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PTE 30 SERIES

SELF-PROPELLED, PALLET LIFT TRUCK

Operation

Maintenance

Repair Parts List

Big Joe Manufacturing Company • Des Plaines, IL 60018

MANUAL NO. 901467
06/20/2017

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WARNING

Do not operate this truck unless you have been authorized and trained to do so, and have read all warnings and instructions in Operator's Manual and on this truck.

Do not operate this truck until you have checked its condition. Give special attention to tires, horn, battery, controller, lift system, brakes, steering mechanism, guards and safety devices.

Operate truck only from designated operating position. Do not carry passengers. Keep feet clear of truck and wear foot protection.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.

Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery surfaces that could cause truck to slide or overturn. Use special care when traveling without load as the risk of overturn may be greater.

Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load trailing.

Use special care when operating on ramps travel slowly, and do not angle or turn. Travel with lifting mechanism downhill.

Do not handle loads which are higher than the load backrest or load backrest extension unless load is secured so that no part of it could fall backward. Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against load backrest.

When leaving truck, neutralize travel control, fully lower lifting mechanism and set brake. When leaving truck unattended, also shut off power.

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TABLE OF CONTENTS

Section		Page
1	DESCRIPTION	1-1
1-1.	INTRODUCTION.	1-1
1-2.	GENERAL DESCRIPTION.	1-1
1-3.	SAFETY FEATURES.	1-2
2	OPERATION	2-1
2-1.	GENERAL.	2-1
2-2.	OPERATING PRECAUTIONS.	2-1
2-3.	BEFORE OPERATION.	2-1
2-4.	GENERAL CONTROL OPERATION.	2-4
2-5.	DRIVING AND STOPPING PROCEDURES.	2-4
2-6.	BELLY-BUTTON SWITCH.	2-4
2-7.	STEERING ARM PNEUMATIC SPRING.	2-5
2-8.	LIFT AND LOWER CONTROLS.	2-5
2-9.	LOADING AND UNLOADING.	2-5
2-10.	PARKING.	2-5
3	PLANNED MAINTENANCE	3-1
3-1.	GENERAL.	3-1
3-2.	MONTHLY AND QUARTERLY CHECKS.	3-1
3-3.	BATTERY CARE.	3-1
3-4.	CHARGING BATTERIES	3-1
3-5.	LUBRICATION.	3-2
4	TROUBLESHOOTING	4-1
4-1.	GENERAL	4-1
4-2.	TRANSISTOR CONTROLLER TROUBLESHOOTING	4-4
4-2.1.	FAULT DETECTION.	4-4
4-2.2.	HAND HELD PROGRAMMER (OPTIONAL)	4-5
4-2.3.	FAULT RECORDING.	4-5
4-2.4.	FAULT RECOVERY.	4-5
4-2.5.	GENERAL CHECKOUT.	4-5
4-2.6.	ADJUSTMENT	4-6
4-2.7.	DIAGNOSTICS AND TROUBLESHOOTING.	4-7
4-2.8.	PROGRAMMER DIAGNOSTICS	4-7
5	STEERING ARM AND CONTROL HEAD SERIVCE	5-1
5-1.	CONTROL HEAD	5-1
5-1.1.	CONTROL HEAD REMOVAL.	5-1
5-1.2.	BELLY-BUTTON SWITCH REPLACEMENT.	5-1
5-1.3.	LIFT, LOWER AND HORN SWITCH REPLACEMENT	5-1
5-1.4.	DIRECTIONAL SWITCH REMOVAL AND ADJUSTMENT.	5-1
5-1.5.	POTENTIOMETER REMOVAL TESTING AND ADJUSTMENT.	5-4
5-1.6.	CONTROL HEAD INSTALLATION.	5-5
5-2.	STEERING ARM	5-5
5-2.1.	PNEUMATIC SPRING REPLACEMENT.	5-5
5-2.2.	STEERING ARM REMOVAL.	5-5
5-2.3.	STEERING ARM INSTALLATION.	5-5
6	BRAKE SERVICING	6-1
6-1.	BRAKES.	6-1
6-1.1.	BRAKE REMOVAL.	6-1
6-1.2.	BRAKE INSTALLATION.	6-1
7	TRANSMISSION, DRIVE WHEEL, LOAD WHEEL, BALANCE WHEEL AND ENTRY ROLLER SERVICING	7-1
7-1.	DRIVE WHEEL.	7-1
7-2.	DRIVE ASSEMBLY	7-1
7-2.1.	REMOVAL.	7-1
7-2.2.	REPAIR	7-1
7-2.3.	INSTALLATION.	7-1
7-3.	LOAD WHEEL.	7-1
7-3.1.	REMOVAL	7-1
7-3.2.	REPAIR	7-4
7-3.3.	LOAD WHEEL INSTALLATION	7-4
7-4.	CASTERS	7-5
7-4.1.	REMOVAL	7-5
7-4.2.	REPAIR	7-5
7-4.3.	INSTALLATION	7-5
7-5.	ENTRY ROLLERS	7-6
7-5.1.	ENTRY ROLLER REMOVAL	7-6
7-5.2.	ENTRY ROLLER REMOVAL	7-6
8	ELEVATION SYSTEM SERVICING	8-1
8-1.	GENERAL.	8-1
8-2.	LIFT LINKAGE	8-1
8-2.1.	REMOVAL	8-1
8-2.2.	REASSEMBLY	8-1
8-3.	POWER SECTION AND FORK SECTION	8-1
8-3.1.	SEPARATING POWER SECTION AND FORK SECTION.	8-1
8-3.2.	FORK FRAME REPAIR.	8-1
8-3.3.	FRAME REPAIR.	8-1
8-3.4.	MATING POWER SECTION AND FORK SECTION.	8-1
9	HYDRAULIC SYSTEM SERVICING	9-1
9-1.	LINES AND FITTINGS	9-1
9-2.	HYDRAULIC PUMP, MOTOR, AND RESERVOIR ASSY	9-3
9-2.1.	REMOVAL	9-3
9-2.2.	DISASSEMBLY AND REASSEMBLY	9-3
9-2.3.	INSTALLATION	9-3
9-2.4.	LIFT CYLINDER	9-4
9-2.5.	HYDRAULIC PRESSURE ADJUSTMENT	9-5
10	ELECTRICAL COMPONENTS	10-1
10-1.	KEY SWITCH REPLACEMENT	10-1
10-2.	BATTERY INDICATOR REPLACEMENT	10-2

https://truckmanualshub.com/

TABLE OF CONTENTS - Continued

Section Page

10-3. EMERGENCY DISCONNECT SWITCH REPLACEMENT. 10-2
10-4. DEADMAN SWITCH. 10-2
10-4.1.REPLACEMENT 10-2
10-4.2.ADJUSTMENT 10-4
10-5. BATTERY DISCONNECT SWITCH. 10-4
10-6. LIFT LIMIT SWITCH. 10-4
10-7. ELECTRICAL CONTROL PANEL 10-4
10-7.1.MAINTENANCE 10-4
10-7.2.CLEANING 10-4
10-7.3.DIAGNOSTIC HISTORY 10-6
10-7.4.TEST THE FAULT DETECTION CIRCUITRY 10-6
10-7.5.PANEL REMOVAL. 10-6
10-7.6.PANEL DISASSEMBLY. 10-6
10-7.7.PANEL INSTALLATION. 10-7
10-8. PUMP MOTOR 10-8
10-9. DRIVE MOTOR. 10-8

11 OPTIONAL EQUIPMENT 11-1

12 ILLUSTRATED PARTS BREAKDOWN 12-1

LIST OF FIGURES

Figure Page

1-1 NAME PLATE 1-1
1-2 PTE 45 LIFT TRUCK 1-1
2-1 SAMPLE OF OPERATOR CHECK LIST 2-3
2-2 FORWARD/REVERSE CONTROL 2-4
2-3 PUSHBUTTON SWITCHES 2-4
2-4 BRAKE ACTUATION 2-4
2-5 BELLY-BUTTON SWITCH 2-5
3-1 LUBRICATION DIAGRAM 3-3
4-1 STATUS LED 4-4
4-2 ELECTRICAL PANEL PARTS 4-4
4-3 CONTROLLER TERMINALS 4-5
4-4 HAND HELD PROGRAMMER 4-6
4-5 WIRING DIAGRAM (SHEET 1) 4-12
5-1 CONTROL HEAD SWITCHES 5-2
5-2 CONTROL HEAD AND STEERING ARM 5-3
5-3 DRIVE CONTROLS 5-4
5-4 STEERING CONTROL 5-6
6-1 TRANSMISSION, BRAKE AND DRIVE MOTOR ASSEMBLY 6-1
7-1 DRIVE ASSEMBLY 7-2
7-2 FORK SECTION 7-3
7-3 WHEEL ASSEMBLY 7-4
7-4 FRAME 7-5
8-1 FORK SECTION 8-2
8-2 FRAME 8-3

Figure Page

9-1 COMPARTMENT 9-1
9-2 HYDRAULIC SYSTEM 9-2
10-1 COMPARTMENT 10-1
10-2 STEERING CONTROL 10-3
10-3 BRAKE ACTUATION 10-4
10-4 FRAME 10-5
10-5 ELECTRICAL PANEL 10-7
12-1 STEERING CONTROL 12-2
12-2 STEERING ARM 12-4
12-3 CONTROL HEAD 12-6
12-4 CONTROL HEAD 12-7
12-5 DRIVE ASSEMBLY 12-8
12-6 TRANSMISSION, BRAKE AND DRIVE MOTOR ASSY 12-9
12-7 COMPARTMENT 12-10
12-8 DECALS 12-12
12-9 FRAME 12-14
12-10 FORK SECTION 12-16
12-11 CASTER ASSEMBLY 12-18
12-12 LOAD WHEEL ASSEMBLY 12-20
12-13 ELECTRICAL PANEL 12-21
12-14 HYDRAULIC SYSTEM 12-22
12-15 PUMP, MOTOR & RESERVOIR ASSEMBLY . 12-24
12-16 CYLINDER ASSEMBLY 12-26
12-17 VALVE ASSEMBLY 12-28

LIST OF TABLES

Table Page

2-1 OPERATOR CHECKS 2-2
3-1 MONTHLY AND QUARTERLY INSPECTION AND SERVICE CHART 3-1
3-2 RECOMMENDED LUBRICANTS 3-2
3-3 LUBRICATION CHART 3-3

Table Page

4-1 TROUBLESHOOTING CHART 4-1
4-2 ADJUSTMENT SETTINGS 4-7
4-3 LED CODES 4-8
4-4 TROUBLESHOOTING CHART 4-9

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SECTION 1
DESCRIPTION

1-1. INTRODUCTION.

This publication describes the 24 volt transistor PTE 30 lift truck distributed by Big Joe Manufacturing Company, Des Plaines, Illinois, 60018. Included are operating instructions, planned maintenance instructions, lubrication procedures, corrective maintenance procedures and a complete parts list with part location illustrations.

Users shall comply with all requirements indicated in applicable OSHA standards and current edition of A.N.S.I. B56.1 Part II. By following these requirements and the recommendations contained in this manual, you will receive many years of dependable service from your Big Joe lift truck.

1-2. GENERAL DESCRIPTION.

The self-propelled PTE 30 truck, Figure 1-2, lifts and transports payloads up to 3000 pounds on rigid forks.

The forward and reverse motion is controlled by either of two controller levers mounted on the control head. Stopping and turning is controlled by the steering arm. Lift and Lower is controlled by pushbuttons on the control head. The battery powered lift truck is quite and without exhaust fumes.

The reversible DC motor propels the lift truck in forward or reverse direction throughout the available speed range. The PTE 30 lift truck can be driven with forks raised of lowered. The lift truck must be protected from the elements.

The model number will be found on the name plate (Figure 1-1) along with the serial number, lifting capacity, and load center. Figure 1-2 shows the locations of the truck's main components and controls.

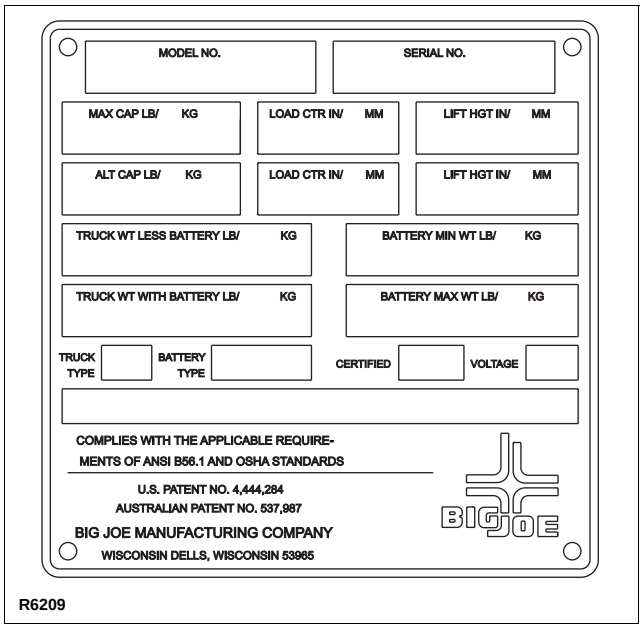

Figure 1-1 Name Plate

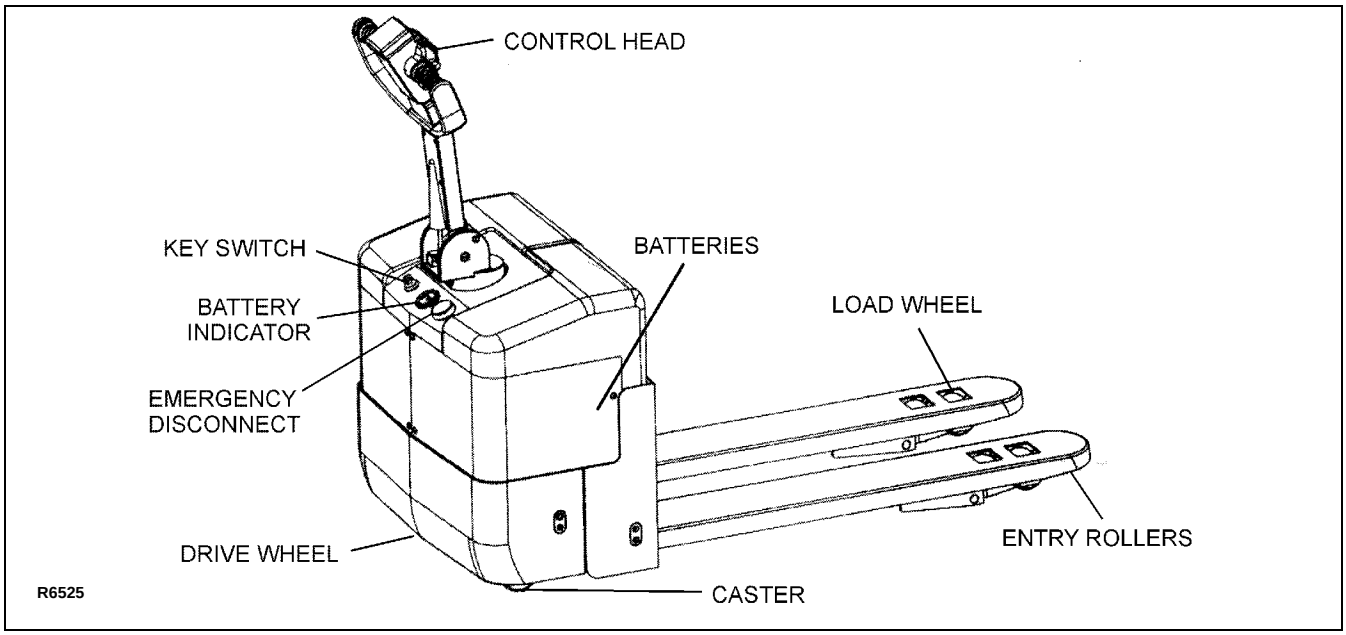

Figure 1-2. PTE 45 Lift Truck

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1-3. SAFETY FEATURES.

The PTE 30 is designed and engineered to provide maximum safety for operator and payload. Some of the safety features incorporated into the design are:

- Dead-man brake to apply the brake and cut off drive power when the steering arm is released.
- Belly-button switch to reverse truck should the operator accidentally pin himself against a wall or obstruction when backing up in slow speed.
- All control functions automatically return to “OFF” when released.
- Externally accessible emergency disconnect switch within operator's reach.
- Separately fused control circuits and power circuits.
- Readily accessible HORN button.
- Slip-resistance hand to provide a firm hand hold for operator.
- Flow control valve regulates maximum lowering speed within prescribed limits.
- Relief valve maintains hydraulic pressure within prescribed limits.
- High visibility color scheme of truck provides visual alert of truck’s presence.
- Battery Indicator
- Casters

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SECTION 2
OPERATION

2-1. GENERAL.

This section gives detailed operating instructions for the PTE 30 lift truck. The instructions are divided into the various phases of operations, such as operating lift, driving, and stopping. Routine precautions are included for safe operation.

2-2. OPERATING PRECAUTIONS.

WARNING: Improper operation of the lift truck may result in operator injury, or load and/or lift truck damage. Observe the following precautions when operating the PTE 30 lift truck.

The following safety precautions must be adhered to at all times.

- Do not operate this truck unless you have been trained and authorized to do so and have read all warnings and instructions in this manual and on the truck.
- All warnings and instructions must be read and understood before using the equipment.
- Equipment must be inspected by a qualified person on a regular basis.
- Do not operate this truck until you have checked its condition. Give special attention to Tires, Horn, Batteries, Controller, Lift System, Brakes, Steering Mechanism, Guards and Safety Devices
- Operate truck only from designated operation position. Wear foot protection. Do not carry passengers.
- Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.
- Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery surfaces that could cause truck to slide or overturn. Use special care when traveling without load as the risk of overturn may be greater.
- Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load or lifting mechanism trailing.
- Do not overload truck. Check nameplate for load weight and load center information.
- Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against load backrest.
- Do not handle loads which are higher than the load backrest unless load is secured so that no part of it could fall backward.
- When leaving truck, neutralize travel control. Fully lower lifting mechanism and set brake. When leaving truck unattended, turn off key switch and push in the emergency disconnect switch and remove key.

2-3. BEFORE OPERATION

Table 2-1 covers important inspection points on the PTE 30 lift truck which should be checked prior to operation. Depending on use, some trucks may require additional checks.

Figure 2-1 shows a sample format for a Operator Checklist, which can be modified as necessary to fit your operation.

WARNING: Periodic maintenance of this truck by a QUALIFIED TECHNICIAN is required.

CAUTION: A QUALIFIED SERVICE TECHNICIAN should check the truck monthly for proper lubrication, proper fluid levels, brake maintenance, motor maintenance and other areas specified in the SECTION 3.

WARNING: If the truck is found to be unsafe and in need of repair, or contributes to an unsafe condition, report it immediately to the designated authority. Do not operate it until it has been restored to a safe operating condition. Do not make any unauthorized repairs or adjustments. All service must be performed by a qualified maintenance technician.

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Table 2-1 Operator Checks

ITEM	PROCEDURE
Transmission and hydraulic systems.	Check for signs of fluid leakage.
Forks	Check for cracks and damage.
Guards and load backrest	Check that safety guards are in place, properly secured and not damaged.
Safety signs	Check that warning labels, nameplate, etc., are in good condition and legible.
Horn	Check that horn sounds when operated.
Steering	Check for binding or looseness in steering arm when steering.
Travel controls	Check that speed controls on control head operate in all speed ranges in forward and reverse and that belly button switch functions.
Wheels	Check drive wheel for cracks or damage. Move truck to check load for freedom of rotation.
Hydraulic controls	Check operation of lift and lower to their maximum positions.
Brakes	Check that brakes actuate when steering arm is raised to upright position, and when lowered to horizontal position.
Deadman/ Parking brake	Check that steering arm raises to upright position when released and brake applies.
Emergency disconnect	Check that emergency disconnect switch can be depressed and turns off power to the truck.
Battery charge	Check that battery indicator is on “1”.

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BIG JOE

Electric Truck
Daily Operator Check-Off List

Date _____ Operator _____

Truck No. _____ Model No. _____

Dept. _____ Shift _____

Hour Meter
Reading—Drive _____ Hoist _____

Check	O.K. (✓)	Need Maintenance
Tires		
Load Wheels		
Horn		
Lift—Lower Control		
Attachment Operation		
Forward & Reverse Controls		
Steering		
Brakes		
Hydraulic Leaks, Cylinders, Valves, Hoses, Etc.		

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Figure 2-1 Sample of Operator Check List

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2-4. GENERAL CONTROL OPERATION.

The speed control (See Figure 2-2) located on each side of the control head provides fingertip control for driving the truck. Rotate the control in the direction you want to travel. The farther you rotate the control from the neutral position, the faster the truck will travel.

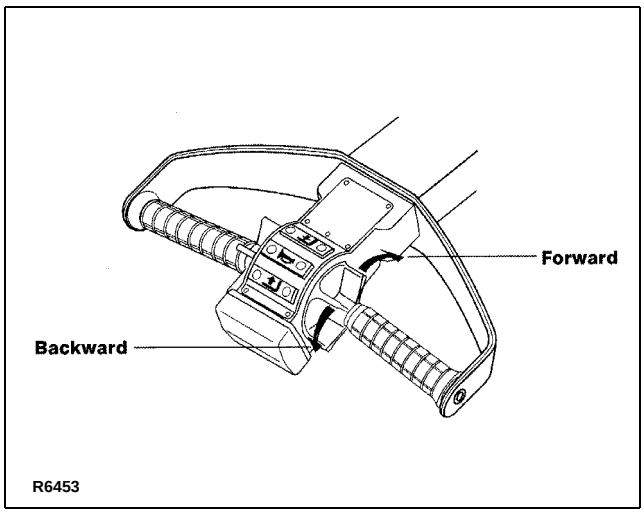

Figure 2-2. Forward/Reverse Control

The pushbutton switches (See Figure 2-3), located on the front of the control head activate the lift-lower controls and the horn.

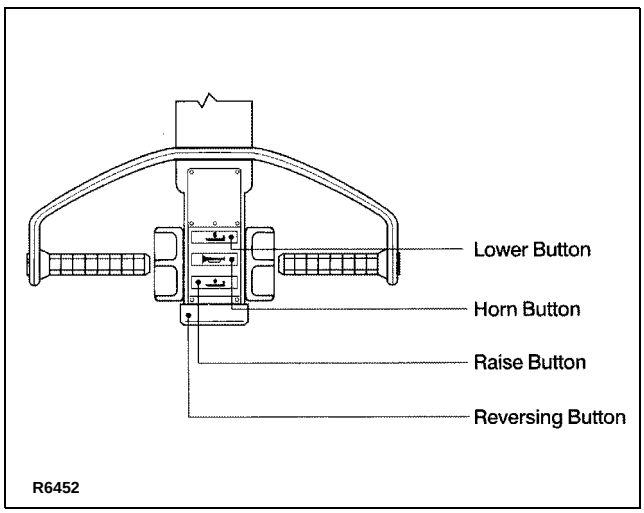

Figure 2-3. Pushbutton Switches

The brake is fully applied by lowering or raising the steering arm. (See Figure 2-4) All traction control power is shut off when the brake is engaged. When the steering arm is in the upright position, the brake acts as a parking brake. Deadman braking occurs when the handle is released and spring action raises steering arm to the upright position.

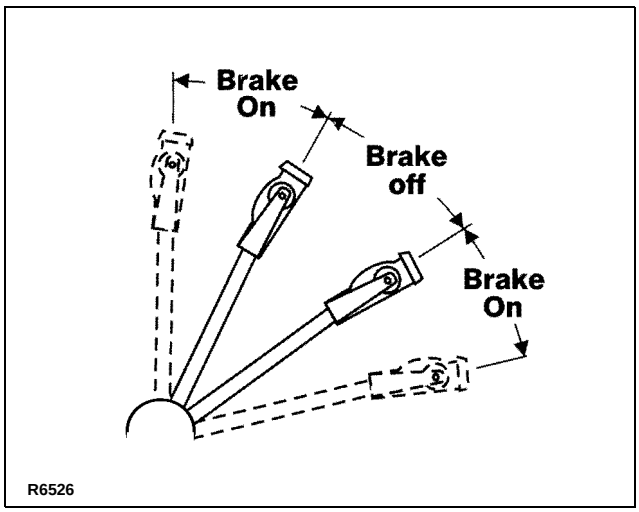

Figure 2-4. Brake Actuation

2-5. DRIVING AND STOPPING PROCEDURES.

1. Turn on the key switch and pull the emergency disconnect switch out. Grasp the grips of the steering head so that the speed control can be comfortably operated by either thumb.
2. Lower the steering arm to a comfortable position above horizontal to disengage the brake and to energize the electrical circuits. See Figure 2-4.
3. To move forward (with load in front), slowly press the speed control forward. See Figure 2-2. Press the forward speed control farther to increase speed.
4. To slow down or stop, release the speed control and lower or raise the steering arm to the horizontal or vertical position. See Figure 2-4. In those positions, the brake engages, slowing or stopping the truck.
5. Procedures for movement in reverse are the same as in the forward direction except slowly press the speed control backward. See Figure 2-2.

2-6. BELLY-BUTTON SWITCH.

The belly-button switch (Figure 2-5) minimizes the possibility of the driver being pinned by the steering arm while driving the lift truck in slow speed. If the switch presses against the operator while the lift truck is being driven toward the operator, the switch changes the direction of the lift truck.

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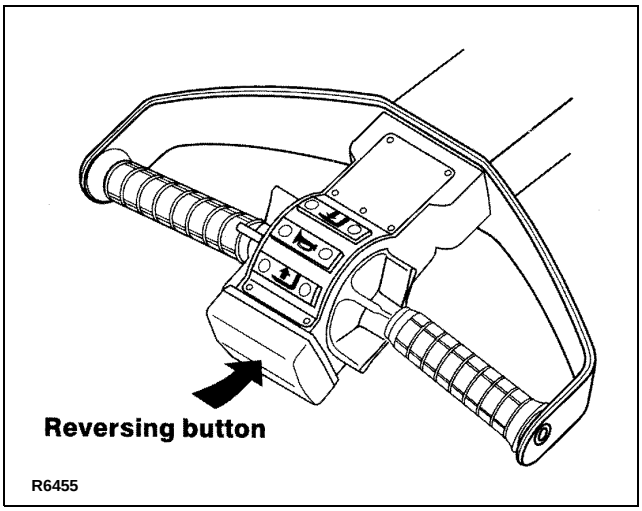

Figure 2-5. Belly-Button Switch

2-7. STEERING ARM PNEUMATIC SPRING.

The steering arm pneumatic spring automatically raises the steering arm to the upright position when the steering arm is released. If the steering arm does not return fully, the steering arm pneumatic spring requires replacement. Return truck to maintenance for repair.

2-8. LIFT AND LOWER CONTROLS.

Lift/Lower Control buttons are located on the steering control head. (Figure 2-3)

To lift forks, push in LIFT button and hold until forks reach desired height. To lower forks, push in LOWER button and hold until forks descend to desired height.

2-9. LOADING AND UNLOADING.

1. Move truck to location where load is to be picked up.
2. Move the truck into position so forks are within pallet or skid, and the load is centered over the forks and as far back as possible.
3. Raise forks to lift load.
4. Drive to area where load is to be placed.
5. Move truck to align load with its new position.
6. Lower the load until it rests squarely in place and the forks are free.
7. Slowly move the truck out from under the load.

2-10.PARKING.

When finished with moving loads, drive truck to its maintenance or storage area. Push the emergency disconnect switch in and turn off the key switch. Charge batteries as necessary. Refer to battery care instructions, SECTION 3.

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NOTES

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SECTION 3
PLANNED MAINTENANCE

3-1. GENERAL.

Planned maintenance consists of periodic visual and operational checks, parts inspection, lubrication, and scheduled maintenance designed to prevent or discover malfunctions and defective parts. The operator performs the checks in SECTION 2, and refers any required servicing to a qualified maintenance technician who performs the scheduled maintenance and any required servicing.

3-2. MONTHLY AND QUARTERLY CHECKS.

Table 3-1 is a monthly and quarterly inspection and service chart based on normal usage of equipment eight hours per day, five days per week. If the lift truck is used in excess of forty hours per week, the frequency of inspection and service should be increased accordingly. These procedures must be performed by a qualified service technician or your Big Joe service representative.

3-3. BATTERY CARE.

These batteries are maintenance-free. Any attempt to open the battery will void the warranty.

Ultra-deep discharging of brand new batteries should be avoided for at least 15 cycles. To dramatically extend battery life, ultra-deep discharge should be avoided. The shallower the average discharge, the longer the battery life.

Charge the battery as described in paragraph 3-4.

3-4. CHARGING BATTERIES

Charging requirements will vary depending on depth of discharge and temperature. Follow safety rules when placing a battery on charge.

Proceed as follows:

1. Park truck at charging station with carriage lowered and key switch and disconnect switch off.
2. Check the condition of the AC cord, the battery connector and battery cables. If there are any cuts in the cable, any exposed wires, loose plugs or connectors, DO NOT attempt to charge the batteries. Contact appropriate personnel for repairs to be made.
3. Connect the charger to connector (13, Figure 12-9). Switch (8) will automatically disconnect the batteries to from the truck. Make sure connectors are mated properly.
4. Connect the charger AC cord to the appropriate power supply and follow the instructions supplied with the charger.

Table 3-1 Monthly and Quarterly Inspection and Service Chart

VISUAL CHECKS	
INTERVAL	**INSPECTION OR SERVICE**
Monthly	Check electrical brake for proper operation.
Monthly	Check load wheels for wear. A poly load wheel must be replace if worn to within 1/16 inch of hub. Check for separation from hub.
Monthly	Check drive wheel for wear. A poly drive wheel must be replace if worn to within 1 inch of hub. Check for separation from hub.
Monthly	Check entry wheels for wear or damage.
Monthly	Inspect wiring for loose connections and damaged insulation.
Monthly	Check deadman brake switch for proper operation.
Quarterly	Check lift cylinder for leakage.
Quarterly	Check for excessive jerking of steering arm when stopping or starting.

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3-5. LUBRICATION.

Refer to Table 3-2 for the recommended types of grease and oil. Table 3-3 in conjunction with Figure 3-1 identifies the items requiring lubrication.

Table 3-2 Recommended Lubricants (See Table 3-3 for Application)

No. 1	Transmission oil—EP SAE 80W-90, Part Number 055780 Transmission oil—EP SAE 10W-30, Part Number 055790 (Note)
No. 2	Grease—Lithium base, general purpose. Part Number 055750 Part Number 055753 (Note)
No. 3	Hydraulic oil-Heavy duty with a viscosity of 150 SUS foam suppressing agent and rust and oxidation inhibitors Part Number 055779 Hydraulic oil-Heavy duty with a viscosity of 100 SUS foam suppressing agent and rust and oxidation inhibitors Part Number 055784 (Note)
No. 4	SAE 30 or 40 Engine lubricating oil

NOTE: USED ON COLD CONDITIONED TRUCKS

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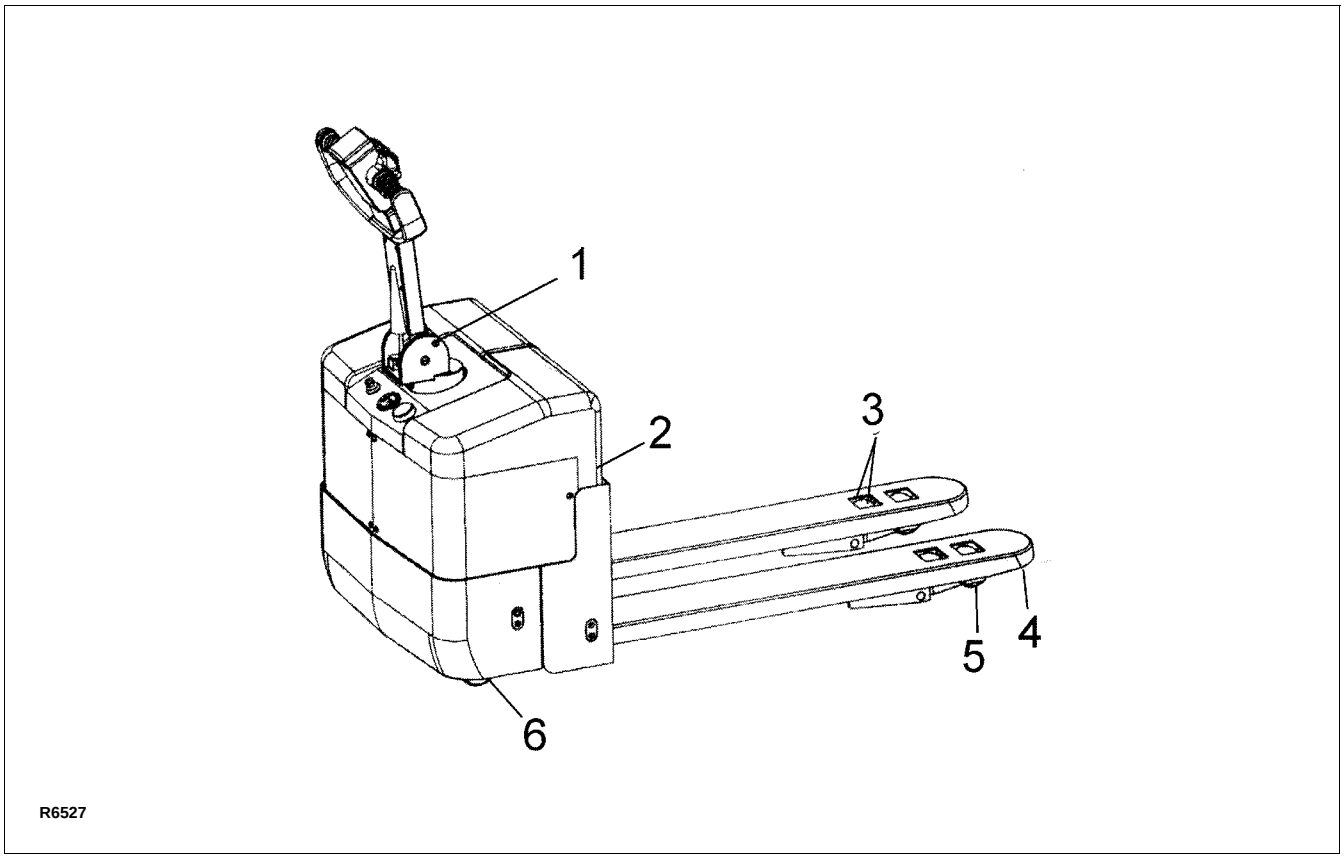

Figure 3-1 Lubrication Diagram

Table 3-3 Lubrication Chart

FIG 3-2 INDEX NO.	LOCATION	METHOD OF APPLICATION	TYPE (Table 3-3)	APPLICATION OF LUBRICANT
1	Steering arm pivot	Can	No. 4	1 or 2 drops each time serviced.
2	Lift Linkage *	Can	No. 4	1 or 2 drops each time serviced.
3	Lift Linkage Fittings**	Gun	No. 2	Pressure lubricate.
4	Entry Rollers	Can	No. 3	1 or 2 drops each time serviced.
5	Load Wheel Fittings**	Gun	No. 2	Pressure lubricate.
6	Casters	Can	No. 2	1 or 2 drops each time serviced.

* Remove covers to gain access to pivot points.

** Raise lift carriage to gain access to grease fittings.

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SECTION 4
TROUBLESHOOTING

4-1. GENERAL

Table 4-1 services as a guide to determine possible causes of trouble. The table is divided into five main categories: Truck Dead: Trouble With Travel: Trouble With Braking: Trouble With Lifting Or Lowering, and Miscellaneous malfunctions. Refer to electrical wiring schematic (Figure 4-5) as a supplement to the troubleshooting chart or when tracing an electrical circuit.

Table 4-1 Troubleshooting Chart

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
TRUCK DEAD		
Truck will not run nor will lift system operate.	a. Fuse (2, Figure 4-2) blown.	Check fuse and replace if necessary.
	b. Battery dead or disconnected.	Check battery quick-disconnect switch (8, Figure 12-9) and check battery voltage.
	c. Keyswitch (4, Figure 12-7) or emergency disconnect switch (6) defective.	Bypass keyswitch to determine if it is malfunctioning. Then bypass emergency disconnect switch to determine if it is malfunctioning.
	d. Defective wiring.	Check for open circuit. Repair as required.
TROUBLE WITH TRAVEL		
Truck does not run forward or reverse. All other functions operate normally.	a. Check all wiring. A loose connection may be the cause of malfunction.	Tighten all loose connections before further troubleshooting.
	b. Defective deadman switch (19, Figure 12-1).	Check and replace switch if defective.
	c. Defective main contactor (5, Figure 4-2).	Check for proper operation and replace if necessary.
	d. Defective potentiometer (14, Figure 12-4).	Check and replace potentiometer if defective.
	e. Transistor control fault may need to be reset.	Move control arm up into the neutral position to reset.
Truck runs forward but not in reverse.	Defective reverse switch (6, Figure 12-4) in control head.	Check for proper operation of reverse switch with steering arm in operating position and replace if necessary.
Truck runs reverse but not in forward.	Defective forward switch (6, Figure 12-4) in control head.	Check for proper operation of reverse switch with steering arm in operating position and replace if necessary.

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Table 4-1 Troubleshooting Chart - Continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Truck runs forward and in reverse at lower speeds; will not run at high speed.	Defective potentiometer (14, Figure 12-4) in control head.	Check for variable resistance at the potentiometer when direction control is activated. If not noted, replace potentiometer.
TROUBLE WITH BRAKING		
Truck does not slow with brake, or brake does not engage.	a. Defective deadman switch (1, Figure 12-1).	Check deadman switch for continuity. If none found when the control arm is in the brake position, replace switch.
	b. Defective electrical brake (24, Figure 12-6).	Replace brake.
TROUBLE WITH LIFTING OR LOWERING		
Oil sprays or flows from the top of the lift cylinder.	Defective packing in lift cylinder.	Repair or replace lift cylinder.
Squealing sounds when lifting forks.	a. Oil level too low.	Add oil to reservoir.
	b. Lift linkage binding.	Apply grease.
Forks do not lift to top.	Oil level too low.	Add oil to reservoir.
Weak, slow or uneven action of hydraulic system.	a. Defective pump or relief valve.	Check pressure. Adjust as necessary.
	b. Worn lift cylinder.	Repair or replace cylinder.
	c. Load larger than capacity.	Refer to I.D.platefor capacity.
	d. Defective lift motor solenoid.	Replace solenoid (9, Figure 4-2) on electrical panel.
	e. Battery charge low.	Charge battery.
Forks do not lift, pump motor does not run.	a. Battery is dead or disconnected.	Check and recharge if required.
	b. Defective wiring.	Check and repair as required.
	c. Defect in electrical system for operating pump motor.	Check lift switch in control head, as well as the solenoid (9, Figure 4-2) on electrical panel. Replace.
Forks do not lift, motor runs.	Defect in hydraulic system.	Check the oil level in the reservoir and the oil lines to the lift cylinder, and repair as required. If normal, check the hydraulic pump, and relief valve. Repair, or adjust.
Forks lift, but will not go down.	Defect in hydraulic system	Check lowering control switch (6, Figure 12-4) and lowering solenoid on valve assembly (11, Figure 12-17). Replace as required.
Load will not hold	a. Oil bypassing internally in control valve	Replace valve assembly (11, Figure 12-17).
	b. Worn lift cylinder.	Repair or replace cylinder.

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Table 4-1 Troubleshooting Chart - Continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
TROUBLE WITH LIFTING OR LOWERING - Continued		
Platform does not lift to top. Pump motor runs.	a. Oil level too low.	Add oil to reservoir.
	b. Load larger than capacity.	Refer to nameplate on side of mast for maximum load capacity.
	c. Batteries need charging.	Charge batteries.
Forks creep downward under load when in a raised position.	Leak in hydraulic system, lift cylinder or lowering valve.	Check for leaking fitting in hydraulic line and repair as required. Replace lift cylinder or valve assembly (21, Figure 12-14).
MISCELLANEOUS		
Steering arm does not return to the upright position.	a. Week pneumatic spring.	Replace spring.
	b. Binding.	Check and free the binding item. Verify that the electrical cable has not been damaged. Repair or replace as needed.
Truck moves forward when arm is pulled down.	a. Belly-button switch defective.	Check for short, and repair or replace as necessary.
	b. Short in control head.	Check wiring and repair as required.
Steering arm jerks excessively starting or stopping the truck.	Drive wheel worn.	Replace drive wheel if worn to within 3/8 inch of hub.
Drive motor is jerky.	Motor worn.	Repair motor.

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4-2. TRANSISTOR CONTROLLER TROUBLE-SHOOTING

4-2.1. Fault Detection.

The controller provides diagnostics information to assist technicians in troubleshooting drive system problems. When a fault is detected, the appropriate fault code is signaled via the LED, externally visible on the side of controller (See Figure 4-1 for LED location on controller). The diagnostic codes flashed by the LED are listed in Table 4-3.

If the fault is critical, the controller is automatically disabled. Faults can be caused internally (e.g. shorted transistors) or externally (e.g., wrench or hardware dropped across controller terminals).

To recover from a fault, the F/R switch must be turned off and back on again. If the fault has been corrected, the controller will turn back on.

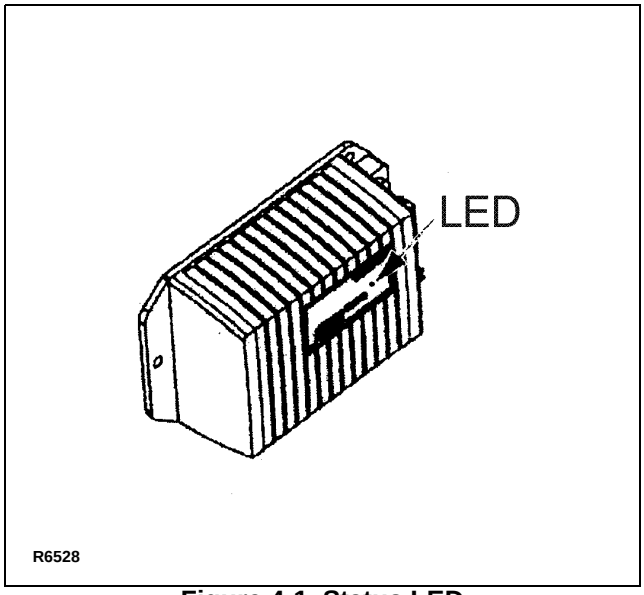

Figure 4-1. Status LED

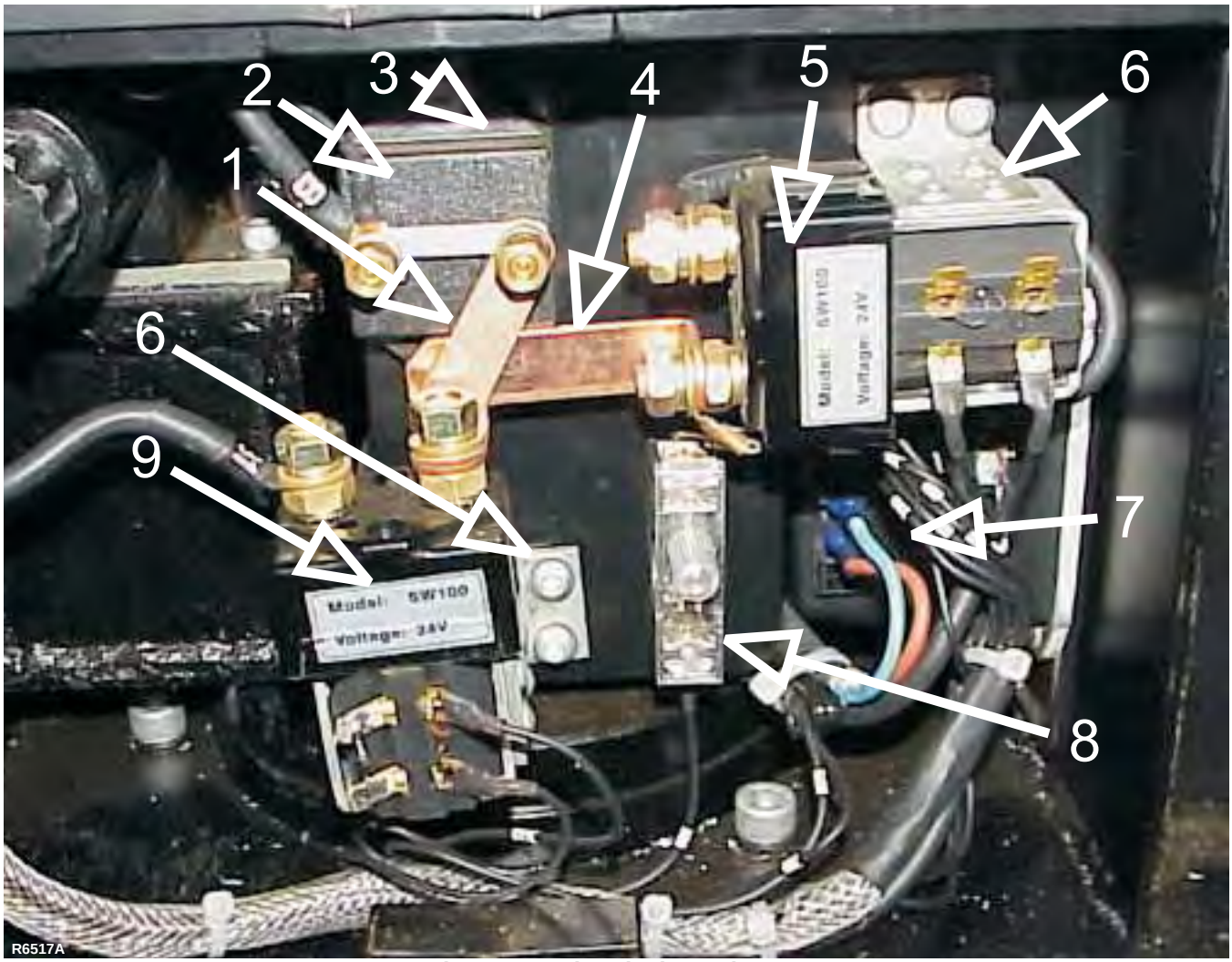

Figure 4-2. Electrical Panel Parts

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The automatic fault detection system includes:

- Contactor coil open / shorted driver
- Contactor driver over-current / contactor coil short
- Contactor welded
- Emergency reverse circuit check
- M- output fault
- Memory checks upon start-up
- Over-voltage cutback
- Power supply out of range (internal)
- Throttle fault
- Under-voltage cutback
- Watchdog (external and internal)

4-2.2. Hand Held Programmer (Optional)

A hand held programmer is available that is designed specifically for use with the controller. It serves dual functions of reading diagnostic data provided by the controller and adjusting certain performance values of the controller. The programmer (**Part Number 005472-02**) is available through your Big Joe dealer. If you require dealer location information, contact Big Joe Manufacturing Co. phone number 847-298-9800.

4-2.3. Fault Recording.

Fault events are recorded in the controller's memory. However, multiple occurrences of the same fault are recorded as one occurrence.

The fault event list can be loaded into the programmer for readout. The Special Diagnostics mode provides access to the controller's diagnostic history file. The history file contains the entire fault event list created since the diagnostic history file was last cleared. The standard Diagnostics mode provides information about only the currently active faults.

4-2.4. Fault Recovery.

Almost all faults require a cycling of the KSI (Key Switch Input) or brake input to reset the controller and enable operation. Refer to Table 4-4 for fault clearance requirements.

4-2.5. General Checkout.

Carefully complete the following checkout procedure. If you find a problem during the checkout, refer to paragraph 4-2.7. for further information.

The checkout can be conducted with or without the handheld programmer (See Paragraph 4-2.2.). However, the checkout procedure is easier with a programmer. To evaluate the system without a programmer, observe the LED and note the flashing pattern and refer to Table 4-3 for the code description.

CAUTION: Put the vehicle up on blocks to get the drive wheel off the ground before beginning these tests.

Turn the keyswitch off and make sure the brake is applied, the throttle is in neutral, and the forward/reverse switches are open.

Do not stand, or allow anyone else to stand directly in front of or behind the vehicle during the tests.

1. If a programmer is available, connect it to the programmer connector (Figure 4-3) on the controller.

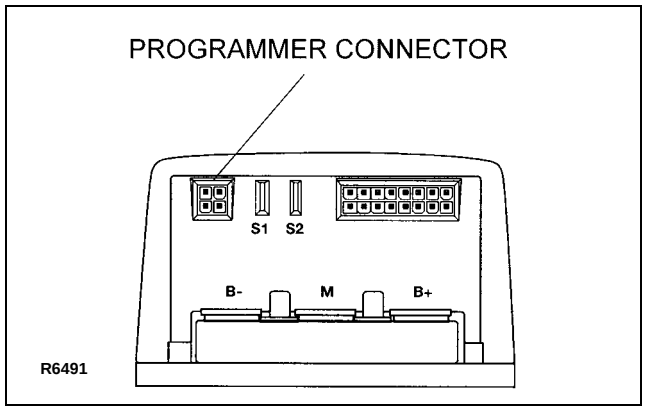

Figure 4-3. Controller Terminals

2. Turn the lift truck key switch to the ON position. The programmer should "power up" with an initial display (2, Figure 4-4), and the controllers Status LED should begin steadily blinking a single flash. If neither happens, check for continuity in the key switch circuit and controller ground.

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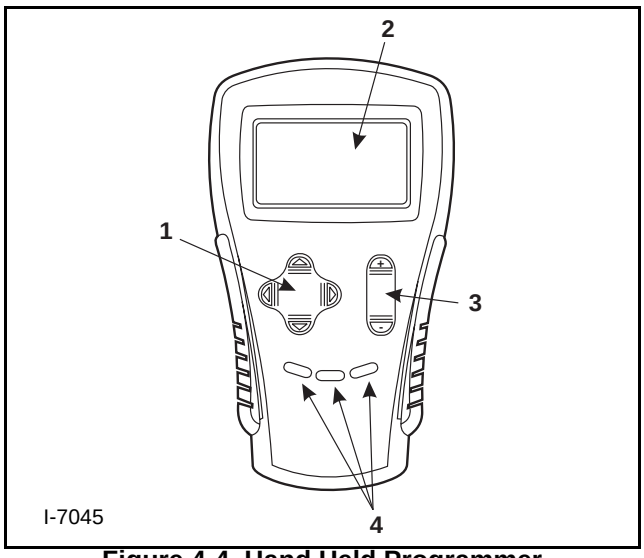

Figure 4-4. Hand Held Programmer

3. If you are using a programmer, put it into the diagnostic mode by pressing the "Menu Navigation Key" (1, Figure 4-4). Using the Navigation key, select the Faults menu. Display the Faults menu by pressing the Right side of the Navigation key. Press the Right side of the Navigation key again to display the list of System Faults. The display should indicate "No Known Faults."

   Release the brake by pulling down the steering arm into the operating position. The controllers LED should continue blinking a single flash and the programmer should continue to indicate no faults. If there is a problem, the LED will flash a diagnostic code and the programmer will display a diagnostic message. If you are conducting the checkout without a programmer, look up the LED diagnostic code in Table 4-3.

   When the problem has been corrected, it may be necessary to cycle the brake in order to clear the fault code.

4. With the brake released, select a direction and operate the throttle. The motor should begin to turn in the selected direction. If it does not, verify the wiring to the forward/reverse switches and motor. The motor should run proportionally faster with increasing throttle. If not, refer to Paragraph 4-2.7.

5. If you are using a programmer, put it into the test mode by using the Navigation key (1) to select the "Monitor" menu. Select the Monitor mode by pressing the "Right" arrow on the Navigation key. Press the Navigation key "Down" arrow to scroll down to observe the status of the forward, reverse, brake, emergency reverse, and mode switches. Cycle each switch in turn, observing the programmer. Each input should show the correct state on the programmer.

6. Check the controller's fault detection circuitry as described in Section 10-7.4.

7. Take the vehicle off the blocks and drive it in a clear area. It should have smooth acceleration and good top speed.

8. Test the plug braking of the vehicle. The vehicle should smoothly slow to a stop and reverse direction, with the audible plugging tone.

9. Verify that all options, such as high pedal disable (HPD), static return to off (SRO), and anti-tie-down, are as desired.

10. Check to see whether the emergency reverse (belly button) feature is working correctly. Verify that the circuit is operational by momentarily disconnecting one of the emergency reverse wires. The vehicle should be disabled and a fault indicated.

4-2.6. Adjustment

To change a parameter (Table 4-2) using the programmer, use the Navigation key (1, Figure 4-4) to select the "PROGRAM" menu. Press the Right key to display a listing of program settings. Scroll down the Program Listing until the desired parameter is highlighted on the display. Press the Right key to display the settings for the item selected. Press the Increase/Decrease key ("+" or "-") (3) until the desired value setting is reached. The parameter is now set at the desired value. All programming occurs in real time. That means the parameter can be changed while the vehicle is in operation.

Some parameters are dependant on other parameters. When the programmer is being used to adjust a parameter and a limit is reached, the display will stop changing.

NOTE: Changing the value of the related parameter may allow the original parameter to be adjusted further.

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Table 4-2 Adjustment Settings

Function	Setting
Acceleration Rate (M1 thru M4)	2.0, 2.0, 0.5, 0.5
Braking Current Limit (M1 thru M4)	80, 80, 200, 200
Deceleration Rate (M1 thru M4)	3.0, 3.0, 5.0, 5.0

4-2.7. Diagnostics and Troubleshooting.

The motor controller provides diagnostics information to assist in troubleshooting drive system problems. The diagnostics information can be obtained in two ways:

- Reading the appropriate display on the programmer
- Observing the fault codes issued by the Status LED. The Status LED is located on the side of the controller. See Figure 4-1 for location of the LED on the controller.

4-2.7.1. LED Diagnostics

During normal operation with no faults present, the Status LED flashes a single flash at approximately 1 flash/second. If the controller detects a fault, a 2-digit fault identification code is flashed continuously until the fault is corrected. For example, three flashes followed by two flashes is code "3,2" appears in the LED code table as:

000 00	000 00	000 00
(3,2)	(3,2)	(3,2)

The codes are listed in Table 4-3. The "0" 's in Table 4-3 indicate an illuminated LED. For suggestions about possible causes of the various faults, refer to Table 4-4 Troubleshooting Chart.

Operational faults, such as an over-temperature situation, are cleared as soon as the operation is brought within range. Non-operational faults, such as a throttle fault, usually requires the brake or key switch to be cycled after the problem is remedied.

4-2.8. Programmer Diagnostics

With a programmer, diagnostics and troubleshooting is more direct than with the LED alone. The programmer presents complete diagnostic information in plain language - no code to decipher. Faults are displayed in the Diagnostic Menu, and the status of the controller inputs/outputs is displayed in the Test Menu.

The following 4-step process is generally used for diagnosing and troubleshooting an inoperative vehicle using the programmer:

1. Visually inspect the vehicle for obvious problems:
2. Diagnose the problem:
3. Test the circuitry with the programmer:
4. Correct the problem.

   Repeat the last three steps as necessary until the vehicle is operational.

   Refer to the Table 4-4 for suggestions covering a wide range of possible faults.

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Table 4-3 LED Codes

LED Code		Explanation
LED Off	Not illuminated	No power or defective controller
Solid On	Always on	Defective controller
Single Flash	0	Controller operational, no faults
1 - 2	0 00	Hardware fail-safe error
1 - 3	0 000	M- fault or motor output short
1 - 4	0 0000	Sequencing fault (SRO)
2 - 1	00 0	Throttle wiper high
2 - 2	00 00	Emergency reverse circuit check fault (BB wiring)
2 - 3	00 000	High-pedal-disable fault (HPD) or expired timer
2 - 4	00 0000	Throttle wiper low
3 - 1	000 0	Contactor driver over current or field winding short
3 - 2	000 00	Welded main contactor
3 - 3	000 000	Field winding open
3 - 4	000 0000	Missing contactor
4 - 1	0000 0	Low battery voltage
4 - 2	0000 00	Overvoltage
4 - 3	0000 000	Thermal cutback, due to over/under temp
4 - 4	0000 0000	anti-tiedown fault, or overheated motor

NOTE: Only one fault is indicated at a time and faults are not queued up.

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Table 4-4 Troubleshooting Chart

LED CODE	PROGRAMMER LCD DISPLAY	POSSIBLE CAUSE	FAULT CLEARANCE
0,1	NO KNOWN FAULTS		
1,1	CURRENT SHUNT FAULT	1. Abnormal vehicle operation causing high current spikes. 2. Current sensor out of range. 3. Controller failure.	Cycle KSI. If problem persists, replace controller.
1,2	HW FAILSAFE	1. Noisy environment. 2. Self-test or watchfault. 3. Controller failure.	Cycle KSI. If problem persists, replace controller.
1,3	M- SHORTED	1. Internal or external short of M- to B-. 2. Incorrect motor wiring. 3. Controller failure.	Check wiring; cycle KSI. If problem persists, replace controller.
1,4	SRO	1. Improper sequence of KSI, brake, interlock, and direction inputs. 2. Interlock or direction switch circuit open. 3. Sequencing delay too short. 4. Wrong SRO or throttle type selected. 5. Misadjusted throttle pot.	Follow proper sequence; adjust throttle if necessary; adjust programmable parameters if necessary.
2,1	THROTTLE WIPER HI	1. Throttle input wire open or shorted to B+. 2. Defective throttle pot. 3. Wrong throttle type selected.	When Throttle Wiper High input returns to valid range.
2,2	EMR REV WIRING	1. Emergency reverse wire or check wire open.	Re-apply emergency reverse or cycle interlock.
2,3	HPD	1. Improper sequence of KSI, interlock, and throttle inputs 2. Misadjusted throttle pot. 3. Sequencing delay too short. 4. Wrong HPD or throttle type selected. 5. Misadjusted throttle pot.	Follow proper sequence; adjust throttle if necessary; adjust programmable parameters if necessary.
	SRVC TOTAL	1. Total maintenance timer expired.	Reset with programmer.
	SRVC TRAC	1. Traction maintenance timer expired.	Reset with programmer.
	TOTAL DISABLED	1. Total disable timer expired.	Reset with programmer.
	TRAC DISABLED	1. Traction disable timer expired.	Reset with programmer.
2,4	THROTTLE WIPER LO	1. Throttle pot wire open or shorted to B+. 2. Wrong throttle type selected. 3. Defective throttle pot.	When Throttle Wiper Low input returns to valid range.
3,1	FIELD SHORT	1. Main contactor soil shorted. 2. Field winding shorted to B+ or B-. 3. Field resistance too low.	Check contactor soil and field winding; cycle KSI.
3,2	MAIN CONT WELDED	1. Main contactor stuck closed. 2. Main contactor driver shorted.	Check wiring and contactor; cycle KSI.
3,3	FIELD OPEN	1. Field winding connection open. 2. Field winding open.	Check wiring and cycle KSI.
3,4	MISSING CONTACTOR	1. Main contactor coil open. 2. Main contactor missing. 3.Wire to main contactor open.	Check wiring and cycle KSI.

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Table 4-5 Troubleshooting Chart - Continued

4,1	LOW BATTERY VOLTAGE	1. Battery voltage < undervoltage cutback. 2. Corroded battery terminal. 3. Loose battery or controller terminal.	When voltage rises above undervoltage cutoff point.
4,2	OVERVOLTAGE	1. Battery voltage > overvoltage shutdown limit.	When voltage falls below overvoltage cutoff point.
4,3	THERMAL CUTBACK	1. Temperature >85°C or <-25°C. 2. Excessive load on vehicle. 3. Improper mounting of controller.	Clears when heatsink temperature returns to within acceptable range.
4,4	ANTI-TIEDOWN	1. Mode switches shorted to B+.	Release Mode Select 1.
		2. Mode Select 1:"tied down" to select Mode 2 or Mode 4 permanently.	
	MOTOR HOT	1. Field resistance > motor hot setpoint.	When resistance < setpoint.
	MOTOR WARM	1. Field resistance > motor warm setpoint.	When resistance < setpoint.

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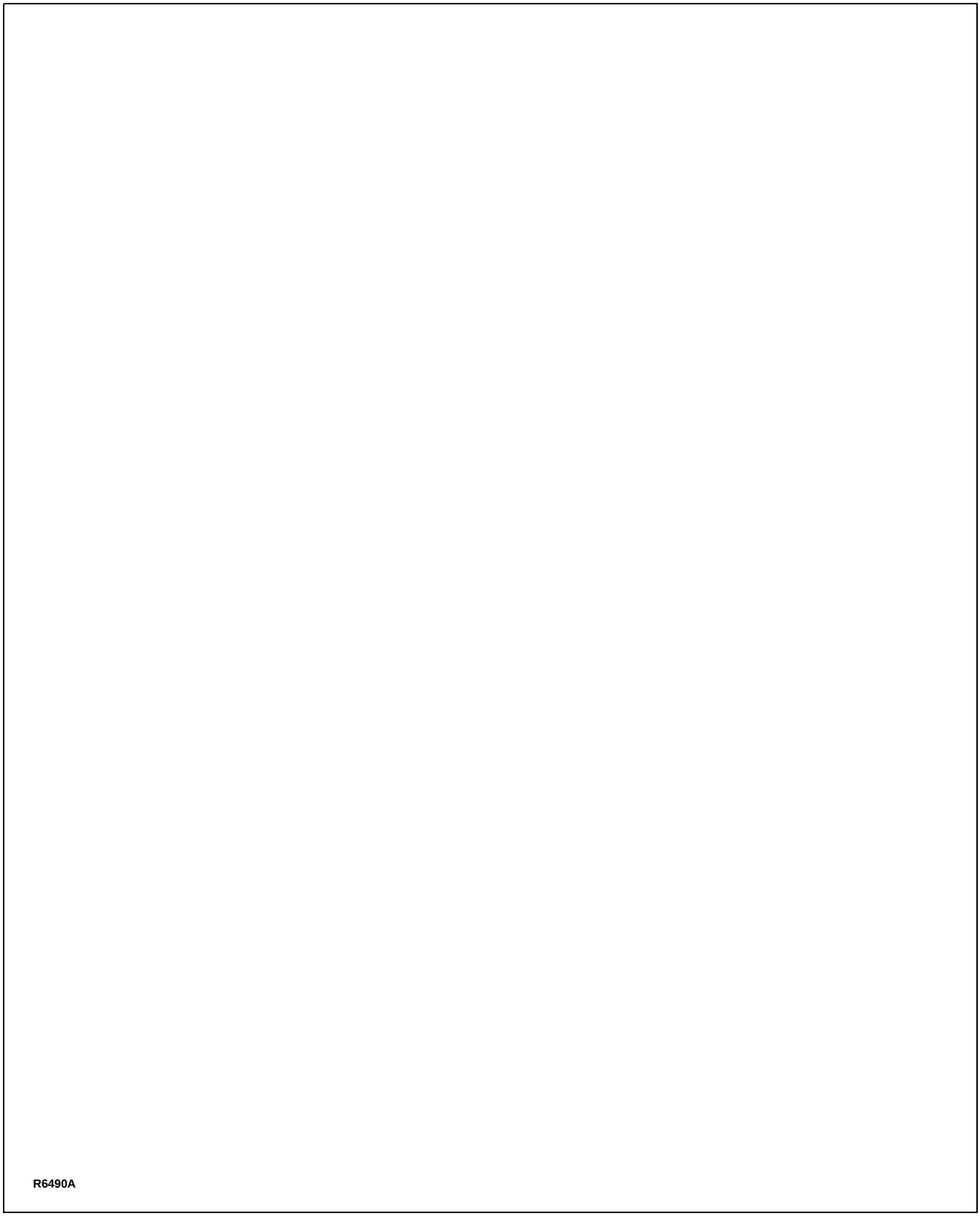

Figure 4-5 Wiring Diagram (Sheet 1)

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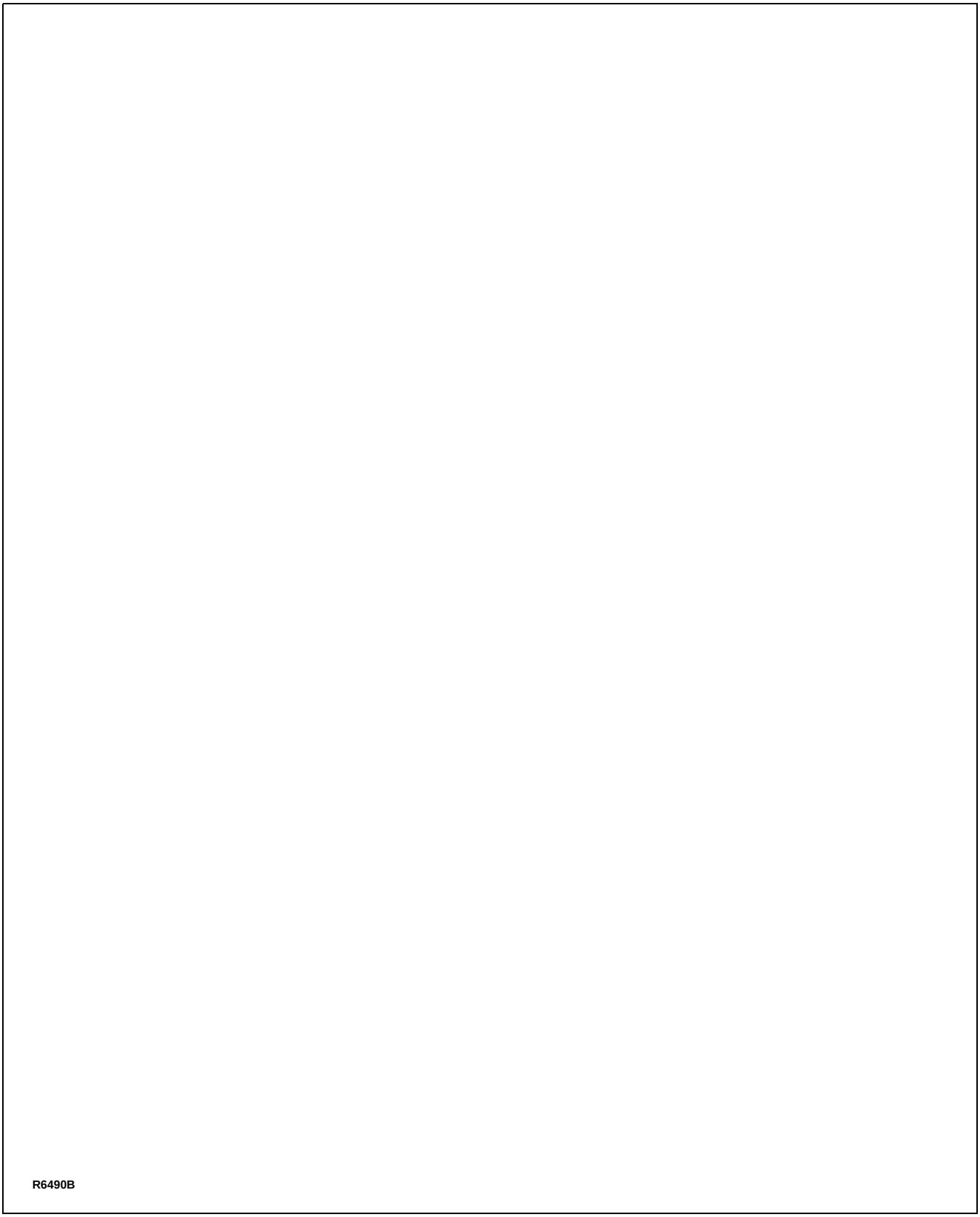

Figure 4-5 Wiring Diagram (Sheet 1)

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SECTION 5
STEERING ARM AND CONTROL HEAD SERIVCE

5-1. CONTROL HEAD

5-1.1. Control Head Removal.

1. Turn off the key switch (4, Figure 12-7), disconnect switch (10) and disconnect the batteries.
2. Remove six screws (13, Figure 5-2) and cover (12).
3. Disconnect the electrical harness located inside the control arm (7).
4. Remove the six outer screws (11, Figure 5-1) and lift off cover (12).

NOTE: The seventh inner screw (11) and nut (15) secure support plate (14) to cover (12).

NOTE: When removing the control head in the following step, be sure to hold it in place until the control cable is disconnected.

5. Working inside the control head, remove two screws (2, Figure 5-2) and two washers (3), being careful not to drop control head (1).
6. Lift up control head (1) and free the electrical harness from the control arm.

5-1.2. Belly-Button Switch Replacement.

1. Remove the control head as described in paragraph 5-1.1.
2. Place the control head on a clean work bench.
3. Trace the belly-button switch leads down to the control head connector and remove the leads from the connector.
4. Remove two screws (6, Figure 5-1) and two screw (7).
5. Lift button (1) with mounting bracket (5) out of the control head.
6. Remove button (1) from mounting bracket (5) being careful not to loose springs (3).
7. ***Pick out potting compound and remove switch (2) from button (1).***
8. ***Position new switch (2) in button (1) and secure in place with potting compound.***
9. Install button (1) with springs (3) on mounting bracket (5) and check for proper operation.
10. Position button (1) with mounting bracket (5) in the control head.
11. Install two screws (6) and two screw (7).
12. Install the switch leads in the control head connector.
13. Install the control head as described in paragraph 5-1.6.

5-1.3. Lift, Lower and Horn Switch Replacement.

1. Remove the control head as described in paragraph 5-1.1.
2. Place the control head on a clean work bench.
3. Trace the leads of the defective switch down to the control head connector and remove the leads from the connector.

NOTE: When screw (11, Figure 5-1) and nut (15) are removed, springs (9) will fall out.

4. Use a small clamp to hold plate (14) and cover (12) together. Remove screw (11) and nut (15). Slowly remove the clamp and separate plate (14) from cover (12) being careful not to loose springs (9).
5. Remove the button with the defective switch.
6. ***Pick out potting compound and remove switch (2) from button (1).***
7. ***Position new switch (2) in button (1) and secure in place with potting compound.***
8. Place buttons (8, 10 and 13) with springs (9) in position cover (12).
9. Place plate (14) into position and temporary secure with a clamp. Install nut (15) and screw (11). Then remove the clamp.
10. Check buttons for proper operation.
11. Install the switch leads in the control head connector.
12. Install the control head as described in paragraph 5-1.6.

5-1.4. Directional Switch Removal and Adjustment.

1. Remove the control head as described in paragraph 5-1.1.
2. Place the control head on a clean work bench.
3. Remove two screws (11, Figure 5-3) and lift mounting bracket (8) out of the control head.

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4. Remove two nuts (10) and two washers (9) from two screws (5).
5. Remove the two screws (5) with switches (6) and block (7).
6. Remove the switch leads from the control head connector.
7. Position the new switches (6) and block (7) on mounting bracket (8) and secure with two screws (5), two washers (9) and two nuts (10).
8. Position mounting bracket (8) in the control head and install two screws (11).
9. Check that rollers on both switches (6) contact the surface of cam (4) but do not engage the switches in the neutral position. If required, loosen screw (11) and adjust position of bracket (8) to obtain proper operation.
10. Install the switch leads in the control head connector.
11. Install the control head as described in paragraph 5-1.6.

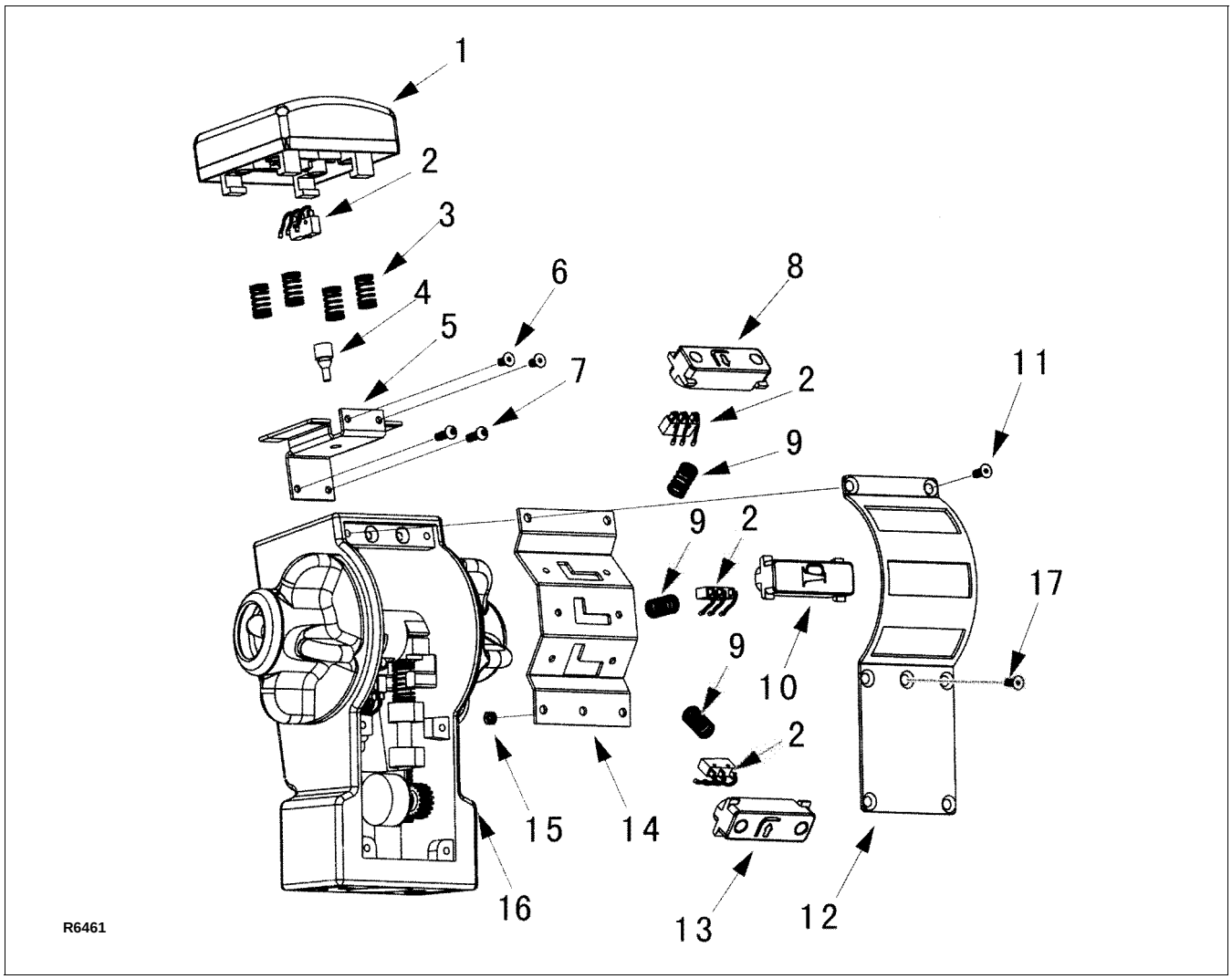

Figure 5-1. Control Head Switches

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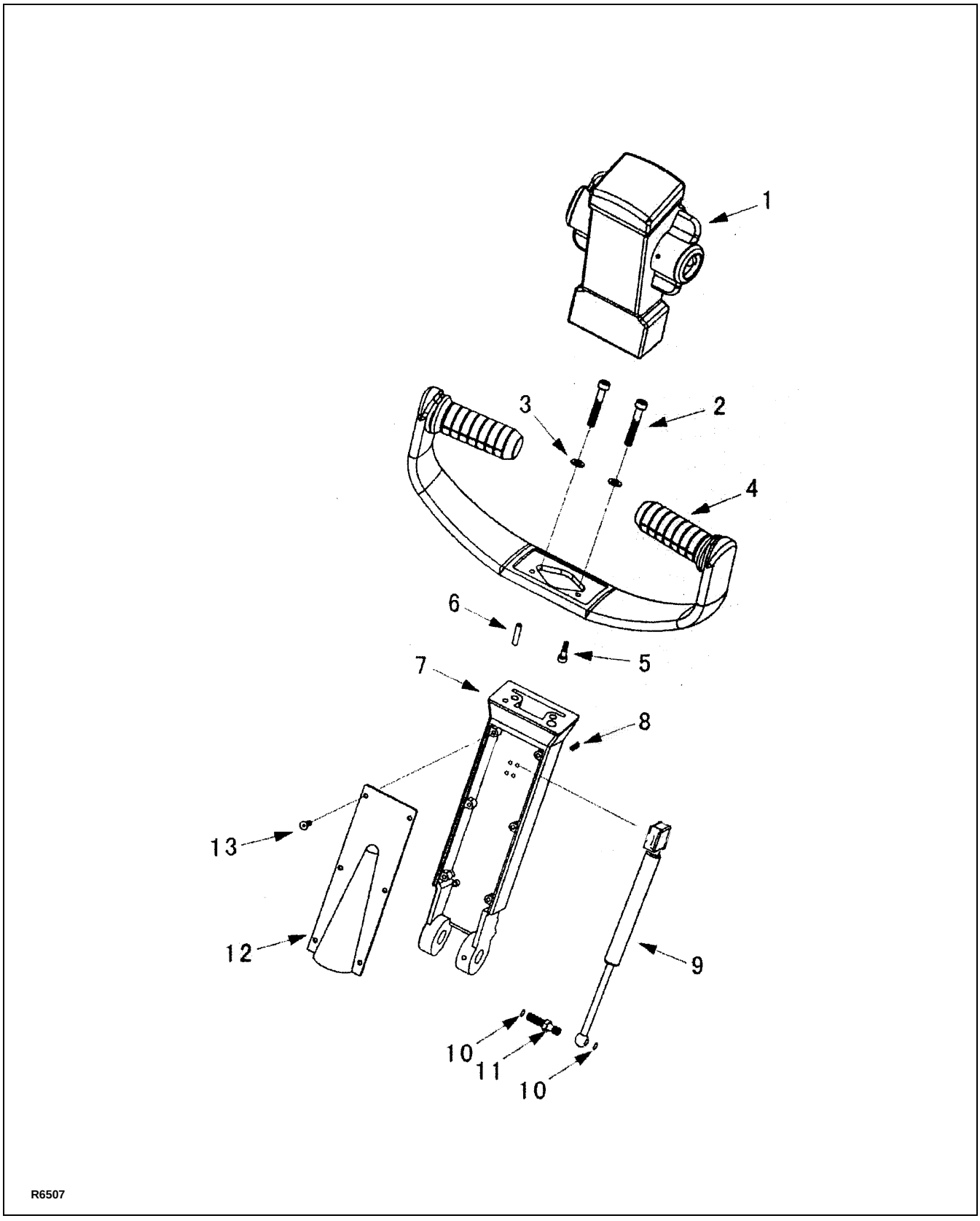

Figure 5-2. Control Head and Steering Arm

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5-1.5. Potentiometer Removal Testing and Adjustment.

1. Remove the control head as described in paragraph 5-1.1.
2. Place the control head on a clean work bench.
3. Remove two screws (11, Figure 5-3) and lift mounting bracket (13) out of the control head.
4. Remove gear (12) from potentiometer (14).
5. Remove the potentiometer mounting nut and remove potentiometer (14) from mounting bracket (13).
6. Remove the potentiometer leads from the control head connector.
7. Position the new potentiometer (14) on mounting bracket (13) and secure with potentiometer mounting nut.
8. Position mounting bracket (13) in the control head and install two screws (11).
9. Set an ohmmeter to the RX1K (1000) scale and connect across the potentiometer leads.
10. Slowly press the control knob (18) in the forward direction until a click indicating forward switch closure is heard and record the ohmmeter reading.
11. Repeat step 10. while pressing control lever in reverse direction. Meter readings should be the same as for the forward direction (±200 ohms). If meter readings are not the same, adjust position of bracket (13) as necessary to obtain the same values. Adjust the potentiometer again if necessary.
12. Install the potentiometer leads in the control head connector.
13. Install the control head as described in paragraph 5-1.6.

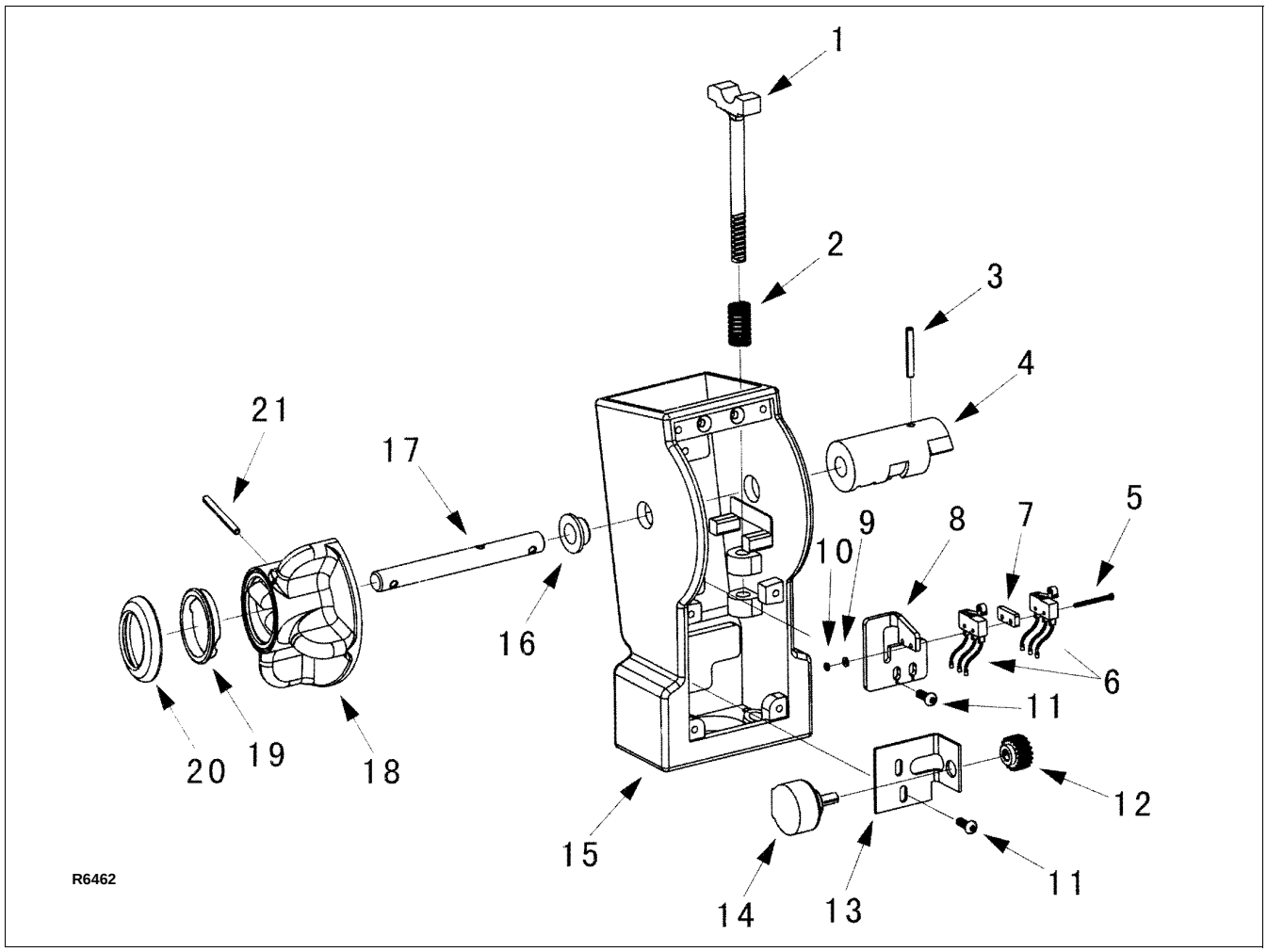

Figure 5-3 Drive Controls

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5-1.6. Control Head Installation.

1. Position control head (1, Figure 5-2) on arm (7) and feed the electrical harness into the control arm.
2. Working inside the control head, install two screws (2) and two washers (3).
3. Connect the electrical harness located inside the control arm.
4. Install cover (12, Figure 5-1) and secure with six screws (11).
5. Reconnect the batteries and turn on the keyswitch (4, Figure 12-7) and pull out emergency switch (6).

5-2. STEERING ARM

5-2.1. Pneumatic Spring Replacement.

The steering arm pneumatic spring (9, Figure 5-2) is replaced while the steering arm (7) is in the upright position.

1. Remove six screws (12) and cover (13) from the steering arm (7).
2. Support steering arm (7) in the raised position.
3. Remove clip (10) and pull pneumatic spring (9) from stud (11).
4. Remove four screws (8) to free pneumatic spring (9) from handle (7).
5. Reassemble in reverse order.

5-2.2. Steering Arm Removal

1. Remove the control head as described in paragraph 5-1.1.
2. Remove the pneumatic spring as described in paragraph 5-2.1.
3. Remove the connector from the control cable located in the steering arm (1, Figure 5-4) and pull the cable out the bottom of the steering arm.
4. Remove two screws (4, Figure 5-4) and cover (2).
5. Remove two screws (16) and cover (14).
6. Remove two screws (26) and lift the steering arm off the truck.

5-2.3. Steering Arm Installation

1. Install the steering arm in the reverse order of removal.

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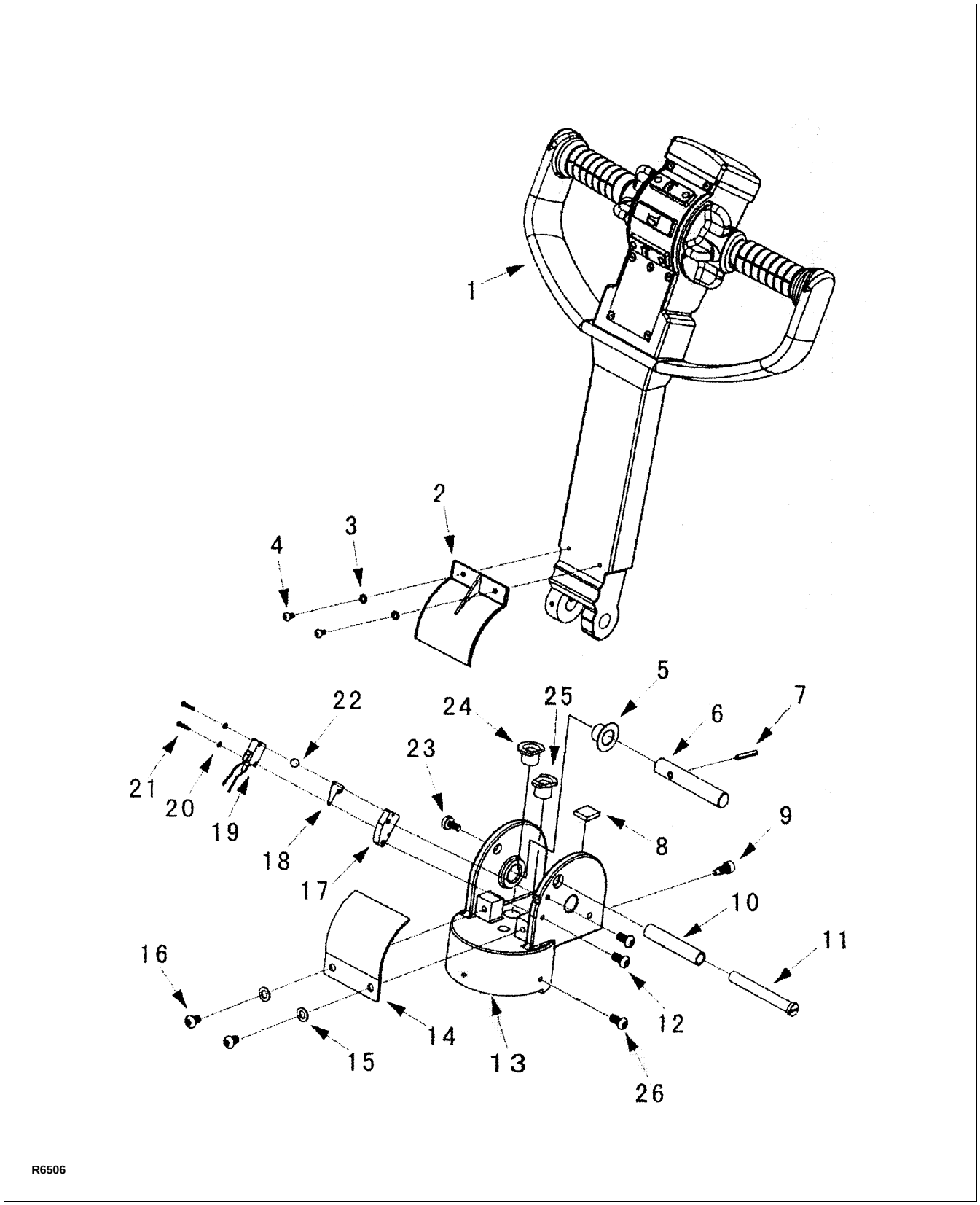

Figure 5-4 Steering Control

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SECTION 6
BRAKE SERVICING

6-1. BRAKES.

6-1.1. Brake Removal.

1. Remove the drive assembly as described in SECTION 7.
2. Remove three screws (26), three washers (25) and brake assembly (24).

6-1.2. Brake Installation.

1. Position brake assembly (24) on the drive motor and secure with three screws (26) and three washers (25).
2. Install the drive assembly as described in SECTION 7.

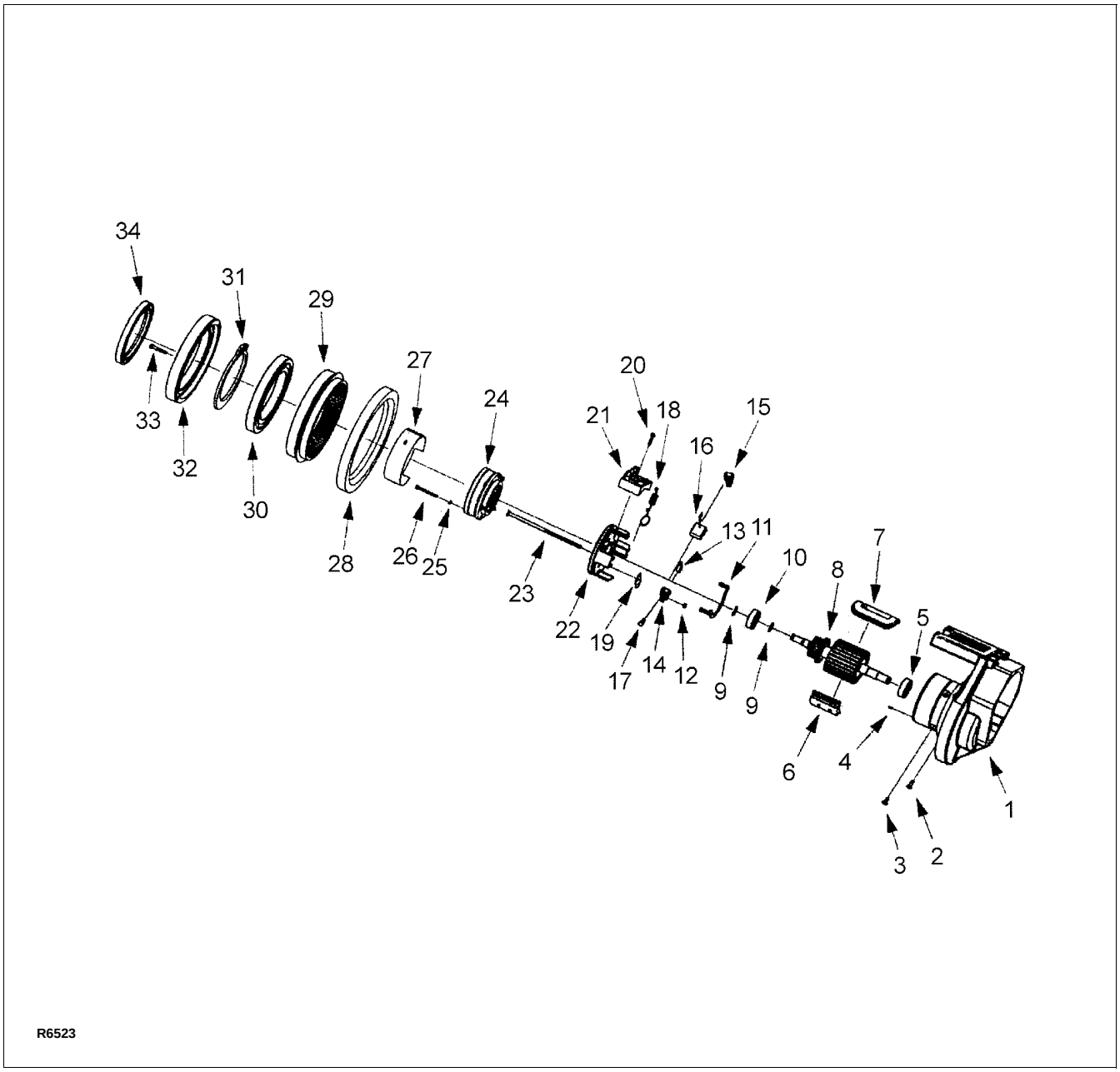

Figure 6-1 Transmission, Brake and Drive Motor Assembly

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SECTION 7
TRANSMISSION, DRIVE WHEEL, LOAD WHEEL, BALANCE WHEEL AND ENTRY ROLLER SERVICING

7-1. Drive Wheel.

1. Fully raise the forks.
2. Jack up the truck so the drive wheel is off the ground; then securely block the truck to prevent movement.
3. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
4. Remove eight screws (15, Figure 7-1) and remove drive wheel (14) from the transmission.
5. Install new drive wheel in reverse order of removal.
6. Turn on the keyswitch (4, Figure 12-7) and pull out switch (6).

7-2. Drive Assembly

7-2.1. Removal.

1. Remove the control head as described in paragraph 5-1.1.
2. Remove the steering arm as described in paragraph 5-2.2.
3. Remove four screws (9, Figure 12-7) and two screws (8) and remove covers (7 and 10)
4. Jack up the truck high enough to provide clearance for removal of the transmission/motor/brake (13).

NOTE: Support the drive assembly during removal of the mounting hardware.

5. Remove three screws (16, Figure 7-1) and lower the drive assembly out the bottom of the frame.

7-2.2. Repair

1. Remove the drive wheel as described in paragraph 7-1.
2. Remove four screws (1) and remove housing (2) from the drive assembly.
3. Pull the motor and brake wiring out of pivot tube (8).
4. Remove four screws (7) and remove pivot tube (8), bearing (10) and mounting plates (11 and 12) from assembly (13).
5. Remove the brake as described in paragraph 6-1.
6. Service the drive motor as described in paragraph 10-9.

NOTE: The transmission does not have any user serviceable parts. If the transmission is the cause of travel problems, it will need to be replaced.

7. Reassemble drive in reverse of disassembly procedure.

7-2.3. Installation.

1. Install the drive assembly in reverse of removal.

7-3. Load Wheel.

7-3.1. Removal

1. Raise forks.
2. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
3. Block the drive wheel to prevent the truck from rolling.
4. Jack up the forks to raise the load wheels off the floor. Securely block the forks in the raised position by positioning supports under both fork tips.

NOTE: When pin (3, Figure 7-3) is removed, load wheel assembly (5) will drop free.

5. Remove screw (13, Figure 7-2) and remove pin and load wheel assembly (12).

NOTE: Inspect the load wheel assembly. If the load wheel is worn within 1/8" of the metal sleeve, or is cracked or damaged, replace the entire load wheel and bearing assembly. Big Joe recommends that both load wheel assemblies be replaced at the same time. This ensures level and safe operation of the lift truck.

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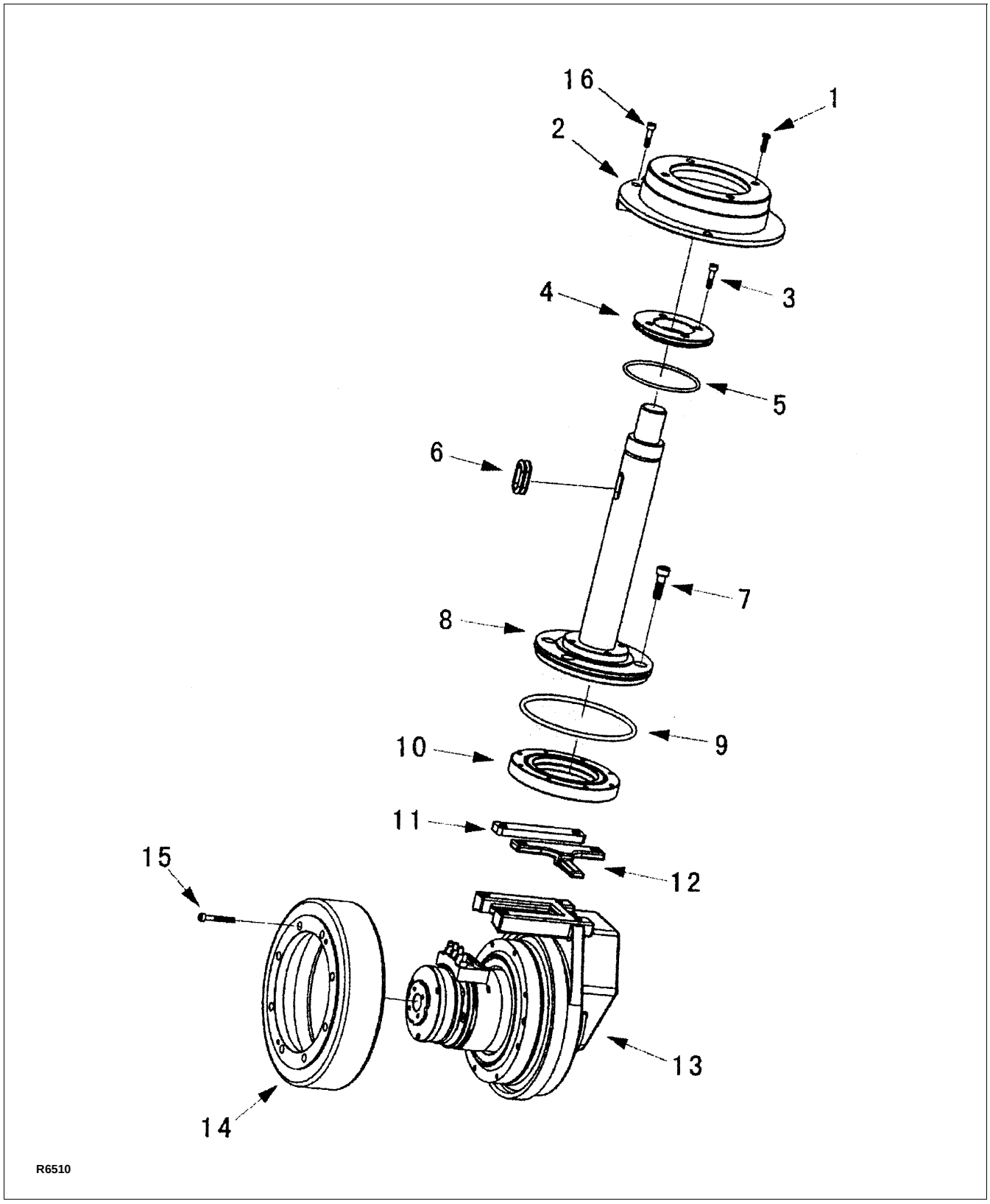

Figure 7-1 Drive Assembly

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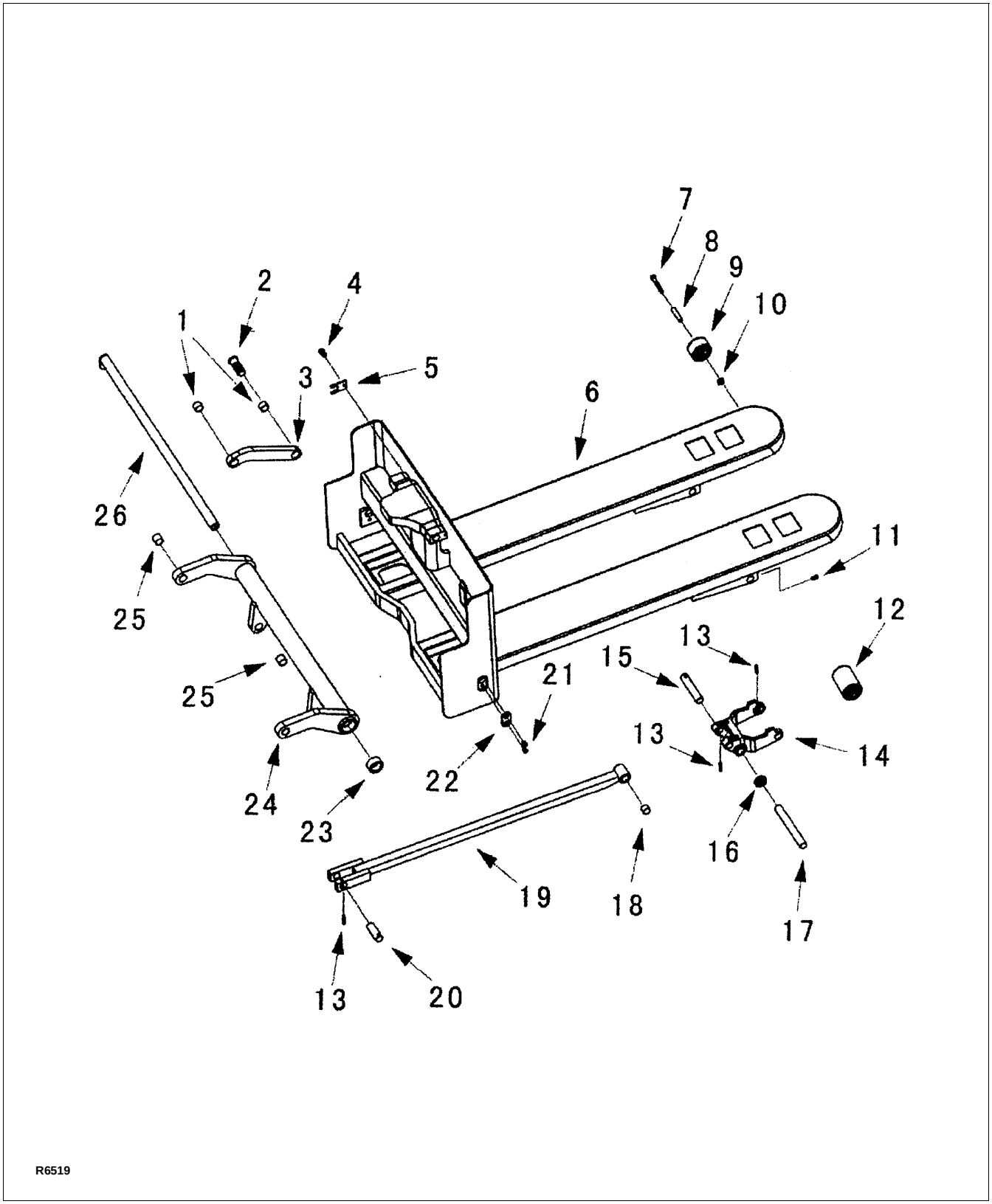

Figure 7-2 Fork Section

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7-3.2. Repair

1. Remove seals (1, Figure 7-3) and rings (2) from wheels (5).
2. Remove bearings (4) from wheels (5).
3. Inspect bearings (4) and replace if necessary.
4. Inspect seals (1) and replace if necessary.
5. Reassemble wheel in reverse of disassembly procedure.

7-3.3. Load Wheel Installation

1. Position load wheel assembly (12, Figure 7-2) in wheel housing (14).
2. Install pin (3, Figure 7-3) and secure with screw (6, Figure 7-2).
3. Remove blocking from under the truck.
4. Lower the forks.
5. Turn on the keyswitch (4, Figure 12-7) and pull out switch (6).

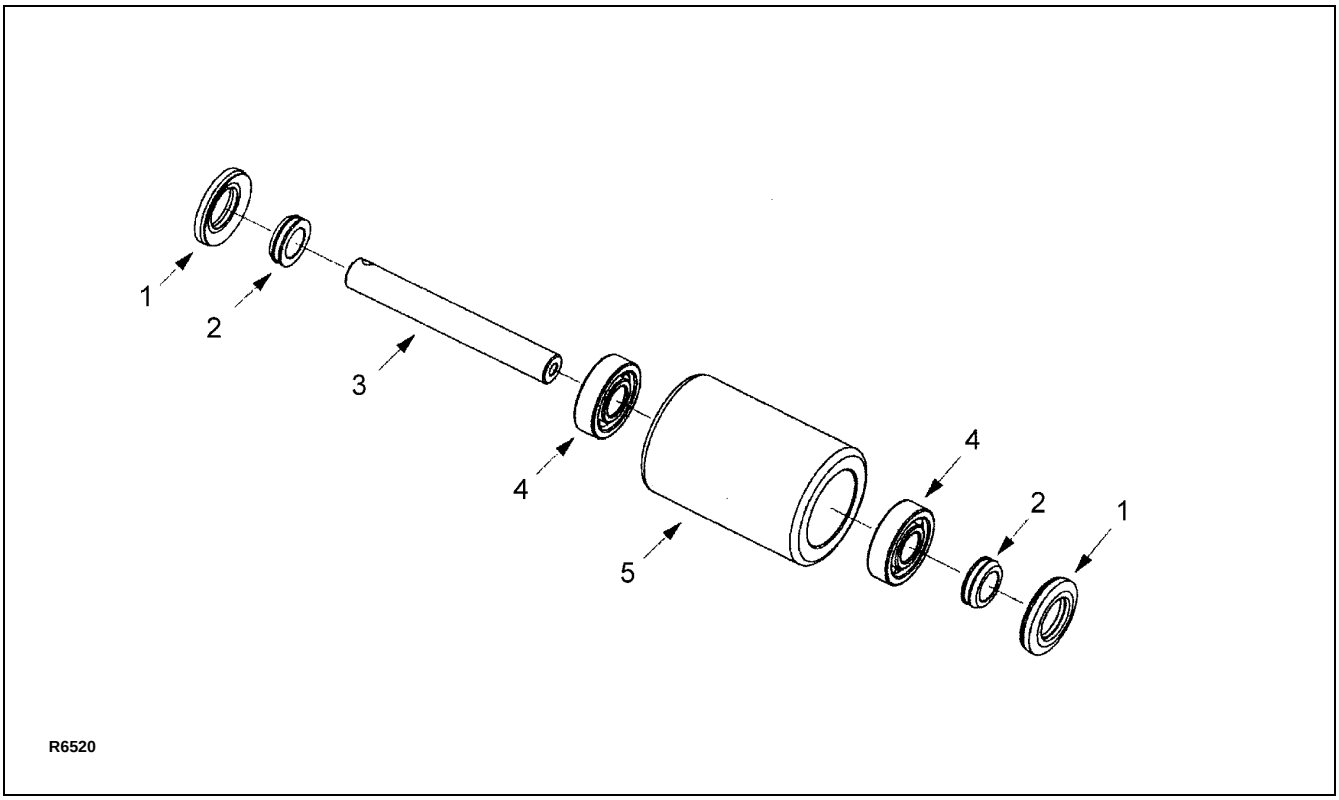

Figure 7-3. Wheel Assembly

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7-4. CASTERS

7-4.1. Removal

1. Remove four screws (9, Figure 12-7) and two screws (8) and remove covers (7 and 10)
2. Fully raise the forks.
3. Jack up the truck so the caster is off the ground; then securely block the truck to prevent movement.
4. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
5. Remove pin (16, Figure 7-4).
6. Remove shaft (15) and mounting bracket (17 or 21).
7. Remove screw (18) and remove caster (20) from bracket (17 or 21).
8. Remove nut (28), washer (27), sleeve (26), spring (25), washer (24), screw (23) and washer (22) from bracket (17 or 21).
9. Remove bearing (19) from bracket (17 or 21).

7-4.2. Repair

Refer to Figure 12-11 for disassembly and reassembly of the caster.

7-4.3. Installation

1. Install the caster in reverse of removal.

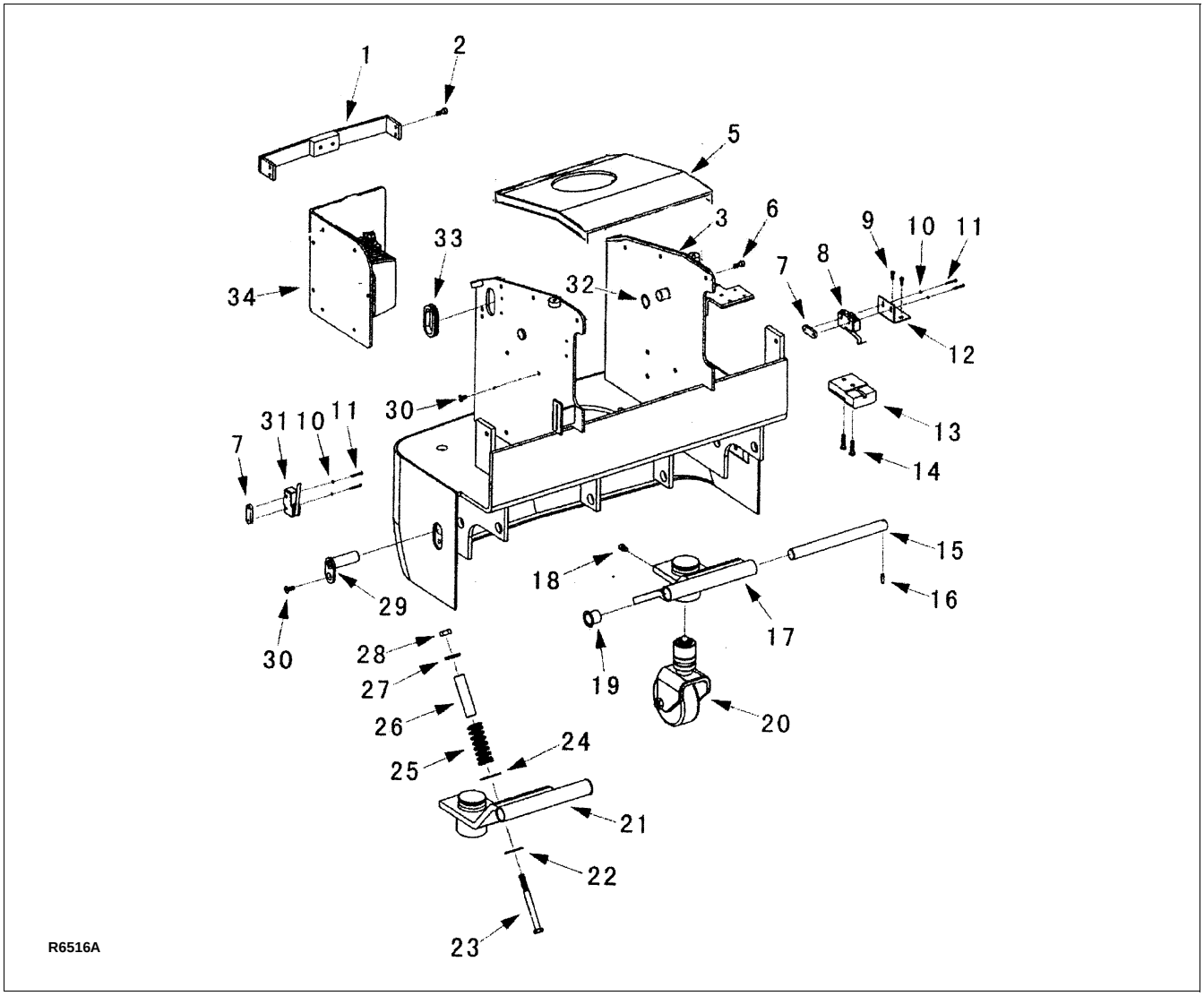

Figure 7-4 Frame

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7-5. ENTRY ROLLERS

Entry rollers provide smoother transition in and out of the pallets.

7-5.1. Entry Roller Removal

1. Raise forks.
2. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
3. Block the drive wheel to prevent the truck from rolling.
4. Jack up the forks to raise the load wheels off the floor. Securely block the forks in the raised position by positioning supports under both fork tips.
5. Remove nut (10, Figure 7-2), screw (7), and roller (9) from the fork tip.
6. Remove sleeve (8) from roller (9).

7-5.2. Entry Roller Removal

1. Install sleeve (8, Figure 7-2) in roller (9).
2. Position new roller (9) in fork tip and secure with screw (7) and nut (10).
3. Remove blocking from under the truck.
4. Lower the forks.
5. Turn on the keyswitch (4, Figure 12-7) and pull out switch (6).

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SECTION 8
ELEVATION SYSTEM SERVICING

8-1. GENERAL.

The elevation system includes the lift linkage, power section and fork section.

8-2. Lift Linkage

8-2.1. Removal

1. Lift complete truck to height sufficient to permit access to lift linkage under forks. Provide blocking under fork frame (6, Figure 8-1).
2. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
3. Remove screw (11, Figure 8-1) from fork frame (6) and drive out shaft (17).
4. Remove pin (13). Support rod (19) and remove pin (20). Lower the end of rod (19) to the floor.
5. Remove rod (19) with attached parts from under the fork.
6. Remove pin (13) from wheel housing (14) and remove pin (15) and wheel housing (14).
7. Remove bearing (18) from end of rod (19).
8. Remove the load wheel from wheel housing as described in paragraph 7-3.1.

8-2.2. Reassembly

1. Install the load wheel in wheel fork as described in paragraph 7-3.3.
2. Install bearing (18, Figure 8-1) in the end of rod (19).
3. Position wheel housing (14) on the end of rod (19) as shown. Secure by installing pin (15) through the lower hole in housing (14). Secure pin (15) with pin (13).
4. Position rod (19) with attached parts under the fork.
5. Position housing (14) in the fork and install pin (17). Secure pin (17) with screw (11).
6. Raise rod (19) into position and secure to bracket (24) with pin (20). Secure pin (20) with screw (13).
7. Remove blocking and lower the truck to the ground.
8. Turn on the keyswitch (4, Figure 12-7) and pull out switch (6).

8-3. Power Section and Fork Section

8-3.1. Separating Power Section and Fork Section.

1. Support entire truck on blocking, providing separate blocks so that frame (3, Figure 8-2) can be fully supported when fork frame (6, Figure 8-1) is removed.
2. Turn off the key switch (4, Figure 12-7) and pull out emergency disconnect switch (6).
3. Remove four screws (9), two screws (8) and covers (7 and 10).
4. Remove the lift cylinder as described in paragraph 9-2.4.
5. Remove the drive wheel as described in paragraph 7-1.
6. Attach a suitable hoist to fork frame (6, Figure 8-1).
7. Remove two screws (30, Figure 8-2) and two mounting pins (29) from frame (3).
8. Remove two screws (2, Figure 8-1) to free links (3) from fork frame (6).
9. Separate fork frame (6) and frame (3, Figure 8-2).

8-3.2. Fork Frame Repair.

1. Removal of components mounted on fork frame (6, Figure 8-1) may be necessary to effect repairs/welding, refer to table of contents for identification of instructions on such components.
2. Inspect frame (6) for broken welds and weld as necessary.
3. Replace frame (6) if forks have been bent severely.

8-3.3. Frame Repair.

1. Repair of the carrier frame (3, Figure 8-2) is limited to chasing damaged threads and welding of any broken welds.

8-3.4. Mating Power Section and Fork Section.

1. Install bearings (1, Figure 8-1) in links (3).
2. Attach links (3) to frame (3, Figure 8-2) with snap rings (32).
3. With suitable hoist, carefully move fork frame (6, Figure 8-1) into position and attach links (3) with screws (2).

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4. Align bracket (24) with the holes in frame (3, Figure 8-2) and insert pins (29). Secure pins (29) with screws (30).
5. Remove hoist from fork frame (6, Figure 8-1).
6. Install the lift cylinder as described in paragraph 9-2.4.
7. Install covers (7 and 10, Figure 12-7) and secure with four screws (9) and two screws (8).
8. Turn on the keyswitch (4) and pull out switch (6).
9. Remove the blocking from under the truck.

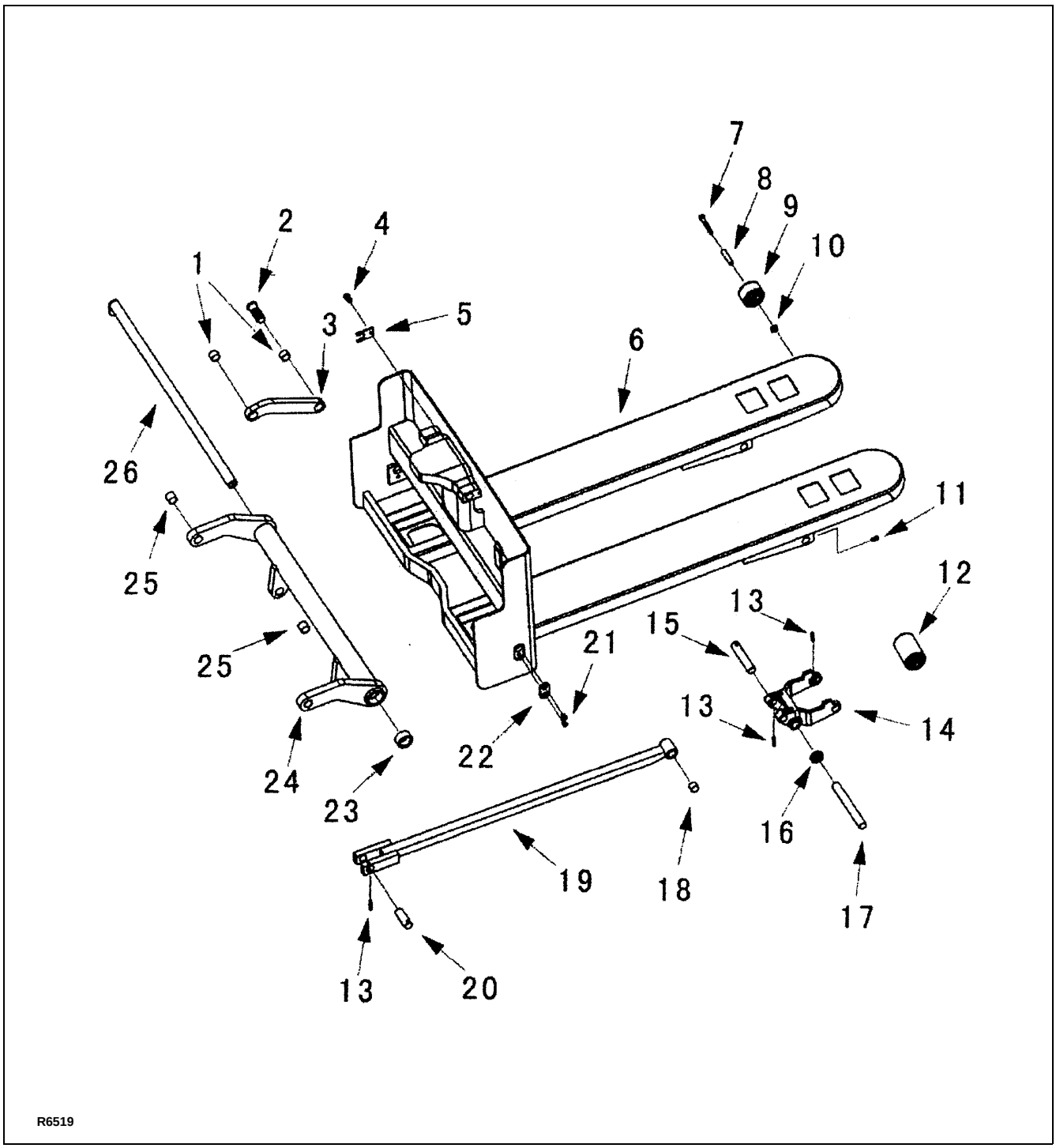

Figure 8-1 Fork Section

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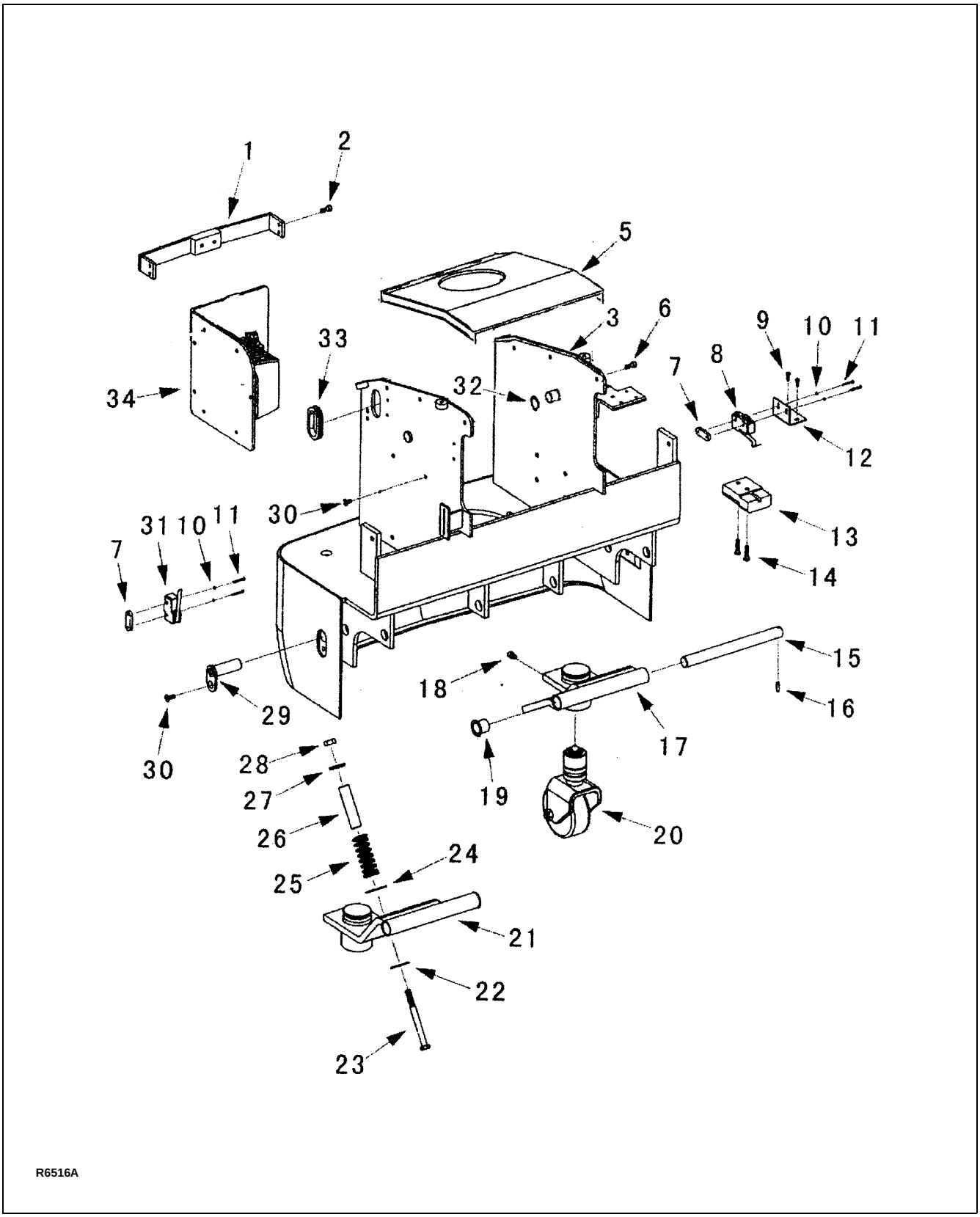

Figure 8-2 Frame

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SECTION 9
HYDRAULIC SYSTEM SERVICING

9-1. LINES AND FITTINGS

WARNING: When forks are raised, pressure exists in the hydraulic system lines and fittings. To ensure release of pressure, forks must be fully lowered and the batteries disconnected before performing any maintenance on the hydraulic system.

NOTE: Leaking hydraulic fittings may be remedied by simply tightening fittings. If this does not remedy the leak, the fittings or line must be replaced.

1. Lower forks fully.
2. Turn off the key switch (4, Figure 9-1) and pull out emergency disconnect switch (6).
3. Remove four screws (9), two screws (8) and covers (7 and 10).

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.

4. Refer to Figure 9-2 and remove leaking line or fitting and replace it with a new line or fitting.
5. Remove breather (12) from the hydraulic reservoir. Check level of hydraulic oil. Hydraulic oil must be one inch below opening. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
6. Reinstall breather (12).
7. Turn on the keyswitch (4, Figure 9-1) and pull out switch (6).
8. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
9. Remove breather (12, Figure 9-2) from the hydraulic reservoir. Check level of hydraulic oil. Hydraulic oil must be one inch below opening. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
10. Reinstall breather (12).
11. Install covers (7 and 10, Figure 9-1) and secure with four screws (9) and two screws (8).

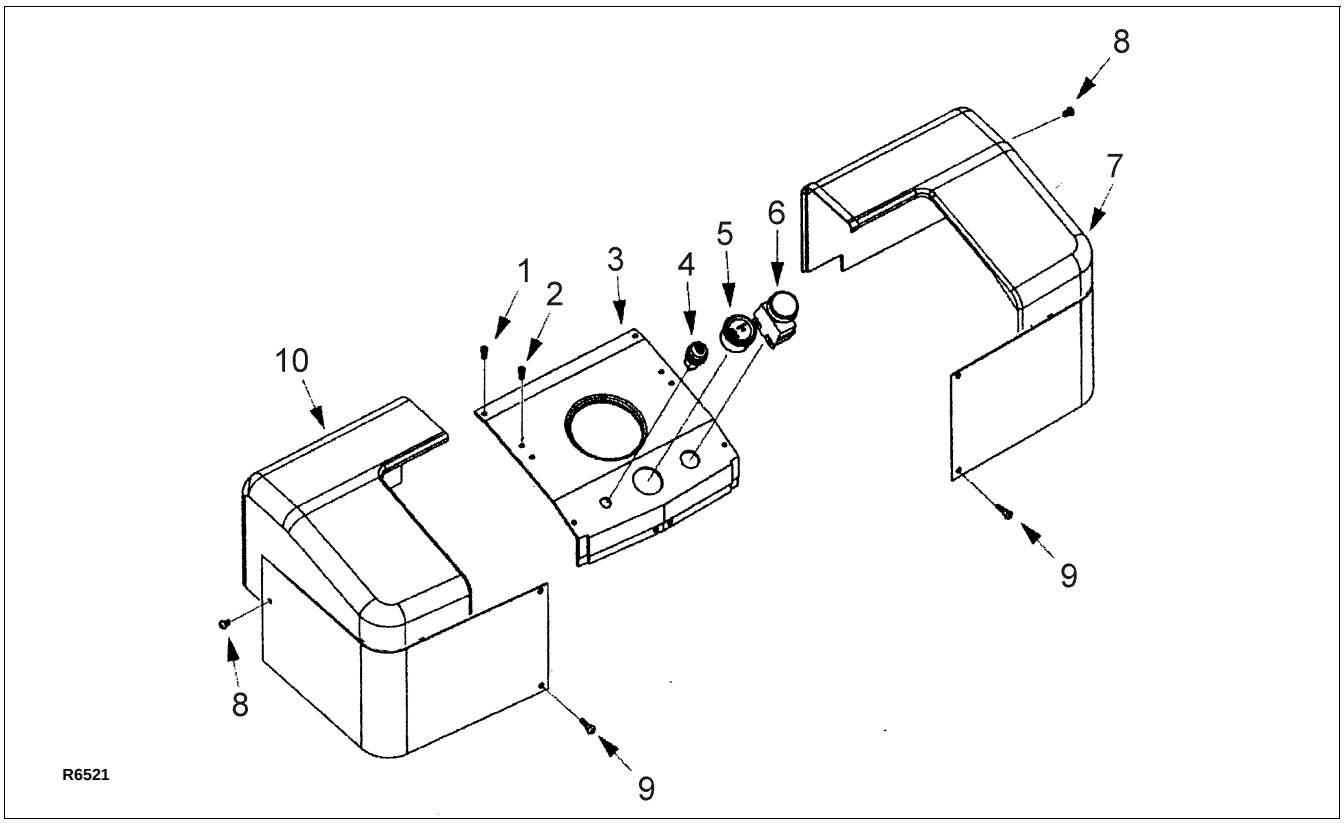

Figure 9-1 Compartment

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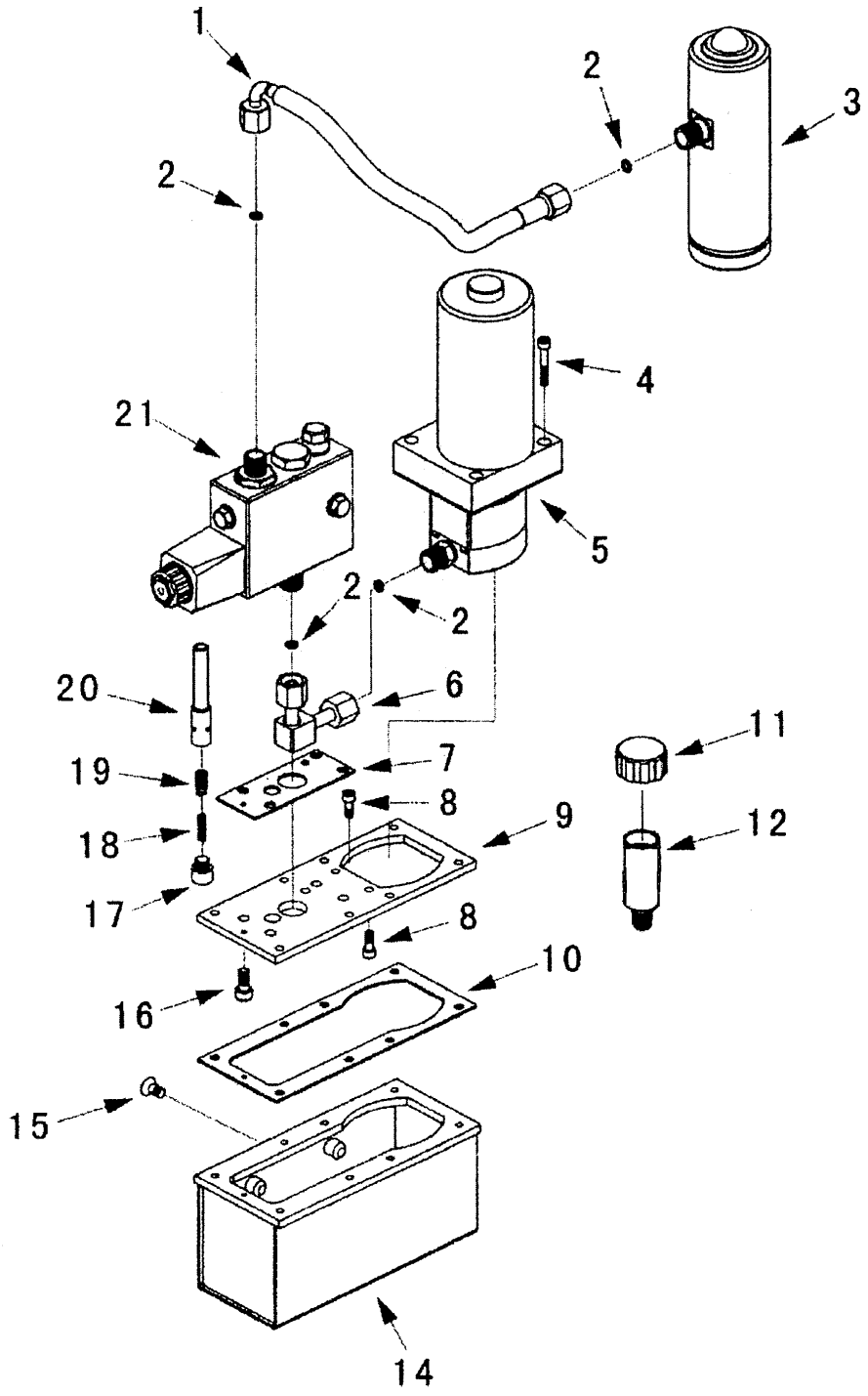

Figure 9-2 Hydraulic System

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9-2. HYDRAULIC PUMP, MOTOR, AND RESERVOIR ASSY

The hydraulic pump/motor assembly can be disassembled and repaired. However, a defective pump, valve or motor requires replacement of that component.

WARNING: When forks are raised. pressure exists in the hydraulic system lines and fittings. To ensure release of pressure, forks must be fully lowered and the batteries disconnected before performing any maintenance on the hydraulic system.

9-2.1. Removal

1. Lower forks fully.
2. Turn off the key switch (4, Figure 9-1) and pull out emergency disconnect switch (6).
3. Remove four screws (9), two screws (8) and covers (7 and 10).
4. Tag and disconnect the cables from the left batteries and remove the battery.
5. Remove the control head as described in paragraph 5-1.1.
6. Remove the steering arm as described in paragraph 5-2.2.
7. Unscrew the red knob from emergency disconnect switch (6).
8. Remove four screws (1), four screws (2) and raise cover (3) up.
9. Tag and disconnect the wires from the key switch (4).
10. Tag and disconnect the wires from the battery indicator (5).
11. Remove panel (3).
12. Tag and disconnect the wires from the emergency disconnect switch (6).
13. Remove the two screws securing the emergency disconnect switch (6) and remove the switch.
14. Remove six screws (6, Figure 12-9) and remove top plate (5).
15. Tag and disconnect electrical leads from the motor.
16. Tag and disconnect electrical leads and spike suppressor from the solenoid located on valve (21, Figure 9-2).

NOTE: The reservoir and hose will be filled with hydraulic oil. Place a container under the hose to catch any hydraulic oil.

17. Disconnect hose (1) from valve (21).
18. While supporting the reservoir (14), remove four screws (5).
19. Remove reservoir (14) with attached parts from the truck.

9-2.2. Disassembly and Reassembly

1. Remove four screws (8, Figure 9-2) and four screws (4).
2. Remove cover (9) with attached parts.
3. Remove and discard gasket (10).
4. Remove breather (12) from cover (9).
5. Disconnect tube (6) from pump and motor assembly (5) and remove the pump and motor assembly from cover (9).
6. Refer to Figure 12-15 for disassembly of the pump and motor assembly.
7. Remove four screws (16) and remove valve assembly (21) from cover (9).
8. Remove and discard gasket (7).
9. Refer to Figure 12-17 for disassembly of the valve.
10. Reassemble in reverse order of disassembly.

9-2.3. Installation

1. Position reservoir (14, Figure 9-2) with attached parts in the truck and secure with four screws (5).
2. Reconnect hose (1) to valve (21).
3. Reconnect electrical leads and spike suppressor to the solenoid located on the valve (21).
4. Reconnect the electrical leads to the motor.
5. Install top plate (5, Figure 12-9) and secure with six screws (6).
6. Install emergency disconnect switch (6, Figure 9-1) and secure with the two screws.
7. Reconnect the wires to the emergency disconnect switch (6).
8. Position panel (3) on the truck.
9. Reconnect the wires to the battery indicator (5).
10. Reconnect the wires to the key switch (4).
11. Secure cover (3) with four screws (1) and four screws (2).

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12. Thread the red knob onto the emergency disconnect switch (6).
13. Install the steering arm as described in paragraph 5-2.3.
14. Install the control head as described in paragraph 5-1.6.
15. Install the battery and reconnect the cables.
16. Turn on the keyswitch (4, Figure 9-1) and pull out switch (6).
17. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
18. Remove breather (12, Figure 9-2) from the hydraulic reservoir. Check level of hydraulic oil. Hydraulic oil must be one inch below opening. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
19. Reinstall breather (12).
20. Install covers (7 and 10, Figure 9-1) and secure with four screws (9) and two screws (8).

9-2.4. Lift Cylinder

9-2.4.1.Removal

1. Lower forks fully.
2. Turn off the key switch (4, Figure 9-1) and pull out emergency disconnect switch (6).
3. Remove four screws (9), two screws (8) and covers (7 and 10).
4. Remove the control head as described in paragraph 5-1.1.
5. Remove the steering arm as described in paragraph 5-2.2.
6. Unscrew the red knob from emergency disconnect switch (6).
7. Remove four screws (1), four screws (2) and raise cover (3) up.
8. Tag and disconnect the wires from the key switch (4).
9. Tag and disconnect the wires from the battery indicator (5).
10. Remove panel (3).
11. Tag and disconnect the wires from the emergency disconnect switch (6).
12. Remove the two screws securing the emergency disconnect switch (6) and remove the switch.
13. Remove six screws (6, Figure 12-9) and remove top plate (5).
14. Ensure that hydraulic pressure has been relieved from the lift circuit. Disconnect the hydraulic line from the lift cylinder.
15. Disconnect hose (1, Figure 9-2) from cylinder (3) and discard O-ring (2).
16. Remove the screw securing the cylinder to fork frame (6, Figure 12-10).

WARNING: Frame is heavy. Use care while securing and lifting in order to prevent injury.

17. With suitable hoist, carefully raise frame (6) slightly so the cylinder can be removed.

9-2.4.2.Installation

1. Position the new cylinder (3, Figure 9-2) on frame (3, Figure 12-9). Then lower the frame (6, Figure 12-10) onto the cylinder.
2. Reconnect the hose (1, Figure 9-2) to cylinder (3) with new O-ring (2).
3. Fill hydraulic reservoir by removing breather (12, Figure 9-2). Use approved Big Joe hydraulic fluid.
4. Reinstall breather (12).
5. Install top plate (5, Figure 12-9) and secure with six screws (6).
6. Install emergency disconnect switch (6, Figure 9-1) and secure with the two screws.
7. Reconnect the wires to the emergency disconnect switch (6).
8. Position panel (3) on the truck.
9. Reconnect the wires to the battery indicator (5).
10. Reconnect the wires to the key switch (4).
11. Secure cover (3) with four screws (1) and four screws (2).
12. Thread the red knob onto the emergency disconnect switch (6).
13. Install the steering arm as described in paragraph 5-2.3.
14. Install the control head as described in paragraph 5-1.6.
15. Turn on the keyswitch (4, Figure 9-1) and pull out switch (6).
16. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
17. Remove breather (12, Figure 9-2) from the hydraulic reservoir. Check level of hydraulic oil. Hydraulic oil must be one inch below opening. If

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required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.

18. Reinstall breather (12).
19. Install covers (7 and 10, Figure 9-1) and secure with four screws (9) and two screws (8).

9-2.5. Hydraulic Pressure Adjustment

The relief valve is factory set to open at the rated pressure setting for the pump (not to exceed 2,600 psi) and rarely needs adjusting. If you suspect that the relief valve is malfunctioning, perform the following procedures:

1. Lower forks as far as they will go.
2. Remove four screws (9, Figure 9-1), two screws (8) and covers (7 and 10).
3. Disconnect hose (1, Figure 9-2) from valve (21) and connect a pressure gauge of adequate range (0-3000 psi) in its place.
4. Activate pump motor and observe reading on pressure gauge. If pressure reading is 2,600 psi, the relief valve is functioning properly and does not need adjustment. If pressure reading is not 2,600 psi, proceed as follows to adjust relief valve:

CAUTION: Do not set pressure too high or hydraulic system may be damaged. Factory recommended setting of 2,600 psi should be observed. Under no circumstances should pressure be set above 2,600 psi,

5. Remove nut (29, Figure 12-17) to gain access to adjusting bolt (27). With pump motor running, observe pressure gauge and set pressure to 2,600 psi by turning adjusting bolt clockwise to increase pressure or counterclockwise to decrease pressure.
6. Deactivate pump motor, disconnect pressure gauge, and reconnect hose (1, Figure 9-2).
7. Fill hydraulic reservoir by removing breather (12). Use approved Big Joe hydraulic fluid.
8. Reinstall breather (12).
9. Bleed air from the hydraulic system by repeatedly raising and lowering lift truck until action is smooth.
10. Refill the hydraulic reservoir.
11. Install covers (7 and 10, Figure 9-1) and secure with four screws (9) and two screws (8).

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SECTION 10
ELECTRICAL COMPONENTS

10-1.KEY SWITCH REPLACEMENT.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Unscrew the red knob from emergency disconnect switch (6).
4. Remove four screws (1), four screws (2) and raise up cover (3).
5. Tag and disconnect electrical leads from key switch (4).
6. Remove the nut and remove key switch (4).
7. Install new switch (4) and secure with supplied nut.
8. Reconnect electrical leads, as noted during removal.
9. Reinstall the cover (3), four screws (2) and four screws (1).
10. Thread the red know back on the emergency disconnect switch (6).
11. Install covers (7 and 10) and secure with four screws (9) and two screws (8).
12. Turn on the keyswitch (4, Figure 10-1) and pull out switch (6).

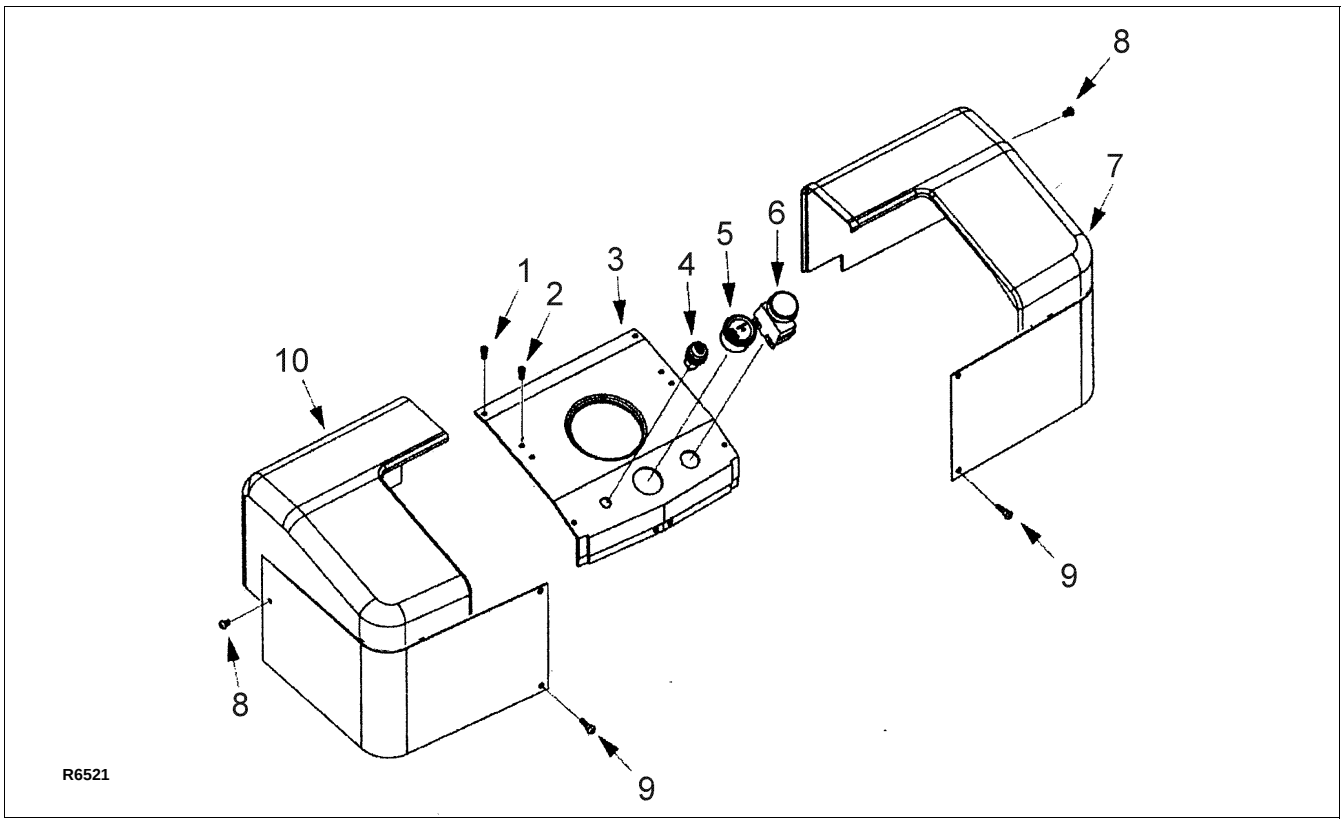

Figure 10-1 Compartment

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10-2.BATTERY INDICATOR REPLACEMENT.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Unscrew the red knob from emergency disconnect switch (6).
4. Remove four screws (1), four screws (2) and raise up cover (3).
5. Tag and disconnect electrical leads from indicator (5).
6. Remove two knurled nuts and U-bracket, part of battery indicator (6), to release and remove the indicator.

NOTE: Replacement indicator will be furnished with nuts and U-bracket. The original U-bracket may be reused, if not damaged.

7. Install battery discharge indicator (5) and secure with supplied U-bracket and nuts. If required, trim the U-bracket legs to proper length.
8. Reconnect electrical leads, as noted during removal.
9. Reinstall the cover (3), four screws (2) and four screws (1).
10. Thread the red know back on the emergency disconnect switch (6).
11. Install covers (7 and 10) and secure with four screws (9) and two screws (8).
12. Turn on the keyswitch (4, Figure 10-1) and pull out switch (6).

10-3.EMERGENCY DISCONNECT SWITCH REPLACEMENT.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Unscrew the red knob from emergency disconnect switch (6).
4. Remove four screws (1), four screws (2) and raise up cover (3).
5. Tag and disconnect electrical leads from emergency disconnect switch (6).
6. Remove the two screws and remove switch (6).
7. Install new switch (6) and secure with the two screws.
8. Reconnect electrical leads, as noted during removal.
9. Reinstall the cover (3), four screws (2) and four screws (1).
10. Thread the red know back on the emergency disconnect switch (6).
11. Install covers (7 and 10) and secure with four screws (9) and two screws (8).
12. Turn on the keyswitch (4, Figure 10-1) and pull out switch (6).

10-4.DEADMAN SWITCH.

10-4.1. Replacement

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove two screws (4, Figure 10-2) and cover (2).
3. Remove two screws (16) and cover (14).
4. Tag and disconnect the wires from deadman switch (19).

NOTE: Ball (22) will be free when switch (19) is removed. Be careful not to loose the ball.

5. Remove two screws (21), washers (20), switch (19), spacer (18), plate (17) and ball (22).
6. Install new switch in reverse order of disassembly.
7. Adjust the switch as described in paragraph 10-4.2.

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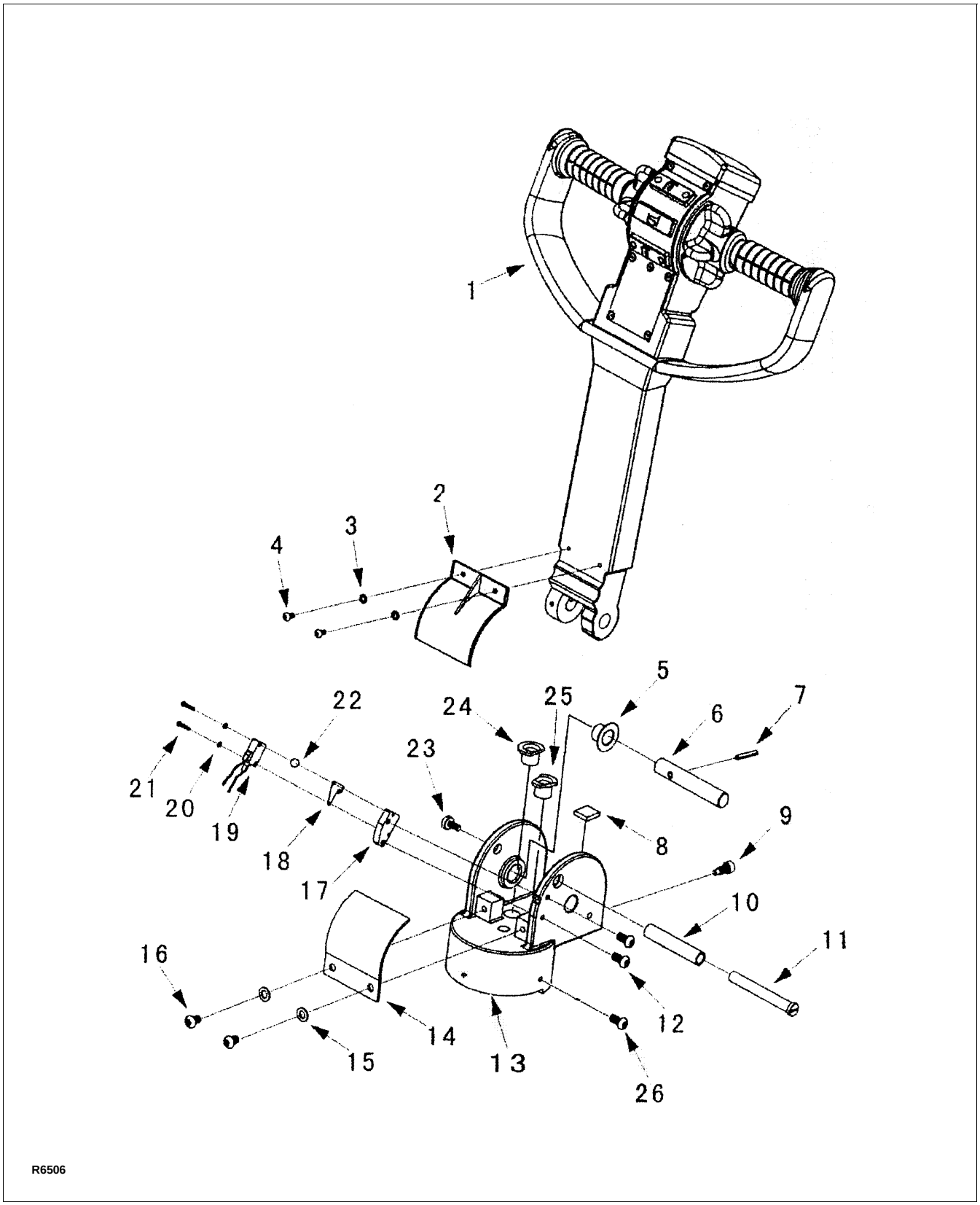

Figure 10-2 Steering Control

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10-4.2. Adjustment

1. Remove two screws (4, Figure 10-2) and cover (2).
2. Remove two screws (16) and cover (14).
3. Loosen two screws (21) and adjust switch (19) so that the brake applies as shown in Figure 10-3.
4. Tighten screws (21) and reinstall covers (2 and 14).

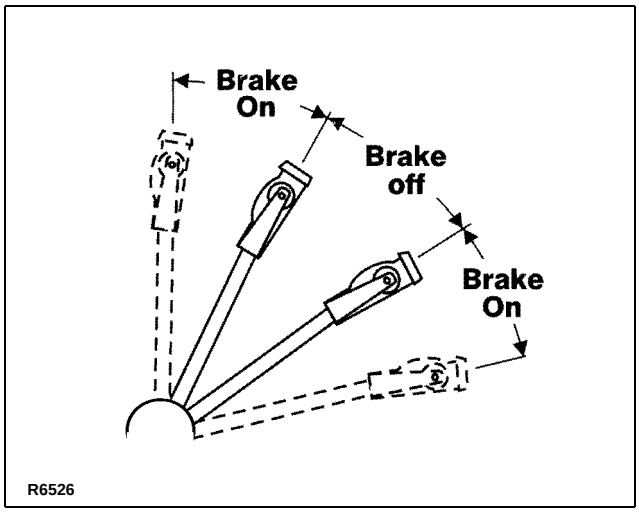

Figure 10-3. Brake Actuation

10-5. BATTERY DISCONNECT SWITCH.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Tag and disconnect the wires from battery disconnect switch (8, Figure 10-4).
4. Remove two screws (11), washers (10), plate (7) and switch (8).
5. Install new switch in reverse order of disassembly.

10-6. LIFT LIMIT SWITCH.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Tag and disconnect the wires from lift limit switch (31, Figure 10-4).
4. Remove two screws (11), washers (10), plate (7) and switch (31).
5. Install new switch in reverse order of disassembly.

10-7. ELECTRICAL CONTROL PANEL

10-7.1. Maintenance

NOTE: Erratic operation of the truck may be caused by defective controller components. Before removing the electrical panel, perform troubleshooting procedures per SECTION 4, to determine corrective action to be taken.

There are no user-serviceable parts inside the controller. No attempt should be made to open the controller. Opening the controller may damage it and will void the warranty.

The controller is programmed at the factory specifically for the truck model on which it is equipped. It is important to replace the controller with the correct preprogrammed unit to assure proper performance settings intended for that particular truck. See Figure 12-13 for the preprogrammed controller number.

It is recommended that the controller exterior be cleaned periodically, and if a handheld programmer is available, this periodic cleaning provides a good opportunity to check the controller's diagnostic history file. It is also recommended that the controller's fault detection circuitry be checked whenever the vehicle is serviced.

10-7.2. Cleaning

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Discharge the capacitors in the controller by connecting a load (such as a contactor coil or a horn) across the controller's B+ and B- terminals.
4. Remove any dirt or corrosion from the bus bar area. The controller should be wiped clean with a moist rag. Allow it to dry before reconnecting the battery.
5. Make sure the connections to the bus bars are tight. Use two well insulated wrenches for this task in order to avoid steering the bus bars.

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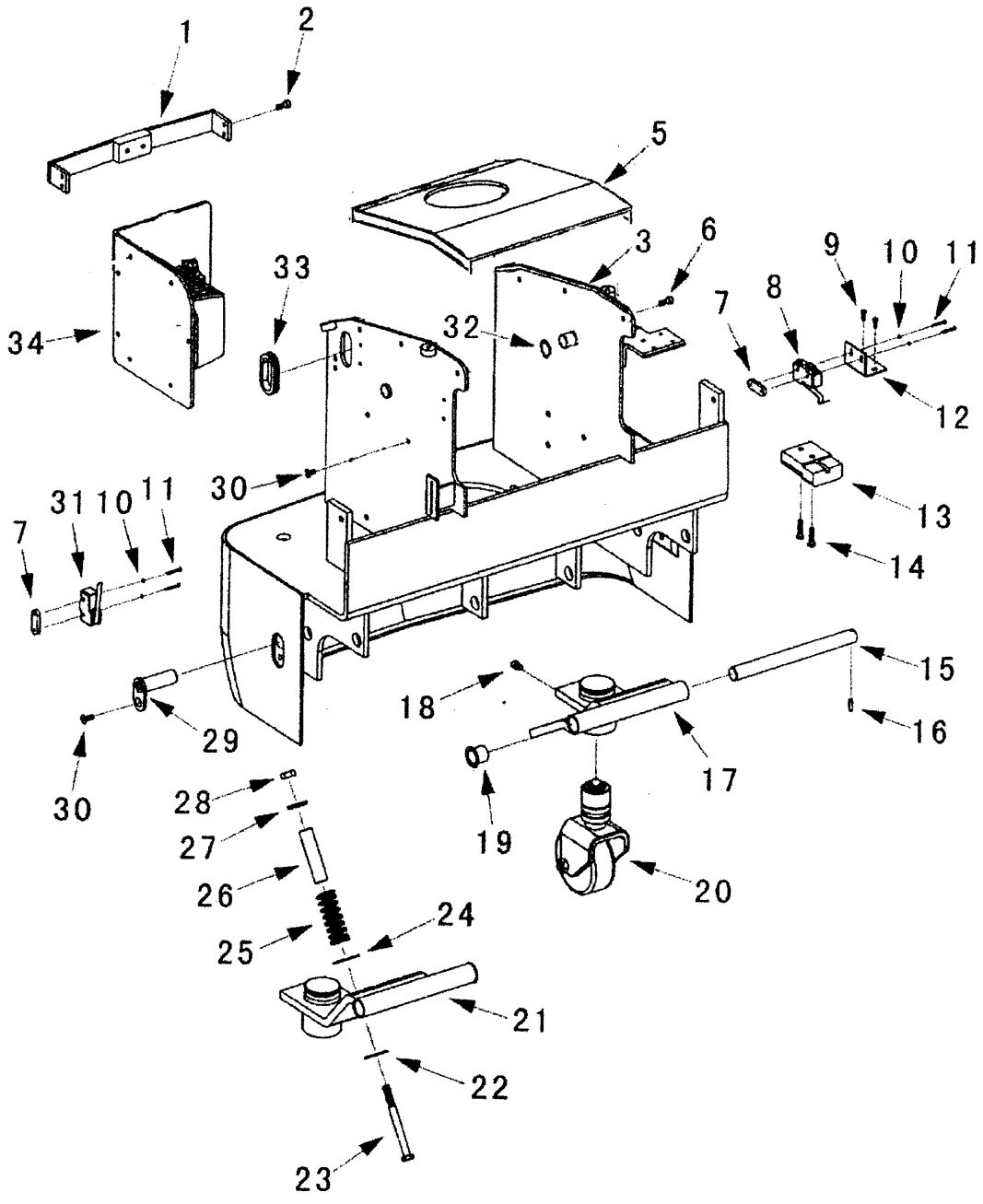

Figure 10-4 Frame

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10-7.3. Diagnostic History

The handheld programmer can be used to access the controller's diagnostic history file. When the programmer is connected to the unit, the error log file is automatically uploaded into the handheld programmer.

To see the present status of the unit, use the Menu Navigation Key (1, Figure 4-4) to select:

Faults->System Faults.

To access this log, use the Menu Navigation Key to select:

Faults->Fault History

The faults are shown as a code and descriptive text. If there are multiple faults, you have to scroll through the list using the Up and Down Buttons on the Menu Navigation Key

The faults may be intermittent faults, faults caused by loose wires, or faults caused by operator errors. Faults such as HPD or over-temperature may be caused by operator habits or by overloading.

After a problem has been diagnosed and corrected, clearing the diagnostic history file is recommended. This allows the controller to accumulate a new file of faults. By checking the new diagnostic history file at a later date, you can quickly determine whether the problem has been completely fixed.

To clear the diagnostic history file, select:

Faults->Clear Fault History.

You will be asked to confirm your actions. Use the "plus" arrow (+) for yes to clear the menu and the "minus" arrow (-) (3) to cancel your selection and not clear the Fault History.

10-7.4. Test the Fault Detection Circuitry

1. Put the vehicle up on blocks to get the drive wheel off the ground.
2. Disconnect the battery and make sure the keyswitch is in the "OFF" position.
3. Using an inline fuse holder fitted with a 10 amp fuse and alligator clips, connect the controller's M and B- terminals.
4. Reconnect the battery and turn the key switch to the "ON" position. Release the brake and apply the throttle. The motor should not operate.
5. Leave the key switch on and remove the in-line fuse wire. The vehicle status should continue to remain off.
6. Cycle the key switch off and on. Release the brake and apply the throttle. The vehicle should now operate normally.

10-7.5. Panel Removal.

1. Turn off the key switch (4, Figure 10-1), push in emergency disconnect switch (6).
2. Remove four screws (9), two screws (8) and covers (7 and 10).
3. Tag and disconnect the cables from the right battery and remove the battery.
4. Remove the control head as described in paragraph 5-1.1.
5. Remove the steering arm as described in paragraph 5-2.2.
6. Unscrew the red knob from emergency disconnect switch (6).
7. Remove four screws (1), four screws (2) and raise cover (3) up.
8. Tag and disconnect the wires from the key switch (4).
9. Tag and disconnect the wires from the battery indicator (5).
10. Remove panel (3).
11. Tag and disconnect the wires from the emergency disconnect switch (6).
12. Remove the two screws securing the emergency disconnect switch (6) and remove the switch.
13. Remove six screws (6, Figure 10-4) and remove top plate (5).
14. Tag and disconnect all electrical wires and cables which connect to the control panel (34).
15. Remove four screws (30) and remove control panel (34).

10-7.6. Panel Disassembly.

Refer to Figure 10-5 for location and identity of the major replacement components mounted on the panel and remove defective parts.

NOTE: The main contactor (5) and lift contactor (9) used on this panel are not repairable and must be replaced if defective.

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10-7.7. Panel Installation.

1. Install the control panel (34, Figure 10-4) and secure with four screws (30).
2. Refer to wiring schematic (Figure 4-5) and connect all electrical wires and cables to the control panel as noted during removal.
3. Install top plate (5) and six screws (6).
4. Install emergency disconnect switch (6, Figure 10-1) and secure with the two screws.
5. Reconnect the wires to switch (6) as noted during removal.
6. Position panel (3) with battery indicator (5) and key switch (4) on top of the truck.
7. Reconnect the wires to battery indicator (5) as noted during removal.
8. Reconnect the wires to key switch (4) as noted during removal.
9. Secure cover (3) with four screws (1) and four screws (2).
10. Thread the red knob on the emergency disconnect switch (6).
11. Install the steering arm as described in paragraph 5-2.3.
12. Install the control head as described in paragraph 5-1.6.
13. Install the right battery and reconnect the cables as noted during removal.
14. Install covers (7 and 10) and secure with four screws (9) and two screws (8).
15. Turn on the keyswitch (4) and pull out switch (6).

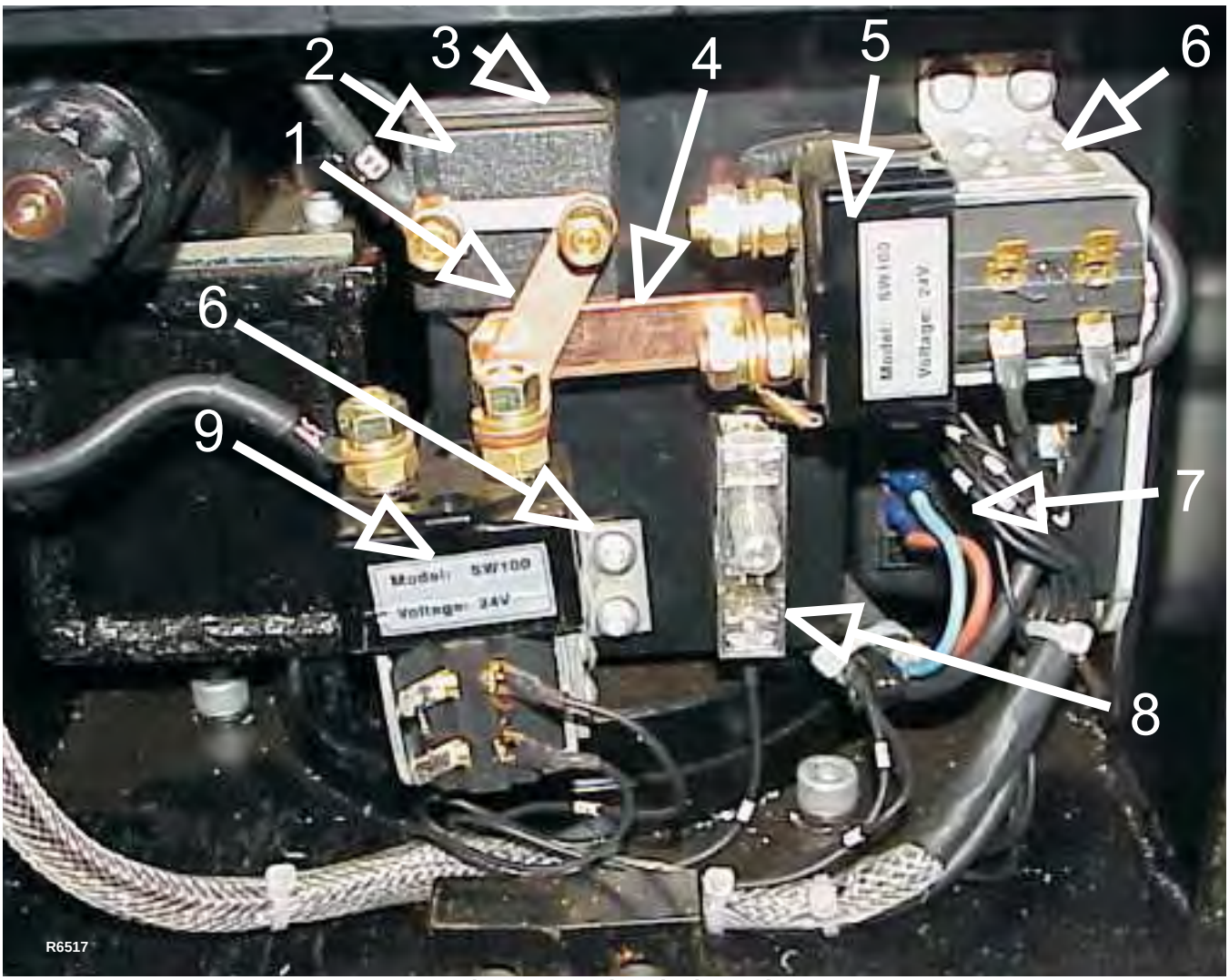

Figure 10-5 Electrical Panel

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10-8.PUMP MOTOR.

The pump motor is replaceable but not repairable. Refer to paragraph 9-2.

10-9.DRIVE MOTOR.

The drive motor exposed surfaces should be cleaned at least once a month to assure proper cooling of motor. Use an air hose to blow bust off of motor surfaces.

1. Remove the drive assembly as described in paragraph 7-2.1.
2. Disassemble the drive assembly as described in paragraph 7-2.2.
3. Refer to Figure 12-6 for disassembly procedure.
4. Remove the drive assembly as described in paragraph 7-2.3.

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SECTION 11
OPTIONAL EQUIPMENT

There is no optional equipment available at this time.

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SECTION 12
ILLUSTRATED PARTS BREAKDOWN

Following is an illustrated parts breakdown of assemblies and parts associated with the PTE 30 Lift Truck.

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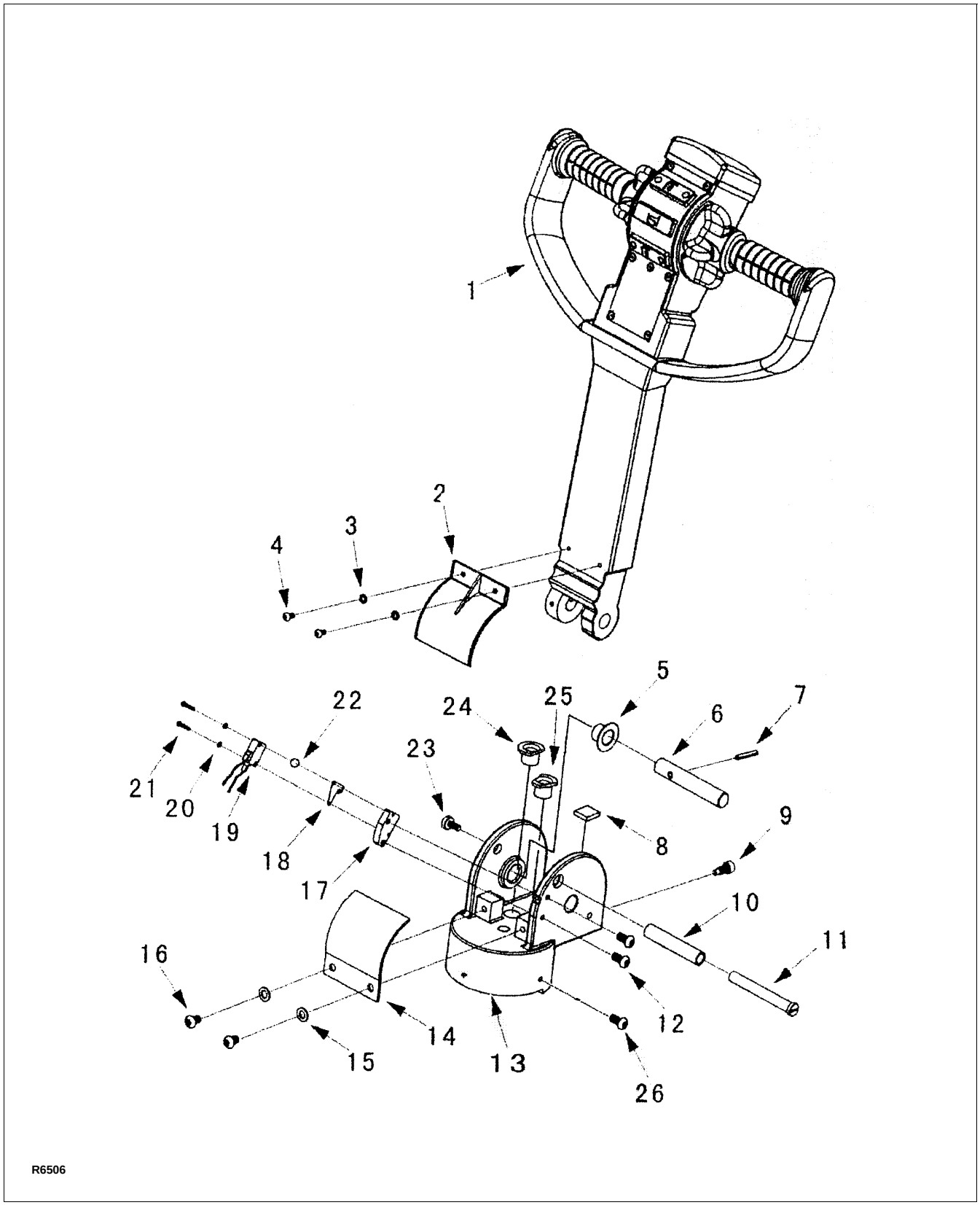

Figure 12-1 Steering Control

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	STEERING ARM (FIGURE 12-3)	REF
2	602289	OUTER COVER	1
3	—	NOT USED	
4	902313	SCREW	2
5	902227	BUSHING	2
6	902290	PIN SHAFT	1
7	902365	SPRING PIN	1
8	902305	RUBBER PAD	1
9	902308	SCREW	2
10	902304	RUBBER SLEEVE	1
11	902291	PIN SHAFT	1
12	902315	SCREW	2
13	902253	HANDLE SOCKET	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
14	902257	INNER COVER	1
15	—	NOT USED	2
16	902314	SCREW	2
17	902273	MOUNTING PLATE	1
18	902355	SPACER	1
19	902377	SWITCH	1
20	902385	WASHER	2
21	902312	SCREW	2
22	902373	STEEL BALL	1
23	902311	SCREW	1
24	902249	GROMMET	2
25	902250	GROMMET	1
26	902403	SCREW	2

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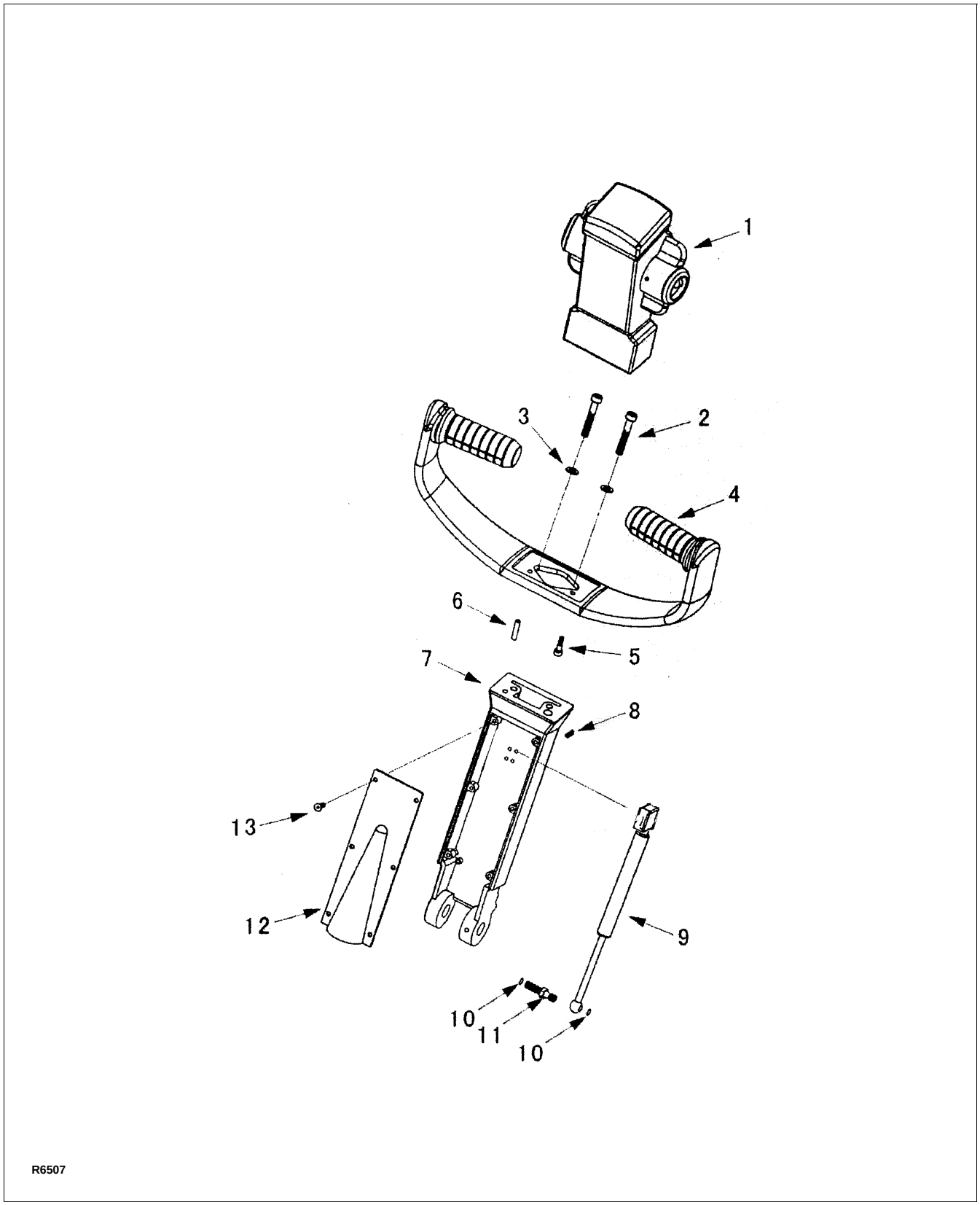

Figure 12-2 Steering Arm

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	CONTROL HEAD (FIGURE 12-3)	REF
2	902204	SCREW	2
3	902185	WASHER	2
4	902062	HANDLE	1
5	902127	SCREW	1
6	902366	SPRING PIN	1
7	902254	HANDLE TUBE	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	902277	SCREW	4
9	902294	PNEUMATIC SPRING	1
10	902401	CLIP	
11	902402	STUD	
12	902234	COVER PLATE	1
13	902316	SCREW	6

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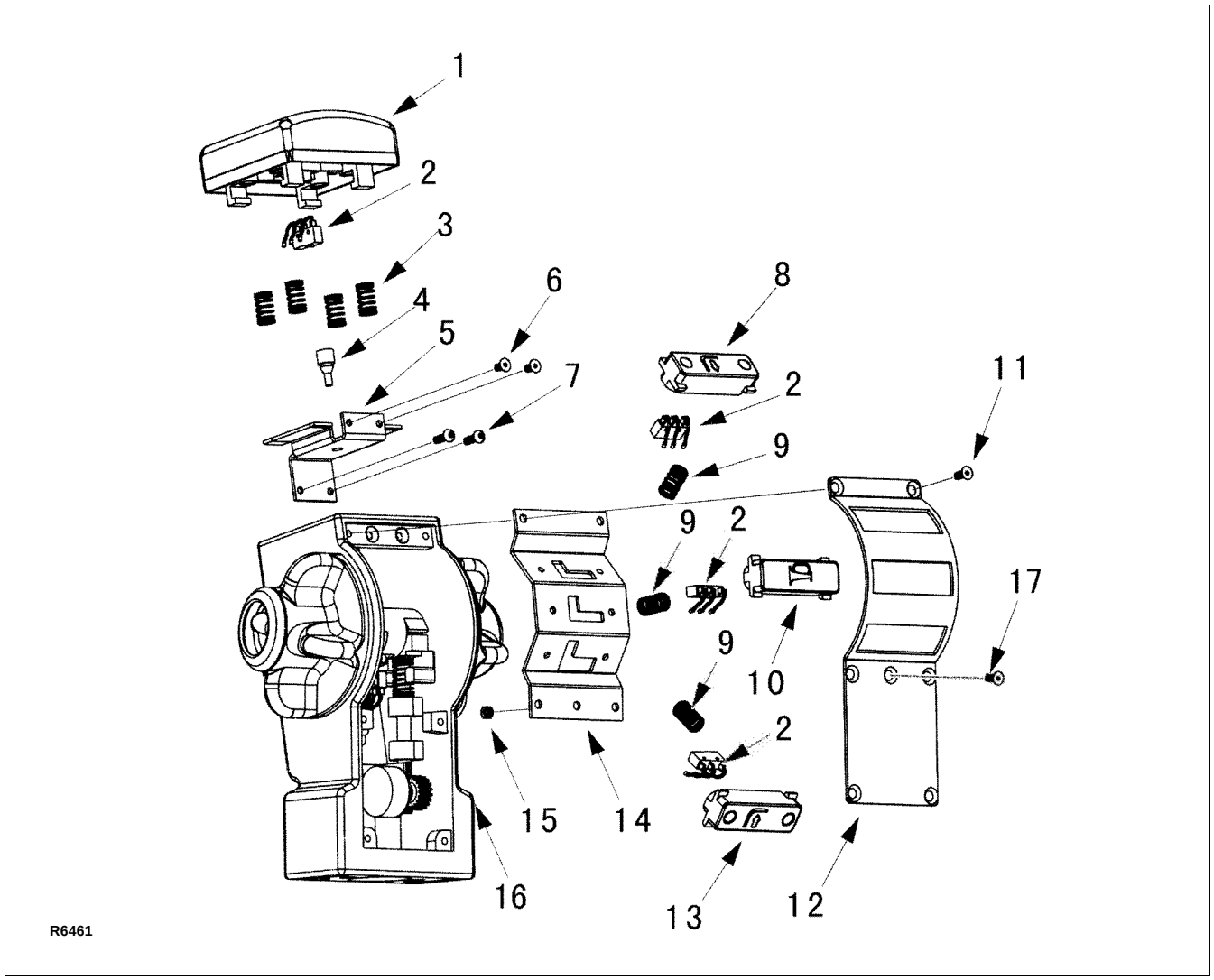

Figure 12-3 Control Head

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902040	CONTROL HEAD	1
1	902047	. COVER	1
2	902174	. SWITCH	4
3	902163	. SPRING	4
4	902115	. RUBBER BUMPER	1
5	902173	. SWITCH BRACKET	1
6	902137	. SCREW	2
7	902141	. SCREW	2
8	902024	. BUTTON-LIFT	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	902164	. SPRING	6
10	902023	. BUTTON-HORN	1
11	902137	. SCREW	7
12	902045	. COVER	1
13	902025	. BUTTON-LOWER	1
14	902170	. SUPPORT PLATE	1
15	902089	. NUT	1
16	—	. CONTROL HEAD (FIGURE 12-4)	REF

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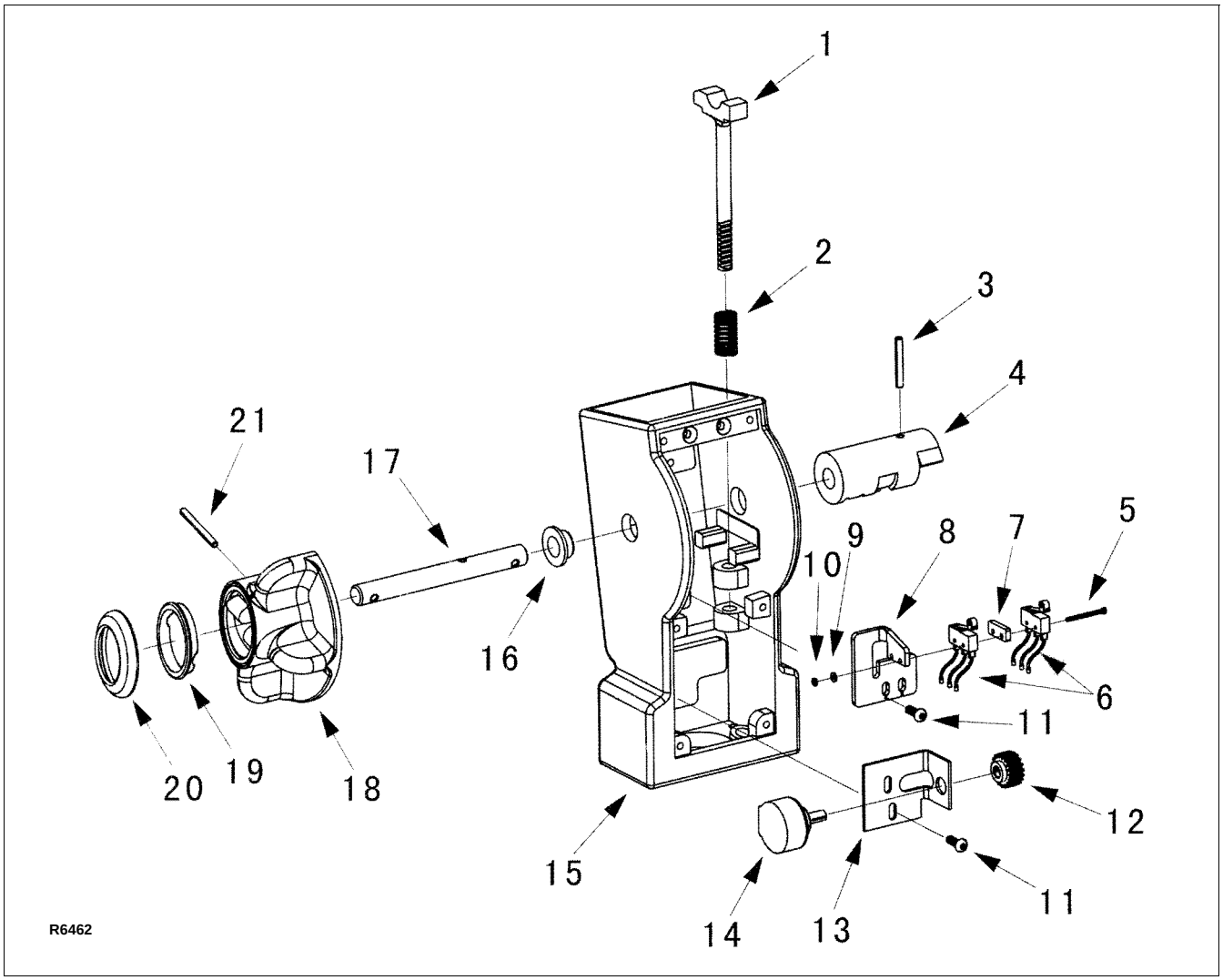

Figure 12-4 Control Head

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	—	CONTROL HEAD	REF
1	902104	. RACK	1
2	902165	. SPRING	1
3	902166	. SPRING PIN	1
4	902028	. CAM	1
5	902136	. SCREW	2
6	902175	. SWITCH	2
7	902068	. ISOLATE BLOCK	1
8	902078	. MOUNTING BRACKET	1
9	902183	. WASHER	4
10	902090	. NUT	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	902141	. SCREW	4
12	902059	. GEAR	1
13	902079	. MOUNTING BRACKET	1
14	902102	. POTENTIOMETER	1
15	902172	. SWITCH BOX	1
16	902056	. FLANGED BEARING	2
17	902029	. CAM SHAFT	1
18	902041	. CONTROL KNOB	2
19	902036	. CONNECTING WASHER	2
20	902046	. COVER	2
21	902167	. SPRING PIN	2

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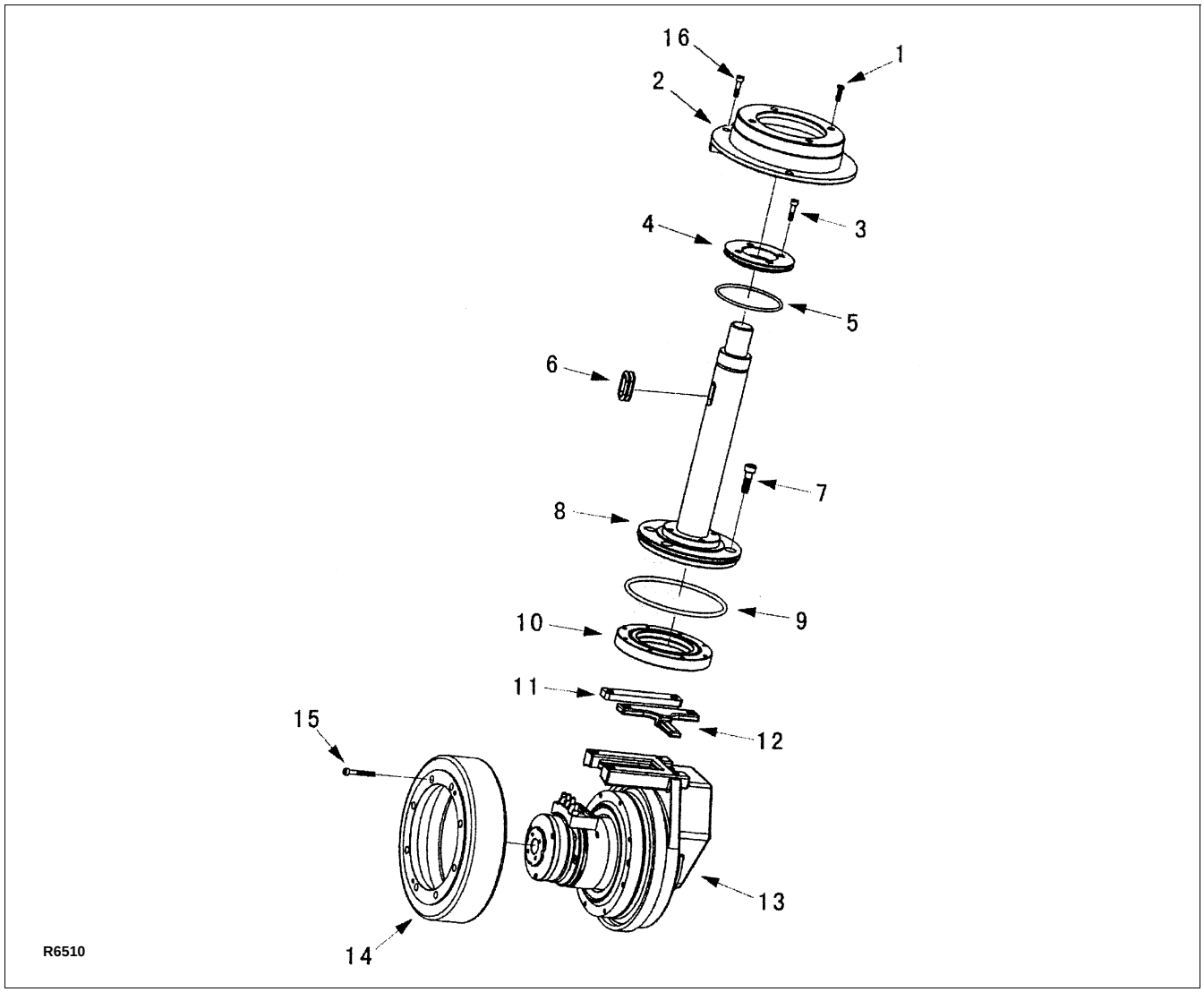

Figure 12-5 Drive Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902326	SCREW	4
2	902295	POSITION HOUSING	1
3	902319	SCREW	4
4	902342	SEAT HOUSING	1
5	902287	O-RING	1
6	902251	GROMMET	1
7	902307	SCREW	4
8	902293	PIVOT TUBE	1
9	902288	O-RING	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
10	902218	BEARING	1
11	902275	MOUNTING PLATE	1
12	902274	MOUNTING PLATE	1
13	—	TRANSMISSION, BRAKE AND DRVIE MOTOR ASSY (FIGURE 12-6)	REF
14	902397	WHEEL ASSEMBLY	1
15	902324	SCREW	8
16	902404	SCREW	3

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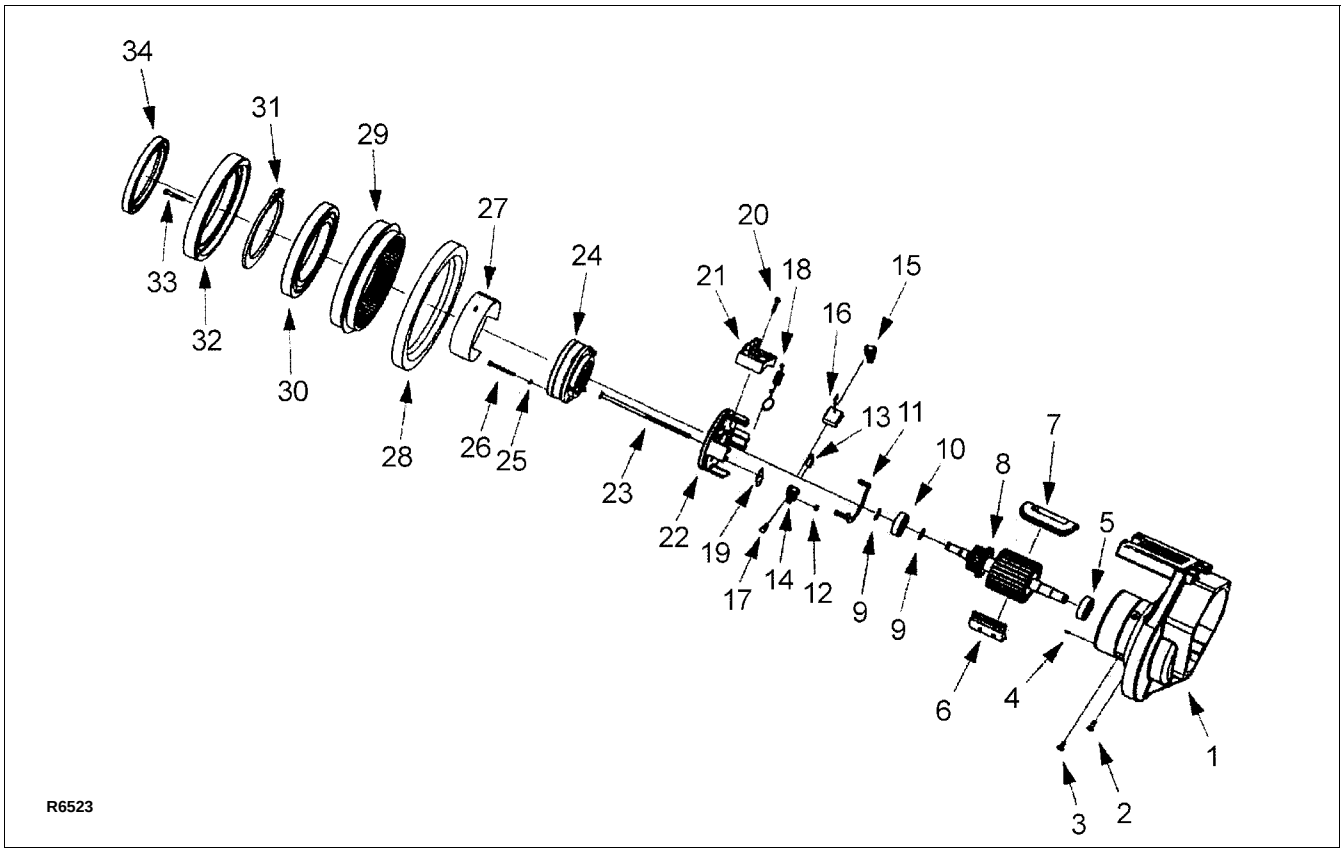

Figure 12-6 Transmission, Brake and Drive Motor Assy

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902379	TRANSMISSION, BRAKE AND DRIVE MOTOR ASSY	1
1	—	. GEAR BOX	1
2	—	. SCREW	4
3	—	. SCREW	4
4	—	. PIN	1
5	—	. BEARING	1
6	—	. STATOR	4
7	—	. COIL	1
8	—	. ROTOR	1
9	—	. SNAP RING	2
10	—	. BEARING	1
11	—	. LINK	2
12	902089	. NUT	8
13	902363	. SPRING	4
14	902258	. LEFT BRUSH SOCKET	2
15	902300	. RIGHT BRUSH SOCKET	2
16	902224	. BRUSH	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
17	902141	. SCREW	4
18	902364	. SPRING	1
19	—	. INSULATING PLATE	4
20	—	. SCREW	1
21	—	. SOCKET	1
22	—	. COVER	1
23	—	. SCREW	2
24	902223	. BRAKE ASSY	1
25	902267	. LOCK WASHER	3
26	902325	. SCREW	3
27	—	. PROTECTION PLATE	1
28	902341	. SEAL	1
29	—	. GEAR	1
30	902214	. BEARING	1
31	902353	. SNAP RING	1
32	—	. COVER	1
33	—	. SCREW	2
34	902340	. SEAL	1

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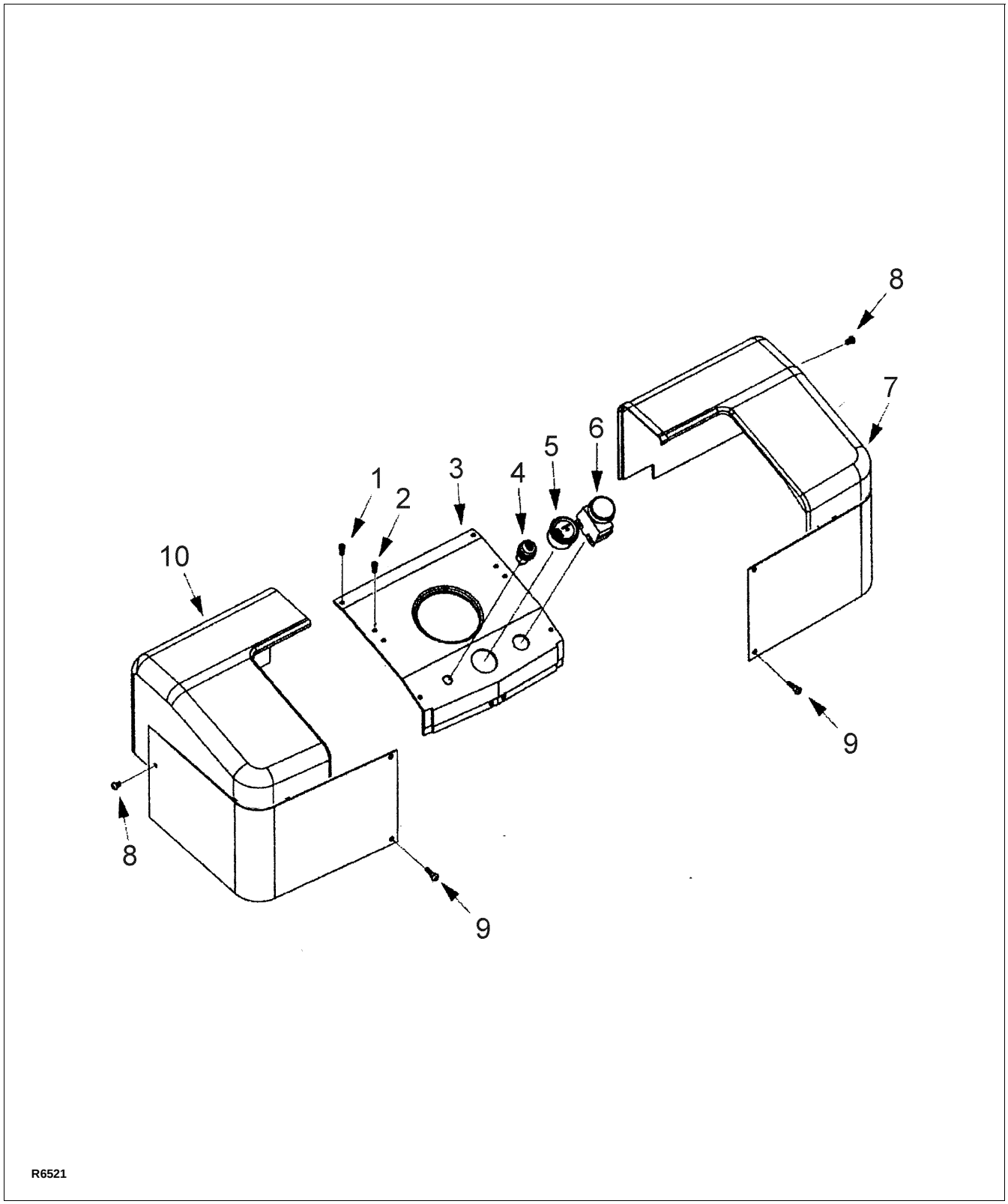

Figure 12-7 Compartment

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902323	SCREW	4
2	902400	SCREW	4
3	902268	MIDDLE PANEL	1
4	902070	KEY SWITCH	1
5	2001-116002	BATTERY INDICATOR	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
6	902239	EMERGENCY STOP BUTTON	1
7	902261	RIGHT PANEL	1
8	902314	SCREW	2
9	902320	SCREW	4
10	902260	LEFT PANEL	1

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Figure 12-8 Decals

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	056564	CAUTION DECAL	2
2	056617	FORWARD-REVERSE DECAL	1
3	056499	NO RIDING DECAL	1
4	056613	OPER. INSTR. DECAL	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
5	061334	NAMEPLATE	1
6	066050	DRIVE SCREW	4
7	056632	BIG JOE DECAL	2

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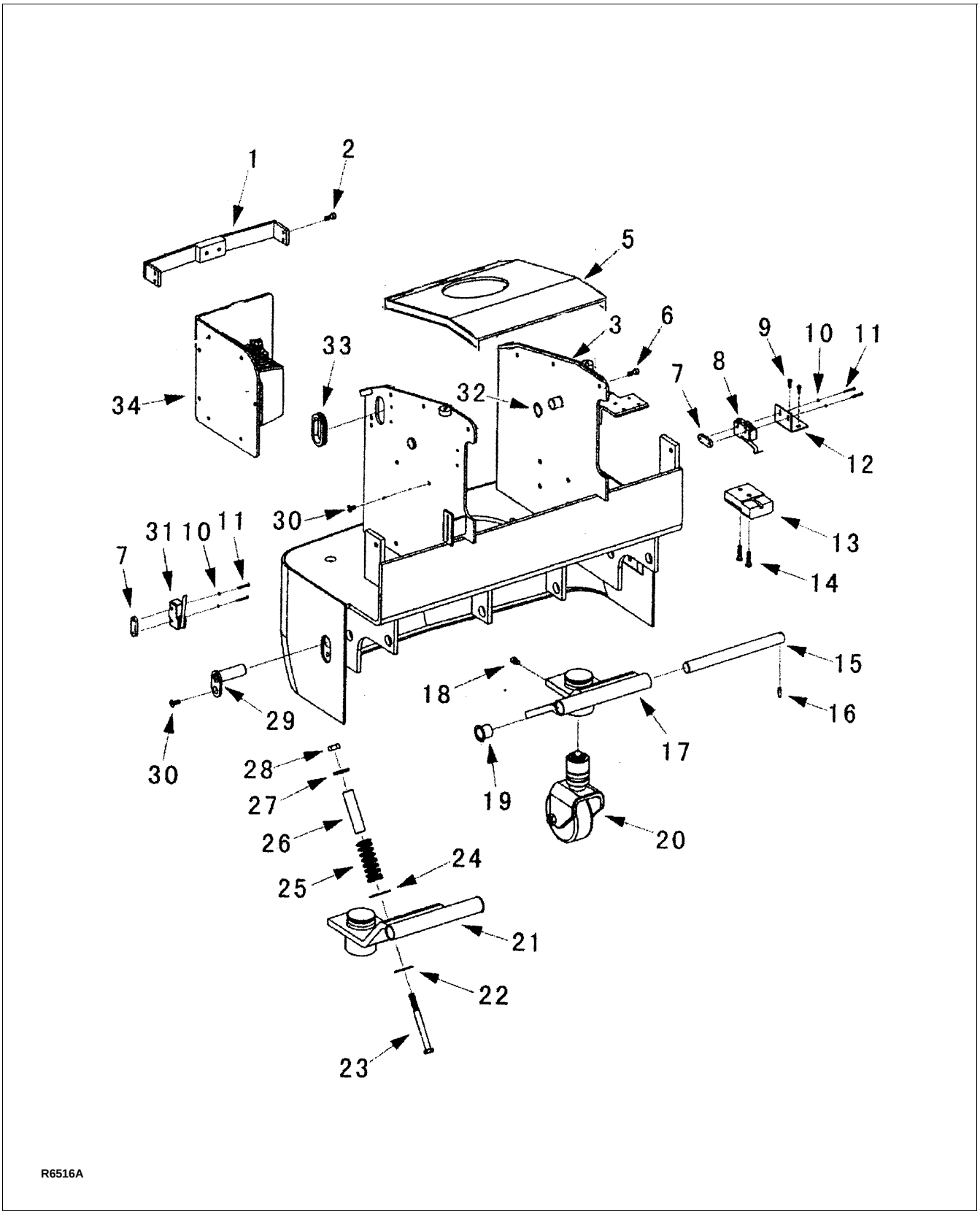

Figure 12-9 Frame

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902376	SUPPORT BRACKET	1
2	902323	SCREW	4
3	902245	FRAME	1
5	902220	TOP PLATE	1
6	902321	SCREW	6
7	902272	MOUNTING PLATE	2
8	902378	SWITCH	1
9	902141	SCREW	2
10	902385	WASHER	4
11	902306	SCREW	4
12	902270	MOUNTING BRACKET	1
13	005401	BATTERY CONNECTOR	1
14	902333	SCREW	2
15	902348	SHAFT	2
16	902368	SPRING PIN	2
17	902259	LEFT CASTER MOUNTING BRACKET	1
18	902334	SCREW	2
19	902213	BEARING	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
20	—	CASTER ASSEMBLY (FIGURE 12-11)	REF
21	902301	RIGHT CASTER MOUNTING BRACKET	1
22	902392	WASHER	2
23	902335	SCREW	2
24	902393	WASHER	2
25	902362	SPRING	2
26	902369	SPRING SLEEVE	2
27	902394	WASHER	2
28	902082	NUT	2
29	902271	MOUNTING PIN	2
30	902338	SCREW	6
31	902171	SWITCH	1
32	902352	SNAP RING	2
33	902252	GROMMET	2
34	—	ELECTRICAL PANEL (FIGURE 12-13)	REF

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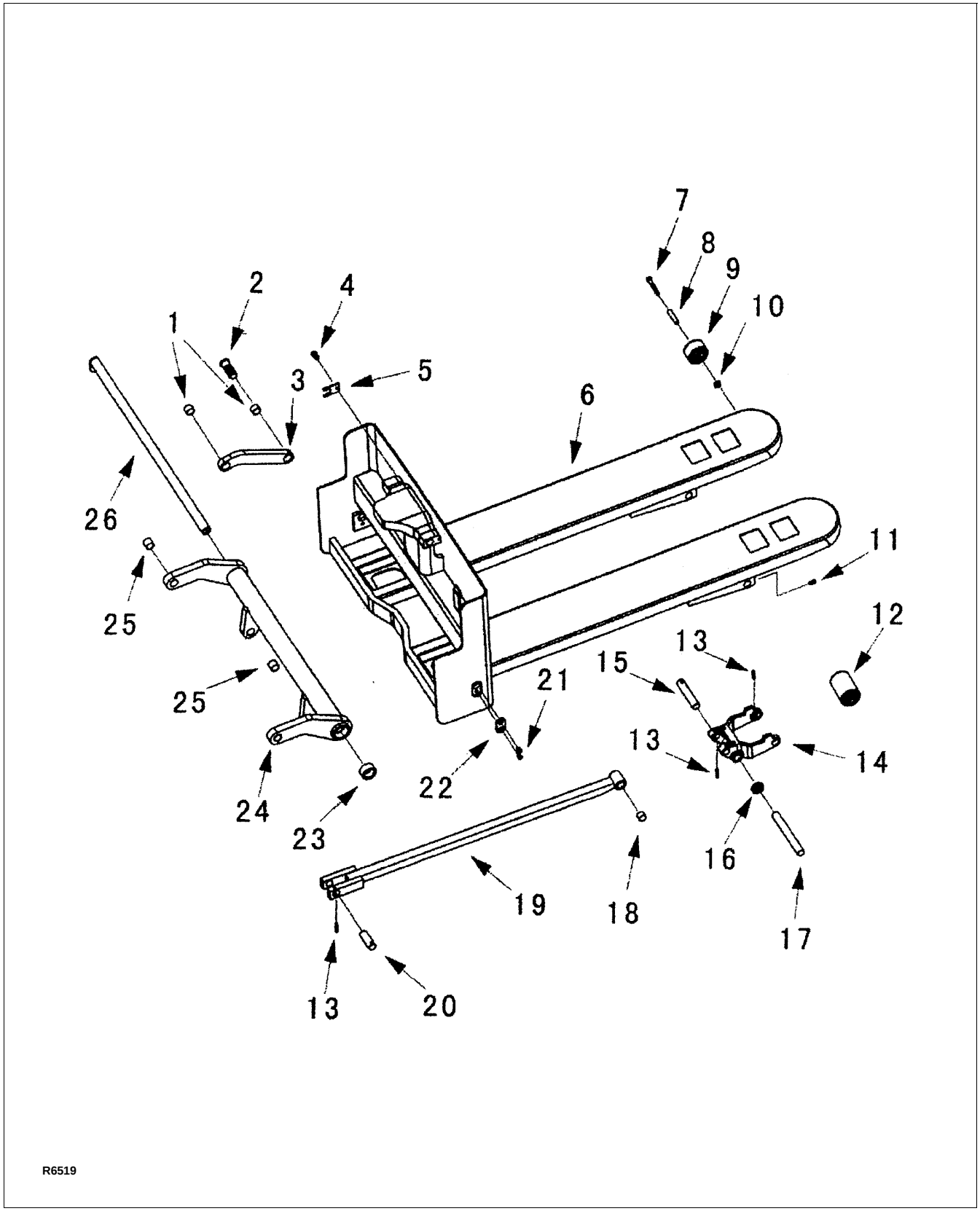

Figure 12-10 Fork Section

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902217	BEARING	4
2	902327	SCREW	2
3	902263	LINK	2
4	902314	SCREW	2
5	902266	LOCK	2
6	902244	FORK FRAME	1
7	902337	SCREW	2
8	902350	SLEEVE	2
9	902240	ENTRY ROLLER	2
10	902277	NUT	2
11	902118	SCREW	2
12	—	WHEEL ASSY, LOAD (FIGURE 12-12)	REF
13	902367	SPRING PIN	6

INDEX NO.	PART NO.	PART NAME	NO. REQD.
14	902399	WHEEL HOUSING	2
15	902343	SHAFT	2
16	902356	SPACER	4
17	902344	SHAFT	2
18	902215	BEARING	2
19	902262	LINK	2
20	902345	SHAFT	2
21	902338	SCREW	3
22	902357	SPACER	3
23	902228	BUSHING	2
24	902222	BRACKET	1
25	902212	BEARING	4
26	902346	SHAFT	1

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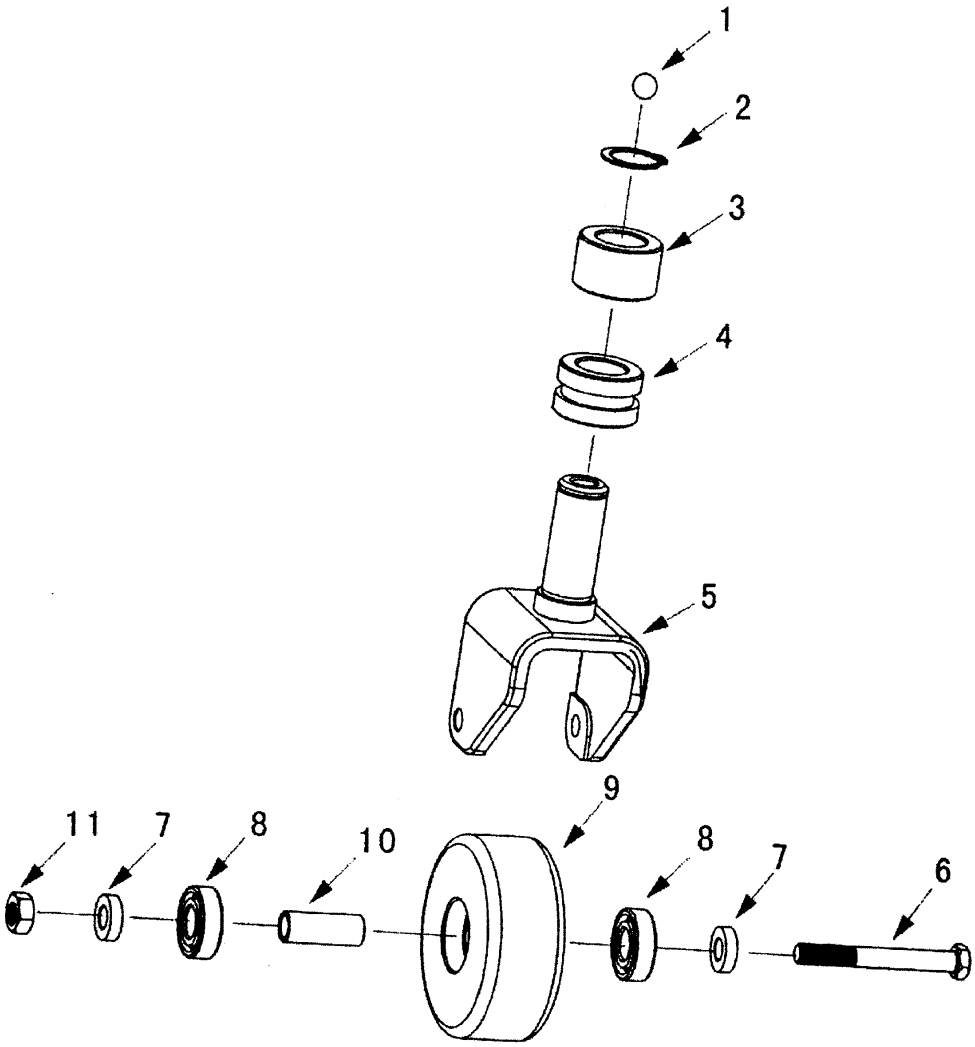

Figure 12-11 Caster Assembly

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902229	CASTER ASSEMBLY	2
1	902372	. STEEL BALL	1
2	902354	. SNAP RING	1
3	902279	. NYLON SLEEVE	1
4	902280	. NYLON SLEEVE	1
5	902398	. WHEEL BRACKET	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
6	902336	. SCREW	1
7	902395	. WASHER	2
8	902219	. BEARING	2
9	902396	. WHEEL	1
10	902351	. SLEEVE	1
11	902082	. NUT	1

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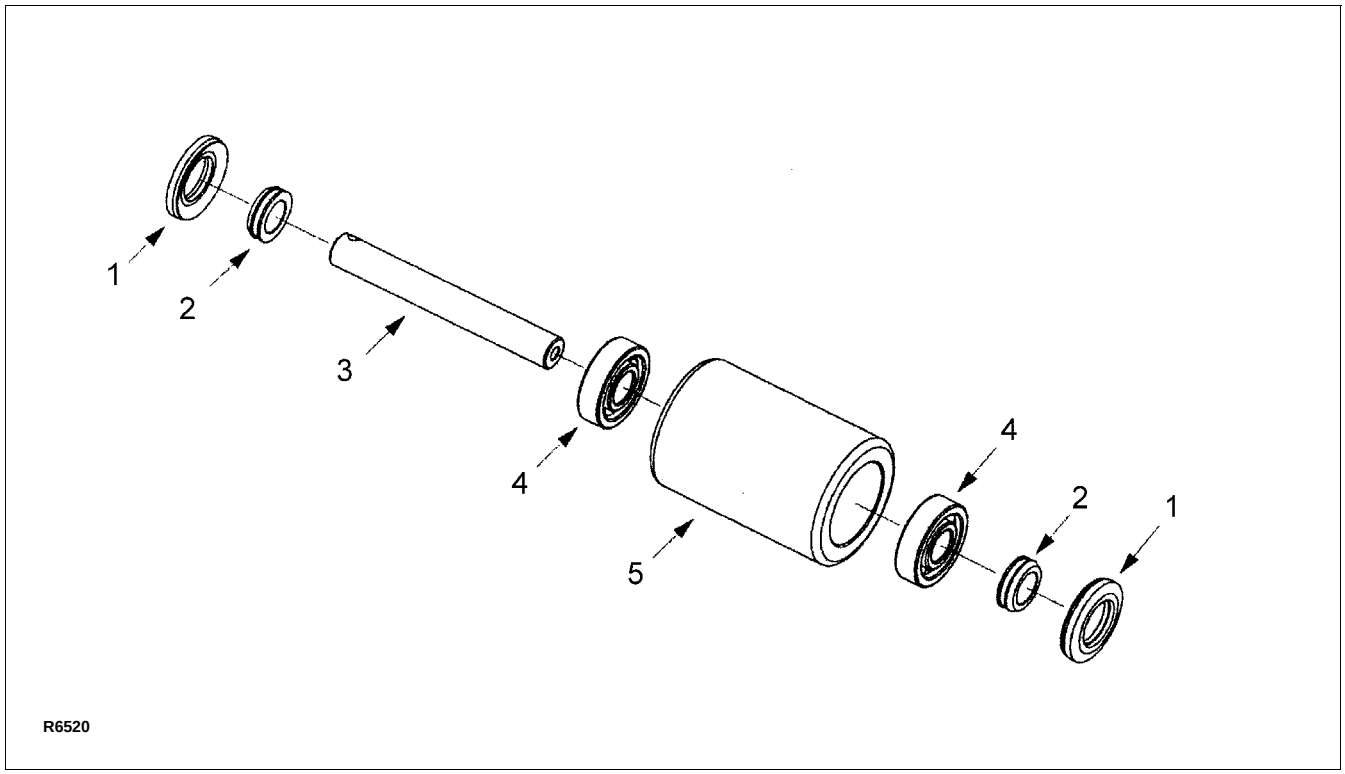

Figure 12-12 Load Wheel Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902265	LOAD WHEEL ASSEMBLY	2
1	902146	. SEAL	2
2	902108	. RING	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
3	902347	. SHAFT	1
4	902211	. BEARING	2
5	902264	. LOAD WHEEL	1

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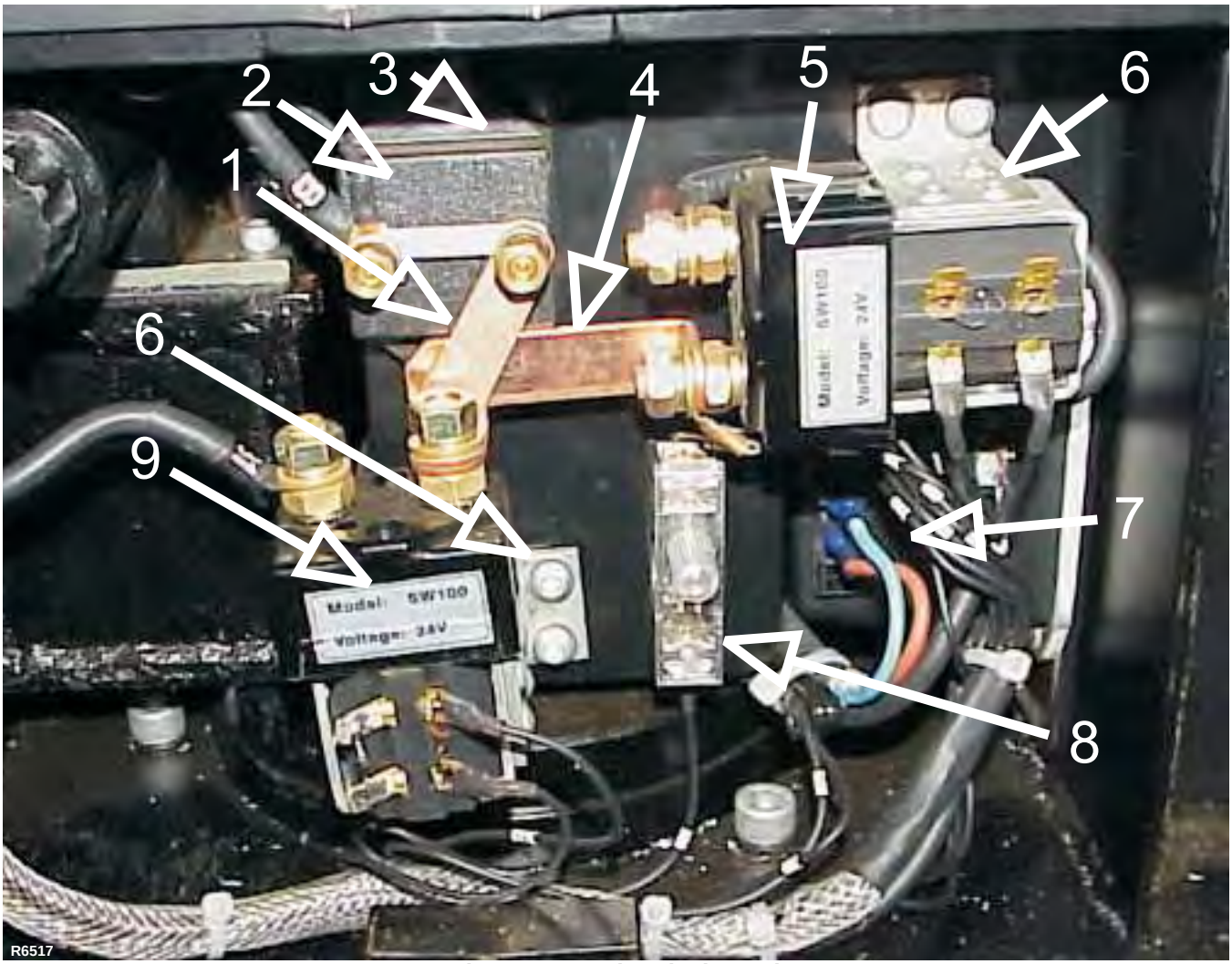

Figure 12-13 Electrical Panel

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902226	BUSBAR	1
2	902056	FUSE	1
3	902238	ELECTRICAL PANEL	1
4	902225	BUSBAR	1
5	902037	CONTACT, MAIN	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
6	902269	MOUNTING BRACKET	2
7	902042	CONTROLLER	1
8	902209	FUSE HOLDER	1
9	902037	CONTACT, LIFT	
—	902210	FUSE, 10 AMP	1

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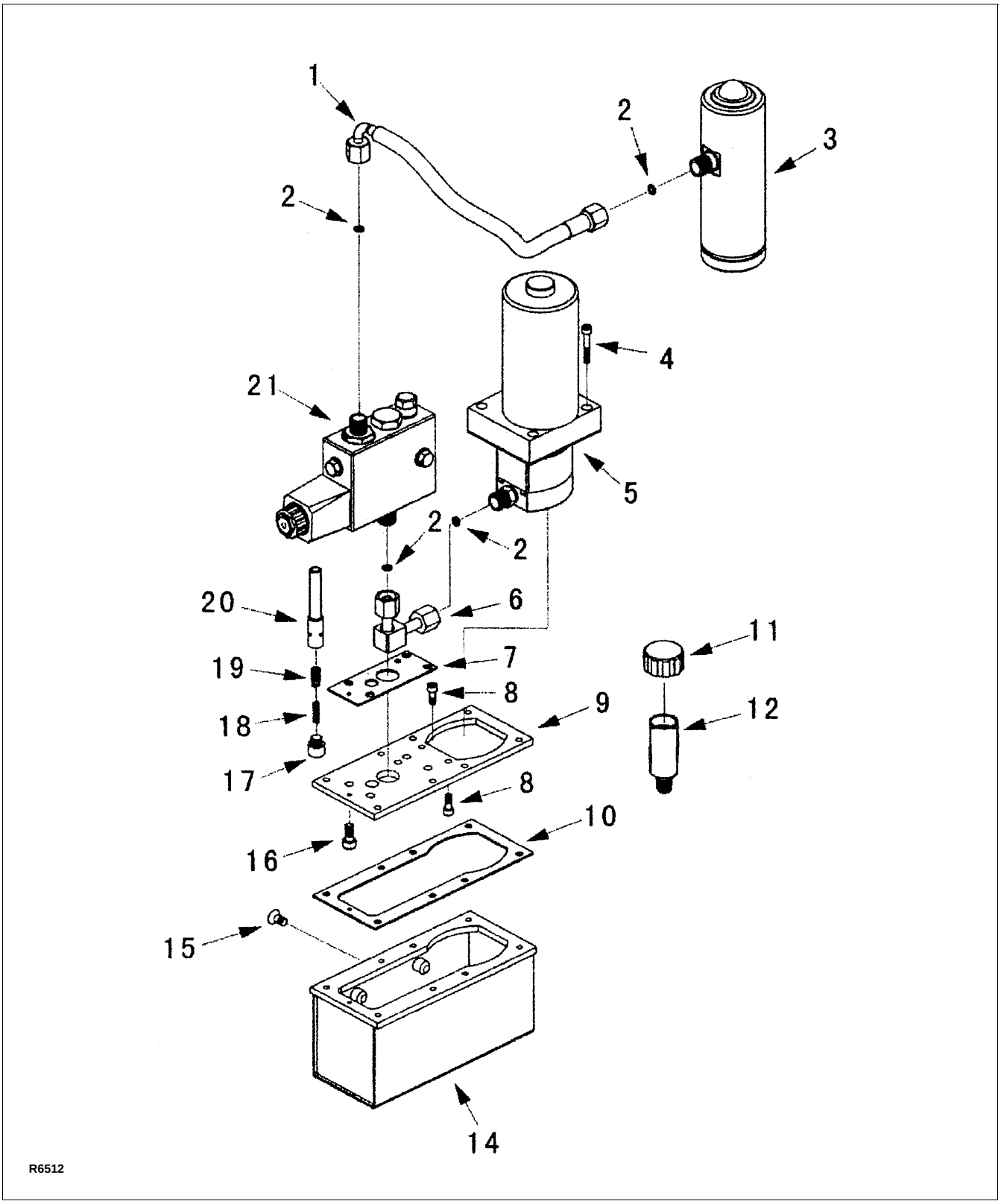

Figure 12-14 Hydraulic System

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	902255	HOSE	1
2	902095	O-RING	4
3	—	CYLINDER ASSEMBLY (FIGURE 12-16)	REF
4	902331	SCREW	4
5	—	PUMP, MOTOR & RESERVOIR ASSEMBLY (FIGURE 12-15)	REF
6	902380	TUBE ASSEMBLY	1
7	902246	GASKET	1
8	902323	SCREW	6
9	902233	COVER	1
10	902247	GASKET	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	902043	COVER	1
12	902405	BREATHER	1
13	—	NOT USED	
14	902299	RESERVOIR	1
15	902332	SCREW	4
16	902322	SCREW	4
17	902309	SCREW	1
18	902361	SPRING	1
19	902382	VALVE CORE	1
20	902281	OIL TUBE	1
21	—	VALVE ASSEMBLY (FIGURE 12-17)	REF

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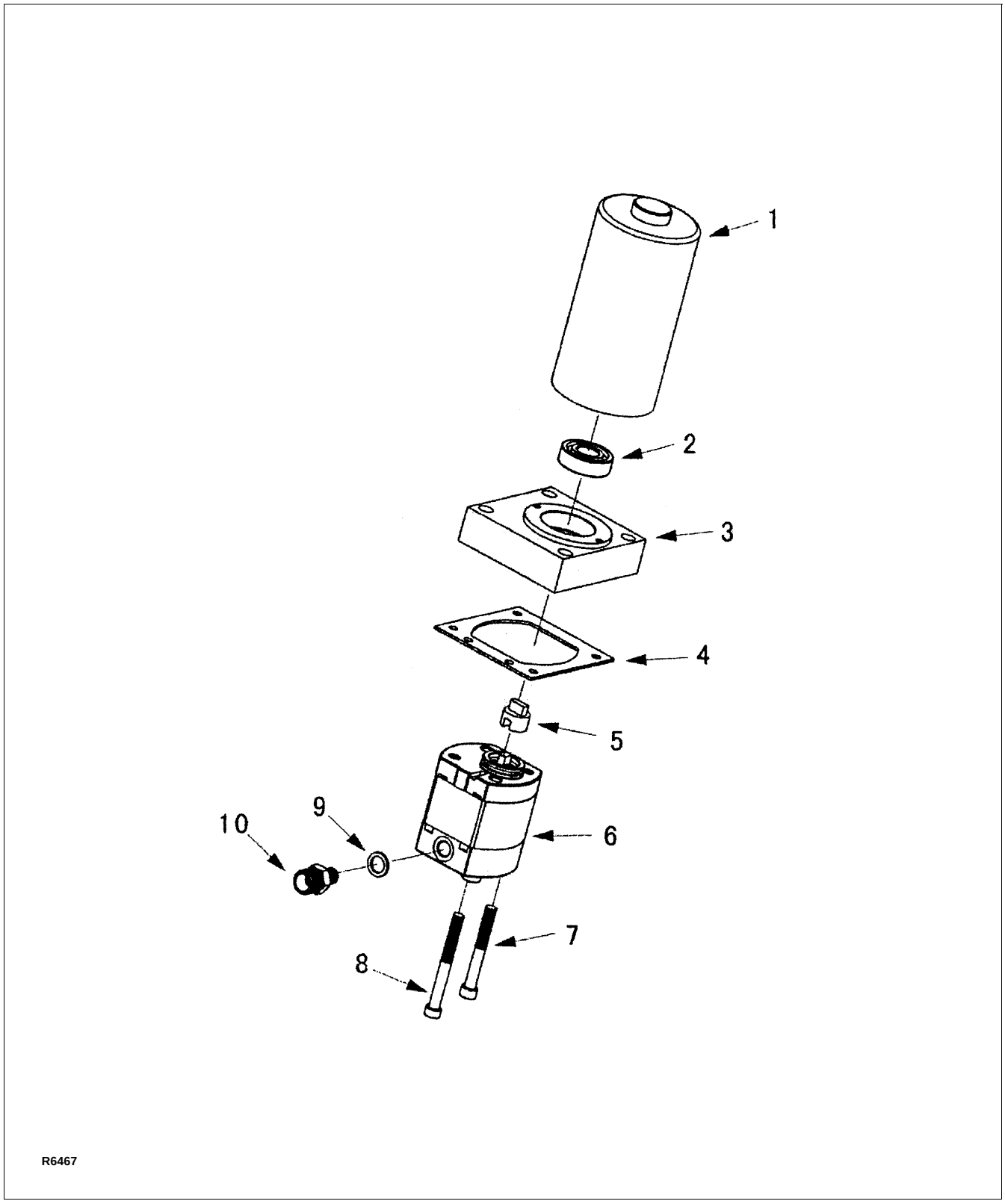

Figure 12-15 Pump, Motor & Reservoir Assembly

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902298	PUMP, MOTOR & RESERVOIR ASSEMBLY	1
1	902256	. HYDRAULIC PUMP MOTOR	1
2	902216	. BEARING	1
3	902221	. BLOCK	1
4	902248	. GASKET	1
5	902232	. COUPLING	1
6	902297	. PUMP ASSEMBLY	1
7	902129	. SCREW	2
8	902318	. SCREW	2
9	902391	. WASHER	1
10	902243	. FITTING	1

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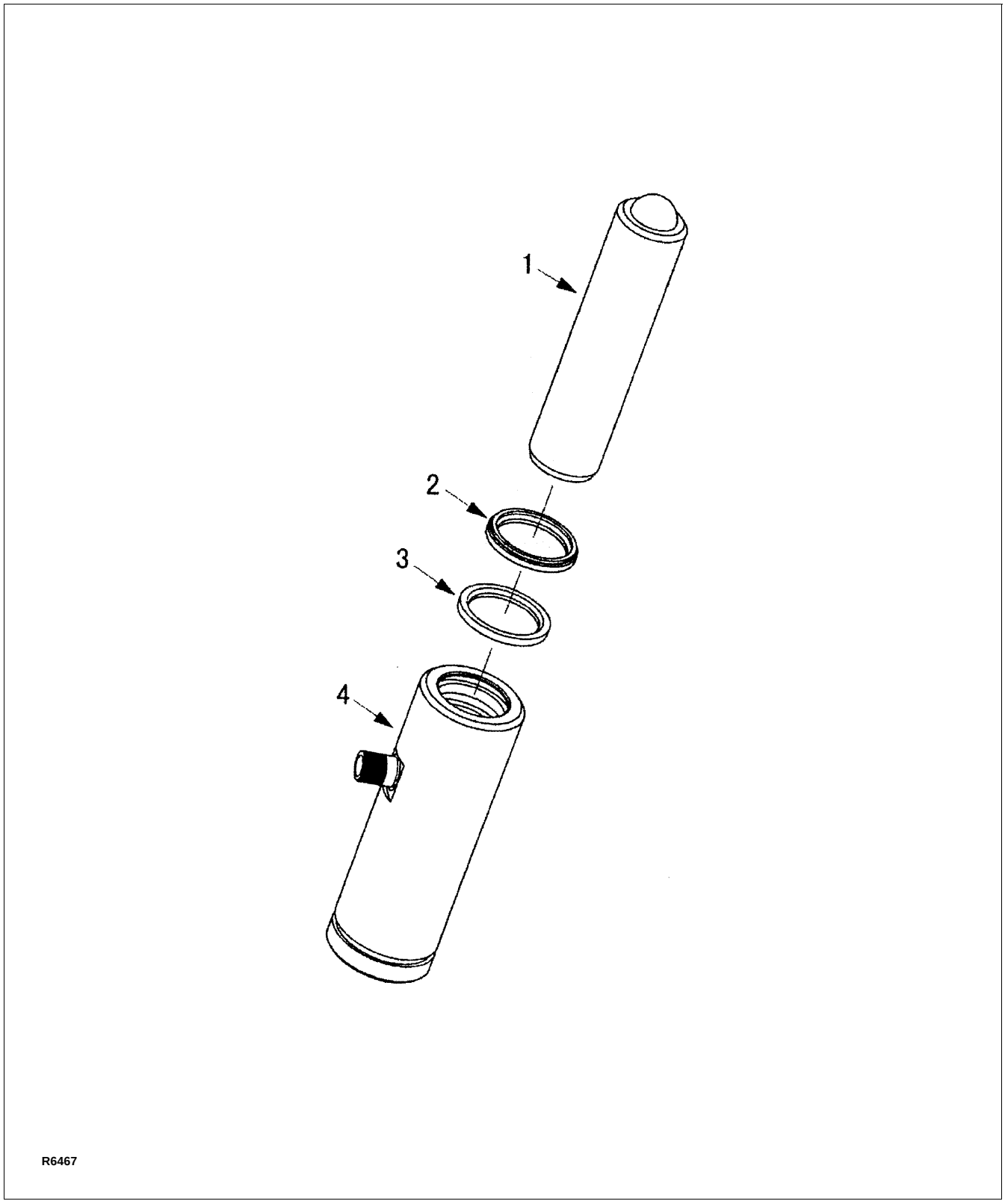

Figure 12-16 Cylinder Assembly

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902235	CYLINDER ASSEMBLY	1
1	902292	. PISTON ROD	1
2	902237	. DUST SEAL	1
3	902339	. SEAL	1
4	902236	. CYLINDER BODY	1

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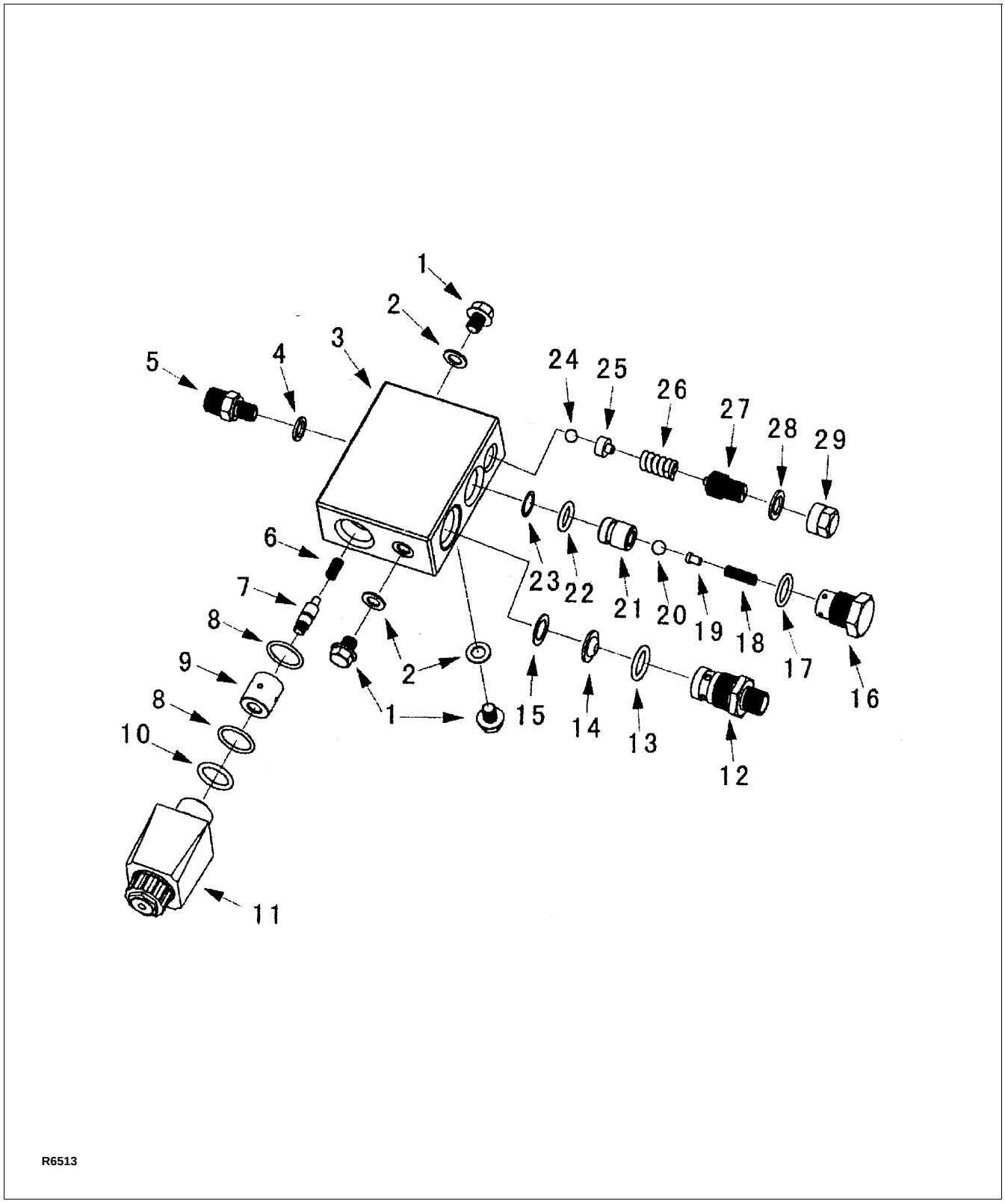

Figure 12-17 Valve Assembly

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	902381	VALVE ASSEMBLY	1
1	902317	. SCREW	3
2	902387	. WASHER	3
3	—	. VALVE BODY	1
4	902391	. WASHER	1
5	902231	. CONNECTOR	1
6	902358	. SPRING	2
7	—	. SPOOL	1
8	902282	. O-RING	2
9	—	. SLEEVE	1
10	902283	. O-RING	1
11	—	. COIL	1
12	902242	. FITTING	1
13	902286	. O-RING	1
14	902241	. FILTER	1
15	902389	. WASHER	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
16	—	. VALVE CAP	1
17	902284	. O-RING	1
18	902360	. SPRING	1
19	902371	. SPRING SOCKET	1
20	902374	. STEEL BALL	1
21	—	. SPOOL	1
22	902285	. O-RING	1
23	902386	. WASHER	1
24	902375	. STEEL BALL	1
25	902370	. SPRING SOCKET	1
26	902359	. SPRING	1
27	902296	. PRESSURE ADJUSTING BOLT	1
28	902388	. WASHER	1
29	902276	. NUT	1

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