain hose to the coupling and place unattached end of the hose in an open container.

g. Connect pressure hose from ground service unit to the ground test coupling (pressure) #2 system.

h. Bring hydraulic pressure to 1000 psi and meter hydraulic fluid into the aircraft hydraulic system while actuating cyclic, collective, and SAS system, (activate SAS system as indicated in paragraph B-6d). Activate armament system by putting battery switch in the "ON" position, inverter switch "ON", master arm switch "SAFE" and the turret selector "Gunner." Flush until fluid from drain line runs in an unbroken stream.

i. Secure the SAS and armament systems. Relieve the pressure from the #2 system and remove the pressure and drain hoses from the ground test couplings. Connect the return line from the reservoir to the ground test coupling and cap the ground test coupling (pressure).

j. Remove filter bowls, clean bowls, install new or cleaned filter elements and reinstall filter bowls.

k. Fill both reservoirs with MIL-H-83282 hydraulic fluid.

l. Accomplish a final filling and bleeding during engine run at flight idle.

APPENDIX C
CONVERTING THE UH-1BI/D/H HELICOPTER HYDRAULIC SYSTEMS FROM MIL-H-S606 TO MIL-H-U83282 HYDRAULIC FLUID

C-1. Ground Servicing Equipment Required.

a. Hydraulic Ground Service Unit, P/N NSU-1 or D-5.

C-2. Items to be Manufactured.

a. Drain line from ground test coupling (return) on aircraft.

C-3. Removal of Components.

a. Disconnect all lines to the hydraulic pump and allow lines to drain.

Plug all lines after draining, disconnect and remove the hydraulic pump from the aircraft.

b. Remove the filter element from the hydraulic module and allow module to drain. Clean and reinstall the filter bowl without the filter element.

C-4. Component Flushing.

a. To flush hydraulic fluid from the hydraulic pump, turn the splined shaft by hand while pump is inverted until fluid no longer drains from the pressure and return ports in the pump. Fill pump through return port with MIL-H-83282 and repeat the above procedure.

b. Disconnect all hydraulic lines to the main rotor servos at the servo cylinders. Drain all lines.

c. Disconnect all hydraulic lines to the tail rotor servo at the servo cylinder. Drain all lines. Disconnect the tail rotor servo cylinder at the control tube and actuate the piston four full strokes to discharge residual fluid from the cylinder.

d. Disconnect lines to ground test couplings, (both sides of the firewall) drain lines and reconnect lines to the couplings.

C-5. Component Replacement.

a. Install hydraulic pump. Fill pump with MIL-H-83282 hydraulic fluid through the case drain port and reconnect all hydraulic lines to the pump.

b. Install pressure and return lines to the main rotor servo cylinders.

CAUTION

Do not interconnect hydraulic hoses from one cylinder to the other.

c. Install pressure and return lines to the tail rotor servo cylinder and reconnect the control rod to the piston.

NOTE

Do not reinstall filter element at this time.

C-6. Filling, Bleeding and Functional Testing.

Refer to Appendix D or E for specific instructions concerning conversion of ground servicing units.

a. Disconnect the return hose to the reservoir at the ground test coupling and allow to drain.

b. Connect the drain line to ground test coupling (return) and place unattached end into a two gallon open container or a container marked to indicate a two (2) gallon level.

c. Attach pressure hose from hydraulic ground servicing unit to the ground test coupling (pressure) on the aircraft.

d. Bring hydraulic pressure to 1000 psi and meter hydraulic fluid into the hydraulic system while actuating the cyclic, collective and anti-torque controls.

NOTE

Use two men, if necessary, to actuate all controls simultaneously.

e. Observe flow of hydraulic fluid from the drain line into the two gallon container until container is full.

f. Relieve pressure at ground test unit, remove pressure line from aircraft and secure hydraulic service unit. Cap ground test coupling (pressure) on aircraft.

g. Remove drain line from ground test coupling (return) and connect the return line from the reservoir to the ground test coupling.

h. Install a clean filter element. Torque and safety wire the filter bowl.

i. Fill reservoir to overflow using MIL-H-83282 hydraulic fluid.

i. Bleed and operational check the hydraulic system I/A/W TM 55-1520-210-23-2, Chapter 7, page 7-9, paragraph 7-6 a and b.

APPENDIX D
CONVERTING THE D-5 AND D-6 HYDRAULIC TEST STANDS FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

D-1. Open main reservoir drain valve, and drain all MIL-H-5606 hydraulic fluid. Close drain valve.

Fill reservoir with six gallons of MIL-H-83282 hydraulic fluid.

D-2. Open reservoir shut-off valve.

D-3. Open high pressure gage shut-off valve.

D-4. Close bypass valve.

D-5. Remove quick disconnect fitting for one inch return hose from stand, and allow all fluid in the line to drain. Install the quick disconnect fitting.

D-6. Open the 1/2 inch and 3/4 inch flow control valves.

D-7. Connect the 1/2 inch and 3/4 inch hoses to their respective quick disconnect fittings on the test stand. Remove the quick disconnect fittings from the free end of the hose assemblies and insert the free ends into the fill neck of the reservoir.

D-8. Drain all fluid from the low and high pressure filters.

D-9. Start the test stand, and set the volume control for five gallons per minute. Operate the test stand for ten minutes. During this period, switch the flow control valve back and forth between the 1/2 inch and 3/4 inch outlets at one minute intervals.

D-10. Open the bypass valve. Close the 1/2 inch and 3/4 inch flow control valves. Operate the stand for one minute.

D-11. Close the bypass valve for 10 seconds to force oil past the relief valve. Re-open the bypass valve.

D-12. Shut down the stand.

D-13. Drain the reservoir and refill with six gallons of MIL-H-83282.

D-14. Repeat steps D-2 thru D-12.

D-15. Drain reservoir and refill with MIL-H83282.

APPENDIX E
CONVERTING THE MSU-1 MOBILE SUPPORT UNIT FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

E-1. To drain pressurized fluid from accumulator open the hand pump bypass valve as shown in TM 55-1730-216-14, para 3-4(d), page 38 and allow the accumulator fluid to return to the reservoir. Close the bypass valve after fluid has passed to the reservoir.

E-2. To drain reservoir. open drain valve at bottom.

E-3. Drain hydraulic system components as shown in TM para 2-1(9)(b), page 33.

E-4. Drain high pressure filter, pump case filter, and start system filter.

E-5. Reassemble filters, replace all plugs and caps removed per para E-3, and close reservoir drain valve.

E-6. Fill reservoir with 10 gallons of MIL-H-83282 hydraulic fluid.

E-7. Refill high pressure pump case per TM para 2-1(9)c, NOTE, page 33.

E-8. Place reservoir selector valve in "SERVICE UNIT RESERVOIR" mode.

E-9. Connect pressure hoses and fill hose and flushing manifold to test stand ref TM para 3-18, page 41. Open fill hose shut off valve.

E-10. Use hand pump, to pump the accumulator up to at least 2000 psi.

E-11. Set pump volume control for maximum, depress start handle and hold until oil appears in the sight tube ref TM para 3-7, page 39.

E-12. Pump the accumulator up to at least 2000 psi.

E-13. Start unit as shown in TM paras 3-9 and 310. NOTE Do not use buddy start system during flushing procedures.

E-14. Perform steps specified in TM para 3-18, Preparation for Hydraulic Service. Set volume control for 10 gallons per minute and compensator for 1500 psi.

E-15. Close high pressure bypass valve, open flushing manifold valve, and operate the stand for five minutes in the flushing mode.

E-16. Close flushing manifold valve. Operate stand in this mode for 30 seconds. Open high pressure bypass valve. Operate stand in this mode for one minute.

E-17. Prepare stand for propulsion mode as shown in TM para 3-30, page 43, do not engage drive pins. Operate stand with control lever on tongue in full forward position for two minutes, then in full reverse position for two minutes.

E-18. Return propulsion selector valve to HYDRAULIC OUTPUT position.

E-19. Shut down stand.

E-20. Repeat steps E-1 thru E-19 twice.

E-21. Drain stand see steps E-1 thru E-5. Refill reservoir with 15 gallons of MIL-H-83282 hydraulic fluid.

E-22. Refill high pressure pump case per step E7.

E-23. Circulate fluid through stand as shown in steps E-10 and E-11.

APPENDIX F
CONVERTING THE AF-5 HYDRAULIC FLUID DISPENSER FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

F-1. Open the valve at the outer end of the hose and bleed off all remaining hydraulic fluid in the dispenser, then close the valve.

F-2. Open the bleeder valve located under the pressure gauge. DO NOT TAMPER WITH THE PRESSURE RELIEF VALVE. This bleeder valve drains the bladder air cavity. When all air stops coming from the bladder bleeder valve, thus indicating that the bladder is deflated, close the bleeder valve.

F-3. Release the air pressure in the oil cavity of the tank by pressing the red tank air drain button. When the pressure gauge reads zero and no further air flows from the button valve,-remove the filler cap.

F-4. Remove the entire hose assembly and allow the hydraulic fluid remaining in the dispenser to drain through the opening in the bottom of the dispenser. Allow the dispenser to drain for one hour.

F-5. Reassemble the dispenser and pour up to five gallons of hydraulic fluid into the tank through the filler cap. Replace the filler cap and tighten with wrench.

F-6. Inflate bladder through the air valve located under the pressure gauge to 10 psi.

F-7. Bleed all trapped air from the fluid cavity by pressing the red button valve and holding it until a clear stream of hydraulic oil ejects.

F-8. Inflate bladder through air valve under pressure gauge until the pressure relief valve opos. Do not exceed 50 psi. Recharge the bladder as required.

F-9. Stencil the dispenser as described in para 26 of this TB to reflect the conversion from MIL-H5606 to MIL-H-83282.

APPENDIX G
CONVERTING THE OV-1 AIRCRAFT HYDRAULIC SYSTEMS FROM MIL-H-5606 TO MIL-H-83282 HYDRAULIC FLUID

G-1. Place the aircraft on jacks.

G-2. Drain the hydraulic fluid (MIL-H-5606) at the reservoir.

G-3. Use a D6A hydraulic mule serviced with MIL-H-83282 with a flash point of 410°F (210°C) to service the aircraft hydraulic system.

G-4. Disconnect the discharge line at the number I engine hydraulic pump and attach the discharge line from the D6A.

G-5. Flush the discharge line with 2 quarts (1.89 liters) of MIL-H-83282 fluid. Disconnect the D6A discharge line.

G-6. Disconnect the number 2 engine hydraulic pump discharge line and attach the D6A discharge line.

G-7. Flush the discharge line with 2 quarts (1.89 liters) of MIL-H-83282 fluid. Disconnect the D6A discharge line.

G-8. Attach the D6A discharge line to the pressure line at the reservoir and flush all hydraulic systems (with the exception of the brake system). The following table indicates the system, number of actuations, and amount of hydraulic fluid used.

SYSTEM	NO. OF ACTUATIONS	HYDRAULIC FLUID USED
Pump discharge lines	-	4 quarts (3.78 liters)
Landing gear	5	16 quarts (15 liters)
Speed brakes	5	& quarts (7.6 liters)
Nose steering	5	4 quarts C3.8 liters)
Flaps	5	2 quarts (1.89 liters)
Ailerons	5	2 quarts (1.89 liters)
Brake, right	-	4 quarts (3.7 liters)
Brake, left	-	4 quarts (3.7 liters)
Windshield wipers	-	1 quart (0.94 liter)
Suction lines	-	4 quarts (3.8 liters)
Total		49 quarts (46.10 liters) I

G-9. After all systems are flushed, disconnect the D6A discharge line from the pressure line at the reservoir.

G-10. Fill the reservoir with MIL-K 83282 hydraulic fluid. Motor each engine to clean up the suction lines to the hydraulic pumps.

G-11. Reconnect the number 1 and number 2 engine hydraulic pump discharge lines.

G-12. Bleed the right and left brakes at the wheel cylinder bleed ports.

G-13. Remove the aircraft from the jacks.

APPENDIX H

REFERENCES

DA PAM 738-751	Functional users Manual for the Army Maintenance Management System-Aviation (TAMMS-A)
TM 55-1510-204-35	DS, GS, 3rd Depot Maintenance Manual: OV-1 Aircraft
TM 55-1520-209-23	Organizational Maintenance Manual: Army Model CH-47A Helicopter
TM 55-1520-228-20	Organizational Maintenance Manual: Army Model OH-58A Helicopter
TM 55-1520-227-23	Organizational Maintenance Manual: Army Model CH-47B, CH-47C Helicopter
TM 55-1730-216-14	Operator, Organizational, Direct Support and General Support Maintenance: MSU-1
TM 55-1520-237-23-4	UH-60A Servicing/Ground Handling

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