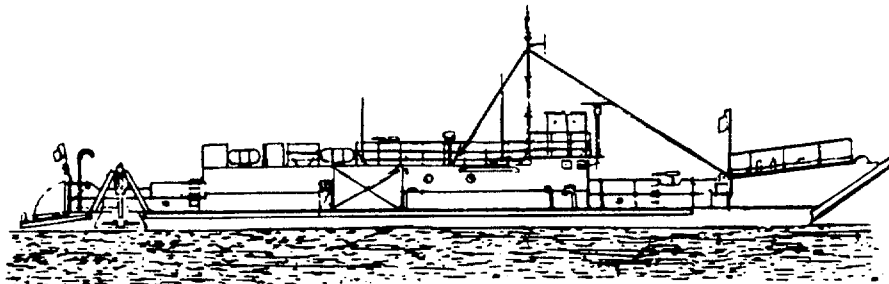


TECHNICAL MANUAL
OPERATOR'S ORGANIZATIONAL,
DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE MANUAL

OPERATOR/CREW
MAST-CENTRALIZED HYDRAULIC SYSTEM-
STEERING SYSTEM
ANCHOR HANDLING SYSTEM
MAINTENANCE INSTRUCTIONS

LANDING CRAFT UTILITY
LCU 1671 1679
NSN 1905-01-009-1056



* This manual supersedes TM 55-1905-220-14-7, 19 September 1980

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 MAY 1984

TECHNICAL MANUAL

NO. 55-1905-220-14-7

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 May 1984

OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT, AND GENERAL
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, ATTN: DRSTR-MPS, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished directly to you.

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CHAPTER 3 (Continued)**SECTION V. MAINTENANCE PROCEDURES (Cont)**

3-171. PISTONS, CONNECTING RODS, AND CYLINDER LINERS.

The following is an index to the piston connecting rods and cylinder liner maintenance instructions:

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Piston	3-171.1
Connecting Rods	3-171.2
Connecting Rod Bearings	3-171.3
Cylinder Liner	3-171.4

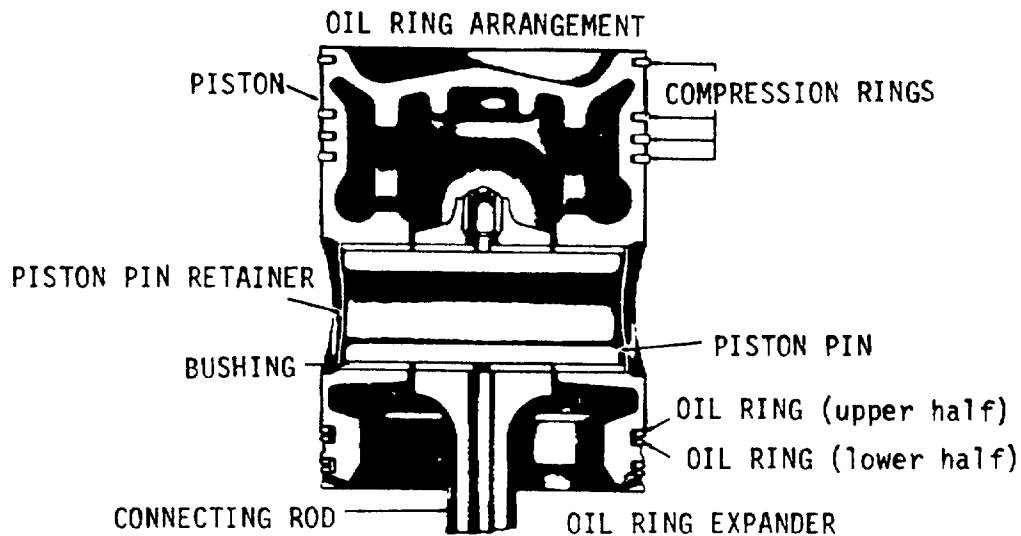
3-171.1. PISTON - MAINTENANCE INSTRUCTIONS.

a. The trunk-type malleable iron piston is plated with a protective coating of tin which permits close fitting, reduces scuffing and prolongs piston life. The top of the piston forms the combustion chamber bowl and is designed to compress the air into close proximity to the fuel spray.

b. Each piston is internally braced with fin-shaped ribs and circular struts, scientifically designed to draw heat rapidly from the piston crown and transfer it to the lubricating oil spray to ensure better control of piston ring temperature.

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Continued).

c. The piston is cooled by a spray of lubricating oil directed at the underside of the piston head from a nozzle in the top of the connecting rod, by fresh air from the blower to the top of the piston and indirectly by the water jacket around the cylinder.



d. Each piston is balanced to close limits by machining a balancing rib, provided on the inside at the bottom of the piston skirt.

e. Two bushings, with helical grooved oil passages, are pressed into the piston to provide a bearing for the hardened, floating piston pin. After the piston pin has been installed, the hole in the piston at each end of the pin is sealed with a steel retainer. Thus, lubricating oil returning from the sprayed underside of the piston head and working its way through the grooves in the piston pin bushings, is prevented from reaching the cylinder walls.

f. Each piston is fitted with compression rings and oil control rings. Eight equally spaced drilled holes just below each oil control ring groove permit excess oil, scraped from the cylinder walls, to return to the crankcase.

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Continued).

- 9. When an engine is hard to start, runs rough or lacks power, worn or sticking compression rings may be the cause. Replacing the rings will aid in restoring the engine to normal.
 - h. The compression rings may be inspected through the ports in the cylinder liners after the air box covers have been removed. If the rings are free and are not worn to the extent that the plating or grooves are gone, compression should be within operating specifications.
 - i. Excessively worn or scored pistons, rings or cylinder liners may be an indication of abnormal maintenance or operating conditions which should be corrected to avoid a recurrence of the failure. The use of the correct types and proper maintenance of the lubricating oil filters and air cleaners will reduce to a minimum the amount of abrasive dust and foreign material introduced into the cylinders and will reduce the rate of wear.
 - j. Long periods of operation at idle speed and the use of improper lubricating oil or fuel must be avoided, otherwise a heavy formation of carbon may result and cause the rings to stick.
 - k. Keep the lubricating oil and engine coolant at the proper levels to prevent overheating of the engine.

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).**This task covers:**

- | | | |
|-------------------|---------------|-----------------|
| a. Pre-Inspection | d. Cleaning | f. Reassembly |
| b. Removal | e. Inspection | g. Installation |
| c. Disassembly | | |

INITIAL SETUP:Test Equipment

Feeler gage

References

None

Special Tools

Assembly tool piston
ring J8128
Pump, hand
NSN 4930-00-263-9886
Installer and remover
piston and connecting
rod bushings-J1513-02
(part J7032 and J7632

Equipment

<u>Condition</u>	<u>Condition Description</u>
<u>Paragraph</u>	

3-163	Oil Pan Removal
3-164	Cylinder Head Removal
3-169	Lube Oil Pump Removal
3-170	Oil Inlet Pipe Removal

Material/Parts

Cylinder kit
P/N 5149265

Special Environmental Conditions

Do not drain oil into bilges.
Use the oil/water separation and recovery system to
collect drained oil.

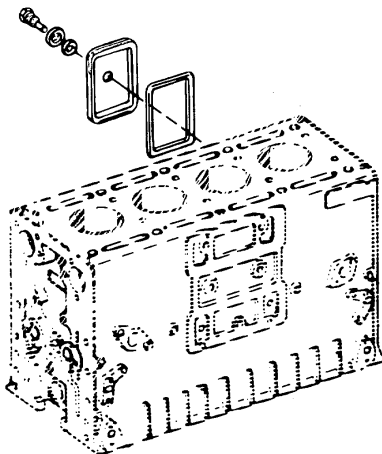
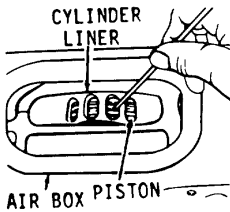
Personnel Required

2

General Safety Instructions

Observe WARNING in procedure.

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

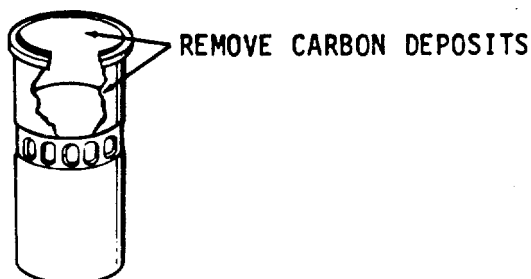
LOCATION	ITEM	ACTION	REMARKS
PRE-INSPECTION			
1. Piston compression rings	a. Air box covers	Remove screws, flat-washers, lockwashers, covers, and gaskets.	Discard gaskets.
	b. Cylinder liners	Check that piston rings are free, and are not worn to the extent that plating or grooves are gone.	
 			
REMOVAL			
2. Piston and connecting rod	a. Cooling system	Drain.	
	b. Oil pan	1. Remove oil.	Pump oil into a suitable container.
		2. Remove pan.	Refer to paragraph 3-163.
	c. Oil inlet pipe	Remove.	Refer to paragraph 3-170.
	d. Lube oil pump	Remove.	Refer to paragraph 3-169.

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REMOVAL (Cont)

- | | | | |
|----|----------------|---|---------------------------|
| e. | Cylinder head | Remove. | Refer to paragraph 3-164. |
| f. | Cylinder liner | 1. Remove the carbon deposits from the upper inner surface of the cylinder liner. | |



2. Use a ridge cutter to remove any ridges in the cylinder liner at the top of the piston ring travel.

NOTE

Move the piston to the bottom of its travel and place a cloth over the top of the piston to collect the cuttings. After the ridge has been removed, turn the crankshaft to bring the piston to the top of its stroke and carefully remove the cloth with the cuttings.

- | | | |
|----|---|---------|
| g. | Nut (1), bearing cap (2), and lower bearing shell (3) | Remove. |
|----|---|---------|

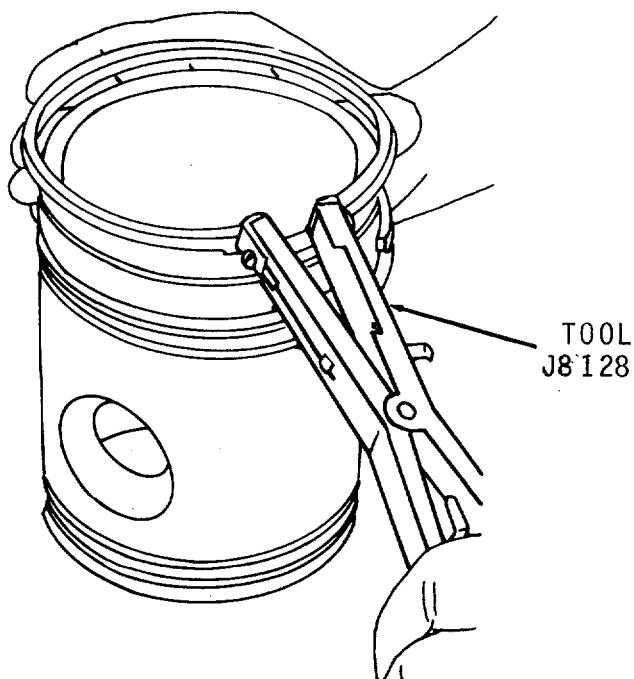
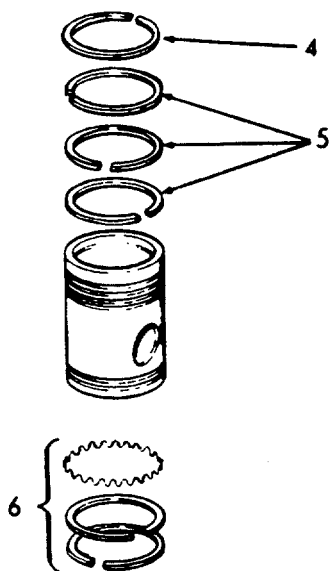
3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REMOVAL (Cont)			
	h. Piston and connecting rod assembly	Push the piston and rod assembly out thru the top of the cylinder block.	The piston cannot be removed from the bottom of the cylinder block.
	i. Lower bearing shell (3), bearing cap (2), and nuts (1)	Reassemble to connecting rod.	



3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
DISASSEMBLY			
3. Piston and Connecting rod	a. Piston and connecting rod assembly	Place connecting rod in a vise with soft jaws.	
	b. Ring (compression fire) (4)	Remove.	Use tool J8128.
	c. Rings (compression) (5)	Remove three rings.	Use tool J8128.
	d. Oil rings (6)	Remove.	Use tool J8128.

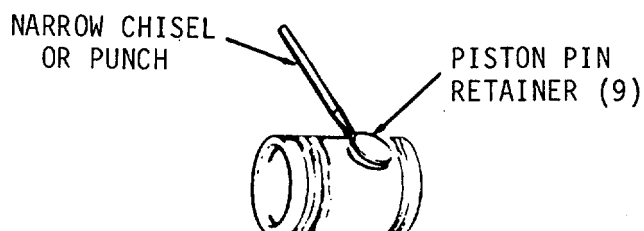


3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

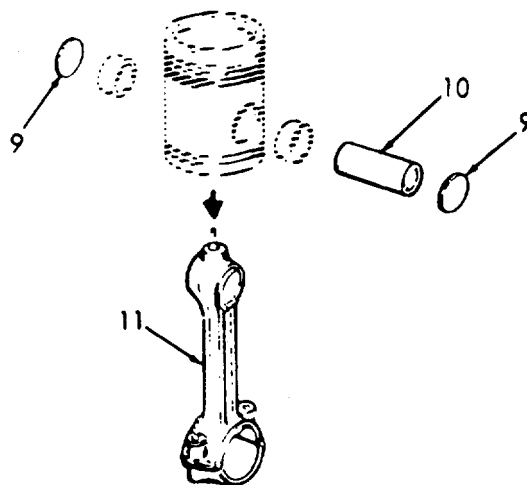
LOCATION	ITEM	ACTION	REMARKS
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DISASSEMBLY (Cont)

- | | | | |
|----|-------------------------|--|--|
| e. | Piston pin retainer (9) | Punch a hole thru the center of one of the piston pin retainers with a narrow chisel or punch, and pry the retainer from the piston. | Be careful not to damage the piston or bushings. |
|----|-------------------------|--|--|



- | | | | |
|----|--------------------------|-------------------------------|-------------------------------------|
| f. | Piston pin (10) | Remove. | |
| 9. | Connect-
ing rod (11) | Remove. | |
| h. | Piston pin retainer (9) | Drive out remaining retainer. | Use a brass rod or a suitable tool. |



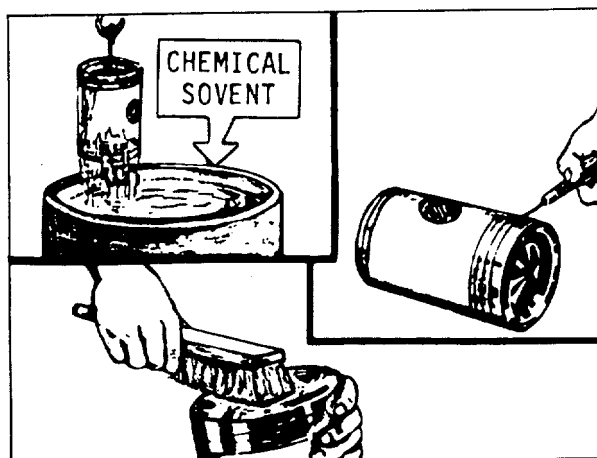
3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
CLEANING			

WARNING

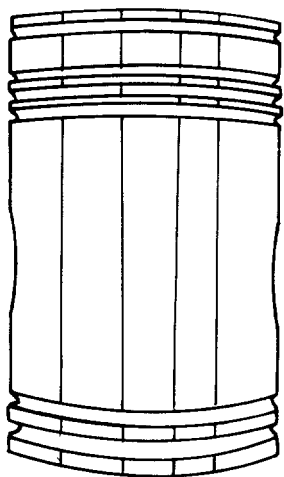
Wear protective eye goggles when using compressed air.

4. Piston components
 - a. Clean the piston components with fuel oil and dry them with compressed air. If fuel oil does not remove the carbon deposits, use a chemical solvent that will not harm the piston pin bushings or the tin-plate on the piston.
 - b. The upper part of the piston, including the compression ring lands and grooves, is not tin-plated and may be wire-brushed to remove any hard carbon. However, use care to avoid damage to the tin-plating on the piston skirt. Clean the ring grooves with a suitable tool or a piece of an old compression ring that has been ground to a bevel edge.
 - c. Clean the inside surfaces of the piston and the oil drain holes in the piston skirt. Exercise care to avoid enlarging the holes while cleaning them.

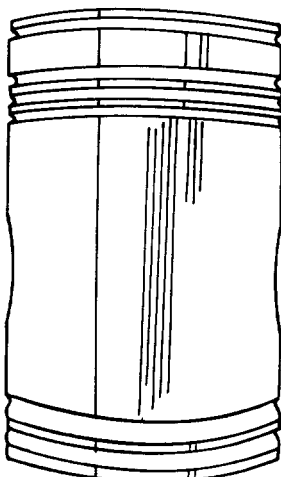


3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

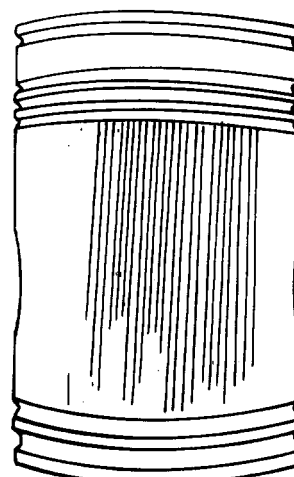
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
5. Piston	a.	If the tin-plate on the piston and the original grooves in the piston rings are intact, it is an indication of very little wear.	
	b.	Examine the piston for score marks, cracks, damaged ring groove lands or indications of overheating. A piston cleaned up may be reused. Any piston with light score marks which can be that has been severely scored or overheated must be replaced. Indications of overheating or burned spots on the piston may be the result of an obstruction in the connecting rod oil passage.	
	c.	Replace the piston if cracks are found across the internal struts. Use the magnetic particle inspection method for locating cracks in the piston.	



**THIS PISTON SUITABLE FOR
INSTALLATION AS IS**



**SLIGHTLY SCORED, USE ONLY
AFTER REMOVING SCORE MARKS
BY POLISHING WITH CROCUS
CLOTH OR HARD INDIA STONE**



**BADLY SCORED UNFIT
FOR USE**

3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
6.	Cylinder liner and block Bore	Check the cylinder liner and block bore for excessive out-of-round, taper, or high spots which could cause failure of the piston.	Refer to paragraph 3-171.4 .
7.	Connecting rod, and piston pin	Inspect.	Refer to paragraph 3-171.2 .
8.	Piston pin bushing	Inspect and measure the piston pin bushings. The piston pin-to-bushing clearance with new parts is .0025 to .0034 inch (0.0064 to 0.0086 cm). A maximum clearance of .010 inch (0.025 cm) is allowable with worn parts. The piston pin bushings in the connecting rod are covered in paragraph 3-171.2.	
9.	Other	Other factors that may contribute to piston failure include oil leakage into the air box, oil pull-over from the air cleaner, dribbling injectors, combustion blow-by, and low oil pressure (dilution of the lubricating oil).	

REASSEMBLY**CAUTION**

Do not remove the bushings from the piston. They are not serviced separately.

10. Piston	a. Piston and cylinder liner fitting	1. Measure the piston skirt diameter lengthwise and crosswise of the piston pin bore. Measurements should be taken at a room temperature of 70°F (21°C). The taper and out-of-round must not exceed .0005 inch (.0013 cm).
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3-171.1. PISTON - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REASSEMBLY (Cont)

Refer to the Table for
piston diameter speci-
fications.

ENGINE PARTS (Standard Size, New)	MINIMUM (inches) (cm)	MAXIMUM (inches) (cm)	LIMITS (inches) (cm)
Piston:			
Height (centerline of			
bushing to top).....	3.5430	8.9992	3.5480 9.0119
Diameter(above compres- ..			
sion rings).....	4.2225	10. 7252	4.2255 10.7328
Diameter (at skirt).....	4.2428	10.7767	4.2450 10.7823
Clearance--piston skirt-.....			
to-liner	.0045	.0114	.0083 .0211 .0120 .0305
Out-of-round			.0005 .0013
Taper.....			.0005 .0013
Compression rings:.....			
Gap (top-fire ring).....	.0230	.0584	.0380 .0965 .0600 .1524
Gap (No. 2, 3 and 4).....	.0180	.0457	.0430 .1092 .0600 .1524
Clearance--ring-to-groove: ..			
No. 1 (top -f i re			
ring).....	.0040	.0102	.0070 .0178 .0180 .0457
No. 2	.0100	.0254	.0130 .0330 .0220 .0559
No. 3 and 4.....	.0040	.0102	.0070 .0178 .0130 .0330
Oil control rings:			
Gap	.0080	.0203	.0230 .0584 .0430 .1092
Clearance	.0015	.0038	.0055 .0140 .0080 .0203

2. A new cylinder liner has an inside diameter of 4.2495 to 4.2511 inch (10.7937-10.7978 cm). Piston-to-liner clearance, with new parts, will vary with the particular piston diameter. A maximum clearance of .012 inch (0.030 cm) is allowed with used parts.