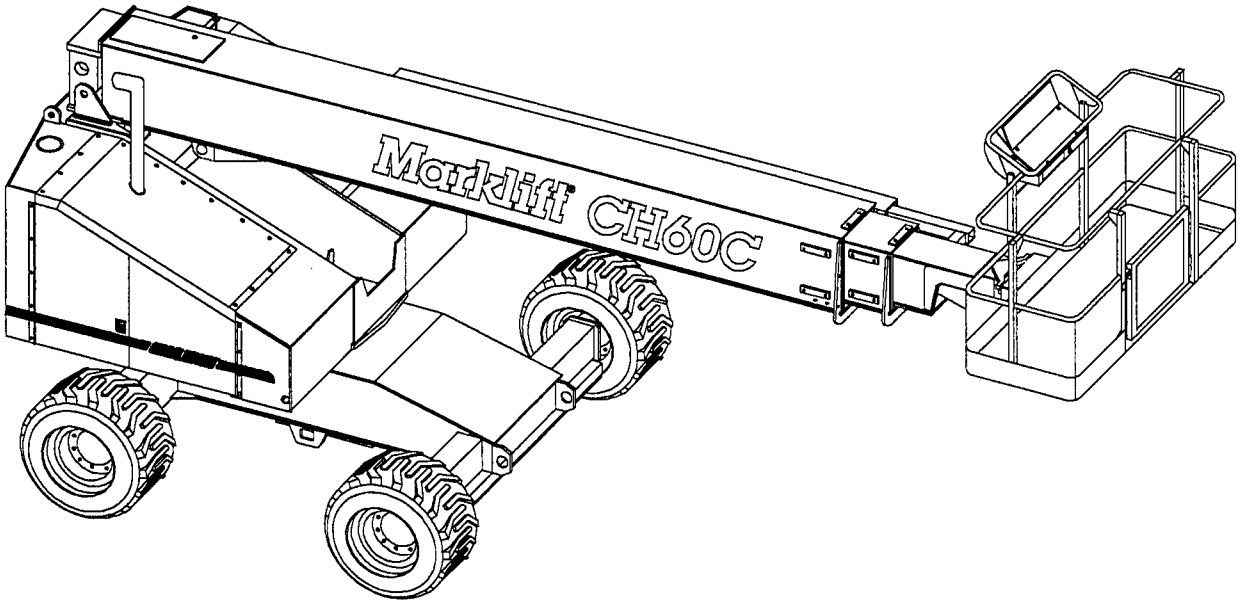
Mark Industries

SELF-PROPELLED BOOMLIFT MODELS: CH44C CH50C CH60C CH66C CH80C CH100C



SERVICE AND MAINTENANCE MANUAL

MARK INDUSTRIES
106 12th Street S.E.
Waverly, Iowa 50677
(319) 352-3920
(319) 352-5727 FAX

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WARNING

IF OPERATION OF THIS MACHINE IS REQUIRED TO PERFORM SERVICE OR MAINTENANCE, THEN THE OPERATOR MUST READ AND UNDERSTAND ALL THE INSTRUCTIONS IN THE OPERATOR'S MANUAL BEFORE OPERATING THE AERIAL LIFT.

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SERVICE & ADJUSTMENTS	4
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INTRODUCTION

Owners, Users, and Operators:

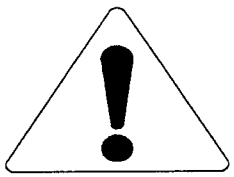
Mark Industries appreciates your choice of our machine for your application. Our number one priority is user safety which is best achieved by our joint efforts. We feel that you can make a major contribution to safety if you as the equipment owners, users and operators:

1. **Comply** with OSHA, Federal, State, and Local Regulations.
2. **Read, Understand, and Follow** the instructions in this and other manuals supplied with this machine.
3. **Use Good, Safe Work Practices** in a common sense way.
4. **Only have trained operators** — directed by informed and knowledgeable supervision — running the machine.
5. **Only have qualified aerial lift mechanics** perform the service and maintenance procedures provided in the "Service and Maintenance Manual".

The information, specifications, vendor information, and illustrations in this publication are based on the information available at the time of approval for printing. Do to on-going changes and revisions by our many suppliers, it is often impossible to show all changes or variations. We reserve the right to make changes at any time without obligation.

If there is anything in this manual that is not clear or which you believe should be added, please send your comments to Manager, Technical Publications, Mark Industries, 106 12th Street, S.E., Waverly, Iowa 50677; or contact us by telephone at (319) 352-3920.

Thank you!



THIS SYMBOL MEANS YOUR SAFETY IS INVOLVED!
READ, UNDERSTAND, AND FOLLOW ALL DANGER, WARNING, AND CAUTION DECALS ON YOUR MACHINE.

INTRODUCTION

Aerial lift longevity and low-cost performance depend on Periodic Maintenance, Troubleshooting and proper Service and Adjustment procedures.

It is responsibility of the owner, user, and operator to detect any unusual, sounds, odors, or other signs of abnormal performance that could indicate trouble ahead.

By detecting any problems in their early stages, you can save yourself unnecessary downtime and your employer a lot of money! Therefore, it is also your responsibility to use good judgment in detecting failures in quickly and repairing them. If you don't, one failure can lead to another.

NOTE: THE SERVICE AND MAINTENANCE PROCEDURES PROVIDED IN THIS MANUAL SHOULD ONLY BE PERFORMED BY A QUALIFIED AERIAL LIFT MECHANIC.

Before attempting to make an adjustment yourself, ask yourself if you have the RIGHT TOOLS, IF you have the PROPER TEST EQUIPMENT and IF you can accurately DIAGNOSE the cause of the problem.

If you can't answer YES to all three questions, rely on your Distributor Serviceman. He has the right tools, testing equipment and service knowledge to pin-point the problem in minutes instead of the hours consumed in hit-or-miss methods. TIME IS MONEY! He will save it for you.

If you decide to attempt an adjustment yourself, follow a logical TROUBLE SHOOTING PROCEDURE. Don't simply replace parts until the trouble is found.

Once the cause of problem or malfunction has been diagnosed, take the corrective action specified in this manual. Follow the procedures given for the specific problem. If the difficulty is not covered, consult your Mark Distributor, or the Mark Industries Product Support Department.

SECTION 2

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RECEIVING A NEW MACHINE	2 - 2
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GENERAL INFORMATION

GENERAL SERVICE INFORMATION

Keep parts in order when large components are disassembled, particularly so when it has a great number of similar parts. Loosely reassemble assemblies whenever possible to prevent small parts from being lost. Keep sub-assembly parts together, but be careful not to get right and left hand parts mixed up.

When an assembly is removed to correct only one difficulty, it is good practice to recondition the whole assembly at that time to avoid repetition of work at a later date.

Bolts and nuts should be placed into their respective holes when removing guards, cases, etc. so that the proper bolts will be on hand for reassembling.

Safety should always be the first consideration when performing maintenance or service to equipment.

Always be conscious of a component's weight. Never attempt to move a heavy part without a proper lifting device. Ensure that adequate support is provided and that objects are set in a stable position.

Any hydraulic component disassembly or reassembly must be done in a clean, enclosed environment by personnel familiar with hydraulic systems and cleanliness procedures.

GENERAL INFORMATION

RECEIVING A NEW MACHINE

Before removing a new machine from the delivery vehicle:

1. Check and follow the Operation & Maintenance Manual for unloading procedure.
2. Check battery/batteries for cracks and for proper water level (if applicable).
3. Check for bent, broken or otherwise damaged functional components
4. Check for sufficient oil levels, both hydraulic and engine (if applicable).
5. Check for fluid leaks in hydraulic or fuel delivery systems.
6. Check lug nuts for looseness.

Upon receipt of a new machine the customer must:

1. Remove all packing materials and inspect for any damage incurred during transport.
2. Complete the NEW EQUIPMENT CONDITION REPORT
3. Complete the WARRANTY REGISTRATION.
4. If your machine is an export model, the export preservative must be removed.

EXPORT PRESERVATIVE REMOVAL

Before an export machine leaves the factory the exterior surfaces are given a coating designed to protect the paint from the environment encountered when shipping items overseas or for great distances. This coating can be removed using **warm soapy water**.

Do not use a steam cleaner to clean or wash this machine.

Do not spray water directly on **any** control panels or electrical compartments.

This preservative is applied to **export machines only.**

GENERAL INFORMATION

MACHINE STORAGE

Machines being placed in storage must be adequately protected from deterioration during the period of idleness. This will ensure that they can be restored to active service with a minimum effort.

Before removing this aerial lift from service for extended periods, it should be prepared for storage as prescribed in the following paragraphs. The specific procedure to be followed depends upon the expected period of storage.

SHORT TERM STORAGE - 30 DAYS OR LESS

Short term storage requires minimal preparation.

The **AERIAL LIFT** should be thoroughly cleaned, lubricated in accordance with Section 3, and painted surfaces retouched where the paint has deteriorated. Exposed portions of all hydraulic cylinders should be coated with multipurpose grease. Coat unpainted metal surfaces with multipurpose grease after removing any rust accumulations.

LONG TERM STORAGE - 30 DAYS OR MORE

Long term storage requires greater preparation than short term storage and must be undertaken with greater care.

The **MACHINE** should be prepared as follows:

1. Perform the short term machine storage preparation, making certain that All points with grease fittings are liberally lubricated.

2. Drain and refill the hydraulic reservoir. Refer to page 3 - ? when servicing the reservoir.

3. Distribute the new hydraulic fluid to all parts of the system by operating all functions.

4. Clean and tape the battery cables after removing and storing the battery.

5. Coat the external ring gear of the swing bearing with open gear lubricant.

6. Fill the hydraulic reservoir to the top *AFTER THE MACHINE IS PARKED IN ITS STORAGE SPOT.*

7. Refer to the engine manual(s) and follow the engine manufacturer's procedures for long term storage.

8. Coat exposed cylinder rods with grease.

RESTORING AERIAL LIFT TO SERVICE

Remove the **AERIAL LIFT** from storage via the following procedure:

1. Remove preservative lubricants from all surfaces.

2. Check all fluid levels, adding or draining as required.

3. Install the battery, if removed and reconnect battery cables.

4. Refer to the engine manual(s) and follow the engine manufacturer's procedures for returning the engine to service.

5. Lubricate the aerial lift according to the maintenance schedule on page 3 - 2.

6. Make a thorough visual inspection of the entire aerial lift, placing special emphasis on the condition of all hydraulic hoses.

GENERAL INFORMATION

NOTES

GENERAL CLEANING, INSPECTION & PREPARATION FOR MAJOR COMPONENT OVERHAUL

A. Clean parts having ground and polished surfaces, such as gears, bearings, and shafts with solvent type cleaners such as emulsion cleaners, or petroleum solvents excluding gasoline. Do not clean these parts in a hot tank solution or sodium hydroxide, orthosillcates or phosphates. When cleaning, remember to clean and/or replace breathers if applicable.



Exercise extreme care to avoid skin rashes, fire hazards and inhalation of vapors when using solvent-type cleaners.

B. Rough parts such as gear case housings may be cleaned hot solution tanks with mild alkali solutions providing these parts are not ground and polished. The parts should remain in the tank long enough to be thoroughly cleaned and heated through. This will aid and speed up the evaporation of the cleaning solution and the rinse water.



Exercise care to avoid skin rashes and inhalation of vapors when using alkali cleaners.

Parts cleaned in solution tanks or with alkali cleaners should be thoroughly rinsed after cleaning to remove all traces of alkali.

C. Parts should be thoroughly dried immediately after cleaning. Use soft, clean, lint-free absorbent paper towels or wiping rags free of abrasive material such as lapping compound, metal filings or contaminated oil. Bearings should never be dried by spinning with compressed air.

D. To prevent corrosion, parts that have been cleaned and dried, then inspected, should be reassembled immediately and coated with a light film of oil.

E. It is impossible to overstress the importance of careful and thorough *inspection* of component parts prior to reassembly. Thorough visual inspection for indications of wear or stress, and the replacement of such parts as are necessary will eliminate costly and avoidable unit failure.

1. Inspect all bearings and replace any that are worn, pitted or damaged in any way. Remove parts needing replacement with a suitable puller or in a press with sleeves. Avoid the use of drifts and hammers, as they may easily mutilate or severely distort component parts.

2. Inspect all gears for wear or damage. Gears which are scored, pitted, ridged or worn should be replaced.

F. If repair is evident, replace all worn or damaged parts. Hex nuts with rounded corners, all lock washers, oil seals, o-rings and gaskets should all be replaced at the time of overhaul.

WELDING INSTRUCTIONS



When doing repair welding on your aerial lift take precaution attaching your ground to the component being repaired. This will eliminate the chance of arcing through a bearing, cylinder, etc., damaging the component. Paint should be removed from the surface to be used as the "ground" (earth).



Use necessary precaution when welding around fuel tanks, oil reservoir, batteries, tubing and pressure systems.



When welding close to glass, cylinder rods, or any polished surface, provide adequate protection from splatter.



Always disconnect the battery cables and applicable grounds before welding. If equipped with an engine, never weld when the engine is running.



Do not weld on wet surfaces since this will cause hydrogen embrittlement of the weld.



Always have a fire extinguisher on hand in case of fire. Adequate ventilation and dry area are necessary. Protective clothing should be used and all persons in the welding area should have protection for their eyes.

AWS CLASS E7018 Low hydrogen rod for normal repairs on low allow to medium carbon steel. All position welding, good penetration and crack resisting up to 80,000 yield. Also suitable for repair of previous intershield welds.

AWS CLASS E11018G Low hydrogen rod for repair on high strength allow steel such as T-1, 80,000 to 100,000 yield. All position welding, good penetration and high tensile strength up to 110,000.

NOTE: Low hydrogen rod E7018 must be used within four (4) hours upon removal from a freshly opened container or from a storage oven.

Low hydrogen rod E11018G must be used within 1/2 hour upon removal from its container or from a storage oven.

GENERAL INFORMATION

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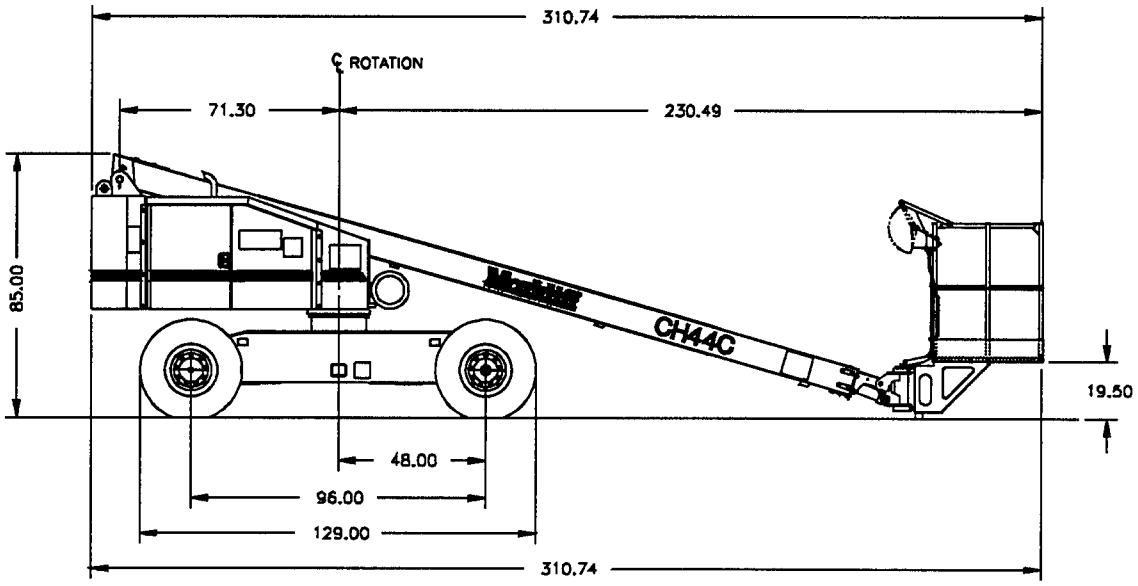
SPECIFICATIONS CH44C

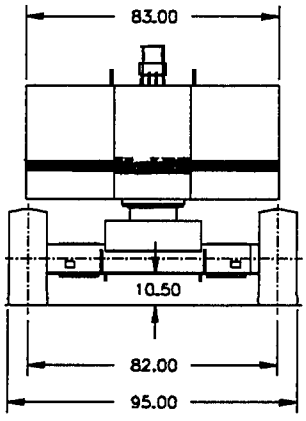
*Working Height (Maximum)	50 ft (15.24 m)
Platform Height (Maximum)	44 ft (13.41 m)
Stowed Height	7 ft 1 in (2.16 m)
Length (stowed)	25 ft 10-3/4 in (7.89 m)
Width	7 ft 11 in (2.41 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach	37 ft (11.27 m)
Boom Elevation	-16° to 75° above horizontal plane
Load capacity 6 ft. Platform/8 ft. Platform	650 lbs. (295 kg)/600 lbs. (272 kg)
Wheelbase	8 ft (2.44 m)
Wheel track	6 ft 10 in (2.08 m)
Tailswing	33 in (0.84 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft (4.9 m)
Travel speed	0 to 3.25 m.p.h. (0 to 5.23 km/h)
Power source	62 hp (46.2 kw) Ford LRG 423 (standard)
Fuel tank capacity	25 gal (94.6 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 38 gal. (144 L)
Tires (monofilled)	12 x 16.5 8 P.R. (Mono)
Ground clearance	10.5 in (.26 m)
Approx. shipping weight	12,000 lbs. (5,443 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 170 psi (11.95 kg/sq-cm) 7350lbs (3334 kg)
Wind speed rating	25 MPH
Gradeability 2WD/4WD	35%/55%

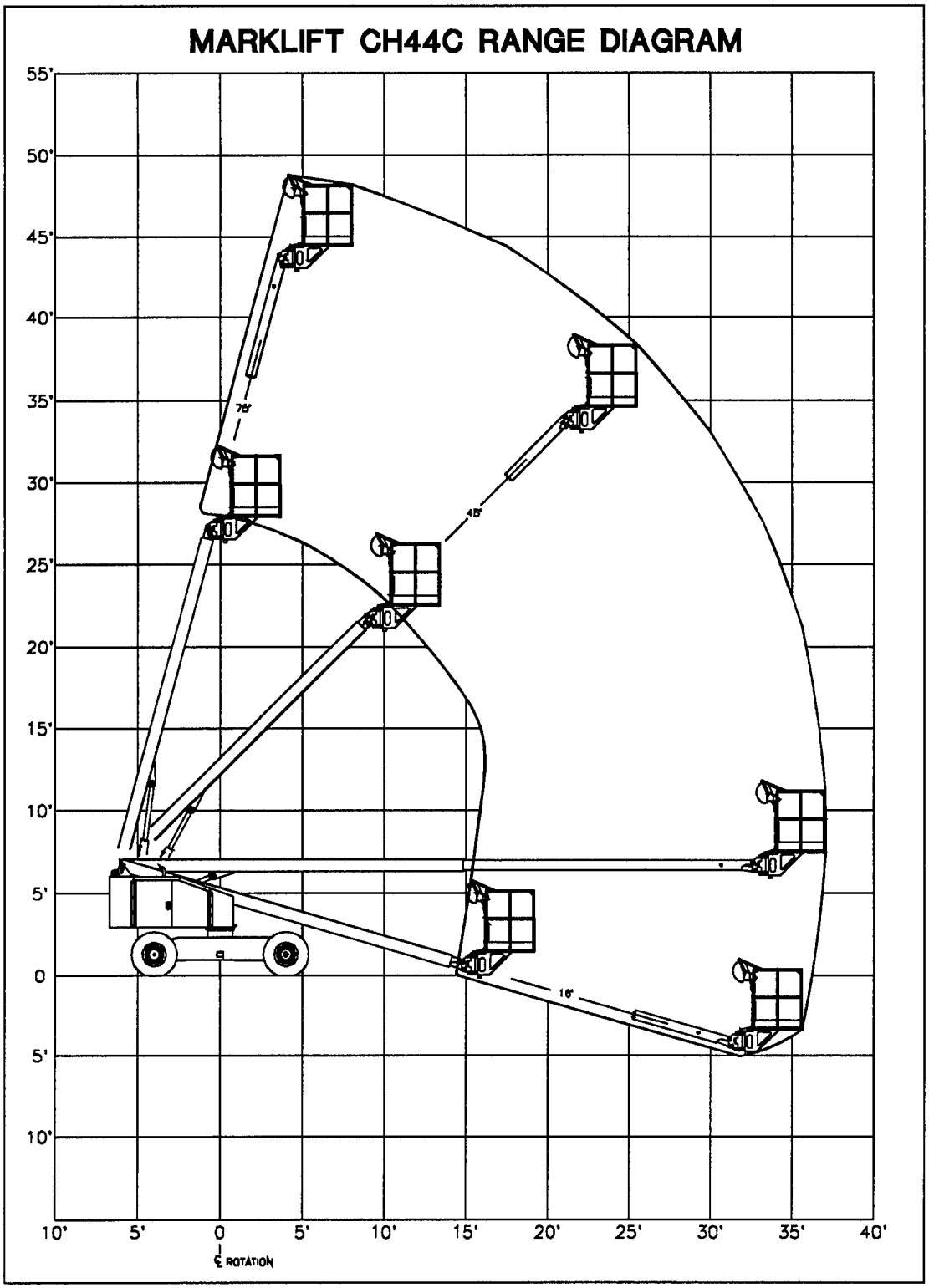
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH44C GENERAL SPECIFICATIONS






MARKLIFT CH44C RANGE DIAGRAM
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
10'
5'
0
5'
10'
15'
20'
25'
30'
35'
40'
℄ ROTATION
75°
45°
16'

SPECIFICATIONS

NOTES

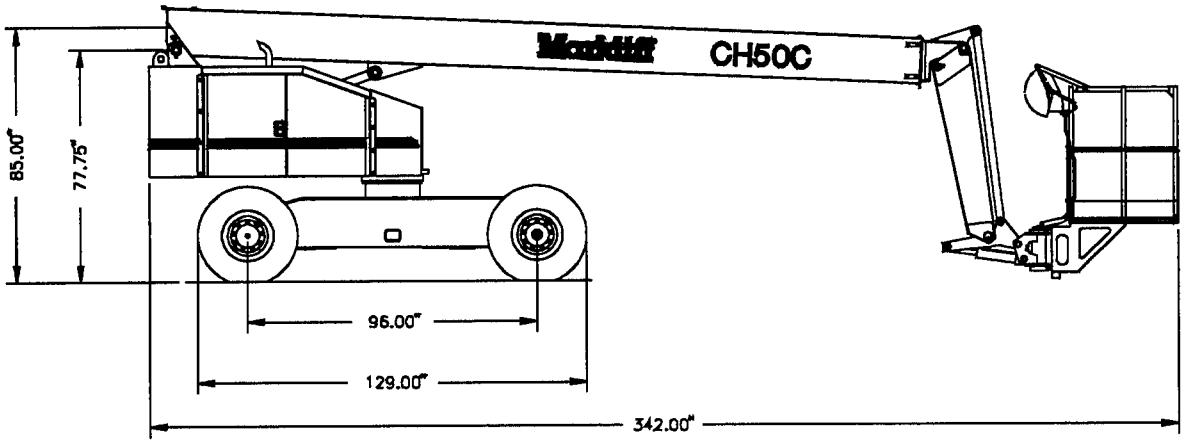
SPECIFICATIONS CH50C

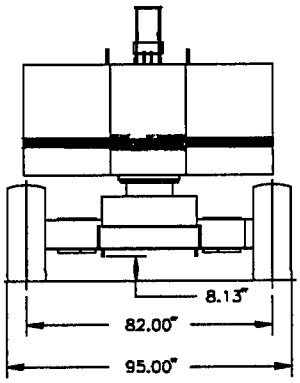
*Working Height (Maximum)	56 ft (17.07 m)
Platform Height (Maximum)	50 ft (15.24 m)
Stowed Height	7 ft 7 in (2.31 m)
Length (stowed)	28 ft 6 in (8.69 m)
Width	7 ft 11 in (2.41 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach	43 ft (13.11 m)
Boom Elevation	-16° to 75° above horizontal plane
Load capacity 6 ft. Platform	500 lbs. (227 kg)
Wheelbase	8 ft (2.44 m)
Wheel track	6 ft 10 in (2.08 m)
Tailswing	33 in (0.84 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft (4.9 m)
Travel speed	0 to 3.25 m.p.h. (0 to 5.23 km/h)
Power source	62 hp (46.2 kw) Ford LRG 423 (standard)
Fuel tank capacity	25 gal (94.6 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 38 gal. (144 L)
Tires (monofilled)	12 x 16.5 8 P.R. (Mono)
Ground clearance	10.5 in (.26 m)
Approx. shipping weight	15,500 lbs. (7,031 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 196 psi (13.78 kg/sq-cm) 8,480lbs (3846 kg)
Wind speed rating	25 MPH
Gradeability 2WD/4WD	25%/50%

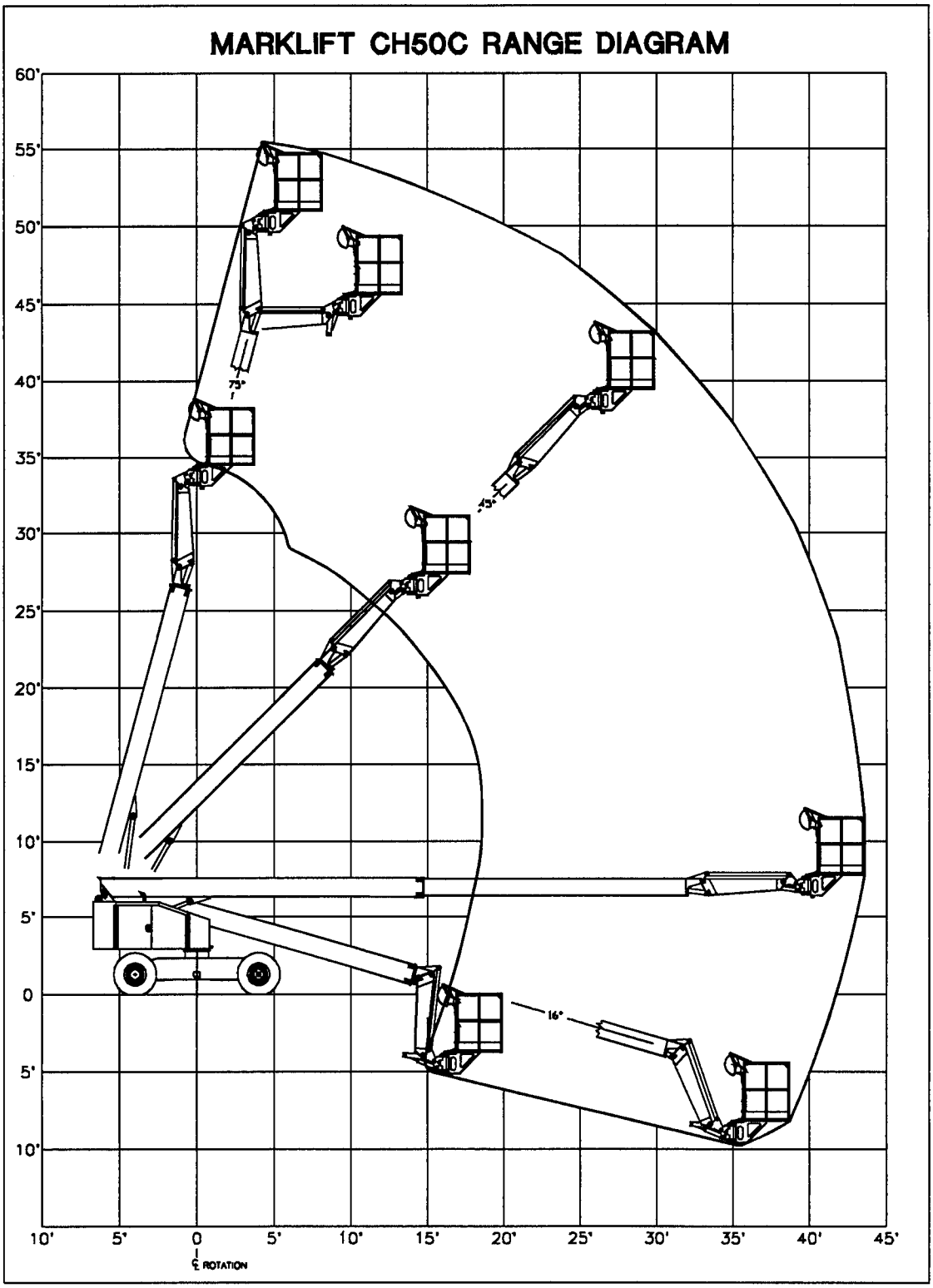
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH50C GENERAL SPECIFICATIONS






MARKLIFT CH50C RANGE DIAGRAM
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
10'
5'
0
5'
10'
15'
20'
25'
30'
35'
40'
45'
℄ ROTATION
75°
45°
16°

SPECIFICATIONS

NOTES

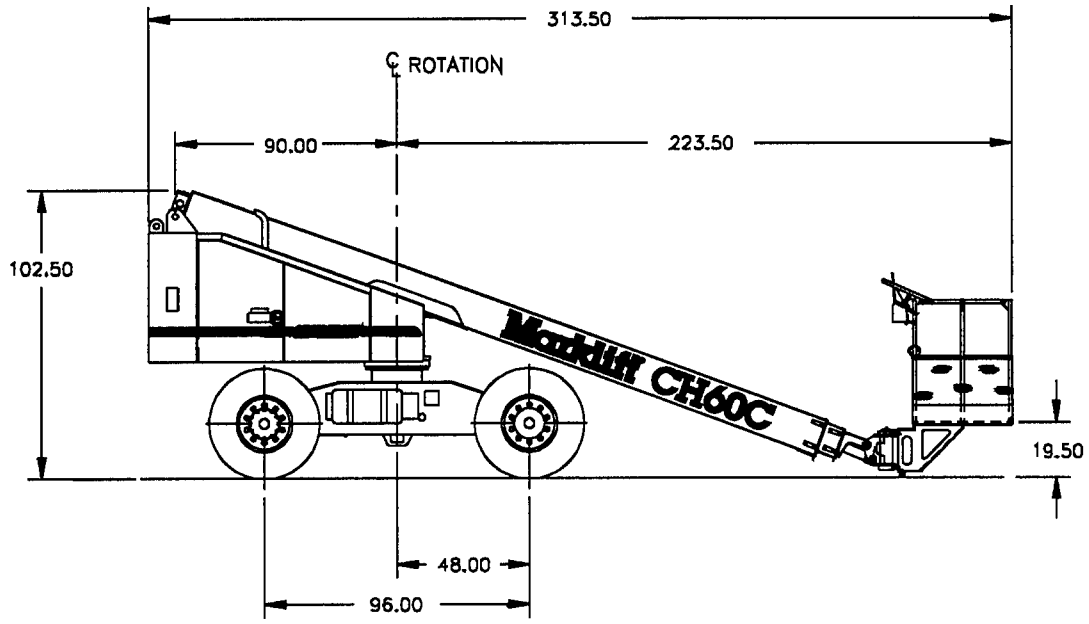
SPECIFICATIONS CH60C

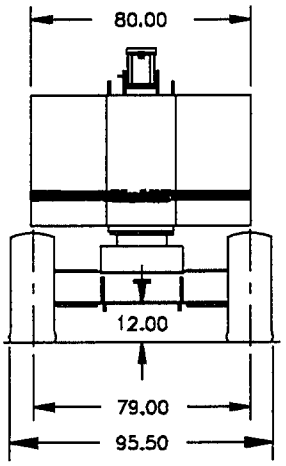
*Working Height (Maximum)	66 ft (20.12 m)
Platform Height (Maximum)	60 ft (18.29 m)
Stowed Height	8 ft 6 in (2.59 m)
Length (stowed)	26 ft 1-1/4 in (7.96 m)
Width	7 ft 11 in (2.41 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach	51 ft 4-5/8 in (15.66 m)
Boom Elevation	-20° to 75° above horizontal plane
Load capacity	650 lbs. (295 kg)
Wheelbase	8 ft (2.44 m)
Wheel track	6 ft 7 in (2.01 m)
Tailswing	42 in (1.07 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft 9 in (5.1 m)
Travel speed	0 to 3.25 m.p.h. (0 to 5.23 km/h)
Power source	66 hp (49.2 kw) Ford LRG 423 (standard)
Fuel tank capacity	40 gal (151 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 52 gal. (196 L)
Tires (monofilled)	15 x 19.5 13 P.R. (loader lug)
Ground clearance	10 in (.25 m)
Approx. shipping weight	21,000 lbs. (9526 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 64 psi (4.5 kg/sq cm) 10,500 lbs (4773 kg)
Wind speed rating	25 MPH
Gradeability	30%

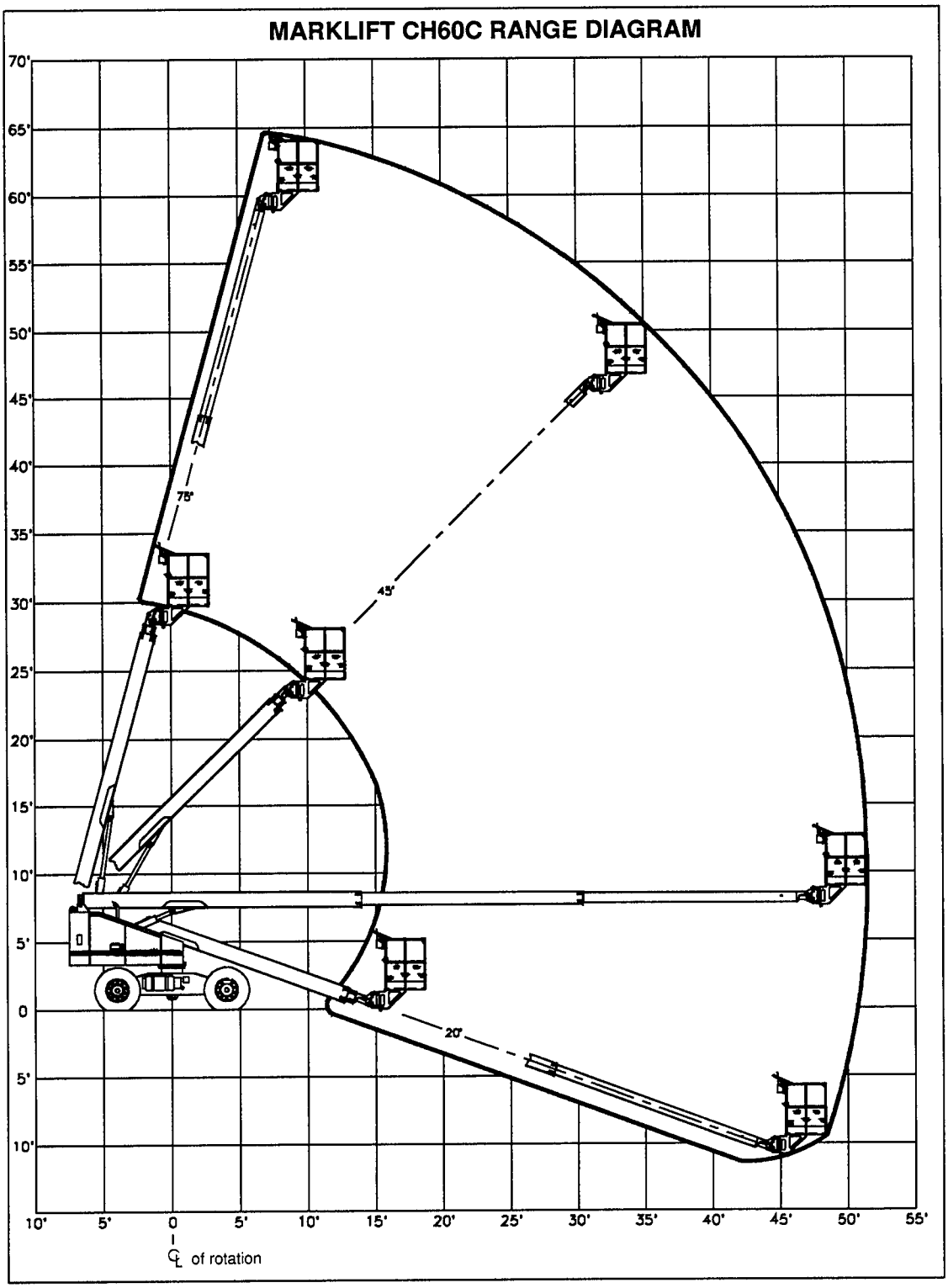
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH60C GENERAL SPECIFICATIONS






MARKLIFT CH60C RANGE DIAGRAM
70'
65'
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
75°
45°
20°
10'
5'
0
5'
10'
15'
20'
25'
30'
35'
40'
45'
50'
55'
℄ of rotation

SPECIFICATIONS

NOTES

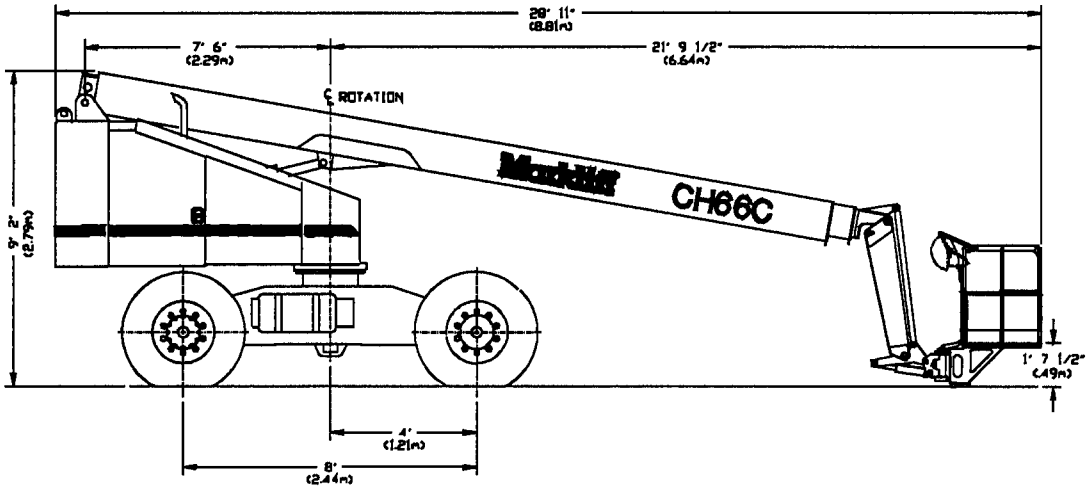
SPECIFICATIONS CH66C

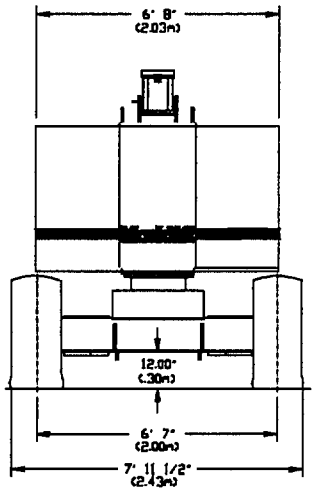
*Working Height (Maximum)	72 ft (21.95 m)
Platform Height (Maximum)	66 ft (20.12 m)
Stowed Height	8 ft 6 in (2.59 m)
Length (stowed)	28 ft 11 in (8.81 m)
Width	7 ft 11 in (2.41 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach	57 ft 4-5/8 in (17.49 m)
Boom Elevation	-20° to 75° above horizontal plane
Load capacity	500 lbs. (227 kg)
Wheelbase	8 ft (2.44 m)
Wheel track	6 ft 7 in (2.01 m)
Tailswing	42 in (1.07 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft 9 in (5.1 m)
Travel speed	0 to 3.25 m.p.h. (0 to 5.23 km/h)
Power source	66 hp (49.2 kw) Ford LRG 423 (standard)
Fuel tank capacity	40 gal (151 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 52 gal. (196 L)
Tires (monofilled)	15 x 19.5 13 P.R. (loader lug)
Ground clearance	10 in (.25 m)
Approx. shipping weight	25,000 lbs. (11,340 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 86.5 psi (6.1 kg/sq cm) 15,730 lbs (4773 kg)
Wind speed rating	25 MPH
Gradeability	25%

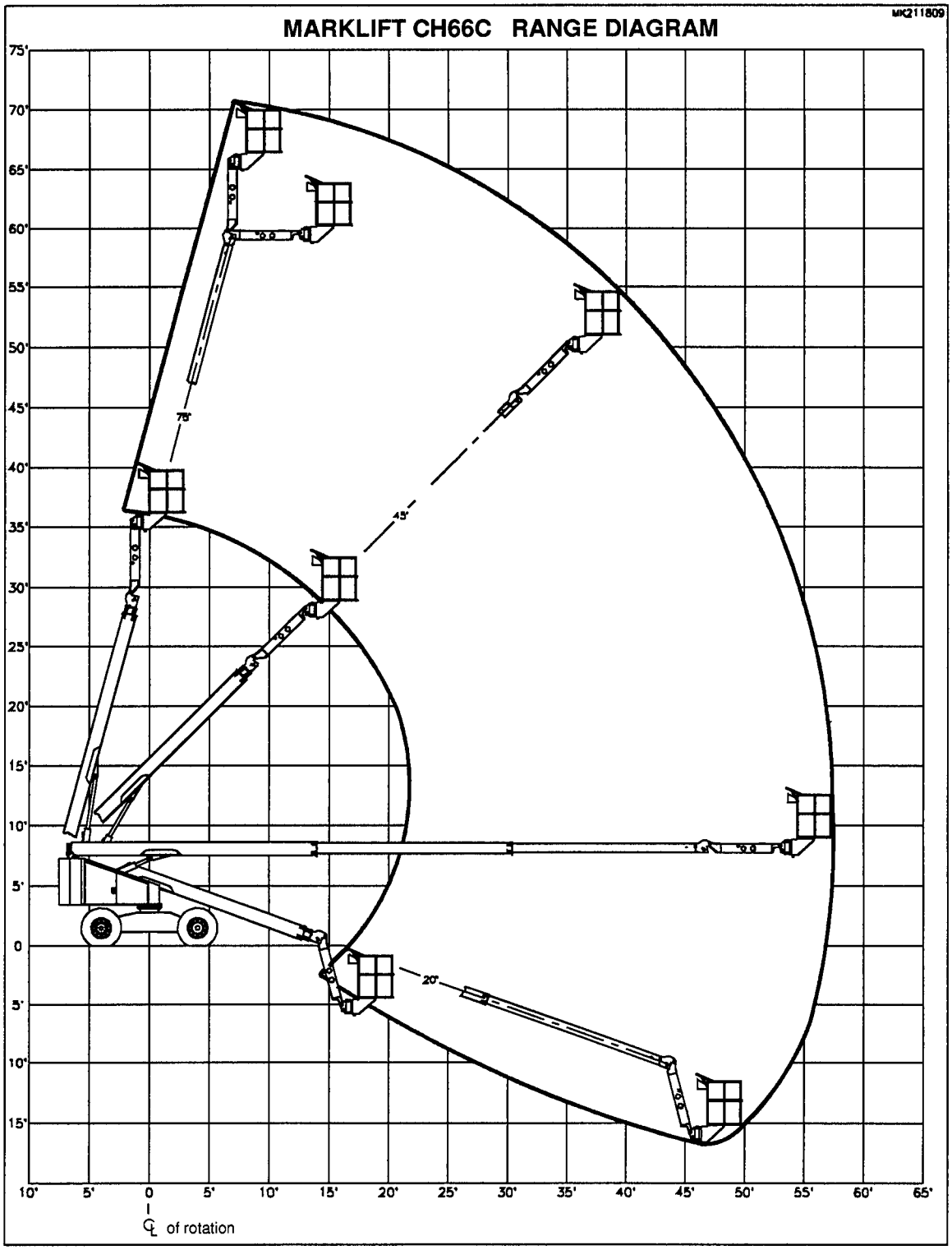
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH66C GENERAL SPECIFICATIONS






MARKLIFT CH66C RANGE DIAGRAM
MK211809
75'
70'
65'
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
15'
75'
45'
20'
10' 5' 0 5' 10' 15' 20' 25' 30' 35' 40' 45' 50' 55' 60' 65'
℄ of rotation

SPECIFICATIONS

NOTES

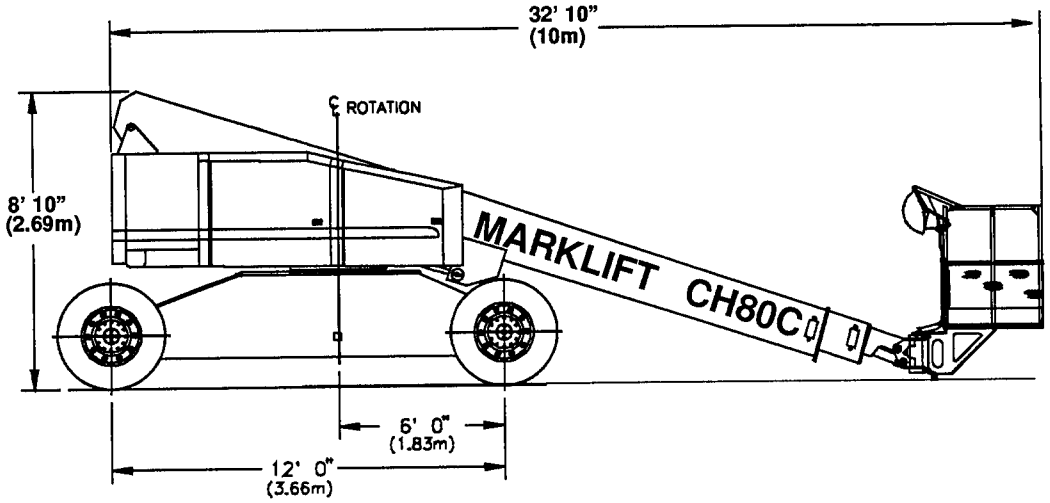
SPECIFICATIONS - CH80C

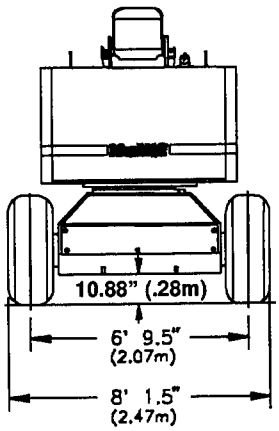
*Working Height (Maximum)	86 ft 4 in (26.31 m)
Platform Height (Maximum)	80 ft 4 in (24.49 m)
Stowed Height	8 ft 10 in (2.69 m)
Length (stowed)	32 ft 10 in (10 m)
Width	8 ft 1 1/2 in (2.48 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach (Center of Turret)	68 ft 8 in (20.93 m)
Boom Elevation	-20° to 75° above horizontal plane
Load capacity	500 lbs. (227 kg)
Wheelbase	12 ft (3.66 m)
Wheel track	6 ft 9 in (2.07 m)
Tailswing	35 in (.89 m)
Turret Rotation	360° continuous rotation
Turning curb radius	22 ft 6 in (6.86 m)
Travel speed	0 to 3.0 m.p.h. (0 - 4.83 km/h)
Power source	62 hp (46.2 kw) Ford LSG 423 (standard)
Fuel tank capacity	40 gal (151 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 52 gal. (196 L)
Tires (monofilled)	15 x 19.5, 13 P.R.
Ground clearance	10.88 in (.28 m)
Approx. shipping weight	36,790 lbs. (16,688 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 71.1 psi 13,857 lbs. (6291 kg)
Wind speed rating	25 MPH
Gradeability	30%

*** Clearance must be allowed for body parts for this and other work heights**

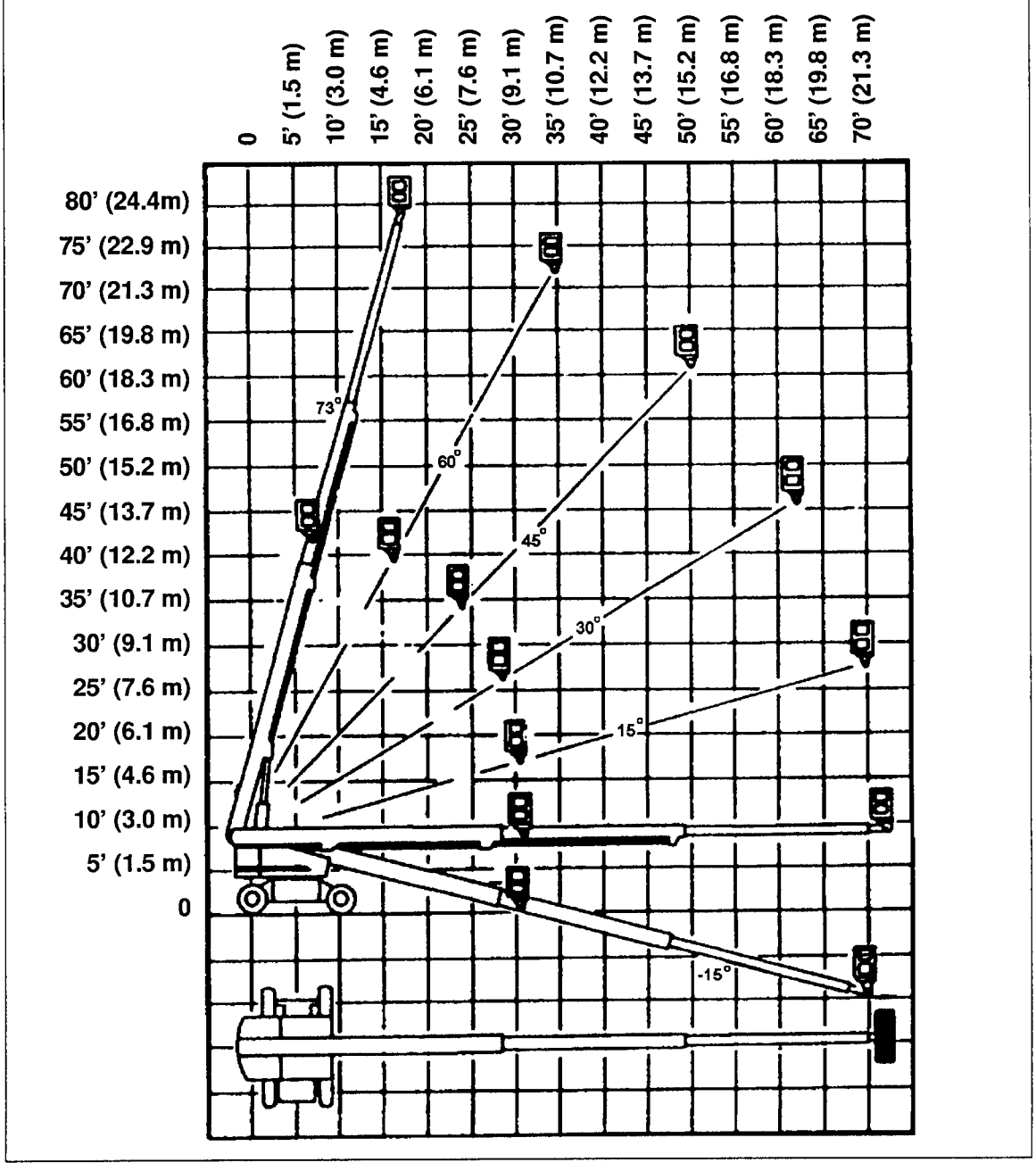
SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH80C GENERAL SPECIFICATIONS





MARKLIFT CH80C RANGE DIAGRAM



SPECIFICATIONS

NOTES

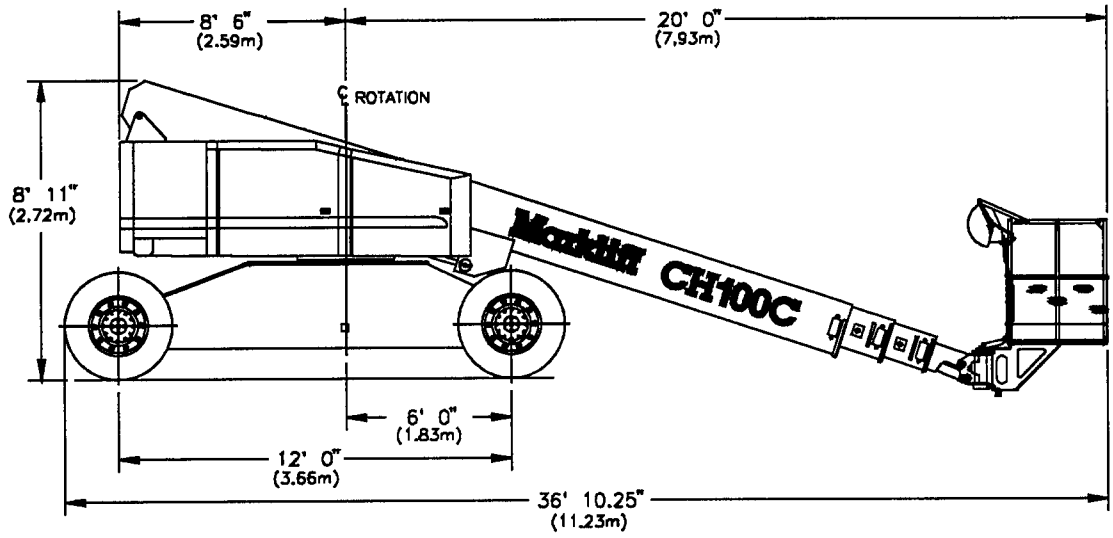
SPECIFICATIONS - CH100C (4x4)

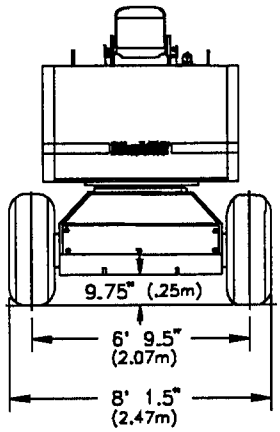
*Working Height (Maximum)	106 ft (32.31 m)
Platform Height (Maximum)	100 ft (30.48 m)
Stowed Height	9 ft 0 in (2.74 m)
Length (stowed)	34 ft 6 in (10.52 m)
Width	8 ft 1 1/2 in (2.48 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach (Center of Turret)	67 ft 4 in (20.52 m)
Boom Elevation	-15° to 75° above horizontal plane
Load capacity	500 lbs. (227 kg)
Wheelbase	12 ft (3.66 m)
Wheel track	6 ft 9 in (2.07 m)
Tailswing	35 in (.89 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft 10 in (5.13 m)
Travel speed	0 to 2.5 m.p.h. (0 to 3.67 km/h)
Power source	Cummins 4B3.9, 76 HP (56.7 kw) (water cooled diesel)
Fuel tank capacity	40 gal (151 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 52 gal. (196 L)
Tires (monofilled)	15 x 19.5 13 P.R.
Ground clearance	12 in (.30 m)
Approx. shipping weight	39,300 lbs. (17,826 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 75 psi 21,000 lbs. (9,526 kg)
Wind speed rating	25 MPH
Gradeability	30% / 75% with Hi-Torque

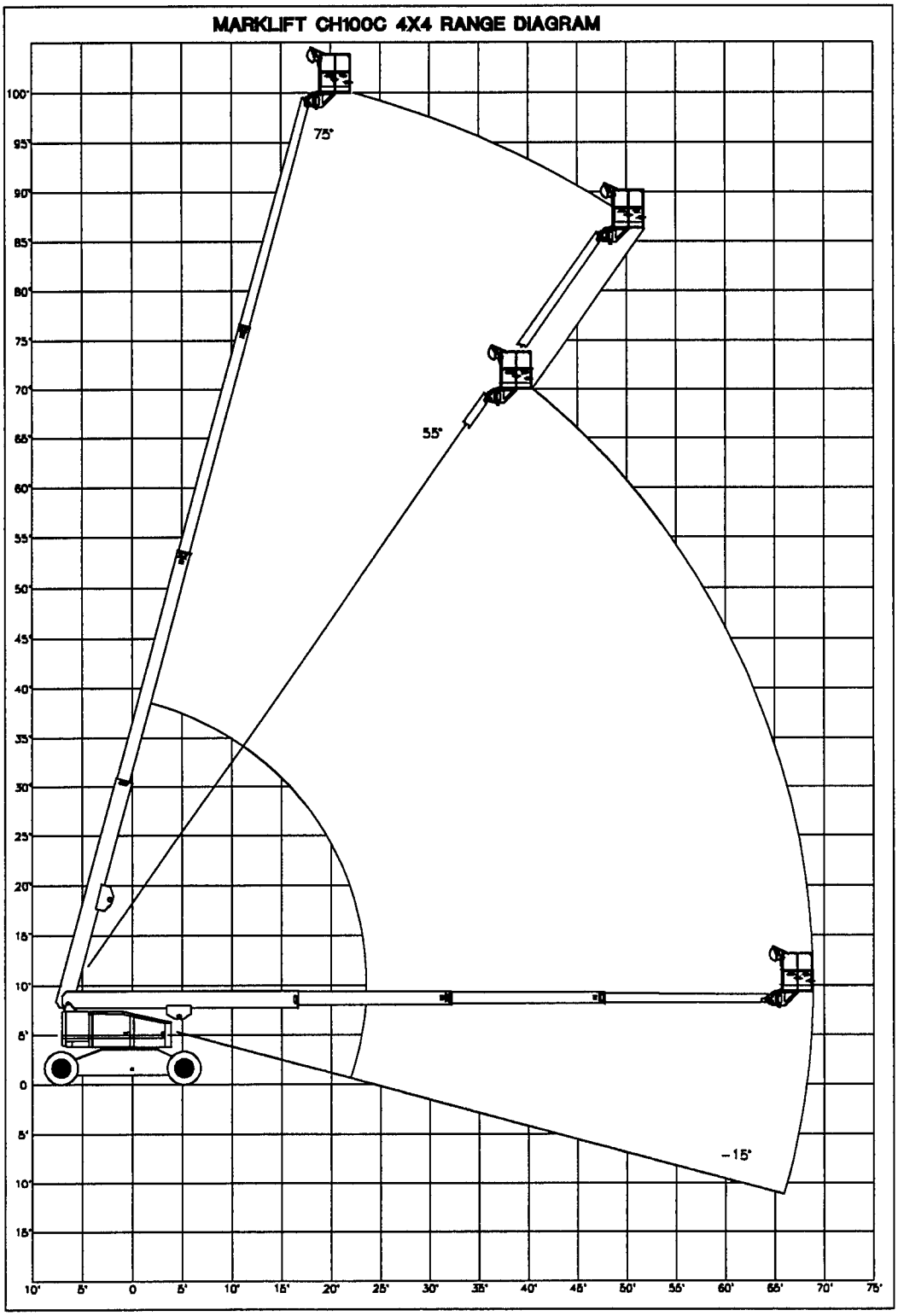
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH100C (4x4) GENERAL SPECIFICATIONS






MARKLIFT CH100C 4X4 RANGE DIAGRAM
75°
55°
-15°
100'
95'
90'
85'
80'
75'
70'
65'
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
15'
10'
5'
0
5'
10'
15'
20'
25'
30'
35'
40'
45'
50'
55'
60'
65'
70'
75'

SPECIFICATIONS

NOTES

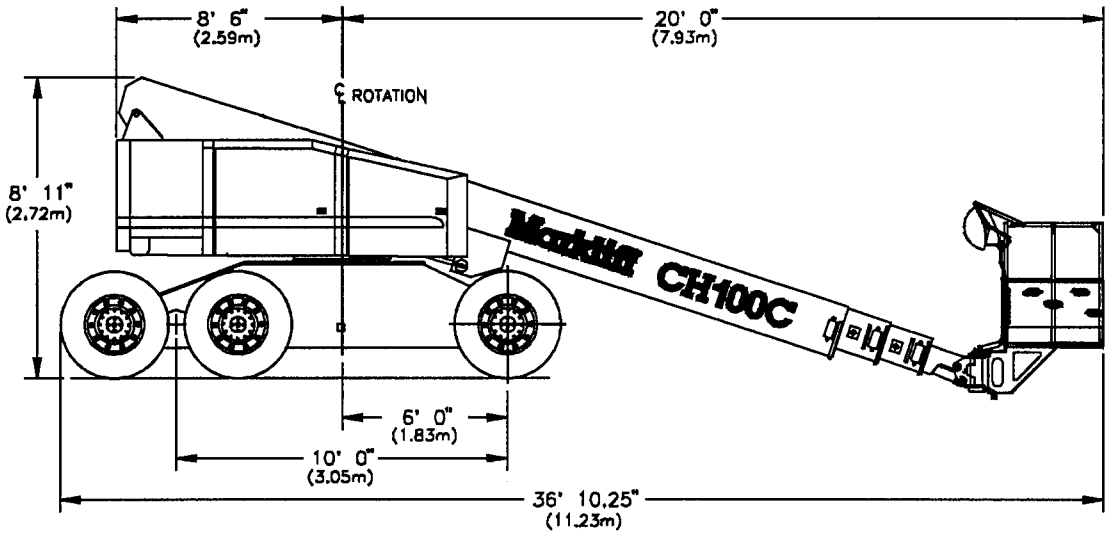
SPECIFICATIONS - CH100C (6x4)

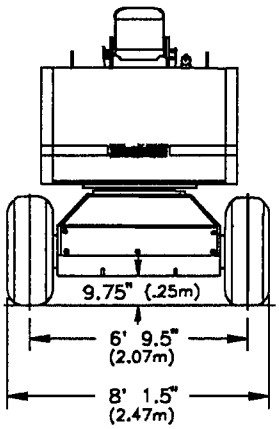
*Working Height (Maximum)	106 ft (32.31 m)
Platform Height (Maximum)	100 ft (30.48 m)
Stowed Height	9 ft 0 in (2.74 m)
Length (stowed)	34 ft 6 in (10.52 m)
Width	8 ft 1 1/2 in (2.48 m)
Platform - Dimensions	72 in x 36 in x 44 in (1.8 x.91 x 1.12 m)
Horizontal Reach (Center of Turret)	67 ft 4 in (20.52 m)
Boom Elevation	-15° to 75° above horizontal plane
Load capacity	500 lbs. (227 kg)
Wheelbase	10 ft (3.05 m)
Wheel track	6 ft 9 in (2.07 m)
Tailswing	35 in (.89 m)
Turret Rotation	360° continuous rotation
Turning curb radius	16 ft 10 in (5.13 m)
Travel speed	0 to 2.5 m.p.h. (0 to 3.67 km/h)
Power source	Cummins 4B3.9, 76 HP (56.7 kw) (water cooled diesel)
Fuel tank capacity	40 gal (151 L)
Hydraulic system Max. operating pressure Reservoir Capacity	Load sensing and pressure compensating 2,500 psi (172 BAR) 52 gal. (196 L)
Tires (monofilled)	15 x 19.5 13 P.R.
Ground clearance	12 in (.30 m)
Approx. shipping weight	39,300 lbs. (17,826 kg)
Wheel loading Max. concentrated floor loading pressure Wheel Load (maximum)	 75 psi 17,800 lbs. (8081 kg)
Wind speed rating	25 MPH
Gradeability	30%

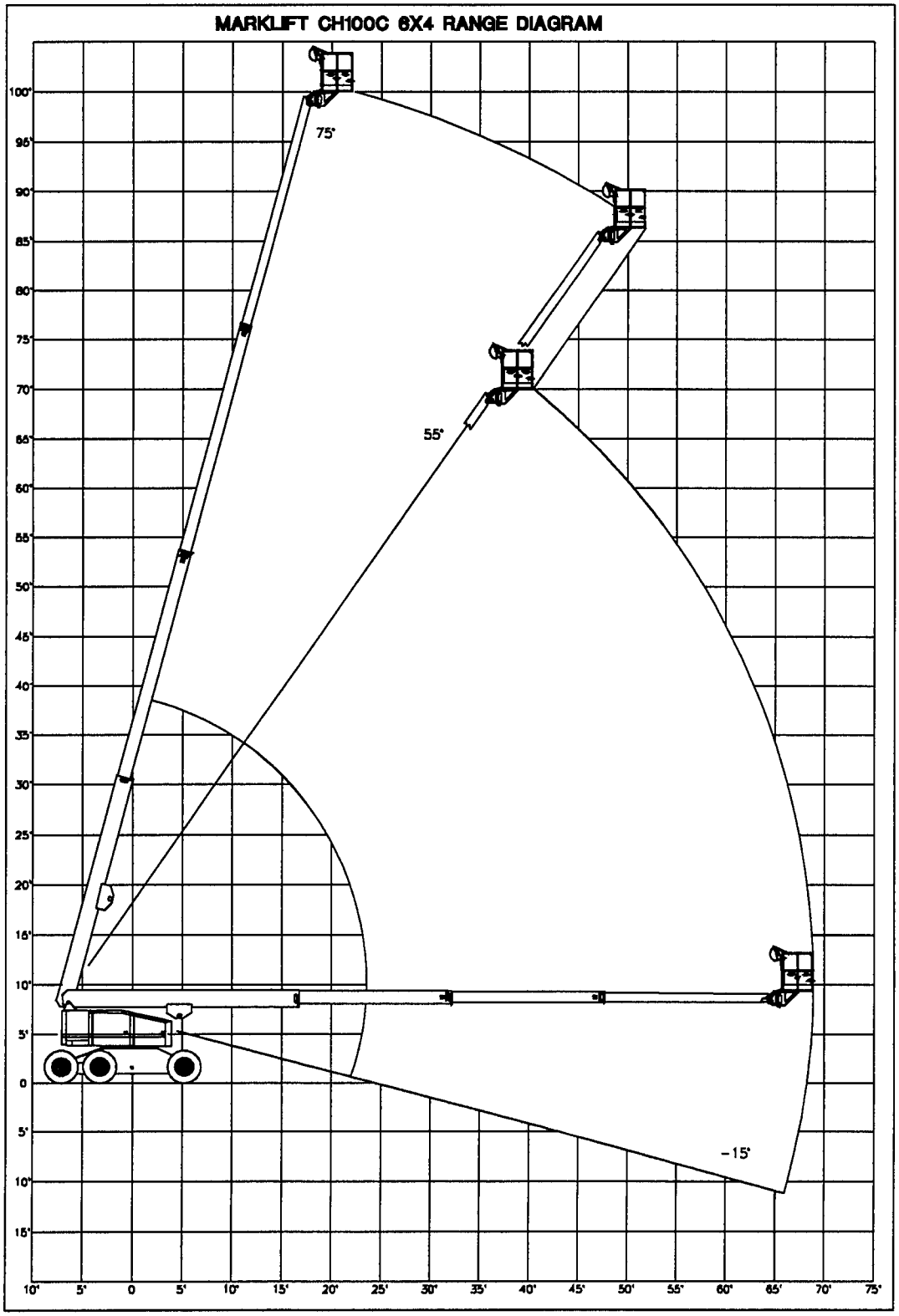
*** Clearance must be allowed for body parts for this and other work heights**

SPECIFICATIONS & RANGE DIAGRAMS

MARKLIFT CH100C (6x4) GENERAL SPECIFICATIONS






MARKLIFT CH100C 6X4 RANGE DIAGRAM
75°
55°
-15°
100'
95'
90'
85'
80'
75'
70'
65'
60'
55'
50'
45'
40'
35'
30'
25'
20'
15'
10'
5'
0
5'
10'
15'
10'
5'
0
5'
10'
15'
20'
25'
30'
35'
40'
45'
50'
55'
60'
65'
70'
75'

SPECIFICATIONS

NOTES

TORQUE RATINGS

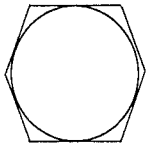
ES - 100.0
TORQUE RATINGS
FOR
DRY - UNCOATED FASTENERS

TORQUE VALUES TO BE WITHIN 5%
ALL FIGURES IN FOOT POUND

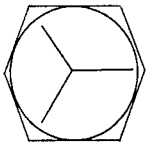
THIS TABLE DOES NOT APPLY TO HYDRAULIC CONNECTIONS. WHEN TORQUING HYDRAULIC CONNECTIONS REFER TO ES-100.1

NOM. DIA. IN.	GRADE 2	GRADE 5	GRADE 8
1/4	6 - * 4	8	12
5/16	12 - * 7	20	25
3/8	20 - * 12	30	45
7/16	35 - * 20	50	75
1/2	50 - * 30	80	110
9/16	75 - * 45	115	160
5/8	100 - * 60	160	225
3/4	180 - * 110	280	400
7/8	175	450	640
1	265	680	970
1-1/8	375	840	1,380
1-1/4	530	1,200	1,930
1-3/8	700	1,570	2,540
1-1/2	930	2,080	3,380
1-3/4	1,460	2,090	5,300
2	2,200	3,200	7,990
2-1/4	3,200	5,350	11,690
2-1/2	4,400	7,300	15,990

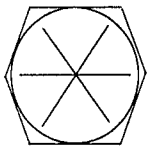
BOLT HEAD MARKING



GRADE 2



GRADE 5



GRADE 8

The above information was compiled for U.N.C. Threaded Fasteners.

NOTE: If threads are not lubricated prior to assembly or are not plated use Torque Spec. ES-100.0

** = Torque Values for Bolts and Screws longer than 6"*

Fasteners as supplied by the vendor are considered not lubricated.

TORQUE RATINGS

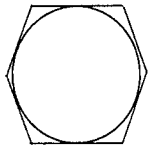
ES - 100.1
TORQUE RATINGS
FOR
LUBRICATED OR PLATED FASTENERS

TORQUE VALUES TO BE WITHIN 5%
ALL FIGURES IN FOOT POUND

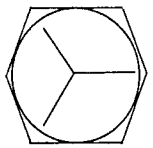
REFER TO THIS TABLE WHEN TORQUING HYDRAULIC CONNECTIONS (Piping & Cylinders).

NOM. DIA. IN.	GRADE 2	GRADE 5	GRADE 8
1/4	5 - * 3	7	10
5/16	9 - * 5	14	20
3/8	16 - * 9	25	35
7/16	25 - * 15	40	55
1/2	40 - * 20	60	85
9/16	55 - * 30	85	120
5/8	75 - * 45	120	170
3/4	135 - * 80	210	300
7/8	130	340	485
1	200	515	720
1-1/8	280	635	1,030
1-1/4	400	890	1,450
1-3/8	520	1,175	1,900
1-1/2	695	1,560	2,530
1-3/4	1,100	1,825	3,980
2	1,650	2,750	6,000
2-1/4	2,400	4,000	8,760
2-1/2	3,300	5,500	12,000

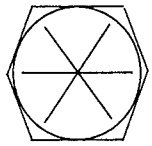
BOLT HEAD MARKING



GRADE 2



GRADE 5



GRADE 8

The above information was compiled for U.N.C. Threaded Fasteners.

NOTE: If threads are not lubricated prior to assembly or are not plated use Torque Spec. ES-100.0

** = Torque Values for Bolts and Screws longer than 6"*

Fasteners as supplied by the vendor are considered not lubricated.

TORQUE CHART

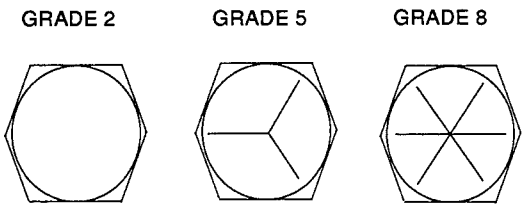
The following table contains many of the more common torques used when performing service or maintenance on the machine, and may be used as a quick reference.

Table 1:

AREA	TORQUE
WHEEL NUTS (ALL WHEELS)	350 ft. lbs. (476 N•m) Dry
TORQUE HUB MOUNTING BOLTS	170 ft. lbs. (231 N•m) Lubed
STEERING CYLINDER PISTON NUT	225 ft. lbs. (306 N•m) Lubed
SWING BEARING BOLTS	225 ft. lbs. (306 N•m) Dry
SLAVE CYLINDER PISTON NUT	225 ft. lbs. (306 N•m) Lubed
LIFT CYLINDER PISTON NUT	1400 ft. lbs. (1904 N•m) Lubed
EXTEND CYLINDER PISTON NUT	1180-1360 ft. lbs. (1605-1850 N•m) Dry

NOTE: CAPSCREW OR BOLT REPLACEMENT: Any bolt or capscrew replacement should be of the same grade or greater than the original. Grade markings are shown below:

BOLT HEAD MARKING



GENERAL INFORMATION

NOTES

SUGGESTED SPARE PARTS LIST: MARKLIFT CH MODEL BOOMLIFTS

(CH44C/CH50C/CH60C/CH66C/CH80C/CH100C)

NOTE: 1 THE KINDS OF PARTS LISTED REFLECT ITEMS WHICH IT MAY BE DESIROUS TO HAVE ON HAND TO ENABLE RAPID REPAIR OF YOUR MARKLIFT BOOMLIFT DURING THE COURSE OF IT'S NORMAL SERVICE LIFE. IT IS NOT INTENDED TO BE ALL INCLUSIVE, OTHER PARTS MAY BE REQUIRED DUE TO UNFORSEEN CIRCUMSTANCES. THE PART NUMBERS ARE SUBJECT TO CHANGE AS A CONSEQUENCE OF THE CONTINUED DEVELOPMENT OF THIS PRODUCT.

NOTE: 2 PARTS LISTED MAY HAVE MULTIPLE APPLICATIONS, SEE NOTES IN REMARKS COLUMN

Ref.	Part No.	Description	Remarks
		GENERAL ASSEMBLY: PAINT, DECALS, ETC.	
1	3900-115	PAINT, WHITE, "TOUCH-UP"	AEROSOL CAN
2	3900-131	PAINT, BLUE, "TOUCH-UP"	AEROSOL CAN
3	20552	BUMPER	BOTTOM OF PLATFORM
4	12400-223	DECAL, "DANFER TAIL SWING"	
5	20419	DECAL, "DANGER KEEP CLEAR"	
6	180710	DECAL, "NOT ELECTRICALLY INSULATED"	
7	182709	DECAL, DIRECTIONAL ARROW, "GREEN"	
8	182710	DECAL, DIRECTIONAL ARROW, "BLUE"	
9	2020	DECAL, GAS/PETROL	GASOLINE ENGINE ONLY!
10	2033	DECAL, DIESEL FUEL ONLY	DIESEL ENGINE ONLY!
11	2017	DECAL, HYDRAULIC SYSTEM FLUID	
12	22385	DECAL, ATTACH SAFETY BELT	
13	22386	DECAL, "D" RING ATTACH SAFETY BELT	
14	181109	DECAL, "DANGER, HIGH VOLTAGE DISTANCE..."	
15	2003	DECAL, BATTERY WATER LEVEL	
16	181102	DECAL,"DANGER DO NOT OPERATE..."	
17	181330	DECAL, LOAD CAPACITY 450 LBS	REF. MACHINE SPECS. FOR APPLICABILITY
18	181322	DECAL, LOAD CAPACITY 500 LBS	REF. MACHINE SPECS. FOR APPLICABILITY
19	181320	DECAL, LOAD CAPACITY 600 LBS	REF. MACHINE SPECS. FOR APPLICABILITY
20	181319	DECAL, LOAD CAPACITY 650 LBS	REF. MACHINE SPECS. FOR APPLICABILITY
21	182818	DECAL, AERIAL CONTROL BOX	TOP/COVER
22	182819	DECAL, AERIAL CONTROL BOX	FRONT/FACE
23	160137	TAPE, WARNING, YELLOW W/BLACK STRIPE	PLATFORM ENTRY
24	24496	DECAL, LAOD RANGE DIAGRAM	CH100C/CH100CXT ONLY!
25	1209-556	COUPLING, PRESSURE TEST	"FEMALE" HALF
		BASE ASSEMBLY:	
26	23983	BUSHING, STEERING YOKE ASSEMBLY	CH80C/CH100C & ALL 2/W DRIVE MODELS
27	212169	BUSHING, STEERING YOKE ASSEMBLY	ALL 4/W DRIVE" EXCEPT CH80C/CH100C
28	212170	WASHER, THRUST	ALL MODELS, AS REQUIRED
29	64910	BUSHING, STEERING CENTER ARM	CH80C/CH100C ONLY!
30	20569	BEARING, ROD END, STEERING TIE ROD	LEFT HAND THREAD
31	20568	BEARING, ROD END, STEERING TIE ROD	RIGHT HAND THREAD
32	600330	SEAL KIT, STEERING CYLINDER ("TEXAS HYDRAULICS")	CH80C/CH100C ONLY!
33	600219	SEAL KIT, TORQUE HUB	P/N 212509/210859 "FAIRFIELD MFG.
34	600619	SEAL, "OUTBOARD", TORQUE HUB INPUT SHAFT	P/N 212509 "AUBURN GEAR"

RECOMMENDED SPARE PARTS LIST

Ref.	Part No.	Description	Qty	Remarks
		BASE ASSEMBLY: (CONT.)		
35	600618	SEAL, "INBOARD", TORQUE HUB INPUT SHAFT		P/N 212509 "AUBURN GEAR"
36	600604	O-RING, PLUNGER, PLANETARY GEAR DISCONNECT		P/N 212509 "AUBURN GEAR"
37	600631	LOCK-WASHER, INPUT SHAFT BEARING RETAINER		P/N 212509 "AUBURN GEAR"
38	69652	SEAL KIT, STEER, MASTER/SLAVE LEV. CYL. (ROSENBLOOM		ALL EXCEPT CH80C/CH100C
39	69665	BUSHING, STEER, MASTER/SLAVE LEV. CYL. (ROSENBLOOM)		ALL EXCEPT CH80C/CH100C
40	68961	SEAL KIT, STEER, MASTER/SLAVE LEV. CYL. (BEST METAL		ALL EXCEPT CH80C/CH100C
42	69665	BUSHING, STEER, MASTER/SLAVE LEV. CYL. (BEST METAL)		ALL EXCEPT CH80C/CH100C
43	68132	SEAL KIT, DRIVE MOTOR (4^3 IN.)		FOR P/N 81393/81394
44	69684	SEAL KIT, DRIVE MOTOR (5^3 IN.)		FOR P/N 81506/81507
45	N/A THIS PRINTING	SEAL KIT, DRIVE MOTOR (8^3 IN.)		CH100CXT ONLY! (FOR P/N 81549/81550
46	68134	SEAL KIT, PARKING BRAKE		
47	23983	BUSHING, OSCILLATING AXLE		MAIN PIVOT PIN
48	212277	THRUST WASHER, OSCILLATING AXLE		MAIN PIVOT PIN
49	600330	SEAL KIT, OSCILATING AXLE CYLINDER		FOR P/N 212260
50	23983	BUSHING, OSCILATING AXLE CYLINDER		FOR P/N 212260
51	65117	NUT, WHEEL, "CONICAL" (RIMS W/CHAMFERED HOLES)		P/N 211867 RIM (prior to 5/22/96)
52	160724	NUT, WHEEL, "FLANGED" (RIMS W/O CHAMFERED HOLES)		P/N 212504 RIM (after 5/22/96)
53	67817	SEAL KIT, ROTARY MANIFOLD, 6/7 PORT		FOR "ALL" P/N 81495/81530
54	600724	SEAL KIT, ROTARY MANIFOLD, "7 PORT" (HYDRA-TOOL)		FOR P/N 81530 "HYDRA-TOOL" ONLY!
		TURRET ASSEMBLY:		
55	441 6834	SWITCH, PROXIMITY		
56	441 6835	CABLE ASSEMBLY, PROXIMITY SWITCH		FOR USE WITH P/N 441 6834
57	70793	STARTER "LOCK-OUT"		
58	69764	FUEL LEVEL SENDING UNIT		
59	69621	FILTER, HYDRAULIC FLUID, "SPIN ON"		
60	69501	SEAL KIT, HYDRAULIC PUMP (FOR P/N 81442)		"ALL UNITS MANUFACUTURED PRIOR TO 1/2/96 EXCEPT CH44C/CH50C
62	600772	SEAL KIT, HYDRAULIC PUMP (P/N 81526)		"ALL UNITS MANUFACTURED AFTER 1/2/96
63	N/A THIS PRINTING	SEAL KIT, EMERGENCY PUMP		
64	70209	RELAY, "CONTINOUS DUTY"		EMERGENCY PUMP, ENGINE START, ETC.
65	69557	COUNTER-BALANCE VALVE, PLATFORM LEVELING		FOR P/N 81443 VALVE ASSY
66	600823	COUNTER-BALANCE VALVE, PLATFORM LEVELING		FOR P/N 81516 VALVE ASSY
67	69565	COIL,PROPORTIONAL/NON-PROPORTIONAL SOLENOID VALVE		APPLICABLE P/N 81443/81516
68	N/A THIS PRINTING	COIL,HIGH SPEED/OSCILATING AXLE VALVE		APPLICABLE P/N 81443/81516
69	69834	COIL,FOWARD/REVERSE DRIVE PILOT VALVE		APPLICABLE P/N 81443 ONLY!
70	N/A THIS PRINTING	COIL,FOWARD/REVERSE DRIVE PILOT VALVE		APPLICABLE P/N 81516 ONLY!
71	441 6828	RELAY,ENGINE RPM/SPEED & STARTER CONTROL		
72	69168	RELAY, DPDT		USE FOR ALL RELAYS IN RELAY CARD
73	441 6836	SLOPE SENSOR		
74	69166	SWITCH, EMERGENCY STOP		
75	21219	GUAGE, FUEL LEVEL INDICATOR		
76	420 2852	VOLTMETER		BATTERY/ALTERNATOR INDICATOR
77	441 4026	CIRCUIT BREAKER, 20 AMPERE		
78	69260	RESISTOR, VARIABLE		GROUND CONTROL OPERATION

RECOMMENDED SPARE PARTS LIST

Ref.	Part No.	Description	Qty	Remarks
		TURRET ASSEMBLY: (CONT.)		
79	1223-299	FUSE, 10 AMPERE		"AGC 10A" - WIRE #303
80	69256	FUSE, 7.5 AMPERE		"AGC 71/2A" - WIRE #26
81	SEE REMARKS	FUSE, 3 AMPERE		"AGC 3A" - WIRE 28
82	SEE REMARKS	FUSE, 1 AMPERE		"1 A" - SLOPE SENSOR INPUT
		ROTATION GEAR BOX ASSEMBLY (ALL EXCEPT CH80C/CH100C)		
83	N/A THIS PRINTING	SEAL KIT, TURRET ROTATION ORBIT MOTOR		FOR P/N 81452 ONLY!
84	600746	SEAL KIT, TURRET ROTATION ORBIT MOTOR		FOR P/N 81539 ONLY
85	69632	GASKET,TURRET ROTATION ORBIT MOTOR TO GEAR BOX		
86	69648	O-RING, BRAKE PISTON (UPPER)		REPAIR PART FOR P/N 211930 GEAR BOX
87	69649	BACK-UP RING, BRAKE PISTON (UPPER)		REPAIR PART FOR P/N 211930 GEAR BOX
88	1218-194	O-RING, BRAKE PISTON (LOWER)		REPAIR PART FOR P/N 211930 GEAR BOX
89	69650	BACK-UP RING, BRAKE PISTON (LOWER)		REPAIR PART FOR P/N 211930 GEAR BOX
90	69643	SNAP-RING, BRAKE THRUST PLATE		REPAIR PART FOR P/N 211930 GEAR BOX
91	28950	O-RING, BRAKE TO GEAR BOX HOUSING		REPAIR PART FOR P/N 211930 GEAR BOX
92	69642	SEAL, PINION/OUTPUT SHAFT		REPAIR PART FOR P/N 211930 GEAR BOX
		ROTATION GEAR BOX ASSEMBLY (CH80C/CH100C)		
93	67688	SEAL KIT, TURRET ROTATION ORBIT MOTOR		
94	67871	SEAL KIT, TURRET ROTATION GEAR BOX		
95	66508	SEAL, PINION/OUTPUT SHAFT		
96	67150	SEAL KIT, BRAKE, TURRET ROTATION GEAR BOX		
		DIESEL ENGINE ASSEMBLY (DEUTZ F4L1011F)		
97	68724	FILTER ELEMENT, AIR		
98	68794	FILTER ELEMENT, OIL		
99	SEE REMARKS	FILTER ELEMENT, FUEL		"DEUTZ" P/N 1174696"
100	68787	SOLENOID, ENGINE SHUT DOWN		
101	600370	SWITCH, PRESSURE, ENGINE OIL		
102	68795	SWITCH, TEMPERATURE, ENGINE OIL, 120 C.		
103	212107	COUPLING, PUMP DRIVE		USED TILL APPROX. MID 1995
104	70829	ACTUATOR/THROTTLE POSITIONER		ENGINE SPEED CONTROL
105	70830	CONTROLLER, ENGINE SPEED		FOR OPERATION OF P/N 70829
106	69141	MOUNT, ENGINE, VIBRATION		
107	SEE REMARKS	BELT, ALTERNATOR & BLOWER		"DEUTZ" P/N 1179565
108	SEE REMARKS	STARTER		"DEUTZ" P/N 2200-0272
109	SEE REMARKS	ALTERNATOR		"DEUTZ" P/N 1180648
		DIESEL ENGINE ASSEMBLY (CUMMINS 4B3.9)		
110	207537	FILTER ELEMENT, AIR		
111	69293	FILTER ELEMENT, OIL		
112	SEE REMARKS	FILTER ELEMENT, FUEL ("PRIMARY")		"FLEET-GAURD" P/N FF5052
113	SEE REMARKS	FILTER ELEMENT, FUEL (FUEL/WATER SPERATOR)		"FLEET-GAURD" P/N F51280
114	70920	SWITCH, PRESSURE, ENGINE OIL		

RECOMMENDED SPARE PARTS LIST

Ref.	Part No.	Description	Qty	Remarks
		CUMMINS 4B3.9 DIESEL ENGINE ASSEMBLY (CONT.)		
115	70921	SWITCH, TEMPERATURE, ENGINE		
116	70829	ACTUATOR/THROTTLE POSITIONER		ENGINE SPEED CONTROL
117	70830	CONTROLLER, ENGINE SPEED		FOR OPERATION OF P/N 70829
118	SEE REMARKS	RADIATOR CAP		"CUMMINS" P/N E6HZ-8100-D
119	69310	HOSE, RADIATOR, UPPER		
120	69311	HOSE, RADIATOR, LOWER		
121	69364	BELT, ALTERNATOR & FAN		
122	69288	STARTER		
123	69289	ALTERNATOR		
124	69296	MOUNT, ENGINE, FRONT, VIBRATION		
125	69308	MOUNT, ENGINE, REAR, VIBRATION		
126	212107	COUPLING, PUMP DRIVE		USED TILL APPROX. MID 1995
		DUAL FUEL (PROPANE/GASOLINE) ENGINE ASSEMBLY (FORD LSG-423)		
127	1243-34	FILTER ELEMENT, AIR		
128	69782	FILTER ELEMENT, OIL		
129	600766	FILTER ELEMENT, FUEL		
130	SEE REMARKS	SOLENOID, ENGINE SHUT DOWN/ANTI-DIESELING		"ZENITH" P/N C81-107-40
131	600767	SWITCH, PRESSURE, ENGINE OIL		
132	600768	SWITCH, TEMPERATURE, ENGINE		
133	69777	RADIATOR CAP		
134	69778	HOSE, RADIATOR, UPPER		
135	69779	HOSE, RADIATOR, LOWER		
136	69783	BELT, ALTERNATOR & FAN		
137	600758	STARTER		
138	600763	RELAY, STARTER MOTOR		
139	600760	ALTERNATOR		
140	SEE REMARKS	VOLTAGE REGUALTOR		"FORD' P/N F0PZ 10316 AA
141	SEE REMARKS	IGNITION MODULE (DURA-SPARK)		"FORD' P/N D9VZ 112A199 A
142	160672	MOUNT, ENGINE, VIBRATION		
143	70855	ACTUATOR/THROTTLE POSITIONER, "LINEAR"		ENGINE SPEED CONTROL
144	70854	CONTROLLER, ENGINE SPEED		FOR OPERATION OF P/N 70855
145	211989	COUPLING, PUMP DRIVE		USED TILL APPROX. MID 1995
		DUAL FUEL (PROPANE/GASOLINE) ENGINE ASSEMBLY (FORD LRG-423)		
146	1243-34	FILTER ELEMENT, AIR		
147	69782	FILTER ELEMENT, OIL		
148	600766	FILTER ELEMENT, FUEL		
149	SEE REMARKS	SOLENOID, ENGINE SHUT DOWN/ANTI-DIESELING		"ZENITH" P/N C81-107-40
150	600767	SWITCH, PRESSURE, ENGINE OIL		
151	600768	SWITCH, TEMPERATURE, ENGINE		
152	69777	RADIATOR CAP		
153	69778	HOSE, RADIATOR, UPPER		
154	69779	HOSE, RADIATOR, LOWER		
155	69783	BELT, ALTERNATOR & FAN		
156	600758	STARTER		
157	600763	RELAY, STARTER MOTOR		

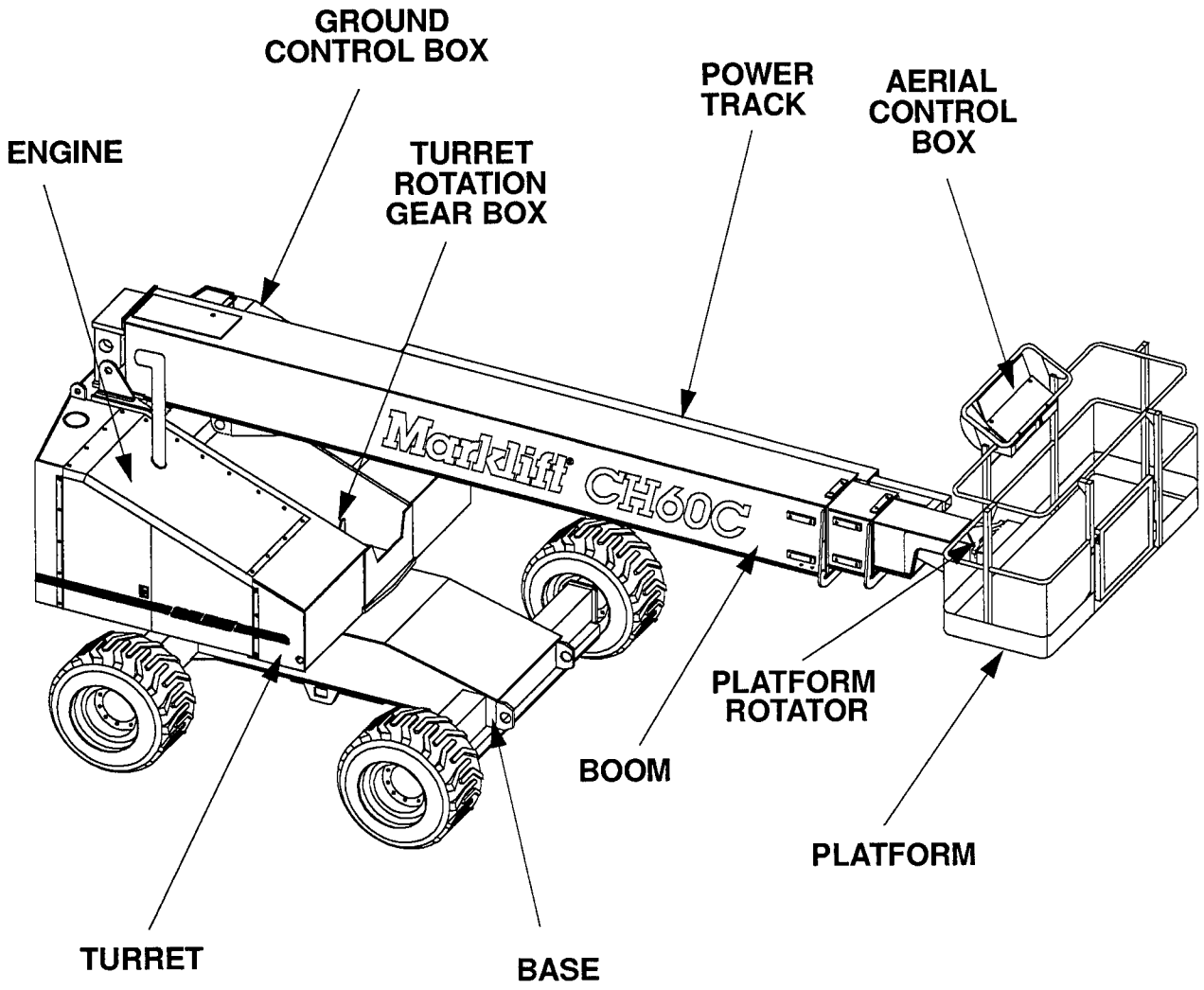
RECOMMENDED SPARE PARTS LIST

Ref.	Part No.	Description	Qty	Remarks
		FORD LRG-423 DUAL FUEL (PROPANE/GASOLINE) ENGINE ASSEMBLY (CONT.)		
158	600760	ALTERNATOR		
159	SEE REMARKS	IGNITION MODULE		"FORD" P/N
160	160672	MOUNT, ENGINE, VIBRATION		
161	70855	ACTUATOR/THROTTLE POSITIONER, "LINEAR"		ENGINE SPEED CONTROL
162	70854	CONTROLLER, ENGINE SPEED		FOR OPERATION OF P/N 70855
163	SEE REMARKS	FUEL PUMP, ELECTRIC		"FORD" P/N ZA-005-002
		PARTS COMMON TO ALL "DUAL FUEL" (PROPANE/GASOLINE) ENIGINES		
164	70504	SOLENOID, "CHOKE OVER-RIDE"		LSG-423 ENGINE ONLY!
165	70505	MODULE/RELAY, "CHOKE OVER-RIDE" SOLENOID		FOR OPERATION OF P/N 70504
166	69154	REPAIR KIT, PROPANE GAS PRESSURE REGULATOR		FOR "BEAM" MODEL #60
167	69773	SOLENOID, PROPANE GAS "SHUT-OFF"		
168	69772	FILTER, PROPANE GAS		
169	69773	SOLENOID, PROPANE GAS "SHUT-OFF"		
		BOOM ASSEMBLY:		
		CH80C/CH100C		
170	67040	SEAL KIT, SLAVE LEVELING CYLINDER ("SIERRA/REMCO")		FOR P/N 21263 ONLY!
171	66486	BUSHING, SLAVE LEVELING CYLINDER ("SIERRA/REMCO")		FOR P/N 21263 ONLY!
172	66044	SEAL KIT, MASTER LEVELING CYLINDER ("SIERRA/REMCO")		FOR P/N 21111 ONLY!
173	67671	BUSHING, MASTER LEVELING CYLINDER ("SIERRA/REMCO")		FOR P/N 21111 ONLY!
174	67776	SEAL KIT, BOOM LIFT CYLINDER ("SIERRA/REMCO")		FOR P/N 24094 ONLY!
175	600170	BUSHING, BOOM LIFT CYLINDER ("SIERRA/REMCO")		FOR P/N 24094 ONLY!
176	600432	SEAL KIT, BOOM EXTENSION CYLINDER ("SIERRA/REMCO")		FOR P/N 24323, 24326 & 23825
177	67948	BUSHING, BOOM EXTENSION CYLINDER ("SIERRA/REMCO")		FOR P/N 24323, 24326 & 23825
178	600088	SEAL KIT, BOOM EXTENSION CYLINDER ("GREAT BEND")		FOR P/N 23825
179	600372	BUSHING, BOOM EXTENSION CYLINDER ("GREAT BEND")		FOR P/N 23825
180	81006	VALVE, "DUAL OVER-CENTER/LOAD HOLDING CARTRIDGE		GREAT-BEND & SIERRA/REMCO CYLINDERS
181	23824	POWER-TRACK (INDIVIDUAL)		(ELECTRICAL CABLE AND HOSE CARRIER)
182	22080	BUSHING, BOOM PIVOT		
		CH60C/CH66C		
183	69652	SEAL KIT, SLAVE LEVELING CYLINDER		FOR P/N 211729
184	69665	BUSHING, SLAVE LEVELING CYLINDER		FOR P/N 211729
185	69348	SEAL KIT, JIB CYLINDER		FOR P/N 212175
186	69349	BUSHING, JIB CYLINDER		FOR P/N 212175
187	69666	VALVE, "COUNTER-BALANCE/LOAD HOLDING		SLAVE & JIB CYLINDER
188	68961	SEAL KIT, MASTER LEVELING CYLINDER (P/N 211758)		SEE "BASE" REF. 40
189	69665	BUSHING, MASTER LEVELING CYLINDER (P/N 211758)		SEE "BASE" REF. 41
190	69808	SEAL KIT, BOOM LIFT CYLINDER (P/N 211691)		
191	69807	BUSHING, BOOMLIFT CYLINDER		FOR P/N 211691
192	69787	VALVE, "COUNTER-BALANCE/LOAD HOLDING"		FOR P/N 211691
193	69595	SEAL KIT, BOOM EXTENSION CYLINDER (P/N 211722)		
194	69613	BUSHING, BOOM EXTENSION CYLINDER		FOR P/N 211722
195	81006	VALVE, "COUNTER-BALANCE/LOAD HOLDING"		FOR P/N 211722
196	441 3025	POWER-TRACK (INDIVIDUAL)		(ELECTRICAL CABLE AND HOSE CARRIER)
197	401 8007	BUSHING, BOOM PIVOT		

RECOMMENDED SPARE PARTS LIST

Ref.	Part No.	Description	Qty	Remarks
		CH44C/CH50C		
198	69652	SEAL KIT, SLAVE LEVELING CYLINDER		FOR P/N 211729
199	69665	BUSHING, SLAVE LEVELING CYLINDER		FOR P/N 211729
200	69348	SEAL KIT, JIB CYLINDER		FOR P/N 212175
201	69349	BUSHING, JIB CYLINDER		FOR P/N 212175
202	69666	VALVE, "COUNTER-BALANCE/LOAD HOLDING		SLAVE & JIB CYLINDER
203	SEE REMARKS	SEAL KIT, MASTER LEVELING CYLINDER (P/N 211758)		SEE "BASE" FOR SEAL KIT PART NUMBER
204	SEE REMARKS	BUSHING, MASTER LEVELING CYLINDER (P/N 211758)		SEE "BASE" FOR SEAL KIT PART NUMBER
205	69226	SEAL KIT, BOOM LIFT CYLINDER (P/N 81531)		
206	600696	BUSHING, BOOMLIFT CYLINDER		FOR P/N 815311
207	600691	VALVE, "COUNTER-BALANCE/LOAD HOLDING"		FOR P/N 81531
208	600698	SEAL KIT, BOOM EXTENSION CYLINDER (P/N 81532)		
209	600705	BUSHING, BOOM EXTENSION CYLINDER		FOR P/N 81532
210	600700	VALVE, "COUNTER-BALANCE/LOAD HOLDING"		FOR P/N 81532
211	441 3025	POWER-TRACK (INDIVIDUAL)		(ELECTRICAL CABLE AND HOSE CARRIER)
212	160723	BUSHING, BOOM PIVOT		
		PLATFORM ASSEMBLY:		
213	69178	SEAL KIT, PLATFORM ROTATOR (P/N 81372/81094)		ROTATOR W/"NON-REMOVABLE UPPER ARM"
214	N/A THIS PRINTING	SEAL KIT, PLATFORM ROTATOR (P/N 81534)		ROTATOR W/"REMOVABLE UPPER ARM"
215	66336	SWITCH, FOOT OPERATED "DEAD-MAN"		
		AERIAL CONTROL BOX		
216	69146	LAMP/BULB, UNSTABLE CONDITION & ENGINE WARNING		
217	69144	LENS, RED		UNSTABLE CONDITION & ENGINE WARNING
218	69144	BASE, LAMP		UNSTABLE CONDITION & ENGINE WARNING
219	441 6838	ALARM, "DUAL" TONE		UNSTABLE CONDITION AUDIBLE WARNING
220	441 6637	ALARM, "DUAL" TONE		UNSTABLE CONDITION AUDIBLE WARNING
221	70459	RELAY		FOR AERIAL CONTROL BOX S/N 357 & PRIOR
222	70462	SPRING, RELAY HOLD-DOWN		FOR USE WITH P/N 70459
223	69163	SWITCH, TOGGLE		EMERGENCY PUMP/PLATFROM ROTATE
224	69164	SWITCH, TOGGLE, W/"BOOT"		PLATFROM LEVELING/JIB OPERATION
225	69162	SWITCH, TOGGLE, W/"BOOT"		FAST/SLOW TRAVEL SPEED
226	69165	BOOT, TOGGLE SWITCH		FOR SWITCHES P/N 69162/69163/69164
227	69119	SWITCH, "ANTI-RESTART		
		"JOY-STICK"/CONTROL LEVERS		
228	69047	"DIGI-SENSOR"		DRIVE & BOOM LIFT/LOWER
229	69051	"DIGI-SENSOR"		TURRET ROTATION
230	69050	"DIGI-SENSOR"		BOOM EXTEND/RETRACT
231	67496	BOOT, "SINGLE AXIS" CONTROL LEVER		BOOM EXTEND/RETRACT ONLY!

MAJOR COMPONENT IDENTIFICATION



ABBREVIATIONS

AC	ALTERNATING CURRENT
ADPTR	ADAPTER
AMP	AMPERE
APPROX	APPROXIMATELY
AR	AS REQUIRED
ASSY	ASSEMBLY
AVAIL	AVAILABLE
BRG	BEARING
BRKT	BRACKET
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CHRG	CHARGING
CTSK	COUNTERSUNK
CVR	COVER
CW	CLOCKWISE
CYL	CYLINDER
°	DEGREE
DC	DIRECT CURRENT
DIA	DIAMETER
DRV	DRIVE
ENG	ENGINE
EXH	EXHAUST
EXT	EXTERNAL
FT	FEET
GAL	GALLON
GR	GRADE
GSK	GASKET
HD	HEAD
HEX	HEXAGON
HP	HORSEPOWER
HSG	HOUSING
HT	HEAT TREATED
HYD	HYDRAULIC
HZ	HERTZ
ID	INSIDE DIAMETER
INCL	INCLUDES
"	INCHES
INT	INTERNAL
INV	INVERTED
LG	LENGTH
LH	LEFT HAND
MAX	MAXIMUM
MIN	MINIMUM
MM	MILLIMETER
MTG	MOUNTING
P/N	PART NUMBER
NO	NUMBER
NSS	NOT SOLD SEPARATELY
OD	OUTSIDE DIAMETER
PTO	POWER TAKE-OFF
#	POUND
QTY	QUANTITY
RD	ROUND
REF	REFERENCE
RH	RIGHT HAND
ROT	ROTATION
RPM	REVOLUTIONS PER MINUTE
SL	SLOTTED
SM	SMALL
SPD	SPEED
STD	STANDARD
T	TOOTH
THK	THICK
THRU	THROUGH
TEMP	TEMPERATURE
V	VOLT
VAC RENT	VOLTS ALTERNATING CUR-
VARI	VARIABLE
VS	VARIABLE SPEED
W/	WITH
W/0	WITHOUT

MAINTENANCE & LUBRICATION

SECTION 3

DESCRIPTION	PAGE NO.
INTRODUCTION.	3 - 1
MAINTENANCE SCHEDULE	3 - 2
OWNER'S INSPECTION RECORD	3 - 5
MAINTENANCE PROCEDURES.	3 - 6
ENGINE	3 - 6
ENGINE & HYDRAULIC OILS	3 - 8
HYDRAULIC SYSTEM.	3 - 8
HYDRAULIC OIL	3 - 8
TORQUE HUB	3 - 9
BATTERY.	3 - 10

MAINTENANCE & LUBRICATION

INTRODUCTION

INTRODUCTION

In addition to the "Before Operation Checks" described in Section 5, a regular program of periodic preventive maintenance is absolutely essential to prolonging the life of the aerial lift, maximizing efficient service and minimizing downtime. This section details a series of checks and procedures which are performed at daily, weekly, monthly and semi-annual intervals.

Even if the operator is not directly responsible for maintenance of the aerial lift, he should perform daily, all of the inspections listed in the "Before Operation Check", in Section 5 of the "Operator's Manual".

NOTE: Report and repair all deficiencies noted during the "Before Operation Check". The operator should be assured that the aerial lift has been properly maintained and inspected before operating it.

MAINTENANCE SCHEDULE (ref pg. 9-2 - 9-3)

The maintenance checks prescribed for longer intervals include those required for the shorter intervals. Thus, the weekly check includes all items in the daily check, the monthly check includes all items in the weekly and daily checks, and so on through the semi-annual check, which includes the quarterly, monthly, weekly and daily checks.

The maintenance schedule provided serves a guide to assure that the minimum basic preventive maintenance requirements will be met under average operating conditions. Conditions which impose greater wear, loads or strain on the aerial lift may dictate reducing the interval between these checks. Before altering the recommended maintenance schedule, reevaluate the aerial lift's operation and review the owner's inspection records. Consider all factors involved and develop a revised schedule adequate to meet routine maintenance requirements.

Refer to the engine manufacturer's manual for engine maintenance requirements. Should any discrepancy occur relative to the maintenance schedule provided in this manual and those provide by the engine manufacturer, the engine manufacturer's recommendations take precedence over those in this manual.

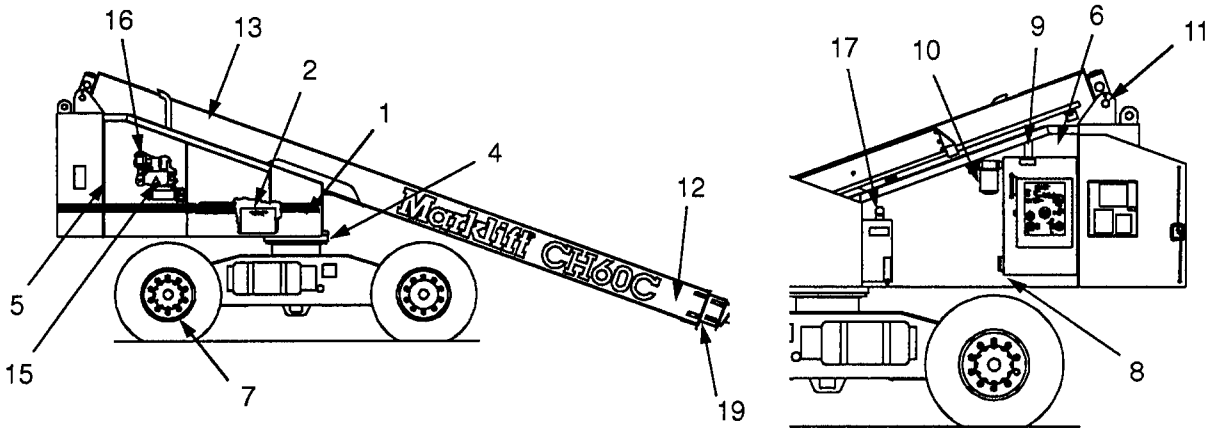
OWNER'S INSPECTION RECORD (ref pg. 9-5

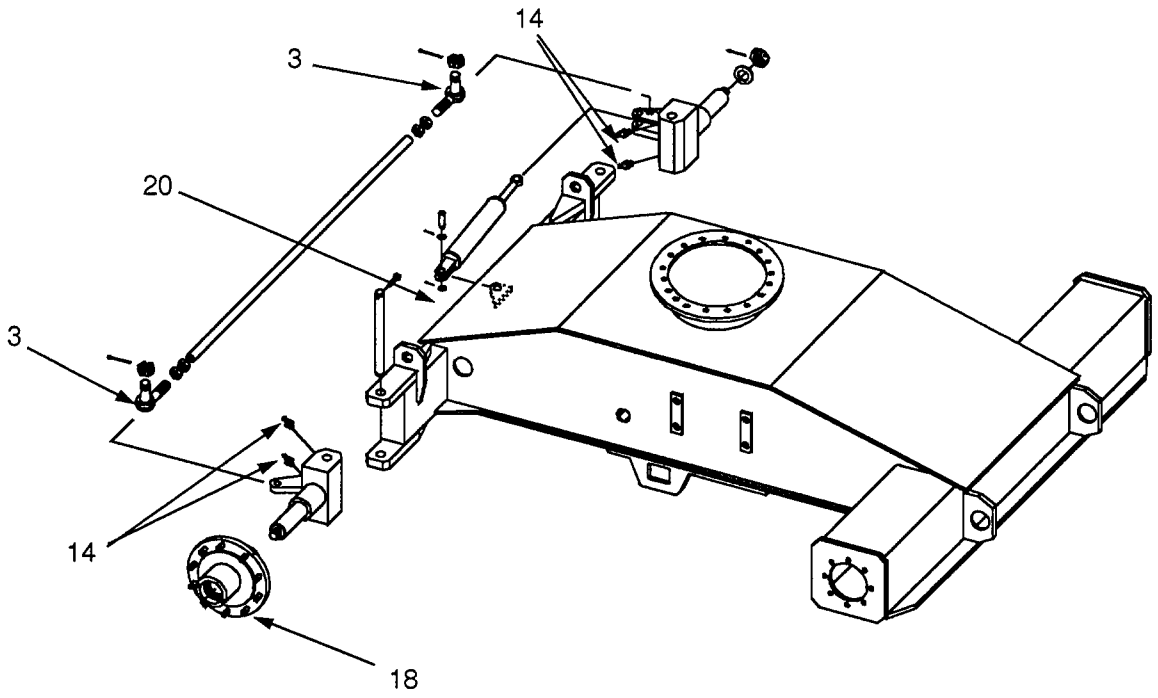
Periodic maintenance of the aerial lift is the responsibility of the owner. The "Aerial Lift Inspection Report" shown on page 9-3 is to be used for recording the date of each inspection, person(s) performing the inspection, any deficiencies found, and corrective action.

This record also serves as a tool toward detecting problem areas and reanalyzing maintenance requirements.

MAINTENANCE & LUBRICATION

MAINTENANCE SCHEDULE





MAINTENANCE SCHEDULE

Table 1: RECOMMENDED INSPECTION AND MAINTENANCE SCHEDULE

ITEM	ITEM DESCRIPTION	LUBRICANT	SERVICE/FREQUENCY
1	Rotation Gear Box	Gear Oil - SAE EP 90	Check/Monthly
2	Battery		Check/Weekly
	Battery Tops, Terminals, and Cables		Inspect/Daily
3	Tie Rod Pin	Mobilcote Type - S	Lubricate/Monthly
4	Ring Gear - (Race) (Gear Teeth)	Multi-Purpose Grease EP-2 (rotate while greasing) Mobilcote Type - S	Lubricate/Monthly
5	Engine	See Manuafacturer's Instructions	See Manufacturer's Instructions
6	Hydraulic Reservoir Fluid	Dexron II or equivalent	Check/Daily Replace/Yearly
7	Torque Hub	Gear Oil - SAE EP 90	Check/Monthly Replace/Yearly
8	Hydraulic Tank Strainer		Clean/Yearly
9	Hydraulic Tank Filler Breather		Clean/Yearly
10	Hydraulic Return Line Filter		Replace/100 Hours
11	Main Boom Pivot Pin	Mobilcote Type - S	Lubricate/Monthly
12	Extension Cable Sheaves	Mobilcote Type - S	Lubricate/Monthly
13	Cable Sheaves	Mobilcote Type - S	Lubricate/Monthly
14	Steering Yoke King Pins	Mobilcote Type - S	Lubricate/Monthly
15	Air Filter	Change according to filter manufacturer's recommen-dations	Inspect/ Weekly or as conditions dictate
16	Fuel Filter		Replace/100 Hours
17	Fuel Tank		Fill/Daily
18	Wheel Bearings	Multi-purpose Grease EP-1	Repack/Yearly
19	Boom Retract Cables		Check Tension/Monthly
20	Oscillating Axle Pivot Pin (Machines with Osc. Axle Option)	Mobilcote Type - S	Lubricate/Monthly

Check each of the above items for secure fasteners, leaks, missing or damaged hardware, or evidence of cracks. **Check** all visible electric wiring and hydraulic hoses for cracking, loose connections, or excessive wear. If a problem is found with any of the following items, **do not operate** the aerial lift until a qualified aerial-lift mechanic makes the necessary repairs.

MAINTENANCE & LUBRICATION

NOTES

Mark Industries

Return To: **Mark Industries**
106 12th Street S.E.
Waverly, IA 50677-9466

AERIAL LIFT INSPECTION REPORT

PRE-DELIVERY ❑ DELIVERY ❑ 30-DAY INSPECTION ❑ YEARLY INSPECTION ❑

MACHINE: SCISSOR LIFT ❑ BOOM LIFT ❑ KNUCKLE BOOM ❑

DEMO ❑ RENTAL ❑ OWNED ❑

DISTRIBUTOR _____ ENGINE S/N _____

ADDRESS _____ MODEL _____ SERIAL NO. _____

CUSTOMER _____ HOUR METER _____

MACHINE LOCATION _____ DATE DELIVERED _____

Scissors - Inspections	OK	NOT OK	N/A
1. Platform Gate Latch	❑	❑	❑
2. Platform Gate	❑	❑	❑
3. Platform Deck	❑	❑	❑
4. Collars on Scissor-pivot Pins	❑	❑	❑
5. Hydraulic Pump	❑	❑	❑
6. Wear (Slide) Pads	❑	❑	❑
7. Tires and Wheels	❑	❑	❑
8. Wheel Bearings	❑	❑	❑
9. Wheel KIngpins	❑	❑	❑
10. Wheel Lug Nuts	❑	❑	❑
11. Hydraulic Reservoir Fluid	❑	❑	❑
12. Hydraulic-fluid Inlet Strainer	❑	❑	❑
13. Hydraulic-fluid Return Filter	❑	❑	❑
14. Lift Cylinder and Pins	❑	❑	❑
15. Hydraulic Valve	❑	❑	❑
16. Batteries	❑	❑	❑
17. Battery Housings	❑	❑	❑
18. Battery Tops, Terminals, and Cables	❑	❑	❑
19. Limit Switches (Proximity)	❑	❑	❑
20. Drive Motors	❑	❑	❑
21. Steering Cylinder and Pins	❑	❑	❑
22. Extendable Platform Deck (Slide, Roller, and Handle Assemblies)	❑	❑	❑
23. Hoses	❑	❑	❑
24. Electrical Wiring	❑	❑	❑
35. Decals	❑	❑	❑
26. Operation and Maintenance Manual in Platform	❑	❑	❑

Booms - Inspections	OK	NOT OK	N/A
1. Platform Gate Latch	❑	❑	❑
2. Platform Gate	❑	❑	❑
3. Platform Deck	❑	❑	❑
4. Boom Pivot Pin	❑	❑	❑
5. Air Filter	❑	❑	❑
6. Engine Oil	❑	❑	❑
7. Torque Hub	❑	❑	❑
8. Torque Ring-gear Bolts	❑	❑	❑
9. Boom	❑	❑	❑
10. Platform Rotator	❑	❑	❑
11. Tie Rod Pin	❑	❑	❑
12. Steering-yoke King Pins	❑	❑	❑
13. Steering Cylinder	❑	❑	❑
14. Fuel Tank	❑	❑	❑
15. Return-line filter	❑	❑	❑
16. Hydraulic Reservoir Fluid	❑	❑	❑
17. Hydraulic Pump	❑	❑	❑
18. Hydraulic Valve	❑	❑	❑
19. Wheel Lug Nuts	❑	❑	❑
20. Extend-cable Equalizer Bracket	❑	❑	❑
21. Extend Cable	❑	❑	❑
22. Limit Switches (Proximity)	❑	❑	❑
23. Boom-lift Cylinder Pins	❑	❑	❑
24. Boom-lift cylinder	❑	❑	❑
25. Rotation Gear Box	❑	❑	❑
26. Power Track	❑	❑	❑
27. Operation and Maintenance Manual in Platform	❑	❑	❑
28. Guard Rail	❑	❑	❑
29. Toe Plate Mesh	❑	❑	❑
30. Tires	❑	❑	❑
31. Decals	❑	❑	❑
32. Electrical Wiring	❑	❑	❑

INSPECTED BY: _____ DATE: _____ TITLE: _____

Explain any deficiencies found, corrective action taken, and identification of the person(s) performing the repair: _____

_____

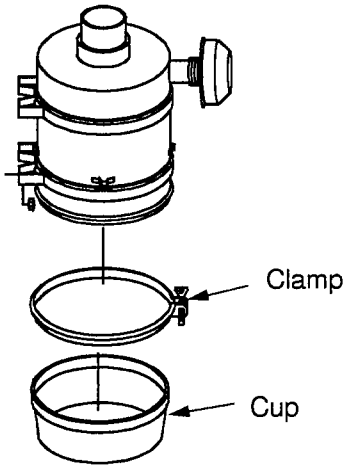
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MAINTENANCE PROCEDURES

ENGINE

Air Cleaner

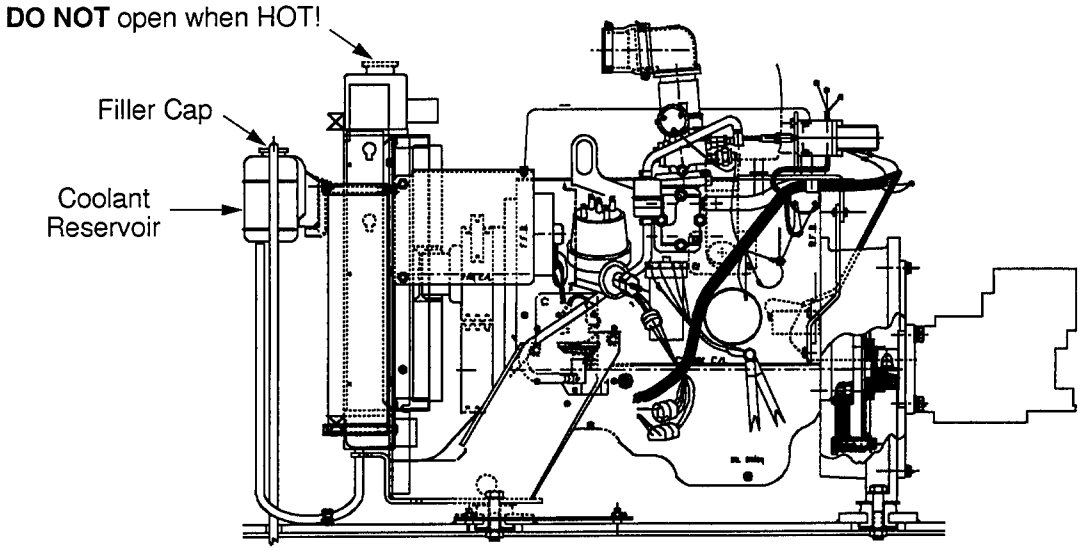


The air cleaner should be checked and cleaned on a weekly basis. To clean the air cleaner:

- Loosen the clamp securing the cup to the air cleaner
- Remove the cup and clean out any dirt or foreign matter in the cup.
- Reinstall the cup and tighten the clamp.

Coolant Level

The coolant level must be checked daily. The coolant level is checked at the coolant reservoir. Ensure that the coolant level is between the Full and Low marks on the coolant reservoir while the engine is cool. If the coolant level is near or below the Low mark, add a equal amounts of antifreeze and water until the level is at the Full mark. Do not add alcohol or methanol antifreeze. Refer to the engine manufacturers manual for additional information. **CAUTION** do not open hot radiator! Allow radiator to cool if engine has been operated recently.



MAINTENANCE & LUBRICATION

ENGINE & HYDRAULIC OIL

Hydraulic & Engine Oil

Various hydraulic fluid manufacturer's use different additives which may cause problems in a hydraulic system when mixed together. This situation is rare but can cause sludge, which can plug filters, or acid which can etch machined surfaces in hydraulic components or deteriorate seals. Any of the above conditions can result in a hydraulic component warranty being voided. If, knowing all this, you still choose to add fluid different from that initially supplied ("NORTRAN automatic transmission fluid", equivalent DEXRON II), stay with a single brand as this will minimize the likelihood of problems occurring. Then at the first complete hydraulic fluid change, you may switch to the brand you prefer to use.

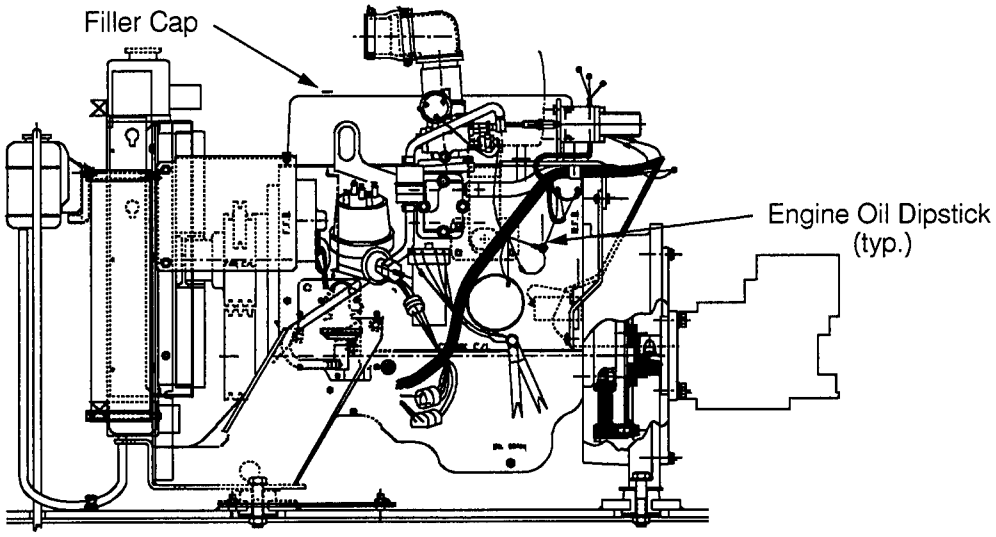
If engine oil needs to be added, the aerial lift owner must be contacted to find out what brand and viscosity of oil is being used. Use the same brand and viscosity of oil that is presently being used in the aerial lift when adding engine oil. The aerial lift owner should refer to the engine manufacturers manual to select the proper oil to use.

Hydraulic Oil

Check the hydraulic fluid level on a daily basis. The oil level must be between the "HIGH" and "LOW" marks in the sight glass of the hydraulic tank. Add fluid as needed through the filler neck on top of the hydraulic tank. The hydraulic system was filled at the factory with Nortran automatic transmission fluid (equivalent Dexron II). Any oil used in this aerial lift's hydraulic system must meet the specifications of Dexron II.

Engine Oil

Check the engine oil level on a daily basis. The oil level must be within the "SAFE" level on the engine oil dip-stick. Add oil as needed in the filler cap on top of the engine. Refer to the engine manufacturer's manual for the recommended type oil.



MAINTENANCE & LUBRICATION

HYDRAULIC SYSTEM

HYDRAULIC RESERVOIR CHECK & FILL

Check the hydraulic oil level on a daily basis. The oil level must be between the "HIGH" and "LOW" marks on the sight glass on the hydraulic tank. Add oil as needed in the filler cap on top of the hydraulic tank. The hydraulic system was filled at the factory with Nortran automatic transmission fluid (equivalent to Dexron II). Any oil used in this aerial lift's hydraulic system must meet the specifications of Dexron II.

HYDRAULIC SYSTEM RETURN LINE FILTER

The hydraulic system return line filter should be changed every 100 hours or quarterly.

HYDRAULIC SYSTEM BLEEDING

The hydraulic system is self-bleeding. After the hydraulic system has been drained, such as during the replacement of a hydraulic system component, raise and lower the platform three complete cycles. Recheck the oil level and fill as required.

Wash the cylinder bore and all the components with solvent and make the following inspections:

CYLINDER BORE For signs of scoring and deep scratches. In the event of any defects, reassemble the entire cylinder and contact your distributor.

CYLINDER SHAFT For dents, deep scratches, or damaged chrome plating. File any sharp edges on ends of shaft to protect the seals upon reassembly. Always protect the shaft finish when clamping in a vice or when welding against weld splatter.

PISTON RINGS For cracks or other damage. Particularly check the interlocking ends that they are not missing or broken.

PISTON SEALS For signs of severe damage. Do not remove unless replacement is necessary.

PISTON & HEAD GLAND It is not normally necessary to replace the piston, piston rings, or head gland.

HYDRAULIC CYLINDER INSPECTION

MAINTENANCE & LUBRICATION

TORQUE HUB

1 Type - EP 90

For normal application, use EP 90. For applications where the lubricant must meet special requirements, the manufacturer of the lubricant should be able to recommend a suitable substitute.

2. Oil Temperature

Continuous - 160°F
Intermittent - 200°F

3. Oil Change

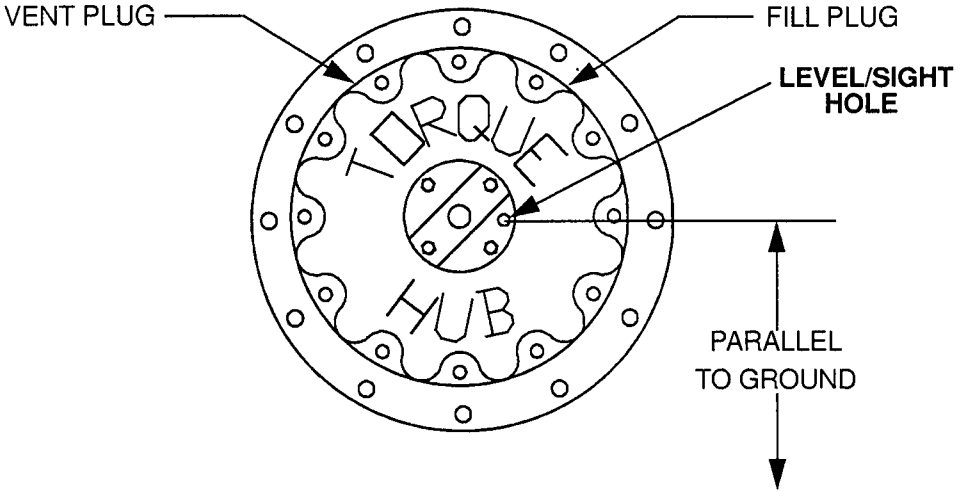
Initial - After 50 hours. Preferably in a loaded condition.

Subsequent - 1000 hours or (1) year whichever comes first. Higher temperatures make it necessary to change oil more frequently.

4. Oil Fill Level

Remove fill plug
Remove vent plug
Pour oil into fill plug
Fill to half - full (approximately 44 oz.)

Fill at a slow pace to allow air to escape.



MAINTENANCE & LUBRICATION

BATTERY



⚠ WARNING

TO AVOID SERIOUS BURNS, EXTREME CARE SHOULD BE USED WHEN HANDLING OR WORKING NEAR BATTTERIES.

Avoid Battery Hazards!

- **Batteries produce flammable and explosive gasses. Keep** electric arcs, sparks, flames, and lit cigarettes (pipes, cigars, etc.) away from batteries.

- **Battery acid will damage eyes or skin on contact. Always** wear a face shield during battery maintenance to avoid getting acid in eyes. **Always** wear rubber gloves and protective clothing to keep acid off skin.

- **Never** check the battery by placing a metal object across the posts. Serious burns or an explosion can result.

Checking the Battery Electrolyte Level

Check the colored "eye" in the top of the battery, a green color indicates that battery electrolyte level is okay.

Water or Acid Loss to Batteries

Water loss from the battery occurs mainly as the result of evaporation brought on by temperature rises during charging. A small amount may be lost due to gasses formed during charging. Electrolyte may be lost if the case becomes cracked or the battery tips over. Therefore, electrolyte is seldom needed.

Checking the Electrolyte (Battery Water) level "physically"

When checking the electrolyte level, don't allow dirt to enter into the battery cells once the caps have been removed. Take particular care to avoid setting the battery-cell caps down on a dirty surface. Replace the caps immediately after checking the level.

MAINTENANCE & LUBRICATION

BATTERY

MATERIALS AND EQUIPMENT REQUIRED

1. Battery Filler Bottle

2. Distilled Water

3. Hydrometer

FILLING THE BATTERY

Use a hydrometer to see how much charge the battery has. A reading of 1.260 or more in all cells indicates a fully-charged condition. (See chart on following page.) If the battery is fully charged, add water up to the level indicator.
If the battery's water level is below the lead plates, add only enough water to barely cover the plates.

Note: Either excessive overcharge or moderate undercharge can shorten battery life. With proper attention to water level, charging time, and hydrometer readings, the batteries should have a long, useful life.

Note: Cold temperatures have a numbing effect on the electrical action of the battery, greatly reducing its capacity. Therefore, it is highly recommended that the battery be kept fully charged during cold weather.

Temperature/Specific Gravity Correction Table For Batteries
Actual Hydrometer Reading At Actual Temperature°
Table 1:

80°F (27°C)	0°F (-18°C)	-10°F (-23°C)	-20°F (-29°C)	-30°F (-34°C)	-45°F (-43°C)	-65° (-54°C)	Approx. State of Charge —%
1.280	1.312	1.316	1.320	1.324	1.330	1.338	100
1.250	1.282	1.286	1.290	1.294	1.300	1.308	75
1.220	1.252	1.256	1.260	1.264	1.270	1.278	50
1.190	1.222	1.226	1.230	1.234	1.240	1.248	25
1.160	1.192	1.192	1.200	1.204	1.210	1.218	0

Table 2: Specific Gravity

Corrected to 80°F (17°C)	Freezing Temperatures
1.280	-90°F (-68°C)
1.250	-62°F (-52°C)
1.200	-16°F (-27°C)
1.150	+05°F (-15°C)
1.000	+19°F (-07°C)

MAINTENANCE & LUBRICATION

NOTES

SERVICE & ADJUSTMENTS

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SERVICE & ADJUSTMENTS

INTRODUCTION

This section contains service and adjustment information and procedures.

SERVICE describes items that require repair or replacement

ADJUSTMENTS describes any adjustments necessary to ensure proper operation of the aerial lift and adjustments required after the replacement or repair of components.

NOTE: THE SERVICE AND ADJUSTMENT PROCEDURES PROVIDED IN THIS MANUAL SHOULD ONLY BE PERFORMED BY A QUALIFIED AERIAL LIFT MECHANIC.

Before attempting to make an adjustment yourself, ask yourself if you have the RIGHT TOOLS, IF you have the PROPER TEST EQUIPMENT and IF you can accurately DIAGNOSE the cause of the problem.

If you can't answer YES to all three questions, rely on your Distributor Serviceman. He has the right tools, testing equipment and service knowledge to pin-point the problem in minutes instead of the hours consumed in hit-or-miss methods. TIME IS MONEY! He will save it for you.

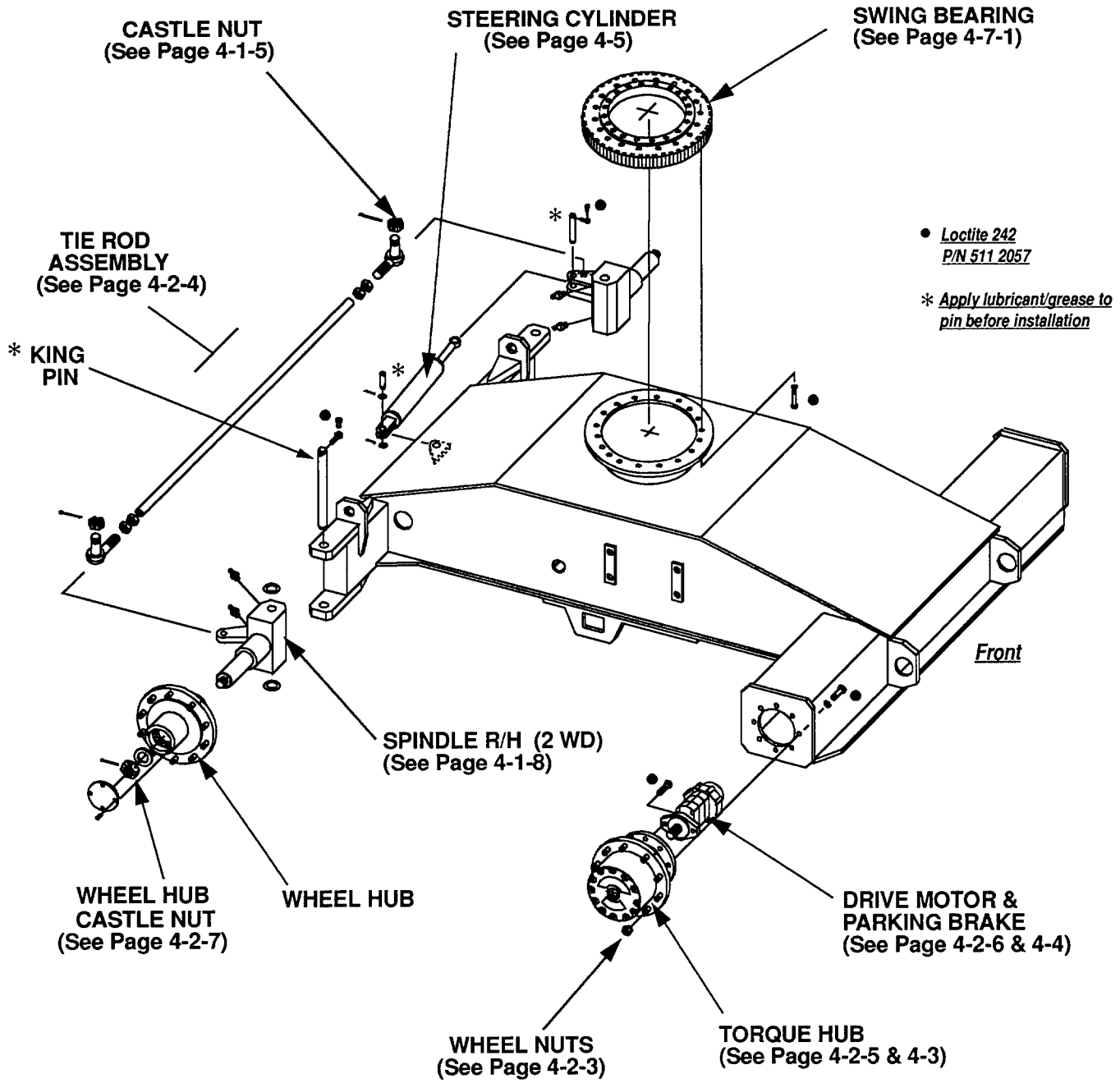
If you decide to attempt an adjustment yourself, follow a logical TROUBLE SHOOTING PROCEDURE. Don't simply replace parts until the trouble is found. Refer to Section 5 Troubleshooting for general and specific troubleshooting information.

Once the cause of problem or malfunction has been diagnosed, take the corrective action specified in this manual. Follow the procedures given for the specific problem. If the difficulty is not covered, consult your Mark Distributor, or the Mark Industries Product Support Department.

SERVICE & ADJUSTMENTS

BASE ASSEMBLY

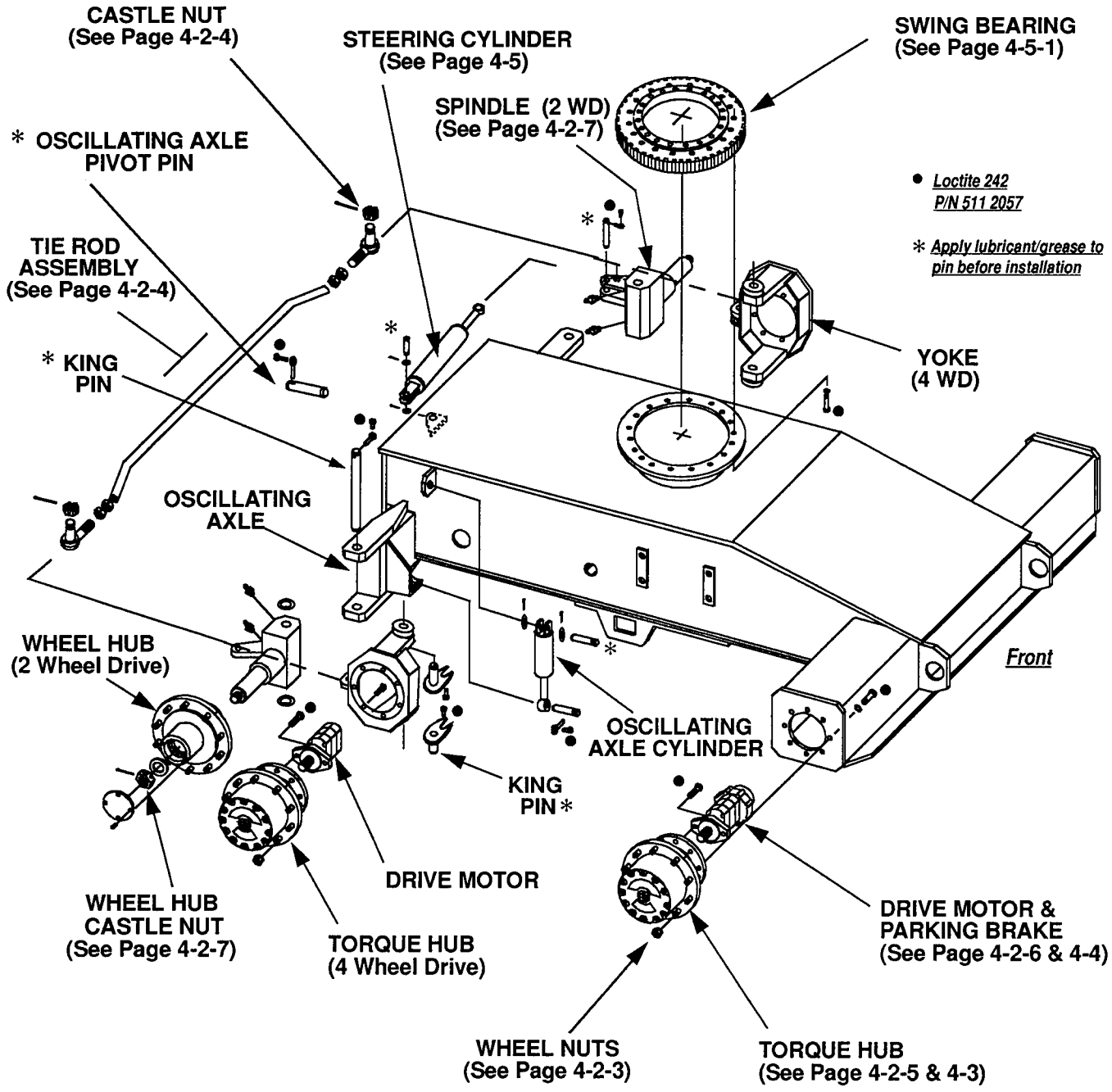
2-WHEEL DRIVE (WITHOUT OSCILLATING AXLE)



SERVICE & ADJUSTMENTS

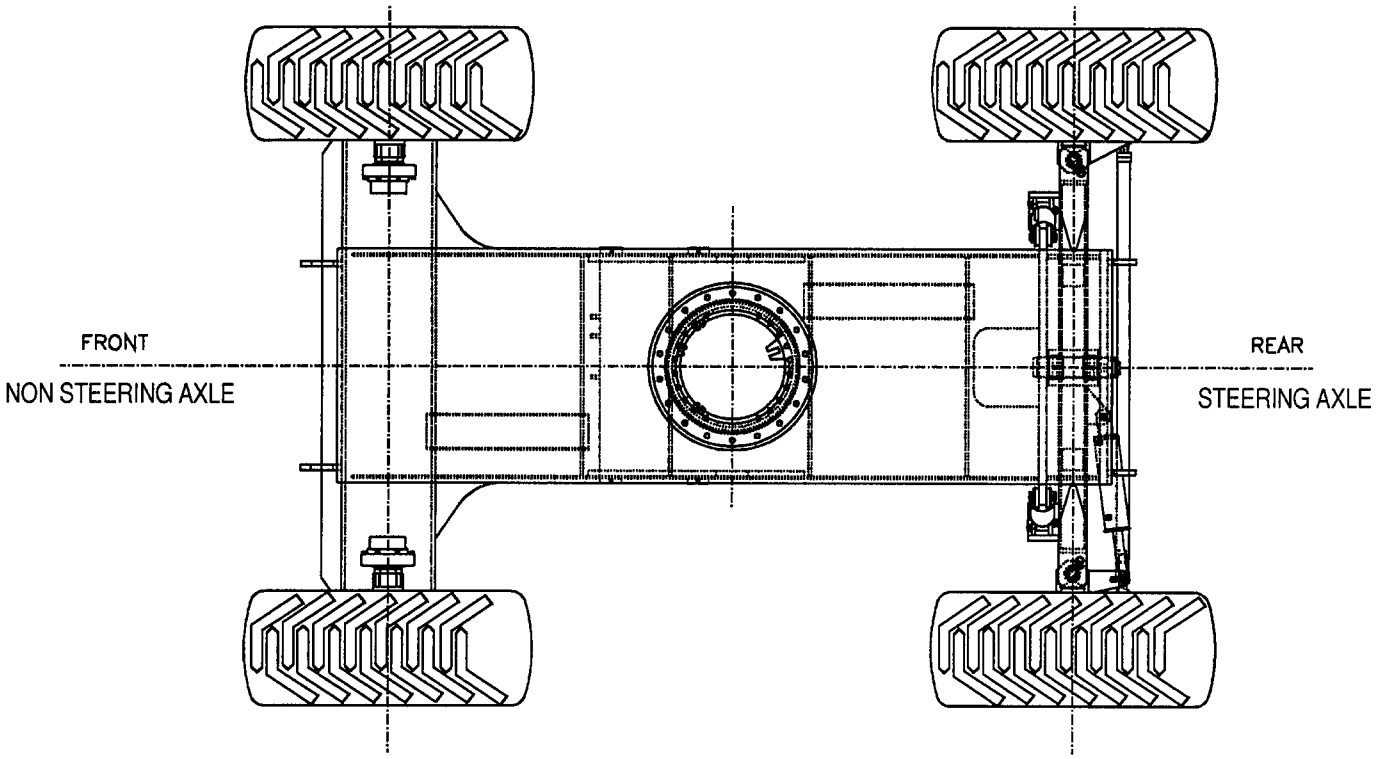
BASE ASSEMBLY

2 -WHEEL OR 4 -WHEEL DRIVE (WITH OSCILLATING AXLE)



SERVICE & ADJUSTMENTS

TIRE & WHEEL ASSEMBLY



NOTE: WHEEL & TIRE ASSEMBLIES MUST BE INSTALLED WITH TREAD IN THE DIRECTION SHOWN ABOVE

MAINTENANCE CHECK As a part of the recommended inspection and maintenance schedule, inspect the tires for damage.

Check for loose or missing wheel (lug) nuts. Wheel nut torque should be checked after first 40 hours and then every six months. Wheel nuts should be torqued to 350 ft. lbs. (476 N•m) dry.

TIRE & WHEEL INSTALLATION

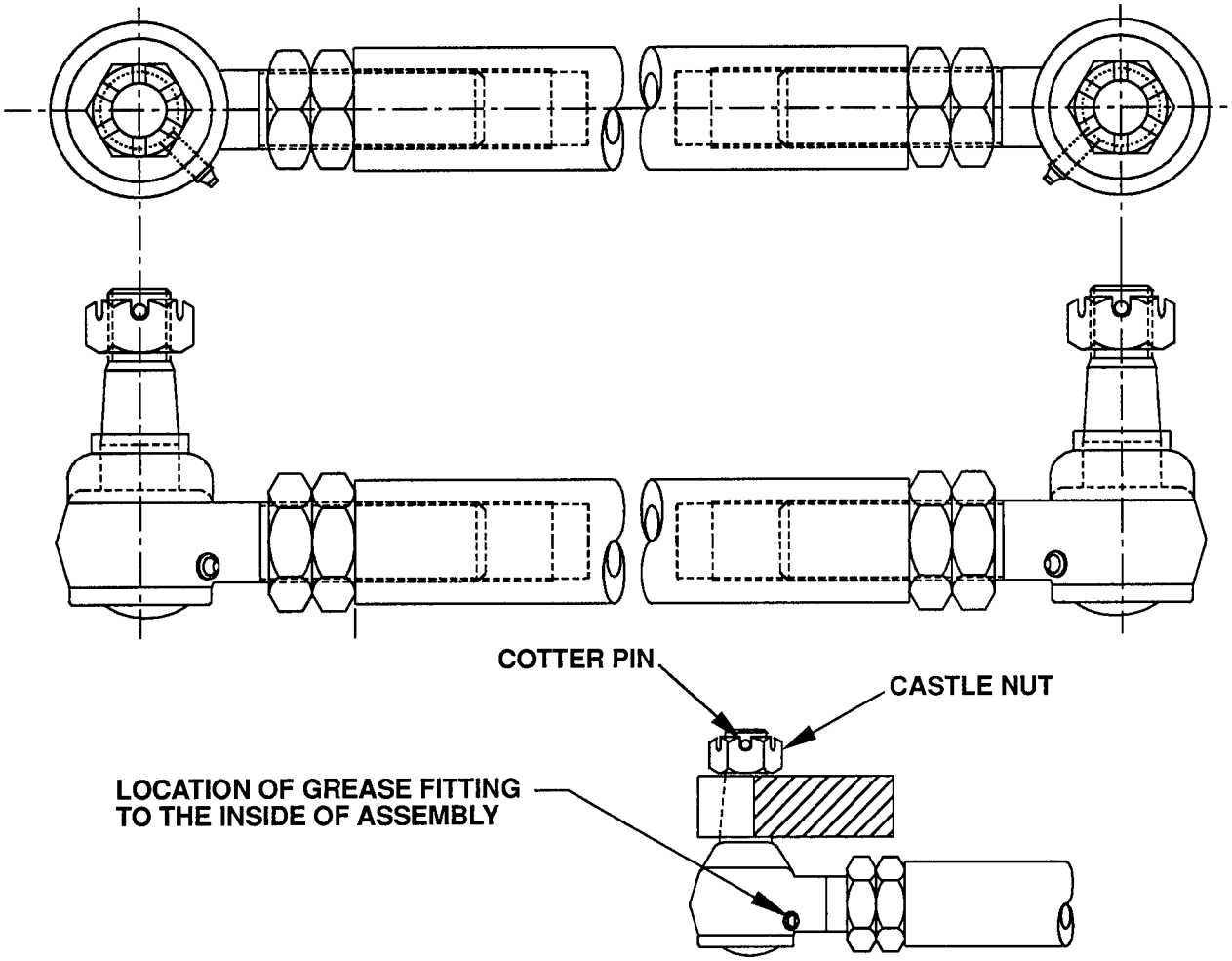
The castle nut is installed as follows:

1. Install tires with tread in the direction shown in the illustration above.

2. Install wheel nuts and torque to 350 ft. lbs. (476 N•m) dry.

SERVICE & ADJUSTMENTS

TIE ROD ASSEMBLY



MAINTENANCE CHECK As a part of the recommended inspection and maintenance schedule, lubricate the tie rod pins monthly with Mobilcote Type-S.

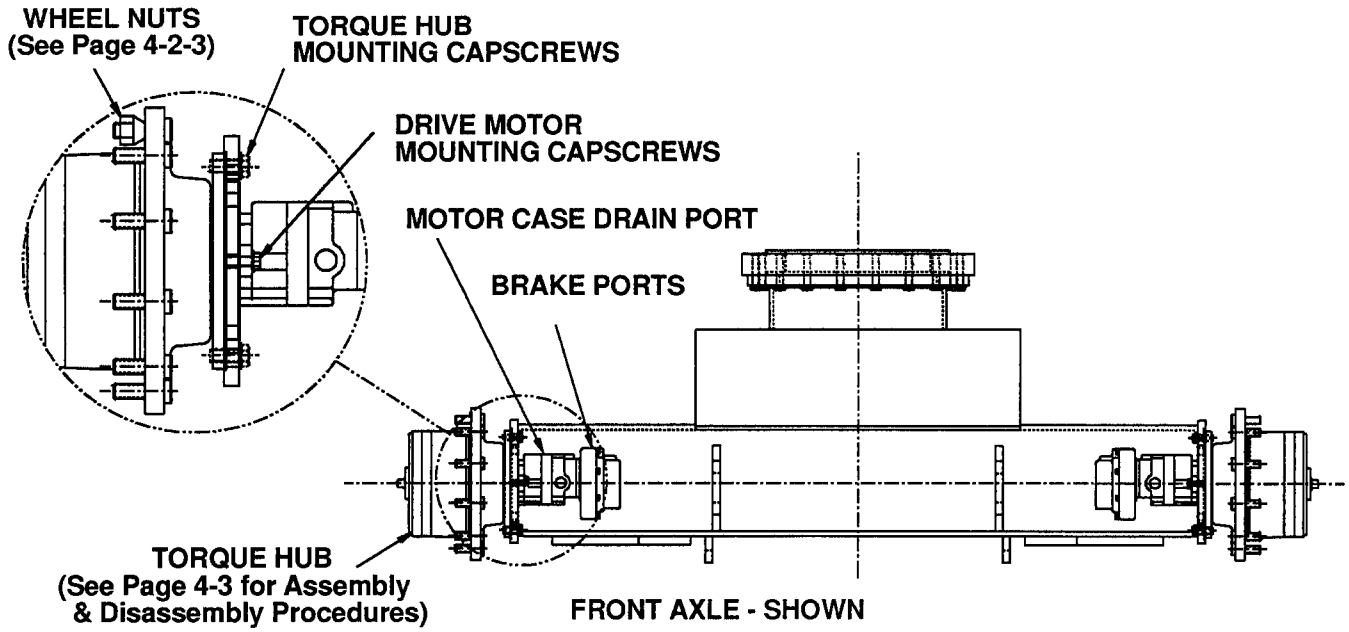
INSTALLING THE CASTLE NUT

The castle nut is installed as follows:

1. Install the castle nut and tighten to approximately 60 ft. lbs (68 N•m).
2. Then back off the castle nut to the next slot in the castle nut (approximately 1/4 turn).
3. Secure with a new cotter pin.

SERVICE & ADJUSTMENTS

TORQUE HUB & DRIVE MOTOR ASSEMBLY



MAINTENANCE CHECK Refer to page 4-3 for torque hub lubrication procedure.

TORQUE HUB

The torque hub assemblies may be removed or installed as follows:

TORQUE HUB REMOVAL

1. Remove the tire and wheel assembly from the torque hub if it has not already been removed.
2. Remove the capscrews which secure the drive motor or the drive motor/brake assembly to the torque hub.
3. Remove the capscrews which secure the torque hub to either the front axle or the rear yoke (4 wheel drive machines only).
4. Remove the torque hub.

TORQUE HUB INSTALLATION

1. Install torque hub in place.
2. Apply Loctite 242 to retaining capscrews and install to secure torque hub. Tighten capscrews to 170 ft. lbs (231 N•m).
3. Apply lubricant/grease to the motor shaft splines. Install the o-ring between motor pilot sealing cap and torque hub and install drive motor or drive motor/brake assembly in place.
4. Apply Loctite 242 to the drive motor mounting capscrews and torque to 64 ft. lbs. Secure the motor to the torque hub with either the brake ports pointing up (front axle) or motor case drain port pointing up (rear axle - 4 wheel drive machines only).
5. Fill the torque hub with gear lube. Refer to page 4-3 for torque hub lubrication requirements and procedure.

SERVICE & ADJUSTMENTS

DRIVE MOTOR & DRIVE MOTOR/BRAKE ASSEMBLY

DRIVE MOTOR & DRIVE MOTOR/BRAKE ASSEMBLY

The rear drive motors (4 wheel drive) and the front drive motor & brake assembly may be removed or installed as follows:

DRIVE MOTOR ASSEMBLY REMOVAL

1. Clean outside of the drive motor assembly and wipe of all hydraulic fittings.

2. Remove the hydraulic fittings and hoses, noting location of each.

3. Remove the capscrews which secure the drive motor or the drive motor/brake assembly to the torque hub.

4. Remove the drive motor assembly from the torque hub. Refer to page 4-4-1 for Assembly and Disassembly procedures.

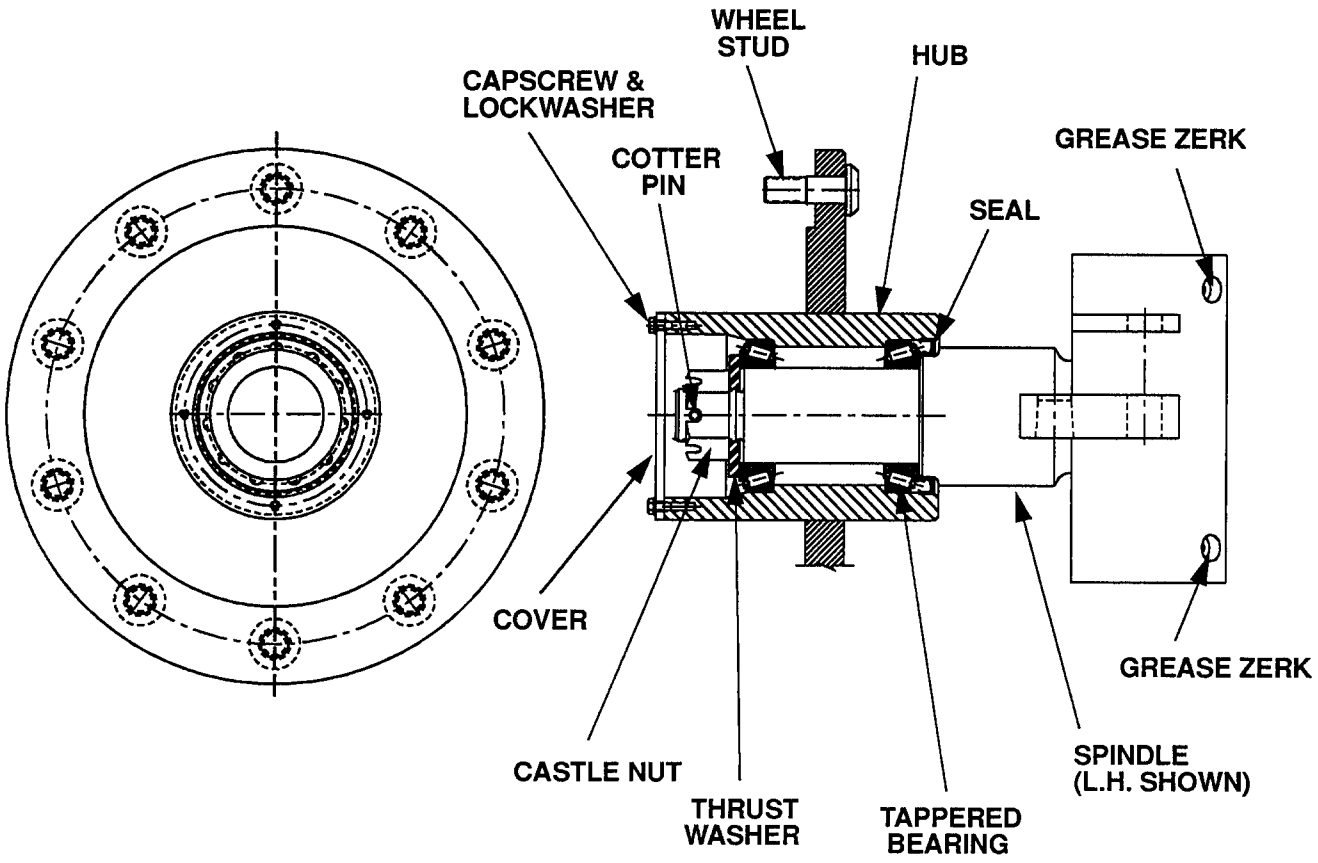
DRIVE MOTOR ASSEMBLY INSTALLATION

1. Apply lubricant/grease to the motor shaft splines. Install the o-ring between motor pilot sealing cap and torque hub and install drive motor or drive motor/brake assembly in place.

2. Apply Loctite 242 to the drive motor mounting capscrews and torque to 64 ft. lbs. Secure the motor to the torque hub with either the brake ports pointing up (front axle) or motor case drain port pointing up (rear axle - 4 wheel drive machines only).

SERVICE & ADJUSTMENTS

HUB ASSEMBLY (2 WHEEL DRIVE)



MAINTENANCE As a part of the recommended inspection and maintenance schedule, repack the wheel bearings yearly with Multi-purpose grease EP-1.

Installing Castle Nut

The castle nut is installed as follows:

1. Install the castle nut and tighten to approximately 50 ft. lbs (68 N•m) to preload the bearing.

2. Then back off the castle nut to the next slot in the castle nut (approximately 1/4 turn).

3. Secure with a new cotter pin.

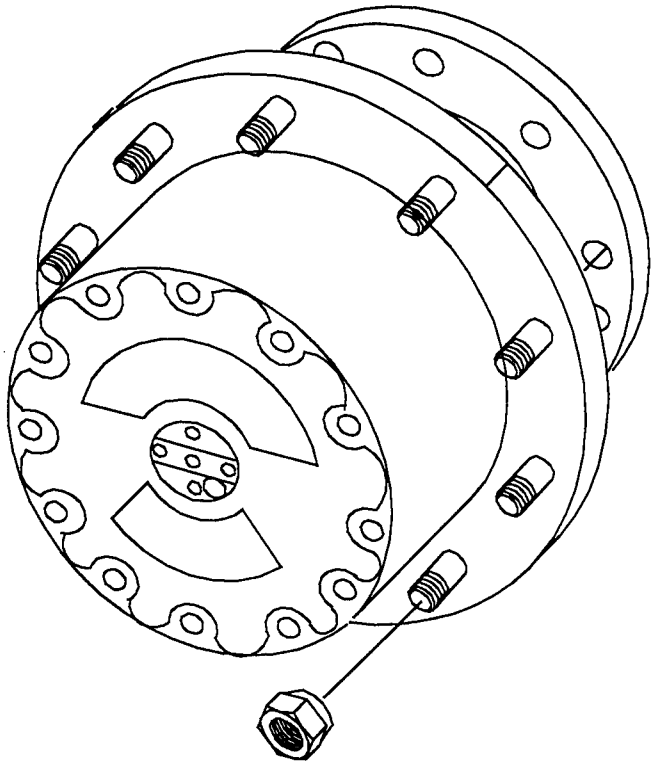
SERVICE & ADJUSTMENTS

NOTES

SERVICE & ADJUSTMENTS

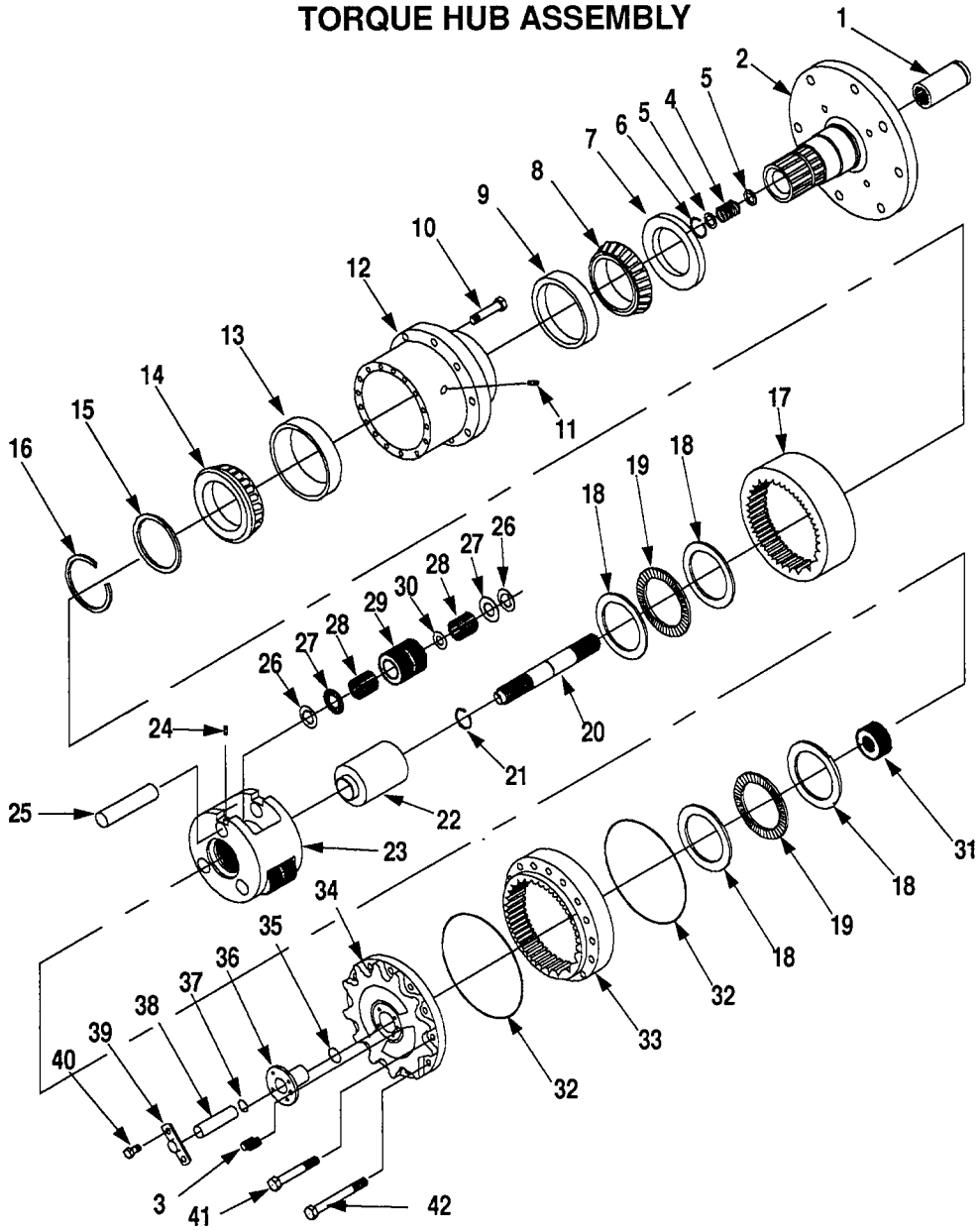
TORQUE HUB ASSEMBLY

"FAIRFIELD MANUFACTURING"



SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY



1.	Coupling	12.	Hub	23.	Carrier	34.	Cover
2.	Spindle	13.	Bearing Cup	24.	Roll Pin	35.	O-Ring
3.	Pipe Plug	14.	Bearing Cone	25.	Planet Shaft	36.	Cover Cap
4.	Spring	15.	Thrust Washer	26.	Thrust Washer	37.	O-Ring
5.	Thrust Washer	16.	Retaining Ring	27.	Thrust Washer	38.	Disconnect Rod
6.	Retaining Ring	17.	Gear, Internal	28.	Needle Roller	39.	DIsconnect Cap
7.	Seal	18.	Thrust Washer	29.	Cluster Gear	40.	Bolt
8.	Bearing Cone	19.	Thrust Bearing	30.	Spacer	41.	Bolt
9.	Bearing Cup	20.	Input Shaft	31.	Input Sun Gear	42.	Shoulder Bolt
10.	Stud	21.	Retaining Ring	32.	O-Ring		
11.	Pipe Plug	22.	Input Spacer	33.	Ring Gear		

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY

Torque Hub Disassembly

1. Loosen all twelve cover bolts (items 41 & 42) and drain the oil from the unit.

2. Remove the twelve cover bolts and lift off the cover sub-assembly. Discard the o-ring (32) from the cover counterbore.

3. Lift out the carrier sub-assembly and thrust bearing set. A thrust washer may stick inside the cover.

4. Pry the ring gear (33) loose and remove it. Discard the o-ring seal (32) from the hub counterbore.

5. Remove the input shaft (20), input gear (31), and the thrust spacers that are on the input shaft.

6. Lift out the internal gear (17) and thrust bearing set. A thrust washer may stick to the bottom of the carrier.

7. Remove the retaining ring from the spindle and discard; then lift the hub off the spindle.



Eye protection should be worn during retaining ring removal.

8. The inside bearing cone and bearing shim can now be removed.

9. The seal can be pried out of the hub with a screwdriver or pry bar. This will also allow the outside bearing to be removed.

   NOTE: If bearing replacement is necessary, the bearing cups can be removed with a "slide hammer puller" or driven out with a punch.

10. To remove the cluster gears from the carrier, drive the anti-roll pin into the planet shaft of the cluster gear. After the planet shaft is removed the roll pin should be driven out of the planet shaft.

    NOTE: When rebuilding the unit, the o-rings and retaining rings should **always** be replaced.

Main Assembly Procedure

1. Using an arbor type press if available, (if not, a hammer may be used), install the wheel studs (10) into the hub (12). The hub flange should be supported from the underside during this operation.

2. Using an arbor type press if available, press bearing cups (9) an (13) with large inside diameters facing out, into hub counter bores.

3. Place bearing cone (8) into bearing cup (9) in small end of hub (12).

4. Press seal (7) into hub counterbore with flat metal side facing in. Use a flat object to assure that seal is pressed evenly and is flush with hub face.

5. Lower hub (12) onto spindle (2) with large open end up.

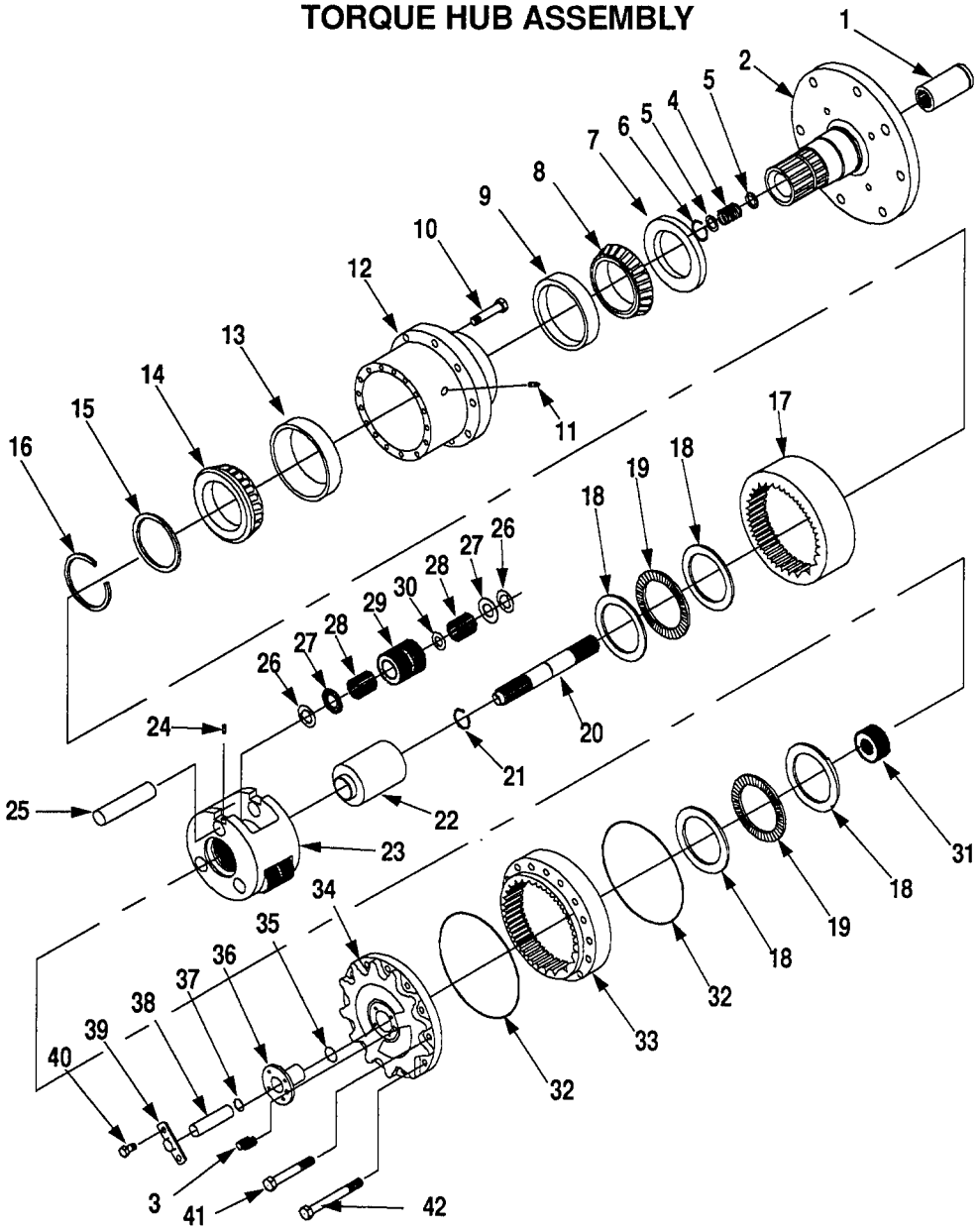
6. Place bearing cone (14) over end of spindle (2) and against bearing cone (13).

7. Place bearing thrust washer (15) over end of spindle (2) and against bearing cone (14).

8. Secure retaining ring (16) completely into spindle groove and against bearing thrust washer. Be sure that retaining ring is .entirely in groove

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY



1.	Coupling	12.	Hub	23.	Carrier	34.	Cover
2.	Spindle	13.	Bearing Cup	24.	Roll Pin	35.	O-Ring
3.	Pipe Plug	14.	Bearing Cone	25.	Planet Shaft	36.	Cover Cap
4.	Spring	15.	Thrust Washer	26.	Thrust Washer	37.	O-Ring
5.	Thrust Washer	16.	Retaining Ring	27.	Thrust Washer	38.	Disconnect Rod
6.	Retaining Ring	17.	Gear, Internal	28.	Needle Roller	39.	DIsconnect Cap
7.	Seal	18.	Thrust Washer	29.	Cluster Gear	40.	Bolt
8.	Bearing Cone	19.	Thrust Bearing	30.	Spacer	41.	Bolt
9.	Bearing Cup	20.	Input Shaft	31.	Input Sun Gear	42.	Shoulder Bolt
10.	Stud	21.	Retaining Ring	32.	O-Ring		
11.	Pipe Plug	22.	Input Spacer	33.	Ring Gear		

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY

⚠CAUTION

Eye protection should be worn during retaining ring installation.

9. The pipe plugs (3) and (11) are installed in the hub (12). The use of lub-seal is recommended on the pipe plug.

10. The disengage thrust washer (5) and spring (4) are installed into the counterbore of the spindle (2).

11. Another thrust washer (5) and retaining ring (6) are installed into the spindle counterbore and retaining ring groove.

⚠CAUTION

Eye protection should be worn during retaining ring installation.

12. The internal gear (17) is installed matching the bore spine to the spindle spline.

13. The thrust washer/thrust washer set (18) and (19) is installed on the portion of the spindle which extends into the internal gear.

14. The o-ring (32) is placed into the counterbore provided in the hub (12). Slight stretching may be necessary. Use sufficient grease or petroleum jelly to hold in place.

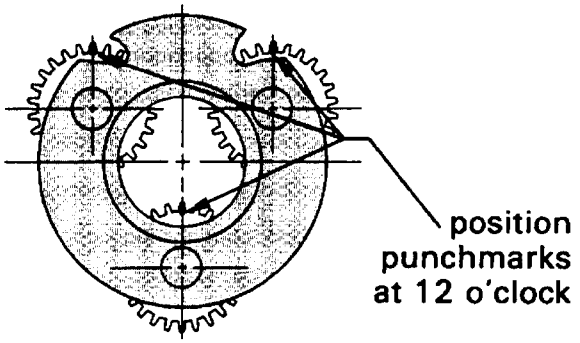
15. Install retaining ring (21) into input shaft retaining ring groove.

16. The input shaft is installed into the spindle. The action of the spring should be checked at this point.

17. The input spacer (22) is installed on the input shaft.

18. Locating the four counter reamed holes in the face of the hub, mark them for later identification. These holes are reamed to accept the shoulder bolts (42).

19. Place carrier assembly on a flat surface with the large gears up and positioned as shown. Find the punch marked tooth on each large gear and locate at 12 o'clock (straight-up) from each planet pin. Marked tooth will be located just under the carrier on upper two gears.



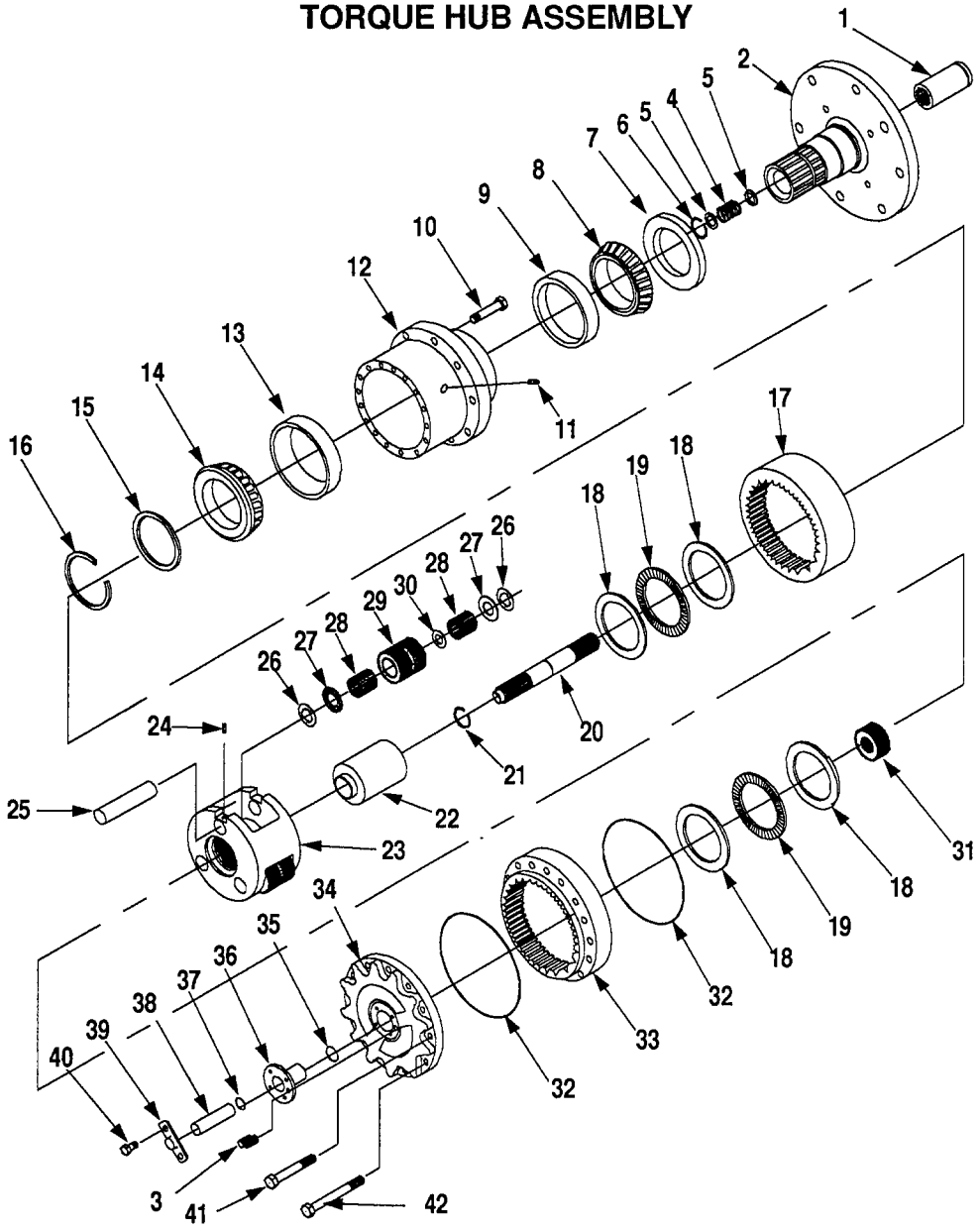
20. With the shoulder side of ring gear facing down, place ring gear (33) over (into mesh with) large gears. Be sure that punch marks remain in correct location during ring gear installation. The side of the ring gear with an "X" stamped on it should be up.

21. While holding ring gear and cluster gears in mesh, place small side of cluster gears into mesh with the internal gear. On the ring gear locate the hole marked "X" over one of the marked counterbored holes in hub.

    NOTE: If the gears do not mesh easily or carrier assembly does not rotate freely, then remove the carrier and ring gear and check the cluster gear timing.

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY



1.	Coupling	12.	Hub	23.	Carrier	34.	Cover
2.	Spindle	13.	Bearing Cup	24.	Roll Pin	35.	O-Ring
3.	Pipe Plug	14.	Bearing Cone	25.	Planet Shaft	36.	Cover Cap
4.	Spring	15.	Thrust Washer	26.	Thrust Washer	37.	O-Ring
5.	Thrust Washer	16.	Retaining Ring	27.	Thrust Washer	38.	Disconnect Rod
6.	Retaining Ring	17.	Gear, Internal	28.	Needle Roller	39.	DIsconnect Cap
7.	Seal	18.	Thrust Washer	29.	Cluster Gear	40.	Bolt
8.	Bearing Cone	19.	Thrust Bearing	30.	Spacer	41.	Bolt
9.	Bearing Cup	20.	Input Shaft	31.	Input Sun Gear	42.	Shoulder Bolt
10.	Stud	21.	Retaining Ring	32.	O-Ring		
11.	Pipe Plug	22.	Input Spacer	33.	Ring Gear		

22. The input gear is installed into this assembly meshing with the larger diameter cluster gear. The counterbored side of the input gear is installed down or to the inside of the unit.

23. After inserting at least one shoulder bolt (42) in the proper location, rotate the carrier. This is to check freedom of rotation and recheck the timing.

24. Another thrust washer/thrust bearing set (items 18 &19) is now installed into the counterbore in the face of the carrier (23).

25. Place o-ring (32) into cover assembly counterbore. Slight stretching may be necessary. Use sufficient grease or petroleum jelly to hold in place.

26. Place cover assembly on ring gear with oil level, check plug in cover located approximately 90° from oil fill plug in hub.

27. Locate four shoulder bolts (42) 90° apart into counterbored hole in hub which were marked in step 17. Torque each bolt to 47 ft. lbs. (64 N•m).

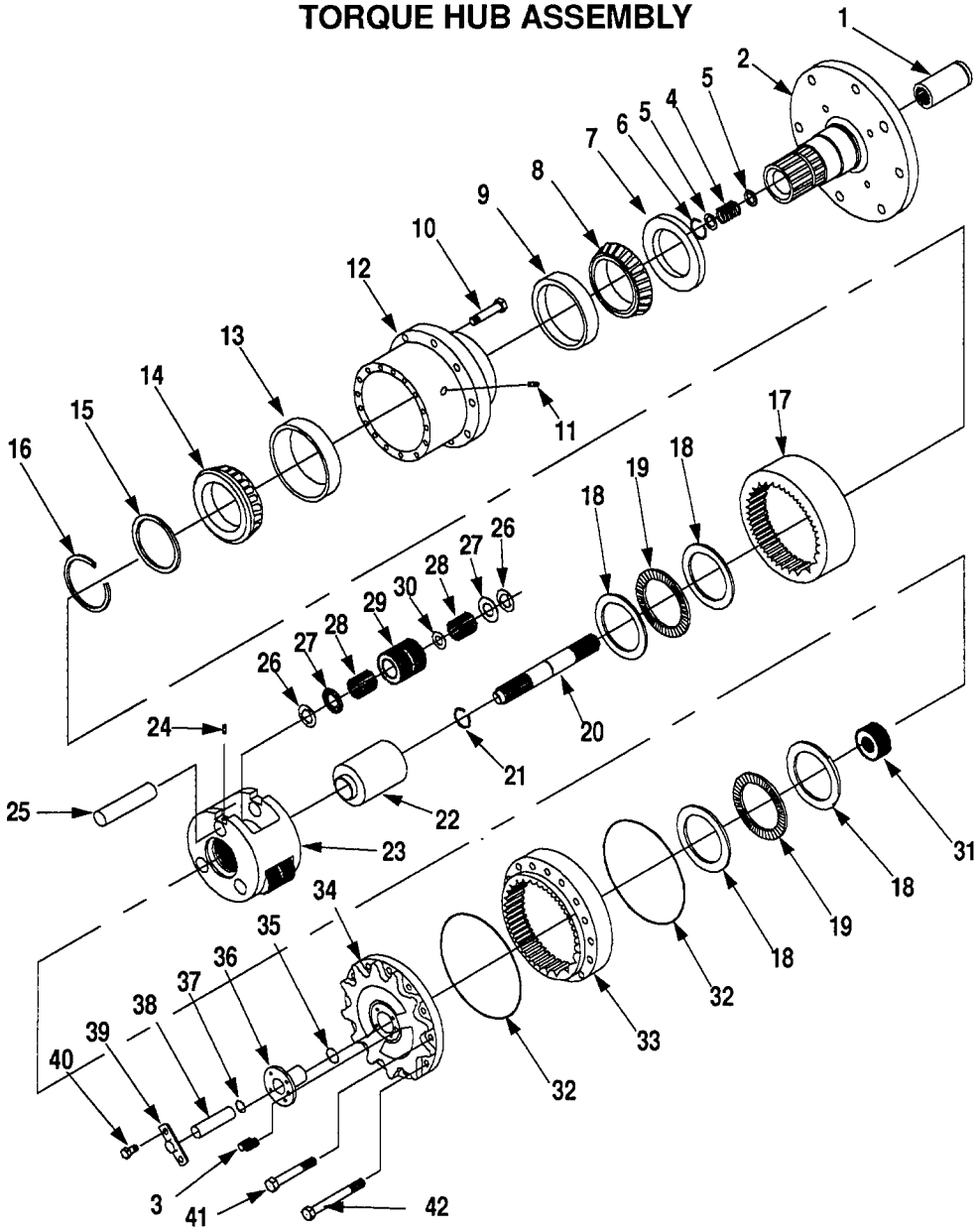
28. Install grade eight bolts (41) into the remaining eight holes and torque all bolts to 47 ft. lbs. (64 N•m). Use the 180° to 90° method in torqueing all bolts.

29. Place coupling (1) into the spindle and onto the input shaft.

    NOTE: This completes the assembly. The unit must be filled one-half full of EP 90 lubricant before operation.

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY



1.	Coupling	12.	Hub	23.	Carrier	34.	Cover
2.	Spindle	13.	Bearing Cup	24.	Roll Pin	35.	O-Ring
3.	Pipe Plug	14.	Bearing Cone	25.	Planet Shaft	36.	Cover Cap
4.	Spring	15.	Thrust Washer	26.	Thrust Washer	37.	O-Ring
5.	Thrust Washer	16.	Retaining Ring	27.	Thrust Washer	38.	Disconnect Rod
6.	Retaining Ring	17.	Gear, Internal	28.	Needle Roller	39.	DIsconnect Cap
7.	Seal	18.	Thrust Washer	29.	Cluster Gear	40.	Bolt
8.	Bearing Cone	19.	Thrust Bearing	30.	Spacer	41.	Bolt
9.	Bearing Cup	20.	Input Shaft	31.	Input Sun Gear	42.	Shoulder Bolt
10.	Stud	21.	Retaining Ring	32.	O-Ring		
11.	Pipe Plug	22.	Input Spacer	33.	Ring Gear		

SERVICE & ADJUSTMENTS

TORQUE HUB ASSEMBLY

Carrier Sub-Assembly

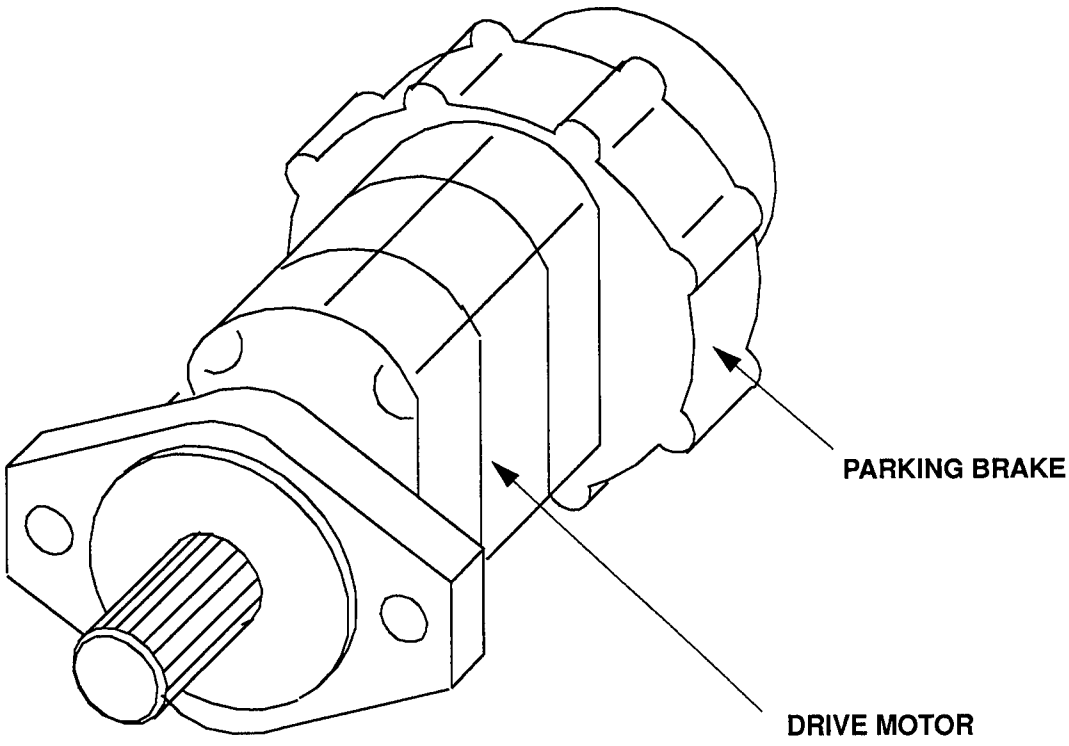
1. Apply a coat of grease or petroleum jelly to cluster gear (29) bore.
2. Place fourteen needle rollers (28) into cluster gear bore.
3. Place a thrust washer (27) into opposite side of cluster gear and against needle rollers.
4. Place second set of fourteen needle rollers (28) into cluster gear.
5. Apply grease or petroleum jelly to the tang side of the two thrust washers (26). Place thrust washers (26) against bosses in carrier with washer tang fitting into slot in carrier outside diameter.

   NOTE: Some old style carriers will not have slots and tangs should be located inside boss relief.
6. While keeping thrust washers in place, slide cluster gear into carrier with larger gear on the side with the small pin hole (hole for #24 pin).
7. Line up cluster gear and thrust washers with hole in carrier and slide planet shaft through. Line up chamfered side of hole in planet shaft with pin hole in carrier.
8. Drive anti-roll pin (2) flush into carrier sub-assembly.

Cover Sub-Assembly

1. Screw pipe plug (3) into cover (34).
2. Place o-ring (37) into cover cap (36) internal groove. The disconnect rod (38) may be used to push o-ring into groove. Rod (38) will be held in place by friction from the o-ring.
3. Slip o-ring (35) over cover cap (36) and against face.
4. Place cover cap (36) into cover with large hole located over pipe plug (3).
5. Install two 1/4 x 20 x 3/4 bolts (40) 180° apart and torque to 70 - 80 in. lbs. (8 - 9 N•m).
6. Place disconnect cap (39) over cover cap (36) with nipple facing out and align with two open holes. Secure disconnect cap to cover with two 1/4 x 20 x 3/4 bolts (40) and torque to 70 - 80 in. lbs. (8 - 9 N•m).

DRIVE MOTOR & PARKING BRAKE



DRIVE MOTOR & DRIVE MOTOR/BRAKE ASSEMBLY

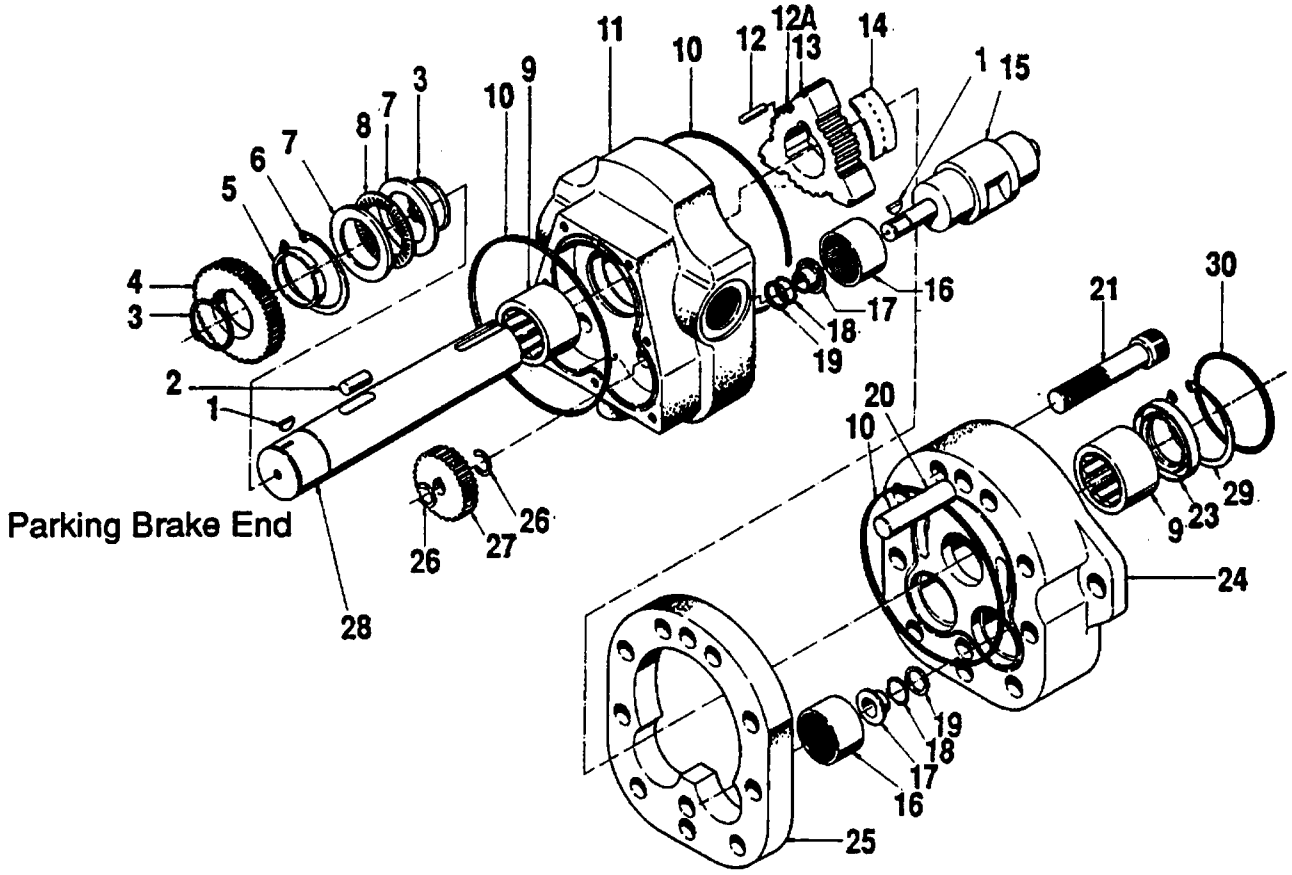
The the drive motor & brake assembly or drive motor (steering axle on 4 wheel drive) and may be removed or installed by following the procedures provided on page 4-2-6:

BRAKE ASSEMBLY

The drive motor brake assembly may be removed from or installed onto the drive motor as part of the brake disassembly/reassembly procedures. Refer to page 4-4-10.

SERVICE & ADJUSTMENTS

DRIVE MOTOR ASSEMBLY



1.	Woodruff Key	11.	Rear End Cap	20.	Dowel Pin
2.	Drive Pin	12.	Tip Seal Roller	21.	Capscrew
3.	Retaining Ring	12A.	Body Seal Roller	23.	Shaft Seal
4.	Drive Gear	13.	Rotor	24.	Front End Cap
5.	Spacer	14.	Seal Plate	25.	Displacement Housing
6.	Retaining Ring	15.	Abutment Valve	26.	Retaining Ring
7.	Bearing Race	16.	Needle Bearing	27.	Gear Pinion
8.	Thrust Bearing	17.	Step Bearing	28.	Splined Shaft (13T)
9.	Needle Bearing	18.	O-Ring	29.	Retaining Ring
10.	Oil Seal	19.	Backup Ring	30.	O-Ring

SERVICE & ADJUSTMENTS

DRIVE MOTOR

Drive Motor Removal for Disassembly

1. Before removing the motor from the system, clean as much debris off from the exterior as possible. The area around the ports is most important. Upon disconnecting plug the ends of the hydraulic lines to prevent contamination of the system.

2. Remove the woodruff key (1) and then carefully remove all burrs from the shaft. Make sure there are no sharp corners around the keyway, this will prevent the shaft seal from being cut upon removal of the end cap. If there is any rust present, remove it using 180 grit emery cloth.

Tools Required for Disassembly

1. Soft face hammer or mallet.

2. Torque wrench with at least 50 ft. lbs. capacity.

3. 5/16" Allen wrench adaptable to torque wrench.

4. No. 03 internal snap ring pliers.

5. 3/16" Allen wrench for gear cover.

6. A bench vise. Note that the disassembly and assembly instructions are based on the assumption that a bench vise is used.

Drive Motor Disassembly

1. Place rear end cap (11) of the motor in vise, so that the front end cap (24) is on top. Tighten the vise enough to prevent motor from rocking out. **Excessive** clamping pressure could damage the inlet and outlet ports. Normally the standard jaws will not contact spotface of ports.

2. Unfasten the nine capscrews (21) holding the end caps and housing together. Remove the capscrews completely from the assembly.

3. Using a soft-faced hammer or mallet, tap upward on the ear of the front end cap (24). By putting the heel of your hand over the splined shaft (28) and your fingers on the opposite ear you can keep the front end cap (24) from falling back down after each tap.

   When you get beyond the dowel pin (20) engagement there should be no further requirement for the hammer. Simply lift the end cap off of the assembly.

4. Removal of the displacement housing (25), the dark center portion of the assembly, is carried out similar to step 3. There are two scallops "cutouts" in the rear end cap (11). It is this area that you tap to remove the housing. **Do not** ever use a screwdriver or pinch bar to remove this part. It is extremely easy to damage the end cap faces. The dowel pins will remain in the displacement housing (25).

   NOTE: The remaining steps may be performed on the bench.

5. Remove seal plates (14).

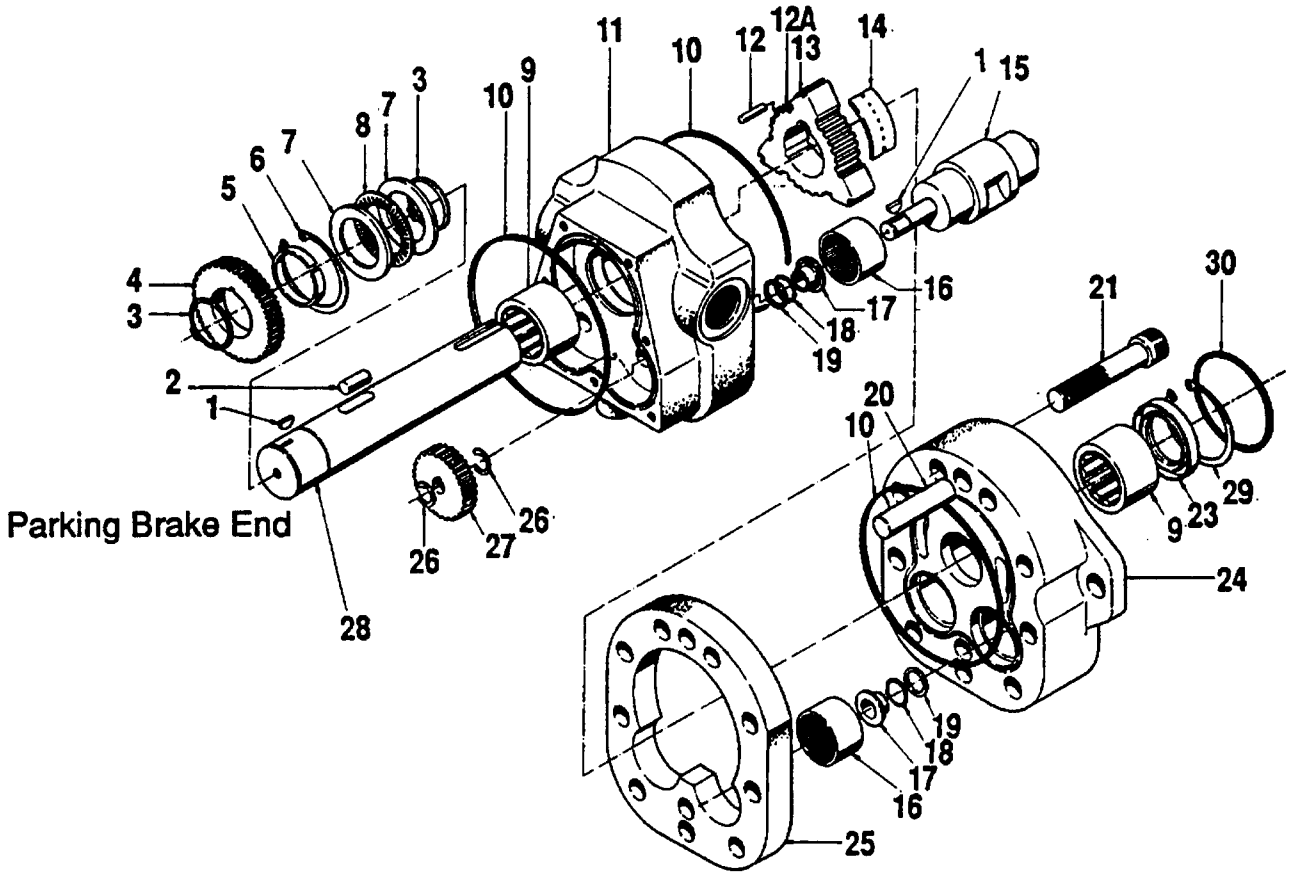
6. Remove seal rollers (12) and (12A). There are two sizes, the seal rollers (12) in the rotor tip are about 1/32nd inch in diameter larger than the seal rollers (12A) behind the seal plates.

7. Remove the seven socket head capscrews holding the brake or Model Code and Serial No. end plate to the rear end cap (11).

8. The previous step exposed a set of pinion gears (27). Before removing mark them as shown on the following page. The two small gears should also be marked left and right.

SERVICE & ADJUSTMENTS

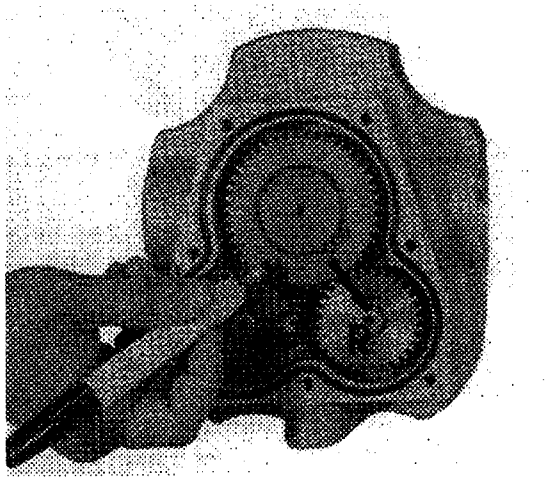
DRIVE MOTOR ASSEMBLY



1.	Woodruff Key	11.	Rear End Cap	20.	Dowel Pin
2.	Drive Pin	12.	Tip Seal Roller	21.	Capscrew
3.	Retaining Ring	12A.	Body Seal Roller	23.	Shaft Seal
4.	Drive Gear	13.	Rotor	24.	Front End Cap
5.	Spacer	14.	Seal Plate	25.	Displacement Housing
6.	Retaining Ring	15.	Abutment Valve	26.	Retaining Ring
7.	Bearing Race	16.	Needle Bearing	27.	Gear Pinion
8.	Thrust Bearing	17.	Step Bearing	28.	Splined Shaft (13T)
9.	Needle Bearing	18.	O-Ring	29.	Retaining Ring
10.	Oil Seal	19.	Backup Ring	30.	O-Ring

SERVICE & ADJUSTMENTS

DRIVE MOTOR



9. Remove the retaining rings (3) and (26) securing the gears, remove the gears and the rear retaining rings (26) from the abutement valves (15).

10. Turn the rotor (13) until the paddle end leaves an abutment valve (15) cavity. By positioning the rotor this way you can lift out the abutment valve. Repeat this procedure for the other abutment valve (15).

11. Lift the rotor (13) up, to expose the drive pin (2) and remove it.

13. Remove the retaining ring (6) securing the splined shaft (28), thrust bearing (8) and bearing races (7).

14. Remove the splined shaft (28) from the rear end cap (11).

14. The step bearing (17) that remains in the front end cap should be taken out and inspected. There is an o-ring (18) and backup ring (19) under this part.

15. Check all mating metal-to-metal parts for scratches or burrs which could cause leakage. Replace all parts on which excessive damage is found. Use the following procedure to be sure that all these surfaces are perfectly smooth:

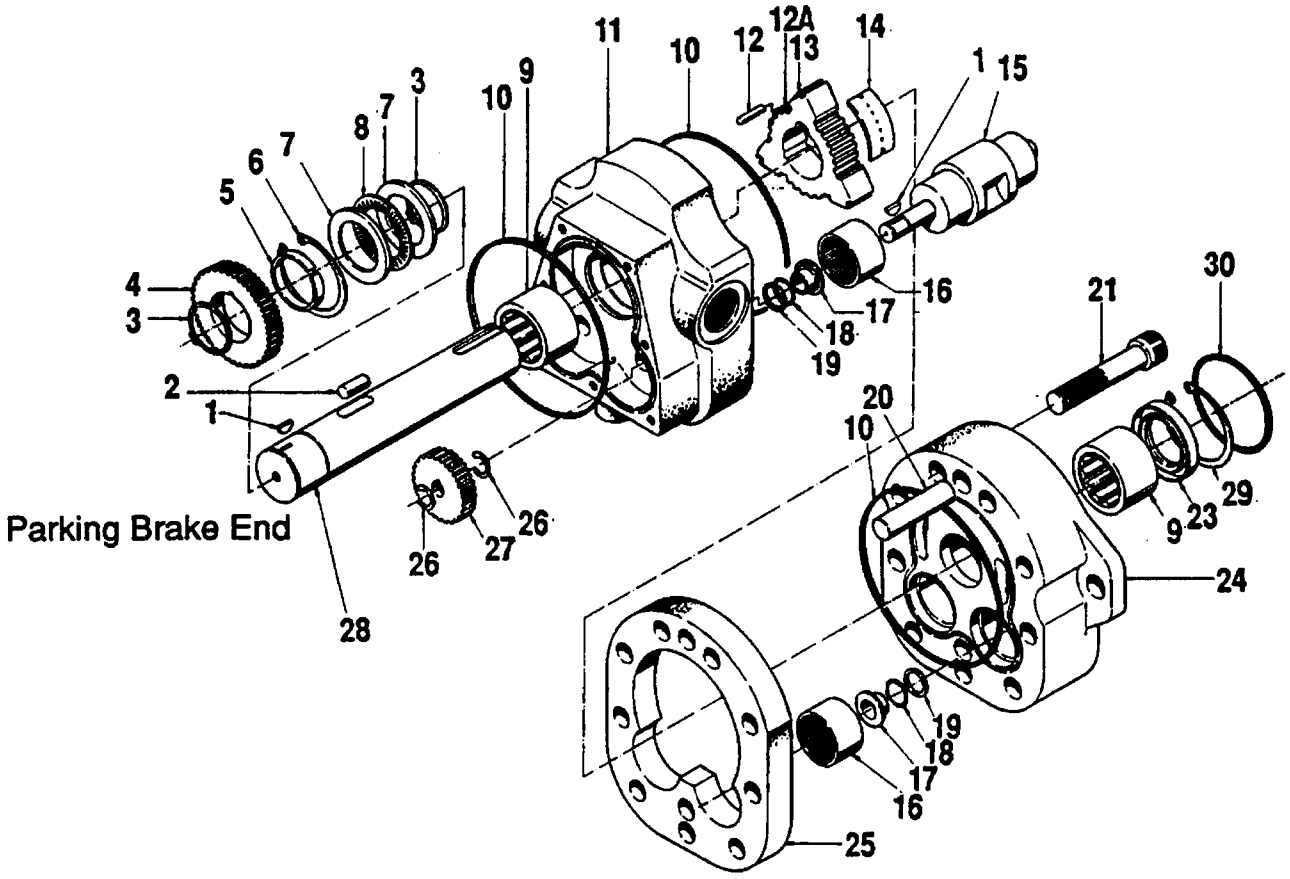
    Place a piece of 240 grit paper on a flat, smooth surface.

    Place the part on the grit paper and stroke gently in a figure eight motion several times. Excessive removal of material should not be done as the parts may not reassemble with proper clearance.

16. Clean all parts in solvent and let them air-dry. All o-rings and shaft seals should be replaced. If conditions are such that you have to use the old seals they should be washed in a mild soap and water solution.

SERVICE & ADJUSTMENTS

DRIVE MOTOR ASSEMBLY



1.	Woodruff Key	11.	Rear End Cap	20.	Dowel Pin
2.	Drive Pin	12.	Tip Seal Roller	21.	Capscrew
3.	Retaining Ring	12A.	Body Seal Roller	23.	Shaft Seal
4.	Drive Gear	13.	Rotor	24.	Front End Cap
5.	Spacer	14.	Seal Plate	25.	Displacement Housing
6.	Retaining Ring	15.	Abutment Valve	26.	Retaining Ring
7.	Bearing Race	16.	Needle Bearing	27.	Gear Pinion
8.	Thrust Bearing	17.	Step Bearing	28.	Splined Shaft (13T)
9.	Needle Bearing	18.	O-Ring	29.	Retaining Ring
10.	Oil Seal	19.	Backup Ring	30.	O-Ring

SERVICE & ADJUSTMENTS

DRIVE MOTOR

Drive Motor Assembly

1. Install splined shaft (28) with thrust bearing (8) and bearing races (7) through the back of the rear end cap (11).

2. Install retaining ring (6) to retain shaft.

3. Put spacer (5) over shaft end, and assemble the drive gear (4) onto the shaft.

4. Install retaining ring (3) to secure the gear.

5. Turn the sub-assembly and set it on the rear cover face. Install new backup ring (19) and o-ring (18) and install one abutment valve (15). A light film of oil should be applied to all new seals prior to installing.

6. Reinstall the round drive pin (2) in the key way of the splined shaft (28) and slip rotor (13) over pin (2).

7. Set the motor sub-assembly on its side, install one of the abutement valves (15) and install a retaining ring (26) to secure it.

8. Install the woodruff key (1) and the gear pinion (27) onto the shaft of the abutement valve (15) and align the timing marks between the two gears.

9. Rotate the splined shaft (28) so the second abutment valve (15) can be installed. Align the timing marks as in the previous step. Rotate the splined shaft (28) one complete revolution to ensure that it is timed correctly. NOTE: When properly timed, the tip of the paddles of the rotor (13) should pass directly through the center of the cavity in the abutment valves (15).

10. Install the retaining rings (26) to secure the gear pinions (27) to the abutement valves.

10. Set the assembly back on the rear cover (11) face. Install the seal plates (14) and seal rollers (12) and (12A) in the rotor (13).

11. Place a new oil seal (10) in the groove of each end cap (11) and (24). Apply a light film of grease to keep them from slipping out of the groove.

12. Install the displacement housing (25) on onto the rear end cap (11). If binding occurs take a soft faced hammer and tap on the housing to free it.

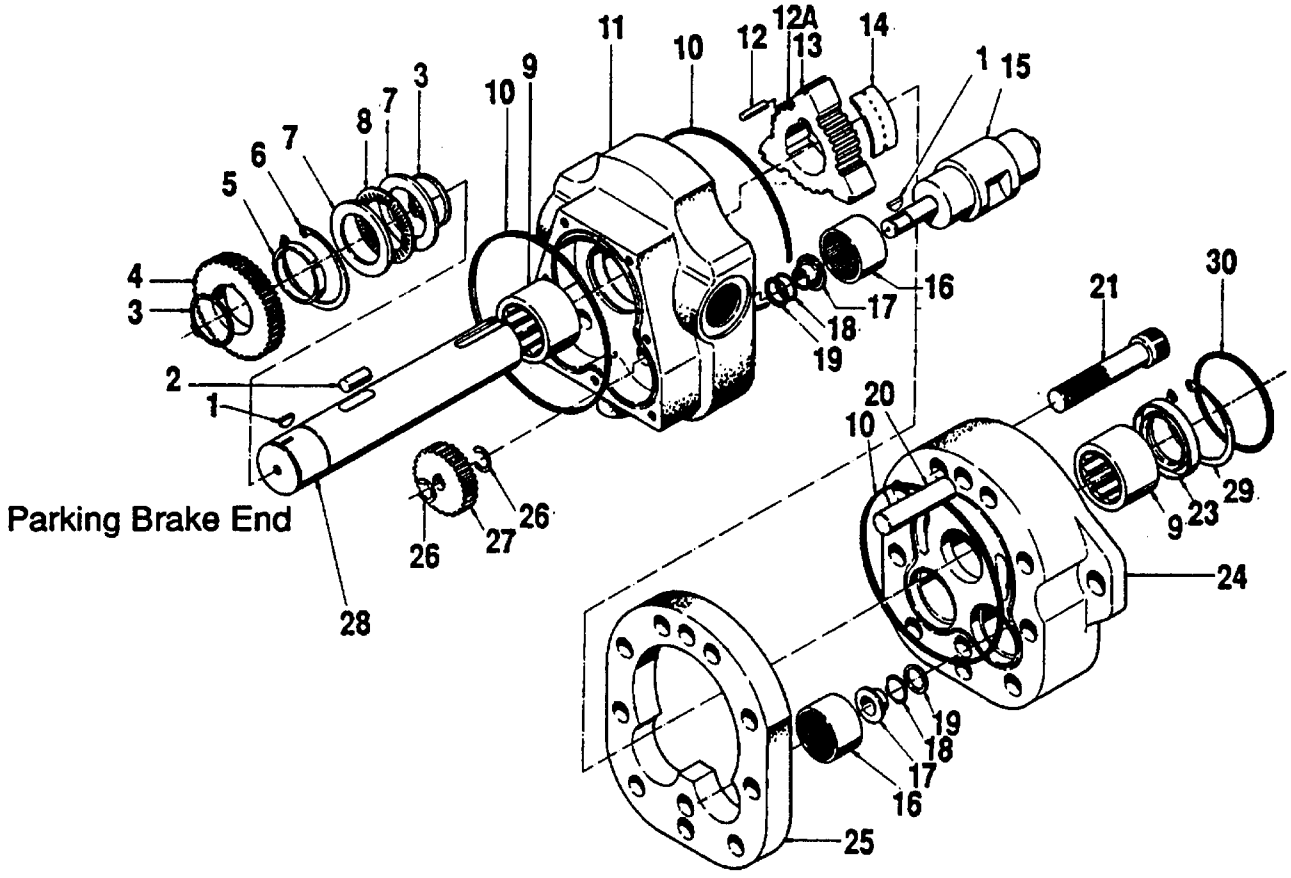
13. Install a new o-ring (18) and backup ring (19) in the front end cap (24). Put the step bearing (17) in place and install the front end cap (24) onto the motor sub-assembly. Tap lightly with a soft face hammer to seat the front end cap.

14. Set the body capscrews (21) in place and torque to 500 in. lbs. (56 N•m).

15. Reinstall the brake or Model Code and Serial No. end plate to the rear end cap (11). Ensure that the oil seal (10) stays in place.

SERVICE & ADJUSTMENTS

DRIVE MOTOR ASSEMBLY



1.	Woodruff Key	11.	Rear End Cap	20.	Dowel Pin
2.	Drive Pin	12.	Tip Seal Roller	21.	Capscrew
3.	Retaining Ring	12A.	Body Seal Roller	23.	Shaft Seal
4.	Drive Gear	13.	Rotor	24.	Front End Cap
5.	Spacer	14.	Seal Plate	25.	Displacement Housing
6.	Retaining Ring	15.	Abutment Valve	26.	Retaining Ring
7.	Bearing Race	16.	Needle Bearing	27.	Gear Pinion
8.	Thrust Bearing	17.	Step Bearing	28.	Splined Shaft (13T)
9.	Needle Bearing	18.	O-Ring	29.	Retaining Ring
10.	Oil Seal	19.	Backup Ring	30.	O-Ring

SERVICE & ADJUSTMENTS

DRIVE MOTOR

Drive Motor Shaft Seal Replacement

1. Clamp the motor in a vise and remove the woodruff key (1) and all burrs or sharp edges which may have developed. Use 400 grit emery cloth to remove all rust from the shaft (28).

2. Remove the retaining ring (29).

3. Remove the front end cap (24) as in steps 1 through 3 of the "Disassembly Procedure".

4. Turn front end cap (24) face down. Use a large screwdriver blade inserted behind the seal (23) and proceed to pound it out, alternating from side to side so as not to damage the bore.

5. The new seal (23) must be installed without cocking it. The best procedure is to obtain a short piece of tubing or pipe with a sufficiently large enough diameter to contact the outer shell of the seal. If the tubing is too small it will damage the seal.

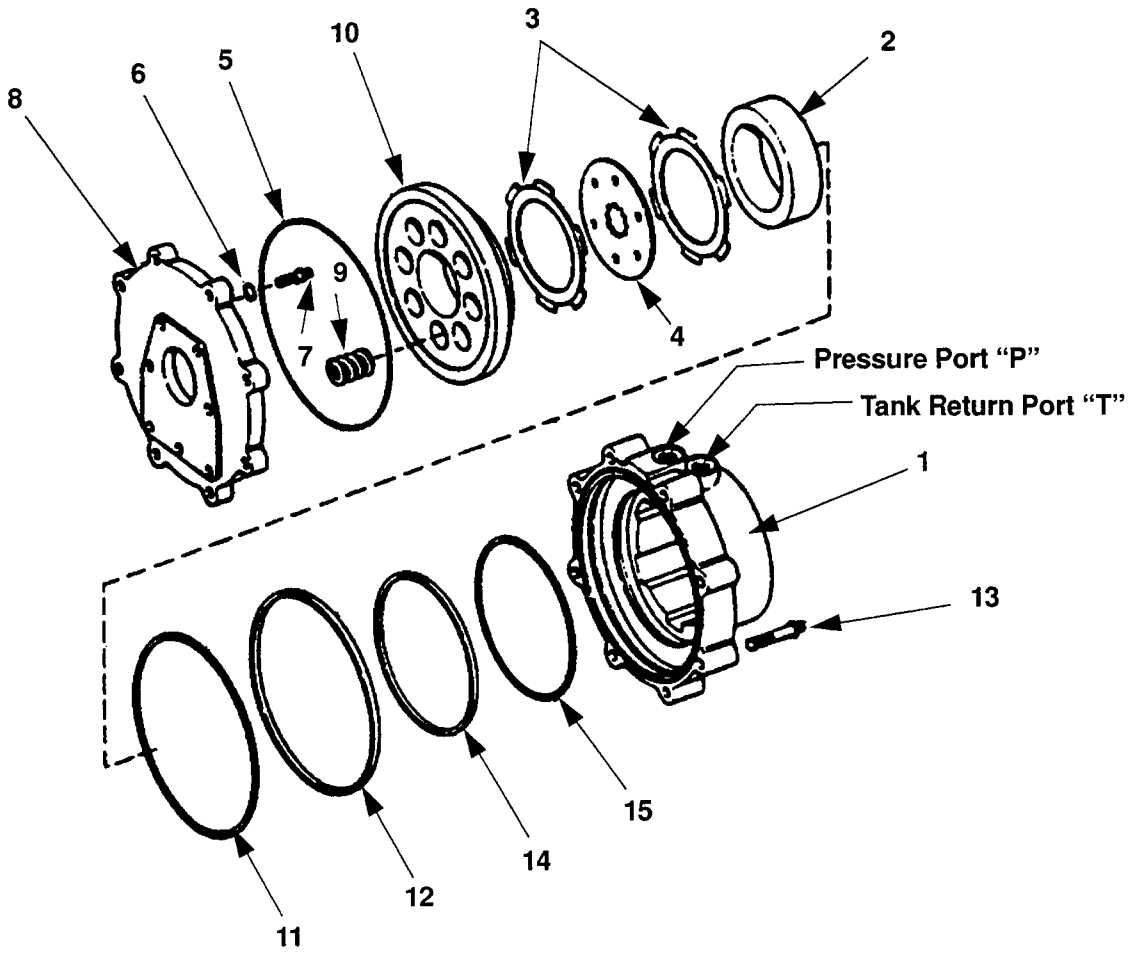
6. Press the seal (23) in just below the lip of the bore in the front end cap (24). Set the retaining ring (29) on top of the seal (23) and finish pressing the seal into the front end cap (24). When the retaining ring (29) snaps into the groove the seal (23) is properly seated.

7. Apply a thin film of grease to the lip of the new seal (23), Slide over shaft to face of end cap.

8. Replace the front end cap sub-assembly, install the body bolts and torque them to 500 in. lbs. (56 N•m).

SERVICE & ADJUSTMENTS

PARKING BRAKE ASSEMBLY



1. Housing
2. Spacer
3. Friction Disc (Qty 5)
4. Driver Plate (Qty 4)
5. O-Ring
6. Brass Washer
7. Socket Head Capscrew
8. Adapter Plate
9. Die Spring
10. Pressure Plate
11. Back-Up Ring
12. O-Ring
13. Socket Head Capscrew
14. O-Ring
15. Back-Up Ring

SERVICE & ADJUSTMENTS

PARKING BRAKE

Tools Required

1. 1/4" Allen wrench.

   NOTE: If it is necessary to remove adapter plate (8), a 3/16" allen wrench and centering fixture will be required. Consult the factory.

Parking Brake Disassembly

1. Thoroughly clean the exterior of the drive motor & parking brake assembly and hydraulic lines before attempting removal.

2. Disconnect hydraulic lines and cap them to prevent loss and contamination of hydraulic fluid.

3. Remove the eight socket head capscrews (13), and separate the brake housing (1) from the adapter plate (8). Discard o-ring (5).

4. Remove remaining brake components.

   (Compressed air can be used to remove the brake piston (10) by applying a maximum of 80 PSI to the "P" port. **PLEASE NOTE:** If compressed air is used precautions must be taken to retain piston so as to eliminate the possibility of injury!)

5. Remove the back-up rings (11 & 15) and o-rings (12 & 14) from the housing (1).

6. If necessary remove the adapter plate (8) from the motor, by removing the seven capscrews (7). Discard the brass washers beneath the capsrews

7. Clean all components in solvent and allow to air dry.

8. Inspect all components for wear and damage. Replace components unfit for service. Note quantities of friction discs (3) and driver plates (4) in the illustration on the adjoining page.

Parking Brake Reassembly

1. If the adapter plate (8) has been removed, reassemble onto the motor. Install capscrews (7) with brass washers (6) and torque to 150 in. lbs. (17 N•m).

2. Install new o-rings (12 & 14) and back-up rings (11 & 15) in the housing (1) as shown. Make sure the ends of the back-up rings are flush and not overlapped.

3. Lubricate all components with clean hydraulic fluid.

4. Position the spacer (2) in the housing (1).

5. Locate friction disc (3) in the housing; then a driver plate (4); then another friction disc (3); and so on, making sure driver plate splines are aligned.

6. Carefully install the pressure plate (10) in the housing (1) so as not to damage the o-rings (12) & (14). Place the eight die springs (9) in the pressure plate (10).

7. Position a new o-ring (5) in the housing using a little grease to hold it in place.

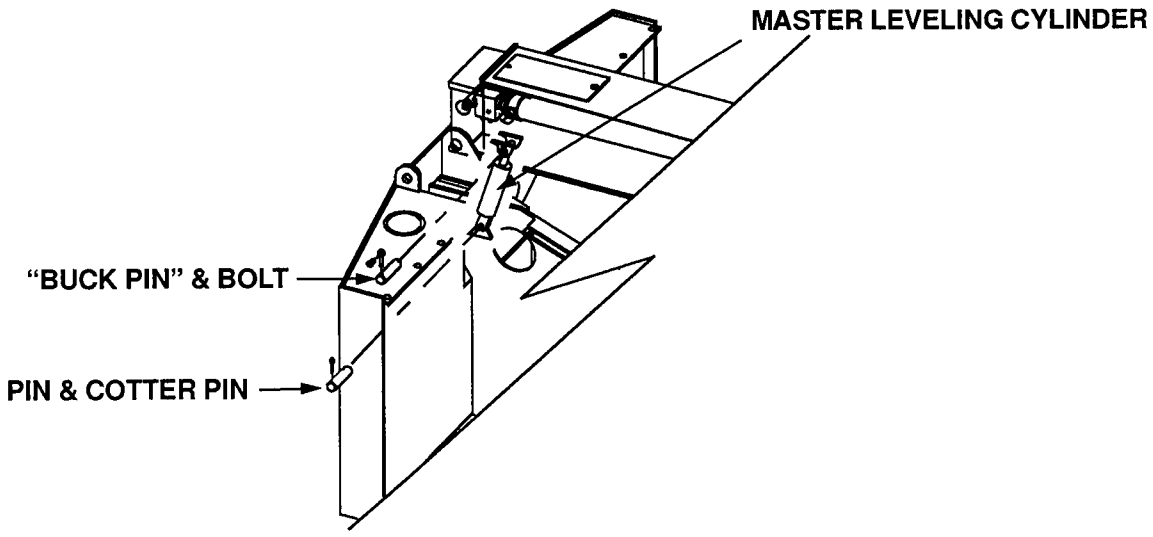
8. Assemble the motor onto the brake by twisting it carefully to engage the splined motor shaft with the plate drivers (4).

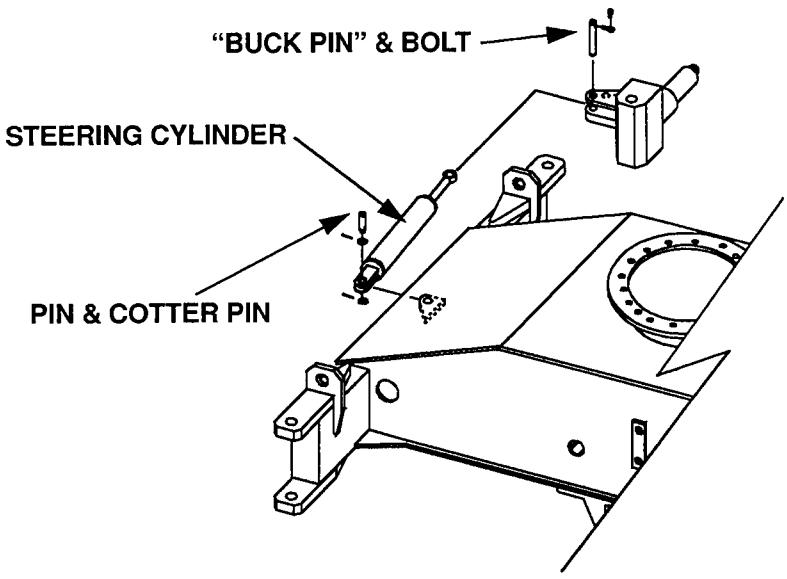
9. Secure the housing to the adapter plate with the eight capscrews (13) and torque them to 300 in. lbs. (34 N•m).

10. Connect the hydraulic lines and test the brake for operation and leaks.

SERVICE & ADJUSTMENTS

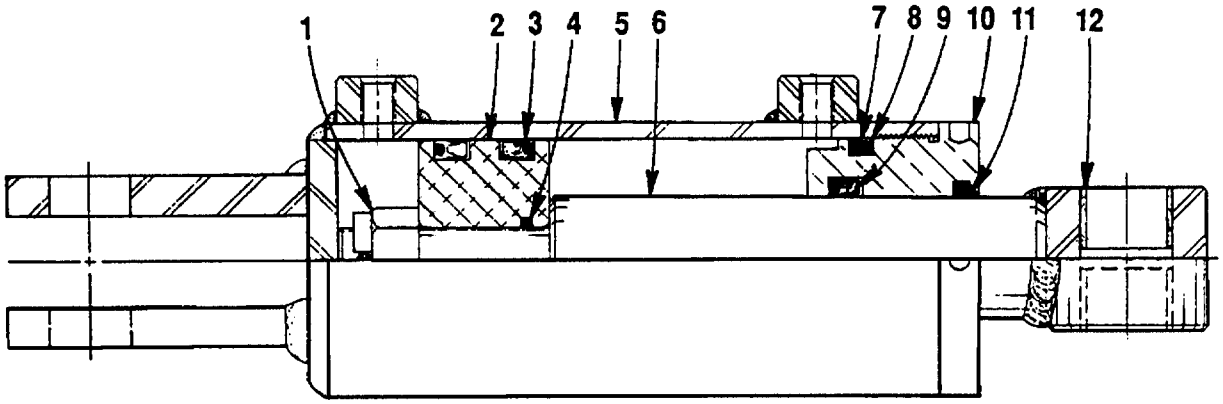
STEERING CYLINDER AND MASTER LEVELING CYLINDER





SERVICE & ADJUSTMENTS

STEERING CYLINDER AND MASTER LEVELING CYLINDER



1. Piston Nut
2. Piston
3. Seal, Polypak
4. O-Ring
5. Barrel
6. Piston Rod
7. O-Ring
8. Back-Up Washer
9. Seal, Polypak (Type B)
10. Head Gland
11. Wiper
12. Bushing

SERVICE & ADJUSTMENTS

STEERING CYLINDER AND MASTER LEVELING CYLINDER

DISASSEMBLY

Do not tear down a cylinder unless no other maintenance procedure can correct the problem. All overhaul, or new cylinder installation, should be done in a clean, dust free atmosphere with all ports plugged until the hose connections are made.

1. The cylinders have a one-piece head gland design which will allow removal of the head gland with a dace type spanner wrench. *NOTE: If a spanner is not available, a chain wrench may be used by wrapping it around the outside of the head gland shoulder.*

IMPORTANT: The head gland should unscrew freely. If, after several turns, a blind is noticed, STOP; DO NOT FORCE THE THREADS. Place a "C" clamp over the threaded end of the barrel in line with the port tube. Gradually draw down the "C" clamp until the head gland can be unscrewed easily. The reason for an occasional bind is due to the fact that the heat generated from welding of the port tube to the case may cause a slight barrel concentricity. This most generally occurs when the cylinder has been in service for only a short period of time. Extended service stress relieves the weld and improves concentricity. This same procedure can be used in reassembly of a bind occurs when installing the head gland.

2. To remove the piston from the shaft, remove the piston nut (1). The piston (2) can then be bumped off the shaft by using the head gland (10) as a bumper.

INTERNAL INSPECTION AND PARTS REPLACEMENT:

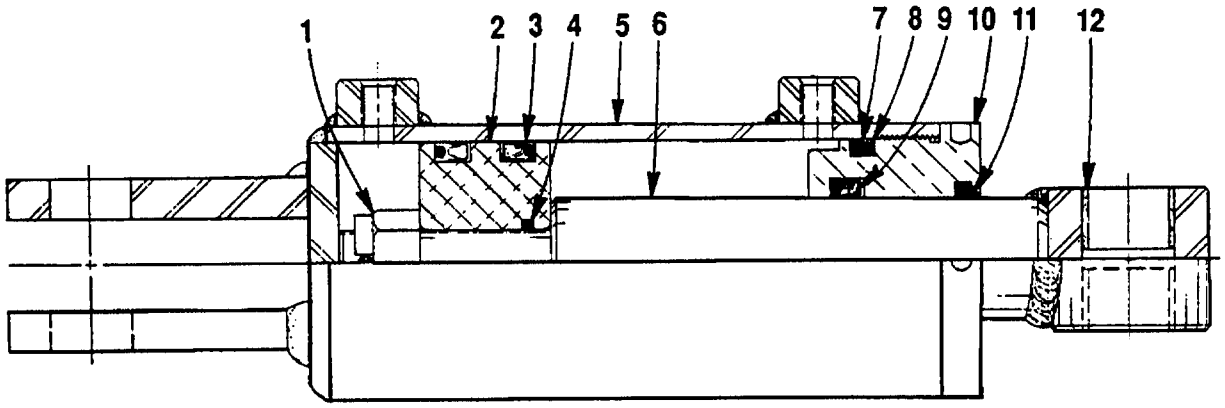
1. The cylinder bore should be thoroughly washed with solvent or diesel fuel and carefully inspected for signs of "scoring" or deep scratches. In the event of any defects in the cylinder case bore, the entire cylinder should be reassembled and contact made with your distributor. Cylinders with this type of damage are generally caused by foreign material in the hydraulic system and there is no satisfactory method of repairing this type damage in the field.

2. The cylinder shaft should be carefully washed and inspected for damage such as dents. deep scratches, damaged chrome plating, ETC. All sharp edges on BOTH ends of the shaft should be removed with a fine file or whetstone to prevent damage to the seals during assembly. Should the rod show severe damage of any type it should be replaced. The static O-ring seal between the piston and the shaft should be replaced prior to reassembly. The new static O-ring and backup washers should be thoroughly lubricated and installed in the piston.

CAUTION: The cylinder shaft should be carefully handled and protected to prevent scoring, scratching, Etc. NEVER leave exposed shaft where weld splatter or other material could damage the finished surface of the shaft.

SERVICE & ADJUSTMENTS

STEERING CYLINDER AND MASTER LEVELING CYLINDER



1. Piston Nut
2. Piston
3. Seal, Polypak
4. O-Ring
5. Barrel
6. Piston Rod
7. O-Ring
8. Back-Up Washer
9. Seal, Polypak (Type B)
10. Head Gland
11. Wiper
12. Bushing

STEERING CYLINDER AND MASTER LEVELING CYLINDER

3. The piston should be carefully washed and inspected for broken, cracked, or damaged seal grooves. NOTE: If the piston seal is removed for any reason whatsoever, it should be replaced by a new seal since removal will usually damage it beyond use. The new piston seal must be "walked into" the seal groove in the same manner that the bead of a tire is "walked onto" the wheel rim. Prior to installing the piston seal, it should be warmed by hanging it in front of an electric heater or other similar means until it has become reasonably flexible. Also, the piston should be well oiled to aid in this assembly.

4. The cylinder head gland should by thoroughly washed and inspected for any damage: All seals should be removes and replaced.

REASSEMBLY:

Lubricate I.D. of piston assembly and slip onto shaft. Apply Loctite 242 to the threads and then tighten the piston nut to 225 ft. lbs. (306 N•m). Before attempting to install the piston and shaft assembly into the cylinder bore case, both the O.D. of the piston and the mouth of the case should be thoroughly lubricated. The piston should then be gently slipped into the mouth of the case and, as soon as the rings come into contact with the chamber. the other end of the shaft should be wiggled in a circular motion to aid the rings in compressing as they are slipping into the cylinder bore.

CAUTION: most piston ring breakage is due to careless or hasty assembly at this point.

Installation of the head gland (10) is accomplished by first applying Loctite 242 to the threads, and turning, first by hand, then by a spanner wrench into the cylinder case, The head should be tightened securely.

OPERATION:

As soon as the cylinder is ready to be placed into operation, it should be slowly cycled under no-load conditions for several minutes in order to allow the entrapped air within the cylinder to escape to the reservoir and, also to facilitate the reforming of the seals which may have temporarily deformed during shipping, storage, or reassembly. New cylinders may show a slight "drifting" tendency when first used. This is natural, due to one or more of the following items.

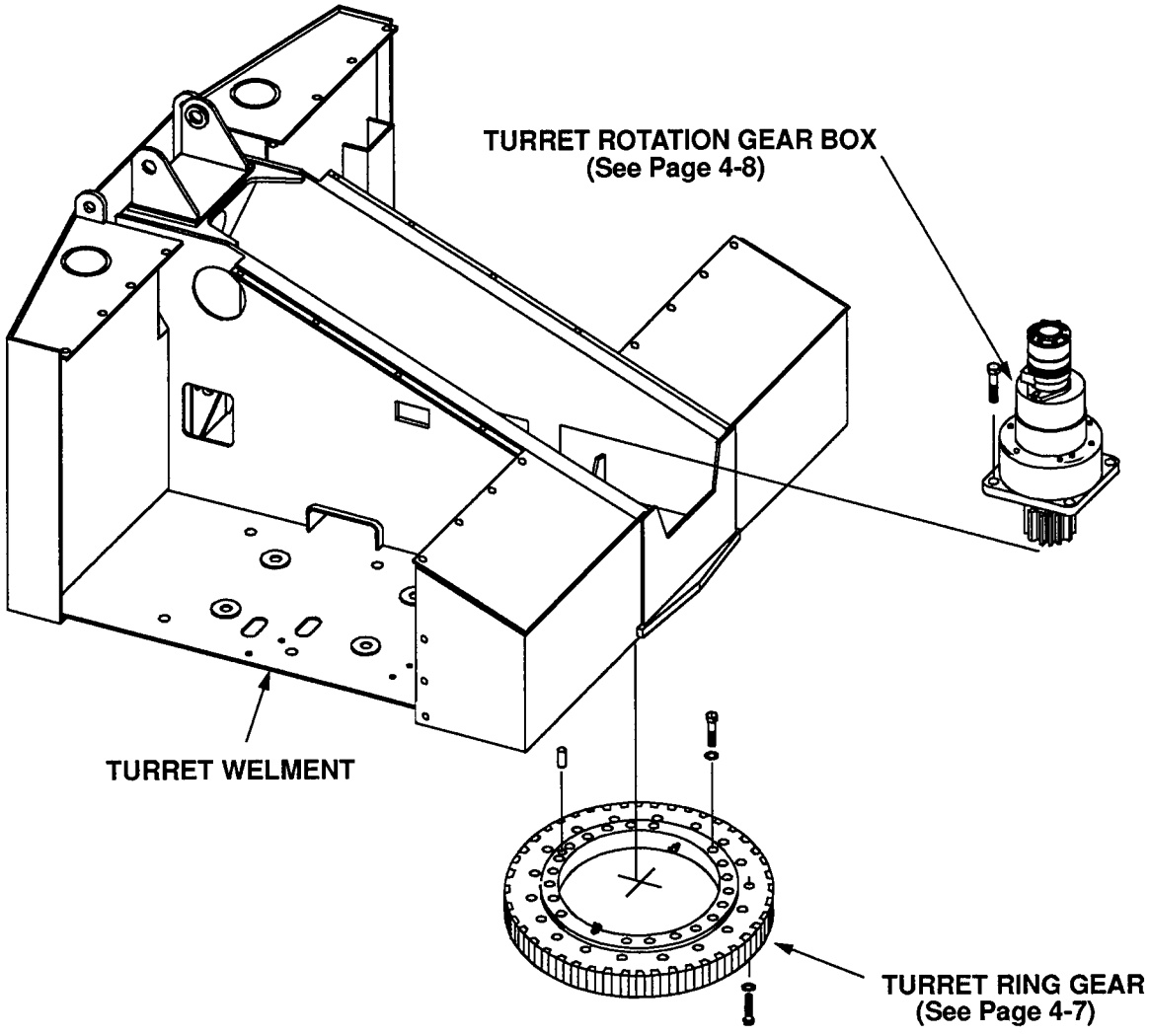
1. Air entrapped in the oil or the cylinder.

2. Seal not yet fully reformed or seated.

"Drifting" should decrease with operation as piston reins and seals "break in" to provide better sealing and the eventual escaping of the trapped air in the oil.

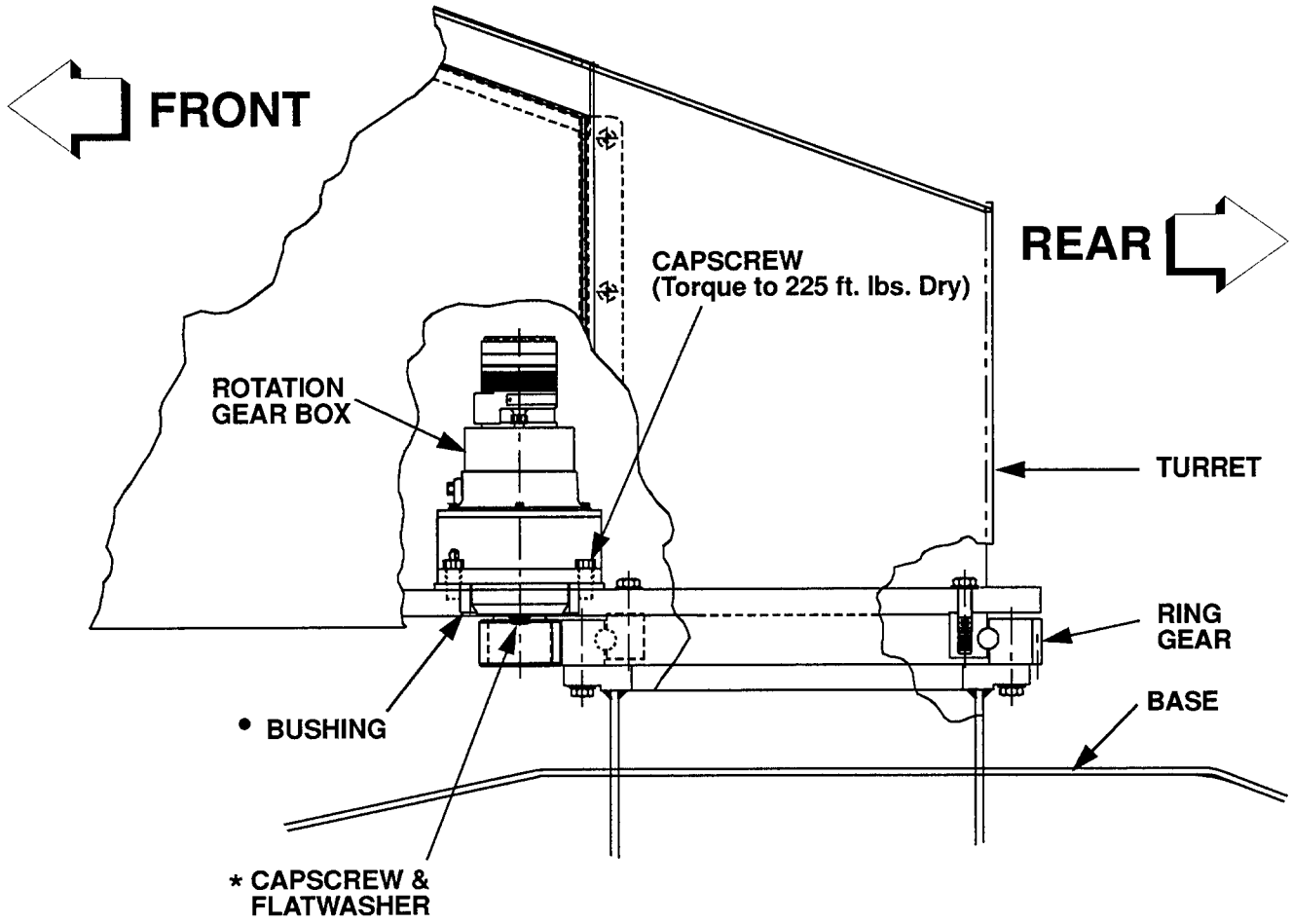
SERVICE & ADJUSTMENTS

TURRET ASSEMBLY



SERVICE & ADJUSTMENTS

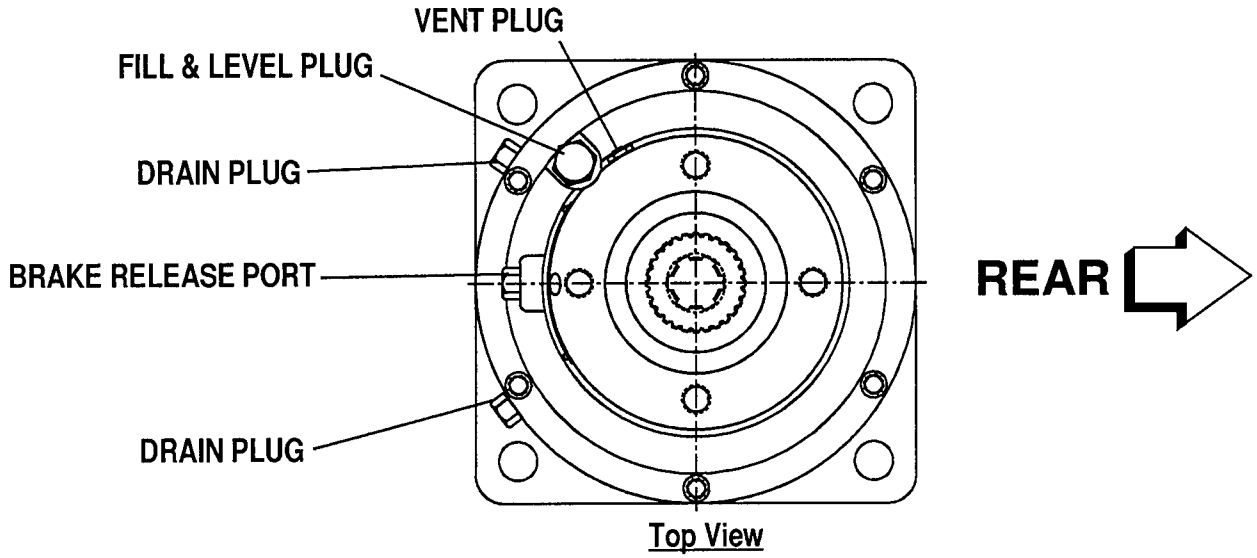
TURRET ASSEMBLY



* USE LOCTITE 242
• USE ANTISEIZE

SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX



MAINTENANCE CHECK

On a monthly basis, check the turret rotation gear box oil level and add oil as needed to maintain a full level.

TURRET ROTATION GEAR BOX ASSEMBLY

The turret rotation gear box assembly may be removed or installed as follows:

ROTATION GEAR BOX REMOVAL

1. Clean outside of the rotation gear box assembly and wipe of all hydraulic fittings.
2. Remove the hydraulic fittings and hoses, noting location of each. Plug all ports.
3. Remove the four retaining capscrews and remove rotation gear box from the turret.

ROTATION GEAR BOX INSTALLATION

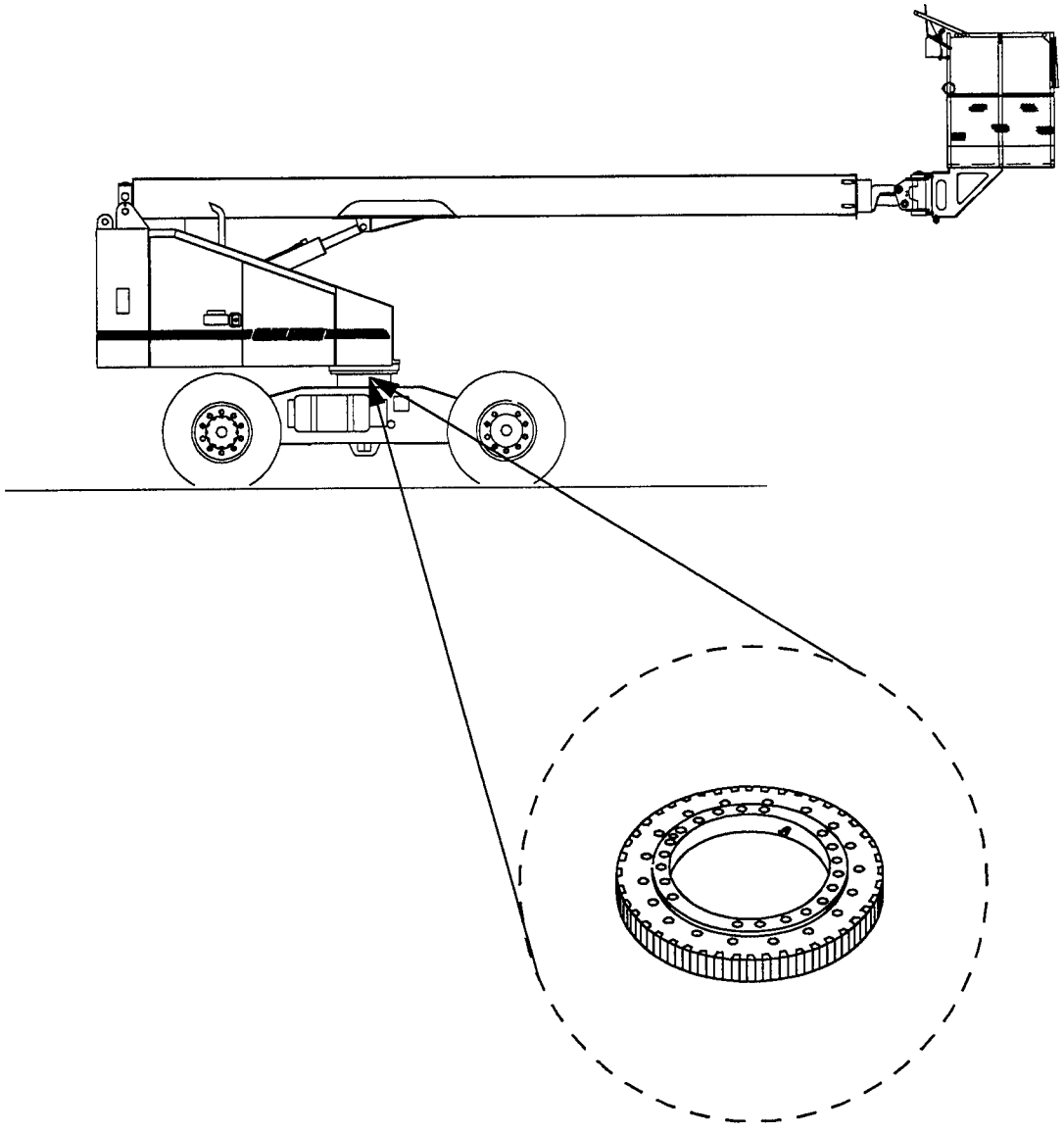
1. Install the rotation gear box as shown above and secure to the turret with the four capscrews. Torque the capscrews to 225 ft. lbs. (306 N•m) dry.

   NOTE: The lower hub of the gear box sets in a bushing that has Antiseize applied to both the I.D. and O.D.. This bushing is retained by two loctited capscrews and flatwashers. See page 4-5-2.

2. Install the hydraulic fittings and hoses.
3. Fill with oil as required. Refer to page 3-3 for lubricant specificatons.

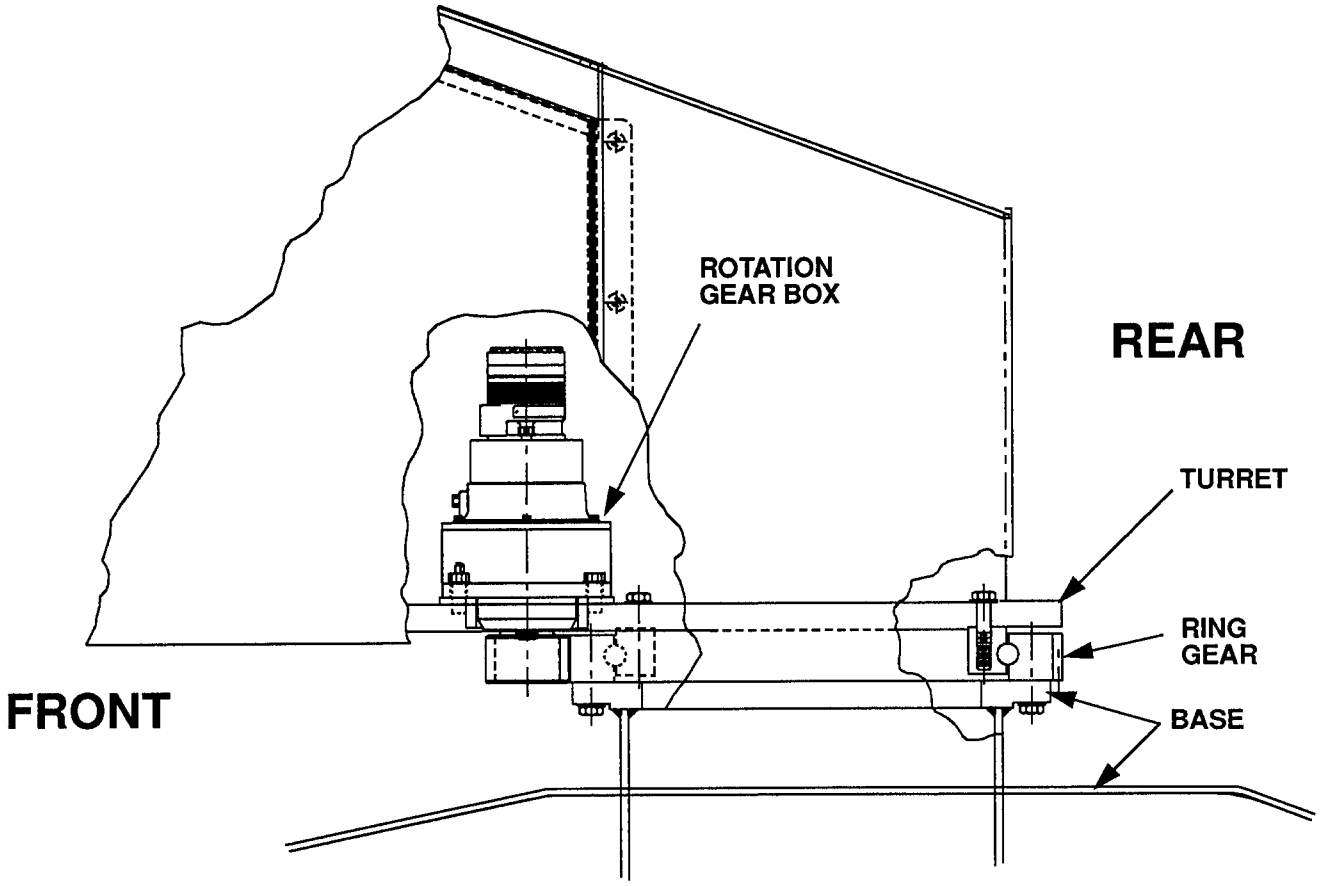
SERVICE & ADJUSTMENTS

TURRET RING GEAR



SERVICE & ADJUSTMENTS

TURRET RING GEAR



MAINTENANCE CHECK

It is very important to perform periodic ring gear bolt checks. The bolts must be kept torque tightened to a rating of 225 ft. lbs. (306 N•m) dry. After the first 200 hours of operation, and every 500 hours thereafter.

RING GEAR TORQUING PROCEDURE

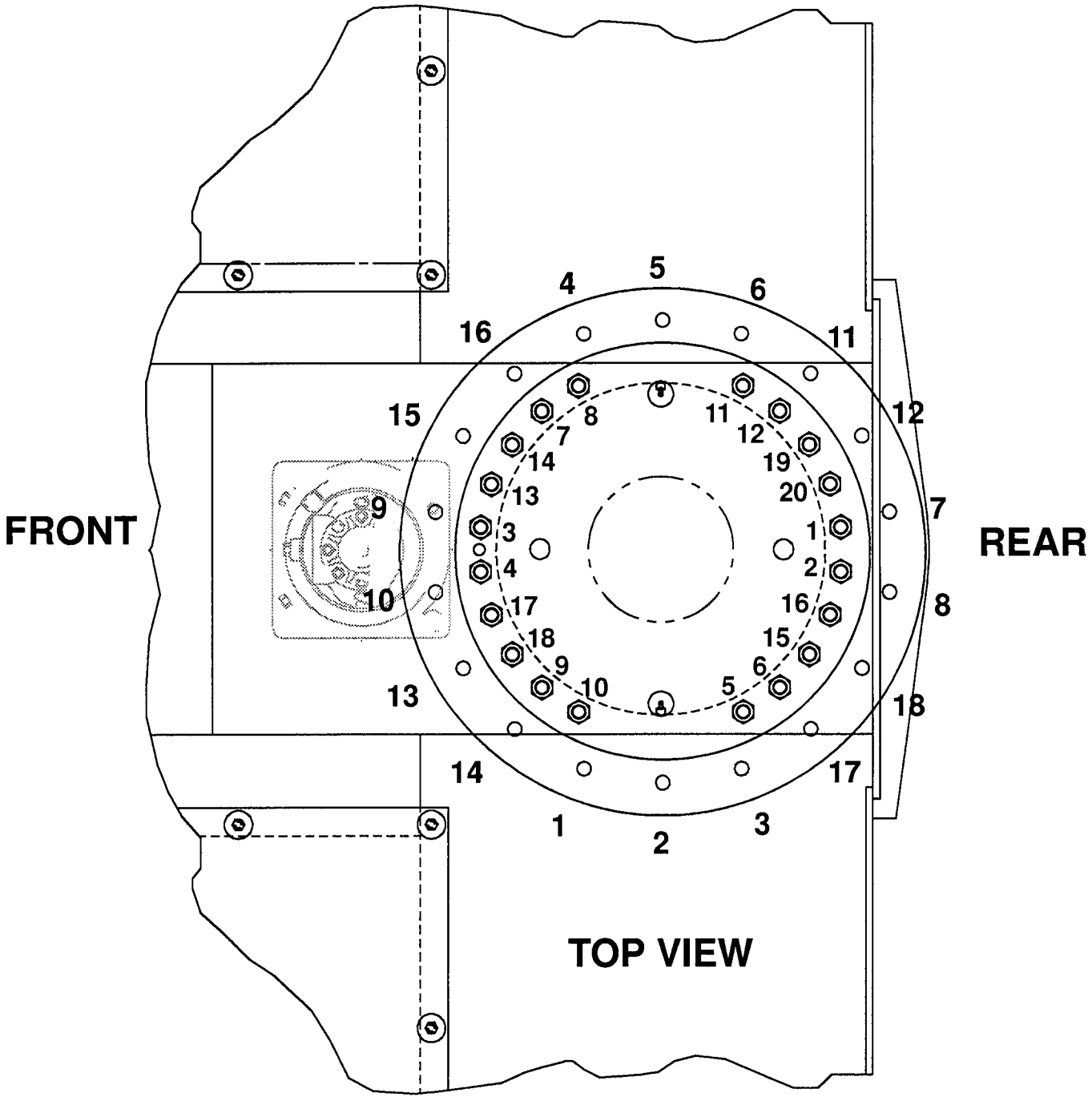
The gear and bearing assembly consists of an inner race and an outer race and ring gear. The inner race is bolted to the turret and the outer race to the base.

A number of causes can reduce tension in the bolts when torquing and after use. These include rust on the threads, damaged or rough threads on bolts or nuts, shanks of bolts which hang up on holes, etc. All of these causes have a tendency to absorb the torque when bolts are being tightened.

Remember, it is important to perform periodic checks of the ring gear bolts. The bolts must be kept toque tightened.

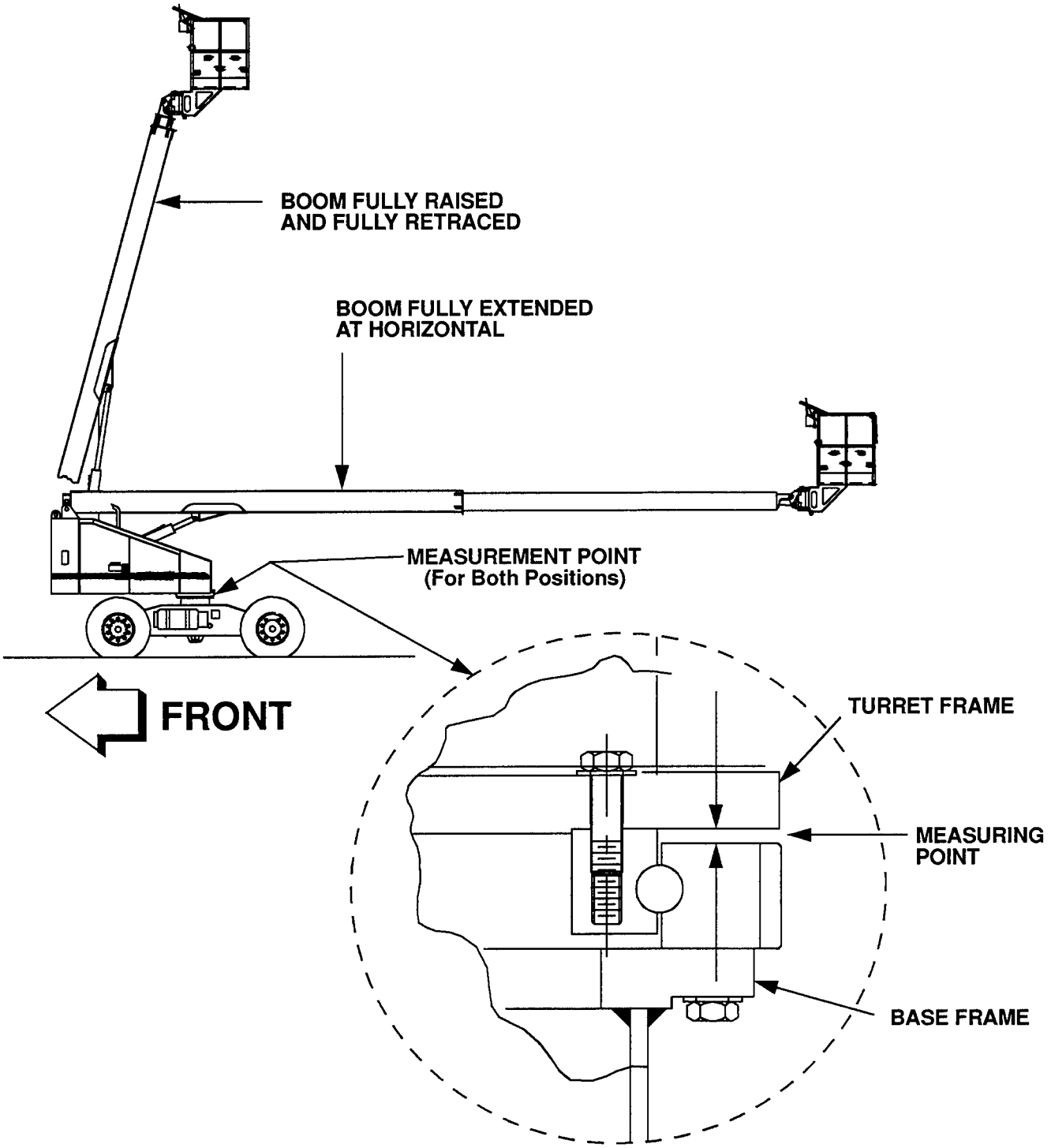
Torque the inner race first, then the outer race as shown in the tightening sequence on the next page. Torque the bolts to 225 ft. lbs. (306 N•m) dry.

RING GEAR BOLT TIGHTENING SEQUENCE



SERVICE & ADJUSTMENTS

RING GEAR WEAR TOLERANCE



RING GEAR WEAR TOLERANCE

RING GEAR BEARING WEAR TOLERANCE

The ring gear and bearing assembly consists of an inner race, an outer race and ring gear, ball bearings, ball spacers and a seal ring.

When the lift is in operation, the inner race will rise above the outer race between no load and full load positions. The amount of this rise is the axial play. This movement is necessary to allow the balls to float and to maintain proper contact in assuming vertical loads. Determine the amount of axial play by measuring the differences between the bottom of the turret and the top of the outer race as follows:

NOTE: The axial play can only be measured accurately if the ring gear bolts are fully torqued. Refer to page 4-7-2 for torquing procedure.

1. With the boom fully raised and fully retracted, measure the distance between the bottom of the turret and the top of the ring gear outer race. Measure the distance at the rear center as shown on page 4-7-3 using a magnetic base dial indicator and record the measurement.

2. With the boom fully extended and horizontal, measure the distance between the bottom of the turret and the top of the ring gear outer race. Again measure the distance at the rear center as shown on page 4-7-3 using a magnetic base dial indicator and record the measurement.

3. Whenever possible it is recommended that these measurements also be taken when a lift is new and recorded for future comparison.

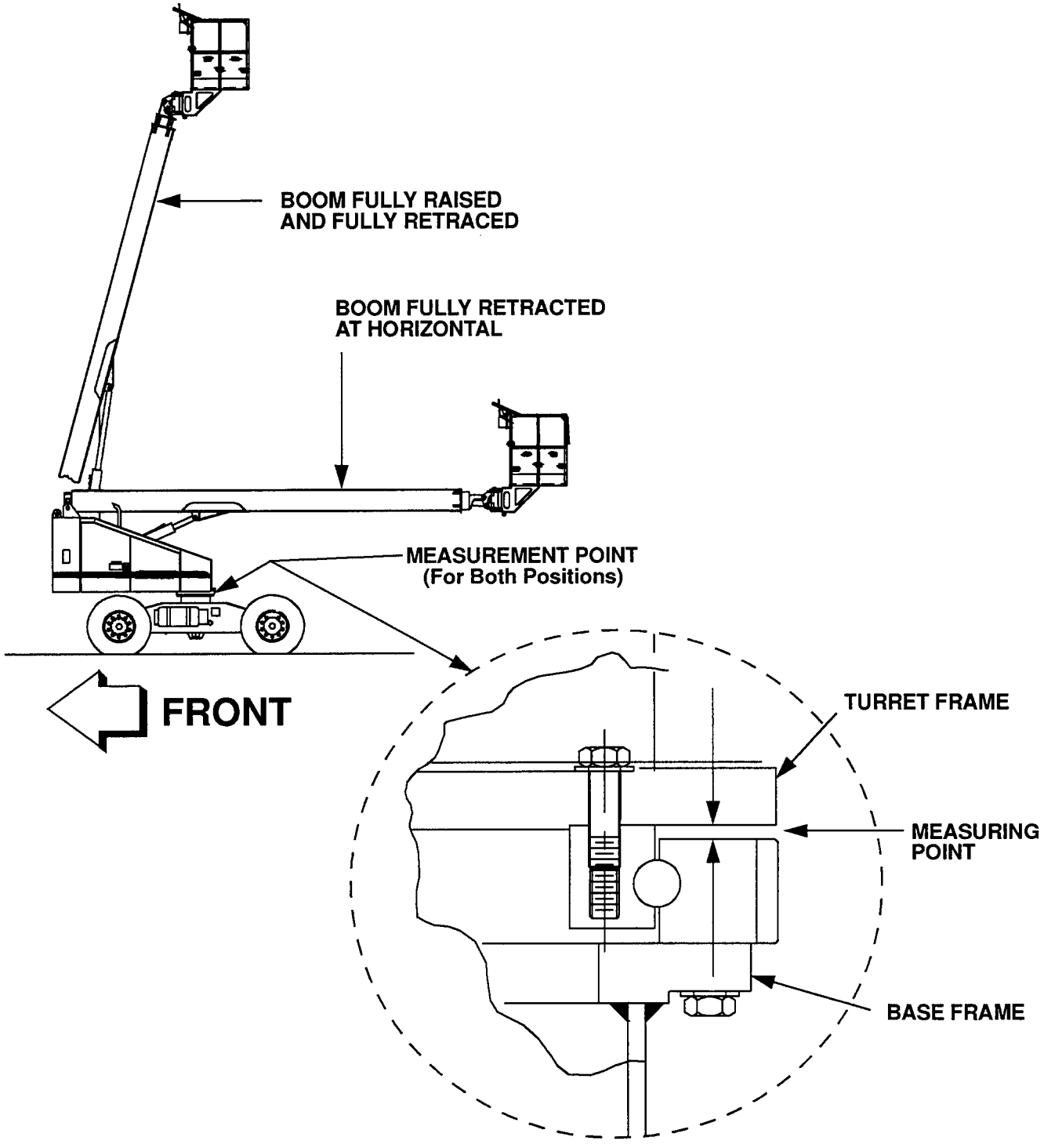
4. Subtract the measurement obtained in step 2 from the measurement obtained in step 1 to determine the difference. This difference is the axial play.

   If the axial play either exceeds.065 or an.035 increase over a new machine's recorded measurement, then bearing replacement "may" be required. When the axial play reaches these maximums it does not necessarily mean the bearing needs replacing. Our recommendation is that, as long as the clearance is less than these values and so long as the bearing rotates smoothly without noise or metal particles in the grease, there is no reason for concern.

If metal particles are found in the grease, or if the swing bearing is noisy (and all other possible malfunctions have been eliminated) consult your dealer or the factory. Any attempt to disassemble the ring gear will automatically void the warranty.

SERVICE & ADJUSTMENTS

RING GEAR REPLACEMENT

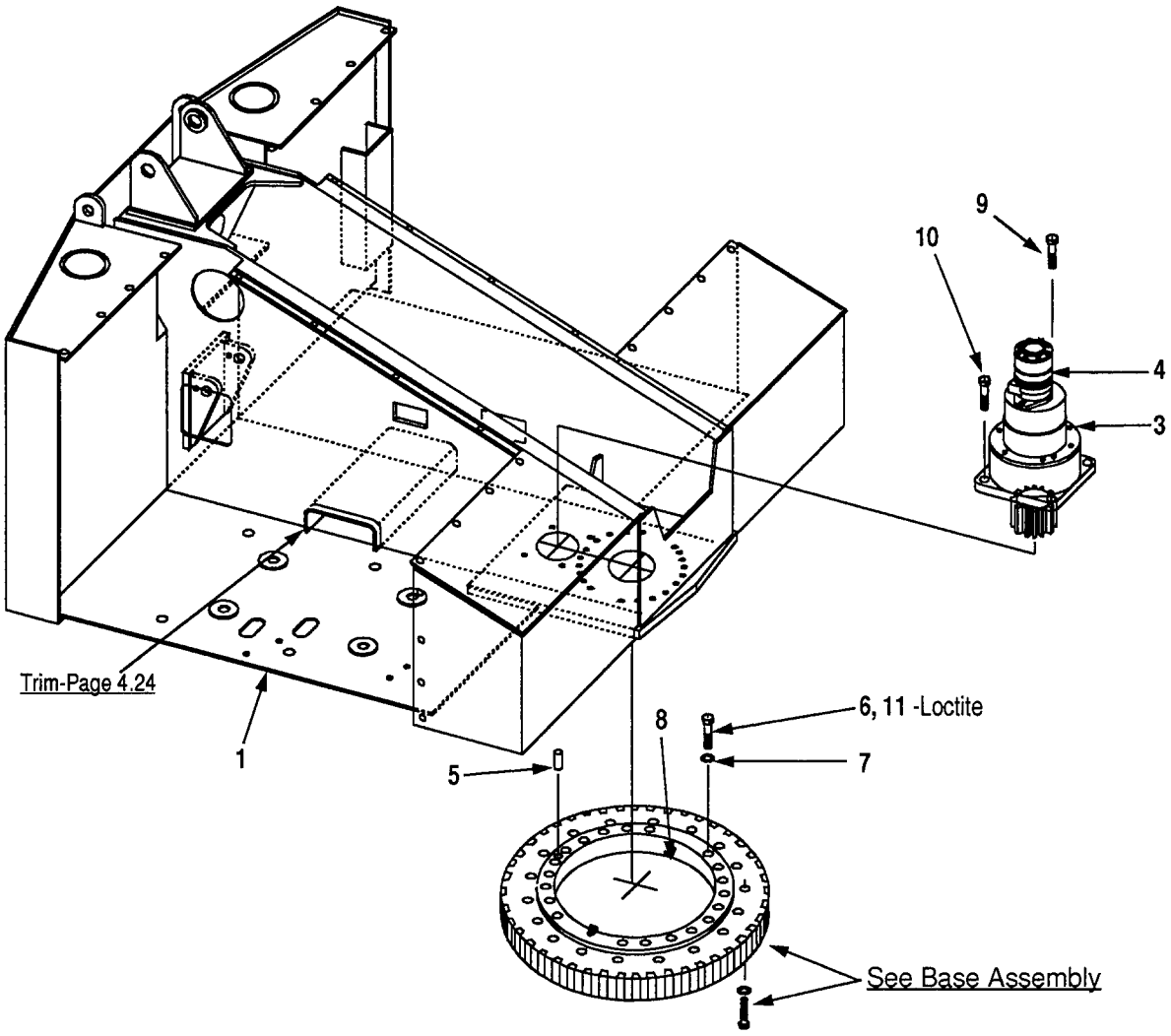


RING GEAR REPLACEMENT

NOT AVAILABLE AT THIS PRINTING

SERVICE & ADJUSTMENTS

RING GEAR REPLACEMENT

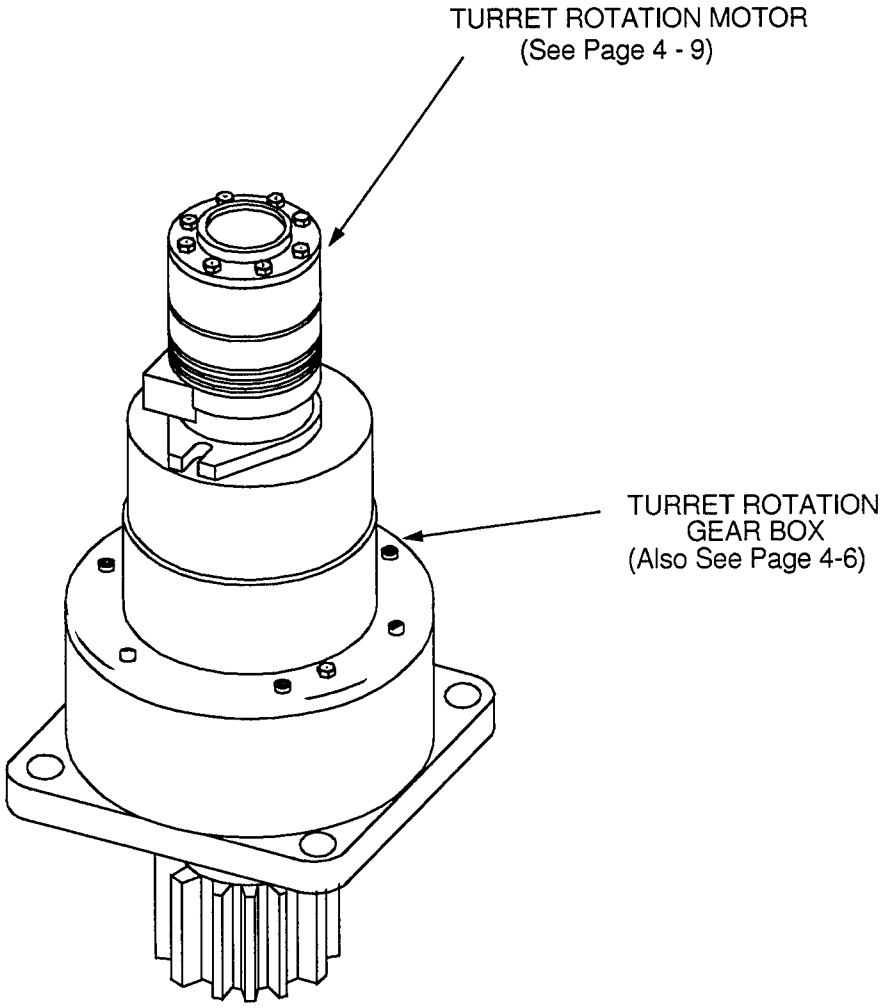


RING GEAR REPLACEMENT

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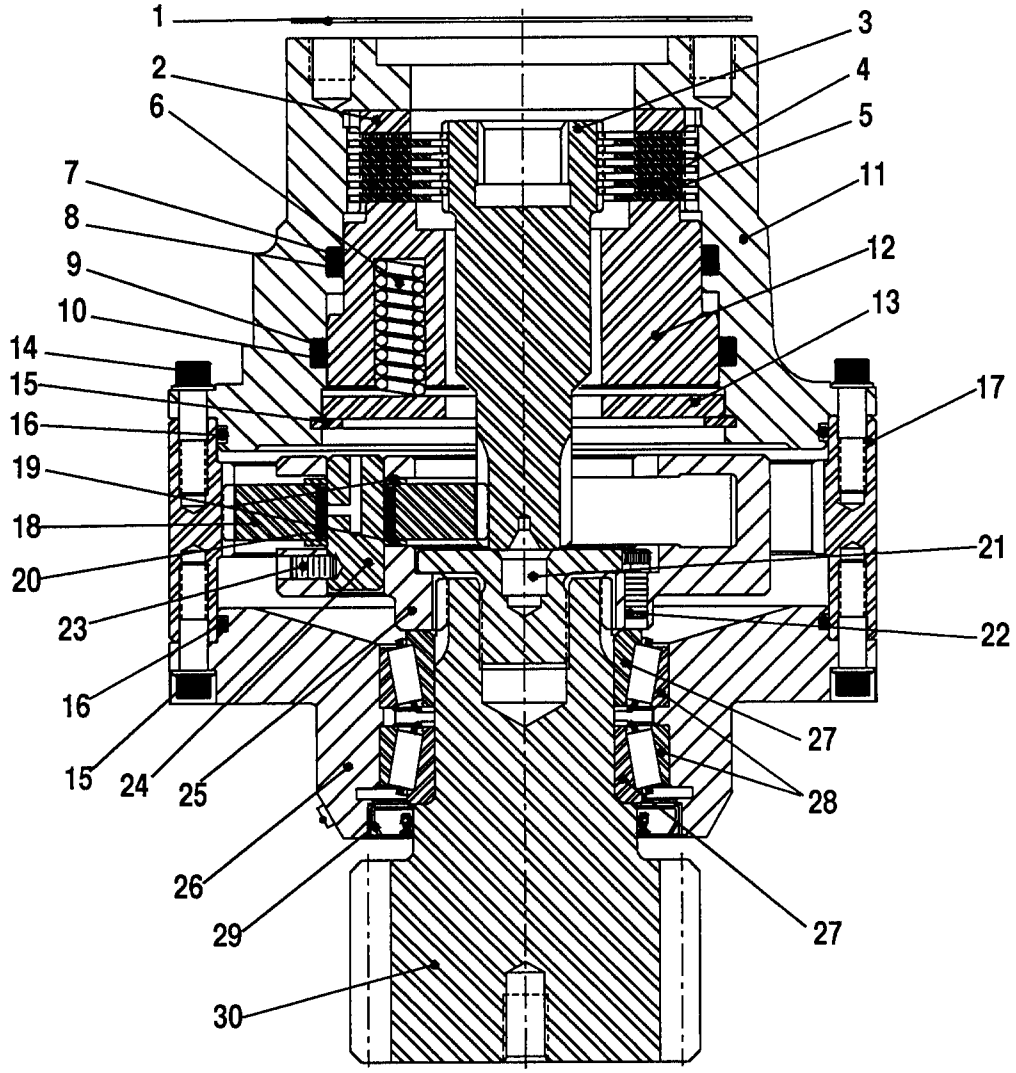
SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX



SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX



1.	Motor Gasket	11.	Brake Housing	21.	Output Shaft Bolt
2.	Backup Plate	12.	Brake Piston	22.	Socket Head Capscrew
3.	Input Sun Gear	13.	Spring Plate	23.	Socket Head Setscrew
4.	Brake Disc.	14.	Capscrew	24.	Planetary Shaft
5.	Reaction Disc, (Separator)	15.	Snap Ring	25.	Planet Carrier
6.	Brake Spring	16.	O-ring	26.	Base
7.	Backup Ring	17.	Housing	27.	Bearing Cone (inner)
8.	O-ring	18.	Planet Gear	28.	Bearing Cup (outer)
9.	O-ring	19.	Thrust Washer	29.	Seal
10.	Backup Ring	20.	Roller Bearing	30.	Output Shaft

SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX

ROTATION GEAR BOX DISASSEMBLY

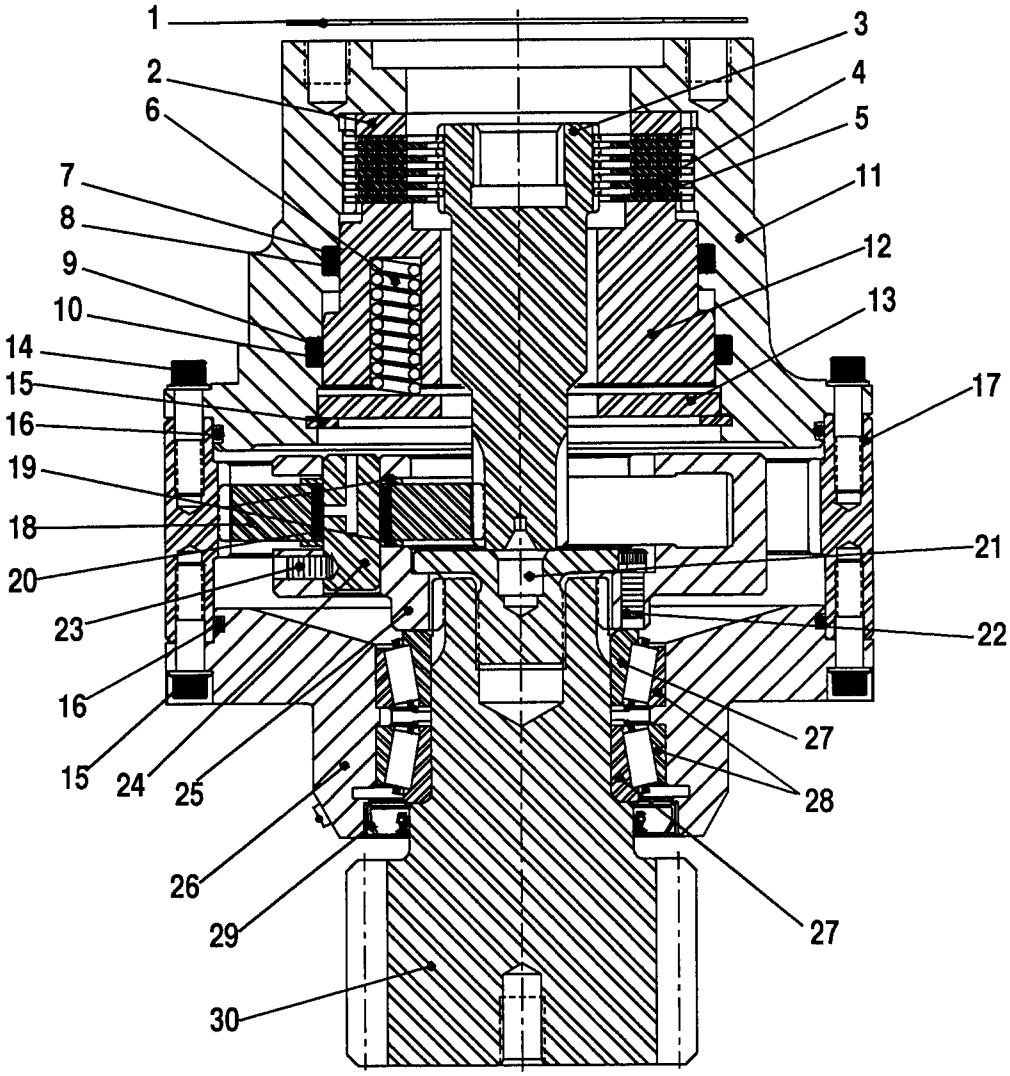
1. Drain the gearbox.
2. Stand the gear box on the pinion. Make an orientation mark from the brake housing down through the base. This will aid you in making sure that the drain and fill plugs, zerk, and motor mounting holes are properly aligned during reassembly.
3. Disconnect the brake hose from the brake housing if not accomplished previously.
4. Remove the two gear box hydraulic motor bolts.
5. Slip the hydraulic motor out of the gearbox and inspect the motor seal. A leaking motor seal may flood the gear box with hydraulic oil. Replace the motor seal if necessary.
6. Note the quantity and/or thickness of the motor gasket (1).
7. Remove the six capscrews (15) that connect the brake housing to the main housing.
8. Lift the brake housing from the gearbox and set it aside for later disassembly.
9. Turn the gearbox pinion (30) side up.
10. Unscrew the 16 capscrews (15) holding the base (26) to the housing (17).
11. Set the housing aside and discard the O-ring (8).
12. Stand the gearbox back on the pinion (30). The output shaft locking screw (22) should be visible in the planet carrier. It can be removed with an allen wrench.
13. Remove the output shaft bolt (21) with a 1/2" drive extension.
14. Set the planet carrier aside for later disassembly.
15. The pinion (30) can now be pressed out of the base.
16. The inner bearing cone (27) should be free. Its' mating cup (28) can be gently tapped out.
17. Remove the output bearing (27) and seal (29) with gear pullers. Discard the seal.

BRAKE DISASSEMBLY

1. Set the brake assembly on the hydraulic motor end.
2. Remove o-ring (16) and discard.
3. Using a "C" clamp, relieve the pressure on the snap ring (15) by gently compressing the spring plate (13).
4. Remove snap ring with snap ring pliers. Loosen and remove the "C" clamp.
5. Lift out spring plate (13).
6. Remove the brake springs (6) and discard.
7. The brake piston (12) may be removed by either pressurizing the brake port or by using channel locks in the spring holes. **Do not** force the piston out of the cylinder or scratch the sides of the piston.
8. Lift the input sun gear (3) from the brake housing.

SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX



1.	Motor Gasket	11.	Brake Housing	21.	Output Shaft Bolt
2.	Backup Plate	12.	Brake Piston	22.	Socket Head Capscrew
3.	Input Sun Gear	13.	Spring Plate	23.	Socket Head Setscrew
4.	Brake Disc.	14.	Capscrew	24.	Planetary Shaft
5.	Reaction Disc, (Separator)	15.	Snap Ring	25.	Planet Carrier
6.	Brake Spring	16.	O-ring	26.	Base
7.	Backup Ring	17.	Housing	27.	Bearing Cone (inner)
8.	O-ring	18.	Planet Gear	28.	Bearing Cup (outer)
9.	O-ring	19.	Thrust Washer	29.	Seal
10.	Backup Ring	20.	Roller Bearing	30.	Output Shaft

TURRET ROTATION GEAR BOX

9. Remove the ten separator (5) and friction discs (4) and inspect them for wear.

10. Lift out the backup plate (2).

11. Remove the two O-rings and backup rings (8), (9), (7) and (10) and discard.

PLANETARY DISASSEMBLY

1. Remove the setscrews (23) from the shafts (24) in the planetary carrier (25). Note that the setscrews have been staked.

2. Push the shafts (24) out either side of the planetary carrier (25).

3. Remove the planet gear (18) from the carrier along with the thrust washers (19) and roller bearings (20).

PLANETARY ASSEMBLY

1. Put the output shaft bolt (21) into the secondary planet carrier (25) so that the threads protrude out the splined hub side.

2. Slip 18 roller bearings (20) inside a planet gear (18) with a thrust ring (19) on each side.

3. Put the gear assembly into the planetary assembly being careful not to lose a thrust washer or roller bearings.

4. Carefully insert a planetary shaft (24) through the carrier making sure that the setscrew hole is lined up and the thrust washers are still in place. Forcing a shaft may break a thrust washer.

5. Apply a few drops of Loctite 242 to the threads of the setscrew (23).

6. You should be able to feel the planetary shaft (24) pull into position as the setscrew (23) bottoms out. The setscrew (23) will be well below the surface of the carrier when properly installed. Torque the setscrew to 80 in. lbs.

7. With a punch, stake the setscrew.

8. Repeat steps 2 through 7 for the other two planet gears.

BRAKE ASSEMBLY

1. Set the brake housing (11) on the motor end.

2. Place a shim approximately 1 inch thick and 2 inches in diameter into the motor pilot hole. This will support the input gear during assembly.

3. Set the input gear (3), pilot down, on the spacer.

4. Put the backup plate (2) in the housing.

5. Dip the brake discs (5) and (4) in clean oil.

6. Beginning with a fiber disc, alternate until all ten are seated. You should have a metal disc on top when finished.

7. Put o-ring (8) on backup ring (7).

8. Set both in the lower o-ring groove of the cylinder with the o-ring on the top.

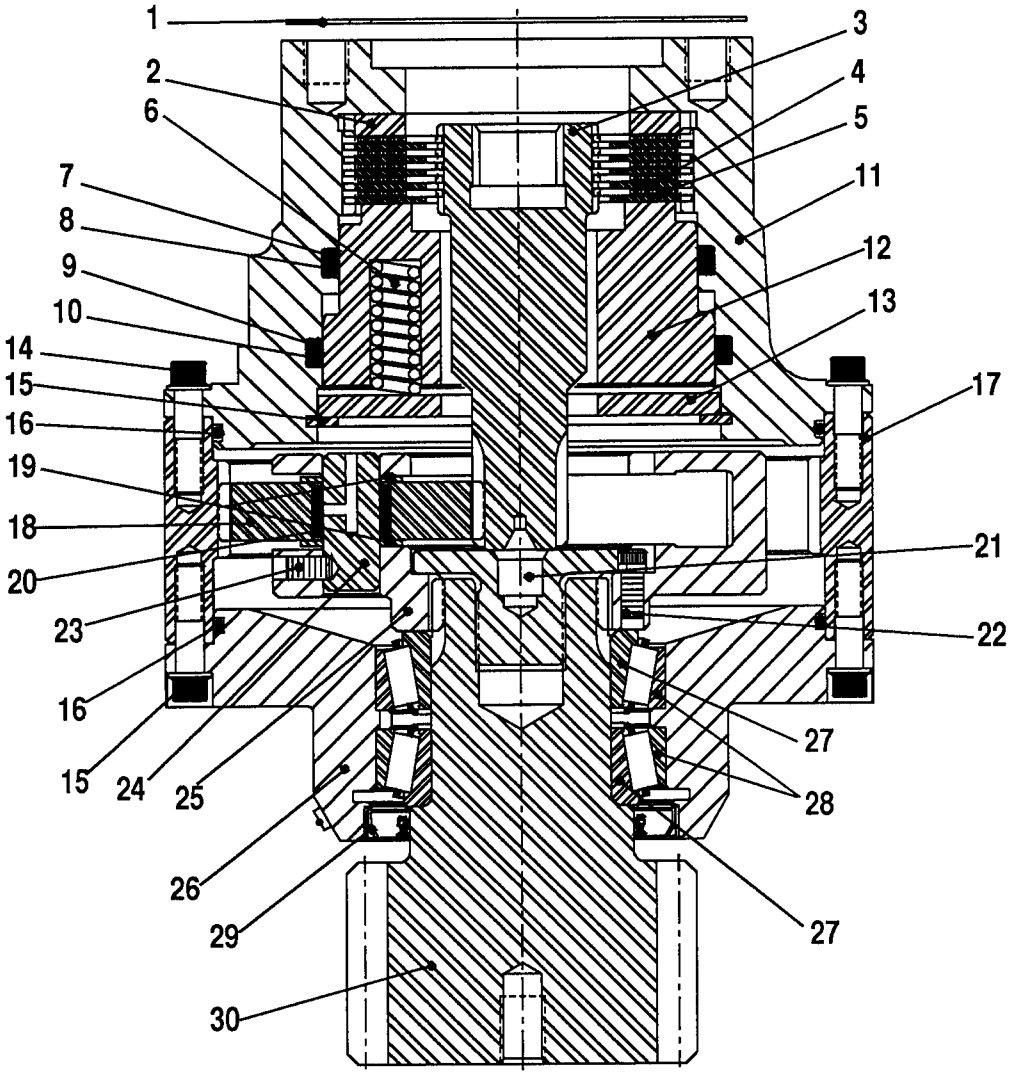
9. Set backup ring (10) on o-ring (9).

10. Set both in the upper o-ring grove with the backup ring on top.

11. Using a twisting motion, gently seat the brake piston (12).

SERVICE & ADJUSTMENTS

TURRET ROTATION GEAR BOX



1.	Motor Gasket	11.	Brake Housing	21.	Output Shaft Bolt
2.	Backup Plate	12.	Brake Piston	22.	Socket Head Capscrew
3.	Input Sun Gear	13.	Spring Plate	23.	Socket Head Setscrew
4.	Brake Disc.	14.	Capscrew	24.	Planetary Shaft
5.	Reaction Disc, (Separator)	15.	Snap Ring	25.	Planet Carrier
6.	Brake Spring	16.	O-ring	26.	Base
7.	Backup Ring	17.	Housing	27.	Bearing Cone (inner)
8.	O-ring	18.	Planet Gear	28.	Bearing Cup (outer)
9.	O-ring	19.	Thrust Washer	29.	Seal
10.	Backup Ring	20.	Roller Bearing	30.	Output Shaft

TURRET ROTATION GEAR BOX

12. Evenly space the correct number of brake springs (6) in the brake piston holes.

13. Put the spring plate (13) on the springs.

14. Set the brake in a hand press. It may be necessary to use a hollow cylinder that will fit over the input gear to compress the spring plate. Apply just enough force to reveal the snap ring groove.

15. Insert the snap ring (15).

16. Put o-ring (16) in the brake housing o-ring groove.

17. Set aside for later assembly.

GEARBOX ASSEMBLY

1. Press both bearing races (28) into the base (26).

2. Turn the base pilot side up. Set the bearing cone (27) in place and press in the output seal (29).

3. Press the base assembly on the output shaft (30) and slip the inner bearing cone (27) in place. Place a collar over the output shaft and gently seat the bearing.

4. Set the secondary planet carrier in place.

5. With a 1/2 inch drive, tighten the output shaft bolt (21). To set the preload, put a torque wrench on the driver and adjust the drag to 20-30 in. lbs.

6. Apply Loctite 242 to the socket head capscrew (22). Tighten the capscrew to lock the bolt in place.

7. Put the base o-ring (16) on the base.

8. Set the main housing (17) on the table with the 16 hole pattern facing up.

9. Put the inverted base assembly on the housing with 16 capscrews (14). Torque to 21 ft. lbs.

10. Stand the gearbox on the pinion.

11. Invert the brake assembly being careful not to let the input gear slip out of position. Set the brake housing on the gearbox and align the input gear splines into the primary planet carrier.

12. Tighten the six capscrews (14).

13. Set the motor gasket (1) in place.

14. Measure the depth of the input.

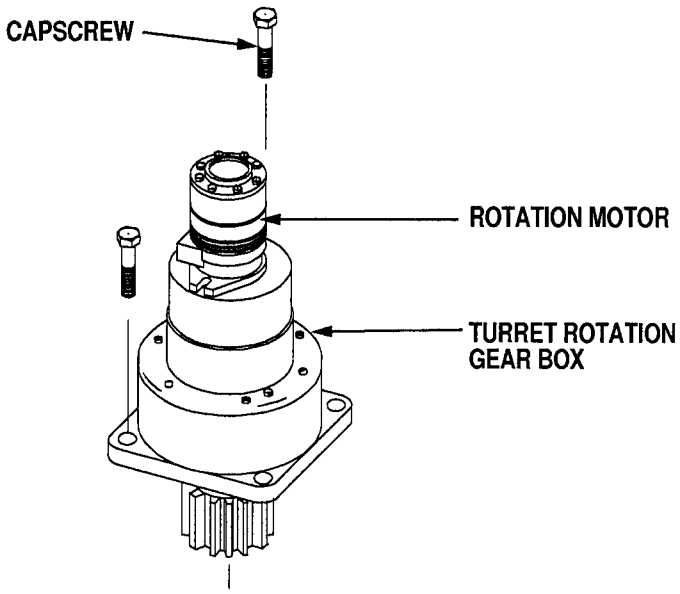
15. Measure the motor shaft length from the mounting surface.

16. Add motor shims to.020-.030 inch clearance. Do not over shim.

17. Reinstall the hydraulic motor and brake hose if removed.

SERVICE & ADJUSTMENTS

ROTATION MOTOR ASSEMBLY



TURRET ROTATION MOTOR ASSEMBLY

The turret rotation motor assembly may be removed or installed as follows:

ROTATION MOTOR REMOVAL

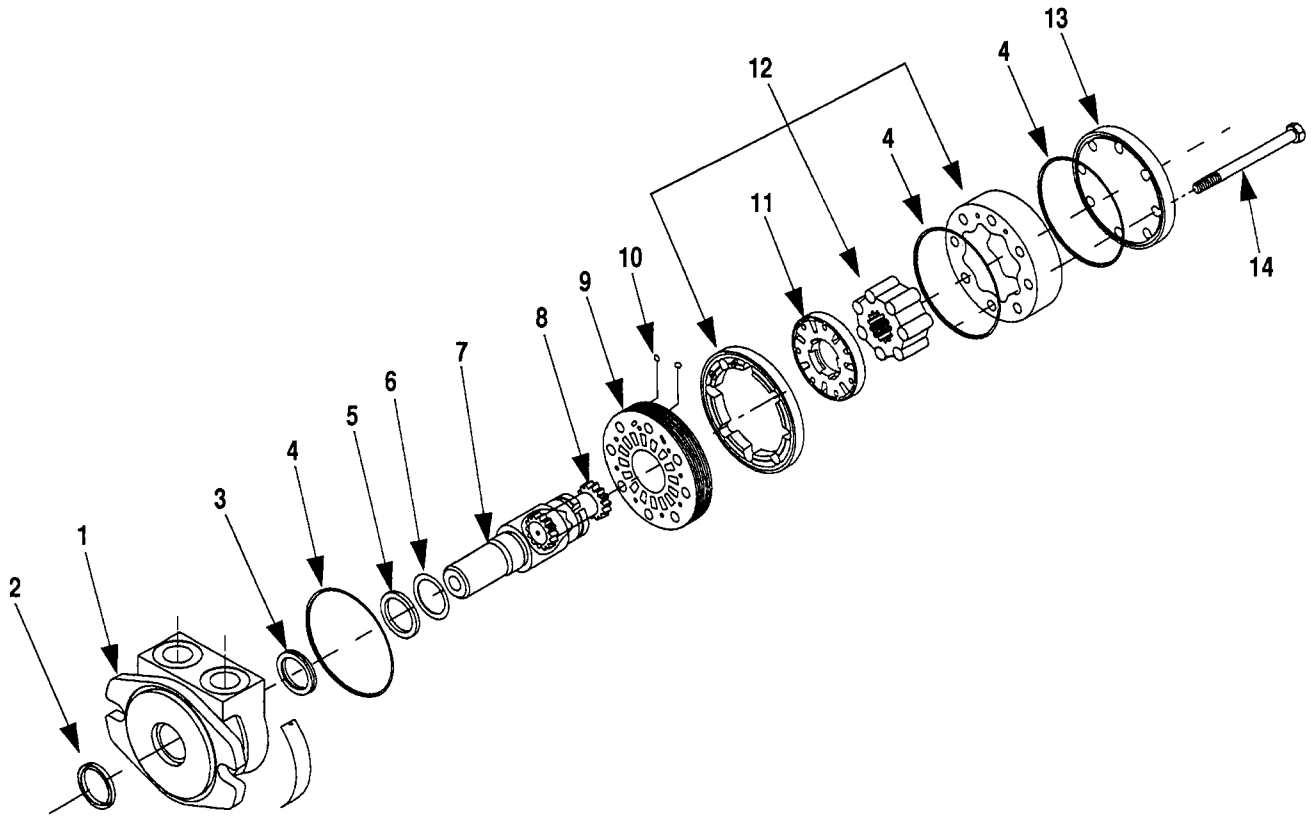
1. Clean outside of the rotation motor assembly and wipe of all hydraulic fittings.
2. Remove the hydraulic fittings and hoses, noting location of each.
3. Remove the two retaining capscrews. Remove the rotation motor from the turret rotation gear box.

ROTATION MOTOR INSTALLATION

1. Install the gasket supplied with the gear box, between motor and gear box.
2. Install the rotation motor and secure to the turret rotation gear box with the two capscrews.
3. Install the hydraulic fittings and hoses.

SERVICE & ADJUSTMENTS

ROTATION MOTOR ASSEMBLY



Rotation Motor Assembly

1. Body
2. Dust Seal
3. Lip Seal
4. Square Ring Seal
5. Retainer Bearing with DU
6. Washer Bearing
7. Shaft, Splined
8. Drive Link
9. Commutator Plate
10. Ball, Check Valve
11. Valve Plate/Spacer Set
12. IGR Assembly
13. Cover
14. Bolt, 5/16 Fine

ROTATION MOTOR ASSEMBLY

Motor Disassembly

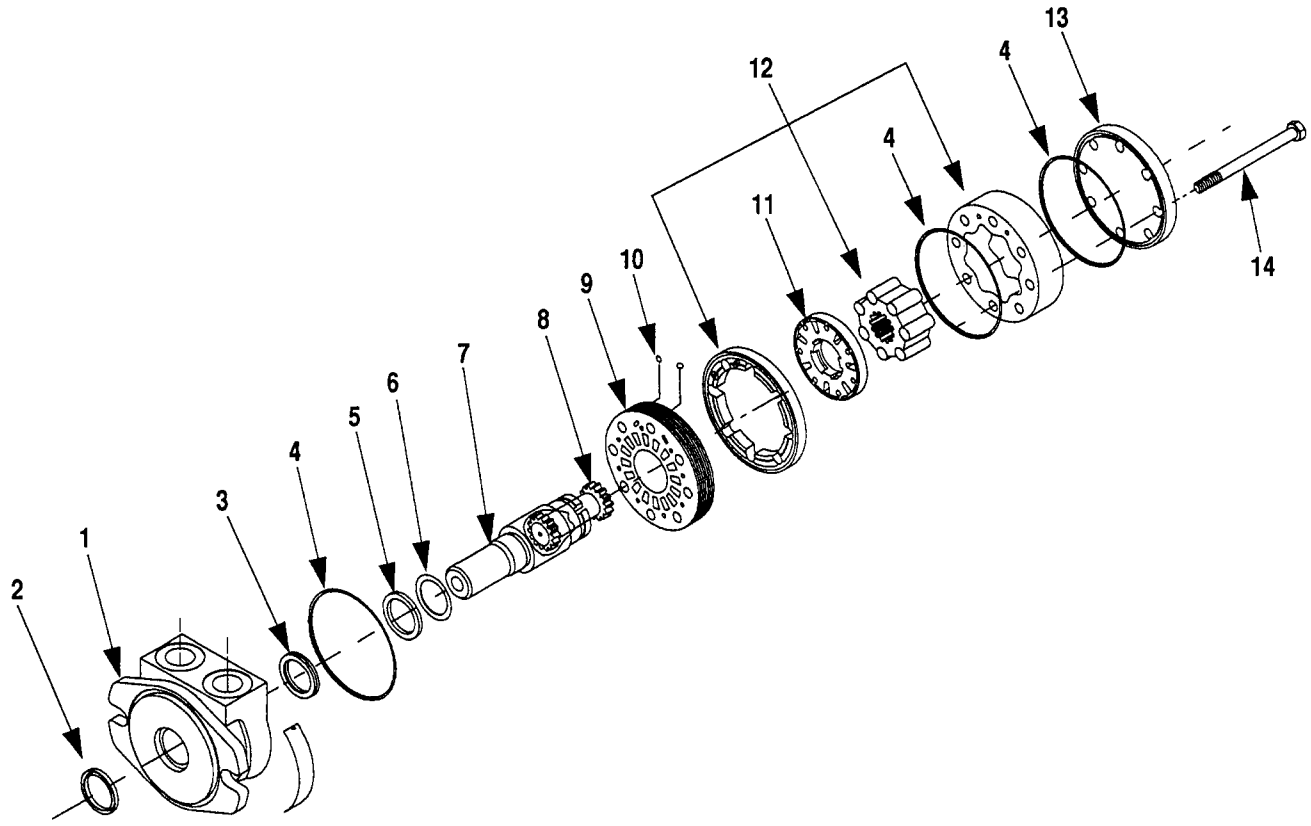
1. Mount the motor in a vice or other holding device with the shaft (7) facing down.
2. Using a 1/2" socket remove the eight 5/16-24 bolts (14).
3. Remove the cover assembly (13) and the square ring (4).
4. Remove the IGR rotor assembly (12) (ie., outer ring, rolls and inner rotor) and square-ring.
5. Remove the rotary valve and spacer (11), the two check balls (10) and the square-ring seal (4). **Note:** Be sure the check balls do not fall into the tapped body holes, and that the check balls are removed and accounted for.
6. Remove commutator plate (9) and square-ring seal (4)).
7. Remove the drive link (8) and output shaft (7).
8. Remove the thrust bearing washer (6) from the body (1). **Important:** Be careful not to bend the thrust washer. The bearing retainer (5) can be removed by placing a small non-metallic punch through the outboard end of the body and lightly tapping the edge of the retainer until it releases from the press fit within the body.
9. The dust seal (2) can be removed by prying between the seal and the body (1) with a small dull screwdriver.
10. The lip seal (3) can be removed by prying between the seal and the seal's seat with a small dull screwdriver.

Motor Assembly

1. Prior to assembly, all parts must be cleaned with a suitable solvent and free of nicks and burrs. Lightly oil all seals, rolls and threaded bolt ends.
2. Install the new dust seal (2) into the body with the lips facing the outside of the body.
3. Install a new lip seal by sliding it, lip first, onto the shaft. The seal must seat against the thrust surface of the shaft.
4. Lubricate the seal (3) and the seal cavity in the body.
5. Insert and press the shaft and seal into the body until fully seated.
6. Again, remove the shaft from the body. The seal should stay within the body.
7. Using your fingers, press firmly on the edges of the seal to ensure the seal seats on the bottom of the seal cavity.
8. A. Install the thrust bearing retainer (5) into the body so the gray side will be visible (the copper flash side is not visible).
   B. Drop the thrust bearing washer (6) into the body bore so it rests on the retainer. Insert the shaft with tangs up, and slide it in as far as possible. Use a rubber mallet to seat the retainer (5) in the body bore. Be sure the bearing washer (6) is between the retainer and the shaft before seating the retainer (5).
9. Before final assembly, all parts must be cleaned with a suitable solvent and be free of nicks and burrs.
10. Insert the output shaft into the body.
11. Lightly oil the square ring seal (8) and place in the body groove.

SERVICE & ADJUSTMENTS

ROTATION MOTOR ASSEMBLY



Rotation Motor Assembly

1. Body
2. Dust Seal
3. Lip Seal
4. Square Ring Seal
5. Retainer Bearing with DU
6. Washer Bearing
7. Shaft, Splined
8. Drive Link
9. Commutator Plate
10. Ball, Check Valve
11. Valve Plate/Spacer Set
12. IGR Assembly
13. Cover
14. Bolt, 5/16 Fine

ROTATION MOTOR ASSEMBLY

12. Place the commutator plate (9) over the shaft with the large "C" shaped groove towards the body (1). Be careful to align the groove on the plate and body without rotating the commutator plate once it is in contact with the body. **Note: Be sure not to dislodge the body square ring seal while positioning the commutator plate (9).**

13. Place the check balls (10) on the 0.100" diameter holes on the commutator plate, also install a lightly oiled square-ring seal into the commutator plate groove.

14. Install the rotary valve and spacer assembly (11) onto the shaft.

15. Lightly oil a square-ring seal (4) and install it in the rotary valve spacer groove (11).

16. Install the drive link (8) into the output shaft (7).

17. Place the IGR outer element onto the rotary valve spacer with the eight bolt holes aligned with the holes in the valve spacer.

18. Install the IGR inner element onto the drive link so the semicircular roll pockets are between the rotary valve ports.

19. Install the seven IGR rolls into each of the semicircular pockets on the inner rotor.

20. Lightly oil the last square-ring seal (4) and install it into the groove in the cover (13).

21. Install the eight bolts (14) with lightly oiled thread ends into the bolt holes. Tighten diagonally to 15 ft. lbs. Now, turn the shaft by hand through several revolutions.

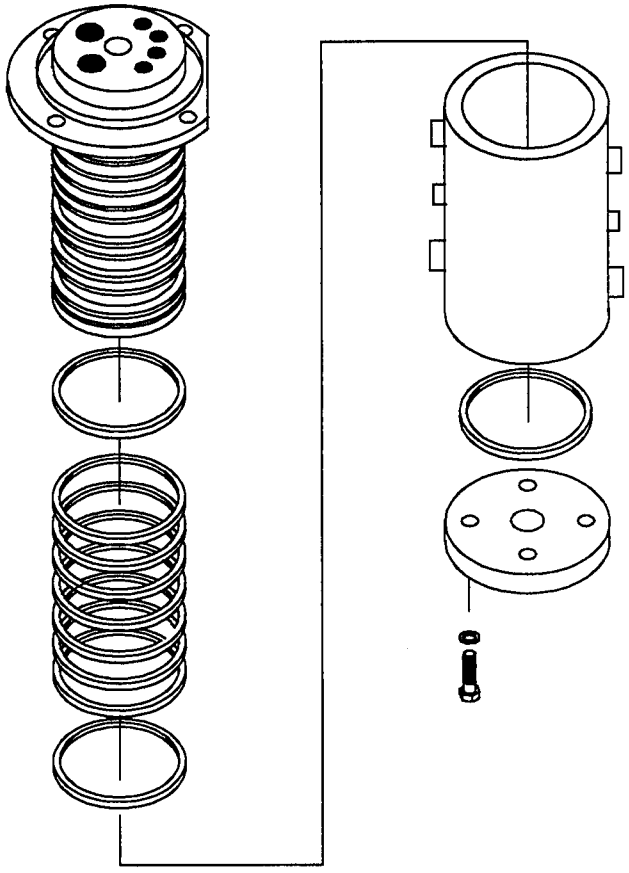
    A. In a diagonal pattern, increase the torque of each bolt by 5 ft. lbs. Turn the shaft by hand through several revolutions.

    B. Repeat step A until the torque of each bolt has reached 20 ft. lbs.

22. The shaft may not turn freely after assembly. A short no-load break in period may be required.

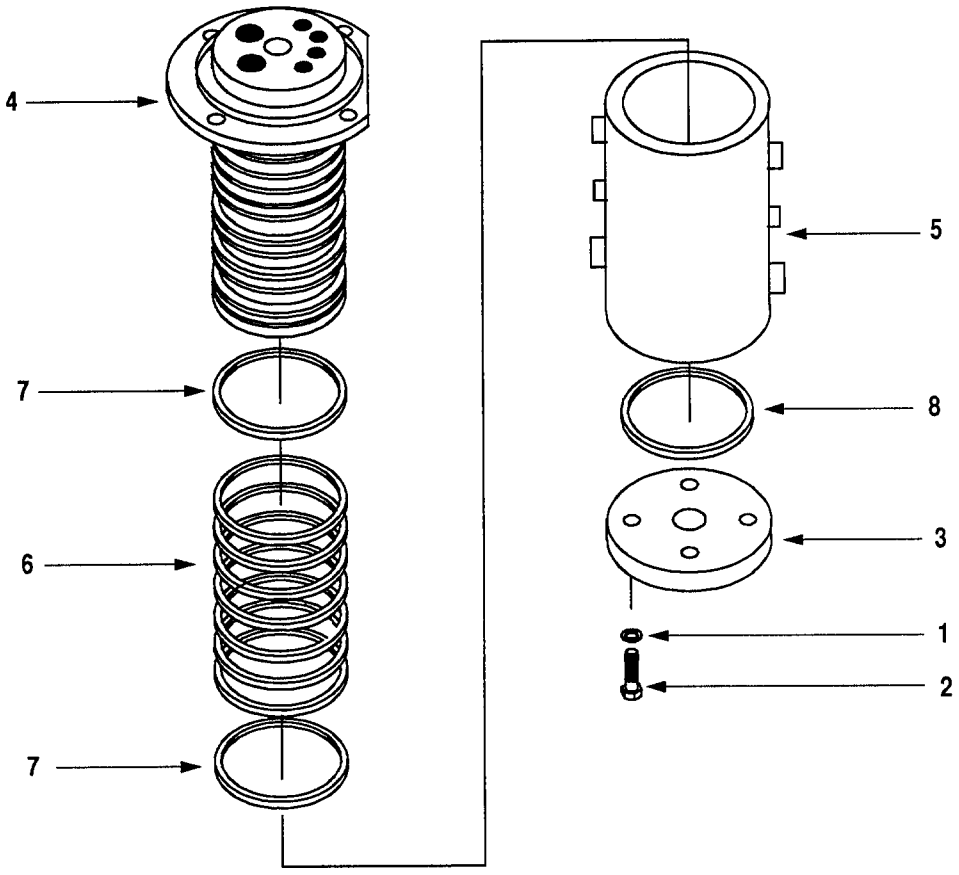
SERVICE & ADJUSTMENTS

ROTARY MANIFOLD



SERVICE & ADJUSTMENTS

ROTARY MANIFOLD



Ref. Rotary Manifold Asssembly

1. Lockwasher
2. Capscrew
3. Retainer, Spool
4. Spool
5. Housing
6. RIng
7. RIng
8. Wear RIng

SERVICE & ADJUSTMENTS

ROTARY MANIFOLD

ROTARY MANIFOLD

Use the following procedures when disassembling, inspecting, repairing and reassembling the rotary manifold.

ATTENTION

As soon as the rotary manifold is ready to be placed into operation, it should be slowly rotated for several minutes to allow any entrapped air to escape and to facilitate reforming of seals that may have temporarily deformed during storage.

An overhaul should be done in a clean, enclosed facility with personnel familiar with hydraulic systems and cleanliness procedures.

ROTARY MANIFOLD DISASSEMBLY

The rotary manifold may be disassembled by removing the four capscrews from the spool retainer.

NOTE: Be sure to mark an index point on the housing and spool to insure proper reassembly.

INSPECTION AND SEAL REPLACEMENT

1. The housing bore should be thoroughly washed with solvent or diesel fuel and inspected for signs of "scoring" or deep scratches. This type of damage is generally caused by the presence of foreign material in the hydraulic system. No satisfactory methed of repairing this type of damage can be conducted in the field.

2. The spool should be carefully washed in solvent or diesel fuel. The seals and O-rings should not be removed from the spool unless they show signs of wear or damage. *NOTE: If a seal is removed for any reason, it should be replaced since removal will amost always damage it beyond use.*

When installing a new seal ring, it must be "walked" into place past other seals and oil grooves and then into its own groove in the same manner that the bead of a tire is "walked" into the wheel rim. The spool should be well oiled to aid in this assembly. Best results can be achieved if the spool, with the seals mounted on the end is allowed to set overnight. This gives the seals a chance to adjust to normal size.

ROTARY MANIFOLD REASSEMBLY

1. The rotary manifolod should be reassembled using a generous coat of oil on the housing ID and spool OD. Generally, reassembly is most successful by placing the housing in a vertical position and inserting the spool into the housing. Each seal and wear ring should be compressed by hand to initially enter the housing bore. With the spool fully inserted into the housing, the assembly may be "up-ended" to replace the retainer plate.

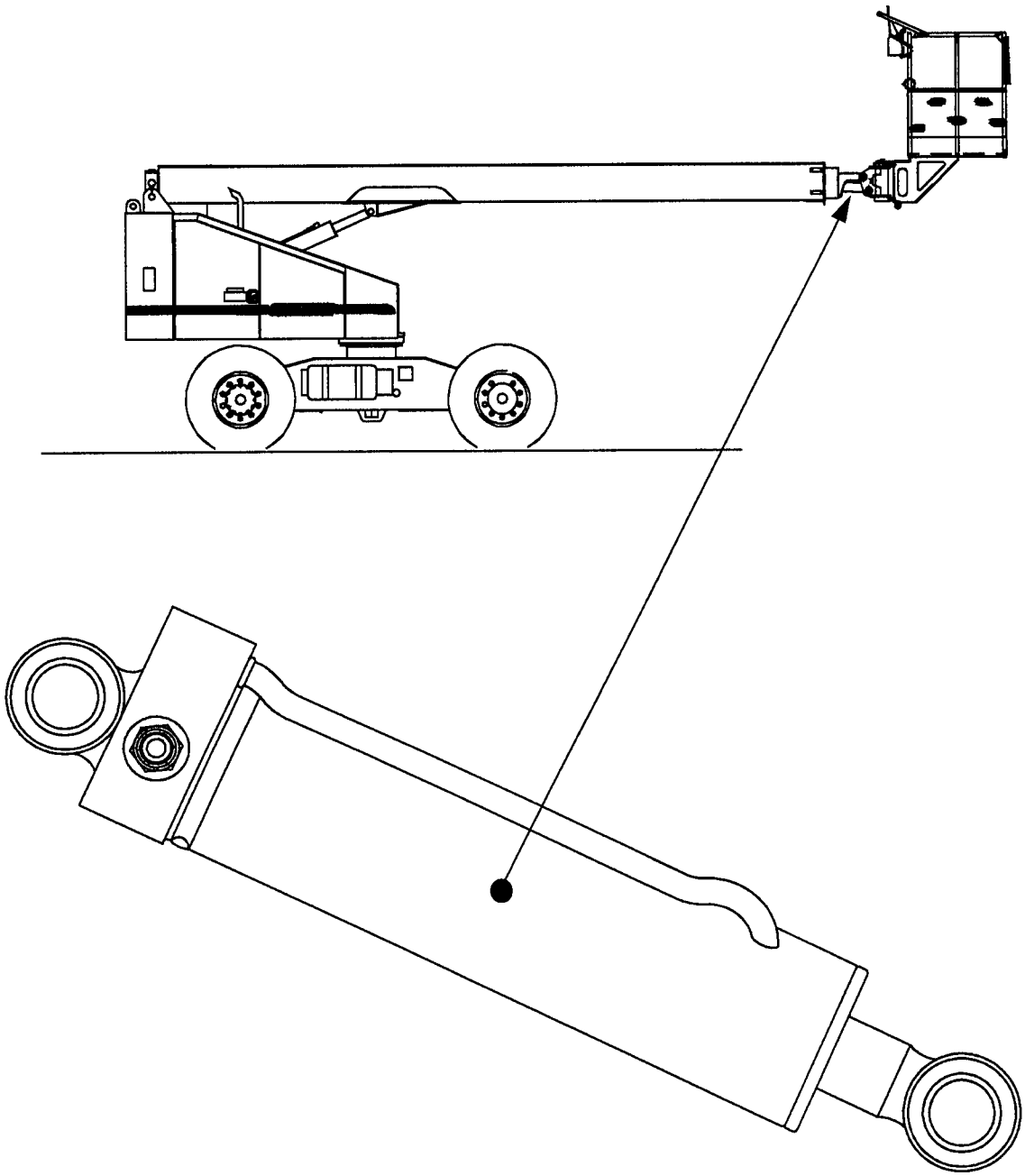
NOTE: If the rotary manifold is oil filled and plugged, ample air space should be allowed for the expansion of oil due to temperature changes.

⚠ CAUTION

It is important that the spool floats freely with the case to prevent wear and leakage. The spool is held stationary with respect to the base by the four capscrews which secure it to the turret

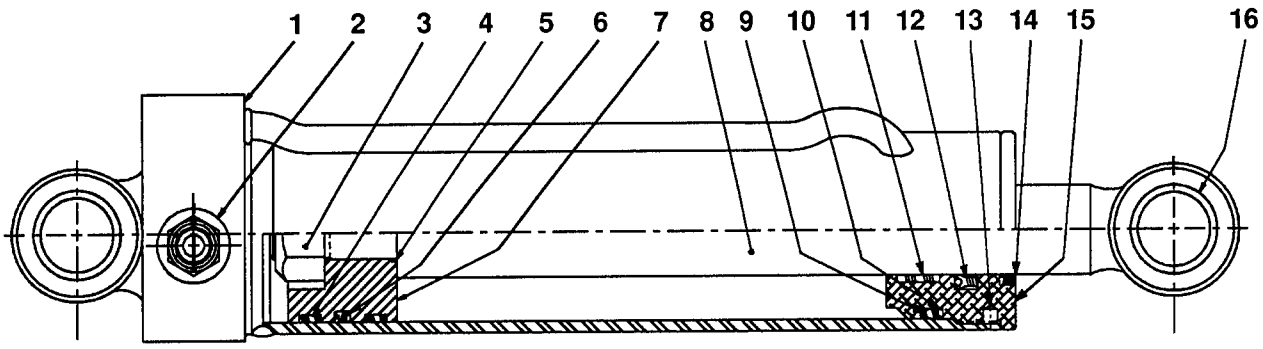
SERVICE & ADJUSTMENTS

SLAVE LEVELING CYLINDER



SERVICE & ADJUSTMENTS

SLAVE LEVELING CYLINDER
(P/N 211729)



Ref.	Slave Leveling Cylinder
1.	Barrel
2.	Counterbalance Valve (Qty 2)
3.	Locknut
4.	Wearband (Qty 2)
5.	O-Ring
6.	T-Seal
7.	Piston
8.	Rod
9.	O-Ring
10.	Back-Up Ring
11.	Wearband (Qty 2)
12.	Seal, Polypak
13.	Locking Insert
14.	Wiper
15.	Head Gland
16.	Bushing (Qty 4)

SERVICE & ADJUSTMENTS

CYLINDER ASSEMBLY

DISASSEMBLY

Do not tear down a cylinder unless no other maintenance procedure can correct the problem. All overhaul, or new cylinder installation, should be done in a clean, dust free atmosphere with all ports plugged until the hose connections are made.

1. The cylinders have a one-piece head gland design which will allow removal of the head gland with a dace type spanner wrench. *NOTE: If a spanner is not available, a chain wrench may be used by wrapping it around the outside of the head gland shoulder.*

IMPORTANT: The head gland should unscrew freely. If, after several turns, a blind is noticed, STOP: DO NOT FORCE THE THREADS. Place a "C" clamp over the threaded end of the barrel in line with the port tube. Gradually draw down the "C" clamp until the head gland can be unscrewed easily. The reason for an occasional bind is due to the fact that the heat generated from welding of the port tube to the case may cause a slight barrel concentricity. This most generally occurs when the cylinder has been in service for only a short period of time. Extended service stress relieves the weld and improves concentricity. This same procedure can be used in reassembly of a bind occurs when installing the head gland.

2. To remove the piston from the shaft, remove the piston nut (1). The piston (2) can then be bumped off the shaft by using the head gland (10) as a bumper.

INTERNAL INSPECTION AND PARTS REPLACEMENT:

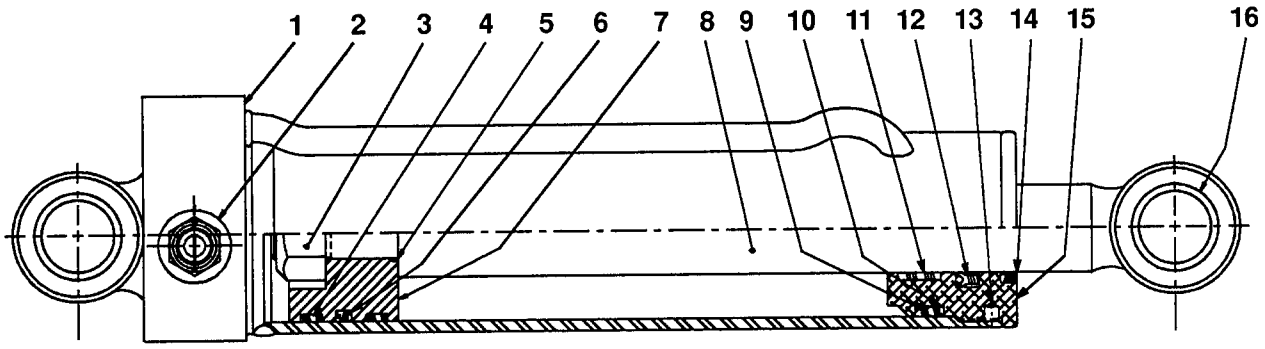
1. The cylinder bore should be thoroughly washed with solvent or diesel fuel and carefully inspected for signs of "scoring" or deep scratches. In the event of any defects in the cylinder case bore, the entire cylinder should be reassembled and contact made with your distributor. Cylinders with this type of damage are generally caused by foreign material in the hydraulic system and there is no satisfactory method of repairing this type damage in the field.

2. The cylinder shaft should be carefully washed and inspected for damage such as dents. deep scratches, damaged chrome plating, ETC. All sharp edges on BOTH ends of the shaft should be removed with a fine file or whetstone to prevent damage to the seals during assembly. Should the rod show severe damage of any type it should be replaced. The static O-ring seal between the piston and the shaft should be replaced prior to reassembly. The new static O-ring and backup washers should be thoroughly lubricated and installed in the piston.

CAUTION: The cylinder shaft should be carefully handled and protected to prevent scoring, scratching, Etc. NEVER leave exposed shaft where weld splatter or other material could damage the finished surface of the shaft.

SERVICE & ADJUSTMENTS

SLAVE LEVELING CYLINDER
(P/N 211729)



Ref.	Slave Leveling Cylinder
1.	Barrel
2.	Counterbalance Valve (Qty 2)
3.	Locknut
4.	Wearband (Qty 2)
5.	O-Ring
6.	T-Seal
7.	Piston
8.	Rod
9.	O-Ring
10.	Back-Up Ring
11.	Wearband (Qty 2)
12.	Seal, Polypak
13.	Locking Insert
14.	Wiper
15.	Head Gland
16.	Bushing (Qty 4)

CYLINDER

3. The piston should be carefully washed and inspected for broken, cracked, or damaged seal grooves. NOTE: If the piston seal is removed for any reason whatsoever, it should be replaced by a new seal since removal will usually damage it beyond use. The new piston seal must be "walked into" the seal groove in the same manner that the bead of a tire is "walked onto" the wheel rim. Prior to installing the piston seal, it should be warmed by hanging it in front of an electric heater or other similar means until it has become reasonably flexible. Also, the piston should be well oiled to aid in this assembly.

4. The cylinder head gland should by thoroughly washed and inspected for any damage: All seals should be removes and replaced.

REASSEMBLY:

Lubricate I.D. of piston assembly and slip onto shaft. Apply Loctite 242 to the threads and then tighten the piston nut to 225 ft. lbs. (306 N•m). Before attempting to install the piston and shaft assembly into the cylinder bore case, both the O.D. of the piston and the mouth of the case should be thoroughly lubricated. The piston should then be gently slipped into the mouth of the case and, as soon as the rings come into contact with the chamber. the other end of the shaft should be wiggled in a circular motion to aid the rings in compressing as they are slipping into the cylinder bore.

CAUTION: most piston ring breakage is due to careless or hasty assembly at this point.

Installation of the head gland (10) is accomplished by first applying Loctite 242 to the threads, and turning, first by hand, then by a spanner wrench into the cylinder case, The head should be tightened securely.

OPERATION:

As soon as the cylinder is ready to be placed into operation, it should be slowly cycled under no-load conditions for several minutes in order to allow the entrapped air within the cylinder to escape to the reservoir and, also to facilitate the reforming of the seals which may have temporarily deformed during shipping, storage, or reassembly. New cylinders may show a slight "drifting" tendency when first used. This is natural, due to one or more of the following items.

1. Air entrapped in the oil or the cylinder.

2. Seal not yet fully reformed or seated.

"Drifting" should decrease with operation as piston reins and seals "break in" to provide better sealing and the eventual escaping of the trapped air in the oil.

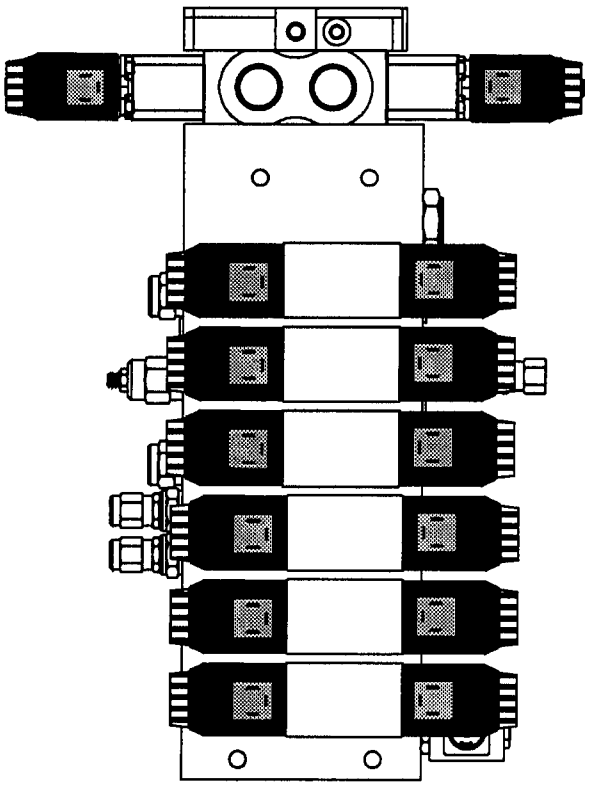
MAIN PUMP

THIS SECTION

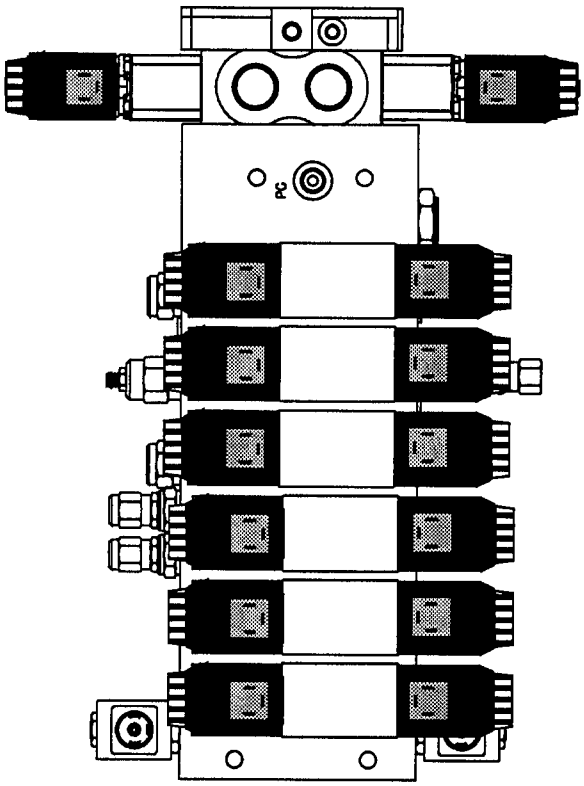
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SERVICE & ADJUSTMENTS

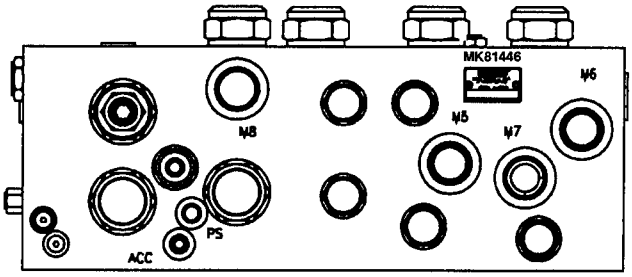
P/N 81443 FUNCTIONS VALVE
(N/A CH44C/CH50C superceded mid 1996 by P/N 81516)
(SEE PAGE 4-13-1)



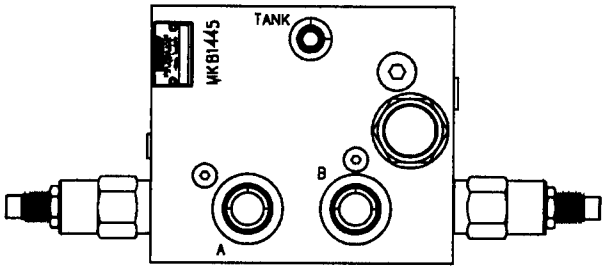
P/N 81516 FUNCTIONS VALVE
(all CH44C/CH50C, supersedes P/N 81443 on CH60C/CH66C/CH80C/CH100C)
(SEE PAGE 4-13-17)



P/N 81446 "4 WHEEL DRIVE" VALVE
(used on all CH models W/4 wheel drive)
(SEE PAGE 4-13-47)

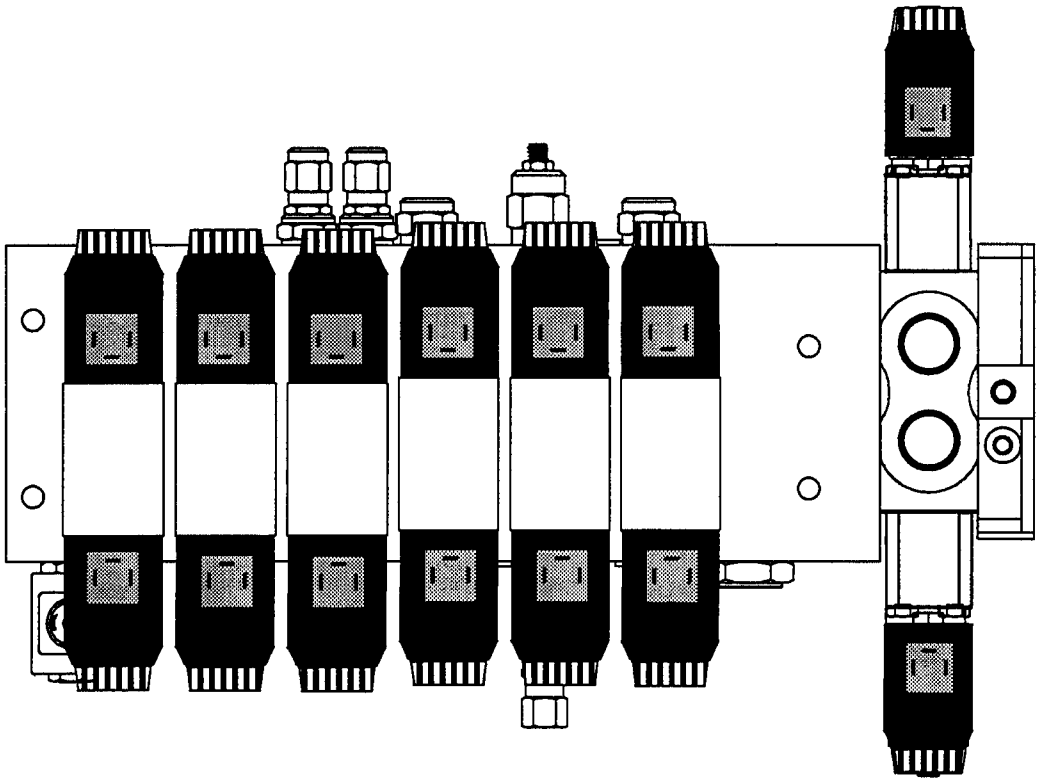


P/N 81445 "2 WHEEL DRIVE" VALVE
(used on all CH models W/2 wheel drive)
(SEE PAGE 4-13-33)



P/N 81443 FUNCTIONS VALVE

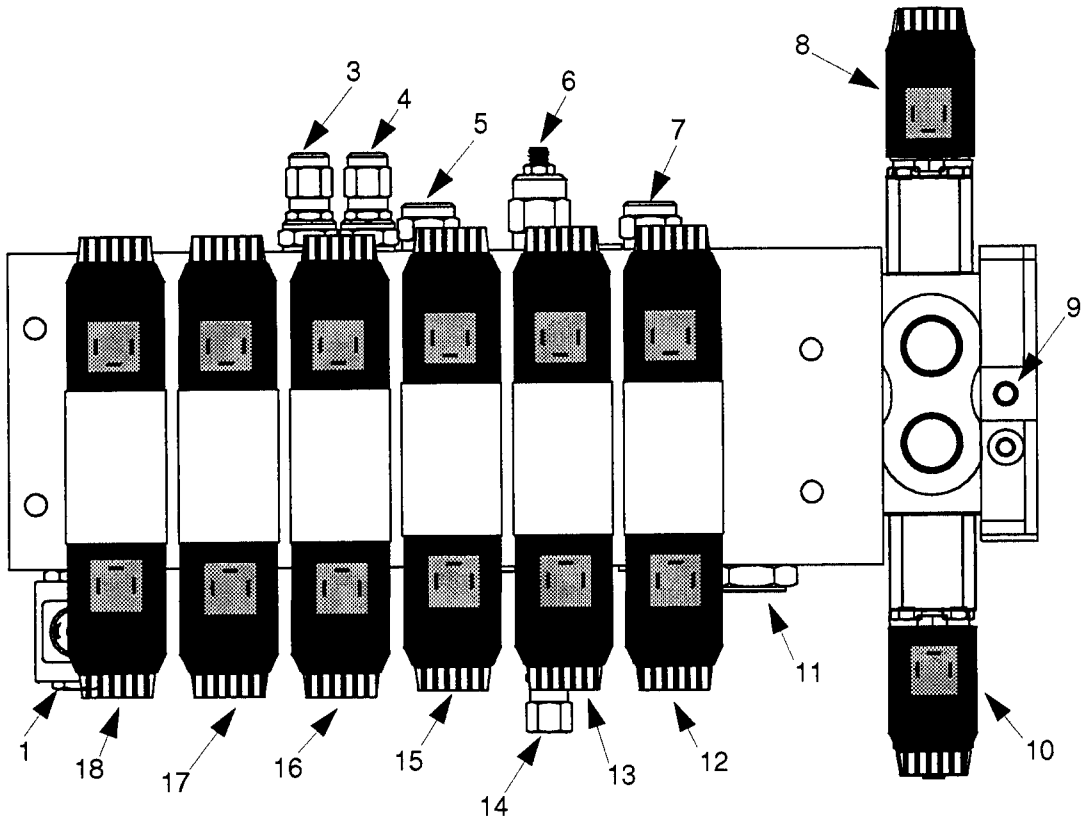
(N/A CH44C/CH50C superceded mid 1996 on CH60C/CH66C/CH80C/CH100C by P/N 81516)



P/N 81443 FUNCTIONS VALVE

(see R/H page for component identification)

TOP VIEW



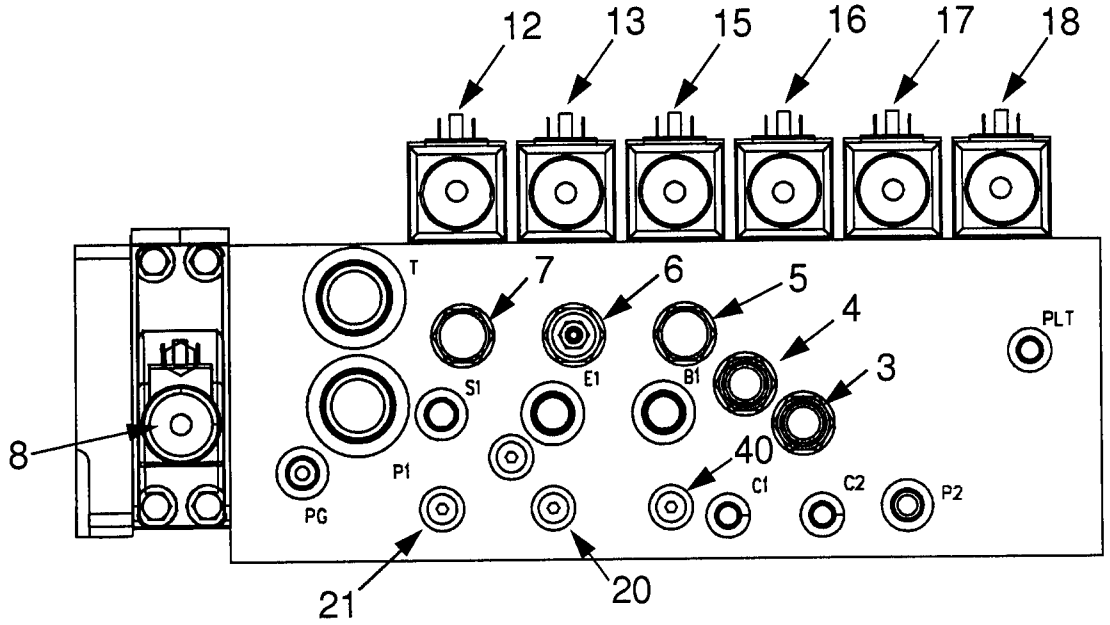
LEGEND: COMPONENTS P/N 81443 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------NOT APPLICABLE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------NOT APPLICABLE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL

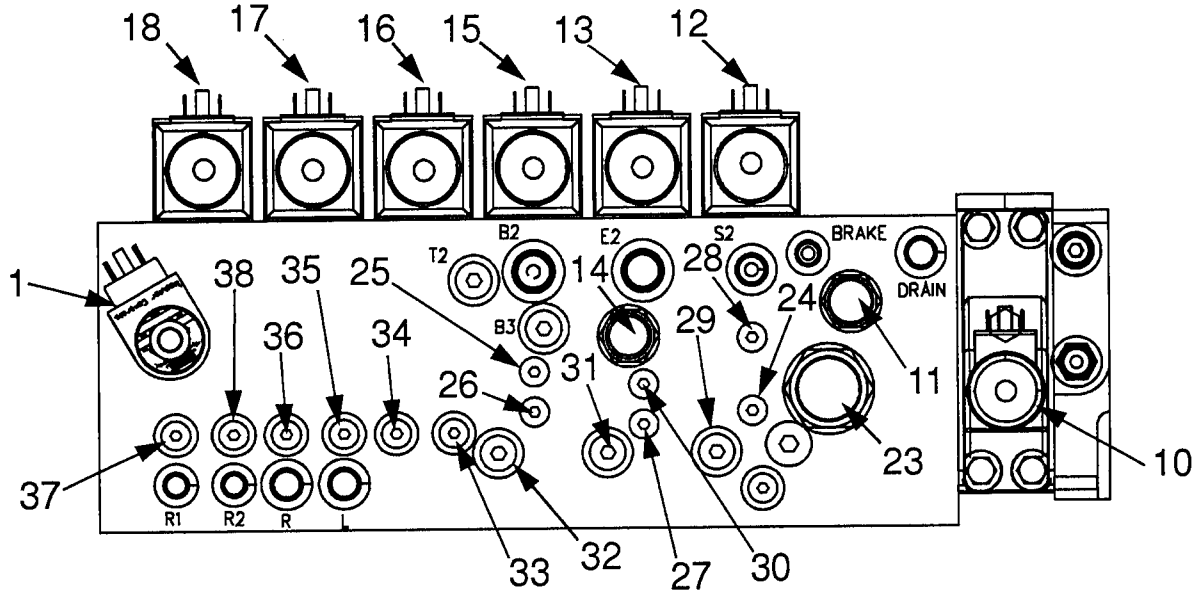
P/N 81443 FUNCTIONS VALVE

(see R/H page for component identification)

LEFT SIDE VIEW



RIGHT SIDE VIEW



LEGEND: COMPONENTS P/N 81443 VALVE

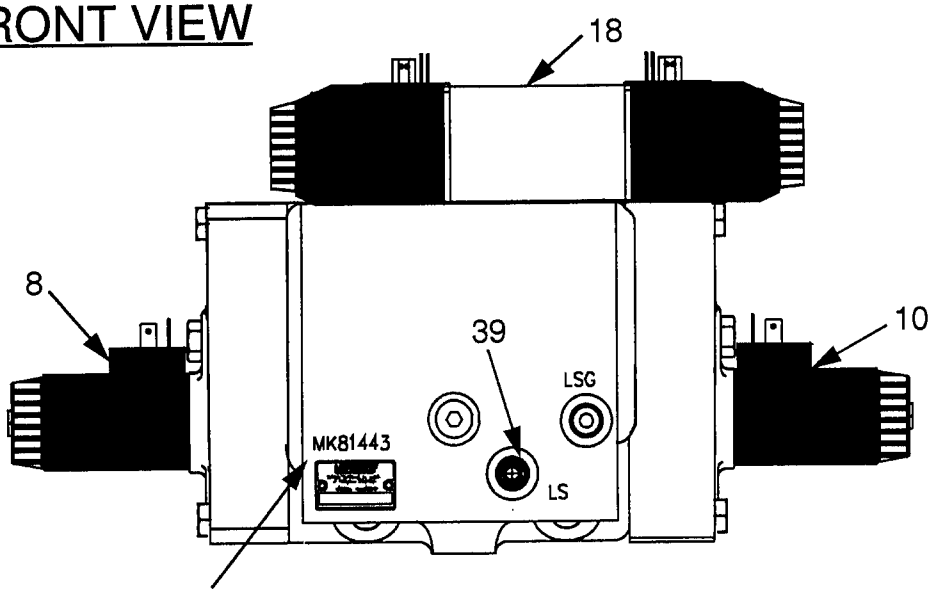
1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------NOT APPLICABLE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------NOT APPLICABLE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL

SERVICE & ADJUSTMENTS

P/N 81443 FUNCTIONS VALVE

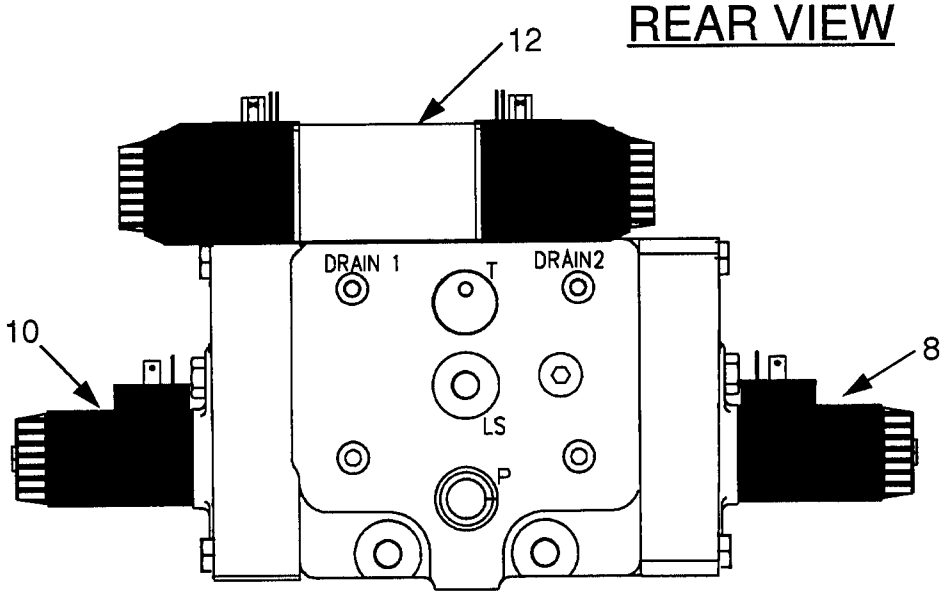
(see R/H page for component identification)

FRONT VIEW



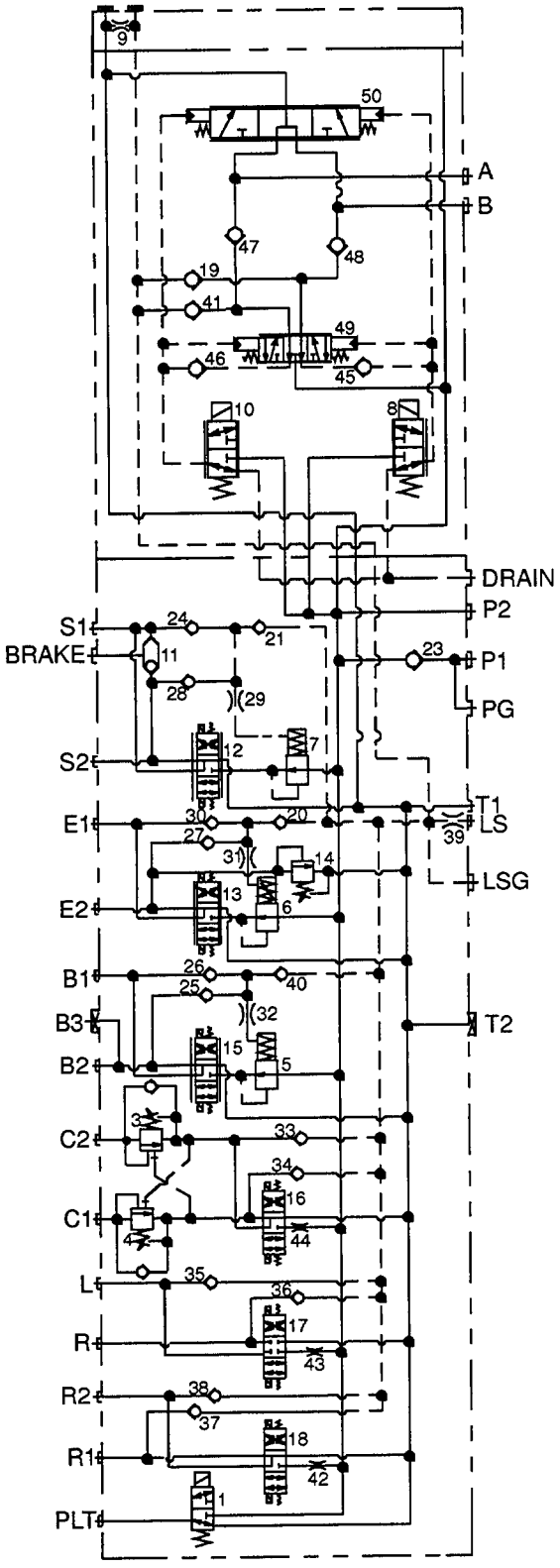
PART NUMBER AND REVISION LEVEL

REAR VIEW



LEGEND: COMPONENTS P/N 81443 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------NOT APPLICABLE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------NOT APPLICABLE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL



HYDRAULIC SCHEMATIC P/N 81443

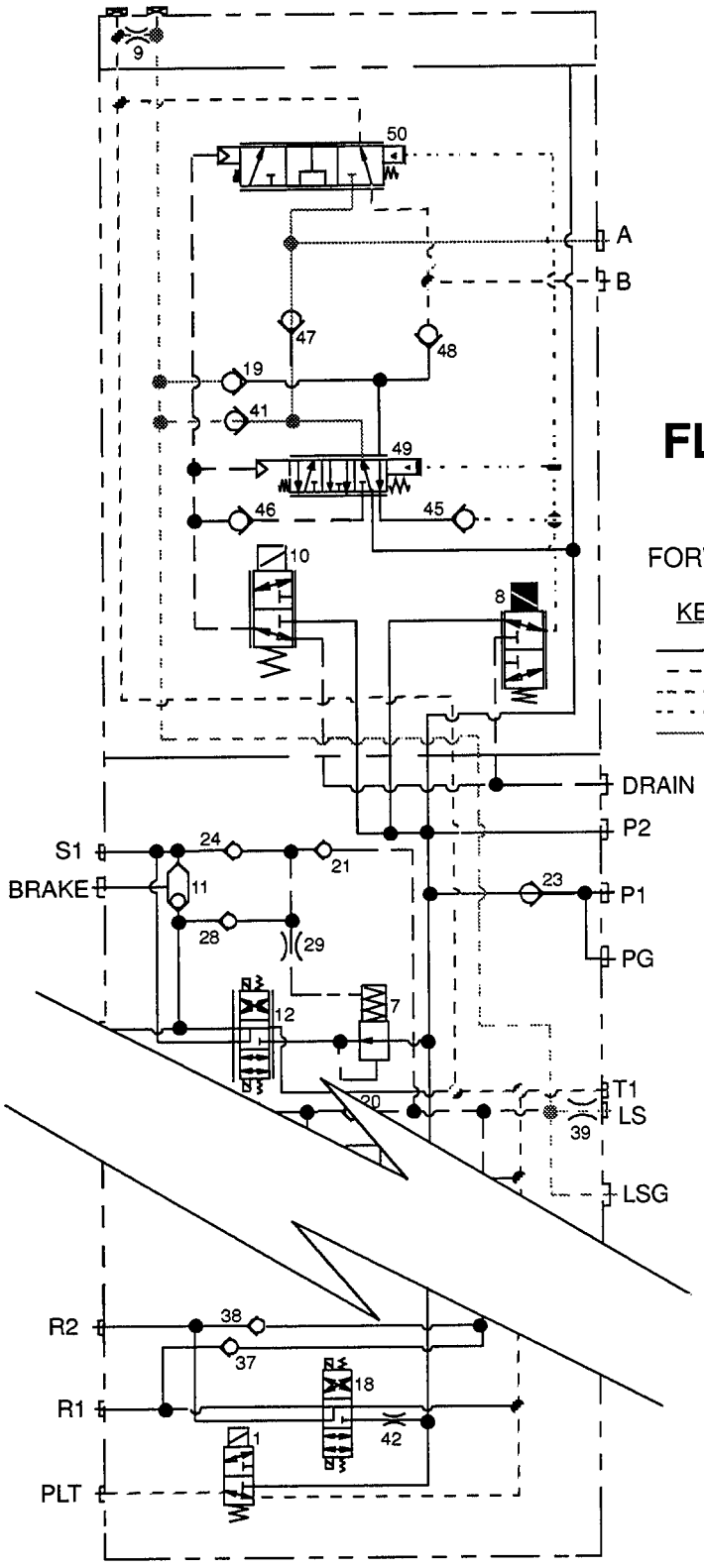
(see R/H page for component identification)

KEY TO PORT IDENTIFICATION

A.....DRIVE FORWARD
B.....DRIVE REVERSE
B1.....BOOM LIFT
B2.....BOOM LOWER
B3.....N/A (BLOCKED)
BRAKE.....ROTATION BRAKE RELEASE
C1.....PLATFORM LEVELING DOWN
C2.....PLATFORM LEVELING UP
DRAIN.....LOAD SENSE DRAIN
E1.....BOOM RETRACT
E2.....BOOM EXTEND
L.....STEER LEFT
LS.....LOAD SENSE SIGNAL TO PUMP
LSG.....LOAD SENSE PRESSURE TEST
P1.....MAIN PUMP INLET
P2.....EMERGENCY PUMP INLET
PG.....PRESSURE TEST
PLT.....HIGH SPEED TRAVEL PILOT SIGNAL
R.....STEER RIGHT
R1.....PLATFORM ROTATE RIGHT
R2.....PLATFORM ROTATE LEFT
S1.....TURRET ROTATE RIGHT
S2.....TURRET ROTATE LEFT
T1.....TANK RETURN
T2.....N/A (BLOCKED)

LEGEND: COMPONENTS P/N 81443 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------NOT APPLICABLE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------NOT APPLICABLE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL



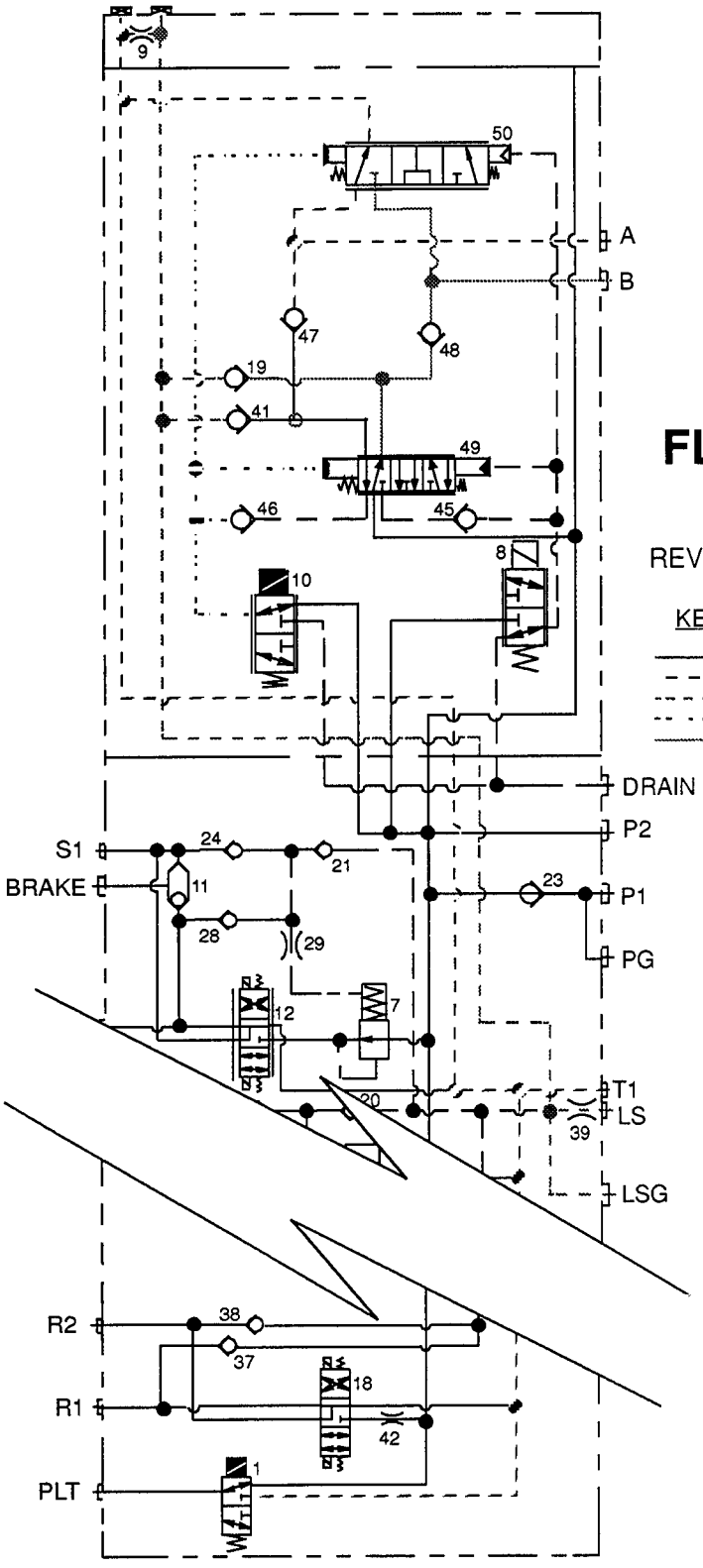
FLOW DIAGRAM

P/N 81443

LOW SPEED DRIVE
FORWARD DIRECTION OF TRAVEL

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW



FLOW DIAGRAM

P/N 81443

HI SPEED DRIVE
REVERSE DIRECTION OF TRAVEL

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW

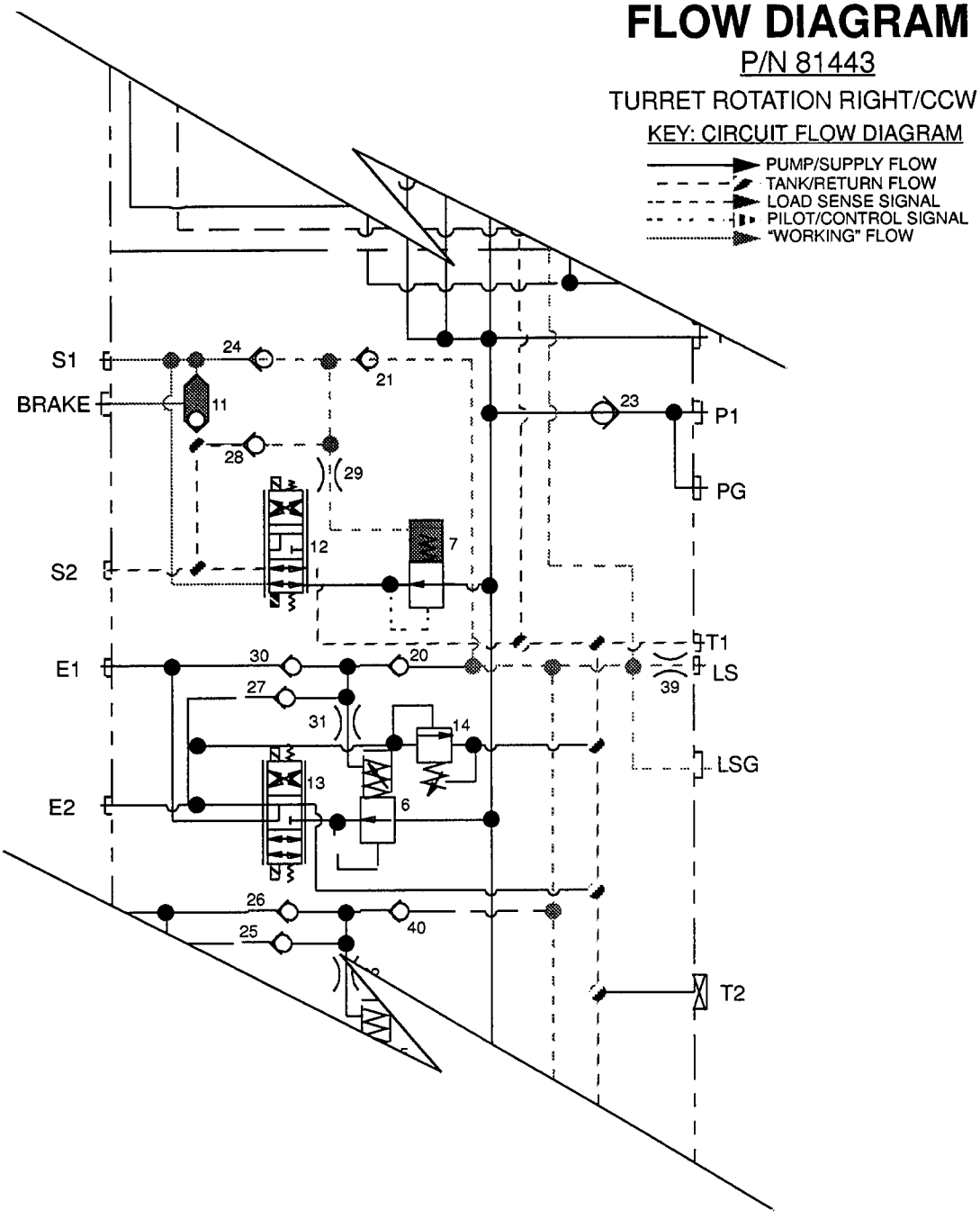
SERVICE & ADJUSTMENTS

FLOW DIAGRAM

P/N 81443

TURRET ROTATION RIGHT/CCW

KEY: CIRCUIT FLOW DIAGRAM



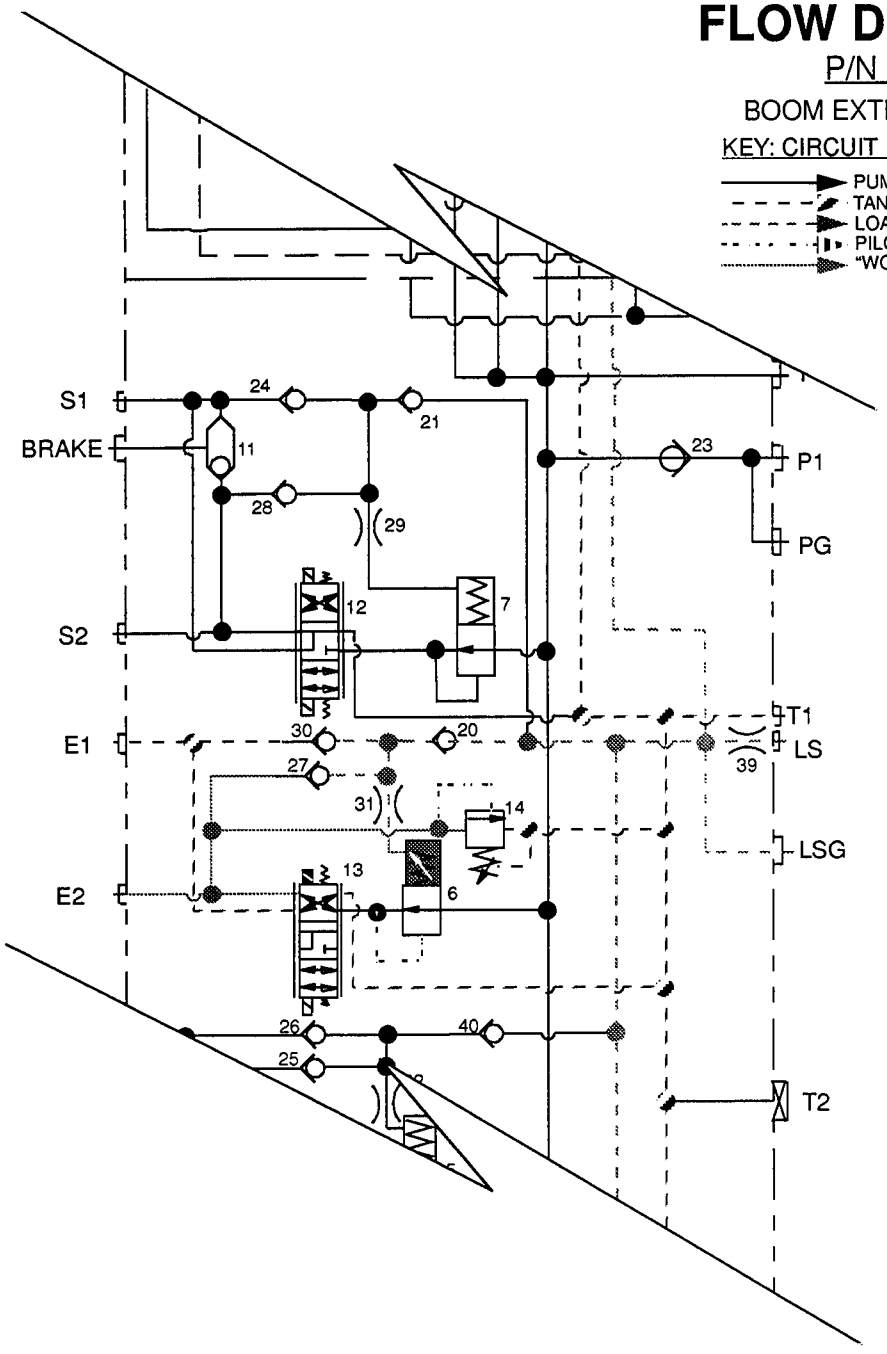
FLOW DIAGRAM

P/N 81443

BOOM EXTENSION/OUT

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW

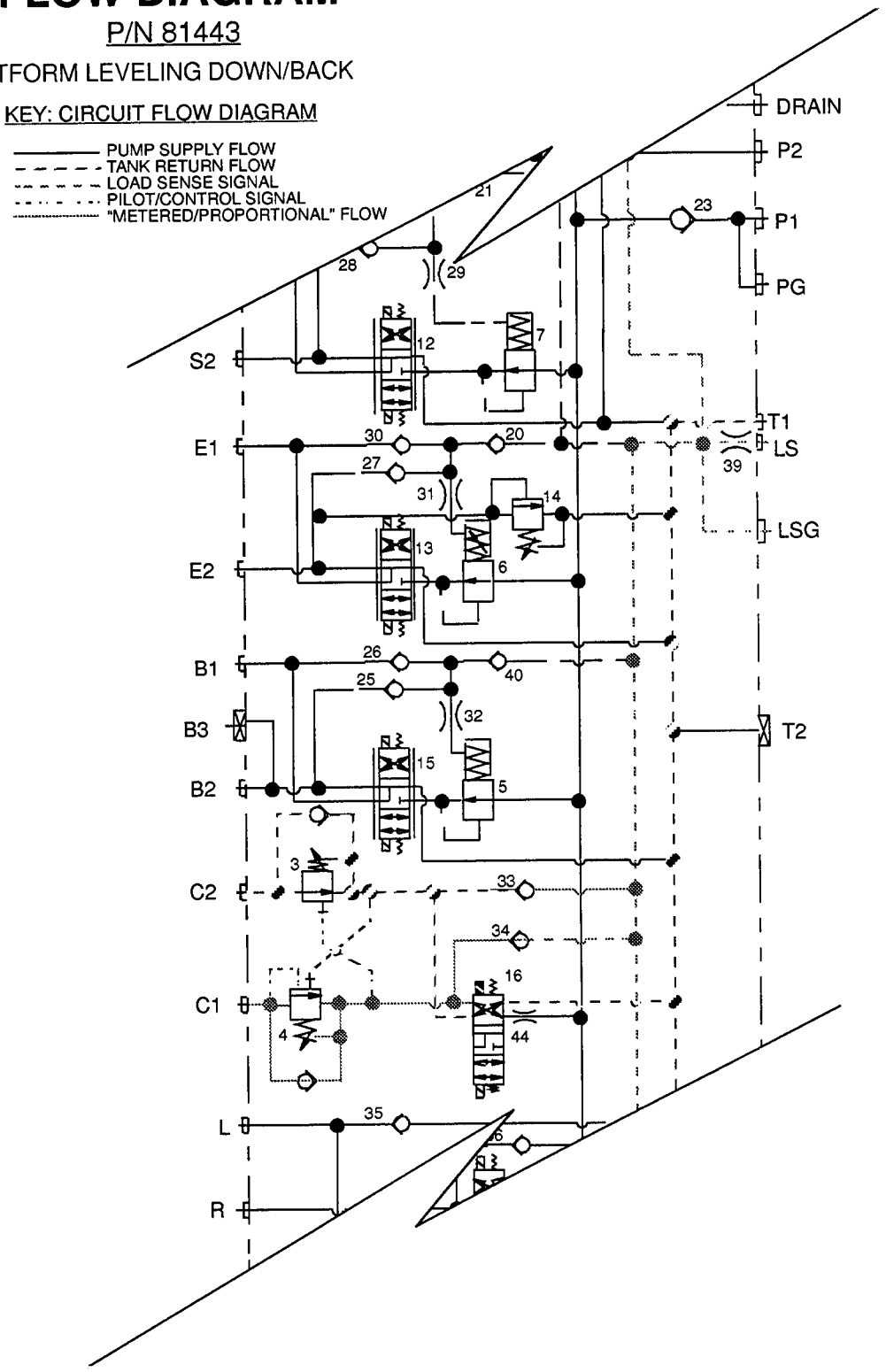


FLOW DIAGRAM

P/N 81443

PLATFORM LEVELING DOWN/BACK

KEY: CIRCUIT FLOW DIAGRAM

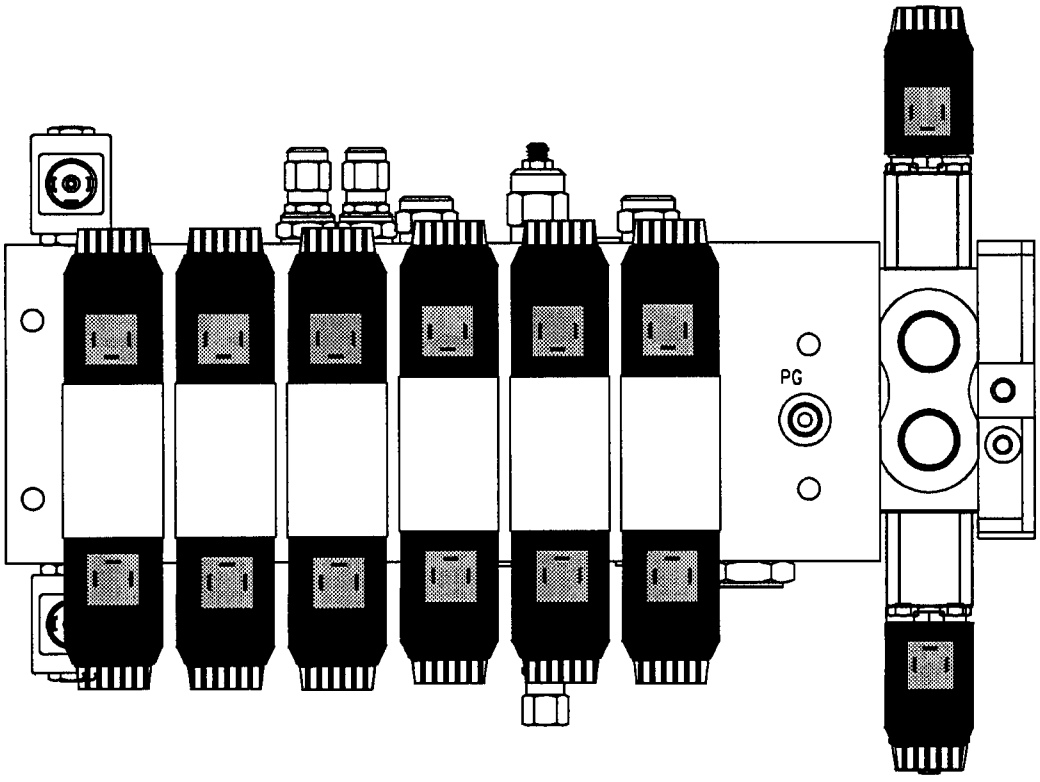


SERVICE & ADJUSTMENTS

NOTES

P/N 81516 FUNCTIONS VALVE

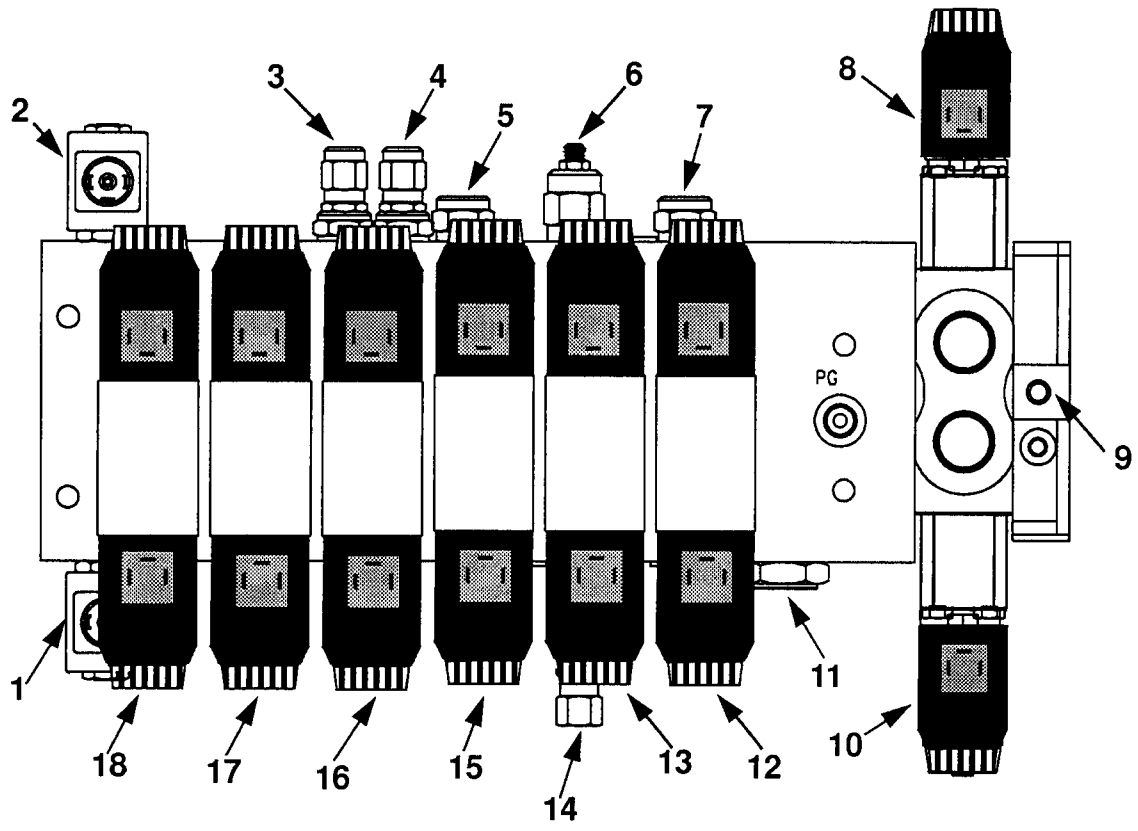
(used on all CH44C/CH50C supersedes P/N 81443 on CH60C/CH66C/CH80C/CH100C)



P/N 81516 FUNCTIONS VALVE

(see R/H page for component identification)

TOP VIEW



LEGEND: COMPONENTS P/N 81516 VALVE

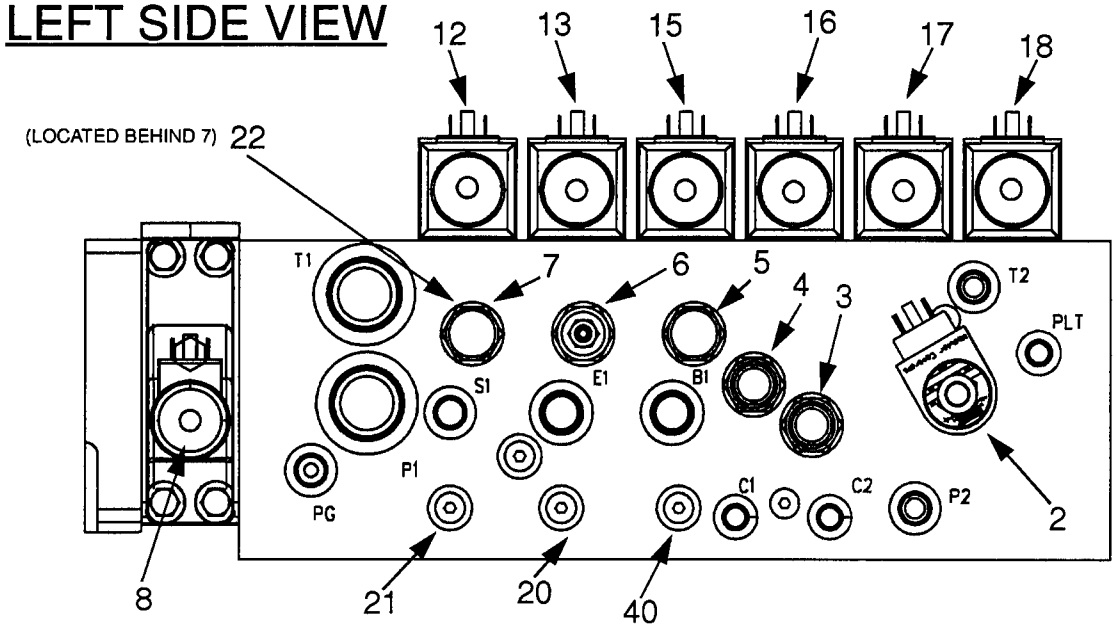
1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------OSCILLATIING AXLE SOLENOID VALVE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------TURRET ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL

SERVICE & ADJUSTMENTS

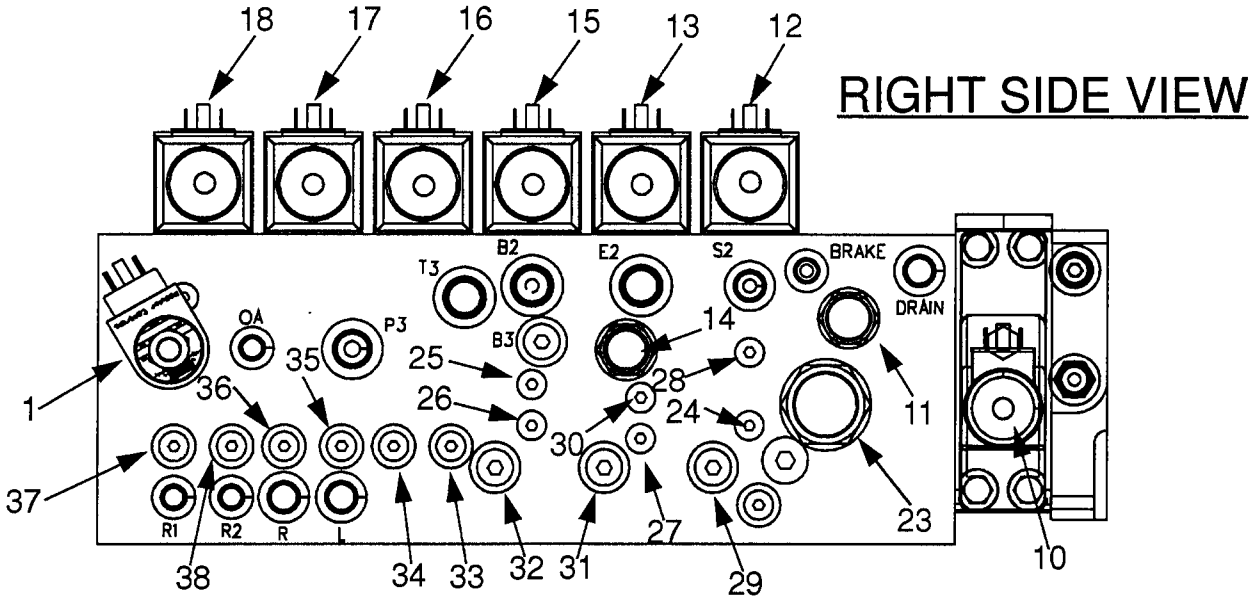
P/N 81516 FUNCTIONS VALVE

(see R/H page for component identification)

LEFT SIDE VIEW



RIGHT SIDE VIEW



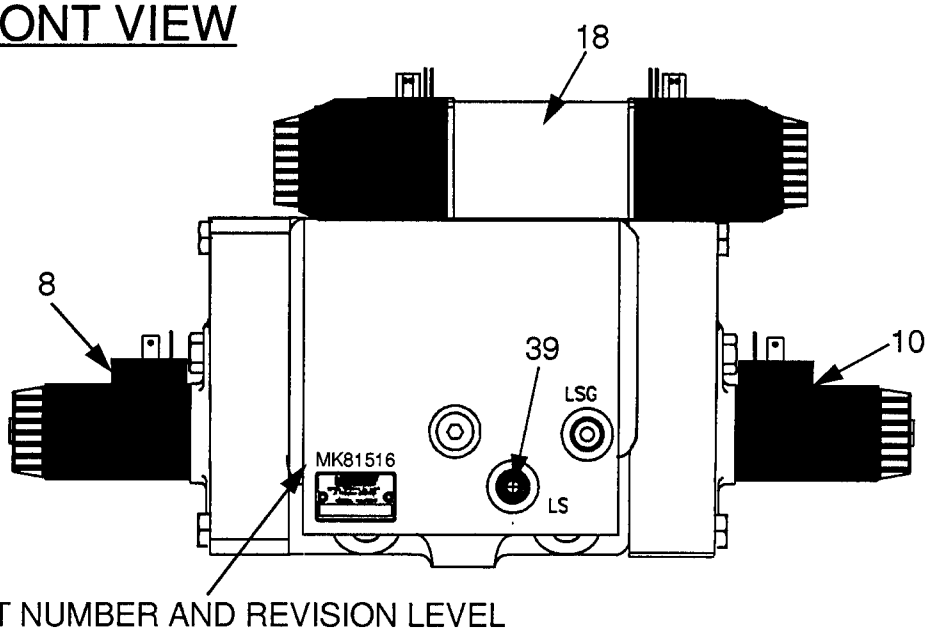
LEGEND: COMPONENTS P/N 81516 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------OSCILLATIING AXLE SOLENOID VALVE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------TURRET ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL

P/N 81516 FUNCTIONS VALVE

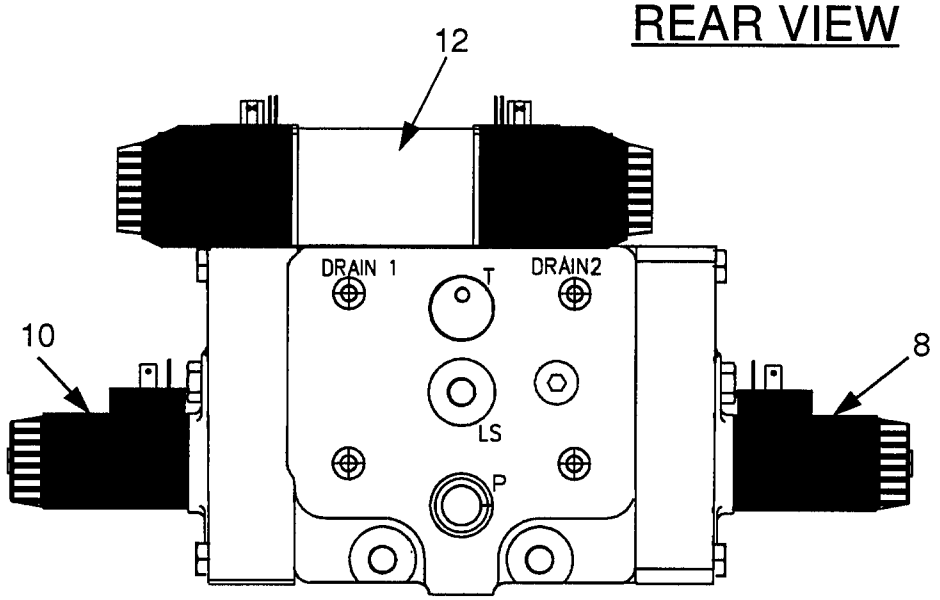
(see R/H page for component identification)

FRONT VIEW



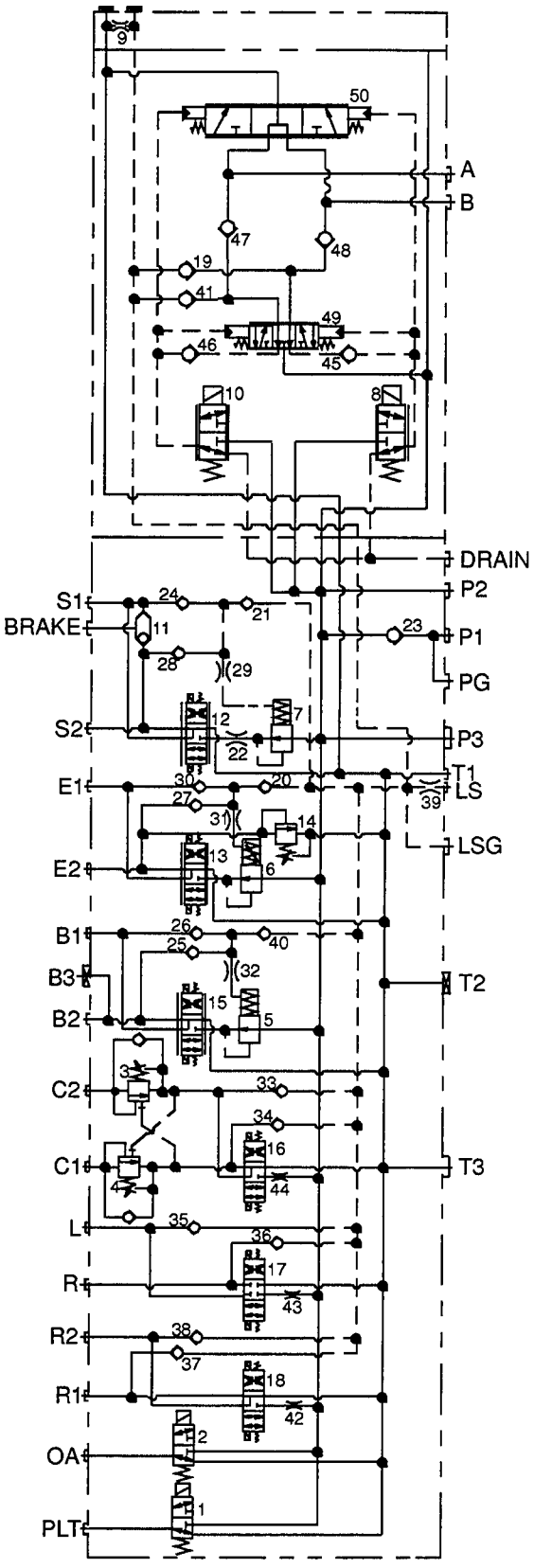
PART NUMBER AND REVISION LEVEL

REAR VIEW



LEGEND: COMPONENTS P/N 81516 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------OSCILLATIING AXLE SOLENOID VALVE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------TURRET ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
46. ----------DRIVE REVERSE LOAD SENSE SIGNAL UNLOADING CHECK VALVE
47. ----------FORWARD DRIVE CHECK VALVE
48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL



HYDRAULIC SCHEMATIC P/N 81516

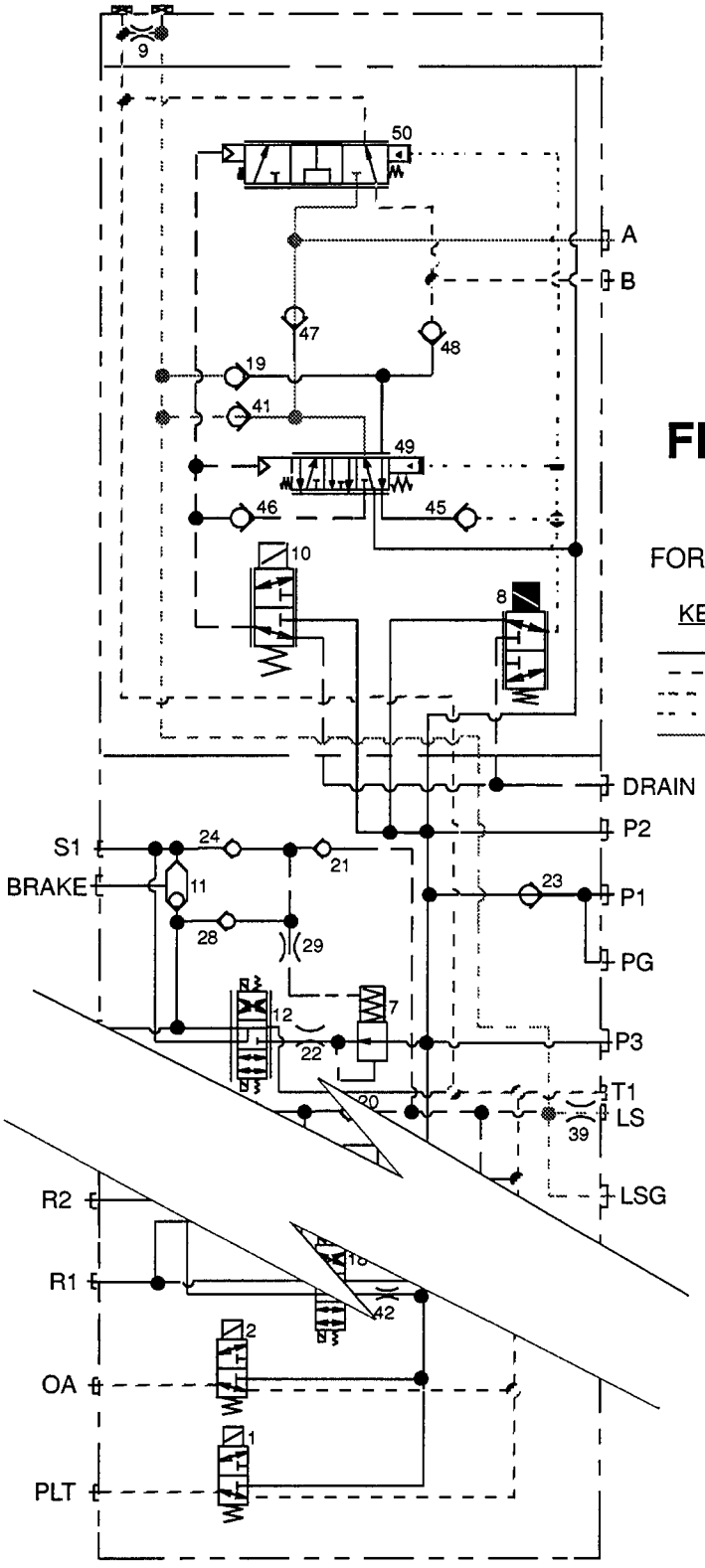
(see R/H page for component identification)

KEY TO PORT IDENTIFICATION

A.....DRIVE FORWARD
B.....DRIVE REVERSE
B1.....BOOM LIFT
B2.....BOOM LOWER
B3.....N/A (BLOCKED)
BRAKE.....ROTATION BRAKE RELEASE
C1.....PLATFORM LEVELING DOWN
C2.....PLATFORM LEVELING UP
DRAIN.....LOAD SENSE DRAIN
E1.....BOOM RETRACT
E2.....BOOM EXTEND
L.....STEER LEFT
LS.....LOAD SENSE SIGNAL TO PUMP
LSG.....LOAD SENSE PRESSURE TEST
OA.....OSCILLATING AXLE PILOT SIGNAL
P1.....MAIN PUMP INLET
P2.....EMERGENCY PUMP INLET
P3.....JIB VALVE SUPPLY
PG.....PRESSURE TEST
PLT.....HIGH SPEED TRAVEL PILOT SIGNAL
R.....STEER RIGHT
R1.....PLATFORM ROTATE RIGHT
R2.....PLATFORM ROTATE LEFT
S1.....TURRET ROTATE RIGHT
S2.....TURRET ROTATE LEFT
T1.....TANK RETURN
T2.....N/A (BLOCKED)
T3.....JIB VALVE RETURN

LEGEND: COMPONENTS P/N 81516 VALVE

1. ----------HIGH SPEED DRIVE SOLENOID VALVE
2. ----------OSCILLATIING AXLE SOLENOID VALVE
3. ----------PLATFORM LEVELING UP COUNTERBALANCE VALVE
4. ----------PLATFORM LEVELING DOWN COUNTERBALANCE VALVE
5. ----------BOOM LIFT/LOWER DIFFERENTIAL PRESSURE SENSING VALVE
6. ----------BOOM EXTEND/RETRACT DIFFERENTIAL PRESSURE SENSING VALVE
7. ----------TURRET ROTATION DIFFERENTIAL PRESSURE SENSING VALVE
8. ----------FORWARD DRIVE PROPORTIONAL SOLENOID VALVE
9. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL UNLOADING ORIFICE
10. ---------- REVERSE DRIVE PROPORTIONAL SOLENOID VALVE
11. ----------TURRET ROTATION GEAR BOX BRAKE RELEASE SHUTTLE VALVE
12. ----------TURRET ROTATION PROPORTIONAL DIRECTIONAL CONTROL VALVE
13. ----------BOOM EXTEND/RETRACT PROPORTIONAL DIRECTIONAL CONTROL VALVE
14. ----------BOOM EXTENSION RELIEF VALVE
15. ----------BOOM LIFT/LOWER PROPORTIONAL DIRECTIONAL CONTROL VALVE
16. ----------PLATFORM LEVELING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
17. ----------STEERING NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
18. ----------PLATFORM ROTATION NON-PROPORTIONAL DIRECTIONAL CONTROL VALVE
19. ----------REVERSE DRIVE LOAD SENSE CHECK VALVE
20. ----------BOOM EXTEND/RETRACT LOAD SENSE CHECK VALVE
21. ----------TURRET ROTATION RIGHT/LEFT LOAD SENSE CHECK VALVE
22. ----------TURRET ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
23. ----------MAIN PUMP CHECK VALVE
24. ----------TURRET ROTATE RIGHT LOAD SENSE CHECK VALVE
25. ----------BOOM DOWN LOAD SENSE CHECK VALVE
26. ----------BOOM UP LOAD SENSE CHECK VALVE
27. ----------BOOM EXTEND LOAD SENSE CHECK VALVE
28. ----------TURRET ROTATE LEFT LOAD SENSE CHECK VALVE
29. ----------TURRET ROTATION PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
30. ----------BOOM RETRACT LOAD SENSE CHECK VALVE
31. ----------BOOM EXTEND/RETRACT PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
32. ----------BOOM LIFT/LOWER PRESSURE DIFFERENTIAL SENSING VALVE DAMPENING ORIFICE
33. ----------PLATFORM LEVEL DOWN LOAD SENSE CHECK VALVE
34. ----------PLATFORM LEVEL UP LOAD SENSE CHECK VALVE
35. ----------STEER LEFT LOAD SENSE CHECK VALVE
36. ----------STEER RIGHT LOAD SENSE CHECK VALVE
37. ----------PLATFORM ROTATE RIGHT LOAD SENSE CHECK VALVE
38. ----------PLATFORM ROTATE LEFT LOAD SENSE CHECK VALVE
39. ----------PUMP COMPENSATOR LOAD SENSE SIGNAL DAMPENING ORIFICE
40. ----------BOOM LIFT/LOWER LOAD SENSE CHECK VALVE
41. ----------FORWARD DRIVE LOAD SENSE CHECK VALVE
42. ----------PLATFORM ROTATION DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
43. ----------STEERING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
44. ----------PLATFORM LEVELING DIRECTIONAL CONTROL VALVE FLOW LIMITING ORIFICE
45. ----------DRIVE FORWARD LOAD SENSE SIGNAL UNLOADING CHECK VALVE
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48. ----------REVERSE DRIVE CHECK VALVE
49. ----------DRIVE "METER- IN" SPOOL
50. ----------DRIVE "METER-OUT" SPOOL



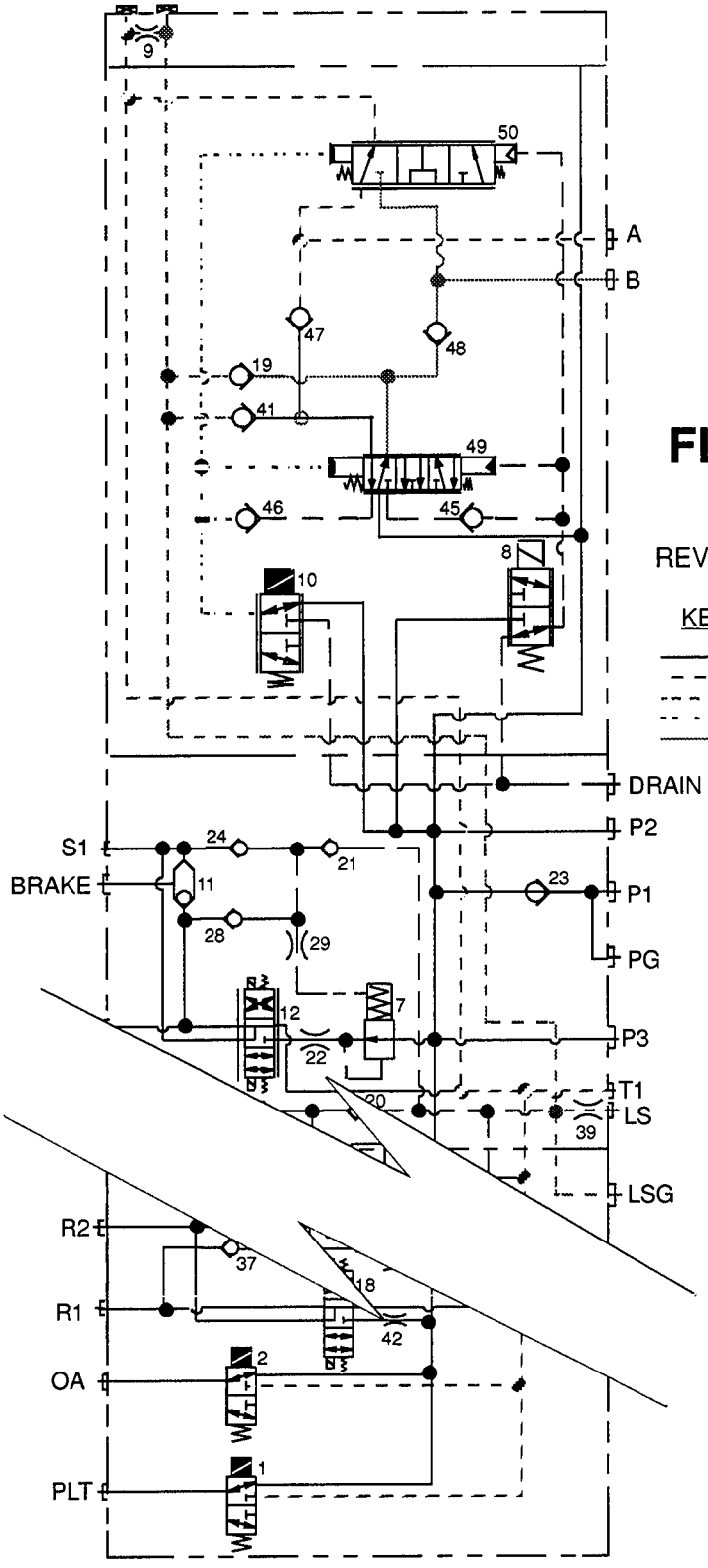
FLOW DIAGRAM

P/N 81516

LOW SPEED DRIVE
FORWARD DIRECTION OF TRAVEL

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW



FLOW DIAGRAM

P/N 81516

HI SPEED DRIVE
REVERSE DIRECTION OF TRAVEL

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW

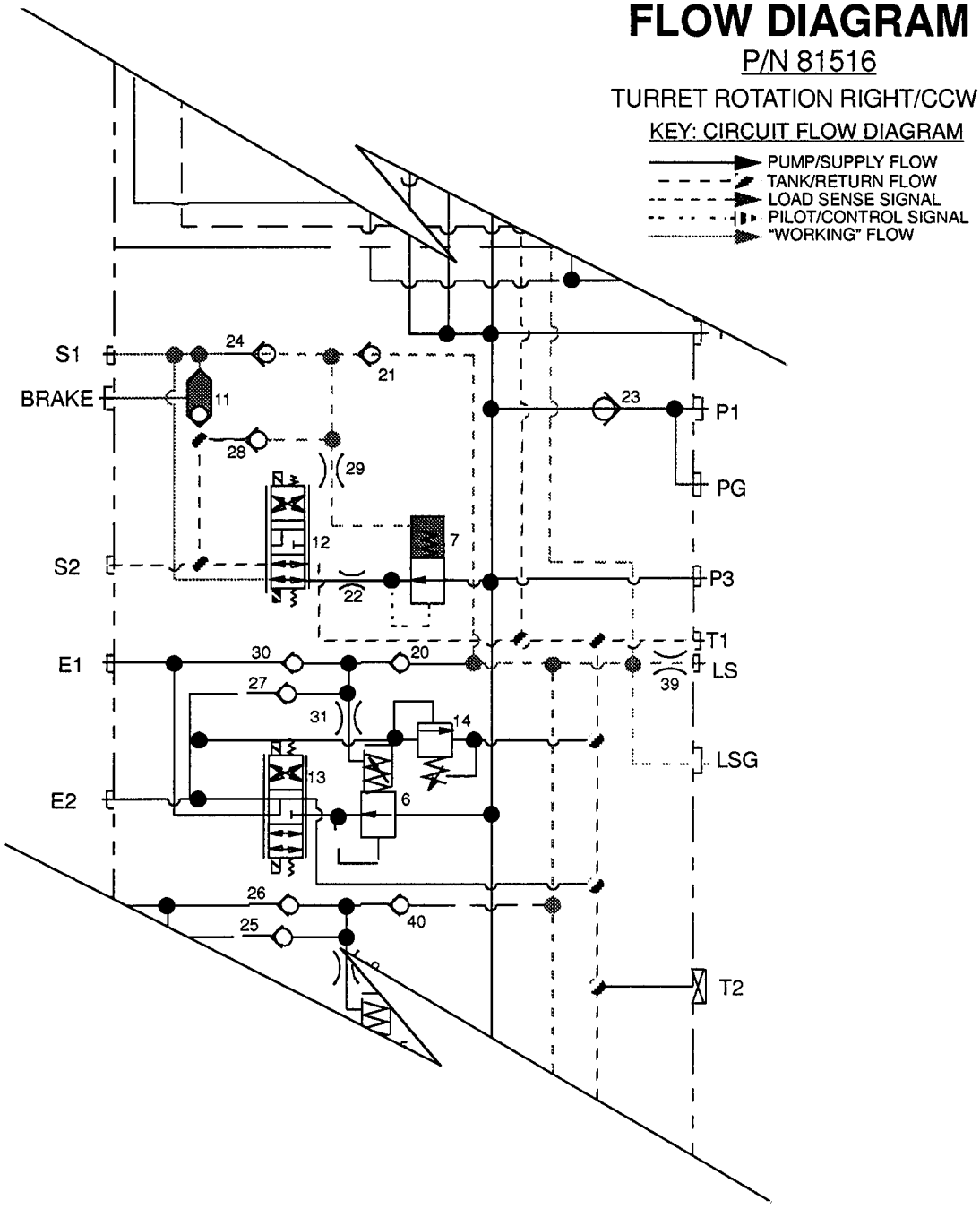
SERVICE & ADJUSTMENTS

FLOW DIAGRAM

P/N 81516

TURRET ROTATION RIGHT/CCW

KEY: CIRCUIT FLOW DIAGRAM



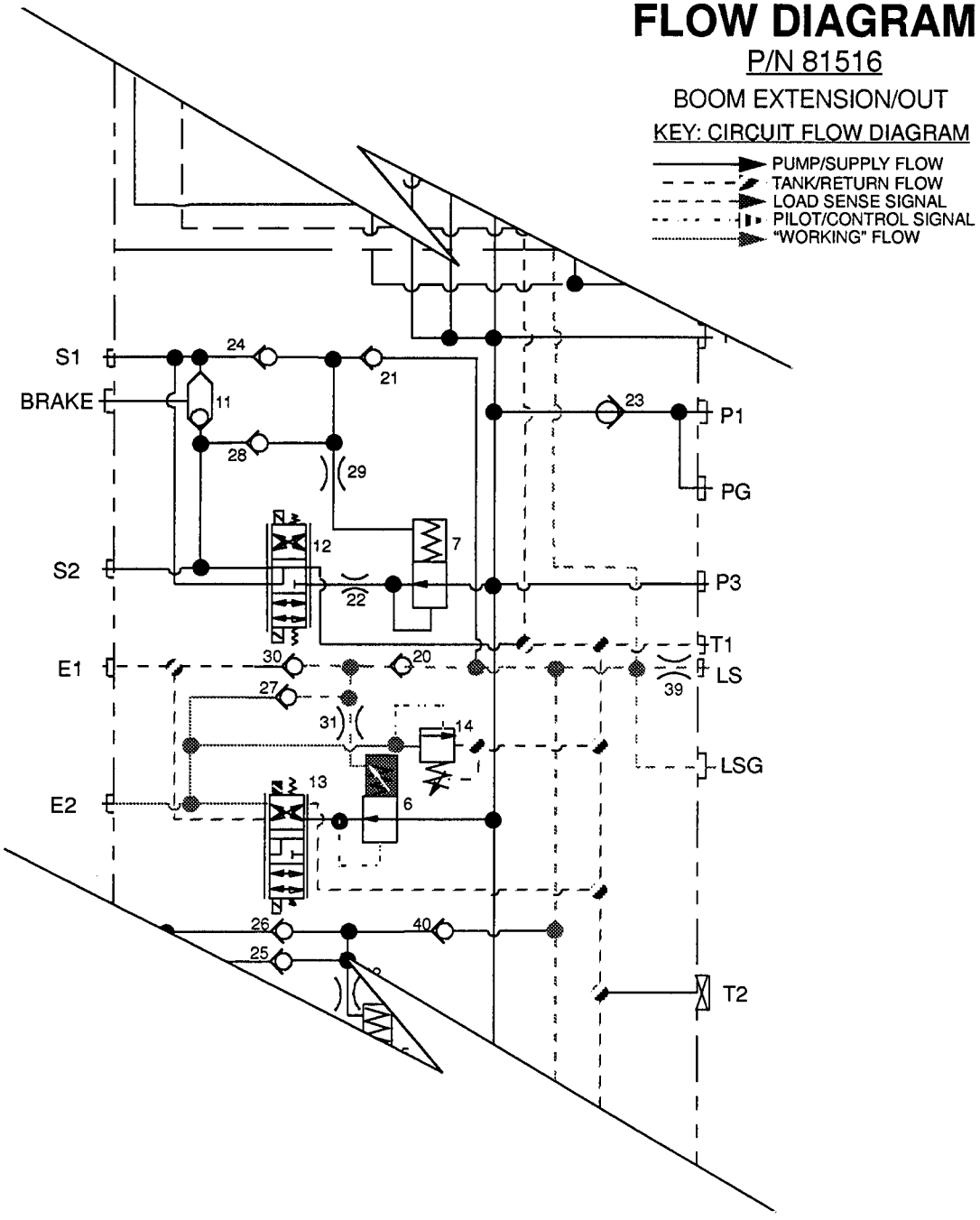
FLOW DIAGRAM

P/N 81516

BOOM EXTENSION/OUT

KEY: CIRCUIT FLOW DIAGRAM

- PUMP/SUPPLY FLOW
- TANK/RETURN FLOW
- LOAD SENSE SIGNAL
- PILOT/CONTROL SIGNAL
- "WORKING" FLOW

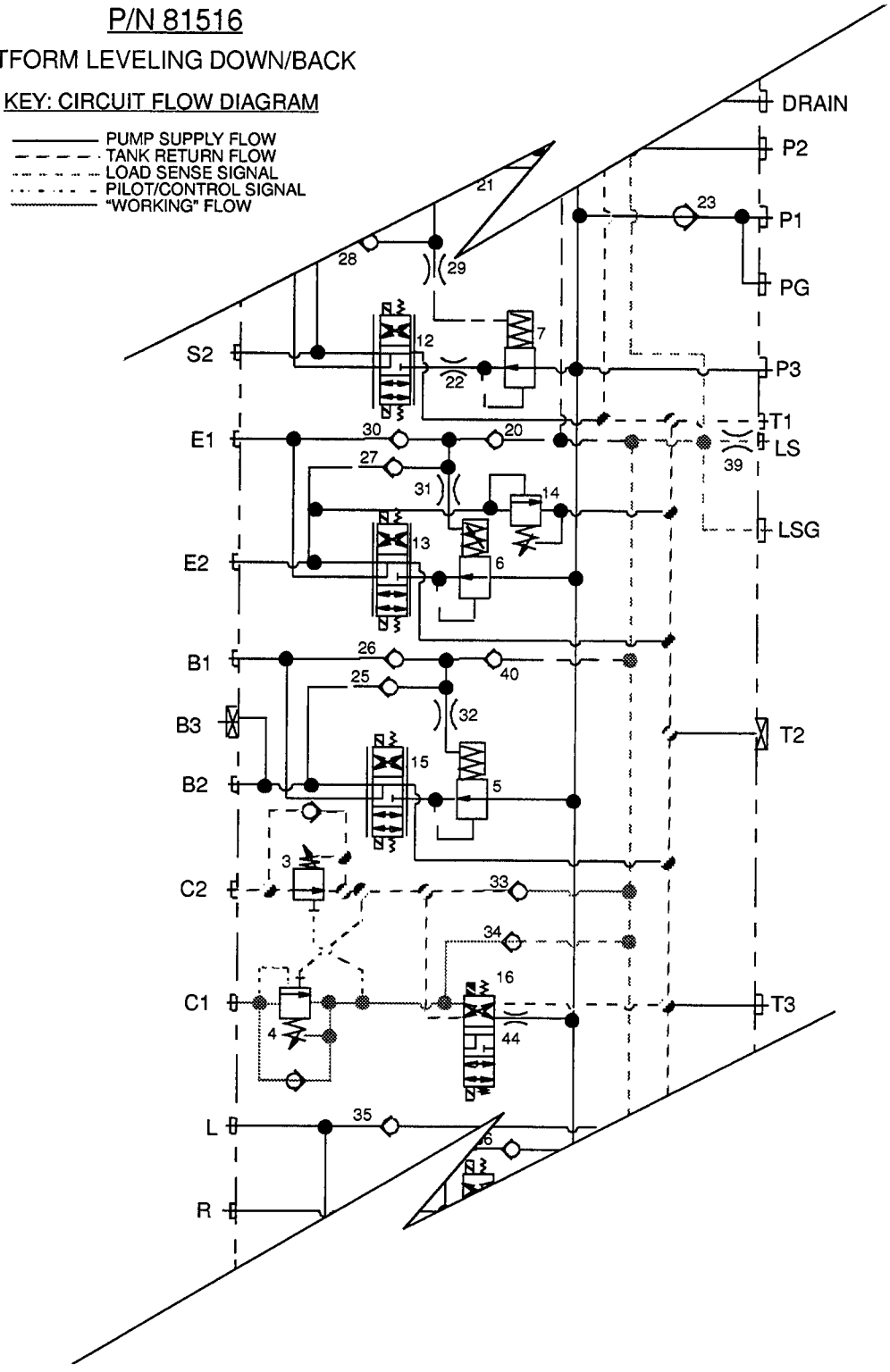


FLOW DIAGRAM

P/N 81516

PLATFORM LEVELING DOWN/BACK

KEY: CIRCUIT FLOW DIAGRAM

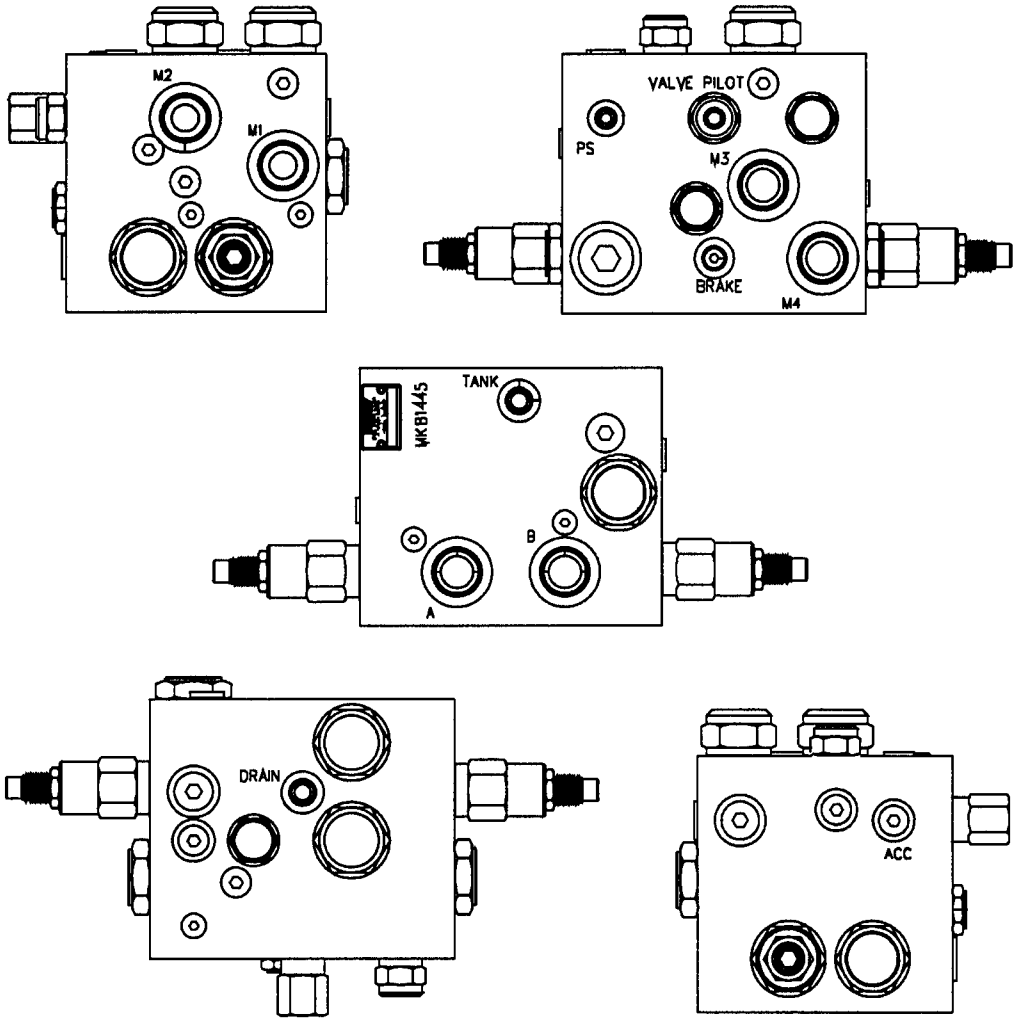


SERVICE & ADJUSTMENTS

NOTES

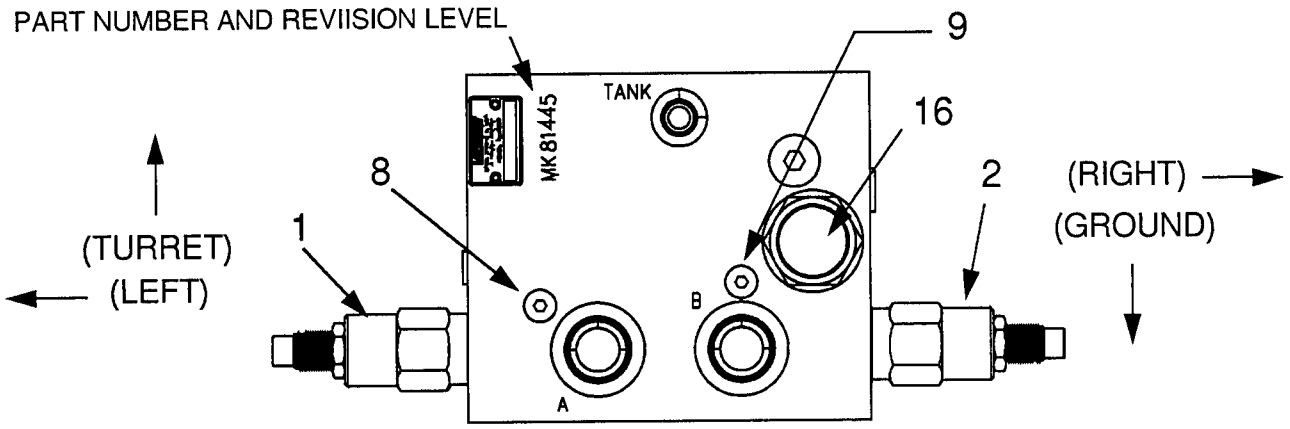
P/N 81445 "2 WHEEL DRIVE" VALVE

(used on all CH44C/CH50C/CH60C/CH66C with 2 wheel drive)



P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEW FROM STEERING AXLE END)

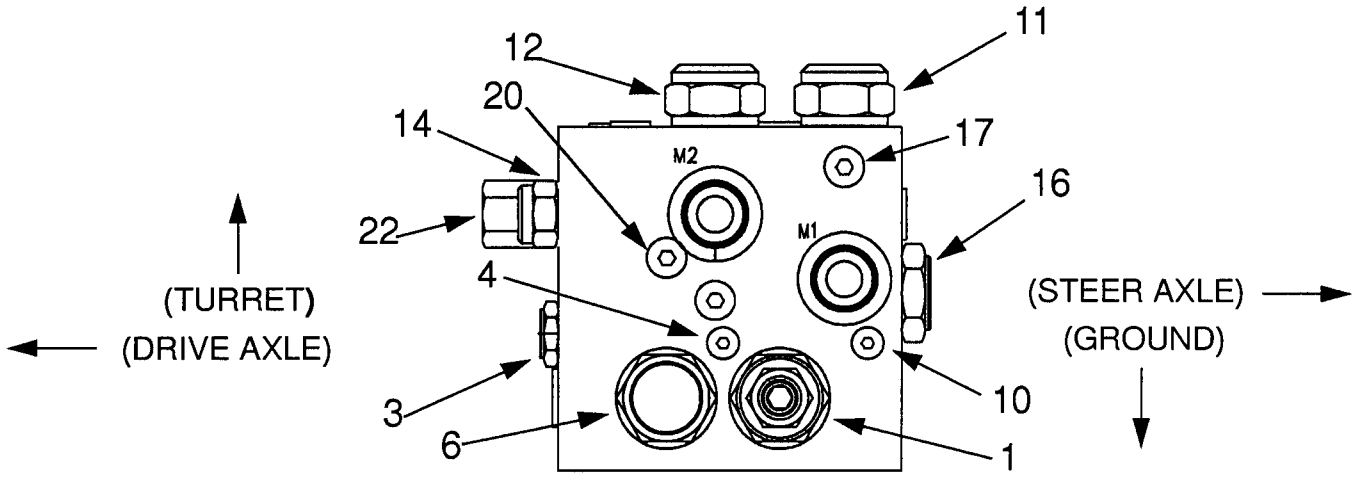


LEGEND: COMPONENT IDENTIFICATION

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
8. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
9. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
10. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
11. .....DIFFERENTIAL PRESSURE SENSING VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEWED FROM LEFT HAND SIDE)



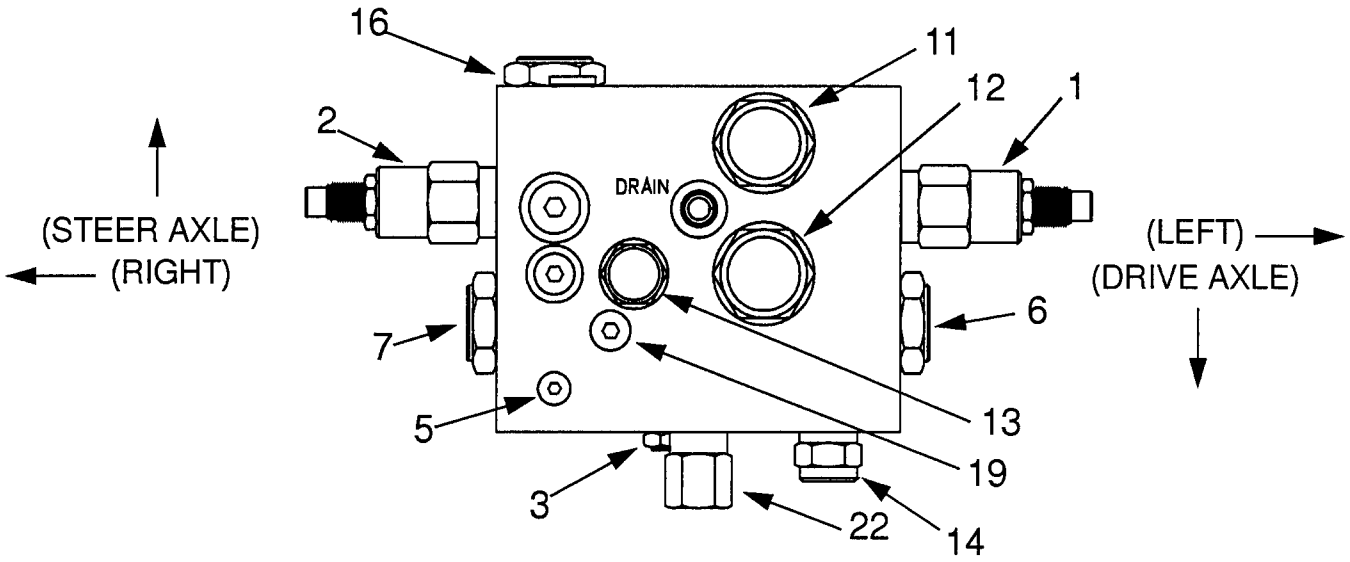
LEGEND: COMPONENT IDENTIFICATION

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
8. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
9. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
10. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
11. .....DIFFERENTIAL PRESSURE SENSING VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

SERVICE & ADJUSTMENTS

P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEWED FROM TURRET SIDE DOWN)

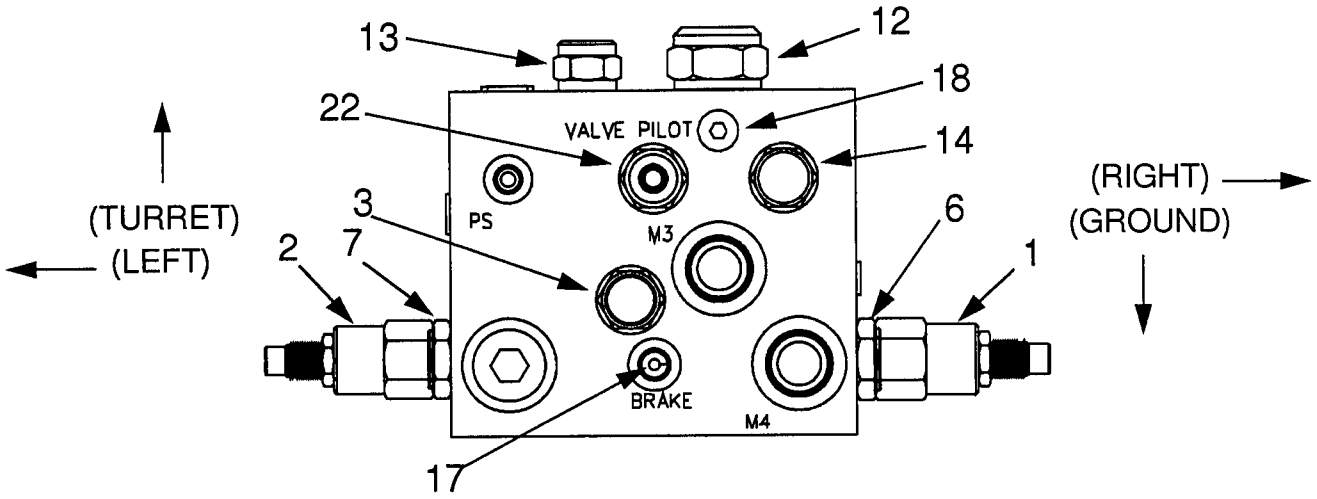


LEGEND: COMPONENT IDENTIFICATION

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
8. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
9. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
10. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
11. .....DIFFERENTIAL PRESSURE SENSING VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEWED FROM DRIVE AXLE END)



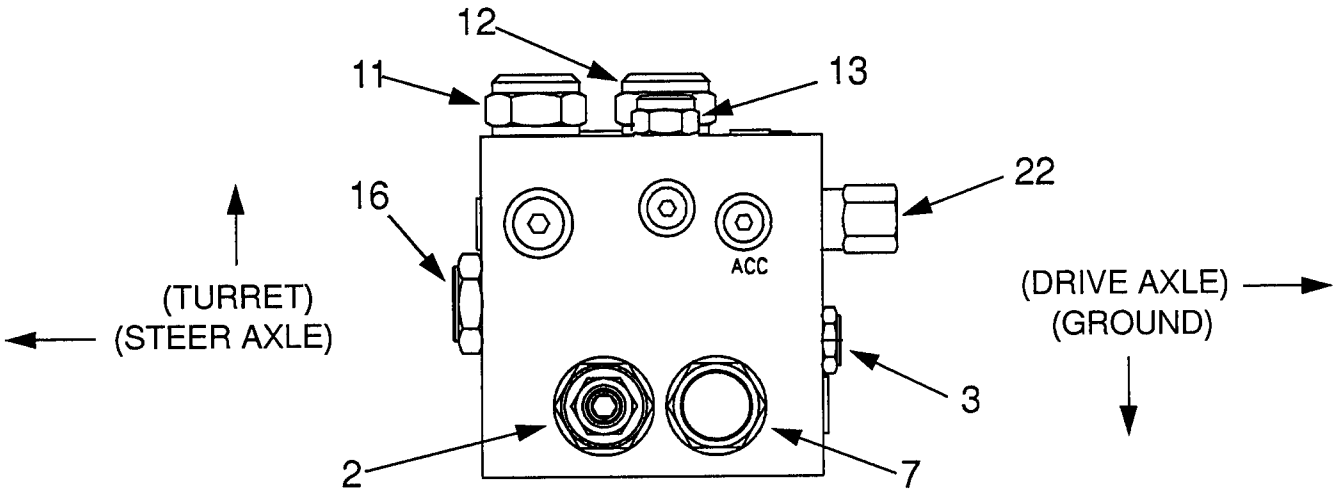
LEGEND: COMPONENT IDENTIFICATION

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
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12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

SERVICE & ADJUSTMENTS

P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEWED FROM RIGHT HAND SIDE)



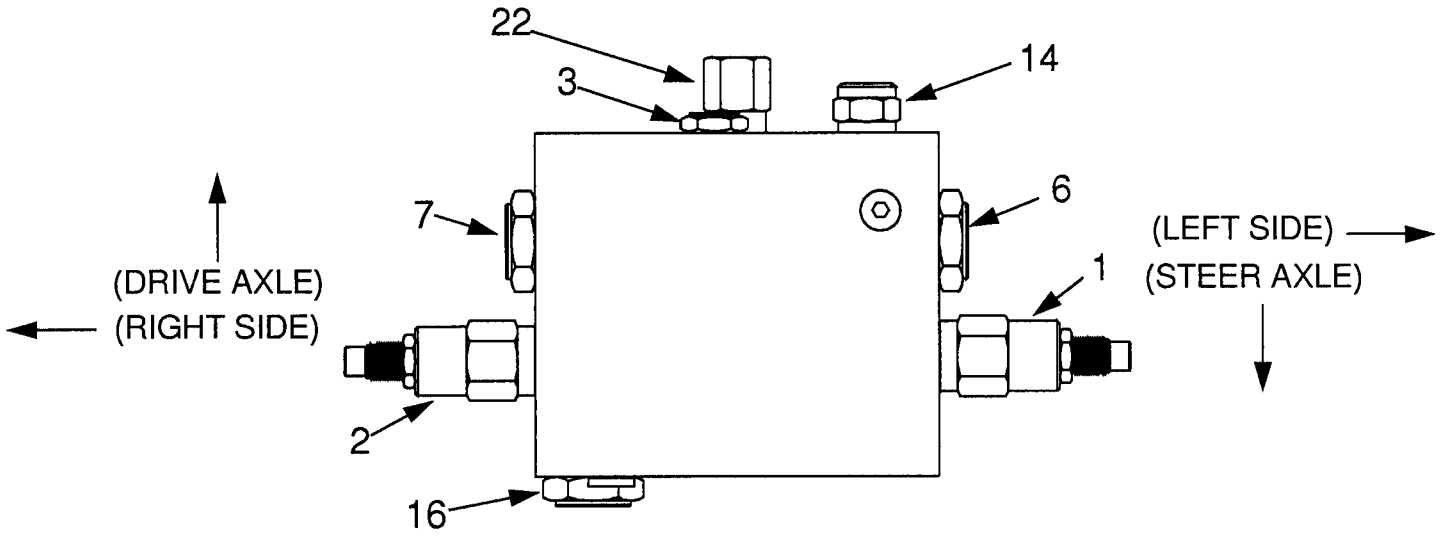
LEGEND: COMPONENT IDENTIFICATION

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
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14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

SERVICE & ADJUSTMENTS

P/N 81445 "2 WHEEL DRIVE" VALVE

(VIEWED FROM GROUND SIDE UP)



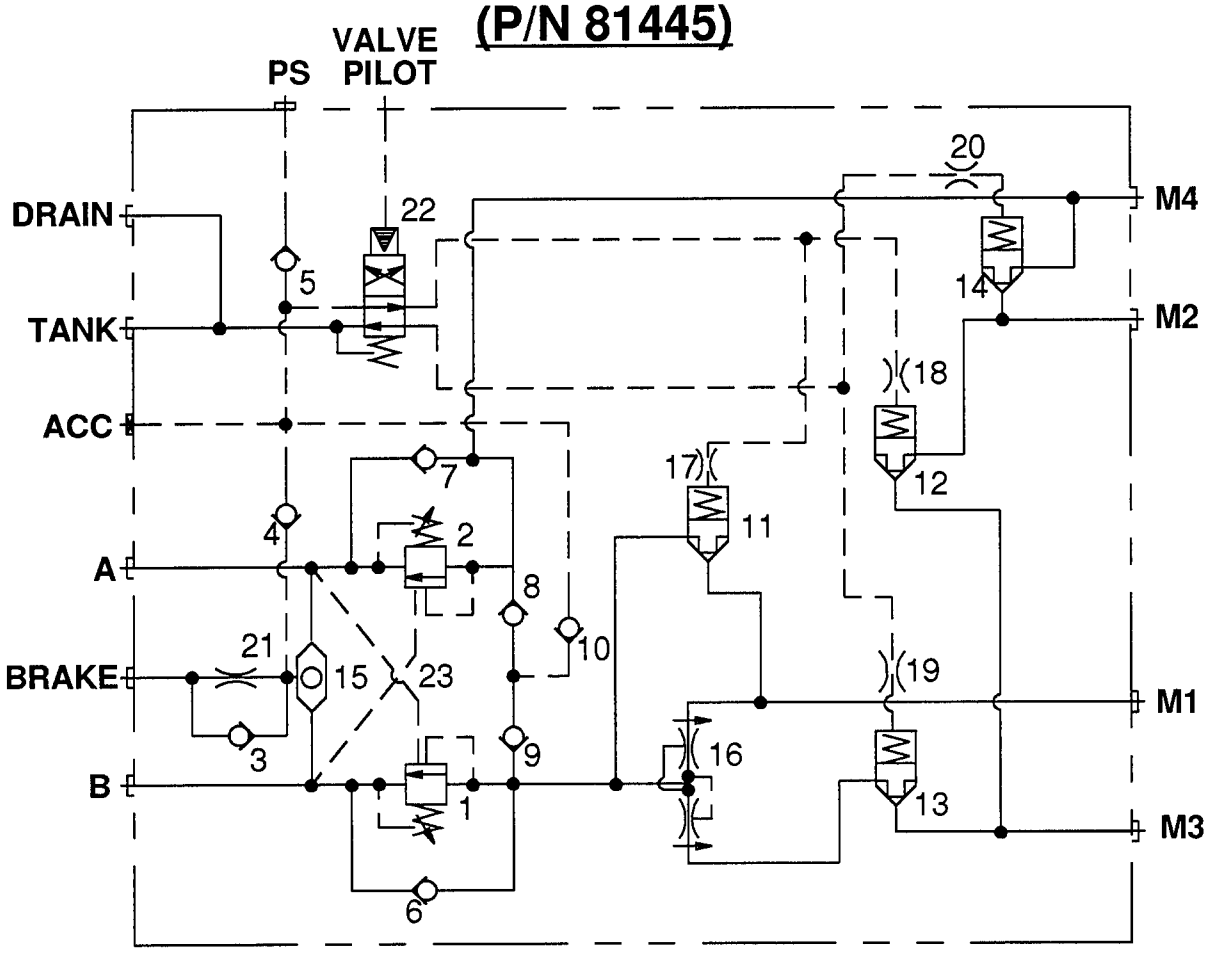
LEGEND: COMPONENT IDENTIFICATION

)

1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
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6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
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18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
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20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
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22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

SERVICE & ADJUSTMENTS

HYDRAULIC SCHEMATIC (P/N 81445)



KEY TO PORT IDENTIFICATION

A.....FORWARD DRIVE
ACC.....N/A (BLOCKED)
B.....REVERSE DRIVE
BRAKE.....PARKING BRAKE RELEASE
DRAIN.....DRIVE MOTOR CASE DRAIN
M1.....LEFT HAND DRIVE MOTOR CW ROTATION
M2.....RIGHT HAND DRIVE MOTOR CCW ROTATION
M3.....LEFT HAND DRIVE MOTOR CW ROTATION
M4.....RIGHT HAND DRIVE MOTOR CCW ROTATION
PS.....HIGH SPEED TRAVEL "PILOT SIGNAL"
TANK.....TANK RETURN

SERVICE & ADJUSTMENTS

P/N 81445 "2 WHEEL DRIVE" VALVE

LEGEND: COMPONENT IDENTIFICATION

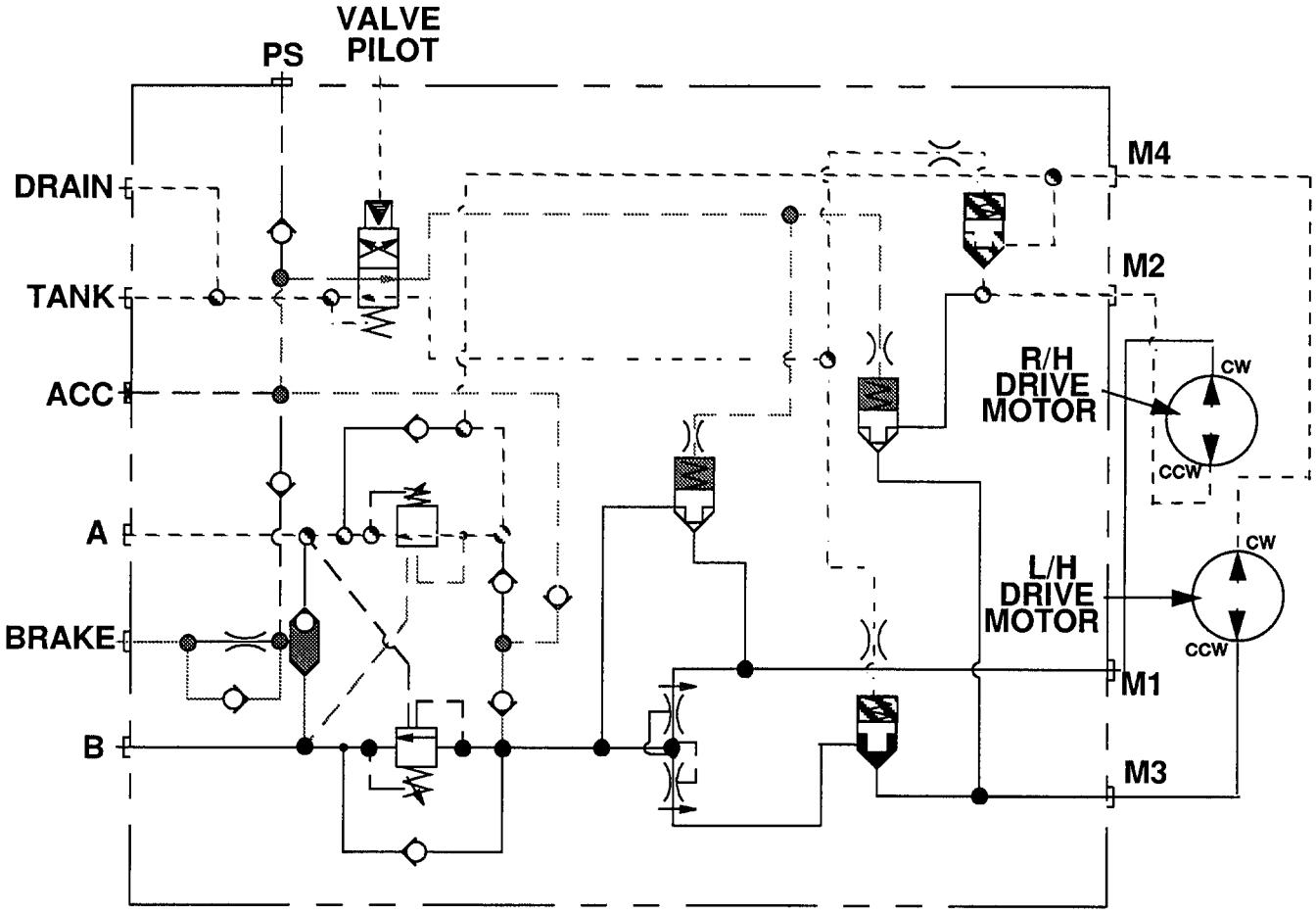
1. .....FORWARD DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....REVERSE DYNAMICBRAKING COUNTERBALANCE VALVE
3. .....PARKING BRAKE RELEASE CHECK VALVE
4. .....HIGH/LOW SPEED TRAVEL PILOT SIGNAL CHECK VALVE
5. .....HIGH SPEED TRAVEL PILOT SIGNAL CHECK VALVE
6. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
7. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
8. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
9. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
10. .....HIGH/LOW SPEED TRAVEL "PILOT" SIGNAL CHECK VALVE
11. .....DIFFERENTIAL PRESSURE SENSING VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....PARKING BRAKE RELEASE SHUTTLE VALVE
16. .....FLOW DIVIDER/COMBINER VALVE
17. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
19. .....DIFFERENTIALPRESSURE SENSING VALVE DAMPENING ORIFICE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
21. .....DIFFERNTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
22. .....HIGH SPEED DRIVE PILOT OPERATED VALVE
23. .....DYNAMIC BRAKING COUNTERBALANCE VALVES PILOT PISTON

FLOW DIAGRAM

P/N 81445

"LOW SPEED" (MOTORS IN PARALLEL) FORWARD TRAVEL

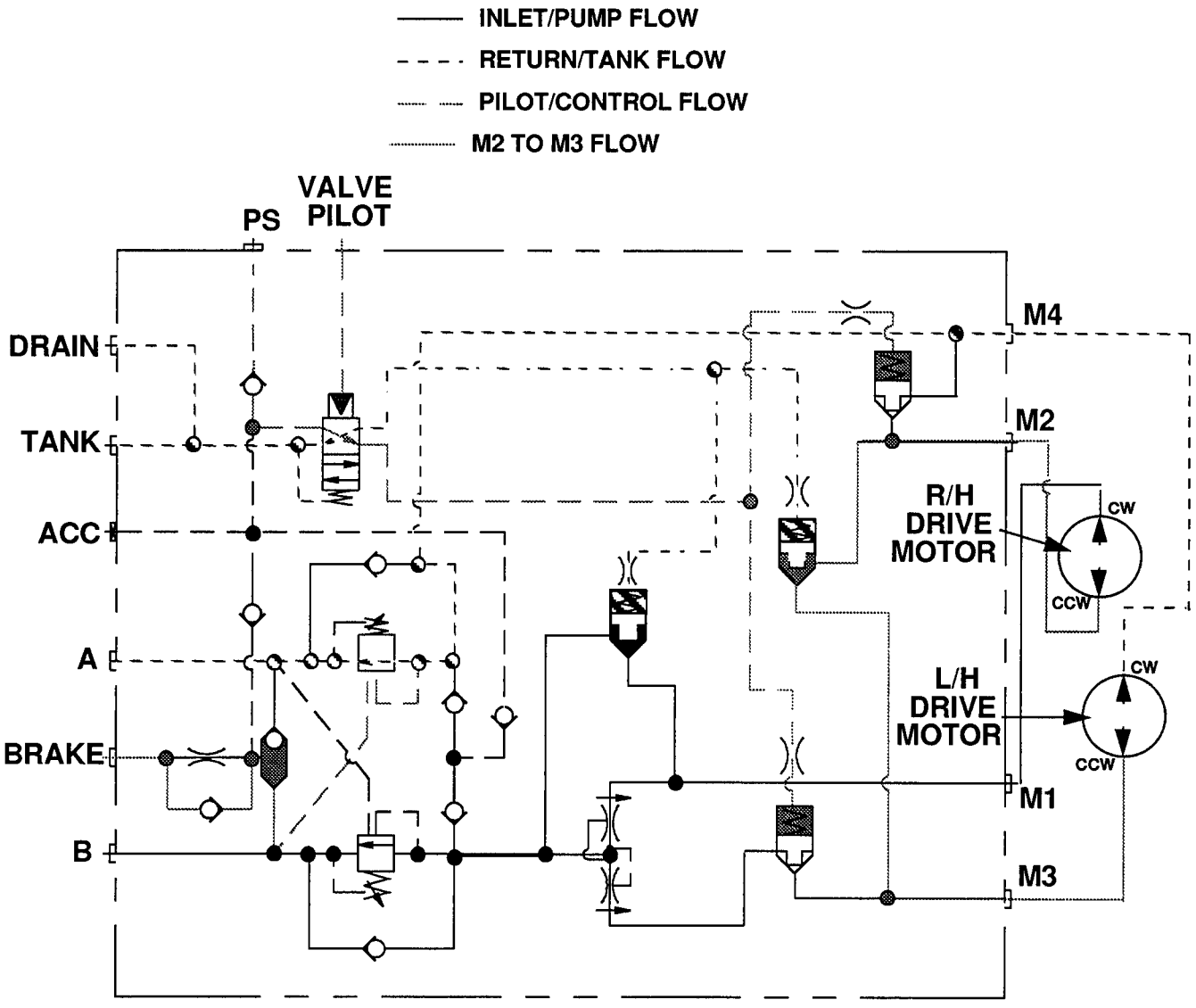
——— INLET/PUMP FLOW
- - - - RETURN/TANK FLOW
..... PILOT/CONTROL FLOW



FLOW DIAGRAM

P/N 81445

"HIGH SPEED" (MOTORS IN SERIES) FORWARD TRAVEL

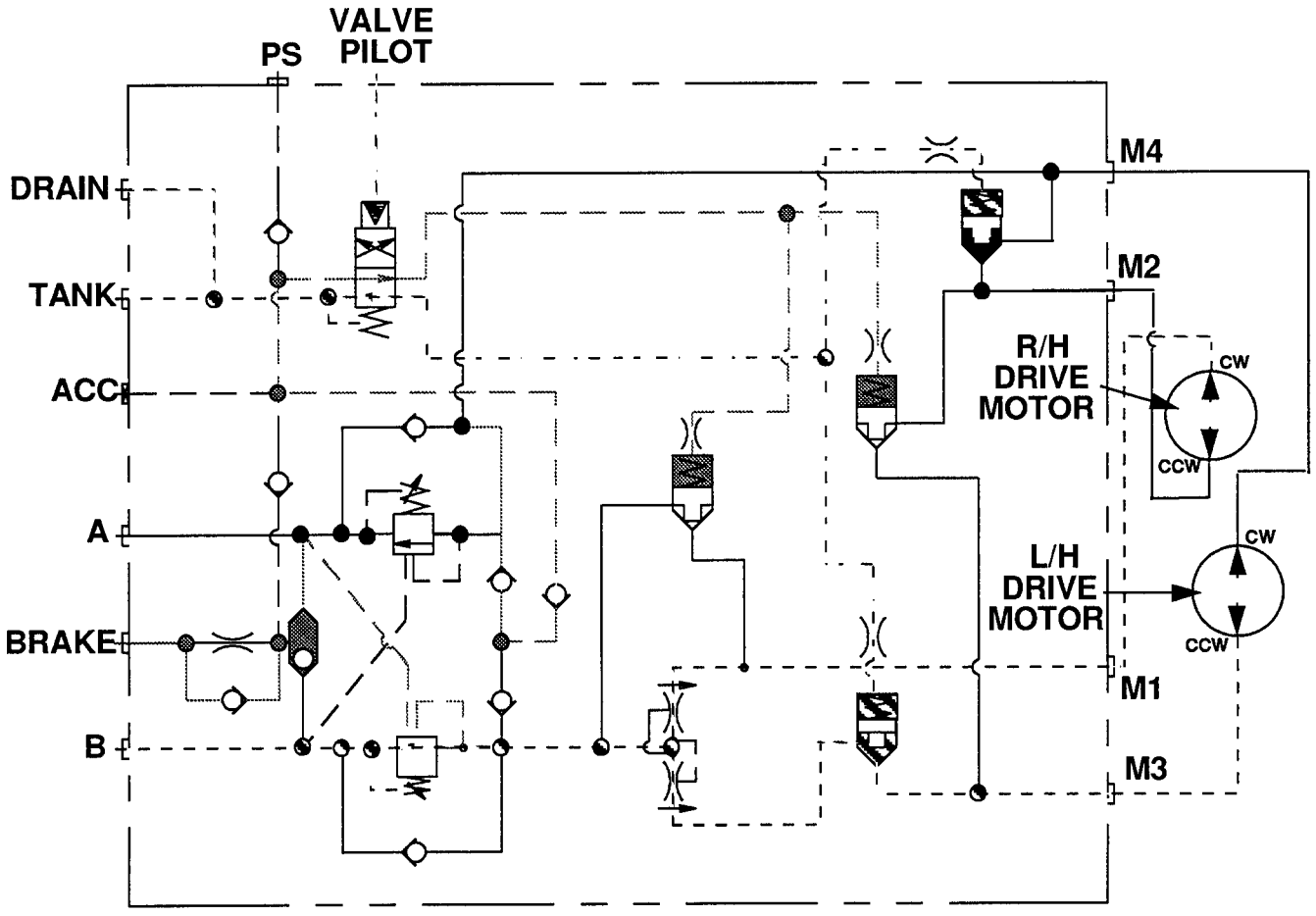


FLOW DIAGRAM

P/N 81445

"LOW SPEED" (MOTORS IN PARALLEL) REVERSE TRAVEL

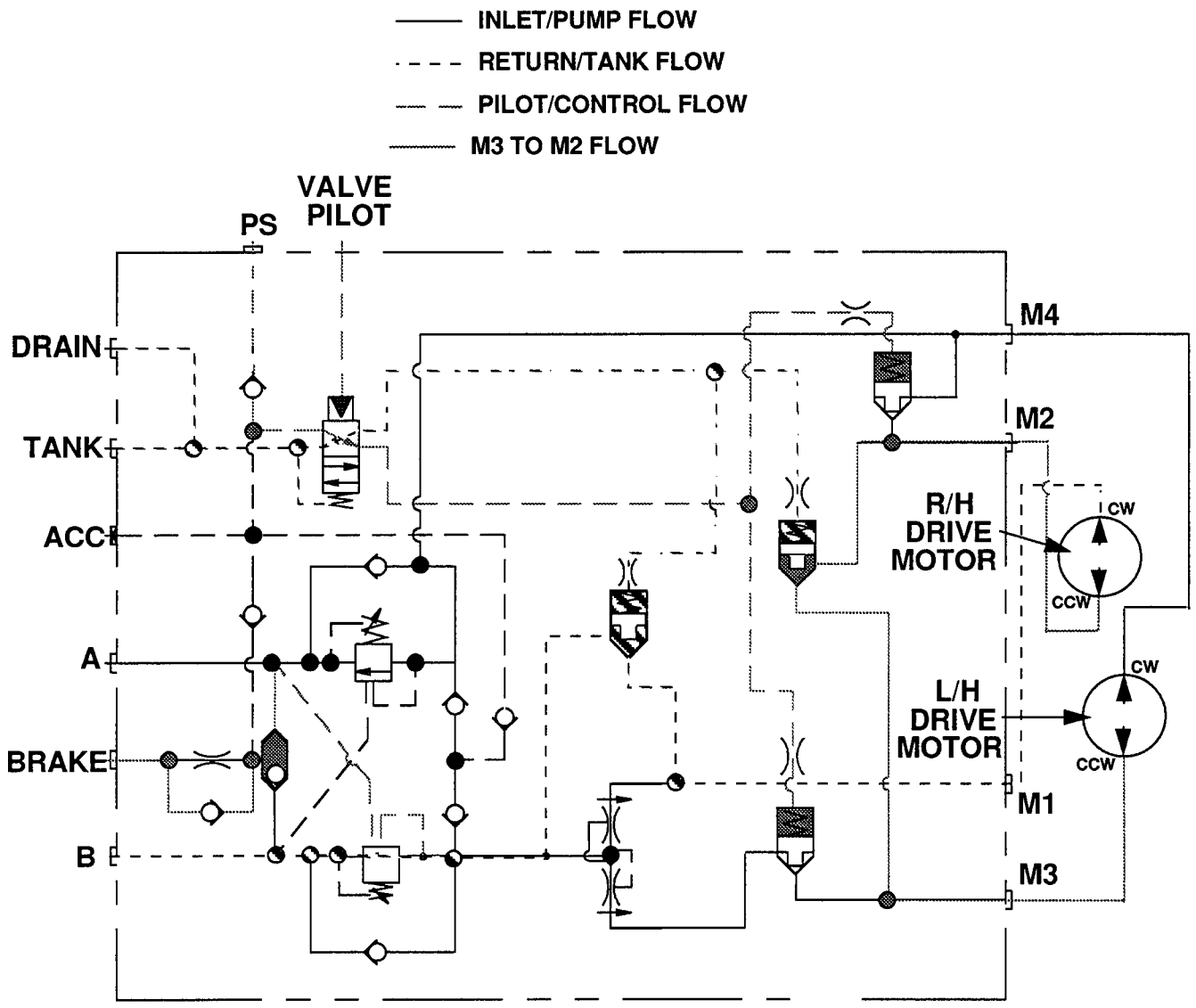
—— INLET/PUMP FLOW
- - - RETURN/TANK FLOW
— — PILOT/CONTROL FLOW



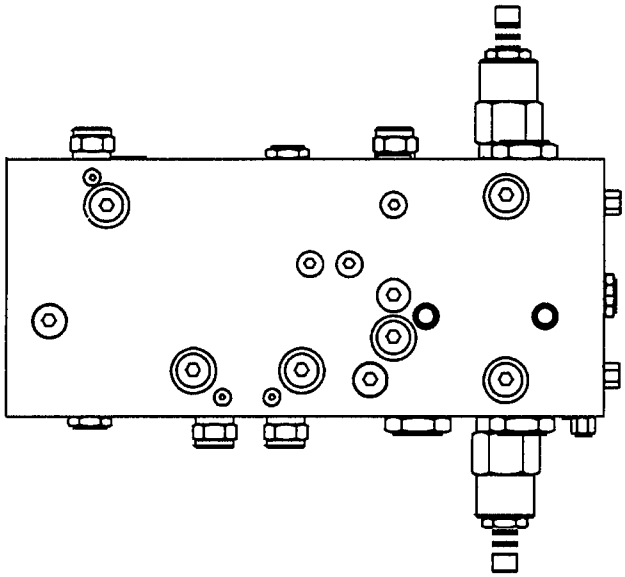
FLOW DIAGRAM

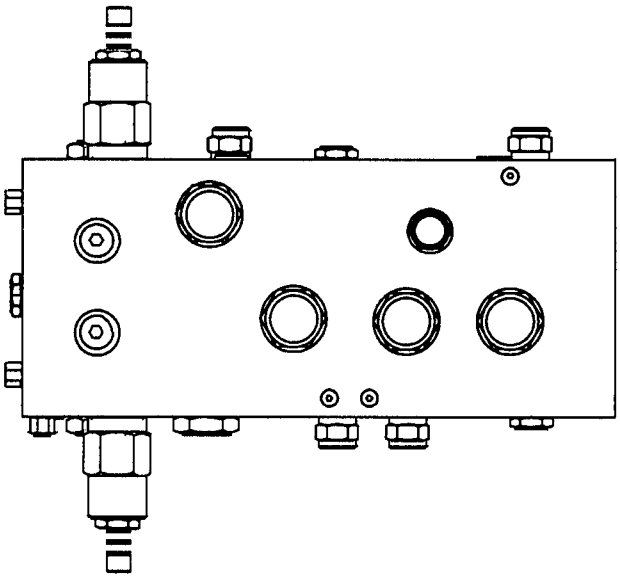
P/N 81445

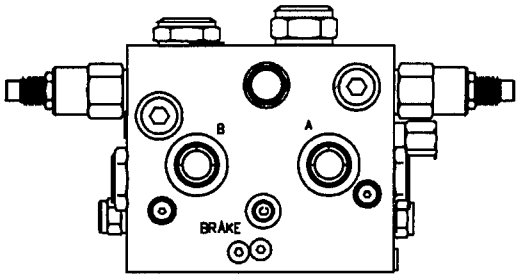
"HIGH SPEED" (MOTORS IN SERIES) REVERSE TRAVEL

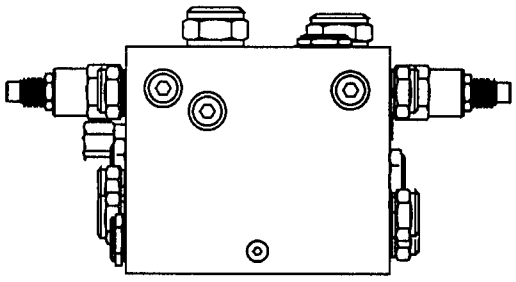


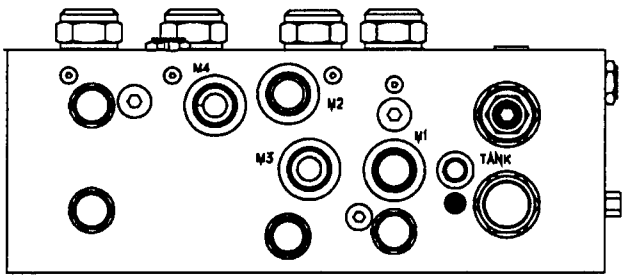
P/N 81446 "4 WHEEL DRIVE" VALVE

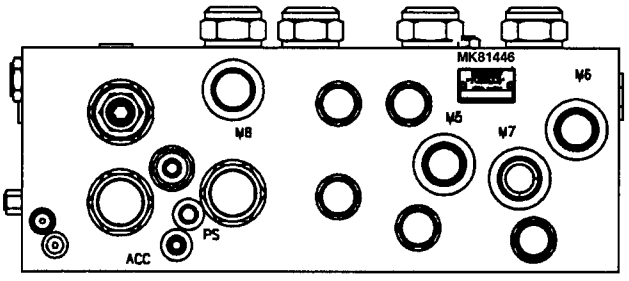




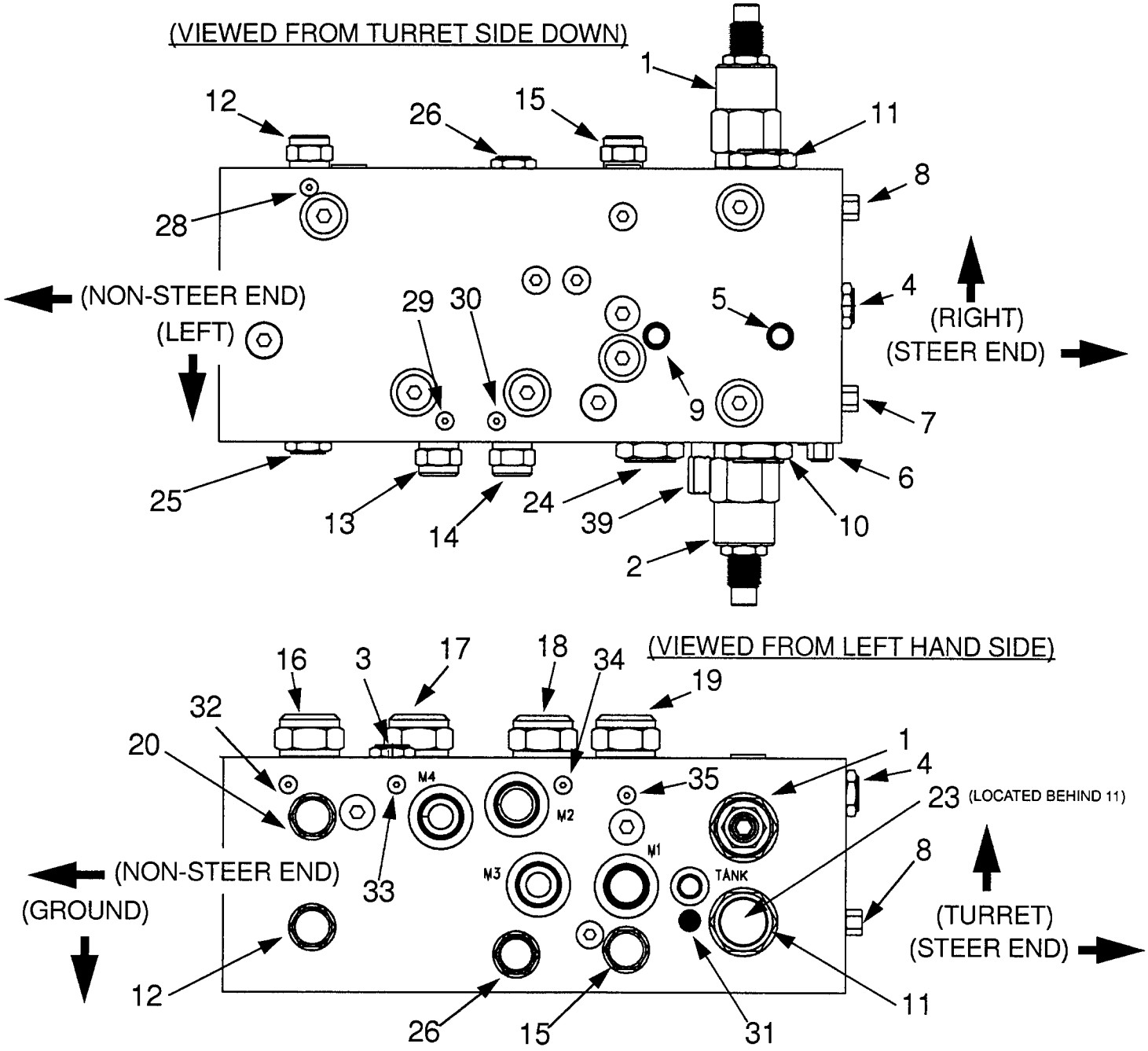








P/N 81446 "4 WHEEL DRIVE" VALVE

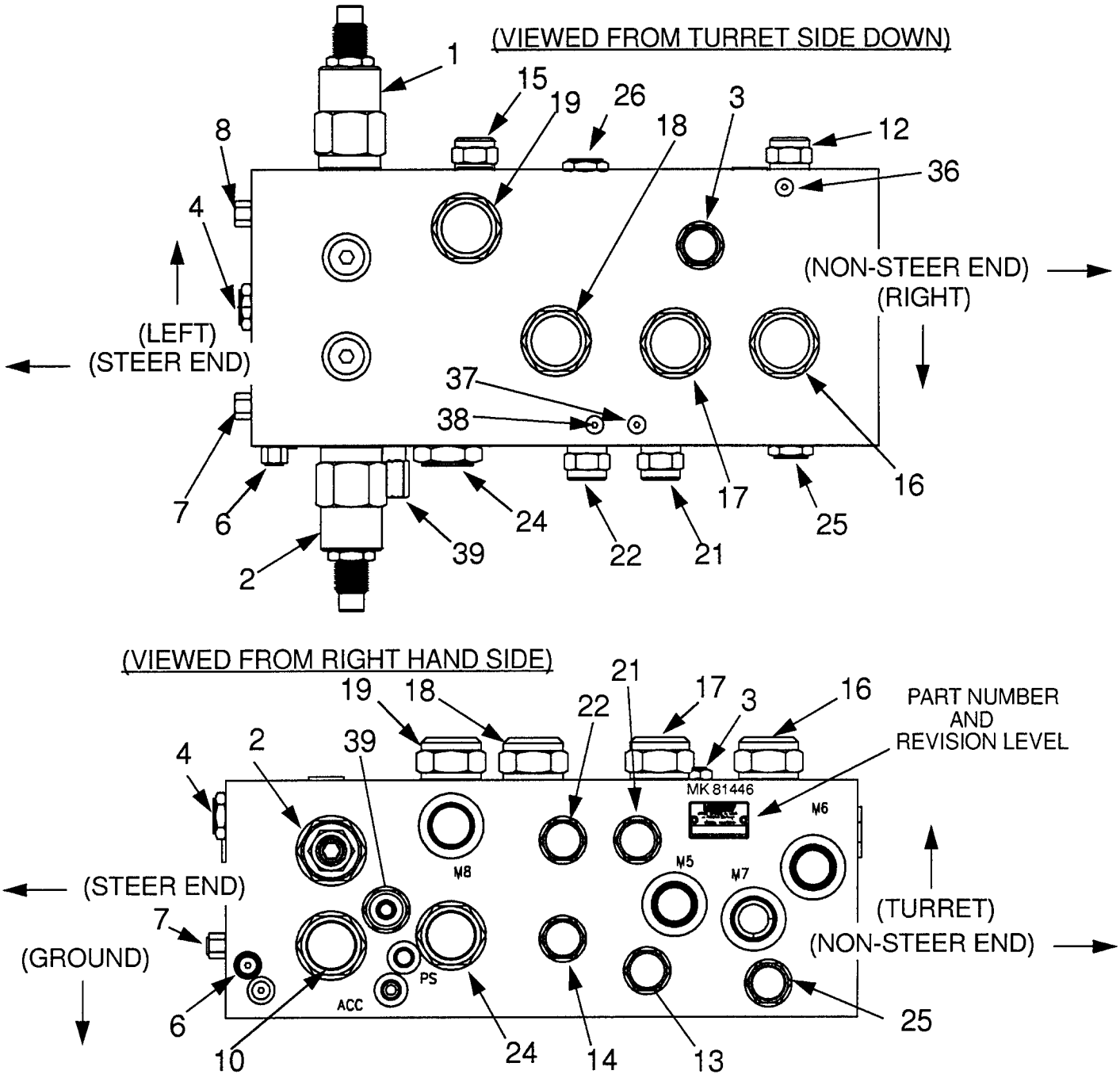


SERVICE & ADJUSTMENTS

LEGEND: COMPONENTS P/N 81446 VALVE)

1. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
3. .....”DUMMY”/CAVITY PLUG
4. .....PARKING BRAKE RATE CONTROL ORIFICE BY-PASS CHECK VALVE
5. .....HIGH/LOW TRAVEL SPEED PILOT SIGNALCHECK VALVE
6. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
7. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
8. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
9. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
10. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
11. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....DIFFERENTIAL PRESSURE SENSING VALVE
16. .....DIFFERENTIAL PRESSURE SENSING VALVE
17. .....DIFFERENTIAL PRESSURE SENSING VALVE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE
19. .....DIFFERENTIAL PRESSURE SENSING VALVE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE
21. .....DIFFERENTIAL PRESSURE SENSING VALVE
22. .....DIFFERENTIAL PRESSURE SENSING VALVE
23. .....PARKING BRAKE RELEASE SHUTTLE VALVE
24. .....”PRIMARY” (FRONT & REAR) FLOW DIVIDER/COMBINER VALVE
25. .....”SECONDARY” (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
26. .....”SECONDARY” (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
27. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
28. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
29. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
30. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
31. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
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36. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
37. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
38. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING .ORIFICE
39. .....HIGH/LOW SPEED DRIVE PILOT OPERATED VALVE
40. .....COUNTERBALANCE VALVE PILOT PISTON

P/N 81446 "4 WHEEL DRIVE" VALVE



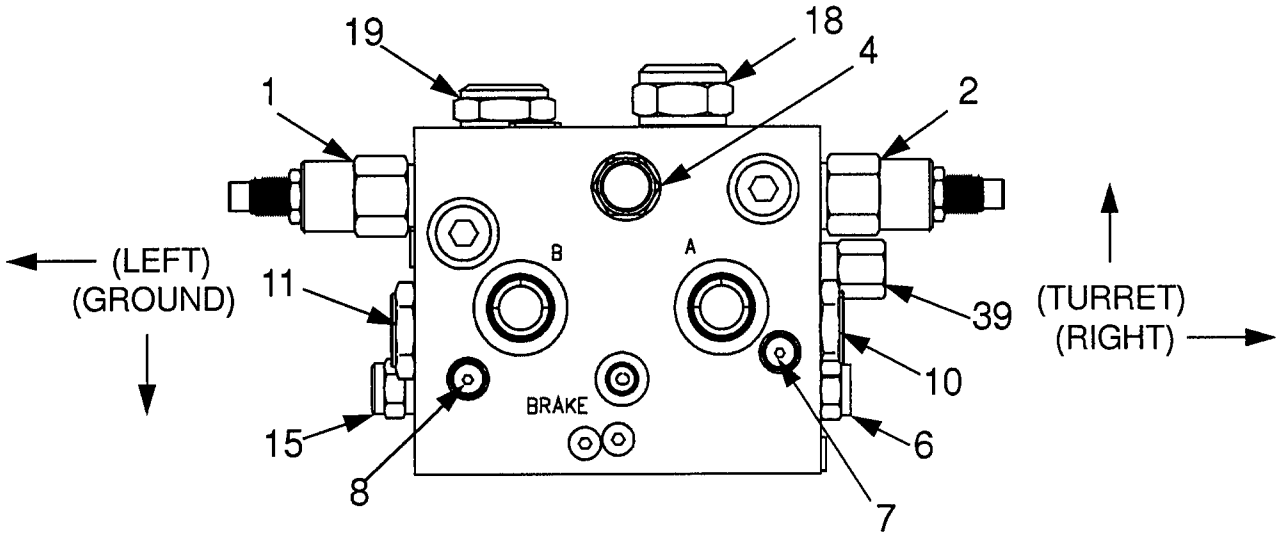
LEGEND: COMPONENTS P/N 81446 VALVE

1. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
3. .....”DUMMY”/CAVITY PLUG
4. .....PARKING BRAKE RATE CONTROL ORIFICE BY-PASS CHECK VALVE
5. .....HIGH/LOW TRAVEL SPEED PILOT SIGNALCHECK VALVE
6. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
7. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
8. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
9. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
10. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
11. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....DIFFERENTIAL PRESSURE SENSING VALVE
16. .....DIFFERENTIAL PRESSURE SENSING VALVE
17. .....DIFFERENTIAL PRESSURE SENSING VALVE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE
19. .....DIFFERENTIAL PRESSURE SENSING VALVE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE
21. .....DIFFERENTIAL PRESSURE SENSING VALVE
22. .....DIFFERENTIAL PRESSURE SENSING VALVE
23. .....PARKING BRAKE RELEASE SHUTTLE VALVE
24. .....”PRIMARY” (FRONT & REAR) FLOW DIVIDER/COMBINER VALVE
25. .....”SECONDARY” (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
26. .....”SECONDARY” (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
27. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
28. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
29. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
30. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
31. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
32. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
33. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
34. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING .ORIFICE
35. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
36. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
37. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
38. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING .ORIFICE
39. .....HIGH/LOW SPEED DRIVE PILOT OPERATED VALVE
40. .....COUNTERBALANCE VALVE PILOT PISTON

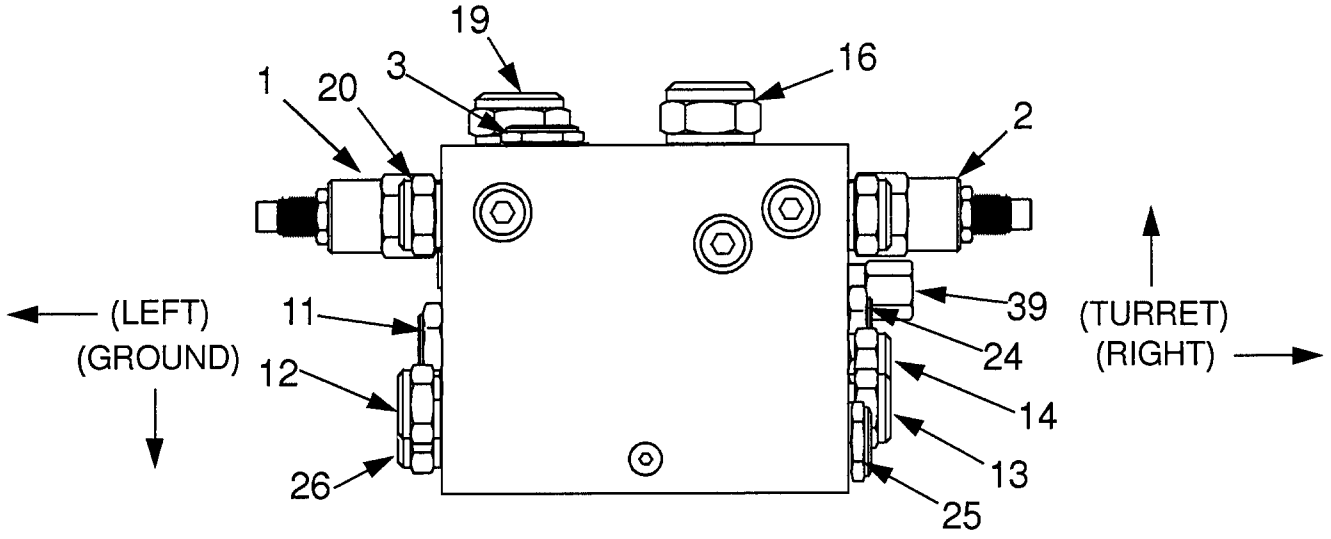
SERVICE & ADJUSTMENTS

P/N 81446 "4 WHEEL DRIVE" VALVE

(VIEWED FROM STEERING AXLE END)



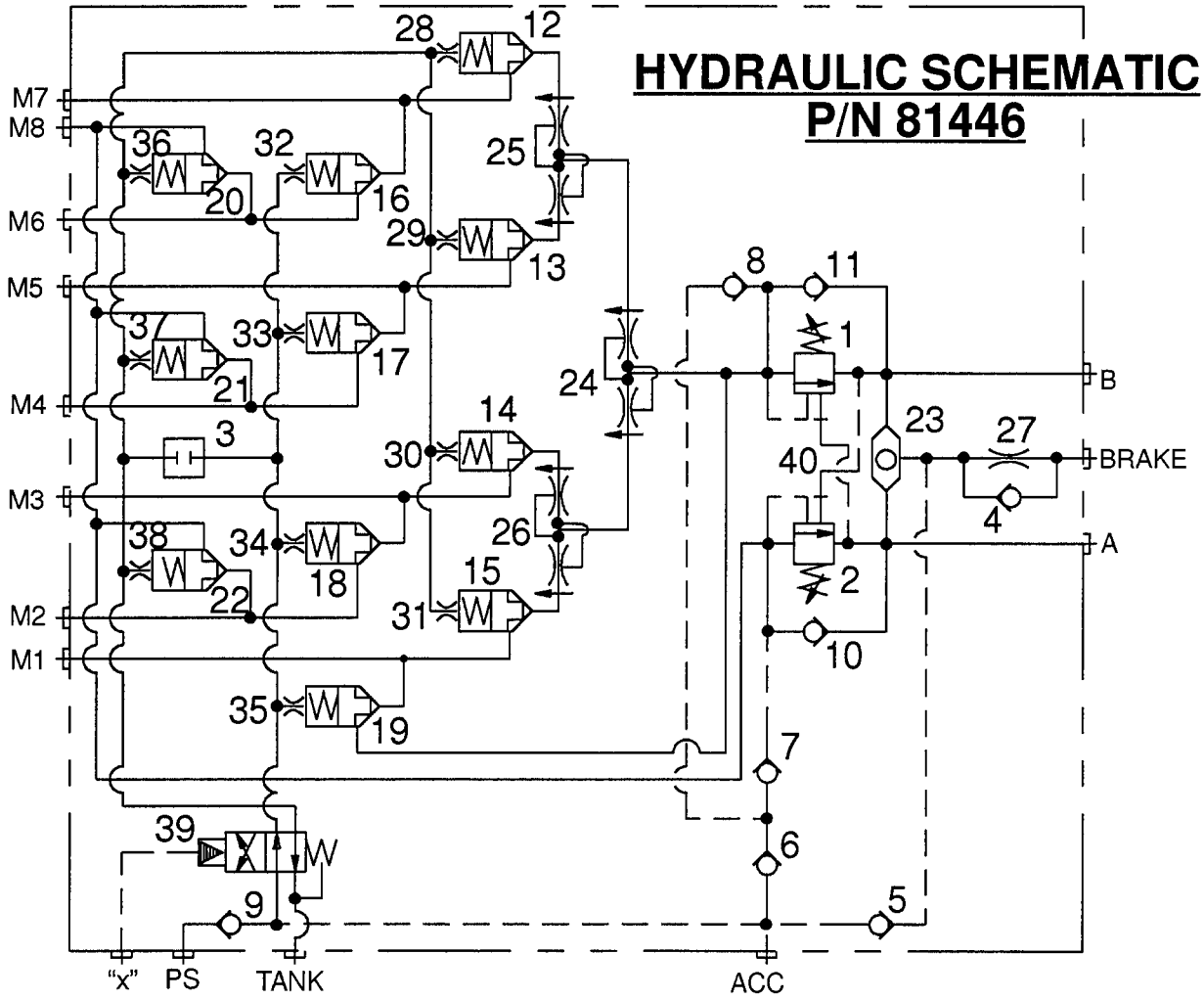
(VIEWED FROM NON-STEERING AXLE END)



LEGEND: COMPONENTS P/N 81446 VALVE)

1. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
3. ....."DUMMY"/CAVITY PLUG
4. .....PARKING BRAKE RATE CONTROL ORIFICE BY-PASS CHECK VALVE
5. .....HIGH/LOW TRAVEL SPEED PILOT SIGNALCHECK VALVE
6. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
7. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
8. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
9. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
10. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
11. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....DIFFERENTIAL PRESSURE SENSING VALVE
16. .....DIFFERENTIAL PRESSURE SENSING VALVE
17. .....DIFFERENTIAL PRESSURE SENSING VALVE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE
19. .....DIFFERENTIAL PRESSURE SENSING VALVE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE
21. .....DIFFERENTIAL PRESSURE SENSING VALVE
22. .....DIFFERENTIAL PRESSURE SENSING VALVE
23. .....PARKING BRAKE RELEASE SHUTTLE VALVE
24. ....."PRIMARY" (FRONT & REAR) FLOW DIVIDER/COMBINER VALVE
25. ....."SECONDARY" (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
26. ....."SECONDARY" (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
27. .....PARKING BRAKE APPLICATION RATE CONTROL ORIFICE
28. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
29. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
30. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
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35. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
36. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
37. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
38. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING .ORIFICE
39. .....HIGH/LOW SPEED DRIVE PILOT OPERATED VALVE
40. .....COUNTERBALANCE VALVE PILOT PISTON

SERVICE & ADJUSTMENTS



KEY TO PORT IDENTIFICATION

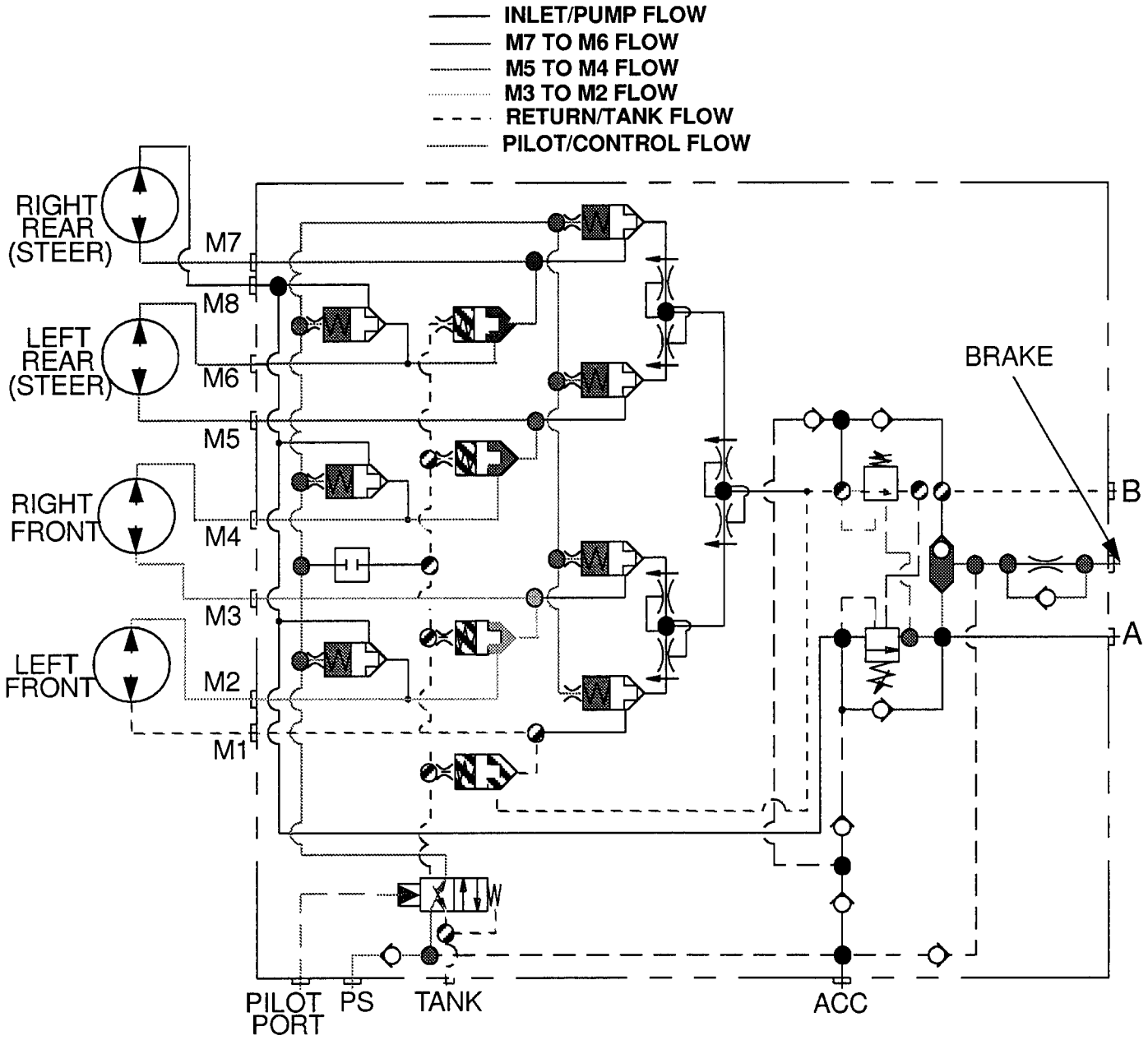
A	FORWARD DRIVE
ACC	N/A (BLOCKED)
B	REVERSE DRIVE
BRAKE	PARKING BRAKE RELEASE
M1	LEFT HAND DRIVE MOTOR CW ROTATION
M2	RIGHT HAND DRIVE MOTOR CCW ROTATION
M3	LEFT HAND DRIVE MOTOR CW ROTATION
M4	RIGHT HAND DRIVE MOTOR CCW ROTATION
M5	LEFT HAND DRIVE MOTOR CW ROTATION
M6	RIGHT HAND DRIVE MOTOR CCW ROTATION
M7	LEFT HAND DRIVE MOTOR CW ROTATION
M8	RIGHT HAND DRIVE MOTOR CCW ROTATION
PS	HIGH SPEED TRAVEL "PILOT" PRESSURE
"x" (NOT IDENTIFIED)	HIGH SPEED TRAVEL VALVE OPERATION PILOT SIGNAL

LEGEND: COMPONENTS P/N 81446 VALVE)

1. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
2. .....DYNAMIC BRAKING COUNTERBALANCE VALVE
3. .....”DUMMY”/CAVITY PLUG
4. .....PARKING BRAKE RATE CONTROL ORIFICE BY-PASS CHECK VALVE
5. .....HIGH/LOW TRAVEL SPEED PILOT SIGNALCHECK VALVE
6. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
7. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
8. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
9. .....HIGH/LOW TRAVEL SPEED PILOT SIGNAL CHECK VALVE
10. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
11. .....COUNTERBALANCE VALVE BY-PASS CHECK VALVE
12. .....DIFFERENTIAL PRESSURE SENSING VALVE
13. .....DIFFERENTIAL PRESSURE SENSING VALVE
14. .....DIFFERENTIAL PRESSURE SENSING VALVE
15. .....DIFFERENTIAL PRESSURE SENSING VALVE
16. .....DIFFERENTIAL PRESSURE SENSING VALVE
17. .....DIFFERENTIAL PRESSURE SENSING VALVE
18. .....DIFFERENTIAL PRESSURE SENSING VALVE
19. .....DIFFERENTIAL PRESSURE SENSING VALVE
20. .....DIFFERENTIAL PRESSURE SENSING VALVE
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25. .....”SECONDARY” (LEFT & RIGHT SIDE) FLOW DIVIDER/COMBINER VALVE
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35. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
36. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
37. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING ORIFICE
38. .....DIFFERENTIAL PRESSURE SENSING VALVE DAMPENING .ORIFICE
39. .....HIGH/LOW SPEED DRIVE PILOT OPERATED VALVE
40. .....COUNTERBALANCE VALVE PILOT PISTON

FLOW DIAGRAM P/N 81446

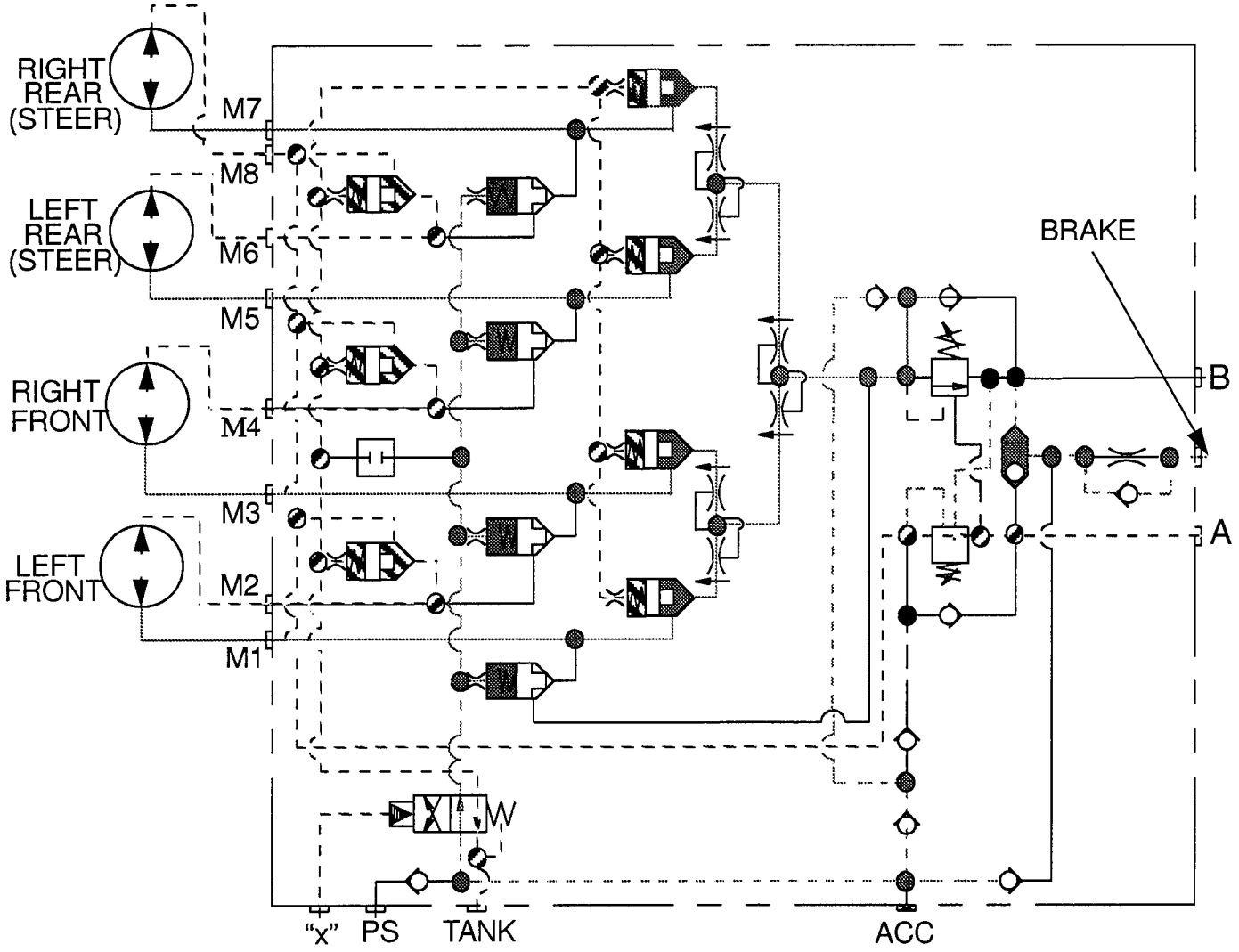
FLOW IN "HIGH SPEED" (SERIES) REVERSE TRAVEL



FLOW DIAGRAM P/N 81446

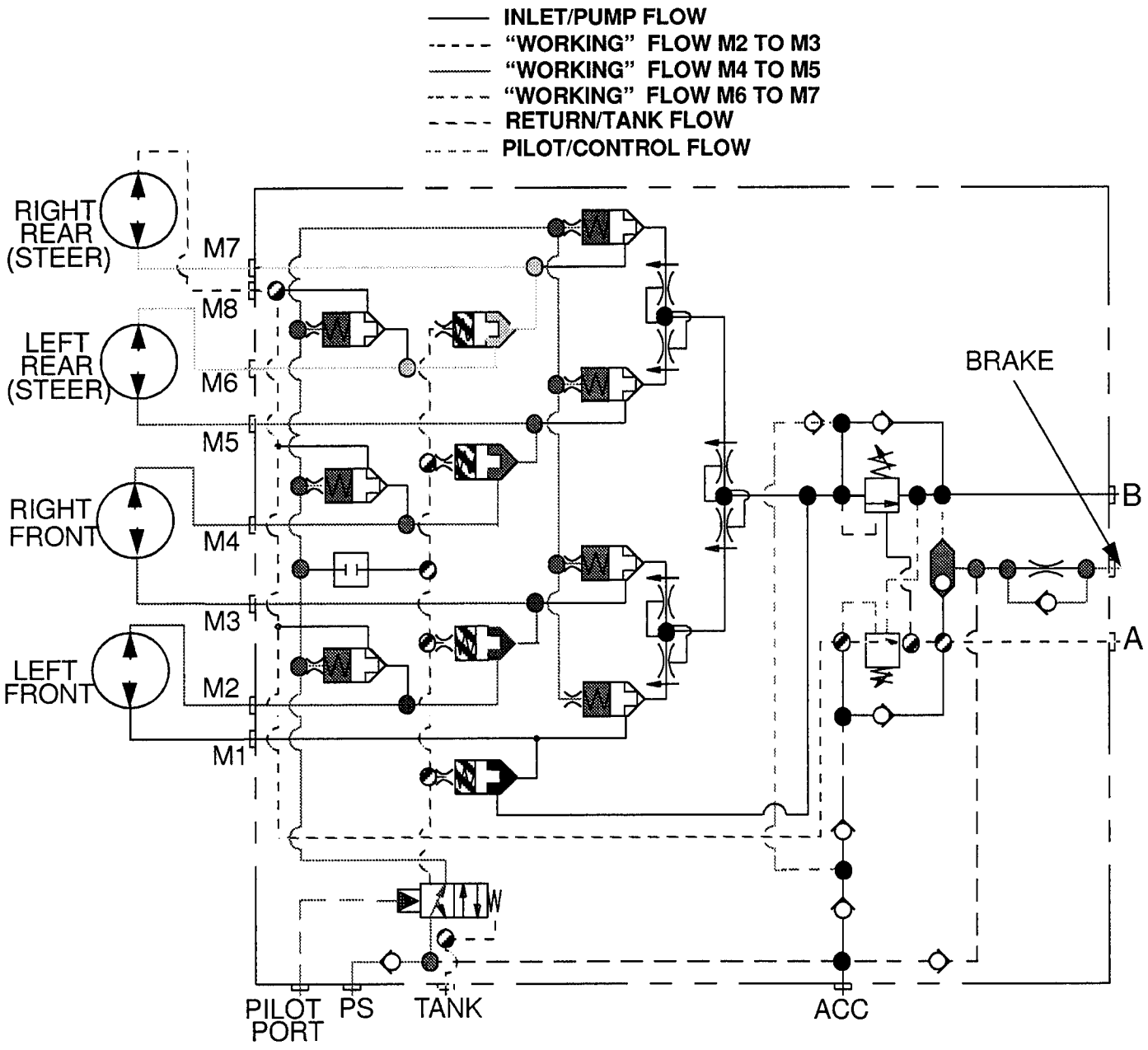
"LOW SPEED" (MOTOR IN PARALLEL) FORWARD TRAVEL

INLET/PUMP FLOW
"WORKING" FLOW
RETURN/TANK FLOW
PILOT/CONTROL FLOW



FLOW DIAGRAM P/N 81446

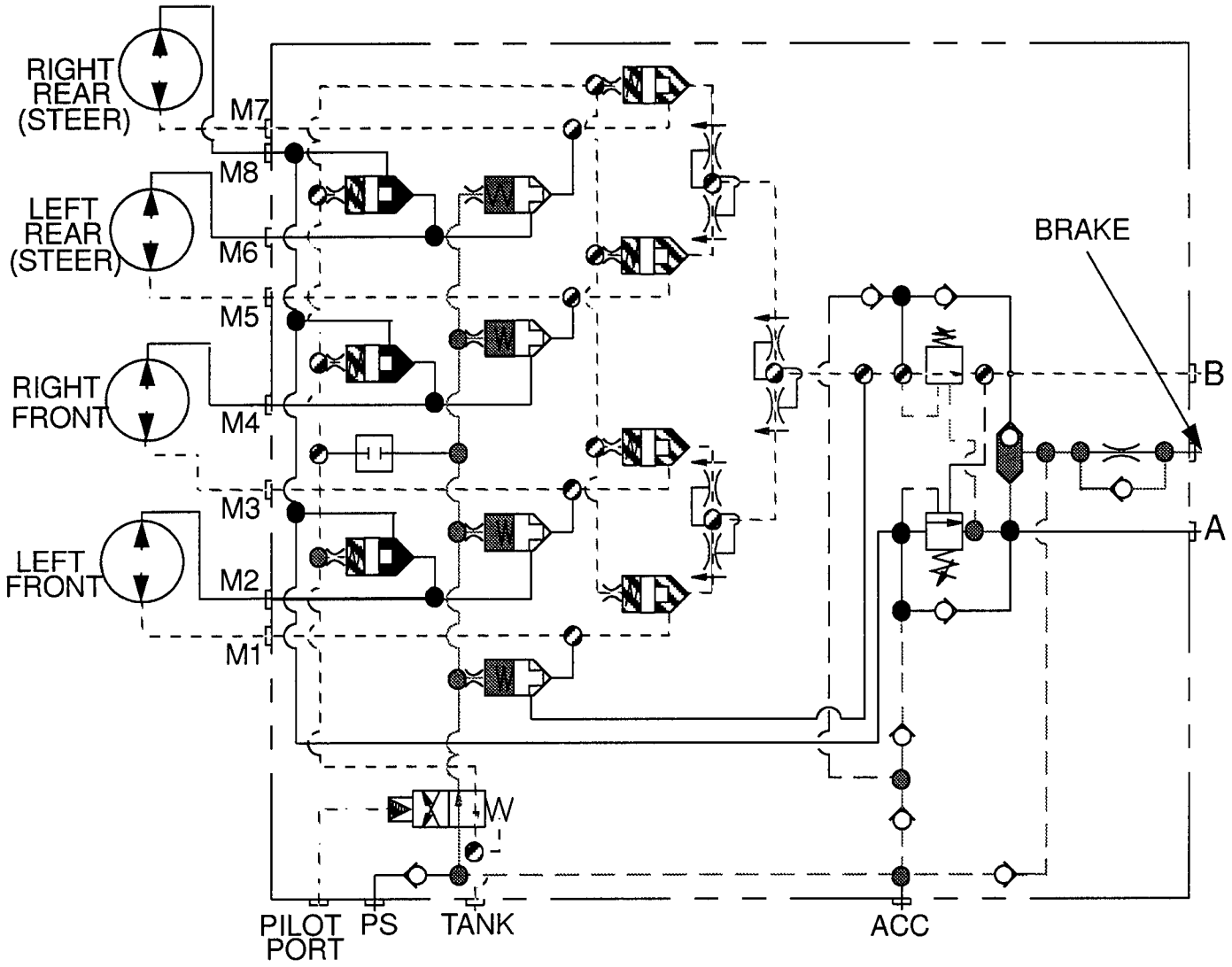
"HIGH SPEED" (MOTOR IN SERIES) FORWARD TRAVEL



FLOW DIAGRAM P/N 81446

FLOW IN "LOW SPEED" (PARALLEL) REVERSE TRAVEL

INLET/PUMP FLOW
RETURN/TANK FLOW
PILOT/CONTROL FLOW



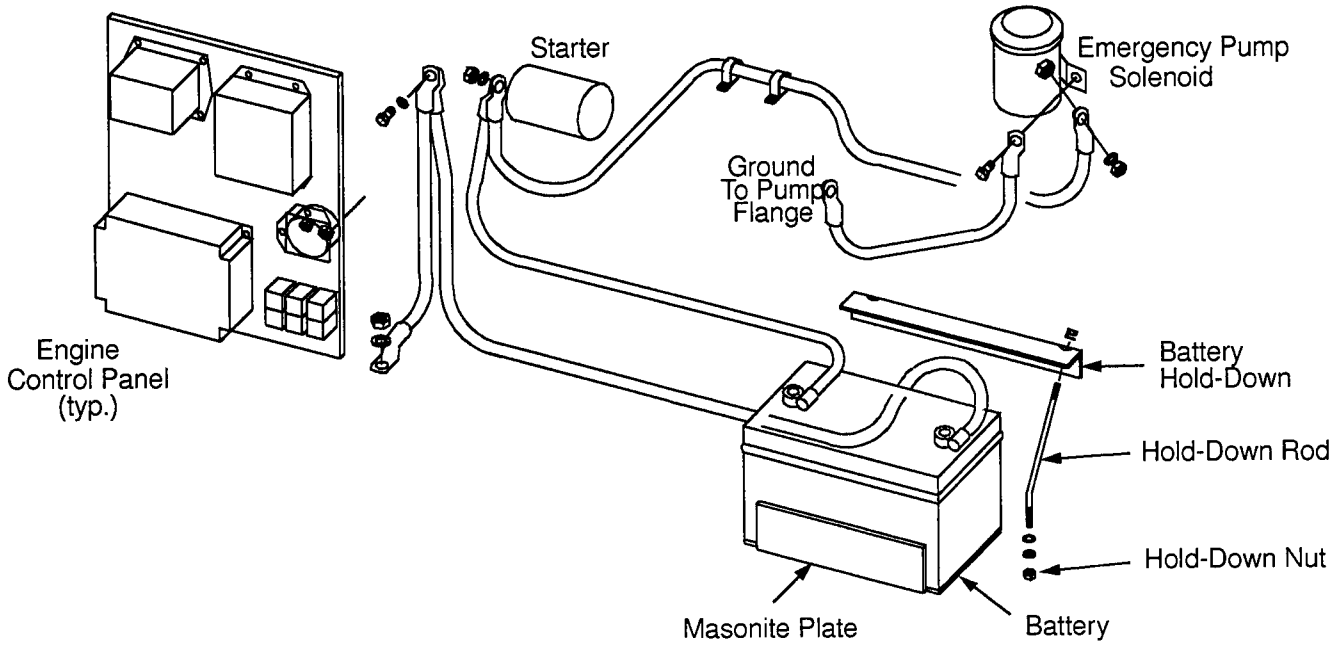
PRESSURE SETTINGS & ADJUSTMENTS

THIS SECTION

NOT AVAILABLE THIS PRINTING

SERVICE & ADJUSTMENTS

BATTERY ASSEMBLY



BATTERY REMOVAL

1. Lower boom and platform completely.
2. Disconnect cables from battery terminals.
3. Remove hold-down nuts from battery hold-down bolts.
4. Remove battery hold-down angle.
5. Remove battery.

BATTERY INSTALLATION

1. Reverse removal procedure

NOTE: Use caution to avoid over-tightening battery hold-down nuts. Over-tightening could crack battery housing.

NOTE: Batteries may only be shipped "dry." Electrolyte must be added at time of installation.

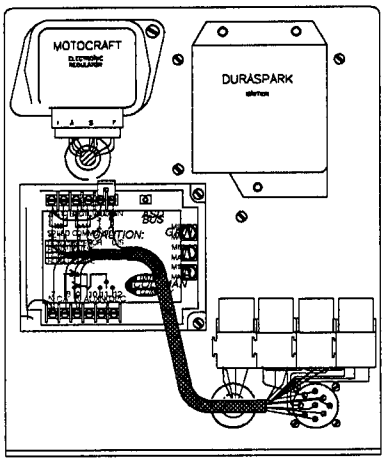
SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

ADJUSTMENT: ENGINE SPEED OR GOVERNOR/CONTROLLER

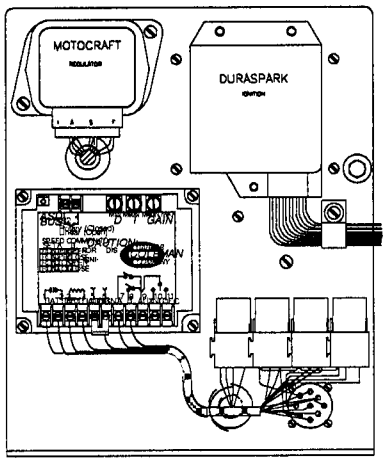
(Ford LSG-423 & LRG-423, Deutz F4L1011F, Cummins 4B3.9)

(SEE PAGE 4-16-1)



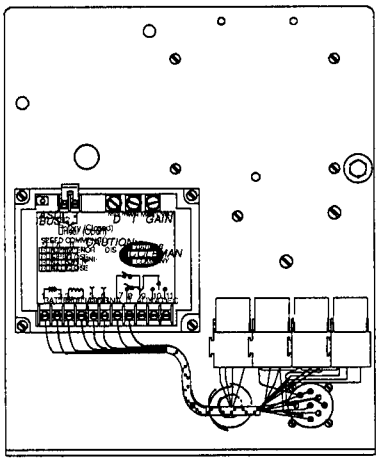
(FORD LSG-423)

(SEE PAGE 4-16-3)



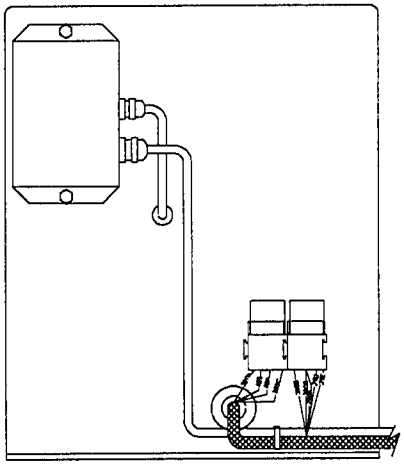
(FORD LSG-423)

(SEE PAGE 4-16-5)



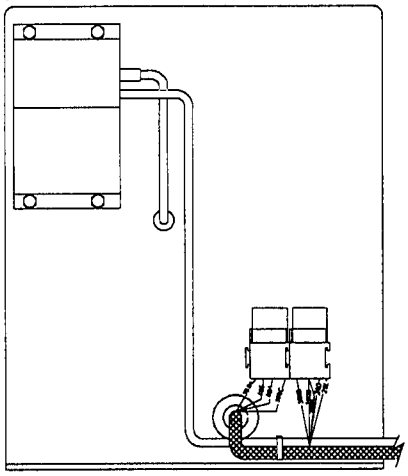
(FORD LRG-423)

(SEE PAGE 4-16-7)



(DEUTZ F4L1011F)

(SEE PAGE 4-16-9/4-16-11)



(DEUTZ F4L1011/CUMMINS 4B3.9))

ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - FORD LSG-423 "DUAL FUEL" (GASOLINE/LPG) ENGINE

Note: Before making any adjustments check the "ungoverned idle" speed by disconnecting one of the wires to the "throttle actuator", this should be approximately 900 to 950 (+/- 25) RPM. Adjust the idle speed screw on the carburetor if necessary.

1. To check the RPM connect a tachometer at the TACH terminal of the ignition coil (**DO NOT remove any wires!**).

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed whenever no controls are operated (see step 5 for adjustment).

3. Move the ground/aerial select switch in the ground control box to "ground" or have a "qualified" operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive (see step 5 for adjustment).

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and operate the drive control lever ("joystick" or actuator). The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive (see step 5 for adjustment).

5. Operate the appropriate function to select the speed range you wish to adjust. Use a short length of wire "stripped" at both ends, **holding one end on the AUX terminal** of the controller **touch the opposite end to** the **INC** terminal **to raise RPM or** the **DEC** terminal **to lower RPM**. Engine speed can be adjusted in increments, up or down, by momentarily touching the terminal. If the desired RPM is overrun touch the wire to the opposite terminal

The method below may be used if a qualified operator is unavailable to operate the controls.

1. **To check/adjust the "mid-range" (boom functions) RPM** attach a "jumper" wire from the AUX terminal to the SPEED A terminal of the governor controller, adjust the RPM as per step 5 (above). Remove the jumper wire if no other adjustments need to be made (see step 3 below).

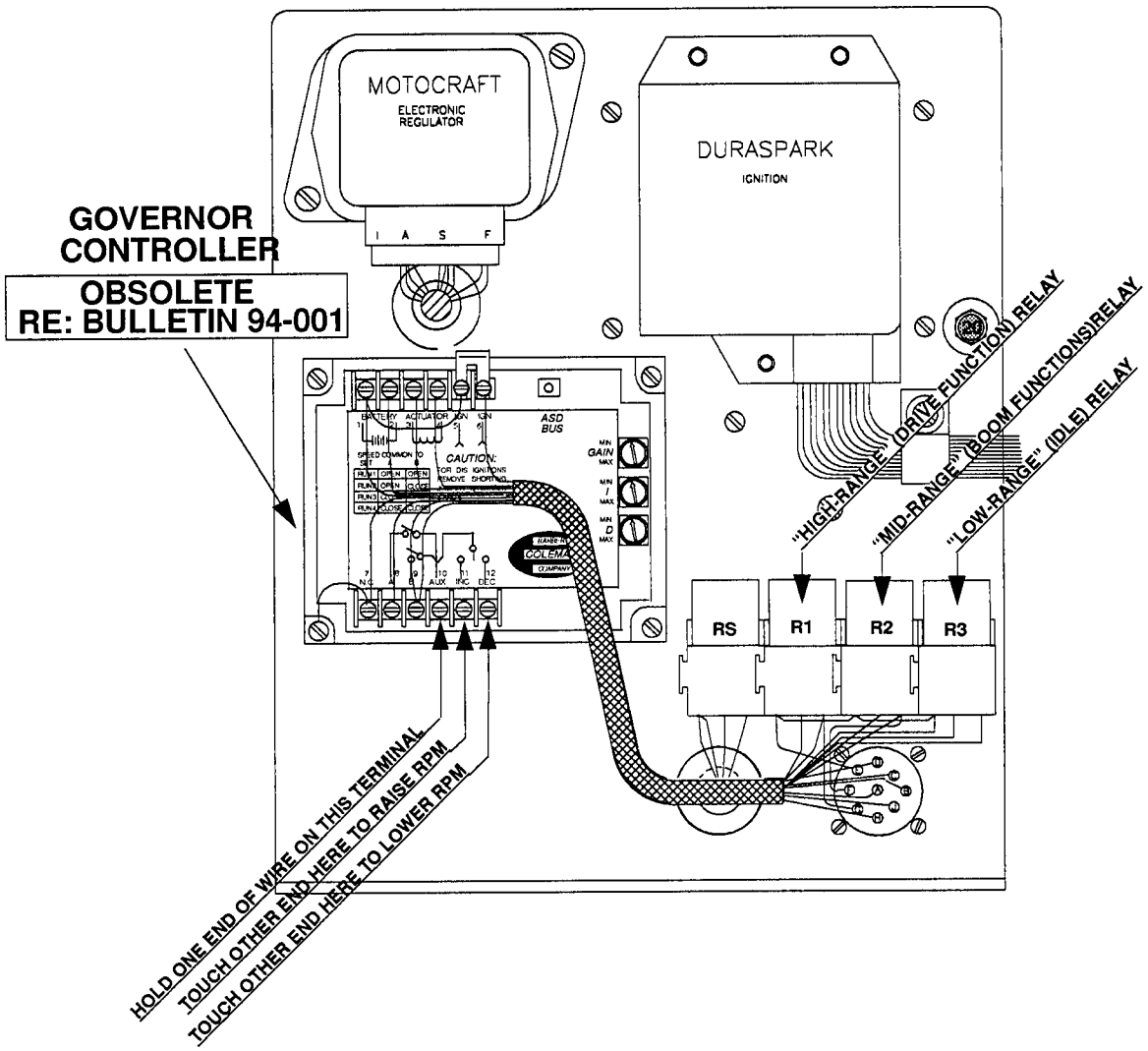
2. **To check/adjust the "high-range" (drive function) RPM,** leave the jumper wire installed in step 1 and attach a jumper from the AUX or SPEED A terminal to the SPEED B terminal. Adjust the RPM as provided in step 5 (above). Remove all of the jumpers at the completion of the engine speed adjustment.

SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

FORD "LSG 423" W/"DUAL FUEL" (GASOLINE/L.P.G.) ENGINE CONTROL PANEL

(FRONT)



ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - FORD LSG-423 "DUAL FUEL" (GASOLINE/LPG) ENGINE

Note: Before making any adjustments check the "ungoverned idle" speed by disconnecting one of the wires to the "throttle actuator", this should be approximately 900 to 950 (+/- 25) RPM. Adjust the idle speed screw on the carburetor if necessary.

1. To check the RPM connect a tachometer at the TACH terminal of the ignition coil (**DO NOT remove any wires!**).

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed whenever no controls are operated (see step 5 for adjustment).

3. Move the ground/aerial select switch in the ground control box to "ground" or have a "qualified" operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive (see step 5 for adjustment).

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and operate the drive control lever ("joystick" or actuator). The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive (see step 5 for adjustment).

5. Operate the appropriate function to select the speed range you wish to adjust. Use a short length of wire "stripped" at both ends, **holding one end on the AUX terminal** of the controller **touch the opposite end to** the **INC** terminal **to raise RPM or** the **DEC** terminal **to lower RPM**. Engine speed can be adjusted in increments, up or down, by momentarily touching the terminal. If the desired RPM is overrun touch the wire to the opposite terminal

The method below may be used if a qualified operator is unavailable to operate the controls.

1. **To check/adjust the "mid-range" (boom functions) RPM** attach a "jumper" wire from the AUX terminal to the SPEED A terminal of the governor controller, adjust the RPM as per step 5 (above). Remove the jumper wire if no other adjustments need to be made (see step 3 below).

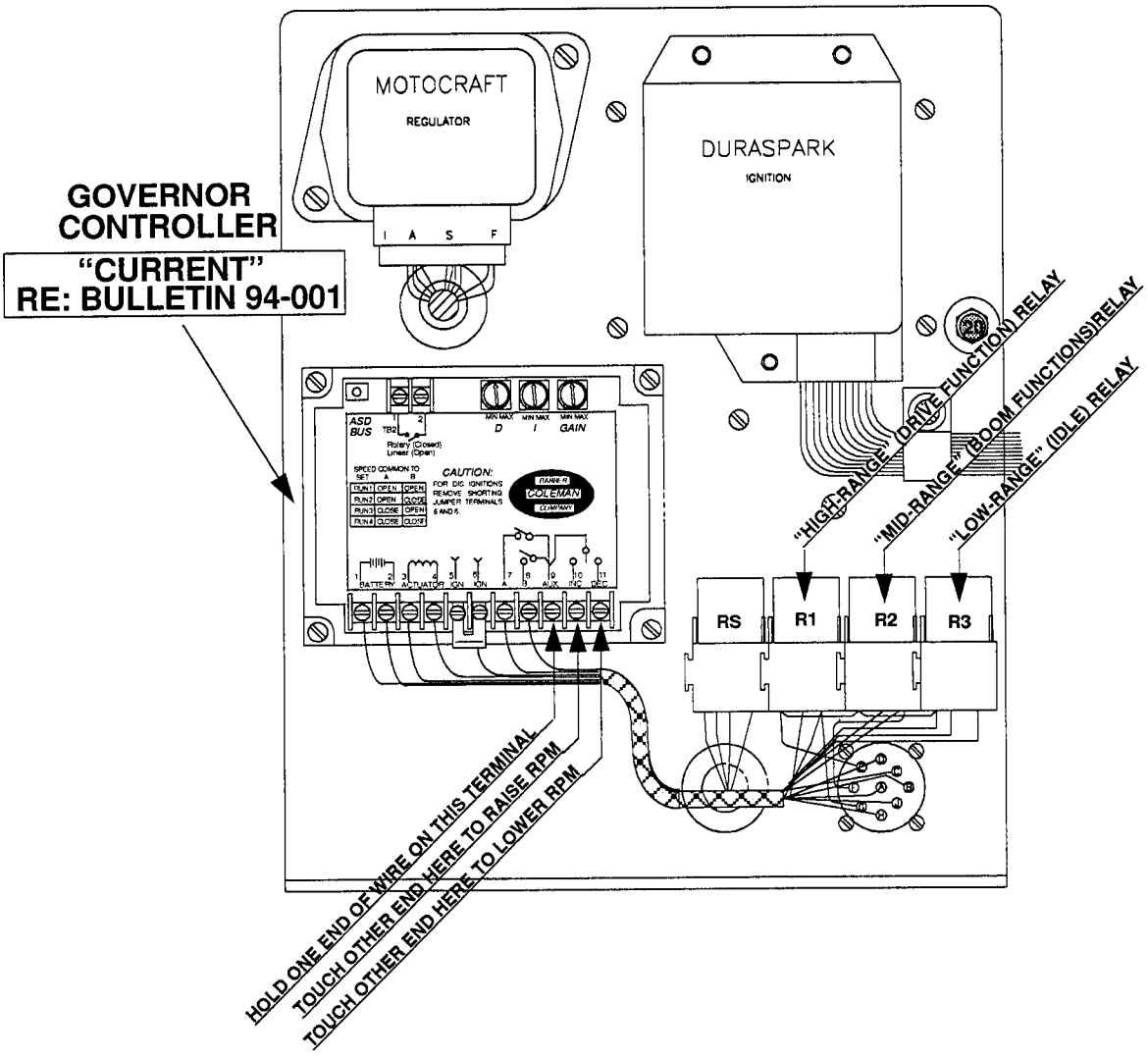
2. **To check/adjust the "high-range" (drive function) RPM,** leave the jumper wire installed in step 1 and attach a jumper from the AUX or SPEED A terminal to the SPEED B terminal. Adjust the RPM as provided in step 5 (above). Remove all of the jumpers at the completion of the engine speed adjustment.

SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

FORD "LSG 423" W/"DUAL FUEL" (GASOLINE/L.P.G.) ENGINE CONTROL PANEL

(FRONT)



ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - FORD LRG-423 "DUAL FUEL" (GASOLINE/LPG) ENGINE

Note: Before making any adjustments check the "ungoverned idle" speed by disconnecting one of the wires to the "throttle actuator", this should be approximately 500 (+/- 50) RPM. Loosen the actuator screws and turn slowly clockwise or counterclockwise to obtain the proper RPM.

1. To check the RPM use the Ford recommended inductive tachometer (Rotunda 059-00006) or apply a piece of reflective tape to the narrowest part of the vibration dampener and use a photoelectric tachometer (**DO NOT remove any wires from the DIS module!**).

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed whenever no controls are operated (see step 5 for adjustment).

3. Move the ground/aerial select switch in the ground control box to "ground" or have a "qualified" operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive (see step 5 for adjustment).

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and operate the drive control lever ("joystick" or actuator). The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive (see step 5 for adjustment).

5. Operate the appropriate function to select the speed range you wish to adjust. Use a short length of wire "stripped" at both ends, **holding one end on the AUX terminal** of the controller **touch the opposite end to** the **INC** terminal **to raise RPM or** the **DEC** terminal **to lower RPM**. Engine speed can be adjusted in increments, up or down, by momentarily touching the terminal. If the desired RPM is overrun touch the wire to the opposite terminal

The method below may be used if a qualified operator is unavailable to operate the controls.

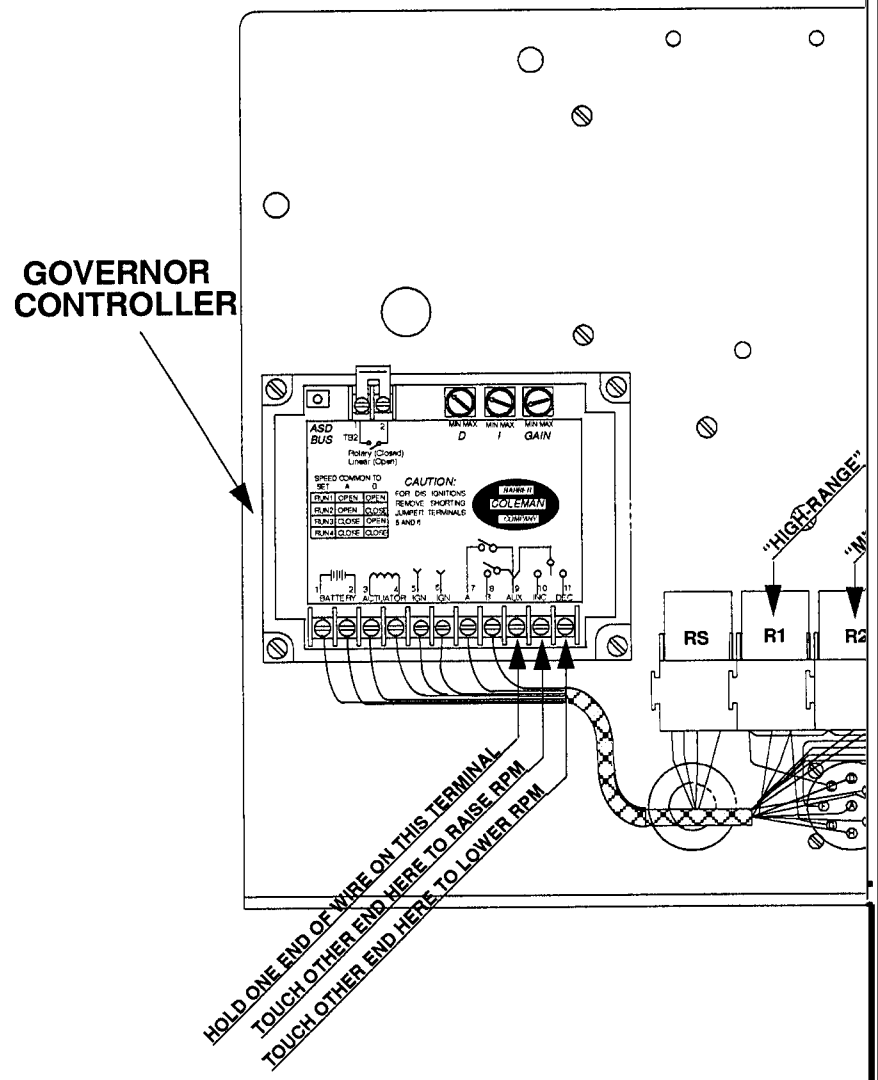
1. **To check/adjust the "mid-range" (boom functions) RPM** attach a "jumper" wire from the AUX terminal to the SPEED A terminal of the governor controller, adjust the RPM as per step 5 (above). Remove the jumper wire if no other adjustments need to be made (see step 3 below).

2. **To check/adjust the "high-range" (drive function) RPM,** leave the jumper wire installed in step 1 and attach a jumper from the AUX or SPEED A terminal to the SPEED B terminal. Adjust the RPM as provided in step 5 (above). Remove all of the jumpers at the completion of the engine speed adjustment.

ENGINE CONTROL PANEL

FORD "LRG 423" W/"DUAL FUEL" (GAS
ENGINE CONTROL PANEL

(FRONT)



ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - DEUTZ F4L1011F DIESEL ENGINE

Note: This procedure utilizes a photoelectric tachometer to check and/or adjust the engine RPM. Contact the engine manufacturer or his local representative for optional methods.

1. Apply photo-reflective tape to the narrowest portion of the vibration dampener.

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed. If adjustment is needed either reposition the actuator in the bracket or adjust the "rod-end bearing" on the shaft.

3. Move the ground/aerial select switch in the ground control box to "ground" or have the operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive. See step 5 If adjustment is necessary.

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and have the operator move the drive control lever. The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive. See step 5 If adjustment is necessary.

5. Operate the appropriate function to select the speed range you wish to adjust. **To adjust** the "**MID-RANGE**" RPM **turn the bottom "trimpot"** (refer to illustration) on the side of the governor controller **counterclockwise to increase** RPM or **clockwise to decrease** RPM. **To adjust** the "**HI-RANGE**" RPM **turn the upper "trimpot"** similarly (refer to illustration).

The method below may be used if an operator is not available to operate the controls.

1. Disconnect wire numbers 206 and 207 on the back of the engine control panel from the WHITE and RED wires going to the governor /controller.

2. **To adjust or check the "mid-range" (boom function) RPM** connect the **red** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

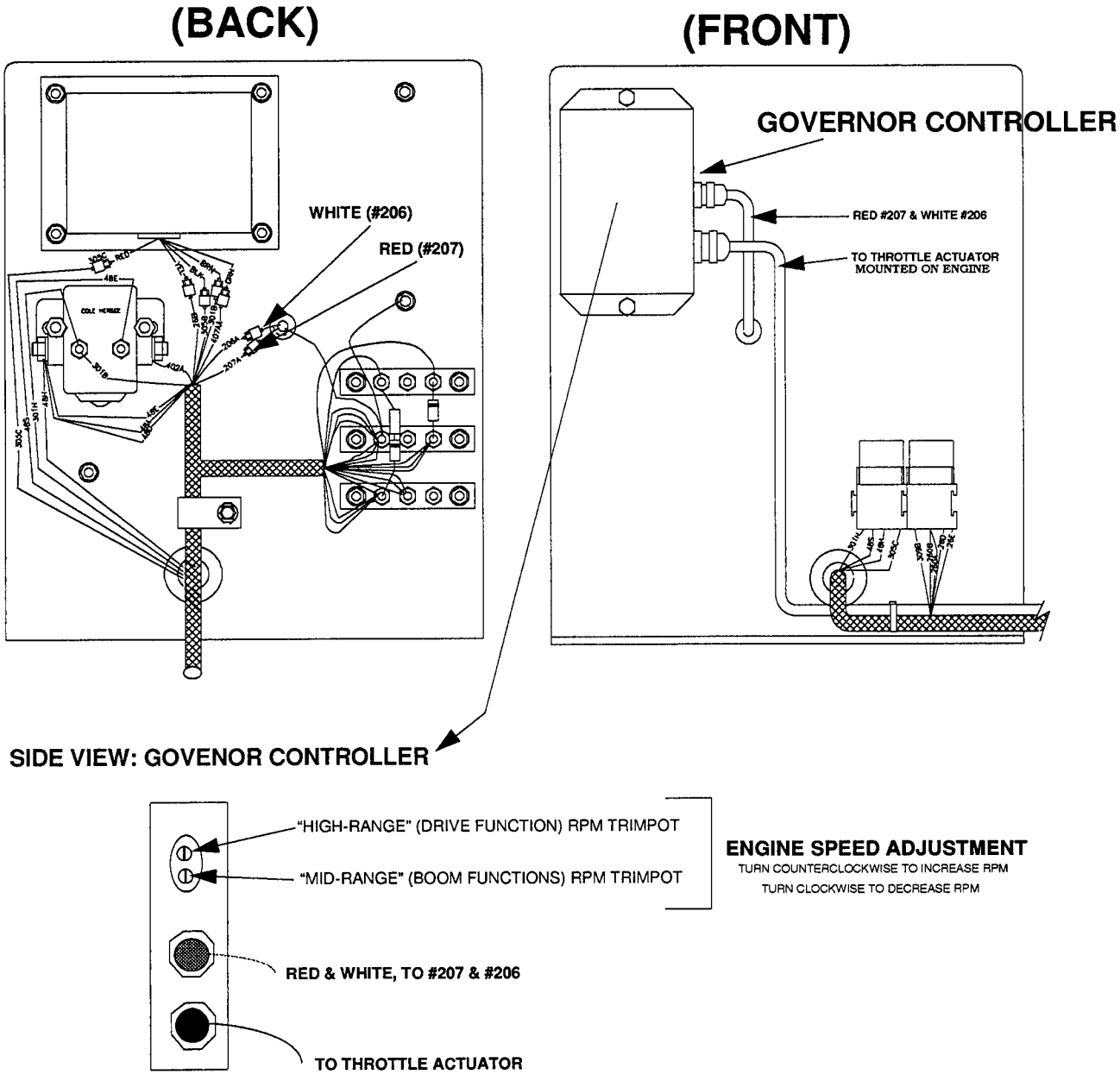
3. **To adjust or check the "high-range" (drive function) RPM** connect the **white/clear** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

DEUTZ "F4L1011F" DIESEL ENGINE CONTROL PANEL

(OLD STYLE SEE PAGE 5-9-11 FOR LATER VERSION)



ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - DEUTZ F4L1011F DIESEL ENGINE

Note: This procedure utilizes a photoelectric tachometer to check/adjust the engine RPM. Contact the engine manufacturer or his local representative for optional methods.

1. Apply photo-reflective tape to the narrowest portion of the vibration dampener.

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed. If adjustment is needed either reposition the actuator in the bracket or adjust the "rod-end bearing" on the shaft.

3. Move the ground/aerial select switch in the ground control box to "ground" or have the operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive. See step 5 If adjustment is necessary.

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and have the operator move the drive control lever. The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive. See step 5 If adjustment is necessary.

5. Operate the appropriate function to select the speed range you wish to adjust. **To adjust** the "**MID-RANGE**" RPM **turn the lowermost "trimpot"** (refer to illustration) on the side of the governor controller **clockwise to decrease** RPM or **counterclockwise to increase** RPM. **To adjust** the "**HI-RANGE**" RPM **turn the "trimpot" directly above the lowermost trimpot** (refer to illustration).

The method below may be used if an operator is not available to operate the controls.

1. Disconnect wire numbers 207 and 206 on the back of the engine control panel from the RED and WHITE/CLEAR wires going to the governor /controller.

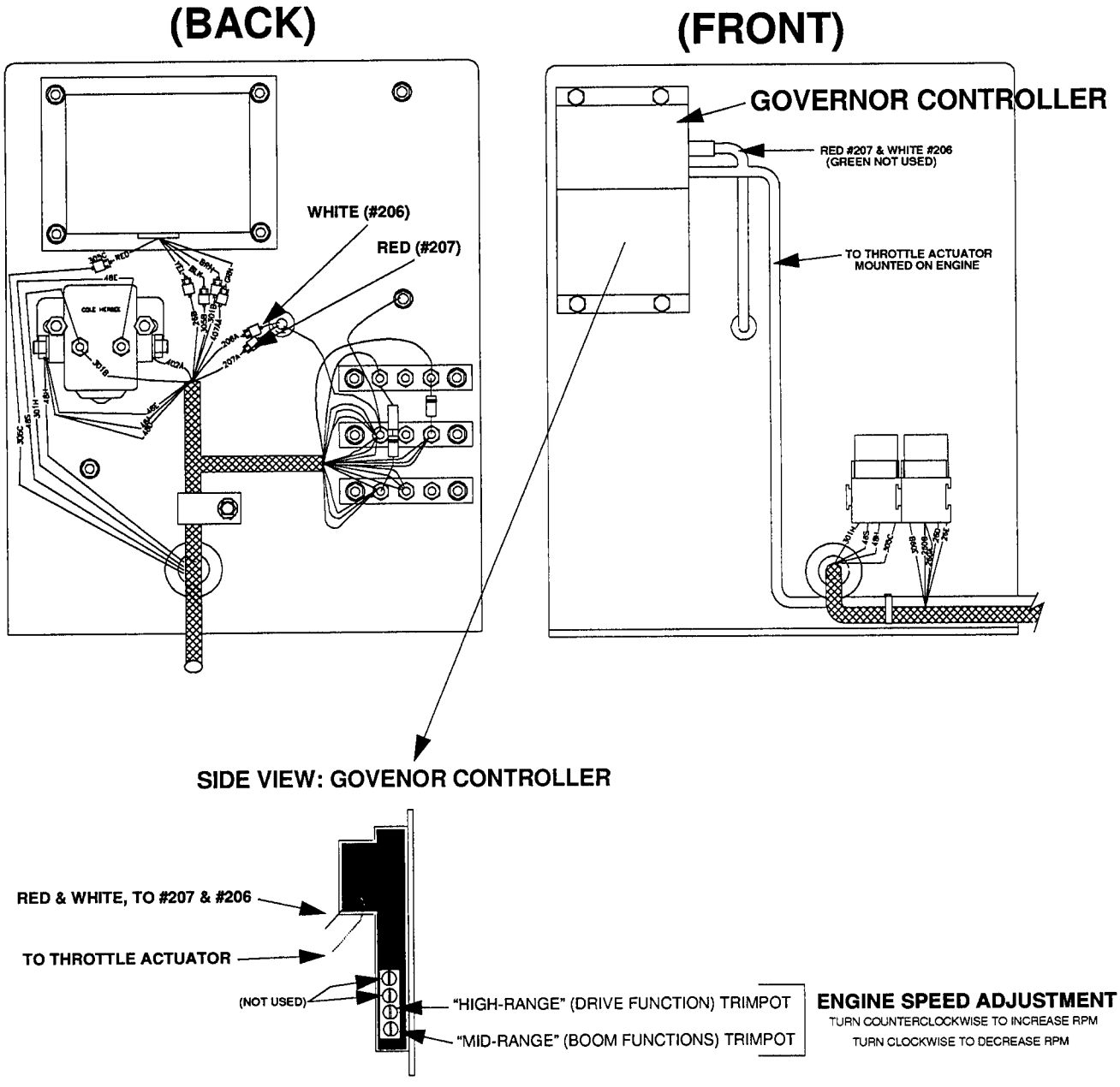
2. **To adjust or check the "mid-range" (boom function) RPM** connect the **red** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

3. **To adjust or check the "high-range" (drive function) RPM** connect the **white/clear** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

DEUTZ "F4L1011F" DIESEL ENGINE CONTROL PANEL



ENGINE SPEED/GOVERNOR CONTROLS

RPM ADJUSTMENT - CUMMINS 4B3.9 DIESEL ENGINE

Note: This procedure utilizes a photoelectric tachometer to check/adjust the engine RPM. Contact the engine manufacturer or his local representative for optional methods.

1. Apply photo-reflective tape to the narrowest portion of the vibration dampener.

2. Start the engine but do not operate any functions. Observe the RPM on the tachometer, the engine should operate at approximately 1000 (+/-50) RPM. This is the "low-range" or idle speed. If adjustment is needed either reposition the actuator in the bracket or adjust the "rod-end bearing" on the shaft.

3. Move the ground/aerial select switch in the ground control box to "ground" or have the operator step down on the foot operated switch in the platform. The engine speed should increase to approximately 1800 (+/-50) RPM. This is the "mid-range" speed and is used for operation of all functions except drive. See step 5 If adjustment is necessary.

4. **Disable the drive operation** by removing the electrical connectors from the coils of the drive directional control valves and have the operator move the drive control lever. The engine speed should increase to approximately 2800 (+/-50) RPM. This is the "high-range" RPM and is required only for operation of the drive. See step 5 If adjustment is necessary.

5. Operate the appropriate function to select the speed range you wish to adjust. **To adjust** the "**MID-RANGE**" RPM **turn the lowermost "trimpot"** (refer to illustration) on the side of the governor controller **counterclockwise to decrease** RPM or **clockwise to increase** RPM. **To adjust** the "**HI-RANGE**" RPM **turn the "trimpot" directly above the lowermost trimpot** (refer to illustration).

The method below may be used if an operator is not available to operate the controls.

1. Disconnect wire numbers 207 and 206 on the back of the engine control panel from the RED and WHITE/CLEAR wires going to the governor /controller.

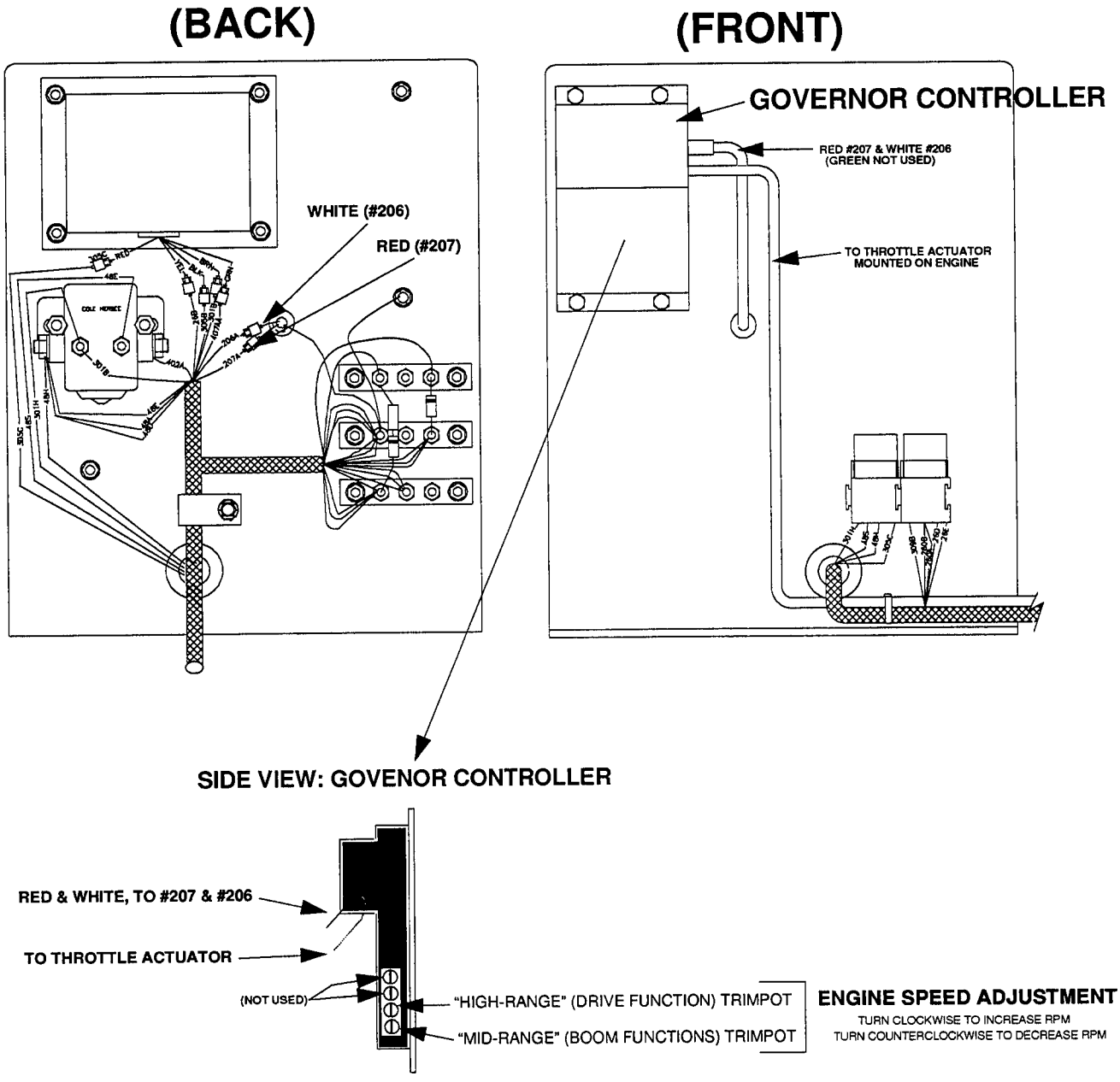
2. **To adjust or check the "mid-range" (boom function) RPM** connect the **red** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

3. **To adjust or check the "high-range" (drive function) RPM** connect the **white/clear** colored wire going to the controller to any 12 volt D.C. power source and adjust the appropriate trimpot as described in step 5 above. Reconnect the wire when adjustment is completed.

SERVICE & ADJUSTMENTS

ENGINE CONTROL PANEL

CUMMINS "4B3.9" DIESEL ENGINE CONTROL PANEL



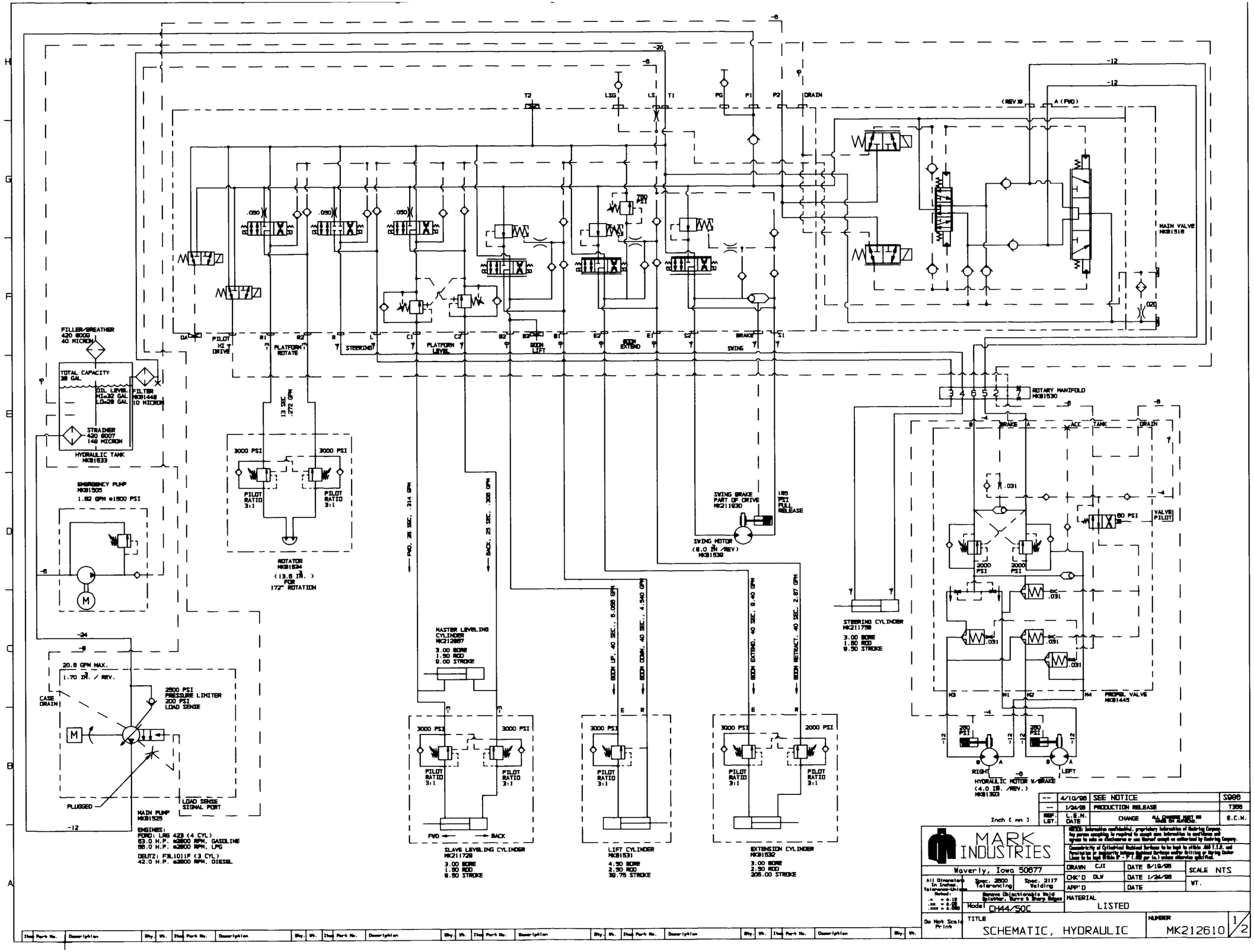
SECTION 5

NOT AVAILABLE AT THIS TIME

SECTION 6

SCHEMATICS

Drawing	Description	Pages
212610	Hydraulic Schematic	2
212874	Electrical Schematics	5
212968	Hydraulic Schematic	2
212969	Hydraulic Schematic	2
212972	Hydraulic Schematic	1
213243	Wiring Diagram	5
213359	Wiring Diagram	6



Item	Part No.	Description	Qty.	Wt.
Item	Part No.	Description	Qty.	Wt.
Item	Part No.	Description	Qty.	Wt.
Item	Part No.	Description	Qty.	Wt.
Item	Part No.	Description	Qty.	Wt.
Item	Part No.	Description	Qty.	Wt.

--	4/10/98	SEE NOTICE	S986
--	1/24/98	PRODUCTION RELEASE	T386
REF. LIST.	L.I.E.N. DATE	CHANGE ALL CHANGES MUST BE MADE ON AUTOCAD.	E.C.N.

Inch [mm]

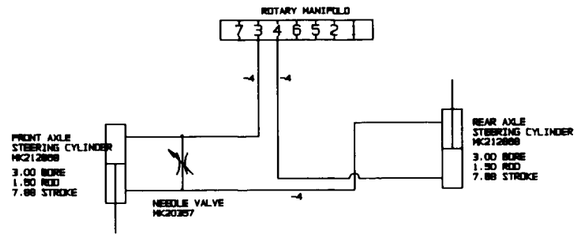
NOTICE: Information confidential, proprietary information of Mark-ing Company. No person accepting is required to accept such information and agrees to make no disclosure or use thereof except as authorized by Mark-ing Company.

Construction of Cylindrical Bolthead Surfaces to be kept to within .005 T.I.R. and Perpendicular or Parallel to Adjacent Surfaces and/or Drilling or Boring Center Lines to be kept within 1° / 1.000 per inch unless otherwise specified.

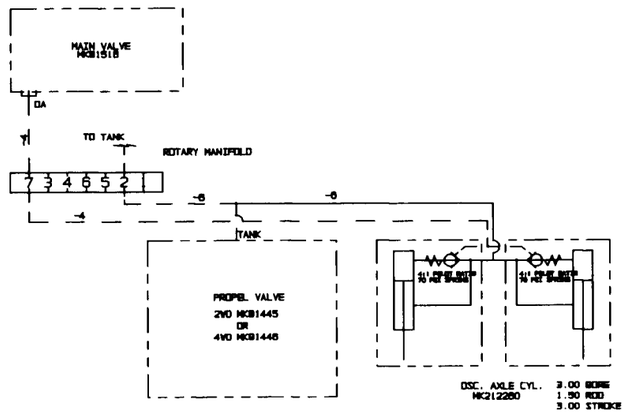
MARK INDUSTRIES
Waverly, Iowa 50677

DRAWN	CJI	DATE 8/12/98	SCALE NTS
CHK'D	DLW	DATE 1/24/98	WT.
APP'D		DATE	

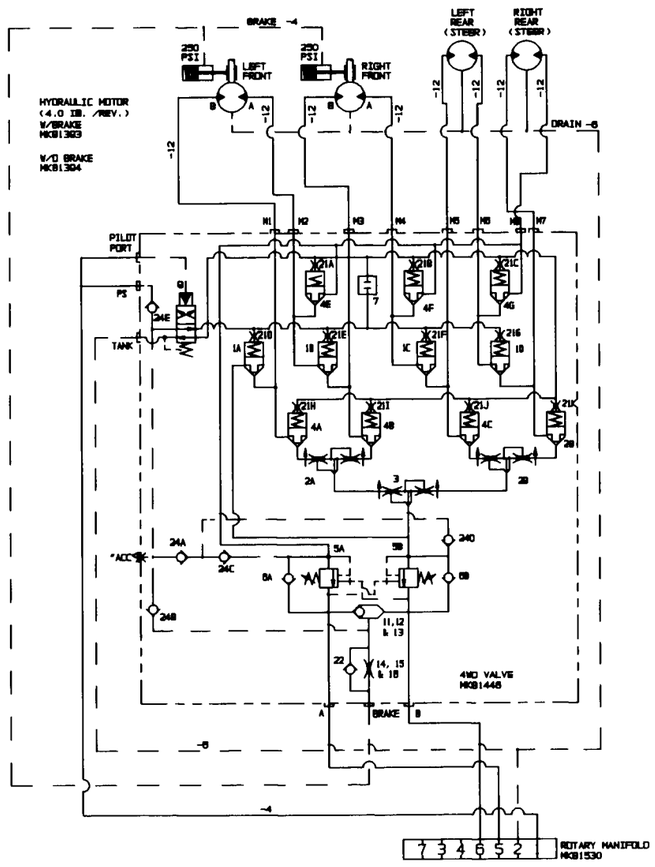
All Dimensions In Inches / Tolerance Unless Noted: .x = ±.12, .xx = ±.03, .xxx = ±.010
Spec. 2500 Tolerancing
Spec. 2117 Welding
Remove Objectionable Weld Splatter, Burrs & Sharp Edges
Model CH44/50C
MATERIAL LISTED
Do Not Scale Print
TITLE SCHEMATIC, HYDRAULIC
NUMBER MK212610 1/2



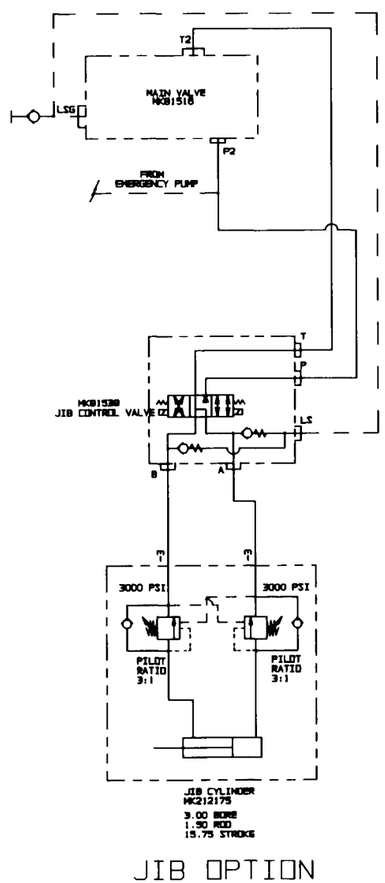
4W STEER OPTION



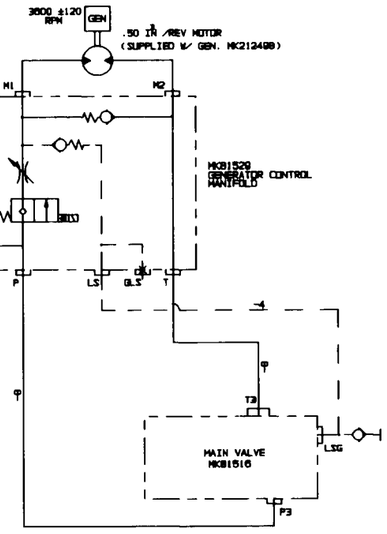
OSCILATING AXLE OPTION



4WD OPTION



JIB OPTION



GENERATOR OPTION
(4KW)

A	4/10/98	SEE NOTICE	S98
—	1/24/98	PRODUCTION RELEASE	T98
REF. LET.	L.E.N. DATE	CHANGE ALL CHANGES MUST BE MADE ON ALMOND.	E.C.N.

Inch [mm]

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Concentricity of Cylindrical Machined Surfaces to be kept to within .005 T.I.R. and Perpendicular or Squareness between Machined Surfaces and/or Drilling or Boring Center Lines to be kept within 0° - 7' (.005 per in.) unless otherwise specified.

MARK INDUSTRIES
Waverly, Iowa 50677

DRAWN	CJI	DATE 6-20-95	SCALE NTS
CHK'D	DLW	DATE 1/24/98	WT.
APP'D		DATE	
MATERIAL	LISTED		

All Dimensions In Inches. Tolerances-Unless Noted: .x = ± .12, .xx = ± .05, .xxx = ± .010
Spec. 2800 Toleroncing
Spec. 2117 Welding
Remove Objectionable Weld Splatter, Burrs & Sharp Edges
Model CH44/SOC OPT.
Do Not Scale Print

TITLE: SCHEMATIC, HYDRAULIC

NUMBER: MK212610 2/2

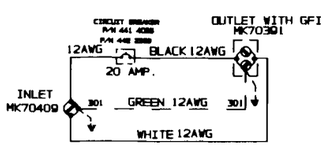
Item	Part No.	Description	Qty.	Wt.

UPPER CONTROL BOX P/N: MK212007A

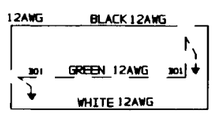
LOWER CONTROL BOX P/N: MK211983A

THIS SCHEMATIC DOES NOT SHOW ANY OF THE SYSTEM ELECTRICAL PLUGS AND THEIR LOCATIONS.

NOTES:
1- TO CONNECT GROUND CONTROL AND AERIAL CONTROL BOXES USE CABLE ASSEMBLY P/N: MK211098.
2- ALL WIRES ARE 16AWG. UNLESS OTHERWISE SPECIFIED.
3- WIRING AND SWITCHES ARE FOR BOOM IN STOWED POSITION.
4- ALL WIRES FOR 115VAC ARE 12 AWG USE CABLE P/N: MK70769.
5- IDENTIFY EACH WIRE BY NUMBER FLAG AT BOTH ENDS.
6- ALL WIRES SHOWN IN THICK LINES ARE 00.
7- ALL WIRES FOR 220VAC ARE 12 AWG USE CABLE P/N: MK70423.



115 VAC WIRING



220 VAC WIRING

REF. LET.	L.E.N. DATE	CHANGE
A	10/8/08	ADDED RELAY CARD FOR CH100C
		PRODUCTION RELEASE

E.C.N. S808

Inch (mm)

MARK INDUSTRIES
Waverly, Iowa 50677

All Dimensions In Inches Tolerance Unless Noted: .x = ± .12, .xx = ± .02, .xxx = ± .010

Spec. 2300 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

Model CH MODELS

DRAWN | DATE | SCALE
CHK'D | DATE | WT.
APP'D | DATE | MATERIAL

Do Not Scale Print

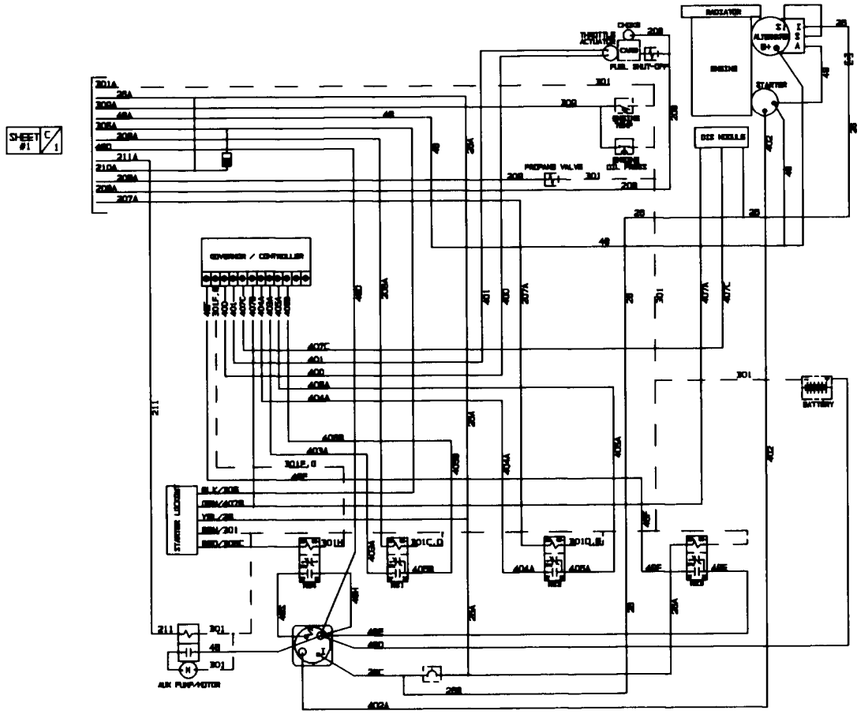
TITLE: ELECTRICAL SCHEMATIC

NUMBER: 1/8

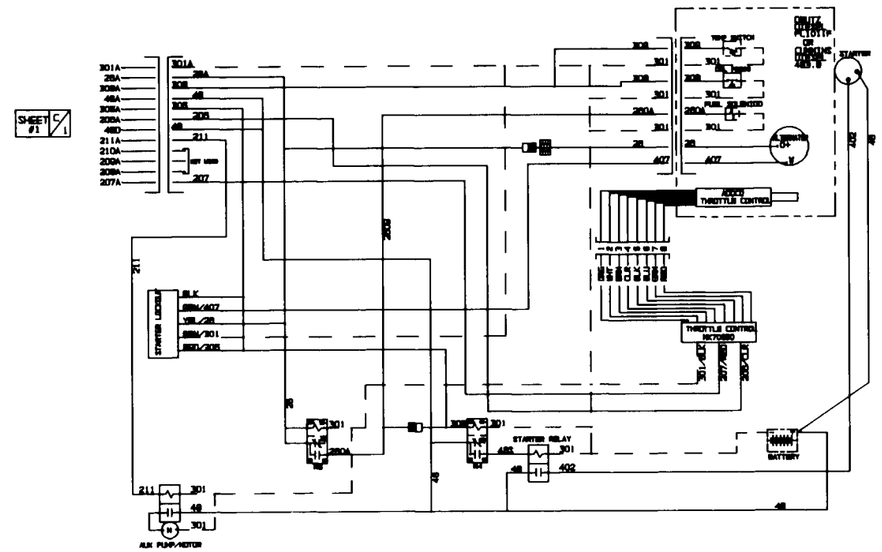
NOTICE: Information contained, proprietary information of Mark Industries. Any person accepting is required to accept same information in confidence and agrees to make no disclosure or use thereof except as authorized by Mark Industries.

Concentricity of Cylindrical Machined Surfaces to be kept to within .010 T.I.R. and Perpendicular or Angularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept Within .7° / .250 per In.) unless otherwise specified.

Item	Part No.	Description	Qty.	Wt.



FORD LRG423 GAS OR DUAL FUEL



DEUTZ DIESEL FL1011F OR CUMMINS DIESEL 4B3.9

A	10/8/98	ADDED RELAY CARD FOR CH100C	S808
—	2/22/98	PRODUCTION RELEASE	T98
REF. LET.	L.E.N. DATE	CHANGE	E.C.N.

Inch [mm]

MARK INDUSTRIES
Waverly, Iowa 50877

NOTICE: Information confidential, proprietary information of Bushring Company. Any person accepting it is required to accept same information in confidence and not to make an disclosure or use thereof except as authorized by Bushring Company.

Concentricity of Cylindrical Machined Surfaces to be kept to within .005 T.I.R. and Perpendicular or Angularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept within .0° 1' .005 per in.) unless otherwise specified.

DRAWN	CJI	DATE 2/14/98	SCALE NONE
CHK'D	BS	DATE 2/22/98	WT.
APP'D		DATE	

All Dimensions In Inches. Tolerances Unless Noted: .X = ±.12, .XX = ±.02, .XXX = ±.010

Spec. 2500 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

MATERIAL: NA

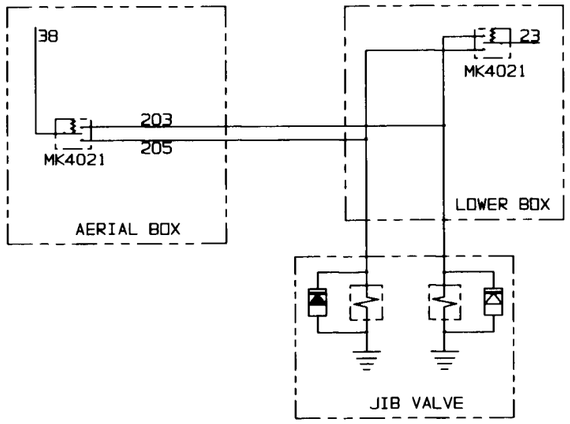
Model: CH MODELS

Do Not Scale Print

TITLE: ELECTRICAL SCHEMATIC

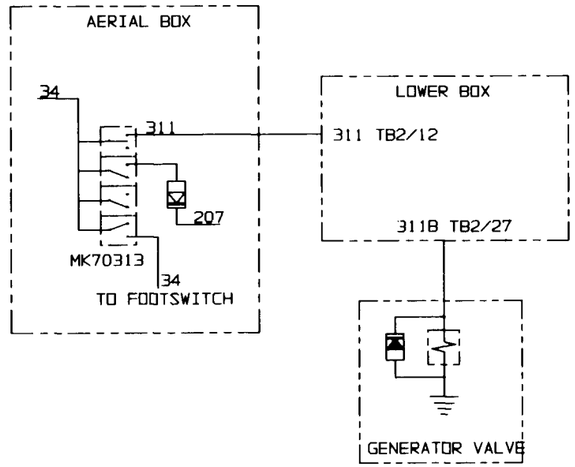
NUMBER: MK212874 2/5

Item	Part No.	Description	Qty.	Wt.



6' JIB OPTION

SHEET #1 D/6



GENERATOR OPTION

SHEET #1 G/7

Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.

REF. LET.	L.E.N. DATE	CHANGE	E.C.N.
A	10/18/98	ADDED RELAY CARD FOR CH100C	S808
—	2/22/98	PRODUCTION RELEASE	TBB

Inch (mm)

MARK INDUSTRIES
Waverly, Iowa 50877

NOTICE: Information confidential, proprietary information of Enshrig Company. Any person accepting is required to accept same information in confidence and agrees to refer as disclosure or use thereof except as authorized by Enshrig Company.

Concentricity of Cylindrical Machined Surfaces to be kept to within .000 T.I.R. and Parallelism to Applicable Machined Surfaces and/or Drilling or Boring Center Lines to be kept within 0° - 7' (.002 per in.) unless otherwise specified.

All Dimensions In Inches. Tolerances Unless Noted: .X = ±.10, .XX = ±.05, .XXX = ±.000

Spec. 2000 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Spatter, Burrs & Sharp Edges

DRAWN	CJI	DATE 2/21/98
CHK'D	BS	DATE 2/22/98
APP'D		DATE

SCALE NONE
WT.
MATERIAL NA

Model CH MODELS

Do Not Scale Print

TITLE ELECTRICAL SCHEMATIC

NUMBER MK212874 3/5

A	10/8/98	ADDED RELAY CARD FOR CH100C	S808
--	2/22/96	PRODUCTION RELEASE	TBB
REF. LET.	L.E.N. DATE	CHANGE ALL DIMENSIONS MUST BE MADE IN AUTOCAD.	E.C.N.

Inch (mm)

DEH CONTROLS
10 CONTROLS DRIVE
SHELTON, CT. 06484

Title: CH50 RELAY CARD (87108)

Size: D | Document Number: 0078-87108-X3 | REV: --

Date: August 30, 1996 | Sheet 1 of 1

MARK INDUSTRIES
Waverly, Iowa 50677

NOTICE: Information confidential, proprietary information of Deshring Company. Any person accepting is required to accept same information in confidence and agrees to make no disclosures or use thereof except as authorized by Deshring Company.

Concentricity of Cylindrical Machined Surfaces to be kept to within .010 T.I.R. and Parallelism or Perpendicularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept within 0° - 3' (.050 per in.) unless otherwise specified.

All Dimensions In Inches. Tolerances-Unless Noted: .x = ± .12, .xx = ± .06, .xxx = ± .030

Spec. 2300 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

DRAWN: CJI | DATE: 2/14/96

CHK'D: GS | DATE: 2/22/96

APP'D: | DATE:

SCALE: NONE

WT.

MATERIAL: NA

Model: CH MODELS

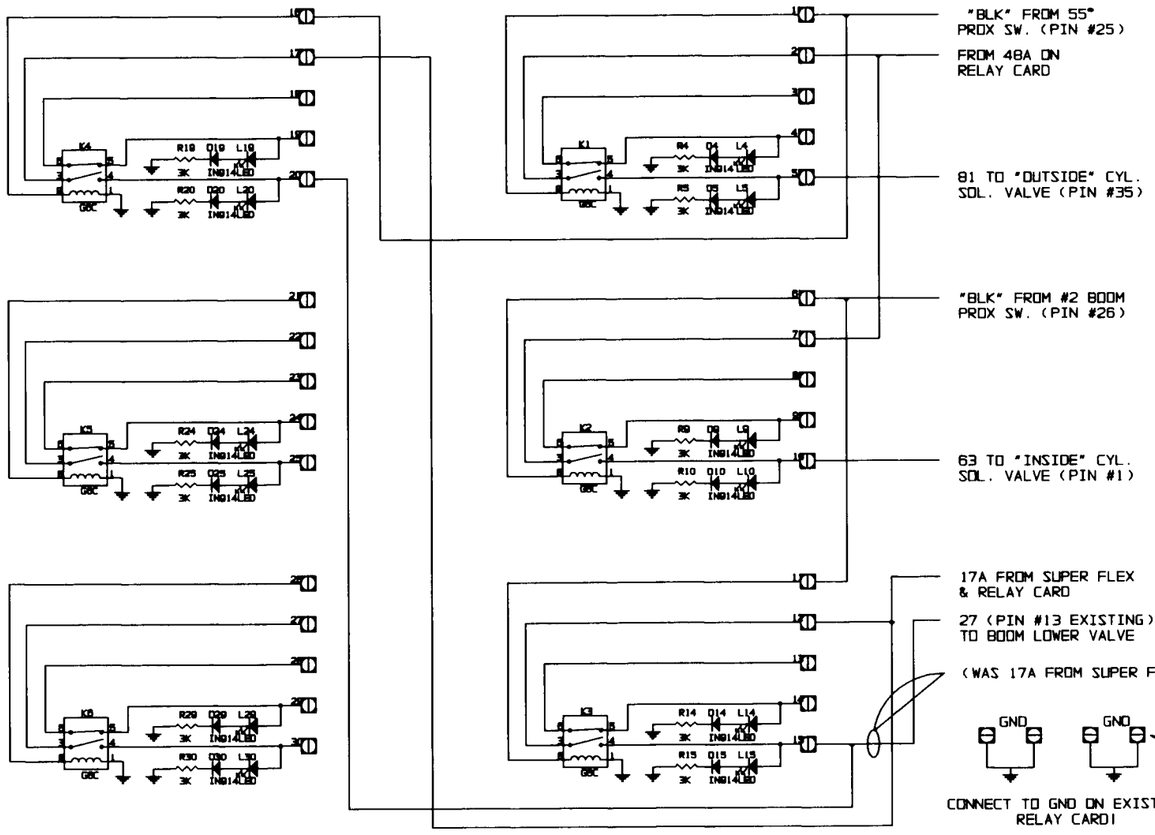
Do Not Scale Print

TITLE: ELECTRICAL SCHEMATIC

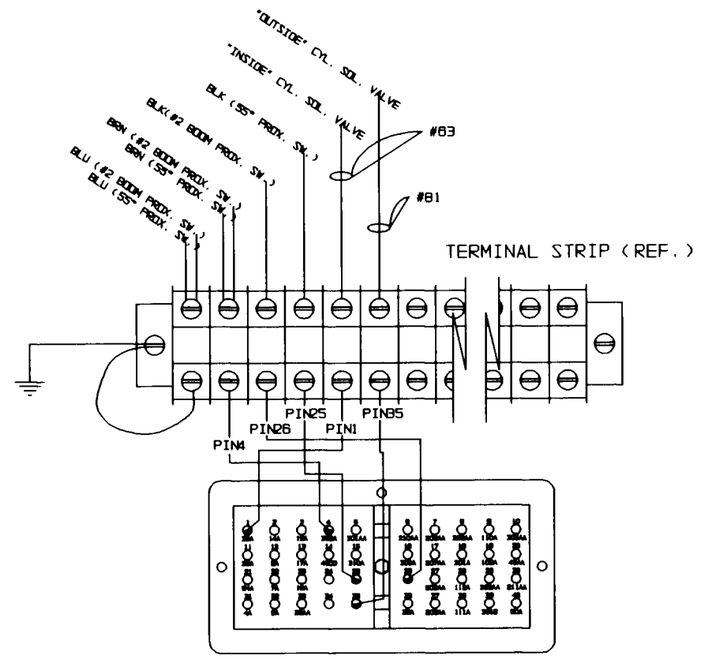
NUMBER: MK212874 4/5

Item	Part No.	Description	Qty.	Vn.

SCHEMATIC: P/N 70917 RELAY CARD



CH100C PROXIMITY SWITCH WIRING INSTALLATION TERMINAL STRIP



CONNECTOR "C"

REF LET.	L.E.N. DATE	CHANGE	E.C.N.
A	10/8/98	ADDED RELAY CARD FOR CH100C	S808
—	2/22/98	PRODUCTION RELEASE	T98

Inch [mm]

NOTICE: Information contained, proprietary information of Rockring Company. Any person accepting is required to accept same information in confidence and agrees to make no disclosure or use thereof except as authorized by Rockring Company.

Concentricity of Cylindrical Machined Surfaces to be kept to within .000 T.I.R. and Perpendicular or Angularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept within 0° - 7' (.000 per in.) unless otherwise specified.

MARK INDUSTRIES
Waverly, Iowa 50677

DRAWN CJI	DATE 2/14/98	SCALE NONE
CHK'D BS	DATE 2/22/98	WT.
APP'D	DATE	

All Dimensions In Inches Tolerances Unless Noted: .x = ±.10 .xx = ±.05 .xxx = ±.000

Spec. 2000 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

MATERIAL NA

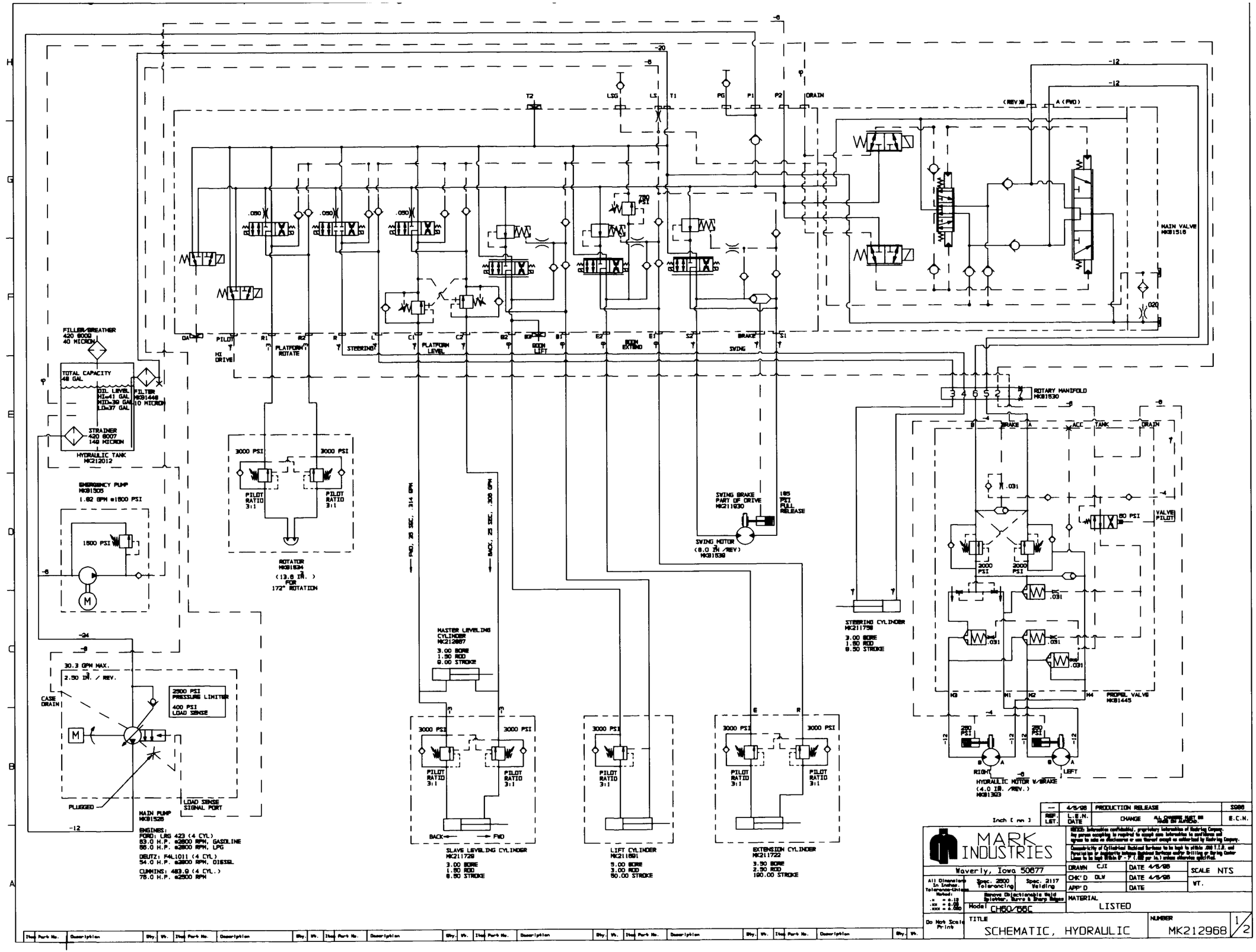
Model CH MODELS

Do Not Scale Print

TITLE ELECTRICAL SCHEMATIC

NUMBER MK212874 5/5

Item	Part No.	Description	Qty.	Wt.



Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.

Inch [mm]

REF. LET.	L.E.N. DATE	CHANGE	E.C.N.
—	4/8/98	PRODUCTION RELEASE	S286

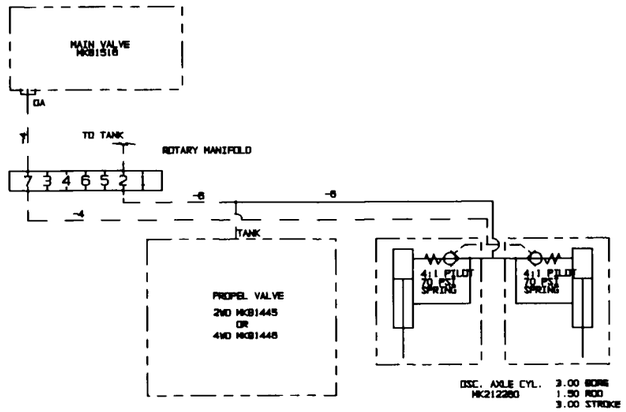
NOTICE: Information confidential, proprietary information of Mark-ing Company. Any person accepting is required to accept same information in confidence and agrees to make no disclosure or use thereof except as authorized by Mark-ing Company.
Unauthority of Published Material Purchaser to be kept in effect .005 T.I.R. and Penetration or progressive surface Hardness Purchaser and/or Drilling or Spring Center Lines to be kept within 0° - 1' (.005 per in.) unless otherwise specified.

MARK INDUSTRIES
Waverly, Iowa 50677

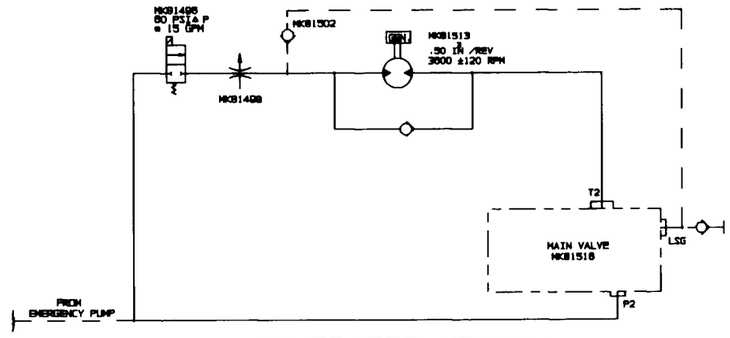
DRAWN	CJI	DATE 4/8/98	SCALE NTS
CHK'D	DLW	DATE 4/8/98	WT.
APP'D		DATE	
MATERIAL	LISTED		

All Dimensions In Inches Tolerances Unless Noted: .x = ± 0.12 .xx = ± 0.02 .xxx = ± 0.010
Spec. 2800 Tolerancing
Spec. 2117 Welding
Remove Objectionable Weld Splatter, Burrs & Sharp Edges
Model CH60/66C
Do Not Scale Print

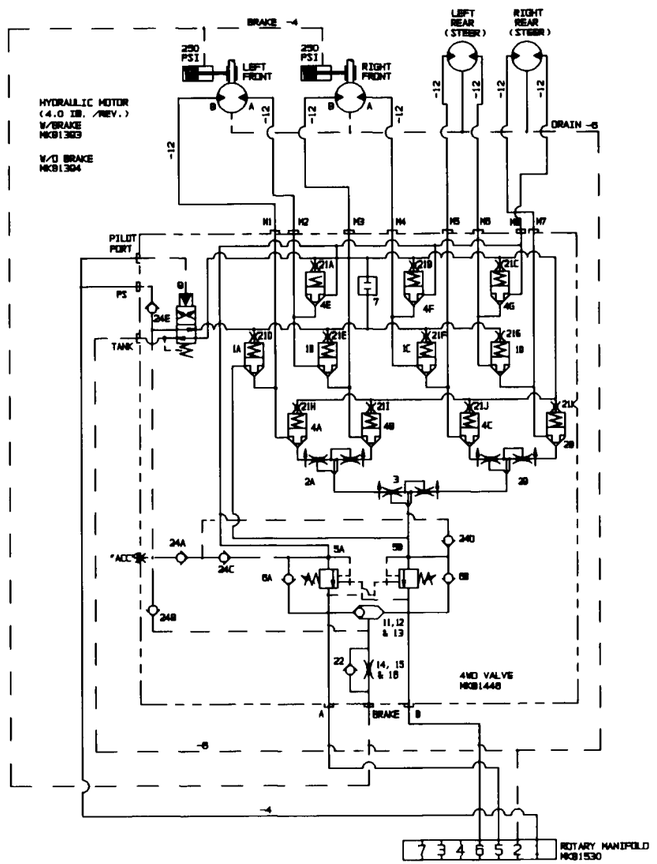
TITLE: SCHEMATIC, HYDRAULIC
NUMBER: MK212968 1/2



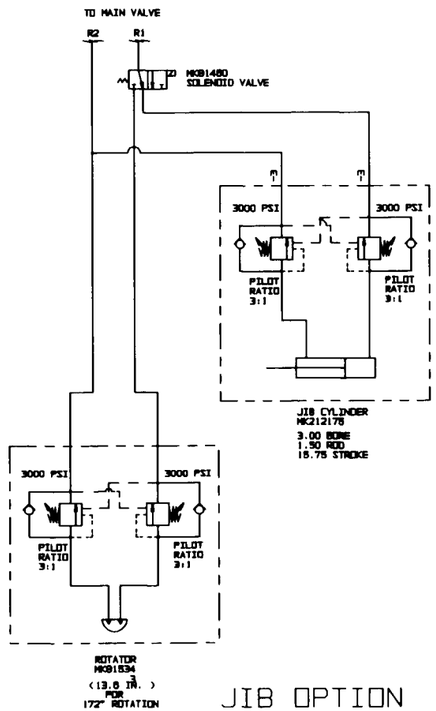
OSCILATING AXLE OPTION



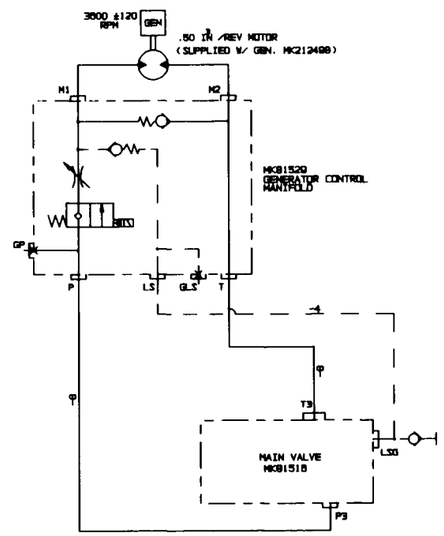
GENERATOR OPTION
(4KW)
PRIOR TO 10/96



4WD OPTION



JIB OPTION



GENERATOR OPTION
(4KW) Ⓐ
AFTER 10/96

Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.	Item	Part No.	Description	Qty.	Wt.

Inch [mm]

REF. LET.	L.E.N. DATE	CHANGE	E.C.N.
—	4/8/98	PRODUCTION RELEASE	5388

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Copyability of Original Material Purchased to be kept to utilize AM T.I.S. and Specifications for proprietary Mark Industries Equipment Purchased and/or Drawings or Parts Lists to be kept Within P - PT. (50 per lb.) unless otherwise specified.

MARK INDUSTRIES
Waverly, Iowa 50677

DRAWN CJI	DATE 4/8/98	SCALE NTS
CHK'D DLV	DATE 4/8/98	WT.
APP'D	DATE	

All Dimensions In Inches. Tolerancing Method: .X = ±.12, .XX = ±.06, .XXX = ±.030
Spec. 2800 Tolerancing
Spec. 2117 Welding
Remove Objectionable Weld Spatter, Burrs & Sharp Edges

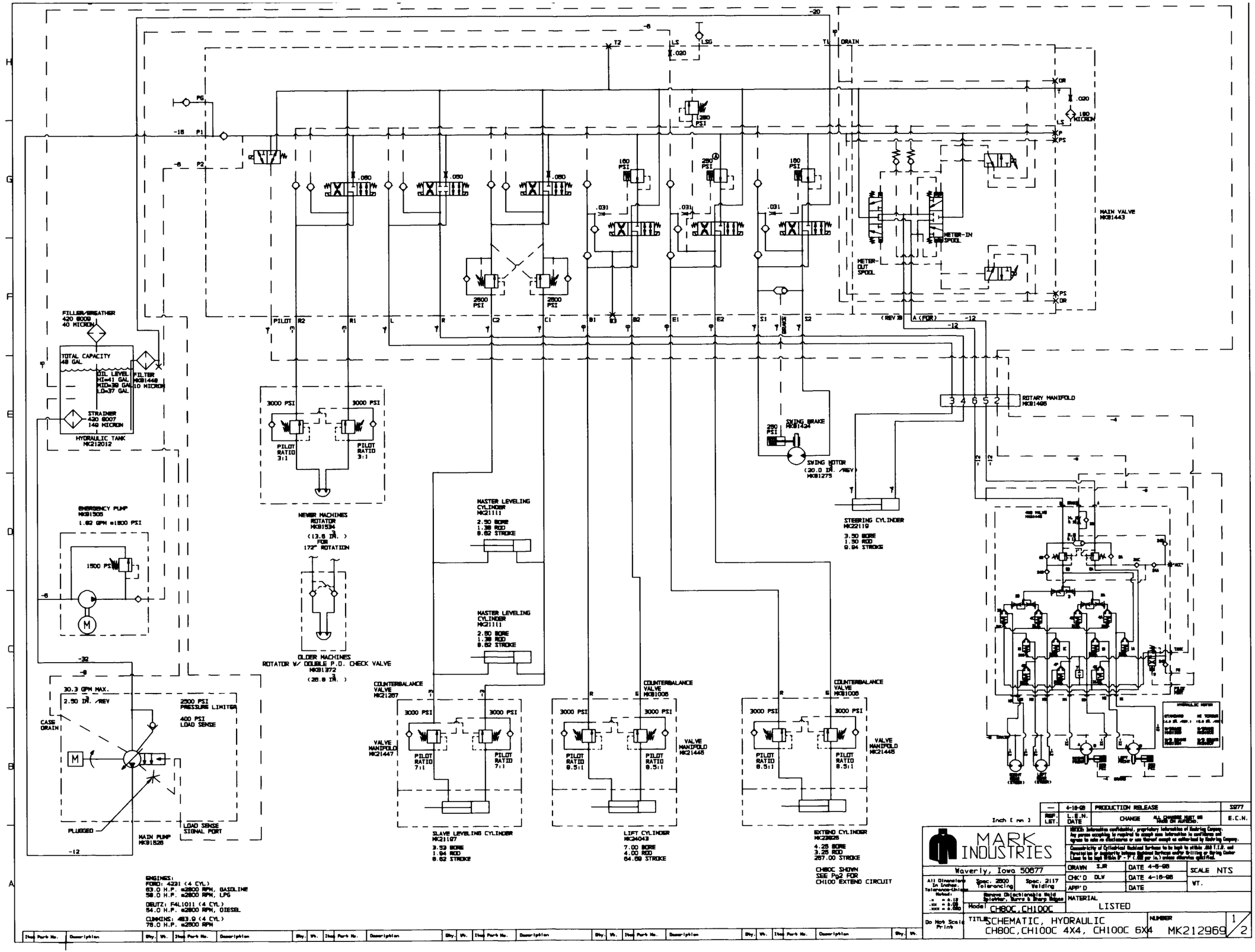
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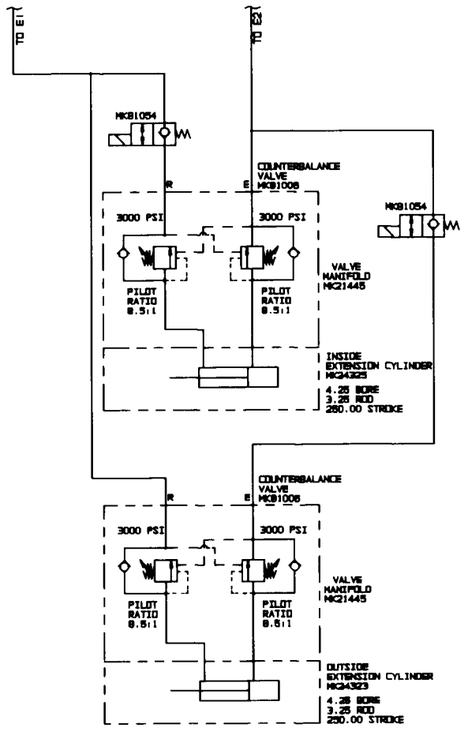
Model CH60/66C OPT.

Do Not Scale Print

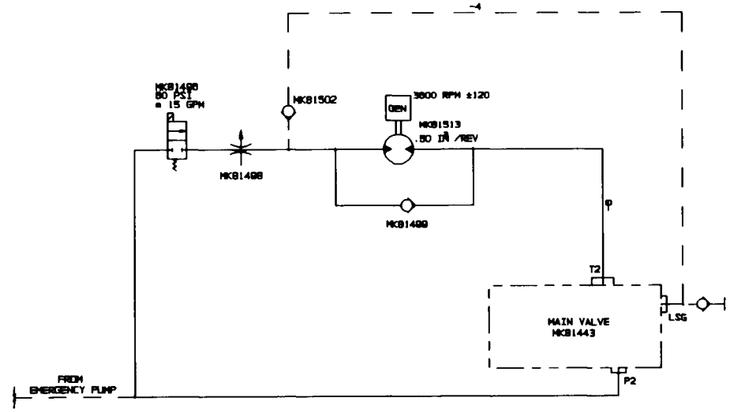
TITLE: SCHEMATIC, HYDRAULIC

NUMBER: MK212968 2/2


-20
-8
T2
LS
LSG
.020
T1 DRAIN
PG
-16 P1
-8 P2
.080
.050
.080
280 PSI
160 PSI
280 PSI
160 PSI
.031
.031
.031
2800 PSI
2800 PSI
DR
.020
.180 MICRON
LS
P
PS
MAIN VALVE MKB1443
METER-IN SPOOL
METER-OUT SPOOL
PS
DR
(REV)
A (FOR)
-12
-12
PILOT
R2
R1
L
R
C2
C1
B1
B3
B2
E1
E2
S1
BRAKE
S2
FILLER/BREATHER
420 8008
40 MICRON
TOTAL CAPACITY
48 GAL.
OIL LEVEL
HI=41 GAL
MID=39 GAL
LO=37 GAL
FILTER
MKB1448
10 MICRON
STRAINER
420 8007
140 MICRON
HYDRAULIC TANK
MK212012
3000 PSI
3000 PSI
PILOT RATIO 3:1
PILOT RATIO 3:1
NEWER MACHINES
ROTATOR
MKB1534
(13.6 IN.³)
FOR
172° ROTATION
OLDER MACHINES
ROTATOR W/ DOUBLE P.O. CHECK VALVE
MKB1372
(28.8 IN.³)
MASTER LEVELING CYLINDER
MK21111
2.50 BORE
1.38 ROD
8.62 STROKE
MASTER LEVELING CYLINDER
MK21111
2.50 BORE
1.38 ROD
8.62 STROKE
SWING BRAKE
MKB1434
280 PSI
SWING MOTOR
(20.0 IN.³/REV)
MKB1275
STEERING CYLINDER
MK22119
3.50 BORE
1.50 ROD
9.84 STROKE
ROTARY MANIFOLD
MKB1486
3 4 6 5 2
EMERGENCY PUMP
MKB1505
1.62 GPM @1800 PSI
1500 PSI
-6
M
-32
-8
30.3 GPM MAX.
2.50 IN.³/REV
2500 PSI
PRESSURE LIMITER
400 PSI
LOAD SENSE
CASE DRAIN
M
PLUGGED
LOAD SENSE SIGNAL PORT
MAIN PUMP
MKB1526
-12
COUNTERBALANCE VALVE
MK21207
3000 PSI
3000 PSI
VALVE MANIFOLD
MK21447
PILOT RATIO 7:1
PILOT RATIO 7:1
SLAVE LEVELING CYLINDER
MK21107
3.53 BORE
1.94 ROD
8.62 STROKE
COUNTERBALANCE VALVE
MKB1008
3000 PSI
3000 PSI
VALVE MANIFOLD
MK21445
PILOT RATIO 8.5:1
PILOT RATIO 8.5:1
LIFT CYLINDER
MK24043
7.00 BORE
4.00 ROD
64.69 STROKE
COUNTERBALANCE VALVE
MKB1008
3000 PSI
3000 PSI
VALVE MANIFOLD
MK21445
PILOT RATIO 8.5:1
PILOT RATIO 8.5:1
EXTEND CYLINDER
MK22625
4.25 BORE
3.25 ROD
287.00 STROKE
CH80C SHOWN
SEE Pg2 FOR
CH100 EXTEND CIRCUIT
ENGINES:
FORD: 4231 (4 CYL.)
69.0 H.P. @2800 RPM, GASOLINE
58.0 H.P. @2800 RPM, LPG
DEUTZ: F4L1011 (4 CYL.)
54.0 H.P. @2800 RPM, DIESEL
CUMMINS: 483.9 (4 CYL.)
78.0 H.P. @2800 RPM
Item Part No. Description Qty. Wt.
Inch [mm]
— 4-18-08 PRODUCTION RELEASE SS77
REF. LET. L.E.N. DATE CHANGE ALL CHANGES MUST BE MADE ON AUTOCAD. E.C.N.
MARK INDUSTRIES
Waverly, Iowa 50877
All Dimensions In Inches. Tolerance Unless Noted: .x = ±.12 .xx = ±.02 .xxx = ±.010
Spec. 2000 Tolerancing
Spec. 2117 Welding
Remove Objectionable Weld Splatter, Burrs & Sharp Edges
DRAWN SJR DATE 4-6-08
CHK'D DLV DATE 4-18-08
APP'D DATE
SCALE NTS
WT.
MATERIAL
LISTED
Model CH80C, CH100C
Do Not Scale Print
TITLE SCHEMATIC, HYDRAULIC CH80C, CH100C 4X4, CH100C 6X4
NUMBER MK212969
1/2



CH100 EXTEND CIRCUIT



GENERATOR OPTION
(4KW)

Item	Part No.	Description	Qty.	Wt.

—	4-18-08	PRODUCTION RELEASE	S977
REF. LET.	L.E.N. DATE	CHANGE ALL DRAWING PART NO. SHALL BE ALPHA-NO.	E.C.N.

Inch [mm]

MARK INDUSTRIES
Waverly, Iowa 50877

INFO: Information confidential, proprietary information of Mark-ing Company. Any person accepting is required to accept same information in confidence and agrees to same no disclosure or use thereof except as authorized by Mark-ing Company.
Concentricity of Cylindrical Machined Surfaces to be kept to within .005 T.I.R. and Perpendicular or Angularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept Within 0 - 1°(.005 per in.) unless otherwise specified.

All Dimensions In Inches Tolerances Unless Noted:	Spec. 2810 Tolerancing	Spec. 2117 Welding
.X = ±.12 .XX = ±.02 .XXX = ±.000	Remove Objectionable Weld Splatter, Burrs & Sharp Edges	

DRAWN	SJR	DATE	4-18-08	SCALE	NTS
CHK'D	GLW	DATE	4-18-08	WT.	
APP'D		DATE			

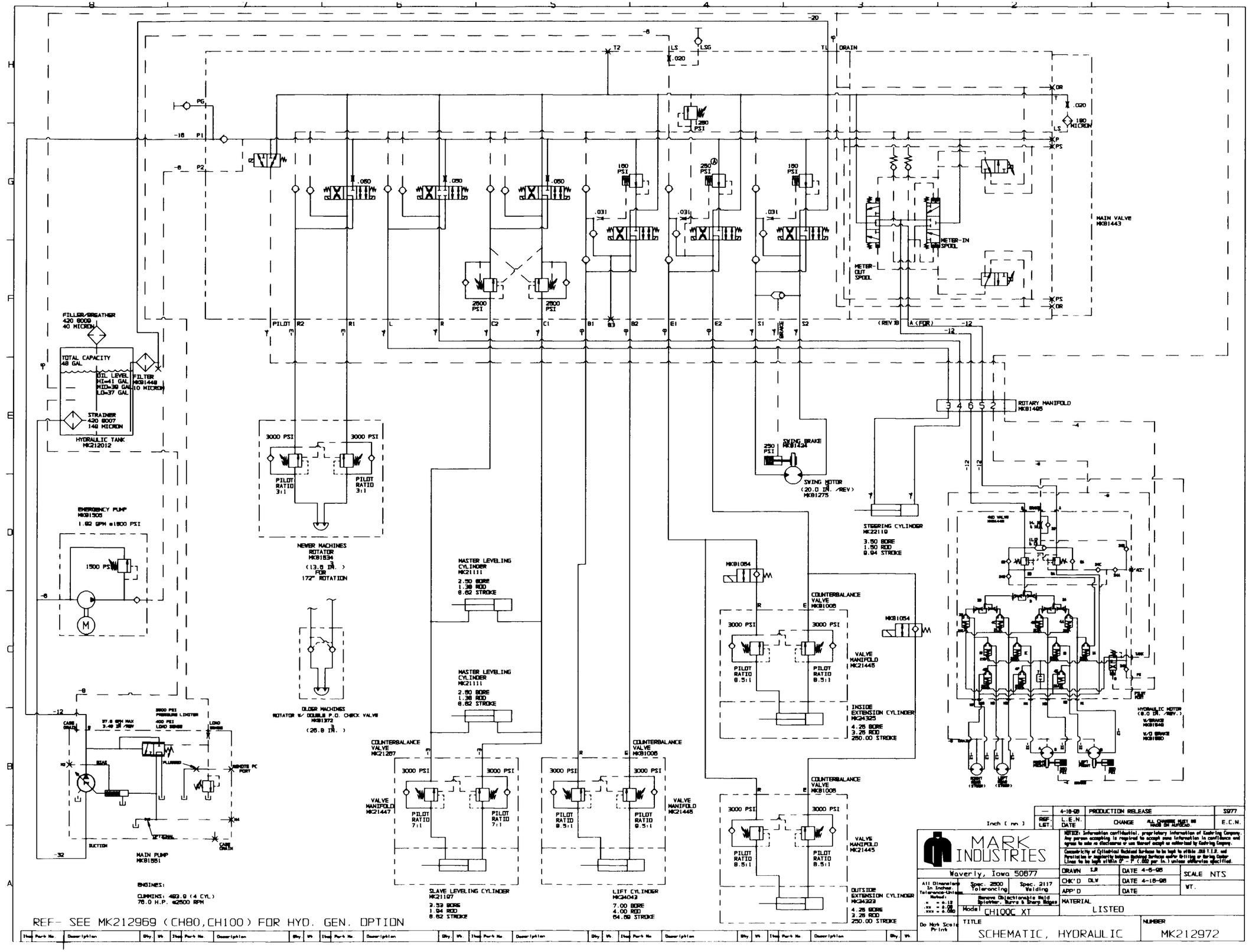
MATERIAL
LISTED

Model CH80C, CH100C

Do Not Scale Print

TITLE SCHEMATIC, HYDRAULIC
CH80C, CH100C 4X4, CH100C 6X4

NUMBER MK212969 2/2



Item	Part No.	Description	Qty	Wt.	Item	Part No.	Description	Qty	Wt.	Item	Part No.	Description	Qty	Wt.	Item	Part No.	Description	Qty	Wt.	Item	Part No.	Description	Qty	Wt.

—	4-16-08	PRODUCTION RELEASE	S977
REF. LET.	L.E.N. DATE	CHANGE ALL CHANGES MUST BE MADE ON AUTOCAD	E.C.N.

Inch [mm]

MARK INDUSTRIES
Waverly, Iowa 50877

All Dimensions In Inches Tolerance Unless Noted: .x = ±.12 .xx = ±.06 .xxx = ±.060

Spec. 2800 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

Model CH100C XT

Do Not Scale Print

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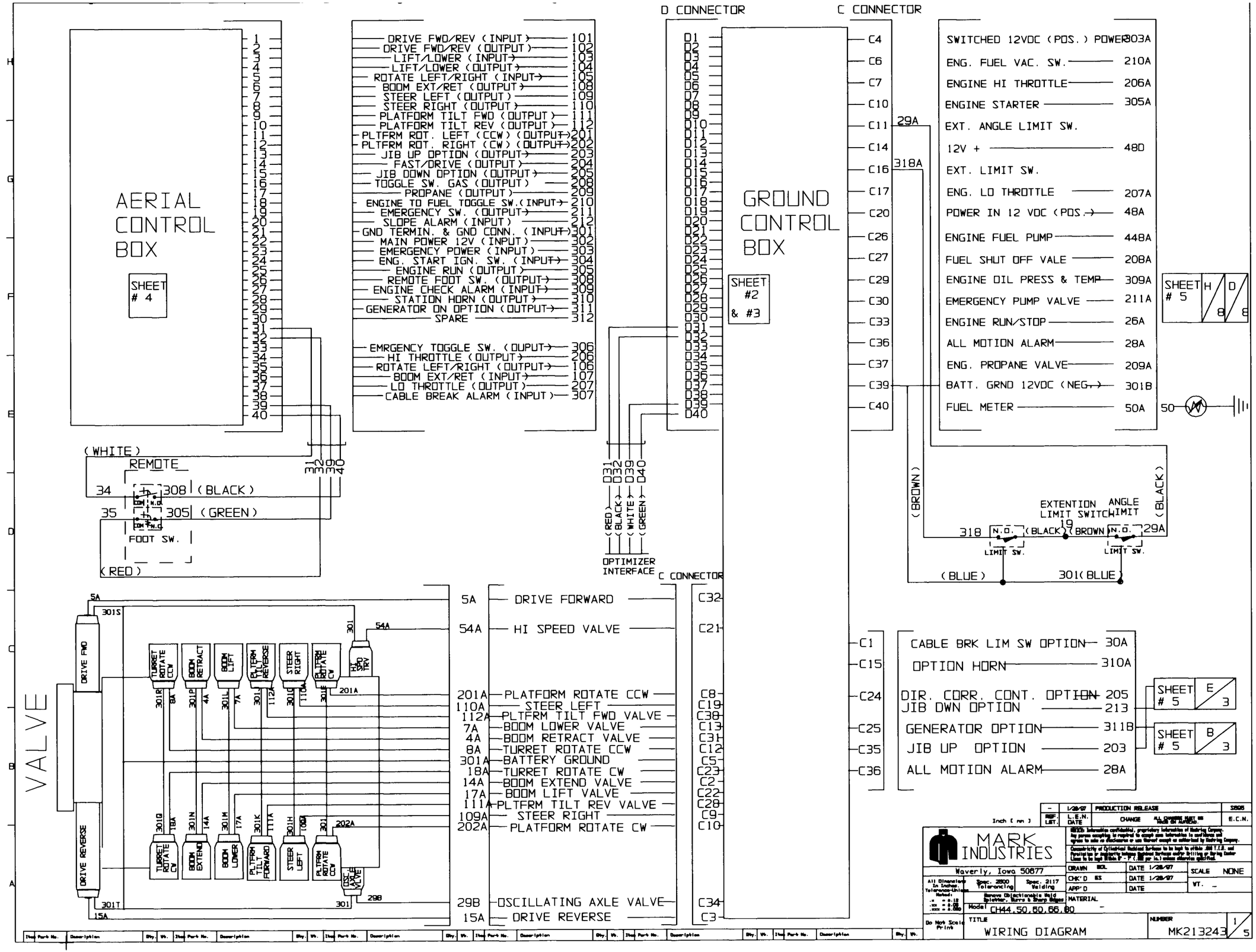
Concentricity of Cylindrical Machined Surfaces to be kept to within .003 T.I.R. and Parallelism or Squareness between Machined Surfaces and/or Drilling or Boring Center Lines to be kept within 0° - 7' (.002 per In.) unless otherwise specified.

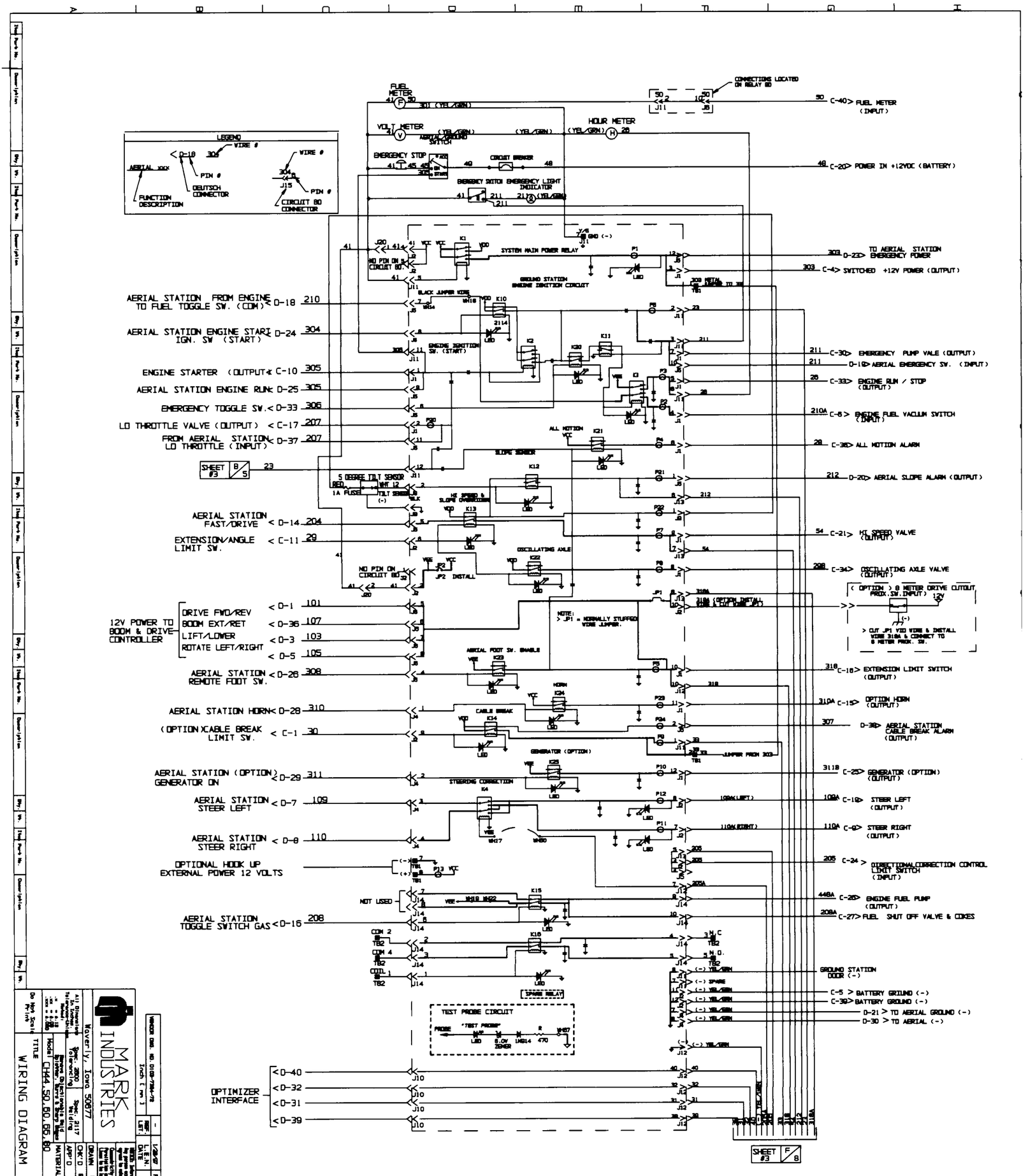
DRAWN	LJR	DATE 4-6-05	SCALE NTS
CHK'D	DLW	DATE 4-16-08	WT.
APP'D		DATE	

MATERIAL LISTED

TITLE SCHEMATIC, HYDRAULIC

NUMBER MK212972


AERIAL CONTROL BOX
SHEET # 4
DRIVE FWD/REV (INPUT) 101
DRIVE FWD/REV (OUTPUT) 102
LIFT/LOWER (INPUT) 103
LIFT/LOWER (OUTPUT) 104
ROTATE LEFT/RIGHT (INPUT) 105
BOOM EXT/RET (OUTPUT) 108
STEER LEFT (OUTPUT) 109
STEER RIGHT (OUTPUT) 110
PLATFORM TILT FWD (OUTPUT) 111
PLATFORM TILT REV (OUTPUT) 112
PLTFRM ROT. LEFT (CCW) (OUTPUT) 201
PLTFRM ROT. RIGHT (CW) (OUTPUT) 202
JIB UP OPTION (OUTPUT) 203
FAST/DRIVE (OUTPUT) 204
JIB DOWN OPTION (OUTPUT) 205
TOGGLE SW. GAS (OUTPUT) 208
PROPANE (OUTPUT) 209
ENGINE TO FUEL TOGGLE SW. (INPUT) 210
EMERGENCY SW. (OUTPUT) 211
SLOPE ALARM (INPUT) 212
GND TERMIN. & GND CONN. (INPUT) 301
MAIN POWER 12V (INPUT) 302
EMERGENCY POWER (INPUT) 303
ENG. START IGN. SW. (INPUT) 304
ENGINE RUN (OUTPUT) 305
REMOTE FOOT SW. (OUTPUT) 308
ENGINE CHECK ALARM (INPUT) 309
STATION HORN (OUTPUT) 310
GENERATOR ON OPTION (OUTPUT) 311
SPARE 312
EMRGENCY TOGGLE SW. (OUPUT) 306
HI THROTTLE (OUTPUT) 206
ROTATE LEFT/RIGHT (OUTPUT) 106
BOOM EXT/RET (INPUT) 107
LO THROTTLE (OUTPUT) 207
CABLE BREAK ALARM (INPUT) 307
(WHITE)
REMOTE
34 308 (BLACK)
35 305 (GREEN)
FOOT SW.
(RED)
D CONNECTOR
GROUND CONTROL BOX
SHEET #2 & #3
C CONNECTOR
SWITCHED 12VDC (POS.) POWER 303A
ENG. FUEL VAC. SW. 210A
ENGINE HI THROTTLE 206A
ENGINE STARTER 305A
EXT. ANGLE LIMIT SW.
12V + 48D
EXT. LIMIT SW.
ENG. LO THROTTLE 207A
POWER IN 12 VDC (POS.) 48A
ENGINE FUEL PUMP 448A
FUEL SHUT OFF VALE 208A
ENGINE OIL PRESS & TEMP 309A
EMERGENCY PUMP VALVE 211A
ENGINE RUN/STOP 26A
ALL MOTION ALARM 28A
ENG. PROPANE VALVE 209A
BATT. GRND 12VDC (NEG.) 301B
FUEL METER 50A
SHEET # 5 H/8 D/8
29A
318A
(BROWN)
EXTENTION LIMIT SWITCH
ANGLE LIMIT
318 N.O. (BLACK) (BROWN) N.O. 29A
LIMIT SW.
LIMIT SW.
(BLUE)
301 (BLUE)
(BLACK)
OPTIMIZER INTERFACE
031 (RED)
032 (BLACK)
039 (WHITE)
040 (GREEN)
VALVE
DRIVE FWD
DRIVE REVERSE
TURRET ROTATE CCW
BOOM RETRACT
BOOM LIFT
PLTFRM TILT REVERSE
STEER RIGHT
PLTFRM ROTATE CW
HI SPD TRV
TURRET ROTATE CW
BOOM EXTEND
BOOM LOWER
PLTFRM TILT FORWARD
STEER LEFT
PLTFRM ROTATE CCW
OSC AXLE VALVE
5A
301S
54A
201A
301R 8A
301P 4A
301L 7A
301 112A
301G 110A
301E 110A
301T
15A
298
301
202A
301Q 18A
301N 14A
301M 17A
301K 111A
301H 109A
C CONNECTOR
5A DRIVE FORWARD C32
54A HI SPEED VALVE C21
201A PLATFORM ROTATE CCW C8
110A STEER LEFT C19
112A PLTFRM TILT FWD VALVE C38
7A BOOM LOWER VALVE C13
4A BOOM RETRACT VALVE C31
8A TURRET ROTATE CCW C12
301A BATTERY GROUND C5
18A TURRET ROTATE CW C23
14A BOOM EXTEND VALVE C2
17A BOOM LIFT VALVE C22
111A PLTFRM TILT REV VALVE C28
109A STEER RIGHT C9
202A PLATFORM ROTATE CW C10
298 OSCILLATING AXLE VALVE C34
15A DRIVE REVERSE C3
C1 CABLE BRK LIM SW OPTION 30A
C15 OPTION HORN 310A
C24 DIR. CORR. CONT. OPTION 205
JIB DOWN OPTION 213
C25 GENERATOR OPTION 311B
C35 JIB UP OPTION 203
C36 ALL MOTION ALARM 28A
SHEET # 5 E/3
SHEET # 5 B/3
MARK INDUSTRIES
Waverly, Iowa 50677
DRAWN BDL DATE 1-28-97
CHK'D BS DATE 1-28-97
APP'D DATE
MATERIAL
Model CH44,50,60,66,80
TITLE WIRING DIAGRAM
NUMBER MK213243
SCALE NONE
WT. -
1/5



MARK INDUSTRIES
Waverly, Iowa 50677

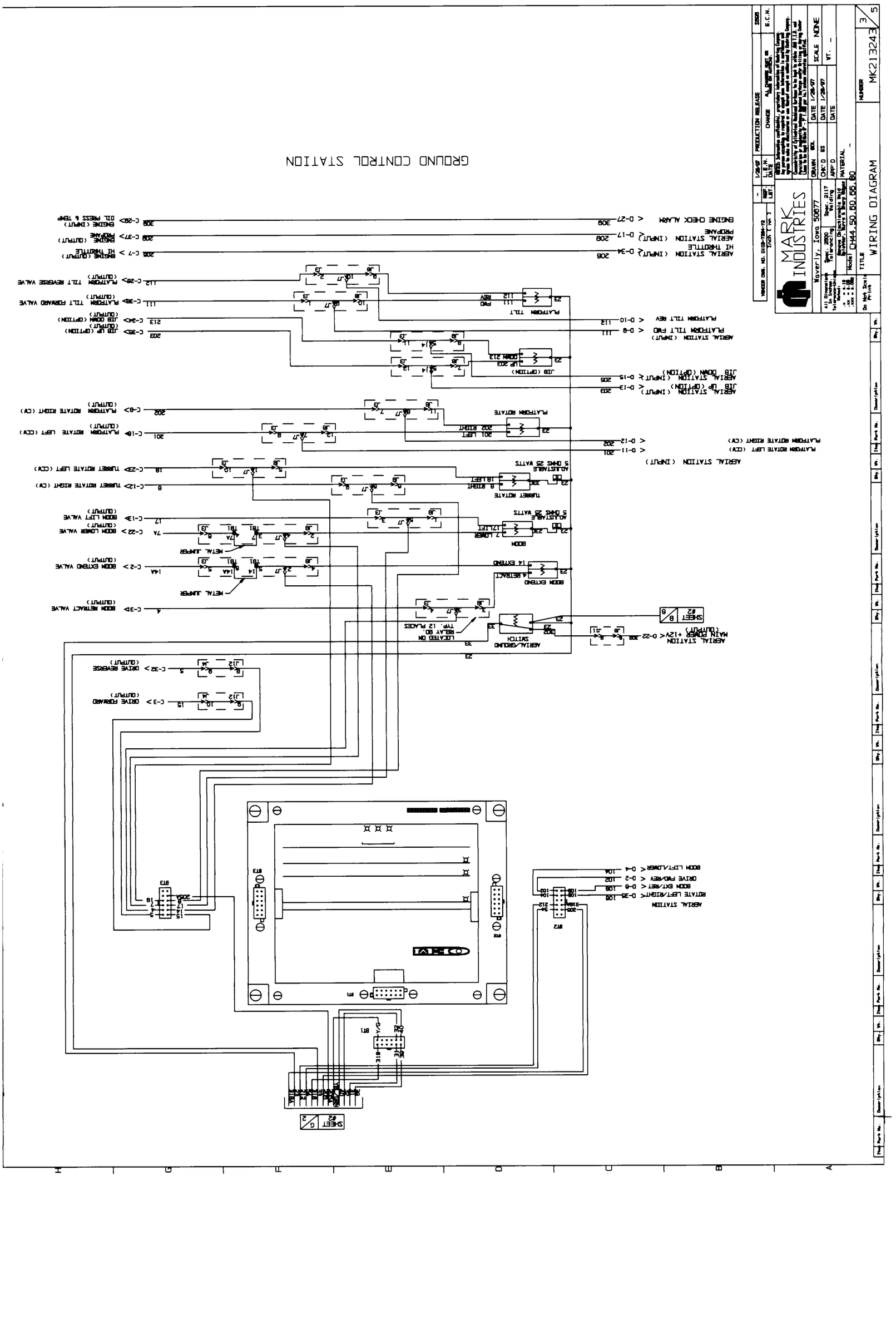
TITLE: WIRING DIAGRAM
Model: CH44,50,60,65,80
NUMBER: MK213243
2/5

MATERIAL: -
SCALE: NONE
WT. -
DRAWN: BDL
DATE: 1/28/07
CHK'D: BS
DATE: 1/28/07
APP'D:
DATE:

E.C.N. 3505
PRODUCTION RELEASE
CHANGE
DATE 1/28/07
VENDOR DWG. NO. D10-7784-78
Inch [mm]
LEFT -

Do Not Scale Print

Proprietary Information


GROUND CONTROL STATION
MARK INDUSTRIES
Waverly, Iowa 50677
Model CH44.50.60.66.80
TITLE WIRING DIAGRAM
NUMBER MK213243
SCALE NONE
DRAWN BDL DATE 1/28/97
CHK'D ES DATE 1/28/97
APP'D DATE
MATERIAL -
WT. -
PRODUCTION RELEASE
CHANGE
E.C.N. 3566
L.E.N. 1/28/97
DATE
REF:
LIST:
ENGINE CHECK ALARM
AERIAL STATION (INPUT) HI THROTTLE
PROPANE
PLATFORM TILT REVERSE VALVE
PLATFORM TILT FORWARD VALVE
JIB DOWN (OPTION)
JIB UP (OPTION)
PLATFORM ROTATE RIGHT (CW)
PLATFORM ROTATE LEFT (CCW)
TUBRET ROTATE LEFT (CCW)
TUBRET ROTATE RIGHT (CW)
BOOM LIFT VALVE
BOOM LOWER VALVE
BOOM EXTEND VALVE
BOOM RETRACT VALVE
DRIVE REVERSE
DRIVE FORWARD
AERIAL STATION
MAIN POWER +12V
SHEET 8 / 2
SHEET 6 / 2
METAL JUMPER
LOCATED ON RELAY 80, TYP. 12 PLACES
ROTATE LEFT/RIGHT
BOOM EXT/RET
DRIVE FWD/REV
BOOM LIFT/LOWER

CONNECTOR PIN #	WIRE #	COLOR	LOCATION
1	101	WHITE	J2-TERMINAL 1 DRIVE
2	102	WHITE	J2-TERMINAL 2 DRIVE
3	103	WHITE	J1-TERMINAL 1 LIFT
4	104	WHITE	J1-TERMINAL 2 LIFT
5	105	WHITE	J1-TERMINAL 4 ROTATE
6	106	WHITE	J3-TERMINAL 3 ROTATE
7	108	WHITE	J2-S2/NO STEER RIGHT
8	110	WHITE	J2-S1/NO STEER LEFT
9	111	WHITE	TOGGLE SW5 PLATFORM TILT
10	112	WHITE	TOGGLE SW5 PLATFORM TILT
11	201	WHITE	TOGGLE SW6 PLATFORM ROT
12	202	WHITE	TOGGLE SW6 PLATFORM ROT
13	203	WHITE	TOGGLE SW7 JIB UP
14	204	WHITE	TOGGLE SW7 JIB DOWN
15	205	WHITE	TOGGLE SW1 DRIVE F/S
16	208	WHITE	TOGGLE SW7 JIB DOWN
17	209	WHITE	TOGGLE SW10 GAS
18	210	WHITE	TOGGLE SW10 PROPANE
19	211	WHITE	TOGGLE SW10 DOOR GUARDRAIL
20	212	WHITE	TOGGLE SW3 EMERG. PUMP
21	301	YEL/GRN	INSTABILITY LIGHT & ALARM #2
22	302	WHITE	GND TERMINAL 30 (-) BATTERY DIRECTION
23	303	WHITE	CIRCUIT BREAKER SW11
24	304	WHITE	EMERGENCY STOP
25	305	WHITE	IGNITION (ON)
26	306	WHITE	JUMPER TO 30
27	309	WHITE	TB 30 +12V POWER TO GROUND CONTROL
28	310	WHITE	ALARM @ 1.5 CHECK ENGINE LIGHT
29	311	WHITE	(OPTION) SW 2 HORN
30	312	WHITE	(OPTION) GENERATOR
31	34	WHITE	SPARE
32	35	WHITE	+12V TO TERMINAL 8 FROM KEY SWITCH
33	306	WHITE	TOGGLE SW 3 EMERGENCY PUMP
34	206	WHITE	J2-S1/NO HI THROTTLE
35	106	WHITE	J1-TERMINAL 3 ROTATE
36	107	WHITE	J3- TERMINAL 1 BOOM EXT.
37	207	WHITE	TERMINAL BLOCK 207 LO THROTTLE
38	307	WHITE	(OPTION) CABLE BREAK ALARM
39	305	WHITE	JUMPER TO 25
40	308	WHITE	+12V TO TERMINAL #2 & FROM KEY SWITCH

DEUTSCH DRC12-40PA MALE PINS 0480-202016141

NOT TO SCALE

AERIAL CONTROL STATION

NOTE:
ALL GROUND (301) WIRES YELLOW/GREEN 18AWG UNLESS OTHERWISE SPECIFIED.

Item	Part No.	Description	Qty.	Wt.

-	1/28/07	PRODUCTION RELEASE	SSGS
REF. LET.	L.E.N. DATE	CHANGE ALL CHANGES MUST BE MADE ON AUTOCAD.	E.C.N.

Inch [mm]

VENDOR DWG. NO. 0103-6635-72

MARK INDUSTRIES
Waverly, Iowa 50677

All Dimensions in Inches + Tolerances Unless Noted: .x = ± 0.10, .xx = ± 0.05, .xxx = ± 0.010

Spec. 2800 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

Do Not Scale Print

Model CH44,50,60,66,80

DRAWN	BDL	DATE 1/28/07
CHK'D	ES	DATE 1/28/07
APP'D		DATE

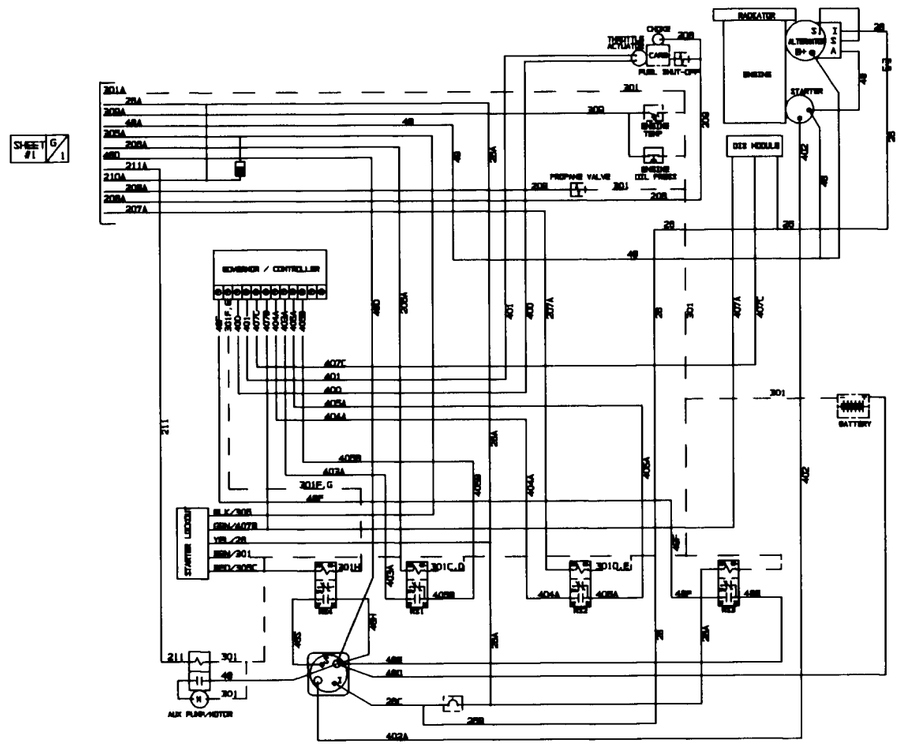
SCALE NONE
WT. -
MATERIAL -

TITLE
WIRING DIAGRAM

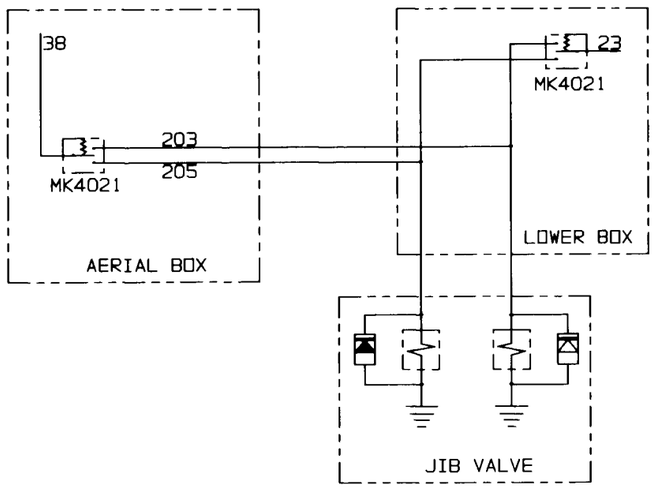
NUMBER
MK213243 4/5

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Ownership of Intellectual Rights Inherent herein and/or Drawings or Drawing Center Lines to be kept Within 0" - 1", .000 per in.² unless otherwise specified.

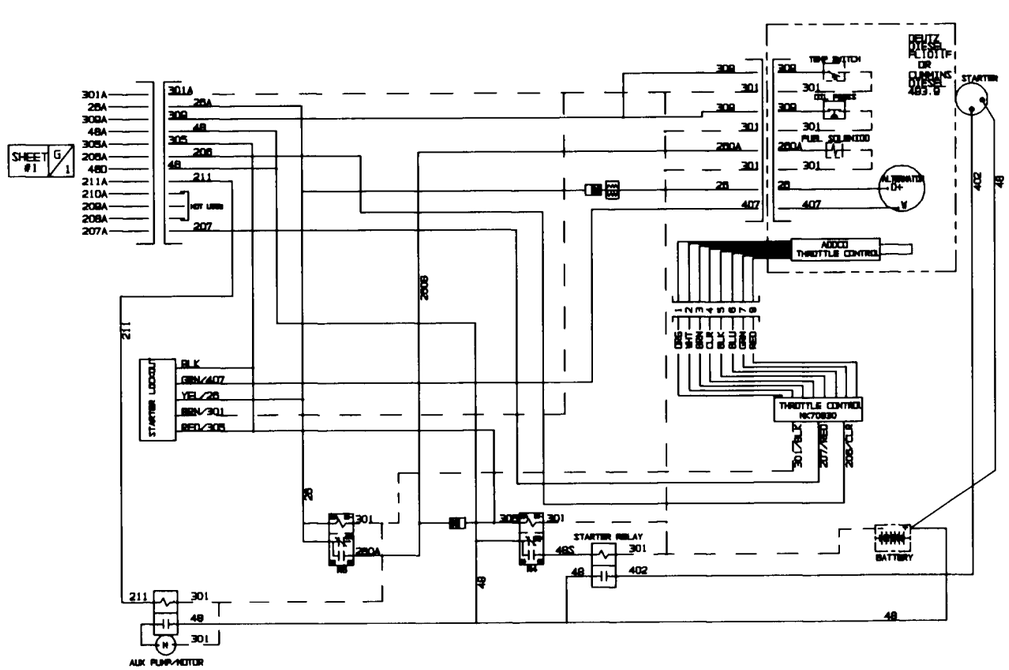


FORD LRG423 GAS OR DUAL FUEL

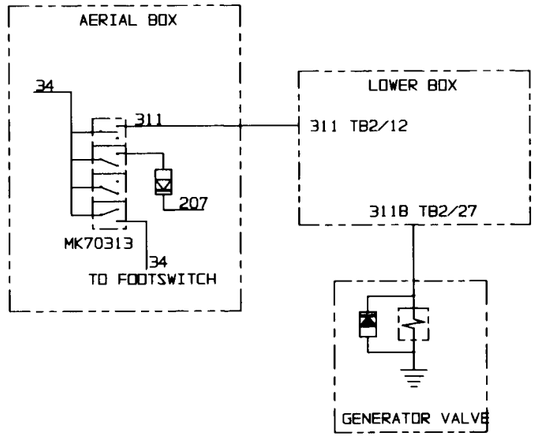


6' JIB OPTION

SHEET #1 B/1



DEUTZ DIESEL FL1011F OR CUMMINS DIESEL 4B3.9



GENERATOR OPTION

SHEET #1 B/1

Item	Part No.	Description	Qty.	Wt.

Inch [mm]

—	1/28/97	PRODUCTION RELEASE	S805
REF. LET.	L.E.N. DATE	CHANGE	E.C.N.

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Commodity of Cylindrical Ruled Surfaces to be kept to within .005 T.I.R. and Perpendicular or Angularity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept Within .5° - .1° (.88 per in.) unless otherwise specified.

MARK INDUSTRIES
Waverly, Iowa 50677

DRAWN	BDL	DATE 1/28/97	SCALE NONE
CHK'D	BS	DATE 1/28/97	WT. —
APP'D		DATE	

All Dimensions In Inches Tolerances-Unless Noted: Spec. 2800 Tolerancing, Spec. 2117 Welding. .X = ± 0.12, .XX = ± 0.02, .XXX = ± 0.010. Remove Objectionable Weld Spatter, Burrs & Sharp Edges.

MATERIAL —

Model CH44,50,60,65,80

Do Not Scale Print

TITLE WIRING DIAGRAM

NUMBER MK213243 5/5

AERIAL CONTROL BOX

SHEET # 4

301	AERIAL BOX GROUND	301
302	MAIN +12VDC IN	302
403	DATA LINK (OUTPUT)	403
404	DATA LINK (OUTPUT)	404
303	+12 VDC EMERGENCY SW. (INPUT)	303
102	DRIVE FWD/REV (OUTPUT)	102
307	CABLE BREAK ALARM (INPUT)	307
104	BOOM UP/DWN (OUTPUT)	104
309	ENGINE ALARM (INPUT)	309
106	TURRET ROTATE (OUTPUT)	106
212	INSTABILITY ALARM (OUTPUT)	212
108	BOOM IN/OUT (OUPTUT)	108
201	PLAT. ROT. CCW/LEFT (OUPUT)	201
202	PLAT. ROT. CW./RIGHT (OUTPUT)	202
31	OPTIMIZER INTERFACE (RED)	31
32	OPTIMIZER INTERFACE (BLK)	32
39	OPTIMIZER INTERFACE (WHT)	39
40	OPTIMIZER INTERFACE (GRN)	40
	N/A OPEN	--
	N/A OPEN	--
	N/A OPEN	--
	N/A OPEN	--
	N/A OPEN	--
	N/A OPEN	--

	#1 EXT. PROX. SW. GROUND	Y/G
	#1 EXT. PROX. SW. (OUTPUT)	29
	#1 EXT. PROX. SW. POWER	413
	#1 ANGLE PROX. SW. GROUND	Y/G
	ANGLE PROX. SW. (OUTPUT)	413
	ANGLE PROX. SW. POWER	410
	#2 EXT. PROX. SW. GROUND	Y/G
	#2 EXT. PROX. SW. OUTPUT	416
	#2 EXT. PROX. SW. POWER	41
	#2 ANGLE PROX. SW. GROUND	Y/G
	#2 ANGLE PROX. SW. (OUTPUT)	415
	#2 ANGLE PROX. SW. POWER	41
	OPEN	--
	OPEN	--
	OPEN	--
	OPEN	--

SHEET #5 G/1

SHEET #5 E/1

D CONNECTOR

D1	C4
D2	C6
D3	C7
D4	C10
D5	C11
D6	C14
D7	C16
D8	C17
D9	C20
D10	C26
D11	C27
D12	C29
D13	C30
D14	C33
D15	C36
D16	C37
D17	C39
D18	C40
D19	
D20	
D21	
D22	
D23	
D24	
D25	
D26	
D27	
D28	
D29	
D30	
D31	
D32	
D33	
D34	
D35	
D36	
D37	
D38	
D39	
D40	

GROUND CONTROL BOX

SHEET #2 & #3

C CONNECTOR

C4	
C6	
C7	
C10	
C11	
C14	
C16	
C17	
C20	
C26	
C27	
C29	
C30	
C33	
C36	
C37	
C39	
C40	

	SWITCHED 12VDC (+) POWER	303A
	BATTERY GROUND (-)	Y/G
	ENGINE HI THROTTLE	206A
	ENGINE STARTER (OUTPUT)	305A
	OPEN	
	12V +	48D
	EXT. PROX. SW. POWER	
	ENG. LO THROTTLE	207A
	POWER IN 12 VDC +	48A
	ENGINE FUEL PUMP	448A
	FUEL SHUT OFF VALE	208A
	ENGINE OIL PRESS & TEMP	309A
	EMERGENCY PUMP VALVE	211A
	ENGINE RUN/STOP	26A
	ALL MOTION ALARM	28A
	ENG. PROPANE VALVE	209A
	JIB DOWN OPTION	213
	FUEL LEVEL SENSOR	50A

SHEET # 6 A/5

SHEET # 5 H/8 D/8

50

(WHITE)

REMOTE

34 308 (BLACK)

35 305 (GREEN)

FOOT SW.

(RED)

VALVE

DRIVE REV

DRIVE FORWARD

TURRET ROTATE CW/RIGHT

BOOM RETRACT

BOOM UP

PLTFRM TILT FORWARD

STEER LEFT

PLTFRM ROTATE CW

HI SPD TRV

TURRET ROTATE CW/LEFT

BOOM EXTEND

BOOM LIFT

PLTFRM TILT BACK

STEER RIGHT

PLTFRM ROTATE CCW

OSC AXL VALVE

5A 301S 54A 202A 201A 298 301T 15A

C CONNECTOR

5A	DRIVE REV. VALVE	C32
54A	HI SPEED VALVE	C21
202A	PLTFRM ROT. CW/RIGHT	C8
109A	STEER LEFT	C19
111A	PLTFRM TILT FWD VALVE	C38
17A	BOOM UP VALVE	C13
4A	BOOM RETRACT VALVE	C31
8A	TURRET ROT. CW/RIGHT	C12
301A	BATTERY GROUND	C5
18A	TURRET ROTATE CW/LEFT	C23
14A	BOOM EXTEND VALVE	C2
7A	BOOM LIFT VALVE	C22
112A	PLTFRM TILT BACK VALVE	C28
110A	STEER RIGHT	C9
201A	PLTFRM ROTATE CCW/LEFT	C18
298	OSCILLATING AXLE VALVE	C34
15A	DRIVE FWD	C3

C1	CABLE BRK LIM SW OPTION	30A
C15	OPTION HORN	310A
C24	DIR. CORR. CONT. PROX. SW.	305
C25	GENERATOR OPTION	311B
C35	JIB UP OPTION	203

SHEET # 6 E/4

SHEET # 6 F/7

SHEET # 6 B/2

SHEET # 5 E/3

SHEET # 5 B/3

Item	Part No.	Description	Qty.	Wt.

REV.	LET.	L.E.N. DATE	CHANGE	E.C.N.
—		6/2/07	PRODUCTION RELEASE	3310

Inch [mm]

TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

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All Dimensions In Inches. Tolerances Unless Noted: .X = ±.125 .XX = ±.030 .XXX = ±.010

Spec. 2800 Torquing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

DRAWN BDL | DATE 6/2/07 | SCALE NONE

CHK'D MV | DATE 6/2/07 | Do Not Scale Print

APP'D | DATE | WT. —

MATERIAL —

Model T885

PRODUCT: ☐DRAIN ☐MARKLIFT ☐OTHER

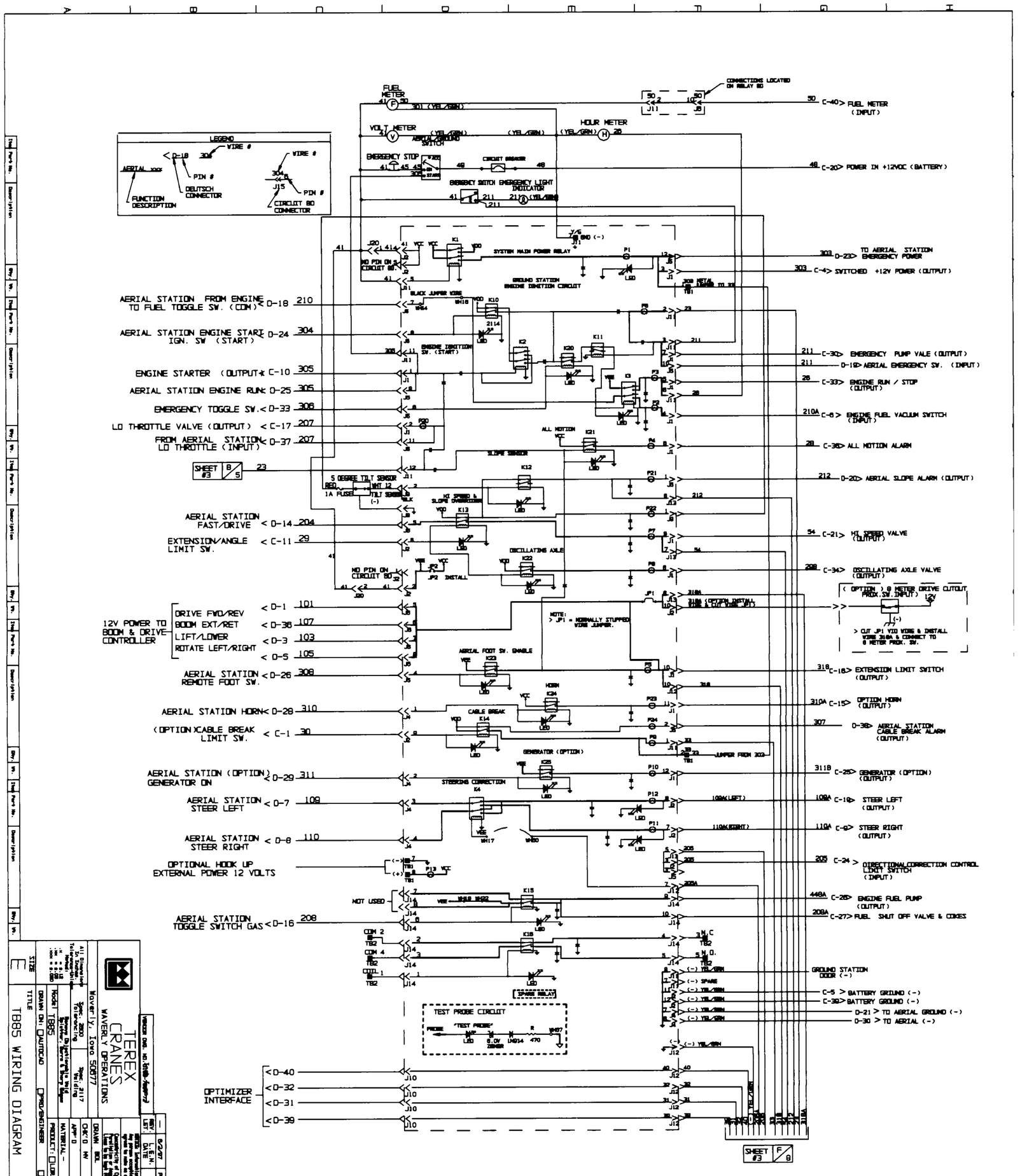
DRAWN ON: ☐AUTOCAD ☐PRO/ENGINEER ☐EUCLID 3 ☐OTHER

SIZE E

TITLE T885 WIRING DIAGRAM

NUMBER MK213359

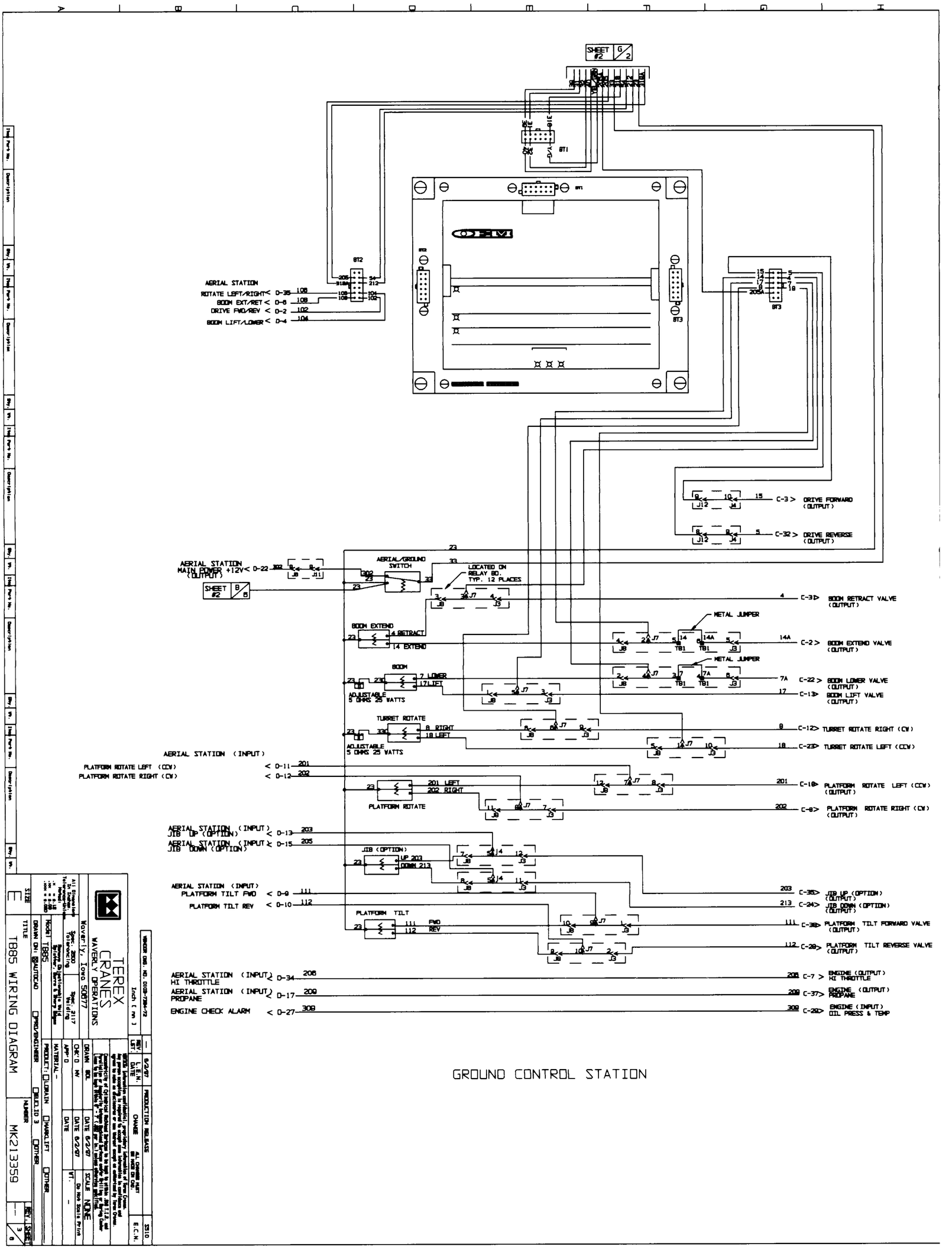
REV. — SHEET 1/6



TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

TB85 WIRING DIAGRAM

SIZE E
NUMBER MK213359
REV --
SHEET 2 of 8
MODEL TB85
DRAWN BY: CAUTHOR
PRODUCT: DURATN
SPECIFICATION 3
PRODUCTION RELEASE
DRAWN BY: BDL
CHK'D BY: HW
APP'D BY: Mike Hall
DATE 8/2/07
SCALE NONE
MATERIAL -
DO NOT SCALE PRINT
E.C.N. 3510



GROUND CONTROL STATION

TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

TB85 WIRING DIAGRAM

MK213359

SIZE E

DRAWN ON: AUTOCAD

PRODUCT: ☐ CRAWLER ☐ MARKLIFT ☐ OTHER

☐ RT/LID 3 ☐ OTHER

DRAWN BY: BDL DATE 6/27/07

CHK'D: MW DATE 6/27/07

APP'D: - DATE -

SCALE: NONE

Do Not Scale Print

REV. LET: I

E.C.N.: 3510

PRODUCTION RELEASE

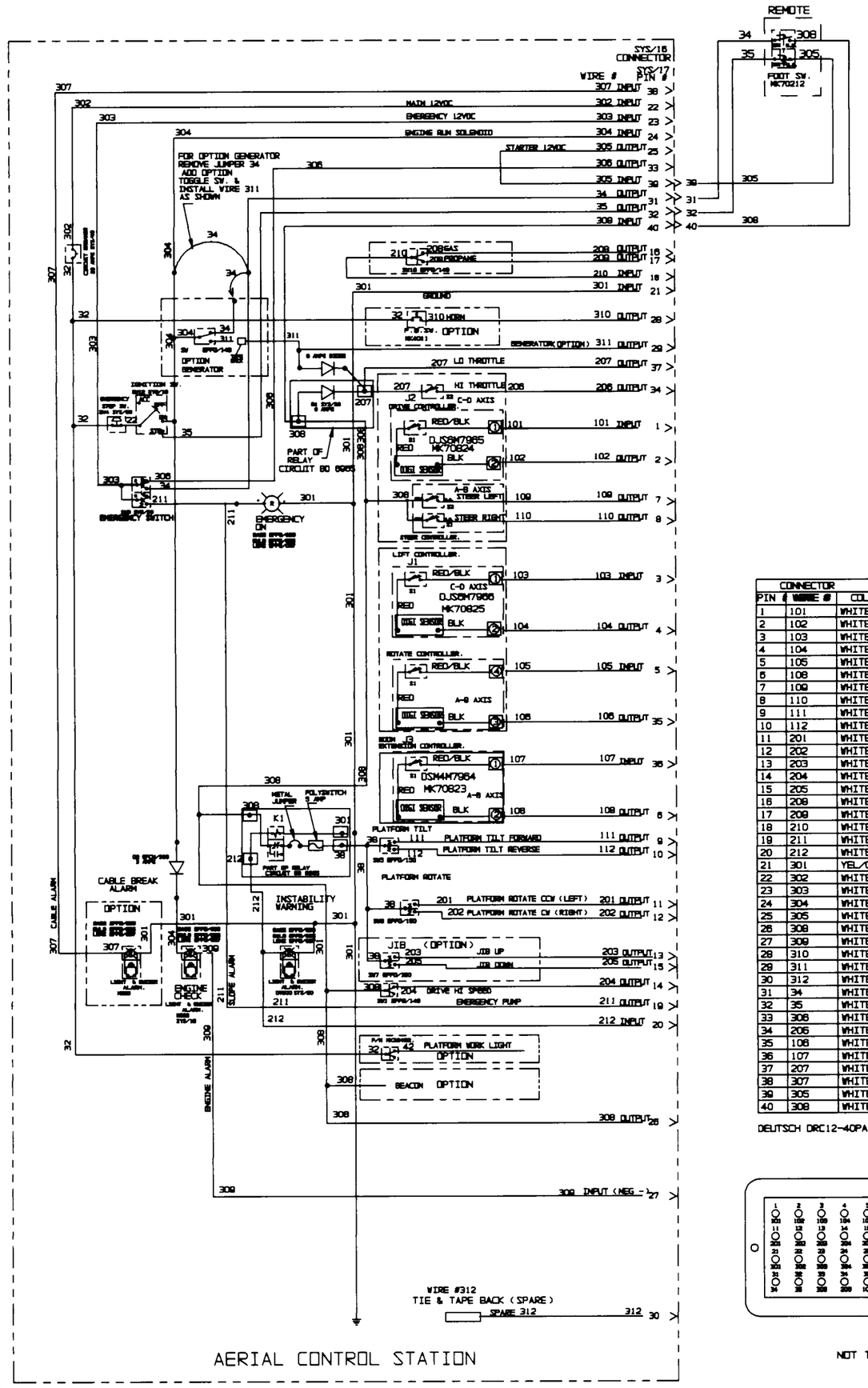
CHANGE: ALL SHEETS PER ECO

DATE: 6/27/07

VENDOR DWG. NO.: 0108-7384-72

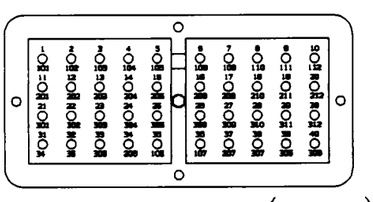
Inch [mm]

SHEET 3/8

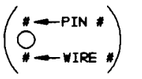


CONNECTOR			
PIN #	WIRE #	COLOR	LOCATION
1	101	WHITE	J2-TERMINAL 1 DRIVE
2	102	WHITE	J2-TERMINAL 2 DRIVE
3	103	WHITE	J1-TERMINAL 1 LIFT
4	104	WHITE	J1-TERMINAL 2 LIFT
5	105	WHITE	J1-TERMINAL 4 ROTATE
6	106	WHITE	J3-TERMINAL 3 ROTATE
7	109	WHITE	J2-S2/NO STEER RIGHT
8	110	WHITE	J2-S1/NO STEER LEFT
9	111	WHITE	TOGGLE SW5 PLATFRM TILT
10	112	WHITE	TOGGLE SW5 PLATFRM TILT
11	201	WHITE	TOGGLE SW6 PLATFRM ROT
12	202	WHITE	TOGGLE SW6 PLATFRM ROT
13	203	WHITE	TOGGLE SW7 JIB UP
14	204	WHITE	TOGGLE SW1 DRIVE F/S
15	205	WHITE	TOGGLE SW7 JIB DOWN
16	208	WHITE	TOGGLE SW10 GAS
17	209	WHITE	TOGGLE SW10 PROPANE
18	210	WHITE	TOGGLE SW10ON GAS/PROPANE
19	211	WHITE	TOGGLE SW3 EMERG. PUMP
20	212	WHITE	INSTABILITY LIGHT & ALARM #2
21	301	YEL/GRN	GND TERMINAL 38 & GND CONNECTIONS
22	302	WHITE	CIRCUIT BREAKER SW11
23	303	WHITE	EMERGENCY STOP
24	304	WHITE	IGNITION (ON)
25	305	WHITE	JUMPER TO 30
26	308	WHITE	TO 308 +12V POWER TO GROUND CONTROL
27	309	WHITE	ALARM #1 & CHECK ENGINE LIGHT
28	310	WHITE	(OPTION) SW 2 HORN
29	311	WHITE	(OPTION) GENERATOR
30	312	WHITE	SPARE
31	34	WHITE	+12V TO FOOTSWITCH TO POWER AERIAL CONTROL
32	35	WHITE	+12V TO FOOTSWITCH FOR START IGNITION
33	308	WHITE	TOGGLE SW 3 EMERGENCY PUMP
34	208	WHITE	J2-S1/NO HI THROTTLE
35	108	WHITE	J1-TERMINAL 3 ROTATE
36	107	WHITE	J3- TERMINAL 1 BOOM EXT.
37	207	WHITE	TERMINAL BLOCK 207 LO THROTTLE
38	307	WHITE	(OPTION) CABLE BREAK ALARM
39	305	WHITE	JUMPER TO 25
40	308	WHITE	MAIN PROTECTION H2V TO POWER AERIAL STATION

DEUTSCH DRC12-40PA MALE PINS 0480-202018141



NOT TO SCALE



NOTE:
ALL GROUND (301) WIRES YELLOW/GREEN 18AWG UNLESS OTHERWISE SPECIFIED.

VENDOR DWG. NO. 0103-0609-72

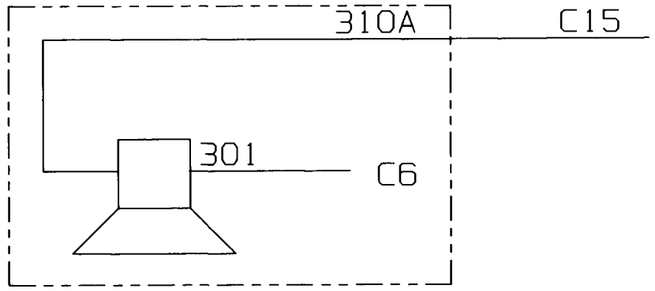
TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

SIZE	E		
TITLE	T885 WIRING DIAGRAM		
NUMBER	MK213359	REV.	--
SHEET	4 of 6		

MODEL T885
DRAWN ON: QUATTRO
PRODUCT: ☐ DRAWN ☐ MARK LIFT ☐ OTHER
CHECKED 3 ☐ OTHER
DRWG ENGINEER
MATERIAL: -
APP'D
DRAWN
CHK'D
SCALE NONE
Do Not Scale Print
DATE 6/2/07
DATE 6/2/07
DATE 6/2/07
INIT. -

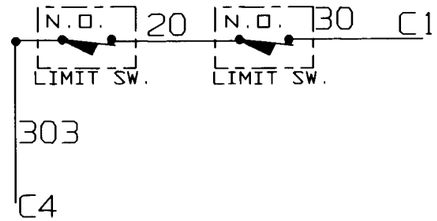
REV. LET.	DATE	CHANGE	E.C.N.
-	6/2/07	PRODUCTION RELEASE	3510

Inch [mm]



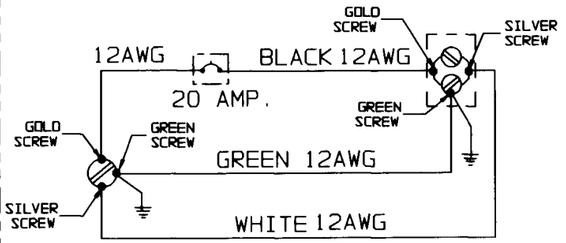
SHEET #1 B/1

OPTION HORN

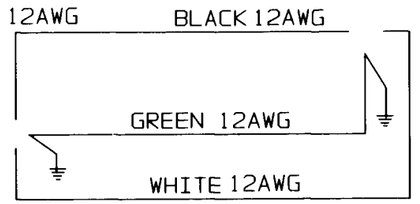


SHEET #1 B/1

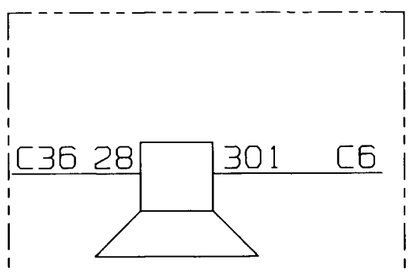
CABLE BR. LIM. SW.



115 VAC WIRING

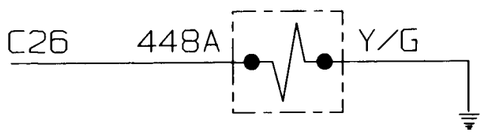


220 VAC WIRING



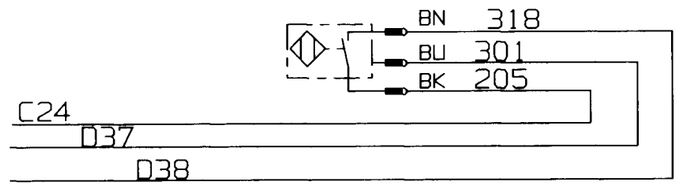
MOTION ALARM

SHEET #1 F/1



FUEL PUMP

SHEET #1 G/1



SHEET #1 B/1

DIR. CORR. CONTROL SW.

ITEM	PART NO.	DESCRIPTION	QTY.	WT.

REV. LIST	DATE	CHANGE	E.C.N.
—	8/2/07	PRODUCTION RELEASE	3310

Inch [mm]

TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

All Dimensions In Inches [Millimeters] Unless Noted: .x ± 0.12 [3.0] .xx ± 0.05 [1.3] .xxx ± 0.030 [0.76]

Spec. 2000 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

Model: T885

DRAWN ON: ☐ AUTOCAD ☐ PRO/ENGINEER ☐ EUCLID 3 ☐ OTHER

DRAWN BDL DATE 8/2/07
CHK'D MV DATE 8/2/07
APP'D DATE

SCALE NONE
Do Not Scale Print
WT. —

MATERIAL —

PRODUCT: ☐ CRANE ☐ MARKLIFT ☐ OTHER

SIZE E

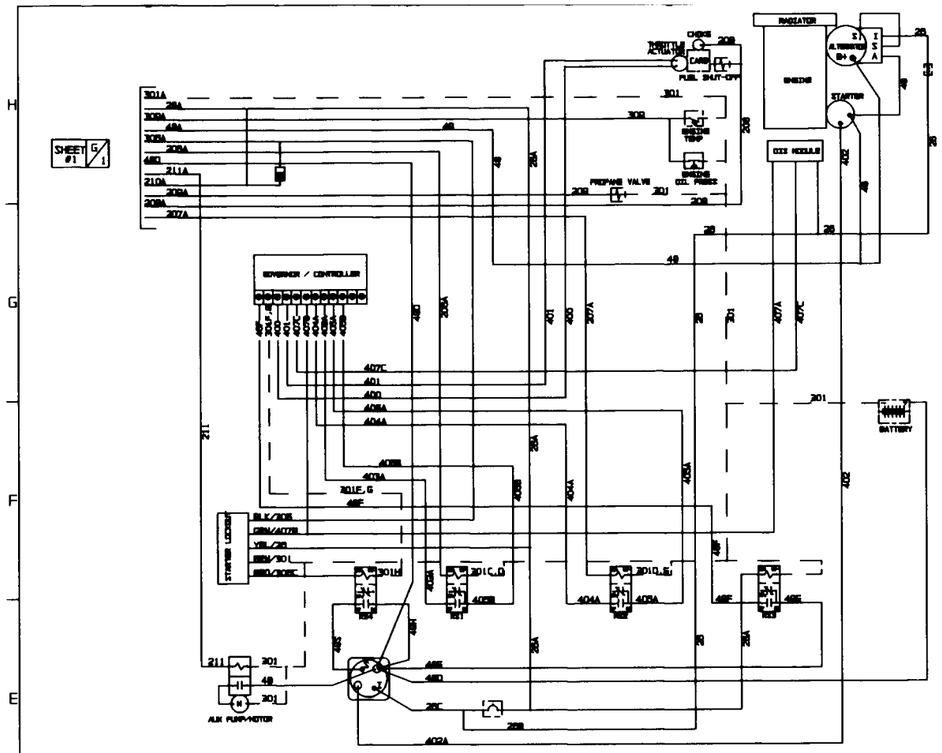
TITLE: T885 WIRING DIAGRAM

NUMBER: MK213359

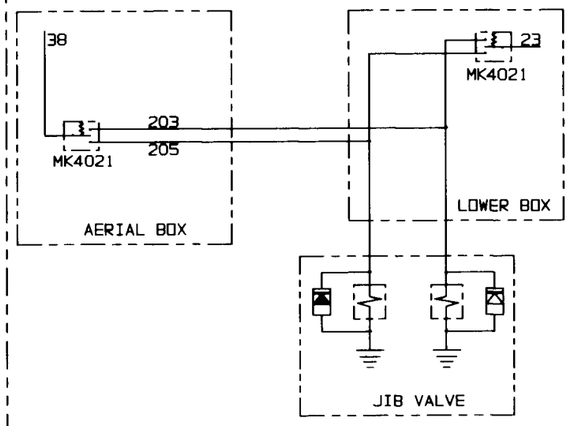
REV. — SHEET 6 of 6

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Conductivity of Cylindrical Machined Surfaces to be kept to within .005 T.I.R. and Parallelism or Concentricity between Machined Surfaces and/or Drilling or Boring Center Lines to be kept Within 0 - 7 (.005 per in.) unless otherwise specified.

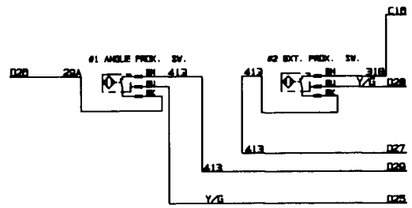


FORD LRG423 GAS OR DUAL FUEL



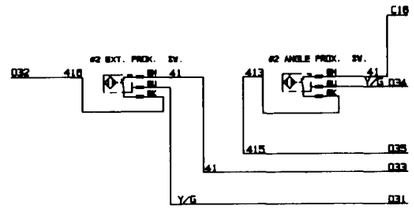
6' JIB OPTION

SHEET #1 B/1



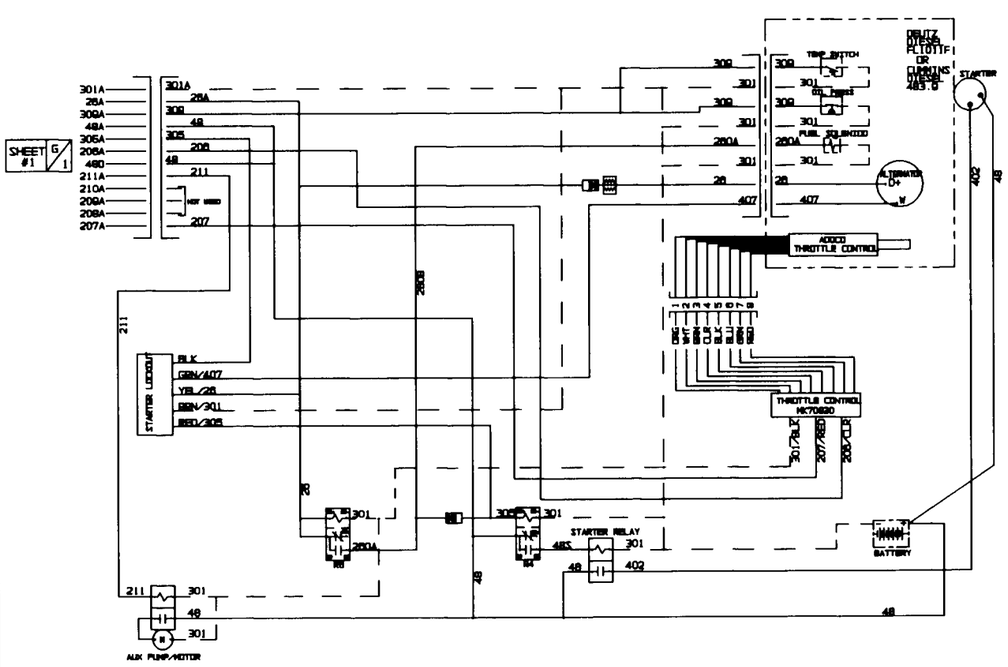
#1 EXT. PROX. SW.

SHEET #1 F/5

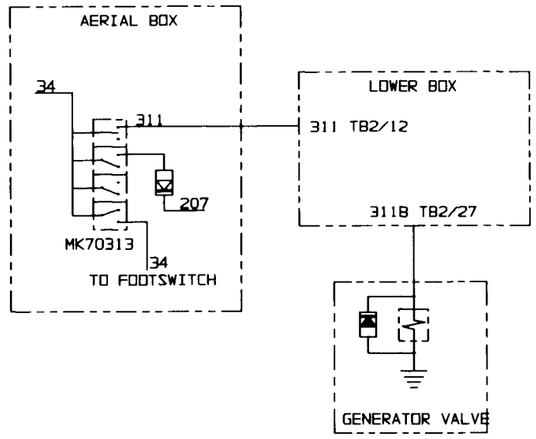


#2 EXT. PROX. SW.

SHEET #1 E/5



DEUTZ DIESEL FL1011F OR CUMMINS DIESEL 4B3.9



GENERATOR OPTION

SHEET #1 B/1

Item	Part No.	Description	Qty.	Wt.

Inch [mm]

REV LIST	L.E.N. DATE	CHANGE	E.C.N.
—	8/2/07	PRODUCTION RELEASE	S510

TEREX CRANES
WAVERLY OPERATIONS
Waverly, Iowa 50677

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All Dimensions In Inches. Tolerances Unless Noted: .x = ± .12, .xx = ± .05, .xxx = ± .010

Spec. 2800 Tolerancing | Spec. 2117 Welding

Remove Objectionable Weld Splatter, Burrs & Sharp Edges

DRAWN	BDL	DATE 8/2/07	SCALE NONE
CHK'D	MV	DATE 8/2/07	Do Not Scale Print
APP'D		DATE	WT. —

MATERIAL —

Model TB85

PRODUCT: ☐DRAIN ☐MARKLIFT ☐OTHER

DRAWN ON: ☐AUTOCAD ☐PRO/ENGINEER ☐EUCLID 3 ☐OTHER

SIZE E

TITLE: TB85 WIRING DIAGRAM

NUMBER: MK213359

REV. -- SHEET 5/6