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TECHNICAL MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS
WITH ILLUSTRATED PARTS BREAKDOWN

FOR

AIRCRAFT MOVER

ELECTRICALLY POWERED

P/N 10040-10

APS SYSTEMS (FSCM 60984)

CONTRACT NO. F41608-88-D-1789

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SAFETY SUMMARY

The following are general safety precautions that personnel must understand and apply during many phases of operation and maintenance to ensure personnel safety and health and the protection of Air Force property. Portions of this information may be included in certain chapters of this publication for emphasis. Specific precautions will be included in the text for certain potentially hazardous operations in the form of WARNING or CAUTION statements.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe safety regulations. Do not replace components or make adjustments inside the equipment with the voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position, due to charges retained by capacitors. To avoid injuries, always remove power from, discharge, and ground a circuit before touching it.

DO NOT WEAR JEWELRY

Remove rings, watches, and other metallic objects which may cause shock or burn hazards.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person capable of rendering aid and resuscitation is present.

RESUSCITATION

Personnel working with or near dangerous voltages shall be familiar with modern methods of resuscitation. Such information may be obtained from the Director of Base Medical Services.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the product in the presence of flammable gases or fumes.

DO NOT OPERATE IN WET OR DAMP AREAS

Operating the product in wet or damp areas can be fatal or cause damage to the equipment.

GIVE CLEANERS SPECIAL CARE

Keep cleaners in approved safety containers and in minimum quantities. Observe manufacturers WARNING labels and current safety directives. Use only in authorized areas. Discard soiled cleaning cloths into safety can.

DANGEROUS PRESSURES

Pressure systems safety precautions apply to all ranges of pressure. Care must be taken during testing to ensure that all test connections are properly and tightly made prior to applying pressure to the last setup. Personnel must be protected by a safety shield or located at a distance sufficient to prevent injury.

DANGEROUS PROCEDURE WARNINGS

Throughout this publication, WARNINGS identify potentially dangerous procedures. Instructions contained therein must be followed.

SECTION I

INTRODUCTION AND GENERAL INFORMATION

1-1. INTRODUCTION. This publication is the basic manual of Operation and Maintenance Instructions with Illustrated Parts Breakdown for the Aircraft Mover manufactured by APS Systems, 3535 West Fifth Street, Oxnard, California 93030-6498 (FSCM 60984). The Aircraft Mover is battery powered - hereafter the Aircraft Mover will simply be referred to as the Mover.

1-2. SCOPE OF MANUAL. This manual is divided into eight sections as follows:

a. Section I, Introduction and General Information. Contains the information pertaining to the scope of the manual, and a simplified description of the equipment.

b. Section II, Tools and Test Equipment. Not applicable to this manual.

c. Section III, Preparation for Use and Shipment. Contains the instructio -out prior to operation and to prepare the unit for shipment.

d. Section IV, Operation Instructions. Contains the theory of operation and detailed instructions for operating the Mover.

e. Section V, Maintenance Instructions. Contains inspection, maintenance, troubleshooting, repair, disassembly, cleaning, assembly and testing instructions.

f. Section VI, Diagrams. Contains the electrical diagrams required to operate and maintain the Mover.

g. Section VII, Illustrated Parts Breakdown. Lists all the parts of the Mover essentially in disassembly sequence and includes a numerical index.

h. Section VIII, Difference Data Sheets. Not applicable to this publi-caton.

1-3. RELATED PUBICATIONS. There are no other publications associated with the Mover.

1-4. PURPOSE OF EQUIPMENT. The Mover is a self-contained, portable, battery powered one-man unit for moving F-16 aircraft on the ground.

1-5. GENERAL DESCRIPTION.

NOTE

The terms "left side" and "right side" are defined as standing at the rear of the unit facing the steering bar.

1-6. The Mover consists principally of: a removable motor housing panel, a battery compartment, and an explosio proof DC motor coupled to the differen tial axle for movement, an electrical panel and battery charger.

1-7. DETAILED DESCRIPTION (See Figure 1-1).

1-8. MOTOR HOUSING. The motor housing (1) is constructed of structural steel. It covers the drive assembly of the Mover.

1-9. BATTERY COMPARTMENT. The battery compartment (2) is made of structural steel, is leak-proof, houses four bat-

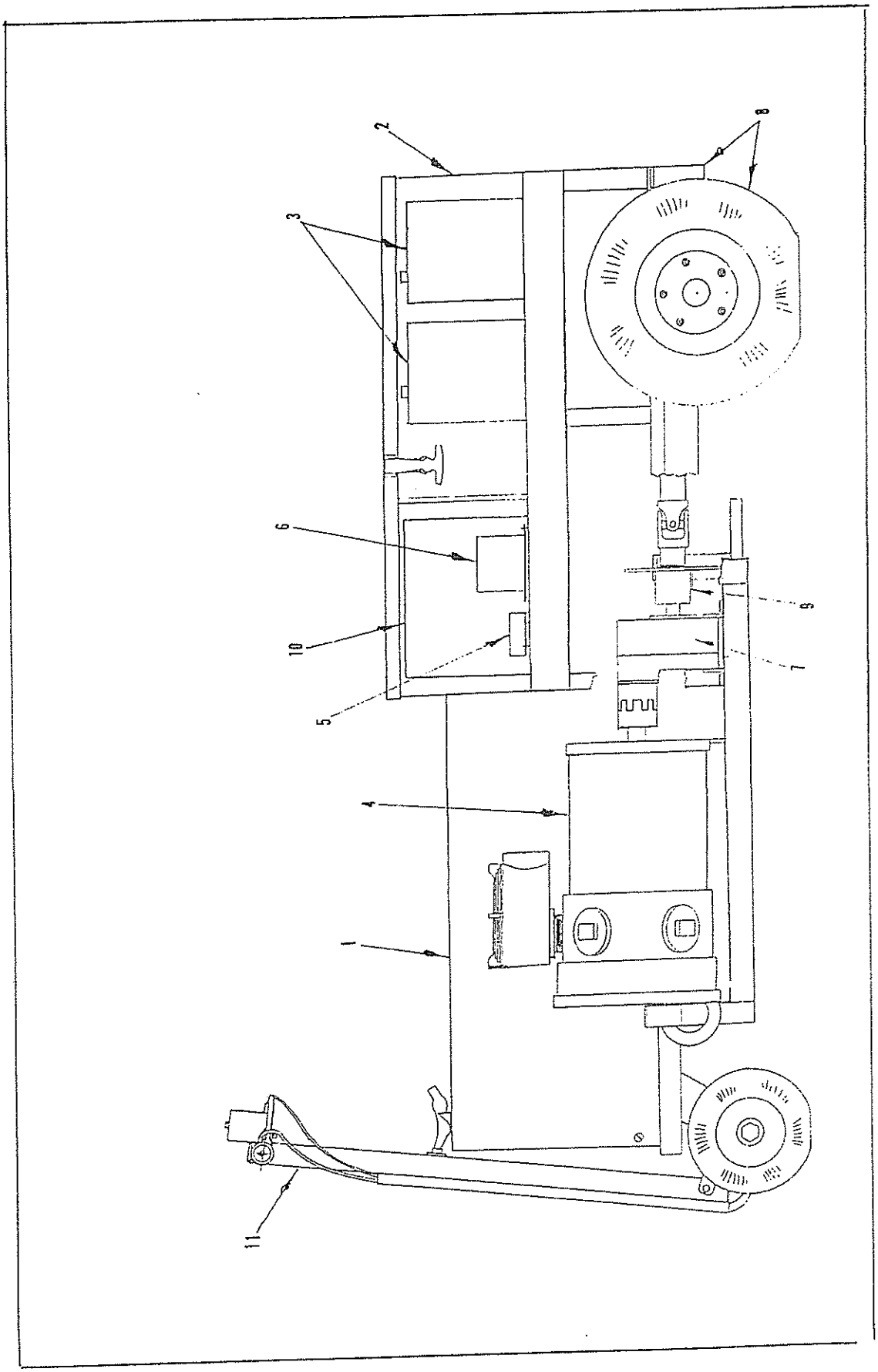


Figure 1-1. Aircraft Mover

teries and other components of the electrical system.

1-10. BATTERIES. Four 12 volt batteries (3) connected in series provide the necessary 48 volts to run the electric motor. The batteries are rated to give 40 minutes of continuous duty.

1-11. ELECTRIC MOTOR. Power for the Mover is provided by a 3 horsepower, explosion proof, 1750 RPM, 48 volt electric DC motor (4) with a 25% overload for 10 seconds.

1-12. ELECTRICAL PANEL. The electrical panel (5) houses the necessary electrical components to start and control the Mover. See Section IV for detailed information.

1-13. CONTROLLER. A transistorized control device (6) inside the electrical panel which allows operator to control of the speed of electric motor. The controller delivers varying power to the motor from fully off to fully on. This power is delivered smoothly rather than in steps or increments. A motorcycle type handle on the steering bar controls the controller via a throttle potbox.

1-14. GEAR RATIO REDUCER. The gear reducer (7) reduces the electric motor RPM in a 5:1 ratio and then transmits its output to the differential axle.

1-15. FRAME AND RUNNING GEAR. The frame is of welded steel construction. The unit rolls on two rear tires driven by the differential axle and free rolling caster wheels on the front for turning.

1-16. BRAKE. The brake system (9) consists of a motorcycle type squeeze handle, small oil reservoir and a disc braking system on the gear reducer drive shaft.

1-17. ELECTRICAL SYSTEM. The electrical system consists of the four 12 volt batteries, an electrical panel, plus a battery charger. See Section IV for electrical components and Section VI for wiring diagrams.

1-18. BATTERY CHARGER. A battery charger (10)is built into the unit and is pre-wired to the four batteries. The charger utilizes 115 VAC, 50 Hz for operation. See Section IV for proper operation of charger.

1-19. STEERING BAR. The steering bar (11) is detachable with a motorcycle type throttle and squeeze type brake on the right handle.

CAUTION

When detaching the steering bar care should be taken to avoid cable and hose damage.

1-20. PROTECTIVE DEVICES AND INSTRUMENTATION. Protective devices and instrumentation are provided as follows:

a. Current Limiter. The controller has a built-in limiter that limits the current to a preset maximum level. This prevents an overload based on motor demand.

b. Undervoltage Cut-Back. Prevents operation of the system with very low battery voltages. This low level is set at 16 volts. Located in controller.

c. Thermal Protection. The controller has thermal protection in case of overheat. If the temperature exceeds 165°F the vehicle performance will be reduced to half its value until the controller cools off.

d. Runaway Protection. Should a fault or short-circuit occur exceeding

a specified limit (7000 ohms) the controller will shut off preventing a runaway.

e. Circuit Breaker. Protects the throttle potbox from battery overload.

f. Overload lamp. Comes on when electric motor is overheating.

1-21. LEADING PARTICULARS. Table 1-1, Table of Leading Particulars, provides the listing of specifications for the Mover.

1-22. CONSUMABLE MATERIAL LIST. Refer to Table 1-2 for the list of consumable materials required to operate, service and maintain the Mover.

Table 1-1. Leading Particulars.

Electrical Requirements	48 Volts DC
Battery (Each)	12 Volt 7 Quarts Electrolite Plates per Cell = 13 Weight = 62 pounds
Tires (Front)	Free Swiveling Size = 2.80/2.50-4 Pressure = 75 pounds 4 Ply
Tires (Rear)	Size = 480-8 Pressure = 60 pounds 2 Ply
Maximum Speed	1.25 MPH (1.83 ft/sec)
Design Acceleration	18 Seconds to Full Speed
Operating Positions	Level, Incline/Decline 0.5 degrees
Rated Continuous Operation	40 Minutes
Weight	1700 Pounds
Dimensions (Towbar stored)	Height = 42.00 Length = 80.00 Width = 36.00
Charger	115 VAC, 50 Cycles

CAUTION

Notice that charger is wired for 50 cycles and not 60 cycles (USA).

Table 1-2. Consumable Materials

Nomenclature	Part Number
Adhesive (stud-lock)	Loctite Corp. Blue # 242
Agent, Degreasing	MIL-D-12491
Compound, corrosion-preventive	MIL-C-6529A
Compound, silicone	MIL-S-8660
Desiccant, activated	MIL-D-3464
Glue, Epoxy	Devcon 5 Minute Epoxy Devcon Corp., Danvers, MA 01923
Grease	MIL-G-18790 MIL-I-2105 Gr. 80W-90 (Axle)
Lubricant	MIL-L-2104 or MIL-L-10324 Non-Detergent
Paper, emery	P-P-105
Powder, lapping	MIL-L-17862
Sealant	VC-3
Solvent, cleaning	P-D-680, Type II
Solvent, mineral spirits	MIL-C-12491
Tapé, water resistant, pressure sensitive	PPD-T-60

Table 1-2. Consumable Materials (continued)

Nomenclature	Part Number
Tape, teflon	MIL-T-27730
Solder	QQ-S-571
Paint, frame, cabinet	Green, 24052 per FED-STD-595
Paint, pre-treat	MIL-C-15328
Paint, primer, epoxy	MIL-P-23377
Paint, primer, zinc chromate	TT-P-1757
Paint, gray, gear reducer	Rockford Gray bioline 8-61-00-01-060
Coating, acid thinner, gear reducer	Rockford 8-61-00-01-061

SECTION II

SPECIAL TOOLS AND TEST EQUIPMENT

2-1 **SPECIAL TOOLS AND TEST EQUIPMENT.** There are no special tools or test equipment required.

SECTION III

PREPARATION FOR USE AND SHIPMENT

3-1. INTRODUCTION. The information contained in this section describes procedures necessary to prepare the Mover for use. Also, included, are procedures for removal of the Mover if required.

3-2. PREPARATION FOR USE.

3-3. UNPACKING. The Mover is shipped completely assembled on fully inflated tires and requires no major assembly of components prior to preparing the Mover for use.

a. Strip waterproof tape from seams, doors and other openings of cabinet.

b. Thoroughly inspect the interior of the Mover. Remove all extraneous packing or cushioning material used to protect internal components during shipment. Small areas of normally exposed metal surfaces may be wrapped with protective covering or tape during shipment. Be certain all such coverings are removed.

3-4. INITIAL INSPECTION. It is important to carefully inspect the complete Mover for possible damage which may have occurred during shipment. The following initial inspection procedures are recommended:

a. Check data appearing on Mover nameplate to verify it is the type of unit designated in paragraph 1-1 of this manual. If there is any doubt, do not attempt to operate the Mover in accordance with the instructions contained in this manual.

b. Inspect battery terminals for corrosion, batteries secure, and battery wires connected and tight. Inspect gages and electrical components for evidence of shipping damage. Check that all parts are securely mounted.

c. Inspect for damaged hose assemblies and fittings. Check that all fittings are securely connected.

d. Carefully inspect electrical wiring for broken wires or frayed insulation. Check that all electrical connections are secure.

e. Check tires for proper inflated pressure. Normal rear tire pressure should be 60 ± 5 psi and front tire 75 ± 5 psi with tires cold. Inspect tire treads and casings for cuts or abrasions and remove any imbedded objects from treads.

f. Check tow and steering assemblies. Check that the steering apparatus swings freely.

g. Inspect Mover frame and cabinet for any damage. Make certain that all bolts and screws are secured. Check latches for proper closing and locking.

NOTE

Batteries are shipped dry from the manufacturer.

h. Fill batteries with electrolyte if required.

3-5. PRELIMINARY LUBRICATION. Check all lubrication points and lubricate the Mover as required (See Table 5-5).

3-6. START. See Section IV for starting procedures.

NOTE

Refer to the troubleshooting information given in Section V if an abnormal indication

is obtained while testing the system for operation.

3-7. PREPARATION FOR STORAGE. Prepare Mover for storage as follows:

a. For extended periods of storage, four weeks or more, the battery cables should be disconnected. If the cables are left connected it is possible the battery may discharge and freeze from a short or solid state device which continually draws small amounts of current.

b. If the Mover is stored in an unheated area during the winter, remove the batteries and store inside.

(1) Batteries should be stored in a clean, cool, dry and well-ventilated location away from radiators or heating ducts, etc., and protected from exposure to direct sunlight.

(2) Before storing, it is necessary that the battery be fully charged and the electrolyte at the proper level. Disconnect leads or cable connections to prevent use or possible added loss of charge during prolonged storage period. Do not remove electrolyte or dismantle the battery.

(3) If storage temperature is 80°F. or higher, check gravity at least monthly, if 60°F. or lower, every two months. Whenever gravity fails to about 1.240 or below, give equalizing charge and also before returning to service.

c. Check all lubrication and lubricate the Mover as required.

d. Install tape over all openings, seams, doors and panels. Check underside of unit.

3-8. PREPARATION FOR SHIPMENT. The Mover does not require an external packing container. For shipment, prepare Mover in the same way as for storage, paragraph 3-7 steps a thru d.

SECTION IV

OPERATING INSTRUCTIONS

4-1. GENERAL. This section provides detailed description and the location of all operating controls and includes step-by-step operating instructions for the Mover. Operator should be familiar with all this section before attempting to operate the unit.

CAUTION

Personnel operating the Mover must be familiar with the location and function of all controls and have a thorough knowledge of the principals of operation involved.

4-2. THEORY OF OPERATION. The aircraft mover is a self-contained, small, battery powered one-man operated unit for moving F-16 aircraft. After the unit is hooked up to the aircraft the operator chooses the direction in which be desires to move the aircraft by use of the forward/reverse select toggle switch. By engaging the throttle the operator increases, or decreases, the electrical power to the motor thereby increasing, or decreasing, the speed. While moving the aircraft forward presents no special handling problems backing the aircraft is similar to backing a trailer and will require some finesse.

4-3. DRIVE SYSTEM. The drive system consists of the electric motor, coupling, gear reducer, and the rear axle. The electric motor RPM is coupled to a gear reducer where a reduction ratio of 5:1 occurs. The output of the gear reducer is then transmitted to the rear axle which has a 12.25:1 gear ratio making the tires turn at controllable speeds.

4-4. BRAKE SYSTEM. The braking system is designed to stop the Mover within 2 feet of travel while towing the aircraft. This applies to traveling on a level surface or an incline/decline of 0.5 degrees.

4-5. OPERATING CONTROLS AND INSTRUMENTS.

4-6. The operating controls (Figure 4-1) are conveniently located and grouped for ease of operation. The two gage instruments (Figures 4-2 and 4-3) are located in the battery compartment and are associated with the battery.

4-7. AMMETER GAGE. When the charger is connected to a proper wall receptacle (115 Vac, 50 Hz) and is charging, the ammeter (Figure 4-2) will display the amount of current going to the batteries in amperes. The gage range is 0 to 30 amperes. See paragraph 4-11 for charger operating instructions.

4-8. BATTERY FUEL GAGE. The battery fuel gage (Figure 4-3) works similar to a car fuel gage. As the charge level goes up and down an LED (horizontal line) will light up showing the current battery charge level. As the level of charge falls below 1/4 full the 70% LED warning will begin to flash. Any further drop of the charge level will activate the 80% discharge alarm (empty) which will cause the bottom two LED's to alternately flash.

4-9. ELECTRICAL PANEL. The electrical panel controls (Figure 4-4) are shown in their respective positions and a functional description given for each item.

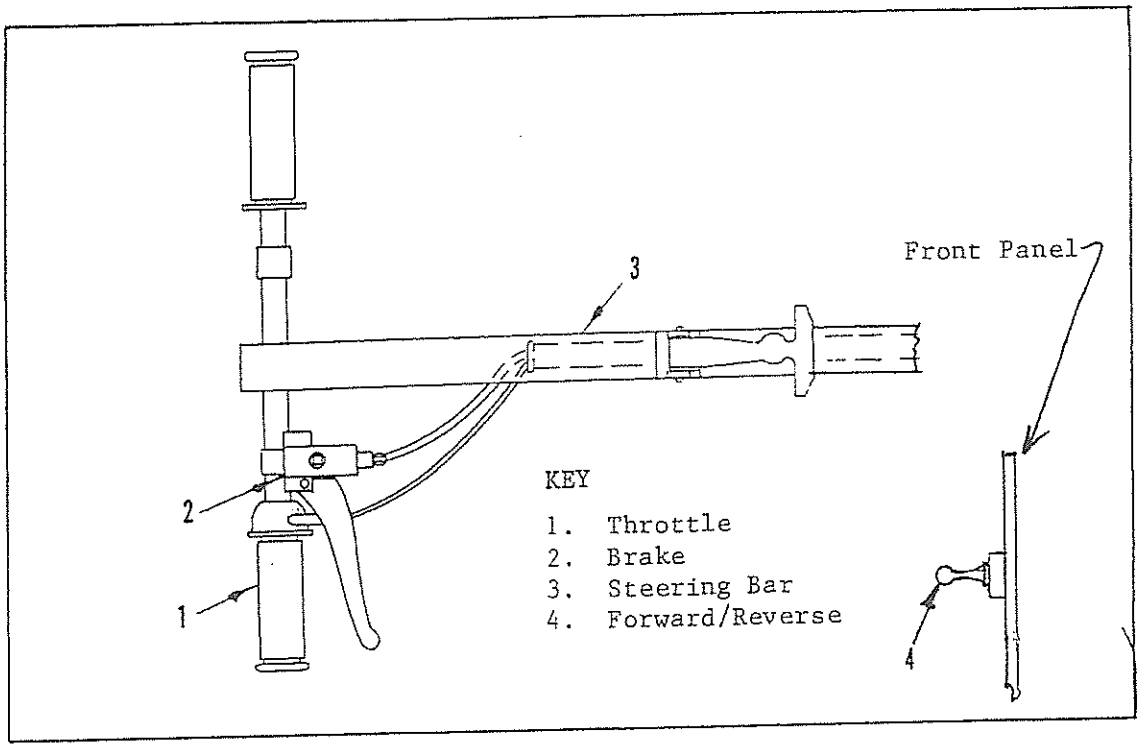


Figure 4-1. Operating Controls

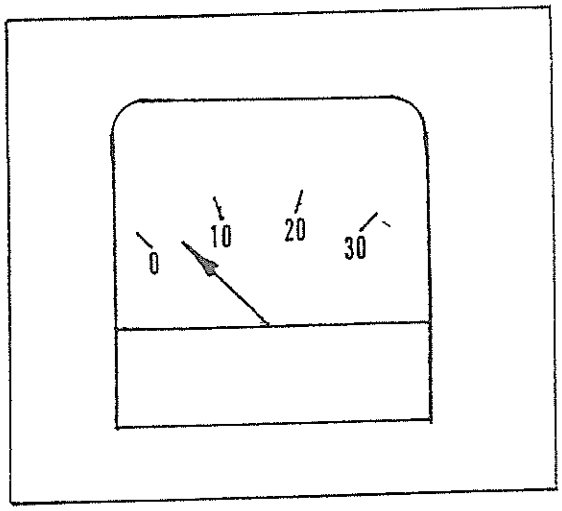


Figure 4-2. Charger Ammeter Gage

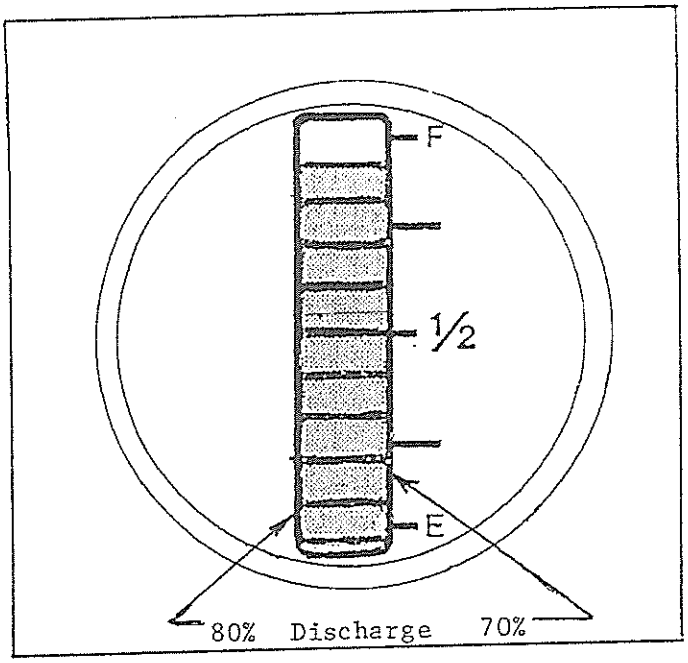
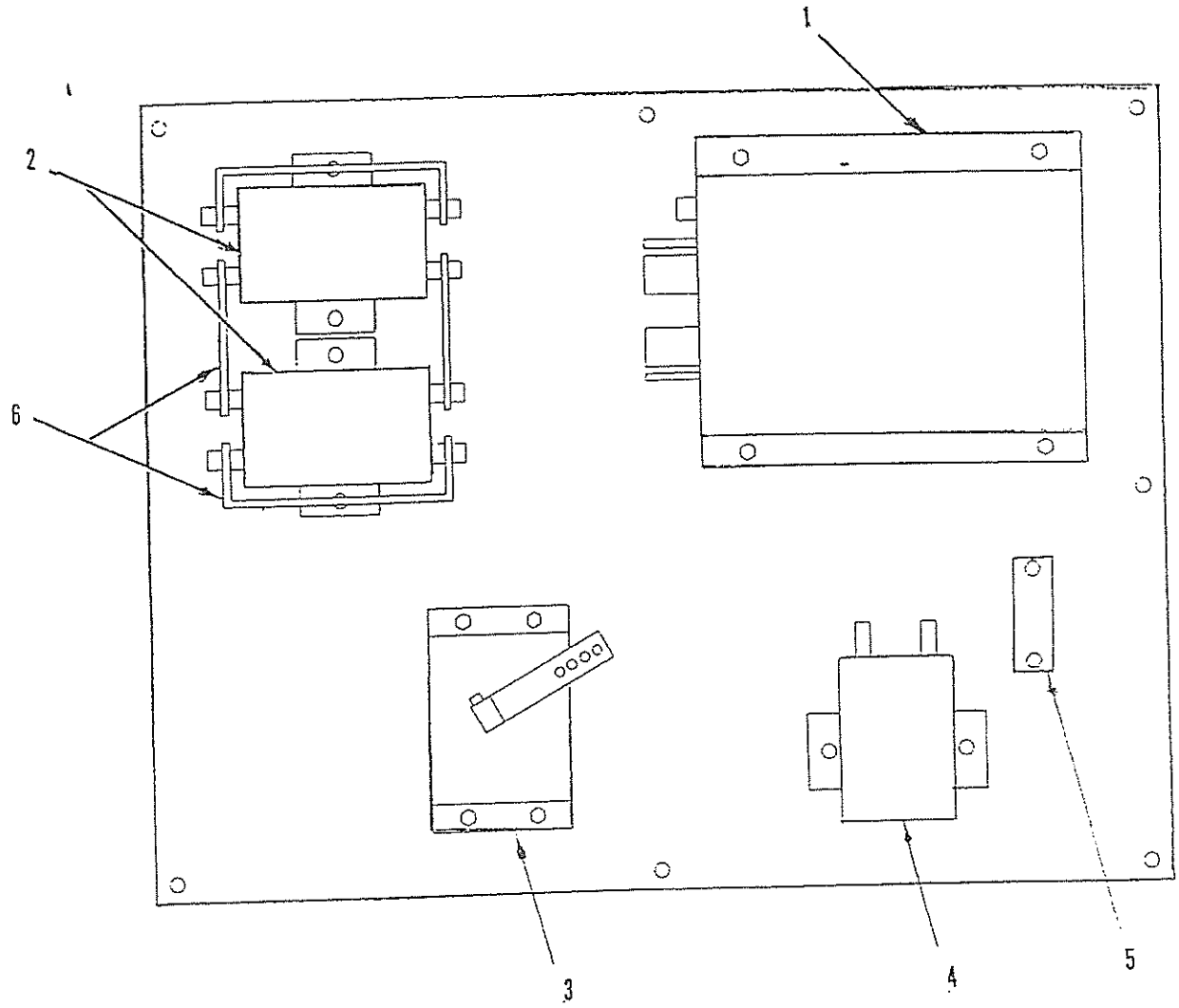


Figure 4-3. Battery Fuel Gage



INDEX NO.	PANEL ITEM	FUNCTION OR OPERATION
1	Controller	Provides smooth control of electric motor drive speed from off to fully on.
2	Contactor	High current capacity starts for motor reversing current.
3	Potbox	Provides a variable resistance to controller for speed control. Set with twist grip throttle.
4	Contactor	Disconnects power to circuitry when system is turned off.
5	Circuit Breaker	Circuit protection to potbox.
6	Jumpers	Electrical path.

Figure 4-4. Electrical Panel

4-10. FORWARD/REVERSE SWITCH. A three position toggle switch (forward, off, reverse) located on the front of the unit determines whether the unit will move forward or in reverse. The operator must select a mode prior to engaging the throttle handle.

WARNING

The throttle must be in the off position before movement of the forward/reverse toggle switch.

4-11. BATTERY CHARGING PROCEDURES.

NOTE

Charger is pre-wired to batteries.

a. Connect power supply cord to a properly grounded outlet of the proper voltage and frequency (115 Vac 50 Hz). Should an extension cord be required use a three prong plug (with ground) of at least 12 gauge and extension as short as possible.

b. If charger battery cables are connected to batteries, charger will automatically start after a short delay.

c. Monitor ammeter for correct charge rate. Initial rate will depend on discharge of batteries, normally 18-30 amps. Charge rate will decrease to a finish of 5-10 amps when all cells are good.

d. Charges will automatically turn off when batteries are fully charged.

WARNING

When charging batteries insure proper ventilation by removing battery compartment cover. Failure to do so may create gas pockets leading to a possible explosion.

WARNING

Do not connect, or disconnect, charger battery cables from batteries with charger connected to a power source.

CAUTION

Do not expose charger to rain.

CAUTION

Replace defective cables or wires immediately.

CAUTION

Do not leave charger on while unattended for more than two consecutive days. Severe overcharging and possible damage to batteries will result if charger should fail to turn off.

4-12. OPERATING PROCEDURES (START).

4-13. EXTERNAL INSPECTION.

a. Battery charger - Disconnected from outlet and cable stored.

b. Forward/Reverse switch - Off.

c. Aircraft towbar - Remove from housing (if stored).

d. Motor housing panel - Remove.

e. Battery cover - Remove.

f. Tires - Check for proper inflation.

g. Brake fluid reservoir - Check filled to proper level.

h. Brake lines - Check for leaks and secure.

i. Throttle cable - Connected and secure.

4-14. INTERIOR INSPECTION.

a. Electric motor - General condition.

b. Coupling - General condition and secure.

c. Gear reducer - General condition, no leaks, secure.

d. Brake assembly - No leaks, secure.

e. Drive shaft - Connected both ends.

f. Rear axle - No leaks.

g. Batteries - Check charge level, water level and general cleanliness.

h. Motor housing panel - Install and secure.

i. Battery cover - Install and secure.

4-15. CHECKOUT PROCEDURES.

a. Select switch - Forward position.

b. Throttle - Engage and check movement in proper direction.

c. Brakes - Apply and check.

d. Select switch - Reverse position and repeat steps (b) and (c).

e. Select switch - Off.

4-16. NORMAL OPERATION.

a. Mover - Position properly in front of aircraft.

b. Aircraft towbar - Connect to aircraft nosewheel and mover pintle hook. Check secure.

c. Forward aircraft movement -

(1) Select switch - Forward position.

(2) Throttle - Engage slowly until movement starts and then as required.

d. Backward aircraft movement -

(1) Select switch - Reverse position.

(2) Throttle - Engage slowly until movement starts then as required.

4-17. NORMAL STOP/SHUTDOWN.

a. Throttle - Off.

b. Brakes - Apply and stop mover.

c. Select switch - Off.

d. Aircraft towbar - Disconnect from aircraft/mover and store.

e. Battery charger - Plug in to charge batteries (if required).

4-18. EMERGENCY SHUTDOWN.

a. Select switch - Off.

SECTION V

MAINTENANCE INSTRUCTIONS

5-1. GENERAL. Maintenance of the Mover consists of periodic inspection, cleaning, service adjustment, minor repairs or replacement of parts and components, and lubrication of main motor. The procedures described in this section must be performed regularly and thoroughly, even though the Mover is operating satisfactorily. Through proper inspection, maintenance, and lubrication, equipment that is not in continuous use is kept ready for operation when necessary and the unit is maintained at peak performance levels for the maximum life of the equipment.

5-2. INSPECTION INSTRUCTIONS.

5-3. VISUAL AND MECHANICAL INSPECTION. Because the purpose of inspections is generally to determine serviceability, it is extremely important to visually inspect parts, particularly those for which no special requirements can be specified. The judgement factor is inherent in all inspections other than dimensional or operational inspections. If a part appears defective, correct the defect or replace the part at the point at which the defect is noted, before performing additional inspections. Do not disassemble equipment merely to perform inspections of components if performance of the equipment or component assembly is satisfactory.

5-4. Inspect all equipment prior to disassembly, when disassembled, and after final reassembly for visible defects. The inspection will check tangible and visible mechanical conditions of the equipment and its components. Pay particular attention to loose, broken or dirty connections and cracked, chipped or broken housing, bases or mounting brackets. Check manually for positive mechanical action of moving parts. Check for binding of rotating equipment. Inspect for freedom from dust and dirt, particularly in air passages, and oil grease, particularly on coils or contacts. Inspect lamps and indicators for broken filaments, loose indicators, broken cases, or bases.

5-5. DIMENSIONAL INSPECTION. Where dimensional inspection is required, make measurements indicated with standard shop measuring devices. Dimensional tolerances are not critical in most of the electrical components, and the inspection may be ignored if visual and mechanical inspection is satisfactory and the equipment is operating properly. Do not disassemble equipment merely to perform dimensional or operational inspections.

5-6. OPERATIONAL INSPECTION. Operational inspection normally may be confined to testing procedures indicated in Section IV. Do not disassemble equipment merely to perform operational inspections. Where operational inspection is indicated, satisfactory operation at rated specifications is generally acceptable, and minimum and maximum performance is not critical, unless specifically called for.

5-7. INSPECTION TABLES. Inspection procedures are tabulated for electrical parts, mechanical parts and related groups of parts for which specific data is required. (See Tables 5-1 through 5-3.) All other parts can be adequately inspected by visual inspection.

5-8. COMPONENT REMOVAL. When it is necessary to remove any components from the Mover observe the following precautions and general practices.

CAUTION

Do not use adjustable jaw-type wrenches on tube fittings. Slippage may result in damage to hexagonal fitting surfaces.

a. Do not attempt to remove or repair any electrical component unless input power is disconnected.

b. When removing electrical components, disconnect electrical leads from terminals and tag each for ease of identification during reassembly.

5-9. SERVICE/PERIODIC INSPECTION. Refer to Table 5-5 for requirements. The following precautions should be observed when servicing the Mover.

a. Always disconnect charger power cable from power source prior to performing any inspection or maintenance procedure.

b. Do not perform any inspection or maintenance procedures on any internal components immediately after operation due to heat build-up.

c. Do not operate Mover with front cabinet section removed due to exposure to rotating components.

5-10. PREVENTATIVE MAINTENANCE. Maintenance is generally limited to cleaning, service adjustments, and minor repair or replacement of parts and components that require attention through normal service use. Generally, the instructions consist of carefully noting method of installation when removing defective parts, performing the necessary minor repair, or adjustment, and installing parts in reverse order of removal.

5-11. LUBRICATION. Perform in accordance with Table 5-5.

5-12. OPERATIONAL CHECKOUT.

5-13. A checkout will be performed as required and after overhaul of a component or complete Mover to verify operational performance. Proceed in accordance with paragraphs 4-12 to 4-15 in Section IV.

WARNING

Unless absolutely necessary, do not operate Mover with cabinet sections open because of exposure to rotating equipment.

WARNING

If an electrical failure or extreme overload occurs, personnel should not breathe the toxic fumes generated inside the motor.

WARNING

Water should not be applied to any electrically energized equipment because of the danger of electric shock which can result in serious or fatal injury.

5-14. BATTERIES. Care of the batteries is of utmost importance since they are the Movers only source of power.

5-15. BATTERY WATER. Distilled water is preferred, de-mineralized water, and tap water could be used if it is not too hard.

CAUTION

Do not add battery acid to a battery that has already been activated.

a. Batteries should be checked

for proper water level and never less than a minimum of 1/16 above the plates. If any part of the plate is exposed to air and dries out, that portion becomes non-functional and probably cannot be revived.

b. Water should be added to the battery when it is near the end of charge and gassing or as soon as possible after termination of charging. At this time the electrolyte is at its maximum level and addition of water to the proper level will not cause an overflow later on.

c. Under normal usage water may need to be added weekly. This interval may be extended based on experience.

5-16. BATTERY POSTS. It is imperative that battery posts and cable terminals be absolutely clean. Any corrosion build-up will inhibit the flow of electricity coming or going. A great portion of maintenance headaches can be traced to dirty battery posts and terminals.

5-17. BATTERY WEAR. As a battery is charged and discharged during normal operation, the lead paste material eventually wears out and drops off the lead grid plates, especially the negative plate. This material falls to the bottom and accumulates, eventually shorting out the battery. Also, as the plate material comes off the battery, the battery's ability to power the electric motor is réduced as it gradually grows weakér.

5-18. BATTERY FAILURE. Insure that the battery receives the proper amount of charge. Consistent undercharge and/or excessive overcharge will contribute to internal battery problems with a loss of capacity and reduction of life.

a. Undercharge

(1) Sulfation - Residual sulfation remaining in the plates if battery is not fully recharged or allowed to remain partially discharged for an extended period of time. --Results in reduced performance and life.

(2) Stratification - Caused by insufficient gassing at end of charge. Little or no mixing of electrolyte will thus create a higher concentration of electrolyte at the bottom of the cell compared to the top. This will eventually lead to sulfation of the bottom of the negative plate with subsequent fall off of performance.

b. Overcharge

(1) Wastes electrical energy while running the risk of permanent damage to the battery.

(2) Excessive gassing, producing hydrogen and oxygen increases the frequeny of water additions to the battery and increases the explosion hazzard significantly over normal and safe charge conditions.

(3) It creates dangerously high battery temperature which significantly shortens normal battery life if repeated instances occur above 110°F. Battery temperature at the end of charge should not exceed 110°F. To assure this, batteries should not be put on charge above 90°F if possible.

c. Vibration. Batteries subject to high vibration, loose mounts, missing battery holddowns, etc. will fail early. This results from plate breakage, plates touching and shorting out, plate material being shook from the plates and building up on the battery bottom then shorting out the battery.

d. Neglect. Low electrolyte levels, missing holddowns, etc. can also cause battery failure. Low

electrolyte levels cause the top part of the plates to dryout, destroying the exposed portion.

5-19. BATTERY CLEANING. See paragraph 5-33.

5-20. INSPECTION AND PREVENTATIVE MAINTENANCE.

5-21. ELECTRIC MOTOR.

WARNING

Make sure motor is disconnected from power source before performing any maintenance operations on the motor.

a. Insulation. Insulation resistance should be checked during each maintenance inspection. Low resistance may be caused by excessive dirt, moisture or impending failure. Although motors can be successfully run with insulation resistance as low as 1/4 megohm investigate the reasons for any insulation resistance below 1 megohm.

b. Brushes. Brush condition and remaining brush life should be checked at each maintenance inspection. Each brush should be checked for length and each spring for proper pressure. When installing new brushes, each brush should be sanded into the curvature of the commutator for most reliable performance. A minimum of 85% surface contact with 100% brush arc is recommended. Replacement brushes should be exactly the same brush grade as the original.

c. Commutator. Commutator runout should not exceed .002" total indicated runout with a bar-to-bar variation of .0002". The mica bar-to-bar insulation should always be kept below the copper surface. When commutator wear results in flush or protruding mica, the mica should be undercut to a depth equal to the thickness of the mica or about .025". The undercut slot should be kept clean and free of dirt.

d. Bearings. Standard bearings are double shielded and pre-lubricated therefore do not require lubrication. Bearings should be replaced during a maintenance overhaul or after several years of service due to normal wear.

5-22. GEAR REDUCER.

a. Oil Leaking from Caps, Cap Screws or Pipe Plugs. Corrective action includes re-tightening, or removal and recoat with Locktite. If this does not correct leaking condition disassembly will be required to replace gaskets.

b. High Internal Operating Temperature (above 200°F). Unit possibly overloaded, damaged bearings, or inadequate oil is a possible cause of heat build-up. Use process of elimination to arrive at cause factor.

c. Oil Leaking from Seals. Indicates that shaft and/or seals are worn and possibly need replacing.

NOTE

Keep dirt and foreign particles off shafts in the area of seals to minimize wear.

NOTE

After replacement of seals some leakage is normal until seals become seated against shaft.

d. Excessive End Play of Shafts. If there is a noticeable shaft movement when couplings are removed it is an indication of bearing

wear.

c. Excessive Backlash. Indicates worn internal gears which may have to be replaced.

NOTE

If any screws are removed a new application of Locktite (or equivalent) is required or lockwashers must be installed.

NOTE

Screw threads and threaded holes must be degreased before applying Locktite (or equivalent).

5-23. REAR AXLE.

a. Whenever roller bearings are removed they should be replaced with new ones.

b. Oil seals should be checked for signs of leaking, cuts or cracks.

c. Check the sealing surface of hub and shaft. Replace if seal has grooved the surface more than 1/64.

5-24. TROUBLESHOOTING.

5-25. When Mover operates in a faulty or erratic manner, check item listed in Table 5-4, Troubleshooting Chart for the trouble, probable cause, and remedy.

CAUTION

Use caution when input power cable is connected when performing any troubleshooting or repair procedures to preclude unnecessary hazard to personnel.

Table 5-1. General Inspection

Part	Inspect For
Tubing	Thin spots from improper flaring, cracks and binds. Nicks and dents are permissible to a depth of 10% of the tube wall thickness.
Threaded fittings, screws, bolts, nuts	Worn or damaged threads.
Oil seals, preformed packing, grommets, gaskets	Cuts or nicks on sealing surface, deterioration, or loss of elasticity.
Springs	Cracks, pitting, broken ends and lack of tension.
Brackets panels, mounts, covers, sheet metal structures, clamps	Dents, distortion, punctures, bends, kinks, cuts.
Keys	Wear, distortion, looseness in shaft.

WARNING

The following involve dangerous voltages which may cause severe shock or injury. Avoid contact with energized components. Remove rings, watches, and other metallic objects which may cause shock or burn hazards.

Table 5-2. Inspection of Electrical Parts

Part	Inspect For
All equipment and components	General condition of parts: cracks, chips and breaks.
All equipment and components (continued)	Mechanical action of moving parts. Condition of leads and cables.
Toggle switches	Check continuity across terminals in both open and closed positions.
Motors	Refer to paragraph 5-21 for inspection data.

Table 5-3. Inspection of Mechanical Parts

Parts	Inspect For
Ball Bearings	Out-of-round, scoring and rough, noisy operation.
Tapered roller bearings and races	Out-of-round, scoring and rough, noisy operation.
Sleeve bearings	Out-of-round, scoring and wear.
Shafts	Wearing, scoring, bent condition, damaged teeth if applicable.

Table 5-4. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Electric motor will not start	Select switch in OFF position	Check select switch in proper position.
	Batteries not fully charged or dead	Check battery charge level, specific gravity, dead cells charge or replace as necessary.
	Wrong voltage or cycles causing non-response from circuitry	Connect to specified power source.
	Defective electrical panel components	Repair or replace defective wiring or components.
Electric motor not working at full capacity	Controller overload (Electrical Panel)	Let controller cool off. Full power returns. Check for cause of overload.
Brakes ineffective	None, or low brake fluid level	Fill reservoir to proper level.
	Line leak	Check line from reservoir to master cylinder for leaks.
	Master cylinder leak	Check master cylinder for any leaks Repair or replace.
	Brake pucks worn	Replace
Throttle ineffective	Throttle line disconnected at handle or potbox	Re-connect

Table 5-4. Troubleshooting (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Battery unequal or low specific gravities	Electrolyte spillage during watering Electrolyte flooding Internal short	Avoid overwatering, neutralize & clean. Water cells during end of charge. Replace cell.
Battery excessive water requirement	Overcharging Jar leakage	Select a properly sized charger. Check charging time and Avg. battery temp. Replace or repair cell.
Battery excessive cell temperature	Overcharging Battery temperature too high at start of charge Shorted cell(s)	Check charger size and charging time. Allow battery to cool down before starting charge. Replace battery.
Poor Mover performance	Battery undersized Discharge indicator malfunction Defective charging connector Sufficient loss of electrolyte	Install higher capacity battery. Reset discharge indicator for 80%. Replace or repair cable and/or connector. Adjust gravities at state of full charge. Check for leakage.

5-26. GENERAL. This section contains essential repair and replacement instructions for using personnel.

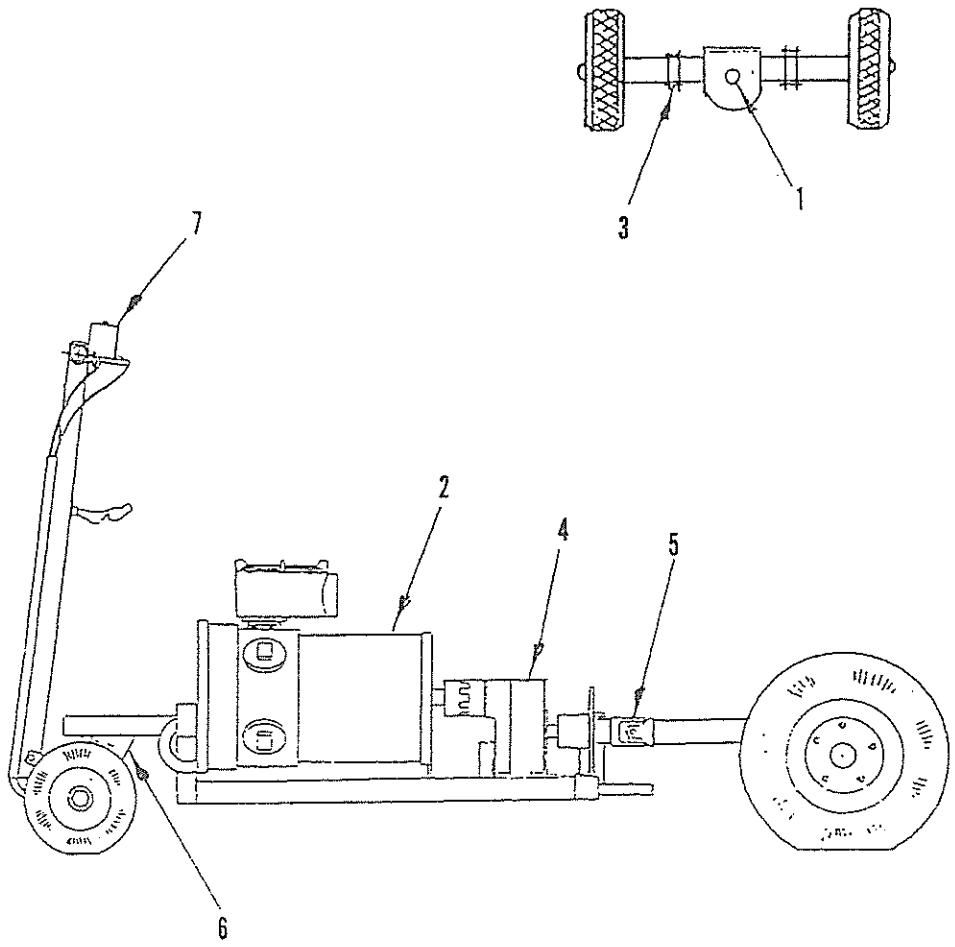
5-27. COMPONENT REMOVAL AND INSTALLATION. When it is necessary to remove any component of the Mover, observe the following precautions and general practices:

CAUTION

Do not use adjustable jaw-type wrenches on tube fittings. Slippage may result in damage to hexagonal fitting surfaces.

a. Do not attempt to remove or repair any electrical component unless input power is disconnected.

Table 5-5. Lubrication Chart



#	ITEM	LUBE	PROCEDURE
1	Rear Axle (Yearly)	Non-Detergent SAE 30 weight oil	Remover top plug and fill with oil until it runs out the rear mid-plug.
2	Electric Motor		Motor does not require lubrication.
3	Wheel Bearing (2 years)	MIL-G-18709	Hand pack the wheel bearings.
4	Gear Box (Yearly)	Lubriplate 5555	Fill on top plug until oil runs out mid plug.
5	U-Joint (2 Years)	MIL-G-10924	Apply with grease gun to grease fitting.
6	Front Wheels (2 Years)	MIL-G-10924	Apply with grease gun to grease fitting.
7	Brake Fluid	SAEJ703 DOT3	Fill to proper level.

b. If it is necessary to remove system lines connected to components, loosen fitting at end of each line, and remove attaching parts securing component to structure. Do not bend system lines on removal, as thread damage or misalignment may result. Cap or plug open lines or ports with protective closures.

c. When removing electrical components, disconnect electrical leads from terminals and tag each for ease of identification during re-assembly.

5-28. DISASSEMBLY/ASSEMBLY OF REAR AXLE. See paragraphs 5-39 and 5-40.

5-29. DISASSEMBLY OF ELECTRIC MOTOR.

a. Remove the brushholder springs (8) and brushes (9) from the brushholders (10).

b. With the motor in a vertical position, drive end up, remove the drive end bearing bracket bolts and remove bracket (5).

c. Next the armature (3) can be removed using a lifting eyebolt in the center hole in the shaft.

d. Disconnect all connections between the magnet frame and the commutator end bearing bracket to the magnet frame. Remove the bracket from the frame, tapping it loose to disengage the rabbet.

e. Further disassembly or replacement of parts can now be accomplished as required by the situation.

f. See paragraph 5-24 for cleaning.

g. See paragraph 5-37 for assembly.

5-30. DISASSEMBLY OF GEAR REDUCER (See Figure 5-2).

a. Remove pipe plugs (15) from housing half (3) and drain all lubricant from unit.

b. Remove bolts (2) (17) (18) holding halves together. Housing halves may be loosened by tapping with rubber hammer.

NOTE

Do not pry halves with screwdriver as housing damage may occur.

c. Carefully slip input shaft assembly (5) and output shaft assembly (14) out of housing halves. Avoid damaging gear teeth or contaminating bearing surfaces with grit or abrasive particles.

d. Disassemble output shaft (14) as follows:

(1) Place side of gear (12) on anvil of a press with shaft up. Push shaft through roller bearing (11) and gear (12). Remove key (9) from shaft keyway only if it is damaged and needs replacing.

(2) Press remaining roller bearing (11) from shaft by supporting inner bearing race on press anvil and pushing shaft through bearing.

NOTE

Do not attempt to strip both roller bearings and gear of a shaft at the same time as one roller will lodge against the key under the gear.

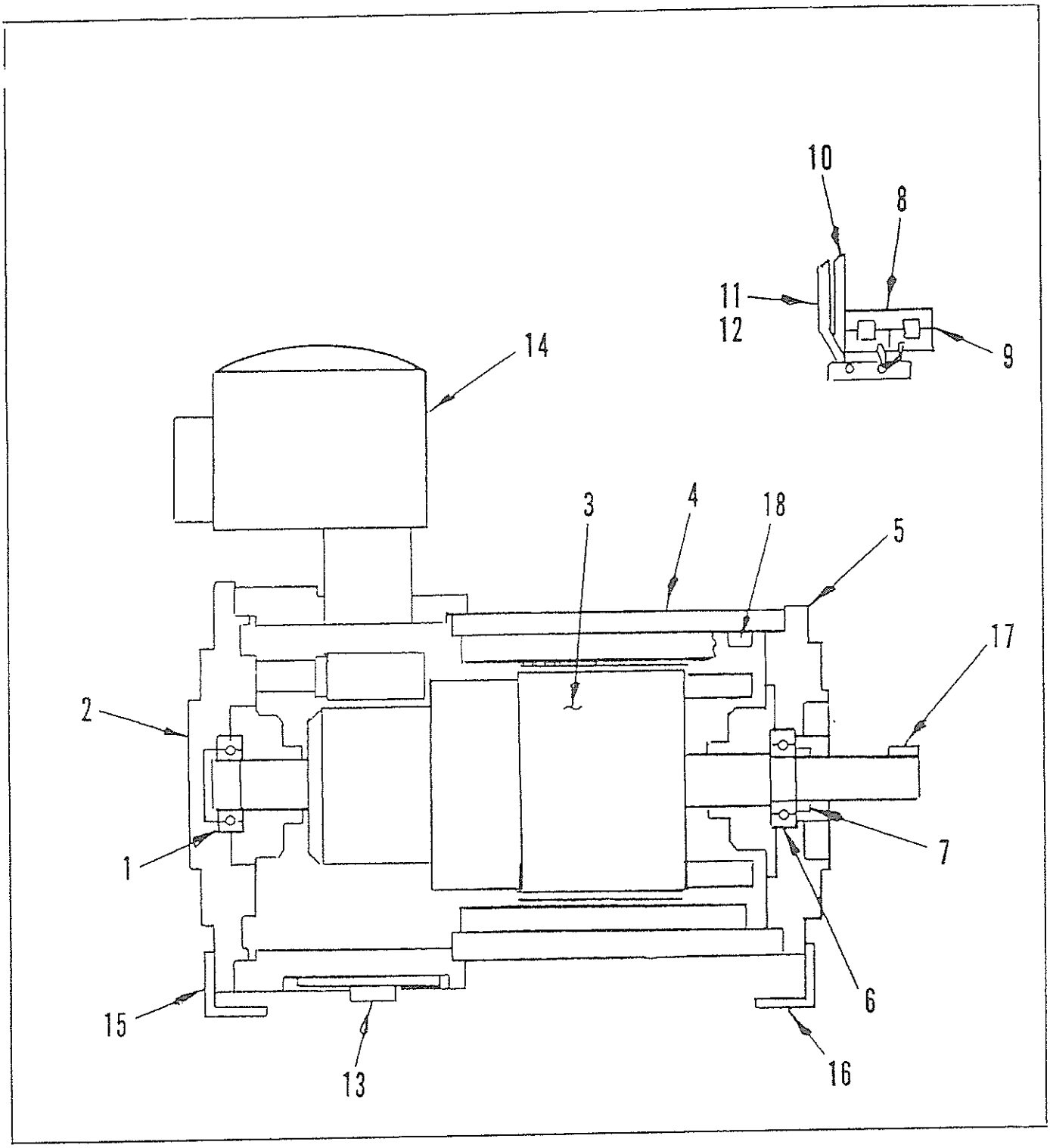


Figure 5-1. Electric Motor

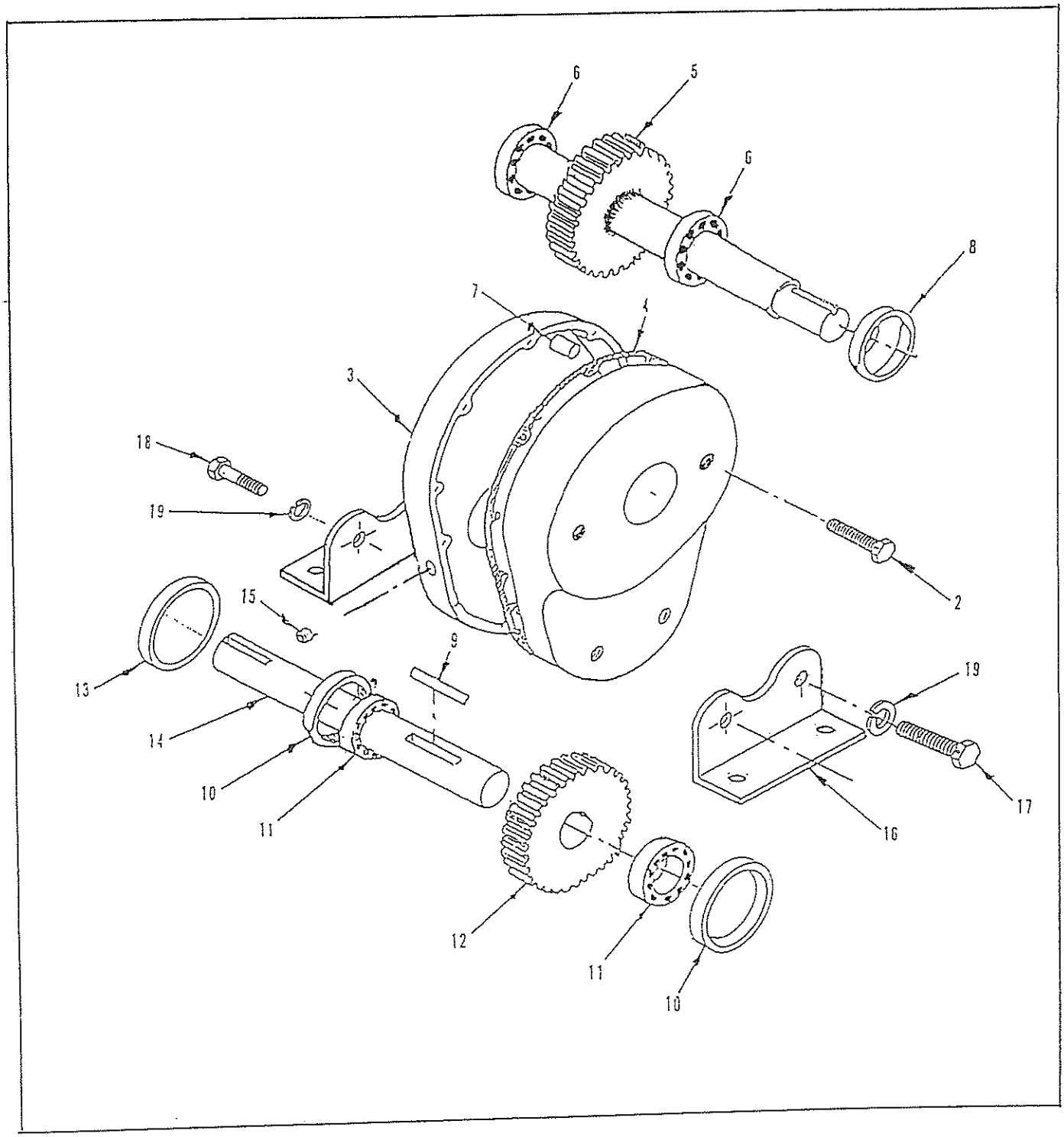


Figure 5-2. Gear Reducer

(3) If roller bearings are to be replaced, bearing cups (10) must be removed from case halves with a puller tool so that no damage will occur to case. If a puller is not available, it is possible to gently tap opposite sides of cup through hole in open caps to remove bearing cups.

(4) Examine seals (8 and 13) for wear or damage and remove from housings only if replacement is necessary.

e. Disassembly of input shaft (5). Use basic procedure in step d above with the exceptions that gear (5) and shaft are one piece.

f. See paragraph 5-32 for cleaning.

g. See paragraph 5-38 for assembly.

5-31. REPAIR. Component repair consists of performing any repair or part replacement necessary to restore the component to a serviceable condition. The operator shall limit repair to only the procedures detailed herein. Perform only those procedures necessary to make the required repair or part replacement.

5-32. CLEANING. The Mover should be cleaned whenever there is an accumulation of dust or dirt on the exterior of the cabinet or whenever grease, oil or similar foreign matter is inadvertently spilled within the Mover. Clean the Mover in accordance with T.O. 35-1-12, and common shop practices.

WARNING

Use solvent in well ventilated area. Avoid contact with open flames and avoid inhalation of fumes, as injury could result.

WARNING

Use approved personnel protective equipment (goggles, face shield) when using compressed air. Provide protection from flying particles. Do not direct airstream toward self or other personnel.

a. Clean all disassembled components, except electrical parts and prelubricated bearings, with solvent, Federal Specification P-D-680 Type II. Use a stiff-bristle, non-metallic brush to ensure that all orfices, packing grooves, and ports are thoroughly clean.

b. Dry all cleaned parts using compressed air at approximately 15 psig, or a clean, lint-free cloth.

c. After cleaning, inspect all parts for wear and defects, such as nicks, burrs, scoring, cracks, corrosion, or similar defects. Inspect all threaded areas for stripped, crossed, or broken threads. Inspect mounting holes for elongation which would effect component performance.

CAUTION

Do not use abrasive cloth, Federal Specification P-C-458, on aluminum or magnesium alloy parts, as it contains an iron oxide which causes rapid oxidation of these metals.

d. Polish out minor defects from noncritically dimensioned surfaces, using abrasive cloth, Federal Specification P-C-458, for ferrous alloy parts and abrasive cloth, Federal Specification P-C-451, for aluminum and magnesium alloy parts. Ensure that precision fits, and seating or sealing surfaces are not

destroyed. Reclean any repaired parts.

e. Replace all preformed packings, back rings, gaskets, and seals, regardless of condition, each time a component is required.

5-33. BATTERY CLEANING.

a. Check the battery for cleanliness at regular intervals. When necessary, dust or other material which has accumulated should be removed by cleaning the battery.

b. If battery tops become wet and dirty, or if any tray corrosion is visible, remove batteries and clean batteries and tray.

c. A periodic washing is recommended at least twice yearly. A clean battery increases battery life.

d. Keep vent plugs in place and tight at all times to avoid loss of electrolyte due to gassing or spillage. The gas-escape holes in the vent plugs should be examined to see that they are not clogged with dirt. Wash all vent plugs yearly or as needed by immersing in a bucket of water and wiping clean.

5-34. ELECTRICAL MOTOR CLEANING.

CAUTION

Solvents must not be used. Liquid solvent may carry electrical conducting dirt deep into cracks and voids in the insulation system.

a. Both the interior and exterior of the motor should be kept clean and free of dirt and grease.

b. Loose dirt may be removed by vacuum cleaning or dry compressed air. Vacuum cleaning is preferred because compressed air may drive dirt deeper into cracks and voids in the insulation system.

c. Loose dirt can be removed with a cleaning rag or a soft bristle brush.

d. Clogged air openings should be cleaned out using care not to damage insulated parts.

5-35. REPAIR OF MOTOR STARTERS. Repair of motor starters and contactors should be generally limited to replacement of contact coils, overload relays, and heaters. Coils should be replaced if they show evidence of overheating or other defects that may cause eventual failure during operation. Contacts are silver plated and are still serviceable even though discolored or pitted. Replacement of contacts is necessary only when silver contact surface has worn thin. Contacts are supplied in kits. Replace all contacts contained in kit at one time. Observe the following during starter repair:

CAUTION

Do not file contacts as contact material and correct alignment will be destroyed.

a. Remove coils by removing coil leads and magnet screws, then remove magnet assembly and slip out coil; replace in reverse order.

b. Remove heaters by removing attaching screws and withdrawing from starter; replace in reverse order.

c. Remove contacts by first removing arc box and cross bar, then twisting out moving contacts and unscrewing stationary contacts. Replace in reverse order.

5-36. REPAIR OF CONTROLLER. The

controller is a sealed unit and cannot be field serviced.

5-37. ASSEMBLY OF ELECTRIC MOTOR. (See Figure 5-1)

a. Install commutator and bracket (2) into frame.

b. Install bolts holding bracket to frame.

c. Connect all connections between magnet frame and commutator end bracket.

d. Install armature (3) and drive end bracket (5).

e. Install drive end bracket bolts.

f. Install brushes and brush holder springs into brush holders.

5-38. ASSEMBLY OF GEAR REDUCER. (See Figure 5-2)

a. Assemble input shaft (5). Press ball bearings (6) onto shaft (5).

b. Assemble output shaft (14).

(1) If roller bearings were replaced install new bearing cups (10) into case halves.

(2) Install key (9) and gear (12) on shaft. Press rollers (11) into place on both sides of gear.

c. Carefully slip input shaft (14) assembly and output shaft (5) assembly into housing half (3).

d. Install only one gasket (4) and dowels (7) into housing half (3).

e. Install remaining housing half (1) by aligning dowels to match and hand rotate shafts to check that gears are meshed. Bolt halves loosely.

f. Bearing may be adjusted by adding or removing gaskets between case halves.

g. Remove cap screws, clean threads on screws and in holes with degreaser, apply Locktite, and torque screws evenly.

CAUTION

Do not get Locktite on seals or bearings.

h. If oil seals (8 and 13) were removed because of wear and tear install new ones into position at this time.

5-39. DISASSEMBLY OF REAR AXLE. (See Figure 7-5).

a. Remove wheel shafts (33) from axle by removing screws (40 and 41).

b. With rubber hammer tap shaft outward from axle and remove items (34, 35, 36, 37, 38 and 39).

c. Separate housing halves (1) and (20) by removing eight cap screws (6), lockwashers (7) and nuts (8).

d. Remove two bearing caps (10) by removing four bolts (9). Bearing caps are marked for identification. Replace them in their original position.

e. Do not remove bearing (12) unless failure is evident.

f. Remove ring gear (16) by removing cap screws (14). With a piece of hardwood block and hammer drive ring gear off carrier (15).

g. Carrier assembly (15) is recommended not to be field disassembled

and should remain as one unit. A visual inspection should be made for wear and tear, broken teeth and excessive play.

h. Remove cotter pin (31), nut (30) and lockwasher (29) from end of union shaft. Remove end yoke (30) and remove pinion shaft by tapping it with a rawhide hammer.

i. Remove front oil seal (27) and replace with new one at time of assembly.

j. Remove washer shim (26) and bearing (25).

k. Remove front bearing cup (24). Shims (23) are located between bearing cup and carrier bore. Take care not to damage shims when removing bearing cup. If damaged - replace.

l. Remove rear bearing cup (18). Check shims (19) for damage.

5-40. ASSEMBLY OF REAR AXLE. (See Figure 7-5).

a. Install shims (19), bearing cup (18), bearing (17) and pinion shaft to rear of housing half (20).

b. Install shims (23), bearing cup (24), bearing (25), shim washer (26), oil seal (27) and end yoke (28). Secure with lockwasher (29), nut (30) and cotter pin (31).

c. Install ring gear (16) on carrier (15) and secure with cap screws (14).

d. Install carrier (15) and secure with bearing cup (11), bearing cap (10) and bolts (9).

e. Install new cover gasket (5) between housing halves (20) and (1) and secure halves to each other with eight cap screw (6), lockwashers (7) and nuts (8).

f. On tire shafts (33) install items (34, 35, 36, 37, 38 and 39). Tap shaft into axle and secure with screws (40) and nuts (41).

5-41. CALIBRATION. Calibration of the entire Mover is not possible. Instruments which appear inaccurate or erratic during operation shall be individually calibrated.

SECTION VI

DIAGRAMS

6-1. GENERAL. This section provides the diagrams and wire lists necessary for troubleshooting, maintenance and repair of the Mover. The Diagram for the Mover is as follows:

Electrical Schematic Figure 6-1

LEGEND FOR FIGURE 6-1

B1	Motor, DC 3HP
BT1	Battery, 4 x 12V
BTC1	Battery Charger
CB10A	Circuit Breaker
CR1	Diode, IN5802
CR2	Diode, IN5802
CR3	Diode, IN5802
DS1	Light
K1	Contactor, Main
K2	Contactor, Reverse
K3	Contactor, Forward
MT1	Throttle Potbox
S1	Switch, Select, Rev.-Off-Fwd.
Z1	Controller, Curtis PMC
CC1	Control Console
M1	Indicator, Battery Condition

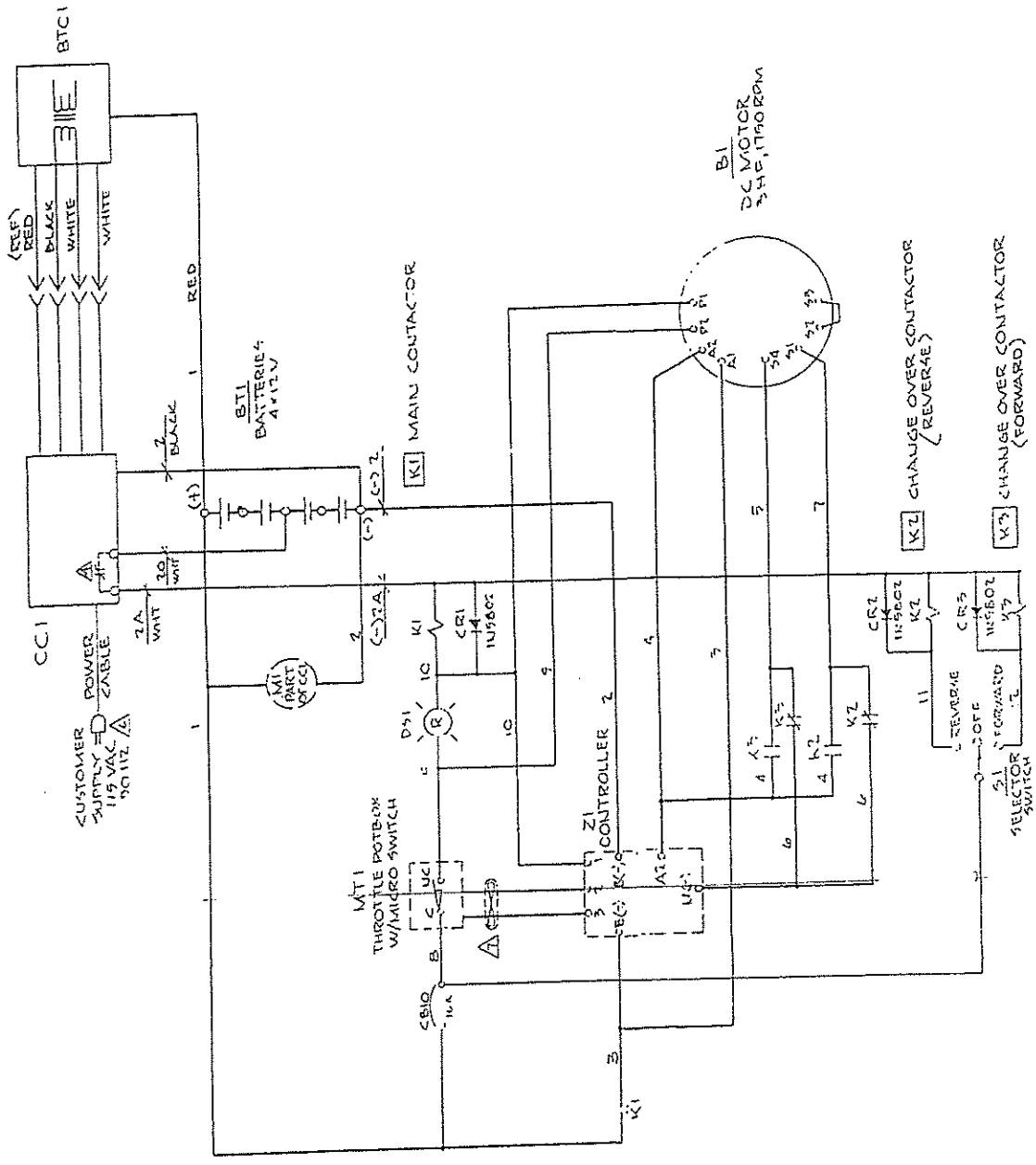


Figure 6-1. Electrical Schematic

SECTION VII

ILLUSTRATED PARTS BREAKDOWN

7-1. GENERAL. Illustrated Parts Breakdown lists, illustrates, and describes assemblies, sub-assemblies and detailed parts for the Aircraft Mover, part number 10040-10 manufactured by APS Systems, Oxnard, California 93030-6498 (FSCM 60984).

The assemblies and parts installed on the end item at manufacture are listed and identified in this manual. When an assembly, or part (including vendor items), is different from the original during the manufacture of later items, series, or blocks, all assemblies and parts are listed and "Usable On" coded. However, when the original assembly or part does not have continued application (no spares of the original were procured or such spares are no longer authorized for replacement), only the preferred assembly or part is listed. Also, when an assembly or part was installed during modification, only the preferred item is listed. Interchangeable and substitute assemblies and parts, subsequently authorized by the Government, are not listed in this manual; such items are identified by information available through the Interchangeable and Substitute (I&S) Data Systems. Refer to T.O. 00-25-184. When a standard size part can be replaced with an oversize or undersize part, the latter parts, showing sizes, are also listed. Repair Parts Kits and Quick Change Units are listed when they are available for replacement.

7-2. SCOPE. This Illustrated Parts Breakdown is divided into three sections: Introduction, Maintenance Parts List and Numberical Index.

7-3. RELATED PUBLICATIONS. There are no other plubications related to this unit.

7-4. SYMBOLS USED.

The following terms, symbols, and abbreviations are used in the MPL.

-	Through
x	Times(By)
#	Number
&	Ampersand
AFR	Air Force Regulations
Alum	Aluminum
AP	Attaching Part
Assy	Assembly
Deg	Degree
dia	Diameter
DPDT	Double Pole Double Throw
F	Follows
FSCM	Federal Supply Code for Manufacturers
ft	Feet
Fwd	Forward
GA	Gage
GFE	Government Furnished Equipment
GTC	Gas Turbine Compressor
Hd	Head
Hp	Horse Power
Hz	Hertz
ID	Inside Diameter
KVA	Kilivolt AC
lg	Long
LH	Left Hand
LP	Low Pressure
MPL	Maintenance Parts List
NHA	Next Higher Assembly
No.	Number

NPT	National Pipe Thread
OD	Outside Diameter
PVC	Poly Vyle Chloride
REF	Reference
RH	Right Hand
sq	Square
SMR	Source, Maintenance, and Recoverability
SS	Stainless Steel
STL	Steel
T.O.	Technical Order
v	Volt
Vac	Volt Alternating Current

7-5. MAINTENANCE PARTS LIST. (Sec. II).

7-6. Purpose. The maintenance parts list (MPL) list all parts used in the overhaul maintenance, essentially in disassembly sequence.

7-7. FIGURE AND INDEX NUMBER, COLUMN. In this column, the digits preceding the dash refer to the figure in the Parts Breakdown on which a part of assembly is illustrated. The digits following the dash are the index numbers of procurable and nonprocurable parts and assemblies. Parts shown for reference purposes only are not given index numbers. The index numbers are numerically arranged in the Group Assembly Parts List and are used primarily to assist in locating a part after it has been found in the Numerical Index.

7-8. PART NUMBER COLUMN. In this column are listed either the manufacturer's part number, Government standard part number, or a vendor part number. The phase "No Number" has been inserted in the "Part Number" column to indicate a group of parts to which no part number has been assigned. Such a group is followed immediately by one or more numbered assemblies and their component parts which comprise the un-numbered group. The symbol "COML" appears in the "Part Number" column to indicate part to which no government standard or manufacturer's part number has been assigned. Such parts are generally procurable from normal commercial sources and are completely identified in the description column for the purpose of replacement. These parts are listed in the Numerical Index by noun name and description.

7-9. FSCM. This column lists the Federal Supply Code for Manufacturers of the parts.

7-10. DESCRIPTION COLUMN. In this column are listed each assembly, its attaching parts and components of the assembly properly indented to show their relationship to the assembly. Those parts used to attach parts or assemblies to each other are designated "AP". These attaching parts are listed immediately following the assembly or part they attach.

7-11. UNITS PER ASSEMBLY. This column lists the quantity of each part used in the end item, at the specific index location.

The term "REF" may appear in the Units per Assembly column. It is used to signify that the part shown is there for information purposes only (clarity) and that the part has already been accounted for in a previous breakdown.

7-12. USABLE ON CODE COLUMN. Usable On Codes may be employed in the breakdown to indicate that the parts so shown are usable as replacement only on the end item identified with the same code. When no code is used the part is applicable to all end items.

7-13. SOURCE CODE DEFINITIONS.

a. Definitions of applicable source, maintenance, and recoverability (SMR) codes are set forth in T.O. 00-25-195.

b. This manual contains Joint Military Services Uniform SMR codes only. Definitions of the SMR codes are available in T.O. 00-25-195.

7-14. NUMERICAL INDEX. This section contains all the part numbers listed in numerical order. The part number is followed by all the Figure/Index numbers where it can be found.

7-15. MANUFACTURER'S CODE NUMBERS. The manufacturer's code numbers are listed in the FSCM column. These codes are:

FSCM

00624 Aeroquip
300 South East Street
Jackson, MI 49203

01288 GE-DC/Motor
3001 East Lake Road
Erie, PA 16531

02799 Arco Electronic
9822 Independence Avenue
Chatsworth, CA 91311

13445 Cole-Hersee Company
20 Old Colony Avenue
Boston, MA 02127

18583 Curtis Instruments
200 Kisco Avenue
Mount Kisco, NY 10549

26455 Tol-O-Matic Inc.
1028 South Third Street
Minneapolis, MN 55415

28891 United Technologies
1510 Wall Street
Fort Wayne, IN 46801

33974 Mark-Five Ind.
1791 Fillmore Avenue
Buffalo, NY 14214

39438 McMaster-Carr Supply Company
P. O. Box 4355
Chicago, IL 60680

FSCM

59730 Thomas & Betts
Hwy 218 S
Iowa City, IA 52240

60168 Enginetics Corp.
4060 Lisa Drive
Tipp City, OH 45371

63761 Lester Electrical
625 West A Street
Lincoln, NE 68522

71286 Rexnord Inc.
601 Route 46 West
Hasbrouck Heights, NJ 07604

71744 General Instrument
4433 N. Ravenswood Ave.
Chicago, IL 60640

73389 Scott & Fetzer
4801 West 150th Street
Cleveland, OH 44133

75665 Dual Air Fan Co.
South Elgin, IL

78080 Dana Corporation
4100 Bennett Road
Toledo, OH 43696

81221 Neapco Products
P. O. Box 399
Pottstown, PA 19464

94189 Dico Inc.
200 SW 16th Street
Des Moines, IA 50305

94222 Southco Inc.
Lester, PA 19113

97271 Dana Corporation
2100 West State Blvd.
Fort Wayne, IN 46801

98750 San Antonio Air Logistics Ctr.
Kelly AFB, TX 78241-5000

MFR	
Aeroquip 300 South East Street Jackson, MI 49203	00624
Arco Electronic 9822 Independence Avenue Chatsworth, CA 91311	02799
Cole-Hersee Company 20 Old Colony Avenue Boston, MA 02127	13445
Curtis Instruments 200 Kisco Avenue Mount Kisco, NY 10549	18583
Dana Corporation 2100 West State Blvd. Fort Wayne, IN 46801	97271
Dana Corporation 4100 Bennett Road Toledo, OH 43696	78080
Dico Inc. 200 SW 16th Street Des Moines, IA 50305	94189
Dual Air Fan Co. South Elgin, IL	75665
Enginetics Corp. 4060 Lisa Drive Tipp City, OH 45371	60168
GE-DC/Motor 3001 East Lake Road Erie, PA 16531	01288
General Instrument 4433 N. Ravenswood Ave. Chicago, IL 60640	71744

MFR	
Lester Electrical 625 West A Street Lincoln, NE 68522	63761
Mark-Five Ind. 1791 Fillmore Avenue Buffalo, NY 14214	33974
McMaster-Carr Supply Company P. O. Box 4355 Chicago, IL 60680	39438
Rexnord Inc. 601 Route 46 West Hasbrouck Heights, NJ 07604	71286
San Antonio Air Logistics Ctr. Kelly AFB, TX 78241-5000	98750
Scott & Fetzer 4801 West 150th Street Cleveland, OH 44133	73389
Southco Inc. Lester, PA 19113	94222
Thomas & Betts Hwy 218 S Iowa City, IA 52240	59730
Tol-O-Matic Inc. 1028 South Third Street Minneapolis, MN 55415	26455
United Technologies 1510 Wall Street Fort Wayne, IN 46801	28891

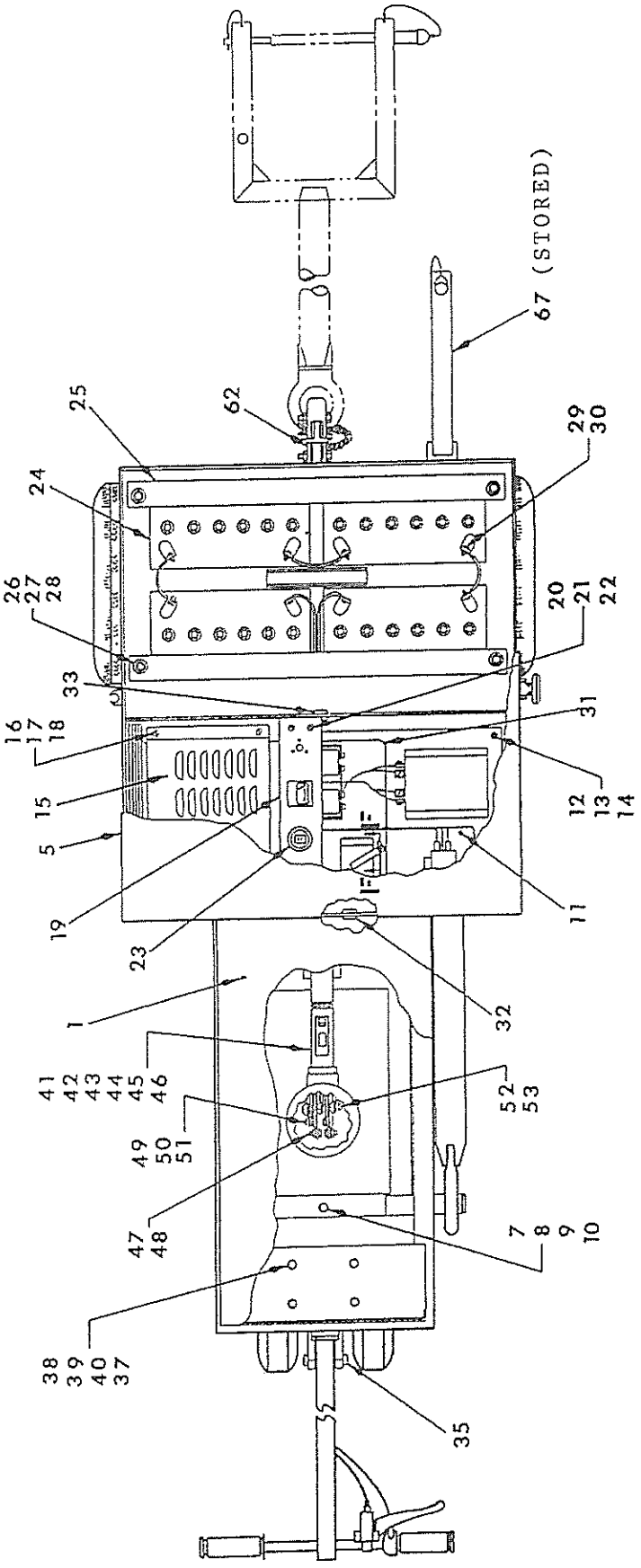


Figure 7-1. Aircraft Mover (Page 1 of 2)

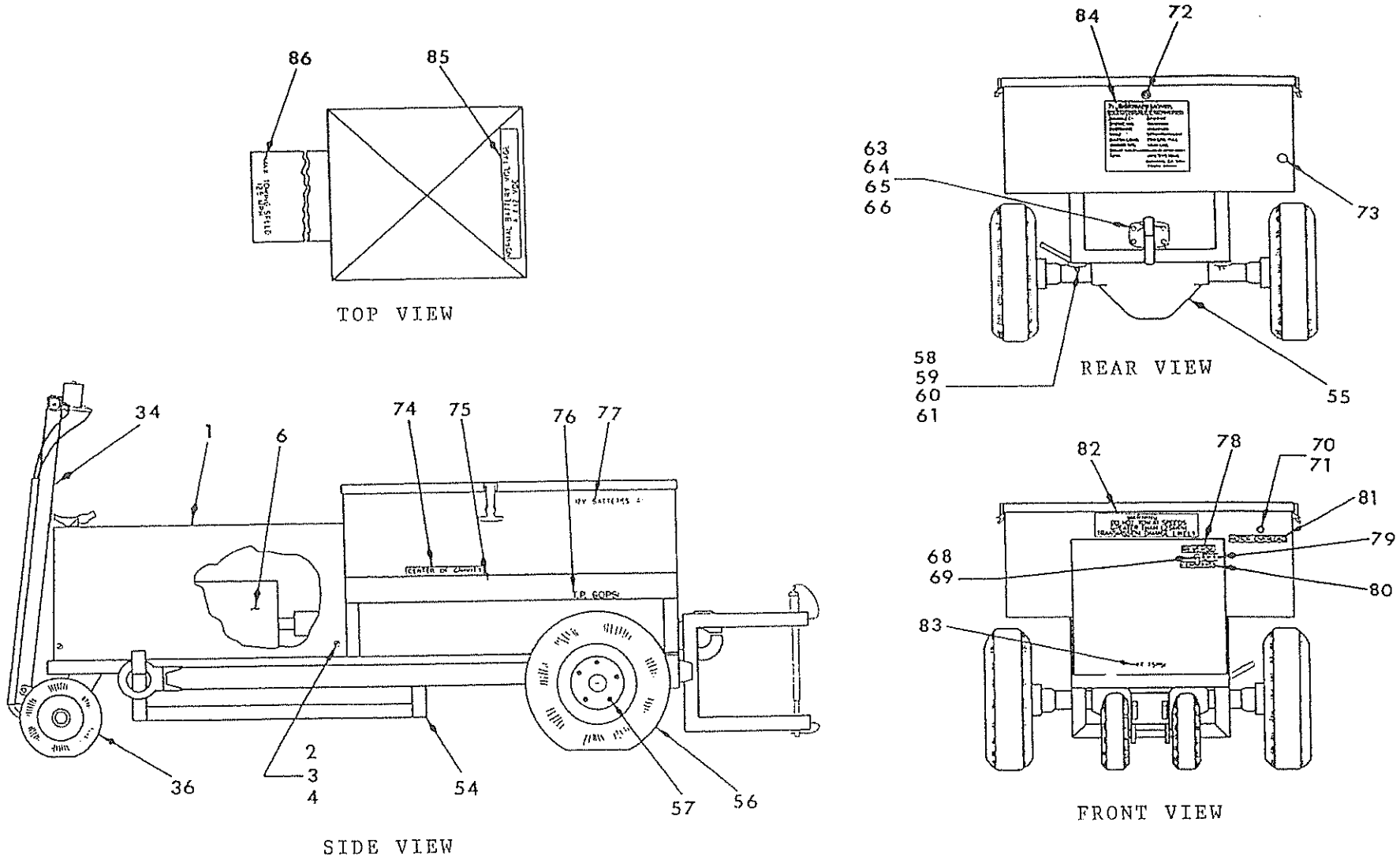


Figure 7-1. Aircraft Mover (Page 2 of 2)

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
-1-	10040-10	60984	AIRCRAFT MOVER, Electrically Powered .	1		
-1	40854-01	60984	. COVER, Drive.	1		
-2	85-11-160-20	94222	. STUD (AP)	4		
-3	85-47-101-15	94222	. RECEPTACLE (AP)	4		
-4	85-34-101-20	94222	. RETAINER (AP)	4		
-5	40790-01	60984	. COVER, Battery.	1		
-6	20044-10	60984	. DRIVE ASSEMBLY. . . . . (See Figure 7-2 for breakdown)	1		
-7	MS90725-69	96906	. SCREW, Cap.	6		
-8	MS27183-14	96906	. WASHER, Flat (AP)	6		
-9	MS35338-46	96906	. WASHER, Lock (AP)	6		
-10	MS51967-8	96906	. NUT, Plain (AP)	6		
-11	20046-10	60984	. ELECTRICAL PANEL ASSEMBLY . . . . . (See Figure 7-3 for breakdown)	1		
-12	8223605-01	98750	. BOLT, Washer head (AP).	4		
-13	MS27183-8	96906	. WASHER, Flat (AP)	4		
-14	8223606-01	98750	. NUT, Nylock (AP).	4		
-15	12490	63761	. CHARGER, Battery.	1		
-16	MS90725-8	96906	. SCREW, Hex head (AP).	4		
-17	MS27183-10	96906	. WASHER, Flat (AP)	4		
-18	MS51967-2	96906	. NUT, Plain (AP)	4		
-19	40790-01	60984	. CONSOLE, Battery charger.	1		
-20	8223605-01	98750	. BOLT, Washer head (AP).	4		
-21	MS27183-8	96906	. WASHER, Flat (AP)	4		
-22	8223606-01	98750	. NUT, Nylock (AP).	4		
-23	900R48HG	18583	. INDICATOR, Battery.	1		
-24	30H580R	90842	. BATTERY 12V	4		
-25	40792-01	60984	. HOLDOWN CLIP, Battery	2		
-26	MS27183-14	96906	. WASHER, Flat (AP)	4		
-27	MS35338-46	96906	. WASHER, Lock (AP)	4		
-28	MS51967-8	96906	. NUT, Plain (AP)	4		
-29	MS90725-32	96906	. SCREW, Hex head	8		
-30	MS51967-5	96906	. NUT, Plain.	8		
-31	60048-10	60984	. WIRE HARNESS.	1		
-32	MS35489-69	96906	. GROMMET	1		
-33	MS35489-78	96906	. GROMMET	1		
-34	30115-10	60984	. STEERING BAR ASSEMBLY . . . . . (See Figure 7-4 for breakdown)	1		
-35	98320A503	39438	. PIN, Quick release (AP)	1		
-36	40849-10	60984	. WHEEL, Swivel	1		
-37	MS90725-64	96906	. SCREW, Cap (AP)	4		
-38	MS27183-14	96906	. WASHER, Flat (AP)	4		
-39	MS35338-46	96906	. WASHER, Lock (AP)	4		
-40	MS51967-8	96906	. NUT, Plain (AP)	4		
-41	1.25 x 7.38	60984	. NIPPLE, Conduit	1		
-42	614	59730	. REDUCER	1		

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
-43	XYB-5	59730	. FITTING, Seal	1		
-44	386	59730	. BUSHING, Insulator.	1		
-45	XSC-8	73389	. SEALING COMPOUND.	AR		
-46	XAF-6	73389	. SEALING FIBER	AR		
-47	MS9072503	96906	. SCREW, Hex head	2		
-48	MS51967-2	96906	. NUT, Plain.	2		
-49	8223605-01	98750	. BOLT, Washer head	2		
-50	MS27183-8	96906	. WASHER, Flat.	2		
-51	8223606-01	98750	. NUT, Nylock	2		
-52	90271A539	39438	. SCREW, Truss, slotted	3		
-53	MS51967-2	96906	. NUT, Plain.	3		
-54	30127-10	60984	. FRAME	1		
-55	40299-01	60984	. AXLE ASSEMBLY . . . . . (See Figure 7-5 for breakdown)	1		
-56	06903-51	94189	. WHEEL & TIRE ASSEMBLY	2		
-57	MS51984-2	96906	. NUT, Tire	10		
-58	MS90725-117	96906	. SCREW, Hex head (AP).	4		
-59	MS27183-18	96906	. WASHER, Flat (AP)	4		
-60	MS35338-48	96906	. WASHER, Lock (AP)	4		
-61	MS51967-14	96906	. NUT, PLain (AP)	4		
-62	MS51335-2	96906	. PINTLE HOOK	1		
-63	MS90725-115	96906	. SCREW, Hex, head (AP)	4		
-64	MS27183-18	96906	. WASHER, Flat (AP)	8		
-65	MS35338-48	96906	. WASHER, Lock (AP)	4		
-66	MS51967-14	96906	. NUT, Plain (AP)	4		
-67	20048-10	60984	. TOW BAR ASSEMBLY. . . . . (See Figure 7-6 for breakdown)	1		
-68	5586	13445	. SWITCH, Toggle.	1		
-69	81264	13445	. BOOT, Rubber.	1		
-70	LH138R	02799	. LIGHT	1		
-71	1829-28V	71744	. BULB.	1		
-72	40862-01	60984	. PLUG.	1		
-73	BP-1 1/8	33974	. PLUG.	1		
-74	40850-13	60984	. NAMEPLATE (CG).	2		
-75	40853-05	60984	. STENCIL (CG DoT).	2		
-76	40853-01	60984	. STENCIL (TIRE PRESS REAR)	2		
-77	40853-07	60984	. STENCIL (BATT).	2		
-78	40850-11	60984	. NAMEPLATE (REV)	1		
-79	40850-05	60984	. NAMEPLATE (OFF)	1		
-80	40850-07	60984	. NAMEPLATE (FWD)	1		
-81	40850-03	60984	. NAMEPLATE (OVERLOAD).	1		
-82	40851-01	60984	. NAMEPLATE (WARNING)	1		
-83	40853-03	60984	. STENCIL (TIRE PRESS FRONT).	1		
-84	40850-01	60984	. NAMEPLATE (I.D.).	1		
-85	40850-15	60984	. NAMEPLATE (BATT VOLT)	1		
-86	40853-11	60984	. STENCIL (MAX TOW SPEED)	1		

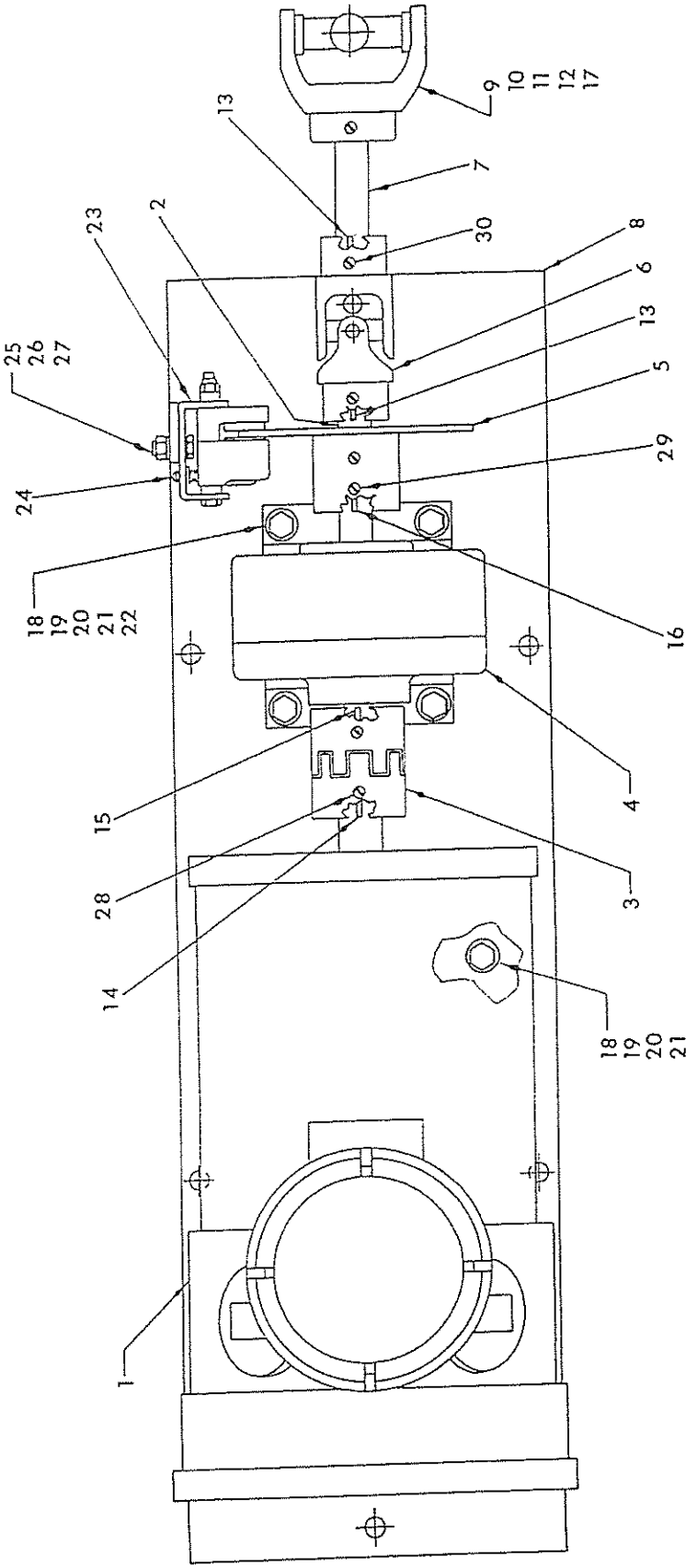


Figure 7-2. Drive Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
-2-	20044-10	60984	DRIVE ASSEMBLY (See Figure 7-1 for NHA)	REF		
-1	40288-01	60984	. MOTOR, Electric . . . . . (See Figure 7-7 for breakdown)	1		
-2	40354-01	60984	. SHAFT, Disc	1		
-3	40290-01	60984	. COUPLING. . . . . (See Figure 7-8 for breakdown)	1		
-4	40289-01	60984	. GEAR REDUCER. . . . . (See Figure 7-9 for breakdown)	1		
-5	40819-01	60984	. DISC, Brake	1		
-6	D-11B	65665	. UNIVERSAL Joint	1		
-7	40354-03	60984	. SHAFT, U-joint.	1		
-8	40794-01	60984	. PLATE, Mounting	1		
-9	2-4-453	78080	. YOKE, End	1		
-10	5-153Y	78080	. JOURNAL & BEARING KIT	1		
-11	2-94-28Y	78080	. U-BOLT KIT.	1		
-12	50-2501	81221	. SET SCREW	2		
-13	40355-11	60984	. KEY	1		
-14	40355-01	60984	. KEY	1		
-15	40355-03	60984	. KEY	1		
-16	40355-05	60984	. KEY	1		
-17	40355-07	60984	. KEY	1		
-18	MS90725-65	96906	. SCREW, Cap.	8		
-19	MS27183-14	96906	. WASHER, Flat.	8		
-20	MS35338-46	96906	. WASHER, Lock.	8		
-21	MS51967-8	96906	. NUT, Plain.	8		
-22	40798-01	60984	. SHIM.	4		
-23	H10SAFCG 07050009	26455	. BRAKE, Caliper. . . . . (See Figure 7-10 for breakdown)	1		
-24	2021-2-3S	00624	. FITTING, Adapter.	1		
-25	MS90725-34	96906	. SCREW, Hex head	2		
-26	MS35338-45	96906	. WASHER, Lock.	2		
-27	MS51967-5	96906	. NUT, PLain.	2		
-28	MS51965-67	96906	. SETSCREW.	2		
-29	MS51965-40	96906	. SETSCREW.	2		
-30	MS51965-79	96906	. SETSCREW.	3		

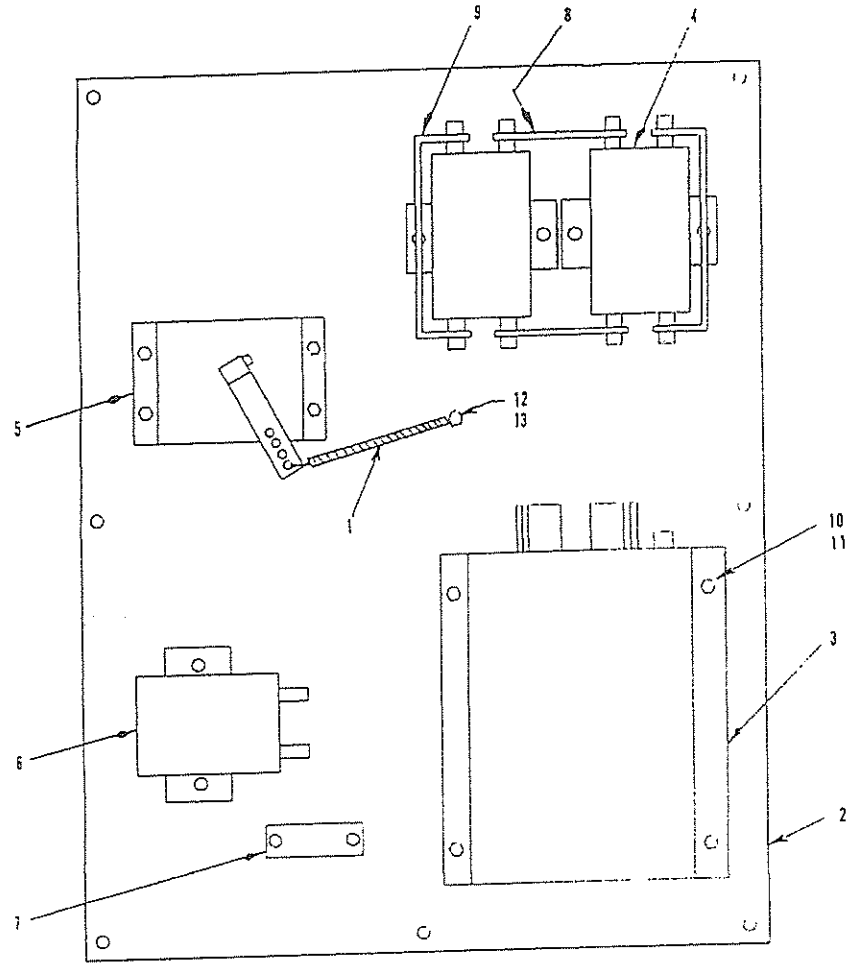


Figure 7-3. Electrical Panel Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-3-	20046-10	60984	ELECTRICAL PANEL ASSEMBLY. . . . . (See Figure 7-1 for NHA)	REF		
-1	9653K45	39438	. SPRING, Extension	1		
-2	40337-01	60984	. PANEL, Electrical	1		
-3	1204-502	18583	. CONTROLLER.	1		
-4	124-911	28891	. CONTACTOR	2		
-5	PB-6	18583	. POTBOX.	1		
-6	124-903	28891	. CONTACTOR	1		
-7	30055-6	13445	. CIRCUIT BREAKER	1		
-8	40800-01	60984	. JUMPER.	2		
-9	40800-03	60984	. JUMPER.	2		
-10	8223605-01	98750	. SCREW, Washer head.	16		
-11	8223606-01	98750	. NUT, Nylock	16		
-12	MS90726-14	96906	. SCREW, Hex head	1		
-13	MS51968-2	96906	. NUT, Plain.	2		

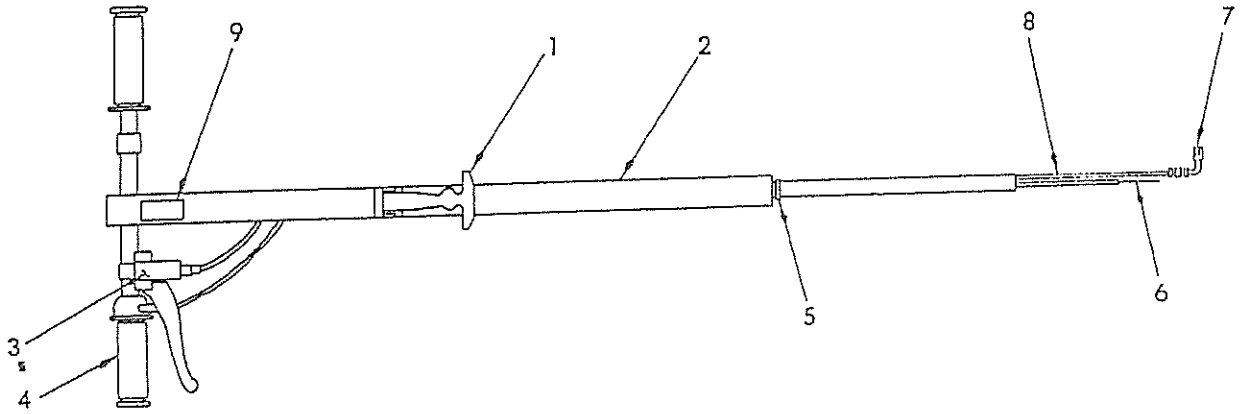


Figure 7-4. Steering Bar Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-4-	30115-10	60984	STEERING BAR ASSEMBLY. . . . . (See Figure 7-1 for NHA)	REF		
-1	110L01-1-1AA	71286	. LATCH, Rubber	1		
-2	40852-10	60984	. DRAW BAR.	1		
-3	3110-0200	60984	. CYLINDER, Master.	1		
-4	40858-01	60984	. THROTTLE CONTROL.	1		
-5	422	59730	. SLEEVE, Nylon	2		
-6	40856-01	60984	. CABLE, Throttle control	1		
-7	2021-2-3S	00624	. ADAPTER	1		
-8	40855-10	60984	. HOSE, Brake Assembly. . . . . (See Figure 7-11 for breakdown)	1		
-9	40850-17	60984	. NAMEPLATE	1		

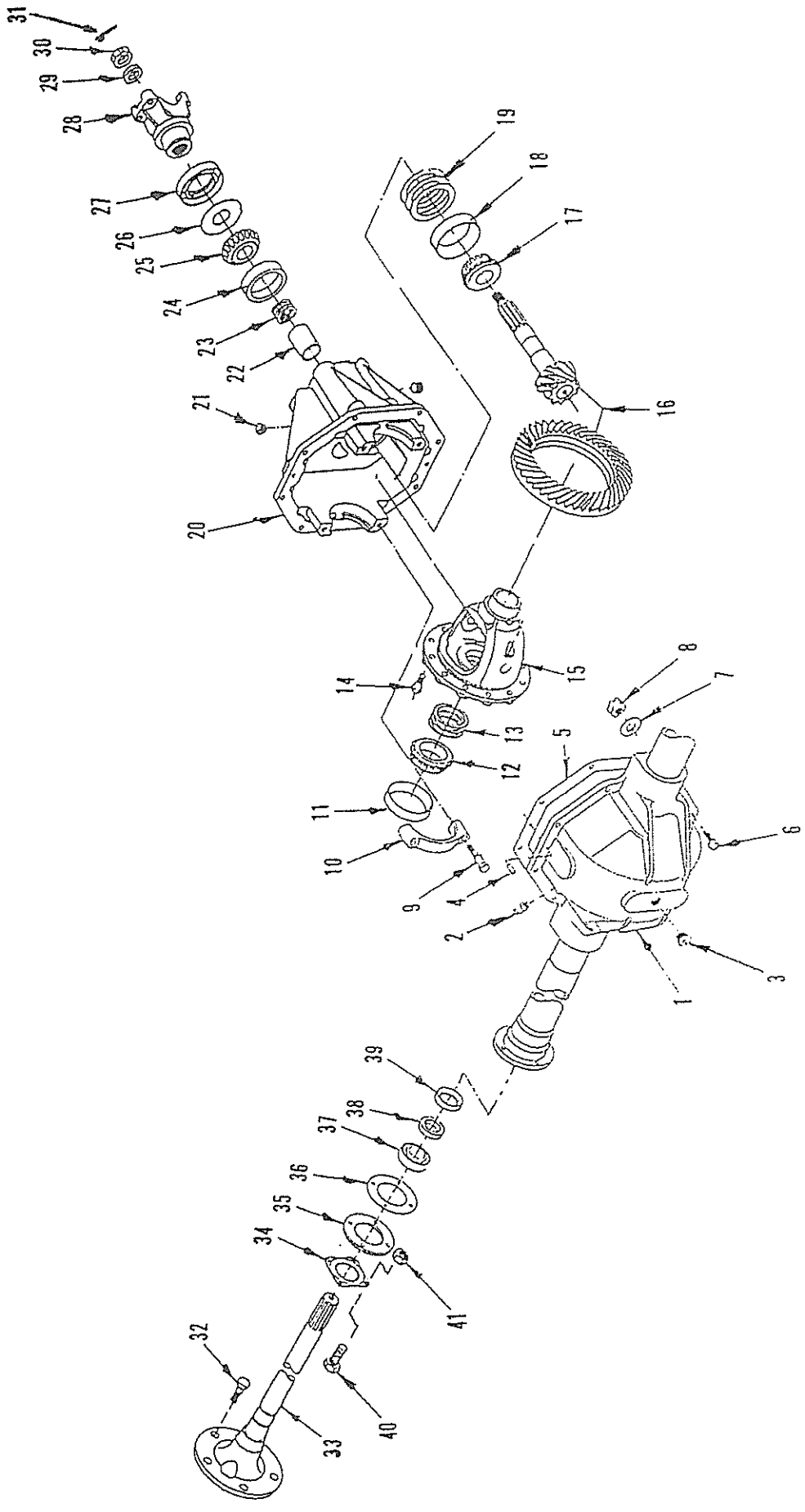


Figure 7-5. Axle Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-5-	40299-01	60984	AXLE ASSEMBLY (See Figure 7-1 for NHA)	REF		
-1	815227	97271	. HOUSING, Rear	1		
-2	070HN164	97271	. VENT.	1		
-3	500135-3	97271	. PIPE PLUG, Recessed	2		
-4	840229	97271	. PIN, Dowel.	1		
-5	840070	97271	. GASKET, Housing	8		
-6	500409-12	97271	. SCREW, Cap.	8		
-7	500362-10	97271	. WASHER, Lock.	8		
-8	500371-2	97271	. NUT	4		
-9	500399	97271	. SCREW, Cap.	2		
-10	840049	97271	. CAP, Bearing.	2		
-11	585911	97271	. CUP, Bearing.	2		
-12	550433	97271	. BEARING, Roller	AR		
-13	30215	97271	. SHIMS	10		
-14	30187	97271	. SCREW, Drive gear	1		
-15	25105-X	97271	. CASE ASSEMBLY	1		
-16	825145	97271	. GEAR & PINION ASSEMBLY (Matched).	1		
-17	585953	97271	. BEARING, Roller	1		
-18	550457	97271	. CUP, Bearing.	AR		
-19	850099	97271	. SHIMS	1		
-20	825146-X	97271	. HOUSING, Front.	2		
-21	500134-3	97271	. PLUG, Oil	1		
-22	850098	97271	. SPACER, Pinion bearing.	AR		
-23	850097	97271	. SHIM.	1		
-24	585938	97271	. CUP BEARING, Roller	1		
-25	585952	97271	. BEARING CORE, Roller.	1		
-26	850096	97271	. WASHER SHIM	1		
-27	850100	97271	. SEAL, Oil	1		
-28	2-4-1721	97271	. END YOKE - Fin.	1		
-29	850017	97271	. WASHER, Flat.	1		
-30	500389-7	97271	. NUT	1		
-31	500024-6	97271	. PIN, Cotter	10		
-32	527A3-1	97271	. BOLT, Wheel (RH).	2		
-33	018SR100-7	97271	. SHAFT, Flanged axle	2		
-34	515A7	97271	. SEAL, Oil	2		
-35	840065	97271	. BEARING RETAINER.	2		
-36	840064	97271	. GASKET.	2		
-37	585907	97271	. BEARING	2		
-38	536A1	97271	. RETAINER RING	2		
-39	A20HH101	97271	. SEAL, Oil	2		
-40	527A5	97271	. BOLT, Hex	8		
-41	526A13	97271	. NUT, Self-lock.	8		

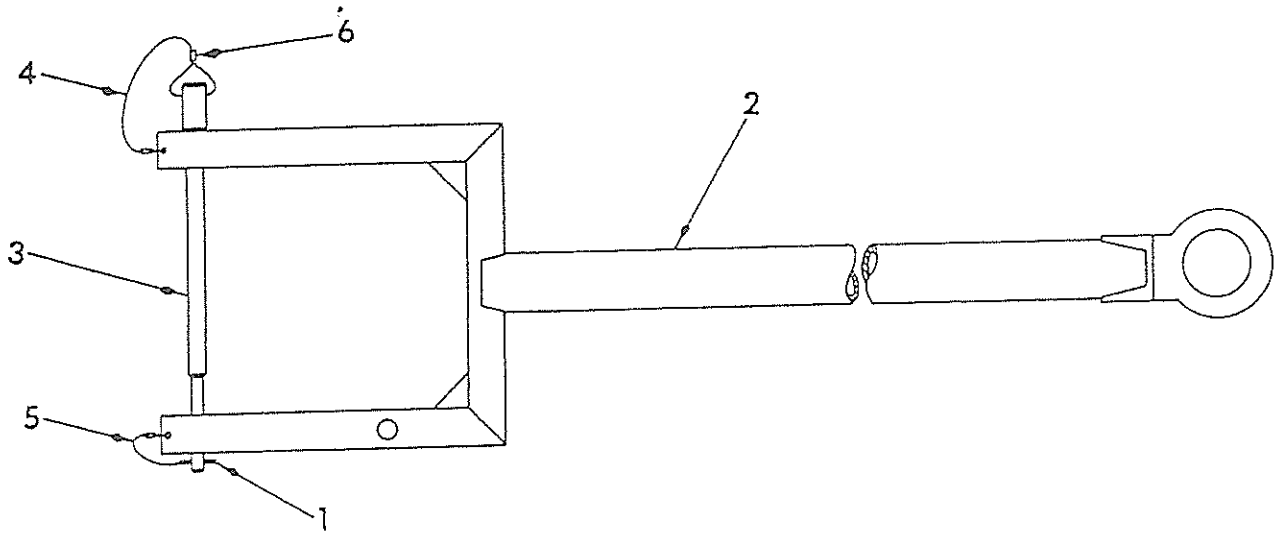


Figure 7-6. Tow Bar Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-6-	20048-10	60984	TOW BAR ASSEMBLY . . . . . (See Figure 7-1 for NHA)	REF		
-1	98320A007	39438	. PIN, Quick release.	1		
-2	40836-10	60984	. ATTACHMENT, Aircraft.	1		
-3	40835-01	60984	. PIN, Aircraft tire.	1		
-4	40857-01	60984	. LANYARD	1		
-5	40857-03	60984	. LANYARD	1		
-6	354T41	39438	. SLEEVE, Compression	4		

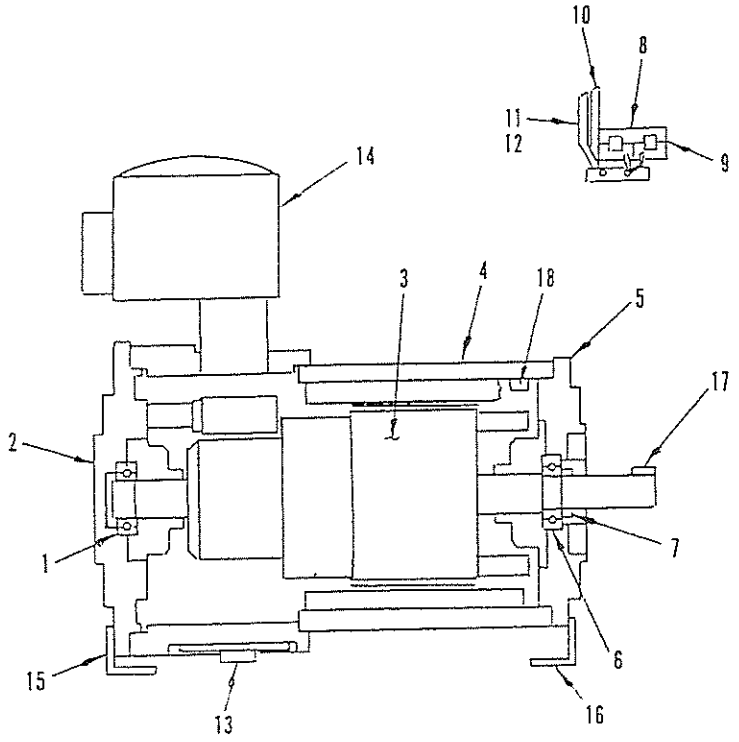


Figure 7-7. Electric Motor

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-7-	40288-01	60984	MOTOR, ELECTRIC . . . . . (See Figure 7-2 for NHA)	REF		
-1	894A605ZJ006	01288	. BEARING, Ball	1		
-2	36B550791 ABG01	01288	. BRACKET, Bearing.	1		
-3	36A90994 MAG03	01288	. ARMATURE.	1		
-4	796C822AAG02	01288	. FIELDWOUND.	1		
-5	36B550790 AA001	01288	. BRACKET, Bearing.	1		
-6	894A605ZJ006	01288	. BEARING, Ball	1		
-7	894A786003	01288	. SEAL.	8		
-8	36B547929G01	01288	. SPRING.	4		
-9	955A470015	01288	. BRUSH	1		
-10	36B550763 ABG02	01288	. YOKE & HOLDER	1		
-11	36A291592 AFG12	01288	. CROSS CONNECTOR	1		
-12	36A291592 AFG11	01288	. CROSS CONNECTOR	4		
-13	36A289740 AB001	01288	. COVER	1		
-14	36A290317006	01288	. BOX, Conduit.	1		
-15	941B747AC001	01288	. FOOT.	1		
-16	36B549492001	01288	. FOOT.	1		
-17	901A110AX329	01288	. KEY	1		
-18	36A285750 AC001	01288	. THERMOSTAT.	1		

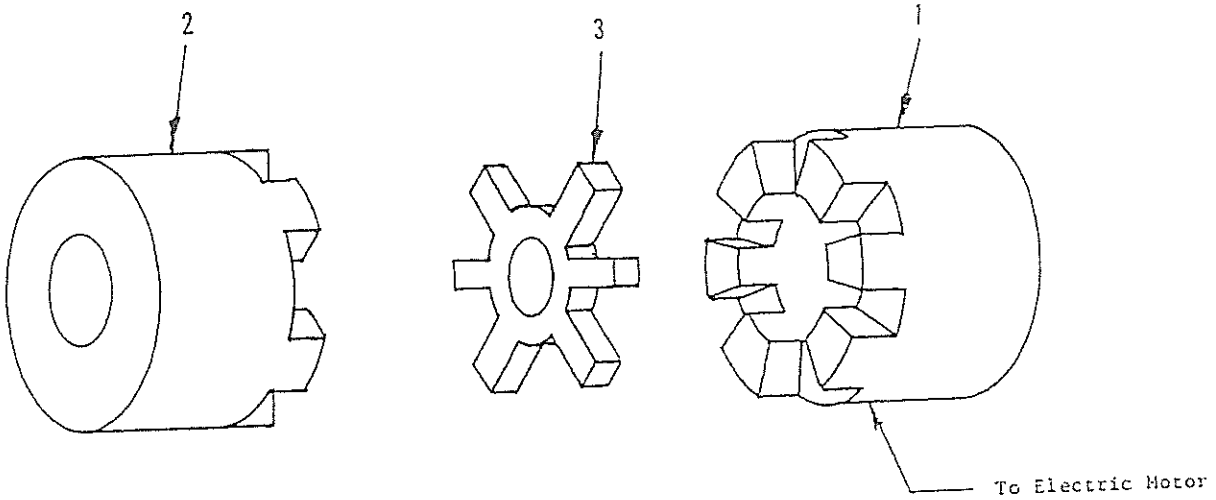


Figure 7-8. Coupling

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-8-	40290-01	60984	COUPLING (See Figure 7-2 for NHA). . .	REF		
-1	L-099	75665	. COUPLING Half (1 1/8 bore).	1		
-2	L-099	75665	. COUPLING Half (5/8 bore).	1		
-3	L-100S0X	75665	. INSERT, Soft spider	1		

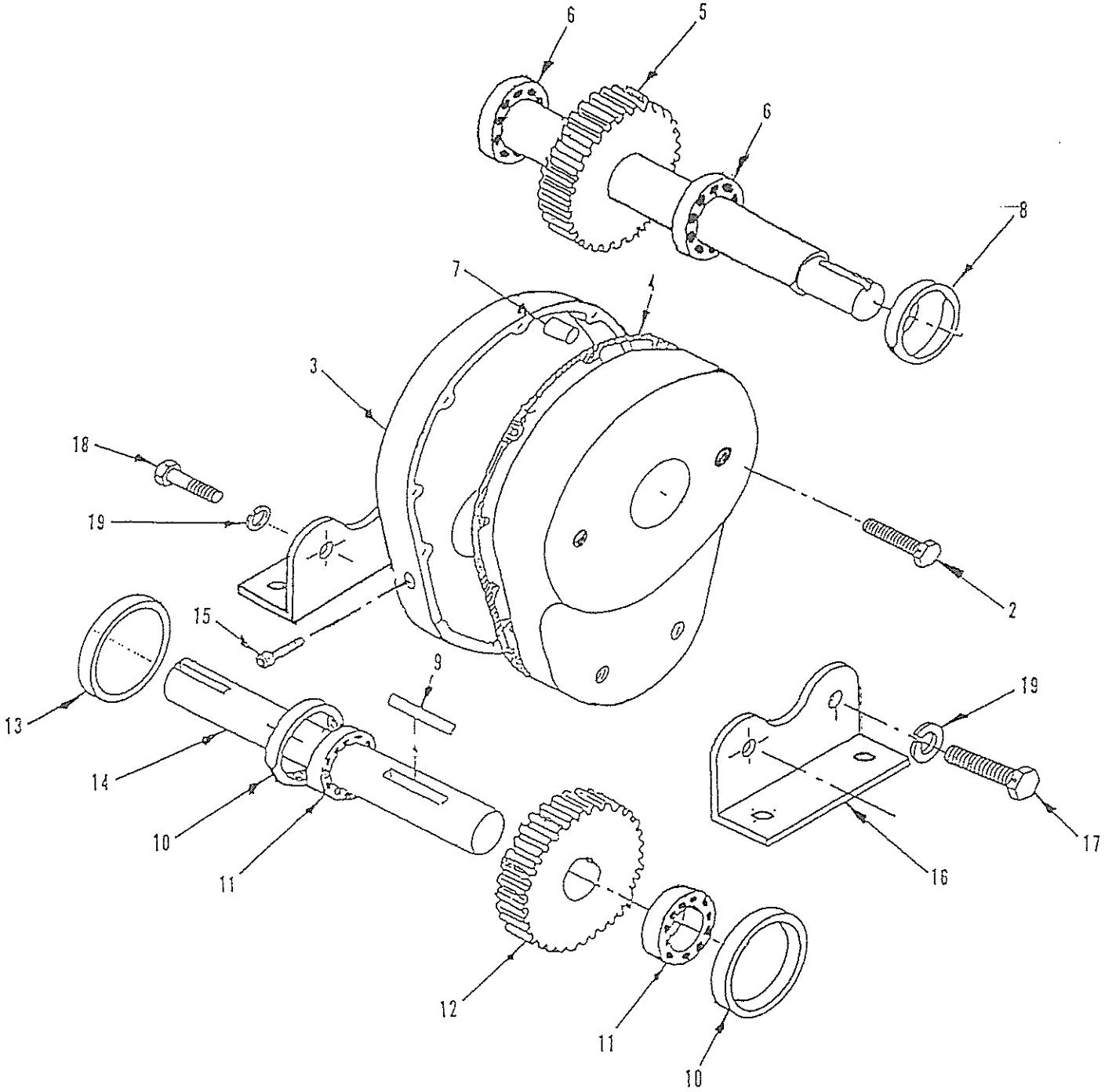


Figure 7-9. Gear Reducer

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-9-	40289-01	60984	GEAR REDUCER (See Figure 7-2 for NHA).	REF		
-1	0223-04462 -0250	None	. HOUSING HALF.	1		
-2	MS90725-63	96906	. SCREW, Cap (AP) (3/8 x 1 3/8) . . .	2		
-3	0223-04459 -0250	None	. HOUSING HALF.	1		
-4	0223-04458 -0250	None	. GASKET.	4		
-5	0223-04504 -0250	None	. GEAR, Hel (LH)/Input shaft.	1		
-6	8-32-11-16 -071	None	. BEARING, Ball	2		
-7	8-47-17-09 -013	None	. PIN, Dowell	2		
-8	8-74-21-25 -028	None	. SEAL.	1		
-9	8-47-17-05 -021	None	. KEY (3/16 x 3/4).	1		
-10	8-32-20-58 -069	None	. CUP, Bearing.	2		
-11	8-32-20-68 -069	None	. BEARING, Cone	2		
-12	0223-04509 -0250	None	. GEAR, Hel (RH).	1		
-13	8-74-21-25 -006	None	. SEAL.	1		
-14	0223-04510 -0250	None	. SHAFT, Output	1		
-15	8-63-12-61 -001	None	. PLUG, Pipe, socket (drain).	4		
-16	0229-00099 -0250	None	. FOOT.	2		
-17	MS90725-60	96906	. SCREW, Cap.	2		
-18	MS90725-66	96906	. SCREW, Cap.	2		
-19	MS35336-46	96906	. WASHER, Lock.	4		
		None =	Hub City 11801 East Smith Ave. Santa Fe Springs, CA 90670			

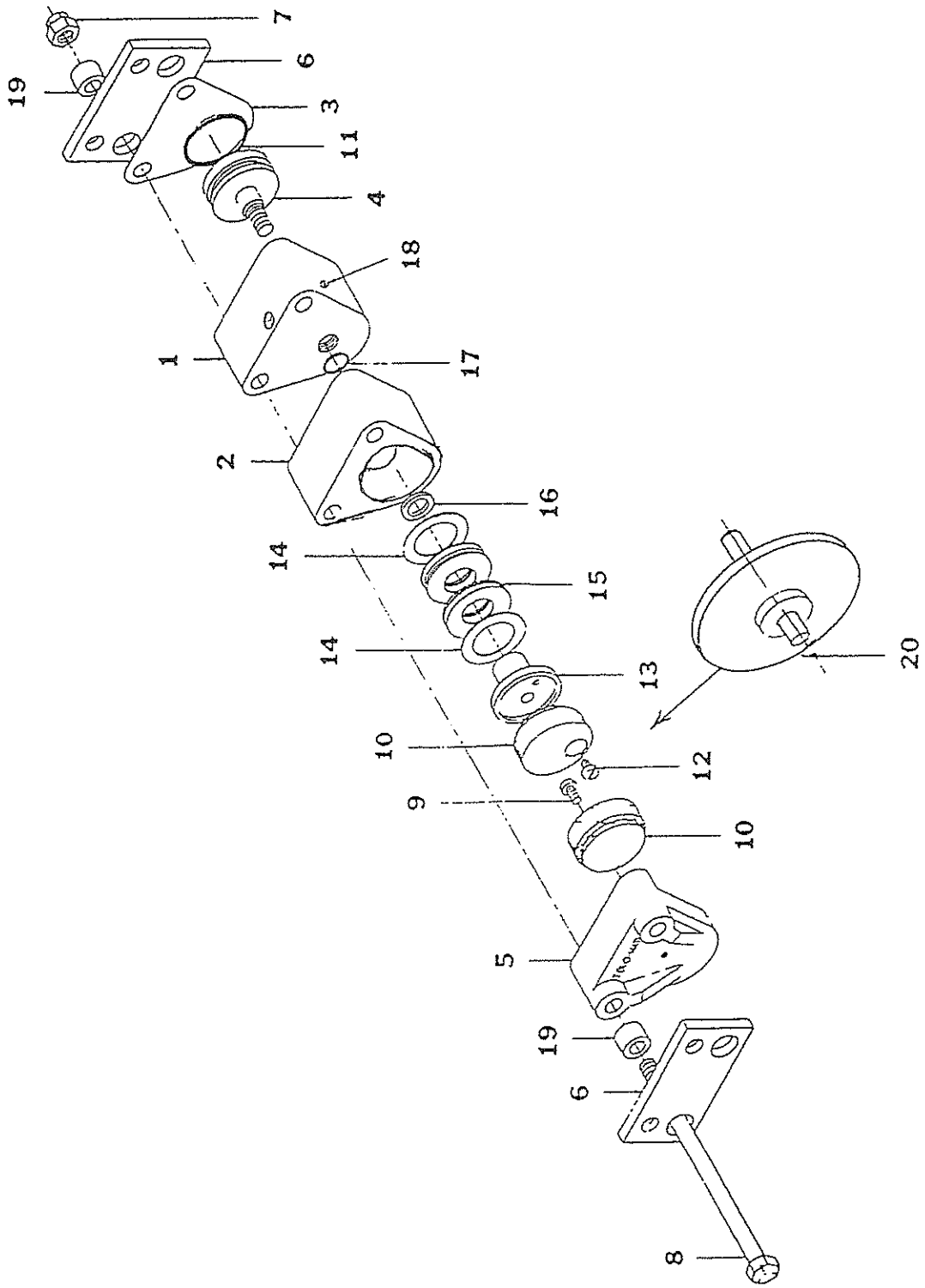


Figure 7-10. Brake Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
-10-	H10SAFCG 07050009	26455	BRAKE ASSEMBLY . . . . . (See Figure 7-2 for NHA)	REF		
-1	0760-1004	26455	. HOUSING, Line	1		
-2	0760-1001	26455	. HOUSING, Spacer	1		
-3	0760-1002	26455	. PLATE, Cover.	1		
-4	0740-1006	26455	. PISTON.	1		
-5	0724-1011	26455	. HOUSING, Dead side.	1		
-6	0760-1016	26455	. BRACKET	2		
-7	0720-1008	26455	. NUT, Flex-lock 3/8-24	2		
-8	0739-1005	26455	. BOLT, HHC, 3/8 x 24 x 6, Gr. 8 . .	2		
-9	0720-1026	26455	. SCREW, #10-24 x 3/8	1		
-10	0720-1024	26455	. PUCK.	2		
-11	0720-1014	26455	. O-RING, Buna-S.	1		
-12	0737-1024	26455	. SCREW, #10-24 x 1/4	1		
-13	0740-1015	26455	. HOLDER, Spring.	1		
-14	0740-1007	26455	. WASHER, Thrust.	2		
-15	0740-1018	26455	. WASHER, Spring, belleville. . . .	12		
-16	0740-1014	26455	. RING, Spacer.	1		
-17	0737-1012	26455	. O-RING, Buna-S.	1		
-18	0701-1033	26455	. SCREW, Bleeder, EPR/Buna-S. . . .	2		
-19	0726-1015	26455	. RING, Spacer.	4		
-20	0801-0014	26455	. DISC, Brake	REF		

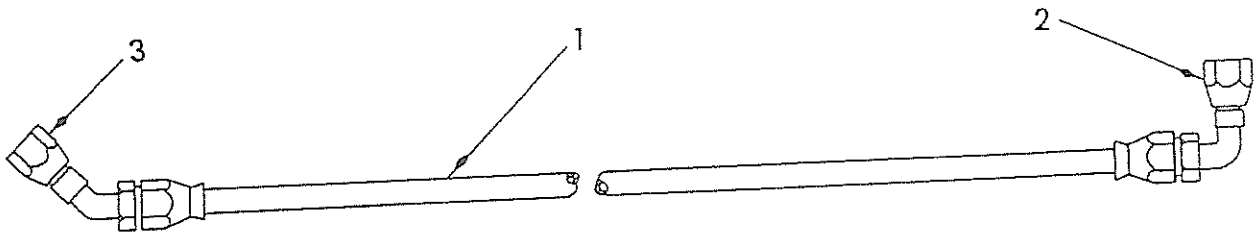


Figure 7-11. Hose Brake Assembly

FIGURE & INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-11-	40855-10	60984	HOSE, BRAKE ASSEMBLY . . . . . (See Figure 7-4 for NHA)	REF		
-1	2807-3-80	00624	. HOSE, Teflon.	1		
-2	190772-3S	00624	. FITTING, 90° Elbow.	1		
-3	190773-3S	00624	. FITTING, 45° Elbow.	1		