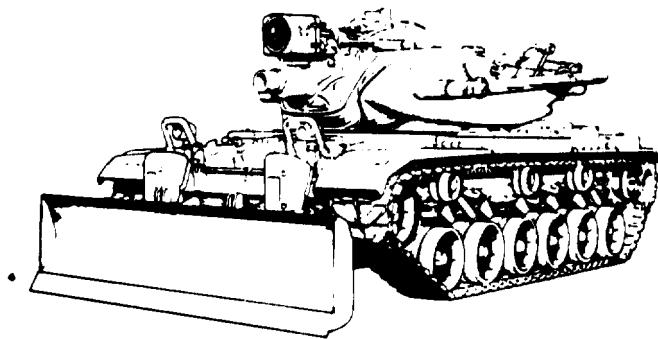


TECHNICAL MANUAL
ORGANIZATIONAL MAINTENANCE
VOLUME 4 OF 5
CHAPTERS 10 THRU 15



ELECTRICAL SYSTEM	10-1
TRANSMISSION AND SHIFTING MAINTENANCE	11-1
FINAL DRIVE AND UNIVERSAL JOINTS	12-1
BRAKE SYSTEM	13-1
TRACK AND SUSPENSION SYSTEM	14-1
STEERING SYSTEM	15-1

COMBAT ENGINEER VEHICLE,
FULL-TRACKED, M728
2350-00-795-1797
(HULL)

This copy is a reprint which includes current pages from Changes 1 through 5.

TA141004

Technical Manual
 No. 9-2350-222-20-1

HEADQUARTERS
 DEPARTMENT OF THE ARMY
 Washington, D.C., 20 February 1981

**ORGANIZATIONAL MAINTENANCE
 COMBAT ENGINEER VEHICLE
 FULL TRACKED, M728
 NSN (2350-00-795-1797)
 (HULL)**

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 Tank-Automotive Command, Attn: AMSTA-MBC, Warren, Michigan 48397-5000. A reply will be furnished to you.

**TABLE OF CONTENTS
 VOLUME 1**

		Page
HOW TO USE THIS MANUAL		iii
CHAPTER	1. INTRODUCTION	1-1
Section	I. General Information	1-1
Section	II. Equipment Description and Data	1-2
CHAPTER	2. PRINCIPLES OF OPERATION	2-1
Section	I. Functional Description	2-1
Section	II. Systems Operation	2-1
CHAPTER	3. HULL MAINTENANCE INSTRUCTIONS	3-1
Section	I. Repair Parts, Special Tools, TMDE, and Support Equipment	3-1
Section	Service Upon Receipt	3-5
Section	III. Preventive Maintenance Checks and Services - Hull (Automotive)	3-7

VOLUME 2

CHAPTER	4. TROUBLESHOOTING	4-1
---------	------------------------------	-----

VOLUME 3

CHAPTER	5. POWER PLANT MAINTENANCE	5-1
CHAPTER	6. ENGINE MAINTENANCE	6-1

*This manual, together with TM 9-2350-222-20-1-1, 20 February 1981, TM 9-2350-222-20-1-2, 20 February 1981, TM 9-2350-222-20-1-3, 20 February 1981, and TM 9-2350-222-20-1-5, 20 February 1981, supersedes TM 9-2350-222-20, 27 September 1965, including all changes.

TABLE OF CONTENTS - Continued

Page

CHAPTER	7.	FUEL SYSTEM MAINTENANCE	7-1
CHAPTER	8.	EXHAUST SYSTEM MAINTENANCE	8-1
CHAPTER	9.	COOLING SYSTEM	9-1

VOLUME 4

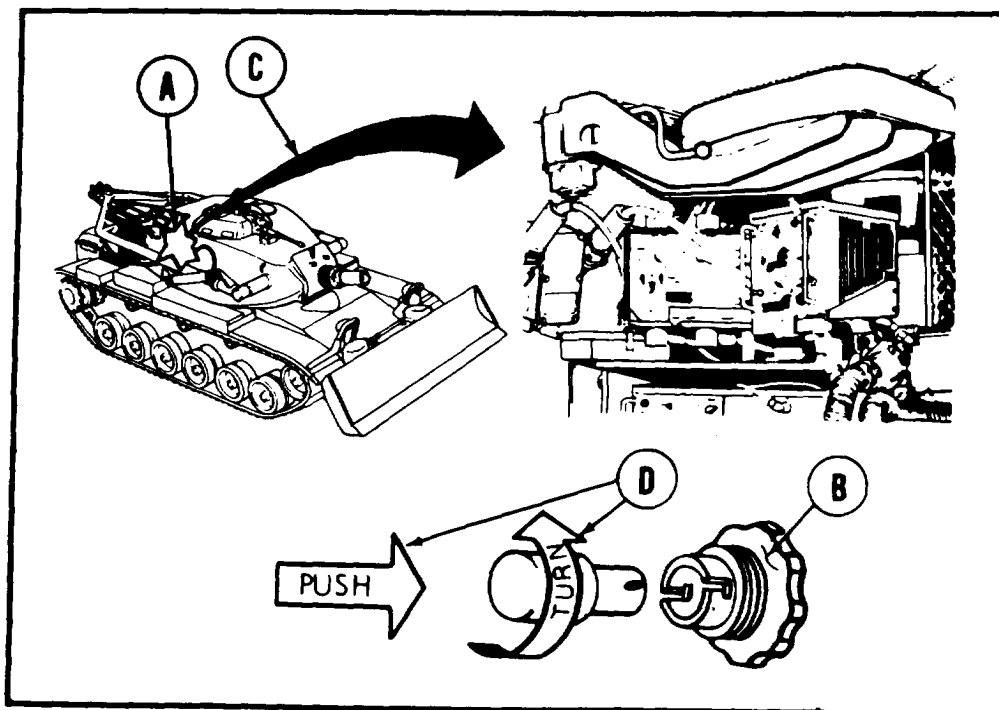
CHAPTER	10.	ELECTRICAL SYSTEM MAINTENANCE.	10-1
CHAPTER	11.	TRANSMISSION AND SHIFTING MAINTENANCE	11-1
CHAPTER	12.	FINAL DRIVE AND UNIVERSAL JOINTS MAINTENANCE	12-1
CHAPTER	13.	BRAKE SYSTEM MAINTENANCE	13-1
CHAPTER	14.	TRACKS AND SUSPENSION SYSTEM MAINTENANCE	14-1
CHAPTER	15.	STEERING CONTROL MAINTENANCE	15-1

VOLUME 5

CHAPTER	16.	EXTERIOR HULL MAINTENANCE..	16-1
CHAPTER	17.	INTERIOR HULL MAINTENANCE..	17-1
CHAPTER	18.	HYDRAULIC SYSTEM	18-1
CHAPTER	19.	PERSONNEL HEATER MAINTENANCE.	19-1
CHAPTER	19.1	BILGE PUMP AND GENERATOR EXHAUST MAINTENANCE	19.1-1
CHAPTER	20.	SPEEDOMETER AND TACHOMETER MAINTENANCE	20-1
CHAPTER	21.	FIRE EXTINGUISHER SYSTEM MAINTENANCE	21-1
CHAPTER	22.	GAS PARTICULATE SYSTEM MAINTENANCE	22-1
CHAPTER	23.	SMOKE GENERATOR MAINTENANCE	23-1
APPENDIX	A.	REFERENCES	A-1
APPENDIX	B.	MAINTENANCE ALLOCATION CHART	B-1
APPENDIX	C.	GENERAL MAINTENANCE	C-1
APPENDIX	D.	EXPENDABLE SUPPLIES AND MATERIALS	D-1
APPENDIX	E.	ELECTRICAL SCHEMATICS	E-1
APPENDIX	F.	ILLUSTRATED LIST OF MANUFACTURED ITEMS	F-1
		ALPHABETICAL INDEX	1-1
		MAINTENANCE INFORMATION INDEX	MI-1

HOW TO USE THIS MANUAL:

- This manual is divided into chapters.
- Chapters are by functional group code and are presented in same order as the RPSTL (Repair Parts and Special Tools List).
- Procedure indexes are on procedures that are four pages or more, and indicate how the procedure is set up, i.e., disassembly, removal, cleaning and inspection, etc.
- All references within this technical manual refer to page numbers.
- Steps are numbered and are to be performed in that order.
- Be sure to read all NOTES, WARNINGS, and CAUTIONS.
- Locator views are included wherever necessary. These will help you locate the item for which the procedure is referencing.
- Jagged circle (☼) on locator (A) indicates a cutout and means the item is inside the vehicle.
- A (⋈) symbol represents the outside surface (B) of a piece of equipment that cannot be shown in its entirety.
- Callout a are shown by a circle with a letter inside.
- Locator arrows (C) are black and mechanical motion arrows (D) are white.
- Broken leader arrow (--->) indicates the item is either inside or under the vehicle and cannot be seen.



TA141017

HOW TO USE THIS MANUAL - Continued

- Certain sections of the manual have detailed 'how to use' instructions at the beginning of the section - for example, troubleshooting.
- A maintenance information index is located in back of this manual. It is set up in alphabetical order and maintenance function, for example, disassemble, clean, inspect, repair, remove, install, assemble, and test.
- An illustrated list of manufactured items, or better known as fabricated tools, is located in back of this manual. It is nothing more than direction on how to fabricate tools that are listed throughout the manual.

CHAPTER 10

ELECTRICAL SYSTEM MAINTENANCE INDEX

PROCEDURE	PAGE
Generator Replacement	10-4
Voltage Regulator Assembly Replacement	10-19
Generator Voltage Adjustment	10-22
Voltage Control Box Replacement	10-24
Starter Replacement	10-26
Starter Low Voltage Relay Solenoid (Side Mounted) Replacement	10-33
Starter Low Voltage Relay Solenoid (Top Mounted) Replacement	10-34.1
Engine Fuel Injection Pump Fuel Shutoff Lead Replacement	10-35
Generator Switch or Guard Replacement	10-40
Generator Switch Bracket Replacement	10-42
Cluster Assembly Cushion Replacement	10-43
Cluster Assembly Mounting Bracket Replacement	10-44
Master Control Panel Displacement	10-45
Master Control Panel Replacement	10-48
Master Control Panel Repair Index	10-52
Starter Switch Replacement	10-55
Master Battery Switch and Indicator Light Replacement	10-57
Engine Fuel Shutoff and Fuel Pump Switch Replacement	10-61
IR/Night Vision Power Switch and Indicator Light Replacement	10-64
Lighting Control Switch and Hi-Beam Indicator Light Replacement	10-68
Blackout Selector Switch Replacement	10-72
Utility Outlet Replacement	10-74
Gas Particulate Switch and Indicator Light Replacement	10-76
Bilge Pump Switch and Indicator Light Replacement	10-80
IR/Night Vision, Bilge Pump, Gas Particulate, Fuel Shutoff, Manifold Preheat, Gage, Fuel Pump, and Utility Outlet Circuit Breaker Replacement	10-84
Master Heater Circuit Breaker, Hi-Lo Switch, and Indicator Light Replacement	10-91
Personnel Heater Wiring Harness Replacement	10-98
Accessories Wiring Harness Replacement	10-103
Master Battery Wiring Harness Replacement	10-107
Master Control Panel Wiring Harness Replacement	10-111
Bilge Pump/Gas Particulate Switch Cable Assembly Replacement	10-116
Fuel Shutoff/Fuel Pump Wiring Harness Replacement	10-118
Indicator Light Base Assembly Repair	10-120
Instrument Panel Cluster Assembly Displacement	10-121
Instrument Panel Cluster Assembly or Support Replacement	10-123
Instrument Panel Cluster Assembly or Support Maintenance Index	10-127
Engine Oil Pressure Indicator Replacement	10-128
Battery General or Indicator Replacement	10-130
Transmission Oil Pressure Indicator Replacement	10-132
Gage 11 Rumination Indicator Light Replacement	10-134
Engine Oil Temperature Indicator Replacement	10-136

ELECTRICAL SYSTEM MAINTENANCE INDEX - Continued

PROCEDURE

PAGE

Fuel Tank Liquid Quantity Indicator Replacement	10-138
Transmission Oil Temperature Indicator Replacement	10-141
Fuel Tank Selector Switch Replacement	10-143
Instrument Panel Wiring Harness Replacement	10-145
Fuel Tank Selector Switch Cable Assembly Replacement	10-149
Bilge Pump Stowage Receptacle Plate Replacement	10-150
Master Control Panel Plate Assembly Replacement	10-152
Infrared/Passive Receptacle Stowage Assembly Replacement	10-156
Headlight Stowage Lampholder Repair and Replacement	10-157
Hydraulic Pump Switch Replacement	10-159
Hydraulic Pump Circuit Breaker Replacement	10-160
Hydraulic Pump Indicator Light Replacement	10-161
Hydraulic Pump Indicator Light Repair	10-162
Hydraulic Pump Switch Bracket Replacement (Early Model)	10-164
Smoke Generator/Hydraulic Pump Switch Bracket Replacement	10-166
Master Relay Replacement	10-166.2
Protection Device Replacement	10-169
Starter Relay Assembly Replacement	10-172
Master Relay/Starter Relay Mounting Plate Replacement	10-175
Fire Extinguisher Relay Replacement	10-177
Air Cleaner Blower Motor Relay Replacement	10-180
Fire Extinguisher and Personnel Heater Circuit Breakers Replacement	10-182
Relays and Circuit Breakers Mounting Plate Replacement	10-185
Bilge Pump Relay Enclosure Assembly Replacement	10-188
Bilge Pump Relay Enclosure Assembly Repair Index	10-190
Circuit Breaker Replacement	10-190
Cable Assembly Replacement	10-193
Solenoid Relay Replacement	10-197
Infrared Power Supply and Shock Mount Assembly Replacement	10-202
Headlight Beam Selector Switch Assembly Replacement	10-207
Powerplant Warning Light Repair	10-208
Domelight Assembly Replacement	10-210
Domelight Resistor Assembly Bracket Replacement	10-212
Domelight Resistor Assembly Replacement	10-213
Domelight Assembly Repair	10-215
Right Taillight - Stoplight Assembly Replacement	10-223
Right Taillight - Stoplight Assembly Repair	10-226
Left Taillight - Stoplight Assembly Replacement	10-229
Left Taillight - Stoplight Assembly Repair	10-232
Taillight Grommet Replacement	10-235
Headlight Adjustment	10-236
Headlight Assembly (Left and Right) Replacement	10-238
Headlight Assembly Repair (Left and Right)	10-239
Headlight Harness Base Assembly Replacement	10-247
Headlight Tube Assembly Replacement	10-250.1

ELECTRICAL SYSTEM MAINTENANCE INDEX - Continued

PROCEDURE	PAGE
Engine Oil Temperature Transmitter (2D Engine)	10-259
Engine Oil High Temperature Switch Replacement (2D Engine)	10-262
Engine Oil Low Pressure Switch Replacement (2D Engine)	10-264
Engine Oil Pressure Transmitter Replacement (2D Engine)	10-267
Transmission Oil High Temperature Switch Replacement	10-270
Neutral Shift Switch Assembly Replacement	10-272
Transmission Oil Pressure Transmitter Replacement	10-274
Transmission Oil Pressure Transmitter Guard Plate Replacement	10-277
Transmission Oil Temperature Transmitter Protector Replacement	10-279
Transmission Oil Temperature Transmitter Replacement	10-281
Disconnect Battery Ground Straps	10-283
Battery Ground Cable Replacement	10-284
Battery Terminal Boot Replacement	10-287
Battery Testing and Replacement	10-289
Battery Supports Replacement	10-302
Battery Jumper Lead Assembly Replacement	10-304
Electrical Wiring Harness and Cable Connector Repair Index	10-307
Male Plug Repair	10-309
Male Connector Repair	10-312
Terminal Connector Repair	10-313
Female Plug Repair	10-315
Female Plug Repair	10-318
Female Connector with Washer (12 Gage Cable) Repair	10-321
Female Connector with Sleeve (14 and 16 Gage Cable) Repair	10-322
Female Receptacle Repair	10-323
Engine Wiring Harness Replacement (2D Engine)	10-339
Engine Wiring Harness (Dust Detector) Replacement	10-350.1
Hull Intermediate Lead Assembly Replacement	10-350.9
Dust Detector Warning Light Harness Assembly Replacement	10-350.13
Dust Detector Warning Light Box Assembly and Bracket Replacement	10-350.16
Dust Detector Operational Test	10-350.19
Driver-to-Turret Interphone Cable Assembly Replacement	10-351
Front Interphone Cable Assembly Replacement	10-356
Generator Electrical Leads Replacement (2D Engine)	10-364
Engine Starter Wiring Harness Replacement (2D Engine)	10-372
Transmission Wiring Harness Replacement	10-378
Engine Ground Lead Assembly Replacement	10-391
Capacitor and Housing Assembly Replacement, Left Fuel Tank	10-396
Capacitor and Housing Assembly Replacement, Right Fuel Tank	10.402
Capacitor and Housing Assembly Repair	10-411
Slave Receptacle Cover Replacement	10-413
Slave Receptacle Ground Cable Replacement	10-414
Slave Receptacle Replacement	10-416

GENERATOR REPLACEMENT (Sheet 1 of 15)

PROCEDURE INDEX

PRODEDURE	PAGE
Removal	10-5
Installation	10-12

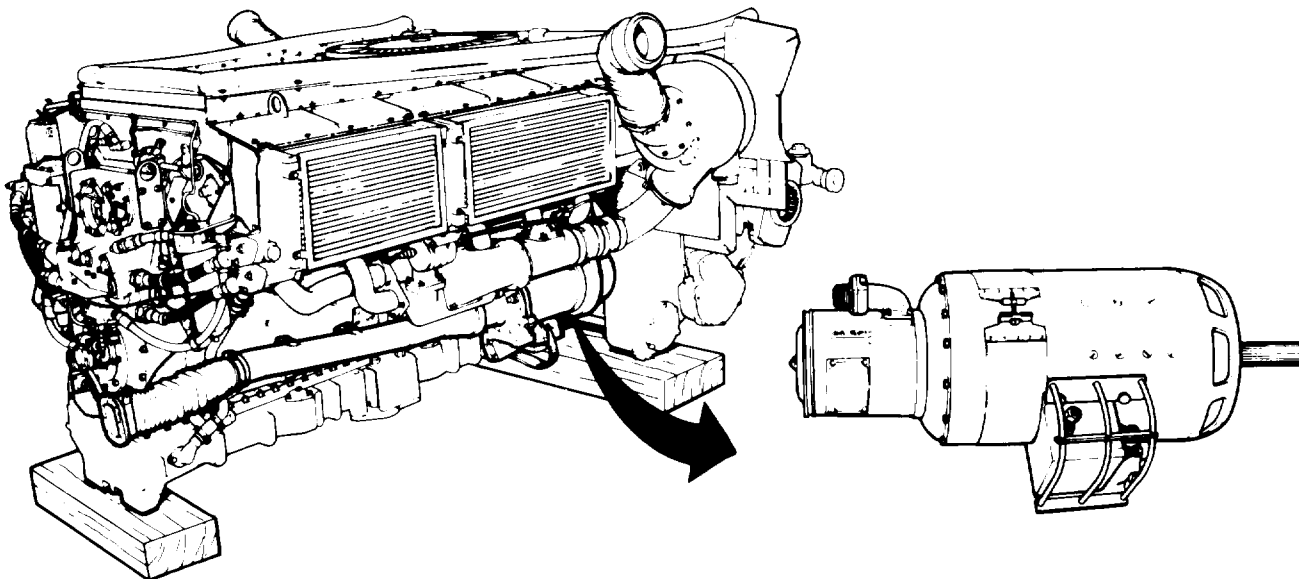
TOOLS: Slip joint pliers
 Flat-tip screwdriver
 Hydraulic jack
 3/8 in. combination box and open end wrench
 1/2 in. combination box and open end wrench
 9/16 in. combination box and open end wrench
 1-1/8 in. open end wrench
 Diagonal cutting pliers
 Putty knife

SUPPLIES: Drive adapter gasket.
 Self-locking nut (6 required)
 Self-locking nut (2 required)
 Self-locking nut (2 required)
 Self-locking nut (2 required)
 Lockwire (Item 60, Appendix D)
 Self-locking nut (2 required)
 Lockwasher (2 required)
 Lockwasher (2 required)
 Goggles (Item 74, Appendix D)
 Rubber gloves (Item 73, Appendix D)

SPECIAL TOOLS: Ground hop kit (Item 30, Chapter 3, Section I)
 Box wrench (Item 4.1, Chapter 3, Section I)

PERSONNEL: Two

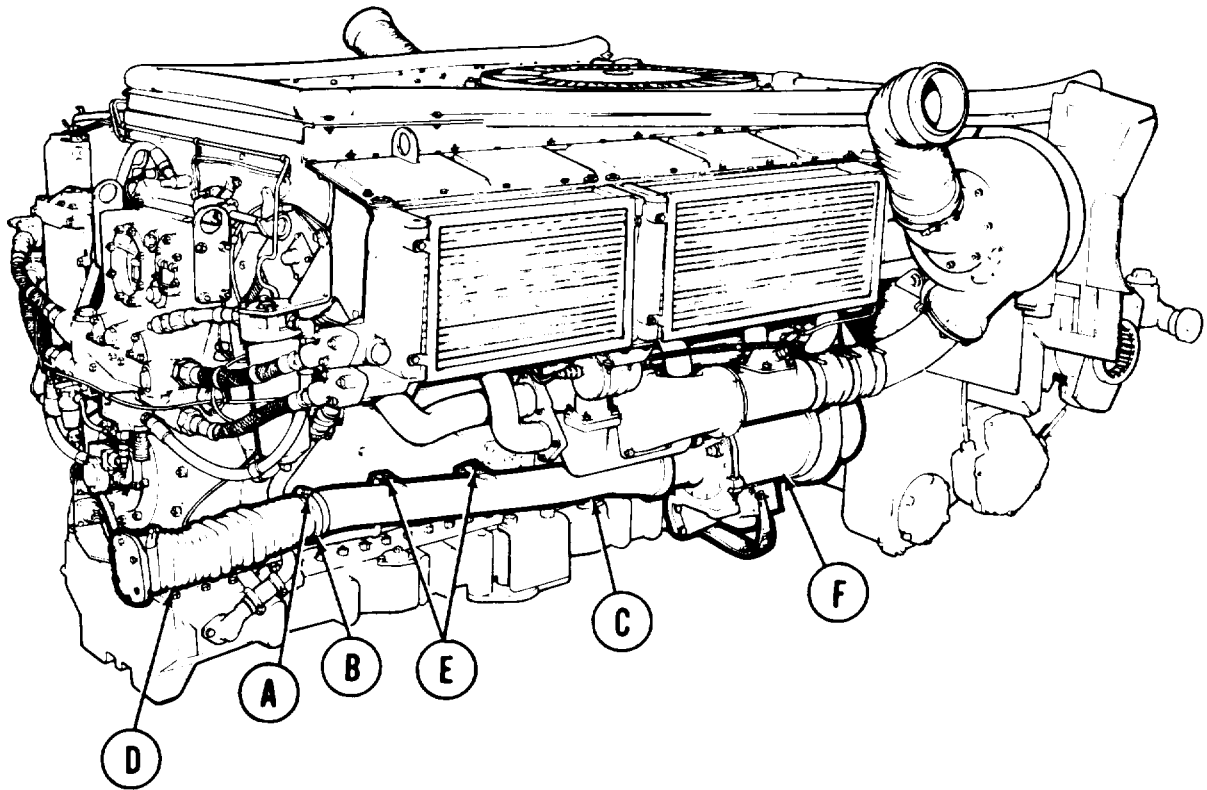
PRELIMINARY PROCEDURE: Remove powerplant (page 5-1)



Go on to Sheet 2

GENERATOR REPLACEMENT (Sheet 2 of 15)**REMOVAL:**

1. Using screwdriver, loosen screw (A).
2. Slide clamp (B) onto generator duct (C).
3. Remove flexible connector (D) from generator duct (C).
4. Remove clamp (B).
5. Using 1/2 inch wrench, remove two screws, lockwashers, and flat washers (E) securing generator duct (C) to engine. Throw lockwashers away.
6. Remove generator duct (C) from generator (F).



Go on to Sheet 3

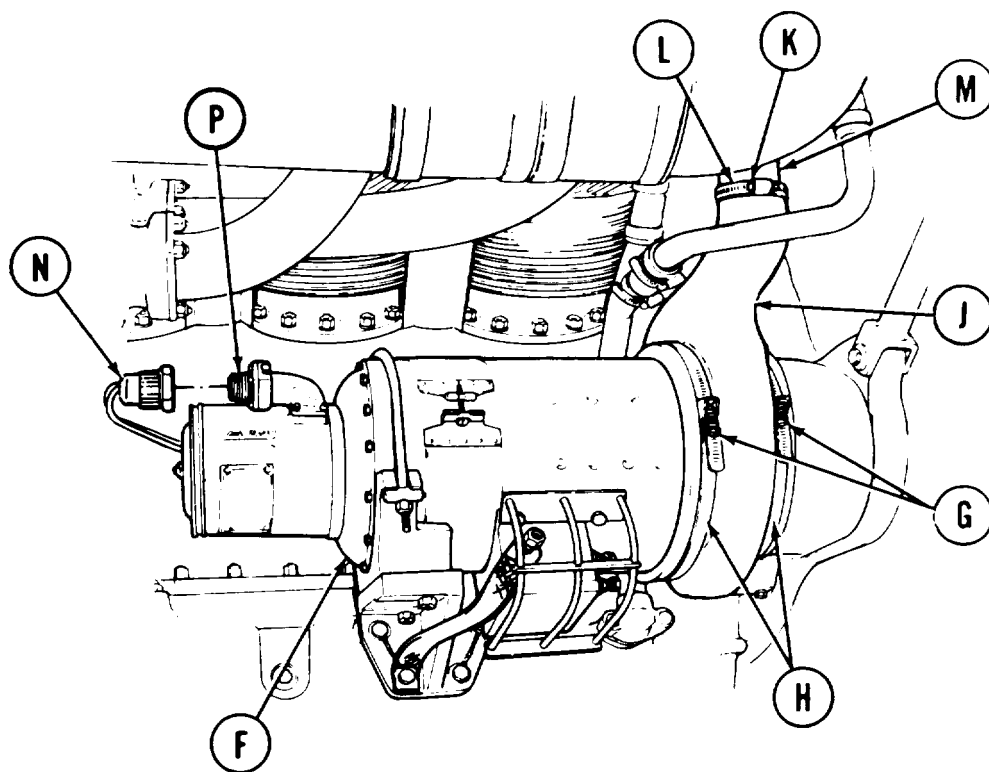
TA139560

GENERATOR REPLACEMENT (Sheet 3 of 15)

NOTE

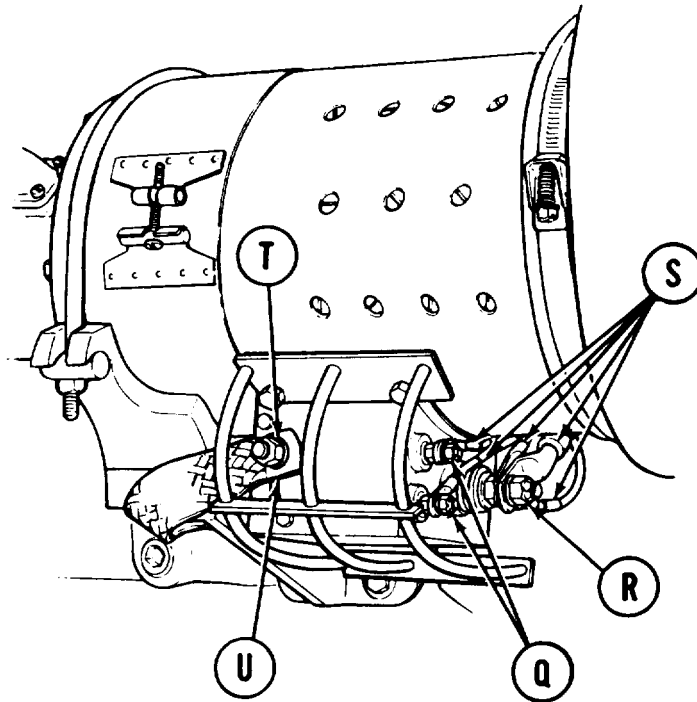
During the remainder of the removal procedure, the screws and clamps are all one piece. The screws are turned until the clamp comes apart.

7. Using screwdriver, turn two screws (G) removing clamps (H) securing flexible boot (J) to generator (F).
8. Using screwdriver, turn screw (K) removing clamp (L) from flexible boot (J)
9. Disconnect flexible boot (J) from exhaust tube (M).
10. Using 1-1/8 inch wrench, remove electrical connector (N) from generator connector (P).



GENERATOR REPLACEMENT (Sheet 4 of 15)

11. Using 3/8 inch wrench, remove two self-locking nuts and washers (Q). Throw self-locking nuts away.
12. Using 9/16 inch wrench, remove self-locking nut and washer (R). Throw self-locking nut away.
13. Using fingers, remove five wires (S) and position aside.
14. Using 9/16 inch wrench, remove self-locking nut and washer (T). Throw self-locking nut away.
15. Remove ground strap and lockwasher (U). Throw lockwasher away.



Go on to Sheet 5

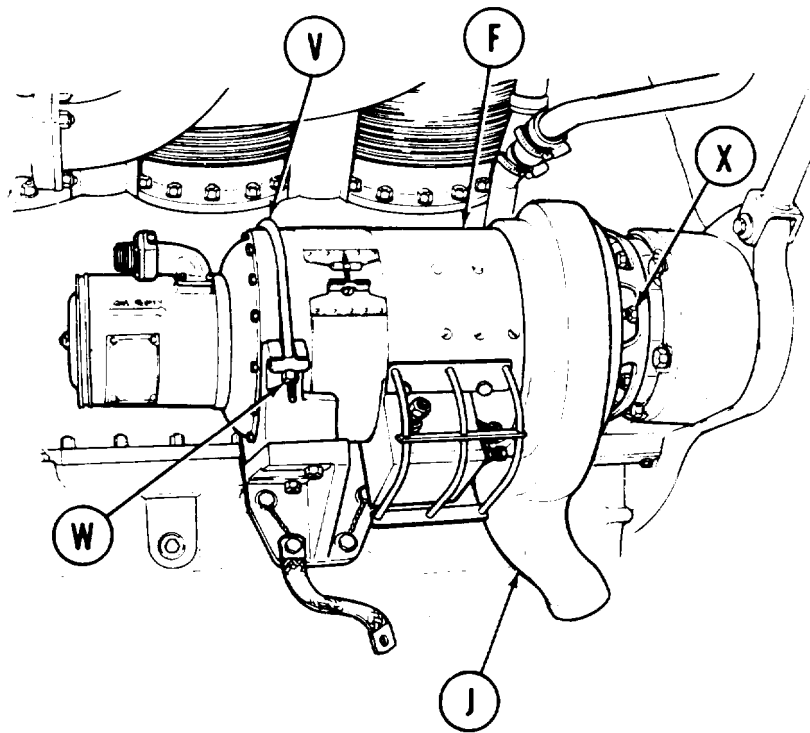
TA139562

GENERATOR REPLACEMENT (Sheet 5 of 15)

NOTE

When removing U-bolt (V) from generator, lift bar and rod out of cradle holder in front of generator. Lift U-bolt over top of generator and slide out of identical holder in back of generator.

16. Using 1/2 inch wrench, loosen two self-locking nuts (W).
17. Remove U-bolt (V) from generator (F)
18. Turn exhaust opening of flexible boot (J) down.
19. Pull flexible boot (J) onto generator (F).
20. Using 9/16 inch half-moon wrench, loosen six self-locking nuts (X).

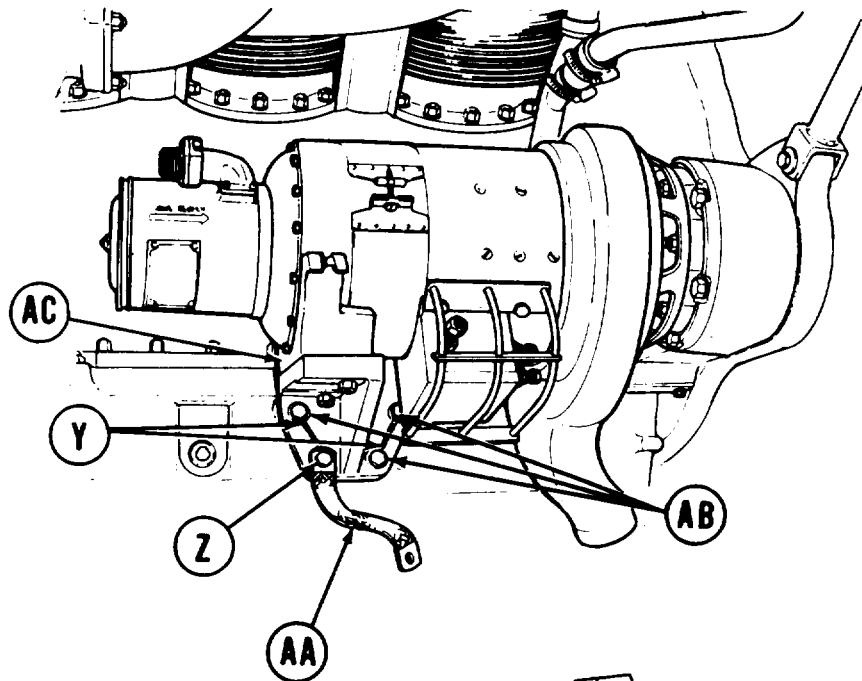


Go on to Sheet 6

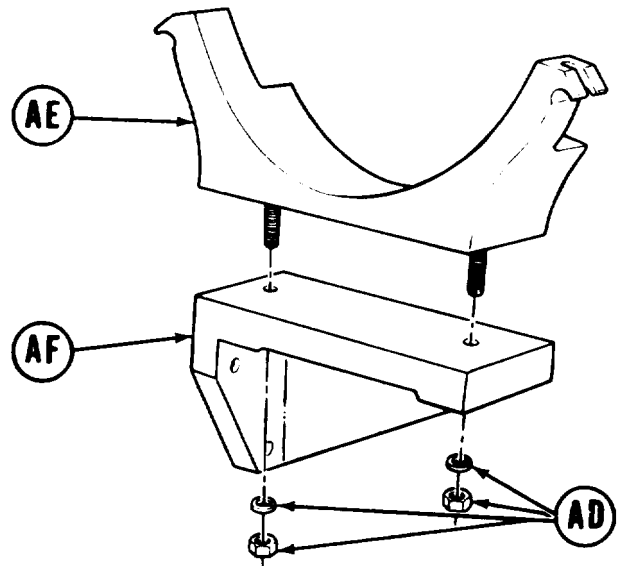
TA139563

GENERATOR REPLACEMENT (Sheet 6 of 15)

21. Using diagonal pliers, remove lockwires (Y).
22. Using 9/16 inch wrench, remove screw and flat washer (Z).
23. Remove ground strap and lockwasher (AA). Throw lockwasher away.
24. Using 9/16 inch wrench, remove three screws and flat washers (AB).
25. Remove cradle assembly (AC) from engine.



26. Using 9/16 inch wrench, remove two nuts and flat washers (AD).
27. Remove cradle (AE) from cradle bracket (AF).



Go on to Sheet 7

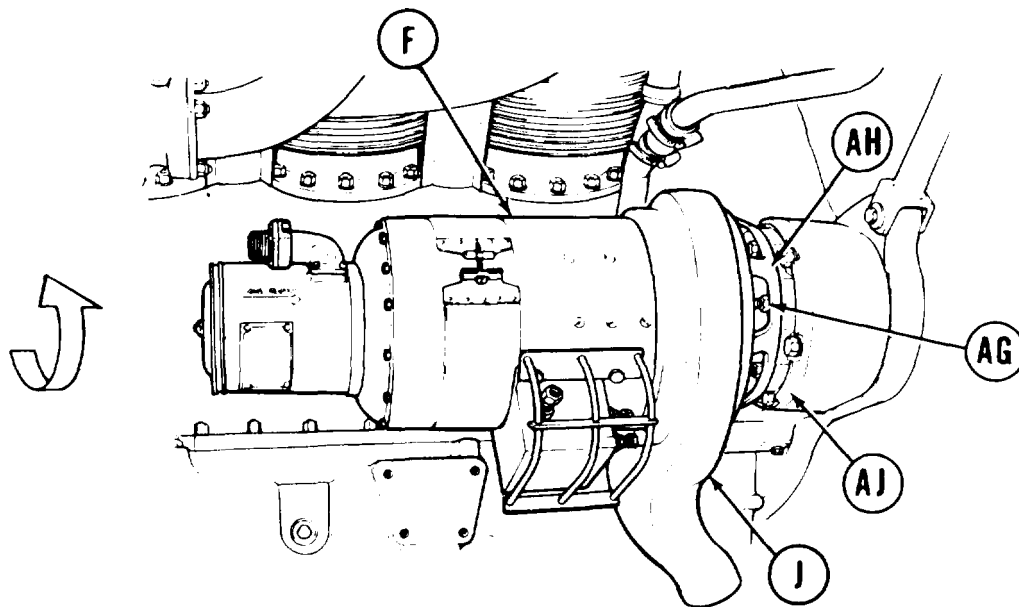
TA139564

GENERATOR REPLACEMENT (Sheet 7 of 15)

WARNING

Generator weighs approximately 100 pounds; therefore, two personnel are required to handle generator during removal. Care must be used to prevent damage to splined shaft and housing when removing generator.

28. Using hydraulic jack, support generator (F).
29. Rotate generator (F) counter clockwise (in direction of arrow) until self-locking nuts (AG) align with elongated holes in mounting flange (AH).
30. Slide generator (F) away from drive adapter (AJ) until drive shaft is disengaged.
31. Remove generator (F) and flexible boot (J) and place on work bench.



Go on to Sheet 8

TA139565