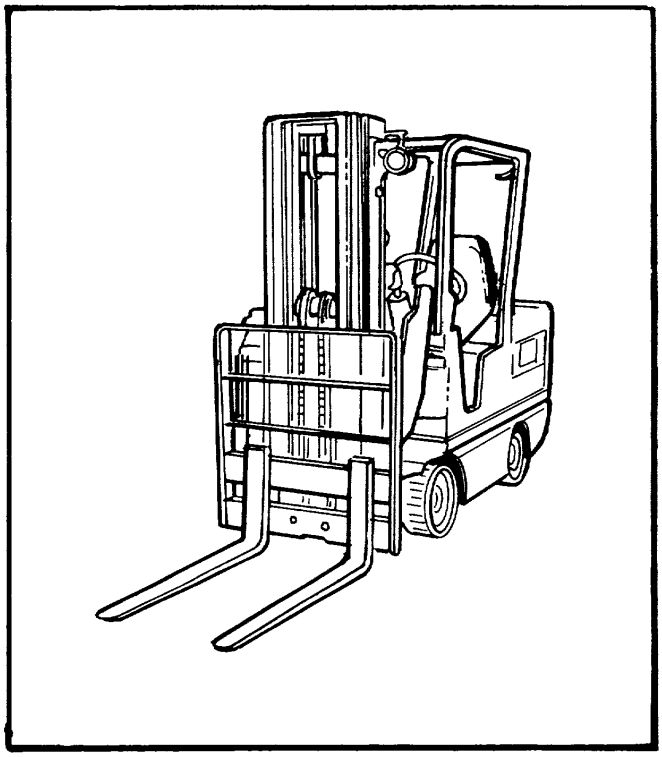
TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION)



OPERATING SECTION

OPERATOR AND ORGANIZATIONAL PMCS

TROUBLESHOOTING

PARTS

MAINTENANCE

APPENDIX B MAC

APPENDIX E EXPENDABLE SUPPLIES

TRUCK, FORKLIFT, ELECTRIC, FRONT/SIDELOADER, SRT, 4000/3000 LB CAPACITY, MHE 256, DREXEL MODEL NO. SL-44/3-ESS (EE), NSN 3930-01-123-1300

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1984

WARNING

Do not operate this vehicle until you have been trained and qualified to do so. Read this manual. Read all "Warning" and "Caution" plates attached to the truck; check truck name plate for capacity. Read and comply with "Warning" and "Caution" notices. "Warning" notes indicate any conditions or practices which, if not strictly observed, could result in personal injury or possible loss of life. "Caution" notes indicate any conditions or practices which, if not strictly observed or remedied, could result in damage to, or destruction of, the equipment.

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working around the forklift or other vehicles. Jewelry can catch on equipment and cause injury, or may short across on electrical circuit and cause severe burns or electrical shock.

WARNING

When working under this vehicle, DO NOT rely on hydraulic and mechanical jacks only; USE SAFETY STANDS.

Disconnect battery cable before repair operations in the vicinity of electrical connections or those requiring electrical disconnects.

Be aware of open flame or spark sources when working near the battery or other areas with voltatile fluids.

Never go near an open flame or spark when cleaning parts or tools with solvents.

WARNING

Like any mechanical equipment, proper operation results in long life and minimum maintenance. Rules to follow when operating are:

WARNING

Replace chain when stretch exceeds dimensions shown.

WARNING

Before attempting work on Hydraulic Door Module disconnect battery connector and relieve power steer accumulator hydraulic pressure.

WARNING

Familiarize yourself with the operation of the power steering system as described in the Operating section (Pgs. 1-6, 1-7) before servicing the system.

WARNING

Discharge the accumulator hydraulic system by sitting in the operator's seat with the key switch in the "OFF" position and operating the hand steering wheel both clockwise and counterclockwise until it becomes difficult to turn. The hydraulic system is now completely discharged and the hydraulic pressure will be at zero psi. Disconnect battery connector (Pg. 5-33, Fig. 5-97).

WARNING

Do not attempt service on electric door module before disconnecting battery (Pg. 5-33, Fig 5-97).

WARNING

Important' Safety precautions must always be taken in every aspect of battery service. Be aware of the dangers involved! Read and comply with all Warning and Caution notes relating to the battery in the Safety Summary section at the front of this manual.

WARNING

Before attempting to free or lower mast, see warning at beginnning of troubleshooting guide.

WARNING

Drain the hydraulic reservoir (Page 5-50) and disconnect the battery connector before attempting removal of the pump & motor assembly.

WARNING

Never work on an extended or bound up mast without first attaching a sling to mast or bound up area.

NOTE

When working on bound up area, attach sling to rail and to obstructed area, recommend application of wrapping a link chain twice around the upper mast channel cross-members and secure with a hoist, crane or some other suitable lifting device. Take care not to damage any lift line, hydraulic tube or hoses.

WARNING

Compressed air used for cleaning purposes will not exceed 30 PSI. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

WARNING

DO NOT use a dry brush or compressed air to clean brakeshoes. There may be asbestos dust on brakeshoes which can be dangerous to your health if you breathe it. (Brakeshoe must be wet, and a soft bristle brush must be used.)

WARNING

Before attempting work on Dash Panel Model -disconnect battery connector.

WARNING

Stay clear of the carriage and the forks or attachment.

WARNING

THIS VEHICLE IS EQUIPPED WITH A POSITIVE LOCKING DIFFERENTIAL IN THE DRIVE AXLE. IT DELIVERS POWER TO BOTH DRIVING WHEELS EVEN WHEN ONE DRIVING WHEEL IS OFF THE GROUND.

WARNING

WHEN SERVICING OF THIS VEHICLE REQUIRES ENGAGEMENT OF THE DRIVE SYSTEM, BLOCK UP FRONT END OF VEHICLE SO BOTH DRIVE TIRES ARE OFF THE GROUND. FAILURE TO DO SO WILL RESULT IN VEHICLE MOTION WHEN DRIVE SYSTEM IS ENGAGED.

WARNING

For replacement of lower two sets of motor brushes (access from under side of truck) truck should be raised to sufficient height (support with safety jacks under chassis) to provide ease of service by maintenance mechanic. Placing truck over a a maintenance pit is preferred.

WARNING

Use of a dust mask is recommended.

WARNING

Do not allow lifting hooks to contact an exposed battery cell link. A serious electrical short circuit will occur.

WARNING

Before attempting to free or lower mast, see warning at beginning of troubleshooting guide.

WARNING

Drain the hydraulic reservoir (Page 5-50) and disconnect the battery connector before attempting removal of the pump & motor assembly.

WARNING

The seat brake is NOT to be used to stop a truck when in motion.

WARNING

Use care when traveling with or without load. Avoid excessive speeds and abrupt turns.

WARNING

A. Observe the truck load rating on the nameplate. Never handle loads in excess of specified rating.

B. Do not handle unstable or loosely stacked loads.

WARNING

Forward tilting of the load mast should be at flow level only or in the rack area for deposit or retrieval of loads.

WARNING

Tilting of the loaded mast should always be slow by feathering (metering) of the tilt control lever.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in a well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

WARNING

Fuel and oil are slippery and can cause falls. To avoid injury, wipe up spilled fuel or oil with rags.

WARNING

If you sustain any injuries, no matter how slight, follow the first aid procedures outlined in FM 21-1 1.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with skin or clothing is made, flush with water. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

WARNING

After Nuclear, Biological or Chemical (NBC) exposure of this vehicle all air filters shall be handled with extreme caution. Unprotected personnel may experience injury or death if residual toxic agents or radioactive material are present. If vehicle is exposed to chemical or biological agents, servicing personnel shall wear protective mask, hood, protective overgarments, and chemical protective gloves and boots. All contaminated air filters shall be placed into double lined plastic bags and moved to a segregation area away from the work site swiftly. The same procedure applies for radioactive dust contamination; however, the Company NBC team should measure the radiation prior to filter removal to determine the extent of safety procedures required per the NBC Annex to the unit Standard Operating Procedures (SOP.) The segregation in which the contaminated air filters are temporarily stored shall be marked with appropriate NBC placards. Final disposal of contaminated air filters shall be in accordance with local SOP.

SAFETY SUMMARY

WARNING

THE FOLLOWING SAFETY PRECAUTIONS MUST ALWAYS BE OBEYED DURING OPERATION OF THIS VEHICLE.

CARRYING PASSENGERS

This truck is not designed as a personnel carrier. Do not operate this truck under any circumstances with anyone but the operator in place. The operator must always remain in the normal operating position in the operator's seat.

LOAD HANDLING AND TRAVELING

Observe all load handling and travel warnings while operating this vehicle.

1. Front load traveling travel with forks straight ahead, and mast tilted rearward and shifted fully to the right. Travel with forks or load about 8" to 12" above travel surface.
2. Side load traveling palletized loads, -when handling palletized loads, travel with forks or load 8" to 12" off the floor, mast pivoted fully to 900, mast tilted rearward and shifted fully to the left.
3. Side load traveling-long loads, -when handling long loads travel with mast pivoted fully to 90 , mast vertical, and load resting on deck of vehicle.

When operating this vehicle, be extremely careful on slippery surfaces to prevent side-slip or fish-tailing.

PIVOT/SHIFT INTERLOCK

This truck is equipped with a pivot/shift safety interlock system. The purpose and operating characteristics of this system must be understood by the operator. Refer to the Operating section of this manual for operating characteristics of the interlocks.

PINCH POINT AREAS

Know the location of all pinch point areas and avoid them when operating this vehicle (Refer to Operating section).

STATIC ELECTRICAL DISCHARGE STRAPS

Ensure that static electrical discharge straps are installed on the fork lift truck and in good condition (dragging the floor). Failure to maintain the straps could result in electrical shock to personnel or the generation of sparks which could cause the ignition of explosives or flammables.

WARNING

OPERATING

THE OPERATOR MUST BE FAMILIAR WITH ALL OF THE FOLLOWING SAFETY PRECAUTIONS BEFORE OPERATING THIS VEHICLE.

This vehicle is equipped with safety features for the protection of the operator and personnel in the vicinity of the vehicle. Do not adjust, disconnect, or tamper in any way with these features.

Allow no one under or near the mast or forks, loaded or empty. Do not hold, reach through, or climb on any part of the mast. Keep feet, arms, and legs inside the confines of the operator's compartment.

This vehicle should be checked for proper operation prior to being placed in service. Refer to the Operator's Check Out List in the Operating section of this manual. If found in need of repair, or any way unsafe, the matter should be reported to the proper authority and the truck removed from service until it has been restored to safe operating condition by a qualified serviceperson.

Be certain all access/service panels, doors, and covers are dosed securely. Do not operate vehicle with panels, doors, and covers open or unsecured.

This vehicle is equipped with an overhead guard and a load backrest extension. Do not remove or alter them.

Do not operate this vehicle unless the operator is in the proper operating position (in the driver's seat).

Be certain all directional and operational controls and levers are in neutral position and the brakes are set before turning key switch on.

Travel in side pick-up position in creep speed only.

Release the parking brake before driving the vehicle.

Never lift or lower personnel on the forks or elevating mast.

Observe condition of all floors prior to entering trucks, trailers, railroad cars, and other vehicles. When operating in these, drive carefully and slowly.

Always look in the direction of travel. Keep a clear view and when load interferes with forward visibility, travel with load trailing, except on ramps.

Ramp operation requires special care. Always travel slowly. Always back down ramps when carrying a load. Always travel forward down ramps when not carrying a load. Do not turn on ramps.

Start, stop, change direction, travel, and brake smoothly. Do not "jam" on brakes. Slow down for all turns, especially on wet or slippery surfaces.

Never use the seat brake to stop a truck in motion.

Use care when traveling without a load. Avoid excessive speed and abrupt turns.

Always travel with the load at either side or front carry position.

Do not speed. Obey all speed limit signs. If none are posted, travel according to conditions.

Do not drive over loose objects.

Do not drive dose to other vehicles. Maintain a safe distance when passing other vehicles.

Never overload this truck. Read nameplate for capacities and load centers.

Elevate mast or load only to pick up or deposit a load. Watch out for obstructions especially overhead. Watch all clearances.

Spread forks as far apart as load will permit and push completely under load. Be certain forks and load are centered. Use care if load handling conditions dictate handling off-center loads.

Do not handle unstable loads. Check all loads before handling.

Use care when handling long, high, or wide loads.

Do not handle off-center loads which can be centered.

Operate with loads that are safely arranged on forks.

Use care when tilting forward or rearward when stacking, depositing, or retrieving a load.

Do not travel with mast tilted forward.

Tilting of a loaded mast should always be done slowly.

Do not release the lift control lever suddenly when lowering loads.

When leaving truck, forks should be fully lowered to the floor, mast placed in a vertical position, controls should be in neutral, power shut off, brakes set, key removed. Block wheels if truck is parked on an incline or being serviced. Battery should be disconnected.

Modifications, alterations, or additions to this vehicle shall not be made by the customer, user, or his agent without the manufacturer's prior written authority.

Drive carefully and slowly onto and across dockboards and bridgeplates. Never exceed their rated capacity and be certain they are properly secured. Dockboards should be strong enough to carry the loads imposed on them, and the load capacity should be plainly marked. They should be secured in position either by being anchored or being equipped with devices that will prevent their slipping. Fork pockets or other effective means should be provided for handling by fork trucks. Dockboards should have a high friction

surface, designed to prevent personnel or vehicles from slipping. The sides of the dockboards should be turned up at right angles, or other means provided, to prevent vehicles from running over the edge. They should be designed and maintained so the end edges will have substantial contact with the dock or loading platform and the carrier to prevent the dockboard from rocking and sliding. Positive protection should be provided to prevent vehicles, trailers, or railroad cars from being moved while the dockboards are in position.

Obey correct operating procedures for the mast (refer to Preventive Maintenance section).

WARNING

THE FOLLOWING SAFETY PRECAUTIONS MUST ALWAYS BE OBEYED WHEN PERFORMING SERVICE ON THIS VEHICLE.

GENERAL SERVICE

When servicing of this vehicle requires engagement of the drive system, block up front end of vehicle so both drive tires are off the ground. Failure to do so will result in vehicle motion when drive system is engaged.

TIRES

This truck is factory-equipped with drive and steer tires which are flat-faced and have a minimum hardness of 80 Durometer, Shore "A". Replacement tires must always match these specifications.

HYDRAULIC CYLINDERS

When replacing cylinder assemblies, remove internal spacers, if any, and install in replacement cylinder. If spacers are not reusable, consult factory for proper spacers.

ELECTRICAL AND HYDRAULIC SYSTEM SERVICE

Before attempting any service or maintenance on the electrical or hydraulic systems, ensure the electrical system is opened (disconnect battery, refer to Maintenance section) and the pressurized oil in the hydraulic accumulator is discharged (refer to Maintenance section). Failure to do so could result in electrical shock or injury due to high pressure oil.

WARNING

MAINTENANCE AND SERVICE

THE FOLLOWING SAFETY PROCEDURES MUST ALWAYS BE FOLLOWED WHEN SERVICING THIS VEHICLE.

Disconnect the battery (refer to Maintenance section) before any repairs are performed.

Discharge the hydraulic system before any repairs are performed. Lower the forks to the floor, operate all control levers with the key switch off, and depressurize the accumulator (refer to Maintenance section).

When working under this vehicle, do not rely on hydraulic and mechanical jacks only. Use safety stands.

When servicing of this vehicle requires engagement of the drive system, block up front end of vehicle so both drive tires are off the ground. Failure to do so will result in vehicle motion when drive system is engaged.

Always be aware of the location of open flame or spark sources. Battery service and procedures which require the use of volatile fluids must be done in areas free of flame or sparks.

Never go near an open flame or spark sources when cleaning parts or tools with solvents.

When service requires raising or lowering of the mast, stay clear of the carriage and forks.

Never work on an extended or bound up mast without first attaching a sling to mast or bound up area. When working on bound up area, attach a sling to rail and to obstructed area; wrap a link chain twice around the upper mast channel cross-members and secure with a hoist, crane, or some other suitable lifting device.

Always wear a dust mask when servicing the traction or pump motor.

CAUTION

FOLLOW THESE GENERAL WORKING PROCEDURES WHEN PERFORMING SERVICE TO THIS VEHICLE.

Use the proper cleaning solution. External parts can be cleaned with a solvent unless they include synthetic rubber. Synthetic rubber parts will come clean with a chlorinated hydrocarbon or hydraulic brake fluid.

Tag all similar parts for location and mark all mating parts for position.

Protect finished surfaces from physical damage and corrosion.

No parts, except those assembled with a press fit require unusual force during assembly. If you encounter trouble in disassembling or assembling a part, determine the reason for the difficulty, then proceed.

Cover all openings after removing parts or subassemblies to keep small tools, parts, or foreign matter from falling in. When assembling two (2) parts, start all the fasteners first, then tighten evenly.

Observe standard torque ratings for the size and type of fastener unless otherwise specified.

When removing the pivot arm and cross head assembly (refer to Maintenance section), be certain the loose end of the umbilical hose assembly is not caught or damaged. Position the removed pivot arm and crosshead assembly on wooden blocks to protect the roller bearings and to securely support the assembly from movement.

WARNING

BATTERY MAINTENANCE

ALL PERSONNEL MUST BE FAMILIAR WITH THE FOLLOWING PRECAUTIONS.

1. The battery contains sulfuric acid which can burn eyes, skin, or clothing.
2. An explosive mixture of oxygen and hydrogen is produced during battery charging.
3. Electricity generated during discharge can shock.
4. The extreme weight of batteries can crush machinery or limbs.

READ AND ALWAYS COMPLY WITH THE FOLLOWING PROCEDURES WHEN SERVICING THE BATTERY.

Read all Warning and Danger Labels on the battery and charger.

Always wear eye goggles or a face shield and rubber gloves when measuring specific gravities, watering, mixing acid, or cleaning the battery.

Wear gloves when assembling the hydrometer as glass breakage is always a possibility.

Neutralize any acid spillage immediately. If acid contacts any part of the skin, wash off with water immediately and neutralize. In the event of acid in the eyes, wash with water immediately and consult a doctor at once.

An emergency eye-wash bottle or fountain should be close to the charging area.

Battery acid fumes are explosive and a large quantity of gas escapes during battery charging.

Battery charging must be done in a well-ventilated area.

Do not smoke in the battery charging area.

Keep open flames, naked lights, and sparks away from the vicinity of the battery.

Flush spilled battery acid immediately with large quantities of water.

Batteries continue to gas even after charging is complete. These same precautions apply after charging.

When adding water to the battey during general maintenance, an automatic cell-filler or a plastic container should be used. Never use metal or glass containers. Glass can break

and metal can cause short circuits between intercell connectors.

When mixing electrolyte, always pour acid into water. Never pour water into concentrated acid.

The battery must be kept clean. The build-up of dirt and moisture on the top of the battery cells can create a current path.

Care should be used to assure the polarity to the vehicle is not reversed when the battery is installed or the battery connections are charged. Before you remove the battery or battery connections, the cable should be tagged for proper polarity. If you have any doubt check the polarity with a meter.

This vehicle is equipped with battery restraints allowing no vertical movement of the battery. If battery is exchanged, the restraints must be replaced before operating the vehicle (refer to Maintenance section).

When removing the battery, do not allow lifting hooks to contact an exposed battery cell link. A serious electrical short circuit will occur.

When mixing electrolyte, always use vessels made of approved plastic, porcelain, glazed earthenware, or lead-lined tanks. Metal vessels other than lead must never be used.

CAUTION

READ AND ALWAYS COMPLY WITH THE FOLLOWING PROCEDURES WHEN SERVICING THE BATTERY.

Refer to the procedures in the Maintenance section before servicing the battery.

Never continue to discharge a battery beyond the point where the specific gravity is less than 1.125.

Keep vent plugs in place and tight at all times to avoid loss of electrolyte due to gassing or spillage.

Never use a hydrometer in lead-acid batteries that has been used in alkaline batteries.

Keep the battery case and battery compartment clean. Built-up dirt and moisture can cause a current path on the outside of the battery. When cleaning, be certain the cleaning fluid does not get into the cells.

Use baking soda and water to clean the battery or compartment. Never use ammonia products.

Maintain the proper electrolyte level.

When adding water, never fill the cells above the bottom of the vent well. Overfilling causes loss of acid, reducing battery capacity.

Impurities in the water added to the battery will remain and increase with each filling. Impurities will shorten battery life.

Unless spillage occurs, never add acid to a battery. Add water only.

Undercharging and overcharging will reduce battery life. Every effort should be made to ensure the battery receives the proper amount of charge.

Charging the battery during lunch periods or rest breaks is not recommended.

TM 10-3930-652-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC. *2 April 1984*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION)

TRUCK, FORKLIFT, ELECTRIC, FRONT/SIDELOADER, SRT, 4000/3000 LB CAPACITY ARMY MODEL MHE 256 DREXEL MODEL SL-44/3-EES(EE) NSN 3930-01-123-1300

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. -Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be furnished to you.

OPERATING SECTION **Page**

PREVENTIVE MAINTENANCE SECTION **Page**

TROUBLE SHOOTING SECTION

PARTS BREAKDOWN SECTION

MAINTENANCE SECTION

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of personnel to whom this Forklift Truck is issued.
Manufactured by:

Drexel Industries, Inc.
Horsham, PA 19044

Procured under Contract No. DTAAE07-81-C-6214

This technical manual is an authentication of the manuafacturer's commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

SCOPE

1. Type of Manual. Operator's, organizational, direct support and general support maintenance manual, including repair parts list.

2. Model Number and Equipment Name. MHE 256, front/sideloader, 4000/3000 lb capacity, solid rubber tire forklift truck.

3. Purpose of Equipment. The front/sideloader is intended to be used for stacking, moving cargo in and around warehouses, loading platforms and docks. It is also intended for moving cargo in and out of highway trailers and railroad cars. Trucks are intended for operation over paved, semi prepared and other hard surfaces for short distances.

MAINTENANCE FORMS, RECORDS AND REPORTS Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR) If your front/sideloader forklift truck needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MP, Warren, MI 48090. We'll send you a reply.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE Refer to TM 750-244-6.

PREPARATION FOR STORAGE OR SHIPMENT

1. Administrative Storage. Refer to page iii of this section of the manual and to TM 740-90-1.

2. Shipment. Refer to TB 749-97-2 for procedures covering preservation of equipment for shipment. General procedures for shipment are found in FM 55-15, with more specific information in TM 55-2200-001-12 for rail and TM 55-450 series for air transport.

PERSONNEL

Military Occupational Specialty (MOS). Qualitative and Quantitative Personnel Requirements Information (QQPRI) will be disseminated in accordance with AR 611-1.

The following MOS can operate and maintain the forklift:

(a) Operator, 57H and 76V

(b) Organizational Maintenance, 63B

(c) Direct Support and General Support, 63W, 52D, and 63G

TRAINING

1. New Equipment Training Team (NETT) are available to major field commands. Request for NETT should be addressed to: Commander, US Army Tank Automotive Command, ATTN: DRSTA-MLT, Warren, MI 48090. Training teams should be requested

TRAINING Cont.

only when trained personnel are not available in the Command to operate and/or maintain the truck.

2. New Materiel Introductory Team (NMIT) are available. Major field commands requiring briefings to Command Staff and users should forward their requests to Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MLT, Warren, MI 48090. Receiving Commands are responsible for NMIT itinerary.

LOGISTIC ASSISTANCE US Army Tank-Automotive Command Field Maintenance Technicians stationed at CONUS and OCONUS installations are available to furnish onsite training and or technical assistance. Assistance may be obtained by contacting the appropriate Logistics Assistance Office (LAO) listed in Appendix B, AR 700-4.

WARRANTY INFORMATION

1. Do not attempt to conduct negotiations directly with the manuafacturer in the event of warranty dispute. These negotiations are the reponsibility of the contracting officer.

2. The MHE 256, front/sideloader, 4000/3000 lb capacity solid rubber tire forklift truck are warranted by Drexel Industries, Inc. for 15 months or 1500 hours of operation after acceptance, whichever comes first. It starts on the date, found in block 23, DA Form 2408-9, in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your organizational maintenance shop.

3. Drexel Industries, Inc. is required to extend to the Government the full benefits of the warranties granted by suppliers of major assemblies or components used in the end item.

4. If a Drexel Industries Service Agency is not available, CONUS units should notify the National Maintenance Point (NMP) by telephone, AUTOVON 786-7363. OCONUS units should follow warranty reporting procedures in TM 38-750.

5. All warranty claims, whether they are settled locally with a manufacturer's representative or processed through normal Army maintenance channels, must be reported to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MP, Warren, MI 48090

WARRANTY

Drexel Industries, Inc. ('"Drexel") warrants for 15 months or 1500 hours of operation after acceptance, whichever occurs first, all supplies furnished under this contract will be free from defects in design, material, and workmanship and all other requirements of the contract as applicable. If the Government, prior to placing vehicles in service, elects to place quantities of such newly delivered vehicles in Government depot storage, the time period of the warranty will not begin to run for such vehicles until each vehicle is withdrawn from Government storage or until six months from the date of acceptance, whichever occurs first provided that the Government, prior to placing in storage of each new vehicle, notifies Drexel of the date in and the date of withdrawal and certifies that the units are stored in accordance with specifications for the storage of forklifts and batteries.

Using activity personnel should be advised that sometimes, even though the majority of repairs are covered by the warranty, there may be a small charge for normal maintenance items. Further, the cause of damage or repairs may later be determined by the dealer or factory to be directly related to misuse, neglect, alterations, or lack of proper maintenance and/or service. In either of these cases, the Government may be obligated to pay for teardown or inspection services, even though the repairs are no longer desired.

NOTIFICATION

At the option of the Government: The Government shall deliver the vehicle to the local Drexel facility or dealership for Drexel corrective warranty repair or replacement, or the Government shall notify Drexel Industries, Inc. in writing (Maple Avenue, Horsham, PA 19044), or by telephone ((215)4-672-2200), or by telex (902020), of any breach of the warranty provisions promptly within 10 days after the receipt of notice Drexel will submit to the Contracting Officer a written recommendation as to the corrective action required to remedy. All remedies and notifications shall be processed in accordance with the terms of the contract.

STORAGE

Forklifts

Storage conditions must be indoors, with a minimum temperature of +35°F. and a maximum of +115°F. and 90% max. relative humidity conditions, also units shall be stored per MIL-Std 162D (live storage) appendix I for storage conditions with the weight of vehicle removed from tires (i.e., units "blocked" with tires 1/8" to 1/4" off floor).

Batteries

Storage conditions must be indoors, with a minimum temperature of +35°F. and should not exceed +95°F. and 90% max. humidity. Batteries are shipped charged and dry, with the electrolyte separate. It is recommended that the storage period does not exceed 12 months, or the battery life cannot be expected to achieve a normal life cycle (i.e., battery plates will experience damaging sulphation after one year).

PUTTING TRUCK INTO SERVICE

1. Open the hydraulic door (left side) and remove the manuals in the plastic bag. Read the manual thoroughly before operating the truck.

2. Cut the wire securing the key.

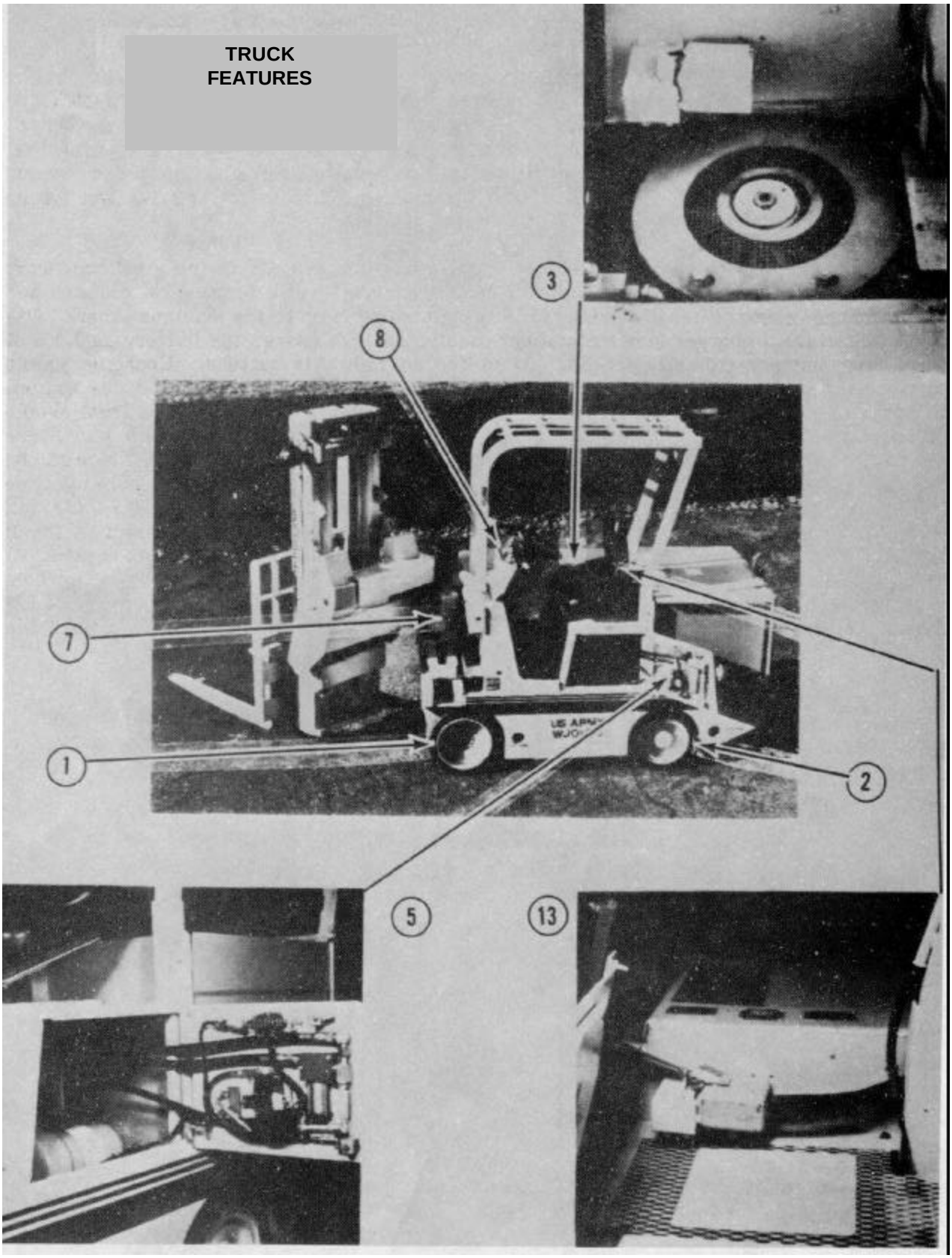
3. Check hydraulic oil level.

4. For batteries which are received charged and wet, remove each vent cap and check electrolyte levels. Ambient temperature should be as close as possible to 77°F. (25°C) or the apparent level may be misleading. In cold weather, batteries may look dry. Do not add water until an accurate estimate of electrolyte level has been made. Ensuring that the electrolyte level is at least above the plates, connect the battery to the recommended charger for six (6) hours. At the end of this period, recheck electrolyte level and top up with water if necessary.

5. For batteries which are received dry-charged, fill the cells to the maximum level with electrolyte of a specific gravity of 1.260. Recheck level after several minutes and add additional electrolyte, if necessary, to bring the levels up to the maximum mark. Use a **constant current charger** (not the charger usually used) to charge the battery at 3.5% of the 6-hour battery capacity, or 38.5 Amps for an 1100 AH battery. Charging should continue for a minimum of 150 hours and should terminate when specific gravities and on-charge cell voltages have remained constant for 3 hours. Electrolyte temperature should be about 125°F. (52°C) for at least half the charge. If this temperature cannot be reached, the charging rate should be increased. If this is done, the charging times can be reduced. If charging current is increased to 150% of normal, minimum charging time should be 110 hours minimum. If charging current is increased to 200% of normal, charging time will be 90 hours. Do not allow electrolyte temperature to exceed 1300°F (54°C). Check levels continually. Add 1.260 specific gravity electrolyte as needed. If specific gravities at the end of the charge exceed 1.290, dilute with water. Continue charge for two hours. If specific gravity is below 1.280, add 1.400 electrolyte until the proper specific gravity of 1.280-1.290 is reached. Continue for two hours. Be certain that vented cell caps are installed.

RESHIPMENT

Secure all loose items. Be certain that all fasteners are tight, doors closed, status of battery, hydraulic fluid, etc. is clearly marked.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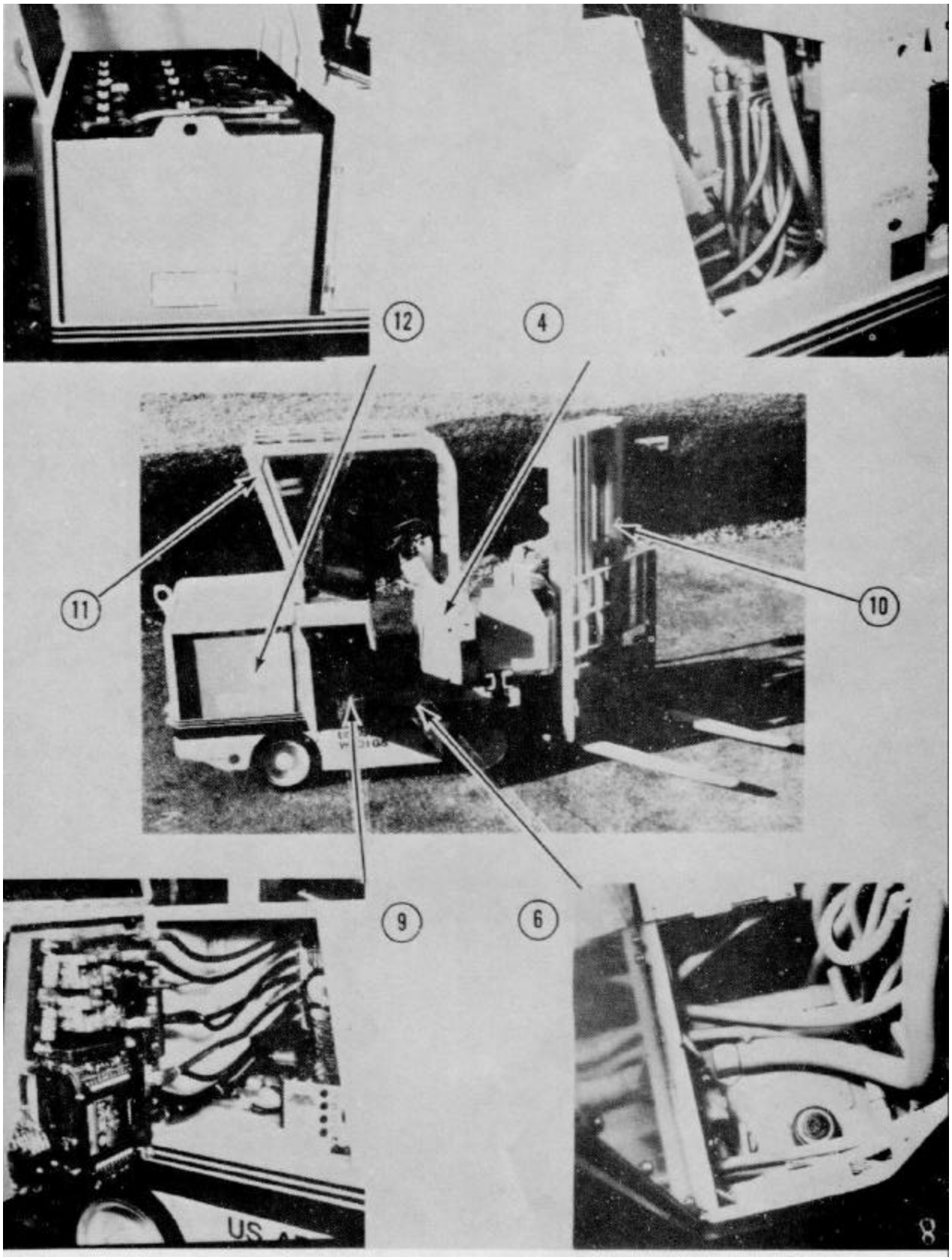
TRUCK FEATURES



MAJOR COMPONENTS

ITEM	DESCRIPTION
-1	Drive Assembly
-2	Steer Axle Assembly
-3	Pump and Motor Assembly
-4	Hydraulic Control Panel Module
-5	Hydraulic Door Module
-6	Hydraulic Reservoir
-7	Pivot and Shift Assembly
-8	Console Assembly
-9	Electric Door Module
-10	Mast Assembly
-11	Overhead Guard
-12	Battery
-13	Battery Connector

ELECTRICAL FORKLIFT TRUCK
MODEL NO. SL-44/3-ESS (EE)

SPECIFICATIONS

1. Item Name: Truck, Forklift, Electric, Front Sideloader, SRT, 4000/3000 LB. CAP.
2. Dimensions: ..... 42 In. Wide x 142 In. Long x 83 In. High
3. Overall Length (With Forks) ..... 142 In.
4. Overall Width (Front Loading) ..... 42 In.
   (Side Loading with 40 In. Long Forks) ..... 58 In.

5. Load Platform Width (For Long Loads) (Side Carry) ..... 16 In.
6. Load Platform Length (For Long Loads) (Side Carry) ..... 74 In.
7. Fork Length: ..... 40 In.
8. Fork Width: ..... 4 In.

9. Overall Height with Forks in Lowest Positions: ..... 83 In.
10. Overall Height with Forks in Highest Positions: ..... 232 In.
11. Overall Length Without Forks: ..... 100 In.
12. Reach Length (To Right Hand Side) ..... 2 In. Min.

13. Lift Height of Forks: ..... 184 In.
14. Fork Forward Tilt Angle in Degrees: 3
15. Fork Backward Tilt Angle in Degrees: 4
16. Prime Mover Type: ..... Electric Motor

17. Battery Compartment Length: ..... 29-3/8 In.
18. Battery Compartment Width: ..... 39 In.
19. Battery Compartment Depth: ..... 26 In.
20. Maximum Load Rating (Front Loading to 184" Lift) ..... 4000 Lbs.
    (Side Loading to 72" Lift) ..... 4000 Lbs.
    (Side Loading to 184" Lift) ..... 3000 Lbs.

21. Fork/Platform Maximum Free Lift Height: ..... 59 In.
22. Lift Mechanism Type: ..... Hydraulic
23. Lift Actuation Method: ..... Manual
24. Wheel Type and Quantity ..... Single Solid Type
    ..... Quantity (4)

25. Steering Type: ..... Ackerman
26. Hazardous Locations/Environmental Protection ..... Type EE

27. Radioactive Content: ..... Does Not Contain Radioactive Material.
28. Features Provided: Battery Discharge Indicator (With Left Interrupt)
Hour Meter, Quartz
Headlight (1) Left Side Mast
Battery Compartment
Tow Hook
29. Battery Electrolyte: ..... Acid
30. Surface Level To Horizontal Center of Gravity
Distance Without Load: ..... 24 In.

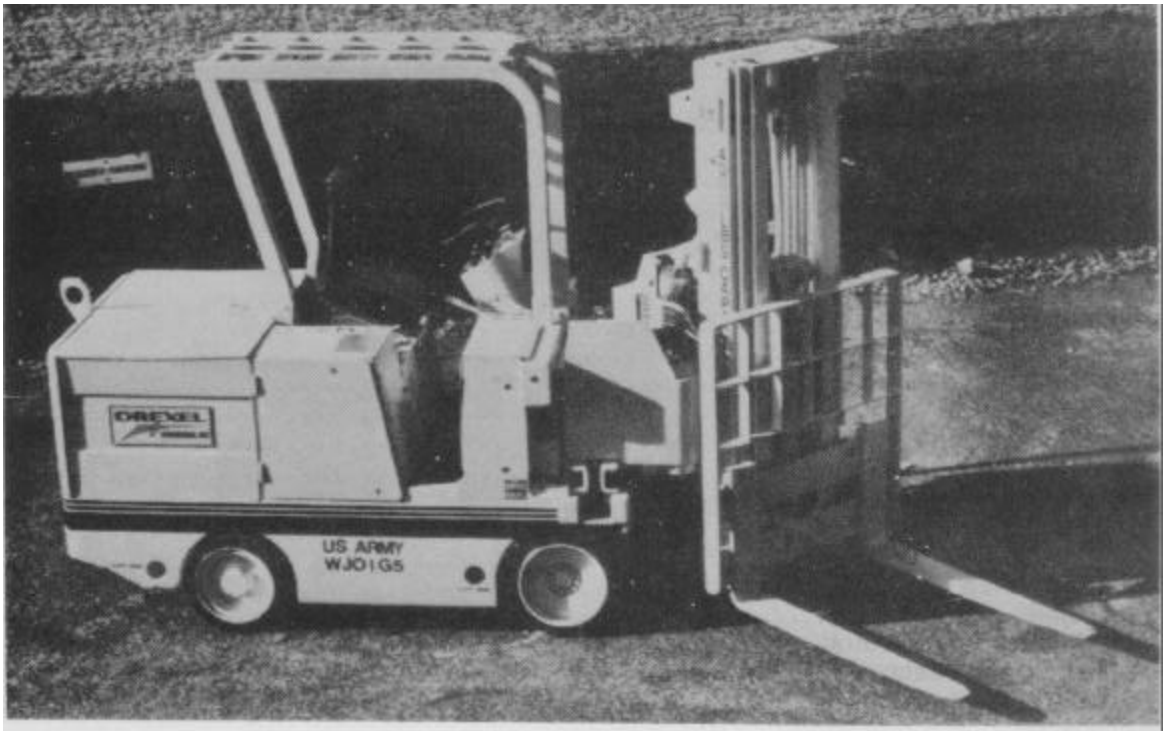
31. Fork Face to Vertical Center of Gravity Distance
Without Load: .....53-1/2 In.
32. Rated Speed: .....6 MPH
33. Fork Load Center Distance: ..... 24 In.
34. Fork Spread Distance ..... 8 In. Min.
..... 36 In. Max.

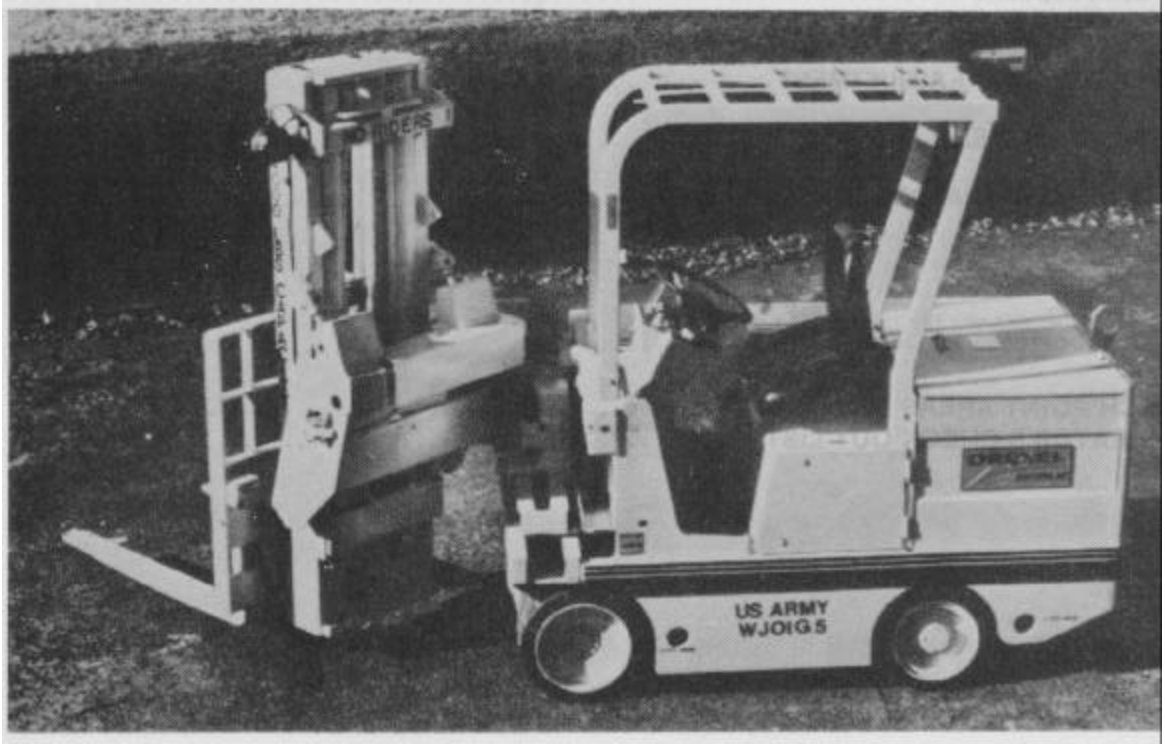
35. Minimum Load Carrying Surface Height: ..... 13/4"
36. Cubic Measure: ..... 286.5 Cu. Ft.
37. Unpackaged Unit Weight: ..... 9050 Lbs.
38. Storage Type: .....General Purpose Warehouse

39. Inspection Frequency: ..... Monthly
40. Storage Aisle Minimum Width: ..... 56 In.
41. Manufacturers Five (5) Digit Federal Supply Code
for Manufacturers (FSCM): 07443
42. Model Number for Above Requirement (Item #41) SL-44/3-ESS

43. Battery ..... 36 Volt
.....Length Max. 38-3/4 In.
..... Width Max. 27-1/16 In.
..... Height Max. 25-5/8 In.
.....Weight Min. 2850 Lbs.
.....Weight Max. 3550 Lbs.
..... Rating (6 Hr. Rate) 1100 AMP Hrs.

ELECTRICAL FORKLIFT TRUCK MODEL NUMBER SL-44/3-ESS (EE)





OPERATING SECTION

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OPERATING SECTION

INTRODUCTION

Your Drexel SwingMast counterbalanced front/side loading fork lift truck represents the greatest advancement in the state of the art in the powered industrial fork lift truck industry in the past twenty-five years.

Its name "Counterbalanced Front/Side Loading Fork Lift Truck" defines its versatility which can be described as follows:

1. When the mast is in the forward position, it operates as a conventional counterbalanced front loading truck. (Figure 1-1).

2. When the mast shift and pivot features are utilized, it permits the front loading unit to operate in storage aisles as narrow as 56 inches wide. The mast assembly pivot and shift features of the Drexel unit simulates the right angle turning of a conventional front loading truck in a wide storage aisle. (Figure 1-2).

3. When the mast assembly is pivoted out 90 degrees and shifted to the right, the truck operates as a side loader. (Figure 1-3).

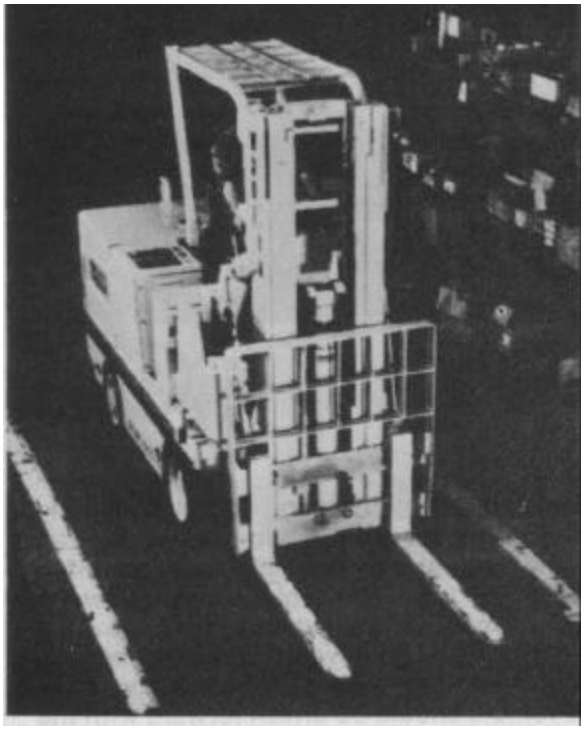


Figure 1-1.

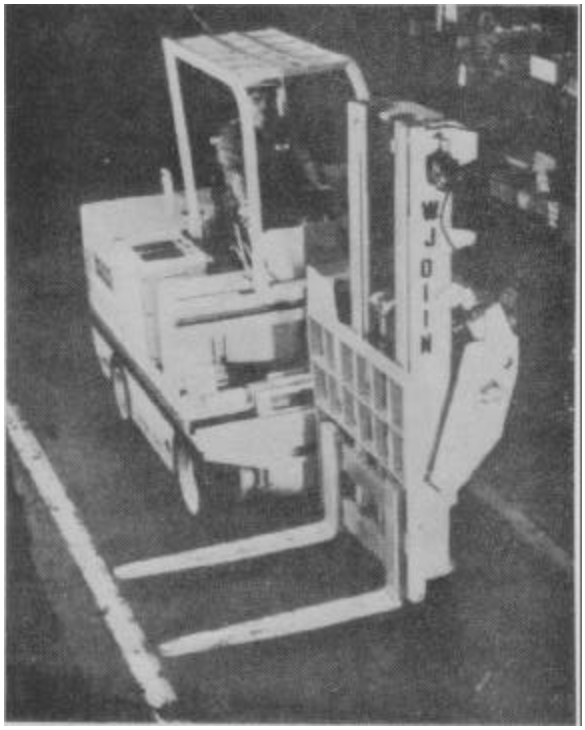


Figure 1-2.

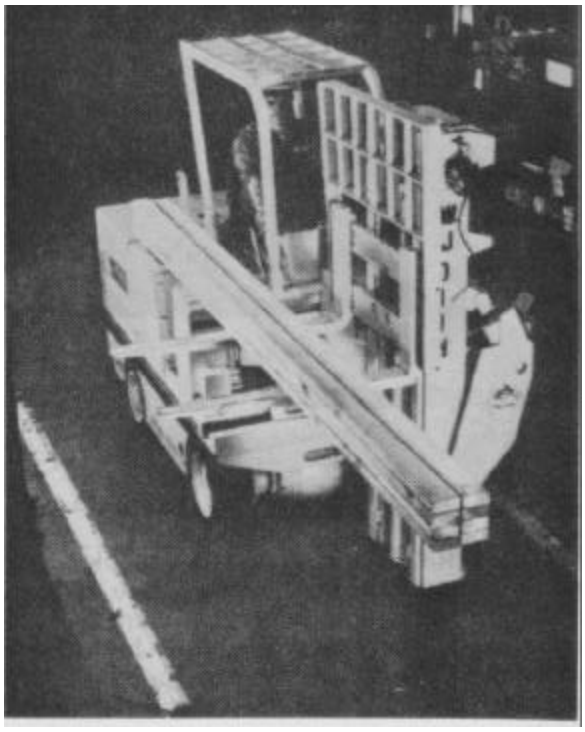


Figure 1-3.

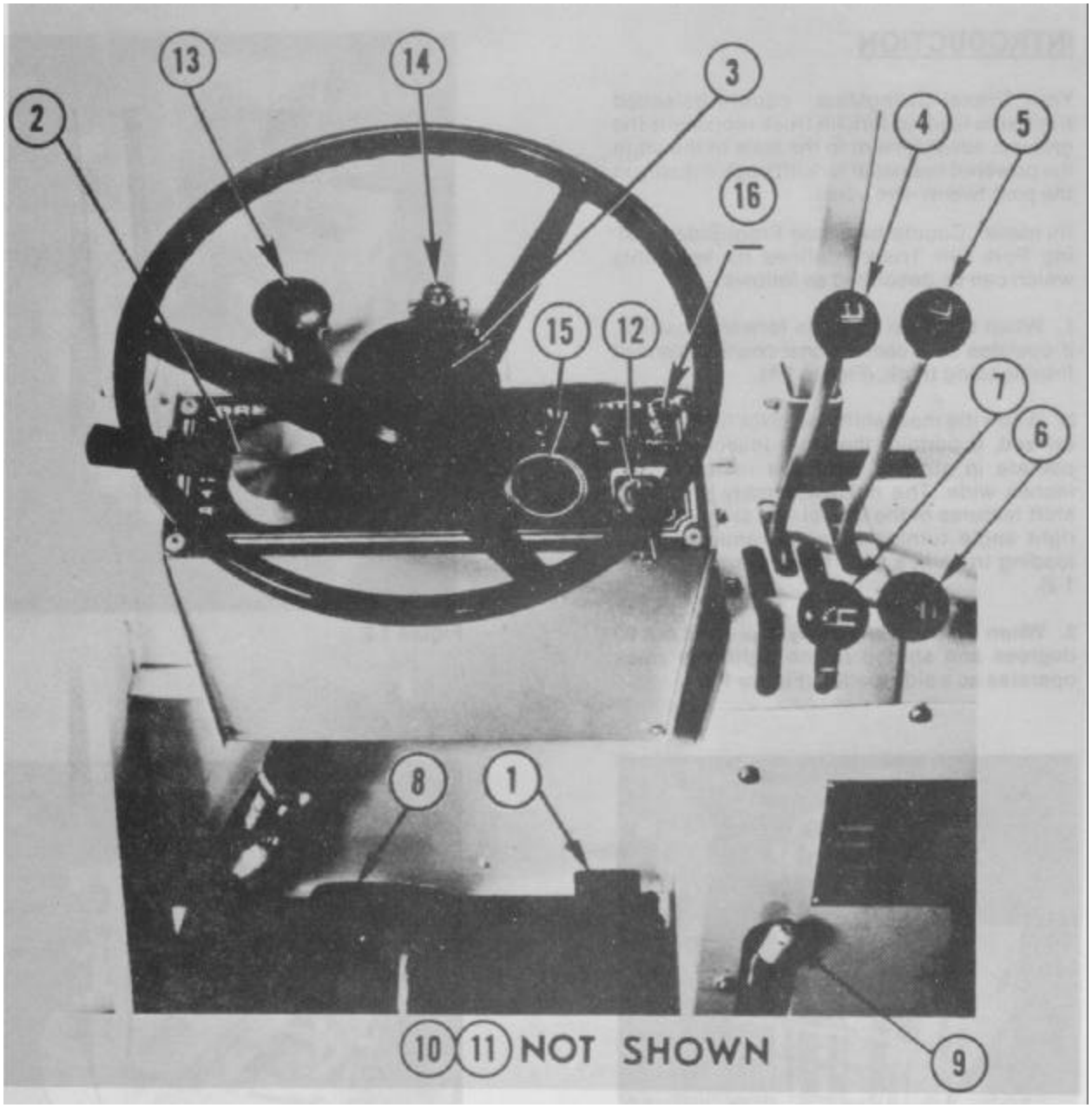


Figure 1-4.

OPERATING CONTROLS (Figure 1-4)

(1) ACCELERATOR PEDAL: The accelerator pedal is mounted on the floor plate at the center of the operator's compartment and is actuated by the operator's right foot. The accelerator pedal controls the speed of the vehicle. Slowly depress the pedal for smooth starts.

(2) DIRECTIONAL CONTROL LEVER: This control determines the direction of the vehicle. In the neutral position all power is interrupted. To have the vehicle move forward, push the control forward, away from the operator. To move in reverse, pull the control back toward the operator. Whenever possible, the vehicle should be driven forward with the load in the front of the operator. The directional control may also be used for vehicle reversal, known as plugging.

(3) HORN BUTTON: The horn button assembly is located in the center of the steering wheel. To use the horn, the operator must press directly on the cover.

(4) LIFT CONTROL LEVER: This control lever when pulled back will elevate the forks. When pushed forward, forks will lower. This lever is self-centering.

(5) TILT CONTROL LEVER: The tilt control lever, when pulled back, will tilt the load back toward the operator. When pushed forward, the load will tilt forward, away from the operator. The lever is self-centering.

(6) SHIFT CONTROL LEVER: This lever controls the shift motion of the mast assembly. When the lever is moved forward, the mast assembly will move to the operator's left. When the lever is pulled back, the mast assembly will move to the operator's right. The lever is self-centering.

(7) PIVOT CONTROL LEVER: This lever controls the pivoting motion of the mast assembly. When the lever is pushed forward, the mast will rotate clockwise away from the operator. Pull the lever backward, the mast will rotate counter-clockwise toward the operator. The lever is self-centering.

(8) BRAKE PEDAL: The brake pedal is located on the floor plate to the left of the accelerator pedal and is actuated by the operator's right foot. The brake pedal stops the forward or reverse motion of the vehicle. The operator should allow ample distance for gradual stopping. This will increase the life of the brake linings.

(9) PARKING BRAKE LEVER: The parking brake is released by pushing down on the lever and engaged by pulling the lever up. The parking brake should be engaged when leaving the operator's seat.

WARNING

The seat brake is NOT to be used to stop a truck when in motion.

(10) SEAT BRAKE: The seat brake is a spring loaded mechanism which keeps the parking brake de-energized when the operator is in the operator's seat. When the operator leaves the operator's seat. the spring mechanism energizes the parking brake.
The seat brake is designed to hold a parked loaded truck on a slope up to 15%.

(11) SEAT SWITCH: The electrical seat switch is actuated when the operator is in the operating seat and deactuated when the operator leaves the operating seat. The seat switch is in series with the key switch (item 12) and emergency switch (item 13) and prevents operation of the truck when the operator is off the truck.

(12) KEY SWITCH: The key switch is a two (2) position on-off switch located on the instrument panel.

(13) EMERGENCY SWITCH: The emergency switch is the third of three switches in series which when any one is open, will cause the electrical control circuit to disrupt the electrical power system and break the drive and hydraulic circuits. Push down the red mushroom button to open the emergency switch. To close, the red mushroom button must be pulled out.

(14) FILTER CONTAMINATION INDICATOR: The filter contamination indicator shows the condition of the return line filter element. When the indicator is in yellow, your filter element should be replaced. If the indicator goes into the red, your filter element is clogged and fluid flow has entered the bypass section of filter. (Replace element).

(15) BATTERY CAPACITY INDICATOR: The battery capacity indicator provides the vehicle operator with a visual means of determining the condition of the battery being used to power the traction and hydraulic systems.

It is designed to protect the battery from over discharge.

It provides the following operating features:

A. Meter always shows proportionate level of charge so operator can judge when to bring truck in.

B. Meter light signals beginning of use of reserve.

C. Reserve available is capacity, not time, so operator isn't under needless pressure.

D. Lift locks out where battery manufacturers specify, so operator doesn't ignore the need to recharge.

E. Meter indicates undercharged replacement battery so operator always knows what capacity he has to work with.

(16) FLOOD LIGHT SWITCH: A dash panel mounted, flood light switch is provided for the operator to control the use of the flood light which is mounted on the left side of the mast and the tail light. mounted on the back of the overhead guard.

Pulling the switch knob outward will turn on the flood light and tail light simultaneously. Pushing the switch inward will turn the two lights off.

TRUCK FEATURES

PIVOT/SHIFT INTERLOCK

When required, this truck is equipped with a pivot/shift interlock system which maintains vehicle operation, with rated load, within specified safety requirements per ANSI B56.1.

This feature must not be modified and no attempt should be made to disable the system. Such action could prove dangerous, not only to the truck operator, but also to personnel working in the vicinity of the vehicle.

You, the vehicle operator, must fully understand the pivot/shift interlock system, the operating characteristics, and checkout procedure before using the vehicle. Operation permitted by the pivot/shift interlock system is as follows:

1. With the mast (and forks) in the conventional forward position (Figure 1-1), left shift is restricted to 16" inches. Pivoting the mast clockwise (approximately 20 degrees), beyond the front loading position, allows full left shift travel.

2. With the mast in the side loading position (Figure 1-2), full left shift is possible. Pivoting counterclockwise is possible until the restricted zone is reached and additional pivot rotation is restricted. Side shifting the mast to the operator's right side, beyond the restricted zone, will allow complete counterclockwise pivot rotation.

CHECKOUT PROCEDURE

Determine the correct operation of the pivot/shift interlock system before each work shift. Starting with the mast in front.

1. Shift the unloaded mast to the right side of the vehicle and pivot the mast clockwise, the full 90 degrees.

2. Shift the mast to the left side. Mast travel should be 2 2inches. If the mast will not shift the full 22 inches, do not operate the vehicle until the malfunction has been found and corrected.

3. Shift the unloaded mast fully to the right side of the vehicle and pivot the mast counterclockwise so that the mast is directly in front of the vehicle (Figure 1-1). Shift the mast to the left. The mast should stop at 16 inches, plus or minus 1 inch of travel (Figure 1-5). If the mast shift is greater than 17 inches or less than 15 inches, do not operate the vehicle until the malfunction has been found and corrected.

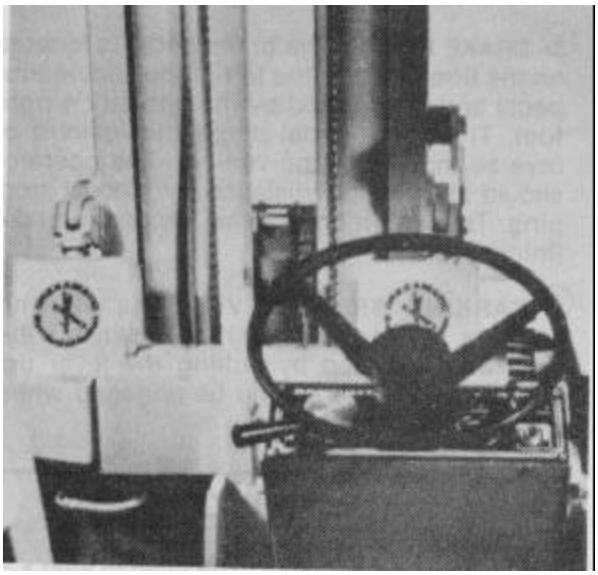


Figure 1-5.

4. When the shift stops at 16 inches of travel (per 3 above), pivot the mast clockwise to approximately 45 degrees. Resume shifting the mast to the left side. Full travel of 22 inches is possible.

5. With the empty mast now shifted fully to the left side of the vehicle, pivot the mast counterclockwise. Mast pivot will stop when the pivot angle reaches 15 degrees, plus or minus 2 degrees (Figure 1-6).

If the pivot/shift interlock system does not function as described in the checkout procedure, do not operate the truck until the malfunction has been found and corrected.

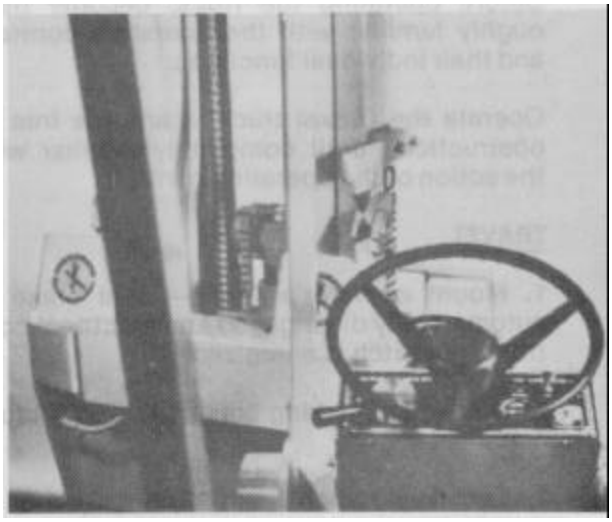


Figure 1-6.

ELECTRIC RETURN TO NEUTRAL

DESCRIPTION

The truck is equipped with an automatic return to neutral feature. When the operator leaves the operator's seat or turns the key switch to the "OFF" position, leaving the directional control lever in a forward or reverse drive mode, the traction system automatically returns to neutral. Upon remounting the operator's seat or turning the key switch to the "ON" position, the directional control lever must be repositioned to a forward or reverse drive mode through the selector's neutral position.

CHECKOUT PROCEDURE

Sitting in the operator's seat, proceed as follows:

1. Turn key switch to “ON".

2. Place directional control lever in F position.

3. Depress accelerator pedal and move truck forward a short distance, then stop by means of the service brake, leaving directional control in "F" position.

4. Turn key switch to "OFF" and then turn it back on.

5. Depress accelerator pedal. Truck should not move. If truck moves, the module has failed and should be replaced.

6. If truck does not move, remove foot from accelerator pedal. Place directional control lever in neutral (N) and then return again to forward (F) drive.

7. Depress accelerator pedal slightly and truck should move forward. (The unit is operating satisfactorily).

PUMP CONTACTOR DELAY CIRCUIT (HYDRAULIC)

DESCRIPTION

The time delay circuit prolongs the life of the pump motor contactor tips. To prevent arcing and to prolong life of the tips, the time delay circuit keeps the pump motor running from 112 to 3/4 seconds after control levers are released.

OPERATING SECTION

CHECKOUT PROCEDURE

1. Operate the tilt lever in reverse tilt direction, and then abruptly release. The pump circuit should run for approximately 1/2 to 3/4 seconds after release of the control lever.

2. If the pump shuts off as the lever is released, the circuit is malfunctioning. Replace the Drexel time delay module assembly.

POWER STEER CIRCUIT

The power steering on the Drexel truck is the accumulator type, providing full time power steering without the necessity of having the hydraulic pump operating constantly. (See figure 1-7).

Initially, hydraulic fluid is pumped by the rear section of the hydraulic pump through the directional control valve, exits via the carryover port) through the check valve and to the Orbitrol unit on the steering column. The Orbitrol unit directs the hydraulic fluid to the steering cylinder, controlling the steer wheels. If the steering wheel is not being turned, the hydraulic fluid from the pump is stored under pressure in the hydraulic accumulator. The accumulator is a sturdy chamber which houses a rubber bladder. The bladder is precharged with pure, dry nitrogen to a pressure of 850 psi. Hydraulic fluid is pumped into the other end of the accumulator, compressing the bladder until the fluid reaches a pressure of 1850 psi. A dual pressure switch senses the pressure in the system and turns the hydraulic pump motor off. If hydraulic fluid is then required for a steering maneuver, the fluid is supplied from the accumulator; the pump does not have to run continuously to provide full time power steering. The check valve prevents the fluid in the accumulator from draining back into the system.

As the fluid in the accumulator is depleted and hydraulic pressure decreases, system pressure is again sensed by the power steering pressure switch. When the pressure decreases to approximately 950 psi, the switch closes and turns the pump motor on. When pressure is built up to 1850 psi, the pressure switch opens and turns the pump motor off.

Hydraulic fluid flow to the accumulator and power steering system is controlled by the power steering solenoid operated hydraulic valve. This normally closed solenoid is actuated by the directional control valves. Whenever the lift, tilt, pivot, or shift, levers are operated, the hydraulic control valve electric switch actuates the power steering solenoid, opening the solenoid valve, permitting hydraulic fluid to dump back into the reservoir, thus metering flow for shift, tilt, or pivot functions which may be performed at normal operating pressures. Upon release of the lever, accumulator charging will continue if required.

OPERATING INSTRUCTIONS

Before operating the truck, become thoroughly familiar with the operating controls and their individual functions.

Operate the Drexel truck in an area free of obstructions until completely familiar with the action of the operating controls.

TRAVEL

1. Mount operator's seat - seat brake is automatically disengaged and electrical control seat switch is energized.

2. Disengage parking brake. (item 9). (Figure 1-4).

3. Turn key switch (item 12) (Figure 1-4) to the "ON" position as indicated on dash panel.

4. Move directional control lever (item 2) (Fig. 1-4) to forward (F) or reverse (R) position to select direction of travel.

5. Slowly depress accelerator pedal. (Pedal travel produces the same effect as it does in an automobile; the further the pedal is depressed, the faster the travel speed). Operate in a straight path, and do not operate at high travel speed until you are thoroughly acquainted with the action and feel of the truck.

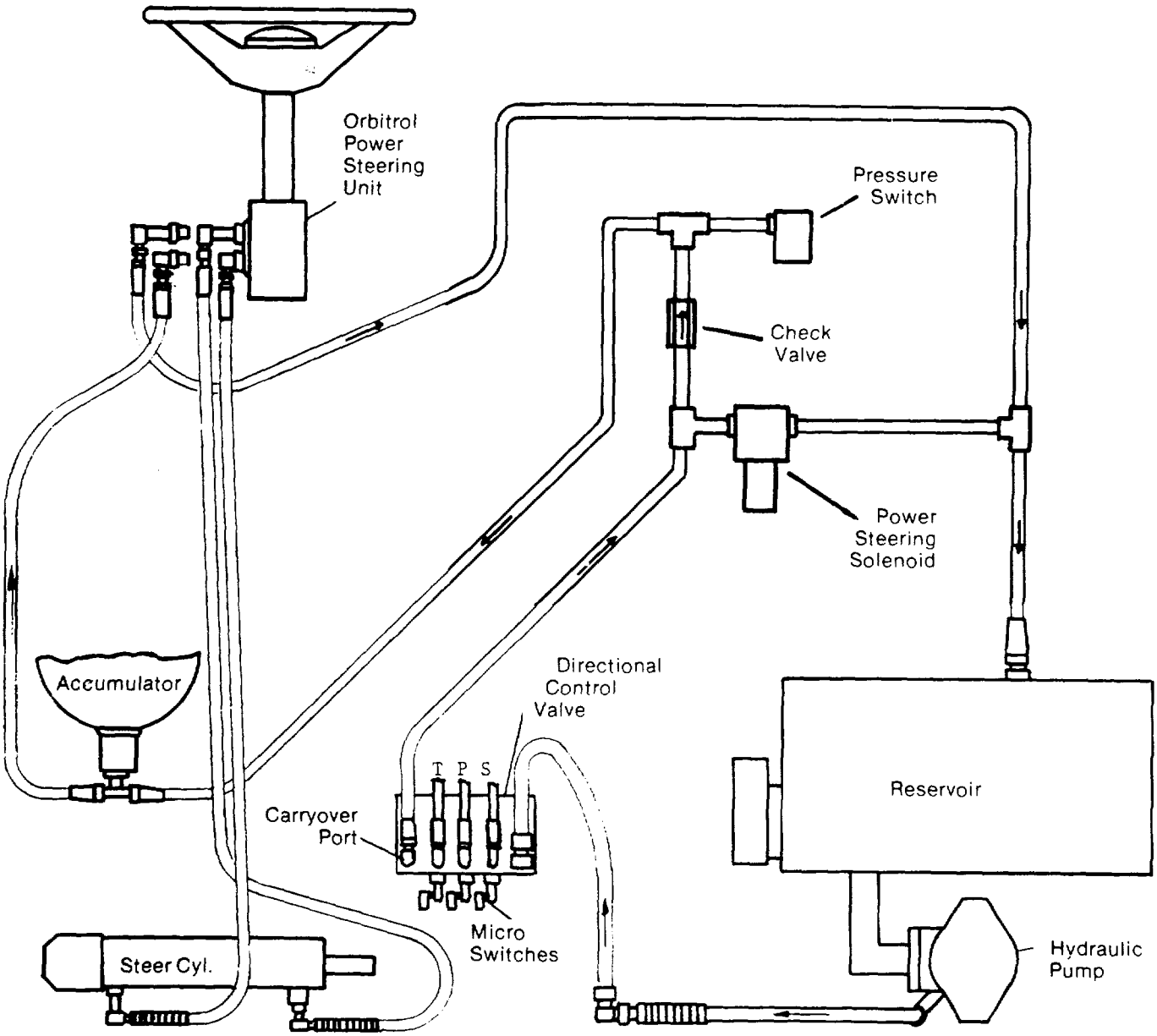


FIGURE 1-7. POWER STEERING SYSTEM

NOTE:

The truck is equipped with an automatic return-to-neutral feature. If the start key (item 12) (Figure 1-4) is turned to the "OFF" position or the operator leaves the operator seat or both, with the directional control selection lever (item 2) (Figure 1-4) in a drive mode of operation the truck automatically, electrically returns to its neutral position. (Ref. Page 1-5).

6. Make right angle turn at slow speed. Clockwise rotation of hand steer wheel produces a truck right hand turn. Counter-clockwise rotation produces a truck left hand turn. Notice the hand steer wheel will not automatically return truck to a straight ahead drive; the operator must return the truck back into straight wheel drive condition.

WARNING

Use care when traveling with or without load. Avoid excessive speeds and abrupt turns.

7. Once you feel you have mastered the truck drive system, proceed to the hydraulic functions.

HYDRAULIC FUNCTIONS

The hydraulic control levers (items 4, 5, 6 & 7) (Figure 1-4) are clearly identified by international symbols. Thoroughly familiarize yourself with their actions as described in the operating control portion of this section.

The mast lift and tilt control functions (Fig. 1-4, items 4 & 5) are the same as on any standard powered industrial fork life truck.

1. Pulling the mast lift control lever towards the operator produces a lifting action of the mast forks. Pushing the mast lift control lever away from the operator produces a lowering action of the mast forks. (Figure 1-8).

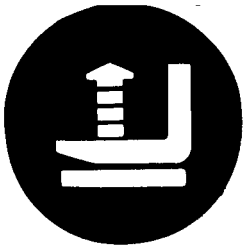


Figure 1-8.

WARNING

A. Observe the truck load rating on the nameplate. Never handle loads in excess of specified rating.
B. Do not handle unstable or loosely stacked loads.

2. Pulling the mast tilt control lever towards the operator produces a rearward tilting action of the mast assembly. Pushing the mast tilt control lever away from the operator produces a forward tilting action of the mast assembly. (Figure 1-9).

Figure 1-9.

WARNING

Forward tilting of the toad mast should be at floor level only or in the rack area for deposit or retrieval of loads.

WARNING

Tilting of the loaded mast should always be slow by feathering (metering) of the tilt control lever.

3. Pulling the mast shift control lever towards the operator produces a right hand shifting action of the mast assembly. Pushing of the mast shift control lever away from the operator produces a left hand shifting action of the mast assembly. (Figure 1-10).

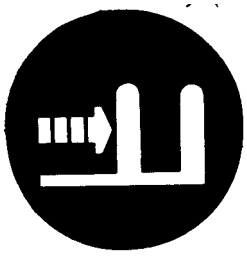


Figure 1-10.

4. Pulling of the mast pivot control lever towards the operator produces a counterclockwise rotating action of the mast assembly. Pushing of the mast pivot control lever away from the operator produces a clockwise rotating action of the mast assembly. (Figure 1-11).

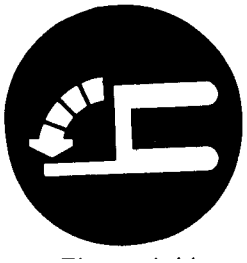


Figure 1-11.

The mast shift and pivot control functions (Reference Figure 1-4, items 6 & 7) are unique to the Drexel unit. Once you have mastered their action by individual operation, you are ready to master their simultaneous operation in the handling of loads. Proceed as follows in an open area free of obstructions. With no load on the mast forks.

5. Starting with the mast in the forward position and fully shifted to the right, push both the pivot and shift control levers forward. (Figures 1-12 & 1-13). You will notice both mast clockwise rotation and left hand shifting actions. The actions, however, will not be synchronized and one function will bottom out before the other. Continued practice in simultaneous feathering (metering) of the control levers will produce a smooth, synchronized action.

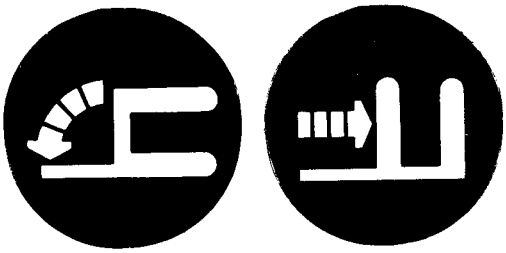


Figure 1-12. *Figure 1-13.*

6. Starting with the mast pivoted clockwise 90 degrees and fully shifted to the left, pull the pivot and shift control levers rearward. (Figures 1-14 & 1-15). You will notice both mast counter-clockwise rotation and right hand shift action. The action again will not be synchronized and one function will bottom out before the other. Continual practice in simultaneous feathering (metering) of the control levers will produce a smooth, synchronized action.

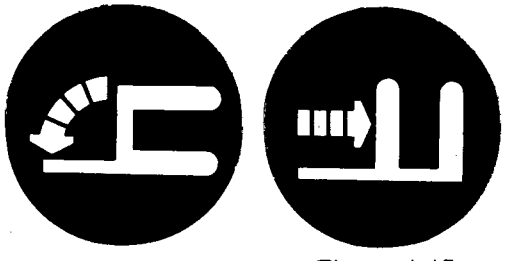


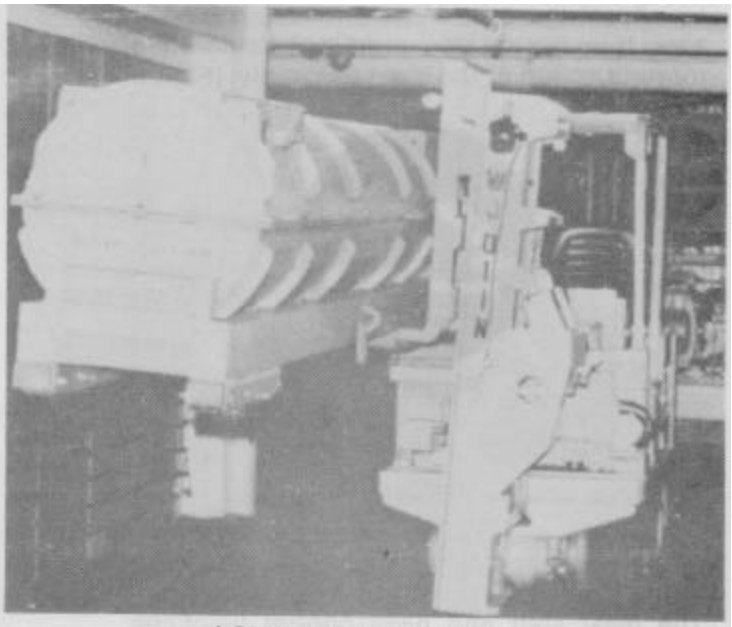
Figure 1-14. *Figure 1-15.*

Once you have mastered steps 5 and 6 above, you are ready to proceed with the same functions operating with a load on the mast forks.

Having accomplished steps 1 through 6 and repeating steps 5 and 6 with a load on the mast forks, you are ready to proceed with load deposit and retrieval. For the following sequence, it is advisable to practice operation in a narrow aisle (60 to 66 inches) at a second load elevation. Also, you should start with an empty rack beam length and utilize the rack vertical members closest to the truck as your guide position.

7. **LOAD DEPOSITS:** (Figures 1-16 and 1-17). As you approach the rack opening, raise the load to the proper elevation. Continue to approach the rack opening at a creep (slow) speed with the truck slightly angled to the rack.
As the forward right corner of the load clears the rack vertical member (your load position will be shifted to the left and rotated to an angle of approximately 45 degrees), stop the shift motion. Continue to rotate the load clockwise as the truck is still moving forward at a creep (slow) speed until the load is perpendicular to the rack. At this point, with the truck still moving forward at a creep (slow) speed, shift the load to the right (as described in step 3 above) until it is completely in the rack opening.

Figure 1-16



LONG LOAD HANDLING

LONG LOAD HANDLING

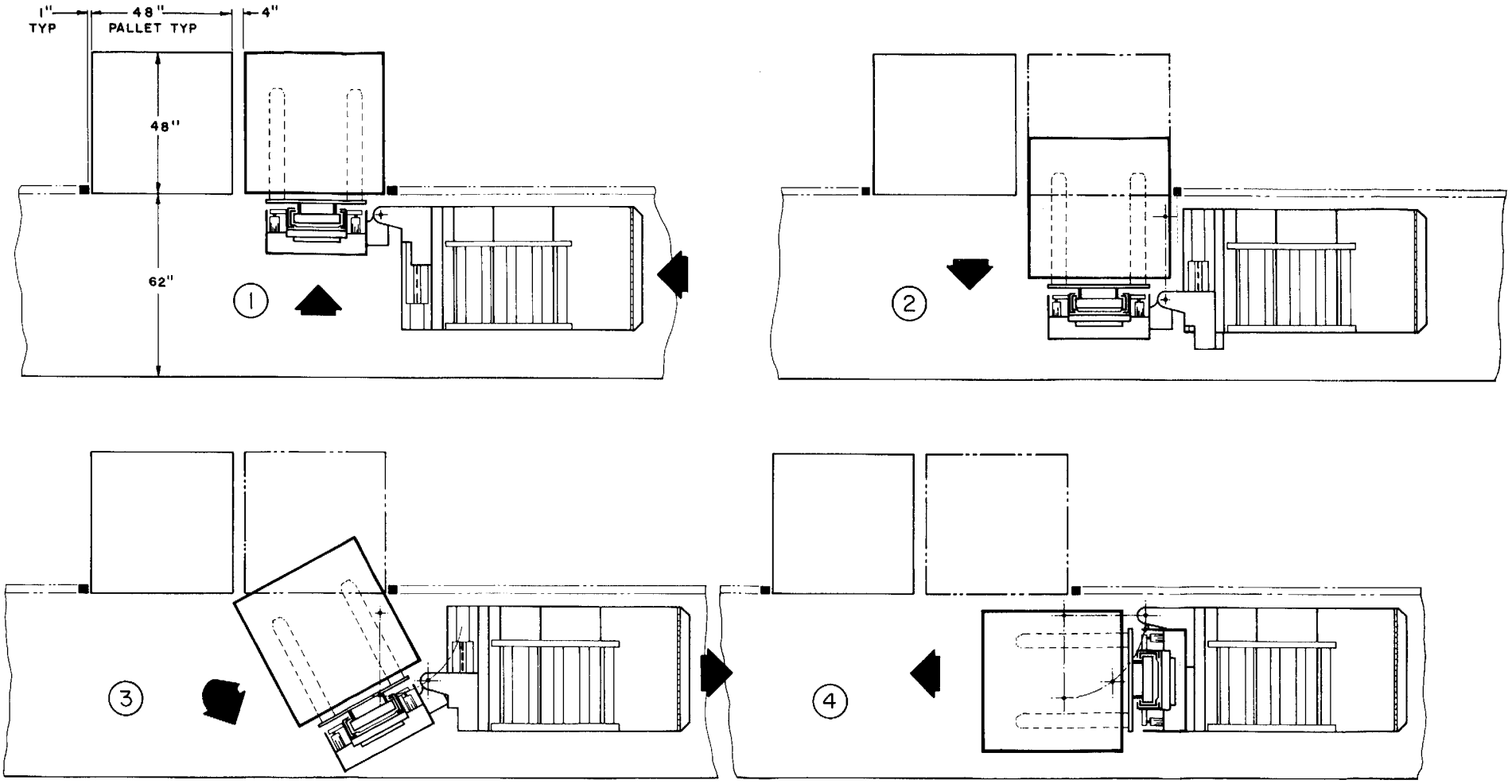


Figure 1-17.

LOAD RETRIEVAL (Follow Steps 1 thru 4)
LOAD DEPOSIT (Follow Steps 4 thru 1)

8. LOAD RETRIEVAL: Once the forks are in the pallet, raise the load approximately 2 inches (rearward mast tilt may be used here) to clear the rack horizontal members. Start to shift the loaded mast to the left with the truck traveling in reverse at a creep (slow) speed, utilizing all of the left hand shift motion. The load face nearest the operator should be very close to the vertical rack member in view of the operator, with the truck still moving in a reverse direction at a creep (slow) speed while performing the function described in item 6 above. When the load is partially shifted to the right and at an angle of approximately 45 degrees (clearing the adjacent load in the rack beam length), continued shifting and pivoting is described in step 6, stop the right hand shift motion (Figure 1-17).

With the truck still traveling in reverse at a creep (slow) speed, continue to pivot the load counter-clockwise (as described in step 4 above) until it is in the forward position. At this point, lower the load to approximately 12 inches off the floor and proceed in either direction at transport speed (5 to 6 MPH). After several hours of practice with the hydraulic functions, you will be proficient to the point where you can go into normal operation. After several days of operation, you will have thoroughly mastered the operating procedure of the Drexel unit.

OPERATORS SEAT ADJUSTMENT

The horizontal position of the operators seat may be adjusted in two ways, as follows:

1. Primary seat position adjustment, up to 4 inches, may be changed by the seated operator grasping the locking lever (Figure 1-18) with the left hand, pushing it outward and shifting body weight forward or rearward to reposition the seat. Release of the locking lever and slight movement of the seat should insure locking in position.

2. Secondary seat position adjustment, up to 3 inches, may be obtained as follows:

A. Raise the seat to a position over the steering wheel.

B. Loosen the three, 3/8 inch, hex head cap screws (Figure 1-19) using a 9/16 inch wrench.

C. Reposition the seat assembly and mounting plate and retighten the 3/8 inch hex head cap screws.

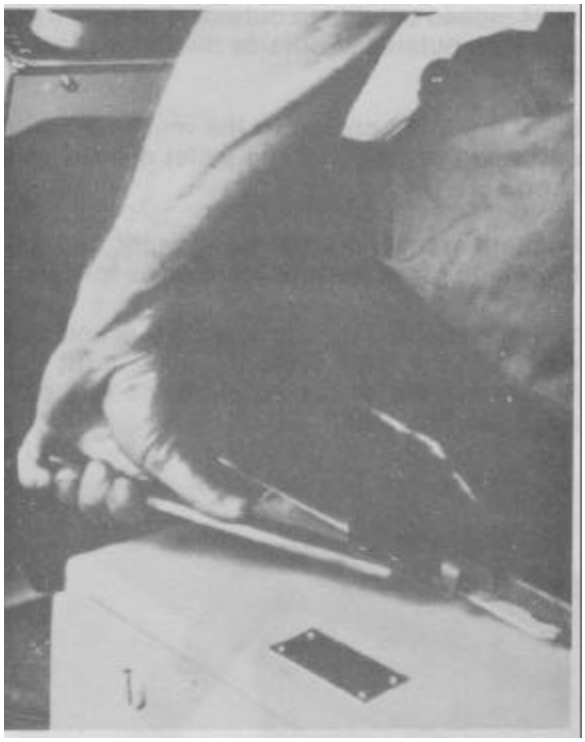


Figure 1-18.

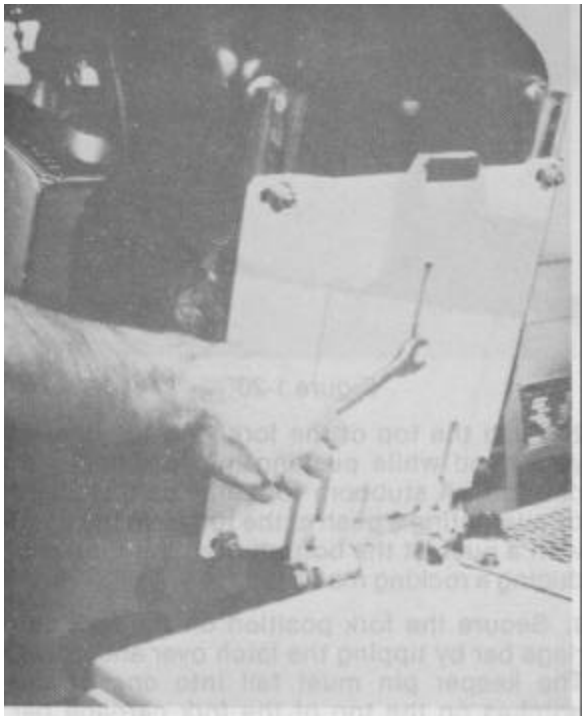


Figure 1-19.

FORK ADJUSTMENT

Forks may be adjusted to obtain a maximum of 34 inches outside to outside dimension, or an 8 inch outside to outside minimum dimension.

Keep the forks spread to the maximum permissible position that the pallet or load will allow.

Position of the forks may be changed and the forks secured in the new location as follows:

1. Reach behind the top of each fork and pull the tip of the latch upward. This will lift the keeper pin out of the notch in the fork carriage bar(Fig. 1-20).

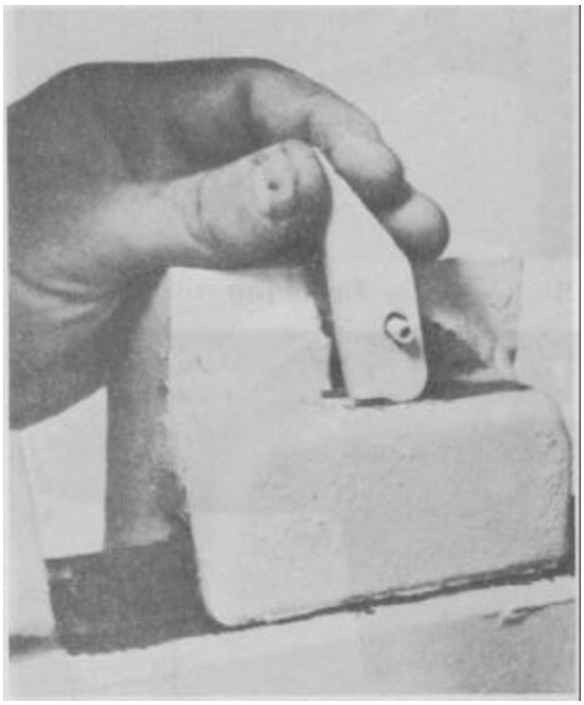


Figure 1-20.

2. Push the top of the fork with the heel of your hand while pushing the fork tine with one foot. A stubborn fork may be dislodged by alternating a push at the top from the hand with a push at the bottom from the foot, producing a rocking motion.

3. Secure the fork position on the fork carriage bar by tipping the latch over and down. The keeper pin must fall into one of the notches on the top of the fork carriage bar (Fig. 1-21).

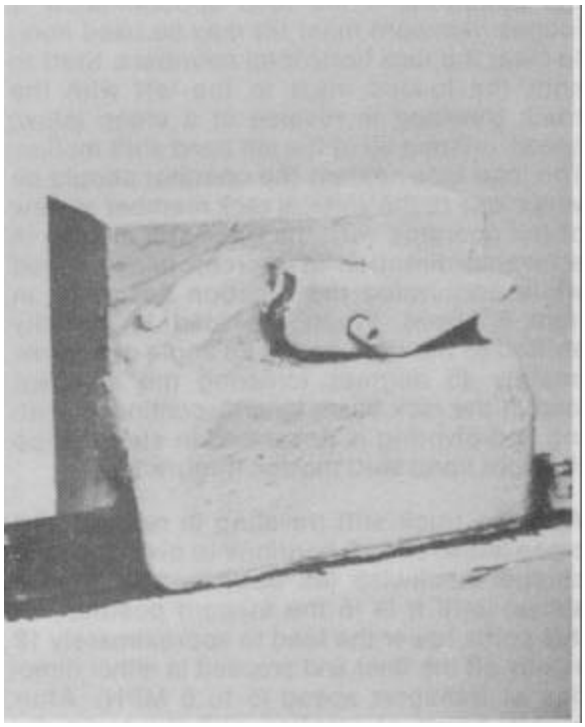


Figure 1-21.

ADJUSTING OPERATORS CONSOLE

The angle of the steering wheel and position of the dash panel and operators console may be changed to suite the convenience of the vehicle operator. Three positions are provided and may be selected as follows:

1. Remove the right and left retaining bolts and hardware using a 3/4" wrench (Fig. 1-22).

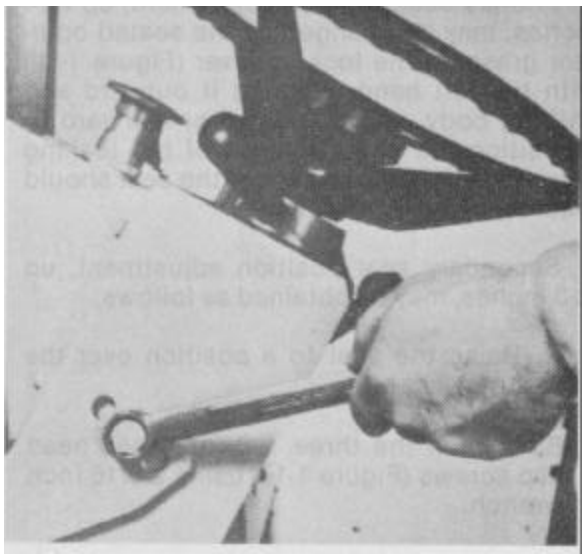


Figure 1-22.

2. Push the console to the desired angle. Insert a bolt, lockwasher and flat washer on both sides and tighten. See Figure 1-23.

Figure 1-23.

SAFETY NOTES

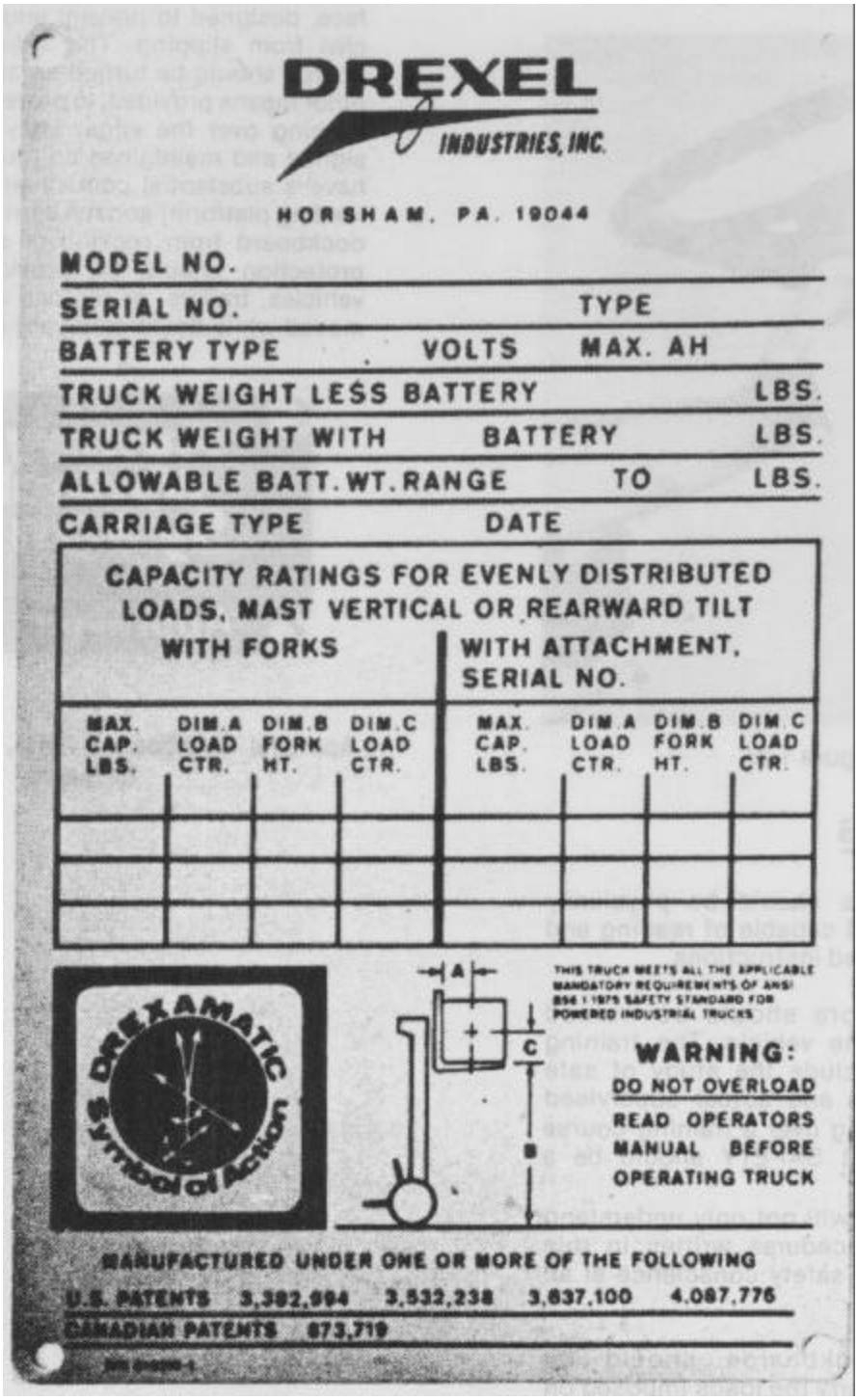
GENERAL: Operators should be physically and mentally fit and capable of reading and understanding posted instructions.

TRAINING: Operators should be trained before operating the vehicle. The training program should include the study of safe operating practices and actual supervised experience in driving over a training course with emphasis that SAFETY should be a HABIT.
The best operators will not only understand and follow the procedures written in this manual, but will be safety conscience at all times.

DOCKBOARDS: Dockboards should be strong enough to carry the loads imposed on them, and the load capacity should be plainly marked. They should be secured in position either by being anchored or being equipped with devices that will prevent their slipping.

Fork pockets or other effective means should be provided for handling by fork trucks. Dockboards should have a high friction surface, designed to prevent employees or vehicles from slipping. The sides of the dockboards should be turned up at right angles or other means provided, to prevent vehicles from running over the edge. They should be designed and maintained so the end edges will have a substantial contact with the dock (or loading platform) and the carrier to prevent the dockboard from rocking or sliding. Positive protection should be provided to prevent vehicles, trailers, or railroad cars from being moved while dockboards are in position.

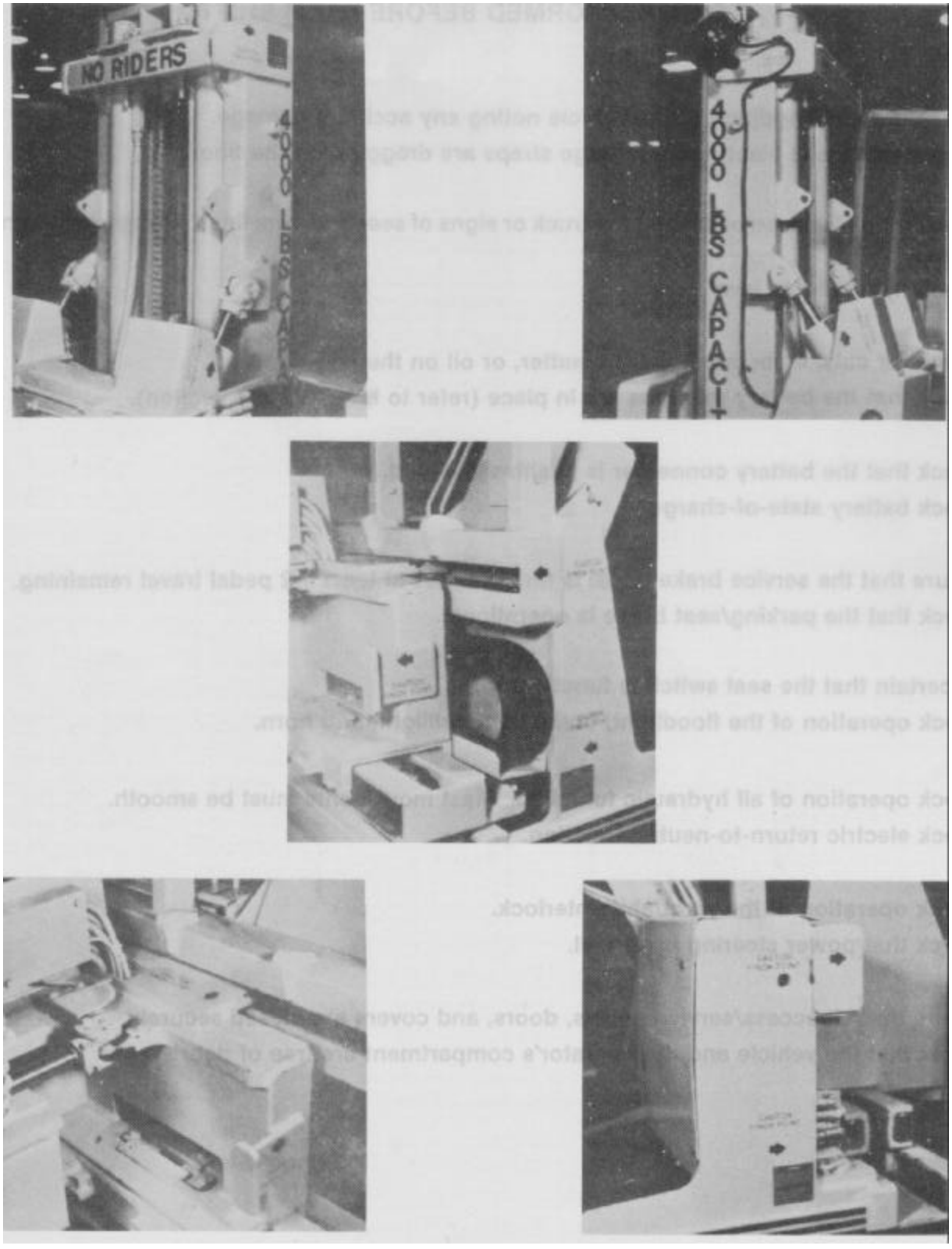
Approval Certification Plate, Factory Mutual Research



Nameplate, Manufacturer and Truck Load Rating

OPERATING SECTION

PINCH POINTS



OPERATING SECTION

OPERATOR'S CHECK OUT LIST
TO BE PERFORMED BEFORE EACH SHIFT

Check general condition of the vehicle noting any accident damage.
Ensure that static electrical discharge straps are dragging on the floor.

Check for oil leaks on or around the truck or signs of seepage from lines, fittings, cylinders, wheels.
Check hydraulic oil level.

Check for cuts, embedded foreign matter, or oil on the tires.
Check that the battery retainers are in place (refer to Maintenance section).

Check that the battery connector is positively locked.
Check battery state-of-charge.

Ensure that the service brake pedal is firm and has at least 1/2 pedal travel remaining.
Check that the parking/seat brake is operational.

Be certain that the seat switch is functioning.
Check operation of the floodlight, brake light, taillight, and horn.

Check operation of all hydraulic functions. Mast movements must be smooth.
Check electric return-to-neutral function.

Check operation of the pivot/shift interlock.
Check that power steering is normal.

Ensure that all access/service panels, doors, and covers are closed securely.
Check that the vehicle and the operator's compartment are free of debris.

PREVENTIVE MAINTENANCE AND CHECKOUT SCHEDULE

Based on (1) Shift Basis	Hours	8	50	250	500	1000	2000	Reference Pg. No.
	Weeks			6	12	26	52	
1. Power Steer System		O			O			2-3
2. Pivot/Shift Interlock System		O			O			1-4 and 1-5
3. Electric Motors Pump-Brushes						O		5-45
Traction Brushes						O		5-22
4. Accelerator Assembly					O			3-6
5. Hyd. Circuit Time Delay		O						1-5
6. Electric Return to Neutral		O						1-5
7. Electric Connections						O		2-4
8. Major Bolt-on Connections					O			2-4
9. Hydraulic Oil Level Check			O					2-4
10. Change Hydraulic Oil							O	2-4
11. Steer Axle					O			2-5
12. Pivot Arm Racking			O					2-5
13. Mast Racking			O					2-5
14. Mast Inspection				O				2-5 , 2-11
15. Truck Lubrication				O				2-8
16. Front End Bearing Assembly Lubrication							O	2-5
17. Battery		O			O			5-33 and 5-34
18. Tires		O						2-6
19. Hydraulic Oil, Return Line Filter					O			5-53

PREVENTIVE MAINTENANCE

Preventive Maintenance will prevent minor problems from developing into serious conditions which could involve excessive downtime and major costly repairs.

WARNING

- **When working under this vehicle, DO NOT rely on hydraulic and mechanical jacks only; USE SAFETY STANDS.**
- **Disconnect battery cable before repair operations in the vicinity of electrical connections or those requiring electrical disconnects.**
- **Be aware of open flame or spark sources when working near the battery or other areas with volatile fluids.**
- **Never go near an open flame or spark when cleaning parts or tools with solvents.**
- **Use the proper cleaning solution. External parts can be cleaned with a solvent unless they include synthetic rubber. Synthetic rubber parts will come clean with a chlorinated hydrocarbon or hydraulic brake fluid.**
- **Tag all similar parts for location and mark all mating parts for position.**
- **Protect finished surfaces from physical damage and corrosion.**
- **Very tight bolts and screws can often be loosened by soaking with penetrating oil, then sharply striking the bolt head a few times with a hammer and punch.**
- **No parts, except those assembled with a "press fit," require unusual force during assembly. If you encounter trouble in disassembling or assembling a part, determine the reason for the difficulty, then proceed. Be patient.**
- **Cover all openings after removing parts or subassemblies to keep small tools and parts, et cetera, from falling in.**
- **When assembling two (2) parts, start all the fasteners first, then tighten evenly.**
- **Observe standard torque ratings for the size and type of fastener unless otherwise specified.**
- **If a part requires replacement, and when practical, take the odd part to the parts house or distributor for comparison to the replacement part.**

MAINTENANCE CHECKS

Eight (8) hour maintenance checks and services are normally performed by the fork truck operator. All other inspection and maintenance checks are normally performed by supporting maintenance personnel.

The service intervals given are based on normal operating conditions. When operating under abnormal or severe conditions, perform the services as often as required to maintain the vehicle in satisfactory operating condition.

POWER STEER SYSTEM

1. Operational Check

A. Sit in the operator's seat and turn the key switch to the "ON" position. Turn the hand steering wheel clockwise and counterclockwise until the pump motor starts.

B. With the pump motor running turn the hand steer wheel clockwise until the steer axle wheels are at a full lock position for a right hand steer. Remove hands from the steering wheel and wait for the pump motor to stop (indicating a full hydraulic charge of the accumulator).

C. After the pump motor has stopped (with key switch still in the "ON" position) and with the truck stationary, turn the hand steering wheel for a full left hand steer and then back to a full right hand steer. Continue the sequence, counting the revolutions of the hand steering wheel, until the pump motor starts again.

D. The number of hand steering wheel revolutions should be approximately 18. If the revolutions counted are less than 12 the truck should be returned to the maintenance shop for a power steer circuit check out with the accumulator check and charge kit (Pages 5-62 through 5-66).

2. Controls Check

A. Sit in the operator's seat and turn the key switch to the "ON" position. Turn the hand steering wheel clockwise and counterclockwise until the pump motor starts.

B. With the pump motor running continue turning the hand steering wheel clockwise and counterclockwise in short strokes at a slow speed (RPM). When the accumulator hydraulic charge is satisfied the pump motor should stop. At this point if there is any evidence of a cycling high pressure shock condition (hammering effect) the truck should be returned to the maintenance shop for check out or replacement of the power steer circuit high pressure switch time delay module. Reference paragraph 3.51 and page 4-69, item 35.

ELECTRIC CONNECTIONS

A. Loose electrical mechanical connections in the power and control circuits usually are the primary reason for fuses opening.

B. Check operating pressures and current draws and compare with Tables 1 & 2, pages 3-18 and 3-19. Hydraulic pressure points are located at the valve inlet fittings of both hydraulic valves (Fig. 3-25 and 3-26).

C. Thoroughly check all electrical mechanical connections and tighten if required. Specific attention should be directed to the power fuses (1FU and 2FU) mounting block fuse connections (Pg. 4-90, item 24).

MAJOR BOLT ON CONNECTIONS

A. All major mechanical connections must be checked and tightened. If operating conditions are considered severe the frequency of checking and tightening should be more often than recommended.

1. Drive axle trunnions (Pg. 5-4, Fig. 5-10).

2. Drive assembly support (Pgs. 5-2 and 5-3, Figs. 5-6, 5-7, and 5-8).

3. Wheel nuts, drive (Pg. 5-21).

4. Steer axle trunnions (Pg. 5-24, Figs. 5-70 and 5-71).

5. Wheel nuts, steer (Pg. 5-29).

6. Mast trunnions(Fig. 5-181).

7. Hydraulic valve control levers (Pg. 3-13, Para. 3.46).

8. Master cylinder mounting (Pg. 4-86, item 12).

9. Pump/motor mounting (Pg. 5-45, Figs. 5-117 and 5-118).

10. Accumulator mounting bracket (Pg. 5-64, Fig. 5-159).

11. Cylinder pins locking bolts.

Tightening of all other mechanical connections are recommended.

HYDRAULIC OIL LEVEL CHECK

A. Mast must be fully lowered and tilted back.

B. Sideshift assembly must be fully shifted to the right.

C. Pivot arm must be fully pivoted in (mast in front loading position).

D. Sitting in operator's seat with key switch in the "off" position turn hand steering wheel clockwise and counterclockwise until it becomes difficult to turn.

E. Check hydraulic oil level (Fig. 5-139). Level must be to "full" mark on dip stick. If not add hydraulic oil (MIL-L-2104C) as required.

CHANGE HYDRAULIC OIL

A. Mast must be fully lowered and back tilt.

B. Sideshift assembly must be fully shifted to the right.

C. Pivot arm must be fully pivoted in (mast in front loading position).

D. Sitting in operator's seat with key switch in the "off" position turn hand steering wheel clockwise and counterclockwise until it becomes difficult to turn.

E. Drain hydraulic reservoir (Pg. 5-50, Step No. 1).

F. Install drain plug.

G. Fill hydraulic reservoir with MIL-L-2104C hydraulic oil to full mark on dip stick (Fig. 5-139). (Fig. 5-139).

NOTE

If hydraulic oil is extremely dirty replace suction line filter. Reference pages 5-50 through 5-53, steps 1 through 19.

STEER AXLE

A. Check steer axle trunnion mounting bolts (See Figs. 5-70 and 5-71), retorque to 90 Ft. Lbs. if required.

B. Check wheel nuts (Pg. 5-29); torque as directed.

C. Check cotter pins on spindle rod end trunnions, replace if required.

D. Check steer cylinder for hydraulic leaks around hose connections and rod gland. Repair if leaks are evident.

E. Raise rear end of truck (place safety stands under chassis) and check for wheel play, indicating loose or damaged bearings. Check cylinder rod end and tube for excessive play. Repair if necessary.

Check tie rod bearing ends for excessive play (Pg. 4-25, items 18 and 22). Repair if necessary.

PIVOT ARM RACKING

A. Pivot the mast to the front position. Pivot arm should just meet crosshead stop when pilot cylinder bottoms (Fig. 5-115). If there is any upward motion of pivot arm when bottoming (indicates racking) or if clearance exists between rear face of pivot arm and crosshead stop, adjust pivot cylinder rod to correct. Reference page 5-43. steps 1 through 3.

MAST RACKING

A. Tilt unloaded mast rearward.-Mast should come to a stop when tilt cylinder bottoms, with no evidence of mast twist (racking). If a twisting condition occurs, adjust the tilt cylinder rods to correct. Reference page 5-85, steps 1 through 3.

MAST INSPECTION-GENERAL

A. Check hoist cylinder for proper sequencing. If not sequencing properly, readjust per Instructions in Section V.

B. Check if unloaded mast will elevate to full lift. (Relief valve should blow.) If it will not go to full lift, check hydraulic oil level in reservoir and add hydraulic oil if required (Pg. 3-17, para. 3.69.1).

C. With load on forks in front carry position, elevate to approximately 5 feet. Lower fast to within 1/2 foot of floor and stop abruptly. Mast should stop with a solid effect. If bouncy, bleed hydraulic cylinder.

D. Check carriage rollers and elevating channel rollers for proper contact with mating surface.

E. Check for any gouging of the mast channel sections in the area of contact with the rollers. Gouging indicates the mast rollers should be adjusted to provide proper clearances.

F. Check for proper lift chain adjustments.

FRONT END BEARING LUBRICATION

A. Remove mast assembly from truck, reference page 5-84.

B. Remove pivot/sideshift assembly from truck. Reference page 5-37.

C. Remove bearing assemblies (Pages 4-34 and 4-35) and pack with grease (MIL-G-18709).

D. Install bearing assemblies to telescoping member and crosshead.

E. Install pivot sideshift assembly on truck (Pages 5-37 through 5-40, reversing steps 1 through 19).

F. Adjust sideshift chain (Page 5-40).

G. Adjust sideshift assembly (Pages 5-40 through 5-42, steps 1 through 12).

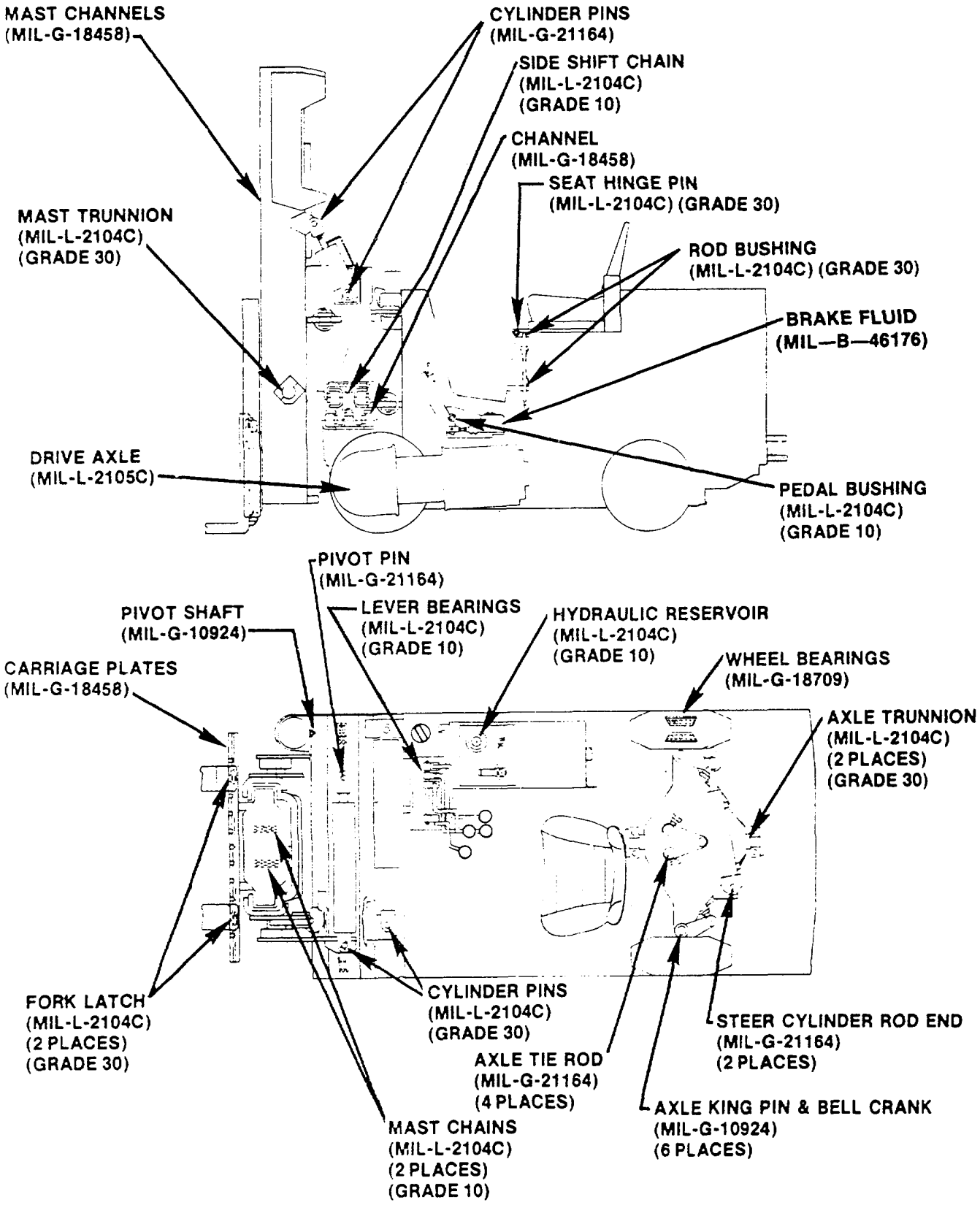
H. Install mast assembly on truck (Pages 5-84 and 5-85, reversing steps 1 through 7).

TIRES

A. Inspect tires for foreign material, cuts, and chunking. Remove any foreign material embedded in tires. If tires are chunked to the state where they produce a rough bouncy ride they must be replaced.

B. Drive tires should be replaced in pairs when the depth of the tread measures less than 1/16 in. at the deepest point.

NOTES


MAST CHANNELS
(MIL-G-18458)
CYLINDER PINS
(MIL-G-21164)
SIDE SHIFT CHAIN
(MIL-L-2104C)
(GRADE 10)
CHANNEL
(MIL-G-18458)
SEAT HINGE PIN
(MIL-L-2104C) (GRADE 30)
MAST TRUNNION
(MIL-L-2104C)
(GRADE 30)
ROD BUSHING
(MIL-L-2104C) (GRADE 30)
BRAKE FLUID
(MIL—B—46176)
DRIVE AXLE
(MIL-L-2105C)
PEDAL BUSHING
(MIL-L-2104C)
(GRADE 10)
PIVOT PIN
(MIL-G-21164)
PIVOT SHAFT
(MIL-G-10924)
LEVER BEARINGS
(MIL-L-2104C)
(GRADE 10)
HYDRAULIC RESERVOIR
(MIL-L-2104C)
(GRADE 10)
WHEEL BEARINGS
(MIL-G-18709)
CARRIAGE PLATES
(MIL-G-18458)
AXLE TRUNNION
(MIL-L-2104C)
(2 PLACES)
(GRADE 30)
FORK LATCH
(MIL-L-2104C)
(2 PLACES)
(GRADE 30)
CYLINDER PINS
(MIL-L-2104C)
(GRADE 30)
STEER CYLINDER ROD END
(MIL-G-21164)
(2 PLACES)
AXLE TIE ROD
(MIL-G-21164)
(4 PLACES)
AXLE KING PIN & BELL CRANK
(MIL-G-10924)
(6 PLACES)
MAST CHAINS
(MIL-L-2104C)
(2 PLACES)
(GRADE 10)

PREVENTIVE MAINTENANCE

	LUBRICANT	TYPE	APPLICATION	SOURCE	MFG. DESIGNATIONS
1.	MIL-L-2105C (Grade 90)	Gear Lube Oil	Drive axle differential	Amoco Oil, Co. Dryden Oil Co., Inc. Esso Europe, Inc. Exxon Co., 5485 Mobil Oil Corp. Shell Oil Co. Sun Oil Co. Texaco, Inc.	Amoco Multi-purpose gear lubricant, 80W ESGL80W-140 Esso Gear Oil GX80W/90 Gear Oil 80W-90 Mobilube HD 80W/90 Spirax HD 80W-90 Sunoco MP GL5 80W-90 Multigear Lubricant EP 80W-90
2.	MIL-L-2104C (Grade 30)	Lube-Oil -	Shift, pivot, and tilt cylinder trunnions. Fork latches. Drive coupling, pump coupling, seat hinge pin, seat brake rod. Mast trunnion post. Steer axle trunnion Post.	Amoco Oil Co. Dryden Oil Co., Inc. Esso Europe, Inc. Mobil Oil Corp. Sun Oil Co. Texaco, Inc.	Amoco 300 Drydene Supreme XHD, SAE 30 ELO 1200 Formula No. MTN 382C Sun Refined 4200 Formula No. TL-10186
3.	MIL-L-2104C (Grade 10)	Lube Oil -	Hydraulic system reservoir, mast lift chains. Brake pedal, side shift chain. Lever bearings.	Esso Europe, Inc. Imperial Oil Co., Inc.	ELO 1095 IMP-HDC-1-B and Imperial S3
4.	MIL-G-10924	Automotive and Artillery	Pivot shaft Bearings Steer axle king pin bearings Steer axle bellcrank bearings	Ashland Oil. Inc. Shell Oil Co. Sun Oil Co.	Tectyl 858C Shell MIL-A and M7630A grease Sunoco C-352-EP
5.	MIL-G-18709 (-40F to 250 F)	General use Ball and Roller Bearing	Steer wheel bearings	Amoco Oil Co. Mobil Oil Corp. Shell Oil Co.	Supermil Grease No. 90781 Formula G-8244 Mobilplex EP No. 2 Shell aluania Grease 2 Formula SG-6151-W
6.	MIL-G-18458	Exposed gear	Mast assembly Fork carriage plates Vehicle side shift assy.	Alco-Metalube Co. Lead-Cote, Inc. Southwest Grease & Oil Co.	Alco-Metalube Heavy Duty Lubricant Lead-Cote Formula 11829
7.	MIL-G-21164	Molybdenum EP	Trunnion, steer cylinder Clevis steer cylinder Steer axle ball joints Clevis, tilt cylinder Clevis, pivot cylinder	E/M Lubricants. Inc. Royal Lubricants Co., Inc. Shell Oil Co.	Everlube 211-G Royco. 64-C Aeroshell Grease 17
8.	MIL-B-46176	Brake Fluid	Master Cylinder and service brake system	Cartel Products Div.	DOT 5 Silicone Brake Fluid

PREVENTIVE MAINTENANCE

MAST OPERATION

WARNING

Like any mechanical equipment, proper operation results in long life and minimum maintenance. Rules to follow when operating are:

1. Never overload the mast.

2. Raise and lower; stop and start, heavy or bulky loads slowly.

3. Always tilt mast slowly and carefully.

4. Do not carry passengers on mast or forks.

5. Do not use mast or forks as battering rams.

6. Center load as closely to mast centerline as possible.

7. Place load as close to carriage face bars as possible.

8. Transport loads with forks as close to ground as possible.

9. Do not jerk mast with tilt cylinders.

10. Whenever possible, raise and lower with mast straight, vertically or back tilted.

11. Do not apply heavy torsional loads or side loads to mast. Basically, the mast is designed to handle downward loads applied at or near the centerline of the carriage.

12. Lift and lower loads with mast tilted rearward.

13. When not in use, or unattended, rest forks on ground.

14. Keep all parts of your body out of the working zone of the mast. Do not stand under load or allow others to do so.

15. Inspect mast and lift hose daily.

MAST LUBRICATION

There are no grease fittings on the mast. All bearings are sealed. Lubrication is required as follows:

Every 50 hours:
Chains-Oil with brush.

Every 500 hours:
Light layer of grease in active rolling corners of each rail.
See Figure 1.

Every 1000 hours:
Remove chains-clean, soak in oil.

MAST INSPECTION

CHAIN WEAR

WARNING

Replace chain when stretch exceeds dimensions shown.

Replace chain when limits shown in Figure 2 are equalled or exceeded. In severe or dusty applications, lubrication intervals should be shortened. Main rail, main carriage rollers, chain sheaves and cylinder head guide rollers are sealed for their life and require no relubrication. The life of bearings vary depending on severity of application. Because the carriage rollers are the closest together of the main rollers, their loading is higher and, consequently, have a shorter life.

Carriage outside thrust rollers must be maintained tight. Check frequently and tighten when necessary.

Some flaking of material from the carriage rolling surface of the inner rail can be expected after a few hundred hours of operation. Keep this flaked material removed via wire brush or burn off with torch. Keep rail greased per Figure 1. The flaking should diminish with further operation.

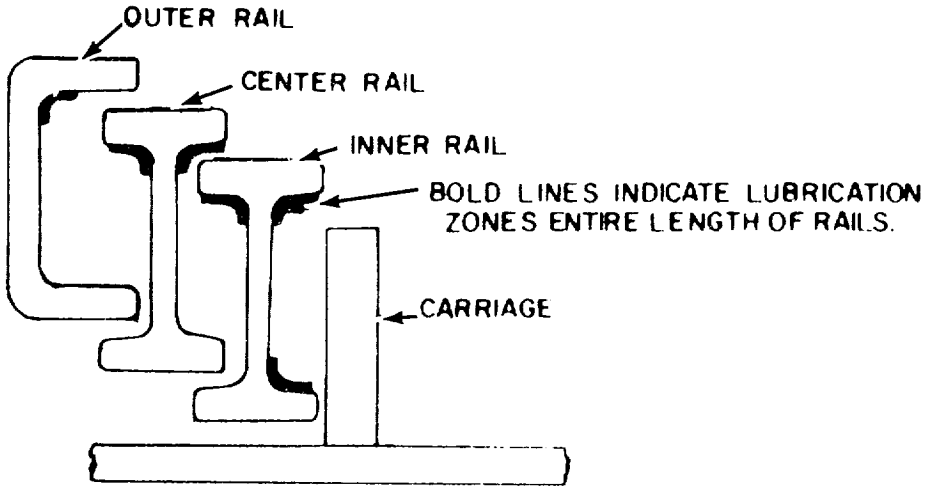


Figure 1.

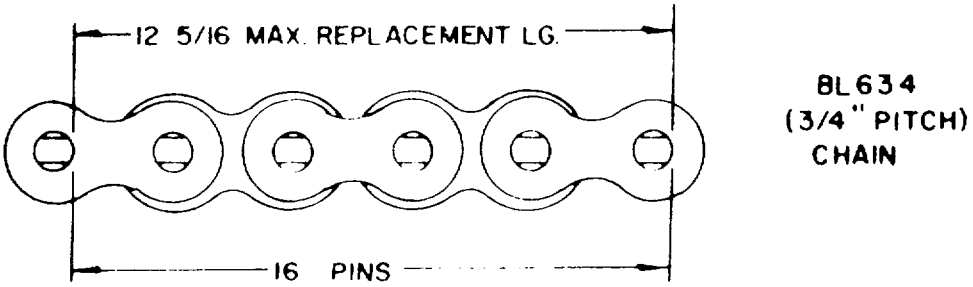


Figure 2.

OPERATOR/CREW
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

1. Do your before (B) PREVENTIVE MAINTENANCE just before you operate the vehicle. Pay attention to the CAUTIONS and WARNINGS.

2. Do your (D) PREVENTIVE MAINTENANCE during operation. (During operation means to monitor the forklift and its components/systems while they are actually being operated.)

3. Do your after (A) PREVENTIVE MAINTENANCE right after operating the vehicle. Pay attention to the CAUTIONS and WARNINGS.

4. Do your weekly (W) PREVENTIVE MAINTENANCE weekly.

5. Do your monthly (M) PREVENTIVE MAINTENANCE once a month.

6. If something doesn't work, troubleshoot it with the instructions in your TM10O-3930-633-12, or notify your supervisor.

7. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

8. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to ORGANIZATIONAL MAINTENANCE RIGHT NOW.

9. When you do your PREVENTIVE MAINTENANCE, take along the tools you will need to make all the checks. Take along a rag; you'll always need at least one.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with skin or clothing is made, flush with water. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

A - Keep it clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

B - Bolts, nuts and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to ORGANIZATIONAL MAINTENANCE if you cannot tighten it.

C - Welds: Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to Organizational Maintenance.

D - Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

E - Hoses and fluid lines: Look for wear, damage and leaks and make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to Organizational Maintenance.

10. It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER - WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Organizational PMCS

Class I	Seepage of fluid (as indicated by wetness of discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

EQUIPMENT OPERATION IS ALLOWABLE WITH MINOR LEAKAGES (CLASS I OR II). OF COURSE, CONSIDERATION MUST BE GIVEN TO THE FLUID CAPACITY IN THE ITEM/SYSTEM BEING CHECKED INSPECTED. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR. EXCEPTIONS ARE FUEL AND BRAKE SYSTEM, WHERE NO LEAKAGE IS ALLOWABLE.

WHEN OPERATING WITH CLASS I OR II LEAKS, CONTINUE TO CHECK FLUID LEVELS AS REQUIRED IN YOUR PMCS.

CLASS III OR FUEL AND BRAKE SYSTEM LEAKS SHOULD BE REPORTED TO YOUR SUPERVISOR OR ORGANIZATIONAL MAINTENANCE.

Operator Preventive Maintenance Checks and Services

B - Before D - During A - After W - Weekly M - Monthly

NOTE: Within designated interval, these checks are to be performed in the order listed.

Item No.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired filled or adjusted as needed	Equipment is not ready/ Available if
						Important Perform weekly as well as before operations PMCS if: 1. You are the assigned operator and have not operated the item since the last weekly. 2. You are operating the equipment for the first time.	
1.	•					Walk Around Checks: a. Check for fluid leaks or appearance of leaks. b. Visually check overhead guard for obvious cracks in weldments.	Class III leaks. Cracked or failed welds.
2.	•					Check that electrical (static) discharge straps are dragging on the floor.	Straps do not keep contact with the floor.
3.	•					Check hydraulic oil level.	
4.	•					Check for cuts, imbedded foreign matter (i.e., nails) or oil on tires. Clean oil off tires using soap and water with bristle brush.	Tires cause "bumpy" or "bouncy" ride.
5.	•					Check that battery retainers are in place to prevent vertical movement of battery.	
6.	•					Check that battery connector is positively locked.	

Operator Preventive Maintenance Checks and Services

B - Before D - During A - After W - Weekly M - Monthly

NOTE: Within designated interval, these checks are to be performed in the order listed.

Item No.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired filled or adjusted as needed	Equipment is not ready/ Available if
7.	•					Check that battery is charged.	Battery indicator meter light is "On", indicating machine is on "reserve" power.
8.		•				Check service brake and ensure that brake pedal is firm and has at least 1/2 pedal travel remaining.	"Spongy" brake action or less than 1/2 pedal travel remaining.
9.		•				Check that parking brake is operational.	Parking brake not operational.
10.		•				Check that seat switch and seat brake are functioning.	Seat switch or seat brake not working.
11.		•				Check for proper operation of the floodlight, brake light, taillight and horn.	Systems not operational. l. (Safety)
12.		•				Check operation of all hydraulic functions. Mast movements must be smooth.	Any hydraulic function inoperable, or operated in a "jerking motion."
13.		•				Check electric "Return to Neutral" function of control selection lever. "Off" position, or when operator leaves operator's seat.	Control does not return to "Neutral" when key switch is turned to
14.		•				Check operation of pivot shift interlock.	Interlock inoperable
15.		•				Check that power steering function is operable.	Lack of power steering.
16.	•					Check that all access/service panels, doors and covers are closed securely.	

Operator Preventive Maintenance Checks and Services

B - Before D - During A - After W - Weekly M - Monthly

NOTE: Within designated interval, these checks are to be performed in the order listed.

Item No.	Interval B	D	A	W	M	ITEM TO BE INSPECTED Procedure: Check for and have repaired filled or adjusted as needed	Equipment is not ready/ Available if
17.			•			Check that vehicle and operators compartment are free of trash and debris.	
18.		•				Key switch "On" - check hydraulic oil return line filter visual indicator for indication of clogging.	Indicator shows yellow or red
19.			•			Connect electrical system to battery charger to recharge battery.	

ORGANIZATIONAL
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

1. Do your (Q) PREVENTIVE MAINTENANCE once each 3 months.

2. Do your (S) PREVENTIVE MAINTENANCE once each 6 months.

3. Do your (A) PREVENTIVE MAINTENANCE once each year.

4. Do your (W) PREVENTIVE MAINTENANCE once each week.

5. Do your (H) PREVENTIVE MAINTENANCE at the hour interval listed.

6. Do your (MI) PREVENTIVE MAINTENANCE when the mileage of the vehicle reaches the amount listed.

7. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

8. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

9. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to direct support maintenance RIGHT NOW.

10. When you do your PREVENTIVE MAINTENANCE, take along the tools you will need to make all the checks. Take along a rag, you'll always need at least one.

WARNING

DRY CLEANING SOLVENT, USED TO CLEAN PARTS IS POTENTIALLY DANGEROUS TO PERSONNEL AND PROPERTY. DO NOT USE NEAR OPEN FLAME OR EXCESSIVE HEAT. FLASH POINT OF THIS SOLVENT IS 138° F.

A - Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

B - Bolts, nuts, and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to direct support maintenance if you can not tighten it.

C - Welds: Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to direct support maintenance.

D - Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

E Hoses and Fluid Lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to direct support maintenance.

11. It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage an operator or crew member needs to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Organizational PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
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CAUTION

EQUIPMENT OPERATION IS ALLOWABLE WITH MINOR LEAKAGES (CLASS I OR II). OF COURSE, CONSIDERATION MUST BE GIVEN TO THE FLUID CAPACITY IN THE ITEM/SYSTEM BEING CHECKED/INSPECTED. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR.

WHEN OPERATING WITH CLASS I OR II LEAKS, CONTINUE TO CHECK FLUID LEVELS AS REQUIRED IN YOUR PMCS.

CLASS III LEAKS SHOULD BE REPORTED TO YOUR SUPERVISOR OR DIRECT SUPPORT.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MO-MONTHLY

ITEM NO.	INTERVAL Q	S	A	B	H	MO	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
							NOTE **Comply with manufacturer's recommended service intervals during period warranty is in effect, then comply with intervals in this PMCS.**
1.							**ELECTRIC CONNECTIONS**
							WARNING **Disconnect battery (insulate terminals) before working on electrical system. Loose electrical/mechanical connections in the power and control circuits usually are the primary reason for fuses opening.**
					1000		a. Check operating pressures and current drain, and compare with Tables I and 2, pages 3-18 and 3-19 in this manual. Hydraulic pressure points are located at valve inlet fittings (see Fig 3-25 and 3-26) of this manual. Request assistance from DS if required.
					1000		b. Check for loose electrical/mechanical connections and tighten if loose. Specific attention should be directed to the power fuses (1FU and 2FU) mounting block fuse connections. Tighten loose connections as required (see page 4-90, Item 24) in this manual.
							MAJOR BOLT-ON CONNECTIONS
							NOTE **All major bolt-on connections must be checked and tightened. If operating conditions are considered severe, the frequency of checking and tightening should be increases. (See page 5-21) in this manual for torque instructions for Drive Axle Assembly.)**
					500		a. Check and tighten drive axle trunnion block bolts to 150 lb ft (see page 5-4, Fig 5-10).

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MO-MONTHLY

ITEM NO.	INTERVAL Q	S	A	B	H	MO	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
					500		b. Check drive assembly support for tightness (see pages 5-2 and 5-3, Figs. 5-6, 5-7 and 5-8 in commercial manual).
					500		c. Tighten wheel nuts as required to 85 pounds feet torque (see page 5-21).
					500		d. Check steer axle trunnions for tightness and torque to 90 pounds feet as necessary.
					500		e. Check mast trunnions for tightness (see Fig 5-181 and 5-182).
					500		f. Check hydraulic valve control levers for tightness (see page 3-13, para 3.46).
					500		g. Check master cylinder mounting for tightness and tighten as necessary.
					500		h. Check hydraulic pump motor mountings for tightness (see page 5-45, Figs. 5-117 and 5-118'.
					500		i. Check and tighten cylinder pins locking bolts.
					500		j. Check and tighten cylinder pins locking bolts.
							STEERING
					500		a. Check cotter pins on spindle rod and trunnions. Replace if required.
					500		b. Check steer cylinder for hydraulic leaks around hose connections and rod gland. Have repaired by DS if Class III leaks are evident.
					500		c. Raise rear end of truck (place safety stands under chassis) and check for wheel side play, indicating loose or damaged bearings. Tighten or replace bearings as required. Contact DS Maintenance if assistance is required.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MO-MONTHLY

ITEM NO.	INTERVAL Q	S	A	B	H	MO	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
					500		d. Check cylinder rod end and tube for excessive play. Repair or replace if necessary. Contact DS Maintenance for assistance.
					500		e. Check tie rod bearing ends for excessive play (see page 4-25, items 18 and 22). Repair if necessary.
4.							**PIVOT ARM RACKING**
					50		Pivot the mast to the front position. Pivot arm should just meet crosshead stop when pivot cylinder bottoms (see Fig 5-115). If there is any upward motion of pivot arm when bottoming (indicates racking) or if clearance exists between rear face of pivot arm and crosshead stop, adjust pivot cylinder rod to correct (see page 5-43, steps 1 thru 3).
5.							**MAST RACKING**
					50		Tilt unloaded mast rearward. Mast should stop when tilt cylinder bottoms, with no evidence of mast twist (racking). If a twisting condition occurs, adjust the tilt cylinder rods to correct (see page 5-85).
6.							**MAST INSPECTION GENERAL**
					250		a. Check hoist cylinder for proper sequencing. If not sequencing properly, readjust per instructions in Section V).
					250		b. Check if mast will elevate to full lift. (Relief valve should blow.) If it will not go to full lift, check hydraulic oil level in reservoir and add hydraulic oil if required (page 3-17, para 3.69.1).
					250		c. With load on forks in front carry position, elevate to approximately 5 feet. Lower mast to within 1/2 foot of floor and stop abruptly. Mast should stop with a solid effect. If bouncy, bleed hydraulic cylinder.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MO-MONTHLY

ITEM NO.	INTERVAL Q	S	A	B	H	MO	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
					250		d. Check carriage rollers and elevating channel rollers for proper contact with mating surface.
					250		e. Check for any gouging of the mast channel sections in the area of contact with the rollers. Gouging indicates the mast rollers should be adjusted to provide proper clearance.
					250		f. Check for proper lift chain adjustments (see pages 5-87 and 5-88).
7.							**FRONT END BEARING AND MAST ASSEMBLY**
					2000		a. Remove mast assembly from truck (see page 5 - 84). Contact Direct Support Unit to perform mast removal, servicing of components and replacement.
					2000		b. Remove pivot/sideshift assembly from truck (see page 5-37). Contact Direct Support Unit to perform removal of pivot/sideshift assembly, servicing of components and replacement.
					2000		c. Remove bearing assemblies (pages 4-34 and 4-35) and pack with grease (MIL-G-18709).
					2000		d. Adjust sideshift chain (see page 5-40).
					2000		e. Adjust sideshift assembly (see pages 5-40 thru 5-42, steps I thru 12).
					50		f. Oil mast chains with brush.

NOTE

There are no grease fittings on the mast.
All bearings are sealed.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MO-MONTHLY

ITEM NO.	INTERVAL Q	S	A	B	H	MO	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
							NOTE **In severe or dusty applications, lubrication intervals should be shortened. Main rail, main carriage rollers, chain sheaves and cylinder head guide rollers are sealed for their lift and require no lubrication. The life of bearings varies depending on severity of application. Because the carriage rollers are the closest together of the main rollers, their loading is higher and consequently have a shorter life.**
						500	j. Apply a light layer of grease in active rolling corners of each rail (see Fig. 1, page 2-12).
						1000	k. Remove chains clean, soak in oil, replace.
8.							**MAST INSPECTION CHAIN WEAR**
							WARNING **Replace chain when stretch equals or exceeds dimension shown in Fig. 2, page 2-12.**
						250	a. Carriage outside thrust rollers must be maintained tight. Check frequently and tighten when necessary.
						250	b. Some flaking of material from the carriage rolling surface of the inner rail can be expected after a few hundred hours of operation. Keep this flaked material removed via wire brush or burn off with torch. Keep rail greased per Fig. 1, page 2-12. The flaking should diminish with further operation.
9.							**TRUCK LUBRICATION**
						250	Lubricate in accordance with chart, pages 2-8 and 2-9.

TROUBLESHOOTING

ELECTRICAL SYSTEM - GENERAL

PRIORITY			PROBABLE CAUSE CHECK LIST	PARA.
		3	SEAT BRAKE NOT FULLY RELEASED	3.14
		4	SERVICE BRAKES ADJUSTED TOO TIGHT	3.14
1			LOOSE CONTROL WIRING	3.13
4			SHORTED HASH FILTERS	3.12
2			SHORTED SOLENOID VALVE COILS	3.11
3			SHORTED CONTACTOR COILS	3.10
	5	9	FAULTY MOTOR	3.9
	3		HITTING MAST STOPS AT FULL LIFT HEIGHT	3.8
	6		RELIEF VALVE SETTING TOO HIGH	3.7
	4	6	OVERHEATED ELECTRICAL COMPARTMENT	3.6
	2	5	LOOSE OR IMPROPERLY CRIMPED CABLE ENDS	3.5
	1	1	LOOSE CONNECTIONS ON FUSE BLOCK	3.4
		2	FIELD WEAKENING “FW” CONTACTORS WELDED	3.3
		7	SKIDDING OR PUSHING LOADS	3.2
		8	SHORT 1A SCR TIMING	3.1

TRACTION FUSE OPENING 1FU

PUMP FUSE OPENING 2FU

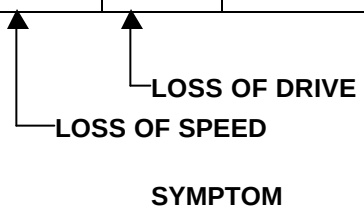
CONTROL FUSES OPENING 3FU, 4FU, 5FU, 6FU

SYMPTOM

TROUBLESHOOTING

ELECTRICAL SYSTEM - DRIVE

PRIORITY		PROBABLE CAUSE CHECK LIST	PARA.
8	15	TRACTION MOTOR DEFECTIVE	3.33
5	14	BATTERY DISCHARGED	3.32
2		PARKING, SEAT OR SERVICE BRAKES TOO TIGHT	3.31
4		FOOT PEDAL LINKAGE FAULTY	3.30
7		SCR THERMAL CUTBACK EXTENDED TRAVEL IN SCR RANGE	3.29
3	13	ACCELERATOR SWITCH DEFECTIVE OR INOPERATIVE	3.28
6		"1A" OR "FW" CONTACTOR INOPERATIVE	3.27
1	12	SCR OR LOGIC CARD FAULTY	3.26
	10	DIRECTIONAL SWITCH INOPERATIVE	3.25
	9	LOGIC CARD TERMINAL PINS NOT IN CONTACT	3.24
	8	RETURN-TO-NEUTRAL DEFECTIVE ON SCR LOGIC CARD	3.23
	7	CONTACTOR COIL DRIVE MODULES DEFECTIVE	3.22
	11	CONTACTORS "L", "F", "R", "1A" INOPERATIVE	3.21
	6	LOOSE OR OPEN CONTROL CIRCUIT CONNECTORS	3.20
	5	BATTERY CONNECTIONS LOOSE	3.19
	3	LINE CONTACTOR CONTROL CIRCUIT FUSE	3.18
	2	DRIVE CIRCUIT POWER FUSE OPEN	3.17
	1	DRIVE CIRCUIT CONTROL FUSE OPEN	3.16
	4	OPEN THERMOCOUPLE SWITCH ON DRIVE MOTOR	3.15



TROUBLESHOOTING

HYDRAULIC SYSTEM - PUMP/MOTOR ASSY

PRIORITY			PROBABLE CAUSE CHECK LIST	PARA.
10			VOLTAGE ON TRUCK CHASSIS - DIRTY BATTERY	3.53
9			LOOSE INTERNAL PLUG, CARRYOVER PORT	3.52
8			FAULTY HIGH PRESSURE SW. HOLDOUT MODULE	3.51
7			REVERSE BREAKDOWN OF NO. 9 REC.	3.50
5			FAULTY RELIEF VALVE CARTRIDGE	3.49
4			FAULTY HIGH PRESSURE SWITCH	3.48
3			PUMP CONTACTOR TIPS WELDED	3.47
6			LOOSE HANDLE MOUNTING TO CONTROL VALVES	3.46
2			LIFT OR STACK CONTROL VALVE SWITCH & CAMS	3.45
11			LEAKING HYDRAULIC SOLENOID (SOL. A)	3.44
	3		LEAKING CHECK VALVE	3.43
1			DAMAGED ACCUMULATOR BLADDER	3.42
	2		LOW GAS PRESSURE IN ACCUMULATOR	3.41
	4		FAULTY LOW OR HIGH PRESSURE SWITCHES	3.40
1			LOOSE PRESSURE SWITCH ELECTRICAL CONNECTORS	3.40
		8	TIME DELAY MODULE FAULTY	3.39
		5	SEAT SWITCH FAULTY	3.38
		7	PUMP CONTACTOR DEFECTIVE	3.37
		6	PUMP CONTACTOR DIODE NO. 9 REC. OPEN	3.36
		4	LOOSE OR OPEN CONTROL CIRCUIT CONNECTORS	3.20
		3	PUMP MOTOR POWER FUSE OPEN	*
		2	PUMP CIRCUIT CONTROL FUSE OPEN	3.35
		1	OPEN THERMAL SWITCHES - OIL TANK OR MOTOR	3.34

PUMP DOES NOT OPERATE

PUMP CYCLES TOO OFTEN

PUMP RUNS CONTINUOUSLY

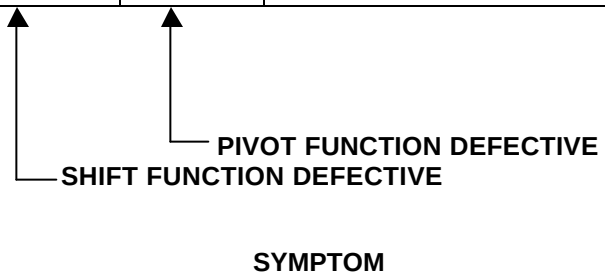
*** REFER TO PG. 3- 1 (SYMPTOM)**

SYMPTOM

TROUBLESHOOTING

HYDRAULIC SYSTEM - PIVOT AND SHIFT

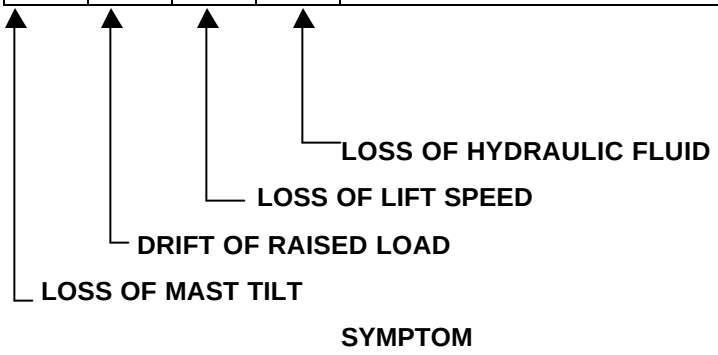
PRIORITY		PROBABLE CAUSE CHECK LIST	PARA.
8	9	COVER END SECTION OF PUMP DEFECTIVE	3.63
6	8	INTERLOCK SWITCHES DEFECTIVE, PIVOT & SHIFT	3.62
7	7	DAMAGED HYDRAULIC SOLENOID INTERLOCK VALVES	3.61
1	1	LOOSE INTERNAL PLUG, CARRYOVER PORT	3.52
2	2	FAULTY RELIEF VALVE CARTRIDGE	3.49
3		SHIFT CYLINDER SPACERS BLOCKING PORT	3.60
4		SHIFT CYLINDER ROD BENT	3.59
5		SHIFT CYLINDER SEALS DEFECTIVE	3.58
	3	PIVOT LINES CROSSED WITH TILT CYLINDER	3.57
	6	PIVOT CYLINDER CUSHION VALVE & RINGS DEFECTIVE	3.56
	4	PIVOT CYLINDER ROD BENT	3.55
	5	PIVOT CYLINDER SEALS DEFECTIVE	3.54



TROUBLESHOOTING

HYDRAULIC SYSTEM-MAST

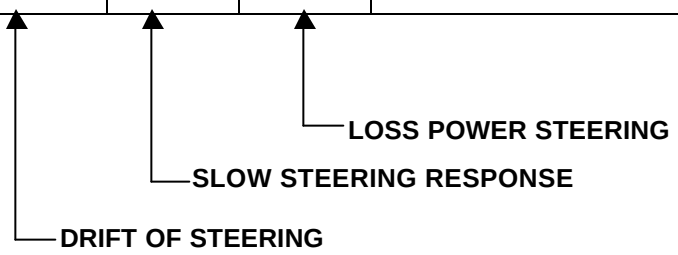
PRIORITY				PROBABLE CAUSE CHECK LIST	PARA.
4				HYDRAULIC LINES REVERSED WITH PIVOT CYL.	3.57
2				HYDRAULIC LINES REVERSED TO ONE TILT CYL.	3.74
	2			LIFT CONTROL VALVE LEAKING OR DAMAGED	3.73
1	3	5		CYLINDER SEALS LEAKING OR DAMAGED	3.72
		4		BATTERY DISCHARGED	3.32
			6	PUMP COUPLING DAMAGED OR KEY SHEARED	3.71
3		2	5	DUAL HYDRAULIC PUMP- SECTIONS DAMAGED	3.71
		3	4	MECHANICAL DAMAGE TO HOIST ASSEMBLY	3.70
			3	LOW OIL LEVEL	3.69
		6	7	CYLINDER SEQUENCING OUT OF ADJUSTMENT	3.68
	1	1	8	OVERLOAD ON HOIST ASSY. - RELIEF VALVE OPENING	3.67
			2	LIFT VALVE SWITCH DEFECTIVE	3.66
			1	BATTERY DISCHARGED - LIFT LOCKOUT ENERGIZED	3.64



TROUBLESHOOTING

HYDRAULIC SYSTEM - POWER STEERING

PRIORITY			PROBABLE CAUSE CHECK LIST	PARA.
2			CENTERING SPRINGS IN STEER HEAD DAMAGED	3.79
	3		DAMAGE TO STEER AXLE ASSY.	3.78
1	1	8	STEER CYLINDER SEALS DAMAGED	3.76
		7	FAULTY HIGH PRESSURE SWITCH	3.48
		6	LEAKING CHECK VALVE	3.43
	2	10	ORBITROL STEER HEAD CHECK VALVE LEAKS	3.75
		4	DAMAGED ACCUMULATOR NITROGEN CHARGE GONE	3.41
		5	DAMAGED ACCUMULATOR - BLADDER	3.42
		2	LOOSE INTERNAL PLUG, CARRYOVER PORT	3.52
		3	FAULTY RELIEF VALVE CARTRIDGE	3.49
		9	REVERSE BREAKDOWN OF DIODE NO. 9 REC.	3.50
		1	OPEN HYDRAULIC SOLENOID VALVE - SOL. A	3.44

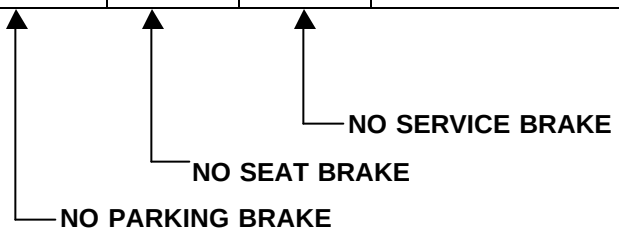


SYMPTOM

TROUBLESHOOTING

MECHANICAL - BRAKE SYSTEM

PRIORITY			PROBABLE CAUSE CHECK LIST	PARA.
5	3	8	GLAZED OR BURNT BRAKE SHOE LININGS	3.89
4	4	7	WORN BRAKE SHOE LININGS	3.88
1			HAND BRAKE LEVER OUT OF ADJUSTMENT	3.31
3	2		BELL CRANK PULL ROD OUT OF ADJUSTMENT	3.87
1			SEAT BRAKE OUT OF ADJUSTMENT	3.14
2	5	9	HYDRAULIC OIL ON BRAKE LINING	3.86
		1	ADJUST BRAKE SHOES	3.85
		6	BRAKE LINE LEAKING	3.84
		5	WHEEL CYLINDER SEALS DEFECTIVE	3.83
		4	MASTER CYLINDER SEALS DEFECTIVE	3.82
		3	FLUID LOW IN MASTER CYLINDER	3.81
		2	AIR IN LINES OR WHEEL CYLINDERS	3.80



SYMPTOM

TROUBLESHOOTING

3.1 Reduced 1A SCR timing coupled with frequent rapid starts can cause high power demands exceeding the capacity of the traction motor fuse. The time-delay pickup of 1A is provided by a circuit on the SCR oscillator card. The feature allows the 1A circuit to be picked up after a time delay which allows the truck to reach 80% of the top speed in the SCR range. The time delay is adjustable by a 1A trimpot on the oscillator card. Normal 1A pickup as the vehicle accelerates should be 1/2 to 3/4 seconds. Refer to page 5-78 for adjustment.

3.2 Skidding or pushing of loads will cause high traction motor power demands and cause fuse 1FU to open. Opening of the 1FU fuse protects the power cables, battery, contactors and traction motor.

3.3 Examine the field weakening "FW" contactor for the possibility of welded contact tips. Determine the condition of the contact tips and replace if questionable. Check to determine if the coil drive module is faulty and is holding the "FW" contactor closed. Refer to Testing for traction motor problems, Pg. 3-8. Energizing the "FW" contactor at the wrong time will cause excessive traction motor current drain during vehicle acceleration, ramping or operation in SCR.

3.4 Loose power fuse block connections will cause a high resistance, which creates overheating of (1FU) traction fuse, (2FU) pump motor fuse, battery power cables, and burning of the fuse block studs and hardware. Unplug battery connector. Using a 1/2" wrench tighten all associated hardware (Pg. 4-91).

3.5 Loose or improperly crimped cable ends will cause high resistance, excessive power requirements, and overheated cables and terminals. Visually examine terminals on the electric door assembly, traction motor and pump motor. Tighten if required.

Check battery cables and examine all bus bar connections at the power contactors on the electric door module assembly (Pg. 4-90).

3.6 Excessive heat in the electrical compartment may cause power fuses 1 FU and 2FU to open. Overheating may be due to one or a combination of the following reasons listed.

3.6.1 Prolonged use of the vehicle in the SCR speed control range.

3.6.2 Failure of the cooling fan assembly (Pg. 4-108, item 5).

3.7 The pump motor power fuse, 2FU. may open if the hydraulic system relief valves are set for a pressure higher than 2000 psi. A higher relief pressure setting can only occur if the valve has been disassembled for service and washers were left out at reassembly (Fig. 3-2 , Pg. 3-2).

Remove the pump inlet hose from the inlet elbow. Loosen the elbow and rotate it away from the "O" Ring plug directly beneath it. Remove the plug and spring. Long needle nose pliers may be needed to grasp and retract the cartridge from the valve body (Fig.3-1).

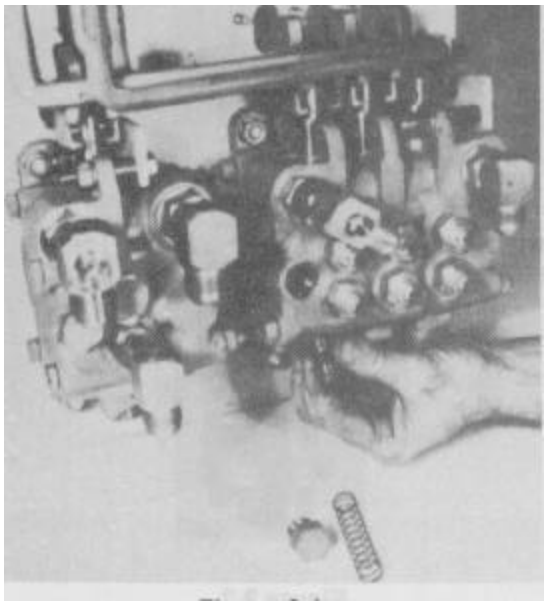


Figure 3-1

Examine the ground lands of the valve for nicks, scratches or debris: clean as required. This valve must also be disassembled. Use vicegrips to firmly hold the valve body, between ground lands. Use a 7/16 inch box wrench to remove the Hex end from the body (Fig. 3-2).

Spread out the individual parts and examine for metal chips or contamination. Clean parts and reassemble in the order shown in Fig. 3-2,

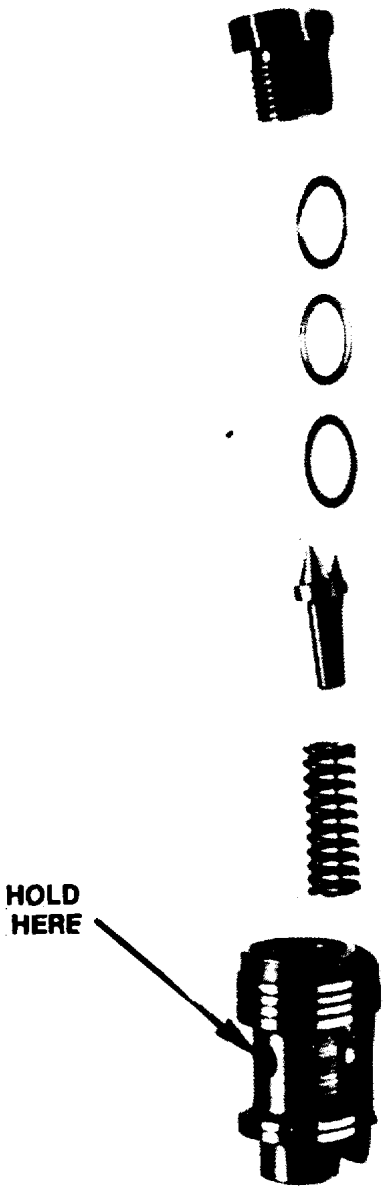


Figure 3-2

CAUTION:

Do not omit any washers as removal of each one raises the relief pressure setting by 200 psi.

Insert the assembled cartridge into the valve bore, round end first and the hexagon end toward the outside and visible. The retainer spring fits over the hex end and installing the "O" Ring plug completes the assembly.

3.8 Continual and frequent full extension of the mast assembly will cause hydraulic pressure to climb to the relief valve level of 2000 psi. This can also occur with other hydraulic functions, i.e., tilt, pivot, and shift.

3.9 The pump or traction motor may be defective causing repeated opening of the power fuses.

3.9.1 Open armature Evidence of this is shown by the burning of commutator bars 1800 apart. Usually this is from a high resistance joint. Open armature, if it occurs, will occur on new motors after 100 to 200 hours of service.

3.9.2 Excessive wear of one brush this indicates the opposite brush is the problem and may not be conducting its share of current. Internal shorts are indicated.

3.9.3 Shorted Field Coil Evidence of a short is shown by excessive brush wear (dusting), high rotational speed and commutator arcing all due to a loss of magnetism in one field pole, thus higher current draw.

3.9.4 High bar damaged brushes or purple, burnt commutator bars, 900 apart. This is due to stalling the pump motor. Removal and repair or replacement of the pump motor is recommended to restore the vehicle to normal operation.

3.10 Power contactor coils may be shorted causing the traction, 3FU, or pump, 4FU, control circuit fuses to open. Damage to either the coil or the built in hash filter may cause internal shorting.

Remove one of the coil terminals from the contactor. Place an ohm-meter across the two coil terminals. A coil resistance measurement between 29 to 34 ohms is normal. Replace coil if resistance is below 29 ohms.

3.11 Solenoid valve coils on the power steering valve, shift interlock valve, pivot interlock valve, and lift lock out valve, if shorted will cause the pump motor control circuit fuse, 4FU, to open.

Damage to either the coil or the attached hash filter can cause shorting.

Remove one of the coil terminals from the solenoid and place an ohm-meter across the two coil terminals. A coil resistance measurement between 43 to 49 ohms is normal.

Replace the coil if resistance is below 43 ohms.

3.12 Check the two leads from the hash filters on each solenoid. Remove one lead and place a volt-ohm-meter across the two terminal connectors. Place the volt-ohmmeter selector knob in the RX 10,000 range. The meter should deflect to 50 ohms then return to an infinite resistance position. Full meter deflection indicates a shorted hash filter. Remove and replace.

3.13 Loose control wiring will cause control fuses to open.

Check the control wire terminals on both sides of the two terminal strips, TS1 and TS2, for loose or missing binding screws. The terminal strips are located on the intermediate electrical panel inside the electrical compartment. Reference page 4-103, item 27.

3.14 Service brake, seat brake, or parking brake if over adjusted will cause the traction power fuse, 1FU, to open. Refer to maintenance section, (Pg. 5-30, 5-31, 5-32).

3.15 An open thermocouple switch on the traction motor will prevent power contactors "F" and "R" from closing. The switch is located on the motor frame near the parking brake linkage (Fig. 3-3).

3.15.1 Motor frame temperature exceeds 240°F. The switch will open and will not close until the motor cools down to a temperature between 225-230°F.

3.15.2 A defective thermocouple switch, will not close when motor frame temperature drops below 225°F. Remove thermocouple switch from motor and check with a volt-ohm-meter across the switch terminals. If there is no continuity the thermocouple is defective.

3.15.3 Control wiring is loose or dislodged.

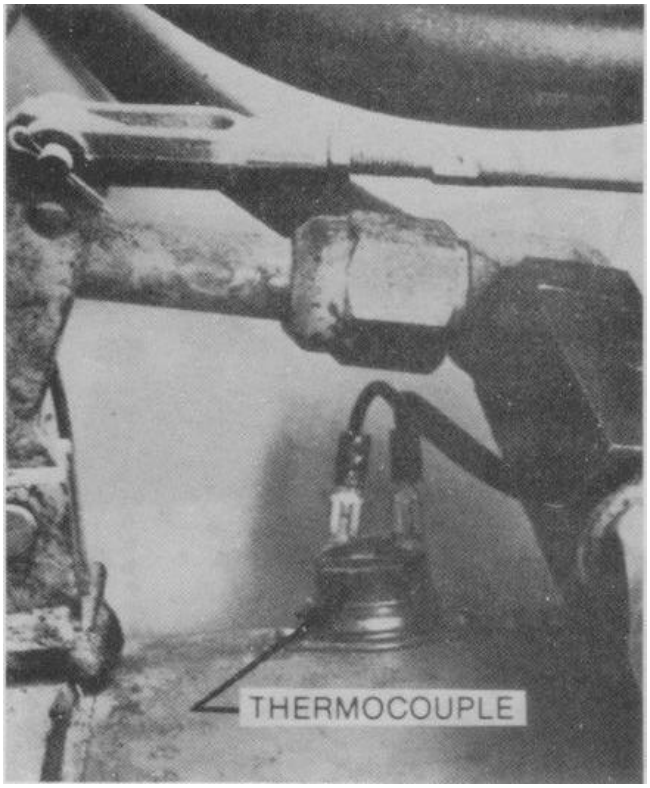


Figure 3-3

3.16 The line circuit control fuse (3FU) may be open. Remove the fuse holder cap by pushing inward and twisting until the cap and fuse can be removed. Examine the ribbon for signs of overcurrent damage. Excessive fuse openings may be due to shorts in associated components or wiring (Fig. 3-4).

Access to the fuse may be obtained by opening the electrical door at the right side of the vehicle. The control circuit fuses are mounted on a panel (Fig. 3-4). Twist and pull out the fuse and examine the ribbon for separations. Check the hydraulic pump motor fuse now that the electric door has been opened (Fig. 3-5).

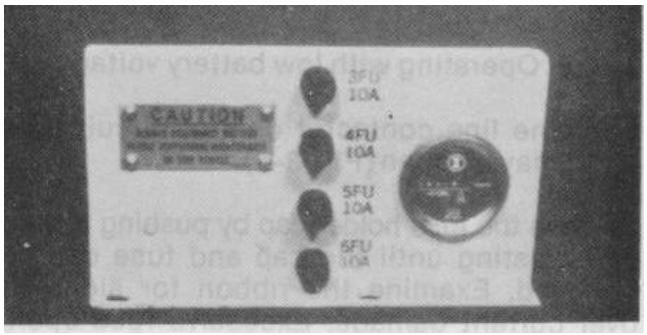


Figure 3-4

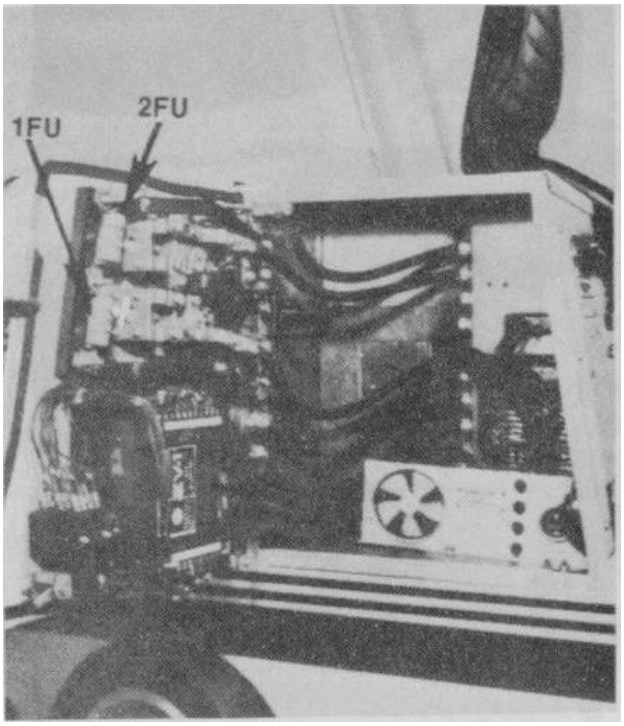


Figure 3-5

3.17 The drive circuit power fuse, (1 FU), may be open. Disconnect battery and check continuity with a volt-ohm-meter (Fig. 3-5). Excessive fuse openings may be due to the following problems:

3.17.1 Operating the vehicle with the seat or parking brake engaged (Refer to page 5-32).

3.17.2 Service brakes over adjusted and dragging (Refer to page 5-31).

3.17.3 Overheated electrical compartment, cooling fan may not be operating.

3.17.4 Traction motor defective.

3.17.5 Loose connections on power fuse block.

3.17.6 Operating with low battery voltage.

3.18 The line contactor control circuit fuse (6FU) may be open (Fig. 3-4')

Remove the fuse holder cap by pushing inward and twisting until the cap and fuse can be removed. Examine the ribbon for signs of over current damage. Excessive fuse openings may be due to shorts in the emergency switch or line contactor coil.

3.19 Loose or separated battery power cable connections may interrupt the supply of power to the vehicle.

3.19.1 Examine the positive and negative battery power cables for cuts or breaks.

3.19.2 Examine the power cable connections at the battery terminals. Excessive heat due to an improper connection may cause separation.

3.19.3 Battery connector contacts may be dislodged. Battery cables, crimped to the contact tips may be loose.

3.20 Loose or open control circuit connectors may cause loss of power to the traction motor control modules.

3.20.1 Examine the two dash module connectors, P1A/J1A and J2A/P2A (Fig. 3-6).

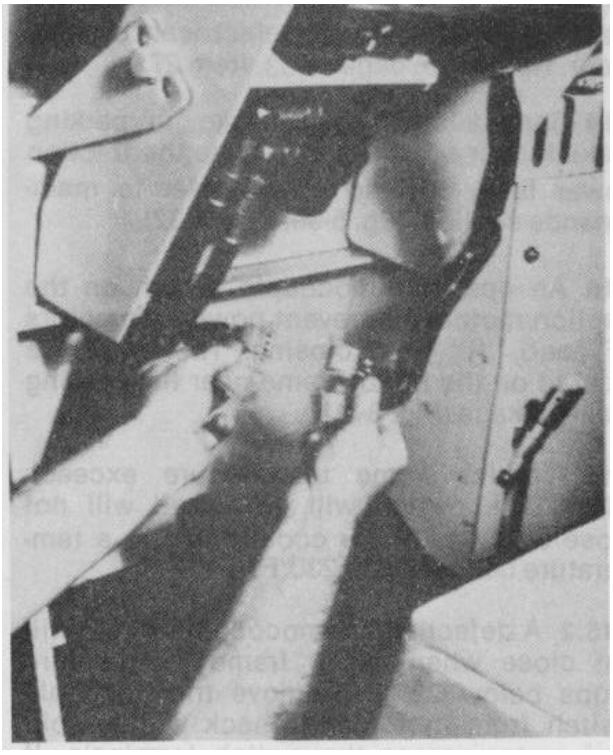


Figure 3-6

3.20.2 Examine the two electrical door module connectors, J5B/P5B and J6A/P6A (Pg. 5-75 Fig. 5-165).

3.20.3 Examine the accelerator module connector, J5A/J5A (Fig. 3-7).

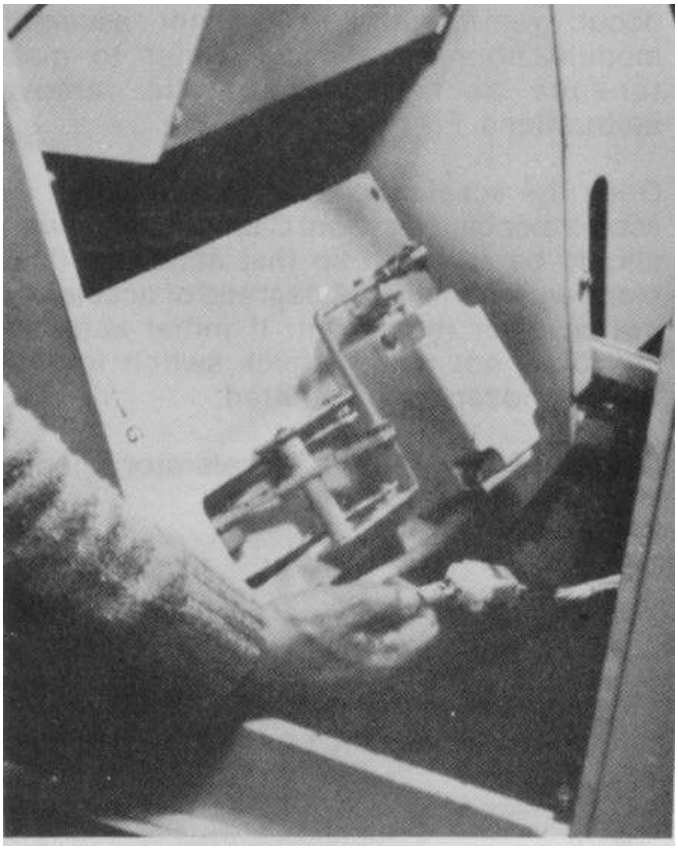


Figure 3-7

3.21 The line "L", forward "F", reverse "R" and 1A contactors may be inoperative causing loss of power to the SCR controller and/or traction motor.

3.21.1 With the battery disconnected, push the contactor armature and contacts inward to check for restriction of free movement.

3.21.2 Check for loose power or control wiring at the contactor tips and coil.

3.21.3 Check for an open coil with a volt-ohm-meter placed across the two coil terminals. Fig. 3-8.

3.21.4 Check for a faulty SCR logic card for "F", "R", and "1A" operation.

3.22 Contactor coil driver modules may fail in one of two ways: First is not to conduct current to the contactor coil when the SCR logic card signals the coil to do so.

Second is to remain closed, thus not allowing the contactor o open at the proper time.

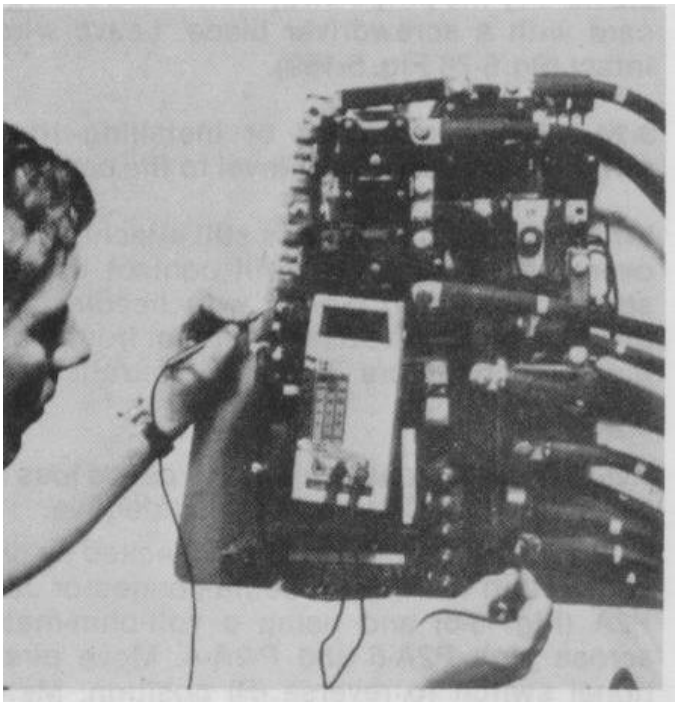


Figure 3-8

3.22.1 Switch the suspect module with a new one and check for proper contactor function. Coil driver location is shown on page 4-90, item 9.

3.23 The return-to-neutral feature requires that the operator must move the directional control lever through the neutral position once the seat switch or key switch is opened before the forward or reverse contactors will close allowing truck movement.

A time delay (0.5 seconds) is built into the seat switch input to allow a momentary opening. This same delay requires the directional switch not be closed until both the key switch and the seat switch have been closed for 0.5 seconds.

3.23.1 Check SCR logic card terminal pin contact, refer to paragraph 3.24 .

3.23.2 Replace SCR logic card with one known to function properly and check vehicle operation, Pg. 5-78.

3.24 Erratic operation and loss of traction power may be due to open terminal pin connections to the SCR logic card.

3.24.1 Remove the two screws that retain the ends of the left and right terminal strips on the logic card (Pg. 5-76, Fig. 5-168).

3.24.2 Pry the strips away from the SCR logic card with a screwdriver blade. Leave wires intact (Pg. 5-76 ,Fig. 5-169).

3.24-3 When removing or installing these strips they must be kept level to the card.

When removed, with wires still attached, turn over and examine the split contact tips for separation. Pinch closed with needle nose pliers as required. Loss of contact from these hidden connectors will cause erratic SCR control.

3.25 The directional switch will cause loss of control to the SCR logic card if defective.

3.25.1 The operation may be checked by disconnecting the dash module connector J2A/ P2A (Fig. 3-6) and using a volt-ohm-meter across pins P2A-6 and P-2A-4. Move directional switch to reverse (R) position. Meter should indicate continuity. Repeat for forward (F) position across pins P2A-6 and P2A-5 (Fig. 5-162).

3.26 When the SCR controller or the logic card is suspected of failure first check the terminal pin connections per paragraph 3.24 before proceeding further. Refer to pages 3-32 thru 3-45 for detailed troubleshooting instructions.

3.27 An inoperative contactor "1A" or field weakening contactor "FW" will cause a reduction in vehicle top speed .

3.28 The accelerator switch module may be worn or out of adjustment causing vehicle speed problems (Fig. 3-9).

ACCELERATOR ASSEMBLY MODULE, TROUBLE SHOOTING

Remove traction motor circuit fuse. Sitting in operator's seat, turn key switch to ON position. Place directional control switch to forward position and slowly start depressing accelerator pedal. Within the first 5 to 11 degrees of pedal travel, forward contactor should be heard kicking in. Continue depressing accelerator pedal; within the last 5 degrees of pedal travel, 1A contactor should be heard kicking in.

If one or both of the above events does not occur, remove the accelerator assembly module from the vehicle. Refer to maintenance section for specific removal instructions. Pg. 5-82.

Open the accelerator box lid and check the accelerator cam location. Cam and start switch should be adjusted so that actuation takes place within the first 2 degrees of accelerator switch lever movement. If initial actuation still does not occur, check switch for continuity and replace if required.

Figure 3-9 shows the accelerator module removed and ready for testing.

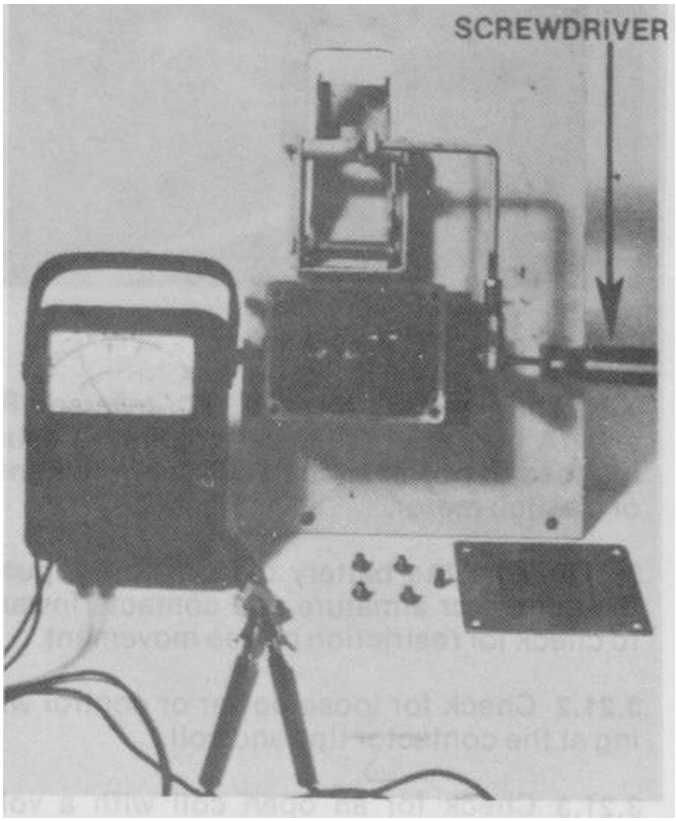


Figure 3-9

If accelerator switch adjustments are correct or have been corrected and switch continuity checks out, then check accelerator switch potentiometer setting.

ACCELERATOR SWITCH POTENTIOMETER ADJUSTMENT

Loosen Allen setscrew which secures potentiometer to the shaft assembly. Connect ohmmeter to potentiometer pins P5A-2 and P5A-4 in connector P5A. Insert tool (or

screwdriver) through front end of shaft assembly. Hold the potentiometer in place while making adjustment. With the start switch engaged, adjust potentiometer to 5500 ohms minimum. Tighten setscrew to secure potentiometer in place. Actuate shaft assembly. There should be no increase in resistance when start switch is engaged. Reading must be below 200 ohms when final 1A switch is engaged. If unable to obtain setting, replace potentiometer.

3.29 Operation of the truck in the SCR speed control range, on very hot days, can cause a slow down of truck speed and eventually lockout the "1A" contactor. Truck speed reduction by the SCR controller is regulated by a THERMAL PROTECTOR (TP). The temperature sensitive device is mounted on the 1 REC heat sink. If the 1 REC temperature exceeds design limits (240°F), the thermal protector lowers the maximum current limit and not allow the 1 REC to exceed its temperature limits. Even at reduced current limit, the vehicle will normally be able to reach sufficient speed for full 1A operation, thereby allowing the panel to cool. As the panel cools, the thermal protector will automatically return the control to full power(Fig. 3-10).

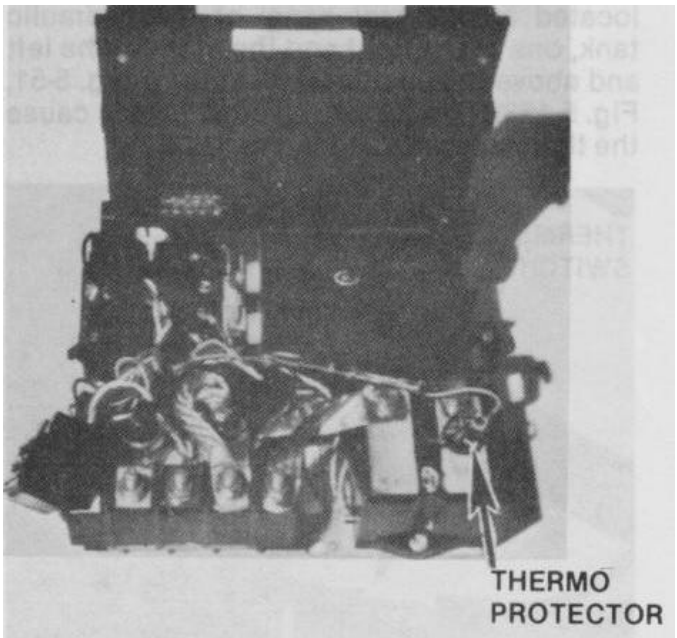


Figure 3-10

3.29.1 If severe speed reduction occurs the vehicle must be parked and the electrical compartment door opened to permit additional cooling.

3.30 Damaged or bent accelerator foot pedal linkage or loss linkage adjustment can cause 1A switch to remain open. Remove accelerator switch module from truck and examine for damage or worn linkage,(Fig. 3-11).

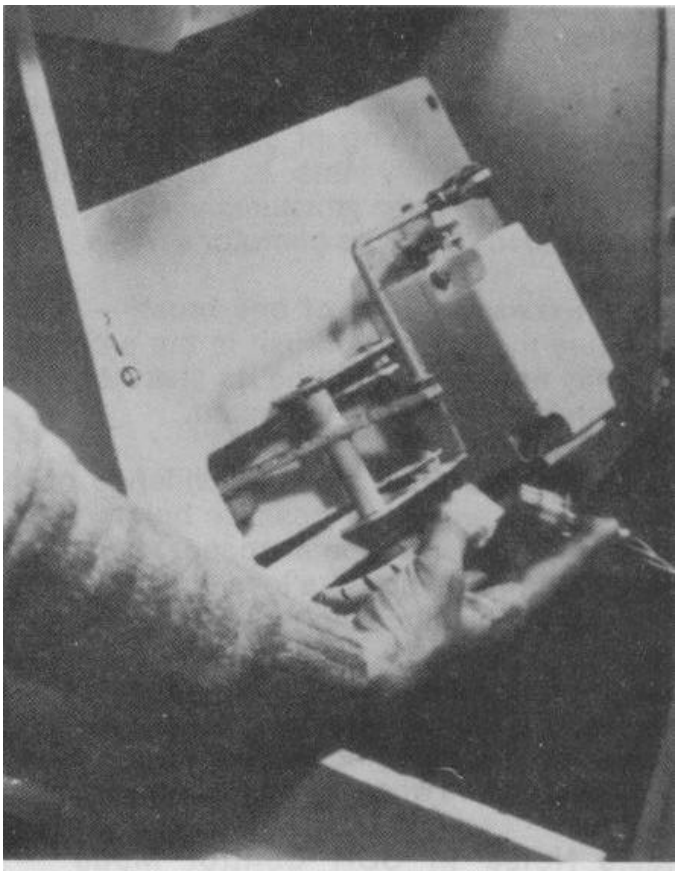


Figure 3-11

3.31 Seat, hand parking, and service brakes drag will cause a reduction in truck speed. Other symptoms of over tightening are:

A. Excessive noise

B. Excessive heat tire life and brake shoe life will be reduced

C. Excessive power consumption battery will discharge rapidly

D. Traction power fuse opening

3.31.1 Refer to page 5-31 for service brake adjustment.

3.31.2 Refer to page 5-32 for seat brake adjustment.

3.31.3 Refer to page 5-32 for hand parking brake adjustment.

3.32 A discharged battery reduces effective voltage across the traction motor and control circuits. Slow travel speeds and erratic contactor operation will result. Refer to page 5-35 "Charging the Battery."

3.33 The traction motor could be defective due to the following five most common reasons:

3.33.1 Open armatures evidence of this is known by the burning of commutator bars 1800 apart. Usually this is from a high resistance joint. Open armatures usually occur around 100 to 200 hours of motor service.

3.33.2 Excessive wear of one brush this indicates the opposite brush is the problem and may not be conducting its share of current. Internal shorts are indicated.

3.33.3 Shorted Field Coil Evidence of a short is shown by excessive brush wear (dusting), high rotational speed and commutator arcing all due to a loss of magnetism in one field pole, thus higher current draw.

3.33.4 High Bar damaged brushes or purple, burnt commutators bars, 90° apart. This is due to hard plugging or stalling the drive motor and occurs when the motor is in service.

3.33.5 Noise in SCR Control Mode Unusual noise when the SCR pulses, the motor current is caused by shorted field coils or by loose or rocking field pole pieces.

The "Wow," "Whumping," or "Wurble," noise as it has been variously described, indicates a field coil that may be shorting out under the influence of an alternating current.

3.33.6 TESTING FOR TRACTION MOTOR PROBLEMS

Testing for paragraph 3.33.1 requires a "Hi-pot" check to determine if insulation resistance of the armature assembly meets a minimum value.

Testing for paragraph 3.33.2 requires a no load speed test. Excessive armature speed or current draw indicates shorts or air gap problems. (With drive wheels up off floor and running in 1A draw should be between 50 to 70 amps and traction motor RPM should be between 2200 and 3000).

Testing for paragraph 3.33.3 is done with a load placed on the traction motor. A Dynamometer must be used to determine current draw and RPM from a given torque setting of 197 in-lbs. and set voltage of 35.5 VDC. One point only is checked in both directions of rotation.

No test exists for paragraph 3.33.4 since it is an in service, operator abuse problem.

Testing for paragraph 3.33.5 is listening for an unusual noise when driving in the SCR range.

"Wow," "Whumping," "Wurble" at certain motor speeds indicates that field coil shorting may be starting.

NOTE

Removal and repair or replacement of the drive motor is recommended to restore the vehicle to normal operation. Ref. Pg.5-10, steps 1, 2, and 3.

3.34 An open thermocouple switch on the pump motor or hydraulic oil tank will prevent the pump power contactor, "P", from closing. The motor thermocouple switch, is located on the motor frame beneath the "S2" power terminal (Fig. 3-12). The two oil tank thermocouple switches, TP-3 and TP-4, are located on the rear panel of the hydraulic tank, one to the right and the other to the left and above the suction outlet elbow (Pg. 5-51, Fig. 5-133). The following reasons may cause the thermal switches to open:

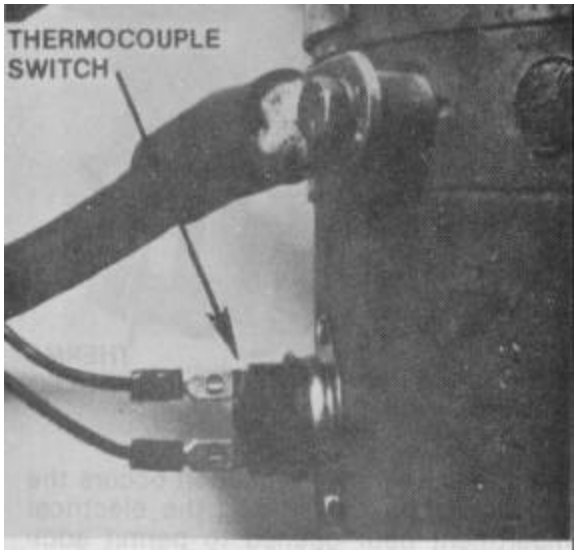


Figure 3-12

3.34.1 Pump motor frame temperature exceeds 240°F. The switch will not reclose until the motor cools to a temperature of 225 - 230°F. (Check hydraulic pressure and current draw) (Pg. 3-18).

3.34.2 Hydraulic oil temperature inside the oil tank exceeds 240°F. The switches will not reclose until the oil cools to a temperature of 225-230° (Fig. 5-133).

(Check hydraulic pressure and current draw) (Pg. 3-18).

3.34.3 Control wiring is loose or dislodged.

3.34.4 Defective switch will not reclose when temperature drops below 225°F. Remove wires and check with a volt-ohmmeter across the switch terminals. No continuity indicates a defective thermocouple switch.

3.35 The pump circuit control fuse (4FU) may be open. Remove the fuse holder cap by pushing inward and twisting counterclockwise until the cap and fuse can be removed. Examine the ribbon for signs of overcurrent damage. Excessive fuse opening may be due to shorts in associated components or wiring (Fig. 3-4).

3.36 The pump contactor rectifier, (No. 9 REC) if defective, will prevent the control circuit from energizing the pump contactor coil.

The pump contactor will not be energized for power steering demands if the 9 REC is open. The component is located in the electrical compartment, on the TS1 terminal strip. Adjust the volt-ohm-meter to the R x 100 resistance range and place meter probes across the rectifier, common to wire No. 30 and positive to wire 28. Resistance of 50,000 ohms or slight meter deflection should be observed. If any movement of low resistance is noticeable replace the 9 REC.

Reverse the meter common to wire No. 28 and positive to wire No. 30. A resistance value of approximately 600 ohms or less is normal. This is shown in Fig. 3-13,
The purpose of the 9 REC is to permit the pump contactor, power steering, and hydraulic solenoid (Sol. A) to be energized to charge the accumulator for power steering demands. When the hydraulic system services the lift, tilt, pivot, or shift functions the 9 REC blocks current to the Sol. A, keeping it from being energized, thus maintaining an open hydraulic system.

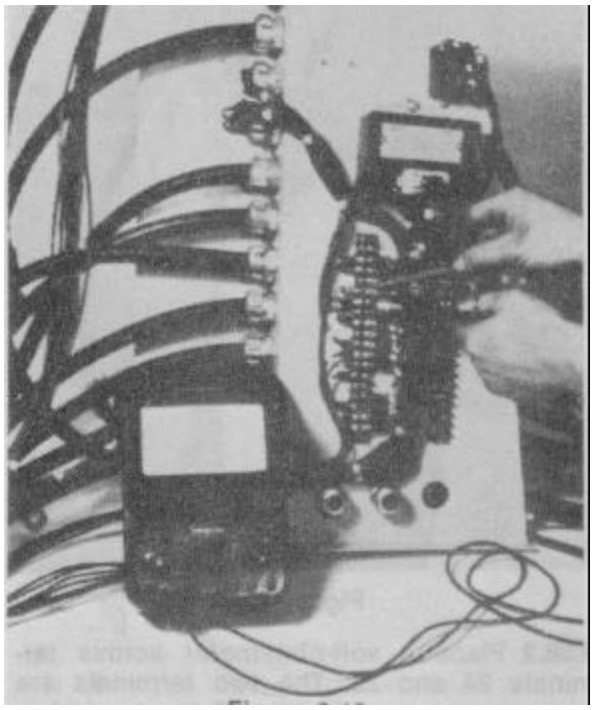


Figure 3-13

3.37 The pump contactor may be inoperative causing loss of power to the pump motor. Check the following conditions:

3.37.1 With the battery disconnected, push the contactor armature and contacts inward to check for restriction of free movement.

3.37.2 Check for loose power or control wiring at the contactor tips and coil.

3.37.3 Check for an open coil with a volt-ohm-meter placed across the two coil terminals.

3.38 A faulty seat switch will prevent operation of the pump motor electrical control circuits(Fig. 3-14).

3.38.1 Disconnect the battery and turn the key switch to "OFF" and raise the operators seat exposing the switch plunger and sealing boot. Manually depress and release the switch plunger. An audible click should be noticed indicating normal mechanical operation, but if it can not be heard for one or both functions, a damaged switch is indicated. Replace seat switch.

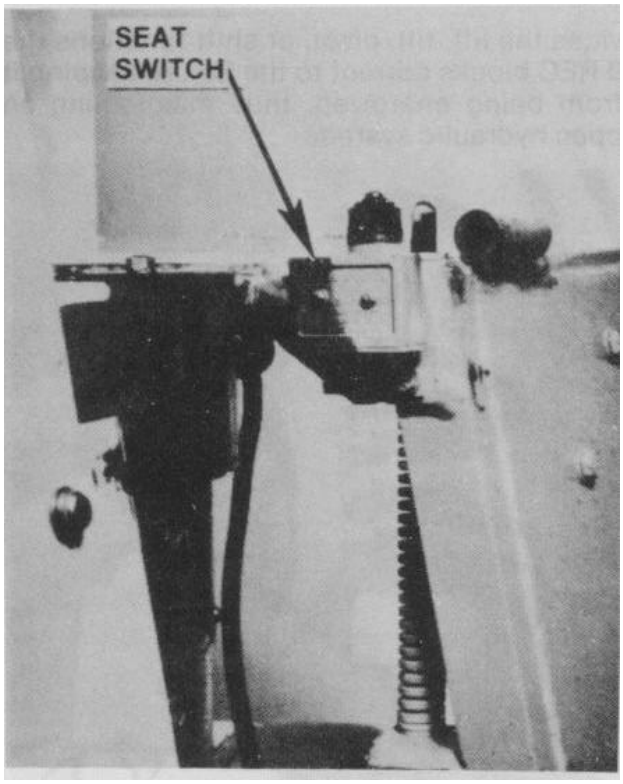


Figure 3-14

3.38.2 Place a volt-ohm-meter across terminals 24 and 25. The two terminals are located on terminal strip (TS-2) mounted in the electrical compartment intermediate panel (Pg. 4-103, item 27).

Select the R x 100 volt-ohm-meter resistance scale. With the seat switch released, the meter should read 10,000 ohms. With the seat switch depressed, the meter should read zero ohms. If there is no change in the volt-ohm-meter when the seat switch plunger is depressed, replace the seat switch.

3.39 A faulty time delay module may be the cause of the pump motor not operating. The time delay module is shown on page 4-102, item 23. Attach a volt-ohm-meter to terminal 9 (negative) and terminal 28. Adjust the volt-ohm-meter for the 50 volt D.C. range. Connect the battery, turn the key switch to "ON", actuate the seat switch, and pull back on any of the hydraulic control levers. Battery voltage should appear on the meter. No voltage indicates the problem is ahead of the module.

3.39.1 Place the volt-ohm-meter across terminals 9 (negative) and 8. Repeat the procedure above. Battery voltage should appear on the meter. Absence of battery voltage on terminal 8 indicates that the pump time delay module should be replaced. No repair to this module is possible.

3.40 Loose pressure switch electrical connectors will cause the pump motor to cycle excessively (Fig.3-15). The power steering system can operate if the high pressure switch (PS1) is disconnected. Operation will be through the action of the low pressure switch (PS2).

A. Turn on and turn off cycle periods will occur approximately in 5 second intervals as the steer wheel is continuously rotated.

B. Steer system hydraulic pressure will be 950 to 1000 psi.

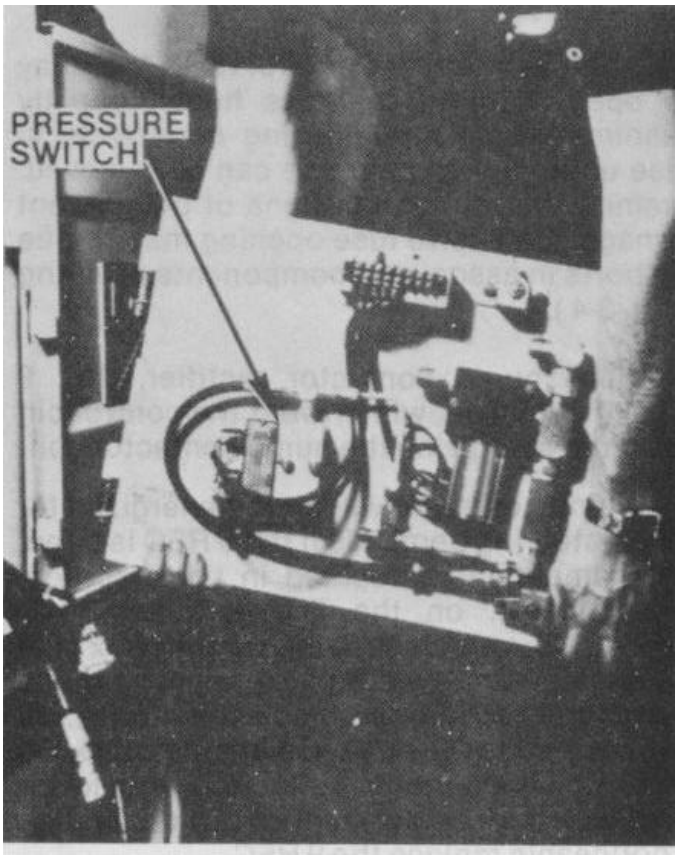


Figure 3-15

3.40.1 Follow troubleshooting procedure for the low pressure switch (PS2).

PS2

Pump motor, turn on and off cycles of five seconds or less for power steer accumulator may be caused by a faulty high pressure switch.

In this case only the low pressure switch is working. Access to check the operation of these two pressure switches is by opening the hydraulic door at the left side of the vehicle and using the terminal strip located at the top of this door.

Battery is to be disconnected after previously charging the system. Adjust the volt-ohm meter to a resistance range and attach the probes to the terminals containing wires No.

30 and 52. The meter should indicate open switch contacts or infinite resistance. Rotate the steering wheel until it is difficult to turn.

The meter at this point must indicate that the low pressure switch, PS2, has closed, indicating continuity.(Fig. 3-16)

Figure 3-16

Replace the low pressure switch if it will not open on rising system pressure or close on dropping or no system pressure.

NOTE

The steering system will operate only on a good, PS2 low, pressure switch although with increased turn on and off cycle times and at a reduced. 950 to 1000 psi pressure.

With a faulty low pressure switch or dislodged connector the power steering system will not recharge when pressure and volume are used up. Operator use of the lift, tilt, pivot and shift functions will temporarily restore power steering, but must not be relied on for extended use.

3.40.2 Follow troubleshooting procedure for the high pressure switch (PS1) .

PS1

Check operation of the high pressure switch by full charging the accumulator disconnecting the battery, and checking with the volt-ohm-meter across terminals containing wires No. 44 and 52. The switch should show an open circuit. Also check across wires No. 52 and No. 4. This connection should indicate a closed switch.

Rotate the steering wheel to reduce system pressure slightly. Recheck with meter to determine if 44 to 52 wires show a closed switch and 52 to 32 wires show an open switch.

3.41 Low nitrogen gas accumulator precharge pressure will cause the pump motor to cycle excessively. Reference pages 5-60 through 5-64.

3.42 If the accumulator rubber bladder is cracked, separated or ruptured, the pump motor will cycle excessively. The required volume of pressurized oil can not be stored as a result of bladder failure.

3.42.1 Remove the protective cover and the valve stem cap from the nitrogen end of the accumulator. Using a small object, (such as the tip of a screwdriver), depress the valve core for an instant. A blast of nitrogen gas will be released from the accumulator in a normal unit.

3.42.2 Lack of any escaping nitrogen gas will mean that a damaged bladder exists or that the valve core has been leaking.

Hydraulic oil running from the valve stem indicates that the bladder is damaged. Replace the accumulator with a new pre-precharged unit. Reference pages 5-63 and 5-64.

3**.43** The steering system check valve or orbitrol unit, if leaking or damaged will cause the pump motor to cycle excessively.

3.43.1 Disconnect battery and hook up accumulator check and charge kit (Pg. 5-61, "Check Out Procedure Hook Up").

3.43.2 Connect the battery, turn the key switch to "ON," and depress the seat switch. The pump motor will turn on and steering pressure will rise until the high pressure switch (PS1) is satisfied and the pump motor will turn off.

3.43.3 Observe the pressure gauge on the kit. The system pressure with the hand steer wheel not turning must remain steady at about 1,800 psi. Downward drift of the gauge and a constant loss of system pressure indicates either the check valve or the orbitrol steer unit is leaking(Fig. 5-156).

3.43.4 Turn key switch off and turn hand steer wheel clockwise and counterclockwise until it becomes difficult to turn.

3.43.5 Disconnect return line hose at orbitrol unit and cap fitting. Turn key switch to "ON" and depress the seat switch.

3.43.6 Repeat step 3.43.2 above.

3.43.7 Observe the pressure on the kit gauge as in step

3.43.3 above. If the pressure drifts downward at a steady rate replace the steering system check valve (Pg. 4-68, item 19). If there is no pressure drift replace the orbitrol unit (Pg. 4-74, item 8).

3.44 A leaking or damaged hydraulic power steering solenoid (Sol. A) valve will cause the pump motor to run continuously (Pg. 4-69, item 13). The hydraulic solenoid valve is normally open and directs carry-over hydraulic oil back to the reservoir. Hydraulic oil is diverted to the accumulator when the hydraulic valve solenoid "A" is energized. Damage of internal components or failed solenoid coil "A" will prevent the valve from performing its function.

3.44.1 Check the hydraulic solenoid valve function manually, the valve is located on the hydraulic door module. Connect the battery, turn the key switch to "ON" and depress the seat switch. The pump motor should now be running continuously. Manually depress the button at the top center of the solenoid coil. Assistance from a screwdriver may be necessary to move the button. The result should be that the hydraulic oil is switched from the reservoir line to the accumulator. An audible change in the sound of oil flow should be evident indicating rising pressure. The hydraulic-accumulator should become pressurized and the high pressure switch (PS1) should shut off the pump motor.

3.44.2 If condition of para. 3.44.1 occurs replace hydraulic solenoid valve "A".

3.45 The hydraulic control valve electrical switches if out of adjustment can stick in the closed position and thus cause the pump motor to run continuously.

Refer to page 3-13, figure 3-19 for switch checkout and adjustment.

Remove the two covers at the right front of the operators compartment to gain access to the four switches (Pg. 4-4, items 3 and 4).

Unplug battery from the vehicle (Fig. 5-97).

IMPORTANT

First determine that the handle shaft support plates are securely attached to the lift valve body at the left end and the stack valve body at the right end. (Figs. 3-17 and 3-18).

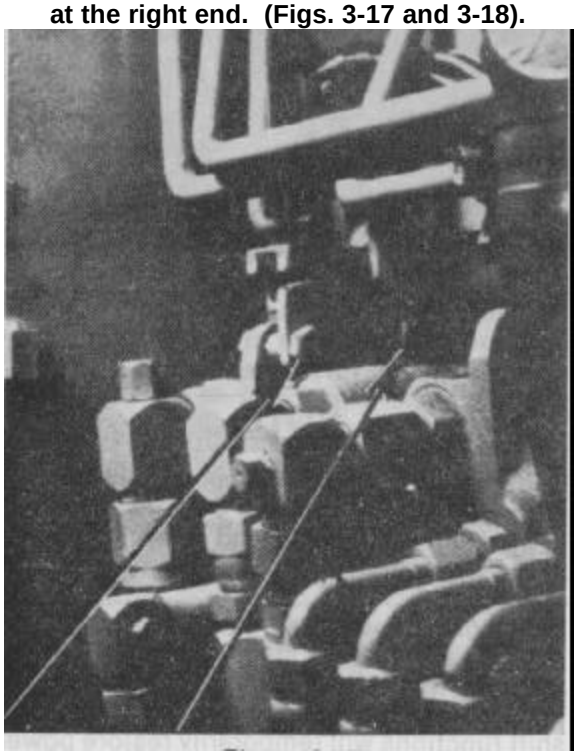


Figure 3-17

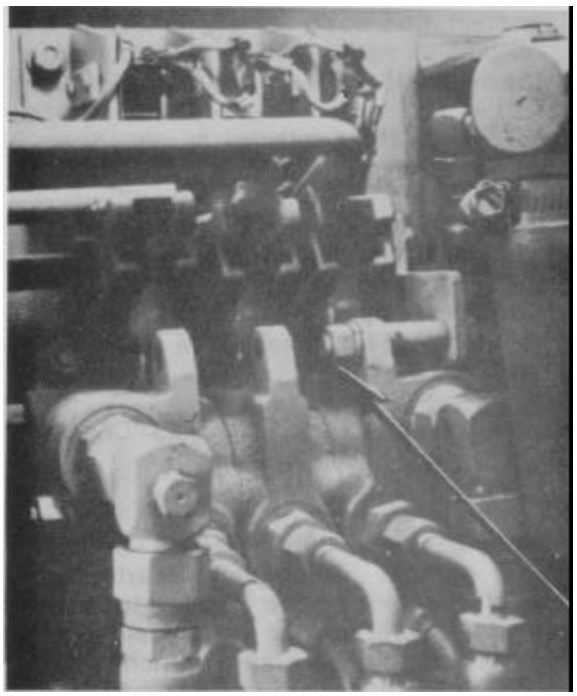


Figure 3-18

Vertical adjustment of the switch support bracket is shown in Fig. 3-19.

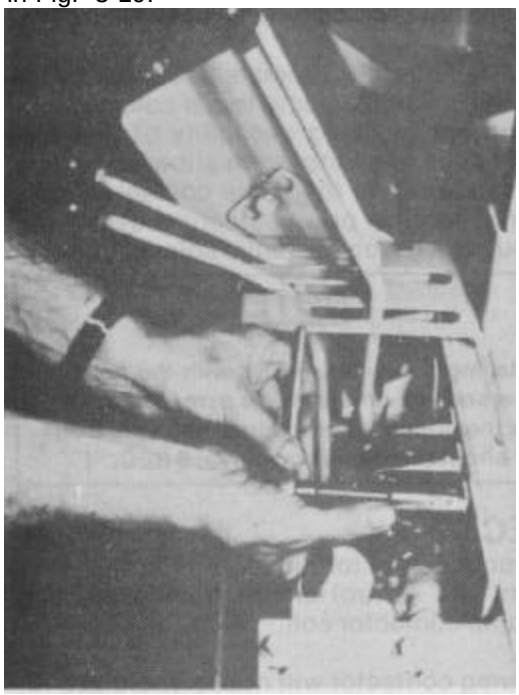


Figure 3-19

Loosen the two 114 inch Hex nuts with a 7/16 inch socket wrench, to allow the switch and bracket to move up or down.

Adjust each switch so that the roller plunger is centered in the notch. Do not place any pretension or loading on the switch arm or roller. Tighten the switch and bracket and recheck adjustment.

Switches should have an audible "click" when the tilt, pivot and shift handles are moved in the forward and rearward direction. The lift switch should "click" only when the handle is pulled back.

Loosen the two No. 6 Hex nuts with a 5/16 open end wrench to allow the switch to move forward and backward horizontally.

All handles must be in the normal, neutral position. Try each handle to determine if handle base rotates freely and each valve spool does not stick in the housing. Lubricate handle base and support shaft if required.

3.46 Loose control handle mounting to the hydraulic control valves can cause the electrical switches to remain closed after the operator releases the control handle.

3.46.1 Unplug battery from the vehicle(Fig. 5-95.

3.46.2 Remove the two covers at the right front of the operator's compartment to gain access to the four switches and the handle mounting (Pg. 4-4, items 3 and 4).

3.46.3 The hydraulic return filter may be moved for access to the control handle mounting hardware (Fig. 3-20).

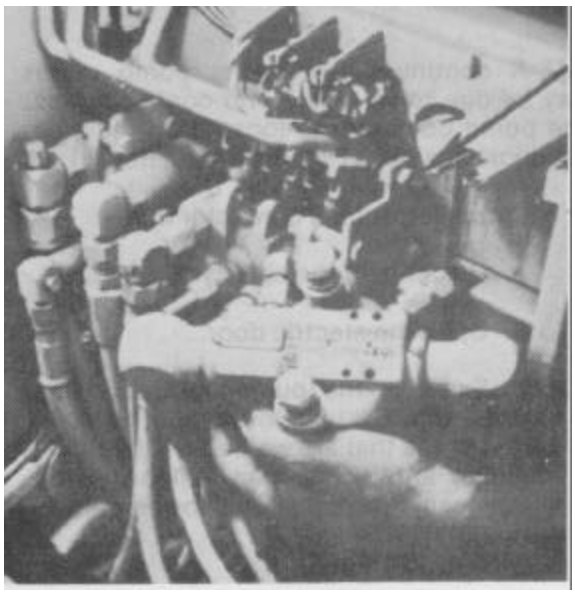


Figure 3-20

Use a 9/16 inch wrench to loosen the two mounting bolts. Slide towards rear of truck away from the mounting bracket and lay against the front of the electrical compartment.

3.46.4 Tighten the two 1/2-13 hex nuts at the end of the handle pivot shaft. Use 3/4 inch wrenches. The arrow in figure 3-20 indicates the handle pivot shaft nuts to be checked and tightened.

3.46.5 Tighten the two 3/8-16 hex bolts and nuts that attach the handle pivot shaft support plate to the lift valve body. The two bolts and nuts are located at the left, inlet end, of the lift valve (Fig. 3-17).

Tighten both bolts with 9/16 inch wrenches. The arrow in figure 3-17 indicates the two bolts to be checked and tightened.

No motion of this shaft support plate is acceptable when the control handles are operated.

3.46.6 Tighten the two 3/8-16 hex bolts and nuts that attach the handle pivot shaft support plates to the stack valve body. The two bolts and nuts are located at the right end of the stack valve (Fig. 3-18).

Tighten both bolts with 9/16 inch wrenches. The arrow in figure 3-18 indicates one of the two bolts to be checked and tightened. No motion of this shaft support plate is acceptable when the control handles are operated.

3.47 A continuously running pump motor may be due to welded pump contactor tips. The pump contactor is located on the electric door assembly(Ref. Page 4-90, Item 4).

Check for welded contactor tips.

A. Disconnect the battery. Fig. 5-97.

B. Open the electric door.

C. Examine the pump contactor tips. Ref. page 5-80, items 7 and 16. Contactor tips that are welded will be rigidly joined and no air gap will be visible between the upper and lower contact tips.

D. A screwdriver may be used to pry the contact tips apart for examination. A blackened, rough surface will indicate the extent of contact tip deterioration.

E. Service the contactor as described on page 5-79.

3.48 A faulty hydraulic high pressure switch (PS1) can cause the pump motor to run continuously. Failure of the high pressure switch (PS1) contacts to open will allow the pump to run continuously at relief valve pressure (2000 psi).

Check the operation of PS1 (Pg. 5-63 "Checking Steering System Oil Pressure").

3.49 Continual running of the pump motor can be caused by contamination of the hydraulic control relief valve cartridge. Failure of the relief valve poppet to seat prevents pressure buildup of the steering system and the high pressure switch (PS1) will not turn the pump motor off. When this condition exists the pump motor will not appear to labor.

3.49.1 Inspect and repair the pressure relief valve as shown on page 3-1 and 3-2 .

3.50 A failure of the number 9 rectifier (No. 9 REC) will cause the pump to run continuously. The current blocking capability of this rectifier may be breaking down allowing battery power to energize the pump contactor, as is required for the power steering cycle, but without energizing hydraulic solenoid "A".

NOTE

Installing a new No. 9 REC with the polarity reversed will create these symptoms. Follow the checkout procedure below to trouble shoot the operation of No. 9 REC.

9 REC

The pump contactor diode, if defective, may prevent the control circuit from energizing the pump contactor coil.

The pump contactor will not be energized for power steering demands if the blocking diode (No. 9 REC) is open. This component is located in the electrical compartment, on the first terminal strip, attached to the sixth and

eighth terminals from the top. Adjust the volt-ohm meter to the R x 100 resistance range. Place meter probes across the diode, common to wire number 30 and positive to wire No. 28. Resistance of 50,000 ohms or slight meter deflection should be observed. If any movement or low resistance is noticeable, replace No. 9 rectifier.

Reverse the meter probes, common to wire No. 28 and positive to wire No. 30. A resistance value of approximately 600 ohms or less is normal. This is shown in Figure 3-21.

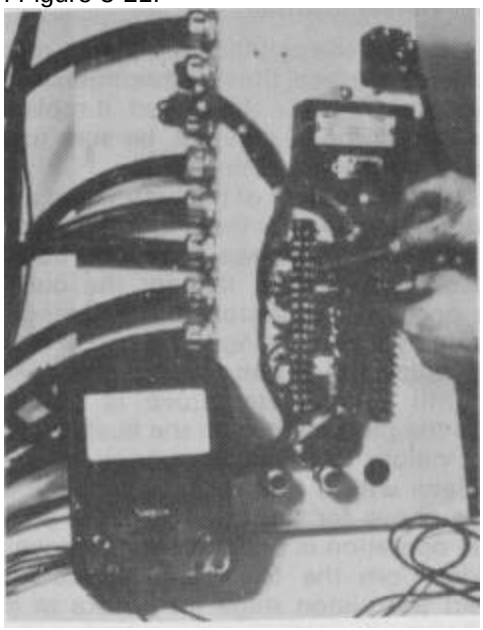


Figure 3-21

The purpose of this blocking diode (No. 9 REC) is to permit the pump contactor and power steering, hydraulic solenoid (SOL. A) to be energized to charge the accumulator for power steering demands. When the hydraulic system is needed for lift, tilt, pivot and shift functions the diode blocks current to SOL. A, keeping it from being energized, thus maintaining an open ended hydraulic system.

3.51 A faulty high pressure switch time delay module could cause the pump motor to cycle at elevated pressures producing a hammering effect. Failure of the PS1 holdout module to immediately break the circuit between wire terminals 44 and 44A when the high pressure switch (PS1) opens, and hold this circuit open from 1-1/2 to 2 seconds, will permit the pump motor to cycle if the hand steering wheel is being operated.

Check the operation of the PS1 time delay module as follows:

A. Open the hydraulic door assembly at the left side of the vehicle.

B. A volt-ohm-meter with the selector knob set for 50 volts D.C. is required. Place the test leads on terminals 44A and 9 (negative). The terminals are found on terminal strip, TS3, at the tip of the hydraulic door assembly. Fig. 3-22

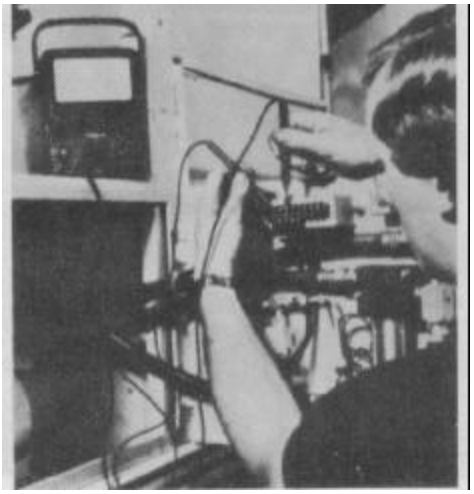


Figure 3-22

C. Connect the battery, turn the key switch to "ON" and depress the seat switch.

D. Read the battery voltage on the volt-ohm-meter.

E. initiate the power steering cycle, turning on the pump motor.

F. Upon reaching the maximum pressure setting, the high pressure switch (PS1) will switch and place a voltage on connection No. 4 to the holdout module. This voltage will energize the holdout module, opening the internal circuit between connections between 44 and 44A.

G. The battery voltage shown on the volt-ohm-meter will drop to zero. Voltage should remain at zero for 1-1/2 to 2 seconds. Failure of the holdout module to interrupt this voltage for less than 1-1/2 seconds requires replacement of the high pressure switch PS1 holdout module.

3.52 Continual running of the pump motor, and loss of system pressure may be due to loss or looseness of the reservoir/carryover separator plug (Fig. 3-23, Fig. 3-24).

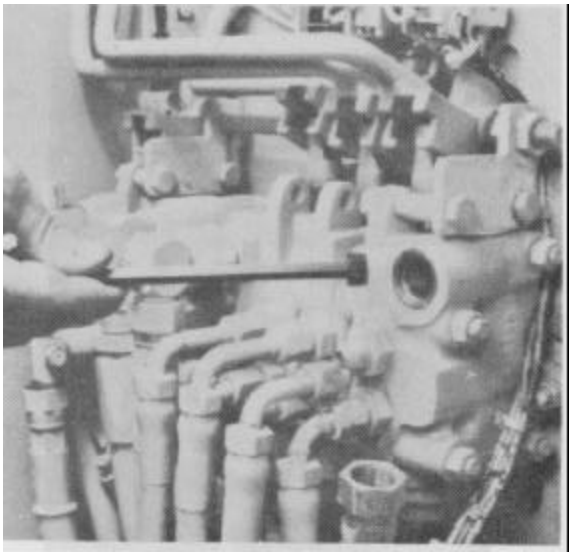


Figure 3-23

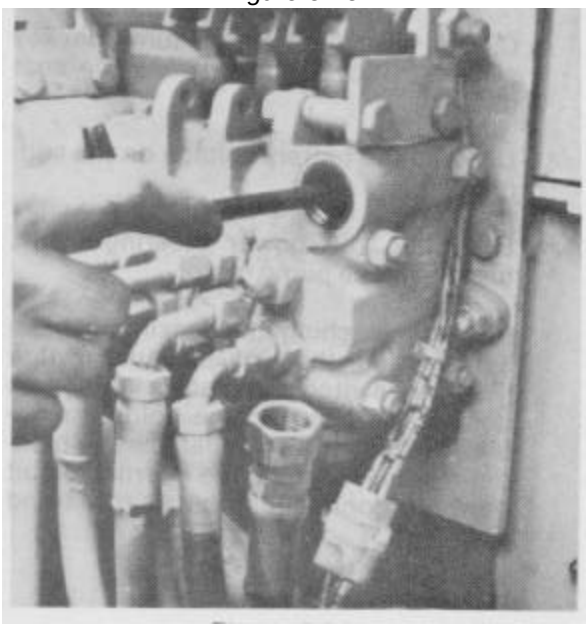


Figure 3-24

3.53 Voltage on the truck frame or a ground fault less than 20,000 ohms can cause sporadic triggering of the time delay module and subsequent turn on the pump motor.

3.53.1 Most common cause for this condition is a dirty, poorly maintained battery. Reference page 5-36 "Cleaning the Battery."

3.54 Inspect the pivot cylinder hydraulic hose and fitting connections, the rod seals, and the piston seals for leaks or excessive wear, replace as required. See Pgs. 4-79 and 4-81 for cylinder parts list and Page 4-67, item 19 for cylinder location.

3.55 Examine the cylinder and piston rod for alignment, surface finish smoothness, and straightness, replace if required. If replacing of the piston rod is required, be sure to use new seals (Pg. 4-81, item 22)

3.56 Slow movement of the piston and a sudden burst of speed ending with a slamming of the piston indicates defective cushion valve or piston rings. Inspect the cushion valve ports in the piston, by removing the "O" ring hydraulic fittings (one end at a time) and pushing the piston towards the opened port until a complete stroke is obtained. Rotate the piston rod until the cushion valve port is visible. Examine for restrictions or dirt and clean with a fine wire. Repeat the procedure above for the other cylinder port. If erratic operation is still apparent remove the cylinder from the truck and disassemble. Inspect the piston rings for cracks or misalignment, replace as required, using a ring compressor(Pg. 4-79, item 3).

3.57 Observe general operation of all hydraulic functions. If for example, operation of the pivot control lever allows tilt movement, the hydraulic hoses are crossed.

3.58 Inspect the shift cylinder hydraulic hose and fitting connections, the rod seals, and the piston seals for leaks or uneven wear, replace as required.

3.59 Examine the cylinder and piston rod for alignment, surface finish smoothness, and straightness, replace if required. If replacing of the piston rod is required, be sure to use new seals (Pg. 4-80, item 22).

3.60 Remove and disassemble the shift cylinder. Check the cylinder spacer for damage or misalignment. The piston end port

must have clear passage through the spacer for oil flow (Pg. 4-80, item 24).

3.61 Review (Pages 1-4 and 1-5) truck features, for correct pivot and shift interlock system operation. Inspect solenoid valves for visual external leaks and damage. Examine the electrical actuation of the solenoids, to determine if the solenoid coils are working and if electrical power is being delivered to the solenoids. If solenoid is working properly but valve still proves to be faulty, disassemble, and replace the valve coil plunger and internal seals (Pg. 4-71).

3.62 With the key switch "OFF," slowly operate the hydraulic control handles individually, listening for switch actuation (switches located on top of hydraulic control valves) and looking for cam and switch misalignment or damage. Adjustment is provided both horizontal and vertical. Adjust or replace as required.(Ref. para. 3.45 thru 3.46.6).

3.63 Determine if pivot and shift functions are building up required hydraulic pressure (Pg. 3-19. Table 2). Check pump for cross threaded fittings, damaged seals, cracks in the housing, or over torqueing of the end cover bolts(Pg. 4-56, item 1).

3.64 Failure of the pump motor to turn on and operate the hydraulic lift when the operator pulls back on the lift control handle to raise the load, will be caused by a discharged battery, allowing the lift lockout relay to interrupt power to the pump contactor.

Other hydraulic functions remain operational without interruption and are interlocked to prevent their use from overriding the locked lift function.

3.64.1 To resume normal operation charge the battery (Pg. 5-35) or remove the battery (Pg. 5-33) and replace with a fully charged battery.

Normal lift function will return with a battery charged to over 80% of rated capacity.

3.66 The lift valve switch if defective or out of adjustment can restrict the motor-pump unit from turning on.

3.67 Overload of the hydraulic hoist assembly in front loading operation will cause the hoist system relief valve to dump system oil back to the reservoir and create an overload of pump motor fuse 2FU. Loads in excess of the load weights and load centers displayed on the vehicle rating plate can create an unsafe vehicle stability condition and must be avoided.

3.68 Proper hoist cylinder sequencing is mandatory to maintain full operating lift speeds to full lift heights.

3.68.1 Adjustment procedure for cylinder sequencing is found in the Maintenance Section V.

3.69 Low reservoir oil level will cause the lift system hydraulic pump to cavitate and not permit full lift of the mast.

3.69.1 Lower hoist cylinder and close the tilt, pivot, and shift cylinders. Check hydraulic oil level (Pg. 5-53, Fig. 5-139), add to full mark if required.

3.70 Mechanical damage of mast assembly will cause reduced lift speed.

Areas to be examined to determine if the hoist assembly is functioning properly are listed below.

3.70.1 Upright and carriage load rollers may be digging into the upright channel and I beam sections. A clean, raw, metal track where the roller contacts the surface of the section is evidence of this condition.

Lubricate as shown in Maintenance Section V. Adjust load roller clearance as specified in Maintenance Section V.

3.71 Loss of lifting or tilting capability and speed, can be due to one or both of the hydraulic pump sections being damaged.

TROUBLESHOOTING

The tilt, pivot, shift functions will be impaired with damage to the end section rotor, ring or vanes.

The hoist function will be impaired with damage to the shaft end section rotor, ring or vanes.

3.71.1 Listen for any unusual noise when the pump is operating.

3.71.2 Determine the lift (Fig. 3-25) and control (Fig. 3-26) circuit system pressure and currents. Compare to characteristics listed in table 1 and table 2.

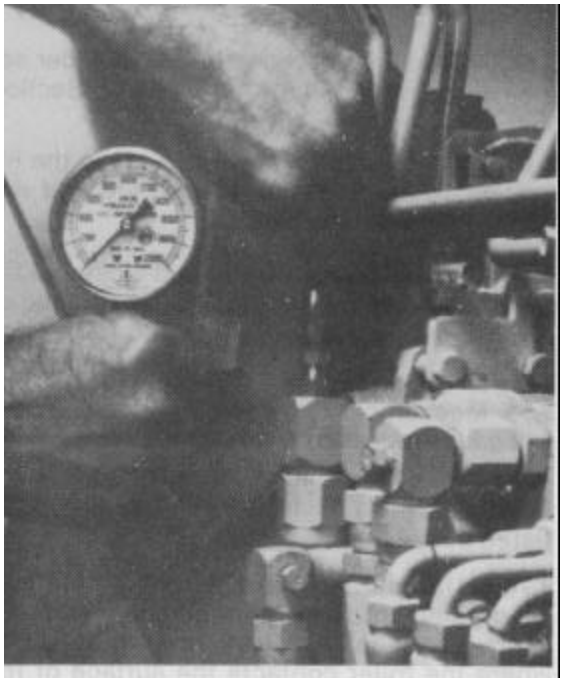


Figure 3-25

CAUTION

Figs. 3-25 and 3-26 show a 2000 PSI gauge checking operating pressures. To determine relief valve pressures, use a 3000 PSI gauge.

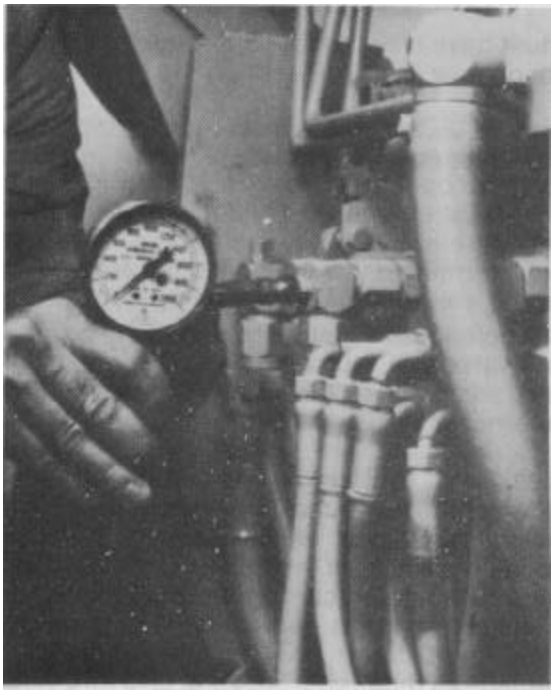


Figure 3-26

LIFT CIRCUIT

To determine lift circuit relief pressure and hoist cylinder operating pressure, connect a 3000 psi hydraulic gauge with a flexible hose ending in a 1/8 NPTF male thread, to the lift valve pressure inlet elbow. This is illustrated in Fig. 3-25.

Raise the hoist assembly until the sections are fully extended and cylinder travel is stopped. Continue to pull back on the lift control handle. Relief pressure reading on the gauge should be 2000 psi, plus or minus 50 psi.

Normal hydraulic pressures, taken at this point, for typical loads on the hoist assembly are listed on table (1), and may be used for reference when analyzing system performance. Hoist capacity is 4000 lbs. Control handle must be fully open.

TABLE 1-MAST

LOAD (POUNDS)	HYDRAULIC PRESSURE (PSI)	BATTERY CURRENT (AMP)
0	770/940	320/340
2500	1260/1420	450/475
4000	1550/1710	525/560

TROUBLESHOOTING

CONTROL CIRCUIT

Determine vehicle hydraulic control circuit operating pressures by connecting a 2000 psi hydraulic gauge with a flexible hose ending in a 1/8 NPTF male thread to the three section control valve pressure inlet elbow. This is illustrated in Figure 3-26

Perform each function, tilt, pivot, and shift with the control handle fully open, with and without rated loads. Normal hydraulic pressures, taken at this point, for typical loads on the hoist assembly and operation of the three functions are given on table 2.

TABLE 2-TILT, PIVOT, SHIFT

FUNCTION	LOAD (POUNDS)	HYDRAULIC PRESSURE(PSI)	BATTERY CURRENT(AMPS)
Tilt Back	0	900	220
Tilt Fwd.	0	340	160
Pivot Out	0	700	200
Pivot In	0	1040	240
Shift Left	0	360	160
Shift Right	0	520	180
Tilt Back	2500	1140	240
Tilt Fwd.	2500	340	160
Pivot Out	2500	700	200
Pivot In	2500	1020	240
Shift Left	2500	360	160
Shift Right	2500	560	180
Tilt Back	4000	1300	260
Tilt Fwd.	4000	340	160
Pivot Out	4000	700	200
Pivot In	4000	1020	240
Shift Right	4000	360	160
Shift Left	4000	600	200

3.71.3 All hydraulic connections must be kept tight. A loose connection in a pressure line will permit oil leakage. If the oil level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the pump can result. In suction lines, loose connections permit air to be drawn into the systems and cause pump cavitation resulting in noisy erratic operation with final results of pump destruction.

3.71.4 Clean oil is the best insurance for long service life. The reservoir should be checked periodically for dirt or other contaminants. If the oil becomes contaminated the system should be thoroughly drained and the reservoir cleaned before new oil is added.

3.71.5 Filter elements should be checked and replaced periodically. A clogged filter element results in a higher pressure drop. This forces particles through the filter which would ordinarily be trapped and finally causes the by-pass to open, resulting in partial or complete loss of filtration.

3.71.6 A pump running excessively hot or noisy is a potential failure. If the pump becomes noisy and runs hot, the truck should be shut down and the cause of improper operation corrected.

3.71.7 Troubleshooting Hydraulic Pump

PROBABLE CAUSES

1. Driven in the wrong direction of rotation.

   REMEDY

   The drive direction must be changed immediately to prevent seizure. Correct the pump cartridge ring position for each direction of rotation.

2. Coupling or shaft sheared or disengaged.

   REMEDY

   Disassemble the pump and check the shaft and cartridge for damage. (Pg. 4-55). Replace the necessary parts.

3. Oil intake pipe in reservoir is restricted.

   REMEDY

   Check all strainers and filter for dirt and sludge. Clean or replace.

4. Fluid viscosity too heavy to pick up prime.

   REMEDY

   Completely drain the system. Add new filtered oil of the proper viscosity.

5. Air leaks at the intake.

   REMEDY

   Check the inlet connections to determine where air is being drawn in. Tighten any loose connections. See that the oil in the reservoir is above the intake pipe opening. Check the minimum drive speed which may be too slow to prime the pump.

6. Relief valve stuck open.

   REMEDY

   Disassemble the pump and wash the valve in clean solvent. Return the valve to its bore and check for any stickiness. A gritty feeling on the valve periphery can be polished with crocus cloth. Do not remove excess material, round off the edges of the lands or attempt to polish the bore. Wash all parts and reassemble the pump.

7. Vane(s) stuck in the rotor slot(s).

   REMEDY

   Disassemble the pump. Check for dirt or metal chips. Clean the parts thoroughly and replace any damaged pieces. If necessary flush the system and refill it with clean oil.

1.1 SYMPTOM

Insufficient pressure build-up.

PROBABLE CAUSE

1. System relief valve set too low.

   REMEDY

   Use a pressure gauge to correctly adjust the relief valve.

   Worn Parts causing internal leakage of pump delivery.

   REMEDY

   Replace pump cartridge.

1.2 SYMPTOM

Pump making noise.

PROBABLE CAUSE

1. Pump intake partially blocked.

   REMEDY

   Service the intake strainers. Check the fluid condition and, if necessary, drain and flush the system. Refill with clean oil.

2. Air leaks at the intake or shaft seal. (Oil in reservoir would probably be foamy).

REMEDY

Operate the pump at the recommended speed.

3. Coupling misalignment.

REMEDY

Check if the shaft seal bearing or other parts have been damaged. Replace any damaged parts. Realign the coupled shafts.

3.72 Damaged or worn cylinder seals will cause internal leakage and could impair the speed or static holding ability of the cylinder.

Check for cylinder drift as follows:

NOTE

Specified drift rates shall be measured when hydraulic oil temperature is not less than 120°F.

3.72.1 The lift assembly shall be capable of holding the rated load at maximum height not less than 2 minutes with not more than 1-3/4 inch vertical drift and not more than 1 degree of rotational drift from the vertical.

3.72.2 Replace the cylinder seals if drift exceeds these specifications. Replace hoist cylinder seals.

3.73 The lift control valve may be leaking or damaged allowing drift of the raised load.

1. Oil may be bypassing between the spool and body. The valve can not be repaired. Remove and replace.

2. The spool is not centering properly. Centering spring is broken. Remove and replace springs (Pg. 4-63, item 13).

3.74 Failure of the hoist assembly to tilt may be due to one pair of the tilt cylinder hydraulic hoses being reversed. This would normally occur after one or both of the tilt cylinders were serviced and reinstalled in the vehicle. Refer to page 4-48 (Hydraulic Assembly).

Tag all hydraulic lines as they are removed from the cylinder.

3.75 A leaking orbitrol check valve reduces the volumetric efficiency of the gerotor section of the unit and will effect the steering response.

Remove orbitrol unit from truck (Pg. 5-64) and replace check valve.

3.76 Remove steer cylinder from steer axle (Pg. 5-24, steps 4 and 5) (Pg. 5-27, steps 1 through 6) and replace all seals.

3.78 Failure of the steer axle king pin bearings and spindle thrust bearings will require higher steer cylinder operating pressures and thus slow down cylinder response as well as require increased manual effort at the hand steer wheel.

3.78.1 A bent steer cylinder rod will produce the same effect as in paragraph 3.78 above. Replace steer cylinder rod.

3.79 A failed or weak orbitrol centering spring will not allow the orbitrol valve to return to its neutral position and will cause the steer system to drift.

3.79.1 Remove orbitrol unit from truck (Pg. 5-64) and replace the valve spool centering spring.

3.80 Spongy operation of the service brake pedal indicates air in the brake system. Examine the brake lines and wheel cylinders for leaks, repair if necessary. Refer to page 5-31 for brake system bleeding procedure.

3.81 Remove filler cap from master cylinder, located underneath the left hand floor plate. If fluid level is not even with the bottom of the filler cap threads, add fluid. Be sure to examine the brake system for leaks and assure a full fluid level.(Fig. 5-92).

3.82 Remove master cylinder filler cap and slowly actuate the brake pedal, a pulse of fluid should be seen in the cylinder reservoir. If not, the piston assembly and the internal seals should be replaced.

3.83 If drive wheel assembly is found to be fluid saturated the brake drum must be removed and the wheel cylinder inspected for leaks or damage. See pages 5-4 and 5-5 drum and brake shoe removal, 3.84 Inspect the brake lines for cracks, cross threaded fittings, or damage. Repair as necessary.

3.84.1 Refer to page 5-31 for brake system bleeding procedure.

3.85 Excess dragging or brake pedal travel indicates that adjustment or replacement of brake shoes are required.

3.85.1 Refer to page 5-31 for service brake adjustment.

3.86 If hydraulic oil, brake fluid, or grease comes into contact with the brake linings, it must be wiped clean and sanded clean with fine emery cloth. However, if the linings are saturated, they must be replaced.

3.86.1 If brake linings are replaced refer to page 5-31 for service brake adjustment.

3.87 Adjustment of the bellcrank pull rod is required, if the seat or hand brake after adjustment will not hold the truck with the rated load on the forks in a carry position on a 15% grade (Fig. 5-95).

3.88 Inspect brake shoe linings. If brake operation results in pulling or poor stopping power, replace brake shoe linings.

3.88.1 If brake linings are replaced refer to page 5-31 for service brake adjustment.

3.89 Brake shoe linings can become glazed or damaged by over adjustment or by contamination of oil, grease, etc., wipe and sand clean with fine emery cloth, replace if worn excessively.

3.89.1 If brake linings are replaced refer to page 5-31 for service brake adjustment.

NO-SPIN DIFFERENTIAL, TROUBLE-SHOOTING

The performance of a NoSPIN-equipped vehicle differs in some ways from a vehicle with a conventional differential. Problems may occur from improper installation of the NoSPIN or improper operation of the NoSPIN-equipped vehicle. Any driver complaint about NoSPIN performance or vehicle operation should be checked against the information in this section as a fast way of isolating the probable cause of trouble.

1.0 SYMPTOM

Hub stud shearing drive tire scuffing, broken shafts and/or undue stress on other axle parts.

PROBABLE CAUSE

1. Overloading and/or improper weight distribution.

Overloading the driving axle can cause axle housing deflection, and the NoSPIN may not be able to operate freely when differential action is needed.

2. Oversize tires.

Use of oversize tires can increase the shock loads on all axle parts in difficult operations where low gear reductions (numerically high ratios) must be used, and excessive braking torque loads may develop when braking severely.

3. Hub studs and/or wheel nuts not properly assembled and/or not checked promptly when vehicle was new and first put into operation and periodically thereafter.

Continued operation with loose studs will elongate the tapped hole in the cast hub. Once this occurs, it is almost impossible to keep the studs bottomed and the nuts tight and it is usually necessary to replace the hub. After it is replaced, the operator should

be cautioned to check and tighten the studs and nuts frequently when the vehicle is first put back into operation.

4. Continued operation of a vehicle after a shaft has broken.

With the NoSPIN, it is sometimes possible to operate the vehicle on one axle shaft. An experienced driver will usually detect a pull to one side or the other if he is not aware of the failure. The vehicle should not, of course, be driven at all after a shaft failure not only because of the damage that may be one to other axle parts from the broken ends or chips, but also because all driving torque is transmitted to the opposite side of the driving axle, placing a constant, steady overload on the axle parts on that side. Caution: When a broken axle shaft is being replaced, it is important that the other shaft be checked for twist and other signs of stress and wear that could lead to its premature failure. Under this condition, both axle shafts should be replaced. In addition, all foreign particles should be removed and all axle and NoSPIN parts thoroughly cleaned before the axle is placed in operation.

5. Bent axle shafts or axle shafts on different centerlines.

This condition may bind the driven clutch spline to the side gear spline, preventing the driven clutch from overrunning freely, subjecting the NoSPIN and axle parts to excess stress and possible failure. Minimal binding is generally indicated by occasional, unusual noises and an increase in the normal torsional stress on the axle shafts. A severe binding condition can prevent the clutch from disengaging until the torsional stress is excessive, stressing other driveline parts. Extreme conditions may delay or prevent clutch/spider re-engagement, allowing one side to overrun continually, transmitting all the power to the opposite side. These conditions can be corrected by replacing the bent shaft or shafts or by repairing misalignment conditions caused by hub faces that are not square with axle shaft flanges.

1.1 SYMPTOM

Vehicle pulls to the left or right on straight forward driving; vehicle tends to go straight forward when making turns.

PROBABLE CAUSE

1. Unequal rolling radii on each of the drive tires.

If the tire rolling radii are not equal, one side of the NoSPIN will be overrunning constantly when power is being applied, while the other will do all the driving, tending to pull the vehicle to one side. Replace tires so that rolling radii are equal.

2. Broken axle shaft; foreign material in the axle housing.

If an axle shaft should break, the remaining axle shaft will carry the full driving torque and will tend to pull the vehicle to one side. The broken shaft should be replaced, and the other shaft checked at the same time for possible damage from broken ends, chips or firm stress conditions. Chips, pieces of metal and other foreign material in the axle can result in erratic NoSPIN action, loss of drive to one side of the axle or damage to other internal parts. Foreign material may lodge between the NoSPIN's driven clutch and spider (central driver) or between the clutch and side gear splines, causing the NoSPIN to remain disengaged so that no drive is transmitted to that side of the NoSPIN.

3. Brake dragging on one wheel.

This condition will tend to pull the vehicle in one direction. Correct by readjusting the brakes. Be sure to elevate both wheels off the ground when doing so. If one wheel is still on the ground, the vehicle will start moving.

4. Worn, damaged or loose steering linkage.

Repair as needed.

1.2 SYMPTOM

No differential action or differentiation; binding during turns; drive axle tire wear during sharp turns.

PROBABLE CAUSE

1. Larger than normal steering angle.

Most vehicles are designed with maximum steering angles of 30° to 35° between the centerlines of the vehicle and the wheels of the steering axle. Some vehicles, such as a short wheelbase lift truck and some farm-type tractors are designed with extremely sharp turning angles of as much as 60° to 65°, and under some conditions, this may be objectionable with NoSPIN. Since drive is being transmitted to the inside front wheel during turns, the line of force is almost perpendicular to the inside rear wheel when making a sharp turn so that instead of rolling freely into the turn, the rear wheel skids sideways, acting as a brake to slow down the vehicle, causing understeer. At times, the inside tire may break traction momentarily changing the line of force and relieving this condition.

2. Insufficient weight on steering axle.

If the driving axle is overloaded because of improper weight distribution, the load on the steering axle may actually be reduced so that steering is erratic. If the load on the steering axle is light, the tires may not have enough frictional resistance to lead the vehicle straight ahead. This condition will accentuate the "understeer" or "push" characteristics occasionally noted in short wheelbase highway tractors. Any additional overload carried may tend to further unweight the steering axle and compound the steering problem.

If the steering axle is overloaded and the driving axle underloaded, the tires on the driving axle may not have enough traction to move the vehicle, so that they may slip or scuff momentarily. The tires will, of course, wear prematurely if this condition is experienced repeatedly.

3. Serious overloading of the driving axle.

If the driving axle is overloaded to the point where there is axle housing deflection, the NoSPIN may not be able to operate freely when differential action is needed. This can compound the overload condition on some axle parts, hub parts and tires. Trussing or reinforcing the axle housing may help to overcome the problem, but if the complaint persists and the operator continues to overload, the NoSPIN should be removed.

1.3 SYMPTOM

Occasional loud snap or cracking noises.

NOTE

An occasional snapping noise is a NoSPIN characteristic, which can occur at irregular, infrequent intervals not usually objectionable. Discussed below are some things to check if conditions occur too frequently and do become objectionable.

PROBABLE CAUSE

1. Unequal rolling radii of tires on drive axle.

This condition causes the NoSPIN to operate constantly so that noises develop more frequently. Correct by equalizing rolling radii.

2. Serious overloading of front axle; bent axle housing.

Either condition may cause the NoSPIN to bind so that one or both of the clutches cannot cam out freely and does not have complete tooth contact so that it slips and jumps to the next tooth. Truss the axle, reduce loads or replace housing.

3. Bent axle shaft/shafts or axle shafts on different centerlines.

If the two axle shafts are not in line, it may cause binding of the driven clutch from overrunning freely subjecting the NoSPIN and axle parts to excess stress and possible failure. Minimal binding is generally indicated by occasional unusual noises and an increase in the normal torsional stress on the axle shafts. A severe binding condition can prevent the clutch from disengaging until the

torsional stress is excessive, thus stressing other driveline parts. Extreme conditions may delay or prevent clutch/spider re-engagement, allowing one side to overrun continually and transmitting all the power to the opposite side. These conditions can be corrected by replacing the bent shaft or shafts or by repairing misalignment conditions caused by hub faces that are not square with axle shaft flanges or by mis-indexing or misalignment of the bolt circles in either the differential carrier or axle housing.

4. Proper operation of the NoSPIN.

If a silent-type NoSPIN is being used, check for a possible tight fit between one of the holdout rings and the clutch. The holdout ring should be loose enough to rotate with only a little resistance. Check also for possible interference from other parts possibly the case is interfering with the clutch when it is overrunning, or perhaps all thrust washers were not removed. Correct the installation, or repair or replace if necessary.

1.4 SYMPTOM

Excessive tire wear.

PROBABLE CAUSE

1. Wheel alignment.

Correct if necessary.

2. Excessive overloading or improper weight distribution.

If the driving axle is overloaded to the point where there is axle housing deflection, the NoSPIN may not be able to operate freely when differential action is needed. This can compound the overload condition on some axle parts, hub parts and tires. Trussing or reinforcing the axle housing may help to overcome the problem, but if the complaint persists and the operator continues to overload, the NoSPIN should be removed.

If special or unusual loading places more weight on one side of the driving axle than the other, it may cause a difference in the rolling radii of the tires, causing one side of the NoSPIN to overrun continuously.

If the steering axle is overloaded and the driving axle underloaded, the tires on the driving axle may not have enough traction to move the vehicle, so that they may slip or scuff momentarily. The tires will, of course, wear prematurely if this condition is experienced repeatedly.

If the driving axle is overloaded because of improper weight distribution, the load on the steering axle may actually be reduced so that steering is erratic. If the load on the steering axle is light, the tires may not have enough frictional resistance to lead the vehicle straight ahead. This condition will accentuate the "understeer" or "push" characteristics occasionally noted in short wheelbase tractors.

1.5 SYMPTOM

Grinding Noises.

PROBABLE CAUSE

1. Internal parts of the axle such as the ring gear, pinion or bearings which may be defective or excessively worn.

Correct by repairing or replacing the necessary parts.

1.6 SYMPTOM

Continuous indexing or clicking sound on straight forward driving.

PROBABLE CAUSE

1. Rolling radii of tires on drive axle.

If the tire rolling radii are not equal, one side of the NoSPIN will be overrunning constantly and the clutch on that side will be indexing continuously.

2. Shift in load more weight on one side of the rear axle than on the other.

If special or unusual loading places more weight on one side of the driving axle than the other, it may cause a difference in the rolling radii of the tires with the same results as number 1 above.

1.7 SYMPTOM

Sudden lock-up during straight forward driving.

NOTE

During straight forward driving on level roads, the NoSPIN remains locked and the assembly rotates as an integral unit with the ring gear, case and carrier bearings. A defective NoSPIN would not alone cause sudden lock-ups and should not normally be considered as the cause. All possible sources should be checked immediately and the condition corrected before the vehicle is put in operation.

PROBABLE CAUSE

1. Seizing brake or brakes.

This could be caused by a cracked brake drum, loose backing plate, or defective self-adjusting brakes. Make needed repairs.

2. Defective wheel bearing or bearings.

A defective bearing that is frozen or seizes periodically could, of course, cause sudden lock-ups and the part or parts should be replaced.

3. Foreign matter in axle housing or improper assembly of axle parts.

A chip or piece of metal from any broken part that lodges between the ring gear and pinion at times would cause a sudden lock-up. Possibly the housing was not thoroughly cleaned after an axle shaft failure. If no other cause can be located, the rear axle should be thoroughly inspected without delay.

1.8 SYMPTOM

Excessive backlash in vehicle drive train; engine lug or vehicle surge during turns.

PROBABLE CAUSE

1. Higher than normal turning angle.

Vehicle designed with high (very sharp) turning angles may lug (surge), have steering difficulty, and drive axle tire wear during sharp turns.

Most vehicles are designed with maximum turning angles of to 35° between the center lines of the vehicle and the wheels of the steering axle. Some vehicles, however, (i.e., short wheelbase lift trucks and some farm-type tractors) are designed with extremely sharp turning angles of as much as 60° to 65°, and under some conditions the handling characteristics may be objectionable with NoSPIN. Since drive is being transmitted to the inside front wheel during turns, the line of force is almost perpendicular to the inside front wheel when making an extremely sharp turn. Then, instead of rolling freely into the turn, the front wheel skids sideward acting as a brake, slowing down the vehicle causing understeer. At times, the inside front tire may break traction, momentarily changing the line of force and relieving the condition but surge if the braking action recurs.

To correct this condition, reduce maximum turning angle, have the driver decelerate the moment lugging begins, or remove the NoSPIN.

2. Inherent working clearance in the NoSPIN.

The inherent working clearance in the NoSPIN design may cause vehicle surge during slow-turns or accentuate the total slack or backlash in the rest of the vehicle drive train (between the transmission gears; in the drive line universal joints; between the ring gear and pinion; axle shaft splines; etc.).

Since normal wear to NoSPIN parts does not appreciably increase the normal working clearance, any increase in the total vehicle slack or backlash can usually be attributed to changes or wear in the other drive train parts rather than in the NoSPIN. Reducing the backlash between the ring gear and pinion to the minimum recommended by the vehicle manufacturer will usually make a noticeable change, particularly if the present backlash is near the maximum.

3. Dragging brake shoe.

A dragging brake shoe can affect steering and/or accentuate total backlash in any vehicle with either conventional or special traction differentials because it tends to pull the vehicle in one direction and cause sudden torque reversals when going from drive to coast. To correct, adjust brakes.

TROUBLESHOOTING

CIRCUIT OPERATION (Fig. 3-27B)

The control circuit is energized by closing the Key switch, Seat switch, and moving the Forward or Reverse lever to either position and then depressing the accelerator, thus closing the Start switch. This applies power to the control card and, if the static return to OFF and pulse monitor trip requirements are satisfied, turns on the PMT driver, which will close the selected directional contactor, completing the circuit to the traction motor.

The control card supplies a gate pulse to 2 REC, turning it on to a conducting state, allowing current to flow from the battery through 1C, 2 REC, 1X, motor field, motor armature, current sensor, and back to the battery. After 1C charges, 2 REC shuts OFF due to lack of current. The control card checks that 1C is charged and unlocks the gates to 1 REC and 5 REC.

The control card then supplies a gate pulse to 1 REC, turning it ON to a conducting state, allowing current to flow from the battery through 1 REC, motor field, motor armature, sensor, and back to the battery. 5 REC turns ON and allows current to flow T4-T3, 1C, 1 REC, 5 REC back to T4-T3. This current charges 1C positive (card terminal 7 is now positive). This charge is now stored on the capacitor until it is time to turn OFF 1 REC. This charging cycle occurs in less than 1 millisecond (0.001 seconds) and 5 REC shuts OFF.

Current continues to flow in 1 REC until the control card turns ON 2 REC. When 2 REC conducts, capacitor 1C discharges around the circuit composed of 1C, 2 REC, 1X and 1 REC. This discharge current opposes the battery current through 1 REC until the resultant current is zero.

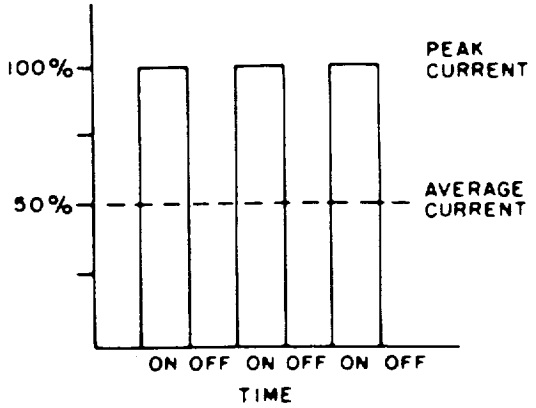


Figure 3-27A

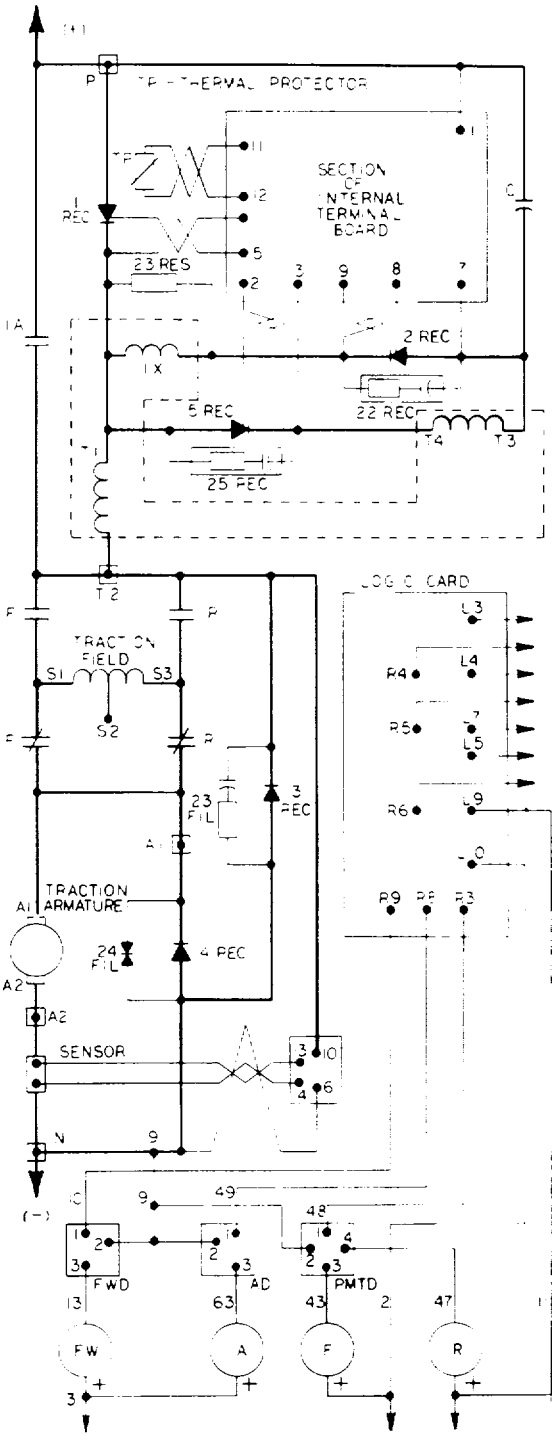


Figure 3-27B

With reverse voltage across 1 REC, 1 REC is turned OFF. Current continues to flow in 1C, 2 REC, motor and the battery loop until the capacitor (card terminal 7) is fully charged negative. This charge exceeds battery voltage by an amount which is a function of motor current, and 2 REC turns OFF. Fig. 3-27 illustrates the pulsing of current from the battery.

During the OFF time, the energy stored in the motor, by virtue of its inductance, will cause current to circulate through the motor around the loop formed by 3 REC, thus providing what is called "flyback current". Fig. 3-28 shows the nature of the motor current, which is composed of both battery current and the inductive flyback current. It should be noted that the average motor current measured will be greater than the average battery current. The SCR control, in effect, converts battery current at battery volts into a higher motor current and a lower motor volts.

The time for the next On and Off cycle to start is determined by the time that the control card takes to oscillate. The oscillation times are controlled by the potentiometer in the accelerator. Slow speed is obtained by having maximum ohms in the potentiometer. As the resistance in the potentiometer decreases, the speed of the motor increases. With level operation, the SCR circuit is capable of delivering approximately 85 to 90 percent speed. For full-speed operation, the 1A contactor is closed to apply full battery voltage across the motor.

CONTROL FEATURES

- OSCILLATOR The oscillator section of the card has two adjustable features, creep speed and controlled acceleration, and one fixed feature, top speed.

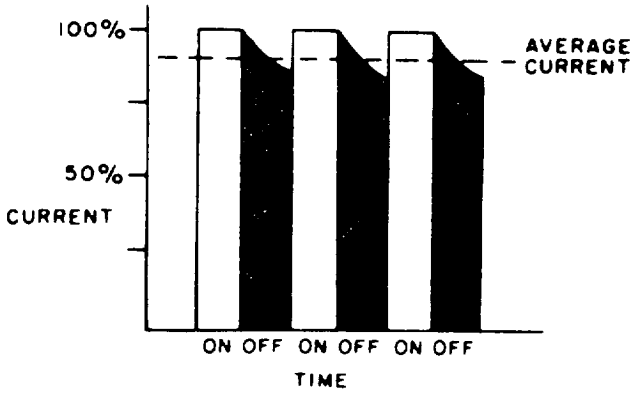
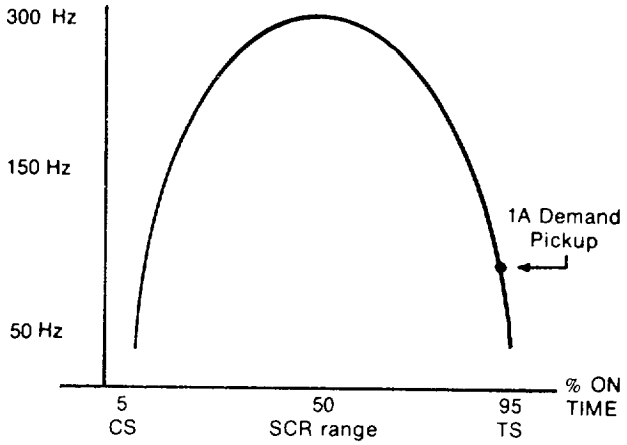


Figure 3-28



Oscillator frequency curve
Figure 3-29

With the accelerator potentiometer at maximum ohms, the creep speed can be adjusted with a trimpot on the card. Top speed is fixed by card design, and is obtained with the accelerator potentiometer at minimum ohms.

The rate at which the oscillator may increase its % ON time is limited by "Controlled Acceleration". The minimum time required to go from creep speed to the 1A pickup point may be varied by an indexed trimpot (C/A) on the card, adjustable from approximately 0.5 seconds to 1.0 seconds.

The % ON time has a range of approximately 5 to 95 percent. The center operating condition of the oscillator is at 50 percent ON time with a nominal 1.7 milliseconds ON time and 1.7 millisecond OFF time. This corresponds to a maximum operating frequency of about 300 hertz. At creep the ON time will decrease to approximately 0.8 milliseconds while OFF time will become in the order of 20 milliseconds. At full SCR operation, this condition will be reversed (short OFF time, long ON time). This variation of ON and OFF time of the oscillator produces the optimum frequencies through the SCR range. See Fig. 3-29

- CURRENT LIMIT This circuit monitors motor current by utilizing a sensor in series with the armature. The information detected across the sensor is fed back to the card so current may be limited to a maximum safe value. If heavy load currents are detected, this circuit overrides the oscillator and limits the average current. An indexed trimpot for the current limit (C/L) adjustment is provided to maintain the peak voltage on the capacitor within its rating when

used on high source inductance and/or low motor resistance applications. Because of the flyback current through 3 REC, the motor current usually runs 2 to 3 times the battery current. The (C/L) trimpot adjustment will produce little or no variation of battery current when used with high resistance motors.

- PLUGGING Slowdown is accomplished when reversing by providing a small amount of retarding torque for deceleration. If the vehicle is moving and the directional lever is moved from forward to reverse, the motor field is reversed, the motor armature is driven by the inertia of the vehicle and acts as generator. This generated current passes through 4 REC and the current sensor. When the plug signal is initiated, the oscillator circuit regulates at a plug current limit level as set by the Plug trimpot on the control card. This controls the pulse rate of 1 REC to regulate the generated motor current and bring the truck to a smooth stop and reversal.

- RAMP START This feature provides SCR torque to restart a vehicle on an incline. The memory for this function is the directional logic in the card. When stopping on an incline, the Directional switch must be left in its original or OFF position to allow the control to assume full power when restarting in the same direction. The "C/L" trimpot affects this torque.

- FULL-POWER TRANSITION This built-in feature provides smooth transition from SCR to 1A bypass. This is accomplished by the SCR continuing to pulse until the 1A contactor power tips close.

- 1A CONTROL The 1A contactor has 6 modes of control:

  1. DEMAND PICKUP (fixed feature of the card) If the oscillator has attained a % ON time equivalent to a motor voltage of 80 to 85 percent of the available battery volts, the 1A contactor will automatically pick up. The 1A switch in the accelerator is not necessary for this function. On "H3" cards, this feature may be eliminated by adding a jumper from R9 to R4.
  2. TIMED PICKUP This feature works with the 1A switch in the accelerator. The time-delay pickup of 1A is provided by a circuit in the card. This feature allows 1A to be picked up after a time delay without reaching the demand point, and is normally used to apply full power at near stall conditions. This time delay is adjustable by means of a 1A time trimpot on the card.
  3. 1A THERMAL HOLDOFF This feature prevents the 1A contactor from closing as a function of time when the truck is in severe thermal cutback to avoid torque jumps. When a truck starts to go into thermal cutback, the 1A time will rapidly increase to infinity as the control goes deeper into thermal cutback. On '"E" and later cards, this feature may be eliminated by adding a jumper from R2 to R4.
  4. 1A CURRENT HOLDOFF This feature is obtained by not wiring in the 1A switch in the accelerator. 1A will not pick up until the vehicle can accelerate to a point where the demand pickup will close the 1A contactor.
  5. 1A PLUGGING HOLDOFF This built-in feature is designed to prevent 1A closure anytime during plugging.
  6. 1A DROPOUT (1A DO) This adjustable feature can be set to open the 1A contactor if the traction motor is subjected to excessive currents. The dropout is adjustable with the (1A DO) trimpot. The directional or Accelerator switch must be returned to NEUTRAL to unlock the dropout circuit. Using this feature will reduce the 1A contactor tip life, thus it should be used only where needed to protect the motor.

- PULSE MONITOR TRIP This function contains three features: The look ahead, the look again, and the automatic look again reset.

If 1 REC is shorted or 1A is welded, PMT will look ahead and prevent F or R from closing if either condition exists.

If 1 REC fails to commutate, or if 1A power tips remain closed when they should be open, the control will open F or R contactor. PMT will then look again by testing for a fault and, if none, reclose F or R. If the fault still exists, the F or R will reopen and remain open.

If 1A closes before a second commutation failure, the look again counter will automatically reset. This eliminates the inconvenience of resetting the PMT with the key switch if the tripping is due to random noise.

When the PMT circuit prevents F or R from closing, the PMT circuit can be reset only by opening the Key switch.

- STATIC RETURN TO OFF This built-in feature of the control requires the operator to return the directional lever to NEUTRAL anytime he leaves the vehicle and returns. If the Seat switch or Key switch is opened, the control will shut off and cannot be restarted until the Directional switch is returned to NEUTRAL. A time delay (0.5 seconds) is built into the Seat switch input to allow momentary opening of the Seat switch. This same delay requires the Directional switch not be closed until both the Key switch and the Seat switch have been closed for 0.5 seconds.

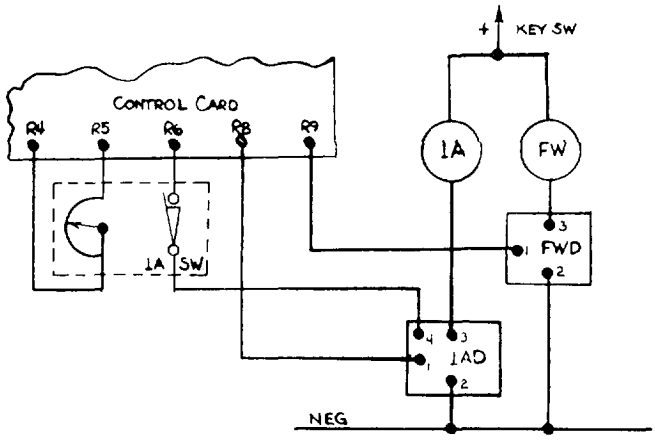
- TIP BOUNCE TIMER After F or R are closed or 1A opens, the oscillator card checks that the capacitor has been charged by 2 REC, the battery volts appear across 1 REC, and an interval of time has elapsed before 1 REC and 5 REC can be gated.

- COIL DRIVE MODULES These modules are typically located on the contactor portion of the control. They are the power devices that operate F, R, 1A and FW contactor coils. These modules pick up or drop out these coils on command from the control card. All modules are equipped with reverse battery protection so that if the battery is connected incorrectly, none of the contactors controlled can be closed electrically.

- THERMAL PROTECTOR (TP) -This temperature-sensitive device is mounted in the 1 REC heat sink. If the 1 REC temperature exceeds design limits, the thermal protector will lower the maximum current limit and not allow 1 REC to exceed its temperature limits. Even at a reduced current limit, the vehicle will normally be able to reach sufficient speed for full 1A operation, thereby allowing the panel to cool. As the panel cools, the thermal protector will automatically return the control to full power.

- FIELD WEAKENING (optional) If the vehicle is supplied with a field weakening circuit, the FW PU and FW DO trimpot adjustments will be on the SCR control card. Field weakening is a method of attaining higher running speed for the vehicle in level operation. The normal settings for this feature are: pickup of FW contactor from 125 to 150 percent of normal full-load running current (1A), and dropout of FW contactor from 275 to 300 percent current. The dropout puts the motor back to the 1A range to climb ramps and inclines.

- FW WITH 1A CURRENT HOLDOFF The 1A switch in the accelerator has to close to allow the FW circuit to operate. To allow the two functions to operate, the 1A switch has to be rewired per Fig. 3-30.



FW with current 1A holdoff
Figure 3-30

- LOW VOLTAGE Batteries under load, particularly if undersized or more than 80 percent discharged, will produce low voltages at the SCR control terminals. The EV-1* control is designed for use down to 50 percent of the nominal battery volts. Low battery volts may cause the control to not operate correctly but the PMT should open the F or R contactor in the event of a commutation failure.

- OSCILLATOR CARD CHANGES

Card IC3645	Volts	FW	Features (Described on page 8) 1	2	3	4	5	6	7
OSC1A3	24-48	Yes	X	X	X		X	X	
A4	48-84	Yes		X	X	X	X	X	
B3	24-48	No	X	X	X		X	X	
B4	48-84	No		X	X	X	X	X	
C3	24-48	Yes					X *	X	
D3	24-48	No					X *	X	
E3	24-48	Yes							
E4	48-84	Yes							
F4	48-84	No							
H3	24-48	No							X

TROUBLESHOOTING

- OSCILLATOR CARD CHANGE FEATURES

1. Optional reduced current limit.

   Adding a connector from R1 to R2 will reduce motor current (by about 50 amperes when used with the EV-1B control.)

2. Low thermal cutback.

   Reduction in current limit is adequate only when the panel is mounted on a good heat sink. 1A thermal holdoff occurs at a low temperature. The low temperature thermal protector (group 1) must be used with this card.

3. No PMT look again reset.

   The PMT look again counter will not reset when 1A closes.

4. Motor current output signal location.

   IM Output is located at R2 instead of L6.

5. REC synch circuit.

   1 REC synchronizing circuit shuts off 1 REC gate pulse causing failure to gate 1 REC with certain motors.

6. Non-optional 1A thermal holdoff.

   The provisions for disabling 1A thermal holdoff by adding a connector from R2 to R4 is not available.

7. Optional no 1A on demand and soft ramp start. Adding a connector from R9 to R4 softens the initial torque on ramp start on some applications, and also prevents 1A from picking up on demand.

GENERAL MAINTENANCE INSTRUCTIONS

The SCR control, like all electrical apparatus, does have some thermal losses. The semiconductor junctions have finite temperature limits above which these devices may be damaged. For these reasons, normal maintenance should guard against any action which will expose the components to excessive heat, such as steam cleaning; or which will reduce the heat dissipating ability of the control, such as restricting air flow.

The following DO'S and DON'TS should be observed:

- Any controls that will be used in ambients of 100 F (40 C) or over should be brought to the attention of the truck manufacturer.

- All external components having inductive coils must be filtered. Refer to vehicle manufacturer for specifications.

- The control should not be steam cleaned. In dusty areas, use low-pressure air to blow off the control. In oily or greasy areas, a mild solution of detergent or denatured alcohol can be used to wash off the control and then blow completely dry with low-pressure air. The control can also be cleaned with Freon TF† degreaser.

†Registered trademark of E. I. DuPont de Nemours & Company

- For the SCR panel to be most effective, it must be mounted against the frame of the truck. The truck frame, acting as an additional heat sink, will give improved truck performance by keeping the SCR control package cooler. The use of a heat-transfer grease (Dow Corning 340) is recommended.

- Terminal boards and other exposed SCR control parts should be kept free of dirt and paint that might change the effective resistance between points.

CAUTION

The truck should not be plugged when the truck is jacked up and the drive wheels are in a free wheeling position. The higher motor speeds can create excessive voltages that can be harmful to the control.

- Do not hipot (or megger) the control. Unless the terminals of each semiconductor and card are connected together, the control may be damaged. Refer to control manufacturer before hipotting.

- Use a lead-acid battery with the voltage and ampere hour rating specified for the vehicle. Follow normal battery maintenance procedures, recharging before 80 percent discharged and with periodic equalizing charges.

TROUBLESHOOTING

TROUBLE-SHOOTING INSTRUCTIONS

The pulsing of the main SCR is too fast for conventional instruments to measure. When the control is functioning properly, a low hum can be heard.

Malfunctions of the SCR will generally fall into one of two categories. They are either no power (Table 1) or full power (Table 2), when operating in the SCR control range.

These simple and easy-to-follow tables outline the various symptoms and the corrective action to be taken.

The same device designations have been maintained on different controls but the wire numbers may vary. Refer to the elementary and wiring diagrams for your specific control. The wire numbers shown on the elementary diagram will have identical numbers on the corresponding wiring diagrams for a specific truck, but these numbers may be different from the numbers referenced in this publication.

WARNING

Before trouble-shooting, jack up wheels, disconnect the battery and discharge capacitor 1C. Reconnect the battery as needed for the specific check.

If capacitor 1C terminals are not accessible, discharge capacitor by connecting from SCR POF terminal to 2 REC anode. Check resistance or, RX1000 scale from frame to SCR power and control terminals. A resistance of less than 20,000 ohms can cause misleading symptoms. Resistance less than 1000 ohms should be corrected first.

Before proceeding, visually check for loose wiring, maladjusted linkage to accelerator switch, signs of overheating of components, etc.

Tools and test equipment required are: (a) 6-volt lamp, 6-volt battery, two A14 diodes (1 Amp 400V), clip leads, volt-ohm meter (20,000 ohms per volt) and general hand tools, or (b) EV-1 System Analyzer, volt-ohm meter (20,000 ohms per volt) and general hand tools. If the system analyzer is used, refer to the analyzer instruction book.

Note

To test an EV-1 Model D, 1 REC, use a 12-volt battery and test lamp.

FUNCTION OF EV-1 CARD TERMINALS FOR IC3645OSC1E3 AND E4 CARDS

TERMINAL	DESCRIPTION	CONDITION	VOLTS		
(Voltage measurements with respect to negative, SCR power terminal)			NOMINAL	THRESHOLD†	
				E3	E4
L1	Not presently used				
L2	Not presently used				
L3	Card power supply input must be low to satisfy PMT reset.	Key open Key closed	0 BV	4.1	4.1
L4	SRO Input. When used ignores open switch between L4 and L5.	Key or seat open Key and seat closed	0 BV		
L5	Accelerator Start and Brake switch input. Must be high after L3 and L7 are at battery volts for over 0.5 seconds and while L9 and L10 are low to complete SRO logic.	Key, seat, brake, or start open.	0		
		Key, seat, brake, and start closed.	BV		
		Key, seat, and direction closed.	0.07 BV (E3) 0.17 BV (E4)	4.1	18
		Key and seat closed, start and direction open.	0.9 BV (E3) 0.5 BV (E4)	4.1	18

†Threshold is the voltage ± approx. 5% below which the logic is the same as for zero volts.

TROUBLESHOOTING

TERMINAL	DESCRIPTION	CONDITION	VOLTS		
			NOMINAL	THRESHOLD†	
				E3	E4
L6	Motor current sensor output	No current	1.8		
		500 Amps average motor current model "B"	3.3		
L7	Seat switch input	Key open	0	8.2	19
		Key and seat closed.	BV		
L8	Not presently used				
L9	Direction switch input from positive side of "F" coil.	Key open	0		
		Key, seat, start, brake and direction "F" closed.	BV	8.2	19
L10	Direction switch input from positive side of "R" coil.	Key open	0		
		Key, seat, start, brake and direction "R" closed.	BV	8.2	19
R1	Card power supply	Key off	0		
		Key on	8.2		
R2	1A thermal holdoff control jumper to R4 to disable 1A thermal holdoff.	Key on, cold T/P	0		
		Key on, thermal cutback	0.66 or more		
R3	Output to PMT Driver	Key off	0 Volts		
		Key, seat, start, brake and direction selected. See Note 1.	5-10 milliamps		
R4	Common return to card for accelerator pot and 1A switch	Key off, use VOM and read from TBR4 to "Neg."	Less than 1 ohm		
R5	Accelerator pot input	Key on and accelerator at "creep".	3-4		
		Key on and accelerator at top speed.	0-.2		
R6	1A switch input	Key on, 1A switch open	8		
		Key on, 1A switch closed	0	2.0	2.0
R7	% ON time output. See Note 2.	Creep speed	2.2		
		Top speed	6.2		
R8	1A driver output	1A contactor open	0 Volts		
		Top SCR Speed. See Note 1.	5-10 milliamps		
R9	FW driver output	FW contactor open	0 Volts		
		1A closed high speed. See Note 1.	5-10 milliamps		
R10	Plugging output logic	Not plugging mode.	0 Volts		
		Plugging mode.	8 Volts		

NOTE 1: Connect milliammeter from terminal to R4. If contactor picks up during this test replace driver. If zero milliamps open lead and recheck to eliminate possible driver short from terminal 1 to 2.

NOTE 2: If B card is used, remove wire to R7 when checking voltage.

†Threshold is the voltage ± approx. 5% below which the logic is the same as for zero volts.

TROUBLESHOOTING

ALL TESTING SHOULD BE DONE WITH TRUCK JACKED UP.

TABLE 1
FAILURES WHICH CAUSE REDUCED OR NO MOTOR TORQUE WITH SCR CONTROL

Trouble-shooting is based on using the voltmeter to determine if the proper voltages are available to permit the control to operate properly. Refer to table pages 9 and 10 for threshold voltages. Check for leakage in switches if voltage is close to the threshold.

SYMPTOM	PROBABLE CAUSE
1A. Contactors do not pickup. No control voltage from positive to negative.	• Check power and control fuses. • Check battery for low specific gravity and connections for looseness or broken fittings.
1B. Contactors do not pickup. Control volts present from positive to negative with proper polarity.	• Plug in battery with Key switch OFF. Volts on L3 should be less than 4 volts. • Close Key switch. Check volts at T2 (pin 10). Should be about 50% of battery volts. Above 70% locks out 1 REC. (Control card contains a 10 K bridge from pin 5 to L3 and pin 6). If near battery volts, check for shorted 1A tips or a shorted 1 REC. If near zero volts, check for shorted 3 REC. (4G). • Close Brake, Start switches (all switches needed to close F or R contactor except the Direction switch). Volts on L3, L5, L7 should be battery volts. Volts on L9 and L10 should be near zero. Wait for one second, then close FORWARD Direction switch. Volts at L10 should remain near zero. Volts at L9 and L9 side of F coil should be battery volts. If not, check wiring and switches. • Connect milliammeter (10 ma scale) from R3 to R4. Should read 5-10 milliamps. If not, open Key switch, open lead from R3 to PMT driver, reclose all switches except Direction switch, wait over one second and close FORWARD Direction switch. If reading is not 5-10 milliamps, replace control card. If reading is good, the coil or wiring to the PMT driver is open or the PMT driver is defective. Check driver. (4E)
1C. Contactors close. NO power and NO SCR hum with accelerator in SCR range.	• Check volts at SCR positive. Should be battery volts. If not, check power fuse. • Check volts at T2. Should be zero. If not, check volts at S1, S2, A1, and A2 to locate open circuit.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE
1C. Contactors close. NO power and NO) SCR hum with accelerator in SCR range. (Cont'd.)	• Check volts at R5. Should he 3-1 at creep reducing to 0.2 or less at top speed. If R5 remains about 4 volts, check accelerator. If R5 is zero, check volts at R1. Should be 8-8.5 volts, If R1 is above 10 or near zero and L3 is hatter' volts, replace control card and check PMT driver for short. (4E) • Check volts at R7. Should be 2-2.5 when Key switch closed. When F or R contactor is closed and accelerator depressed, should increase to about 6.2 volts. If remains near 2 volt-, check volts at 1C (grey wire or 2 REC anode). If more than 0.125 BV, check if 2 REC will gate on. (4G) If less than 0.125 BV, check if 1 REC will gate on. (4G) Check current sensor green lead to card input pin 13. • Check 23 FIL for shorted resistor. • Replace control card. (4A)
1D. Contactors close. Little or no power. Normal SCR hum.	• Check 3 REC for open circuit. 14H) • Check 4 REC for short. (4H) • Check for open thermal protector. (4J)
1E. Contactors close. Little or no power. Abnormal SCR hum.	• Check 2 REC for short. M4G) • Check 5 REC for short. 14G) • Check 22 REC and 25 REC. (4M) **Note** **A 25 REC which checks good with an ohmmeter can cause a mis-operation of 5 REC under load, and can cause 1A to close on demand at lower than normal motor volts**
1F. Contactors close. Little power. No SCR hum.	• Check 1C for low resistance (4B).
1G. One contactor closes with normal operation but opposite contactor will not close.	• Close Key, Brake, Start switches (all switches needed to close F or R contactor except the direction switch.) Volts on L9 and L10 should be near zero. Wait for one second, then close Direction switch in the direction that contactor will not close. Volts at other direction input (L9 or L10) should remain near zero. Volts at non-closing direction (L9 or L10) and top of coil should be battery volts. If not, check wiring and switches. • Close switches as above. Check volts at negative side of coil or corresponding terminal of PMT driver. Zero volts indicates open coil, battery volts indicates open driver. (4E) • Replace control card. (4A)
1H. PMT trips after operating in 1A and acceleration is returned to SCR range.	• Check for cause of long 1A dropout time, i.e., defective 1A driver, low resistance in 1A filter, shorted turns in 1A coil, or low voltage coil.

TROUBLESHOOTING

TABLE 2
FAILURES WHICH CAUSE FULL MOTOR TORQUE WITH SCR CONTROL

SYMPTOM	PROBABLE CAUSE
2A. Contactors close. Full SCR speed immediately with audible hum. NO PMT trip.	• Key switch on. Check volts at R5. Should be 3-4 volts at creep position. If near zero, check Accelerator potentiometer. (4D) • Replace control card. (4A)
2B. Contactors close once or twice and then remain open. PMT trips.	• Check 5 REC for open circuit or open gate. (4G) • Check 1C for open and connections. (4B) • Check 1C for dead short. (4B) • Check 5 REC for short. • Check 2 REC for short. • Check 1X choke and transformer T3-T4. (4N) • Replace control card. (4A)
2C. Contactors close. Stall currents, under SCR operation, higher than normal and uncontrollable with C/L trimpot. Contactors may open once or twice and then remain open.	• Check current sensor yellow lead from negative end of sensor to card input pin 14. • Replace control card. (4A)

NOTES

TROUBLESHOOTING

TABLE 3
MISOPERATION OF OTHER FEATURES

SYMPTOM	PROBABLE CAUSE
3A. 1A or FW contactors close with Key switch.	• Check drivers for short from terminals 2 to 3 by disconnecting wires to terminal 1 on the driver. (4E) • Check resistance from R4 to SCR negative. If not zero, the control card has been damaged, probably by a high-current input to R4 burning open a run on the card. Check for possible shorts and improper leads being connected to this terminal. Normally only the accelerator pot, 1A switch from R6, and B card use R4 as a negative. • Replace control card. (4A)
3B. F or R will close without returning Direction switch to OFF.	• Check location of L5. Any open switch between L5 and Direction switch will satisfy SRO. • Open lead from R3 to driver. Close switches normally used to close F or R. If F or R close, replace driver. • Reconnect lead from R3. Close Key switch only. Volts at L3 should be BV, volts at L5, L7, L9, L10 should be near zero. Close Seat, Brake and Direction switches. Volts at L7 should be BV. Volts at L5 should be about 0.07 BV (0.17 BV on E4 card). If near 4.1 volts, (18 on E4 card) check Start switch leakage. Close Start switch. If contactor picks up, replace control card. (4A)
3C. PMT does not open F or R contactor.	• Operate traction drive. Jumper R3 to R4. If contactor does not drop out, replace PMTD driver. • Operate traction motor in low speed SCR range. Be sure wheels are turning freely. Push 1A tips closed manually. F or R should open. If not, replace control card. (4A)
3D., 1A will not close at run (percent pickup).	• Connect a milliammeter from R8 to R4. Should read 5-10 milliamps when 1A should be closed. If near zero, see later steps for improper inputs or control card. Check volts at terminal 3 of 1A driver. Should be battery volts decreasing to about 2 volts when 1A should be closed. If near zero, check coil and wiring to terminal 3. If remains battery volts, check wiring from R8 to terminal 1 and terminal 2 to negative, then replace 1AD driver.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE
3D. 1A will not close at run (percent pickup). (Cont'd.)	• If milliamps from R8 to R4 are near zero when 1A should be closed, open lead from R8 to 1A driver and recheck. If now good, there is a wiring short to negative in the lead from R8 or defective driver. (4E) • Check volts at R7. Should be greater than 6 at top speed. If less than 5.7 volts, 1A will not close on demand. Check volts at R5, should reduce to less than 0.2 volts at top speed. If over 0.2 volts, check accelerator. If less than 0.2 volts, check that creep trimpot is not turned too far CCW. • Check continuity of violet wire from T2 to pin 10. • Replace control card. (4A)
3E. 1A will not close at SCR stall (time pickup). (Check truck diagram to see if 1A switch closes card circuit R4 to R6.)	• Check 1A switch circuit. Key switch on. Volts at R6 should drop to less than 2 volts when 1A switch is closed. • Check volts at orange lead to TP. If volts are above 1.6 (0.06 on OSC1A and OSC1B cards), control is in thermal cutback. Allow to cool, and recheck 1A function. • Turn 1A trimpot fully CCW and recheck. • Check continuity of violet wire from T2 to pin 10. • Replace control card. (4A)
3F. 1A will not open until start switch is opened.	• Check volts at R6. Should be near 8 volts when 1A switch is open. If not, check wiring and 1A switch.
3G. FW contactor will not close after 1A pickup.	• Check volts at R6. After 1A contactor closes, this point must be less than 2 volts. If not, check 1A switch and wiring. • Open lead to R9 and connect milliammeter from R9 to R4. When control signals FW to pick up, should read 5-10 milliamps. If remains at zero, turn FW PU trimpot fully CW and recheck. If remains zero, replace control card. (4A) If reads 5-10 ma, reset FW PU trimpot. (6)

TROUBLESHOOTING

	SYMPTOM	PROBABLE CAUSE
3G.	FW contactor will not close after 1A pickup. (Cont'd.)	• Reconnect lead to R9 and check volts at R9 when FW should pick up. If near 8 volts, check lead from R9 to terminal 1 of FW driver and R2 to negative for open, then replace driver. If about 2 volts, check volts at terminal 3 of FW driver. Should be battery volts dropping to 2 volts or less when FW should pick up. If volts are near zero, check wiring from positive to FW oil, FW coil, and wiring to terminal 3 of FW driver. If volts remain greater than four volts, replace driver.
3H.	FW contactor will not drop out with increasing load.	• Check dropout setting on card. (6) • Replace control card. (4A)
3J.	Stiff plug. Severe reversal.	• Check plug adjustment setting on card. (6) • Check 4 REC for open circuit. (4H) • Replace control card. (4A)
3K.	Very soft reversal.	• Check plug adjustment setting on card. (6) • Replace control card. (4A)
3L.	Blown power fuse. Very hot power cables.	• Check 3 REC for short. (4H) (Possible damage also to 1 REC and transformer module.)
3M.	Hourmeter feeder faults: (1) Pump contactor closes when either F or R direction is selected. (2) One direction okay; opposite direction picks up both F and R. (3) Either direction selected picks up both F and R.	• Diode shorted 3 to 4. (4H) Replace hourmeter block. • Diode shorted 1 to 4 or 2 to 4. (4H) Replace hourmeter block. • Diode shorted 1 to 4 and 2 to 4. (4H) Replace hourmeter block.

TROUBLESHOOTING

TABLE 4
CHECKING COMPONENTS

4A Main SCR Control Card

All trouble-shooting is written to check all outside devices and eliminate them as the source of symptoms. The conclusion being then that the card is faulty.

1. Instructions for Removal of Card
   a. Remove the four (4) screws shown in Fig. 3-31.
   b. Jack out the right- and left-hand terminal board, using a screwdriver in the slots, (leaving the wires intact) as shown in Fig. 3-32.
   c. Pry open the latches carefully with a screwdriver as shown in Fig. 3-33.
   d. Jack out the bottom plug with a screwdriver as shown in Fig. 3-34.

The card can be removed by hinging 10 degrees and pulling out, or, if panel components (not related to card hinge mountings) are to be replaced, disregard all instructions above except "C" and the card will hinge up to 90 degrees.

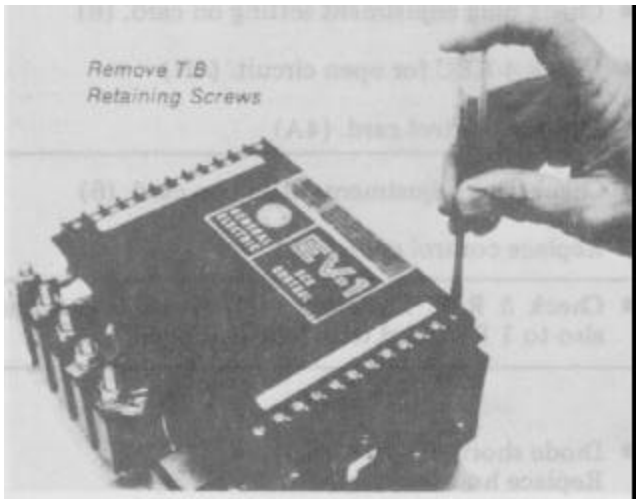


Figure 3-31

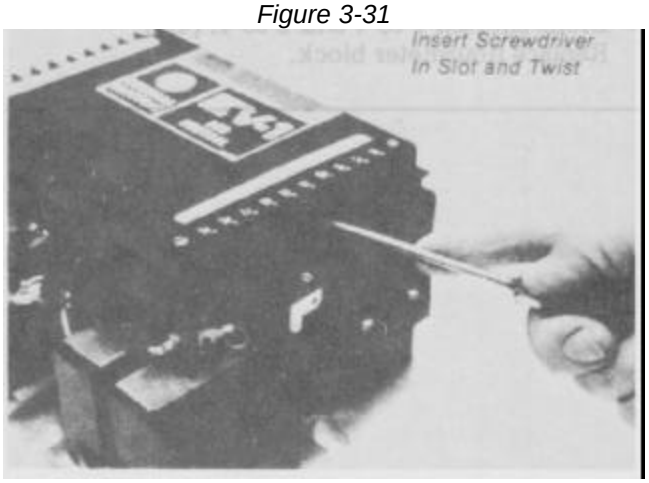


Figure 3-32

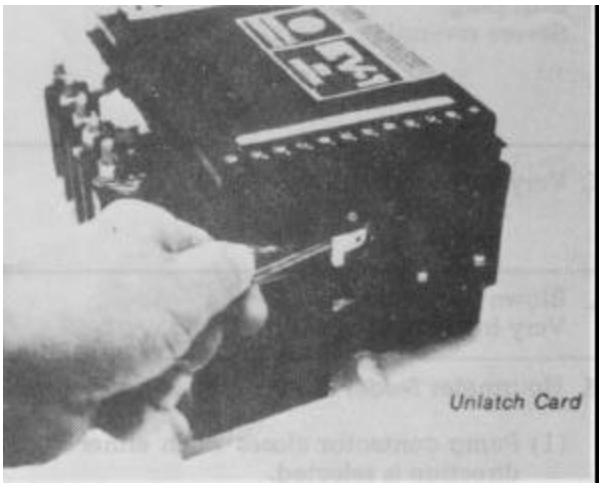


Figure 3-33

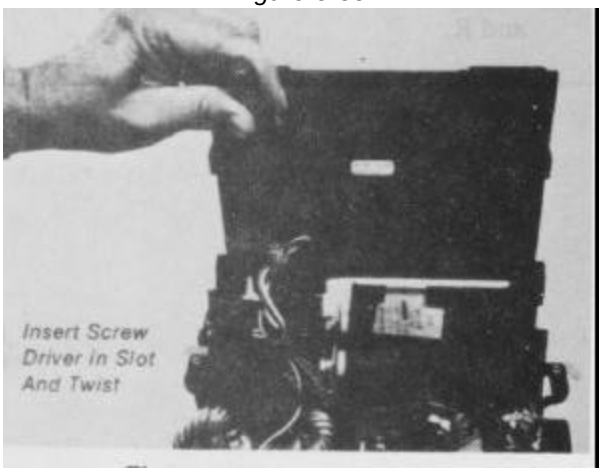


Figure 3-34

TROUBLESHOOTING

4B. Capacitor 1C

Disconnect battery and discharge capacitor. Measure ohms through the capacitor using the R x 10,000 scale. Meter should read zero and then swing slowly to above 100,000 ohms. Replace capacitor if above reading is not obtained.

4C. Contactors F, R, 1A, and P

75-ampere contactors (see GEH-3099)
150-ampere contactors (see GEH-4469)
300-ampere contactors (see GEH-4469)

NOTE 1. Control is arranged so that F and R do not break current. Check to see that 1A drops out ahead of F or R.

NOTE 2. Most contactor coils are polarity sensitive. The left-hand terminal must be connected to positive.

4D. Potentiometer in Accelerator

To check operation of the potentiometer, disconnect battery and disconnect wires at card terminal R4 and R5. Connect a VOM to wire removed with scale set to R x 100. With accelerator in creep speed position, the ohms reading should be 4800 to 6000 ohms. With accelerator in top speed position, reading should be 200 ohms or less. With wire disconnected as above, check for resistance of 1 megohm or higher from pot wires to truck frame.

4E. Driver Module

(IC3645CPM1RDA2 and IC3645CPMIRDB2)

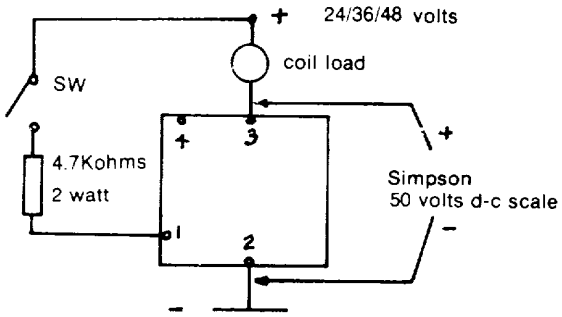
(a) Connect circuit as shown.

(b) Voltmeter should read battery volts with switch open.

(c) Close switch and meter reading should be 3 volts or less.

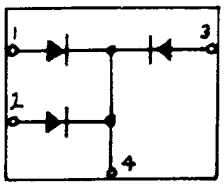
(d) Move load to terminal 4 and repeat steps

(b) and (c).



NOTE: For 72 volt, use 8.2 Kohms 2-watt resistor.

4F. Hourmeter Module



Check individual diode circuits with trouble light or Simpson. (4H)

TROUBLESHOOTING

4G. SCRs (1 REC, 2 REC, 5 REC)

These are silicon control rectifiers. Before checking, disconnect battery and discharge capacitor 1C. Disconnect one power connection on the rectifier. Disconnect gate leads of SCRs at the card plug.

To check an SCR, it is necessary to have a 6-volt battery, a 6-volt lamp and 2 A-14 diodes.

NOTE: Models C and D require 12-volt battery and 12-volt lamp.

Connect the positive lead to the anode (1), connect negative lead to the cathode (3) as shown in Figure 3-35.

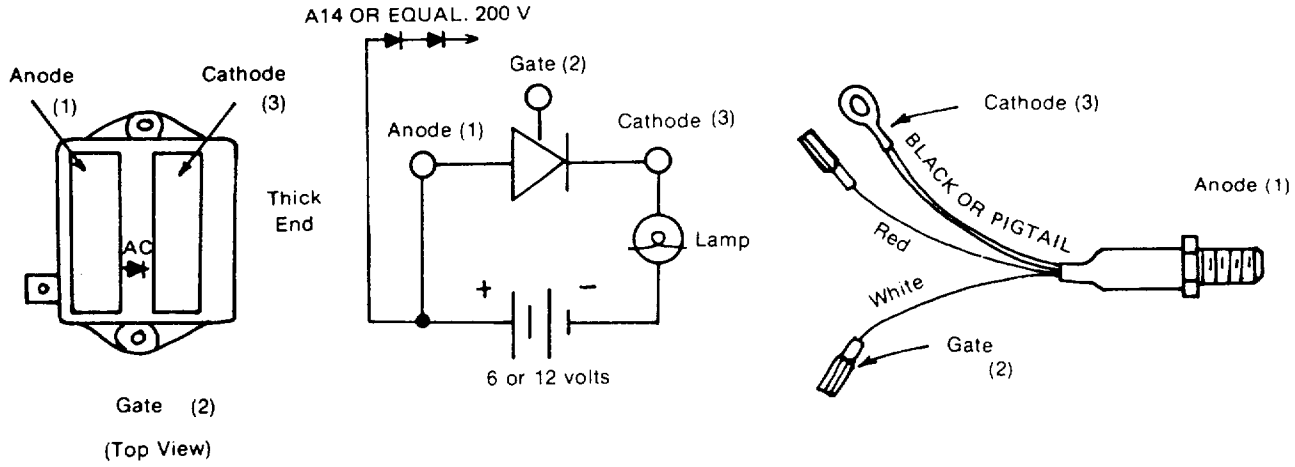


Figure 3-35

(a) The lamp should not light. If the lamp does light, the SCR is shorted and must be replaced.

(b) If check (a) was satisfactory, test the SCR for its ability to be turned on by the gate. Connect positive through two diodes to gate (point 2). If gate is operative, the lamp will come on and should remain on when the gate is removed. Some SCR's will operate correctly even if the lamp does not remain on, particularly with a weak battery.

(c) If lamp cannot be lit under step (b) the SCR is open and must be replaced.

(d) If the SCR is a stud-type device, check continuity between the red and black cathode leads.

NOTE: If you do not have a test light to check the SCRs as described above, they may be checked for shorts or opens by use of the VOM.

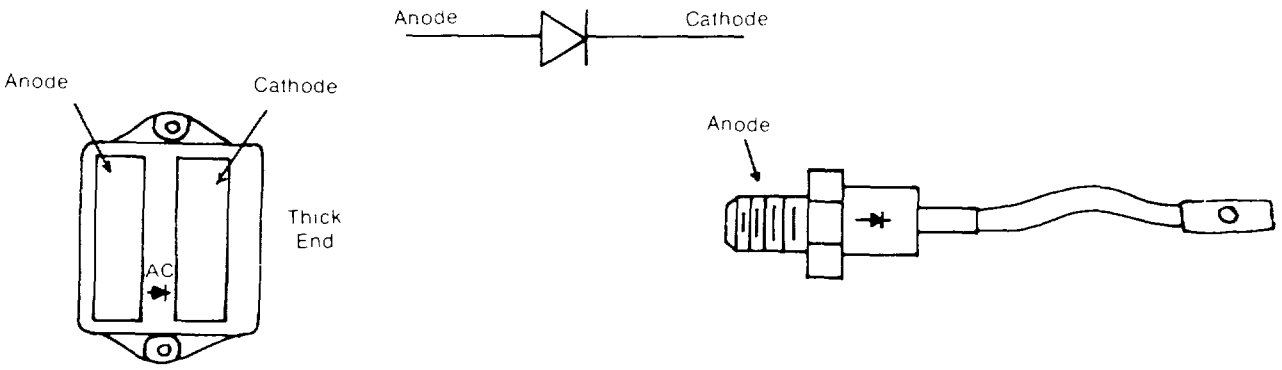
(1) Measure resistance from anode to cathode (R x 100 scale). If SCR is shorted (zero ohms), it must be replaced.

(2) Measure resistance from gate lead (white lead) to cathode and then from cathode to gate lead (R x 1 scale). If resistance reads either zero ohms (shorted) or infinity ohms (open), replace the SCR. When reassembling SCRs, refer to TABLE 5.

4H. Rectifiers (3 REC, 4 REC, Diode Blocks)

When checking diodes, disconnect battery and discharge capacitor 1C to prevent burning out the ohmmeter. When replacing rectifiers, refer to TABLE 5. For 3 and 4 REC, disconnect one lead or

flexible connection. 3 and 4 REC are diodes with about 7 to 12 ohms in the conducting direction (+ ⟶| ——— −) measured on the R x 1 scale, and 10,000 ohms or higher, in the non-conducting direction measured on the R x 10,000 scale. ⟶| ——— −



4J. Thermal Protector (TP)

Remove both connections from TP and with a VONI read less than 200 ohms terminal to terminal, if heat sink is at room temperature. Set VOMI to highest ohm scale and check pins to heat sink, reading should be infinity.

4K. Filter Block (HF), 23 FIL, etc.

To check, disconnect all wires from filter block. With VON! on R x 10,000 scale, touch the lead to the filter terminals to charge the filter. After a few seconds, reverse the meter leads and touch the filter terminals. The VONM needle will deflect and return to infinity. If this capacitor action is not observed, replace the filter block.

4L. Filter Block - 23 RES, etc.

Should these filters fail. it will be evidenced visually by severe cracking.

4M. Filter Block - 22 REC, 25 REC.

The capacitor filter test, as in 4K, is valid for 22 REC and 25 REC only to detect an open or shorted filter. If control has symptoms as in 1E, interchange 22 REC and 25 REC and try again. If problem is corrected the old 25 REC is marginal. If problem is not corrected, replace both filters with known good filters.

4N. IX Choke - Transformer Secondary T3-T4

Refer to panel wiring diagram', page 24 thru 27, to locate windings. With VONI on RX-1 scale, check choke winding or transformer secondary, reading should be zero ohms.

TABLE 5
REPLACEMENT OF EV-1 COMPONENTS

When replacing stud semiconductors such as 2, 3, 4, or 5 REC. it is not necessary to torque these devices to a specific value. However, the device should be screwed into the heat sink and tightened to a snug fit. SCR gates, not screw connected, terminate inside card plug. Remove card connector for access to stab terminals.

The use of a heat-transfer grease (such as GE Versilube G-350-M or equivalent) is recommended.

5A. When replacing module semiconductors such as 1 REC (Models A and B). 1 REC and 3 REC (Model C), and 1 REC, 2 REC and 3 REC (Model D):

(1) Remove all module connections.

(2) Remove module by backing out the two screws at the device sides.

(3) If a 1 REC, remove the thermal protector.

(4) Clean the insulator surface with a clean rag and isopropyl alcohol.

(5) Inspect insulator surface for tears or cracks. If defective, replace. Wipe a light layer of machine oil on base and smooth insulator into position.

(6) Coat insulator with a light coat of heat-transfer grease similar to GE-350.

(7) Install thermal protector in new module. Tighten until snug.

(8) Set new module on insulation and start screws back into the base. Be sure to use original screws and washers. Run screws in to "finger tight." Check to see the bottom of the heat sink is flat against the insulator. Alternately tighten the two screws by 1/4 turn until firm.

(9) Replace all connections removed in Step 1.

5B. Capacitor (EV-1A and B)

(1) Remove card completely.

(2) Remove card box right support.

(3) Remove nuts from capacitor connections and slide capacitor to the right.

(4) Reverse procedure to install new capacitor.

5C. 22 REC and 25 REC, 23 FIL (Models C and D)

When replacing these devices, use original hardware in the same holes, as the inserts are used for electrical connections to the transformer.

5D. Transformer/Choke

(1) Remove card box and card supports.

(2) Remove capacitor (Models A and B).

(3) Disconnect all transformer leads.

(4) Remove 2 REC, 5 REC, and snubbers as needed.

(5) Remove 4 mounting bolts and lift transformer free.

(6) Reverse procedure to reassemble.

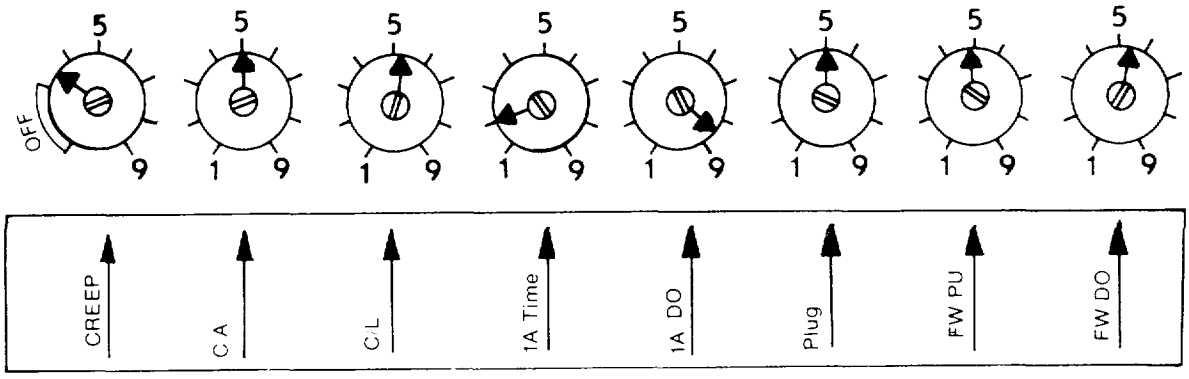
TROUBLESHOOTING

TABLE 6
TUNEUP FOR NEW OR MISTUNED CARD 1

Panels are factory adjusted for a particular motor and truck and should not need adjustment. The card is supplied with single turn potentiometer with internal stops and the box is marked with "dial" setting.

The truck manufacturer should supply the "combination" setting for the particular model truck. The following is for explanation only and should not be used for setting your control:

Creep 7, C/A 7, C/L 5-112, 1A Time 4, 1A DO 9. Plug 8, FW PU 3-1/2, FWV DO 6



With a new card, turn all pots fully CCW to "1". Then set each pot to the setting.

REPAIR PARTS SUPPLY

General:

a. The basic policies and procedures in AR 710-2 and AR 725-50 are generally applicable to repair parts management for Material Handling Equipment (MHE) items.

b. This technical manual contains illustrated parts breakdown and lists of repair parts keyed to Federal Supply Code for Manufacturer (FSCM). This technical manual does not reference repair parts to National Stock Numbers (NSN).

c. National Stock Numbers (NSN) are initially assigned only to Prescribed Load List (PLL) and Authorized Stockage List (ASL) items and major assemblies. Additional NSN are assigned as demands warrant.

d. Automated processing (AUTODIN) of Federal Supply Code for Manufacturers (FSCM) part number requisitions, without edit for matching NSN, is authorized.

e. Weapon System Designator Codes on repair parts requisitions are not required.

f. Repair parts are available from commercial sources for CONUS units and may be locally purchased IAW AR 710-2 and AR 735-110.

g. Initial PLL/ASL will be distributed by US Army Tank-Automotive Command (TACOM), DRSTA-FHM.

Prescribed Load List: The PLL, distributed by TACOM, is an estimated 15 days supply recommended for initial stockage at organizational level. Management of PLL items will be governed by the provisions of AR 710-2 and local command procedures. A prepared list of PLL parts will be provided to OCONUS units before shipment of the end item. Selection of PLL parts for shipment to OCONUS units is based upon the receiving commands recommendations after their review of the TACOM prepared list. Organizations and activities in CONUS will establish PLL stocks through normal requisitioning process.

NOTE: Local purchase of repair parts is authorized IAW AR 710-2 and AR 735-110.

Authorized Stockage List: The ASL, distributed by TACOM, is an estimated 45 days supply of repair parts for support units and activities. An initial list of ASL parts will be provided to designated support units (OCONUS) before shipment of the end items. The parts shipped will be selected according to the recommendations of the receiving commands. Receiving commands will make their recommendations after review of the initial list distributed by TACOM. Support units and activities in CONUS will establish ASL stocks through the normal requisitioning process. NOTE: Local purchase of repair parts is authorized by AR 710-2 and AR 735-110.

Requisitioning Repair Parts (MILSTRIP):

a. Preparation and transmittal.

(1) Requisitions will be prepared in the normal MILSTRIP format.

(2) Requisitions transmitted by AUTODIN for NSN repair parts will be automatically routed by the Defense Automated Addressing System (DAAS) to the responsible Federal Supply Class Manager.

(3) Requisitions for non-NSN repair parts may be locally procured or requisitioned from the Defense Construction Center (DCSC), Columbus, Ohio. These requisitions, when properly coded, will be forwarded by the DAAS to DSCS. When the Manufacturer's Part Number and the Federal Supply Code for Manufacturer (FSCM) exceed column 8-22 of the requisition format (DD Form 1348-1), prepare an AOE/AO5 requisition (DD Form 1348-6) and mail to:

Commander
Defense Construction Supply Center
ATTN: DCSC-OSR
Columbus, Ohio 43215

b. Project Codes: (Cols. 57-59)

(1) Project codes have been assigned to identify non-NSN repair parts requisitions placed on the wholesale supply system.

(2) Hawaii, Alaska and Panama, when submitting requisitions for non-NSN repair parts for their Material Handling Equipment are considered OCONUS and will use coding applicable to OCONUS.

(3) Refer to Tables I and II for applicable codes/formats.

c. Requisition Format. Unique or specific coding applicable to repair parts requisitions for this equipment is furnished in Tables I and II. Other entries should conform to normal AR 725-50 MILSTRIP codes and formats.

TABLE I
NON-NSN REQUISITION FORMAT

CARD COLUMN	DESCRIPTION	ENTRY CONUS	ENTRY OCONLUS
1-3	Document Identifier Code	AOB	A02
4-6	Routing Identifier Code	S9C	S9C
8-22	Part Number	Enter the Federal Supply Code for Manufacturer (FSCM), followed by the Part Number (PN).	
54-56	Distribution Code:		
54	Control Activity	F	AR 725-50
55-56	Weapons System Designator Code	N/A	N/A
57-59	Project Code	BGX	JZM

TABLE II
NSN REQUISITION FORMAT

1-3	Document Identifier Code	ADA	AO1
8-22	National Stock Number	Enterapp I cab I e 13 digit NSN	
54-56	Distribution Code:	Same as Table I above	
57-59	Project Code	Not required	

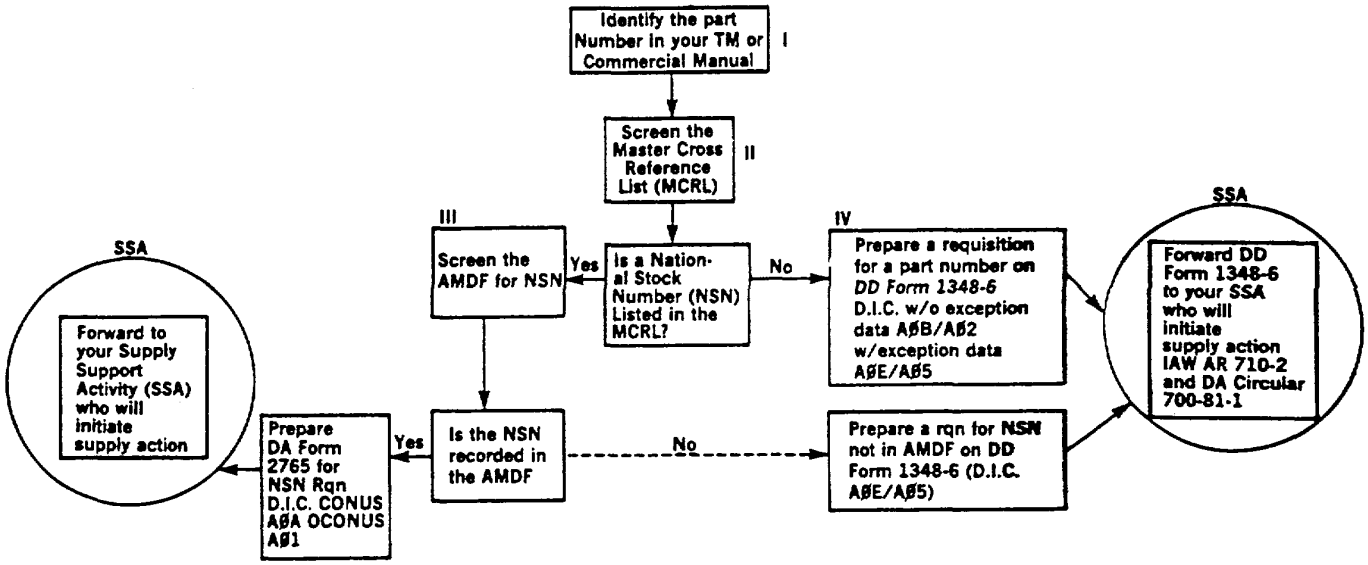
PRESCRIBED LOAD LIST AND AUTHORIZED STORAGE LIST

END ITEM: Forklift, EMD, Front/Side Loader, SRT 4000/3000 lb Capacity MAKE: Drexel Industries MODEL: SL-44/3-ESS(EE)

NSN: 3930-01-123-1300

SMR CODE	NSN	PRIME P/N	FSCM	PART DESCRIPTION	UNIT PRICE	U/M	QTY OF PARTS REQ'D FOR NO. OF END ITEMS PLL 1-5	1-5	ASL 6-20	21-50
PAFZZ	5920-00-138-5239	ALS400	71400	Fuse, Cartridge	1.33	EA			2	
PAOZZ	5920-00-879-6285	FO2A125VIOAS	81349	Fuse, Cartridge	.17	EA	1		3	
PAOZZ	6240-01-023-0399	4350	08108	Bulb, Sealed Beam	6.61	EA	1		1	
PAOZZ	6240-00-931-6679	110	08108	Bulb, Tail Light	1.20	EA	1		1	
PAOZZ	6240-00-299-3985	1150	08108	Bulb, Stop Light	2.35	EA	1		1	
PAOZZ	6220-00-482-6916	3042	78422	Tail Light Lens	1.31	EA	1		1	
PAOZZ	4330-00-090-8837	529206-5125	92863	Filter Element, Flui	5.27	EA	1		1	

DO YOU NEED A REPAIR PART
FOR
ONE OF YOUR COMMERCIAL CONSTRUCTION
OR
MATERIALS HANDLING EQUIPMENT ITEMS?
YES? THEN FOLLOW THESE 4 EASY STEPS!



NON-NSN REQUISITION (MANUAL)

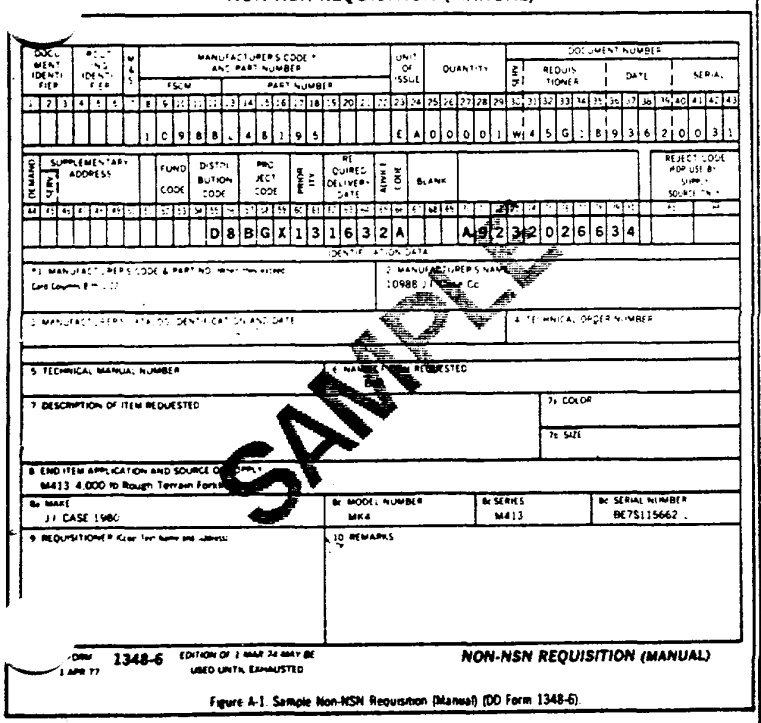


Figure A-1. Sample Non-NSN Requisition (Manual) (DD Form 1348-6).

LEGEND FOR 1348-6

CARD COLUMNS	*CONUS*	*OCONUS*
1-3 DOC Ident Code -		
PN w/o Exception Data	AØB	AØ2
PN w/Exception Date	AØE	AØ5
NSN Not in AMDF	AØE	AØ5

4-7 (LV Blank - SSA will complete)

8-22 For Non NSN: Fed Supply Code for Manufacturer (FSCM followed by Part Number (obtain from TM or Commercial Manual)

8-22 For NSN not in AMDF - enter NSN

57-59 Project Code:	MHE	CCE
CONUS	BGX	BGW
OCONUS	JZM	JZC

Reference Code for Cols 71-80:
A - Technical Order or Tech Manual.
B - End Item Application.
C - Noun Description of Item.
D - Drawing or Specification Number.

Identification of reference Data specified in Col. 70.

NOTE: All other entries will be made IAW AR 710-2/725-50. Project Codes are mandatory entries.

MANUAL BLOCKS:

BLOCK 1. Mfg Code & PN - Enter applicable FSCM and PN when they exceed Cols 8-22. (Cols 8-22 will be left blank).

BLOCKS 2-8. Enter applicable data (obtain from TM or Commercial Manual).

BLOCKS 8a-8d. Obtain data from vehicle data plate.

BLOCK 9. Self explanatory.

BLOCK 10. Enter any applicable exception data such as "NSN not in AMDF".

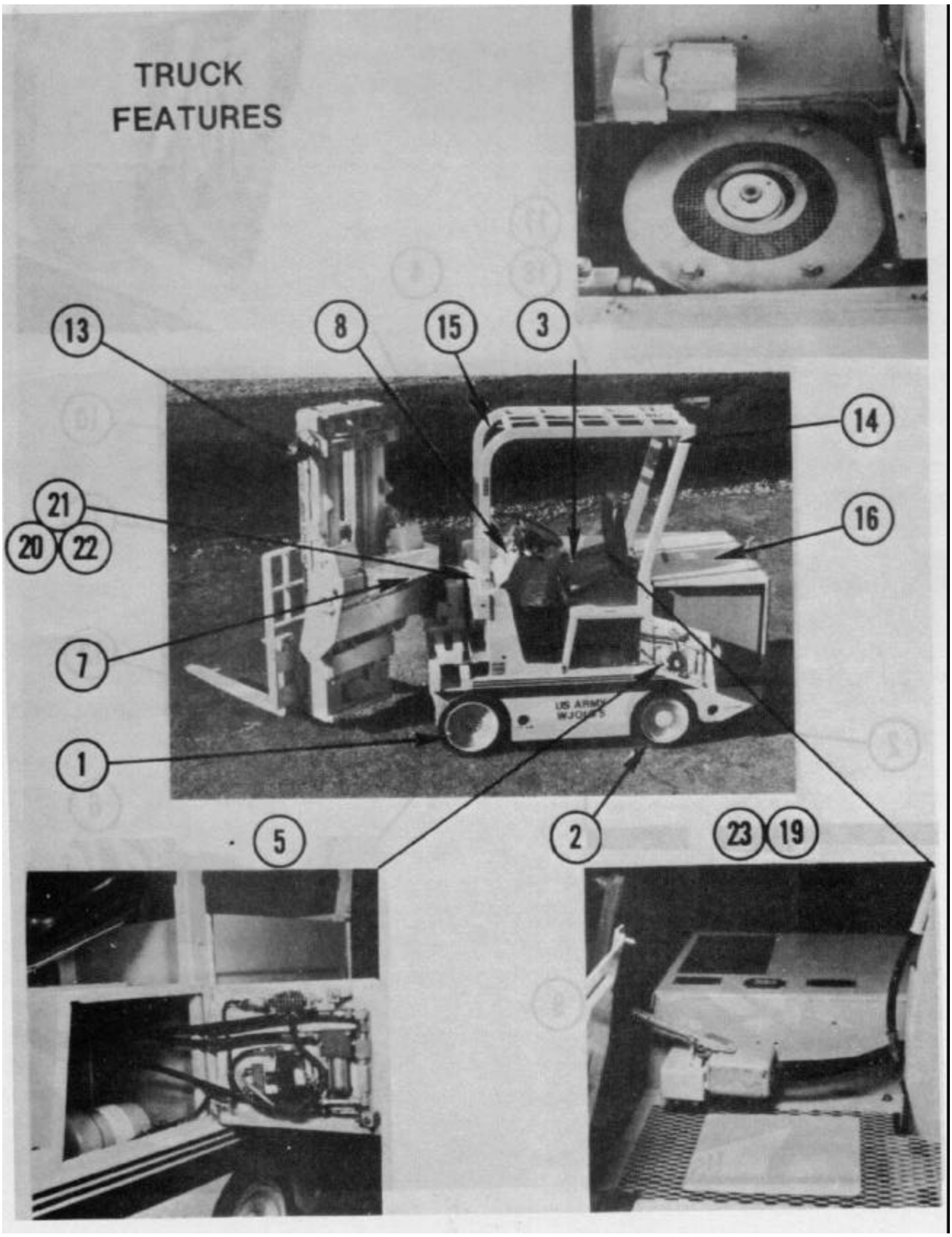
All NSN items not listed on the AMDF and part number req will be forwarded to DCSC (RIC S9C) for supply support.

PARTS BREAKDOWN SECTION

TABLE OF CONTENTS

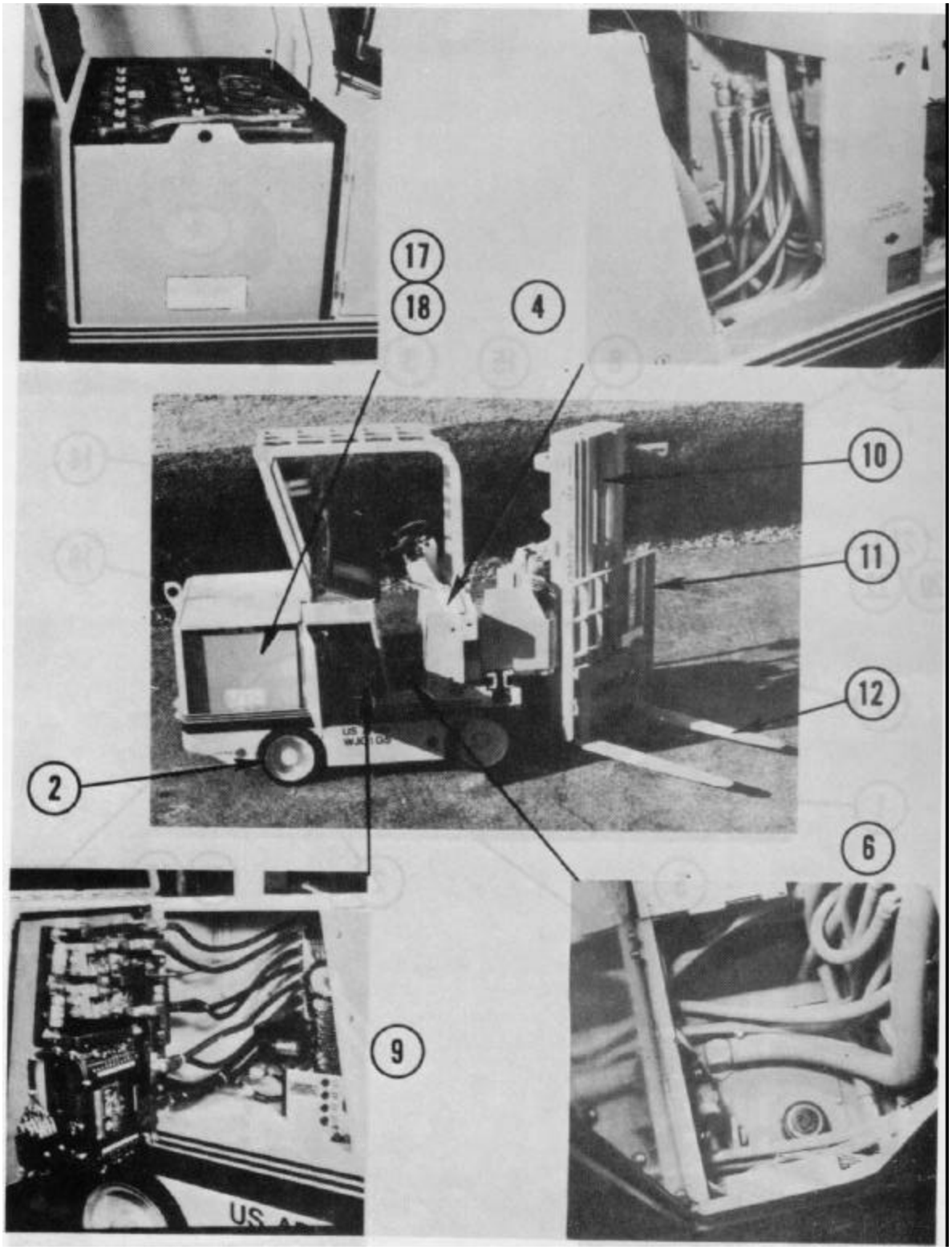
PARTS BREAKDOWN

PARTS BREAKDOWN



PARTS BREAKDOWN

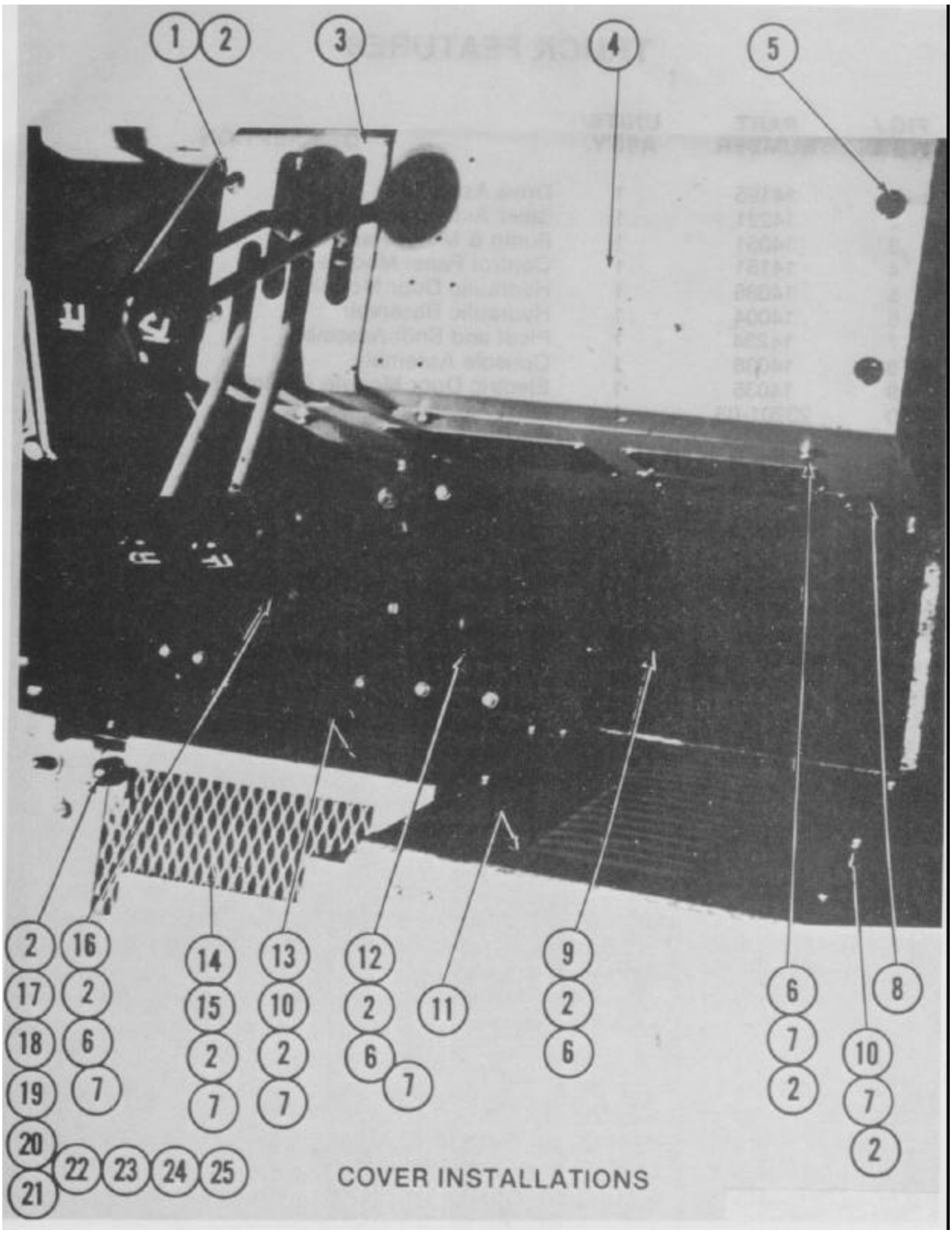
TRUCK FEATURES



PARTS BREAKDOWN
TRUCK FEATURES

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
1	14195	1	Drive Assembly
2	14221	1	Steer Axle Assembly
3	14051	1	Pump & Motor Assembly
4	14151	1	Control Panel Module, Hyd.
5	14086	1	Hydraulic Door Module
6	14004	1	Hydraulic Reservoir
7	14-234	1	Pivot and Shift Assembly
8	14038	1	Console Assembly
9	14035	1	Electric Door Module Assembly
10	23201-03	1	Mast Assembly
11	14063-2	1	Backrest, Load
12	5806-1	2	Forks 40" Lg. x 4" W x 1-3/4" Thk)
13	25054	1	Floodlight
14	25055	1	Tail/Brake Light
15	10799	1	Overhead Guard
16	14227	1-	Top Cover, Battery
17	14232	2	Side Cover, Battery (Not Shown)
18	50681	1	Battery, 36 Volts
19	23876	1	Connector, Battery
20	MS90725-68	4	Screw, Hex. Hd. (3/8-16 UNC-2A x 2-1/2 LG)
21	MS51922-17	4	Nut, Hex. Self-Locking (3/8-16 UNC-2B)
22	MS27183-14	4	Washer, Flat (3/8)
23	14197	1	Bracket, Mtg. (Battery Conn.)

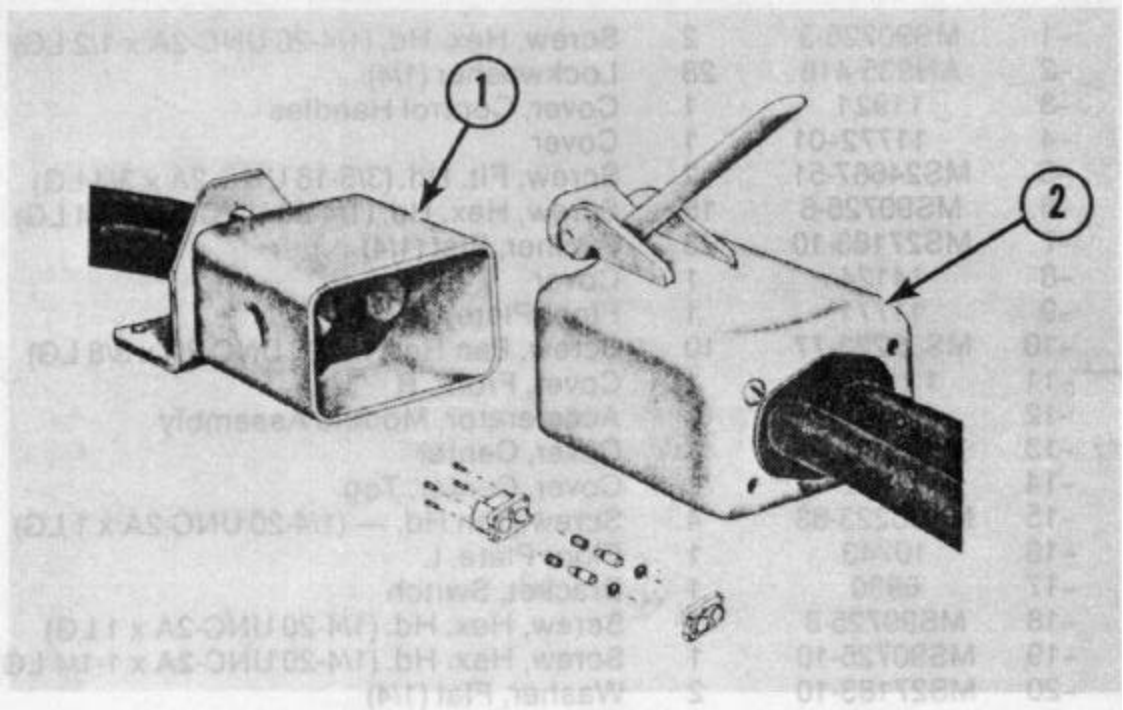
PARTS BREAKDOWN



COVER INSTALLATIONS

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS90725-3	2	Screw, Hex. Hd. (1/4-20 UNC-2A x 1/2 LG)
-2	AN935-416	28	Lockwasher (1/4)
-3	11921	1	Cover, Control Handles
-4	11772-01	1	Cover
-5	MS24667-51	2	Screw, Fit. Hd. (3/8-16 UNC-2A x 3/4 LG)
-6	MS90725-6	15	Screw, Hex. Hd. (1/4-20 UNC-2A x 3/4 LG)
-7	MS27183-10	23	Washer, Flat (1/4)
-8	14124	1	Cover
-9	11771	1	Floor Plate, R
-10	MS35223-77	10	Screw, Pan Hd. (1/4-20 UNC-2A x 3/8 LG)
-11	11133-2	1	Cover, Front, R
-12	10869	1	Accelerator, Module Assembly
-13	11132	1	Cover, Center
-14	14082	1	Cover, Center, Top
-15	MS35223-83	4	Screw, Pan Hd. - (1/4-20 UNC-2A x 1 LG)
-16	10743	1	Floor Plate, L
-17	6930	1	Bracket, Switch
-18	MS90725-8	1	Screw, Hex. Hd. (1/4-20 UNC-2A x 1 LG)
-19	MS90725-10	1	Screw, Hex. Hd. (1/4-20 UNC-2A x 1-1/4 LG)
-20	MS27183-10	2	Washer, Flat (1/4)0
-21	MS35690-402	2	Nut, Hex. (1/4-20 UNC-2B)
-22	25600	1	Switch, Seat
-23	4281-01	1	Retainer
-24	AN515-6-24	2	Screw, Rd. Hd. (#6-32 NC-2A x 1-1/2 LG)
-25	MS35333-20	2	Lockwasher, Int. Tooth (#6)

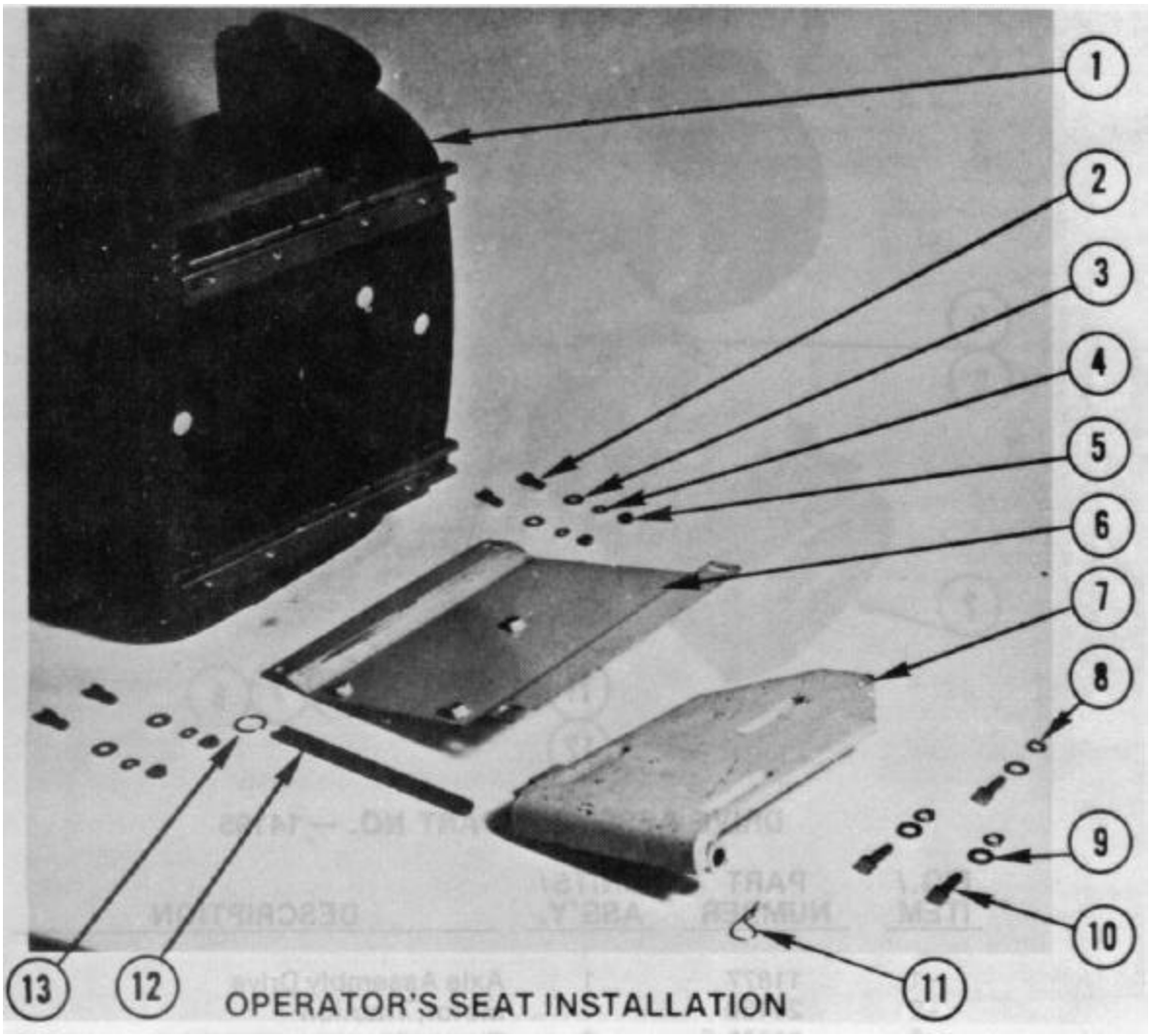
PARTS BREAKDOWN



BATTERY CONNECTOR ASSEMBLY PART NO.-23876

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23866	1	Assembly, Mounting Half
-2	23875	1	Assembly, Locking Half
-3	23893	1	Kit, Service

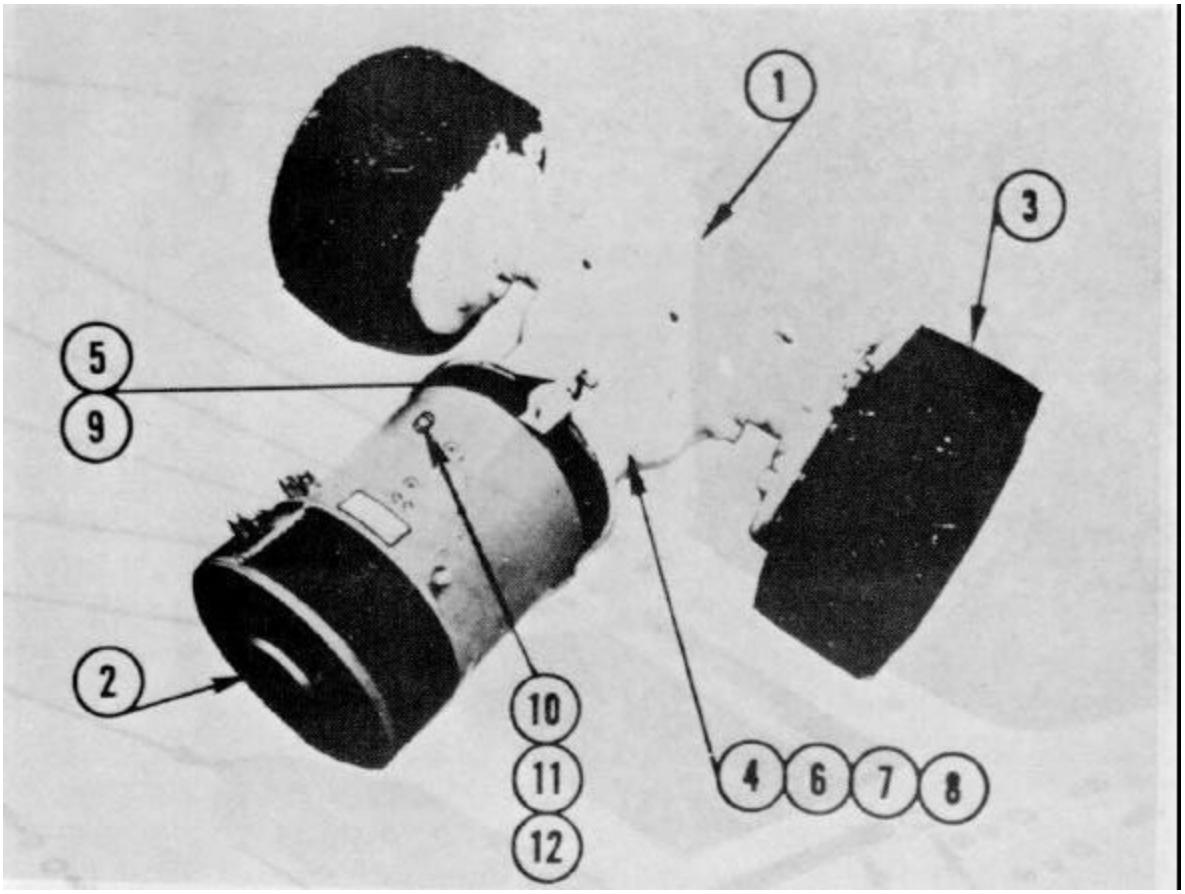
PARTS BREAKDOWN



OPERATOR'S SEAT INSTALLATION

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50697	1	Seat
-2	MS16997-78	4	Screw, Soc. Hd. (5/16-18 UNC-3A x 3/4 LG)
-3	MS27183-13	4	Washer, Flat - (5/16)
-4	AN935-516	4	Lockwasher- (5/16)
-5	MS35690-502	4	Nut, Hex. (5/16-18 UNC-2B)
-6	10581	1	Bracket, Seat
-7	10985	1	Mount, Seat
-8	AN935-616	3	Lockwasher - (3/8)
-9	MS27183-14	3	Washer, Flat -(3/8)
-10	MS90725-62	3	Screw, Hex. Hd. - (3/8-16 UNC-2A x 1-1/4 LG)
-11	25607	1	Hairpin, Cotter
-12	10651	1	Rod, Seat Retaining
-13	25608	1	Ring, Split

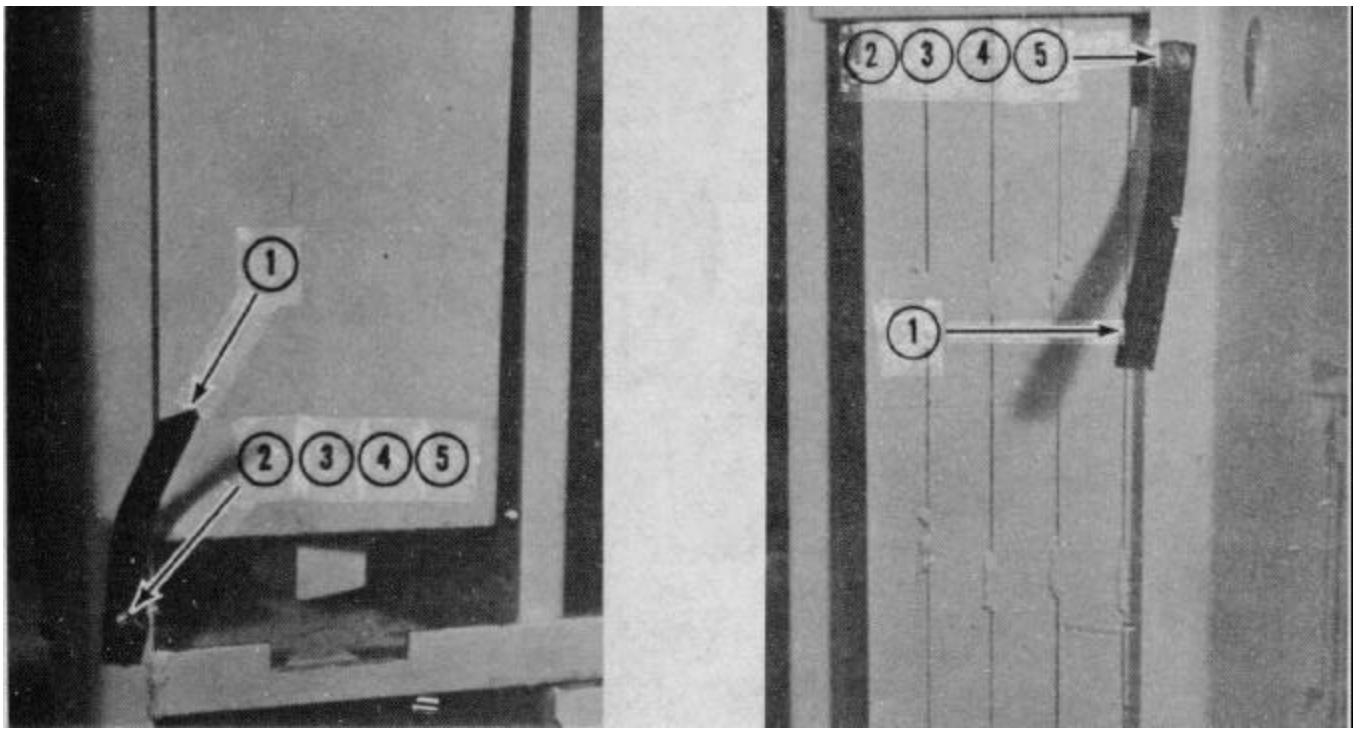
PARTS BREAKDOWN



DRIVE ASSEMBLY PART NO. - 14195

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	11877	1	Axle Assembly Drive
-2	20150	1	Motor, Traction
-3	50393-2	2	Tire-18" x 9" x 12-1/8"
-4	7095	1	Traction Motor Support
-5	6775	1	Crank, Brake
-6	MS90726-72	4	Screw, Cap, Hex. Hd. - (3/8-24 x 3-1/2 LG)
-7	MS90726-62	4	Screw, Cap, Hex. Hd. - (3/8-24 x 1-1/4 LG)
-8	AN935-616	8	Lockwasher - (3/8)
-9	25002	2	Yoke Pin w/Cotter Pin
-10	50695	1	Thermostat
-11	AN935-6	2	Lockwasher - (#6)
-12	MS35223-26	2	Screw, Pan Hd. (#6 - 32 UNC-2A x 1/4 LG)

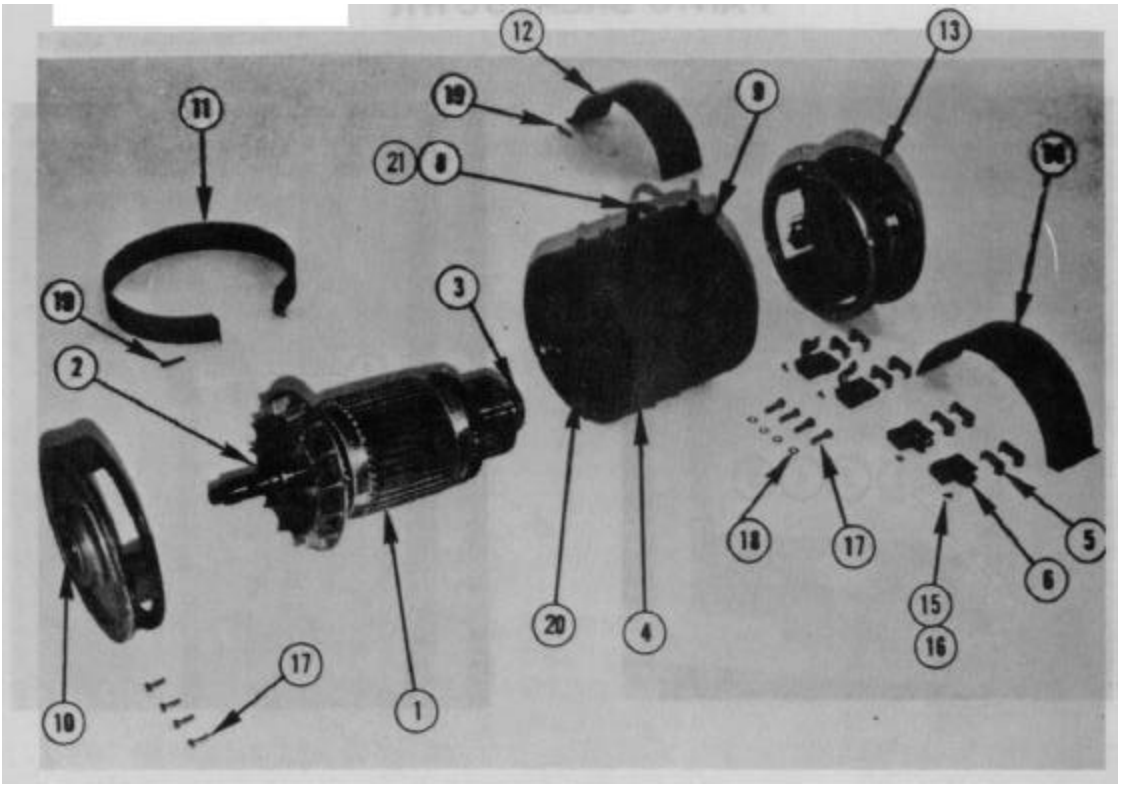
PARTS BREAKDOWN



GROUND STRAP INSTALLATION

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	6719	2	Strap, Ground
-2	MS27183-14	4	Washer, Flat (3/8)
-3	AN935-616	2	Lockwasher (3/8)
-4	MS90725-64	2	Screw, Hex. Hd. (3/8-16UNC-2A x 1-1/2 Lg.)
-5	MS35690-602	2	Nut, Hex. (3/8-16UNC-2B)

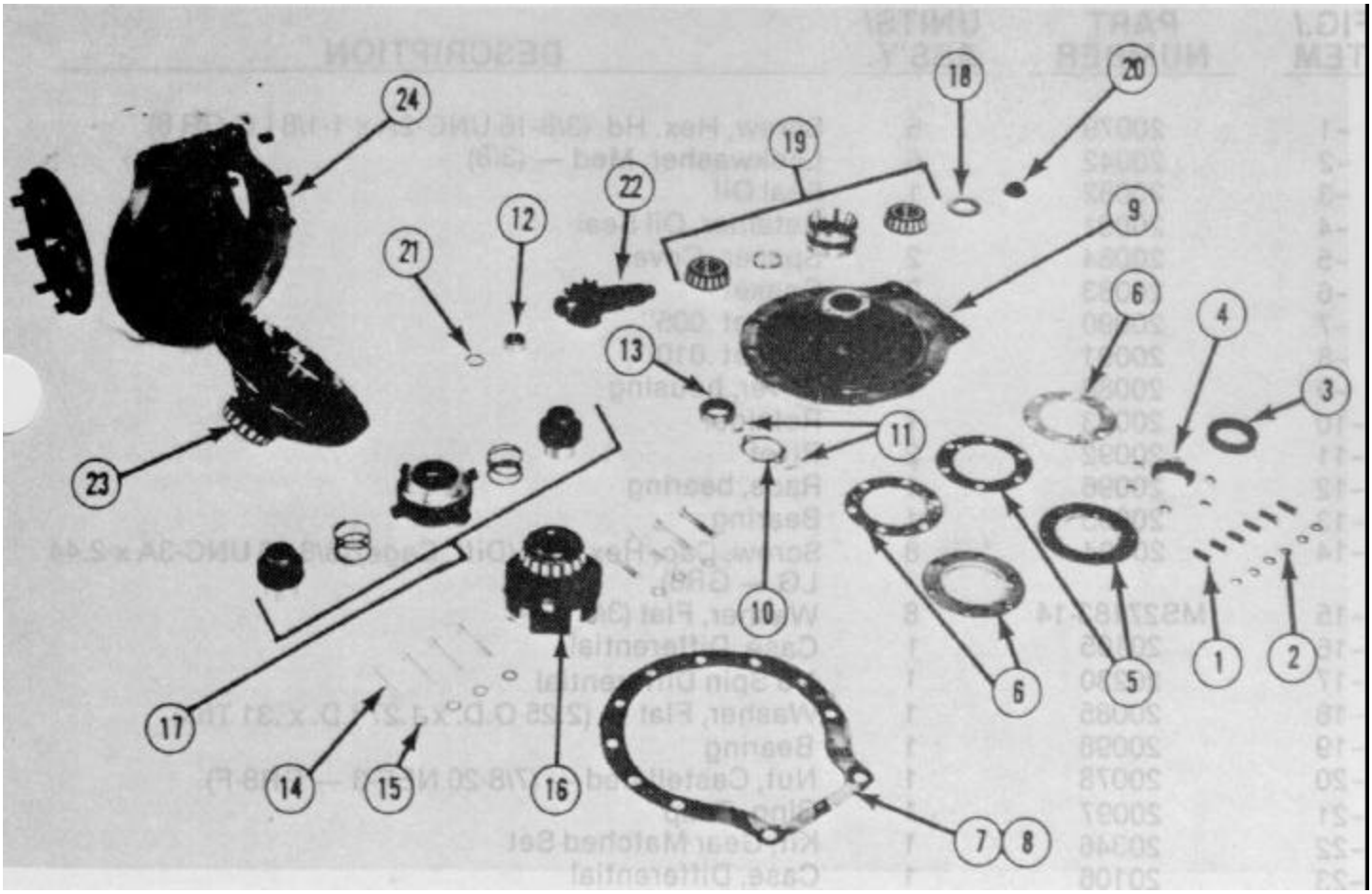
PARTS BREAKDOWN



TRACTION MOTOR ASSEMBLY PART NO. - 20150

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	20156	1	Armature Assembly
-2	20154	1	Bearing
-3	20155	1	Bearing
-4	20158	1	Frame
-5	20153	8	Spring
-6	20152	4	Brush
-7	20160	1	Kit, Brush (consists of items 5 & 6)
-8	50695	REF	Thermostat
-9	20151	5	Bushing Assembly
-10	20159	1	End Shield, Drive End
-11	20164	1	Cover, Drive End
-12	20162	1	Cover, Top, Commutator End
-13	20157	1	End Shield, Commutator End
-14	20163	1	Cover, Bottom, Commutator End
-15	AN520-10-8	4	Screw, RDH (#10-32 NF-2A x 112 LG)
-16	MS27183-8	4	Washer, Flat (#10)
-17	MS90725-61	8	Screw, Hex. Hd. (3/8-16 UNC-2A x 1-1/4 LG)
-18	AN935-616	4	Lockwasher (3/8)
-19	AN515-416-24	2	Screw, RDH (1/4-20 UNC-2A x 1-1/2 LG)
-20	20165	1 set	Coils, Field
-21	50379-16	1	Connector, Cross

PARTS BREAKDOWN



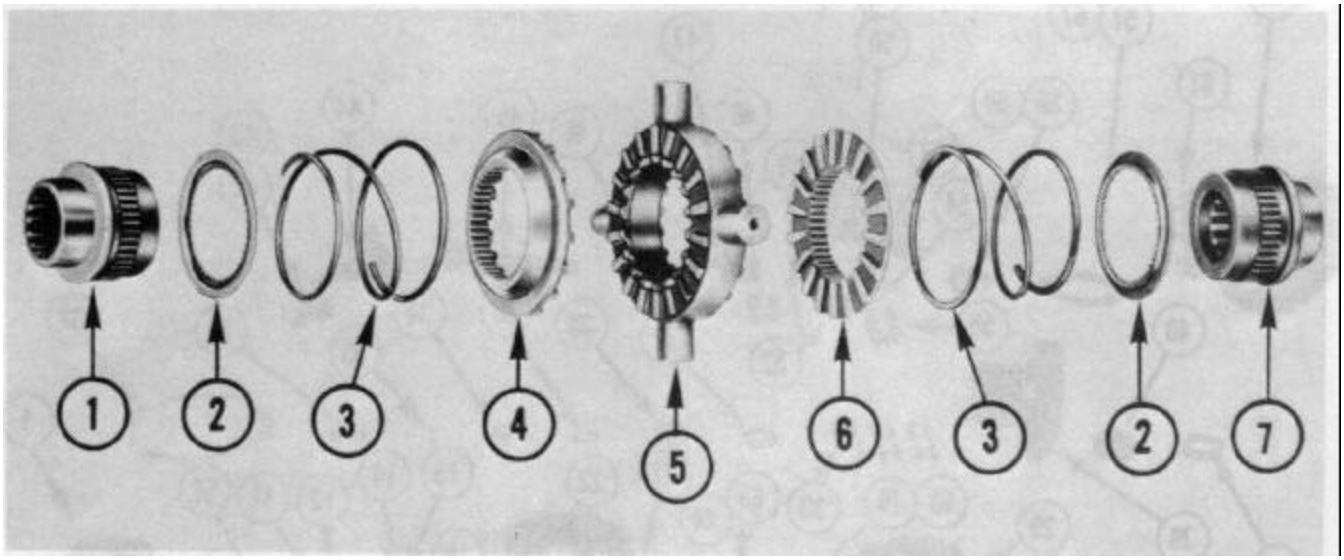
DRIVE AXLE DIFFERENTIAL OF PART NO. - 11877

PARTS BREAKDOWN

DRIVE AXLE DIFFERENTIAL (PART OF - 11877)

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	20079	6	Screw, Hex. Hd. (3/8-16 UNC-2A x 1- 1/8 LG GR 8)
-2	20042	6	Lockwasher, Med - (3/8)
-3	20082	1	Seal Oil
-4	20081	1	Retainer, Oil Seal
-5	20084	2	Spacer, Cover
-6	20083	3	Gasket
-7	20090	3	Gasket .005"
-8	20091	2	Gasket .010"
-9	20089	1	Cover, housing
-10	20093	1	Retainer
-11	20092	2	Rivet
-12	20096	1	Race, bearing
-13	20095	1	Bearing
-14	20104	8	Screw, Cap, Hex. Hd. (Diff. Cage) (3/8-16 UNC-3A x 2.44 LG - GR8)
-15	MS27183-14	8	Washer, Flat (3/8")
-16	20105	1	Case, Differential
-17	20230	1	No Spin Differential
-18	20085	1	Washer, Flat - (2.25 O.D. x 1.27 I.D. x .31 Thk)
-19	20098	1	Bearing
-20	20078	1	Nut, Castellated - (7/8-20 NEF-3 - GR8-F)
-21	20097	1	Ring, Snap
-22	20346	1	Kit, Gear Matched Set
-23	20106	1	Case, Differential
-24	20107	1	Housing, Differential

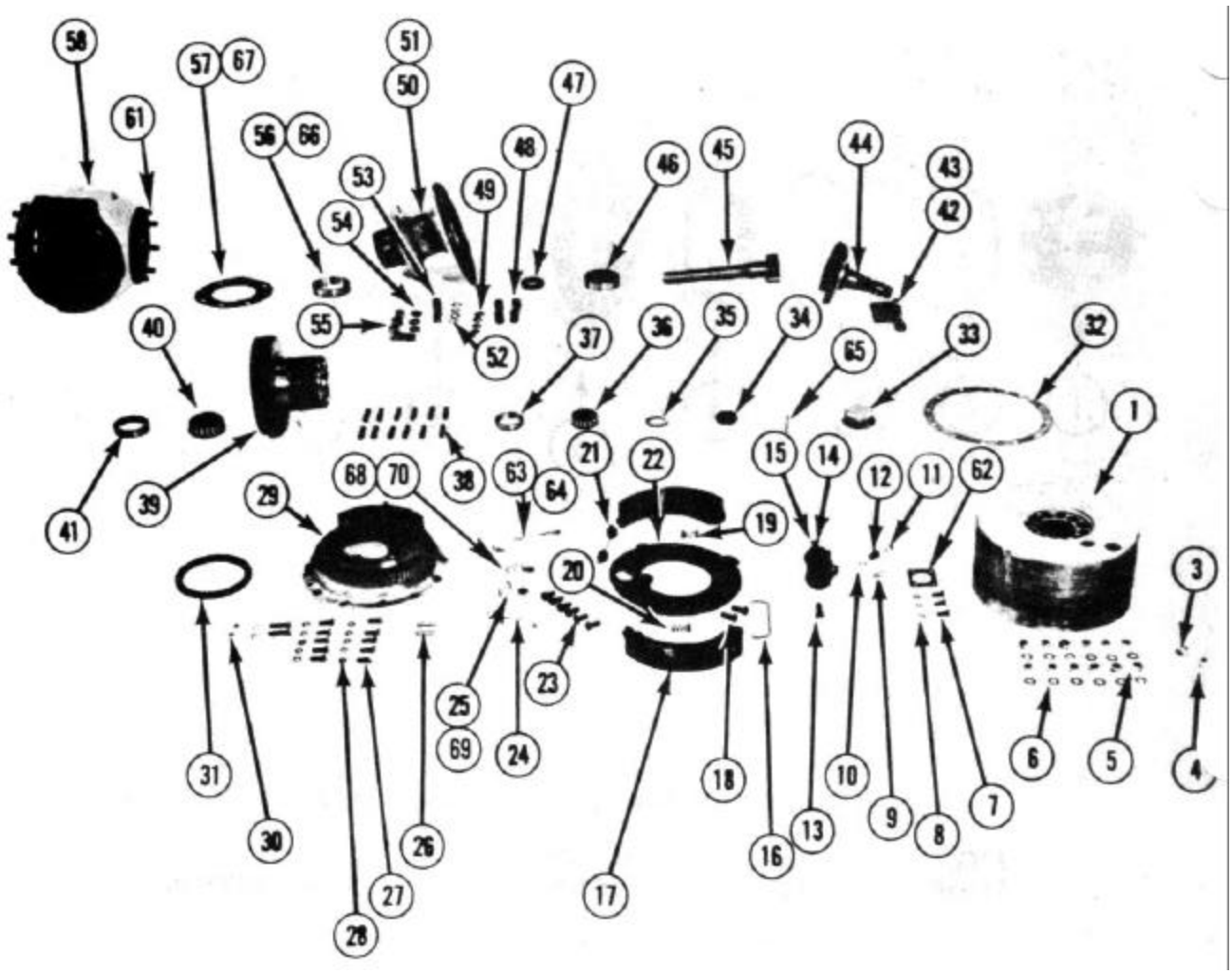
PARTS BREAKDOWN



NO-SPIN DIFFERENTIAL ASSEMBLY PART NO.-20230

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	20231	1	Side Gear-LH
-2	20232	2	Retainer
-3	20233	2	Spring
-4	20234	1	Clutch Assembly (LH)
-5	20235	1	Spider Assembly
-6	20236	1	Clutch Assembly (RH)
-7	20237	1	Side Gear-RH

PARTS BREAKDOWN



DRIVE AXLE WHEEL END (PART OF-11877)

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
		REF	Drive Axle Wheel End
-1	20343	2	Wheel
-2			Not Required
-3	20004	2	Plug
-4	20005	2	Plug
-5	20000	24	Nut, Hex. (1/2-20 UNS-2B-GR8)
-6	20001	24	Lockwasher, Ext. Tooth -1/2
-7	20029	6	Screw, Cap, Hex. Hd. (5/16-18 UNC-2A x 3/4 LG)
-8	20028	6	Lockwasher, Med. 5/16
-9	20016	2	Adapter, brake bleed screw
-10	20019	2	Gasket, inlet adapter
-11	20017	6	Elbow

PARTS BREAKDOWN

DRIVE AXLE WHEEL END (PART OF-11877)

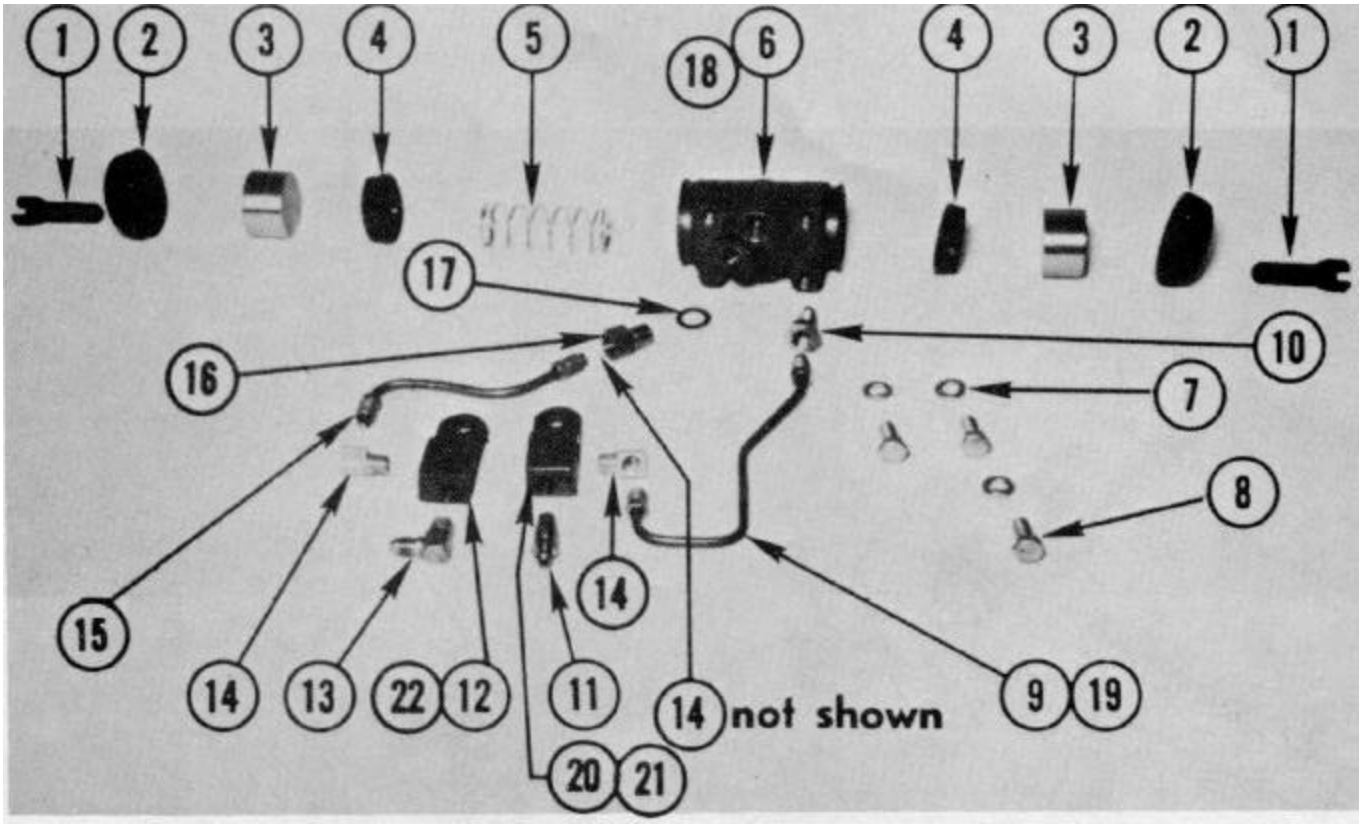
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-12	20018	2	Adapter, brake cylinder
-13	20033	4	Push rod, cylinder
-14	20032	1	Cylinder assembly, brake, LH
-15	20031	1	Cylinder assembly, brake, RH
-16	20012	2	Spring, retainer
-17	20336	4	Shoe and lining assembly
-18	20040	4	Cam Bolt Assembly, Shoe Adj.
-19	20326	4	Spring
-20	20007	4	Rod
-21	20006	2	Spring, return
-22	20344	2	Plate, backing
-23	20029	12	Screw, Cap, Hex. Hd. (5/16-18 UNC-2A x 3/4 LG)
-24	20013	2	Tube Assembly, Brake Actuating
-25	20021	1	Fitting, brake, RH
-26	20037	4	Dowel
-24	MS90728-60	24	Screw, Cap, Hex. Hd. (3/8-16 UNC-2B x 1" LG-GR 8)
-28	20024	24	Lockwasher, Int. Tooth - (3/8)
-29	20345	2	Case, Final Drive
-30	20022	4	Nut, Jam (3/8-16 UNC-2B)
-31	20047	2	Seal, Oil
-32	20046	2	Gasket
-33	20048	2	Cap, Wheel
-34	20050	2	Nut
-35	20051	2	Washer
-36	20054	2	Cup, Roller, Brg.
-37	20053	2	Cone, Roller, Brg.
-38	20057	24	Studs
-39	20052	2	Gear FD Internal
-40	20055	2	Cone, Roller Brg.
-41	20056	2	Cup, Roller Brg.
-42	20061	8	Bolt, Hex. Hd. (3/4-16 UNF-3 x 2.5 LG-GR8)
-43	20062	2	Screw, Hex. Hd. (3/4-16 UNF-2A x 2-3/8 LG-GR8)
-44	20063	2	Spindle, Wheel
-45	20064	2	Shaft, Axle
-46	20072	2	Bearing
-4-7	20073	2	Coupling
-48	20065	16	Nut
-49	MS35333-88	8	Washer
-50	20112	1	Housing, Axle LH
-51	20113	1	Housing, Axle RH
-52	20069	8	Lockwasher
-53	20067	8	Dowel
-54	20060	8	Lockwasher
-55	20058	8	Nut, Hex. (3/4-16 UNS-2B, GRD 8)
-56	20075	2	Cup, Roller, Brg.
-57	20071	11	Gasket
-58	20107	REF	Housing, Differential
-59	20339	1	Service brake kit - (consists of items 16, 17 and 21)
-60	5619-51	REF	Kit, Service (wheel cylinder)

PARTS BREAKDOWN

DRIVE AXLE WHEEL END (PART OF-11877)

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-61	20068	16	Stud
-62	20030	2	Spacer
-63	20014	1	Tube Assembly, Bleeder, LH
-64	20015	1	Tube Assembly, Bleeder, RH
-65	20049	2	Pin, Cotter (1/8 Diax 1-3/4 LG)
-66	20074	2	Cone, Roller Brg.
-67	20070	7	Gasket
-68	20026	1	Fitting, Brake, RH
-69	20020	1	Fitting, Brake, RH
-70	20025	1	Fitting, Brake, LH

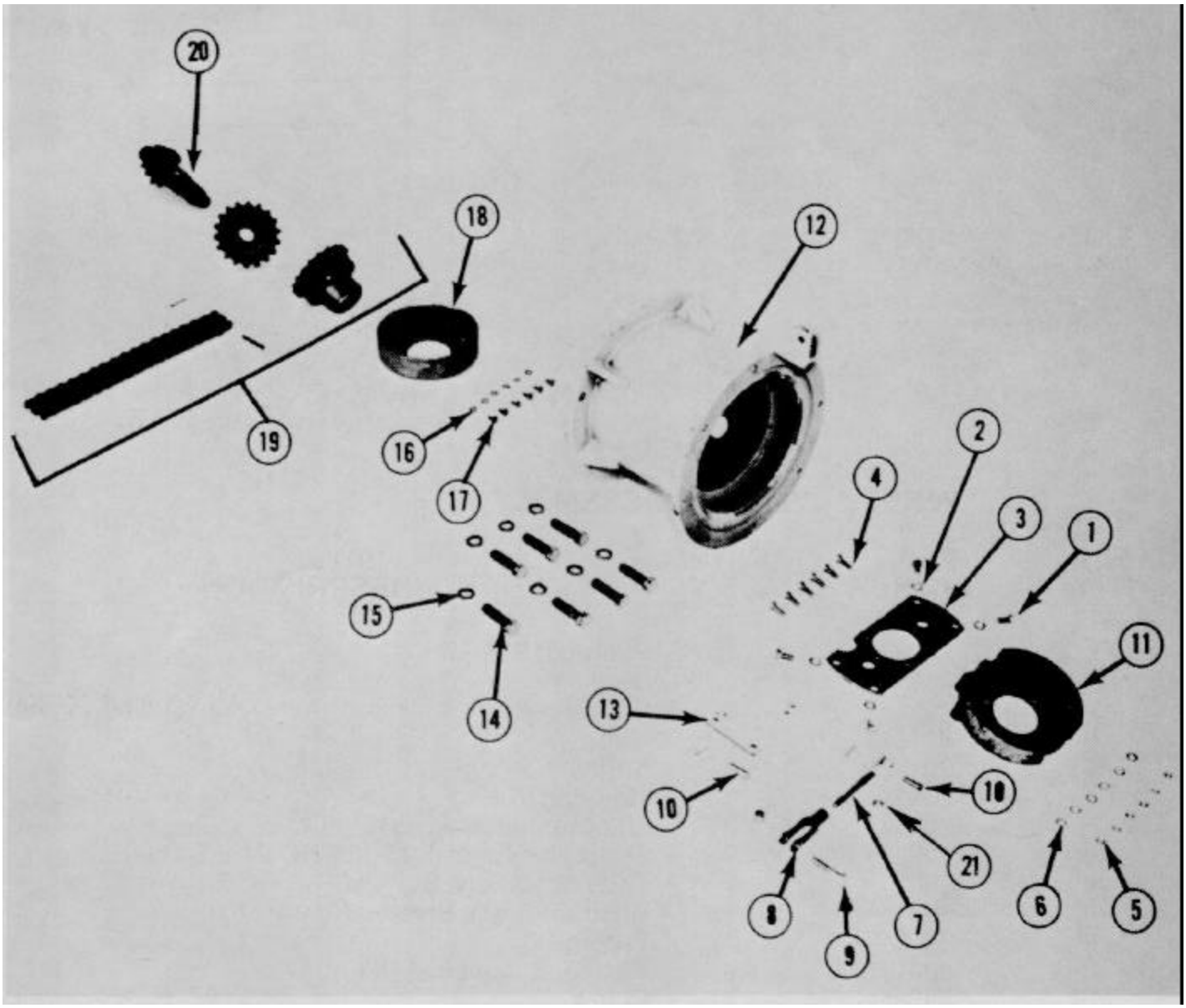
PARTS BREAKDOWN



WHEEL CYLINDER ASSEMBLY

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	20033	2	Pushrod, Cylinder
-2	20114	2	Boot
-3	20115	2	Piston
-4	20121	2	Cup
-5	20122	1	Spring
-6	20123	1	Housing, RH
-7	20028	3	Lockwasher, Med.(5/16)
-8	20029	3	Screw, Hex. Hd. (5/16-18 UNC-2A x 3/4 LG)
-9	20014	1	Tube Assembly, Bleeder-R
-10	20016	1	Adapter, Brake Bleeder Screw
-11	20021	1	Fitting
-12	20017	REF	Fitting, Brake Line: RH
-13	25525	1	Elbow
-14	20020	3	Elbow
-15	20013	1	Tube Assembly, Brake Actuating
-16	20018	1	Adapter
-17	20019	1	Gasket
-18	20124	1	Housing, LH
-19	20015	1	Tube Assembly, Bleeder - L
-20	20026	REF	Fitting, Bleeder Screw, LH
-21	20025	REF	Fitting, Bleeder Screw, RH
-22	20021	REF	Fitting, Brake Line, LH
-23	5619-51	A/R	Kit, Service (Items 2, 3, 4, 5)

PARTS BREAKDOWN



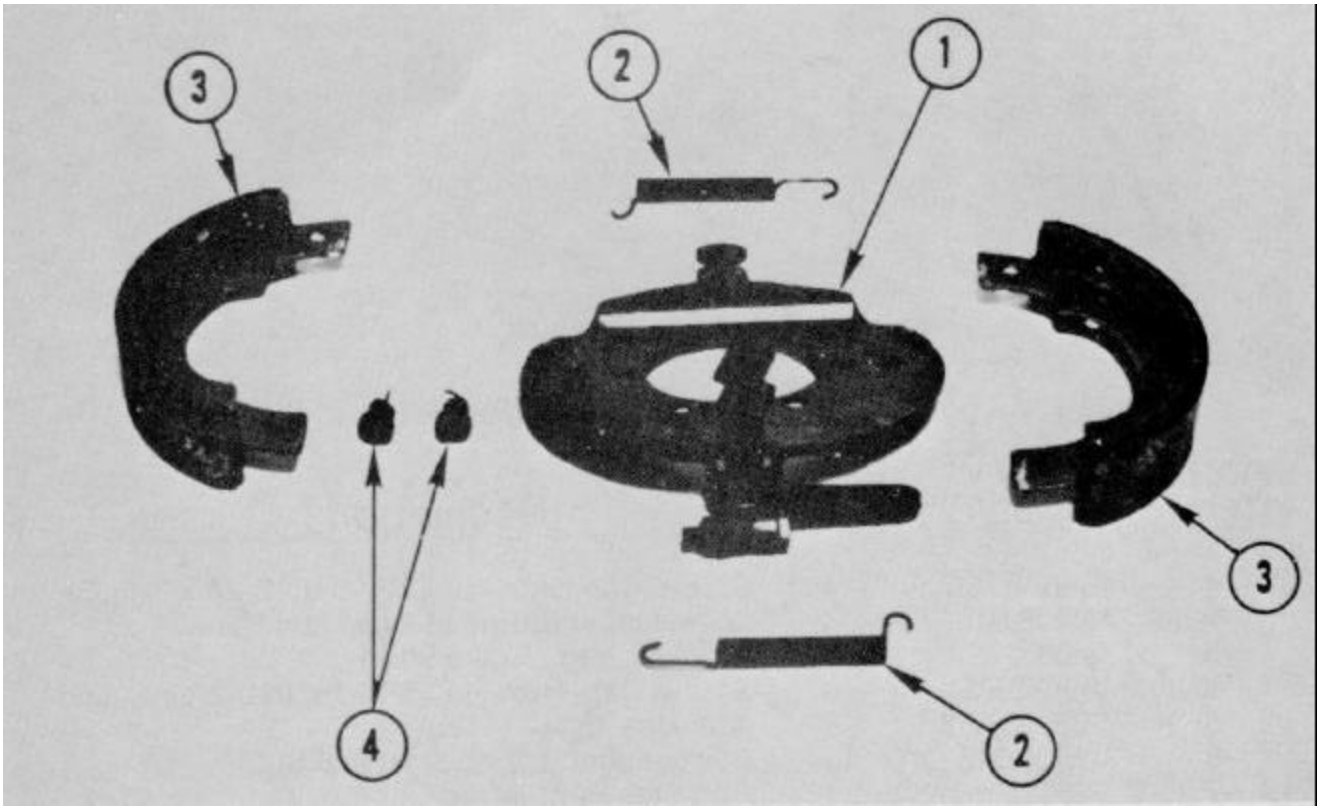
TRACTION MOTOR SUPPORT

PARTS BREAKDOWN

TRACTION MOTOR SUPPORT

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS90725-58	4	Screw, Cap, Hex. Hd. (3/8-16 UNC-2A x 3/4 LG)
-2	AN935-616	4	Lockwasher Spring st'l. (3/8 st'd.).
-3	5032	1	Bracket, Mtg., Brake Shoe
-4	MS90725-34	6	Screw, Cap, Hex. Hd. (5/16-18 UNC-2A x 1" LG)
-5	MS35690-502	6	Nut, Hex. (5/16 - 18)
-6	AN935-516	13	Lockwasher, spring st'l. (5/16 Std.)
-7	5057	1	Rod Brake Actuating
-8	25000	1	Yoke End
-9	25001	1	Pin, Yoke w/Cotter Pin 5/16 Dia.
-10	25002	1	Pin, Yoke w/Cotter Pin
-11	25006	1	Kit, Brake (Parking)
-12	7095	1	Support, Drive Motor
-13	6775	REF	Brake Crank
-14	20078	7	Screw, Cap, Hex. Hd. (9/16-12 UNC-2A x 2-1/8 LG - GR8)
-15	20079	7	Lockwasher, Med. (9/16)
-16	AN935-416	6	Lockwasher, Spring Stl. (1/4 Std.)
-17	MS90725-3	6	Screw, Mach. Hex. Hd. (1/4-20 UNC-2A x 1/2 LG)
-18	5034-1	1	Drum Brake
-19	8543	1	Coupling Assembly, Roller Chain
-20	20102	REF	Pinion
-21	MS35691-622	1	Nut, Jam, Hex. (3/8-24 UNF-2B)
-22	8543-2	A/R	Kit, Chain

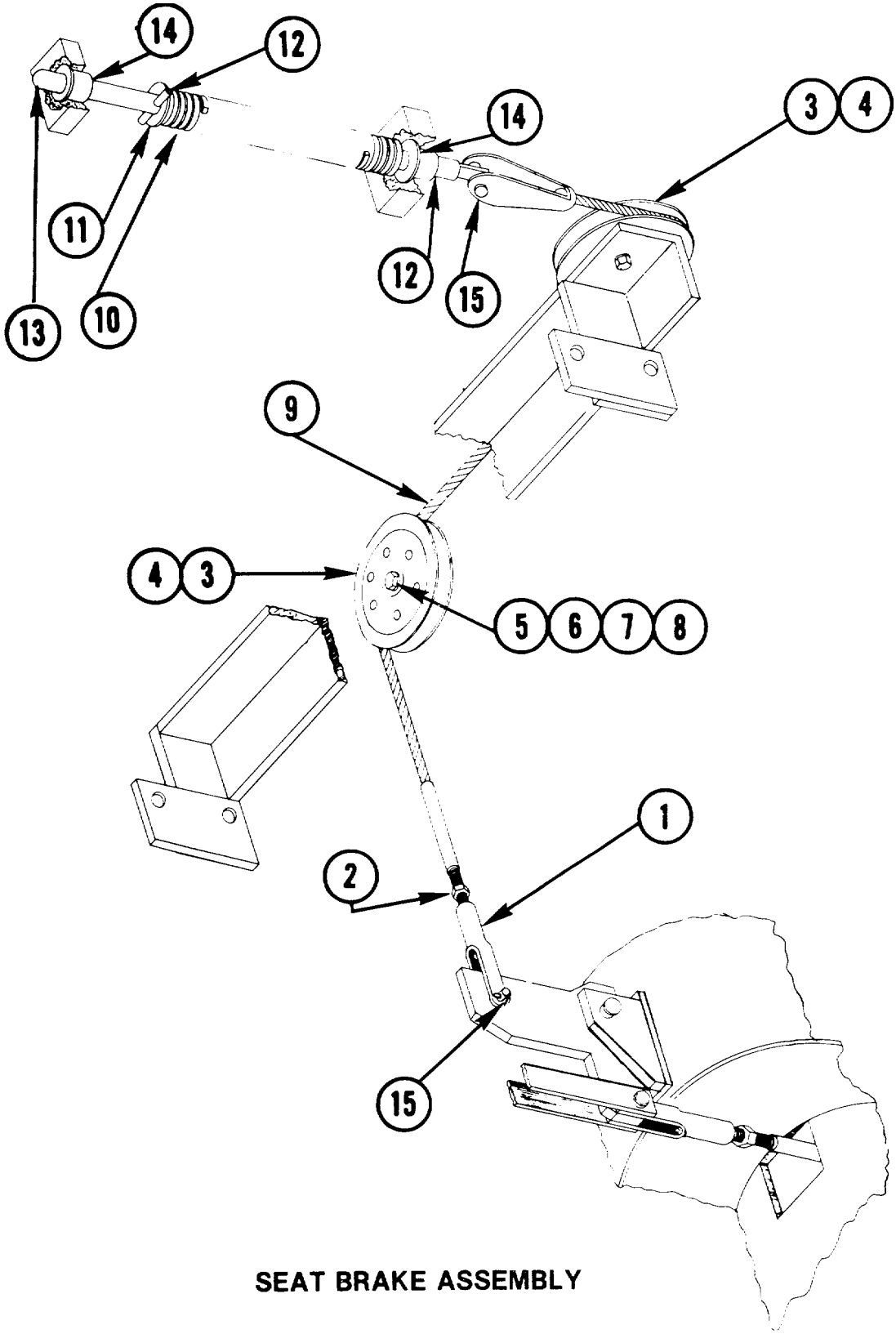
PARTS BREAKDOWN



BRAKE ASSEMBLY (PARKING)-PART NO. - 5034

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25005	1	Plate, backing
-2	25003	2	Spring
-3	25135	2	Lining Assembly, Shoe
-4	25004	2	Spring
-5	25006	REF	Kit, Parking brake, (consists of items 2, 3, 4)

PARTS BREAKDOWN



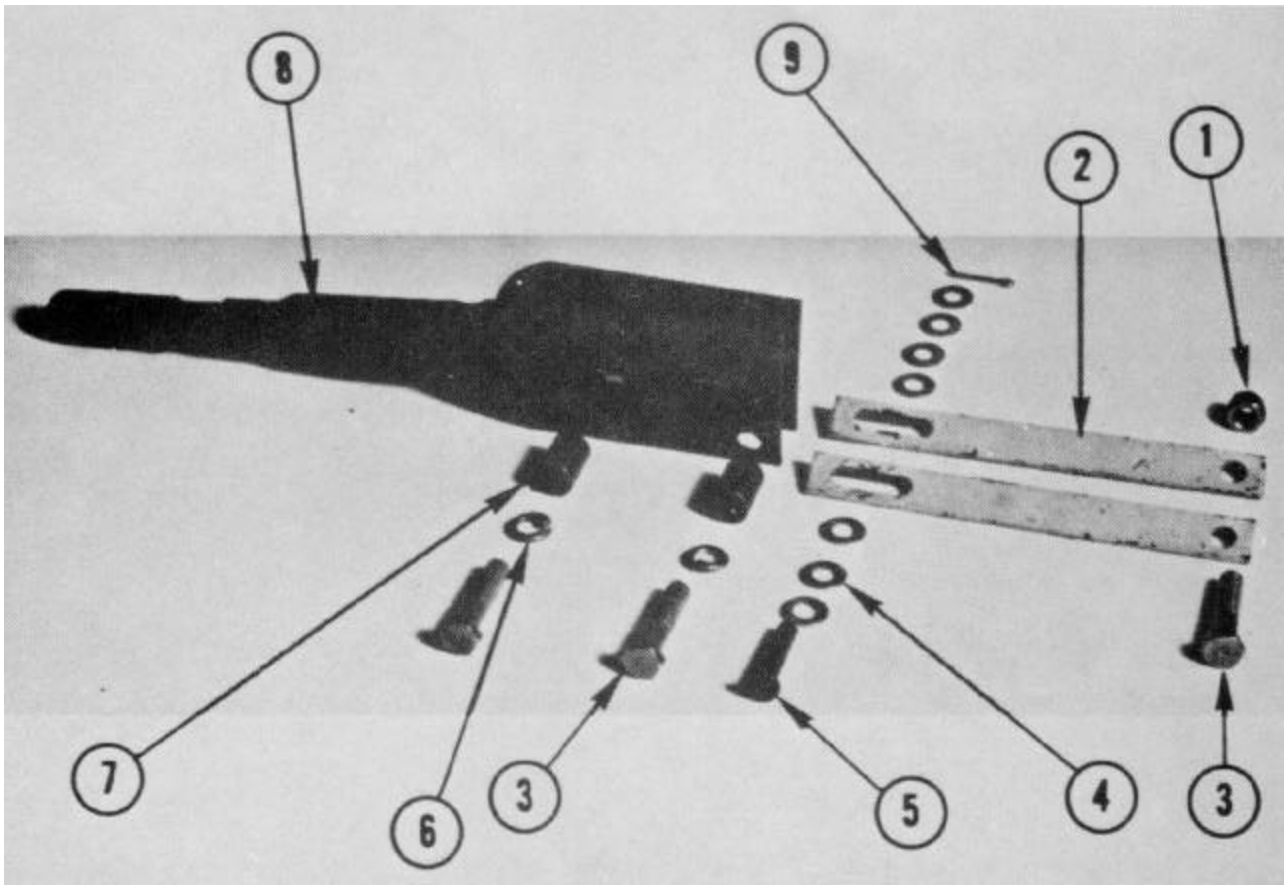
SEAT BRAKE ASSEMBLY

PARTS BREAKDOWN

SEAT BRAKE ASSEMBLY

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25032	1	Yoke
-2	MS35690-522	1	Nut, Hex. (5/16-24 UNF-2B)
-3	6840	2	Clip, Cable Retaining (Not Shown)
-4	25031	2	Sheave, Wire Rope
-5	MS35690-602	2	Nut, Hex. (3/8-16 UNC-2B)
-6	AN935-616	2	Lockwasher (3/8)
-7	MS90725-64	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 1-1/2 LG)
-8	MS27183-14	2	Washer, Flat (3/8)
-9	8874-3	1	Cable, Brake
-10	25030	1	Spring
-11	MS27183-18	1	Washer, Flat (1/2)
-12	MS9048-171	2	Pin, Spring (3/16 Dia. x 1-1/8 LG)
-13	10960	1	Rod
-14	25033	2	Bearing
-15	25615	2	Pin, Clevis, w/cott. pin (5/16 Dia x 3/4 eff. Lgth.)

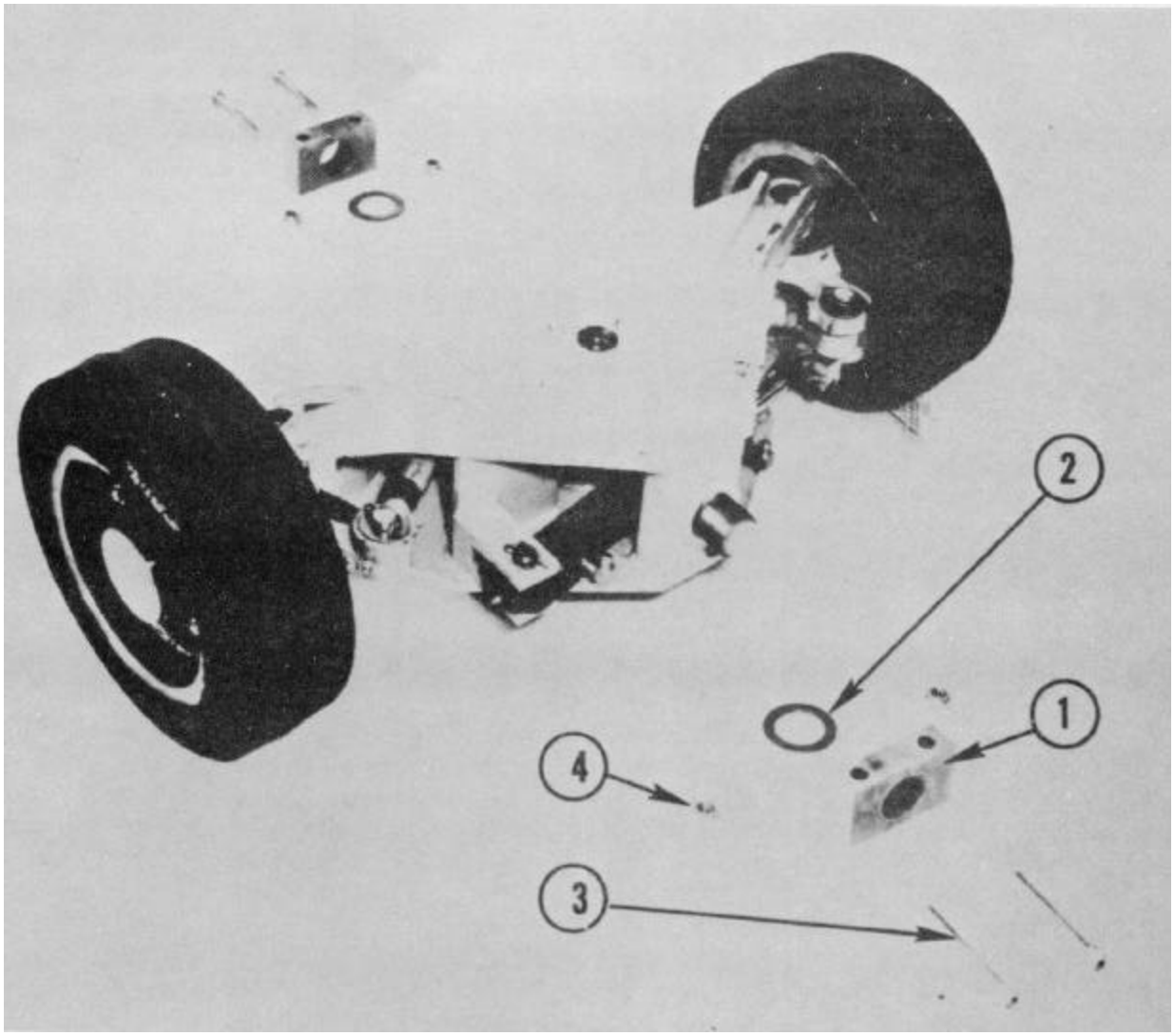
PARTS BREAKDOWN



PARKING BRAKE LEVER AND LINKAGE

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS51922-17	1	Nut, Hex., Self-Locking (3/8-16 UNC-2B)
-2	11080	2	Link, Brake Lever
-3	MS90725-66	3	Screw, Hex. Hd. (3/8-16 UNC-2A x 2" LG)
-4	MS27183-12	7	Washer, Flat (5/16)
-5	25609	1	Pin, Clevis (5/16 DIA x 1-17/64 EFF. LGTH)
-6	AN935-616	2	Lockwasher (3/8)
-7	25610	2	Spacer
-8	25171	1	Hand Brake Lever
-9	MS24665-300	1	Pin, Cotter (3/32 DIA x 3/4 LG)

PARTS BREAKDOWN



STEER AXLE MOUNTING GROUP

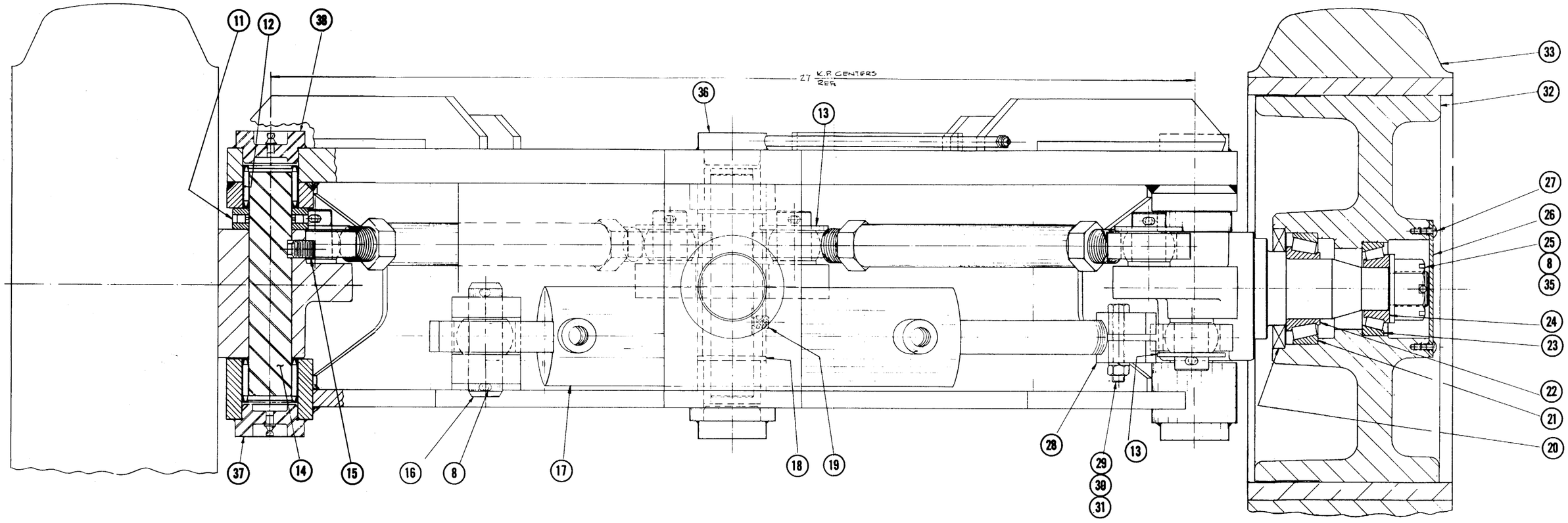
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10514	2	Steer Axle Support Block
-2	25123	2	Thrust Bearing
-3	MS16997-176	4	Cap Screw, Soc. Hd. (5/8-11 UNC-3A x 4-1/2 LG)
-4	25124	4	Nut, Flex Loc. (Heavy Duty) (5/8-11)

PARTS BREAKDOWN

STEER AXLE PART NO. - 14221

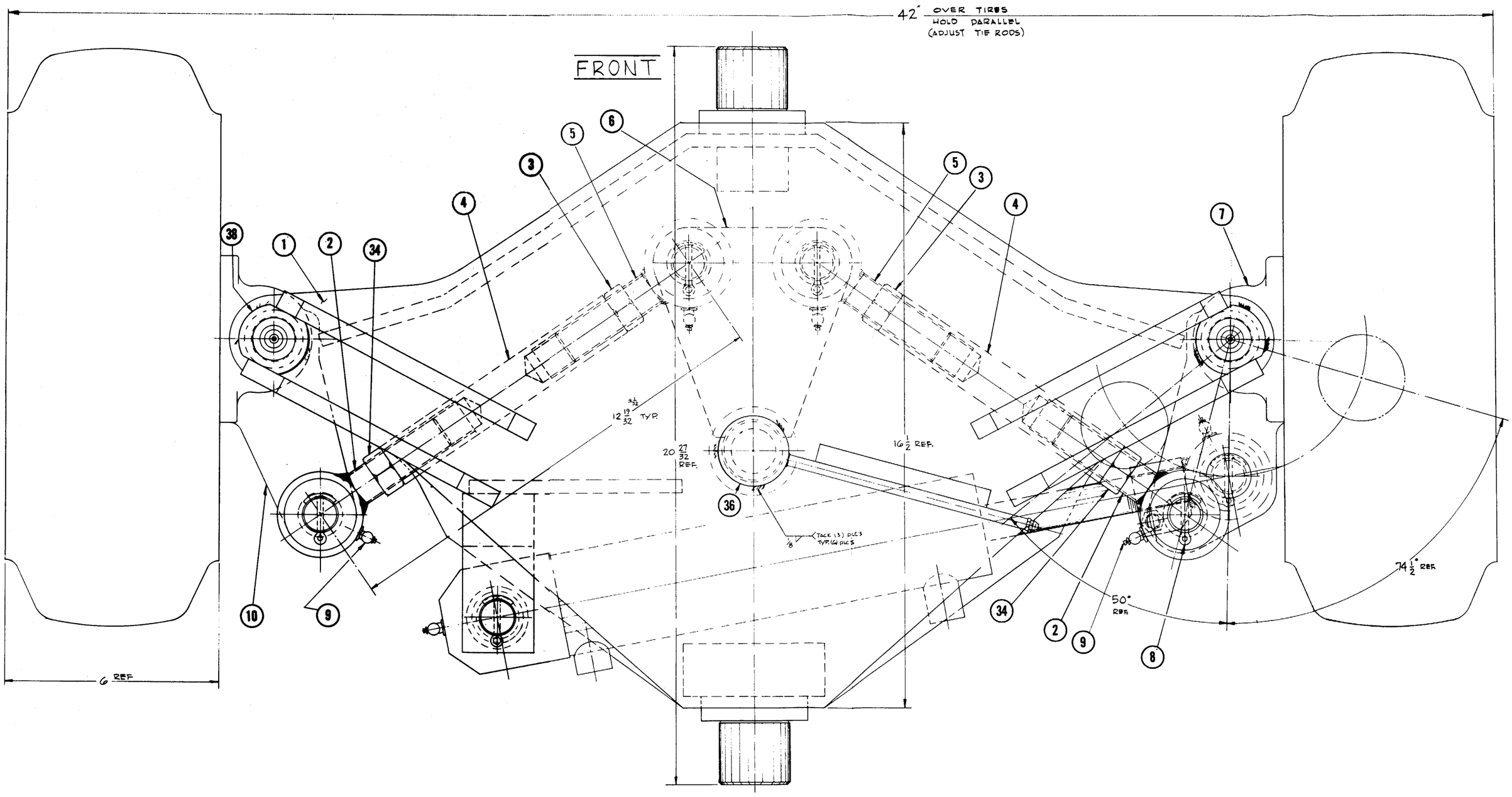
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	14225	1	Axle (Weldment)
-2	10898	2	Tie Rod End, RH Th'd
-3	4821-02	2	Nut, LH Th'd
-4	10895	2	Spacer, Tie Rod
-5	10897	2	Tie Rod End, LH Th'd
-6	10831	1	Bell Crank (Weldment)
-7	14224	1	Spindle, RH
-8	MS24665-513	9	Pin, Cotter (3/16 Dia. x 11/2" Lg)
-9	MS15003-1	4	Fitting, Lube, Straight
-10	10827	1	Spindle, LH
-11	25008	2	Thrust Bearing, Roller (11/4 Bore)
-12	25153	6	Bearing, Needle
-13	MS27183-27	5	Washer, Flat (1" I.D. x 2" O.D. x 1/8)
-14	10894	3	Pin, King
-15	23937	2	Setscrew, Soc. Half Dog Point (1/2-13 x 3/4 Lg)
-16	8537	1	Pin, Cylinder Mounting
-17	8212-03	1	Steer Cylinder Assembly
-18	25009	2	Bearing, Thrust
-19	MS51017-103	1	Setscrew, Soc., Cup Point (3/8-16 UNC-3A x 1/2 Lg)
-20	25010	2	Seal, Oil
-21	25011	2	Cup, Roller Bearing
-22	25012	2	Cone, Roller Bearing
-23	25013	2	Cup, Roller Bearing
-24	25014	2	Cone, Roller Bearing
-25	50364	2	Nut, Fin., Hex Slotted (1"-14 UNF x 7/8 Thk)
-26	7173	2	Cover, Hub
-27	AN520-10-6	8	Screw, Mach., RD. HD. Recessed (#10-32 NF-2A x 3/8 Lg)
-28	8532	1	Rod End, Cylinder
-29	MS16997-101	1	Screw, Cap, Soc. HD. (3/8-16 UNC-3A x 11/2 Lg)
-30	AN935-616	1	Lockwasher (3/8)
-31	MS35690-602	1	Nut (3/8-16 UNC-2B)
-32	11887-01	2	Wheel
-33	50331	2	Tire (161/4 x 6 x 11 '4)
-34	4821-01	2	Nut, RH Th'd
-35	7443	2	Washer, Flat
-36	11346	1	Cap, Grease
-37	11348	3	Cap, Grease
-38	11350	2	Cap, Grease

PARTS BREAKDOWN



STEER AXLE PART NO. - 14221

PARTS BREAKDOWN

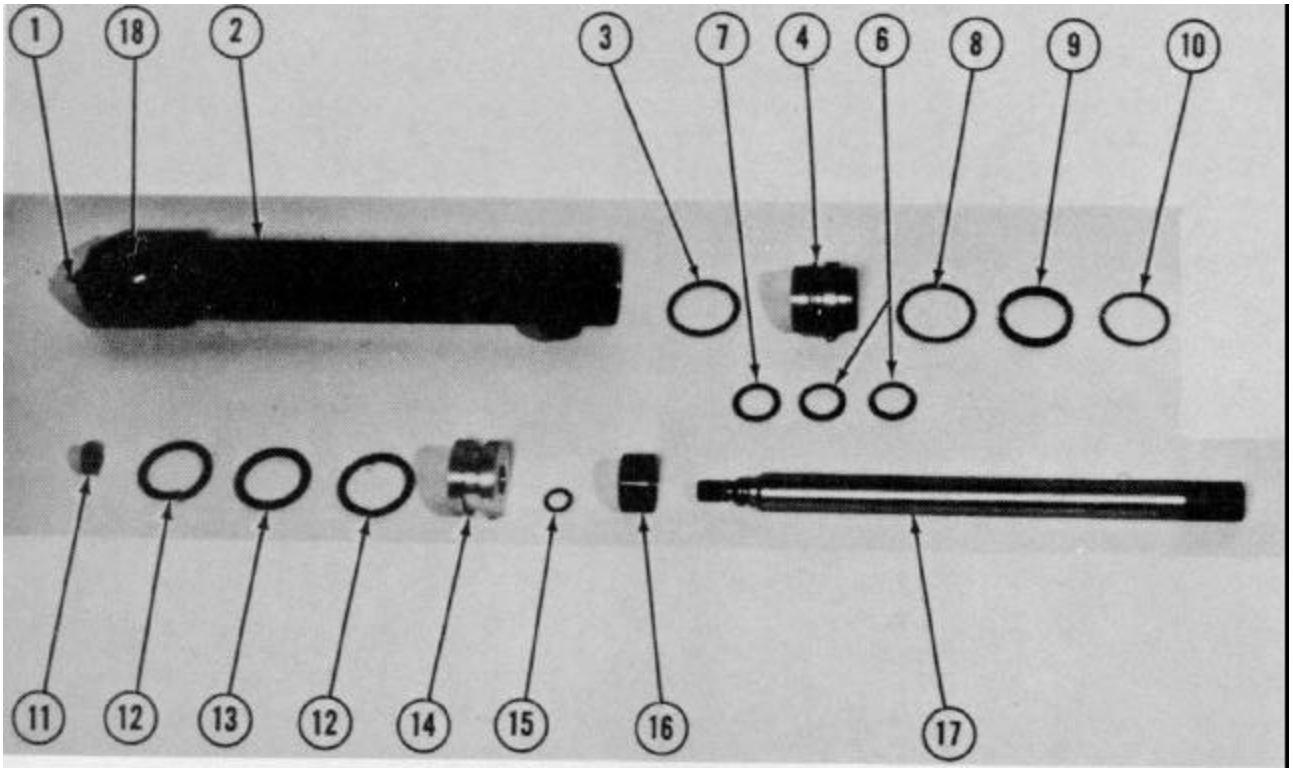


STEER AXLE PART NO. - 14221

PARTS BREAKDOWN

WARNING

WHEN REPLACING THIS CYLINDER ASSEMBLY REMOVE INTERNAL SPACERS, IF ANY, AND INSTALL IN REPLACEMENT CYLINDER. IF SPACERS ARE NOT REUSABLE, CONSULT FACTORY FOR PROPER SPACERS.



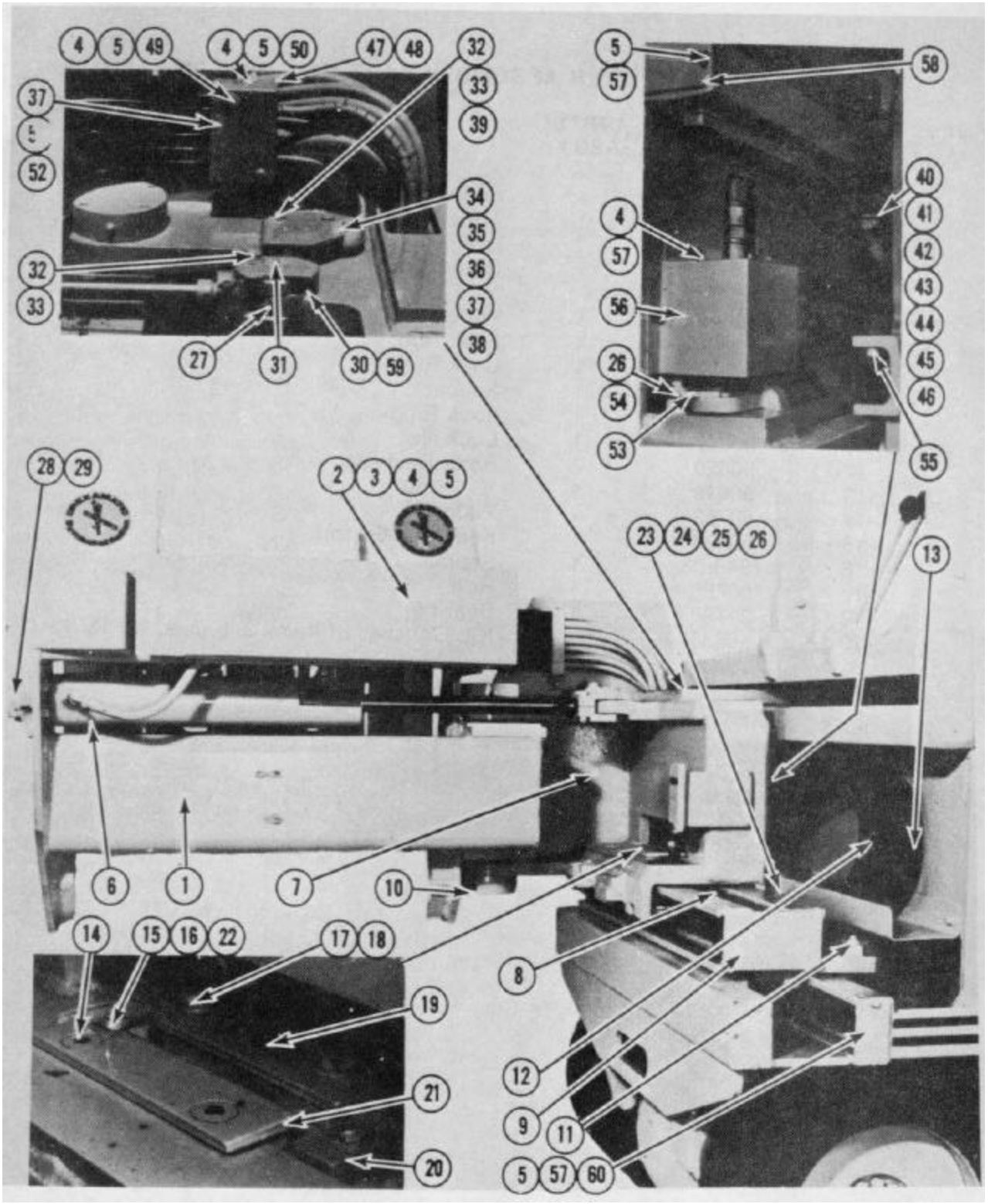
STEER CYLINDER ASSEMBLY PART NO. -- 8212-03

PARTS BREAKDOWN

STEER CYLINDER ASSEMBLY PART NO. - 8212-03

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS15003-1	1	Fitting, Lub., Straight (1/8 NPT)
-2	50754	1	Tube Assembly
-3	50622	1	Seal, Gland
-4	50621	1	Gland/Bushing
-5			NOT USED
-6	50624	1	Wiper, Rod
-7	50623	1	Seal, Rod
-8	50629	1	Lock Ring
-9	50626	1	Spacer
-10	50630	1	Lock Ring
-11	50627	1	Lock Nut
-12	50620	2	Ring, Back-Up
-13	50619	1	"O" Ring
-14	50753	1	Piston
-15	50628	1	Seal, Rod-Piston
-16	7840-06	1	Spacer
-17	50755	1	Rod
-18	21190	1	Bearing
-19	50633	1	Kit, Consists of Items 3, 6, 7, 8, 12, 13, 15

PARTS BREAKDOWN



PIVOT AND SIDE SHIFT ASSEMBLY PART NO.-14234

PARTS BREAKDOWN

PIVOT AND SIDE SHIFT ASSEMBLY PART NO. - 14234

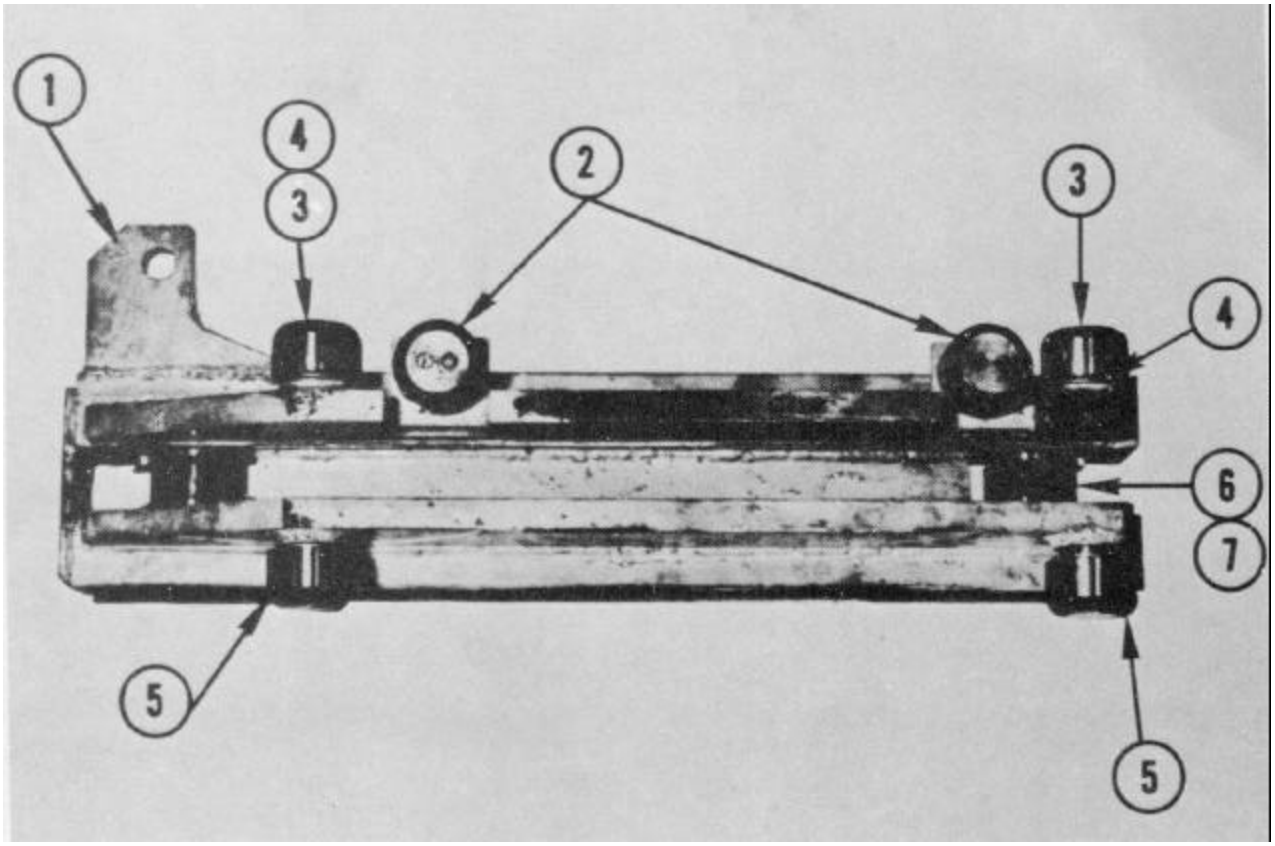
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	14009	1	Pivot, Arm (Weldment)
-2	14042	1	Cover, Pivot Arm
-3	MS90725-10	2	Screw, Cap, Hex. Head (1/4-20UNC-2A x 1-1/4 Lg)
-4	MS27183-10	4	Washer, Flat (1/4)
-5	AN935-416	8	Washer, Split, Lock (1/4)
-6	10864	1	Cylinder, Pivot
-7	10787	1	Crosshead (Weldment)
-8	25016	1	Chain Group
-9	10744	1	Slide, Telescoping
-10	9237	1	Assembly, Pivot Shaft
-11	11212-03	1	Cylinder, Shift
-12	10983	1	Umbilical Assembly, Tilt, Pivot, Shift
-13	11266	1	Hose Assembly, Umbilical, Lift and Elec.
-14	MS24667-74	2	Screw, Flt. Hd., CSK (1/2-13 UNC-2A x 1" Lg)
-15	MS35691-602	REF	Nut, Jam, Hex. (3/8-16 UNC-2B)
-16	MS51017-105	REF	Setscrew, Soc., Cup Point (3/8-16 UNC-2A x 3/4 Lg)
-17	MS90725-109	2	Screw, Hex. Hd. (1/2-13 UNC-2A x 1" Lg)
-18	AN935-816	2	Lockwasher (1/2)
-19	10852	1	Hold-down (Rear)
-20	11341	REF	Block, Adj.
-21	10851	2	Hold-down (Fwd.)
-22	11342	REF	Insert
-23	10943	1	Tray, Umbilical
-24	25616	3	Screw, BTNHD, Hex. Soc. (5/16-18 NC x 5/8 Lg)
-25	MS27183-12	3	Washer, Flat (5/16)
-26	AN935-516	3	Lockwasher (5/16)
-27	10708	1	Bearing
-28	5039-1	1	Pin, Cylinder
-29	MS24665-513	2	Pin, Cotter (3/16 x 1-1/2 Lg)
-30	14033	1	Pin, Pivot Cam
-31	MS15003-1	1	Fitting, Lube
-32	AN935-616	3	Lockwasher (3/8)
-33	MS90725-58	3	Screw, Hex. Hd. (3/8-16 NC x 3/4 Lg)
-34	25600	1	Switch, Pivot
-35	4281-01	1	Retainer
-36	AN515-6-20	2	Screw, Rd. Hd. (#6-32 NC x 1-1/4 Lg)
-37	MS35333-20	4	Lockwasher, Int. Tooth (#6)
-38	14032	1	Bracket, Switch
-39	MS27183-14	2	Washer, Flat (3/8)
-40	25058	1	Switch, Shift

PARTS BREAKDOWN

PIVOT AND SIDE SHIFT ASSEMBLY PART NO. - 14234

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-41	25681	1	Arm, Lever (Not Shown)
-42	MS35224-68	1	Screw, Pan Hd. (#10-32 NF x 1-1/4 Lg) (Not Shown)
-43	MS35224-69	1	Screw, Pan Hd. (#10-32 NFx1-1/2 Lg) (Not Shown)
-44	MS27183-9	2	Washer, Flat (#10) (Not Shown)
-45	AN935-10	2	Lockwasher (#10) (Not Shown)
-46	MS35650-102	2	Nut, Hex. (#10-32 NF-2B) (Not Shown)
-47	11229	1	Cover, Junction Box
-48	11231	1	Box, Junction
-49	MS90725-14	2	Screw, Hex. Hd. (1/4-20UNC-2A x 2" Lg)
-50	MS90725-3	2	Screw, Hex. Hd. (1/4-20UNC-2A x 1/2" Lg)
-51	25087	1	Strip, Terminal
-52	MS35223-30	2	Screw, Pan Hd. (#6-32NC-2A x 1/2 Lg)
-53	11188	2	Pin, Fixed
-54	MS90725-32	2	Screw, Hex. Hd. (5/16-18UNC-2A x 3/4 Lg)
-55	MS35457-98	6	Screw, Soc. Hd. (1/2-13UNC-3A x 1/2 Lg)
-56	11079	1	Cover
-57	MS90725-6	8	Screw, Hex. Hd. (1/4-20UNC-2A x 3/4 Lg.)
-58	10735	1	Cap, End
-59	9934-01	1	Pin, Pivot, Fixed
-60	10728	2	Cap, Fixed Guide End

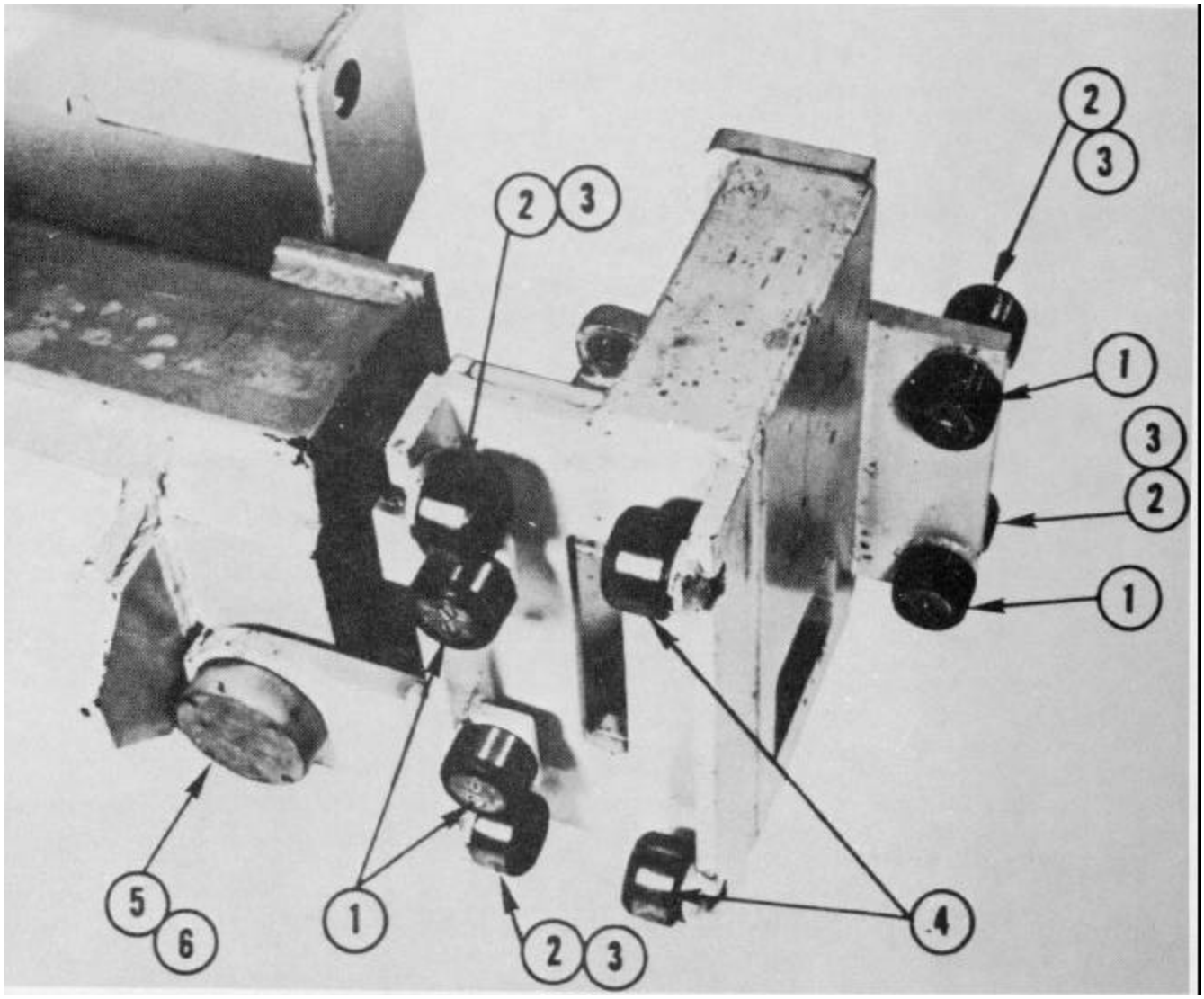
PARTS BREAKDOWN



TELESCOPING SLIDE ASSEMBLY PART NO. - 25174

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10744	1	Slide, Telescoping
-2	25176	2	Bearing Assembly
-3	7971	2	Bearing, Roller
-4	25017	2	Washer, Thrust
-5	25177	2	Bearing Assembly
-6	8210	2	Follower, Cam
-7	10866	2	Shaft

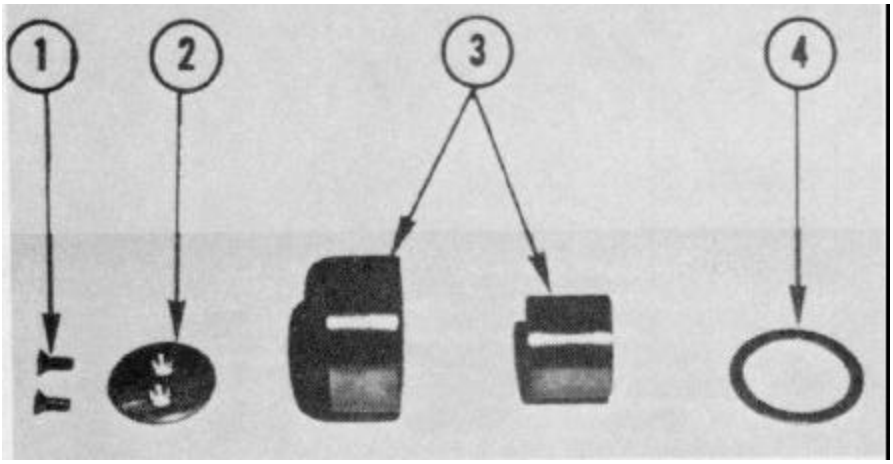
PARTS BREAKDOWN



CROSSHEAD ASSEMBLY PART NO. - 25175

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25176	4	Bearing Assembly
-2	25017	4	Washer, Thrust
-3	7971	4	Bearing, Roller
-4	25177	2	Bearing Assembly
-5	5510-2	REF	Cover (Pivot Shaft)
-6	MS16997-65	REF	Screw, Soc., Hd. (1/4-20 UNC-3A x 1-3/4 LG)

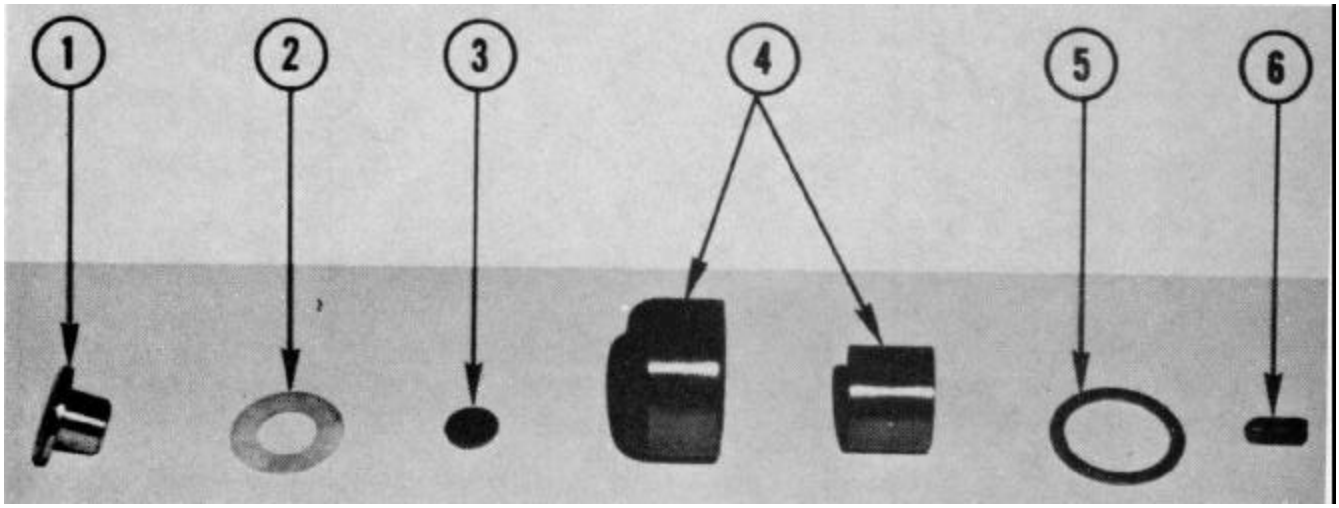
PARTS BREAKDOWN



BEARING ASSEMBLY - SIDE THRUST - PART NO. - 25176

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS24667-29	2	Screw, Flt. Hd. (1/4-20 UNC-3A x 5/8 LG)
-2	10817	1	Retainer, Roller
-3	7971	1	Bearing, Roller
-4	25017	1	Washer, Thrust

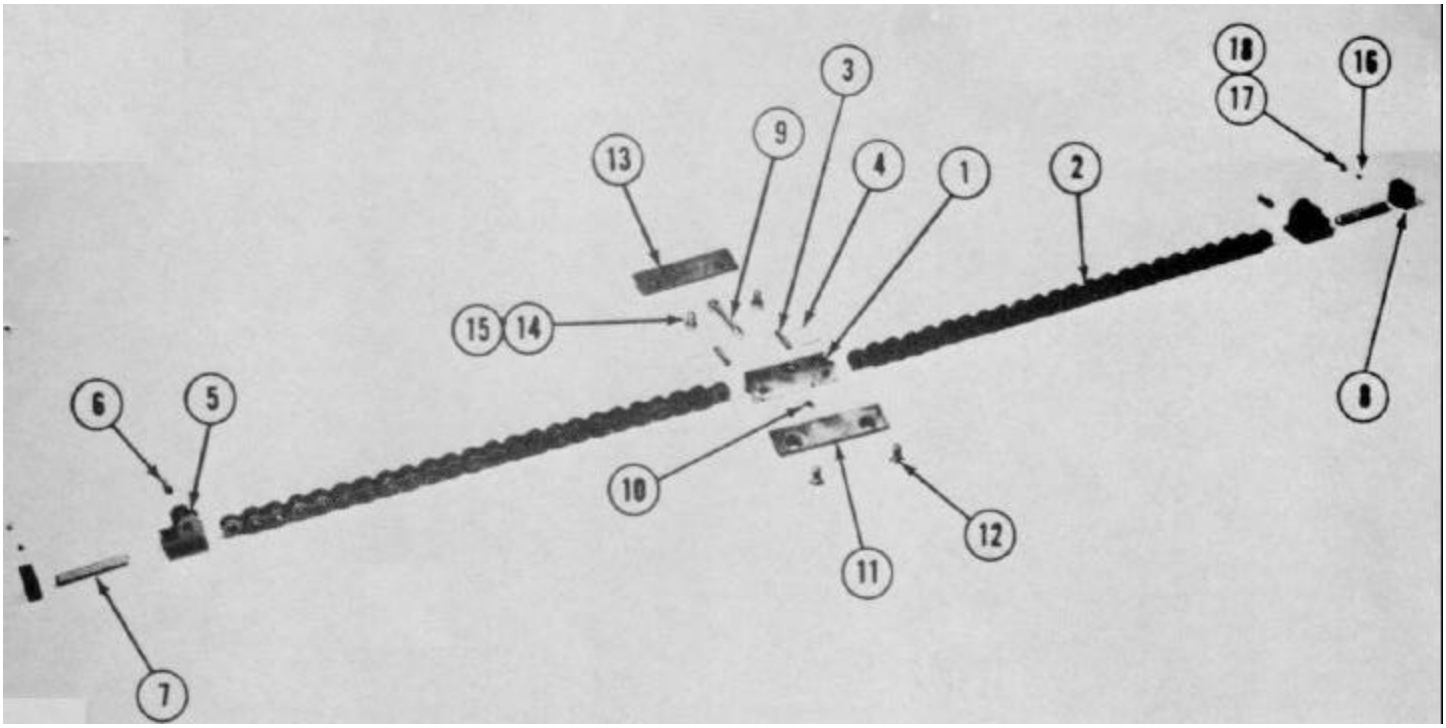
PARTS BREAKDOWN



BEARING ASSEMBLY - VERTICAL LOADING - PART NO. - 25177

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	6709	1	Bearing, Side
-2	6623	1	Cover, Dust (Roller)
-3	14018-14	1	Disc
-4	7971	1	Bearing, Roller
-5	25017	1	Washer, Thrust
-6	23938	1	Setscrew, Soc. (Nyloc) (1/2-13 UNC-3A x 1'" LG)

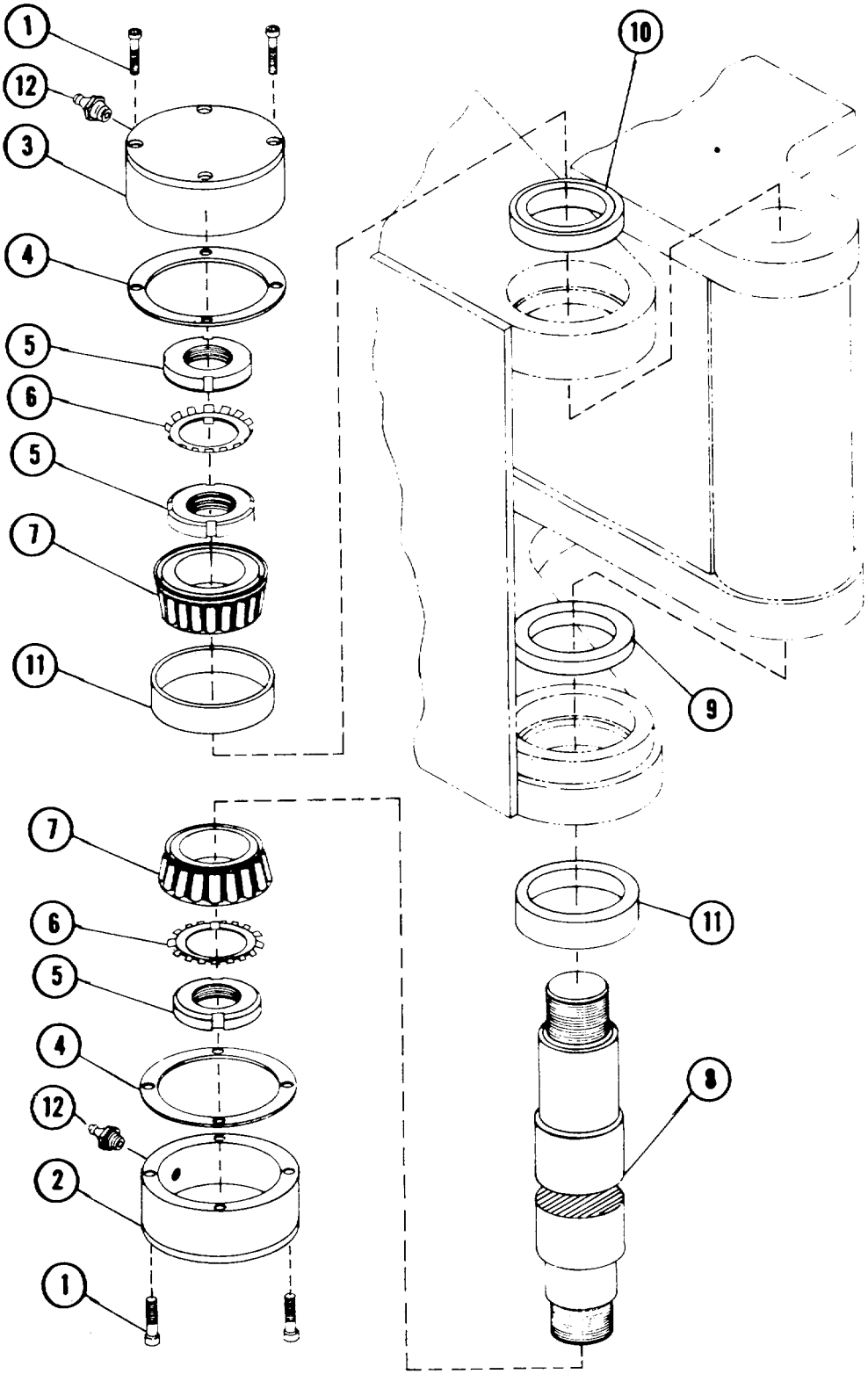
PARTS BREAKDOWN



CHAIN GROUP, SIDE SHIFT PART NO. - 23700

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	7859	1	Anchor Chain
-2	25016	2	Chain, leaf
-3	5364-03	2	Pin, chain
-4	MS24665-155	4	Pin, Cotter(1/16 DIA x 1 " LG)
-5	10836	2	Block, chain tension
-6	23702	2	Pin, dowel
-7	50334	2	Setscrew, Soc. (Special)
-8	11341	2	Block, Adj.
-9	MS16638-50	1	Screw, soc. hd. shoulder (5/8 DIA x 3 LG x 1/2-13 UNC-3A x 3/4)
-10	MS51922-33	REF	Nut, Hex., Self-Locking (1/2-13 UNC-2A)
-11	10851	REF	Hold-down (FWD)
-12	MS24667-74	REF	Screw, Flt. Hd., CSK (1/2-13 UNC-2A x 1" LG)
-13	10852	REF	Hold-down (RR)
-14	AN935-816	REF	Lockwasher, Spring (3/8)
-15	MS90725-109	REF	Screw, Hex. Hd. (1/2-13 UNC-2A x 1" LG)
-16	11342	2	Insert
-17	MS35691-602	2	Nut, Jam, Hex. (3/8-16 UNC-2B)(Not Shown)
-18	MS51017-105	2	Setscrew, Soc., Cup Point (3/8-16 UNC-2A x 3/4 LG)

PARTS BREAKDOWN



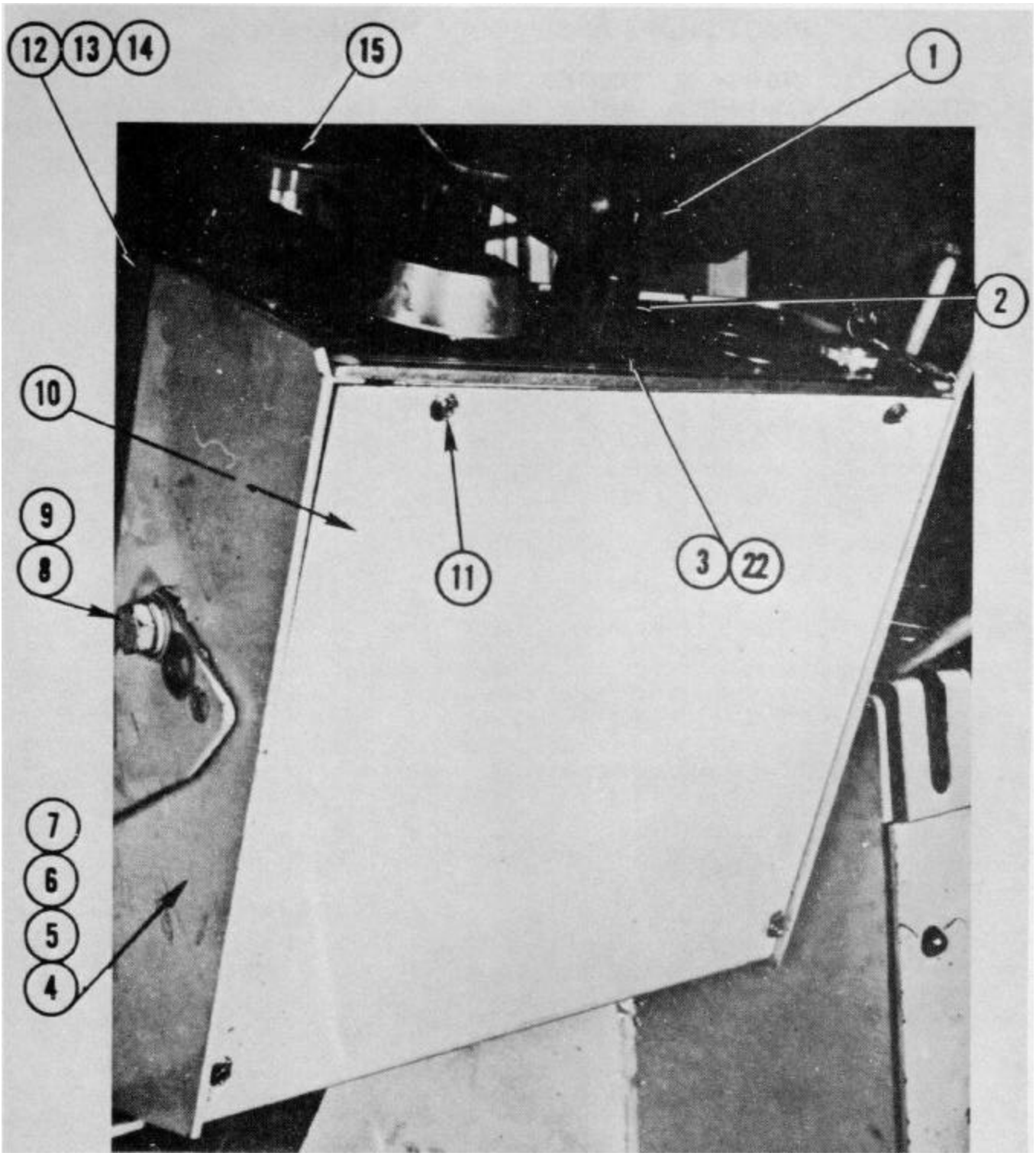
PIVOT SHAFT ASSEMBLY PART NO. - 9237

PARTS BREAKDOWN

PIVOT SHAFT ASSEMBLY PART NO. - 9237

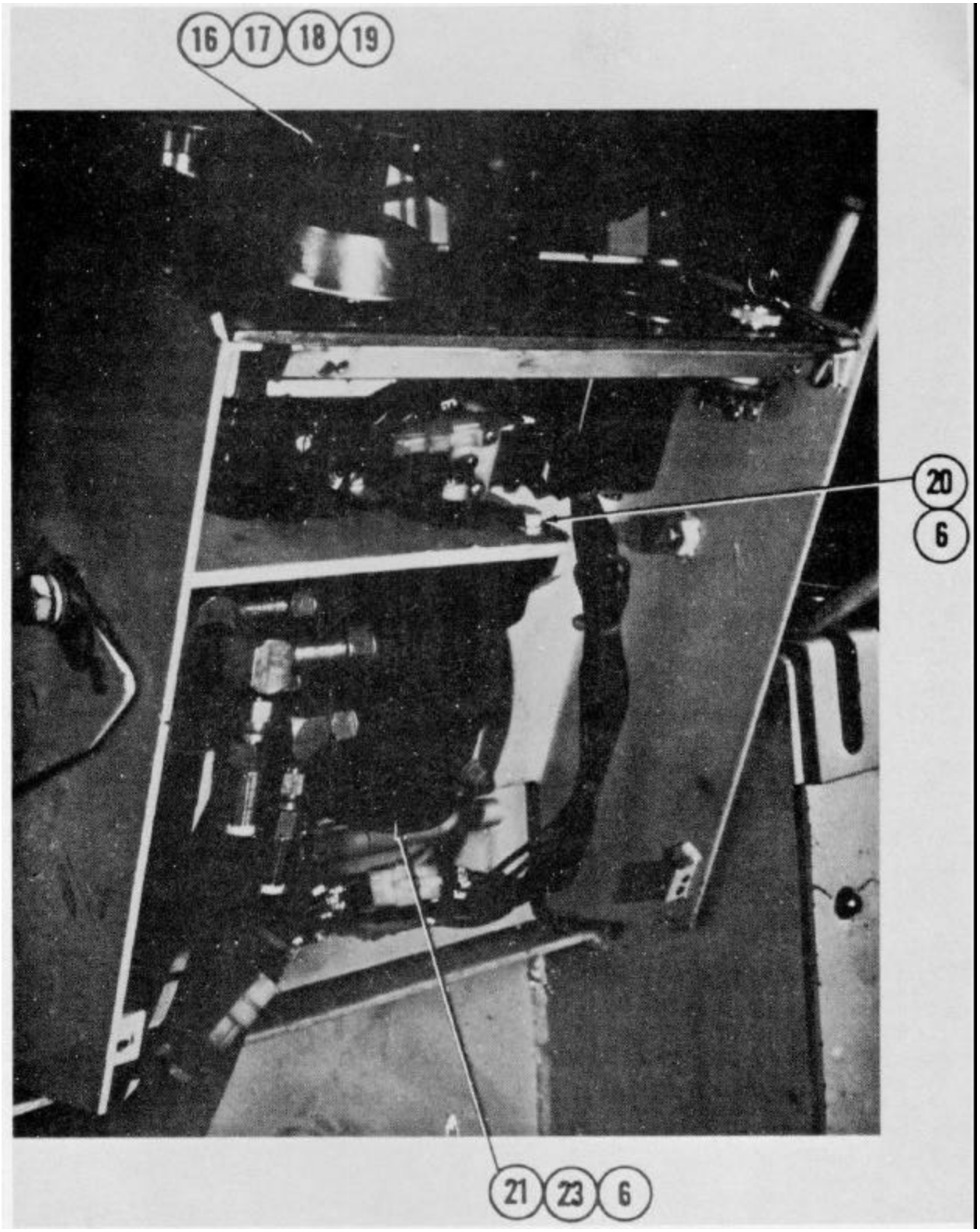
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS16997-65	8	Screw, Soc., HD (1/4-20 UNC-3A x 1-3/4 LG)
-2/-3	5510-2	2	Dust Cover
-4	5438	2	Gasket
-5	25154	3	Locknut, Bearing
-6	25155	2	Lockwasher, Bearing
-7	25151	2	Cone, Roller Bearing
-8	5423	1	Pivot Shaft
-9	9236	1	Spacer
-10	9235	1	Spacer
-11	25152	2	Cup, Roller Bearing
-12	MS15002-1	2	Lube fitting, straight

PARTS BREAKDOWN



CONSOLE ASSEMBLY PART NO. - 14038

PARTS BREAKDOWN



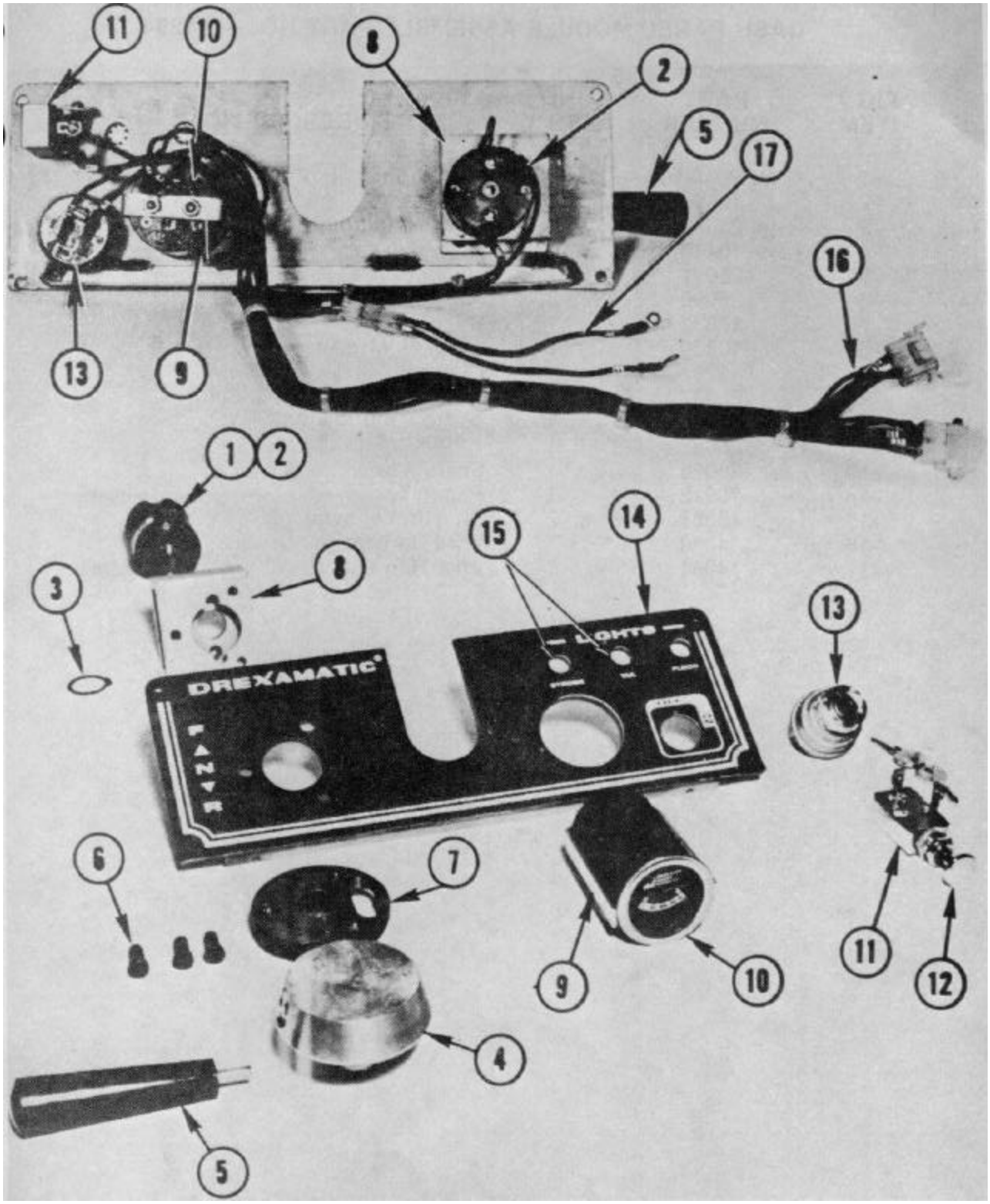
CONSOLE ASSEMBLY PART NO. - 14038

PARTS BREAKDOWN

CONSOLE ASSEMBLY PART NO. - 14038

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10441	1	Steering Wheel Assembly
-2	25040	1	Column, Steering
-3	10838	1	Module, Dash Panel
-4	14037	1	Console
-5	MS35690-602	3	Nut, Hex. (3/8-16 UNC-2B)
-6	AN935-616	7	Lockwasher (3/8)
-7	MS27183-14	3	Washer, Flat (3/8)
-8	MS90725-111	2	Screw, Hex. Hd. (1/2-13 UNC-2A x 1-1/4 LG)
-9	AN935-816	2	Lockwasher (1/2)
-10	10910	1	Cover
-11	10840-11	4	Screw, Self-Tapping, Hex. Hd. (with washer) Type A - (#10 x 3/8 LG)
-12	14013	1	Box
-13	AN935-416	4	Lockwasher (1/4)
-14	MS35225-79	4	Screw, Pan Hd. (1/4-20 UNC-2A x 1/2 LG)
-15	25093	1	Switch, Emergency
-16	25067	1	Indicator, Filter
-17	MS35650-102	2	Nut, Hex. (#10-32 UNF-2B)
-18	AN935-10	2	Lockwasher (#10)
-19	MS35224-67	2	Screw, Pan Hd. (#10-32 UNF-2A x 1" LG)
-20	MS90725-64	2	Screw, Hex. Hd. (#3/8-16 UNC-2A x 1-1/2 LG)
-21	25700	1	Unit, Orbitrol
-22	25092	4	Rivet
-23	MS90725-60	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 1" LG)

PARTS BREAKDOWN



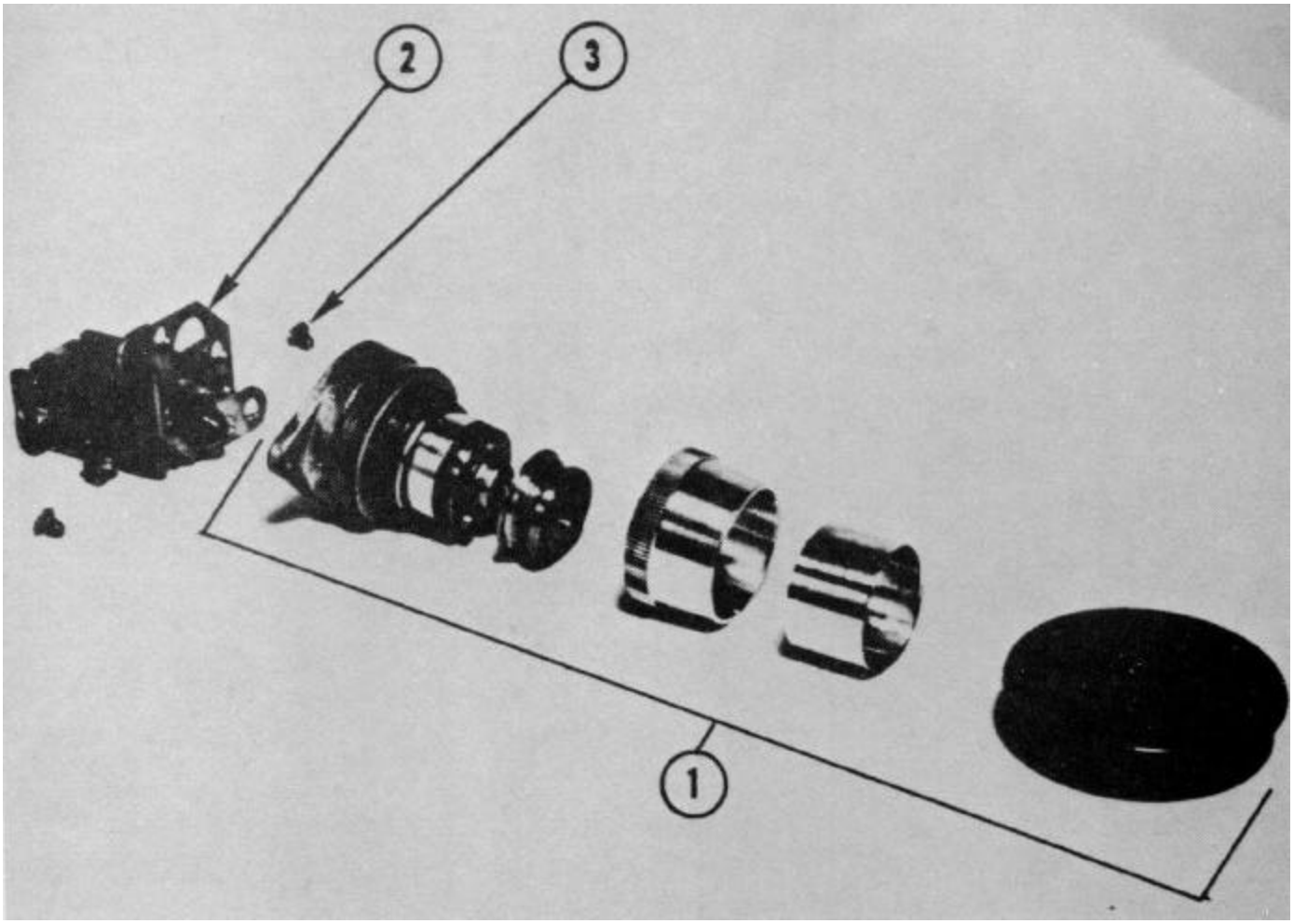
DASH PANEL MODULE ASSEMBLY PART NO. - 11204

PARTS BREAKDOWN

DASH PANEL MODULE ASSEMBLY PART NO. - 11204

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS9048-104	1	Pin, Spring (1/8 DIA x 3/4 LG)
-2	10418	1	Switch
-3	25089	1	Ring, Retaining
-4	10416	1	Body, Lever
-5	25091	1	Handle
-6	25090	3	Screw, Soc. Hd. (Low Hd.)
-7	10332	1	Bushing
-8	10330	1	Bracket, Mtg.
-9	11297	1	Clamp
-10	25037	1	Indicator, Battery Capacitor
-11	25038	1	Switch, Flood Light
-12	25088	1	Knob
-13	25036	1	Switch, Key
-14	10912	1	Panel
-15	25587	2	Plug (not shown)
-16	14060	1	Wire Harness
-17	14061	1	Wire Harness

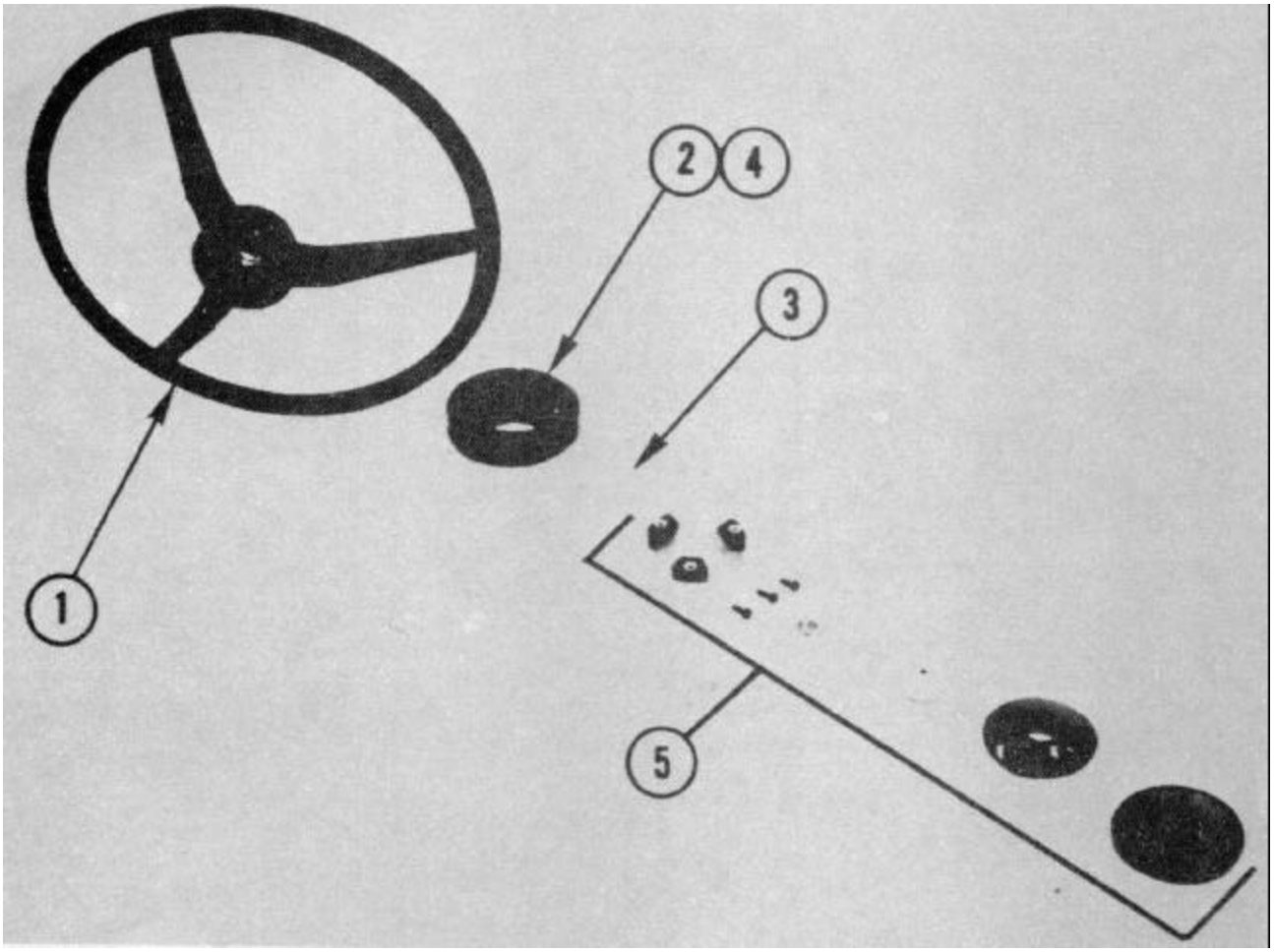
PARTS BREAKDOWN



EMERGENCY SWITCH ASSEMBLY PART NO. - 25093

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25073	1	Pushbutton Assembly
-2	25074	1	Block, Contact
-3	AN505-8-4	2	Screw, Flat Hd. (#8-32 UNC-2A x 1/4 LG)

PARTS BREAKDOWN



STEERING WHEEL ASSEMBLY PART NO. 10441

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	7978	1	Wheel, Steering
-2	7979	1	Adapter, Horn
-3	MS24367-28	3	Screw, Self-tapping, Pan HD (#8 x 11/4 LG)
-4	25095	1	Tape 3/4 Wide
-5	25045	1	Kit, Horn Button

PARTS BREAKDOWN

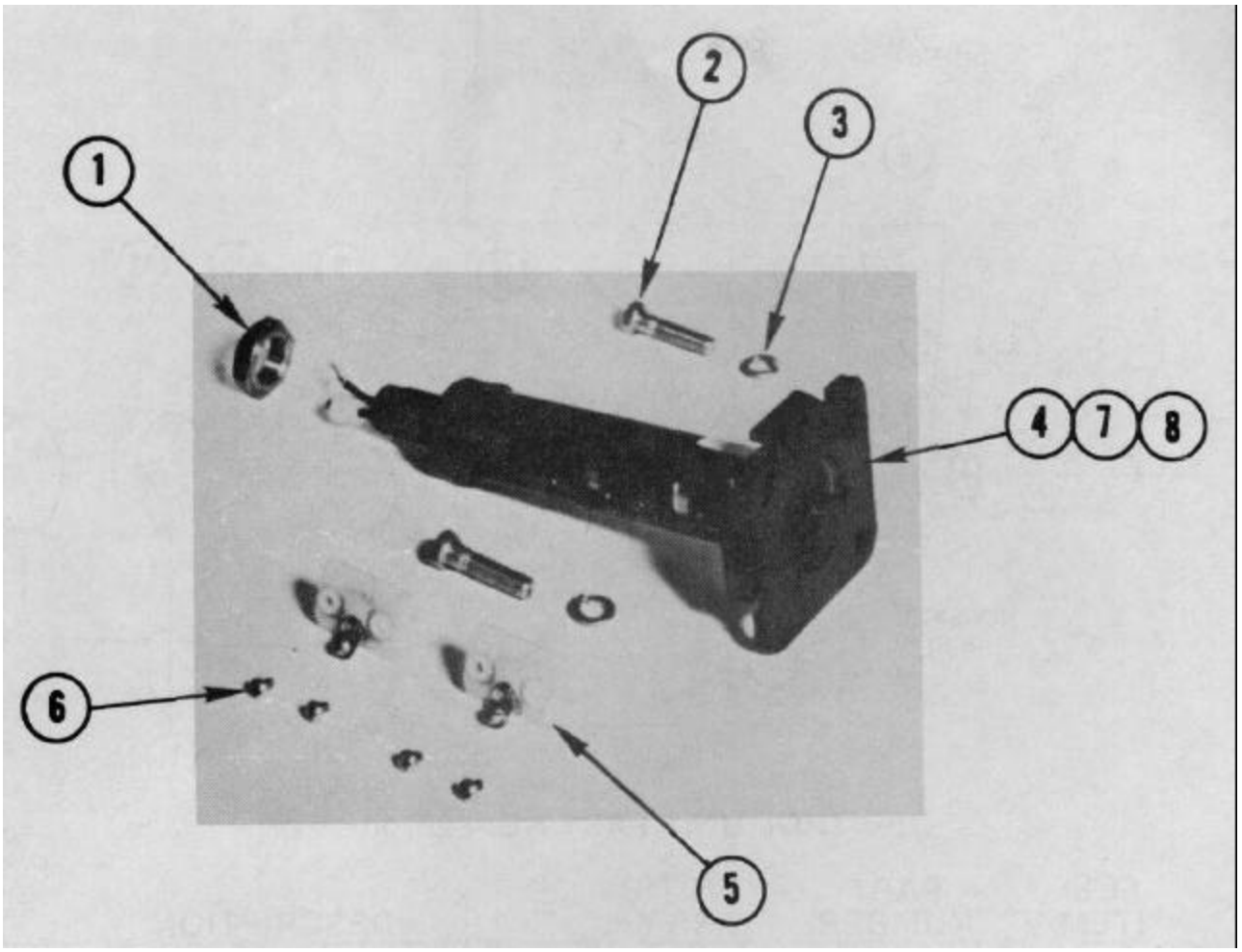
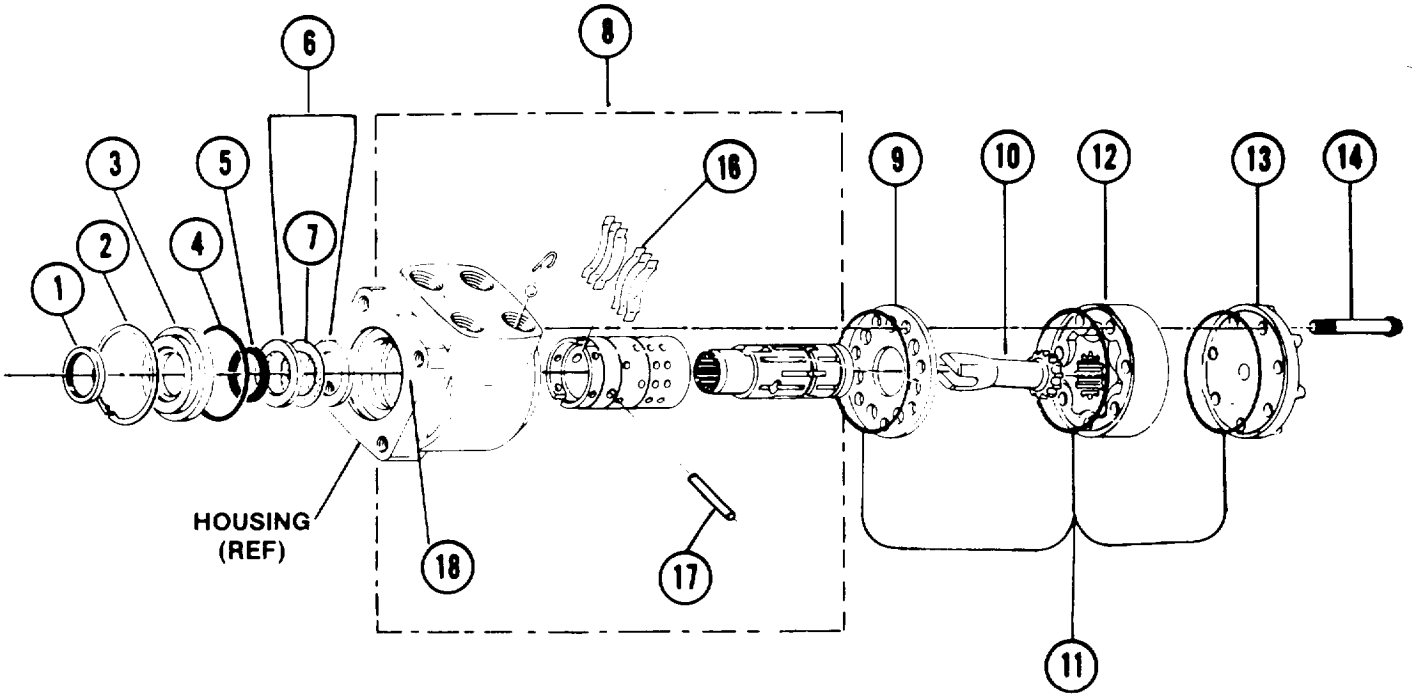


FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25094	1	Nut (Steering Wheel)
-2	MS90725-60	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 1" LG)
-3	AN935-616	2	Lockwasher (3/8)
-4	25613	1	Column, Steering
-5	25612	2	Brush Assembly, Horn
-6	25614	4	Screw, Self-Tapping, RD Hd. (#10-32 NF x 1/4 LG)
-7	25042	1	Ring, Contact
-8	25041	1	Wire Assembly

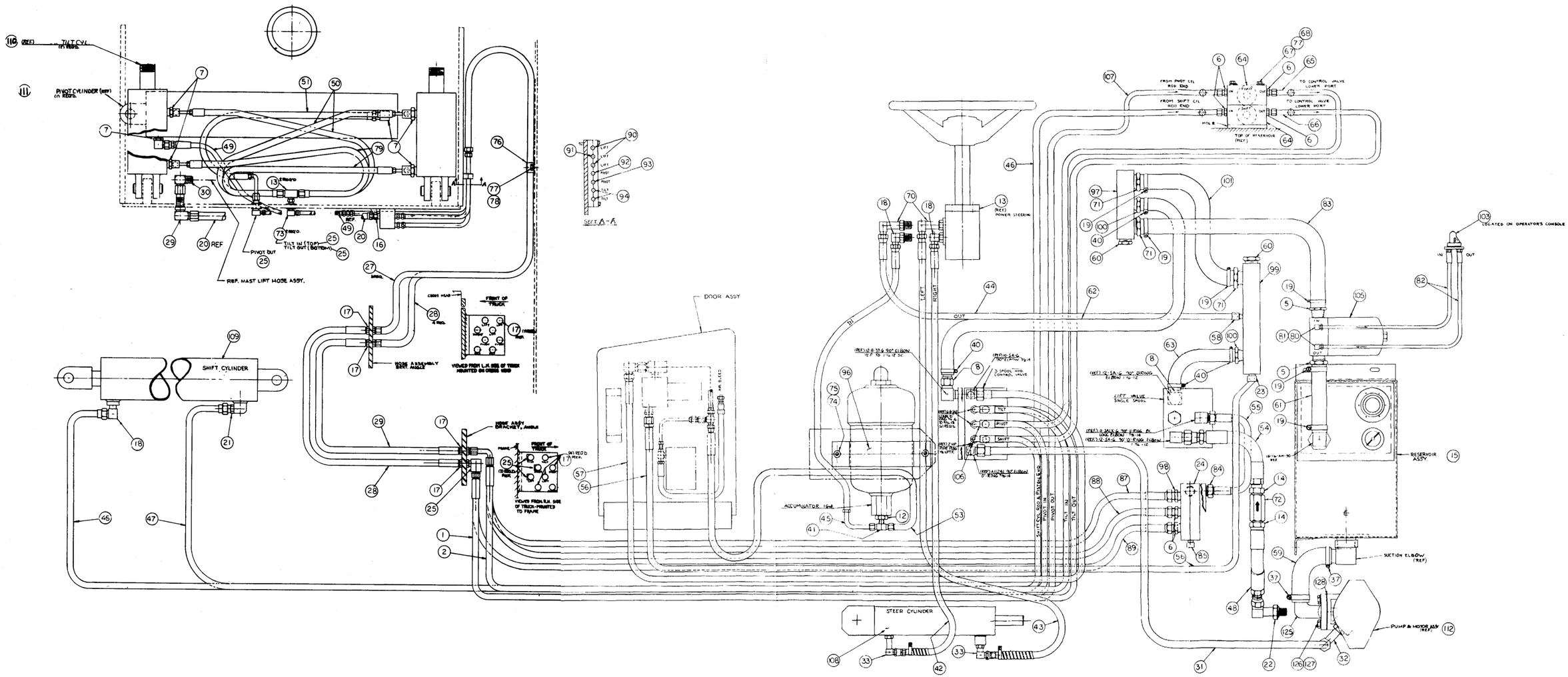
PARTS BREAKDOWN



ORBITROL UNIT PART NO.-25700

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25620	1	Seal, Oil
-2	25621	1	Ring, Snap
-3	25622	1	Bushing, Seal Gland
-4	25623	1	Seal, O-Ring
-5	25624	1	Seal, Quad Ring
-6	25625	2	Race Thrust
-7	25626	1	Bearing, Needle Thrust
-8	25627	1	Control Parts Assembly (NSS)
-9	25628	1	Plate, Spacer
-10	25629	1	Drive
-11	25630	3	Seal
-12	25707	1	Gear Set (Gerotor)
-13	25632	1	Cap, End
-14	25702	7	Screw, Cap-12 Pt Dr (5/16-24 UNF x 1-3/8 LG)
-15	50369	A/R	Kit, Seal (Consists of items 1, 4, 5, 11)
-16	25679	6	Spring, Centering
-17	25678	1	Pin
-18	25680	1	Check Valve (Located in Housing)
-19	25708	1	Spacer (Not Shown)

PARTS BREAKDOWN



HYDRAULIC ASSEMBLY PART NO. - 14196

PARTS BREAKDOWN

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50013-43	1	Hose Assembly
-2	50013-42	1	Hose Assembly
-3			NOT USED
-4			NOT USED
-5	25527	2	Elbow, Hose
-6	25528	6	Connector, Straight
-7	23705	5	Elbow, 90°-O-Ring
-8	25535	2	Fitting, Hose
-9	23703	1	Connector, Straight
-10			NOT USED
-11			NOT USED
-12	9973	1	Plug
-13	23707	2	Tee, Side
-14	25588	2	Elbow, 90°
-15	14004	1	Reservoir Assembly
-16	25506	1	Connector, Straight
-17	25531	11	Connector, Blkhd, Str.
-18	25516	3	Elbow, 90°-O-Ring
-19	25532	6	Clamp, Hose
-20	50361	1	Tube Assembly (Lift Manf/Blkhd Ftg)
-21	25520	1	Connector, Str-O-Ring
-22	25589	1	Elbow, 90°-O-Ring
-23	25547	1	Elbow, 90°
-24	11125-1	1	Manifold
-25	23704	6	Elbow, Blkhd, 90°
-26			NOT USED
-27	50013-29	3	Hose Assembly (Lift/Crosshead)
-28	50013-30	4	Hose Assembly (Tilt and Pivot/Crosshead)
-29	25500	1	Elbow, Swivel
-30	23708	1	Elbow, Bulkhead
-31	50002-027	1	Hose Assembly (Pump/Valve)
-32	25591	1	Elbow, 90°-O-Ring
-33	23706	2	Elbow, LG, 900-O-Ring
-34			NOT USED
-35			NOT USED
-36			NOT USED
-37	25538	2	Clamp Hose
-38	11266	1	Hose Assembly (Quad) (Outer lift)
-39	10983	1	Hose Assembly (Quad) (Inner Tilt/Pivot)
-40	25592	4	Clamp, Hose
-41	25515	1	Tee, Side
-42	50016-01	1	Hose Assembly (Steer/Piston End)
-43	50016-02	1	Hose Assembly (Steer/Rod End)
-44	50013-51	1	Hose Assembly (Steer/Return)

PARTS BREAKDOWN

HYDRAULIC ASSEMBLY PART NO. - 14196

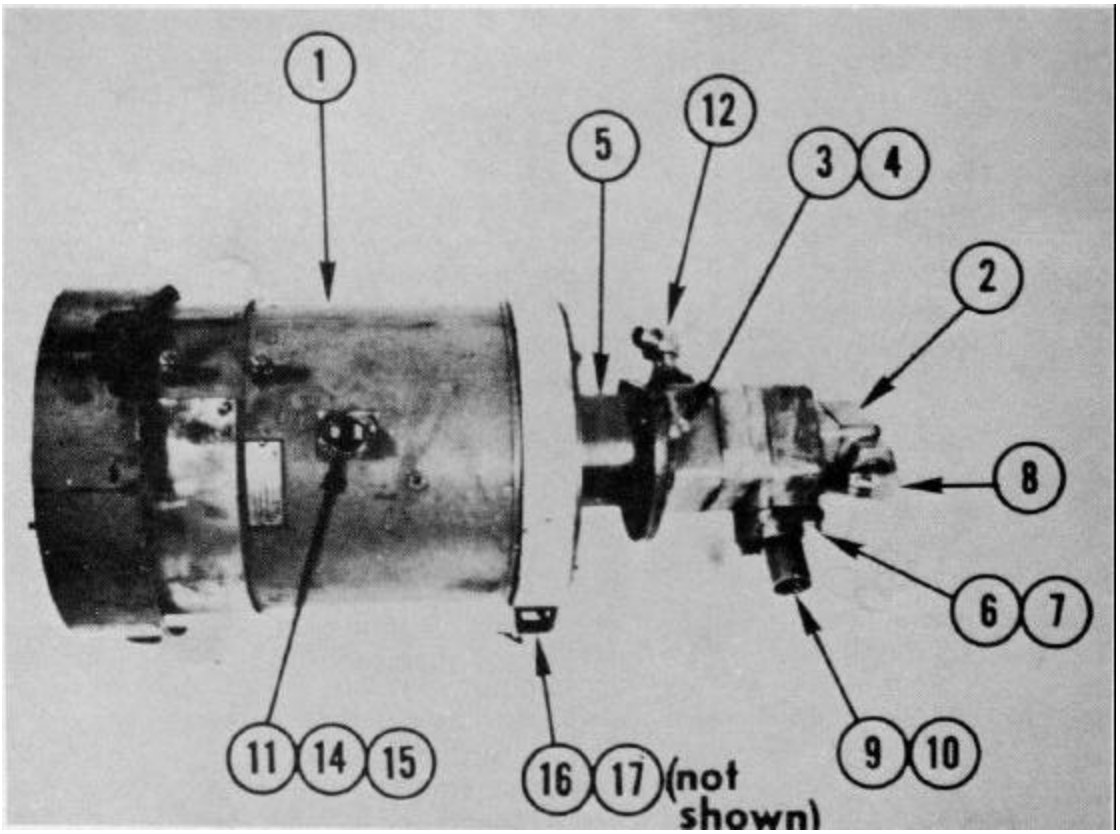
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-45	50013-27	1	Hose Assembly (Steer/Feed)
-46	50013-47		Hose Assembly (Shift/Rod End)
-47	50013-34	1	Hose Assembly (Shift/Piston End)
-48	50016-10	1	Hose Assembly (Pump/Press)
-49	50013-92	1	Hose Assembly (Pivot/Clevis End)
-50	50013-50	2	Hose Assembly (Tilt/Blkhd-Pivot Arm)
-51	50013-37	1	Hose Assembly (Pivot/Rod End)
-52			NOT USED
-53	50013-38	1	Hose Assembly (Press Sw Manf/Accum)
-54	10980	1	Tube Assembly
-55	50016-08	1	Hose Assembly
-56	50002-036	1	Hose Assembly (Sol./Door)
-57	50002-030	1	Hose Assembly (Sol. Door/Stack Valve)
-58	25503	1	Elbow, 90°
-59	25568	1	Hose (Pump/Suction)
-60	MS49005-10	2	Plug, Pipe (3/4 NPTF)
-61	50003-10	1	Hose (Reservoir Return)
-62	50014-09	1	Hose
-63	50014-08	1	Hose
-64	25072	2	Valve, Solenoid
-65	50013-53	1	Hose Assembly
-66	50013-46	1	Hose Assembly
-67	MS90725-20	2	Screw, Hex. Hd. (1/4-20 UNC-2 A x 3-1/2 LG)
-68	MS27183-10	2	Washer, Flat (1/4)
-69			NOT USED
-70	25517	2	Elbow, Ex. Long, 900-O-Ring
-71	25594	3	Connector, Straight
-72	25544	1	Valve, Check
-73	10986	2	Washer
-74	MS35690-602	2	Nut, Hex. (3/8-16 UNC-2B)
-75	AN935-616	2	Lockwasher (3/8)
-76	10969	1	Clamp, Hose
-77	AN935-416	4	Lockwasher (1/4)
-78	MS90725-1	2	Screw, Hex. Hd. (1/4-20 UNC-2A x 3/8 LG)
-79	50013-49	2	Hose Assembly (Tilt Cyl/Blkhd)
-80	25595	2	Connector, Straight
-81	25596	2	Elbow, Swivel, 90°
-82	50012-05	2	Hose Assembly
-83	50003-09	1	Hose Assembly
-84	25548	2	Connector, Straight
-85	25521	1	Pipe Plug
-86			NOT USED

PARTS BREAKDOWN

HYDRAULIC ASSEMBLY PART NO. - 14196

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-87	50013-39	1	Hose Assembly (Lift Manf/Umb Brkt)
-88	50013-40	1	Hose Assembly (Lift Manf/Umb Brkt)
-89	50013-41	1	Hose Assembly (Lift Manf/Umb Brkt)
-90	10971	2	Tube Assembly
-91	10972	1	Tube Assembly
-92	10970-01	1	Tube Assembly
-93	10970-02	1	Tube Assembly
-94	10973	2	Tube Assembly
-95	25064	REF	Accumulator (1 Gal.)
-96	10652	REF	Clamp, Accumulator
-97	14101	1	Manifold
-98	25586	1	Elbow, 90°
-99	11422	1	Manifold
-100	25597	2	Connector, Straight
-101	50003-08	1	Hose
-102	25598	1	Connector, Straight
-103	25067	1	Indicator
-104			NOT USED
-105	25066	1	Filter Assembly
-106	50013-54	1	Hose Assembly
-107	50013-52	1	Hose Assembly (Sol. in/Umb)
-108	8212-03	REF	Cylinder, Steer
-109	11212-03	REF	Cylinder, Shift
-110	6982	REF	Cylinder, Tilt
-111	10864	REF	Cylinder, Pivot
-112	14051	REF	Pump and Motor Assembly
-113	25700	REF	Unit, Orbitrol
-114			NOT USED
-115			NOT USED
-116			NOT USED
-117			NOT USED
-118			NOT USED
-119			NOT USED
-120			NOT USED
-121			NOT USED
-122			NOT USED
-123			NOT USED
-124			NOT USED
-125	10920	1	Fitting, Suction Line
-126	MS90725-62	4	Screw, Hex. Hd., Gr 5 (1/2-13 x 11/4" LG)
-127	AN935-816	4	Lockwasher (1/2")
-128	7464	1	Gasket

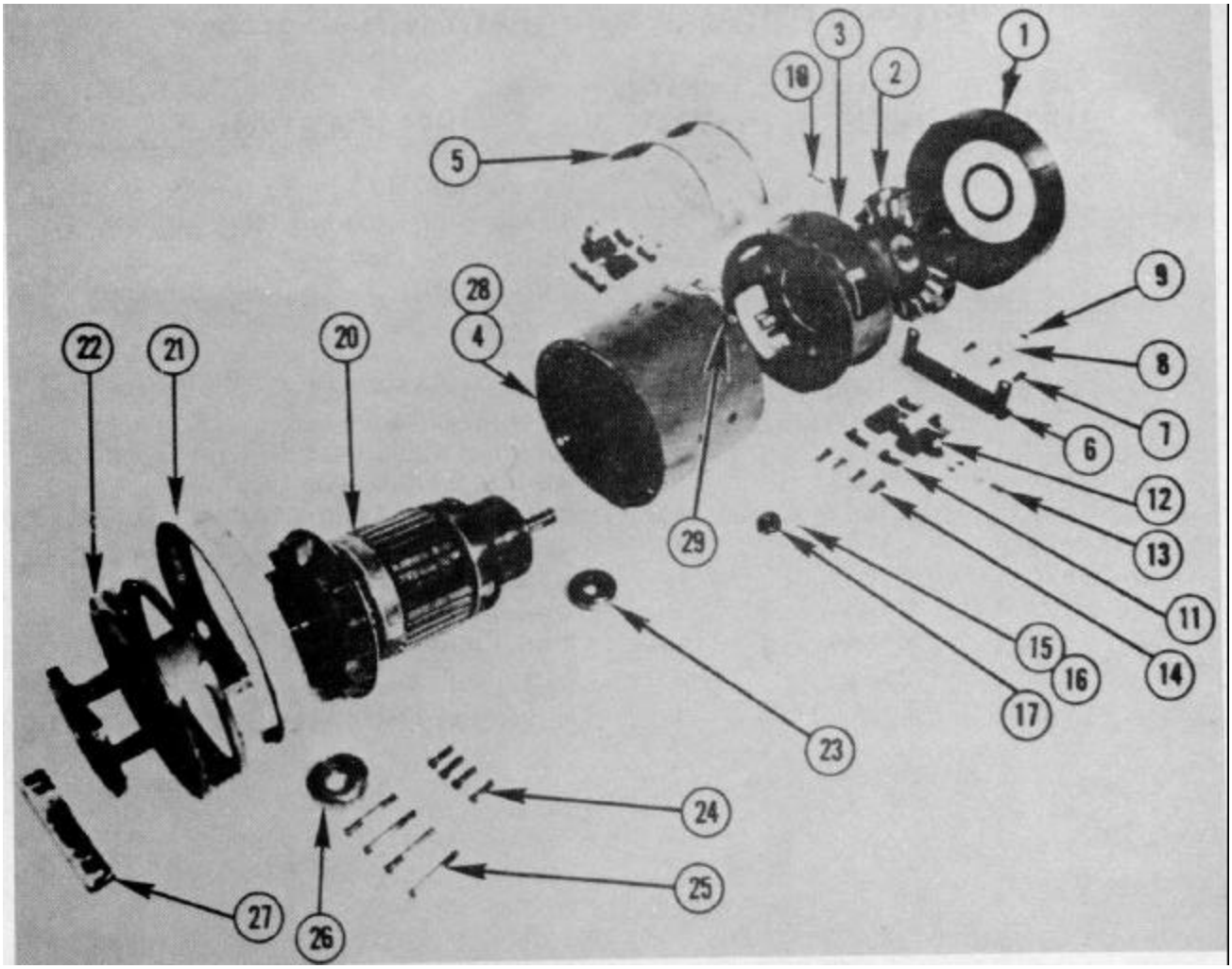
PARTS BREAKDOWN



PUMP & MOTOR ASSEMBLY PART NO. - 14501

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	21000	1	Motor, Pump
-2	21150	1	Pump
-3	MS90725-113	2	Screw, Hex. Hd. (1/2-13 UNC-2A x 1-1/2 LG)
-4	AN935-816	2	Lockwasher (1/2)
-5	9623	REF	Coupling, Chain
-6	MS90725-111	4	Screw, Hex. Hd. (1/2-13 UNC-2A x 1-1/4 LG)
-7	AN935-816	4	Lockwasher (1/2)
-8	25591	1	Elbow
-9	10920	1	Fitting, Suction Line
-10	7464	1	Gasket
-11	50695	1	Thermostat
-12	25589	1	Fitting, Pressure
-13			Not Used
-14	MS35223-26	2	Screw, Pan Hd. (#6-32 UNC-2A x 1/4 LG)
-15	AN935-6	2	Lockwasher (#6)
-16	MS51922-17	2	Nut, Hex., Self-Locking (3/8-16 UNC-2B)
-17	MS27183-10	2	Washer, Flat (3/8)

PARTS BREAKDOWN



PUMP & MOTOR ASSEMBLY PART NO. - 21000

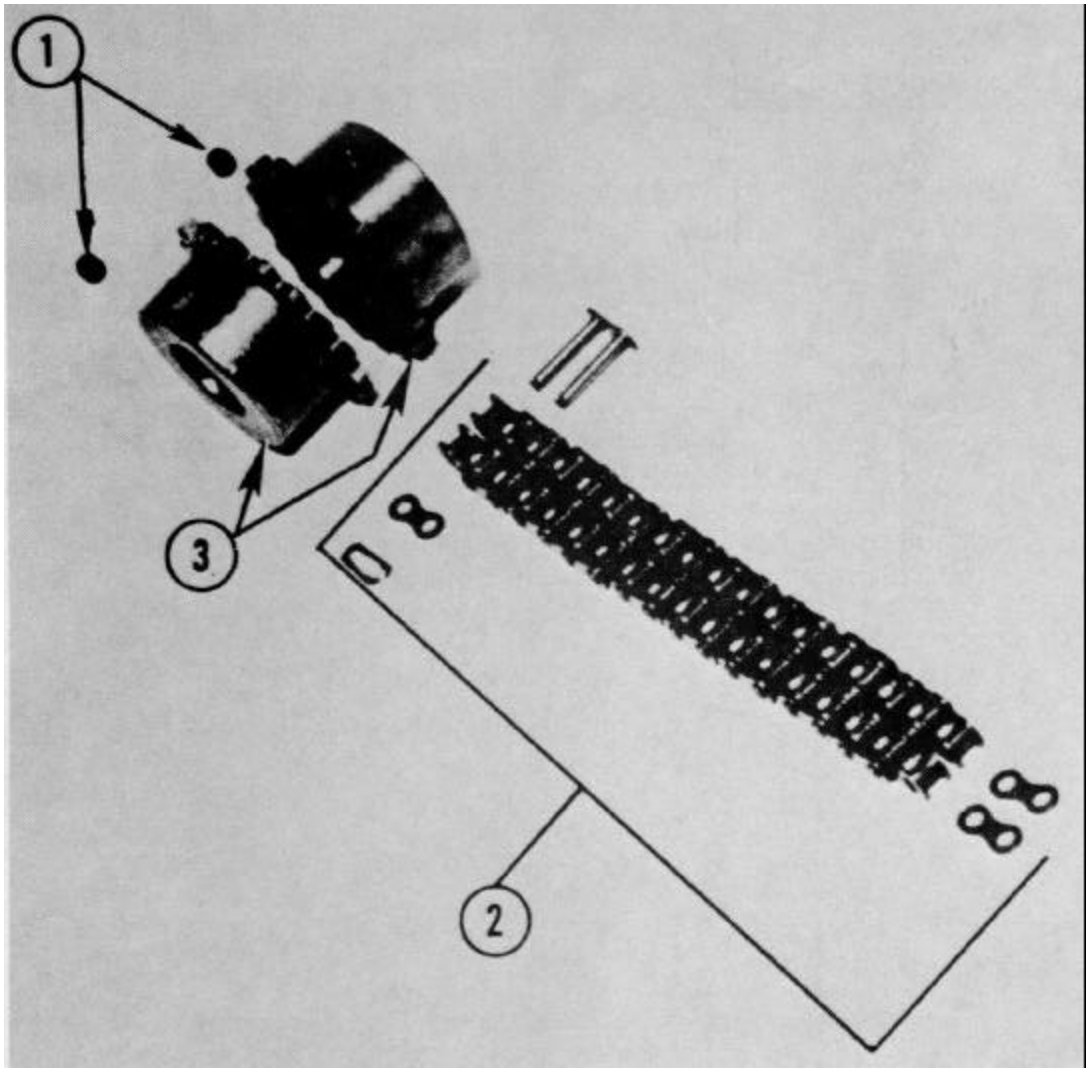
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	21009	1	Fan cover
-2	21031	1	Fan
-3	21022	1	End Bell (Commutator end)
-4	21007	1	Frame
-5	21020	2	Cover
-6	21025	1	Foot - Commutator end
-7	21024	3	Screw, Hex. Hd. (3/18-16 UNC-2A x 3/4 LG)
-8	21032	1	Snap Ring
-9	21038	1	Key (Fan)
-10	21029	1	Screw, Rdh. (1/4-20 UNC-2A x 1-1/2 LG)
-11	21015	8	Spring, Brush
-12	21016	4	Brush
-13	21014	8	Screw, Rdh. (#10-32 NF-2A x 1/2 LG)

PARTS BREAKDOWN

HYDRAULIC ASSEMBLY PART NO. - 21000

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-14	21011	4	Screw, Hex. Hd. (3/8-16 UNC-2A x 1-1/4 LG)
-15	MS35223-26	REF	Screw, Panhead (6-32 NC-2A x 1/4 LG)
-16	AN935-6	REF	Lockwasher (#6)
-17	50695	REF	Thermostat
-18	not req'd		
-19	not req'd		
-20	21043	1	Armature Assembly
-21	21004	1	Cover Drive End
-22	21001	1	End bell, drive
-23	21021	1	Bearing, Commutator end
-24	21005	4	Screw, Hex. Hd. (3/8-16 UNC-2A x 1," LG)
-25	21002	4	Screw, Hex. Hd. (3/8-16 UNC-2A x 3" LG)
-26	21039	1	Bearing, drive end
-27	21034	1	Foot, drive end
-28	21044	1 (set)	Coils, Field
-29	21040	2	Stud and Tube
-30	21042	1	Kit, Brush (Consists of items 11 and 12)

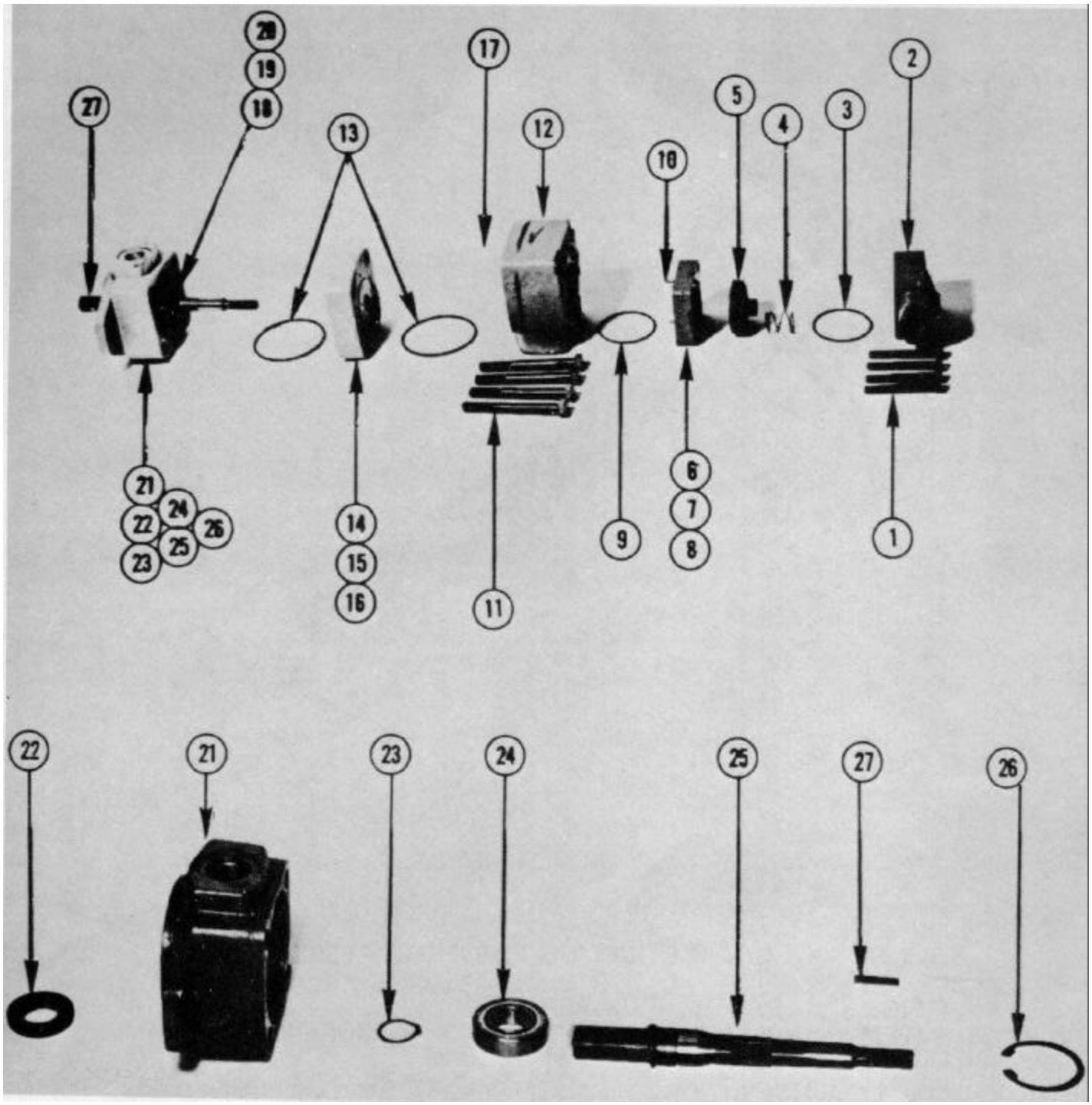
PARTS BREAKDOWN



CHAIN COUPLING PART NO. - 9623

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS51017-64	2	Setscrew Soc., Cup Point (1/4-20 UNC-3A x 5/16 LG)
-2	9623-2	1	Kit, Chain
-3	9623-5	2	Sprocket Group

PARTS BREAKDOWN



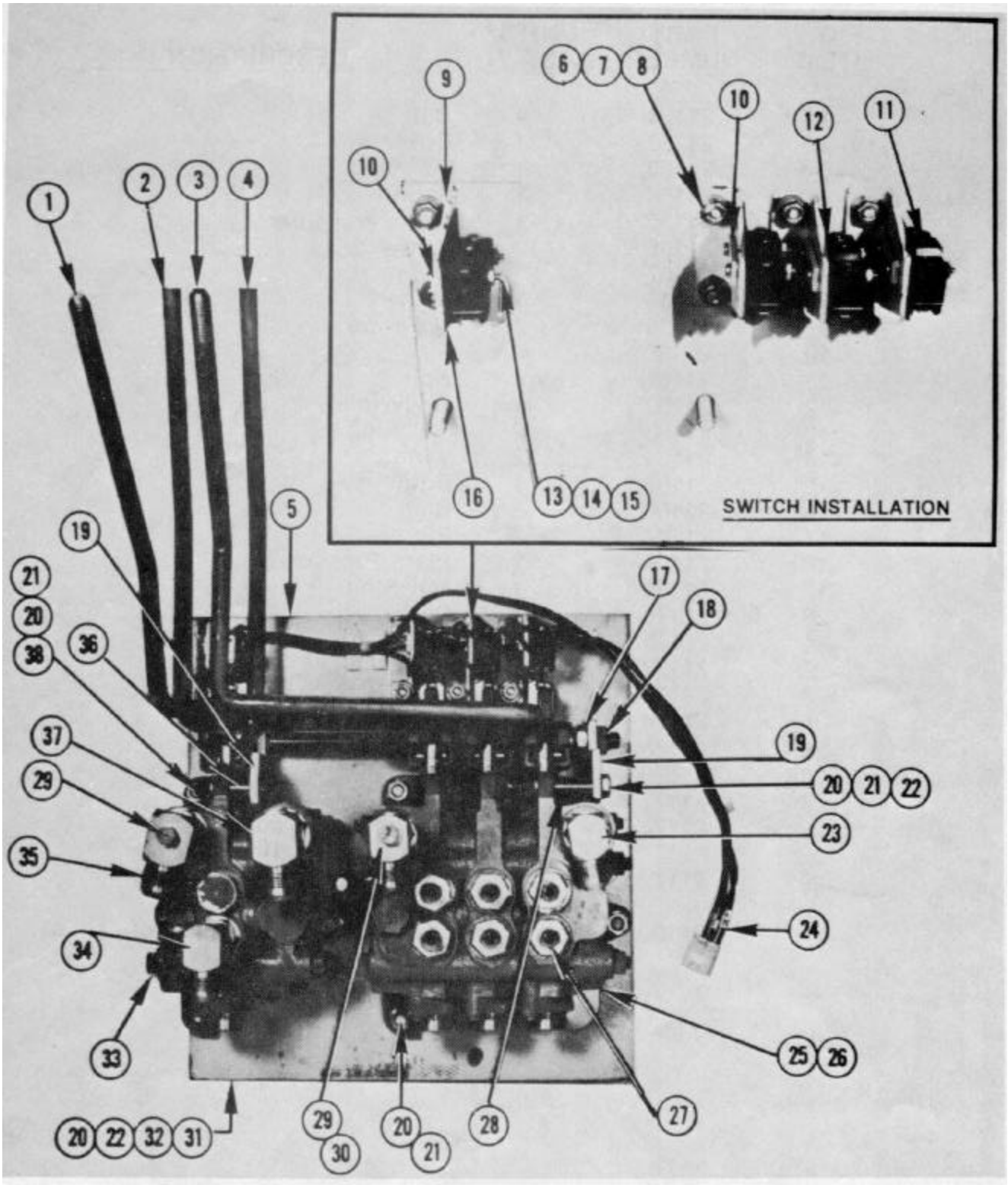
HYDRAULIC PUMP PART NO. - 21150

PARTS BREAKDOWN

HYDRAULIC ASSEMBLY PART NO. - 21150

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	21151	4	Bolt
-2	21152	1	Cover
-3	21153	1	"O" Ring
-4	21154	1	Spring
-5	21155	1	Plate, Pressure
-6	21156	12	Vanes
-7	21157	1	Rotor
-8	21158	1	Ring
-9	21159	1	"O" Ring
-10	21160	2	Pin
-11	21161	4	Bolt
-12	21162	1	Body, Inlet
-13	21163	2	"O" Ring
-14	21164	12	Vane
-15	21165	1	Rotor
-16	21166	1	Ring
-17	21167	2	Pin
-18	21168	1	Plate, Pressure
-19	21169	1	"O" Ring
-20	21170	1	Spring
-21	21171	1	Body
-22	21172	1	Seal Shaft
-23	21173	1	Snap Ring
-24	21174	1	Bearing
-25	21175	1	Shaft
-26	21176	1	Snap Ring
-27	21177	1	Key
-28	21178	1	Service Kit (a) consists of items 3, 9,13,19, 22
-29	21179	1	Cartridge Kit (c) consists of items 3, 6, 7, 8, 9
-30	21180	1	Cartridge Kit (b) consists of items 13,14,15, 16

PARTS BREAKDOWN



CONTROL PANEL MODULE PART NO.-14151

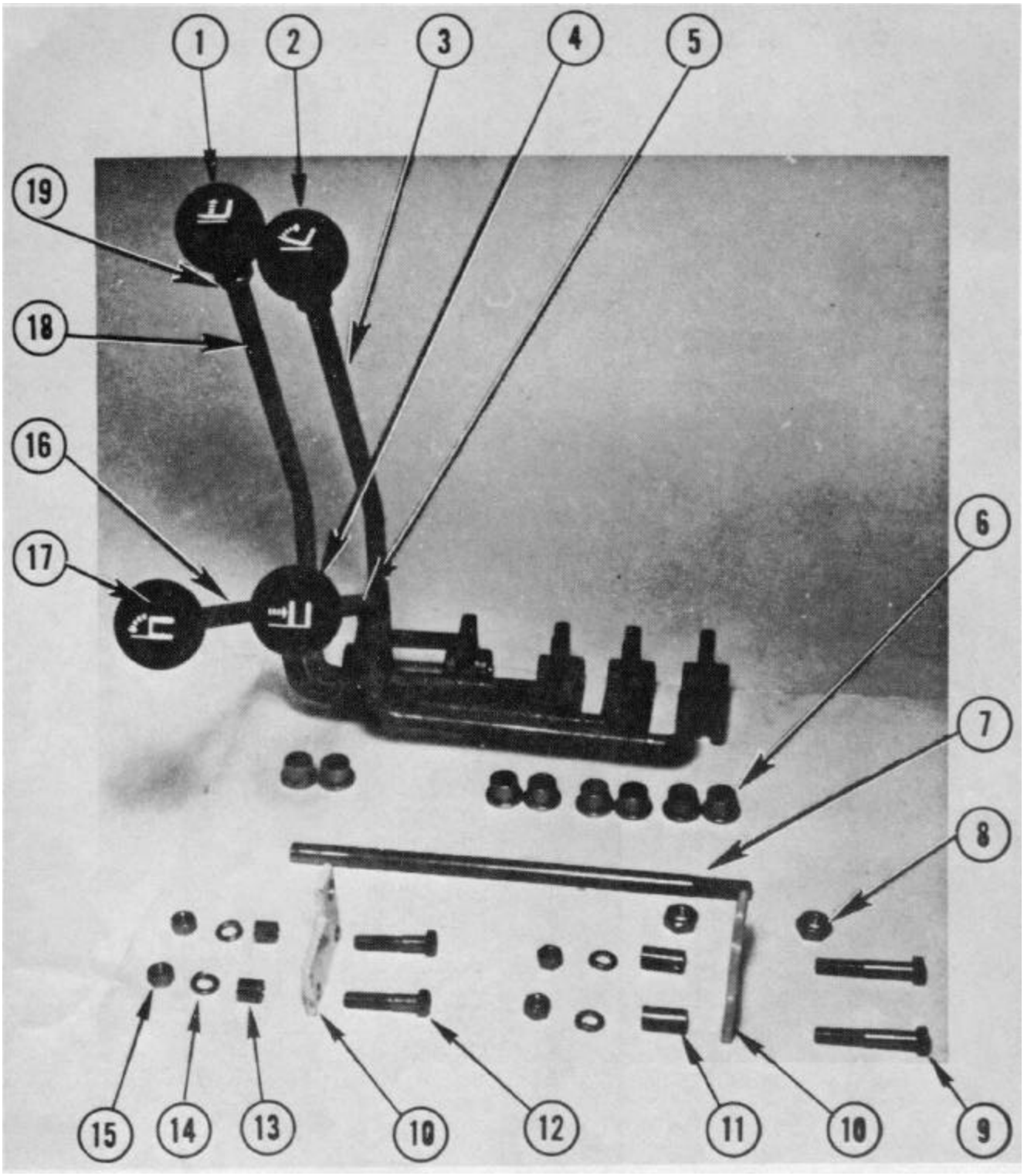
PARTS BREAKDOWN

HYDRAULIC ASSEMBLY PART NO. - 14151

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
1	10940*	REF	Handle, Pivot
2	10938*	REF	Handle. Lift
3	10941*	REF	Handle. Shift
4	10939*	REF	Handle, Tilt
5	25079	1	Plate, Mtg.
6	MS35690-402	8	Nut, Hex. (1/4-20 UNC-2B)
7	AN935-416	8	Lockwasher (i/4)
8	MS27183-10	8	Washer, Flat (1/4)
9	10978	4	Bracket. Switch
10	4281-02	4	Retainer
11	25585	4	Switch. Stack
12	10977	4	Insulator
13	MS35333-37	16	Lockwasher. Int. Tooth (#6)
14	MS35649-62	16	Nut, Hex. (#6-32 NC-2B)
15	10962-28	8	All Thread (#6-32 NC-2B x 1-5/8 LG)
16	4281-01	4	Retainer
17	MS35691-802	REF	Nut, Jam. Hex. (1/2-13 UNC-2B)
18	10932*	REF	Shaft
19	10933*	REF	Bracket, Mtg.
20	MS35690-602	14	Nut, Hex. (3/8-16 UNC-2B)
21	AN935-616	14	Lockwasher (3/8)
22	MS90725-67	5	Screw, Hex. Hd. (3/8-16 UNC-2A x 2-1/4 LG)
23	25511	1	Elbow
24	10979	1	Harness, Wire
25	22000	1	Valve Assembly, Control (Tilt-Pivot-Shift)
26	25541	1	Elbow
27	25520	6	Connector, Straight
28	10962-26*	REF	Spacer
29	25521	2	Plug, Pipe
30	11241	1	Elbow (mod)
31	14150	1	Sub-Panel
32	MS27183-14	3	Washer, Flat (3/8)
33	22050	1	Valve Assembly, Control (Lift)
34	25522	1	Elbow
35	14065	1	Elbow (mod)
36	10962-30*	REF	Spacer
37	25518	1	Elbow
38	MS90725-64	REF	Screw, Hex. HD (3/8-16 UNC-2A x 1-1/2 LG)

*See page **4-61**

PARTS BREAKDOWN



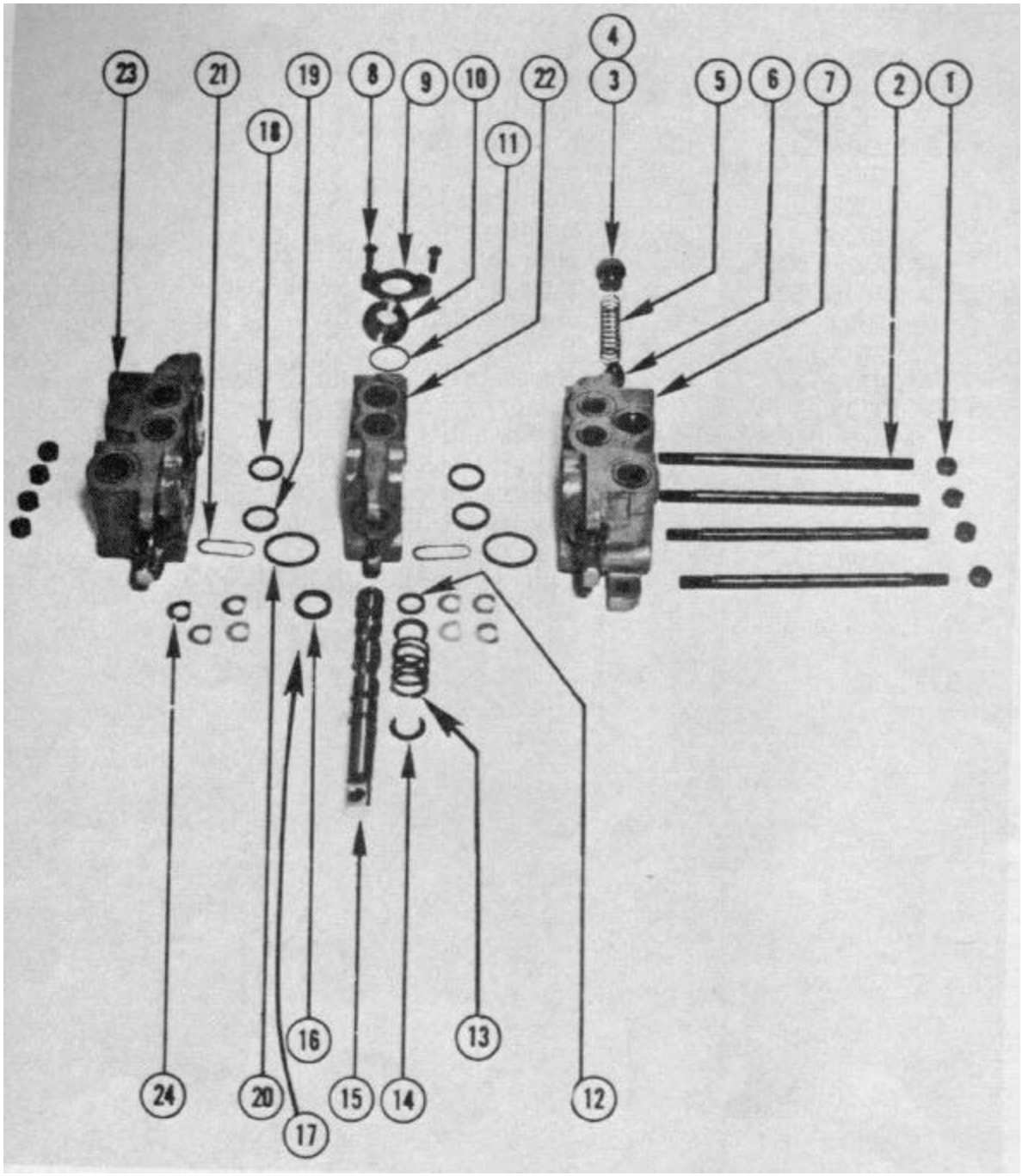
CONTROL HANDLES GROUP

PARTS BREAKDOWN

CONTROL HANDLES GROUP

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50382-01	1	Knob (Lift)
-2	50382-02	1	Knob (Tilt)
-3	10939	1	Handle (Tilt)
-4	50382-04	1	Knob (Shift)
-5	10941	1	Handle (Shift)
-6	10928	10	Bearing
-7	10932	1	Shaft
-8	MS35691-802	2	Nut, Jam (1/2-13 UNC-2B)
-9	MS90725-67	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 2-1/4 LG)
-10	10933	2	Bracket, Mounting
-11	10962-26	2	Spacer
-12	MS90725-64	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 1-1/2 LG)
-13	10962-30	2	Spacer
-14	AN935-616	4	Lockwasher (3/8)
-15	MS35690-602	4	Nut, Hex. (3/8-16 UNC-2B)
-16	10940	1	Handle (Pivot)
-17	50382-03	1	Knob (Pivot)
-18	10938	1	Handle (Lift)
-19	MS35691-802	4	Nut, Jam, Hex. (1/2-13 UNC-2B)

PARTS BREAKDOWN



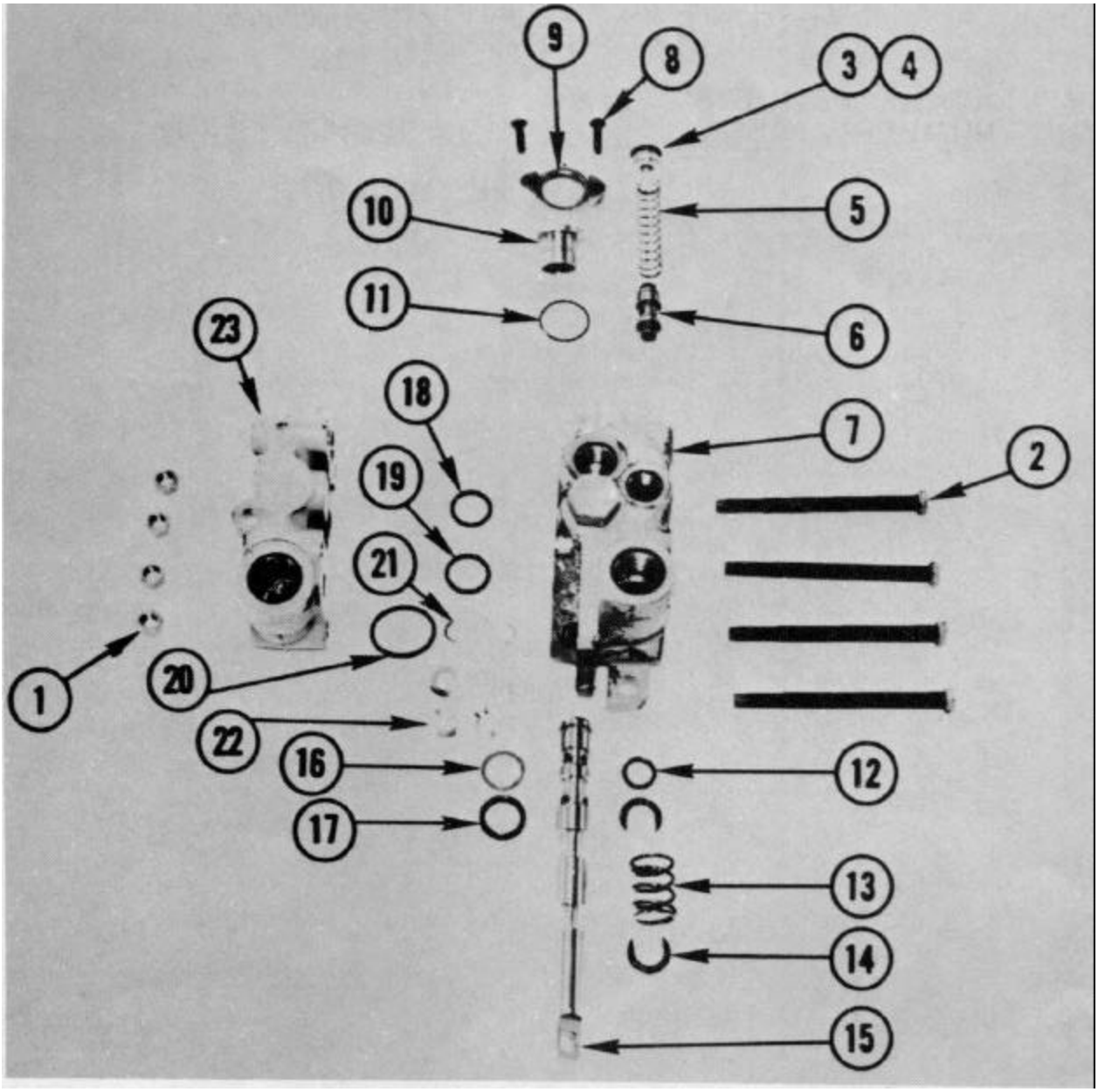
CONTROL VALVE PART NO. - 22000
(TILT-PIVOT-SHIFT)

PARTS BREAKDOWN

CONTROL VALVE PART NO. - 22000
(TILT-PIVOT-SHIFT)

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	22001	8	Nut, Hex. (3/8-16 UNC-2B)
-2	22002	4	Rod
-3	22004	1	Plug
-4	22005	1	"O" Ring
-5	22006	1	Spring
-6	22007	1	Valve, Relief
-7	22008	1	Section. Inlet
-8	22009	6	Screw
-9	22010	3	Retainer
-10	22011	3	Sleeve
-11	22012	3	"O" Ring
-12	22013	3	Ring, Quad
-13	22014	3	Spring, Centering
-14	22015	6	Washer, "C"
-15	Part of 7. 22, 23	3	Spool
-16	22023	3	Ring, Quad
-17	22022	3	Ring, Back-up
-18	22024	2	Seal
-19	22025	2	Seal
-20	22026	2	Seal
-21	22027	2	Retainer
-22	22028	1	Section, Center
-23	22029	1	Section, Outlet
-24	22030	8	Shims
-25	22033	3 Req'd.	Service Kit (consists of items 4, 11,12, 16, 17, 18, 19, 20 and 21)

PARTS BREAKDOWN



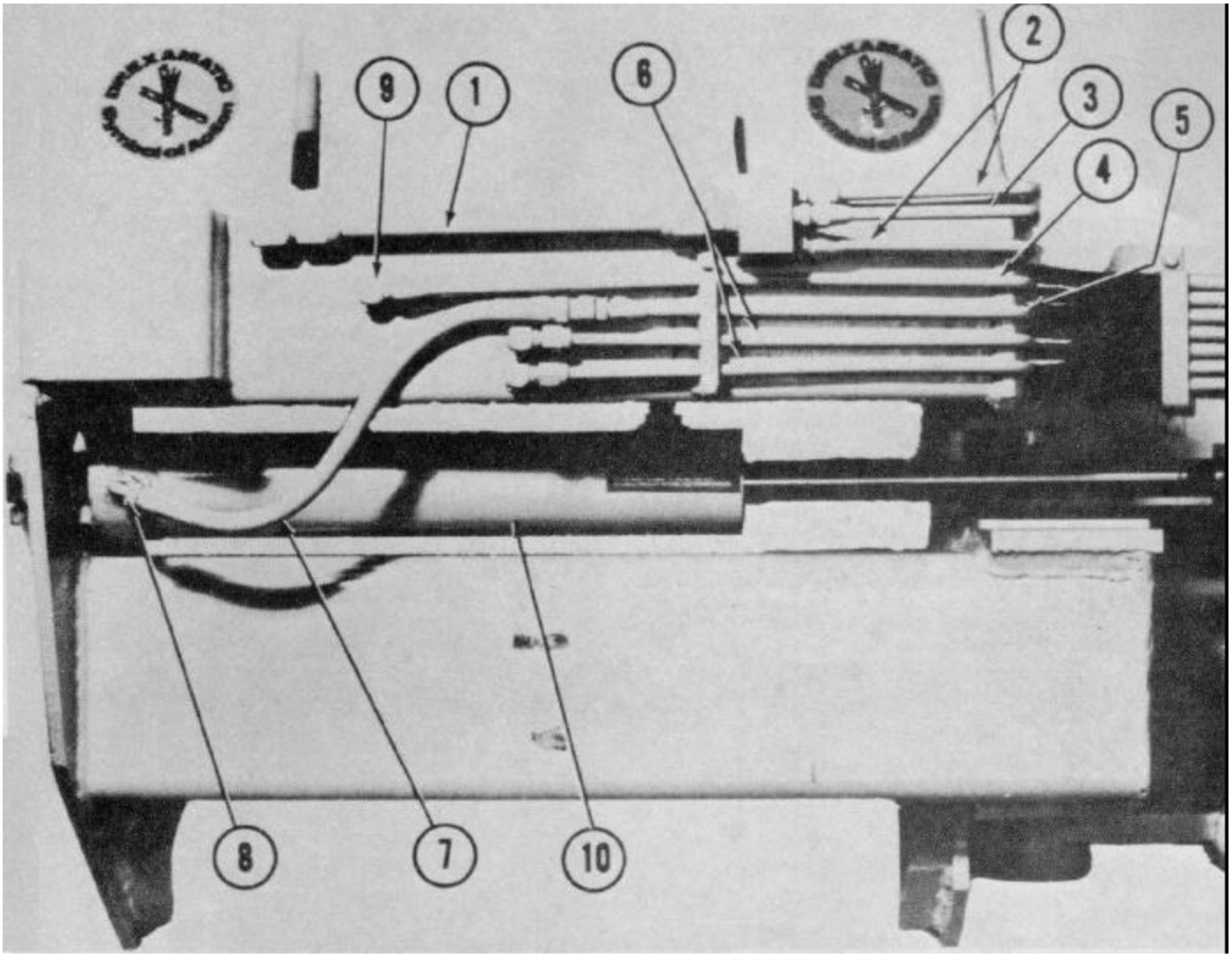
LIFT CONTROL VALVE PART NO. - 22050

PARTS BREAKDOWN

LIFT CONTROL VALVE PART NO. - 22050

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	22001	4	Nut, Hex. (3/8-16 UNC-2B)
-2	22051	4	Bolts
-3	22004	1	Plug
-4	22005	1	"O" Ring
-5	22006	1	Spring
-6	22007	1	Valve, Relief
-7	22052	1	Section, Inlet
-8	22009	2	Screw
-9	22010	1	Retainer
-10	22011	1	Sleeve
-11	22012	1	"O" Ring
-12	22013	1	Ring, Quad
-13	22014	1	Spring, Centering
-14	22015	2	Washer, "C"
-15	22053	1	Inlet, Spool "T"
-16	22023	1	Ring, Quad
-17	22022	1	Ring, Back-up
-18	22024	1	Seal
-19	22025	1	Seal
-20	22026	1	Seal
-21	22027	1	Retainer
-22	22030	4	Shims
-23	22054	1	Section, Outlet
-24	22033	1 Req'd.	Kit, Service (consists of items 4,11,12,16, 17, 18, 19,20 and 21)

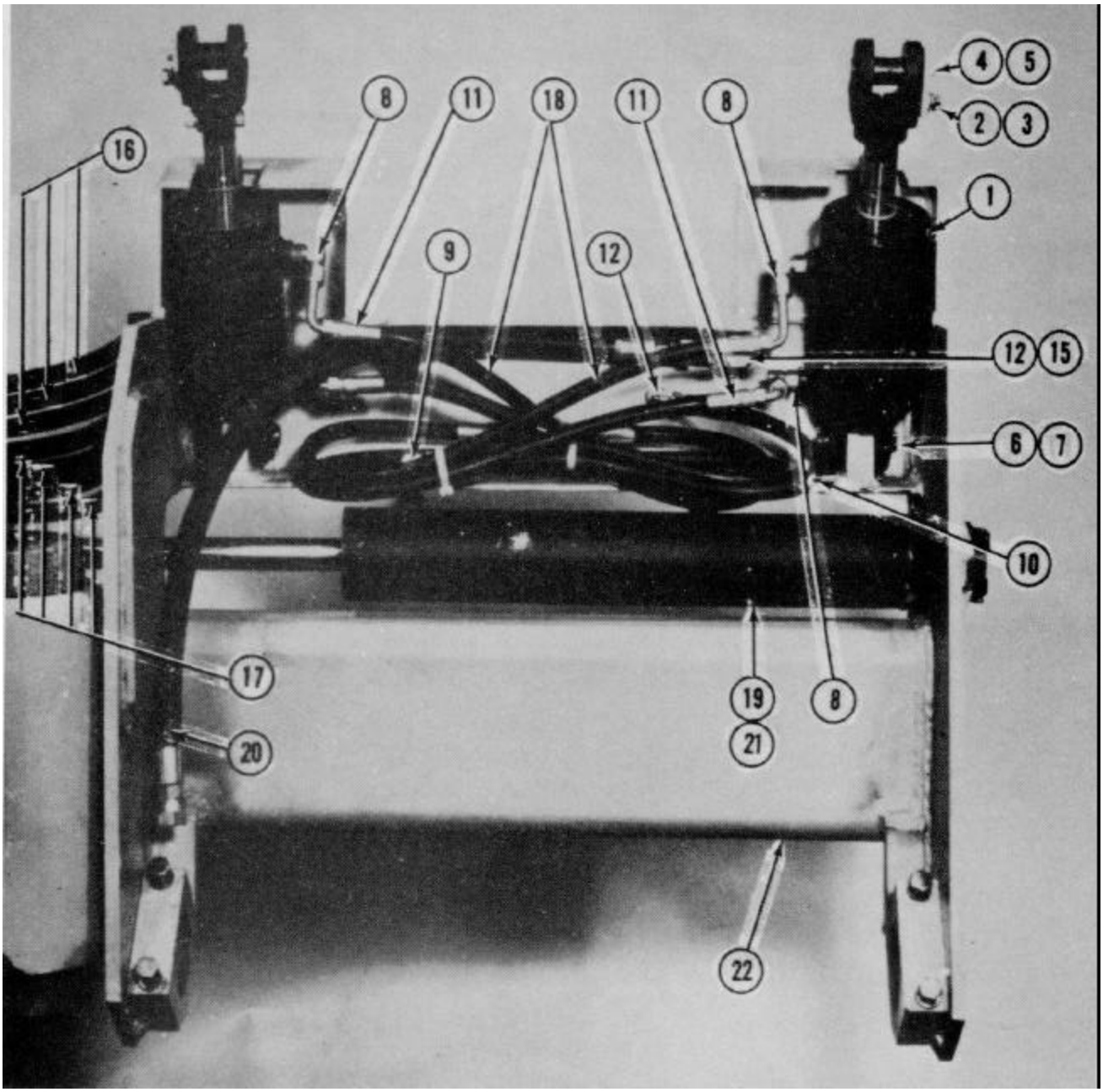
PARTS BREAKDOWN



HYDRAULIC GROUP, PIVOT ARM

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50361	1	Tube Assembly - Lift
-2	10971	2	Lift Tube Assembly - Manifold
-3	10972	1	Lift Tube Assembly - Manifold
-4	10970-01	1	Pivot Tube Assembly - Bulkhead
-5	10970-02	1	Pivot Tube Assembly - Hose
-6	10973	2	Tilt Tube Assembly - Bulkhead
-7	50013-92	1	Hose Assembly - Pivot
-8	23705	1	Elbow, 900-O-Ring
-9	23704	1	Elbow. Bulkhead 90°
-10	10864	REF	Cylinder. Pivot

PARTS BREAKDOWN



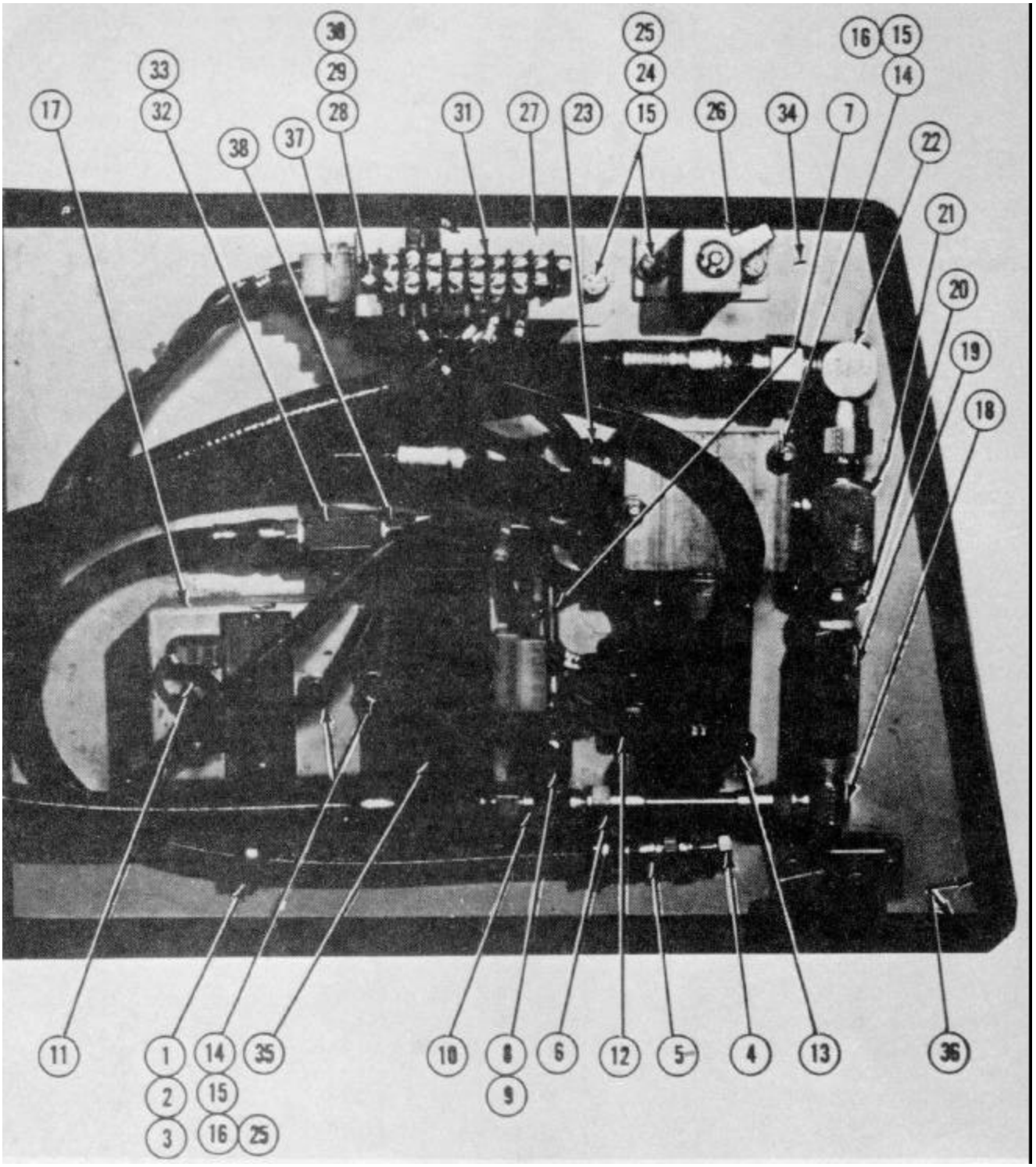
HYDRAULIC GROUP,PIVOT ARM

PARTS BREAKDOWN

HYDRAULIC GROUP, PIVOT ARM

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	6982	2	Cylinder, Tilt
-2	9934-01	REF	Pin, Pivot
-3	MS15003-1	REF	Fitting, Lub.
-4	MS90725-58	REF	Screw, Cap, Hex. Hd. (3/8-16 UNC-2A x 3/4 LG)
-5	AN935-616	REF	Washer, Lock, Spring (3/8)
-6	5039-1	2	Pin, Cylinder
-7	MS24665-513	4	Pin. Cotter (3/16 Dia x 1-1/2 LG)
-8	23705	4	Elbow, 90°, "O" Ring
-9	23706	1	Elbow, LG, 90°, "O" Ring
-10	50013-37	1	Hose Assembly, Pivot rod end
-11	50013-49	2	Hose Assembly
-12	25000	1	Nut, Swivel
-13	23704	3	Elbow, Bulkhead
-14	23707	2	Tee, Side-Swivel Nut (Not Shown)
-15	23708	1	Elbow, Bulkhead 90°
-16	50013-29	3	Hose Assembly - lift
-17	50013-30	4	Hose Assembly -Tilt and Pivot
-18	50013-50	2	Hose Assembly
-19	10864	REF	Cylinder, Pivot
-20	50016-08	REF	Hose Assembly
-21	25526	1	Adapter (Not Shown)
-22	14009	REF	Pivot Arm

PARTS BREAKDOWN



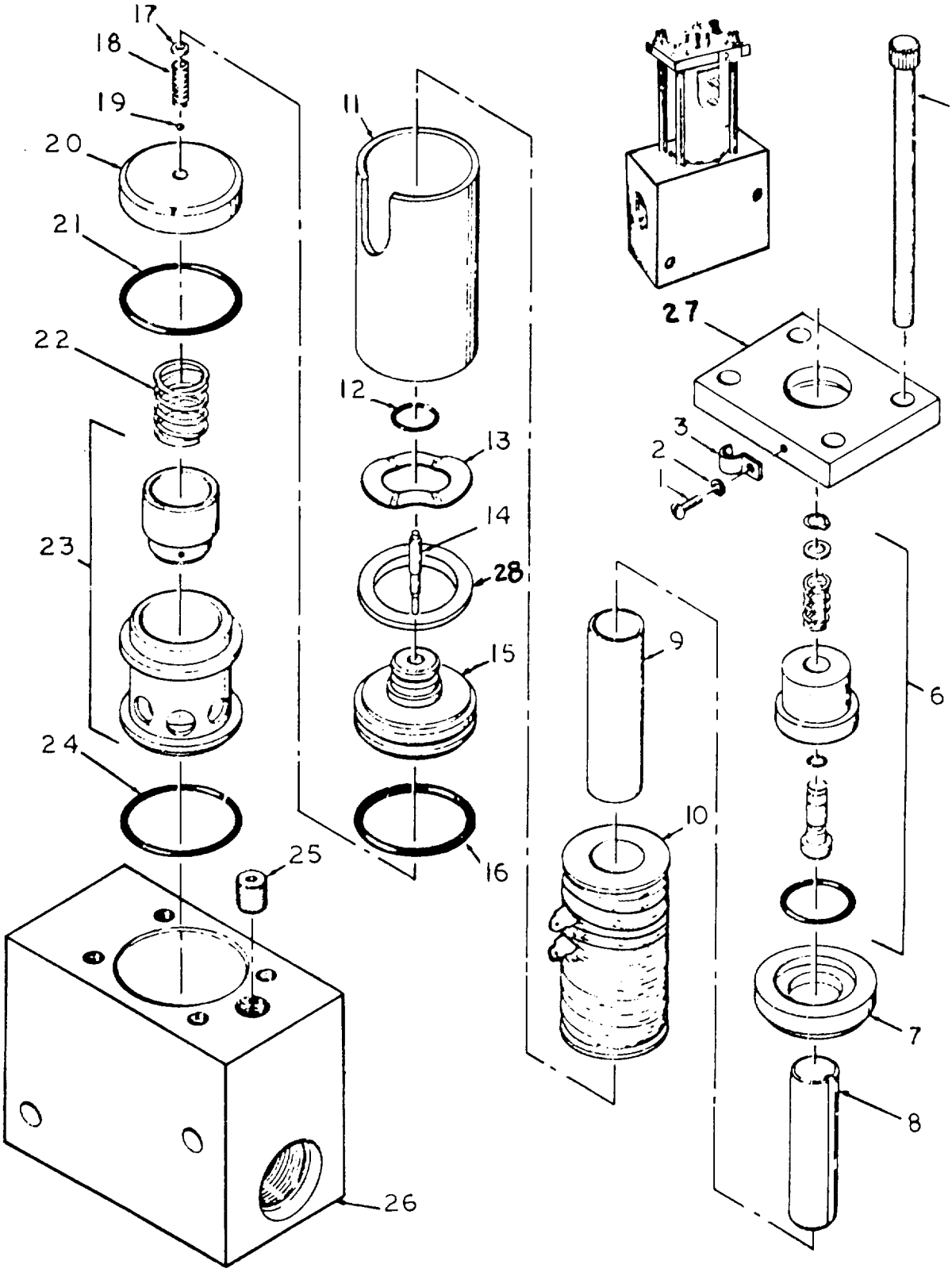
HYDRAULIC DOOR MODULE ASSEMBLY PART NO. - 14086

PARTS BREAKDOWN

HYDRAULIC DOOR MODULE ASSEMBLY PART NO. -14086

FIG./ ITEM	PART NUMBER	UNITS/ *ASS'Y.*	DESCRIPTION
-1	MS35223-61	2	Screw, Pan Hd. (#10-32 x 3/8 LG)
-2	AN935-10	4	Lockwasher (#10)
-3	MS21919G9	2	Clamp, Hose
-4	25504	1	Plug, Tube
-5	50000-08	1	Hose Assembly
-6	11087	1	Tube Assembly
-7	11088	1	Tube Assembly
-8	25507	1	Nut, Tube
-9	25508	1	Reducer, Tube End
-10	25505	1	Tee, Tube
-11	14068	1	Control Cable
-12	10321-1	1	Hash filter
-13	25072	1	Valve, Solenoid "A" N.O. 36 VDC
-14	MS35690-402	4	Nut, Hex. (1/4-20 UNC-2B)
-15	AN935-416	10	Lockwasher (1/4)
-16	MS35190-296	4	Screw, Flat Hd. (1/4-20 UNC-2A x 2-1/4 LG)
-17	10619	1	Switch Assembly, Double Pressure
-18	25503	1	Elbow, 90°
-19	25046	1	Valve, Check
-20	25502	1	Connector, Male Pipe
-21	25501	1	Tee, Pipe to tube
-22	25500	1	Elbow, Swivel, 900
-23	25506	1	Connector, Straight
-24	MS90725-5	6	Screw, Hex. Hd. (1/4-20 UNC-2A x 5/8)
725	MS27183-10	2	Washer, Flat (1/4)
-26	25132	2	Latch
-27	11084	1	Bracket, Connector
-28	MS35223-31	2	Screw, Pan Hd. (#6-32 NC-2A x 5/8 LG)
-29	AN935-6	2	Lockwasher (#6)
-30	MS35649-62	2	Nut, Hex. (#6-32 NC-2B)
-31	25087	1	Strip, Terminal
-32	25509	1	Tee, Pipe
-33	25510	1	Connector, Pipe, Male
-34	10849	1	Door, Hydraulic Compartment
-35	14057	1	Module-Time Delay
-36	25618	5-1/2 Ft	Strip, Rubber (Adh. Back) 1/8 x 5/8
-37	25138	1	Connector, Soc.
-38	25047	1	Snubber

PARTS BREAKDOWN



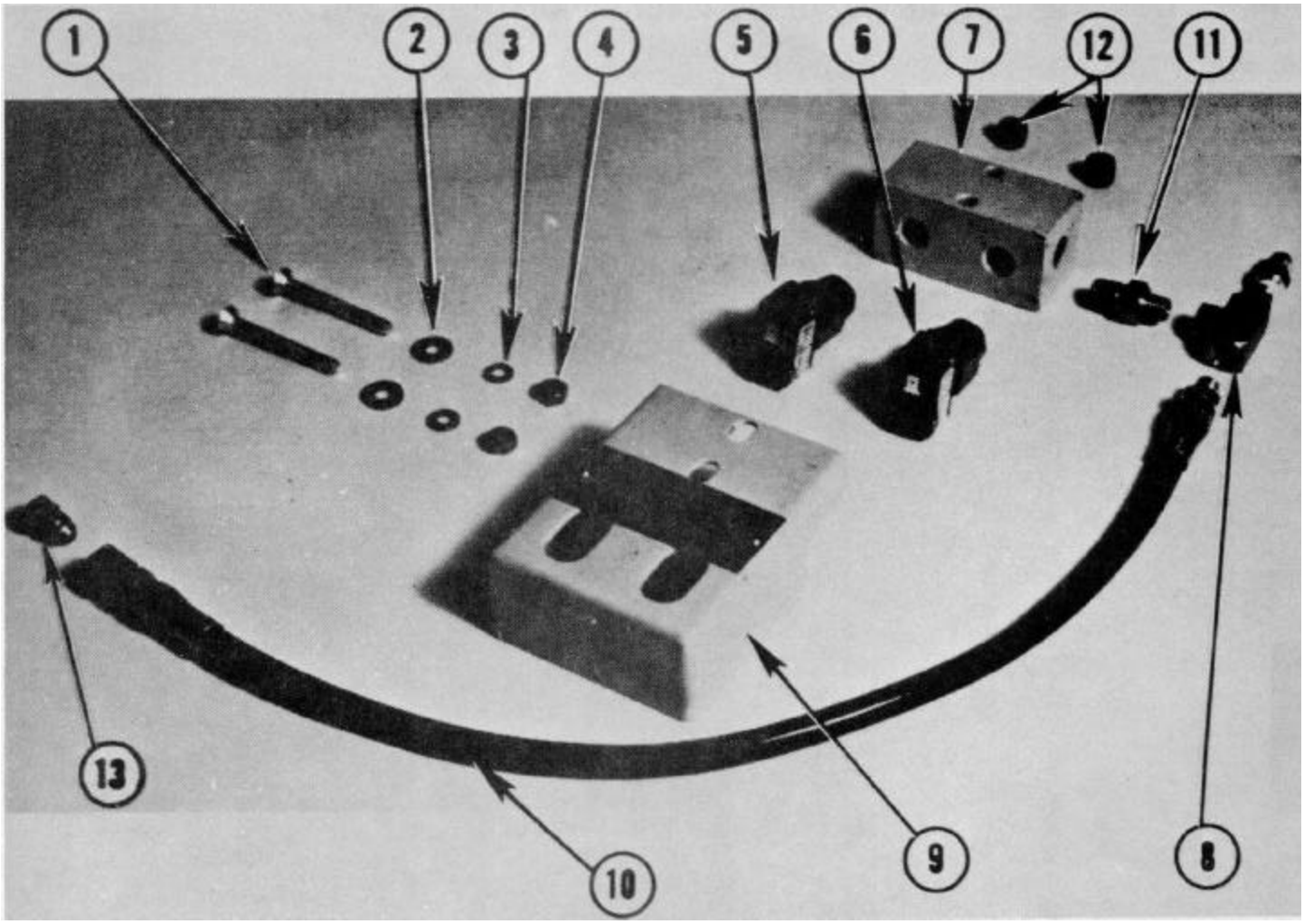
SOLENOID VALVE ASSEMBLY PART NO. - 25072

PARTS BREAKDOWN

SOLENOID VALVE ASSEMBLY PART NO. - 25072

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
	25072	REF	Solenoid Valve Assembly
-1	AN515-6-4	1	Screw, Machine (#6-32 x 1/4 Rd. Hd.)
-2	AN935-6	1	Lockwasher (6)
-3	25634	1	Clamp, Cable
-4	MS90725-21	4	Screw, Hex. Hd. (1/4-20 UNC-2A x 3-3/4 LG)
-5			
-6	25635	1	Manual Release Assembly
-7	25636	1	Washer
-8	25637	1	Plunger
-9	25654	1	Tube
-10	25639	1	Coil
-11	25640	1	Shell
-12	25641	1	Packing, O-Ring
-13	25642	1	Washer, Wave
-14	25643	1	Rod
-15	25655	1	Stop
-16	25662	3	Packing, O-Ring
-17	25646	1	Spacer
-18	25647	1	Spring
-19	25657	1	Steel Ball, Grade 1,7/64 DIA
-20	25658	1	Seat, Pilot
-21	25662	REF #16	Packing, O-Ring
-22	25659	1	Spring
-23	25660	1	Valve Seat Assembly
-24	25662	REF#16	Packing, O-Ring
-25	MS49005-2	1	Plug, Socket Hd., 1/8 Pipe
-26	25661	1	Body
-27	25653	1	Plate
-28	25663	1	Washer
-29	6855-100		Kit, Service (Consists of items -6, -10, -12, -13, -14 and -16)

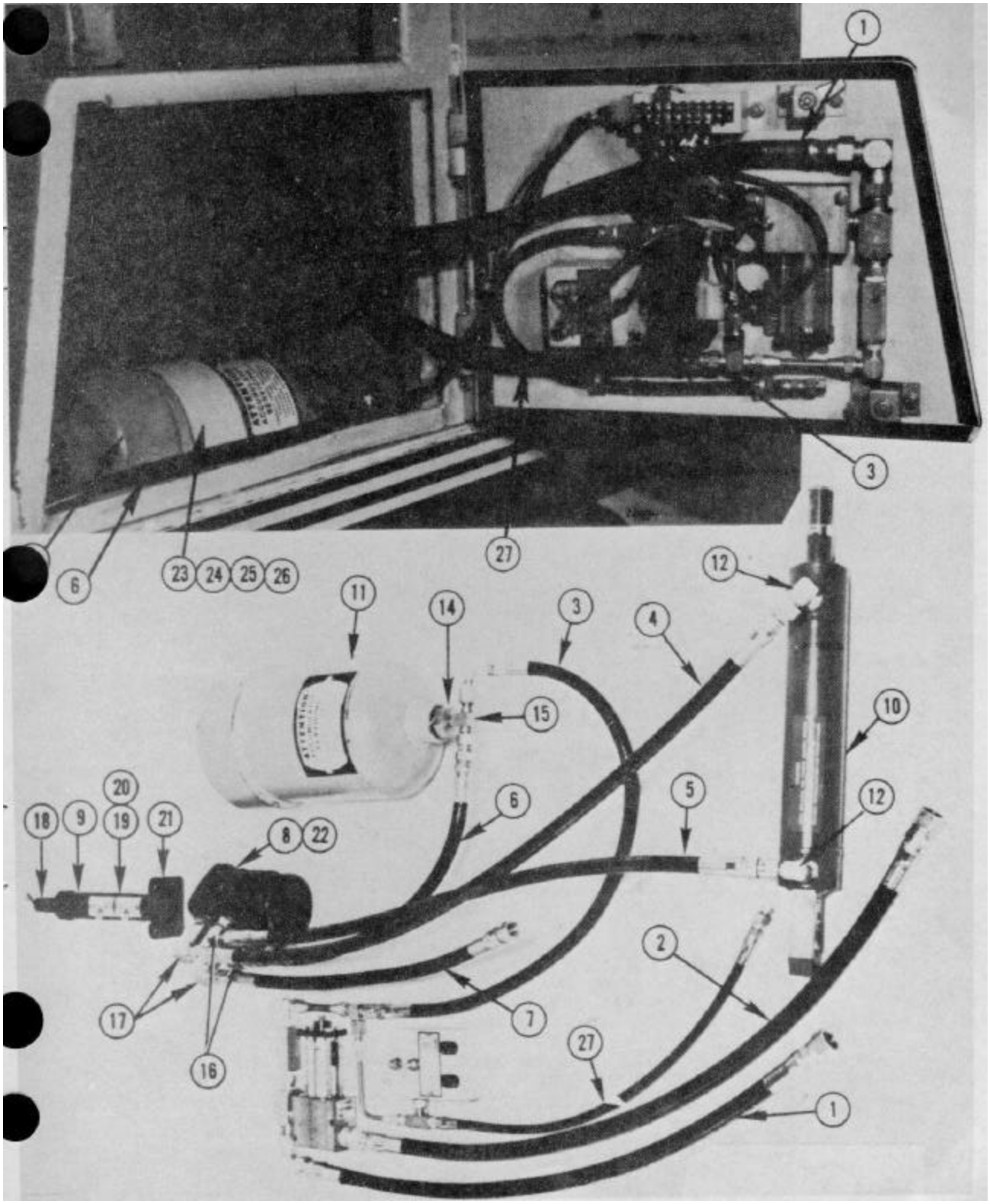
PARTS BREAKDOWN



PRESSURE SWITCH ASSEMBLY PART NO.- 10619

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS35190-296	REF	Screw, Flt. Hd. (1/4-20 UNC-2A x 2-1/4 LG)
-2	MS27183-10	REF	Washer, Flat (114)
-3	AN935-416	REF	Lockwasher (1/4)
-4	MS35690-402	REF	Nut, Hex. (1/4-20 UNC-2B)
-5	25048	1	Switch, Pressure (Low)
-6	25049	1	Switch, Pressure (High)
-7	10620	1	Block, Manifold
-8	25509	REF	Tee
-9	10621	1	Cover
-10	50000-08	REF	Hose Assembly
-11	25510	REF	Connector
-12	MS49005-4	2	Plug, Pipe (1/4-18 PTF)
-13	25504	REF	Plug

PARTS BREAKDOWN



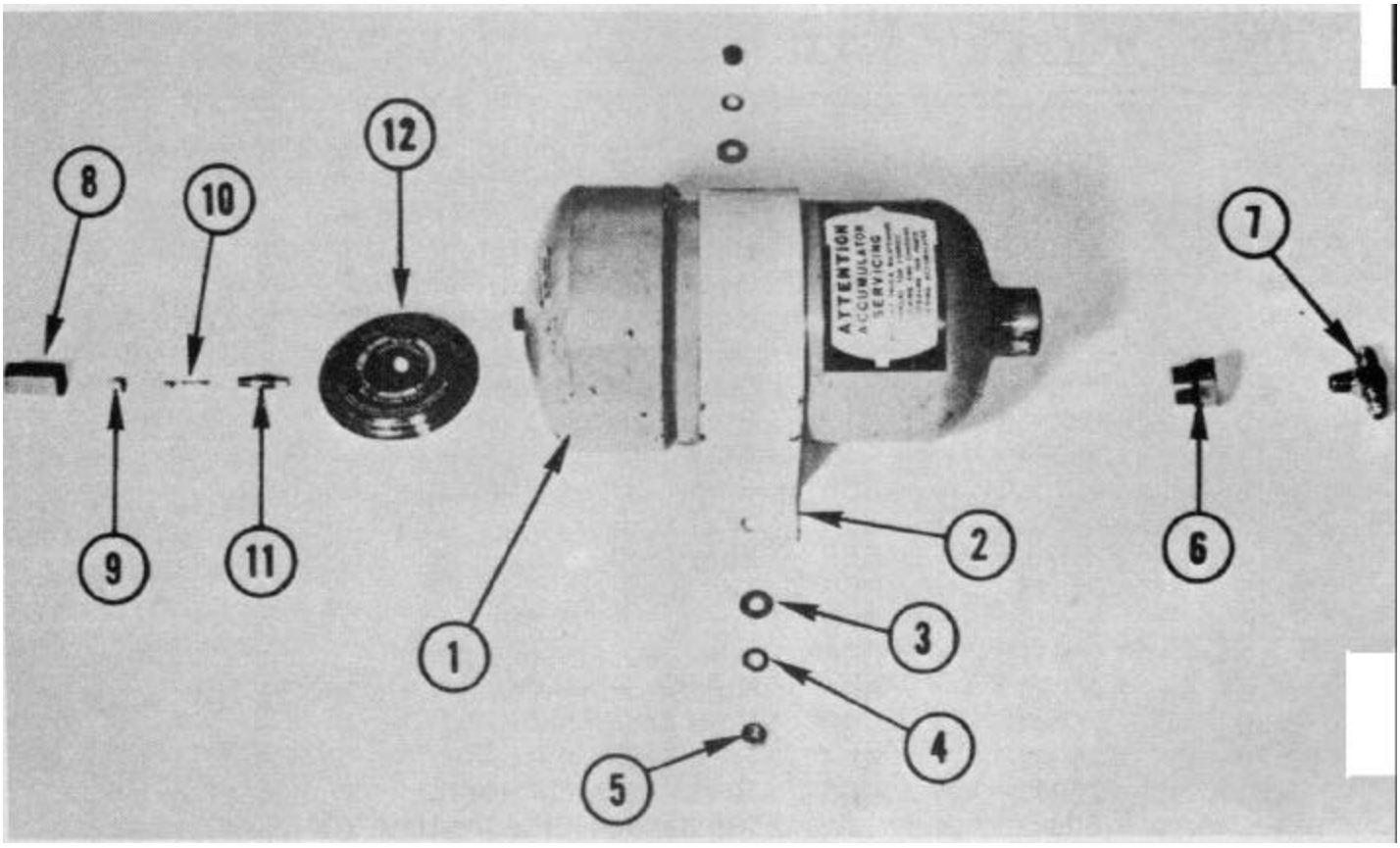
HYDRAULIC CONNECTIONS

PARTS BREAKDOWN

HYDRAULIC CONNECTIONS

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50002-030	REF	Hose Assembly - RH Side Sol (door) to Stack Valve
-2	50002-036	REF	Hose Assembly - LH Sol (door) to return manifold
-3	50013-38	REF	Hose Assembly (press switch manifold)
-4	50016-02	REF	Hose Assembly (steer-rod end)
-5	50016-01	REF	Hose Assembly (Steer-Piston end)
-6	50013-27	REF	Hose Assembly (Steer-Feed)
-7	50013-51	REF	Hose Assembly (Steer Return)
-8	25700	1	Unit, Orbitrol
-9	25040	1	Column, Steering
-10	8212-03	1	Steer Cylinder
-11	25064	1	Accumulator
-12	23706	REF	Elbow, 900-O-Ring
-13		REF	NOT USED
-14	9973	REF	Plug (Mod.)
-15	25515	REF	Tee, Side, Male
-16	25516	REF	Elbow 90°, "O" Ring
-17	25517	REF	Elbow Ex. LG 90°, "O" Ring
-18	25094	REF	Nut, Steering Wheel (13/16-20 NEF-2B)
-19	25041	REF	Wire Assembly
-20	25042	REF	Ring, contact
-21	25043	REF	Brush Assembly (horn)
-22	50369	1	Kit, Service (Steering Unit)
-23	10652	1	Clamp
-24	MS35690-602	2	Nut, Hex. (3/8-16 UNC-2B)
-25	AN935-616	2	Lockwasher (3/8)
-26	MS27183-14	2	Washer, Flat (3/8)
-27	50000-08	REF	Hose Assembly

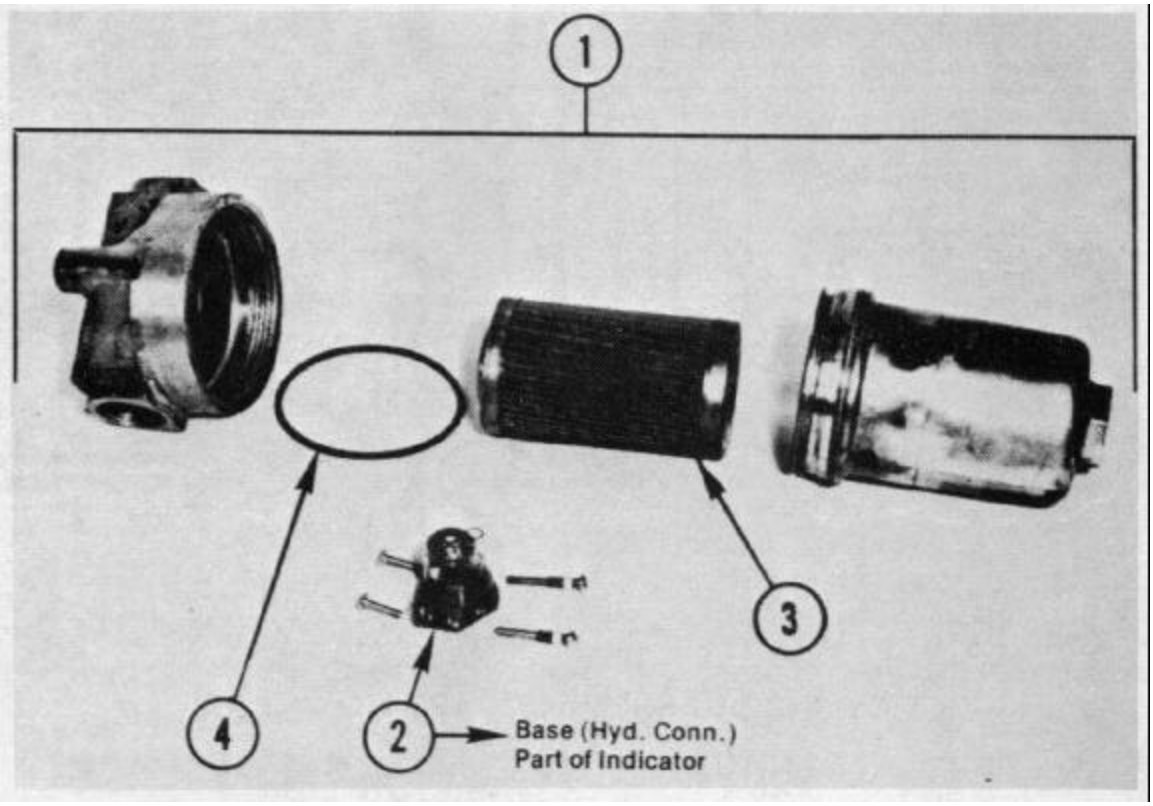
PARTS BREAKDOWN



ACCUMULATOR ASSEMBLY PART NO. - 25064

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25064	REF	Accumulator
-2	10652	REF	Clamp
-3	MS27183-14	REF	Washer, Flat (3/8
-4	AN935-616	REF	Lockwasher (3/8)
-5	MS35690-602	REF	Nut, Hex. (3/8-16 UNC-2B)
-6	9973	REF	Plug (Mod.)
-7	25515	REF	Tee, Side
-8	25569	1	Guard, Valve
-9	25570	1	Nut, Valve
-10	25571	1	Valve Assembly, Tank
-11	25574	1	Core Valve
-12	25573	1	Cover, Valve

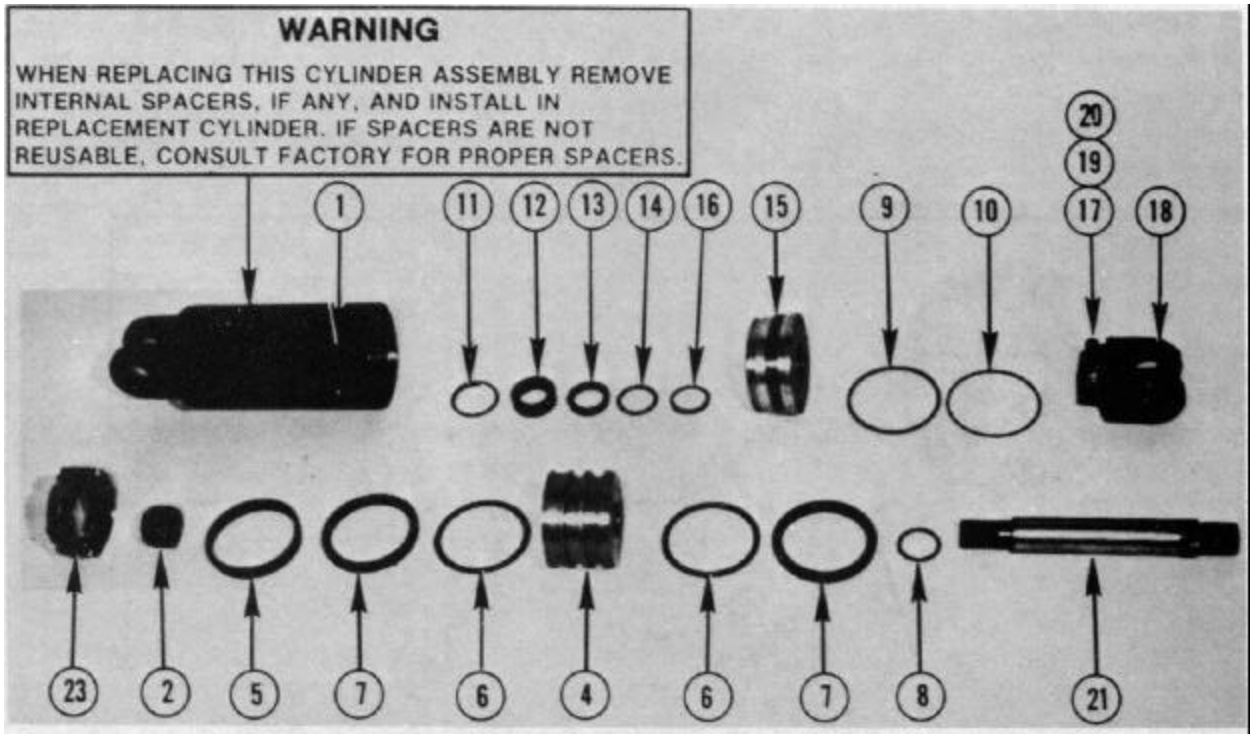
PARTS BREAKDOWN



FILTER ASSEMBLY WITH INDICATOR PART NO. 25065

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25066	1	Filter Assembly
-2	25067	1	Indicator
-3	25068	1	Filter Element
-4	25617	1	O-Ring

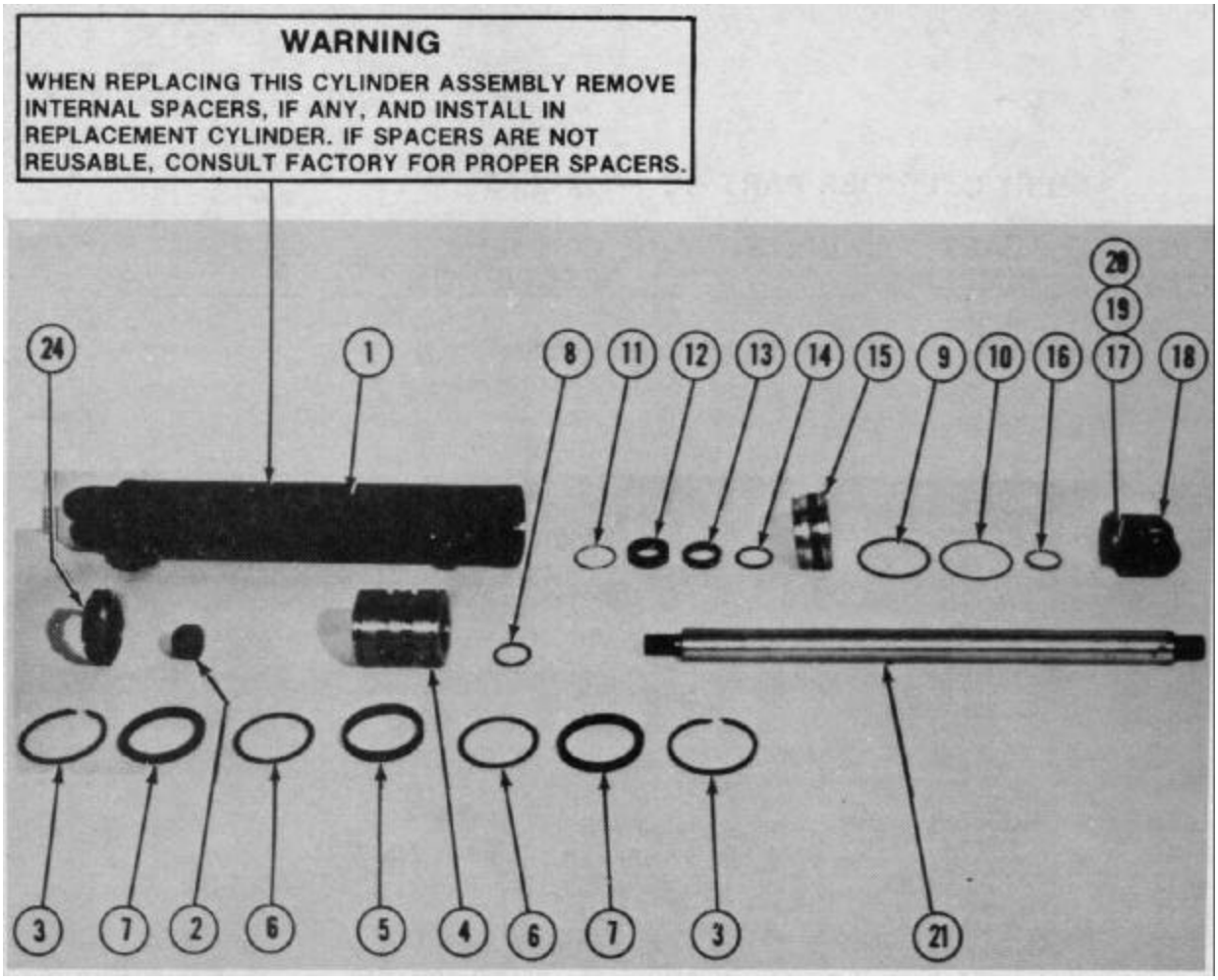
PARTS BREAKDOWN



TILT CYLINDER ASSEMBLY PART NO.- 6982

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	6982-7	1	Shell Assembly
-2	6982-1	1	Nut
-3			Not Required
-4	6982-6	1	Piston
-5	6982-2	1	Bearing
-6	6982-3	2	Ring, Nylon
-7	6982-4	2	Seal
-8	6982-5	1	"O" Ring
-9	6982-10	1	"O" Ring
-10	6982-11	1	Back-up Ring
-11	6982-20	1	Snap Ring
-12	6982-9	1	Bearing
-13	6982-12	1	Seal
-14	6982-13	1	Nylon Ring
-15	6982-14	1	Gland
-16	6982-15	1	Wiper Ring
-17	MS16997-102	1	Capscrew, Soc. Hd. (3/8-16 UNC-3A x 1-3/4 LG)
-18	9933	1	Rod End
-19	AN935-616	1	Lockwasher (3/8)
-20	MS35690-602	1	Nut, Hex. (3/8-16 UNC-2B)
-21	6982-8	1	Rod
-22	6982-25	1	Kit, Service (Consists of items 5, 6, 7, 8, 9, 10, 13, 14, 16)
-23	9243-124	1	Spacer

PARTS BREAKDOWN



SHIFT CYLINDER ASSEMBLY PART NO.-11212-03

PIVOT CYLINDER ASSEMBLY PART NO. - 10864

PARTS BREAKDOWN

SHIFT CYLINDER PART NO.-11212-03

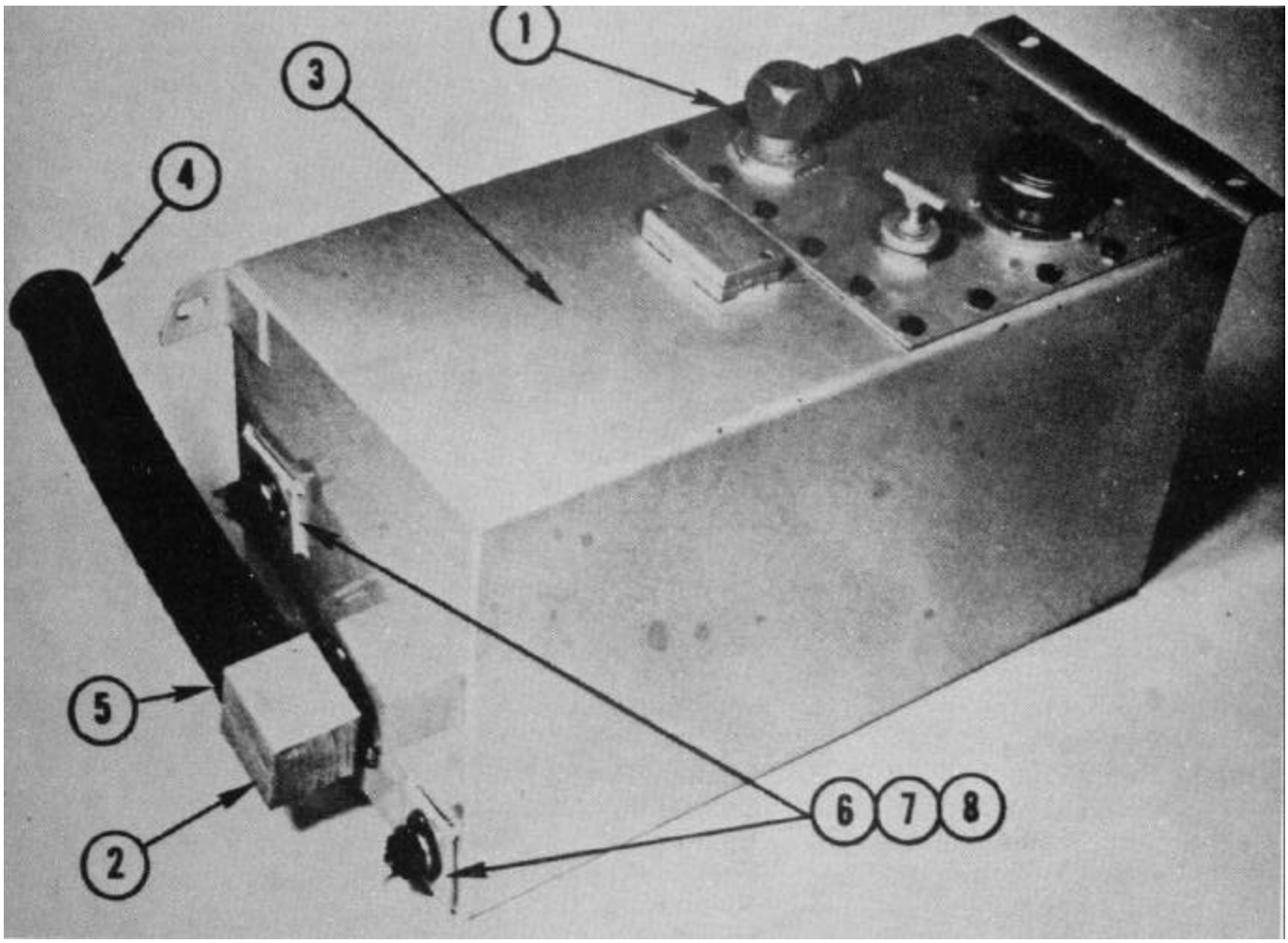
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
	11212-01	REF	Shift Cylinder
-1	10863-5	1	Shell Assembly
-2	10863-7	1	Nut
-3			Not Required
-4	10863-6	1	Piston
-5	25112	1	Bearing
-6	25113	2	Ring, Nylon
-7	25114	2	Seal
-8	25115	1	"O" Ring
-9	25116	1	"O" Ring
-10	25122	1	Back-up Ring
-11	25117	1	Snap Ring
-12	10863-4	1	Bearing
-13	25118	1	Seal
-14	25119	1	Ring, Nylon
-15	10863-3	1	Gland
-16	25120	1	Wiper Ring
-17	MS16997-102	1	Screw, Soc. Hd. (3/8-16 UNC-3A x 1-3/4 LG)
-18	9933	1	Rod End
-19	AN935-616	1	Lockwasher (3/8)
-20	MS35690-602	1	Nut, Hex. (3/8-16 UNC-2B)
-21	10863-2	1	Rod
-22	10863-8	1	Kit, Service (Consists of items 6, 7, 8, 9, 10, 13, 14, 16)
-23		1	NOT USED
-24	9243-39	1	Spacer

PARTS BREAKDOWN

PIVOT CYLINDER PART NO. - 10864

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
	10864	REF	Pivot Cylinder
-1	10864-5	1	Shell Assembly
-2	10864-7	1	Nut
-3	25097	2	Piston Ring
-4	10864-6	1	Piston
-5	25098	1	Bearing
-6	25099	2	Ring, Nylon
-7	25100	2	Seal
-8	25101	1	"O" Ring
-9	25102	1	"O" Ring
-10	25103	1	Back-up Ring
-11	25104	1	Snap Ring
-12	10864-4	1	Bearing
-13	25105	1	Seal
-14	25106	1	Nylon Ring
-15	10864-3	1	Gland
-16	25107	1	Wiper Ring
-17	MS16997-102	1	Screw, Soc. Hd. (318-16 UNC-3A x 1-3/4 LG)
-18	9933	1	Rod End
-19	AN935-616	1	Lockwasher (3/8)
-20	MS35690-602	1	Nut, Hex. (3/8-16 UNC-2B)
-21	10864-2	1	Rod
-22	10864-8	1	Kit, Service (Consists of items 6, 7, 8, 9, 10, 13, 14, 16)
-23			Not Required
-24			Not Required

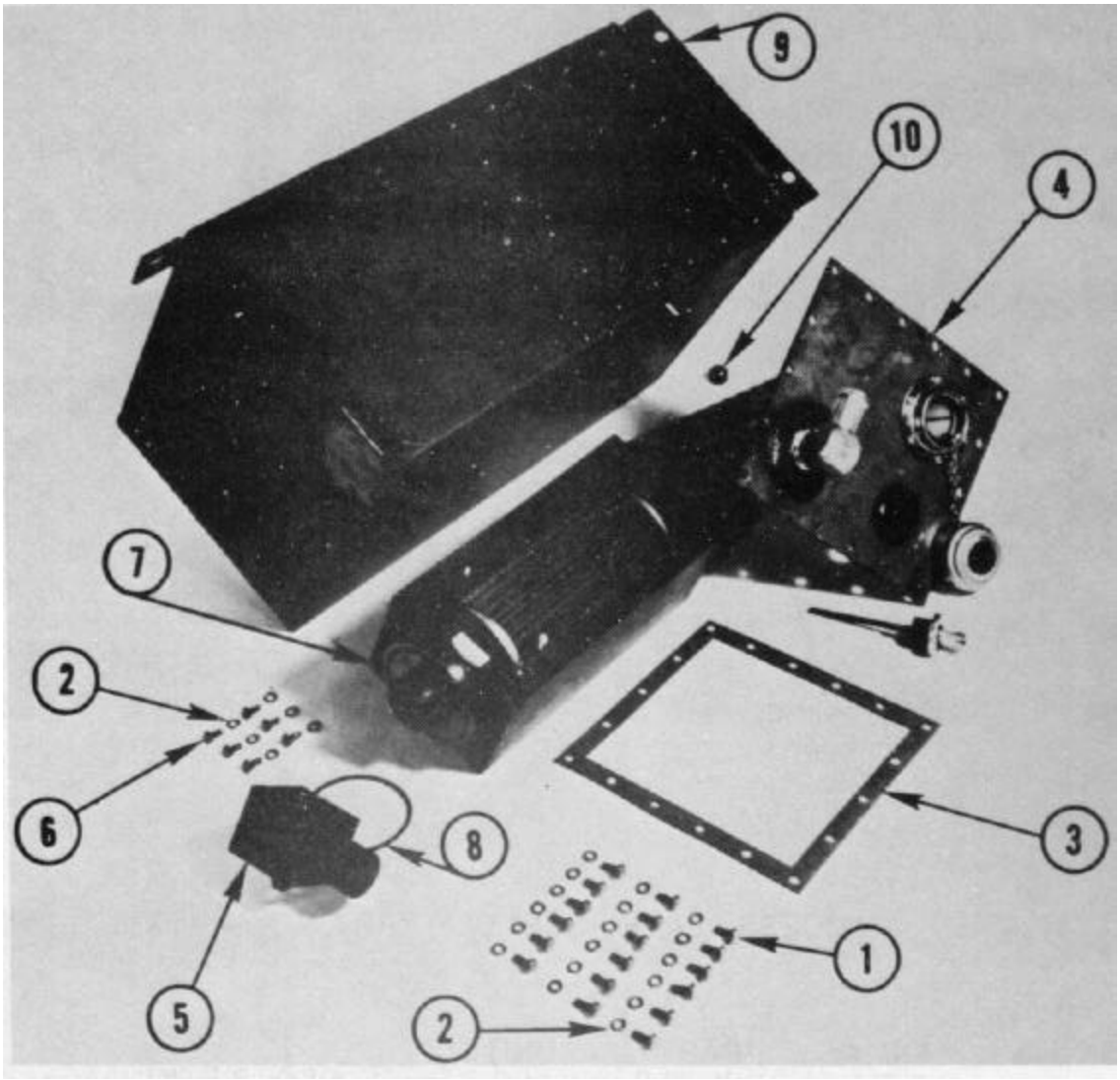
PARTS BREAKDOWN



HYDRAULIC RESERVOIR ASSEMBLY PART NO.- 14004

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	11338	1	Plate Assembly, Access
-2	10925	REF	Elbow, Suction
-3	10844	REF	Reservoir
-4	25568	REF	Hose
-5	25538	REF	Clamp
-6	50390	2	Thermostat
-7	MS35223-26	4	Screw, Pan Hd. (#6-32 NC-2A x 1/4 LG)
-8	AN935-6	4	Lockwasher (#6)

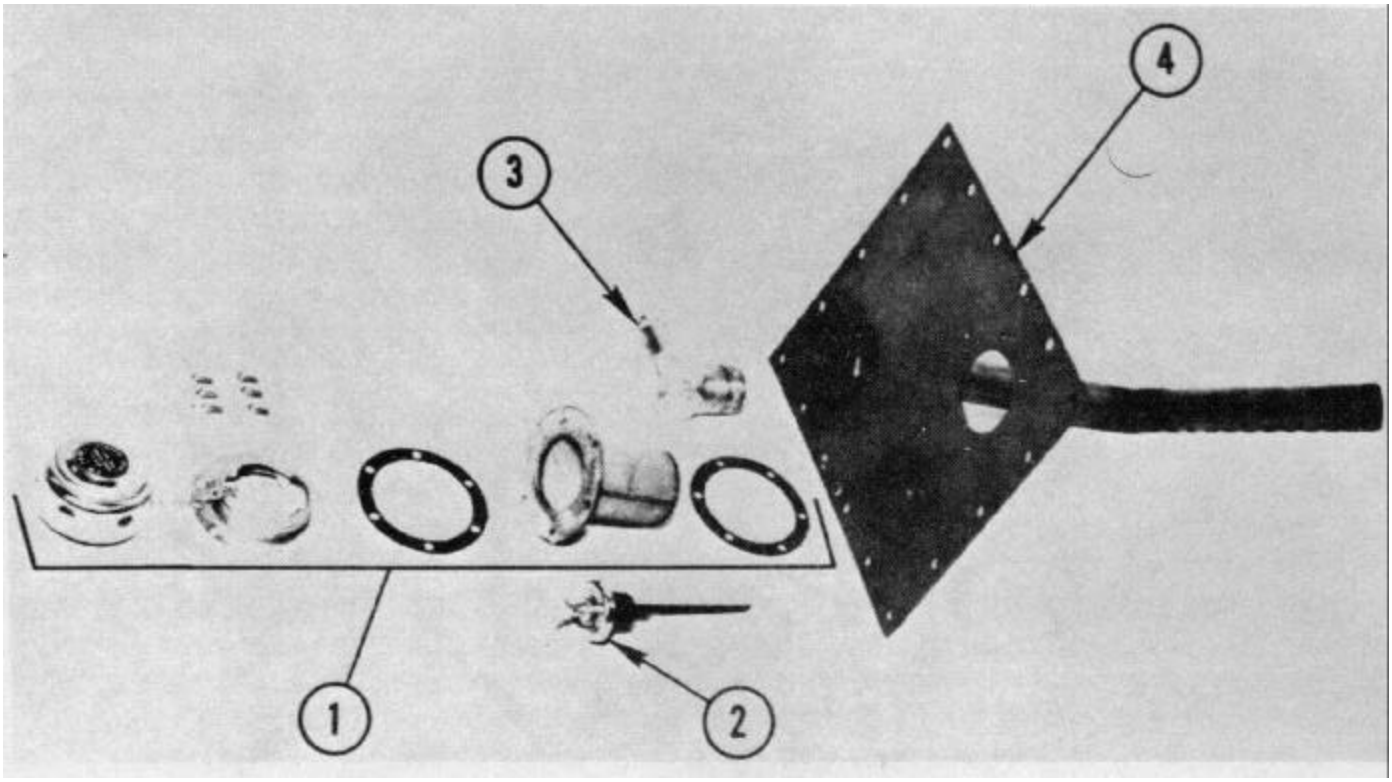
PARTS BREAKDOWN



HYDRAULIC RESERVOIR ASSEMBLY PART NO. - 14004

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS90725-5	18	Screw, Hex. Hd. (1/4-20 UNC-2A x 5/8 LG)
-2	AN935-416	24	Lockwasher (1/4)
-3	10924	1	Gasket
-4	11338	REF	Access Plate Assembly
-5	10925	1	Elbow, Suction
-6	MS90725-3	6	Screw, Hex. Hd. (1/4-20 UNC-2A x 1/2 LG)
-7	11337	1	Filter Assembly
-8	25060	1	"O"' Ring
-9	10844	1	Reservoir
-10	MS49005-8	1	Plug, Pipe(1/2-14 NPTF)

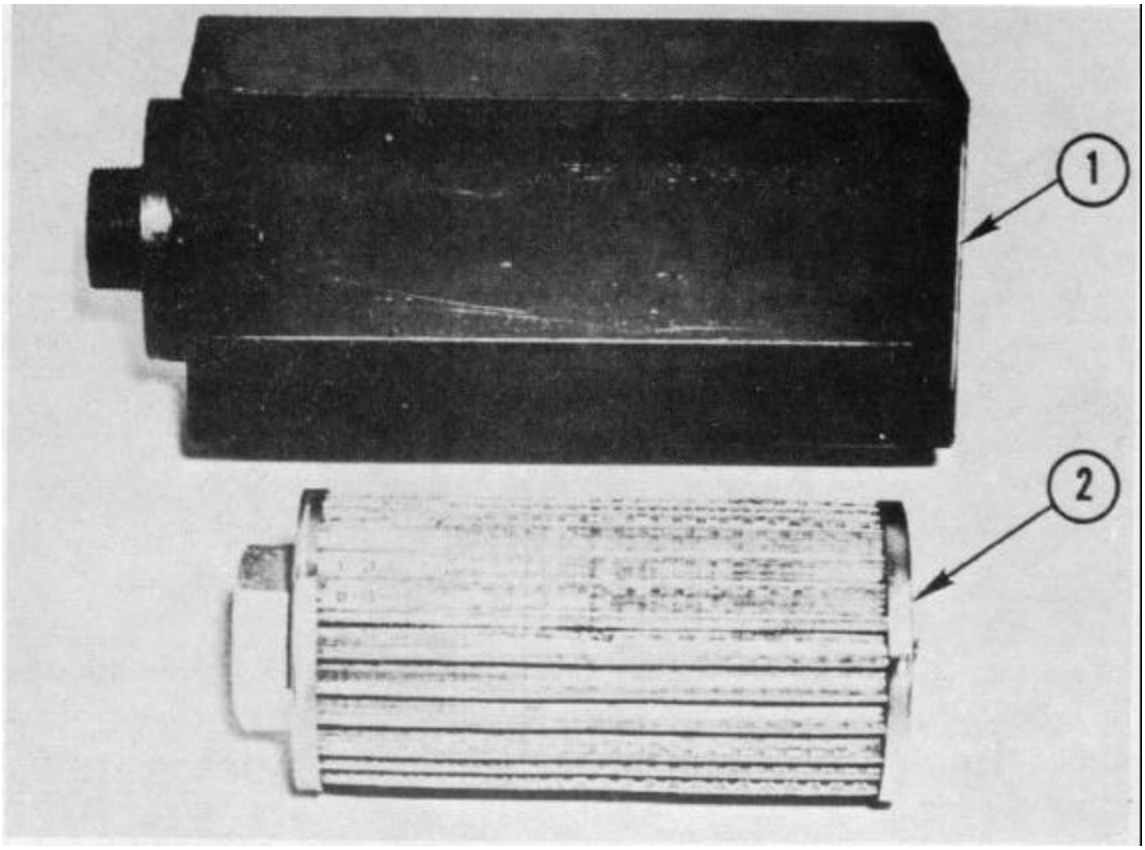
PARTS BREAKDOWN



ACCESS PLATE ASSEMBLY PART NO. - 11338

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25061	1	Assembly, Filler and Breather Cap
-2	10854	1	Dip Stick
-3	25527	1	Elbow
-4	10922	1	Plate, Access

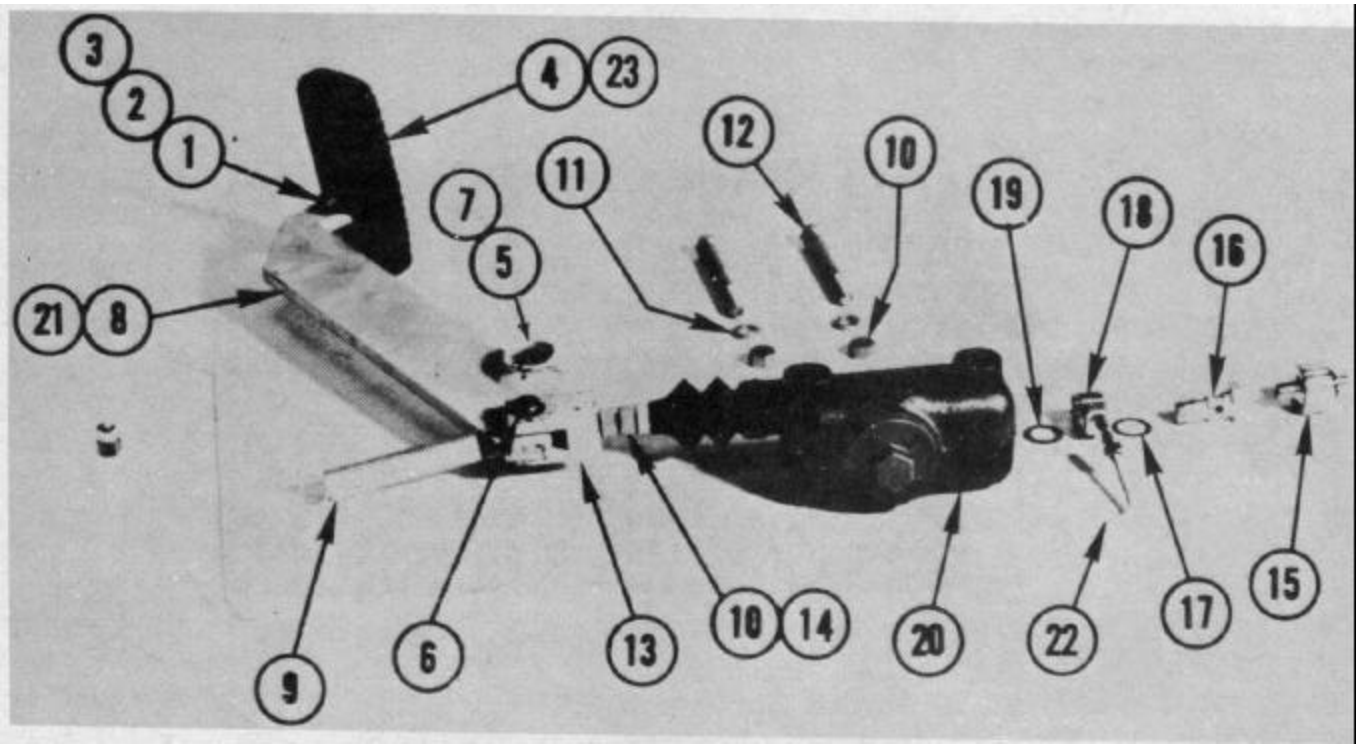
PARTS BREAKDOWN



FILTER ASSEMBLY PART NO. - 11337

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10848	1	Baffle
-2	25059	1	Filter

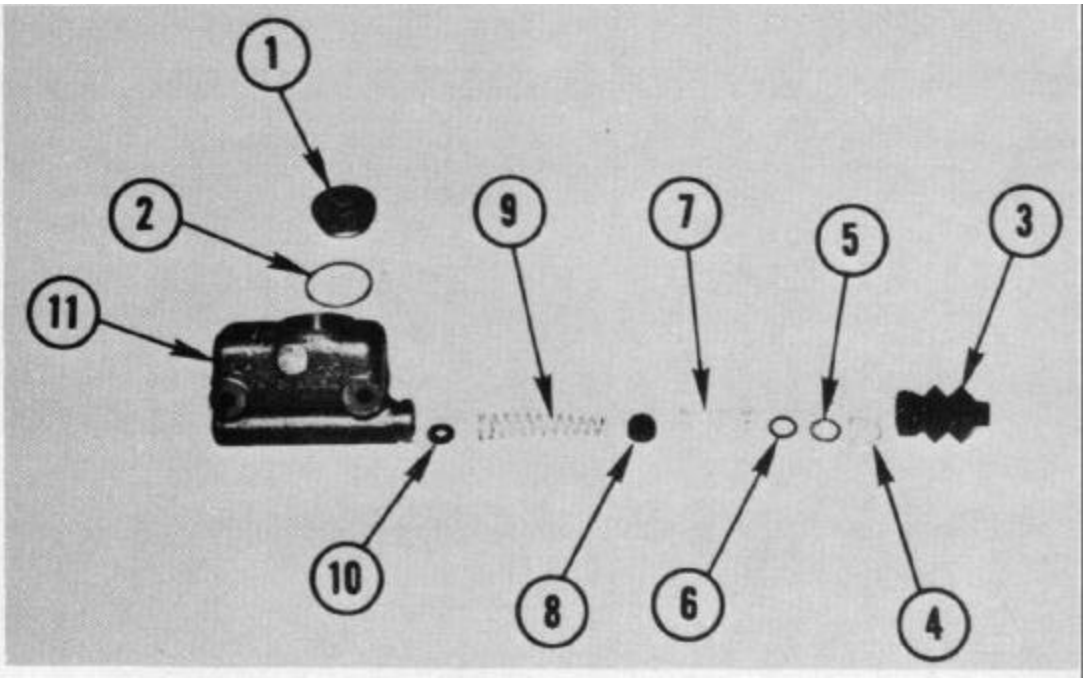
PARTS BREAKDOWN



SERVICE BRAKE ASSEMBLY PART NO. - 10861

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS35690-502	1	Nut, Hex. (5/16-18 UNC-2B)
-2	AN935-516	1	Lockwasher (5/16)
-3	MS90725-36	1	Screw, Hex. Hd. (5/16-18 UNC-2A x 1-1/4 LG)
-4	23942	1	Pad, Pedal
-5	MS24665-302	1	Pin, Cotter (3/32 DIA x 1 LG) (Not Shown)
-6	25081	1	Pin, Clevis (w/Cotter Pin)
-7	MS27183-23	1	Washer, Flat (3/4) (Not Shown)
-8	10826	1	Arm, Brake Pedal
-9	25021	1	Spring
-10	MS35691-602	3	Nut, Jam, Hex. (3/8-16 UNC-2B)
-11	AN935-616	2	Lockwasher (3/8)
-12	MS90725-71	2	Screw, Hex. Hd. (3/8-16 UNC-2A x 3-1/4 LG)
-13	10824	1	Yoke
-14	10825	1	Rod, Brake adjusting
-15	25023	1	Switch, stop light
-16	25024	1	Bolt, Swivel Fitting
-17	25026	1	Seal, Washer
-18	25028	1	Fitting, Swivel Bolt
-19	25025	1	Seal, Washer
-20	20210	1	Cylinder, Master Brake
-21	25027	1	Bearing
-22	10796	1	Tube Assembly
-23	23941	1	Pedal, Brake

PARTS BREAKDOWN



MASTER BRAKE CYLINDER ASSEMBLY PART NO. - 20210

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	20211	1	Cap, Filler
-2	20212	1	Gasket, Filler Cap
-3	20213	1	Boot
-4	20214	1	Lockwire, Stop Plate
-5	20215	1	Plate, Piston Stop
-6	20216	1	"O" Ring
-7	20217	1	Piston Assembly
-8	20218	1	Cup, Primary Piston
-9	20219	1	Spring
-10	20220	1	Valve and Seat Assembly
-11	20221	1	Casting, (not serviced)
-12	20223	1	Kit, Service (items 3, 5, 6, 8)

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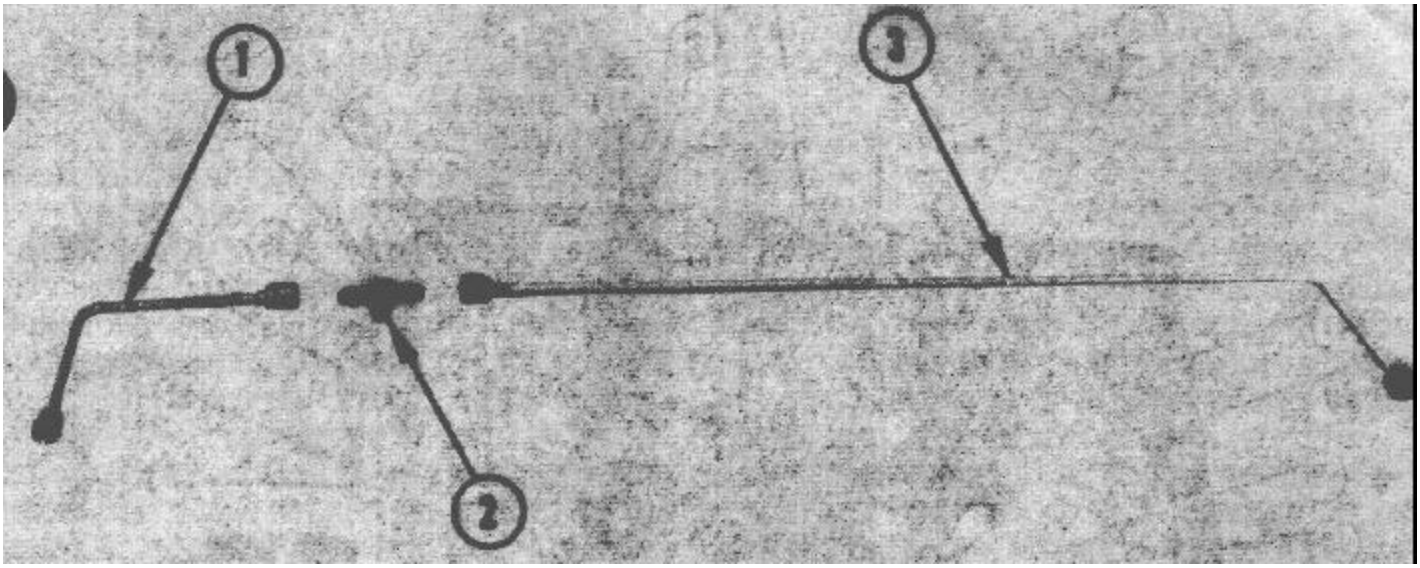
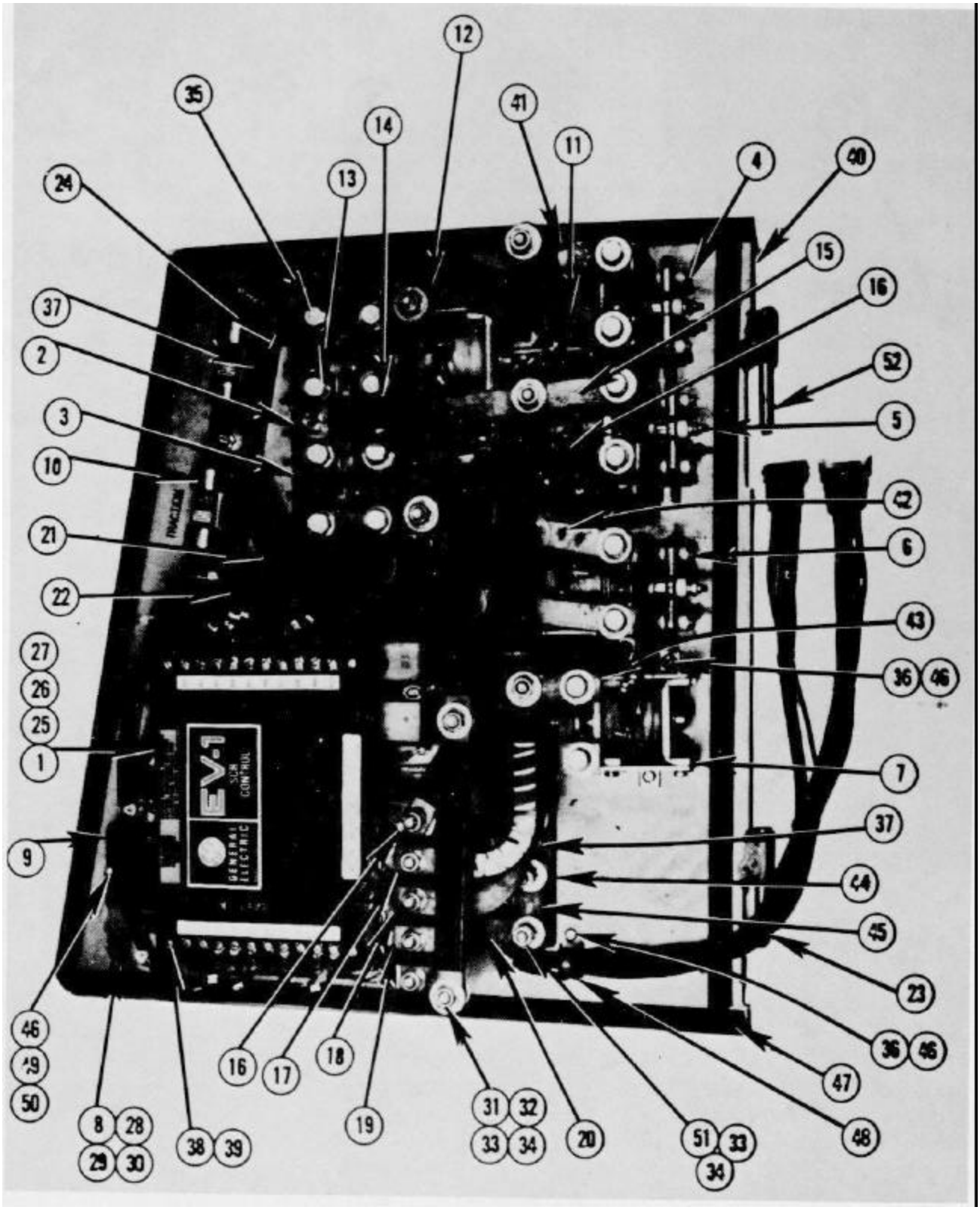
PARTS BREAKDOWN



DRIVE AXLE BRAKE TUBE GROUP

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10984	1	Tube Assembly
-2	25512	1	Tee; 3116 tube- 3/8- 24
-3	10797	1	Tube Assembly

PARTS BREAKDOWN



ELECTRIC DOOR MODULE ASSEMBLY PART NO. - 14035

PARTS BREAKDOWN

ELECTRIC DOOR MODULE ASSEMBLY PART NO. - 14035

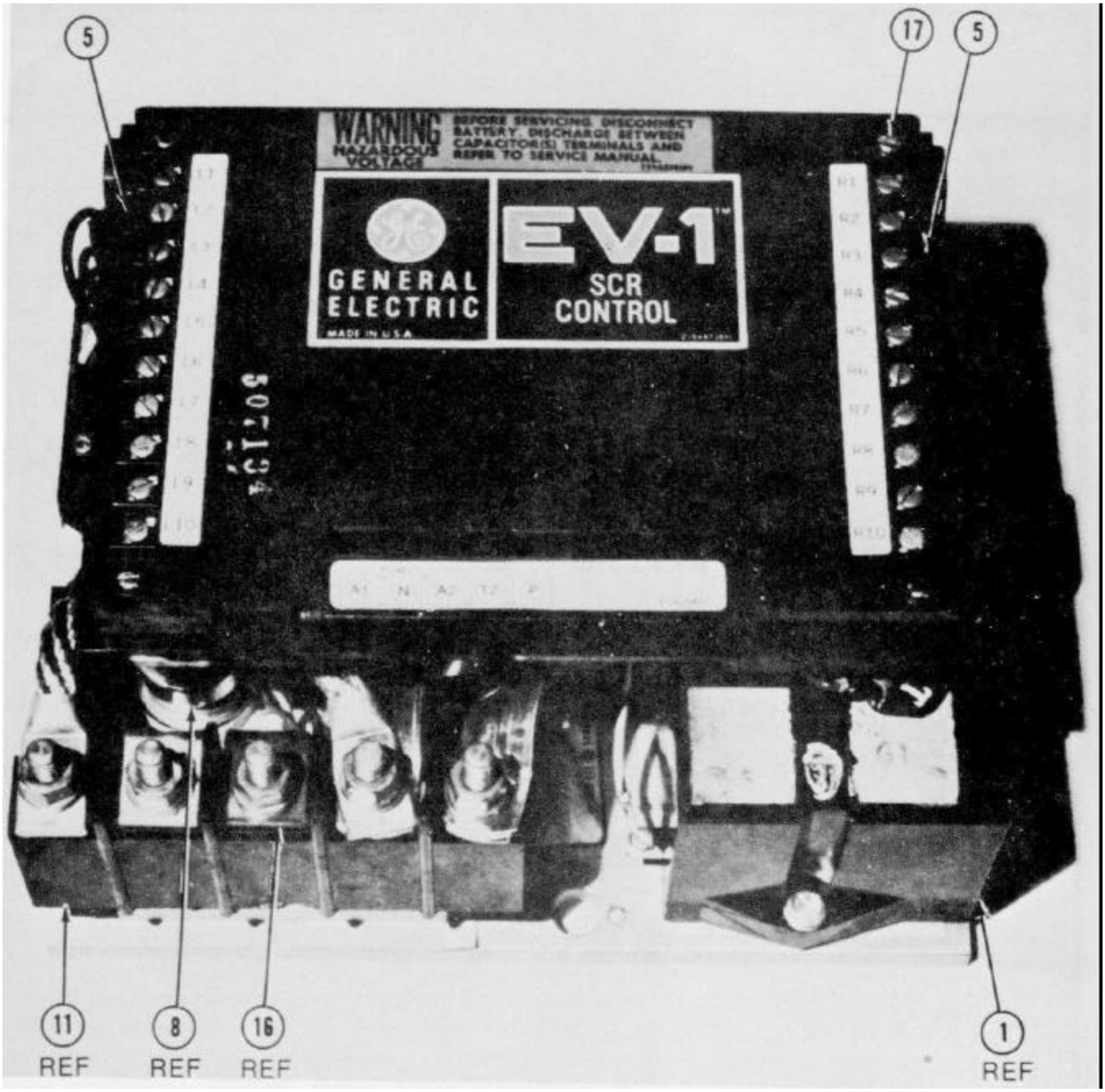
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50339	1	SCR Control
-2	50398	1	Contactor, R
-3	50398	1	Contactor, F
-4	50294	1	Contactor, P
-5	50294	1	Contactor, 1A
-6	50294	1	Contactor, Line
-7	50294	1	Contactor, FW
-8	25132	2	Latch
-9	25071	3	Driver, Coil
-10	25134	2	Fuse, Power(ALS400) (1FU and 2FU)
-11	14046	1	Bus Bar
-12	14044	2	Bus Bar
-13	14043	2	Bus Bar
-14	14026	1	Bus Bar
-15	14029	1	Bus Bar
-16	14020	1	Bus Bar
-17	14024	1	Bus Bar
-18	11110	1	Bus Bar
-19	11056	1	Bus Bar
-20	11057	1	Bus Bar
-21	14022	1	Bus Bar
-22	11118	1	Bus Bar
-23	14047	1	Wire Harness
-24	9640	1	Block, Fuse
-25	MS90725-59	3	Screw, Hex. Hd. (3/8-16 UNC-2A x 7/8 LG)
-26	MS27183-14	3	Washer, Flat (3/8)
-27	AN935-616	3	Lockwasher (3/8)
-28	MS90725-5	4	Screw, Hex. Hd. (1/4-20 UNC-2A x 5/8 LG)
-29	MS27813-10	4	Washer, Flat (1/4)
-30	AN935-416	4	Lockwasher (1/4)
-31	MS90725-33	11	Screw, Hex. Hd. (5/16-18 UNC-2A x 7/8 LG)
-32	MS35690-502	44	Nut, Hex. (5/16-18 UNC-2B)
-33	MS15795-612	44	Washer, Flat (516)(Brass)
-34	AN935-B516	44	Lockwasher, Bronze (5/16)
-35	MS90725-31	REF	Screw, Hex. Hd. (5/16-18 UNC-2A x 5/8 LG)
-36	MS35224-63	9	Screw, Pan Hd. (#10-32 NF-2A x 1/2 LG)
-37	MS16997-78	4	Screw, Soc. Hd. (5/16-18 UNC-2A x 3/4 LG)
-38	50339-7	REF	Block Assembly, Terminal
-39	50339-22	REF	Sems Unit
-40	14034	1	Door
-41	14027	1	Bus Bar
-42	14103	1	Bus Bar
-43	14102	1	Bus Bar
-44	11066	1	Connector, Strip, Triple
-45	11055	1	Bus Bar

PARTS BREAKDOWN

ELECTRIC DOOR MODULE ASSEMBLY PART NO. - 14035

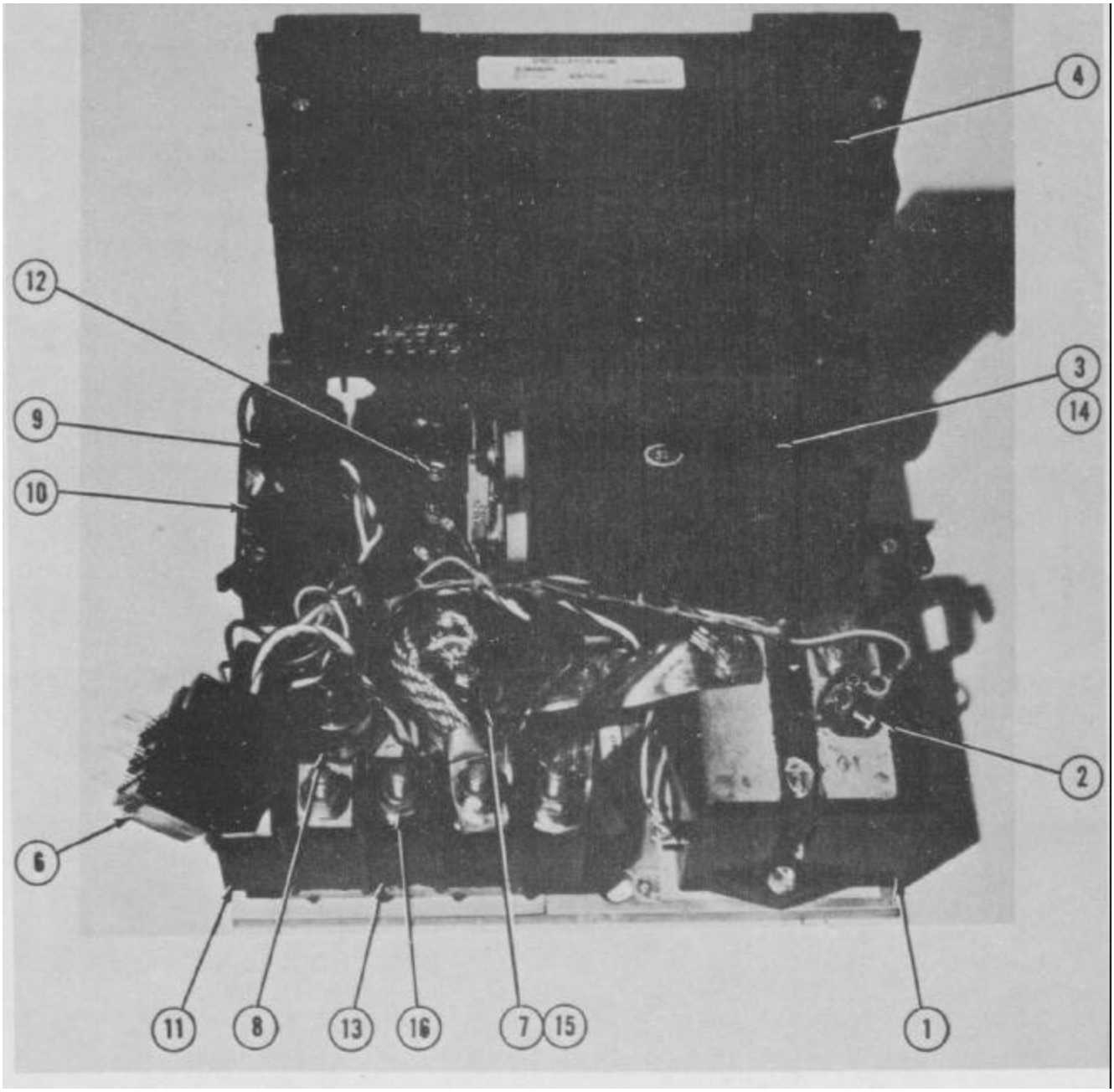
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-46	AN935-10	21	Lockwasher (#10)
-47	14035-46	7 Ft.	Strip, Rubber
-48	MS21917-69	1	Clamp
-49	14035-39	2	Stud, All Thread (#10-32 NF-2A x 3-5/8 LG)
-50	MS35650-102	2	Nut, Hex. (#10-32 NF-2B)
-51	MS35690-511	3	Nut, Hex. Brass (5/16-18UNC-2B)
-52	NAS1515M6	2	Washer, Teflon (1/16 x 3/8 I.D. x 5/8 O.D.) (Not Shown)

PARTS BREAKDOWN



SCR PANEL PART NO. - 50339

PARTS BREAKDOWN



SCR PANEL PART NO. - 50339

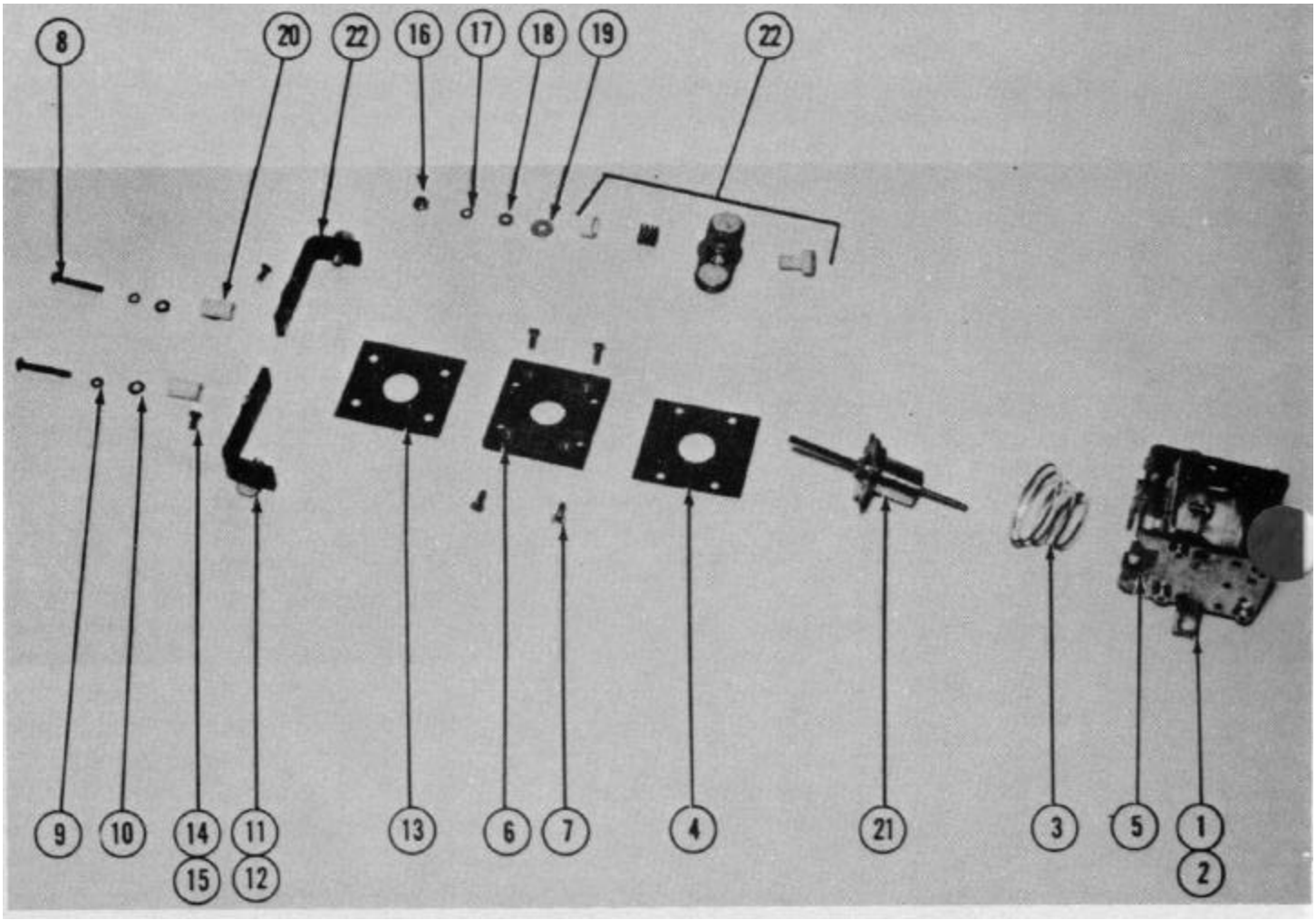
PARTS BREAKDOWN

SCR PANEL PART NO. - 50339

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
	50339	REF	SCR Panel
-1	50339-1	1	#1 REC (Main SCR)
-2	50339-2	1	Thermal Protector
-3	50339-3	1	Commutating Capacitor
-4	50339-4	1	Oscillator Card
-5	50339-7	2	Card Connection Block
-6	50339-8	1	Card Connector
-7	50339-9	1	#3 REC (Flyback Diode)
-8	50339-10	1	#4 REC (Plugging Diode)
-9	50339-11	1	#2 REC (Turn-off SCR)
-10	50339-12	1	#5 REC (Charging SCR)
-11	50339-13	1	Power Connection Block
-12	50339-14	2	#22 REC and #25 REC (Filters for 2 and 5 REC)
-13	50339-15	1	Motor Current Sensor(Located behind middle power connector)
-14	50339-16	1	*Transformer and Choke (1X)
-15	50339-17	1	3 REC Filter
-16	50339-20	1	Shunt
-17	50339-22	4	Sems Unit, Pan Hd. (#6-32 x 1-1/8 LG w/Lockwasher)

*Transformer and choke (1X) located in encapsulated block under capacitor. 3 REC filter (23 FIL) located under pigtail of diode.

PARTS BREAKDOWN



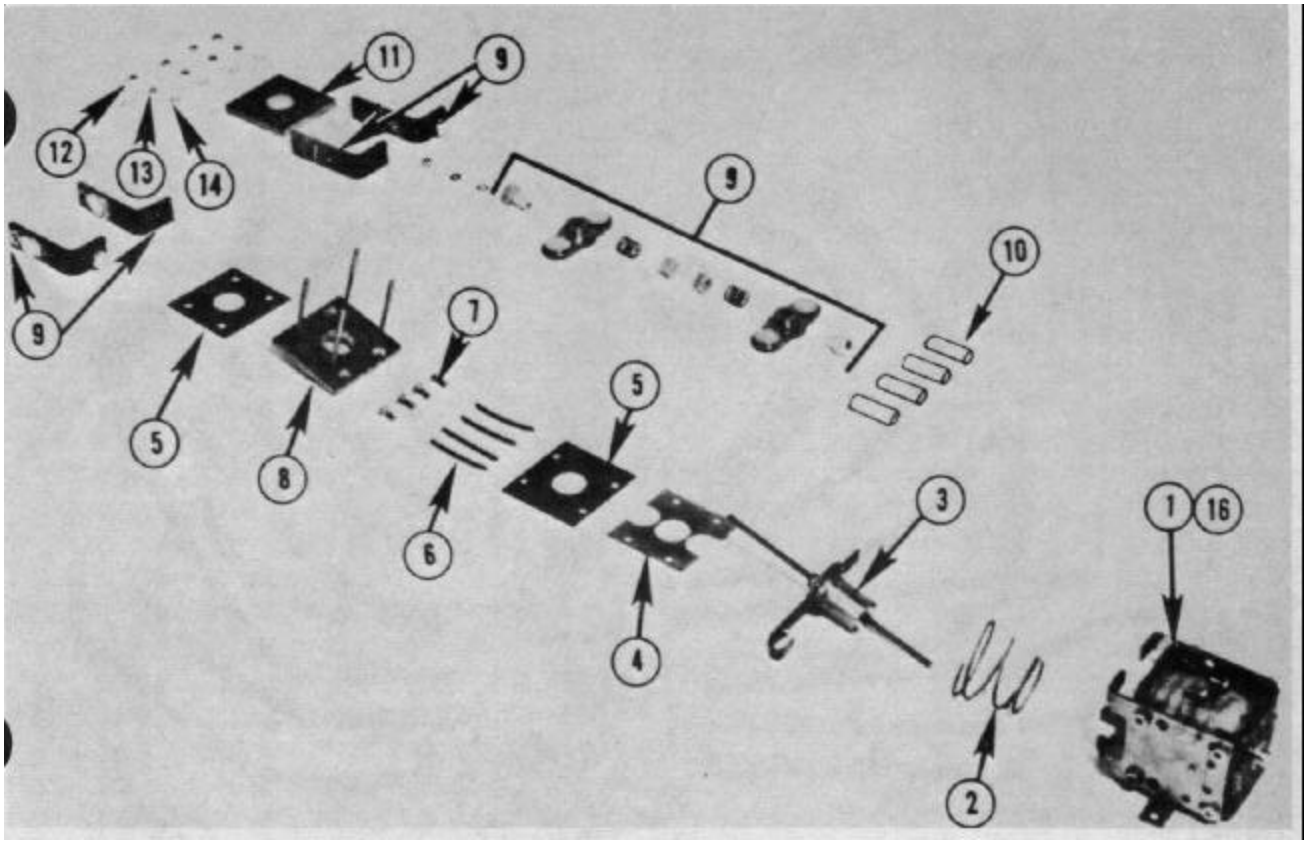
CONTACTOR ASSEMBLY PART NO. - 50294 (L, 1A, FW, P)

PARTS BREAKDOWN

CONTACTOR ASSEMBLY PART NO. - 50294 (L, 1A, FW, P)

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50260-14	1	Solenoid Sub-Assembly
-2	50260-37	REF	Coil, Replacement
-3	50260-11	1	Spring, Return
-4	50260-2	1	Insulation
-5	50260-24	1	Guide, Operator
-6	50260-8	1	Insulator Assembly
-7	50260-17	4	Screw, FLT Hd. (#8-32 NC-2A x 1/2 LG)
-8	50260-18	2	Screw, RD Hd. (#8-32 NC-2A x 1-1/4 LG)
-9	50260-19	2	Lockwasher (#8)
-10	50260-22	2	Washer, Flat (#8)
-11	50260-25	2	Screw, Hex. Hd. (5/16-18 UNC-2A x 5/8 LG)
-12	50260-26	2	Lockwasher, Bronze (5/16)
-13	50260-1	1	Insulation
-14	50260-21	2	Washer, Ext. Lock 82° (#8)
-15	50260-16	2	Screw, FLT Hd. (#8-32 NC-2A x 7/16 LG)
-16	50260-15	1	Nut, Flex-Loc. (#10-32 NF-2A)
-17	50260-20	1	Washer, Flat (#10)
-18	50260-23	1	Lockwasher (#10)
-19	50260-12	1	Washer, Non-Metallic
-20	50260-7	2	Guide, Bridge
-21	50260-38	1	Core and Rod Assembly
-22	50260-36	1	Kit, Service

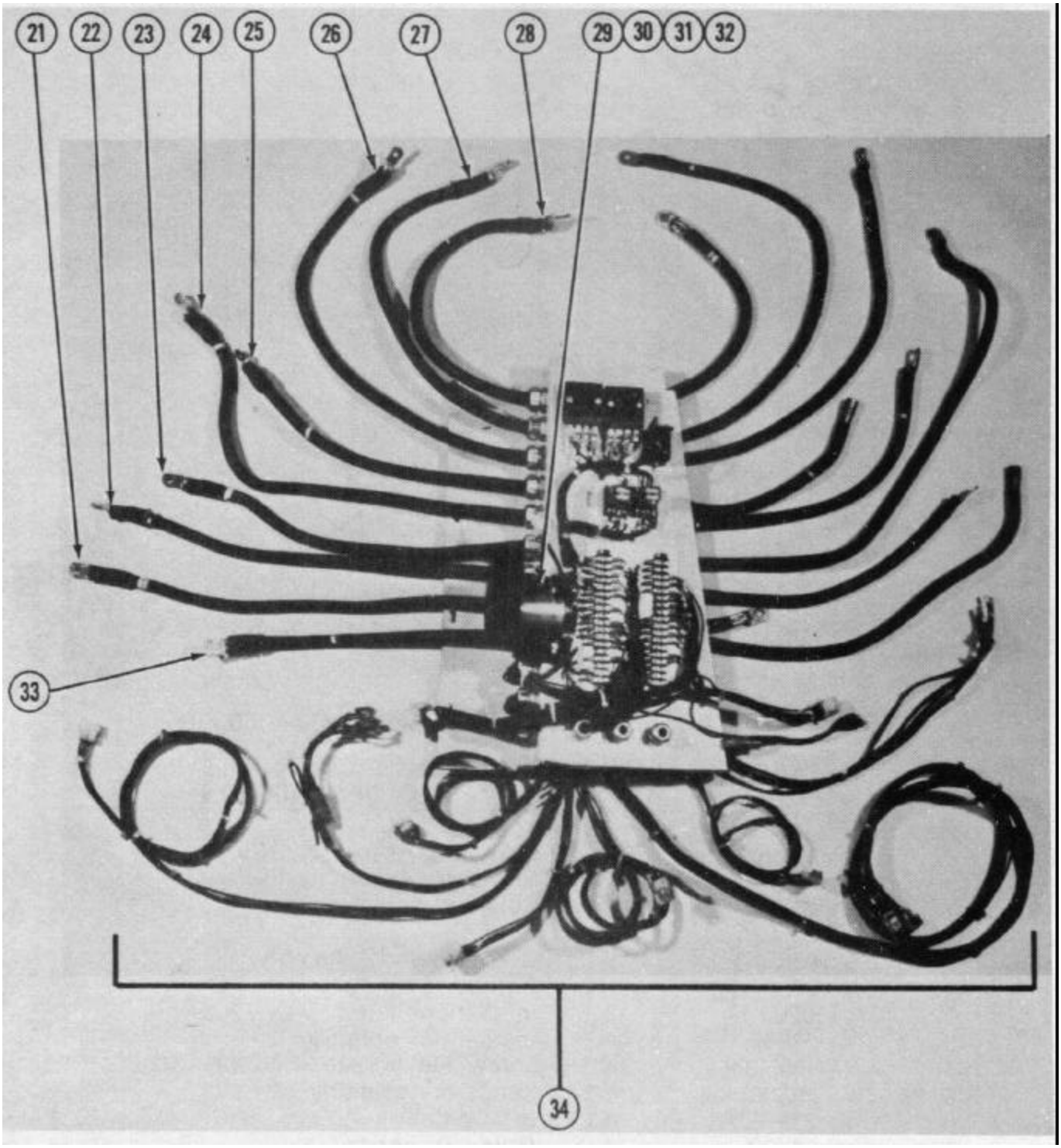
PARTS BREAKDOWN



CONTACTOR ASSEMBLY R AND F PART NO. - 50398

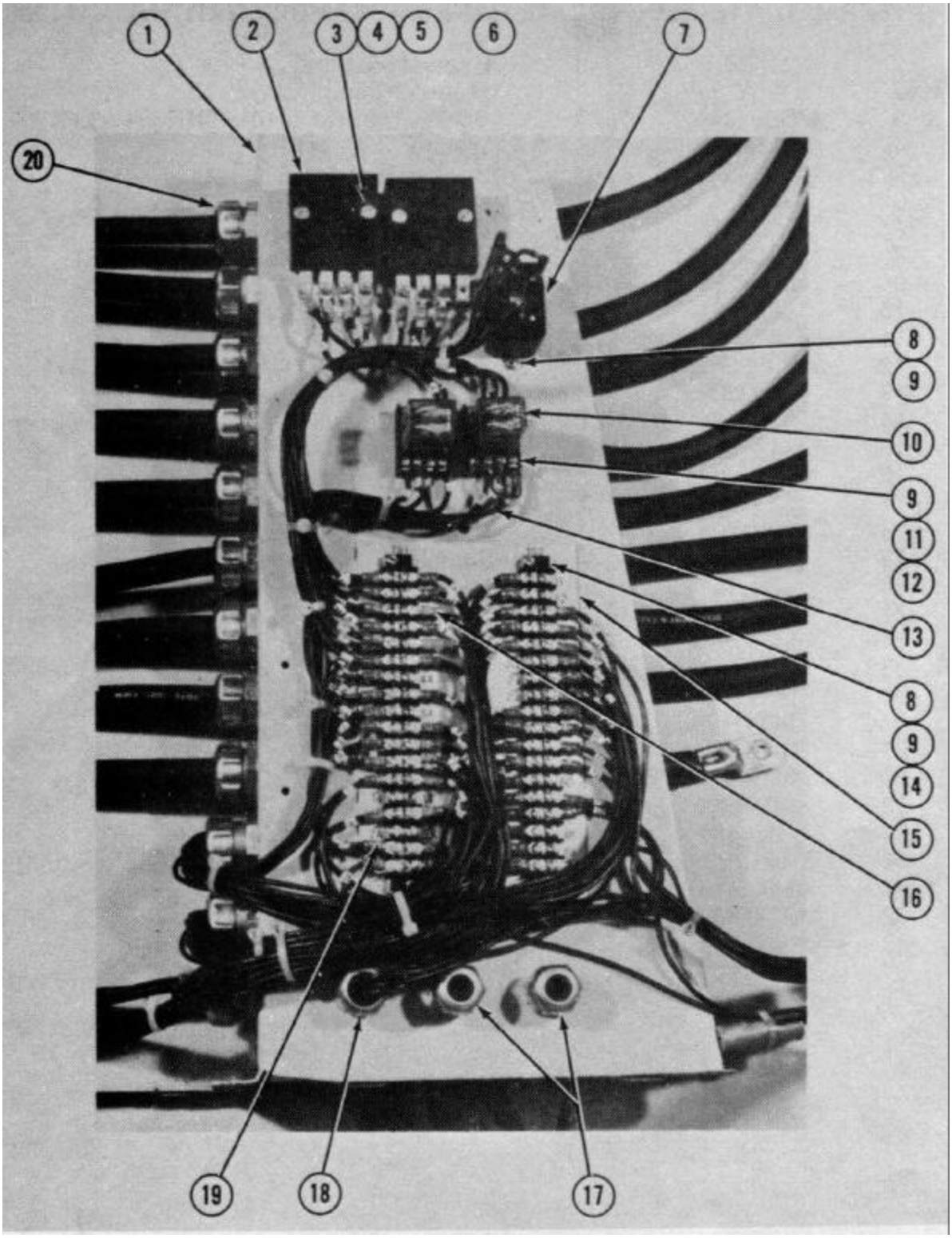
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
	50398	REF	Contactor Assembly, REV Contactor Assembly, FWD
-1	23507	1	Solenoid Assembly
-2	23501	1	Spring
-3	23511	1	Core and Rod Assembly
-4	23504	1	Detent
-5	50260-1	2	Insulation Plate
-6	23509	4	Insulating Tubing
-7	AN505-8-9	4	Screw, Flat Hd. (#8-32 NC-2A x 1/2 LG)
-8	23503	1	Insulator Assembly
-9	23506	4	Kit, Contact
-10	23508	4	Guide, Bridge
-11	23505	1	Insulator
-12	MS27183-7	4	Washer, Flat (#8)
-13	AN935-8	4	Lockwasher (#8)
-14	MS35649-82	4	Nut, Hex(#8-32 NC-2B)
-15	50260-2	1	Insulation Plate
-16	23500	REF	Coil, Replacement

PARTS BREAKDOWN



INTERMEDIATE ELECTRICAL PANEL ASSEMBLY PART NO.-14206

PARTS BREAKDOWN



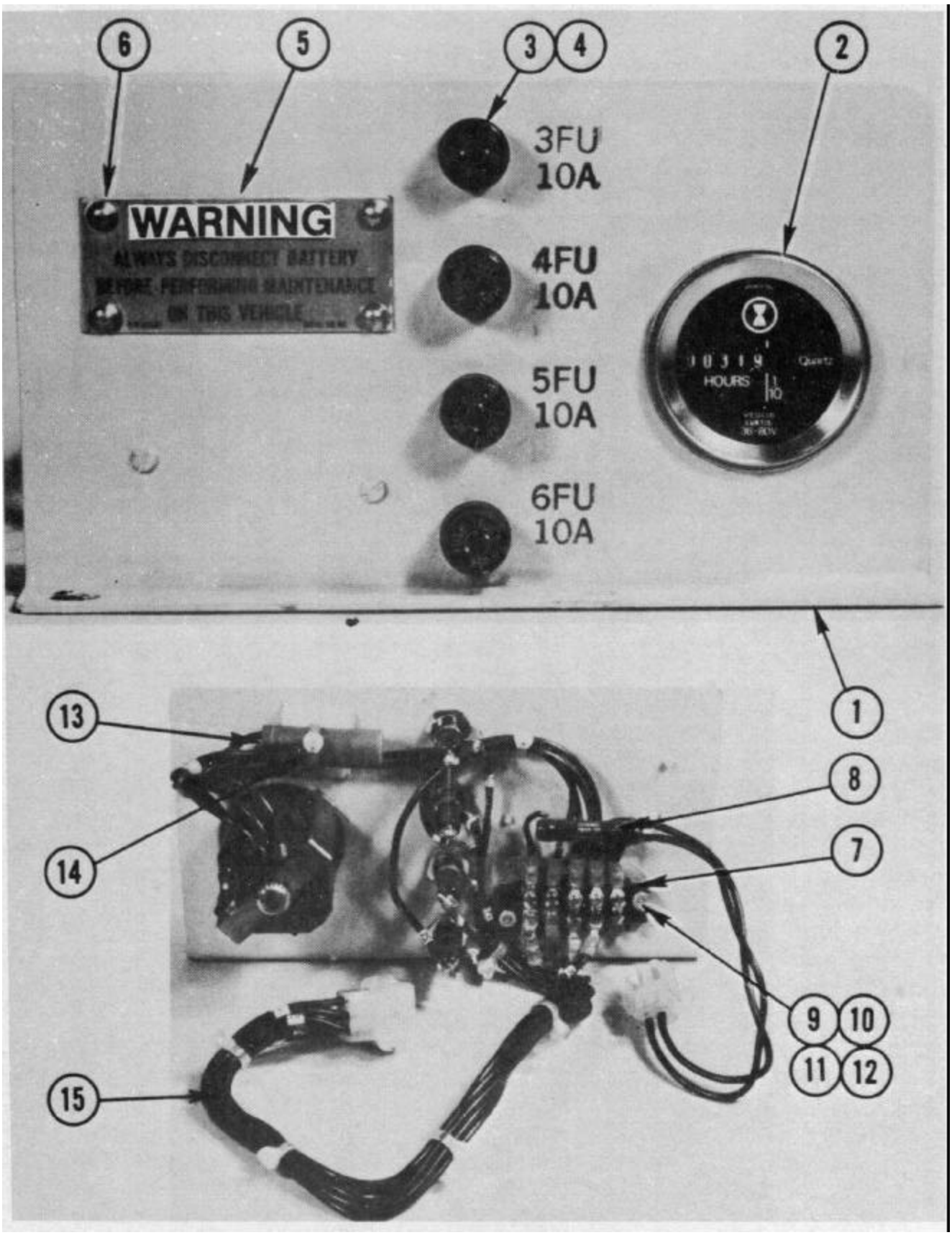
INTERMEDIATE ELECTRICAL PANEL ASSEMBLY PART NO.--14206

PARTS BREAKDOWN

INTERMEDIATE ELECTRICAL PANEL ASSEMBLY PART NO.-14206

-1	14207	1	Panel, Mounting
-2	25213	1	Module, Time Delay
-3	MS35224-69	4	Screw, Pan Hd (#10-32 NF x 11/2 LG)
-4	MS27183-8	4	Washer, Flat (#10)
-5	AN935-10	4	Lockwasher (#10)
-6	25071	1	Module, Coil Driver
-7	20117	1	Relay, Lift Lockout
-8	MS35223-31	6	Screw, Pan Hd (#6-32 NC x % LG)
-9	AN935-6	10	Lockwasher (#6)
-10	25170	2	Relay, DPDT (36 VDC)
-11	23896	2	Socket, Relay
-12	MS35223-30	4	Screw, Pan Hd (#6-32 NCX x 1/2 LG)
-13	14233	1	Assembly, Wire
-14	20119	2	Strip, Terminal
-15	14155	1	Label, Terminal Strip
-16	20118	1	Diode (#9 Rec)
-17	20125	2	Relief, Strain (1/2)
-18	20126	1	Relief, Strain (1/2)
-19	20120	3	Jumper
-20	20116	12	Relief, Strain (3/4)
-21	14141-06	1	Cable, Power (PS 2)
-22	14141-03	1	Cable, Power (TA 2)
-23	14141-02	1	Cable, Power (TS 2)
-24	14141-07	1	Cable, Power (TA 1)
-25	14141-08	1	Cable, Power (Pos)
-26	14141-04	1	Cable, Power (TS 1)
-27	14141-01	1	Cable, Power (TS 3)
-28	14141-09	1	Cable, Power (PA 1)
-29	23868	1	Assembly, Fan
-30	MS90725-6	2	Screw, Hex. Hd (1/4-20 UNC-2A x 3/4 LG)
-31	AN935-416	2	Lockwasher (1/4)
-32	MS27183-10	2	Washer, Flat (1/4)
-33	14141-05	1	Cable, Power (Neg)
-34	14100	1	Harness, Wire, Master

PARTS BREAKDOWN



AUXILIARY PANEL ASSEMBLY PART NO.-11893

PARTS BREAKDOWN

AUXILIARY PANEL ASSEMBLY PART NO.-11893

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	11910	1	Plate, Mounting
-2	25051	1	Meter, Hour
-3	25052	4	Fuse
-4	25078	4	Fuseholder
-5	50367	1	Nameplate, "Warning"
-6	AN535-8-4	4	Rivet
-7	25077	1	Strip, Terminal
-8	25076	1	Resistor
-9	MS35223-31	2	Screw, Pan Hd. (#6-32 NC-2A x 5/8 Lg)
-10	MS35649-62	2	Nut, Hex (#6-32 NC-2B)
-11	AN935-6	2	Lockwasher (#6)
-12	MS27183-6	2	Washer, Flat (#6)
-13	10321-1	1	Filter, Hash
-14	25080	1	Ty-Rap
-15	11885	1	Harness, Wire

PARTS BREAKDOWN

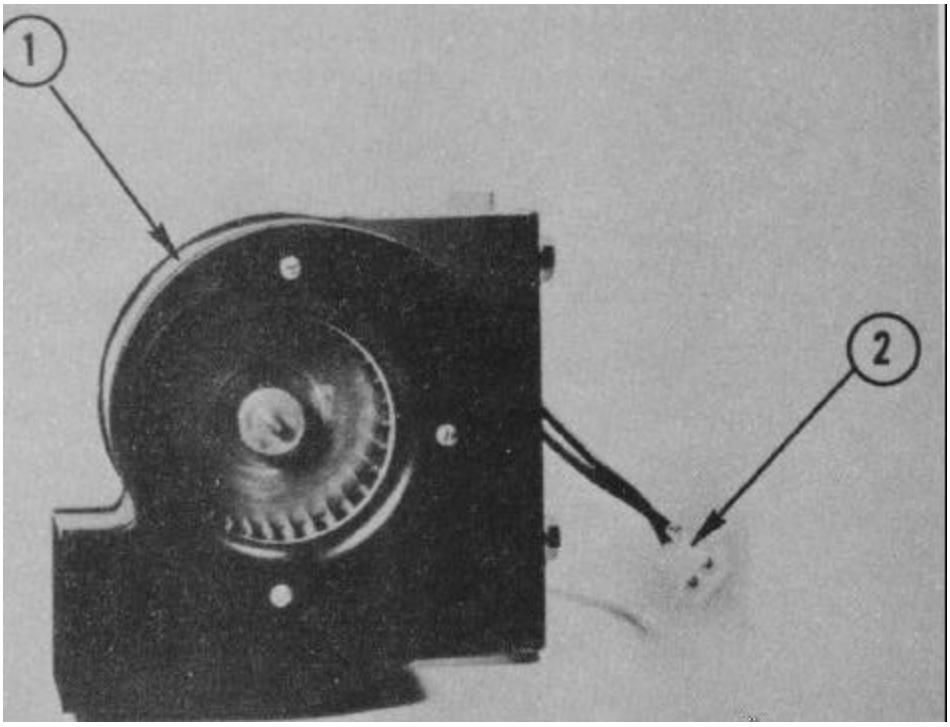
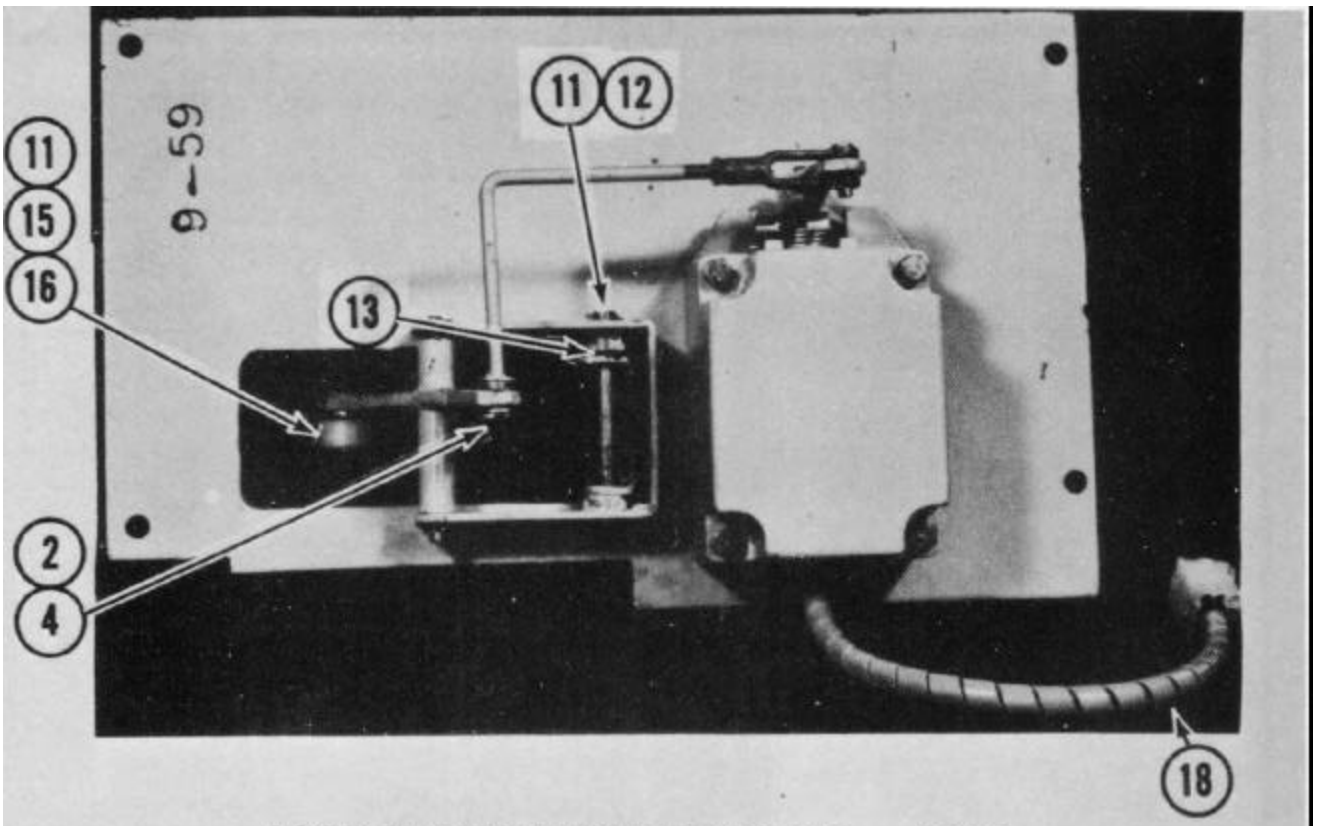
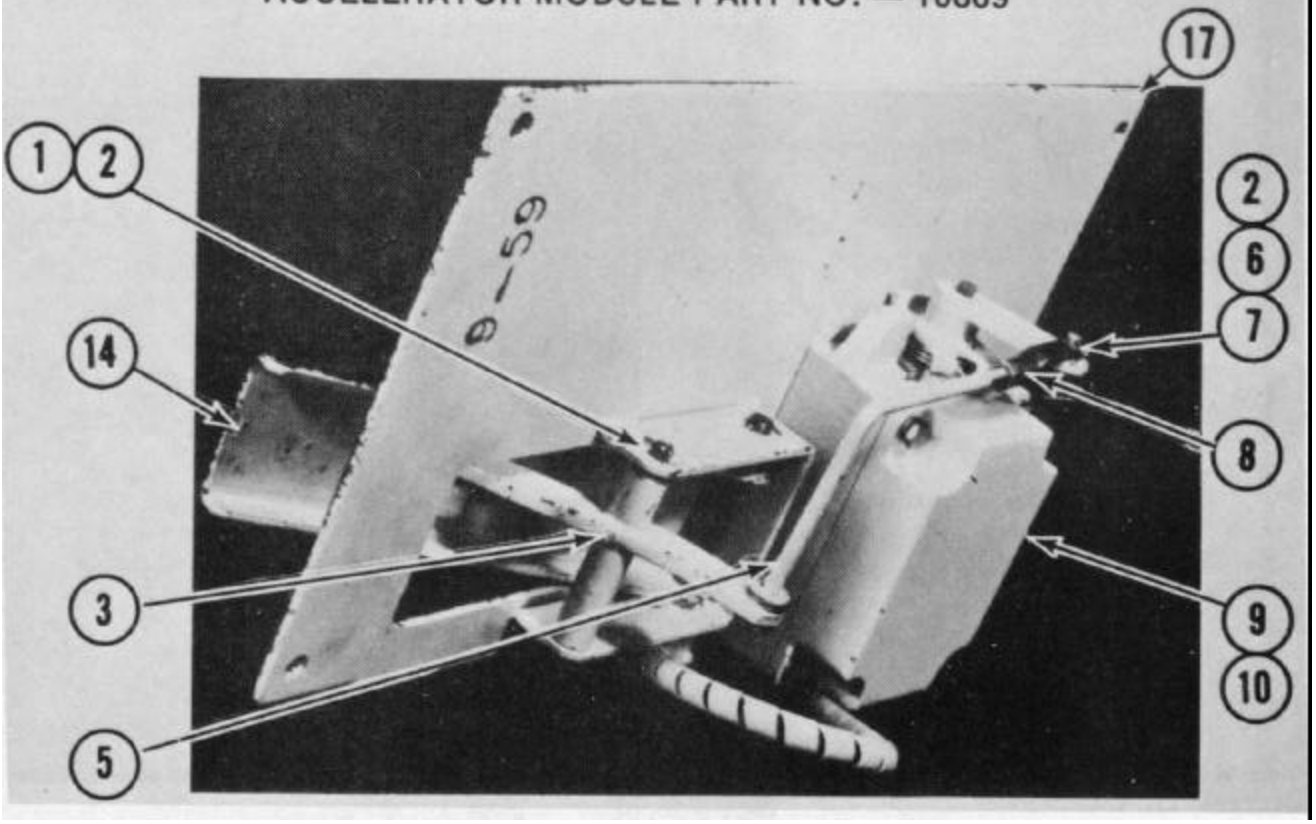


FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23868-1	1	Fan
-2	11988	1	Wire Assembly

PARTS BREAKDOWN



ACCELERATOR MODULE PART NO. — 10869

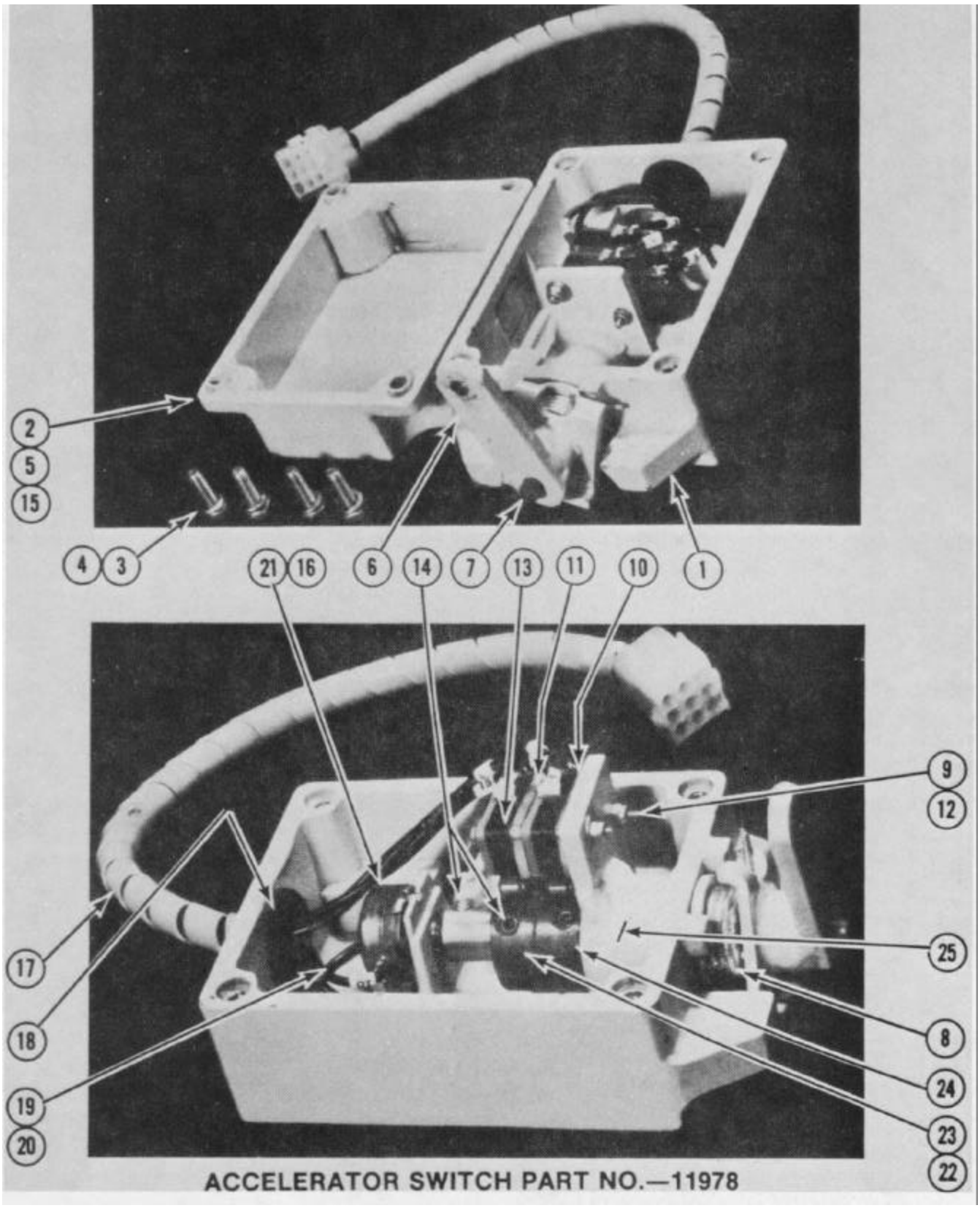


PARTS BREAKDOWN

ACCELERATOR MODULE PART NO. - 10869

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10818	1	Pin, Clevis
-2	MS24665-151	4	Pin, Cotter (1/16 Dia x 1/2 LG)
-3	10761	1	Lever
-4	MS27183-10	1	Washer, Flat (1/4)
-5	10760	1	Rod, Lever
-6	25084	1	Yoke
-7	25085	1	Pin, Clevis (1/4 Dia x 55/64 LG)
-8	MS35690-422	1	Nut, Hex. (1/4-28 UNF-2B)
-9	AN505-416-10	4	Screw, Fit. Hd. (1/4-20 x 5/8 LG)
-10	11978	1	Switch Assembly, Accelerator
-11	MS24665-299	2	Pin, Cotter(3/32 Dia x 5/8 LG)
-12	MS20392-5C105	1	Pin, Clevis (3/8 Dia x 3-9/32 LG)
-13	10639	2	Spacer
-14	10459	1	Pedal
-15	MS27183-14	1	Washer, Flat (3/8)
-16	10638	1	Roller
-17	10758	1	Plate, Floor
-18	11335	1	Harness, Wire

PARTS BREAKDOWN



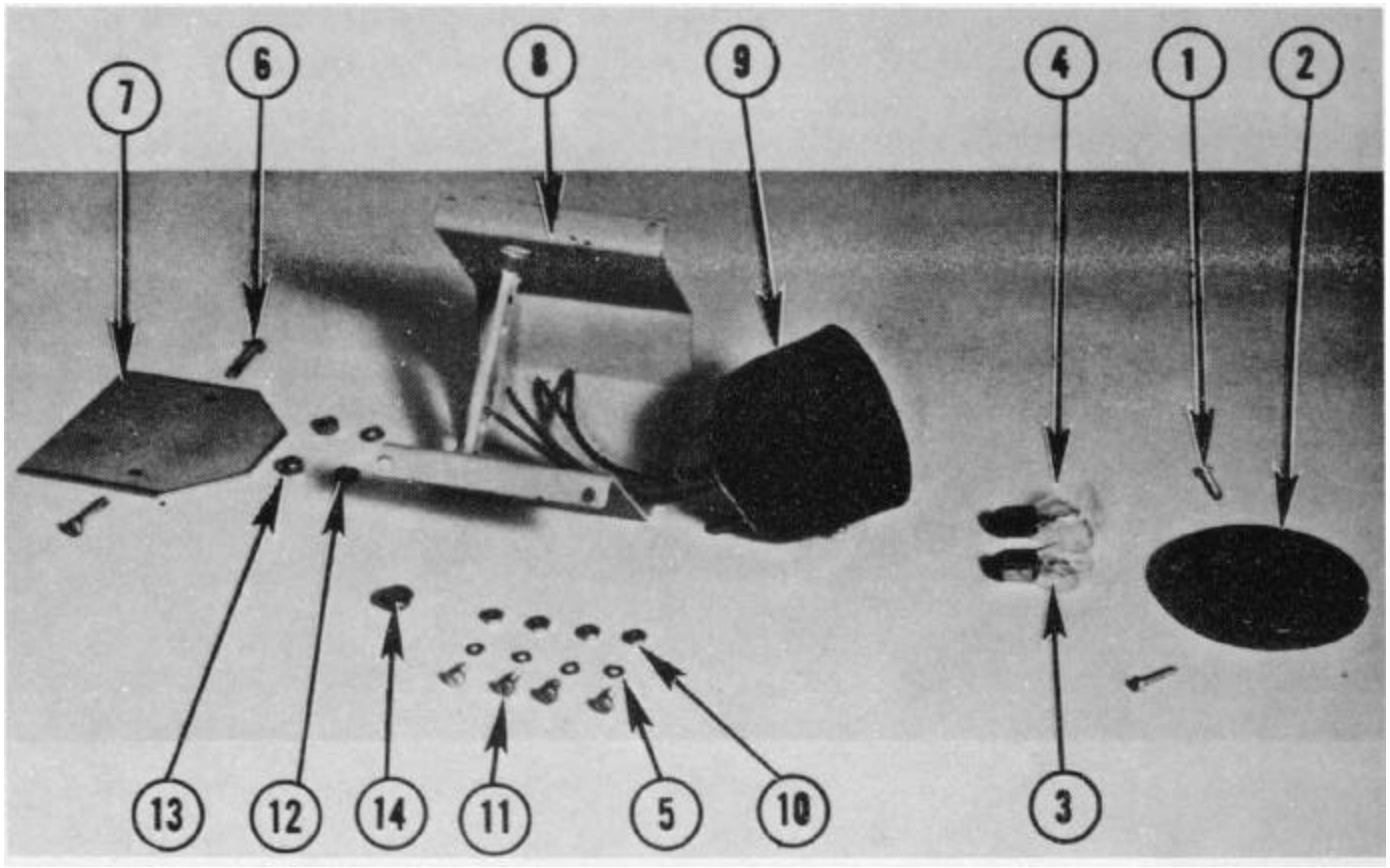
ACCELERATOR SWITCH PART NO.—11978

PARTS BREAKDOWN

ACCELERATOR SWITCH PART NO.-11978

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	11932	1	Box, Accelerator Switch
-2	11929	1	Cover
-3	MS35333-40	4	Lockwasher, Int. Tooth (1/4)
-4	MS35223-80	4	Screw, Pan Head (`/4-20-UNC-3A x 5/8 Lg)
-5	10218	1	Gasket
-6	10765	1	Shaft, Lever
-7	23957	1	Plug
-8	10150-02	1	Spring, Torsion
-9	MS20365-440A	2	Nut, Hex-Self Locking (#4-40 UNC-2B)
-10	12055	4	Spacer
-11	12056	1	Spacer
-12	MS35223-23	2	Screw, Pan Head (#4-40 UNC-2A x 1½,2 Lg)
-13	25035	2	Switch
-14	MS51017-63	3	Setscrew, HDLS Soc., Cup Pt. (1/4-20 UNC-3A x ¼/4 Lg)
-15	10262	1	Nameplate
-16	10152	1	Insulator
-17	11883	1	Harness, Wire
-18	25082	1	Grommet
-19	50275-03	1	Wire Assembly
-20	50275-04	1	Wire Assembly
-21	25551	1	Potentiometer
-22	25086	1	Ring, Retaining
-23	10261	1	Cam
-24	10147	1	Cam
-25	10145	1	Bushing

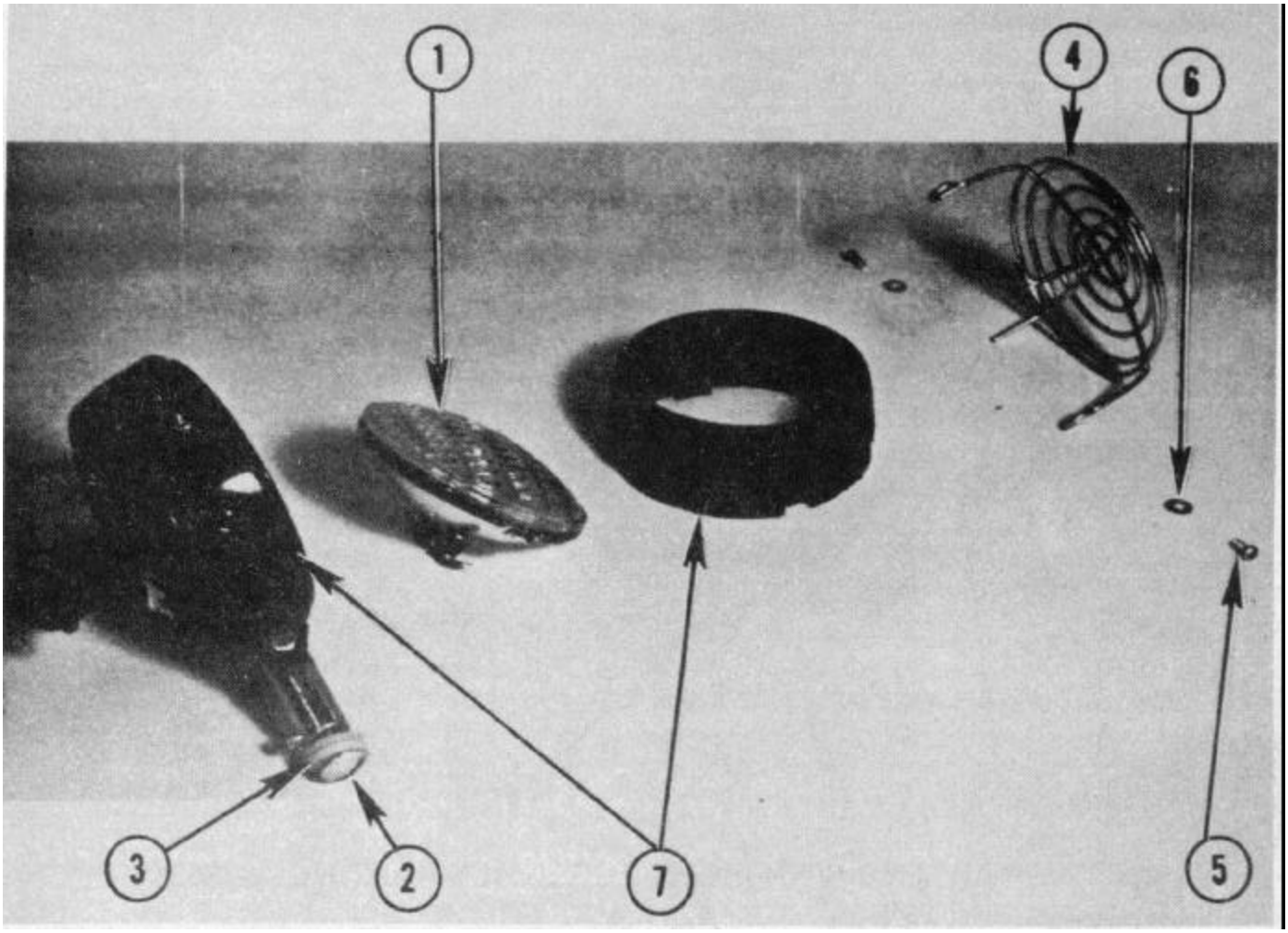
PARTS BREAKDOWN



TAIL AND STOPLIGHT ASSEMBLY PART NO. - 25055

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS24637-27	2	Screw, Self-Tapping, Pan HD (#8 x 1" LG)
-2	25580	1	Lens
-3	25582	1	Bulb, Tail Light
-4	25581	1	Bulb, Stop Light
-5	AN935-10	4	Lockwasher (#10)
-6	MS35224-68	2	Screw, Pan Hd. (#10-32 NF-2A x 1-1/4 LG)
-7	9281-1	1	Cover
-8	9281-2	1	Housing
-9	25583	1	Body, Tail/Brake Light
-10	MS35650-102	4	Nut, Hex. (#10-32 NF-2B)
-11	MS35224-24	4	Screw, Pan Hd. (#10-32 NF-2A x 5/8 LG,
-12	AN935-416	2	Lockwasher (1/4)
-13	MS35690-402	2	Nut, Hex. (14-20 UNC-2B)
-14	MS35489-69	1	Grommet

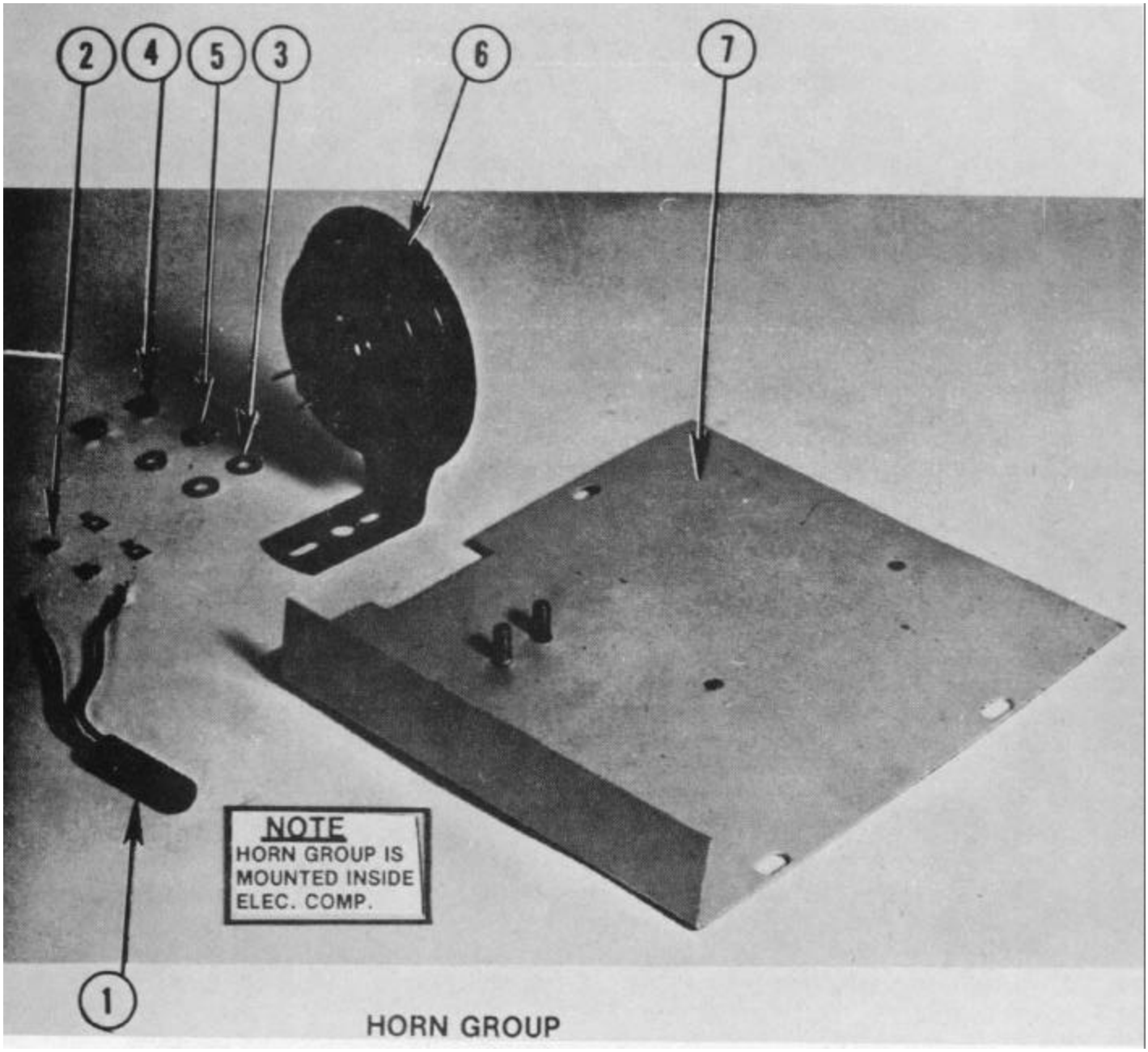
PARTS BREAKDOWN



FLOODLIGHT ASSEMBLY PART NO. - 25054

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	25578	1	Lamp, Sealed Beam
-2	25576	1	Screw, Truss Hd. (3/8-16 NC-2A x 1"' LG)
-3	25577	2	Washer, Nylon (3/8)
-4	25579	1	Guard
-5	AN515-8-7	2	Screw, RD Hd. (#8-32 NC-2A x 7/16 LG)
-6	25665	2	Lockwasher, Int. Tooth (#8)
-7	25664	1	Housing

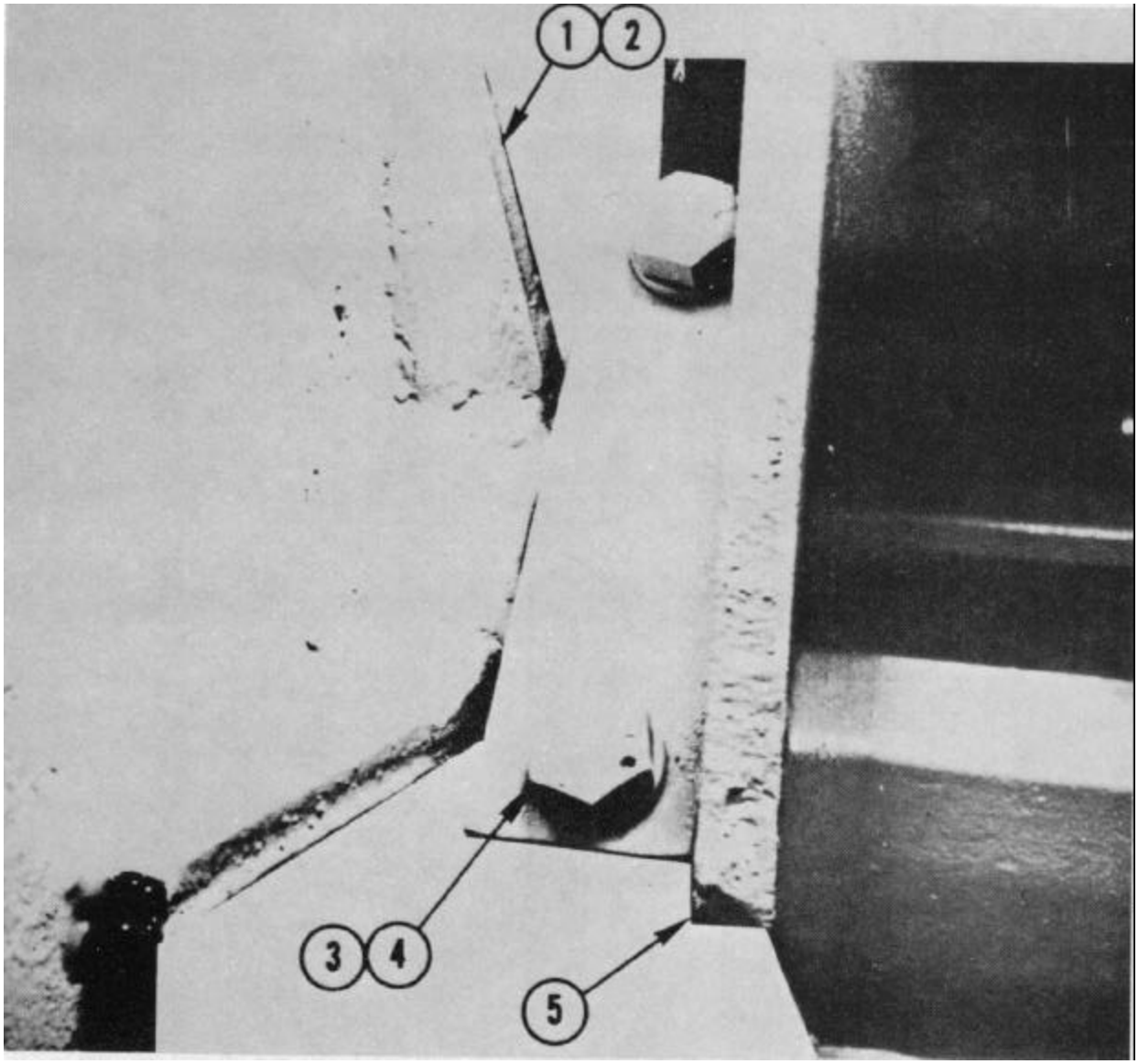
PARTS BREAKDOWN



HORN GROUP

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	10321-2	1	Filter, Hash
-2	MS35223-41	2	Screw, Pan Hd. (#8-32 NC-2A x 1/4 LG)
-3	MS27183-12	2	Washer, Flat (5/16)
-4	MS35690-502	2	Nut, Hex. (5/16-18 UNC-2B)
-5	AN935-516	1	Lockwasher (5/16)
-6	25070	1	Horn
-7	14016	1	Plate, Mtg.

PARTS BREAKDOWN



MOUNTING GROUP, MAST ASSEMBLY

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23201-03	1	Mast Assembly
-2	9952	REF	Bearing
-3	MS90725-118	4	Screw, Hex. Hd. (1/2-13 x 3" LG)
-4	AN935-816	4	Lockwasher (1/2)
-5	14009	REF	Pivot Arm

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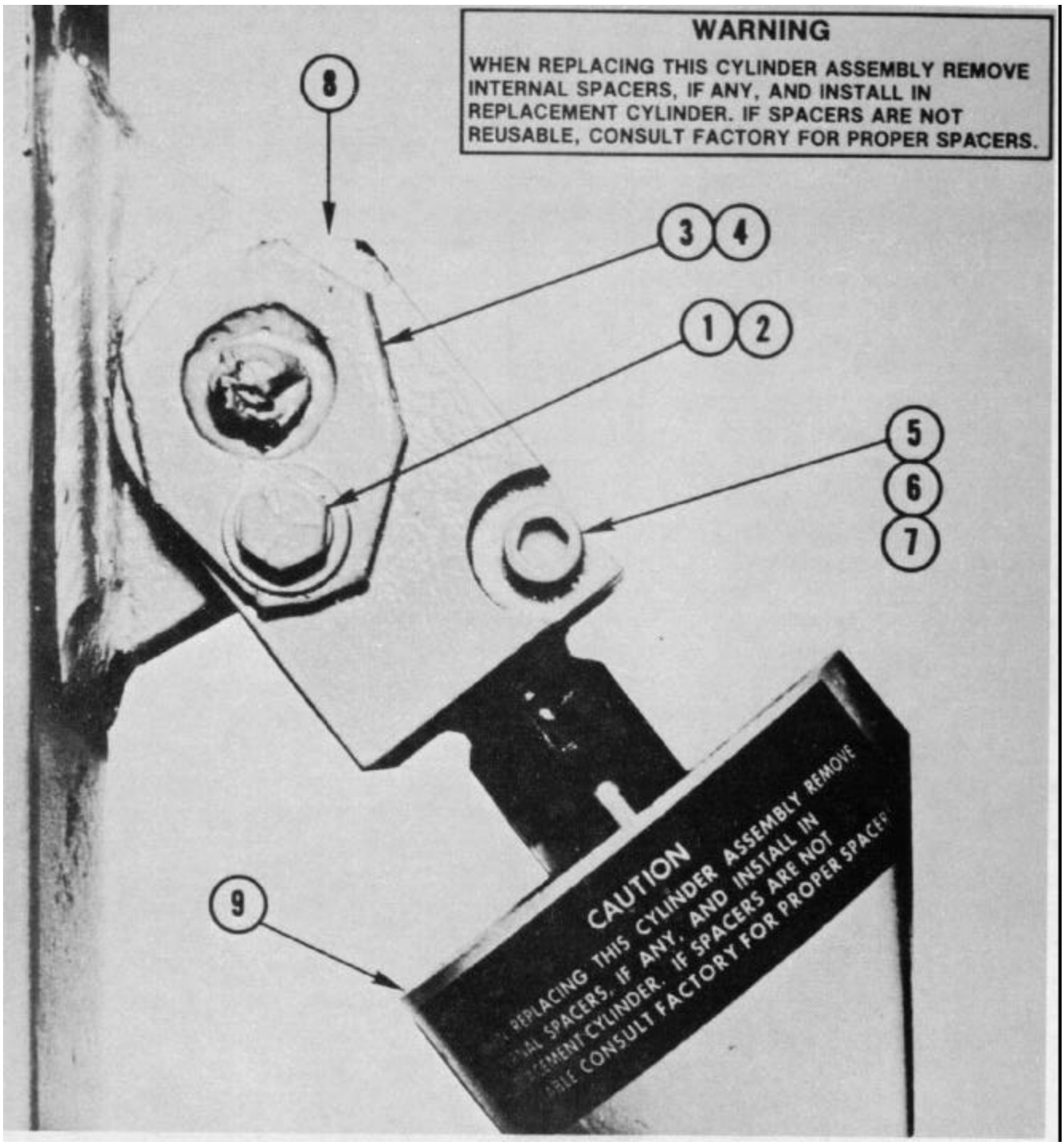
PARTS BREAKDOWN



TILT CYLINDER MOUNTING GROUP

PARTS BREAKDOWN

TILT CYLINDER MOUNTING GROUP

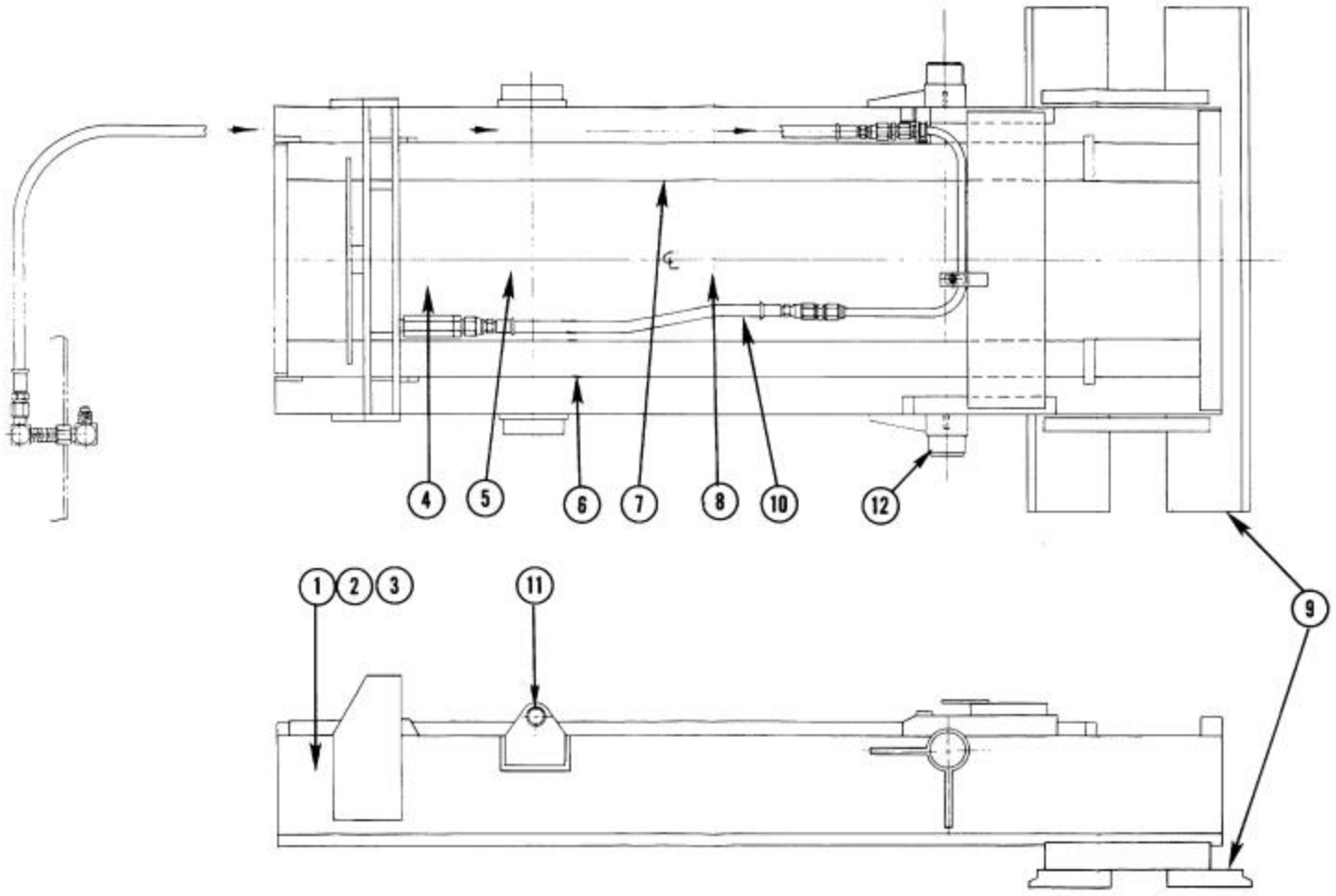
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	MS90725-58	2	Screw, Hex. Hd. (3/8-16 x 3/4 LG)
-2	AN935-616	2	Lockwasher (3/8)
-3	9934-01	2	Pin, Pivot
-4	MS15003-1	2	Fitting, Lube
-5	MS35690-602	REF	Nut, Hex. (3/8-16 UNC-2B)
-6	AN935-616	REF	Lockwasher (318)
-7	MS16997-102	REF	Screw, Soc. Hd. (318-16 x 1-3/4 LG)
-8	9933	REF	Rod End
-9	6982	REF	Cylinder, Tilt

PARTS BREAKDOWN

MAST ASSEMBLY PART NO.-23201-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23370-3	1	Upright Assembly, Inner
-2	23373-3	1	Upright Assembly, Intermediate
-3	23378-3	1	Upright Assembly, Outer
-4	23386-3	1	Chain Group
-5	23400-3	1	Cylinder Assy., Lift (Primary)
-6	23415-3	1	Cylinder Assy., Lift, LH, (Secondary)
-7	23416-3	1	Cylinder Assy., Lift, RH, (Secondary)
-8	23440-3	1	Hose Group
-9	23434	1	Carriage Assembly
-10	23242-3	1	Mounting Group, Mast Hydraulic
-11	9772	2	Bushing
-12	9952	2	Bushing

PARTS BREAKDOWN



MAST ASSEMBLY PART NO. -23201-3

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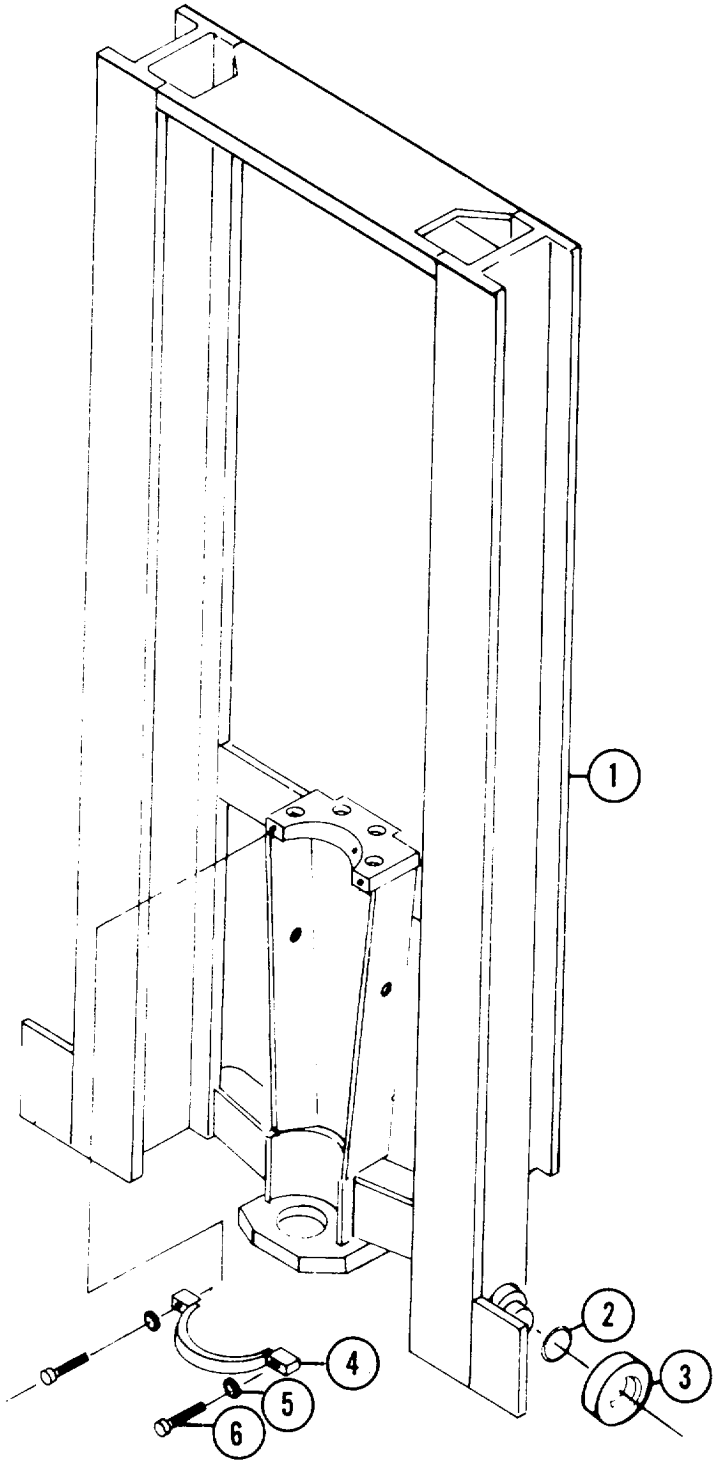
PARTS BREAKDOWN



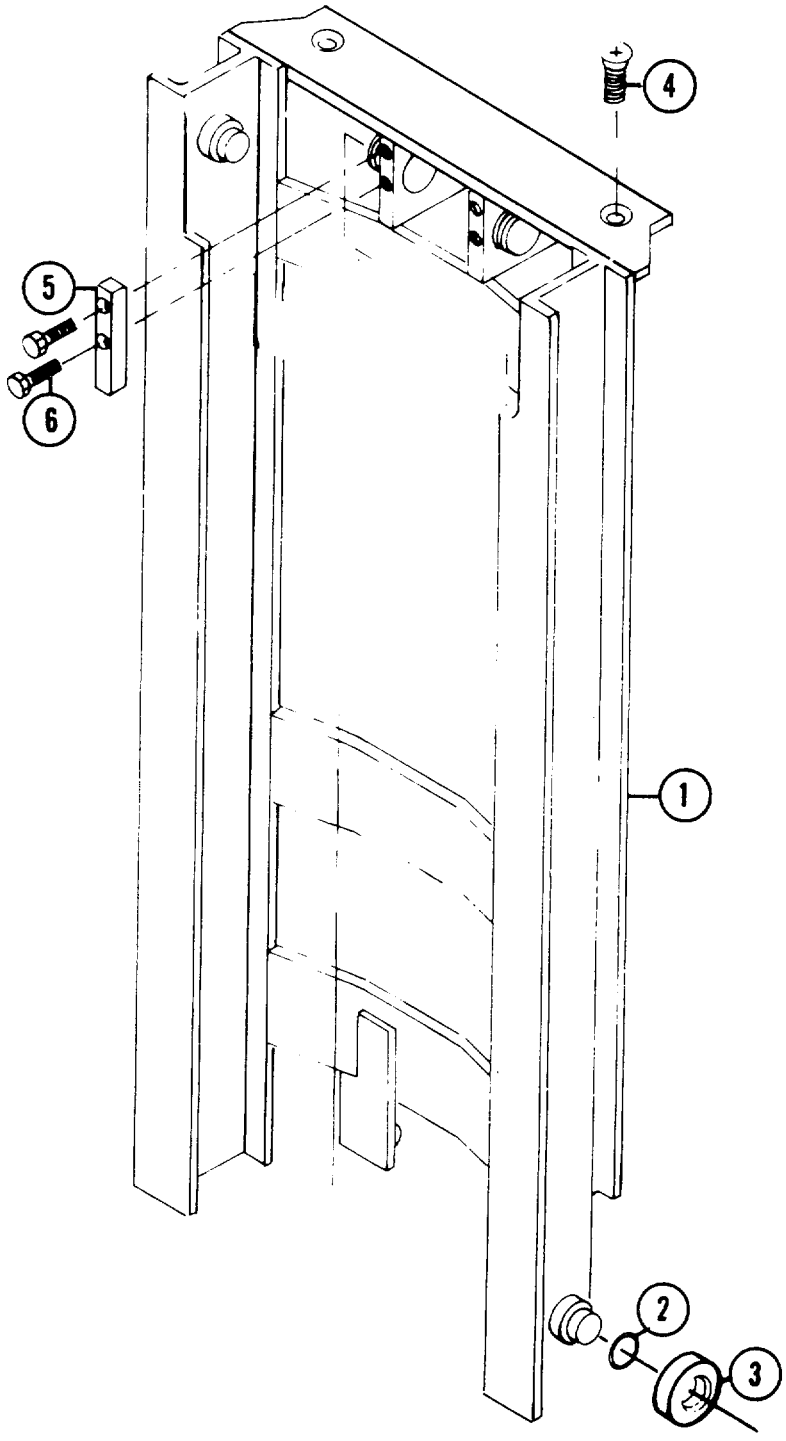
INNER UPRIGHT ASSEMBLY PART NO.-23370-3

PARTS BREAKDOWN

INNER UPRIGHT ASSEMBLY PART NO.-23370-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23371-3	1	Upright, Inner
-2	23252	A/R	Shim
-3	23253	2	Roller
-4	23372	1	Retainer, Cylinder
-5	23319	2	Lockwasher
-6	23322	2	Bolt, Hex.

PARTS BREAKDOWN



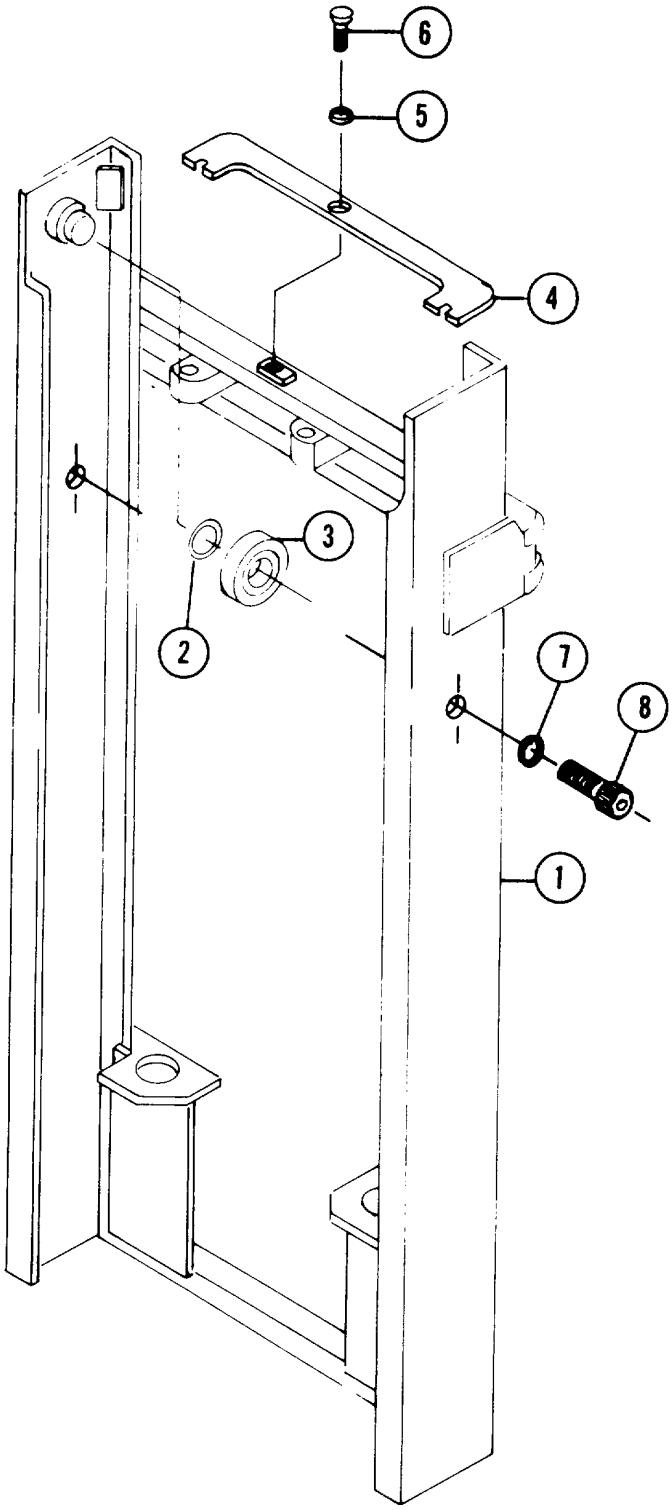
INTERMEDIATE UPRIGHT ASSEMBLY PART NO.-23373-3

PARTS BREAKDOWN

INTERMEDIATE UPRIGHT ASSEMBLY PART NO.-23373-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23374-3	1	Upright, Intermediate
-2	23252	A/R	Shim
-3	23253	4	Roller
-4	23375	2	Screw, Flat Hd.
-5	23376	2	Stop
-6	23377	4	Screw, Socket Hd.

PARTS BREAKDOWN



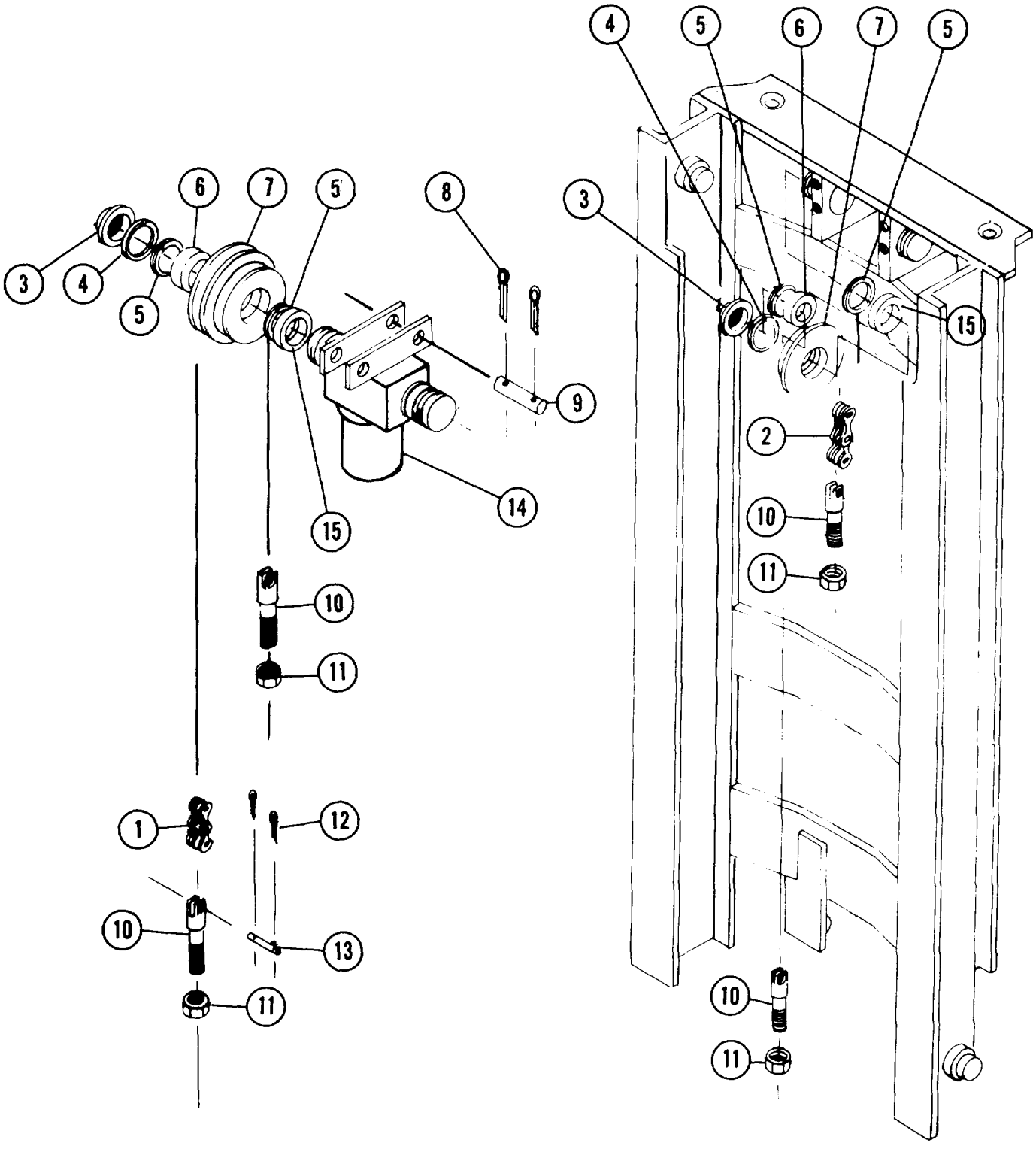
OUTER UPRIGHT ASSEMBLY PART NO.-23378-3

PARTS BREAKDOWN

OUTER UPRIGHT ASSEMBLY PART NO.-23378-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23379-3	1	Upright, Outer
-2	23380	A/R	Shim
-3	23381	2	Roller
-4	23382	1	Brace
-5	23319	1	Lockwasher
-6	23383	1	Bolt, Hex.
-7	23384	2	Lockwasher
-8	23385	2	Screw, Socket Hd. Cap

PARTS BREAKDOWN



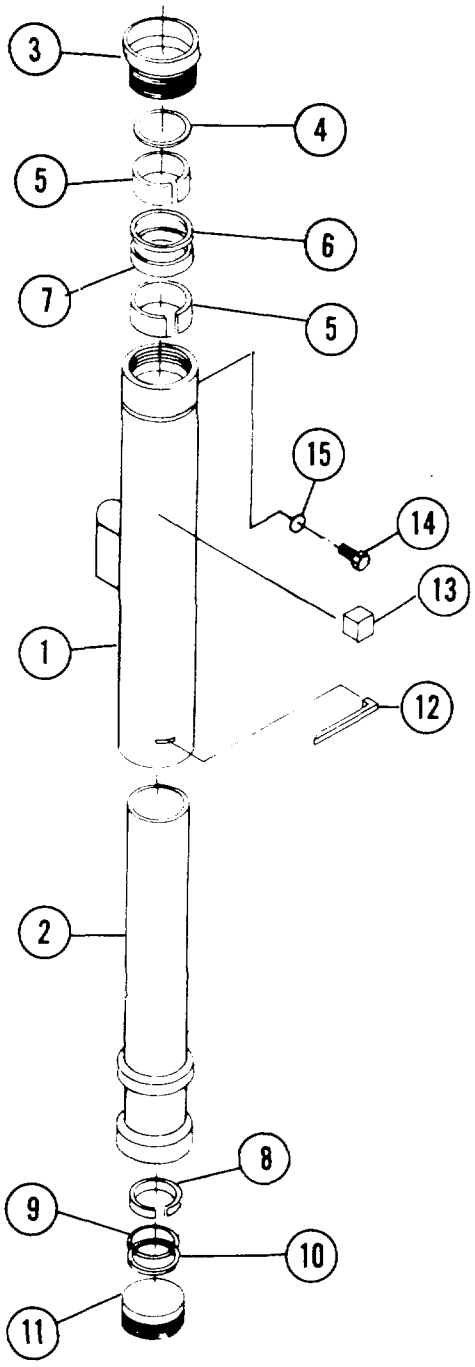
CHAIN GROUP PART NO.-23386-3

PARTS BREAKDOWN

CHAIN GROUP PART NO.-23386-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23387-3	2	Chain, Primary
-2	23387-11	2	Chain, Secondary
-3	23388	4	Shield, Grease
-4	23389	4	Ring, Snap
-5	23390	8	Ring, Snap
-6	23391	4	Bearing
-7	23392	4	Tire
-8	23393	2	Pin, Cotter
-9	23394	2	Retainer, Chain
-10	23312	8	Anchor, Chain
-11	23309	8	Nut, Lock
-12	23396	16	Pin, Cotter
-13	23397	8	Pin, Chain
-14	23398	1	Crosshead, Cylinder
-15	23399	4	Seal, Oil

PARTS BREAKDOWN



LIFT CYLINDER ASSEMBLY (PRIMARY) PART NO.-23400-3

PARTS BREAKDOWN

LIFT CYLINDER ASSEMBLY (PRIMARY) PART NO.-23400-3

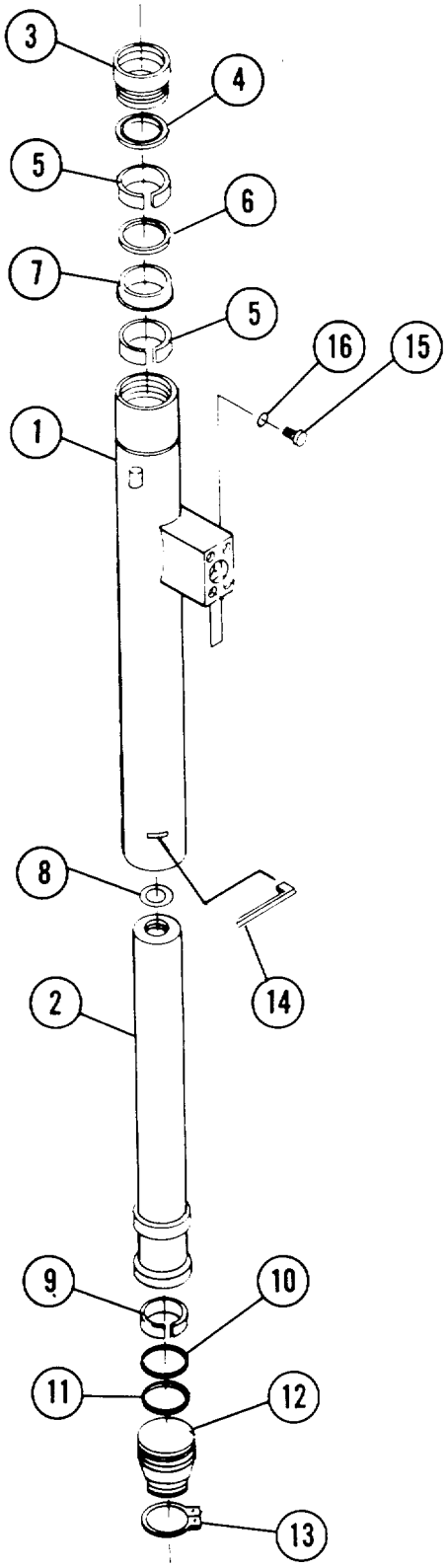
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23401-3	1	Barrel
-2	23402-3	1	Piston
-3	23403	1	Nut, Gland
-4	23404	1	Wiper
-5	23405	2	Ring. Wear
-6	23406	2	Ring, Modular
-7	23407	1	Seal
-8	23408	1	Ring, Wear
-9	23409	1	O-Ring
-10	23410	1	Ring, Back-Up
-11	23411	1	Base
-12	23412	1	Lockwire
-13	23413	1	Key
-14	23279	1	Screw, Bleed
-15	23280	1	Washer, Seal
-16	23417	1	Kit, Service (Consists of Items 4, 5, 6, 7, 8, 9, 10, 12, 14, 15)

PARTS BREAKDOWN

LIFT CYLINDER ASSEMBLY, LH (SECONDARY) PART NO.-23415-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23418-3	1	Barrel, LH
-2	23419-3	1	Piston
-3	23420	1	Nut, Gland
-4	23421	1	Wiper
-5	23422	2	Ring, Wear
-6	23423	1	Ring, Modular
-7	23424	1	Seal
-8	23425	1	Spacer
-9	23426	1	Ring, Wear
-10	23427	1	O-Ring
-11	23428	1	Ring, Back-Up
-12	23429	1	Base
-13	23430	1	Ring, Snap
-14	23431	1	Lockwire
-15	23279	1	Screw, Bleed
-16	23280	1	Washer, Seal
-17	23482	1	Kit Service (Consists of Items 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16)

PARTS BREAKDOWN



LIFT CYLINDER ASSEMBLY, LH (SECONDARY) PART NO.-23415-3
RH (SECONDARY) PART NO.-23416-3

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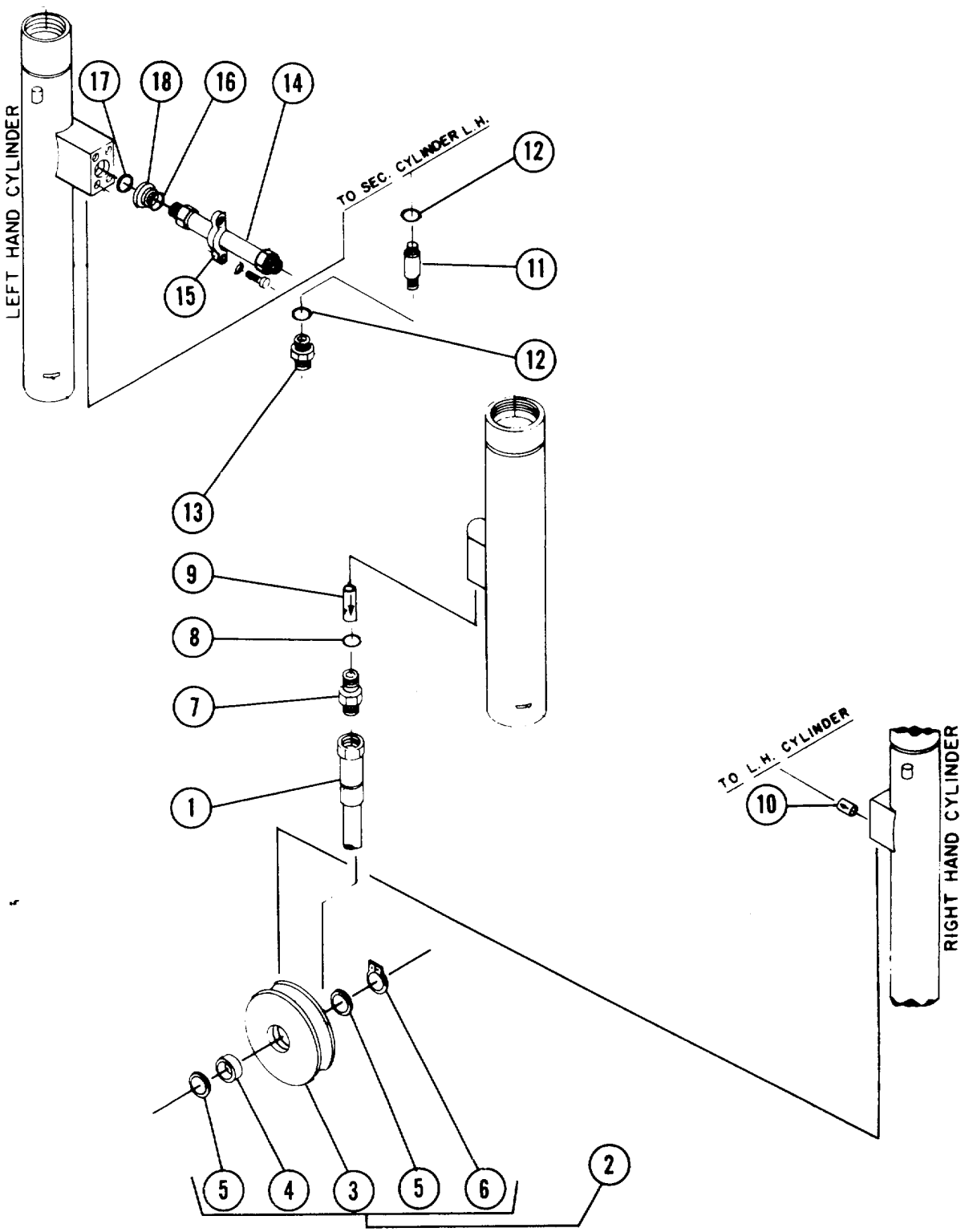
PARTS BREAKDOWN

LIFT CYLINDER ASSEMBLY, RH (SECONDARY) PART NO.-23416-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23433-3	1	Barrel, RH
-2	23419-3	1	Piston
-3	23420	1	Nut, Gland
-4	23421	1	Wiper
-5	23422	2	Ring, Wear
-6	23423	1	Ring, Modular
-7	23424	1	Seal
-8	23425	1	Spacer
-9	23426	1	Ring, Wear
-10	23427	1	O-Ring
-11	23428	1	Ring, Back-Up
-12	23429	1	Base
-13	23430	1	Ring, Snap
-14	23431	1	Lockwire
-15	23279	1	Screw, Bleed
-16	23280	1	Washer, Seal
-17	23482	1	Kit, Service (Consists of Items 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16)

PARTS BREAKDOWN

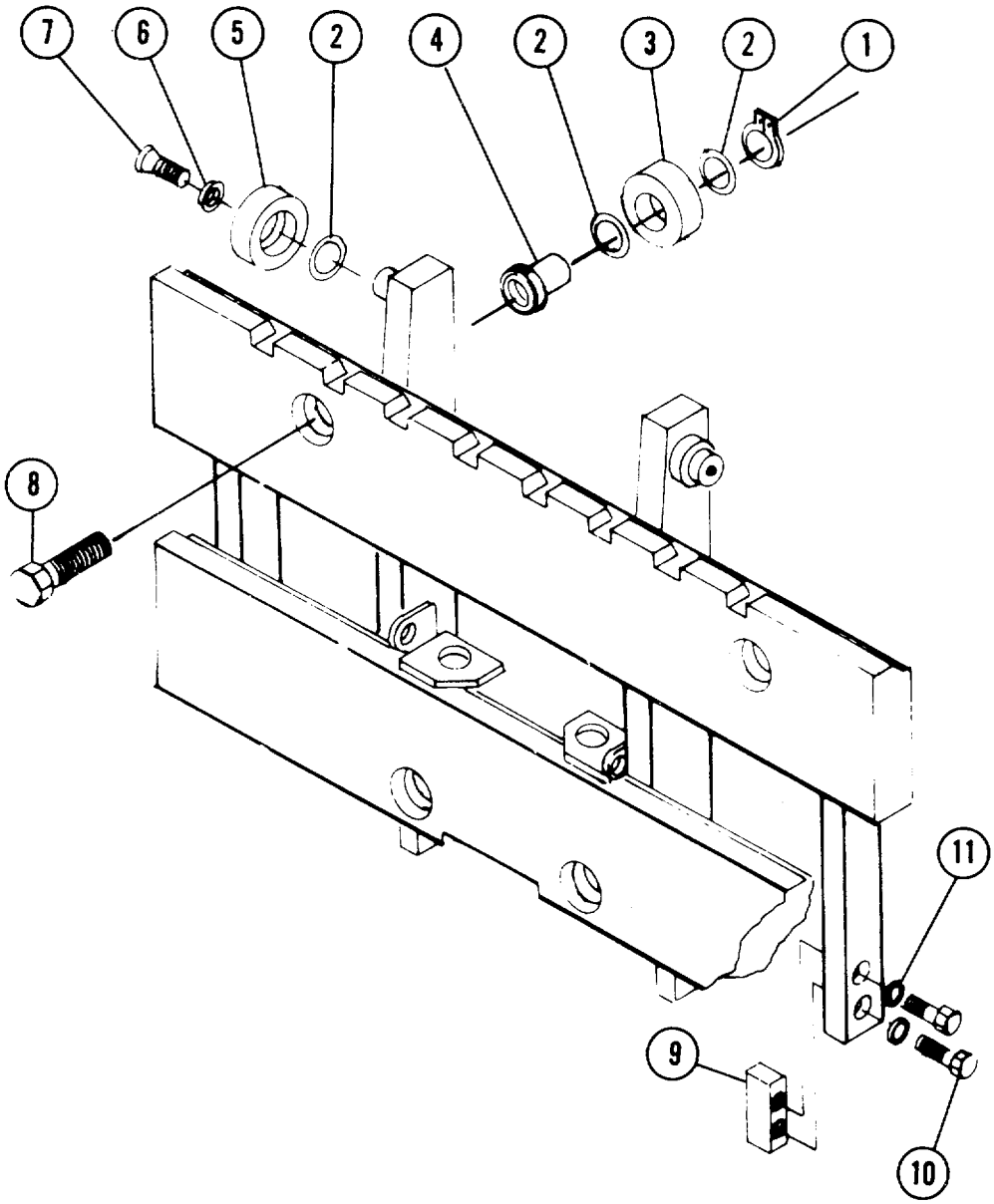


HOSE GROUP PART NO.-23440-3

PARTS BREAKDOWN

HOSE GROUP PART NO.-23440-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23441-3	1	Hose
-2	23442	1	Roller Assy., Hose
-3	23443	1	Roller, Hose
-4	23444	1	Bearing
-5	23445	2	Ring, Snap
-6	23446	1	Ring, Snap
-7	23447	1	Fitting
-8	23448	1	O-Ring
-9	23449	1	Protector, Flow
-10	23450	1	Protector, Flow
-11	23451	1	Regulator, Flow
-12	23452	2	O-Ring
-13	23453	1	Adapter
-14	23454	1	Hose
-15	23455	2	Flange Assembly, Split
-16	23456	2	O-Ring
-17	23350	2	O-Ring
-18	23457	2	Adapter



CARRIAGE ASSEMBLY PART NO.-23434

PARTS BREAKDOWN

CARRIAGE ASSEMBLY PART NO.-23434

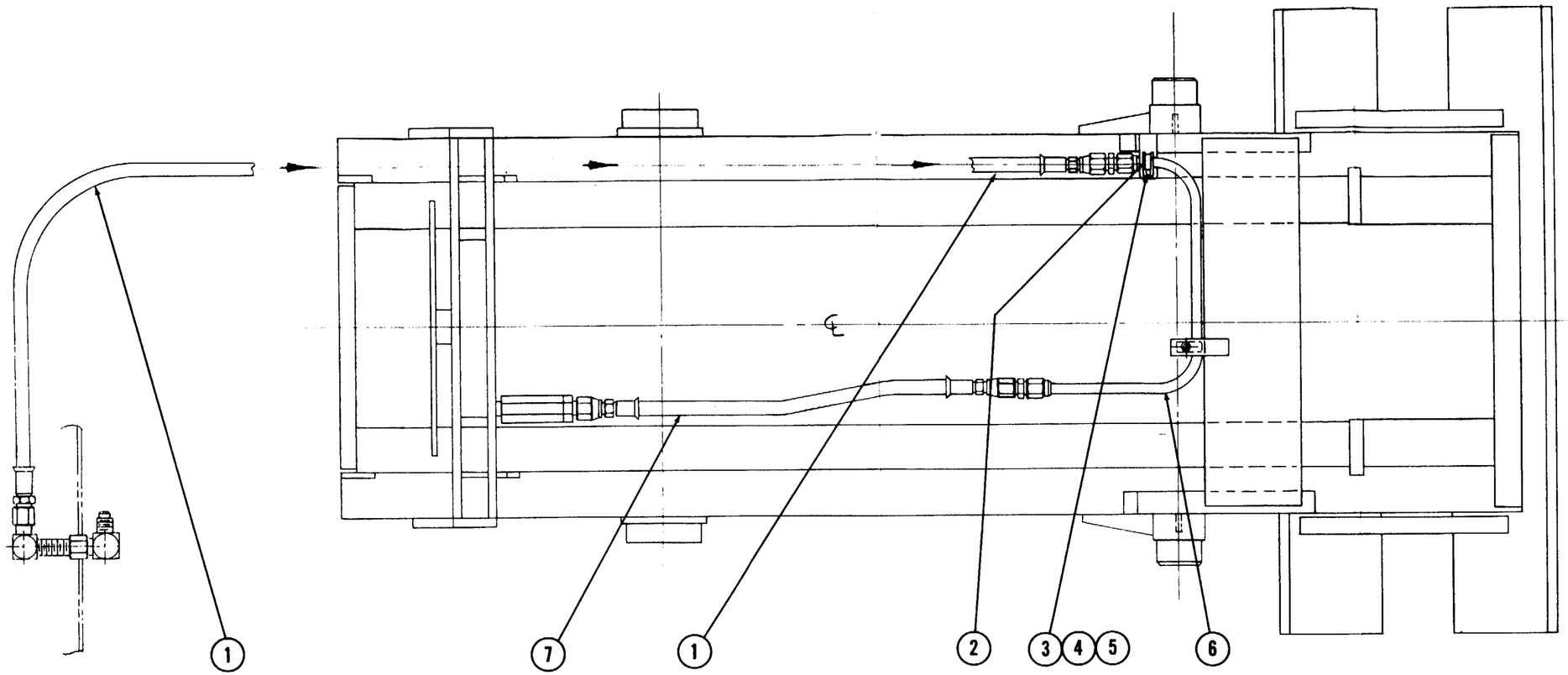
FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	23358	4	Ring, Snap
-2	23252	A/R	Shim
-3	23435	4	Roller, Thrust
-4	23360	4	Shaft
-5	23253	6	Roller
-6	23436	2	Washer
-7	23437	2	Screw, Socket, Flat Hd.
-8	23361	4	Bolt, Lock
-9	23438	2	Stop
-10	23439	4	Bolt, Hex.
-11	23352	4	Lockwasher

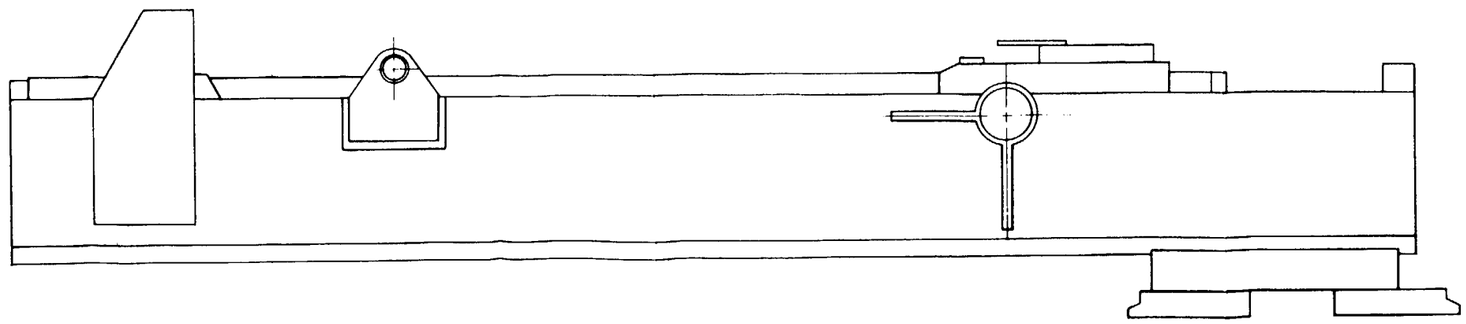
PARTS BREAKDOWN

MAST HYDRAULIC MOUNTING GROUP PART NO.-23242-3

FIG./ ITEM	PART NUMBER	UNITS/ ASS'Y.	DESCRIPTION
-1	50016-09	1	Hose Assembly
-2	MS21919D68-10	2	Clamp
-3	AN935-10	2	Lockwasher
-4	MS35649-102	2	Nut, Hex.
-5	MS35223-65	2	Screw, Pan Hd.
-6	11813	1	Tube Assembly
-7	50016-24	1	Hose Assembly

PARTS BREAKDOWN





MAST HYDRAULIC MOUNTING GROUP PART NO. ¾ 23242-3

TABLE OF CONTENTS

INTERLOCKS PIVOT/SHIFT

POWER STEER SYSTEM

ELECTRICAL SYSTEM

MAST ASSEMBLY

MAINTENANCE

WARNING

THIS VEHICLE IS EQUIPPED WITH A POSITIVE LOCKING DIFFERENTIAL IN THE DRIVE AXLE. IT DELIVERS POWER TO BOTH DRIVING WHEELS EVEN WHEN ONE DRIVING WHEEL IS OFF THE GROUND.

WHEN SERVICING OF THIS VEHICLE REQUIRES ENGAGEMENT OF THE DRIVE SYSTEM, BLOCK UP FRONT END OF VEHICLE SO THAT BOTH DRIVE TIRES ARE OFF THE GROUND. FAILURE TO DO SO WILL RESULT IN VEHICLE MOTION WHEN DRIVE SYSTEM IS ENGAGED.

MAINTENANCE

Maintenance Concept:

a. The Drexel 4000/3000 Lb Forklift will not require special or new maintenance considerations. Maintenance operations can be accomplished within the current maintenance support concept for Material Handling Equipment.

b. Nature and Extent of Maintenance:

(1) Maintenance Allocation Chart (MAC): Maintenance will be performed as necessary by the category indicated in the MAC to retain and/or restore serviceability. Units may exceed their authorized scope and function in the MAC when approved by the appropriate Commander.

(2) Operator Maintenance: Operator maintenance is limited to daily preventive maintenance checks and routine servicing.

(3) Organizational Maintenance: Organizational maintenance consists of scheduled preventive maintenance services, limited removal, minor repair and adjustments.

(4) Direct Support Maintenance: Direct support maintenance consists of repairs on-site and for return to the user of the end item/assemblies which can be maintained efficiently with a minimum of tools and test equipment.

(5) General Support Maintenance: General support will overhaul and repair for return to the supply system those items designated by the area support commander.

(6) Depot Maintenance: There is no scheduled Depot Maintenance on the Drexel Forklift.

c. Maintenance Expenditure Limit: The Maintenance Expenditure Limit is based on a life expectancy of 18 years. Repair limits are based on 50% of replacement cost for the first 12 years and 30% for the last 6 years.

DRIVE ASSEMBLY REMOVAL

1. Remove the battery from the vehicle using the procedure described on Pg. 5-33.

2. Block the front and rear of both steer tires.

3. Unbolt and remove the right floor plate and accelerator module.

4. Remove the two 6-32 x 1/4 inch round head screws and lockwashers that attach the thermostat to the traction motor frame. Place the thermal switch to one side in a protected area(Fig. 5-1).

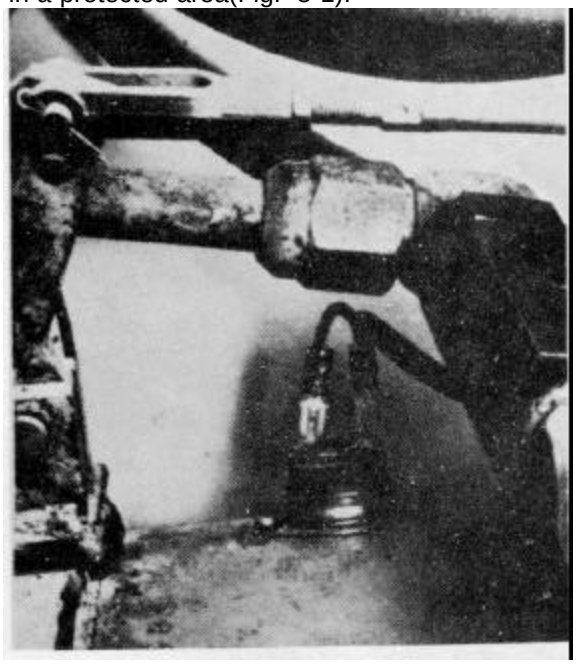


Figure 5-1

5. Remove the five power cables from the top rear of the traction motor using a 1/2 inch wrench (Fig. 5-2). Place the cables in a protected area.

6. Remove the bolt and lock nut attaching the hand parking brake lever linkage to the bell crank on the traction motor, using a 9116 inch wrench (Fig. 5-3).

7. Hold the operator's seat down to slacken the seat brake cable. Remove the cotter pin and clevis pin from the clevis end of the cable (Fig. 5-4). Place loose end of the cable in a protected area.

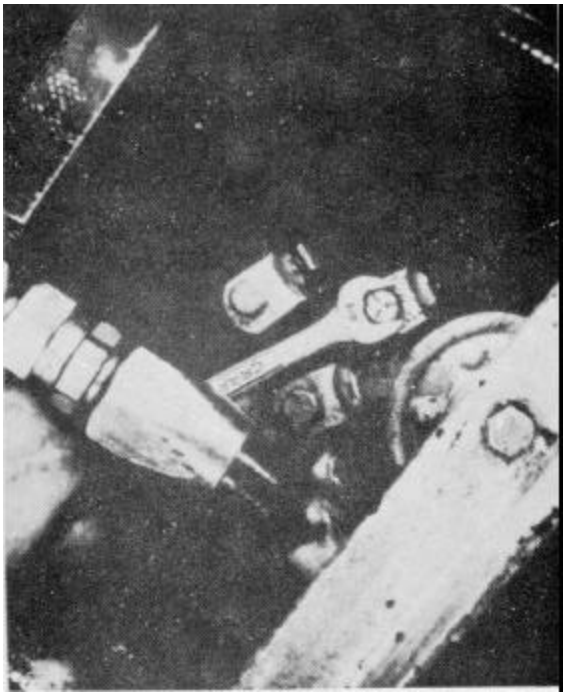


Figure 5-2

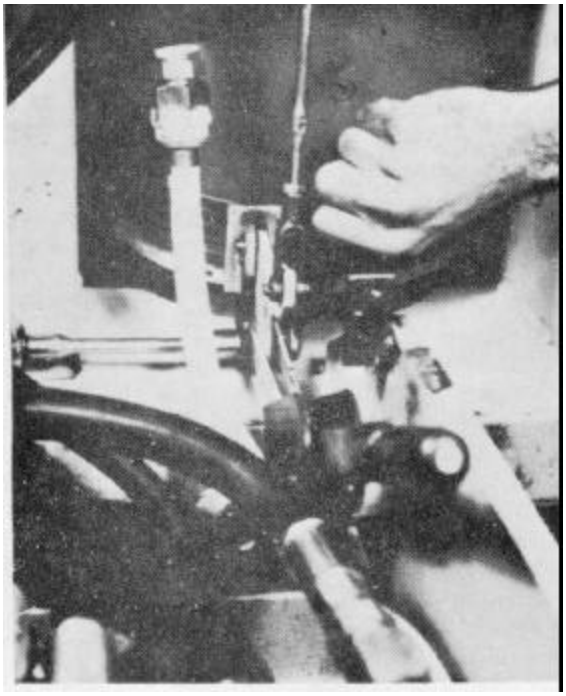


Figure 5-3

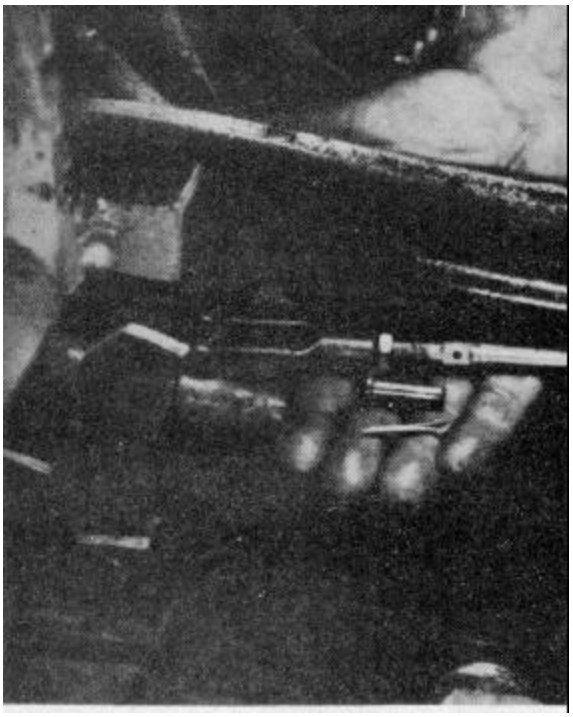


Figure 5-4

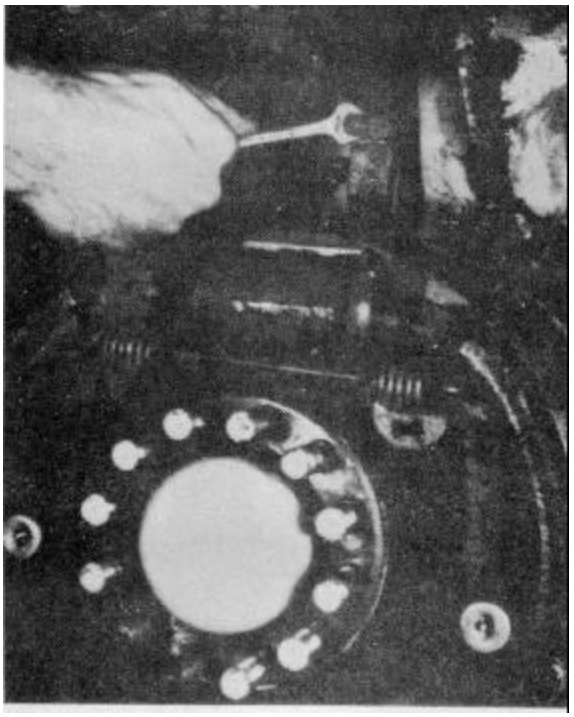


Figure 5-5

8. Raise the front of the vehicle so that the drive tires are 1/4 to 1/2 inches from the floor.

9. Remove both wheels from the drive axle.

Follow the procedure on page 5-4 , steps 1 and 2 (Fig. 5-11 and 5-12).

10. Remove the service brake line connections to the drive axle brake cylinder using a 7/16 wrench. Plug fittings and lines to prevent contamination (Fig. 5-5).

11. Replace the wheels on the drive axle and temporarily secure each one with three or four nuts.

12. Support the rear of the traction motor with a wheeled dolly, transmission jack, or equivalent.

13. Remove the (2) drive assembly support bolts (Fig. 5-6, 5-7 and 5-8).

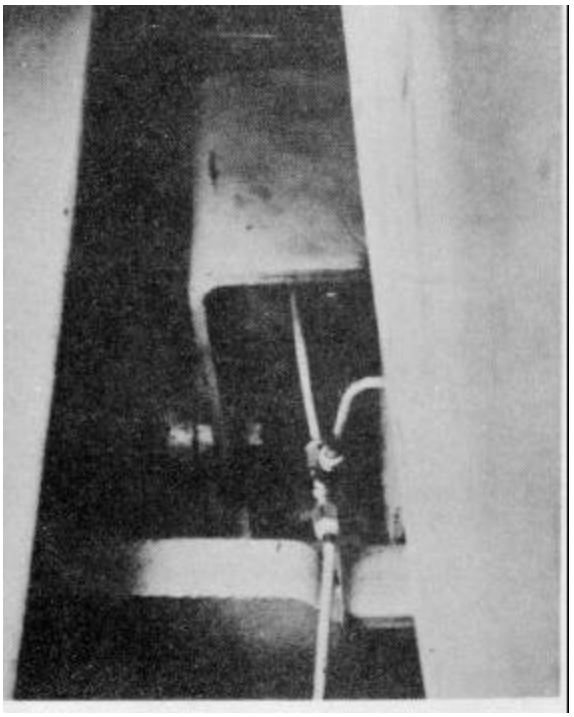


Figure 5-6

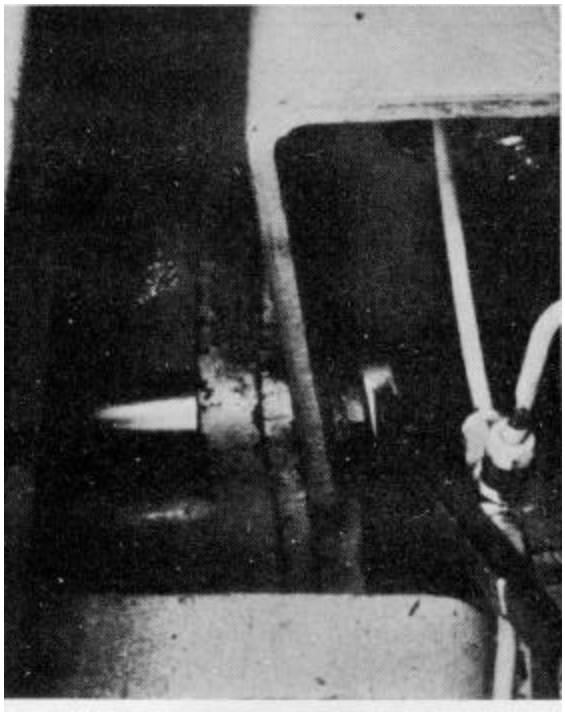


Figure 5-7

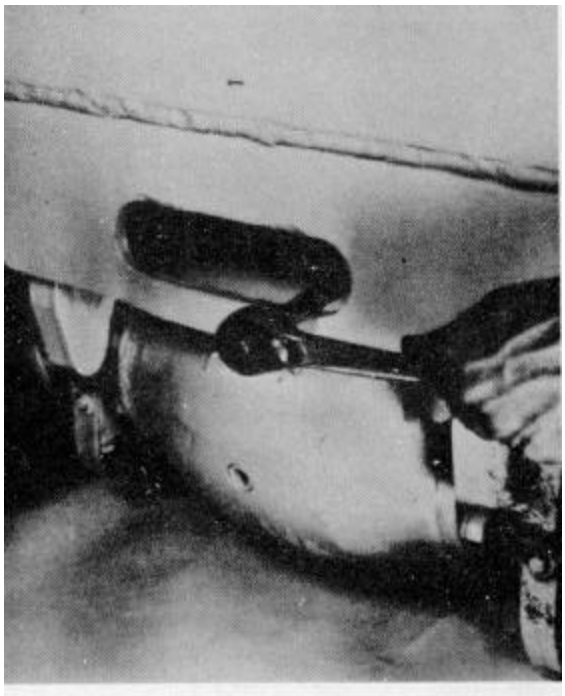


Figure 5-8

14. Remove the grounding strap if attached to the steer axle trunnion blocks (Fig. 5-9)

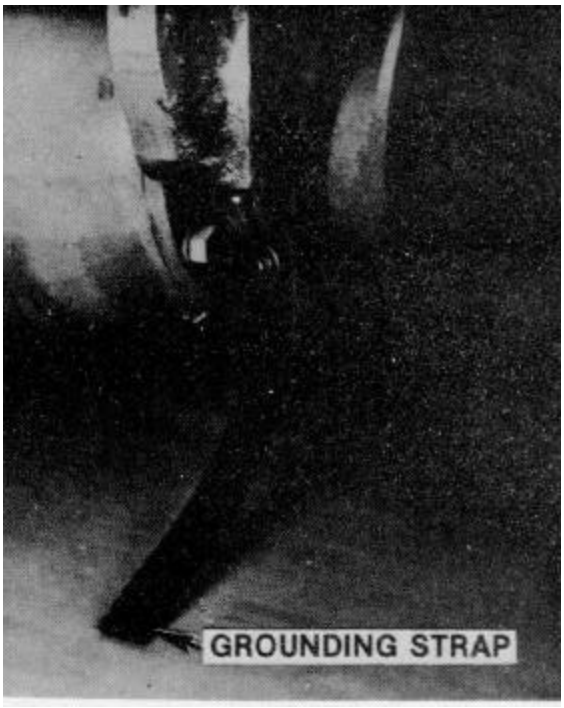


Figure 5-9

15. Remove the (2) bolts from each steer axle trunnion block using a one inch wrench (Fig. 5-10). Remove the two trunnion blocks from the vehicle.

16. Raise the front of the vehicle sufficient to clear the drive assembly and place support jacks under the chassis.

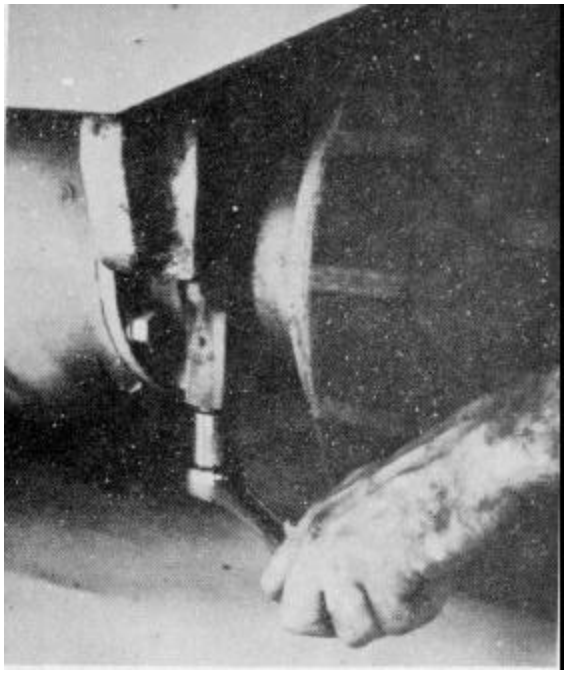


Figure 5-10

17. Withdraw the drive assembly from under the raised vehicle.

Install the assembly by reversing the procedure outlined above.

The following torque values apply:

Grounding Strap - 1/4-20, Gr. 5 - 8 Foot - Pounds

Power Cables - 5/16-18, Gr. 5 - 17 Foot - Pounds

Parking Brake - 3/8-16, Gr. 5 - Tighten the self locking nut maintaining a free linkage connection.

Drive Axle Support - 9/16-18, Gr. 8 - 130 Foot - Pounds

Axle Trunnion Blocks - 5/8-11, Gr. 5 - 150 Foot - Pounds

DISASSEMBLY OF DRIVE AXLE

NOTE:
BEFORE BEGINNING:

Wheels and service brake components may be replaced with the drive axle assembly either installed or removed from the vehicle.

Raise the drive axle assembly so that the tires are free from the ground. The wheel and tire assembly weighs approximately 100 lbs. to maintain a clearance of one-quarter inch or less for convenience of removal.

REMOVING THE WHEELS

1. Remove the twelve nuts, lockwashers and six conical dowels (if provided) from the final drive gear studs, using a three-quarter inch, deep socket or a standard socket with a two inch extension, attached to a one-half inch drive, sixteen inch long breaker bar. Fig. 5-11 illustrates removal of the wheel nuts using an air driven impact gun.

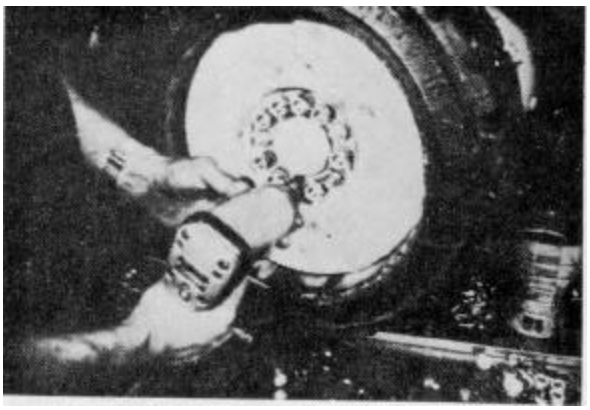


Figure 5-11

2. Remove the wheel and brake drum along with the tire. Older axle models with conical dowels may require rocking the assembly as it is pulled to free the dowels. Fig. 5-12 shows the wheel removed to expose the service brake components (Fig. 5-13).

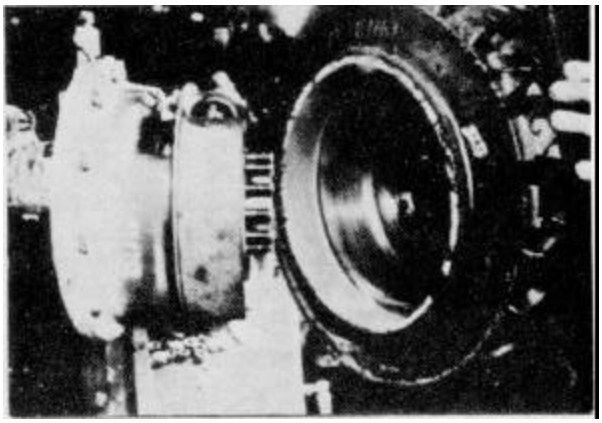


Figure 5-12

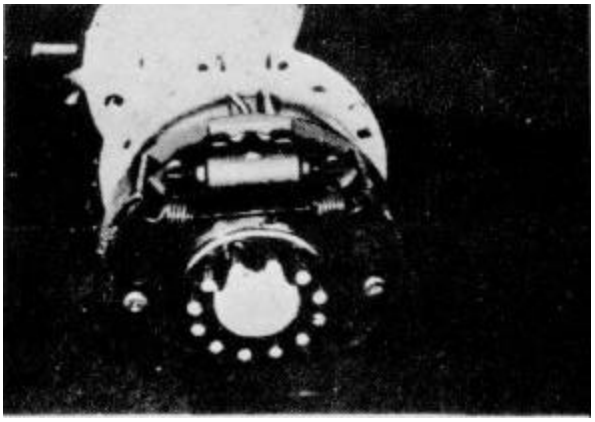


Figure 5-13

REMOVING BRAKE SHOES

1. Remove the brake shoe return spring using a spring tool or vice-grip pliers (Fig. 5-14).

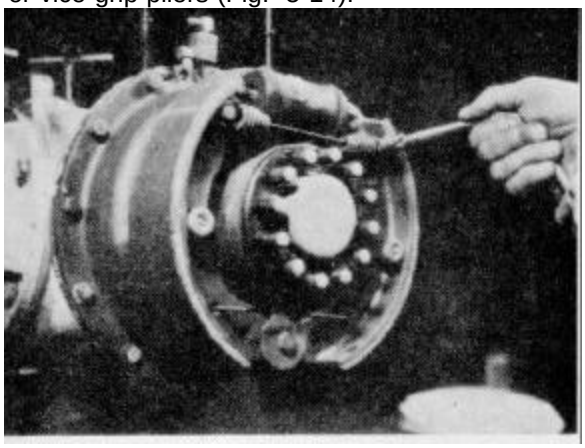


Figure 5-14

2. Both shoe retainer springs must be removed to free shoe from the backing plate. Push uppermost spring retainer cup inward and rotate ninety degrees to either side. Pull cup forward and clear of rod. Remove coil spring and inner spring retainer cup. Fig. 5-15 shows location of rear brake shoe retainer assembly. Repeat procedure for front brake shoe removal.

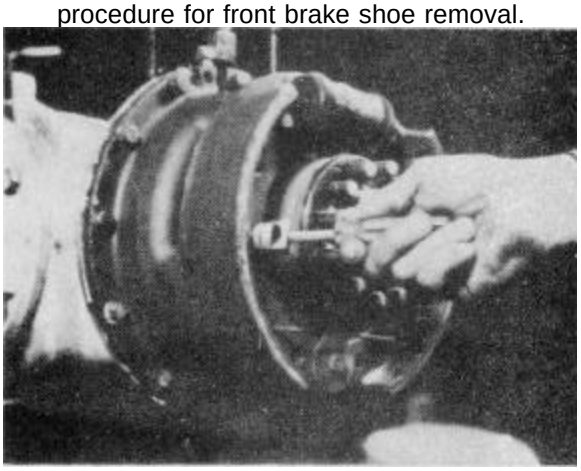


Figure 5-15

3. Drop and pull the rear brake shoe forward releasing tension on the bottom retainer spring. Remove the retainer spring from both shoes. Fig. 5-16 shows retainer spring being removed.

Figure 5-16

REMOVING THE WHEEL CYLINDER

1. Remove the hydraulic service line and the cylinder bleeder line from the rear of the wheel cylinder, behind the backing plate. Fig. 5-17 shows the lines removed from the wheel cylinder.

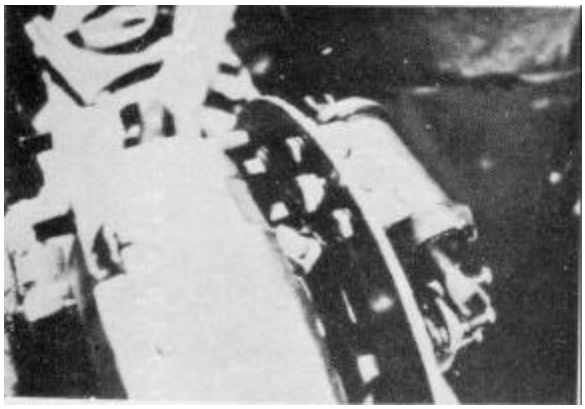


Figure 5-17

2. Remove attaching 5/16 18 x 3/4 inch bolts and lock washers with a one-half inch wrench. Fig. 5-18 shows location and removal of these bolts.

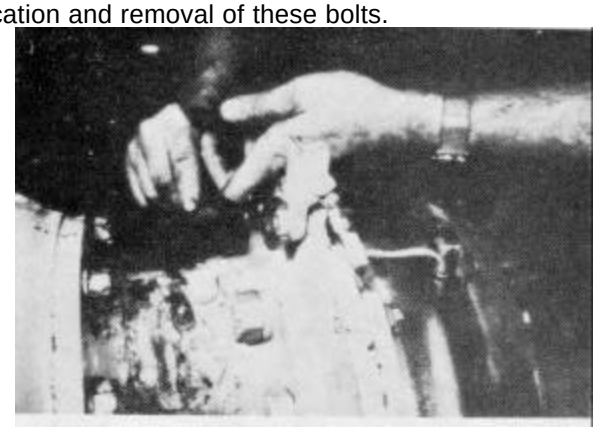


Figure 5-18

3. Withdraw the wheel cylinder from the backing plate and remove the cylinder spacer plate as shown in Fig. 5-19.

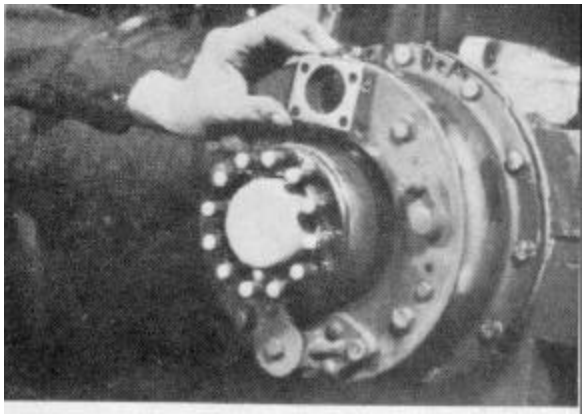


Figure 5-19

REMOVING THE BRAKE BACKING PLATE

1. Remove the eight hex head cap screws (two 3/8 16 x 1-1/8 inch and six 3/8-16 x 7/8 inch long) with a five-eighths inch socket and breaker bar as each screw was assembled with loc-tite sealant. Fig. 5-20 shows the location and removal of these bolts.

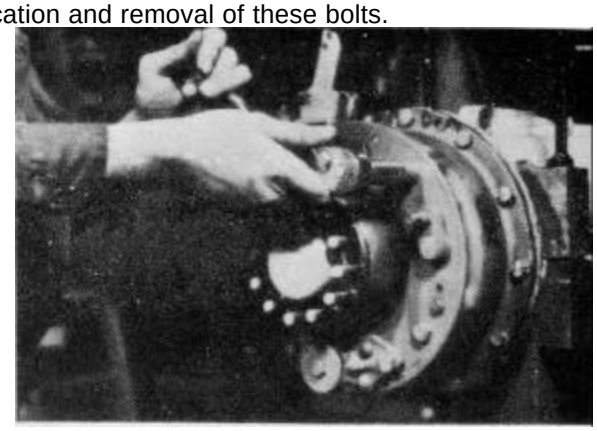


Figure 5-20

2. Pull the backing plate forward, away from the final drive gear housing and the two locating dowel pins (Fig. 5-21).

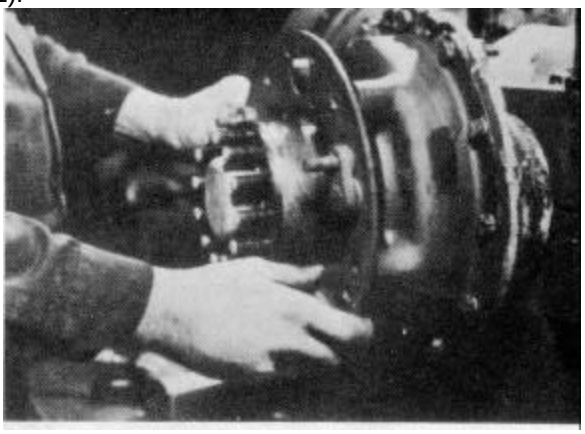


Figure 5-21

NOTE

If removal of the self-adjusting pawls from the backing plate is required, be certain to mark the position of the pawls before removal. This will allow you to approximate brake adjustment when assembling. Refer to Pg. 5-19 for the assembly procedure.

3. Remove the two loose shoe retaining pins from the backing plate. See Fig. 5-22 for location.

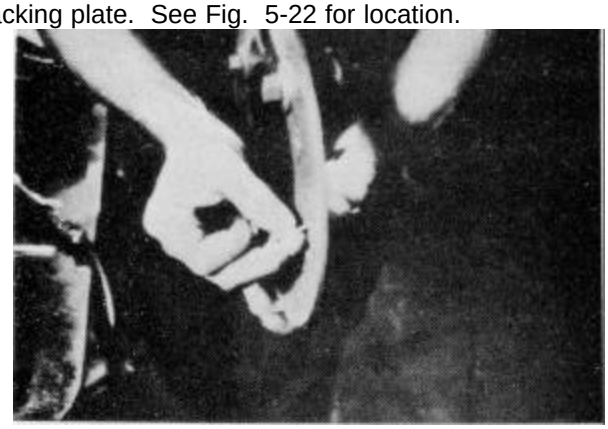


Figure 5-22

REMOVING THE FINAL DRIVE GEAR HOUSING

1. Remove the nuts, lockwashers and capscrews which attach the brake line and bleeder manifold blocks to the gear case and axle housing. Use a 9/16 inch wrench to remove the two 3/816 x 1-1/2 inch long capscrews and nuts.

Break any attached hydraulic lines and remove the two manifold blocks (Fig. 5-23).

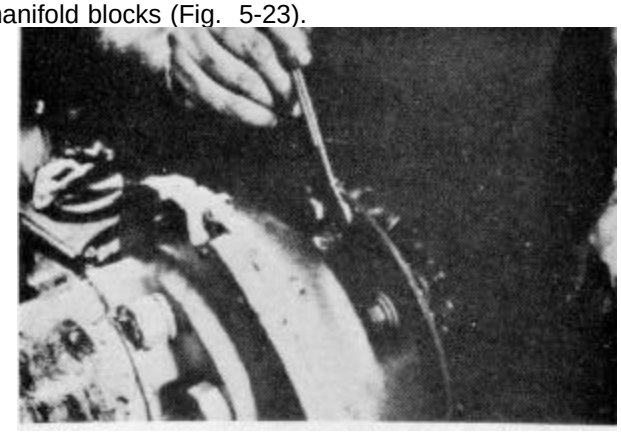


Figure 5-23

2. Remove the remaining ten capscrews, 3/8 16 x 1 inch long and lockwashers with a 9/16 inch wrench. Fig. 5-24 shows the location of these bolts.

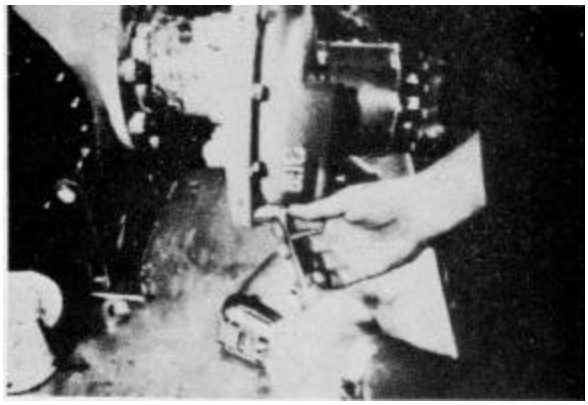


Figure 5-24

3. Pull off the gear housing and oil seal assembly. Examine the lip of the oil seal for nicks or damage. Examine the final drive housing, oil seal surface for scratches or damage. See Fig. 5-25 showing removal of housing.

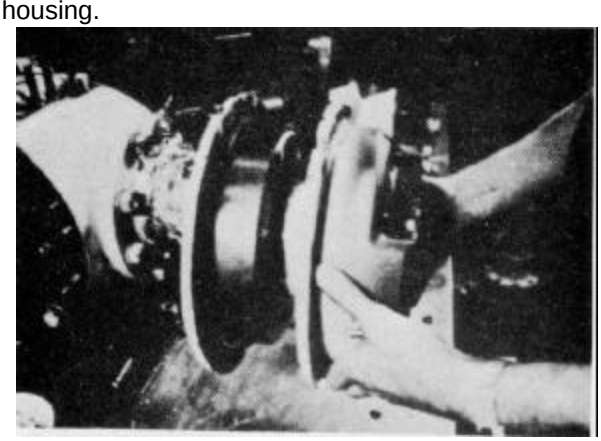


Figure 5-25

4. With a screwdriver or small bar, pry off the wheel cap, Fig. 5-26, thereby exposing the end of spindle and spindle nut (Fig. 5-27).

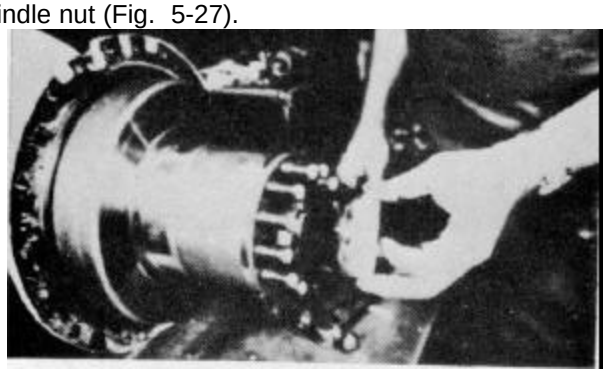


Figure 5-26

5. Remove the cotter pin. Use a 1-13116 socket wrench to remove the spindle nut (Fig. 5-28). Remove the hub bearing thrust washer from end of spindle. Fig. 5-29 shows nut being removed.

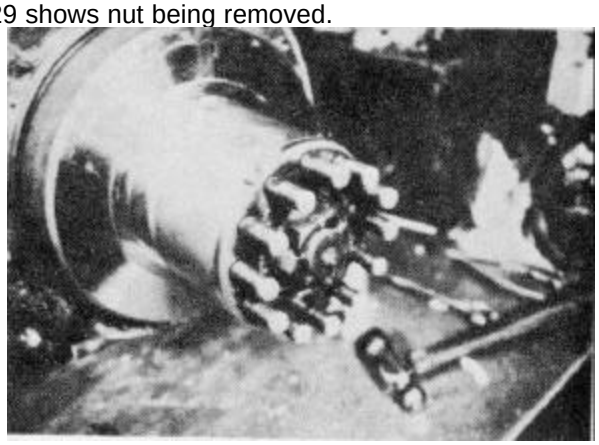


Figure 5-27

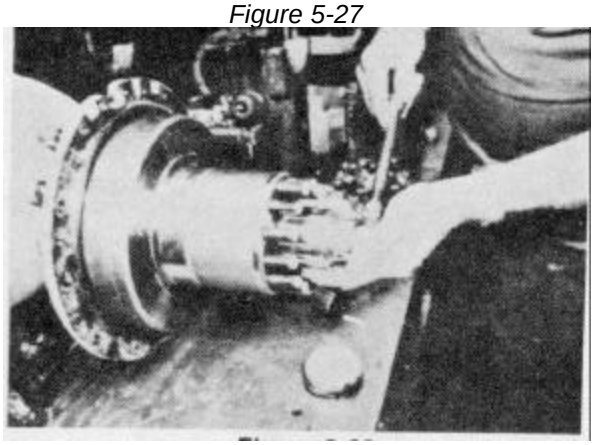


Figure 5-28

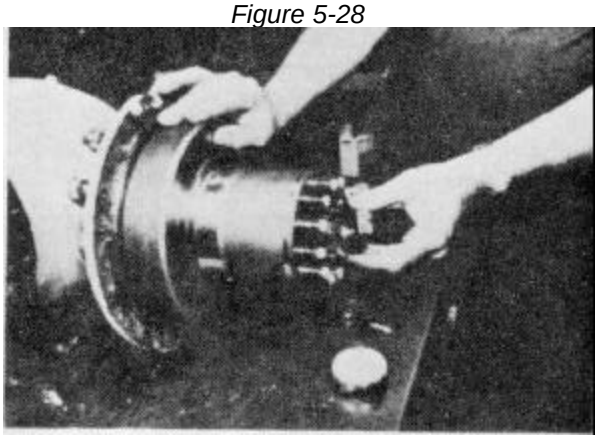


Figure 5-29

NOTE

The spindle nut is used to adjust the spindle bearings and adjustment should be to a slight drag when reassembling.

6. Remove the hub bearing cone from the end of the spindle (Fig. 5-30).

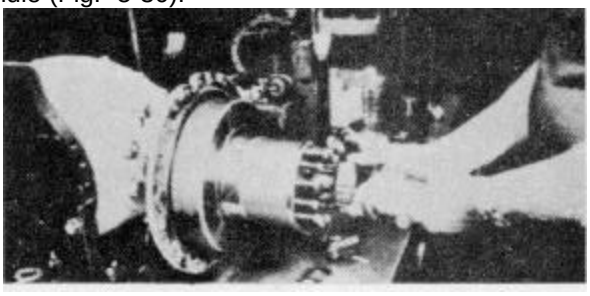


Figure 5-30

7. Pry or pull off the final drive internal tooth gear with bearing cones. Fig. 5-31 shows complete removal of gear.

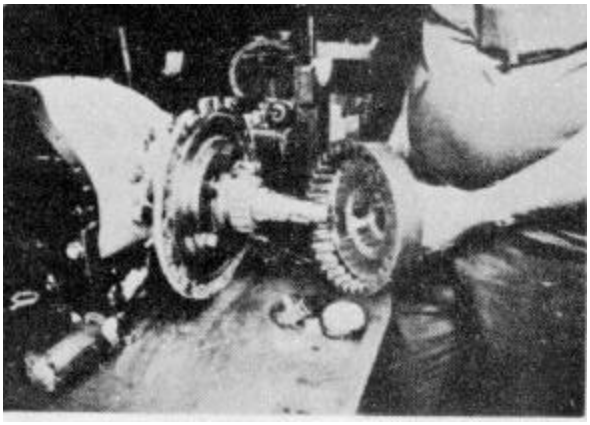


Figure 5-31

8. Remove the inside hub bearing cone (Fig. 5-32).

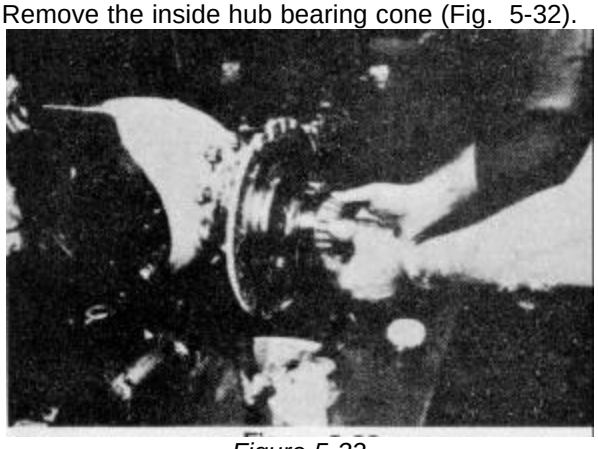


Figure 5-32

The spindle and axle shaft spur gear are now exposed for inspection and/or removal (Fig. 5-33).

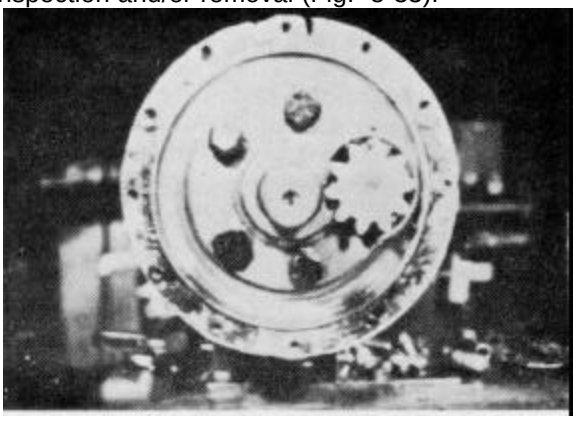


Figure 5-33

9. Remove the three, 3/4 16 x 2-1/2 inch long spindle bolts and one 3/4 16 x 2-1/4 inch long bolt using a 1-1/8 inch socket or box wrench. Remove the four nuts and lockwashers. Lift off the spindle.

10. Pry out the drive shaft, drive shaft bearing and bearing retainer with a small pry bar.

11. Press the drive shaft out of bearing and retainer.

NOTE:

Disassembly beyond this point will require that the drive axle and traction motor assembly be removed from the vehicle.

AXLE HOUSING REMOVAL

1. Remove the eight 5/8 - 16 nuts from the studs on the differential housing using a 15/16 inch socket or box wrench (Fig. 5-34).

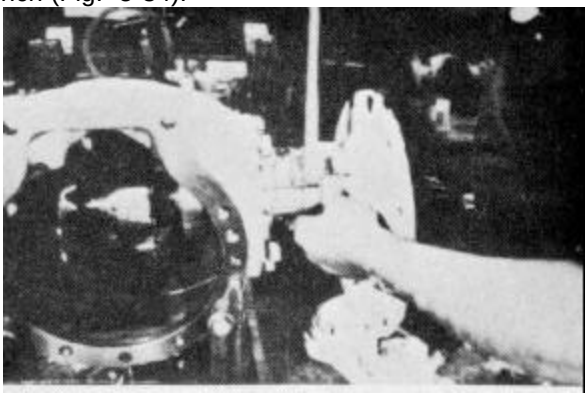


Figure 5-34

2. Remove four split lockwashers and four internal tooth lockwashers. Remove the four conical alignment bushings from the stud ends (Fig. 5-35).

Figure 5-35

3. Remove the differential bearing pre-load adjusting shims from the eight studs. Measure and note the thickness of the shim pack (Fig. 5-36).

NOTE:

The differential should be shimmed until there is no end play and a small amount of drag. If, when rebuilding the axle with the original shimming, it is found there is some end play, or the differential is unduly loose, it is advisable to remove one of the thinnest shims from the bevel side.

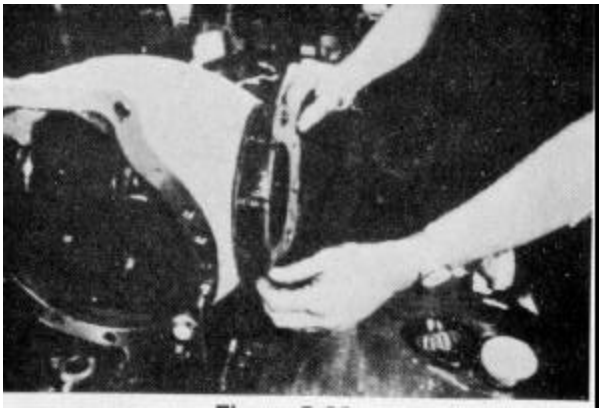


Figure 5-36

DIFFERENTIAL REMOVAL FROM DRIVE AXLE

1. Remove the four 3/8 24 x 1-1/4" long hex head bolts and four 3/8 24 x 3-1/2" long hex head bolts from the drive motor support using a 9/16 inch socket or box wrench. Fig. 5-37 shows location and removal of the eight bolts and lockwasher..

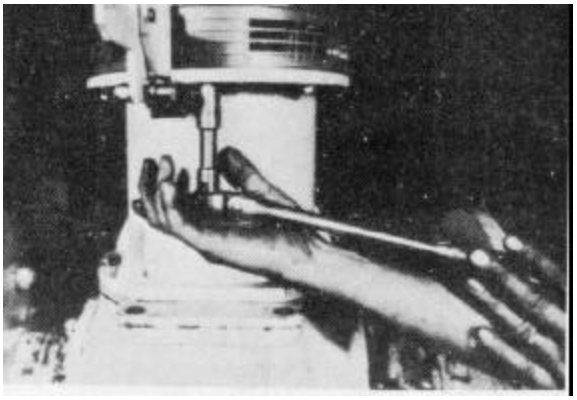


Figure 5-37

2. Use a small pry bar to separate the traction motor pilot from the drive motor sup port, pull the motor straight backward to free the splined armature shaft from the parking brake and coupling assembly. Fig. 5-38 shows the traction motor shaft and the parking brake assembly.

Figure 5-38

3. Remove the six 5/16 - 18 x 1" long hex head cap screws, nuts and lockwashers from the brake mounting bracket and parking brake backing plate.

4. Remove the four 318 16 x 3/4" long hex head cap screws and lockwashers from the brake mounting bracket and drive motor support. Fig. 5-39 shows removal of the parking brake assembly except for the drum which remains attached to the coupling.

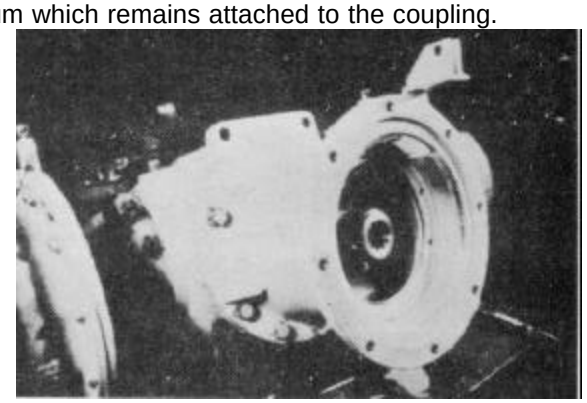


Figure 5-39

5. Remove the seven 9/16 - 12 x 2" long hex head cap screws and lockwashers with a 13/16 inch socket or box wrench from the differential case end of the drive motor support. Fig. 5-40 shows removal of these bolts.

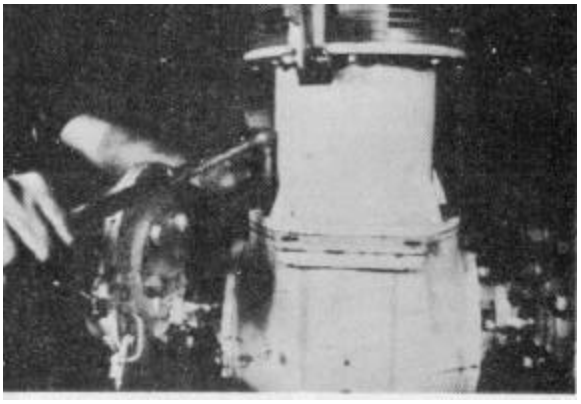


Figure 5-40

6. Pry the motor support away from the pilot on the differential case cover. The drive coupling and parking brake drum are now exposed (Fig. 5-41).

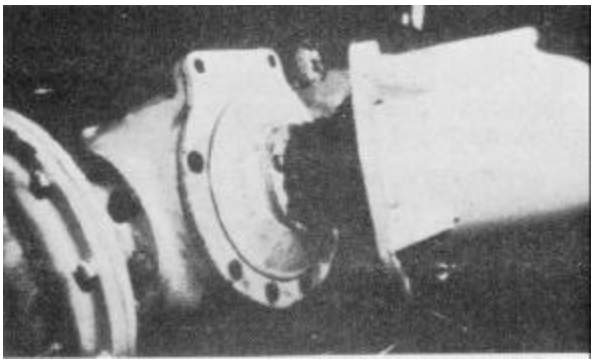


Figure 5-41

7. Remove the parking brake drum from the drive coupling by removing the six 1/4 - 20 x 1/2" long hex head cap screws using a 7/16 inch socket wrench. Fig. 5-42 shows the brake drum removed from the hub.

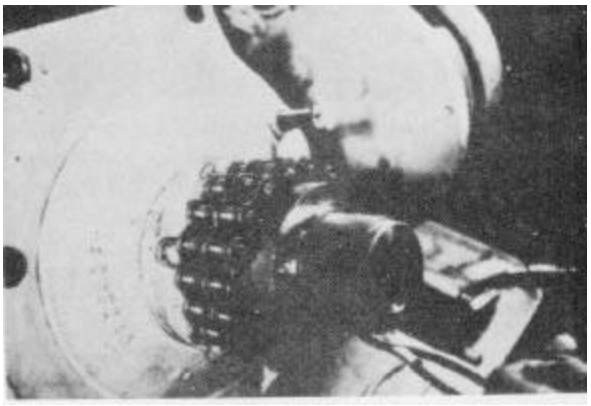


Figure 5-42

8. Rotate the drive coupling until the link pin is accessible. Pull the cotter pin and remove the chain from the two hubs.

9. Remove the 7/8 12 pinion nut using a 1-1/8 inch wrench and remove the hub from the pinion spline (Fig. 5-43).

Figure 5-43

10. Break the gasket seal between the pinion case and the final drive housing (Fig. 5-44).

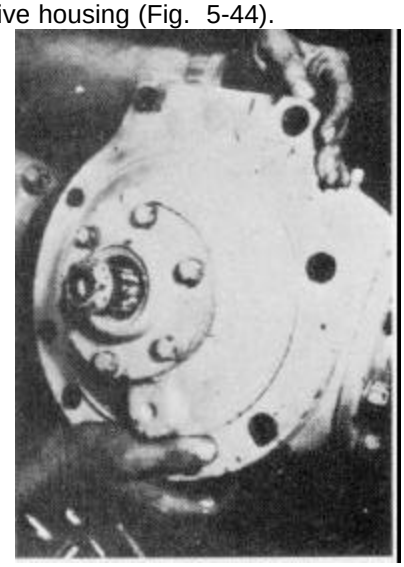


Figure 5-44

11. Pull the pinion and pinion case back and away from the bevel gear(Fig. 5-45).

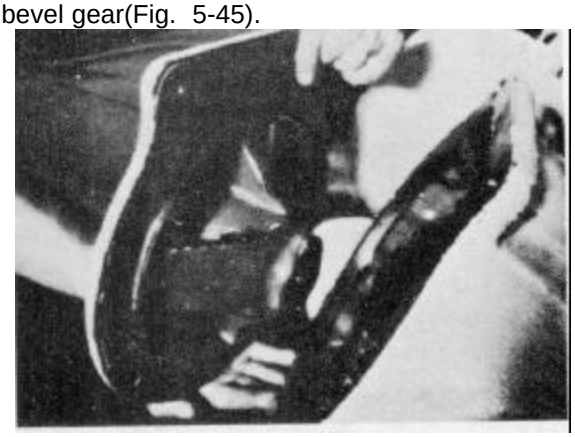


Figure 5-45

12. Examine the pinion gear teeth for abnormal wear, chips or gauling. Rotate the pinion shaft to check for bearing roughness, noise or axle play. Check wear pattern on both sides of gear teeth (Fig. 5-46).

Figure 5-46

13. The bevel gear and differential assembly are now visible (Fig. 5-47).

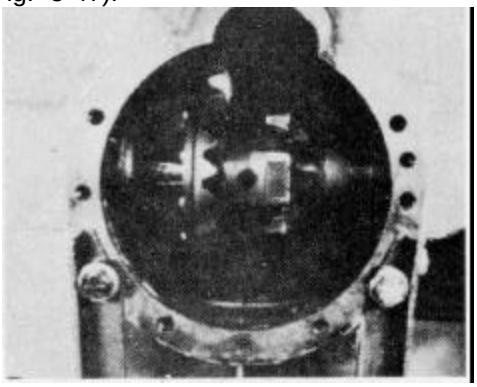


Figure 5-47

14. Remove the gasket/shims from the final drive housing (Fig. 5-48).

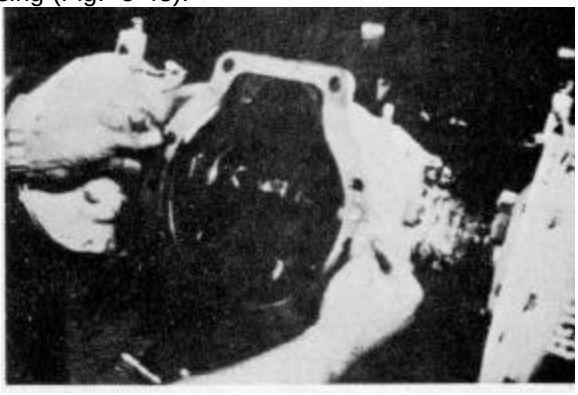


Figure 5-48

15. The bevel gear and differential assembly along with the bearing cones, may now be removed (Fig. 5-49).

Figure 5-49

Remove the bearing cones from each end of the differential case.

Examine the bevel gear teeth for scoring, gauling, chipping or abnormal wear. Examine both sides of teeth. Examine all roller bearing cups and roller surfaces for indications of wear.

DISASSEMBLY OF DIFFERENTIAL CASE AND GEAR ASSEMBLY

NOTE:
If original identification marks are not clear, mark the differential case halves with a punch or chisel for correct alignment on reassembly (Fig. 5-50).

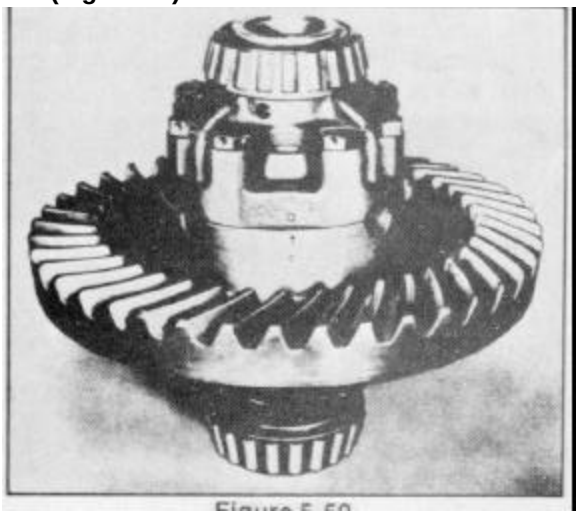


Figure 5-50

1. Remove the lockwire, if used and eight cap screws and separate the case halves.

2. Remove the no-spin differential as a complete assembly.

Always replace bevel gears in sets. Never use an old bevel pinion with a new bevel gear or vice versa. This will cause premature wear and damage to gears.

When replacing the bevel gear, drill out rivets. Never chop off rivets as you may damage the differential case flange (Fig. 5-51).

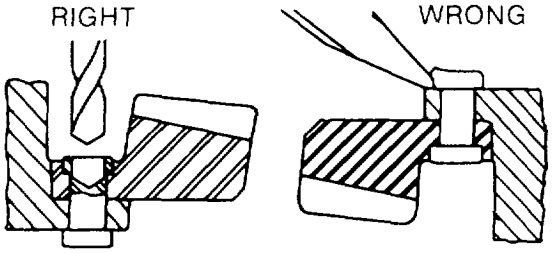


Figure 5-51

3. Carefully center punch rivets in center of head. Use a drill 1/32" smaller than body of rivet to drill through head. Always drill from the gear side, so drill cannot cut into differential case flange. Using a punch and hammer or press, press out rivet.

4. File face of differential flange to remove any burrs or nicks. With three or four bolts used as guides fasten new bevel gear to differential case. Use bevel gear provided in gear kit P/N 20102-1.

5. Attach twelve bolts from bolt set p/n 20080 (Provided in gear kit pin 20102) washers and castellated nuts. Torque to value shown in list at end of maintenance section. Turn nut to expose hole at end of bolt. Install and secure cotter pin.

REASSEMBLY OF DIFFERENTIAL ASSEMBLY AND PINION GEAR.

1. Return the differential assembly to the final drive housing.

2. Install the axle housing tubes, reusing the original shims. When using a new bevel set it is advisable to start with the shim pack originally used. If this is not available, start with about .030 shimming on each side — between center section arms — and add to or remove until the proper preload is obtained.

The differential should be shimmed till there is no end play and just a little drag. If. when rebuilding the axle with the original shimming, it is found there is some end play, or the differential is unduly loose, it is advisable to remove one of the thinnest shims from the bevel end.

3. Install the pinion case assembly to the final drive housing reusing the original shims. Turn bevel pinion by hand. If pinion is too tight, add shims between pinion case and drive housing.

Add or subtract shims until .006 to .012 backlash is obtained. This done, check tooth contact area. With proper adjustment, the proper contact starts near the toe of the gear and extends 60 to 75% of the length of the tooth. This adjustment will distribute the load over the proper area of the tooth and will give a quiet running, long service gear set.

TOOTH CONTACT CHECK -

1. Apply oiled red lead lightly to the gear teeth. When the pinion is rotated, the red lead is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts.

2. Sharper impressions may be obtained by applying a small amount of resistance to the gear with a flat steel bar and using a wrench to rotate the pinion. When making adjustments, check the drive side of the gear teeth. Coast side should be automatically correct when drive side is correct. As a rule, coating about twelve teeth is sufficient for checking purposes.

Figure 5-52

With adjustments properly made (pinion at correct depth and backlash set at .006" to .012") the above contacts will be procured. The area of contact favors the toe and is centered between the top and bottom of the tooth.

The hand rolled pattern shown in Fig. 5-52 (gears unloaded) will result in a pattern centered in length of the tooth when the gears are under load, shown on previous page. The loaded pattern will be almost full length and the top of the pattern will approach the top of the gear.

SATISFACTORY TOOTH CONTACT GEARS LOADED

The pattern on the coast side of teeth will appear the same width as the drive side shown below; however, the overall length will be centered between the toe and heel of gear tooth.

Set used gears so the tooth contacts match existing wear patterns. Hand rolled patterns of used gears will be smaller in area and should be at the toe end of wear patterns. See Fig. 5-53 for proper contact area.

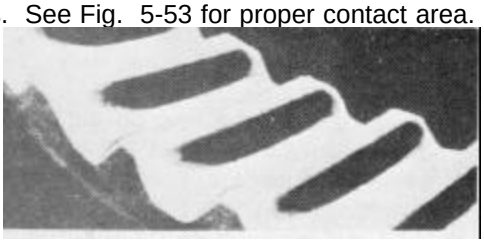


Figure 5-53

3. HIGH TOOTH CONTACT - A high contact indicates pinion is too far out. Set the pinion to the correct depth by removing shims under the pinion cage. Slight outward movement of bevel gear may be necessary to maintain correct backlash. Fig. 5-55A shows adjustment of pinion or bevel gear to correct high tooth contact.

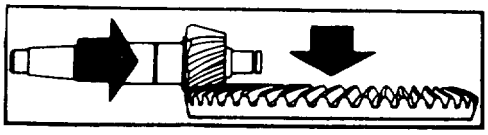


Figure 5-55A

Fig. 5-54 shows a typical tooth contact pattern when the gear teeth are too far apart.

Figure 5-54

4. LOW TOOTH CONTACT - A low contact indicates pinion is too deep. Set the pinion to the correct depth by adding shims under the pinion cage. Slight inward movement of the bevel gear may be necessary to maintain correct backlash. Fig. 5-55B shows adjustment of pinion or bevel gear to correct low tooth contact.

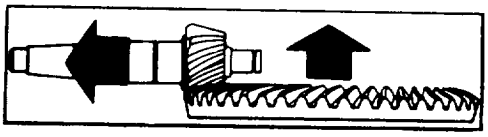


Figure 5-55B

Fig. 5-56 shows a typical tooth contact pattern when the gear teeth are too close together.

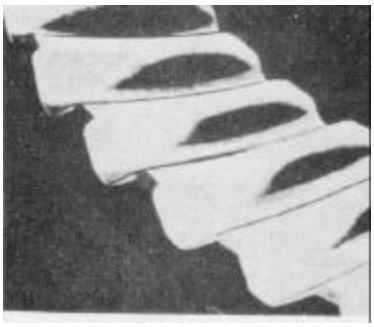


Figure 5-56

REMOVAL OF PINION AND CASE ASSEMBLY

1. Remove six 3/8 - 16 x 1-1/8" long capscrews and lockwashers using a 9/16 inch socket or box wrench. Lift the oil seal assembly and retainer away from the case.

2. Lift off the two bevel pinion bearing cover spacers and three gaskets.

3. Place bevel pinion cage with pinion and bearings assembled in an arbor press with tooth end of pinion up. Press pinion and bearings out of cage.

4. The bevel pinion bearing consists of two Timken bearing cones, one double row Timken bearing cup and one bearing cone spacer. This spacer is ground to the correct dimension to be used with the particular bearing cones and cup and is shipped this way from the Timken Roller Bearing factory. (Do not use original spacer with other bearings). When wear appears on the bearing cup or cones, always replace complete assembly, that is, the bearing cones, bearing cup and mating spacer.

5. Remove the oil seal from the oil seal retainer.

NOTE:
When reassembling the drive coupling with the pinion and oil seal, coat the seal and coupling shaft with white lithium grease to prevent possible oil leakage.

Fig. 5-57 shows the pinion and case disassembled and spread out for inspection.

Figure 5-57

DIFFERENTIAL DISASSEMBLY (NO SPIN)

NOTE:
The decision to disassemble the axle for inspection should be made only after performing all of the operational tests and determining that the NoSPIN or some other internal axle part is not working properly.

Review the "Trouble Shooting" section of this manual to determine that the situation requires actual removal of the NoSPIN differential from the vehicle axle.

No special tools are required to remove a NoSPIN from the axle. A retaining bolt and washers are useful to keep the NoSPIN assembly intact when removing it from the differential case and when reinstalling after the parts are checked.

1. Mark the mating halves of the differential case with a center punch so they can be reassembled in the original position when repairs or inspection is completed (Fig. 5-50).

2. Insert the NoSPIN retaining bolt and washer assembly, if available, threading the nut finger tight against the washer.

3. Separate the case halves and lift out the NoSPIN assembly. If a retaining bolt and washer assembly is not available hold the differential case firmly as the last bolts are being removed from the case halves, as shown in Fig. 5-58.

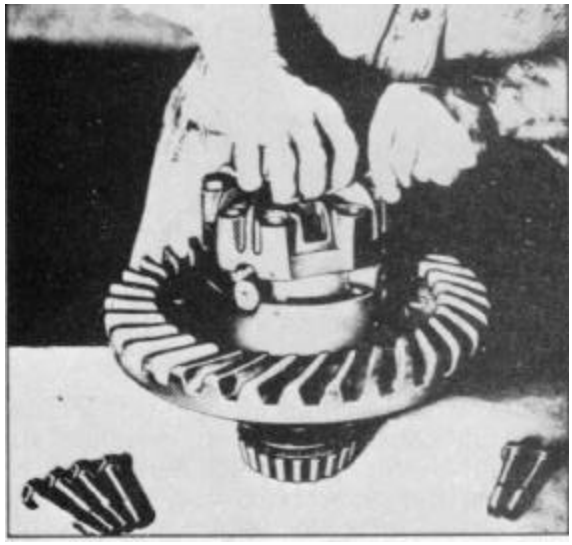


Figure 5-58

4. Release the retaining bolt and washer assembly, if used, holding the NoSPIN firmly to absorb the sudden release of spring pressure.

5. Remove side gears, springs, spring retainer, driven clutches (or the clutch and holdout ring assemblies if a silent-type NoSPIN) and the spider and center cam assembly. (The spider and center cam are not normally available as separate parts and are serviced by replacing the complete spider, snap ring and center cam assembly if either part is needed.)

INSPECTION OF DIFFERENTIAL PARTS (NO SPIN)

1. Wash all parts thoroughly with solvent.

2. Inspect the splines on the side gears and clutches. Remove any burrs or small chopped edges with an abrasive stone or electric burr grinder. If large sections of the spline are broken away, replace the part.

Check the side gear hubs for fractures.

3. Carefully examine the differential case. If trunnion holes are worn or scored or if the thrust surfaces on inside ends of the differential case are worn or scored, the case should be replaced. Examine threads of all bolts, nuts and/or cap screws, and replace those which show indications of being stripped or damaged. It is a good practice also to carefully examine bearings and the ring gear for wear or damage.

4. Check the thrust and bearing surfaces of the case, for signs of pickup of metal or wear. Replace if necessary.

5. In silent-type NoSPIN, check each clutch and holdout ring assembly for correct indexing of holdout ring to cam ring. Be sure the holdout ring rotates on the clutch with only a little resistance.

6. Check holdout rings in silent-type for fractures and chipping or excessive wear of the teeth. If desired, the holdout ring can be removed from the clutch with a snap ring spreader. Check for signs of improper assembly with the key in the spider or central driver.

7. Check the center cam for free movement.

It must be free to rotate within the limits of the key in the spider (or central driver). It is not necessary to remove the center cam from the spider (or the central driver) since these parts are serviced only as an assembly. If either part is excessively worn or damaged, the complete spider-center cam (or central driver-center cam) assembly should be replaced.

8. In models using the welded cam and clutch assembly, check for failure of the hydrogen weld attaching the cam ring to the clutch.

Cams must be perfectly aligned with drive clutch teeth. If a weld failure has occurred, it will be possible to rotate the cams ring in the driven clutch by tapping lightly on the cams.

If the weld has failed, the cam and clutch assembly must be replaced.

9. Inspect the clutch teeth on the spider (or central driver) and driven clutches. Very slight chips can be touched up with an abrasive stone. If excessively chipped or rounded, the parts should be replaced. If a part is replaced due to broken or chopped teeth, the mating part should also be replaced as it may have invisible fractures.

10. Cams on the center cam, clutches or cam and clutch assemblies must not be excessively chipped. A smooth wear pattern up to 50% of the cam face width is acceptable.

11. Check the side gear spline fit on its mating axle shaft. Be sure the splines do not bind. Also check internal side gear splines for wear or chipping.

12. Check the spring load (in lbs. ± 10%) at the operation height.

REASSEMBLY OF DIFFERENTIAL (NO SPIN)

Lightly lubricate all parts before reassembling. If the retaining bolt and washers are available, the NoSPIN can be assembled outside of the case and then installed into the case and ring gear in the usual way. Be sure, however, that the retaining washers are small enough to pass through the differential case-ends after the case bolts are tightened. Fig-Fig. 5-59 and 5-60 illustrate two of the areas requiring lubrication.

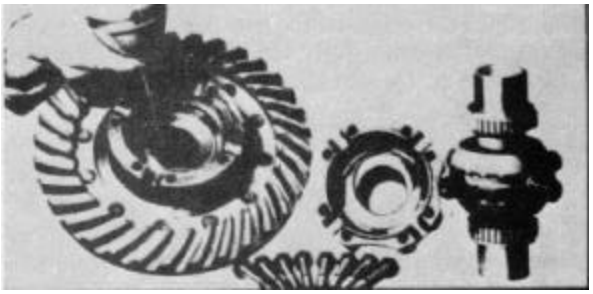


Figure 5-59

Figure 5-60

If the retaining bolt and washers are not available, it is quite easy to assemble the pieces into the case, holding the case in position by hand pressure until the case bolts are tightened as outlined in the following step-by-step procedures.

1. Lay ring gear and large half of case on bench with the bearing end of case hub down and the inner case facing upward. Be sure no thrust washers are inside the case.

2. Place the ground hub of a side gear into the bore of the case, being sure the side gear will rotate freely in the case. Some two-speed axles use different length side gears and the correct side gear must be used.

3. Assemble a spring over the inner hub of the side gear and against the spring seat of the side gear. Place the cupped section of a spring retainer over the spring (Fig. 5-61).

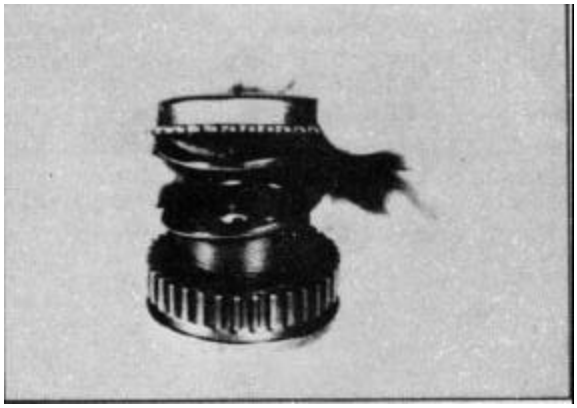


Figure 5-61

CAUTION:

Incorrect assembly of the spring retainer can limit the spring movement and prevent proper NoSPIN operation.

4. Alternately compress and release the spring, checking for possible binding in any position and for good contact between the end coil of the spring and the seat of the spring retainer in all positions.

5. Assemble a clutch (or clutch and holdout ring assembly if the NoSPIN is silent-type) over the spring retainer with the clutch teeth up. Be sure the spring retainer is seated properly into the clutch and does not bind in the splines.

6. Place spider-center cam assembly (or central driver center cam assembly) on the driven clutch indexing the teeth.

7. Place the other clutch (or clutch and holdout ring assembly if silent-type) on the spider again indexing the teeth and being sure again (if silent-type) that the spider-key and holdout ring slot are properly aligned as shown in Fig. 5-62 and 5-63. Assemble the spring retainer into the clutch with cup down, being sure it is properly seated. Place the second spring and side gear in position.

IMPORTANT:

If the NoSPIN is the silent-type, be sure the slot in each holdout ring is properly aligned into the key in the spider (central driver).

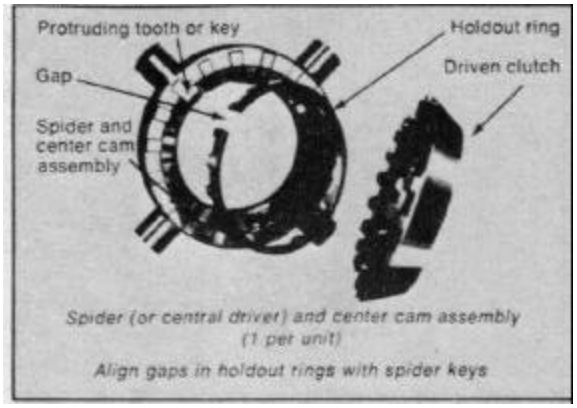


Figure 5-62

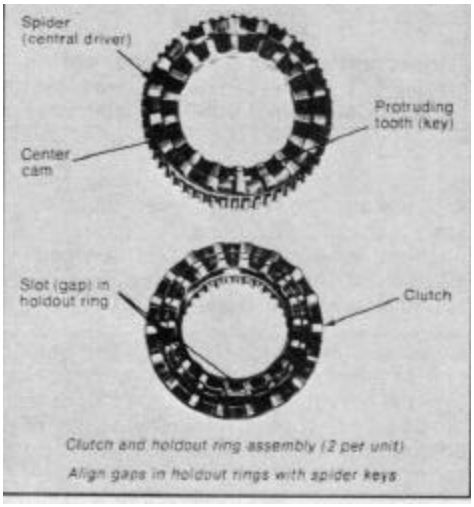


Figure 5-63

8. Mount the mating half of the case over the side gear and compress unit. Be sure the side gear splines are completely indexed with the clutch splines. Rotate to index side gear-clutch splines on both sides and align punch marks (Fig. 5-64).

9. Hold the case halves together firmly, aligning the punch marks to be sure the two case halves are properly mated. Start threading some of the case bolts but do not release hand pressure until two or more bolts are drawn up enough to overcome the spring pressure.

10. Tighten case bolts to the torque specified at end of maintenance section. Check to be certain of a snug fit between the holes in the case and the spider trunnions.

Lock and assemble the NoSPIN case and ring gear assembly as previously described in the section for differential and pinion gear assembly.

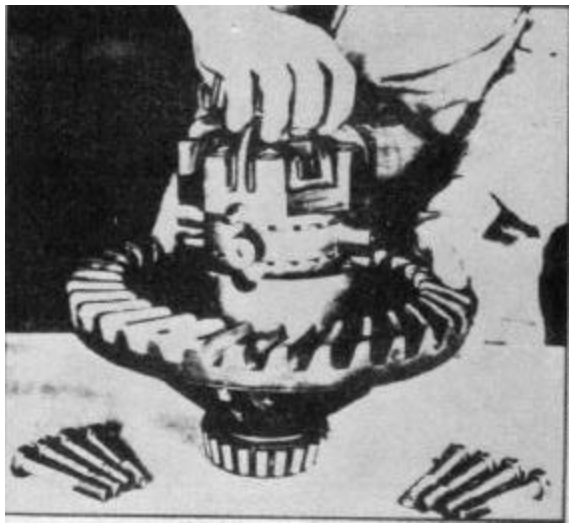


Figure 5-64

FINAL ASSEMBLY OF 10766 DRIVE AXLE ASSEMBLY

NOTE:

Observe all torque recommendations for attaching hardware. Coat oil seals and sealing surfaces with a light coat of lithium grease or equivalent.

1. Replace final drive shaft putting some light oil into bearing before putting in place.

2. Replace final drive spindle putting a light coating of Permatex on inner face and on bolts holding it in place. Replace lockwashers and nuts. Tighten nuts to a minimum of 200 pound feet.

3. Lightly smear cup grease in bearing cups of hub and put on hub; replace outer bearing. thrust washer and adjusting nut. Adjust bearings till there is a slight load on bearings. **There should be no end play**. Replace and bend over cotter pin.

4. Put a light coating of Permatex on cap where it goes into hub and drive cap in place.

5. Replace final drive gear cover.

Be sure there are no sharp edges where oil seal has to ride up on hub to get in place and that the oil seal surface is smooth and polished.

NOTE:

Oil seal is assembled against the seal lip and cover has to be put on very carefully taking precaution to be sure cover is kept square with spindle. Some light grease should be smeared on the hub O.D. before cover is put on.

6. Assemble brake backing plate to drive gear cover.

7. Attach wheel cylinder to brake backing plate with spacer between cylinder and backing plate.

8. If the self-adjusting pawls have been removed(from the brake backing plate, note that the spring washer must face away from the plate when assembling. the pawl bolt must be tightened so that the pawl will not turn with less than 120 inch-lbs. of torque and will turn with not more than 300 inch-lbs. of torque.

NOTE

These torque ratings are critical for proper operation of the self-adjuster.

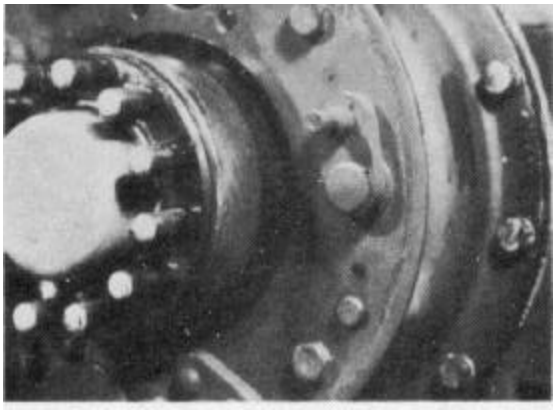


Figure 5-65

9. Align the adjusting pawls with the marks made before they were removed to approximate proper brake adjustment (Pg 5-6).

10. Install one brake shoe. Hook the springs into place on the shoe and into the other shoe which should be approximately in place but tipped out at an angle to make assembly easier.

11. When both shoes are properly in place fit the inner cup, spring, and outer cup on each retaining pin. Push the outer cup over the pin and turn it 90° to lock it on the pin

12. Make a preliminary adjustment of the brakes by checking that the outer surface of each lining is even with the edge of the backing plate; if the linings are not evenly worn, align the thickest part of the lining with the edge of the backing plate.

13. Put wheel back in place, replace taper dowels, lockwashers and nuts. Check brake operation before placing vehicle in service by applying the brake pedal hard several times.

14. Reassembly of the drive coupling. parking brake assembly. motor support tube and traction motor is accomplished by reversing the procedure. as previously described. for disassembly.

15. Fill axle to correct level with gear lubricating oil, Grade 90 per MIL-L-2105 or commercial equivalent.

Lubricate drive motor coupling chain with heavy duty lubrication oil, Grade 30 per MIL-L-2104 or commercial equivalent. Apply light coating to outside with brush.

Fig. 5-66 shows location of lubrication fill hole for drive axle. Fill level hole is forward and lower and is not shown.

17. With **both** drive tires jacked up operate the drive train for five minutes. Listen for any unusual noises. Inspect for any oil leaks.

Figure 5-66

18. Lower the vehicle to the floor and operate in forward and reverse direction. at all speeds. Listen for any unusual noise and inspect axle for leaks. Determine if service brakes are adjusted properly.

NOTES

MAINTENANCE SECTION

TORQUE VALUES FOR DRIVE AXLE ASSEMBLY

SIZE	THREAD	GRADE	LOCATION	TORQUE FT.-LBS. DRY	LUBE
1/4	20	5	Parking Brake Drum	8	6
5/16	18	5	Parking Brake Backing Plate	17	13
5/16	18	8	Wheel Cylinder Bolts	24	18
3/8	16	8	Gear Case - Brake Manifold - Parking Brake Bracket - Differential Case - Pinion Retainer - Service Brake Backing Plate	44	34
3/8	24	5	Traction Motor - Bevel Gear Bolt Set P/N 20080	35	27
1/2	20	-	Wheel Nuts	85	65
9/16	12	8	Motor Support to Final Drive Case	135	120
5/8	18	-	Axle Housing Nuts	170	130
3/4	16	8	Spindle to Axle Housing	295	230
7/8	20	-	Pinion Nut	200	175

SPECIAL TORQUE REQUIREMENTS

1-Brake Shoe Self-Adjuster Bolt: Minimum torque to rotate pawl, 120 inch-lbs. Maximum allowable torque to rotate pawl, 300 inch-lbs.

2-Hub Bearing Spindle Nut: Adjust nut to place slight load on bearings with **no end play**. Advance to nearest cotter hole.

TRACTION MOTOR BRUSH REPLACEMENT

WARNING

For replacement of lower two sets of motor brushes (access from under side of truck) truck should be raised to sufficient height (support with safety jacks under chassis) providing ease of service by maintenance mechanic. Placing truck over a maintenance pit is preferred.

1. Pull mounting pin from seat bracket and remove seat assembly.

2. Remove center louvered cover (4) 1/4-20 screws (Pg. 4-4, item 13).

3. Remove accelerator module (Pg. 5-76) and both right hand and left hand floorplates.

4. Loosen brush cover screw and slide cover off of mounting pins. Upper and lower brush rigging will be exposed (Fig. 5-67 and Fig. 5-68).

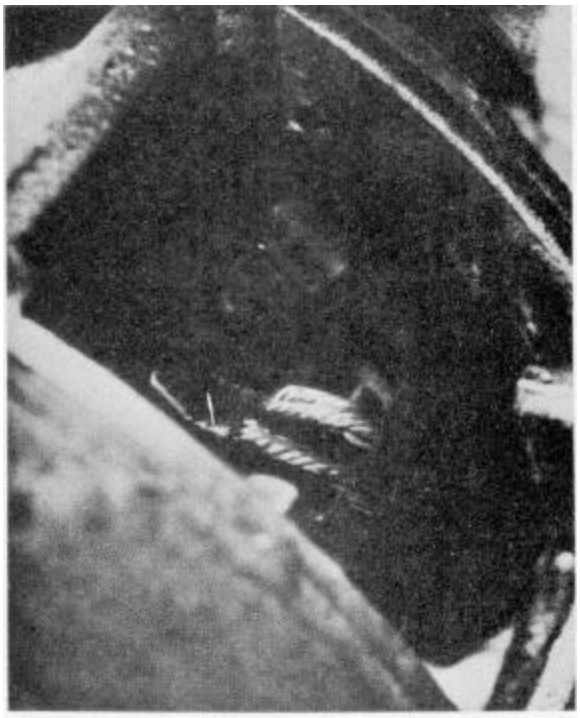


Figure 5-67

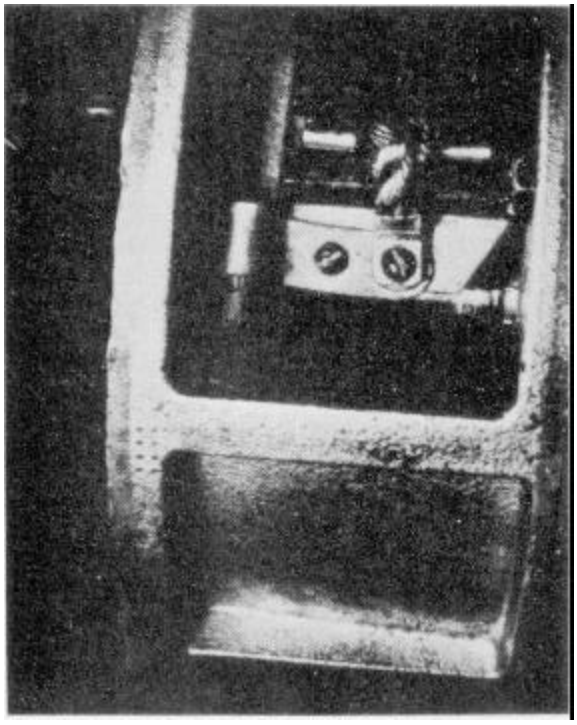


Figure 5-68

5. Remove (4) upper brush holder clips (Fig. 5-120).

6. Remove brush wires and inspect brushes. If they are worn to within 3/8 inch of the lead inset counter bore they should be replaced (Fig. 5-121 and 5-123).

NOTE

Determine through past experience if sufficient brush lift is remaining to last until next preventive maintenance inspection.

7. Inspect lower two sets of brushes from under side of truck following steps 4 through 6 above.

8. Inspect commutator for excessive wear, cracks, or burnt spots. Inspect the mica bar to bar insulation. When commutator wear results in flush or protruding mica, the mica should be undercut to a depth equal to the thickness of the mica (approximately .025 inches). Undercut slot should be clean and free of contamination.

9. After inspection or replacement of brushes, with both drive wheels off of floor operate motor, check brush seating and contact with commutator.

NOTE

If brushes show indication of arcing, seat brushes using a brush seater and commutator cleaner (Ideal Ind. Inc., Sycamore, Ill.) or equivalent.

WARNING

Use of a dust mask is recommended.

To Seat Brush With motor running, press down hard on the brush and apply the brush seater at heel of brush. Friction of the revolving commutator or ring releases the brush seater material and carries it under the brush.

To Clean Commutator With motor running, hold the cleaner against the commutator (pressing lightly) and slowly move it back and forth across the face of the commutator.

Air blow commutator end to remove dust generated by seating and cleaning operations.

10. Install motor brush and access covers.

11. Install seat assembly.

12. Lower truck to floor and operate to check motor performance.

NOTES

STEER AXLE REMOVAL

1. Remove the battery from the vehicle using the procedure described on Pg. 5-33

2. Attach an overhead crane hook to the rear counterweight lifting eye and support steer axle weight of truck (steer axle wheels still in contact with floor).

3. Rotate the hand steering wheel until turning becomes difficult.

4. Remove the hydraulic hose from the rod end of the steer cylinder using an 11/16 wrench. A 5/8 inch wrench will be required when replacing this hose to prevent twisting (Fig. 5-69).

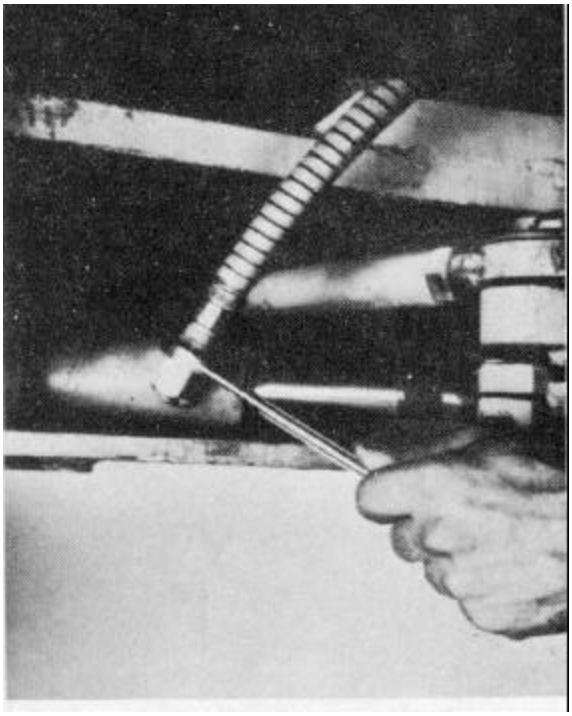


Figure 5-69

5. Remove the hydraulic hose from the clevis end of the steer cylinder, using the tools required in step 4.

6. Remove the two bolts and lock nuts from the front trunnion block (Fig. 5-70).

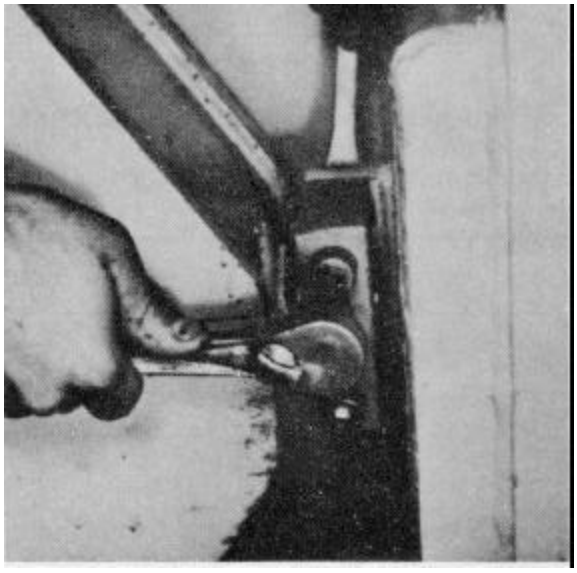


Figure 5-70

7. Remove the two bolts and lock nuts from the rear trunnion block (Fig. 5-71).

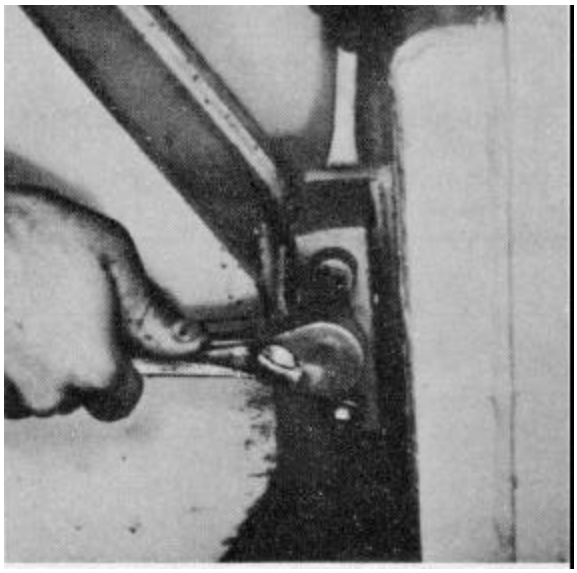


Figure 5-71

8. Raise the rear of the vehicle frame clear of the axle assembly and place support jacks under chassis. Roll and steer axle back and out from under the vehicle.

Install steer axle by reversing the procedure outlined above.

Following torque values apply:
Trunnion bolts - 90 Foot - Pounds.

STEER AXLE DISASSEMBLY

REMOVING THE WHEELS

1. Unscrew and remove the four round head screws which secure the hub cover. Remove the cover.

2. Take out and discard the spindle nut cotter pin.

3. Remove the spindle nut with a 1-1/2 inch wrench.

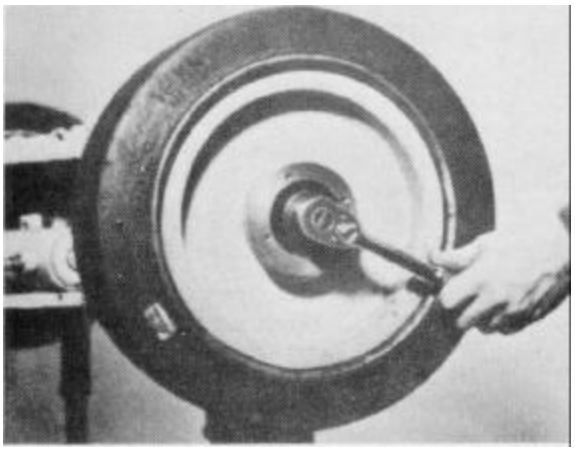


Figure 5-72

4. Pull the wheel off complete with bearings. Take care that the lips of the grease seal are not damaged by the spindle when the wheel is pulled off. The outside. wheel bearing along with washer will probably fall out when the wheel is pulled off.

NOTE

When installing the wheel, tighten the spindle nut to 20 ft. lbs. to seat the bearings. Then back It off until it Is free and retighten to 5 ft. lbs. Back the nut oft to the first cotter slot and Install a new 3/16 x 1-1/2 Inch cotter pin.

REMOVING THE GREASE CAPS

NOTE:

Grease caps are used to close off the top and bottom king pin and bell crank needle bearings. They are lightly pressed into the bearing bore at final assembly and tack welded in place prior to lubricating the king pin and bell crank bearings. Remove in the following way:

1. Break the tack welds with a chisel and hammer, pneumatic chisel or a small, high speed, abrasive hand grinder.

2. Tap the sides of the grease cap with a hammer until a screwdriver can be inserted under the rim. Pry the grease cap up and out of the bearing bore (Fig. 5-73). Prior to removal of the top bell crank grease cap raise the restraining clip for the grease feed tube (Fig. 5-74).

Figure 5-73

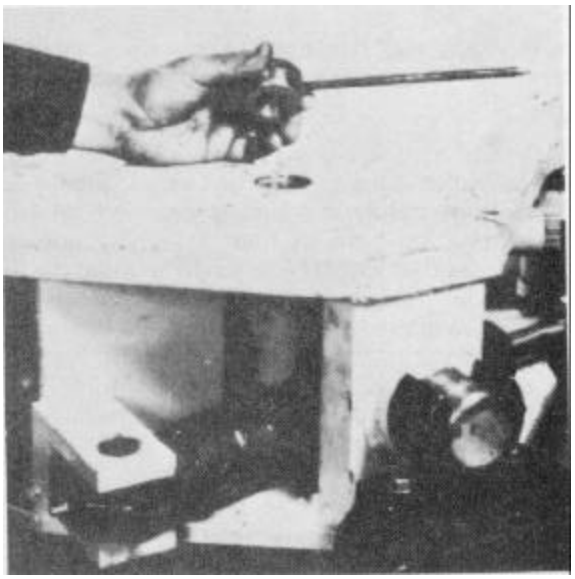


Figure 5-74

REMOVING THE HUB ASSEMBLY

1. The outside wheel bearing will probably come out when the wheel is pulled off the spindle. Remove the innermost bearing along with the grease seal by reaching through the hub and tapping out the seal and bearing with a suitable drift. Do not touch bearing rollers or cage when doing this.

Figure 5-75

Figure 5-76

2. Roller bearing outer races are pressed into the hub and should be inspected in place.

3. Clean the spindle and bearings with a safe solvent.

4. Check for damage or signs of wear. Replace parts as required. Bearings should be replaced in pairs.

5. When assembling, using a press to install the outer races in the hub is recommended. This is to ensure that they are pressed straight in and not cocked.

6. Lubricate the spindle and bearings with grease (MIL-G-18709).

7. Press in a new grease seal. Lubricate the lips of the seal and take care when installing the wheel on the spindle that the seal lips are not knicked.

Figure 5-78

REMOVING THE POWER STEER CYLINDER ASSEMBLY

1. Remove the bottom cotter pin from the cylinder mounting pin.

2. Lift the cylinder mounting pin up and out of the axle weldment cylinder mounting clevis (Fig. 5-79).

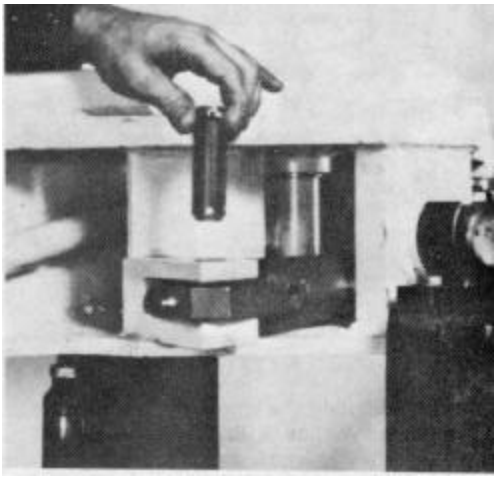


Figure 5-79

3. Rotate the right spindle to pull the cylinder clevis away from the axle weldment mounting clevis.

4. Remove the cotter pin and flat washer from the bottom spindle cylinder mounting pin (Fig. 5-80).

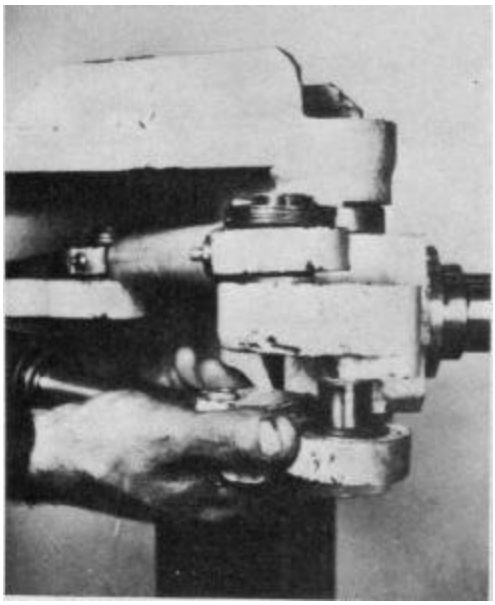


Figure 5-80

5. Remove the power steer cylinder rod end from the spindle mounting pin (Fig. 5-80).

6. Remove the steer cylinder assembly from the axle weldment.

REMOVING SPINDLES

1. Remove the cotter pin and flat washer from the spindle tie rod mounting pin (Fig. (5-81).

2. Pull the tie rod end up and off of the spindle mounting pin (Fig. 5-82). (Swing opposite wheel hub and tie rod will retract into axle weldment).

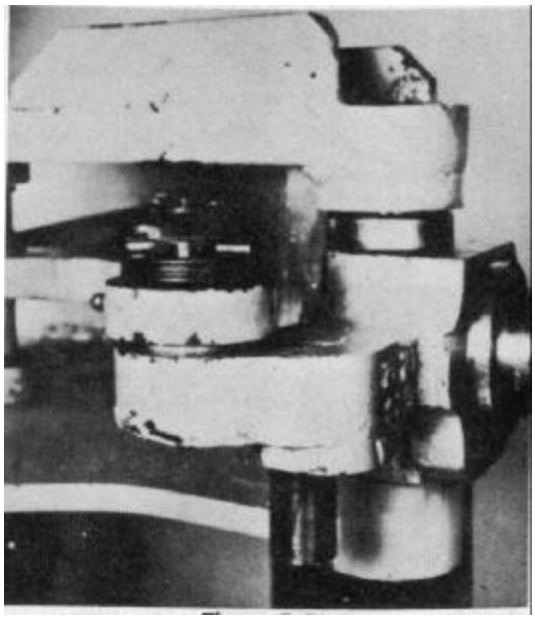


Figure 5-81

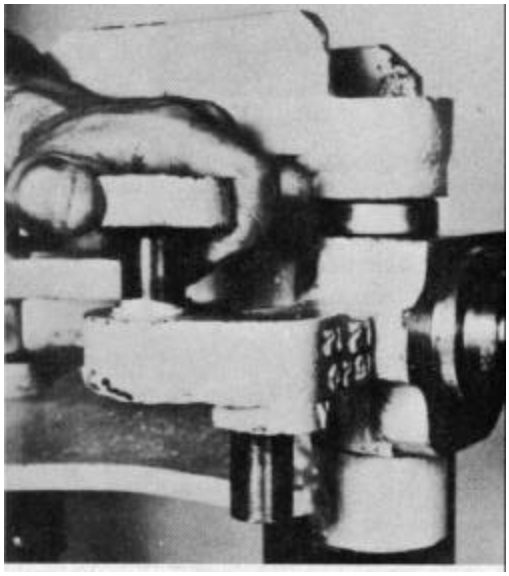


Figure 5-82

REMOVING STEER AXLE KING PINS

3. Loosen the king pin retaining set screw located at the side of the spindle (Fig. 5-83).

4. Remove the king pin from the spindle bore (Fig. 5-84).

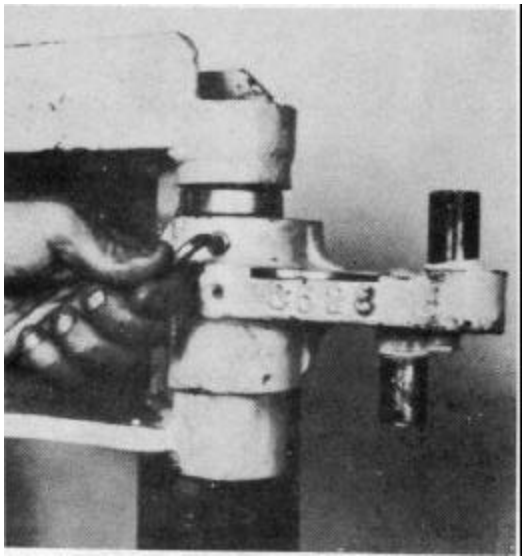


Figure 5-83

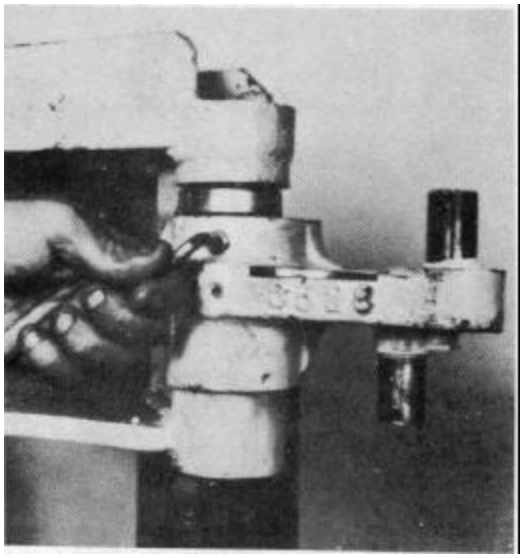


Figure 5-84

NOTE:
When installing the king pin, the flat must be placed in line with the retaining set screw in the spindle. Apply Loc-tite compound to the set screw prior to installing.

5. Remove the spindle and roller thrust bearing from the axle weldment.

REMOVING THE BELL CRANK AND TIE ROD ASSEMBLY

1. Loosen the bell crank retaining set screw located at the side of the bell crank tube (Fig. 5-85).

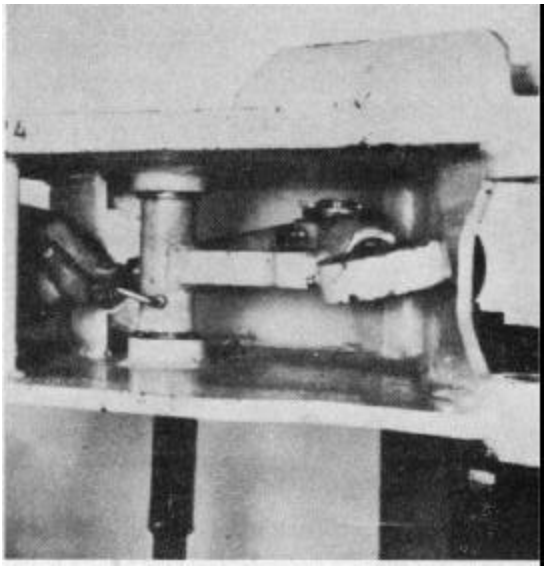


Figure 5-85

2. Remove the bell crank pin from the bell crank tube (Fig. 5-86).

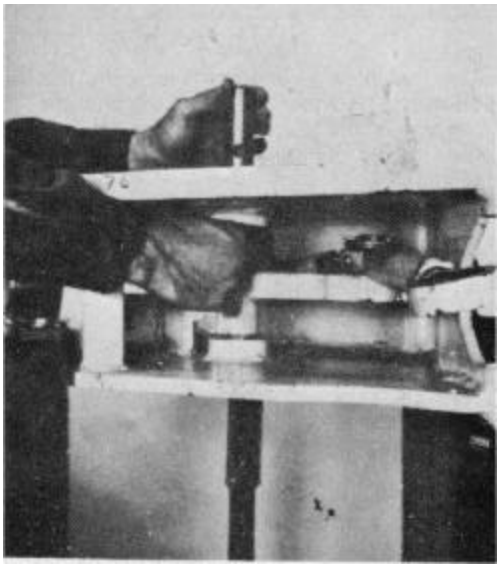


Figure 5-86

NOTE:

When installing the bell crank pin, the flat must be placed in line with the retaining set screw in the bell crank. Apply Loc-tite compound to this set screw prior to installing.

3. Remove the bell crank assembly and thrust washer from the axle weldment (Fig. 5-87).

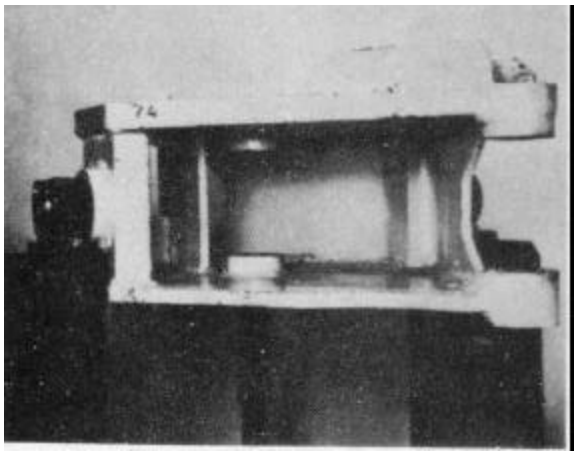


Figure 5-87

REMOVING THE NEEDLE BEARINGS

1. Use a 1-19/32 inch round bar to tap needle bearings from the axle weldment. Reassemble steer axle by reversing procedure outlined above.

Following torque values apply:

1. Bell crank pin set screw, 3/8-16, 48 ft. lbs.
2. Spindle nut, 1-14, tighten to 20 ft. lbs., back off until free, then tighten to 5 ft. lbs. Back off to first cotter pin slot to insert cotter pin.
3. King pin set screw, 1/2-13, 120 ft. lbs.

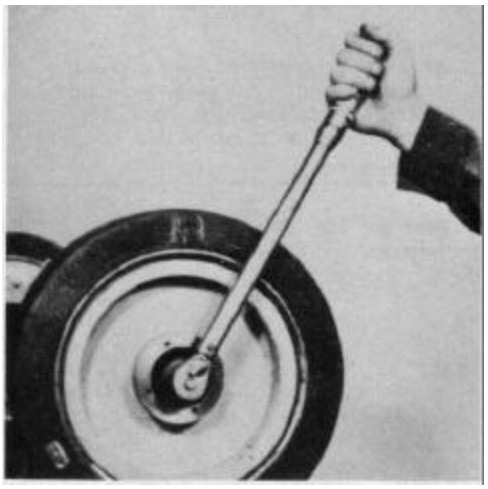


Figure 5-88

MASTER BRAKE CYLINDER LINKAGE ADJUSTMENT

NOTE:

In order to prevent master cylinder pressure build up and service brake drag, the master cylinder plunger rod must be adjusted as follows:

1. Back off the jam nut on the adjustment rod by turning it in a counterclockwise direction (Fig. 5-89).

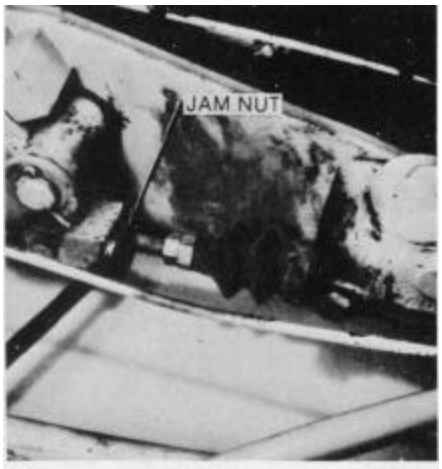


Figure 5-89

2. In adjusting the master rod length, turn the adjustment rod clockwise via the two jam nuts to decrease the length, or counterclockwise to increase the length (Fig. 5-90). The adjustment rod length should be set so that a free play of between 1/32 and 1/16 inches is obtained.

Figure 5-90

NOTE:

The free play mentioned is actually the clearance between the end of the plunger rod within the master cylinder boot and the master cylinder plunger position. (Fig. 5-89).

3. Tighten the plunger rod jam nut on the push rod by turning the nut in a clockwise direction (Fig. 5-89).

SERVICE BRAKE

BRAKE SHOE INSPECTION

REMOVE THE WHEEL TO INSPECT BRAKE SHOE CONDITION. NEW LININGS ARE 1/4 INCH THICK. REPLACE THE SHOES IF LINING THICKNESS IS LESS THAN 1/16 INCH AT THE THINNEST POINT.

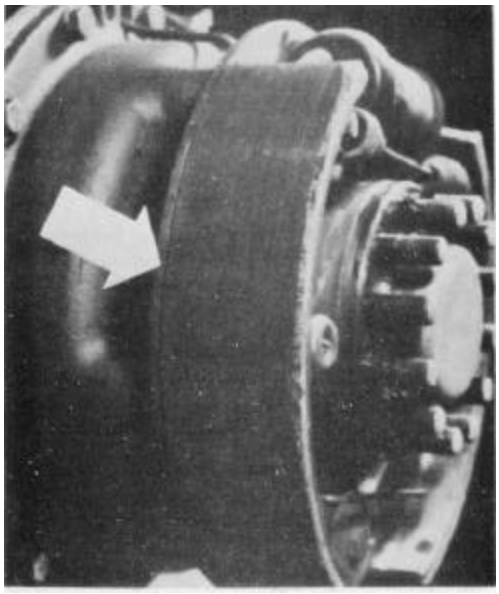


Figure 5-91

BRAKE ADJUSTMENT

BRAKES ARE SELF-ADJUSTING AND SHOULD NOT NEED ROUTINE ADJUSTMENT. IF ADJUSTMENT IS REQUIRED FOR ANY REASON, REMOVE THE WHEEL AND CHECK THAT THE LININGS ARE EVEN WITH THE EDGE OF THE BRAKE BACKING PLATE. USE THE SELF-ADJUSTER PAWL BOLT(S) REACHED FROM BEHIND THE BRAKE BACKING PLATE TO MAKE THIS ADJUSTMENT. FIT THE WHEEL AND APPLY THE BRAKE HARD SEVERAL TIMES BEFORE PUTTING THE VEHICLE IN SERVICE.

Brake bleeding procedures should be performed after the brake shoe adjustments have been completed.

NOTE:

Two service people required.

1. Inspect master cylinder brake fluid level, if low, add fluid (Fig. 5-92).

Figure 5-92

2. Pump brake pedal several times and hold down firmly.

3. While holding pedal down, crack the bleeder valve with 7/16" wrench to let air out then tighten without allowing the pedal to move off the floor. Now release brake pedal (Fig. 5-93).

Figure 5-93

4. Repeat steps 2 and 3 until the brake fluid flowing from the bleeder valve is free of air and when brake pedal feels solid.

5. Repeat steps 2 through 4 on both front wheel cylinders until desired pedal reaction is obtained.

6. Fill master cylinder with brake fluid to top level (Fig. 5-92).

7. If brake pedal sponginess persists rebleed system.

HAND PARKING BRAKE ADJUSTMENT

The adjustment of the hand operated parking brake is performed in the released position (Fig. 5-94).

To increase parking brake effort turn brake lever knob end clockwise. To decrease effort turn knob end counterclockwise.

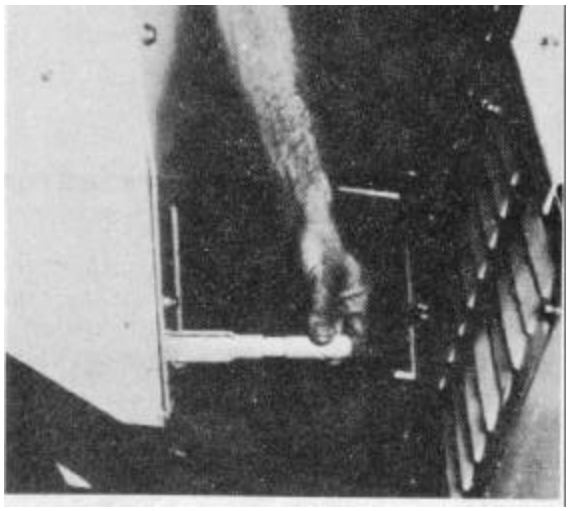


Figure 5-94

SEAT PARKING BRAKE ADJUSTMENT

When the seat parking brake cable length is properly adjusted, the brake system with the operator's seat vacated will hold the truck on a grade of 15% with the rated load in a carry position.

With the truck parked on level ground, proceed to adjust the seat parking brake system as follows: (Fig. 5-95).

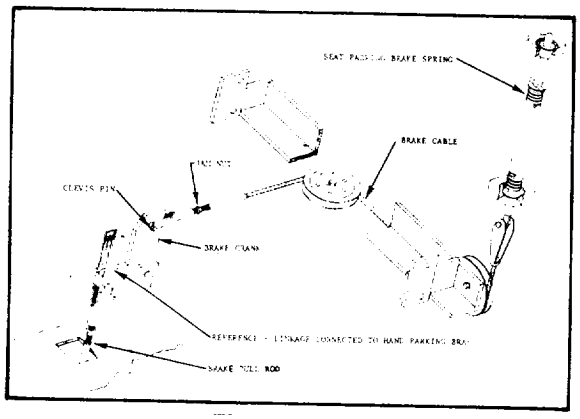


Figure 5-95

1. Engage the hand brake parking lever and remove the clevis pin that attaches the brake cable to the brake crank (Fig. 5-95).

2. Release the jam nut from the brake cable clevis and back off approximately three to four turns (Fig. 5-96).

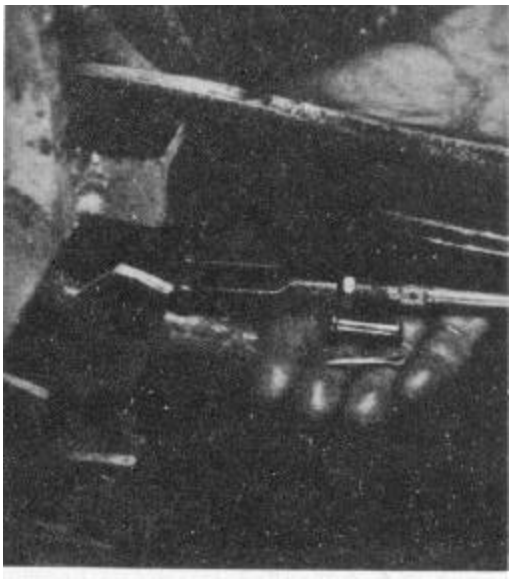


Figure 5-96

3. With the operator's seat held in the operating position, the seat parking brake spring will be compressed to its maximum position. Adjust the clevis on the brake cable so that the clevis pin may be installed with the cable in its taut position.

4. With the operator's seat still in the operating position, again remove the c!evis pin from the brake cable clevis. Turn the brake cable clevis counterclockwise one rotation. Reinstall the clevis pin attaching the brake cable clevis to the brake crank (Fig. 5-96).

5. Disengage the hand brake parking lever.

NOTE:

Check out of the brake system is as follows with rated load on forks.

1. Applying the service brakes brings the truck to a stop on a grade of 15%.

2. While still applying pressure to the foot brake pedal of the service brake system. raise off of the operator's seat so that the seat parking brake spring will apply pressure to the parking brake crank.

3. Release the foot pressure on the service brake system brake pedal. The truck should hold on the grade with rated load in a carry position on the forks.

BATTERY

REMOVAL OF BATTERY FROM VEHICLE

Drive the vehicle to an area having overhead lifting capability or obtain a lift truck of 3,000 lbs. capacity, with a jib-boom attachment. The following steps are recommended for removal of the battery from the vehicle:

1. Place the unloaded vehicle in a clear work area. Lower the forks to the floor. Turn the key switch "OFF"

2. Apply the parking hand brake and position the operator's seat over the steering wheel.

3. Disconnect the battery connector(Fig. 5-97).

4. Open the battery cover and allow it to rest against the lifting eye on the rear counterweight.

5. Lift off right and left battery compartment side covers.

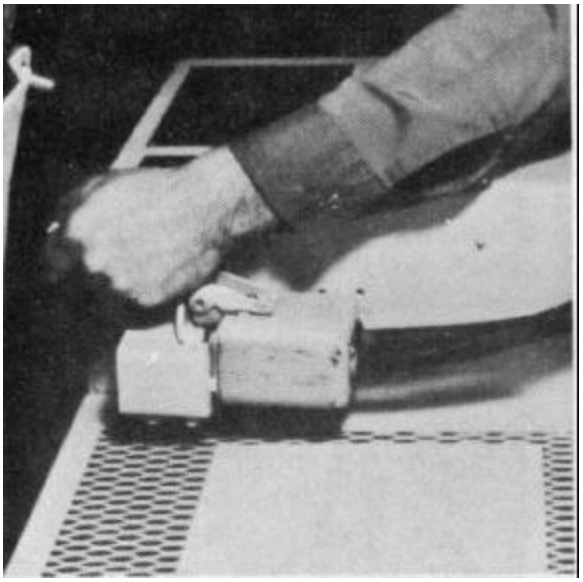


Figure 5-97

6. Remove the two battery retainer angles. One located at the left rear, the second at the right front of the compartment (Fig. 5-98). Use a 9/16 wrench to remove the two hex head bolts from each retainer.

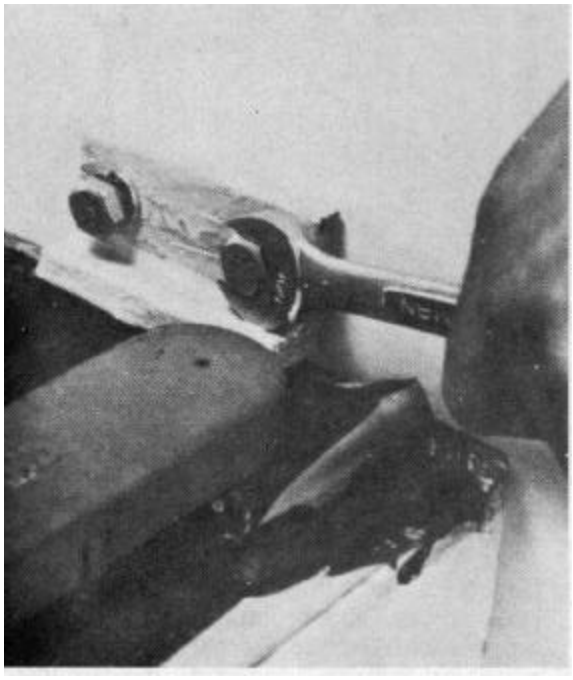


Figure 5-98

7. Attach a spreader bar with chains and hooks to an overhead crane of lift truck with a jib-boom attachment (Fig. 5-99).

WARNING

Do not allow lifting hooks to contact an exposed battery cell link. A serious electrical short circuit will occur.

8. Attach the spreader bar chain hooks to the lifting eyes at the sides of the battery (Fig. 5-99).

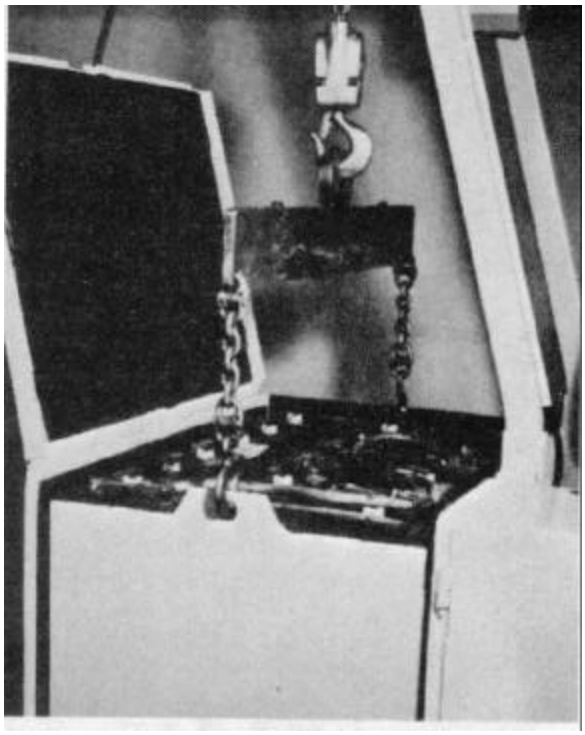


Figure 5-99

9. Raise the battery to a height clearing the compartment's side walls and remove from either side of the compartment (Fig. 5-99).

Reverse steps 4 through 9 to install battery in the vehicle. The replacement battery must comply with the requirements for weight and capacity shown on the manufacturer's nameplate attached to the vehicle.

The plywood floor of the battery compartment must be removed for inspection of the steer axle assembly and articulating stop blocks (Fig. 5-100).

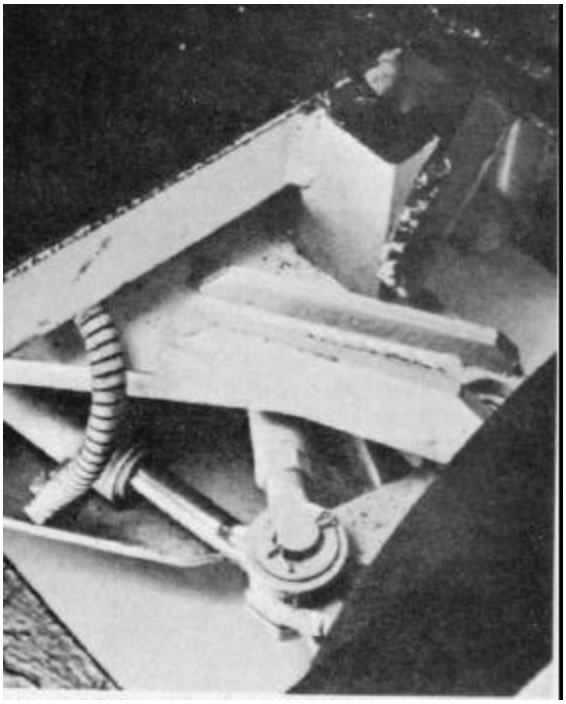


Figure 5-100

BATTERY SERVICE

WARNING

Important safety precautions must always be taken in every aspect of battery service. Be aware of the dangers Involved Read and comply with ell Warning and Caution notes relating to the battery In the Safety Precautions section at the front of this manual.

CHECKING STATE-OF-CHARGE

Daily, or at least .weekly, certain pilot cells should be checked with a hydrometer. This is done when the battery is discharged, and will give a good idea of battery condition, possibly preventing damage due to overdischarge. Check at least three cells. These should be the weakest ones-which will be determined by monthly readings when all the cells are checked.

A high quality hydrometer in good condition should always be used. Be certain to wear rubber gloves and safety goggles or a face shield during the procedure. Take care when assembling the hydrometer, as the glass syringe could break. Washing the syringe to remove impurities before the check is recommended.

A hydrometer which has been used in alkaline batteries should never be used in lead acid batteries.

Be certain that the rubber tip of the hydrometer is fully immersed in the electrolyte and remains so throughout the check; otherwise air may be drawn in and give a false reading. Squeeze and release the rubber bulb slowly. Draw sufficient electrolyte so that the float is midway in the barrel. It must not touch either top or bottom. Hold the hydrometer vertically so that the float is free. Tilting it may cause the float to stick to the sides of the barrel. Shake the hydrometer slightly to ensure that the float is not sticking.

Hold the hydrometer at eye level. The electrolyte will curve upwards slightly where it meets the glass of the barrel and the float, This should be ignored. Read the true level. Specific gravity readings should be corrected for electrolyte temperature. Add 0.003 to the actual specific gravity for each 10°F. above 770F. Remember that this is electrolyte temperature, not air temperature.

After the check, return the electrolyte to the same cell from which it was taken.

Never continue to discharge a battery beyond the point where the specific gravity Is less than 1.125.

WATERING

Check electrolyte level daily. This is one of the most important factors in battery life,

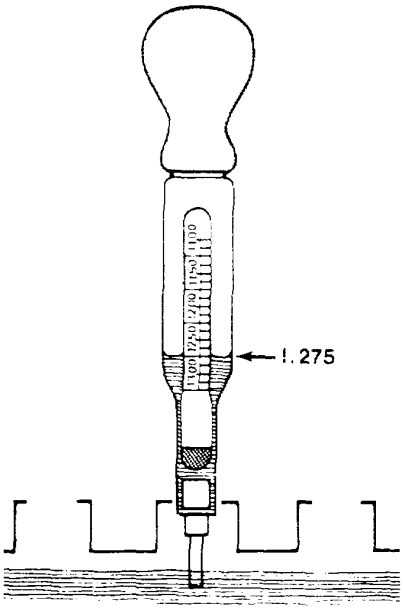
Check every cell. Never allow the level to fall below the top of the battery plates. If the battery is being charged, add just enough water to cover the tops of the cells. Adding too much may cause losses due to expansion and splashing during the charging process. After charging has been completed, recheck the level of each cell and top up, if necessary, to the proper level. Never fill the cells above the bottom of the vent well.

Wear rubber gloves when adding water to the battery. An automatic cell-filler or a plastic container should be used. Never use metal or glass containers. Glass can break and metal can cause a short circuit between intercell connectors if carelessly handled.

Never add acid to a battery during routine maintenance. Add water only. The water should be approved for battery use and should be as free of impurities as possible. Impurities in the water will remain in the battery and will increase with each filling: this will shorten battery life.

Excessive water requirements indicate that the battery is being overcharged.

Check each cell with a hydrometer after charging as outlined above. After watering, replace all vent plugs and be sure they are tight to prevent loss of electrolyte.



CHARGING

Before the battery is removed from the truck, cables should be tagged for polarity to prevent possible reversal of connections. If there is any doubt, check polarity with a meter.

This vehicle is equipped with battery restraints which prevent verticle movement of the battery. When the battery is exchanged, these restraints must be reinstalled for safe operation of the truck.

Battery charging must be done in a well-ventilated area removed from flames, sparks, and naked lights. An emergency eye-wash

bottle or fountain should be close by. No smoking is permitted in the charging area. Check electrolyte level in each cell before charging.

In general, a storage battery may be charged at any current rate that does not produce excessive gassing or bubbling of the electrolyte or result in temperatures above 110°F. (1250F. for short periods). During a normal recharge, the temperature would not be expected to rise more than 15°-20°F. Excessive temperature rise should be avoided as any rise in temperature decreases the battery voltage on charge. This allows a higher current to flow, thus further raising the temperature and compounding the effect.

Every effort should be made to ensure that the battery receives the proper amount of charge: neither too little nor too much. Consistant "undercharge"-failing to recharge the battery completely at reasonable intervals-will cause gradual sulfation of the negative plates with possible shedding of the active material, loss of capacity, and shortened life. "Overcharge"-higher than proper current rates or failure to stop the charge when complete-will cause high electrolyte temperatures, loss of material from positive plates, and "formation" (corrosion) of the positive grid structure.

"Boost charging" of the battery during lunch periods and rest breaks is not recommended. During the last hour of charging, cell voltages should not vary more than +0.01/-0.00 volts. Specific gravities should not vary more than +0.002/-0.000. If the measurements show more of a variation, check that the battery is being charged for the proper length of time, that the charger is the right size for the battery, that all connections are clean and tight, and that the A.C. supply voltage is not varying more than 10%.

If all these points are checked, and variations remain, the battery should have an "equalizing" or "weekend" charge. This involves setting charger timer to 11 hours if 8 hours is the normal period, or switching to "weekend charge" if it has this provision. Equalizing charges are normally given once a month, orate most once every two or three weeks. It should not be done every week. The equalizing charge is merely a continuation of the regular charge at the finish rate until there is no further rise in voltage or specific gravity over a one-hour period. It serves to ensure a full charge and equalize any minor differences between cells.

A large quantity of explosive gas is given off during battery charging. This "gassing" will continue for some time even after charging has been completed.

Water spilled on the battery during charging or electrolyte splashed from the cells must be removed. Refer to "Cleaning," following. Neutralize any acid or electrolyte spillage immediately. If acid contacts any part of the skin, wash off with water immediately and neutralize. In the event of acid in the eyes, wash with water immediately and consult a doctor at once.

CLEANING

The entire battery, and its tray and connections as well, should be kept clean and dry since grease, oil, dirt, or moisture can cause a current path grounding the battery. Grease and oils may disintegrate the battery sealing compound and cause leakage.

Electrolyte spilled on battery and neighboring areas never evaporates. In addition to increasing the possibility of a voltage leak, it corrodes metals that are subject to attack by sulphuric acid.
Battery cleaning schedules should be adapted for the type of environment in which the truck operates. Wipe off grease and oil with a cloth dampened with a chlorinated hydrocarbon solvent or a similar cleaner. Never use ammonia products to clean a battery.
Neutralize electrolyte on the battery top or tray by applying a warm solution of bicarbonate of soda (one pound of soda to one gallon of water). Make sure the vent caps are firmly in place before applying this solution since it will neutralize the electrolyte if it gets into the cells. Allow the solution to "fizz" for a few minutes, then wash off thoroughly with clear water. This procedure should be carried out at least twice a year.
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 when necessary immersing them in a bucket of water and wiping clean.

If there is any corrosion on metal parts of the tray or compartment, clean with a bicarbonate of soda solution and refinish with acid-resistant paint.

Accumulated dust and dirt on the battery and battery tray can be removed at shorter intervals with plain water, compressed air, or a cloth, depending on its nature.

RECORDS

Certain records are essential to obtain the best results in battery operation.

When several batteries are in use, each one should be identified by being assigned a permanent number when received and that number painted, stamped, or otherwise plainly marked.

Each battery as received, after its freshening charge, should have recorded the specific gravity of each cell. This serves as a reference for the comparison of later readings.

In a new application, the workload (amount of discharge) should be checked for perhaps several weeks to determine whether it is within the expected range. This is done by reading the specific gravity of a particular cell at the beginning and end of discharge and comparing the difference with the specific gravity drop.

For best operation, this daily discharge should not exceed 80% of the rated gravity drop. The "pilot cells" used for such purposes should be changed at monthly intervals, or otherwise, the frequent hydrometer readings may noticeably reduce their specific gravity.

Many users prefer to keep this record continually. Where batteries are interchanged among different trucks, such a record will immediately indicate where the load is heaviest.

REMOVAL OF PIVOT/SIDESHIFT ASSEMBLY FROM TRUCK

NOTE

Place the vehicle in an area where an overhead crane is available with a minimum of one ton (2000 lb.) capacity.

Apply the hand parking brake and block the drive tires preventing vehicle movement.

1. Remove mast assembly from the pivot arm following the procedure outlined on Pg. 5-78. Plug and tie back the mast hydraulic hose.

2. Rotate the pivot arm clockwise for access to the chain tensioning assembly on the crosshead weldment.

Remove the holddown plates (Fig. 5-101), dowel pins and chain tension blocks (Fig. 5-102, Fig. 5-103). (Pg. 4-36. items 5 and 6).

The chain ends must be disconnected prior to removal of the crosshead.

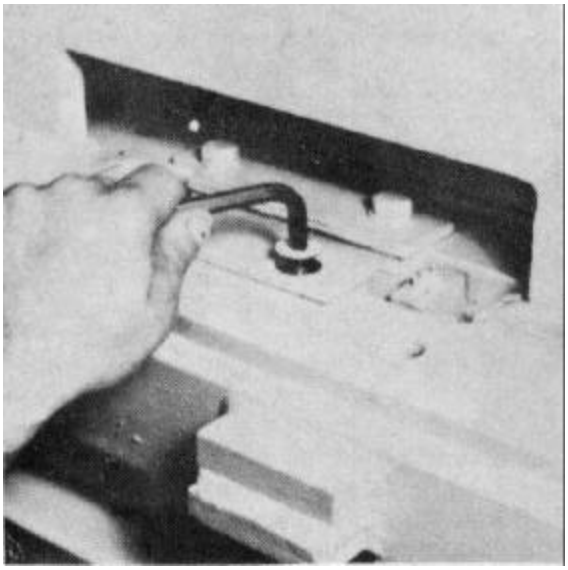


Figure 5-101.

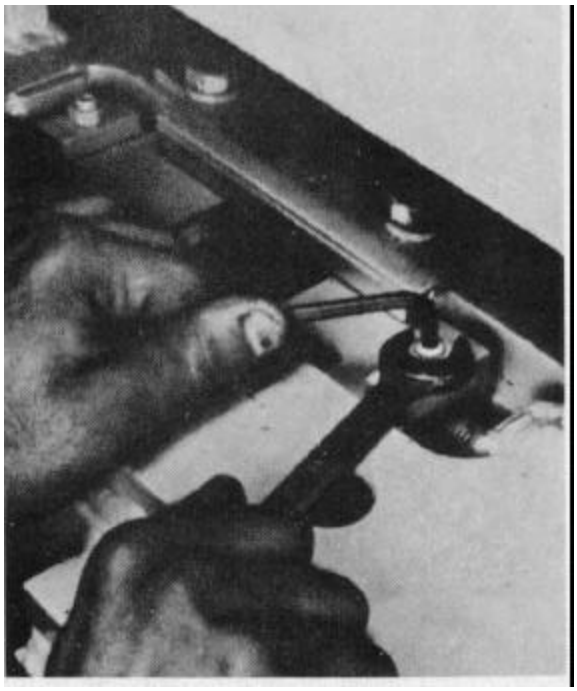


Figure 5-102

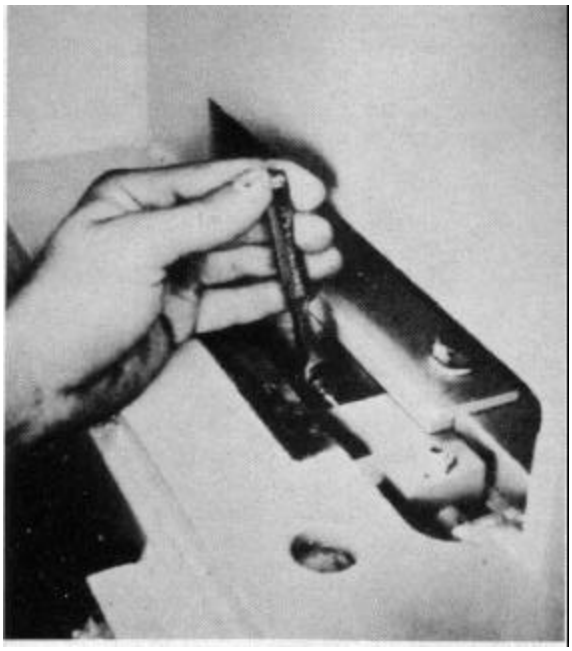


Figure 5-103

3. Rotate the pivot arm counterclockwise until it contacts the stop on the crosshead. Place an adjustable "C" clamp across the pivot joint (Fig. 5-104). Use a clamp with a six inch minimum throat and a six inch minimum to twelve inch maximum opening.

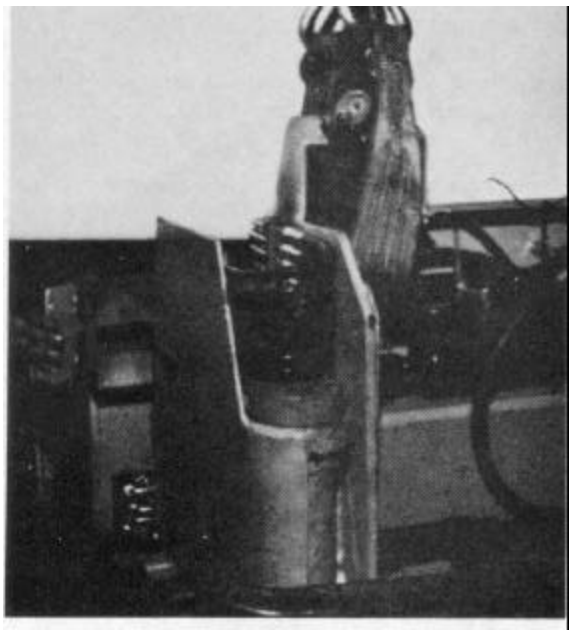


Figure 5-104

4. Disconnect the battery (Fig. 5-97). Move each of the hydraulic control handles to the extreme positions to relieve any trapped hydraulic oil pressure.

5. Support the pivot arm and crosshead assembly with a webbed sling attached to the overhead crane. Place the sling under the pivot arm rear extension beneath the right tilt cylinder (Fig. 5-104).

6. Remove the four capscrews from the end plate on the upper tail guide channels using a 7/16 wrench. Remove the retainer plate (Fig. 5-104).

7. Remove the two allen head screws from the upper flanges of the telescoping section assembly, use a 3/8 allen wrench (Fig. 5-105).

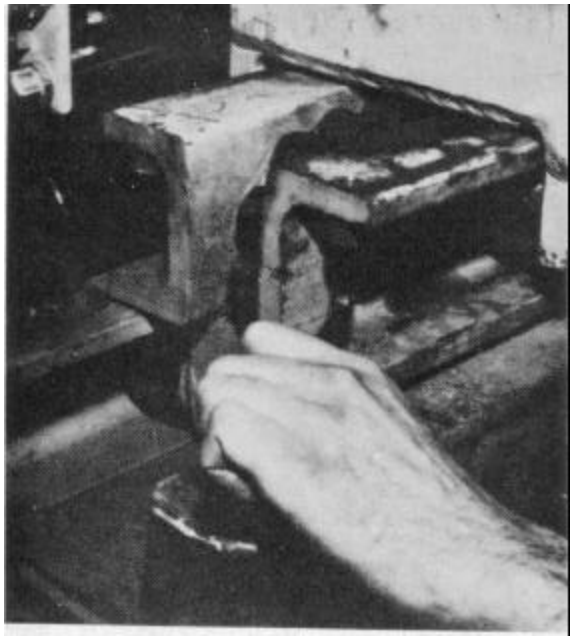


Figure 5-105

8. Remove the two capscrews from the umbilical hose fitting cover using a 7/16 wrench. Remove the cover to expose the hose fittings and fitting support bracket (Fig. 5-105).

9. Disconnect the seven (7) outer hose fittings using an 11/16 wrench. Disconnect the electrical control cable connector, P8A, from J8A, inside the vehicle chassis.

Remove the two (2) 3/8-16, hex head capscrews, hex nuts and split lockwashers that attach the hose fitting support bracket to the vehicle frame. Allow the umbilical hose assembly and fitting support bracket to rest on the shift cylinder. Cap or plug all open hydraulic fittings or hoses.

CAUTION

When removing the pivot arm and crosshead assembly, make sure that the loose end of the umbilical hose assembly is not caught or damaged.

Position the removed pivot arm and crosshead assembly on wooden blocks to protect the roller bearings and to securely support the assembly from movement.

10. Support the weight of the pivot arm and crosshead assembly with the attached sling and overhead crane. Roll the assembly out of the telescoping section assembly, toward the right side of the vehicle.

REMOVAL OF THE TELESCOPING WELDMENT

11. Remove the two cap screws from each of the two end plates on the left side of the chassis guide channels. Use a 7/16 inch open end or box wrench. Remove each plate and set aside.

12. Remove the two allen head screws from the upper flanges of the fixed channel weldment. Use a 3/8 allen wrench (Fig. 5-106).

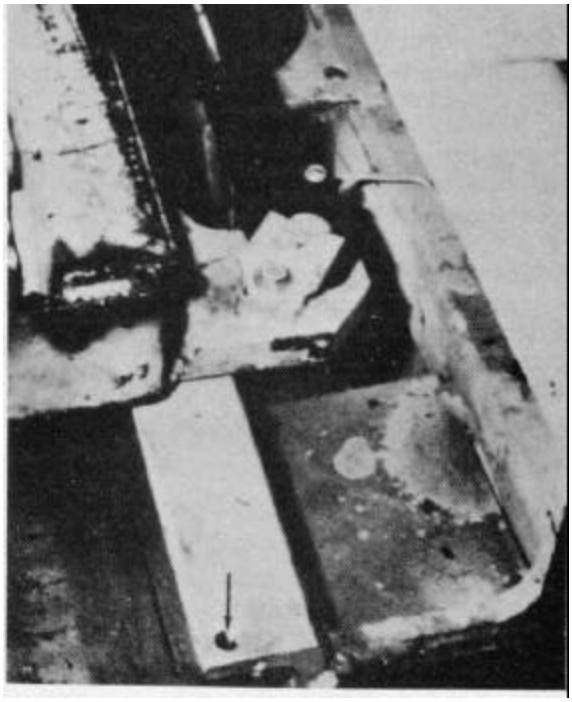


Figure 5-106

13. Remove the umbilical hose assembly support tray. Use a 3/16 inch allen wrench to unscrew the three (3) round head allen screws.

14. Unscrew and remove the hex head cap screw, lockwasher and flat washer that fix the shift cylinder pin to the shift cylinder rod clevis (Fig. 5-106). Use a 9/16 inch wrench. Pry the pin free of the shift cylinder rod clevis.

15. Pull the telescoping section assembly toward the left side of the vehicle and free of the shift cylinder rod clevis. Guide the free ends of the leaf chain from around the cam follower rollers at each end of the telescoping section assembly. Continue to pull the telescoping section assembly toward the left side of the vehicle until free of the fixed channel weldment. Weight of the assembly is 175 pounds and assistance from an overhead crane and sling is required.

CHASSIS CHAIN ANCHOR REMOVAL

16. Remove a 5/8 diameter, socket head, shoulder screw and the 1/2-13, self locking, hex nut that holds the chain anchor to the chassis guide rollers (Pg. 4-36, items 1, 9, and 10). Use a 5/16 allen wrench and a 3/4 inch socket wrench for disassembly. Remove the two leaf chains and chain anchor from the chassis.

SHIFT CYLINDER REMOVAL

17. Remove the two (2) shift cylinder hydraulic hoses from the cylinder. Use a 3/4 inch wrench. Plug and cap fittings and hoses. Tag hose assemblies for later identification.

18. Remove the hex head cap screw, from the shift cylinder pin (Fig. 5-107). Use a 9/16 inch wrench. Pry the pin free of the shift cylinder piston end clevis.

19. Pull the shift cylinder to the left until free. Lift the shift cylinder upward and free of the vehicle chassis.

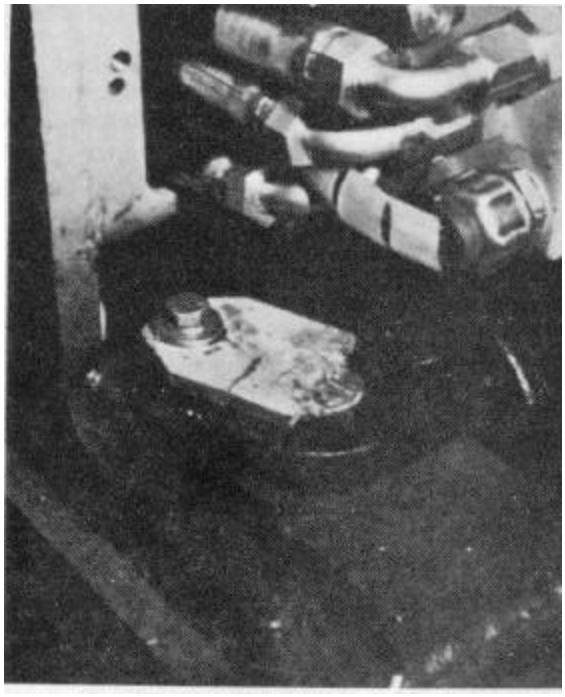


Figure 5-107

Assemble the pivot/sideshift assembly by reversing the procedure outlined above (Steps 1 through 19).

NOTE

For steps 7 and 12 when assembling use Loctite Safety Solvent and Loctite Sealant 271-31 (red) No. 559.

SIDE SHIFT CHAIN ADJUSTMENT

1. Pivot mast out 90° to gain access to the chain retainer plates (Fig. 5-101).

2. Remove front chain retainer plate using a 5/16" allen wrench (Fig. 5-101).

3. Slightly loosen the rear retainer plate bolts with a 3/4" wrench. Do not remove this plate(Fig. 5-101).

4. Loosen the jam nut on the locking set screw with a 9/16" wrench on both the right hand and left hand side. Back out the locking set screws with a 3/16" allen wrench. Removal is not necessary(Fig. 5-102).

5. Chain adjustment is accomplished with a 1/4" drive ratchet wrench with a 5/16" socket and a 5116" hexagonal insert, one inch long. Adjust both chain ends evenly until snug (Fig. 5-103).

6. Tighten the locking set screw and secure in position with the jam nut tightened against the adjustment block. Hold the locking set screw in position with the 3/16" allen wrench (Fig. 5-102).

7. Tighten rear retainer plate bolts and install front retainer plate(Fig. 5-101).

8. Operate the side shift for several cycles and recheck chain tension. Adjust again if either chain becomes slack.

SIDE SHIFT THRUST ROLLER ADJUSTMENT

Looseness of crosshead and telescoping members may be caused by worn side thrust bearings or loss of original adjustment. Pg. 4-33 shows the roller and side thrust bearing assembly.

The roller assembly is typical at two places at the front of the telescoping assembly and two places at the rear of the crosshead. The following procedure describes the proper adjustment of the four side thrust bearings.

1. Pivot the mast ninety degrees clockwise; i.e. side loading position. This allows the pivot interlock to permit unrestricted shift.

2. Shift the front end assembly fully to the left. The access hole for the adjusting screw on the left front roller of the telescoping assembly is now visible. It is inside the front roller support plate, beneath the leaf chain.

Fig. 5-108 shows a set screw wrench inserted.

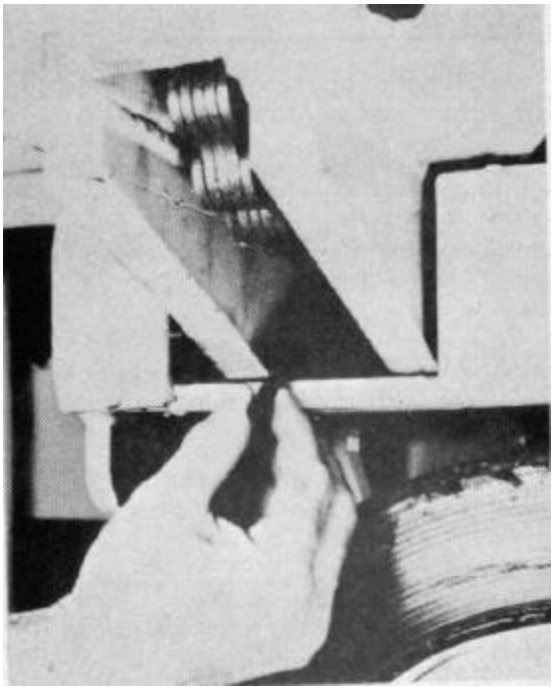


Figure 5-108

3. Use a 1/4 inch Allen wrench to turn the adjusting screw clockwise until the thrust button is seated firmly against the opposing channel. Back the screw outward one-eighth turn.

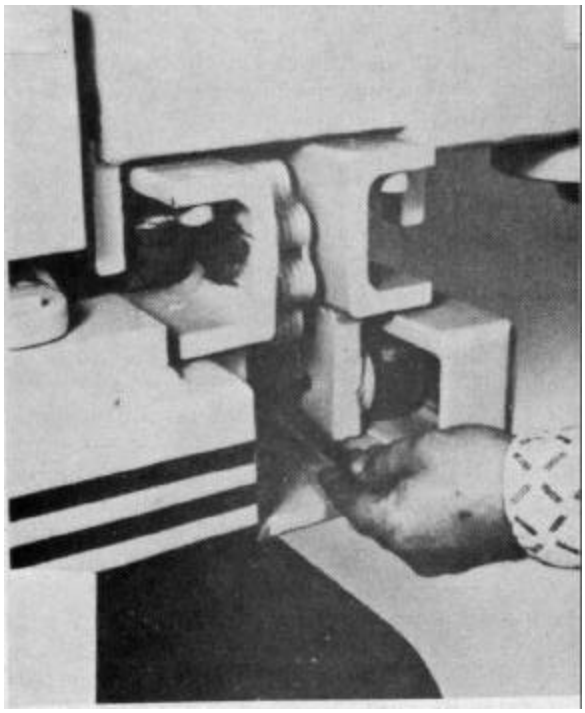


Figure 5-109

NOTE:
The adjusting screws have a nylon locking inset to prevent loosening after adjustment. While adjusting the side thrust buttons determine if sufficient drag remains to maintain the screw in position. Replace adjusting screw if questionable.

4. Shift the front end assembly fully to the right. The access hole for the adjusting screw on the right front roller of the telescoping assembly is now visible. It is inside the front roller support plate, beneath the leaf chain. Fig. 5-109 shows a set screw wrench inserted.

5. Use a 1/4 inch Allen wrench to turn the adjusting screw clockwise until the thrust button is seated firmly against the opposing channel. Back the screw outward one-eighth turn.

6. Shift the front end assembly from left to right and back for several cycles to determine if the telescoping assembly moves without drag or binding. Any evidence of binding requires one or both adjusting screws to be further retracted until a smooth shift action is obtained.

7. Shift the front end assembly fully to the left. The access hole for the adjusting screw on the left rear crosshead roller is now visible. It is found in front of the hydraulic shift cylinder rod clevis, above the telescoping assembly cylinder rod ear. Fig. 5-110 shows a set screw wrench inserted.

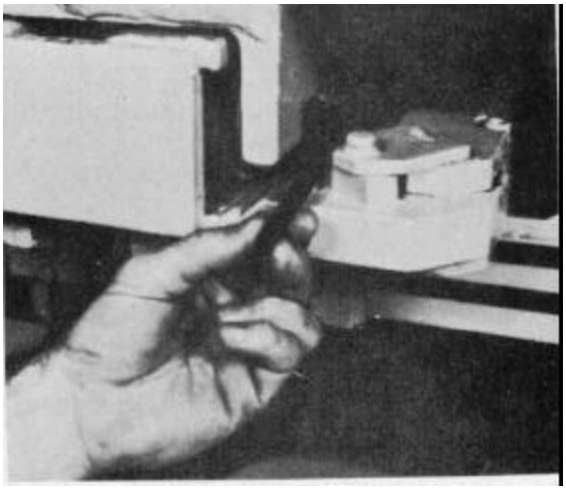


Figure 5-110

8. Use a 1/4 inch Allen wrench to turn the adjusting screw clockwise until the thrust button is seated firmly against the telescoping assembly. Back the screw outward one-eighth turn.

9. Shift the front end assembly fully to the right. The access hole for the adjusting screw on the right rear crosshead roller is now visible. It is found in front of the hydraulic shift cylinder chassis connection. Fig. 5-111 shows a set screw wrench near the hole.

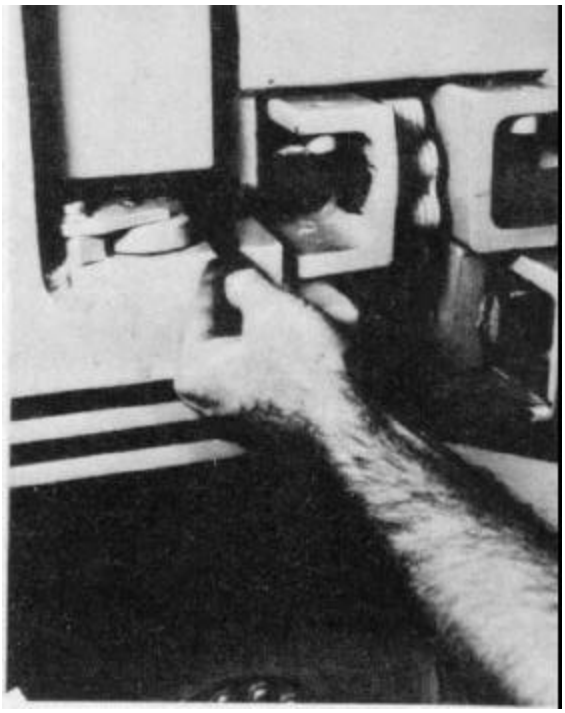


Figure 5-111

10. Use a 1/4 inch Allen wrench to turn the adjusting screw clockwise until the thrust button is seated firmly against the telescoping assembly. Back this screw outward one-eighth turn.

11. Shift the front end assembly from left to right and back for several cycles to determine if the crosshead moves without drag or binding on the telescoping assembly. Any evidence of binding requires one or both adjusting screws to be further retracted until smooth shift action is obtained.

12. Lubricate the telescoping assembly and fixed channels on the vehicle frame.

PIVOT SHAFT ASSEMBLY

1. Install both upper and lower bearing cups in the crosshead weldment (Fig. 5-113).

2. Securely tie down the crosshead weldment (with "C" clamps) to a horizontal work bench so that the center line of the pivot shaft when installed will be parallel to the top surface of the work bench (Fig. 5-112).

3. With overhead crane lower pivot arm into crosshead socket so that pivot shaft opening is in line with shaft opening in crosshead (Fig. 5-112).

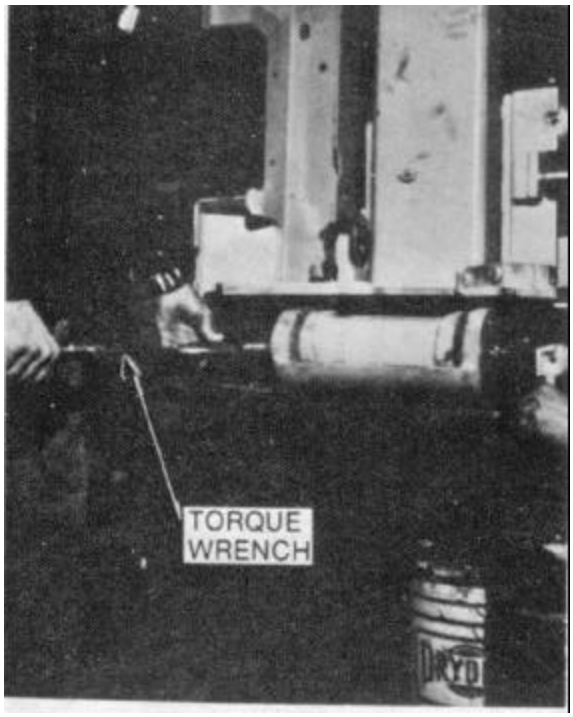


Figure 5-112

4. Install pivot shaft through openings, upper bearing cone (packed with MIL-G-10924 grease and upper bearing locking nut (Fig. 5-113). Hand tighten bearing locking nut.

5. Install lower bearing cone (packed with MIL-G 10924 grease), and lower bearing locking nut. Run in bearing locking nut only part way making sure that cone is not seated into cup (Fig. 5-113).

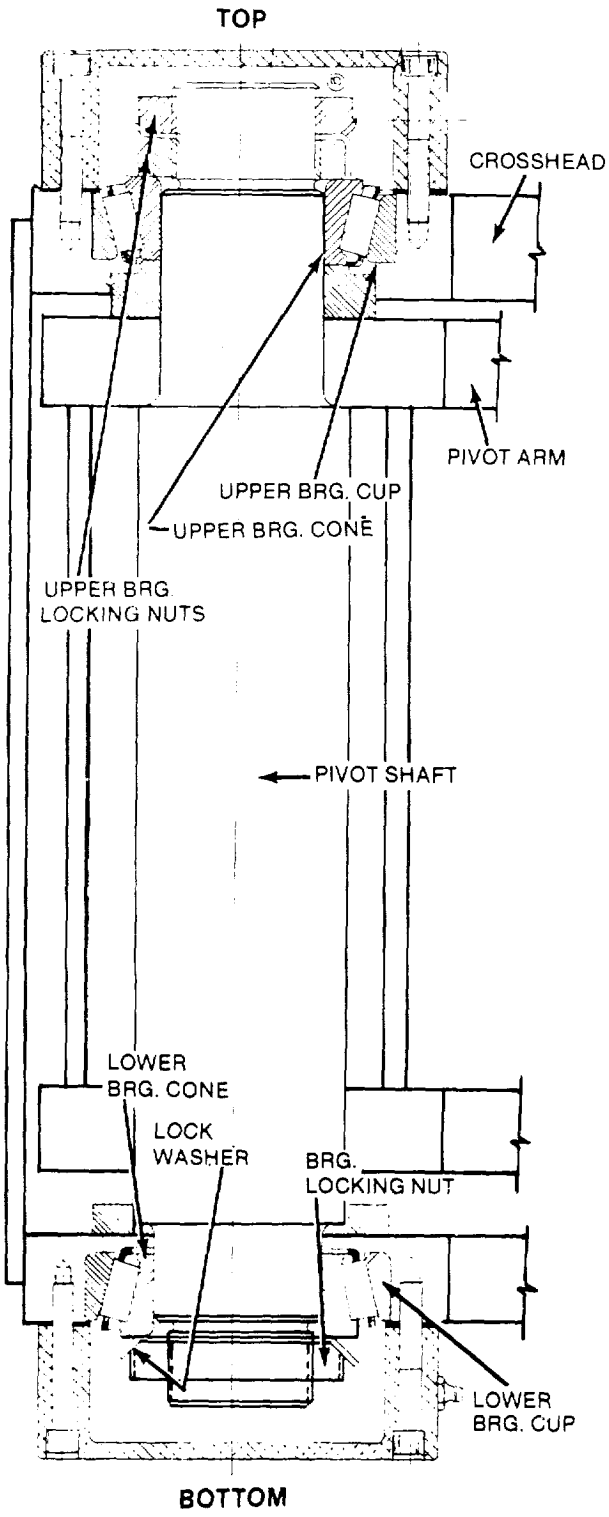


Figure 5-113

6. Holding bottom end of pivot shaft with a spanner wrench. tighten upper bearing nut to a torque of 90 foot pounds plus or minus 5 foot pounds (Fig. 5-112).

7. Install upper lockwasher and second upper bearing nut. Tighten to a torque of 15 foot pounds plus or minus 2 foot pounds (Fig. 5-112).

8. Holding top end of pivot shaft with a spanner wrench, and as oscillating bearing, tighten lower bearing locking nut to a torque of 185 foot pounds plus or minus 9 foot pounds.

9. Pack both upper and lower dust covers with MIL-G 10924C grease.

10. Install dust covers with grease fittings pointing towards rear of truck. Apply Loctite safety solvent and Loctite sealant 271-31 (red) No. 559 to mounting hardware.

NOTE

For disassembly of the pivot shaft assembly reverse the outlined procedure, steps 1 through 10 above, after securing the assembly as outlined in step 2.

PIVOT ARM RACKING ADJUSTMENT

1. Adjust pivot arm closed position by lengthening or shortening closed length of pivot cylinder so that the pivot arm meets the crosshead stop as the pivot cylinder bottoms.

2. Loosen the clevis locking screw with a 5/16! allen wrench.

3. Adjust the pivot cylinder rod with a 1-1!8" open end wrench (C.W. to shorten C.C.W. to lengthen) until the cylinder stroke bottoms out as the pivot arm meets the crosshead stop(Fig. 5-114 and Fig. 5-115).

Figure 5-114

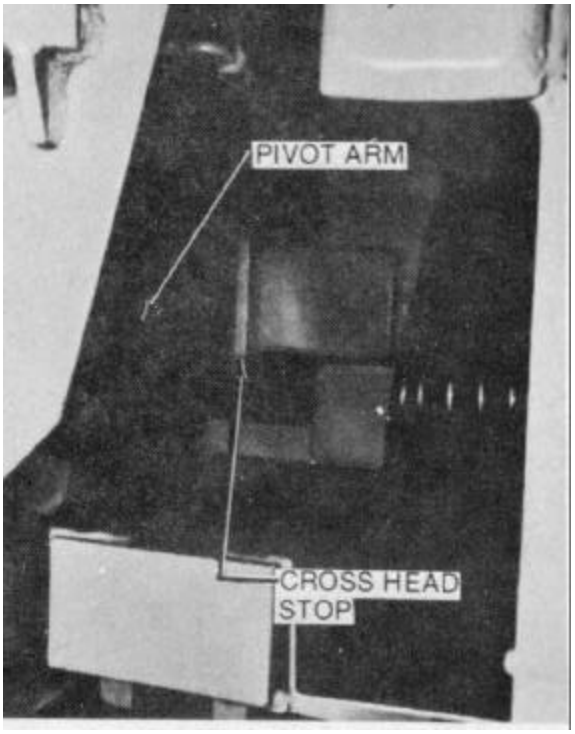


Figure 5-115

HYDRAULIC PUMP-MOTOR ASSEMBLY

REMOVAL PUMP & MOTOR ASSEMBLY

WARNING

Drain the hydraulic reservoir (Page 5-50) and disconnect the battery connector before attempting removal of the pump & motor assembly.

1. Remove the suction line hose from the hydraulic pump suction fitting by loosening the hose clamp. Fig. 5-116.

Figure 5-116

2. Remove the two pressure lines from the pump outlet fitting (Fig. 5-116).

3. Remove the two power cables from the pump motor terminals.

4. Back off the two nuts at the base of the pump motor mounting bracket. Back off a minimum of three turns (Fig. 5-117).

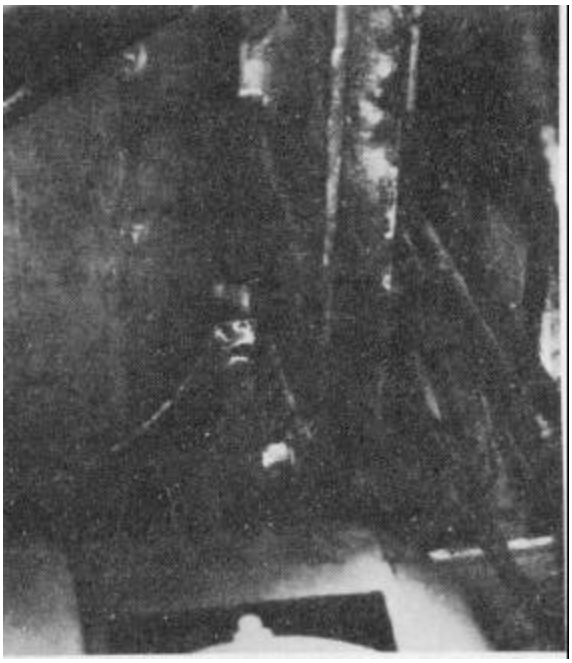


Figure 5-117

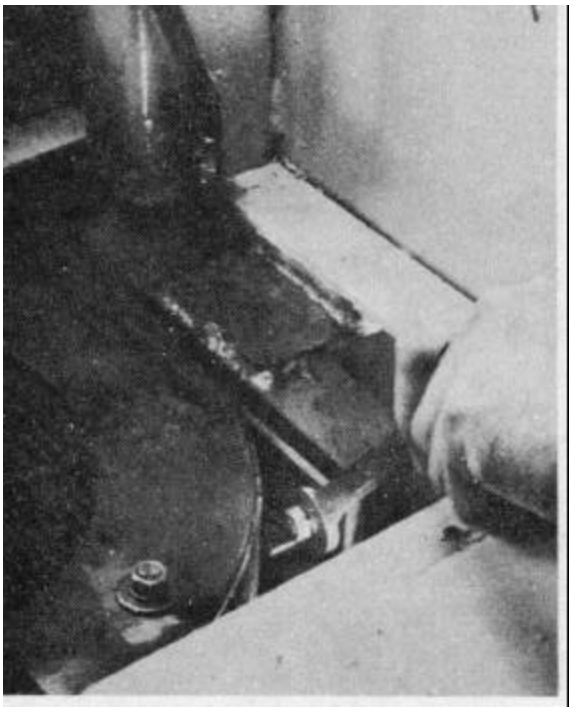


Figure 5-118

5. Attach a sling by means of an overhead crane to the pump motor assembly. Then remove the two nuts at the upper end of the pump motor mounting brackets (Fig. 5-118).

6. Allow the pump motor assembly to fall slightly forward until the pump motor bracket is free of the studs at the upper end of the pump motor mounting bracket.

7. Raise the pump motor assembly slowly out of the truck chassis. Install pump motor assembly by reversing the procedure outlined above.

PUMP MOTOR BRUSH REPLACEMENT

1. Pull mounting pin from seat assembly and remove seat. Pg. 4-7.

2. Remove pump motor cover screen - (4) 1/4-20 screws.

3. Remove center louvered cover - (4) 1/4-20 screws.

4. Open L.H. door of truck.

5. Loosen brush cover screw and slide cover off of mounting pins. Brush rigging is now exposed (Fig. 5-119).

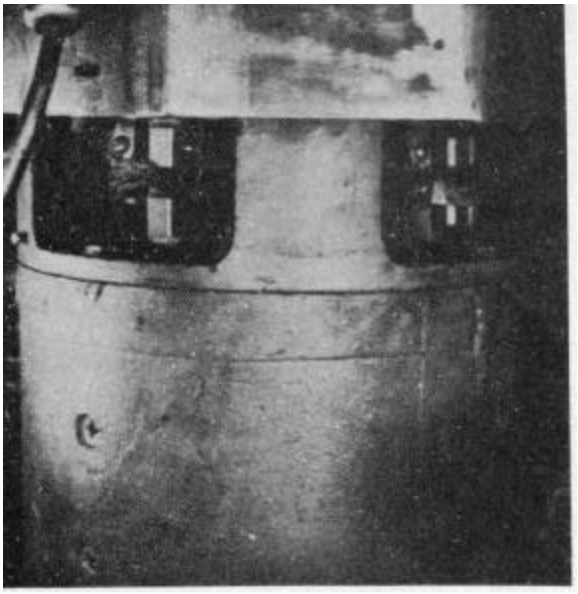


Figure 5-119

6. The (4) L.H. brush holder clips are removed with the fingers (Fig. 5-120).

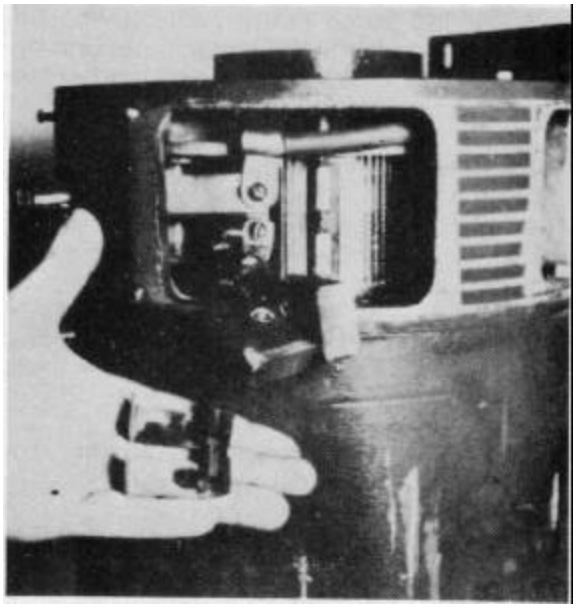


Figure 5-120

7. Remove brush wires and inspect brushes. If they are worn to within 3/8 inch of the lead inset counter-bore Fig. 5-122, they should be replaced. Determine by past experience if there is sufficient brush life remaining to last through the next inspection period. Replace if required (Fig. 5-121 and Fig. 5-122).

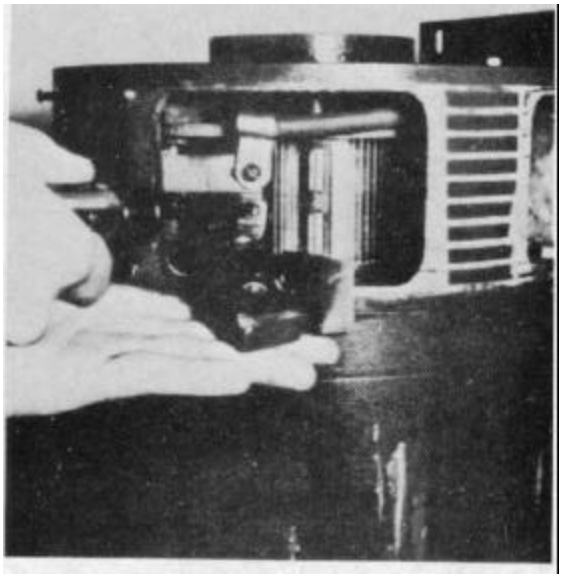


Figure 5-121

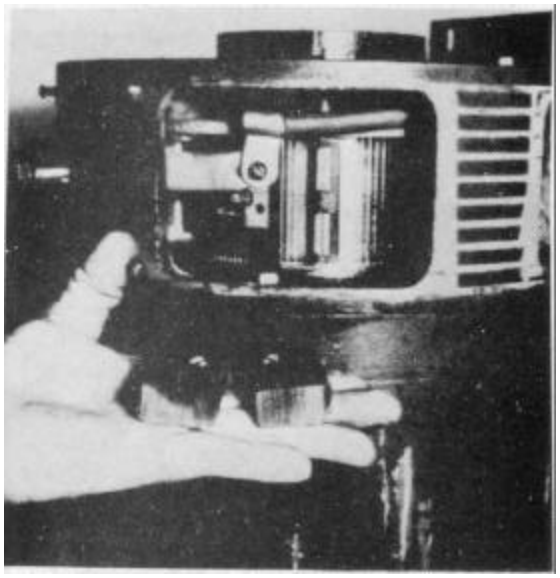


Figure 5-122

8. Inspect the commutator for excessive wear, cracks, or burning. Inspect the mica bar to bar insulation. When the 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 free and clean of dirt (Fig. 5-123).

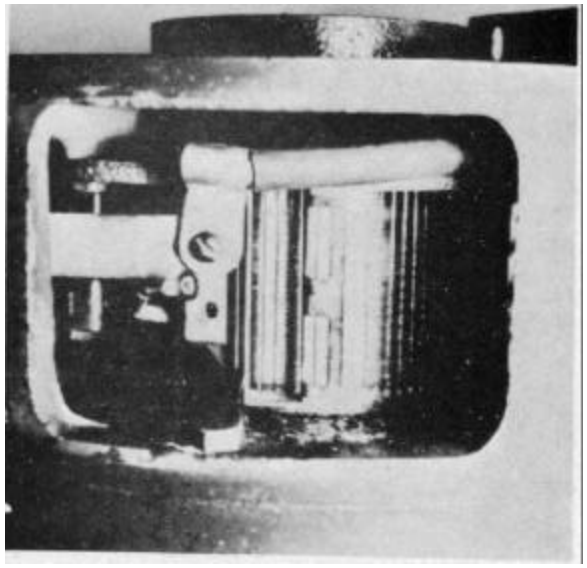


Figure 5-123

9. Open R.H. door of truck.

10. Open brush access door located on the electrical panel (Fig. 5-124).

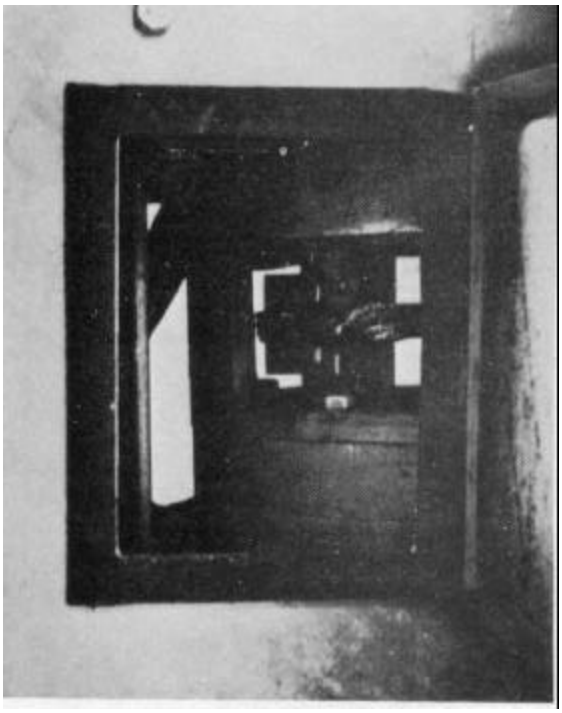


Figure 5-124

11. The (4) R.H. brush holder clips are removed with fingers (Fig. 5-120).

12. Remove brush wires and inspect brushes for cracks and wear. Replace if required (Fig. 5-121 and Fig. 5-122).

13. Operate motor and observe brush seating and contact with the motor commutator.

NOTE

If brushes show indication of arcing, seat brushes using a brush seater and commutator cleaner (Ideal Ind. Inc., Sycamore, Ill.) or equivalent.

WARNING

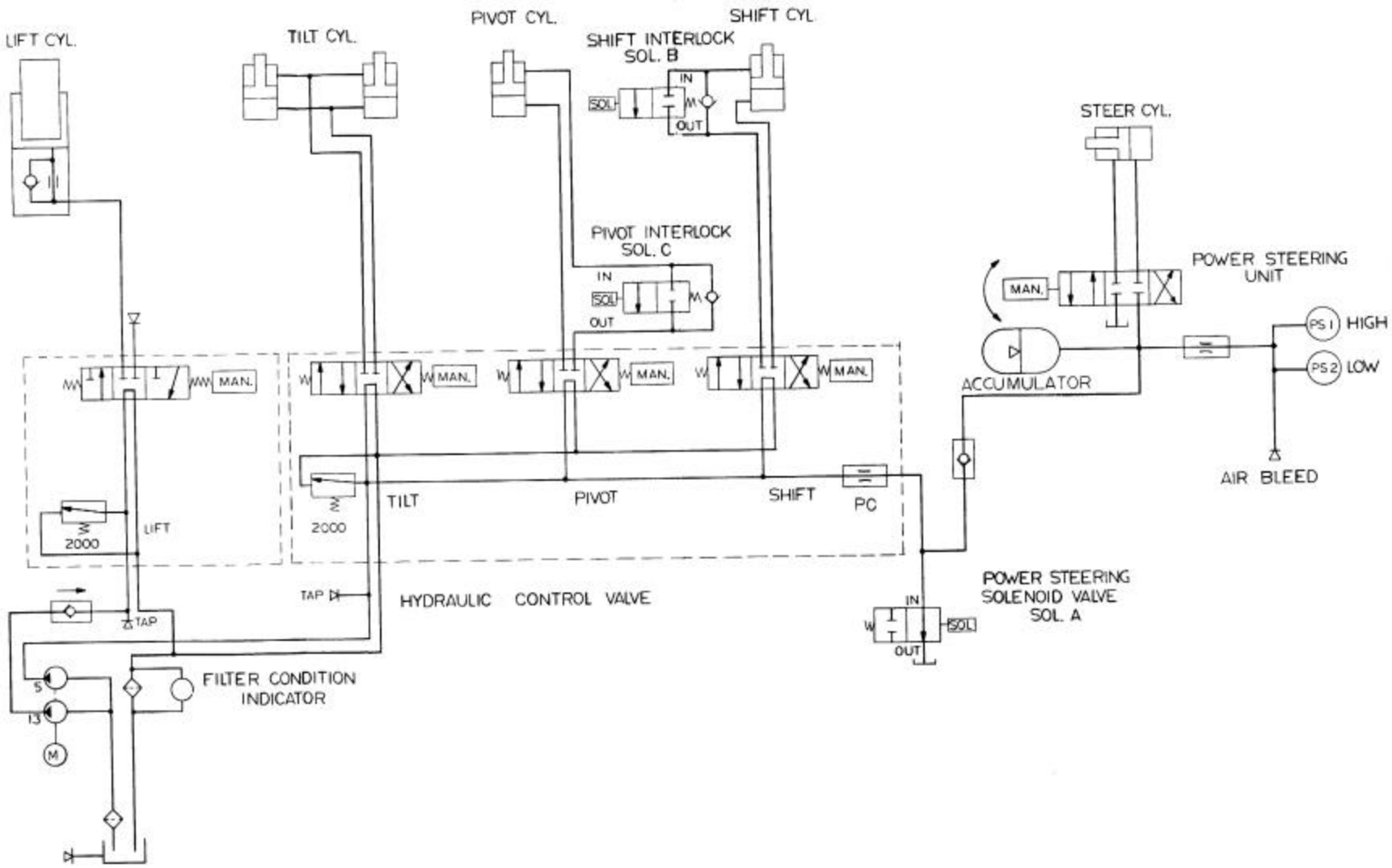
Use of a dust mask is recommended.

To Seat Brush With motor running, press down hard on the brush and apply the brush seater at heel of brush. Friction of the revolving commutator or ring releases the brush seater material and carries it under the brush.

To Clean Commutator With motor running, hold the cleaner against the commutator (pressing lightly) and slowly move it back and forth across the face of the commutator.

Air blow commutator end to remove dust generated by seating and cleaning operations.

14. Reassemble brush cover and access cover on truck.



HYDRAULIC SCHEMATIC
FIGURE 5-125

HYDRAULIC DOOR MODULE REMOVAL

WARNING

Before attempting work on Hydraulic Door Module disconnect battery connector and relieve power steer accumulator hydraulic pressure (Ref. step I below).

If a system malfunction is diagnosed on the hydraulic door module and a new or rebuilt module is available, replace as follows:

1. Turn off key switch and turn hand steering wheel clockwise and counterclockwise repeatedly until it becomes difficult to turn. The hydraulic accumulator will now be at zero PSI hydraulic oil pressure.

2. Disconnect hydraulic hoses (Fig. 5-126, Fig. 5-127).

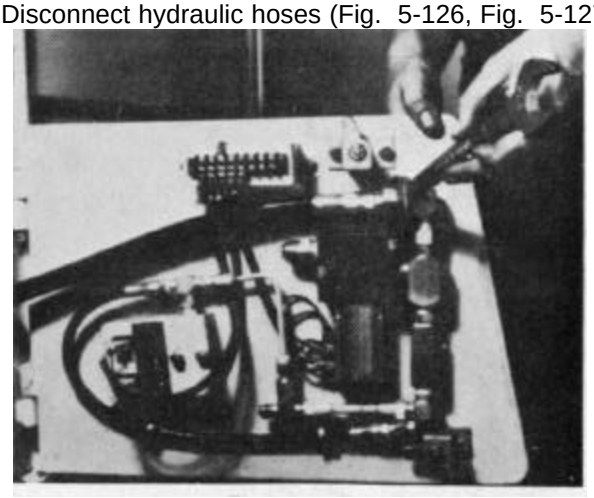


Figure 5-126

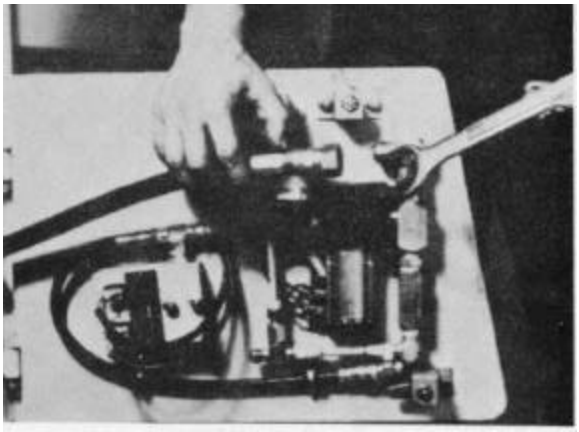


Figure 5-127

3. Disconnect quick disconnect electrical control circuit cable (Fig. 5-128).

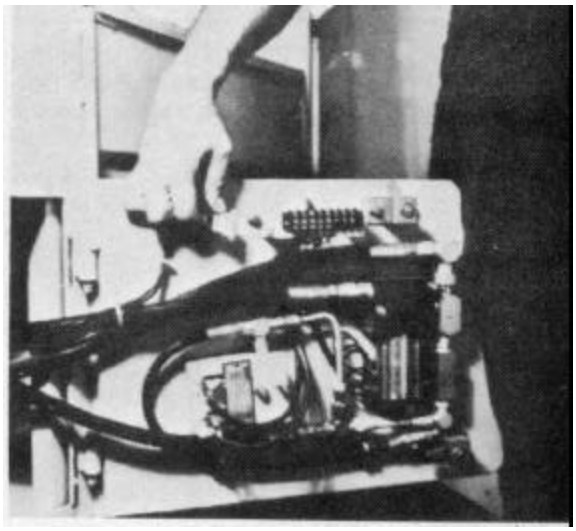


Figure 5-128

4. With hydraulic door module open to approximately 80 degrees, lift module out of hinge sockets (Fig. 5-129).

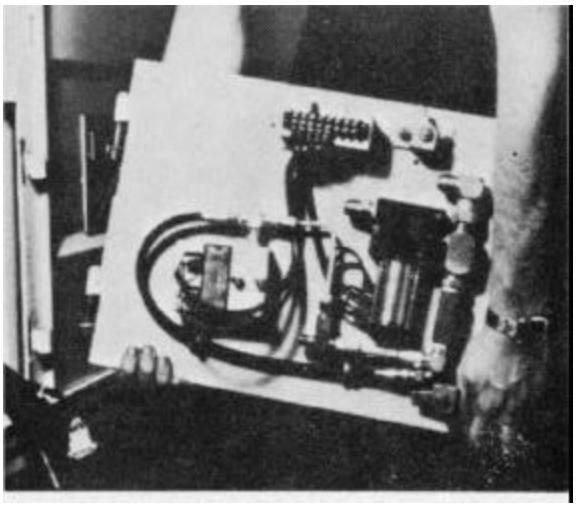


Figure 5-129

5. Replace new module reversing steps (2) through (4) above.

Return faulty module to maintenance shop for trouble shooting and repair.

HYDRAULIC OIL RESERVOIR SUCTION FILTER REMOVAL

NOTE
The hydraulic suction filter is located inside the reservoir.

1. Drain the hydraulic oil from the reservoir by removing the drain plug located at the bottom of the tank using a 3/8 inch allen wrench (Fig. 5-130).

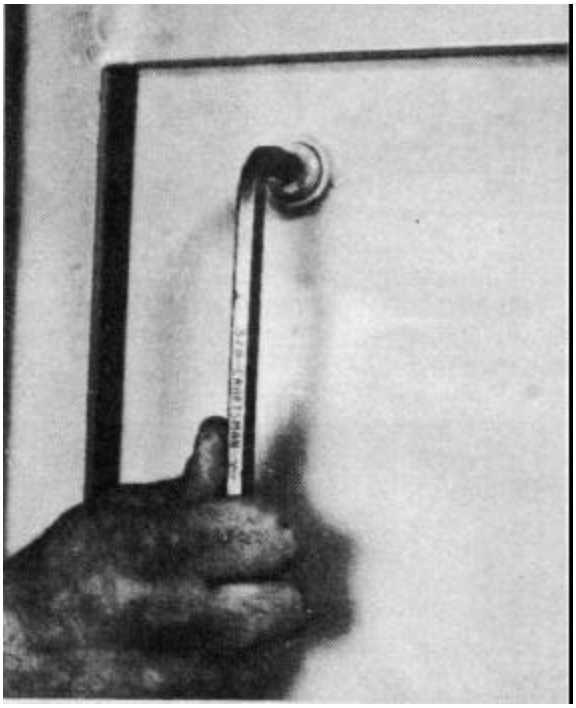


Figure 5-130

Make sure truck is level so reservoir will completely drain.

2. Lift the right side of the truck 12 inches off the floor and position blocks under the frame. This provides access to the suction hose and outlet elbow.

3. Remove the suction hose clamp from the outlet elbow (Fig. 5-131).

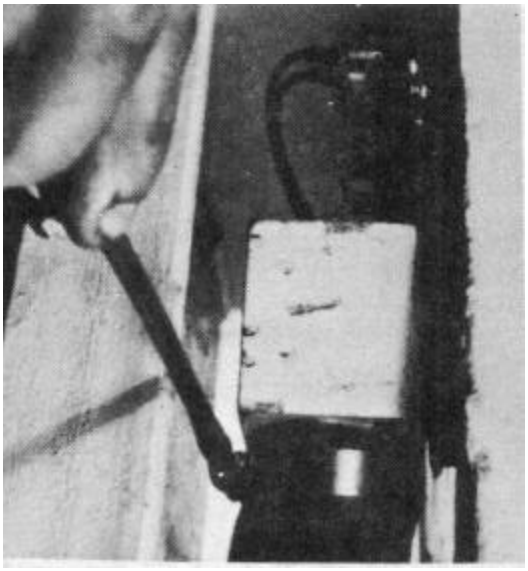


Figure 5-131

4. The suction hose may be removed from the end of the outlet elbow by rotating the body of the elbow with a 2-1/2 inch open end wrench or an adjustable offset pipe wrench (Fig. 5-132). Continue to rotate the outlet elbow, removing it from the suction baffle.

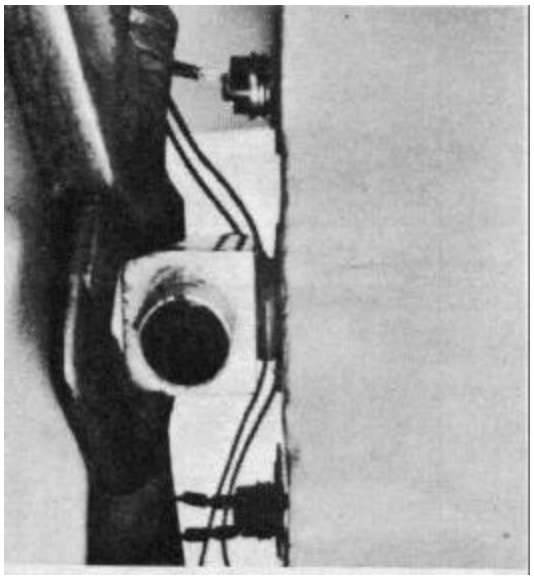


Figure 5-132

5. Remove (6) 1/4-20 x 1/2" long screws from the suction baffle using a 7/16 inch socket wrench (Fig. 5-133).

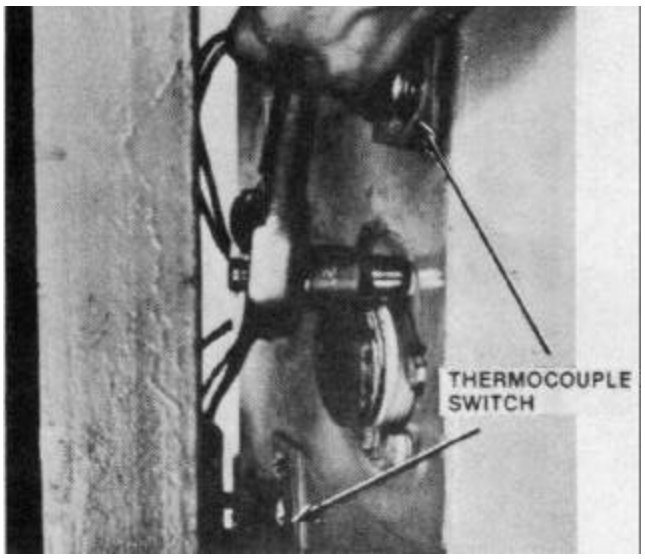


Figure 5-133

6. Raise the hinged door to expose the top of the reservoir(Pg. 4-2, item 6).

7. Loosen the (2) mounting screws from the pivot and shift hydraulic solenoid valves using a 7/16 inch wrench. The two solenoid valves are located under the floor of the electrical compartment and are partially visible (Fig. 5-134). A full view of the pivot and shift hydraulic solenoid valves is shown in figure 5-135 for reference purposes. The valves may remain attached to the associated hydraulic lines.

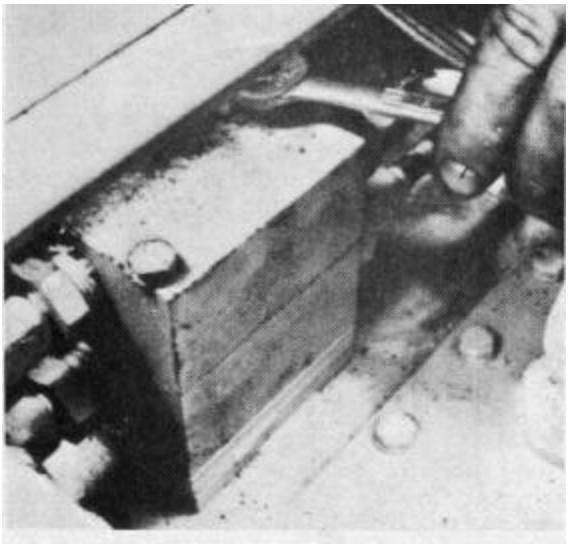


Figure 5-134

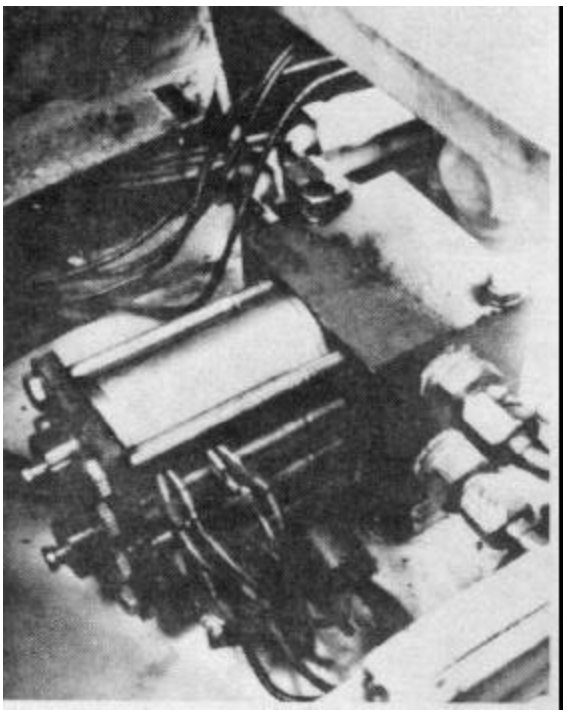


Figure 5-135

8. Remove the (2) 3/8-16 bolts from the lift line manifold using a 9/16 inch socket wrench. Hydraulic lines may remain attached to the manifold (Fig. 5-136).

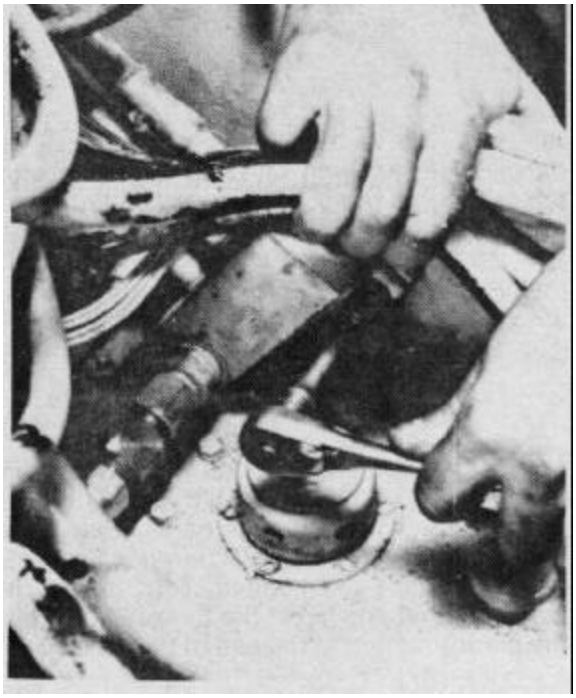


Figure 5-136

9. Remove (18) 1/4-20 x 5/8" long mounting bolts from the access cover using a 7116" socket wrench and a 7/16" box wrench (Fig. 5-137).

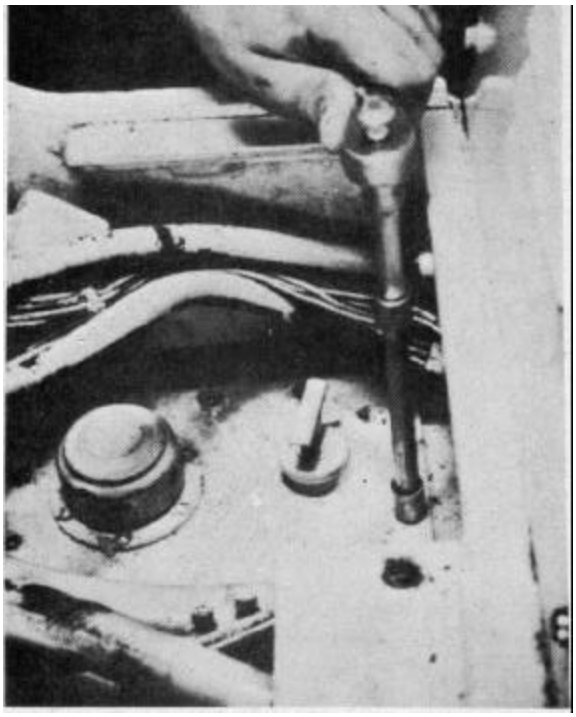


Figure 5-137

10. Hold the access cover open with one hand while reaching into the reservoir with the other. Pull the baffle forward and rotate it so that the suction filter is uncovered. The suction filter may be removed by turning it counterclockwise with only one hand. Withdraw the suction filter only from the reservoir (Fig. 5-138). Replace with a new filter element.

11. Insert the new suction filter into the reservoir (Fig. 5-138). Hand tighten as hard as possible the filter inside the baffle. (Reference Pg. 4-85). Check "O" ring (Reference Pg. 4-83, item 8) replace if damaged. Turn the baffle assembly over and insert the threaded end into the mounting ring at the end of the reservoir.

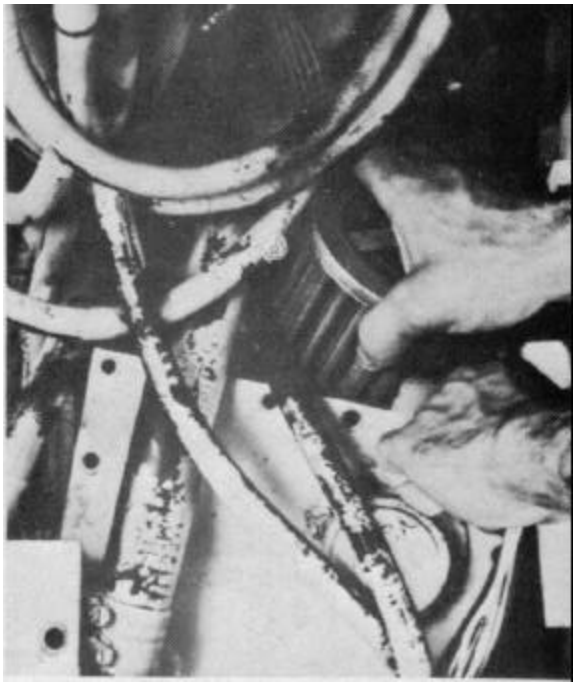


Figure 5-138

12. Install the (6) mounting screws (Fig. 5-133).

13. Install the outlet elbow and suction hose (Fig. 5-131 and 5-132). Use of teflon sealing tape is recommended for the baffle threads.

14. Install the drain plug (Fig. 5-130). Lower the vehicle to the floor.

15. Attach the access cover by installing the (18) bolts (Fig. 5-137, step 9).

16. Install the lift line manifold (Fig. 5-136).

17. Attach the pivot and shift hydraulic solenoid valves (Fig. 5-134 and 5-135).

18. Remove the breather cap and refill the reservoir with clean hydraulic oil. Reference Pg. 2-8 lubrication chart. Refill to full mark on dip stick (Fig. 5-139).

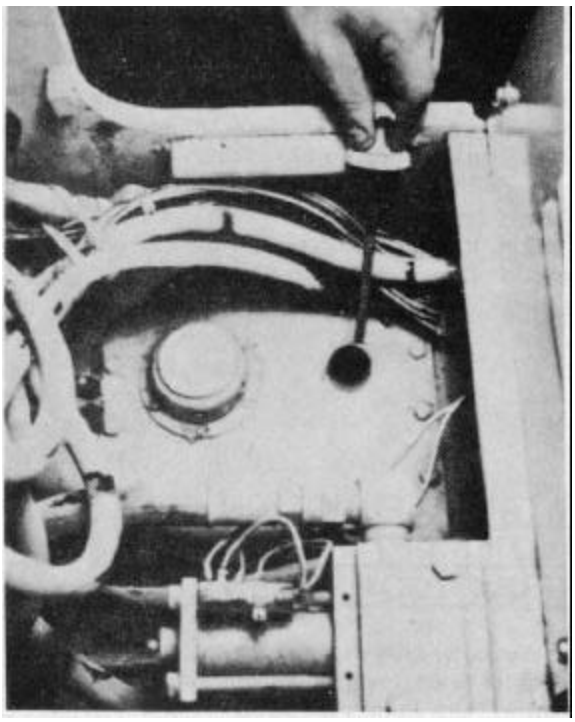


Figure 5-139

Figure 5-140

19. Operate the vehicle hydraulic functions to warm the hydraulic oil. Check the suction hose, inlet elbow, and baffle connections for leakage. Recheck the hydraulic oil level.

RETURN LINE FILTER REPLACEMENT

1. Remove the vertical cover at the right, front of the operator's compartment. The return line filter is now exposed for servicing (Pg. 4-2, view 4).

2. Unscrew the filter element housing. Turn the housing counterclockwise using a 1-1/2 inch open end wrench on the hexagonal boss at the end of the housing (Pg. 4-77).

3. Lower the housing to expose the filter element and remove it from the vehicle (Fig. 5-140). Examine the inside of housing for foreign material.

4. Remove the used filter element by grasping it at the end and pulling it downward and off the support tube (Fig. 5-141).

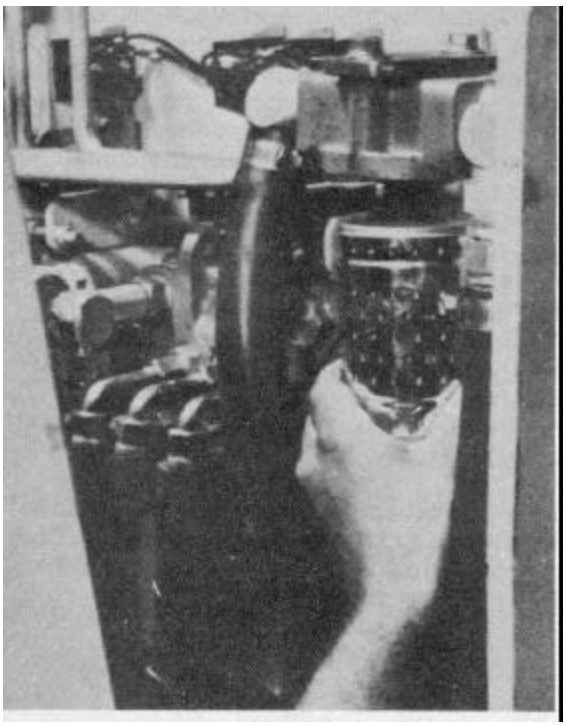


Figure 5-141

5. Take replacement filter element from the sealed container. Coat filter element seal and support tube with hydraulic oil. Push filter element onto the support tube.

6. Lubricate the housing seal and threads with white lithium grease.

7. Place the housing over the filter element.

Push it up and into the base. Rotate clockwise to engage the threads. Tighten to 9 ft. lbs. maximum torque.

8. Operate hydraulic system and inspect for leaks.

9. Replace front covers.

PIVOT/SHIFT INTERLOCKS

General Description

Mechanical, hydraulic and electrical components are combined providing a safety interlock system which prevents the truck operator from positioning his load into an unsafe condition. The system provides increased vehicle capacity and utility while maintaining vehicle stability and operator safety.

The mechanical components are: the pivot interlock switch actuating cam; and the shift interlock switch actuating cam.

The hydraulic components are: the pivot circuit shut-off hydraulic solenoid valve (Sol. C); and the shift circuit shut-off hydraulic solenoid valve (Sol. B).

The electrical components are: the pivot interlock switch; and the shift interlock switch. Both solenoid C (pivot) and solenoid B (shift) have electrically energized coils.

The simplified block diagram (Fig. 5-142) shows the relationship of the electrical and hydraulic components forming the pivot/shift interlock system.

The first section provides positional data, such as pivot arm rotation and lateral position of the mast/side shift assembly.

The second section, when signaled by the first section, limits the travel of the pivot and shift functions.

DETAILED FUNCTION OF PIVOT/SHIFT INTERLOCK CIRCUIT COMPONENTS

The pivot switch is mechanically cammed open when the mast assembly is in the front loading position. The switch will remain cammed open up to 15 degrees of clockwise mast rotation.

The pivot switch actuating cam is located at the rod end clevis of the pivot cylinder which rotates along with the pivot arm. The pivot switch is mounted to the uppermost plate of the side shift crosshead and remains stationary (Fig. 5-147, Fig. 5-148).

Closing of the pivot switch (15 to 90 degrees clockwise mast rotation) actuates the pivot hydraulic solenoid valve and also the shift hydraulic solenoid valve which permits full left shift.

The action of the pivot hydraulic solenoid valve, Sol.C, when de-energized, is to close off hydraulic flow to the pivot cylinder, restricting counterclockwise rotation of the mast assembly (between 15 degrees and 0 degrees). Valve design permits reverse hydraulic flow under any condition so that pivoting clockwise, to a side carry position, is always possible.

The shift switch is mechanically cammed closed from full right shift and up to seventeen inches of left shift. Beyond the shift cam, the interlock switch opens.

MAINTENANCE SECTION

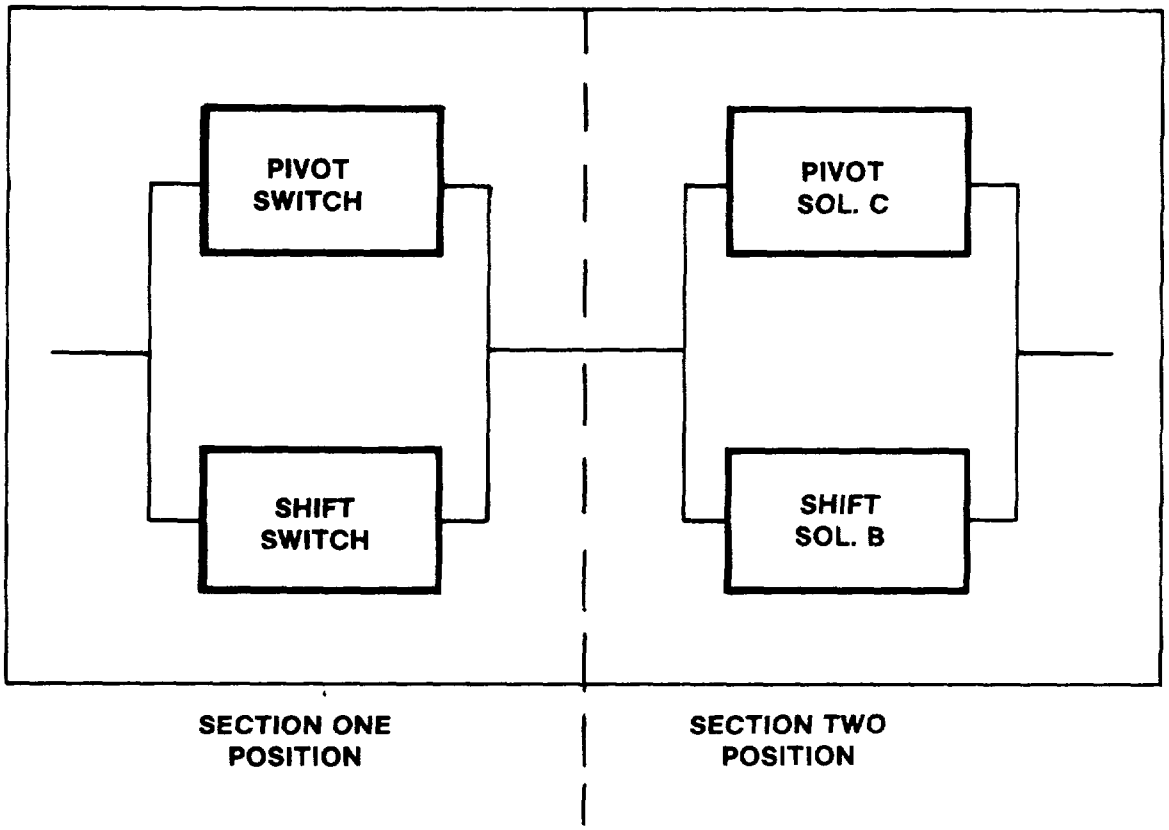


Figure 5-142

The shift switch actuating cam is affixed to the outer side of the lower crosshead tail guide channel, and is stationary. The shift interlock switch is mounted to the right rear of the side shift crosshead and travels with the crosshead assembly (Fig. 5-145, Fig. 5-146).

Opening of the shift interlock switch deenergizes the shift solenoid, Sol. B, and the pivot solenoid, Sol. C. The left shift function will stop just after the switch leaves the cam, providing the mast is in the 0 to 15 degree pivot zone.

The action of the shift hydraulic solenoid valve, Sol. B, when not energized is to close off hydraulic flow to the shift cylinder so that mast shift to the left is restricted to 17 inches. Valve design permits reverse hydraulic flow under any condition so that shift travel to the right is always possible.

PIVOT/SHIFT INTERLOCK SWITCH ADJUSTMENTS

Proper operation of the pivot/shift interlock system is essential for safe operation of this vehicle. Do not begin any maintenance or repair of these interlocks until the operating characteristics and checkout procedure are understood. Refer to the operating section of this manual for operational and checkout instructions.

NOTES

Figure 5-145

SHIFT INTERLOCK LIMIT SWITCH

The shift interlock limit switch is located at the right, rear of the side shift crosshead below the tail guide channels. It is attached by a bracket to the crosshead weldment (Fig. 5-145). This position allows the switch roller lever arm to contact the raised cam bar. The cam bar is permanently attached to the underside of the bottom tail guide channel.

Beginning at the extreme right shift position and up to 17 inches of left shift travel, the cam must hold the interlock switch roller lever arm in a downward position.

NOTE

Check the shift interlock for functional operation using the following procedure:

NOTES

1. Raise the empty mast assembly 12 inches from the floor in the front carry position. Shift the front end to the extreme left side of the vehicle. This will clear the switch lever from the cam bar.

2. Grasp the switch lever and rotate downward. Listen for a "click" as the arm is rotated and then released, indicating satisfactory mechanical operation (Fig. 5-145).

3. Examine the lever arm for straightness. Replace if bent. Determine if the roller turns freely. Lubricate roller with a 10 grade oil. Examine the two number 10-32 NF mounting screws that attach the switch base to the mounting bracket; tighten if required.

4. Attach a volt-ohm-meter to terminals 50 and 9. These terminals are on terminal strips found inside the electrical junction box on the crosshead assembly (Pg. 4-30). Set the voltohm-meter to a convenient resistance range.

The meter should show an open circuit when the roller lever arm is normally extended. Shift the front end to the right until the cam bar activates the roller lever arm. The meter should indicate that the switch circuit: has closed.

5. Actuation of the switch may be adjusted in two ways.

The first method is by adjusting the angular position of the roller lever arm. Use a 9/62 allen wrench to loosen the clamp screw at the base of the arm. Rotate the arm to the desired position and tighten the clamp screw. Centering of the roller with the cam bar may be done at this time. Check switch operation as described in step 4. Fig. 5-146 shows the adjustment of the roller lever arm.

The second method for adjustment will permit forward and rearward movement of the complete interlock switch assembly. Loosen the two number 10-32 NF mounting screws that attach the switch base to the crosshead mounting bracket. Horizontal slots in the bracket permit longitudinal adjustment. Position the switch to the desired location and tighten mounting screws. Check switch operation as described in step 4.

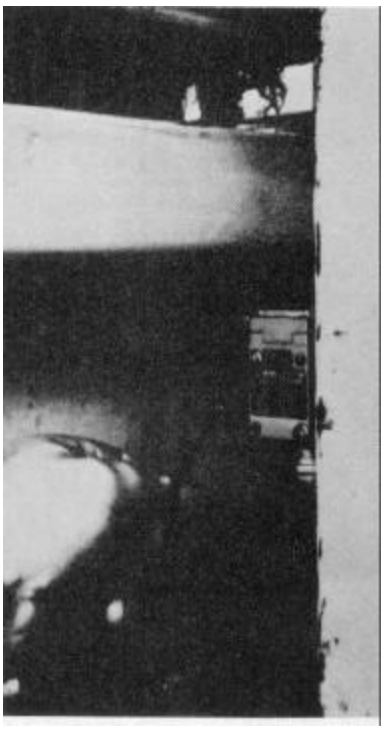


Figure 5-146

PIVOT INTERLOCK LIMIT SWITCH

The pivot interlock limit switch is located on the crosshead top plate behind the mast pivot joint assembly (Fig. 5-147). It is mounted within a protective housing, attached to the crosshead, in a position allowing the switch plunger to contact a rotating cam at the rod end clevis pin of the pivot cylinder. The rotating cam is bolted to the pivot cylinder rod end clevis so the extension of the cylinder to pivot the mast will also rotate the cam.

With the mast assembly in the front loading position, the pivot switch is open. Pivoting the mast beyond 15 degrees clockwise rotation and up to full 90 degree rotation closes the interlock switch. Check the pivot interlock for functional operation using the following procedure:

1. Raise the empty mast assembly approximately 12 inches from the floor. Position the side shift assembly to the left side of the vehicle.

Pivot the mast assembly to the full clockwise position. This will clear the cam from the pivot interlock switch roller plunger(Fig. 5-147).

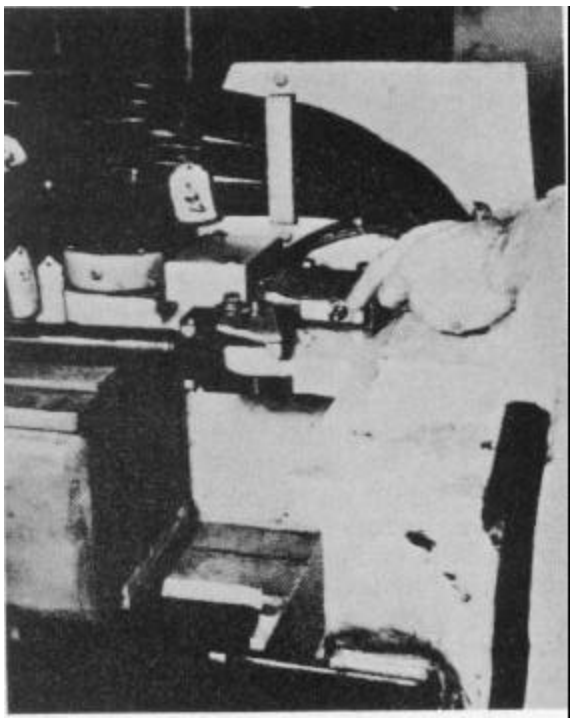


Figure 5-147

2. Depress the plunger and listen for a "click" which will be audible when the plunger is released. Do not use excessive force to depress the plunger. If sticking occurs, lubricate the plunger with 10 grade oil.

3. Examine the two number 6-32 NC mounting screws that attach the switch base to the mounting bracket; tighten if required. Figure 5-147 shows the location of the pivot interlock limit switch and the plunger being checked.

4. Attach a volt-ohm-meter to terminals 50 and 9. These terminals are on terminal strips found inside the electrical junction box on the crosshead assembly (Pg. 4-30). Set the voltohm-meter to a convenient resistance range.

The meter should register continuity with the switch plunger extended. Pivot the mast assembly counterclockwise until the rotating cam activates the interlock switch plunger. The meter should indicate that the switch circuit has opened.

5. Actuation of the switch may be adjusted in two ways.

The first method is by adjusting the angular position of the rotating cam. Use a 9/16 wrench to loosen the clamp screw (Fig 5-148). Take the tip of the cam and rotate it either clockwise or counterclockwise to obtain 15 degree maximum pivot of the pivot arm when the switch circuit closes. Tighten clamp screws and check operation as described in step 4.

The second method for adjustment will permit inward and outward movement of the complete interlock switch assembly. Loosen the two 3/8-16 NC cap screws that attach the housing to the crosshead using a 9/16 wrench. (Fig. 5-148). Slots are provided in this housing for longitudinal adjustment. Position the switch to the required location and tighten. Check switch operation as described in step 4.

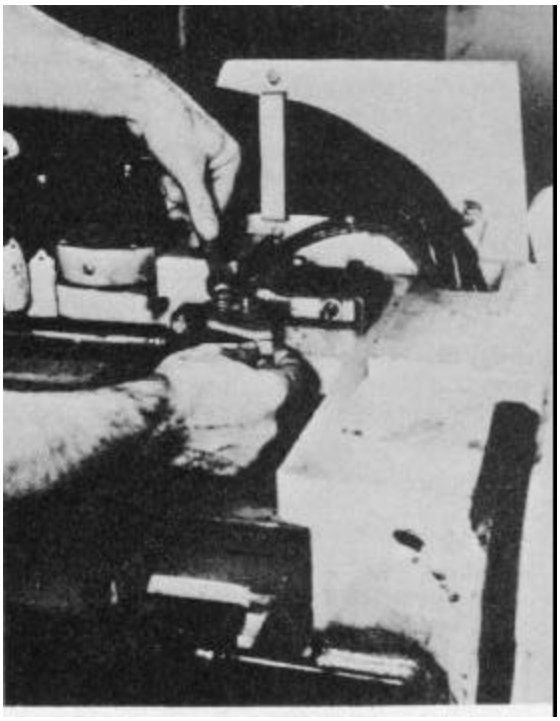


Figure 5-148

POWER STEER SYSTEM

WARNING.

Familiarize yourself with the operation of the power steer system as described in the Operating section (Pgs. 1-6, 1-7) before servicing the system.

Checking/Adjusting Nitrogen Precharge

1. With the key switch OFF, depressurize the accumulator by turning the steering wheel back and forth until it becomes difficult to turn.

2. Connect a standard nitrogen regulator and pressure gauge assembly to the accumulator gas valve stem using a suitable adaptor hose. The regulator must be fitted to a dry nitrogen cylinder.

3. Check accumulator gas pressure. It should be 800-850 psi. Adjust, if necessary, with the regulator. When the charge is correct, close the valve on the nitrogen cylinder.

Checking Steering System Oil Pressure

1. With the pressure gauge/regulator assembly attached to the accumulator, turn the key switch ON to build up hydraulic pressure.

2. Check that the high pressure switch is operating by noting that the hydraulic pump is turned off at 1850 psi.

3. Watch the pressure gauge after the pump has stopped. If pressure decreases rapidly, some component in the system is leaking. If it does not, depressurize the accumulator by turning the steering wheel back and forth. Watch the pressure gauge to ensure the low pressure switch starts the pump at about 900950 psi.

4. Disconnect the hose from the accumulator. Carefully check the gas valve for leaks with soapy water or oil. If the valve core is leaking, reseat it by depressing and releasing it quickly several times. If leakage continues, tighten core or replace it. A special high pressure core (Part No. 25574) must be used.

5. Replace the valve cap and tighten it one-half turn beyond hand tight. Replace the valve guard.

Gas Precharge-New Accumulator

NOTE

The following applies only to accumulators not previously precharged.

1. Remove the gas valve guard and cap from the accumulator. Depress the plunger of the gas valve core to release all gas.

2. Use a wooden dowel or the like to push the metal bladder protector away from the fluid port of the accumulator and add one pint of hydraulic fluid to lubricate the bladder and provide a fluid cushion. Do not use a sharp object to do this. Take care not to puncture the bladder.

3. After the oil has been poured in, ensure that the metal protector is centered in the fluid port.

4. Connect a dry nitrogen bottle with a regulator and pressure gauge to the accumulator using a suitable adapter hose assembly.

5. Slowly adjust the regulator on the nitrogen bottle to a pressure of 800-850 psi. Close the valve on the nitrogen bottle and disconnect the hose from the accumulator.

6. Test the gas valve for leakage with soapy water or oil.

ACCUMULATOR CHECK AND CHARGE KIT

With the optional Drexel Accumulator Check and Charge Kit, use the following procedures.

The kit, when used properly, provides for thorough checkout of the power steer system accumulator gas and hydraulic systems (Fig. 5-155).

It Is also used in the gas charging operation.

System Check Out

Before attaching the accumulator maintenance kit to the vehicle accumulator, make sure the hydraulic system is completely discharged. Discharge the hydraulic system by sitting in the operator's seat with the key switch in the "OFF" position and operating the hand steering wheel both clockwise and counterclockwise until it becomes difficult to turn. The hydraulic system is now completely discharged and the hydraulic pressure will be at zero psi.

Figure 5-155

The maintenance kit contains a pressure gauge, needle shut off valve, and two hose assemblies. One hose is equipped with a coupling and gland which will interface with the valving of a dry nitrogen bottle. This hose assembly is approximately six feet long. The second hose is equipped with a bleeder valve, air chuck, and swivel nut which is compatible with the gas valve assembly of the accumulator. This hose is approximately two feet long (Fig. 5-156).

Checkout Procedure Hook Up

1. Remove the accumulator gas valve guard and valve nut (Pg. 4-76, items 8 and 9).

2. Take the short hose which is equipped with the air chuck and make sure that the bar handle on the air chuck is turned completely counterclockwise. Turn the bleeder valve hand stem completely clockwise (Fig. 5-156, Fig. 5-157).

3. Turn the shut off valve on the kit fully clockwise to its "OFF" position (Fig. 5-156, Fig. 5-157).

4. Install the air chuck to the accumulator gas valve by means of the swivel nut, making sure that the nut is hard finger tight.

Figure 5-156

Checking Nitrogen Precharge

1. Turn the bar handle on the air chuck completely clockwise (Fig. 5-156, Fig. 5-157).

2. Read the gas pressure on the pressure gauge. If the pressure gauge reads between 800 and 850 psi, your accumulator is properly precharged (Fig. 5-156, Fig. 5-157).

Checking Steering System Oil Pressure (with kit still attached)

1. Sitting on the operator's seat, turn the key switch to the "ON" position. The hydraulic pump motor should operate and the pressure on the gauge should rise to a pressure somewhere between 1,850 and 1,875 psi and the pump motor should turn off. This indicates that the system high pressure switch is operating correctly.

2. To recheck the high pressure system, operate the truck's hand steering wheel in a clockwise and counterclockwise direction. While the wheel is being turned, notice the gas pressure on the pressure gauge falling. When the gauge falls to between 925 and 950 psi the pump motor unit should start. Stop the turning of the hand steering wheel and notice the pressure on the gauge rising. The system should turn off when the pressure rises to a reading between 1,850 and 1,875 psi.

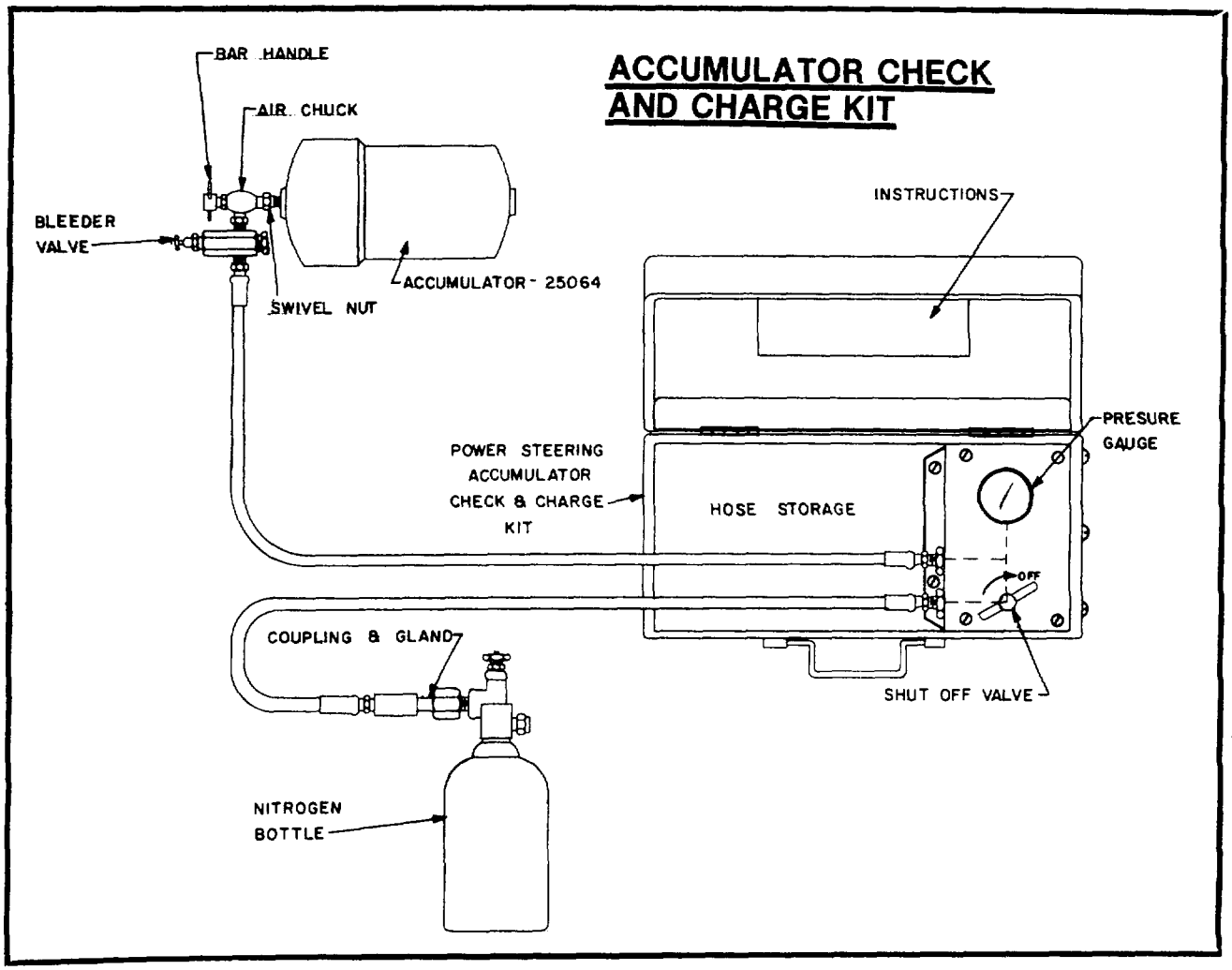


Figure 5-157

DRY NITROGEN BOTTLE MUST BE EQUIPPED WITH A PRESSURE REGULATING VALVE ASS'Y! (Nitrogen Bottle and Pressure Regulating Valve Not Supplied With Kit).

3. If the system checks out per steps 1 and 2 above its operation is normal. Disconnect the accumulator check and charge kit as follows:

A. Turn the bar handle on the air chuck valve completely counterclockwise.

B. Turn the bleeder valve stem counterclockwise and you will hear gas escaping. When the pressure on the gauge reaches zero psi, you may disconnect the air chuck from the accumulator by means of the swivel nut.

C. Return the hose into the kit container.

Accumulator Gas Charge Adjustment

If after hooking up the kit to the gas accumulator, as described in checkout procedure hook up, you find that the gas pressure recorded in step 2 of "Checking Nitrogen Pressure" was below 800 psi, the accumulator gas charge must be adjusted. With the kit attached to the gas accumulator proceed as follows:

1. Taking the six foot long hose stored in the kit which is equipped with a coupling and gland nut, attach it to a dry nitrogen bottle. The dry nitrogen bottle must be equipped with a pressure regulating valve (Fig. 5-158).

2. Turn the shut off valve on the kit counterclockwise approximately three turns (Fig. 5-158).

3. Adjust the pressure regulating valve on the dry nitrogen bottle until the gas pressure on the kit pressure gauge reads approximately 875 psi (Fig. 5-158).

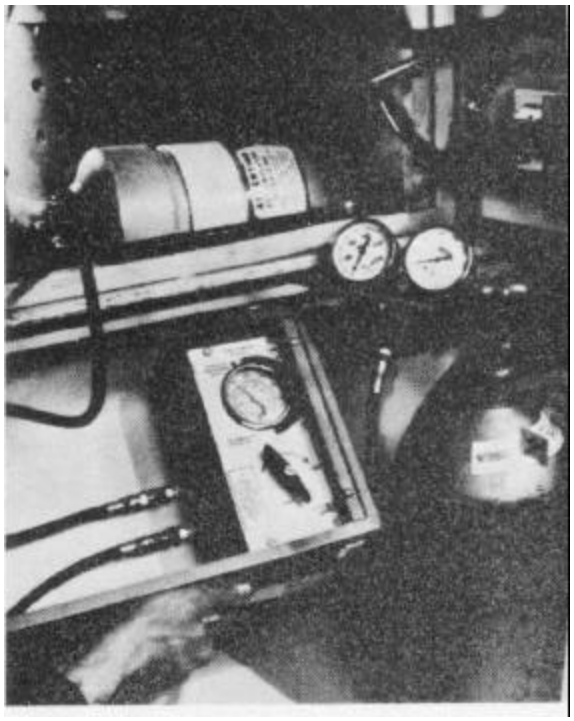


Figure 5-158

4. Turn the shut off valve on the kit clockwise to the "OFF" position.

5. Turn the pressure regulating valve on the dry nitrogen bottle to the "OFF" position.

While you loosen the gland nut on the coupling of the dry nitrogen bottle you will hear gas escaping. Do not remove the coupling and gland nut completely from the dry nitrogen bottle gauge system until the escaping gas has stopped.

6. After removing the coupling and gland from the dry nitrogen bottle, return the hose assembly to the kit (Fig. 5-155).

7. While watching the pressure gauge on the kit, reduce the pressure in the accumulator system by slowly turning the bleeder valve clockwise. When it reaches between 850 and 860 psi, turn the bleeder valve outward stopping the escaping gas.

8. Repeat the sequence of checks outlined above under "Checking Steering System Oil Pressures." If the system checks out and operation is normal disconnect the kit per steps 3 of "Checking Steering System Oil Pressure."

Gas Precharge New Accumulator

1. Install new accumulator in truck (Pg. 5--64) and hook up the accumulator check and charge kit per steps 1 through 4 of "Checkout Procedure Hook Up" and step 1 of "Accumulator Gas Charge Adjustment."

2. Follow steps 2 through 9 of 'Accumulator Gas Charge Adjustment."

ACCUMULATOR REPLACEMENT

WARNING

Discharge the accumulator hydraulic system by sitting in the operator's seat with the key switch in the "OFF" position and operating the hand steering wheel both clockwise and counterclockwise until it becomes difficult to turn. The hydraulic system is now completely discharged and the hydraulic pressure will be at zero psi. Disconnect battery connector (Pg. 5-33, Fig. 5-97).

1. Open hydraulic door module to expose accumulator(Fig. 5-159).

2. Remove two hydraulic hoses from tee fitting from hydraulic end of accumulator (Fig. 5-159).

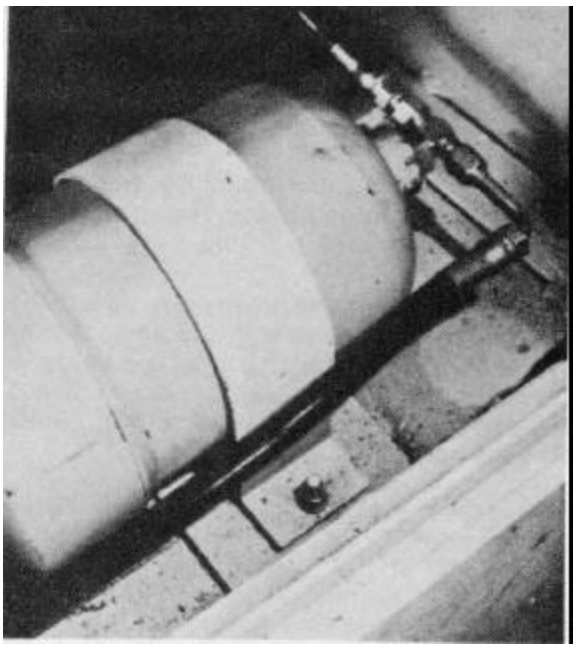


Figure 5-159

3. Remove two 3/8-16 nuts, flat washers, and lockwashers.

4. Remove hold down clamp and remove accumulator from truck.

5. Install new accumulator reversing steps 2 through 4 above.

6. Precharge accumulator gas pressure (Pg. 5-63, Gas Precharging New Accumulator).

ORBITROL UNIT REPLACEMENT

WARNING

Discharge hydraulic accumulator hydraulic pressure and disconnect battery.

NOTE

Remove console front cover and dash panel module assembly.

1. Disconnect (4) hydraulic lines from orbitrol unit (Fig. 5-160).

2. Remove (2) 3/8-16 hex head bolts attaching steer column orbitrol assembly to console mounting bracket (Fig. 5-160).

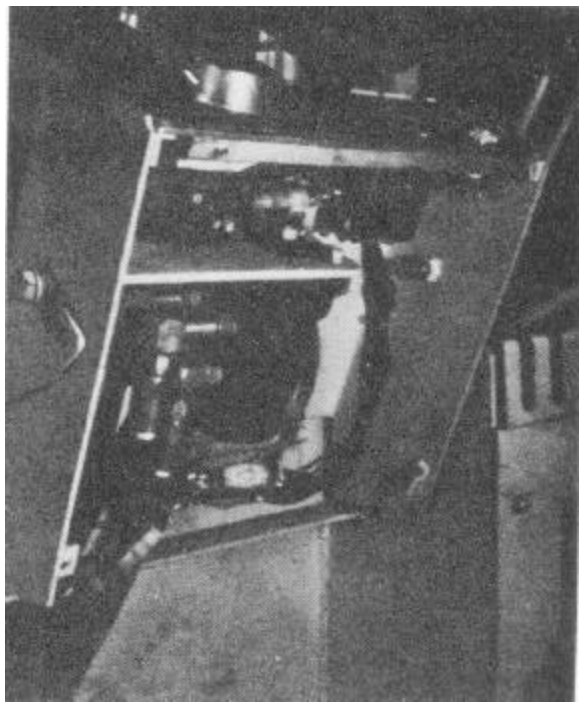


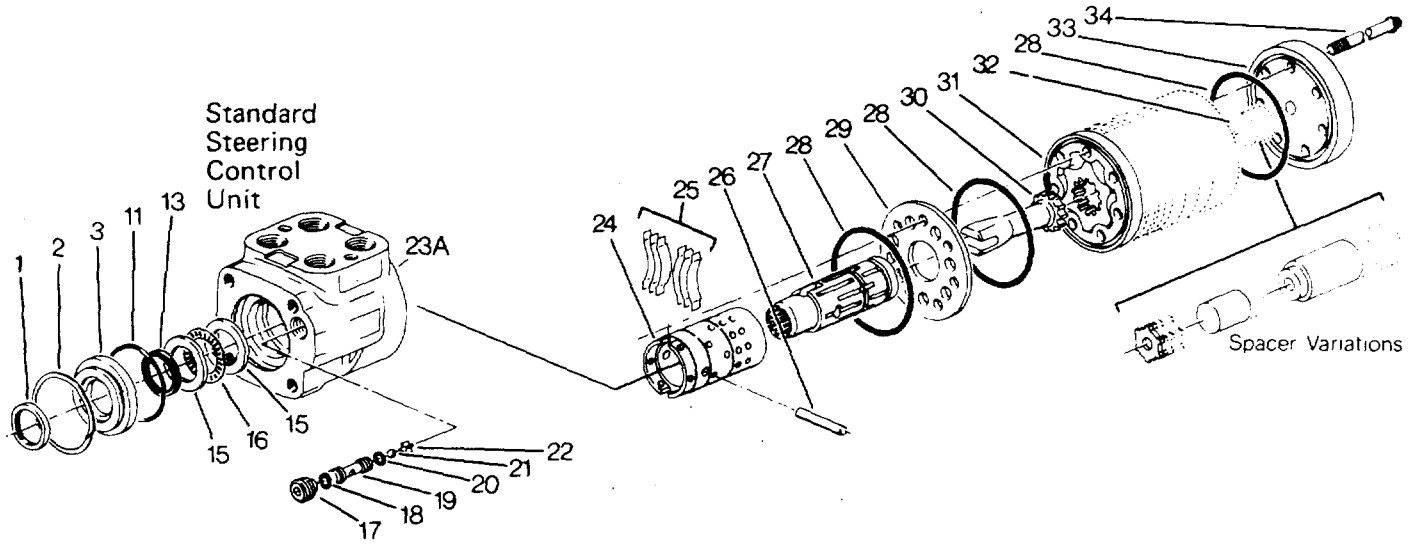
Figure 5-160

3. Lower steer column orbitrol assembly through console mounting bracket, exposing remaining (2) 3/8-16 hex head bolts attaching steer column to orbitrol unit (Pg. 4-46, item No. 2). Remove bolts, and orbitrol will fall free of steering column.

4. Remove (4) hydraulic fittings from orbitrol unit and install on replacement orbitrol unit.

5. Reverse steps 1 through 3 outlined above for installation of replacement orbitrol unit.

MAINTENANCE SECTION



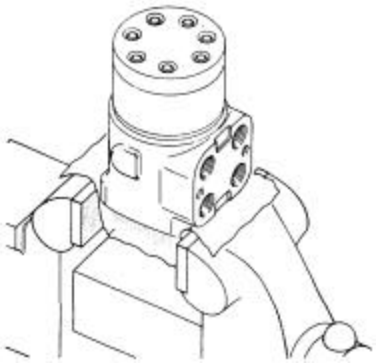
1. Oust Seat
2. Retaining Ring
3. Seal Gland Bushing
4. NOT USED
5. NOT USED
6. NOT USED
7. NOT USED
8. NOT USED
9. NOT USED
10. NOT USED
11. Seal, 2-1/8"OD
12. NOT USED
13. Quad Ring Seal
14. NOT USED
15. Bearing Race
16. Needle Thrust Bearing
17. Set Screw
18. Seal, 5/8" OD
19. Check Ball Seat
20. Seal, 7/16" OD
21. Check Ball
22. Check Ball Retainer
23A. Standard Housing
23B. ITEM DELETED
24. Control Sleeve
25. Centering Springs
26. Pin
27. Control Spool
28. Seal, 3" OD
29. Spacer Plate
30. Drive
31. Meter (Gerotor)
32. Spacer(s)
33. End Cap
34. Cap Screw

Disassembly

Cleanliness is extremely important when repairinq a steering control Unit. Work in a clean area. Before disconnecting tile lines, clean port area of unit thoroughly. Use a wire brush to remove foreign material and debris from around exterior joints of the unit.

Meter (Gerotor) End

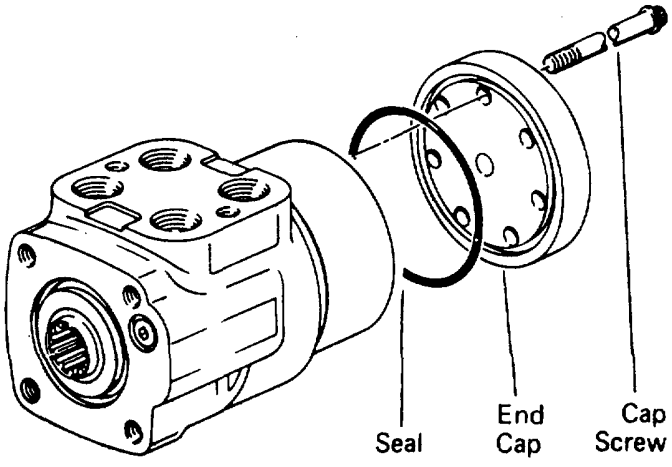
Figure 1



Although not all drawings show the unit in a vise, we recommend that you keep the unit in the vise during disassembly. Follow the clamping procedures explained throughout the manual.

1. Clamp unit in vise, meter end up. Clamp lightly on edges of mounting area, see Fig. 1. Use protective material on vise jaws. Do not overtighten jaws.

Figure 2



2. Remove 5/16" cap screws.

3. Remove end cap.

4. Remove seal from end cap.

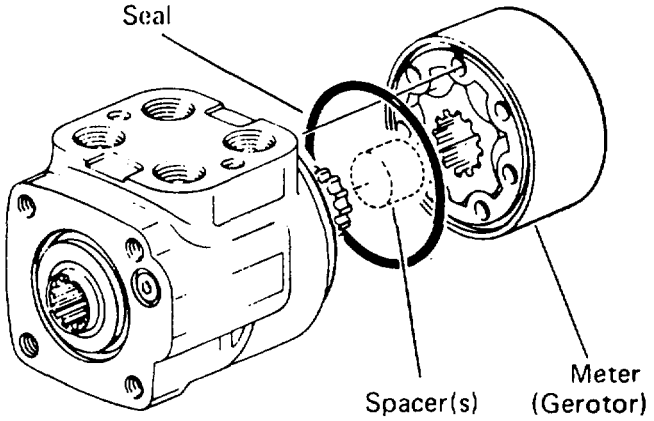


Figure 3

5. Remove meter. Be careful not to drop star.

6. Remove seal from meter.

7. Remove drive spacer(s) (not used on 4.5 cu. in displacement units).

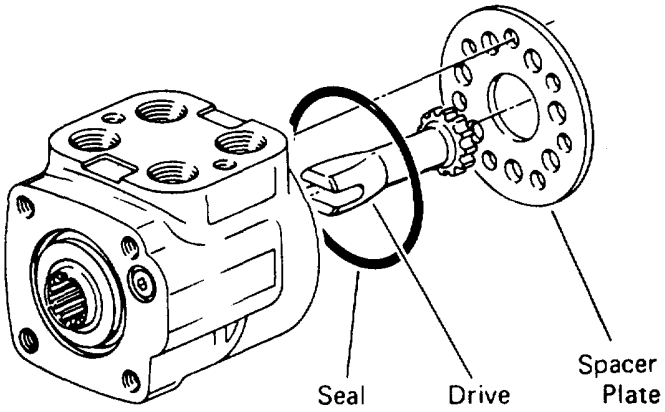


Figure 4

8. Remove drive.

9. Remove spacer plate.

10. Remove seal from housing.

Disassembly
Control End

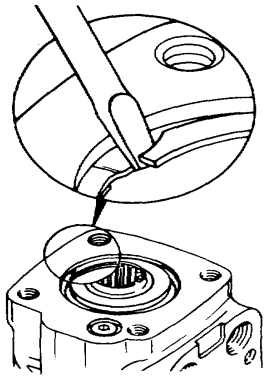
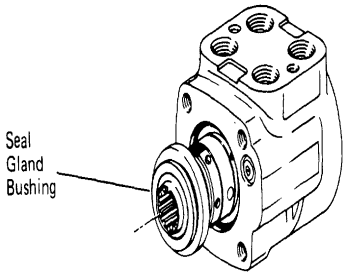


Figure 5

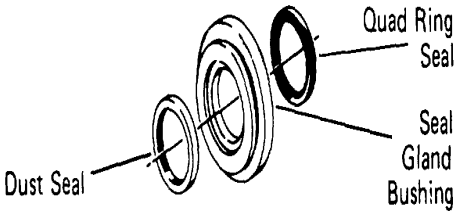
11. Remove housing from vise. Place housing on a clean soft cloth to protect surface finish. Use a thin bladed screwdriver to pry retaining ring from housing, as shown in Fig. 5.

Figure 6



12. Rotate spool and sleeve until pin is horizontal. Push spool and sleeve assembly forward with your thumbs just far enough to free gland bushing from housing, see Fig. 6. Remove bushing

Figure 7



13. Remove quad ring seal from seal gland bushing.

14 Use a thin bladed screwdriver to pry dust seal from seal gland bushing. Do not damage bushing.

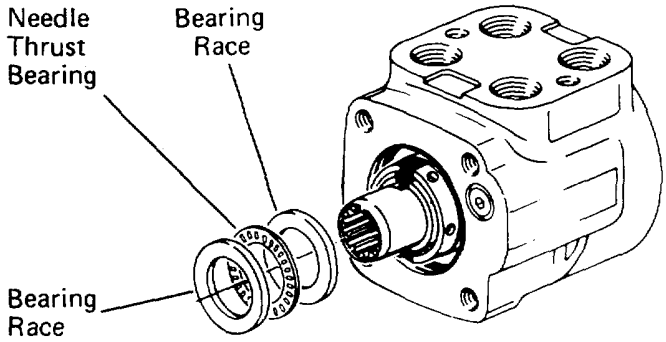


Figure 8

15. Remove 2 bearing races and the needle thrust bearing from spool and sleeve assembly.

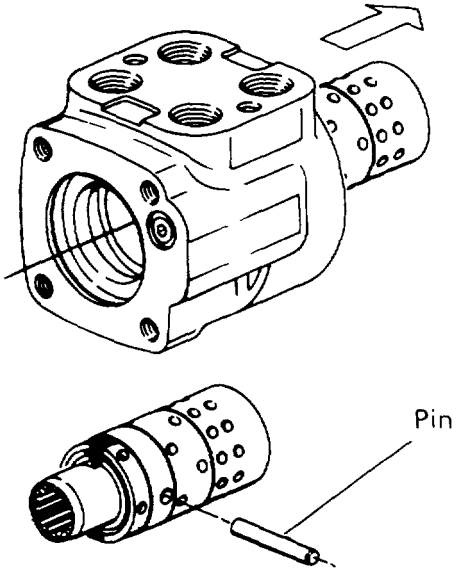


Figure 9

16. Remove spool and sleeve assembly from 14 hole end of housing, see Fig. 9.

Caution

Do not bind spool and sleeve in housing. Rotate spool and sleeve assembly slowly when removing from housing.

17. Push pin from spool and sleeve assembly.

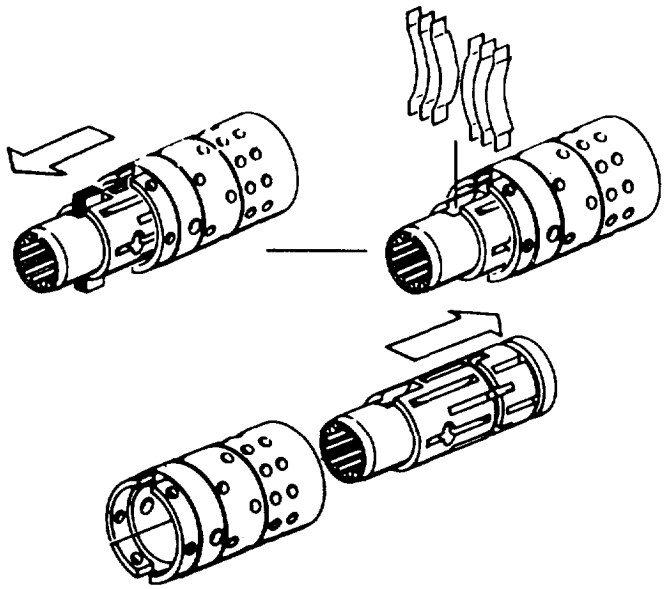


Figure 10

18. Push spool partially from control end of sleeve, then remove 6 centering springs from spool carefully by hand, see Fig. 10.

19. Push spool back through and out of sleeve, see Fig. 10. Rotate spool slowly when removing from sleeve.

20. Remove seal from housing, see Fig. 11.

Disassembly

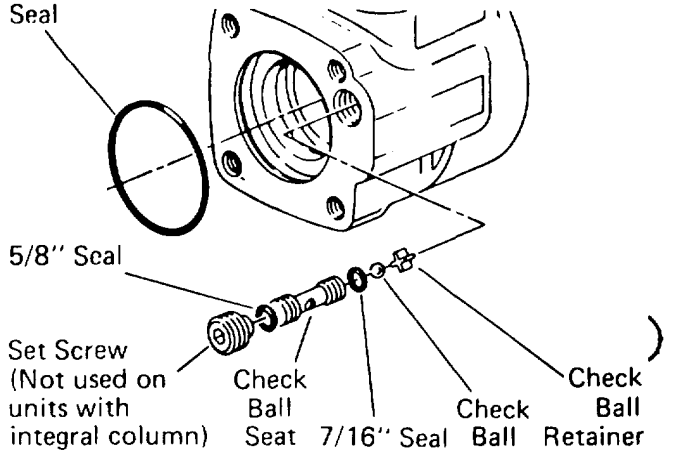


Figure 11

21. Remove set screw (not used on units with integral column) from housing, see Fig. 11.

22. Screw a 1/8"-24 machine screw into end of check ball seat. Then by pulling on screw, with a pliers, lift seat out of housing.

23. Remove 2 seals from check valve seat.

24. Tip housing to remove check ball and check ball retainer.

Reassembly

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe dry with cloth or paper towel because lint or other matter can get into the hydraulic system and cause damage. Do not use a coarse grit or try to file or grind these parts.

Note

Lubricate all seals (with exception of new quad ring seal) with clean petroleum jelly such as Vaseline.

Do not use excessive lubricant on seals for meter section.

Refer to parts listings covering your steering control unit when ordering replacement parts. A good service policy is to replace all old seals with new seals.

Control End

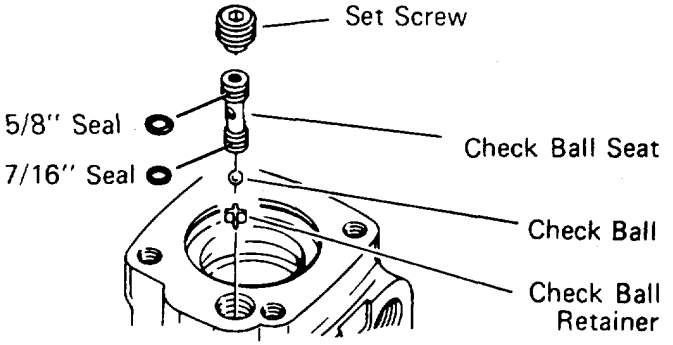


Figure 12

Reassembly

1. Use a needle nose pliers to lower check ball retainer into check valve hole of housing. Make sure retainer is straight (not tilted on edge) in housing, see Fig. 12.

2. Install check ball in housing.

3. Lubricate 5/8" diameter seal and 7/16" diameter seal. Install seals on check ball seat as shown in Fig. 12.

4. Lubricate check ball seat and seals thoroughly before installing seat in housing. When installing seat do not twist or damage seals. Install check ball seat in housing, insert open end of seat first, see Fig. 12. Push check ball seat to bottom of hole.

5. Install set screw 'Use a 5/16" allen wrench to torque set screw to 100 inch pounds. To prevent interference, make sure top of set screw is slightly below housing mounting surface.

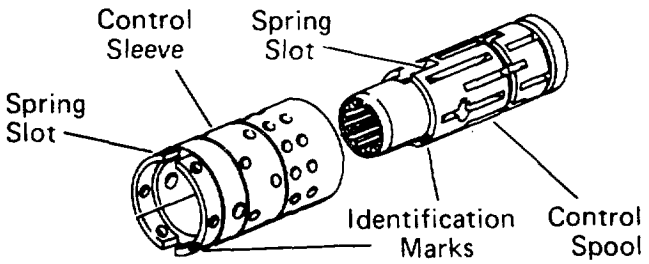
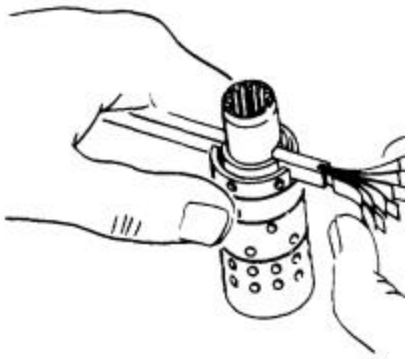


Figure 13

6 Assemble spool and sleeve carefully so that the spring slots line up at the same end. Rotate spool while sliding parts together. Some spool and sleeve sets have identification marks, align these marks as shown in Fig. 13. Test for free rotation. Spool should rotate smoothly in sleeve with finger tip force applied at splined end.

Figure 14

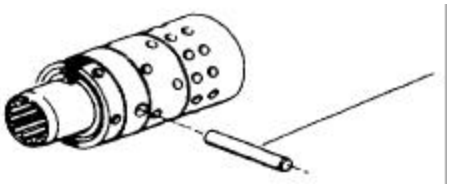


7. Bring spring slots of both parts in line and stand parts on end of bench. Insert spring installation tool through spring slots of both parts. Tool is available as part no. 600057. Position 3 pairs of centering springs (or 2 sets of 3 each) on bench so that extended edge is down and arched center section is together. In this position, insert one end of entire spring set into spring installation tool, as shown in Fig. 14.

8. Compress extended end of centering spring set and push into spool sleeve assembly withdrawing installation tool at the same time.

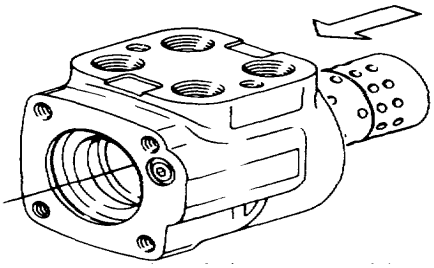
9. Center the spring set in the parts so that they push down evenly and flush with the upper surface of the spool and sleeve.

Figure 15



10. Install pin through spool and sleeve assembly until pin becomes flush at both sides of sleeve.

Figure 16



11. Position the spool and sleeve assembly so that the splined end of the spool enters the 14 hole end of housing first, see Fig. 16.

Caution

Be extremely careful that the parts do not tilt out of position while inserting. Push parts gently into place with slight rotating action, keep pin nearly horizontal. Bring the spool assembly entirely within the housing bore until the parts are flush at the meter end or 14 hole end of housing. Do not pull the spool assembly beyond this point to prevent the cross pin from dropping into the discharge groove of the housing. With the spool assembly in this flush position, check for free rotation within the housing by turning with light finger tip force at the splined end.

12. Place housing on clean, lint free cloth. Install 2-1/8" diameter seal in housing, see Fig 17.

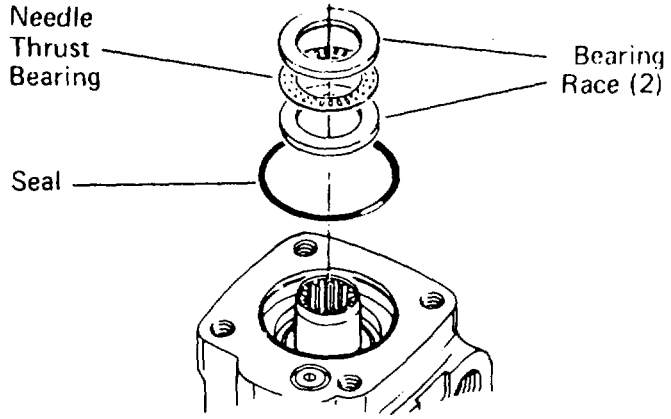


Figure 17

13. Install 2 bearing races and the needle thrust bearing in the order shown in Fig. 17.

14. Install 1-1/4" diameter dust seal in seal gland bushing, flat or smooth side of dust seal must face down towards bushing, see Fig. 19.

15. Install dry quad ring seal in seal gland bushing. Smooth seal in place with your finger. Do not use any seal that falls freely into pocket of bushing, see Fig. 19.

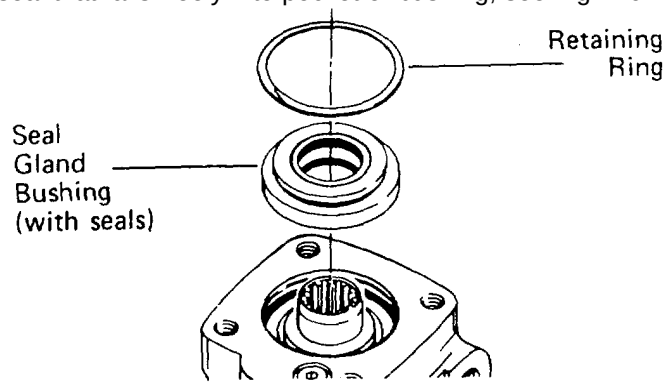


Figure 18

16. Install seal gland bushing over the spool end with a twisting motion. Tap the bushing in place with a rubber hammer. Make sure the bushing is flush against the bearing race.

Reassembly

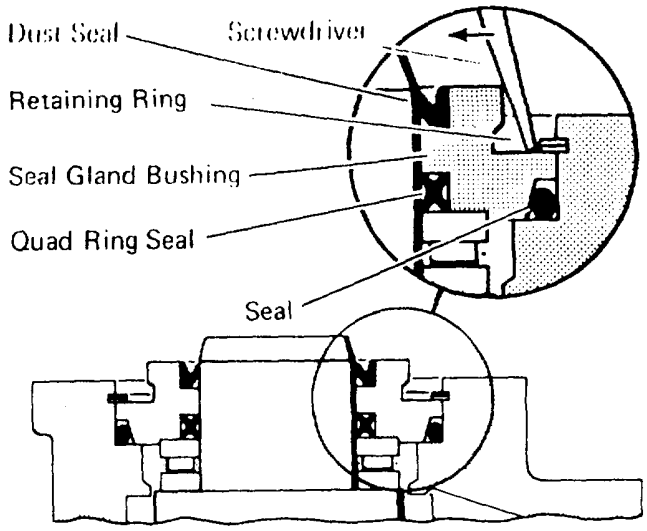
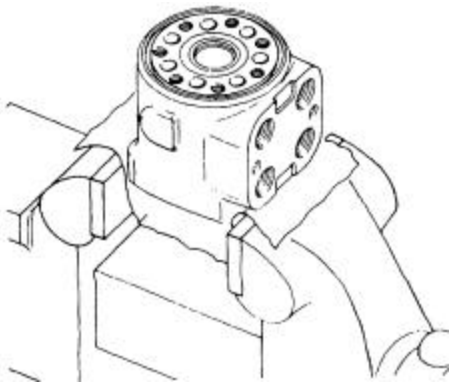


Figure 19

17. Install retaining ring (see Fig. 18 and 19) in housing After installing ring, tap on ring end or pry with screwdriver around entire circumference of ring to properly seat ring in groove.

Figure 20



18. Clamp housing in vise, as shown in Fig. 20.

Clamp lightly on edges of mounting area. Do not over tighten jaws.

Note

Check to insure that the spool and sleeve are flush or slightly below the 14 hole surface of the housing. Clean the upper surface of the housing by wiping with the palm of clean hand. Clean each of the flat surfaces of the meter section parts in a similar way when ready for reassembly. Do not use cloth or paper to clean surfaces.

Reassembly

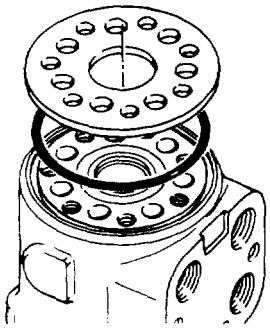


Figure 21

19. Install 3" diameter seal in housing, see Fig. 21.

20. Install spacer plate. Align bolts holes in spacer plate with tapped holes in housing.

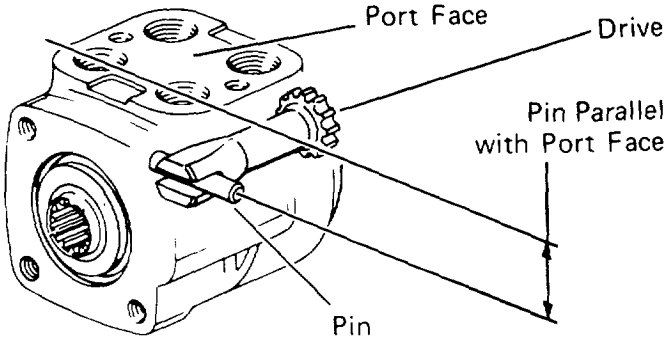


Figure 22

21. Rotate spool and sleeve assembly until pin is parrallel with port face, see Fig. 22. Install drive, make sure you engage drive with pin, To assure proper alignment, mark drive as shown in Fig. 24 (ref. B). Note relationship between slotted end of drive to splined end of drive when marking.

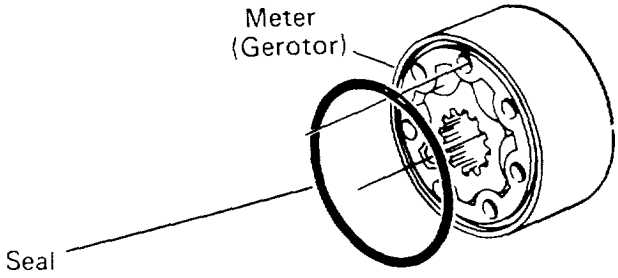


Figure 23

22. install 3" diameter seal in meter.

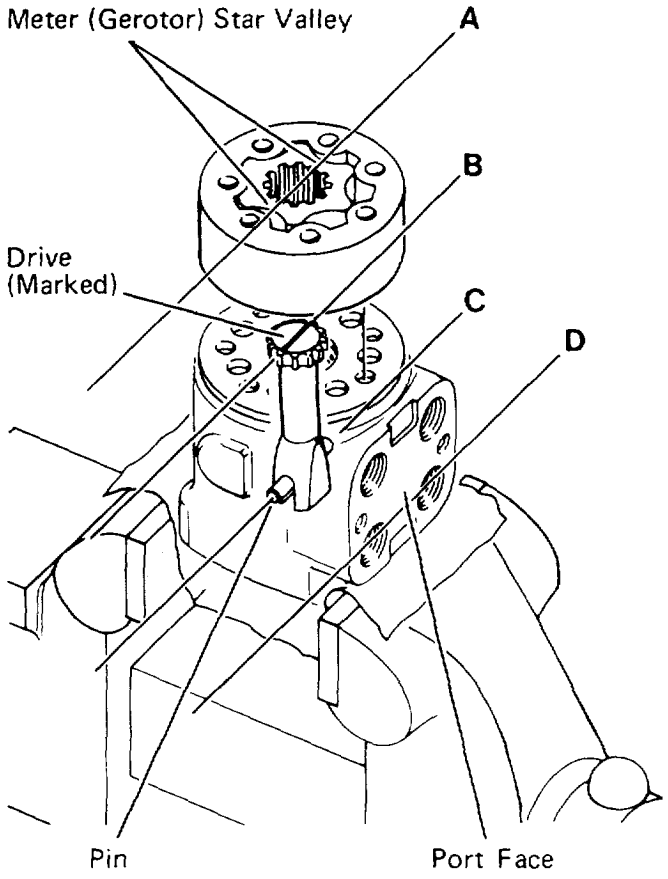
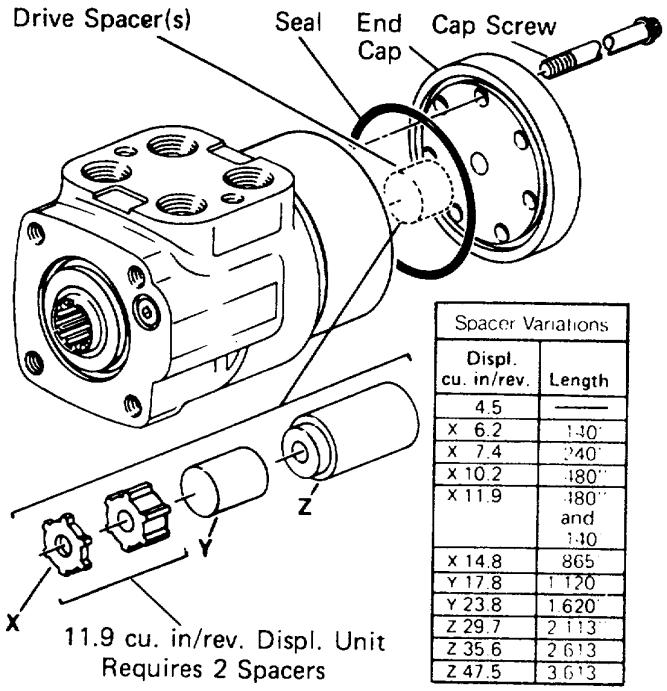


Figure 24

23. With seal side of meter toward spacer plate, align star valleys (ref. A) on drive (ref. B). Note the parallel relationship of reference lines A, B, C, and D-Fig. 24. Align bolt holes without disengaging meter from drive.



Spacer Variations	
Displ. cu. in/rev.	Length
4.5	——
X 6.2	1.40"
X 7.4	2.40"
X 10.2	1.80"
X 11.9	1.80" and 1.40"
X 14.8	865
Y 17.8	1.120"
Y 23.8	1.620"
Z 29.7	2.113"
Z 35.6	2.613"
Z 47.5	3.613"

Figure 25

Reassembly

24. Install drive spacer(s) when used, in meter, see Fig. 25.

25. Install 3" diameter seal in end cap.

26. Install end cap on gerotor, align holes.

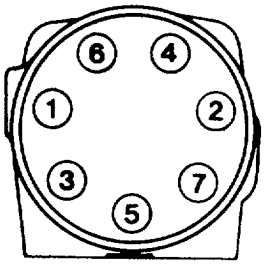
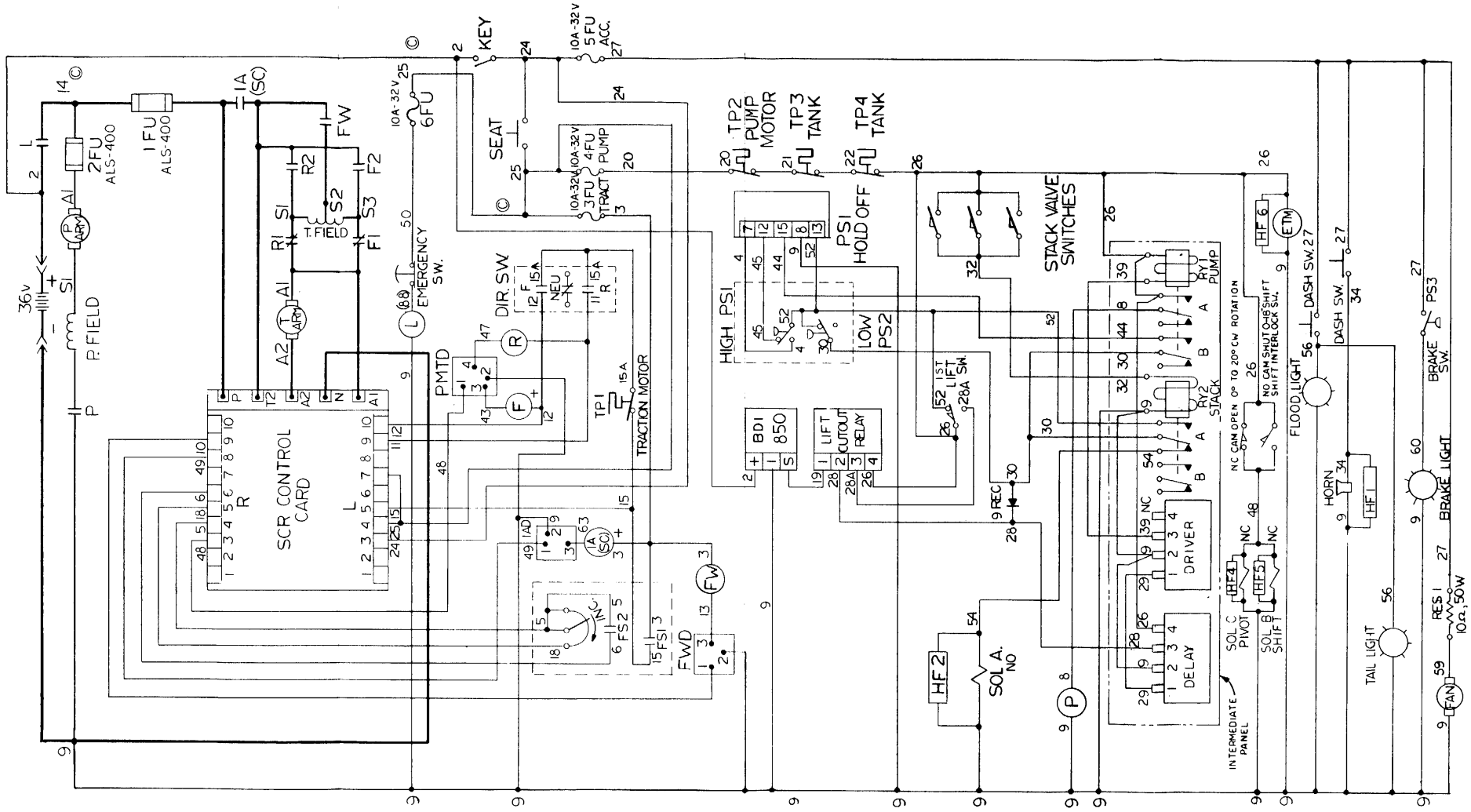


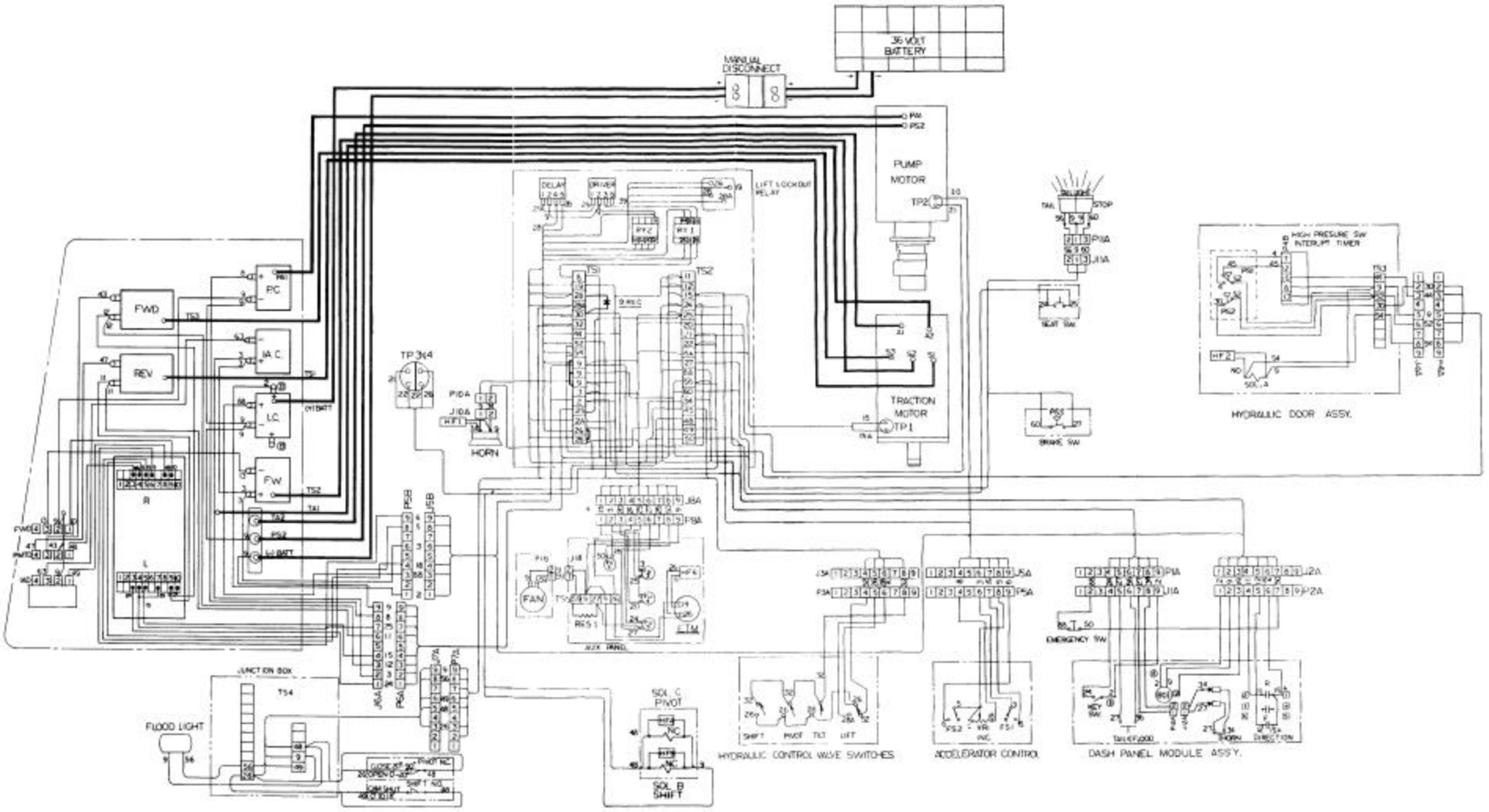
Figure 26

27. Install 7 dry cap screws in end cap. Pretighten screws to 150 inch pounds, then torque screws to 275 inch pounds in the sequence shown in Fig. 26.



ELECTRICAL SCHEMATIC

Figure 5-161



ELECTRICAL WIRING DIAGRAM

Figure 5-162

ELECTRIC DOOR MODULE REMOVAL

WARNING
Before attempting work on Electric Door Module disconnect battery connector (Fig. 5-97).

If system malfunction is diagnosed to the electric door module and a new or rebuilt module is available, replace as follows:

1. Disconnect (9) electric power cables (Fig. 5-163 Fig. 5-164).

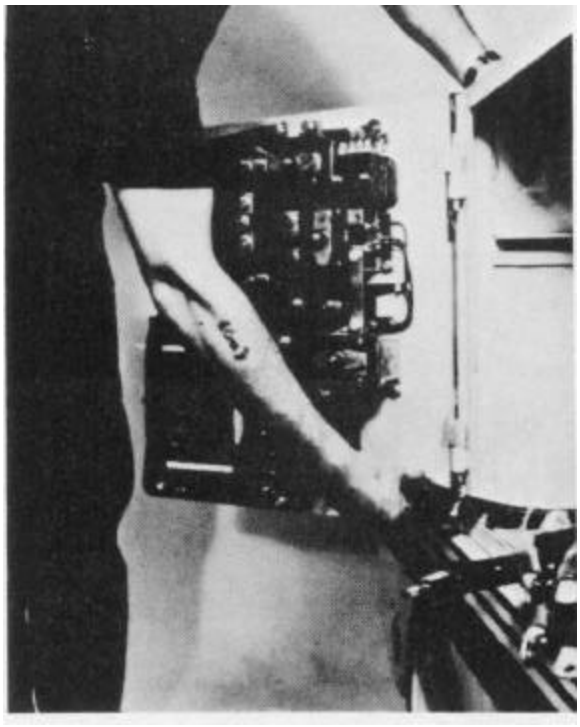


Figure 5-163

2. Disconnect (2) quick disconnect electrical control cables (Fig. 5-165).

3. With electric door module open to approximately 80 degrees, lift module out of hinge sockets (Fig. 5-166).

4. Replace new module reversing steps (1) through (3) above.

Return faulty module to maintenance shop for trouble shooting and repair.

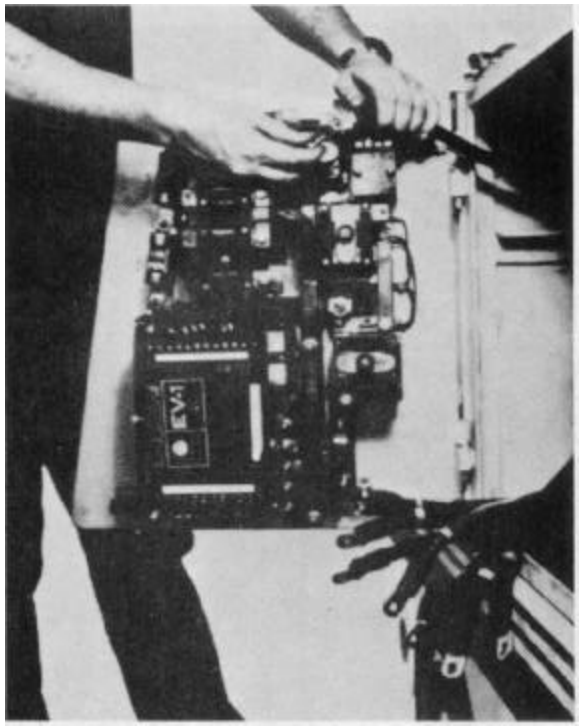


Figure 5-164

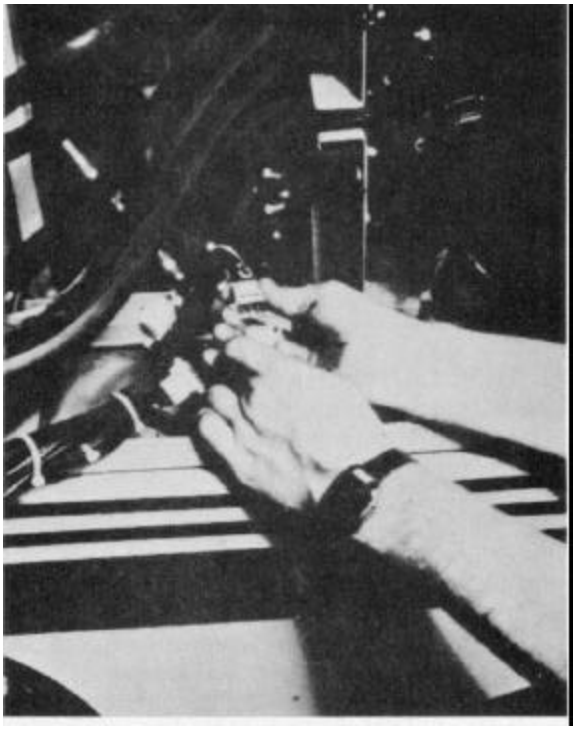


Figure 5-165

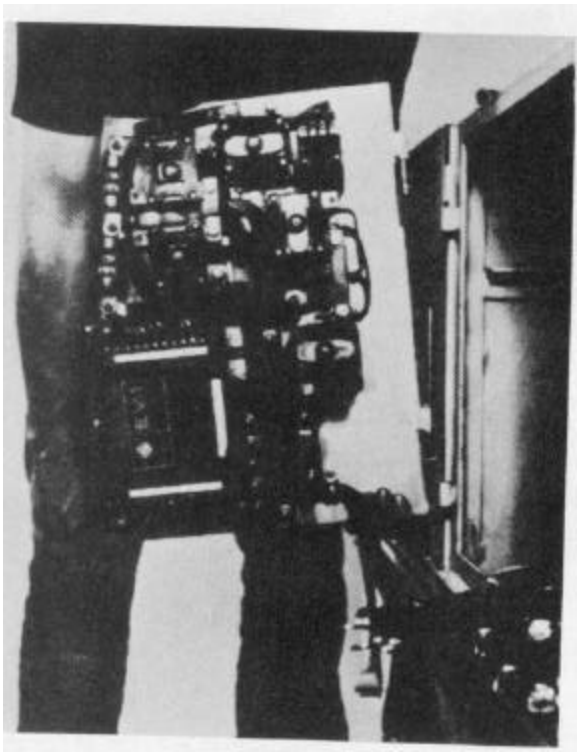


Figure 5-166

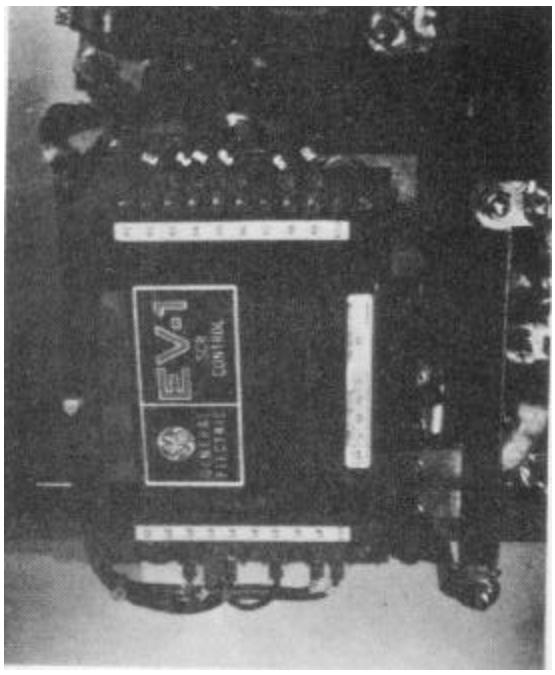


Figure 5-167

SCR REPLACEMENT

WARNING
Do not attempt service on electric door module before disconnecting battery (Pg. 5-33, Fig. 5-97).

1. Open right hand door (Electric door module).

2. SCR panel is located at lower left hand corner of door(Facing door) (Fig. 5-167).

3. Remove (4) screws (Fig. 5-168) and separate terminal strips from oscillator card by prying up with a screwdriver (Fig. 5-169) in slots provided.

4. Lay terminal strips (with control wiring intact) aside over edge of electric door module.

5. Remove the three lower power cables, TA2, PS2 and negative (-). Use a 1/2 inch wrench. Return hardware to the connector strip studs in the same order as removed but allow to remain loose (Fig. 5-170).

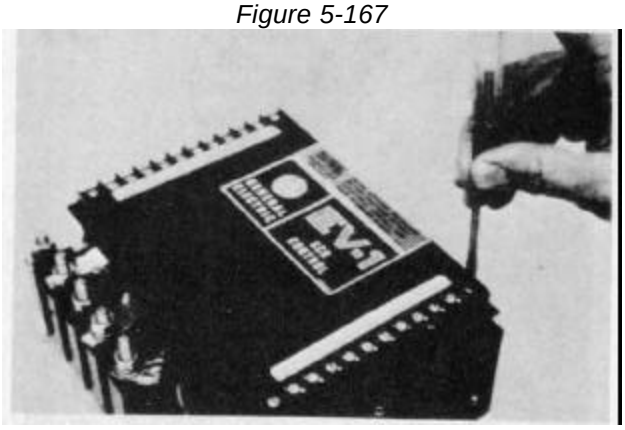


Figure 5-168

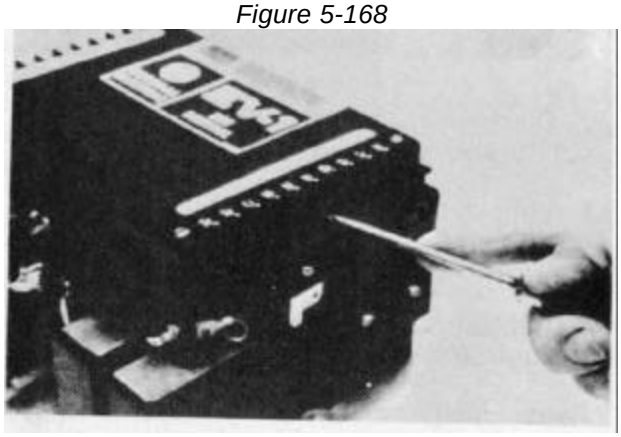


Figure 5-169

6. Remove the 5/16-18 hex nut, flat washer and split lockwasher from the bottom, outside SCR control power connector terminal (Al) (Fig. 5-170). Loosen the opposite end of the attached bus bar, where it attaches to the forward and reverse contactor bus bar. Remove the loosened bus bar from the (Al) terminal and swing it to one side.

7. Remove the hardware from the second lowest SCR control power connector terminal (N), negative (Fig. 5-170). Lift the bus bar from the terminal and swing aside.

8. Remove the hardware from the middle, SCR control power connector terminal (A2), (Fig. 5-170). Lift the bus bar from the terminal and swing aside.

9. Remove the hardware from the fourth SCR control power connector terminal (FW) contactor and bus bar Loosen the remaining bolt and nut attaching the bus bar. Lift the bus bar from the (T2) terminal and swing to one side.

10. Remove the hardware from the fifth, inside SCR control power connector terminal (P), positive (Fig. 5-170). Remove the bolt, nut and hardware from the intersection with its mating bus bars.

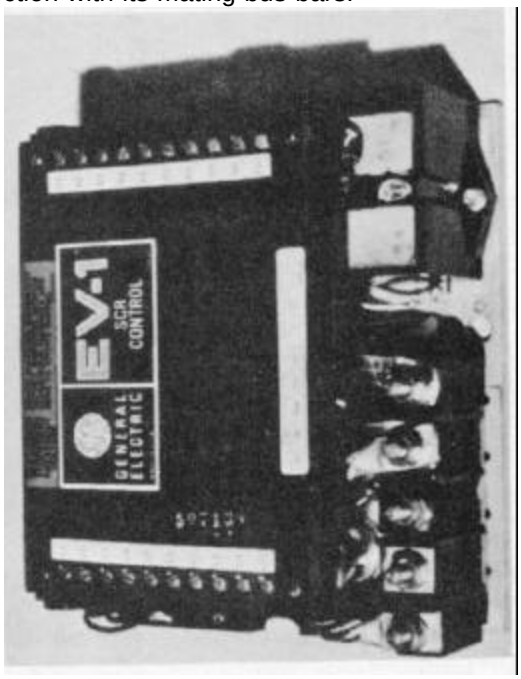


Figure 5-170

Remove the bolt, lockwasher and flatwasher from the end of the bus bar attached at the 1A contactor.

Lift the end of the bus bar from the (P) terminal. Remove the bus bar from the electric door assembly.

11. Use a 9/16 socket wrench to remove the three hex head cap screws, lockwashers and flat washers, attaching the SCR control to the electric door assembly (Fig. 5-167). Protect the SCR assembly from dropping off the door unexpectedly.

12. Slide the SCR control downward and off the edge of the door.

13. Clean the heat transfer grease from the door and the SCR control heatsink with a petroleum distillate, chlorinated hydrocarbon solvent or dupont freon TF degreaser or equal.

The SCR control or electric door assembly should not be steam cleaned. In dusty areas, use low-pressure air to blow off the control or door assembly. In oily or greasy areas, a mild solution of detergent or denatured alcohol can be used to wash the SCR control and electric door assembly. Blow completely dry with low pressure air.

NOTE
Installing new or rebuilt SCR control.

14. Make certain that the mounting area is smooth, clean and flat.

15. Apply heat transfer grease to the rear, heatsink of the SCR control. Dow Corning 340, Wakefield Engineering Type 120 or equivalent. Apply the compound evenly to a thickness of 1/32 to 3/64 inch, over the complete surface of the heat sink. Use of a hard rubber squeegee will help distribute the grease evenly to the required thickness.

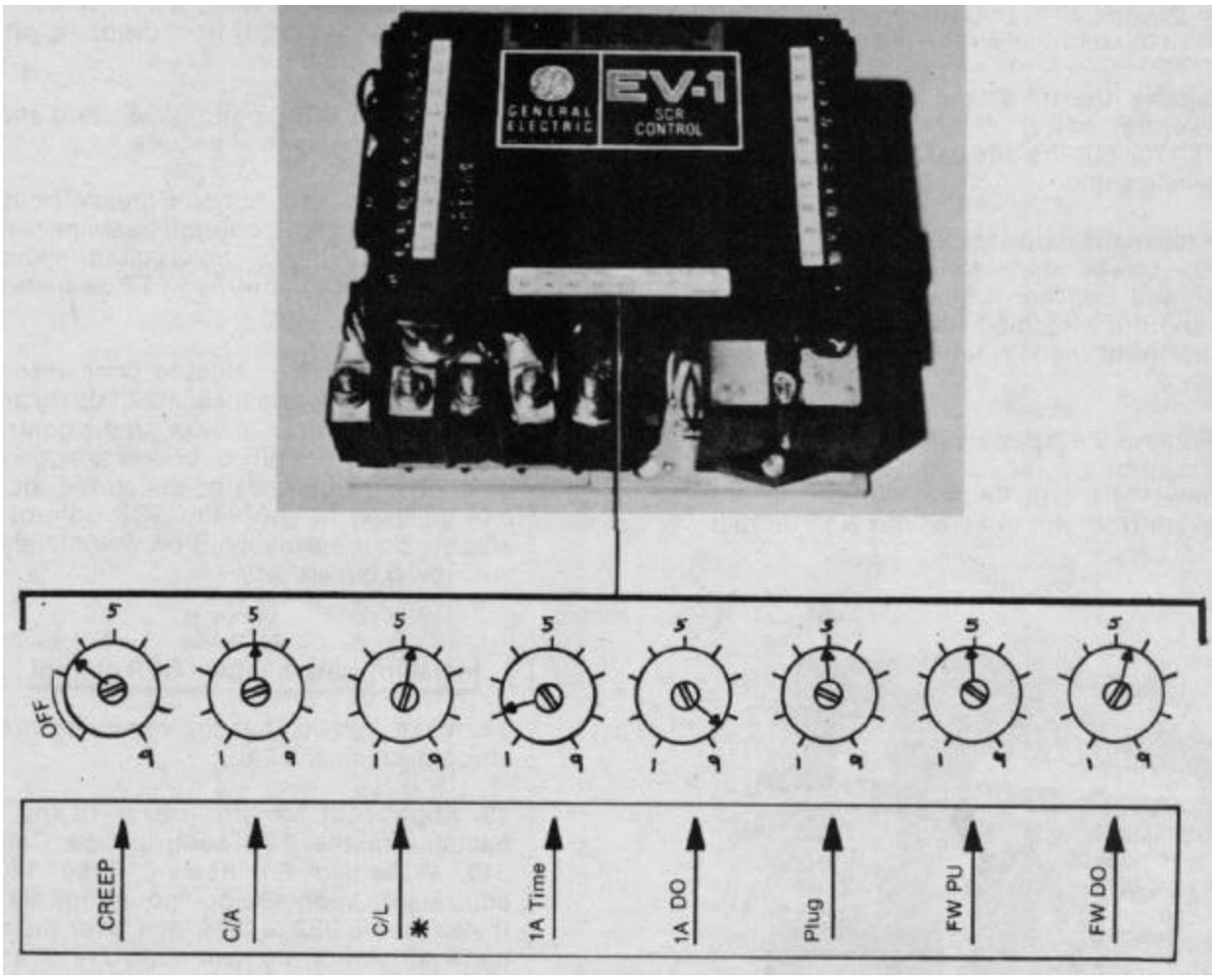
16. Align the SCR control mounting holes with the tapped mounting holes in the electrical door module. Place the SCR control directly into position and fasten with the appropriate hardware (Fig. 5-167).

17. Clean excess heat transfer grease from around the sides of the SCR control heat sink with a clean, dry cloth.

18. Assemble by reversing the above procedure, steps 1 through 6.

TUNEUP OF NEW OSCILLATOR CARD

Panels are factory adjusted for this truck and its particular traction motor and should not need adjustment. The factory settings specified below are for new trucks, and can be varied for individual feel by slight adjustment in either direction (CW or CCW).



*The maximum setting for current limit (C/L adjustment) must not exceed 500 amps motor current with a truck stalled condition in the SCR range.

CONTACTOR COIL REPLACEMENT

NOTE
Do not remove the top frame screws (closest to the contact section) since these determine the total core stroke.

Disassembly

1. Remove two (2) end frame screws from the bottom end (side away from the contact structure) from each contactor side frame and remove the end frame assembly including coil (Fig. 5-171).

Assembly

1. Thoroughly check the core tube end frame assembly to be sure that the brass tube is tightly wedged into the end frame assembly, and the teflon bearing inside is not loose, torn or folded. If there is any damage to this assembly it should be replaced.

2. Position the coil onto the brass tube in the same orientation as the original coil with regard to terminal location and mounting screw direction, making sure the neoprene washer is in place.

3. Slide end frame assembly with coil into the contactor frame assembly making sure the movable core assembly enters the tube assembly freely, to prevent damage to the teflon tube bearing.

4. By using a suitable "C" clamp or hand arbor press and two (2) 3/4 inch I.D. nuts or equivalent, the bearing end frame can be pressed into position and the four (4) frame side screws tightened. On multideck units, the tip insulation plate must be removed so that pressure is applied directly to the contactor core rod assembly during compression. Sufficient pressure should be applied until the cores bottom out or there is no further movement.

CONTACTOR CHECK:

1. Coil pick-up at room temperature:

Intermittent duty - 50% of rated voltage.

Continuous duty - 65% of rated voltage.

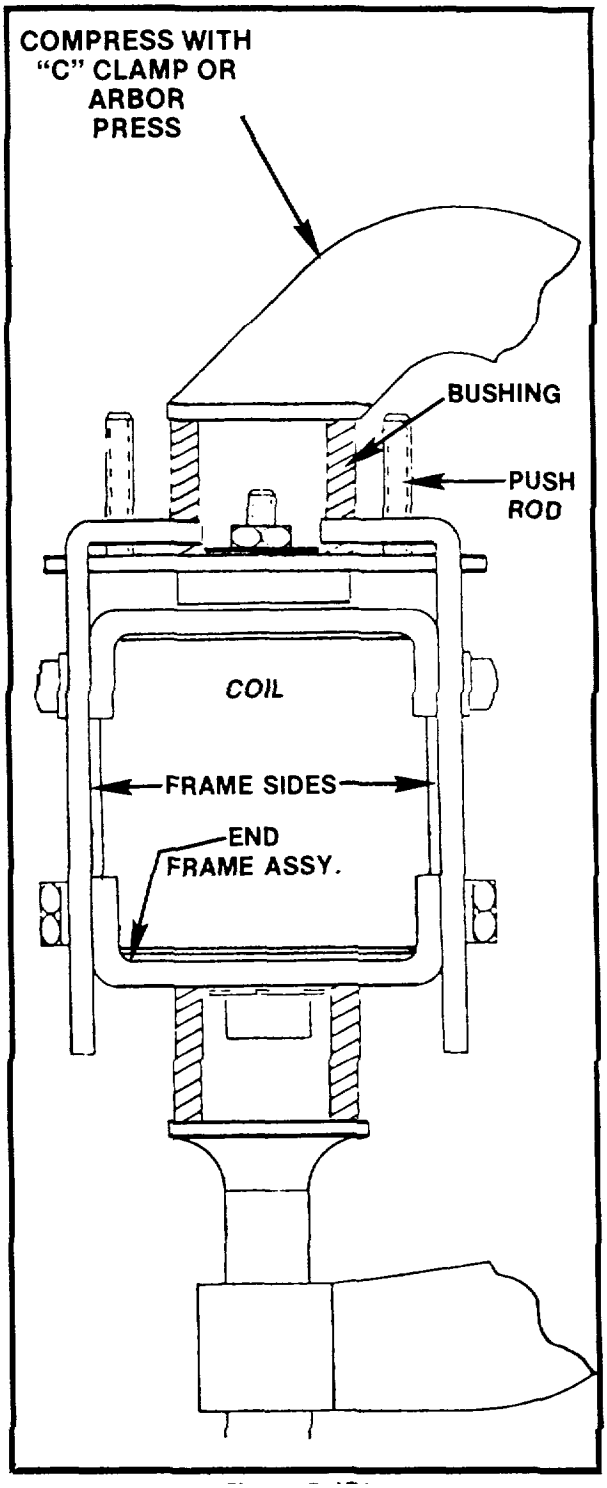


Figure 5-171

CONTACTOR TIP REPLACEMENT

(Single Pole, Single Throw)
(L, 1A, FW, P) (Fig. 5-172)

CAUTION

Do not disturb the two (2) side frame mounting screws located on each side frame nearest the contact tips. These are present at the factory and control the contactor core stroke adjustment.

1. Remove flex-locknut (1), lockwasher (2), flatwasher (3) and washer - non-metallic (4), from core rod.

2. Remove cup bushing (5), main contact load spring (6), and bridge assembly movable (7).

3. Remove shoulder bushing (8), and leave all washers - metallic (9) intact. These washers serve as shims for adjustment of N.O. contact gap.

4. Remove screws (10), lockwashers (11), flatwashers (12), and bridge guides (13).

5. Remove screws (14), star washers (15), and bus bar assemblies (16).

6. Replace bus bar assemblies (16), and bridge assembly - movable (7), and reassemble in reverse order incorporating the following torque requirements:

Core rod nuts - 20 inch pounds

CONTACTOR CHECK:

1. No binding of movable contact assembly during mechanical operation.

2. N.O. contact gap - .160 (Use number 20 to 21 drill shank).

3. Coil P.U. should be 50% system voltage at room temperature.

Adjustment of N.O. contact air gap is accomplished by reverting to step 3 and shims to increase gap and removing shims to decrease gap.

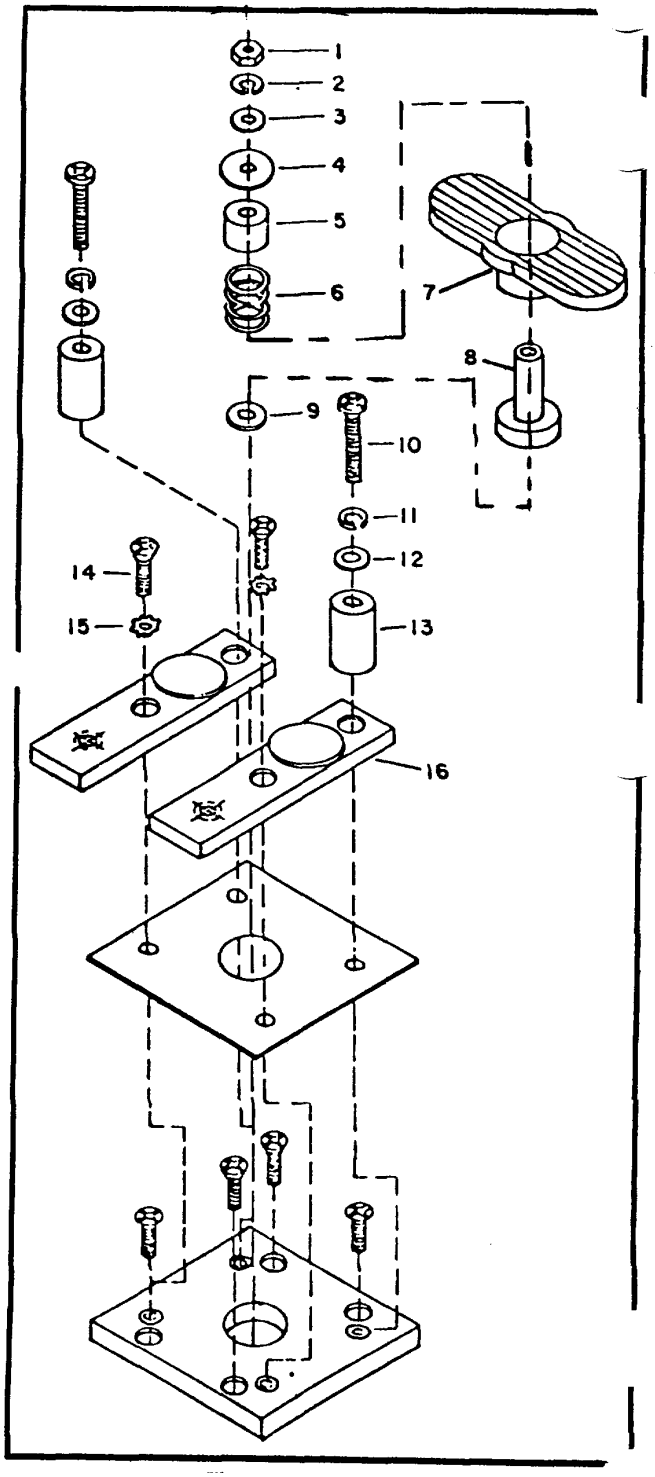


Figure 5-172

CONTACTOR TIP REPLACEMENT

(Single Pole, Double Throw) (FWD and REV) (Fig. 5-173)

CAUTION

Do not disturb the two (2) side frame mounting screws located on each side frame nearest the contact tips. These screws are set at the factory and control the core stroke.

1. Remove nuts (1), lockwashers (2), and flatwashers (3), and remove insulation plates (4).

2. Remove bus bars (5) noting the position of the mounting studs relative to the coil terminal. The replacement bus bars must be reassembled in the same manner as the previous bus bar alignment.

3. Remove flex-loc nut (6), lockwasher (7), and flatwasher(8).

4. Remove top shoulder bushing (9).

5. Remove top bridge assembly (10).

6. Remove top bridge assembly main contact load spring (11).

7. Remove top cup bushing (12). (Recess facing upwards).

8. Remove N.C. contact adjustment shims (13).

9. Remove lower cup bushing (14). (Recess facing downward).

10. Remove lower bridge assembly load spring (15).

11. Remove lower bridge assembly (16).

12. Remove lower shoulder bushing (17).

13. Leave N.O. contact adjustment shims (18) intact.

14. Remove bridge guides (19).

15. Remove insulation tubing (20).

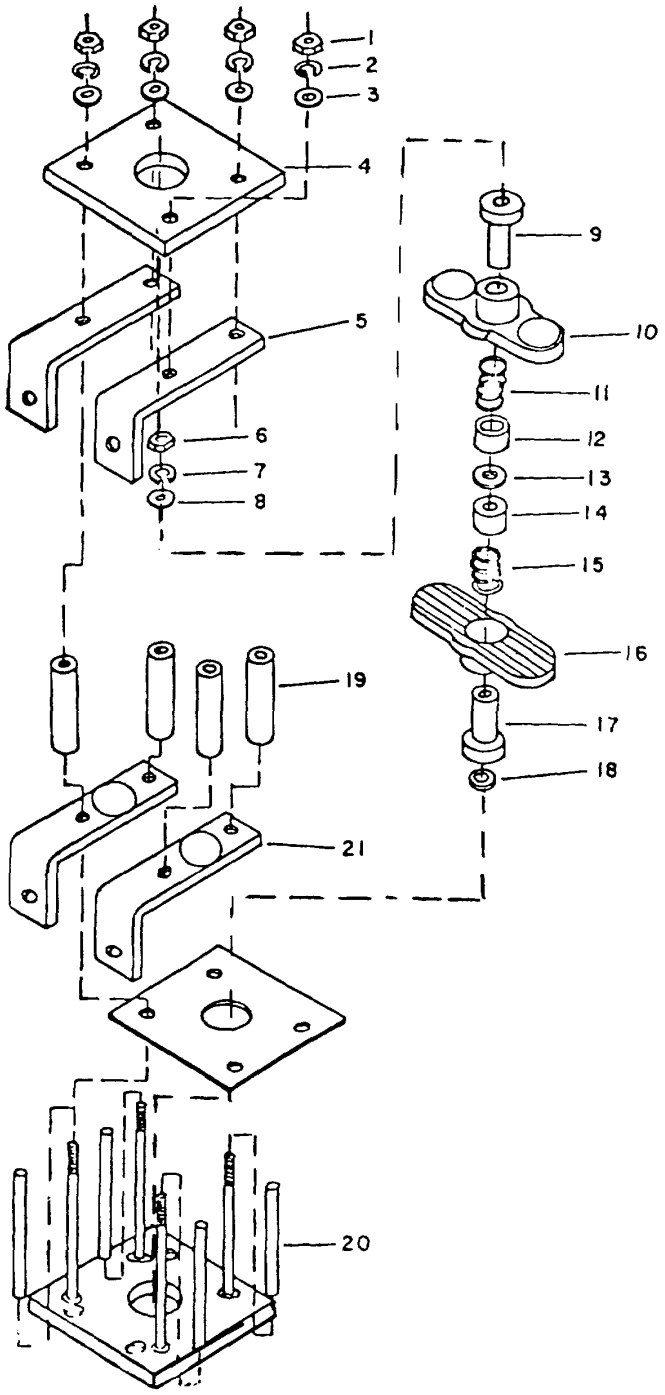


Figure 5-173

16. Remove lower bus bar assemblies (21).

17. Replace bus bar assemblies (5221) and bridge assemblies (10 and 16) and reassemble in reverse order making sure that the insulation tubing (20) is firmly recessed into bus bar assemblies (21).

18. **Torque requirements:**

10-32 nuts/20 inch pounds
8-32 nuts120 inch pounds
6-32 nuts/10 inch pounds

CONTACTOR CHECK:

1. No binding of movable contact assembly during mechanical operation.

2. N.O. contact gap - .160 (Use number 20 or21 drill shank).
N.C. contact gap - .160 (Use number 20 or 21 drill shank).

3. Coil P.U. should be 50% system voltage at room temperature.

Adjustment of the N.O. contact air gap is accomplished by reverting to step 13 and adding shims to increase gap and removing shims to decrease gap. Adjustment of N.C. contact air gap is accomplished by reverting to step 8 and adding shims to decrease gap and removing shims to increase gap.

Figure 5-174

REMOVAL OF ACCELERATOR MODULE

1. Remove the three (3), 1/4-20 x 3/4 inch long, hex head cap screws from the accelerator module floor plate, using a 7/16 inch wrench (Fig. 5-174).

2. Grasp the accelerator pedal and pull the front of the accelerator module upward. Angle the floor plate to clear the brake pedal and lay the accelerator module on the left floor plate. Pull the attached electric control cable out from under the right floor plate (Fig. 5-175).

Figure 5-175

3. Remove the wire harness connector, P5A from the electrical system connector, J5A (Fig. 5-176),

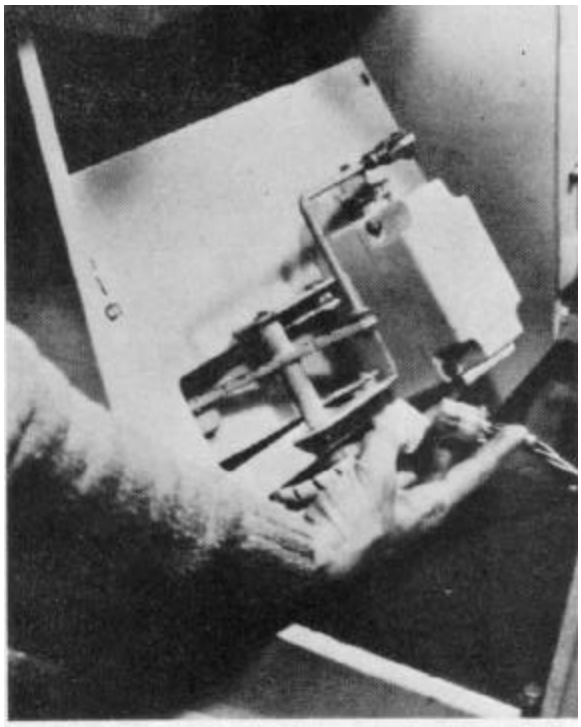


Figure 5-176

4. The accelerator module may now be removed from the vehicle.

5. Install the accelerator module by reversing the procedure outlined above.

DASH PANEL MODULE REMOVAL

WARNING
Before attempting work on Dash Panel Module - disconnect battery connector (Fig. 5-96).

If a system malfunction is diagnosed to the dash panel module and a new or rebuilt module is available, replace as follows:

1. Remove operator's console assembly front cover (Fig. 5-177).

2. Disconnect (2) quick disconnect electrical control cables (Fig. 5-178).

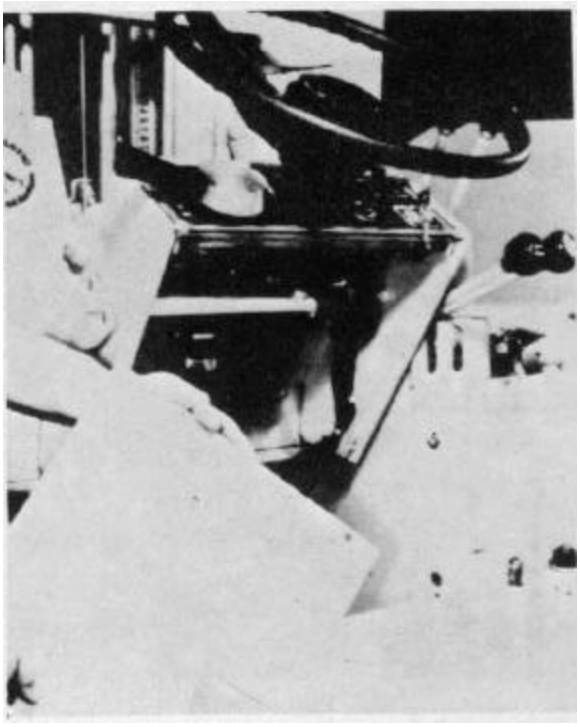


Figure 5-177

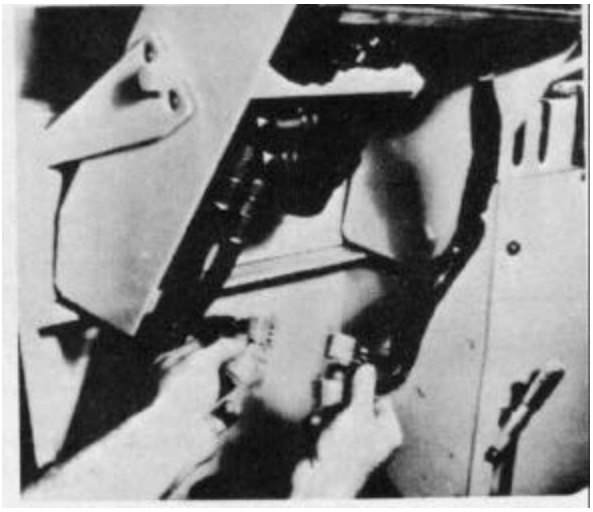


Figure 5-178

3. Disconnect horn cable quick disconnect.

4. Remove (4) screws, one at each corner of the dash panel plate. Slide complete module rearward towards the operator's seat (Fig. 5-179 and 5-180).

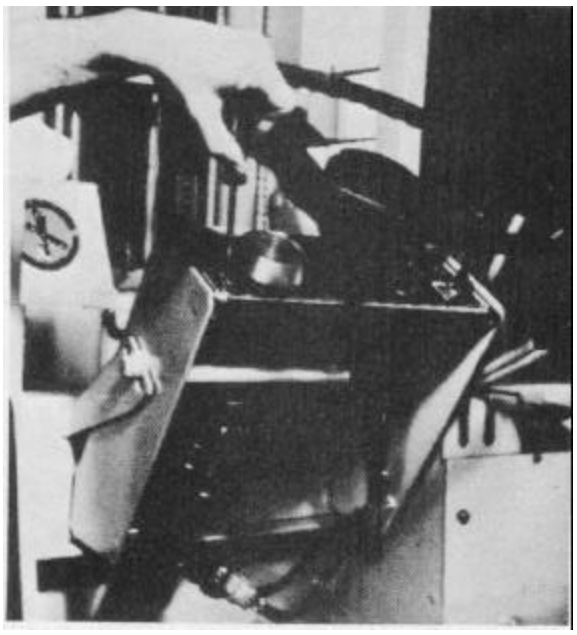


Figure 5-179

Figure 5-180

5. Replace new module reversing steps (1) through (4) above.

Return faulty module to maintenance shop for trouble shooting and repair.

MAST ASSEMBLY

Removal From Truck

1. Position truck in an open area beneath an overhead crane with a minimum capacity of 1 ton (2000 lbs.) (Fig. 5-181).

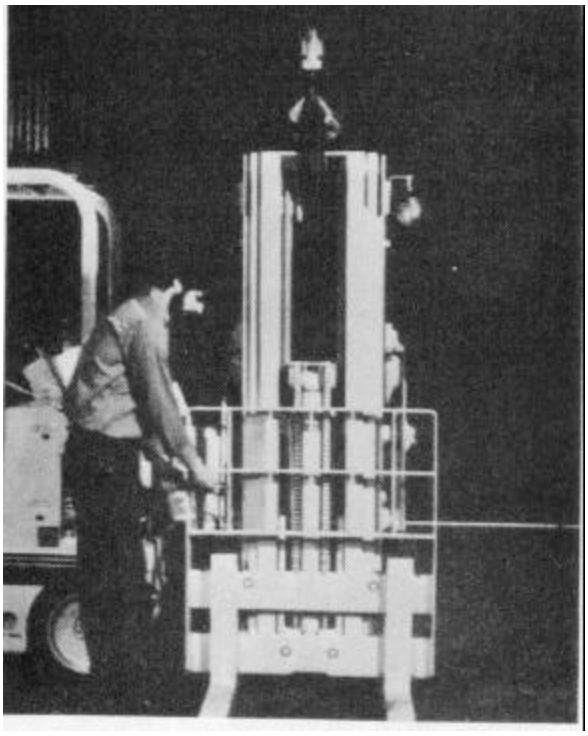


Figure 5-181

2. With key switch in the "OFF" position operate the (4) control valve levers (lift, tilt, pivot and shift (Fig. 1-4) fore and aft several strokes to assure release of any trapped hydraulic oil under pressure.

3. Disconnect mast lift hydraulic hose, cap and tie back for protection (Fig. 5-182).

4. Attach a sling through the mast section and assume the weight of the mast with the overhead crane (Fig. 5-181).

5. Remove the 3/8-16 bolt from both tilt cylinder rod ends and pry tilt cylinder clevis pins out (Fig. 5-183).

6. Remove (4) 1/2-13 bolts from mast trunnion mounts (Fig. 5-183) and remove upper trunnion half (one each side) (Fig. 5-183).

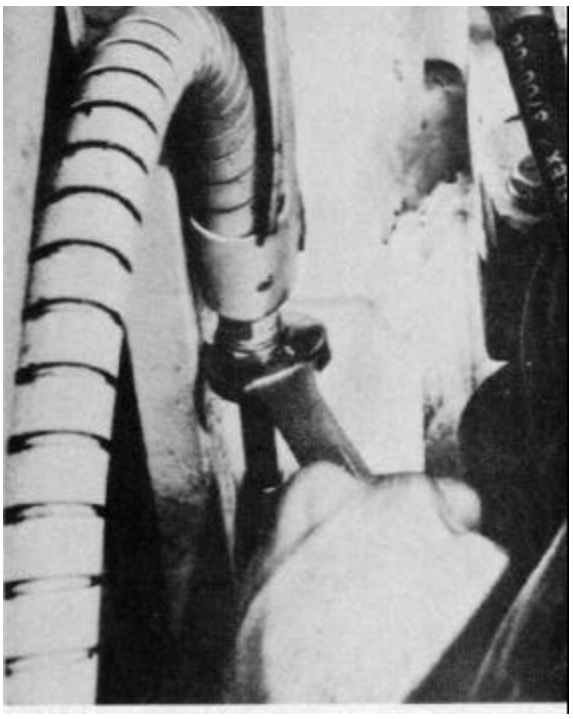


Figure 5-182

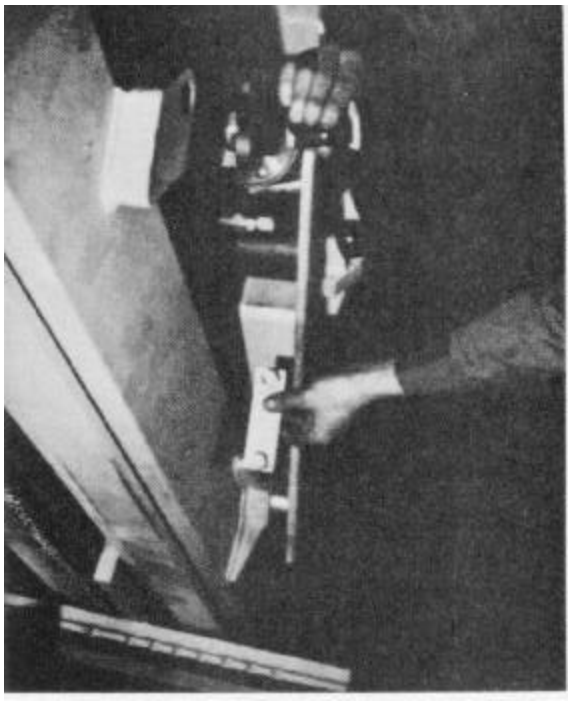


Figure 5-183

7. Install mast, reversing above outline procedures steps 1 through 6.

MAST RACKING ADJUSTMENT

The mast tilting motion is adjusted to prevent mast racking, caused by uneven tilt cylinder strokes. Initiate the following adjustment procedures to remedy mast racking.

1. Loosen the clevis locking screws on each cylinder with a 5/16" allen wrench (Fig. 5-184).

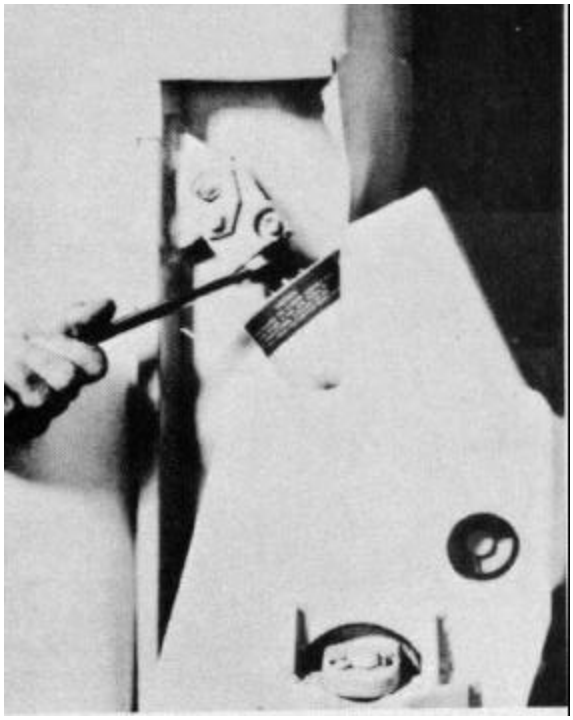


Figure 5-184

2. With the mast unloaded, adjust the (2) tilt cylinder rod strokes with a 1-1/8" open end wrench (c.w. to shorten & c.c.w. to lengthen) until the cylinder strokes, extended and retracted, are equal. The mast should operate without racking or twisting and the standard 3° forward and 4° backward tilt angles must be maintained (Fig. 5-184).

3. Retighten the clevis locking screws.

MAST

THEORY OF OPERATION

The mast when raised passes through two basic operations:

1. The Full Free Lift Operation. With the mast collapsed the carriage is at the bottom of the inner rail assembly (See Fig. 1). During free lift, the carriage travels to the top of the inner rail without any rail movement at two inches per inch stroke of primary cylinder (See Fig. 2).

2. Rail Extension Operation. After free lift operation, both the inner and center rail assembly move simultaneously with the inner rail moving at twice the speed of the center rail until full mast extension (See Fig. 3).

These lifting operations are powered and caused by a simple gravity return hydraulic lift cylinder. The chain reeving arrangement is such that, for every inch of secondary cylinder stroke, the fork travels two inches. This unique feature provides uniform lift speeds throughout mast extension.
Figures 1, 2 and 3 are schematic drawings which describe the mast chain reeving and its normal operation. Figure 1 shows the mast collapsed. Mast internal action is as follows:

The primary lift cylinder begins to stroke upward from oil entry into base cylinder. The chain sheave on the top of the primary lift cylinder moves with the ram, thus lifting the lower end of the primary chain which is connected to the carriage at twice the cylinder stroke and speed. When carriage reaches top of inner rail, this completes free lift operation; at this time, the carriage and inner rail become one and act as a unit.

When the center rail moves upward by the action of the secondary cylinders, the inner rail must move at two times the center rail speed. At this time, center and inner rail are moving upward and the carriage moves upward while remaining at the top of the inner rail. The inner rail and carriage move two inches upward for every inch of secondary cylinder ram stroke. The center rail moves upward one inch for each inch stroke of the secondary cylinder ram.

In addition, a hose sheave attached to center rail is employed to supply hydraulic oil to the primary tilt cylinder barrel. One end of the hose is affixed to the port on secondary cylinder barrel and the other is attached to the port on the primary cylinder barrel.

Proper sequencing is insured by the dead weight of the center and inner rail, primary lift cylinder and carriage.

Downward sequence is the reverse of upward sequencing.

Downward forces from the fork loading are carried by the forks to the carriage through the primary chain to the inner rail. The inner rail load is then transmitted through the secondary chain to the outer rail. The cylinder load is transmitted to the center rail assembly.

MAST ADJUSTMENT

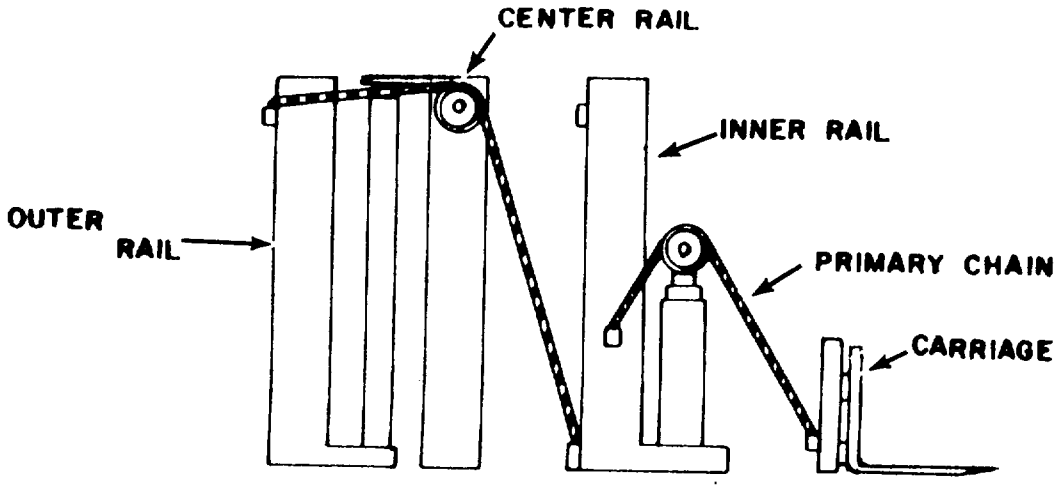
Should adjustment become necessary, the following adjustments can be made:

CARRIAGE: Inside and outside thrust rollers. These thrust rollers are eccentric shaft are adjustable and should be adjusted in such a way as to center the carriage within the inner rail. These rollers should be in light contact with the rails. These rollers should be frequently inspected and adjusted when necessary to maintain smooth carriage operation.

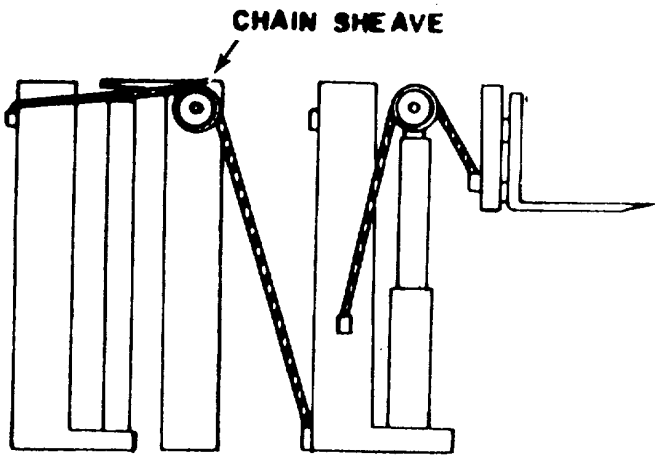
MAIN MAST GUIDE ROLLERS: In the event lateral wear within the rail section causes excessive side slop, the mast will require reshimming. Shims .030" thick are available to place under the main mast guide rollers to compensate for this wear. Shim the mast until it rolls snug but free for a man to manually push the rails in when mast is in horizontal position. Avoid unbalancing the shims. See Mast Disassembly Instructions.

CHAIN ADJUSTMENT: Both pairs of mast chains are adjustable. With the mast collapsed and unloaded, adjust as follows:

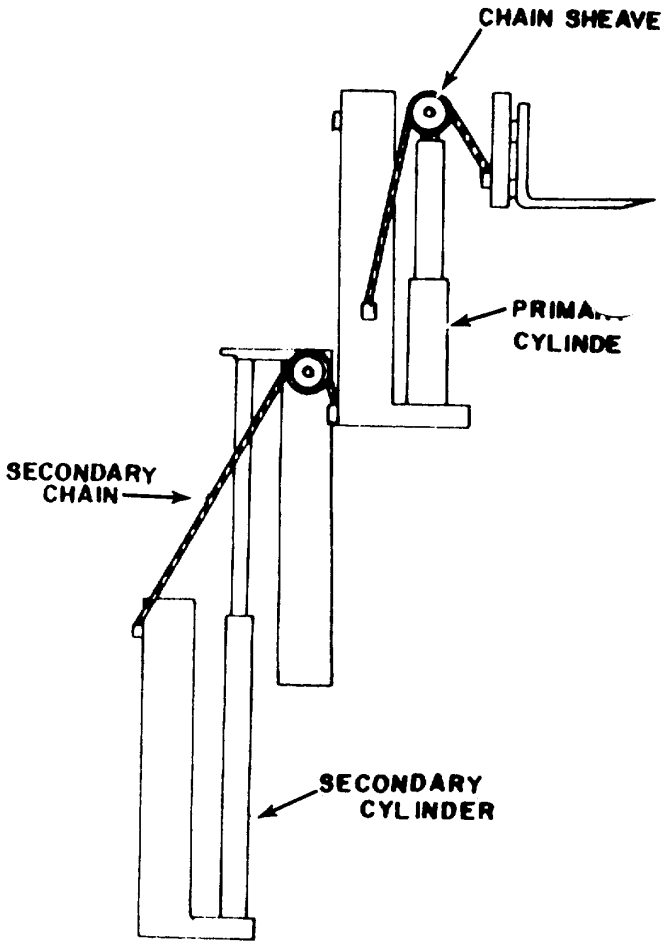
Adjust primary chain at its carriage terminal so that the carriage roller protrudes below rail 1-3/4". Equalize tension. Adjust secondary chain at its inner rail terminal so that lower inner rail roller lowest point is flush with bottom of center rail. Equalize tension.



MAST COLLAPSED
FIG. 1



MAST AT FULL FREE LIFT POSITION
FIG. 2



FULL MAST EXTENSION
FIG. 3

MAST DISASSEMBLY

1. Remove mast from truck. Lay mast horizontally facing up.

2. Free primary chains at carriage. Remove stops from back of carriage. Roll carriage out lower end of mast.

3. Remove primary cylinder retaining strap and lift hose at both ends. Remove primary cylinder assembly.

4. Disconnect secondary chains at bottom of inner rail. Disconnect opposite end of chain. Remove chains.

5. Remove stops at top of center rail.

6. Roll inner rail to top and lift inner rail through cut-out in center rail. Pull rollers.

7. Remove bolts in top of center rail securing secondary lift cylinder pistons.

8. Remove stop bolts in sides of outer rail.

9. Remove hose sheave at lower end of mast.

10. Roll center rail to top of outer rail and lift center rail lower rollers through cut-out. Pull rollers.

11. Remove brace securing secondary cylinders at top of outer rail.

12. Remove snap rings at base of secondary cylinders.

13. Remove hose connecting tops of secondary cylinders. Remove cylinders.

PRIMARY CYLINDER ASSEMBLY

a. Secure cylinder in vise.

b. Remove head & sheave assembly with the use of a rubber mallet.

c. Install two 1/2-13 x 2 bolts in base plug of cylinder.

d. Using suitable bar for leverage in between bolts, rotate plug until end of lockwire appears in slot. Place screwdriver under lockwire and rotate to extract.

e. Pull plug out.

NOTE

Removal of plug cuts static seal o-ring and backup ring. These must be replaced.

f. Place a two inch dia. x 6 ft. long rod into hollow end of chrome piston and drive piston out of barrel.

g. Removal of gland nut is accomplished by using chain wrench.

h. All seals, wear rings and other cylinder internal parts are now accessible. These parts should be removed and worn parts discarded.

i. Thoroughly clean all parts and blow dry.

NOTE

Do not replace bearing rings unless damaged. It also is not necessary to remove flow regulator when repacking cylinder. However, if it is removed, be sure to re-install regulator with arrow pointing towards base of cylinder.

j. Inspect all parts for nicks, scratches or other damage.

PRIMARY CYLINDER RE-ASSEMBLY:

a. Snap one bearing ring into the groove in the top of the barrel, into the gland nut and on the bottom of piston.

b. Grease the bearing ring in the barrel and insert piston into barrel, letting it protrude from top end of barrel approximately four inches.

c. Install seal onto piston with groove going on first facing bottom of cylinder and then modular ring.

NOTE
Modular ring not used on cylinders built after September 10, 1980.

d. Push piston back into barrel until end of piston is flush with seal or modular ring.

e. Install wiper into gland nut and grease the surfaces that contact piston. Install gland nut and tighten.

f. Push piston from base end until enough clearance is obtained to install base plug.

g. Install o-ring and back-up rings into position on plug and apply a heavy layer of grease.

h. Insert plug into barrel. Rotate plug until hole in plug aligns with slot in barrel. Insert hook end of lockwire into hole. Rotate plug which will pull wire into barrel.

i. Collapse cylinder to prevent damage to chrome piston surface.

SECONDARY CYLINDER DISASSEMBLY

a. Secure cylinder in vise.

b. Install two 3/8-16 x 2-1/2 bolts in base plug of cylinder.

c. Using suitable bar for leverage in between bolts, rotate plug until end of lockwire appears in slot. Place screwdriver under lockwire and rotate to extract.

d. Pull out plug.

NOTE
Removal of plug cuts the static seal o-ring and backup ring. These must be replaced.

e. Using a two inch dia. x 3 ft. long rod, drive piston out of barrel.

f. Removal of gland nut is accomplished by using chain wrench.

g. All seals, wear rings and other cylinder internal parts are now accessible. These parts should be removed with worn parts discarded.

h. Thoroughly clean all parts and blow dry.

NOTE
Do not replace bearing rings unless damaged.

i. Inspect all parts for nicks, scratches or other damage.

SECONDARY CYLINDER RE-ASSEMBLY

a. Snap one bearing ring into the groove in the top of the barrel, into the gland nut and on the bottom of the piston.

b. Grease the bearing ring in the barrel and insert piston into barrel, letting it protrude from top end of barrel approximately four inches.

c. Install seal onto piston with groove going on first facing bottom of cylinder and then modular ring.

d. Push piston back into barrel until end of piston is flush with modular ring.

e. Install wiper into gland nut and grease the surfaces that contact piston. Install gland nut and tighten.

f. Push piston from base end until enough clearance is obtained to install base plug.

g. Install o-ring and backup rings into position on plug and apply a heavy layer of grease.

h. Insert plug into barrel. Rotate plug until hole in plug aligns with slot in barrel. Insert hook end of lockwire into hole. Rotate plug which will pull wire into barrel.

i. Collapse cylinder to prevent damage to chrome piston surface.

BLEEDING THE CYLINDER

Before the mast is put into service, air must be bled from the hoist cylinder according to the following procedures:

1. Assemble the forks (or attachment) onto the mast carriage.

2. Without a load on the forks, extend and retract the mast through one complete cycle.

3. With the mast fully lowered, check the truck hydraulic tank and top off if necessary.

4. Extend and retract the mast completely at least four more times. This action will force air in the system to the top of the cylinder where the bleed screw is located. On masts having more than one cylinder, it will be necessary to bleed all cylinders where bleed screws are provided.

5. Extend the carriage to about ten inches off the ground.

WARNING

Stay clear of the carriage and the forks or attachment.

6. Open the bleed screw no more than one turn. The weight of the carriage will force air and hydraulic oil out of the cylinder through the bleed hole.

7. If the carriage reaches the bottom of its travel before all the air is bled, close the bleed screw and repeat steps 5 and 6.

8. When the oil stream no longer contains air bubbles, close the bleed screw.

9. Top off the hydraulic tank with clean, fresh oil.

10. Extend and retract the mast completely. If the mast doesn't operate smoothly or if it appears to be "spongy", repeat steps 2 through 9.

NOTE

MAINTENANCE

MAST TROUBLESHOOTING GUIDE

The following guide lists problems that may be encountered, the probable causes, and recommended corrective action that should be taken to restore mast to its operating condition.

WARNING

Never work on an extended or bound up mast without first attaching a sling to mast or bound up area.

NOTE: When working on bound up area, attach sling to rail and to obstructed area, recommend application of wrapping a link chain twice around the upper mast channel cross-members and secure with a hoist, crane or some other suitable lifting device. Take care not to damage any lift line, hydraulic tube or hoses.

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Mast will not lift load or lift cylinder does not move.	1. Overload.	1. Reduce load.
	2. Insufficient oil flow supplied to the cylinder, or no oil.	2. Troubleshoot truck hydraulic system for proper oil level in tank, defective pump drive or pump, damaged control valve linkage, hydraulic leaks in supply lines. Repair or replace as required.
	3. Relief setting to low.	3. Adjust relief valve. Do Not Exceed Recommendation.
		NOTE **Anytime oil is added to the truck reservoir, check lift cylinder for possible entrapment of air.**
Lifts load to partial lift height slowly or stops.	1. Low on oil.	1. Troubleshoot truck hydraulic system (See Above).
	2. Seal failure.	2. Replace seals, inspect for probable cause of failure. If failure was caused by contaminates in oil; drain flush system, replace truck filter, and refill with fresh oil.
	3. Relief setting too low.	3. Adjust relief valve. Do Not Exceed Recommendation.
	4. Mast webs warped, shimmed to light, rail not lubricated, defective rollers.	4. Check mast rollers and alignment. Repair, adjust or lubricate as necessary.

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Jerky or Spongy movement of mast.	1. Air in hydraulic system.	1. Bleed cylinder(s), trouble-shoot inlet side of truck pump system for vacuum leaks, check hydraulic oil level. Repair as necessary.
	2. Bent of damaged cylinder piston(s).	2. Disassemble, repair or replace as necessary.
	3. Mast rails improperly lubricated.	3. Lubricate as required.
	4. Stuck or defective relief valve.	4. Remove valve and check. If caused by contaminates in oil, drain, flush system, replace truck filter and refill with fresh oil.
	5. Load rollers defective or shimmed to tight.	5. Reshim or repair as necessary.
Sudden increase in lift speed.	1. Check valve failure.	1. Replace check valve.
Mast at extension drifts down slowly.	1. Defective seals.	1. Replace seals, inspect for probable causes of failure. If failure was caused by contaminates in oil, drain, flush system, replace truck filter, and refill with fresh oil.
	2. Pressure line leaking.	2. Troubleshoot all hydraulic lines and fittings. Tighten or replace as necessary.
	3. Internal check valve leaking.	3. Replace check valve.
Mast at extension fails to lower completely or partially lowers. **WARNING** **Before attempting to free or lower mast, see warning at beginning of trouble-shooting guide.**	1. Damaged lift cylinder(s).	1. Inspect, repair or replace as necessary.
	2. Mast rail bound, shimmed to tight behind load rollers.	2. Reshim.
	3. Mast rails improperly lubricated.	3. Lubricate as required.
Piston(s) drift up when load is lifted then stops.	1. Air in Cylinder(s).	1. Bleed Cylinder(s).
Lift Cylinders leak.	1. Faulty seals.	1. Replace seals.
	2. Faulty o-rings.	2. Replace o-rings. NOTE: Repack cylinder(s) if necessary.
Mast will not extend to full lift height.	1. Hydraulic oil reservoir low.	1. Add hydraulic oil to meet trucks manufacturer's specifications.

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive side movement or looseness in carriage or rails.	1. Load rollers out of adjustment.	1. Adjust as required.
Carriage and/or rails hang up or bind during operation.	1. Faulty load rollers.	1. Replace and adjust as required.
WARNING **Before attempting to free or lower mast, see warning at beginning of troubleshooting guide.**	2. Load rollers adjusted to tightly.	2. Adjust or replace as required.
Carriage side bars hitting or scraping channel members	1. Carriage rollers Improperly shimmed or excessively worn.	1. Adjust or replace carriage rollers as required.
Mast out of sequence on ascent. Rails move before carriage.	1. Carriage travel obstructed or rough running.	1. Remove obstruction. Replace or adjust thrust rollers.
	2. Worn or out of adjustment thrust rollers, carriage.	2. Replace and/or adjust.
	3. Worn or damaged main carriage rollers.	3. Replace as required.
	4. Load excessively off center.	4. Center load.
Mast out of sequence on descent, carriage lowers before rails retract.	1. Inner rail tight to center rail.	1. Reshim as required.
	2. Central rail tight to outer rail.	2. Reshim as required.
	3. Mechanical obstruction.	3. Remove obstruction.
	4. Broken load roller.	4. Replace roller.
Excessive spalling on one inner rail only.	1. Carriage roller on opposite side broken.	1. Replace roller. Remove spalled material, lightly lubricate rail.

PARTS LIST

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10864-6	Piston	4-81		07443
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10866	Shaft	4-32		07443
10869	Module, Accelerator	4-5		07443
10894	King Pin	4-25		07443
10895	Spacer, Tie Rod	4-25		07443
10897	Tie Rod End, Lh	4-25		07443
10898	Tie Rod End, Rh	4-25		07443
10910	Cover	4-41		07443
10912	Panel	4-43		07443
10920	Connector	4-52		07443
10922	Plate, Access	4-84		07443
10924	Gasket	4-83		07443
10925	Elbow, Suction	4-83		07443
10928	Scaring	4-61		07443
109:2	Shaft	4-61		07443
10933	Bracket, Mtg	4-61		07443
10938	Handle, Lift	4-61		07443
10939	Handle, Tilt	4-61		07443
10940	Handle, Pivot	4-61		07443
10941	Handle, Shift	4-61		07443
10943	Tray, Umbilical	4-31		07443
10960	Rod	4-22		07443
10962-26	Spacer	4-61		07443
10962-28.	All Thread	4-59		07443
10962-30.	Spacer	4-61		07443
10969	Clamp, Hose	4-50		07443
10970-01	Tube Assembly	4-66		07443
10970-02	Tube Assembly	4-66		07443
10971	Tube Assembly	4-66		07443
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10977	Insulator	4-59		07443
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11084	Bracket	4-70		07443
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11204	Dash Panel Assembly	4-43		07443
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11342	Insert	4-31		07443
11346	Cap, Grease	4-25		07443
11348	Cap, Grease	4-25		07443
11350	Cap, Grease	4-25		07443
11422	Manifold	4-51		07443
11771	Floor, Plate	4-5		07443
11772-01	Cover	4-5		07443
11813	Tube Assembly	4-142		07443
11877	Axle Assembly, Dr	4-8		07443
11883	Harness, Wire	4-113		07443
11885	Harness, Wire	4-107		07443
11887-01	Wheel	4-25		07443
11893	Panel Assembly, Aux	4-107		07443
11910	Plate, Mounting	4-107		07443
11921	Cover, Cont. Handles	4-5		07443
11929	Cover	4-113		07443
11932	Box, Accelerator Switch	4-113		07443
11978	Switch Assembly, Accelerator	4-111		07443
11988	Assembly, Wire	4-108		07443
12055	Spacer	4-113		07443
12056.	Spacer	4-113		07443
14004	Reservoir Assembly	4-82		07443
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14016	Plate, Mtg	4-116		07443
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14026	Bus Bar	4-91		07443
14027	Bus Bar	4-91		07443
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14044	Bus Bar	4-91		07443
14046	Bus Bar	4-91		07443
14047	Harness, Wire	4-91		07443
14051	Pump & Motor Assembly	4-52		07443
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14060	Harness, Wire	4-43		07443
14063-2	Backrest, Load	4-3		07443
14065	Elbow Mod	4-59		07443
14068	Control Cable	4-70		07443
14081-14	Disc	4-35		07443
14082	Cover, Top	4-5		07442
14086	Hydraulic Door Assembly	4-70		07443
14100	Harness, Wire, Master	4-104		07443
14101	Manifold	4-51		07443
14102	Bus Bar	4-91		07443
14103	Bus Bar	4-91		07443
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14141-01	Cable,PowerTS3	4-104		07443
14141-02	Cable, PowerTS2	4-104		07443
14141-03	Cable, Power TA2	4-104		07443
14141-04	Cable, Power TS1	4-104		07443
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14141-07	Cable, Power TA1	4-104		07443
14141-08	Cable, Power P05	4-104		07443
14141-09	Cable, Power PA1	4-104		07443
14150	Sub-Panel	4-59		07443
14151	Pump and Motor Assembly	4-3		07443
14155	Label, Term	4-104		07443
14195	Drive Assembly	4-8		07443
14196	Assembly, Hydraulic	4-49		07443
14197	Bracket, Mtg	4-3		07443
14206	Electrical Panel Assy, Int	4-104		07443
14207	Panel, Mounting	4-104		07443
14221	Steer Axle Assembly	4-25		07443
14224	Spindle, Rh	4-25		07443
14225.	Axle Weldment	4-25		07443
14227	Top Cover, Battery	4-3		07443
14232	Side Cover, Battery	4-3		07443
14233	Assembly, Wire	4-104		07443
20000	Nut	4-14	N-18-1	78500
20001	Lockwasher	4-14	1229-V-516	78500
20004	Plug	4-14	1850-R-96	78500
20005	Plug	4-14	1850-0-95	78500
20006	Spring, Return	4-15		07443
20007	Rod	4-15	1779-0-147	78500
20012	Spring, Ret	4-15		07443
20013	Tube Assembly	4-17	2847-N-560	78500
20014	Tube Assembly, Rh	4-17	3897-L-3158	78500
20015	Tube Assembly, Lh	4-17	3897-M-3159	78500
20016	Adapter	4-17	1898-E-993	78500
20017	Fitting, Brake Line	4-17	.1898-K-687	78500
20018	Adapter	4-17	1898-G-683	78500
20019	Gasket	4-17	1898-U-686	78500
20020	Elbow	4-17	1898-C-679	78500
20021	Fitting, Brake, Rh	4-17	1898-D-680	78500
20022	Nut, Jam	4-15	13-X-113	78500
20024	Lockwasher	4-15	10-X-526	78500
20025	Fitting, Bleeder Scr., Rh	4-17	1898-E-1149	78500
20026	Fitting, Bleeder Scr., Lh	4-17	1898-F-1150	78500
20028	Lockwasher	4-17	WA-15	78500
20029	Screw, Cap	4-17	S-256	78500
20030	Spacer	4-16	1744-D-4	78500
20031	Cylinder Assembly, Bk., Rh	4-15	AI-3761-D-4	78500
20032	Cylinder Assembly, Bk., Lh	4-15	AI-3761-E-5	78500
20033	Push Rod, Cylinder	4-17	1745-M-13	78500
20037	Dowel	4-15	184-Z-78	78500
20040	Bolt	4-15	A-2747-C-3	78500
20042	Lockwasher	4-12	WA16	78500
20046	Gasket	4-15	2808-N-716	78500
20047	Seal, Oil	4-15	1805-B-340	78500
20048	Cap, Wheel	4-15	3862-J-10	78500
20049	Pin, Cotter	4-16	K2414	78500
20050	Nut	4-15	14-X-47	78500
20051	Washer	4-15	1829-Y-363	78500
20052	Gear, Fd	4-15		07443
20053	Cone, Roller Brg	4-15	1788	60038
20054	Cup, Roller Brg	4-15	2720	60038
20055	Cone, Roller Brg	4-15	33891	60038
20056	Cup, Roller Brg	4-15	33821	60038
20057	Studs	4-15	4-X-1101	78500
20058	Nut, Hex	4-15	N-112-1	78500
20060	Lockwasher	4-15	WA-112	78500
20061	Bolt	4-15	3-X-195	78500
20062	Bolt	4-15	S-11219-L	78500
20063	Spindle, Wheel	4-15	3811-X-50	78500
20064	Shaft, Axle	4-15		07443
20065	Nut	4-15	N-110-1	78500

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20068	Stud	4-16	4X389	78500
20069	Lockwasher	4-15	WA-110	78500
20070	Gasket	4-16	2808X 596	78500
20071	Gasket	4-15	2808-P-614	78500
20072	Bearing	4-15	1828-Y-311	78500
20073	Coupling	4-15	1874-J-244	78500
20074	Cone, Roller Brg	4-16	368A	60038
20075	Cup, Roller Brg	4-15	362A	60038
20078	Nut	4-12	L827-T-228	78500
20079	Screw	4-12	S-269-1	78500
20081	Rtnr, Oil Seal	4-12	1805-W-309	78500
20082	Seal, Oil	4-12	1805-D-134	78500
20083	Gasket	4-12	2208-Y-389	78500
20084	Spacer, Cover	4-12	1844-0-472	78500
20085	Washer	4-12	1829-W-673	78500
20089	Cover, Housing	4-12	3826-R-252	78500
20090	Gasket, .005 in	4-12	2808-Y-597	78500
20091	Gasket, .010 In	4-12	2808-Z-598	78500
20092	Rivet	4-12	17-X-161	78500
20093	Retainer	4-12	1229-V-828	78500
20095	Bearing	4-12	1228-N-66	78500
20096	Race, Bearing	4-12	1221-H-34	78500
20097	Ring, Snap	4-12	1854-C-237	78500
20098	Bearing	4-12	L828-D-108	78500
20104	Screw	4-12	15-X-249	78500
20105	Case, Diff	4-12	3235-E-1487	78500
20106	Case, Diff	4-12	3235-C-1485	78500
20107	Housing, Differential	4-12	3801-A-547	78500
20112	Hsg., Axle Lh	4-15	3897-R-1032	78500
20113	Hsg., Axle Rh	4-15	3897-T-1034	78500
20114	Boot	4-17	5975	63477
20115	Piston	4-17	5981	63477
20116	Strain Relief	4-103	2535	59730
20117	Relay	4-103	889G2	80495
20118	Diode, 9 Rec	4-103	IN5625	09214
20119	Term Strip	4-103	18-140	71785
20120	Jumper	4-103	J141-J-1	71785
20121	Cup	4-17	FC857	63477
20122	Spring	4-17	FC860	63477
20123	Housing, Rh	4-17	FD4146	63477
20124	Housing, Lh	4-17	FD4147	63477
20125	Strain Relief	4-104	2521	59730
20126	Strain Relief	4-104	2523	59730
20150	Motor, Traction	4-8		07443
20151	Bushing Assembly	4-10		07443
20152	Brush	4-10		07443
20153	Spring	4-10		07443
20154	Bearing	4-10	894A605ZK007	01288
20155	Brg., Comm End	4-10	894A605ZK006	01288
20156	Armature Assembly	4-10		07443
20157	Shield End	4-10		07443
20158	Frame	4-10		07443
20159	Shield, End	4-10		07443
20160	Kit, Brush	4-10		07443
20162	Cover, Top	4-10		07443
20163	Cover, Bot	4-10		07443
20164	Cover, De	4-10		07443
20165	Coils, Field	4-10		07443
20211	Cap, Filler	4-87	FC12103	63477
20212	Cylinder, Ma. Bk	4-87	FE17207	63477
20213	Boot	4-87	FC9096	63477
20214	Lockwire	4-87	FC8959	63477
20215	Plate, Stop	4-87	FC8958	63477
20216	O-Ring	4-87	FC17426	63477
20217	Piston Assembly	4-87	FC17096	63477

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20219	Spring	4-87	FC17214	63477
20220	V & Seat Assembly	4-87	FCL3702	63477
20221	Casting	4-87	17095	63477
20223	Kit, Service	4-87		07443
20230	No Spin Differential	4-12		07443
20231	Gear, Side - Lh	4-13		07443
20232	Retainer	4-13		07443
20233	Spring	4-13		07443
20234	Clutch Assembly Lh	4-13		07443
20235	Spider Assembly	4-13		07443
20236	Clutch Assembly Rh	4-13		07443
20237	Gear, Side Rh	4-13		07443
20294	Contactor	4-91		07443
20326	Spring	4-15	2758-E-5	78500
20336	Shoe & Lng. Assembly	4-15		07443
20339	Kit, Service	4-15		07443
20343	Wheel	4-14		07443
20344	Plate, Backing	4-15	A5-3736X232	78500
20345	Case, F.D.	4-15	3875R460	78500
20346	Kit, Gear	4-12		07443
21000	Motor, Pump	4-54		07443
21001	End Bell, Dr	4-54		07443
21002	Screw	4-54		07443
21004	Cover, DE	4-54		07443
21005	Screw	4-54		07443
21007	Frame	4-53		07443
21009	Fan Cover	4-53		07443
21011	Screw	4-54		07443
21014	Screw	4-53		07443
21015	Spring, Brush	4-53		07443
21016	Brush	4-53		07443
21020	Cover	4-53		07443
21021	Bearing, CE	4-54	36A28977004	01288
21022	End Bell, CE	4-53		07443
21024	Screw	4-53		07443
21025	Foot, CE	4-53		07443
21029	Screw	4-53		07443
21031	Fan	4-53		07443
21032	Snap Ring	4-53		07443
21034	Foot, DE	4-54		07443
21038	Key Fan	4-53		07443
21039	Bearing, DE	4-54	36A28977005	01288
21040	Stud & Tube	4-54		07443
21042	Kit, Brush	4-54		07443
21043	Armature Assembly	4-54		07443
21044	Coils, Field	4-54		07443
21150	Pump	4-57	V2010-1F13S5S-1AB10LH	62983
21151	Bolt	4-57	108561	62983
21152	Cover	4-57	372865	62983
21153	O-Ring	4-57	199822	62983
21154	Spring	4-57	345626	62983
21155	Plate, Press	4-57	373795	62983
21156	Vanes 12	4-57	92350	62983
21157	Rotor	4-57	351247	63983
21158	Ring	4-57	317678	62983
21159	O-Ring	4-57	199823	62983
21160	Pin	4-57	2456	62983
21161	Bolt	4-57	96168	62983
21162	Body, Inlet	4-57	357292	62983
21163	O-Ring	4-57	154090	62983
21164	Vanes 1l2	4-57	923479	62983
21165	Rotor	4-57	358337	62983
21166	Ring	4-57	331807	62983
21167	Pin	4-47	7688	62983
21168	Plate, Press	4-57	358347	62983

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21169	O-Ring	4-57	154022	62983
21170	Spring	4-57	309795	62983
21171	Body	4-57	31510	62983
21172	Seal, Shaft	4-57	229236	62983
21173	Snap Ring	4-57	160686	62983
21174	Bearing	4-57	82938	62983
21175	Shaft	4-57	351249	62983
21176	Snap Ring	4-57	140356	62983
21177	Key	4-57	9955	62983
21178	Kit, Service	4-57		07443
21179	Kit, Cartridge	4-57		07443
21180	Kit, Cartridge	4-57		07443
21190	Bearing	4-29	B16L	51588
22000	Valve Assembly, Cant	4-63	CM11N01R20DDD-E21	62983
22001	Nut	4-63	1454	62983
22002	Rod	4-63	223153	62983
22004	Plug	4-63	186580	62983
22005	O-Ring	4-63	154129	62983
22006	Spring	4-63	259871	62983
22007	Vive, Relief	4-63	232799	62983
22008	Section, Inlet	4-63	CM11NO1R20D	62983
22009	Screw	4-63	282027	62983
22010	Retainer	4-63	284154	62983
22011	Sleeve	4-63	284155	62983
22012	O-Ring	4-63	187000	62983
22013	Ring, Quad	4-63	282971	62983
22014	Spring, Ctrg	4-63	246632	62983
22015	Washer, C	4-63	284156	62983
22022	Ring, Back-Up	4-63	286669	62983
22023	Ring, Quad	4-63	283856	62983
22024	Seal	4-63	223493	62983
22025	Seal	4-63	223489	62983
22026	Seal	4-63	226161	62983
22027	Retainer	4-63	237736	62983
22028	Sect, Center	4-63	CM11-NO1R20-DD	62983
22029	Sect, Outlet	4-63	CM1 1-NOR20-DDD-E	62983
22030	Shims	4-63	307198	62983
22033	Kit, Service	4-63		07443
22050	Valve Assy, Cont. Lift	4-65	CM11NO2R20TL-E21	62983
22051	Bolt	4-65	146835	62983
22052	Sect. Inl	4-65	CM11-NO02R20	62983
22053	Inlet, Sp T	4-65	NO P/N	62983
22054	Sect, Outlet	4-65	CM11-NO1R	62983
23201-03	Mast Assembly	4-121		07443
23252	Shim	4-125		07443
23279	Screw, Bleed	4-133		07443
23280	Washer, Seal	4-133		07443
23309	Nut, Lock	4-131		07443
23312	Anchor, Chain	4-131		07443
23319	Lockwasher	4-125		07443
23322	Bolt, Hex	4-125		07443
23350	O-Ring	4-139		07443
23352	Lockwasher	4-141		07443
23358	Ring, Snap	4-141		07443
23360	Shaft	4-141		07443
23361	Bolt, Lock	4-141		07443
23370-3	Upright Assembly, Inner	4-125		07443
23371-3	Upright, Inner	4-125		07443
23372	Retainer, Cylinder	4-125		07443
23373-3	Upright Assembly, Intermediate	4-127		07443
23374-3	Upright, Intermediate	4-127		07443
23375	Screw, Flat Head	4-127		07443
23376	Stop	4-127		07443
23377	Screw, Socket Head	4-127		07443
23378-3	Upright Assembly, Outer	4-129		07443
23379-3	Upright, Outer	4-129		07443

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23380	Shim	4-129		07443
23381	Roller	4-129		07443
23382	Brace	4-129		07443
23383	Bolt, Hex	4-129		07443
23384	Lockwasher	4-129		07443
23385	Screw, Socket Head Cap	4-129		07443
23386-3	Chain Group	4-131		07443
23387-11	Chain, Secondary	4-131		07443
23387-3	Chain, Primary	4-131		07443
23388	Shield, Grease	4-131		07443
23389	Ring, Snap	4-131		07443
23390	Ring, Snap	4-131		07443
23391	Bearing	4-131		07443
23392	Tire	4-131		07443
23393	Pin, Cotter	4-131		07443
23394	Retainer, Chain	4-131		07443
23396	Pin, Cotter	4-131		07443
23397	Pin, Chain	4-131		07443
23398	Crosshead, Cylinder	4-131		07443
23399	Seal, Oil	4-131		07443
23400-3	Cyl. Assy., Lift Primary	4-133		07443
23401-3	Barrel	4-133		07443
23402-3	Piston	4-133		07443
23403	Nut, Gland	4-133		07443
23404	Wiper	4-133		07443
23405	Ring, Wear	4-133		07443
23406	Ring, Modular	4-133		07443
23407	Seal	4-133		07443
23408	Ring, Wear	4-133		07443
23409	O-Ring	4-133		07443
23410	Ring, Back-Up	4-133		07443
23411	Base	4-133		07443
23412	Lockwire	4-133		07443
23413	Key	4-133		07443
23415-3	Cyl. Assy., Lift, Lh. Secondary	4-134		07443
23416-3	Cyl. Assy., Lift, Rh. Secondary	4-137		07443
23417	Kit, Service	4-133		07443
23418-3	Barrel, Lh.	4-134		07443
23419-3	Piston	4-134		07443
23420	Nut, Gland	4-134		07443
23421	Wiper	4-134		07443
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23423	Ring, Modular	4-134		07443
23424	Seal	4-134		07443
23425	Spacer	4-134		07443
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23427	O-Ring	4-134		07443
23428	Ring, Back-Up	4-134		07443
23429	Base	4-134		07443
23430	Ring, Snap	4-134		07443
23431.	Lockwire	4-134		07443
23433-3	Barrel, Rh	4-137		07443
23435	Roller, Thrust	4-141		07443
23436	Washer	4-141		07443
23437	Screw, Socket, Flat Head	4-141		07443
23438	Stop	4-141		07443
23439	Bolt, Hex	4-141		07443
23440-3	Hose Group	4-139		07443
23441-3	Hose	4-139		07443
23442	Roller Assembly, Hose	4-139		07443
23443	Roller, Hose	4-139		07443
23444	Bearing	4-139		07443
23445	Ring, Snap	4-139		07443
23446	Ring, Snap	4-139		07443
234 474	Fitting	4-139		07443
23448	O-Ring	4-139		07443

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23451	Regulator, Flow	4-139		07443
23452	O-Ring	4-139		07443
23453	Adapter	4-139		07443
23454	Hose	4-139		07443
23455	Flange Assembly, Split	4-139		07443
23456	O-Ring	4-139		07443
23457	Adapter	4-139		07443
23482	Kit, Service	4-134		07443
23500	Coil Repl	4-101		07443
23501	Spring	4-101		07443
23503	Insulator Assembly	4-101		07443
23504	Detent	4-101		07443
23505	Insulator	4-101		07443
23506	Kit, Contact	4-101		07443
23507	Solenoid Assembly	4-101		07443
23508	Guide, Bridge	4-101		07443
23509	Insul Tubing	4-101		07443
23511	Core & Rod Assembly	4-101		07443
23700	Chain Group	4-36		07443
23702	Pin, Dowel	4-36	28420-437A-20	56878
23703	Connector, Str	4-49	6-SA-2	92985
23704	Elbow, Bulkhead, 90	4-68	6-37-108	92985
23705	Elbow, 90 Deg	4-68	6-SA-6	92985
23706	Elbow, 90 Deg., Lg	4-68	6-SAL-6	92985
23707	Tee, Side	4-68	6-SW-9	92985
23708	Elbow, Bulkhead, 90	4-68	10-37-108	92985
23866	Assembly, Mtg. Half, Battery	4-6	EC58168	80495
23868	Assembly, Fan	4-104		07443
23868-1	Fan	4-108		07443
23875	Assembly, Lkg. Half, Battery	4-6	5821 B	80495
23876	Connector, Battery	4-6		07443
23893	Kit, Service	4-6		07443
23896	Socket, Relay	4-104		07443
23937	Setscrew, Socket	4-25		07443
23938	Setscrew, Soc	4-35	NK565E813-H16	02615
23941.	Pedal, Brake	4-86	A3577	70750
23942	Pad. Pedal	4-86	A2549	70750
23951	Plug	4-113	K-5	23540
25000	Yoke End	4-68	2708-4A	71843
25001	Pin, Yoke	4-19	2708-1/2-3A	71843
25002	Pin, Yoke	4-8	2708-1/2-4A	71843
25003	Spring	4-20		07443
25004	Spring	4-20		07443
25005	Plate, Backing	4-20	315933	14894
25006	Kit, Brake, Parking	4-29		07443
25008	Brg., Thrust	4-25	T126	60038
25009	Brg., Thrust	4-25	TT-2006-1	70901
25010	Seal, Oil	4-25	63X1357	73680
25011	Cup, Inner Roller Brg	4-25	25520	60038
25012	Cone, Inner Roller Brg	4-25	25580	60038
25013	Cup, Outer Roller Brg	4-25	14274	60038
25014	Cone, Outer Roller Brg	4-25	14125A	60038
25016	Chain, Leaf	4-31		07443
25017	Washer, Thrust	4-32		07443
25021	Spring	4-86	LE-069F-7MW	84838
25023	Sw., Stop Light	4-86	8626	13445
25024	Bolt, Swvl, Ftg	4-86	FC3474	63477
25025	Seal, Washer	4-86	FC602	63477
25026	Seal, Washer	4-86	FC603	63477
25027	Bearing	4-86	AA838-4	63477
25028	Ftg., Swvl. Bit	4-86	FC5733	63477
25030	Spring	4-22	9-1632036	43766
25031	Sheave	4-22	2012-1	43766
25032	Yoke	4-22	2708-3A	71843

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25035	Switch	4-113		07443
25036	Switch, Key	4-43	956-8111	13445
25037	Indicator, Btry. Cap	4-43	853G2	80495
25038	Switch	4-43	5027	13445
25040	Column, Strg	4-41	204-1027-004	96151
25041	Wire Assembly	4-46	5380-6	96151
25042	Ring, Contact	4-46	21149	96151
25045	Kit, Horn Btn	4-45	208-1013-002	96151
25046	Valve, Check	4-70	JC3	36358
25047	Snubber	4-70	12MR4E	99752
25048	Sw. Press, Low	4-73		07443
25049	Sw. Press, High	4-73		07443
25051	Meter, Hour	4-107	12729-08	18583
25052	Fuse	4-107	AGC10	71400
25054	Floodlight	4-115	G5523	78422
25055	Tail/Brake Light	4-3	210/36V	78422
25059.	Filter	4-85	M4008	27473
25060	O-Ring	4-83	2-236	02697
25061	Assembly, Cap, Breather	4-84	Type 700	99381
25064	Accumulator	4-76	4228-8000-87	26337
25065	Filter Assembly, Ind	4-77		07443
25066	Filter Assembly	4-77	301161N2500-529206-5125	92863
25067	Indicator	4-41	909421-25	92863
25068	Filter, Element	4-77	529206-5126	92863
25070	Horn	4-116	24S-50	21003
25071	Driver, Coil	4-93	1C3645CPM1RDA2	02989
25072	Valve, Sol	4-70	203-4-36A	82271
25073	Pushbutton Assembly	4-44	CR2940UM-200AC	02295
25074	Block, Contact	4-44	CR2940U202	02295
25076	Resistor	4-107	1718	44655
25077	Strip, Term	4-107	5-140	71785
25078	Fuse holder	4-107	HKP	71400
25079	Plate, Mtg	4-59	TC5342A	59730
25080	TY-Rap	4-107	TY-25M	59730
25081	Pin, Clevis	4-86	35	71177
25082	Grommet	4-113	3837	70485
25084	Yoke	4-111	2708-2A	71843
25085	Pin, Clevis	4-111	2708-1/2-2A	71843
25086	Ring, Retaining	4-113	5100-62	79136
25087	Strip, Term	4-70	8-140	71785
25088	Knob	4-43	8113-10	13445
25089	Ring, Retaining	4-43	5100-110	79136
25090	Screw, Soc. Head	4-43	72531-5C-12	56878
25091	Handle	4-43	190	80813
25092	Rivet	4-41	4460	79038
25093	Switch Assembly, Emer	4-41		07443
25094	Nut, Strg. Wheel	4-46	21084	96151
25095	Tape	4-45	77866	02295
25097	Ring, Piston	4-81		07443
25098	Bearing	4-81		07443
25099	Ring, Nylon	4-81		07443
25100	Seal	4-81		07443
25101	O-Ring	4-81		07443
25102	O-Ring	4-81		07443
25103	Ring, Back-Up	4-81		07443
25104	Ring, Snap	4-81		07443
25105	Seal	4-81		07443
25106	Ring, Nylon	4-81		07443
25107	Ring, Wiper	4-81		07443
25112	Bearing	4-80		07443
25113	Ring, Nylon	4-80		07443
25114	Seal	4-80		07443
25115	O-Ring	4-80		07443
25116	O-Ring	4-80		07443
25117	Ring, Snap	4-80		07443

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25118	Seal	4-80		07443
25119	Ring, Nylon	4-80		07443
25120	Ring, Wiper	4-80		07443
25122	Ring, Back-Up	4-80		07443
25123	Bearing, Thrust	4-24	TT3001-3	70901
25124	Nut, Flex Loc	4-24	37FA1011	56878
25132	Latch	4-70	14-10-72-11	94222
25134	Power Fuse	4-91	ALS400	71400
25135	Lng. Assy., Shoe	4-20		07443
25138	Connector	4-70	1-48027-0	00779
25151	Cone, Roller Brg	4-38	28520	60038
25152	Cup, Roller Brg	4-38	28521	60038
25153	Bearing, Needle	4-25	BH2020	60380
25154	Locknut	4-38	TN09	60038
25155	Lockwasher	4-38	TW109	60038
25170	Relay, Dpot., 36VDC	4-104		07443
25171	Lever, Hand Brake	4-23	01009403	92867
25174	Slide Assy., Tel	4-32		07443
25175	Crosshead Assy	4-33		07443
25176	Bearing Assy., Side Thrust	4-32		07443
25177	Bearing, Assy., Vert. Ldg	4-32		07443
25213	Module, Time Delay	4-104	IC3645CPM1TDD03	02989
25500	Elbow, Swvl	4-70	10-SW-6	92985
25501	Tee	4-78	10-37-27	92985
25502	Connector	4-70	6-8 PC-11	92985
25503	Elbow, 90 Deg	4-70	6-6-37-6	92985
25504	Plug, Tube	4-70	4-37-17	92985
25505	Tee, Tube	4-70	6-37-11	92985
25506	Connector, Str	4-70	10-37-2	92985
25507	Nut	4-70	6-37-15A	92985
25508	Reducer, Tube	4-70	6-4-37-TR	92985
25509	Tee, Pipe	4-70	2-PC-25	92985
25510	Connector	4-70	4-2-PC-11	92985
25511	Elbow	4-59	10-SA-6	92985
25512	Tee	4-89	3-37-11	92985
25515	Tee, Side, Male	4-76	6-37-9	92985
25516	Elbow, 90 Deg	4-49	6-8-SA-6	92985
25517	Elbow, 90 Deg	4-50	6-8-SALX-6	92985
25518	Elbow	4-59	12-SA-6	92985
25520	Connector, Str	4-49	6-8-SA-2	92985
25521	Plug, Pipe	4-50	2HP	92985
25522	Elbow	4-59	10-SALX-6	92985
25525	Elbow	4-17	3-37-6	92985
25526	Connector, Str	4-68	10-37-4	92985
25527	Elbow	4-49	16-16-AM-90	92985
25528	Connector, Str	4-49	6-8-37-2	92985
25531	Connector, Str	4-49	6-37-104	92985
25532	Clamp	4-49	5416	81646
25535	Fitting, Hose	4-49	186100H12-125	01276
25538	Clamp	4-49	5428	81646
25541	Elbow	4-59	12-8-37-6	92985
25544	Valve, Check	4-50	VCL-12P-05-A-10	92003
25547	Elbow, 90 Deg	4-49	10-12-37-6	92985
25548	Connector, Str	4-50	10-12-37-2	92985
25551	Potentiometer	4-113		07443
25568	Hose, Suction	4-50	2661-24	01276
25569	Guard, Valve	4-76	A66725-207	26337
25570	Nut, Valve	4-76	AG-133	26337
25571	Valve Assy	4-76	A768-240	26337
25573	Plate, Cover	4-76		26337
25574	Core, Valve	4-76	AG-138	26337
25576	Screw, Truss Hd	4-115	54-0391-3	78422
25577	Washer	4-115	54-0388-8	78422
25578	Lamp, Sealed Beam	4-115	4350	08108
25579	Guard	4-115	54-0910-3	78422
25580	Lens	4-114	3042	78422

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25582	Bulb	4-114	110	08108
25583	Body, Tail/Br. Light	4-114		78422
25585	Switch	4-59	BZ-2RW822T	91929
25586	Elbow, 90 Deg	4-51	6-8-37-6	92985
25587	Plug	4-43	SS51074	50808
25588	Elbow, 90 Deg	4-49	12-37-6	92985
25589	Elbow, 90 Deg	4-49	12-SAL-6	92985
25591	Elbow, 90 Deg	4-49	10-B-SA-6	92985
25592	Clamp	4-49	5412	81646
25594	Connector, Str	4-50	16-16-AM-180	92985
25595	Connector, Str	4-50	4-37-2	92985
25596	Elbow, Swivel	4-50	4-SW-6	92985
25597	Connector, Str	4-51	12-12-AM-180	92985
25598	Connector, Str	4-51	3-37-2	92985
25600	Switch	4-5	BZE6-2RN	91929
25607	Hairpin, Cotter	4-7	LHCOT-2	27797
25608	Ring, Split	4-7	LSP-932	27797
25609	Pin, Clevis	4-23		07443
25610	Spacer	4-23	81-000155	92867
25612	Brush Assy., Horn	4-46	6689	96151
25613	Column, Strg	4-46		07443
25614	Screw, Slftpg	4-46	21144	96151
25615	Pin, Clevis	4-22	33	71177
25616	Screw, Btnhd	4-31		07443
25617	O-Ring	4-77		07443
25618	Strip, Rubber	4-70		07443
25620	Seal, Oil	4-47		07443
25621	Ring, Snap	4-47		07443
25622	Bushing	4-47		07443
25623	Seal, O-Ring	4-47		07443
25624	Seal, Quad Ring	4-47		07443
25625	Race, Thrust	4-47		07443
25626	Bearing, Needle Thrust	4-47		07443
25627	Parts Assy., Cont	4-47		07443
25628	Plate, Spacer	4-47		07443
25629	Drive	4-47		07443
25630	Seal	4-47		07443
25632	Cap, End	4-47		07443
25634	Clamp, Cable	4-72	8585	71785
25635	Release Assy	4-72	31626	82271
25636	Washer	4-72	43107	82271
25637	Plunger	4-72	31111	82271
25639	Coil	4-72	31110	82271
25640	Shell	4-72	31108	82271
25641	Pkg, O-Ring	4-72	A-111	82271
25642	Washer, Wave	4-72	100231	82271
25643	Rod	4-72	31504	82271
25646	Spacer	4-72	31512	82271
25647	Spring	4-72	31513	82271
25653	Plate	4-72	31408	82271
25654	Tube	4-72	31612	82271
25655	Stop	4-72	111143	82271
25657	Ball, Steel	4-72		82271
25658	Seat, Pilot	4-72	111124	82271
25659	Spring	4-72	111493	82271
25660	Seat Assy., Valve	4-72	112053	82271
25661	Body	4-72	111106	82271
25662	O-Ring	4-72	A-212	82271
25663	Washer	4-72	31611	82271
25664	Housing	4-115		07443
25665	Lockwasher	4-115		07443
25678	Pin	4-47		07443
25679	Spring, Centering	4-47		07443
25680	Check Valve	4-47		07443
25681	Arm, Lever	4-31A	CL9007, Type MA-11	81487

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25702	Screw, Cap	4-47		07443
25707	Gear Set, Gerotor	4-47		07443
25708	Spacer	4-47		07443
4281-01	Retainer	4-5		07443
4281-02	Retainer	4-59		07443
4821-01	Nut, Rh. Thd	4-25		07443
4821-02	Nut, Lh. Thd	4-25		07443
50000-08	Hose Assy.	4-70		07443
50002-027	Hose Assy.	4-49		07443
50002-030	Hose Assembly	4-50		07443
50002-036	Hose Assy.	4-50		07443
50003-08	Hose	4-51	2583-16	01276
5000 3-09	Hose	4-50	2583-16	01276
50003-10	Hose	4-50	2583-16	01276
50012-05	Hose Assy	4-50		07443
50013-27	Hose Assy.	4-50		07443
50013-29	Hose Assy.	4-49		07443
50013-30	Hose Assy.	4-49		07443
50013-34	Hose Assy.	4-50		07443
50013-37	Hose Assy.	4-68		07443
50013-38	Hose Assy	4-50		07443
50013 -39	Hose Assy.	4-51		07443
50013-40	Hose Assy	4-51		07443
50013-41	Hose Assy	4-51		07443
50013-42	Hose Assy.	4-49		07443
50013-43	Hose Assy.	4-49		07443
50013-46	Hose Assy.	4-50		07443
50013-47	Hose Assy	4-50		07443
50013-49	Hose Assy.	4-68		07443
50013-50	Hose Assy.	4-68		07443
50013-51	Hose Assy.	4-49		07443
50013-52	Hose Assy.	4-51		07443
50013-53	Hose Assy.	4-50		07443
50013-54	Hose Assy	4-51		07443
50013-92	Hose Assembly	4-66		07443
50014-08	Hose	4-50	2583-12	01276
50014-09	Hose	4-50	2582-12	01276
50016-01	Hose Assy.	4-49		07443
50016-02	Hose Assy.	4-49		07443
50016-08	Hose Assy.	4-50		07443
50016-09	Hose Assy.	4-142		07443
50016-10	Hose Assy.	4-50		07443
50016-24	Hose Assembly	4-142		07443
50260-1	Insulation	4-99		07443
50260-11	Spring, Return	4-99		07443
50260-12	Washer, Nm	4-99		07443
50260-14	Sub Assy., Sol	4-99		07443
50260-1 5	Nut, Flex-Loc	4-99		07443
50260-16	Screw, Fit. Hd	4-99		07443
50260-17	Screw, Fit. Hd	4-99		07443
50260-18	Screw, Rd. Hd	4-99		07443
50260-19	Lockwasher	4-99		07443
50260-2.	Insulation	4-99		07443
50260-20	Washer, Flat	4-99		07443
50260-21	Lockwasher	4-99		07443
50260-22	Lockwasher	4-99		07443
50260-23	Lockwasher	4-99		07443
50260-24	Guide, Oper.	4-99		07443
50260-25	Screw, Hex. Hd	4-99		07443
50260-26	Lockwasher, Brz	4-99		07443
50260-36	Kit, Service	4-99		07443
50260-37	Coil	4-99		07443
50260-38	Core & Rod Assy.	4-99		07443
50260-7	Guide, Bridge	4-99		07443
50260-8	Insulator Assy.	4-99		07443

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DII P/N	DESCRIPTION	PAGE NO.	MFG. P/N	FSCM
50275-03	Wire Assembly	4-113		07443
50275-04	Wire Assembly	4-113		07443
5032	Bracket, Mtg	4-19		07443
50331	Tire	4-25		07443
50334	Screw, Adj	4-36		07443
50339	SCR Control	4-96	IC3645SCR1E3TOXFAE	02989
50339-1	Main SCR 1 Rec	4-96	19485399G10	02989
50339-10	Diode 4 Rec	4-96	259A9208PXBR	02989
50339-11 .	SCR 2 Rec	4-96	259A2135G1	02989
50339-12	SCR 5 Rec	4-96	259A2138G1	02989
50339-13	Block, Power Conn	4-96	136C2305G1	02989
50339-14	Fitrs. 3, 5 Rec	4-96	194B5393G1	02989
50339-15	Sensor	4-96	259A8750G1	02989
50339-16	Xmfr. & Choke	4-96	136C2306G1	02989
50339-17	Filter #3 Rec	4-96	259AB759G1	02989
50339-2	Thrm. Protector	4-96	19486376G	02989
50339-20	Shunt	4-96	245A6991G1	02989
50339-22	Screw, Pan Hd. SI	4-96	N144P13018C6	02989
50339-3	Capacitor	4-96	259A5523P2	02989
50339-4	Oscillator Card	4-96	1C36450SC1E3	02989
50339-7	Card Conn. Block	4-96	194B6385G1	02989
50339-8	Card Conn	4-96	19486388G1	02989
50339-9	Diode 3 Rec	4-96	259A9208PXCR	02989
5034	Brake Assembly	4-20		07443
50361	Tube Assy	4-66		07443
50364	Nut. Hex	4-25		07443
50367	NPL, Warning	4-107		07443
50369	Kit, Seal	4-47		07443
50379-16	Connector, Cross	4-10		07443
50382-01	Knob Lift	4-61		07443
50382-02	Knob Tilt	4-61		07443
50382-03	Knob Pivot	4-61		07443
50382-04	Knob Shift	4-61		07443
5039-1	Pin, Cylinder	4-68		07443
50390	Thermostat	4-82		07443
50393-2	Tire	4-8		07443
50398	Contractor, F., R	4-101		07443
5057	Rod, Brake	4-19		07443
50619	O-Ring	4-29	50001-330-0010	91561
50620	Ring, Back-Up	4-29	50011-330	91561
50621	Gland/Bushing	4-29	19018-303	91561
50622	Seal, Gland	4-29	5001-228-0260	91561
50623	Seal, Rod	4-29	50001-214-0010	91561
50624	Wiper, Rod	4-29	50051-309	91561
50626	Spacer	4-29	39003-103	91561
50627	Lock Nut	4-29	50067-108-5010	91561
50628	Seal, Rod-Piston	4-29.	50001-210-0010	91561
50629	Lock-Ring	4-29	50024-250-1010	91561
50630	Lock-Ring	4-29	50023-225-1010	91561
50633	Kit	4-29	19012-303	91561
50681	Battery	4-3		07443
50695	Thermostat	4-8		07443
50697	Seat	4-7	WM127SP	27797
50753	Piston	4-29	39004-301	91561
50754	Tube Assembly	4-29	8112-010-TB	91561
50755	Rod	4-29	7206-120-1250	91561
5364-03	Pin, Chain	4-36		07443
5423	Pivot Shaft	4-38		07443
5438	Gasket	4-38		07443
5510-2	Dust Cover	4-38		07443
5619-51	Kit, Service	4-17		07443
5806-1	Forks	4-3		07443
6623	Cover, Roller	4-35		07443
6709	Bearing, Side	4-35		07443
6719	Strap, Ground	4-9		07443
6775	Crank, Brake	4-8		07443

PARTS LIST BY DII PART NUMBER

DII P/N	DESCRIPTION	PAGE NO.	MFG. P/N	FSCM
6840	Clip, Trng	4-22		07443
6855-100	Kit, Service	4-72		07443
6930	Bracket, Switch	4-5		07443
6982	Tilt Cylinder	4-68		07443
6982-1	Nut	4-78		07443
6982-10	O-Ring	4-78		07443
6982-11	Back-Up Ring	4-78		07443
6982-12	Seal	4-78		07443
6982-13	Nylon Ring	4-78		07443
6982-14	Gland	4-78		07443
6982-15	Wiper Ring	4-78		07443
6982-2	Bearing	4-78		07443
6982-20	Snap Ring	4-78		07443
6982-25	Kit Service	4-78		07443
6982-3	Ring Nylon	4-78		07443
6982-4	Seal	4-78		07443
6982-5	O -Ring	4-78		07443
6982-6	Piston	4-78		07443
6982-7	Shell Assy.	4-78		07443
6982-8	Rod	4-78		07443
6982-9	Bearing	4-78		07443
7095	Support Motor	4-8		07443
7173	Hub Cover	4-25		07443
7443	Washer, Flat	4-25		07443
7464	Gasket	4-51		07443
7840-06	Spacer	4-29		07443
7859	Anchor, Chain	4-36		07443
7971	Bearing	4-32		07443
7978	Wheel, Strg	4-45		07443
7979	Adapter, Horn	4-45		07443
8210	Follower, Cam.	4-32		07443
8212-03	Cylinder Assembly, Steer	4-25		07443
8532	Rod End, Cyl	4-25		07443
8537	Pin, Cyl. Mtg.	4-25		07443
8543	Coupling Assy.	4-19		07443
8543-2	Kit, Chain	4-19		07443
8874-3	Cable, Brake	4-22		07443
9235	Spacer	4-38		07443
9236	Spacer	4-38		07443
9237	Pvt. Shaft Assy.	4-31		07443
9243-124	Spacer	4-78		07443
9243-39	Spacer	4-80		07443
9281-1	Cover	4-114		07443
9281-2	Housing	4-114		07443
9623	Cplg., Chain	4-55		07443
9623-2	Kit, Chain	4-55		07443
9623-5	Group, Sprocket	4-55		07443
9640	Block, Fuse	4-91		07443
9772	Bushing	4-121		07443
9933	Rod End	4-78		07443
9934-01	Pin, Pivot	4-31A		07443
9952	Bushing	4-121		07443
9973	Plug Mod	4-49		07443

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DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
A-111	Pkg., 0-Ring	4-72	25641	82271
A-212	O-Ring	4-72	25662	82271
A-2747-C-3	Bolt	4-15	20040	78500
AA838-4	Bearing	4-86	25027	70901
AG-133	Nut, Valve	4-76.	25570	26337
AG-138	Core, Valve	4-76	25574	26337
AGC10	Fuse	4-107	25052	71400
AI-3761-D-4	Cylinder Assembly, Bk., Rh	4-15	20031	78500
AI-3761-E-5	Cylinder Assembly, Bk., Lh	4-15	20032	78500
ALS400	Power Fuse	4-91	25134	71400
A2549	Pad. Pedal	4-86	23942	70750
A3577	Pedal, Brake	4-86	23941	70750
A5-3736X232	Plate, Backing	4-15	20344	78500
A66725-207	Guard, Valve	4-76	25569	26337
A768-240	Valve Assy	4-76	25571	26337
BH2020	Bearing, Needle	4-25	25153	60380
BZ-2RW822T	Switch	4-59	25585	91929
BZE6-2RN	Switch	4-5	25600	91929
616L	Bearing	4-29	21190	51588
CL9007, Type MA-11	Arm, Lever	4-31A	25681	81487
CM11-NO01R20-D	Sect, Inl	4-63	22008	62983
CM11-NO1R20-DD	Sect. Center	4-63	22028	62983
CM 11-NO1R20-DDD-E	Sect. Outlet	4-63	22029	62983
CM11-NO2R20	Sect, Inl	4-65	22052	62983
CM11-NO1R	Sect. Outlet	4-65	22052	62983
CM11NO2R20TL-E21	Valve Assy., Cont. Lift	4-65	22050	62983
CM11NO1R20DDD-E21	Valve Assembly, Cont	4-63	22000	62983
CR2940UM-200AC	Pushbutton Assembly	4-44	25073	02295
CR2940U202	Block, Contact	4-44	25074	02295
EC5816B	Assembly, Mtg. Half, Battery	4-6	23866	80495
FCL3702	V & Seat Assembly	4-87	20220	63477
FC12103	Cap, Filler	4-87	20211	63477
FC17096	Piston Assembly	4-87	20217	63477
FC17214	Spring	4-87	20219	63477
FC17426	O-Ring	4-87	20216	63477
FC3474	Bolt, Swvl. Ftg	4-86	25024	63477
FC5733	Ftg., Swvl. Bit	4-86	25028	63477
FC602	Seal, Washer	4-86	25025	63477
FC603	Seal, Washer	4-86	25026	63477
FC857	Cup	4-17	20121	63477
FC860	Spring	4-17	20122	63477
FC8958	Plate, Stop	4-87	20215	63477
FC8959	Lockwire	4-87	20214	63477
FC9096	Boot	4-87	20213	63477
FD4146	Housing, Rh	4-17	20123	63477
FD4147	Housing, Lh	4-17	20124	63477
FD7000	Cup, Piston	4-87	20218	63477
FE17207	Cylinder, MA Bk	4-87	20212	63477
F F707-3	Bearing	4-22	25033	70901
G5523	Floodlight	4-115	25054	78422
HKP	Fuseholder	4-107	25078	71400
IC3645CPM1TDD3	Module, Time Delay	4-104	25213	02989
IC36458CR1E3ROXFAE	SCR Control	4-96	50339	02989
IN5625	Diode, 9 Rec	4-103	20118	09214
JC3	Valve, Check	4-70	25046	36358
J141-J-1	Jumper	4-103	20120	71785
K-5	Plug	4-113	23957	23540
K2414	Pin, Cotter	4-16.	20049	78500
LE-069F-7MW	Spring	4-86	25021	84838
LHCOT-2	Hairpin, Cotter	4-7	25607	27797
LSP-932	Ring, Split	4-7	25608	27797
L827-T-228	Nut	4-12	20078	78500
L828-D-108	Bearing	4-12	20098	78500
M400B	Filter	4-85	25059	27473
N-100-1	Nut	4-15	20065	78500
N-112-1	Nut, Hex	4-15	20058	78500

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DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
N-18-1	Nut	4-14	20000	78500
NK565E813-H16	Setscrew, Soc	4-35	23938	02615
NO P/N	Inlet, Sp. T	4-65	22053	62983
N144P13018C6	Screw, Pan Hd. SI	4-96	50339-22	02989
S-11219-L	Bolt	4-15	20062	78500
S-256	Screw, Cap	4-17	20029	78500
S-269-1	Screw	4-12	20079	78500
SS51074	Plug	4-43	25587	50808
TC5342A	Plate, Mtg	4-59	25079	59730
TN09	Locknut	4-38	25154	60038
TT-2006-1	Brg., Thrust	4-25	25009	70901
TT3001-3	Bearing, Thrust	4-24	25123	70901
TW109	Lockwasher	4-38	25155	60038
TY-25M	Ty-Rap	4-107	25080	59730
Type 700	Assembly, Cap. Breather	4-84	25061	99381
T1 26 .	Brg., Thrust	4-25	25008	60038
VCL-12P-05-A-10	Valve, Check	4-50.	25544	92003
V2010-1 F13S5S-1AB10LH	Pump	4-57	21150	62983
WA-110	Lockwasher	4-15	20069	78500
WA-112	Lockwasher	4-15	20060	78500
WA-15	Lockwasher	4-17.	20028	78500
WA16	Lockwasher	4-12	20042	78500
WM127SP	Seat	4-7	50697	27797
01009403	Lever, Hand Brake	4-23	25171	92867
1-48927-0	Connector	4-70	25138	00779
1C3645CPM1RDA2	Driver, Coil	4-93.	25071	02989
1C36450SC1E3	Oscillator Care	4-96.	50339-4	02989
10-SA-6	Elbow	4-59	25511	92985
10-SALX-6	Elbow	4-59	25522	92985
10-SW-6	Elbow, Swvl	4-70	25500	92985
10-X-526	Lockwasher	4-15	20024	78500
10-12-37-2	Connector, Str	4-50	25548	92985
10-12-37-6	Elbow, 90 Deg	4-49	25547	92985
10-37-108	Elbow, Bulkhead, 90	4-68	23708	92985
10-37-2	Connector, Str	4-70	25506	92985
10-37-27	Tee	4-78	25501	92985
10-37-4	Connector, Str	4-68	25526	92985
10-8-SA-6	Elbow, 90 Deg	4-49.	25591	92985
100231	Washer, Wave	4-72	25642	82271
108561	Bolt	4-57	21151	62983
110	Bulb	4-114	25582	08108
111106	Body	4-72	25661	B2271
111124	Seat, Pilot	4-72	25658	82271
111143	Stop	4-72	25655	82271
111493	Spring	4-72	25659	82271
112053	Seat Assy., Valve	4-72	25660	82271
1150	Bulb	4-114	25581	09108
12-SA-6	Elbow	4-59	25518	92985
12-SAL-6	Elbow, 90 Deg	4-49	25589	92985
12-12-AM-180	Connector, Str	4-51	25597	92985
13-37-6	Elbow, 90 Deg	4-49	25588	92985
12-8-37-6	Elbow	4-59	25541	92985
12MR4E	Snubber	4-70	25047	99752
1221-H-34	Race, Bearing	4-12	20096	78500
1228-N-66	Bearing	4-12	20095	78500
1229-V-516	Lockwasher	4-14	20001	78500
1229-V-828	Retainer	4-12	20093	78500
1246-D-290	Dowel	4-15	20067	78500
12729-08	Meter, Hour	4-107	25051	28583
13-X-113	Nut, Jam	4-15	20022	78500
136C2305G1	Block, Power Conn	4-96	50339-13	02989
136C2306G1	XMFR & Choke	4-96	50339-16	02989
14-X-57	Nut	4-15	20050	78500
14-10-72-11	Latch	4-70	25132	94222
140356	Snap Ring	4-57	21176	62983
14125A	Cone, Outer Roller Brg	4-25	25014	60038

PARTS LIST BY DII PART NUMBER

DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
14274	Cup, Outer Roller Brg	4-25	25013	60038
1454	Nut	4-63	22001	62983
146835	Bolt	4-65 .	22051	62983
15-X-249	Screw	4-12	20104	78500
154022	O-Ring	4-57	21169	62983
154090	O-Ring	4-57	21163	62983
154129	O-Ring	4-63	22005	62983
16-16-AM-180	Connector, Str	4-50	25594	92985
16-16-AM-90	Elbow	4-49	25527	92985
160686	Snap Ring	4-57	21173	62983
17-X-161	Rivet	4-12	20092	78500
17095	Casting	4-87	20221	63477
1718	Resistor	4-107	25076	44655
1744-D-4	Spacer	4-16	20030	78500
1745-M-13	Push Rod, Cylinder	4-17	20033	78500
1779-0-147	Rod	4-15	20007	78500
1788	Cone, Roller Brg	4-15	20053	60038
18-140	Term Strip	4-103	20119	71785
1805-8-340	Seal, Oil	4-15	20047	78500
1805-D-134	Seal, Oil	4-12	20083	78500
1805-W-309	Rntr, Oil Seal	4-12	20081	78500
1828-Y-311	Bearing	4-15	20072	78500
1829-W-673	Washer	4-12	20085	78500
1829-Y-363	Washer	4-15	20051	78500
184-2-78	Dowel	4-15	20037	78500
1844-D-472	Spacer, Cover	4-12	20084	78500
1850-Q-95	Plug	4-14	20005	78500
1850-R-96	Plug	4-14	20004	78500
1854-C-237	Ring, Snap	4-12	20097	78500
186100H12-125	Fitting, Hose	4-49	25535	01276
186580	Plug	4-63	22004	62983
187000	O-Ring	4-63	22012	62983
1874-J-244	Coupling	4-15	20073	78500
1898-C-679	Elbow	4-17	20020	78500
1898-D-680	Fitting, Brake, Rh	4-17	20021	78500
1898-E-1149	Fitting, Bleeder, Scr., Rh	4-17	20025	78500
1898-E-993	Adapter	4-17	20016	78500
1898-F-1150	Fitting, Bleeder, Scr., Lh	4-17	20026	78500
1898-G-683	Adapter	4-17	20018	78500
1898-K-687	Fitting, Brake Line	4-17	20017	78500
1898-U-686	Gasket	4-17	20019	78500
190	Handle	4-43	25091	80813
19012-303	Kit	4-29	50633	91561
19018-303	Gland/Bushing	4-29	50621	91561
194B5393G1	Fitrs 3.5 Rec	4-96	50339-14	02989
194B5399G10	Main SCR 1 Rec	4-96	50339-1	02989
194B6376G	Thrm. Protector	4-96	50339-2	02989
19486385G1	Card Conn. Block	4-96.	50339-7	02989
194B6388G1	Card Conn	4-96	50339-8	02989
199822	O-Ring	4-57	21153	62983
199823	O-Ring	4-57	21159	62983
2-PC-25	Tee, Pipe	4-70	25509	92985
2-236	O-Ring	4-83	25060	02697
2HP	Plug, Pipe	4-50	25521	92985
2012-1	Sheave	4-22	25031	43766
203-4-36A	Valve, Sol	4-70	25072	82271
204-1027-004	Column, Strg	4-41	25040	96151
208-1013-002	Kit, Horn Btn	4-45	25045	96151
210/36V	Tail/Brake Light	4-3	25055	78422
21084	Nut, Strg. Wheel	4-46	25094	96151
21144	Screw, Slftpg	4-46	25614	96151
21149	Ring, Contact	4-46	25042	96151
2208-Y-389	Gasket	4-12	20083	78500
223153	Rod	4-63	22002	62983
223489	Seal	4-63	22025	62983
223493	Seal	4-63	22024	62983

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DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
226161	Seal	4-63	22026	62983
229236	Seal, Shaft	4-57	21172	62983
232799	Vive, Relief	4-63	22007	62983
237736	Retainer	4-63	22027	62983
24S-50	Horn	4-116	25070	21003
245A6991G1	Shunt	4-96	50339-20	02989
2456	Pin	4-57	21160	62983
246632	Spring, Ctrg	4-63	22014	62983
2521	Strain Relief	4-104	20125	59730
2523	Strain Relief	4-104	20126	59730
2535	Strain Relief	4-103	20116	59730
25520	Cup, Inner Roller Brg	4-25	25011	60038
25580	Cone, Inner Roller Brg	4-25	25012	60038
2582-12	Hose	4-50	50014-09	01276
2583-12	Hose	4-50	50014-08	01276
2583-16	Hose	4-51	50003-08	01276
2583-16	Hose	4-50	50003-09	01276
2583-16	Hose	4-50	50003-10	01276
259AB759G1	Filter No. 3 Rec.	4-96	50339-17	02989
259A2135G1	SCR 2 Rec	4-96	50339-11	02989
259A2138G1	SCR 5 Rec	4-96	50339-12	02989
259A5523P2	Capacitor	4-96	50339-3	02989
259A8750G1	Sensor	4-96	50339-15	02989
259A9208PXBR	Diode 4 Rec	4-96	50339-10	02989
259A9208PXCR	Diode 3 Rec	4-96	50339-9	02989
259871	Spring	4-63	22006	62983
2661-24	Hose, Suction	4-50	25568	01276
2708-1/2-2A	Pin, Clevis	4-111	25085	71843
2708-1/2-3A	Pin, Yoke	4-19	25001	71843
2708-1/2-4A	Pin, Yoke	4-8	25002	71843
2708-2A	Yoke	4-111	25084	71843
2708-3A	Yoke	4-22	25032	71843
2708-4A	Yoke End	4-68.	25000	71843
2720	Cup, Roller Brg	4-15	20054	60038
2758-E-5	Spring	4-15	20326	78500
2808-N-716	Gasket	4-15	20046	78500
2808-P-614	Gasket	4-15	20071	78500
2808-Y-597	Gasket, .005 In	4-12	20090	78500
2808-Z-598	Gasket, .010 In	4-12	20091	78500
2808X596	Gasket	4-16	20070	78500
282027	Screw	4-63	22009	62983
282971	Ring, Quad	4-63	22013	62983
283856	Ring, Quad	4-63	22023	62983
284154	Retainer	4-63	22010	62983
284155	Sleeve	4-63	22011	62983
284156	Washer, C	4-63	22015	62983
28420-437A-20	Pin, Dowel	4-36	23702	58878
2847-N-560	Tube Assembly	4-17	20013	78500
28520	Cone, Roller Brg	4-38	25151	60038
28521	Cup, Roller Brg	4-38	25152	60038
286669	Ring, Back-up	4-63	22022	62983
3-X-195	Bolt	4-15	20061	78500
3-37-11	Tee	4-89	25512	92985
3-37-2	Connector, Str	4-51	25598	92985
3-37-6	Elbow	4-17	25525	92985
301161N2500-529206-5125	Filter Assembly	4-77	25066	92863
3042	Lens	4-114	25580	78422
307198	Shims	4-63	22030	62983
309795	Spring	4-57	21170	62983
31108	Shell	4-72	25640	8227?
31110	Coil	4-72	25639	82271
31111	Plunger	4-72	25637	82271
31408	Plate	4-72	25653	82271
31504.	Rod	4-72	25643	82271
31510	Body	4-57	21171	62983
31512	Spacer	4-72	25646	82271

PARTS LIST BY DII PART NUMBER

DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
31513	Spring	4-72	25647	82271
315933	Plate, Backing	4-20	25005	14894
31611	Washer	4-72	25663	82271
31612	Tube	4-72	25654	82271
31626	Release Assy	4-72	25635	82271
317678	Ring	4-57	21158	62983
3135-C-1485	Case, Diff	4-12	20106	78500
3235-E-1487	Case, Diff	4-12	20105	78500
33	Pin, Clevis	4-22	25615	71177
331807	Ring	4-57	21166	62983
33821	Cup, Roller Brg	4-15	20056	60038
33891	Cone, Roller Brg	4-15	20055	60038
345626	Spring	4-57	21154	62983
35	Pin, Clevis	4-86	25081	71177
351247	Rotor	4-57	21157	62983
351249	Shaft	4-57	21175	62983
357292	Body, Inlet	4-57	21162	62983
358337	Rotor	4-57	21165	62983
358347	Plate, Press	4-57	21168	62983
36A28977004	Bearing, CE	4-54	21021	01288
36A28977005	Bearing, DE	4-54	21039	01288
362A	Cup, Roller Brg	4-15	20075	60038
368A	Cone, Roller Brg	4-16	20074	60038
37FA1011	Nut, Flex Loc	4-24	25124	56878
372865	Cover	4-57	21152	62983
373795	Plate, Press	4-57	21155	62983
3801-A-547	Housing, Differential	4-12	20107	78500
3811-X=50	Spindle, Wheel	4-15	20063	78500
3826-R-252	Cover, Housing	4-12	20089	78500
3837	Grommet.	4-113	25082	70485
3862-J-10	Cap, wheel	4-15	20048	78500
3875R460	Case, F.D.	4-15	20345	78500
3897-L-3158	Tube Assembly, Rh	4-17	20014	78500
3897-M-3159	Tube Assembly, Lh	4-17	20015	78500
3897-R-1032	Hsg., Axle Lh	4-15	20112	78500
3897-T-1034	Hsg., Axle Rh	4-15	20113	78500
39003-103	Spacer	4-29	50626	91561
39004-301	Piston	4-29	50753	91561
4-SW-6	Elbow, Swivel	4-50	25596	92985
4-X-1101	Studs	4-15	20057	78500
4-2-PC-11	Connector	4-70	25510	92985
4-37-17	Plug, Tube	4-70	25504	92985
4-37-2	Connector, Str	4-50	25595	92985
4X389 .	Stud	4-16	20068	78500
4228-8000-87	Accumulator	4-76	25064	26337
43107	Washer	4-72	25636	82271
4350	Lamp, Sealed Beam	4-115	25578	08108
4460	Rivet	4-41	25092	79038
5-140	Strip, Term	4-107	25077	71785
50001-210-0010	Seal, Rod-Piston	4-29	50628	91561
50001-214-0010	Seal, Rod.	4-29	50623	91561
50001-330-0010	O-Ring	4-29	50619	91561
5001-228-0260	Seal, Gland	4-29	50622	91561
50011-330	Ring, Back-up	4-29	50620	91561
50023-225-1010	Lock-Ring	4-29	50630	91561
50024-250-1010	Lock-Ring	4-29	50629	91561
50051-309	Wiper, Rod	4-29	50624	91561
50067-108-5010	Lock Nut	4-29	50627	91561
5027	Switch	4-43	25038	13445
5100-110	Ring, Retaining	4-43	25089	79136
5100-62	Ring, Retaining	4-113	25086	79136
529206-5126	Filter, Element	4-77	25068	92863
5380-6	Wire Assembly	4-46	25041	96151
54-0388-0	Washer	4-115	25577	78422
54-0391-3	Screw, Truss Hd	4-115	25576	78422
54-0910-3	Guard	4-115	25579	78422

PARTS LIST BY DII PART NUMBER

DII P/N	DESCRIPTION	PAGE NO.	DII P/N	FSCM
1412	Clamp	4-49	25592	81646
5416	Clamp	4-49	25532	81646
5428	Clamp	4-49	25538	81646
58218	Assembly, Lkg. Half, Battery	4-6	23875	80495
5975	Boot	4-17	20114	63477
5981	Piston	4-17	20115	63477
6-SA-2	Connector, Str	4-49	23703	92985
6-SA-6	Elbow, 90 Deg	4-68	23705	92985
6-SAL-6	Elbow, 90 Deg., Lg	4-68	23706	92985
6-SW-9	Tee, Side	4-68	23707	92985
6-37-104	Connector, Str	4-49	25531	92985
6-37-108	Elbow, Bulkhead, 90	4-68	23704	92985
6-37-11	Tee, Tube	4-70	25505	92985
6-37-15A	Nut	4-70	25507	92985
6-37-9	Tee, Side, Male	4-76	25515	92985
6-4-37-TR .	Reducer, Tube	4-70	25508	92985
6-6-37-6	Elbow, 90 Deg	4-70	25503	92985
6-8-PC-11	Connector	4-70	25502	92985
6-8-SA-2	Connector, Str	4-49	25520	92985
6-8-SA-6	Elbow, 90 Deg	4-49	25516	92985
6-8-SALX-6	Elbow, 90 Deg	4-50	25517	92985
6-8-37-2	Connector, Str	4-49	25528	92985
6-8-37-6	Elbow, 90 Deg	4-51	25586	92985
63X1357	Seal, Oil	4-25	25010	73680
6689	Brush Assy., Horn	4-46	25612	96151
7206-120-1250	Rod	4-29	50755	91561
72531-5C-12	Screw, Soc. Head	4-43	25090	56878
7688	Pin	4-47	21167	62983
77866	Tape	4-45	25095	02295
8-140	Strip, Term	4-70	25084	71785
81-000155	Spacer	4-23	25610	92867
8112-010-TB	Tube Assembly	4-29	50754	91561
8113-10	Knob	4-43	25088	13445
82938	Bearing	4-57	21174	62983
853G2	Indicator, Btry. Cap	4-43	25037	80495
8585	Clamp, Cable	4-72	25634	71785
8626	Sw., Stop Light	4-86	25023	13445
889G2	Relay	4-103	20117	80495
894A605ZK006	Brg., Comm End	4-10	20155	01288
894A605ZK007	Bearing	4-10	20154	01288
9-1632036	Spring	4-22	25030	21728
909421-25.	Indicator.	4-41	25067	92863
923479	Vanes 12	4-57	21164	62983
92350	Vanes 12	4-57	21156	62983
956-8111	Switch, Key	4-43	25036	13445
96168	Bolt	4-57	21161	62983
9955	Key	4-57	21177	62983

979 Records Processed

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists army regulations, field manuals, technical manuals, publication indexes and general references pertinent to the operation and maintenance of the MHE 256.

A-2. ARMY REGULATIONS

Supply Policy Below The Wholesale Level .....AR 710-2
Requisitioning, Receipt, And Issue System.....AR 725-50
Supply Operations Manual: Vol 1; Distribution System
Procedures .....AR 735-110

A-3. FIELD MANUALS

Chemical, Biological, Radiological And Nuclear
Defense .....FM 21-40
Manual For Wheeled Driver .....FM 21-305
Army Motor Transport Units And Operations .....FM 55-30

A-4. FORMS

Equipment Inspection And Maintenance Worksheet .....DA Form 2404
Equipment Control Record .....DA Form 2408-9
DOD Single Line Item Release/Receipt Document .....DD Form 1348-1
NON-NSN Requisition (Manual) .....DD form 1348-6

A-4. TECHNICAL MANUALS

Chemical, Biological And Radiological (CBR)
Decontamination .....TM 3-220
The Army Maintenance Management System (TAMMS) .....TM 38-750
Transportability Guidance: Application Of Blocking,
Bracing And Tiedown Materials For Rail (Loading
Rules) Transport .....TM 55-2200-001-12
Administrative Storage Of Equipment .....TM 740-90-1
Procedures For Destruction Of Equipment To
Prevent Enemy Use .....TM 750-244-3

A-5. GENERAL REFERENCES

Dictionary Of United States Army Terms .....AR 310-25
Authorized Abbreviations And Brevity Codes .....AR 310-50
How To Prepare And Conduct Military Training .....FM 21-6
Military Symbols .....FM 21-30

A-6. PUBLICATION INDEXES.

Consolidated Index Of Army Publications and
Blank Forms (Includes Blank Forms; Doctrinal
Training And Organizational Publications;
Technical Manuals.....DA PAM 310-1

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I

INTRODUCTION

B-1 General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2 Maintenance functions. Maintenance functions will be limited to and defined as follows

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services 1, including fault location/ troubleshooting 2, removal/installation, and disassembly/assembly 3 procedures, and maintenance actions 4 to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3 Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. Column I lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

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1 Services - inspect, test, service, adjust, aline, calibrate, and/or replace.

2 Fault locate/troubleshoot The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

3 Disassemble/assemble encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

4 Actions welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number of complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C.....Operator or crew
O.....Organizational maintenance
F.....Direct Support Maintenance
H.....General Support Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4 Explanation of Columns in Tool and Test Equipment Requirements, Section III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
06	ELECTRICAL SYSTEM								
0607	Panel Control	Test			3.5				p 3-31
		Replace			2.5				
		Repair				4.5			
	Contractor, Hydraulic	Replace			0.8				
		Repair			0.5				
	Contractor, Fwd. and Rev.	Replace			0.8				
		Repair			0.5				
	Panel, Instrument	Replace		0.8					
		Repair		0.8					
	Hourmeter	Replace		0.2					
0608	Switch, Light	Replace		0.3					
	Switch, Emergency Stop	Replace		0.3					
	Switch, Stoplight	Replace		0.3					
	Switch, Seat	Adjust		0.2					
		Replace		0.3					
0609	Lights, Lamp	Replace		0.3					
	Lights, Assembly (Head, Stop & Tail)	Replace		0.3					
0611	Horn, Button Assy	Replace		0.2					
		Repair		0.4					
	Horn Assembly	Replace		0.6					
	Horn Wiring	Replace		9.5					
0612	Battery Storage	Test		0.2					p 5-34
		Service		8.0					
		Replace		0.5					
		Repair				12.0			
		Overhaul					19.0		

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
0612 Cont.	Battery, Receptacle Charging	Replace		0.9					
		Repair			1.0				
	Battery, Cables	Replace		0.8					
		Repair		0.9					
0613	Hull or Chassis Wiring, Harness	Replace			2.5				
		Repair			2.5				
10	FRONT AXLE								
1000	Front Axle Assembly Driving	Service	0.4						
		Replace			6.5				
		Repair			3.5				
1002	Differential Assembly	Service	0.4						
		Replace		5.5					
		Repair		5.0					
	Bearings and Seals	Replace		2.5					
11	REAR AXLE								
1100	Rear Axle Assembly Steering	Service	0.4						
		Adjust	1.0						
		Replace		4.0					
		Repair		4.0					
1104	Steering Arm	Adjust		0.4					
		Replace		0.5					
	Steering Axle	Replace		6.0					
	Tie Rod Assembly	Adjust	0.7						
		Replace		1.5					
	King Pin	Replace		3.0					

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
12	BRAKES								
1201	Handbrake Assembly	Adjust		0.5					
		Replace			1.8				
	Handbrake Linkage	Adjust		0.5					
		Replace		1.0					
1202	Service Brake	Adjust		0.5					
	Assembly	Replace			1.8				
		Repair			1.8				
	Brake Shoe Assembly	Replace		0.9					
1204	Hydraulic Brake								
	Master Cylinder	Service		0.3					
		Replace		1.2					
		Repair			1.6				
	Hydraulic Brake								
	Wheel Cylinder	Replace		1.8					
13	WHEELS								
1311	Wheel Assembly Rear								
	Wheel Bearings	Adjust		0.4					
		Replace		1.6					
	Wheel Assembly	Replace		1.6					
1313	Tires, Solid Rubber	Replace				1.7			
14	STEERING								
1407	Wheel, Steering	Replace		0.5					
	Pump, Steering	Replace			1.5				
		Repair			2.5				
1411	Hose Assembly	Replace		1.3					
	Hydraulic	Repair		1.8					
1412	Steering Cylinder	Replace		1.2					
		Repair		1.8					

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
1414	Steering Valve Assembly	Replace Repair			2.0 4.2				
18	BODY, CAB, HOOD & HULL								
1801	Overhead Guard	Replace Repair		1.0	 1.5				
	Covers (Battery Compartment)	Replace		0.2					
1805	Floor Plate	Replace		0.3					
1806	Seats - Seat Assembly	Replace Repair		0.5 1.0					
24	HYDRAULIC LIFT COMPONENTS								
2401	Hydraulic Pump	Replace Repair			1.5 2.5				
2402	Hydraulic Control Valve	Replace Repair			1.6 2.0				
2403	Hydraulic Control Levers and Linkage	Adjust Replace		0.3	 0.5				
2404	Hydraulic Tilt Cylinder Assembly	Replace Repair		1.8	 1.0				
	Hydraulic Side Shift Cylinder Assembly	Replace Repair		0.8	 1.0				
	Hydraulic Pivot Cylinder	Replace Repair		1.8	 1.0				

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
2405	Hydraulic Mast Column	Service		0.2					
	Chain Assembly	Adjust		0.2					
		Replace			0.6				
		Repair			0.7				
	Crosshead	Replace			0.7				
		Repair			0.6				
	Forks	Replace		0.2					
	Roller Assembly	Replace			3.0				
	Upright Assembly	Replace				16.0			
		Repair				20.0			
2406	Hydraulic Lines and Fittings	Replace			2.0				
2407	Oil Reservoir	Service	0.1	0.3					
		Replace			2.5				
2408	Cap, Oil Breather	Replace		0.1					
2409	Filter Element, Tank	Replace		0.4					
2410	Filter Assembly, Hydraulic	Service		0.2					
		Replace		0.5					
2411	Indicator, Filter	Replace		0.4					
2412	Hydraulic Valve, Regulating	Replace		0.5					
2413	Reel, Assembly Hose	Replace			1.7				
		Repair			1.5				
40	ELECTRIC MOTORS								
4000	Motor Assembly, Traction	Replace			8.0				
		Repair			4.5				
	Motor Assembly, Pump	Replace			3.0				
		Repair			4.0				

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
4000 Cont.	Motor Assembly, Steering	Replace		3.0					
		Repair		4.0					
4003	Holders, Brush Elect. Contact	Replace		2.5					
4005	Endbell	Replace		4.0					
	Frame Supports and Housing (Drive Motors)	Replace		4.0					
4007	Drive Components Adapter Assembly, Gear Reduction	Service	0.7						
		Replace		1.0					
		Repair		1.0					
4010	Drive Motor Control Assembly	Replace		0.4					
		Repair			1.6				
	Drive Module Assembly	Replace		3.0					
		Repair		1.5					
4011	Fuse and Circuit Breakers, Cartridge, Fuse	Replace	0.2						
	Holder, Fuse	Replace		0.4					
	Link, Fuse	Replace		0.2					
4012	Switches, Contractors and Relays	Replace		0.6					
	Switch Directional Control	Repair		0.3					
4014	Fixed Resistor	Replace		0.3					
4015	Relay, Thermal	Replace		0.3					

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Eqpt.	(6) Remark
			C	O	F	H	D		
4019	Radio Interference Suppression Static Straps	Replace		0.3					
4020	Capacitor and Diode	Replace Repair		0.6 0.5					

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
TRUCK, FORKLIFT, FRONT/SIDE LOADER, 4,000/3,000 LB., MHE 256

Tool or Test Equipment Ref Code	Maintenance Category	Nomenclature	National/ Nato Stock Number	Tool Number
	O	Multimeter	6625-00-553-0142	
	O	Hydrometer	6630-00-171-5126	
	H	Hydraulic Press	3440-00-449-7295	
	F	Armature Tester	6625-00-238-1460	
	F	Ohmeter	6625-01-007-9426	
	F	Armature Tester	6625-00-238-1459	
	H	Oscilloscope	6625-00-127-0079	

SECTION IV. REMARKS

Reference Code	Remarks
NONE	

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. Scope

This appendix lists components of the end item and basic issue items for the forklift truck to help you inventory items required for safe and efficient operation.

C-2. General

These Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Integral Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between accounts.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the forklift truck in operation, to operate it, and to perform emergency repairs. Although shipped separately packed BII must be with the forklift truck during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

a. Column (1) Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown. Not applicable.

b. Column (2) National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) Description. Indicates the National item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parenthesis) followed by the part number. Useable on code not applicable.

d. Column (4) Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) Quantity Required (Qty. rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. INTEGRAL COMPONENTS OF END ITEM

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
NONE					

SECTION III. BASIC ISSUE ITEMS

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
N/A	7510-01-065-0166	FOLDER, EQUIPMENT (72094) 43986-1		EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

NONE

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

E-1. SCOPE

This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CAT 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS

a. Column (1) Item number. This number is assigned to the entry in the listing.

b. Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item.

(enter as applicable)

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3) National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parantheses followed by the part number.

e. Column (5) Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION	U/M
			BRAKE FLUID, AUTO MIL-B-46176	( )
1	O	9150-01-102-9455	1 Gal Can	
2			GAA, GREASE, AUTOMOTIVE AND ARTILLERY MIL-G-10924 (81349)	
	O	9150-00-190-0907	35 Lb Can	
3			GREASE, BALL AND BEARING MIL-G-18709 (81349)	
	O	9150-00-753-4650	8 Oz Cartidge	
	O	9150-00-663-9795	6.5 Lb Can	
	O	9150-00-249-0908	35 Lb Can	
4			GREASE, MOLYBDENEUM, DISULFIDE MIL-G-21164 ( )	
	O	9150-00-935-4018	14 oz Cartridge	
5			LUBRICATING OIL MIL-G-18458 ( )	
	O	9150-00-530-6814	35 Lb Can	
6			LUBRICATING OIL, ENGINE MIL-L-2104 (81349) OE/HDO 10	
	O	9150-00-189-6727	1 qt can	
	O	9150-00-186-6668	5 gal can	
	O	9150-00-191-2772	55 gal drum	
			OE/HDO 30	
	O	9150-00-188-9858	5 gal drum	
	O	9150-00-188-9859	55 gal drum	
7			LUBRICATING OIL, GEAR SOW/90 MIL-L-2105 C	
	O	9150-01-035-5393	5 gal drum	
8	O		SOLVENT: DRY CLEANING P-D-680 (81348)	
	O	6850-00-281-1985	1 gal can	
9			SULPHURIC ACID MIL-STD-605 (96906	
	O	6810-00-249-9354	1 gal	

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution:

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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter=10m Millimeters=0.01 Meters=0.3937 Inches
1 Meter=100 Centimeters=1000 Millimeters=39.37 Inches
1 Kilometer=1000 Meters=0.621 Miles

WEIGHTS

1 Gram=0.001 Kilograms=1000 Milligrams=0.035 Ounces
1 Kilogram=1000 Grams=2.2 Lb
1 Metric Ton=1000 Kilograms=1 Megagram=1.1 Short Tons

LIQUID MEASURE

1 Milliliter=0.001 Liters=0.0338 Fluid Ounces
1 Liter=1000 Millilters=33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter=100 Sq Millimeters=0.155 Sq Inches
1 Sq Meter=10,000 Sq Centimeters=10.76 Sq Feet
1 Sq Kilometer=1,000,000 Sq Meter=0.0386 Miles

CUBIC MEASURE

1 Cu Centimeter=1000 Cu Millimeters=0.06 Cu Inches
1 Cu Meter=1,000 Cu Centimeters=35.31 Cu Feet

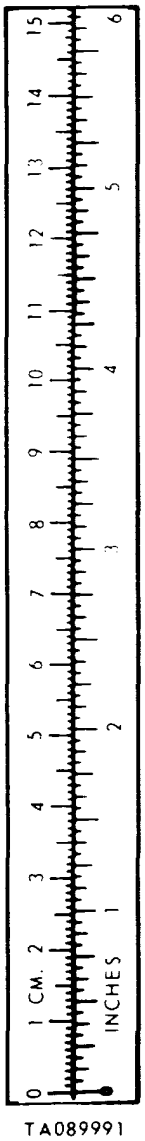
TEMPERATURE

5/9 (°F – 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° +32=F°

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.756
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	5.895
Miles per Gallon	Kilometers per Liters	0.425
Miles per hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.385
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric-Tons	Short Tons	1.102
Newton-Meters	Pound Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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