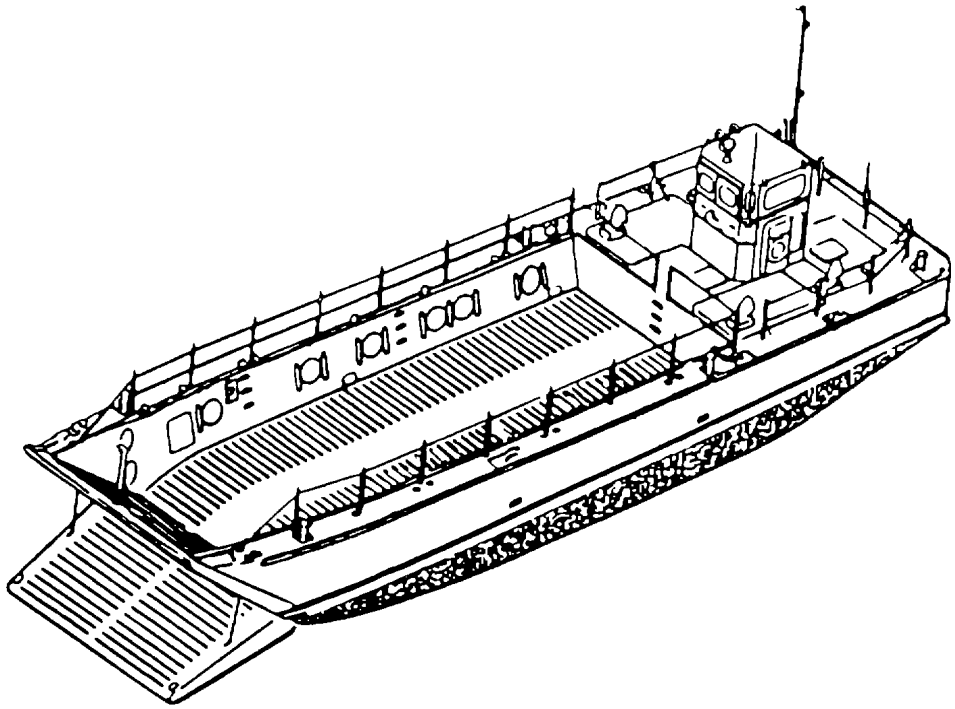
TECHNICAL MANUAL

OPERATOR, UNIT AND INTERMEDIATE (DIRECT AND GENERAL SUPPORT) MAINTENANCE MANUAL

LANDING CRAFT, MECHANIZED STEEL, DED, OVERALL LENGTH 74 FEET,

MOD 1, MARK VIII, NAVY DESIGN LCM-8

HULL NUMBERS 8500 THROUGH 8519 (MARINETTE MARINE CORP.)
NSN 1905-01-169-0938



INTRODUCTION
PAGE 1-1

OPERATING INSTRUCTIONS
PAGE 2-1

OPERATOR MAINTENANCE
PAGE 3-1

UNIT MAINTENANCE MAINTENANCE
PAGE 4-1

INTERMEDIATE DIRECT SUPPORT MAINTENANCE
PAGE 5-1

INTERMEDIATE GENERAL SUPPORT MAINTENANCE
PAGE 6-1

APPENDIXES

Approved for public release, distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

30 June 1989

TECHNICAL MANUAL
55-1905-221-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 June 1989

OPERATOR, UNIT, AND INTERMEDIATE DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL

LANDING CRAFT, MECHANIZED:
STEEL: DED: OVERALL LENGTH 74 FEET
MOD 1, MARK VIII, NAVY DESIGN LCM-8
HULL NUMBERS 8500 THROUGH 8519 (MARINETTE MARINE CORP.)
NSN 1905-01-169-0938

Approved for public release; distribution is unlimited.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake 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. AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798 A reply will be furnished directly to you.

TABLE OF CONTENTS

Page

CHAPTER 1 INTRODUCTION

Section I. General Information 1-1

Section II. Equipment Description and Data 1-5

Section III. Technical Principles of Operation 1-39

CHAPTER 2 OPERATING INSTRUCTIONS

Section I. Description and Use of Operator's Controls and Indicators..... 2-1

Section II. Preventive Maintenance Checks and Services. 2-25

TABLE OF CONTENTS (Continued)

Page

Section III. Operation Under Usual Conditions. 2-44
Section IV. Operation Under Unusual Conditions. 2-54
Section V. Operation of Auxiliary Equipment. 2-58

CHAPTER 3. OPERATOR MAINTENANCE INSTRUCTIONS

Section I. Lubrication Instructions 3-1
Section II. Troubleshooting 3-2
Section III. Maintenance Procedures 3-5

CHAPTER 4. UNIT MAINTENANCE INSTRUCTIONS

Section I. Repair Parts, Special Tools, TMDE, and Support Equipment 4-2
Section II. Service Upon Receipt of Material 4-3
Section III. Troubleshooting 4-5
Section IV. Maintenance Procedures 4-21

CHAPTER 5. INTERMEDIATE DIRECT SUPPORT MAINTENANCE PROCEDURES

Section I. Repair Parts, Special Tools, TMDE and Support Equipment 5-1
Section II. Troubleshooting 5-3
Section III. Maintenance Procedures 5-16

CHAPTER 6. INTERMEDIATE GENERAL SUPPORT MAINTENANCE PROCEDURES

Section I. Repair Parts and Special Tools 6-1
Section II. Troubleshooting 6-1
Section III. Maintenance Procedures 6-17

APPENDIX A REFERENCES A-1
APPENDIX B MAINTENANCE ALLOCATION CHART B-1
APPENDIX C COMPONENTS OF END ITEMS AND BASIC ISSUE ITEMS LIST C-1
APPENDIX D EXPENDABLE SUPPLIES AND MATERIAL LIST D-1
FOLD OUTS WIRING DIAGRAMS FP-1/FP-2

INDEX INDEX-1

LIST OF ILLUSTRATIONS

Figure	Title	
1-1	Location and Description of Major Components	1-6
1-2	Engine Arrangement	1-39
1-3	Crankshaft Rotation	1-40
1-4	Engine Fuel System	1-41
1-5	Engine Exhaust System	1-43
1-6	Fresh Water Cooling System	1-44
1-7	Raw (Sea) Water Cooling System	1-45
1-8	Hydraulic Starting System Diagram	1-46
1-9	Hydraulic Steering System	1-48
1-10	Power Take-Off	1-49
1-11	Ramp Hoist Hydraulic System	1-51
1-12	Ramp Chain Hoist	1-53
1-13	Bilge Pumps, Oil Water Separator Lines and Fittings	1-54
1-14	Plan View Wiring Diagram	1-56, 57
2-1	Pilothouse Controls and Instruments	2-2
2-2	Distribution Panel	2-5
2-3	Steering System Expansion Tank With Sight Glass	2-7
2-4	Engine Controls	2-8
2-5	Engine Electrical START Button	2-10
2-6	Hydraulic Starting Solenoid Valve On Engine	2-10
2-7	Fuel System Valves	2-12
2-8	Sea Water Discharge Valve	2-12
2-9	Bilge Drainage System	2-14, 15
2-10	Steering System And Ramp Hoist System Suction Valves	2-16
2-11	Hydraulic Starting System Tank and Valves	2-16
2-12	Hydraulic Starting System Accumulator	2-17
2-13	Hydraulic Starting System Hand Pump	2-18
2-14	Steering System Valves, Pump Discharge	2-19
2-15	Steering System Cylinder Valves	2-19
2-16	Clutch Lever and Ramp Hoist Pump	2-20
2-17	Cooling System Expansion Tank Sight Glass	2-20
2-18	Ramp Hoist Hydraulic System Filters and Indicator	2-21
2-19	Steering System Filter Gage	2-21
2-20	Ramp Emergency Lowering Instructions	2-23
2-21	Steering System Valves	2-51
2-22	Emergency Tiller	2-52
2-23	Ramp Hoist Hydraulic System Suction Strainer	2-53
2-24	Starting Aid	2-55
2-25	Bilge Overboard Discharge Valves	2-59
5-1	Ramp Hoist Hydraulic System Diagram	5-63
5-2	Hydraulic Steering System Diagram	5-116
5-3	Hydraulic Starting System Diagram	5-202
6-1	Hydraulic Steering System Diagram	6-20

LIST OF TABLES

Table	Title	Page
1-1	Engine Repair and Replacement Standards (American Standard)	1-12
1-2	Engine Repair and Replacement Standards (Metric)	1-20
1-3	Standard Bolt and Nut Torque Specifications	1-28
1-4	Special Bolt and Nut Torque Specifications (American Standard)	1-29
1-5	Special Bolt and Nut Torque Specifications (Metric)	1-33
1-6	Stud Torque and Height Specifications	1-37
1-7	Special Plug Torque Specifications	1-38

CHAPTER 5

DIRECT SUPPORT MAINTENANCE PROCEDURES

Page

- Maintenance Procedures 5-15
- Repair Parts, Special Tools, Test, Measurement and Diagnostic Equipment (TMDE); and Support Equipment 5-1
- Troubleshooting 5-2

SECTION I. REPAIR PARTS, SPECIAL TOOLS; TEST MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) AND SUPPORT EQUIPMENT

5-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools required to perform Direct Support Maintenance on the Landing Craft are listed in Appendix C.

5-3. REPAIR PARTS.

Maintenance Repair Parts are listed and Illustrated in TM 55-1905-221-34P

SECTION II. TROUBLESHOOTING

5-4. DIRECT SUPPORT MAINTENANCE, and TROUBLESHOOTING

Table 5-1 contains troubleshooting information useful to you in diagnosing and correcting malfunctions or unsatisfactory operation of the landing craft.

a. The troubleshooting table lists the common malfunctions and unsatisfactory conditions you are most likely to run into.

b. You should first find the malfunction in the table which most closely describes the problem; then perform the tests, inspections and corrective actions in the order in which they are listed.

c. This manual cannot list all possible symptoms which may occur. If a condition exists which cannot be resolved by you, notify your supervisor.

d. You should verify the fault before performing the troubleshooting procedures.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
PROPULSION ENGINE
1. Engine will not turn over. Hand-crank the engine at least one revolution. If engine cannot be rotated a complete revolution, internal damage is indicated. Report condition to GENERAL SUPPORT MAINTENANCE.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
PROPULSION ENGINE (Cont.)
2. Low cranking speed.
Step 1. Check batteries for low or discharged condition.
Replace or charge as necessary.
Step 2. Check electric starting motor.
a. Perform no-load test and torque test per paragraph 5-12.2.
b. Replace starter.
c. Repair as required. Refer to paragraph 5-12.2.
Step 3. Check hydraulic starting system.
Refer to paragraphs 5-13.1. through 5-13.7.
3. Low compression.
Step 1. Check for burned or sticking exhaust valves.
Remove cylinder head and repair as per paragraph 5-15.
Step -2. a. Check valve guide for carbon deposits or distortion.
1. Remove carbon deposits. Refer to paragraph 5-15.
2. Replace bent or worn guide. Refer to paragraph 5-15.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
PROPULSION ENGINE (Cont.)
b. Check for valve-to-guide clearance.
1. Reface valve if necessary. Refer to paragraph 5-15.
2. Replace worn valve. Refer to paragraph 5-15.
c. Check valve for improper seating.
1. Reface if necessary. Refer to paragraph 5-15.
2. Replace worn valve. Refer to paragraph 5-15.
Step 3. a. Check for broken or bent valve.
Replace bent or broken valve. Refer to paragraph 5-15.
b. Check for defective valve spring.
Replace defective valve spring. Refer to paragraph 5-15.
c. Check valve guide and insert for damage.
Replace damaged or defective insert or valve guide. Refer to paragraph 5-15.
d. Check cylinder head and piston for damage.
1. Replace damaged or defective cylinder head. Refer to paragraph 5-15.
2. Replace defective or damaged piston. Refer to paragraph 6-31.1.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
PROPULSION ENGINE (Cont.)	
	e. Check for contact between valve head and piston for incorrect valve clearance. Replace damaged valve. Refer to paragraph 5-15.
Step 4.	a. Check valve stem for varnish deposits. Reface valve. Refer to paragraph 5-15.
	b. Check for worn valve guide or excessive back pressure. 1. Reface valve and insert. Refer to paragraph 5-15. 2. Replace valve and insert if necessary. Refer to paragraph 5-1.
Step 5.	a. Check for bent valve guide or stem. Replace damaged stem or guide. Refer to paragraph 5-15.
	b. Check for scuffed or scored valve stem. 1. Clean valve stem with crocus cloth dampened with fuel oil. 2. Replace valve if unable to clean.
	NOTE When installing valve, use care in depressing spring so that cap DOES NOT SCRAPE valve stem.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
PROPULSION ENGINE (Cont.)
c. Inspect for dirt or metal chips. Remove.
d. Inspect for lack of lubrication. 1. Replace defective oil pump. Refer to paragraph 6-26. 2. Replace clogged oil tubes and lines.
Step 6. a. Check ALL valves for bent condition. Replace bent valves. Refer to paragraph 5-15.
b. Check for gear train failure. Report condition to GENERAL SUPPORT MAINTENANCE.
c. Check for improper gear train timing. Report condition to GENERAL SUPPORT MAINTENANCE.
4. Insufficient or no fuel.
Step -1. Check filters and fuel lines for obstructions. a. Disassemble and clean out obstructions. b. Service strainers and filters.
Step 2. Check for defective fuel pump. Replace defective pump.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
PROPULSION ENGINE (Cont.)
5. Governor unstable (hunting).
Step 1. Check for faulty governor.
Replace if defective.
Step 2. Check linkage to injectors.
Replace defective or damaged parts.
6. Black exhaust smoke (incompletely burned fuel).
Step 1. Check for obstruction in exhaust piping.
Disassemble system and replace or repair parts as required.
Step 2. Check for faulty air silencer.
Remove and clean screen.
7. High engine coolant temperature.
Step 1. Check for defective fresh water pump.
a. Remove and repair as required.
b. Replace pump if damaged beyond repair.
Step 2. Check for obstruction(s) in raw water system.
Disassemble raw water (muffler) cooling system, remove obstruction(s) and reassemble.
Step 3. Check for defective muffler.
Replace or repair as required.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ALTERNATOR
1. Alternator fails to charge.
Step 1. Check for open isolation diode.
Remove and disassemble alternator, replace diode and reassemble. Refer to paragraph 5-12.1.
Step 2. Check for open rotor winding.
Remove and disassemble alternator, and verify rotor winding continuity.
Replace rotor if open. Refer to paragraph 5-12.1.
Step 3. Check for bilge pump leaking sea water causing voltage regulator to short out.
Replace leaking gland.
2. Unsteady or low charging rate.
Step 1. Check for grounded, open, or shorted turns in stator coils.
Remove and disassemble alternator, and replace stator. Refer to paragraph 5-12.1.
Step 2. Check for grounded or shorted turns in rotor winding.
Remove and disassemble alternator, and replace rotor. Refer to paragraph 5-12.1.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ALTERNATOR (Cont)
Step 3. Check for shorted or open rectifier diode(s). Remove, disassemble alternator, and test diode plates to determine which plate has faulty diode(s). Replace defective diode(s). Refer to paragraph 5-12.1.
3. Alternator noisy. Check for worn bearings. Remove and disassemble alternator and replace worn or defective bearings. Refer to paragraph 5-12.1.
ELECTRIC STARTING MOTOR
Starter does not crank engine adequately. Step 1. Check for defective brushes. Replace brushes. Refer to paragraph 5-12.2.
Step 2. Check for damaged Bendix drive. Replace Bendix drive. Refer to paragraph 5-12.2.
Step 3. Check for worn bearings. Remove starter from engine, disassemble, and replace defective bearings. Refer to paragraph 5-12.2.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

HYDRAULIC STARTING SYSTEM

1. Cranking speed too low.

   Step 1. a. Check for excessive internal leakage in starting moto

   Remove starting motor, disassemble and replace parts as necessary.

   Refer to paragraph 5-13.2.

   b. Check for broken or weak cylinder spring.

   Remove starting motor, disassemble and replace parts as necessary.

   Refer to paragraph 5-13.2.

   c. Check for damaged seal surfaces.

   Remove starting motor, disassemble and replace parts as necessary.

   Refer to paragraph 5-13.2.

   d. Check cylinder and port plate for scored face.

   Remove starting motor, disassemble and replace parts as necessary.

   Refer to paragraph 5-13.2.

   e. Check for broken cylinder.

   Remove starting motor, disassemble and replace parts as necessary.

   Refer to paragraph 5-13.2.

2. Fluid loss from reservoir.

   Check for worn starting motor shaft seals.

   a. Remove starting motor, and housing plate and check system for fluid inside housing.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
HYDRAULIC STARTING SYSTEM (Cont)
b. Replace shaft seal if inspection reveals fluid is in housing. Refer to paragraph 5-13.2.
3. Hydraulic starting motor turns, but engine does not.
Check for damaged or overrunning clutch.
Replace Bendix drive. Refer to paragraph 5-13.2.
4. Hand pump fails to charge system.
Check for damaged piston seal rings.
Remove, disassemble hand pump and replace defective seal rings. Refer to paragraph 5-13.6.
5. Loss of accumulator precharge (nitrogen).
Step 1. Check for damaged piston or seal rings.
NOTE Release all hydraulic pressure in the system prior to performing any maintenance on the accumulator.
a. Release nitrogen in accumulator.
b. Remove accumulator and disassemble. Refer to paragraph 5-13.5.
c. Replace defective piston or sealing rings.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
HYDRAULIC STARTING SYSTEM (Cont)
Step 2. Check for damaged seal ring between end cap and tube.
a. Apply liquid soap on threaded end of accumulator at end cap.
Bubbling of soap indicates a leak past the end cap seal.
NOTE Release all hydraulic pressure in the system prior to performing any maintenance on the accumulator.
b. Release nitrogen in accumulator.
c. Remove accumulator. Refer to paragraph 5-13.5.
d. Replace defective seal.
6. High pressure in system (3500 psi (24,133 kpa) or above).
a. Check relief valve for proper operation.
NOTE There is a 500 psi (3,447.5 kpa) differential between cut-in and cut-out.
Clean and adjust to specified operating pressure of 3400 psi (23,443 kpa).
b. Check plunger for sticking or binding.
Replace defective relief valve.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

STEERING SYSTEM

1. Steering pump noisy.

   Check pump intake for partial obstruction.

   a. Service intake strainers.

   b. Check internal flow path for cleanliness. Clean if required.

2. Oil too hot.

   Check for relief valve leaking at high pressure.

   NOTE

   Release pressure in system prior to performing maintenance on the relief valve.

   Remove and replace relief valve.

   Refer to paragraph 5-7.6.

RAMP HOIST HYDRAULIC SYSTEM

Hydraulic pump noisy.

Step 1. Check pump intake for partial obstruction.

a. Service intake strainers.

Table 5-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
RAMP HOIST HYDRAULIC SYSTEM (Cont)	
b. Check internal flow path for cleanliness. Clean if required.	
Step 2. Check for binding of drive shaft.	
Remove pump, disassemble and replace defective parts as required. Refer to paragraph 5-6.1.	

SECTION III. MAINTENANCE PROCEDURES

The following is an index to the maintenance procedures.

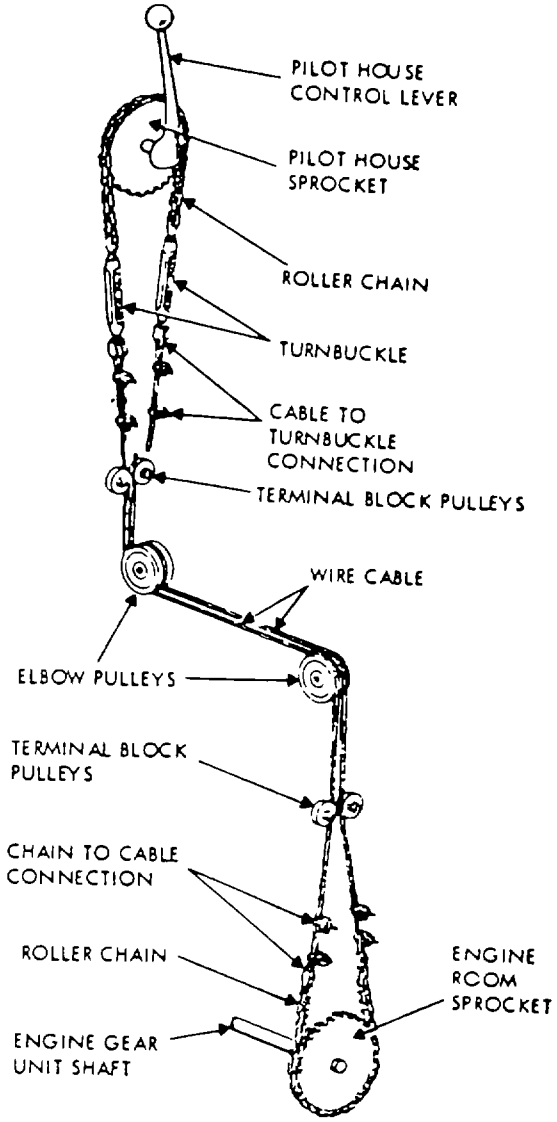
DESCRIPTION	PARAGRAPH
Common Tools and Equipment	5-1
Communication Equipment -Electric Power	5-8
Cylinder Block	5-16
Cylinder Head	5-15
Direct Support Maintenance, and Troubleshooting	5-4
Engine Cooling Piping	5-22
Engine Electrical System	5-12
Engine Speed Governor	5-29
Fresh Water Expansion Tank	5-26
Fresh Water Pump	5-25
Fuel Injector	5-18
Fuel Pump	5-17
Heat Exchanger, Thermostat and Housing, Hoses and Clamps	5-21
Hydraulic Starting System	5-13
Hydraulic Steering System	5-7
Injector Control Tube	5-19
Muffler and Exhaust Piping	5-24
Pilothouse Canopy	5-31
Radio Set AN/VRC-46/47	5-9
Radio Set AN/VRC-80	5-10
Radio Set URC-92	5-11
Ramp Controls	5-6
Raw Water Pump	5-27
Repair Parts	5-3
Rocker Arms, Cam Followers and Pushrods	5-14
Sea Water Duplex Strainer	5-28
Sea Water Piping	5-23
Special Tools, TMDE, and Support Equipment	5-2
Throttle Controls - Engine Room	5-20
Throttle Controls - Pilothouse	5-5
Transmission Control Valve	5-30

5-5. THROTTLE CONTROLS - PILOTHOUSE.

a. Each propulsion unit consists of two engines connected by clutches to a common gear box. The throttle adjustment is made so that each engine of a twin unit will carry its share of the load.

b. This Landing Craft is equipped with a model MD engine control system which consists of a pilothouse control head, terminal blocks, elbows, engine control unit, conduit and cable as shown below. The twin engine control is designed to allow the operator to control both propulsion units with one hand. Clutch action occurs in the first 30° of travel each side of neutral, while the remaining 60° of travel provides governor control from idle-to-full ahead or astern. Separate neutral throttle controls and separate stop controls for each engine are located on the pilothouse control panel.

5-5. THROTTLE CONTROLS - PILOTHOUSE.



Refer to the following paragraphs for maintenance procedures

DESCRIPTION	PARAGRAPH
Pilot House Control	5-5.1
Chains, Cabling, Terminal Block Pulley, and Marine Control Elbow	5-5.2
Engine Control Levers and Brackets	5-5.3
Engine Control Unit	5-5.4
Free-Wheeling Brake	5-5.5

5-5.1. PILOTHOUSE CONTROLS.

This task covers-

a. Inspection
b. Removal
c. Cleaning
d. Repair/Replace
e. Installation

INITIAL SETUP

Test Equipment
NONE

Special Tools

NONE

Tools
General Mechanic's Tool Kit
NSN 5180-00-629-9783

Material/Parts
Cleaning solvent P-D-680
Clean cloths
Grease

Personnel Required
2 MOS 61C10

References
NONE

Equipment
Condition Condition Description

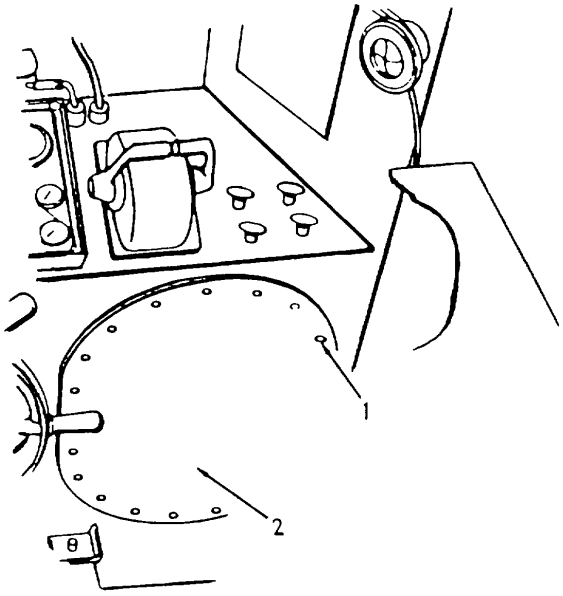
NONE

Special Environmental Conditions
NONE

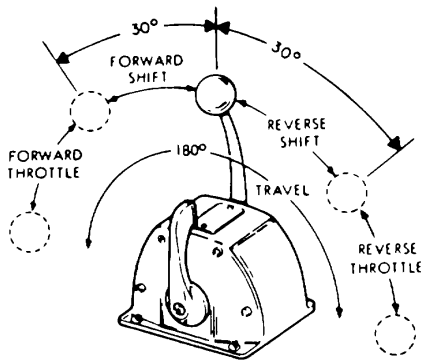
General Safety Instructions
Observe WARNINGS in procedure.

5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS
INSPECTION		
1. Control Unit	a. Remove screw-assembled washers (1).	
	b. Remove access cover (2).	
	c. Inspect chains and chain links for signs of wear.	
	d. Inspect cable, cable terminals, and cable clamps for signs of wear.	



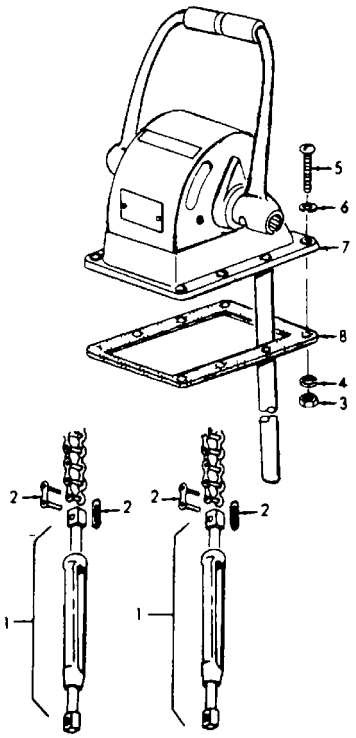
5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS
INSPECTION (Cont)		
	e. Place control lever 30° each side of neutral.	In engine room, observe operation of clutch lever or marine gear of clutch lever or marine gear.
	f. Advance control lever to full ahead, or astern.	In engine room, observe operation of clutch lever or marine gear. In engine room, observe operation of throttle lever on governor.
		**NOTE** Starboard view shown, Port view is similar.
REMOVAL		
2. Control Unit	a. Loosen turnbuckles (1).	
	b. Remove keeper from chain connecting link (2), and remove link.	Remove total of four plaœs.
	c. Remove nuts (3), lockwashers (4), screws (5), and sealing washers (6).	
	d. Lift and remove control station (7), and gasket (8).	1. Lift high to clear struts.

5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS

REMOVAL (Cont)



2. Discard gasket, if damaged.

NOTE

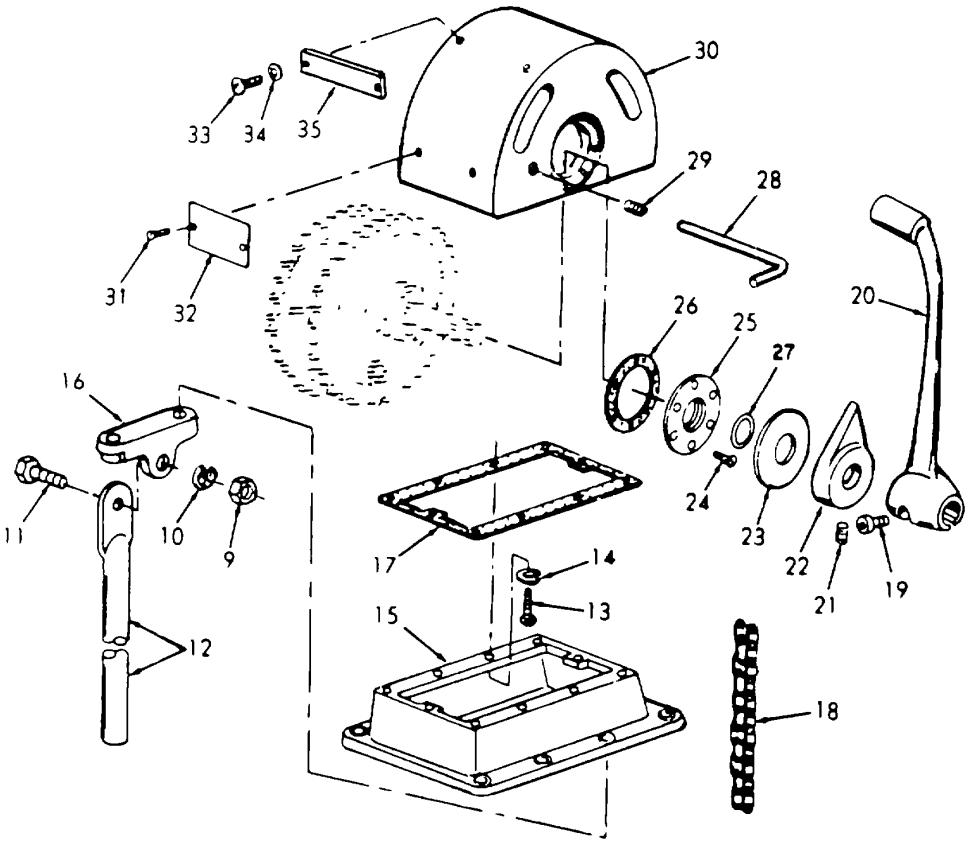
Starboard view shown, Port view is similar.

5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS
CLEANING		
3. Control Unit	**WARNING** Dry cleaning solvent, P-D-680, used to clean parts, is potentially dangerous to personnel and property. Avoid repeated or prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° to 138°F (38° 59°C). Clean all metal parts (except bearings) with cleaning solvent P-D-680 and dry thoroughly.	
REPAIR/REPLACE		
4. Control Unit (12).	a. Remove nuts (9), lockwashers (10), screws (11), and struts	Remove two places.
	b. Remove screws (13), and lockwashers (14).	
	c. Remove mounting plate (15), supports (16), and gasket (17).	
	NOTE The following steps apply to the starboard engine only. The port engine is similar.	
	d. Remove two chains (18).	
	e. Remove socket head screw (19), and control arm (20).	
	f. Remove setscrew (21), indicator (22), and washer (23).	
	g. Remove screws (24), flange (25), and gasket (26).	

5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS
REPAIR/REPLACE (Cont)		
	h. Remove preformed packing (27) from flange I25).	If damaged.
	i. Remove lock pin (28), and/or pipe plug (29).	
	j. Remove sprockets and shaft assembly from housing (30).	
	k. Remove screws (31) and nameplate (32).	If necessary.
	l. Remove screws (33), sealing washers (34), and neutral indicator nameplate (35).	If necessary.



5-5.1. PILOTHOUSE CONTROLS (Continued).

LOCATION/ITEM	ACTION	REMARKS

REPAIR/REPLACE (Cont)

m. Remove bearing spacers (36).
n. Remove setscrews (37) from sprockets (38 and 39).

o. Remove sprocket (38).

p. Remove bearing (40).

q. Remove sprocket (39) and key (41) from shaft (42).

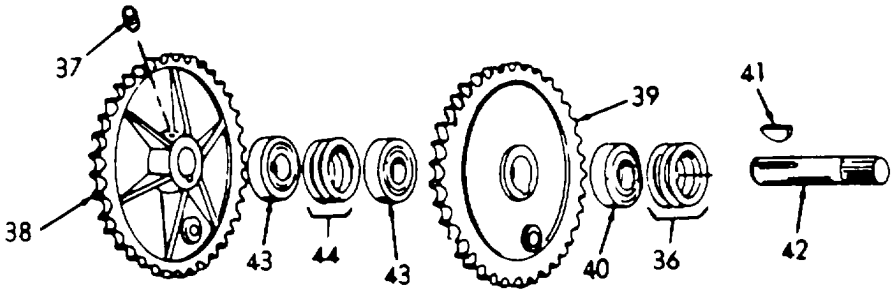
r. Remove bearings (43) and spacers (44) from shaft (42).

NOTE

Inspect all parts prior to reassembly for nicks, burrs, damaged threads, defective bearings and other signs of damage.

s. Install bearings (43), and spacers (44) on shaft (42).

t. Install sprockets (38 and 39), and key (41), on shaft (42).

u. Install setscrews (37) in sprockets (38 and 39).

v. Install bearing (40), and spacers (36). 5-25