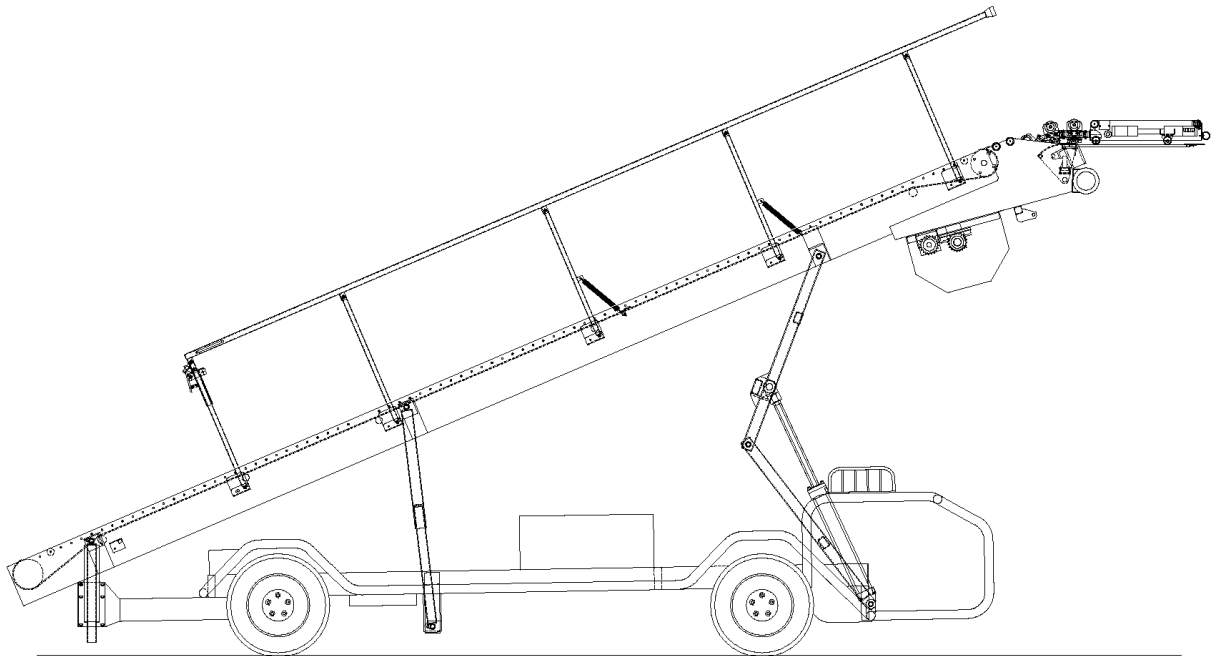


MOBILE ROLLER DRIVE BELT LOADER MODEL TC-999 MONGOOSE™

Patents Pending

OPERATION AND MAINTENANCE Preliminary



NMC-Wollard, Inc.
2021 Truax Blvd.
Eau Claire, WI 54703
715-835-3151
Fax 715-835-6625
Web Site: www.nmc-wollard.com
General Email: nmc-wollard@nmc-wollard.com

INTRODUCTION

Congratulations on the purchase of your new Mobile Roller Drive Belt Loader from NMC-Wollard, Inc. With its optional equipment this is the simplest, most flexible system on the market today. With proper operation and preventative maintenance it will last for years.



This SAFETY ALERT SYMBOL indicates important safety messages in the manual. When you see this symbol, be alert to the possibility of PERSONAL INJURY and carefully read the message that follows.



Never operate without all covers, shields and guards in place. Keep hands, feet and clothing away from moving parts.

Some covers and guards have been removed for illustrative/photographic purposes only in this manual.

The Warranty appears in the front of this book. Locate the serial number on the machine and record on the configuration page in this section. This number is for your reference and for proper identification of your machine by NMC-Wollard, Inc.

For information on ordering repair parts, refer to the Repair Parts Chapter 4 at the back of this book.

You are urged to study this manual and follow the instructions carefully. Your efforts will be repaid in better operation and service as well as a savings in time and repair expense. Failure to read and understand the machine or the system could lead to serious injury. If you do not understand the instructions in this manual contact the manufacturer.

This supercedes all previous published instructions.

When reading this manual, if a figure or paragraph outside the current section is referred to, it will be identified by Chapter-Section-Figure Number or Chapter-Section-Paragraph.

Example:

Figure 2-2-4
2-2-1.4

Chapter 2-Section 2-Figure 4
Chapter 2-Section 2-Paragraph 1.4

If figures from the current section are referred to, the chapter and section may not be included. If paragraphs from the current chapter are referred, the chapter and section may not be referenced, ie, the first digit of the paragraph number indicates the section number.

INTRODUCTION

This manual is available on CD-ROM P/N 308183CD

Keep a copy of your NMC-Wollard, Inc. manuals on your computer or CD-ROM! You will be able to view and print pages and search for words or numbers. CD-ROM manuals include a linked table of contents. Mouse click on a table of contents entry to display the page containing that item.

For availability and pricing, contact NMC-Wollard, Inc. customer service at:

Phone (715) 835-3151

Fax (715) 835-6625

Email custserv@nmc-wollard.com

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1 YEAR LIMITED WARRANTY NMC-WOLLARD, INC.

NMC-Wollard, Inc. warrants to the original owner that all components of the equipment are free from defects in material and workmanship under normal use and service for 12 months or 1,000 hours, whichever comes first, from the date of shipment.

This warranty provides for NMC-Wollard, Inc. equipment components that fail because of defects in material or workmanship during the warranty period, without charge to the owner for parts or labor. The owner must provide prompt notice of the defect and allow a reasonable time for replacement or repair.

This warranty applies only to parts manufactured by NMC-Wollard, Inc. Components installed on NMC-Wollard, Inc. equipment but not manufactured by NMC-Wollard, Inc. shall be covered under the original manufacturer's warranty. NMC-Wollard, Inc. will assist in administering all such warranties, with the exception of tires, battery, and other expendable parts, for which the owner will be required to deal directly with the original manufacturer for warranty service. Neither tune-ups, normal maintenance and repair or replacement of expendable parts (such as oil, lubricants, belts, filters, tires, battery, etc.) are covered by this warranty.

This warranty does not cover damage resulting from carelessness or neglect; accidents, fire, or other casualties; improper repair, operation, transportation, or storage; or failure to provide necessary or appropriate maintenance. This warranty does not cover deterioration or failure caused by chemicals, falling objects, dirt and sand, or excessive heat or moisture. The NMC-Wollard, Inc. equipment must be maintained according to the instructions provided with it or this warranty may be considered void. Warranted components must be replaced with parts manufactured or approved by NMC-Wollard, Inc. Warranty determination will be made after NMC-Wollard, Inc. inspects the failed part.

NMC-Wollard, Inc. is not liable for damage or injury resulting from improper installation, use, abuse, inability to use or misapplication of NMC-Wollard, Inc. equipment, nor is NMC-Wollard, Inc. liable for damage resulting from equipment repaired or modified by persons not authorized by NMC-Wollard, Inc. NMC-Wollard, Inc. does not warrant any part or product to meet local, municipal, state, provincial, or national laws or regulations.

This Limited Warranty is in lieu of all other warranties, whether express, implied, or statutory. No other express warranty is given or authorized by NMC-Wollard, Inc. NMC-Wollard, Inc. expressly disclaims any implied warranty of merchantability or fitness for a particular purpose or otherwise. NMC-Wollard, Inc. shall not be liable for loss of use of equipment, loss of time, loss of business, or for any other incidental, or consequential damages. No authorized NMC-Wollard, Inc. representative has the right to change or modify this warranty in any respect.

This warranty is non-transferable.

TO OBTAIN WARRANTY SERVICE

Warranty can be obtained by contacting NMC-Wollard, Inc., 2021 Truax Blvd., Eau Claire, WI. 54703, (Phone 715 835-3151) (Fax 715 835-6625).

What should you do when you receive a new unit?

Check that you have received all the equipment ordered. Check inside the product manual for engine warranties. Some OEM manufacturers supply a registration card that must be filled out and returned immediately to initiate the warranty. If a survey card or delivery checklist is enclosed from NMC-Wollard, Inc. please return it.

What should you do when you discover a possible warranty problem?

Call NMC-Wollard, Inc. (715-835-3151). We will require the serial number, number of hours on the unit, and a description of the problem. You will be given a warranty authorization number and assistance in troubleshooting.

IMPORTANT!

Clear and immediate communication with the factory is the key to obtaining a satisfactory and timely resolution of your warranty problem.

Every warranty situation is different and so there are no hard rules. We will work with your maintenance personnel and service managers to equitably resolve all claims.

What should you do after warranty problem has been resolved?

Complete and return the warranty claim form within 10 days. Place the assigned warranty authorization number we gave you when you first called us with the problem on your claim.

Return defective parts immediately. Your claim cannot be processed until all defective parts have been returned to NMC-Wollard, Inc. Identify returned parts with the assigned warranty authorization number.

What should you use for labor rate and labor time?

Labor rate are reviewed annually, if you do not have an established rate, call NMC-Wollard, Inc. We do not publish a rate book; instead, we have accumulated average times for repairs. We will authorize repair time once we have approved the repair. If unforeseen circumstances cause a significantly greater repair time than originally approved, please contact us before submitting your claim.

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REVISION RECORD

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REVISION HIGHLIGHTS

To: HOLDERS OF NMC-Wollard, Inc. OPERATION, MAINTENANCE AND PARTS
MANUAL number 308183 Roller Drive Belt Loader.

REVISION NO. _____ DATED _____

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CONFIGURATION

The NMC-Wollard, Inc. sales order number for this unit is _____.

The serial number placard is fixed to this unit. Locate the placard and record the serial number (or range of numbers for multiple orders) below.

SERIAL NUMBERS	

Both the sales order and serial numbers are required for proper identification by NMC-Wollard, Inc. whenever you call for service parts or other technical support.

EFFECTIVITY CODE

This manual is effective on units having the following serial numbers:

Effectivity Code	Serial Numbers

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1 DESCRIPTION

1.1 PRODUCT SAFETY

A brief definition of signal words that may be used in this manual:

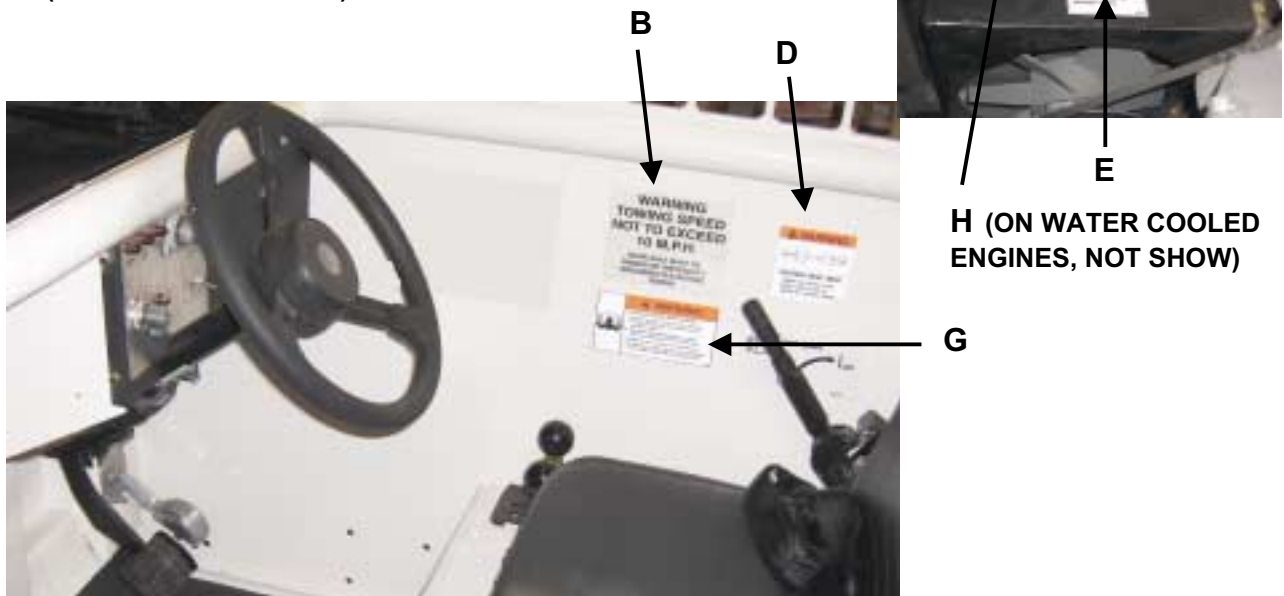
⚠ DANGER Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation that, if not avoided could result in death or serious injury, and includes hazards that are exposed when guards are removed.

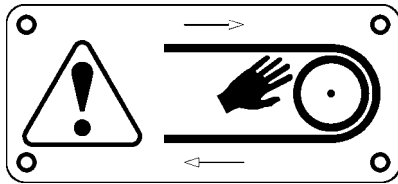
⚠ CAUTION Indicates a potentially hazardous situation that, if not avoided may result in minor or moderate injury.

A (ON FOUR CORNERS OF MAIN CONVEYOR BED)

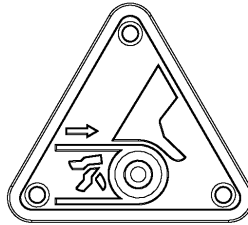
C (ON HYDRAULIC TANK)



⚠ CAUTION Read all safety signs on the machine and in this manual. Replace any lost or damaged signs by ordering the part numbers shown on the safety decals page.

1.2 SAFETY DECALS

DECAL A. PART NO.
562A547 EFF 002,003



DECAL A PART NO. 308796
EFF 001,004,+

WARNING
TOWING SPEED
NOT TO EXCEED
10 M.P.H.

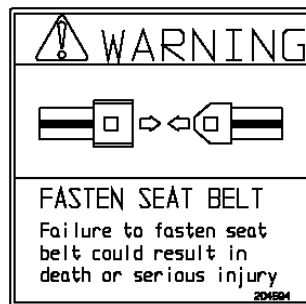
REAR AXLE MUST BE
RAISED OR DRIVESHAFT
DISCONNECTED BEFORE
TOWING

HS62A249

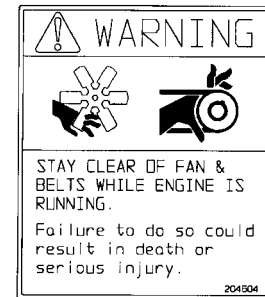
DECAL B. PART NO.
562A249



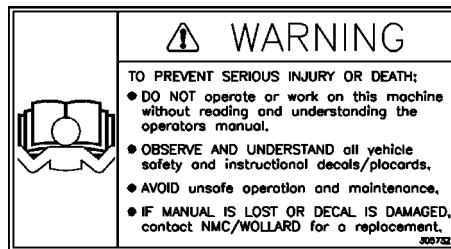
DECAL C. PART NO.
562A284



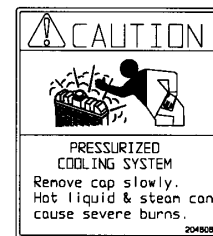
DECAL D. PART
NO. 204594



DECAL E. PART NO.
204604



DECAL G. PART NO. 305732



DECAL H. PART NO.
204606

SAFETY SIGN CARE

- Keep Safety Signs Clean And Legible At All Times.
- Replace Safety Signs That Are Missing Or Have Become Illegible.
- Replaced Parts That Displayed A Safety Sign Should Also Display The Current Sign.
- Safety Signs Are Available From The Manufacturer.

HOW TO INSTALL SAFETY SIGNS

- Be Sure That The Installation Area Is Clean And Dry.
- Remove The Smallest Portion Of The Split Backing Paper.
- Align The Decal Over The Specified Area And Carefully Press The Small Portion With The Exposed Adhesive Backing In Place.
- Remove Second Backing And Press Remaining Decal In Place.

1.3 GENERAL SAFETY PRECAUTION

- All personnel who will handle, install, use or service this machine are required to read and understand the recommended practices and safety precautions in this manual. If there is a question that can not be answered satisfactorily by a supervisor, contact the Customer Service Department at NMC-Wollard, Inc.

THERE ARE INHERENT HAZARDS ASSOCIATED WITH OPERATION OF THIS MACHINE.

For your safety:

- Keep all guards in place before operating.
- Do not wear loose clothing or jewelry while operating equipment.
- Long hair must be properly secured to avoid contact with moving parts.
- Keep hands, hair and clothing away from moving parts.
- Keep hands and arms inside operator's station (compartment). Dangerous crush points exist between the chassis and conveyor bed during lowering.
- Operator must be present while this machine is in use.
- Exercise extreme caution while maneuvering this machine in heavy traffic area.
- Keep machine clear of foreign objects and clean of grease/oil and other lubricants
- Hazards exist at front and rear ends of belt conveyors. Fingers, hands or feet can be caught by belt and pulled around rollers.
- Return rollers on bottom side of belt conveyor create pinch points. Avoid contact by hair, hands or clothing.
- When approaching other traffic, slow down, sound horn, and if vision is obstructed, keep right. Under all conditions, operate at a speed that will permit you to come to a stop safely.
- Use special care when operating on inclines. Travel slowly and do not angle or turn.
- Never allow anyone to ride on the machine with you if there are no passenger seats.
- Watch out for obstructions. Check overhead clearances.
- If the machine has to be parked on an incline, set the parking brake and chock the wheels.

THERE ARE INHERENT HAZARDS ASSOCIATED WITH THE OPERATION AND SERVICING OF THIS MACHINE.

For your safety:

- Shut off and lockout power before cleaning or servicing this unit.
- Only qualified and authorized persons should be permitted to operate, maintain, repair, adjust, and inspect the machine.
- Properly vent the work area.
- Avoid fire hazards and have fire protection equipment present. Do not use open containers of fuel or flammable fluids for cleaning parts.

- Sparks or open flames in the maintenance area are dangerous. Explosive vapor can easily escape from a vehicle into the work area.
- You can easily slip and fall on sloping surfaces of chassis and conveyor. Step only where non skid strips or gripstrut pads have been provided. Keep these strips and pads in serviceable condition.
- Brakes, steering mechanisms, warning devices, lights, safety guards, etc., should be inspected regularly and maintained in a safe operating condition.
- Inspect all hoses and connections. Replace failing hoses and repair leaking connections to avoid fluid pressure hazards.
- Escaping hydraulic fluid under pressure can penetrate the skin and cause serious injury. Relieve all pressure from the hydraulic system before connecting or disconnecting the lines or making repairs. Check all hoses and fittings before start-up and periodically during operation.
- Always wear eye protection when operating or servicing this machine.
- Before starting repairs or examining the conveyor, remove rings and jewelry to prevent an accidental short circuit or entrapment.
- Before starting repairs which do not require battery power, always turn off the key switch, then disconnect the battery to prevent accidental short circuit.
- Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.
- Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
- Never make any alterations or modifications to this equipment.

CALIFORNIA**Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

FAILURE TO HEED MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH

1.4 EQUIPMENT DESCRIPTION

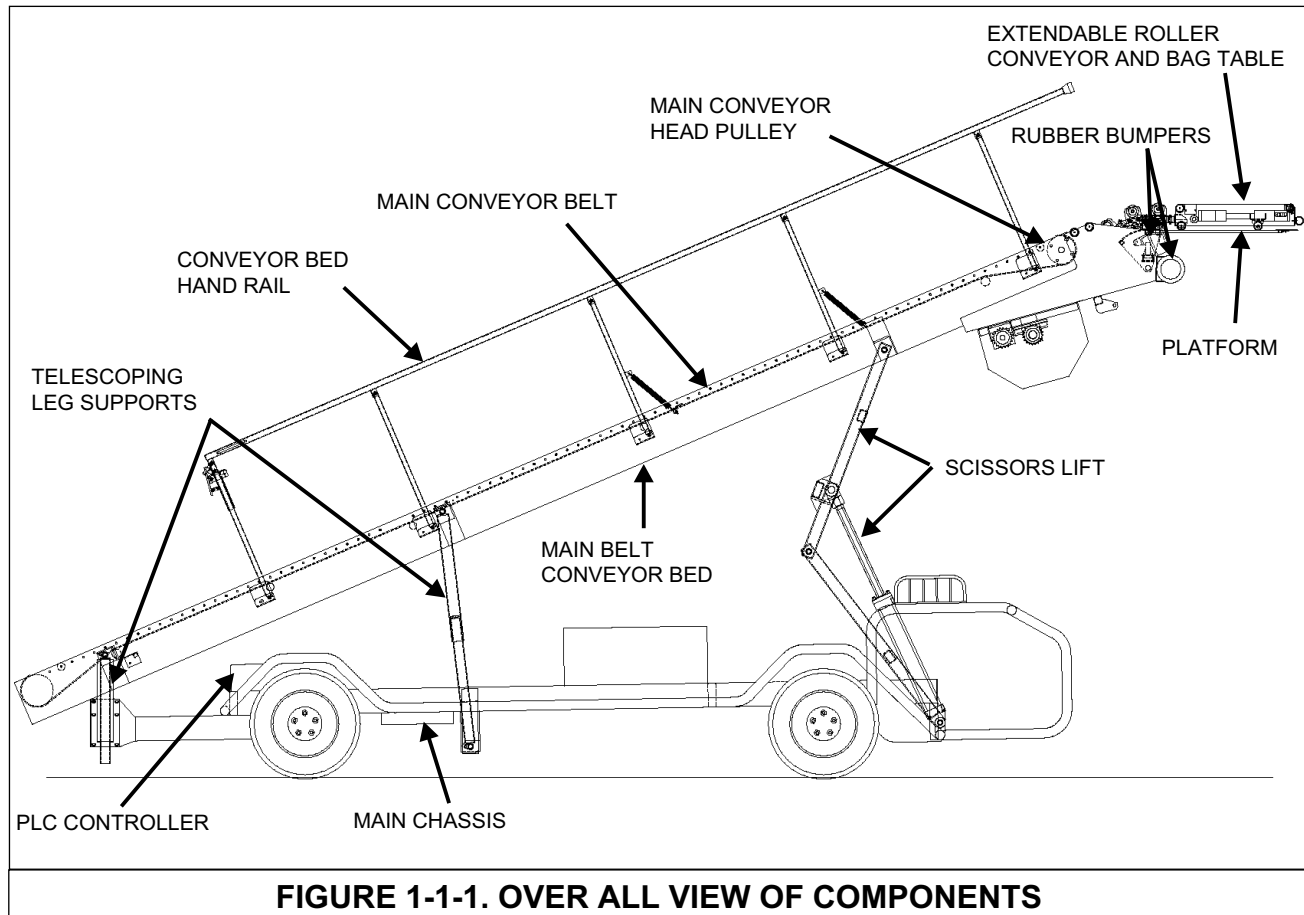


FIGURE 1-1-1. OVER ALL VIEW OF COMPONENTS

1.4.1 Intended Usage EQUIPMENT DESCRIPTION

The NMC-Wollard, Inc., Roller Drive Belt Loader, Model TC999 series, is a belt conveyor with a center-mounted conveyor belt coupled with an extendable, serpentine roller drive conveyor (may be referred to as roller drive conveyor or roller conveyor hereafter); *specifically* designed to assist airport ground service personnel in the loading and unloading of passenger baggage and cargo. It can also be used to load and unload trucks, cargo carts, and lifts or other baggage and cargo conveying devices as long as it is operated within its design capability and other performance specifications. For loading capacities, weights and sizes, elevating ranges, etc., refer to Chapter 1, Section 3. Do not use this machine to lift any items, it is a conveyor only. Baggage handling personnel may climb the conveyor belt to reach cargo areas only if the handrail is in the UP position, the catch/latch is locked and the platform is supported (not free standing). Do not climb or ride on the belt if it is operating. Do not climb a loaded belt. The belt conveyor is designed for a concentrated load of 200 lbs/sq. ft. maximum.

1.4.2 Main Chassis

The chassis is a welded-steel structure containing the operator's station, power pack (engine package), drive train, battery system, stabilizers, and independent hydraulic system. Steering is powered by the independent hydraulic system. The drive train is a conventional rear-wheel design, having a transmission, drive shaft, and differential.

1.4.3 Main Belt Conveyor

1.4.3. 1 Belt Conveyor Bed

The conveyor bed is composed of a steel frame upon which the drive roller, tail roller, bed and idler rollers, rubber conveyor belt and extendable serpentine roller system are assembled. A rubber bumper is assembled to the front end of the bed to protect the aircraft and loader. An optional bumper can be installed at the rear end of the conveyor.

1.4.3. 2 Main Conveyor Belt Drive System

The belt is driven by the head pulley which has a hydraulic motor inside it. One of the serpentine conveyor (may be referred to as roller drive conveyor or roller conveyor hereafter) roller drive rolls has dowel pins embedded in it for a speed sensor to pick up a signal and send this signal to a PLC (programmable logic controller). A second speed sensor picks up a signal from a sprocket mounted to the head stock pulley and sends this signal to the PLC. The PLC compares the two signals and sends a signal to the proportional valve to increase or decrease the hydraulic flow to the belt head stock (drive) pulley until the correct ratio between the signals is reached. At that time the belt speed will match the roller speed. (73 ft/min typical). Should this speed need to be changed, contact the factory.

A counterbalance valve in the belt motor hydraulic circuit prevents runaway of heavy packages when in the "Unload" or "Reverse" mode of operation.

IMPORTANT: Unless the handbrake is applied and the gearshift lever is in neutral position, the main belt will not operate.

Operating a belt control switch causes the spool of the main belt control valve to shift, directing fluid to turn the hydraulic motor either forward or reverse as required, at the speed dictated by the control system described above.

When running forward, fluid free-flows through the counterbalance valve. When running in reverse, the counterbalance valve remains closed until sufficient pilot pressure builds up and shifts the spool to allow fluid to flow.

1.4.3. 3 Conveyor Bed Lift System

⚠ CAUTION Do not use the conveyor bed as a lifting mechanism. The conveyor is designed to support only the specified loads.

The conveyor bed is supported by square, telescoping legs at the rear and the midpoint of the conveyor. At the front of the conveyor, the bed is supported by a hydraulic cylinder/scissors assembly. When the conveyor is down, the bed is level. It is supported on the telescoping legs at the midpoint which are retracted and at the front by the scissors assembly. The rear legs are telescoped upward.

As the forward end of the conveyor bed is raised by the scissors assembly, the bed pivots on the center support and the rear support will telescope completely down. By the design geometry of the lift system, as the front of the bed continues to raise, the center support will begin to telescope upward and the rear of the bed will pivot on the rear support, thereby keeping the rear of the belt conveyor at the same height throughout the raise and lower cycle.

A counter balance valve on the scissors cylinder locks the cylinder in place when in the raised position. The bed is powered down.

1.4.3. 4 Conveyor Bed Lift Controls

The conveyor bed "Raise" and "Lower" control switch is located on the dash to the operator's right side of the steering wheel. The switch controls the Conveyor Bed Up/Down Valve. Pushing the momentary contact UP shifts a solenoid valve to direct fluid to extend the scissors cylinder, and pushing DN shifts the a solenoid valve to direct fluid to retract the cylinder.

When extending the cylinder, fluid free-flows through the counterbalance valve.

When retracting the cylinder, fluid pressure builds up in the cylinder retract line until it is sufficient to force the counterbalance valve open and allow fluid to escape from the blind end of the cylinder. The counterbalance valve controls pressure in the retract line to prevent the cylinder from retracting too quickly.

1.4.4 Extendable Conveyor Front Platform

The extendable conveyor front platform (may be referred to as platform hereafter) provides a support structure for the front of the extendable roller drive conveyor (may be referred to as bag table hereafter) and incorporates a level sensor to keep the platform level. It is supported on the cargo door sill during operation. This feature raises or lowers the forward end of the belt conveyor bed as required to keep the platform level.

When the roller drive conveyor is stored (retracted), the bag table will be supported on this platform.

The platform is constructed of a series of stainless steel bars held together by a long pin at both ends. The bars are separated by spacers. This construction provides flexibility and allows the platform to conform to the cargo door sill.

Platform leveling can be set to automatic or can be done manually. When set to automatic, the platform will float to its full down position, and the belt conveyor forward end will slowly lower until the platform contacts the cargo door sill. Once in contact with the sill, the level sensor will signal the conveyor bed to lower or raise however required to keep the platform level within 5 degrees. In manual mode, the platform can be raised with the platform UP switch. When manually lowered, the platform will float down to the pivot limit of the platform. **IMPORTANT:** The level sensor does not limit movement in manual mode.

There is a delay in the automatic leveling system to prevent abrupt operation if the switch closes momentarily from bouncing. When the scissors lift is going up and down to keep the platform level, the hydraulics for the scissors cylinder is proportioned to 15% of manual mode flow for smooth operation. In manual mode, the flow reverts to full flow and operation is faster.

If the automatic leveling system fails, it will sound a bell alarm after a 20 second delay.

If the roller drive conveyor is retracted and the loader is put into Reverse without raising the platform off the door sill, and AUTO LEVEL is selected, the platform will raise automatically to prevent dragging on the sill. In MAN LEVEL the platform does not raise automatically. There is also a UHMW wear strip on the bottom of the platform to reduce friction.

For setup information and operational checks, see Setup Information, 4.3.

1.4.5 Serpentine Extendable Roller Drive Conveyor With Bag Table

The serpentine roller conveyor (may be referred to as roller drive conveyor or roller conveyor hereafter) consists of 40 electric motorized rollers, 3" outside diameter. In addition, the bag table has a belt with two motorized rollers and a high torque drive roller under the bag table at the rear and there are two motorized rollers to transition baggage from the belt to the roller conveyor. The roller conveyor assembly is guided by wheels and cam followers in tracks under the conveyor belt in the belt conveyor bed. The roller conveyor can extend out approximately 20 feet.

The rollers are all joined together with a series of articulating links. When the roller conveyor “propel extend” control is activated, a large double row spur gear engaged with the articulating links drives it out. Likewise, when the “propel retract” control is activated, it drives the roller conveyor back in. This is a rack and pinion principle. The double spur gears are driven by a hydraulic motor and chain reduction drive. This hydraulic motor has a spring applied, hydraulic release brake to prevent the roller conveyor from backing up if on an incline.

Each drive roller has an individual, self resetting circuit breaker located under its bumper/cover.

At the forward end of the roller conveyor is a bag table which has a short conveyor belt powered by two lagged electric motorized drive rollers. This bag table contains the controls to power the roller conveyor in or out, to start and stop the belt and roller conveyors simultaneously and has E-stops for emergency shutdown.

Under the rear end of the bag table, there is a high torque motorized traction roller which assists in propelling the forward end of the roller conveyor out while the double spur gears drive the roller conveyor out from the belt conveyor bed. This prevents the roller conveyor from crowding ahead. While this conveyor is driven back into the belt conveyor bed, this roller “free wheels”.

There is approximately a 3 second time delay on conveyor startup, during which a pulsing alarm will sound to warn all persons in the area, of the startup.

For setup information and operational checks, see Setup Information, 4.3.

1.4.6 Hydraulic System

Also see Chapter 2, Section 2

The hydraulic system powers the conveyor bed scissor lift cylinder, platform cylinder, the conveyor belt and roller conveyor extension drives, and vehicle power steering. The system consists of an engine-driven hydraulic pump, oil reservoir, strainer, control valves, high pressure oil filter, return oil filter to protect proportional valves; check, flow control and gate valves; and the associated plumbing, fittings and hoses. The following functional units are explained in this section: Conveyor Bed Lift System, Conveyor Belt Drive System, and Power Steering.

1.4.6. 1 Oil Reservoir

The hydraulic oil reservoir is behind the operator’s station. The tank is made of welded aluminum to reduce internal corrosion and scale buildup. Working oil capacity is 8.5 U.S. gallons (32 liters). The reservoir is fitted with a magnetic drain

plug, sight gauge, and a vented filler/strainer located in the center of a clean out cover.

A shutoff valve and an 80-mesh external Y-strainer are installed in the suction line between the reservoir and the pumps. A 10-micron filter unit, with a replaceable element and a shutoff valve, is located in the return line.

See Chapter 2, Section 1, for hydraulic fluid capacity and specification.

1.4.6. 2 Hydraulic Pump

The hydraulic pump is driven by the vehicle engine. It is a fixed-displacement gear-type mounted on the engine. The main pressure relief valve is with the engine package and limits system pressure to a specified setting. All main valves are open-center types which allow unused hydraulic oil to return freely to reservoir when a function is not being used.

1.4.6. 3 Power Steering System

The steering gear is powered by a gimbal-mounted, double-acting hydraulic cylinder mounted on the front axle. The control unit is actuated directly by the steering wheel to control flow of hydraulic power to the steering cylinder.

Turning the steering wheel actuates the rotary valve in the power steering unit. As the valve opens, hydraulic oil travels into a metering motor within the power steering unit, then out from the motor, through the valve, and out to the retract side of the steering cylinder. Return oil from the extend side flows through the valve to the reservoir. Oil flowing through the metering motor causes it to turn, and as it turns, it moves a feedback linkage that returns the rotary valve to center and locks the steering cylinder in position. The metering motor therefore ensures that the steering cylinder is precisely controlled by the command received from the steering wheel.

In the event of a power failure, steering can be done manually by turning the steering wheel. In this case, steering wheel movement turns the metering motor directly through the feedback linkage. The motor is then used as a pump to force oil into the cylinder, while drawing oil into the suction side (through check valve) from the return line.

1.4.7 Electrical System

See schematics in Chapter 2, Section 2

All electrical power requirements are supplied by the alternator/battery system. This includes starting, control and monitoring, roller drive motors, vehicle lighting, and accessory equipment.

1.4.7. 1 Battery System

Four 12V batteries are used to supply the electrical requirements of the loader unit. Two sets of two batteries are connected in series for 24V. Each set of series connected batteries is then connected in parallel to maintain 24V. The electric roller assemblies are 24VDC. The controls on the engine are 12VDC. For this reason, one of the 12V batteries is used to run all 12V engine controls. Because of the additional load, this battery will loose charge quicker than the others, so an equalizer is used to allow all batteries to charge equally.

A 28V, 55A alternator is installed on the engine. Full load is 62 amp max, normal about 30A. A red "Low Volts" light on the instrument panel warns of alternator system malfunction, and a resistor across the light provides start-up current to the alternator.

1.4.7. 2 Instrument Panel Assembly

The instrument panel, located at the operator's station, contains all necessary controls for the engine, lighting systems, and engine system monitors. The controls and indicators are grouped and labeled for ease of use and identification.

Fuses for the control circuits are located on a sub-panel under the lower right-hand corner of the instrument panel. See Chapter 2, Section 2, Figure 1. All fuses are labeled as to circuit and current rating. The complete panel can be unplugged and removed for service or replacement.

1.4.7. 3 The Electrical Control

The bag table propel roller and two belt drive rollers are powered by 24VAC.

Inside the bag table are two 24VAC controllers in an enclosure to control each of the two bag table drive rollers. Inside the enclosure is a single potentiometer which regulates the speed of these rollers. The enclosure also contains a third controller for the bag table propel roller and a potentiometer to regulate the speed of this roller. This propel roller is set at 105 RPM.

The roller drive motors on the roller drive conveyor are controlled by a PLC. The rollers are factory set for 73 ft/min which has been determined to be an optimal speed for typical operations. This speed can be changed by resetting the personality codes on the Sevcon controller. Contact the factory for this procedure, if required.

For setup information and operational checks, see Setup Information, 4.3.

1.4.7. 4 Engine Package Electrical Assembly

All wiring for the engine package is self-contained and may be unplugged from the vehicle chassis harness for quick removal of engine/transmission assembly. A

sub-panel on the engine contains the starter and glow plug (diesel engine) relays and the main system and glow plug system power fuses.

1.4.7. 5 Chassis and Conveyor Electrical Power Distribution

A single harness on the main chassis interconnects the instrument panel and engine package with all other electrical components, lighting, and accessories.

Another harness interconnects the bed devices.

Three harnesses are installed along the center of the roller conveyor. One harness supplies power to lower 20 rollers and the other to the upper 20 rollers. A third harness supplies power to the bag table rollers and control wires to the bag table. These harnesses exit from the rear of the roller conveyor, below the belt conveyor bed and are carried on a flexible cable carrier. The harnesses drop out at the center of the bed and go to the control enclosure and PLC.

All components installed are of standard automotive or industrial type for easy procurement and replacement. All components are weatherproof or are adequately protected from the elements.

Power for all vehicle control and lighting circuits is supplied to the engine sub-panel from the positive battery cable connection on the engine starter. At this point, the power circuit is divided into two circuits:

Wire #10 (through 30-ampere fuse, feeds the instrument panel keyswitch.

Wire #7 (through a 30-ampere Slo-Blo fuse) feeds the glow plugs (diesel engines only).

At the instrument panel, power is fed through the keyswitch to the run, start, and accessory circuits. The keyswitch (SW1) is a 3-position conventional anti-restart automotive rotary switch with OFF-RUN-START positions. The START position is mechanically interlocked so that SW1 must be turned to OFF before the starter may be re-engaged. Each of these circuits is in turn divided as necessary and all are fused in accordance to wire size and circuit load.

1.4.7. 6 Engine Run Circuit

Diesel engines are controlled by a solenoid-operated fuel pump shutdown. The solenoid is energized to run, de-energize to shut down. The fuel shutdown solenoids are integral parts of the engines.

1.4.7. 7 Engine And Brake System Monitoring

Engine water temperature, oil pressure, and running hours are monitored by sensors, lights, and gauges on the instrument panel and engine. A single light monitors the condition of the brake system. All indicator lights are automatically tested every time the engine is switched on or off.

Power feeds the indicator lights and hour meter through SW1 when in the "Run" or "Start" position.

Oil pressure and water temperature switches on the engine operate the "Low Oil Pressure" and "High Water Temp" indicators on the instrument panel.

The pressure differential/metering valve on the split brake system contains a switch that closes and illuminates the "Brake Fault" light if there is any pressure imbalance in the brake system.

The "High Water Temp" and "Brake Fault" indicators are self-testing, because the corresponding switches always stay open unless a fault condition occurs. When the keyswitch is off, capacitors CAP1 and CAP2 are not charged. As SW1 closes, power is applied and current begins to flow through indicator lamps PL3 and PL4 into the capacitors to charge the capacitors up to system voltage. As the capacitors charge and their voltage rises, the current through the lamps is correspondingly reduced until the current stops completely. When SW1 is turned to "Run", the lamps immediately illuminate, then gradually dim until they go out.

When SW1 is turned to "Off", voltage is removed from wire #17. The capacitors, which are charged up to system voltage, then discharge through the lamps back to ground, causing the lamps to illuminate momentarily.

Glow plugs are furnished to aid in cold-weather starting.

1.4.7. 8 Running Lights, Work Lights, Horn, and Other Accessories

Running lights and work lights are energized in the SW1 RUN position.

The headlights and rear lights are controlled by a two-position toggle switch on the instrument panel. The stop lights are controlled by an automotive style brake switch on the brake pedal assembly. The backup lights are controlled by a switch on the automatic transmission shifter shaft.

Optional turn signal lights are controlled by a lever-operated switch on the steering column and a flasher.

Head lights, stop light, turn signals, and various other accessories are protected by a 15A fuse (6FU, see schematic).

Other accessories are energized through fuse 7FU, including the front and optional rear spotlights, which are controlled by toggle switches on the instrument panel. The horn is controlled by a center-mounted button on the steering wheel.

A spotlight is provided to illuminate the area of the bag table platform to aid positioning at night. This light is powered anytime the ignition is ON.

1.4.8 Engine and Drive Train

The TC-999 Roller Drive Belt Loader is designed with a self-contained quick-change modular power package (engine, transmission, drive shaft, cooling system, engine electric pack, and the engine-driven hydraulic pump system) which is assembled into an easily removable frame.

The quick-change feature makes it possible to remove and replace the complete power package for rapid turnaround of the vehicle. The self-contained package can be run for testing outside of the chassis. A test stand with fuel tank and electrical controls is available from NMC-Wollard, Inc. for this purpose.

Both front and rear axles and drive shaft are conventional automotive type, with disc brakes on the front and drum brakes on the rear. The rear axle has a limited slip differential to provide improved traction in wet, ice, and snow conditions.

1.4.9 Brake System

1.4.9.1 Service Brake

The standard brake system is a non-powered, dual-circuit system using standard automotive components. The front wheels have disc brakes and the rear have self-adjusting drum brakes. A pressure differential metering valve balances the pressures between the front and rear brake systems to assure safe, effective braking. This valve also monitors pressures in both systems and signals system malfunctions via the "Brake Fault" light on the instrument panel.

1.4.9.2 Park Brake

Rear axle brakes are also cable-operated by the handbrake lever. The lever is provided with a locking setscrew to prevent unauthorized adjustment.

1.4.10 Interlock Features

For safer, efficient operation, the following features are designed into the Roller Drive Belt Loader system.

1.4.10. 1 Loader Interlock Circuits (Also see 1.4.10. 2)

1. With all E-Stops out, unit in neutral, park brake set and rollers fully retracted, all five green indicator lights on instrument panel should be lit. Lights will go out when status changes. Engine will only start when the e-stops, neutral and park brake lights are on.
2. The loader conveyors will only operate if the baggage loader is in neutral with the park brake on. Releasing the park brake or shifting from neutral with the conveyor running will kill the engine. To restart, reapply the parking brake and/or shift to neutral.
3. The complete roller drive belt loader will shut down (including engine) when any emergency stop button is pushed.
4. A hand brake switch is mounted on the hand brake mechanism, and the switch contacts will close only when the handbrake is fully applied.
5. The Neutral switch is mounted on the gearshift selector mechanism, and is closed only when the gearshift is in Neutral.
6. The roller drive conveyor is interlocked so it will kill the engine if it is extended and either the park brake is released or if the shift lever is shifted out of neutral. Rollers must be retracted to drive unit. For emergency procedure see 2.2.7.
7. When the conveyor bed is fully lowered, the platform automatically lowers. The platform can not be raised if the conveyor bed is completely lowered. You must raise the conveyor bed at least a couple inches first.
8. The main belt conveyor bed can not be lowered when the platform is full up. To lower the bed, the platform must be lowered slightly to disable this feature.
9. In manual, when bed is lowered and platform contacts the table surface, the bed will stop lowering before the platform is forced fully up for safety. Adjust LS under platform weldment.
10. When in AUTO LEVEL, the platform will come down and then the bed will start lowering until the platform rests on a surface and is level. Platform can raise up approximately 2 degrees but not go below level.
11. If the shift lever is put in reverse with AUTO LEVEL selected, the platform will automatically raise up to protect the aircraft except when the main conveyor bed is fully down. If MAN LEVEL is selected, the platform will not raise when Reverse is selected.
12. The engine starter will not engage unless the transmission shift lever is in neutral, ignition switch is in RUN position, and no emergency stop buttons are depressed.

13. Vehicle running and work lights operate only when the instrument panel ignition switch is in RUN position.

For setup information and operational checks, see Setup Information, 4.3.

1.4.10. 2 Status Indicator Panel

1. The roller conveyor, conveyor belt and bag table will not operate if the indicator lights (except "Rollers Full Retract" light) on the fault indicator panel are not lit. This panel is located on right side of the instrument panel.
2. When either the "Conveyor E-Stop" or the "Bag Table E-Stop" indicator lights are out, you need to check the E-Stop buttons. There is a "Conveyor E-Stop" button, located on both sides of the rear end and on both sides of the front end of the main conveyor belt bed. The bag table has two "Bag Table E-Stop" buttons, one on each side of bag table. If they are activated you will need to reset them. See 2.2.5.
3. If the "Neutral Switch" indicator light is not lit, the shift lever needs to be placed in neutral for the loader to operate.
4. If the "Park Brake" indicator light is not lit, the park brake must be applied for the loader to operate.
5. The "Rollers Full Retract" indicator light will be lit when the rollers are fully retracted. This needs to be lit before shifting into gear or releasing the park brake. See 1.4.10. 3.



**FIGURE 1-1-2. STATUS
INDICATOR PANEL**

1.4.10. 3 Bag Table And Roller Drive Conveyor

1. If the conveyor is operating forward while you retract the roller conveyor, the belt conveyor automatically stops so baggage doesn't bunch up.
2. If the roller conveyor is not completely retracted into the storage position and you release the park brake or shift from neutral, the engine will kill. This is to protect the aircraft from damage. See 1.4.10. 2.

1.4.10. 4 Alarms

1. When any conveyor start button is pushed, a load pulsing horn alarm will sound for 3 seconds before the conveyor starts. This alarm is located near the spotlight at the bag table platform.

2. If the automatic leveling fails, a bell alarm located near the scissors lift will sound after a 20 second delay. Manual monitoring will be required until the leveling unit is serviced.

1.4.11 Backup Power And Operation

If the engine fuel supply runs out and the engine stops operating, a backup electric hydraulic pump can be used to finish up the operation. Turning the electric pump switch ON will power all hydraulic requirements except power steering. See figure 1-2-8.

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2 OPERATION

2.1 PRE-OPERATION

2.1.1 Understand the Controls

2.1.1.1 Operator's Station - See Figure 1- 2-1

1. Operator station controls are conventional in design, clearly labeled, and conveniently grouped at the operator station. Functional and operational interlocks are provided for operator safety and protection of the vehicle to permit long, trouble-free service.
2. General instructions for operation of the unit are given in this section. For a more detailed description of engine operation, refer to the manufacturer's manuals provided in Chapter 5.

⚠ WARNING Do not drive this machine before fastening seat belt.

Service (Foot) brake - apply to slow and stop vehicle.

Handbrake - set hand brake to secure vehicle in parked position. Conveyor will not operate unless the handbrake is set and shift lever is in neutral.

Foot Throttle - apply to increase ground speed.

Hand Throttle - this control is used to charge the batteries and supply sufficient hydraulic fluid flow to operate the conveyor belt at 73 ft/min. Push toward the rear to increase speed, push forward to decrease speed.

Shift Lever - select direction of travel with this lever. Putting the lever rearwards to the "F" position causes the vehicle to travel forward. Putting the lever in the reverse position causes the vehicle to move in reverse. The Center position is neutral. Conveyor will not operate unless this control is in neutral and handbrake is set.

Horn - standard automotive type horn button. Push to sound audible warning.

2.1.1.2 Control Panel - See Figure 1- 2-2

Ignition switch - Turn ignition switch to **RUN** position. Check that headlights, taillights, stop lights, backup lights, and spotlights are operational. **NOTE:** The instrument panel ignition switch is of the anti-restart type. Once the engine has been cranked, the switch must be returned to "OFF" before the engine can be cranked again.

Light switch - Lower toggle switch turns headlights and tail lights on or off.

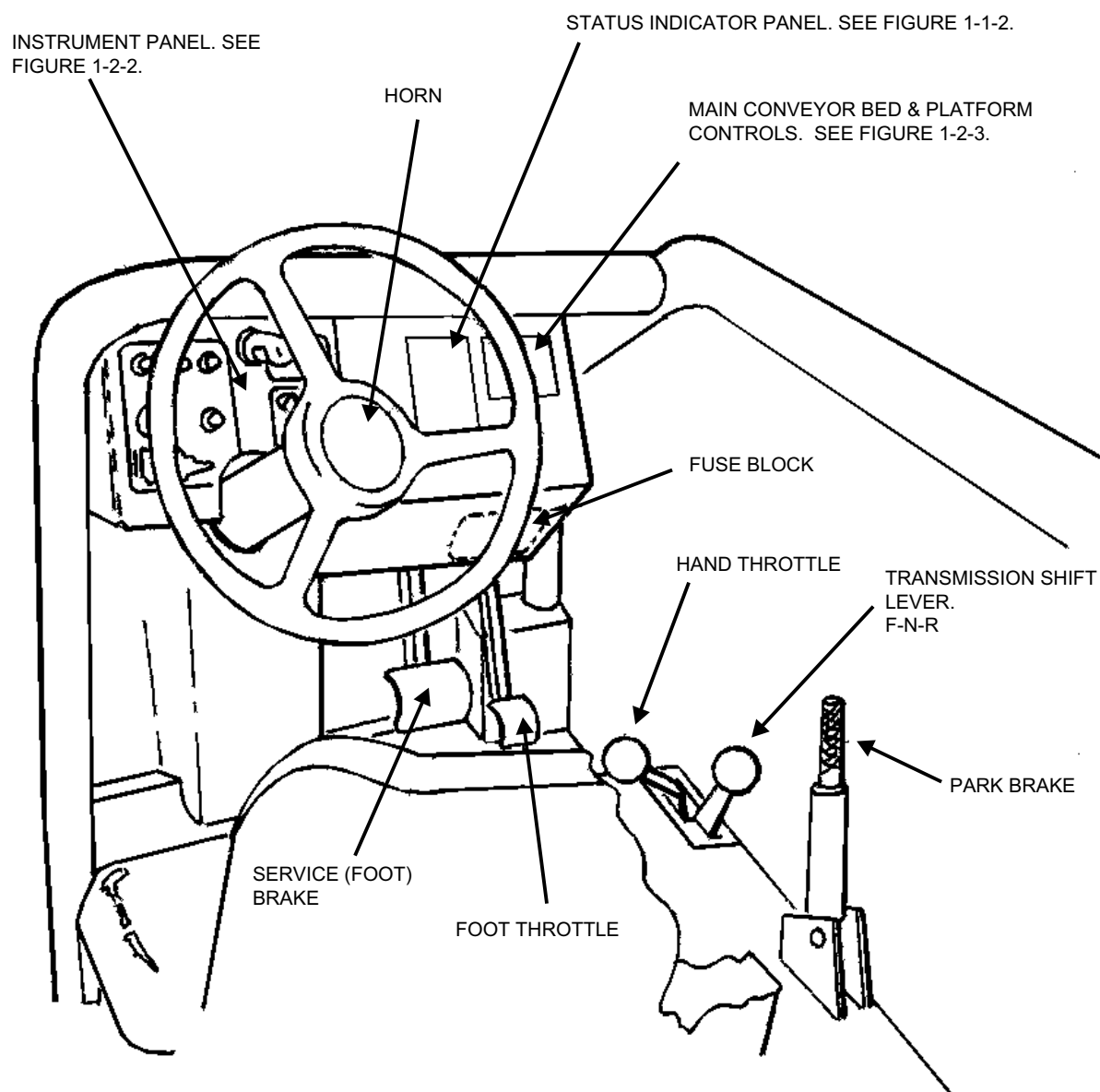
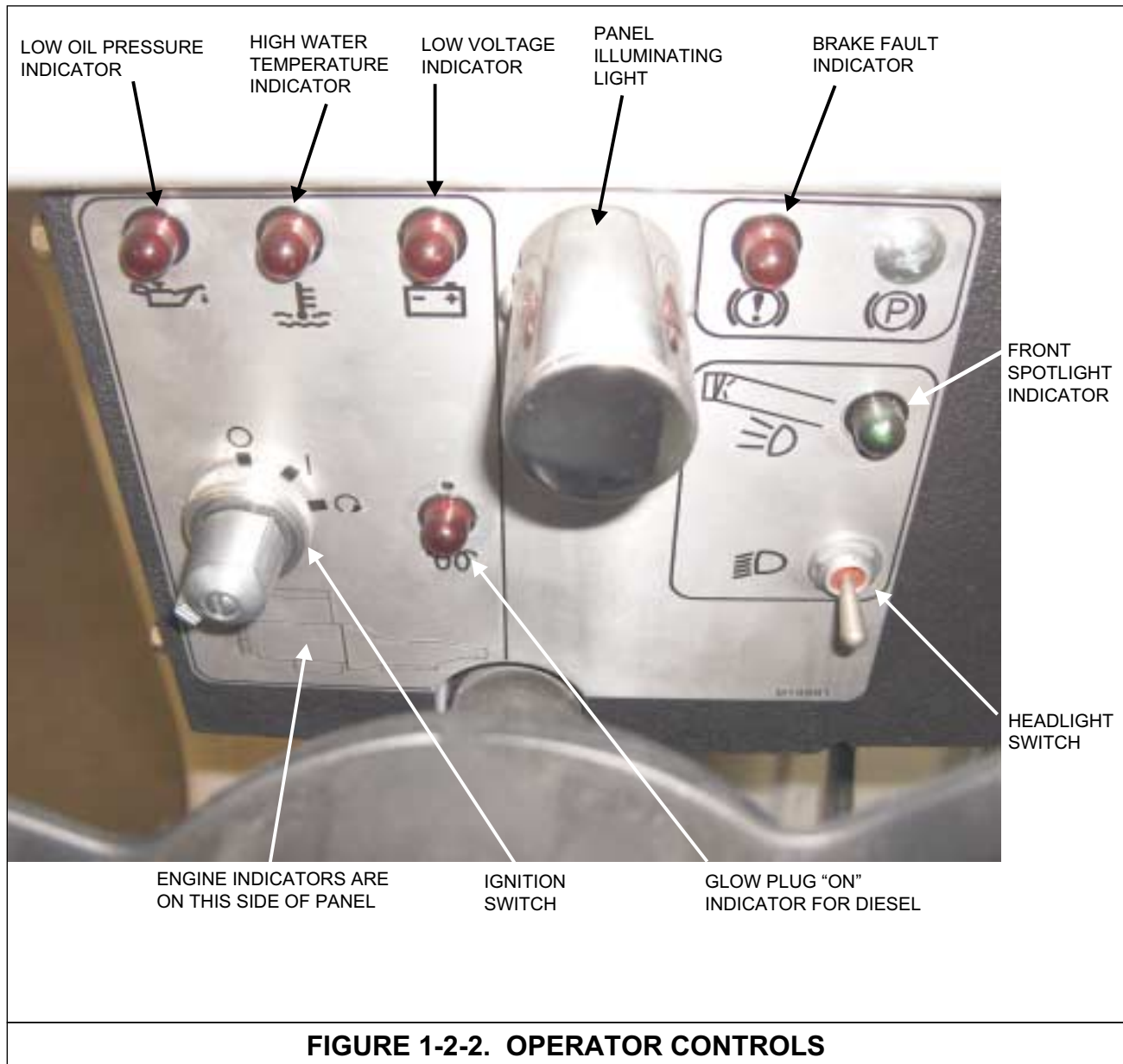


FIGURE 1-2-1. OPERATOR CONTROLS



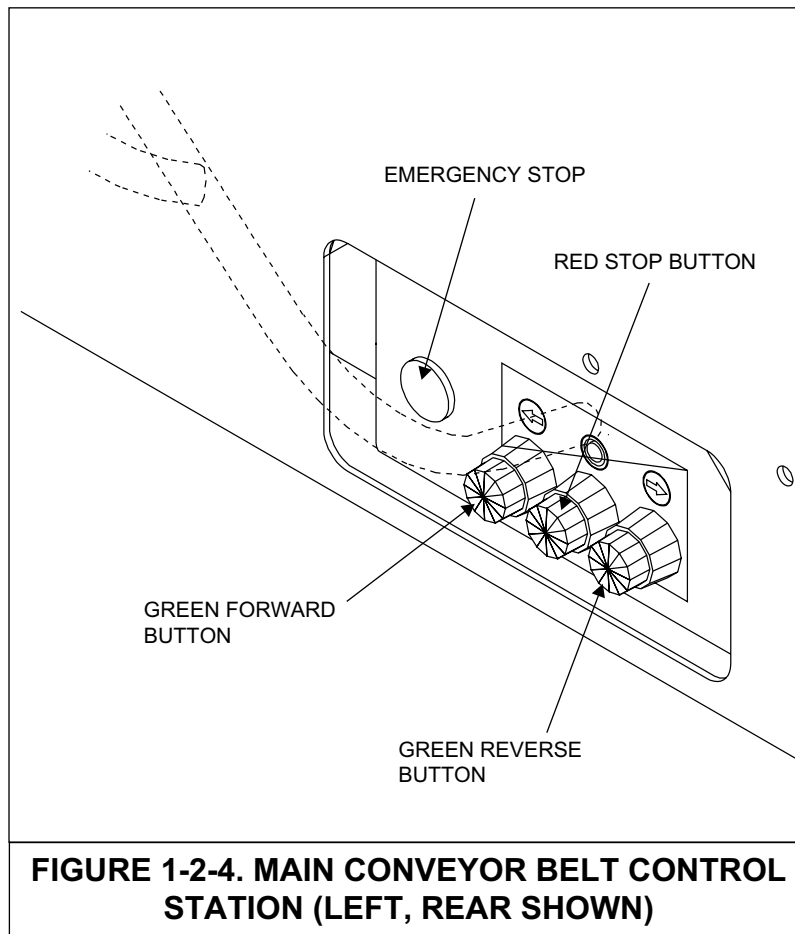
2.1.1.3 Main Conveyor Bed, Platform And Leveling Controls

See figure 1-2-3

1. The switches for these controls are located to the right side of the steering column on the dash wall.
2. When the auto level switch is switched to AUTO LEVEL, it will allow the main conveyor bed to raise and lower as required so the platform will rest on the cargo door sill in a level orientation. **NOTE:** This control should be switched to AUTO LEVEL only after the platform has been positioned over the cargo door

**FIGURE 1-2-3. CONVEYOR PLATFORM AND LEVELING CONTROLS**

- sill. If set before this, the main conveyor bed will completely lower to the stored position.
3. If it is required to level the platform when it is not supported (such as on the cargo door sill), switch to MAN LEVEL and position the main conveyor bed at the desired height. Then press and hold the PLATFORM LEVEL switch until the bag table comes to rest, level to the horizon.
 4. The CONV. BED UP and DOWN switch will raise and lower the main conveyor bed when the auto level switch is switched to manual operation. In this mode, the bag platform is manually leveled by raising and lowering the bed as required. If this switch is operated when in AUTO LEVEL mode, the conveyor will raise and lower at 15% speed.
 5. In auto level mode, the scissors lift cylinder will operate more slowly than manual mode. This provides smooth auto level operation. In auto mode there is also a short time delay to prevent triggering of leveling by momentary weight shifts on the conveyor.



2.1.1.4 Conveyor Control Stations

Electric push buttons control the conveyor with a push button station located on both sides of the rear and on both sides of the front ends of the main belt conveyor bed and a station on each side of the bag table. See figure 1-2-4 and figure 1-2-5.

The two outer, green buttons will start the conveyor in forward or reverse as indicated on the placard. The center, red button will stop the belt. You must stop the belt before reversing direction.

The bag table has a propel handle on each side of it. Pulling forward on the handle activates a switch to signal the spur gears to extend the roller conveyor and to start the propel roller located under the forward end of the bag table. Pushing back on the handle activates a switch to signal the spur gears to retract the roller conveyor. The propel roller will “free wheel” on retraction.



VERY IMPORTANT: There are six stations with red, emergency E-stop buttons. Pushing any of these buttons will shut down the complete system including the engine. To reset an E-stop button, twist the button $\frac{1}{4}$ turn clockwise. There is an E-Stop button located on both sides of the rear end of the main conveyor belt bed, figure 1-2-4, and on each side of the front end of the main conveyor belt bed. The bag table has two E-Stop buttons, one on each side, figure 1-2-5.

2.1.2 Daily Inspection

Before putting the unit into service and each day before operating the unit, always walk around unit and make the following checks:

2.1.2.1 Conveyor Belts

- General condition.
- Tension.
- Alignment - Belt centered on head and tail rollers.

⚠ CAUTION Do not exceed bed capacity of 2,000 pounds distributed over total belt conveyor, or a 200 lbs/sq. ft. concentrated load. Full capacity is only available when belt is properly tensioned.

2.1.2.2 Tires

- Check condition and pressure. Correct cold pressure is 65 PSI (4.6 kg/cm²) on all tires.

⚠ CAUTION The 65 PSI (4.6 kg/cm²) cold tire pressure is for standard ST225/75D15 radial tire only. Optional tires may have a higher pressure. Check marking on tires to determine maximum inflation of optional tires.

2.1.2.3 Hydraulic System

1. Check level of hydraulic oil by observing sight gauge on hydraulic tank (behind operator station).
2. **IMPORTANT:** Check hydraulic oil level with cylinders completely lowered or overfilling might result, causing damage to the hydraulic system or overflow of the tank.

2.1.2.4 Fuel Tank

Check fuel gauge on fuel tank for sufficient fuel for the day's operation.

2.1.2.5 Electrical System

Turn ignition switch to RUN position. Check that headlights, taillights, stop lights, backup lights, and spotlight are operational. See 2.1.1.2.

2.1.2.6 Engine and Transmission

1. With the transmission shift lever set in Neutral position and parking brake set, turn ignition switch to the **RUN** position.
 - Check that **LOW VOLTS** and **LOW OIL PRESS** indicators are illuminated.
 - Check that **HIGH WATER TEMP** and **BRAKE FAULT** indicators flash briefly and then go out.
2. Start engine and allow to warm up at idle speed for a few minutes.

NOTE: The engine starter will not engage unless the transmission shift lever is in neutral position and no emergency stop buttons are pushed in.

NOTE: For diesel cold weather starting, refer to 2.2.1.

Operations Check

1. Check operation of horn and power steering.
2. Check forward and reverse operation of conveyor belt from all operating stations.
3. Check operation of main conveyor bed lift.

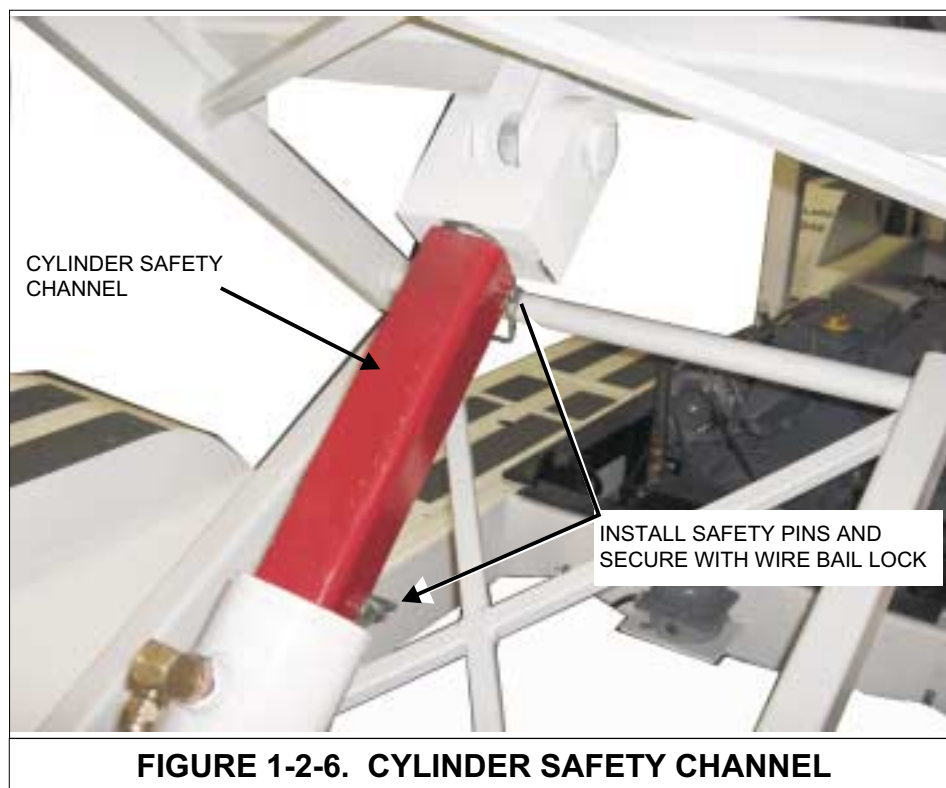
⚠ CAUTION Be sure there is sufficient overhead clearance before raising main conveyor bed.

4. Raise the main conveyor bed to the full up position. Install the cylinder safety channel as shown in Figure 1-2-6. Lower the bed until the cylinder rests on the channel.

⚠ WARNING Before working beneath the raised main conveyor bed, always install the cylinder safety channel. See figure 1-2-6.

⚠ CAUTION Do not force the main conveyor bed down with the cylinder safety channel installed or damage may result.

5. Stop engine.
6. Open engine cover (if applicable).
7. Check engine oil level.
8. Check coolant level in radiator (if applicable).
9. Check fuel filter for presence of water (diesel engines). Drain if necessary.
10. Check condition and tension of engine belt.
11. Close engine cover, remove the cylinder safety channel and lower the main conveyor bed.



⚠ DANGER

Do not stand on any area of the Roller Drive Belt Loader that is not specifically designed to be stood on. Stand only on areas constructed with “gripstrut” or otherwise covered with a skid-resistant surface.

Immediately repair any damaged gripstrut or skid-resistant material.

Do not ride on the Roller Drive Belt Loader except in a designated passenger seat.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY OR DEATH.

If all of the above checks are satisfactory, the unit is ready to service aircraft. If trouble is discovered during any of the above checks, report the problem to the proper maintenance personnel for correction before further operation.

2.2 OPERATING INSTRUCTIONS

2.2.1 Diesel Engine Starting

⚠ WARNING Starting aids such as ether should never be used at the same time as glow plugs or intake pre-heaters.

1. Consult the engine user manual for cold weather starting instructions. With some diesel engines, use of glow plugs is at the discretion of the operator, while with others, a control circuit is built into the electrical system, that automatically operates the glow plugs for a set period of time before permitting engine cranking.
2. Where glow plug operation is manual, turn ignition switch to RUN, then hold glow plug switch to "ON" for 20 seconds, then while still holding glow plugs "ON", crank engine until it starts. Continue to hold glow plugs on for a few seconds after engine starts until even running has been attained.
3. When glow plug operation is automatic, turn ignition switch to RUN. Glow plugs and red pilot light on dash will go on. DO NOT crank until light goes out.
4. **NOTE:** It is possible to crank engine before light goes out, but this practice should be avoided, unless restarting after short "engine off" intervals.

The use of ether or similar starting aids is not approved by NMC-Wollard, Inc..

2.2.2 How to Safely Approach the Aircraft

⚠ CAUTION This unit has restricted visibility on the right-hand side and rear. Before moving unit, walk around and ensure that there are no obstructions in the desired direction of movement. Be extra cautious when driving in reverse or making right turns.

⚠ CAUTION The operator position is forward of the front wheels. Be sure to compensate for this by steering late. Make wide turns until you are accustomed to driving the unit.

⚠ WARNING NMC-Wollard does not recommend or sanction the use of the platform/bag table for purposes of opening or closing cargo doors or to load late baggage.

1. For aircraft where the cargo door cannot be opened from the ground, and where late bags cannot be added from ground level, NMC-Wollard recommends that the front end of the Mongoose® main conveyor bed be positioned at least 3-4 feet below the cargo doorsill, with the platform and bag table at maximum down attitude. The belt loader can then be positioned so that the platform/bag table is under the aircraft, and then the agent can stand on the main conveyor bed only and utilize the handrail as instructed following, in order to open or close the cargo door or to load late bags. An optional access step on the front of the

driver's compartment is also recommended in order to reach the cargo door control panel safely.

⚠ DANGER To use the platform/bag table for any non recommended purpose in a freestanding setup, the operating personnel must assume responsibility for all risks. To minimize these risks consider the following:

- The platform/bag table must be level. This is accomplished by switching the level control to MAN LEVEL and positioning the main conveyor bed at the desired height. Then press and hold the PLATFORM LEVEL switch until the platform comes to rest, level to the horizon. If re-leveling is required, this step can be repeated.
- There is no handrail on the platform/bag table to use as an aid to maintaining balance.
- The bag table conveyor belt may free roll by weight shifting.
- The platform is designed to support only 375 pounds when not resting on the aircraft.
- Never stand or walk on the bag table during wet, snow or ice conditions.

⚠ CAUTION VERY IMPORTANT: When backing away from the aircraft with the platform below the aircraft, be sure the * MAN LEVEL switch is selected so the platform does not automatically raise and damage the aircraft when the shift lever is placed into Reverse.

2. To load or unload the aircraft, put the main conveyor bed down and drive the unit to within approx. 10 feet (3 meters) of the aircraft to be serviced. Position the unit at right angles to the cargo door threshold.
3. Place shift lever in Neutral position.

⚠ DANGER Any operation of the main conveyor bed, platform, auto level or conveyor drive system is strictly forbidden if personnel are standing anywhere on the conveyor system, particularly on the platform/bag table. There is an immediate potential danger of causing someone to slide off the platform/bag table by accidentally manually lowering the platform or by placing the system into auto level mode.

4. Raise the front end of the main conveyor bed and manually level the platform so the platform is approximately 6 inches (15 cm) higher than the cargo door sill.
NOTE: Manual level mode must be selected to operate the main conveyor bed lift and the platform. Note also, that the platform will not raise unless the main conveyor bed has been lifted enough to deactivate the scissors limit switch.

5. It is possible to raise and lower the main conveyor bed with the vehicle in motion but it is a distraction to the driver and should not be done as normal operating procedure.
6. Put the shift lever into the forward position and very slowly position the platform in the center of the door opening.. The orange stripe on the lower side of the platform should be directly over the edge of the sill. Make any adjustments required. Place shift lever in Neutral position and set parking brake. A spotlight will illuminate this area for night operation. **NOTE:** The spotlight is on continuously whenever the ignition switch is on.
7. Set the shift lever to neutral and apply the park brake.
8. Switch the auto level switch to AUTO LEVEL. The platform will gently lower onto the door sill and the main conveyor bed will lower as required to level the platform.
9. As the aircraft is loaded or unloaded, the auto level will maintain the level condition as the payload increases or decreases.

⚠ CAUTION Be sure that shift lever is secure in the detent.

10. **IMPORTANT:** Conveyor will not operate unless the shift lever is in Neutral and the parking brake is applied. If the roller conveyor is extended with the park brake released or shift lever in drive, the engine will shut down and will not restart unless in neutral with park brake applied.

2.2.3 LOADING AND UNLOADING THE BELT CONVEYOR

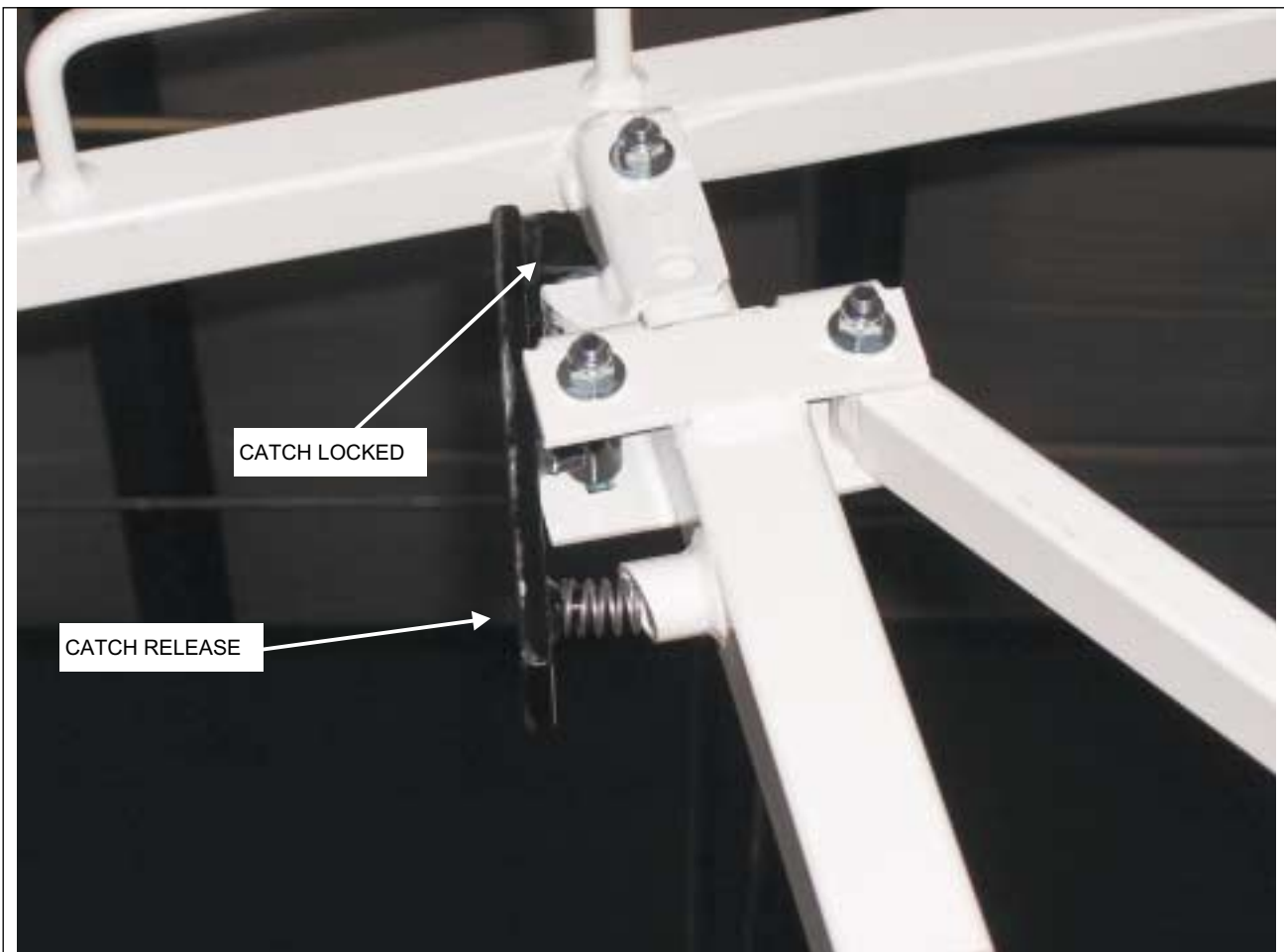
⚠ WARNING It is anticipated that personnel will walk up the belt conveyor to get to aircraft cargo holds. You can lose balance doing this and possibly fall. Never operate the belt while walking on the conveyor bed. Always be sure that the operator inside the cargo hold is aware of your presence before ascending the conveyor belt.

1. Always raise the conveyor bed hand rail and lock it in the raised position before walking on the conveyor. See figure 1-2-7.

⚠ WARNING Secure the conveyor bed hand rail in the “UP” position and be sure the catch locks before walking on the conveyor. See figure 1-2-7. Use this rail to climb the conveyor safely.

⚠ WARNING Never extend or retract or operate the roller conveyor while someone is on it.

2. Watch and observe the activities of other personnel and do not compromise their safety.
3. Engine speed must be high enough to provide steady hydraulic flow from the pump and to maintain battery charge.

**FIGURE 1-2- 7. HAND RAIL CATCH/LATCH**

4. Inside the cargo hold, grasp the propel handle and pull the bag table to the furthest baggage loading space or to the nearest baggage to be unloaded.
5. When all personnel are clear of moving parts, start the roller drive belt loader. A pulsing horn alarm will sound for 3 seconds before the conveyor starts. This alarm is located near the spotlight under the bag table platform.
6. **NOTE:** In order to minimize incidents of baggage falling off the roller conveyor at the turn, the individual roller segments at the turn need to be as even and level as possible. The best way to accomplish this is to pull the bag table straight in and then make the widest possible right angle turn in the appropriate direction.
7. While loading, pull the propel handle back toward the cargo door as the forward space fills up with baggage. When the bag table and roller conveyor is being retracted, the belt conveyor will stop so baggage does not crowd onto the roller conveyor. **IMPORTANT:** Do Not lift on the bag table while the roller conveyor is retracting or the cam followers can jump the tracks.

8. While unloading, move the propel handle forward to extend the roller conveyor further into the cargo hold. When the roller conveyor is being pulled out, the belt conveyor continues to operate.
9. The conveyor is started or stopped from any of four conveyor control stations; one at each corner of the rear of the main conveyor bed or at either forward side of the bag table. When any conveyor start button is pushed, a load pulsing horn alarm will sound for 3 seconds before the conveyor starts.
10. The controls are electric push buttons. The forward green button will start the conveyors in the load direction. The reverse green button will start it in the unload direction. The center red button will stop the conveyor. See figures 1-2-4 and 1-2-5.
11. **IMPORTANT:** The conveyor must be stopped before it will change direction.
12. **VERY IMPORTANT:** Every conveyor control station, figures 1-2-4 and 1-2-5, and both sides of the front end of the main belt conveyor bed has an emergency E-stop button. Push any of the E-stops in and all operation will stop, including the engine.
13. To reset an E-stop after all hazards have been cleared, pull the button out and twist ¼ turn clockwise.

⚠ WARNING Hazards exist at front and rear ends of belt and roller conveyors. Fingers, hands or feet can be caught by belt or roller and pulled around drive rollers.

⚠ CAUTION Because of the close proximity of operation to the baggage loader, exercise precaution to keep body limbs, clothing and hair away from moving parts during operation.

⚠ CAUTION Do not wear loose clothing or jewelry while operating equipment. Very long hair must be properly secured to avoid contact with moving parts.

⚠ CAUTION Return rollers on bottom side of belt conveyor create pinch points. Avoid contact by body, hair or clothing.

14. When loading or unloading is completed, stop the conveyor.
15. Completely retract the roller conveyor. **IMPORTANT:** Do Not lift on the bag table while the roller conveyor is retracting or the cam followers can jump the tracks. When the bag table reaches the platform, guide it horizontally to align it into the storage position.

⚠ WARNING It is anticipated that personnel will walk down the belt conveyor to leave the aircraft cargo hold. You can lose balance doing this and possibly fall. Never operate the belt while walking on the conveyor bed. Always be sure that the operator inside the cargo hold is aware of your

presence before descending the conveyor belt. Also see the precautions and instructions in 2.2.3.

16. Always raise the conveyor bed hand rail and lock it in the raised position before walking on the conveyor. See figure 1-2-7.

⚠ WARNING Secure the conveyor bed hand rail in the “UP” position and be sure the catch locks before walking on the conveyor. See figure 1-2-7. Use this rail to descend the conveyor safely.

2.2.4 How to Safely Leave the Aircraft

1. After all persons are clear of the machine, lower the hand rail. You must release a catch latch before the rail will lower.
2. Switch the Level Control switch to MANUAL and raise the platform about 6 inches off the cargo door sill.
3. Place shift lever in reverse position, release parking brake, straighten front wheels and slowly back unit a few feet (one or two meters) away from the aircraft.

⚠ CAUTION Before backing up, look back to make sure the area is clear and also watch that the loader is not contacting the cargo door sides.

4. **NOTE:** If you move the shift lever into reverse with AUTO LEVEL selected, the platform will automatically raise. This is an aid in preventing equipment damage and should not be made part of the normal operating procedure.
5. Place shift lever in the Neutral position while holding the foot brake depressed.

⚠ CAUTION Be sure there is sufficient clearance around and under the main conveyor bed before lowering.

6. Lower the main conveyor bed and then the platform to the full down position.
7. After lowering the main conveyor bed, shift to Forward or Reverse to drive away from the aircraft.
8. It is possible to raise and lower the main conveyor bed with the vehicle in motion but it is a distraction to the driver and should not be done as normal operating procedure.

⚠ DANGER Do not stand on any area of the baggage loader that is not specifically designed to be stood on. Stand only on areas constructed with “gripstrut” or otherwise covered with a skid-resistance surface.

⚠ WARNING Do not ride on the baggage loader except in a passenger seat, if so equipped.

⚠ CAUTION Immediately repair any damaged gripstrut or skid-resistant material.

⚠ CAUTION Do not use the conveyor bed as a lifting mechanism. The main belt conveyor is designed to support only 2,000 pounds distributed over total conveyor belt area or a 200 lbs/sq. ft. concentrated load. The platform is designed to support only 375 pounds when not resting on the aircraft.

⚠ WARNING Never allow more than one person to stand on the bag table at a time. Do not permit baggage, tools, etc on the bag table while standing on it. Exercise caution, you can lose balance doing this and possibly fall.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY OR DEATH.

2.2.5 Emergency Shutdown

Complete shut down including engine can be done in emergency situations by pushing in the emergency E-stop button at any of six locations. There is an E-Stop button located on both sides of the rear end of the main conveyor belt bed, figure 1-2-4, and on each side of the front end of the main conveyor belt bed. The bag table has two E-Stop buttons, one on each side, figure 1-2-5. The buttons must be reset by twisting ¼ turn clockwise before the engine will restart.

2.2.6 Emergency Stopping

1. Be prepared for emergency situations such as brake failure, by driving defensively and being aware of possible evasive actions.
2. The best defense against emergencies created by equipment failure is adhering to the periodical maintenance schedule and performing regular equipment inspections.
3. In the event of brake failure:
 - Pump the brakes to build brake pressure
 - Apply the parking brake
 - Shift the transmission to Reverse if extreme emergency
 - Turn off ignition if loss of power steering and power brakes will not cause additional problems

2.2.7 In Case of Engine or Hydraulic Pump Failure

2.2.7.1 Electric Powered Hydraulic Pump

If the engine fuel supply runs out and the engine stops operating, a backup electric hydraulic pump can be used to finish up the operation. Turning the electric pump switch ON will power all hydraulic requirements except power steering. See figure 1- 2-8. This pump is located inside the left, rear, chassis.

In the event of electrical (ignition circuit) failure, turn ignition off and then on. Raise step and turn pump switch on. Operate controls as required. Use the manual over rides located on the ends of the solenoid valves to operate the roller conveyor extend/retract, platform and bed UP/DOWN. These valves are located under the rear step. See figure 1-2-9. Do not use the control panel switches while using the manual solenoid over rides.

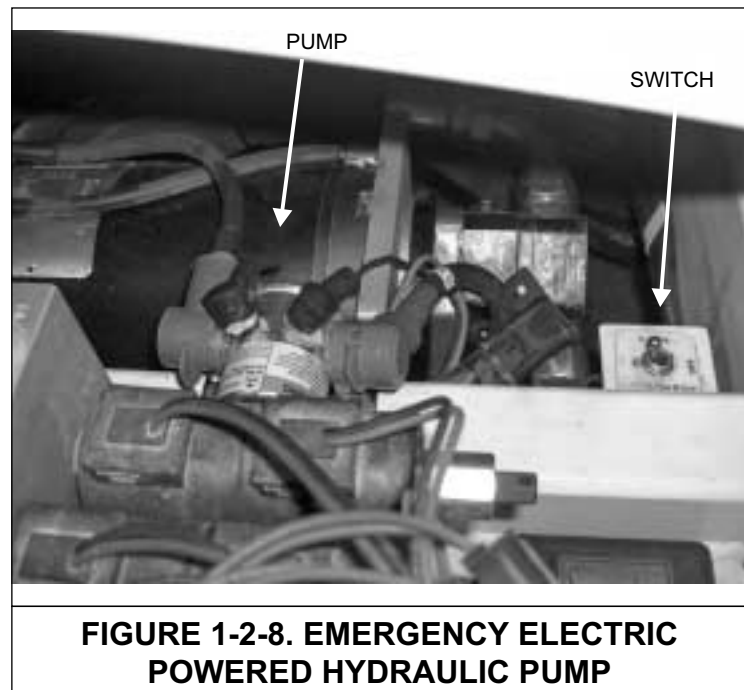


FIGURE 1-2-8. EMERGENCY ELECTRIC POWERED HYDRAULIC PUMP

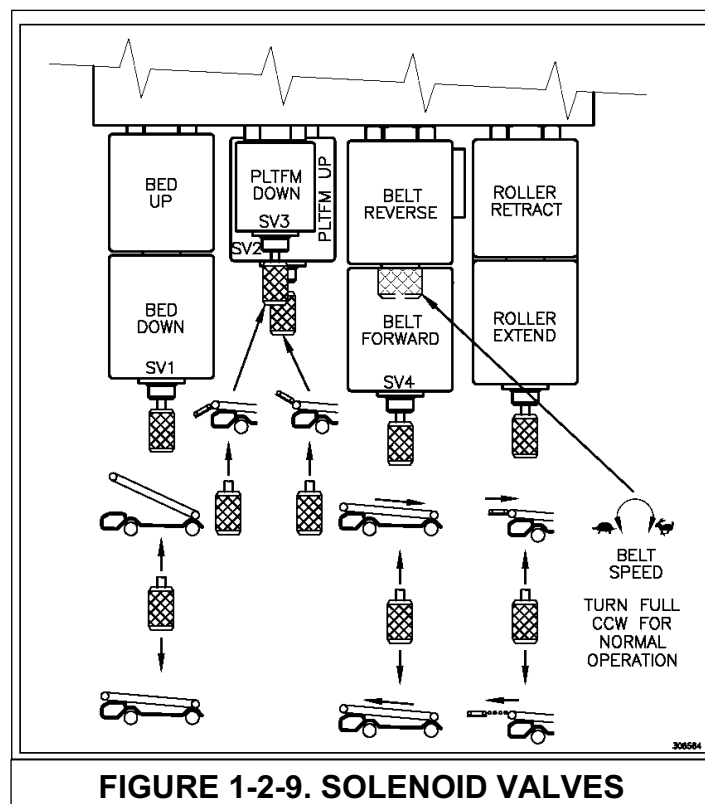
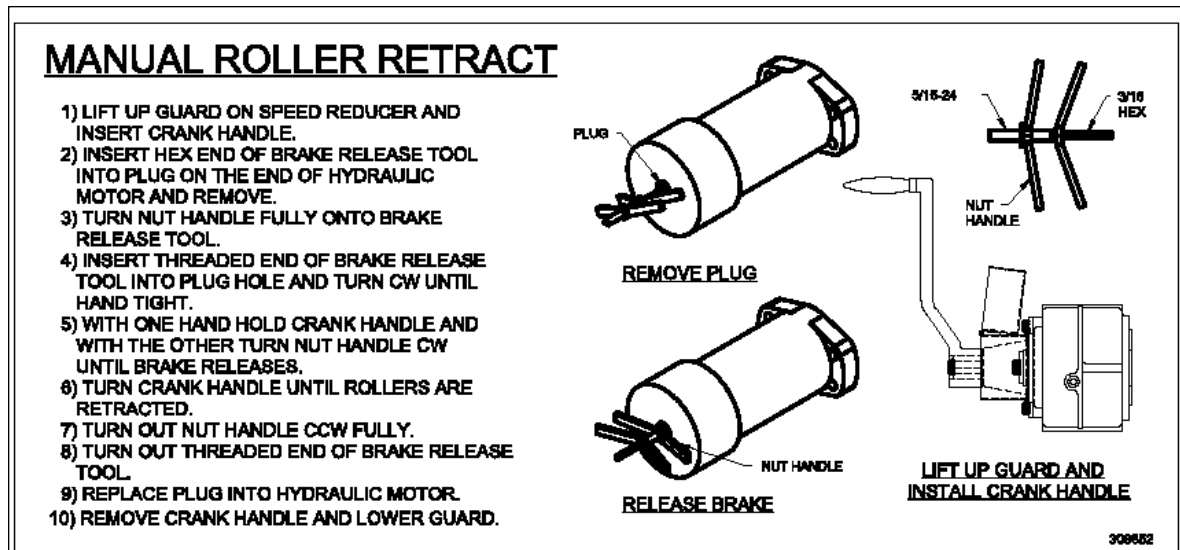


FIGURE 1-2-9. SOLENOID VALVES

2.2.7.2 Manual Roller Conveyor Retract

See figure 1-2-10.

1. Lift up guard on speed reducer and insert crank handle.
2. Insert hex end of brake release tool into plug on the end of hydraulic motor and remove the plug.
3. Turn nut handle fully onto brake release tool.
4. Insert threaded end of brake release tool into plug hole and turn CW until hand tight.

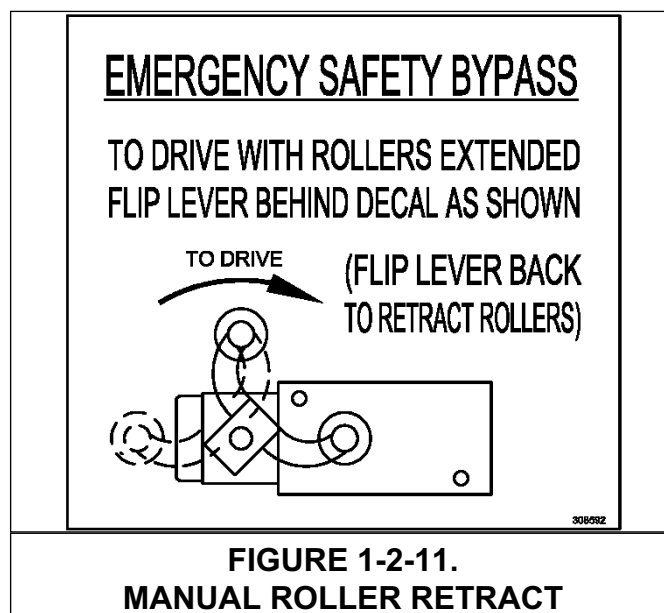


**FIGURE 1-2-10.
MANUAL ROLLER RETRACT**

5. With one hand hold crank handle and with the other turn nut handle CW until brake releases.
6. Turn crank handle until rollers are retracted.
7. Turn out nut handle CCW fully.
8. Turn out threaded end of brake release tool.
9. Replace plug into hydraulic motor.
10. Remove crank handle and lower guard.

2.2.7.3 Emergency Safety Bypass

If the roller conveyor is extended and the park brake is released or the shifter is shifted out of neutral, the engine will kill. If it is required to move the loader away from the aircraft and the roller drive conveyor can not be retracted by the normal procedure, flip the limit switch lever as illustrated to override this interlock. See figure 1-2-11. This limit switch is located at the rear, right corner of the belt conveyor as shown on figure 1-2-12.



2.2.8 Towing the Roller Drive Belt Loader

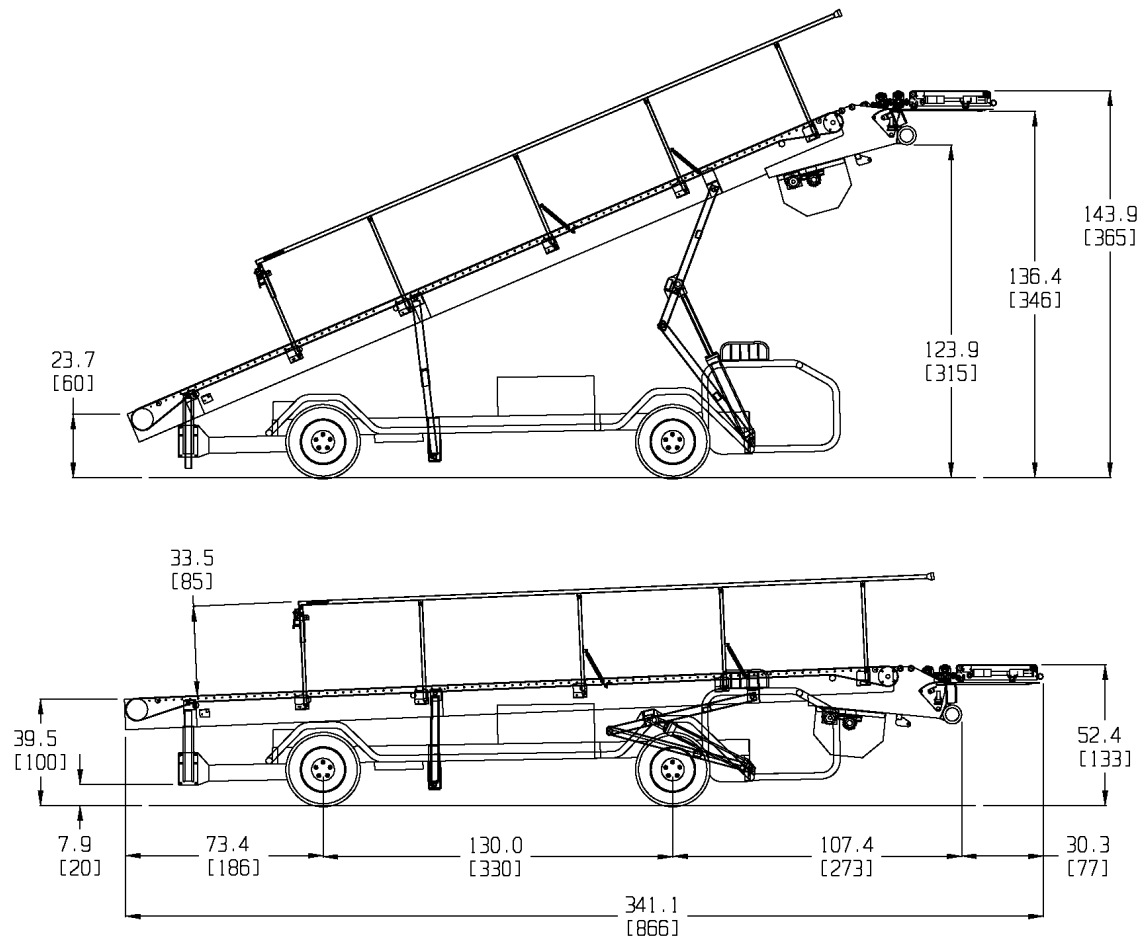
1. If there is a failure in the engine/power train and the unit must be towed disconnect the drive shaft (or raise rear wheels off the ground). This will prevent damage to the transmission while towing. Towing speed must not exceed 10 miles per hour. Vehicle may be moved short distances (less than 500 feet) without disconnecting drive shaft.
2. Use the emergency electric hydraulic pump to lower the main conveyor bed before towing.



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3 SPECIFICATIONS AND CAPABILITIES

This vehicle is designed to service all aircraft having doorsill heights ranging from 46 in. (117cm) to 134 in. (340 cm).



3.1 CHASSIS

Frame - - - - - welded steel tubular construction
Wheelbase - - - - - 130 inches (330 cm)
Wheel track
- - - - - Front 69 in. (175 cm)
- - - - - Rear 66 in. (168 cm)
Vehicle Speed, level ground - - - - - 25 mph (40 kph)
Turning Radius - - - - - 22 feet (6.7 m)
Ground Clearance - - - - - 6 inches (15.3 cm)

3.2 CONVEYOR BED, MAIN BELT ONLY

Up/Down Controls - - - - - Electric solenoid valve switches on dash
Belt Controls - - - - - Electric Push Button at Conveyor Corners
Total Length, Fully Lowered - - - - - 341.1" (866 cm)
Width- - - - - 31.5 in. (80 cm)
Belt Width - - - - - 24 in. (61 cm)
Rated Capacity
- - - - - 2000 lbs. (909 kg) distributed
- - - - - 200 lbs/sq. ft. (91 kg/sq m) concentrated
Belt Speed - - - - - 73 fpm default
Belt Movement - - - - - Forward-Stop-Reverse controls
Front Vertical Rubber Bumpers- - - - - 4 in. (10 cm) O.D. X 3 in. (7.6 cm) I.D.
Front Full Width Bumper - - - - - 7 in. (18cm) O.D.x5 in. (13cm) I.D.
Rear Rubber Bumper Option- - - - - 4 in. (10 cm) X 6-3/4 in. (17 cm)
Roller Spacing - - 3-in. (8 cm) for 2 ft. (61 cm) from end, 6 in. (15 cm) on balance

3.3 AXLES

Front - - - - - Automotive type, non-drive, steerable
 - - - - - 5 bolt
 Rear - - - - - Automotive type, drive ratio 5.89:1
 Capacity - - - - - 3,300 lbs. (1,500 kg)

3.4 TIRES

- - - - - 6-ply rating, ST225/75D15
 Inflatable pressure - - - - - 65 psi (cold)

3.5 BRAKES

System - - - - - 4-wheel split cylinder
 Front - - - - - Disc type
 Rear - - - - - Drum type
 Parking - - - - - Orscheln lever, rear wheels

3.6 ELECTRICAL SYSTEM

Type - - - - - 12 VDC, negative ground
 Alternator - - - - - 28VDC - 55Amp
 Battery (4 batteries) - - - - - 1100 amps cold crank

3.7 HYDRAULIC SYSTEM

Lift cylinder - - - - - Double Acting
 Valves - - - - - Solenoid actuated
 Pump - - - - - Engine Driven
 Emergency Pump - - - - - Electric operated, 12VDC
 System pressure - - - - - 2,500 psi max. (178 kg/sq.cm.)
 Return Filter - - - - - In return line, 10 micron, replaceable element
 Pressure Filter - - - - - In line, 6 micron, replaceable element
 Strainer - - - - - In suction line, 80 mesh
 Hydraulic reservoir - - - - - Sight gauge, breather/strainer
 - - - - - Capacity 8.5 U.S. gallons (32 liters)

Use Mobil DTE-13 or other ISO 32 oil in operating temperatures of +20°F – +120°F (-7°C – +50°C).

Use Mobil Aero HFA (MIL-H-5606A) in operating temperatures of -25°F – +50°F (-32°C – +10°C).

3.8 INSTRUMENTATION

Warning indicators - - - - - Volts, oil, water, brakes
On-Off switches: - - - - -Running lights, glow plugs (for cold starting)
Hour meter - - - - - Records engine running time

3.9 ENGINE OPTIONS

- Deutz F4M-2011 in-line, 4-cylinder diesel, 4-cycle, 59 hp at 2600 rpm, 167 in 3 (2.7L) displacement.

3.10 TRANSMISSIONS

- Ford C-6

Shift Control - - - - -2 lever, one with detented R-N-F

3.11 COOLING SYSTEM

Deutz Engine - - - - - Oil Cooled
Transmission (For Deutz) - - - - - Oil cooled

3.12 STEERING SYSTEM

Type - - - - - Power steering; Char-Lynn Orbitrol
Cylinder - - - - - Single-stage hydraulic

4 COMMISSIONING, DECOMMISSIONING AND SETUP

4.1 SHIPPING

The Roller Drive Belt Loader is sized for shipping by motor carrier. No special shipping precautions are required other than those specified by the appropriate regulatory authority and the carrier.

The hydraulic reservoir is easily drained.

For long term storage, refer to Chapter 1, Section 5.

Shipping Dimensions

Length	- - - - -	333.2 inches (846 cm)
Width	- - - - -	82 inches (208 cm)
Height	- - - - -	56.2 inches (143 cm)
Shipping Weight	- - - - -	7660 lbs (3475 kg)

Parts Shipping

Shipping major vendor replaceable components, such as motors, transmissions, control valves, hydraulic power unit, cylinders, etc., should be done as per the manufacturer's instructions and should be shipped in the original carton. If replacement is necessary, repack defective unit in the new component's carton. Then return the defective part to original manufacturer for overhaul.

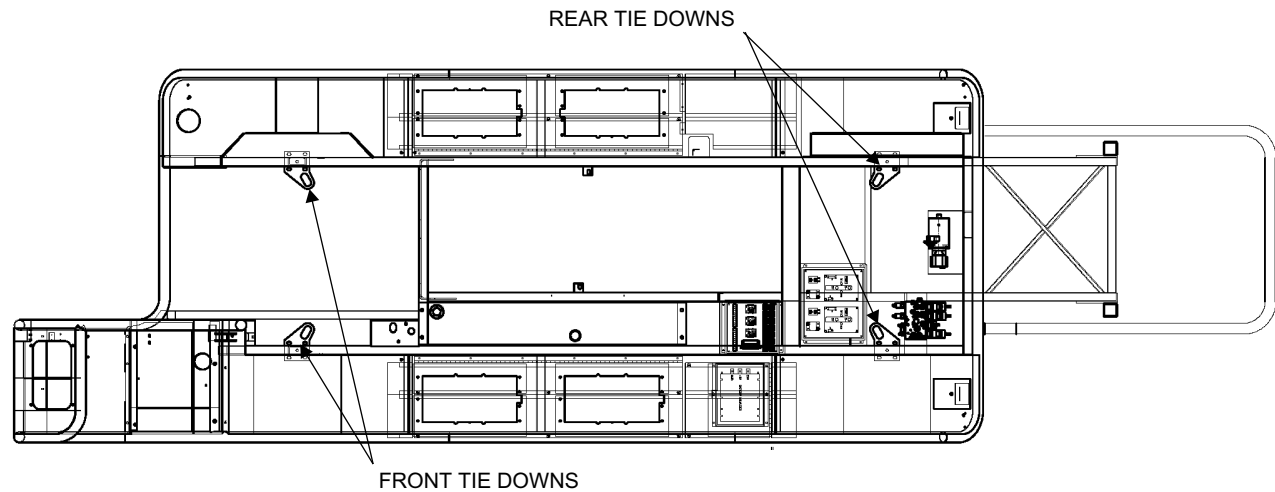
Tie Down

Whenever shipping the Roller Drive Belt Loader on flat bed or other carrier, it must be securely tied down. Connect tie down to anchors provided inside each fender well on the frame.

Do not connect tie downs to the main conveyor bed, as this may cause structural damage.

See Figure 1-4-1.

Wrap a bungee cord around the bag table and platform.

**FIGURE 1-4-1. TIE DOWN ANCHORS**

4.2 STORAGE

4.2.1 Short Term Storage (up to 1 month)

The unit may be stored under cover with the wheels blocked for a period not to exceed one month. No special precautions are required.

4.2.2 Long Term Storage (1 month or longer)

Common sense should be applied to preparing the vehicle for storage. No special instructions are necessary except for those provided below:

Engine

Engine preservation instructions are given in the manufacturer's handbook supplied with this manual.

Hydraulic System

1. Drain hydraulic tank and refill with clean, new oil.
2. Run complete system through several cycles to flush new oil into all lines, cylinders and pumps.
3. Drain and clean hydraulic tank.
4. Refill tank with clean, new oil.

Brake System

Special storage precautions are not required; however, to prevent rusting of brakes and water absorption by the brake fluid, the following procedures may be followed:

1. Drain master cylinder reservoir and refill with clean brake fluid to DOT-5 specification.

NOTE: DOT-5 is a moisture-repellant fluid.

2. Bleed each wheel brake until all original fluid is expelled.
3. Refill reservoir with DOT-5 fluid.
4. Coat all wheel discs and drums with a protective film of grease.
5. Wheel brake liners must be changed after this operation and all grease/oil removed from discs and drums before placing back into service.

Hydraulic Cylinders

All cylinders should be stored with rods fully retracted. If this is not possible, apply a light coat of automotive grease to all exposed cylinder rod surfaces. Wrap rods securely with heavy-duty plastic sheeting.

Battery

The batteries should be removed and kept on a trickle charge in an appropriate storage area.

Fuel Tank

Drain and clean the fuel tank. Upon removal from storage, flush tank completely before refilling.

Axles

Drain oil and remove access cover from rear axle. Clean inside of differential with a lint-free rag; replace and refill with clean, new oil. Run the axle for 2-5 minutes to make sure that oil is evenly distributed. Lubricate wheel bearings on both axles.

Tires

Support the vehicle on blocks to take the weight off the tires. Reduce tire pressure to 15 PSI.

Chassis

Thoroughly clean all structural elements and paint or coat with protective grease on all exposed bare metal. Lubricate all rotating and sliding elements, including bearings, bushings, chains, rollers, etc. In particular, remove conveyor idler bed rollers and liberally lubricate internal bearings at both ends with 30W engine oil.

4.3 SETUP INFORMATION

The Mobile Roller Drive Belt Loader is setup for proper operation from the factory. Check the following operation and settings only if required to obtain satisfactory operation.

1. Be sure that all the air is bled out of the platform cylinder using the bleeders on the cylinder.
2. The platform auto level can be set with the orange level sensor.
3. When the level platform switch is pressed, the platform will level without resting on any surface.
4. Set the max. roller extend LS so that the speed sensor on the last roller is not exposed.
5. Set the max. roller retract so that the bag table does not bind with the guides when the platform is full down and the front casters/roller stays on the platform when full up. Be sure that the air is bled out of the hydraulic brake on the motor so that it stops consistent with bed full up and down.
6. In manual with bed raised off LS scissors and platform full down turn engine off. Turn ignition on without starting unit and put in auto level. Auto level fail alarm will come on after 20 seconds.
7. With rollers extended out on test table, press the roller/belt forward button. The alarm will sound for 3 seconds before the rollers and belt start. The same will be true in reverse.
8. When the rollers and belt are running forward, retract the roller assembly and the belt will stop as it is being retracted. The belt will not stop when running in reverse and rollers are being retracted.
9. With the ignition on and the engine not running, turn on the emergency pump located behind the rear step. All functions will operate normally except the steering.
10. In manual mode, bed up/down runs at full speed. In auto level bed up/down runs at 15% of full speed. If in auto level mode and the up/down switch is pressed, the bed will move up/down at 15% speed.
11. Under the bag table at the rear is a high torque roller. With the ignition on and the engine not running and the bag table raised so that the roller is free, shift the roller extend handle and the roller will run forward. Shift the handle to reverse and the roller will free wheel. If the roller direction is wrong, there is a dipswitch on the controller. After changing the setting turn off the ignition and the turn it back on. The roller should be set to 105 RPM by adjusting the potentiometer on the controller under the bag table.
12. The 3" diameter rollers run at 73ft/min, which is 93 RPM. This is set with the Sevcon controller at ??% full voltage. Speed sensors on the roller conveyor and

the headstock pulley run a hydraulic proportional valve so that the belt speed matches the rollers.

13. The platform up/down speed is set by flow control NV2 on the hydraulic manifold. This valve should be approximately $\frac{1}{4}$ turn open.
14. All pressures are pre-set so they don't need adjusting.
15. The bed up/down speed is not pre-set and is controlled by NV1 on the hydraulic manifold.

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1 SERVICING

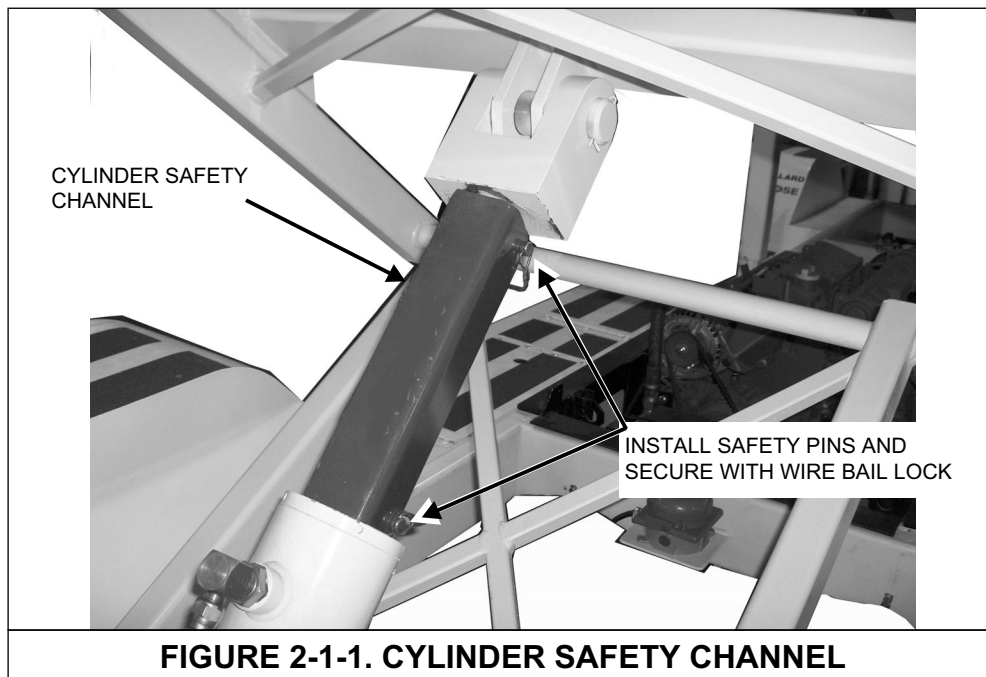
1.1 PREVENTIVE MAINTENANCE AND PERIODIC INSPECTION

The following is a guide for conducting periodic inspections on the conveyor truck to ensure long service life. The frequencies shown are for the unit operating in average U.S. climate. If the unit is operated in adverse climatic conditions, such as salt spray and extreme cold or dusty environments, adjust the inspection schedules to a more realistic frequency.

Servicing the NMC-Wollard, Inc. Mobile Roller Drive Belt Loader TC-999 requires little more attention than other conventional vehicles of its type. No special tools are required, other than those normally found in any modern garage or airline ground support equipment servicing facility. All work should be performed in accordance with authorized standard shop practices.

⚠ WARNING Before working beneath the raised conveyor bed, always the cylinder safety channel and set securely into place. See figure 2-1-1.

IMPORTANT: THIS MANUAL DOES NOT COVER ENGINE OR TRANSMISSION MAINTENANCE. Inspect and service engine and transmission according to the manufacturers' recommended maintenance schedules.



1.1.1 Bolt Tightening Data

The following data is excerpted from SAE Report J1701, March, 1999. The complete report is available from SAE at www.sae.org. It contains detailed information about variables for torque management to achieve correct fastener joint tightening. This is an advisory guide and responsibility for its application lies with the user. Individual application discretion is recommended.

INCH SERIES TIGHTENING TORQUE, FT-LB						
Bolt Size	Grade 2 Dry	Grade 2 Lubed	Grade 5 Dry	Grade 5 Lubed	Grade 8 Dry	Grade 8 Lubed
0.250-28	7	5	10	8	14	11
0.250-20	6	5	9	7	12	9
0.3125-24	13	10	20	15	28	21
0.3125-18	12	9	18	14	25	19
0.375-24	23	17	35	27	50	38
0.375-16	20	15	31	24	44	33
0.4375-20	36	27	56	42	78	59
0.4375-14	32	24	50	38	70	53
0.500-20	55	42	85	64	120	90
0.500-13	49	37	76	32	107	80
0.5625-18	78	59	121	91	171	128
0.5625-12	70	53	109	82	154	115
0.625-18	110	82	170	127	240	180
0.625-11	97	73	150	113	212	159
0.750-16	192	144	297	223	420	315
0.750-10	172	129	269	201	376	282
1.000-12	-	-	704	528	995	746
1.000-8	-	-	644	483	909	681

METRIC TIGHTENING TORQUE, N-m						
Bolt Size	Class 8.8 Dry	Class 8.8 Lubed	Class 9.8 Dry	Class 9.8 Lubed	Class 10.9 Dry	Class 10.9 Lubed
8.0 x 1.25	26.40	19.80	28.50	21.40	36.50	27.30
10.0 x 1.50	52.20	39.20	56.60	42.40	72.20	54.20
12.0 x 1.75	91.00	68.00	99.00	74.00	126.00	94.00
14.0 x 2.00	145.00	109.00	157.00	118.00	200.00	150.00
16.0 x 2.00	226.00	170.00	245.00	184.00	313.00	235.00
20.0 x 2.50	441.00	331.00	478.00	358.00	610.00	458.00
24.0 x 3.00	762.00	572.00	826.00	620.00	1055.00	791.00
30.0 x 3.50	1515.00	1136.00	1641.00	1231.00	2095.00	1572.00
36.0 x 4.00	2647.00	1985.00	2868.00	2151.00	3662.00	2746.00

37° TUBE FITTINGS & PIPE FITTINGS						
Dash #	37° Swivel Nut Ft-Lbs	37° Jic Flats from Finger Tight	O-Ring Lock Nut Ft.-lbs.	Pipe Dia. (Inch)	NPT Ft.-lbs.	NPT Turns from Finger Tight
-04	10	2	8	1/4	25	2 ½
-06	20	1 1/4	13	3/8	40	2 ½
-08	40	1	21	½	54	2 ½
-10	60	1	33	-	-	2 ½
-12	80	1	48	3/4	78	2 ½
-16	110	1	63	1	112	2 ½
-20	130	1	-	1 1/4	154	2 ½
-24	160	1	-	1 ½	211	2 ½
-32	250	1	-	2	300	2 ½

Torque Conversion: Ft-Lbs = 0.7376xN-m N-m = 1.356xFt-Lbs

NOTE: Do not use these values if a different torque value is given for a specific procedure.

1.1.2 Fluid Specifications

ENGINE REQUIREMENTS FOR AMBIENT TEMPERATURE RANGES			
Ambient temp	Item	Specification	Capacity
All	Diesel Engines	Diesel fuel, ASTM number 2D	Approx. 17 gallons [64 L]
ENGINE OIL REQUIREMENTS FOR AMBIENT TEMPERATURE RANGES			
Ambient temp	Item	Specification	Capacity
All	Deutz 2011 oil cooled	SAE 20W20	13 Qts [12.3 L]
TRANSMISSION REQUIREMENTS FOR AMBIENT TEMPERATURE RANGES			
Ambient temp	Item	Specification	Capacity
All	C6 transmission fluid	ATF Type A, Dexron III	
All	Allison transmission fluid	ATF Type A, Dexron III	

HYDRAULIC FLUID REQUIREMENTS FOR AMBIENT

Ambient Temp	Item	Specification	Capacity
20°F to 120°F -7°C to 50°C	Hydraulic Fluid	Mobil DTE-13 or equiv ISO 32 oil	8.5 Gals [32 L]
-25°F to 50°F -32°C to 10°C		Mobil Aero HFA (MIL H-5606A)	

AXLE REQUIREMENTS FOR AMBIENT TEMPERATURE RANGES

Ambient temp	Item	Specification	Capacity
All	Rear axle oil	SAE 85 W90 Specification API GL5-MIL 2105-B	7 pints

BRAKE FLUID REQUIREMENTS FOR AMBIENT TEMPERATURE RANGES

Ambient temp	Item	Specification	Capacity
All	Brakes, Master Cylinder	Brake fluid, DOT III	14.1 Cu. In. (1 pint) [.47 L]

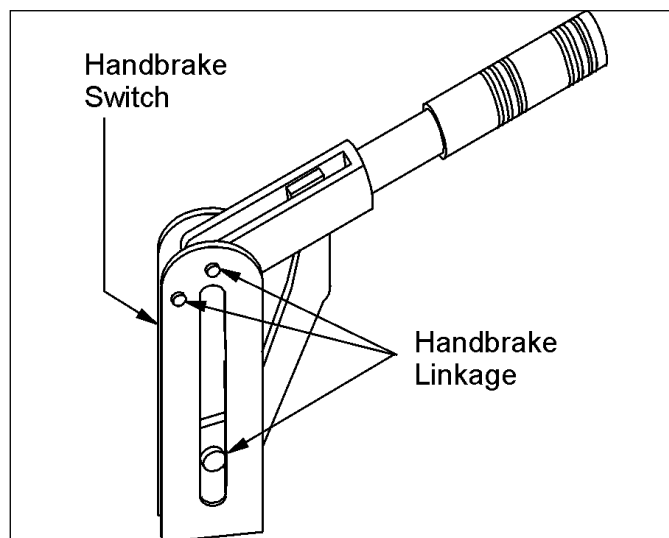
1.1.3 Periodic Inspection

Refer to 2-1 - 1.1.2 for fluid specifications and capacities.

PERIODIC MAINTENANCE SCHEDULE		
COMPONENT	SERVICE REQUIRED	REF
AS REQUIRED		
General	THIS MANUAL DOES NOT COVER ENGINE OR TRANSMISSION MAINTENANCE. Inspect and service engine and transmission according to the manufacturers' recommended maintenance schedules. A separate manual for this purpose has been included in Chapter 5, Manufacturer's Information. Do not make modifications to the unit without obtaining written approval or service bulletin from NMC-Wollard, Inc..	
WEEKLY Every 50 Hours		
Fluid leaks	Park the unit on a clean and dry surface. After several hours, check under the unit for fluid leaks. If you find any, try to determine its exact source. Fix the problem or report the problem to the proper authority.	
Hydraulic oil	Check level, top off if required.	Fig. 2-1-3
Battery	Once per week, service battery.	2-1.5
MONTHLY Every 100 Hours		
Air cleaner	Service air cleaner	2-1.2
Hydraulic	Replace hydraulic return and high pressure oil filters.	2-1.4.3
	Check hydraulic lines, fittings, and hydraulic cylinders for leakage.	
	Check plumbing assemblies for dents, kinks, abrasions, leakage, and security.	
	Check hose and tubing attachments for security.	
	Check condition of Y-strainer on bottom of reservoir.	
Roller Drive Belt	Perform a complete check of the following Roller Drive Belt Loader components: Lift —Operate the forward and rear lift cylinders up and down several times. Check for smoothness of operation. Listen for any unusual noises. Conveyor Belt —Examine the belt for wear, damage, alignment and deterioration. Operate the drive in both directions and check for proper belt tension, ease of movement, and smoothness of controls. Belt should be centered on head and tail rollers and move smoothly in both directions. Adjust belt according to procedures in 2-1-1.11, if required.	2-1.11
Tail Roller and Head Roller Bearings	Lubricate with Auto Chassis Lube	
Handbrakes	Lubricate with #10 General Purpose Oil	Fig. 2-1-2
Cylinder: Pivots	Lubricate with #10 General Purpose Oil	
Scissors Frame: Lower Pivots	Lubricate with #10 General Purpose Oil	

Scissors Frame	Lubricate with Multi Purpose Graphite-Based Grease	
3 MONTHS Every 250 Hours		
All connections	Check security of fasteners and mountings.	
Air filter	Replace air filter cartridge	
Tail roller and head roller bearings	Lubricate, using auto chassis lube	
Handbrake	Lubricate, using #10 general-purpose oil	Fig. 2-1-2
Scissors Frame: Lower Pivot	Lubricate with Multi Purpose Graphite-Based Grease	
Check engine belts	Belts should be replaced when they show signs of cracking or belt backing starts to fray. Serpentine belts should also be replaced if the tension indicator moves out of the area covered by the range marks on the tensioner housing.	
6 MONTHS Every 500 Hours		
Repeat Service	Perform 100-hour, 1-month service.	
	Perform 250-hour, 2-month service.	
Electrical	Check security of wiring, ties, and clamps.	
Lights	Check condition of lamps and security of fixtures.	
Controls	Give system a complete functional check using controls at both operator station and conveyor.	Chapter 1 Section 2
	Check stations for waterproof sealing integrity and good mechanical and electrical condition.	
Drive shaft	Drive shaft universal joints Lubricate, using multi-purpose graphite-based grease	Fig. 2-2
Steering	Lubricate, using auto chassis grease: Steering knuckles and tie rod ends	
	Lubricate, using auto chassis grease: Steering cylinder pivots	
Bed Roller Bearing & Shafts	Lubricate with #10 General Purpose Oil	Fig. 2-1-2
Handrail Pivots	Lubricate with #10 General Purpose Oil	
Operator Seats Adjustment Lever	Lubricate with #10 General Purpose Oil	
Operator Seat Slide	Lubricate with Auto Chassis Grease	
8 MONTHS Every 1000 Hours		
Repeat Service	Perform 100 hour, 1 month service	

Repeat Service	Perform 250 hour, 2 month service	
Repeat Service	Perform 500 hour, 6 month service	
ANNUAL Every 2000 Hours		
Repeat Service	Perform 100-hour, 1-month service.	
Repeat Service	Perform 250-hour, 2-month service.	
Repeat Service	Perform 500-hour, 4-month service	
Repeat Service	Perform 1,000-hour, 8-month service	
Rear axle	Change oil in differential. Use SAE 90 hypoid oil 44 fl. oz. with 4 oz. friction modifier (Ford #C8AZ19546A).	
Hydraulic oil	Drain hydraulic tank, change return and high pressure oil filters and refill with new, filtered oil.	2-1.4.3
Wheel bearings	Grease front wheel bearings using all-purpose bearing grease. Refer to the Spicer Axle manual in Section 5.	
Handbrake switch	Grease handbrake switch using light silicone grease	Fig. 2-1-2
Master cylinder	Lubricate master cylinder actuating rod clevis using SAE #10 oil.	



Apply #10 oil to the bearing outer surface and to the shaft where it enters the bearing.

The bearing is bronze-colored.

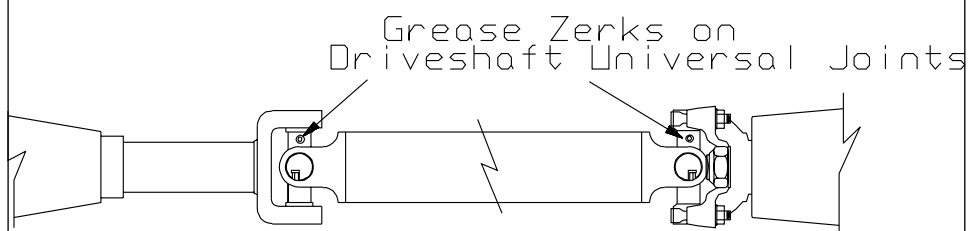
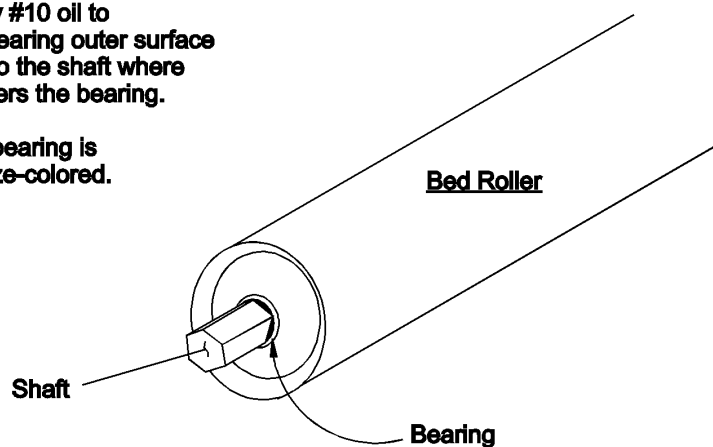


FIGURE 2-1-2. SELECTED LUBRICATION POINTS

1.2 AIR INTAKE

Remove air cleaner cartridge and blow out (from inside) or shake out accumulated dirt. Clean housing and reinstall.

IMPORTANT: Do not exceed 100 psi (7.0 kg/cm²) air pressure at nozzle because high pressures can rupture the paper.

IMPORTANT: Under extreme dust conditions, service cartridge more often (as required).

1.3 FUEL SYSTEM

The vehicle fuel tank has a capacity of 17 US gallons (64 liters). The fuel cap is located midway along the inside of the left running board. Fill the tank with diesel fuel.

Diesel engines are sensitive to fuel problems and attention needs to be given to fuel management. Diesel units are equipped with state-of-the-art diesel fuel filters, which separate water from fuel and filter out both particulates and biological contaminants. Fuel tanks are treated with a powerful biocide with the first fuel fill-up at the factory.

Change **diesel fuel filters** regularly and treat the tank with **biocide** on a periodic basis. It is impossible to recommend a specific time period for the fuel system service because of the widely differing operating conditions that the conveyor trucks are subject to at different stations and different seasons.

Treatment of diesel fuel with a **biocide** deters the growth of algae and other biological contaminants in the fuel. It is recommended that Racor 300X Biocide (NMC-Wollard, Inc. Stk #1.8169) be used regularly at the rate of one-half can per full tank. If a standard biocide is to be used, then use according to instructions given with its package. Other biocides have different concentrations, so instructions may vary.

Inspect the diesel fuel filter **sedimentation** bowl daily until a pattern of water accumulation has been established, then establish a maintenance schedule.

A loss of engine power will signify the need for changing the Racor filter element. A vacuum gauge is available from Racor or can be rigged by the user. A low vacuum indicates a clogged filter element.

1.4 HYDRAULIC SYSTEM

1.4.1 Hydraulic System Safety

⚠ WARNING Make sure that:

- The conveyor front is properly stored on the cylinder safety channel before removing any plumbing from the front cylinder.
- The conveyor bed is stored on the cylinder safety channel before performing any work under the bed.
- Wear proper eye protection before removing or installing any gauges or fittings. There may be residual pressure in the hydraulic system which may cause oil to enter the eyes. If oil gets in someone's eyes, flush out immediately with large quantities of water and seek medical attention.
- If oil gets injected into the skin, it must be removed immediately by a doctor. Serious infection or reactions can develop if proper medical treatment is not administered immediately.
- Allow fluid to cool before working on system.
- Dirt or contamination is the greatest enemy of any type of hydraulics!
- Cleanliness is the best way to insure satisfactory system life, on either new or repaired units. Cleaning parts by using a solvent wash and air drying is adequate if clean solvent is used. This is precision equipment. The internal mechanisms and related items must be kept free of foreign materials and chemicals.
- Protect all exposed sealing surfaces and open cavities from damage and foreign materials.
- Always replace gaskets and O-rings. Clean gasket sealing surfaces prior to installing new gasket.
- Lightly lubricate all O-rings with clean petroleum jelly prior to assembly.

1.4.2 Hydraulic System - Special Instructions

The hydraulic oil is supplied to the hydraulic system from a reservoir installed in the truck chassis next to the left front fender behind the operator's seat. The reservoir has a sight gauge attached for determining the level of oil. Working capacity of the reservoir is 8.5 U.S. gallons (32 liters).

IMPORTANT! Always check hydraulic oil level with the bed fully lowered and cylinders fully retracted. Failure to follow these instructions could cause overfilling.

Proportional valves in this system are very sensitive to dirt in the oil.

⚠ CAUTION Always take every precaution to keep dirt out of the hydraulic system. By adhering to the following recommendations, you can significantly reduce downtime and repair costs over the life of your machine.

- **Keep oil storage areas clean and dry.**
- **Keep barrel bungs covered and sealed** until you're ready to use the oil. Clean the bung seals before removing them, and clean the bung before removing it.
- **Use only clean pumps and conduits** to transfer fluid from barrels to the reservoir. Clean the system's entry port thoroughly.
- **Filter all fluid introduced into the reservoir** through a nominal, no-bypass, 10-micron filter. Do not use a bucket or such method.
- **Clean all components and hoses in the area** when repairing or replacing a component of the hydraulic system. Use only clean tools and lint-free rags.
- **Never add used fluid to the system.** The high costs of downtime and component replacement is more costly than the price of new oil.
- **In the event of a catastrophic failure of a pump or motor:** Drain, clean, flush the system, and change filters. Otherwise, metal particles and dirt can remain in the system to cause damage after you replace the component.

1.4.3 Hydraulic Reservoir - Cleaning, Filling And Filters

Drain and replace oil if there is any doubt as to its purity.

1. To drain reservoir, place a container underneath and remove the magnetic drain plug.
2. Inspect plug for metallic particles.
3. Drain and discard oil, clean drain plug.

Clean the exterior of reservoir with mineral spirits or a similar type solvent.

1. To clean interior of reservoir, place a suitable container under drain opening and flush tank with mineral spirits only. Allow sufficient time for cleaning material to thoroughly drain and interior to dry. A jet of air under low pressure directed into the interior will speed the drying time. Keep reservoir clean.

NOTE! A removable clean out cover is provided which will allow interior access if necessary.

2. Replace the return and high pressure filter cartridges.

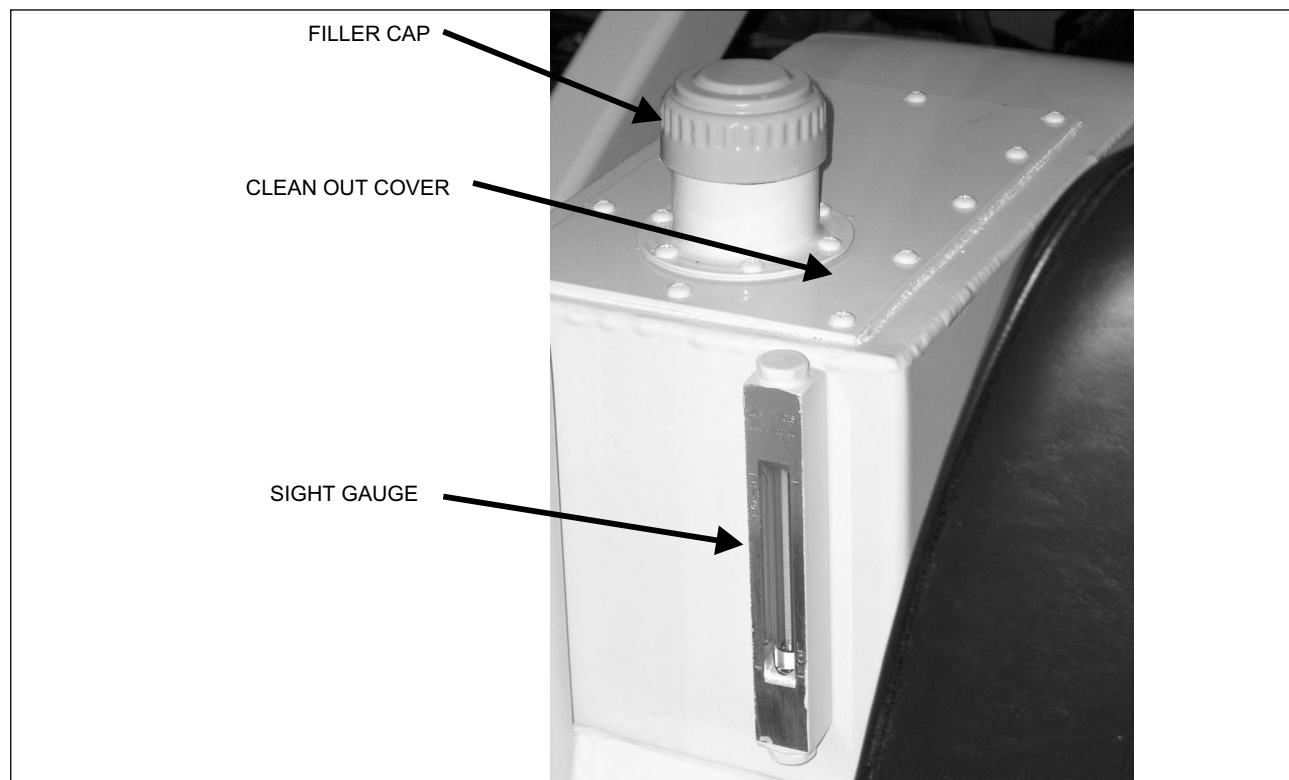


FIGURE 2-1-3. HYDRAULIC RESERVOIR



FIGURE 2-1-4. HYDRAULIC HIGH PRESSURE FILTER

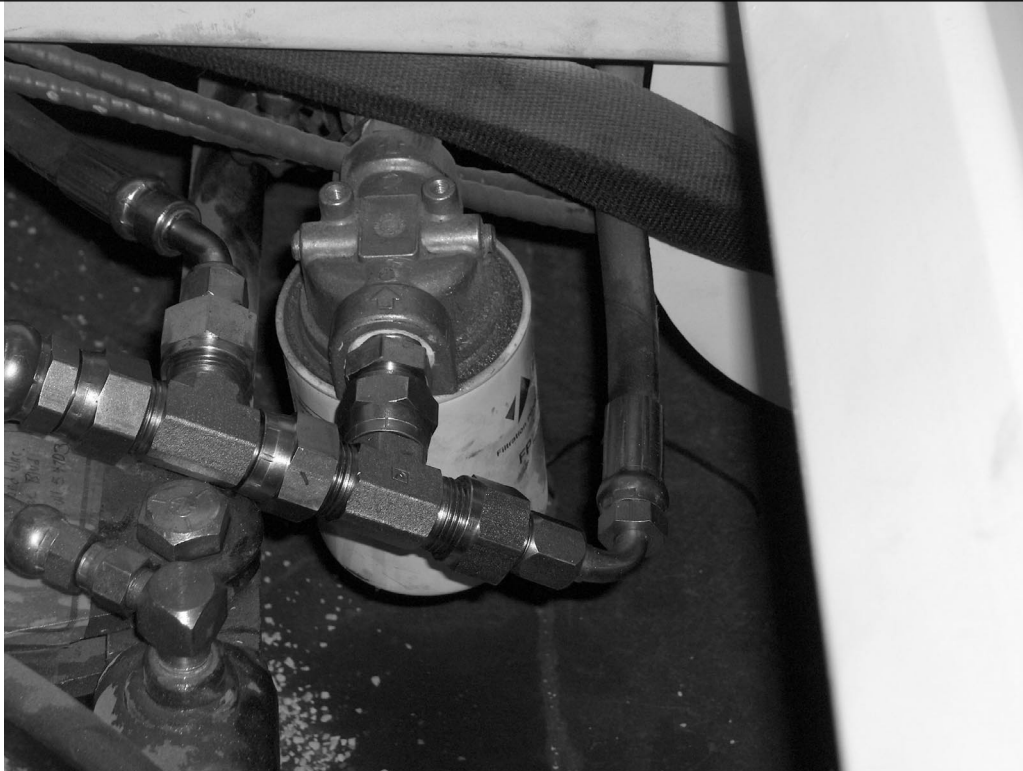


FIGURE 2-1-5. HYDRAULIC RETURN FILTER

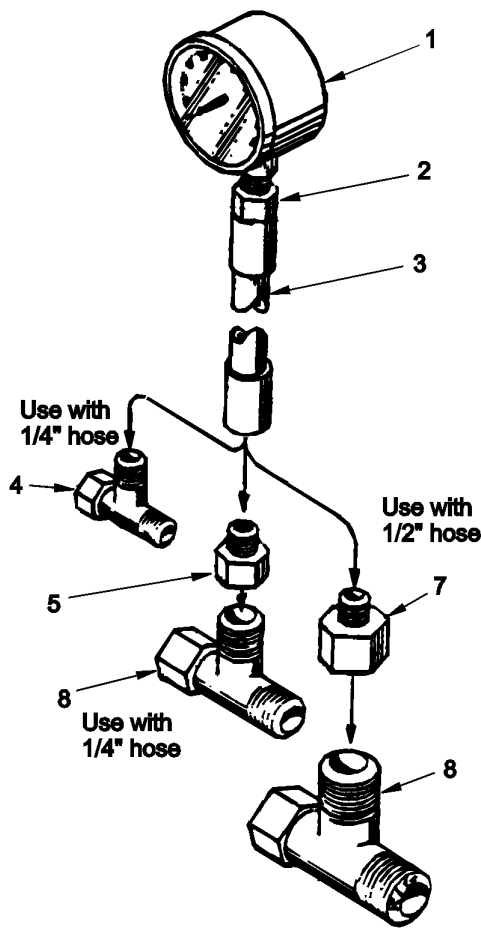
3. Replace drain plug and fill reservoir with the recommended oil to proper level. See fluid specifications, 2–1.1.2
4. Start engine and operate system in all modes. Recheck oil level. Add oil if required.
5. Remove suction strainer plug. Drain sediment and remove contaminants from screen.

1.4.4 Main Relief Valve Pressure

Some adjustments to the hydraulic system will require a pressure gauge. Figure 2-1-6 shows an inexpensive test gauge kit which can be readily assembled and adapted to fit almost any part of the hydraulic system by removing a hose and connecting the gauge in line or directly to a fitting. Kits are available from NMC-Wollard, Inc.

The pressure relief valve is a separate component mounted on the hydraulic unit package close to the pump.

1. With engine off, disconnect the pressure hose from the hydraulic pump.
2. Connect the test gauge in line and reconnect the hose.
3. Loosen the locknut for the relief adjustment screw.

**FIGURE 2-1-6. TEST KIT**

1. Gauge, 0-3000 PSI
(Marsh P/N J7678P) (NMC-Wollard, Inc. STK #1.0474)
2. Adapter
(Aeroquip P/N 2022-4-4) (NMC-Wollard, Inc. STK #3.3097)
3. Hose Assy., Hydraulic, 1/4" X 12" Lg
(NMC-Wollard, Inc. STK #14762-2)
4. Tee, Swivel
(Aeroquip P/N 203102-4-4) (NMC-Wollard, Inc. STK #3.2966)
5. Reducer
(Aeroquip P/N 221501-6-4) (NMC-Wollard, Inc. STK #3.2941)
6. Tee, Swivel
(Aeroquip P/N 203102-6-6) (NMC-Wollard, Inc. STK #3.2769)
7. Reducer
(Aeroquip P/N 221501-8-4) (NMC-Wollard, Inc. STK #3.2965)
8. Tee, Swivel
(Aeroquip P/N 203102-8-8) (NMC-Wollard, Inc. STK #3.2679)

Complete Kit: NMC-Wollard, Inc. STK #19432.

4. Back the adjusting screw out to reduce pressure.
5. Start engine. Turn the steering full left. While an assistant holds the steering wheel full left, gradually increase relief valve setting to 2500 PSI.
6. Tighten locknut and replace protective cap.
7. Stop engine, remove test gauge, and replace hose.

1.4.5 Counterbalance Valve Pressure

The conveyor forward/reverse valve is located under the conveyor bed. It controls the "Reverse" or "Unload" operation of the belt to prevent heavy packages running away. The pressure cannot be set while the valve is on the vehicle. The front cylinder counterbalance valve is located in the plumbing adjacent to the cylinder. Remove and adjust in the same manner as for the conveyor forward/reverse valve.

1. With engine off, disconnect and remove the valve.
2. Use a suitable test bench and connect the pressure line to port #1 on the valve, leaving port #3 (pilot port) open to atmosphere. Port #2 will be the output port.
3. Gradually increase test pressure to 2,000 psi, and adjust the counterbalance valve to relieve at 2,000 psi.
4. Lock setting, remove from test bench, and reinstall on vehicle.

1.5 BATTERY MAINTENANCE

⚠ CAUTION Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

1. Always disconnect battery connector before performing battery service.
2. Check electrolyte level once per week. Use a flashlight to observe level or use dipstick attached to one of the cell caps for proper level. Fill as required with distilled water.
3. Once per week, check specific gravity in all cells before charging or watering. Specific gravity reading should agree to within ± 0.0020 . Add water to required level, then give the battery an equalizing charge. Check specific gravity readings at end of charge. All cells should read in fully charged range specified by battery manufacturer.
4. Keep battery clean by wiping it with a damp cloth. Keep all connections clean and tight. Remove any corrosion, and wash terminals with a solution of 1 part baking soda and 4 parts water. Tighten all connections securely.

NOTE: Coat battery terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

1.6 WHEEL BEARINGS

1. To provide adequate working space under Roller Drive Belt Loader, raise front of Roller Drive Belt Loader with jack and support Roller Drive Belt Loader with appropriate jack stands. Position jack so it does not interfere with work.
2. Remove front wheel and tire assemblies, see 2-4-4.2.
3. Remove center cap from hub.
4. Remove cotter pin, spindle nut, and washer from spindle.

5. Remove hub. Outer wheel bearing cone will slide out of hub. Inspect outer bearing cone and cup. Remove bearing cone and cup if they appear damaged in any way. (Always replace cup and cone as a set.)

NOTE: Always replace grease seals.

6. Remove grease seal. Inspect inner bearing cone and cup. Remove bearing cone and cup if they appear damaged in any way. (Always replace cup and cone as a set.)
7. Using a clean rag, wipe old grease from spindle, hub, and bearings.
8. Install new outer bearing cup, if removed.
9. Install new inner bearing cup, if removed.
10. Install new grease seal, if removed, using a plug to place pressure evenly around seal. If you bend or otherwise damage seal, discard and use a new one.

IMPORTANT! DO NOT OVERFILL with grease because too much grease can cause seal to fail or grease cap to pop loose after assembly.

11. Spread grease inside hub cavity.
12. Use grease to lubricate the seal lip.
13. Install hub. Rotate hub while installing to spindle so seal doesn't roll under. As spindle goes into inner cone, try to feel that all parts are straight and properly seated on spindle bearing journal.
14. Grease outer cone and place over spindle and into cup.
15. Assemble washer and nut to spindle. Tighten nut to 10-15 ft-lbs torque. Rotate hub while tightening nut.
16. Back off nut until it just becomes loose.
17. While rotating hub, retighten nut to finger tight. Line up cotter pin hole in spindle with slot in nut. Check hub for excessive end play. Excessive end play indicates that nut is too loose. Hub should rotate freely, but if hub binds or if you can feel the bearings, it means that the nut is too tight. Readjust nut if needed.
18. Insert cotter pin and bend to lock it on nut. Fill grease cap with grease and snap into place.
19. Check seal for a turned-under lip. Check hub for any indication of roughness which might indicate misalignment. If roughness is noted, disassemble hub and check inner cup for any small nick. If a nick is found, the hub must be replaced.
20. Lube all grease fittings with MIL-G-10924D grease, if not already done.
21. Install front wheels and tighten mounting nuts to 90 ft-lbs torque.

22. Remove jack stands and jack.

⚠ WARNING Always recheck lug nut torque one hour after mounting wheel and tire assembly. Failure to do so may result in loose wheels and/or broken wheel studs.

1.7 FRONT WHEEL ALIGNMENT

Toe-in is a condition in which the front of the tires are closer together than the back. This is used to compensate for the natural tendency of road-to-tire friction to force the wheels apart. If the wheels were set parallel (no toe-in), steering linkage wear would allow the wheels to actually toe-out. By setting a certain amount of toe-in, the wheels will be nearly parallel in actual use.

An improper toe-in can grind off tire tread in a short period of driving. Toe-in should be checked using a toe gauge or trammel.

1. Jack up each front wheel and support on adequate jack stands. Chalk a band near center of tire while spinning the wheel.
2. Use a sharp-nosed scribe to form a thin line near the center of the chalk band while spinning the wheel. Keep the line THIN.
3. Lower wheels to floor. Roll machine forward until wheels have made one complete turn. Wheels should point straight ahead. This will impart a rearward thrust to the wheels and will provide an accurate toe-in reading.
4. Move toe-in gauge to behind wheels. Set pointers exactly on scribed lines. Top of pointers should be as near the center of the spindle height as possible.
5. Carefully remove gauge without altering pointer setting. Align one pointer with scribe mark on the front of one of the tires. Check distance between the other pointer and scribe mark on other tire. The distance at the front must be less than at the rear and is the amount of toe in.
6. Loosen tie rod jam nuts and rotate tube to obtain $0.125" \pm .030"$ toe-in.
7. Tighten jam nuts to secure adjustment.

NOTE: An alternate and more accurate procedure to set toe in, is to remove the wheels and measure across the front and rear of the disc brake rotors when aligned straight forward. The distance across the front should be $.063" \pm .015"$ less than at the rear.

1.8 ADJUST TRANSMISSION NEUTRAL/BACKUP SWITCH

This switch is a combination unit located on the automatic transmission shifter shaft in the engine package.

1. Remove clevis pin holding shifter arm to cable clevis.
2. Connect a volt-ohm meter (on resistance range) or a continuity tester across both Red/Blue wires coming out of the switch.
3. Loosen hold-down bolts on switch and rotate switch until contact opens for the same throw of shifter arm either side of Neutral.
4. Retighten switch bolts and recheck adjustment.
5. Replace clevis pin.

1.9 BLEEDING THE BRAKES

Figure 2-7

Bleeding the brakes means removing air from the brake system. Air in the system causes a springy or spongy feel when braking. Bleeding consists of pumping fresh fluid throughout the system. This forces air out through the wheel cylinder or caliper bleeder valves.

1. Clean master cylinder filler cover and remove cover. Fill master cylinder reservoir to within 1/4" (6 mm) from top of reservoir. Replace cover.

⚠ CAUTION Compressed air used to service brake components must be oil-free or rubber parts may be damaged.

2. Clean all wheel cylinder and caliper bleeder screws.
3. If using a pressure bleeding system, connect the bleeding system pressure hose with the special fitting to the master cylinder.
4. If the bleeder screw is not at the top of the caliper, remove screws holding caliper to front axle weldment and rotate caliper to top of rotor. This will allow trapped air to escape.
5. Open bleeder screw and allow fluid and air to flow into jar. When air bubbles can no longer be seen and fluid runs clear, close the bleeder screw. Repeat this procedure on the left rear, right front, and left front wheel cylinders, in that order. Remove the pressure bleeding system hose. The procedure is complete.

If you are not using a pressure bleeding system, use the standard method as follows in steps 6 and 7:

NOTE: Bleeding the brakes without pressure bleeding equipment requires two persons, one to observe the fluid being bled, and one to depress the brake pedal.

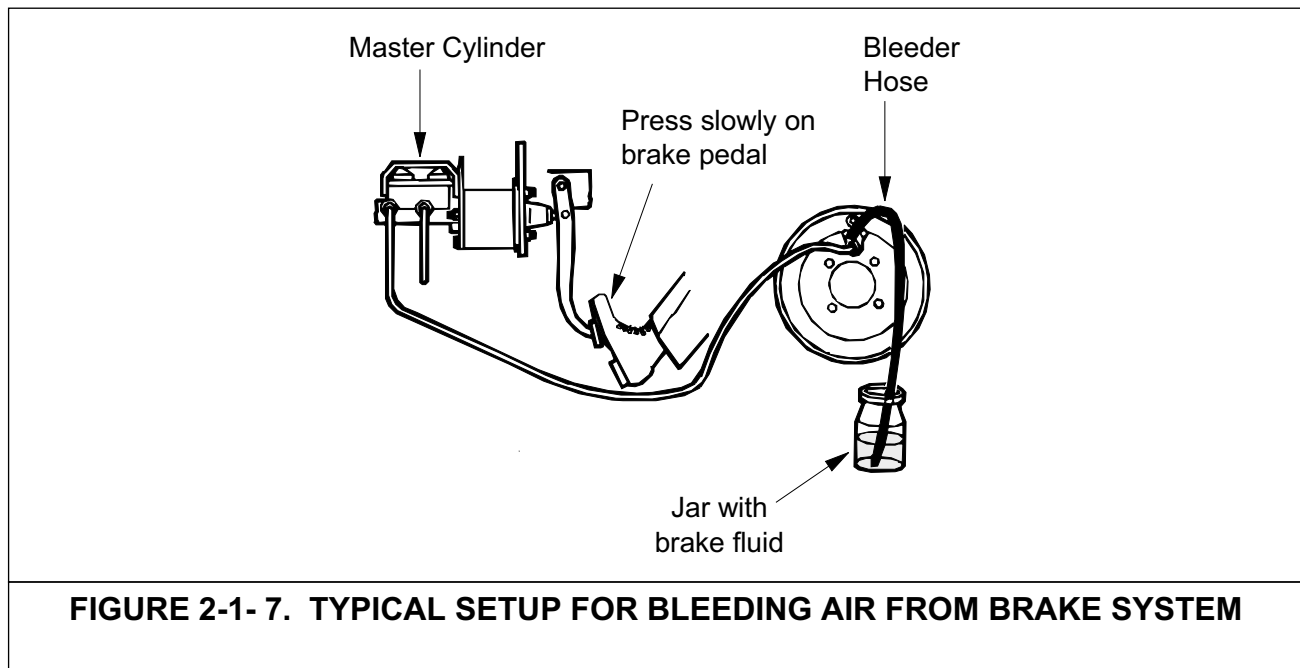
6. With a bleeder hose set up as in step 4, loosen bleeder screw and depress brake pedal several times until air bubbles can no longer be seen and fluid runs clear. Close bleeder screw. Repeat this procedure on the left rear, right front, and left front wheel cylinders, in that order. (Remember to check fluid level in master cylinder frequently.)
7. Replace caliper to original position.
8. After all four brakes have been bled, fill reservoir and install cover on master cylinder.

IMPORTANT! Do not let reservoir run empty. If you let the reservoir run empty, air will enter the system and you will have to begin the procedure all over again.

1.10 QUADRASTAT NEUTRAL SWITCH

This switch is an integral part of the shift lever selector mechanism located under the operator's seat.

1. Remove seat and seat plate.



2. Connect a volt-ohm meter (on resistance range) or continuity tester across the switch wires (green and white).
3. Loosen the single adjusting bolt and adjust switch until contact opens for the same throw of lever either side of Neutral.
4. Retighten adjusting bolt and replace seat and seat plate.

1.11 ADJUST CONVEYOR BELT

1.11.1 Adjust Belt Tension

Figure 2-1-8

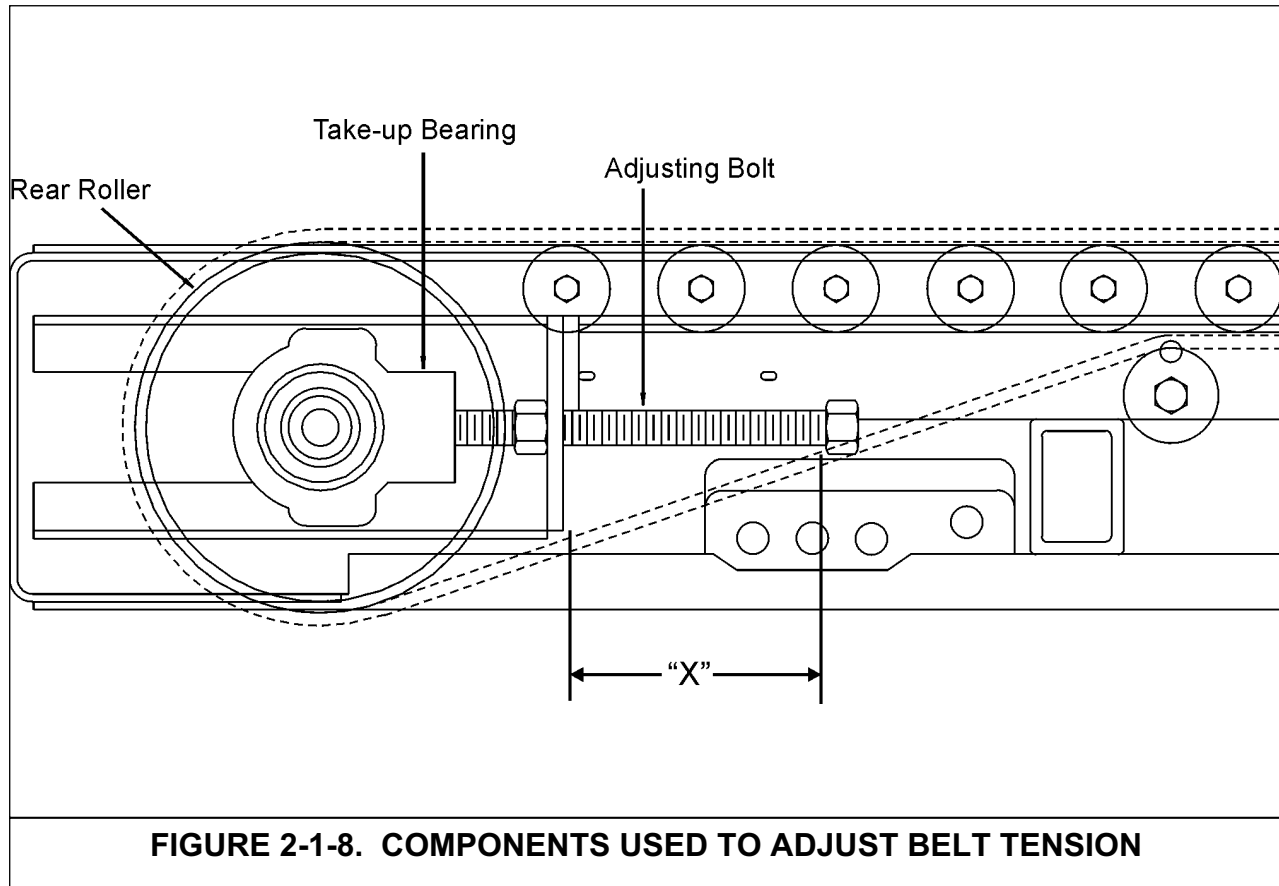
⚠ WARNING Conveyor belt can only be used at full load if BOTH belt and chain are tight. Load may slip uncontrollably down bed when at an angle if chain or belt are loose. Personal injury may result.

1. Belt must be adjusted to convey a 1000 total lbs. distributed uniformly over the belt carrying area at maximum angle.

⚠ CAUTION Roller bed capacities:

- Do not exceed 200 lbs/ft²
 - Do not exceed 1,000 lbs. At maximum bed angle
 - Do not exceed 2,000 lbs. At 0° to 15° bed angle.
 - DO NOT USE ROLLER BED AS A LIFTING DEVICE.
2. Tighten belt by adjusting tightener bolt on take-up bearing at back of conveyor. Adjust equally at both sides. As a point of reference, the dimension "X" shown on figure 2-1-8 is about 3.5" when set by the factory on a new belt.
 3. Belt must not slip while conveying loads within the specification above. If slippage occurs, adjustment is required.
 4. To test belt adjustment it is necessary to stop the belt and place 1000 lbs. of weight on it (sand bags or other known weight items). The belt must start without slippage when inclined at maximum angle.
 5. If slippage occurs, tighten more in small increments. Do not tighten by large increments because over tightening will damage the belt or belt splices. Retest.
 6. Readjust slide bars by loosening retaining flat-head screw (just under edge

of belt) and re-positioning slide bar to within 1/16" of rear roller. Tighten screw to lock in position.



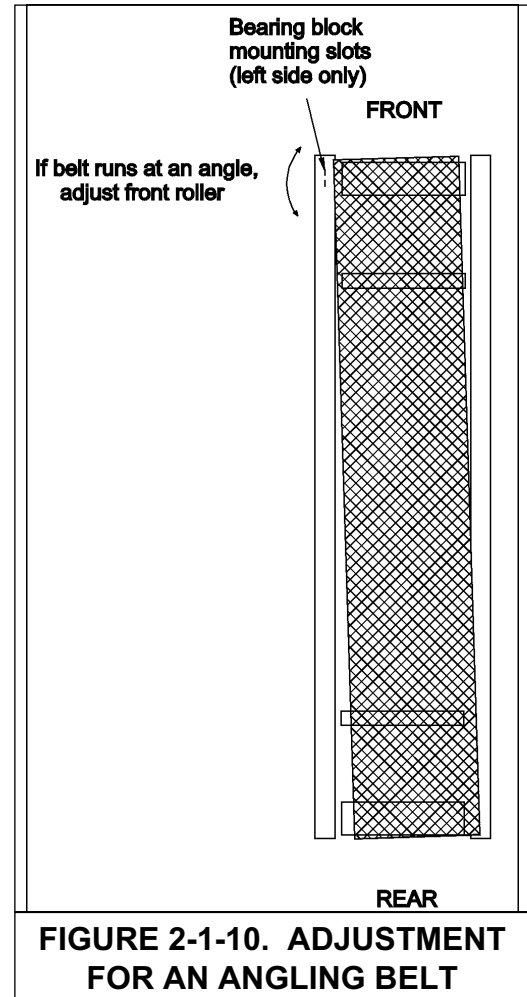
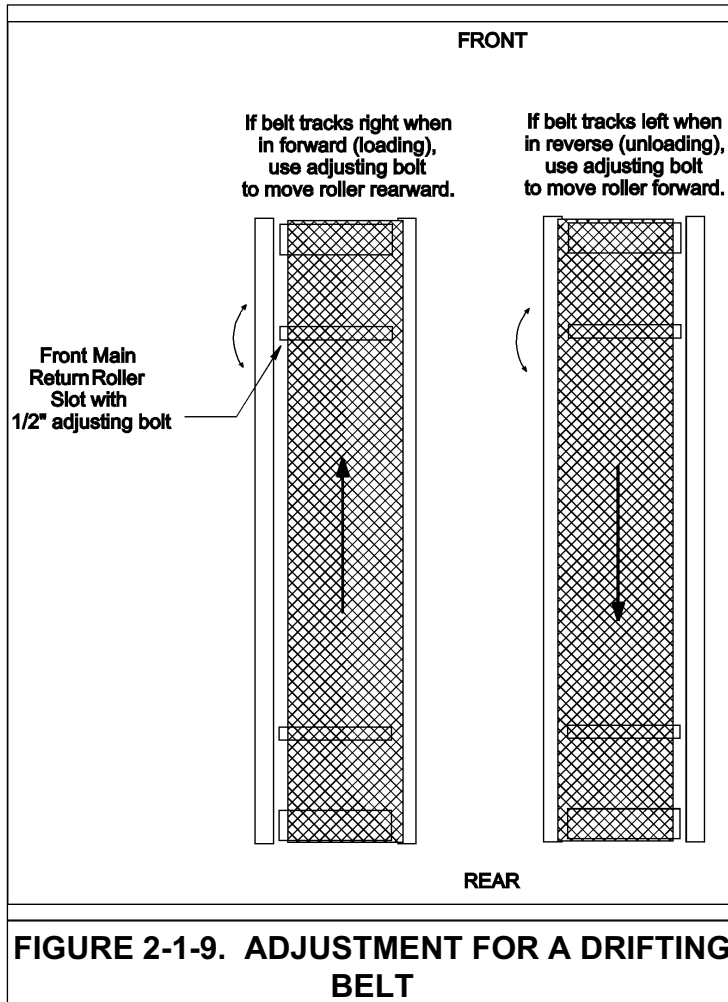
1.11.2 Front Return Roller Adjustment (To Remedy A Drifting Belt)

Figure 2-1-9.

Adjust front main return roller (also known as "crowder" roller) when belt tracks to one side when going forward, but goes over to the other side when in reverse. The front main return roller has a slot in the left mounting hole to allow for adjustment. The roller shaft is secured in adjusted position by a 1/2" bolt and lockwasher.

1.11.3 Front Head Roller Adjustment (To Remedy A Belt Running At An Angle)

Figure 2-1-10



Adjust front head roller when belt angles to one side. The front head roller bearing block has mounting slots to allow for adjustment. It may also be necessary to adjust rear head roller using take-up bearing. Be sure to readjust slide bar clearances when complete.

1.12 FOOTBRAKE ADJUSTMENT

Instructions are on Figure 2-1-11

1.13 REAR WHEEL BRAKES

The rear brakes are of the self-adjusting type.

1. Start engine.

2. Ensuring that there is sufficient space around the conveyor, engage Reverse, and back up at normal speed. Step on the brake firmly until the unit stops.
3. Repeat this procedure 2 or 3 times.

1.14 HANDBRAKE (PARKING BRAKE) ADJUSTMENT

Adjustment of the handbrake is made by turning the knurled handle on the Orscheln lever until the desired tension is achieved.

1. Locate the setscrew in the handle.
2. Remove the setscrew completely to free the knurled handle.
3. Adjust as required, then replace the setscrew.
4. Additional adjustments can be made at the rear end of the cable.

1.15 ENGINE SPEED AND THROTTLE ADJUSTMENT

See Figure 2-1-12.

Engine speed is adjusted at the Inc. factory and under normal conditions should not be tampered with. If you are installing a new throttle cable, then you will need the following instructions.

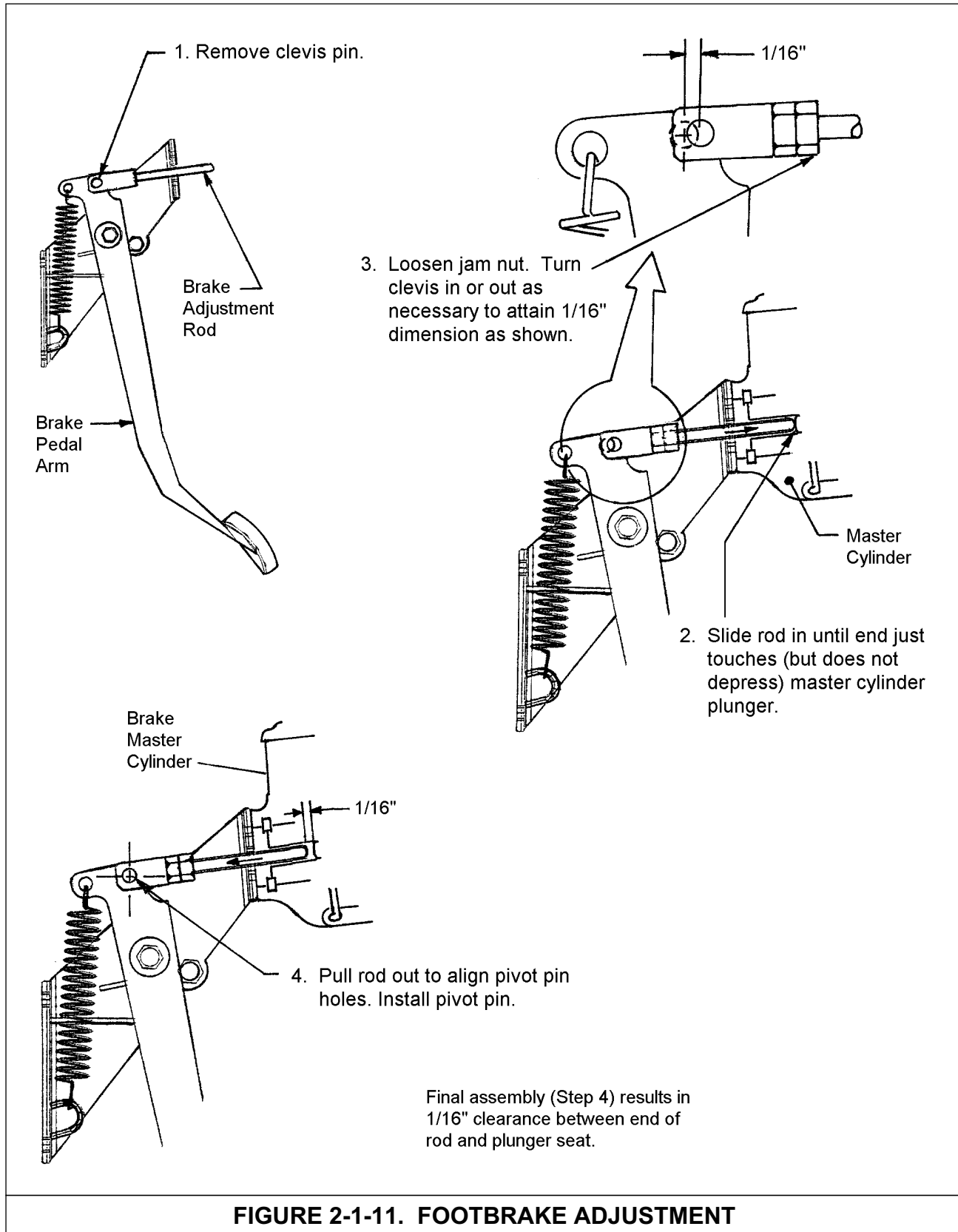
1. Adjustments are somewhat tricky as there are several places to adjust. The general rule, however, is to start at the engine and work forwards from there, i.e., disconnect throttle cable at engine.
2. Diesel engines have both a minimum rpm and a maximum rpm adjustment. Minimum rpm should be set for satisfactory operation (generally 750 to 900 rpm range). Maximum rpm should generally be set around 2400 rpm to achieve 120 ft (minimum belt speed).

Note: Deutz 1011 engines have a special idle adjusting procedure. See 2-1-1.16 for procedure.

3. Reconnect throttle cable to engine.

IMPORTANT: See control cables, Chapter 5 for additional safety and maintenance topics.

4. The throttle adjustment allows the maximum speed of the conveyor belt to be preset as desired.

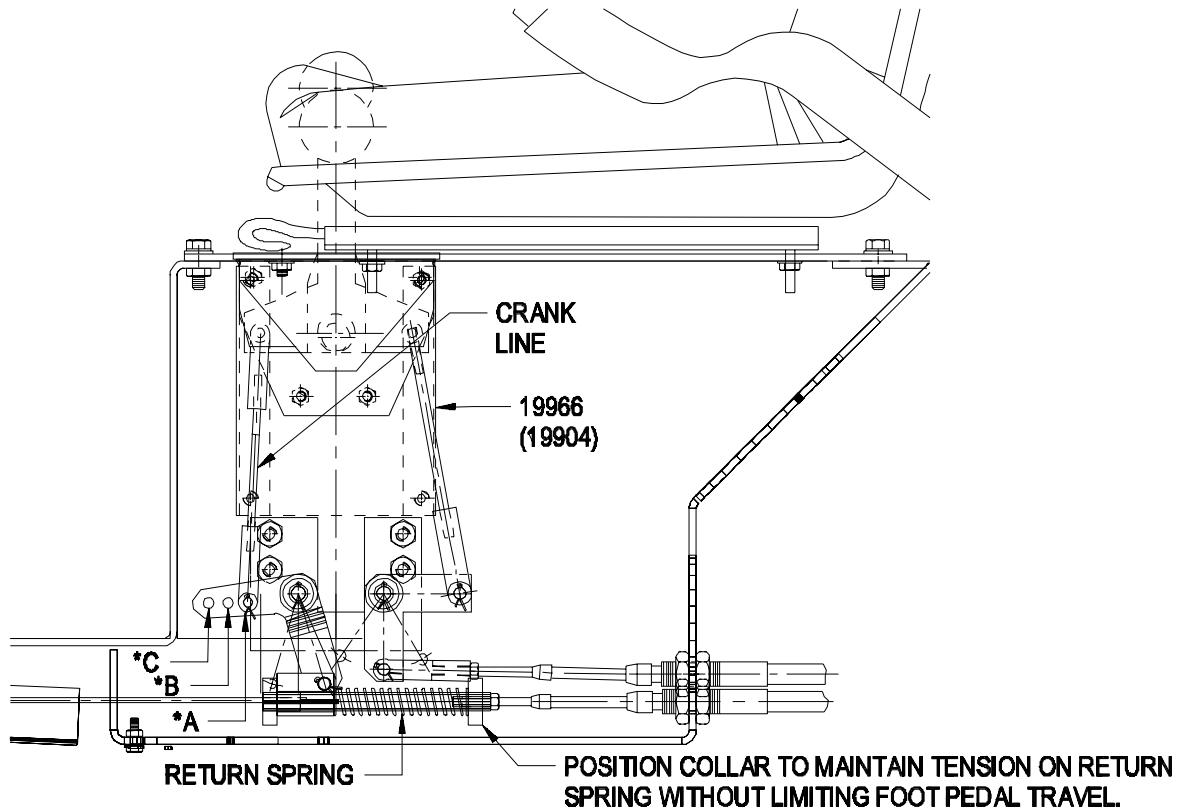
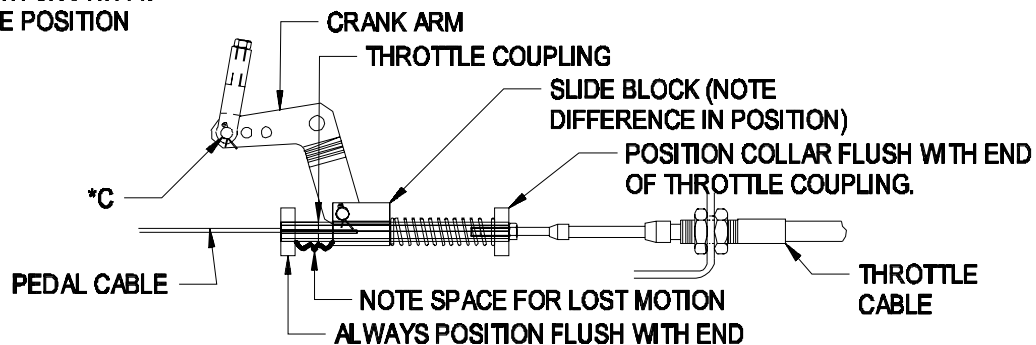


NOTE: The minimum speed of the belt is fixed by the engine idle speed, and is therefore not adjustable.

5. Once engine has been set up correctly, disconnect end of throttle cable inside cab (under seat). Reconnect engine end of cable and adjust cable sleeve so that cable core is pulled almost all the way out when the engine is at idle. Make sure not to adjust sleeve so far back that cable prevents engine throttle lever from resting against idle stop.
6. Go back into cab and check that throttle crank & slide block are set up correctly depending on the type of engine. (See Figure 2-1-12)
7. Adjust the crank link length so that hole at the bottom end of the crank arm swings about equally on both sides of an imaginary vertical line drawn through the pivot, as the hand throttle is operated through its full stroke.

IMPORTANT! Adjustment of engine speeds should only be attempted by competent maintenance personnel. A reliable tachometer with a range of 0-3000 RPM will be required.

8. Engine speed is adjusted at the NMC-Wollard, Inc. factory and under normal conditions should not be tampered with. If you are installing a new throttle cable, then you will need the following instructions.
9. Start engine and allow to warm up for about 5 minutes. Operate throttle 2 or 3 times.
10. Adjust idle speed to 750-900 RPM (depending on application) and lock in position.
11. For diesel engines, adjust the throttle cable sleeve and/or the cable end (which screws into the throttle coupling) so that the front collar just rests against the slide block (with the engine at idle). Ensure slide block does not prevent engine from returning to idle stop. Adjust rear collar to achieve satisfactory return spring tension. Re-adjust throttle cable sleeve slightly forwards to take up slack in crank linkage until there is about a 1/32" gap between the front collar and the slide block.
12. Loosen front collar and push pedal cable core into throttle coupling enough to take up slack in cable. Tighten collar to clamp cable. Ensure cable does not prevent engine from returning to idle stop.
13. Finally, adjust stop bolt under accelerator pedal to limit pedal travel to match engine throttle travel. It is important to do this so that the pedal cannot overstress the cable or engine throttle mechanism at full stroke.

CRANK LINK POSITIONS:*A - DIESEL ENGINES REQUIRING 1 7/16" TO 2"
OF THROTTLE TRAVEL****B - DIESEL ENGINES REQUIRING 1 1/8" TO 1 7/16"
OF THROTTLE TRAVEL****C - ALL GAS ENGINES, DIESELS REQUIRING
LESS THAN 1 1/8" TRAVEL****DIESELS, GAS ENGINES W/ SPEED LIMITERS****BOTH SHOWN AT
IDLE POSITION****GAS ENGINES W/O SPEED LIMITERS****FIGURE 2-1-12. THROTTLE ADJUSTMENT**

1.16 GOVERNOR BUFFER SPRING ADJUSTMENT FOR DEUTZ ENGINE

See Figure 2-1-13

The following procedure is for adjusting or readjusting of the governor buffer spring in case of governor instability (hunting). This condition is generally found with the automatic transmission either in neutral or in gear with a minimum idle no lower than 650-700 RPM.

This procedure is performed on a running engine; therefore, extreme caution must be taken to guard against personal injury as there are moving parts (i.e. V-belt, crankshaft pulley, cooling fan, etc.)

1. Engine must be near operating temperature.
2. Remove cooling fan. Depending upon application this may require loosening and possible removal of heat exchanger to gain access to the cooling fan retaining belts.
3. Remove lower plastic belt protection cover (see Figure 2-1-13, items A-B) to provide access to the governor buffer spring by removing two (2) 6 mm bolts using a 10 mm wrench.

NOTE: The Deutz 1011 engine will require a special tool, Deutz part number 0301-320 to remove this cover.

4. Before any speed adjustments are made, the buffer spring must be backed off. This is done by loosening the locknut, 6 mm using a 10 mm socket, by $\frac{1}{2}$ -1 turns counterclockwise while holding the center slotted screw from turning (See Figure 2-1-13, item C). Turn the slotted screw counterclockwise until contact against the governor arm no longer exists (approximately 1 - 2 turns)
5. Start engine with cooling fan removed. Set engine speed control lever 30 RPM below desire low idle speed (650-700 RPM).
6. The resetting of buffer spring is done by turning the slotted screw clockwise and holding the locknut from turning. When turning slotted screw with the attached spring, contact with the governor arm is made and will increase speed. The speed setting should be increased 30 RPM to the normal low idle speed.
7. Having achieved the correct speed, stop engine, secure adjustment by holding the slotted screw and tighten the locknut against the locking plate. Refit the belt protection cover with plastic plug securely in place.
8. If governor instability is still present, repeat above steps and, under step 5, lower engine speed by means of adjusting control by 10 RPM lower. If necessary, this step can be repeated.

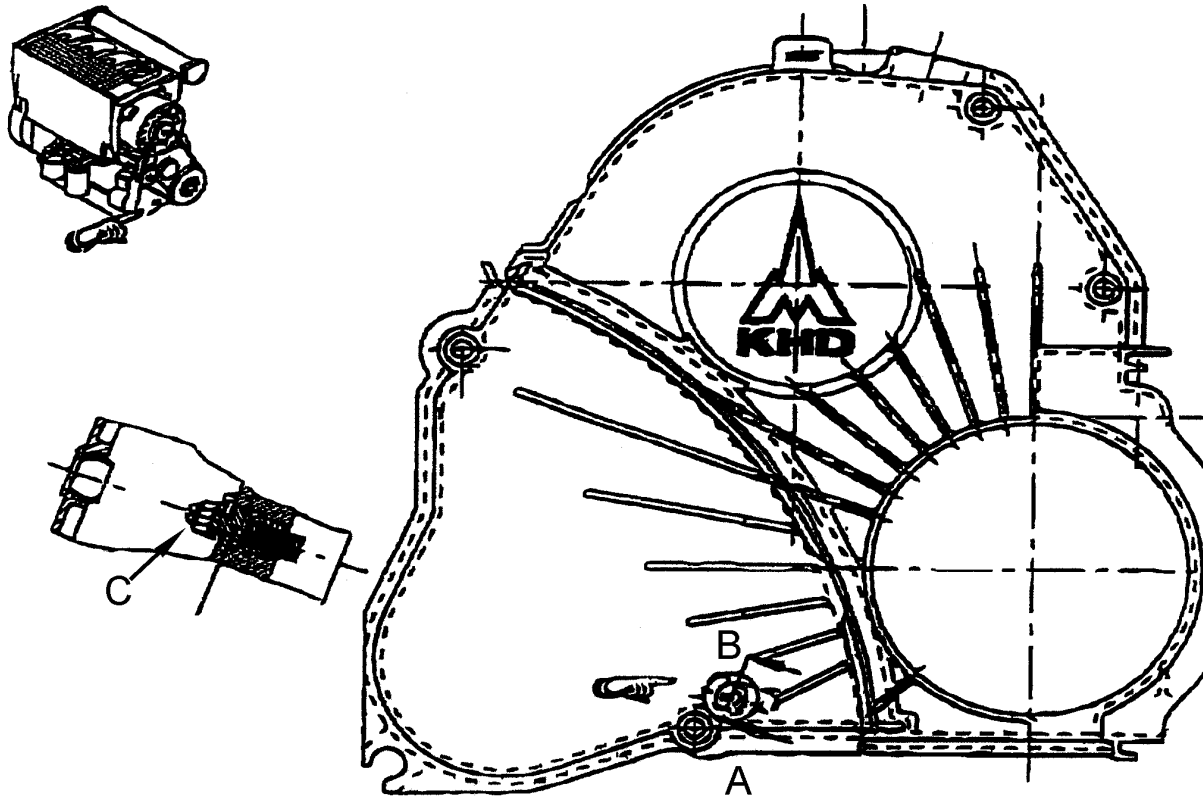


FIGURE 2-1-13. GOVERNOR BUFFER SPRING, DEUTZ

1.17 TRANSMISSION LINKAGES AND CABLES

The transmission cable is adjusted at the NMC-Wollard, Inc. factory and under normal conditions should not be tampered with. If you are installing a new cable, then you will need the following instructions.

Adjustments are provided for the transmission linkage on the Quadrastat shift lever and on the push-pull cable.

1. With engine off, remove the clevis pin holding transmission shifter arm to cable clevis.
2. Place transmission in Neutral.
3. Place Quadrastat shift lever in Neutral. Remove seat and seat plate.

4. In the cab, adjust the cable sleeve and clevis attached to the vertical leg (of the shifter arm) so that the shift lever throws full stroke Forward and Reverse without being stopped by the cable.
5. Lock all adjustments in place.
6. Set transmission shifter and Quadrastat shift lever in the Neutral position.
7. Adjust cable sleeve and clevis at transmission end until hole in shifter arm matches up with hole in clevis.
8. Replace clevis pin and lock all adjustments in place.
- 9.

1.18 OTHER ENGINE ADJUSTMENTS

Refer to the engine manufacturer's manual, which has been supplied with this manual.

1.19 ENGINE BELT ADJUSTMENT

In general, all engine v-belts should be adjusted to obtain approximately $\frac{1}{2}$ " deflection (for an applied force of about 10 lbs.) in the middle of the longest belt span. Also refer to the engine manual for any specific adjustments. Serpentine belts are generally controlled by an automatic tensioner and are therefore not adjustable.

Belt-driven pumps can place a lot of load on the belt. To ensure adequate belt tension, operate the engine and set the main relief pressure (as described in 2-1-1.4.4) to about 25% above the recommended setting. Adjust belt tension until the pump will operate satisfactorily without belt slippage at this setting. Once this has been achieved, reduce main relief pressure to the recommended setting.

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2 TROUBLE SHOOTING

2.1 GENERAL

Troubleshooting the Mongoose™ is relatively simple for maintenance personnel who have a working knowledge of automotive repair and electrical and hydraulic systems. The work requires no tools other than those found in any well-equipped automotive maintenance shop.

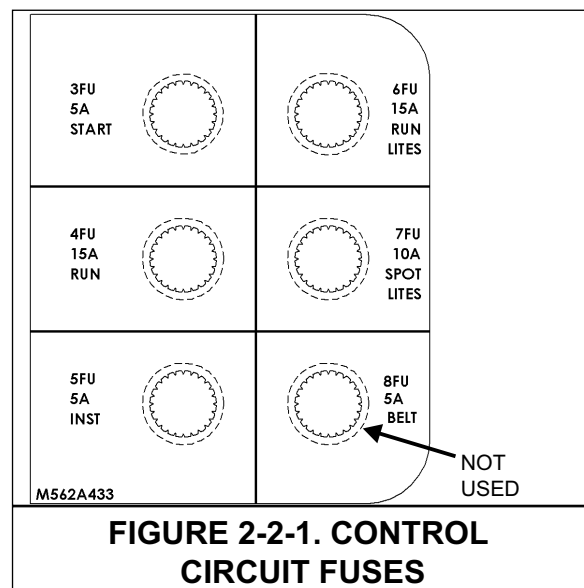
The following notes may help with your understanding of how the conveyor truck is designed to operate:

- The engine starter will not engage unless the park brake is applied, the transmission shift lever is in neutral position, the ignition switch is in “Run” position, and no emergency stop switches are depressed
- The ignition switch on the instrument panel is of the anti-restart type, which means once the engine has been cranked, the switch must be turned back to OFF before the engine can be cranked again.
- The “High Water Temp.” light is self-testing and designed to flash briefly whenever the ignition switch is turned on or off. This tests the lamp and socket to ensure proper functioning.
- Vehicle running and work lights will operate only when the instrument panel ignition switch is in the “Run” position.
- Due to tire static resistance on dry pavement the wheels may not be able to turn fully from lock to lock when unit is stationary.

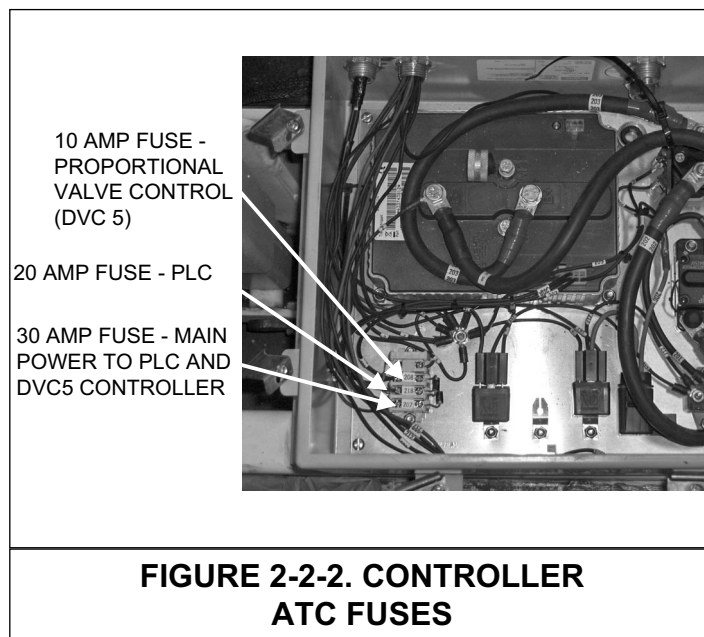
⚠ WARNING Before working beneath the raised conveyor bed, install the cylinder safety channel and set securely into place. See figure 2-1-1.

2.2 FUSES AND CIRCUIT BREAKERS.

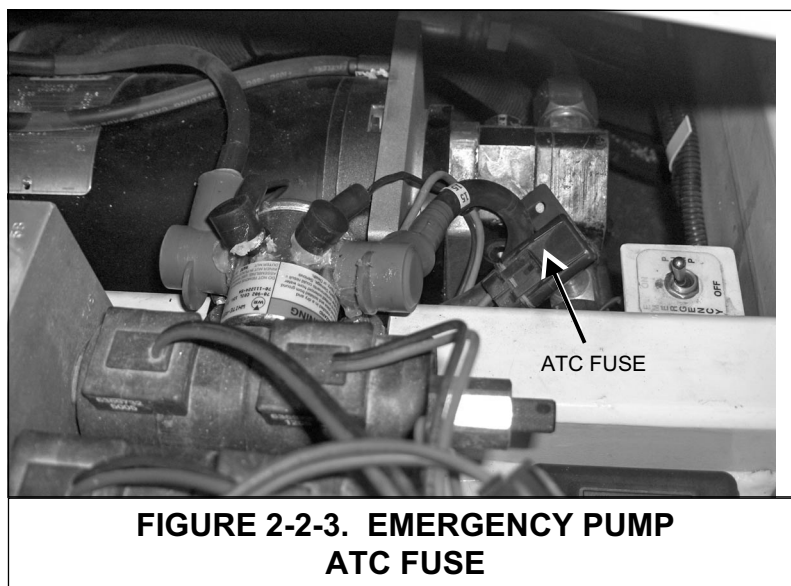
2.2.1 Control Circuit Fuses.



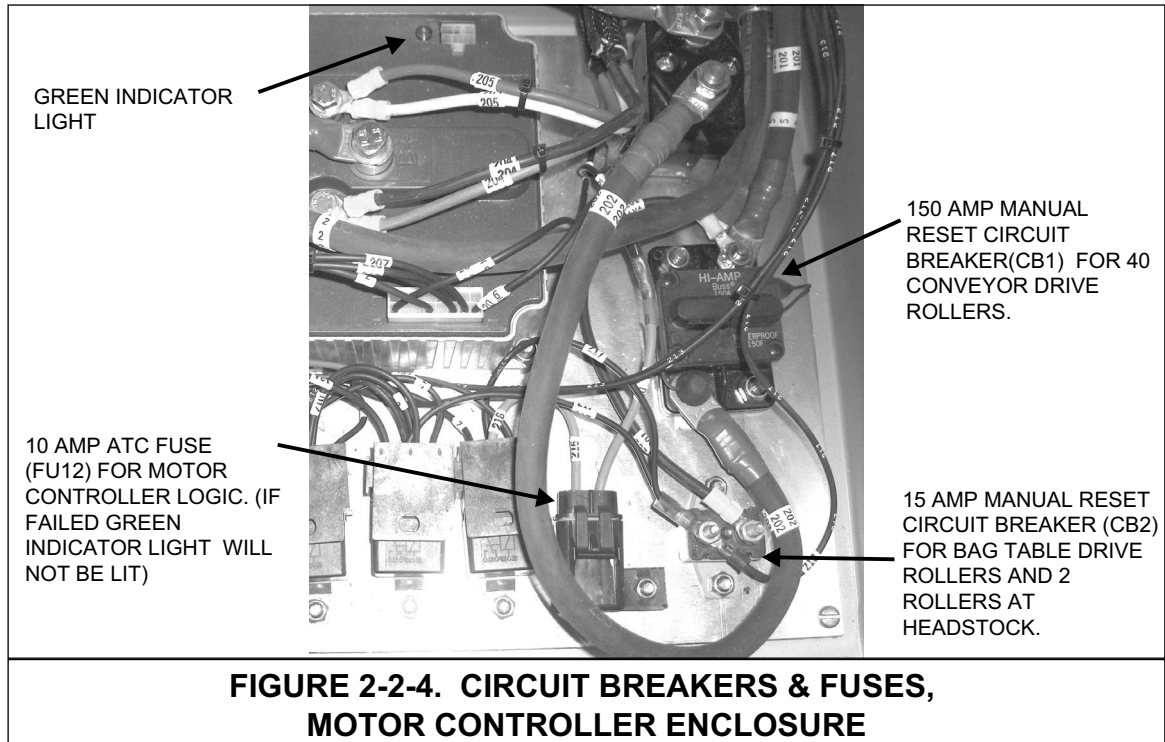
2.2.2 Controller ATC Fuses.



2.2.3 Emergency Pump ATC Fuse.



2.2.4 Circuit Breakers And Fuse.



1. A steady green indicator light means the Sevcon motor controller logic is functioning properly. See figure 2-2-4.
2. If the green light is blinking, this is an error code. Refer to the Sevcon Control manual to identify the code.

2.2.5 PLC Control

A blinking green light on the PLC means it is operating properly.

2.2.6 Bag Table Controller

1. This controller is located under the bag table and has a serviceable fuse to protect the propel roller circuit.
2. This controller also has an adjustable potentiometer to adjust the propel roller speed to properly match the speed of the hydraulic driven spur gears extending the roller drive conveyor. The extend speed is approximately 55 FPM. Set to 105 RPM.

2.3 HYDRAULIC POWER AND DISTRIBUTION SYSTEM

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Limited or no hydraulic power, and/or erratic operation in all functions.		H1, H2 H5 H7, H14 H15, H16	M1 M3, M4	Pump Counter-balance relief Pump
Hydraulic oil foaming		H4, H5, H6, H16		
Noisy engine pump		H2, H5, H7, H10, H15, H16	M1, M3	Relief valve Pump
Noise in vicinity of reservoir		H2, H3, H5		
Hydraulic oil milky or discolored		H4, H6, H15, H16		
Hydraulic system running hot		H1, H7 H10, H15, H17	M5, M16	

2.4 POWER STEERING

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Steering response sluggish or intermittent. All other systems OK		H1, H10, H12, H19, H20		Cross over relief
it steers in one direction only		H7, H14		Crossover relief
Unit wanders excessively when driven		H12	M19	
Steering "feels loose" and excessively sensitive		H18, H20		
Power steering does not move right or left smoothly.		H5, H6, H7, H10, H11, H12, H17, H18, H19		

2.5 LIGHTING AND ACCESSORY SYSTEMS

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
No running or accessory lights; all other circuits OK	E5, E2			Keyswitch
No running lights; all other circuits OK	E1, E2			Fuse 6FU

No spotlights or horn; all other circuits OK	E1, E2, E4			Fuse 7FU
Malfunction in one light or group of lights	E2, E3, E4, E5, E6, E12, E13			
No horn	E1, E2, E3, E4, E5			Fuse 7FU Horn button
Stoplight malfunction. Backup lights stay on all the time. (Also see Brake System)	E6, E11		M12	
Fuses blow repeatedly				Check for short circuits

2.6 BRAKE SYSTEM

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Brakes feel excessively spongy with poor or no stopping power		H21, H22, H25, H26	M4, M8, M21	
Stop lights stay on all the time (Also see Lighting & Accessory Systems.)	E6	H1, H23	M8, M20, M22	

No Stop lights. (Also see Lighting & Accessory Systems.)	E2, E3, E4, E5, E6, E12, E13			
Brakes feel normal, vehicle has poor stopping power		H27, H1		
"Brake Fault" light on instrument panel glows when brakes are depressed		H21, H22, H23, H25, H26		
"Brake Fault" light glows continuously	E6, E14, E4	H1, H23		
Vehicle pulls to one side when braking		H1, H22, H23, H25, H26, H27	M21, M22	Check rear brakes
Handbrake will not hold		H26, H27	M23, M21, M22	Cable and/or rear brakes
Brake fluid milky or discolored		H24		
Brake pedal gradually goes down to floor when depressed with a constant force		H21, H22		
"Brake Fault" light does not flash when ignition is turned on or off	E2, E12, E13, E3, E15			Capacitor
Parking brake ON light flashes brightly when handbrake is released.	E2, E3, E16			Diode REC 2

2.7 AXLES, WHEELS AND TIRES

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Uneven tire wear.			M19, M28	
Excessive noise from rear when first shifting into gear or accelerating			M29, M30	

2.8 ENGINE AND CONTROL SYSTEM

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Starter will not crank; all other systems OK	E2, E4, E5, E7, E8 E1, E2 E3, E7, E9 E11		M12 M21, M22	Fuse 3FU Relay CR1 Neutral Sw. Starter
Starter cranks continuously	E6, E10			
Engine cranks but will not start	E1, E2 E5, E2		M3 M9, M12	Fuse 4FU Keyswitch
Engine will not stop.	E6		M20, M21, M22	
Engine runs rough, speed "hunts" up and down.			M10 M14, M24	

Oil warning light does not illuminate at any time	E2, E4, E5, E12, E13			
Oil warning light stays on when engine is running	E4, E6			
"High Water Temp" light does not flash when ignition is turned on or off	E2, E12, E13 E3, E15			Capacitor
"High Water Temp" light glows continuously	E4, E6 E14			
Hourmeter does not register when ignition is turned on	E2, E3, E19			
Engine starts with difficulty when cold. Glow plugs have no effect.	E1, E2 E3, E7, E9 E4, E5, E23			1FU CR 2
Fuse 1FU blows repeatedly	E6, E10			
Engine idles high (Check idle stop adjustment)			M14, M20, M21, M22	Accelerator
Engine will not accelerate when driving.			M14, M21, M22, M24	Accelerator

2.9 AUTOMATIC TRANSMISSION AND CONTROL SYSTEM

Trouble Symptom	Electrical	Hydraulic	Mechanical	Remarks
Water in transmission fluid		H28		
Transmission overheats		H1, H29		
Transmission does not shift into neutral when gearshift lever is in neutral position			M12, M21, M22	
Transmission fluid milky and dirty				Drain and flush
Transmission will not shift			M21, M22, M27	

2.10 PROBABLE CAUSE/REMEDIES BY CODE: ELECTRICAL

Check all fuses and circuit breakers. See section 2.2.

2.11 PROBABLE CAUSE/REMEDIES BY CODE: HYDRAULICS

Code Number	Probable Cause	Test/Remedy
H1	Hydraulic hose or tubing blocked or pinched	Remove and inspect. Replace if necessary.
H2	Suction strainer clogged	Remove and clean with mineral spirits. Check condition of reservoir and reinstall strainer.
H3	Return filter clogged	Replace element. Check condition of reservoir and suction strainer.
H4	Reservoir contaminated	Open reservoir and check for contamination. Drain and clean with mineral spirits and a lint-free cloth if necessary. Flush system and refill with new oil. (MOBIL-DTE-13)
H5	Oil level low	Add oil to proper level on sight gauge.
H6	Wrong type hydraulic oil or contaminated oil	Flush system, drain and refill with new oil. See H4.
H7	Defective or improperly adjusted relief valve	Check pressures. Readjust or replace valve as required.
H8	Counterbalance valve out of adjustment	Remove and readjust as required, or replace.
H9	Not applicable	
H10	Valve clogged or damaged	Remove and inspect. Clean or replace as necessary.
H11	Cylinder rod seal defective	Remove and inspect. Clean or replace as required. Check rod surfaces for damage. Replace if required.
H12	Cylinder piston seal defective	Replace and test. Check cylinder bore for wear or damage.
H13	Return spring broken	Remove and inspect. Replace spring or valve as required.

H14	Pressure regulating spring broken	Remove and inspect. Replace spring or valve as required.
H15	Hydraulic pump defective	Remove and test on a hydraulic test bench. Repair or replace as necessary. (See Mfr's service data, Chap. 5.)
H16	Hydraulic pump shaft seal leaking	Allow any air in reservoir to disperse. Run system. Stop pump and crack the pump pressure line, check for air in the oil. Remove and repair pump if required.
H17	Hydraulic motor defective	Refer to manufacturer's service information. (Replacement is usually the best option)
H18	Power steering centering spring broken	With power switch turned off, gently move steering wheel in both directions. The wheel should always tend to return to its original position. If not, remove and repair steering unit as required. (See Mfr's data, Chap. 5.)
H19	Power steering internal check valve blocked open or damaged	Check system pressure by "bottoming out" lift cylinder. Operate power steering until wheels stop turning. If system pressure is below 1,800 psig, remove and repair power steering unit.
H20	Power steering unit worn or damaged	Remove, repair or replace. (See Mfr's data, Chap. 5.)
H21	Brake master or wheel cylinder seals bad	Remove and repair as required.
H22	Air in brake system	Pressure bleed all brake lines.
H23	Master or wheel cylinder(s) seized	Remove and repair or replace as required.
H24	Brake fluid contaminated	Drain system. Refill with new fluid; purge all lines. Disassemble all components and clean with new fluid; also replace any damaged/corroded components. Refill system with fresh fluid. Pressure bleed system.
H25	Brake fluid level low	Refill with new fluid. Check for leaks. Pressure bleed system.
H26	Brake linings worn or out of adjustment	Check condition of linings. Replace and/or adjust as required.
H27	Brake linings contaminated (oil, etc.)	Drain system. Refill with fresh fluid. Purge all brake lines. Disassemble all components and clean with new brake fluid. Replace any damaged or corroded components. Reassemble, refill with fresh, new fluid and pressure bleed system. Replace linings.
H28	Oil cooler perforated	Pressure test radiator and check for leaks from cooler. Replace if required.
H29	Oil cooler blocked	Check and replace if required.

2.12 PROBABLE CAUSE/REMEDIES BY CODE - MECHANICAL/STRUCTURAL

Code Number	Probable Cause	Test/Remedy
M1	Engine belt slipping or broken	Check belt tension, adjust or replace if required.
M2	Chain loose	Check tension, adjust if required.
M3	Taperlock bushing loose or damaged.	Inspect, replace, or adjust as required.
M4	Shaft key missing or damaged.	Inspect and replace if necessary. Inspect keyways.
M5	Sprocket damaged or worn.	Inspect and replace if necessary.
M6	Drive chain worn.	Inspect and replace if necessary.
M7	Drive chain broken.	Repair or replace.
M8	Foot brake linkage out of adjustment	Readjust linkage.
M9	Not applicable	
M10	Broken, perforated or loose fuel line	Visually inspect and vacuum test fuel line. Repair or replace as necessary.
M11	Control rods out of adjustment or damaged	Check, repair or readjust as required.
M12	Shift lever linkage out of adjustment	Check and readjust.
M13	Throttle linkage out of adjustment	Readjust linkage.
M14	Accelerator linkage out of adjustment	Readjust linkage.
M15	Tail roller out of adjustment	Adjust.
M16	Foreign material jammed between head or tail rollers, or in drive sprocket	Remove obstructions and repair any damage.
M17	Belt damaged	Check for tearing or excessive stretch. Replace if required.
M18	Belt guide damaged	Check for wear or broken springs. Repair or replace as required.
M19	Tie rod ends defective	Check for free play; replace as required.
M20	Return spring broken	Replace spring.
M21	Linkage broken	Check and repair or replace as required.
M22	Linkage seized	Check, clean/lubricate or repair.
M23	Handbrake cable linkage out of adjustment	Readjust linkage.
M24	Fuel filter clogged	Clean filter.
M25	Rear lifting frame shifted to one side	Center the rear lifting frame pivot shaft.
M26	Bearings worn	Inspect and replace as required.

M27	Modulator cable out of adjustment	Check and adjust if necessary.
M28	Toe-in alignment	Check and adjust wheel alignment to manufacturer's specifications.
M29	Axle U-bolts loose	Tighten U-bolts
M30	Drive shaft universal joints loose	Replace as required.

2.13 ELECTRICAL AND HYDRAULIC SCHEMATICS AND DIAGRAMS

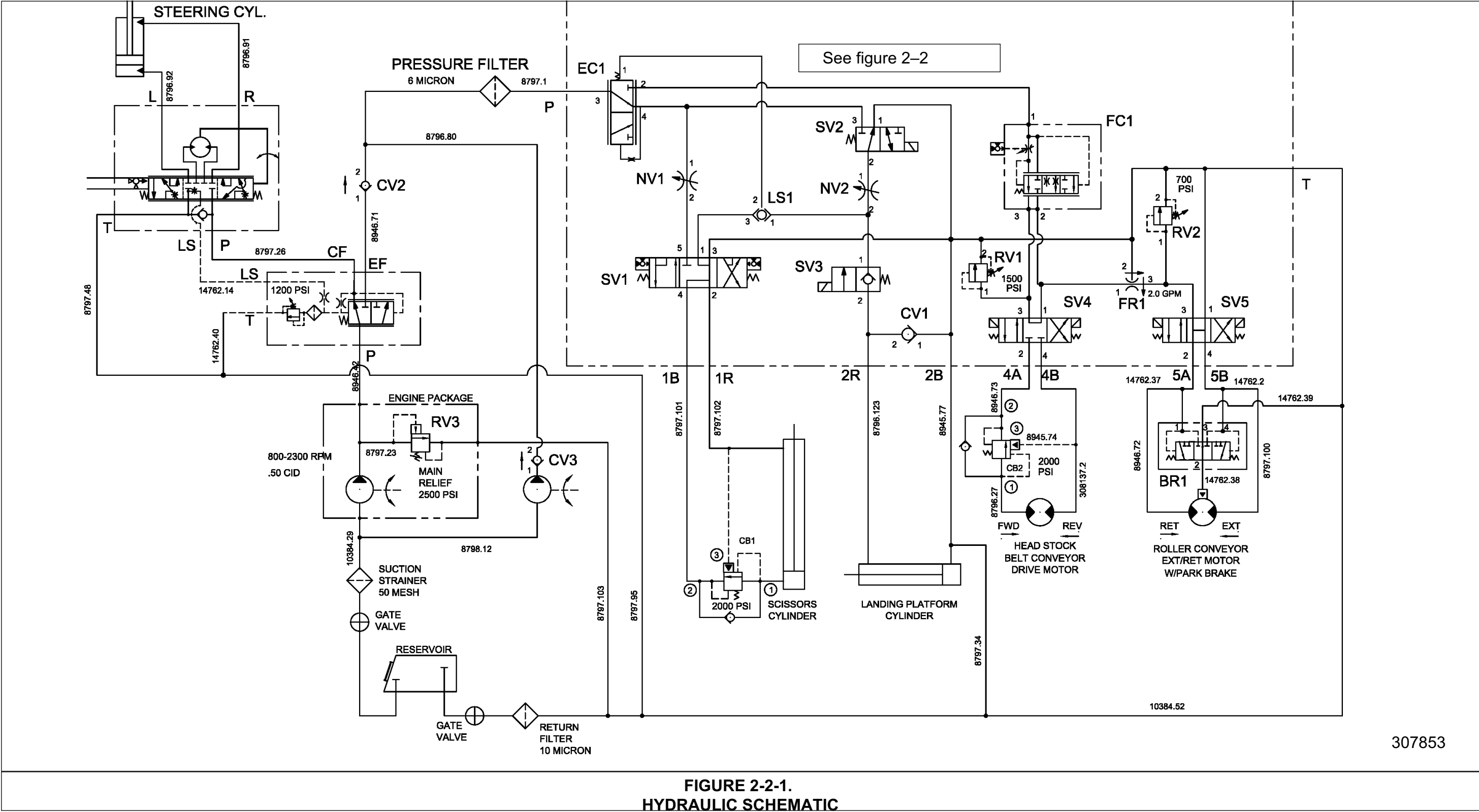
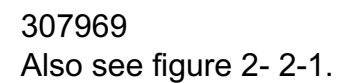
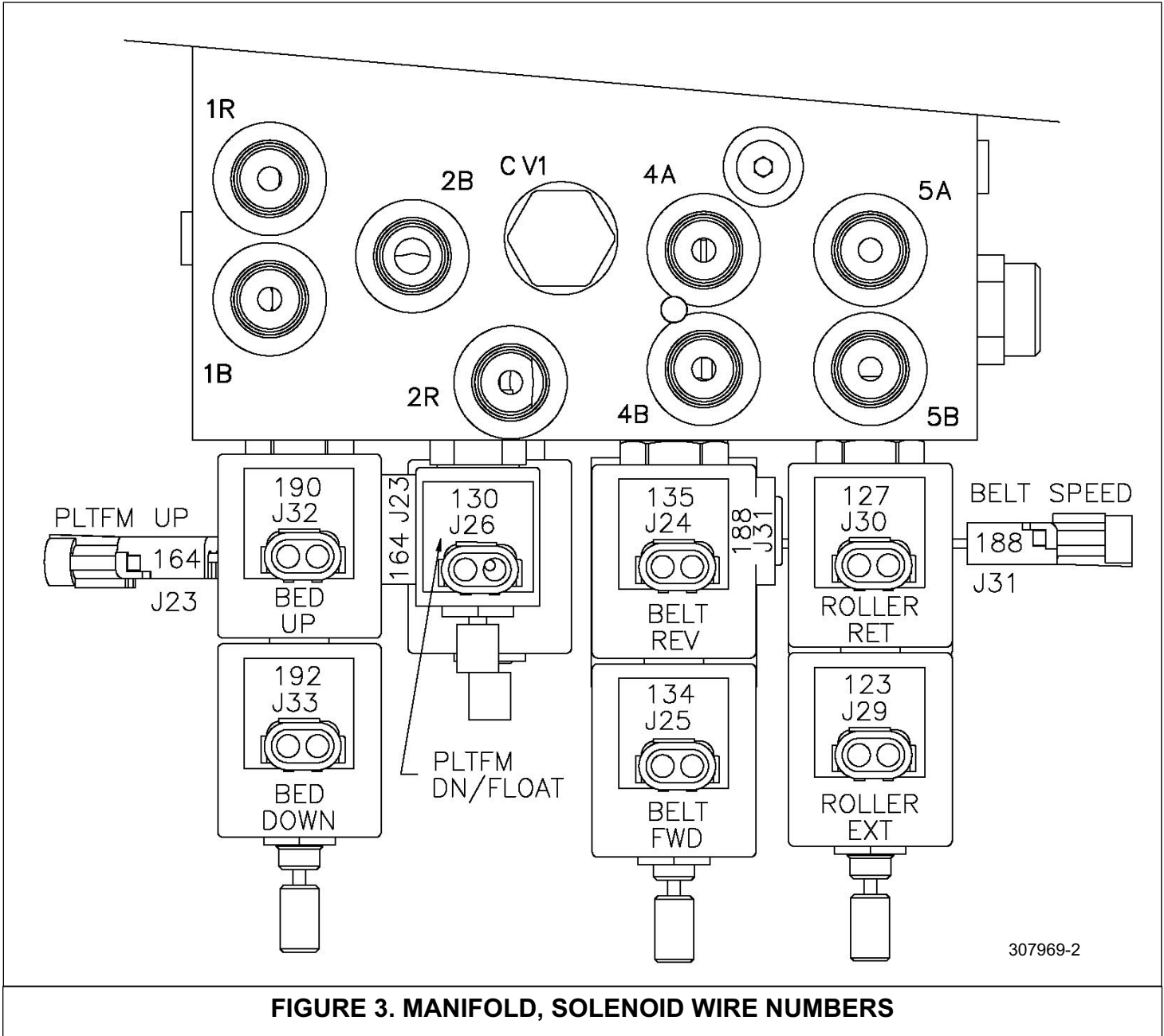


FIGURE 2-2-1.
HYDRAULIC SCHEMATIC



CHAPTER 2 - MAINTENANCE

2 TROUBLE SHOOTING



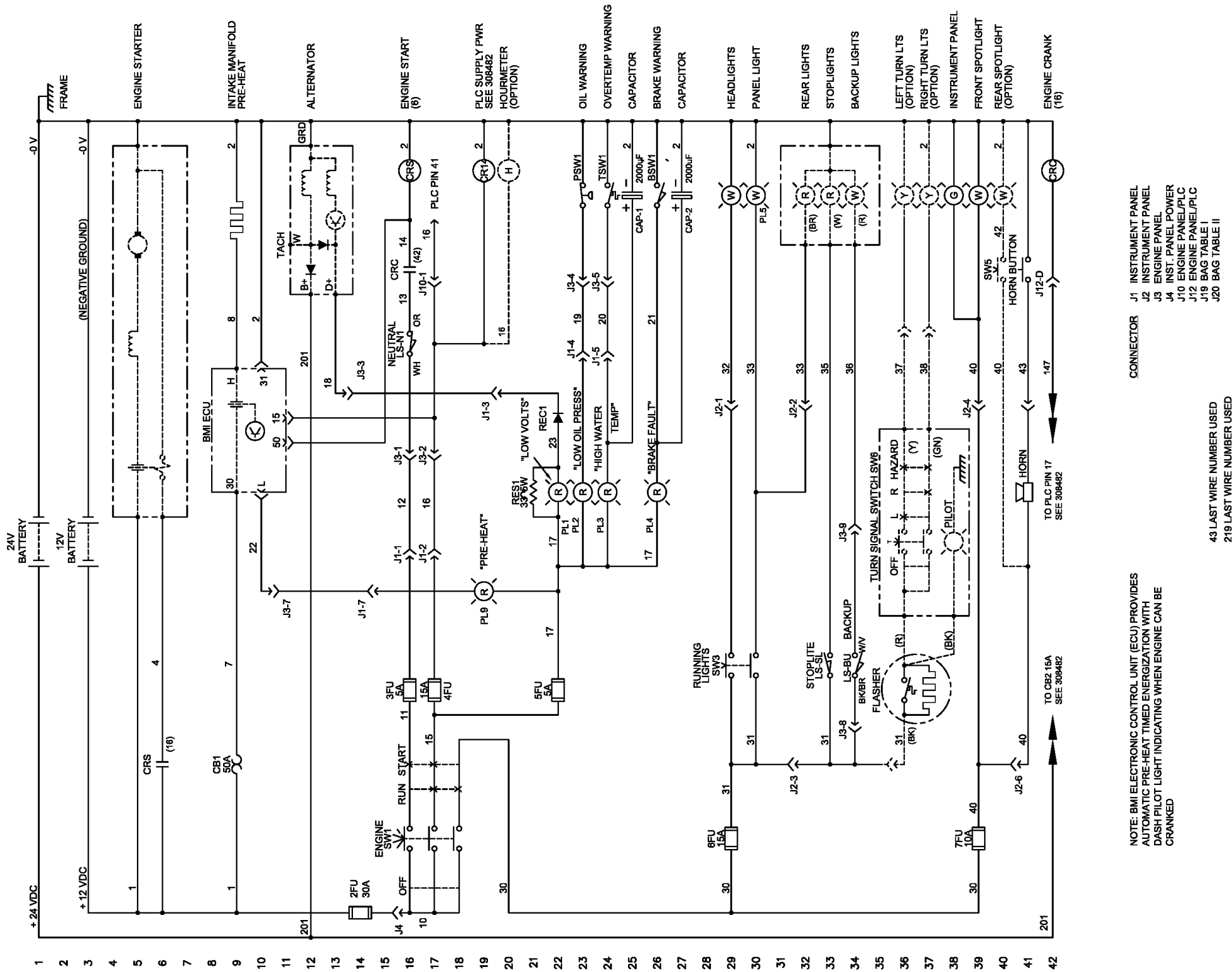
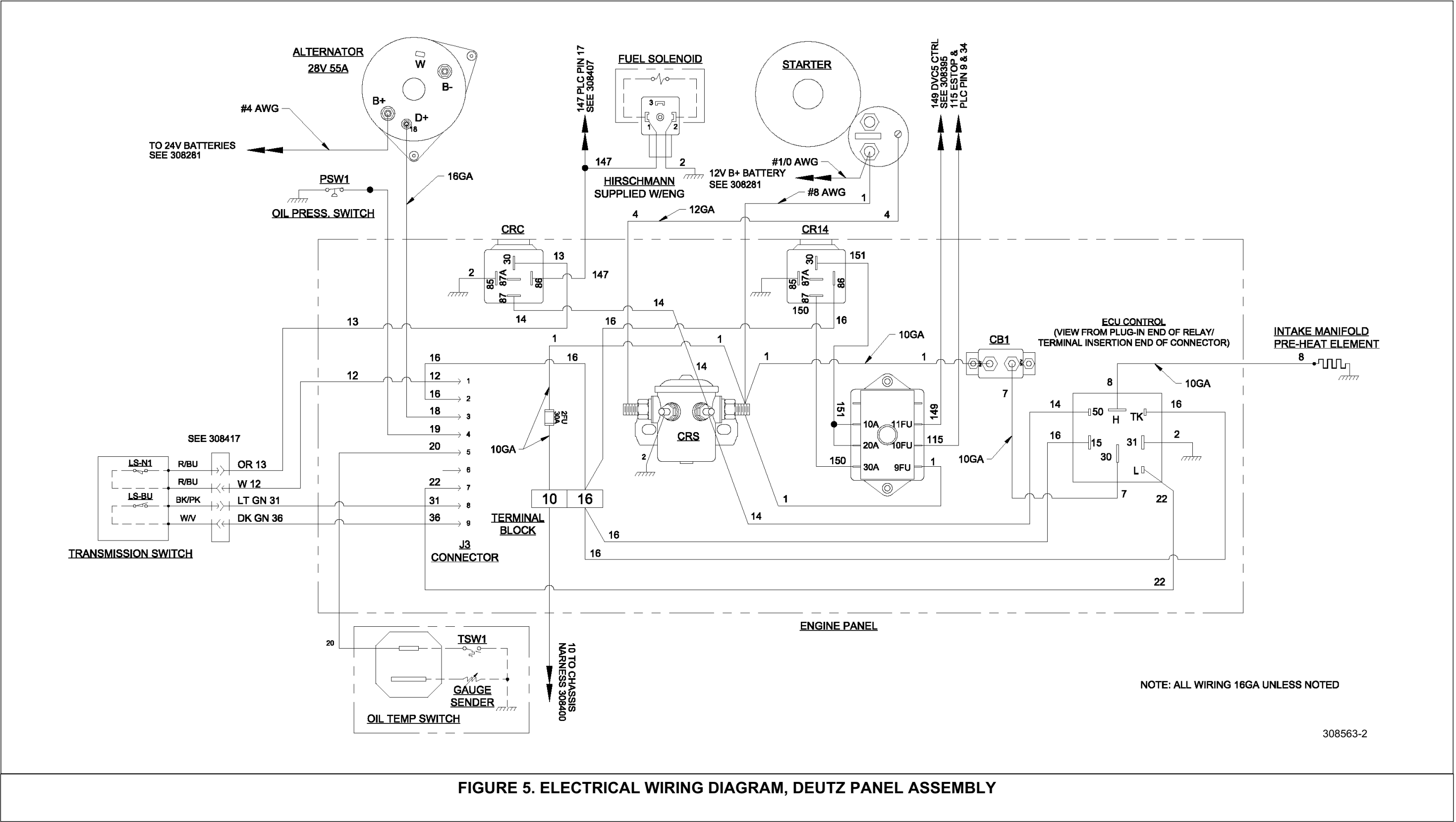
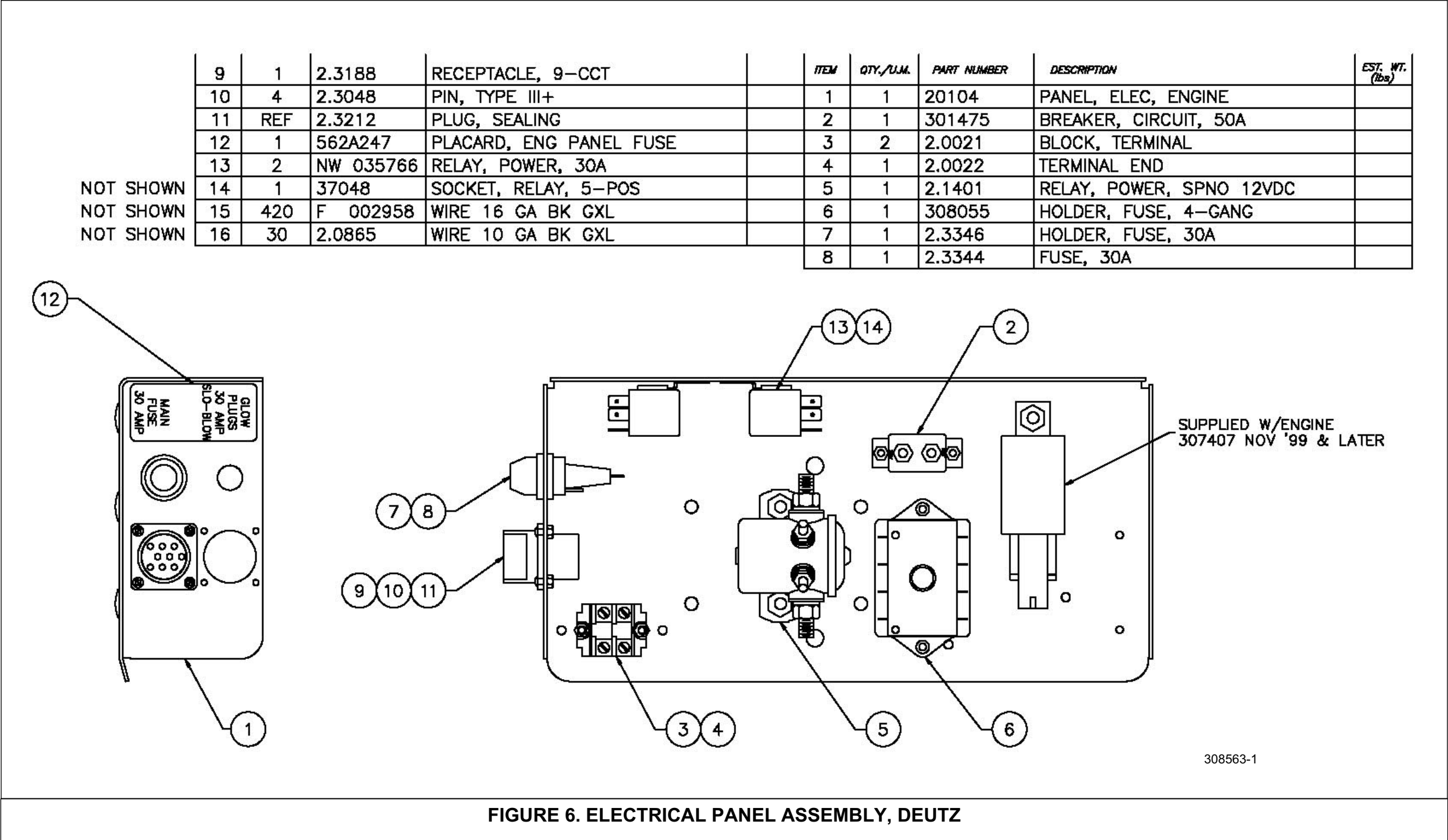
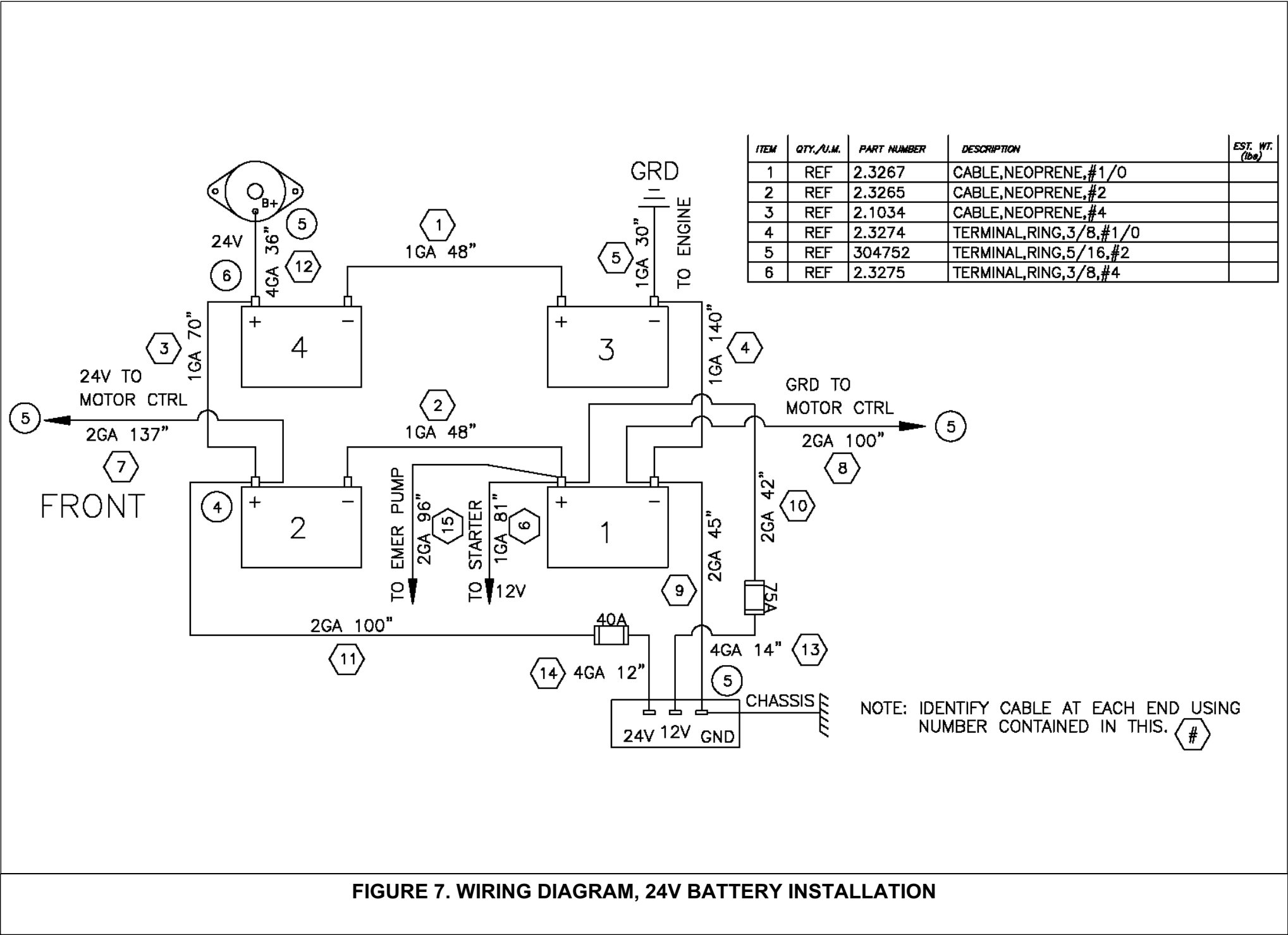


FIGURE 2-2-4.
ELECTRICAL SCHEMATIC - POWER PACK, DUETZ

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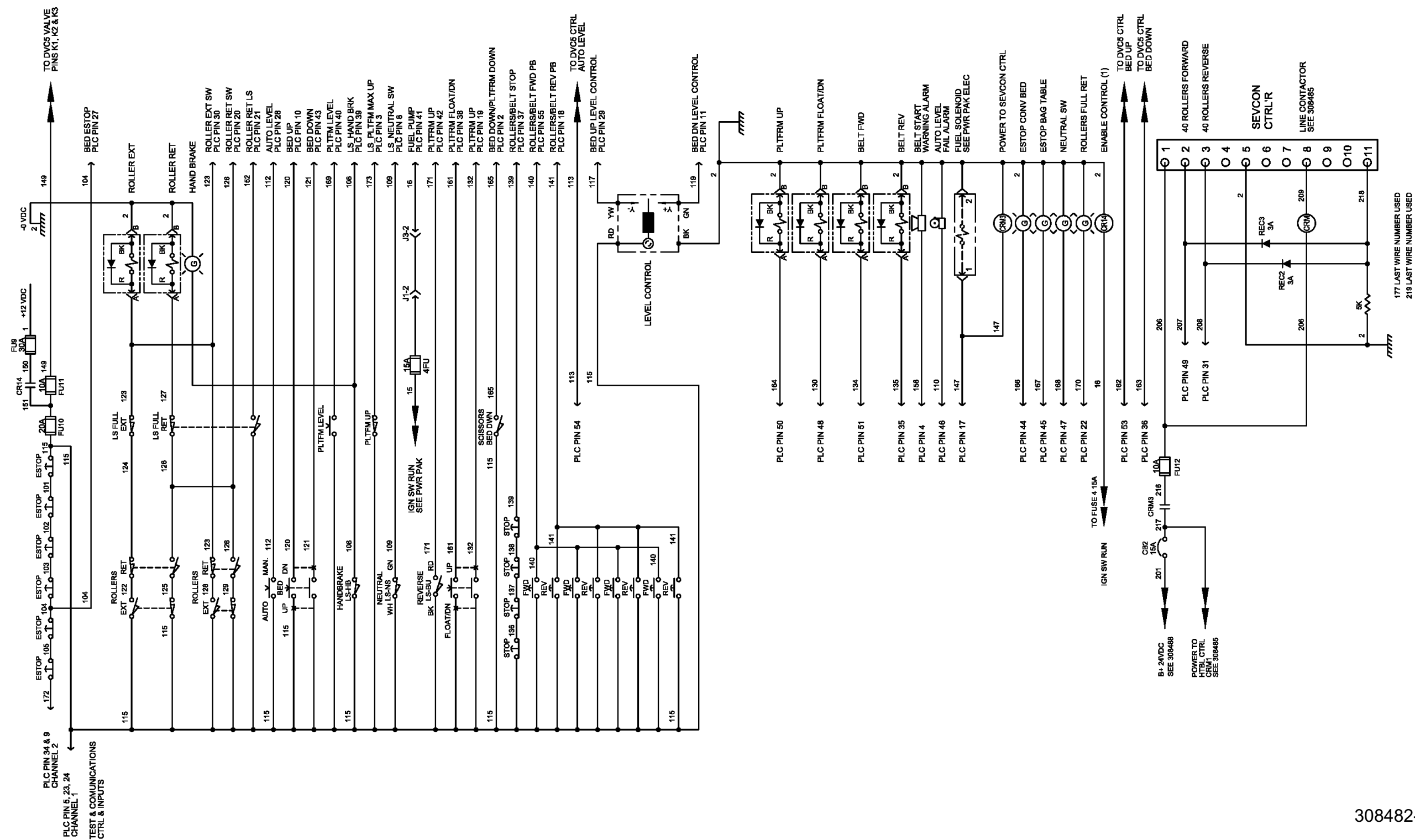
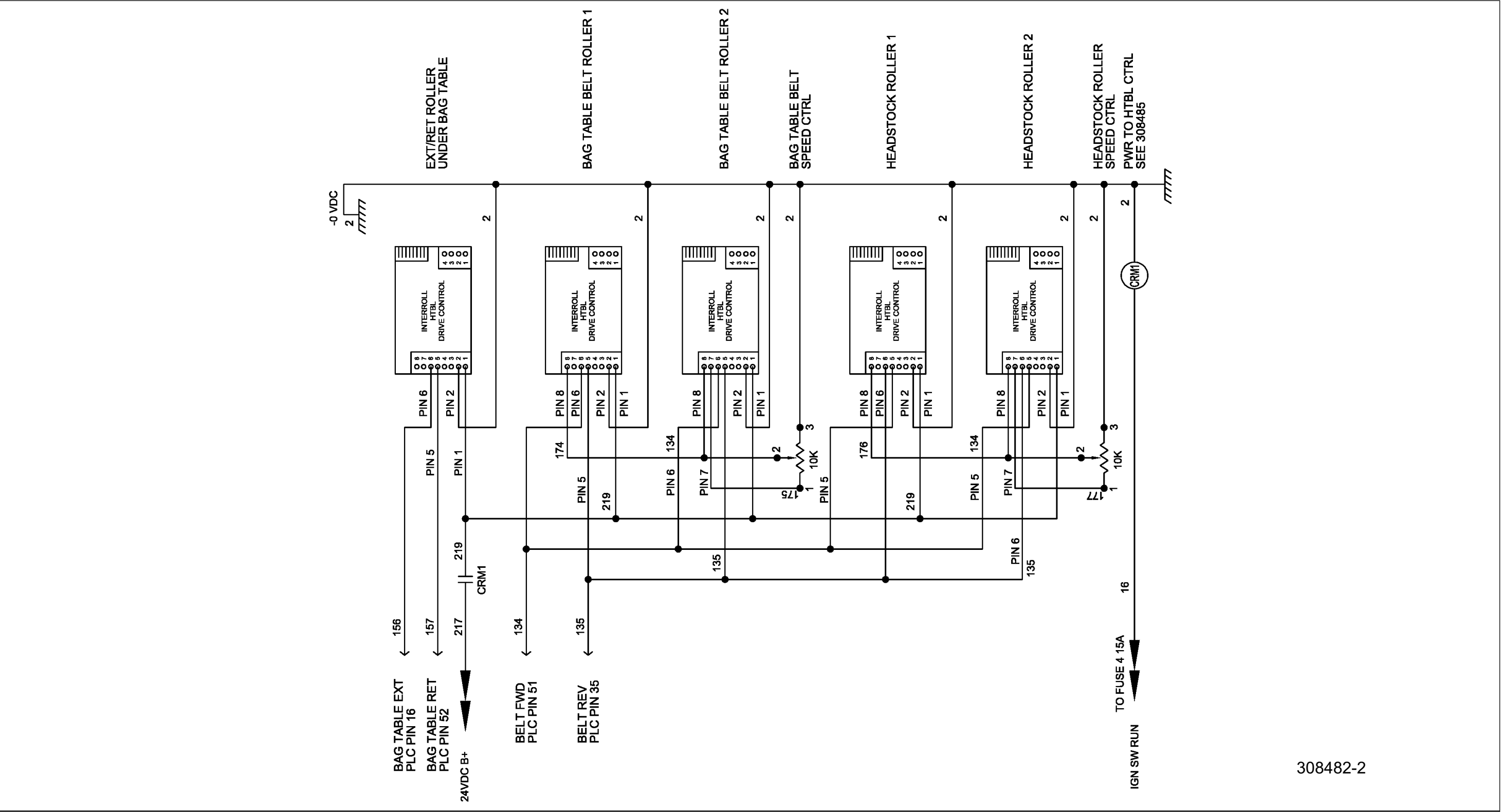
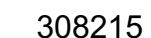


FIGURE 2-2-8.
ELECTRICAL SCHEMATIC - PLC WIRING



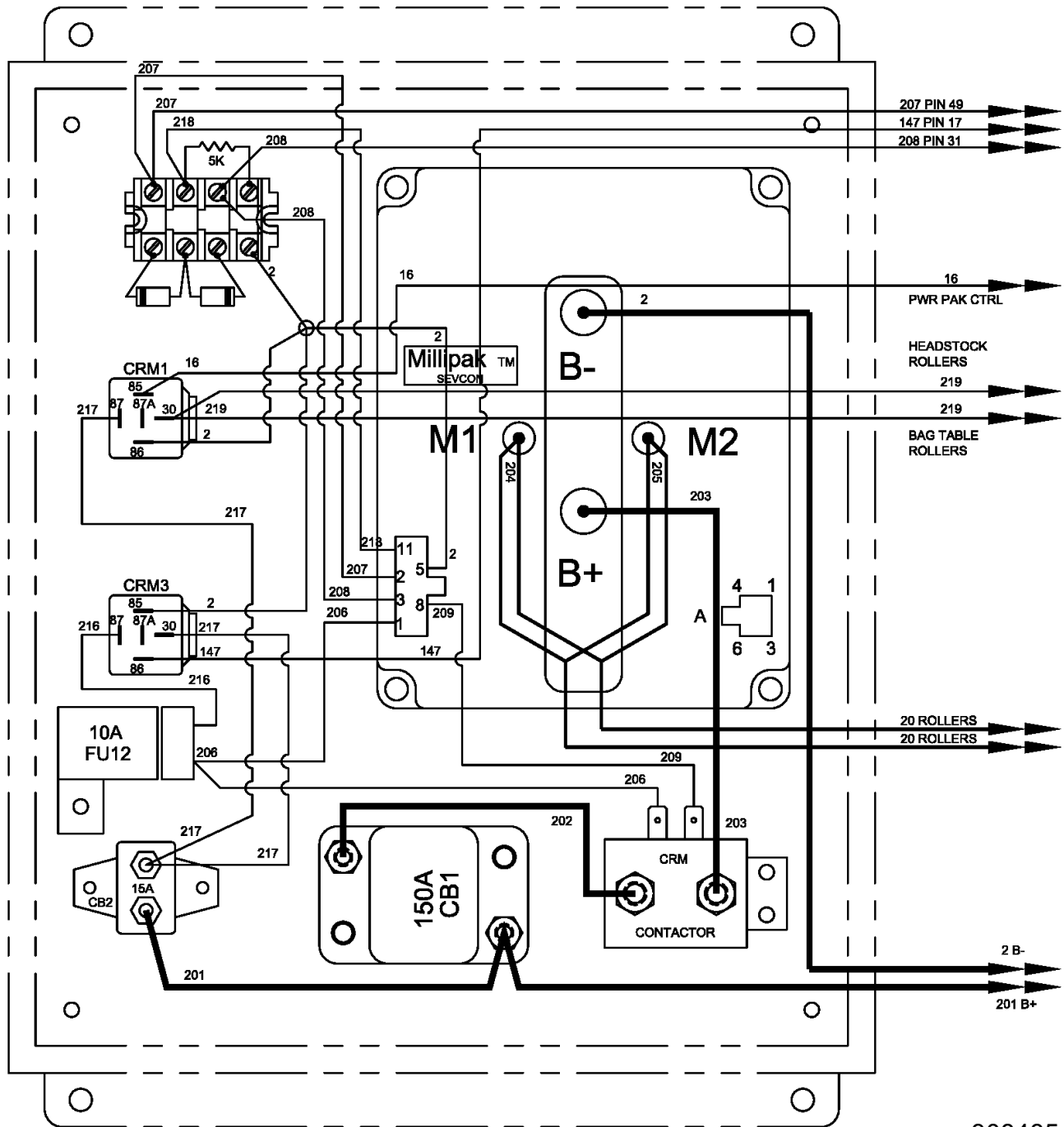
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FIGURE 2-2-8.
ELECTRICAL SCHEMATIC - PLC WIRING

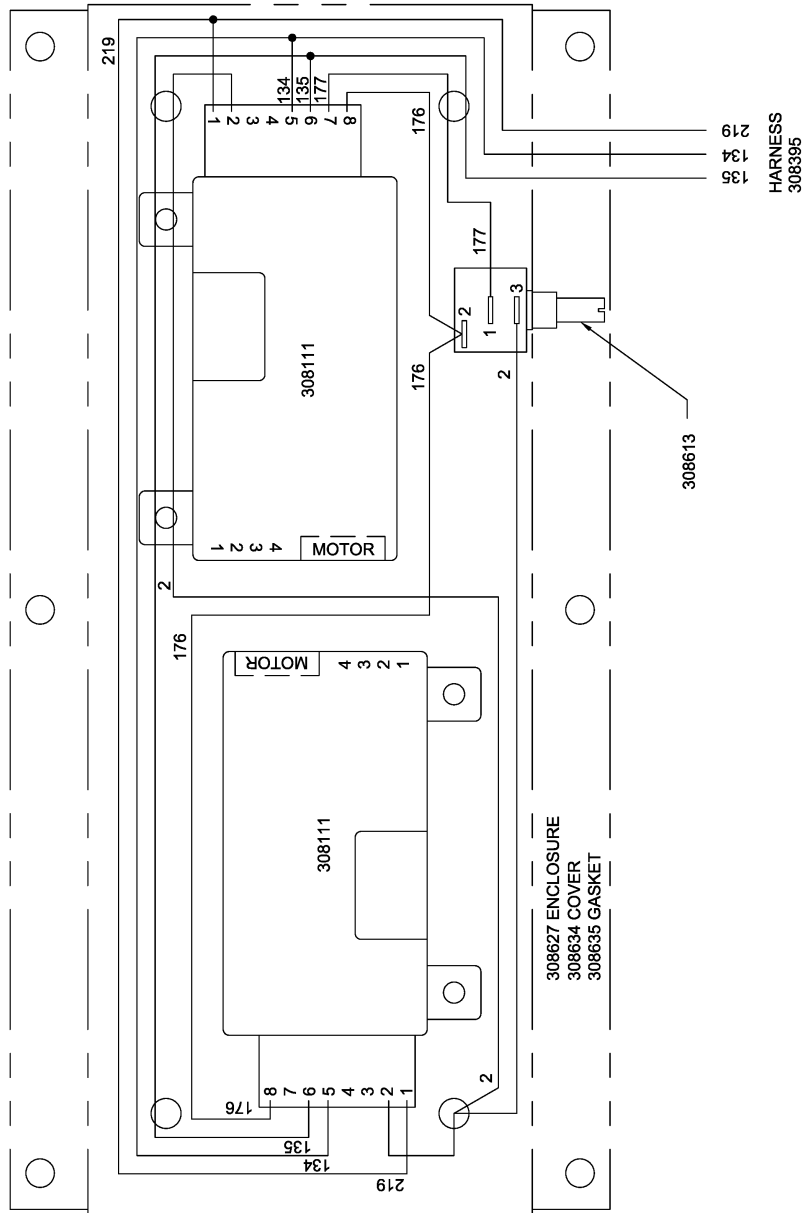


CHAPTER 2 - MAINTENANCE

2 TROUBLE SHOOTING



**FIGURE 2-2-10.
WIRING DIAGRAM - MOTOR CONTROLLER**



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FIGURE 2-2-11. WIRING DIAGRAM, CTRL, HEADSTOCK ROLLERS

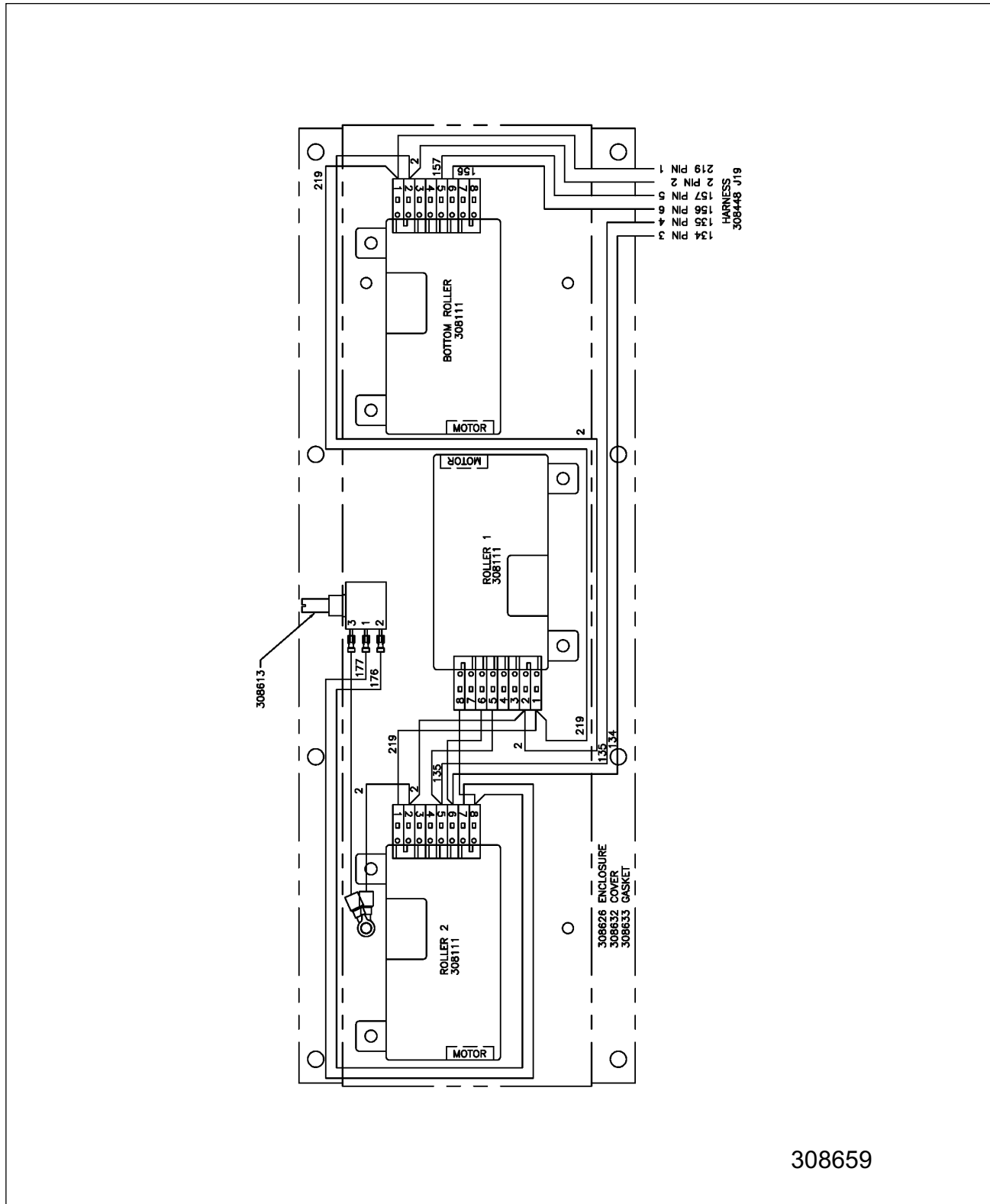


FIGURE 2-2-12. WIRING DIAGRAM, CTRL, BAG TABLE

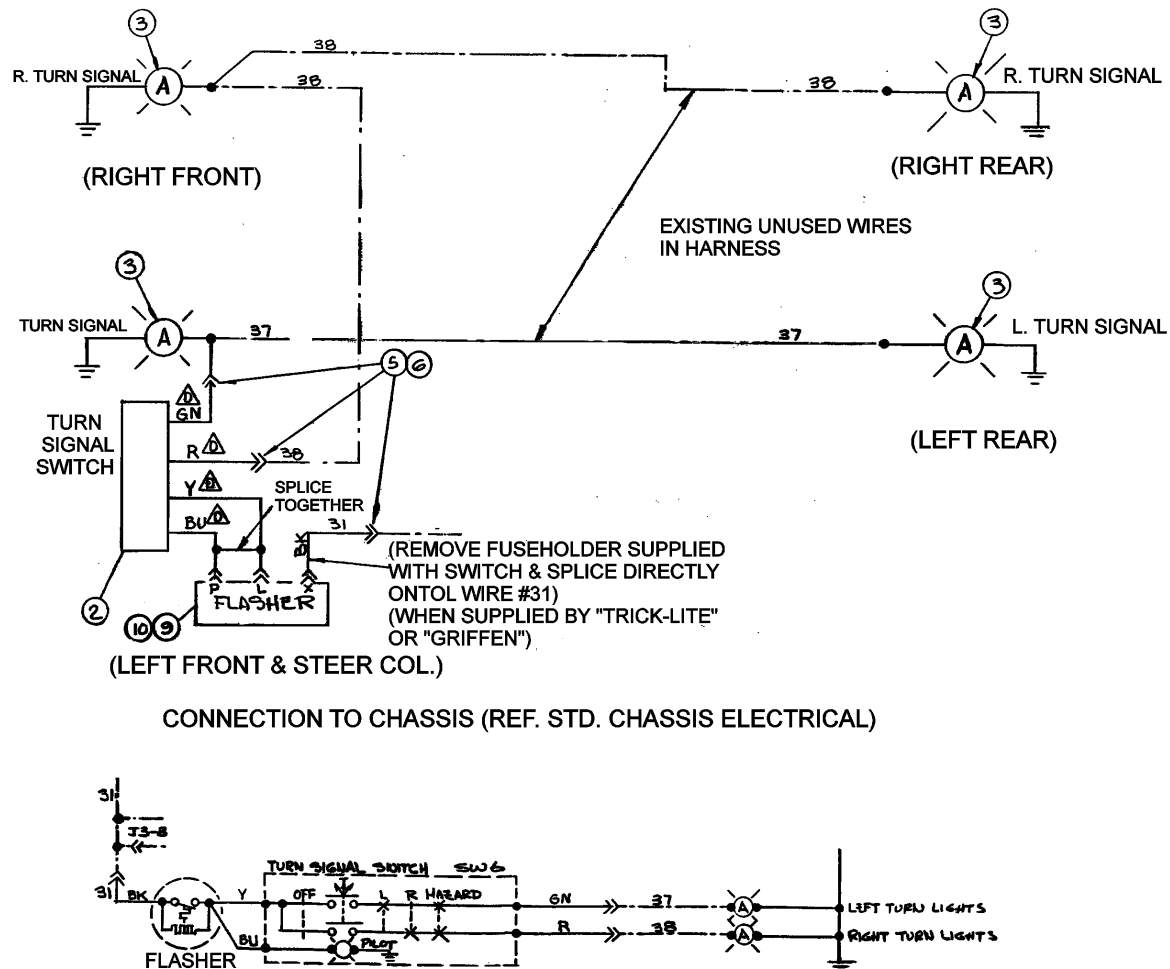


FIGURE 2-2-13.
TURN SIGNALS OPTION SCHEMATIC

3 REMOVAL AND INSTALLATION

3.1 GENERAL

Removal and installation of components and assemblies from the unit are generally not difficult and no special tools are required. Instructions given here are for those components and assemblies that may pose the greater challenge. All fastenings are standard SAE or metric. Some components will require suitable hoists or slings for removal and installation.

The following procedures are given only as a guide and do not in any way restrict technicians from developing their own procedures. No procedures are given where the type of work required is obvious. Assembly is normally done in reverse order of disassembly unless a special procedure is required.

⚠ WARNING Make sure that:

- the conveyor front is properly stored on the cylinder safety channel before removing any plumbing from the front cylinder. See figure 2-1-1.
- the conveyor bed is stored on the cylinder safety channel before performing any work under the bed. See figure 2-1-1.

3.2 CONVEYOR BED REMOVAL AND INSTALLATION

Information not available at time of publication.

IMPORTANT! Cap all ends of hoses and fittings to prevent contamination of hydraulic system.

⚠ WARNING The front cylinder assembly is very heavy. Attempting to remove it without adequate support may result in injury.

3.3 SCISSORS LIFT CYLINDER REMOVAL AND INSTALLATION

Information not available at time of publication.

IMPORTANT! Cap all ends of hoses and fittings to prevent contamination of hydraulic system.

⚠ WARNING The cylinder assembly is very heavy. Attempting to remove it without adequate support for the assembly may result in injury.

3.4 POWER PAK ASSEMBLY

3.4.1 Removal

NOTE: Conveyor Bed removal is not required.

1. Chock wheels. Start engine.
2. Raise rear of conveyor bed to the maximum height.
3. Raise front of conveyor bed hydraulically so the bed is horizontal.
4. Shut off engine. Disconnect batteries.
5. Using hoists, forklifts, or other suitable lifting equipment, provide support at both the front and rear of the conveyor bed. **Conveyor bed weight: approx. 1200 lbs., or 550 kg.**
6. Remove engine cover.
7. Disconnect two drive shaft U-bolts and remove drive shaft.
8. For units where park brake cable runs through engine frame, disconnect parking brake cable and move clear of engine frame.
9. Using a suitable container to prevent spillage, disconnect the fuel lines and plug them to prevent leaking. Mark for identification if necessary.
10. Disconnect transmission shift cable and move clear of engine frame. Mark for identification if necessary.
11. Disconnect throttle cable and move clear of engine frame. Mark for identification if necessary.
12. Close off hydraulic tank valves. Using a suitable container, disconnect one hydraulic line from hydraulic pump and two from the relief valve body. Mark lines for identification if necessary. Cap all ends of hoses and fittings. Remote hoses if necessary for clearance when power pak is removed.
13. Disconnect exhaust system hangers and remove any exhaust system parts which would interfere with power pak removal.
14. Disconnect the harness plug from the engine electrical panel.
15. Lift the engine electrical panel. Disconnect any wires that split off the harness just behind the plug removed in the previous step.
16. Remove bolts and nuts that secure engine frame to vehicle chassis.
17. Connect a low profile sling or rigid frame to the four lifting points on engine frame. Lift out engine frame assembly from vehicle chassis with sling using a forklift truck or similar boom lifting device.

3.4.2 Installation

1. Connect a low profile sling or rigid frame to the four lifting points on engine frame.

2. CAREFULLY lift engine frame assembly back into vehicle chassis with sling, using a forklift truck or similar boom lifting device. Make sure that all engine components clear chassis.
3. Align the engine frame tie-down points with mating holes in vehicle chassis. Reinstall the bolts and nuts that secure engine frame to vehicle chassis.
4. Perform the previous steps 15-6, the reverse of installation.
5. Remove conveyor bed supports.
6. Connect battery. Check all fluid levels.
7. Start engine and check for proper operation.

New Transmission Installation Notes

Use a teflon sealer on transmission cooling line fittings that thread in side of transmission case.

Do not start engine with new transmission installed without adding a minimum amount of transmission fluid. Do not operate unit under load before having proper fluid level.

ENG. TRANS. ASSEMBLY INSTRUCTIONS

- 1) INSTALL FLEX PLATE (ITEM #6) AND SUPPORT RING (ITEM #5) ON ENGINE AS SHOWN USING HEX HEAD BOLTS (ITEM #27).
- 2) INSTALL DOWEL PINS (ITEM #14) IN ADAPTER PLATE (ITEM #4)
- 3) ALIGN TORQUE CONVERTER STUDS WITH CORRESPONDING HOLES IN FLEX PLATE (ITEM #6), ALIGN TRANSMISSION WITH THE DOWEL PINS AND SECURE TO THE ADAPTER PLATE (ITEM #4) USING SUPPLIED BOLTS (ITEM #12) AND LOCK WASHERS (ITEM #13).
- 4) CHECK TORQUE CONVERTER END PLAY, .125" MIN. - .188" MAX., PRIOR TO INSTALLING ITEM #8.
- 5) INSTALL NUTS (ITEM #8) ON TORQUE CONVERTER STUDS AFTER TRANSMISSION IS SECURELY BOLTED TO ENGINE. ACCESS STUDS THROUGH CUTOUT IN BOTTOM OF ADAPTER (#4).
- 6) INSTALL SPEEDOMETER GEAR (ITEM #19) ON SHAFT.
- 7) INSTALL UNIVERSAL JOINT YOKE (ITEM #20) ON SHAFT AND SECURE USING NUT (ITEM #21).
- 8) INSTALL SPEEDOMETER CABLE ACCESS PLUG (ITEM #16) IN HOLE AS SHOWN.
- 9) REMOVE KICKDOWN ARM (ITEM #24) AND REINSTALL 180° FROM ORIGINAL POSITION.
- 10) PAINT DIPSTICK TUBE (ITEM #17) BLACK - OUTSIDE ONLY.
- 11) PLACE O-RING (ITEM #18) ON GROOVED END OF DIPSTICK TUBE (ITEM #17).
- 12) REMOVE PLASTIC PLUG AND FIRMLY INSERT TUBE (ITEM #17) IN HOLE UNTIL SEATED.
- 13) DO NOT INSTALL VENT TUBE.
- 14) THE STEEL PART OF THE TAIL-HOUSING MUST BE PAINTED BLACK.

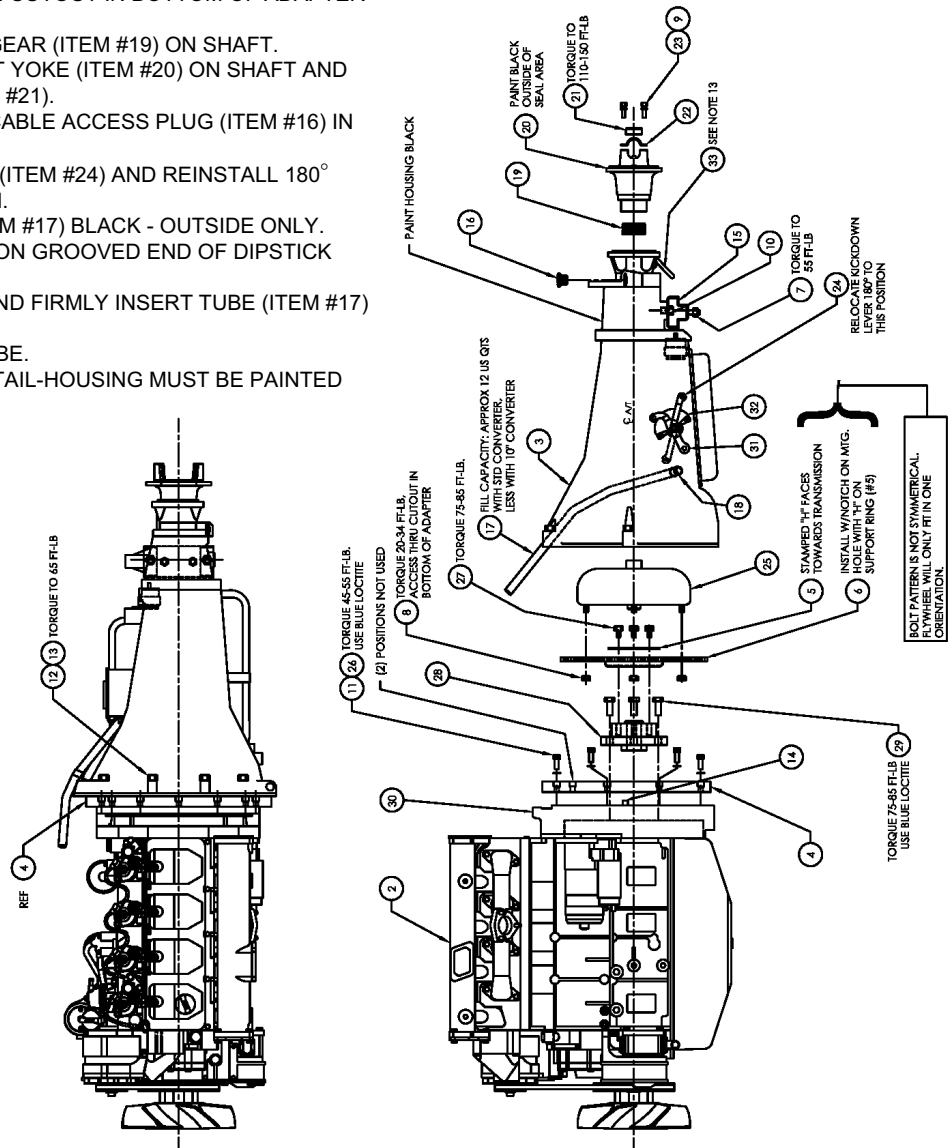


FIGURE 2-3-1.
ENGINE/TRANSMISSION ASSEMBLY, DEUTZ F4M1011F

3.5 REAR AXLE

If you need to disassemble or replace the axle, first remove axle from Roller Drive Belt Loader.

1. Use a hydraulic jack to lift both rear wheels off the ground. Secure the Roller Drive Belt Loader on jack stands placed under the frame.
2. Remove rear wheels.
3. Remove U-bolts securing rear universal joint to input yoke of differential and swing drive shaft out of the way. Tape bearing to universal joint spider to prevent losing bearings. If replacing the axle, remove the universal joint input yoke from the differential.
4. Unhook brake line at splitter tee. The feeder hose has a banjo block on the end. Remove it from the weld stud on the axle.
5. Pull off the rear brake drums. Pull the spring on the emergency cable back to allow unhooking the cable from the brake lever.
6. Force the prongs on the emergency cable housing plug inward to remove it from the brake assembly.
7. If the axle is being replaced, remove the steel brake line from the retainer tabs welded to the axle so it can be installed on the new axle.
8. Loosen the two U-bolts at each end holding the axle to the frame.
9. Position an axle jack or other mobile lifting device under axle and raise it enough to relieve tension. Remove U-bolts to free axle unit from Roller Drive Belt Loader and lower axle.
10. Raise Roller Drive Belt Loader until rear axle unit can be moved from under Roller Drive Belt Loader.
11. Move axle unit from beneath Roller Drive Belt Loader. If sufficient clearance cannot be obtained at the rear, slide unit outside of Roller Drive Belt Loader.

3.5.1 Disassembly and Assembly of Axle

See Axle information in Chapter 5.

3.5.2 Installation of Axle

1. Position rear axle under Roller Drive Belt Loader and raise axle into position.
2. Install U-bolts and secure axle to frame using original fasteners if undamaged.
3. Secure splitter tee to differential housing.
4. Install brake lines. Bleed brakes as described in 2-1-1.9.

5. Connect rear universal joint to differential. Tighten U-bolt nuts to 70 ft-lbs
6. Remove differential fill plug (upper plug) and fill with oil (SAE 80W-85-140, MIL-L-2105) to level of plug hole
7. Apply a non-hardening sealing compound (like Permatex #51 or equivalent) to plug threads and install and tighten plug.
8. Install wheels. See 2-4-4.2.

3.6 DRIVE SHAFT

The drive shaft transmits torque from the transmission to the rear axle assembly. Universal joints at each end of the drive shaft compensate for any angular misalignment between the transmission and the rear axle.

Repair of the drive shaft assembly is limited to replacing universal joints, the slip joint components, or the complete drive shaft.

3.6.1 Removal

1. Remove four capscrews and two clamps securing front yoke to transmission.
2. Remove nuts and lock washers from "U" bolts securing rear spider to yoke on differential.
3. Remove "U" bolts and carefully strike the yoke to push the drive shaft slip joint together. Remove drive shaft assembly from Roller Drive Belt Loader. Be careful not to allow bearing caps to fall off spider.

3.6.2 Installation

1. Install drive shaft assembly on transmission and secure with capscrews and lock washers and clamps. Tighten capscrews to 70 ft./lbs.
2. Position slip yoke on differential gear case yoke and loosely install "U" bolts. Remove tape securing bearings to yoke and tighten "U" bolt nuts to 70 ft./lbs.
3. Grease universal joints with a high-quality grease.

3.7 RADIATOR

If radiator leaks, do not attempt to repair it by pouring any substance into the radiator. This will only be a temporary fix at best, and may damage the engine and water pump.

The recommended way to fix a radiator is to either replace it with a new one or take it to a qualified radiator repair facility.

3.7.1 Removal

1. Drain cooling system.

2. Disconnect upper and lower hoses. Replace if bulged, cracked, or leaky.
3. Remove radiator mounting fasteners and remove radiator.

3.7.2 Installation

1. Install radiator and secure with fasteners.
2. Connect hoses. Use new clamps if old clamps are corroded or faulty.
3. Fill cooling system.
4. Install transmission oil cooler assembly.
5. Start engine and check for leaks and proper operating temperature.

3.8 FUEL TANK

If excessive amounts of water appear in the filter/separator, the tank may be contaminated and will require removal and cleaning or replacement.

⚠ WARNING Fuel vapors create fire and explosion hazards which can result in severe personal injury or death. Do not allow any open flame, smoking materials or other potential ignitor near the fuel system.

Have a fire extinguisher handy and keep other personnel away from operation.

3.8.1 Removal and Disassembly

⚠ WARNING Disconnect the negative battery cable. An electrical arc at the sending unit can act as an ignitor creating a fire and explosion hazard, which can result in personal injury or death.

1. Disconnect cables from battery and remove battery from Roller Drive Belt Loader (to prevent a possible spark when removing tank and related components).
2. Place a suitable container beneath drain opening at bottom rear of tank.
3. Remove drain plug from fuel tank and drain tank.
4. Remove filler cap and cover filler hole to keep out debris. Also remove the fuel gauge.
5. Disconnect fitting from tank and unbolt four bolts securing tank at top. Lift tank out of frame.

3.8.2 Cleaning and Inspection

1. Install drain plug on bottom of tank.
2. Pour a detergent and water solution into tank.

3. Agitate mixture by rotating tank. Make sure solution contacts entire interior surfaces of tank.
4. Drain cleaning solution from tank and rinse tank.
5. Flush interior of tank with clean water and allow to air dry.
6. Inspect filler cap and fuel gauge for corrosion and damage.
7. Inspect fuel tank for damage. Repair or replace tank as needed.
8. Inspect fittings for damage.

3.8.3 Repair or Replacement

⚠ WARNING Fuel tanks can be lethal bombs capable of instantly killing anyone nearby.

⚠ WARNING Before soldering or brazing, clean the tank thoroughly. Fill tank with an inert gas such as carbon dioxide or nitrogen, or completely fill with water.

1. Repair tank by soldering or brazing if needed. Re-prime and paint any repaired areas of tank.
2. Test any repair with wet soap lather. Place an air hose in tank and admit air. By holding a rag around hose where it enters, a mild pressure will be built up. If the repair is sound, no bubbles will appear.
3. Replace corroded or damaged cap or fuel gauge.
4. Replace protectors if they are damaged or deteriorated.
5. Replace damaged parts.
6. If there is any doubt as to the integrity of the tank, replace the tank.

3.8.4 Reassembly

1. Install new gasket on fuel gauge opening on tank, then carefully lower fuel gauge into tank. Do not use gasket cement.
2. Temporarily tape or cover tank filler opening to prevent entry of dirt when installing tank.
3. Apply thread sealer to drain plug threads and install drain plug.

3.8.5 Installation

1. When ready to install tank, place a quart of fuel in the tank, slosh around, and pour out.
2. Position tank and lower into position.

3. Tighten mounting hardware.
4. Install battery and connect battery cables.
5. Fill tank with fuel and check for leaks.

3.9 FRONT AXLE ASSEMBLY

3.9.1 Removal

1. To provide adequate working space under Roller Drive Belt Loader, raise front of Roller Drive Belt Loader with jack and support Roller Drive Belt Loader with appropriate jack stands. Position stands so they do not interfere with axle removal.
2. Remove front wheel and tire assemblies, see 2-4-4.2.
3. Unhook the brake hose banjo block from the calipers.
4. Unhook the steel brake line from the master cylinder at the tee on the cross over brake line on the driver's side. Also unhook the line going from this tee to the back brakes. Protect line ends from dirt.
5. Remove the cross over brake line from the clips welded to the axle.
6. If the cross over brake line is to be removed with the axle, it must be unhooked from the rubber caliper brake hose.
7. Unhook the steering cylinder hoses. Protect hose ends from dirt.
8. Position axle jack under front axle.
9. Remove nuts, washers, U-bolts attaching axle assembly to frame.
10. Lower axle jack until front axle clears frame and remove axle.

3.9.2 Disassembly

1. Remove cotter pins and caliper retaining bolts holding caliper to mounting bracket and remove caliper. If necessary, loosen a bleeder to relieve pressure. Place a block between the friction pads to secure the pistons.
2. Remove grease cap from hub.
3. Remove cotter pin, nut, and washer from wheel hub and pull off wheel hub and brake disk. Protect bearings from contamination.
4. Remove brake disc from wheel hub, if necessary, by removing socket head capscrews. Do not remove wheel studs unless replacement is necessary.
5. Inspect hub bearings. Remove bearing cups, if necessary. Always replace cup and cone as a set.

3.9.3 Assembly

1. If inner and outer bearings are to be replaced, install new cups into hub. Make sure cups are seated well.

2. Install wheel studs, if removed.
3. Grease inner cone and cup and install inner cone.
4. Install grease seal using a plug to place pressure evenly around seal. If you bend or otherwise damage seal, discard and use a new one.
5. Install brake disc on wheel hub, if removed.
6. Adjust toe-in of front wheels.

IMPORTANT! DO NOT OVERFILL with grease because too much grease can cause seal to fail or grease cap to pop loose after assembly.

NOTE: If the tie rod ball joints were replaced or adjusted in any way, check toe-in and adjust if necessary.

Use MIL-G-10924D grease on the front axle.

7. Pump grease into hub cavity.
8. Use grease to lubricate the seal lip.
9. Install hub. Rotate hub while installing to spindle so seal doesn't roll under. As spindle goes into inner cone, try to feel that all parts are straight and properly seated on spindle bearing journal.
10. Grease outer cone and place over spindle and into cup.
11. Assemble washer and nut to spindle. Tighten nut to 10-15 ft-lbs torque. Rotate hub while tightening nut.
12. Back off nut until it just becomes loose.
13. While rotating hub, retighten nut to finger tight. Line up cotter pin hole in spindle with slot in nut. Check hub for excessive end play. Excessive end play indicates that nut is too loose. Hub should rotate freely, but if hub binds or if you can feel the bearings, it means that the nut is too tight. Readjust nut if needed.
14. Insert cotter pin and bend to lock it on nut. Fill grease cap with grease and snap into place.
15. Check seal for a turned-under lip. Rotate hub and check for any indication of misalignment or roughness. If either is noted, disassemble hub and check inner cups for any small nicks or other damage. If damaged, the hub must be replaced.
16. Using a C-clamp (surface that contacts pad **MUST** be clean.) on each piston, force pistons into caliper to allow caliper to fit over disc.
17. Reassemble brake caliper to caliper bracket. Insert retaining bolts and reinstall cotter pins. Tighten bolts to 60 ft-lbs torque (PDI axle) or 105 ft-lbs torque (Brierton axle).

18. Lube all grease fittings with MIL-G-10924D grease.

3.9.4 Installation

1. Position axle under Roller Drive Belt Loader and raise axle using an axle jack.
2. Install U-bolts over front axle and secure to mounting plate on frame with washers and nuts. Torque nuts to 70 ft.-lbs
3. Install front wheels and tighten lug nuts per 2-4-4.2.
4. Remove jack stands and jack.

⚠ WARNING Always recheck lug nut torque one hour after mounting wheel and tire assembly. Failure to do so may result in loose wheels and/or broken wheel studs.

3.10 ALTERNATOR

The alternator requires no special care except to keep the drive belt properly tensioned. It is not a user-repairable item.

If you suspect a problem with the alternator, most alternator problems can be traced to one of the following causes:

- Battery or battery connection fault.
- Loose, dirty, or corroded alternator connections.
- Broken wires to alternator.
- Slipping drive belt.

IMPORTANT! When welding on the Roller Drive Belt Loader, disconnect the battery to prevent damage to the alternator.

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4 REPAIRS

Repairs should consist of part replacement or replacement of the entire assembly. Repair of electrical and hydraulic components should be restricted to the procedures outlined in this section. Refer to Chapter 4 for parts identification and location.

⚠ WARNING Before working beneath the platform or for maintenance/repair activities that involve removing or disconnecting the bed lift system hydraulic components; raise the bed and set securely on the cylinder safety channel. See figure 2-1-1.

NOTE: Parts for the automatic transmission should be obtained from the local authorized Ford parts dealer. Serial and model numbers of the transmission will be required. Overhaul data for both the engine and transmission can be obtained direct from the manufacturer, or at a nominal cost from NMC-Wollard, Inc.

All structural repair is performed at the discretion of the user's maintenance shop and should follow prevailing practices for that shop. The instructions below are offered only to advise the user of NMC-Wollard, Inc. recommended procedures.

Metal Cracks

Small cracks or fractures in non-critical areas may be stop-drilled, welded or patched. The user should also determine if the component is beyond economical repair and should be replaced.

Welding

Welding repair to major structural members, assemblies of subassemblies, which effect their structural integrity, should not be attempted without first contacting the engineering department at NMC-Wollard, Inc. for instructions.

4.1 UNIVERSAL JOINT REPAIR

Removal-Flange Yoke End

1. Match mark the flange yoke bearing caps and spider to ensure that bearings are assembled on same spider journals.
2. Remove retaining ring clips securing bearing caps to flange yoke and separate flange yoke from drive shaft.
3. Support drive shaft in a way that will allow bearings to be pressed from yoke without interference.

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4. Using a short piece of pipe or a solid rod (about same diameter as bearing cap) and a hydraulic press, press a bearing cap until spider bottoms on yoke.
5. Use a hammer to tap loosened bearing cap from yoke.
6. Turn drive shaft over and repeat steps 4 and 5 to remove remaining bearing cap.

Removal–Slip Yoke End

1. Loosen slip yoke dust cap and remove slip yoke from drive shaft.
2. Remove retaining rings securing bearing caps in slip yoke.
3. Repeat previous steps 3-6 under 'Flange Yoke End' to disassemble universal joint.

Assembly–Slip Yoke End

1. Clean and inspect yokes for damage and replace if necessary.
2. Apply automotive grease to new needle bearings to retain them in caps.
3. Start one of the caps into slip yoke bearing bore.

⚠ CAUTION Protect bearings before installation and handle carefully during installation to prevent entry of dirt or other foreign matter into bearings.

4. Pack grease passage in spider with automotive type grease before installation.
5. Install new seals on spider journals. Install spider in yoke and start one journal into bearing cap assembled to yoke. Be careful to not dislodge needle bearings.
6. Start remaining bearing cap into remaining yoke bore and start journal into that bearing. Do not dislodge needle bearings in either bearing.
7. Using either a press or bench vise, carefully push bearing caps into bores and onto bearing journals. If substantial resistance is encountered, a needle bearing may have been dislodged and is impeding progress. Carefully remove bearing caps and make sure bearings are in place. If a bearing is damaged, replace it with a new one.
8. Continue pressing on one side until retaining ring groove is exposed. Install retaining ring. Turn yoke over and press the other bearing into its bore. Install the retaining ring.
9. Install remaining seals and bearings on spider journals. Tape these bearings to yoke to prevent them from falling off spider.

10. Loosely assemble dust cap. Lubricate splines on drive shaft and insert shaft into slip yoke, insuring that front and rear yokes are aligned.
11. Lubricate slip joint through grease fitting before installing drive shaft on belt conveyor.

Assembly–Flange Yoke End

1. Apply automotive grease to needle bearings to retain them in cap.
2. Pack grease passage in spider with automotive-type grease before installation.
3. Slide two bearing assemblies onto spider journals 180 deg. apart. Use match marks to get correct bearing on correct journal.
4. Position spider and bearing assembly on flange yoke and secure bearing assemblies with retaining ring clips.
5. Install remaining two bearing assemblies on spider journals and position flange assembly on drive shaft. Install retaining rings.

4.2 WHEELS AND TIRES

The front and rear wheels are similar in maintenance, cleaning, and inspection.

4.2.1 Removal

1. Move belt conveyor to a level surface. Shut off engine and set parking brake.
2. Using a jack, overhead crane, or some other suitable lifting device (minimum 5 ton), raise end of belt conveyor. Before tires leave the ground, loosen the lug nuts. Then continue raising the belt conveyor until the tire comes off the ground.
3. Place jack stands under belt conveyor to support it while wheel is off.
4. Remove lug nuts, valve stem bracket (rear wheels), and tire and wheel assembly.

4.2.2 Disassembly

1. Let air out of tire and remove valve core.

⚠ CAUTION Use proper tire removal tools to prevent possible damage to the tire bead.

⚠ WARNING If a bead breaker slips, it can fly off with enough force to cause serious injury.

2. Remove tire from wheel using standard safety equipment, tire changing equipment, and safety practices.
3. Remove valve stem, if damaged or defective.

4.2.3 Inspection and Cleaning

1. Wash dirt and grease from wheels and tires with soap and water and a soft bristle brush or a clean cloth. Rinse with clean water and allow to air dry.

⚠ CAUTION Do not use cleaning solvent on tires. Solvents cause deterioration of the rubber.

2. Inspect tire for uneven wear. Replace any badly worn tire.
3. Inspect tire for cuts, nails, stones in tread, or deterioration. If damage is severe, replace tire.
4. Inspect wheels for cracks and other damage. If damaged, replace wheel.

4.2.4 Repair

⚠ CAUTION Never mix rim parts of different manufacturers or different sizes. Do not use damaged parts.

1. Remove stones and other foreign material imbedded in tires.
2. Repair punctures or cuts if possible.
3. Remove nicks, burrs, and rust from wheels. Clean rim sealing area with coarse steel wool. Repaint wheel if necessary.

4.2.5 Assembly

1. If removed, install a new valve stem in wheel.
2. Mount tire on wheel using standard safety equipment, tire changing equipment, and safety practices. To help get tire on, always use an approved rubber lubricant or use a small amount of soapy water for lubricating tire bead.

⚠ WARNING Do not attempt to use extremely high air pressure to seat a tire bead. If a tire cannot be seated using normal pressure, contact the manufacturer for advice.

⚠ WARNING Make sure no one is in the blow-out trajectory area. Always stand to one side when inflating tires.

3. Install valve core and place entire assembly in restraining device and inflate tire to 60 PSI. Make sure bead has seated all around and on both sides.
4. Inspect tire and wheel components while still in restraining device to make sure they are properly seated. If further adjustment is necessary, first deflate tire and remove valve core. Check for leaks. If none are detected, install valve cap.

4.2.6 Installation

⚠ CAUTION Do not lean or rest your body or repair equipment against the restraining device while the wheel/tire is in the device.

⚠ WARNING Never inflate tires with air from systems using alcohol evaporators.

1. Assemble valve stems, if not already done.

⚠ CAUTION Wheel Installation Procedure.

- Clean and dry wheel nuts, studs, and mating surfaces before assembly.
 - Start wheel nuts by hand to avoid cross threading.
 - Torque using criss cross tightening sequence.
2. Clean and dry wheel nuts, studs, and mating surfaces before assembly.
 3. Mount wheel and tire assembly on axle and install clamp plates over the studs and then thread the flange nuts on. Tighten gradually in an alternating pattern.
 4. Start wheel nuts by hand to avoid over threading.
 5. Run unit and recheck lug nut torque after the first hour of operation and after the first 8 hours of operation, after initially mounting wheel and tire assembly. After this, check monthly or every 250 hours, whichever comes first..

Which Wheel	Stud Size	Tightening Torque (Dry)
Front	9/16	130 ft. lbs.
Rear	1/2	120 ft. lbs.

⚠ WARNING

Always recheck lug nut torque after the first hour of operation and after the first 8 hours of operation, after initially mounting wheel and tire assembly. After this, check monthly or every 250 hours, whichever comes first. Failure to do so may result in loose wheels and/or broken wheel studs. It is not recommended to lube wheel studs. Inaccurate tightening torque will result.

6. Remove jack stand and jack from beneath belt conveyor.
7. Run unit and check wheels after one hour and periodically thereafter to be sure wheels are set.

4.3 AXLES, BRAKE ASSEMBLIES, AND DIFFERENTIAL

Refer to Chapter 5 and the illustrated parts breakdowns in Chapter 4.

4.4 HYDRAULIC STEERING UNIT (COLUMN MOUNTED)

1. Trouble shooting information is included in Chapter 5, Power Steering Unit.
2. Service instructions and repair parts information is included in Chapter 5, Power Steering Unit.

4.5 HYDRAULIC PUMP

1. Trouble shooting information is included in Chapter 5, Hydraulic Pump.
2. Service instructions and repair parts information is included in Chapter 5, Hydraulic Pump.

4.6 HYDRAULIC MOTOR

1. Trouble shooting information is included in Chapter 5, Hydraulic Motor - Char-Lynn
2. Service instructions and repair parts information is included in Chapter 5, Hydraulic Motor - Char-Lynn.

4.7 TRANSMISSION

1. Trouble shooting information is included in Chapter 5, C-6 Transmission Service.
2. Parts information is included in Chapter 5, C-6 Transmission Parts.

4.8 CONVEYOR BELT REPLACEMENT

Figures 2-4-1 and 2-4-2.

You may purchase a ready-made belt from NMC-Wollard, Inc. Refer to Chapter 4 for the part number and other ordering information. The belt kit consists of the belt cut to proper length with the lacing attached and a length of steel pin to join the ends.

1. Park the unit in a service facility.
2. Using the tail roller adjusting bolts, fully retract the take-up bearings to relieve belt tension.
3. Remove steel pin from lacing and remove belt from conveyor bed. Observe belt routing when removing
4. Thread new belt through rollers and guides so that ends of belt rest on top of conveyor bed when threading is completed. Assemble laced ends with new steel pin. (Use of a belt stretcher may be required).
5. Using the adjusting bolts, move the take-up bearings rearward until all slack is taken up on both edges. Keep belt aligned on rollers.

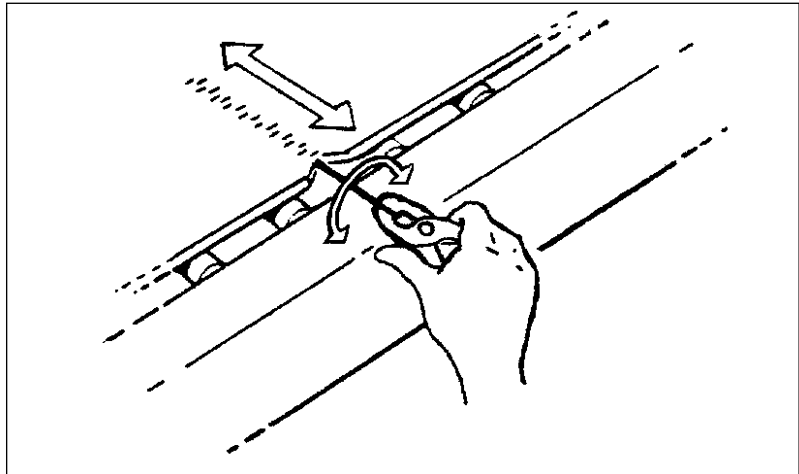


FIGURE 2-4-1. REMOVING/INSTALLING STEEL PIN

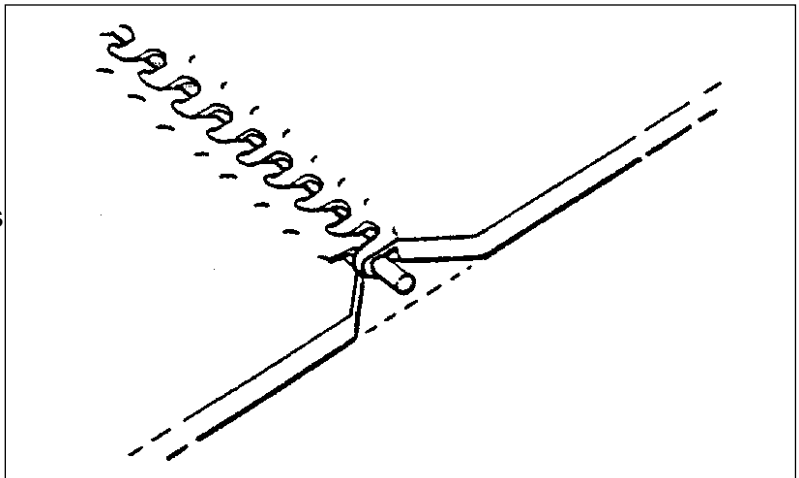


FIGURE 2-4-2. STEEL PIN INSTALLED, BELT EDGES ALIGNED

⚠ CAUTION Do not over-tension the belt. Over-tensioning will cause belt damage, such as pulled-put lacing.

⚠ WARNING Conveyor belt can only be used at full rated load if belt is properly tensioned. Load may slip uncontrollably down bed when at an angle if belt is loose. Personal injury may result.

6. Adjust belt tracking as described in 2-1-1.11.

4.9 BELT REPAIR

Figures 1 and 2.

Users having belt lacing equipment can make their own belt repairs by cutting out damaged areas and splicing in new sections.

IMPORTANT! This procedure should be done only by someone qualified to repair conveyor belts.

1. Park the unit in a service facility.
2. Using the tail roller adjusting bolts, fully retract the take-up bearings to relieve belt tension.
3. Remove steel pin from lacing and remove belt from conveyor bed. Observe belt routing when removing
4. Lay belt on a flat, smooth surface and examine damaged areas.
5. Mark belt for cutting. Cuts should be made at least 2 inches (5 cm) back from defective areas. Save old section cut from belt.

IMPORTANT! Make sure that the cut end is square with the centerline of the belt.

6. Using section cut from belt as a pattern, cut new piece from new belt material. Make sure that new piece is of proper length and that cut ends are absolutely square.

IMPORTANT! New splice pieces must be installed full width of belt. Patches will not work satisfactorily.

7. Carefully remove enough rubber tread from the belt ends (approx. 1-inch) to provide a solid surface for the new lacing. Be careful not to damage the belt fabric.

NOTE! A special tool called a “hand skiver” may be used to remove raised belt material, or a small hand sander with a coarse-grit disc may also be used.

8. Apply steel belt lacing to cut ends of splice section and belt using a commercial belt lacer.
9. Mate newly laced end of splice with newly laced end of belt. Assemble splice to belt using steel lacing pins.
10. Thread repaired belt through rollers and guides so that ends of belt rest on top of conveyor bed when threading is completed. Assemble laced ends with new steel pin. (Use of a belt stretcher may be required).
11. Using adjusting bolts, move the take-up bearings rearward until all slack is taken up on both edges. Keep belt aligned on rollers. Do not over-tension or under-tension.

⚠ WARNING Conveyor belt can only be used at full rated load if belt is properly tensioned. Load may slip uncontrollably down bed when at an angle if belt is loose. Personal injury may result.

12. Tension belt properly as described in 2-1-1.11.
13. Adjust belt tracking as described in 2-1-1.11.

4.10 ABRASIVE COATING REPLACEMENT - HEAD AND TAIL ROLLERS

NOTE! Abrasive coating is not applied to rubber-faced rollers.

Wear of abrasive coating will be evidenced by belt slippage. This condition is seldom seen, and then only after extensive use of the belt drive. However, should slippage occur, the following corrective action must be taken:

1. Refer to steps 1-3, Conveyor Belt Replacement to remove belt from conveyor.
2. Thoroughly clean head and tail rollers using suitable solvent. Allow to air dry.
3. Use stiff bristle brush and apply liberal even coat of abrasive coating.

NOTE! “Ferrox” non-slip coating manufactured by Martex Safety Products, 1A Paine Avenue, Irvington, NJ 07111, is the only abrasive coating recommended by NMC-Wollard, Inc. for this application.

4. Allow coating to dry completely (overnight or at least 6 hours).
5. Re-install conveyor belt. Refer Conveyor Belt Replacement, steps 4-7.

4.11 REPAIR SKID RESISTANT SURFACES

Immediately repair any damaged gripstrut or skid resistant material.

If gripstrut is damaged and no longer serviceable, grind off the welds to the old part and weld a new part on.

To replace skid resistant strips, remove any remaining pieces of the original and scrap away old adhesive with a razor knife or paint scraper. Clean the surface with solvent cleaner. Remove the protective backing from the new skid resistant strip and firmly apply to the surface. Temperature must be 65°F or warmer for proper adhesion.

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1 COMPONENT OVERHAUL

Overhaul of components in the Belt Conveyor is limited to procedures provided by manufacturers in Chapter 5, Manufacturers' Information. Other components are not recommended for overhaul. Further overhaul must be done at the manufacturer's facility or an authorized repair station.

Parts for the engine and automatic transmission should be obtained from the manufacturer's authorized parts dealer. Serial No. and Model No. are required.

1.1 LIMITED REPAIR ITEMS

Certain components, although not recommended for overhaul, are subject to limited repair procedures. Repairs consist mainly of removal and replacement of parts, the installation of seal kits, etc. Components not covered in the overhaul and repair sections in this manual are not considered repairable items and should be replaced when defective.

1.2 GUIDELINES FOR REPAIRING THE BELT CONVEYOR

⚠ CAUTION Before attempting any repairs on the belt conveyor, know the safety precautions located in the front part of this manual.

The following are general instructions for the removal, disassembly, cleaning, inspection, reassembly, and installation of belt conveyor components within the capabilities of the using organization. Common shop practices are not described. Use the exploded views in parts manual, chapter 4 for reference.

1.2.1 Special Tools

There are no special tools required for this belt conveyor. Common automotive shop tools are all that is required to service the belt conveyor.

1.2.2 Removal and Disassembly

Special instructions are noted in the appropriate text. Disassemble components only to the extent necessary to do repairs.

1.2.3 Cleaning.

When cleaning, keep related parts together so reassembly is easier. Valves, pistons, sleeves and other internal parts that have close tolerance fits in mating bores should be cleaned individually to prevent surface scoring and marking. Special cleaning instructions are given where required.

1.2.4 Using Compressed Air

Use low-pressure compressed air to remove debris and dirt as necessary.

1.2.5 Frame, Engine, and Transmission

IMPORTANT! Be sure all openings are closed or covered adequately before cleaning to prevent the entry of water into internal parts.

Structural parts are best cleaned using soap and water and suitable brushes. Steam cleaning may also be done before disassembly to remove heavy accumulations of grease, oil, and dirt from exterior of engine, transmission and rear axle assembly.

1.2.6 Metal Parts

Wash metal parts in an appropriate cleaning solvent. Allow to air dry. Do not use compressed air to dry parts. The moisture generally present in air systems may cause corrosion. Lubricate metal parts as soon as possible after cleaning.

1.2.7 Bearings

Wash bearings in a bearing washer or immerse in solvent and scrub clean with a soft brush. Remove all grease and oil from bearing recesses. Allow to air dry. Apply a thin film of lubricating oil to bearings and check for free movement between inner and outer race. Worn bearings must be replaced.

1.2.8 Gears

Clean gears using a soft bristle brush and cleaning solvent. Remove foreign matter from the gears.

1.2.9 Inspecting Parts

Inspect all parts visually for cracks, breaks, scratches, dents, bends, punctures, galling, wear, scoring, stripped threads, distortion and deformation. Give special attention to bearing surfaces, mating surfaces, gaskets and seals. Specific dimensional checks and tests are given where required.

1.3 REPAIR AND REPLACEMENT

1.3.1 Structural Parts

Structural parts, enclosing, and supporting members may be repaired by welding, brazing and refinishing. Major repairs should be performed by overhaul facilities. Where repainting is required, the surface should first be suitably prepared and primed.

1.3.2 Wiring

Wiring should be repaired in accordance with standard automotive practices.

1.3.3 Gaskets and Seals

Gaskets, oil seals, preformed packing, and seals should be replaced instead of being cleaned and reused, unless otherwise specified by local directives. Replace any seals and packings that show any deterioration or damage.

Use repair kits when available.

1.3.4 Reassembly and Installation

Unless otherwise specified, reassembly and installation are the reverse of removal and disassembly. Use the illustrations in parts manual chapter for reference.

1.4 ENGINE REPAIR AND MAINTENANCE

Refer to the operator's manual supplied by the engine manufacturer (supplied with this manual) for instructions. More detailed "shop" manuals may be special-ordered from NMC or can be obtained from a local distributor.

1.4.1 Ordering Parts

If you need parts for your engine, you must provide the complete engine number, and belt conveyor description, name, and serial number.

The engine number is stamped on a label fastened to the cylinder block.

1.5 REAR BRAKES

The rear brake is a two-shoe type hydraulic brake mounted on a backing plate that serves as a dust shield. The brake assembly can be removed as a complete assembly or partially disassembled while mounted on the axle housing.

1.5.1 Rear Drum Brake Removal

1. Raise belt conveyor high enough off floor to provide adequate working space underneath the frame. Support belt conveyor with jack stands. Be sure that positioning of jack stands does not interfere with work task.
2. Remove lug nuts and remove rear wheel assembly.
3. Remove hub bearing lock nut.
4. Remove hub and drum assembly. If necessary, manually retract the brake shoes by loosening the star wheel adjuster.
- 5.

IMPORTANT! When removing hub and drum assembly, always replace hub oil seal.

⚠ CAUTION Do not handle the brake linings with grease or oil on hands. The linings can become contaminated and will have to be discarded.

6. Remove automatic adjusting link wires and pivot.
7. Remove two upper shoe springs.
8. Remove the leading shoe hold-down clip. Lift and rotate the clip until released from hold-down pin.
9. Remove bottom shoe spring and adjusting bolt assembly.
10. Remove the two trailing shoe hold-down clips. Lift and rotate the clip until released from hold-down pin.
11. Remove anchor pins from holes.
12. If removal of the wheel cylinder or backing plate is necessary, place a clean pan under brake assembly. Disconnect hydraulic line and cap the ends to prevent system contamination.
13. If necessary, remove wheel cylinder attaching capscrews and wheel cylinder.
14. Clean and inspect the brake assembly according to paragraph 3-1-1.6.3.

NOTE: Disassembly of the brake is the same whether it is mounted on the vehicle or is on a bench.

1.5.2 Adjustment.

The rear brake is self-adjusting. Normal vehicle operation is sufficient to keep the rear brakes properly adjusted.

However, following overhaul or when new linings are installed, the brakes must be manually adjusted to locate the curvature of the lining to the drum and obtain the proper clearance. To adjust the rear brakes manually:

1. If not already done, raise belt conveyor high enough off floor to provide adequate working space underneath the frame. Support belt conveyor with safety stands. Be sure that positioning of safety stands does not interfere with work task.
2. Remove the rubber plug covering the adjustment slot on the backing plate. The slot is located about two inches from the bottom edge of the backing plate. (There are actually two slots. Use the slot that is toward the front of the vehicle).
3. Insert an adjusting tool through the adjustment slot to engage the star wheel on the adjustment bolt. To move the shoes closer to the brake drum, move the tool handle down.

To move the shoes away from the drum, rotate the tool handle up while keeping the adjuster spring pushed away from the star wheel.

⚠ CAUTION Do not allow linings to drag on drum or they will heat up and lock. The linings will be charred and rendered useless.

4. Adjust the linings until a slight resistance can be felt when the brake drum is rotated. Then adjust in the other direction until the drum can just rotate freely.

1.5.3 Rear Drum Brake Assembly and Installation

1. Before assembly, apply a thin layer of brake lubricant (or NLGI No. 2 grease) to the following parts:
 - a. Ends of cylinder push rods.
 - b. Adjusting bolt threads and on ends where they contact shoes.
 - c. All shoe sliding surfaces.
 - d. Anchor pins, anchor pin holes, and anchor pin slots.

2. Position wheel cylinder, install capscrews and lock washers, and tighten to 15-20 ft-lbs torque.
3. Install the two anchor pins in the holes in the backing plate.
4. Put the trailing shoe in position into the anchor pin slot and engage it with the wheel cylinder push rod.
5. Install the two trailing shoe hold-down pins through the backing plate.
6. To install the two hold-down clips, engage the clip on the pin and rotate the clip down until it sets flat on the shoe.
7. Install the stamped adjusting spring lever on the leading shoe.
8. Position leading shoe in anchor pin slot and position adjusting bolt assembly between shoes. At the same time, install the lower spring.
9. Hold the leading shoe in correct position and install the hold-down pin and clip.
- 10.
11. Install the two upper springs. Place the green spring on the leading shoe for the right-hand brake and on the trailing shoe for the left-hand brake.
12. Install the short automatic adjustment wire to connect the pivot to the pin near the anchor location.
13. Install the long automatic adjustment wire to connect the pivot to the stamped automatic adjustment spring.
14. Install the automatic adjustment pivot and spacer to the leading shoe on its shoulder bolt fastener. Be careful that the pivot is not pinched under the edge of the shoulder.
15. Rotate the star wheel to make sure it can easily rotate with a "click" in one direction and cannot easily rotate in the other direction.

⚠ CAUTION Do not overtighten brake tube fittings. Over tightening may crack the fitting or damage the seat in the cylinder fitting.

16. Connect brake line to wheel cylinder. Tighten tube fitting firmly. Do not overtighten.
17. Bleed brake system as described in Chapter 2. Check for leaks when bleeding system.

1.6 WHEEL CYLINDERS

Wheel cylinders are used to apply hydraulic force to the rear brake shoes. There is one wheel cylinder on each rear axle end.

NOTE: If the wheel cylinder is leaking or has failed, it is better to install a new one rather than repair the old one. The time and cost involved to recondition a cylinder is usually greater than its replacement cost.

1.6.1 Removal

1. Remove brake drum. Refer to paragraph 3-1-1.5.1.
2. Back off brake adjusting bolts if necessary to get clearance between drum and brake shoes.
3. Disconnect brake line at cylinder. Plug brake line or secure clean rag around open brake line to keep brake fluid from contaminating brake linings and work area.
4. Remove brake return spring.
5. Remove securing wheel cylinder to brake. Spread brake shoes apart until ends of shoes clear cylinder. Remove cylinder.

1.6.2 Disassembly

1. Remove rubber boots from wheel cylinders.
2. Apply low-pressure compressed air to cylinder inlet (if needed) and force pistons and cups from cylinder bores. Remove spring.
3. If needed, remove bleeder screw from cylinder.

1.6.3 Cleaning and Inspection

1. Clean all parts and dry with compressed air.
2. Inspect boots for tears, holes, and deterioration. Replace if damaged.

NOTE: A hard, crystal-like substance sometimes forms a ring in cylinder bore near where piston stops when brake is released.

3. Inspect pistons, cups, and cylinder bores for scratches, scoring, pitting and corrosion.
4. Use crocus cloth or a hone to remove deposits or minor surface irregularities. If bore does not clean up readily, replace cylinder.
5. Inspect tapped holes of cylinder for thread damage. Use a tap to clean up minor damage. Replace cylinder if threads are damaged due to cross-threading or of capscrew or fittings.
6. Check passage in bleeder screw. Use a piece of fine wire to open passage if blocked. Also check threads for damage. Replace bleeder screw if threads cannot be cleaned up.
7. Piston movement should be smooth.

1.6.4 Assembly

1. Lubricate cylinder bore, spring, cups, and pistons with clean brake fluid. Install into cylinder. Open side of cups and flat side of piston must be toward inside of cylinder.
2. Install rubber boots making sure they engage grooves on cylinder.
3. Install bleeder screw into cylinder but do not tighten.

1.6.5 Installation

1. Position wheel cylinder, install capscrews and lock washers, and tighten to 15-20 ft-lbs torque.
2. Spread brake shoes apart enough to allow projections of brake shoes to engage cylinder properly.
3. Connect brake line to wheel cylinder. Tighten tube fitting firmly. Do not overtighten.
4. Bleed brake system as described in Chapter 2, Section 1. Check for leaks when bleeding system.
5. Install brake drum as described in paragraph 3-1-1.5.3.
6. Install wheel assembly and tighten 9/16 lug nuts (rear) to 130 ft-lbs torque. Remove safety stands and lower belt conveyor.

⚠ WARNING Always recheck lug nut torque after the first hour of operation and after the first 8 hours of operation, after initially mounting wheel and tire assembly. After this, check monthly or every 250 hours, whichever comes first. Failure to do so may result in loose wheels and/or broken wheel studs. It is not recommended to lube wheel studs. Inaccurate tightening torque will result.