

CHAPTER 1

GENERAL INFORMATION AND OPERATING INSTRUCTIONS

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CHAPTER 1

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CHAPTER 1. GENERAL INFORMATION AND OPERATING INSTRUCTIONS

Section 1. General Description

1. GENERAL INFORMATION (SEE FIGURE 1)

The CLT-8 container platform/transporter is a self-propelled vehicle with one platform, able to lift, transport and transfer load units weighing up to 3600 Kgs. (8000 Lbs.). Designed to service all planes with low cargo bays for containers, especially the A-320 series (A-319, A-321, etc.), facilitating loading and unloading processes.

The load lift and transfer platform is constituted of Heliroll rollers and wheels. The platform is divided into two sections to facilitate the transfer of two AKH containers. It also includes structural lateral guides and two load stops, one in the front and one in the rear (a third, central load stop is optional) allowing for transportation of two AKH containers. The vehicle can be equipped with mobile load guides for centering the load on the platform.

It functions as a transporter that picks up containers (either from the cargo terminal or from container carriers) and transports them to the plane, while lifting the load from carrier height (approx. 480 mm) to the height of low bay aircraft cargo doors (2995 mm and/or 3600 mm).

Its small dimensions, traction system and easy maneuverability give this vehicle great operational flexibility and precise, secure positioning control.

2. OPERATING CHARACTERISTICS

Three fundamental operating features of the CLT-8 should be highlighted:

- All operations are performed from the operator's control position, located on the right side of the load platform, including driving, lifting, loading and unloading containers; this provides great flexibility and ease in controlling the unit.
- The equipment incorporates Heliroll wheels in the load platform for centering containers, especially the latest A-319s. Mobile load guides are optional.
- Loads are lifted using hydraulic scissors and cylinders, with a height preselection system for 2100 mm (A-319, A-320, A-321, B-767, IL-86), 2600 mm (A-310, A-330, A-340, B-747, MD-11) and 3060 mm (A-330, A-340, MD-11), with manual adjustment at the actual height of the cargo doors. The third preselected height may optionally be set at 2900 mm when the maximum platform lift height is limited to 2995 mm.

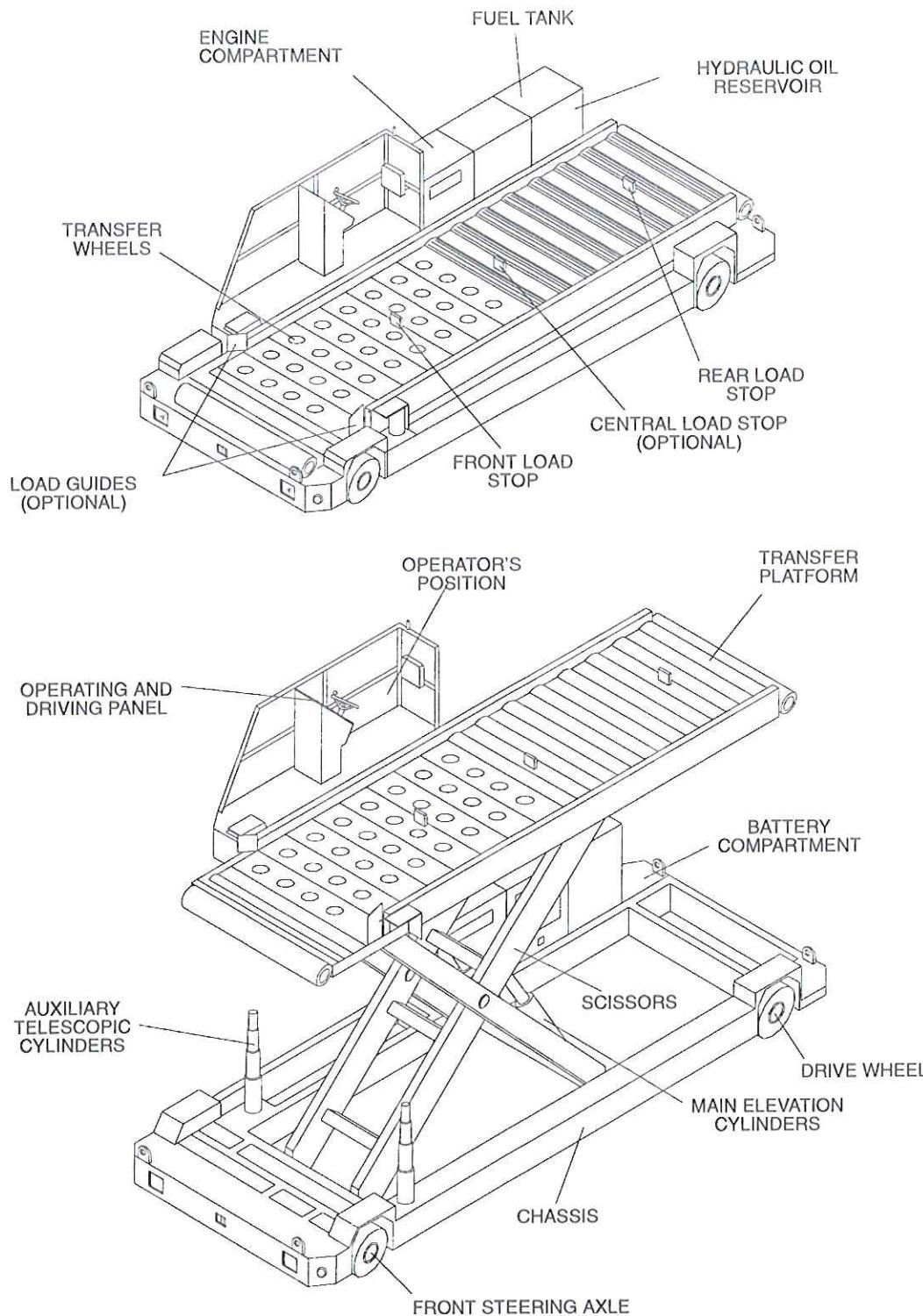


Figure 1
PLATFORM/TRANSPORTER CLT-8

3. MAIN COMPONENTS**A. CHASSIS**

The unit's basic chassis is made with laminated sections and welded steel sheets, forming a resilient structure that supports the engine set, scissor and cylinder lift system, steering axle and drive system groups.

B. LOAD PLATFORM AND OPERATOR'S POSITION

The load platform is constructed with welded laminated sections forming a compact assembly along with the control position, roller bed and load guides. It is attached to the chassis by scissors. A "fingers" system for transfer to carrier is available as an option in the front and/or rear.

C. OPERATOR'S COMPARTMENT CONTROLS (SEE FIGURE 2)

The control position has been designed to perform all operations, including driving, lifting, and container loading and unloading, offering maximum visibility as well as safety and easy access to the aircraft cargo hold door mechanisms.

The following control elements are found in the operator's compartment:

- Steering wheel and control sets for lights, horn and turn signals.
- Accelerator and service brake pedals.
- Vehicle driving controls.
- Motor ignition switch.
- Emergency stop button (lighted button optional).
- Lighted indicators and other control instruments.
- Load platform lifting and lowering controls.
- Load transfer controls.

D. ENGINE GROUP

The CLT-8 unit was designed with an engine group that includes a Deutz BF4M 1012 Diesel engine (other engines are optional), together with a hydraulic pump for vehicle traction, which is directly connected to the engine flywheel.

The entire assembly, along with the hydraulic oil and fuel tanks, is mounted on the right side of the vehicle, behind the control position.

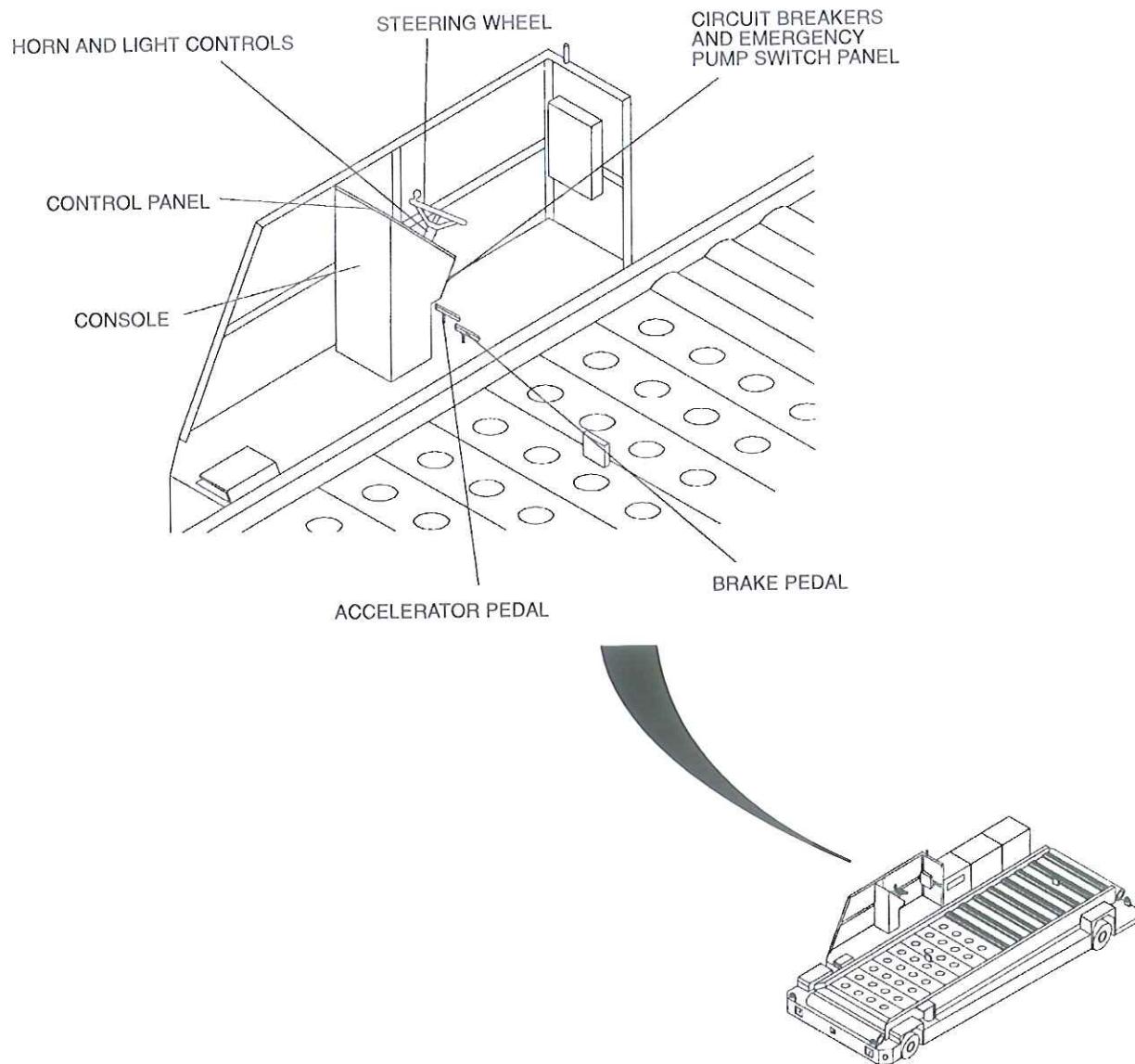


Figure 2
OPERATOR'S COMPARTMENT CONTROLS

E. LOAD PLATFORM (SEE FIGURE 3)

The load transfer system consists of two independently or simultaneously activated sections, mounted along the load platform frame. There is a section of Heliroll wheels to center containers. Options include front and/or rear "fingers" for transfer to carriers, mobile load guides and mid-platform load stop.

Section movement is controlled with the manipulating device on the control panel: FRONT TRANSFER SECTION and REAR TRANSFER SECTION. Each manipulating device has two unstable operating positions: "forward or reverse."

Roller movement is performed in each section by hydraulic motors conveniently placed and connected to the driving pinions of the roller axles through a system of chains, tie rods and pinions.

The Heliroll roller axles for load centering are also activated by a system of hydraulic motors, pinions, chains and tie rods.

The load stops are raised at the default position, and are automatically lowered under the following operating conditions.

- (1) When the transfer manipulation device is actuated toward the front or the rear (front or rear section), with the traction manipulation device in the neutral position:
 - With the platform up to 600 mm the rear or front load stop will lower according to the load stop selector.
 - With the platform 600 mm or higher the front load stop lowers.
- (2) When the load transfer centering manipulation device is activated to the left or right, with the traction manipulation device in the neutral position, the front load stop lowers.

A control button panel in the rear of the vehicle to perform platform to carrier container loading and unloading operations is optional.

F. GENERAL HYDRAULIC SYSTEM (SEE FIGURE 4)

The CLT-8 hydraulic system is a closed circuit system for traction, based on an automotive type variable flow pump. Other functions operate with a double stage gear pump.

There is a manual emergency pump (electrically activated pump is optional), to power all hydraulic functions in case of electrical and/or hydraulic failure.

G. TRACTION CIRCUIT

An automotive type pump supplies flow in function of the revolutions of the diesel engine, to two "slow" traction motors, connected in parallel, directly coupled to the rear wheels. Traction control is attained through a direction selector (forward/reverse), and the activation of the accelerator pedal.

Traction pressure is limited by two safety valves attached to the pump body.

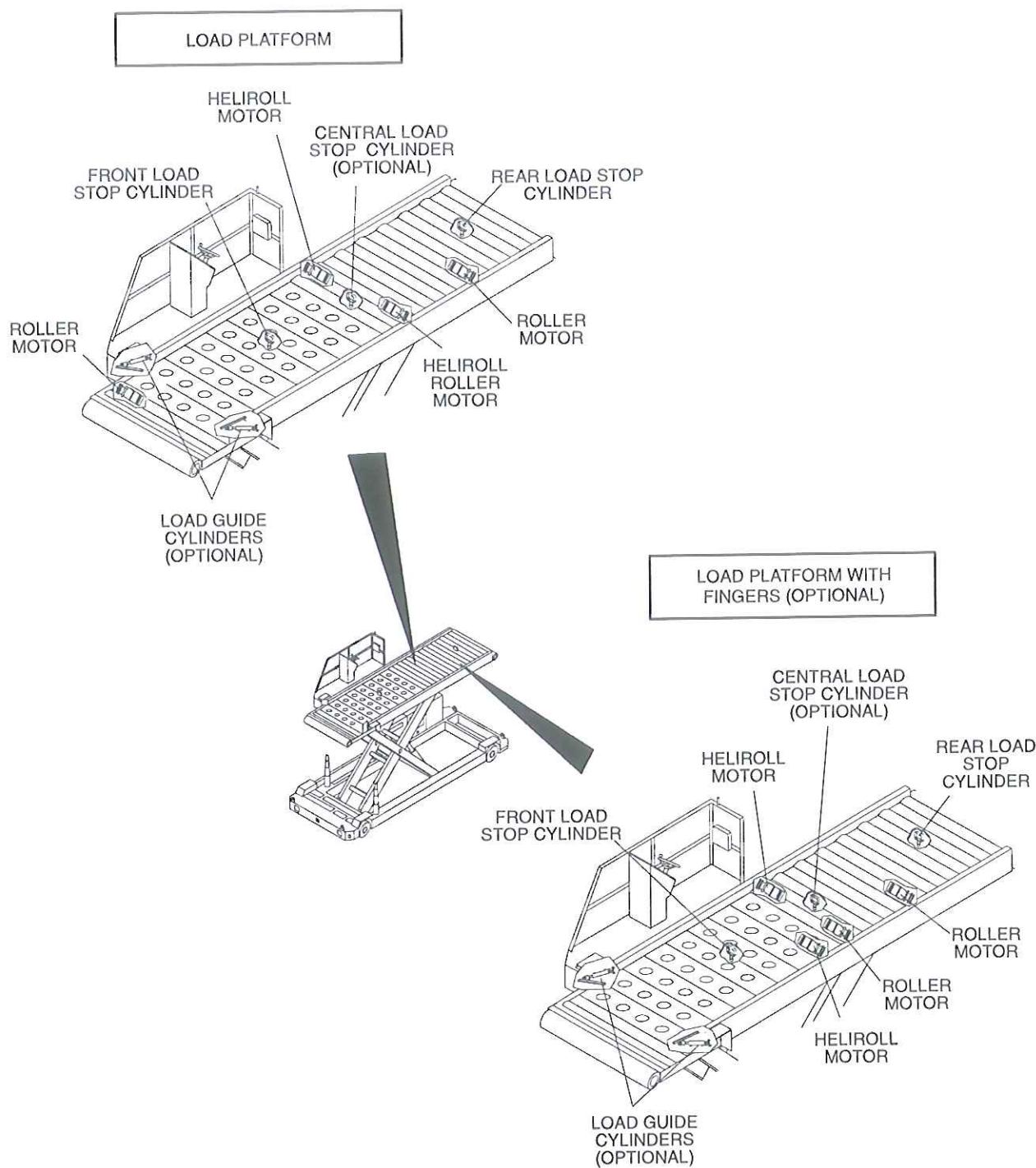


Figure 3
LOAD PLATFORM COMPONENTS

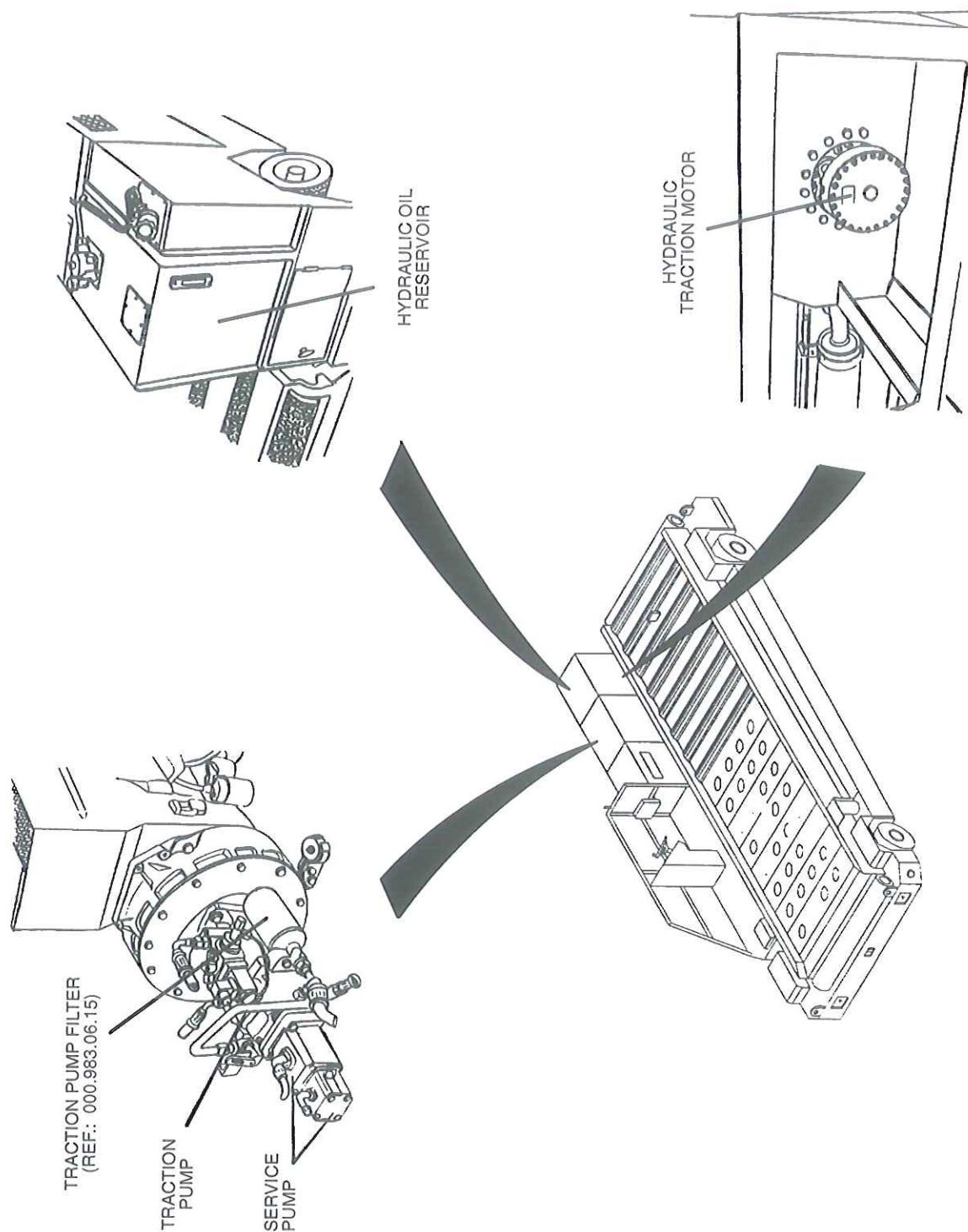


Figure 4
HYDRAULIC SYSTEM COMPONENTS (Sheet 1)

H. BRAKE CIRCUIT

The vehicle has three types of brakes: service brake, parking brake and hydrostatic brake.

(1) Service brake

The service brake circuit, which acts on the rear wheels, consists of brake shoes which are hydraulically activated (using the same oil as the hydraulic circuit) with a valve located on the brake pedal.

(2) Parking brake

The parking brake is negative type. It works automatically on the rear right wheel, two seconds after placing the traction manipulation device in the neutral position.

(3) Hydrostatic brake

When the foot is lifted from the accelerator, the automotive pump progressively decelerates the vehicle.

I. STEERING CIRCUIT (SEE FIGURE 5)

The steering circuit consists of an Orbitrol valve coupled to the steering wheel, which activates the double rod, double acting steering cylinder, to a degree proportional to the rotation of the steering wheel, in order to turn the directional wheels of the front axle by means of the steering rods.

J. PLATFORM OPERATION CIRCUIT (SEE FIGURE 6)

Functions performed by this circuit include:

- Lifting/lowering platform
- Load transfer and centering
- Load stops activation

(1) Lifting/lowering platform

Lifting and lowering of the platform is performed by two main double acting cylinders and two compensated telescopic cylinders. These cylinders are activated by manipulation devices on the control panel. It operates at two lifting and lowering speeds. Cylinders include directional anti-return valves.

(2) Load transfer and centering

The vehicle includes four hydraulic motors, controlled from the control panel, which perform load transfer and centering. Each motor includes pressure limiting valves. The unit may also be optionally equipped with mobile load guides activated by two single rod double-acting hydraulic cylinders.

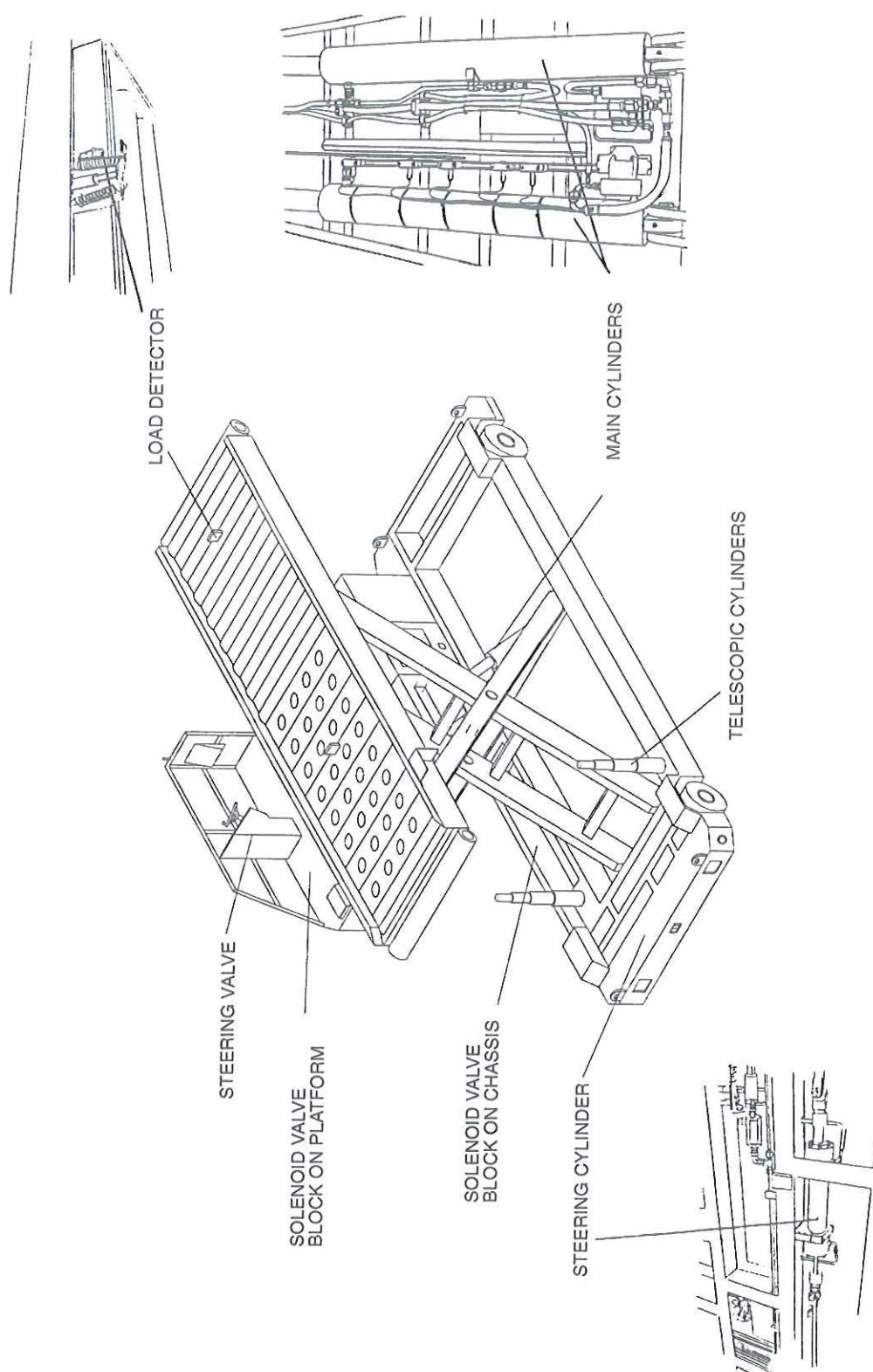


Figure 5
HYDRAULIC SYSTEM COMPONENTS (Sheet 2)

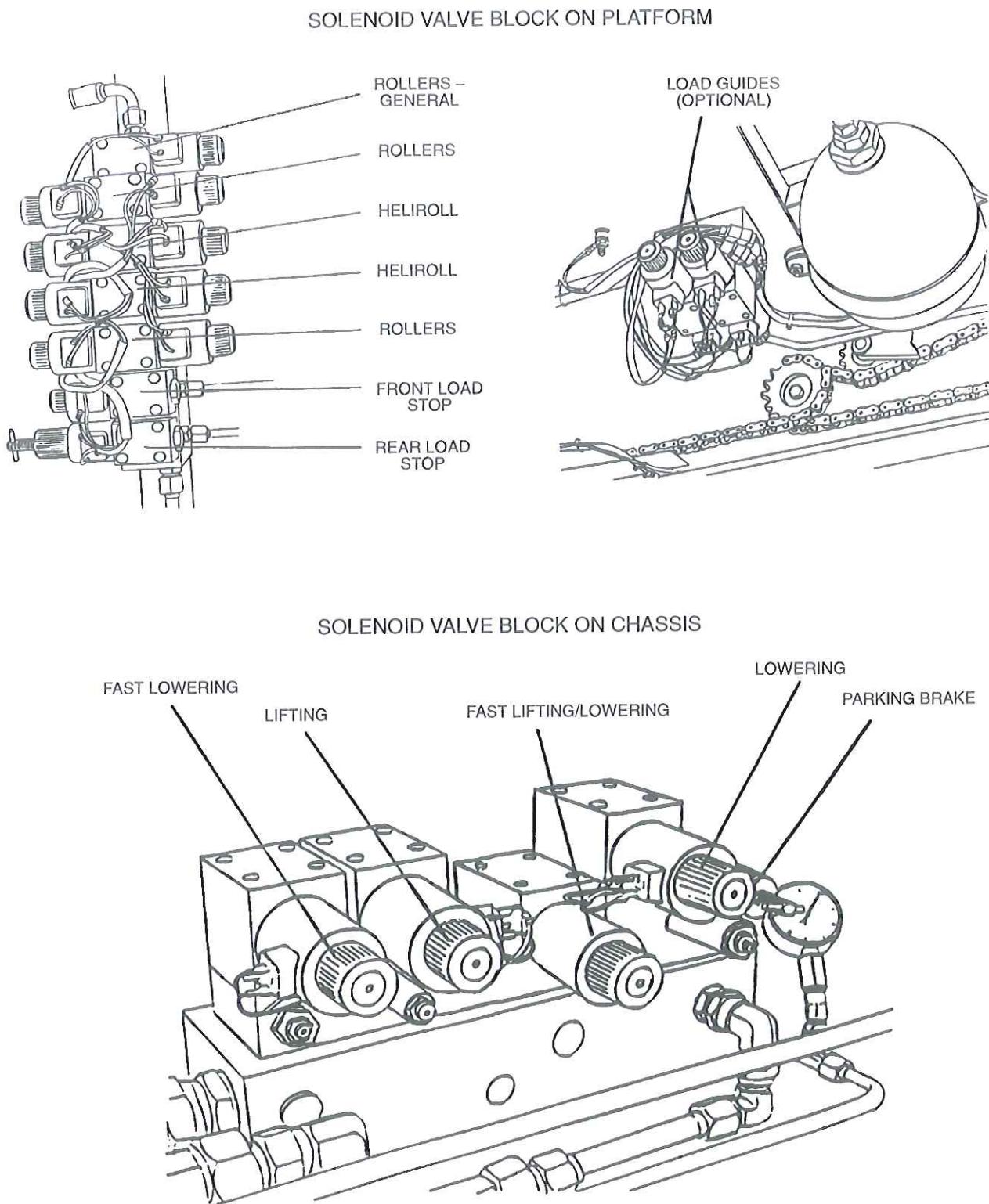


Figure 6
HYDRAULIC SYSTEM COMPONENTS (Sheet 3)

(3) Load stop operation

The platform has two load stops (a third, central load stop is optional), always raised by springs, each of which includes a single acting cylinder, which controls load operations.

K. ELECTRICAL SYSTEM (SEE FIGURE 7)

(1) Wiring

Wires are numbered at the ends to facilitate identification.

(2) Power source

System functioning voltage is 24 VDC, supplied by two serially connected 12-volt batteries and a 28-volt alternator (35 amps), located on the diesel engine.

The battery cut-off switch is located next to the batteries. This switch allows the batteries to be disconnected from the rest of the circuit.

(3) Instrumentation

All control instruments, controls and indicators are grouped together on the control panel. An optional button panel for activating the platform, rollers, rear working light and emergency stops can be installed on the rear right section of the chassis.

(4) Relays and circuit protectors

The electrical system control relays, as well as the system protectors (automatic switches or circuit breakers) are located on the console.

(5) Load detectors (see Figure 5)

The electrical system includes a series of inductors to detect the position of the platform and the load stops.

(6) Lighting circuit

The vehicle is equipped with standard driving lights, in both rear and front.

The front has two headlights, and two parking and turning signal lights.

The rear has two light modules with reverse lights, turn signal lights, brake lights, parking lights and reflectors.

A front spotlight is included. Flashing signal beacon, rear spotlight, emergency warning lights, gauge lights, and flashing beacon to indicate platform lifting and lowering platform, are optional.

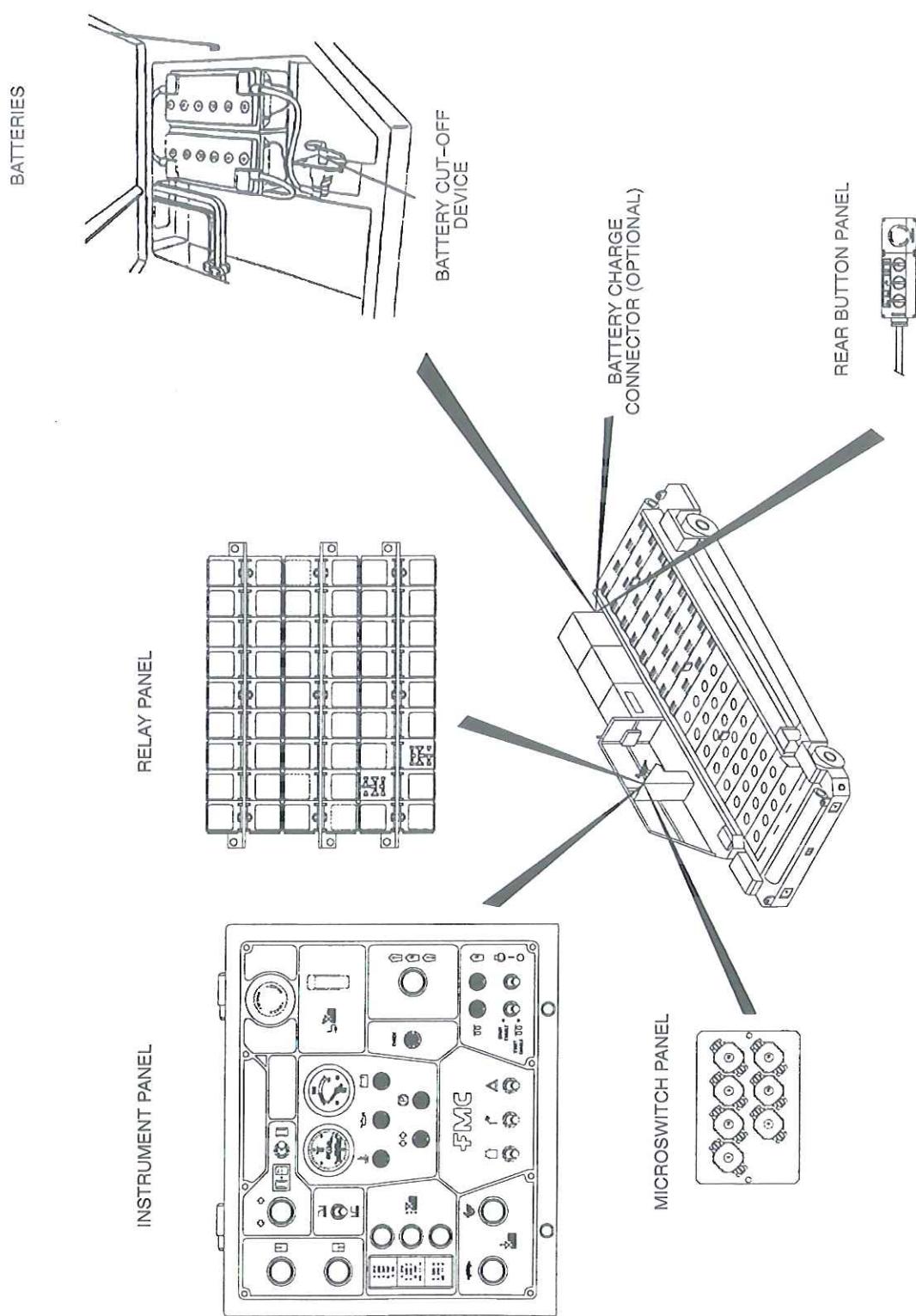


Figure 7
ELECTRICAL SYSTEM COMPONENTS

(7) Other electrical devices

The electrical system may incorporate a reverse warning signal, platform lowering warning signal, button panel on chassis, emergency stop button on chassis, speed limiter at 6 Km/h, serial/parallel hydraulic motor locking, truck transfer, emergency stop buttons on panel, lighted button panels, battery connector, emergency motor pump and electronic accelerator.

L. AXLES AND WHEELS

(1) Front axle

Front axle is the steering axle, made up of solid wheels, bushings and axle spindles.

(2) Rear Axle

Rear axle is the drive axle, made up of two hydraulic motors coupled directly to the solid wheels, with service and parking brakes built in.

M. FUEL SYSTEM

Fuel supply to the thermal engine comes from the tank located in the rear right side of the chassis, next to the hydraulic oil tank. The gage that sends the electric signal to the fuel indicator on the instrument panel is mounted inside the tank.

Section 2. Operation Instructions

1. PRELIMINARY PRECAUTIONS

**WARNING**

DO NOT PERFORM ANY TASK BELOW THE LOAD PLATFORM WITHOUT FIRST ENSURING THAT THE MAINTENANCE ARMS ARE IN PLACE.

**WARNING**

ALWAYS WEAR SAFETY GLASSES WHEN CHECKING AND/OR ADJUSTING THE HYDRAULIC SYSTEM PRESSURE (INCLUDING PEOPLE WEARING PRESCRIPTION GLASSES). PRESSURIZED HYDRAULIC OIL MAY AFFECT EYES AND SKIN. IN CASE OF AN ACCIDENT OF THIS TYPE, WASH THE AFFECTED AREA IMMEDIATELY.

**WARNING**

INCORRECT ADJUSTMENT OF HYDRAULIC SYSTEM SAFETY VALVES CAN CAUSE DAMAGE TO THE VEHICLE AND INJURE OPERATING PERSONNEL. ALWAYS USE HIGH QUALITY, RELIABLE MEASURING TOOLS FOR THE HYDRAULIC ADJUSTMENT PROCESS.

**WARNING**

NEVER REMOVE PLUGS FROM HYDRAULIC LINES, OR FROM CONNECTION POINTS OF THE PRESSURE GAUGE WITH THE PROPULSION MOTOR OR DURING THE ACTIVATION OF ANY HYDRAULIC FUNCTIONS.

**WARNING**

NEVER EXCEED THE ESTABLISHED WEIGHT LIMITS FOR THIS EQUIPMENT. FAILURE TO OBSERVE THESE LIMITS MAY CAUSE INJURY TO EQUIPMENT OPERATOR AND DAMAGES TO AIRCRAFT AND VEHICLE.

CAUTION

DO NOT USE, ADJUST OR REPAIR THE VEHICLE UNTIL YOU HAVE READ ALL THE WARNINGS AND CAUTIONS IN THIS SECTION.

CAUTION

STOP VEHICLE IMMEDIATELY WHEN THE LIGHTED LOW OIL PRESSURE OR HIGH MOTOR TEMPERATURE INDICATORS ARE LIT AND THE VEHICLE HAS NOT STOPPED AUTOMATICALLY.

CAUTION

THE VEHICLE SHOULD ALWAYS BE PARKED WITH THE TRACTION JOYSTICK IN NEUTRAL POSITION, ALL LIGHTS OFF, ENGINE SWITCH IN THE "OFF" POSITION AND THE PLATFORM COMPLETELY LOWERED.

CAUTION

IN EMERGENCY VEHICLE TOWING MANEUVERS, SPEED SHOULD NEVER EXCEED 8 KM/H (5 MPH). UNDER NO CIRCUMSTANCES CAN THE UNIT BE TOWED WITHOUT FIRST PLACING THE TRACTION CIRCUIT ON BYPASS AND RELEASING THE PARKING BRAKE.

2. DRIVING AND OPERATION INSTRUMENTS AND CONTROLS

The controls for driving the vehicle and performing cargo loading/unloading and platform lifting/lowering operations are located in the control position (see Figure 1). These controls are described below:

A. ACCELERATOR PEDAL

The right pedal is the accelerator. It controls motor revolutions. Electronic control, as opposed to cable control, is optional.

B. BRAKE PEDAL

The left pedal is the service brake. It controls the activation of the brake and the propulsion wheels through a brake valve coupled to the pedal.

C. STEERING WHEEL AND DRIVING LIGHT CONTROLS

The steering wheel and the light, horn and turn signal control assembly are located on the steering column.

D. CONTROL FRAME

The following assemblies are available in the console: control panel, relay panel, automatic switches or circuit breakers and electric emergency pump switch (optional).

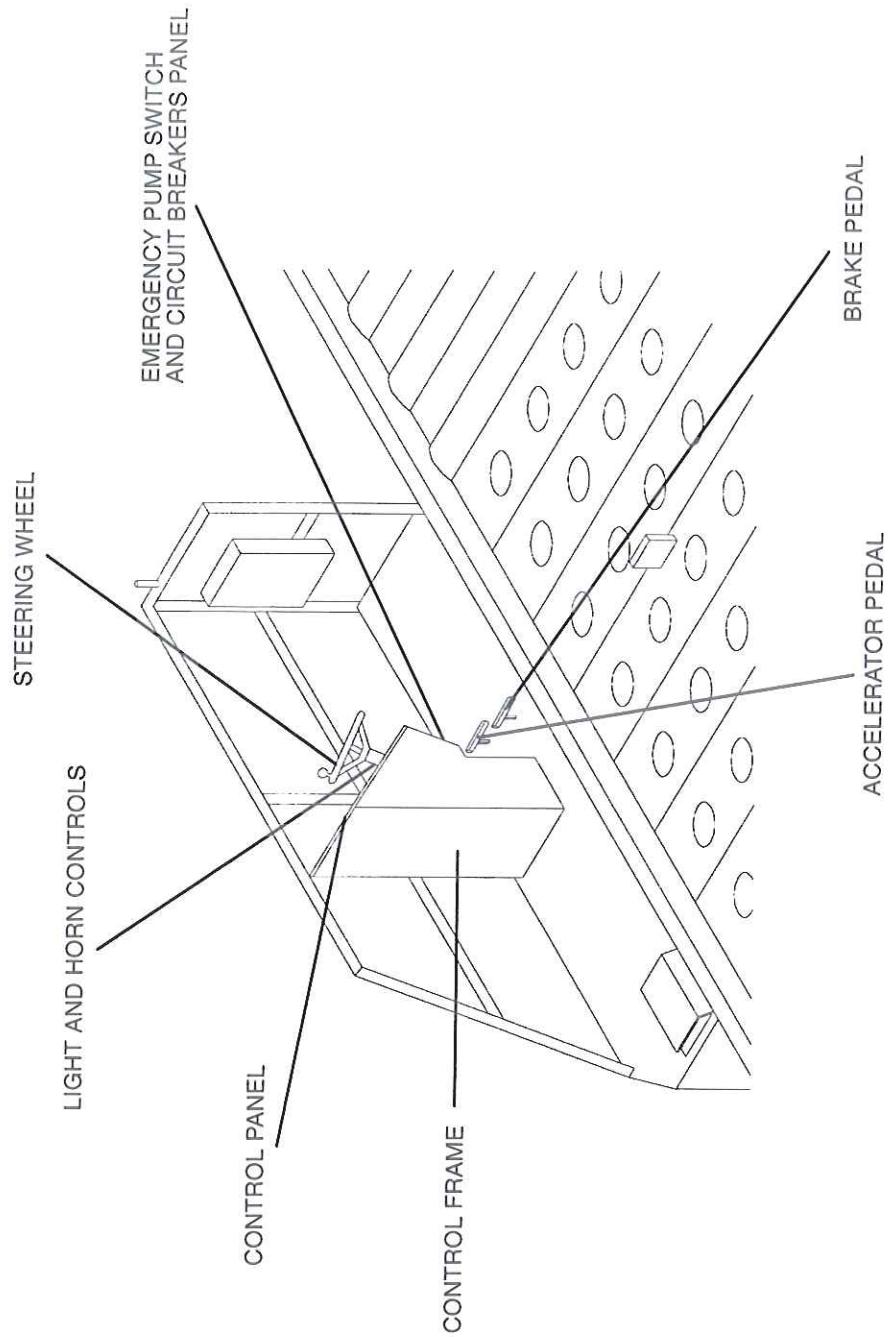


Figure 1
CONTROL POSITION

E. INSTRUMENTS AND CONTROL PANEL (SEE FIGURE 2)

The following controls are located on the control panel: joysticks, indicators, indicator gauges, selectors and switches.

- (707) Engine start ignition key
- (708) Emergency stop button (optional)
- (717) Battery charge indicator
- (718) Oil pressure indicator
- (719) Engine temperature indicator
- (720) Heater indicator
- (723) Hourmeter
- (724) Fuel level indicator
- (728) Lighted emergency stop button (optional)
- (732) Electronic accelerator "autocheck" indicator (optional)
- (738) Beacon switch (optional)
- (739) Spotlight switch (optional)
- (744) Emergency warning lights switch (optional)
- (756) Signal lights indicator
- (757) Parking brake indicator
- (764) Traction joystick
- (765) Slow platform lifting/lowering joystick
- (766) Fast platform lifting/lowering joystick
- (767) Rear roller section joystick
- (768) Front roller section joystick
- (769) Load centering joystick
- (770) Front and/or rear load stop selector
- (792) 2100 mm height preset
- (793) 2660 mm height preset
- (794) 3060 mm or 2900 mm height preset
- (805) Forward/Backward selector in neutral indicator
- (814) Transfer to truck (optional)
- (826) Guides/Heliroll selector (optional)
- (831) Engine start-up bypass

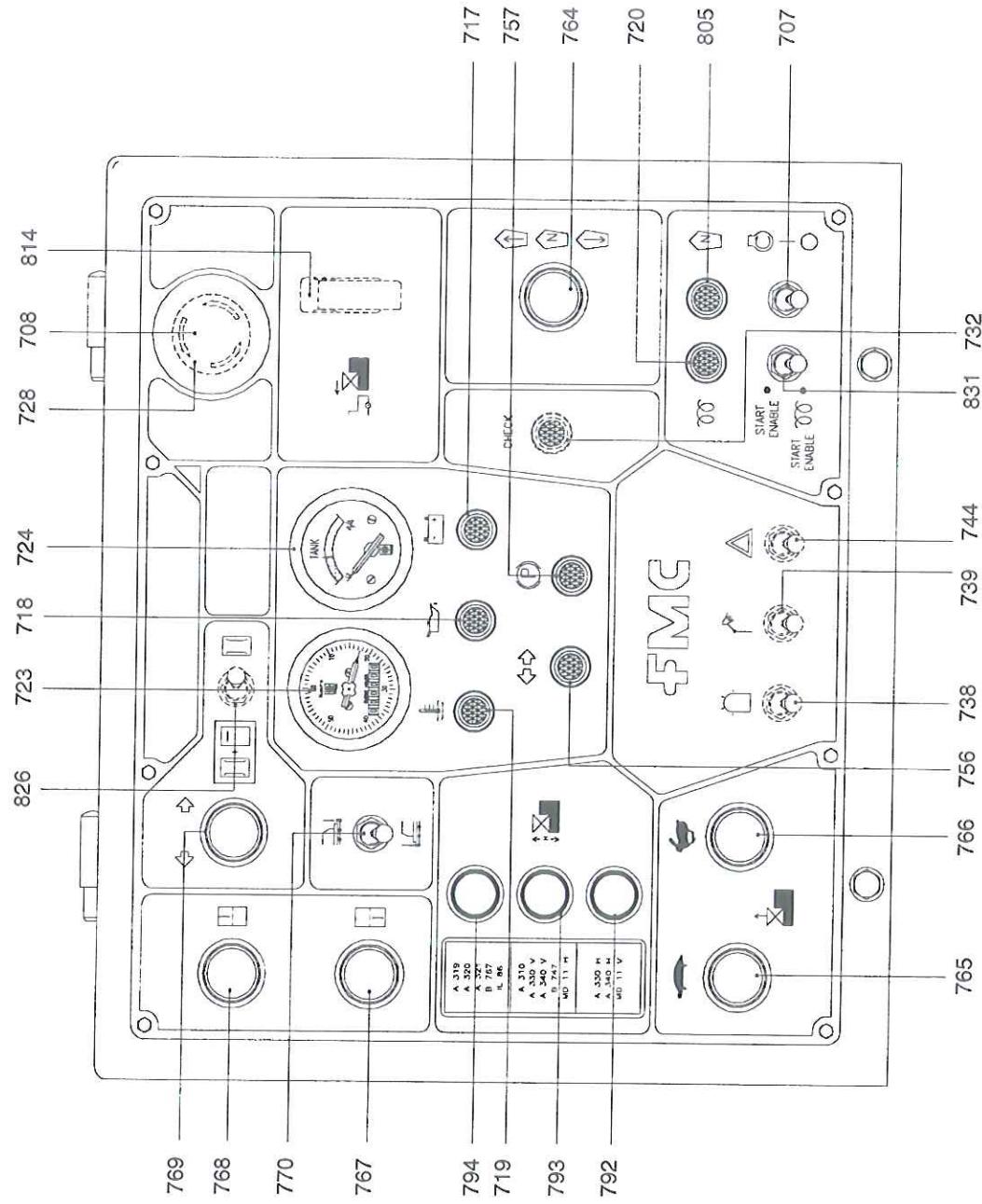


Figure 2
INSTRUMENTS AND CONTROL PANEL

F. RELAY AND CIRCUIT BREAKERS PANEL (SEE FIGURE 3)

Located inside the control frame, accessed by lifting the control panel, the relay panel contains the following elements:

- (721) Engine safety features relay
- (733) Auxiliary alternator starter inhibition relay
- (734) Horn relay
- (771) Auxiliary parking brake timer relay
- (776) In-traction platform lowering and lifting inhibitor relay
- (780) Front load stop inductor relay
- (781) Rear load stop inductor relay
- (783) Platform lowering detection inductor relay
- (789) First preset detection inductor relay
- (790) Second preset detection inductor relay
- (791) Third preset detection inductor relay
- (796) Telescopic cylinder detection relay
- (797) Telescopic cylinder platform lowering signal relay
- (798) In-traction roller deactivation relay
- (804) Neutral position safety relay
- (806) Load stops operation at 600 mm relay
- (807) Slow platform lowering at 600 mm relay
- (808) Auxiliary bypass timer relay (optional)
- (810) Button panel inhibition with joystick and preset relay
- (811) Button panel inhibition with joystick and preset relay
- (812) Joystick inhibition with preset relay
- (813) Preset inhibition with joystick relay
- (815) Platform lowering inhibition when lifting platform relay
- (816) No traction with load stops in lowered position relay
- (817) Platform maximum lowering while vehicle at 6 Km/h relay (optional)
- (818) Traction control at 6 Km/h relay (optional)
- (820) Enabling rear load stop only with button panel relay
- (821) Rear button panel inhibition in traction relay

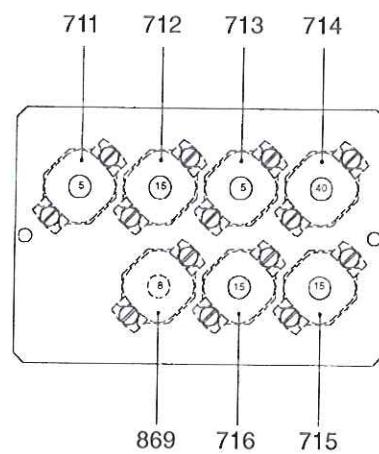
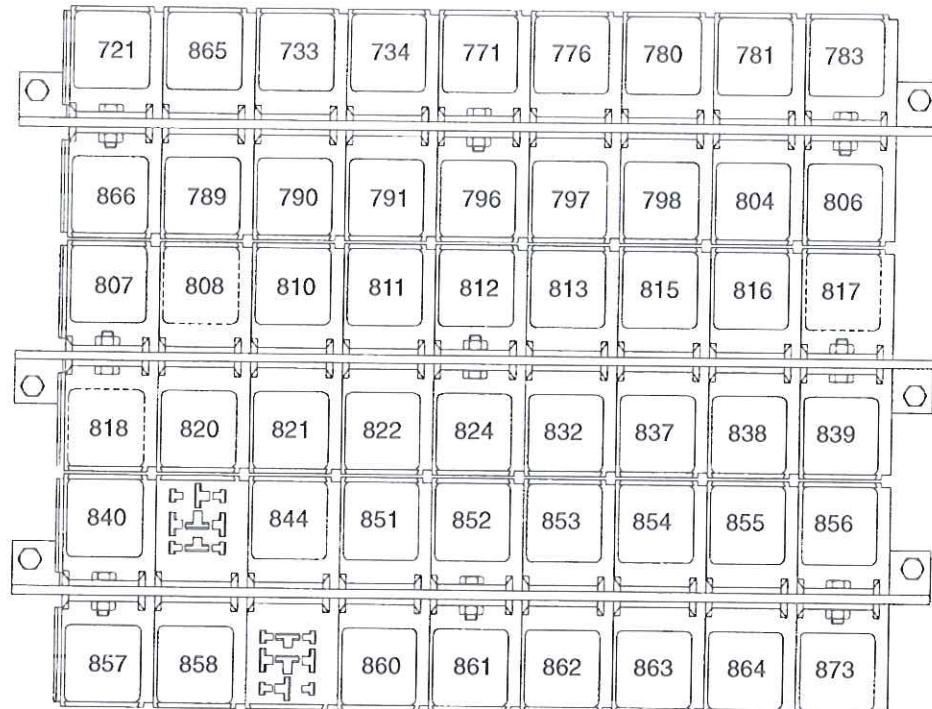


Figure 3
RELAY AND CIRCUIT BREAKERS PANEL

- (822) Parking brake applied when rollers activated relay
- (824) Telescopic cylinder signal when raising platform relay
- (832) Electromagnetic accelerator relay
- (837) Parking brake applied when engine stopped relay
- (838) Start inhibition relay
- (839) Light controls relay
- (840) Auxiliary timer relay
- (844) Auxiliary timer relay
- (851) Auxiliary preset relay
- (852) Auxiliary slow platform lowering relay
- (853) Auxiliary slow platform raising relay
- (854) Auxiliary fast platform raising relay
- (855) Auxiliary fast platform lowering relay
- (856) Auxiliary platform elevation in button panel relay
- (857) Auxiliary platform lowering in button panel relay
- (858) Auxiliary reverse driving relay
- (860) Auxiliary second section of rollers forward motion relay
- (861) Auxiliary second section of rollers backwards motion relay
- (862) Auxiliary first section of rollers forward motion relay
- (863) Auxiliary first section of rollers backwards motion relay
- (864) Auxiliary left centering relay
- (865) Right centering relay
- (866) First start-up safety relay
- (873) Heliroll inhibition with first section of rollers relay

G. CIRCUIT BREAKERS (SEE FIGURE 3)

Located above the control frame in the area in front of the driver. They protect critical components of the electrical system and include:

- (711) Circuit breaker, 5 A. (Starter ignition)
- (712) Circuit breaker, 15 A. (Lights, warning device, and optional features)
- (713) Circuit breaker, 5 A. (Instruments)
- (714) Circuit breaker, 40 A. (Electrical heater and ventilator)
- (715) Circuit breaker, 15 A. (Traction, emergency stop and brake)

- (716) Circuit breaker, 15 A. (Services)
- (869) Circuit breaker, 8 A. (Optional electronic accelerator)

H. EMERGENCY ELECTRIC PUMP SWITCH (OPTIONAL)

Located above the control frame in the area in front of the driver. Activates the electrically powered hydraulic pump for emergency operations.

3. SAFETY AND CONTROL DEVICES

A. SAFETY DEVICES

The following devices have been incorporated into the vehicle's systems to provide the unit with operating safety:

- (1) Engine shutdown for insufficient engine oil pressure. Through the pressure switch in the engine, the engine is automatically shut down and the insufficient oil pressure lighting indicator turns on when oil pressure is insufficient.
- (2) Engine shutdown for excessive engine temperature. Through the thermocontact on the engine block the motor is automatically shut down and the excessive engine temperature lighting indicator turns on.
- (3) Engine shutdown for belt breakage (Deutz engine ventilator turbine and alternator).
- (4) Engine start inhibition if traction joystick is not in neutral position.
- (5) Starter motor inhibition if engine is running.
- (6) Traction inhibition if no direction is selected on traction joystick, accelerator pedal is pressed and load stops are lifted.
- (7) Emergency stop buttons immediately disconnect engine and all vehicle electricity.
- (8) Platform includes a battery cut-off switch located on the rear of the battery box in order to isolate the battery and power supply to all vehicle circuits.
- (9) Elevation cylinders with directional check valves (main and telescopic).
- (10) Negative action parking brake.
- (11) Parking brake automatically applied two seconds after placing traction joystick in neutral position.
- (12) Parking brake applied in traction if any load stop is in lowered position.

- (13) Parking brake applied when any emergency stop button is pressed.
- (14) Parking brake applied when rollers are activated.
- (15) Parking brake applied when contact is turned off.
- (16) Transfer inhibited if traction joystick is not in neutral position.
- (17) Lift/lower platform inhibited when vehicle is in traction.
- (18) Traction inhibited with parking brake engaged.
- (19) Speed limited to 6 Km/h with platform elevated (optional).
- (20) Platform lifting inhibited if platform height above 600 mm with any load stop in lowered position.
- (21) Platform lowering to 600 mm disabled with any load stop in lowered position.
- (22) Rollers operation disabled when vehicle is in traction.
- (23) Operation of optional rear button panel controls disabled when platform height above 600 mm.

B. CONTROL DEVICES

- (1) Platform lowering and reverse driving alarm horn (optional).
- (2) Flashing amber beacon (optional).
- (3) Gage lights (optional).
- (4) Platform lifting/lowering beacon (optional).
- (5) Reverse driving alarm horn.
- (6) Front spotlight.
- (7) Rear spotlight (optional).
- (8) Automatic load stop operation.
- (9) Electronic accelerator verification (optional).
- (10) Transfer motors protected by torque limiting valves.
- (11) Emergency procedures.

- (12) Impossibility to simultaneously activate operation controls from control position and optional rear button panel.

4. PREPARING THE VEHICLE FOR USE

A. PRELIMINARY CHECKS (SEE FIGURE 4)

Ensure that all routine maintenance inspections have been performed by technical personnel daily, before operating vehicle. Before using the vehicle, the following checks should be made:

- (1) Traction joystick should be in neutral position.
- (2) Check hydraulic oil reservoir and fuel tank levels.
- (3) Check oil and coolant level in engine.
- (4) Connect battery cut-off switch.
- (5) Check operation of all panel instruments, indicators, switches and warning lights.
- (6) Check operation of all vehicle lights.

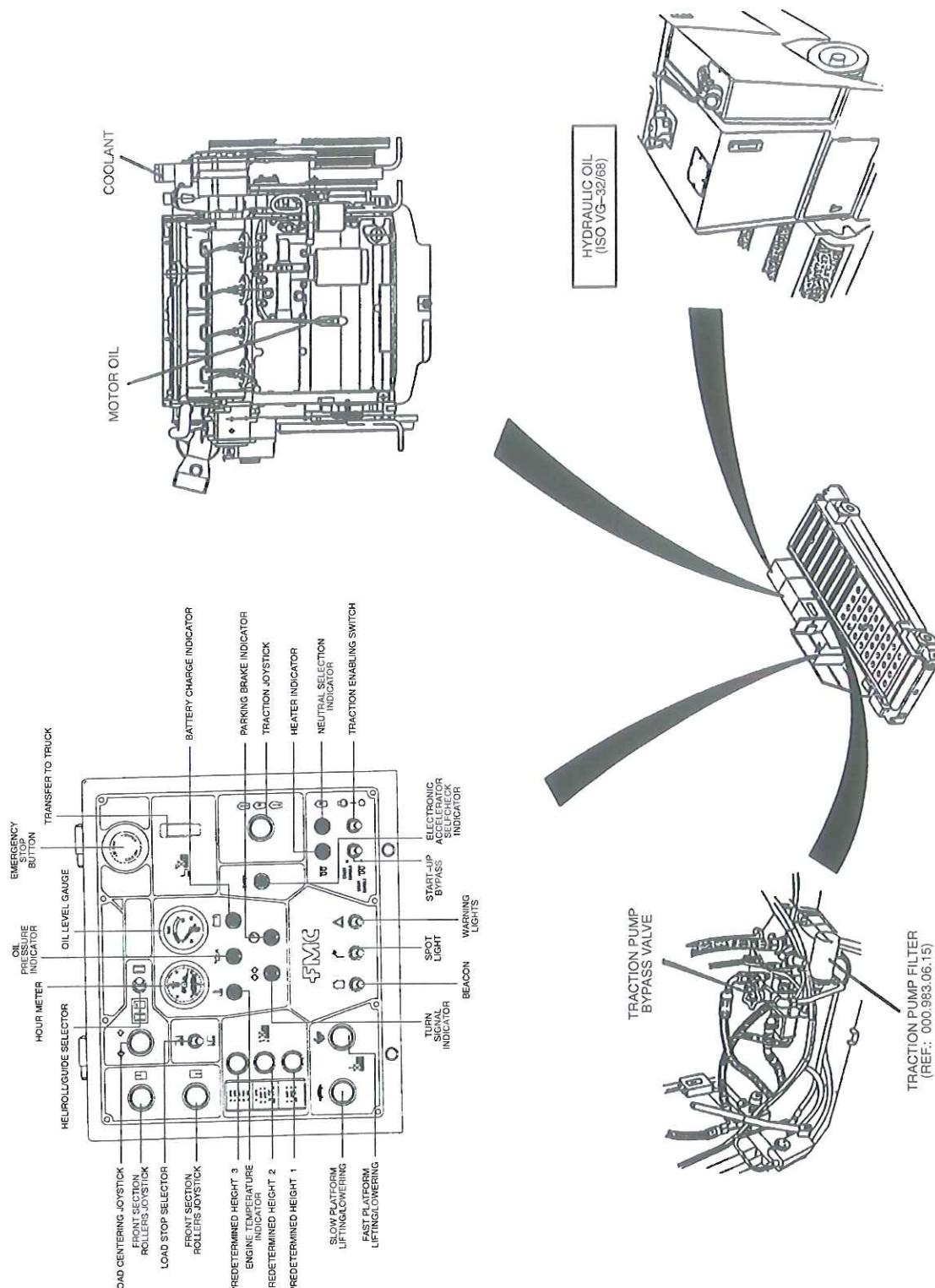


Figure 4
ITEMS TO CHECK BEFORE DRIVING THE VEHICLE

B. STARTING THE ENGINE

To start the engine, disengage emergency stops, turn traction enabling switch to neutral position, connect the starting circuit holding on the starter enabling switch and, at the same time, the engine contact switch (see Figure 2).

Once the engine is running, release the starter switch, but keep holding the starter enabling switch for a few seconds.

C. DRIVING THE VEHICLE**CAUTION**

BEFORE DEFINITIVELY PUTTING THE VEHICLE IN MOTION, CHECK THE SERVICE BRAKES OPERATION PRESSING THE BRAKE PEDAL.

To drive the vehicle proceed as follows:

- (1) Move the traction joystick to the desired direction of motion (forward or reverse).
- (2) Lightly press service brake pedal.
- (3) Progressively lift the foot from the brake pedal and lightly press the accelerator.
- (4) While driving the unit, it is recommended to pay attention to all indicators on the instrument panel, but specially the indicator lights.

NOTE: THE DRIVING SPEED WITH PLATFORM ELEVATED MAY BE LIMITED TO 6 KM/H IF THE OPTIONAL SPEED LIMITER IS INSTALLED.

5. PLATFORM OPERATION**A. INTRODUCTION**

The platform/transporter is designed to perform the following functions:

- (1) Operation with containers on all low-bay aircraft (lower deck).
- (2) Operation with containers of special dimensions (A-320 series).

NOTE: IN AIRCRAFT APPROACH AND VEHICLE SEPARATION MANEUVERS, MAKE SURE THAT THE OPERATING AREA IS CLEAR, AND ACT WITH MAXIMUM CAUTION TO AVOID CAUSING ACCIDENTS OR DAMAGES, ESPECIALLY AIRCRAFT ENGINE DAMAGES WHICH MAY BE CAUSED WITH THE PLATFORM ELEVATED.

NOTE: WHEN LIFTING THE LOAD PLATFORM AT 600 MM AND ABOVE, FROM THE GROUND LEVEL, THE VEHICLE SPEED IS AUTOMATICALLY REDUCED TO 6 KM/H.

IMPORTANT: BEFORE PERFORMING ANY LOADING OR UNLOADING MANEUVERS WITH THE VEHICLE, PROPERLY OPERATION OF ALL SYSTEMS AND CONTROLS SHOULD BE VERIFIED.

CAUTION

MANEUVERS FOR APPROACHING AIRCRAFT CARGO BAY SHOULD ALWAYS BE PERFORMED AT SLOW SPEED.

B. LOADING AND UNLOADING MANEUVERS**(1) Approach maneuvers**

The unit is designed to allow for approach maneuvers for loading or unloading, from the aircraft or from other land-based equipment, such as container carriers, while at the same time lifting or lowering the platform. The desired loading height may be preselected depending on the type of aircraft: 2100 mm (A-319, A-320, A-321); 2600 mm (A-310, A-330, A-340, B-747, MD-11), and 3060 mm (A-330, A-340, MD-11). The last preset may be changed to 2900 mm (optional). Manual adjustment is then performed at actual aircraft height.

Once the vehicle is docked and centered at the aircraft bay or cargo element, select direction for load transfer rollers to rotate. To center loads actuate on the centering joystick.

For transferring loads to container carriers, the vehicle includes an optional loading and unloading operations control button panel in the rear right area of the chassis, which allows platform height adjustment from 485 mm to 600 mm. There is also an emergency stop button and a switch for the rear spotlight on this button panel. Equipment configuration allows the platform to be raised to 600 mm or lowered from that same height with the rear load stop in the lowered position.

(2) Transfer maneuvers

Actuate the manipulating devices corresponding to the section of rollers necessary for the operation. The traction manipulation device should be in the neutral position so that the parking brake is activated. The vehicle may also incorporate mobile load guides for centering loads on the platform, allowing simultaneous operation of the load guides and the Helirolls, or independent guide operation, depending on the position of the guides/Heliroll selector located on the instrument panel.

(3) Separation maneuvers

Select reverse on the traction joystick. Parking brake is automatically released. Progressively depress the accelerator pedal and actuate platform lowering joystick to desired height.

After driving vehicle to parking area and before leaving it, the traction joystick should be left in the neutral position, ignition key should be left in "OFF" position, and platform should be completely lowered.

It is recommended to disconnect electric power from the battery by turning off the cut-off switch, located in the rear of the vehicle, if prolonged period of inactivity is expected.

Section 3. Specifications
1. OPERATING CHARACTERISTICS

Load capacity	3600 Kg (8000 Lb)	
Maximum driving speed	16 Km/h (10 mph) 21 Km/h (13 mph) (optional)	
Load transfer speed	18 m/min. (60 feet/min.)	
Elevation time to first preset height (2100 mm high)	8-10 seconds	
Minimum transfer height	480 mm (18.86 in.)	
Maximum transfer height	3600 mm (141.73 in.) Optional maximum height	2995 mm (117.5 in.)
Exterior turn radius	8.0 m (315 in.)	
Gradient capacity	5° (8%) with cargo	

2. GENERAL DIMENSIONS (SEE FIGURE 1)

Ground clearance	105 mm (4 in.)
Front track width	2.66 m (105 in.)
Rear track width	2.68 m (106 in.)
Wheelbase	4.46 m (176 in.)

3. SHIPPING DIMENSIONS

Total length	6.50 m (256 in.)
Total width	2.9 m (114 in.)
Total height	1.70 m (67 in.)
Approximate total weight	7230 Kg (16104 Lb)
Shipping volume	32 m ³ (1130 cu.ft.)

4. LOAD PLATFORM DIMENSIONS

Width between guides	1.56 m (61.41 in.)
Distance between load stops	4.12 m (162.41 in.)

Side guides height	60 mm (2.36 in.)
Load stops height	50 mm (1.97 in.)
Front end platform width	<1600 mm (63 in.)

5. CAPACITIES

Hydraulic oil reservoir capacity	218 Lt. (57 gls.)
Fuel tank capacity	75 Lt. (20 gls.)
Hydraulic fluid	ISO VG 32/68

6. ENGINE

<u>Motor</u>	<u>Nº of cylinders</u>	<u>Power</u>
DEUTZ BF4M 1012	4	65 Kw (88 H.P.) at 2500 rpm

7. WHEELS AND TIRES

Rear axle wheel	Solid type, specification: 7.00 R12.
Rear axle wheel (optional)	Pneumatic type, specification: 7.50 R12 (pressure = 10 bar).
Front axle, wheel	Solid type, specification: 21 x 8 R9.

8. BRAKES

Hydrostatic	Deceleration (by lifting foot from accelerator pedal) through hydraulic traction motors.
Service	Hydraulic brake acting upon the rear wheels; shoe and drum.
Parking	Negative brake on rear right wheel.
Fluid	Hydraulic oil ISO VG 32/68

9. AXLES

Front axle	Steering axle made up of wheel, bushing and axle spindle.
Rear axle	Drive axle made up of hydraulic motors directly coupled to wheels, with service brake on both wheels and parking brake on rear right wheel.

10. STEERING

- System Hydraulic steering system activated by a 100 cm³/rev. Orbitrol valve. The system incorporates a cushion valves block.
- Activation Through double acting, double rod hydraulic cylinder through interconnected rods.

11. LOAD PLATFORM

- Transfer system Made up of Heliroll rollers and wheels, activated by four motors. System divided into two sections that may be operated together or separately.
- Load stops The cargo area is delimited by two load stops: one in the front and another in the rear. These load stops are activated by hydraulic cylinders. A central load stop is optional.
- Load guides Optional. Made up of two guides placed in the front of the load platform.

12. HYDRAULIC SYSTEM

- Traction pump 50-cm³/rev. piston-type variable-flow hydraulic pump, directly coupled to the engine flywheel.
- Traction motors Two low-speed piston hydraulic motors, high torque and 380 cm³/rev. flow, directly coupled to the drive wheels.
- Service pump Double-body gear pump with 38 and 11 cm³/rev. flow capacities, tandem coupled to the traction pump.
- Hydraulic Actuators Double-action single-rod cylinders for main platform elevation.
- Compensated telescopic cylinders for platform elevation.
- Double-rod double-action steering cylinder.
- Single-action single-rod load stop activation cylinders.
- Double-action single-rod load guide cylinders (optional).
- Transfer motors Constant-flow hydraulic motors, 295 cm³/rev. output, for transfer rollers

Flow regulators	Flow regulators for main and auxiliary elevation cylinders.
	Flow regulator for load transfer system
Pressure switch	Pressure switches for service brake and hydropneumatic accumulator.
Accumulator	Hydropneumatic accumulator in steering line, platform lowering directional check valve, and brake system.
Filters	Filter in reservoir return line.
	Filter in services pump suction line in the reservoir.
	Cartridge filter in traction pump.
Manual pump	A lever-activated manual pump is installed for emergency maneuvers.
Traction circuit operation pressure	350 bar (5075 psi)
Services circuit pressure	170 bar (2465 psi)
Roller motors circuit pressure	100 bar (1450 psi)
Service brake circuit pressure	40 bar (580 psi)
Parking brake circuit pressure	20 bar (290 psi)
Accumulator operating pressure	80–120 bar (1160–1740 psi)

13. ELECTRICAL SYSTEM

Power supply	Two 12-volt direct current batteries (12 VDC). 28-volt alternator (35 A.) on engine.
<u>Lighting</u>	
Front end	Two headlights, and two turning and parking lamps.
Rear end	Two modules with turning signal, parking, and brake lights, reverse lamps and reflectors.
	Front spotlight. Optionally, rear spotlight, beacon, and platform lifting and lowering beacon.
Circuit breakers and protectors	Circuit breaker, 5 A. for ignition.
	Circuit breaker, 40 A. for heater and electric fan.
	Circuit breaker, 5 A. for instruments panel.

Circuit breaker, 15 A. for options, lights and warning device.	
Circuit breaker, 15 A. for functions.	
Circuit breaker, 15 A. for emergency, traction and brakes.	
Circuit breaker, 8 A. for electronic accelerator (optional).	
Optional emergency motor pump	An optional electrically activated pump may be installed.

14. SAFETY AND EMERGENCY FUNCTIONS

Engine safety features	The engine is protected against excessive engine temperature, low oil pressure and, in the case of the Deutz engine, belt breakage. Starter motor activation inhibited with engine running. The engine cannot be started if traction selector is not in neutral position.
Traction safety	There is traction only if desired gear is selected, accelerator is pressed, parking brake is not engaged and load stops are up.
Emergency stops	Standard version of vehicle is equipped with emergency stop button on instrument panels. Additional emergency stop buttons on the chassis and the rear button panel are optional. Buttons may be lighting type.
Services safety features	Two seconds after setting the traction selector in neutral position, the parking brake is automatically applied.
	Elevation cylinders, main and telescopic, with directional check valves.
	Platform lifting/lowering disabled above 600 mm when load stops are lowered. Below 600 mm, platform lifting and lowering is enabled, even when rear load stop is lowered.
	Transfer motors are protected by torque limiting valves.
	Transfer disabled if traction selector is not in neutral position.
	Automatic load stops operation.
	Negative parking brake.
	Traction speed limited to 6 Km/h with platform lifted (optional).

- Emergency indicators The control panel includes the following light indicators: high engine temperature, low oil pressure, battery charge, belt breakage, engine starting heater, turn signals, engaged parking brake, and traction selector in neutral position. An electronic accelerator check indicator is optional.
- Other indicators As standard equipment, as well as options, light and audio indicators are available for vehicle and platform functions.

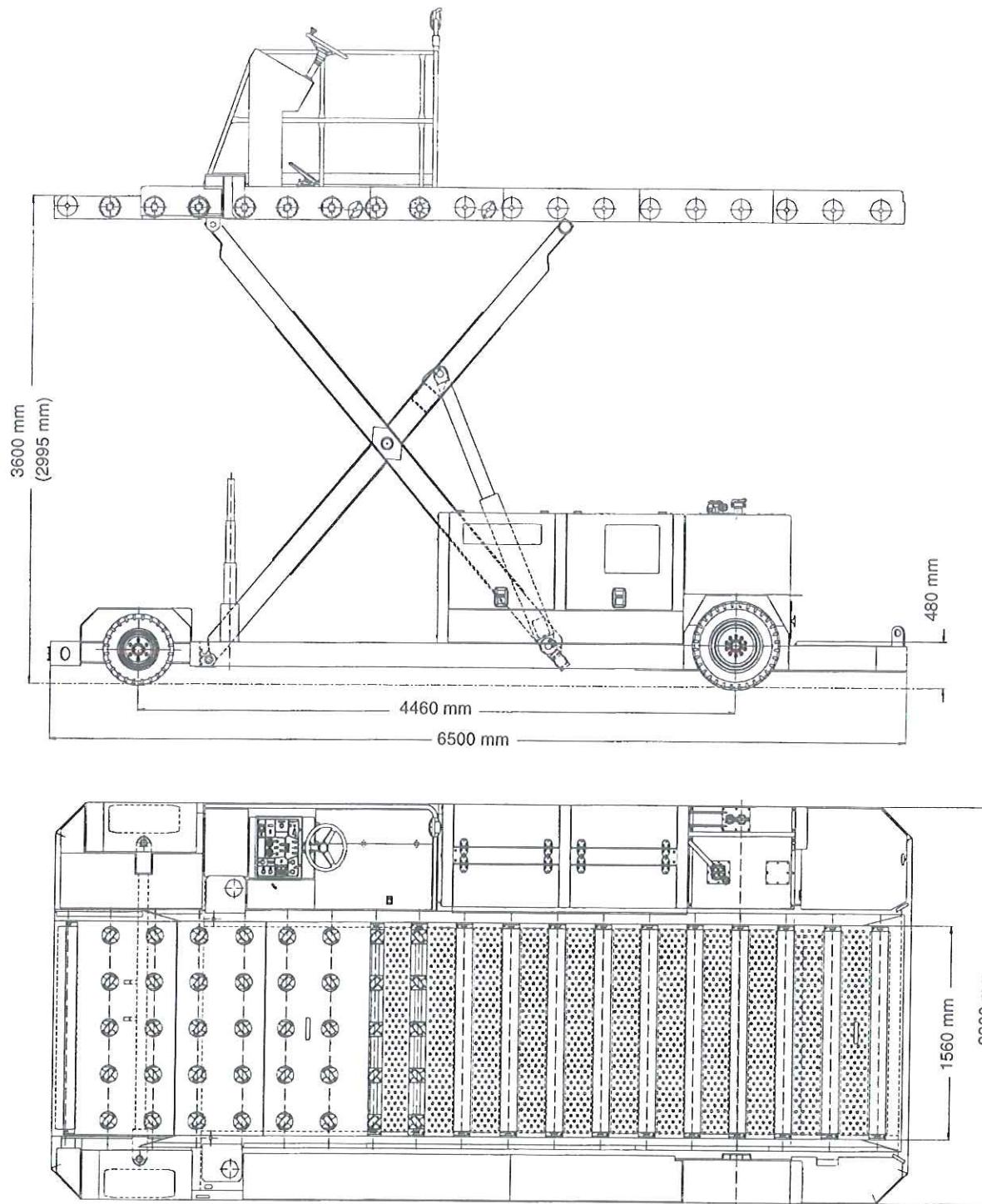


Figure 1
GENERAL DIMENSIONS

*Section 5. Assembly and Setup***1. GENERAL INSTRUCTIONS FOR VEHICLE SETUP****CAUTION**

DO NOT OPERATE THE VEHICLE, UNTIL ALL OF SETUP INSTRUCTIONS AND INITIAL INSPECTIONS INDICATED BELOW HAVE BEEN PERFORMED BY QUALIFIED MAINTENANCE PERSONNEL.

When the vehicle reaches its final destination procedure should continue as follows:

- Step 1.** Remove all protections, metal bands, wedges, etc., used for transportation and packaging.
- Step 2.** Check the general status of all the vehicle's components: wheels, panels, steering wheel, pedals, rollers, cylinders, etc.
- Step 3.** Confirm that the front wheel lug nut torque is 220 N·m and rear wheel lug nut torque is 320 N·m.
- Step 4.** Install all the elements which have been removed and sent in a separate crate, such as the seat, beacon, etc.
- Step 5.** Check the general status of the battery and its charge. If it is not adequate, proceed to charge it before installing it in the vehicle. Clean the terminals well, and after connecting them, grease them with clear mineral grease. Check the electrolyte level.
- Step 6.** Before connecting the battery, check all general electrical connections, terminals, connectors, and instruments.
- Step 7.** Check the position of the battery cut-off key, turning it to the connection position (see Figure 1).
- Step 8.** Before starting the engine refer to the manufacturer's instructions (see Chapter 5).
- Step 9.** Check hydraulic oil and fuel levels, and refill if necessary.
- Step 10.** Check light indicators on instrument panel. Replace bulbs if necessary.
- Step 11.** Slowly operate the vehicle, driving in both directions, and check brakes.

CAUTION

IF ANY ANOMALY IS DETECTED IN THE OPERATION OF HYDRAULIC FUNCTIONS, BRAKE CIRCUIT, WIRING, ETC., OR IF THERE ARE ANY BROKEN OR DAMAGED PARTS, THE VEHICLE SHOULD NOT BE USED UNTIL IT IS EXAMINED BY MAINTENANCE PERSONNEL.

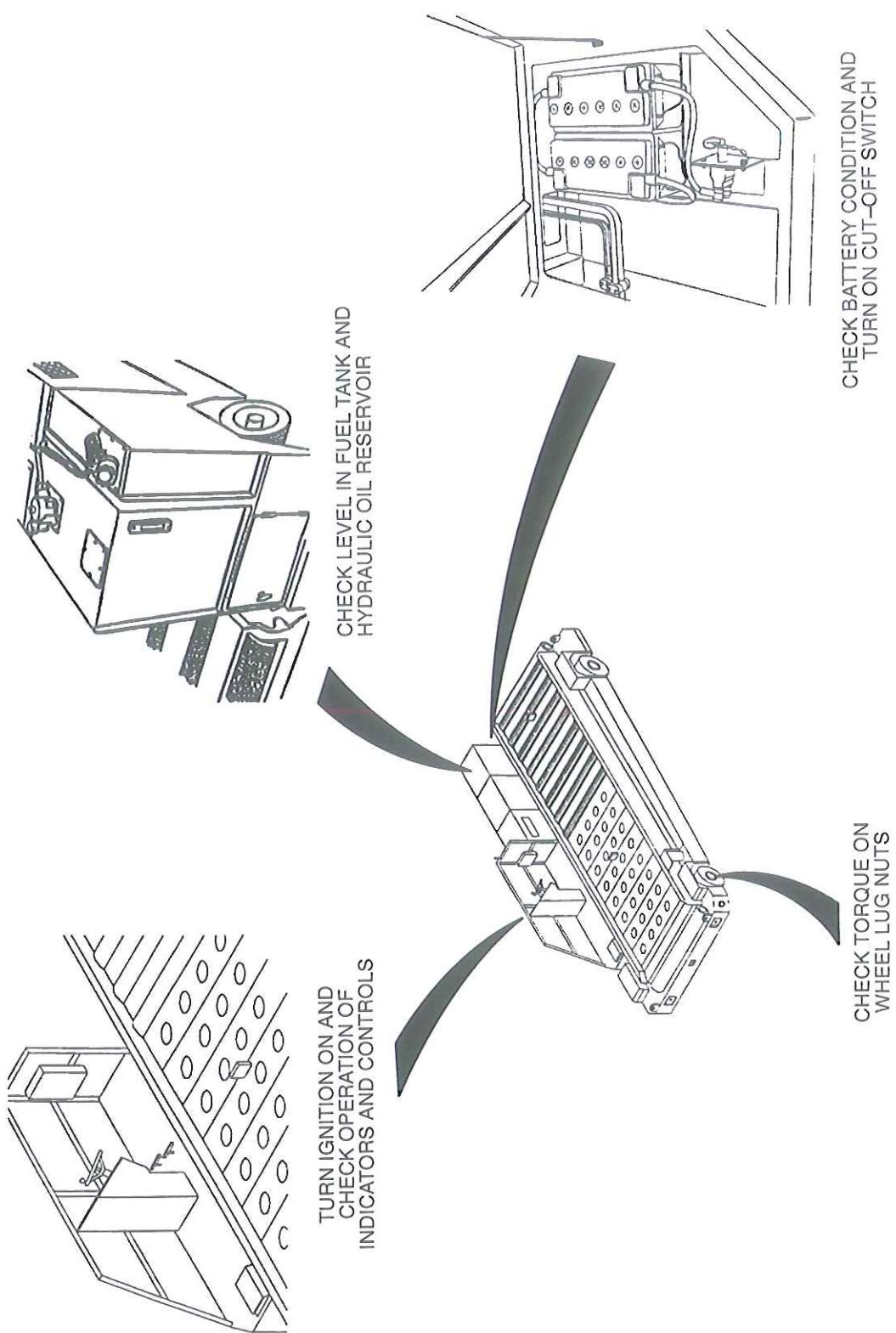


Figure 1
VEHICLE SETUP INSTRUCTIONS

2. INITIAL INSPECTION

It is recommended that the following maintenance service be performed after the first 50 hours of operation, after the initial set up of the vehicle.

A. ENGINE

Follow manufacturer's maintenance indications (see Chapter 5 in this manual).

B. HYDRAULIC SYSTEM

Step 1. Replace oil return filter, suction filter and traction pump cartridge.

Step 2. Check hydraulic oil level and refill if necessary.

Step 3. Check for leaks in hydraulic circuit and tighten if necessary.

Step 4. Check for possible damages in tubes and hoses. Replace if necessary.

C. WHEELS

Check lug nut torque: 220 N-m on front wheels and 320 N-m on rear wheels.

D. SAFETY FEATURES

Check safety features in engine, traction, services, and instrument panel indicators listed in the previous section.

*Section 6. Storage and Inactivity***1. VEHICLE INACTIVITY**

If it is necessary to subject the vehicle to a period of inactivity, certain precautions should be taken to guarantee its return to operability.

A. PAINT

Clean and repaint damaged areas.

B. LUBRICATION

See Chapter 2, Section 1.

C. GREASING

Apply grease to hinges and door latches.

Retract all hydraulic cylinder rods and grease all exposed parts.

Disconnect battery terminals and protect with clear mineral grease.

D. BATTERY

Remove battery and store in a dry place.

E. ENGINE

See storage instructions in Chapter 5.

2. RETURN VEHICLE TO SERVICE FROM STORAGE

To return the vehicle to service after an extended storage period proceed as follows.

A. LUBRICATION

Lubricate the vehicle according to Chapter 2, Section 1, of this manual.

B. GREASING

Remove grease protection and grease according to Chapter 2, Section 1, of this manual.

C. BATTERY

Install, clean, check electrolyte level and connect battery.

D. ENGINE

Follow instructions provided by manufacturer, see Chapter 5.

E. HYDRAULIC SYSTEM

Change hydraulic oil in unit in case of prolonged inactivity. Purge the unit according to Chapter 2, Section 1, of this manual.

F. WHEELS

Check torque on wheel lug nuts.



*Section 7. Emergency Procedures***1. LOWERING THE PLATFORM (FIGURE 1)**

Follow the procedures indicated below, in case of engine or hydraulic pump malfunction or electrical power failure.

**WARNING**

BEFORE LOWERING THE PLATFORM MAKE SURE THAT THE ENTIRE SURFACE BELOW IS FREE OF PEOPLE OR OBJECTS.

- Step 1.** Actuate on the platform lowering switch located in the rear of the engine compartment, until the platform is completely lowered.
- Step 2.** If the platform is not completely lowered activate the manual pump (electric pump), located in the rear of the engine compartment, until the accumulator is charged.
- Step 3.** Actuate on the platform lowering switch, and verify that the platform is completely lowered.

**WARNING**

DO NOT DIRECTLY ACTUATE ON THE PLATFORM LOWERING SOLENOID VALVE DUE TO RISK OF CRUSHING HANDS WITH PLATFORM.

2. REMOVING LOADS (FIGURE 2)

Follow the procedures indicated below, in case of engine or hydraulic pump malfunction or electrical power failure.

- Step 1.** Bypass hydraulic transfer motors for each section, opening the red valve located below the floor of the operator control position.
- Step 2.** Actuate on the solenoid valve operation knob to lower the rear load stop. If the load stop does not lower completely, activate the manual pump (electric pump), located in the rear of the engine compartment, until the accumulator is charged.
- Step 3.** Remove load manually.
- Step 4.** Close the roller bypass valves and reactivate the rear load stop selector switch so that it returns to the raised position.

If load guides are installed on the vehicle, and they prevent smooth load movement, actuate on the guide solenoid valves, located below the driver's position.

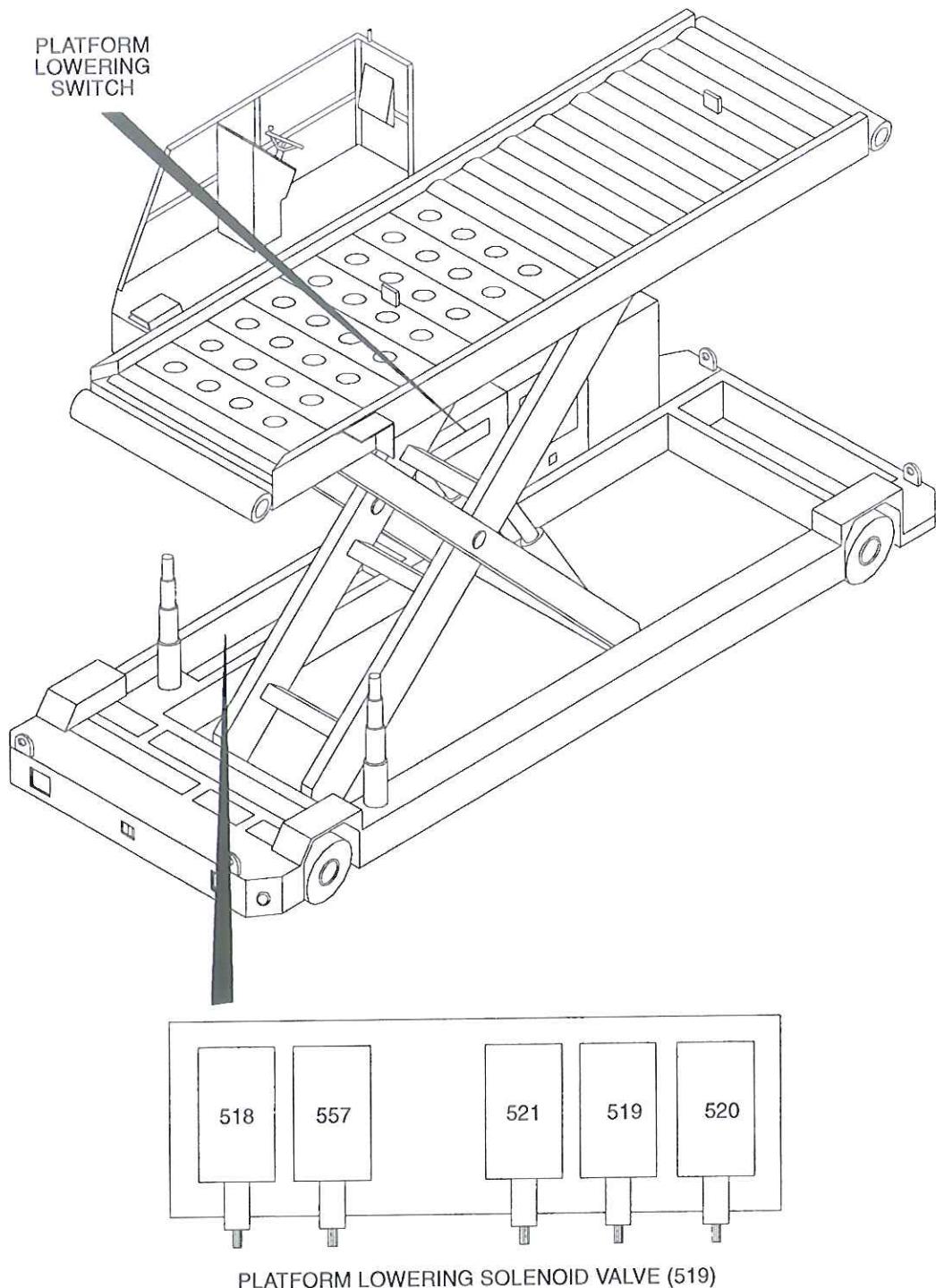


Figure 1
EMERGENCY LOWERING LOAD PLATFORM

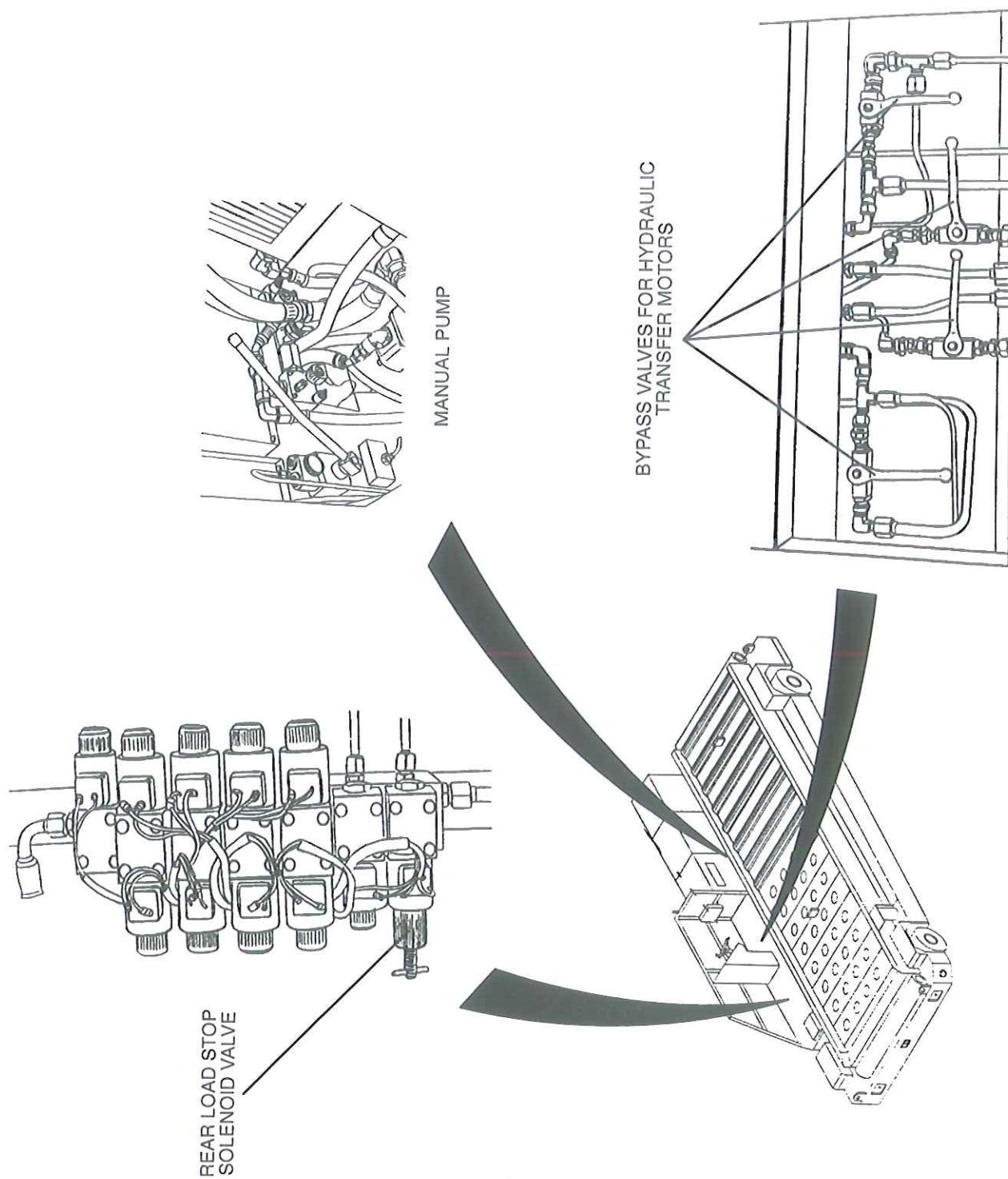


Figure 2
EMERGENCY LOAD REMOVAL

3. RELEASING THE PARKING BRAKE (FIGURE 3)

Follow the procedures indicated below, in case of engine or hydraulic pump malfunction or electrical power failure.

- Step 1.** Rotate the parking brake solenoid valve operation knob, clockwise, as far as it will go. This solenoid valve is located on the chassis below the control position. If the pressure in the accumulator is not sufficient to release the brake, recharge it with the manual pump (electric pump), located in the rear of the engine compartment, until the accumulator is charged.

NOTE: THIS MANEUVER IS VALID FOR A FEW MINUTES, ONLY. IF MORE TIME IS NECESSARY, PERFORM MECHANICAL BRAKE RELEASE AS DESCRIBED BELOW.

- Step 2.** To perform mechanical parking brake release, access the right hydraulic traction motor through the rear door, below the tanks. Remove cap from the interior hub with a 36 mm wrench, and tighten the interior screw with a 10 mm allen wrench.
- Step 3.** After towing the vehicle, return the solenoid valve operation knob to the initial position, or return the screw and wheel hub cap to the initial position.

4. TOWING THE VEHICLE (FIGURE 4)

Follow the procedures indicated below, in case of engine or hydraulic pump malfunction or electrical power failure.

- Step 1.** Open the traction pump bypass, located above the pump in the engine compartment.
- Step 2.** Release the parking brake.
- Step 3.** Lower the platform.
- Step 4.** Tow the vehicle.
- Step 5.** Close the traction pump bypass valve.

**WARNING**

DO NOT EXCEED THE SPEED OF 8 KM/H (5 MPH) WHILE TOWING THE VEHICLE. EXCEEDING THIS SPEED LIMIT MAY CAUSE INJURIES TO PEOPLE OR DAMAGE TO THE EQUIPMENT.

If the optional emergency electric pump is installed on the vehicle, it may be used in the previous steps, above.

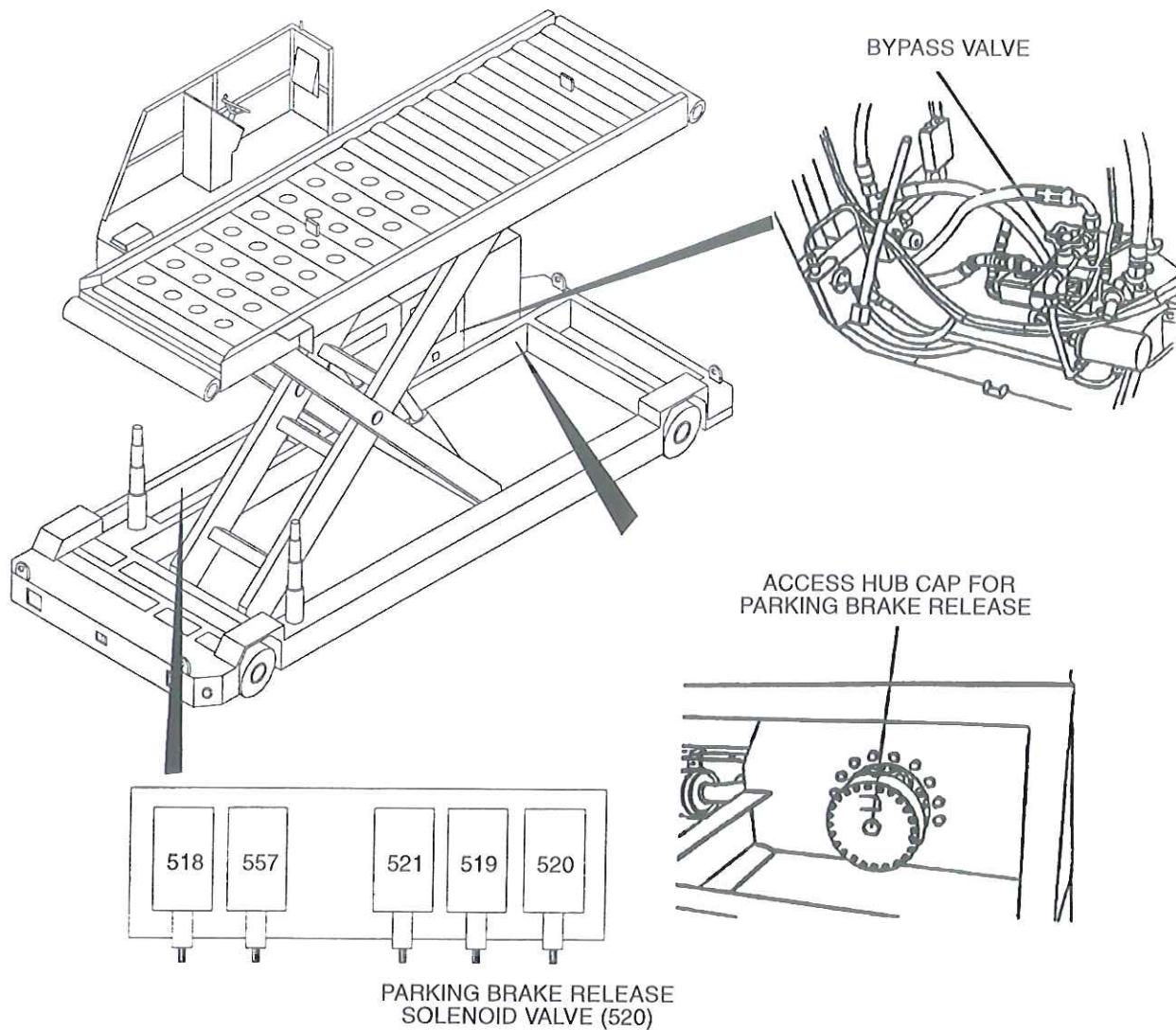


Figure 3
PARKING BRAKE RELEASE

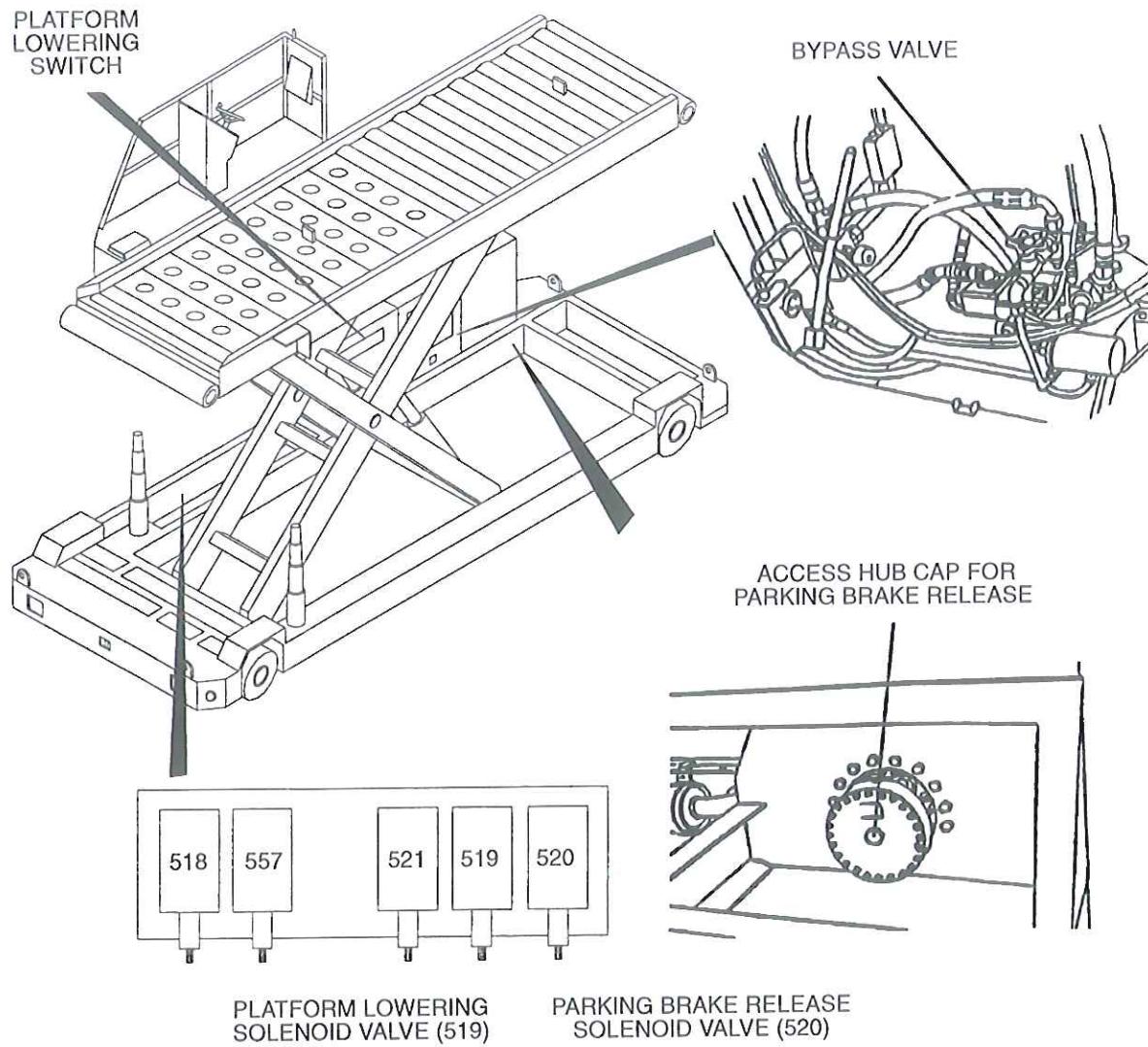


Figure 4
VEHICLE TOWING