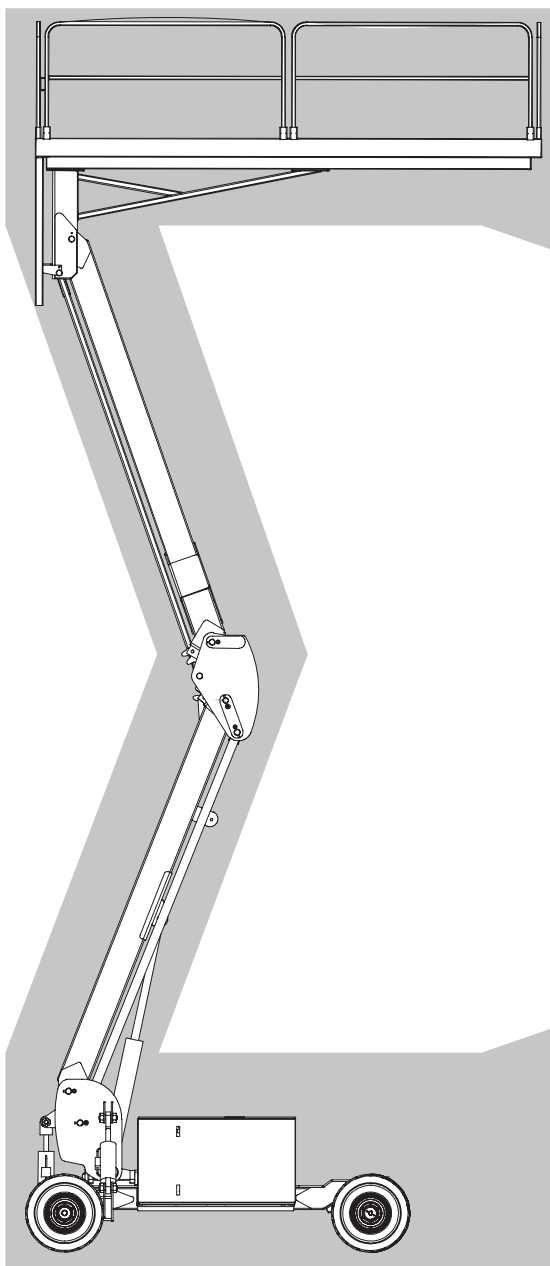




SERVICE AND PARTS MANUAL

Speed Level™ Sigma Lifts



2684 & 3084 RT Internal Combustion
2684 & 3084 ES Electric
CE & ANSI certifications

Serial Number Range
11800001 - Up

Part # 91885
May 2010

Revision History

Original Release Date: May 2010

Date	Reason for Update
5/2010	New Release



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Speed Level™ is a trademark of MEC.

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NOTES:

INTRODUCTION

This manual consists of Service and Illustrated Parts sections.

The Service Section of this manual is designed to provide you, the customer, with the instructions needed to properly maintain the MEC self-propelled aerial work platform. When used in conjunction with the Illustrated Parts Section and the Operators Manual (provided separately), this manual will assist you in making necessary adjustments and repairs, and identifying and ordering the correct replacement parts.

All parts represented here are manufactured and supplied in accordance with MEC quality standards.

We recommend that you use genuine MEC parts to ensure proper operation and reliable performance.

To obtain maximum benefits from your MEC Aerial Work Platform, always follow the proper operating and maintenance procedures. Only trained authorized personnel should be allowed to operate or service this machine. Service personnel should read and study the Operator's, Service and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs.

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MACHINE SPECIFICATIONS - RT MODELS

	2684RT		3084RT		
Working Height*	32 ft*	10.0 m*	36 ft*	11.0 m*	
Platform Height	26 ft	7.9 m	30 ft	9.0 m	
Stowed Height	Rails Up	107 in	2.72 m	105 in	2.67 m
	Rails Folded Down	72 in	1.83 m	70 in	1.78 m
Maximum Occupants	0 m/s wind	5	5		
	45 km/h (12.5 m/s) wind	5	5		
	On Slide-Out Extension	2	N/A		
Lift Capacity	1700 lbs	770 kg	1500 lbs	680 kg	
Slide-Out Deck Capacity	700 lbs	320 kg	N/A		
Platform Dimensions	Length (inside rails)	12 ft 2 in	3.71 m	14 ft	4.27 m
	Length (platform extended)	16 ft 2 in	4.93 m	N/A	
	Platform Width (inside rails)	72 in	1.83 m	72 in	1.83 m
	Guardrail Height	43.5 in	1.1 m	43.5 in	1.1 m
	Toeboard Height	6 in	15 cm	6 in	15 cm
Overall Length	13 ft 2 in	4.0 m	14 ft 6 in	4.4 m	
Overall Width	84 in		2.13 m		
Wheel Base	100 in		2.54 m		
Wheel Track	72 in		1.83 m		
Turning Radius	Inside	8 ft	2.44 m		
	Outside	16 ft 8 in	5.08 m		
Ground Clearance	10 in		25 cm		
Machine Weight** (Unloaded)(Approximate)	7800 lb**	3535 kg**	8100 lb**	3674 kg**	
Drive System (Proportional)					
Drive Speed - Platform elevated	0-.4 mph		0-.6 km/h		
Drive Speed - Platform lowered	0-3.2 mph		0-5 km/h		
Lift/Lower Speeds (Approximate)	35 sec/40 sec				
Gradeability	40%		22°		
Ground Pressure/Wheel (Maximum)	90 psi	6.3 kg/cm²	94 psi	6.6 kg/cm²	
Wheel Load	2855 lb	1295 kg	2965 lb	1345 kg	
Wind Speed (Maximum)	28 mph		45 km/h (12.5 m/s)		
Tire Size - Standard	26 x 12D / 380NHS				
Tire Pressure	45 psi		3.1 bar		
	Foam-filled tires are standard in Europe and Australia, optional in North America				
Wheel Lug Nut Torque	75-85 ft/lb		102-115 Nm		
Hydraulic Pressure	Main System	2800 psi	193 bar		
	Lift System	2800 psi	193 bar		
	Steering System	2000 psi	138 bar		
Hydraulic Fluid Capacity	23 gallon		87 liters		
Engine	Diesel -- Kubota D1105E, 25HP (18.6 kW), Liquid Cooled Dual Fuel (North America only) -- Kubota DF752, 20HP (14.9 kW), Liquid Cooled,				
Noise Level	86 dB maximum				
Maximum Vibration	does not exceed 2.5 m/sec at operator's position				
Ambient Operating Range	-30° C minimum; 50° C maximum				
Operating Inclination	Manual and self-leveling, side/side to 14°, fore/aft to 10°				
Brakes	Dual Rear Wheel Multi-disc				
*Working Height adds 6 feet (2 m) to platform height.					
**Weight may increase with certain options or country standards.					

MACHINE SPECIFICATIONS - ES MODELS

		2684ES		3084ES	
Working Height*		32 ft*	10.0 m*	36 ft*	11.0 m*
Platform Height		26 ft	7.9 m	30 ft	9.0 m
Stowed Height	Rails Up	107 in	2.72 m	105 in	2.67 m
	Rails Folded Down	72 in	1.83 m	70 in	1.78 m
Maximum Occupants	0 m/s wind	5		5	
	45 km/h (12.5 m/s) wind	5		5	
	On Slide-Out Extension	2		N/A	
Lift Capacity		1700 lbs	770 kg	1500 lbs	680 kg
Slide-Out Deck Capacity		700 lbs	320 kg	N/A	
Platform Dimensions	Length (inside rails)	12 ft 2 in	3.71 m	14 ft	4.27 m
	Length (platform extended)	16 ft 2 in	4.93 m	N/A	
	Platform Width (inside rails)	72 in	1.83 m	72 in	1.83 m
	Guardrail Height	43.5 in	1.1 m	43.5 in	1.1 m
	Toeboard Height	6 in	15 cm	6 in	15 cm
Overall Length		13 ft 2 in	4.0 m	14 ft 6 in	4.4 m
Overall Width		84 in		2.13 m	
Wheel Base		100 in		2.54 m	
Wheel Track		72 in		1.83 m	
Turning Radius	Inside	8 ft		2.44 m	
	Outside	16 ft 8 in		5.08 m	
Ground Clearance		10 in		25 cm	
Machine Weight** (Unloaded)(Approximate)		8400 lb**	3810 kg**	8700 lb**	3946 kg**
Drive System (Proportional)					
Drive Speed - Platform elevated		0-.4 mph		0-.6 km/h	
Drive Speed - Platform Lowered		0-3.2 mph		0-5 km/h	
Lift/Lower Speeds (Approximate)		35 sec/40 sec			
Gradeability		40%		22°	
Ground Pressure/Wheel (Maximum)		98 psi	6.9 kg/cm ²	101 psi	7.1 kg/cm ²
Wheel Load		3065 lb	1390 kg	3175 lb	1440 kg
Wind Speed (Maximum)		28 mph		45 km/h (12.5 m/s)	
Tire Size - Standard		26 x 12D / 380NHS			
Tire Pressure		45 psi		3.1 bar	
		Foam-filled tires are standard in Europe and Australia, optional in North America			
Wheel Lug Nut Torque		75-85 ft/lb		102-115 Nm	
Hydraulic Pressure	Main System	2800 psi		193 bar	
	Lift System	2800 psi		193 bar	
	Steering System	2000 psi		138 bar	
Hydraulic Fluid Capacity		23 gallon		87 liters	
Electric Motor		8 hp (6kW): 3600 rpm			
Power Source -- Voltage		48 volts DC			
Batteries		Eight 6-volt DC 370 amp-hour industrial deep cycle batteries			
Battery Charger	Input	120 Volt AC, 50.60 Hz, 18 Amp - 240 Volt AC, 50.60 Hz, 9 Amp			
	Output	48 Volt DC, 32 Amp, 1500 W, Timed Shutoff			
Maximum Vibration		does not exceed 2.5 m/sec at operator's position			
Ambient Operating Range		-30° C minimum; 50° C maximum			
Operating Inclination		Manual and self-leveling, side/side to 14°, fore/aft to 10°			
Brakes		Dual Rear Wheel Multi-disc			
*Working Height adds 6 feet (2 m) to platform height.					
**Weight may increase with certain options or country standards.					



MEC OPERATOR POLICY

NOTE: The best method to protect yourself and others from injury or death is to use common sense. If you are unsure of any operation, don't start until you are satisfied that it is safe to proceed and have discussed the situation with your supervisor.

Service personnel and machine operators must understand and comply with all warnings and instructional decals on the body of the machine, at the ground controls, and platform control console.



MODIFICATIONS OF THIS MACHINE FROM THE ORIGINAL DESIGN AND SPECIFICATIONS WITHOUT WRITTEN PERMISSION FROM MEC ARE STRICTLY FORBIDDEN. A MODIFICATION MAY COMPROMISE THE SAFETY OF THE MACHINE, SUBJECTING OPERATOR(S) TO SERIOUS INJURY OR DEATH.

MEC's policies and procedures demonstrate our commitment to Quality and our relentless ongoing efforts towards Continuous Improvement, due to which product specifications are subject to change without notice.

Any procedures not found within this manual must be evaluated by the individual to assure oneself that they are "proper and safe."

Your MEC Aerial Work Platform has been designed, built, and tested to provide many years of safe, dependable service. Only trained, authorized personnel should be allowed to operate or service the machine.

MEC, As Manufacturer, Has No Direct Control Over Machine Application And Operation. Proper Safety Practices Are The Responsibility Of The User And All Operating Personnel.

If there is a question on application and/or operation contact:



MEC Aerial Work Platform

1401 S. Madera Avenue
Kerman, CA 93630 USA
Ph: 1-800-387-4575
www.mecAWP.com



SAFETY SYMBOLS

To help you recognize important safety information, we have identified warnings and instructions that directly impact on safety with the following signals:



***“DANGER” INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.
THIS SIGNAL WORD IS LIMITED TO THE MOST EXTREME SITUATIONS.***



“WARNING” INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.



“CAUTION” indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



“Caution” without alert symbol indicates a situation which, if not avoided, may result in property damage.

GENERAL SAFETY TIPS

Regular inspection and conscientious maintenance is the key to efficient economical operation of your aerial work platform. It will help to assure that your equipment will perform satisfactorily with a minimum of service and repair.

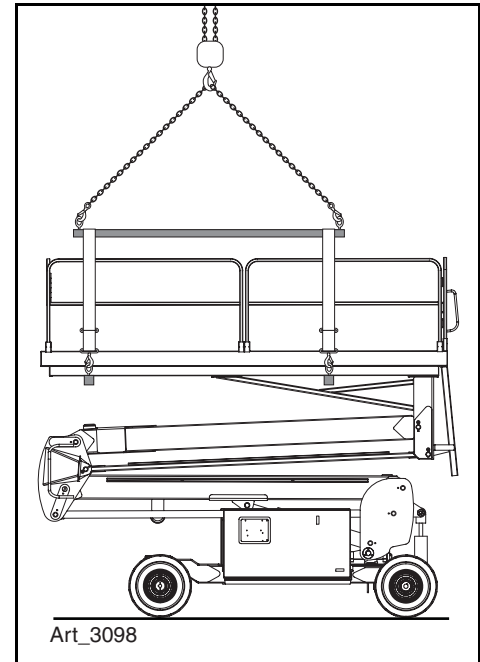
The actual operating environment of the machine governs the inspection schedule. Correct lubrication is an essential part of the preventative maintenance to minimize wear on working parts and ensure against premature failure. By maintaining correct lubrication, the possibility of mechanical failure and resulting downtime is reduced to a minimum.



NEVER PERFORM SERVICE ON THE MACHINE WITH THE PLATFORM ELEVATED WITHOUT FIRST SUPPORTING THE PLATFORM/BOOM ASSEMBLY.

- Use a crane with chains and straps of adequate lifting capacity to support the platform.
- Never leave hydraulic components or hoses open. They must be protected from contamination (including rain) at all times.
- Never open a hydraulic system when there are contaminants in the air.
- Always clean the surrounding area before opening hydraulic systems.
- Use only recommended lubricants. Improper lubricants or incompatible lubricants may be as harmful as no lubrication.
- Watch for makeshift “fixes” which can jeopardize safety as well as lead to more costly repair.

Figure 1-1: Support Platform



HYDRAULIC SYSTEM



**HYDRAULIC FLUID UNDER PRESSURE CAN PENETRATE AND BURN SKIN, DAMAGE EYES, AND MAY CAUSE SERIOUS INJURY, BLINDNESS, AND EVEN DEATH.
CORRECT LEAKS IMMEDIATELY.**



Hydraulic fluid leaks under pressure may not always be visible. Check for pin hole leaks with a piece of cardboard, not your hand.

ELECTRICAL SYSTEM



Prevent damage to battery and/or electrical system;
• **Always disconnect the negative battery cable first.**
• **Always connect the positive battery cable first.**

When the negative cable is installed, a spark will occur if contact is made between the positive side of the battery and a metal surface on the machine. This can cause damage to the electrical system, battery explosion, and personal injury.

TOTAL SYSTEM



Engine coolant level must be checked only after engine has cooled. If radiator cap is removed while the coolant is at normal operating temperature, pressure within the coolant system will force hot liquid out through the filler opening and may cause severe scalding.

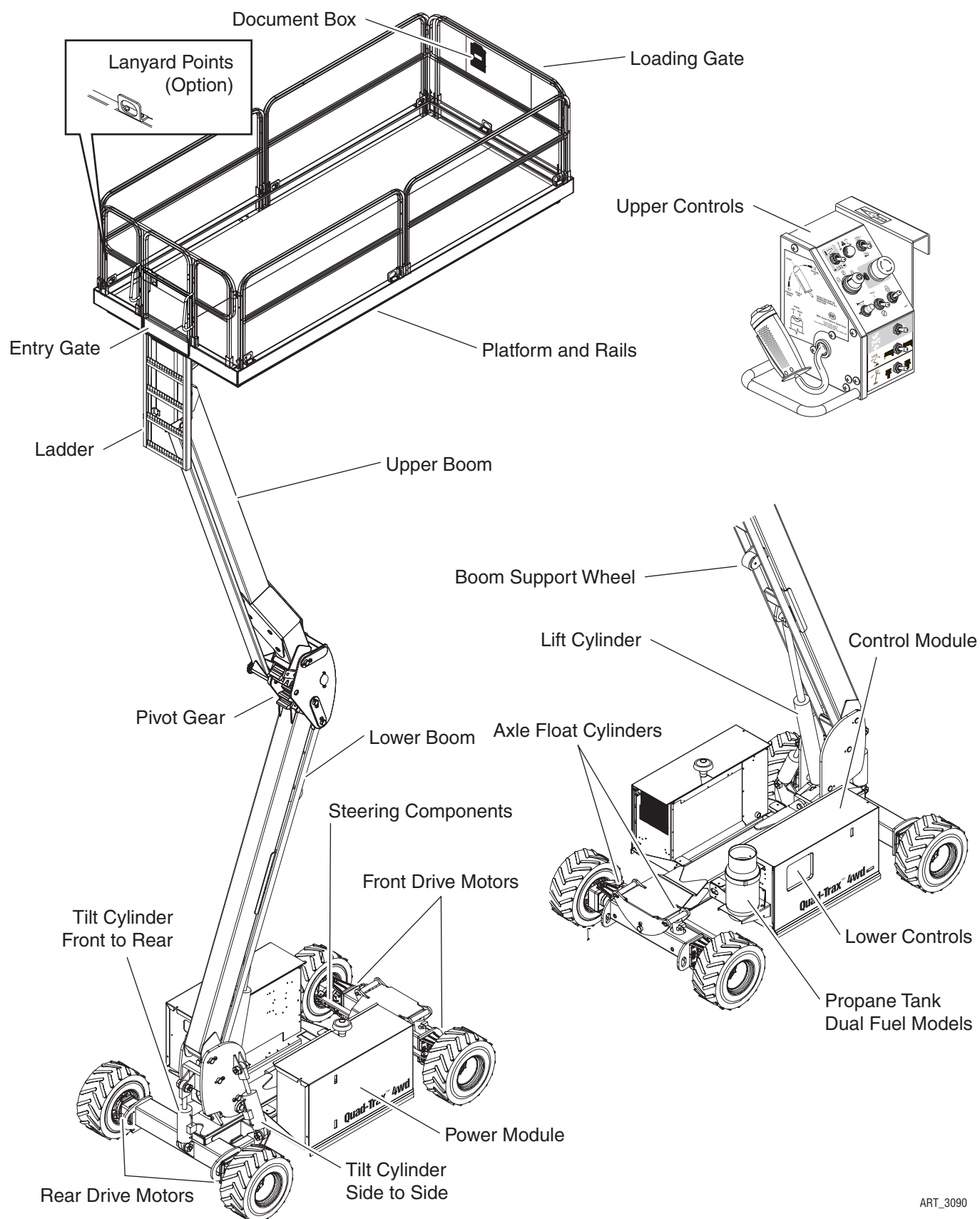
Failure to perform preventive maintenance at recommended intervals may result in the unit being operated with a defect that could result in injury or death of the operator.

Immediately report to your supervisor any defect or malfunction. Any defect shall be repaired prior to continued use of the aerial work platform.

Inspection and maintenance should be performed by qualified personnel familiar with the equipment.

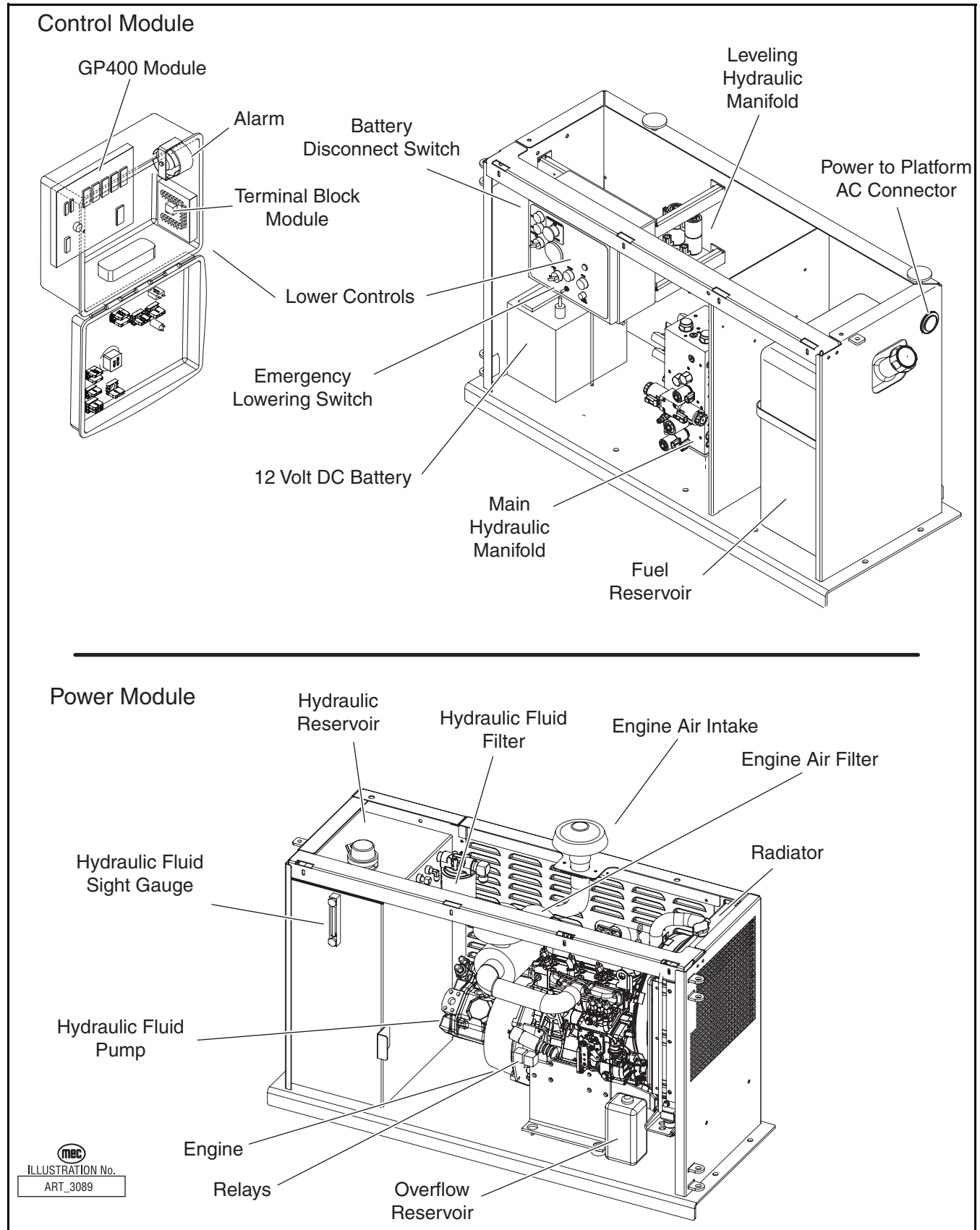
PRIMARY MACHINE COMPONENTS

Figure 1-2: Component Locations



ART_3090







Figure 1-3: Component Locations, Modules



TORQUE SPECIFICATIONS

FASTENERS

Use the following values to apply torque unless a specific torque value is called out for the part being used.

AMERICAN STANDARD CAP SCREWS									METRIC CAP SCREWS								
SAE GRADE	5				8				METRIC GRADE	8.8				10.9			
CAP SCREW SIZE - inches -									CAP SCREW SIZE - millimeters -	 				 			
	TORQUE				TORQUE					TORQUE				TORQUE			
	FT. LBS		Nm		FT. LBS		Nm			FT. LBS		Nm		FT. LBS		Nm	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
1/4 - 20	6.25	7.25	8.5	10	8.25	9.5	11	13	M6 X 1.00	6	8	8	11	9	11	12	15
1/4 - 28	8	9	11	12	10.5	12	14	16	M8 X 1.25	16	20	21.5	27	23	27	31	36.5
5/16 - 18	14	15	19	20	18.5	20	25	27	M10 X 1.50	29	35	39	47	42	52	57	70
5/16 - 24	17.5	19	23	26	23	25	31	34	M12 X 1.75	52	62	70	84	75	91	102	123
3/8 - 16	26	28	35	38	35	37	47.5	50	M14 X 2.00	85	103	115	139	120	146	163	198
3/8 - 24	31	34	42	46	41	45	55.5	61	M16 X 2.50	130	158	176	214	176	216	238	293
7/16 - 14	41	45	55.5	61	55	60	74.5	81	M18 X 2.50	172	210	233	284	240	294	325	398
7/16 - 20	51	55	69	74.5	68	75	92	102	M20 X 2.50	247	301	335	408	343	426	465	577
1/2 - 13	65	72	88	97.5	86	96	116	130	M22 X 2.50	332	404	450	547	472	576	639	780
1/2 - 20	76	84	103	114	102	112	138	152	M24 X 3.00	423	517	573	700	599	732	812	992
9/16 - 12	95	105	129	142	127	140	172	190	M27 X 3.00	637	779	863	1055	898	1098	1217	1488
9/16 - 18	111	123	150	167	148	164	200	222	M3 X 3.00	872	1066	1181	1444	1224	1496	1658	2027
5/8 - 11	126	139	171	188	168	185	228	251	<p>Torque values apply to fasteneers as received from the supplier, dry or when lubricated with normal engine oil.</p> <p>If special graphite grease, molydisulphide grease, or other extreme pressure lubricants are used, these torque values <i>do not</i> apply.</p>								
5/8 - 18	152	168	206	228	203	224	275	304									
3/4 - 10	238	262	322	255	318	350	431	474									
3/4 - 16	274	302	371	409	365	402	495	544									
7/8 - 9	350	386	474	523	466	515	631	698									
7/8 - 14	407	448	551	607	543	597	736	809									
1 - 8	537	592	728	802	716	790	970	1070									
1 - 14	670	740	908	1003	894	987	1211	1137									

HYDRAULIC COMPONENTS TORQUE TABLE

NOTE: Always lubricate threads with clean hydraulic fluid prior to installation.

Use the following values to torque hydraulic components when a specific value is not available. Always check for torque values in the following places before relying on the Hydraulic Components Torque Table;

- parts drawings and service instructions in this manual.
- packaging and instruction sheets provided with new parts.
- instruction manuals provided by the manufacturer of the component being serviced.

TYPE: SAE PORT SERIES	CARTRIDGE POPPET		FITTINGS		HOSES	
	FT. LBS	Nm	FT. LBS	Nm	FT. LBS	Nm
#4	N/A	N/A	N/A	N/A	135 - 145	15 - 16
#6	N/A	N/A	10 - 20	14 - 27	215 - 245	24 - 28
#8	25 - 30	31 - 41	25 - 30	34 - 41	430 - 470	49 - 53
#10	35 - 40	47 - 54	35 - 40	47 - 54	680 - 750	77 - 85
#12	85 - 90	115 - 122	85 - 90	115 - 122	950 - 1050	107 - 119
#16	130 - 140	176 - 190	130 - 140	176 - 190	1300 - 1368	147 - 155

EMERGENCY SYSTEMS AND PROCEDURES



IF THE CONTROL SYSTEM FAILS WHILE THE PLATFORM IS ELEVATED, HAVE AN EXPERIENCED OPERATOR USE THE EMERGENCY LOWERING PROCEDURE TO SAFELY LOWER THE PLATFORM.

DO NOT ATTEMPT TO CLIMB DOWN ELEVATING ASSEMBLY.

EMERGENCY STOP

The machine is equipped with an EMERGENCY STOP switch on both control panels.

- Press the EMERGENCY STOP switch at any time to stop all machine functions.
- Turn switch *clockwise* to reset.

SELECTOR SWITCH SET TO PLATFORM

- Either switch will stop all machine functions.
- Both switches must be reset or machine will not operate.

SELECTOR SWITCH IS SET TO BASE

- The upper controls are locked out.
- The lower controls switch must be reset or the machine will not operate.
- The machine will operate from the lower controls if the upper controls switch is tripped.

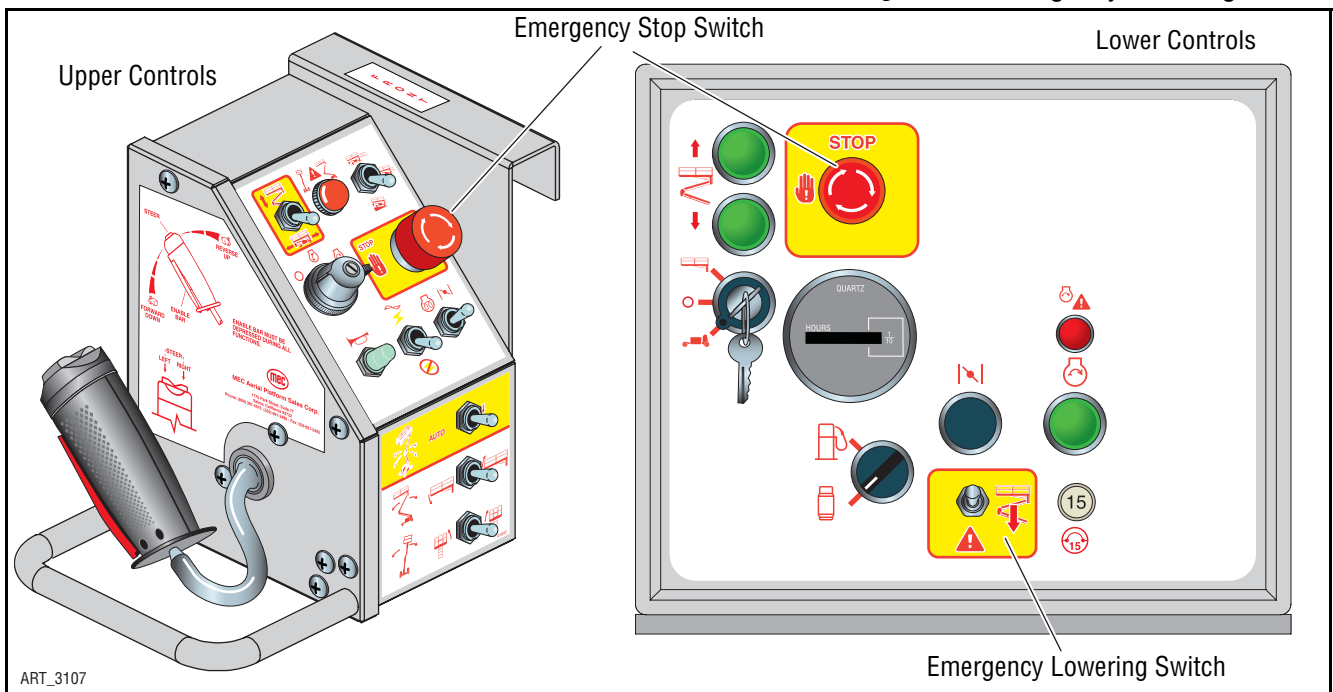
EMERGENCY LOWERING

The Emergency Lowering System is used to lower the platform in case of power failure. The Emergency Lowering switch **will** continue to function if the EMERGENCY STOP switch is tripped.

To lower the platform, perform the following steps:

- Push and hold the toggle switch down to lower the platform.
- Once the platform is fully lowered, release the toggle switch.

Figure 1-4: Emergency Lowering Switch



PARKING BRAKE AND TOWING CIRCUIT

The machine can be winched or moved short distances in case of power failure at speeds not to exceed 5 MPH (8.05 km/h). Before towing or winching the machine, it is necessary to release the brake. Reset the brakes after winching or towing.



AFTER DISENGAGING BRAKES THERE IS NOTHING TO STOP THE MACHINE'S TRAVEL. MACHINE WILL ROLL FREELY ON SLOPES. BE ON GUARD AGAINST RUNAWAY.



Prior to manually releasing brakes, insure wheels are chocked to prevent unintentional movement.

DISENGAGE BRAKES BEFORE TOWING:

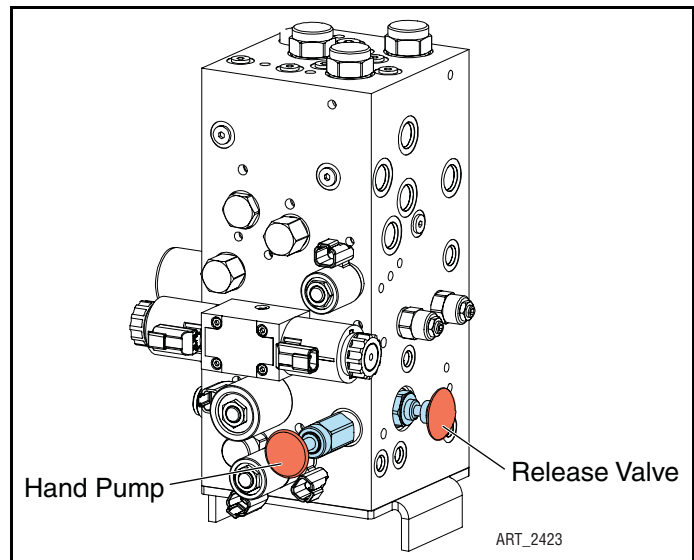
- Chock the wheels.
- Push and hold release valve.
- Using the hand pump on the manifold, pump valve until pressure is built and valve cannot be pumped.
- Machine is now ready for towing.

ENGAGE BRAKES BEFORE DRIVING:

- Pull out the manual brake release valve to reset brakes.

NOTE: Brakes will reset automatically when drive function is activated.

Figure 1-5: Disengage Brakes



LIFT AND SUPPORT THE MACHINE



DEATH OR SERIOUS PERSONAL INJURY MAY RESULT FROM THE USE OF SUBSTANDARD LIFTING DEVICES AND/OR JACK STANDS. ENSURE THAT ALL LIFTING DEVICES AND JACK STANDS ARE OF ADEQUATE CAPACITY AND IN GOOD WORKING CONDITION BEFORE USE.

The following are needed to safely lift and support the machine;

- a jack with a lifting capacity of two (2) tons or more.
- jack stands with a rating of two (2) tons or more.

TO RAISE THE MACHINE

1. Move machine to a firm level surface capable of supporting the weight of the machine.
2. Chock tires on one end of machine and raise the other end of machine.
3. If wheel is to be removed, break loose but ***do not remove*** lug nuts before raising the machine.
4. Position a jack at the end of the machine to be lifted, under a solid lifting point in the center of the frame.
5. Raise the machine and place two (2) suitable jack stands under solid support points at the outer ends of the frame.
6. Lower the machine to rest on the jack stands and inspect for stability.

TO LOWER THE MACHINE

1. Tighten lugs to proper torque (refer to machine specifications).
2. Raise machine slightly and remove jack stands.
3. Lower the machine and remove the jack.
4. Remove chocks.

TRANSPORTING THE MACHINE

SAFETY INFORMATION



THIS INFORMATION IS PROVIDED FOR REFERENCE AND DOES NOT SUPERSEDE ANY GOVERNMENT OR COMPANY POLICY REGARDING THE LOADING, TRANSPORT OR LIFTING OF MEC MACHINERY.

DRIVERS ARE RESPONSIBLE FOR LOADING AND SECURING MACHINES, AND SHOULD BE PROPERLY TRAINED AND AUTHORIZED TO OPERATE MEC MACHINERY.

DRIVERS ARE ALSO RESPONSIBLE FOR SELECTING THE CORRECT AND APPROPRIATE TRAILER ACCORDING TO GOVERNMENT REGULATIONS AND COMPANY POLICY.

DRIVERS MUST ENSURE THAT THE VEHICLE AND CHAINS ARE STRONG ENOUGH TO HOLD THE WEIGHT OF THE MACHINE (SEE THE SERIAL NUMBER PLATE FOR MACHINE WEIGHT).

DRIVING OR WINCHING ONTO OR OFF OF A TRANSPORT VEHICLE

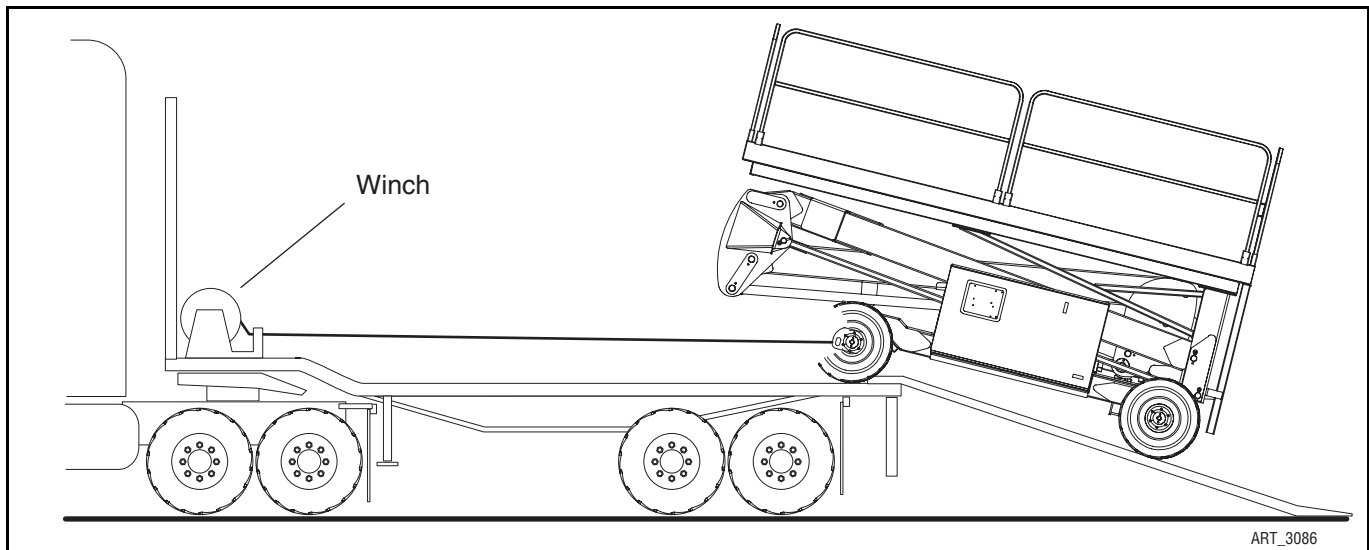


MEC DOES NOT RECOMMEND UNASSISTED LOADING OR UNLOADING.

ALWAYS ATTACH THE MACHINE TO A WINCH WHEN LOADING OR UNLOADING FROM A TRUCK OR TRAILER BY DRIVING.

Refer to the Operator's Manual for loading, unloading, driving and operating instructions.

Figure 1-6: Loading the Machine





Section 1

HYDRAULIC SYSTEM

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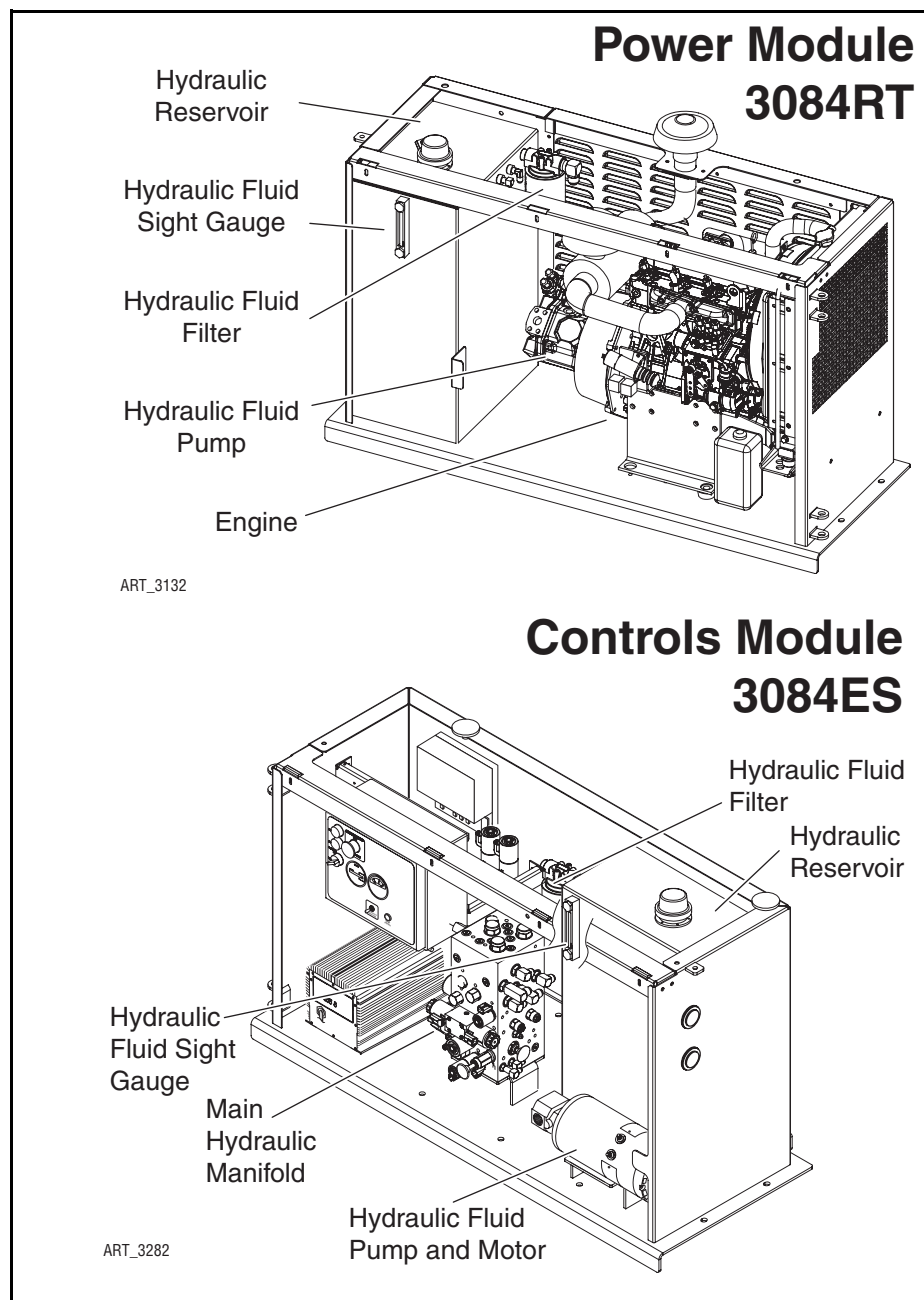
HYDRAULIC SYSTEM – GENERAL

The hydraulic integrated circuit, generally known as the manifold system (valve type) is designed to control all or part of machine functions by integrating various hydraulic cartridge valves into a manifold to provide directional, pressure, flow, and load control.

The hydraulic system is a feedback, load-sensing type. Generally in this type of system, hydraulic fluid is provided by a variable displacement, pressure compensated, axial piston type pump which is directly coupled to the engine. As the engine turns, the hydraulic pump drains fluid from the reservoir and pumps this fluid to the valve manifold.

If no function is selected to perform, the pump remains on standby and no fluid is pumped through the manifold. Each function has a maximum pressure control limit set by pressure relief valve.

Figure 1-1: Hydraulic System



HYDRAULIC ROADMAP

HYDRAULIC RESERVOIR

Hydraulic fluid is held in the reservoir for delivery to the various components and then returned to the reservoir. Returning hydraulic fluid is routed through a filter before entering the reservoir. The reservoir also serves as the oil cooling device.

PUMP

The pump delivers hydraulic fluid under pressure to the main hydraulic manifold.

HYDRAULIC MANIFOLD

The main manifold directs the hydraulic fluid to the hydraulically operated components and returns fluid to the reservoir through the use of electronically operated solenoid valves.

DRIVE AND BRAKE SYSTEM

There are four (4) hydraulic, fixed-displacement gear wheel motors to provide power to all four wheels [two (2) front and two (2) rear].

The two rear wheel motors have integral spring-held brakes. The brakes are released by hydraulic pressure developed in the drive circuit during drive mode. A fixed orifice in the brake circuit controls the deceleration rate and initiates a smooth stop.

FLOATING AXLE LOCK CYLINDERS

Two (2) hydraulic cylinders control the floating axle on the front of the machine. When platform is elevated, the cylinders lock into place to increase machine stability.

STEERING SYSTEM

Two (2) hydraulic cylinders control steering.

LIFT SYSTEM

The machine is equipped with one (1) hydraulic lift cylinder.

TILT SYSTEM

The boom and platform tilts as a unit to provide a level work platform, regardless of chassis level. One (1) hydraulic cylinder provides tilt from front to rear, and one (1) hydraulic cylinder provides tilt from side to side.

OPTIONAL GENERATOR SYSTEM

If equipped, the generator is driven by a hydraulic motor which receives hydraulic fluid directly from the pressure port of the pump.

HYDRAULIC FLUID

HANDLING PRECAUTIONS



PERSONS IN REGULAR CONTACT WITH MINERAL-BASED HYDRAULIC FLUID NEED TO BE AWARE OF THE IMPORTANCE OF THOROUGH HYGIENE AND THE PROPER METHODS FOR HANDLING MINERAL OILS, IN ORDER TO AVOID POTENTIAL HAZARDS TO HEALTH.

IF MINERAL-BASED HYDRAULIC FLUID IS SPLASHED INTO THE EYES, IT MUST BE WASHED OUT THOROUGHLY USING ABUNDANT QUANTITIES OF WATER. SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.

HYDRAULIC FLUID UNDER PRESSURE CAN PENETRATE AND BURN SKIN, DAMAGE EYES, AND MAY CAUSE SERIOUS INJURY OR BLINDNESS.

FLUID LEAKS UNDER PRESSURE MAY NOT ALWAYS BE VISIBLE.

FLUID RECOMMENDATIONS

MEC recommends the use of **Mobile Fluid DTE 10, DTE 13 M or AW32** hydraulic fluid. Do not substitute with lower grade fluids as pump damage may result.

SYSTEM FLUSHING PROCEDURE

1. With platform fully down, drain hydraulic fluid from hydraulic reservoir into a clean, empty container.
2. When the hydraulic reservoir is empty, remove suction strainer and hoses.
3. Remove the bypass filter and hose.
4. Flush the hoses with clean hydraulic fluid.
5. Discard old bypass filter element and replace.
6. Flush out the reservoir with hoses removed from the hydraulic reservoir.
7. Reinstall all hoses removed in the previous steps.
8. Fill hydraulic reservoir with filtered, fresh hydraulic fluid (refer to Lubrication Chart).
9. Loosen output hose fittings at pump to flood with hydraulic fluid. Tighten fittings.
10. Start up the machine. Briefly operate all functions. Two or three lift cycles may be necessary to purge all air from lift cylinder(s).
11. When the above procedures have been completed, fill hydraulic reservoir to full mark on sight gauge.
12. Check all leaks and correct as necessary. Machine is now ready to be placed back in operation.

NOTE: Avoid mixing petroleum and synthetic base fluids. It is not advisable to mix fluids of different brands or types, except as recommended.

HYDRAULIC FLUID RESERVOIR

Consists of the reservoir, a filler cap with breather, a drain plug, a sight gauge, and a bypass filter with a 10 micron filter element.

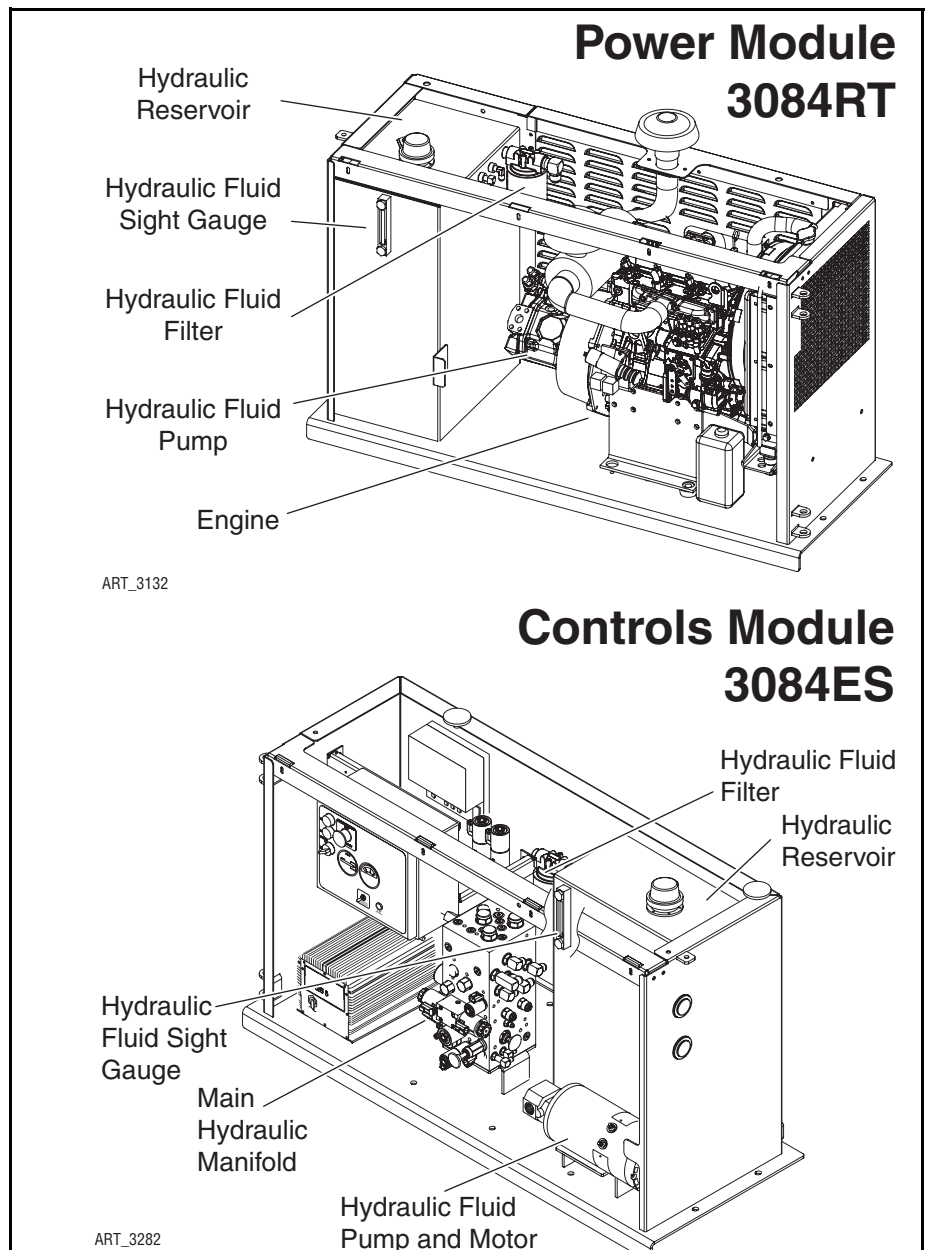
- Check reservoir for signs of leakage weekly.

HYDRAULIC RESERVOIR ASSEMBLY



All machines are produced with a spin-on, bypassing filter. When the filter is clogged, hydraulic flow bypasses the filter element. The filter element must be changed every six (6) months or 500 hours. Extremely dirty conditions may require that the filter be replaced more often. **Beware of hot fluid. Contact with hot fluid may cause severe burns.**

Figure 1-2: Hydraulic Fluid Reservoir



HYDRAULIC PUMP - 3084RT

NOTE: Refer to *Section 4 – Hydraulic Pressure Adjustment Procedures.*
Refer to *Parts Section F.*

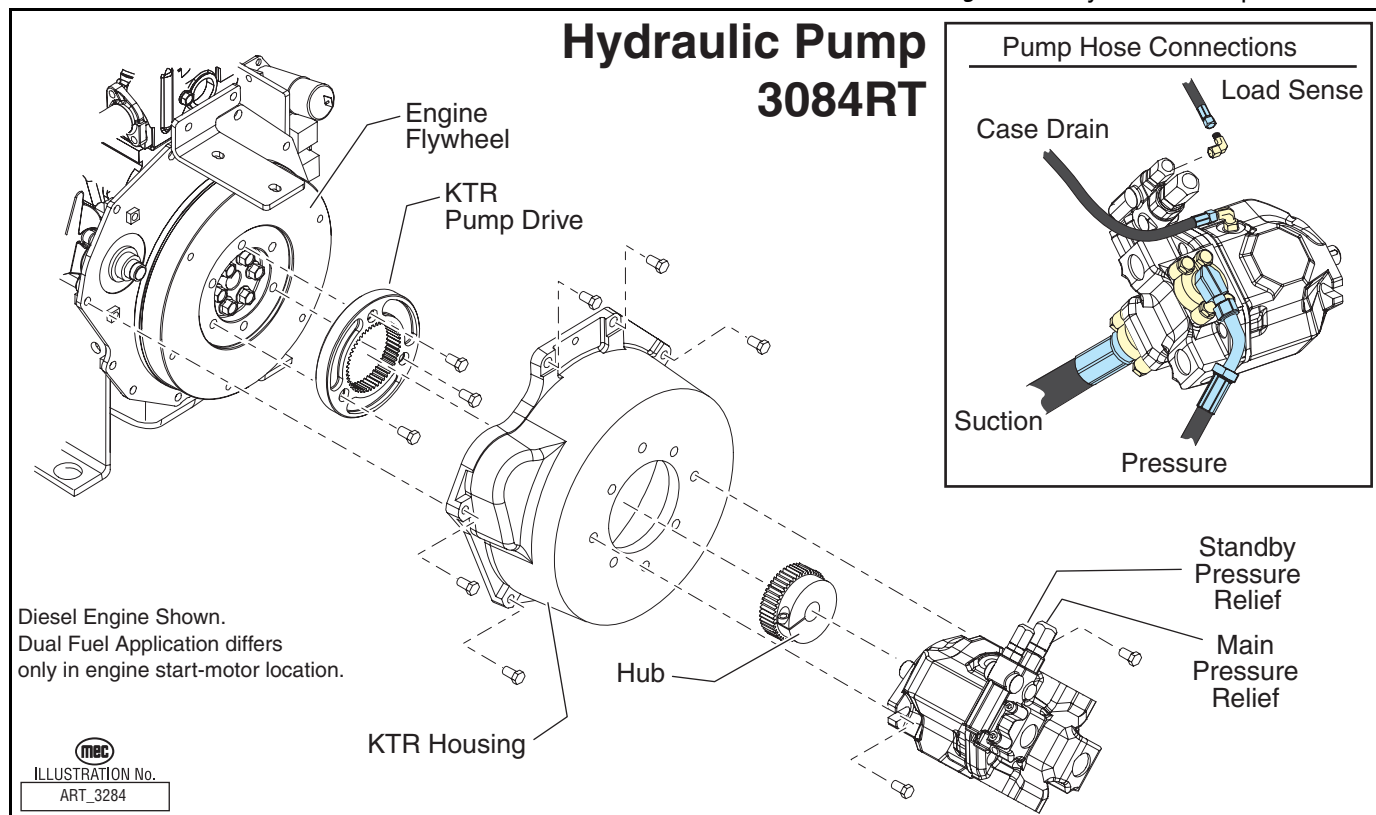
An internal combustion engine drives a variable displacement axial piston pump.

REMOVE

1. Turn the Battery Disconnect Switch (inside Control Module) to the OFF position.
2. Place a large container under the engine and pump to catch fluid that will be lost during pump replacement. Dispose of used fluid properly.
3. Tag and disconnect hydraulic hoses, and IMMEDIATELY cap or cover the openings to prevent contamination.
4. Remove the two (2) bolts that hold the pump to the housing.
5. Remove the pump.

INSTALL

1. Install drive hub onto pump shaft. Torque bolt to 45 Ft. Lbs. (61 Nm).
2. Position the pump next to the housing. Turn the pump until the splines on the hub align allowing the pump to become flush with the housing.
3. Turn the pump until the bolt holes align with the mounting holes on the housing and install the bolts. Torque to 25-28 Ft. Lbs. (35-38 Nm).
4. Install the hydraulic hoses.
5. Turn the Battery Disconnect Switch to the ON position.
6. Check for leaks and check all hydraulic pressures

Figure 1-3: Hydraulic Pump - 3084RT

HYDRAULIC PUMP SEALS - 3084RT

DRIVE SHAFT SEAL REPLACEMENT

Caution: Be careful not to damage the drive shaft when removing the old seal.

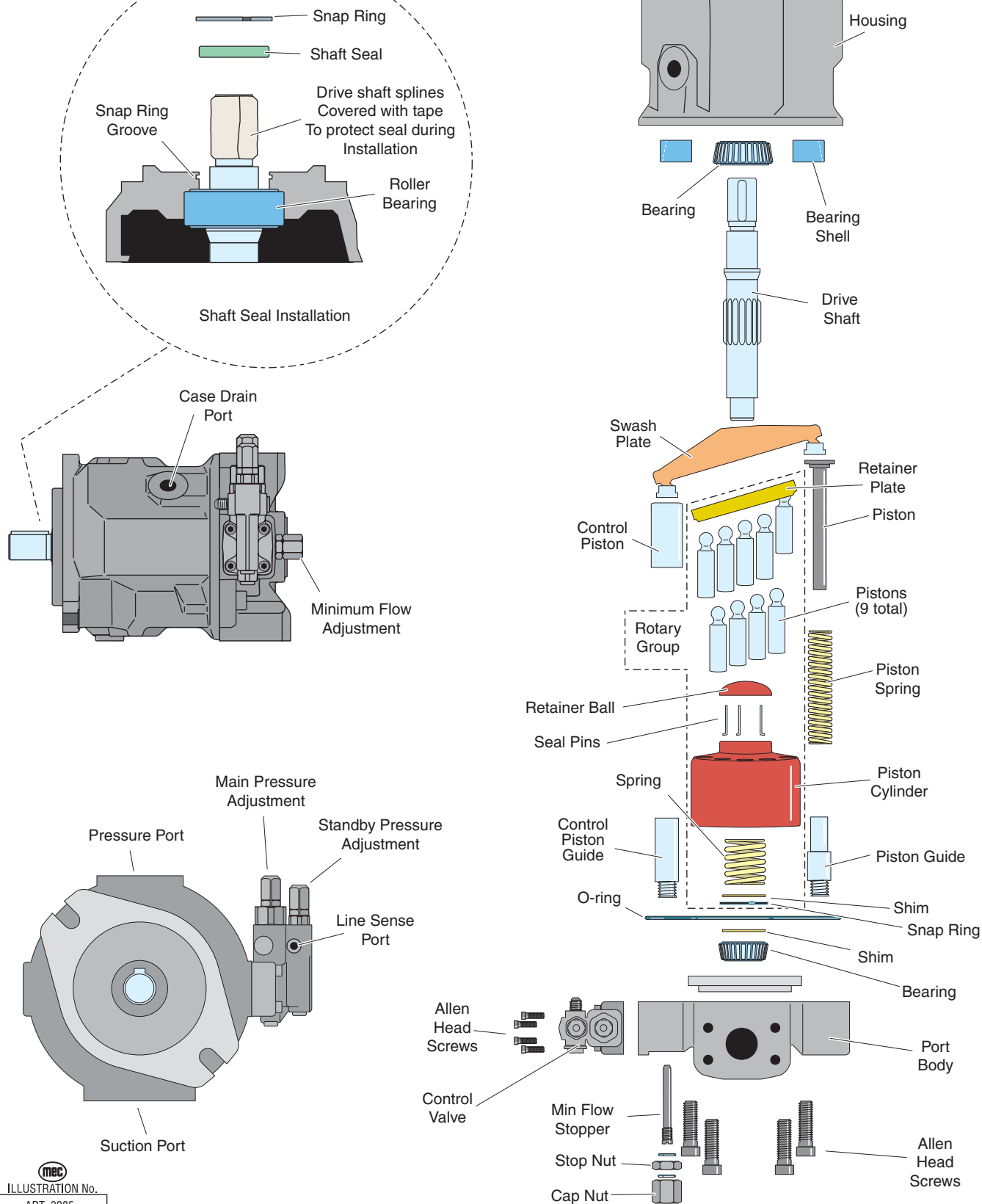
1. Remove the shaft key.
2. Remove the snap ring.
3. Remove the shaft seal.
 - Check the surface of the shaft and the housing for imperfections.
4. Install new shaft seal.
 - Cover the keyway portion of the drive shaft with tape to prevent damage to the seal during installation.
 - Coat the shaft seal with grease.
 - Seat the shaft seal with a seal setting tool.
5. Install the snap ring.
6. Install the shaft key.

HYDRAULIC PUMP REBUILD

Pump rebuild should be performed only by a qualified mechanic. Contact MEC Technical Support before attempting to rebuild the pump.

Figure 1-4: Hydraulic Pump Seals - 3084RT

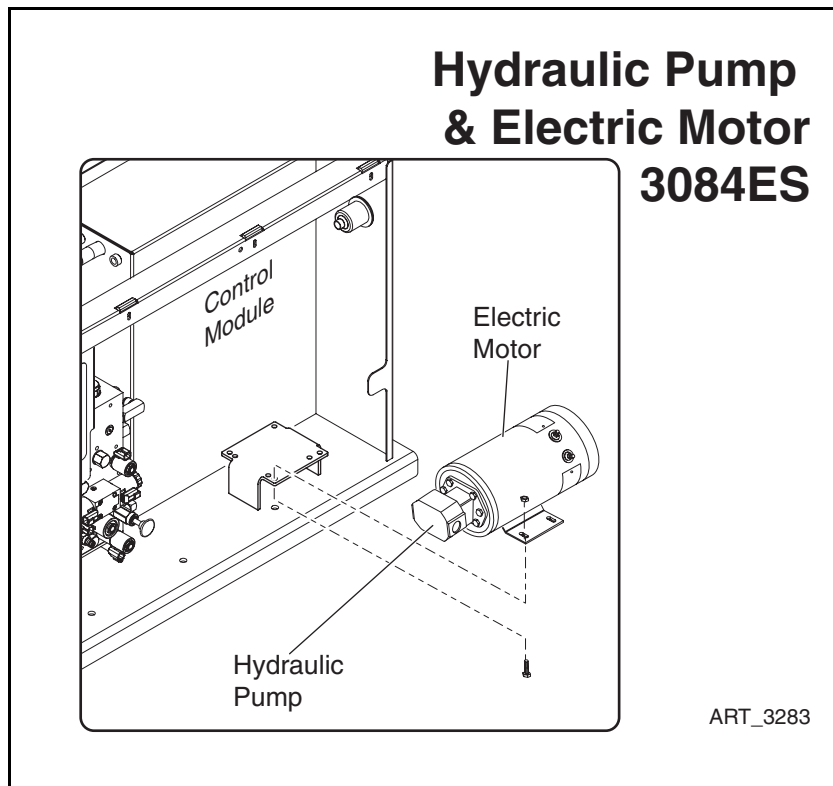
Hydraulic Pump 3084RT



HYDRAULIC PUMP - 3084ES

The hydraulic pump and electric motor used on the 3084ES model contain no serviceable parts, and must be replaced rather than repaired. See the Parts section of this manual for more information.

Figure 1-5: Hydraulic Pump & Electric Motor, 3084ES



HYDRAULIC MANIFOLD

NOTE: Refer to *Parts Section E*.

Tag all components as they are removed to aid in reassembly.

HYDRAULIC MANIFOLD REMOVAL

1. Disconnect the negative battery terminal.
2. Tag and disconnect the solenoid valve leads.
3. Tag and disconnect hydraulic hoses, and IMMEDIATELY cap the openings to prevent contamination.
4. Remove the bolts that hold the manifold to the mounting bracket.
5. Remove the manifold block.

DISASSEMBLY

1. Remove coils from solenoid valves.
2. Mark and remove valves.
3. Mark and remove fittings, plugs, springs, balls, and orifices.

CLEANING AND INSPECTION

1. Wash the manifold in cleaning solvent to remove built-up contaminants, then blow out all passages with clean compressed air.
2. Inspect the manifold for cracks, thread damage and scoring where O-rings seal against internal and external surfaces.
3. Wash and dry each component and check for thread damage, torn or cracked O-rings, and proper operation.
4. Replace defective parts and O-rings.

ASSEMBLY

NOTE: Lubricate all O-rings before installation to prevent damage to the O-ring. Seat balls in manifold block by lightly tapping on the ball with a brass drift punch.

1. Install fittings, plugs, springs, balls, and orifices. Use one drop of Loctite #424 or equivalent thread locker on each screw-in orifice.
2. Install valves.

INSTALLATION

1. Attach manifold assembly to mounting plate with mounting bolts.
2. Connect solenoid leads (as previously tagged).
3. Connect hydraulic hoses (as previously tagged). Be certain to tighten hoses.
4. Connect the battery.
5. Operate each hydraulic function and check for proper operation and leaks.
6. Adjust valve pressures.

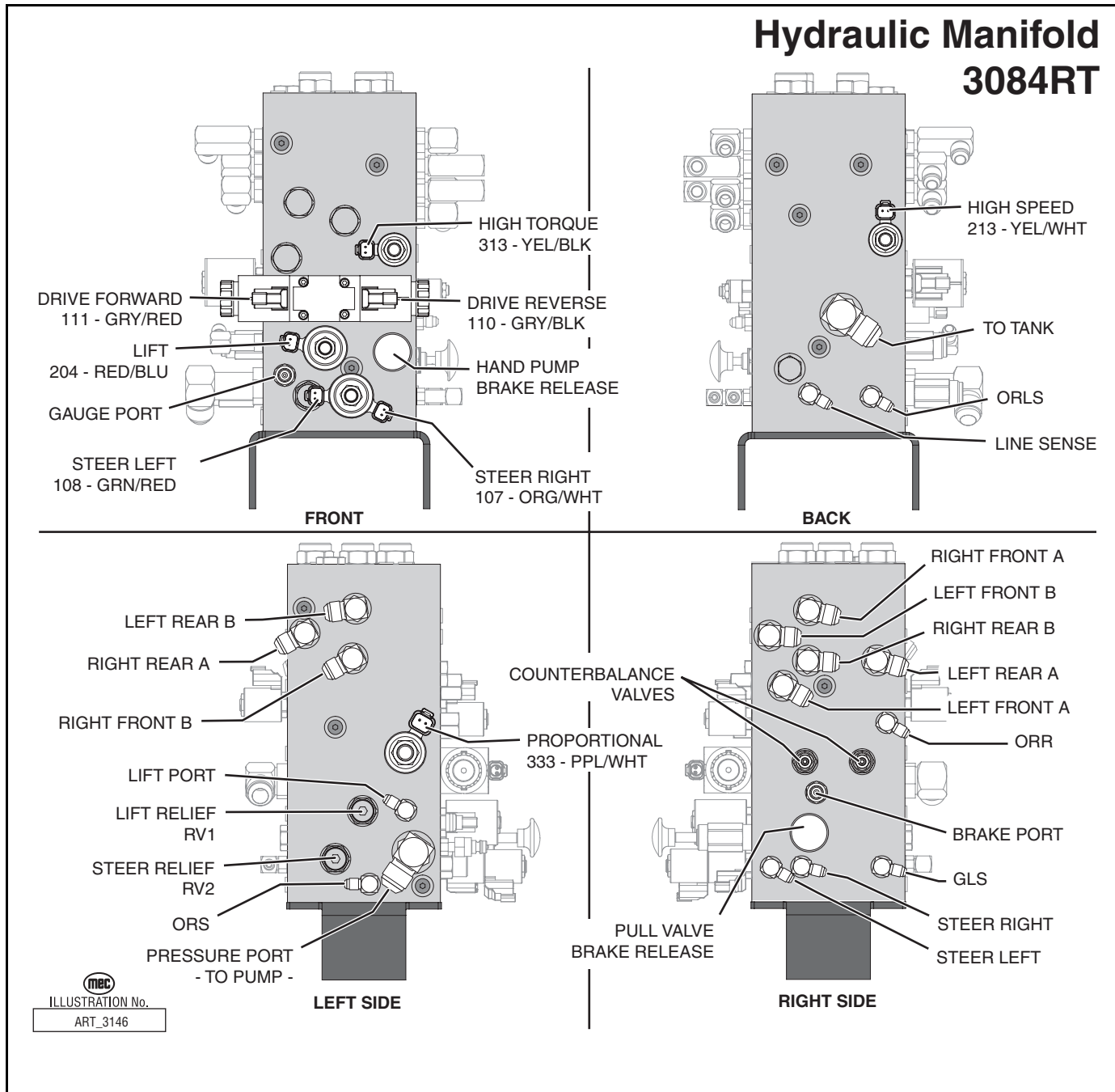
Figure 1-6: Main Hydraulic Manifold - 3084RT

Figure 1-7: Main Hydraulic Manifold - 3084ES

Hydraulic Manifold 3084ES

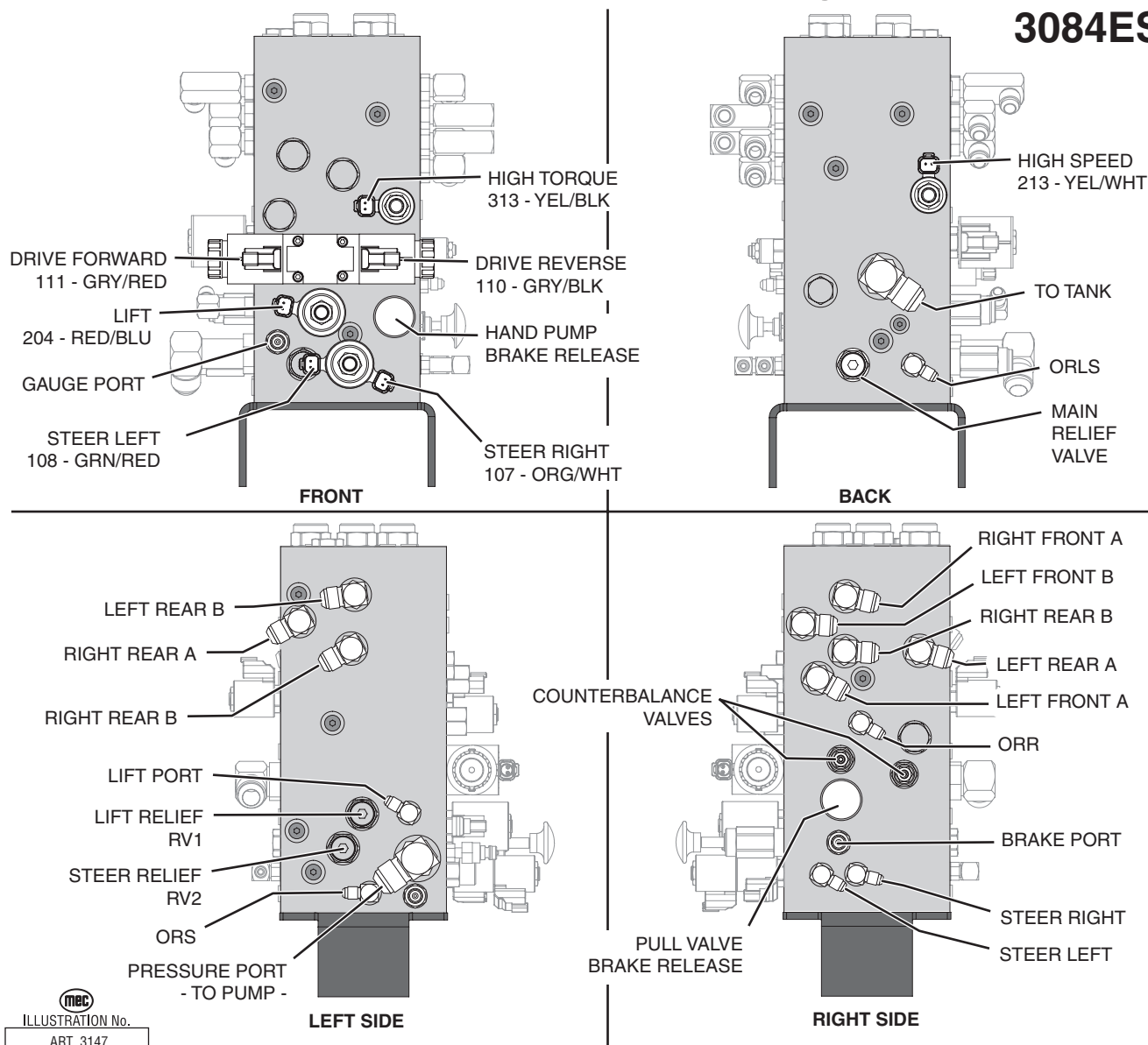
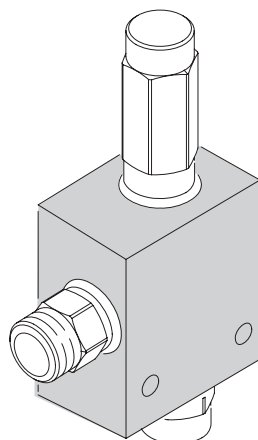
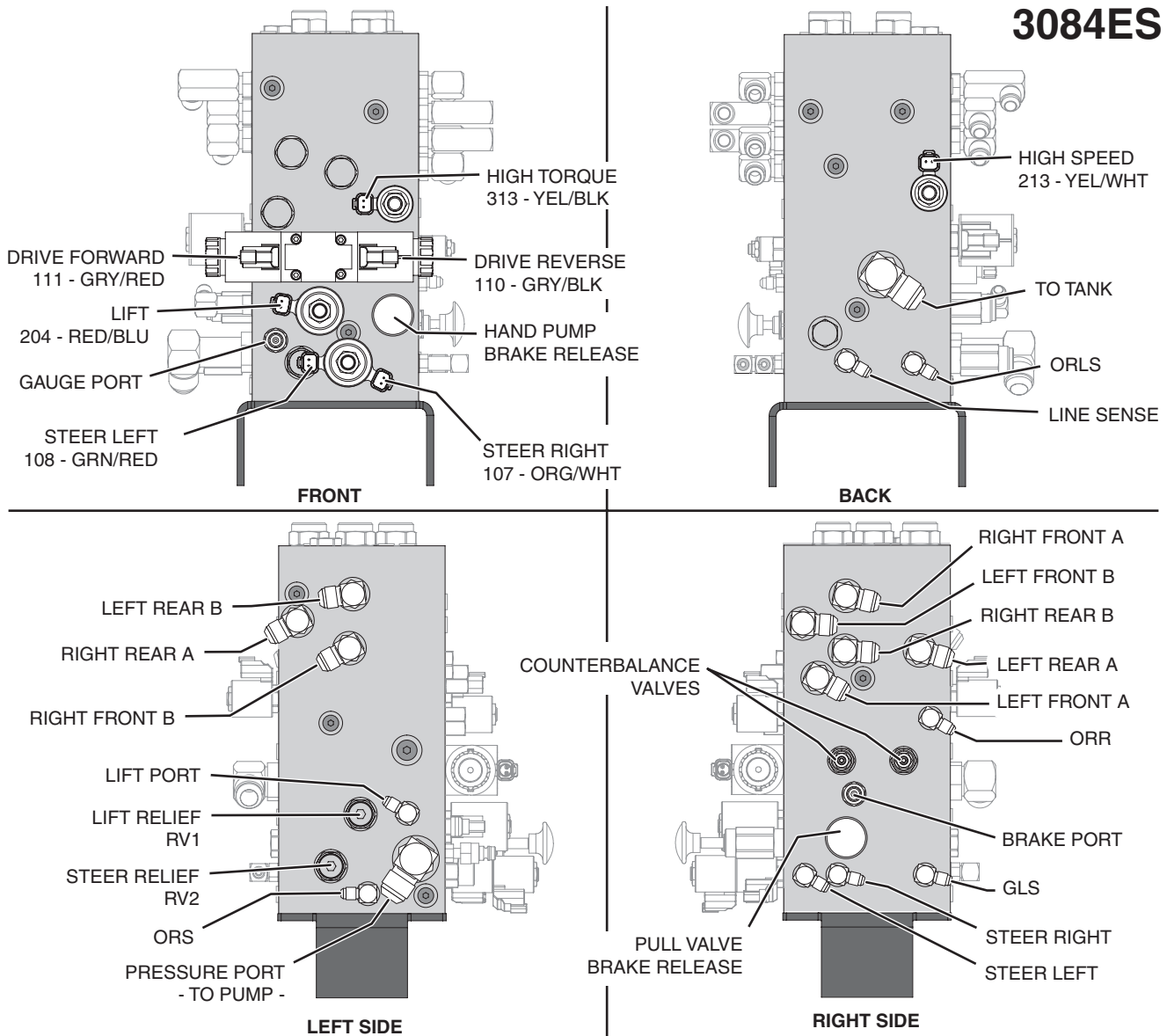


Figure 1-8: Main Hydraulic Manifold - 3084ES Alternate Configuration

Hydraulic Manifold - Alternate Configuration 3084ES



**REMOTE
MAIN RELIEF VALVE**

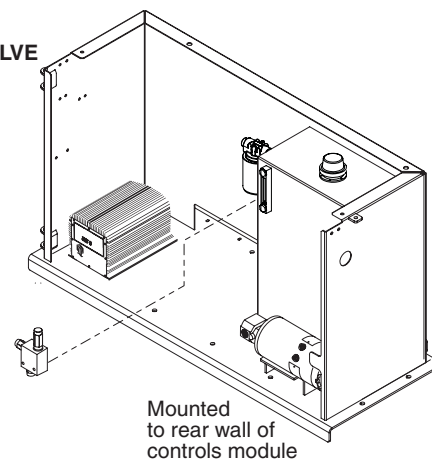
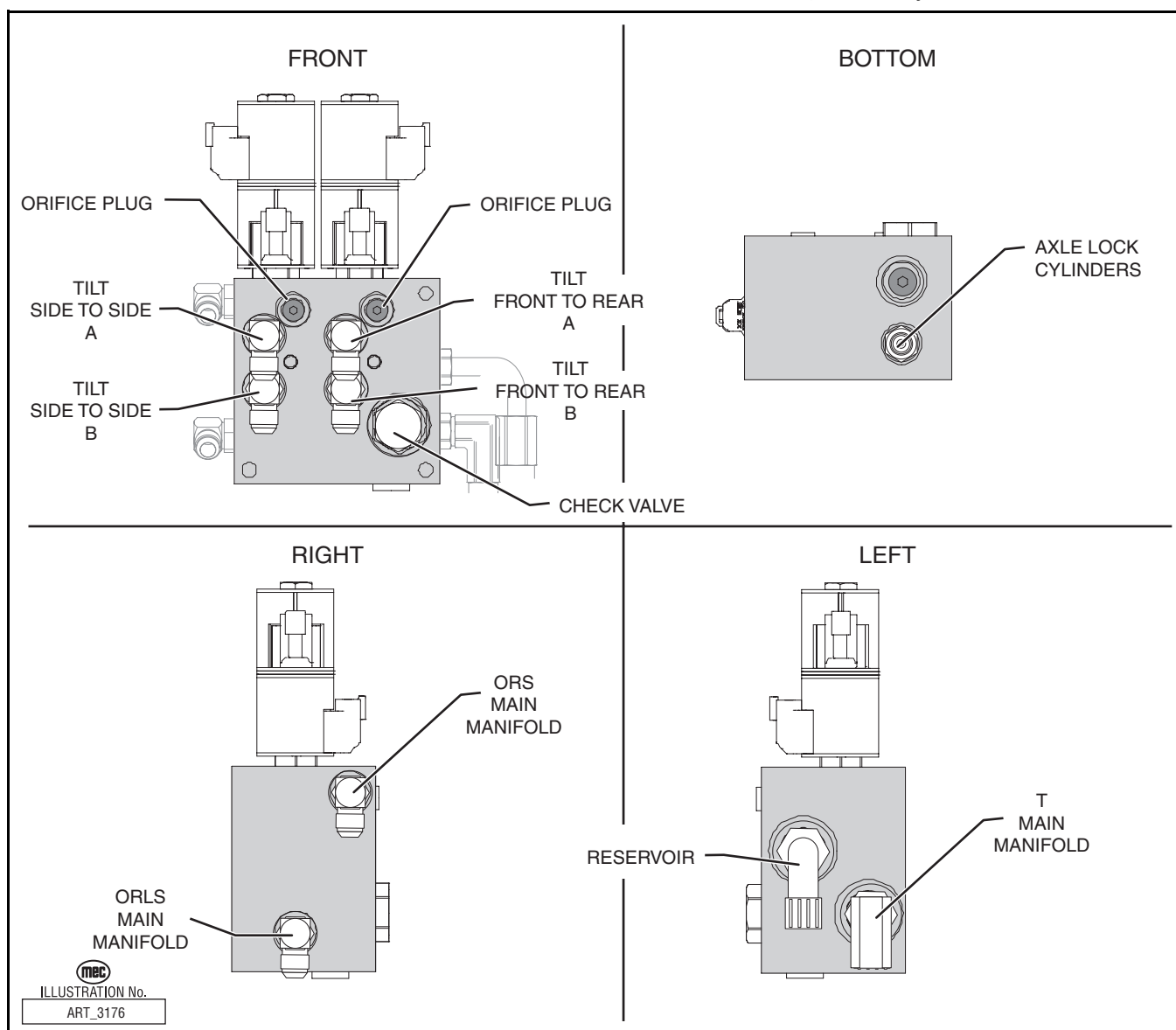


ILLUSTRATION No.
ART_3286

Figure 1-9: Hydraulic Manifold, Leveling

DRIVE AND BRAKE SYSTEM

WHEEL DRIVE

NOTE: Refer to *Section 3* for Remove and Install instructions.
Refer to *Parts Section D*.

There are four (4) hydraulic fixed-displacement gear wheel motors to provide power to all four wheels.

DYNAMIC BRAKING CIRCUIT

The two (2) rear wheel motors have integral spring-held brakes. Hydraulic pressure developed in the drive circuit during drive mode releases the brakes. A fixed orifice in the brake circuit controls the brake application to provide a smooth stop.

FRONT WHEEL MOTORS (DT-701)

Refer to Figure 1-10.

HOUSING AND SHAFT DISASSEMBLY

1. Remove all shaft-related components from the shaft. Secure the motor housing in a vise.
 - Remove the retaining ring from the groove in the pilot of the housing.
 - Remove the spacer from the housing.
 - Remove the shaft from the housing.
 - Remove the bearing, thrust bearing, and two (2) thrust washers from the shaft.
2. Being careful not to drop bearing rollers,
 - Pry out the shaft seal, backup seal, and dust seal from the bearing assembly.

NOTE: It is not necessary to remove the metal backup ring from the bearing to service the motor.

- Remove the high pressure seal from the groove in the pilot of the housing.
 - Discard shaft seal, backup seal and high pressure seal.
3. Clean all parts in an oil-based solvent and dry using compressed air.

HOUSING AND SHAFT ASSEMBLY

1. Apply a light coating of fluid to all new seals prior to installation.
 - Install the high pressure seal into the groove in the pilot of the housing.
2. Place the shaft on a clean, flat surface with the output end facing up.
 - Place the first thrust washer, thrust bearing and second thrust washer over the shaft.
 - Using plastic installation sleeve, place the shaft seal over the shaft with the lip facing down.
 - Repeat for the backup seal, making sure the lip faces down.
 - If the metal backup ring came out in *Step 2* above, place it over the shaft with the large O.D. facing down.
 - Lightly grease the bearing and place it over the shaft with the large O.D. facing down.
 - Use an arbor press to carefully press the bearing down to press the seal assembly into the bearing.
3. Place the shaft assembly into the housing.
 - Place the dust seal over the shaft with the lip facing up.
 - Place the bearing spacer and retaining snap ring over the shaft.

NOTE: It may be necessary to lightly tap the snap ring and bearing spacer to allow the retaining ring to seat properly.

- Replace all shaft-related components (i.e. keys, wire rings, nuts).

MOTOR SECTION DISASSEMBLY

1. Make a “V” shaped set of alignment marks on the end-cover and housing to aid in the reassembly process.
 - Clamp the motor housing in a vise with the shaft facing down.
2. Remove the seven (7) bolts that hold the motor assembly together.
 - Carefully remove the end-cover - *be aware that the piston and spring may fall out.*
 - Carefully remove the piston from the end-cover and set it aside.
 - Remove and discard the O-ring seal and backup seal.
 - Remove the spring and set it aside.
3. Lift commutator container and commutator from the motor and set aside.
 - Place commutator on a flat, clean surface with the seal facing up.
 - Gently tap on the seal with a small screwdriver until the opposite side of the seal lifts from the groove. Remove the seal and discard.
4. Remove the manifold, rotor set, and divider plate. Remove all seals and discard.

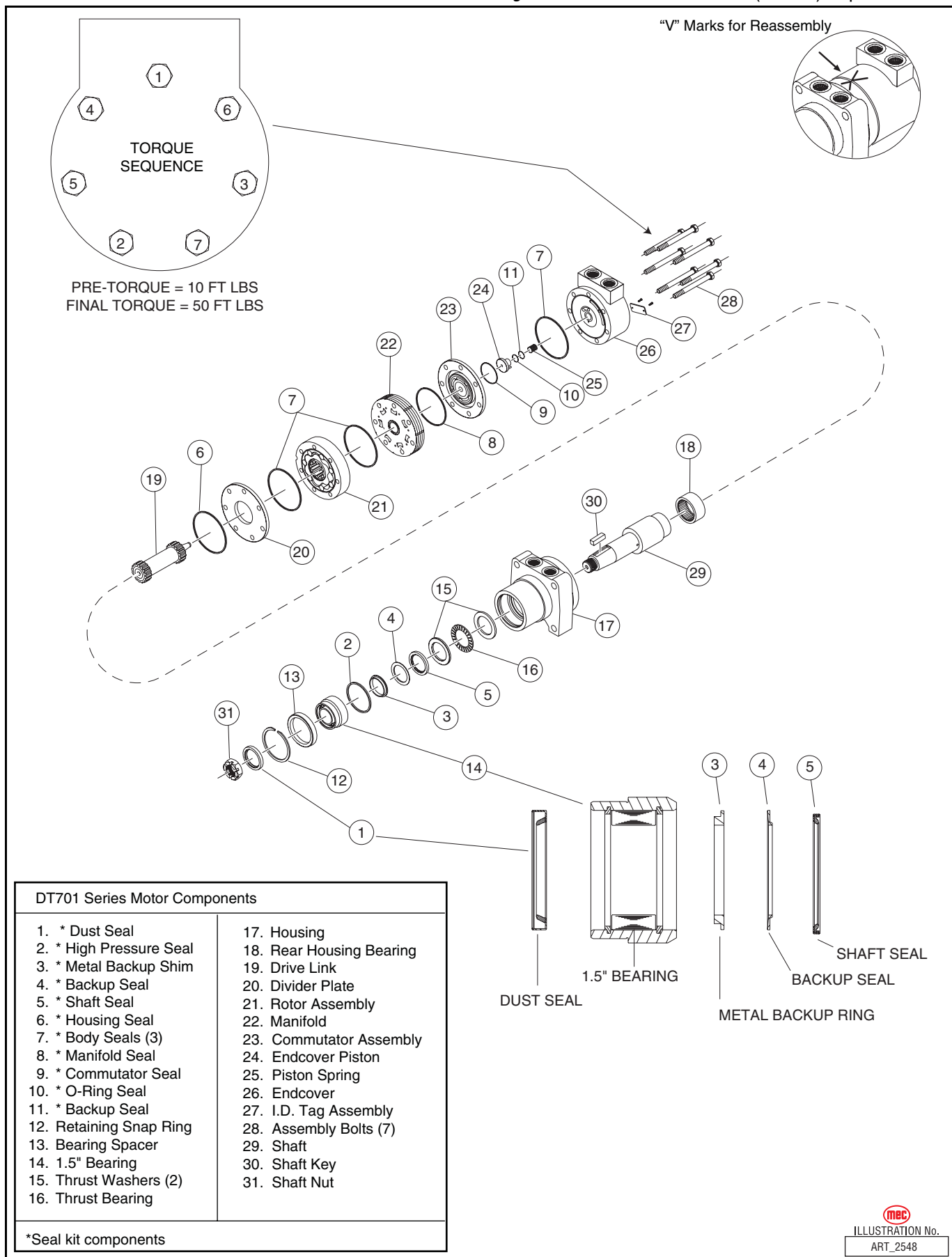
CAUTION – Do not allow rollers to drop from the rotor assembly when removing the rotor from the motor.

- Remove the drive link from the motor and set aside.
5. Clean all parts in an oil-based solvent and dry using compressed air.

MOTOR SECTION ASSEMBLY

1. Apply a light coating of fluid to all new seals prior to installation.
2. Install the drive link into the end of the shaft with the tapered end facing up.
 - Place the rear housing seal in the groove in the housing.
 - Place the divider plate onto the housing.
 - Place body seals in grooves in both sides of the rotor.
 - Place the rotor onto the housing with the side of the rotor with chamfer in splines facing the housing.
 - Place the manifold over the rotor with the seal-groove side up.
 - Install the manifold seal
3. Install the commutator seal into the commutator with the metal side facing up.
 - Use finger pressure to press the seal down flush with the surface of the commutator.
 - Place the commutator onto the manifold and then place the commutator onto the protruding end of the drive link. Make sure that the seal side is facing up.
4. Install the remaining body seal in the groove on the end-cover.
 - Install the piston spring into the end-cover, then the white backup seal followed by the O-Ring seal.
 - Line up the alignment pin with the hole in the end-cover and press the piston into the end-cover.
 - While holding the piston in place, lower the end-cover assembly onto the motor. Align the “V” shaped marks that were made on the housing and end-cover before disassembly.
5. Install the seven (7) assembly bolts.
 - Tighten bolts in sequence (see illustration)
 - Pre-torque to 10 ft. lbs. (13.6 Nm). Final torque to 50 ft. lbs. (67.8 Nm).

Figure 1-10: Front Wheel Motor (DT701) Exploded View



REAR WHEEL MOTORS WITH BRAKES (DT-710)

Refer to Figure 1-11.

DISASSEMBLY

1. Make a “V” shaped set of alignment marks on the end-cover and housing to aid in the reassembly process.
 - Clamp the motor housing in a vise with the shaft facing down.
2. Remove the seven (7) bolts that hold the motor assembly together.
 - Carefully remove the end-cover - *be aware that the piston and spring may fall out.*
 - Carefully remove the piston from the end-cover and set it aside.
 - Remove and discard the O-ring seal and backup seal.
 - Remove the spring and set it aside.
3. Lift commutator container and commutator from the motor and set aside.
 - Place commutator on a flat, clean surface with the seal facing up.
 - Gently tap on the seal with a small screwdriver until the opposite side of the seal lifts from the groove. Remove the seal and discard.
4. Remove the manifold, rotor set, and divider plate. Remove all seals and discard.

CAUTION: – Do not allow rollers to drop from the rotor assembly when removing the rotor from the motor.

- Remove the drive link from the motor and set aside.
5. Clean all parts in an oil-based solvent and dry using compressed air.

ASSEMBLY

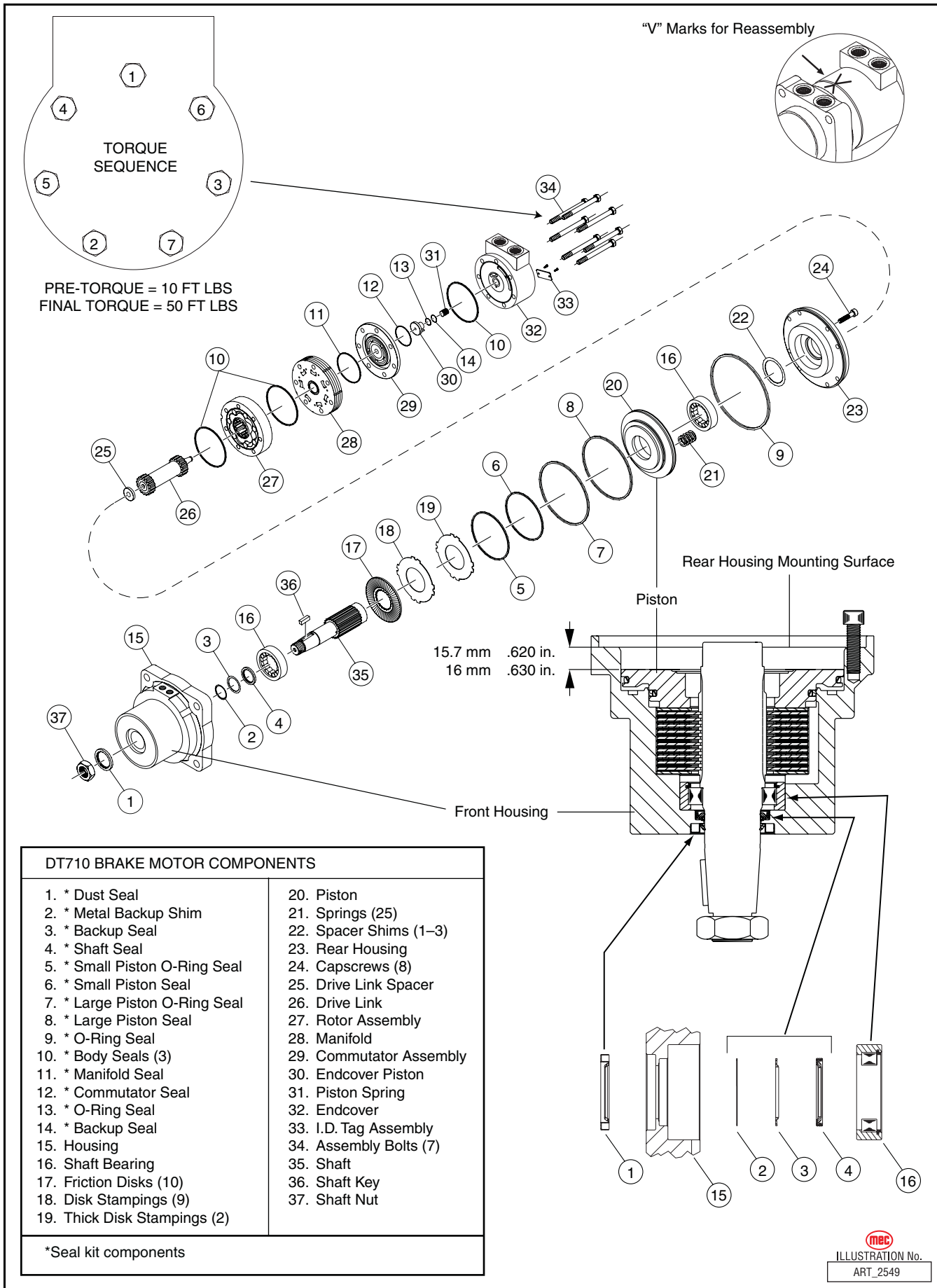
1. Apply a light coating of fluid to all new seals prior to installation.
2. Place the housing on a clean, flat surface with the output end facing up.
 - Install the dust seal with the lip on the seal facing up.
 - Clamp the housing in a vise with the pilot on the housing facing down.
 - Install the metal backup shim into the bore.
 - Install the backup seal into the housing bore with the lip on the seal facing up.
 - Install the shaft seal into the housing bore with the lip on the seal facing up.
 - Refer to illustration for seal orientation.
3. Install the bearing shims (not shown in illustration) in housing.
 - Install housing bearing.
 - Install the shaft being careful not to cut seal lip with the shaft keyway.
4. Locate the 2 thick disk stampings and set them aside.
 - Install one (1) thick disk stamping into the housing. Make sure that lugs or splines engage those in the housing.
 - Install one (1) friction disk engaging splines on the disk with those on the shaft.
 - Alternate disk stampings and friction disks until all disks except the thick disk stamping are installed.
 - Install the second thick disk stamping on top of the disk assembly.

5. Install the small O-Ring seal and large O-Ring seal into corresponding grooves in the piston.
 - Install small seal and large seal in corresponding grooves over the O-Ring seals.
 - Thoroughly coat the seals and sealing surfaces of the housing with clean fluid.
 - Install the piston into the housing with the large O.D. side facing up.
 - Evenly press the piston down. Be careful not to pinch the seals.

IMPORTANT: – If replacing the disks and disk stampings, the new stack must be between .620 and .630 in. thick (15.7 mm and 16 mm) (see illustration).

6. Install spring on top of the piston.
 - Install O-Ring seal in groove in the rear surface of the housing.
 - Install the rear shaft bearing. Make sure that the snap ring that retains the bearing rolls faces out.
 - Place the rear housing onto the front housing and line up bolt holes.
 - Hold the motor assembly together, remove from the vise and place in an arbor press.
 - Press down on the rear housing until it contacts the front housing and lock the press
 - Install eight (8) cap-screws and torque to 45 ft. lbs. (61 Nm).
7. Install the drive link into the end of the shaft with the tapered end facing up.
 - Place the body seals in the grooves in both sides of the rotor.
 - Place the rotor onto the housing with the side of the rotor with the chamfer in the splines facing the housing.
 - Place the manifold over the rotor with the seal groove side up.
 - Install the manifold seal.
8. Install the commutator seal into the commutator with the metal side facing out.
 - Use finger pressure to press the seal down flush with the surface of the commutator.
 - Place the commutator onto the manifold and then place the commutator onto the protruding end of the drive link. Make sure that the seal side is facing up.
9. Install the remaining body seal in the groove on the end-cover.
 - Install the piston spring into the end-cover, then the white backup seal followed by the O-Ring seal.
 - Line up the alignment pin with the hole in the end-cover and press the piston into the end-cover.
 - While holding the piston in place, lower the end-cover assembly onto the motor. Align the “V” shaped marks that were made on the housing and end-cover before disassembly.
10. Install the seven (7) assembly bolts.
 - Tighten bolts in sequence (see illustration)
 - Pre-torque to 10 ft. lbs (13.6 Nm).
 - Final torque to 50 ft. lbs (67.8 Nm).

Figure 1-11: Rear Wheel Motor (DT-710) Exploded View



FLOATING AXLE LOCK CYLINDERS

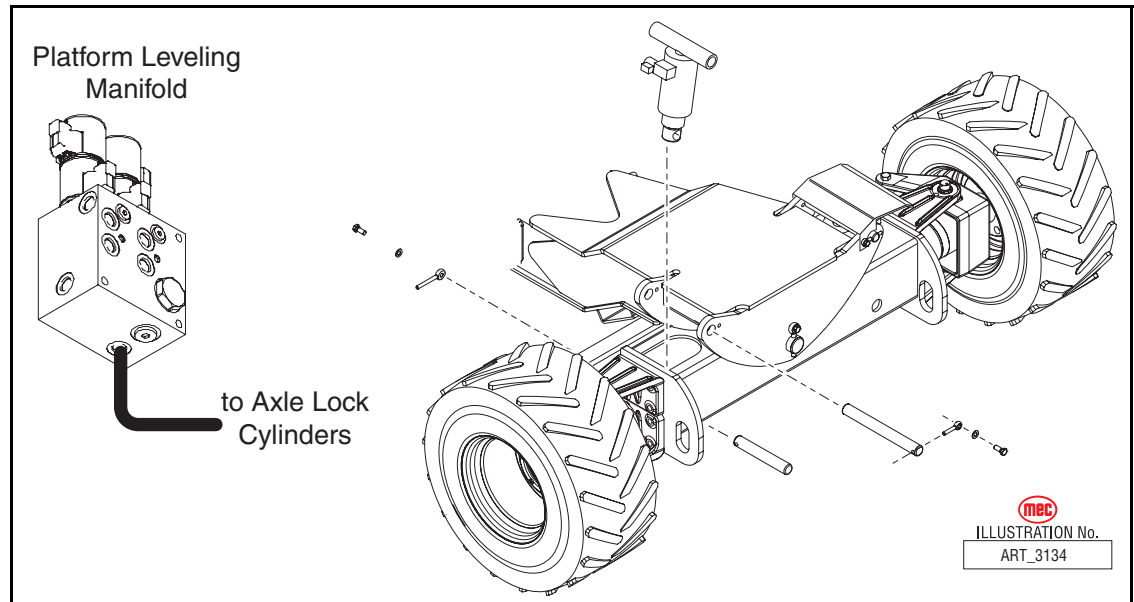
NOTE: Refer to *Cylinder Repair*.

Refer to *Section 3* for Remove and Replace instructions.

Refer to the *Parts Manual, Section E* for parts list.

There are two (2) cylinders in the floating axle system. These cylinders allow fluid to transfer from one side to the other while the platform is in the stowed position. When the platform is elevated, the electrically operated valve closes, preventing fluid flow and thereby locking the cylinders.

Figure 1-12: Axle Lock Cylinder



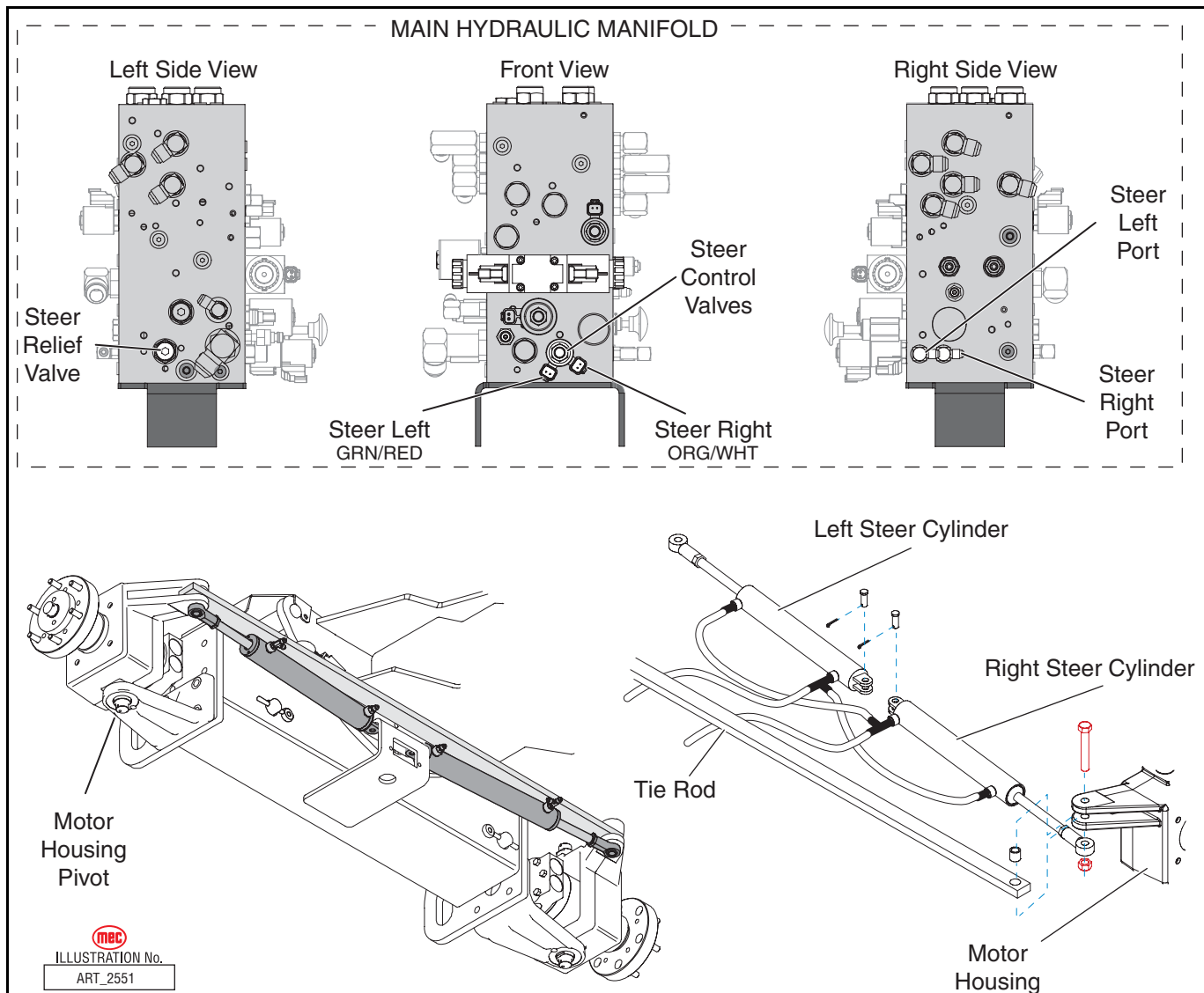
STEERING CIRCUIT

NOTE: Refer to *Hydraulic Manifold and Relief Pressure Adjustment Procedure*.
Refer to *Section 3* for Remove and Replace instructions.
Refer to *Parts Section E* for hose routing.

The steering system consists of the following components:

- The wheel motor housings have pivots on the top and bottom, and are mechanically linked together via a tie-rod.
- Steering is accomplished hydraulically by using two (2) double-acting cylinders, and a 4-way 3-position solenoid-operated, hydraulic directional control cartridge valve.
- Maximum steering pressure is limited by the steering relief valve (refer to *Relief Pressure Adjustment Procedure*).

Figure 1-13: Steering Circuit

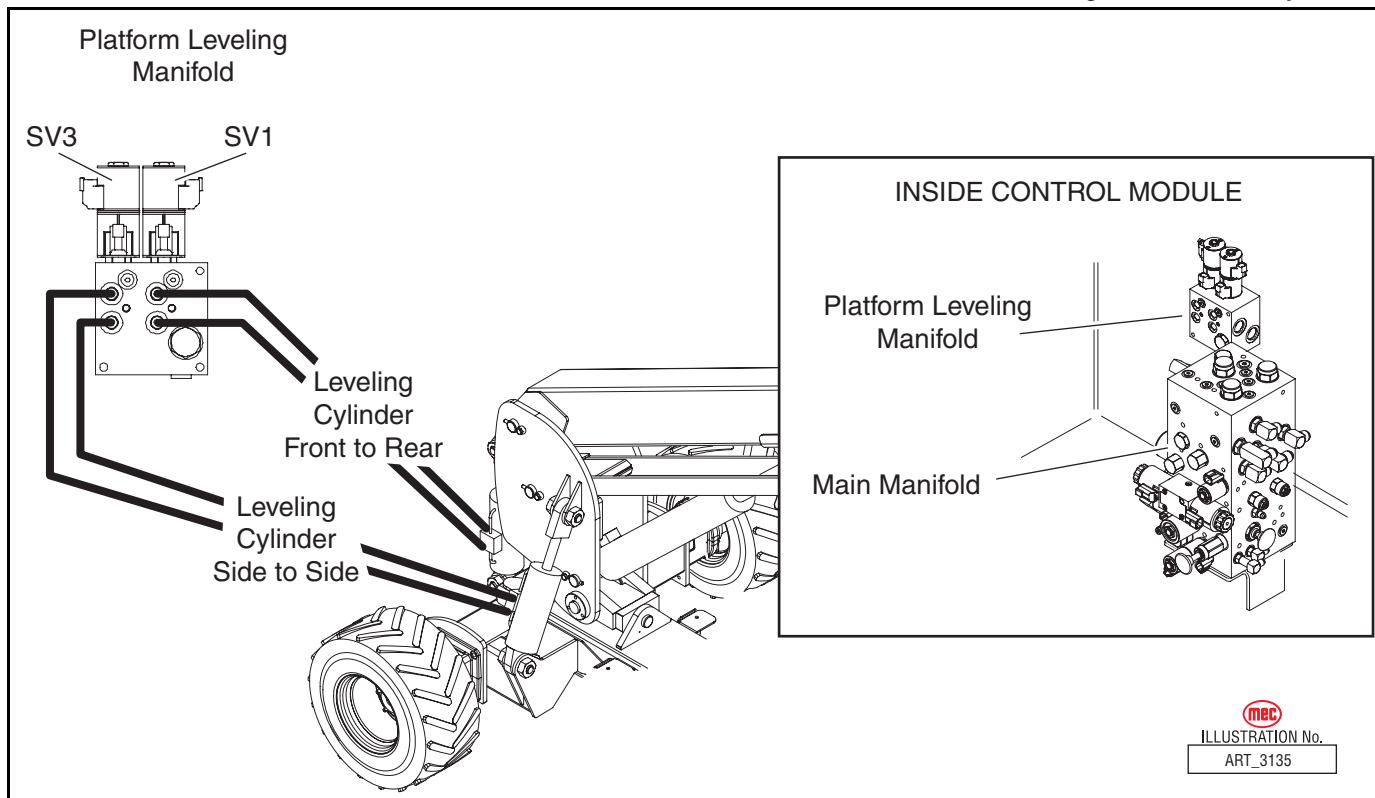


PLATFORM LEVELING SYSTEM

There are two (2) hydraulic cylinders in the platform leveling system. These cylinders work in conjunction with a pivot mount to allow the platform and boom to tilt front-to-rear and side-to-side in order to provide a level work platform.

Automatic leveling is controlled by the GP400 processor.

Figure 1-14: Platform Leveling Manifold and Cylinders

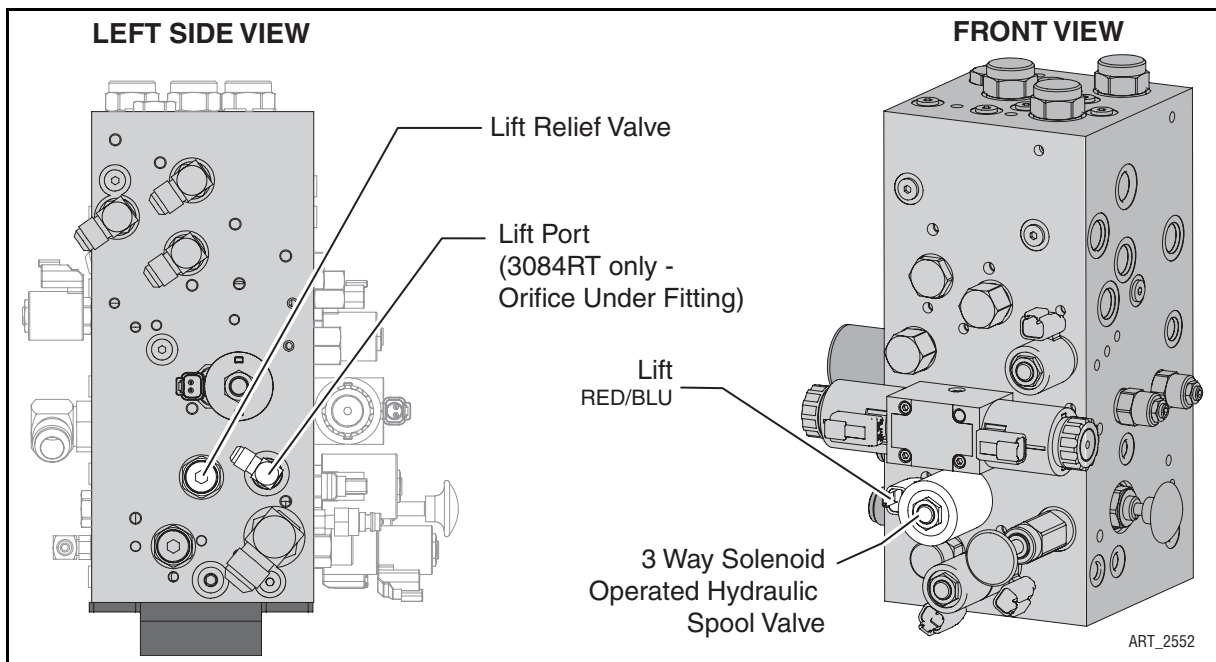


PLATFORM LIFT CIRCUIT

NOTE: Refer to *Hydraulic Manifold and Relief Pressure Adjustment Procedure*.
Refer to *Section 3* for Remove and Replace instructions.

- On model 3084RT, the lift system uses the hydraulic pump to obtain proportional lifting function controlled by the lift valve and proportional valve.
- On model 3084ES, the lift system uses the electric motor to obtain proportional lifting function controlled by the lift valve.
- Lowering is single speed. When lowering, the holding valve on the lift cylinder opens allowing gravity to lower the platform. Lowering speed is regulated by a fixed orifice located on the lift cylinder.
- **ANSI:** Platform capacity is limited by a hydraulic relief valve in the lift circuit. (Refer to Machine Specifications or the Hydraulic Schematic for proper setting).
- **CE:** Lift capacity is controlled by the Overload System.

Figure 1-15: Platform Lift, Main Hydraulic Manifold



LIFT CYLINDER

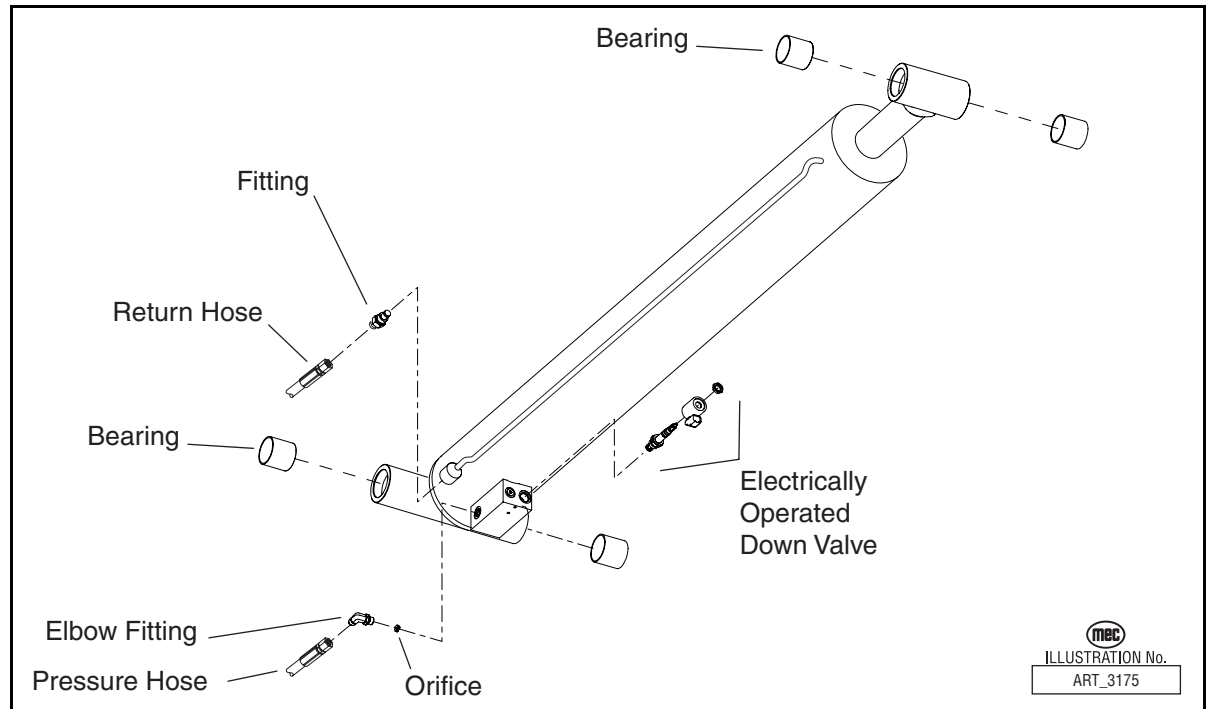
NOTE: Refer to *Cylinder Repair*.

One (1) single acting type hydraulic cylinder.

The cylinder has an integrated 2-position, 2-way solenoid operated platform lower valve for holding the platform in position. The valve is also electrically actuated via a toggle switch for manually lowering the platform.

The normally-closed holding valve prevents retraction of the cylinder rod should a hydraulic line rupture or a leak develop between the cylinder and its related control valve.

Figure 1-16: Lift Cylinder



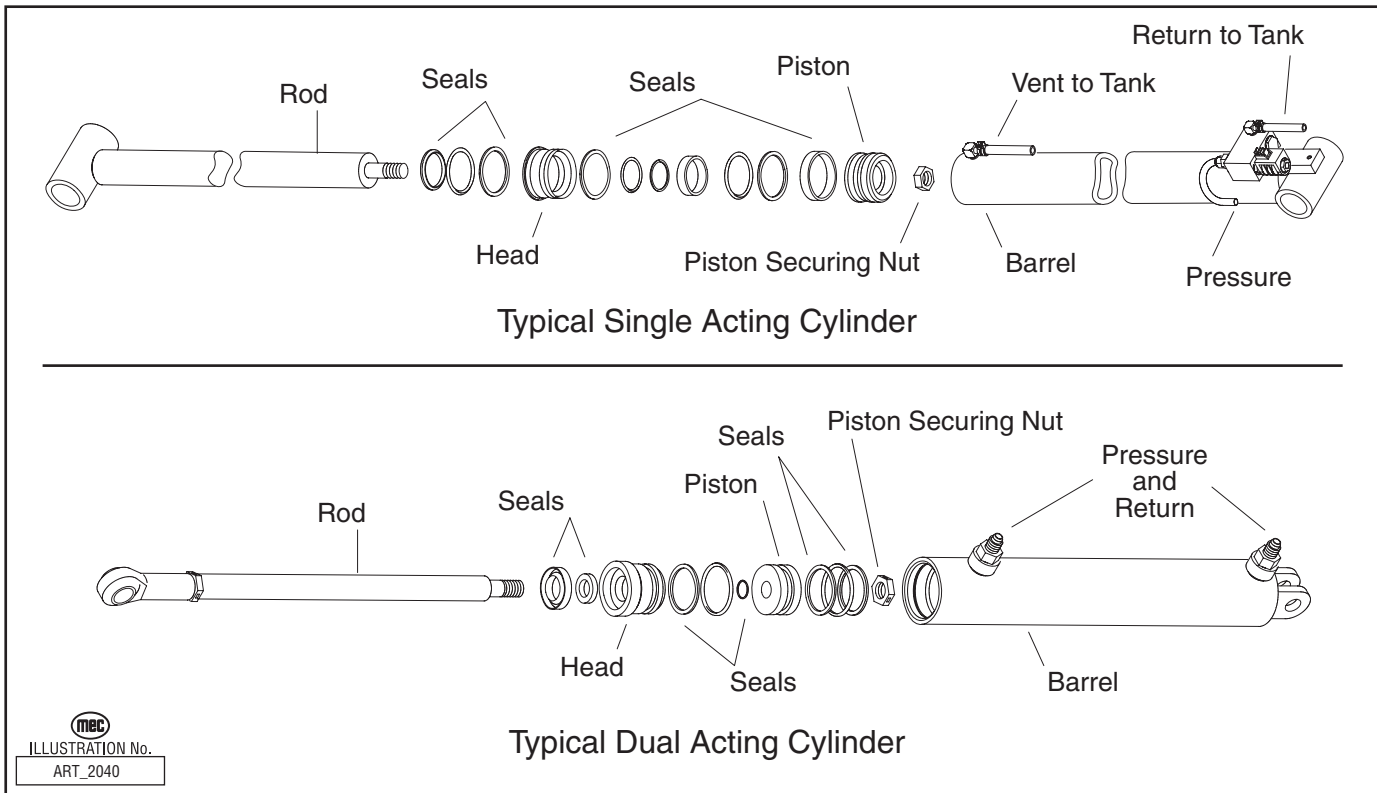
GENERAL CYLINDER REPAIR



WARNING

CYLINDERS ARE HEAVY. SUPPORT CYLINDERS BEFORE REMOVING HARDWARE THAT SECURES THE CYLINDER TO THE MACHINE.

Figure 1-17: Typical Cylinders, Exploded View



REMOVAL

NOTE: Refer to *Section 3* for Remove and Replace instructions, and the *Parts Manual* for a list of hardware specific to the cylinder being repaired.

1. Tag hoses for proper reassembly.
2. Disconnect hoses and **IMMEDIATELY** cap the openings to prevent contamination.
3. Remove cylinder from the machine as described in *Section 3*.

PREPARATION



Take precautions to protect the rod surface. Guard against dirt or other foreign objects entering system.

1. Drain all fluid from cylinder.
2. Clean all dirt and grit from outside of cylinder.
3. Insert cylinder into vise.

CYLINDER DISASSEMBLY

1. Remove the head from the cylinder body.
2. Remove the shaft assembly from the barrel, pulling in a straight line, so as not to scar the internal parts.
3. Insert shaft into a **soft jawed** vise so that the head and piston can be removed. Be sure the shaft and vise are both clean before using.
4. Remove nut at the end of the shaft and pull head and piston off of the rod.
5. Remove all seals from the head and piston using a non-sharp seal tool. These tools are available from various seal suppliers.
6. Clean all fluid and debris off of the head, piston, shaft, collar and barrel using solvent, rags, and an air hose.
7. Inspect parts for scratches, pits or polishing. Check seal grooves and sealing surfaces.
 - a. Scratches or pits deep enough to catch the fingernail are unacceptable; replace the cylinder.
 - b. Polishing is a sign of uneven loading. Check for roundness. If a polished surface is not round within .007 in. (0.18 mm) replace the cylinder.

CYLINDER ASSEMBLY

CAUTION:

- To insure a quality repair, cylinder parts must be thoroughly cleaned, dry, and free of solvents, and assembly must be performed in a clean area free of dust and contamination.
- Do not use sharp edged tools during seal replacement. After installing seals wait at least one hour before assembling the cylinder to allow the seals to return to their original shape.
- Torque all hardware according to the Hydraulic Components Torque Table unless otherwise specified.

1. Lubricate all components with clean hydraulic fluid.
2. Install new seal kit components. Install all seals on the head and piston using the non-sharp seal tool.
3. Place a small amount of fluid on the inside head seals. Reinstall the head on the shaft by slipping head over the piston end of the shaft. Be very careful not to damage the inside seals.
4. Place a small amount of fluid on the inside seals of the piston. Reinstall the piston on the shaft by slowly twisting the piston onto the threads of the shaft. Be very careful not to damage the inside seals.
5. Reinstall the shaft nut. Torque 1 ½" nut to 160 ft. lbs. (216 Nm).
6. Grease the outside seals of the head and piston.
7. Reinstall the shaft into the barrel of the cylinder and push in until groove of the head lines up with the slot in the barrel.
8. Reinstall the cylinder retainer. Installation is reverse of removal.
9. Cycle the cylinder using air to check for proper operation.

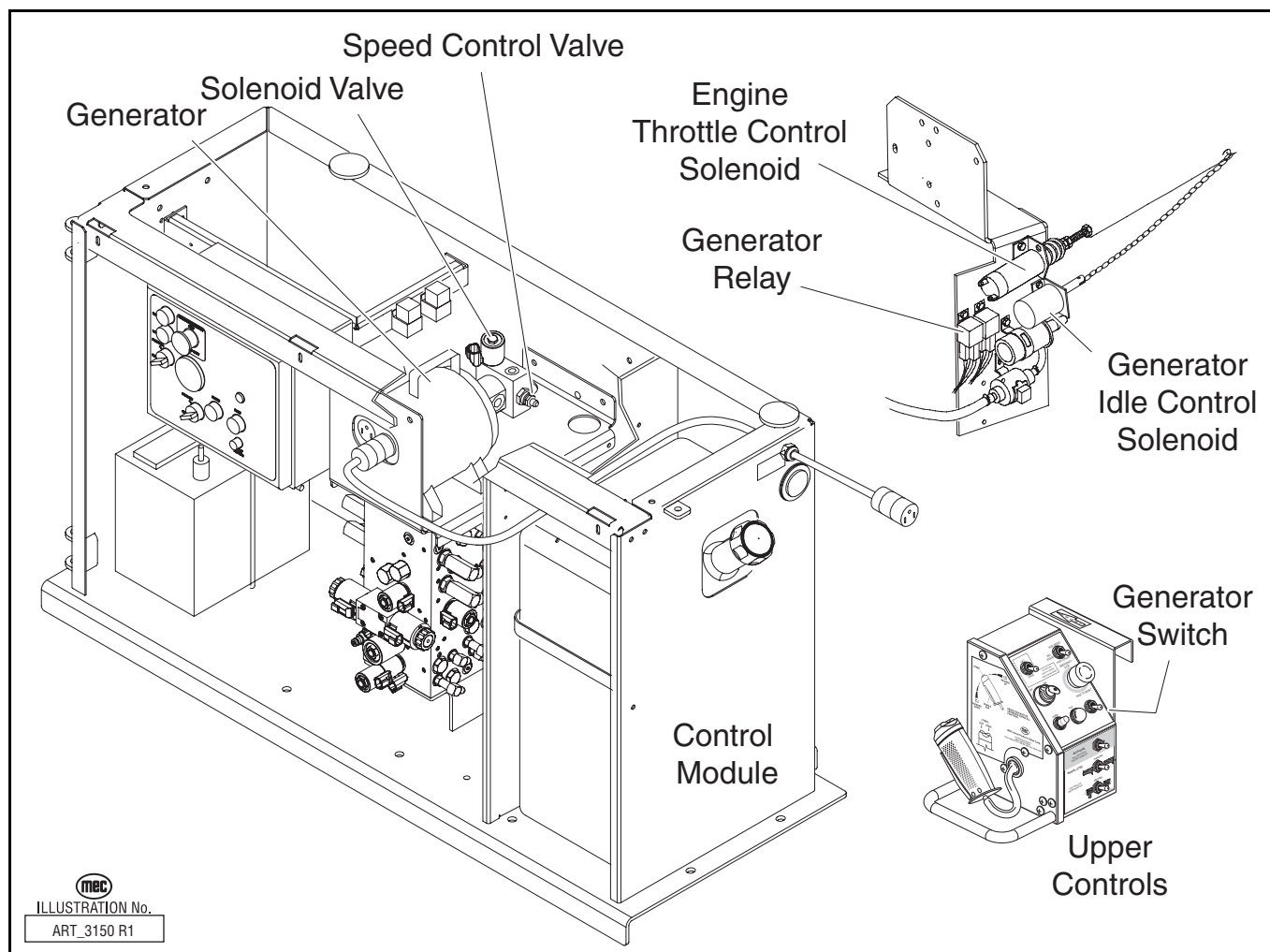
NOTE: Keep all parts clean when working with hydraulic cylinders. Even one small piece of dirt or grit can damage the cylinder.

GENERATOR OPTION - 3084RT

NOTE: Refer to *Section 6*,
Refer to *Parts Sections E and F*

This option is available only on model 3084RT.

Figure 1-18: Optional Generator Connections



NOTES:



Section 2

ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM – GENERAL

The electrical control system consists of lower controls located on the machine base and upper controls located on the machine platform. Emergency lowering controls are also located on the machine base.

LOWER CONTROLS

The lower controls will operate all functions except the steer, drive and level functions.

UPPER CONTROLS

The upper controls will operate all functions including drive, steer, lift, and lower. A momentary bi-directional rocker switch on the joystick provides the steering function. The control system for operation of drive, steer, lift, and lower are electric-over-hydraulic type. The drive system is a proportional system controlled by position and direction of the upper controls joystick.

EMERGENCY STOP

There are two red Emergency Stop switches: One located on the upper controls and one on the lower controls. Activation of either Emergency Stop switch will immediately cut electrical power to all controls, thereby stopping all machine functions. Press the switch to stop all electrical power and turn the switch clockwise to reset.

When both Emergency Stop switches are “set”, the controls have electrical power and the machine will operate.

Figure 2-1: Diagnostic LED

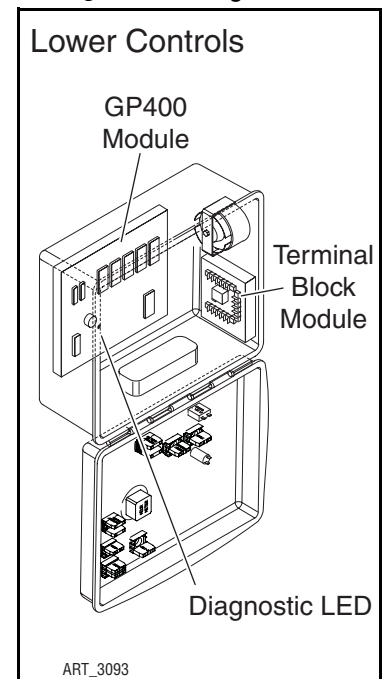
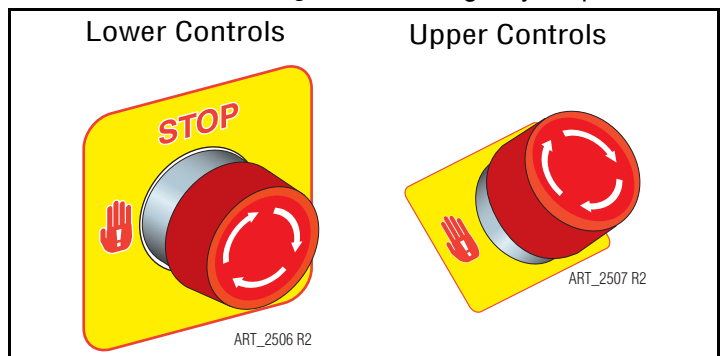


Figure 2-2: Emergency Stop Switches

NOTE: Both switches must be set or the machine will not operate.
The electric Emergency Lowering switch will continue to function when the Emergency Stop switches are depressed.



EMERGENCY LOWERING

The machine utilizes a toggle switch to open the down valve on the lift cylinder, allowing hydraulic fluid to return to the hydraulic reservoir at a controlled rate.

DIAGNOSTIC LED

If the machine fails to operate, inspect the GP400 Module located inside the control box. The LED located on the processor should be *ON*. If the LED is *OFF* or *FLASHING*, refer to *Section 4: Troubleshooting*.

START DELAY LIGHT - 3084RT

The START DELAY light is located on the Lower Control box (see Figure 2-4 on Page 2-8).

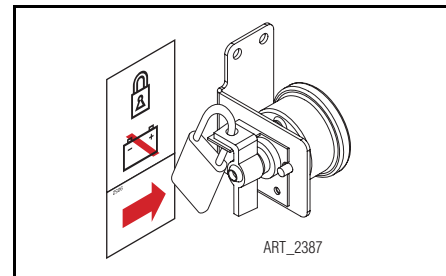
The machine is equipped with a start system protective device, controlled by the GP400. This protects the starter and related parts from damage caused by over-cranking in hard starting situations.

- Maximum starter operation time is 10 seconds.
- If no start, the START DELAY light will illuminate and the starter will be disabled for 35 seconds.
- When the START DELAY light goes OFF the starter will operate.

BATTERY DISCONNECT SWITCH

All electrical power is routed through the Master Disconnect switch located in the Control Module. The switch can be locked in the OFF position with a padlock to prevent unauthorized use.

Figure 2-3: Master Disconnect Switch



BATTERIES

CAUTION

Discharged batteries can freeze, causing damage to the battery and/or battery case. A broken battery case will allow electrolyte to leak out.

WARNING

CHARGING BATTERIES CREATE EXPLOSIVE HYDROGEN GAS. KEEP SPARKS, FLAMES AND SMOKING MATERIALS AWAY FROM BATTERIES. ALWAYS WEAR SAFETY GLASSES WHEN WORKING WITH BATTERIES.

BATTERY FLUID IS CORROSIVE. THOROUGHLY RINSE SPILLED FLUID WITH CLEAN WATER.

REPLACE ONLY WITH MANUFACTURER-APPROVED BATTERIES.

BEFORE DISCONNECTING THE BATTERY NEGATIVE (–) LEAD, MAKE SURE THAT ALL SWITCHES ARE OFF. IF ON, A SPARK WILL OCCUR AT THE GROUND TERMINAL THAT COULD IGNITE HYDROGEN GAS OR FUEL VAPORS.

3084RT – One (1) battery (12 Volts DC) supplies the electrical power required to start the engine and operate the electrical circuits.

3084ES – Eight (8) batteries (6 Volts DC) supply power required to operate the machine.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of battery on a machine not in use:

- Keep battery clean. Electrolyte of batteries should be checked regularly and kept at proper level.
- Never stack one battery directly on top of another because post or container damage can result. If batteries are stored individually, place supporting boards between layers. Rotate stock so that the oldest batteries are used first.
- Batteries should be kept fully charged. A battery, while in storage, should be recharged to full charge at recommended intervals.

A BATTERY FULLY (100%) CHARGED AT 80°F (26.6°C)

- drops to 65% at 32°F (0°C)
- drops to 40% at 0°F (-32°C)

Table 2-1: Recommended Battery Charge Intervals

If Stored At	Recharge
Below 40°F (4°C)	Every week
40°-60°F (4°-15°C)	Every 2 weeks
Above 60°F (15°C)	Every month

BATTERY MAINTENANCE (IN USE)

Check battery and surrounding area for signs of damage or corrosion.

Check battery terminals for:

- **Corrosion:** Regularly clean connections and apply a nonmetallic grease or protective spray to retard corrosion.
- **Loose connections:** Be sure all cable connections are tightly secured, and that good contact is made with terminals.
- **Broken or frayed cables:** Be sure all connections are good and that no loose or broken wires are exposed. Replace as necessary.

Check battery electrolyte level. Replenish the electrolyte, if necessary. Remove vent caps before filling, and **USE ONLY DISTILLED WATER. DO NOT OVERFILL.** Fill to level indicator (or ½ inch over the top of separators, if there is no level indicator). Fill after charging to prevent overflow of acid due to expansion. Do not use a hose to add water to batteries.

Allowing the electrolyte level to drop below the top of the separators will lead to shortened battery life.

Excessive water usage can indicate that a battery has been overcharged, has been subjected to excessively high temperatures, or is nearing the end of its service life.

BATTERY PREVENTATIVE MAINTENANCE:

Every 15 hours (after battery has been charged), spot-check the specific gravity of two or more cells. A fully charged battery should indicate 1.28 specific gravity. If low readings are noted, check the following:

- Check terminals for corrosion, loose connections and broken or frayed cables.
- Check all cells with a hydrometer for variance in specific gravity. A variation of 0.03 points or more between cells is a cause for concern. Mark the low cells.

Recheck specific gravity of all cells after recharging. Wash the top of the battery, making sure all vents are in place. Do not allow cleaning water or other foreign matter to enter the cells. Use a solution of bicarbonate soda (5 tsp. of baking soda per quart of warm water) and water to wash the battery if there is an accumulation of acid.

Table 2-2: Battery Specific Gravity and Voltage

Specific Gravity		Volts DC		
	Each Cell	Per Cell	6V Battery	12V Battery
Fully Charged	1.280	2.10	6.30	12.60
Fully Discharged	1.130	1.75	5.19	10.50

BATTERY REPLACEMENT



WARNING

TURN OFF THE BATTERY DISCONNECT SWITCH BEFORE REMOVING ANY BATTERY FROM THE MACHINE.

CAUTION

Prevent damage to the battery and/or electrical system;

- **Always disconnect the negative battery cable first.**
- **Always connect the positive battery cable first.**

TO REMOVE A BATTERY;

1. Turn the Battery Disconnect switch to OFF.
2. Disconnect the battery cables and remove battery hold-down hardware.
3. Lift the battery from the compartment, put the battery aside and dispose of properly.

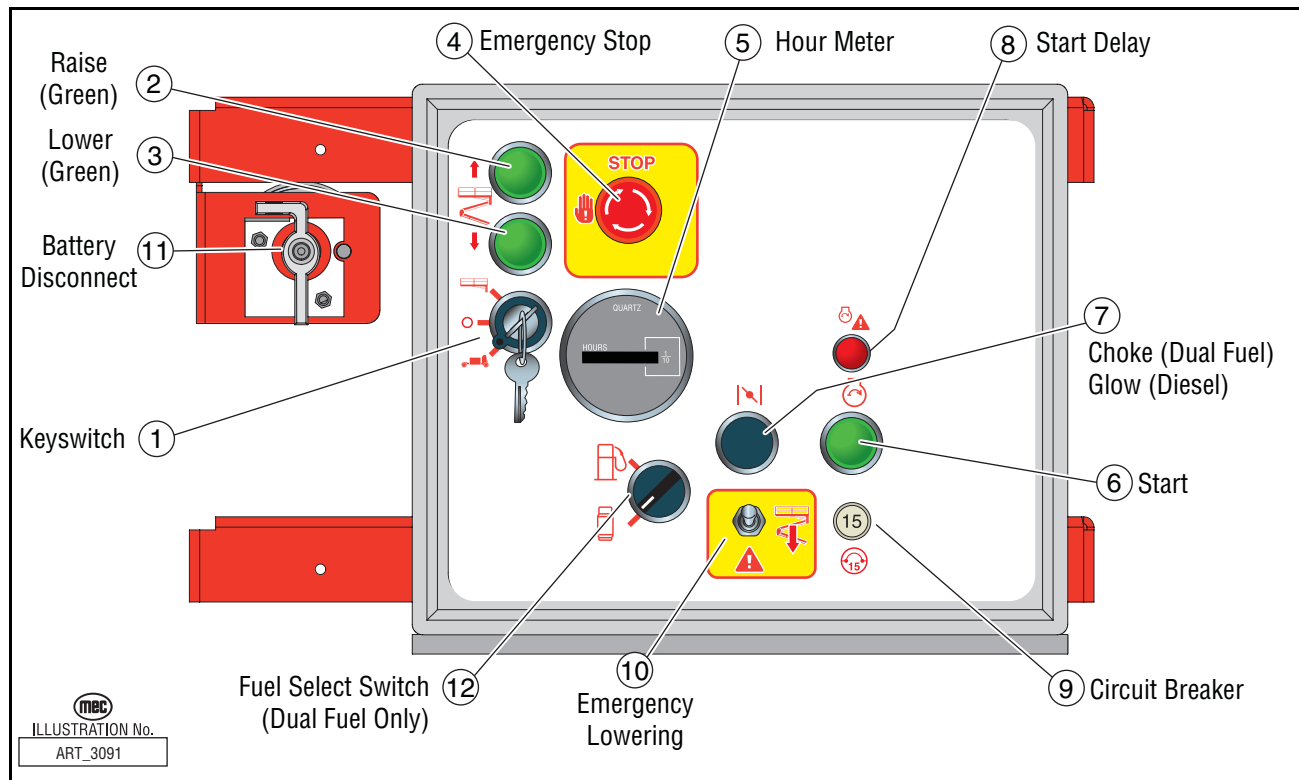
TO INSTALL A BATTERY;

1. Position the battery in the compartment and secure with hold-down hardware.
2. Connect battery cables.

CONTROLS

LOWER CONTROLS - 3084RT DUAL FUEL/DIESEL

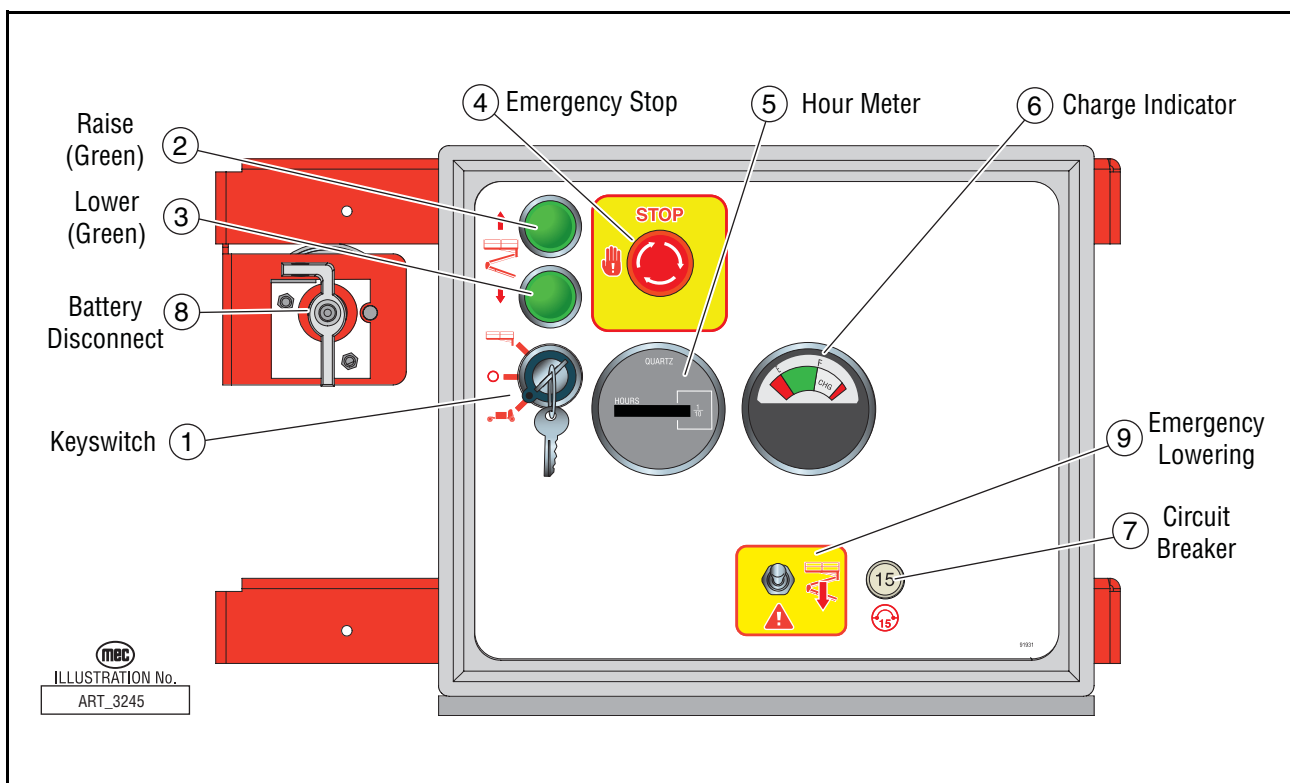
Figure 2-4: Lower Controls--Dual Fuel



CONTROL		DESCRIPTION	
1	Selector Switch (key can be removed in any position)	PLATFORM	Select to operate from the platform control panel.
		BASE	Select to operate from the base control panel.
		OFF	Select to stop operation from either control panel.
2	RAISE Button	Press and hold to elevate the platform. Release to stop elevation. Throttle activation is automatic.	
3	LOWER Button	Press and hold to lower the platform. Release to stop lowering.	
4	EMERGENCY STOP Switch	Press to stop all machine functions. Turn <i>clockwise</i> to reset.	
5	Hour Meter	Indicates total elapsed time of machine operation.	
6	Start Button	Press to start engine. Release when engine starts.	
7	Choke/Glow	Operate when starting in cold start conditions.	
8	Start Delay Light	Prevents over-cranking of engine. When lit, starter is disabled. After approximately 35 seconds the light will go out and starter will operate.	
9	Circuit Breaker	Trips when there is excessive electrical load. Push to reset.	
10	EMERGENCY LOWERING Switch	Push and hold the toggle switch Down to fully lower the platform.	
11	Battery Disconnect	Battery power supply. Turn OFF and padlock to secure machine from unauthorized use.	
12	Fuel Selector (Dual Fuel Only)	Turn switch to select Gasoline or Propane.	

LOWER CONTROLS - 3084ES ELECTRIC

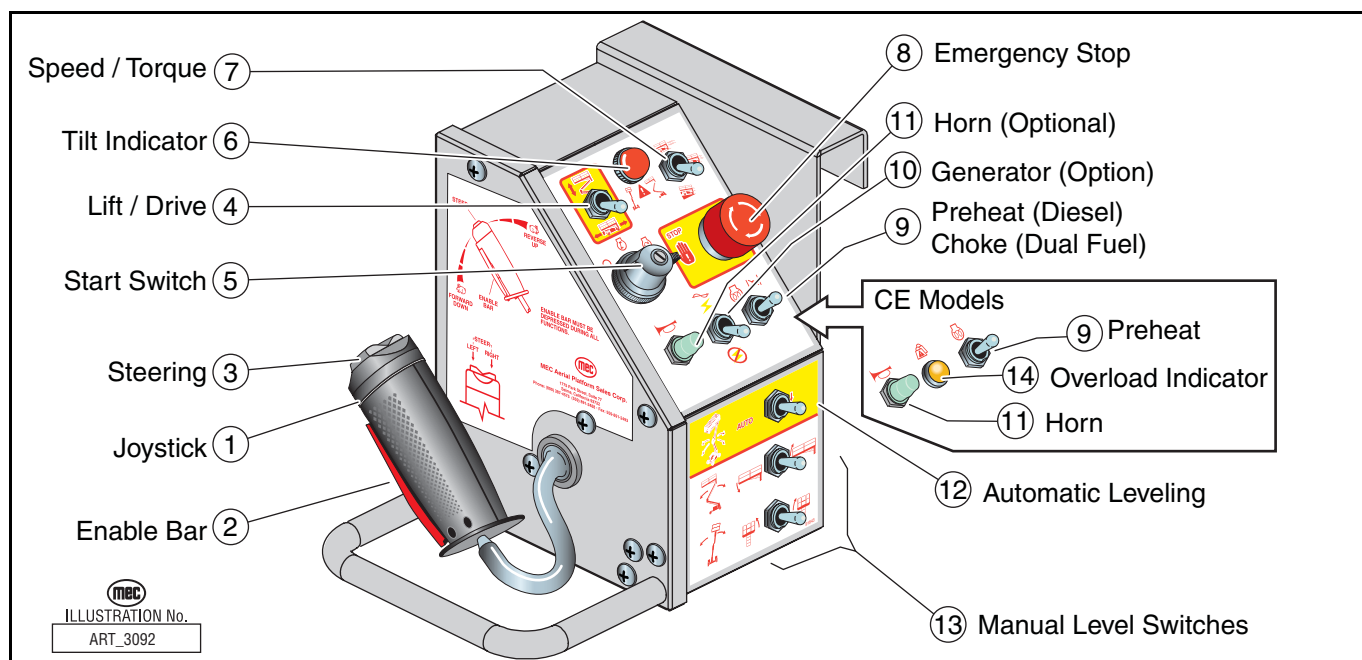
Figure 2-5: Lower Controls--Electric



CONTROL		DESCRIPTION	
1	Selector Switch (key can be removed in any position)	PLATFORM	Select to operate from the platform control panel.
		BASE	Select to operate from the base control panel.
		OFF	Select to stop operation from either control panel.
2	RAISE Button	Press and hold to elevate the platform. Release to stop elevation. Throttle activation is automatic.	
3	LOWER Button	Press and hold to lower the platform. Release to stop lowering.	
4	EMERGENCY STOP Switch	Press to stop all machine functions. Turn <i>clockwise</i> to reset.	
5	Hour Meter	Indicates total elapsed time of machine operation.	
6	Charge Indicator	Indicates state of battery charge.	
7	Circuit Breaker	Trips when there is excessive electrical load. Push to reset.	
8	Battery Disconnect	Battery power supply. Turn OFF and padlock to secure machine from unauthorized use.	
9	EMERGENCY LOWERING Switch	Push and hold the toggle switch Down to fully lower the platform.	

UPPER CONTROLS - 3084RT DUAL FUEL/DIESEL

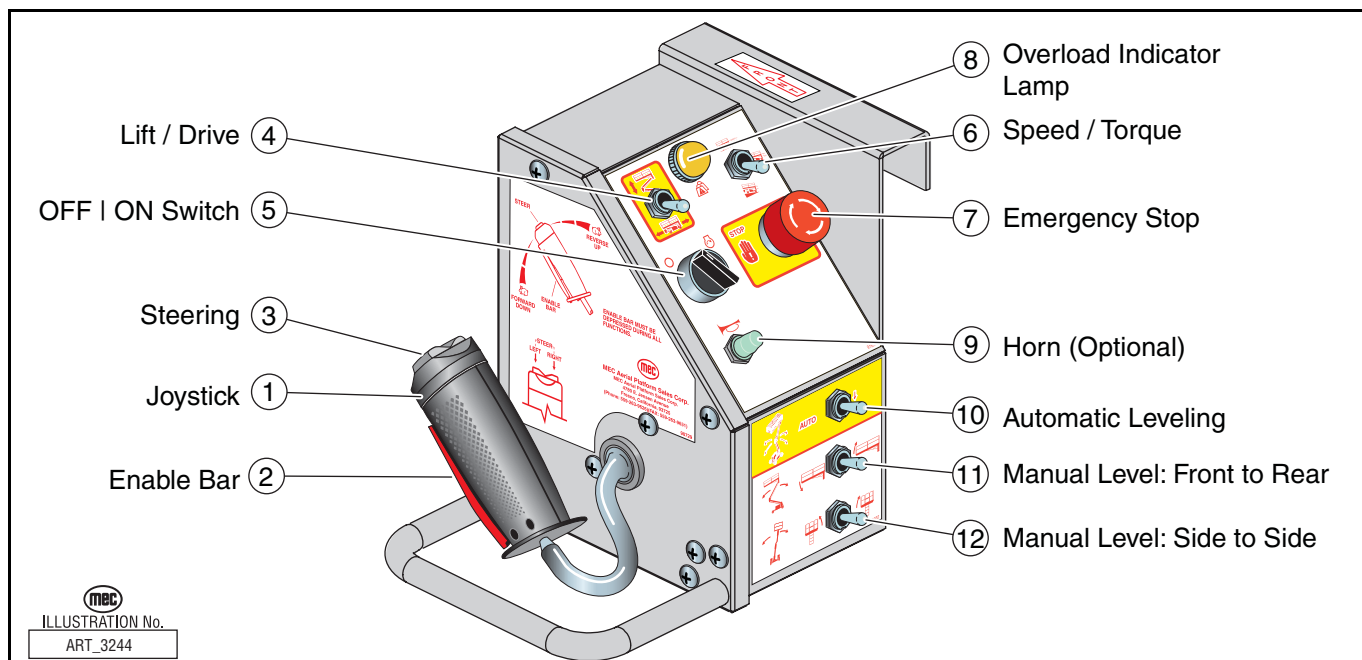
Figure 2-6: Upper Controls--Dual Fuel



CONTROL		DESCRIPTION	
1	Joystick	DRIVE	Controls Forward and Reverse travel at variable speeds.
		LIFT	Move toward operator to elevate platform. Lift speed increases proportional to the joystick movement. Will not function if TILT light is <i>ON</i> . Move away from operator to lower platform. Speed is fixed.
2	Enable Bar	Squeeze to enable DRIVE, STEER, and LIFT from joystick.	
3	Steering Switch	Using thumb, press and hold the rocker switch to steer Left or Right.	
4	Lift/Drive Selector	Select LIFT or DRIVE function for joystick.	
5	Start Switch	Turn to start engine. Switch will return to RUN position for normal operation. Turn to <i>OFF</i> to shut engine down. Anti-restart switch must be turned OFF before attempting to start.	
6	Tilt Indicator Light	Light <i>ON</i> indicates platform out of level. Platform will not elevate when TILT light is <i>ON</i> .	
7	Speed / Torque Switch	HIGH TORQUE	Slow speed. Provides maximum torque for rough terrain and climbing.
		MID RANGE	Mid speed. Provides medium torque for smooth to moderate terrain.
		HIGH SPEED	Provides high speed when platform height is below 10 feet (3 m).
8	EMERGENCY STOP Switch	PUSH to stop all machine functions. TURN CLOCKWISE to reset.	
9	Choke/Preheat	Operate when starting in cold start conditions.	
10	Generator (option)	Turn switch ON to engage optional AC generator. Drive and Lift are disabled while the generator is on.	
11	Horn (option)	Press to sound warning horn.	
11	Automatic Level Switch	Move switch DOWN and hold until automatic leveling is complete. Tilt Light will turn <i>OFF</i> when platform is level.	
12	Manual Level Switch Front to Rear	Move switch to the left to LOWER the front of the platform. Move the switch to the right to RAISE the front of the platform.	
13	Manual Level Switch Side to Side	Move the switch to the left to move the platform to the LEFT. Move the switch to the right to move the platform to the RIGHT.	
14	Overload Indicator	Platform overloaded when light is ON. Alarms will sound in Upper and Lower Control boxes.	

UPPER CONTROLS - 3084ES ELECTRIC

Figure 2-7: Upper Controls-Electric



CONTROL		DESCRIPTION	
1	Joystick	DRIVE	Controls Forward and Reverse travel at variable speeds.
		LIFT	Move toward operator to elevate platform. Lift speed increases proportional to the joystick movement. Will not function if TILT light is <i>ON</i> . Move away from operator to lower platform. Speed is fixed.
2	Enable Bar	Squeeze to enable DRIVE, STEER, and LIFT from joystick.	
3	Steering Switch	Using thumb, press and hold the rocker switch to steer Left or Right.	
4	Lift/Drive Selector	Select LIFT or DRIVE function for joystick.	
5	Off/On Switch	Turn power ON or OFF at the platform. Does not affect lower controls.	
6	Tilt Indicator Light	Light <i>ON</i> indicates platform out of level. Platform will not elevate when TILT light is <i>ON</i> .	
6	Speed / Torque Switch	HIGH TORQUE	Slow speed. Provides maximum torque for rough terrain and climbing.
		MID RANGE	Mid speed. Provides medium torque for smooth to moderate terrain.
		HIGH SPEED	Provides high speed when platform height is below 10 feet (3 m).
8	EMERGENCY STOP Switch	PUSH to stop all machine functions. TURN CLOCKWISE to reset.	
9	Choke/Preheat	Operate when starting in cold start conditions.	
10	Generator (option)	Turn switch ON to engage optional AC generator. Drive and Lift are disabled while the generator is on.	
11	Horn (option)	Press to sound warning horn.	
11	Automatic Level Switch	Move switch DOWN and hold until automatic leveling is complete. Tilt Light will turn <i>OFF</i> when platform is level.	
12	Manual Level Switch Front to Rear	Move switch to the left to LOWER the front of the platform. Move the switch to the right to RAISE the front of the platform.	
13	Manual Level Switch Side to Side	Move the switch to the left to move the platform to the LEFT. Move the switch to the right to move the platform to the RIGHT.	
14	Overload Indicator	Platform overloaded when light is ON. Alarms will sound in Upper and Lower Control boxes.	



ALARMS AND SWITCHES

MOVEMENT ALARM

The Movement Alarm is activated as soon as the DOWN operation is activated from either control station. This is the default setting. If desired, the movement alarm setting can be modified to activate the alarm during other functions (refer to *Section 4: Troubleshooting*).



THE MOVEMENT ALARM IS PROVIDED FOR YOUR PROTECTION, AND PROTECTION OF PERSONS WORKING IN THE IMMEDIATE AREA. DISABLING THIS IMPORTANT SAFETY DEVICE MAY RESULT IN SERIOUS INJURY OR DEATH.

EZFIT ANGLE SENSOR

The Angle Sensor provides platform elevation information to the GP400 control module. When the GP400 reads a certain output from the angle sensor it will:

- disable tilt operation.
- enable tilt sensor cutout operation.
- reduce drive speed.

On CE models, the Angle Sensor works in conjunction with the Pressure Transducer and a second redundant Angle Sensor located beside the first.

Figure 2-8: EZfit Angle Sensor

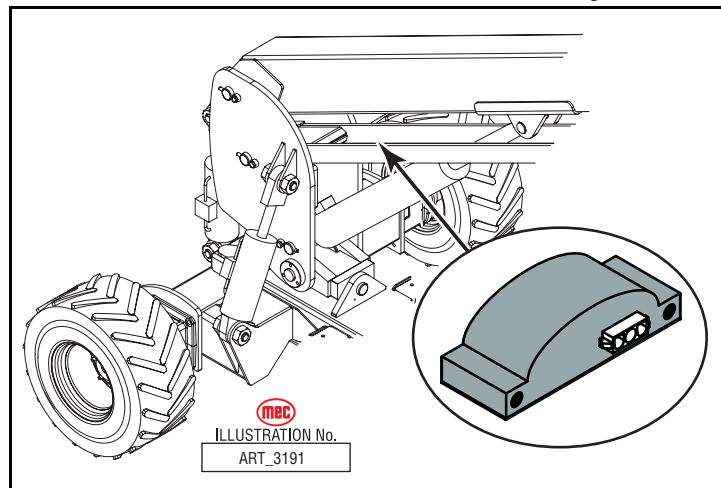


Figure 2-9: Pressure Transducer (CE Models)

PRESSURE TRANSDUCER (CE ONLY)

The Pressure Transducer provides lift cylinder pressure information to the GP400. It works in conjunction with the Angle Sensor. Excessive pressure indicates platform overload. When the GP400 reads a certain output from the angle sensor it will:

- disable lift, lower and drive operation.
- sound audible alarms.
- turn ON the OVERLOAD light on the upper control panel.

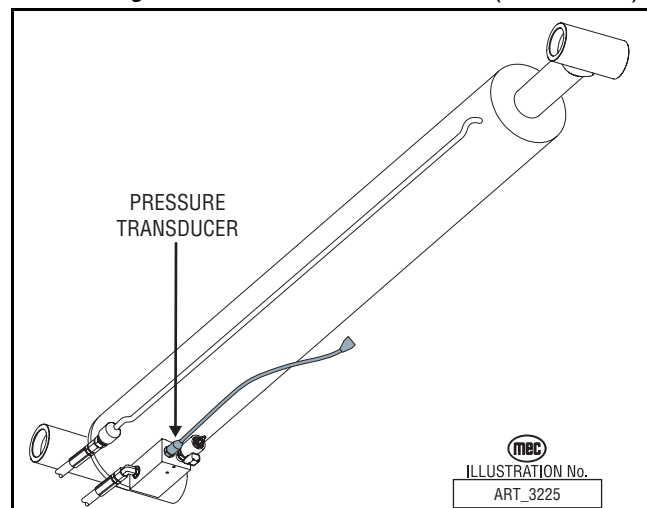
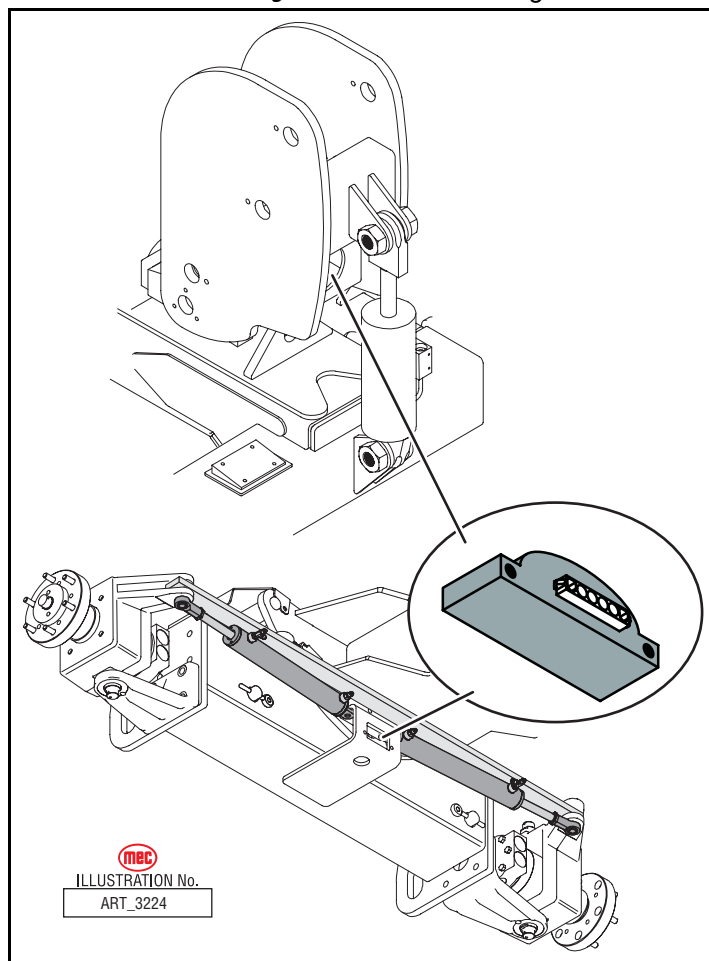


Figure 2-10: CAN Tilt Angle Transducer**CAN TILT ANGLE TRANSDUCER**

Provides level information to GP400.

- **Platform Level** located on the mast assembly, accessible through the rear of the mast. Provides platform level information to the GP400 through the CAN-bus system.
- **Axle Level** located on the front axle near the steer cylinder mount. Provides axle position information to the GP400 through the CAN-bus system.

**Figure 2-11:** Relay Locations**RELAYS - 3084RT ONLY**

Relays are located on the engine inside the power module. These relays reduce the current flow through the GP400 Control Module. Refer to the Section 5 for relay functions and interconnect.

START RELAY

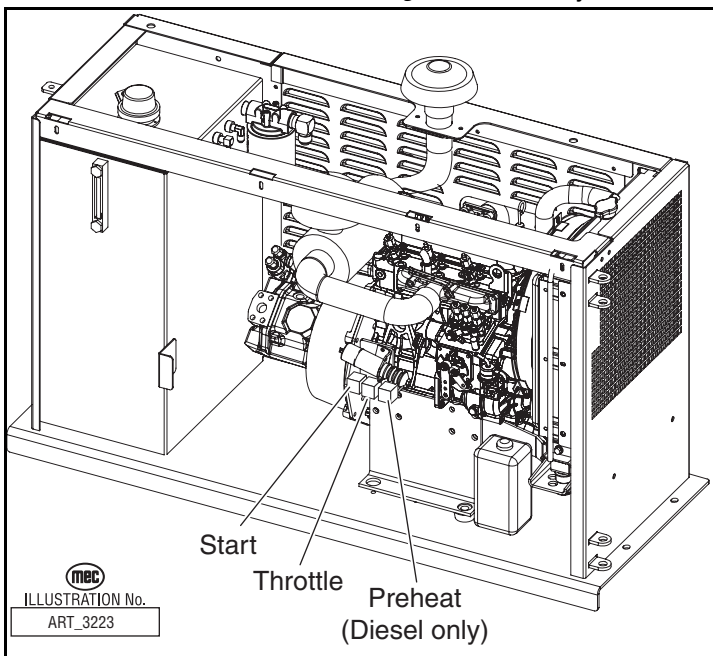
Provides power to the starter solenoid.

THROTTLE RELAY

Provides power to the electric throttle solenoid.

PREHEAT RELAY (DIESEL ONLY)

Provides power to the diesel engine glow plugs.



DEUTSCH CONNECTORS

Deutsch connectors used on MEC equipment are designed so that individual parts may be replaced without replacing the entire component. Special tools and detailed instructions are provided in Deutsch Connector field kits, MEC part no. 84091.

Figure 2-12: Deutsch Connectors

MALE PLUG CONNECTOR

- Use the flat end of the Removal Tool or a flat blade screwdriver to pry the locking wedge from the connector, taking care not to damage the Sealing Gasket.
- Inspect and replace damaged parts.
- Replace or re-crimp wires and contacts.

FEMALE RECEPTACLE CONNECTOR

- Use the notched end of the removal tool or a wire hook to pull the locking wedge from the connector
- Replace worn or damaged parts
- Replace or re-crimp wires and contacts.

LOCKING FINGERS

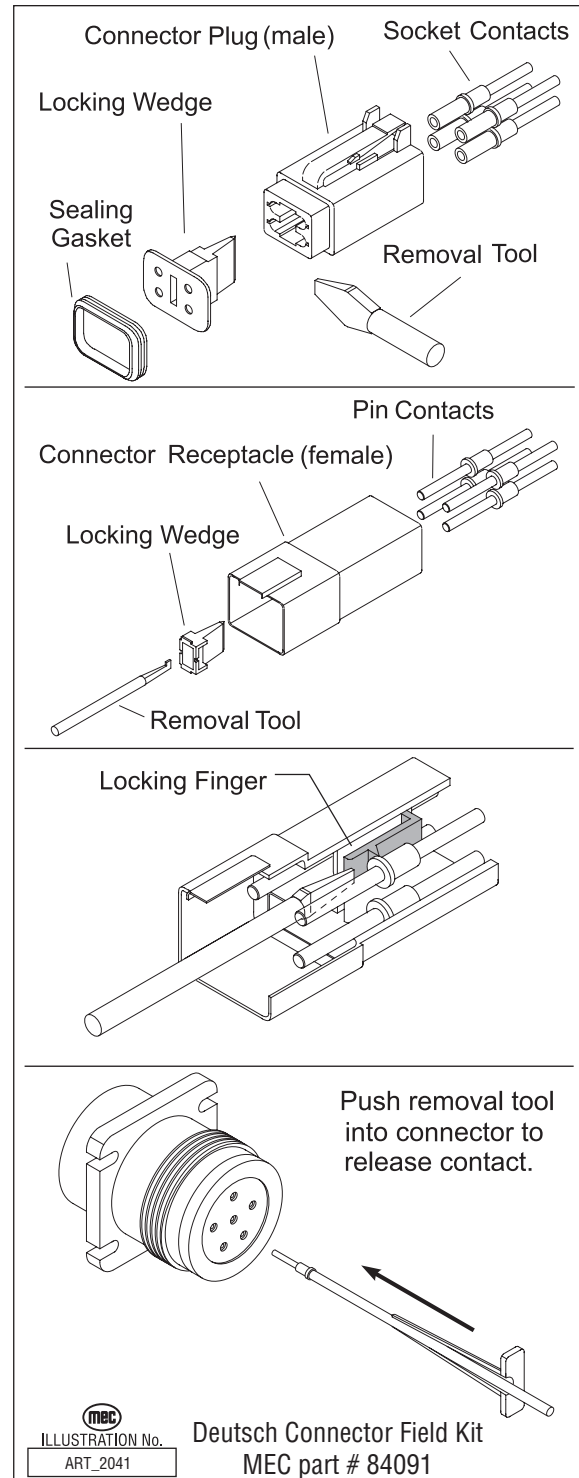
- Remove the locking wedge as outlined above.
- Using the removal tool or a flat blade screwdriver, push the Locking Fingers aside to release the contact.
- Pull the wire and contact out of the connector.

HEAVY DUTY PLUG

- Slide the removal tool along the wire to be replaced and push into the connector to release the contact.
- Pull the wire and contact out of the plug.

CRIMPING

- Strip 1/4 in. (6 mm) insulation from the wire.
- Insert the contact into the crimping tool and insert the stripped wire into the contact making sure no wires are outside the contact barrel.
- Close the handles of the crimping tool, then release the handles to remove the crimped contact.

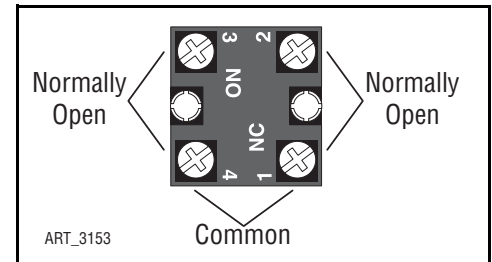


CONTINUITY CHECKS

SELECTOR SWITCH – ON-OFF

- Disconnect wires.
- Connect first probe of ohm meter to *common* terminal.
- Connect second probe to any normally open terminal.
- With switch OFF (open) there should be no reading.
- With the switch ON (closed) there should be a low reading.
- Repeat for each normally open terminal.

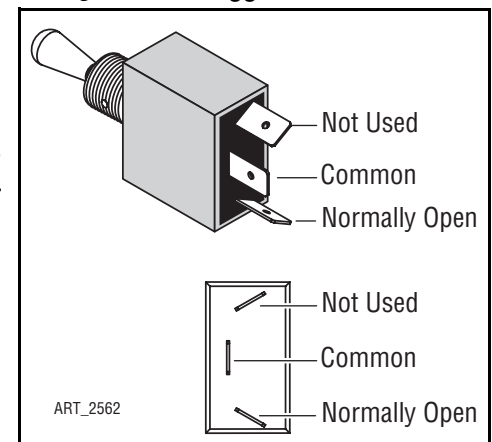
Figure 2-13: Selector Switch



TOGGLE SWITCH – ON-OFF

- Disconnect wires.
- Connect first probe of ohm meter to *common* terminal.
- Connect second probe to normally open terminal.
- With the switch turned OFF there should be no reading.
- With the switch turned ON there should be a low resistance.

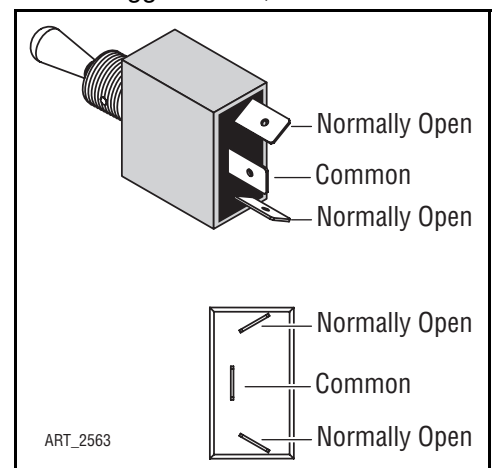
Figure 2-14: Toggle Switch, ON-OFF



TOGGLE SWITCH – 1-POLE 2-POSITION

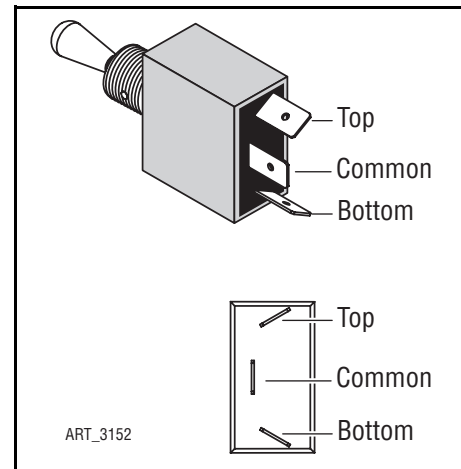
- Disconnect wires.
- Connect first probe of ohm meter to *common* terminal.
- Connect second probe to *top* normally open terminal.
- With toggle DOWN there should be no reading.
- With the toggle UP there should be a low resistance.
- Move second probe to *bottom* normally open terminal.
- With toggle UP there should be no reading.
- With the toggle DOWN there should be a low resistance.

Figure 2-15: Toggle Switch, 1-Pole 2-Position



TOGGLE SWITCH – 1-POLE 3-POSITION

- Disconnect wires.
- Connect first probe of ohm meter to *common* terminal.
- Connect second probe of ohm meter to *top* terminal.
- With the toggle UP or MIDDLE there should be a low resistance.
- Move second probe to *bottom* terminal.
- With the toggle DOWN or MIDDLE there should be a low resistance.
- Connect first probe of ohm meter to *top* terminal.
- Connect second probe of ohm meter to *bottom* terminal.
- With toggle in ANY POSITION there should be no reading.

Figure 2-16: Toggle Switch, 1-Pole 3-Position**TOGGLE MOMENTARY SWITCH**

- Disconnect wires.
- Connect first probe of ohm meter to common terminal.

Test top position

- Connect second probe to *top* normally open terminal.
- With the toggle in the neutral (open) position there should be no reading.
- With the toggle UP (closed) there should be a low resistance.
- With the toggle DOWN (closed) there should be no reading.

Test bottom position

- Move second probe to *bottom* normally open terminal.
- With the toggle in the neutral (open) position there should be no reading.
- With the toggle DOWN (closed) there should be a low resistance.
- With the toggle UP (closed) there should be no reading.
- Repeat for both rows of two-row switch.

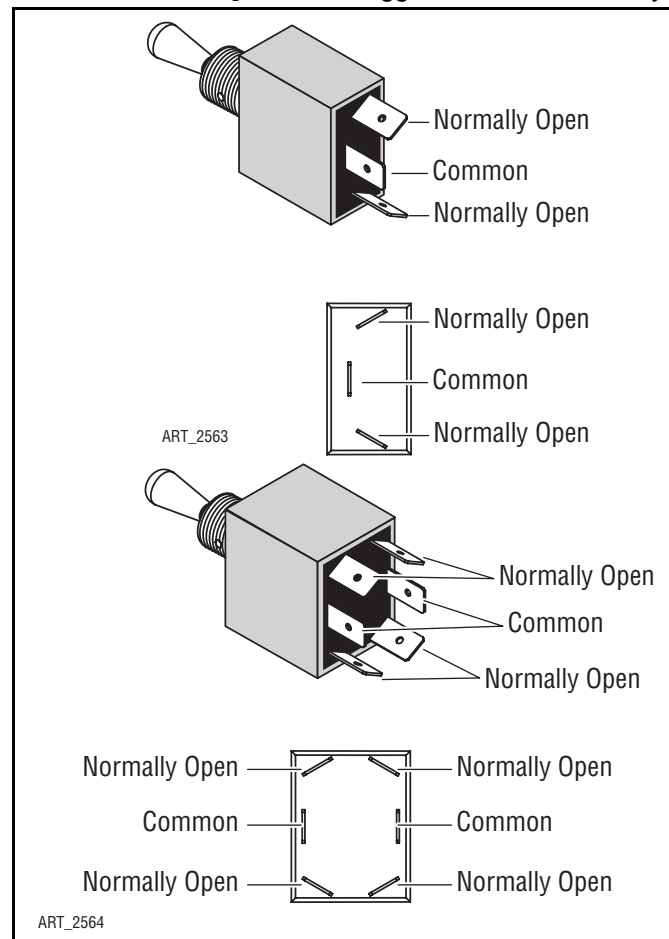
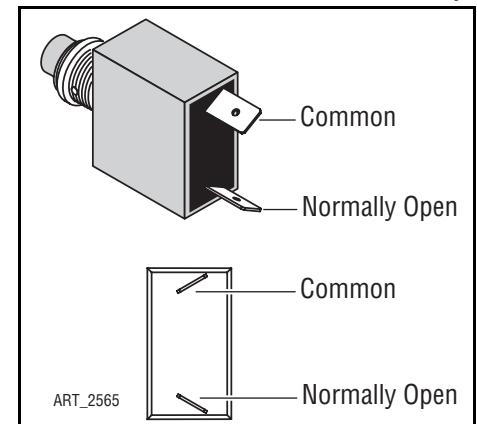
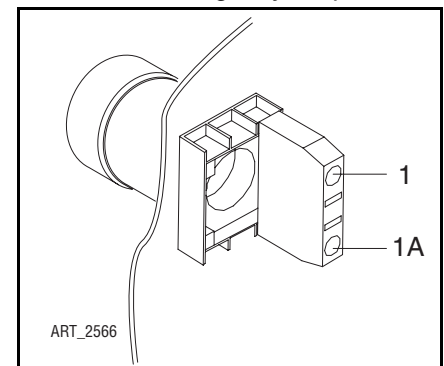
Figure 2-17: Toggle Switch, Momentary

Figure 2-18: Button Switch, Momentary**MOMENTARY BUTTON SWITCH**

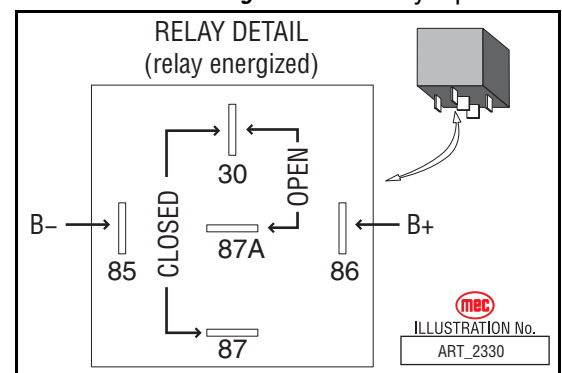
- Disconnect wires.
- Connect one probe of ohm meter each terminal.
- With the button in the neutral (open) position there should be no reading.
- With the button pushed (closed) there should be a low resistance

**Figure 2-19:** Emergency Stop Switch**EMERGENCY STOP BUTTON**

- Disconnect wires.
- Connect one probe of ohm meter each terminal.
- With the button PRESSED there should be no reading.
- With the button RESET there should be a low resistance.

**Figure 2-20:** Relay Operation**RELAY**

- With the #85 terminal grounded, apply voltage to #86 terminal connection.
- Confirm normally closed (#87A) contacts are opening. Continuity with #30 will be broken.
- Confirm normally open (#87) contacts are closing. Continuity with #30 will be made.



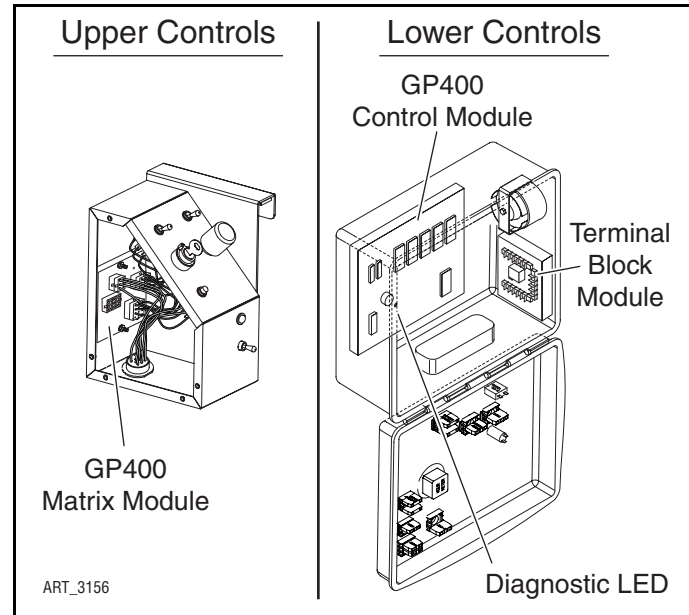
GP400 CONTROL MODULE SETUP

LOCATION

- The GP400 Control Module processor is located in the lower control box.
- The GP400 Matrix Module is located in the upper control box.

Diagnostic information *can be found in Section 4: Troubleshooting*. Wiring information can be found in *Section 5: Schematics*.

Figure 2-21: GP400 Module Locations



GENERAL DESCRIPTION

The GP400 control module uses a variety of sensors to maintain proper and safe operation of the machine. This machine may be sold into many different countries that require a variety of monitoring equipment. For example, the CE equipped machine, designed for European (and many other) countries, is equipped with a Load Sensing system that uses a Pressure Transducer to monitor oil pressure in the lift circuit and an Angle Transducer to monitor platform elevation. ANSI models use an Angle Transducer, and only monitor platform elevation.

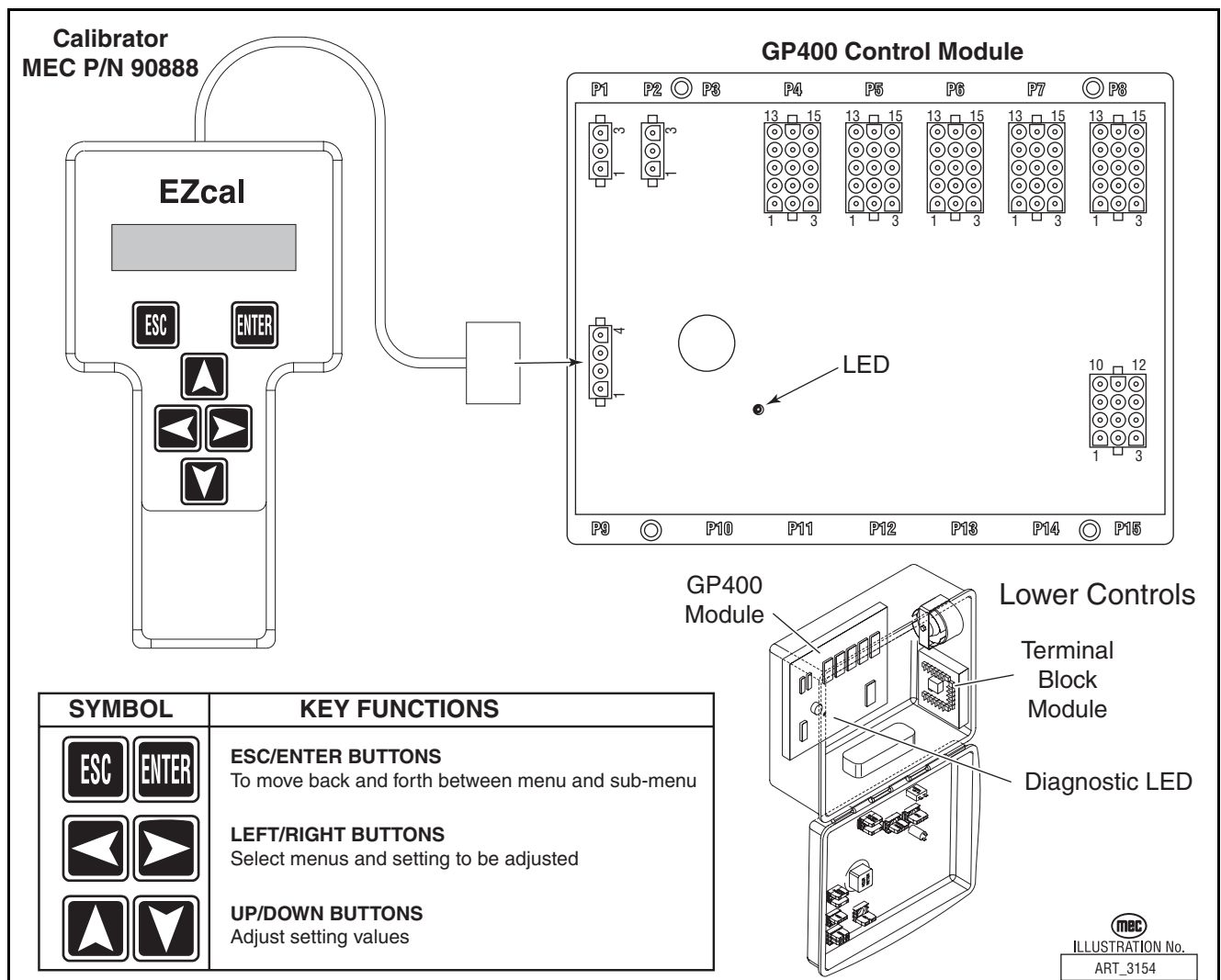
In the event the GP400 requires replacement, a calibration process must be performed before the machine can be operated. The GP400 will operate initially in an “assembly mode” to provide basic machine operation. However, it will divert to a failure mode if not properly calibrated within a few start-up cycles.



WARNING

ONLY TRAINED AND AUTHORIZED PERSONNEL SHALL BE PERMITTED TO CALIBRATE THE PLATFORM OVERLOAD SENSING SYSTEM. READ ALL INSTRUCTIONS CLOSELY BEFORE ATTEMPTING EACH STEP OF THE CALIBRATION PROCEDURE.

Figure 2-22: EZ-Cal Connection



GP400 CALIBRATION

The EZ-Cal hand held device (MEC part # 90888) is required to access the GP400 for troubleshooting and calibration.

The GP400 processor relies on angle and pressure sensors to monitor machine position at all times. These sensors send varied voltages to the GP400 that relate directly to their respective position. The calibration process is the means by which the GP400 equates these voltages to actual machine position.

For example, the Angle Transducer, used to monitor platform elevation, varies its output between 1 and 4 volts through a 140 degree rotation. During calibration the GP400 may learn that 1.8 volts (fictional number used for explanation) represents the fully stowed position and 3.6 volts represents the fully elevated position and therefore voltages between those figures relate to various heights in between.

All machines are calibrated at the factory and should not require calibration unless the GP400 is replaced or if the GP400 displays a code that alerts to the need to recalibrate.

Tilt Sensor calibration is required on all machines regardless of destination or certification (ANSI or CE) and must be performed first.

ANSI calibration follows Tilt calibration for machines not equipped with an overload protection system and consists of only height calibration.

CE calibration is required of all machines outfitted with an Overload Protection System as required for CE certification. All steps in the CE calibration must be performed in the proper sequence before the GP400 will recognize complete and proper calibration. Begin with the ANSI/CE Tilt Sensor Calibration, then proceed to the CE Calibrations section.

If the calibration procedure is performed incorrectly or there is a failure in one of the monitored circuits during the calibration, the GP400 will not allow the operator to continue with the calibration process. An error message will display on the EZ-cal indicating the reason for the interruption.

Additional details of these error messages can be found at the end of the calibration instructions.

This and other procedures can only be performed using an EZ-Cal scan tool. If you do not have an EZ-Cal, please contact MEC to obtain one.

ANSI/CE Tilt Sensor Calibration

Correctly performing the following procedure will ensure that your machine will continue to auto-level correctly and operate safely.

The automated leveling system relies on the information provided by three sensors:

- The platform tilt sensor (Platform CAN Tilt Angle Transducer) is used to level the platform to within 0.2 degrees of absolute level when auto-leveling. It is also used by the control system to monitor platform level status for enhanced unit stability. The platform tilt sensor is located inside the Lower Boom Mount.
- The axle sensor (Axle CAN Tilt angle transducer) which is mounted to the front oscillating axle provides information as to the position of the axle relative to the chassis. This information is used to allow or disallow drive when the platform is in the elevated position. If the front axle is more than 3 degrees out of parallel with the chassis, drive will be turned off to prevent the loss of stability.
- The third level sensor is located inside the GP400 and monitors the chassis angle. All three sensors will calibrate at one time during the calibration procedure.

1. Park machine on a flat level surface.
2. Be sure that all tires are properly inflated to the same pressure and that the tires are all the same size.
3. Ensure that the platform is perfectly level side-to-side and front-to-rear by using the two Manual Level Switches located in the upper control box and a spirit level. Use a framers level if necessary.
4. Open the lower control box and plug the EZ-cal into plug J-9 (4-pin connector) on the GP400. The display should light up and read "HELP - PRESS ENTER.
 - a. Press the right arrow to access "ACCESS LEVEL 3", press ENTER.
 - The display reads CODE 0000 with the cursor flashing.
 - b. Press the Up and Right arrows to enter code 2222, Press Enter
 - Display reads "ACCESS LEVEL 2"
 - On later models, the display may continue to read "ACCESS LEVEL 3". Repeat step b. and enter code 1775.
 - c. Right arrow to SETUPS, Press Enter
 - Display reads 'CHANGE DEFAULTS'
 - d. Right arrow to TILT SETUPS, Press Enter
 - Display reads "CALIBRATE LEVEL".
 - e. Press Enter
 - Display reads "CALIBRATE LEVEL YES: ENTER NO: ESC"
 - f. Press Enter
 - Display reads "CALIBRATE LEVEL YES: ENTER NO: ESC" plus has actual tilt percentages.
 - g. Press Enter again.
 - The percentage numbers should be 0.0 - 0.0 (or very close).
 - h. Level calibration is complete. Unplug the EZ-Cal or press ESC, ESC, ESC.

ANSI Height Calibration

Height calibration must be performed if the GP400 is replaced. For this procedure it is not necessary to place any load in the platform.

1. Drive machine to level ground, in area where it can reach full elevation.
2. Turn selector switch to Base controls.
3. Plug **EZ-Cal** into connector P9 on GP400 Control Module. **EZ-Cal** display reads HELP: PRESS ENTER
4. Press right arrow to ACCESS LEVEL 3, Press Enter.
 - Display reads CODE 0000
5. Press Up and Right Arrow to enter code 2222. Press Enter.
 - Display reads ACCESS LEVEL 2.
 - On later models, the display may continue to read "ACCESS LEVEL 3". Repeat step b. and enter code 1775.
6. Press Right Arrow to SETUPS, Press Enter.
 - Display reads CHANGE DEFAULTS
7. Press Right Arrow to HEIGHT SETUPS, Press Enter.
 - Display reads CALIBRATE HEIGHT
8. Press Enter.
 - Display reads PLATFORM DOWN? Verify that platform is fully lowered.

9. Press Enter.
 - Display reads PLEASE LIFT.
10. Hold lower controls switch in the up position until machine is fully elevated, then release switch.
 - Display reads PLEASE LOWER.
11. Hold switch in down position until platform is in the fully lowered position. Release switch.
 - Display reads FINISHED.

CE CALIBRATIONS

CE Platform Load Calibration

Perform the tilt sensor calibration outlined at the beginning of this section ("ANSI/CE Tilt Sensor Calibration" on page 2-20).

Platform Load calibration must be performed any time:

- significant repairs are made to the elevating assembly
- the lift cylinder is removed and serviced or replaced
- any Platform Overload System component is replaced

During the calibration procedure the platform is fully raised and lowered three times:

1. "DYNAMIC" calibration – fully loaded platform raised & lowered in one continuous movement. DYNAMIC measurements are taken.
2. "LOADED" calibration – fully loaded platform raised & lowered with stops to take measurements. STATIC measurements are taken.
3. "EMPTY" calibration – unloaded platform raised & lowered with stops to take measurements. STATIC measurements are taken.

The following procedure must be followed **COMPLETELY** to calibrate the **GP400 Overload System**. If any problem is detected, the procedure stops and an Error Message will display on the EZ-Cal. Explanations of each message and suggested corrections can be found in the section of this manual following the calibration procedure.

NOTE: If the calibration procedure is interrupted, completed phases do not need to be repeated. A "REDO" prompt will appear – answer "NO" if there is no reason to repeat the phase, or "YES" if the phase must be repeated (for example because the wrong platform load was used on the previous phase).

1. Drive machine to a flat, level surface where it can reach full elevation. Choose a place where the rated load can be placed in the platform and later removed **without** moving the machine.
2. Place rated load in platform (see platform labels or serial plate).
3. Turn selector switch to Base controls.
4. Plug **EZ-Cal** into connector P9 on GP400 Control Module. **EZ-Cal** display reads HELP: PRESS ENTER
5. Press right arrow to ACCESS LEVEL 3, Press Enter.
 - Display reads CODE 0000
6. Press up and right arrow to enter code 2222, Press Enter.
 - Display reads ACCESS LEVEL 2.
 - On later models, the display may continue to read "ACCESS LEVEL 3". Repeat step b. and enter code 1775.

7. Press Right Arrow to SETUPS, Press Enter.
 - Display reads CHANGE DEFAULTS
8. Press Right Arrow to LOAD SETUPS. Press Enter.
 - Display reads CALIBRATE LOAD
9. Press Enter.
 - Display reads PLATFORM DOWN? Verify that platform is fully lowered.
10. Press Enter.
 - Display reads PLATFORM LOADED? Verify that rated load is in platform.
11. Press Enter.
 - Display reads PLEASE LIFT.
12. Hold lower controls switch in the up position until machine is fully elevated, then release switch.
 - Display reads PLEASE LOWER.
13. Hold switch in down position until platform is in the fully lowered position. Release switch.
 - Display reads PLATFORM LOADED?
14. Ensure that the rated load is distributed evenly in the platform, then press Enter.
 - Display reads PLEASE LIFT.
15. Hold lower controls switch in the up position until machine is fully elevated, then release switch.
 - Display reads TOTAL DATA #XX, then PLEASE LOWER.

NOTE: The platform will rise incrementally during this phase on the calibration. Do not release the switch until fully elevated.

16. Hold switch in down position until platform is in the fully lowered position.

NOTE: The platform will lower incrementally during this phase on the calibration. Do not release the switch until fully lowered.

17. Release switch.
 - Display reads TOTAL DATA #XX, then PLATFORM EMPTY?
18. Remove the load from the platform.

NOTE: If you must switch to platform controls to move the machine, steps 1.] through 7.] must be repeated. Steps 12.] through 20.] will generate the REDO prompt. Answer NO. If machine was not moved, proceed to step 22.].

19. Press Enter.
 - Display reads PLEASE LIFT.
20. Hold lower controls switch in the up position until machine is fully elevated, then release switch.
 - Display reads TOTAL DATA #XX, then PLEASE LOWER.
21. Hold switch in down position until platform is in the fully lowered position.
 - Display reads TOTAL DATA #XX, then BUILDING TABLES, then CALDATE mm/dd/yy.
22. Enter current date using Up, Down and Right Arrows.
 - Display reads FINISHED.
23. Disconnect **EZ-Cal**.

The Platform Overload Sensing System is now calibrated.



CE Height Calibration

For this procedure it is **not** necessary to place any load in the platform.

1. Drive machine to a flat, level surface where it can reach full elevation.
2. Turn selector switch to Base controls.
3. Plug **EZ-Cal** into connector P9 on GP400 Control Module.
 - Display reads HELP: PRESS ENTER
4. Press right arrow to ACCESS LEVEL 3. Press Enter.
 - Display reads CODE 0000
5. Press Up and Right Arrow to enter code 2222. Press Enter.
 - Display reads ACCESS LEVEL 2.
 - On later models, the display may continue to read "ACCESS LEVEL 3". Repeat step b. and enter code 1775.
6. Press Right Arrow to SETUPS. Press Enter.
 - Display reads CHANGE DEFAULTS
7. Press Right Arrow to HEIGHT SETUPS. Press Enter.
 - Display reads CALIBRATE HEIGHT
8. Press Enter.
 - Display reads PLATFORM DOWN?
9. Verify that platform is fully lowered. Press Enter.
 - Display reads PLEASE LIFT.
10. Hold lower controls switch in the up position until machine is fully elevated, then release switch.
 - Display reads PLEASE LOWER.
11. Hold switch in down position until platform is in the fully lowered position. Release switch.
 - Display reads FINISHED.

CALIBRATION PROBLEMS

FAILURE MESSAGES

Various problems can be detected by the EZ-Cal that prevent successful calibration. These problems are reported with a flashing message including an “F” code. The following descriptions are helpful in solving the problem. References in parentheses refer to electrical schematic points.

F01:CHECK HWFS

This message is given if the startup tests have not completed.

Check HELP message for more information.

F02:NOT GROUND MODE

This message is given if the machine is not in ground mode (P7-2 must be high). Calibration can only be carried out in ground mode.

F03:NOT STOPPED

This message is given if any function switch is closed. Check DIAGNOSTICS / SWITCHES to see which function switch is closed.

F04:TILTED

This message is given if the machine is tilted. Calibration must be carried out with the machine level. If the machine is level, perform the Tilt Calibration procedure above.

F05:BAD HEIGHT

This message is given if the height sensor output (P8-2 and P8-6) is out of range at the start of calibration. The height sensor output must be between 1.0V and 4.0V. Check DIAGNOSTICS / SENSORS to see the output. A reading of 0V or 5V is probably due to a wiring problem.

F06:CHECK ELEV

This message is given if the elevation switch (P7-5) is open at the start of calibration, when the operator has confirmed the “PLATFORM DOWN?” question.

If the platform is down, check the elevation switch wiring.

F08:CHECK ELEV

This message is given if the elevation switch (P7-5) is closed at the end of the DYNAMIC lift, when the platform should be fully raised.

This message would occur if the UP switch was accidentally opened near the start of the DYNAMIC lift.

If the platform is fully raised, check the elevation switch wiring.

F09:BAD HEIGHT

This message is given if the height sensor output (P8-2 and P8-6) is out of range at the start of the DYNAMIC lift. The height sensor output must be between 1.0V and 4.0V. Check DIAGNOSTICS / SENSORS to see the output. This is usually due to a wiring problem.

F10:BAD HEIGHT

This message is given if the height sensor output (P8-2 and P8-6) is out of range at the end of the DYNAMIC lift. The height sensor output must be between 1.0V and 4.0V. Check DIAGNOSTICS / SENSORS to see the output. A reading of 0V or 5V is probably due to a wiring problem.

F11:NOT UP

This message occurs at the start of the DYNAMIC lift if the operator selects a function other than UP.



F12:TOO MANY

This message occurs if the DYNAMIC lift takes too long.

This message could occur if the UP switch was not released at the end of the dynamic lift.

F13:LOW HEIGHT RANGE

This message occurs at the end of the DYNAMIC lift if the height sensor output did not change sufficiently to give a reasonably accurate platform height estimate. DIAGNOSTICS / ANALOGS can be used to check the height sensor output (P8-2 and P8-6) when the platform is fully lowered and fully raised; a difference of at least 1V is to be expected.

This message could occur if the UP switch was accidentally opened too early (when the platform is not fully raised).

F14:BAD HEIGHT

This message occurs if the height sensor output (P8-2 and P8-6) is out of range during the DYNAMIC lift. The height sensor output must be between 1.0V and 4.0V. Check DIAGNOSTICS / SENSORS to see the output. A reading of 0V or 5V is probably due to a wiring problem.

F15:CHECK ELEV

This message is given if the elevation switch (P7-5) is open when the platform has been fully lowered after the DYNAMIC lift.

This message would occur if the DOWN switch was accidentally opened before the platform was fully lowered.

If the platform is fully lowered, check the elevation switch.

F16:LOW ELEV.OPEN

This message is given if the elevation switch (P7-5) opened during lift at too low of a height (below 5%). Check CALIBRATIONS / HEIGHT CALS. The "ElevUp" value shows the recorded height where the switch opened.

F17:HIGH ELEV.OPEN

This message is given if the elevation switch (P7-5) opened during lift at a too high height (above 25%).

Check CALIBRATIONS / HEIGHT CALS; the "ElevUp" value shows the recorded height where the switch opened.

F18:LOW ELEV.CLOSE

This message is given if the elevation switch (P7-5) closed during lower at a too low height (below 5%).

Check CALIBRATIONS / HEIGHT CALS; the "ElevDown" value shows the recorded height where the switch opened.

F19:HIGH ELEV.CLOSE

This message is given if the elevation switch (P7-5) closed during lower at a too high height (above 25%).

Check CALIBRATIONS / HEIGHT CALS; the "ElevUp" value shows the recorded height where the switch opened.

F20:HEIGHT<>0%**F21:HEIGHT<>0%**

This message occurs if the platform height is not 0% after the platform has been fully lowered at the end of a calibration step. The platform must return to the same height each time it is fully lowered.

Check DIAGNOSTICS / SYSTEM to check the height.

F22:HEIGHT<>100%**F23:HEIGHT<>100%**

This message occurs if the platform height is not 100% after the platform has been fully raised during a calibration step. The platform must return to the same height each time it is fully raised. Check DIAGNOSTICS / SYSTEM to check the height.

F24:TOO MANY

This message occurs if too many static measurements are taken during a calibration step. In the rare event that this occurs, please call MEC for assistance.

F25:CHECK ELEV**F26:CHECK ELEV**

This message indicates a problem with the elevation switch (P7-5) during the STATIC phases.

The switch is either staying closed to a higher height, or staying open to a lower height, than that recorded during the DYNAMIC phase.

F27:BAD HEIGHT

This message indicates a problem with the height sensor output (P8-2 and P8-6) during the STATIC calibration phases.

The height sensor output must be between 1.0V and 4.0V at all times.

Check DIAGNOSTICS / SENSORS to see the output. A reading of 0V or 5V is probably due to a wiring problem.

F30:BAD HEIGHTS

This message indicates that the recorded heights are not increasing during STATIC lift, or are not decreasing during STATIC lower.

This problem may be caused by repeatedly opening and closing the UP or DOWN switch during the STATIC phases.

F31:REJECT CURVE

The DYNAMIC pressure curve is unacceptable.

An initial pressure peak when the platform lifted cannot be found between 0% and 15% height.

Check for proper weight in the platform and check pressure sensor and lift cylinder hydraulics.

F32:REJECT CURVE

The DYNAMIC pressure curve is unacceptable.

There should be a lowest pressure about halfway through the lift (i.e.: near 50% height); the lowest pressure measured is at too low a height.

Check for proper weight in the platform and check pressure sensor and lift cylinder hydraulics.

F33:REJECT CURVE

The DYNAMIC pressure curve is unacceptable.

There should be a lowest pressure about halfway through the lift (i.e.: near 50% height); the lowest pressure measured is at too high a height.

Check for proper weight in the platform and check pressure sensor and lift cylinder hydraulics.

F34:REJECT CURVE

The DYNAMIC pressure curve is unacceptable.



There is not enough difference between the initial pressure peak and the minimum pressure.

Check for proper weight in the platform and check pressure sensor and lift cylinder hydraulics.

F40:REJECT DELTA

This message indicates that there is not enough difference between the loaded & empty pressure.

This message could occur if the platform were not properly loaded during the STATIC LOADED phase, or if the platform were not properly empty during the STATIC EMPTY phase.

This message could also occur if the wrong pressure sensor was fitted (e.g.: a 5000psi sensor when a 3000psi one is needed).

Check CALIBRATIONS / HEIGHT CALS; the "Height" indicates the first height at which there was insufficient difference and the "Up" and "Down" values show the loaded pressure (first) and the difference between loaded and empty pressure (second).

F42:LOW PRESSURE

This message indicates that the pressure is too low (0.5V or less) when the elevation switch opens during the DYNAMIC lift.

This message would occur if the pressure sensor was disconnected, or if there were some other wiring error.

Check DIAGNOSTICS / SENSORS to check the pressure.

F43:HIGH PRESSURE

This message indicates that the pressure is too high (4.5V or more) when the elevation switch opens during the DYNAMIC lift.

This message would occur if the wrong pressure sensor was fitted, or if there were some other wiring error.

Check DIAGNOSTICS / SENSORS to check the pressure.

F44:LOW PRESSURE

This message indicates that the pressure is too low (0.5V or less) at a STATIC measurement point.

This message would occur if the pressure sensor was disconnected, or if there were some other wiring error.

Check DIAGNOSTICS / SENSORS to check the pressure.

F45:HIGH PRESSURE

This message indicates that the pressure is too high (4.5V or more) at a STATIC measurement point.

This message would occur if the wrong pressure sensor was fitted, or if there were some other wiring error.

Check DIAGNOSTICS / SENSORS to check the pressure.

F46:CHECK ELEV

This message indicates that the elevation switch opened more than once during the DYNAMIC lift.

F47:CHECK ELEV

This message indicates that the elevation switch closed more than once during the DYNAMIC lower.

F48:BAD PRESSURE

This message is given if the pressure sensor output (P8-2 and P8-6) is out of range at the start of calibration.

The height sensor output must be between 0.5V and 4.5V.

Check DIAGNOSTICS / SENSORS to see the output. A reading of 0V or 5V is probably due to a wiring problem.

F52:NOT CALIBRATED

This message is a catch-all code which indicates an improper calibration sequence or that one of the phases of calibration was not completed. The skipped phase must be completed or the calibration sequence must be passed through in proper sequence before this message will clear. Re-start the calibration sequence and proceed through each sequence in the specified order.

A "Redo" prompt will appear before each sequence. Answer "NO" if there is no reason to repeat or "YES" if the phase must be completed.

INFORMATION MESSAGES

During calibration the following messages will be displayed. They are informational prompts only and do not indicate a failure.

BUILDING TABLES

This message indicates that the STATIC measurements are being used to build calibration data - the process should take no more than 5s.

CALDATE:

This message is prompting for the date to be entered; it is stored to identify when the machine was calibrated.

The last calibrate date can be viewed in DIAGNOSTICS / LOG.

Press LEFT & RIGHT to select the flashing digits.

Press UP & DOWN to change the flashing digits.

Press ENTER when the entry is complete.

IMPORTANT: The date 00/00/00 is not allowed!

FINISHED

This message confirms that calibration is complete and successful.

GO DOWN MORE!

This message occurs if the DOWN switch is released during either STATIC lowering phase, when more measurements are needed (before the platform is fully lowered).

GO UP MORE!

This message occurs if the UP switch is released during either STATIC lifting phase, when more measurements are needed (before the platform is fully raised).

LIFT EMPTY

This message is displayed during the STATIC empty phase while the platform is being raised to the next measurement height.

LIFT LOADED

This message is displayed during the STATIC loaded phase while the platform is being raised to the next measurement height.

LIFTING

This message is displayed during the DYNAMIC phase while the platform is being raised.

LOWER EMPTY

This message is displayed during the STATIC empty phase while the platform is being lowered to the next measurement height.

LOWER LOADED

This message is displayed during the STATIC loaded phase while the platform is being lowered to the next measurement height.

LOWERING

This message is displayed during the DYNAMIC phase while the platform is being lowered.

MEASURING #

This message is displayed when the platform is stopped during either STATIC phase, when the GP400 takes a measurement.

There will be a short delay while the machine is allowed to stabilize after movement is stopped.

MUST GO DOWN!

This message occurs if the wrong switch is operated when the GP400 is waiting for the platform to be lowered.

MUST GO UP!

This message occurs if the wrong switch is operated when the GP400 is waiting for the platform to be raised.

PLATFORM DOWN?

This message is prompting for confirmation that the platform is fully lowered. If necessary the DOWN switch can be activated to lower the platform.

Press ENTER to confirm when the platform is fully lowered.

PLATFORM EMPTY?

This message is prompting for confirmation that the platform is completely empty.

Press ENTER to confirm when the platform is empty.

PLATFORM LOADED?

This message is prompting for confirmation that the platform is loaded to rated load: 1500 lbs (US/CSA), 680 Kgs (CE/AU). (100% of the load rating listed on the serial plate).

Press ENTER to confirm when the platform is loaded.

PLEASE LIFT ...

This message is prompting for the platform to be raised.

The UP switch should be operated.

PLEASE LOWER ...

This message is prompting for the platform to be lowered.

The DOWN switch should be operated.

PLEASE WAIT

This message indicates that the is busy; the delay will be short (no more than 5s).

REDO DYNAMIC:

This message is displayed if the DYNAMIC phase of load calibration has previously been completed.

Press ENTER when "NO" is displayed if there is no need to redo the DYNAMIC phase.

Press UP or DOWN to display "YES" then press ENTER if it is necessary to redo the DYNAMIC phase.

If the previous DYNAMIC calibration was in error, or if the height or pressure sensor is replaced, it will be necessary to redo the DYNAMIC phase.

REDO EMPTY:

This message is displayed if the EMPTY phase of load calibration has previously been completed.

Press ENTER when "NO" is displayed if there is no need to redo the EMPTY phase.

Press UP or DOWN to display "YES" then press ENTER if it is necessary to redo the EMPTY phase.

If the previous EMPTY calibration was in error, or if the pressure sensor is replaced, it will be necessary to redo the EMPTY phase.

REDO LOADED:

This message is displayed if the LOADED phase of load calibration has previously been completed.



Press ENTER when “NO” is displayed if there is no need to redo the LOADED phase.

Press UP or DOWN to display “YES” then press ENTER if it is necessary to redo the LOADED phase.

If the previous LOADED calibration was in error, or if the pressure sensor is replaced, it will be necessary to redo the LOADED phase.

TOTAL DATA:

This message is displayed at the end of each phase, to confirm the number of measurements recorded by the GP400. No operator input is required during this process.



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MECHANICAL COMPONENTS

This section describes the major components of the machine and the steps required to service them.

BASE



When steam cleaning the base/undercarriage, cover electrical components to prevent water penetration.

Steam clean the base as necessary, and inspect all welds and brackets. Check for cylinder pins that have turned in their mounting, which may indicate sheared retaining pins.

TIRES AND WHEELS

Inspect for cuts, chunking, side-wall damage, or abnormal wear. Any tire faults **MUST BE CORRECTED** before further machine operation. Refer to Parts sections for replacement tires.



FAILURE TO USE APPROVED PARTS MAY CAUSE DEATH OR SERIOUS PERSONAL INJURY.

REPLACE TIRES WITH THE CORRECT TIRES TO MAINTAIN THE RATING OF THE EQUIPMENT.

IF FOAM FILLED TIRES WERE FITTED AS ORIGINAL EQUIPMENT THEY MUST BE REPLACED WITH EQUIVALENT SPECIFICATION TIRES AND FOAM-FILL WEIGHT.

CHANGING TIRES

Refer to “*Lift and Support The Machine*” in the *Introduction* section for instructions and safety precautions.



Always block the wheels before lifting the machine.

1. Chock tires on the end of machine opposite the tire to be changed.
2. Break loose but **do not remove** lug nuts before raising the machine.
3. Lift the end of machine requiring a tire change and support with jackstands of adequate capacity.
4. Remove lug nuts and pull the wheel off.
5. Install the replacement wheel.
6. Install lug nuts and tighten.
7. Lower the machine.
8. Tighten lug nuts to proper torque (Refer to machine specifications).
9. Remove the chocks.

DRIVE MOTORS

Refer to *Section 1* for repair information.

There are two (2) hydraulic drive motors on the front axle and two (2) hydraulic drive motors on the rear drive axle. Repair or replace as necessary when damage or leaks occur.



- Clean all fittings before disconnecting hoses.
- Tag hoses for proper reassembly.
- Plug all openings immediately to prevent contamination.

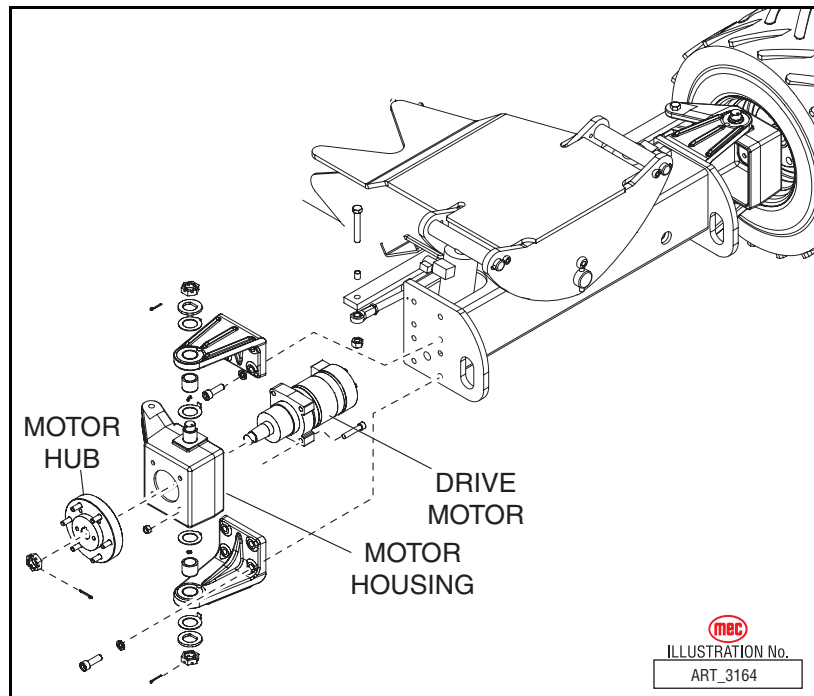
FRONT DRIVE MOTORS

Refer to *“Lift and Support The Machine”* in the *Introduction* section for instructions and safety precautions.

Figure 3-1: Front Drive Motor

Remove

1. Raise and support the front end of machine.
2. Remove the wheel and tire assembly to access drive motor.
3. Remove the hub from the drive motor shaft using a suitable hub pulling tool. DO NOT use a hammer on the shaft or hub as this will damage the motor.
4. Disconnect the cylinder end and tie-rod from the motor housing.
5. Turn the motor housing to gain access to the motor and hose assemblies.
6. Disconnect hose assemblies from drive motor. Immediately cap and plug all openings to prevent contamination.
7. Remove the cap screws and remove the drive motor.



Replace

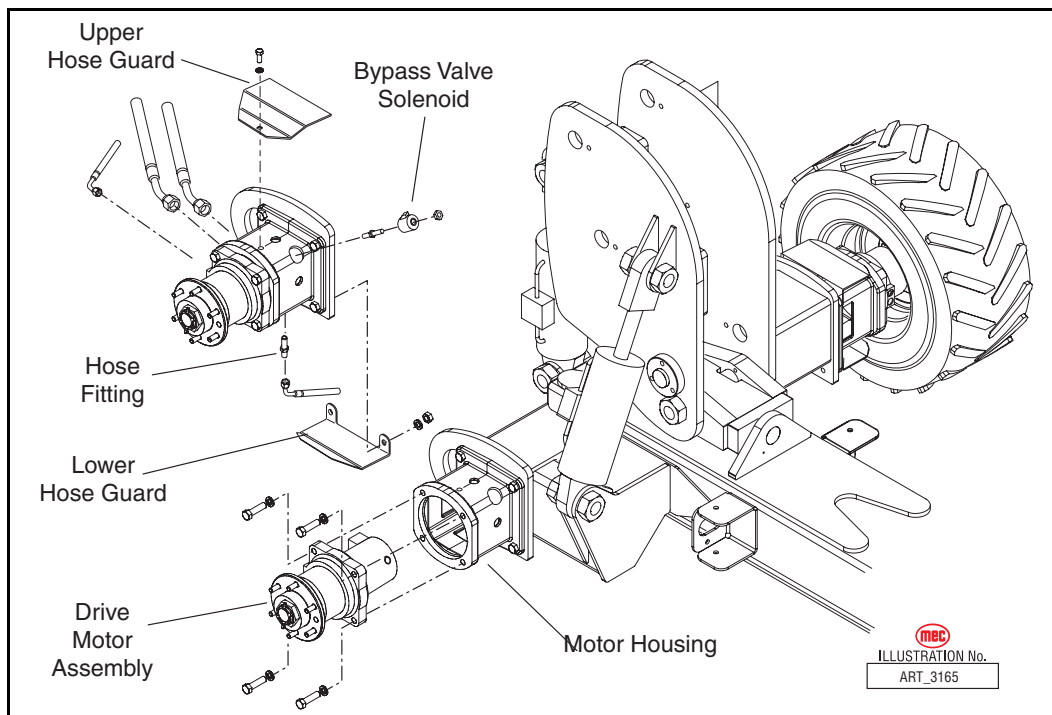
Installation is reverse of removal.

- Use Loctite® on mounting bolts.

REAR DRIVE MOTOR

Refer to “*Lift and Support The Machine*” in the *Introduction* section for instructions and safety precautions.

Figure 3-2: Rear Drive Motor



Remove

1. Raise and support the rear end of machine (see *Raising the Machine*).
2. Remove the wheel and tire assembly to access drive motor.
3. Remove the upper and lower hose guards.
4. Disconnect hose assemblies from drive motor. Immediately cap and plug all openings to prevent contamination.
5. Remove the hose fitting and the bypass valve solenoid from the motor.

NOTE: The bypass valve solenoid is mounted **UP** on the left side motor, and mounted **DOWN** on the right side motor.

6. Remove the cap screws and remove the drive motor from the housing.

Replace

Installation is reverse of removal.

- Use Loctite® on mounting bolts.

STEER CYLINDER

There are two (2) double acting type steer cylinders on this machine. During operation, cylinder(s) should not leak, but a slight damping at the rod seal is acceptable. The pins should be checked for wear.

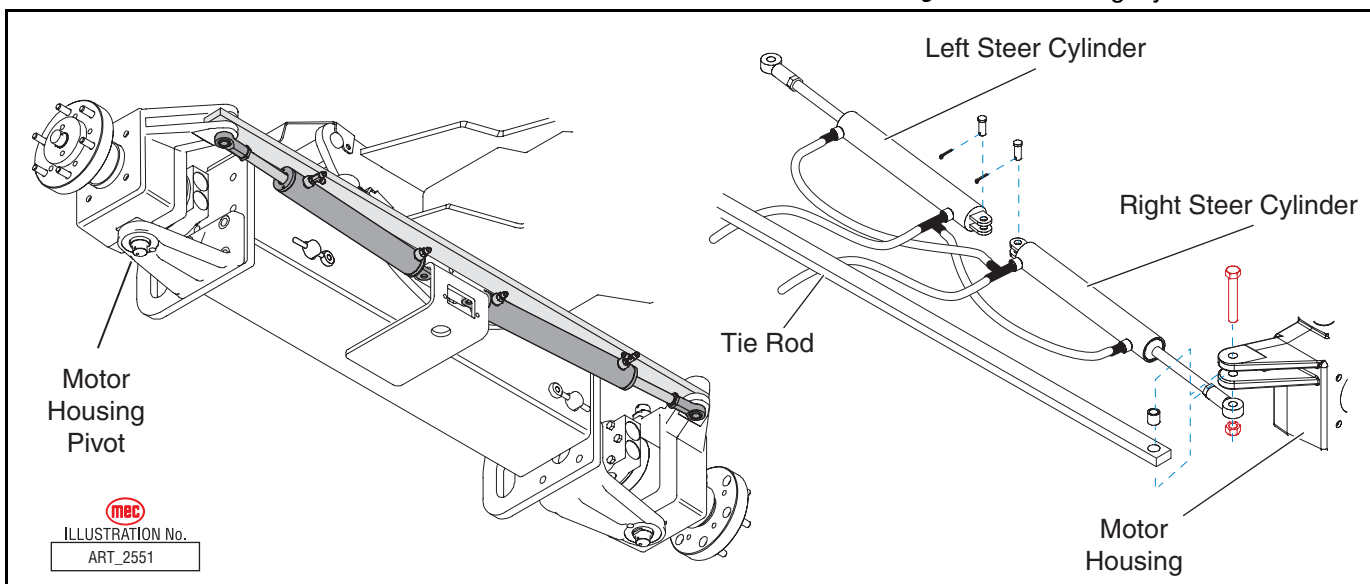
TO REPLACE STEER CYLINDER:



- Clean all fittings before disconnecting hoses.
 - Tag hoses for proper reassembly.
 - Plug all openings to prevent contamination.
1. Raise and support the front end of machine (see *Intro Section - Raising the Machine*).
 2. Disconnect hydraulic hoses. Immediately cap and plug all openings to prevent contamination.
 3. Remove the nut and bolt holding the steer cylinder to the motor mounting bracket.
 4. Remove the pin and cotter pin holding the steer cylinder to the front axle.
 5. Carefully lift off the steer cylinder.
 6. Position the new steer cylinder and install pin and cotter pin to hold cylinder to the front axle.
 7. Install nut and bolt to hold cylinder to motor mounting bracket.
 8. Connect hydraulic hoses.
 9. To purge air from cylinder, cycle the steering system fully left and right 4-5 times.

NOTE: Refer to *Section 1* for seal replacement instructions.

Figure 3-3: Steering Cylinder Installation



FLOATING AXLE LOCK CYLINDERS

There are two Floating Axle Lock Cylinders located at the front of the machine.

REMOVE

1. Raise and support the front end of machine.
2. Disconnect hydraulic hoses. Immediately cap and plug all openings to prevent contamination.
3. Remove the bolt and banjo pin that secures the pivot pin to the frame and remove the pivot pin.
4. Remove the bolt and banjo pin that secures the pivot pin to the floating axle and remove the pivot pin.

REPLACE

Installation is reverse of removal. Apply one (1) drop of Loctite® to the bolts that secure clevis pins.

BLEED PROCEDURE - 3084RT

Use this procedure for machine model 3084RT.

1. Start engine.
2. Loosen the bleed valve located on the top of the cylinder.
3. Watch as air escapes from valve.
4. Once a steady stream of fluid runs from the valve, tighten the valve.
5. Repeat on opposite side.

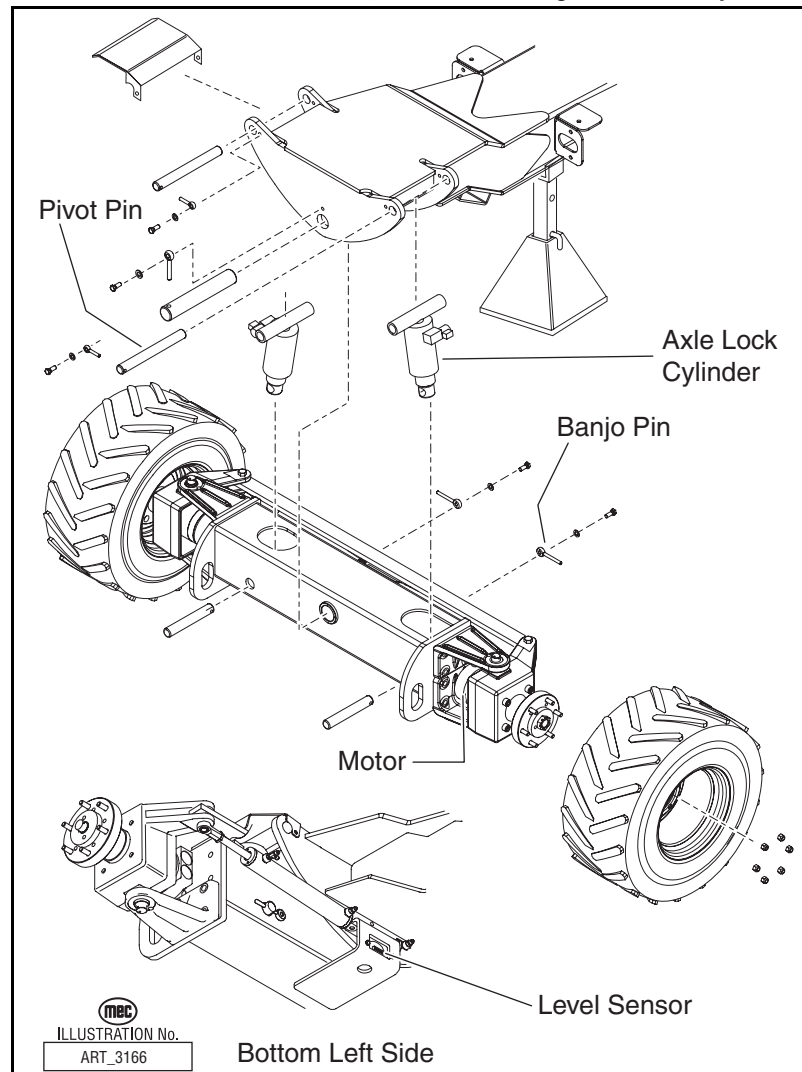
BLEED PROCEDURE - 3084ES

Use this procedure for machine model 3084ES.

1. Loosen the bleed valve located on top of the cylinder
2. Drive the machine very slowly while watching as air escapes from the valve.
3. Once a steady stream of fluid runs from the valve, tighten the valve.
4. Repeat on opposite side.

Figure 3-4: Floating Axle Lock Cylinder**TEST LOCKING AND CENTER POSITION**

1. Place a block approximately 4 inches (10 cm) high behind one of the front tires.
2. Elevate the platform to 10-11 feet (3-3.4 m).
3. Slowly drive the tire onto the block.
 - The axle lock cylinders should be locked (no movement).
 - The opposite tire should be off the ground.
4. Lower the platform.
 - The axle lock cylinders should release.
 - The suspended tire should lower to the ground.



PLATFORM LEVELING CYLINDERS

There are two Tilt Cylinders located at the rear of the machine.



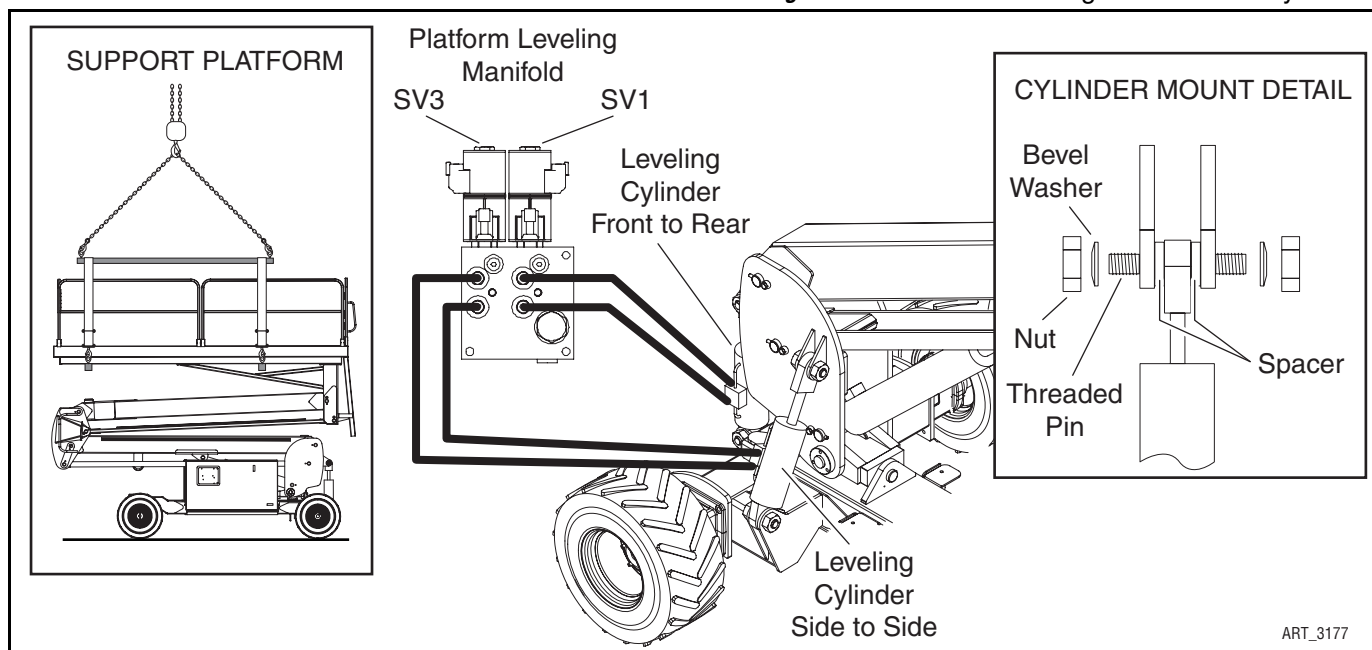
NEVER PERFORM SERVICE ON THE MACHINE WITH THE PLATFORM ELEVATED WITHOUT FIRST SUPPORTING THE PLATFORM/BOOM ASSEMBLY.

- Use a crane with chains and straps of adequate lifting capacity to support the platform.

REMOVE

1. Support the platform.
2. Disconnect hydraulic hoses. Immediately cap and plug all openings to prevent contamination.
3. Remove the nuts and beveled washers from the mounting pins.
4. Carefully remove the mounting pins.
5. Carefully lift the cylinder.
6. Installation is reverse of removal.

Figure 3-5: Platform Leveling Manifold and Cylinders



HOSES AND CABLES

NOTE: Refer to *Parts Section E* for detailed hydraulic hose diagrams.

Inspect all hoses and electrical cables for security and damage. Hoses and cables should be examined for rubbing and chafing.

Check all ties and clamps that keep hoses secure.

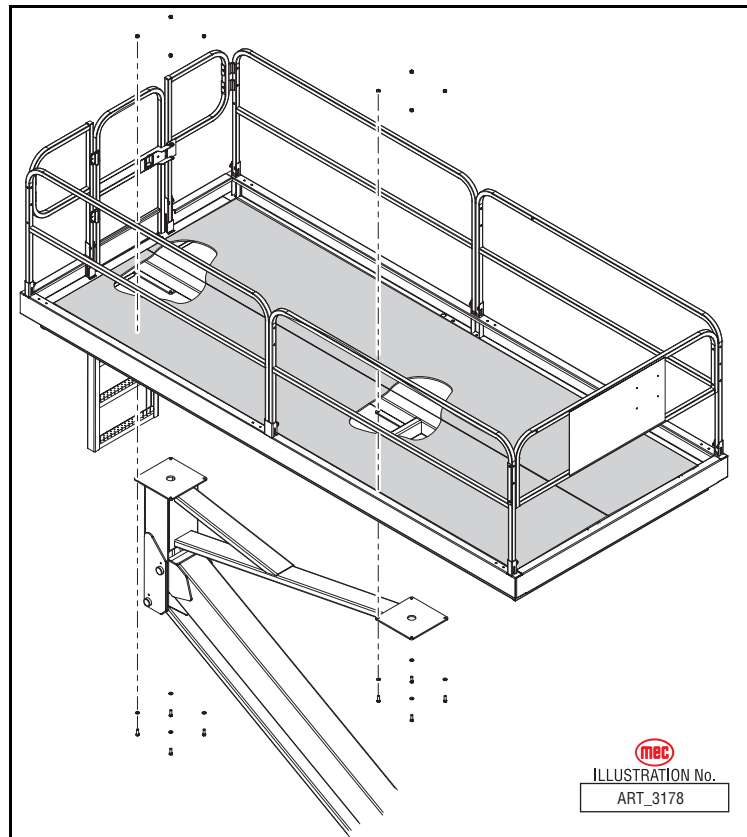
Check for leaks at fittings. Replace any damaged hose or cable.

1. Tag hoses for proper reassembly.
2. Disconnect hydraulic hoses. Immediately cap and plug all openings to prevent contamination.
3. Torque hose fittings according to the Hydraulic Torque Specification Table.

PLATFORM REMOVAL

Figure 3-6: Platform Removal

1. Connect overhead crane or appropriate lifting device to the platform.
2. Disconnect cables that go to the platform.
3. Remove the bolts that secure the platform to the boom assembly.
4. Lift the platform away from the boom assembly.
5. Installation is reverse of removal.



LIFT CYLINDER REMOVAL AND INSTALLATION

NOTE: Refer to *Section 1* for seal replacement instructions.

Refer to *Parts Section C* for detailed parts list and illustration.

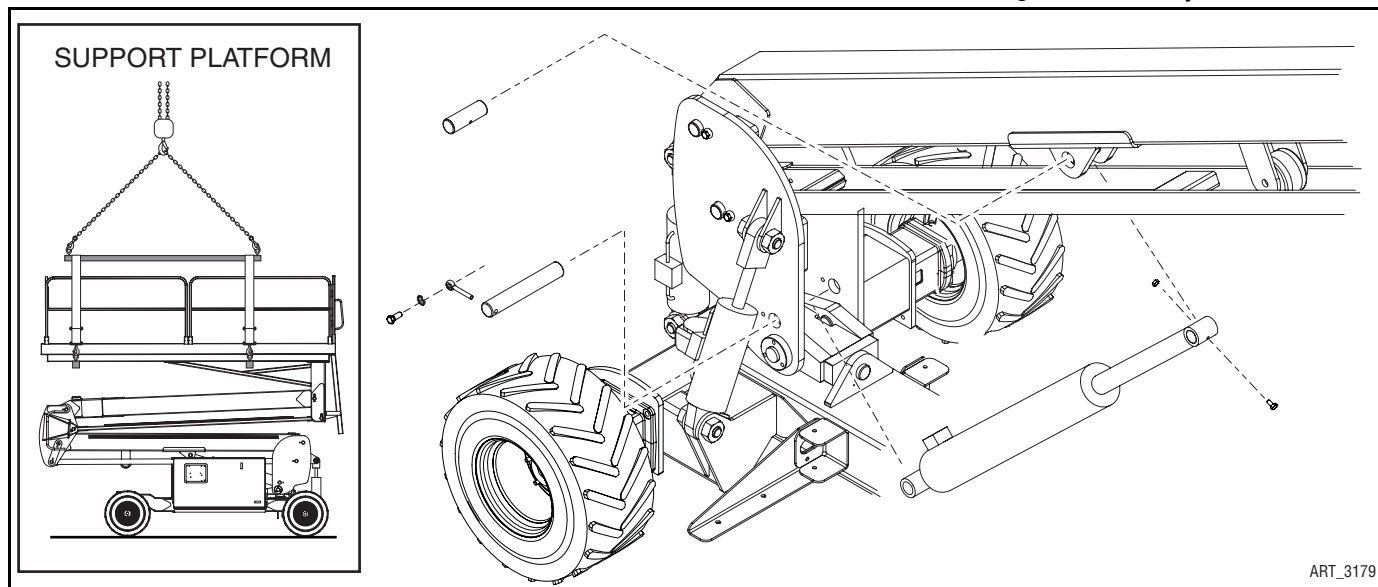


CLEAN ALL FITTINGS BEFORE DISCONNECTING HOSES.
CYLINDERS ARE HEAVY. PROVIDE PROPER SUPPORT *BEFORE* REMOVING PINS.
ATTACH THE LIFTING DEVICE TO THE CYLINDER BODY.
LIFTING BY EITHER END WILL CAUSE THE CYLINDER TO EXTEND.

1. Raise the platform.
2. Connect overhead crane by appropriate lifting device to the platform.
3. Tag wiring and hoses for proper reassembly.
4. Disconnect wires from the cylinder.
5. Disconnect hydraulic hoses. Immediately cap and plug all openings to prevent contamination.
6. Remove the bolt and nut that secure the cylinder head to the mounting pin on the boom assembly.
7. While supporting the cylinder, carefully remove the mounting pin and lower the cylinder to the chassis.
8. Remove the bolt, lock washer and banjo pin from the lower mounting pin, then remove the mounting pin.
9. Remove the cylinder.
10. Installation is reverse of removal.

NOTE: Apply one (1) drop of Loctite® to all bolts.

Figure 3-7: Lift Cylinder Removal



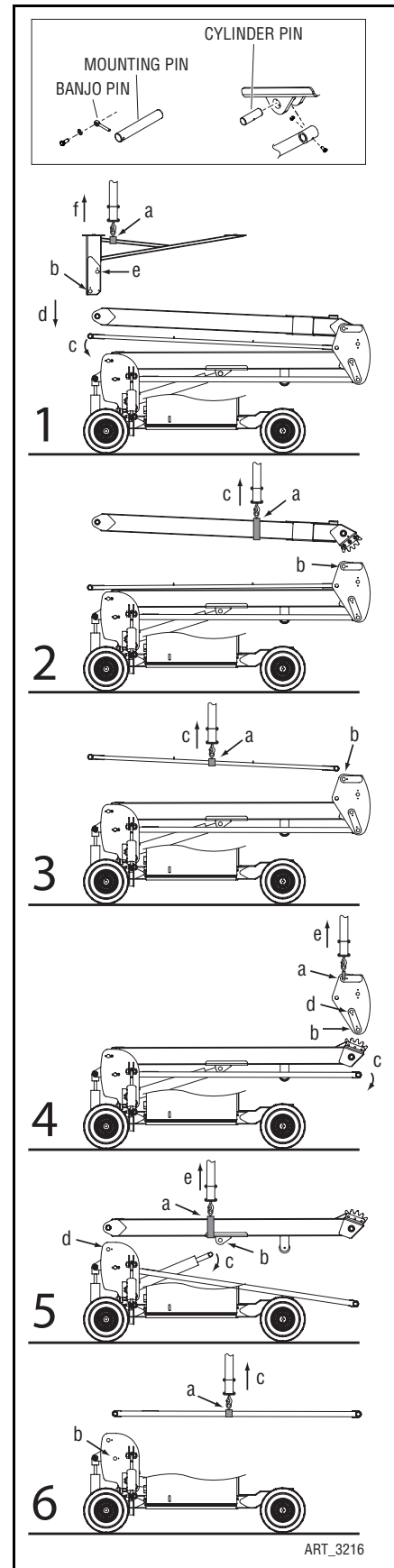
BOOM - ELEVATING ASSEMBLY

Remove the platform (see "Platform Removal" on page 3-10).

Figure 3-8: Elevating Assembly Removal

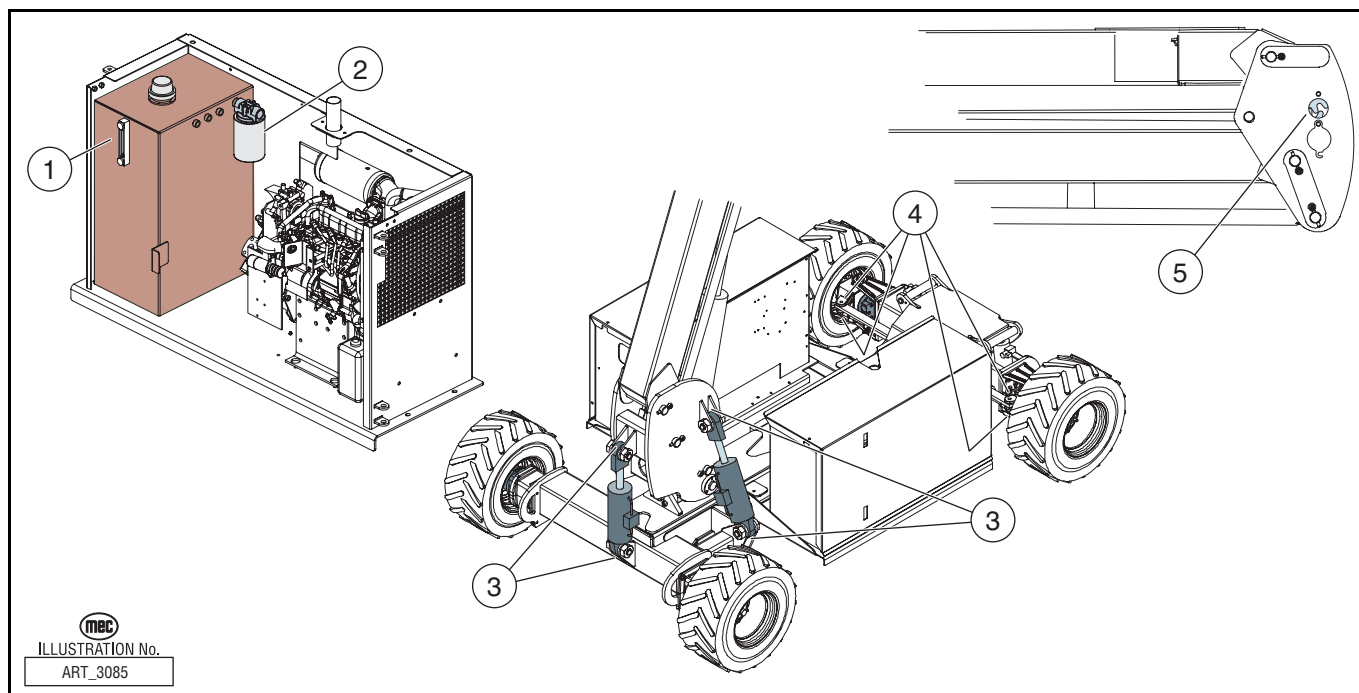
1. Remove the platform pivot.
 - a. Attach a crane to the platform pivot and apply enough lift to provide support.
 - b. While supporting the tension beam, remove the lower bolt, washer and banjo pin.
 - c. Lower the tension beam to rest on the lower boom.
 - d. Using the crane, lower the platform pivot and upper boom to rest on the lower boom.
 - e. Remove the upper bolt, washer and banjo pin.
 - f. Lift the platform pivot up and away.
2. Remove upper boom
 - a. Attach a crane to the upper boom and apply enough lift to provide support.
 - b. Remove the bolt, washer and banjo pin.
 - c. Lift the upper boom up and away.
3. Remove upper tension beam.
 - a. Attach a crane to the upper tension beam.
 - b. Remove the bolt, washer and banjo pin.
 - c. Lift the upper tension beam up and away.
4. Remove boom pivot.
 - a. Attach a crane to the boom pivot through the top holes and apply enough lift to provide support.
 - b. While supporting the tension beam, remove the lower bolt, washer and banjo pin.
 - c. Lower the tension beam to rest on the chassis.
 - d. Remove the upper bolt, washer and banjo pin.
 - e. Lift the boom pivot up and away.
5. Remove the lower boom.
 - a. Attach a crane to the upper boom and apply enough lift to provide support.
 - b. While supporting the lift cylinder remove the cylinder pin.
 - c. Lower the lift cylinder to rest on the chassis.
 - d. Remove the bolt, washer and banjo pin.
 - e. Lift the lower boom up and away.
6. Remove lower tension beam.
 - a. Attach a crane to the lower tension beam.
 - b. Remove the bolt, washer and banjo pin.
 - c. Lift the lower tension beam up and away.
7. Installation is reverse of removal.

Apply one (1) drop of Loctite® to all bolts.



LUBRICATION

Figure 3-9: Lubrication Points



No.	ITEM	SPECIFICATION	FREQUENCY
1	Hydraulic Reservoir	Mobile Fluid DTE 10, DTE 13 M, or AW32 M <i>Do not substitute with lower grade fluids as pump damage may result.</i> Fill to the middle of the sight gauge with platform in the stowed position.	Routine Maintenance Check Daily Scheduled Maintenance Change yearly or every 1000 hours, whichever occurs first
2	Hydraulic Filter	Filter Element	Scheduled Maintenance Normal Conditions Change every six months or 500 hours, whichever occurs first Severe Conditions Change every three months or 300 hours, whichever occurs first
3	Tilt Cylinders Pivot Points	Lithium N.L.G. #2 EP Purge old grease	Scheduled Maintenance Normal Conditions Apply every 6 months or 500 hours, whichever occurs first Severe Conditions Apply every 3 months or 250 hours, whichever occurs first
4	Steering Pivot Points	Lithium N.L.G. #2 EP Purge old grease	Scheduled Maintenance Normal Conditions Apply every 6 months or 500 hours, whichever occurs first Severe Conditions Apply every 3 months or 250 hours, whichever occurs first
5	Boom Gear	High copper content Anti-Seize compound Apply through access port or from front when platform is fully elevated	Scheduled Maintenance All Conditions Apply every 1 months or 100 hours, whichever occurs first

ENGINE MAINTENANCE

DIESEL ENGINE MODELS

For complete service information consult the engine manual that came with the machine.



Always wear protective eye-wear when working with fuel and oil.
Engine should be OFF when replacing filter elements.

OIL AND OIL FILTER, DIESEL

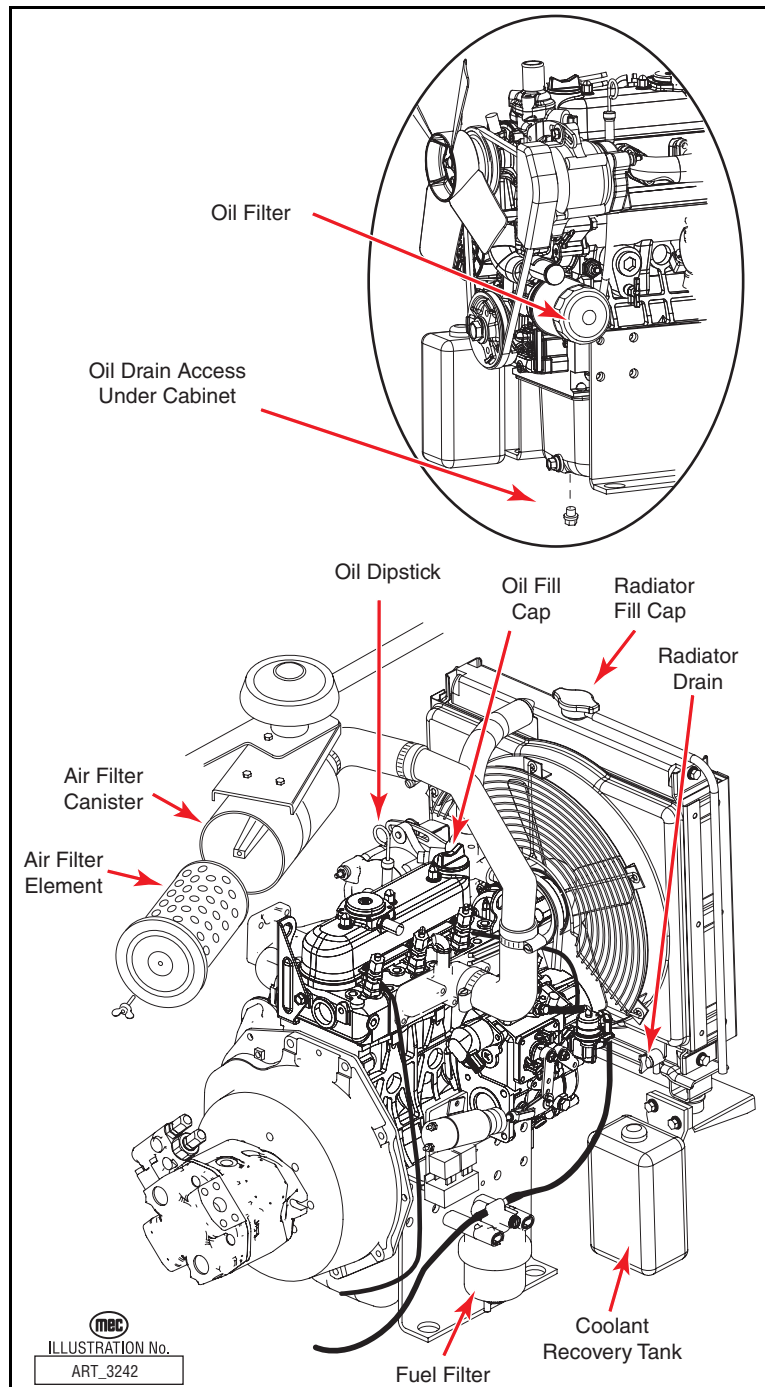
Dispose of used oil and filters properly.

1. Use a suitable container to catch drained oil. Remove the drain plug. After oil has drained, replace the drain plug.
2. Remove the old filter and wipe the filter seal contact surface with a clean towel. Coat the seal on the new filter with clean oil, then install and tighten by hand.
3. Fill engine with 10w-30 motor oil until the dipstick indicates FULL. Capacity is 5.4 US quarts (5,1 l).
4. Recheck dipstick after running engine. Fill as necessary.

AIR FILTER ELEMENT, DIESEL

1. Remove the wing-bolt
2. Remove old filter and replace with a new filter.
3. Replace and tighten the wing-bolt. **Do not run the engine with the air filter element removed.**

Figure 3-10: Diesel Engine – Oil Filter and Air Filter

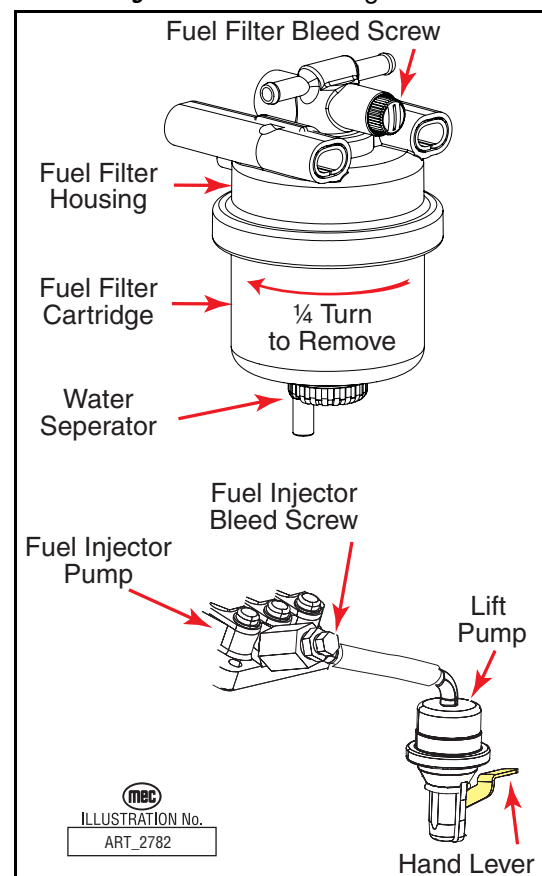


FUEL FILTER, DIESEL

1. Turn OFF valve on bottom of fuel tank.
2. Place a suitable container beneath the fuel filter assembly to catch spilled fuel. Clean the filter area.
3. Turn filter cartridge $\frac{1}{4}$ counterclockwise remove. Wipe the filter seal contact surface with a clean towel and install a new filter.
4. Open valve at fuel tank and check for leaks.
5. Purge the air from the fuel system as follows;
 - Fill fuel tank to the fullest extent. Open valve on bottom of fuel tank.
 - Loosen bleed screw on top of fuel filter housing a few turns.
 - Close the bleed screw when there are no more bubbles.
 - Open the bleed screw on the fuel injector pump. Use the lift pump hand lever to pump fuel to the injectors. Close the bleed screw when there are no more bubbles.

NOTE: Do not attempt to start the engine until Step 5 has been performed.

Figure 3-11: Diesel Engine Fuel Filter



6. If fuel becomes contaminated with water, use the Water Separator Valve at the bottom of the fuel cartridge to drain water.

IDLE SPEED ADJUSTMENT, DIESEL

1. Bring engine to operating temperature.
2. Slow engine to complete idle.
3. Adjust the Idle Stop Screw until the RPM is 950. Adjust slightly up or down to avoid vibrations.
4. Hold the Idle Stop Screw while tightening the jam nut to prevent change in adjustment.

HIGH SPEED ADJUSTMENT, DIESEL

IMPORTANT: – In order to prevent electrical system damage, check the Throttle Solenoid Adjustment after this procedure.

1. Bring engine to operating temperature.
2. Disconnect the Throttle Solenoid linkage at the clevis.
3. Manually pull the Throttle Lever until it contacts the High Speed Stop Screw.
4. Adjust the High Speed Stop Screw until the RPM is 3000 with the Throttle Lever against the High Speed Stop Screw.
5. Turn off the engine and reconnect the Throttle Solenoid linkage at the clevis.
6. Hold the High Speed Stop Screw while tightening the jam nut to prevent change in adjustment.

THROTTLE SOLENOID ADJUSTMENT, DIESEL

IMPORTANT: – This final adjustment must be made after all other throttle speed adjustments. The solenoid must be free to retract fully in order to turn OFF the High Amperage Pull Circuit. Improper adjustment will result in solenoid failure and may damage the electrical system.

1. With the engine OFF, manually retract the solenoid by grasping the piston, just ahead of the boot, and pull to the fully retracted position.

NOTE: The solenoid must retract and extend smoothly. If movement is impaired it may be necessary to reposition the solenoid to improvement alignment.

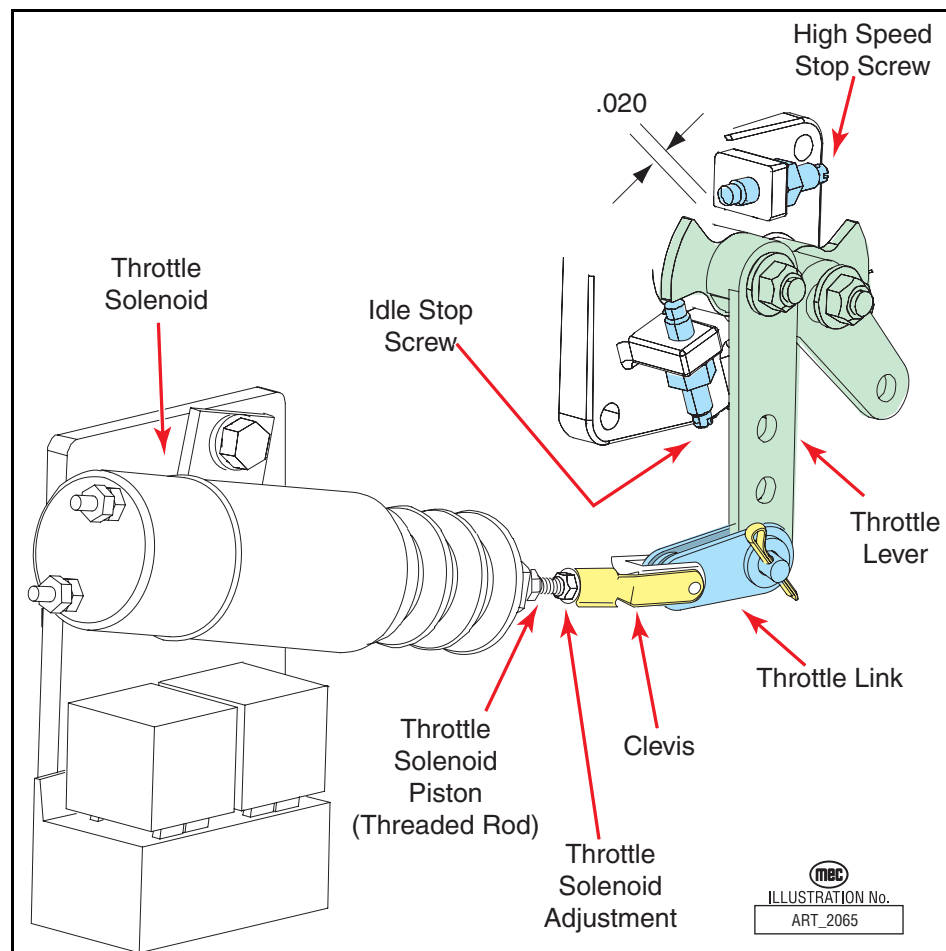
2. With the solenoid piston fully retracted measure the distance between the High Speed Stop Screw and the Throttle linkage using a .020 feeler gauge.

3. Adjust clearance at the Throttle Solenoid linkage only.

Do not adjust the High Speed Stop Screw.

- Disconnect the linkage at the clevis and turn the clevis to lengthen or shorten as necessary.
- Reconnect the clevis and measure again. Repeat until the measurement is correct.

Figure 3-12: Diesel Engine Throttle Adjustments



GASOLINE & DUAL FUEL ENGINE MODELS

For complete service information consult the engine manual that came with the machine.



Always wear protective eye-wear when working with fuel and oil.
Engine should be OFF when replacing filter elements.

OIL AND OIL FILTER - GASOLINE & DUAL FUEL

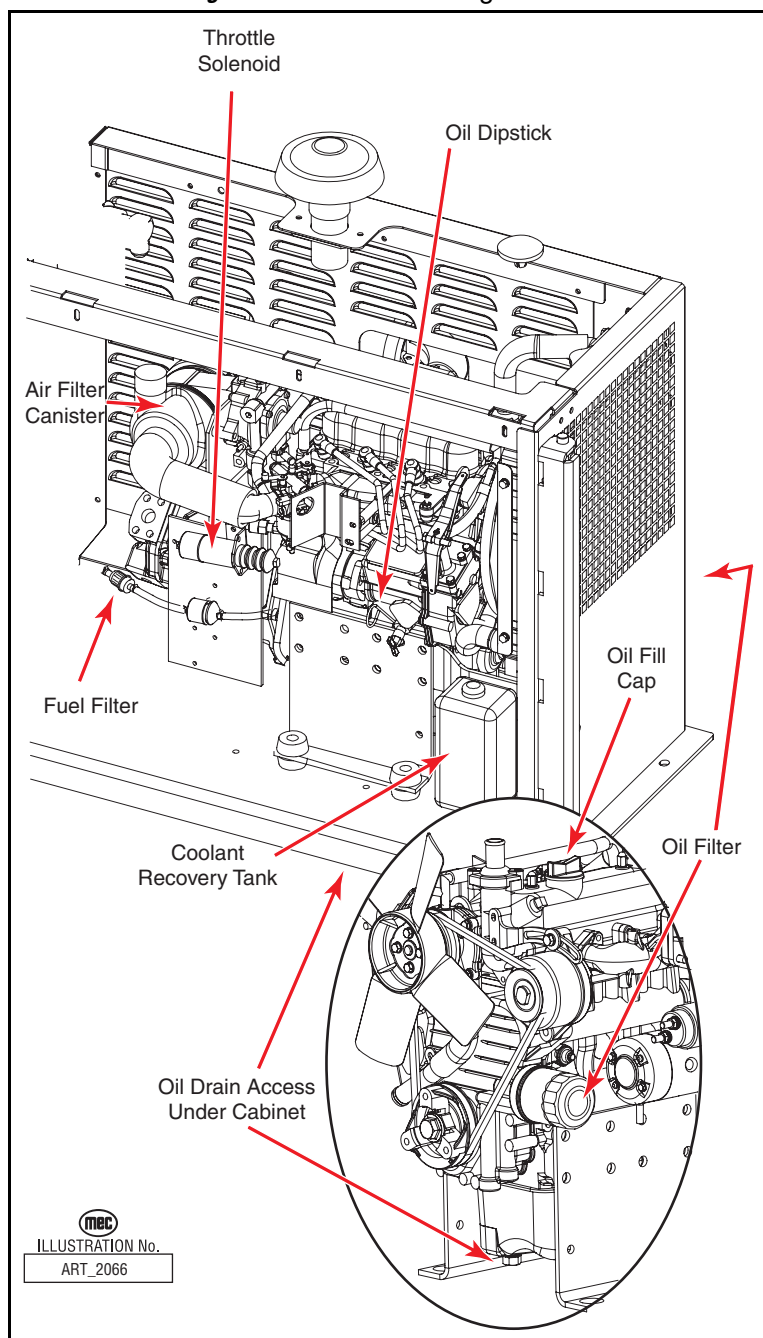
Dispose of used oil and filters properly.

1. Use a suitable container to catch drained oil. Remove the drain plug. After oil has drained, replace the drain plug.
2. Remove the old filter. Coat the seal on the new filter with clean oil, then install and tighten by hand.
3. Fill engine with 10w-30 motor oil until the dipstick indicates FULL. Capacity is 3.4 US quarts (3,25 l).
4. Recheck dipstick after running engine. Fill as necessary.

FUEL FILTER - GASOLINE

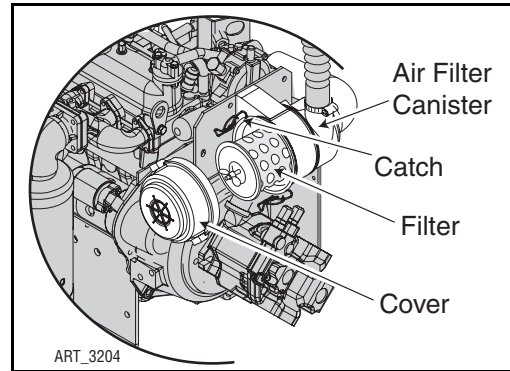
1. Turn OFF valve at fuel tank.
2. Loosen the hose clamps on the fuel lines and slide them away from the in-line fuel filter.
3. Remove the in-line fuel filter from the fuel lines.
4. Install a new in-line fuel filter.
 - There is an arrow, indicating direction of flow, on the body of the in-line fuel filter. Make sure that the arrow points **from** the fuel tank and **to** the engine.
5. Reposition and tighten the hose clamps.
6. Open valve at fuel tank and check for leaks.

Figure 3-13: Dual Fuel Engine - Oil and Fuel Filter



AIR FILTER ELEMENT - GASOLINE & DUAL FUEL**Figure 3-14:** Dual Fuel Engine Air Filter Element

1. Unlock the catches holding the filter canister cover.
2. Remove the wing-nut from the filter assembly and remove the filter element.
3. Inspect the canister for debris and clean as necessary.
4. Install a new filter element and tighten the wing-nut.
5. Replace the canister cover and lock the catches.

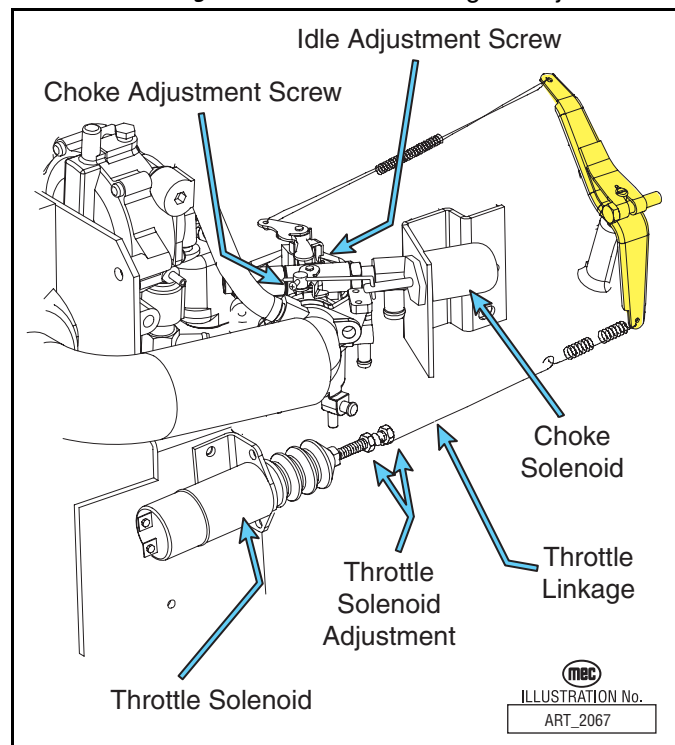
**ENGINE ADJUSTMENT - GASOLINE & DUAL FUEL****Figure 3-15:** Dual Fuel Engine Adjustments

The following adjustment points are sealed by the factory and cannot be adjusted.

- Carburetor Pilot Screw
- LPG Main Pressure Adjustment Screw
- LPG Idle Pressure Adjustment Screw
- Distributor Ignition Timing Adjustment Screw

CHOKE ADJUSTMENT - GASOLINE & DUAL FUEL

1. Loosen the Choke Adjustment Screw until the linkage rod can move freely.
2. Manually retract the Choke Solenoid Piston until it stops.
3. While holding the solenoid fully retracted, close the choke plate until it stops in the fully closed position.
4. Allow the choke plate to open slightly and tighten the Choke Adjustment Screw.
5. Check Choke Solenoid operation to ensure that the choke plate travel does not prevent the Choke Solenoid from retracting fully.



IDLE SPEED ADJUSTMENT - GASOLINE & DUAL FUEL

1. Bring the engine to operating temperature.
2. With the engine at idle, adjust the Throttle Stop Screw until the engine RPM is 1350 ± 50 .

HIGH SPEED ADJUSTMENT - GASOLINE & DUAL FUEL

1. Bring the engine to operating temperature.
2. Loosen the adjusting nuts on the Throttle Solenoid.
3. Have an assistant press the enable trigger on the Upper Controls joystick.
4. Adjust the nuts on the Throttle Solenoid Piston until the engine RPM is 3400 ± 50 .
5. Tighten the nuts to secure the adjustment.

NOTES:



Section 4a

TROUBLESHOOTING - 3084RT MODELS

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GENERAL TROUBLESHOOTING TIPS

HYDRAULIC FLUID PUMP - 3084RT MODELS

The Hydraulic Pump used in this model is a Variable Displacement, Pressure Compensated, Piston type pump. Proper adjustment is critical for normal operation of the machine. Refer to "Hydraulic Pressure Adjustment - 3084RT" on page 4a-33.

Common Causes of Electrical System Malfunctions:

- Battery switch is turned OFF (located to the left of lower controls).
- Battery connections are loose or corroded
- Battery is not fully charged.
- Emergency Stop buttons are pushed (OFF position).
- Circuit breaker is in the tripped (OFF position).

Common Causes of Hydraulic System Malfunctions:

- Hydraulic fluid level is too low.
- Incompatible hydraulic fluids mixed, destroying the additives and causing varnish build up, resulting in the valves sticking.
- Water in the hydraulic fluid due to a damp climate.
- Improper hydraulic fluid used. Viscosity too high in cold climates. Viscosity too low in warm climates.
- Hydraulic fluid contaminated with debris - filter change interval neglected.

NOTE: MEC uses a multiple viscosity fluid that is light enough for cold climates and resists thinning in warm climates. Use only the recommended hydraulic fluid. Substituting with a lower grade fluid will result in pump failure. Refer to "Lubrication" in the *INTRODUCTION* Section

NOTE: Contamination always causes failure in any hydraulic system. It is very important to be careful not to introduce any contamination into hydraulic system during the assembly procedures. Please make sure all ports and cavities of the manifold and cylinders are properly covered/plugged during maintenance activities.

ELECTRICAL SYSTEM TROUBLESHOOTING - 3084RT

The electronic control system used on the 3084RT was designed for low maintenance and long trouble free operation. The system consists of two microprocessor based modules; The Matrix Module and the GP400 Processor. They communicate through a low voltage digital signal called Can-Bus communication.

To protect against part failure or incorrect plug connections, the modules are fully short circuit and reverse polarity protected. All electrical plug connections are waterproof to promote longer trouble free operation and to increase terminal life.



NEVER ATTEMPT TO SUPPLY BATTERY POWER, OR VOLTAGE HIGHER THAN 12 VOLTS TO ANY PART OR MODULE IN THIS SYSTEM, AS CATASTROPHIC FAILURE OF THE MODULES MAY RESULT.

USE OF HIGH PRESSURE WASHING EQUIPMENT DIRECTLY ON THE MODULES CAN FORCE WATER INTO SEALED CONNECTION AND CAN CAUSE A TEMPORARY SYSTEM SHUT-DOWN. HIGH PRESSURE WASHING WITHIN THE VICINITY OF THE MODULES IS HIGHLY DISCOURAGED.

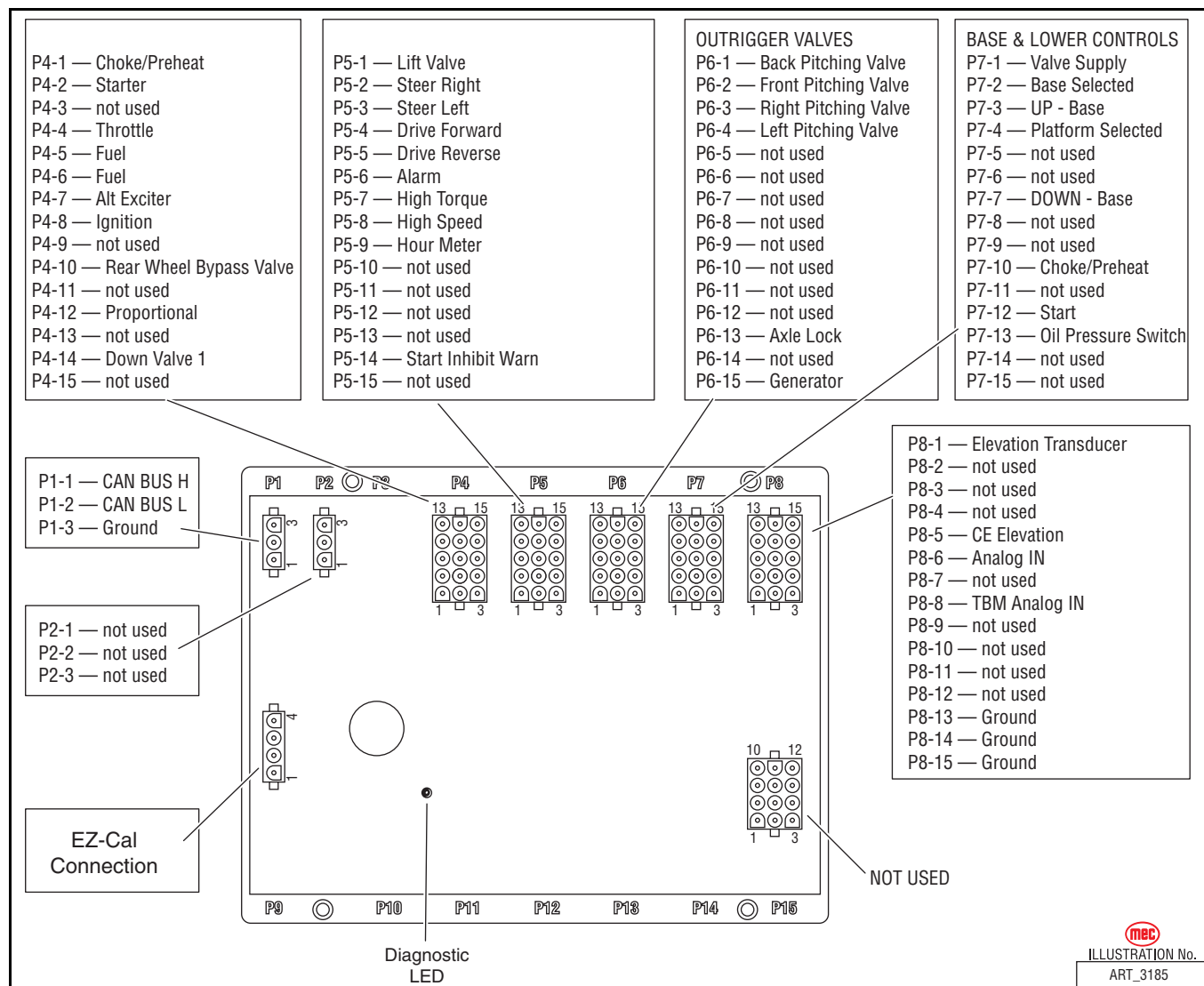
GP400 MODULE

The GP400 module is “the brains” of the system. It receives and processes a variety of inputs both from the machine and the operator, then controls all the operative functions of the machine. It also has a feature that allows the technician to access and monitor all functionality of the system, along with a technician-friendly series of fault messages that can be accessed through the use of the EZ-Cal scan tool. Flash codes are also provided in case an EZ-Cal scan tool is not available.

Such information can be used for preventative maintenance and troubleshooting should a problem arise. A comprehensive list of EZ-Cal accessible information can be found later in this section.

The GP400 operates on 12 volts DC and should never be probed or operated with voltage higher than 14 volts DC

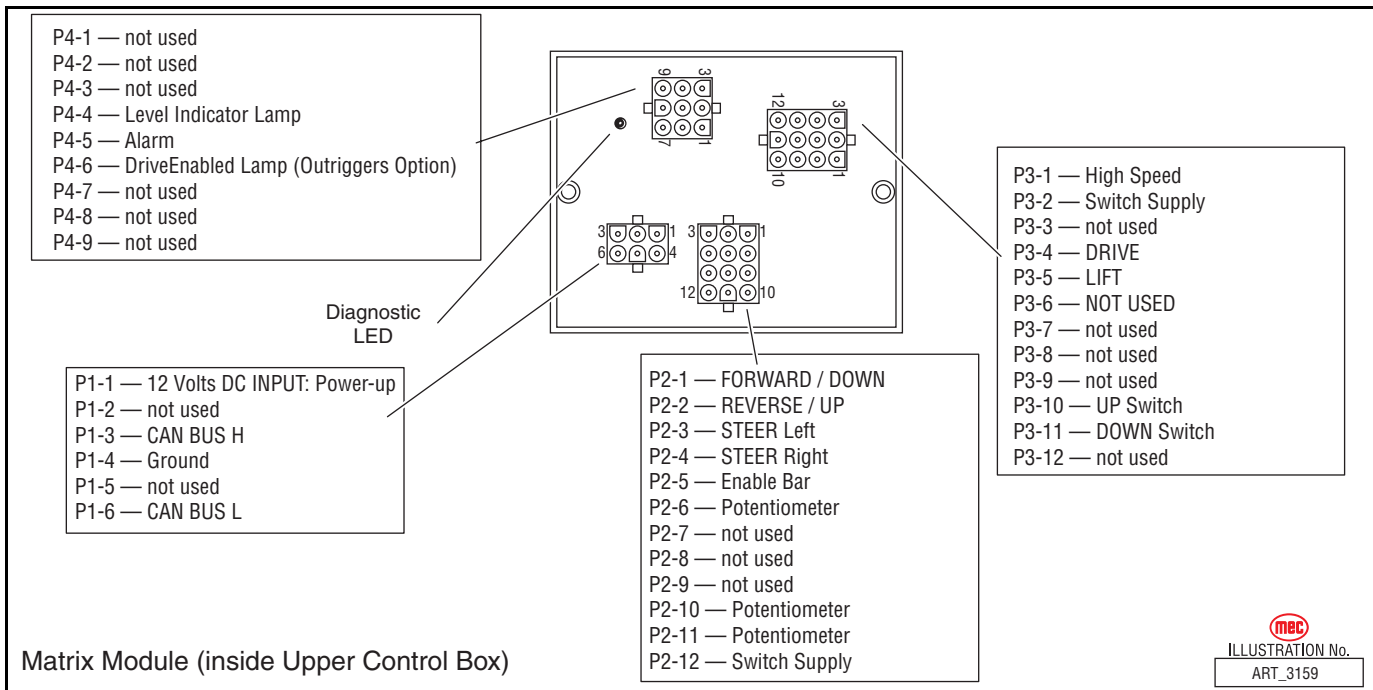
Figure 4a-1: GP400 Module



MATRIX MODULE

The Matrix Module is the remote module located inside the upper control box. It received inputs from the operator and relays them to the GP400.

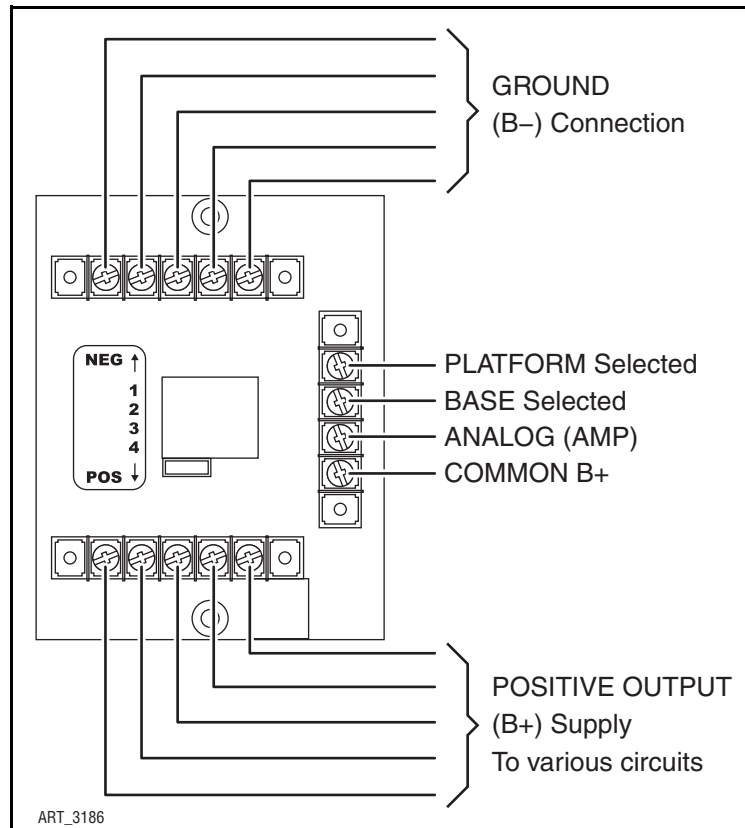
Figure 4a-2: Matrix Module



TERMINAL BLOCK MODULE (TBM)

Figure 4a-3: Terminal Block Module (TBM)

There is a module inside the lower control box, called a TBM (Terminal Block Module) that provides terminal point connections for both positive and ground circuits. A signal from the Emergency Stop circuit activates a load-reduction relay within the TBM that provides ample power to the B+ (positive) terminal strip. This arrangement protects the system against voltage drop conditions that can be detrimental to the electrical system.



EZ-CAL SCAN TOOL

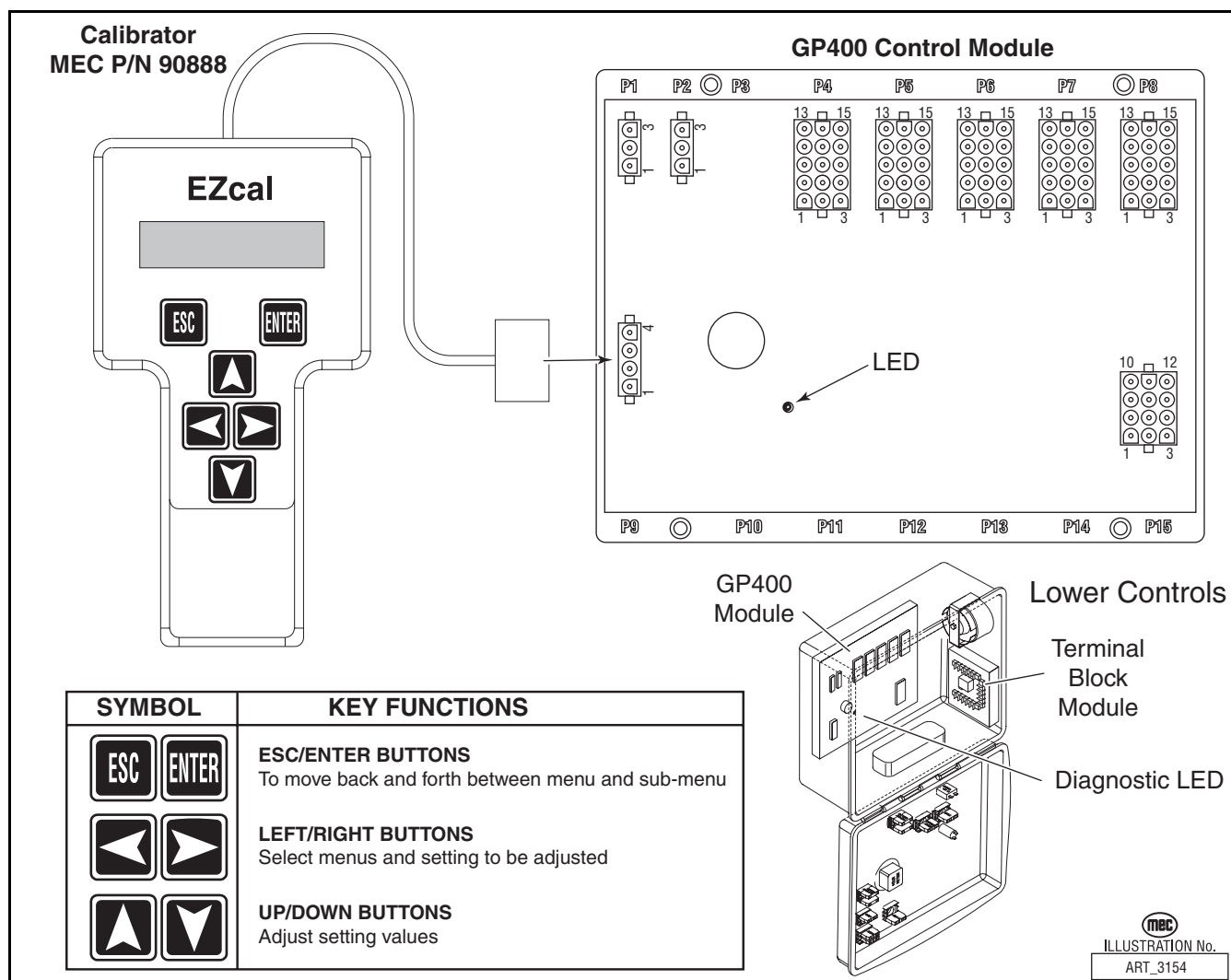
The EZ-Cal (MEC part # 90888; not part of the machine) is a hand-held scan tool that interfaces with the system to provide various information and adjustments. The EZ-cal receives its power from the GP400 when connected. The system must be powered up by closing the Battery disconnect switch and pulling both emergency stop switches. You must also select Base or Platform depending on the station you will operate from.

USING THE EZ-CAL SCAN TOOL

To operate the EZ-cal, plug the cable into the 4-terminal receptacle P9 on the GP400 and power the system up.

- The EZ-Cal display will illuminate and read "HELP: PRESS ENTER". From this point, use the right and left arrows to scroll through the base menus.
- Once the desired base menu is obtained (i.e. *ADJUSTMENTS*) press Enter to access sub menus.
- Use the right and left arrows to scroll through sub menus, press Enter again.
- The up/down arrows are used to change settings only.
- Press ESC to back up one level.

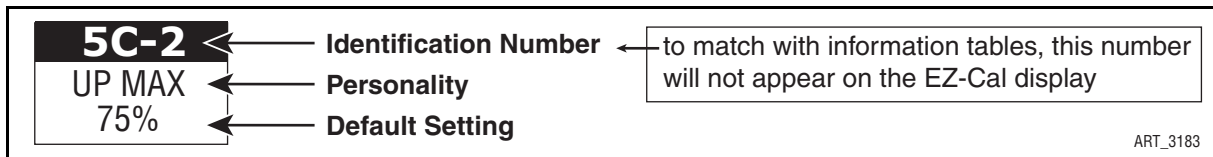
Figure 4a-4: EZ-Cal Scan Tool Connections - GP400 Module



USING THE EZ-CAL WITH THE FLOW CHARTS

Use the EZ-cal Flow Charts as a guide to locate diagnostic information and make adjustments. Each box in the flow chart will have 3 bits of information.

Figure 4a-5: EZ-Cal Display Example



The IDENTIFIER (5c2): – Used to locate this specific personality in the informational charts. Here you can obtain specific information on the individual personalities.

The PERSONALITY (Up Max): – Identifies the individual personalities.

The DEFAULT SETTING: – The factory setting. If adjustments are made, they must be returned to default setting.



ACCESS LEVEL 1 PROVIDES ACCESS TO CHANGE PERSONALITIES NORMALLY PRESET AT THE FACTORY TO PROVIDE PROPER MACHINE MOVEMENT AT SAFE SPEEDS. PERSONALITIES MUST NOT BE CHANGED WITHOUT PRIOR AUTHORIZATION FROM MEC AND MAY ONLY BE RETURNED TO FACTORY SPECIFICATION AS LISTED IN THE FOLLOWING TABLES.

ERROR MESSAGES

To obtain error messages from the EZ-cal Connect the EZ-cal as mentioned above. The display will read, "HELP:PRESS ENTER". Press Enter to display the current error message. Use the following list of error messages to better understand the fault. Pressing Enter twice will provide a scrolling message of the current error followed by a log of previous errors that may have occurred within recent operation.

SCROLLING MESSAGES

The EZ-Cal will provide a scrolling message of the current error followed by a log of previous errors that may have occurred within recent operation. Refer to "Scrolling Message" on page 4a-19.

FLASH CODES

Flash Codes, provided from the GP400 red LED, will also assist in the event an EZ-cal is not available. However, the EZ-cal yields considerably more relevant information. Refer to "EZ-Cal HELP Messages" on page 4a-22 for flash coded error messages.

Figure 4a-6: EZ-Cal Flow Chart: Adjustments and Setup, ANSI Models

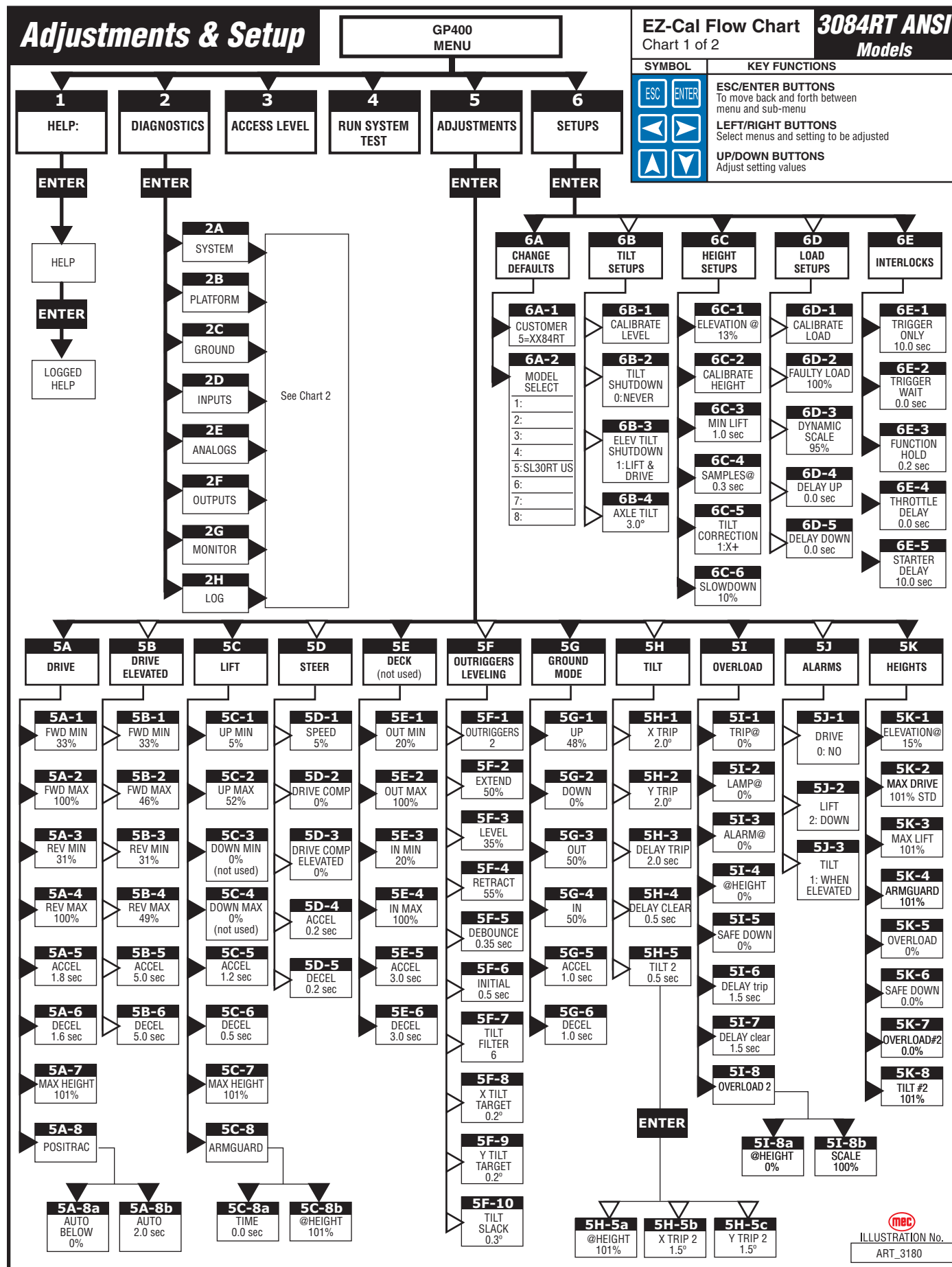


Figure 4a-7: EZ-Cal Flow Chart: Diagnostic, ANSI Models

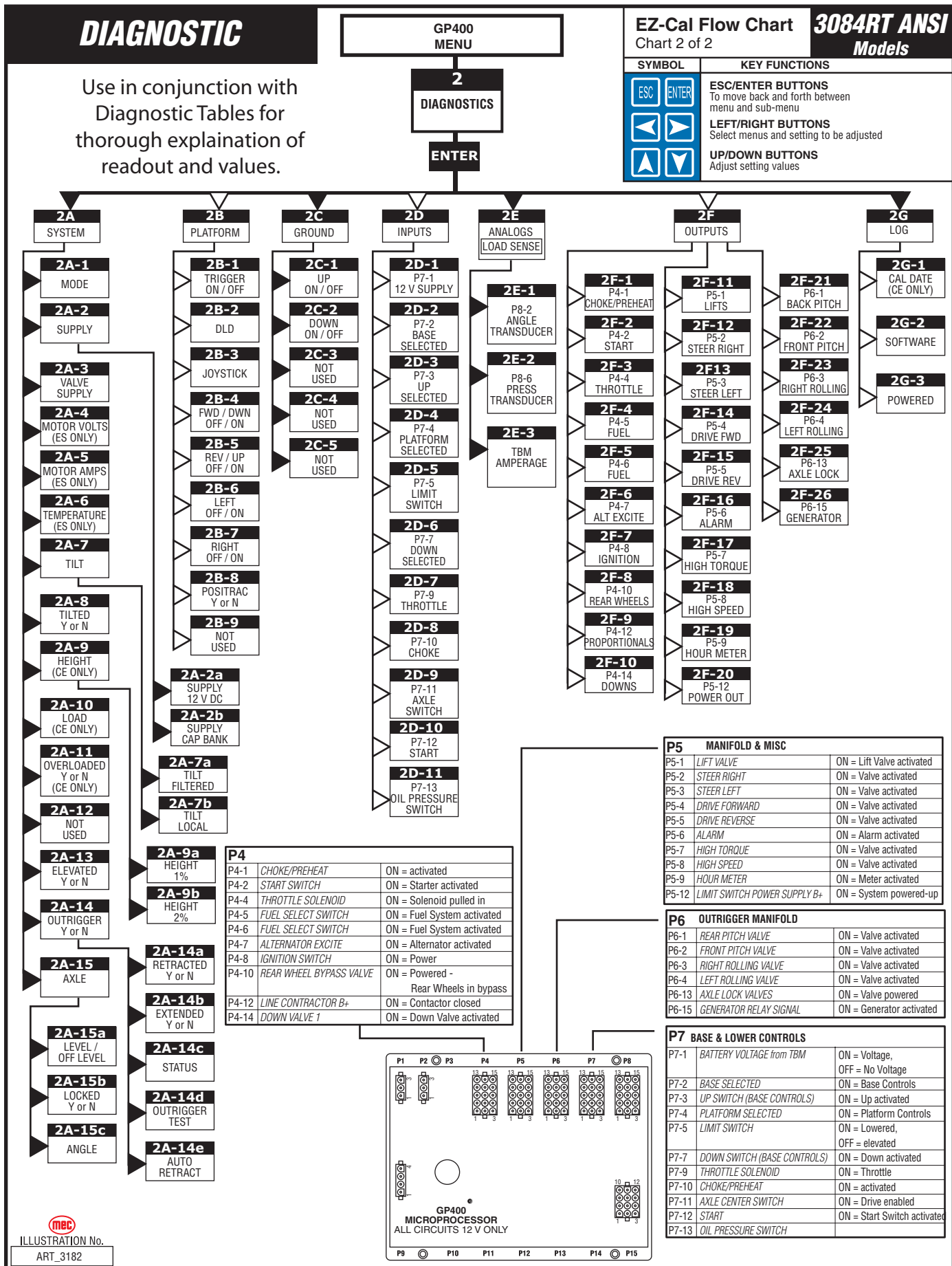


Figure 4a-8: EZ-Cal Flow Chart: Adjustments and Setup, CE Models

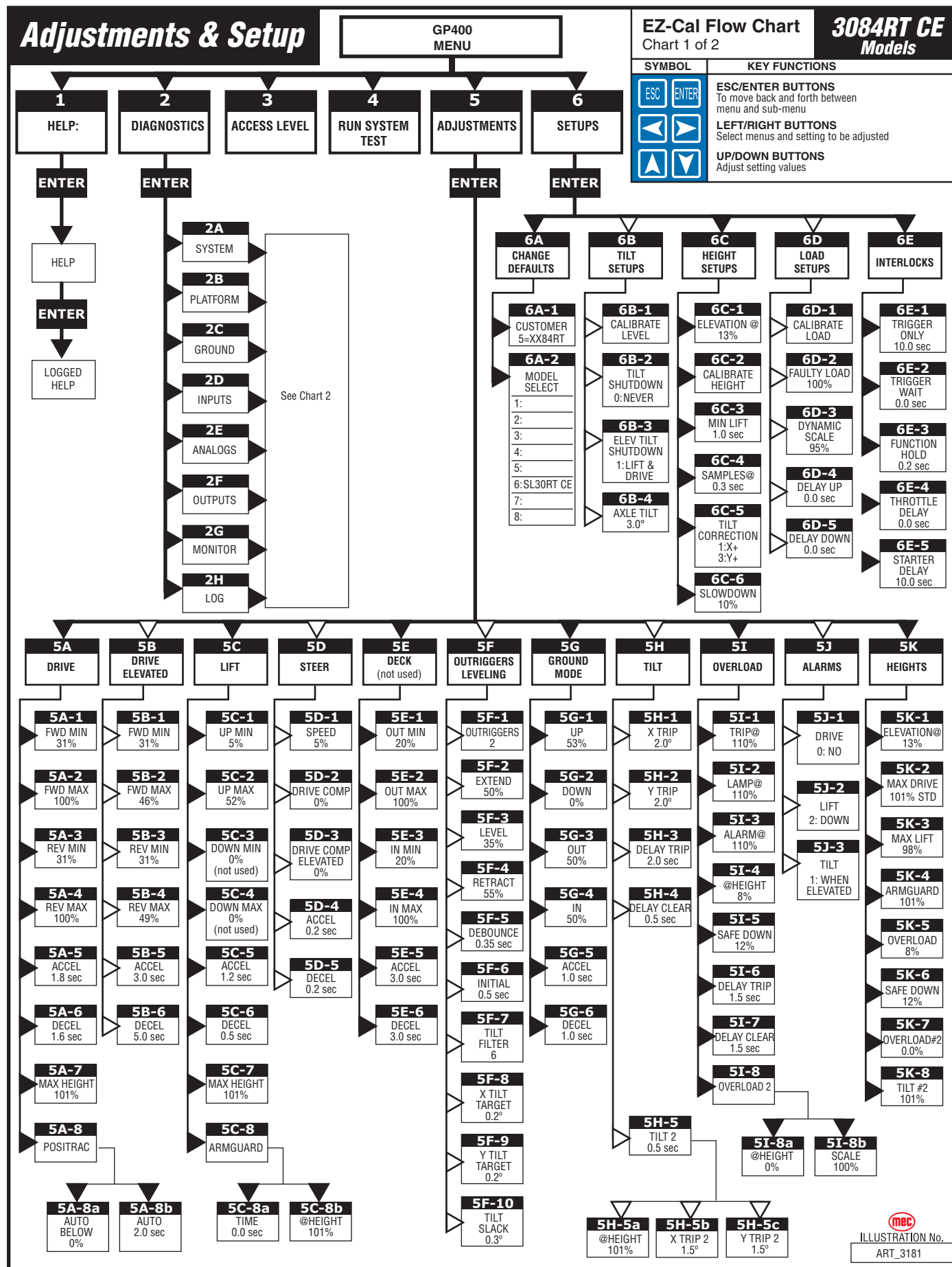
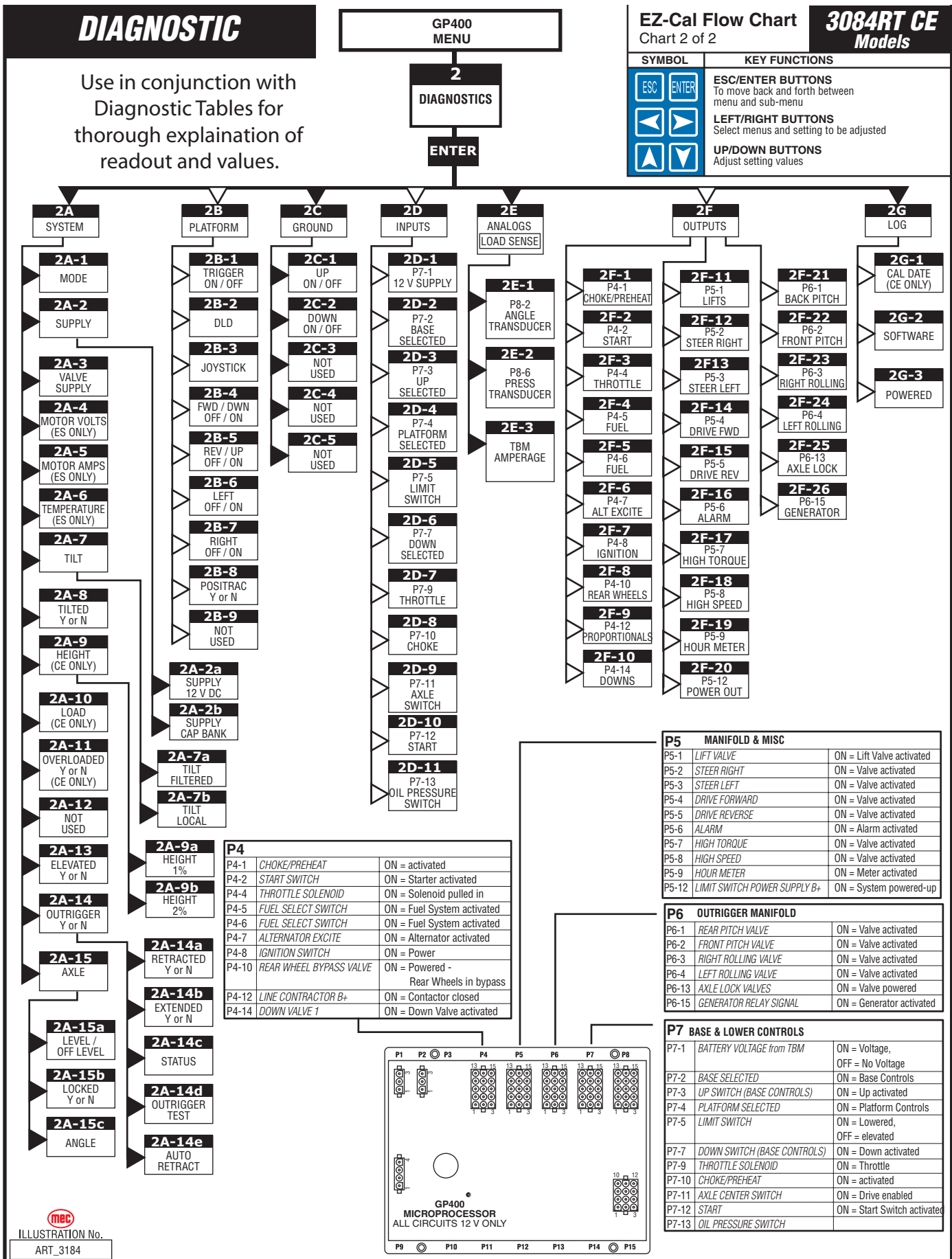


Figure 4a-9: "EZ-Cal Flow Chart: Diagnostic, CE Models



EZ-CAL ADJUSTMENT

Refer to "Using the EZ-cal Scan Tool" on page 4a-7.

Adjustments possible in Access Level 1 Only.

Before changing personalities, ensure that the correct customer and model have been selected in the SETUPS menu. Any changes to settings will be lost when the model or customer is changed.

To reach ADJUSTMENTS, first access Level 1, then press --> for ADJUSTMENTS.

Press Enter, then press --> to scroll through the sub-menus.

Once the desired sub-menu is found, press Enter again, then --> to scroll through the personalities. Press the Up or Down arrows to change the personality. Press ESC to go back one or more levels to reach other sub-menus.

Table 4a-1: EZ-Cal Adjustment Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
5A DRIVE (PLATFORM STOWED)	5A-1	FWD Min	33%	Slowest speed possible
	5A-2	FWD Max	100%	Maximum speed potential
	5A-3	REV Min	31%	Slowest speed possible
	5A-4	REV Max	100%	Maximum speed potential
	5A-5	ACCEL	1.8 sec	Ramp-up time to maximum
	5A-6	DECEL	1.6 sec	Ramp-down time to stop
	5A-7	MAX Height	101%	Maximum drivable height
POSITRACK	5A-8	Positrack	—	Sub category, press ENTER to access
Sub Menu	5A-8a	AUTO below	0%	Not Used
	5A-8b	AUTO	Not Used	Not Used
5B DRIVE ELEVATED	5B-1	FWD Min	33%	Slowest speed possible
	5B-2	FWD Max	46%	Maximum speed potential
	5B-3	REV Min	31%	Slowest speed possible
	5B-4	REV Max	49%	Maximum speed potential
	5B-5	ACCEL	5.0 sec	Ramp-up time to maximum
	5B-6	DECEL	5.0 sec	Ramp-down time to stop
5C LIFT	5C-1	UP Min	5%	Slowest speed possible
	5C-2	UP Max	52%	Maximum speed potential
	5C-3	DOWN Min	0% (not used)	Gravity down (not used)
	5C-4	DOWN Max	0% (not used)	Gravity down (not used)
	5C-5	ACCEL	1.2 sec	Ramp-up time to maximum
	5C-6	DECEL	0.5 sec	Ramp-down time to stop
	5C-7	MAX Height	ANSI: 101% CE: 98%	Maximum height potential
ARMGUARD (CE)	5C-8	Armguard	—	Sub category, press ENTER to access
Sub Menu	5C-8a	Armguard Time	0.0 sec	CE Option Only
	5C-8b	Armguard @ Height	101%	CE Option Only
5D STEER	5D-1	Speed	0%	Maximum speed potential
	5D-2	Drive Compensation	0%	Adds additional to drive speed
	5D-3	Drive Comp Elevated	0%	Adds additional to drive speed elevated
	5D-4	ACCEL	0.2 sec	Ramp-up time to maximum
	5D-5	DECEL	0.2 sec	Ramp-down time to stop
5E - DECK	5E-	Not Used	Not Used	Power-out deck (not used)



Table 4a-1: EZ-Cal Adjustment Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
5F OUTRIGGERS Called "Outriggers" on the EZ-Cal, these personalities effect Auto-level function	5F-1	Outriggers	2	Not Used
	5F-2	Extend	50%	O/R speed before all legs down
	5F-3	Level	35%	O/R speed after all legs touch down
	5F-4	Retract	55%	Maximum speed potential
	5F-5	Debounce	0.35	Compensates for switch bounce
	5F-6	Initial	0.5	Not Used
	5F-7	Tilt filter	6	Compensates for tilt sensor free movement
	5F-8	X Tilt target	0.2 deg	Target level stops movement
	5F-9	Y Tilt target	0.2 deg	Target level stops movement
	5F-10	Tilt Slack	0.3 deg	Additional compensation
	5F-11	Outrigger Test	Yes/No	Not Used
5G GROUND MODE Lower Control Operations	5G-1	UP	53%	Maximum speed potential
	5G-2	DOWN	0%	Gravity down
	5G-3	OUT	0%	Power deck operation (not used)
	5G-4	IN	0%	Power deck operation (not used)
	5G-5	ACCEL	1.0 sec	Ramp-up time to maximum
	5G-6	DECEL	1.0 sec	Ramp-down drive output
5H TILT	5H-1	X Trip	2.0 degrees	Angle tilt sensor signals Out Of Level
	5H-2	Y Trip	2.0 degrees	Angle tilt sensor signals Out Of Level
	5H-3	Delay Trip	2.0 sec	Time delay between Tip and Signal
	5H-4	Delay Clear	0.5 sec	Time delay between Tip and Signal OFF
TILT 2	5H-4	Tilt 2	—	Sub category, press ENTER to access
Sub Menu	5H-5A	At Height	101%	Point where lesser tilt angle used
	5H-5B	X Trip 2	1.5 sec	Not Used
	5H-5C	Y Trip 2	1.5 sec	Not Used
5I OVERLOAD ANSI: values = 0 CE: values apply	5I-1	Trip @	ANSI: 0% CE: 110%	% of weight over maximum to trigger overload
	5I-2	Lamp @	ANSI: 0% CE: 0%	% of weight over maximum to trigger lamp
	5I-3	Alarm @	ANSI: 0% CE: 0%	% of weight over maximum to trigger alarm
	5I-4	@ Height	ANSI: 0% CE: 8%	% of elevation load sense starts monitoring weight
	5I-5	Safe Down	ANSI: 0% CE: 12%	% of elevation lift-down still operates in overload
	5I-6	Delay Trip	1.5 sec	Delay before overload trip
	5I-7	Delay Clear	1.5 sec	Delay before overload clear
	5I-8	Overload # 2	—	Sub category, press ENTER to access
	5I-8a	@ Height	0%	% of height for secondary overload valve
	5I-8b	Scale	100%	% of reduced overload valve
5J ALARMS	5J-1	Drive: Yes/No	No	1 = FWD 2 = REV 3 = Both 4 = All Motion
	5J-2	Lift	2 = Down	1 = UP 2 = DOWN 3 = Both 4 = All Motion
	5J-3	Tilt	1 = When Elevated	1 = When Elevated 2 = Always
5K HEIGHTS	5K-1	Elevation	15%	Point at which machine enters elevated mode
	5K-2	Maximum Drive	101%	Maximum drivable height
	5K-3	Maximum Lift	ANSI: 101% CE: 98%	Maximum elevated height potential
	5K-4	Armguard	101%	Stops descent for 5 sec
	5K-5	Overload	ANSI: 0% CE: 8%	% of elevation load sense starts monitoring weight
	5K-6	Safe Down	ANSI: 0% CE: 12%	% of elevation lift-down still operates in overload
	5K-7	Overload # 2	0%	Not Used
	5K-8	Tilt # 2	ANSI: 0% CE: 0%	Reduced degree of tilt at % elevation

EZ-CAL SETUP

Refer to "Using the EZ-cal Scan Tool" on page 4a-7

Table 4a-2: EZ-Cal Setup Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
6A CHANGE DEFAULTS	6A-1	Customer	5: XX84RT	Identifies Base Model Must be set when GP400 is Replaced
	6A-2	Model	5 = ANSI 6 = CE	Select from these choices only
6D TILT SETUPS	6B-1	Calibrate Level?	Y = ENTER N = ESC	Follow instructions in Section 2 - Level Sensor Calibration
		WARNING! Refer to Tilt Sensor Calibration instructions before attempting calibration		
	6B-2	Tilt Shutdown	0 = Never	Function shutdown tilted when platform stowed
	6B-3	Elevated Shutdown	1 = Lift & Drive	Function shutdown tilted when platform elevated
	6B-4	Axle Tilt	3.0 deg	Maximum deflection of axle before elevated drive interlock
6C HEIGHT SETUP (CE OPTION ONLY)	6C-1	Elevation @	13%	
	6C-2	Calibrate Height	Start Calibration	See Section 2 for calibration of Height Sensor
	6C-3	Minimum Lift	1.0 sec	Calibration setting - do not change
	6C-4	Samples	0.10 sec	Calibration setting - do not change
	6C-5	Tilt Correction	Disabled	Calibration setting - do not change
	6C-6	Slow Down	10%	Calibration setting - do not change
6D LOAD SETUPS (CE OPTION ONLY)	6D-1	Calibrate Load	Start Calibration	See Section 2 for calibration of CE Overload System
	6D-2	Faulty Load	100%	Calibration setting - do not change
	6D-3	Dynamic Scale	95%	Calibration setting - do not change
	6D-4	Delay Up	0.0 sec	Not Used
	6D-5	Delay Down	0.0 sec	Not Used
6E INTERLOCKS Delays	6E-1	Trigger Only	10.0 sec	Enable bar held without operation before interlock
	6E-2	Trigger Wait	0.0 sec	Delay after enable bar pulled before function enabled
	6E-3	Function hold	0.2 sec	Function enabled after operator release
	6E-4	Delays	—	Sub category, press ENTER to access
Sub Menu	6E-4a	Throttle Delay	0.0 sec	Delay before throttle enabled
	6E-4b	Start Delay	10.0 sec	Interlocks start to protect start system from overheat

EZ-CAL DIAGNOSTICS

The EZ-Cal Diagnostics menu provides the ability to view and test individual circuits for irregularities. Whether diagnosing a failure or testing functions during preventative maintenance, the *Diagnostics Menu* provides a quick view at the inputs and outputs as registered by the GP400 Control Module **in real time**. Using the EZ-Cal Flow Chart, compare ID number to this menu for circuit identification and result.

To reach DIAGNOSTICS menu from HELP;

- Press the right arrow and scroll to DIAGNOSTICS and press ENTER.
- Locate the desired sub menu and press ENTER.
- Press the right arrow to scroll through the test points.

NOTE: The ID number will not appear on the EZ-Cal display. It is shown in the *Diagnostics Menu* for reference only.

Using the ID number, match specific personalities from the Diagnostic Flow Chart with this table for additional information.

Press **ESC** to go back one level (necessary to change selection).

Table 4a-3: EZ-Cal Diagnostics Menu

SELECTION	ID	EZ-cal READOUT	EXPLANATION
2A SYSTEM	2A-1	MODE	Current operation - Press ENTER to read interlock when 2-2 flash is present
	2A-2	Supply	Voltage through EMS circuit to either Base or Platform input. 12 - 13.5 volts
Sub Menu	2A-2a	Supply	Voltage through EMS circuit to either Base or Platform input. 12 - 13.5 volts
	2A-2b	Cap Bank Voltage	Capacitor bank charge voltage, should be around 35 volts - Electric models only
	2A-3	Valve Supply	Supply all 12 volt circuits through TBM Module
	2A-4	Motor Volts	Not used on I/C engine models
	2A-5	Motor 1	Not used on I/C engine models
	2A-6	Temperature	Not used on I/C engine models
	2A-7	Tilt	Current state of tilt as measured by 4-way e-z fit sensor located in elevating linkage
Sub Menu	2A-7a	Tilt Filtered	Slowed tilt value used for O/R or Auto-level
	2A-7b	Tilt Local	Current state of level as measured by level sensor located inside the GP400
	2A-8	Tilted Y/N	Indicates tilted state. All motorized functions stop above limit, lift disabled in stowed
	2A-9	Height	Current state of platform elevation in %. (CE overload option only)
Sub Menu	2A-9a	Height 1 %	Reading in % from Angle Transducer #1 - relates directly to degree of elevation
	2A-9b	Height 2 %	Reading in % from Angle Transducer #2 - CE Equipped units only
	2A-10	Load	Current load on platform in %. (CE overload option only)
	2A-11	Overloaded Y/N	Platform overloaded. (CE overload option only)
	2A-12	Last Moved	Not used
	2A-13	Elevated Y/N	Shows platform elevation above/below limit switch, test limit switch operation
	2A-14	Outriggers Y/N	Turns the auto-level feature on/off
Sub Menu	2A-14a	Retracted Y/N	All Retract switches closed - For outrigger equipped units only.
	2A-14b	Extended Y/N	All pressure switches closed - For outrigger equipped units only.
	2A-14c	Status	For outrigger equipped units only
	2A-14d	Outrigger Test	Follow instructions on EZ-cal to test O/R circuits - For outrigger equipped units only.
	2A-14e	Auto-retract 15s	Retract in drive mode - auto-retract feature used on 5492 models only
	2A-15	Axle	Press ENTER for Axle sub menus

Table 4a-3: EZ-Cal Diagnostics Menu

SELECTION	ID	EZ-cal READOUT	EXPLANATION
Sub Menu	2A-15a	Level / Off Level	Status of axle position as read by GP400 - Not used on all models
	2A-15b	Locked Y/N	Status of oscillating axle lock valves, locked = no oscillation - Not used on all models
	2A-15c	Angle	Position of oscillating Axle relative to the chassis - Not used on all models
2B PLATFORM	2B-1	Trigger ON/OFF	Current status of enable trigger - upper controls
	2B-2	DLD	Status of Lift/Drive selector switch
	2B-3	Joystick	Indicates % of stroke from center in real time. Direction not indicated here
	2B-4	FWD/DWN OFF/ON	Status of Forward micro-switch Forward stroke of the joystick
	2B-5	REV/UP OFF/ON	Status of Reverse micro-switch Reverse stroke of the joystick
	2B-6	LEFT OFF/ON	Status of Left Steer switch
	2B-7	RIGHT OFF/ON	Status of Right Steer switch
	2B-8	Positrac Y/N	Status of rear wheel solenoids activation. Activated in high speed or elevated drive
	2B-9	EMSG OFF/ON	Not used
2C GROUND	2C-1	UP OFF/ON	Status of Up switch from lower control station
	2C-2	DOWN OFF/ON	Status of Down switch from lower control station
	2C-3	OUT OFF/ON	Not used
	2C-4	IN OFF/ON	Not used
	2C-5	EMSG OFF/ON	Not used
2D INPUTS	2D-1	P7-1	12 Volt Supply. Battery voltage from TBM Module
	2D-2	P7-2	Base Selected. ON= Base/Platform select switch in Base position
	2D-3	P7-3	Up. On= platform UP switch activated to elevate platform
	2D-4	P7-4	Platform Selected. ON= Base/Platform selector switch in Platform position.
	2D-5	P7-5	Limit Switch. ON= limit switch closed - platform low enough to be in stowed position
	2D-6	P7-7	Down. ON= Down switch activated for platform lower operation
	2D-7	P7-9	Throttle Solenoid. ON= Throttle requested by function operation
	2D-8	P7-10	Choke (gas engine) or pre-heat (diesel). ON= Choke or Pre-heat switch activated
	2D-9	P7-11	Axle Center Switch. ON= Front axle parallel with chassis - Elevated drive enabled
	2D-10	P7-12	Start. ON= input from engine-start switch
	2D-11	P7-13	Oil Pressure Switch
2E ANALOGS		Not used	Not used

Table 4a-3: EZ-Cal Diagnostics Menu

SELECTION	ID	EZ-cal READOUT	EXPLANATION
2F OUTPUTS	2F-1	P4-1	Choke (gas engine) or pre-heat (diesel). ON= Choke or Pre-heat activated
	2F-2	P4-2	Engine Start. ON= Starter activated
	2F-3	P4-4	Throttle Solenoid. ON= Throttle solenoid pulled in
	2F-4	P4-5	Fuel to fuel select switch. ON= fuel system activated
	2F-5	P4-6	Fuel to fuel select switch. ON= fuel system activated
	2F-6	P4-7	Alternator Excite. ON= power to activate alternator charge
	2F-7	P4-8	Ignition. ON= power to ignition coil (gas) or fuel hold solenoid (diesel)
	2F-8	P4-10	Rear Wheel Bi-pass Valves. ON= Valves powered, rear wheels in bi-pass
	2F-9	P4-12	Proportional Valve. ON= Proportional valve activated for lift and drive operation
	2F-10	P4-14	Down Valves. ON= Down valves activated for platform lower operation
	2F-11	P5-1	Lift Valve. ON= Lift valve activated for platform Lift
	2F-12	P5-2	Steer Right. ON= steer right valve activated
	2F-13	P5-3	Steer Left. ON= steer left valve activated
	2F-14	P5-4	Drive Forward. ON= drive forward valve activated
	2F-15	P5-5	Drive Reversed. ON= drive reverse valve activated
	2F-16	P5-6	Alarm. ON= alarm activated (default alarm in Down, may be selected for other modes)
	2F-17	P5-7	High Torque. ON= high torque valve activated (drive range toggle in down position)
	2F-18	P5-8	High Speed. ON= high speed valve activated (drive range toggle in up position)
	2F-19	P5-9	Hour Meter. ON= Meter powered up
	2F-20	P5-12	Power Supply to limit switch and TBM module - should be ON when system powered
	2F-21	P6-1	Rear Pitching Valve. ON= rear pitching valve activated for Platform Rear Leveling
	2F-22	P6-2	Front Pitching Valve. ON= Front Pitching valve activated for Platform forward Level
	2F-23	P6-3	Outrigger – Not used
	2F-24	P6-4	Left Rolling Valve. ON= Left valve activated for platform Level Left
	2F-25	P6-11	Axle Lock Valves. ON= Axle valves powered, front axle will oscillate
2G LOG	2G-1	Cal Date	Date of Load Sense calibration (CE option only)
	2G-2	Software	MEC specific software version
	2G-3	Powered	Accumulated time GP400 powered up (red LED on)

EZ-CAL RETRIEVE MODE AND HELP MESSAGES

NOTE: *It is important to understand that an error message will only be available if the red Diagnostic LED is flashing. If the machine is not operating properly and the red Diagnostic LED is not flashing, the trouble may lie with something not monitored by the electronic control system, i.e. a switch, hydraulic valve or wiring damage.*

There are two different menus that you can access for message retrieval; MODE and HELP.

MODE MENU

Allows the technician to see the current state of the controller with a short description. Go to, DIAGNOSTICS/SYSTEM/MODE (EZ-Cal Flow Chart 2, ID# 2a1). Pressing ENTER a second time will provide additional information with certain messages.

HELP MENU

Provides various HELP messages to identify failure modes.

Some error messages may also be identified by counting the number of times the red LED flashes on the controller so that even without access to an EZ-Cal, some simple diagnostics are possible. However, it is recommended to use an EZ-Cal to diagnose problems, and not rely on the LED! The EZ-Cal provides a much higher detail of information.

MODE MESSAGE

- Connect the EZ-Cal (see illustration).
The display will read, "HELP: PRESS ENTER".
- Press Enter to display the current message.
- Refer to the following list of HELP messages to better understand the nature of the message or fault.
- If the GP400 does not register a fault, the display will read EVERYTHING OK.

SCROLLING MESSAGE

Pressing **ENTER** twice will provide a scrolling message of the current message (if one exists) followed by a log of previous operations and/or errors that occurred immediately prior, starting with most recent. **All messages are cleared whenever the system is powered down.**

Other helpful menus available include **DIAGNOSTICS** which allows the technician to monitor specific plug input/output information. Refer to EZ-Cal Flow Chart 2 – Diagnostics (ANSI Page 4a-10 – CE Page 4a-12).

MODE MESSAGES

The purpose of **MODE** is to indicate, in real time, the current state of the controller with a short description.

INITIALIZING

- The system is preparing to operate, immediately after power-on.

SHUTDOWN!

- The system cannot operate – for example both the PLATFORM & GROUND inputs are active together.

CHECK CANBUS

- The system cannot operate – CANBUS communications is not successful (for example wire damage to the platform)



PLATFORM, GROUND

- The system is ready to operate, from the upper or lower controls as indicated (selected by the Base/Platform selector switch)

GROUND UP, GROUND DOWN,

- A ground function is operating normally

GROUND UP LOCKED, GROUND DOWN LOCKED,

- A ground function is selected but not allowed (for example, the function switch was closed at power-on)

GROUND FAULTY

- Multiple ground function inputs are active at the same time

WAITING FOR TRIGGER

- A platform function is selected, but the joystick trigger switch is not closed (close the trigger switch to proceed)

TRIGGER CLOSED

- The joystick trigger switch is closed, but no function is selected (select a function to proceed)

TRIGGER LOCKED

- The joystick trigger switch was closed at power-on, or closed for too long with no function selected (check trigger switch)

FORWARD, REVERSE

- A platform drive function is operating normally

FORWARD (LEFT), FORWARD (RIGHT), REVERSE (LEFT), REVERSE (RIGHT)

- A platform drive function is operating normally, with steer also active

STEER LEFT, STEER RIGHT

- A platform steer function is operating normally (without drive)

UP, DOWN

- A platform lift/lower function is operating normally

FORWARD LOCKED, REVERSE LOCKED

- A platform drive function is selected but not allowed (for example, the switch was closed at power-on)

LEFT LOCKED, RIGHT LOCKED

- A platform steer function is selected but not allowed (for example, the switch was closed at power-on)

UP LOCKED, DOWN LOCKED

- A platform lift/lower function is selected but not allowed (for example, the switch was closed at power-on)

CHECK DRIVE/LIFT

- Neither platform drive nor platform lift select is active, or both are active at the same time

CHECK JOYSTICK

- Both platform joystick directions are active at the same time

STEER FAULTY

- Both platform steer directions are active at the same time

EXTENDING LEGS

- Outrigger legs are extending normally

RETRACTING LEGS

- Outrigger legs are extending normally

OUTRIGGERS LOCKED

- An outrigger function is selected but not allowed (for example, the switch was closed at power-ON)

INTERLOCKED**

- An interlock shutdown is active, preventing one or more functions. The interlock can be due to many different causes ...

Press <ENTER> from the **MODE display to see the precise cause of the interlock (listed below) – press <ESC> from that display to return to the **MODE** display:

TEST MODE

- The system test mode is active – switch power off and on again to clear

TILTED

- The vehicle is tilted beyond limits, descend, then move vehicle to a more level location

OVERLOADED

- The vehicle platform is overloaded, reduce platform load. **(CE option only)**

TOO HIGH

- The vehicle platform is too high to allow some functions – descend first

ARMGUARD

- During descent, the system is configured to stop movement to provide an armguard delay – release and re-select DOWN to continue lowering **(CE option only)**

TOO HOT

- The EZLIFT heatsink has reached 75°C, preventing all functions except lowering. Functions will be allowed again when the heatsink cools to below 70°C.
- The heatsink temperature can be viewed in the DIAGNOSTICS/SYSTEM/ TEMPERATURE display, ID # 2a5.
- The heatsink must be bolted to a significant metal panel of the vehicle, capable of dissipating heat to the environment.

UNCALIBRATED

- The height and/or pressure sensors have not been calibrated see CALIBRATION OF OVERLOAD SYSTEM **(CE option only)**.
- If machine is not equipped with Overload system, refer to SETUPS table and change those personalities that do not match the figure listed in the table.

EXTERNAL ALL, EXTERNAL DRIVE, EXTERNAL LIFT

- An external cutout input is preventing functions – determine the cause of the external cutout (for example, a limit switch)

EZ-CAL HELP MESSAGES

In addition to the **MODE** messages detailed above, the GP400 provides a **HELP** message to identify failure modes. Some error messages may also be identified by counting the number of times the red LED flashes on the controller so that even without access to an EZ-Cal, some simple diagnostics are possible. However, it is recommended to use an EZ-Cal to diagnose problems, and not rely on the LED! The EZ-Cal provides a much higher detail of information.

- Connect the EZ-Cal (see illustration).
The display will read, "HELP: PRESS ENTER".
- Press Enter to display the current message.
- Refer to the following list of HELP messages to better understand the nature of the message or fault.
- If the GP400 does not register a fault, the display will read EVERYTHING OK.

Pressing ENTER twice will provide a scrolling message of the current message (if one exists) followed by a log of previous operations and/or errors that occurred immediately prior, starting with most recent. **All messages are cleared whenever the system is powered down.**

NOTE: When using the LED to attempt diagnosis, please note that a **DUAL FLASH** code is indicated. The LED will flash on/off a certain number of times, pause off for a short delay, then flash on/off a second certain number of times, followed by a much longer pause off. The sequence will then repeat.

INFORMATION ONLY MESSAGES

The following are "information only" HELP messages which are not indicative of any possible problem – there is no LED flash code (the LED remains on steady):

STARTUP! _____ (no flash code)

- The system has just been powered on and is carrying out some initialization steps prior to being ready to operate. If you select a function during this time, it may be locked out until you release then re-select it.

EVERYTHING OK _____ (no flash code)

- There is no problem with the system – it is ready to operate in platform mode when a function is selected.

NOTE: If this is the HELP message when a function is selected, check for open-circuit switches or wiring.

GROUND MODE ACTIVE! _____ (no flash code)

- There is no problem with the GP400 – it is ready to operate in ground mode when a function is selected.

CLOSE TRIGGER _____ (no flash code)

- A platform function is selected but the trigger switch is not closed.

VEHICLE TILTED _____ (no flash code)

- The vehicle is tilted beyond the limits, some functions may be prevented.

FUNCTION ACTIVE MESSAGES

The following **HELP** messages indicate that there is no problem with the GP400 but that a function is active – the vehicle should be moving as requested by the operator.

DRIVING! _____ (no flash code)
LIFTING! _____ (no flash code)
LOWERING! _____ (no flash code)
STEERING! _____ (no flash code)
EXTENDING OUTRIGGERS! _____ (no flash code)
RETRACTING OUTRIGGERS! _____ (no flash code)

CALIBRATION MESSAGES

The following are “calibration” **HELP** messages – until the machine is properly calibrated for height and/or pressure (as required), many functions will not be available.

NOT CALIBRATED _____ **Flash Code: 1/1**

FUNCTIONS LOCKED - NOT CALIBRATED _____ **Flash Code: 1/1**

- The height and/or pressure sensors have not been calibrated and are required because of the setup of the GP400.
- Calibration procedures are accessible from the **SETUPS/HEIGHT SETUPS** and **SETUPS/LOAD SETUPS** menus.

FAULT: CUSTOMER _____ **Flash Code: 1/1**

- The system must be configured to the customer requirements – with the EZ-Cal in **SETUPS/CHANGE DEFAULTS** menu, scroll to the correct machine from this menu, the press Right Arrow to select the appropriate model.

NOTE: Selecting the incorrect customer or model will cause the machine to operate incorrectly or go into fault mode.

SHUTDOWN HELP MESSAGES

This section lists “shutdown” HELP messages – functions can be shut down to prevent them being used:

SHUTDOWN - CHECK EMS SWITCHES! _____ Flash Code: 2/1

- The Base/Platform selector switch position indicates the mode in which the system must operate if both are active together; the system does not know how to function

FUNCTIONS LOCKED - TEST MODE SELECTED _____ Flash Code: 2/2

- Test mode is not accessible with this system. Switch power off/on to reset to normal operation

FUNCTIONS LOCKED - ARMGUARD (CE option only) _____ Flash Code: 2/2

- During descent, the System can stop movement for a configurable time, to allow a safety check that no-one is close to the machine. The operator must release and re-select DOWN to continue lowering (after the delay time-out).

FUNCTIONS LOCKED – OVERLOADED (CE option only) _____ Flash Code: 2/2

- System overload features are active, and the platform is excessively loaded to allow operation – the platform load must be reduced.

FUNCTIONS LOCKED – UNDERLOADED (CE option only) _____ Flash Code: 2/2

- System overload features are active, and the platform load is too low to be valid – this could be caused by erroneous calibration, a sensor fault, or a change in the vehicle mechanics/hydraulics.

FUNCTIONS LOCKED - TOO HIGH _____ Flash Code: 2/2

- The platform is raised too high to allow some functions. Certain functions may not be allowed above certain elevations.
- Check operator’s manual or ADJUSTMENTS/HEIGHTS/MAX DRIVE and MAX LIFT to see if drive and/or lift is allowed at all heights.

FUNCTIONS LOCKED - TILTED _____ Flash Code: 2/2

- The vehicle is tilted too much to allow some functions.
- Check operator’s manual or ADJUSTMENTS/TILT/Xtrip and Ytrip, which determine the maximum allowed vehicle tilt.
- Refer to EZ-Cal Flow Chart 1 – Adjustments and Setup.

FUNCTIONS LOCKED - EXTERNAL SHUTDOWN _____ Flash Code: 2/2

- An external shutdown is preventing functions – check DIAGNOSTICS/SYSTEM/ MODE/INTER-LOCK to see which external interlock is active.

CHECK GROUND INPUT SWITCHES! _____ Flash Code: 2/2

- There is a problem with the ground function select switches – more than one is active at the same time.

SELECT DRIVE/LIFT MODE! _____ Flash Code: 2/2

- There is a problem with the platform drive/lift select switch – neither mode is selected.

CHECK DRIVE/LIFT SELECT SWITCH! _____ Flash Code: 2/2

- There is a problem with the platform drive/lift select switch – both modes are selected together.

CHECK JOYSTICK SWITCHES! _____ Flash Code: 2/2

- There is a problem with the platform joystick switches – both directions are selected together.

RELEASE TRIGGER! _____ Flash Code: 2/2

- The trigger was closed at power-on, or closed for too long with no function selected.

RELEASE GROUND SWITCHES! _____ Flash Code: 2/2

- Ground function switches were closed at power-on.

RELEASE JOYSTICK SWITCHES! _____ Flash Code: 2/2

- Platform joystick switches were closed at power-on, or closed for too long without trigger switch (see **SETUPS/INTERLOCKS/TRIGGERwait**).

RELEASE OUTRIGGER SWITCHES! _____ Flash Code: 2/2

- Outrigger switches were closed at power-on.

WIRING MESSAGES

The following are “wiring” HELP messages – problems have been detected which are likely due to vehicle wiring issues:

FAULT: ENERGIZED VALVE - CHECK P5 WIRING! _____ Flash Code: 3/2**FAULT: VALVE FEEDBACK HIGH - CHECK VALVE WIRING! _____ Flash Code: 3/2**

- There is a voltage on one or more valve outputs, when all outputs are off.
- Check each valve output to trace where the invalid supply is coming from.

FAULT: CAPBANK VOLTAGE TOO HIGH - CHECK LINE CONT! ____ Flash Code: 3/3

- The voltage on the B+ stud of the controller (connected to an internal voltage stabilization capacitor bank) is too high when the line contactor is off. B+ stud voltage should be approximately 32 volts at idle.
- Check the line contactor tips are not welded, and check the power wiring for errors.

FAULT: ENERGIZED LINE CONTACTOR - CHECK P5 WIRING! ____ Flash Code: 3/4

- There is a voltage on the line contactor coil output, when it is off.
- Check wiring to the line contactor coil to trace where the invalid supply is coming from.

FAULT: MOTOR OVERLOAD! _____ Flash Code: 3/5

- The power protection circuits in the controller have activated to protect from extreme overload.
- Check for short-circuit power wiring; check for a seized or shorted motor.

SUPPLY MESSAGES

The following are “supply” HELP messages – problems have been detected which are likely due to supply issues:

FAULT: LOW OIL PRESSURE! _____ Flash Code: 4/1

- Engine oil pressure switch open after start sequence initiated. Engine stalled or unable to start.

FAULT: BAD INTERNAL 5V! _____ Flash Code: 4/2

- The internal “5V slave” supply is out of range; if the fault remains, the controller may have to be replaced.

FAULT: BAD INTERNAL SLAVE! _____ Flash Code: 4/2

- The internal “slave” is not operating correctly; if the fault remains, the controller may have to be replaced.

FAULT: BAD INTERNAL 12V! _____ Flash Code: 4/3

- The internal “12V” supply is out of range;
- 12V Supply is generated by the Motor control module and supplied to the GP400. Check for wiring errors between the two modules. If the fault remains, the Motor Controller may have to be replaced.

FAULT: BATTERY VOLTAGE TOO LOW! _____ Flash Code: 4/4

- The battery supply is too low – the batteries must be re-charged.

FAULT: BATTERY VOLTAGE TOO HIGH! _____ Flash Code: 4/4

- The battery supply is too high – check that the correct battery and charger are installed.

FAULT: BAD 5V SENSOR SUPPLY - CHECK P2-1 WIRING! _____ Flash Code: 4/5

- The “5V sensor” supply is out of range; this supply is available to power external 5V-powered sensors – check that it has not been overloaded or short-circuited to other wiring (CE models).

SENSOR MESSAGES CE MODELS

The following are “sensor” HELP messages – problems have been detected which are likely due to sensor issues (CE models).

FAULT: CHECK HEIGHT1 SENSOR _____ **Flash Code: 6/1**

FAULT: CHECK HEIGHT2 SENSOR _____ **Flash Code: 6/1**

- A height sensor is giving an out-of-range voltage (below 0.5V or above 4.5V).

FAULT: CHECK HEIGHT SENSORS _____ **Flash Code: 6/1**

- When two height sensors are fitted, both should read the same height at all times; this message indicates that the sensors are reading different heights. Check for loose sensors and/or re-calibrate.

FAULT: CHECK PRESSURE SENSOR _____ **Flash Code: 6/2**

- A pressure sensor is giving an out-of-range voltage (below 0.5V or above 4.5V).

FAULT: CHECK ELEVATION SWITCH _____ **Flash Code: 6/3**

- The elevation switch is in disagreement with the height sensor(s).
- During calibration, the height at which the elevation switch opens (while lifting) and closes (while lowering), is recorded. Subsequently, height and these calibration points are continuously checked – any significant difference generates this error.

CANBUS MESSAGES

This section lists “CANBUS” HELP messages – problems have been detected with CANBUS communications between different modules (of course, only applicable if more than one module is connected together via CANBUS):

FAULT: CANBUS! _____ **Flash Code: 6/6**

- There are problems with CANBUS communications between the different modules; messages expected from one or more module are not being received, or messages intended to one or more module cannot be transmitted.
- Check for open- and short- circuit problems with CANBUS wiring; ensure that the CANBUS is wired correctly pin-to-pin; ensure that the vehicle chassis is not erroneously shorted to the chassis (for example, due to insulator breakdown in the motor).

POWER WIRING MESSAGES

The following are “power wiring” HELP messages – problems have been detected which are likely due to power wiring errors:

FAULT: CAPBANK VOLTAGE TOO LOW - CHECK STUD WIRING! **Flash Code: 7/7**

- The voltage on the B+ stud of the controller (connected to an internal voltage stabilization capacitor bank) is too low when the line contactor is off (a pre-charge circuit in the module normally applies approximately 32 volts to the capacitor bank).
- Check the 300 amp fuse, line contactor or power wiring for errors. Also check DC motor for internal grounding.

OTHER MESSAGES

The following are other HELP messages:

SOME BIG BAD PROBLEM! _____ **Flash Code: 9/9**

- This message should not occur!

FACTORY OVERRIDE _____ **Flash Code: (fast flashing)**

- When the controller is first shipped, prior to initial calibration, it is configured in a special “factory override” state. In this state, none of the normal shutdowns or interlocks will occur – the vehicle can be freely lifted/lowered and driven irrespective of any calibration needs, vehicle tilt, etc.
- As soon as an EZ-Cal is connected to the controller, the factory override state is ended.
- If calibration does not occur, then the factory override state will recur if the EZ-Cal is disconnected and power is switched off/on.

IMPORTANT: – Never use a vehicle in factory override; this state is **ONLY** intended for use during manufacture! While factory override is active, the LED is rapidly flashed on/off.

TROUBLESHOOTING CHART

The following chart is a guide to help the technician find the area of a problem. In order to benefit from the information, you are advised to fully assess the symptoms by operating all machine functions. There may be some functions that operate while others may not. Record this information and proceed down the left-hand column until you find the failure scenario that best fits the problem. Refer to the information provided to the right for possible causes and remedies. This unit contains a Microprocessor based control system which contains various safety features designed to protect itself and the operator in the event of a failure.

The EZ-Cal scan tool will provide the technician with detailed information related to the failure. ***It is strongly recommended that the technician use the EZ-Cal to read any displayed messages before proceeding to use this Troubleshooting chart.***

Information on the use of the EZ-cal tool plus helpful Flow Charts and graphs can be found earlier in this troubleshooting section. Please read and familiarize yourself with all of the information provided in the troubleshooting section before attempting to diagnose or repair the machine.

Table 4a-4: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	REMEDY/SOLUTION
General Power Issue		
No operation from Upper or Lower control station	Main Battery Switch turned OFF	Located left of Lower Control Box
	Emergency Stop Switch pushed or Ignition Switch turned OFF	Upper or lower E-Stop will cut all power, as will the Ignition Switch in the Upper Control Box
	Battery discharged or faulty cables	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge battery - repair cables
	Circuit Breaker Tripped	Located in Lower Control Box Panel Look for short circuit and/or damage in wiring or high amperage draw at valve coils or engine actuators.
	Damaged Upper Control Box harness	Inspect the harnesses and harness plugs for damage or broken wires - May receive 6-6 flash code on GP-400 (CAN bus) or no power at all
	Blown supply fuse	Locate source of short circuit. Inspect/replace fuse located just below Main Battery Switch
	Other fault in system monitored by GP400	Check HELP message on EZ-cal or check Flash Code for error
Functions from Lower Controls but not from Upper Controls	Interlock Switch (Joystick)	Check power to red wire (power to switch) and power to purple wire (power out of switch) at the joystick plug
Lift/Lower		
Platform will not raise	Excessive weight on platform	Reduce weight to within platform capacity
	Lift Relief Valve out of adjustment	Adjust Relief Valve to rated platform capacity
	Lift Valve SV-1 not energized	Check wiring to lift valve Check for EZ-cal message or flash code
	Lowering valve SV-5 stuck open (located at base of lift cylinder)	Check and remove contamination from valve
	Level sensor out of level (platform elevated above 10')	Reposition machine to firm level surface Check level sensor function using EZ-cal
	Main system pressure inadequate	Check pump output pressure
	Battery discharged - no charge output	Check battery voltage, alternator output (14.5 volts) Clean, service and charge battery
	System interruption	Check HELP messages using EZ-cal



Table 4a-4: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	REMEDY/SOLUTION
Platform will not lower or lowers slowly	Maintenance lock in maintenance position	Return maintenance lock to the stowed position
	Lowering valve not energized	Check wiring to lowering valve located on Lift Cylinder
	Lowering valve not shifting	Clean debris, check for damage, replace
	Lowering orifice/s plugged	Clean orifice/s located inside hose fitting on lift cylinder
	System interruption	Check HELP messages using EZ-cal
Lowers but not completely	Down valve on lift cylinder inoperative	Check lift valve coil
Emergency lowering not working	Lowering valve not shifting	Clean debris, check for damage, replace
	Lowering orifice plugged	Clean orifice/s located inside hose fitting on the lift cylinder
	E-down battery discharged	Charge, check charge diode & connections
	Valve coil failed on cylinder	Test (6-8 ohms), replace
Drive		
No drive function	Lift/Drive select switch not in Drive position or not operational	Select Drive position (upper control box), Check switch Check switch position from GP400 with EZ-cal (see EZ-cal ID# 2b-2) DLD
	Drive valve not shifting (SVD1)	Check connections at valve Check Drive Valve for contamination Check Drive output from GP400 (See EZ-cal chart ID# 2b-4 & 2b-5 also 2f1-4 & 2f-15)
	Proportional Valve not shifting (SP1)	Check connections at valve Check Proportional valve for contamination Check proportional output from GP400 (see EZ-cal ID# 2f-9 & 2b-3)
	Drive system shut down (interlock)	Check HELP and MODE message on EZ-Cal
No drive elevated	Unit out of level	Lower and operate Auto-level
	System Interruption (interlock)	Check HELP messages using EZ-Cal
Slow drive with platform stowed	High torque enabled	Check Speed/Torque switch on upper controls
	Malfunctioning rear wheel bypass valve	Located on rear wheel motors only Check electrical by disconnecting valves Check function by replacing valves
	Wheel motors not functioning correctly	Inspect wheel motors for excessive bypass
Poor gradeability or drive performance	High or mid speed enabled	Check Speed/Torque switch on upper controls
	Batteries discharged	Check battery voltage with multi-meter or EZ-Cal Clean, service, charge batteries
	Wheel motors not functioning correctly	Inspect wheel motors for excessive bypass
	Malfunctioning rear wheel bypass valve	Located on rear wheels only Check electrical by disconnecting valves Check function by replacing valves
	Malfunctioning series parallel valves	Located on top of main hydraulic manifold PD1, PD2 & PD3 Remove and inspect
	Incorrectly adjusted or worn hydraulic pump	See Hydraulics section for pump adjustment Inspect or replace pump
Drive in one direction only	Drive valve SVD1 not energized in one direction	Check 12 volts to appropriate coil Check coil Check valve function
	Counterbalance valve CBV1 or CBV2 not functioning correctly	Swap counterbalance valves to see if functioning direction changes
	No output from GP400	Check switch position output from GP400 (see EZ-Cal ID# 4f-7 – FWD or 2f-9 – Reverse)

Table 4a-4: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	REMEDY/SOLUTION
No low speed (high torque mode)	Speed/Torque switch inoperative	Check continuity through Speed Select switch with wires disconnected terminals 2 & 1
	Valve SV3 not functioning	Check for 12 volts and ground to valve Check for faulty valve spool Check switch position output from GP400 (See EZ-cal ID# 2f-17)
	EP1 poppet valve not functioning	Check or replace valve (see hyd schematic for location)
No Mid Speed	SV3 or SV4 powered and/or shifted	These valves should not have 12 volts In mid-speed, check valve function
	Speed/Torque selector switch malfunction	Terminals 1 or 3 are common with terminal 2 when switch is in mid position
No High Speed	Speed/Torque selector switch inoperative	Check continuity through Speed Select switch with wires disconnected terminals 2 & 3
	Valve SV4 not functioning	Check voltage and ground to valve Check for faulty valve spool Check switch position output from GP400 (See EZ-cal ID# 2f-18)
	EP2 poppet valve not functioning	Check or replace valve
No Speed Selection	Limit switch not functioning	Check limit switch located on left rear of base Check limit switch input with EZ-Cal (EZ-Cal ID# 2d5)
Steer		
No steer in either direction	Lift/Drive selector switch in the Lift position	Switch must be in Drive position for steer operation
	Joystick rocker switch inoperative	Check continuity through rocker switch on green and yellow wires (right & left) with blue wire (input).
	Steering valve inoperative	Check steering valve for power or damage Check switch position output from GP400 (see EZ-cal ID # 2f-12 & 2f-13)
	System Interruption	Check HELP messages using EZ-Cal
	Hoses connected incorrectly	See hydraulic section for proper connection
	Pressure relief valve set too low	Set steer relief valve to 2000 p.s.i.
Steers in one direction only	Steering valve inoperative or stuck	Inspect – replace steering valve
	No power to steering coil	Check for power and ground in both directions. Repair wiring Check switch position output from GP400 (see EZ-cal ID#s 2f-12 right & 2f-13 left)
	System Interruption	Check HELP and MODE message on EZ-Cal
Steers, but not fully, or steers slowly	One or both steering cylinder seals failed	Check steering cylinder seals – replace
	Pressure relief valve set too low	Set steer relief valve to 2000 p.s.i.
	King pin/s seizing in the bore	Disassemble and inspect Repair Replace bushings

Table 4a-4: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	REMEDY/SOLUTION
Level (Auto and Manual)		
No Auto - level operation	System senses platform elevation above 10 feet (3.2m)	Check elevation status using the EZ-cal (see ID# 2a-13) Recalibration of Height may be necessary (see Calibration section for instruction).
	System interruption	Check HELP messages using EZ-cal
	Level switch inoperative	Check level switch located in the upper control box, Check switch position input to GP400 (see EZ-cal ID# 2a-14)
	Level Valves not functioning	Located behind lower control box Inspect valve for power or damage Check switch position output from GP400 (see EZ-cal ID# 2f-21 through 2f-24)
Auto-level operates but platform is not level when cycle is complete	Level sensor not properly calibrated	See Calibration section for proper level sensor calibration
	Unit on too extreme angle	Relocate unit to more level ground
	A level valve is sticking	Located behind lower control box Inspect valve for power or damage Check switch position output from GP400 (see EZ-cal ID# 2f-21 through 2f-24)
	Level cylinder hoses not connected in correct location	See hydraulic section for correct location
	Level valves wired incorrectly	See Electrical section for proper plug connection.
	Relief valve out of adjustment	Re-set Steer relief valve to 2000 PSI
No Manual level operation	See "No Auto-level Operation" for information	

HYDRAULIC PRESSURE ADJUSTMENT - 3084RT

- Before attempting to check and/or adjust pressure relief valves, operate the machine for 15 minutes or long enough to sufficiently warm the hydraulic fluid.
- Insert a 0-5000 psi gauge onto the pressure test port on the valve manifold using gauge adapter fitting MEC part no. 8434

Table 4a-5: Hydraulic Pressure Adjustment

Model	Main		Lift		Steer		Stand-by	
3084RT	2800 PSI	193 bar	2500 PSI	172.4 bar	2000 PSI	137.9 bar	500-550PSI	35-38 bar

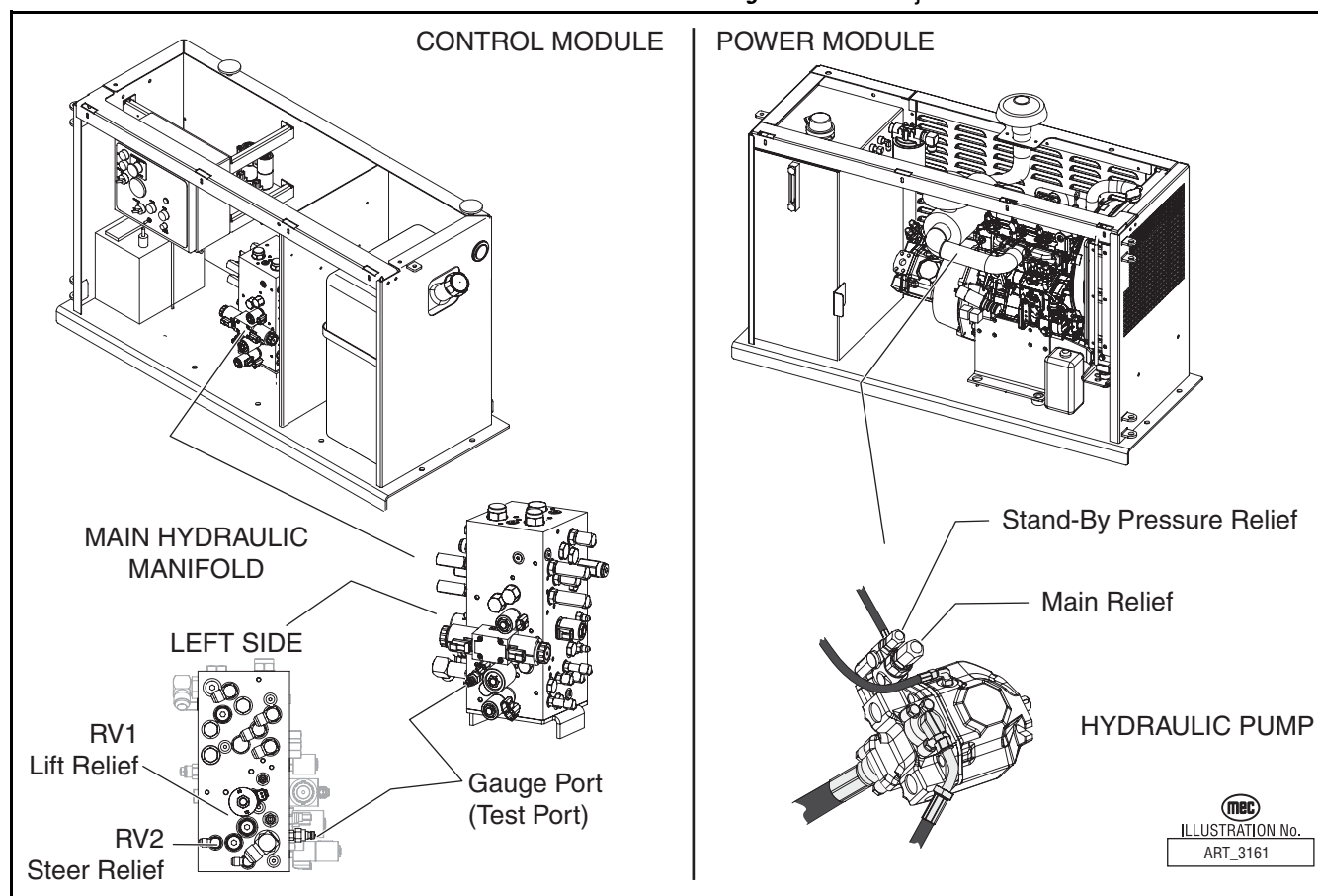
ADJUSTING RELIEF VALVES

- Remove the tamper proof cap.
- Turn adjustment screw “IN” to increase pressure.
- Turn adjustment screw “OUT” to decrease pressure.
- When correct pressure is obtained replace tamper proof cap with a new one.



Do not operate pump with tamper proof cap removed. Fluid will emit under pressure.

Figure 4a-10: Adjustable Valves Location - 3084RT



ADJUSTMENTS - 3084RT

This machine uses a variable displacement, pressure compensated, piston type hydraulic pump. Proper adjustment is critical for normal operation of the machine.

All of the following steps must be performed in sequence to achieve proper adjustment and machine performance.

Refer to "Adjustable Valves Location - 3084RT" on page 4a-33.

See Section 5 - Schematics for correct pressure settings.

Main Relief and Standby Pressure Adjustments

- Start engine and operate the unit for 15 minutes or until the hydraulic fluid is warm.
- Insert a 0 – 5000 PSI (0-345 bar) gauge onto the manifold pressure gauge port.
- Remove the acorn nut from the Main Relief adjustment screw. Loosen the jam nut and turn the screw counterclockwise 3 turns. Tighten the jam nut and install the acorn nut.
- Remove the acorn nut from the Standby adjustment screw and loosen the jam nut. Turn the screw clockwise 3 turns or until the needle on the gauge stops climbing. At this point the gauge is reading full main relief pressure.
- Access the Main Relief screw again and adjust it until the gauge settles at 2800 PSI (193.5 bar). Tighten the jam nut and install the acorn nut.
- Check the gauge reading again to ensure the setting did not change.
- Turn the Standby adjustment screw counterclockwise until the gauge reads 550 PSI (38 bar). Tighten the jamb nut and install the acorn nut.
- Check the gauge reading again to ensure the setting did not change.

Pump Displacement Adjustment

This adjustment is set at the factory and should not be altered. The displacement adjustment controls the maximum amount of fluid flow that the pump will produce per revolution. Excessive flow will result in severe engine loading and stalling. Reduced flow will result in slower functions with no engine loading. If you suspect that the setting is incorrect, please call MEC Product Support at (800) 387-4575 for assistance.

Lift Relief (RV1)

The Lift Relief valve is located on the left-side, center of the valve manifold. It will be necessary to remove the cap from the relief valve if adjustment is necessary.

REMOVING THE CAP WHILE THE ENGINE IS RUNNING WILL RESULT IN FLUID LEAKAGE.

To check Lift Relief valve setting, park the machine on a firm level surface free from overhead obstructions.

- Extend the platform to full height with **no load on platform**.
- Hold the switch for 10 seconds to get an accurate reading on the pressure gauge.
- If pressure is LOW, adjust lift relief valve ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust lift relief valve ¼ turn counterclockwise and recheck.
- Repeat until correct.

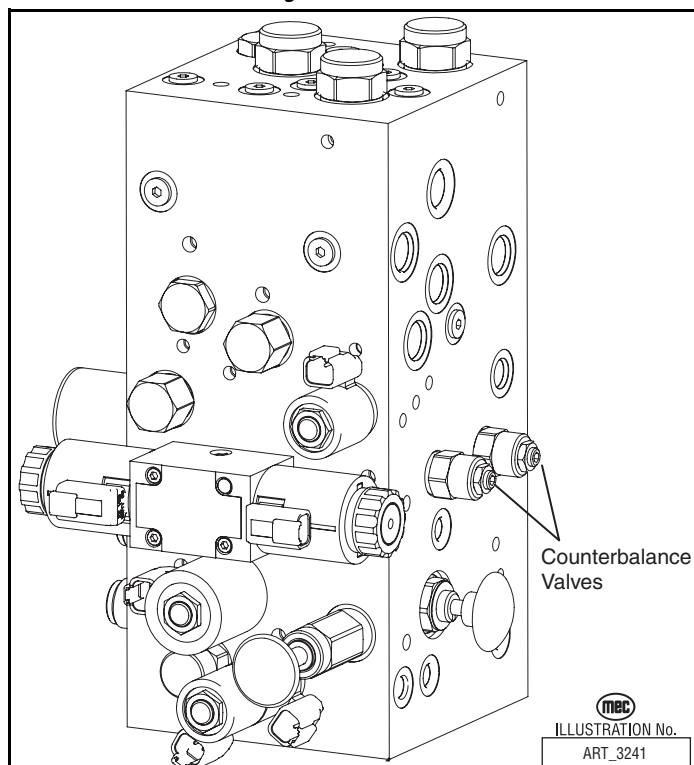
Steering Relief (RV2)

The steering Relief valve is located on the lower left side of the valve manifold. It is necessary to remove the cap from the relief valve if adjustment is necessary. REMOVING THE CAP WHILE THE ENGINE IS RUNNING WILL RESULT IN FLUID LEAKAGE.

- Energize the steering to full left.
- Hold the switch for 10 seconds to get an accurate reading on the pressure gauge.
- If pressure is LOW, adjust steering relief valve ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust steering relief valve ¼ turn counterclockwise and recheck.
- Repeat until correct.

COUNTERBALANCE VALVES

1. Loosen the locknut on one of the valves.
2. Turn the adjustment screw counterclockwise (to the left) until it reaches the internal stop and the screw will turn no further.
3. Turn the adjustment screw clockwise (to the right) 3¼ turns.
4. Tighten the locknut while holding the adjustment screw in position to prevent it from rotating.
5. Repeat steps 1 through 4 on the other Counterbalance valve.
6. Adjustment is complete.

Figure 4a-11: Counterbalance Valves

COMPONENT ILLUSTRATIONS

Figure 4a-12: Controls and Switches

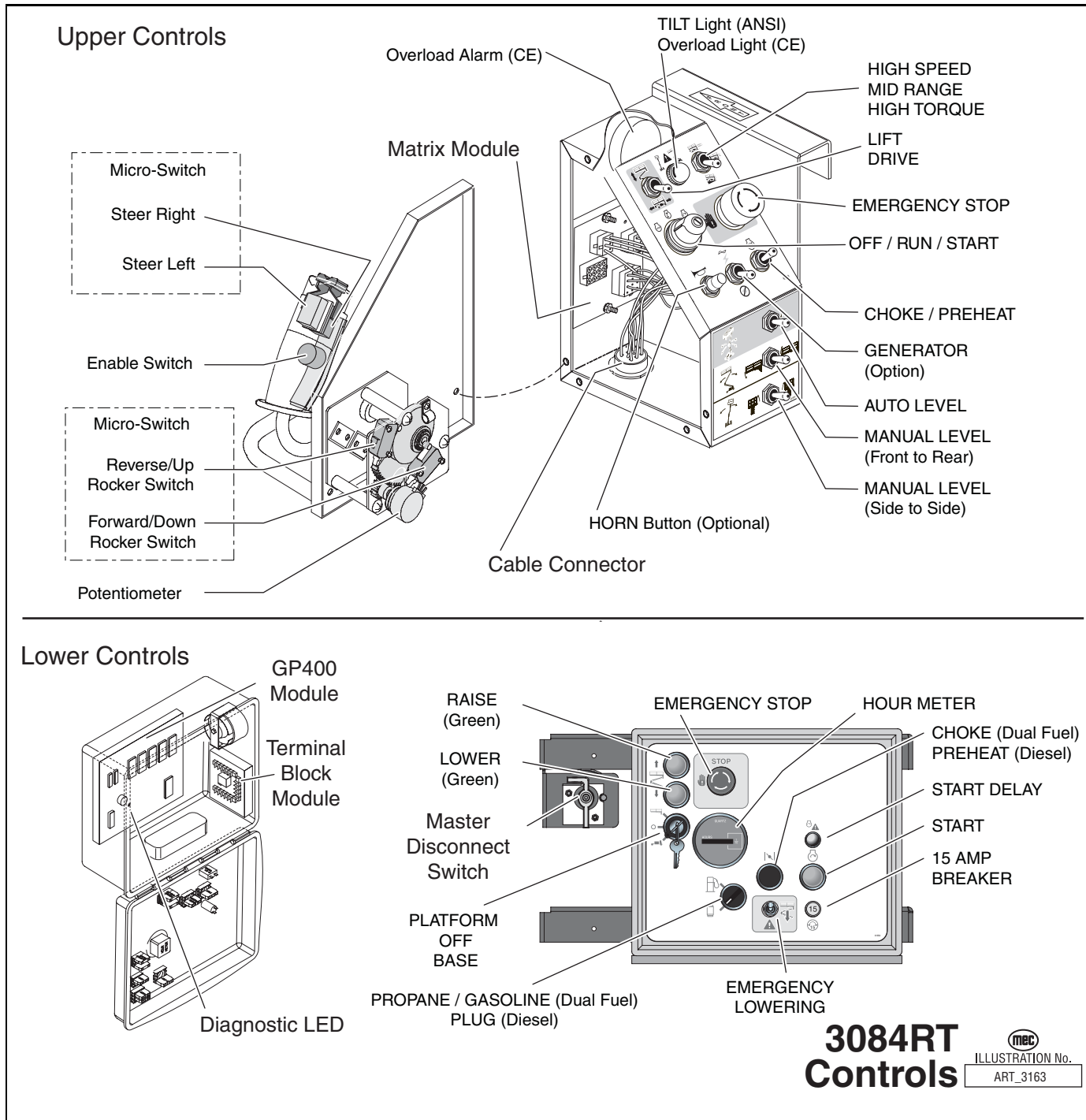
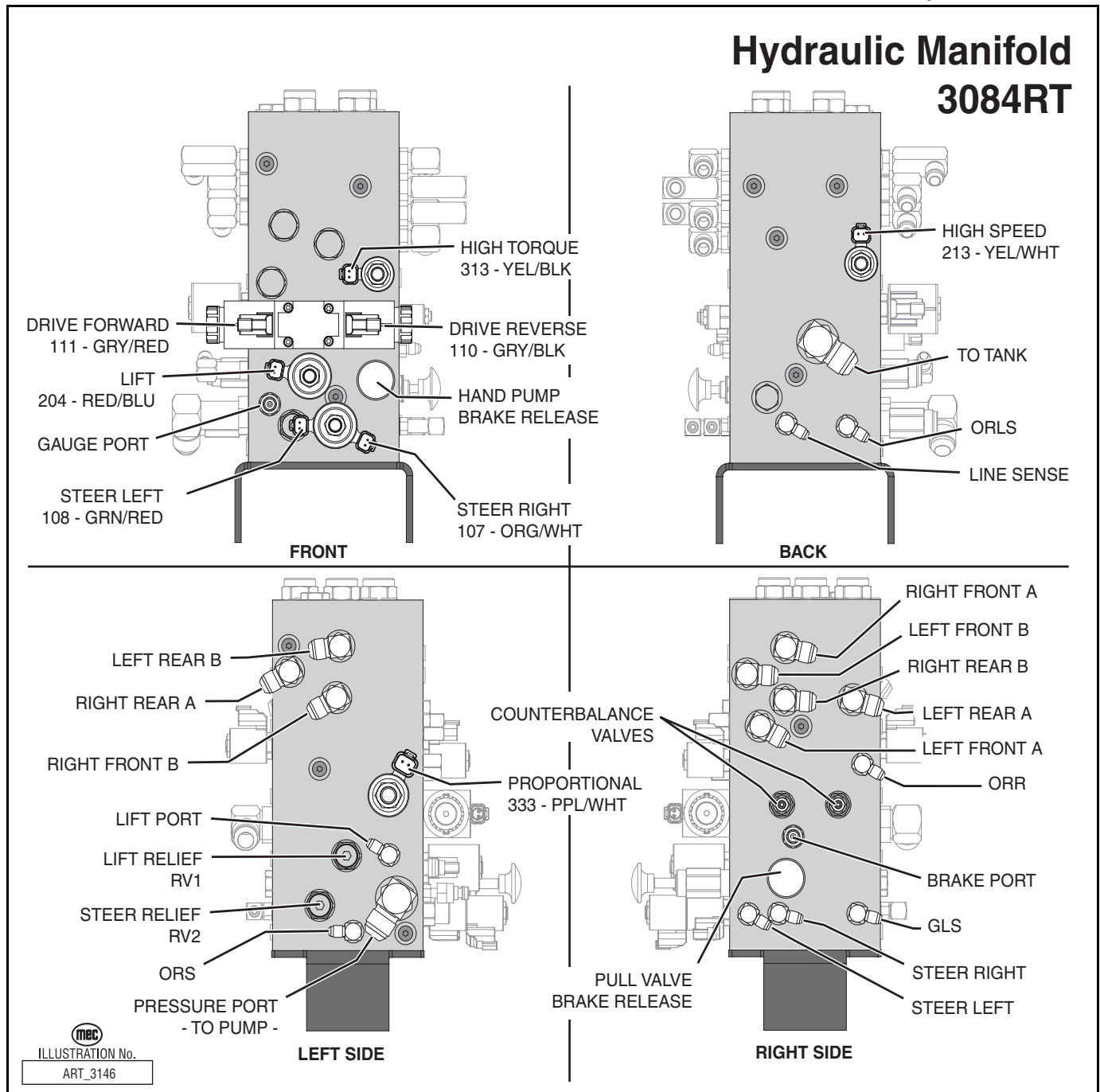


Figure 4a-13: Hydraulic Manifold,



NOTES:



Section 4b

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GENERAL TROUBLESHOOTING TIPS

HYDRAULIC FLUID PUMP: 3084ES MODELS

The 3084ES Aerial Work Platforms operate on a “Motor Control” theory in which fluid flow volume is controlled by varying the speed of the DC electric motor driving a fixed displacement pump. 100% of the fluid produced by the pump goes to the selected function.

BATTERY CHARGE STATE: 3084ES MODELS

Before you begin troubleshooting this model, check the battery state of charge and inspect the battery connections for looseness or corrosion. A fully charged battery pack on a 48 Volts DC system will have a nominal voltage of 52.5–54 Volts DC.

Common Causes of Electrical System Malfunctions:

- Battery switch is turned OFF (located to the left of lower controls).
- Battery connections are loose or corroded
- Battery is not fully charged.
- Emergency Stop buttons are pushed (OFF position).
- Circuit breaker is in the tripped (OFF position).

Common Causes of Hydraulic System Malfunctions:

- Hydraulic fluid level is too low.
- Incompatible hydraulic fluids mixed, destroying the additives and causing varnish build up, resulting in the valves sticking.
- Water in the hydraulic fluid due to a damp climate.
- Improper hydraulic fluid used. Viscosity too high in cold climates. Viscosity too low in warm climates.
- Hydraulic fluid contaminated with debris - filter change interval neglected.

NOTE: MEC uses a multiple viscosity fluid that is light enough for cold climates and resists thinning in warm climates. Use only the recommended hydraulic fluid. Substituting with a lower grade fluid will result in pump failure. Refer to “Lubrication” in the *INTRODUCTION* Section

NOTE: Contamination always causes failure in any hydraulic system. It is very important to be careful not to introduce any contamination into hydraulic system during the assembly procedures. Please make sure all ports and cavities of the manifold and cylinders are properly covered/plugged during maintenance activities.

ELECTRICAL SYSTEM TROUBLESHOOTING - 3084ES

The electronic control system used on the 3084ES is designed for very low maintenance and long trouble free operation. The system consists of three electronic microprocessor controlled modules; the Matrix Module, P600 Motor Control Module and the GP400 Processor. They communicate through low voltage digital signal technology called **CANBUS** communication.

The modules are protected against short circuit and reverse polarity to protect against part failure or incorrect plug connections.



NEVER ATTEMPT TO SUPPLY BATTERY POWER, OR VOLTAGE HIGHER THAN 12 VOLTS TO ANY PART OR MODULE IN THIS SYSTEM, AS CATASTROPHIC FAILURE OF THE MODULES MAY RESULT.

USE OF HIGH PRESSURE WASHING EQUIPMENT DIRECTLY ON THE MODULES CAN FORCE WATER INTO SEALED CONNECTION AND CAN CAUSE A TEMPORARY SYSTEM SHUT-DOWN. HIGH PRESSURE WASHING WITHIN THE VICINITY OF THE MODULES IS HIGHLY DISCOURAGED.

GP400 MODULE

The GP400 module is “the brains” of the system. It receives and processes a variety of inputs both from the machine and the operator, then controls all the operative functions of the machine. It also has a feature that allows the technician to access and monitor all functionality of the system, along with a technician-friendly series of fault messages that can be accessed through the use of the EZ-Cal scan tool. Flash codes are also provided in case an EZ-Cal scan tool is not available.

Such information can be used for preventative maintenance and troubleshooting should a problem arise. A comprehensive list of EZ-Cal accessible information can be found later in this section.

The GP400 operates on 12 volts DC and should never be probed or operated with voltage higher than 14 volts DC.

Figure 4b-1: GP400 Module

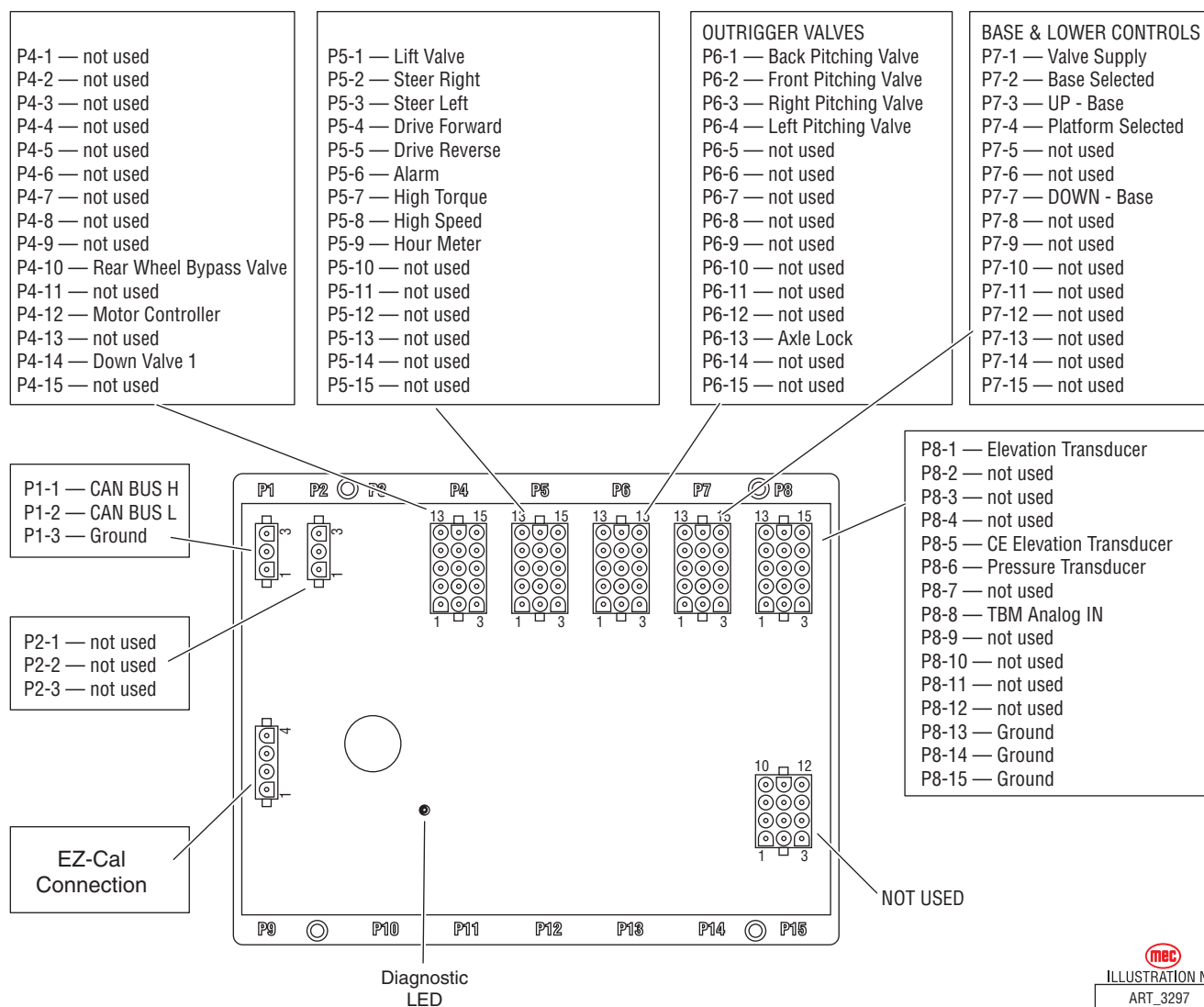
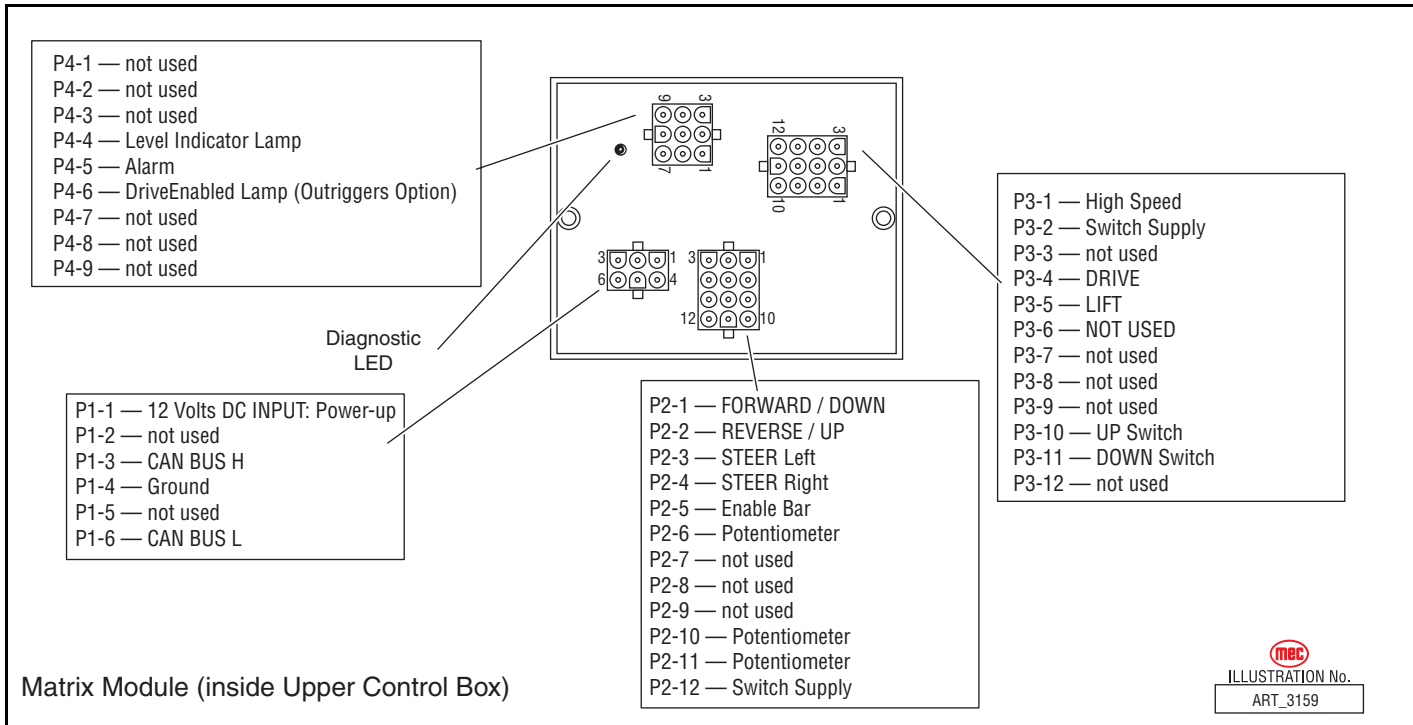


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MATRIX MODULE

The Matrix Module is the remote module located inside the upper control box. It received inputs from the operator and relays them to the GP400.

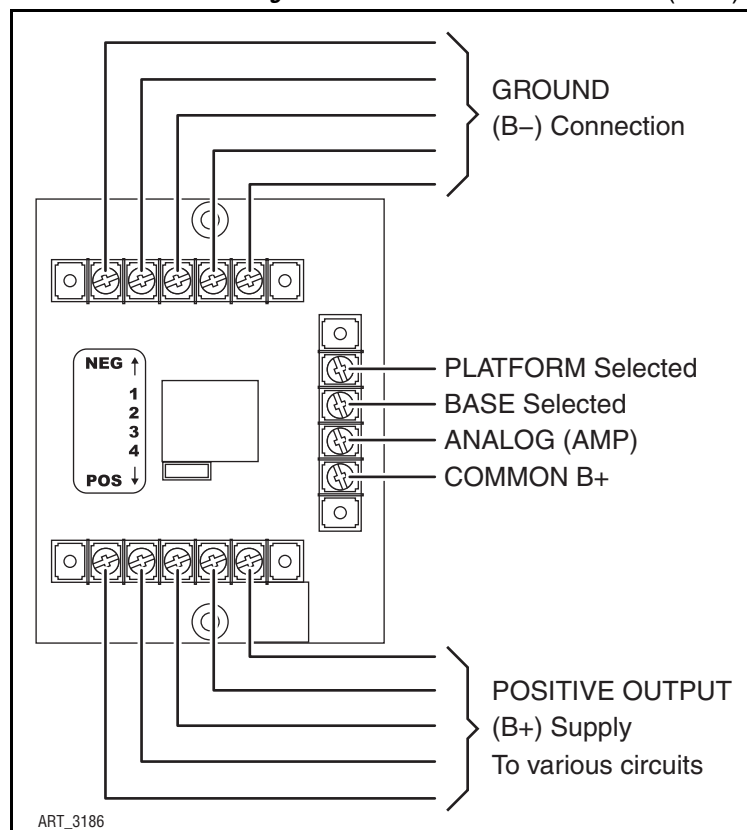
Figure 4b-2: Matrix Module



TERMINAL BLOCK MODULE (TBM)

Figure 4a-3: Terminal Block Module (TBM)

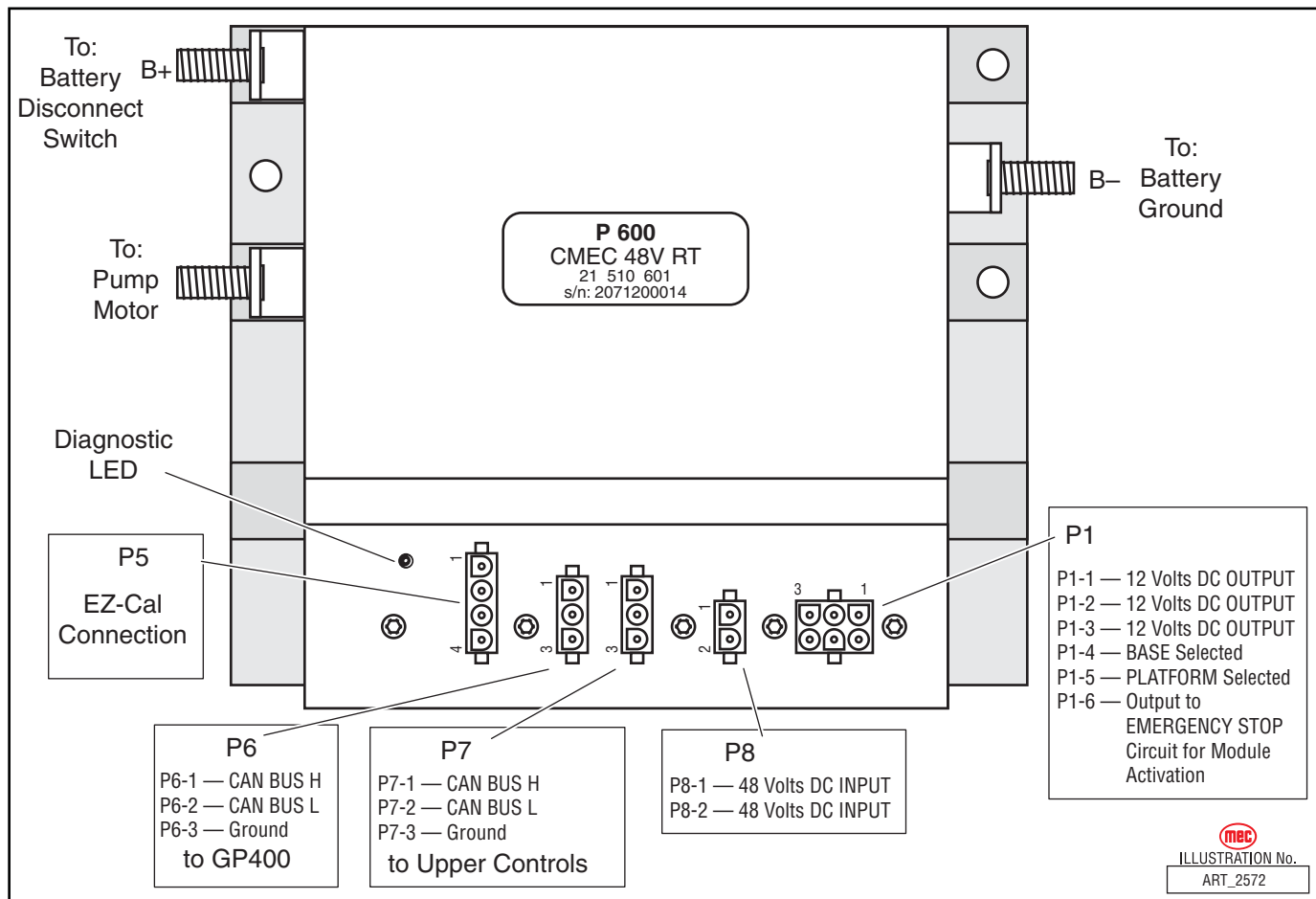
There is a module inside the lower control box, called a TBM (Terminal Block Module) that provides terminal point connections for both positive and ground circuits. A signal from the Emergency Stop circuit activates a load-reduction relay within the TBM that provides ample power to the B+ (positive) terminal strip. This arrangement protects the system against voltage drop conditions that can be detrimental to the electrical system.



P600 Motor Control Module

The Motor Control Module operates the electric pump motor with varied speeds depending on operator commands. Pulse-width Modulation provides smooth and controlled operation with maximum battery efficiency. The Motor Controller also converts battery voltage (48 volts DC) to the user-friendly 12 volts DC used throughout the rest of the system.

Figure 4b-4: P600 Motor Control Module



EZ-CAL SCAN TOOL

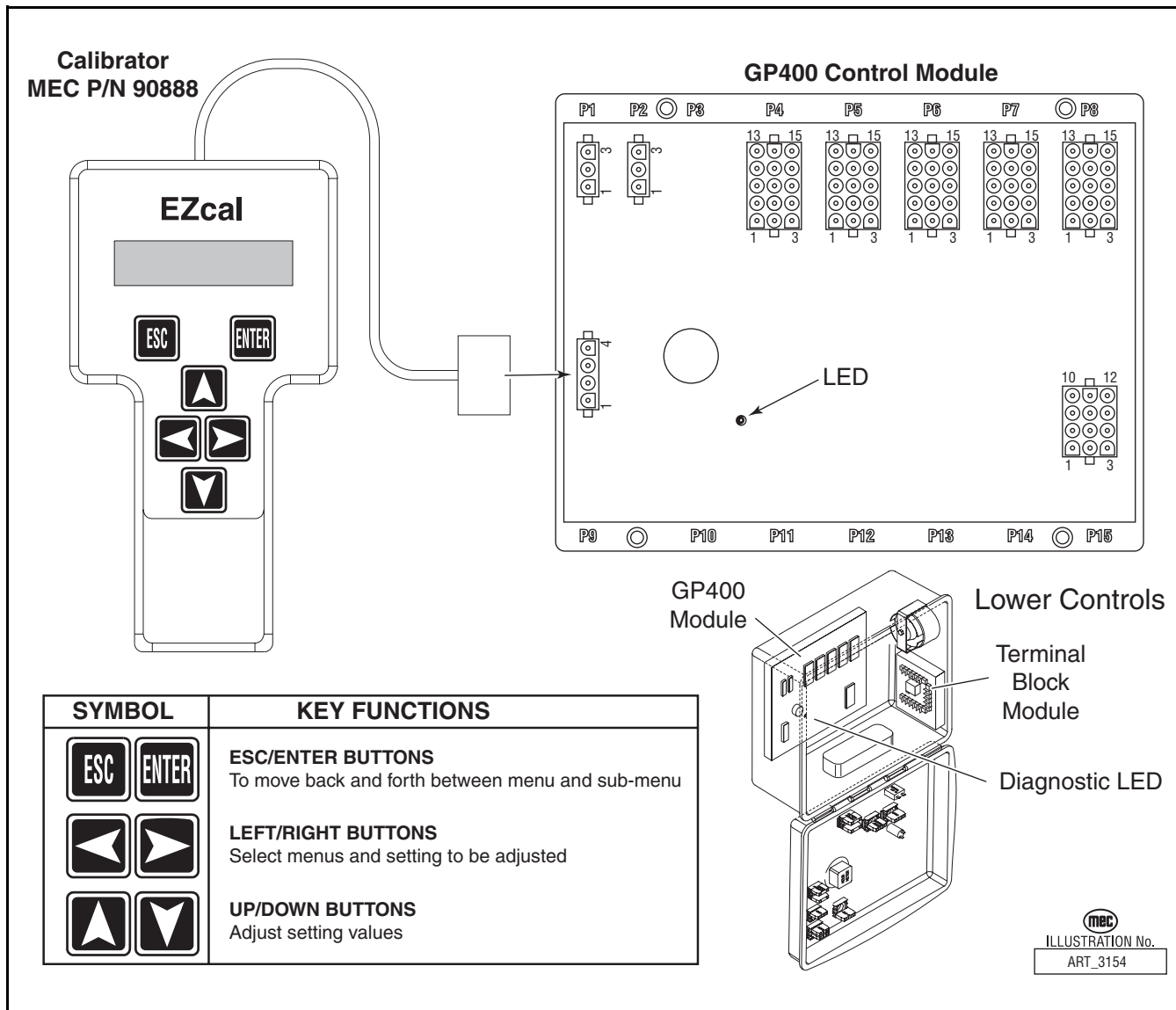
The EZ-Cal (MEC part # 90888; not part of the machine) is a hand-held scan tool that interfaces with the system to provide various information and adjustments. The EZ-cal receives its power from the GP400 when connected. The system must be powered up by closing the Battery disconnect switch and pulling both emergency stop switches. You must also select Base or Platform depending on the station you will operate from.

USING THE EZ-CAL SCAN TOOL

To operate the EZ-cal, plug the cable into the 4-terminal receptacle P9 on the GP400 and power the system up.

- The EZ-Cal display will illuminate and read "HELP: PRESS ENTER". From this point, use the right and left arrows to scroll through the base menus.
- Once the desired base menu is obtained (i.e. *ADJUSTMENTS*) press Enter to access sub menus.
- Use the right and left arrows to scroll through sub menus, press Enter again.
- The up/down arrows are used to change settings only.
- Press ESC to back up one level.

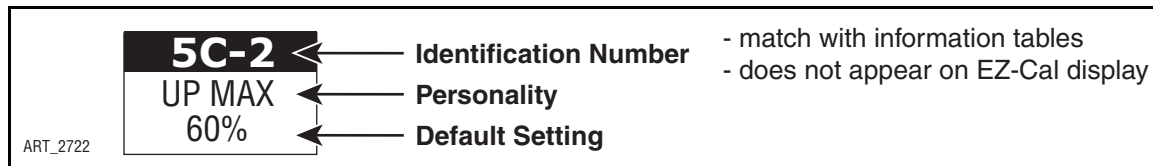
Figure 4b-5: EZ-Cal Scan Tool Connections - GP400 Module



USING THE EZ-CAL WITH THE FLOW CHARTS

Use the EZ-cal Flow Charts as a guide to locate diagnostic information and make adjustments. Each box in the flow chart will have 3 bits of information.

Figure 4b-6: EZ-Cal Display Example



The IDENTIFIER (5c2): – Used to locate this specific personality in the informational charts. Here you can obtain specific information on the individual personalities.

The PERSONALITY (Up Max): – Identifies the individual personalities.

The DEFAULT SETTING: – The factory setting. If adjustments are made, they must be returned to default setting.



ACCESS LEVEL 1 PROVIDES ACCESS TO CHANGE PERSONALITIES NORMALLY PRESET AT THE FACTORY TO PROVIDE PROPER MACHINE MOVEMENT AT SAFE SPEEDS. PERSONALITIES MUST NOT BE CHANGED WITHOUT PRIOR AUTHORIZATION FROM MEC AND MAY ONLY BE RETURNED TO FACTORY SPECIFICATION AS LISTED IN THE FOLLOWING TABLES.

ERROR MESSAGES

To obtain error messages from the EZ-cal Connect the EZ-cal as mentioned above. The display will read, "HELP:PRESS ENTER". Press Enter to display the current error message. Use the following list of error messages to better understand the fault.

Pressing Enter twice will provide a scrolling message of the current error followed by a log of previous errors that may have occurred within recent operation.

SCROLLING MESSAGES

The EZ-Cal will provide a scrolling message of the current error followed by a log of previous errors that may have occurred within recent operation. Refer to "Scrolling Message" on page 4b-19.

FLASH CODES

Flash Codes, provided from the GP400 red LED, will also assist in the event an EZ-cal is not available. However, the EZ-cal yields considerably more relevant information. Refer to "EZ-Cal HELP Messages" on page 4b-22 for flash coded error messages.

Figure 4b-7: EZ-Cal Flow Chart: Adjustments and Setup, ANSI Models

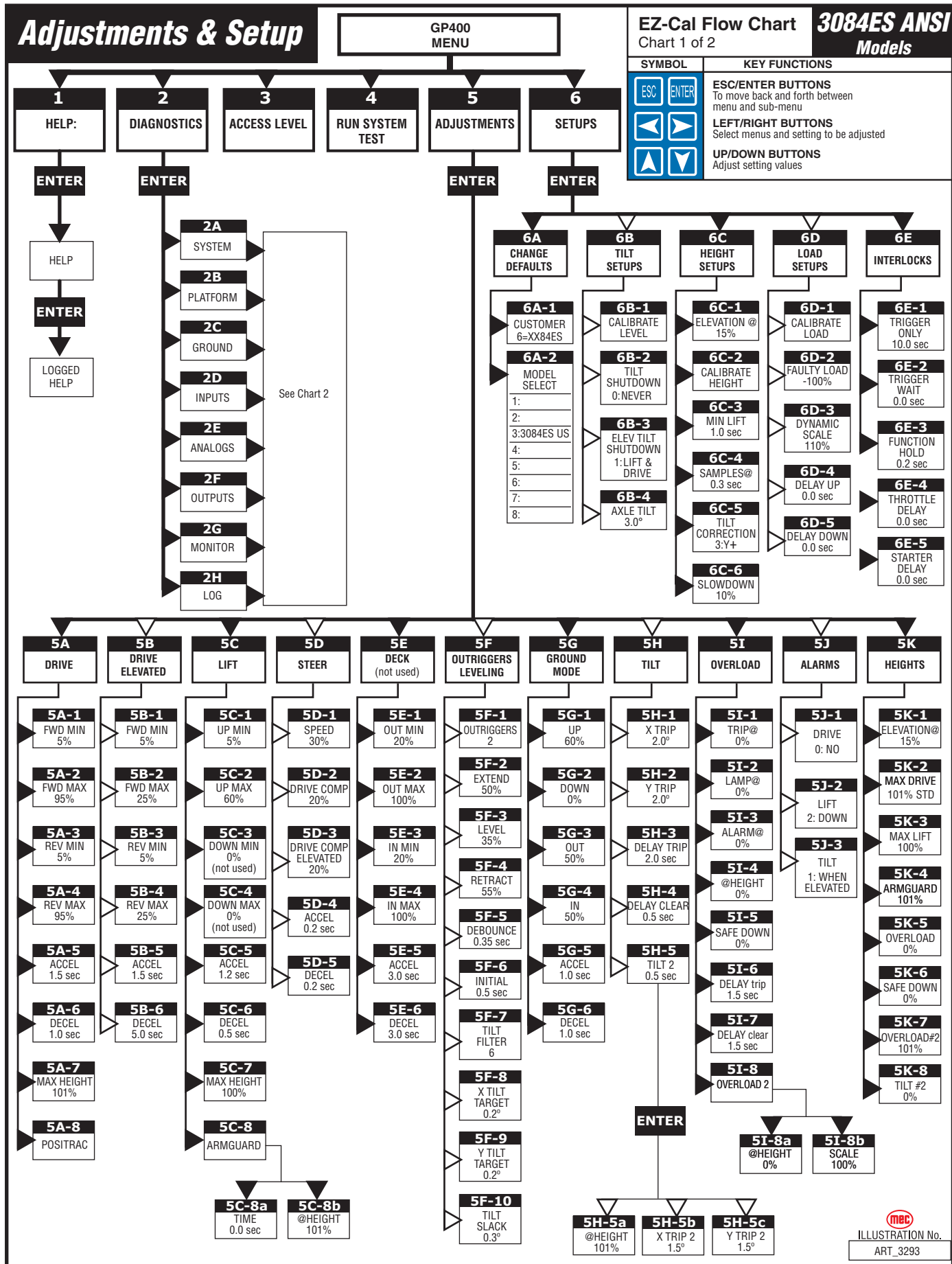


Figure 4b-8: EZ-Cal Flow Chart: Diagnostic, ANSI Models

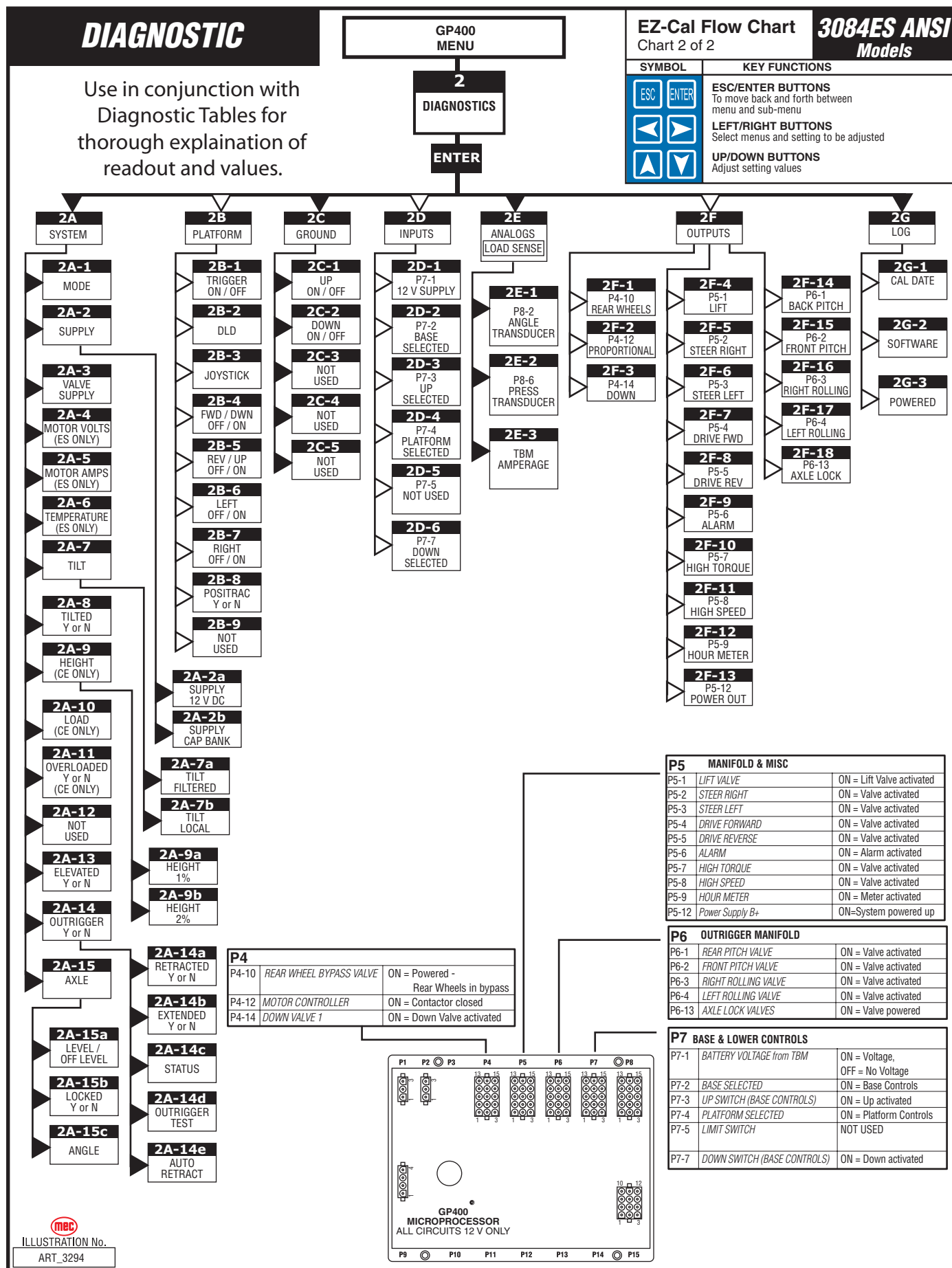


Figure 4b-9: EZ-Cal Flow Chart: Adjustments and Setup, CE Models

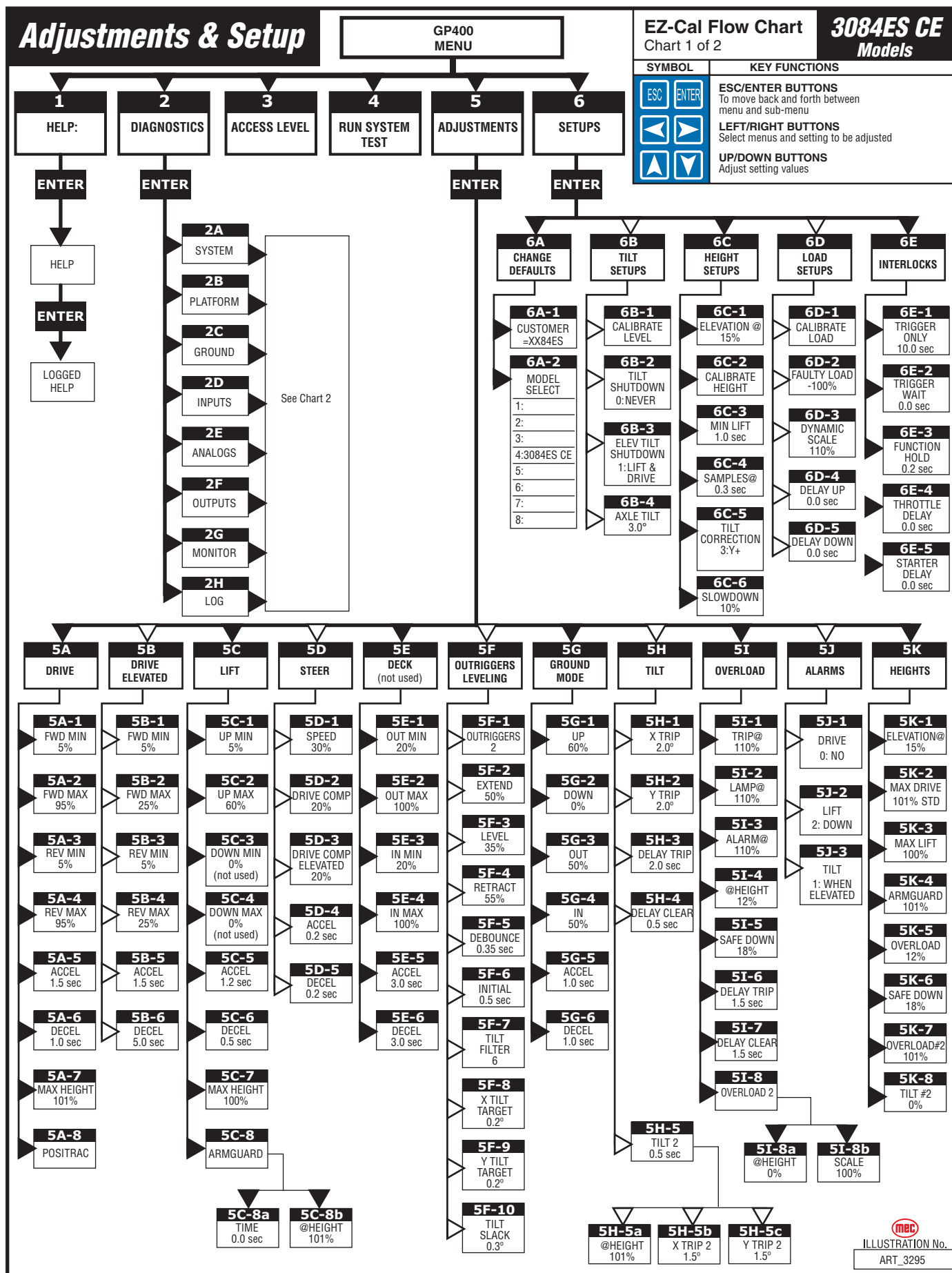
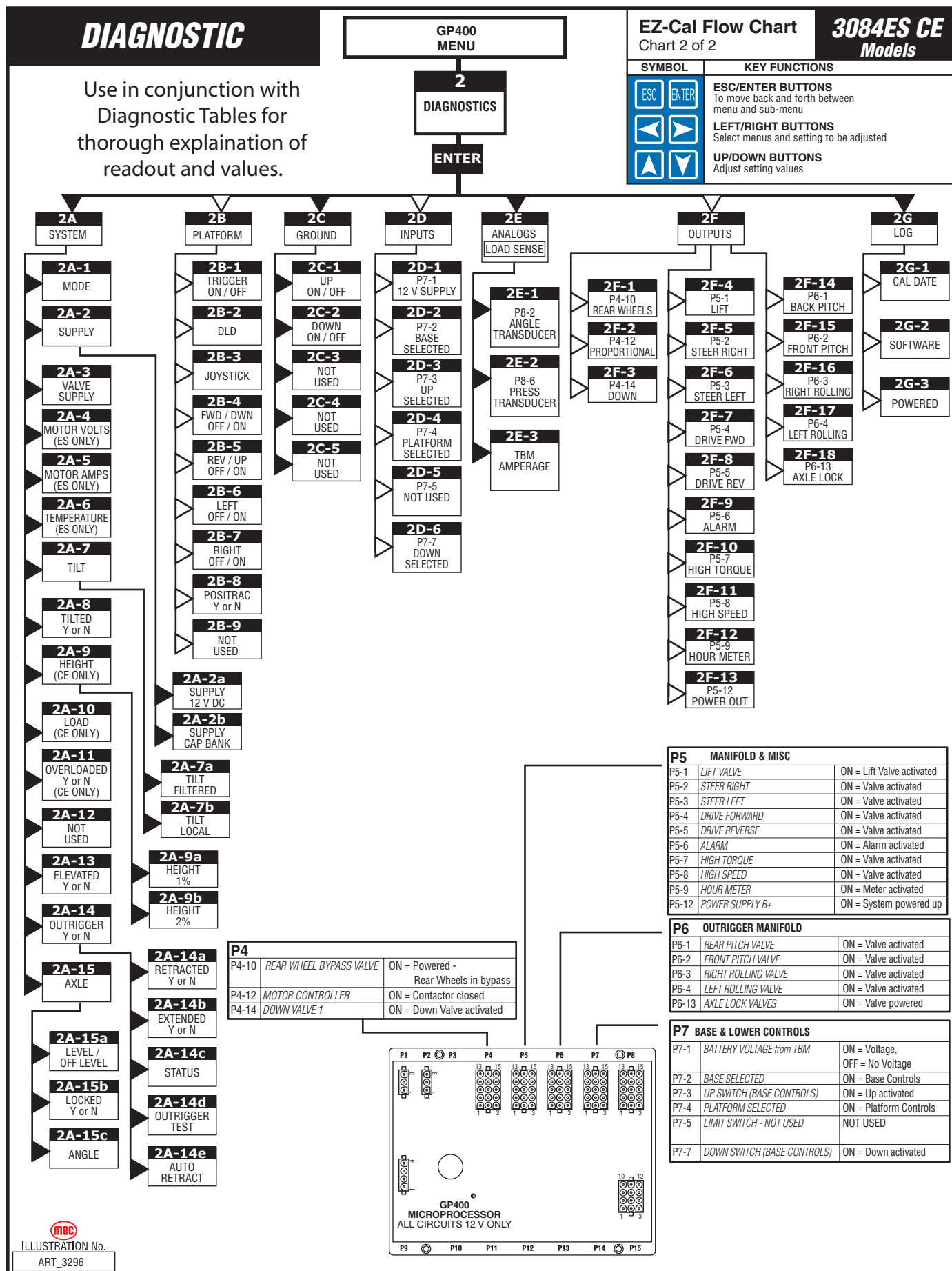


Figure 4b-10: "Outriggers" EZ-Cal Flow Chart: Diagnostic, CE Models



EZ-CAL ADJUSTMENT

Refer to "EZ-Cal Scan Tool" on page 4b-8.

Adjustments possible in Access Level 1 Only.

Before changing personalities, ensure that the correct customer and model have been selected in the SETUPS menu. Any changes to settings will be lost when the model or customer is changed.

To reach ADJUSTMENTS, first access Level 1, then press --> for ADJUSTMENTS.

Press Enter, then press --> to scroll through the sub-menus.

Once the desired sub-menu is found, press Enter again, then --> to scroll through the personalities. Press the Up or Down arrows to change the personality. Press ESC to go back one or more levels to reach other sub-menus.

Table 4b-1: EZ-Cal Adjustment Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
5A DRIVE - PLATFORM STOWED	5A-1	FWD Min	5%	Slowest speed possible
	5A-2	FWD Max	95%	Maximum speed potential
	5A-3	REV Min	5%	Slowest speed possible
	5A-4	REV Max	95%	Maximum speed potential
	5A-5	ACCEL	1.5 sec	Ramp-up time to maximum
	5A-6	DECEL	1.0 sec	Ramp-down time to stop
	5A-7	MAX Height	101%	Maximum drivable height
	5A-8	Positrack	Not Used	Not Used
	5A-9	Positrack	Not Used	Not Used
5B DRIVE PLATFORM ELEVATED	5B-1	FWD Min	5%	Slowest speed possible
	5B-2	FWD Max	23%	Maximum speed potential
	5B-3	REV Min	5%	Slowest speed possible
	5B-4	REV Max	23%	Maximum speed potential
	5B-5	ACCEL	1.5 sec	Ramp-up time to maximum
	5B-6	DECEL	5.0 sec	Ramp-down time to stop
5C LIFT	5C-1	UP Min	5%	Slowest speed possible
	5C-2	UP Max	60%	Maximum speed potential
	5C-3	DOWN Min	0% (not used)	Gravity down (not used)
	5C-4	DOWN Max	0% (not used)	Gravity down (not used)
	5C-5	ACCEL	1.2 sec	Ramp-up time to maximum
	5C-6	DECEL	0.5 sec	Ramp-down time to stop
	5C-7	MAX Height	ANSI: 101% CE: 100%	Maximum elevated height potential
	5C-8	Armguard --> Time	0.0 sec	CE Spec. Machines Only
	5C-9	Armguard --> @ Height	101%	CE Spec. Machines Only
5D STEER	5D-1	Speed	30%	Maximum speed potential
	5D-2	Drive Compensation	30%	Adds additional to drive speed
	5D-3	Drive Comp Elevated	20%	Adds additional to drive speed elevated
	5D-4	ACCEL	0.2 sec	Ramp-up time to maximum
	5D-5	DECEL	0.2 sec	Ramp-down time to stop
5E - DECK	5E-	Not Used	Not Used	Power-out deck (not used)

Table 4b-1: EZ-Cal Adjustment Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
5F OUTRIGGERS Called <i>"Outriggers"</i> on the EZ-Cal, these personalities control SPEED-LEVEL™ functions	5F-1	Outriggers	2= drive i lock	Outrigger program controls level operation
	5F-2	Extend	50%	Maximum speed potential
	5F-3	Level	35%	Extend speed after all legs touch down
	5F-4	Retract	55%	Maximum speed potential
	5F-5	Debounce	0.35	Compensates for switch bounce
	5F-6	Initial	0.5	Minimum level operating time
	5F-7	Tilt filter	6	Compensates for tilt sensor free movement
	5F-8	X Tilt target	0.2 deg	Target level stops movement - side/side
	5F-9	Y Tilt target	0.2 deg	Target level stops movement - fore/aft
	5F-10	Tilt Slack	0.3 deg	Variance to tilt target
	5F-11	Not Used	Not Used	Not Used
5G GROUND MODE Lower Control Operations	5G-1	UP	65%	Maximum speed potential
	5G-2	DOWN	0%	Gravity down (not used)
	5G-3	OUT	0%	Power deck operation (not used)
	5G-4	IN	0%	Power deck operation (not used)
	5G-5	ACCEL	1.0 sec	Ramp-up time to maximum
	5G-6	DECEL	1.0 sec	Ramp-down drive output
5H TILT	5H-1	X Trip	3.0 degrees	Angle tilt sensor signals Out Of Level
	5H-2	Y Trip	3.0 degrees	Angle tilt sensor signals Out Of Level
	5H-3	Delay Trip	2.0 sec	Time delay between Tip and Signal
	5H-4	Delay Clear	0.5 sec	Time delay between Tip and Signal OFF
	5H-5	Tilt 2	—	Second tilt setting used for increased stability. Press ENTER to access
5H-5 Sub Menu	5H-5A	@ Height	101%	Point where lesser tilt angle used
	5H-5B	X Trip 2	1.5 sec	Secondary tilt angle - see 5H-5
	5H-5C	Y Trip 2	1.5 sec	Secondary tilt angle - see 5H-5
5I OVERLOAD ANSI: values = 0 CE: values apply	5I-1	Trip @	ANSI: 0% CE: 110%	% of weight over maximum to trigger overload
	5I-2	Lamp @	ANSI: 0% CE: 0%	% of weight over maximum to trigger lamp
	5I-3	Alarm @	ANSI: 0% CE: 0%	% of weight over maximum to trigger alarm
	5I-4	@ Height	ANSI: 0% CE: 8%	% of elevation load sense starts monitoring weight
	5I-5	Safe Down	ANSI: 0% CE: 12%	% of elevation lift-down still operates in overload
	5I-6	Delay Trip	1.5 sec	Delay before overload trip
	5I-7	Delay Clear	1.5 sec	Delay before overload clear
	5I-8	Overload 2	—	Sub category - press ENTER to access
5I-8 Sub Menu	5I-8a	Height 0%	0%	% of height for secondary overload valve
	5I-8b	Scale	100%	% of reduced overload valve
5J ALARMS	5J-1	Drive: Yes/No	No	1 = FWD 2 = REV 3 = Both 4 = All Motion
	5J-2	Lift	2 = Down	1 = UP 2 = DOWN 3 = Both 4 = All Motion
	5J-3	Tilt	1 = When Elevated	1 = When Elevated 2 = Always
5K HEIGHTS	5K-1	Elevation @	15%	Point at which machine enters elevated mode
	5K-2	Maximum Drive	101%	Maximum drivable height
	5K-3	Maximum Lift	ANSI: 101% CE: 98%	Maximum elevated height potential
	5K-4	Armguard	101%	Stops descent for 5 sec
	5K-5	Overload	ANSI: 0% CE: 12%	% of elevation load sense starts monitoring weight
	5K-6	Safe Down	ANSI: 0% CE: 18%	% of elevation lift-down still operates in overload
	5K-7	Overload # 2	0%	Not Used
	5K-8	Tilt # 2	ANSI: 0% CE: 0%	Reduced degree of tilt at % elevation



EZ-CAL SETUP

Refer to "EZ-Cal Scan Tool" on page 4b-8.

Table 4b-2: EZ-Cal Setup Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLANATION
6A CHANGE DEFAULTS	6A-1	Customer	5=xx84ES	Choose basic model and power source
	6A-2	Model Select	3 = 3084ES ANSI 4 = 3084ES CE	Choose model and certification
6D TILT SETUPS	6B-1	Calibrate Level?	Y = ENTER N = ESC	Follow instructions in Section 2 - Level Sensor Calibration
		WARNING! Refer to Tilt Sensor Calibration instructions before attempting calibration		
	6B-2	Tilt Shutdown	0 = Never	Function shutdown tilted when platform stowed
	6B-3	Elev Tilt Shutdown	1 = Lift & Drive	Function shutdown tilted when platform elevated
	6B-4	Axle Tilt	3.0 deg	Oscillating axle maximum interlock angle
6C HEIGHT SETUP	6C-1	Elevation @	15%	% of maximum height when system goes into elevated mode
	6C-2	Calibrate Height	Start Calibration	See Section 2 for calibration of Height Sensor
	6C-3	Min Lift	1.0 sec	Calibration setting - do not change
	6C-4	Samples	0.30 sec	Calibration setting - do not change
	6C-5	Tilt Correction	3=Y+	Calibration setting - do not change
	6C-6	Slow Down	10%	Calibration setting - do not change
6D LOAD SETUPS (EUROPEAN OPTION ONLY)	6D-1	Calibrate Load	Start Calibration	See Section 2 for calibration of CE Overload System
	6D-2	Faulty Load	-100%	calibration setting - do not change
	6D-3	Dynamic Scale	110%	calibration setting - do not change
6E INTERLOCKS	6E-1	Trigger Only	10.0 sec	Time that the enable bar can be held without operation before timeout
	6E-2	Trigger Wait	0.0 sec	Delay before function after enable bar is actuated
	6E-3	Function hold	0.2 sec	Function enabled after operator release
	6E-4	Throttle Delay	0.0 sec	Delay before throttle enabled (not used)
	6E-5	Starter Delay	10.0 sec	Starter over-crank feature; time starter is off (not used)

EZ-CAL DIAGNOSTICS

The EZ-Cal Diagnostics menu provides the ability to view and test individual circuits for irregularities. Whether diagnosing a failure or testing functions during preventative maintenance, the *Diagnostics Menu* provides a quick view at the inputs and outputs as registered by the GP400 Control Module and the P600 Motor Control Module **in real time**. Using the EZ-Cal Flow Chart, compare ID number to this menu for circuit identification and result.

To reach DIAGNOSTICS menu from HELP;

- Press the right arrow and scroll to DIAGNOSTICS and press ENTER.
- Locate the desired sub menu and press ENTER.
- Press the right arrow to scroll through the test points.

NOTE: The ID number will not appear on the EZ-Cal display. It is shown in the *Diagnostics Menu* for reference only.

Using the ID number, match specific personalities from the Diagnostic Flow Chart with this table for additional information.

Press **ESC** to go back one level (necessary to change selection).

Table 4b-3: EZ-Cal Diagnostics Menu

SELECTION	ID	READOUT	EXPLANATION
2A SYSTEM	2A-1	MODE	Current function message/s, press ENTER for additional information
	2A-2	Supply	Indicates valve supply output on or off; should be ON
	2A-3	Valve Supply	Regulated 12 volt signal output from Motor Controller to supply all 12 volt circuits
	2A-4	Motor Volts	Real time motor voltage
	2A-5	Motor 1	Real time motor amperage draw. Varies depending on load and motor speed.
	2A-6	Temperature	Motor controller chassis temp. Error message "too Hot" at 75 C.
	2A-7	Tilt	Current state of tilt as measured by Can-tilt angle transducer in degrees
	2A-8	Tilted Y/N	Indicates tilted state. All motorized functions interlocked above @ height (15% elevation)
	2A-9	Height	Current state of platform elevation in %.
	2A-10	Load	Current load on platform in %. (Over load option only)
	2A-11	Overloaded Y/N	Platform overload status. (Over load option only)
	2A-12	Last Moved	Not used
	2A-13	Elevated Y/N	Shows platform elevation is above 15% (@ height setting). Elevated settings apply.
	2A-14	Outrigger (leveling function)	Press ENTER for outrigger sub categories.
SUB CATEGORIES	2A-14a	O/R Retracted Y/N	Not used
	2A-14b	O/R Extended Y/N	Not used
	2A-14c	O/R Status	Current state of level will be displayed,
	2A-14d	O/R Test Y/N	Not used
2B PLATFORM	2B-1	Trigger ON/OFF	Current status of enable trigger; pulled =ON @ platform controls
	2B-2	DLD	Position of Lift/Drive selector switch
	2B-3	Joystick	Indicates % of stroke from center in real time. Direction not indicated here
	2B-4	FWD/DWN OFF/ON	Status of Forward micro-switch Forward stroke of the joystick
	2B-5	REV/UP OFF/ON	Status of Reverse micro-switch Reverse stroke of the joystick
	2B-6	LEFT OFF/ON	Status of Left Steer switch
	2B-7	RIGHT OFF/ON	Status of Right Steer switch
	2B-8	Positrac Y/N	Status of rear wheel solenoids activation. Activated in high speed or elevated drive
	2B-9	EMSp OFF/ON	Not used

Table 4b-3: EZ-Cal Diagnostics Menu

SELECTION	ID	READOUT	EXPLANATION
2C GROUND	2C-1	UP OFF/ON	Status of Up switch from lower control station
	2C-2	DOWN OFF/ON	Status of Down switch from lower control station
	2C-3	OUT OFF/ON	Not used
	2C-4	IN OFF/ON	Not used
	2C-5	EMSg OFF/ON	Not used
2D INPUTS READOUT = plug and Pin example: P7-1 = Plug 7 Pin 1 refer to schematic	2D-1	P7-1	12V supply from Motor Controller. ON= Voltage, OFF= no voltage
	2D-2	P7-2	Base selected, ON= selector on Base position - unit operating from base controls
	2D-3	P7-3	Up selected from base controls, ON= Up activated
	2D-4	P7-4	Platform Selected. ON= selector in platform position. Operate from upper controls
	2D-5	P7-5	Platform Down limit switch. Not used.
	2D-6	P7-7	Down selected from lower controls, ON= Down activated
		P7-6 & P7-8-P7-15	Not used
2E ANALOGS		P15-1 - P15-15	Not used
	2E-1	P8-2	State of angle #2 in %, relates directly to the degree of platform elevation.
	2E-2	P8-5	State of angle #1 in %, relates directly to the degree of platform elevation.
2F OUTPUTS READOUT = plug and Pin example: P7-1 = Plug 7 Pin 1 refer to schematic	2E-3	P8-6	Measures pressure in lift cylinder for load sense system. CE only.
		Numbers not listed in this table but that are displayed by EZ-Cal are not used.	
	2F-1	P4-10	Rear wheel bypass valves. ON= valves powered - rear wheels in bypass
	2F-2	P4-12	Line Contactor signal B+. ON= Contactor activated
	2F-3	P4-14	Down Valve/s signal B+. ON= down valve activated
	2F-4	P5-1	Lift Valve Signal B+. ON= lift valve activated
	2F-5	P5-2	Steer Right signal B+. ON= valve activated
	2F-6	P5-3	Steer Left signal B+. ON= valve activated
	2F-7	P5-4	Drive FWD signal B+. ON= valve activated
	2F-8	P5-5	Drive Rev signal B+. ON= valve activated
	2F-9	P5-6	Alarm signal B+. ON= alarm activated
	2F-10	P5-7	High Torque signal B+. ON= valve activated
	2F-11	P5-8	High Speed signal B+. ON= valve activated
	2F-12	P5-9	Hour Meter signal B+. ON= Meter activated
	2F-15	P5-12	Power supply to valves. Should be ON when system is powered up
	2F-16	P6-1	Back Pitching Valve. ON= valve activated
	2F-17	P6-2	Front Pitching Valve. ON= valve activated
	2F-18	P6-3	Left Rolling Valve. ON= valve activated
	2F-19	P6-4	Right Rolling Valve. ON= valve activated
	2F-20	P6-13	Axle Lock Valves. ON= Valves activated (axles can oscillate)
2H LOG	2H-1	Cal Date	Date of last calibration (height or load)
	2H-2	Software	MEC specific software
	2H-3	Powered	Accumulated time GP400 powered up (red LED on)

EZ-CAL RETRIEVE MODE AND HELP MESSAGES

NOTE: *It is important to understand that an error message will only be available if the red Diagnostic LED is flashing. If the machine is not operating properly and the red Diagnostic LED is not flashing, the trouble may lie with something not monitored by the electronic control system, i.e. a switch, hydraulic valve or wiring damage.*

There are two different menus that you can access for message retrieval; MODE and HELP.

MODE MENU

Allows the technician to see the current state of the controller with a short description. Go to, DIAGNOSTICS/SYSTEM/MODE (EZ-Cal Flow Chart 2, ID# 2a1). Pressing ENTER a second time will provide additional information with certain messages.

HELP MENU

Provides various HELP messages to identify failure modes.

Some error messages may also be identified by counting the number of times the red LED flashes on the controller so that even without access to an EZ-Cal, some simple diagnostics are possible. However, it is recommended to use an EZ-Cal to diagnose problems, and not rely on the LED! The EZ-Cal provides a much higher detail of information.

MODE MESSAGE

- Connect the EZ-Cal (see illustration).
The display will read, "HELP: PRESS ENTER".
- Press Enter to display the current message.
- Refer to the following list of HELP messages to better understand the nature of the message or fault.
- If the GP400 does not register a fault, the display will read EVERYTHING OK.

SCROLLING MESSAGE

Pressing **ENTER** twice will provide a scrolling message of the current message (if one exists) followed by a log of previous operations and/or errors that occurred immediately prior, starting with most recent. **All messages are cleared whenever the system is powered down.**

Other helpful menus available include **DIAGNOSTICS** which allows the technician to monitor specific plug input/output information. Refer to EZ-Cal Flow Chart 2 – Diagnostics (ANSI Page 4b-11 – CE Page 4b-13).

MODE MESSAGES

The purpose of **MODE** is to indicate, in real time, the current state of the controller with a short description.

INITIALIZING

- The system is preparing to operate, immediately after power-on.

SHUTDOWN!

- The system cannot operate – for example both the PLATFORM & GROUND inputs are active together.

CHECK CANBUS

- The system cannot operate – CANBUS communications is not successful (for example wire damage to the platform)



PLATFORM, GROUND

- The system is ready to operate, from the upper or lower controls as indicated (selected by the Base/Platform selector switch)

GROUND UP, GROUND DOWN,

- A ground function is operating normally

GROUND UP LOCKED, GROUND DOWN LOCKED,

- A ground function is selected but not allowed (for example, the function switch was closed at power-on)

GROUND FAULTY

- Multiple ground function inputs are active at the same time

WAITING FOR TRIGGER

- A platform function is selected, but the joystick trigger switch is not closed (close the trigger switch to proceed)

TRIGGER CLOSED

- The joystick trigger switch is closed, but no function is selected (select a function to proceed)

TRIGGER LOCKED

- The joystick trigger switch was closed at power-on, or closed for too long with no function selected (check trigger switch)

FORWARD, REVERSE

- A platform drive function is operating normally

FORWARD (LEFT), FORWARD (RIGHT), REVERSE (LEFT), REVERSE (RIGHT)

- A platform drive function is operating normally, with steer also active

STEER LEFT, STEER RIGHT

- A platform steer function is operating normally (without drive)

UP, DOWN

- A platform lift/lower function is operating normally

FORWARD LOCKED, REVERSE LOCKED

- A platform drive function is selected but not allowed (for example, the switch was closed at power-on)

LEFT LOCKED, RIGHT LOCKED

- A platform steer function is selected but not allowed (for example, the switch was closed at power-on)

UP LOCKED, DOWN LOCKED

- A platform lift/lower function is selected but not allowed (for example, the switch was closed at power-on)

CHECK DRIVE/LIFT

- Neither platform drive nor platform lift select is active, or both are active at the same time

CHECK JOYSTICK

- Both platform joystick directions are active at the same time

STEER FAULTY

- Both platform steer directions are active at the same time

EXTENDING LEGS

- Outrigger legs are extending normally

RETRACTING LEGS

- Outrigger legs are extending normally

OUTRIGGERS LOCKED

- An outrigger function is selected but not allowed (for example, the switch was closed at power-ON)

INTERLOCKED**

- An interlock shutdown is active, preventing one or more functions. The interlock can be due to many different causes ...

Press <ENTER> from the **MODE display to see the precise cause of the interlock (listed below) – press <ESC> from that display to return to the **MODE** display:

TEST MODE

- The system test mode is active – switch power off and on again to clear

TILTED

- The vehicle is tilted beyond limits, descend, then move vehicle to a more level location

OVERLOADED

- The vehicle platform is overloaded, reduce platform load. **(CE option only)**

TOO HIGH

- The vehicle platform is too high to allow some functions – descend first

ARMGUARD

- During descent, the system is configured to stop movement to provide an armguard delay – release and re-select DOWN to continue lowering **(CE option only)**

TOO HOT

- The EZLIFT heatsink has reached 75°C, preventing all functions except lowering. Functions will be allowed again when the heatsink cools to below 70°C.
- The heatsink temperature can be viewed in the DIAGNOSTICS/SYSTEM/ TEMPERATURE display, ID # 2a5.
- The heatsink must be bolted to a significant metal panel of the vehicle, capable of dissipating heat to the environment.

UNCALIBRATED

- The height and/or pressure sensors have not been calibrated see CALIBRATION OF OVERLOAD SYSTEM **(CE option only)**.
- If machine is not equipped with Overload system, refer to SETUPS table and change those personalities that do not match the figure listed in the table.

EXTERNAL ALL, EXTERNAL DRIVE, EXTERNAL LIFT

- An external cutout input is preventing functions – determine the cause of the external cutout (for example, a limit switch)

EZ-CAL HELP MESSAGES

In addition to the **MODE** messages detailed above, the GP400 provides a **HELP** message to identify failure modes. Some error messages may also be identified by counting the number of times the red LED flashes on the controller so that even without access to an EZ-Cal, some simple diagnostics are possible. However, it is recommended to use an EZ-Cal to diagnose problems, and not rely on the LED! The EZ-Cal provides a much higher detail of information.

- Connect the EZ-Cal (see illustration).
The display will read, "HELP: PRESS ENTER".
- Press Enter to display the current message.
- Refer to the following list of HELP messages to better understand the nature of the message or fault.
- If the GP400 does not register a fault, the display will read EVERYTHING OK.

Pressing ENTER twice will provide a scrolling message of the current message (if one exists) followed by a log of previous operations and/or errors that occurred immediately prior, starting with most recent. **All messages are cleared whenever the system is powered down.**

NOTE: When using the LED to attempt diagnosis, please note that a **DUAL FLASH** code is indicated. The LED will flash on/off a certain number of times, pause off for a short delay, then flash on/off a second certain number of times, followed by a much longer pause off. The sequence will then repeat.

INFORMATION ONLY MESSAGES

The following are "information only" HELP messages which are not indicative of any possible problem – there is no LED flash code (the LED remains on steady):

STARTUP! _____ (no flash code)

- The system has just been powered on and is carrying out some initialization steps prior to being ready to operate. If you select a function during this time, it may be locked out until you release then re-select it.

EVERYTHING OK _____ (no flash code)

- There is no problem with the system – it is ready to operate in platform mode when a function is selected.

NOTE: If this is the **HELP** message when a function is selected, check for open-circuit switches or wiring.

GROUND MODE ACTIVE! _____ (no flash code)

- There is no problem with the GP400 – it is ready to operate in ground mode when a function is selected.

CLOSE TRIGGER _____ (no flash code)

- A platform function is selected but the trigger switch is not closed.

VEHICLE TILTED _____ (no flash code)

- The vehicle is tilted beyond the limits, some functions may be prevented.

FUNCTION ACTIVE MESSAGES

The following **HELP** messages indicate that there is no problem with the GP400 but that a function is active – the vehicle should be moving as requested by the operator.

DRIVING! _____ (no flash code)

LIFTING! _____ (no flash code)

LOWERING! _____ (no flash code)

STEERING! _____ (no flash code)

EXTENDING OUTRIGGERS! _____ (no flash code)

RETRACTING OUTRIGGERS! _____ (no flash code)

CALIBRATION MESSAGES

The following are “calibration” HELP messages – until the machine is properly calibrated for height and/or pressure (as required), many functions will not be available.

NOT CALIBRATED _____ **Flash Code: 1/1**

FUNCTIONS LOCKED - NOT CALIBRATED _____ **Flash Code: 1/1**

- The height and/or pressure sensors have not been calibrated and are required because of the setup of the GP400.
- Calibration procedures are accessible from the **SETUPS/HEIGHT SETUPS** and **SETUPS/LOAD SETUPS** menus.

FAULT: CUSTOMER _____ **Flash Code: 1/1**

- The system must be configured to the customer requirements – with the EZ-Cal in **SETUPS/CHANGE DEFAULTS** menu, scroll to the correct machine from this menu, the press Right Arrow to select the appropriate model.

NOTE: Selecting the incorrect customer or model will cause the machine to operate incorrectly or go into fault mode.

SHUTDOWN HELP MESSAGES

This section lists “shutdown” HELP messages – functions can be shut down to prevent them being used:

SHUTDOWN - CHECK EMS SWITCHES! _____ Flash Code: 2/1

- The Base/Platform selector switch position indicates the mode in which the system must operate if both are active together; the system does not know how to function

FUNCTIONS LOCKED - TEST MODE SELECTED _____ Flash Code: 2/2

- Test mode is not accessible with this system. Switch power off/on to reset to normal operation

FUNCTIONS LOCKED - ARMGUARD (CE option only) _____ Flash Code: 2/2

- During descent, the System can stop movement for a configurable time, to allow a safety check that no-one is close to the machine. The operator must release and re-select DOWN to continue lowering (after the delay time-out).

FUNCTIONS LOCKED – OVERLOADED (CE option only) _____ Flash Code: 2/2

- System overload features are active, and the platform is excessively loaded to allow operation – the platform load must be reduced.

FUNCTIONS LOCKED – UNDERLOADED (CE option only) _____ Flash Code: 2/2

- System overload features are active, and the platform load is too low to be valid – this could be caused by erroneous calibration, a sensor fault, or a change in the vehicle mechanics/hydraulics.

FUNCTIONS LOCKED - TOO HIGH _____ Flash Code: 2/2

- The platform is raised too high to allow some functions. Certain functions may not be allowed above certain elevations.
- Check operator’s manual or ADJUSTMENTS/HEIGHTS/MAX DRIVE and MAX LIFT to see if drive and/or lift is allowed at all heights.

FUNCTIONS LOCKED - TILTED _____ Flash Code: 2/2

- The vehicle is tilted too much to allow some functions.
- Check operator’s manual or ADJUSTMENTS/TILT/Xtrip and Ytrip, which determine the maximum allowed vehicle tilt.
- Refer to EZ-Cal Flow Chart 1 – Adjustments and Setup.

FUNCTIONS LOCKED - EXTERNAL SHUTDOWN _____ Flash Code: 2/2

- An external shutdown is preventing functions – check DIAGNOSTICS/SYSTEM/ MODE/INTER-LOCK to see which external interlock is active.

CHECK GROUND INPUT SWITCHES! _____ Flash Code: 2/2

- There is a problem with the ground function select switches – more than one is active at the same time.

SELECT DRIVE/LIFT MODE! _____ Flash Code: 2/2

- There is a problem with the platform drive/lift select switch – neither mode is selected.

CHECK DRIVE/LIFT SELECT SWITCH! _____ Flash Code: 2/2

- There is a problem with the platform drive/lift select switch – both modes are selected together.

CHECK JOYSTICK SWITCHES! _____ Flash Code: 2/2

- There is a problem with the platform joystick switches – both directions are selected together.

RELEASE TRIGGER! _____ Flash Code: 2/2

- The trigger was closed at power-on, or closed for too long with no function selected.

RELEASE GROUND SWITCHES! _____ Flash Code: 2/2

- Ground function switches were closed at power-on.

RELEASE JOYSTICK SWITCHES! _____ Flash Code: 2/2

- Platform joystick switches were closed at power-on, or closed for too long without trigger switch (see **SETUPS/INTERLOCKS/TRIGGERwait**).

RELEASE OUTRIGGER SWITCHES! _____ Flash Code: 2/2

- Outrigger switches were closed at power-on.

WIRING MESSAGES

The following are “wiring” HELP messages – problems have been detected which are likely due to vehicle wiring issues:

FAULT: ENERGIZED VALVE - CHECK P5 WIRING! _____ Flash Code: 3/2**FAULT: VALVE FEEDBACK HIGH - CHECK VALVE WIRING! _____ Flash Code: 3/2**

- There is a voltage on one or more valve outputs, when all outputs are off.
- Check each valve output to trace where the invalid supply is coming from.

FAULT: CAPBANK VOLTAGE TOO HIGH - CHECK LINE CONT! _____ Flash Code: 3/3

- The voltage on the B+ stud of the controller (connected to an internal voltage stabilization capacitor bank) is too high when the line contactor is off. B+ stud voltage should be approximately 32 volts at idle.
- Check the line contactor tips are not welded, and check the power wiring for errors.

FAULT: ENERGIZED LINE CONTACTOR - CHECK P5 WIRING! _____ Flash Code: 3/4

- There is a voltage on the line contactor coil output, when it is off.
- Check wiring to the line contactor coil to trace where the invalid supply is coming from.

FAULT: MOTOR OVERLOAD! _____ Flash Code: 3/5

- The power protection circuits in the controller have activated to protect from extreme overload.
- Check for short-circuit power wiring; check for a seized or shorted motor.

P600 TEMPERATURE MESSAGES

This section lists “temperature” HELP messages – problems have been detected which are likely due to excessive duty cycling or poor heatsinking:

FAULT: BAD INTERNAL TEMPERATURE SENSOR! _____ Flash Code: 4/1

- The heatsink temperature is out of range; if the fault remains, the power controller may have to be replaced.

FUNCTIONS LOCKED - TOO HOT! _____ Flash Code: 4/2

- The heatsink temperature exceeds 75°C, preventing all functions except lowering. Check for excessive motor current draw; check for good heatsinking to vehicle chassis.

SUPPLY MESSAGES

The following are “supply” HELP messages – problems have been detected which are likely due to supply issues:

FAULT: BAD INTERNAL 5V! _____ Flash Code: 4/2

- The internal “5V slave” supply is out of range; if the fault remains, the controller may have to be replaced.

FAULT: BAD INTERNAL SLAVE! _____ Flash Code: 4/2

- The internal “slave” is not operating correctly; if the fault remains, the controller may have to be replaced.

FAULT: BAD INTERNAL 12V! _____ Flash Code: 4/3

- The internal “12V” supply is out of range;
- 12V Supply is generated by the Motor control module and supplied to the GP400. Check for wiring errors between the two modules. If the fault remains, the Motor Controller may have to be replaced.

FAULT: BATTERY VOLTAGE TOO LOW! _____ Flash Code: 4/4

- The battery supply is too low – the batteries must be re-charged.

FAULT: BATTERY VOLTAGE TOO HIGH! _____ Flash Code: 4/4

- The battery supply is too high – check that the correct battery and charger are installed.

FAULT: BAD 5V SENSOR SUPPLY - CHECK P2-1 WIRING! _____ Flash Code: 4/5

- The “5V sensor” supply is out of range; this supply is available to power external 5V-powered sensors – check that it has not been overloaded or short-circuited to other wiring (CE models).

SENSOR MESSAGES CE MODELS

The following are “sensor” HELP messages – problems have been detected which are likely due to sensor issues (CE models).

FAULT: CHECK HEIGHT1 SENSOR _____ **Flash Code: 6/1**

FAULT: CHECK HEIGHT2 SENSOR _____ **Flash Code: 6/1**

- A height sensor is giving an out-of-range voltage (below 0.5V or above 4.5V).

FAULT: CHECK HEIGHT SENSORS _____ **Flash Code: 6/1**

- When two height sensors are fitted, both should read the same height at all times; this message indicates that the sensors are reading different heights. Check for loose sensors and/or re-calibrate.

FAULT: CHECK PRESSURE SENSOR _____ **Flash Code: 6/2**

- A pressure sensor is giving an out-of-range voltage (below 0.5V or above 4.5V).

FAULT: CHECK ELEVATION SWITCH _____ **Flash Code: 6/3**

- The elevation switch is in disagreement with the height sensor(s).
- During calibration, the height at which the elevation switch opens (while lifting) and closes (while lowering), is recorded. Subsequently, height and these calibration points are continuously checked – any significant difference generates this error.
- This section lists “CANBUS” HELP messages – problems have been detected with CANBUS communications between different modules (of course, only applicable if more than one module is connected together via CANBUS):

FAULT: CANBUS! _____ **Flash Code: 6/6**

- There are problems with CANBUS communications between the different modules; messages expected from one or more module are not being received, or messages intended to one or more module cannot be transmitted.
- Check for open- and short- circuit problems with CANBUS wiring; ensure that the CANBUS is wired correctly pin-to-pin; ensure that the vehicle chassis is not erroneously shorted to the chassis (for example, due to insulator breakdown in the motor).

POWER WIRING MESSAGES

The following are “power wiring” HELP messages – problems have been detected which are likely due to power wiring errors:

FAULT: CAPBANK VOLTAGE TOO LOW - CHECK STUD WIRING! **Flash Code: 7/7**

- The voltage on the B+ stud of the controller (connected to an internal voltage stabilization capacitor bank) is too low when the line contactor is off (a pre-charge circuit in the module normally applies approximately 32 volts to the capacitor bank).
- Check the 300 amp fuse, line contactor or power wiring for errors. Also check DC motor for internal grounding.

OTHER MESSAGES

The following are other HELP messages:

SOME BIG BAD PROBLEM! _____ **Flash Code: 9/9**

- This message should not occur!

FACTORY OVERRIDE _____ **Flash Code: (fast flashing)**

- When the controller is first shipped, prior to initial calibration, it is configured in a special “factory override” state. In this state, none of the normal shutdowns or interlocks will occur – the vehicle can be freely lifted/lowered and driven irrespective of any calibration needs, vehicle tilt, etc.
- As soon as an EZ-Cal is connected to the controller, the factory override state is ended.
- If calibration does not occur, then the factory override state will recur if the EZ-Cal is disconnected and power is switched off/on.

IMPORTANT: – Never use a vehicle in factory override; this state is **ONLY** intended for use during manufacture! While factory override is active, the LED is rapidly flashed on/off.

TROUBLESHOOTING CHART

The following chart is a guide to help the technician find the area of a problem. In order to benefit from the information, you are advised to fully assess the symptoms by operating all machine functions. There may be some functions that operate while others may not. Record this information and proceed down the left-hand column until you find the failure scenario that best fits the problem. Refer to the information provided to the right for possible causes and remedies. This unit contains a Microprocessor based control system which contains various safety features designed to protect itself and the operator in the event of a failure.

It is strongly recommended that the technician use the EZ-cal to read any displayed messages before proceeding to use this Troubleshooting chart. The EZ-cal scan tool will provide the technician with detailed information related to the failure.

Information on the use of the EZ-cal tool plus helpful Flow Charts and graphs can be found earlier in this troubleshooting section. Please read and familiarize yourself with all of the information provided in the troubleshooting section before attempting to diagnose or repair the machine.

Table 4b-4: Troubleshooting Chart

Problem	Possible Cause	Remedy/Solution
General Power Issue		
No operation from upper or lower control station; no red LED at GP400.	Main battery switch turned off	Located left of lower control box.
	Emergency switch pushed in or ignition switch turned off or defective	Upper or lower e-stop switch will cut all power, as will the ignition switch in the platform control box.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts.
	Blown 30 amp fuse	Located just below the battery cutoff switch
	Circuit breaker tripped	Located in lower control box panel
No functions; LED illuminated or flashing on GP400	Blown 300 amp fuse	Located just to the left of lower control station. Check for excessive motor amperage draw. Will receive a 7-7 flash code on GP400.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	Damaged upper control box harness	Inspect from harness plug to terminal strip under platform. May receive 6-6 flash code on GP-400 (CAN bus)
	Other fault in system monitored by GP400	Check Help message on EZ-Cal or check flash code for error
Functions from lower controls but not from upper controls	Interlock switch (joystick)	Check power to red wire (power to switch) and power to purple wire (power out of switch) at joystick plug
	Loose plug connections on Matrix module	Check plug connections
	Damaged upper control box harness	Inspect from harness plug to terminal strip under platform. May receive 6-6 flash code on GP-400 (CAN bus)
	System interlock	Check HELP messages using EZ-Cal



LIFT/LOWER		
Platform will not raise; electric motor operating.	Excessive weight on platform	Reduce weight to rated platform capacity
	Lift Relief Valve RV-1 out of adjustment	Adjust relief valve to rated platform capacity
	Lift Valve SV-1 not energized	Check wiring to lift valve. Check for EZ-Cal message or flash code
	Lowering Valve SV-5 stuck open (located at base of lift cylinder)	Check and remove contamination from valve
	Main system pressure inadequate	Check pump output pressure
Platform will not raise; electric motor NOT operating.	Level sensor out of level (platform elevated above 10')	Reposition machine to firm level surface. Check level sensor function using EZ-Cal See Diagnostic chart 2e1
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries Battery charger may not operate if battery voltage drops below 20 volts
	System interlock	Check HELP messages using EZ-Cal
Platform raises uncommanded when operating other functions	Lift Valve SV-1 sticking	Clean or replace SV-1 valve
	Shuttle Valve LS-2 damaged or contaminated	Clean or replace LS-2 valve. See hydraulic diagram for location
Platform will not lower or lowers slowly	Maintenance lock in maintenance position	Return maintenance lock to the stowed position
	Lowering valve not energized	Check wiring to lowering valve located on Lift Cylinder. Check for EZ-Cal message or Flash code
	Lowering valve not shifting	Clean debris. Check for damage, replace
	Lowering orifice plugged	Clean orifice located inside hose fitting on lift cylinder
	System interruption	Check HELP messages using EZ-Cal
Platform lowers uncommanded (drift down)	Lowering Valve SV-5 sticking or contaminated	Deploy Maintenance Lock! Remove and clean or replace lowering valve SV5
	Cylinder internal seal failure	Check, repair seals
Emergency lowering not working	Lowering valve not shifting	Clean debris, check for damage, replace
	Lowering Orifice ORF-3 plugged	Clean orifice, located in Lift cylinder hose port.
	Emergency Down battery discharged	Charge, check charge diode & connections
	Emergency Down supply fuse blown	Replace fuse, check for shorts in wire and coil
	Valve coil failed on cylinder	Test, replace
DRIVE:		
No drive function	Drive Valve not shifting	Check electrical connections at drive valve, check drive valve for contamination.
	Lift/Drive select switch malfunction	Check continuity through switch
	Drive system interlock	Check HELP and MODE messages on EZ-Cal
Drive operates uncommanded when operating other functions	Drive Valve SVD-1 sticking or damaged	Clean, replace SVD-1 valve. See hydraulic diagram.
	Shuttle Valve LS-3 damaged or contaminated	Clean or replace LS-3 valve. See hydraulic diagram for location

No drive elevated	Unit out of level	Lower and re-position the machine.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	System interlock	Check HELP messages using EZ-Cal
Slow drive with platform in stowed position	High torque enabled	Check Speed/Torque Switch at platform controls
	Elevation sensor out of calibration	Use EZ-Cal to monitor platform state of elevation. See Diagnostic chart I.D. 2a13 for elevated status and 2e1 for platform % of elevation input. Failure of the angle transducer will trigger a fault code.
	Malfunctioning rear wheel bypass valve	Located on rear wheel motors only. Check by replacing valves.
	Wheel motor/s not functioning correctly	Inspect wheel motors for excessive bypass
Poor gradability performance	High or Mid Speed enabled	Check Speed/Torque Switch
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400, Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	Wheel motor/s not functioning correctly	Inspect wheel motors for excessive bypass
	Malfunctioning Rear wheel bypass valve	Located on rear wheel motors only. Check electrical by disconnecting valves or function by replacing valves
	Malfunctioning Series/Parallel Valves	Located on top of main hydraulic Manifold
	Worn hydraulic pump	Check with flow meter or replace pump
Drive in one direction only	Drive Valve SVD1 not energizing in one direction	Check 12 volts to appropriate coil, check coil, check valve function
	Counterbalance Valve CBV1 or CBV2 malfunction	Swap counterbalance valves to see if functioning direction changes.
	No output from GP400	Scan using EZ-Cal and troubleshooting charts. EZ-cal chart I.D 4f-7 - Fwd or 2f-9 - Reverse
No Low Speed (high torque mode)	Speed/torque selector switch inoperative	Check continuity of Speed/Torque switch in platform control box
	Valve SV3 not functioning	Check for 12 volts and ground to valve check for faulty valve spool
	EP1 poppet valve not functioning	Check or replace valve
No Mid Speed	SV3 or SV4 powered and/or shifted	These valves should not have 12 volts, in mid-speed, check valve function
	Speed/torque selector switch malfunction	Check continuity through switch
No High Speed	Speed/torque selector switch inoperative	Check continuity of Speed/Torque switch in platform control box
	Valve SV4 not functioning	Check voltage and ground to valve check for faulty valve spool
	EP2 poppet valve not functioning	Check or replace valve
No brake effectiveness	Brake Orifice OD-1 obstructed	Remove, clean orifice. See hydraulic diagram for location in manifold.
	Brake discs worn past service limit	Replace brake discs located inside rear wheel motors.

LIFT AND DRIVE

No drive or lift operation motor operates	Main Relief Valve RV-3 out of adjustment	For test purposes, swap RV-3 with RV-2.
	Pump or pump coupler failure	Inspect, replace as necessary
	Diverter Valve EC-1 malfunction	Inspect, replace as necessary
	Hydraulic tank empty	Check, fill with approved oil
No drive or lift operation motor does not operate	Motor malfunction	Inspect, replace as necessary
	System interlock	Check HELP messages using EZ-Cal
	Battery discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts.

STEER

No steer in either direction	Joystick rocker switch inoperative	Check rocker switch output on green and yellow wires, input on blue wire.
	Steering Valve SV-2 inoperative	Check steering valve for power or damage.
	System interlock	Check HELP messages using EZ-Cal
	Hoses connected incorrectly	See hydraulic section for correct connection.
	Pressure Relief Valve RV-2 set too low	Set steer relief valve to 2000 PSI
Steers in one direction only	Steering Valve inoperative or stuck	Inspect; replace steering valve
	No power to steering coil	Check for power and ground in both directions, repair wiring
	System interlock	Check HELP messages using EZ-Cal
Steers but not fully or steers slowly	One or both steering cylinder internal seal failure	Check steering cylinder seals, replace
	Pressure relief valve set too low	Set steer relief valve to 2000 PSI
	King pin/s seizing in the bore	Disassemble and inspect, repair, replace bushings
Wheels do not stay in position while driving	One or both steering cylinder internal seal failure	Check steering cylinder seals, replace
Steers uncommanded	Steering Valve SV-2 sticking or damaged	Remove and inspect for visible debris and stem straightness, clean with solvent and air
	Check Valve CV-1 or CV-2 damaged or contaminated with debris	Remove and clean or replace check valves see hydraulic diagram for manifold location

LEVEL, AUTO & MANUAL

No level operation	Platform is in elevated position or is perceived to be in the elevated position. Elevation is monitored by a sensor located on left-rear portion of the scissor stack.	Use EZ-Cal to monitor platform state of elevation. See Diagnostic chart I.D. 2a13 for elevated status and 2e1 for platform % of elevation input. Failure of the angle transducer will trigger a fault code.
	System interlock	Check HELP messages using EZ-Cal
	Level switch/s inoperative	Check level switch located in the upper control box
	Directional pressure valve not functioning	Located behind lower control box. Inspect valve for loss of power, ground or damage.

No auto-level operation; manual level operates	Switch or switch wiring problem. Located inside upper control box	Check switch and wiring
	Level Sensor not calibrated	See Tilt Sensor Calibration instructions found earlier in this section.
	System Interlock	Check HELP messages using EZ-Cal
Unit will not accurately level platform	Unit on too extreme an angle	Relocate unit to more level ground
	Level valve sticking	Inspect/replace valves located behind lower control box
	Excessive weight on platform	Reduce weight to 1500 lbs max (680Kg)
	Pressure relief valve out of adjustment	Set steering relief valve SV-2 to 2000 PSI (138 bar)
	Tilt sensor not calibrated or not calibrated properly	See Tilt Sensor Calibration instructions found earlier in this section.
	Level cylinder valves wired incorrectly	Refer to schematic diagram for correct wiring.
	Level cylinder hoses connected incorrectly	See Hydraulic section for hose routing detail
Will not stay level; drifts down	Counterbalance valve adjustment or failure	Located on the outrigger cylinder, not adjustable. If valve is suspect it must be replaced
	Failure of cylinder internal seals	Inspect and repair as necessary

TROUBLESHOOTING BATTERY CHARGER: ELECTRIC MODELS

Insufficient AC power systems, poor connections, bad batteries or low electrolyte in batteries may result in poor charger performance. Refer to *Section 2: Electrical System* for electrical requirements, and charger and battery maintenance instructions.

Refer to the *Operator's Manual* for detailed charging instructions.

To be able to use the trouble shooting guide safely and effectively, it is important to read through this guide before beginning any tests.



Do not operate the charger if it is malfunctioning. Personal injury or property damage may result.

Do not disassemble charger. Return to MEC when service or repair is required.

To reduce the risk of fire, only use AC circuits and extension cords in accordance with all National and Local Electrical Codes for the location of use.

Only use MEC approved lead acid type flooded batteries. Use of GEL type batteries may damage the charger and cause machine instability due to decreased weight.



TO REDUCE THE RISK OF ELECTRIC SHOCK, ALWAYS DISCONNECT BOTH THE POWER SUPPLY CORD AND THE OUTPUT WIRES BEFORE ATTEMPTING MAINTENANCE.

THE CHARGER SURFACE CAN GET HOT WHILE OPERATING. CONTACT WITH THE SKIN OR SURROUNDING MATERIALS SHOULD BE AVOIDED.

TO REDUCE THE RISK OF AN ELECTRIC SHOCK, CONNECT ONLY TO A PROPERLY GROUNDED SINGLE-PHASE (3 WIRE) OUTLET.

Incorrect assembly may result in a risk of electric shock or fire. The following procedures are intended only to determine if a malfunction may exist in the charger. As most returned chargers test good, it is very important that this procedure is followed and that other problems are corrected before assuming the charger has failed.

The MEC battery charger is a fully automatic type with a maintenance feature that will maintain battery voltage indefinitely when connected to an AC power source. The battery charger should be plugged into an un-switched AC power source if the machine is stored for long periods of time.

IMPORTANT: – All MEC electric aerial lifts are equipped with lead acid type flooded batteries. The yellow wire loop on the back of the charger must be intact. If it is cut, broken or damaged the charger may go into GEL charging mode, causing damage to the machine and/or batteries.

TROUBLESHOOTING - 3084ES MODEL -- TROUBLESHOOTING BATTERY CHARGER: ELECTRIC BATTERY CHARGER, HB1500-48

Figure 4b-11: Battery Charger

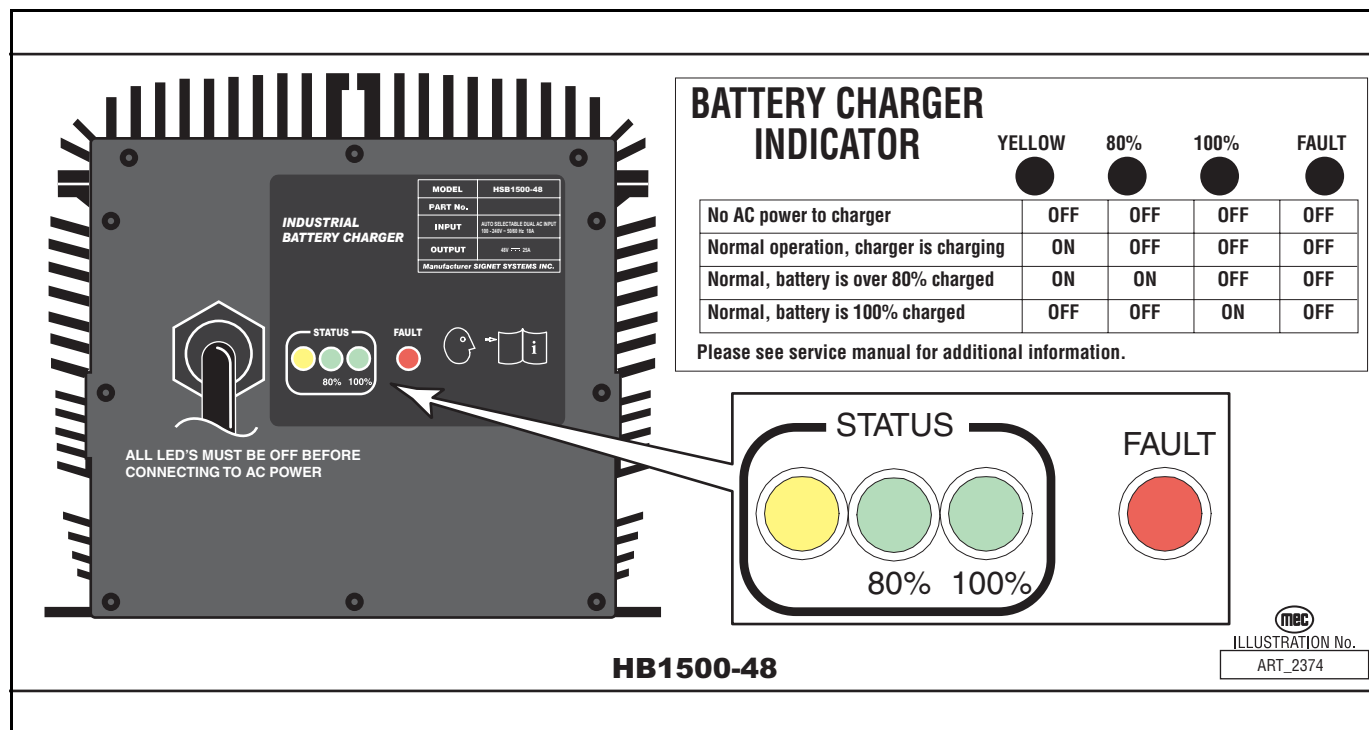


Table 4b-5: Battery Charger Fault Codes

CHG YELLOW LED	80% GREEN LED	100% GREEN LED	Fault RED LED	Condition
X	X	X	ON	<ul style="list-style-type: none"> Battery pack probably bad Weak or bad cell Batteries excessively discharged
OFF	OFF	OFF	ONE FLASH	<ul style="list-style-type: none"> Output open circuit or short circuit or reverse polarity connection of battery to charger Battery voltage is too high (may be connected to wrong voltage battery)
OFF	OFF	OFF	TWO FLASH	<ul style="list-style-type: none"> Charger has timed-out at 22 hours (battery pack probably bad or bad cell)
X = "don't care" LED may be ON or OFF				

To determine if a charger is malfunctioning, identify the problem from the following list and refer to the Trouble Table for instructions.

1. Charger does not turn ON -or- no yellow LED
2. Red FAULT LED is ON or BLINKING
3. Batteries do not fully charge
4. The AC supply circuit breaker is tripped or fuse is blown

If the problem is not listed above, refer the problem to a qualified service agent for additional trouble shooting procedures.



NOTE: Over 1/2 of all battery chargers returned as “failed” are good. Please follow the troubleshooting procedures carefully and check all other items before returning the charger.

Table 4b-6: Trouble Table - HB1500-48 Battery Charger

PROBLEM	DIAGNOSIS
Charger does not turn ON - no LEDs	<p>The AC plug must be disconnected and reconnected to start the charger once it has turned-off from a charge cycle.</p> <ul style="list-style-type: none"> • Connect the AC supply cord securely to a live AC outlet (minimum 20-amp circuit) • Check the AC outlet to ensure it is working and has 20-amp supply. • Check that DC output wires and connections are in good working condition. • Replace charger if everything else is correct.
Red FAULT LED is ON or BLINKING	<p>The faults identified below cause the FAULT LED to turn ON or BLINK. If the cause of the fault is removed the charger restarts automatically.</p> <ul style="list-style-type: none"> • LED is ON Weak or bad battery pack, bad cell, low electrolyte level or batteries excessively discharged. • LED blinks once: OUTPUT CONNECTION ERROR Check Battery and Charger Connection <ul style="list-style-type: none"> - Connection may be corroded or loose - Check for pinched or broken wires (may cause a short) - Output may be connected in reverse polarity to batteries (the charger is not damaged by any of these problems.)
Red FAULT LED BLINKS twice: charger has Timed-Out	<p>The charger has a 22 hour timer - if charge cycle is not complete within 22 hours the charger will stop charging.</p> <ul style="list-style-type: none"> • Possible Causes: <ul style="list-style-type: none"> - Batteries are extremely discharged - unplug for 30 seconds then plug charger back in to restart and complete charging. - Electrolyte is low in one or more cells. - Batteries are weak, old, or have one or more bad cells. Batteries will still charge but in a weakened capacity - they should be replaced.
Batteries do not fully charge	<ul style="list-style-type: none"> • Overnight Charging <ul style="list-style-type: none"> - Make sure AC power supply is not being switched OFF at night • NEW batteries <ul style="list-style-type: none"> - New batteries sometimes require 20 to 30 charge/discharge cycles before they charge normally. 80% LED after overnight charging is normal. Within a few weeks the 100% LED should light after overnight charge. • OLD batteries <ul style="list-style-type: none"> - Check for dead cells or reduced capacity.
AC Line circuit breaker tripped or fuse blown	<ul style="list-style-type: none"> • Overloaded Circuit Minimum 20-amp service required. Plug charger into a different AC outlet on a different circuit. If charger operates properly the AC line may require repair. If charger fails and AC line checks “good” the charger should be replaced.

HYDRAULIC PRESSURE ADJUSTMENT - 3084ES

- Before attempting to check and/or adjust pressure relief valves, operate the machine for 15 minutes or long enough to sufficiently warm the hydraulic fluid.
- Insert a 0-5000 psi gauge onto the pressure test port on the valve manifold using gauge adapter fitting MEC part no. 8434

Table 4b-7: Hydraulic Pressure Adjustment

Model	Main		Lift		Steer		Stand-by	
3084ES	2800 PSI	193 bar	2500 PSI	172.4 bar	2000 PSI	137.9 bar	not used	not used

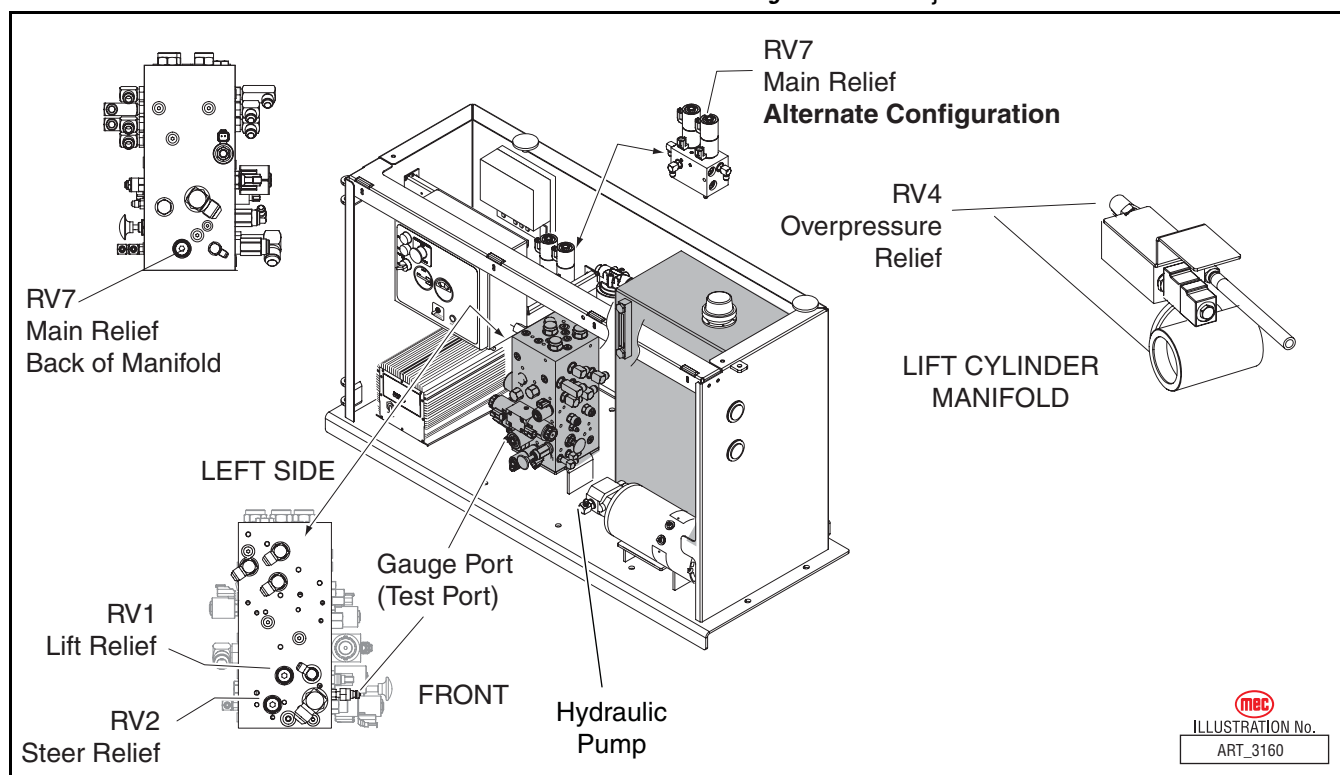
ADJUSTING RELIEF VALVES

- Remove the tamper proof cap.
- Turn adjustment screw “IN” to increase pressure.
- Turn adjustment screw “OUT” to decrease pressure.
- When correct pressure is obtained replace tamper proof cap with a new one.



Do not operate pump with tamper proof cap removed. Fluid will emit under pressure.

Figure 4b-12: Adjustable Valves Location - 3084ES



ADJUSTMENTS - 3084ES

The Hydraulic Pump used in this model is not adjustable.

Refer to "Figure 4b-12:Adjustable Valves Location - 3084ES" on page 4b-37.

See Section 5 - Schematics for correct pressure settings.

Main Relief (RV7)

- Disconnect forward or reverse coil of drive valve.
- Energize drive function by moving joystick in the direction of the already disconnected coil.
- Hold the switch for 10 seconds to get an accurate reading on the pressure gauge.
- If pressure is LOW, adjust main relief valve ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust main relief valve ¼ turn counterclockwise and recheck.
- Repeat until correct.

Lift Relief (RV1)

- Move the platform to full height with **no load on platform**.
- Hold the switch for 10 seconds to get an accurate reading on the pressure gauge.
- If pressure is LOW, adjust lift relief valve ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust lift relief valve ¼ turn counterclockwise and recheck.
- Repeat until correct.

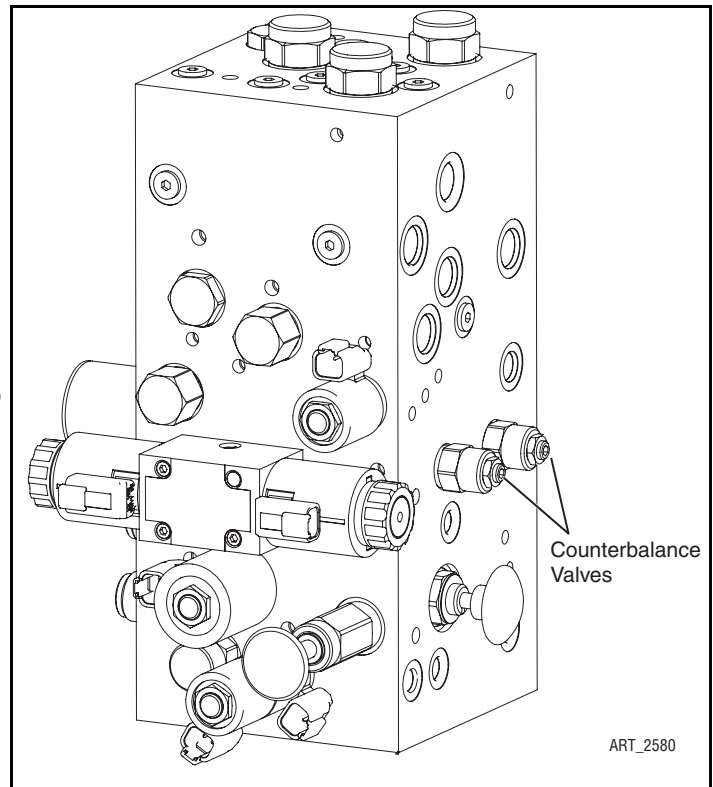
Steering Relief (RV2)

- Energize the steering to full left.
- Hold the switch for 10 seconds to get an accurate reading on the pressure gauge.
- If pressure is LOW, adjust steering relief valve ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust steering relief valve ¼ turn counterclockwise and recheck.
- Repeat until correct.

COUNTERBALANCE VALVES

Figure 4b-13: Counterbalance Valves

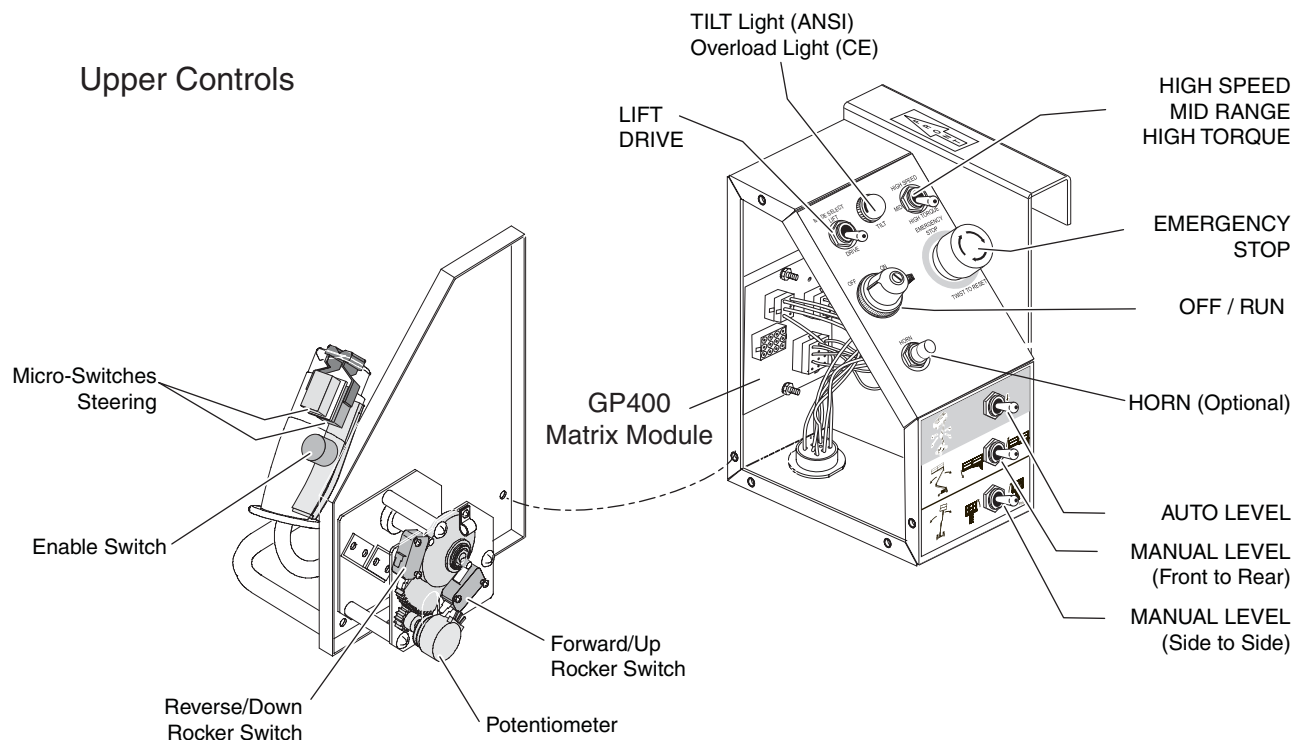
1. Loosen the locknut on one of the valves.
2. Turn the adjustment screw clockwise (to the right) until it reaches the internal stop and the screw will turn no further.
3. Turn the adjustment screw clockwise (to the right) $3\frac{1}{4}$ turns.
4. Tighten the locknut while holding the adjustment screw in position to prevent it from rotating.
5. Repeat steps 1 through 4 on the other Counterbalance valve.
6. Adjustment is complete.



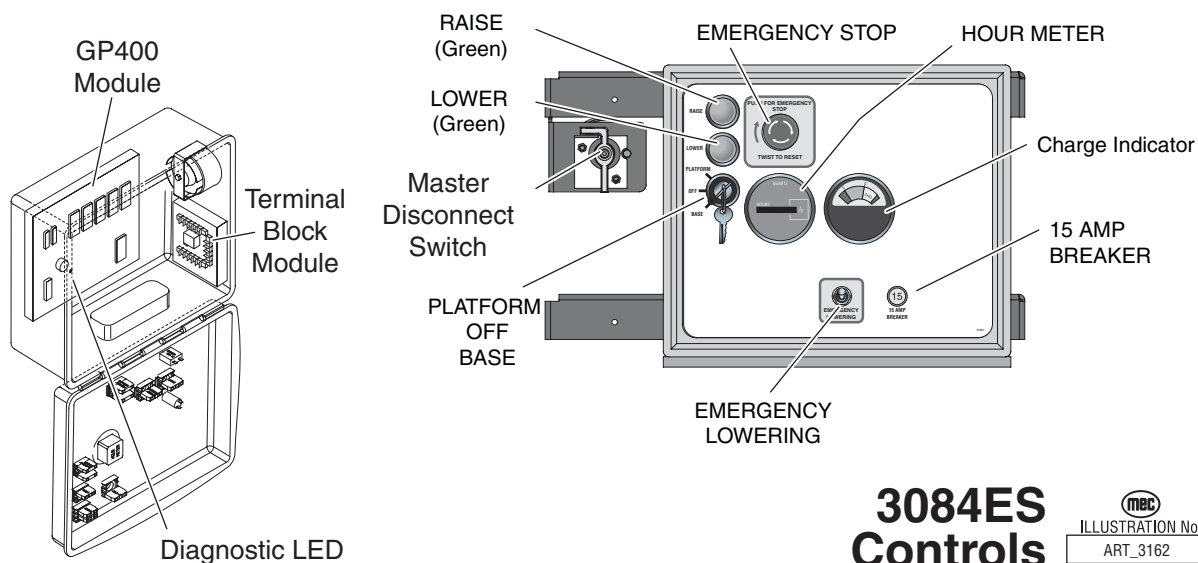
COMPONENT ILLUSTRATIONS

Figure 4b-14: Controls and Switches, ES

Upper Controls



Lower Controls



**3084ES
Controls**

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ILLUSTRATION No.
ART_3162

Figure 4b-15: Hydraulic Manifold, ES

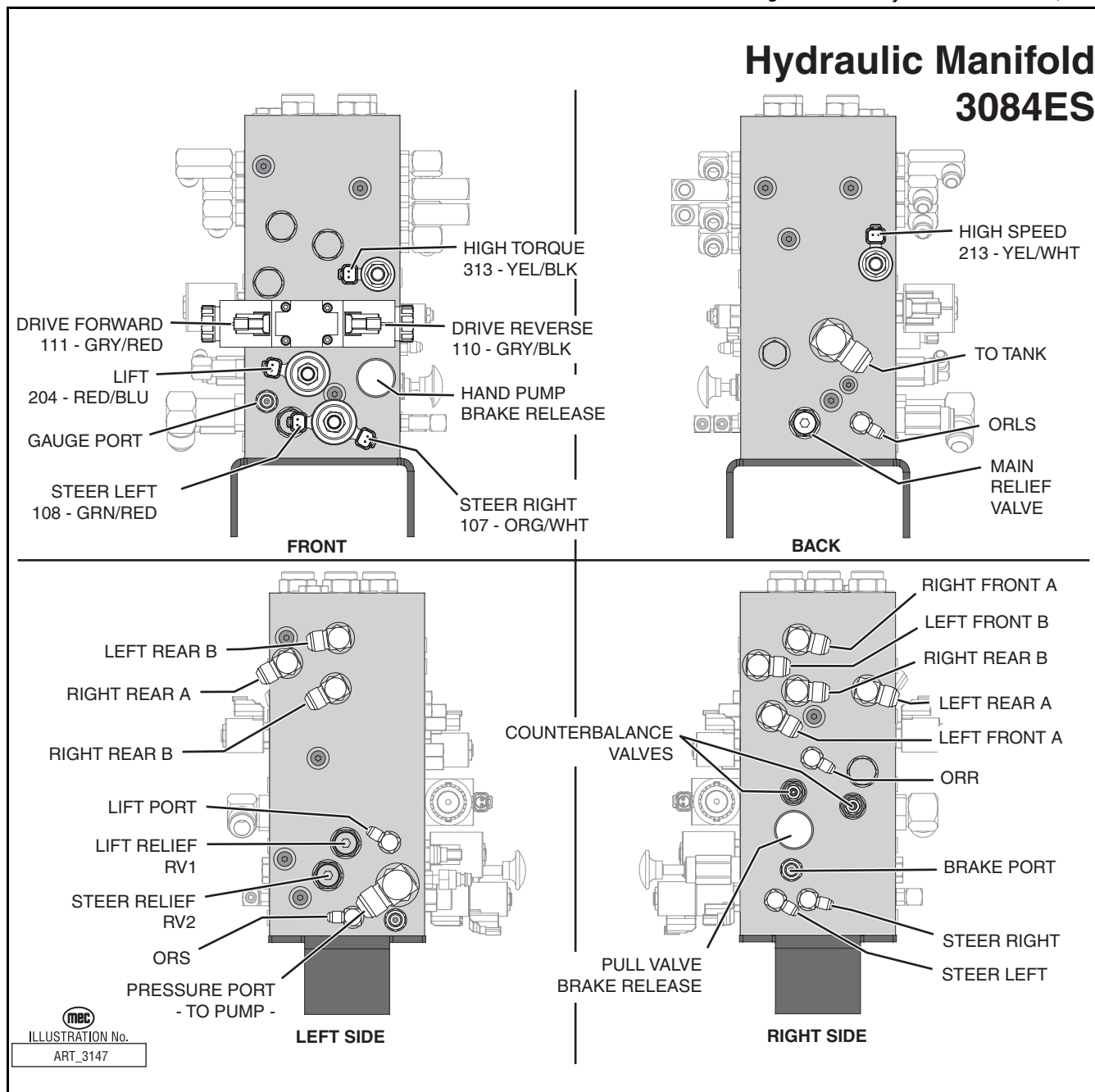
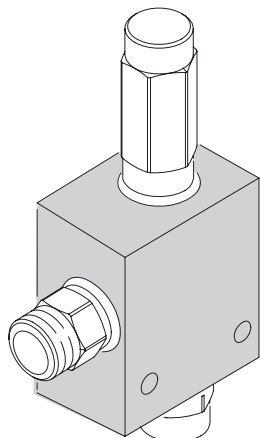
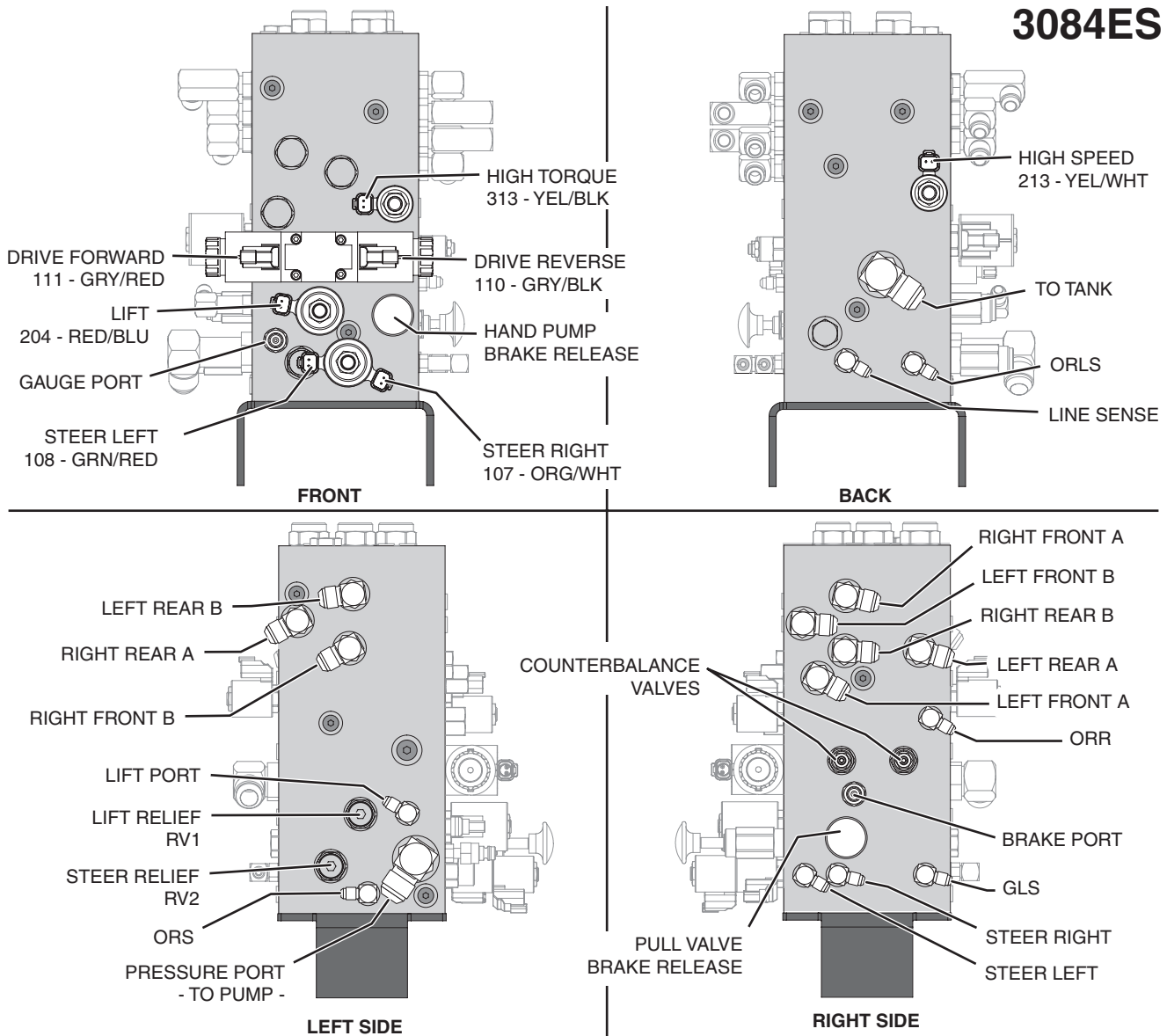


Figure 4b-16: Main Hydraulic Manifold - 3084ES Alternate Configuration

Hydraulic Manifold - Alternate Configuration 3084ES



**REMOTE
MAIN RELIEF VALVE**

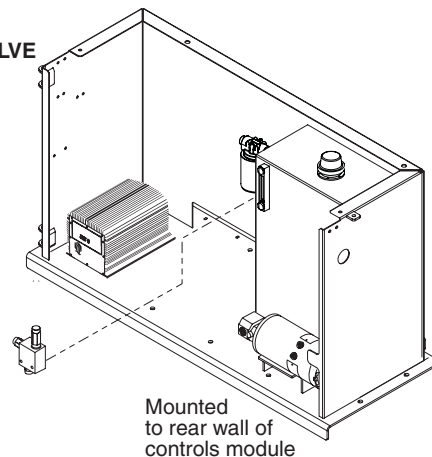


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Section 5

SCHEMATICS

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3084RT DIESEL/DUAL FUEL MODELS

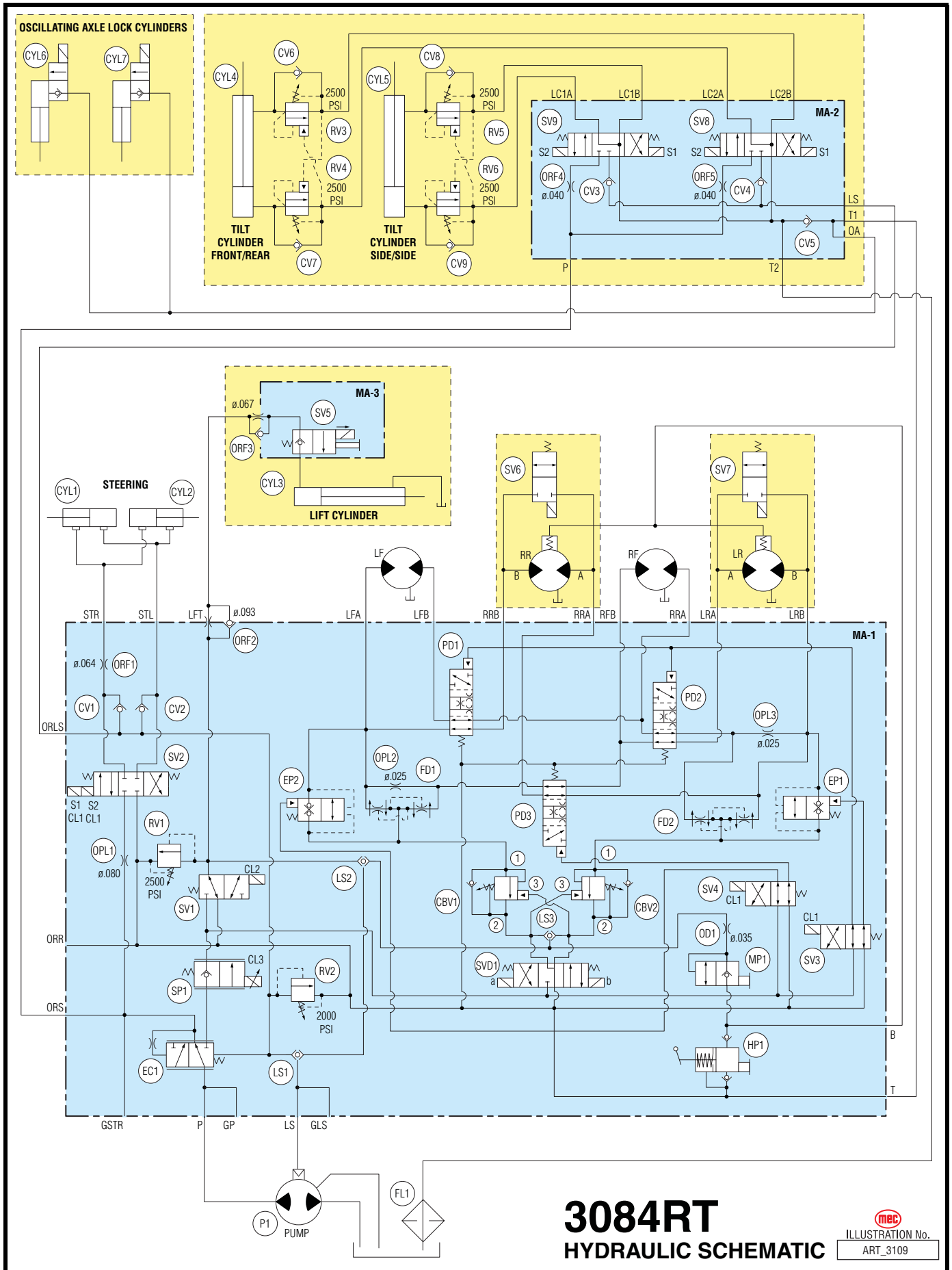
HYDRAULIC - 3084RT

The following table applies to Figure 5-1, Figure 5-2, and Figure 5-2.

Callout	Description
MA-1	MAIN MANIFOLD
CBV1	Counter Balance Valve, Drive
CBV2	Counter Balance Valve, Drive
CL1	Coil - Speed/Torque/Steer Valves #8
CL2	Coil - Lift Valve #10
CV1	Check Valve, Load Sense Steer Left
CV2	Check Valve, Load Sense Steer Right
EC1	Priority Flow Control
EP1	Piloted Poppet Valve - Torque/Speed
EP2	Piloted Poppet Valve - Torque/Speed
FD1	Flow Divider/Combiner
FD2	Flow Divider/Combiner
HP1	Hand Pump, Brake Release
LS1	Load Sense Shuttle Valve
LS2	Load Sense Shuttle Valve
LS3	Load Sense Shuttle Valve
MP1	Manual Push Brake Release Valve
OD1	Orifice Disc, Brakes, 0.035
OPL1	Orifice Plug, Steering, 0.087
OPL2	Orifice Plug, Flow Divider Bleed, 0.025
OPL3	Orifice Plug, Flow Divider Bleed, 0.025
ORF1	Orifice, Steering, 0.064
ORF2	Orifice, Lift, 0.093
PD1	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD2	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD3	Pilot Valve, Series Parallel, 4-Way / 3-Position
PLG4	Port Plug
PLG6	Port Plug
RV1	Relief Valve, Lift, 2500 PSI
RV2	Relief Valve, Steering, 2000 PSI
SP1	Proportional Valve
SV1	Spool Valve, Lift, 3-Way
SV2	Spool Valve, Steer, 4-Way / 3-Position
SV3	Spool Valve, Series Parallel, 4-Way / 3-Position
SV4	Spool Valve, Series Parallel, 4-Way / 3-Position
SVD1	Spool Valve, Drive, 4-Way / 3-Position

Callout	Description
	STEERING COMPONENTS
CYL1	Steer Cylinder, Right
CYL2	Steer Cylinder, Left
	TILT COMPONENTS
MA-2	Combination Valve Manifold - Tilt
CV3	Check Valve, Tilt, Side/Side Load Sense
CV4	Check Valve, Tilt, Front/Rear Load Sense
CV5	Check Valve, 10 PSI Oscillating axle
CV6	Check Valve, Tilt Cyl, Front/Rear
CV7	Check Valve, Tilt Cyl, Front/Rear
CV8	Check Valve, Tilt Cyl, Side/Side
CV9	Check Valve, Tilt Cyl, Side/Side
CYL4	Tilt Cylinder, Front/Rear
CYL5	Tilt Cylinder, Side/Side
CYL6	Axle Lock Cylinder
CYL7	Axle Lock Cylinder
ORF4	Orifice, 0.040, Tilt, Side/Side
ORF5	Orifice, 0.040, Tilt, Front/Rear
RV3	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV4	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV5	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
RV6	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
SV8	Spool Valve, Tilt Front/Rear
SV9	Spool Valve, Tilt Side/Side
	LIFT COMPONENTS
MA-3	Lift Cylinder Manifold
CYL3	Lift Cylinder
ORF3	Orifice, 0.067 Descend
SV5	Solenoid Valve, 12V, Dual Coil
	Wheel Motors
LF	Wheel Motor - Left Front
LR	Wheel Motor w/ Brake - Left Rear
RF	Wheel Motor - Right Front
RR	Wheel Motor w/ Brake - Right Rear
SV6	Spool Valve - Right Wheel Motor Bypass
SV7	Spool Valve - Left Wheel Motor Bypass
	RESERVOIR
FL1	Filter, 10 Micron, Fluid Return
P1	Pump, Hydraulic Fluid

Figure 5-1: Hydraulic Schematic - 3084RT



3084RT

HYDRAULIC SCHEMATIC

ILLUSTRATION No.
ART_3109

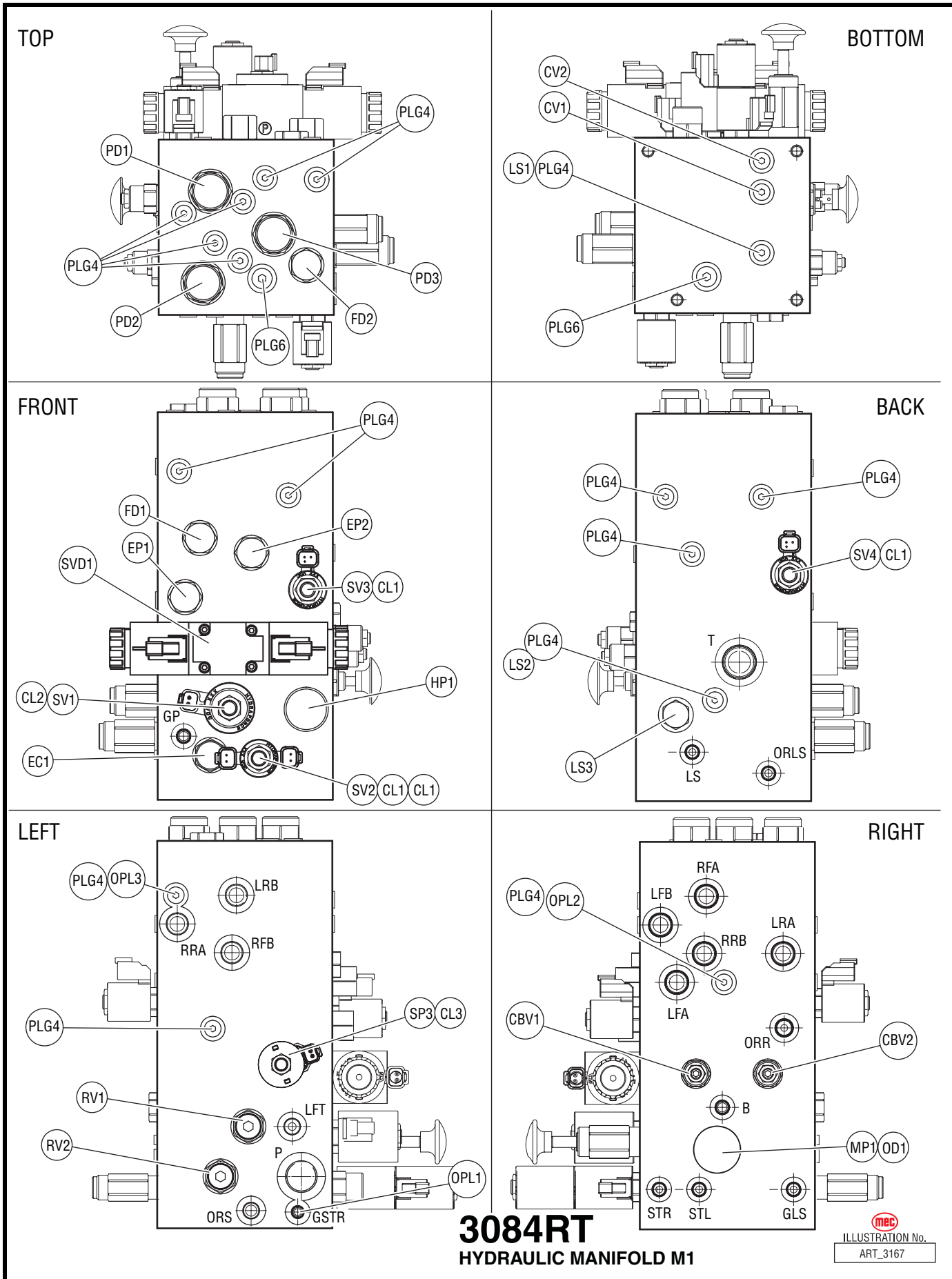
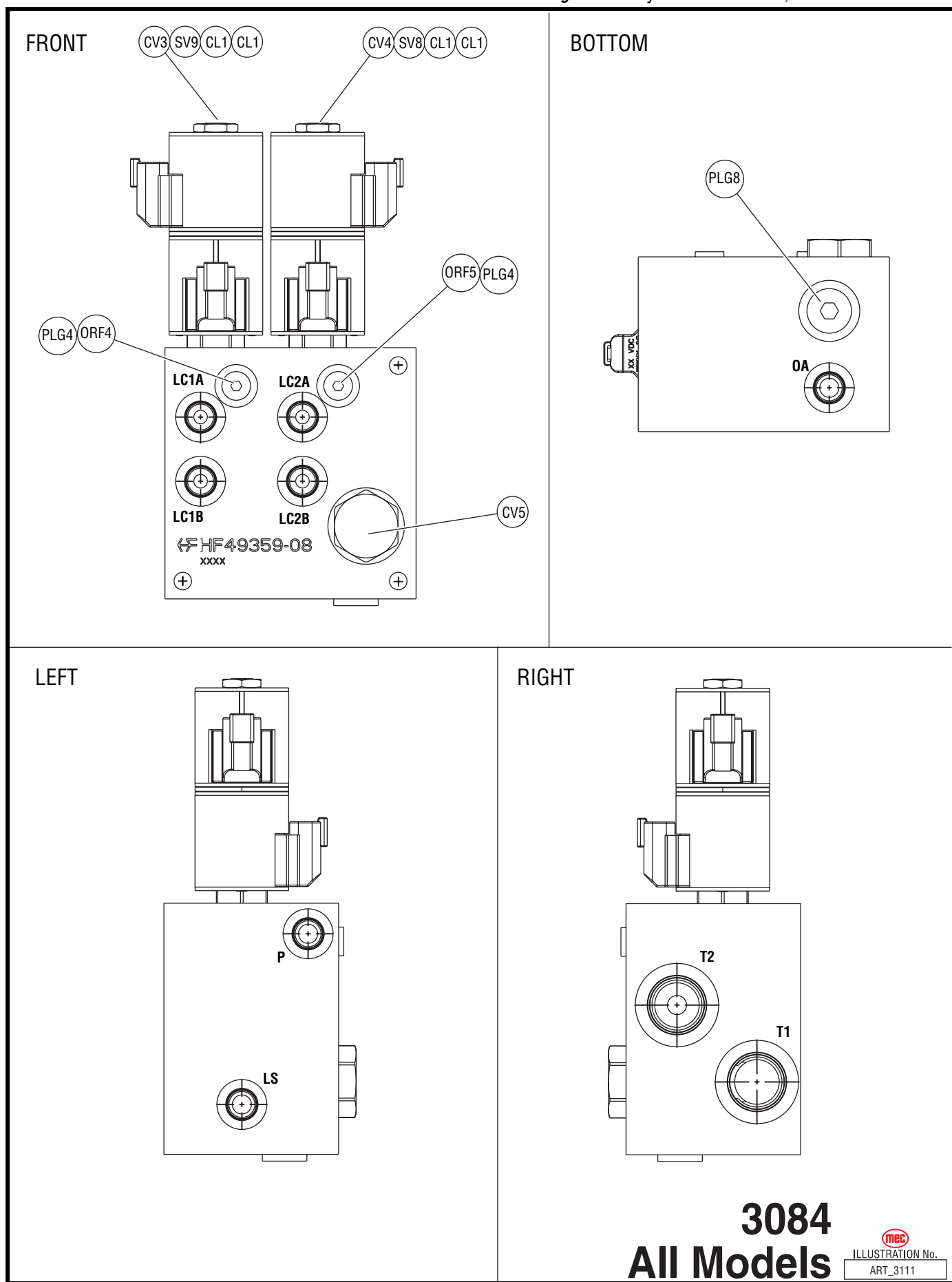
Figure 5-2: Hydraulic Manifold, Main M1 - 3084RT

Figure 5-3: Hydraulic Manifold, Tilt M2 - All Models

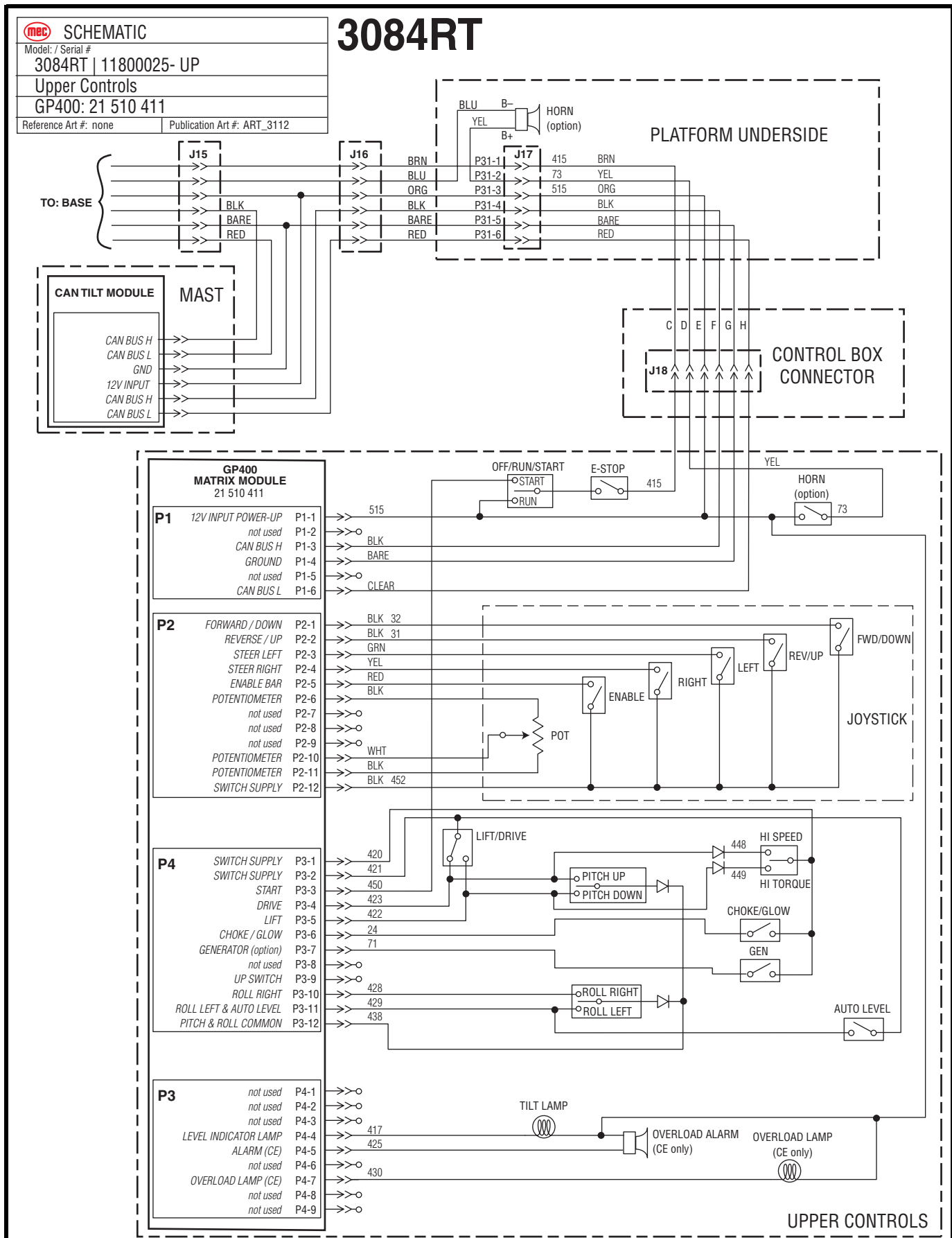
ELECTRICAL - 3084RT**Figure 5-4:** Electric Schematic, Upper Controls - 3084RT

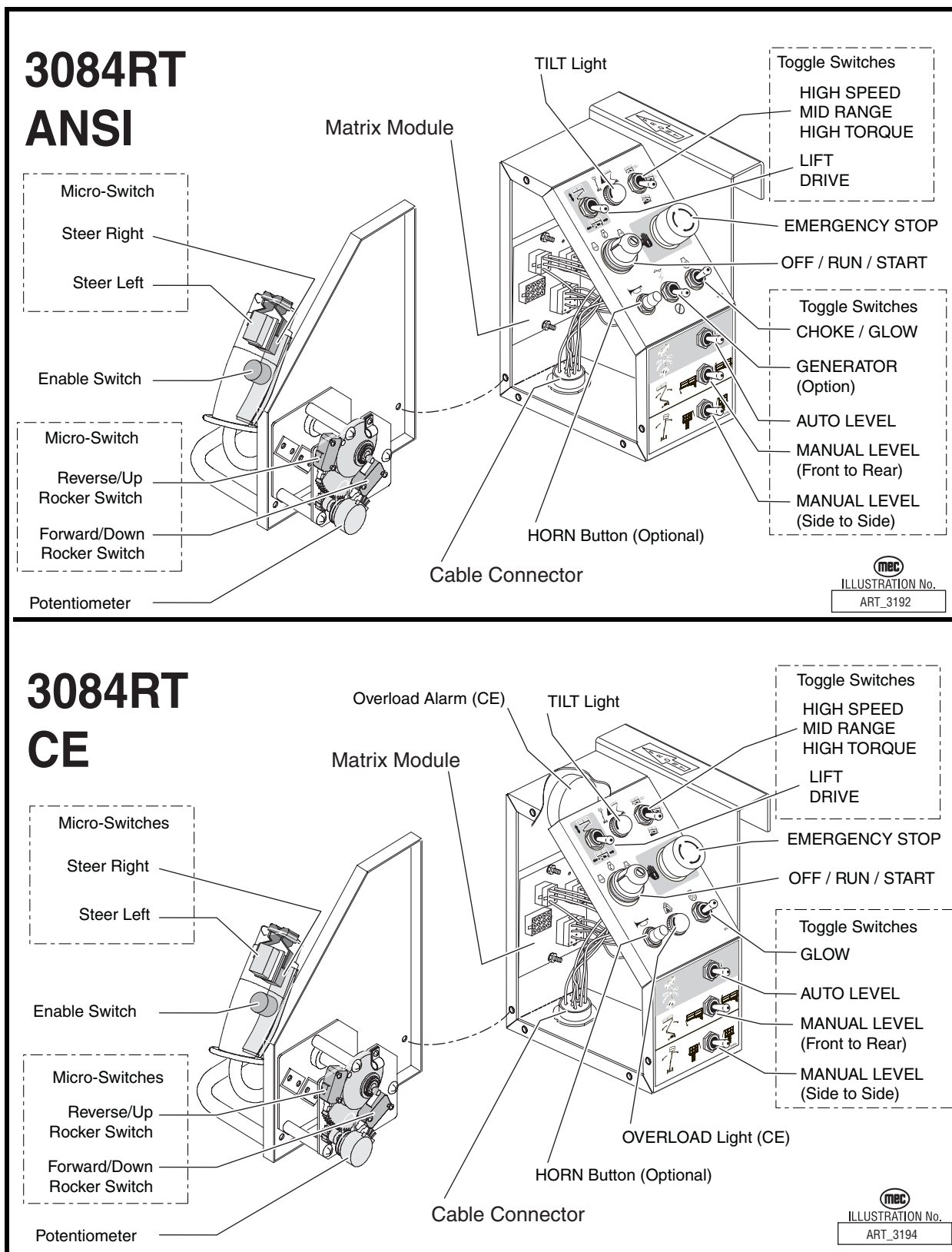
Figure 5-5: Upper Controls Components - 3084RT

Figure 5-6: Electric Schematic, Lower Control Box - 3084RT Dual Fuel

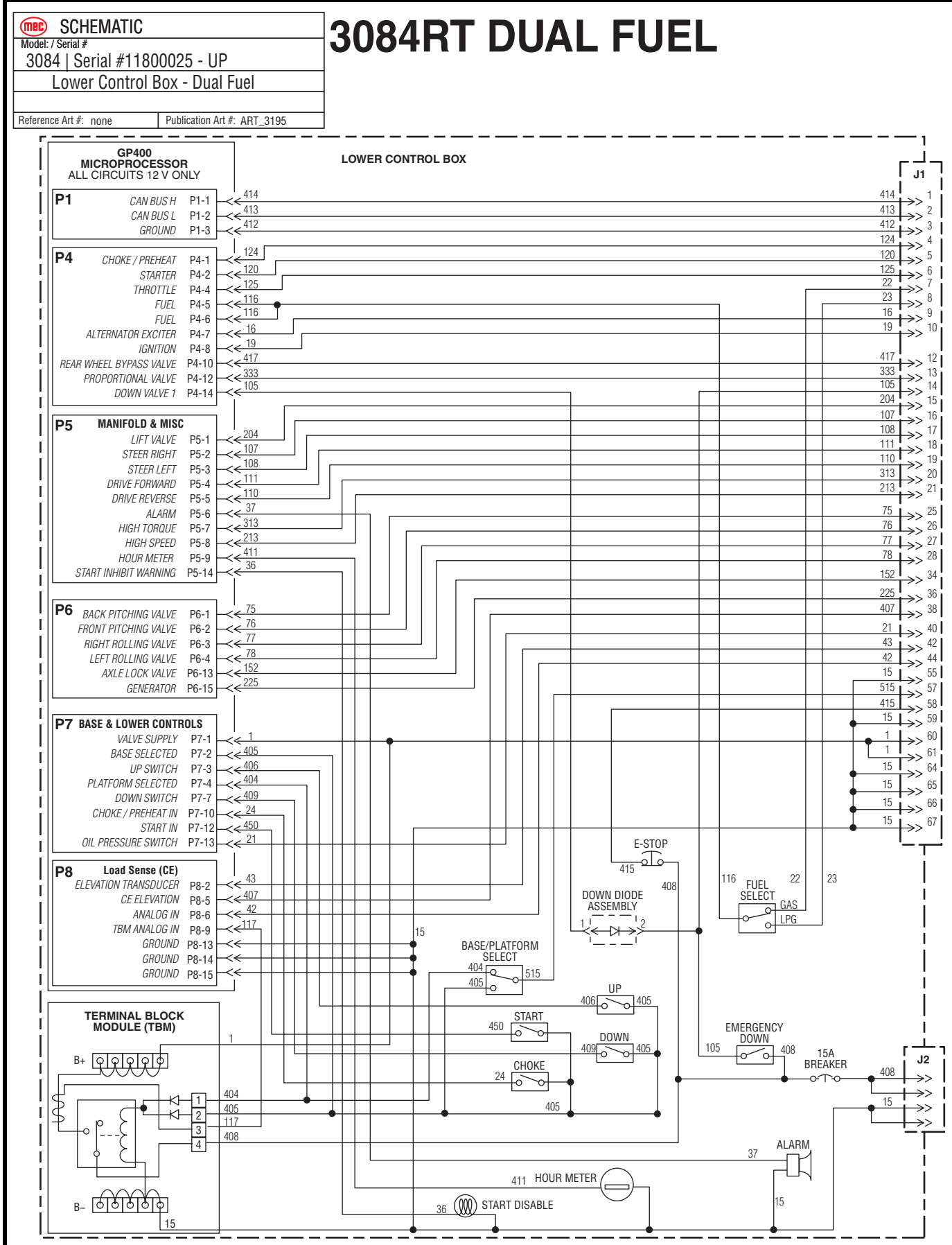




Figure 5-8: Electric Schematic, Lower Control Box - 3084RT Diesel

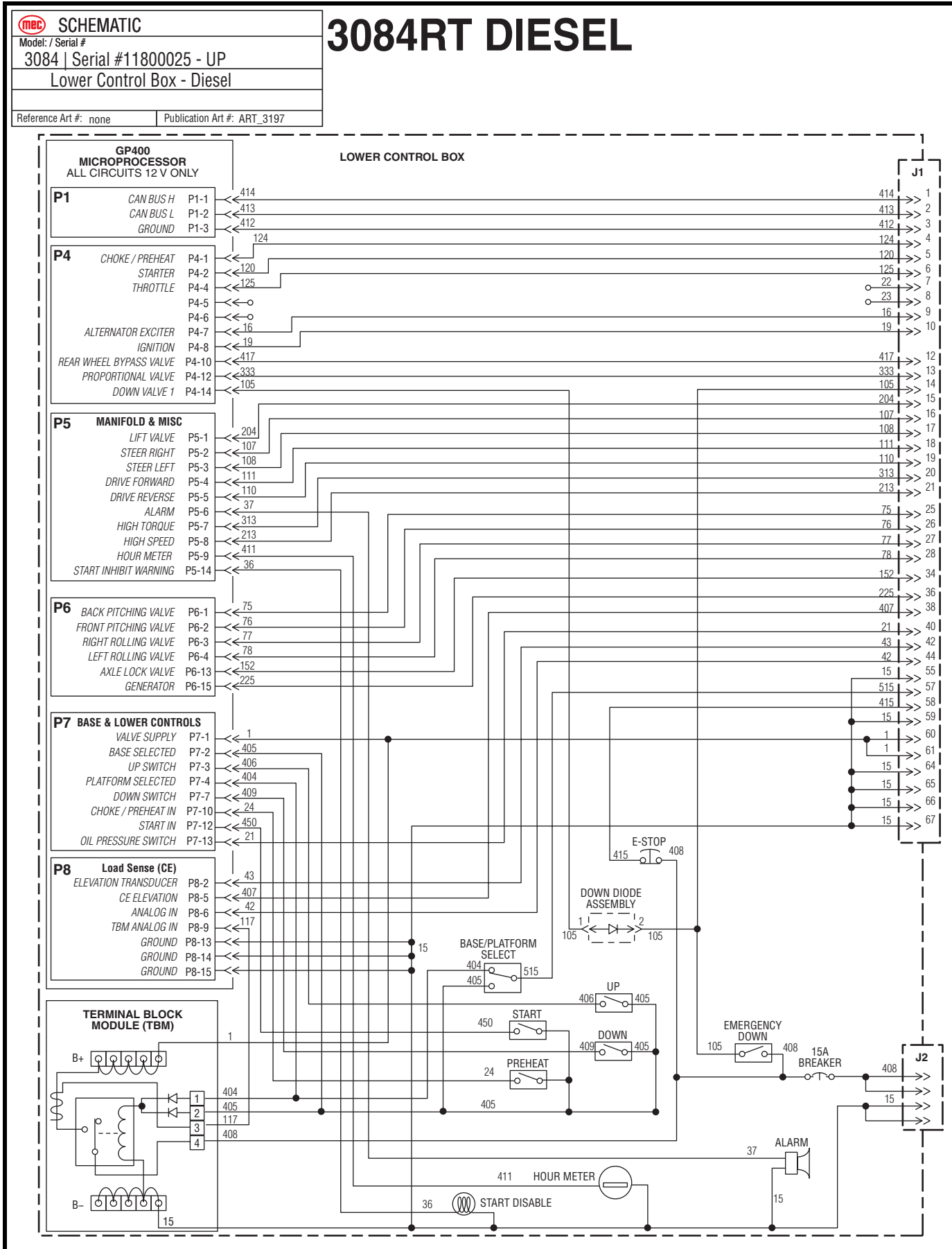
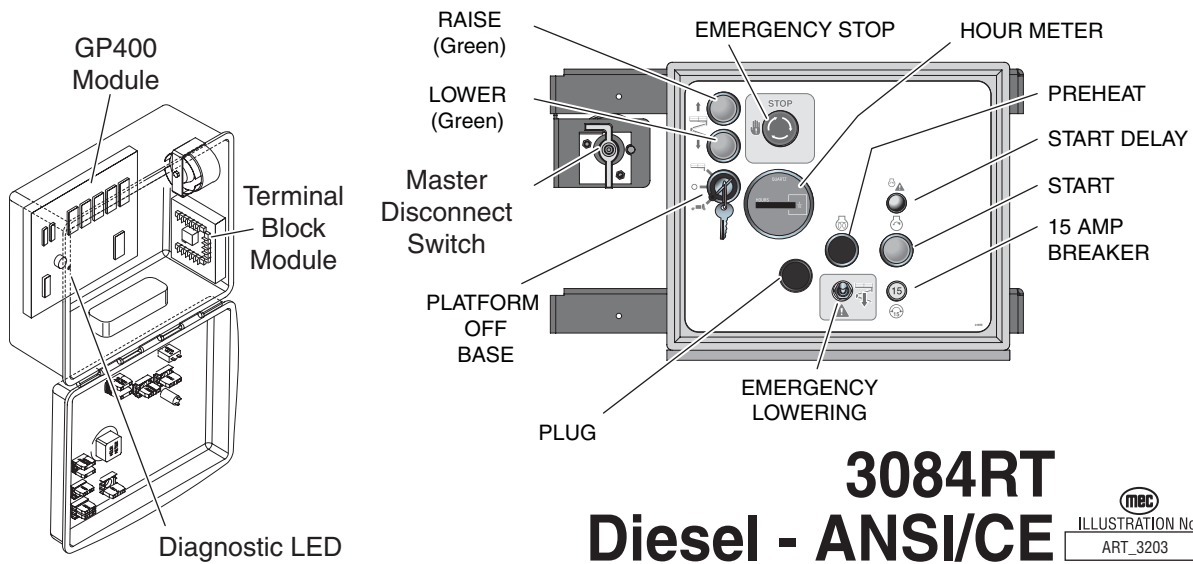
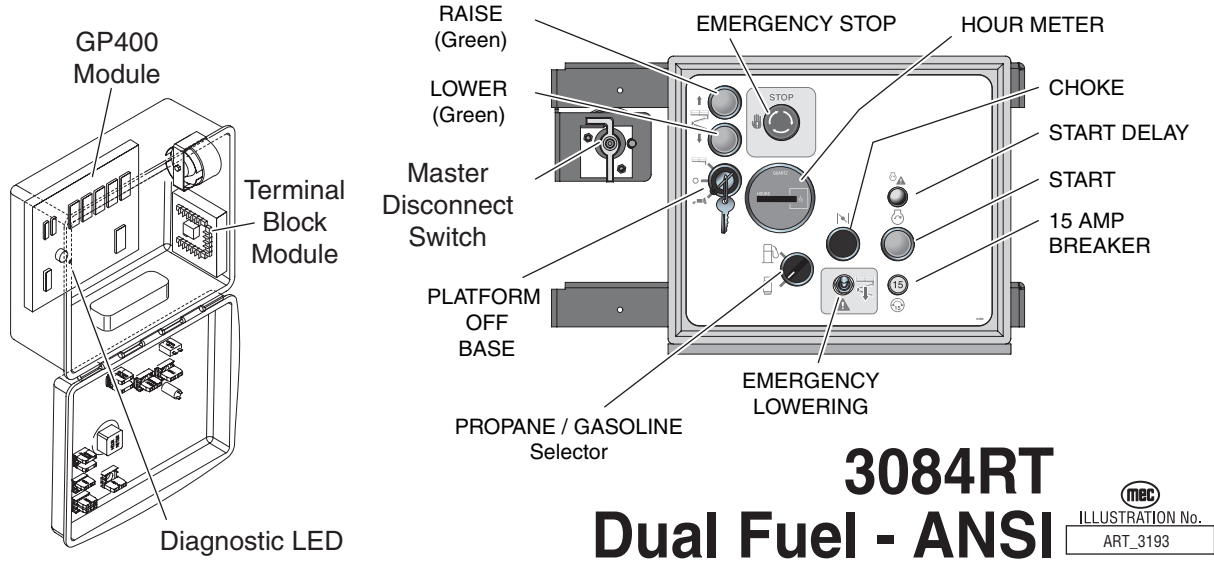




Figure 5-10: Lower Controls Components - 3084RT



NOTES:



3084ES ELECTRIC MODEL

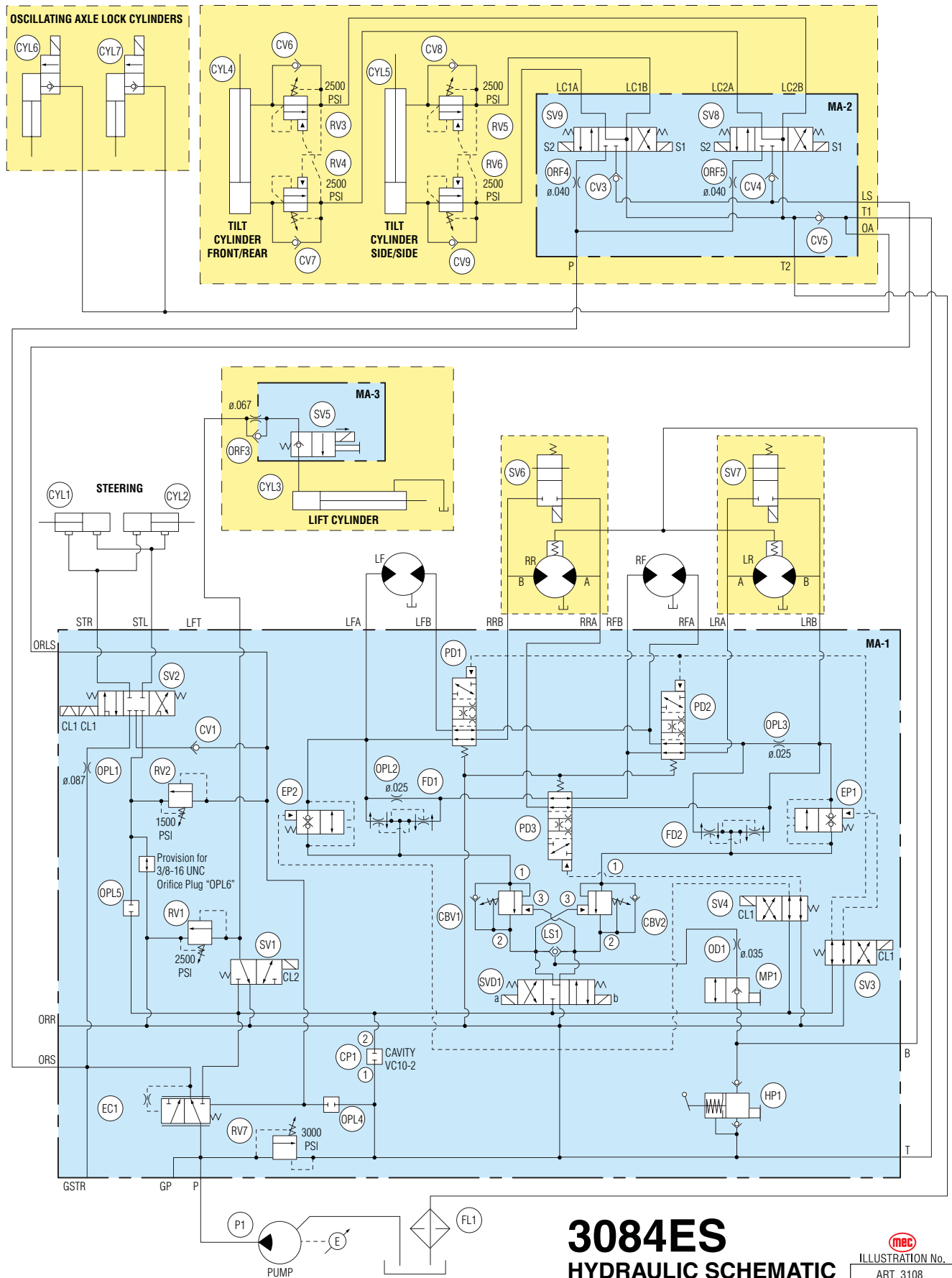
HYDRAULIC - 3084ES

The following table applies to Figure 5-11, Figure 5-12 and Figure 5-13.

Callout	Description
MA-1	MAIN MANIFOLD
CBV1	Counter Balance Valve, Drive
CBV2	Counter Balance Valve, Drive
CL1	Coil - Speed/Torque/Steer #8
CL2	Coil - Lift Valve #10
CL3	Coil - Proportional
CP1	Cavity Plug, Stopped
CV1	Check Valve, Load Sense Steer
EC1	Priority Flow Control
EP1	Piloted Poppet Valve - Torque/Speed
EP2	Piloted Poppet Valve - Torque/Speed
FD1	Flow Divider/Combiner
FD2	Flow Divider/Combiner
HP1	Hand Pump, Brake Release
LS1	Load Sense Shuttle
MP1	Manual Push Brake Release Valve
OD1	Orifice Disc, Brakes, 0.035
OPL1	Orifice Plug, Steering, 0.087
OPL2	Orifice Plug, Flow Divider Bleed, 0.025
OPL3	Orifice Plug, Flow Divider Bleed, 0.025
OPL4	Orifice Plug, Stopped
OPL5	Orifice Plug, Stopped
PD1	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD2	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD3	Pilot Valve, Series Parallel, 4-Way / 3-Position
PLG4	Port Plug
PLG6	Port Plug
RV1	Relief Valve, Lift, 2500 PSI
RV2	Relief Valve, Steering, 2000 PSI
RV7	Relief Valve, 3000 PSI Main
SV1	Spool Valve, Lift, 3-Way
SV2	Spool Valve, Steer, 4-Way / 3-Position
SV3	Spool Valve, Series Parallel, 4-Way / 3-Position
SV4	Spool Valve, Series Parallel, 4-Way / 3-Position
SVD1	Spool Valve, Drive, 4-Way / 3-Position

Callout	Description
	STEERING COMPONENTS
CYL1	Steer Cylinder, Right
CYL2	Steer Cylinder, Left
	TILT COMPONENTS
MA-2	Combination Valve Manifold - Tilt
CV3	Check Valve, Tilt, Side/Side Load Sense
CV4	Check Valve, Tilt, Front/Rear Load Sense
CV5	Check Valve, 10PSI Oscillating Axle
CV6	Check Valve, Tilt Cyl, Front/Rear
CV7	Check Valve, Tilt Cyl, Front/Rear
CV8	Check Valve, Tilt Cyl, Side/Side
CV9	Check Valve, Tilt Cyl, Side/Side
CYL4	Tilt Cylinder, Front/Rear
CYL5	Tilt Cylinder, Side/Side
CYL6	Axle Lock Cylinder
CYL7	Axle Lock Cylinder
ORF4	Orifice, 0.040, Tilt, Side/Side
ORF5	Orifice, 0.040, Tilt, Front/Rear
RV3	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV4	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV5	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
RV6	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
SV8	Spool Valve, Tilt Front/Rear
SV9	Spool Valve, Tilt Side/Side
	LIFT COMPONENTS
MA-3	Lift Cylinder Manifold
CYL3	Lift Cylinder
ORF3	Orifice, 0.067 Descend
SV5	Solenoid Valve, 12V, Dual Coil
	Wheel Motors
LF	Wheel Motor - Left Front
LR	Wheel Motor w/ Brake - Left Rear
RF	Wheel Motor - Right Front
RR	Wheel Motor w/ Brake - Right Rear
SV6	Spool Valve - Right Wheel Motor Bypass
SV7	Spool Valve - Left Wheel Motor Bypass
	RESERVOIR
FL1	Filter, 10 Micron, Fluid Return
P1	Pump, Hydraulic Fluid

Figure 5-11: Hydraulic Schematic - 3084ES



3084ES

HYDRAULIC SCHEMATIC

ILLUSTRATION No.
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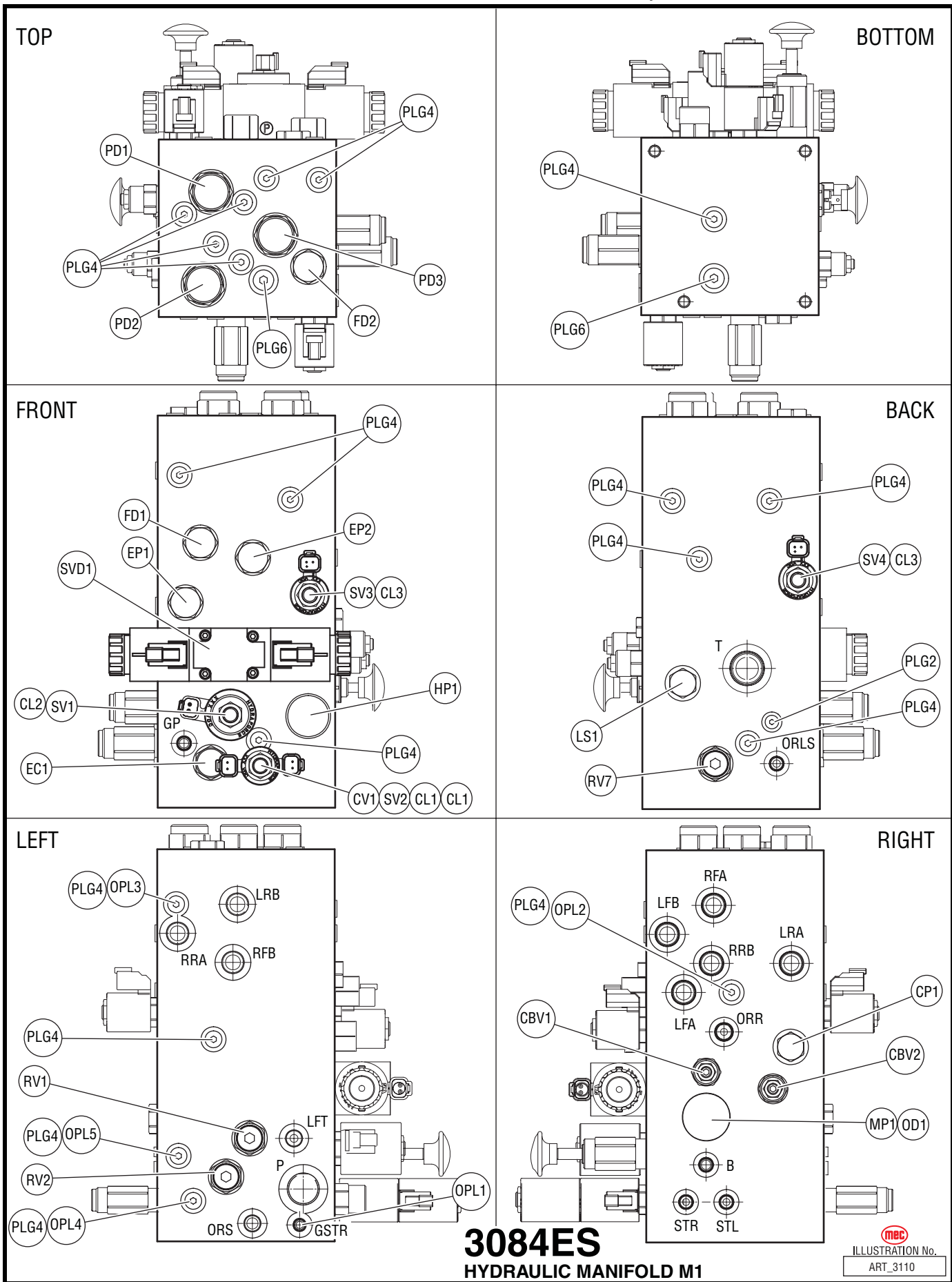
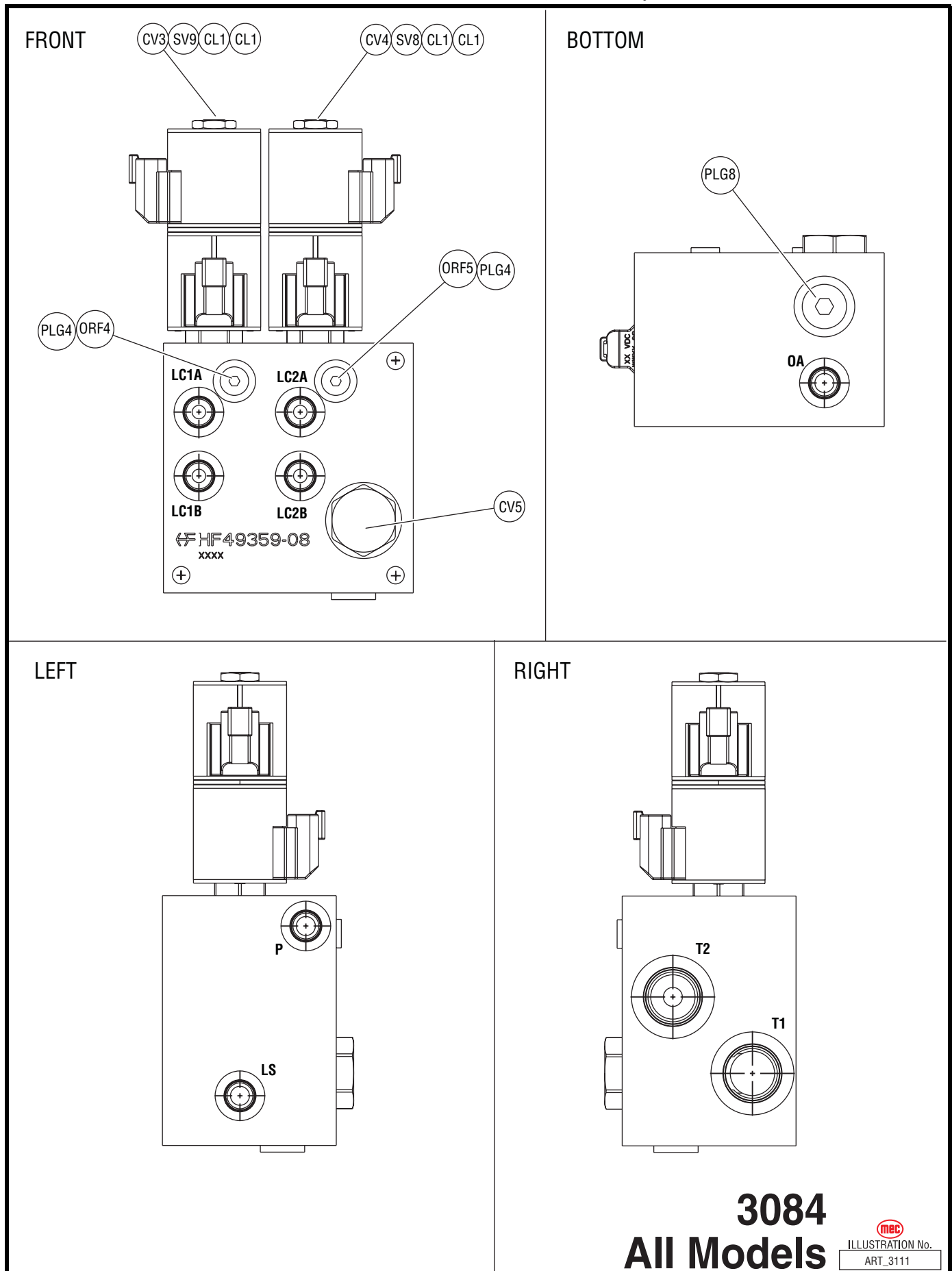
Figure 5-12: Hydraulic Manifold, Main M1 - 3084ES

Figure 5-13: Hydraulic Manifold, Tilt M2 - All Models

3084
All Models

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 ILLUSTRATION No.
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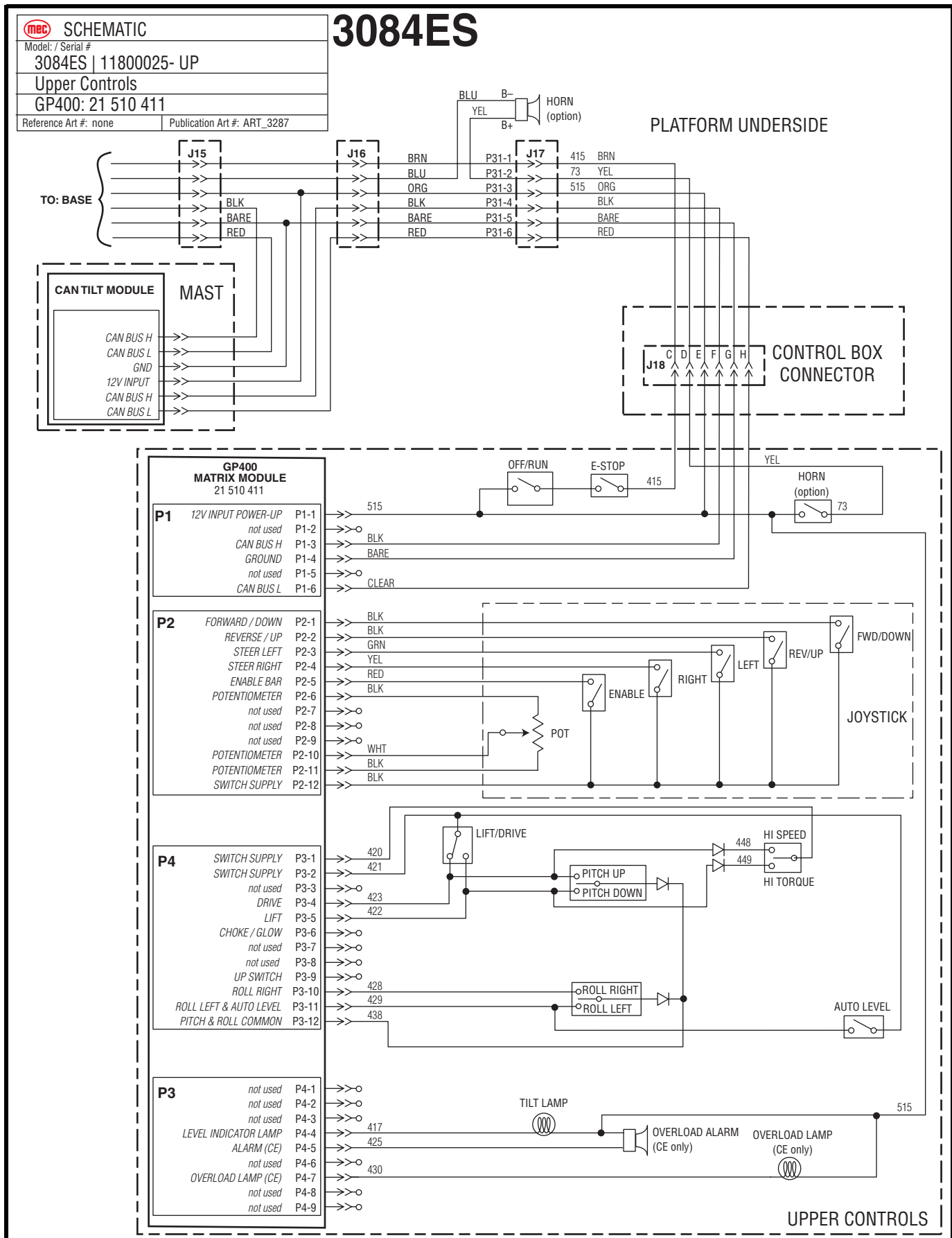
ELECTRICAL - 3084ES**Figure 5-14:** Electric Schematic, Upper Controls - 3084ES

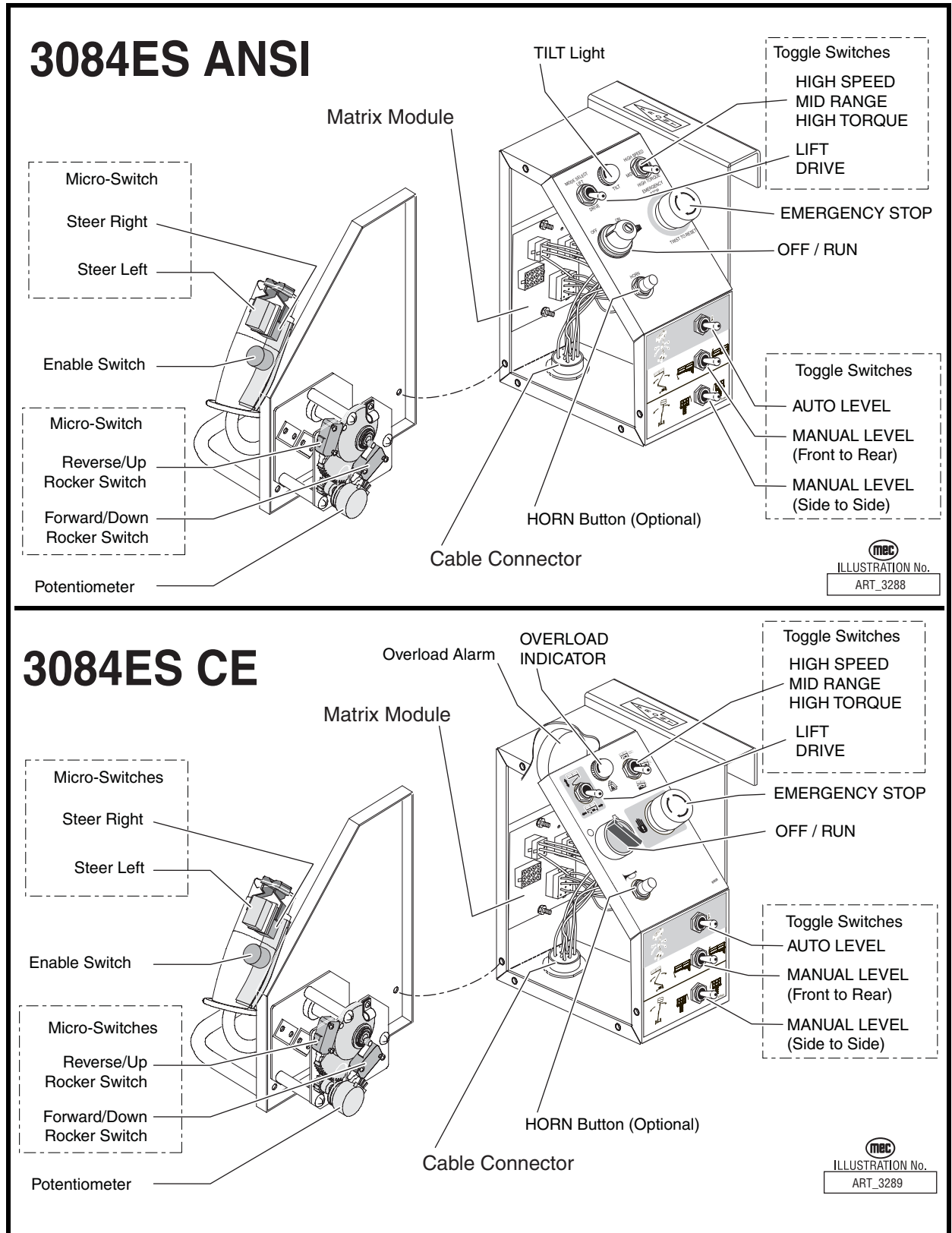
Figure 5-15: Upper Controls Components - 3084ES

Figure 5-16: Electric Schematic, Lower Control Box - 3084ES

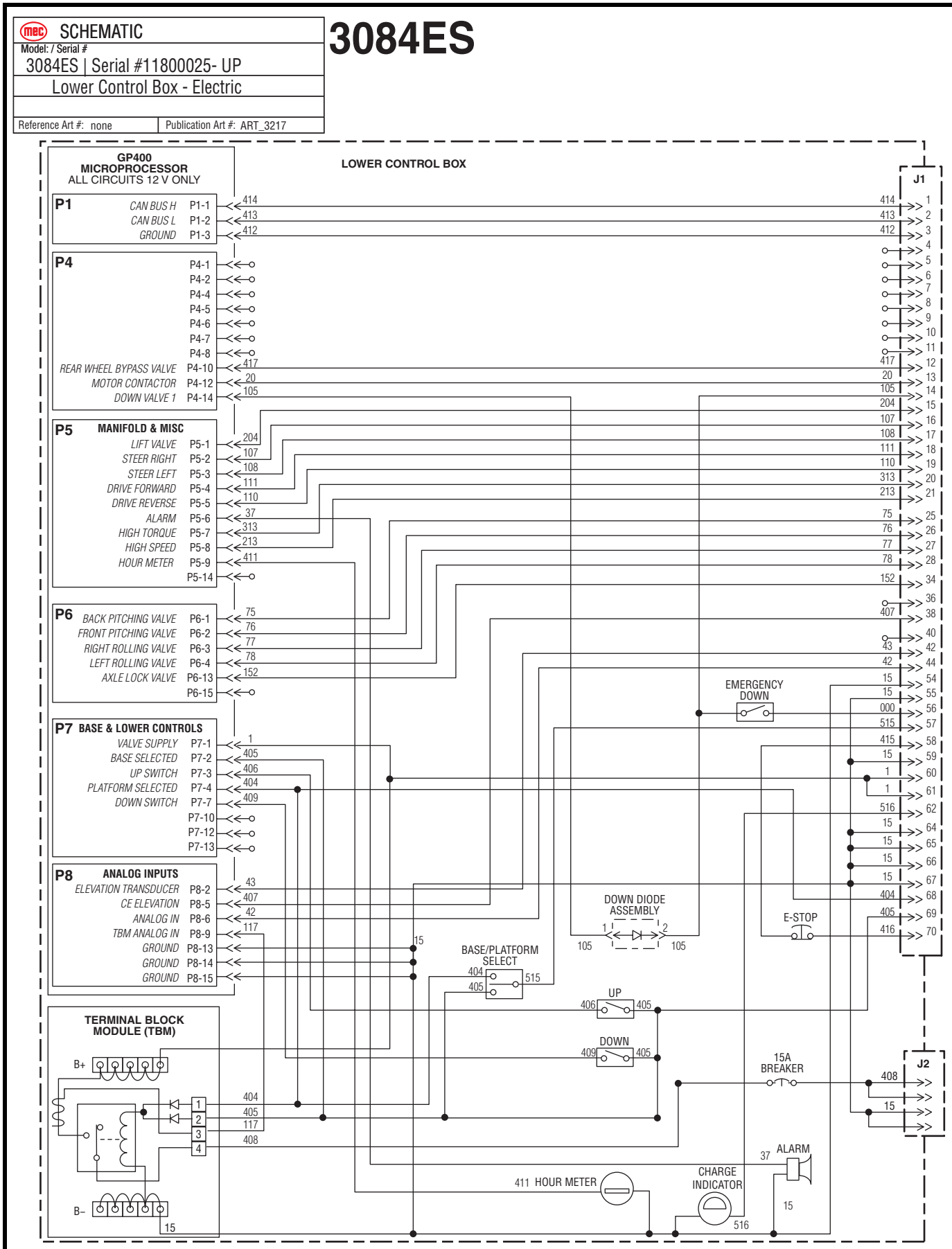


Figure 5-17: Electric Schematic, Base - 3084ES

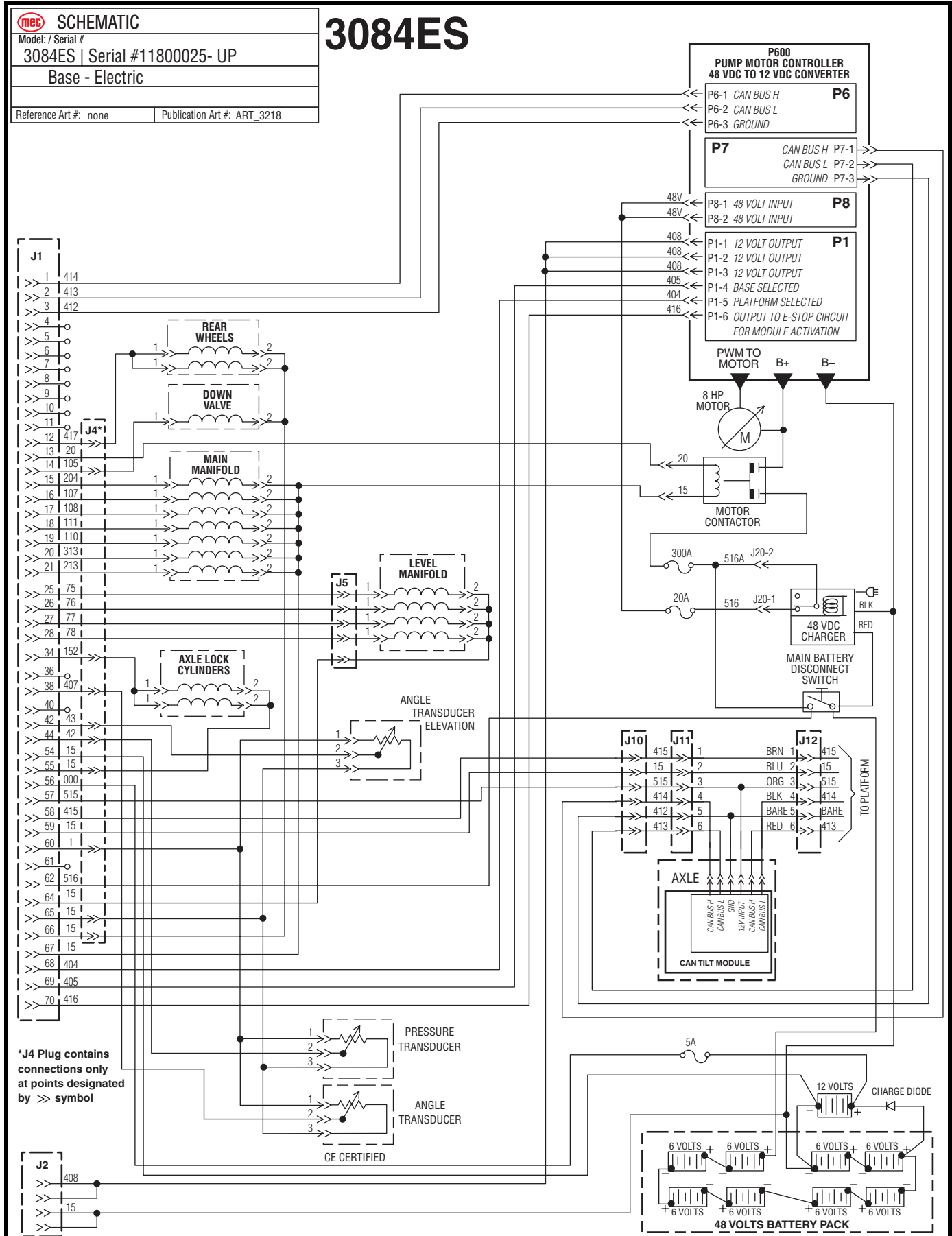
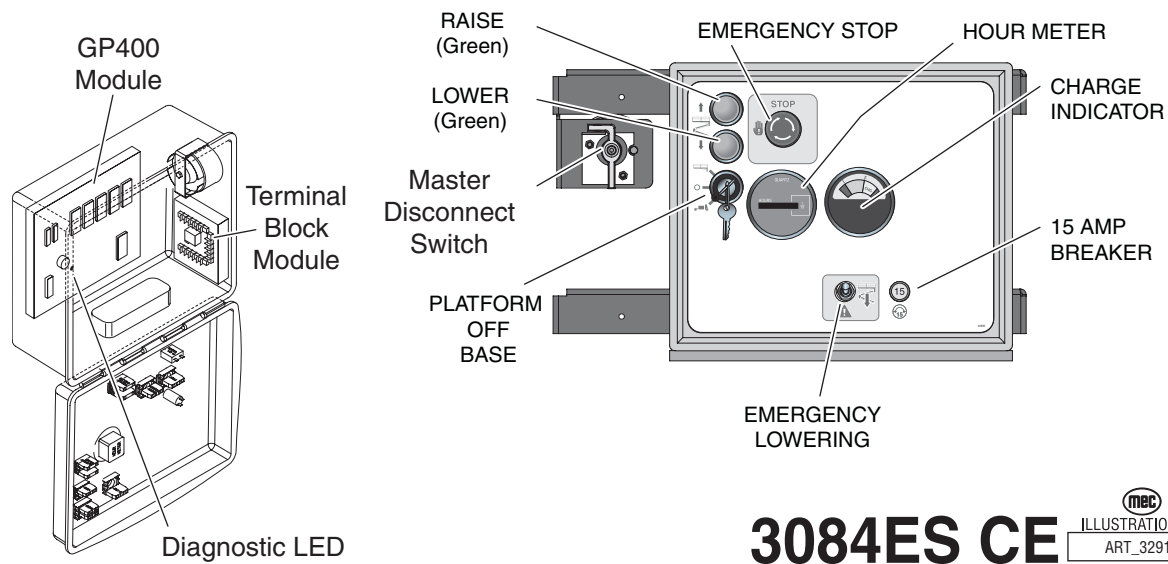
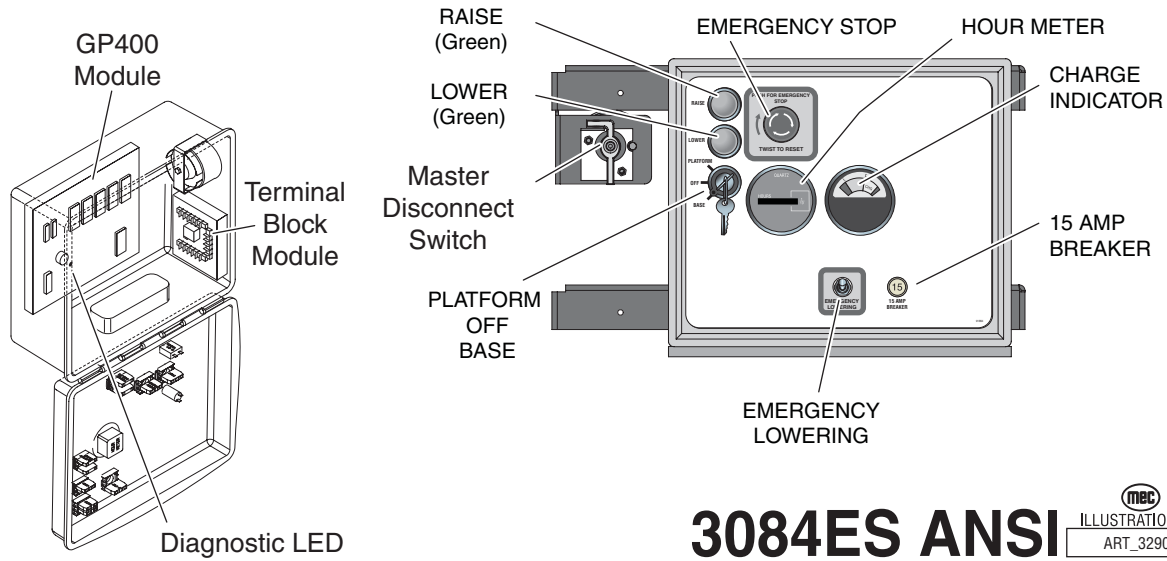


Figure 5-18: Lower Controls Components - 3084ES

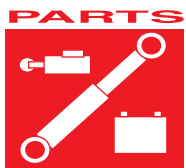
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SECTION A

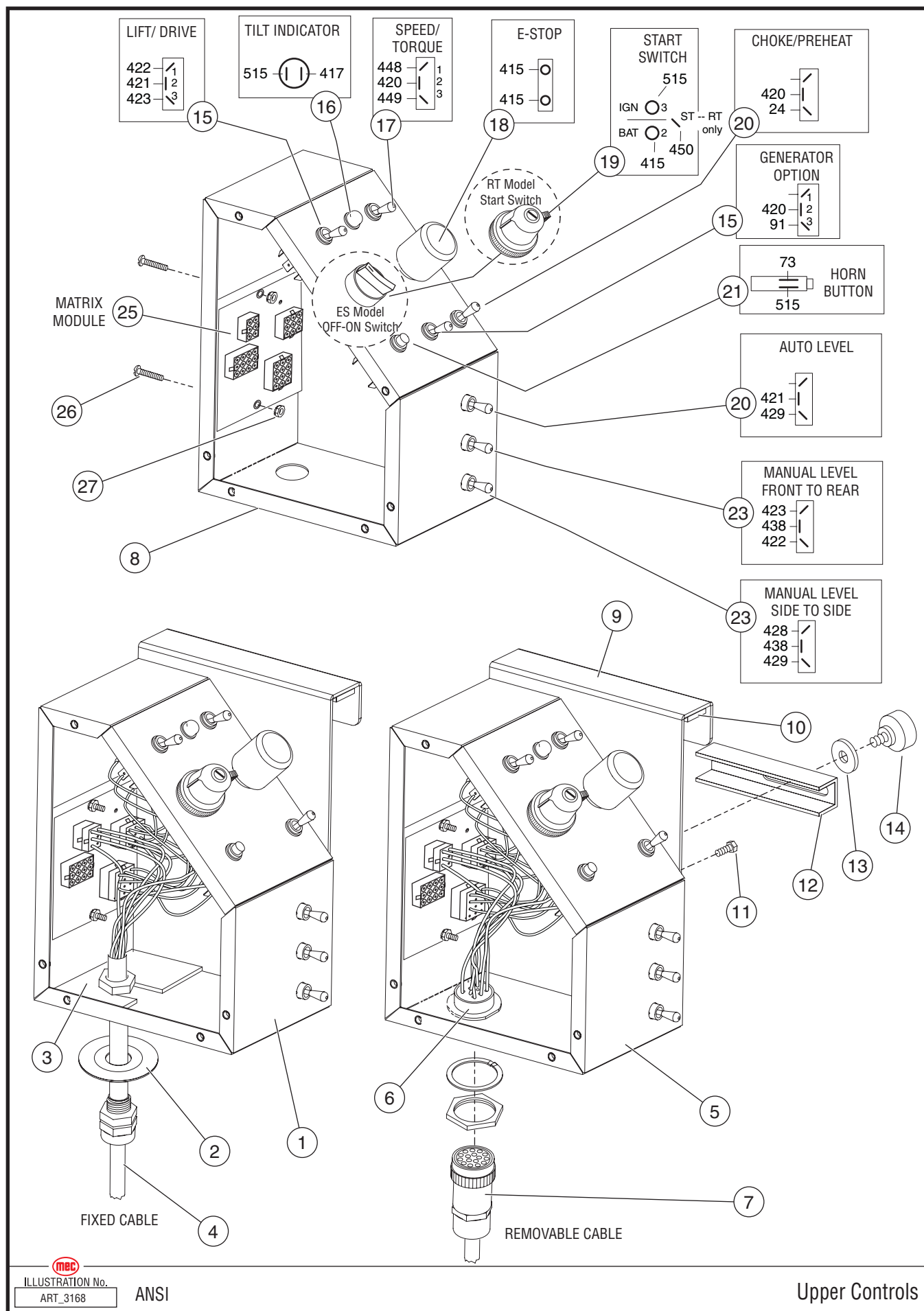
CONTROLS

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Upper Controls, ANSI Models

ITEM	PART NO.	QTY	DESCRIPTION
Fixed Control Box Assembly			
1	83062	1	Assembly With Fixed Cable, ES Models
	83063	1	Assembly With Fixed Cable, RT Models
2	REF	1	Strain Relief Washer (see Wire Harness, Section F)
3	REF	1	Mounting Plate (see Wire Harness, Section F)
4	REF	1	Cable, Fixed (see Wire Harness, Section F)
Removable Control Box Assembly			
5	83064	1	Assembly With Removable Cable, ES Models
	83065	1	Assembly With Removable Cable, RT Models
6	REF	1	Harness, Removable (see Wire Harness, Section F)
7	REF	1	Cable, Removable (see Wire Harness, Section F)
All Models			
8	16242	1	Weldment, Control Box
9	13865	1	Bracket, Control Box Holder
10	6350	.5 FT	Tape, Foam
11	50109	1	Screw, 5/16-18
12	13864	1	Bracket, Control Box Holder
13	50063	1	Washer, Flat
14	8826	1	Thumb Screw, 5/16-18, Flower
15	6234	1	Switch, Toggle, Lft/Drive
	6234	1	Switch, Toggle, Generator Option
16	9184	1	Lens, Amber, Tilt Indicator
	9188	1	Light, Bayonet, 14 Volt
	9179	1	Socket, Indicator Light
17	6905	1	Switch, Toggle, Speed/Torque
18	7800	1	Switch, Emergency Stop
19 RT	91619	1	RT MODELS - Switch, Start
19 ES	91926	1	ES MODELS - Switch, Start
	90714	1	ES MODELS - Switch Base
	8082	1	ES MODELS - Contact Block, N.O.
20	5630	1	Switch, 2-Position Momentary Single Pole
21	8044	1	Switch, Button (Horn option)
	8819	1	Boot
22	--	--	--
23	91954	2	Switch, 3-Position Momentary
24	--	--	--
25	91663	1	Matrix Module
26	50189	2	Screw, 10-32 x 1..25
27	50238	2	Nut, 10-32 Nylock

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



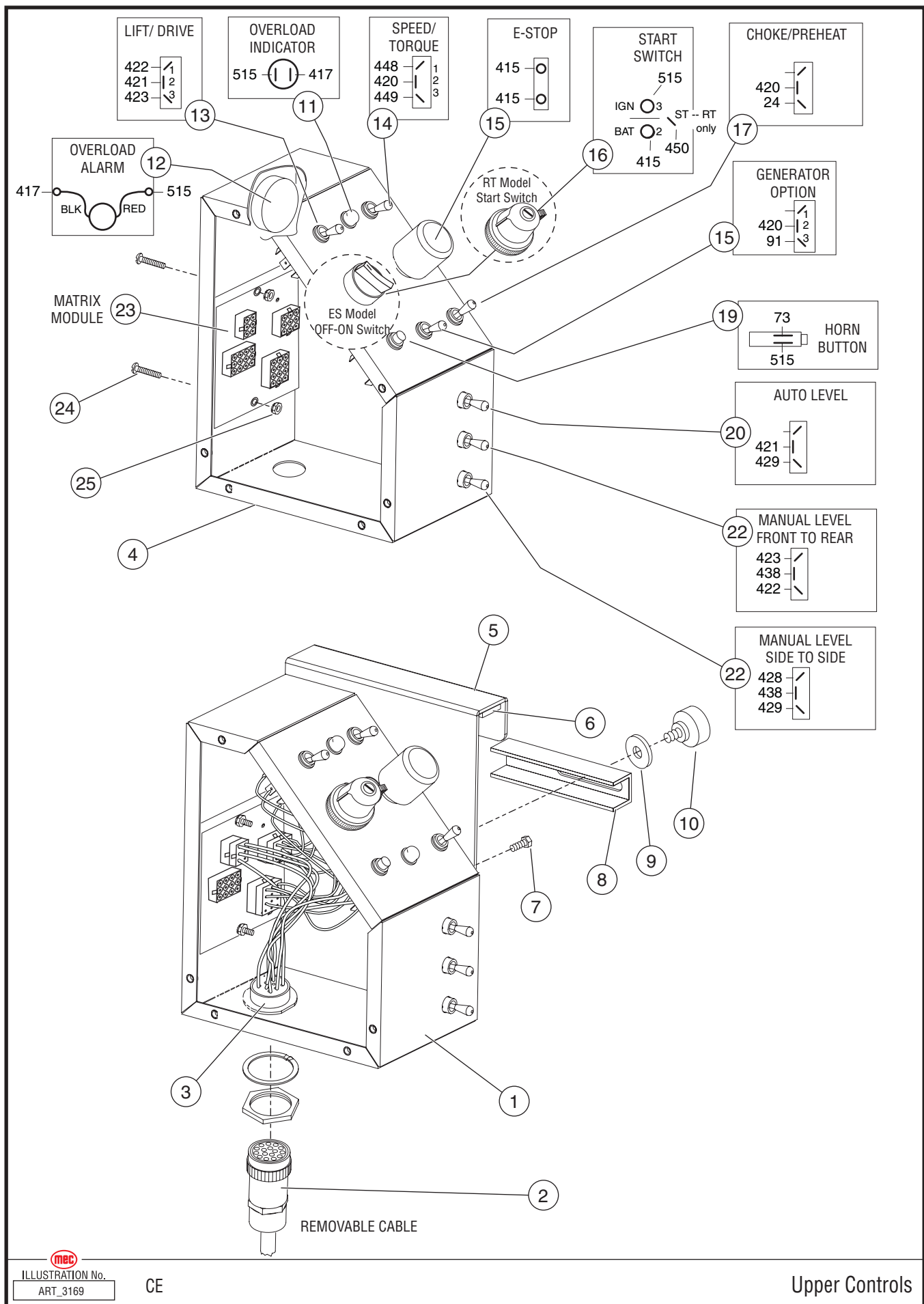


ILLUSTRATION No.
ART_3169

CE

Upper Controls

Upper Controls, CE Models

ITEM	PART NO.	QTY	DESCRIPTION
Removable Control Box Assembly			
1	83066	1	Assembly With Removable Cable, ES Models
	83067	1	Assembly With Removable Cable, RT Models
2	REF	1	Harness, Removable (see Wire Harness, Section F)
3	REF	1	Cable, Removable (see Wire Harness, Section F)
4	16242	1	Weldment, Control Box
5	13865	1	Bracket, Control Box Holder
6	6350	.5 FT	Tape, Foam
7	50109	1	Screw, 5/16-18
8	13864	1	Bracket, Control Box Holder
9	50063	1	Washer, Flat
10	8826	1	Thumb Screw, 5/16-18, Flower
11	9183	1	Lens, Red, Overload
	9188	1	Light, Bayonet, 14 Volt
	9179	1	Socket, Indicator Light
12	7553	1	Alarm
13	6234	1	Switch, Toggle, Lft/Drive
	6234	1	Switch, Toggle, Generator Option
14	6905	1	Switch, Toggle, Speed/Torque
15	7800	1	Switch, Emergency Stop
16 RT	91619	1	RT MODELS - Switch, Start
16 ES	91926	1	ES MODELS - Switch, Start
	90714	1	ES MODELS - Switch Base
	8082	1	ES MODELS - Contact Block, N.O.
17	5694	1	Switch, Toggle, Choke/Preheat (RT Only)
18	--	--	--
19	8044	1	Switch, Button (Horn option)
20	5630	1	Switch, 2-Position Momentary Single Pole
21	5694	1	Switch, Toggle, Manual Level, Front-Rear
22	91954	2	Switch, 3-Position Momentary
23	91663	1	Matrix module
24	50189	2	Screw, 10-32 x 1..25
25	50238	2	Nut, 10-32 Nylock

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



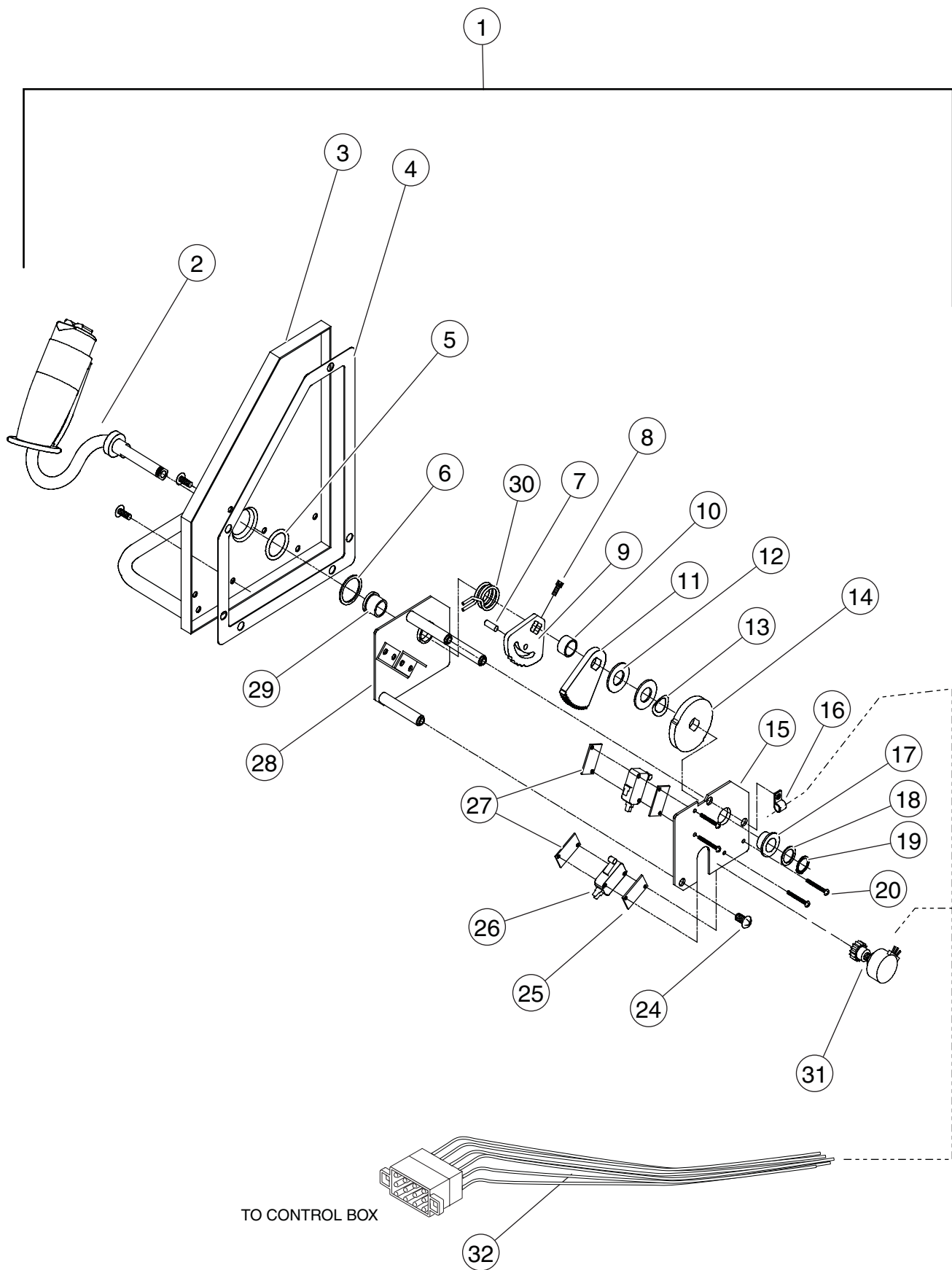


ILLUSTRATION No.
ART_2220 R3

Reference: ART_13868

Control Box Cover Assembly

Upper Control Box Cover Assembly

ITEM	PART NO.	QTY	DESCRIPTION
1	83076	1	Control Box Cover Assembly
2	92199	1	Joystick Assembly
3	3772	1	Cover
4	7875	1	Gasket
5	7882	1	O-Ring
6	HDW3768	1	Washer, Flat
7	1008348	1	Pin, Hold Down
8	50155	1	Screw, 6-32 x 1/2 inch
9	13502	1	Bracket, Centering
10	3763	1	Spacer, Step
11	13402	1	Gear, large
12	HDW8531	2	Washer, Flat
13	HDW7881	1	Washer, Bevel
14	3782	1	Cam, Directional
15	13403	1	Plate, Bottom
16	6917	1	Clamp, Cable, 1/4 inch
17	7818	1	Bearing, Bronze, Flanged
18	HDW3771	1	Washer, Flat
19	5736	1	Ring, Retaining, 1/2 inch
20	50139	4	Screw, 4-40 x 5/8 inch
21	--	--	--
22	--	--	--
23	--	--	--
24	50191	12	Screw, 10-32 x 1/2 inch
25	3764	2	Plate, Spacer
26	8696	2	Switch, Limit, Micro V7
27	3765	2	Plate, Strap
28	3766	1	Plate, Top
29	7819	1	Bearing, Bornze, Flanged
30	8435	1	Spring, Joystick Centering
31	91824	1	Potentiometer Assembly
32	REF	1	Wire Harness, (see Wire Harness, Section F)

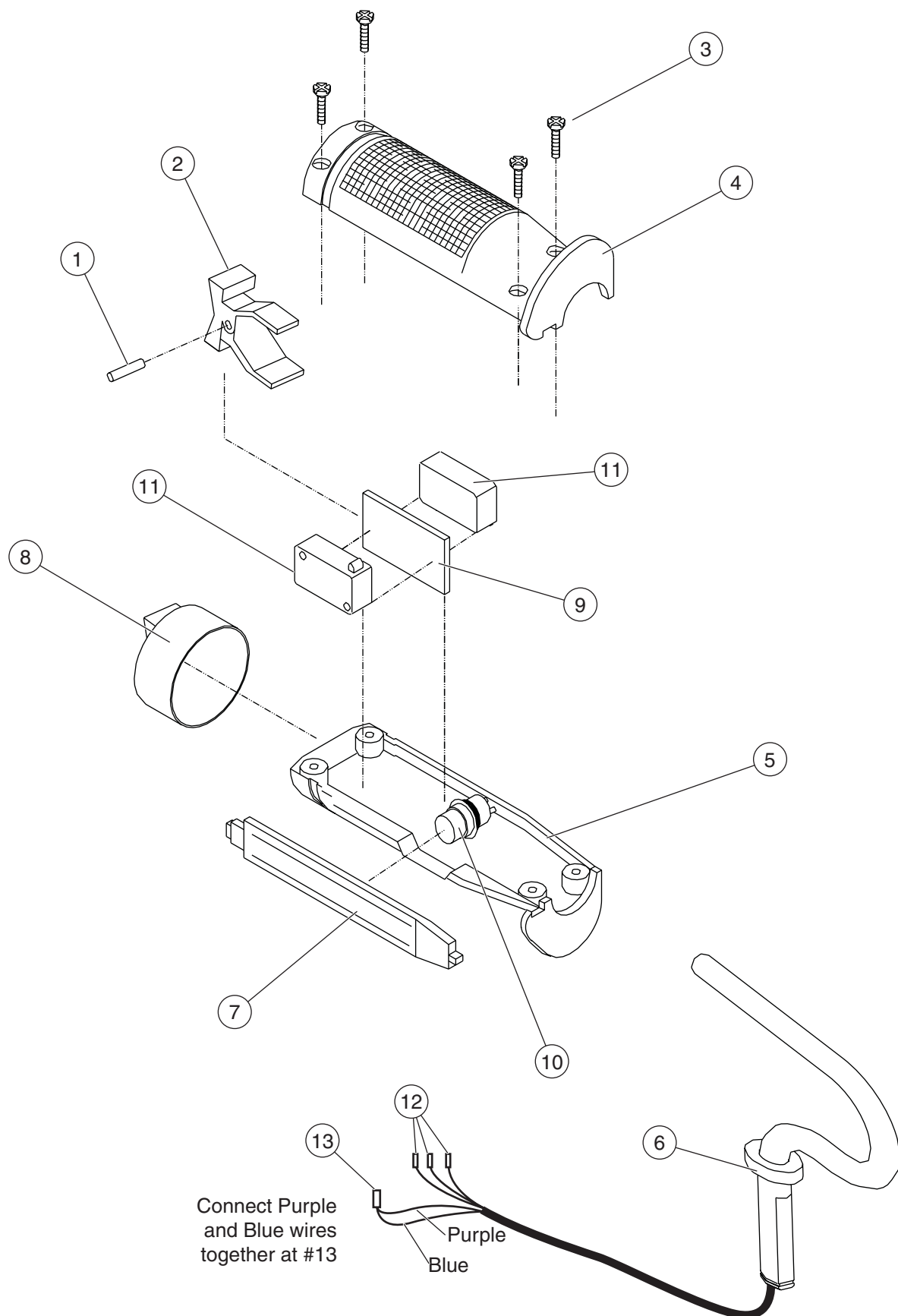


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• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



Control Arm (Joystick)



ILLUSTRATION No.
ART_2221 R1

Reference: ART_188

Upper Control Joystick

ITEM	PART NO.	QTY	DESCRIPTION
--	92199	--	Joystick Assembly
--	8630	--	Joystick Assembly without Control Arm (#6)
1	8750	1	Pin (Service Only)
2	8453	1	Switch Actuator (Service Only)
3	HDW8455	4	Screw (Service Only)
4	8752	1	Grip, Top Half (Service Only)
5	8751	1	Grip, Bottom Half (Service Only)
6	13638	1	Control Arm without wire
7	8748	1	Trigger (Service Only)
8	8456	1	Rocker Boot (Service Only)
9	8447	1	Switch Seperator (Service Only)
10	8753	1	Motion Switch, OFF-ON (Service Only)
11	8448	2	Switch (Service Only)
12	91839	3	Amp Socket (not shown)
13	92194	1	Push Connector, 3/16"
--	8761	--	Switch Assembly (not shown) -- includes item #9, item #11 (x2), wire and connectors

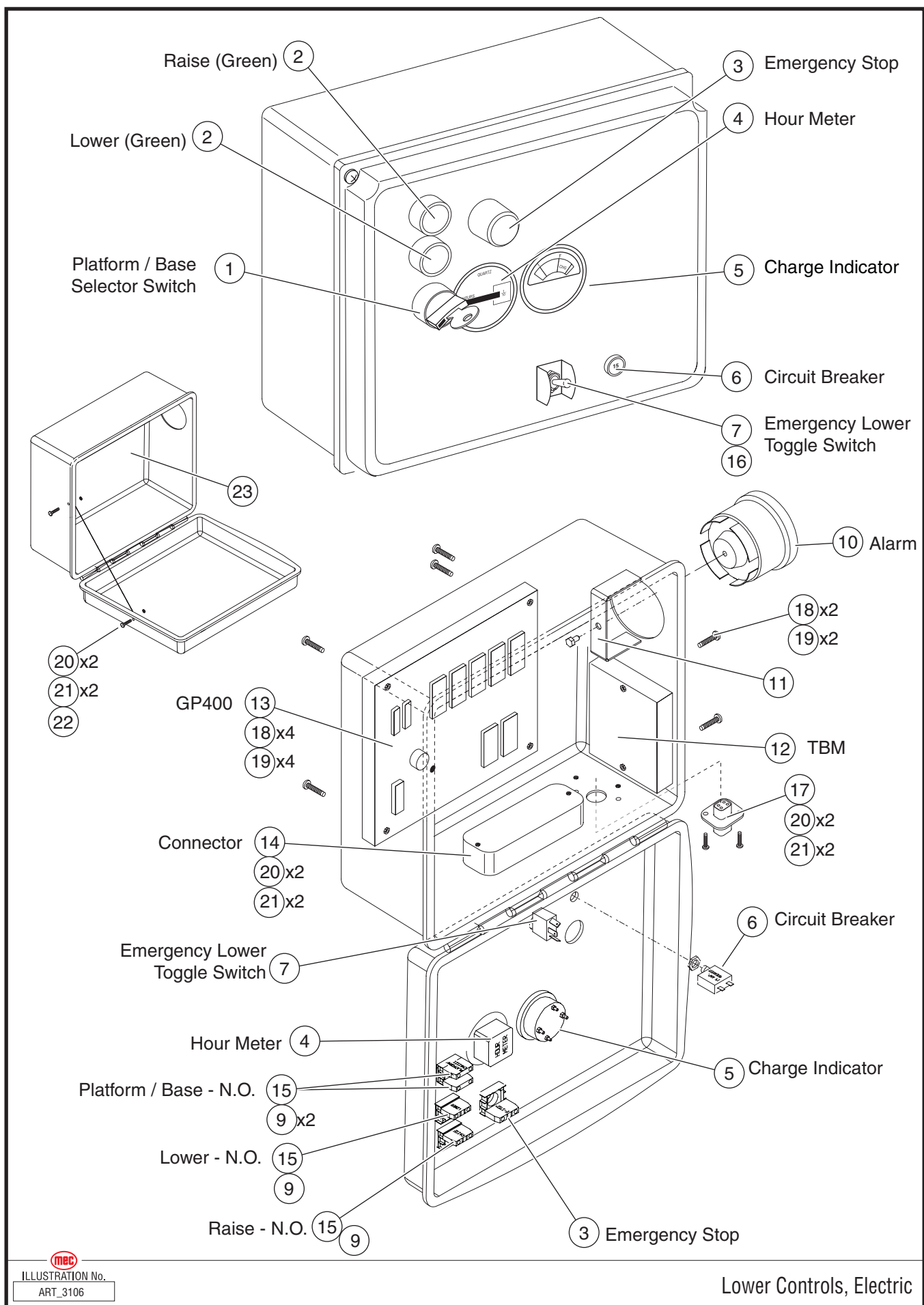


• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



Lower Controls, 3084ES Electric Models

ITEM	PART NO.	QTY	DESCRIPTION
–	83077	1	Lower Control Box Assembly, ES Models
1	9549	1	Switch, 3-Position, Keyed
2	91667	2	Switch, Button, Green
3	7800	1	Switch, Emergency Stop, Red
4	91704	1	Hour Meter
5	91744	1	Charge Indicator
6	7235	1	Circuit Breaker
7	5630	1	Switch, Toggle, 1 Pole 2 Position
8	–	–	–
9	8082	4	Contact Block, N. O.
10	91711	1	Alarm, 107dB
11	17082	1	Bracket, Alarm Mount
12	91838	1	Terminal Block Module (TBM)
13	91659	1	System Controller, GP400
14	91887	1	Deutsch Connector, DRC 12 70P
15	90714	3	Contact Base
16	1313	1	Switch Guard
17	91290	1	Deutsch Connection, DT14-4P-L012
18	50229	6	Screw, 10-24 x 1.00
19	50230	6	Nut, 10-24 Nylock
20	50233	6	Screw, 8-32 x 1.00
21	50231	6	Nut, 8-32 Nylock
22	91921	1	Lanyard
23	92015C	1	Control Box
--	REF	--	Harness -- See Section F

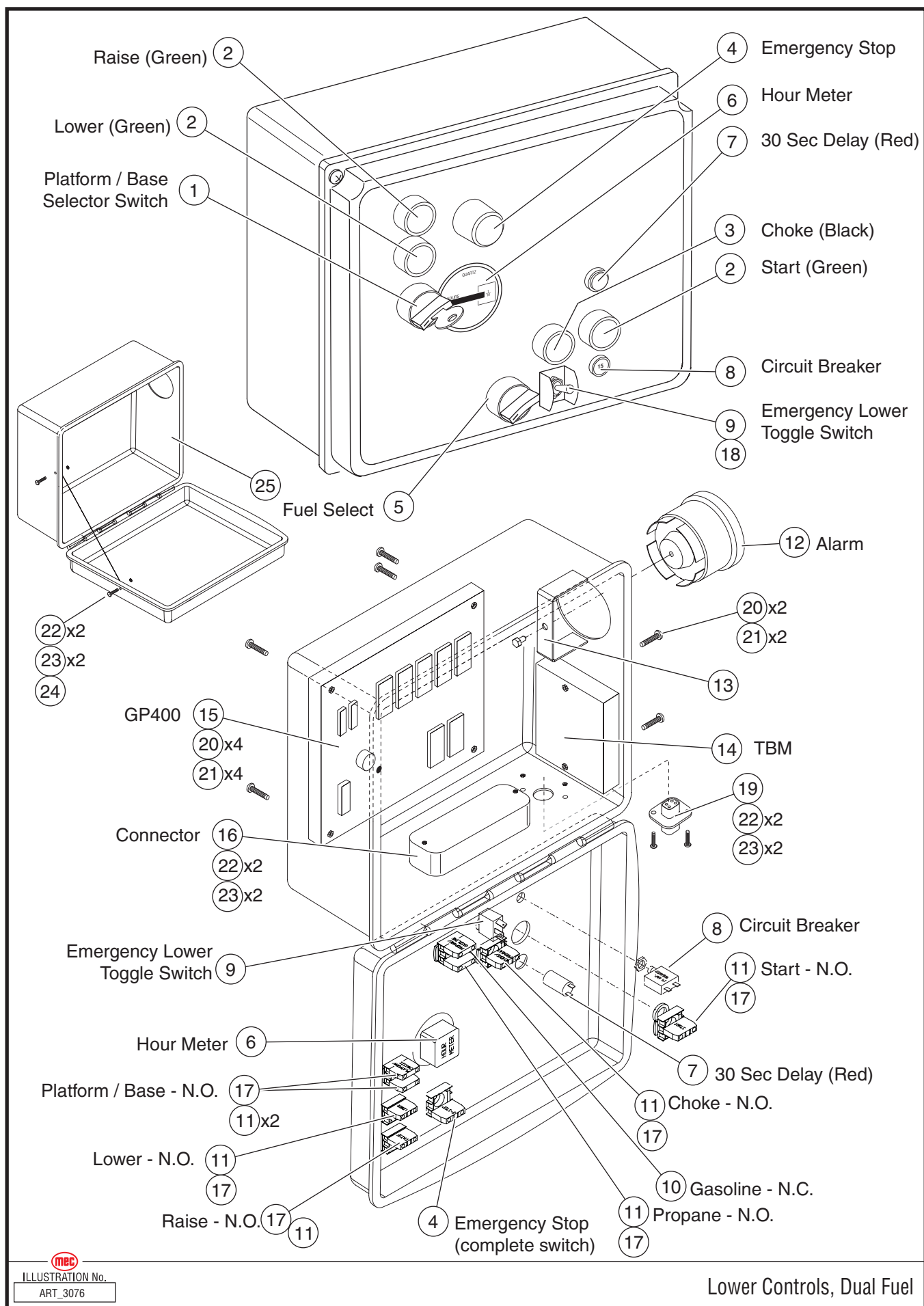


• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



Lower Controls, 3084RT Dual Fuel Models

ITEM	PART NO.	QTY	DESCRIPTION
–	83078	1	Lower Control Box Assembly, DF Models
1	9549	1	Switch, 3-Position, Keyed
2	91667	3	Switch, Button, Green
3	91957	1	Switch, Button, Black
4	7800	1	Switch, Emergency Stop
5	91926	1	Switch, 2-Position
6	91704	1	Hour Meter
7	92254	1	Light, Red
8	7235	1	Circuit Breaker
9	5630	1	Switch, Toggle, 1 Pole 2 Position, Emergency Down
10	8083	1	Contact Block, N. C.
11	8082	7	Contact Block, N. O.
12	91711	1	Alarm, 107dB
13	17082	1	Bracket, Alarm Mount
14	91838	1	Terminal Block Module (TBM)
15	91659	1	System Controller, GP400
16	91887	1	Deutsch Connector, DRC 12 70P
17	90714	6	Contact Base
18	1313	1	Switch Guard
19	91290	1	Deutsch Connection, DT14-4P-L012
20	50229	6	Screw, 10-24 x 1.00
21	50230	6	Nut, 10-24 Nylock
22	50233	6	Screw, 8-32 x 1.00
23	50231	6	Nut, 8-32 Nylock
24	91921	1	Lanyard
25	92016C	1	Control Box
--	REF	--	Harness -- See Section F

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



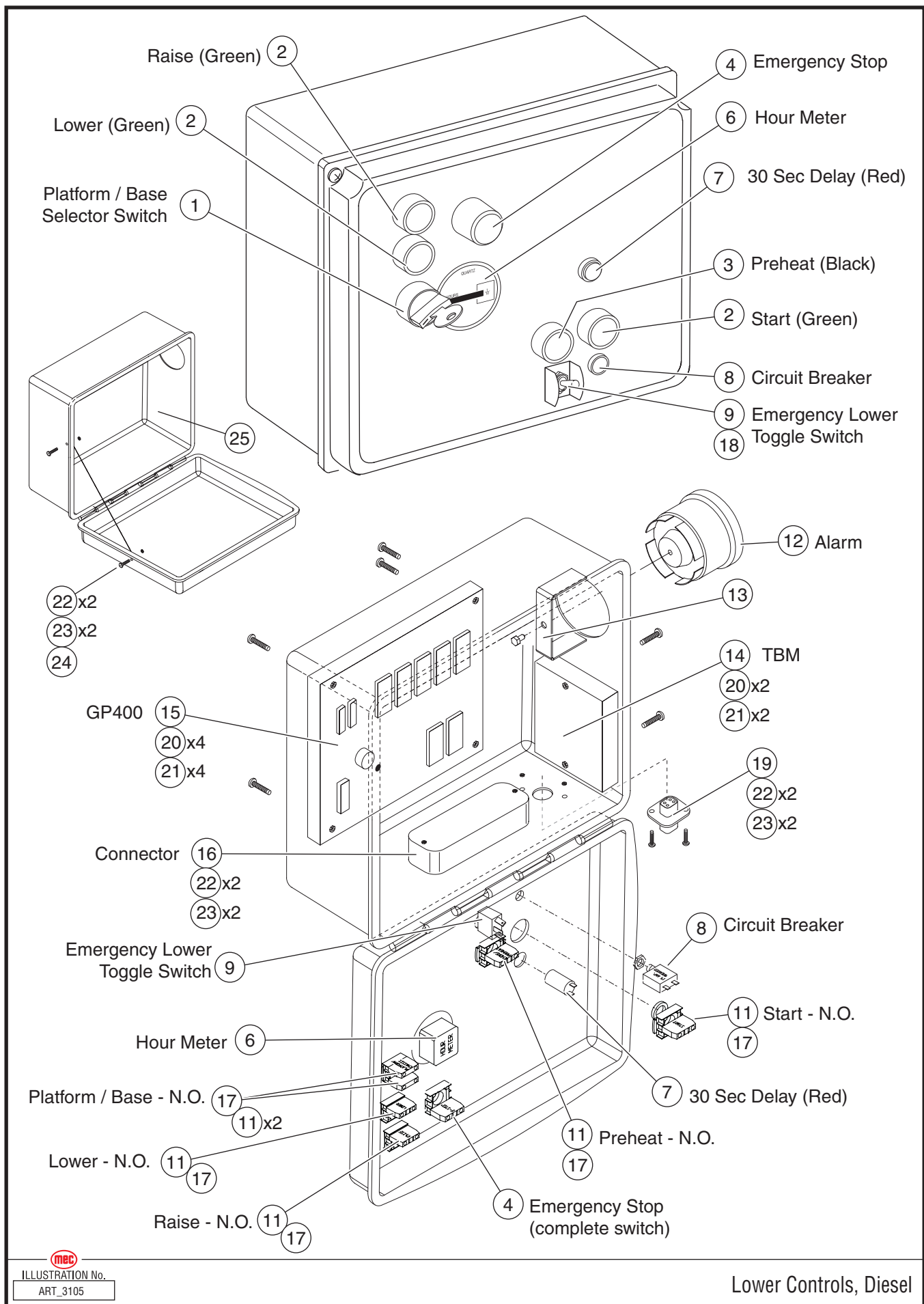


ILLUSTRATION No.
ART_3105

Lower Controls, Diesel

Lower Controls, 3084RT Diesel Models

ITEM	PART NO.	QTY	DESCRIPTION
–	83079	1	Lower Control Box Assembly, Diesel Models
1	9549	1	Switch, 3-Position, Keyed
2	91667	3	Switch, Button, Green
3	91957	1	Switch, Button, Black
4	7800	1	Switch, Emergency Stop
--	--	--	--
6	91704	1	Hour Meter
7	92254	1	Light, Red
8	7235	1	Circuit Breaker
9	5630	1	Switch, Toggle, 1 Pole 2 Position, Emergency Down
--	--	--	--
11	8082	6	Contact Block, N. O.
12	91711	1	Alarm, 107dB
13	17082	1	Bracket, Alarm Mount
14	91838	1	Terminal Block Module (TBM)
15	91659	1	System Controller, GP400
16	91887	1	Deutsch Connector, DRC 12 70P
17	90714	6	Contact Base
18	1313	1	Switch Guard
19	91290	1	Deutsch Connection, DT14-4P-L012
20	50229	6	Screw, 10-24 x 1.00
21	50230	6	Nut, 10-24 Nylock
22	50233	6	Screw, 8-32 x 1.00
23	50231	6	Nut, 8-32 Nylock
24	91921	1	Lanyard
25	92016C	1	Control Box
--	REF	--	Harness -- See Section F

• as req: as required

• INCL: Included with assembly

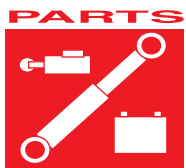
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NOTES:





SECTION B

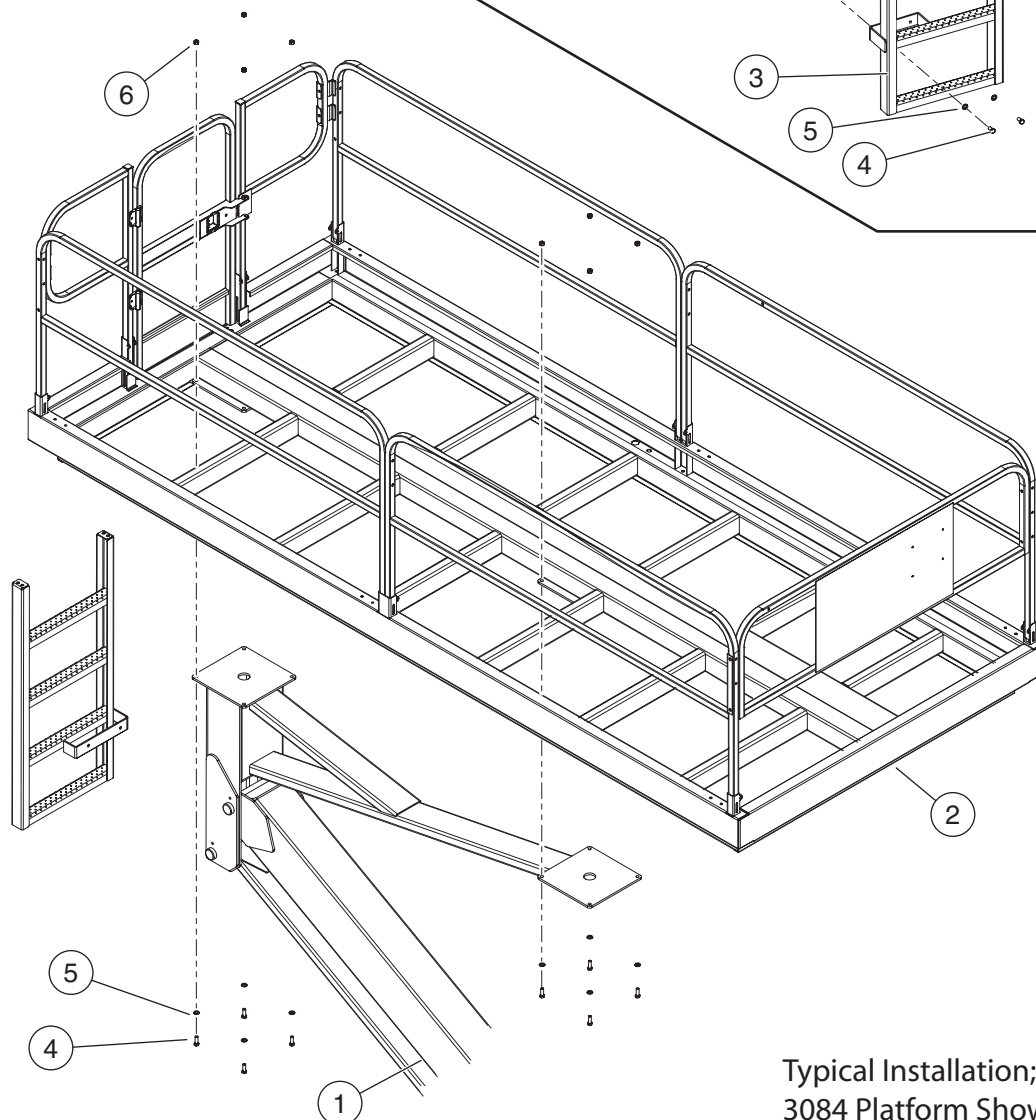
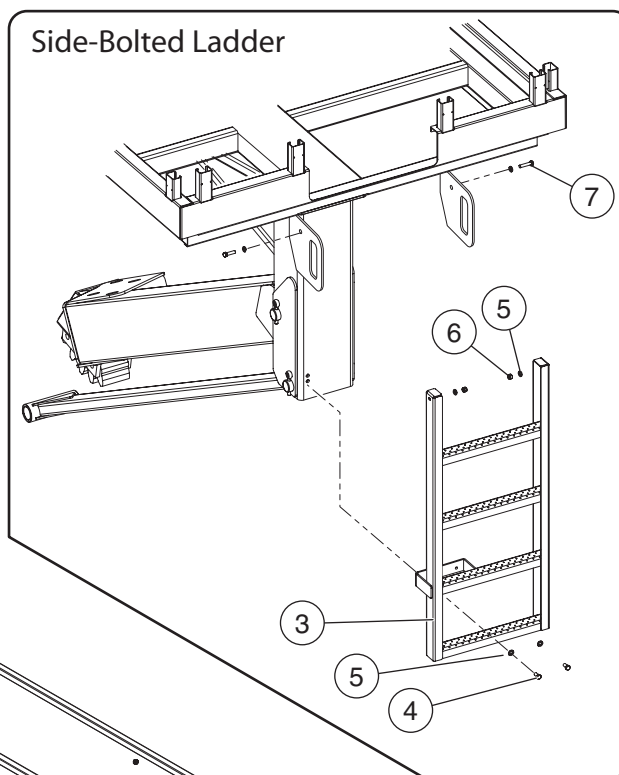
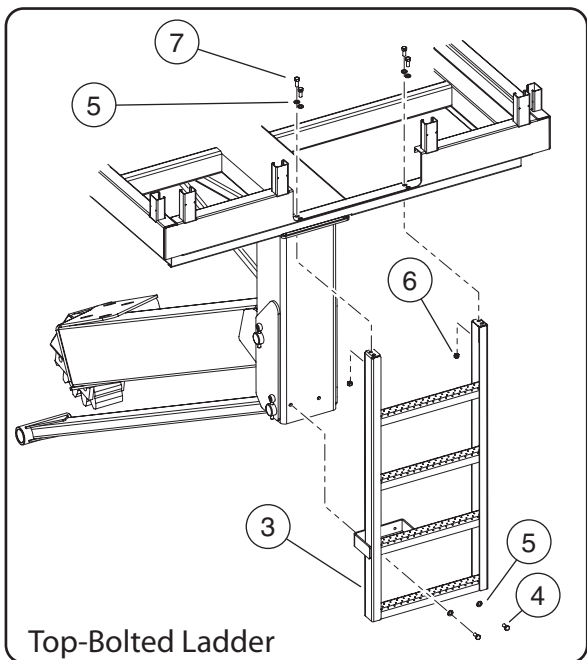
PLATFORM AND RAILS

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Typical Installation;
3084 Platform Shown

Platform Installation

Platform Installation

ITEM	PART NO.	QTY	DESCRIPTION
1	83083	REF	Boom Assembly
2	83080	REF	Platform Assembly, 3084
	83097	REF	Platform Assembly, 2684
3	19258	1	Ladder, Side-Bolted
	19148	1	Ladder, Top-Bolted
4	50040	10	Bolt, M12 x 35, GR8.8
5	50003	14	Washer, 13.5 mm ID x 24mm OD
6	50054	14	Nut, M12, GR8.8
7	50039	4	Bolt, M12 x 30



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

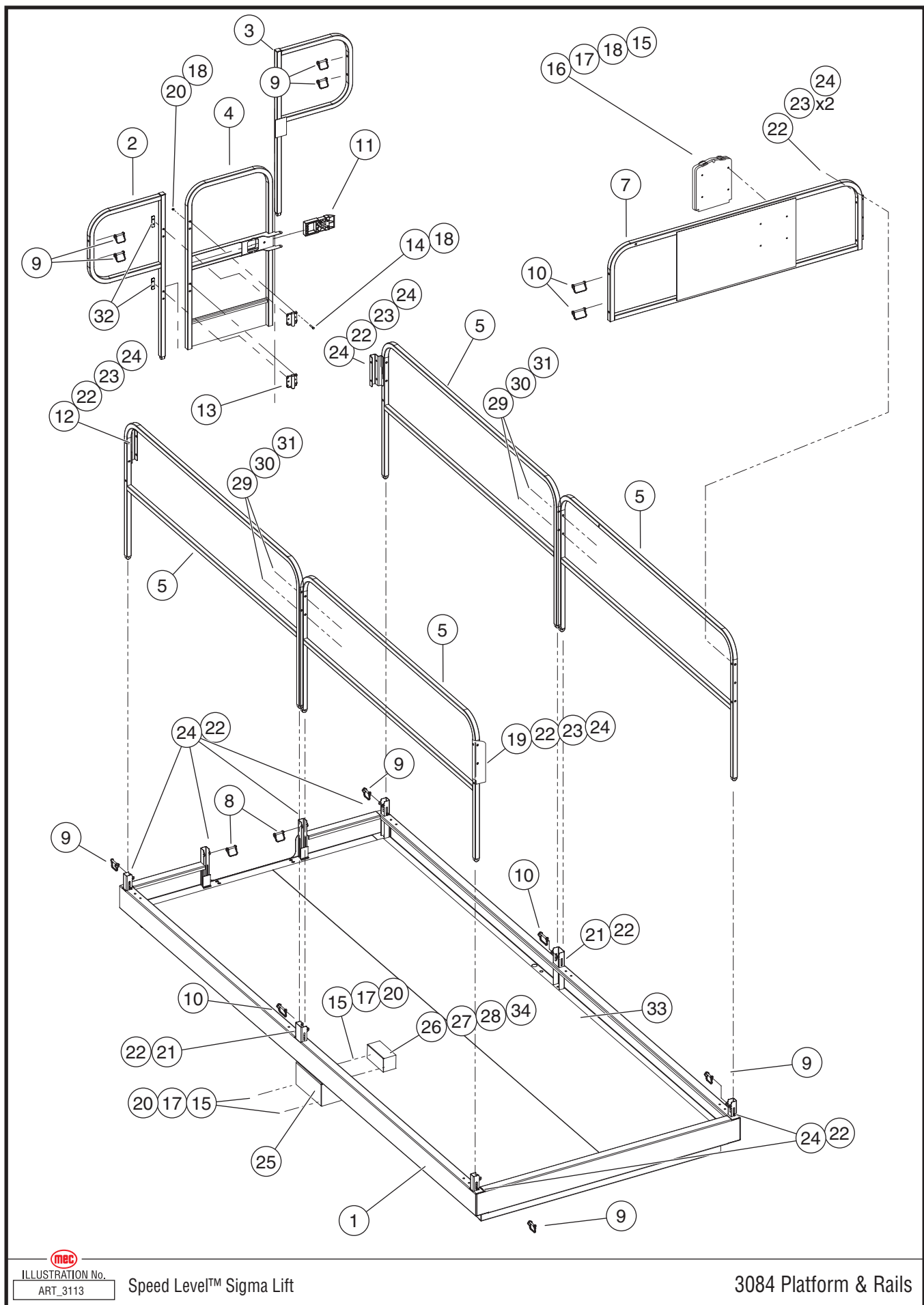


ILLUSTRATION No.
ART_3113

Speed Level™ Sigma Lift

3084 Platform & Rails

Platform & Rails, 3084

ITEM	PART NO.	QTY	DESCRIPTION
–	83080	1	Platform Assembly, 3084
1	19252	1	Platform Deck
2	19207	1	Entry Rail, RH
3	19221	1	Entry Rail, LH
4	19192	1	Gate
5	19216	4	Side Rail
6	--	--	--
7	19218	1	Front Rail
8	50182	2	Clip Fastener, 3/8 X 2
9	50183	8	Clip Fastener, 3/8 X 2.25
10	50186	4	Clip Fastener, 3/8 X 3.25
11	16799	1	Gate Latch
--	7408	1	Gate Spring (not shown)
--	50015	1	Bolt, 8 x 50 (not shown)
--	50001	2	Washer, #8 (not shown)
--	50048	1	Nut, #8 Nylock (not shown)
12	19215	2	Bracket, Rear Rail
13	17960	2	Hinge - up to Serial # 11800033
	91888	2	Hinge - Serial # 11800034 - UP
14	50125	8	Bolt, 6mm x 55
15	50047	10	Nut, 6mm
16	8909	1	Manual Enclosure
17	50028	8	Bolt, 6mm x 20
18	50000	10	6mm Washer
19	19228	1	Front Gate Lock
20	50068	4	Fender Washer, M6
21	50024	2	Bolt, M10 x 85
22	50049	17	Nut, M10 Nylock
23	50002	34	Washer, M10
24	50021	15	Bolt, M10 x 55
25	19262	1	Cover, Control Cable
26	91597	1	GFI Power Box
27	91598	1	GFI Cover Plate
28	92007	1	GFI Power Plug, Female
29	50018	4	Bolt, M8 x 80
30	50048	4	Nut, M8
31	50001	8	Washer, M8
32	19238	4	Backing Plate, Hinge
33*	19263	1	Deck Plate, Single Piece
33**	19132	1	Deck Plate, 2-Piece Deck, 30" x 163.75"
	19144	1	Deck Plate, 2-Piece Deck, 38" x 163.75"
34	92008	1	Strain Relief Connector

*Single-piece deck. **2-piece deck.

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



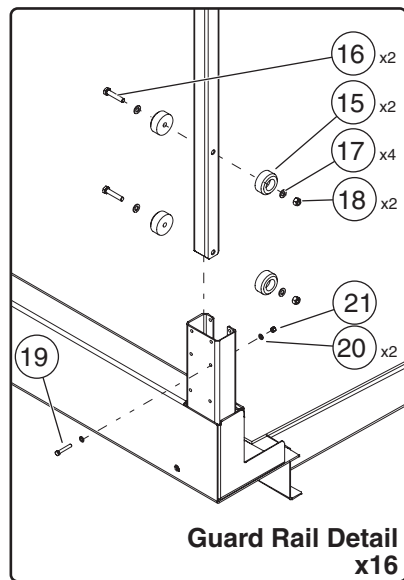
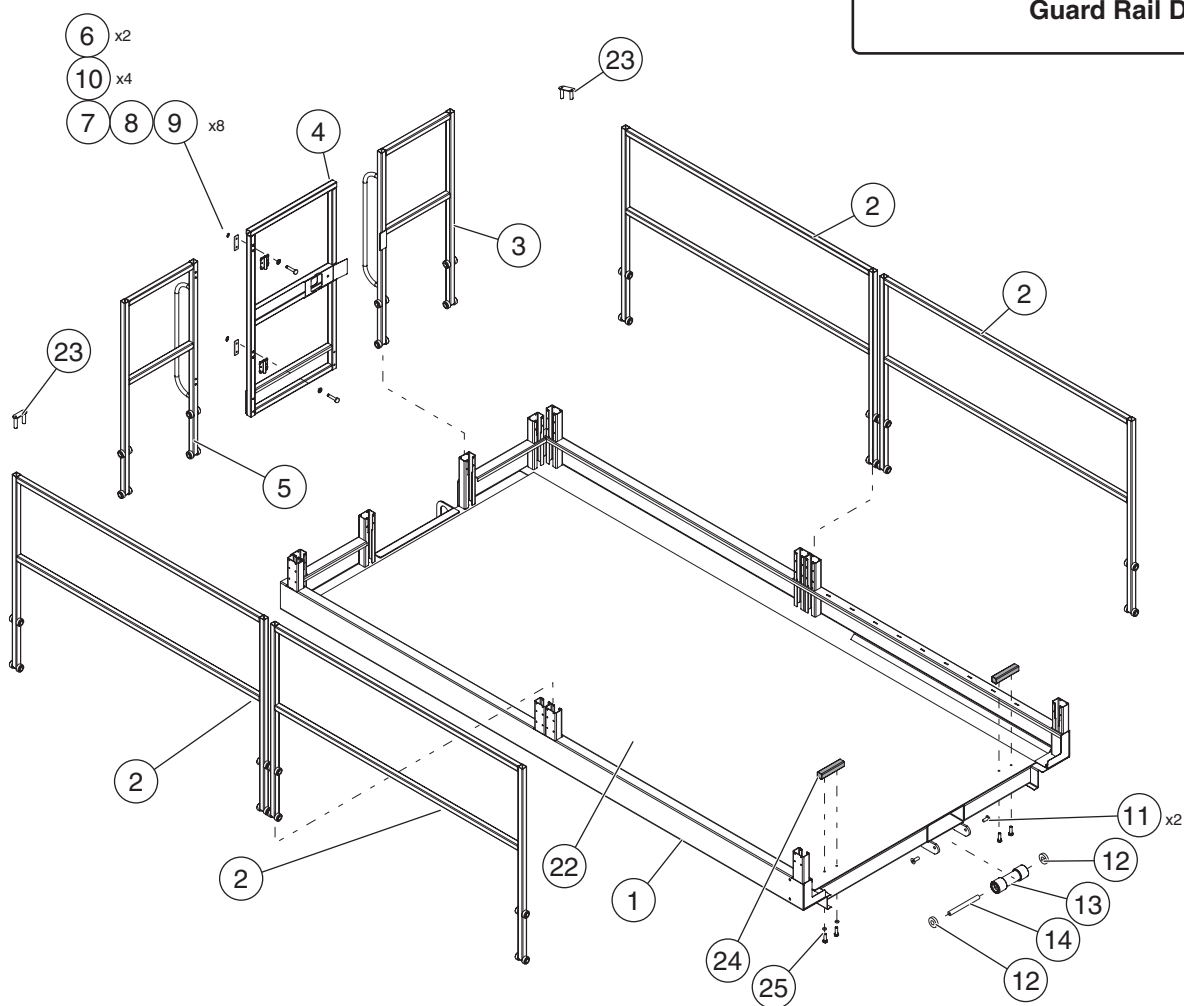


ILLUSTRATION No.
ART_3476

Speed Level™ Sigma Lift

2684 Platform & Rails, 1 of 2



Platform & Rails, 2684

ITEM	PART NO.	QTY	DESCRIPTION
–	83097	1	Platform Assembly, 2684
1	19356	1	Platform Weldment
2	19377	4	Side Rail
3	19381	1	End Rail, Left
4	22366	1	Gate Weldment
--	22372	1	Gate Toeboard
--	16799	1	Gate Latch (not shown)
--	7408	1	Gate Spring (not shown)
--	50015	1	Bolt, 8 x 50 (not shown)
--	50001	2	Washer, #8 (not shown)
--	50048	1	Nut, #8 Nylock (not shown)
5	19384	1	End Rail, Right
6	91888	2	Hinge
7	50125	8	Bolt, 6mm x 55
8	50000	8	Washer, M6 Flat
9	50047	8	Nut, M6 Nylock
10	19238	4	Backing Plate, Hinge
11	50039	10	Screw, M12x1.75 x 30,
12	91593	10	Bearing
13	19399	2	Roller
14	19398	2	Axle, Threaded
15	19131	64	Rail Wheel
16	50016	32	Bolt, M8 x 55
17	50001	64	Washer, M8
18	50048	32	Nut, M8 Nylock
19	50283	16	Bolt, M4 x 55
20	50284	32	Washer, M4
21	50285	16	Nut, M4 Nylock
22	19390	1	Platform Deck Plate
23	22459	2	Plate, Corner Cap
	22458	4	Pin, Corner Cap
	50286	4	Bolt, Button Head, M12 x 50
Items #24 and #25 used on serial numbers 12800001 - 12800009 only			
24	22248	2	Block, Deck Extension Stop
25	50036	4	Bolt, M10-1.5 x 50
	50006	4	Washer, M10 Nordloc

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• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

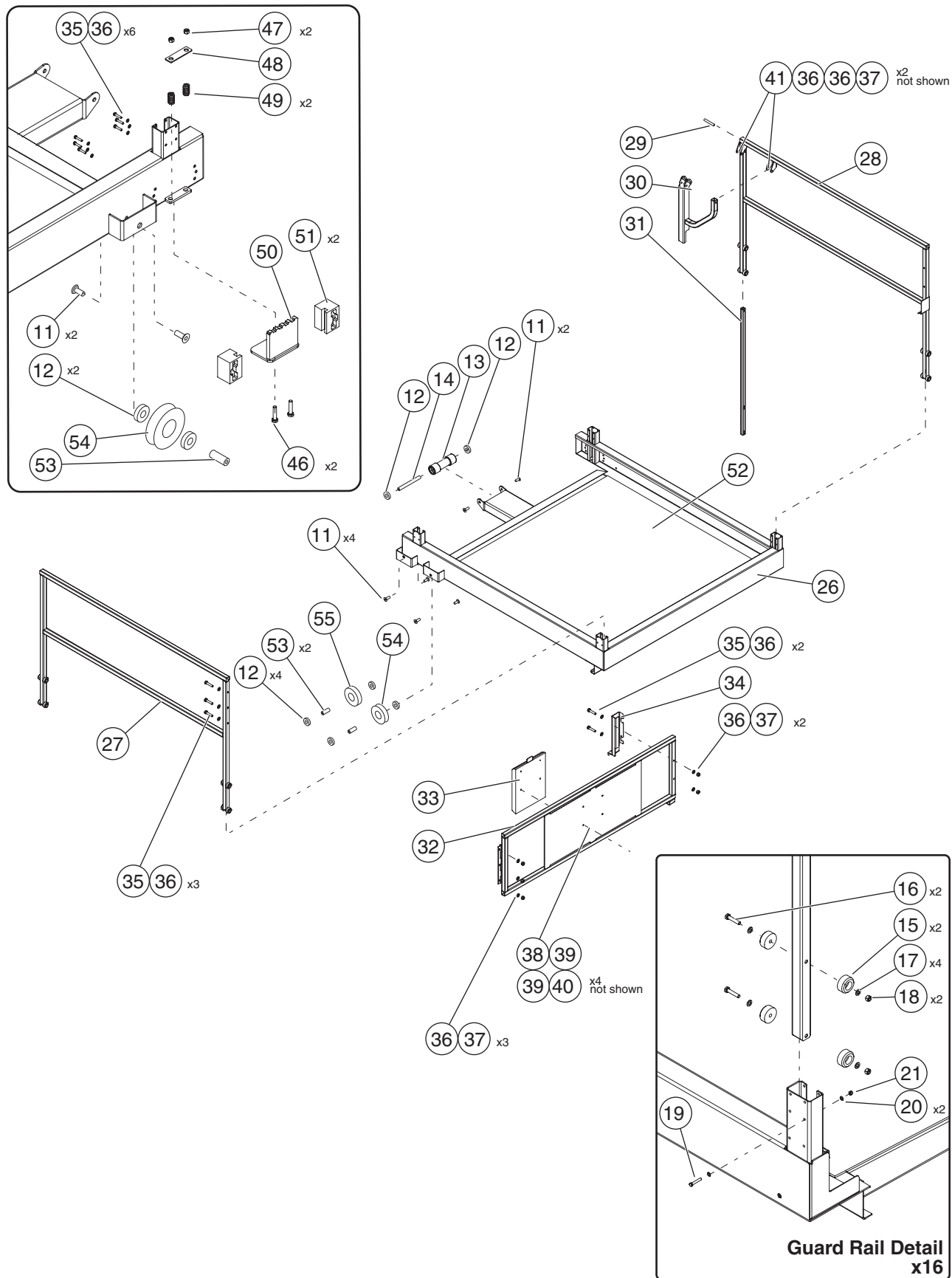


ILLUSTRATION No.
ART_3477

Speed Level™ Sigma Lift

2684 Platform & Rails, 2 of 2

Platform & Rails, 2684 (continued)

ITEM	PART NO.	QTY	DESCRIPTION
–	83097	1	Platform Assembly, 2684
11		10	Screw, Countersink,
12	91593	10	Bearing,
13	19399	2	Roller
14	19398	2	Axle, Threaded,
15	19131	64	Rail Wheel,
16	50016	32	Bolt, M8 x 55
17	50001	64	Washer, M8
18	50048	32	Nut, M8 Nylock
19	50283	16	Bolt, M4 x 55
20	50284	32	Washer, M4
21	50285	16	Nut, M4 Nylock
26	19337	1	Platform Extension Weldment
27	19357	1	Side Rail, Deck Extension, Right Side
28	19366	1	Side Rail, Deck Extension, Left Side
29	92219	1	Spring Pin, M8 x 55
30	19367	1	Deck Extension Handle Weldment
31	19370	1	Deck Extension Bar
32	19374	1	Gate, Material Loading
33	8909	1	Manuals Case
34	19376	1	Latch, Material Loading Gate
35	50015	11	Bolt, M8 x 50
36	50001	20	Washer, M8
37	50048	7	Nut, M8 Nylock
38	50028	4	Bolt, M6 x 20
39	50000	8	Washer, M6
40	50047	4	Nut, M6
41	50287	2	Bolt, Button Head Cap Screw, M8 x 70
42	--	--	--
43	--	--	--
44	--	--	--
45	--	--	--
46	50288	2	Cap Screw, Shouldered, M10 x 60
47	50053	2	Nut, M10
48	19389	1	Plate
49	92218	2	Spring
50	19385	1	Weldment, Locking Rack
51	19388	2	Locking Track
52	19391	1	Platform Extension Deck Plate
53	16791	3	Threaded Axle
54	16793	2	V-Wheel
55	16792	1	Flat Wheel

• as req: as required

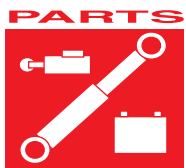
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• REF: Reference only



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SECTION C

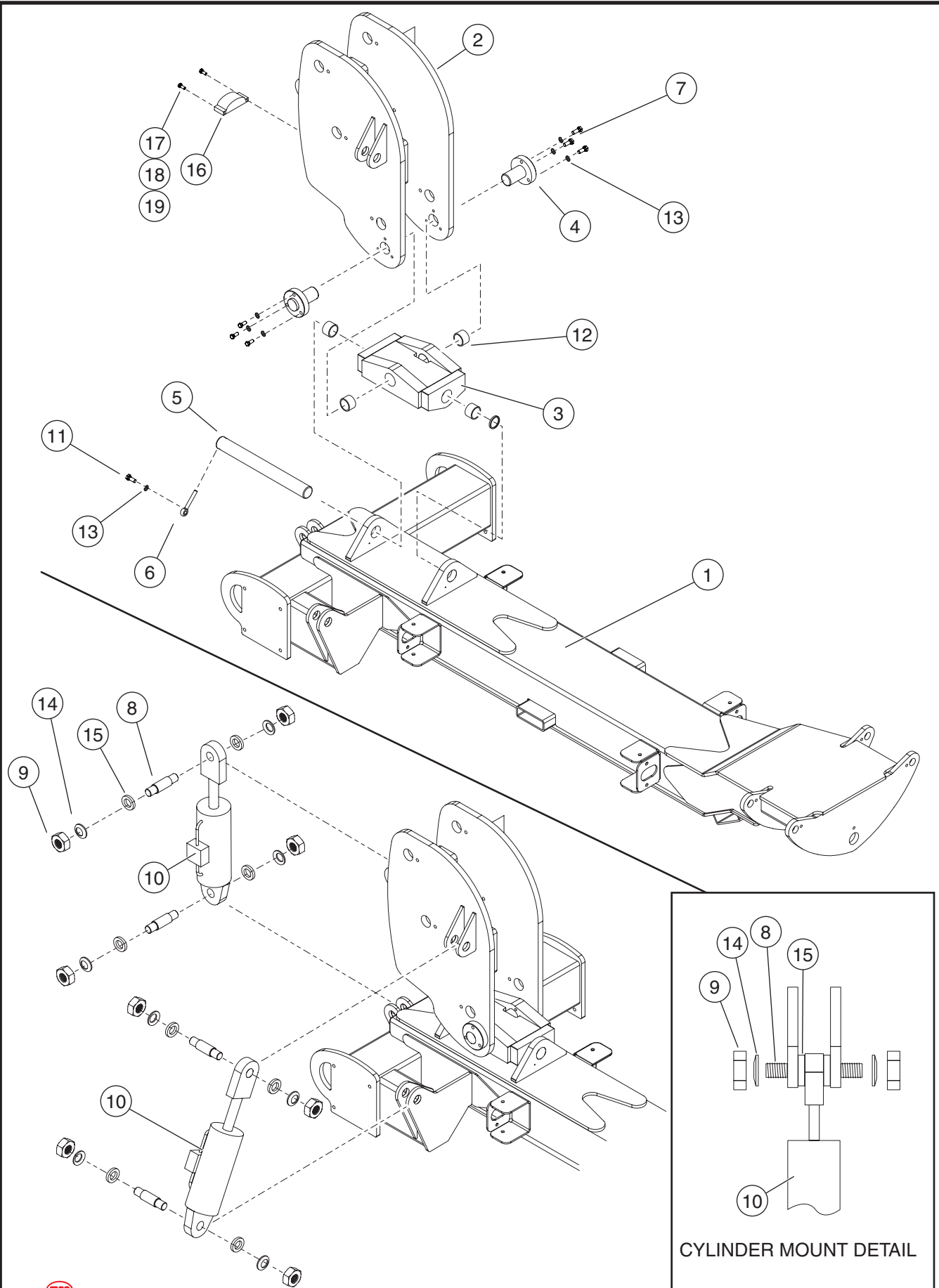
BOOM

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CYLINDER MOUNT DETAIL

Boom Mount and Pivot

Boom Mount and Pivot

ITEM	PART NO.	QTY	DESCRIPTION
–	83081	1	Chassis Assembly
1	19020	1	Chassis Weldment
2	19031	1	Boom Mount Weldment
3	19013	1	Level Pivot Weldment
4	19124	2	Pin
5	19123	1	Pin
6	18152	1	Pin Retainer
7	50023	6	Bolt, M12 x 50
8	19122	4	Pin
9	50119	8	Nut, Nylock 1-1/4"
10	19081	2	Cylinder, Level
11	50039	1	Bolt, M12 x 30
12	92011	4	Bearing, Flange
13	50007	6	Washer, M12 Nord-Lock
14	50065	8	Flat Washer, 1¼
15	19164	8	Spacer
16	92009	1	CAN Tilt Angle Transducer, Model 151
17	50125	2	Screw, M6 x 55
18	50047	2	Nut, M6 Nylock
19	50068	2	Washer, M6 Fender
20	92040	as needed	Spacer



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

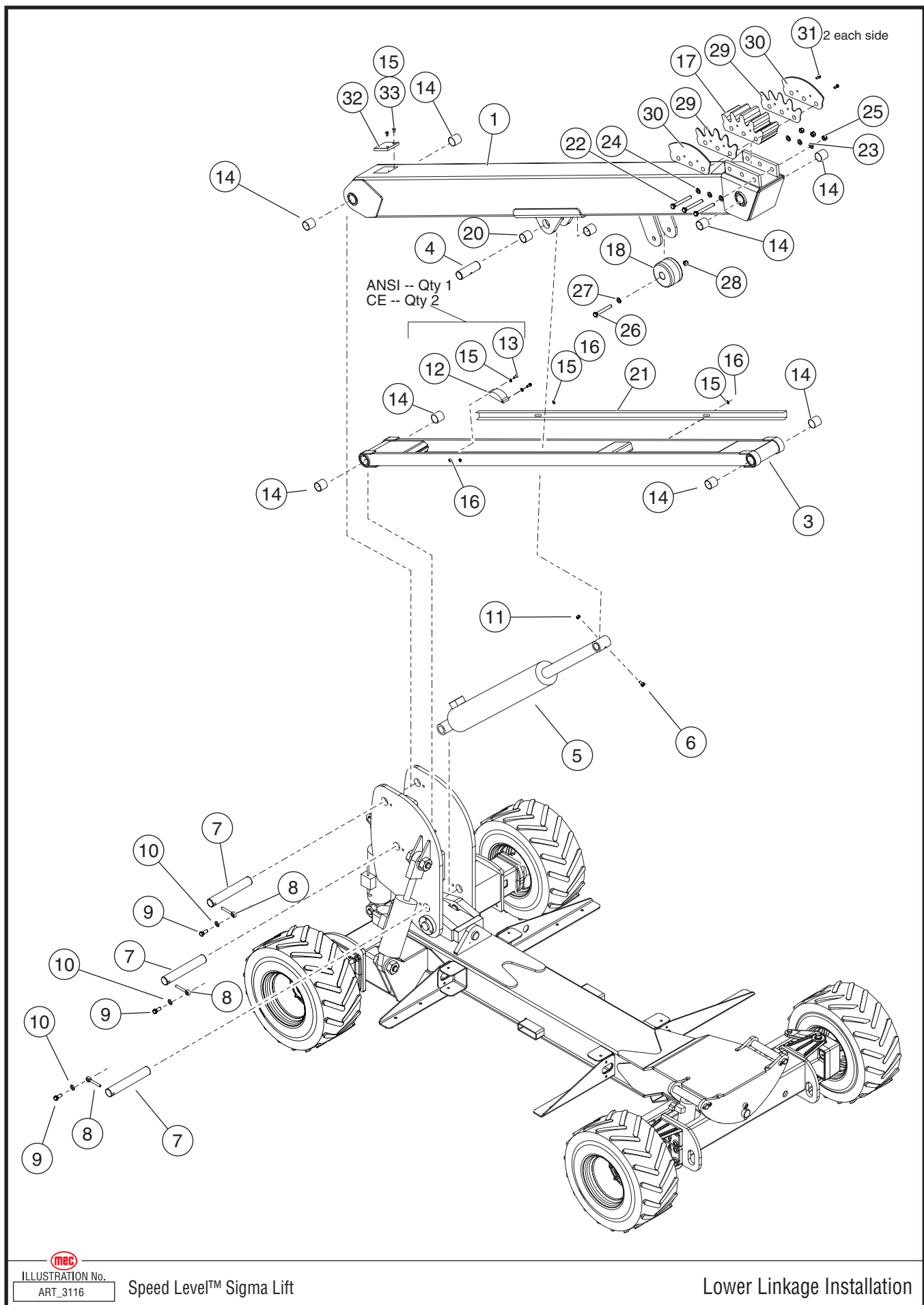


ILLUSTRATION No.
ART_3116

Speed Level™ Sigma Lift

Lower Linkage Installation

Lower Boom Assembly

ITEM	PART NO.	QTY	DESCRIPTION
--	83082	1	3084 -- Lower Boom Assembly
--	83095	1	2684 -- Lower Boom Assembly
1	19034	1	3084 -- Lower Boom Weldment
	19327	1	2684 -- Lower Boom Weldment
2	--	--	--
3	19049	1	3084 -- Lower Tension Weldment
	19329	1	2684 -- Lower Tension Weldment
4	19118	1	Cylinder Mount Pin
5	19084	1	Lift Cylinder
6	50024	1	Bolt, M10.9 x 65
7	19121	3	Pin, Boom Mount
8	18152	3	Pin Retainer
9	50039	3	Bolt, M12 x 30
10	50007	3	Washer, M12 Nordlock
11	50049	1	Lock Nut, M10
12	90844	1	ANSI Specifications - EZfit Angle Transducer, Model 120
		2	CE Specifications - EZfit Angle Transducer, Model 120
13	50016	2	ANSI Specifications - Screw, M8 x 55
		4	CE Specifications - Screw, M8 x 55
14	92011	8	Flange Bearing
15	50001	10	M8 Washer
16	50048	4	ANSI Specifications - M8 Lock Nut
		6	CE Specifications - M8 Lock Nut
17	19199	1	Gear, Pivot
18	91963	1	Wheel
19	--	--	--
20	92012	2	Flange Bearing, 2.0 x 1.0
21	19158	1	3084 -- Cable Cover
	19436	1	2684 -- Cable Cover
22	50058	3	Bolt, HHCS 1"-8 x 8", GR8, ZP
23	50063	3	Washer, 1" ZP STD FLAT
24	50064	3	Washer, 1" ZP FLAT XT
25	50120	3	Nut, NNYL 1"-8
26	50059	1	Bolt, 3/4-10 x 5.5
27	50062	1	Washer, 3/4 Std
28	50118	1	Nut, 3/4-10 Jam Nylock
29	19240	2	Spacer, Lower Boom Gear Shield
30	19241	2	Guard
31	50031	4	Bolt, M8 x 25
32	19157	1	Wear Pad
33	50124	2	Cap Screw, M8 x 1.25 x 20, Button Head Allen

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



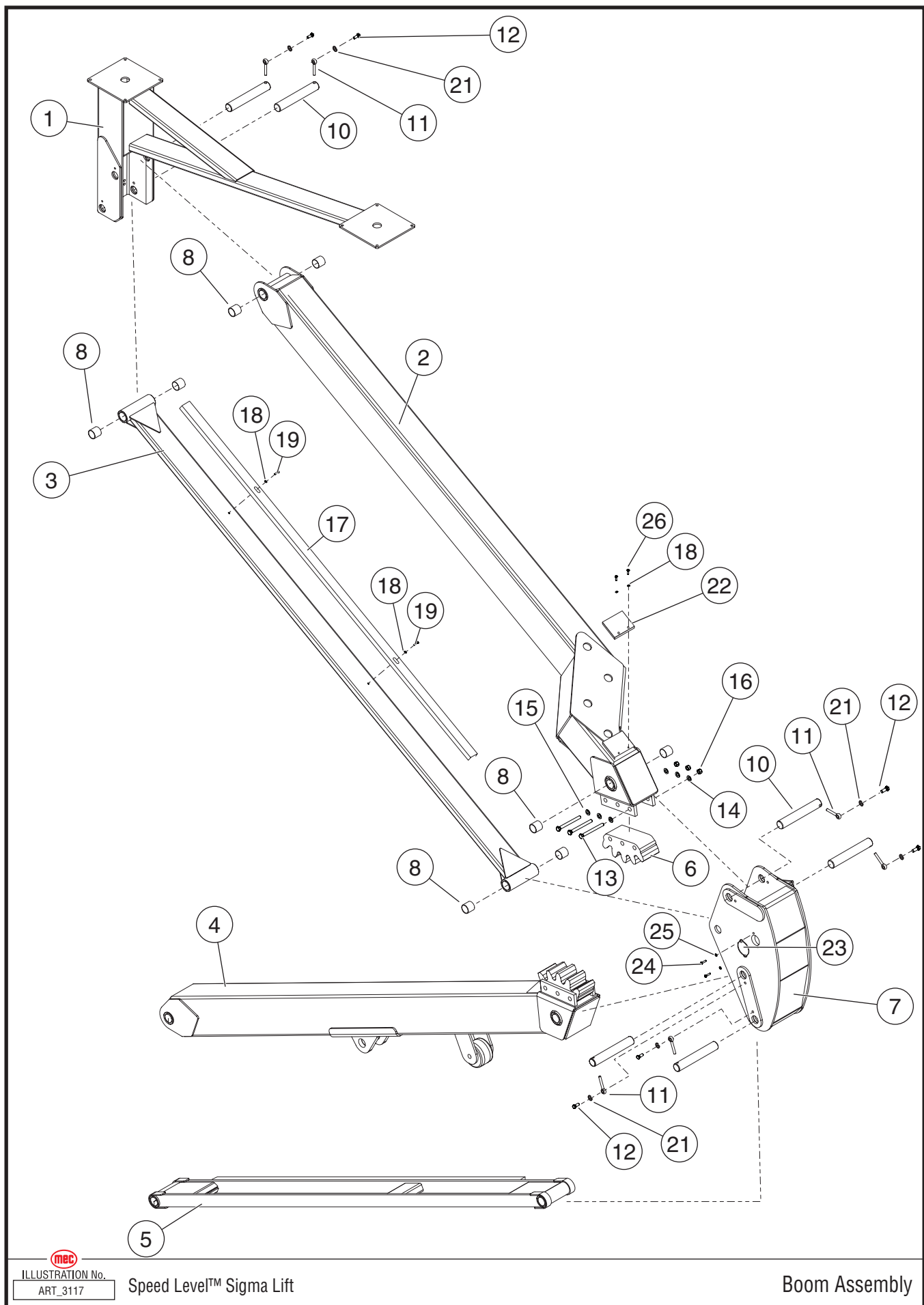


ILLUSTRATION No.
ART_3117

Speed Level™ Sigma Lift

Boom Assembly

Upper Boom Assembly

ITEM	PART NO.	QTY	DESCRIPTION
–	83083	1	3084 -- Upper Boom Assembly
--	83096	1	2684 -- Upper Boom Assembly
1	19068	1	Platform Pivot Weldment
2	19073	1	3084 -- Upper Boom Weldment
	19332	1	2684 -- Upper Boom Weldment
3	19058	1	3084 -- Upper Tension Weldment
	19334	1	2684 -- Upper Tension Weldment
4	REF	1	Lower Boom Weldment (see “Lower Boom Assembly” on Page C-5)
5	REF	1	Lower Tension Weldment (see “Lower Boom Assembly” on Page C-5)
6	19199	1	Gear, Pivot
7	19055	1	Boom Pivot Weldment
8	92011	8	Flange Bearing
9	--	--	--
10	19121	6	Boom Mount Pin
11	18152	6	Pin Retainer
12	50046	6	Bolt, M12 x 35
13	50058	3	Bolt, HHCS 1"-8 x 8", GR8, ZP
14	50063	3	Washer, 1" ZP STD FLAT
15	50064	3	Washer, 1" ZP FLAT XT
16	50120	3	Nut, NNYL 1"-8
17	19158	1	3084 -- Cable Cover
	19436	1	2684 -- Cable Cover
18	50001	4	M8 Washer Standard
19	50048	2	M8 Lock Nut
–	–	–	–
21	50007	6	Split Lock Washer, M12
22	19157	1	Wear Pad
23	19183	1	Grease Port Cover
24	50037	2	Bolt, M12 x 20
25	50003	2	Washer, M12
26	50124	2	Bolt



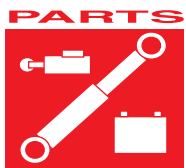
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• NS: Not a Stock item

• REF: Reference only

NOTES:



SECTION D

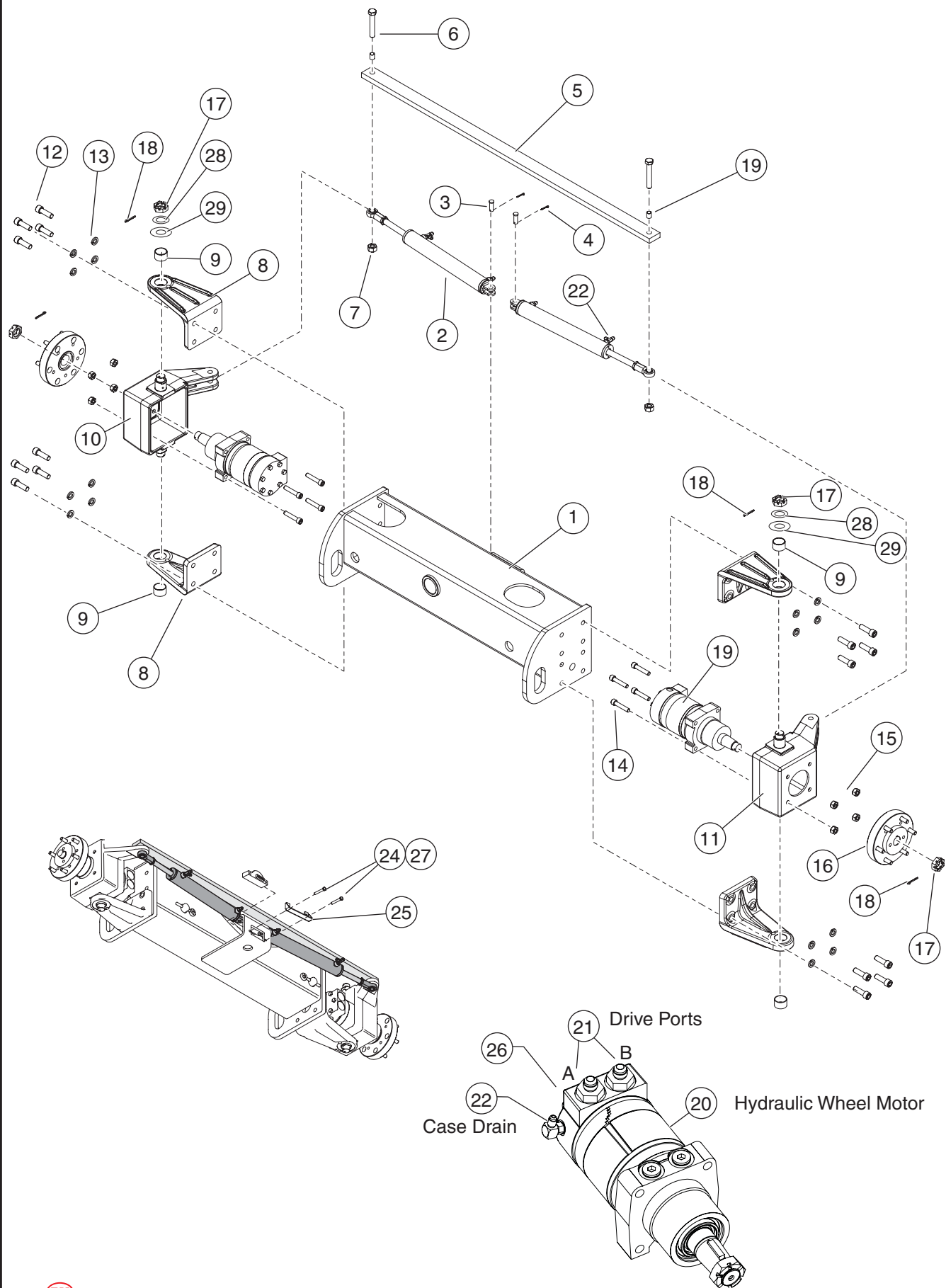
AXLES

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MEC
ILLUSTRATION No.
ART_3118

Speed Level™ Sigma Lift

Front Axle Assembly

Front Axle Assembly

ITEM	PART NO.	QTY	DESCRIPTION
–	83084	1	Front Axle Assembly
1	19008	1	Front Axle Weldment
2	91019	2	Cylinder, Steering
	90990	–	Seal Kit, Steer Cylinder (not shown)
3	50172	2	Pin, Clevis, ½ DIA. X 1 3/8" LG
4	50178	2	Pin, Cotter, .12 DIA. X 1" LG
5	19079	1	Rod, Tie Steering
6	50154	2	Screw, 5/8" - 11. 4" LG, GR 5
7	HDW6633	2	Nut, Lock, 5/8" - 11, GR 5
8	40334	4	Mount, Motor W/Bearings
9	9307	4	Bearing, 1.50 x 1.0 DIA
10	40308	1	Mount, Wheel Motor, RH, FRONT
11	40464	1	Mount, Wheel Motor, LH, FRONT
12	50012	16	Screw, M16 X 50, GR 12, Socket Head
13	50008	16	Lock Washer, M16
14	50072	8	Screw, ½"-13, 2.50" LG, GR 8, Socket Head
15	HDW8457	8	Nut, ½"-13, GR8
16	10709	2	Hub
17	HDW8568	6	Nut, 1 1/8" - 18
18	50177	6	Pin, Cotter, .156 DIA. X 1.75" LG
19	7292	2	Bearing
20	7300P	2	Motor, Wheel, Hyd.
21	50659	4	Fitting, MB-MJ-12-8
22	50665	4	Fitting, MB-MJ90-4-4
23	92010	1	CAN Tilt Angle Transducer, (152)
24	50017	2	Screw, M8 x 60
25	19197	1	Guard
26	50645	2	Fitting, MJ-FJX-8-8
27	50048	2	Locknut, M8
28	20312	8	Washer Bearing
29	20311	4	Washer, 2.550 x 1.560

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



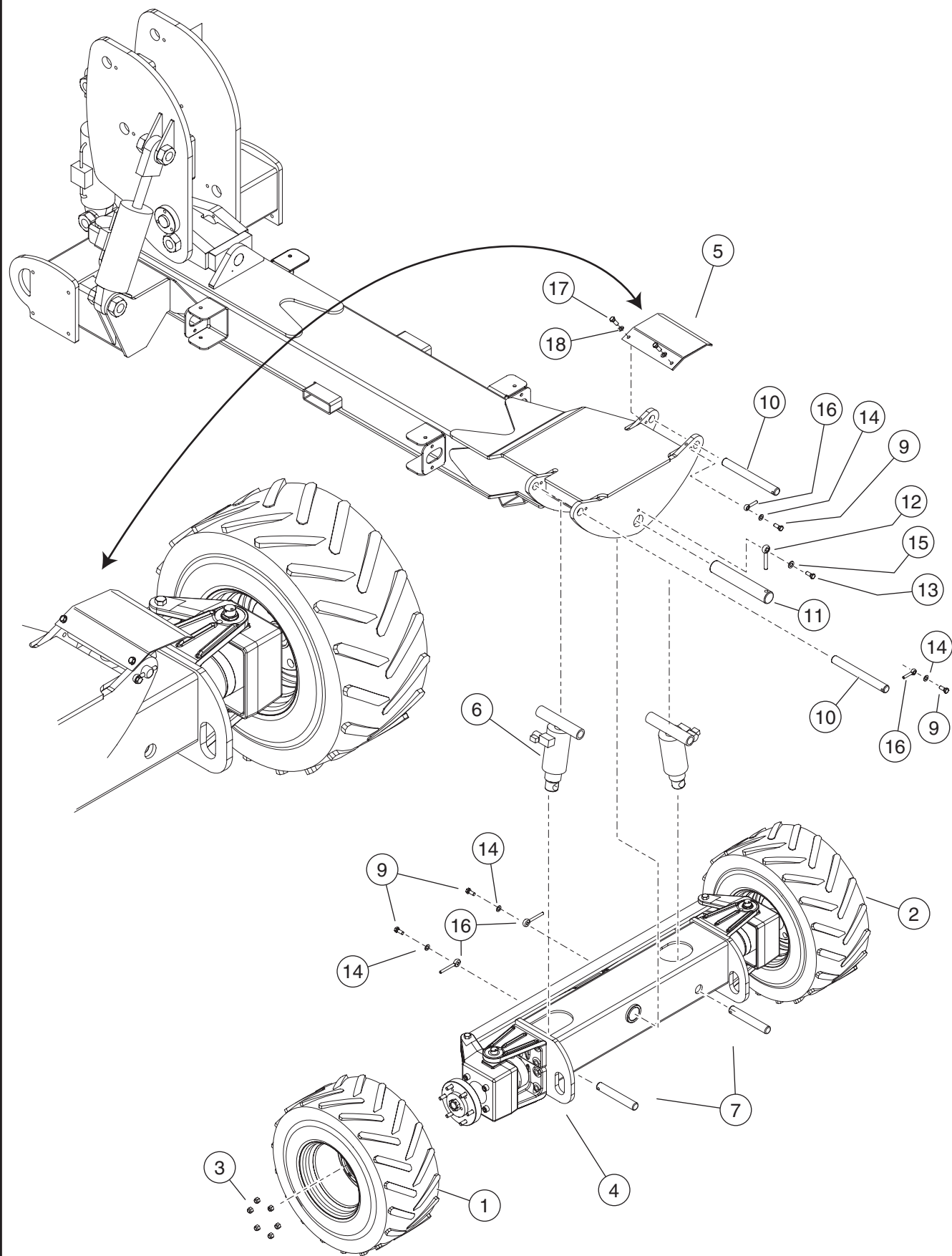


ILLUSTRATION No.
ART_3119

Speed Level™ Sigma Lift

Front Axle Installation

Axle Installation, Front

ITEM	PART NO.	QTY	DESCRIPTION
1	91166	1	Wheel/tire Assy, LH - 10 PLY - PNEUMATIC (ANSI standard)
	91168	1	Wheel/tire Assy, LH - 10 PLY - FOAM (ANSI option) (CE standard)
	91578	1	Wheel/tire Assy, LH - Non-Marking PNEUMATIC (ANSI option)
	91580	1	Wheel/tire Assy, LH - Non-Marking FOAM (ANSI, CE option)
	91581	1	Wheel/tire Assy, LH - Turf PNEUMATIC (ANSI option)
2	91165	1	Wheel/tire Assy, RH - 10 PLY - PNEUMATIC (ANSI standard)
	91167	1	Wheel/tire Assy, RH - 10 PLY - FOAM (ANSI option) (CE standard)
	91577	1	Wheel/tire Assy, RH - Non-Marking PNEUMATIC (ANSI option)
	91579		Wheel/tire Assy, RH - Non-Marking FOAM (ANSI, CE option)
	91581	1	Wheel/tire Assy, RH - Turf PNEUMATIC (ANSI option)
incl	91180	–	Wheel (service)
incl	91181	–	Tire 26x12.00-380 (service)
3	50165	12	Nut, Lug, ½" - 20, GR 5
4	REF		Front Axle Assembly
5	19162	2	Cover
6	19087	2	Cylinder, Axle Lock
7	18074	2	Pin, Ø1.25"
8	--	--	--
9	50033	4	Bolt, M10 x 25
10	19119	2	Pin, Ø1.25
11	19120	1	Pin, Ø7.0
12	18152	1	Pin Retainer, 0.5 x 3.80
13	50039	1	Bolt, M12 x 30
14	50006	4	Lock Washer, M12
15	50007	1	Lock Washer, M10
16	18151	4	Pin Retainer, .375 x 3.75
17	50027	4	Bolt, M6 x 10
18	50068	4	Washer, M6 Flat

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



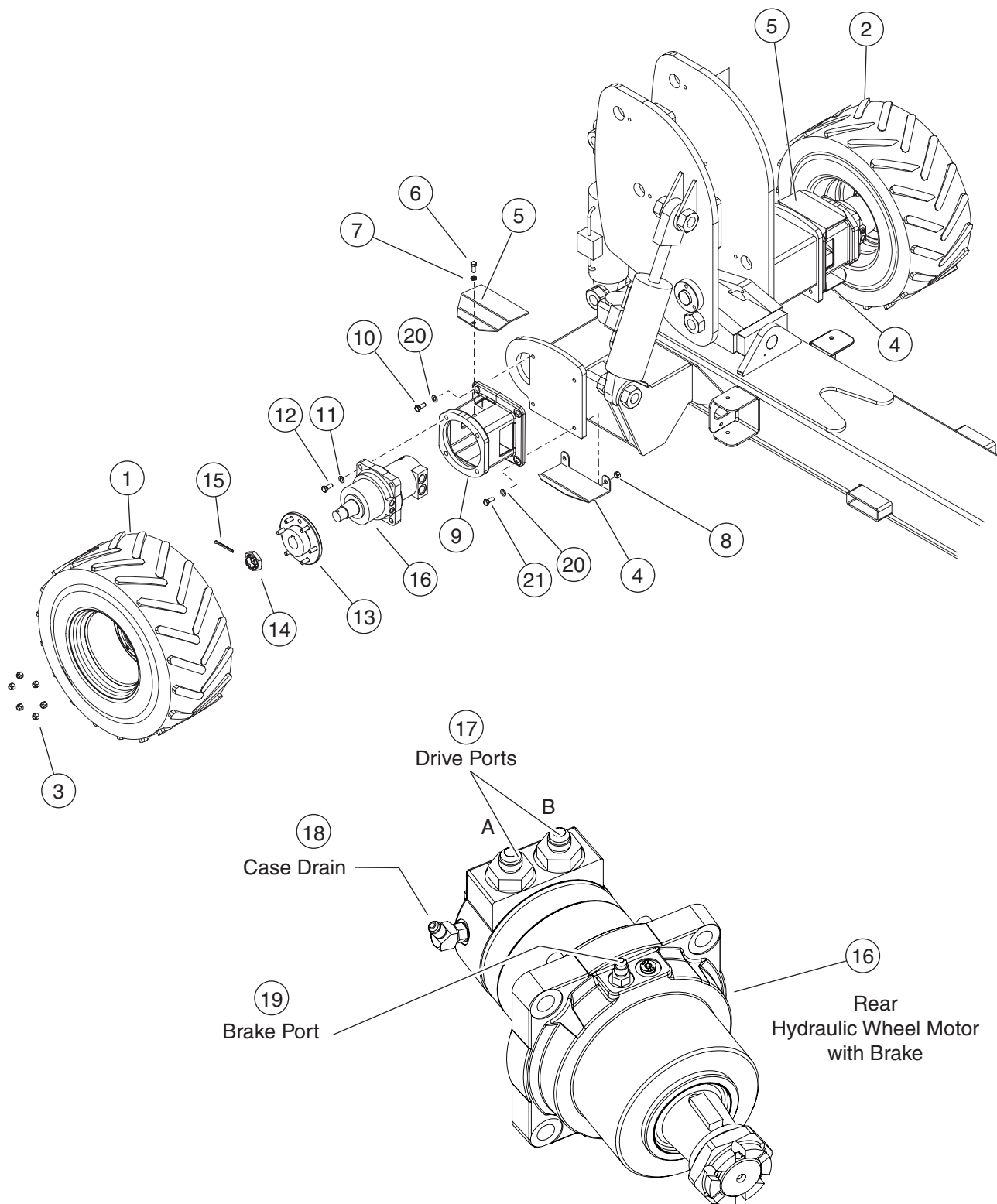


ILLUSTRATION No.
ART_3120

Speed Level™ Sigma Lift

Rear Axle Installation

Axle Installation, Rear

ITEM	PART NO.	QTY	DESCRIPTION
1	91166	1	Wheel/tire Assy, LH - 10 PLY - PNEUMATIC (ANSI standard)
	91168	1	Wheel/tire Assy, LH - 10 PLY - FOAM (ANSI option) (CE standard)
	91578	1	Wheel/tire Assy, LH - Non-Marking PNEUMATIC (ANSI option)
	91580	1	Wheel/tire Assy, LH - Non-Marking FOAM (ANSI, CE option)
	91581	1	Wheel/tire Assy, LH - Turf PNEUMATIC (ANSI option)
2	91165	1	Wheel/tire Assy, RH - 10 PLY - PNEUMATIC (ANSI standard)
	91167	1	Wheel/tire Assy, RH - 10 PLY - FOAM (ANSI option) (CE standard)
	91577	1	Wheel/tire Assy, RH - Non-Marking PNEUMATIC (ANSI option)
	91579		Wheel/tire Assy, RH - Non-Marking FOAM (ANSI, CE option)
	91581	1	Wheel/tire Assy, RH - Turf PNEUMATIC (ANSI option)
incl	91180	–	Wheel (service)
incl	91181	–	Tire 26x12.00-380 (service)
3	50165	12	Nut, Lug, ½" - 20, GR 5
4	16349	2	Bottom Hose Cover
5	19168	2	Top Hose Cover
6	50010	2	Screw, M8 x 25
7	50001	2	Washer, Lock, M8
8	50051	4	Nut, M16
9	40258	2	Mount, Motor, Rear Axle, Machined
10	50043	8	Bolt, M16 x 40
11	50253	8	Washer, Lock, 5/8
12	50151	8	Screw, 5/8"-11, 2.25" LG, GR 5
13	14773	2	Hub
14	HDW9037	–	Nut, Castle, M42 X 3 (service)
15	50170	2	Pin, Cotter, .250 DIA. X 3" LG
16	91319	2	Wheel Motor, Hyd W/brake
17	50659	4	Fitting, MB-MJ-12-8
18	50646	2	Fitting, MB-MJL-4-4
19	50647	2	Fitting, MB-MJ90L-4-4
20	50008	8	Washer, Lock, M16
21	50044	8	Bolt, M16 x 60 G10.9

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



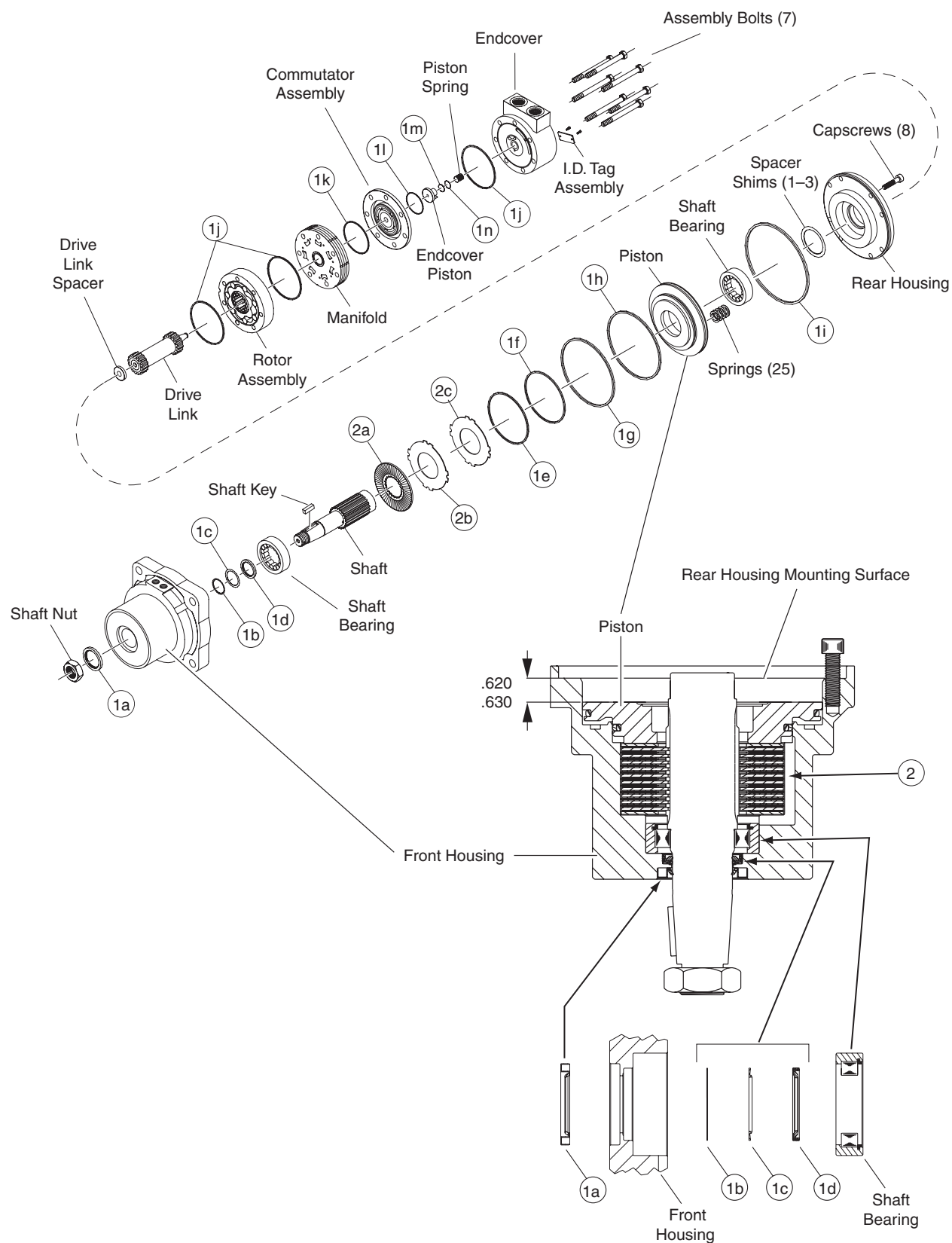


ILLUSTRATION No.
ART_2397 R2

DT710 BRAKE MOTOR COMPONENTS

Wheel Motor, Rear

Wheel Motor, Rear

ITEM	PART NO.	QTY	DESCRIPTION
–	91319	–	Wheel Motor W/brake
1	9781	–	Seal Kit
1a	incl	1	Dust Seal
1b	incl	1	Metal Backup Shim
1c	incl	1	Backup Seal
1d	incl	1	Shaft Seal
1e	incl	1	Small Piston O-ring Seal
1f	incl	1	Small Piston Seal
1g	incl	1	Large Piston O-ring Seal
1h	incl	1	Large Piston Seal
1i	incl	1	O-ring Seal
1j	incl	3	Body Seal
1k	incl	1	Manifold Seal
1l	incl	1	Commutator Seal
1m	incl	1	O-ring Seal
1n	incl	1	Backup Seal
–	–	–	–
2	91138	–	Disk Kit
2a	incl	10	Friction Disk
2b	incl	9	Disk Stamping
2c	incl	2	Thick Disk Stamping

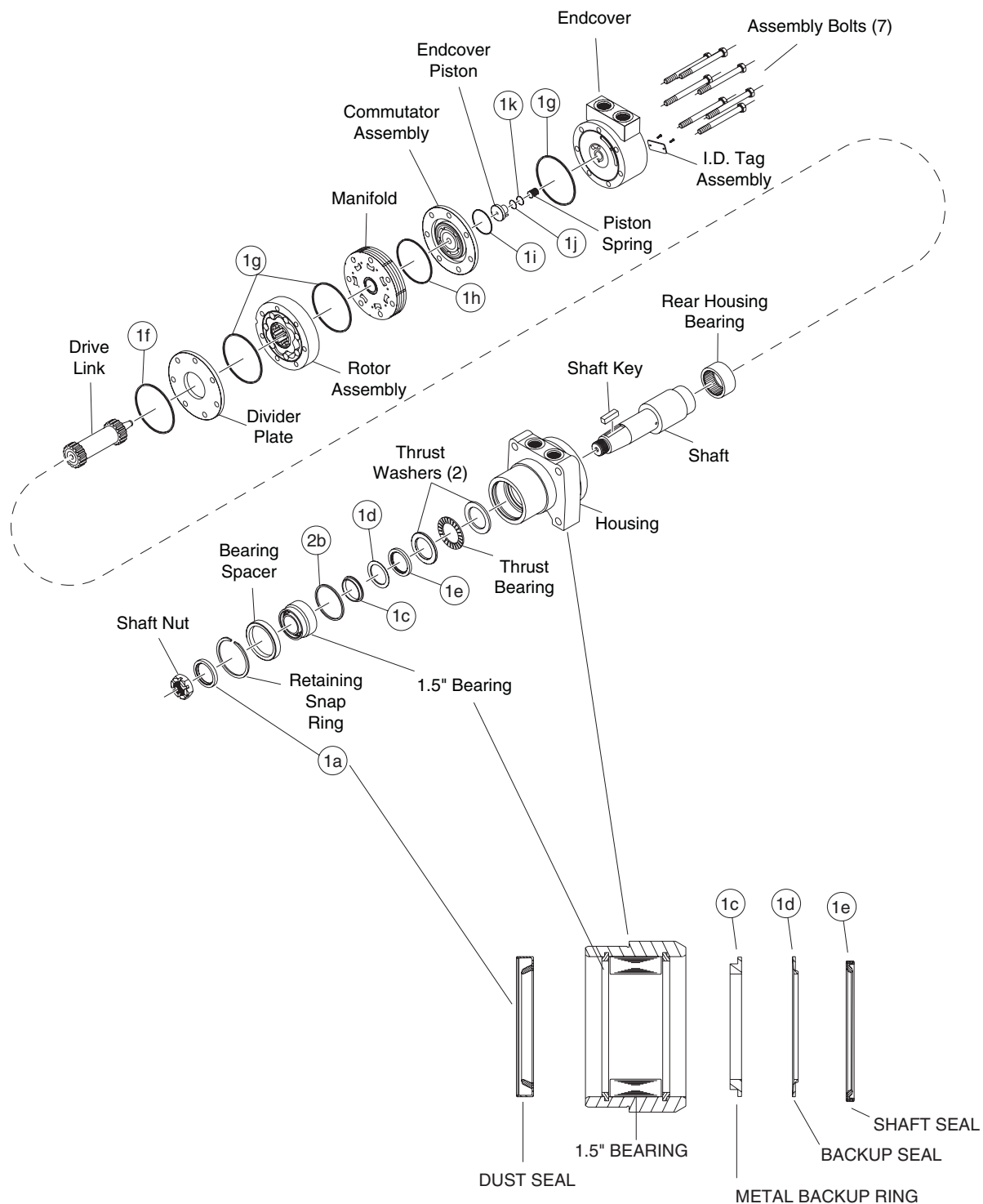


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• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



Wheel Motor, Front

ITEM	PART NO.	QTY	DESCRIPTION
–	7300P	–	Motor Wheel Hyd Painted
1	90592	–	Seal Kit
1a	incl	1	Dust Seal
1b	incl	1	High Pressure Seal
1c	incl	1	Metal Backup Shim
1d	incl	1	Teflon Back Up Seal
1e	incl	1	Shaft Seal
1f	incl	1	Housing Seal
1g	incl	3	Body Seals
1h	incl	1	Manifold Seal
1i	incl	1	Commutator Seal
1j	incl	1	O-ring Seal
1k	incl	1	Teflon Backup Seal



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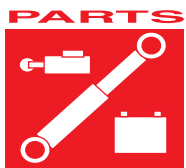
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• REF: Reference only

NOTES:





SECTION E

HYDRAULICS

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ES MODELS

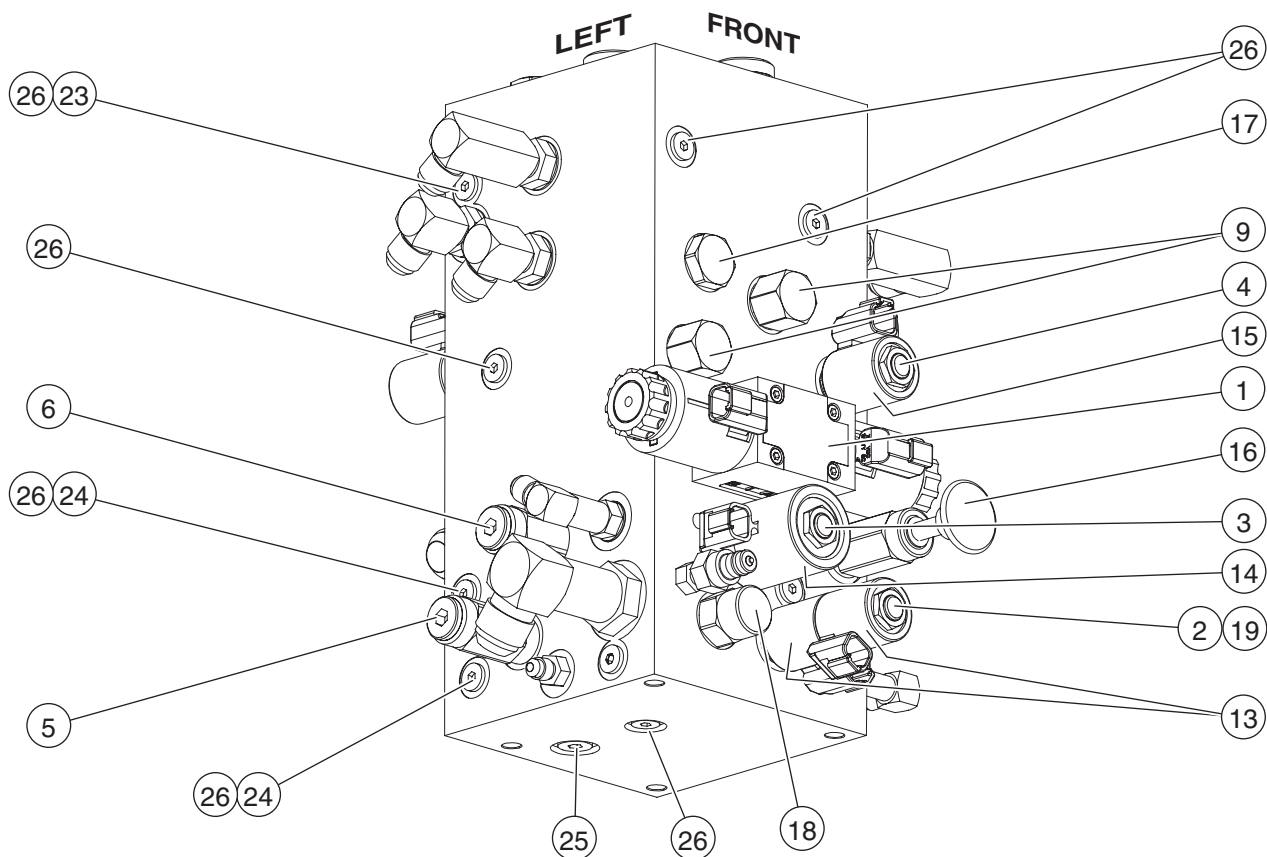
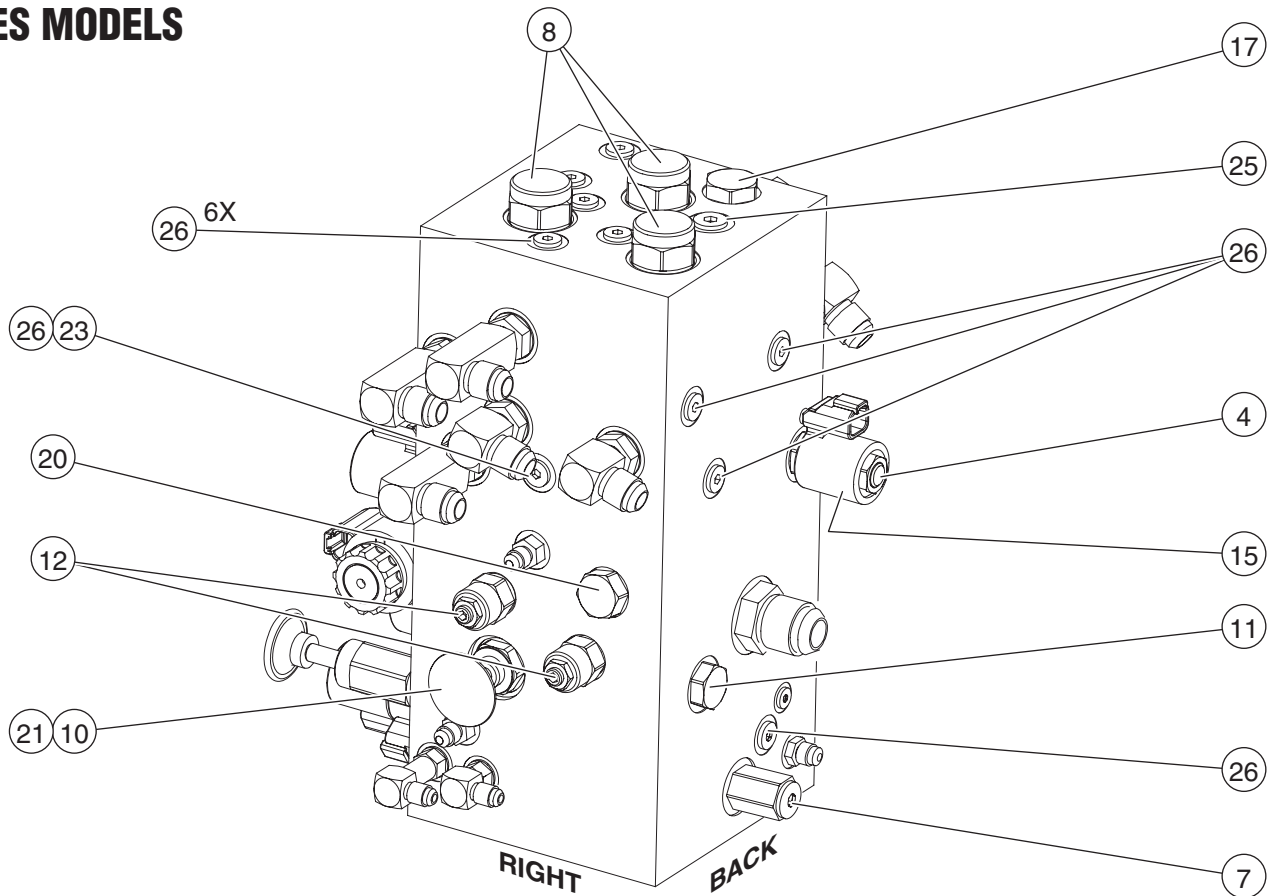


ILLUSTRATION No.
ART_3170

Sheet 1 of 2

ES Manifold Assembly

Main Manifold Assembly, Electric Models

ITEM	PART NO.	QTY	DESCRIPTION
—	83072	—	Manifold Assembly, ES Models
--	91743	--	Manifold w/ valves, no fittings, ES Models
1	91144	1	Valve, Drive, 4 way 3 Position
2	91146	1	Valve, Steer, 4 Way 3 Position
3	91145	1	Valve, Lift Spool, 3 Way
4	91147	2	Valve, Series Parallel Spool, 4 way 3 position
5	91150	1	Valve, Relief, Steer
6	91149	1	Valve, Relief, Lift
7	91476	1	Valve, Relief,
8	91151	3	Valve, Piloted Spool 4 way 3 position
9	91152	2	Valve, Piloted Poppet
10	91012	1	Valve, Manual — Pull
11	91153	1	Valve, Load Shuttle Check
12	91350	2	Valve, Counterbalance
13	91141	2	Coil, Series 8, 12V
14	91142	1	Coil, Series 10, 12V
15	91141	2	Coil, Series
16	91015	1	Hand Pump, Brake Release
17	91351	2	Flow Divider / Combiner
18	91352	1	Pressure Compensator
19	91141	1	Coil
20	REF	1	Cavity Plug
21	91354	1	Orifice Disc
22	91355	1	Orifice Plug, Steer
23	91356	2	Orifice Plug, Flow Divider Bleed
24	REF	2	Orifice Plug
25	7484	2	Port Plug M 0.38" O-Ring, RBG-6
26	HDW7314	19	Port Plug M ¼", O-Ring, RBG-4

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• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

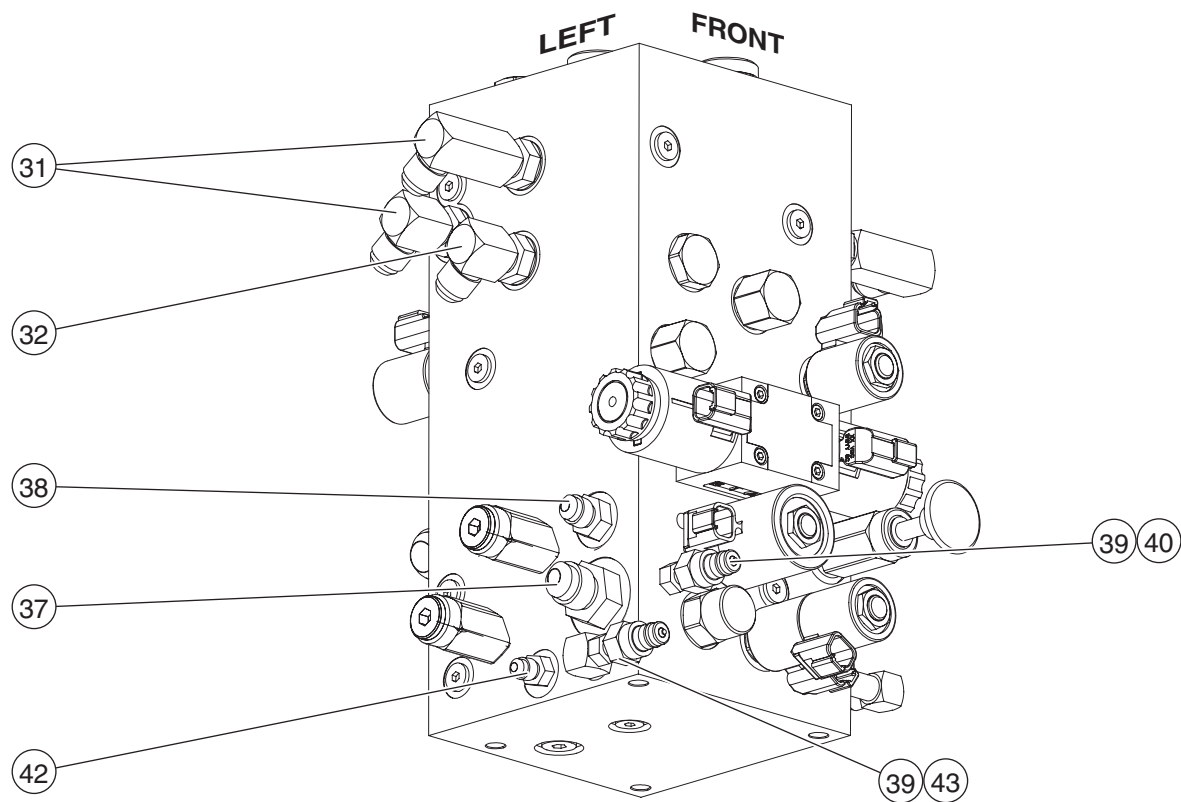
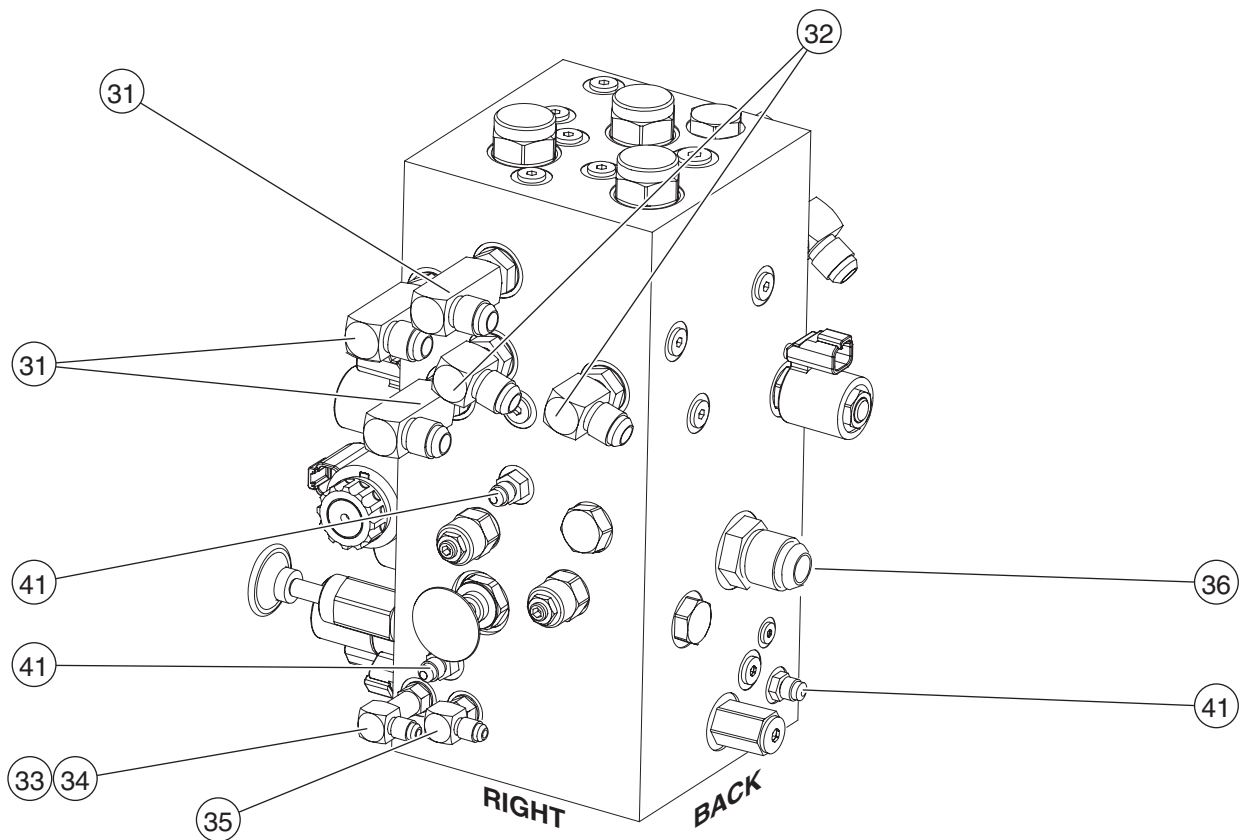


ILLUSTRATION No.
ART_3171

Sheet 2 of 2

ES Manifold Assembly

Main Manifold Assembly, Electric Models (continued)

ITEM	PART NO.	QTY	DESCRIPTION
31	50796	4	Elbow, 90°, Male, ½", O-Ring, Male, ½", MB-MJ90LL-8-8
32	50792	4	Elbow, 90°, Male, ½", O-Ring, Male, ½", MB-MJ90-8-8
33	50770	1	Fitting, Orifice 1/16" (Electric only)
34	50794	1	ELBOW, 90°, Male ¼" O-ring, Male ¼", MB-MJ90LL-4-4
35	50647	1	ELBOW, 90°, Male ¼" O-ring, Male ¼", MB-MJ90L-4-4
36	50763	1	Fitting, Male ¾" O-ring, Male ¾", MB-MJ-12-12
37	50659	1	Fitting, Male ¾" O-ring, Male ¾", MB-MJ-12-8
38	50799	1	Fitting, Male .37 JIC, Male .37 O-RING, MB-MJL-8-6
39	HDW7971	2	Fitting, Male Disconnect, ¼" NPT
40	50950	1	Adapter Male ¼" O-ring Male ¼" NTP, MP-MB-4-4
41	50769	3	Adapter, Male ¼", O-ring, Male ¼" 37° MB-MJ-4-4
42	50775	1	Adapter, Male ¼", O-ring, Male ¼" MB-MJ-6-4
43	50952	1	Elbow, 90°, MP-MB90-4-4
44	50960	2	Port Plug, MB-06-Plug



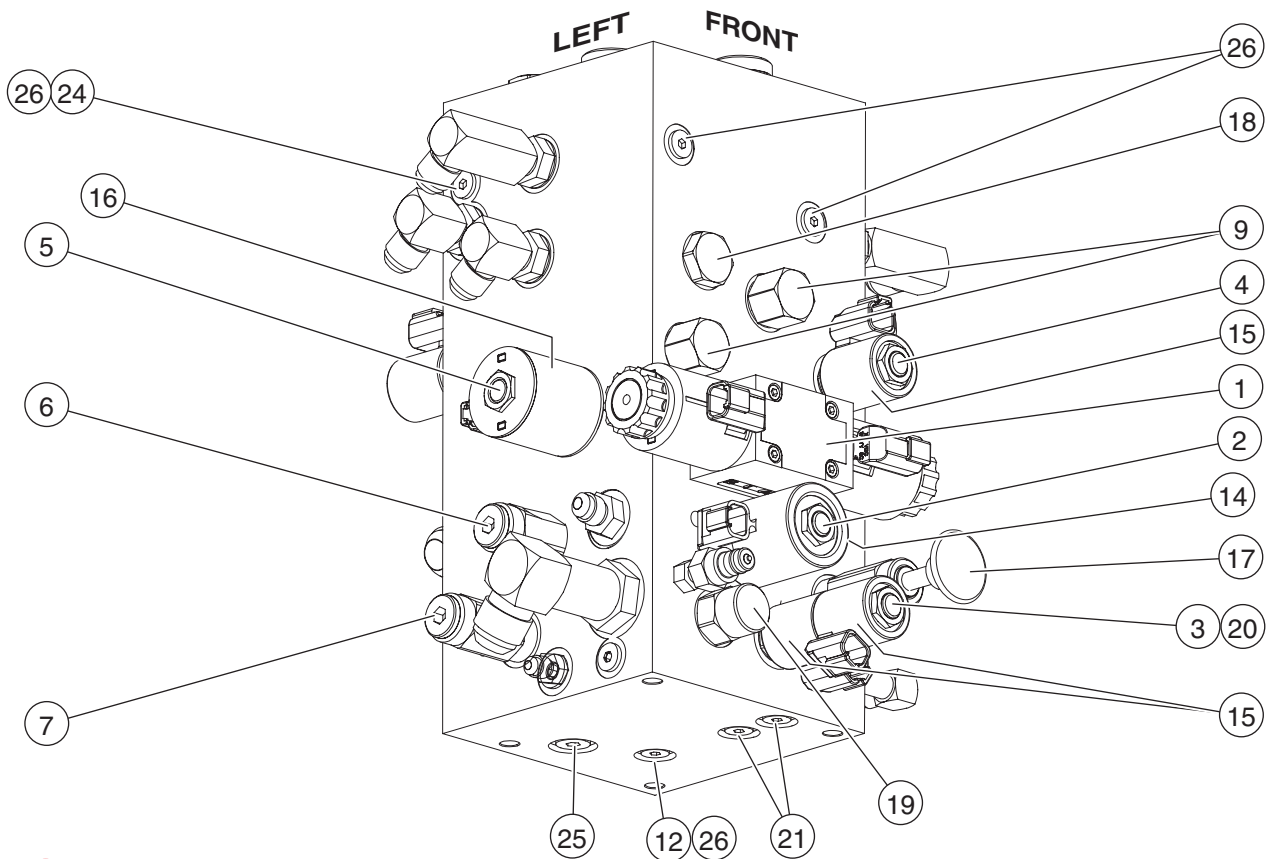
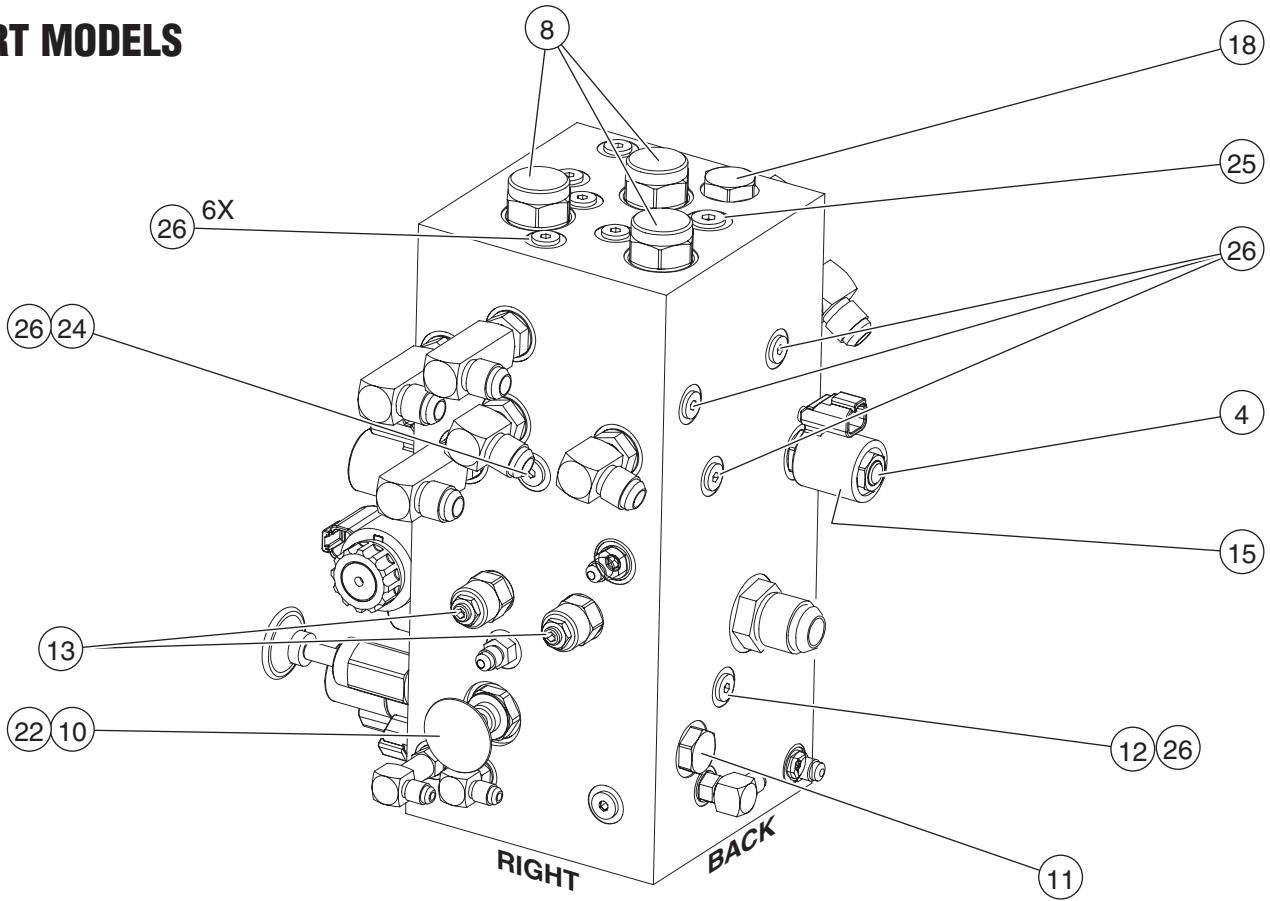
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS



Main Manifold Assembly, RT Models

ITEM	PART NO.	QTY	DESCRIPTION
—	83071	—	Manifold Assembly, RT Models
--	91140	--	Manifold w/ valves, no fittings, RT Models
1	91144	1	Valve, Drive, 4 way 3 Position
2	91145	1	Valve, Lift Spool, 3 Way
3	91146	1	Valve, Steer, 4 Way 3 Position
4	91147	2	Valve, Series Parallel Spool, 4 way 3 position
5	91148	1	Valve, Proportional
6	91149	1	Valve, Relief, Lift
7	91150	1	Valve, Relief, Steer
8	91151	3	Valve, Piloted Spool 4 way 3 position
9	91152	2	Valve, Piloted Poppet
10	91012	1	Valve, Manual — Pull
11	91153	1	Valve, Load Shuttle Check
12	91154	2	Valve, Load Shuttle Check
13	91350	2	Valve, Counterbalance
14	91142	1	Coil, Series 10, 12V
15	91142	1	Coil, Series 10, 12V
16	91142	1	Coil, Series 10, 12V
17	91015	1	Hand Pump, Brake Release
18	91351	2	Flow Divider / Combiner
19	91352	1	Pressure Compensator
20	91141	2	Coil, Series 8, 12V
21	91353	2	Valve, Check
22	91354	1	Orifice Disc
23	--	--	--
24	91356	2	Orifice Plug, Flow Divider Bleed
25	7484	2	Port Plug M 0.38" O-Ring, RBG-6
26	HDW7314	20	Port Plug M ¼", O-Ring, RBG-4

... continued



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS

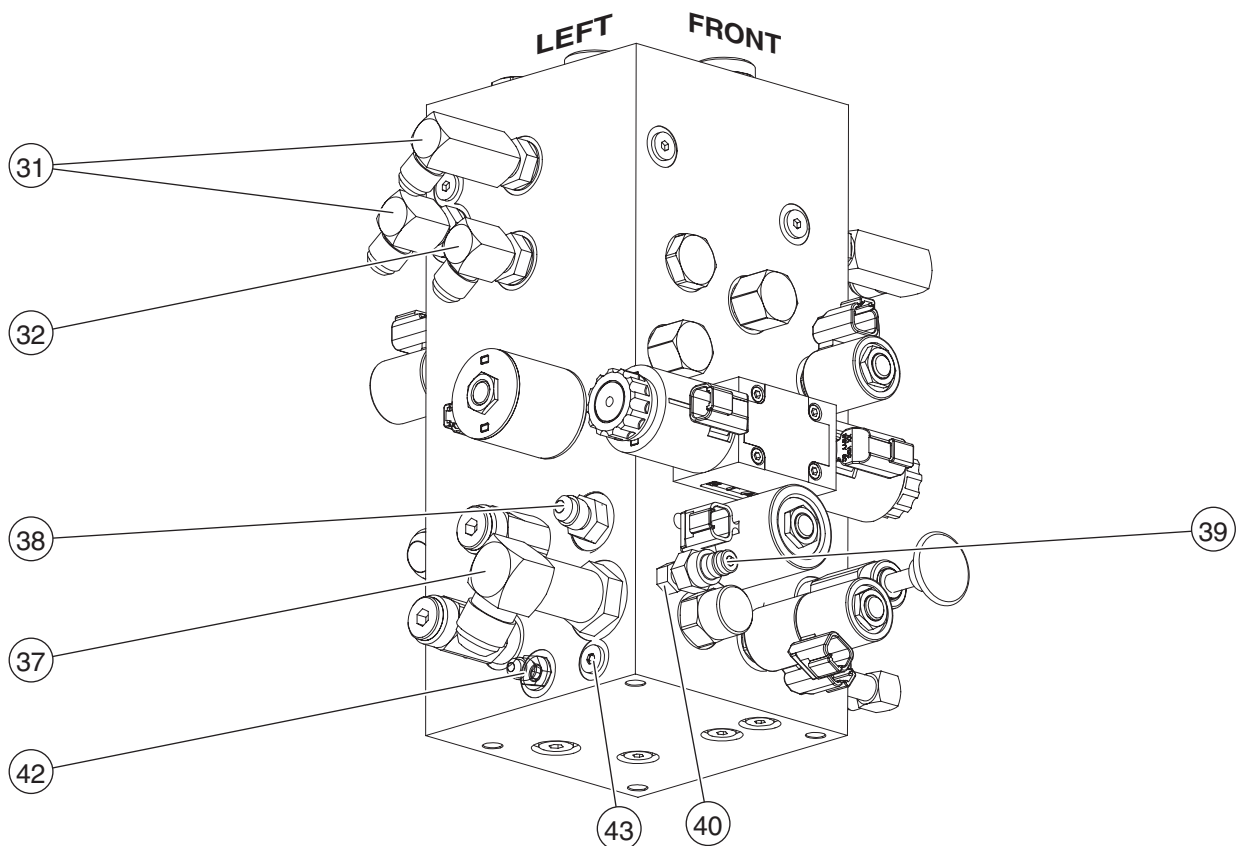
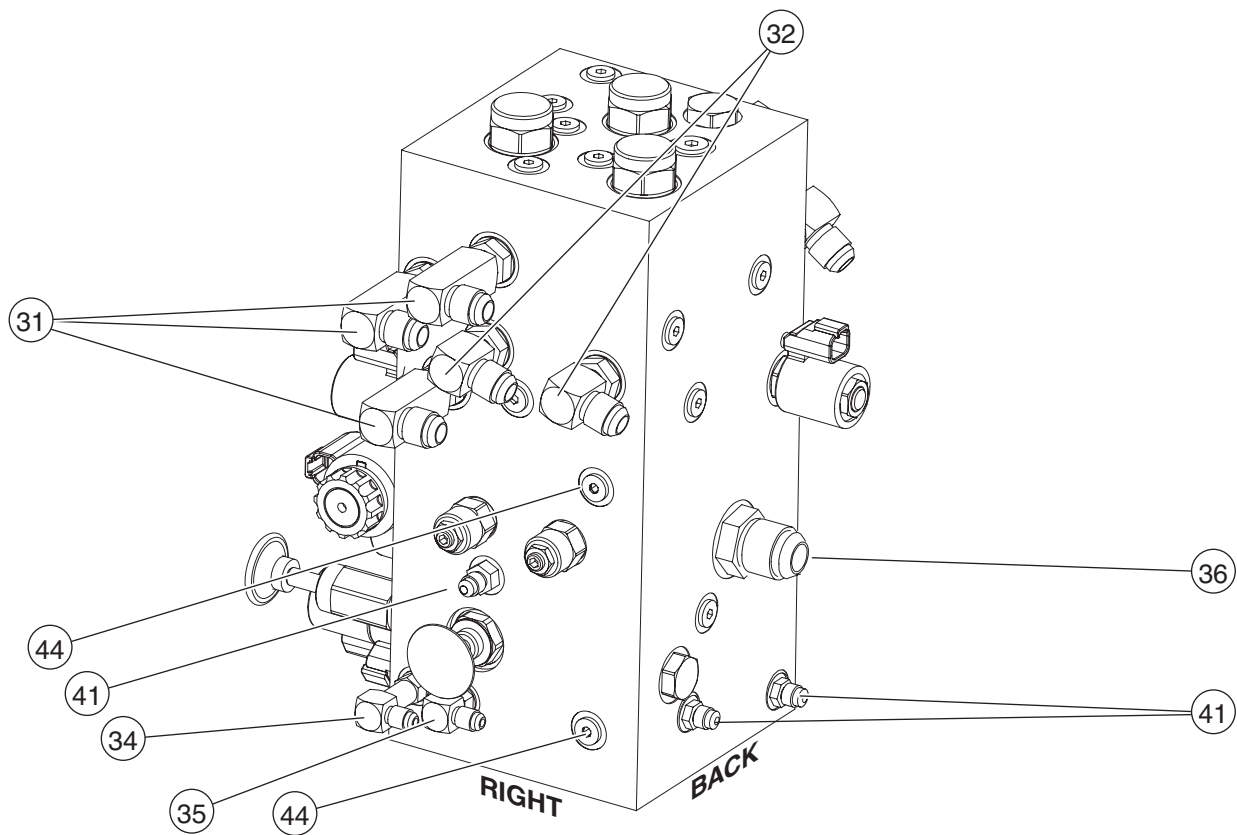


ILLUSTRATION No.
ART_3173

Sheet 2 of 2

RT Manifold Assembly

Main Manifold Assembly, RT Models (continued)

ITEM	PART NO.	QTY	DESCRIPTION
31	50796	4	Elbow, 90°, Male, ½", O-Ring, Male, ½", MB-MJ90LL-8-8
32	50792	4	Elbow, 90°, Male, ½", O-Ring, Male, ½", MB-MJ90-8-8
33	--	--	--
34	50794	1	ELBOW, 90°, Male ¼" O-ring, Male ¼", MB-MJ90LL-4-4
35	50647	1	ELBOW, 90°, Male ¼" O-ring, Male ¼", MB-MJ90L-4-4
36	50763	1	ELBOW, 90°, Male ¾" O-ring, Male ¾", MB-MJ-12-12
37	50821	1	ELBOW, 90°, Male ¾" O-ring, Male ¾", MB-MJ90LL-12-12
38	50658	1	Fitting, Male .37 JIC, Male .37 O-RING, MB-MJL-6-6
39	HDW7971	1	Fitting, Male Disconnect, ¼" NPT
40	50950	1	Adapter Male ¼" O-ring Male ¼" NTP, MP-MB-4-4
41	50769	3	Adapter, Male ¼", O-ring, Male ¼" 37° MB-MJ-4-4
42	50775	1	Adapter, Male ¼", O-ring, Male ¼" MB-MJ-6-4
43	50961	1	Port Plug, MB-04-Plug
44	50960	2	Port Plug, MB-06-Plug



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

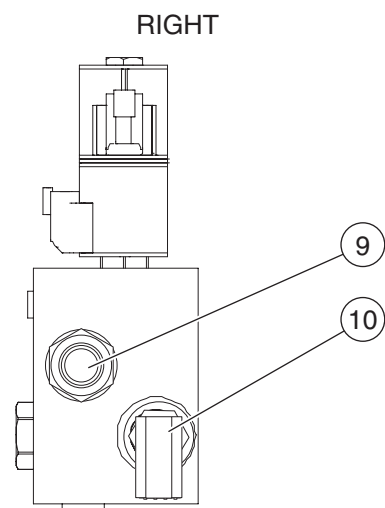
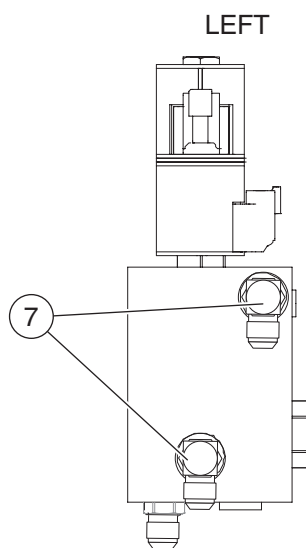
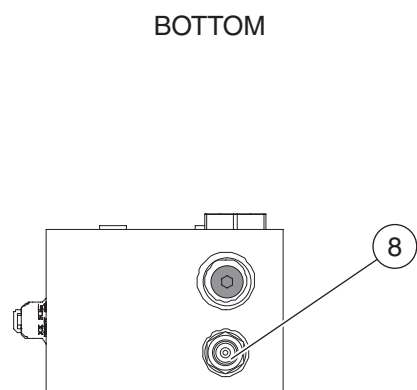
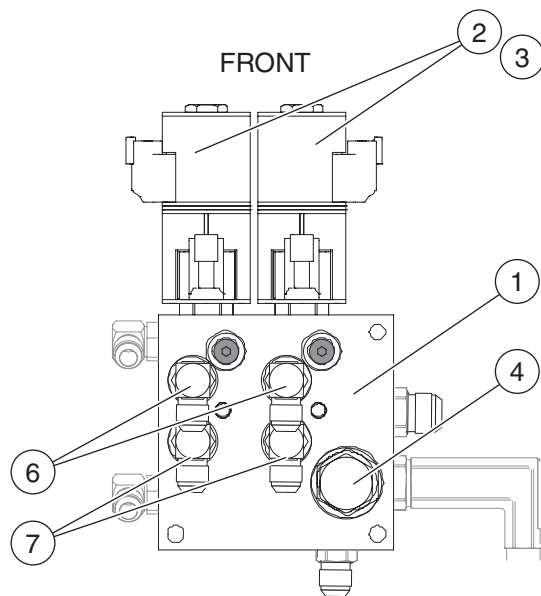


ILLUSTRATION No.
ART_3205

Speed Level™ Sigma Lift

Leveling Manifold

Leveling Manifold Assembly

ITEM	PART NO.	QTY	DESCRIPTION
--	83093	1	Leveling Manifold Assembly w/ Fittings
1	19300	1	Leveling Manifold Assembly w/o Fittings
2	92123	2	Valve
3	91143	2	Coil
4	91473	1	Check Valve
5	--	--	--
6	50661	2	Fitting, MB-MJ-90LL-6-4 (MB-MJ-90-4-4
7	50660	4	Fitting, MB-MJ-90-6-4
8	50775	1	MB-MJ-6-4
9	50763	1	MB-MJ-12-12
10	50821	1	MB-MJ-90LL-12-12



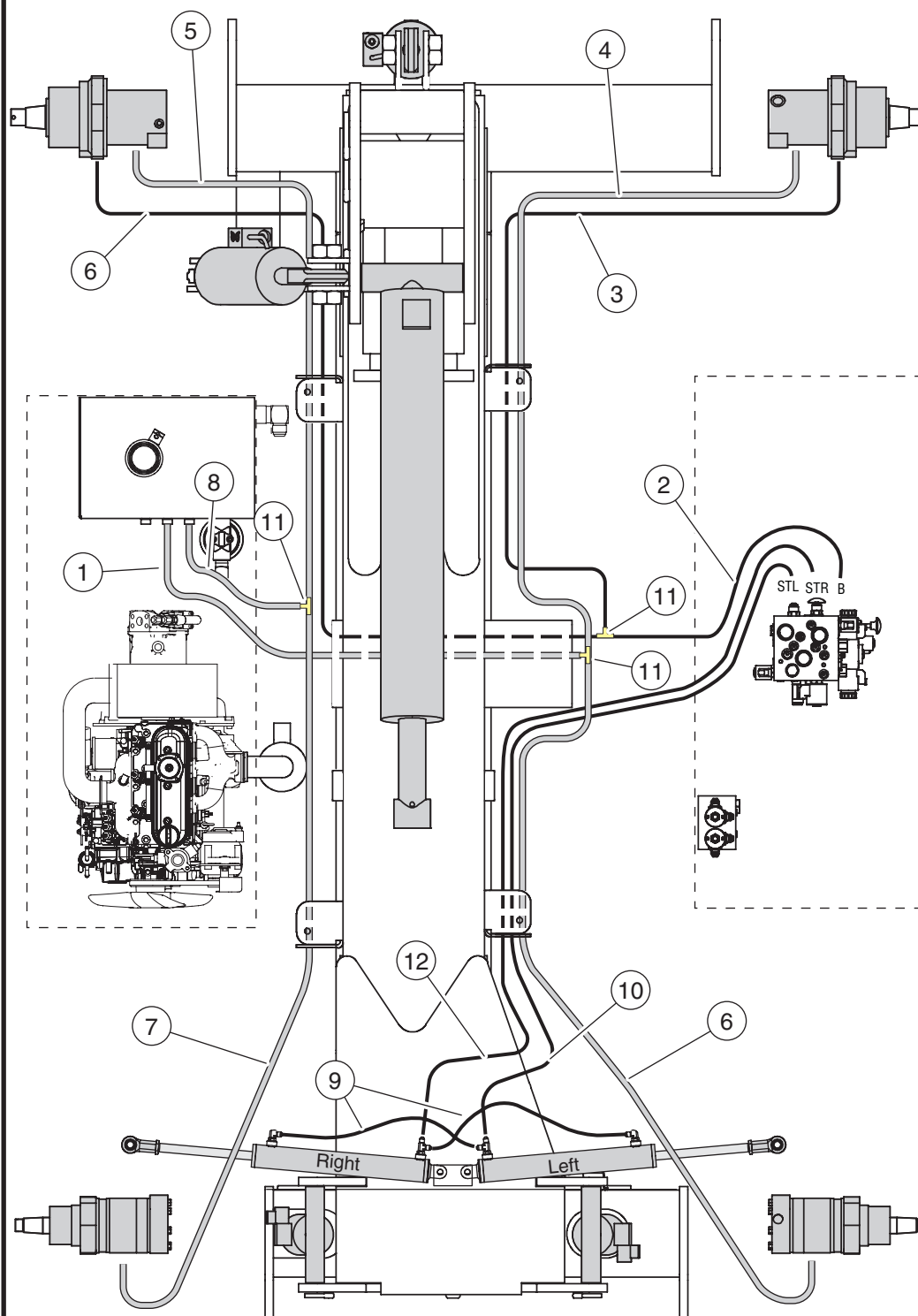
• as req: as required

• INCL: Included with assembly

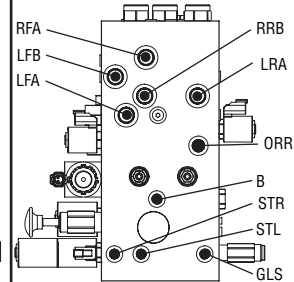
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• REF: Reference only

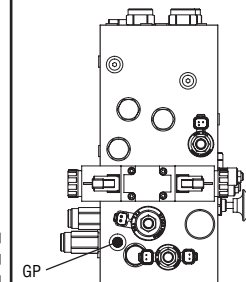
RT MODELS



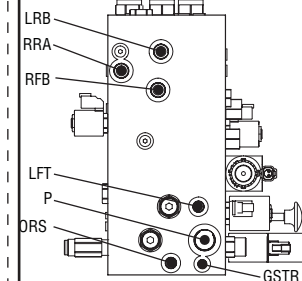
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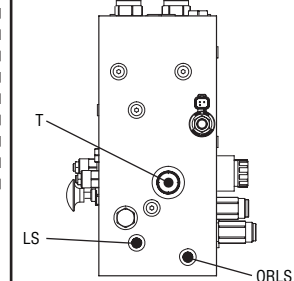
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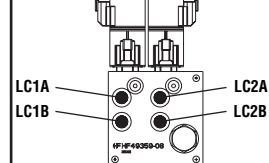
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BACK



FRONT



LEFT



RIGHT



BOTTOM

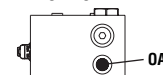


ILLUSTRATION No.
ART_3199

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Steer, Brake, Case Drain

Hydraulic Hose Routing, RT Models: Steer, Brake, Case Drain

ITEM	PART NO.	QTY	DESCRIPTION
1	19340	1	Hose Assy, 1/4" x 65", 4G4FJX-4G4FJX
2	19358	1	Hose Assy, 1/4" x 15", 4G4FJX-4G4FJX90S
3	19359	1	Hose Assy, 1/4" x 86", 4G4FJX-4G4FJX90S
4	19361	1	Hose Assy, 1/4" x 73", 4G4FJX-4G4FJX90S
5	19362	1	Hose Assy, 1/4" x 52", 4G4FJX-4G4FJX90S
6	19363	2	Hose Assy, 1/4" x 89", 4G4FJX-4G4FJX
7	19364	1	Hose Assy, 1/4" x 77", 4G4FJX-4G4FJX
8	19365	1	Hose Assy, 1/4" x 38", 4G4FJX-4G4FJX
9	90316	2	Hose Assy, 1/4" x 21", 4G4FJX-4G4FJX
10	19364	1	Hose, Lt Steer Cyl, 1/4" x 77", 4G4FJX-4G4FJX
11	50927	3	Tee, MJT-04
12	19359	1	Hose, Rt Steer Cyl, 1/4" x 86", 4G4FJX-4G4FJX90S



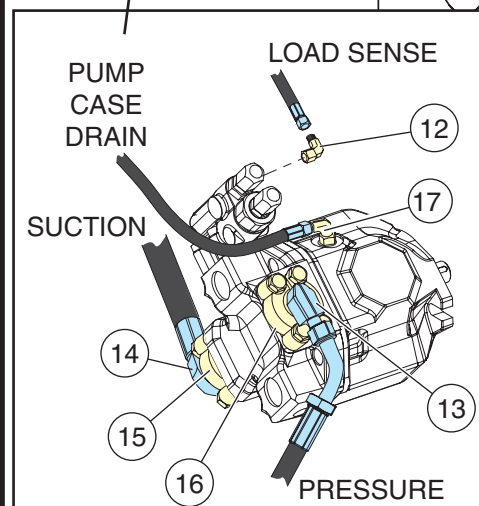
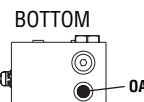
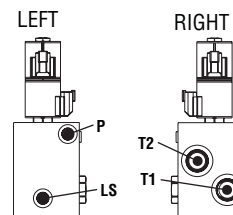
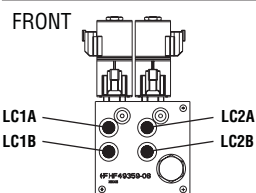
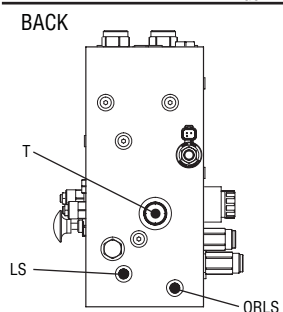
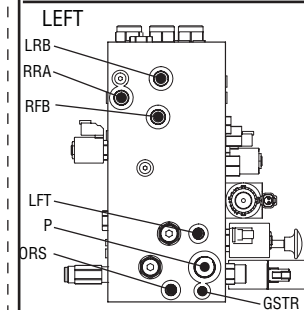
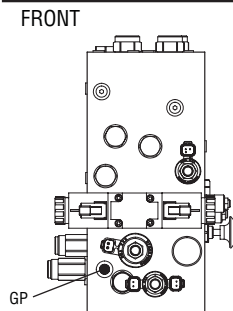
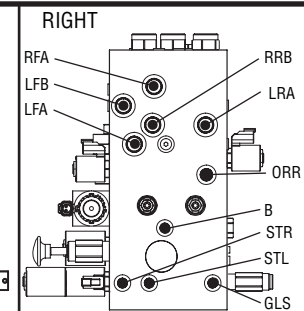
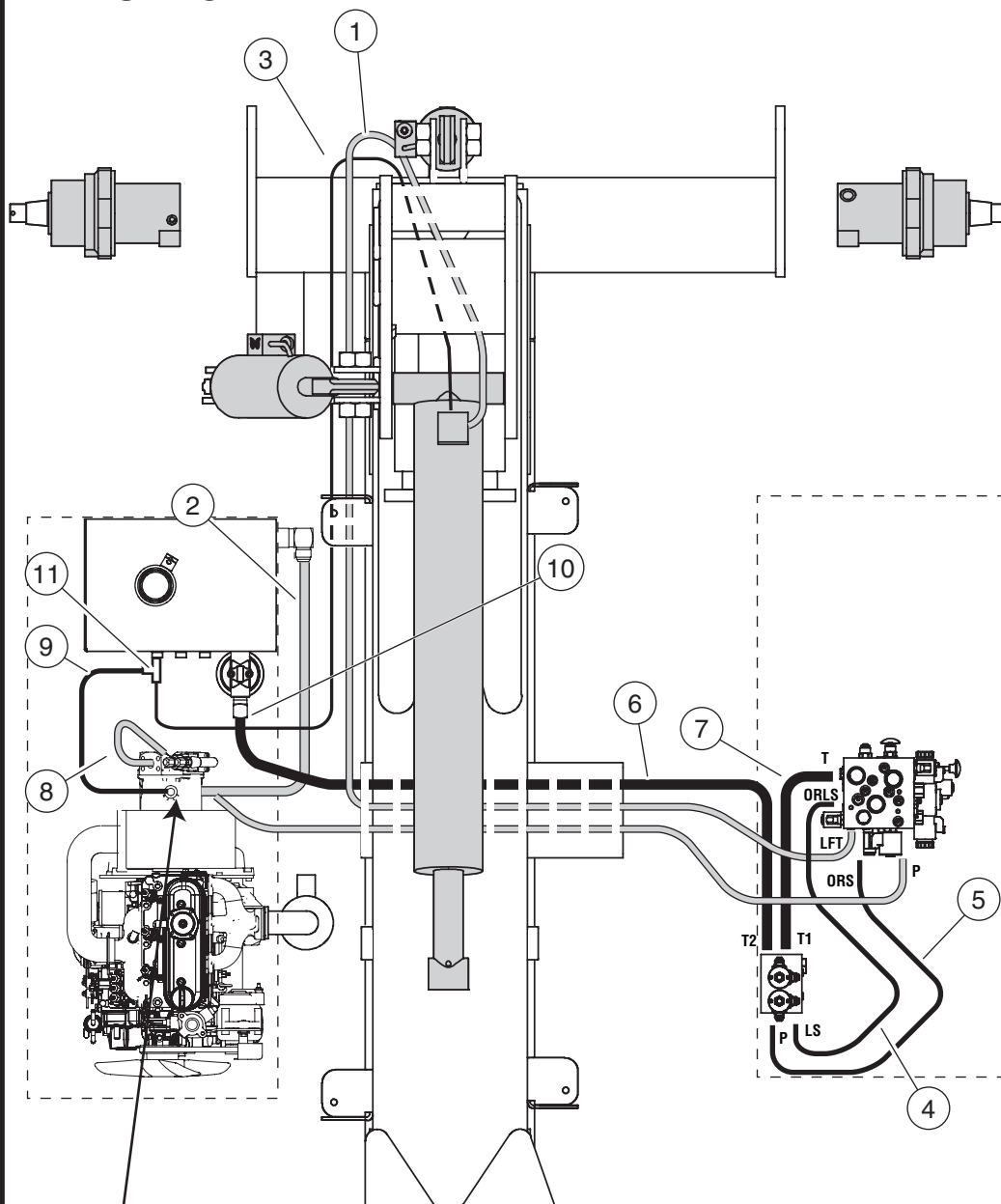
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS



mecc
ILLUSTRATION No.
ART_3200

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Lift and Pump

Hydraulic Hose Routing, RT Models: Lift, Pump

ITEM	PART NO.	QTY	DESCRIPTION
1	19341	1	Hose Assy, 3/8" x 132", 6G6FJX90S-6G6FJX
2	91265	1	Hose Assy, 1" x 22", 16G16FJX-16G16FJX
3	19342	1	Hose Assy, 3/8" x 118", 6G6FJX-6G6FJX
4	19369	1	Hose Assy, 1/4" x 28", 4G4FJX-4G4FJX45
5	19370	1	Hose Assy, 1/4" x 33", 4G4FJX-4G4FJX90S
6	19343	1	Hose Assy, 3/4" x 90", 12G12FJX-12G12FJX90S
7	19347	1	Hose Assy, 3/4" x 21", 12G12FJX-12G12FJX90S
8	91423	1	Hose Assy, 3/4" X 82", 12M3K-12FJX-12FJX45
9	90276	1	Hose Assy, 1/4" X 24", 4G1-4FJX-6FJX-24
10	50916	2	Fitting, MP-MJ 90
11	50892	1	Tee, MJ-FJX-MJT-4
12	50665	1	Fitting, MB-MJ-90-4-4
13	91163	1	Adapter 3/4" Flange, Male 1" JIC 90
14	HDW91176	1	Adapter 1" Flange, Male 1" JIC
15	91161	1	Flange Kit #16
16	91162	1	Flange Kit #12
17	50660	1	Fitting, MB-MJ-90-6-4



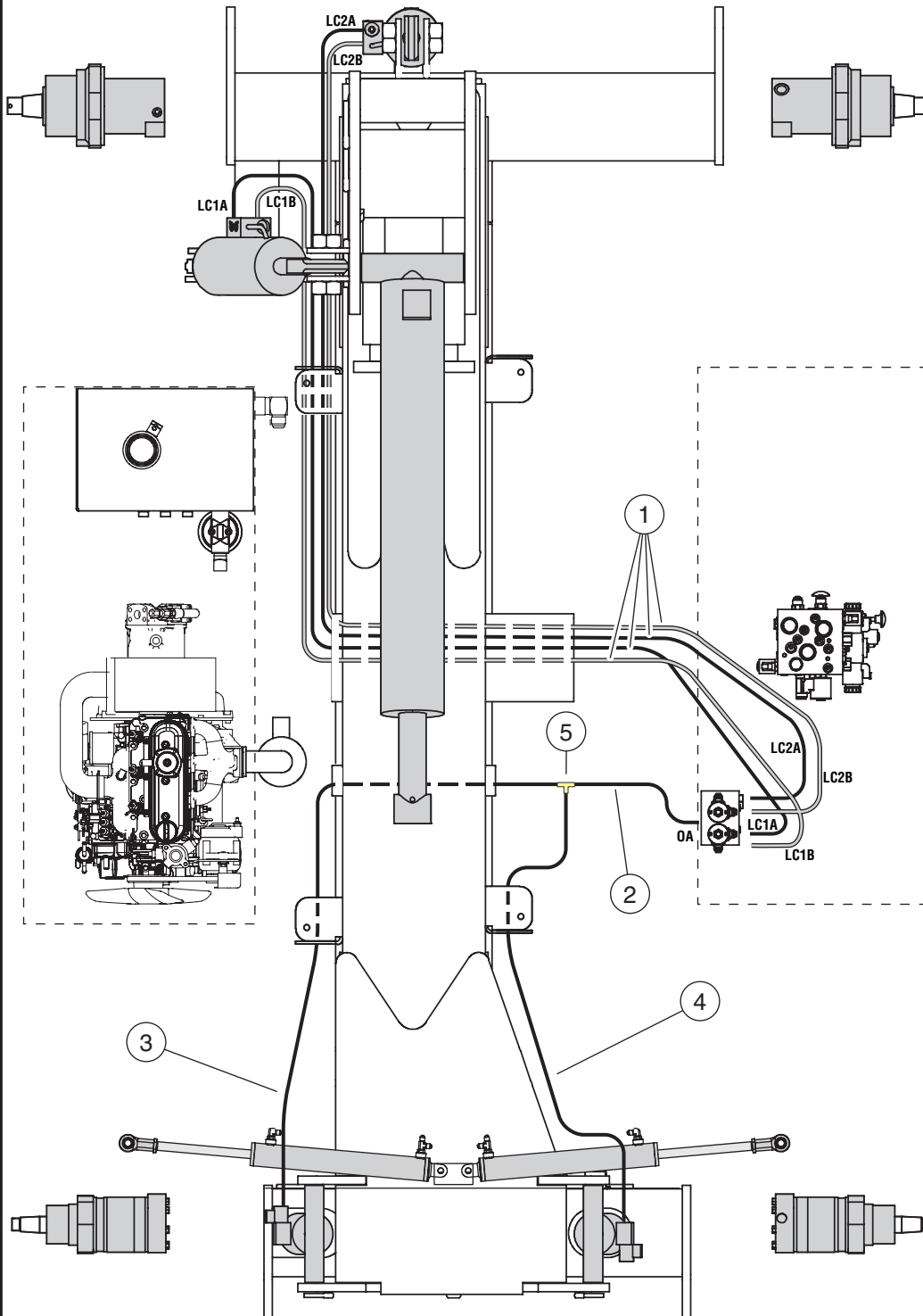
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• INCL: Included with assembly

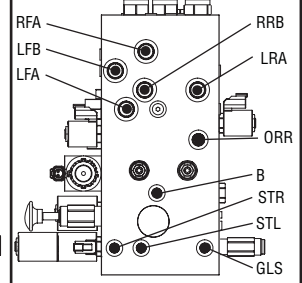
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• REF: Reference only

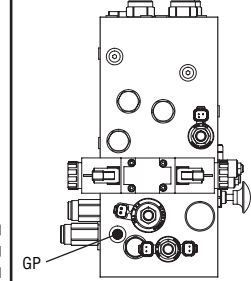
RT MODELS



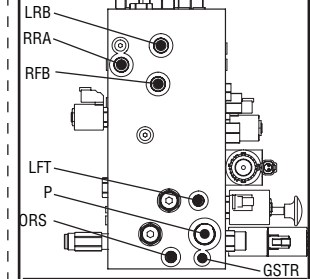
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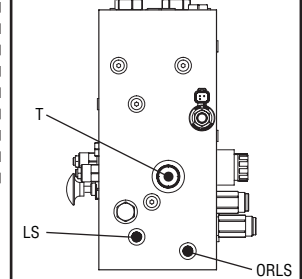
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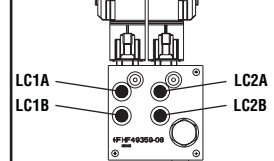
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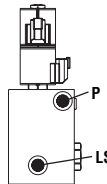
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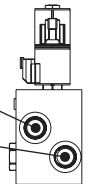
FRONT



LEFT



RIGHT



BOTTOM

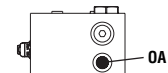


ILLUSTRATION No.
ART_3201

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Level and Axle Float

Hydraulic Hose Routing, RT Models: Platform Level, Axle Float

ITEM	PART NO.	QTY	DESCRIPTION
1	19349	4	Hose Assy, 1/4" x 120", 4G4FJX-4G4FJX
2	90316	1	Hose Assy, 1/4" x 21", 4G4FJX-4G4FJX
3	19361	1	Hose Assy, 1/4" x 73", 4G4FJX-4G4FJX90S
4	19340	1	Hose Assy, 1/4" x 65", 4G4FJX-4G4FJX
5	50927	1	Tee, MJT-4



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS

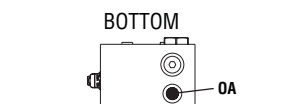
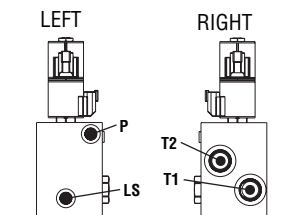
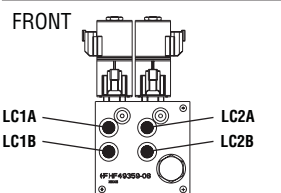
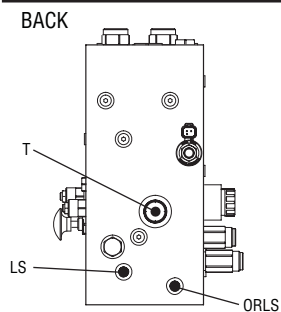
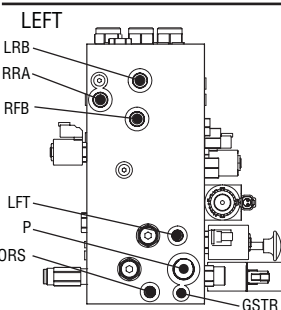
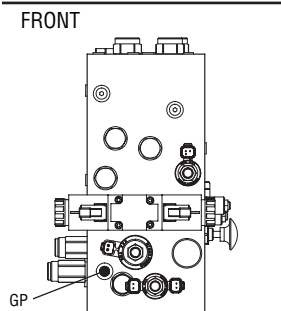
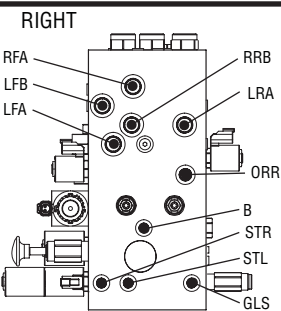
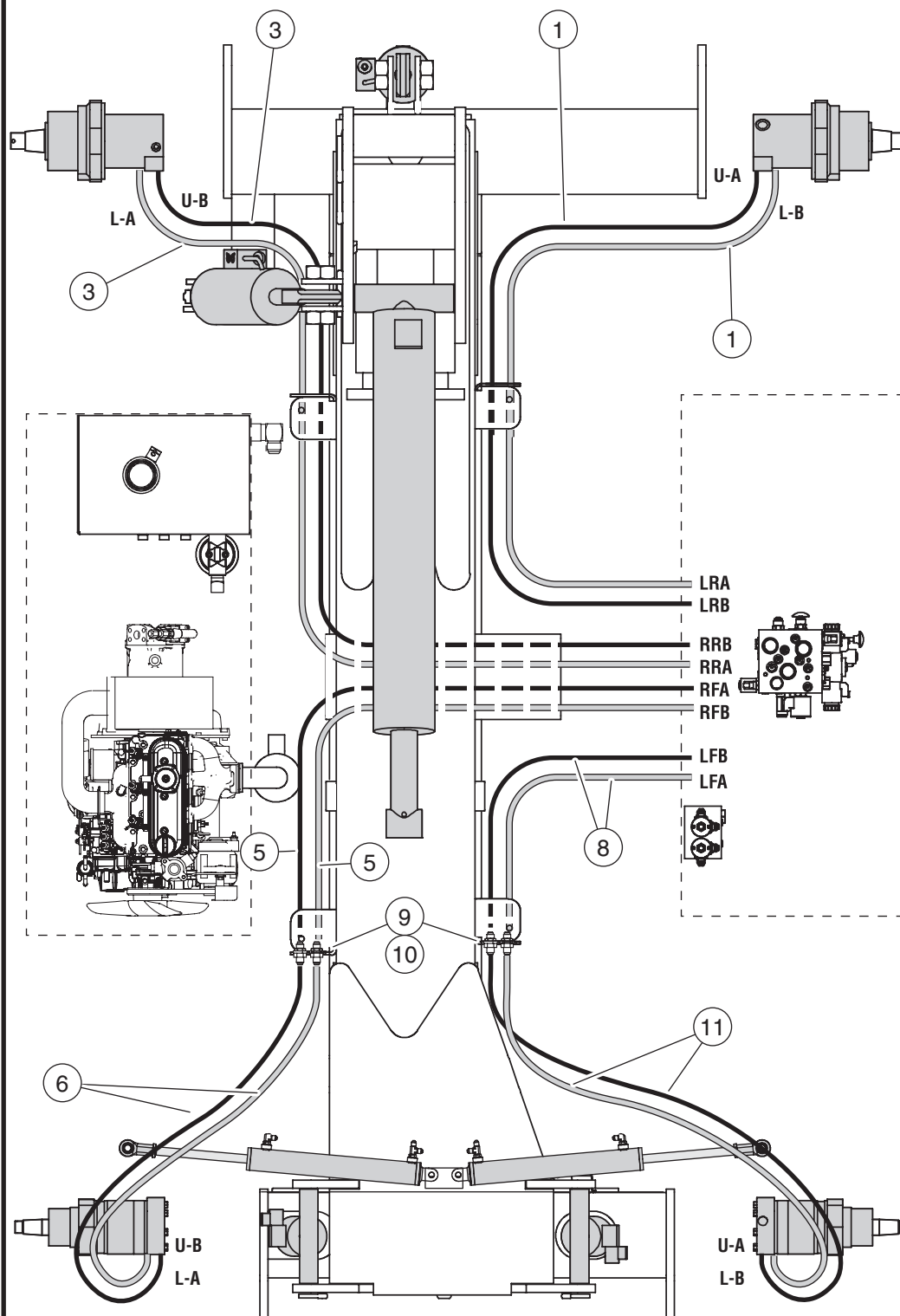


ILLUSTRATION No.
ART_3202

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Drive Motors

Hydraulic Hose Routing, RT Models: Drive Motors

ITEM	PART NO.	QTY	DESCRIPTION
1	19355	2	Hose Assy, 1/2" x 49", 8M3K-8FJX-8FJX45
2	--	--	--
3	19357	2	Hose Assy, 1/2" x 102", 8M3K-8FJX-8FJX45
4	--	--	--
5	19353	2	Hose Assy, 1/2" x 61", 8M3K-8FJX-8FJX
6	19352	2	Hose Assy, 1/2" x 37", 8M3K-8FJX-8FJX90S
7	--	--	--
8	19354	2	Hose Assy, 1/2" x 44", 8M3K-8FJX-8FJX
9	50904	4	Adapter, Male 1/2" JIC-1/2" JIC Bulkhead MJ-MJH-8-8
10	91193	4	Jamnut, 3/4-16
11	19350	2	Hose Assy, 58"



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

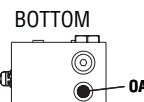
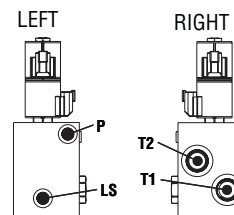
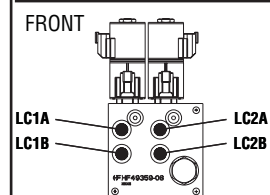
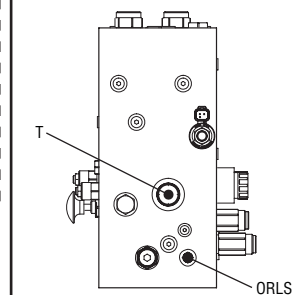
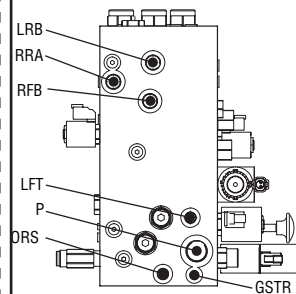
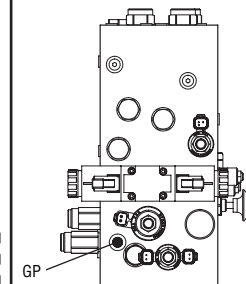
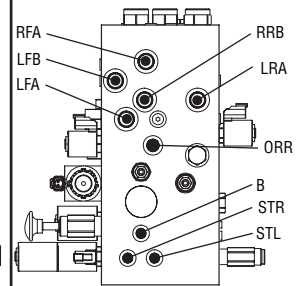
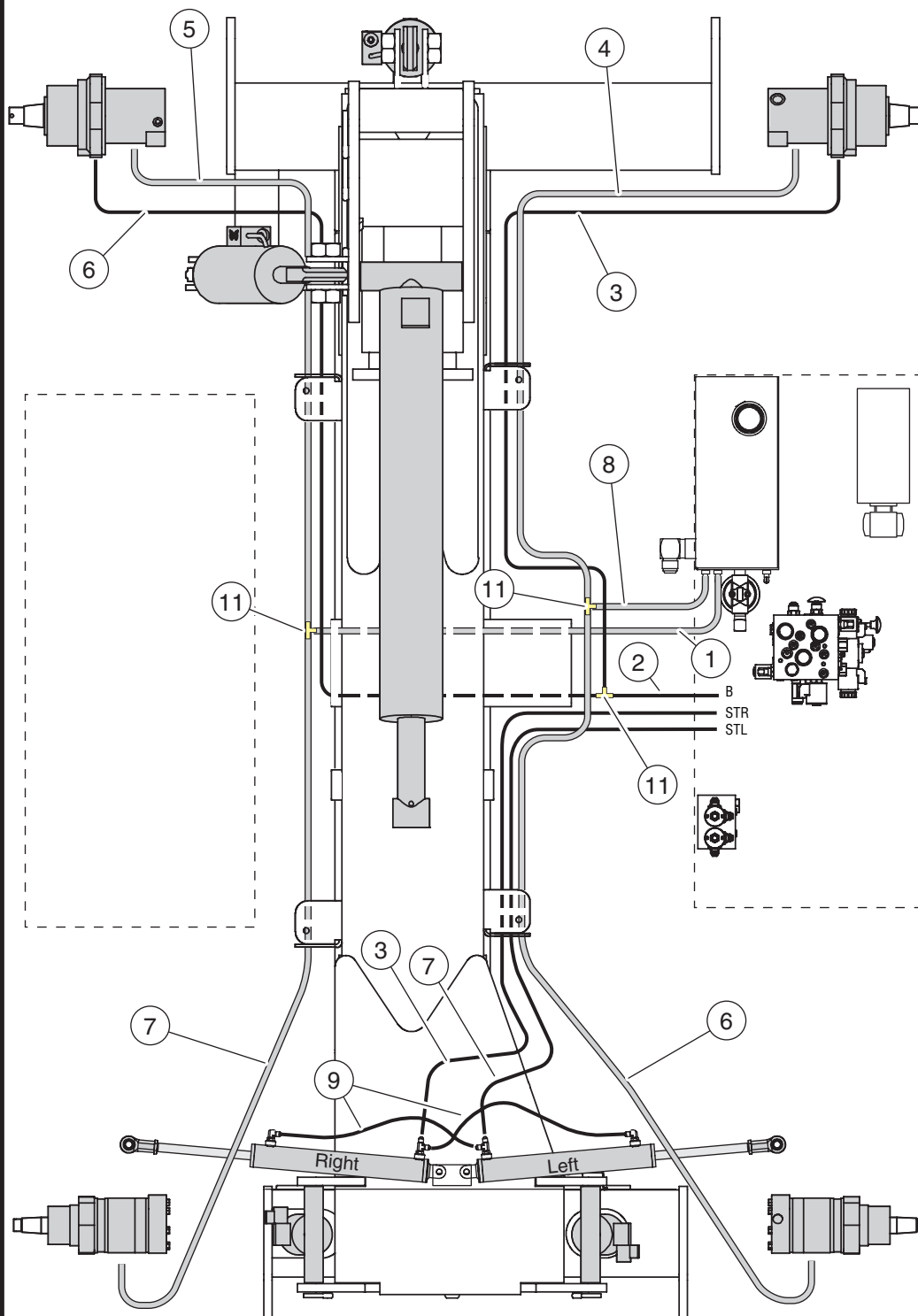


ILLUSTRATION No.
ART_3208

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Steer, Brake, Case Drain

Hydraulic Hose Routing, ES Models: Steer, Brake, Case Drain

ITEM	PART NO.	QTY	DESCRIPTION
1	19340	1	Hose Assy, 1/4" x 65", 4G4FJX-4G4FJX
2	19358	1	Hose Assy, 1/4" x 15", 4G4FJX-4G4FJX90S
3	19359	2	Hose Assy, 1/4" x 86", 4G4FJX-4G4FJX90S
4	19361	1	Hose Assy, 1/4" x 73", 4G4FJX-4G4FJX90S
5	19362	1	Hose Assy, 1/4" x 52", 4G4FJX-4G4FJX90S
6	19363	2	Hose Assy, 1/4" x 89", 4G4FJX-4G4FJX
7	19364	1	Hose Assy, 1/4" x 77", 4G4FJX-4G4FJX
8	19365	1	Hose Assy, 1/4" x 38", 4G4FJX-4G4FJX
9	90316	2	Hose Assy, 1/4" x 21", 4G4FJX-4G4FJX
10	--	--	--
11	50927	3	Tee, MJT-04



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

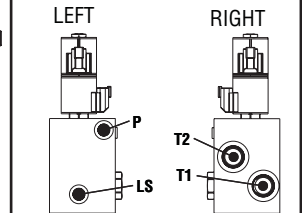
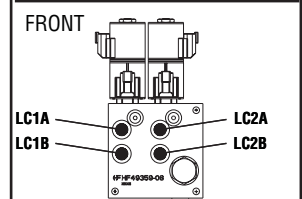
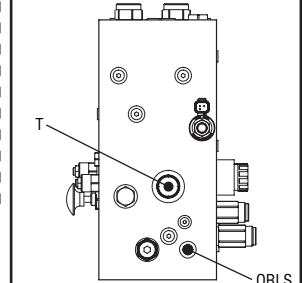
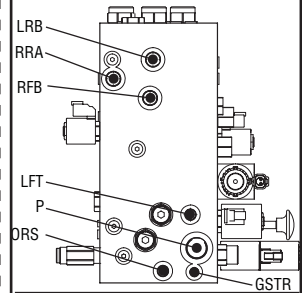
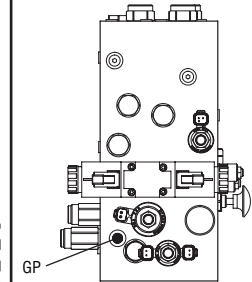
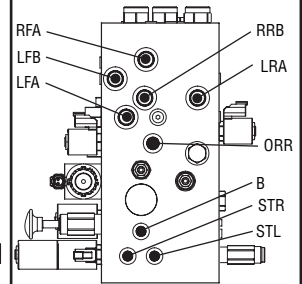
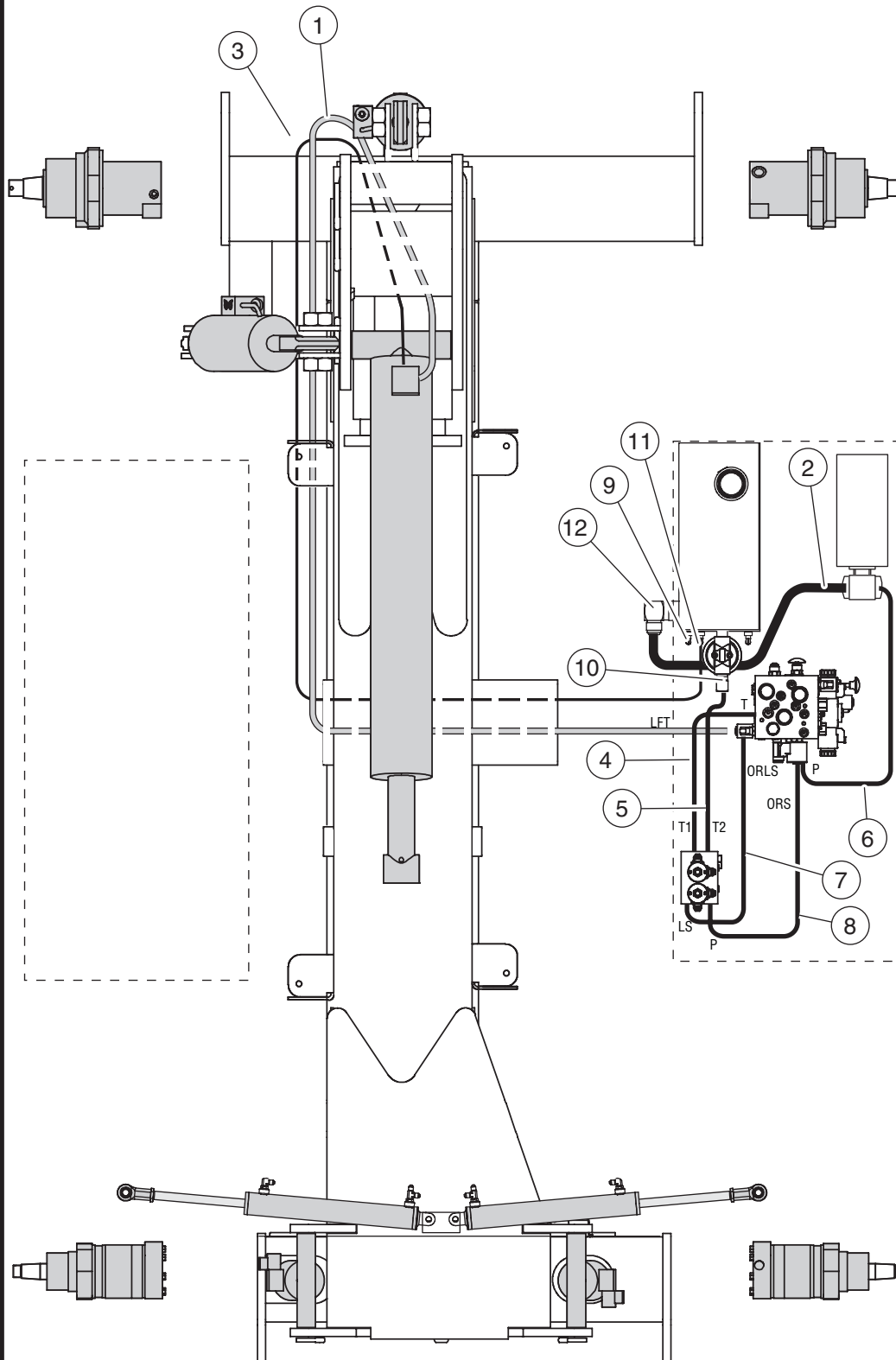


ILLUSTRATION No.
ART_3200

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Lift and Pump

Hydraulic Hose Routing, ES Models: Lift, Pump

ITEM	PART NO.	QTY	DESCRIPTION
1	19341	1	Hose Assy, 3/8" x 132", 6G6FJ90X - 6G6FJX
2	91698	1	Hose Assy, 3/4" x 35", 12G12FJX - 12G12FJX
3	91909	1	Hose Assy, 3/8" x 150", 6G6FJX - 6G6FJX
4	91879	1	Hose Assy, 3/4" x 16", 12G12FJX - 12G12FJX
5	19347	1	Hose Assy, 3/4" x 21", 12G12FJX - 12G12FJX90S
6	90315	1	Hose Assy, 1/2" x 21", 8G8FJX - 8G8FJX90S
7	19369	1	Hose Assy, 1/4" x 28", 4G4FJX - 4G4FJX45
8	19370	1	Hose Assy, 1/4" x 33", 4G4FJX - 4G4FJX90S
9	50665	2	Fitting, 90°, MB - MJ90 - 04 - 04
10	50906	1	Fitting, MJ - MP - 12 - 12
11	50892	1	Tee, MJFJX - MJT - 4
12	50907	1	Fitting, MJ - MP - 12 - 20



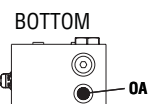
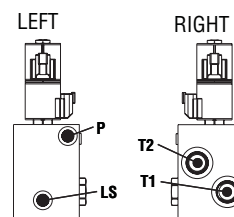
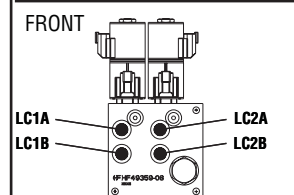
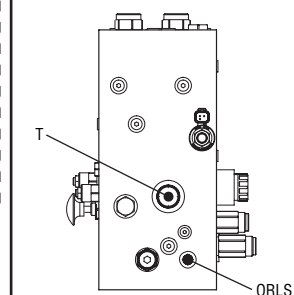
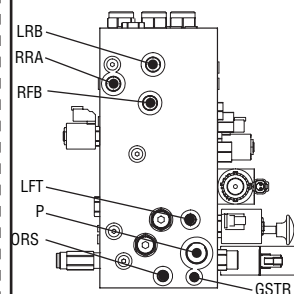
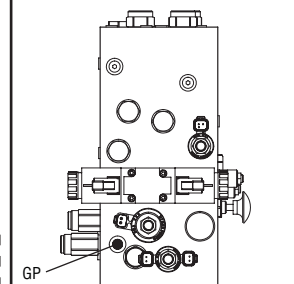
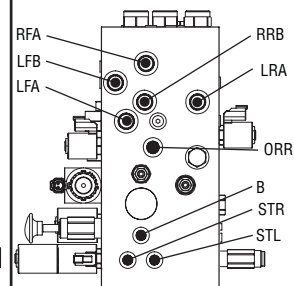
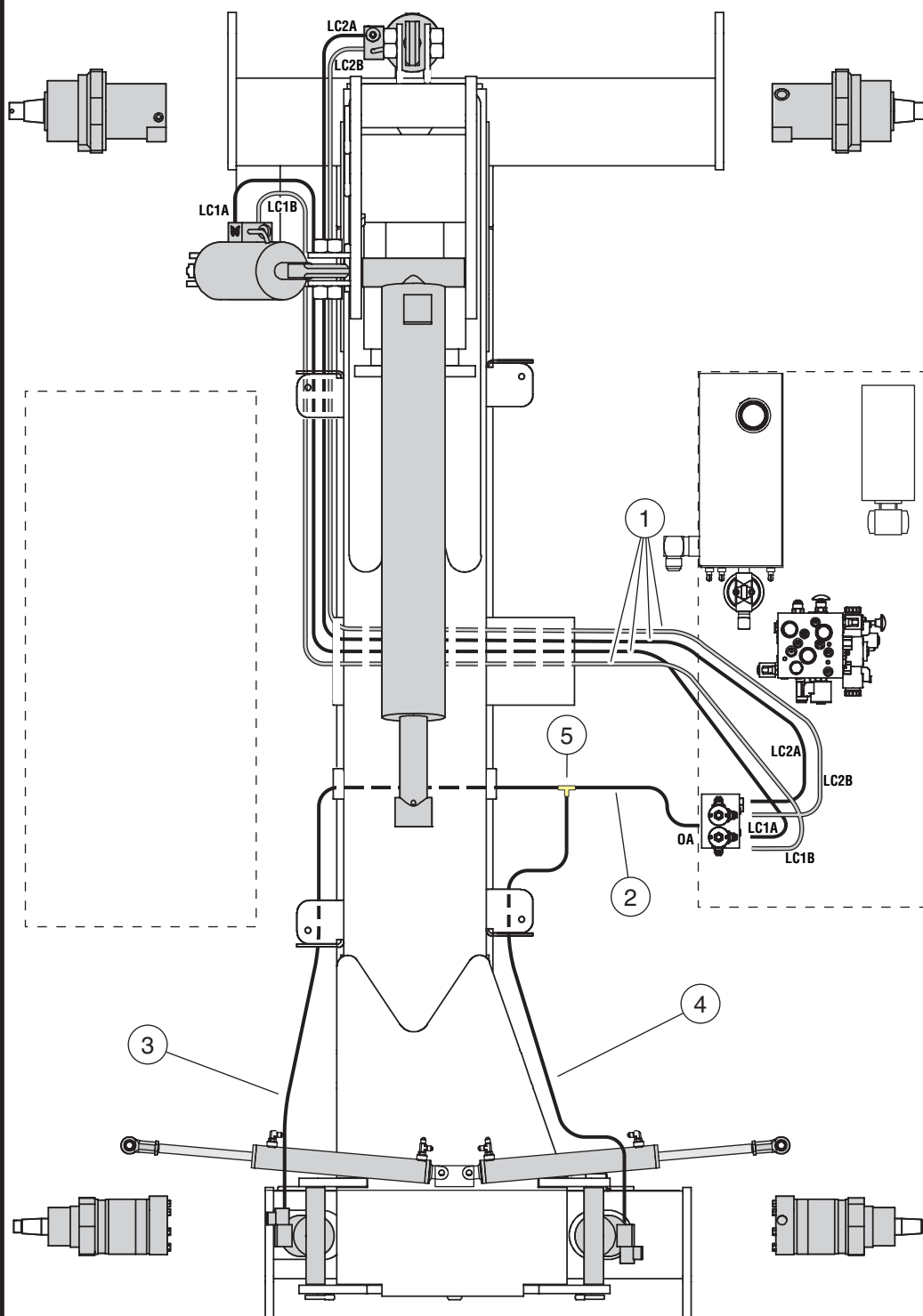
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS



Hydraulic Hose Routing, ES Models: Platform Level, Axle Float

ITEM	PART NO.	QTY	DESCRIPTION
1	19349	4	Hose Assy, 1/4" x 120", 4G4FJX-4G4FJX
2	90316	1	Hose Assy, 1/4" x 21", 4G4FJX-4G4FJX
3	19361	1	Hose Assy, 1/4" x 73", 4G4FJX-4G4FJX90S
4	19340	1	Hose Assy, 1/4" x 65", 4G4FJX-4G4FJX
5	50927	1	Tee, MJT-4



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

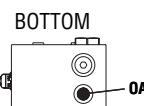
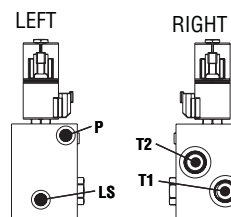
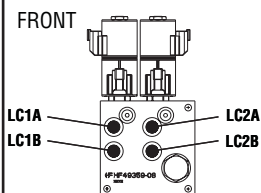
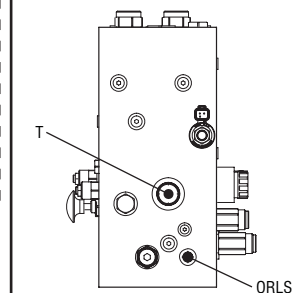
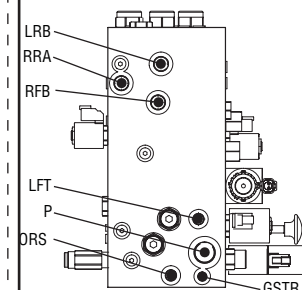
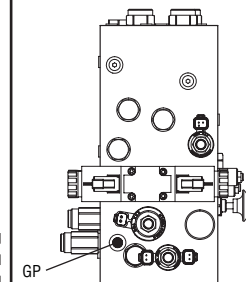
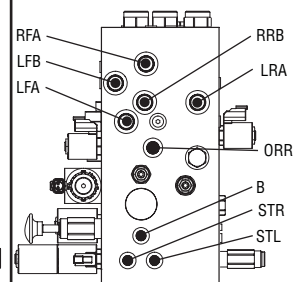
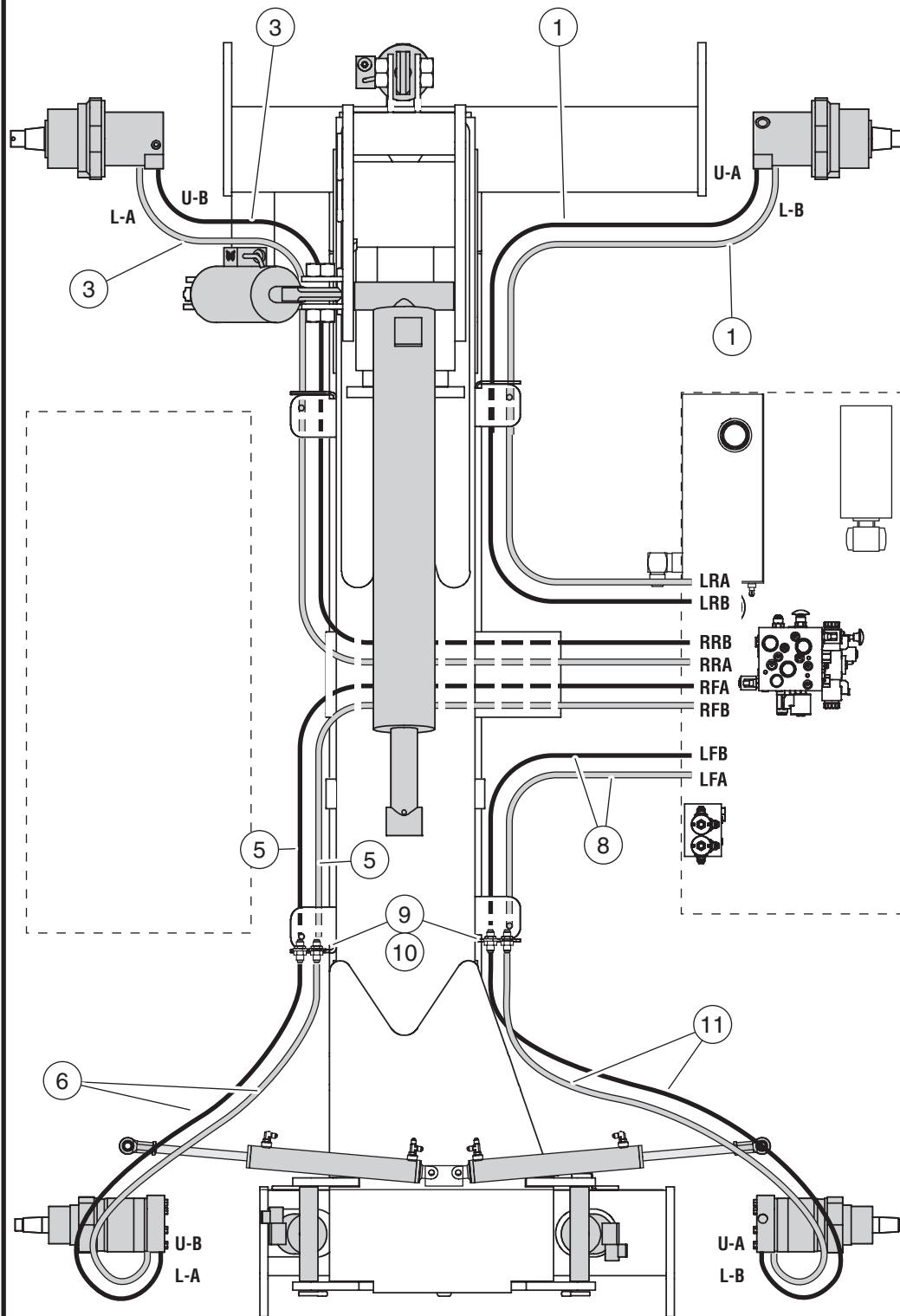


ILLUSTRATION No.
ART_3211

Speed Level™ Sigma Lift

Hydraulic Hose Routing: Drive Motors

Hydraulic Hose Routing, ES Models: Drive Motors

ITEM	PART NO.	QTY	DESCRIPTION
1	19355	2	Hose Assy, 1/2" x 49", 8M3K-8FJX-8FJX45
2	--	--	--
3	19357	2	Hose Assy, 1/2" x 102", 8M3K-8FJX-8FJX45
4	--	--	--
5	19353	2	Hose Assy, 1/2" x 61", 8M3K-8FJX-8FJX
6	19352	2	Hose Assy, 1/2" x 37", 8M3K-8FJX-8FJX90S
7	--	--	--
8	19354	2	Hose Assy, 1/2" x 44", 8M3K-8FJX-8FJX
9	50904	4	Adapter, Male 1/2" JIC-1/2" JIC Bulkhead MJ-MJH-8-8
10	91193	4	Jamnut, 3/4-16
11	19350	2	Hose Assy, 58"



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

Lift Cylinder

ITEM	PART NO.	QTY	DESCRIPTION
1	19084	1	Lift Cylinder
–	92077	--	Seal Kit
2	6669	4	Bearing
3	50776	2	Fitting, MB-MJ-6-6
4	50890	1	Fitting, MJ-FJX-90-6-6
5	91732	1	Orifice
6	91464	1	Valve, 2-Way, NC
	91141	1	Coil, 12V
7	90845	1	Pressure Sensor (CE only)



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

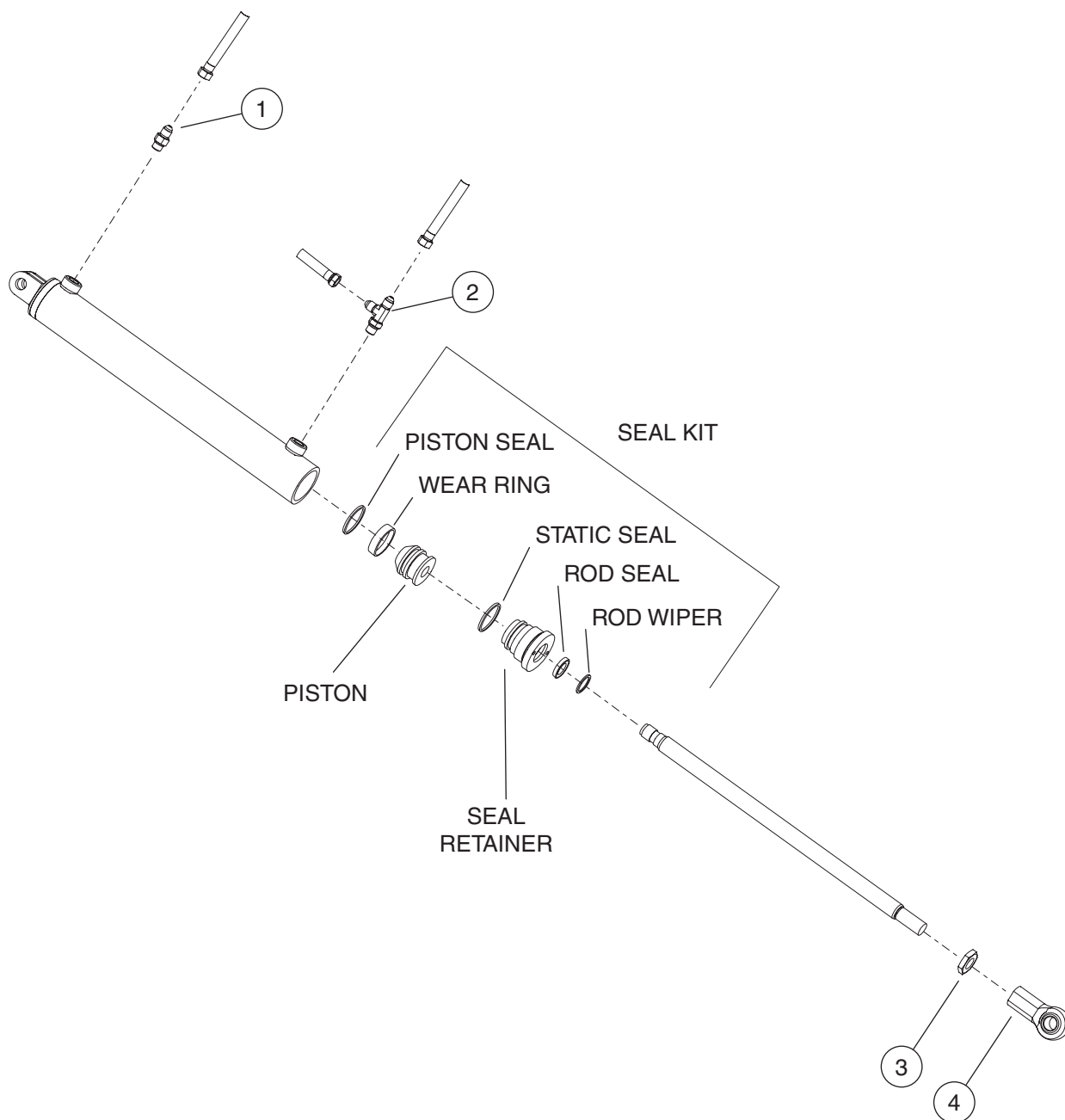


ILLUSTRATION No.
ART_2713

91019 Steering Cylinder

X72 Steering Cylinder

Steering Cylinder

ITEM	PART NO.	QTY	DESCRIPTION
–	91019	2	Steering Cylinder
–	90990	--	Seal Kit (Service)
1	50769	1	Adapter Male ¼" O-Ring-Male ¼" JIC
2	50962	1	Tee, MJ-MB-MJT-4
3	HDW5925	1	Jamnut 5/8-18
4	7293	1	Rod End
5	50665	2	Fitting, 90, MJ-FJX90-4-4



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

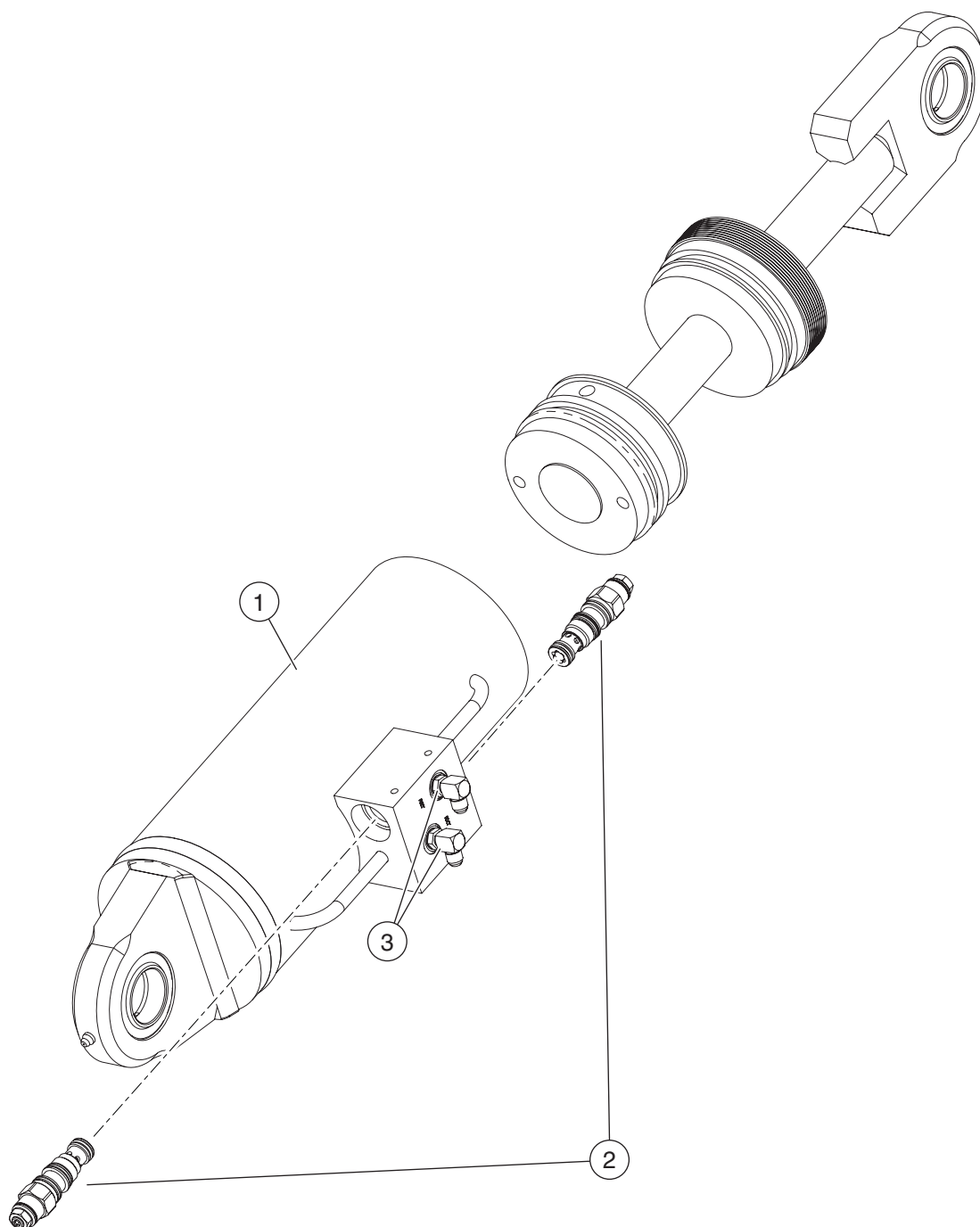


ILLUSTRATION No.
ART_3219

Sigma Level

Level Cylinder

Level Cylinder

ITEM	PART NO.	QTY	DESCRIPTION
1	19081	2	Level Cylinder
–	92078	--	Seal Kit (Service)
2	92125	4	Counterbalance Valve
3	50665	4	Fitting, MB-MJ90-4-4



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

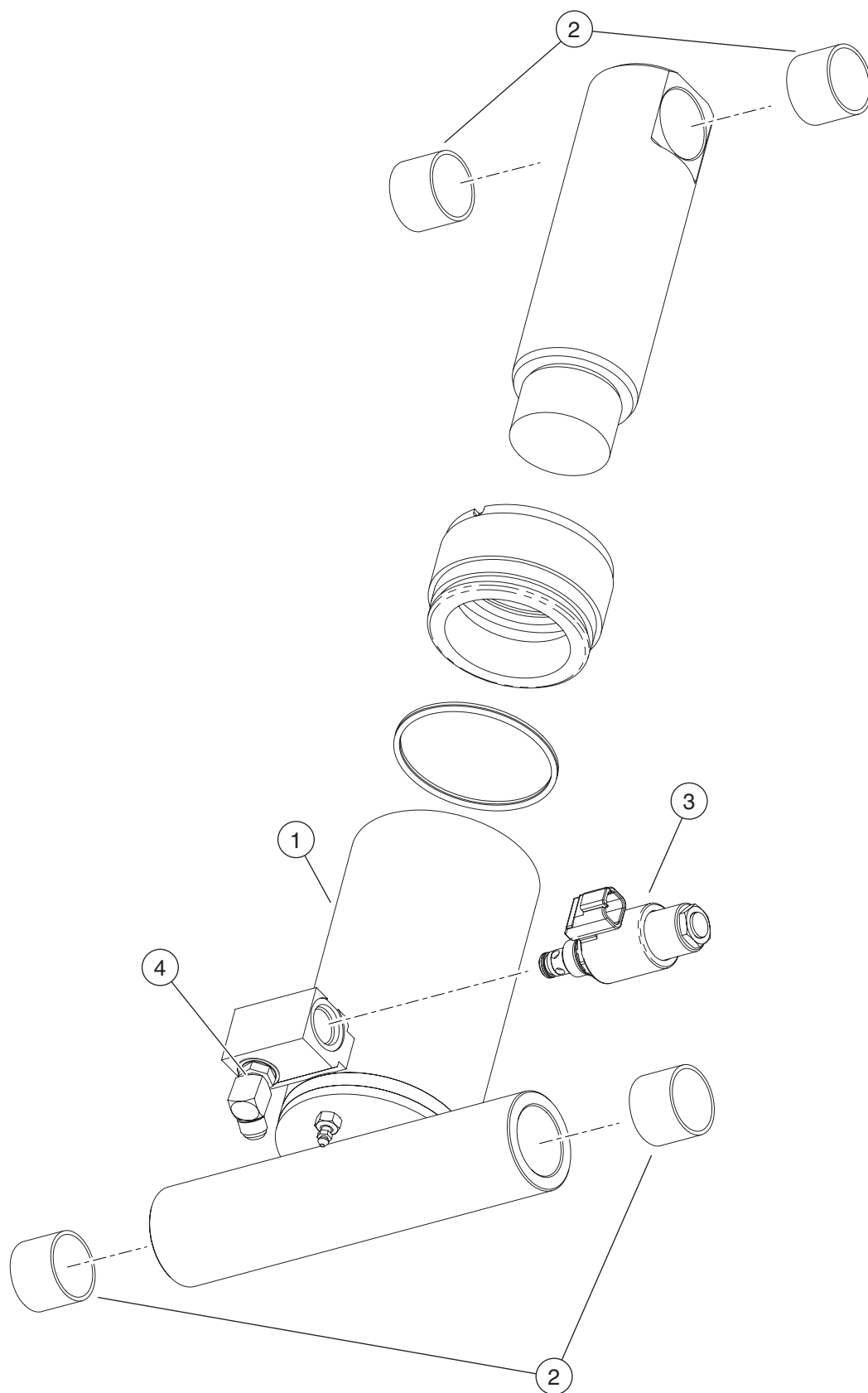


ILLUSTRATION No.
ART_3220

Sigma Level

Axle Lock Cylinder

Axle Lock Cylinder

ITEM	PART NO.	QTY	DESCRIPTION
1	19087	2	Axle Lock Cylinder
–	92079	--	Seal Kit (Service)
2	7896	4	Bearing
3	92192	1	Valve
4	50665	2	Fitting, MB-MJ90-4-4



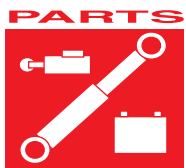
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

NOTES:



SECTION F

BASE

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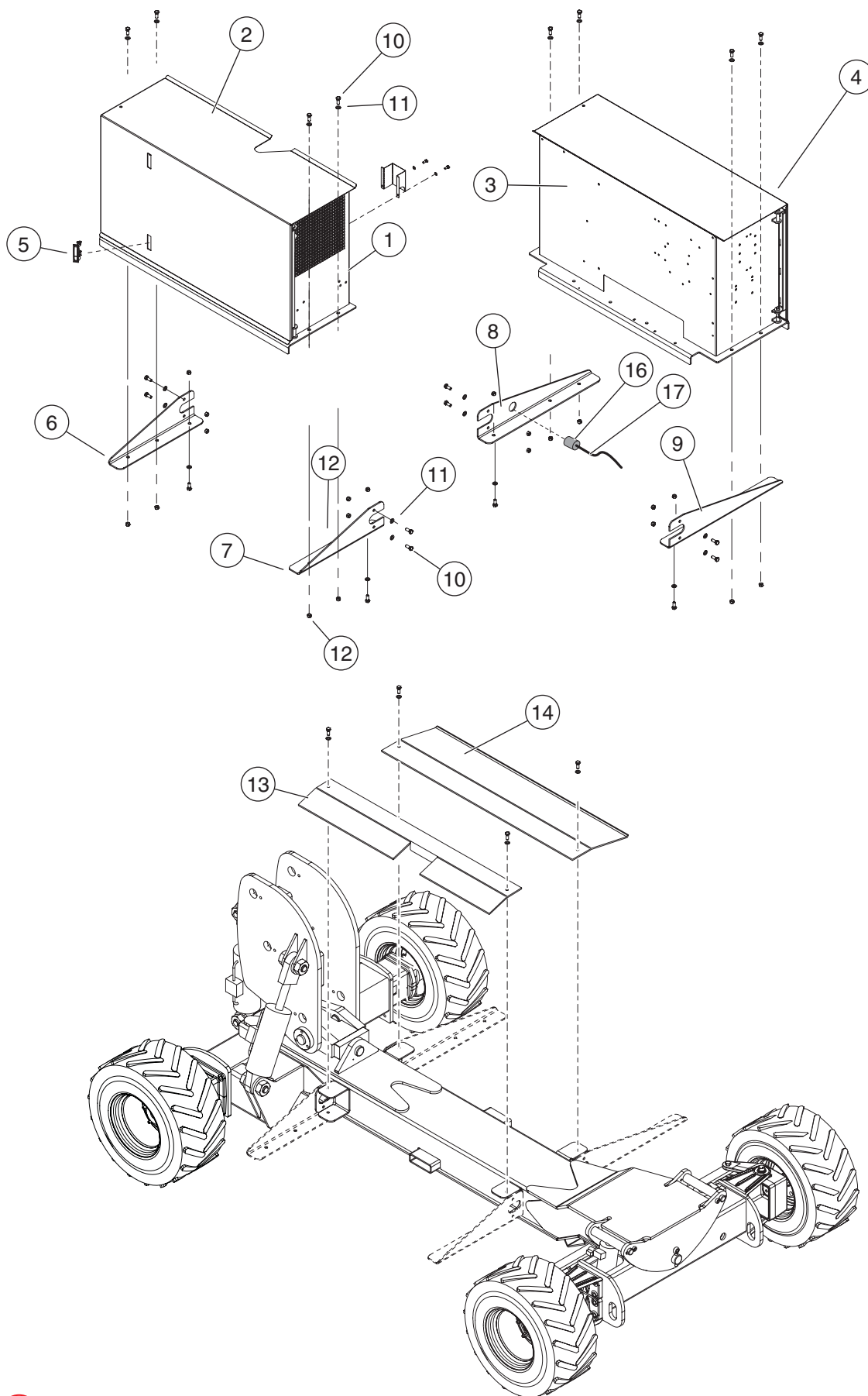


ILLUSTRATION No.
ART_3121

Speed Level™ Sigma Lift

Module Installation

Module Installation

ITEM	PART NO.	QTY	DESCRIPTION
1	16978	1	Power Module Weldment, ES
	16213	1	Power Module Weldment, RT
2	16984	1	Power Module Door, ES
	16220	1	Power Module Door, RT
3	16989	1	Control Module, ES
	16153	1	Control Module, RT
4	16985	1	Control Module Door, ES
	16156	1	Control Module Door, RT
5	8386	4	Door Latch Trigger
6	19106	1	Module Bracket, Right Front
7	19105	1	Module Bracket, Right Rear
8	19104	1	Module Bracket, Left Rear
9	19103	1	Module Bracket, Left Front
10	50039	24	Bolt, M12 x 30
11	50003	24	Washer, M12
12	50050	24	Nut, M12 Nylock
13	19155	1	Hose Cover, Right Side
14	19154	1	Hose Cover, Left Side
15	19159	1	RT Models -- Exhaust Cover
16	90749	1	Plug, Marincos 15 amp
17	REF	--	Cable, Power To Platform, 14G -- See "Wire Harness" pages at the end of Section F



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

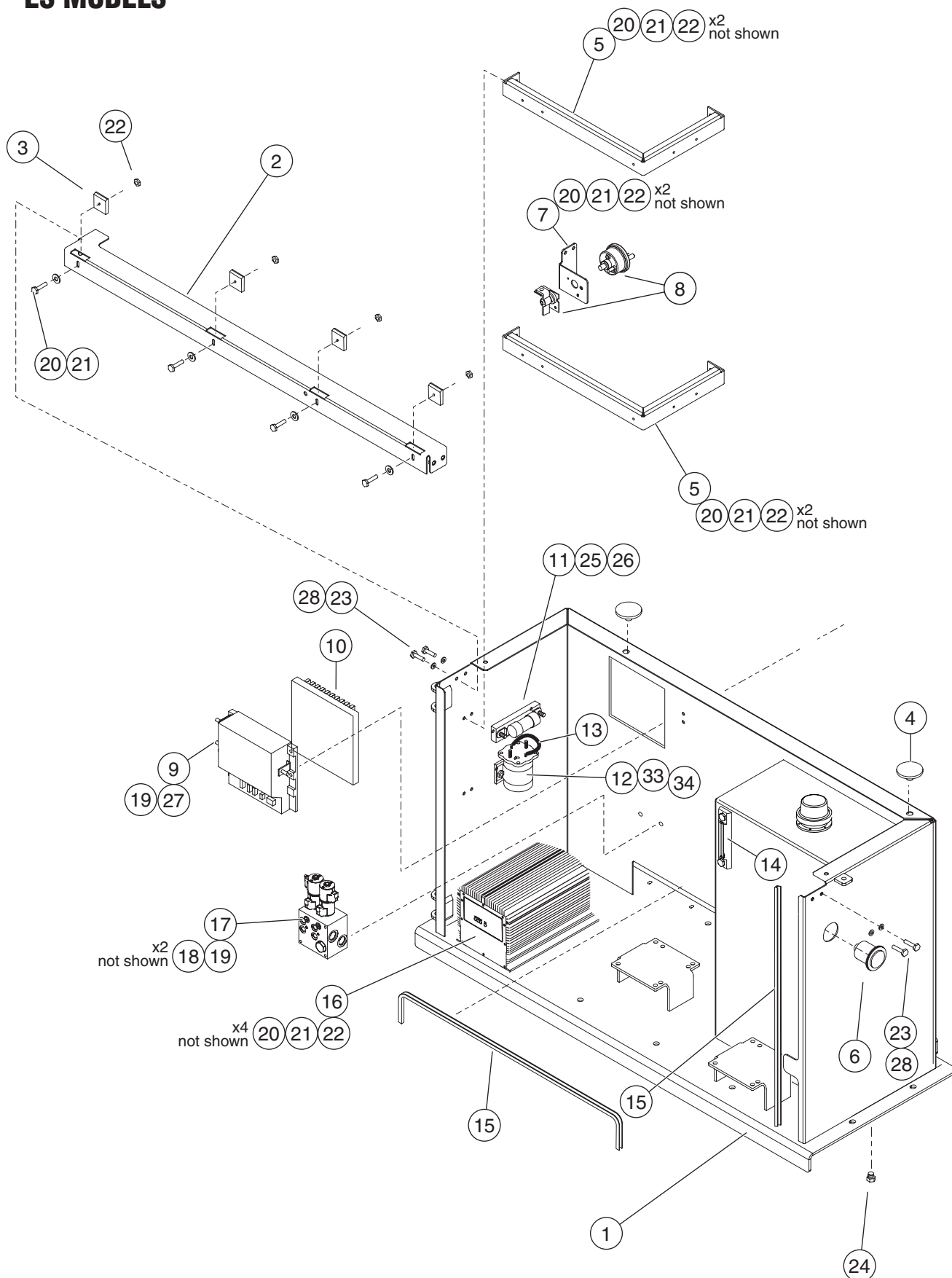


ILLUSTRATION No.
ART_3122

Speed Level™ Sigma Lift

Control Module, Drawing 1 of 2

Control Module – ES, Drawing 1 of 2

ITEM	PART NO.	QTY	DESCRIPTION
1	REF	–	Control Module Weldment -- See "Module Installation" on Page F-3.
2	16154	1	Bracket, Cross Support
3	14896	4	Block, Slide, Door
4	25429	2	Pad
5	16226	2	Bracket, Control Box
6	90749	1	Plug, Battery Charger Connection
7	16229	1	Bracket, Battery Disconnect
8	8841	1	Switch, Battery Disconnect
9	91658	1	Motor Controller
10	19276	1	Heat Sink
11	91709	1	Fuse, 300 AMP
12	91745	1	Contact, Solenoid 48V, 12V Coil
13	8368	1	Diode
14	9370	1	Fluid Level Gauge
15	6121	5 ft	Trim Lock
16	91633	1	Battery Charger
17	93093	1	Manifold, Leveling -- See Section E - Hydraulics
18	50237	3	Screw, Hex M8 x 100
19	50048	6	Nut, M8 Nylock
20	50028	14	Screw, Hex, M6 x 20
21	50068	15	Washer, M6 Fender
22	50047	14	Nut, M6 Nylock
23	50150	4	Screw, 5/16–18 x ¾, GR5
24	HDW9200	1	Plug, ¼ NPT
25	HDW7778	2	Screw, FPH MS 1/4-20 x 12
26	HDW8267	2	Nut, Top Lk 1/4-20 Gr C
27	50282	2	Screw, Hex, M8 x 35
28	50061	4	Washer, 5/16 Flat

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



ES MODELS

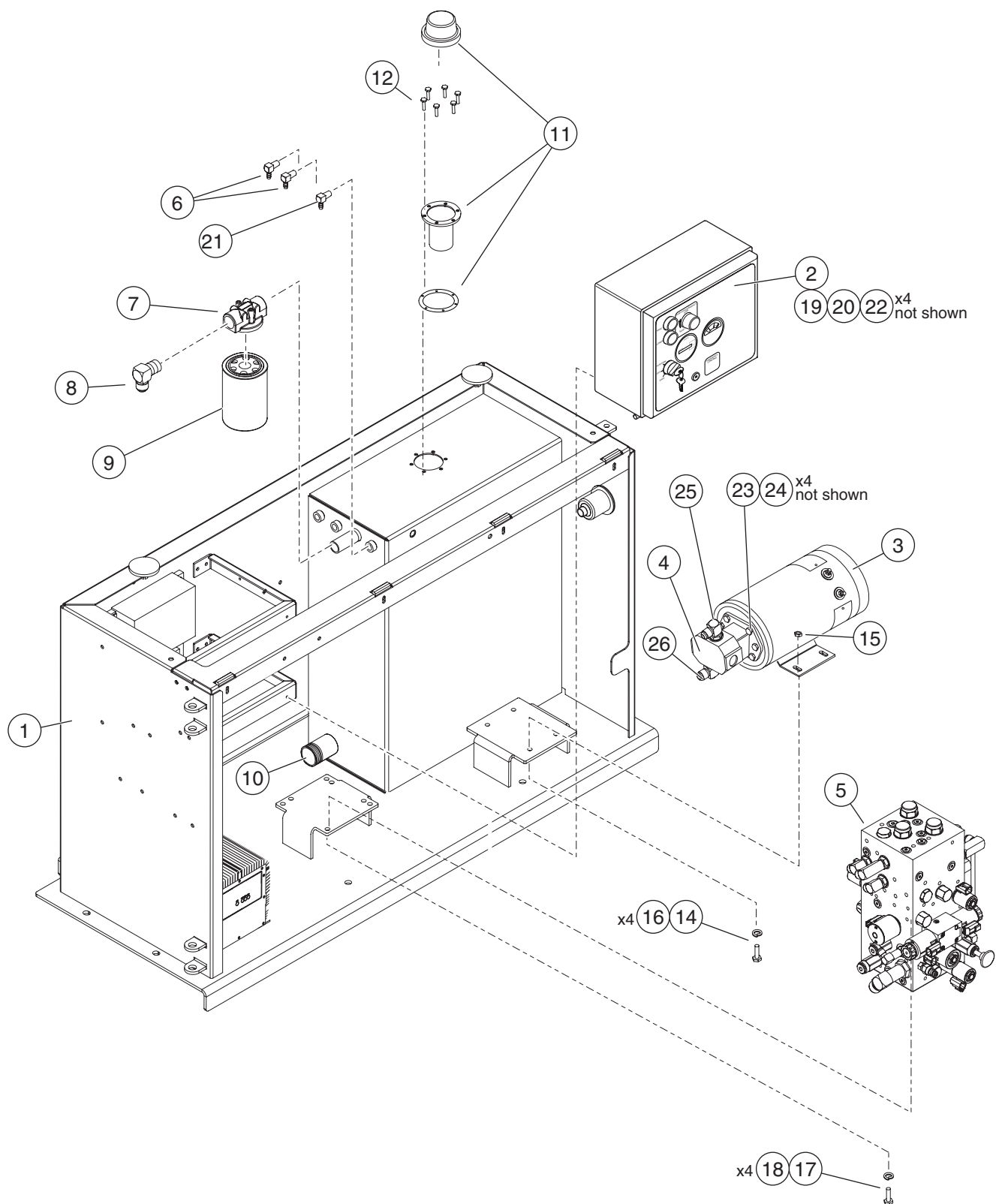


ILLUSTRATION No.
ART_3123

Speed Level™ Sigma Lift

Control Module, Drawing 2 of 2

Control Module – ES, Drawing 1 of 2

ITEM	PART NO.	QTY	DESCRIPTION
1	REF	–	Control Module Weldment
2	83077	1	Control Box -- See Section A - Controls
3	91640	1	Electric Motor
4	91673	1	Pump, 10CC
5	83072	1	Hydraulic Manifold -- See Section E - Hydraulics
6	HDW6727	2	Fitting, MP-MJ-4-4 90
7	6714	1	Filter Head
8	50916	1	Elbow, 90° ¾ NPT – ¾ JIC
9	6156	1	Filter Cartridge
10	50650	1	Nipple, MJ-MP-12-20
11	9367	1	Filler/Strainer
12	50143	6	Bolt, 32 x 1.57
13	--	--	--
14	50031	4	Screw, Hex, M8 x 25
15	50048	4	Nut, M8 Nylock
16	5000	4	Washer, M8
17	50147	4	Screw, 3/8 x 1
18	HDW7783	4	Lock Washer, 3/8
19	50214	4	Screw, M6 x 30
20	50047	4	Nut, M6 Nylock
21	50919	1	Fitting, MP-MJ-4-6 90
22	50068	4	Washer, M6 Fender
23	50188	4	Screw, Hex Fine Thread 3/8-24 x 1.5
24	50062	4	Washer, 3/8
25	50762	1	Fitting, MB-MJ-10-8 90
26	50763	1	Fitting, MB-MJ-12-12 90



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS

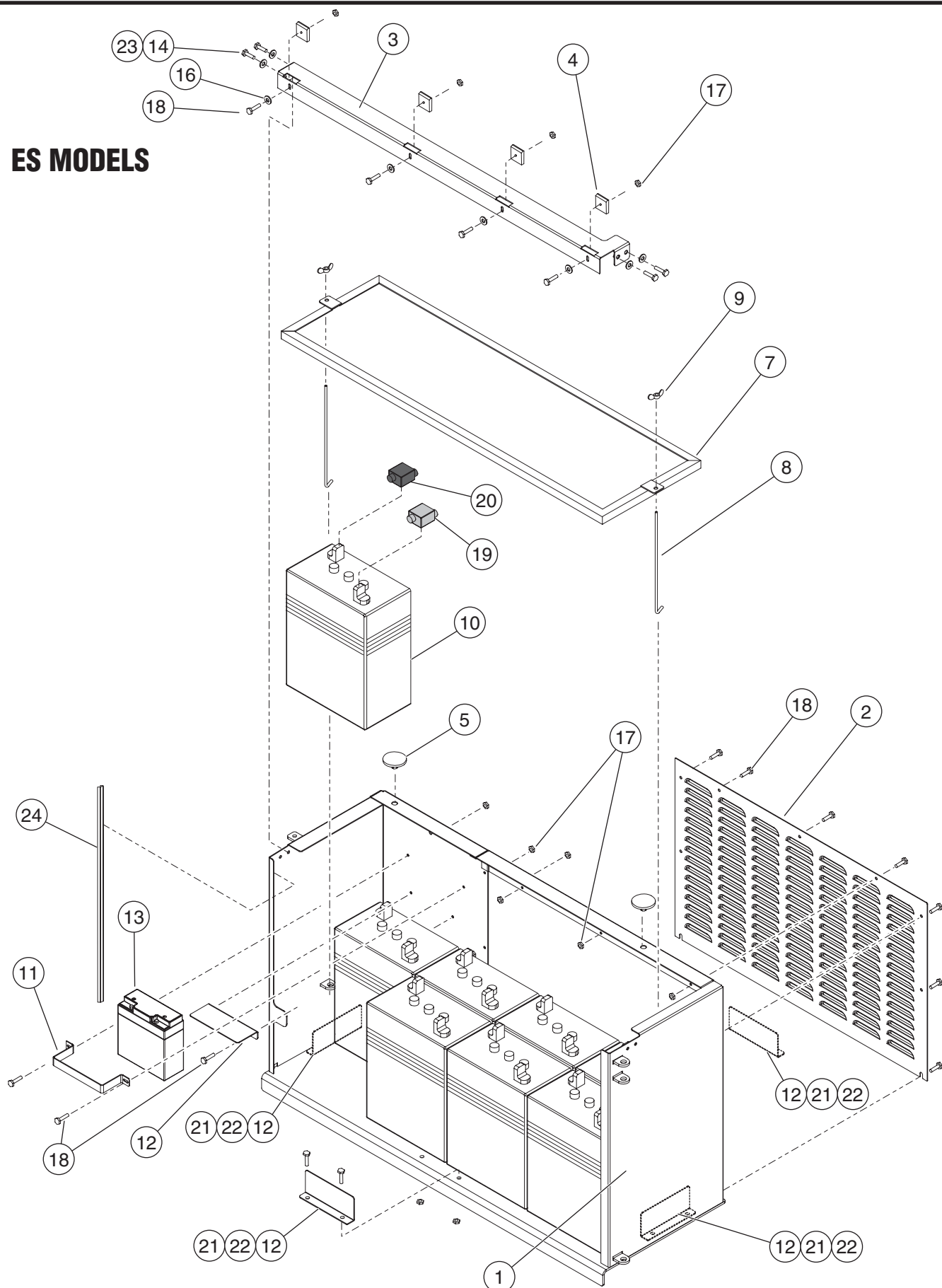


ILLUSTRATION No.
ART_2719

3072ES - 3772ES - Sigma Level, ES

Power Module

Power Module – ES

ITEM	PART NO.	QTY	DESCRIPTION
1	REF	–	Weldment, Battery Module -- See "Module Installation" on Page F-3.
2	16974	1	Panel, Battery Module
3	16977	1	Crossbar, Battery Module
4	14896	4	Block, Slide, Door
5	25429	2	Pad
6	--	--	--
7	16983	1	Battery Holddown
8	2987	2	Holddown Rod
9	6110	2	Wingnut
10	91641	8	Battery, 375 AH, UL16
11	16619	1	Bracket, Battery
12	16620	5	Shelf, Battery
13	90898	1	Battery, 12VDC / 17-18 AH
14	HDW5724	4	Screw, 5/16–18, ¾" LG, GR 5
15	--	--	--
16	50068	17	Washer, M6 Fender
17	50047	17	Nut, M6 Nylock
18	50028	18	Screw, Hex, M6 x 20
19	91790	8	Battery Boot, Red, Positive
20	91790	8	Battery Boot, Black, Negative
21	91789	4	Screw, Hex, M8 x 20
22	50030	4	Nut, M8 Nylock
23	50061	4	Washer, 5/16 Flat
24	6121	26"	Trim Lock, 1/4"



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS

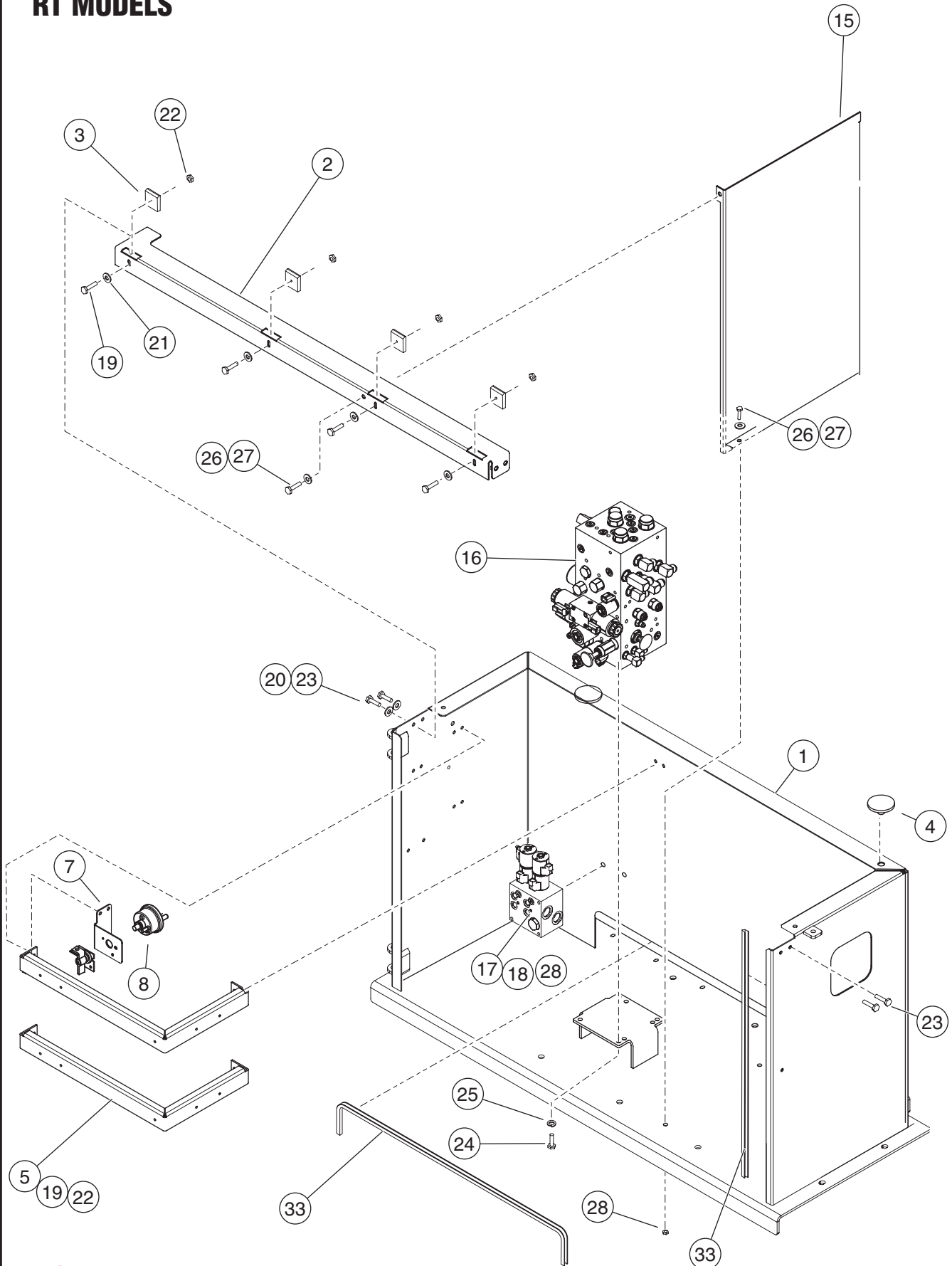


ILLUSTRATION No.
ART_3077

Speed Level™ Sigma Lift

Control Module, Drawing 1 of 2

Control Module RT, Drawing 1 of 2

ITEM	PART NO.	QTY	DESCRIPTION
1	REF	—	Control Module Weldment -- See "Module Installation" on Page F-3.
2	16154	1	Bracket, Cross Support
3	14896	4	Block, Slide, Door
4	25429	2	Pad
5	16226	2	Bracket, Control Box
6	--	--	--
7	16229	1	Bracket, Battery Disconnect
8	8841	1	Switch, Battery Disconnect
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	--	--	--
14	--	--	--
15	16152	1	Bulkhead
16	83071	1	Hydraulic Manifold -- See Section E - Hydraulics
17	83093	1	Manifold, Leveling -- See Section E - Hydraulics
18	50237	3	Screw, Hex M8 x 100
19	50028	8	Screw, M6 x 20
20	50000	4	Washer, M6 Flat
21	50068	8	Washer, M6
22	50047	8	Nut, M6 x 1.0 Nylock
23	50150	4	Screw, 5/16-18 x ¾, GR5
24	50147	4	Screw, 3/8 x 1
25	HDW7783	4	Lock Washer, 3/8
26	50001	5	Washer, M8 Flat
27	50030	5	Screw, Hex M8 x 20
28	50048	5	Nut, M8 Nylock
29	50047	3	Nut, M6 Nylock
30	--	--	--
31	--	--	--
32	--	--	--
33	6121	5 ft	Trim Lock



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS

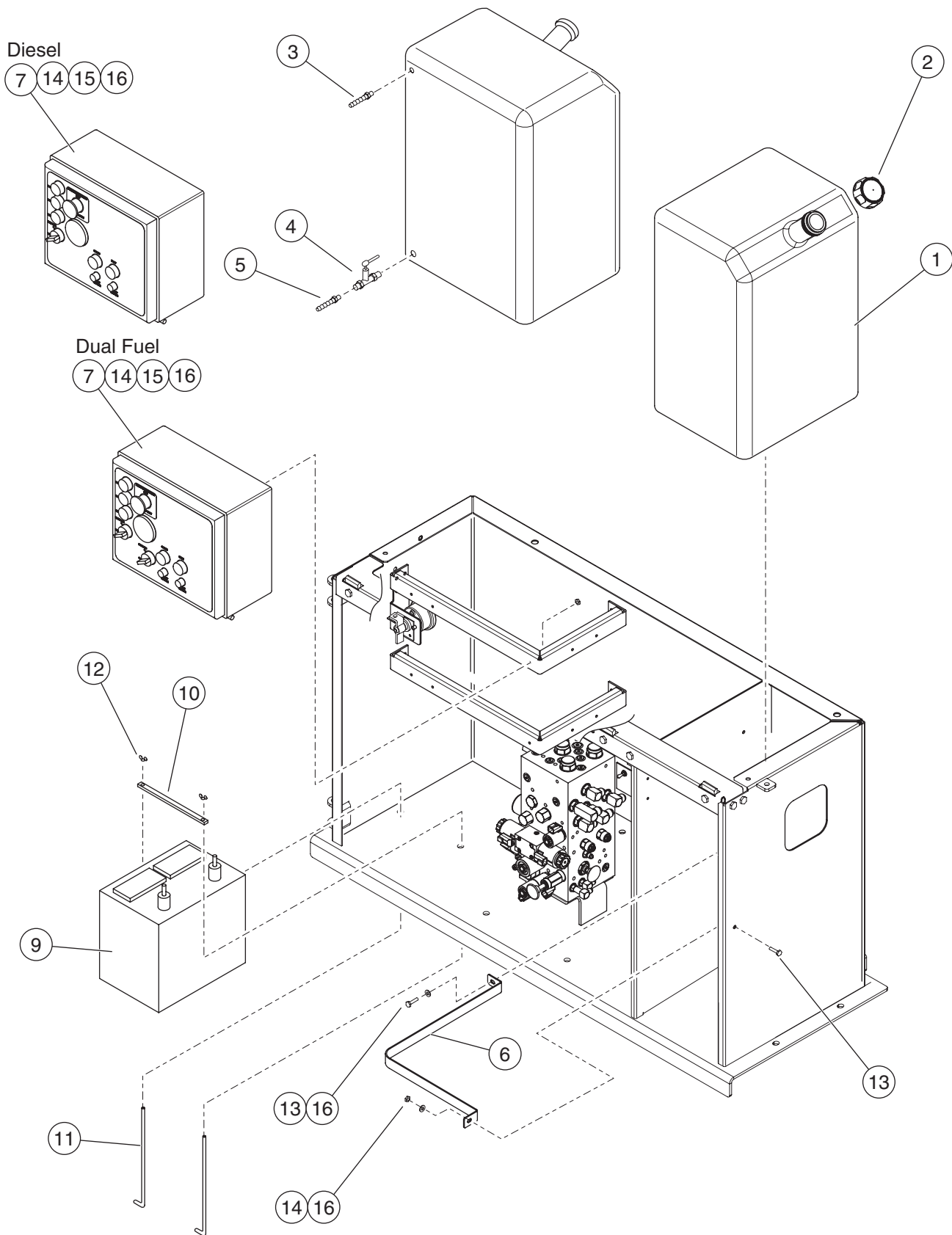


ILLUSTRATION No.
ART_3078

Speed Level™ Sigma Lift

Control Module, Drawing 2 of 2

Control Module, RT Drawing 2 of 2

ITEM	PART NO.	QTY	DESCRIPTION
1	91023	1	Fuel Tank, Plastic
2	91091	1	Fuel Tank Cap
3	HDW91233	1	Plug (Dual Fuel) 1/8 NPT, 3/19 Hose Barb
	HDW91320	1	Adapter (Diesel)
4	6919	1	Fuel Shutoff
5	HDW91279	1	Adapter, Male 1/8 NPT, 5/16 Hose Barb
	7788	1	Clamp (Not Shown)
	6458	90 IN	Hose, Fuel Line (Not Shown)
6	16225	1	Bracket, Fuel Tank
7	83078	1	Dual Duel Models -- Control Box Assy
	83079	1	Diesel Models -- Control Box Assy
8	--	--	--
9	6854	1	Battery, 12VDC, Grp 24 Deep Cycle
10	3436	1	Hold Down Bar
11	2987	2	Hold Down Rod
12	HDW6110	2	Wing Nut
13	50028	2	Screw, M6 x 20
14	50047	6	Nut, M6 Nylock
15	50239	4	Screw, Hex M6 x 30
16	50130	6	Washer, M6 Fender



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS

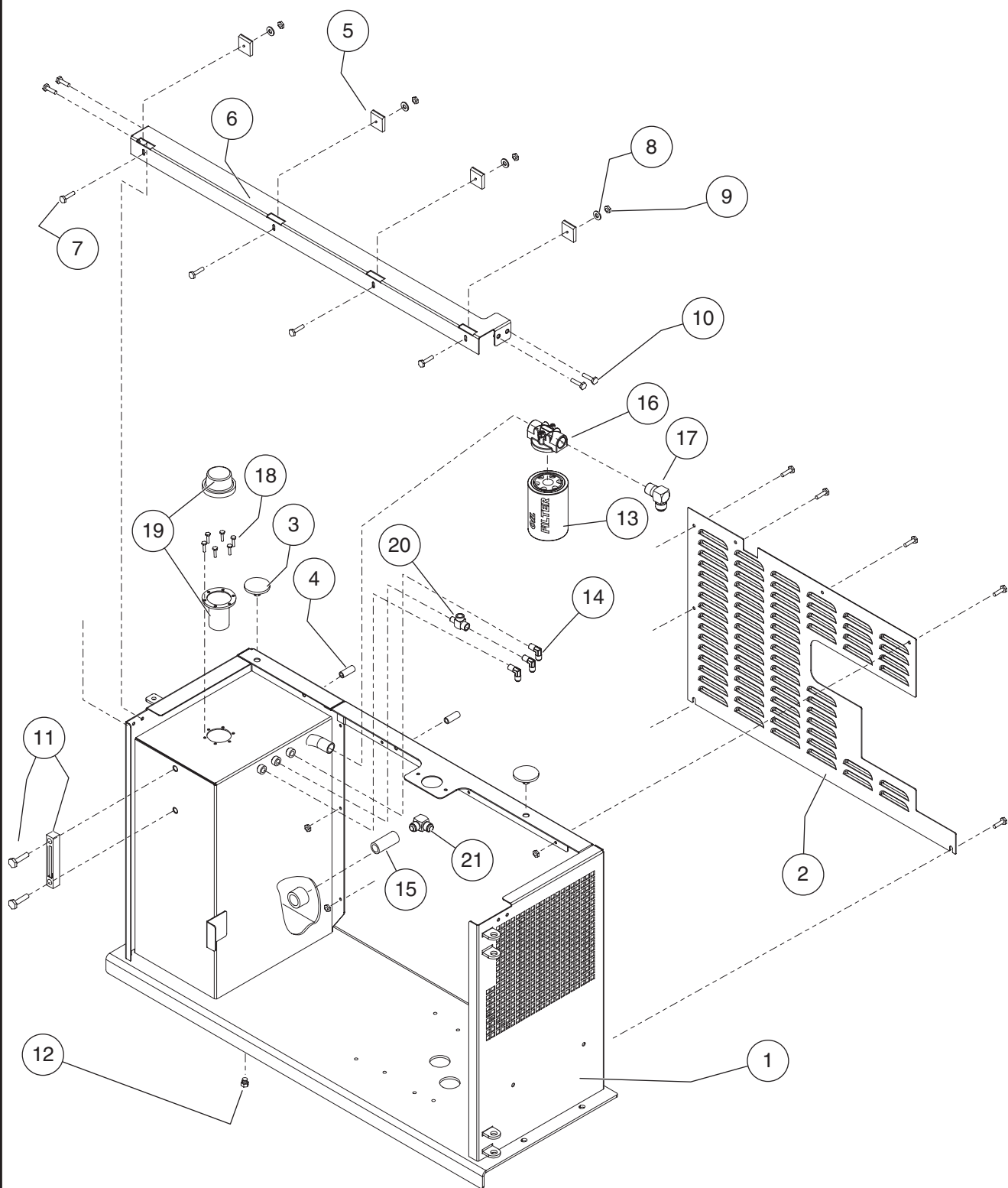


ILLUSTRATION No.
ART_3478

91RT - Speed Level™ RT

Power Module

Power Module – RT

ITEM	PART NO.	QTY	DESCRIPTION
1	16213	REF	Power Module Weldment
2	16247	1	Guard, Engine Module
3	25429	2	Pad
4	40620	2	Spacer, Insulator
5	14896	4	Slide Block, Door
6	14826	1	Bracket, Cross Support
7	50028	11	Screw, M6 x 20
8	50068	13	Washer, M6 Fender
9	50047	12	Nut, M6 Nylock
10	HDW5724	4	Screw, 5/16 - 18 x 3/4 inch, GR5
11	9370	1	Level Gauge
12	HDW9200	1	Plug, 1/4 NPT
13	6156	1	Filter Cartridge
14	50664	2	Elbow, MP-MJ90-4-4
15	50648	1	Fitting, MJ-MP-16-20
16	6714	1	Filter Head
17	HDW9268	1	Elbow, 90° 1/4 NPT - 3/4 JIC
18	HDW8482	6	Bolt, 32 x 1.57
19	9367	1	Filler/Strainer
20	50893	1	Tee, MJ-FJX-MJT-6
21	50649	1	Elbow 90, MJ-FJX90-16-16
22	50061	4	Washer, 5/16 Flat
23	50920	1	Fitting, MJ-MP90-6-4



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DUAL FUEL MODELS

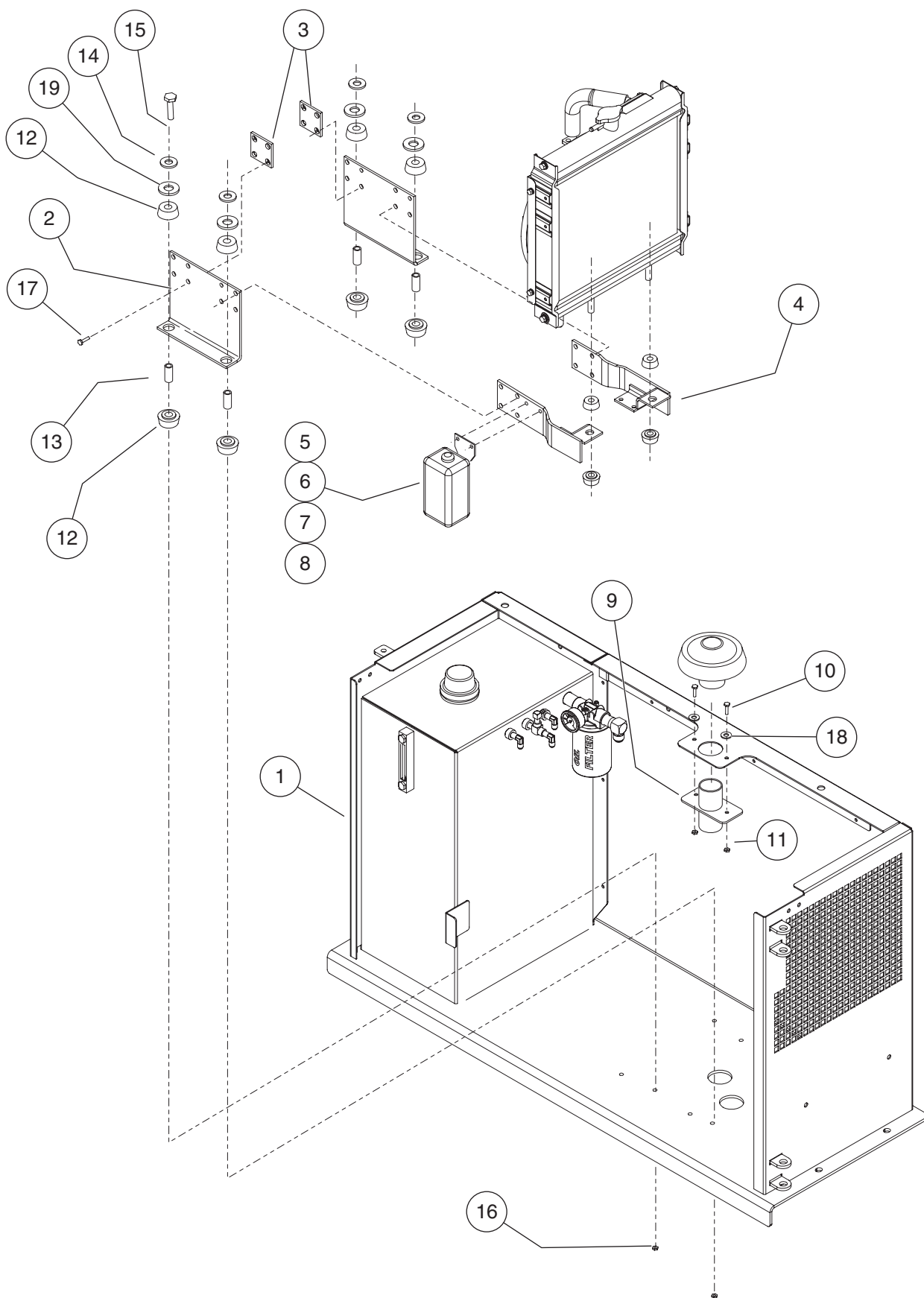


ILLUSTRATION No.
ART_2126 R1

Dual Fuel

Engine Mount, DF752

Engine Mount – Dual Fuel

ITEM	PART NO.	QTY	DESCRIPTION
1	16213	REF	Power Module Weldment
2	16211	2	Engine Mount, Dual Fuel
3	16210	2	Spacer
4	91131	1	Radiator Bracket Kit
5	91127	1	Coolant Overflow Tank
6	50028	2	Screw, M6 x 20
7	50047	2	Nut, M6 Nylock
8	6458	3 FT	Hose
9	16295	1	Air Intake Weldment
10	HDW5723	2	Screw, 1/4 - 20 x 3/4
11	HDW8267	4	Nut, 1/4 - 20
12	7736	8	Insulator, Rubber
13	40620	4	Spacer - Isolator
14	HDW8567	4	Washer, Flat, 3/8
15	HDW8279	4	Bolt, 3/8 - 16 x 2 1/2 GR8
16	HDW8268	4	Nut, 3/8 - 16
17	HDW91234	12	Screw, M10-1.25 x 25 8.8
18	50130	2	Washer, 1/4 Flat
19	90480	4	Washer, 3/8 x 1-1/2 Fender



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DIESEL MODELS

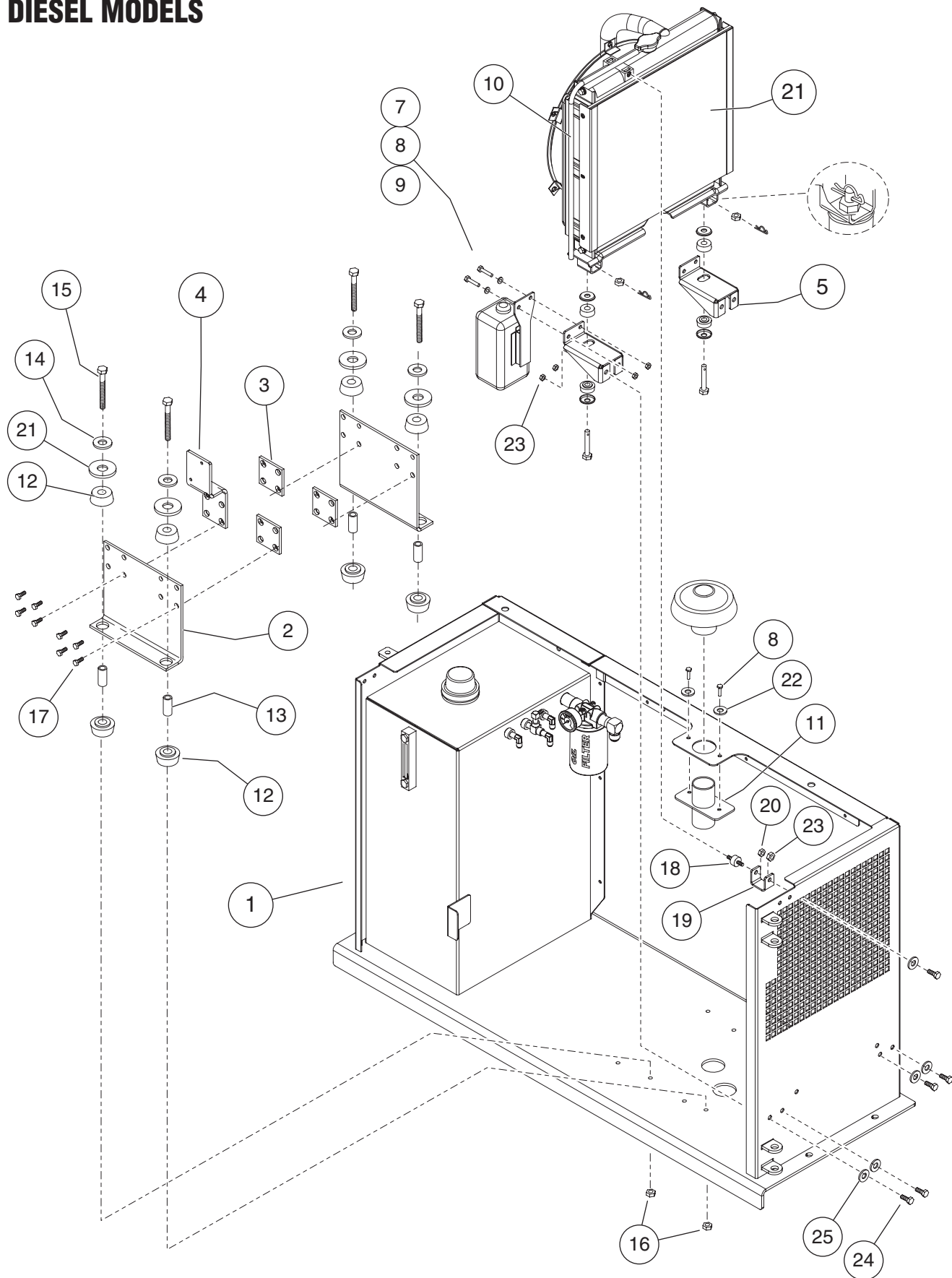


ILLUSTRATION No.
ART_2127 R2

Diesel

Engine Mount, D1105

Engine Mount – Diesel

ITEM	PART NO.	QTY	DESCRIPTION
1	16213	REF	Power Module Weldment
2	16209	2	Engine Mount, Diesel
3	16210	3	Spacer
4	16207	1	Bracket, Solenoid Mount
5	16345	2	Bracket, Radiator Mount
6	--	--	--
7	91127	1	Coolant Overflow Tank
8	50028	2	Screw, M6 x 20
9	50047	2	Nut, M6 Nylock
10	6458	3 FT	Hose
11	16295	1	Air Intake Weldment
12	7736	8	Insulator, Rubber
13	40620	4	Spacer - Isolator
14	HDW8567	4	Washer, Flat, 3/8
15	HDW8279	4	Screw, 3/8 - 16 x 2 1/2 GR8
16	HDW8268	4	Nut, 3/8 - 16
17	HDW91234	12	Screw, M10 - 1.25 x 25 8.8
18	91591	1	Vibration Isolator
19	16346	1	Radiator Brace
20	50047	1	Nut, M6
21	90480	4	Washer, 3/8 x 1-1/2 Fender
22	50130	2	Washer, 1/4 Flat
23	50049	5	Nut, M10 Nylock
24	50215	5	Bolt, M10 x 20 HHCS
25	50002	5	Washer, M10 Flat



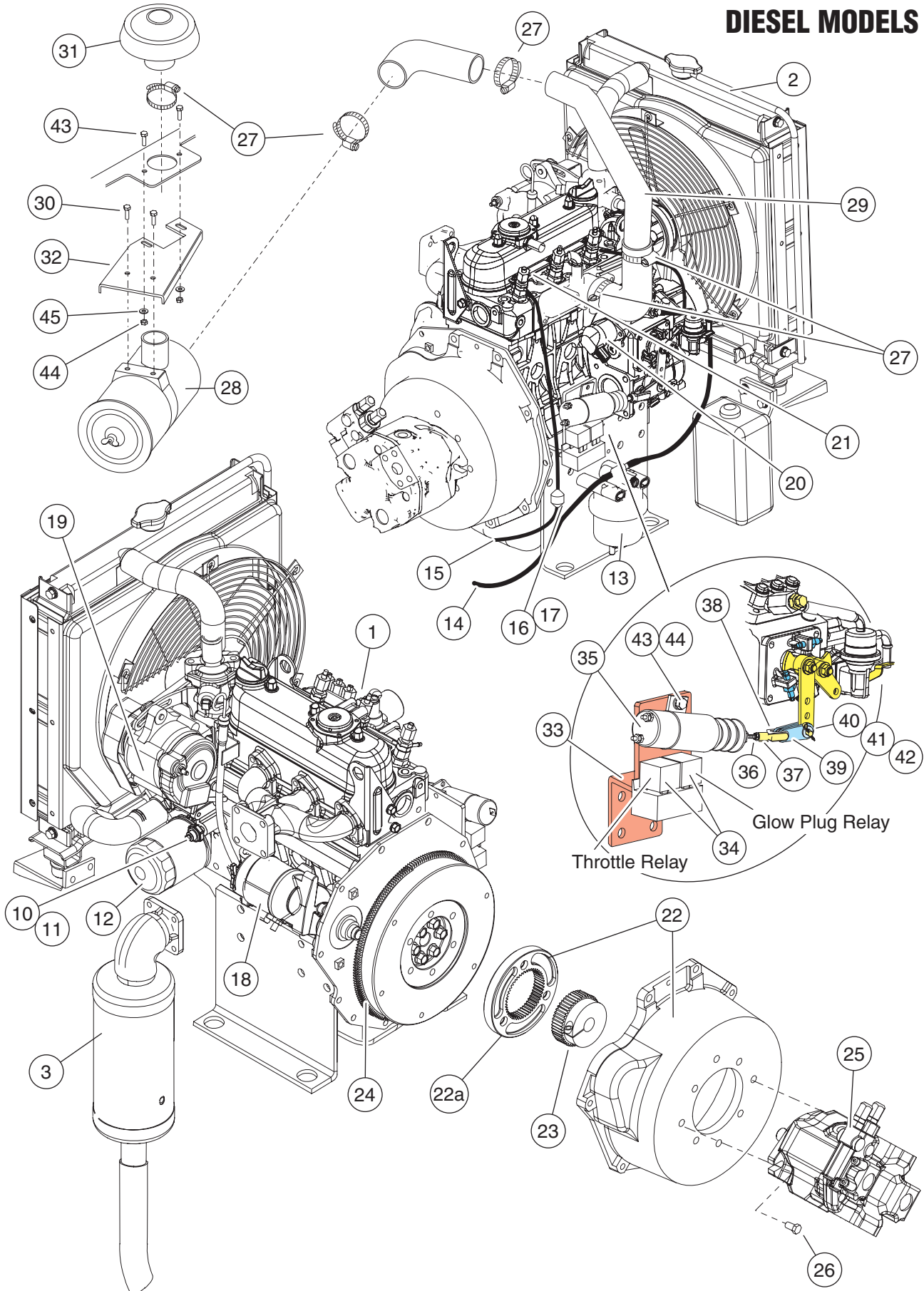
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DIESEL MODELS



Diesel Engine, Kubota D1105

Engine – Diesel

ITEM	PART NO.	QTY	DESCRIPTION
Additional attaching engine parts found earlier in this section			
--	84036	--	Engine Subassembly, Diesel
1	91429	1	Engine Kit, D1105
2	91113	1	Radiator Kit
--	9831	--	Radiator
3	19405	1	Muffler Kit
--	92164	--	Gasket, Exhaust (not shown)
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	91175	1	Oil Pressure Switch
11	HDW91187	1	Fitting, 1/8 NPT, m-F
12	8665	1	Oil Filter
13	91116	1	Fuel Filter Assembly
--	91123	--	Fuel Filter Element
14	6458	8 FT	Hose, Fuel, 5/16
15	91199	6 FT	Hose, Fuel, 3/16
16	91114	1	Valve, Check
17	7788	5	Hose Clamp
18	8413	incl	Starter
19	90227	incl	Alternator
20	8001	incl	Fuel Solenoid
21	9832	incl	Glow Plugs
22	91112	1	KTR housing Kit, D905
22a	91572	--	Coupler, Outer
23	91130	1	Hub
24	91630	1	Ring Gear
25	91160	1	Hydraulic Pump
26	HDW6433	2	Screw, 3/8-16 × 1"

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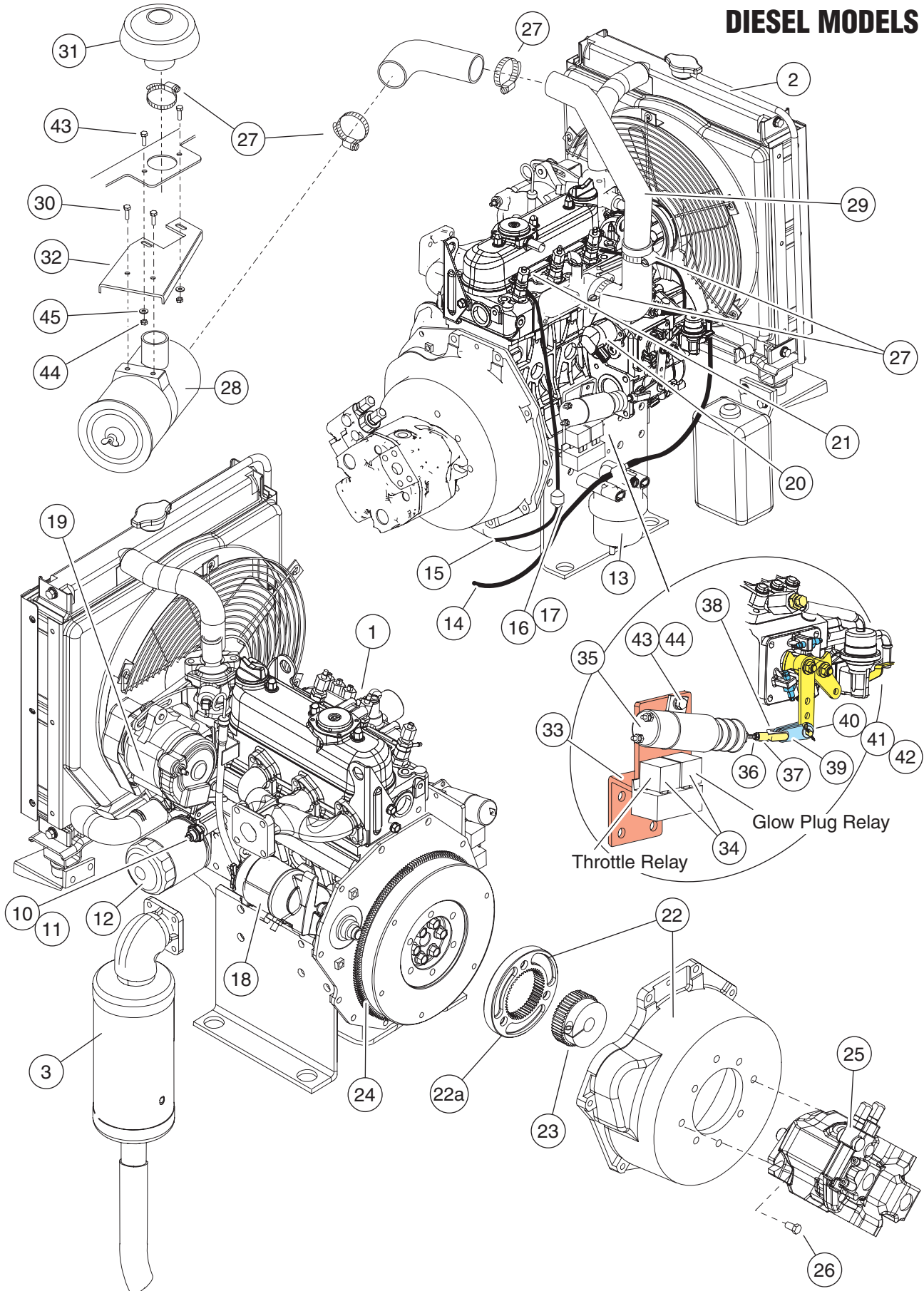
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DIESEL MODELS



Diesel Engine, Kubota D1105

Engine – Diesel (continued)

ITEM	PART NO.	QTY	DESCRIPTION
27	7545	5	Hose Clamp
28	91111	1	Air Cleaner kit
--	8667	--	Air Filter Element
29	16720	1	Tube, Intake Extension
30	946640	2	Screw,
31	91799	1	Breather Cap
32	16721	1	Bracket
33	16207	1	Bracket, Solenoid
34	91375	2	Relay
35	91589	1	Solenoid, Throttle
36	HDW91231	1	Jamnut, ¼-28
37	91117	1	Yoke
38	91588	1	Washer, ¼" Rubber
39	16347	2	Throttle Link
40	HDW5217	1	Washer, Flat, 5/16"
41	HDW91590	1	Clevis Pin, 5/16 × 1"
42	HDW5290	1	Cotter Pin, 1/8" × 1"
43	50028	4	Screw, M6 x 20
44	50047	4	Nut, M6 Nylock
45	HDW5217	2	Flat Washer



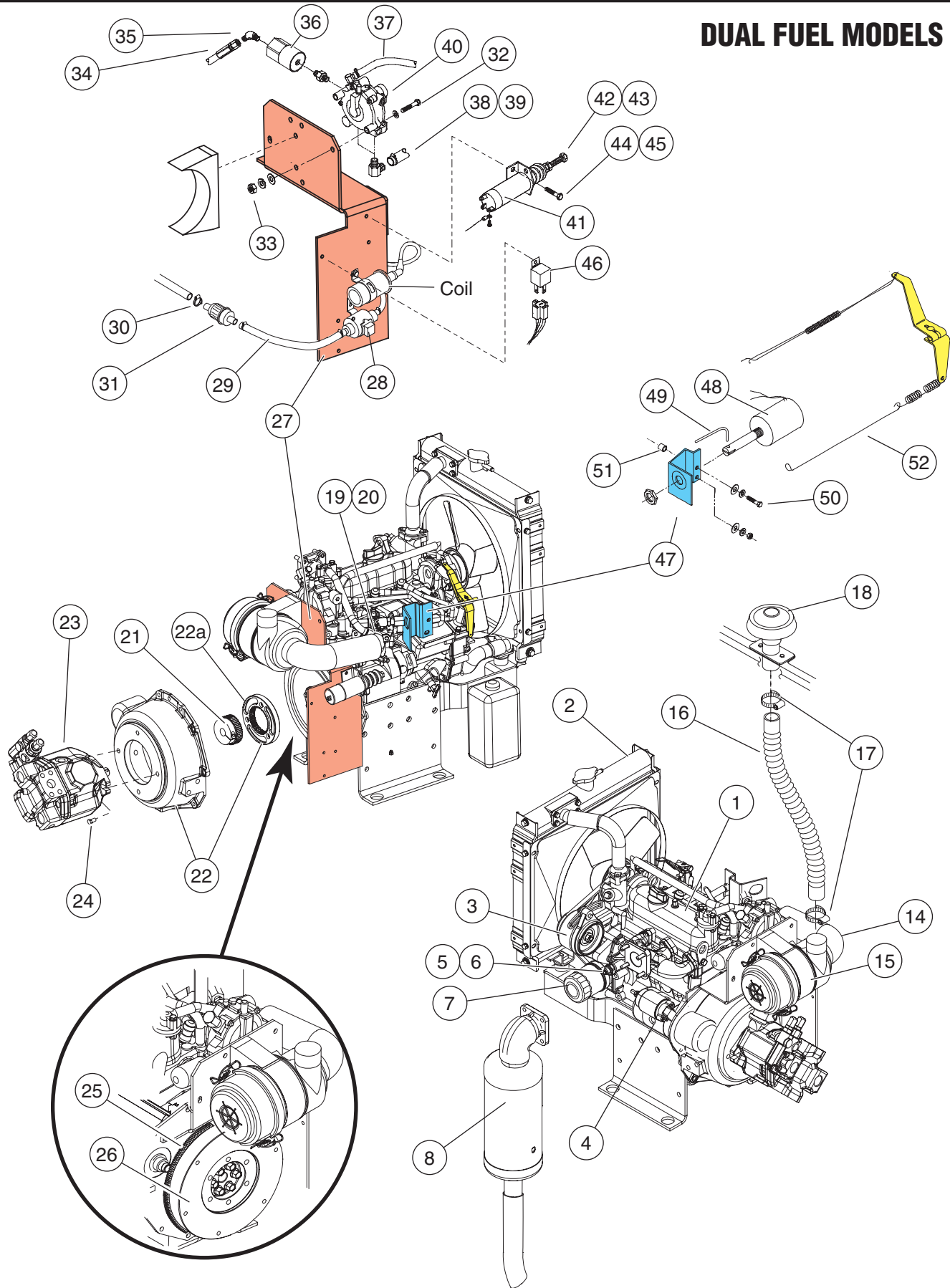
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DUAL FUEL MODELS



Dual Fuel Engine, Kubota DF752

Engine – Dual Fuel

ITEM	PART NO.	QTY	DESCRIPTION
Additional attaching engine parts found earlier in this section			
	91035		Engine Subassembly, Dual Fuel
1	91125	1	Engine, Kubota DF752
2	8472	1	Radiator
3	90227	1	Alternator, 40 AMP
4	8365	1	Starter
5	91175	1	Oil Pressure Switch
6	HDW91187	1	Fitting, 1/8 NPT, M-F
7	8516	1	Oil Filter
8	19405	1	Muffler
--	92164	--	Gasket, Exhaust (not shown)
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	--	--	--
14	91136	1	Air Filter Element
15	91188	1	Intake Hose
16	91340	1	Hose, 2.00" I.D. Flex
17	7545	2	Hose Clamp
18	91799	1	Breather Cap
19	91133	1	Carburetor Flange
20	91617	1	Carburetor Assembly
21	91130	1	Hub
22	91129	1	KTR Housing Kit, DF752
22a	91573	--	Coupler, Outer
23	91160	1	hydraulic Pump
24	HDW6433	2	Screw, 3/8-16 × 1"
25	91765	1	Ring Gear
26	91766	1	Flywheel

... continued



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DUAL FUEL MODELS

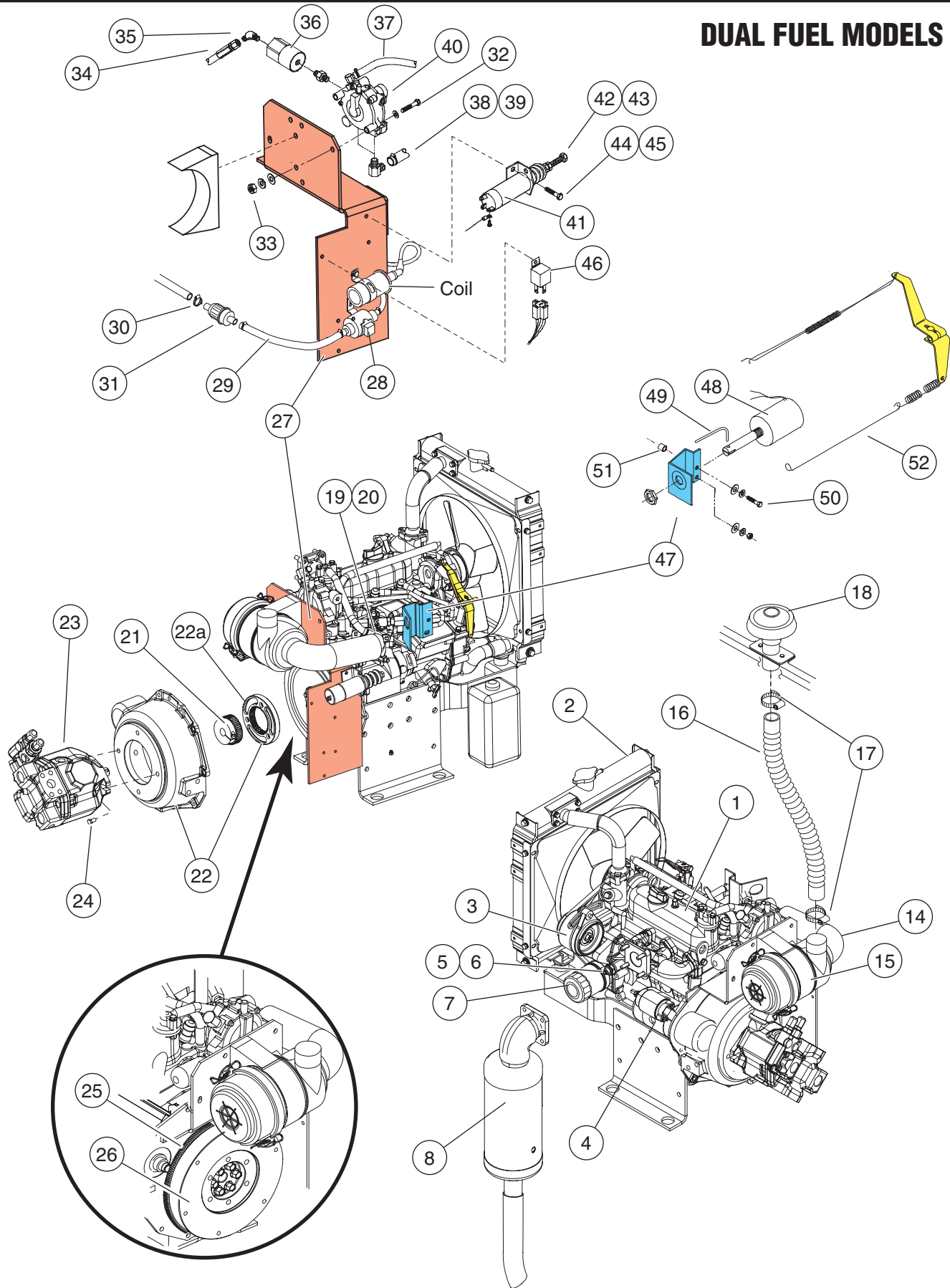


ILLUSTRATION No.
ART_2129-R4

Dual Fuel Engine, Kubota DF752

Engine – Dual Fuel (continued)

ITEM	PART NO.	QTY	DESCRIPTION
27	21020	1	Bracket, Components
28	91177	1	Fuel Pump
29	6458	as req	Hose, Fuel, 5/16
30	7788	5	Hose Clamp, 5/16
31	8514	1	Fuel Filter
32	50015	2	Screw, M8 x 50
33	50048	2	Nut, M8 Nylock
34	7406	1	Hose Assembly, LP
35	HDW6894	1	Elbow, 90° Brass
36	91132	1	Valve, lockoff
37	91197	10 in	LP Hose, ½"
38	91198	60 IN	Radiator Hose, 3/8"
39	91232	6	Hose Clamp, #8
40	9833	1	LPG Regulator
41	91119	1	Solenoid, Throttle
42	HDW9247	1	Screw, Cap Socket Head, ¼–28 × 1.0"
43	HDW91231	2	Jamnut, ¼–28
44	50028	6	Screw, M6 x 20
45	50047	6	Nut, M6 Nylock
46	91375	1	Relay, Throttle
47	20212	1	Choke Bracket
48	9502	1	Choke Solenoid
49	9498	1	Choke Linkage
50	HDW91283	1	Screw, M6–1.0 × 25
51	20204	1	Spacer
52	9252	1	Throttle Linkage



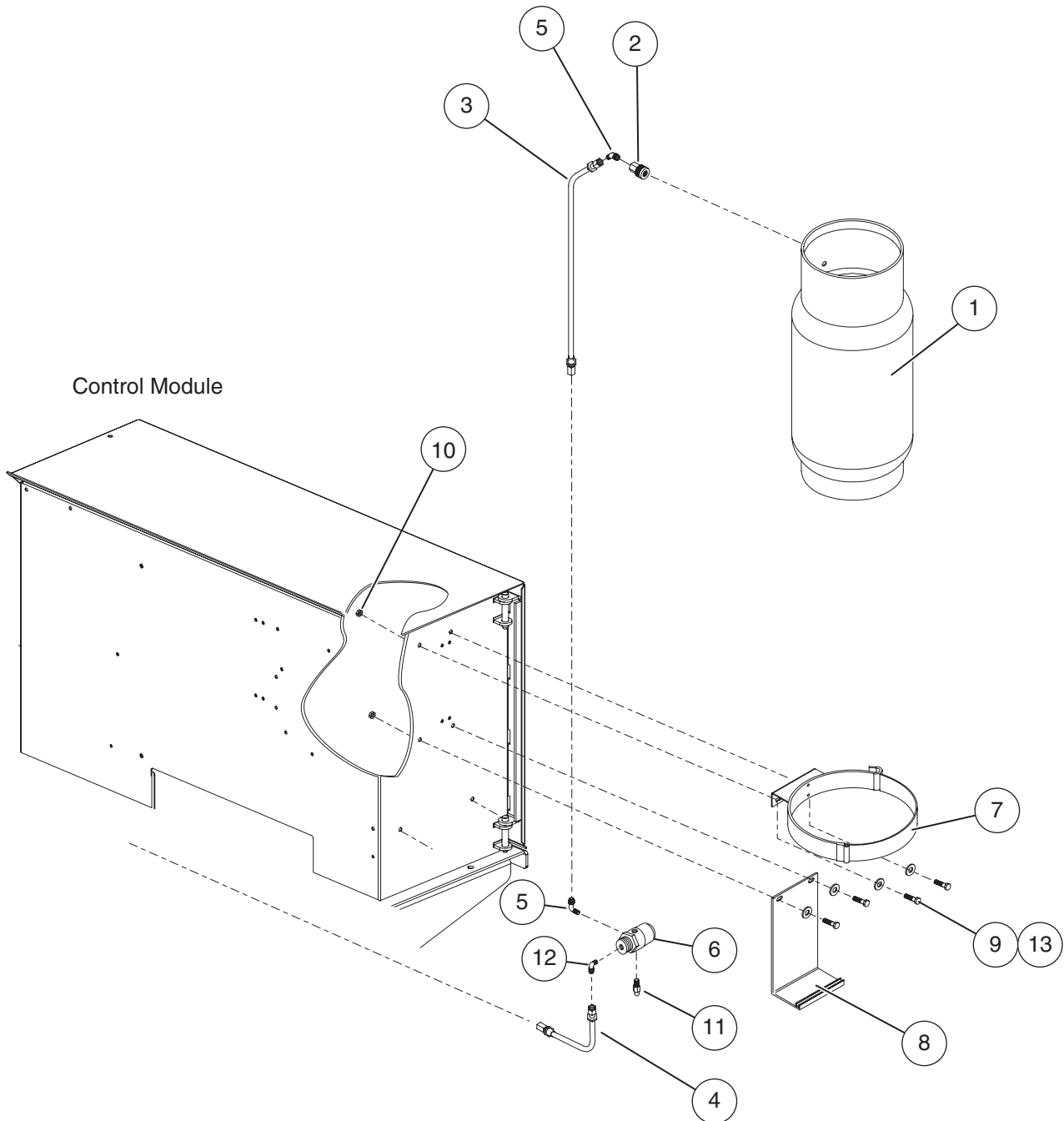
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• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

DUAL FUEL MODELS



Dual Fuel

LP Tank

LP Tank – Dual Fuel

ITEM	PART NO.	QTY	DESCRIPTION
1	6859	1	LP Tank
2	6868	1	Quick Disconnect
3	6890	1	Hose Assembly, 30"
4	7406	1	Hose Assembly, 90"
5	HDW6894	2	Elbow, Brass, NPT to SAE 45°
6	6861	1	Bulkhead Filter
7	6860	1	Bracket, Tank Mount
8	19102	1	Tank Support Weldment
9	50031	4	Screw, M8 x 25
10	50048	4	Locknut, M8 Nylock
11	6938	1	Relief Valve
12	HDW6727	1	Elbow, Brass NPT to SAE 90
13	50001	4	Washer, M8 Flat

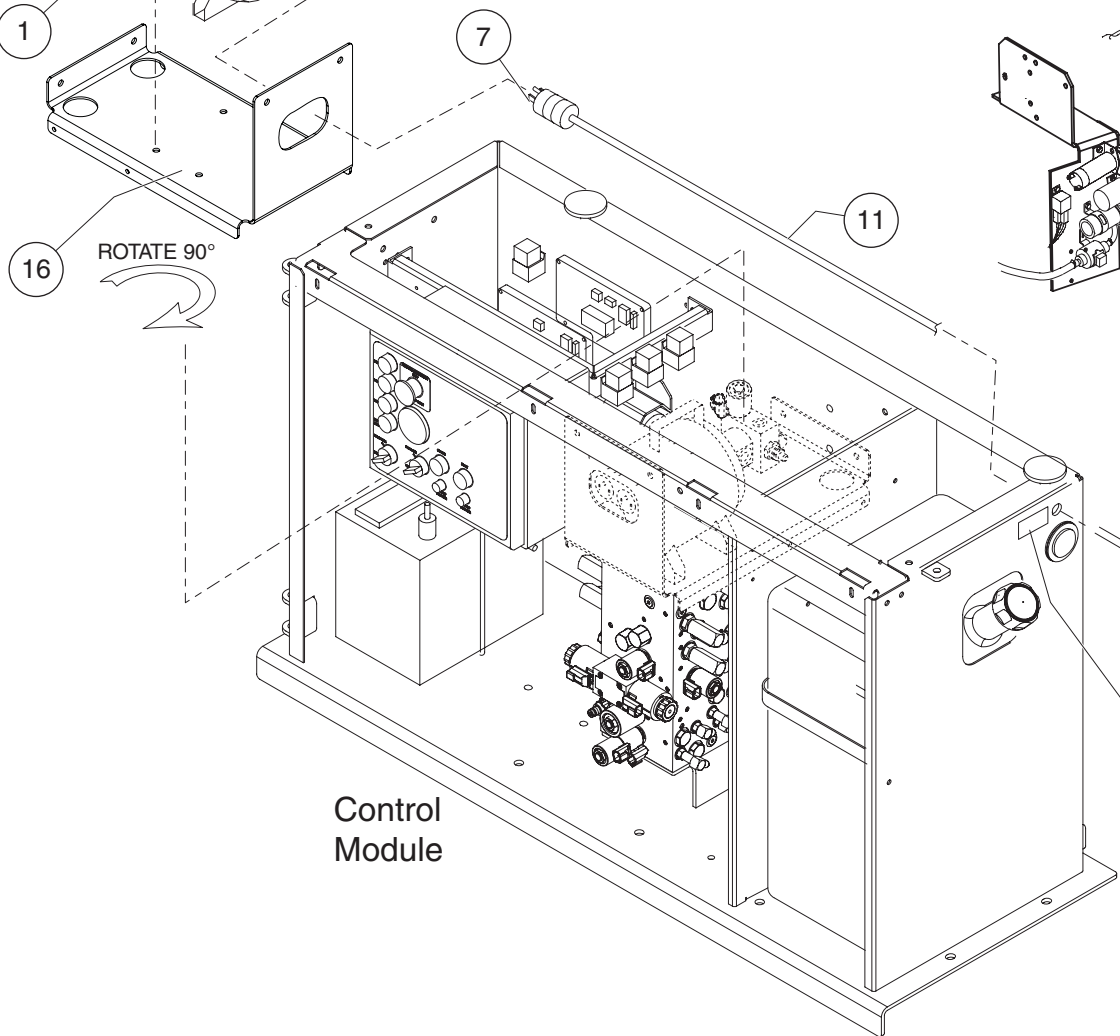
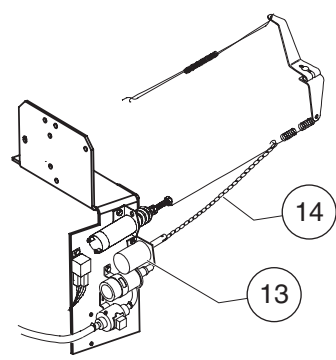
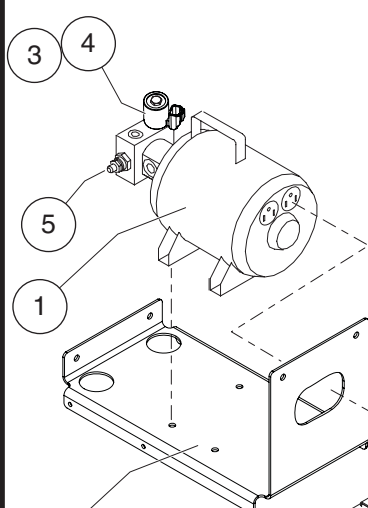
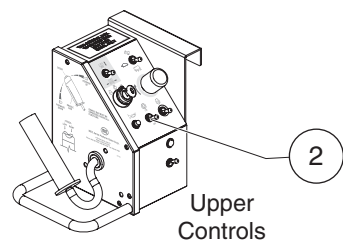


• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



RT MODELS


 ILLUSTRATION No.
 ART_2135R1

Generator Option

Generator Option, RT

ITEM	PART NO.	QTY	DESCRIPTION
Refer to Section E for Hose Kit			
1	91550	1	Generator, 2000 Watt
2	5630	1	Switch, Toggle
3	91551	--	Valve, Solenoid, 2-way, n.c. -- included with item #1
4	91002	--	coil, 12V 10 Series -- included with item #1
5	91546	--	Needle Valve -- included with item #1
6	--	--	--
7	91544	1	Plug, Male, 3 Prong
8	91545	2	Receptacle, Female
9	7594	1	Strain Relief
10	--	--	--
11	7617	6 FT	Wire, 14GA, 3 conductor
12	91556	1	Label, AC Generator
13	9502	1	Solenoid, Generator-Throttle, Gas Engine
	91119	1	Solenoid, Generator-Throttle, Diesel Engine
14	91469	2 FT	Chain, Sash #8
15	92196	1	Harness, Engine Intermediate, Generator Option
16	16369	1	Bracket, Generator Mount



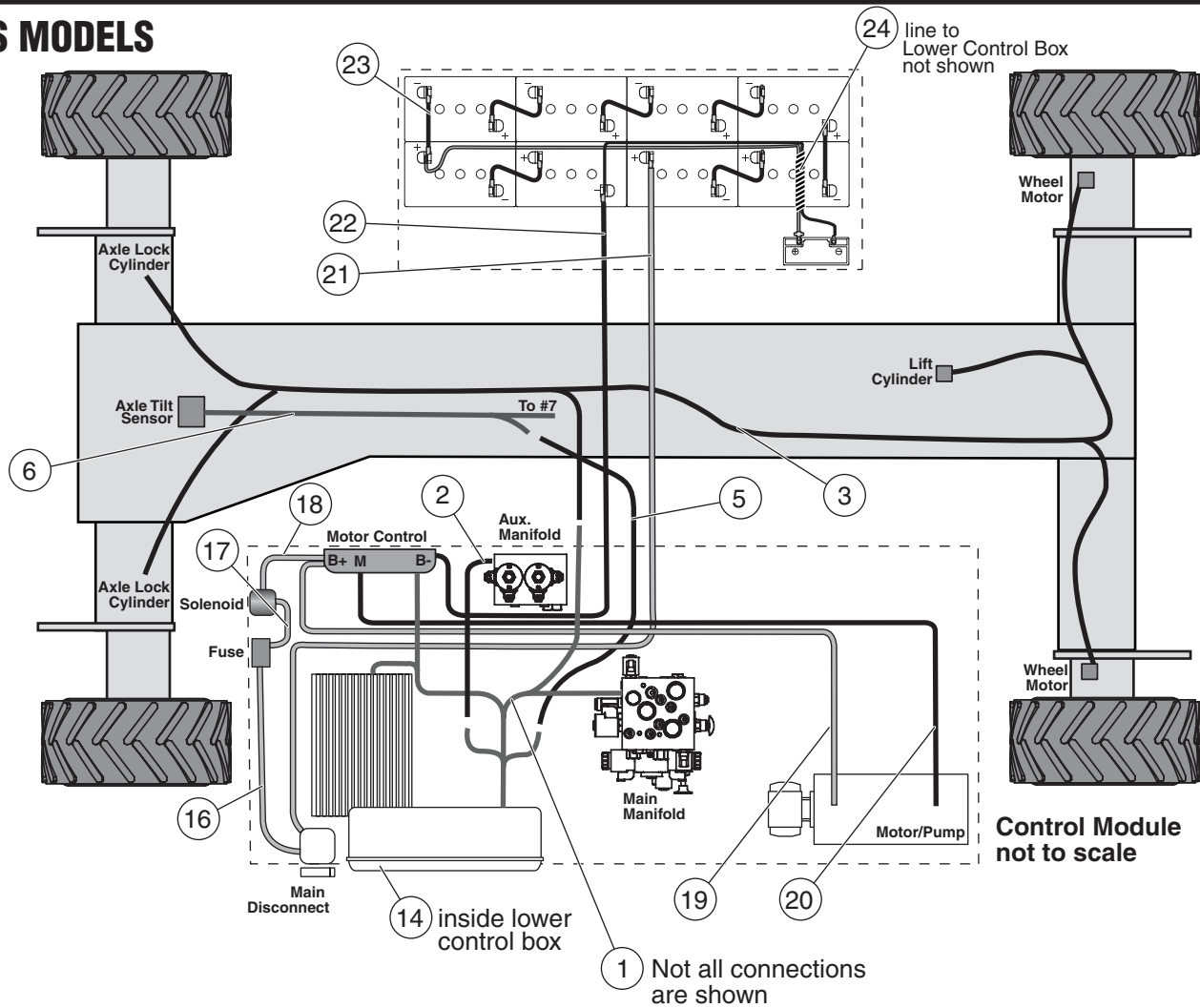
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• REF: Reference only

ES MODELS



UPPER CONTROLS

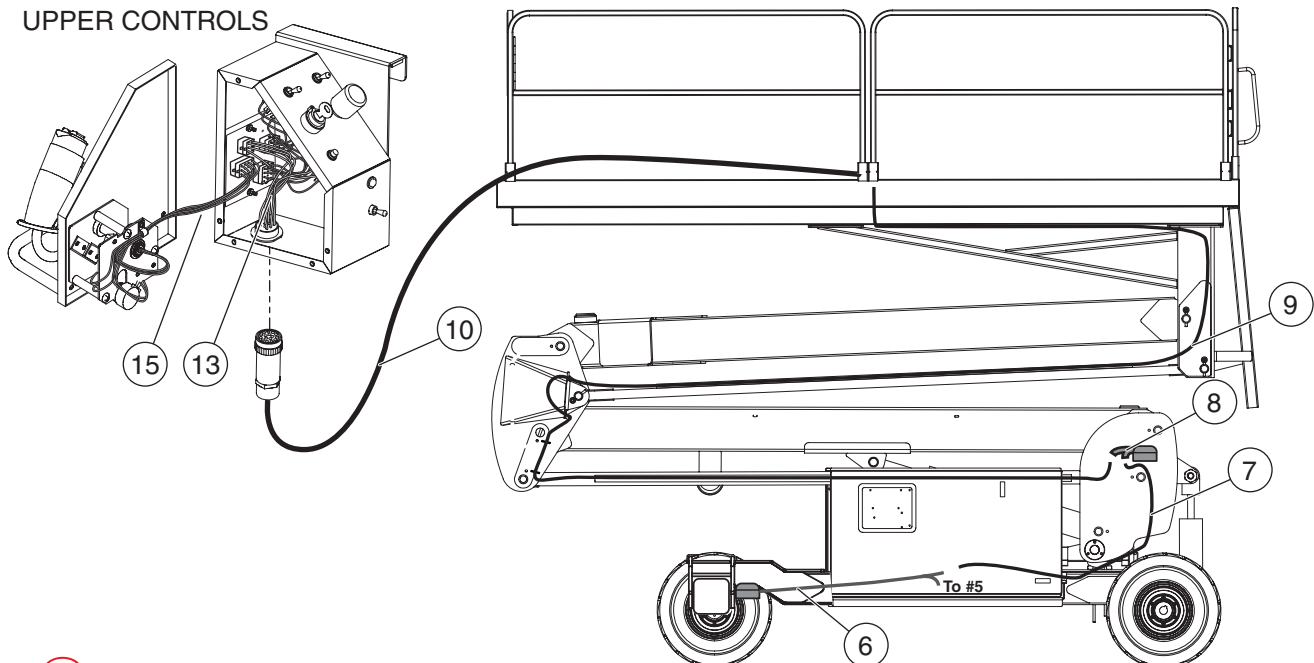


ILLUSTRATION No.
ART_3221

Speed Level™ Sigma Lift -- ES Models

Wire Harnesses

Wire Harness – Electric Models

ITEM	PART NO.	QTY	DESCRIPTION
1	92145	1	Harness, Main, Lower Control Box to Valve Manifold and Modules
2	92134	1	Harness, Main Harness to Level Manifold
3	92135	1	Harness, Main Harness to Down Valve, Axle Cylinders, Wheel Bypass
4	--	--	--
5	92137	1	Harness, Communication, Main Harness to Axle CAN-Tilt
6	92138	1	Harness, Communication, Axle CAN-Tilt Connection Adapter
7	92139	1	Harness, Communication, Axle CAN-Tilt to Boom Pivot CAN-Tilt
8	92140	1	Harness, Communication, Boom Pivot Angle CAN-Tilt Adapter
9	92141	1	Harness, Communication, Boom Pivot Angle CAN-Tilt to Platform Bottom
10	91780	1	Harness, Communication, Platform Bottom to Upper Control Box, Removable Control Box
	92196	1	Harness, Communication, Platform Bottom to Upper Control Box, Fixed Control Box
11	9441	55 ft	Cable, Power to Platform, 3084 (not shown--connects plug on module base to plug at platform)
		50 ft	Cable, Power to Platform, 2684 (not shown--connects plug on module base to plug at platform)
12	--	--	--
13	92143	1	Harness, Inside Upper Control Box Base -- Removable Control Box only
14	92146	1	Harness, Lower Control Box Interior
15	92193	1	Harness, Matrix Module to Joystick
16	92150	1	Cable, Master Disconnect to Fuse
17	92151	1	Cable, Fuse to Solenoid
18	92151	1	Cable, Solenoid to Motor Controller B+
19	92152	1	Cable, Red, Motor Controller B+ to Motor B+
20	92153	1	Cable, Black, Motor Controller M to Motor B-
21	92148	1	Cable, Battery+ to Master Disconnect
22	92149	1	Cable, Battery- to Motor Controller B-
23	6208	7	Cable, Battery Connection
24	92147	1	Harness, Emergency Down

• as req: as required

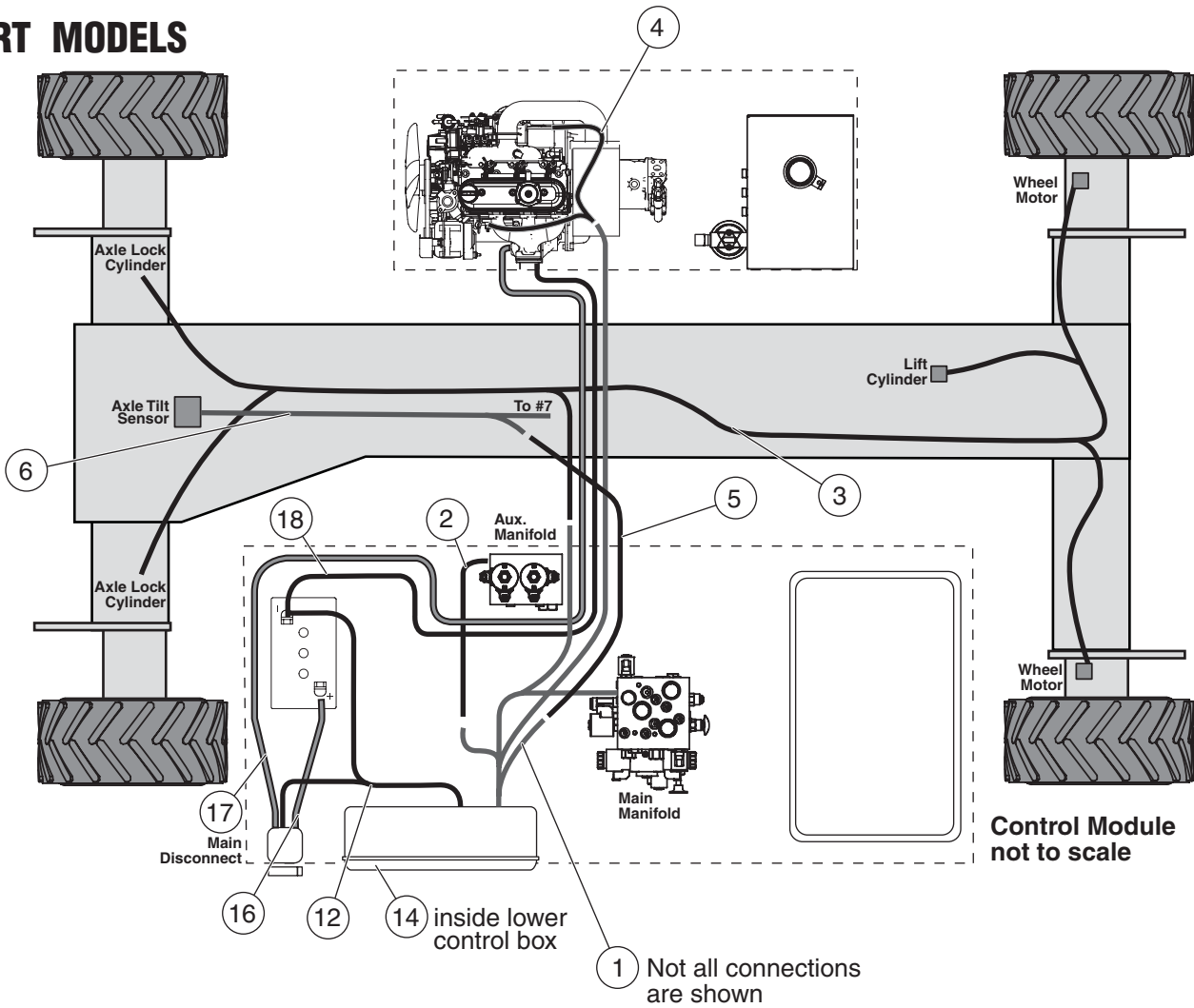
• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



RT MODELS



UPPER CONTROLS

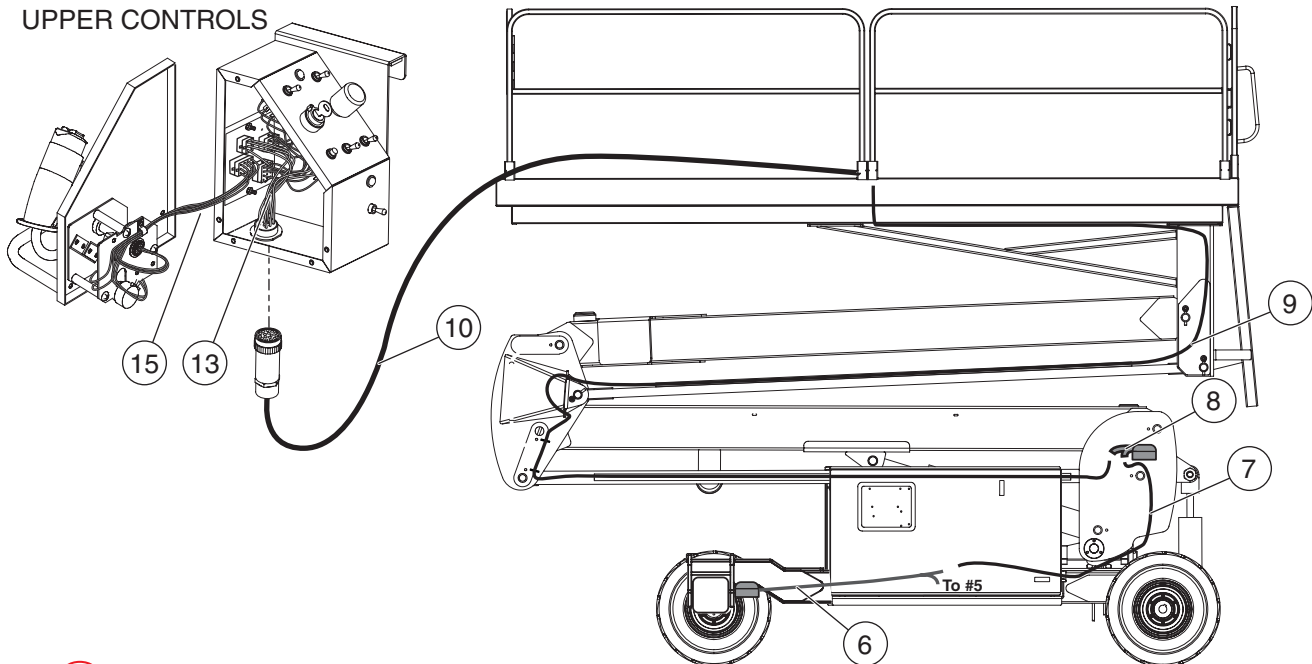


ILLUSTRATION No.
ART_3222

Speed Level™ Sigma Lift -- RT Models

Wire Harnesses

Wire Harness – RT Models

ITEM	PART NO.	QTY	DESCRIPTION
1	92133	1	Harness, Main, Lower Control Box to Valve Manifold and Modules
2	92134	1	Harness, Main Harness to Level Manifold
3	92135	1	Harness, Main Harness to Down Valve, Axle Cylinders, Wheel Bypass
4	92136	1	Harness, Engine, Main Harness to Engine
5	92137	1	Harness, Communication, Main Harness to Axle CAN-Tilt
6	92138	1	Harness, Communication, Axle CAN-Tilt Connection Adapter
7	92139	1	Harness, Communication, Axle CAN-Tilt to Boom Pivot CAN-Tilt
8	92140	1	Harness, Communication, Boom Pivot Angle CAN-Tilt Adapter
9	92141	1	Harness, Communication, Boom Pivot Angle CAN-Tilt to Platform Bottom
10	91780	1	Harness, Communication, Platform Bottom to Upper Control Box, Removable Control Box
	92196	1	Harness, Communication, Platform Bottom to Upper Control Box, Fixed Control Box
11	9441	55 ft	Cable, Power to Platform, 3084 (not shown--connects plug on module base to plug at platform)
		50 ft	Cable, Power to Platform, 2684 (not shown--connects plug on module base to plug at platform)
12	92142	1	Harness, 12V Power Supply to Lower Control Box
13	92143	1	Harness, Inside Upper Control Box Base -- Removable Control Box only
14	92144	1	Harness, Lower Control Box Interior
15	92193	1	Harness, Matrix Module to Joystick
16	92154	1	Cable, Battery+ to Master Disconnect
17	92155	1	Cable, Master Disconnect to Engine Starter
18	92156	1	Cable, Battery- to Engine



• as req: as required

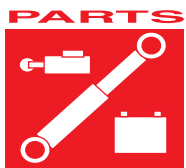
• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

NOTES:





SECTION G

DECALS, ANSI MODELS

CONTENTS

PAGE

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Decals, RT Models (continued)	G-11



ES MODELS - ANSI



2 3084ES

mec 3084ES SPEED LEVEL™

2684ES

mec 2684ES SPEED LEVEL™



WARNING

- **SHEET LOADING GATE** MUST BE IN LOWERED LOCKED POSITION BEFORE OPERATING FROM PLATFORM.
- **PLATFORM ENTRANCE** MUST BE PROPERLY CLOSED AND ALL GUARDRAILS PROPERLY IN PLACE AND SECURED BEFORE OPERATING FROM PLATFORM.

FAILURE TO FOLLOW INSTRUCTIONS COULD CAUSE DEATH OR PERSONAL INJURY.

WARNING

INSPECT MACHINE AND MAKE SURE THAT IT IS OPERATING PROPERLY, THAT ALL NAME PLATE AND SAFETY AND CONTROL DECALS ARE IN PLACE AND LEGIBLE, AND THAT THE MACHINE IS IN ACCORDANCE WITH THE MANUFACTURER'S MAINTENANCE REQUIREMENTS CONTAINED IN THE OPERATION AND MAINTENANCE MANUAL AND THE DAILY SAFETY CHECKLIST.

OPERATE MACHINE WITH EXTREME CAUTION. WATCH FOR OBSTRUCTIONS WHICH MAY STRIKE PLATFORM, PERSONNEL, CONTROLS, OR MACHINE. OPERATE CONTROLS SLOWLY FOR SMOOTH PLATFORM MOTION.

FOR DRIVING WITH PLATFORM LOWERED:	OTHER HAZARDS
<ul style="list-style-type: none"> • DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD LIMIT CAPACITY. LOAD TO BE UNIFORMLY DISTRIBUTED. PLACE LOAD NEAR CENTER OF PLATFORM WHEN POSSIBLE. • DO NOT DRIVE ON SIDE SLOPE IF PLATFORM IS OVER 5% OFF LEVEL. • DO NOT DRIVE UP OR DOWN A GRADE OF OVER 40%. 	<ol style="list-style-type: none"> 1. DO NOT EXCEED PLATFORM LOAD CAPACITY. 2. DO NOT EXCEED MAXIMUM SIDE FORCE AND MAXIMUM NUMBER OF OCCUPANTS. 3. DO NOT USE WITHOUT GUARD RAILS IN PLACE, AND ENTRY GATE PROPERLY SECURED. 4. DO NOT USE IF WORK PLATFORM IS NOT WORKING PROPERLY OR IF ANY PART IS DAMAGED OR WORKING PROPERLY. 5. DO NOT USE NEAR MOVING VEHICLES OR CRANES. 6. DO NOT STAND OR SIT ON GUARDRAILS. ALL PERSONNEL SHALL ALWAYS MAINTAIN FIRM FOOTING ON PLATFORM FLOOR. 7. DO NOT USE WHILE UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.
<p>FOR DRIVING WITH PLATFORM ELEVATED:</p> <ul style="list-style-type: none"> • DRIVE ONLY ON A SMOOTH, FIRM, AND PLANAR SURFACE FREE OF OBSTRUCTIONS. • DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD CAPACITY. • LOAD MUST BE UNIFORMLY DISTRIBUTED. • IF TILT WARNING LIGHT ILLUMINATES OR TILT ALARM SOUNDS LOWER PLATFORM AND RE-LEVEL. • USE EXTREME CAUTION. 	<ol style="list-style-type: none"> 8. DO NOT OVERIDE SAFETY DEVICES. 9. DO NOT LEAVE MACHINE UNATTENDED WITH KEY IN THE SWITCH. 10. DO NOT RAISE PLATFORM WHILE MACHINE IS ON A TRUCK, FORK-LIFT, OR OTHER DEVICE OR VEHICLE. 11. DO NOT USE LADDER, SCAFFOLDING, OR OTHER DEVICES TO INCREASE SIZE OR WORKING HEIGHT OF PLATFORM. 12. DO NOT ENTER OR EXIT PLATFORM WHILE IN MOTION. 13. DO NOT RECHARGE BATTERIES NEAR SPARKS OR OPEN FLAME. BATTERIES EMIT HIGHLY EXPLOSIVE HYDROGEN GAS. 14. DO NOT PERFORM SERVICE ON THE MACHINE WITHOUT PROPERLY SUPPORTING ELEVATING ASSEMBLY. 15. DO NOT ATTACH OVERHANGING LOADS OR INCREASE PLATFORM SIZE.

IMPROPER OPERATION OF THIS MACHINE COULD CAUSE DEATH OR SERIOUS INJURY.

DANGER

YOU MUST NOT OPERATE THIS MACHINE:

UNLESS YOU HAVE BEEN AUTHORIZED TO USE AND TRAINED IN THE SAFE OPERATION OF THIS MACHINE.

TRAINING INCLUDES COMPLETE KNOWLEDGE OF THE SAFETY AND OPERATION INSTRUCTIONS CONTAINED IN THE MANUFACTURER'S MANUAL, ANSI MANUAL OF RESPONSIBILITIES, YOUR EMPLOYER'S WORK RULES AND APPLICABLE GOVERNMENTAL REGULATIONS.

AN UNAUTHORIZED AND UNTRAINED OPERATOR SUBJECTS THEMSELVES AND OTHERS TO DEATH OR SERIOUS INJURY.

TIP-OVER HAZARDS	ELECTROCUTION HAZARD
<ul style="list-style-type: none"> DO NOT DRIVE NEAR DROP-OFFS, HOLES, OPEN ELEVATOR SHAFTS, AND LOADING DOCKS. DO NOT ELEVATE PLATFORM ON UNEVEN OR SOFT SURFACES. DO NOT DRIVE ONTO UNEVEN OR SOFT SURFACES WHEN ELEVATED. DO NOT RAISE PLATFORM IN WINDY OR GUSTY CONDITIONS. 	<p>ELECTROCUTION HAZARD</p> <p>THIS MACHINE IS NOT INSULATED</p> <p>MAINTAIN SAFE CLEARANCE FROM ELECTRICAL LINES AND APPARATUS. YOU MUST ALLOW FOR MACHINE SWAY, ROCK OR SAG AND ELECTRICAL LINES SWAYING.</p> <p>THIS MACHINE DOES NOT PROVIDE PROTECTION FROM CONTACT WITH OR PROXIMITY TO AN ELECTRICALLY CHARGED CONDUCTOR.</p> <p>YOU MUST MAINTAIN A CLEARANCE OF AT LEAST TEN (10) FEET BETWEEN ANY PART OF THIS MACHINE OR ITS LOAD AND ANY ELECTRICAL LINE OR APPARATUS CARRYING UP TO 50,000 VOLTS. ONE FOOT OF ADDITIONAL CLEARANCE IS REQUIRED FOR EVERY ADDITIONAL 30,000 VOLTS OR LESS.</p>
<p>DEATH OR SERIOUS INJURY WILL RESULT FROM IMPROPER USE OF THIS EQUIPMENT</p>	<p>DEATH OR SERIOUS INJURY WILL RESULT FROM CONTACT OR INADEQUATE CLEARANCE</p>

WARNING

USE OR OPERATION OF AN UNSPECTED WORK PLATFORM COULD CAUSE DEATH, PERSONAL INJURY.

NEW	1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR	6TH YEAR	7TH YEAR	8TH YEAR	9TH YEAR	10TH YEAR
<ul style="list-style-type: none"> • DO NOT OPERATE THIS WORK PLATFORM IF AN INSPECTION HAS NOT BEEN PERFORMED WITHIN 13 MONTHS OF THE LAST RECORDED INSPECTION DATE. • STAMP MONTH/DAY/YEAR NEXT TO APPROPRIATE YEAR AFTER EACH INSPECTION. 										
<p>CHANGE OF OWNERSHIP OF THIS WORK PLATFORM MUST BE REPORTED TO MANUFACTURER:</p> <p>MEC Aerial Platform Sales Corp. 4700 E. Jensen Avenue Fresno, California 93726 Phone: (559) 363-9626</p>										

WARNING

- LANYARD ANCHORAGE POINTS ARE RECOMMENDED FOR WORK POSITIONING RESTRAINTS ONLY.

USE OF FALL ARREST SYSTEMS ATTACHED TO ANCHORAGE POINTS ON MOBILE EQUIPMENT MAY CAUSE MACHINE TO TIP, RESULTING IN SERIOUS INJURY OR DEATH.

2684

WARNING

MAXIMUM PLATFORM CAPACITY - EXTENSIVE DISTRIBUTION

5 PERSONS
1700 LBS
770 kg

2 PERSONS
700 LBS
320 kg

150 LBS
68 N

250 LBS
110 N

3084

WARNING

MAXIMUM PLATFORM CAPACITY - EXTENSIVE DISTRIBUTION

5 PERSONS
1500 LBS
680 kg

250 LBS
110 N



WARNING

DISTANCE FROM GROUND TO LADDER WILL VARY WITH GROUND VARIATIONS. CHECK DISTANCE BEFORE LEAVING PLATFORM.

18

STEER

REVERSE UP

FORWARD DOWN

ENABLE BAR

ENABLE BAR MUST BE DEPRESSED DURING ALL FUNCTIONS.

MEC Aerial Platform Sales Corp.
1772 Park Street, Suite 77
Salerno, California 93722
Phone: (800) 887-4272, (559) 363-9626 Fax: (559) 363-9626

19

LIFT

DRIVE

ACTIVATE SIDE LEVER TO CONTROL DIRECTION AND SPEED

HIGH SPEED

MID RANGE

HIGH TORQUE

EMERGENCY STOP

OFF

ON

HORN

TILT

TWIST TO RESET

17

LOCATE CONTROL BOX HERE

FOR NORMAL OPERATION OF THIS UNIT

21

THIS MACHINE HAS BEEN CONSTRUCTED IN ACCORDANCE WITH CAN B354.2-01.

20

AUTO LEVEL

HOLD SWITCH UNTIL LEVELING IS COMPLETE

MANUAL LEVEL

Front to Rear

Side to Side

HOLD SWITCH IN DESIRED DIRECTION

ILLUSTRATION No. ART_3124

Sigma Level

ANSI Speed Level™ ES Models: Sheet 1 of 4

Decals

Decals, ES Models, ANSI Specification

ITEM	PART NO.	QTY	DESCRIPTION
1	90719	1	Decal, MEC Oval
2	91987	2	3084ES -- Decal, MEC 3084ES
	92232	2	2684ES -- Decal, MEC 3084ES
3	--	--	--
4	--	--	--
5	8911	1	Decal, Manuals Inside
6	91869	1	Decal, Warning, Sheet Loading
7	91846	1	Decal, Warning Panel
8	91845	1	Decal, Danger, Electric - Tipover - Wind Rating
9	90718	1	Warning, Inspection Report
10	8606	1	Warning, Lanyard (option)
11	8605	5	Decal, Anchorage Point (option)
12	91847	2	3084 -- Decal, Capacity, 1500 LB
	92228	2	2684 -- Decal, Capacity, 1700 LB
13	91849		Decal, Ladder Clearance
14	90739	1	Decal, Made in USA
15	91850	4	Decal, Crush Hazard
16	7156	1	Decal, Front
17	7155	1	Decal, Locate Control Box Here
18	90729	1	Decal, Upper Control Box, Side
19	91862	1	Decal, Upper Controls
20	91843	1	Decal, Level Controls
21	90794	1	CAN B354 (Canadian Only)

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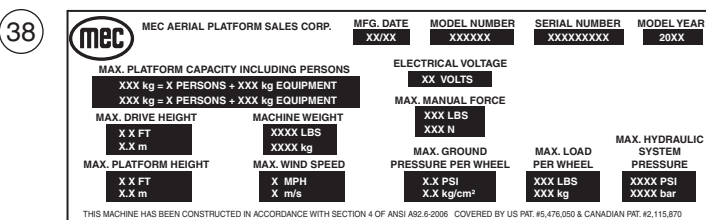
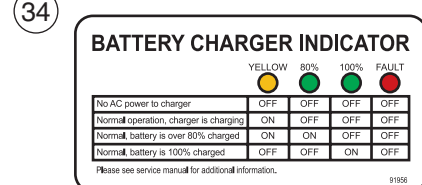
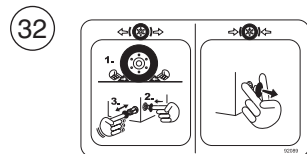
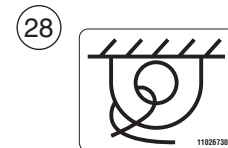
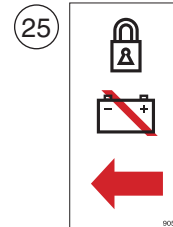
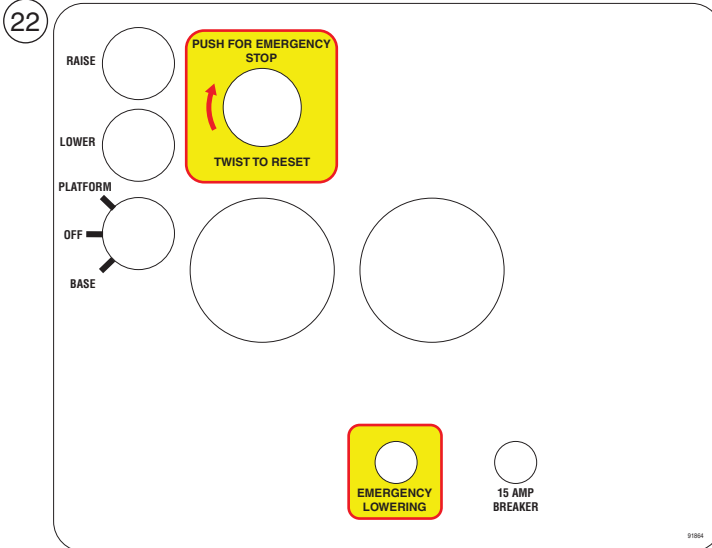
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS - ANSI



Decals, ES Models, ANSI Specification (continued)

ITEM	PART NO.	QTY	DESCRIPTION
22	91864	1	Decal, Lower Controls
23	91266	2	Decal, Quad Trax 4wd
24	91848	1	3084 -- Decal, Platform Capacity, Small
	92122	1	2684 -- Decal, Platform Capacity, Small
25	9052	1	Decal, Battery Disconnect And Lock
26	8779	1	Warning, Battery, Explosive Gas
27	91774	1	Warning, Battery Replacement
28	11026730	2	Tie Down Point
29	90732	1	Decal, Warning, Pressure Wash
30	6873	1	Decal, Hydraulic Oil
31	90750	1	Decal, Battery Charger
32	92089	1	Decal, Brake Release
33	8502	4	Decal, Tire Inflation
34	91956	1	Decal, Battery Charge Indicator
35	--	--	--
36	90725	4	Decal, Warning, Tire Replacement
37	90751	1	Decal, Power To Platform
38	91592	1	Serial Plate
39	91870	1	Decal, Greaseport



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS - ANSI

INSIDE CASE

9

5

7

8

12

6

10

OPTION

11

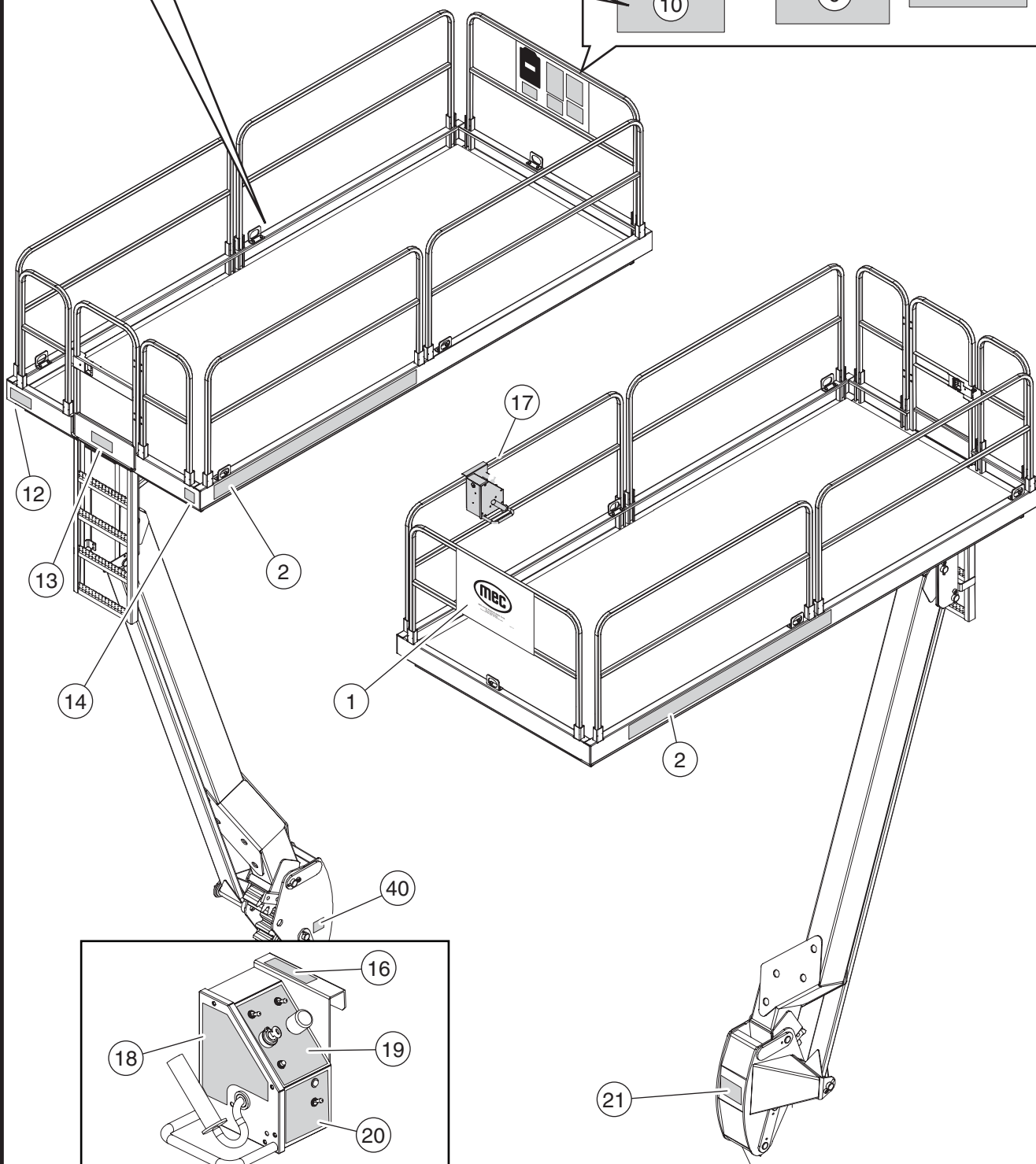


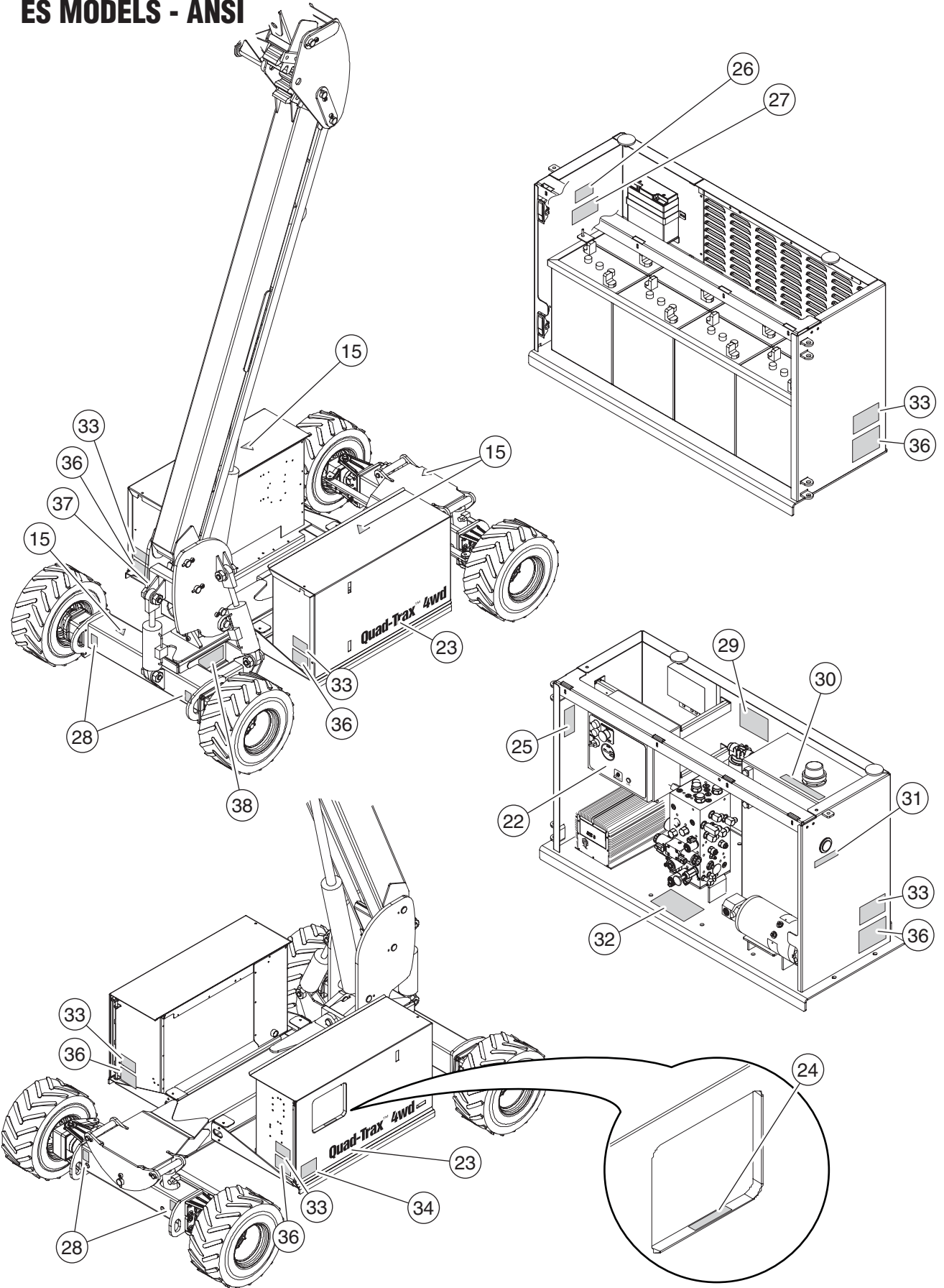
ILLUSTRATION No.
ART_3126

Sigma Level

ANSI Speed Level™ ES Models: Sheet 3 of 4

Decals

ES MODELS - ANSI



MEC
ILLUSTRATION No.
ART_3127

Sigma Level

ANSI Speed Level™ ES Models: Sheet 4 of 4

Decals

RT MODELS - ANSI



2 3084RT

mec 3084RT SPEED LEVEL™

2684RT

mec 2684RT SPEED LEVEL™



WARNING

- SHEET LOADING GATE MUST BE IN LOWERED LOCKED POSITION BEFORE OPERATING FROM PLATFORM.**
- PLATFORM ENTRANCE MUST BE PROPERLY CLOSED AND ALL GUARDRAILS PROPERLY IN PLACE AND SECURED BEFORE OPERATING FROM PLATFORM.**

FAILURE TO FOLLOW INSTRUCTIONS COULD CAUSE DEATH OR PERSONAL INJURY.

WARNING

INSPECT MACHINE AND MAKE SURE THAT IT IS OPERATING PROPERLY, THAT ALL NAME PLATE AND SAFETY AND CONTROL DECALS ARE IN PLACE AND LEGIBLE, AND THAT THE MACHINE IS IN ACCORDANCE WITH THE MANUFACTURER'S MAINTENANCE REQUIREMENTS CONTAINED IN THE OPERATION AND MAINTENANCE MANUAL AND THE DAILY SAFETY CHECKLIST.

OPERATE MACHINE WITH EXTREME CAUTION. WATCH FOR OBSTRUCTIONS WHICH MAY STRIKE PLATFORM, PERSONNEL, CONTROLS, OR MACHINE. OPERATE CONTROLS SLOWLY FOR SMOOTH PLATFORM MOTION.

OTHER HAZARDS

FOR DRIVING WITH PLATFORM LOWERED:

- DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD LIMIT CAPACITY.
- DO NOT EXCEED MAXIMUM SIDE FORCE AND MAXIMUM NUMBER OF OCCUPANTS.
- DO NOT USE WITHOUT GUARD RAILS IN PLACE, AND ENTRY GATE PROPERLY SECURED.
- DO NOT USE IF WORK PLATFORM IS NOT WORKING PROPERLY OR IF ANY PART IS DAMAGED OR WORKS LOOSE.
- DO NOT USE NEAR MOVING VEHICLES OR CRANES.
- DO NOT STAND OR SIT ON GUARDRAILS. ALL PERSONNEL SHALL ALWAYS MAINTAIN FIRM FOOTING ON PLATFORM FLOOR.
- DO NOT USE WHILE UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.
- DO NOT OVERRIDE SAFETY DEVICES.
- DO NOT LEAVE MACHINE UNATTENDED WITH KEY IN THE SWITCH.
- DO NOT RAISE PLATFORM WHILE MACHINE IS ON A TRUCK, FORKLIFT, OR OTHER DEVICE OR VEHICLE.
- DO NOT USE LADDER, SCAFFOLDING, OR OTHER DEVICES TO INCREASE SIZE OR WORKING HEIGHT OF PLATFORM.
- DO NOT ENTER OR EXIT PLATFORM WHILE IN MOTION.
- DO NOT RECHARGE BATTERIES NEAR SPARKS OR OPEN FLAME. BATTERIES EMIT HIGHLY EXPLOSIVE HYDROGEN GAS.
- DO NOT PERFORM SERVICE ON THE MACHINE WITHOUT PROPERLY SUPPORTING ELEVATING ASSEMBLY.
- DO NOT ATTACH OVERHANGING LOADS OR INCREASE PLATFORM SIZE.

FOR DRIVING WITH PLATFORM ELEVATED:

- DRIVE ONLY ON A SMOOTH, FIRM, AND PLANAR SURFACE FREE OF OBSTRUCTIONS.
- DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD CAPACITY.
- LOAD MUST BE UNIFORMLY DISTRIBUTED.
- IF TILT WARNING LIGHT ILLUMINATES OR TILT ALARM SOUNDS LOWER PLATFORM AND RE-LEVEL.
- USE EXTREME CAUTION.

IMPROPER OPERATION OF THIS MACHINE COULD CAUSE DEATH OR SERIOUS INJURY.

DANGER

YOU MUST NOT OPERATE THIS MACHINE:

UNLESS YOU HAVE BEEN AUTHORIZED TO USE AND TRAINED IN THE SAFE OPERATION OF THIS MACHINE.

TRAINING INCLUDES COMPLETE KNOWLEDGE OF THE SAFETY AND OPERATION INSTRUCTIONS CONTAINED IN THE MANUFACTURER'S MANUAL, ANSI MANUAL OF RESPONSIBILITIES, YOUR EMPLOYER'S WORK RULES AND APPLICABLE GOVERNMENTAL REGULATIONS.

AN UNAUTHORIZED AND UNTRAINED OPERATOR SUBJECTS THEMSELF AND OTHERS TO DEATH OR SERIOUS INJURY.

ELECTROCUTION HAZARD

THIS MACHINE IS NOT INSULATED.

MAINTAIN SAFE CLEARANCE FROM ELECTRICAL LINES AND APPARATUS. YOU MUST ALLOW FOR MACHINE SWAY, ROCK OR SAG AND ELECTRICAL LINES SWAYING.

THIS MACHINE DOES NOT PROVIDE PROTECTION FROM CONTACT WITH OR PROXIMITY TO AN ELECTRICALLY CHARGED CONDUCTOR.

YOU MUST MAINTAIN A CLEARANCE OF AT LEAST TEN (10) FEET BETWEEN ANY PART OF THIS MACHINE OR ITS LOAD AND ANY ELECTRICAL LINE OR APPARATUS CARRYING UP TO 50,000 VOLTS. ONE FOOT OF ADDITIONAL CLEARANCE IS REQUIRED FOR EVERY ADDITIONAL 30,000 VOLTS OR LESS.

DEATH OR SERIOUS INJURY WILL RESULT FROM CONTACT OR INADEQUATE CLEARANCE

TIP-OVER HAZARDS

- DO NOT DRIVE NEAR DROP-OFFS, HOLES, OPEN ELEVATOR SHAFTS, AND LOADING DOCKS.
- DO NOT ELEVATE PLATFORM ON UNEVEN OR SOFT SURFACES.
- DO NOT DRIVE ONTO UNEVEN OR SOFT SURFACES WHEN ELEVATED.
- DO NOT RAISE PLATFORM IN WINDY OR GUSTY CONDITIONS.

DEATH OR SERIOUS INJURY WILL RESULT FROM IMPROPER USE OF THIS EQUIPMENT

WARNING

USE OR OPERATION OF AN UNSPECTED WORK PLATFORM COULD CAUSE DEATH, PERSONAL INJURY

NEW	<ul style="list-style-type: none"> DO NOT OPERATE THIS WORK PLATFORM IF AN INSPECTION HAS NOT BEEN PERFORMED WITHIN 13 MONTHS OF THE LAST RECORDED INSPECTION DATE. STAMP MONTH/DAY/YEAR NEXT TO APPROPRIATE YEAR AFTER EACH INSPECTION. <p>NOTICE — CHANGE OF OWNERSHIP OF THIS WORK PLATFORM MUST BE REPORTED TO MANUFACTURER:</p> <p>MEC Aerial Platform Sales Corp. 4780 E. Johnson Avenue Fresno, California 93725 Phone: (559) 263-6626</p>	6TH YEAR
1ST YEAR		7TH YEAR
2ND YEAR		8TH YEAR
3RD YEAR		9TH YEAR
4TH YEAR		10TH YEAR
5TH YEAR		

WARNING

- LANYARD ANCHORAGE POINTS ARE RECOMMENDED FOR WORK POSITIONING RESTRAINTS ONLY.

USE OF FALL ARREST SYSTEMS ATTACHED TO ANCHORAGE POINTS ON MOBILE EQUIPMENT MAY CAUSE MACHINE TO TIP, RESULTING IN SERIOUS INJURY OR DEATH.

CERTIFIED LANYARD ANCHORAGE POINT

2684

WARNING

MAXIMUM PLATFORM CAPACITY - EVENLY DISTRIBUTED

5 PERSONS
1700 LBS
770 kg

2 PERSONS
700 LBS
320 kg

150 LBS
68 N

3084

WARNING

MAXIMUM PLATFORM CAPACITY - EVENLY DISTRIBUTED

5 PERSONS
1500 LBS
680 kg

1500 LBS
680 N

WARNING

DISTANCE FROM GROUND TO LADDER WILL VARY WITH GROUND VARIATIONS. CHECK DISTANCE BEFORE LEAVING PLATFORM.

MADE IN USA

MEC AERIAL PLATFORM SALES CORP.



18

STEER

REVERSE UP

FORWARD DOWN

ENABLE BAR

ENABLE BAR MUST BE DEPRESSED DURING ALL FUNCTIONS.

MEC Aerial Platform Sales Corp.

1775 Park Street, Suite 77
Fresno, California 93722
Phone: (800) 367-6675 (559) 263-6626 Fax: 559-891-2683

19

MODE SELECT

LIFT

DRIVE

OFF

START

HORN

ON

OFF GENERATOR

HIGH SPEED

TILT

MID

HIGH TORQUE EMERGENCY STOP

TWIST TO RESET

CHOKE/LOW

17

LOCATE CONTROL BOX HERE

FOR NORMAL OPERATION OF THIS UNIT

20

AUTO LEVEL

HOLD SWITCH UNTIL LEVELING IS COMPLETE

MANUAL LEVEL

Hold switch in desired direction

Slide to Stop

21

THIS MACHINE HAS BEEN CONSTRUCTED IN ACCORDANCE WITH CAN B354.2-01.

MEC
ILLUSTRATION No.
ART_3128

Sigma Level

ANSI Speed Level™ RT Models: Sheet 1 of 4

Decals

Decals, RT Models, ANSI Specification

ITEM	PART NO.	QTY	DESCRIPTION
1	90719	1	Decal, MEC Oval
2	91990	2	3084RT -- Decal, SPEED LEVEL
	92231	2	2684RT -- Decal, SPEED LEVEL
3	--	--	--
4	--	--	--
5	8911	1	Decal, Manuals Inside
6	91869	1	Decal, Warning, Sheet Loading
7	91846	1	Decal, Warning Panel
8	91845	1	Decal, Danger, Electric - Tipover - Wind Rating
9	90718	1	Warning, Inspection Report
10	8606	1	Warning, Lanyard (option)
11	8605	5	Decal, Anchorage Point (option)
12	91847	2	3084 -- Decal, Capacity, 1500 LB
	92228	2	2684 -- Decal, Capacity, 1700 LB
13	91849	1	Decal, Ladder Clearance
14	90739	1	Decal, Made in USA
15	91850	4	Decal, Crush Hazard
16	7156	1	Decal, Front
17	7155	1	Decal, Locate Control Box Here
18	90729	1	Decal, Upper Control Box, Side
19	91158	1	Decal, Upper Controls
20	91843	1	Decal, Level Controls
21	90794	1	CAN B354 (Canadian Only)

... continued



• as req: as required

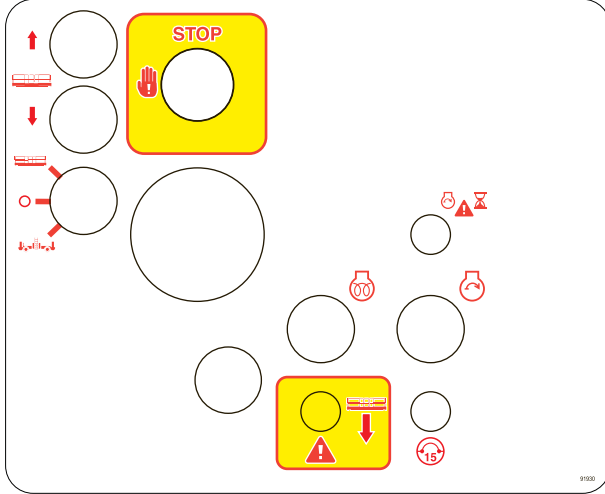
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• NS: Not a Stock item

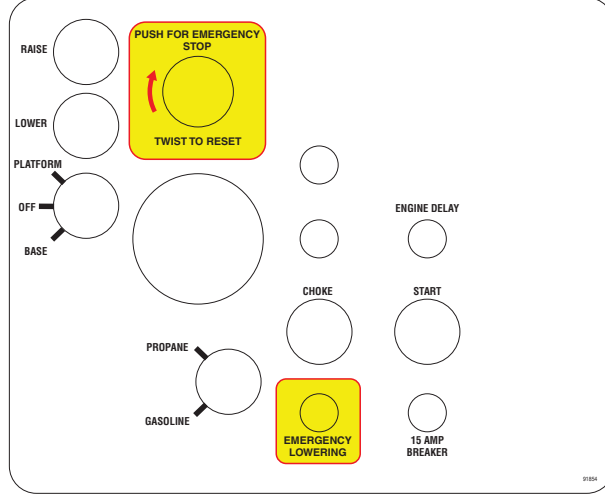
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RT MODELS - ANSI

22 DIESEL



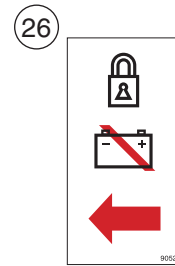
23 DUAL FUEL



24 Quad-Trax™ 4wd

2684
PLATFORM CAPACITY
1700 LBs (770kg)
92122

3084
PLATFORM CAPACITY
1500 LBs (680kg)
91848

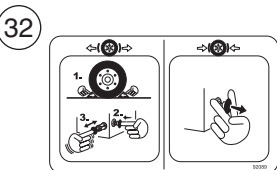


27 HYDRAULIC OIL

28 POWER TO PLATFORM



31 INFLATE TO TIRE MANUFACTURER'S MAX. SPECIFICATIONS OR SEE SERVICE MANUAL



34 WARNING

- REPLACE TIRES WITH MANUFACTURER'S EQUIPMENT ONLY.
- FAILURE TO USE MANUFACTURER'S TIRES MAY CAUSE MACHINE INSTABILITY.
- REFER TO MAINTENANCE MANUAL FOR REPLACEMENT PART NUMBER.

8519

35 DUAL FUEL

WARNING

L.P.G.

1. NO SMOKING - WHILE CHANGING TANKS.
2. "MOUNT TANKS PROPERLY" USING HOLES IN COLLAR FOR HORIZONTAL MOUNTING AND SLOT FOOTINGS FOR VERTICAL MOUNTING TO INSURE FULL USAGE.
3. OPEN VALVE SLOWLY SO THAT HOSE AND TANK PRESSURE CAN EQUALIZE OR VALVE MAY SLUG.
4. CLOSE VALVE BEFORE DISCONNECTING AND USE UP FUEL STILL IN LINE.
5. FOR PROPER USE OF THE L.P. SYSTEM, THE USE OF FUEL MANUFACTURED TO NATURAL GAS PROCESSORS ASSN. SPECIFICATIONS - "HD-6" - IS RECOMMENDED.

36 DUAL FUEL

GASOLINE ONLY

37 DIESEL

DIESEL ONLY



39

MEC AERIAL PLATFORM SALES CORP.		MFG. DATE	MODEL NUMBER	SERIAL NUMBER	MODEL YEAR
MAX. PLATFORM CAPACITY INCLUDING PERSONS XXX kg = X PERSONS + XXX kg EQUIPMENT XXX kg = X PERSONS + XXX kg EQUIPMENT		XXXX	XXXXXX	XXXXXXXXXX	20XX
MAX. DRIVE HEIGHT X X FT X.X m		MACHINE WEIGHT XXXX LBS XXXX kg		ELECTRICAL VOLTAGE XXX VOLTS	
MAX. PLATFORM HEIGHT X X FT X.X m		MAX. WIND SPEED X MPH X m/s		MAX. MANUAL FORCE XXX LBS XXX N	
MAX. GROUND PRESSURE PER WHEEL X X PSI X.X kg/cm²		MAX. LOAD PRESSURE PER WHEEL XXX LBS XXX kg		MAX. HYDRAULIC SYSTEM PRESSURE XXXX PSI XXXX bar	

THIS MACHINE HAS BEEN CONSTRUCTED IN ACCORDANCE WITH SECTION 4 OF ANSI A92.6-2006. COVERED BY US PAT. #6,476,980 & CANADIAN PAT. #2,115,870

40 GREASE PORT
(Slide to open)
91870

ILLUSTRATION No.
ART_3129

Sigma Level

ANSI Speed Level™ RT Models: Sheet 2 of 4

Decals

Decals, RT Models, ANSI Specification (continued)

ITEM	PART NO.	QTY	DESCRIPTION
22	91930	1	Decal, Lower Controls DIESEL
23	91854	1	Decal, Lower Controls DUAL FUEL
24	91266	2	Decal, Quad Trax 4wd
25	91848	1	3084 -- Decal, Platform Capacity, Small
	92122	1	2684 -- Decal, Platform Capacity, Small
26	9052	1	Decal, Battery Disconnect And Lock
27	6873	1	Decal, Hydraulic Oil
28	90751	1	Decal, Power To Platform
29	8779	1	Warning, Battery, Explosive Gas
30	90732	1	Decal, Warning, Pressure Wash
31	8502	4	Decal, Tire Inflation
32	92089	1	Decal, Brake Release
33	--	--	--
34	8519	4	Decal, Warning, Tire Replacement
35	6948	1	Decal, Warning, LPG DUAL FUEL
36	6872	1	Decal, Gasoline Only DUAL FUEL
37	9378	1	Decal, Diesel Only DIESEL
38	11026730	2	Tie Down Point
39	90751	1	Serial Plate
40	91870	1	Decal, Grease Port



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS - ANSI

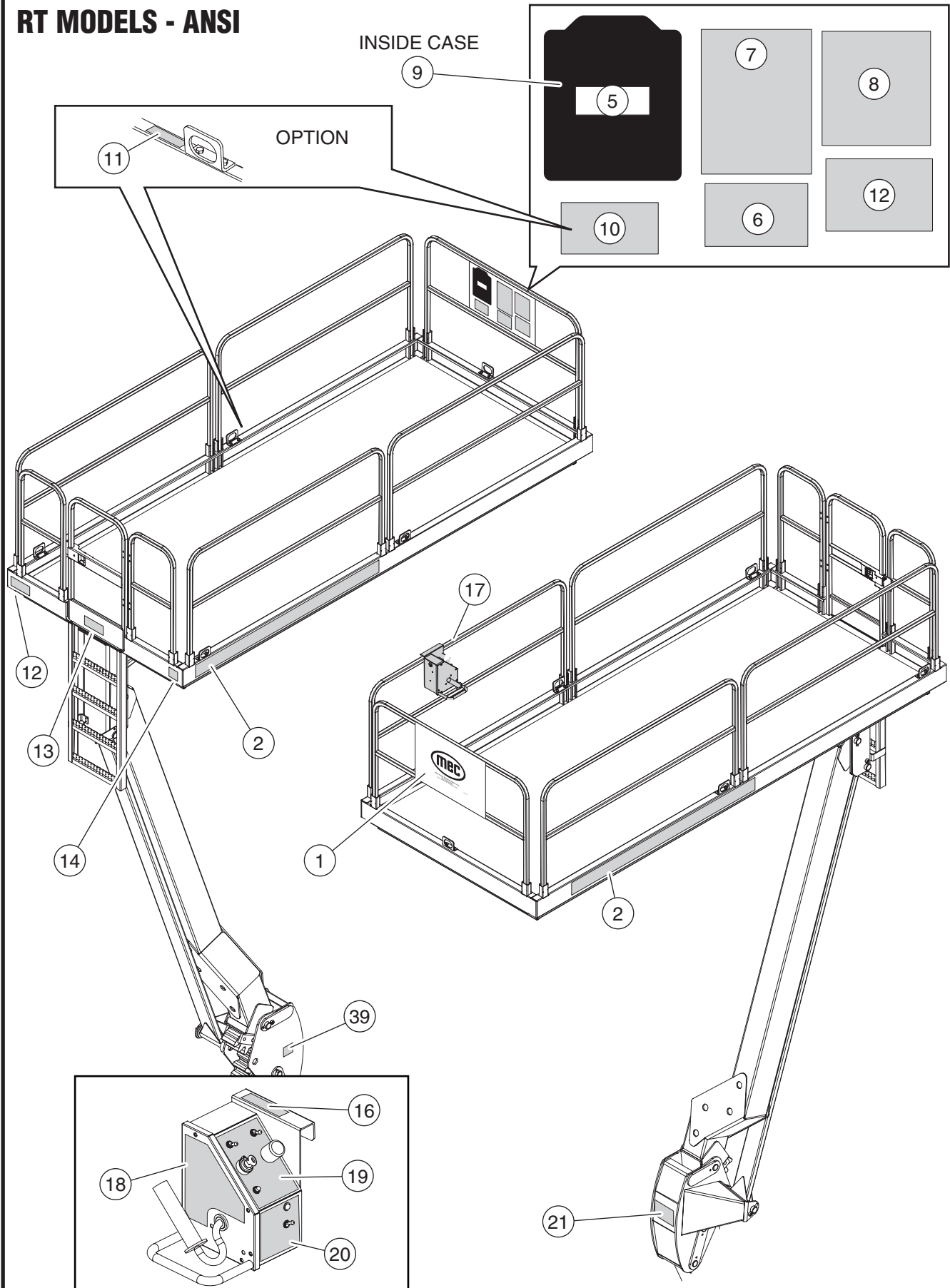


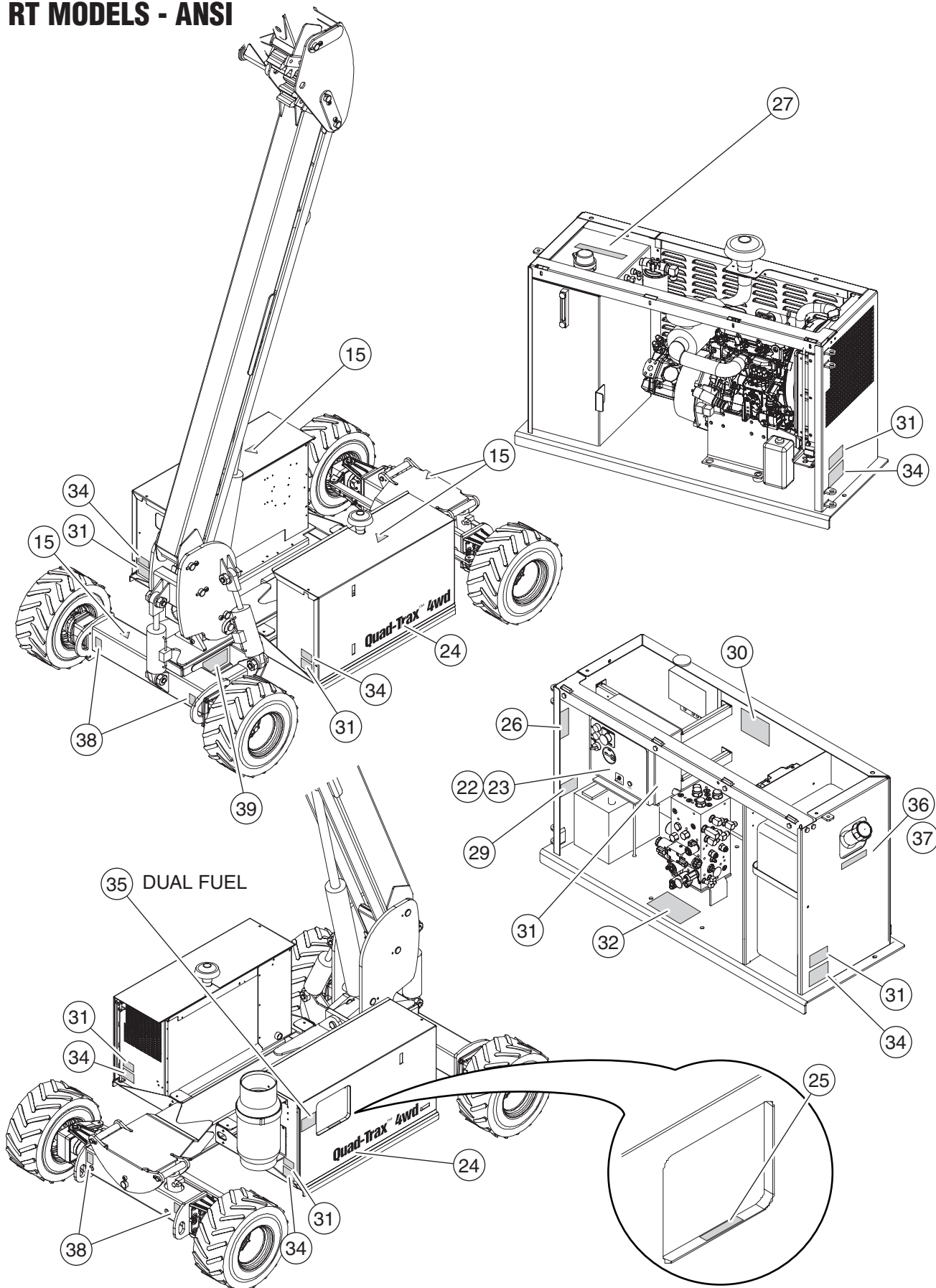
ILLUSTRATION No.
ART_3130

Sigma Level

ANSI Speed Level™ RT Models: Sheet 3 of 4

Decals

RT MODELS - ANSI



MEC
ILLUSTRATION No.
ART_3131

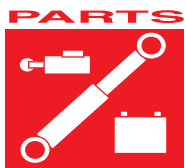
Sigma Level

ANSI Speed Level™ RT Models: Sheet 4 of 4

Decals

NOTES:





SECTION H

DECALS, CE MODELS

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ES MODELS - CE

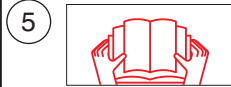


3084ES

mec 3084ES SPEED LEVEL™

2684ES

mec 2684ES SPEED LEVEL™



WARNING

INSPECT MACHINE AND MAKE SURE THAT IT IS OPERATING PROPERLY, THAT ALL NAME PLATE AND SAFETY AND CONTROL DECALS ARE IN PLACE AND LEGIBLE, AND THAT THE MACHINE IS IN ACCORDANCE WITH THE MANUFACTURER'S MAINTENANCE REQUIREMENTS CONTAINED IN THE OPERATION AND MAINTENANCE MANUAL AND THE DAILY SAFETY CHECKLIST.

OPERATE MACHINE WITH EXTREME CAUTION. WATCH FOR OBSTRUCTIONS WHICH MAY STRIKE PLATFORM, PERSONNEL, CONTROLS, OR MACHINE. OPERATE CONTROLS SLOWLY FOR SMOOTH PLATFORM MOTION.

FOR DRIVING WITH PLATFORM LOWERED:

- DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD LIMIT CAPACITY. LOAD TO BE UNIFORMLY DISTRIBUTED. PLACE LOAD NEAR CENTER OF PLATFORM WHEN POSSIBLE.
- DO NOT DRIVE ON SIDE SLOPE IF PLATFORM IS OVER 5% OFF LEVEL.
- DO NOT DRIVE UP OR DOWN A GRADE OF OVER 40%.

FOR DRIVING WITH PLATFORM ELEVATED:

- DRIVE ONLY ON A SMOOTH, FIRM, AND PLANAR SURFACE FREE OF OBSTRUCTIONS.
- DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD CAPACITY.
- LOAD MUST BE UNIFORMLY DISTRIBUTED.
- IF TILT WARNING LIGHT ILLUMINATES OR TILT ALARM SOUNDS LOWER PLATFORM AND RE-LEVEL.
- USE EXTREME CAUTION.

IMPROPER OPERATION OF THIS MACHINE COULD CAUSE DEATH OR SERIOUS INJURY.

DANGER

YOU MUST NOT OPERATE THIS MACHINE:

UNLESS YOU HAVE BEEN AUTHORIZED TO USE AND TRAINED IN THE SAFE OPERATION OF THIS MACHINE. TRAINING INCLUDES COMPLETE KNOWLEDGE OF THE SAFETY AND OPERATION INSTRUCTIONS CONTAINED IN THE MANUFACTURER'S MANUAL, AND MANUAL OF RESPONSIBILITIES, YOUR EMPLOYER'S WORK RULES AND APPLICABLE GOVERNMENTAL REGULATIONS.

AN UNAUTHORIZED AND UNTRAINED OPERATOR SUBJECTS HIMSELF AND OTHERS TO DEATH OR SERIOUS INJURY.

ELECTROCUTION HAZARD THIS MACHINE IS NOT INSULATED

MAINTAIN SAFE CLEARANCE FROM ELECTRICAL LINES AND APPARATUS. YOU MUST ALLOW FOR MACHINE SWAY, ROCK OR SAG AND ELECTRICAL LINES SWAYING.

THIS MACHINE DOES NOT PROVIDE PROTECTION FROM CONTACT WITH OR PROXIMITY TO AN ELECTRICALLY CHARGED CONDUCTOR.

YOU MUST MAINTAIN A CLEARANCE OF AT LEAST TEN (10) FEET BETWEEN ANY PART OF THIS MACHINE OR ITS LOAD AND ANY ELECTRICAL LINE OR APPARATUS CARRYING UP TO 50,000 VOLTS. ONE FOOT OF ADDITIONAL CLEARANCE IS REQUIRED FOR EVERY ADDITIONAL 30,000 VOLTS OR LESS.

DEATH OR SERIOUS INJURY WILL RESULT FROM CONTACT OR INADEQUATE CLEARANCE

TIP-OVER HAZARDS



DO NOT DRIVE NEAR DROP-OFFS, HOLES, OPEN ELEVATOR SHAFTS, AND LOADING DOCKS



DO NOT ELEVATE PLATFORM ON UNEVEN OR SOFT SURFACES



DO NOT DRIVE ONTO UNEVEN OR SOFT SURFACES WHEN ELEVATED



DO NOT RAISE PLATFORM IN WINDY OR GUSTY CONDITIONS

91845

WARNING		
USE OR OPERATION OF AN UNSPECTED WORK PLATFORM COULD CAUSE DEATH, PERSONAL INJURY		
NEW	<ul style="list-style-type: none"> DO NOT OPERATE THIS WORK PLATFORM IF AN INSPECTION HAS NOT BEEN PERFORMED WITHIN 13 MONTHS OF THE LAST RECORDED INSPECTION DATE. STAMP MONTH/DAY/YEAR NEXT TO APPROPRIATE YEAR AFTER EACH INSPECTION. 	6TH YEAR
1ST YEAR		7TH YEAR
2ND YEAR		8TH YEAR
3RD YEAR		9TH YEAR
4TH YEAR		10TH YEAR
5TH YEAR	<p>CHANGE OF OWNERSHIP OF THIS WORK PLATFORM MUST BE REPORTED TO MANUFACTURER:</p> <p>MEC Aerial Platform Sales Corp. 4700 N. Jensen Avenue Palo Alto, California 94305 Phone: (650) 253-9626</p>	NOTED

WARNING

- LANYARD ANCHORAGE POINTS ARE RECOMMENDED FOR WORK POSITIONING RESTRAINTS ONLY.

USE OF FALL ARREST SYSTEMS ATTACHED TO ANCHORAGE POINTS ON MOBILE EQUIPMENT MAY CAUSE MACHINE TO TIP, RESULTING IN SERIOUS INJURY OR DEATH.

CERTIFIED LANYARD ANCHORAGE POINT

2684

WARNING

MAXIMUM PLATFORM CAPACITY
EVENLY DISTRIBUTED

5 PERSONS
770 kg

2 PERSONS
320 kg

MAXIMUM WIND SPEED
12.5 M/S
45 KMH

MAXIMUM SIDE LOAD
400 N

3084

WARNING

MAXIMUM PLATFORM CAPACITY
EVENLY DISTRIBUTED

680 kg

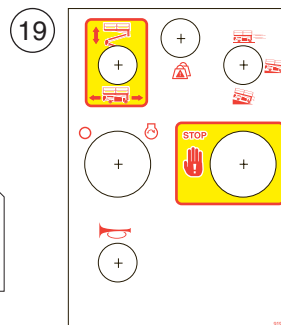
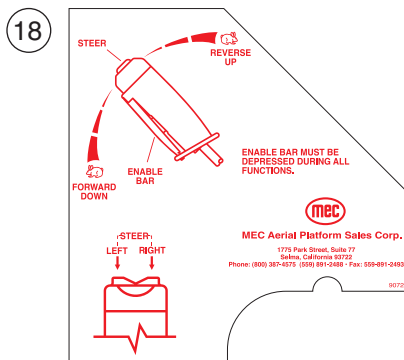
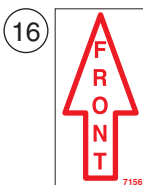
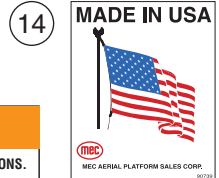
5 PERSONS

MAXIMUM WIND SPEED
12.5 M/S
45 KMH

MAXIMUM SIDE LOAD
400 N

WARNING

DISTANCE FROM GROUND TO LADDER WILL VARY WITH GROUND VARIATIONS. CHECK DISTANCE BEFORE LEAVING PLATFORM.



17

LOCATE CONTROL BOX HERE
FOR NORMAL OPERATION OF THIS UNIT

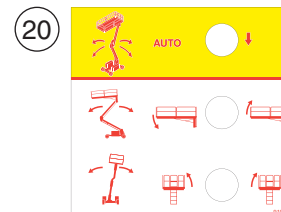


ILLUSTRATION No.
ART_3398

Sigma Level

CE Speed Level™ ES Models: Sheet 1 of 4

Decals

Decals, ES Models, CE Specification

ITEM	PART NO.	QTY	DESCRIPTION
1	90719	1	Decal, MEC Oval
2	91987	2	3084ES -- Decal, MEC 3084ES
	92232	2	2684ES -- Decal, MEC 3084ES
3	--	--	--
4	--	--	--
5	8911	1	Decal, Manuals Inside
6	91869	1	Decal, Warning, Sheet Loading
7	91846	1	Decal, Warning Panel
8	91845	1	Decal, Danger, Electric - Tipover - Wind Rating
9	90718	1	Warning, Inspection Report
10	8606	1	Warning, Lanyard
11	8605	5	Decal, Anchorage Point
12	91944	2	3084 - Decal, Capacity, 1500 LB
	92121	2	2684 - Decal, Capacity, 1700 LB
13	91849		Decal, Ladder Clearance
14	90739	1	Decal, Made in USA
15	91850	1	Decal, Crush Hazard
16	7156	1	Decal, Front
17	7155	1	Decal, Locate Control Box Here
18	90729	1	Decal, Upper Control Box, Side
19	91934	1	Decal, Upper Controls
20	91932	1	Decal, Level Controls
21	--	--	--

... continued



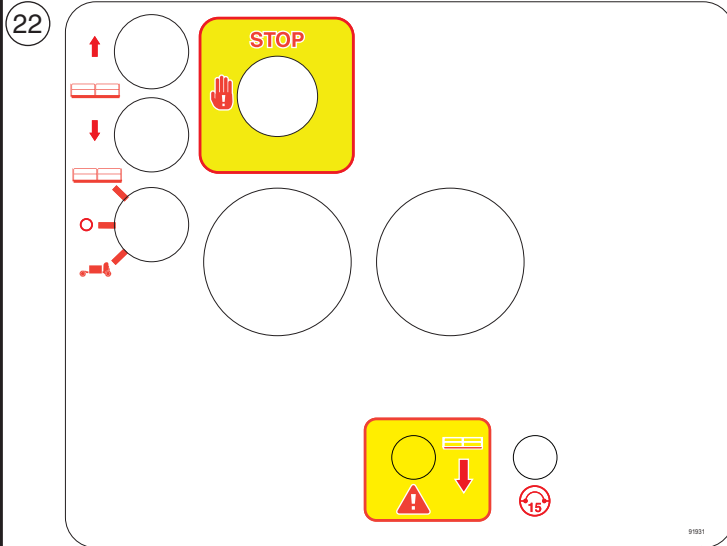
• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

ES MODELS - CE



23 Quad-Trax™ 4wd

24
2684
PLATFORM CAPACITY
1700 LBs (770kg)
92122

3084
PLATFORM CAPACITY
1500 LBs (680kg)
91848

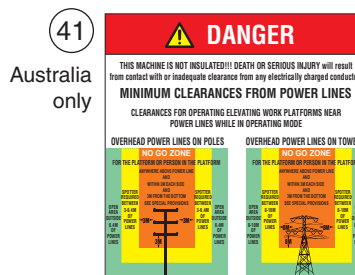
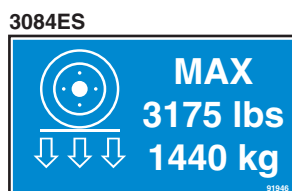
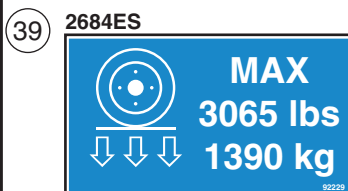
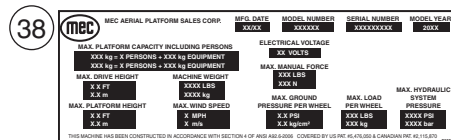
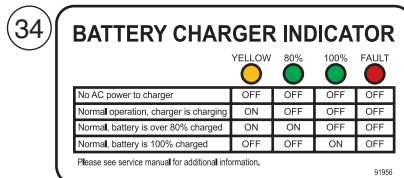
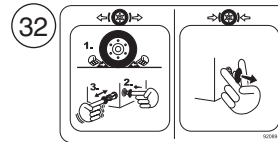
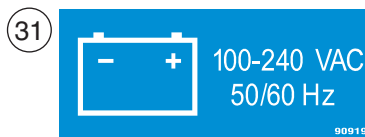
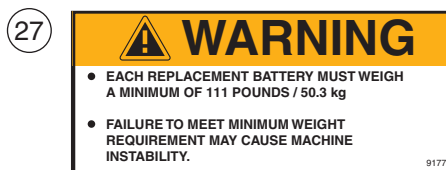
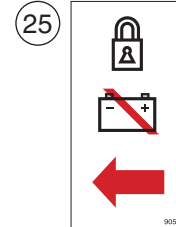


ILLUSTRATION No.
ART_3399

Sigma Level

CE Speed Level™ ES Models: Sheet 2 of 4

Decals

Decals, ES Models, CE Specification (continued)

ITEM	PART NO.	QTY	DESCRIPTION
22	91931	1	Decal, Lower Controls
23	91266	2	Decal, Quad Trax 4wd
24	91848	1	3084 - Decal, Platform Capacity, Small
	92122	1	2684 - Decal, Platform Capacity, Small
25	9052	1	Decal, Battery Disconnect And Lock
26	8779	1	Warning, Battery, Explosive Gas
27	91774	1	Warning, Battery Replacement
28	11026730	1	Tie Down Point
29	90732	1	Decal, Warning, Pressure Wash
30	6873	1	Decal, Hydraulic Oil
31	90919	1	Decal, Battery Charger
32	92089	1	Decal, Brake Release
33	8502	4	Decal, Tire Inflation
34	91956	1	Decal, Battery Charge Indicator
35	8867	1	Tag, Warning
36	8519	4	Decal, Warning, Tire Replacement
37	90751	1	Decal, Power To Platform
38	91775	1	Serial Plate
39	91946	4	3084ES - Decal, Wheel Load
	92229	4	2684ES - Decal, Wheel Load
40	91870	1	Decal, Grease Port
41	91325	1	Decal, Danger, Electrocution Hazard (AUS Only)

• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only



ES MODELS - CE

INSIDE CASE

OPTION

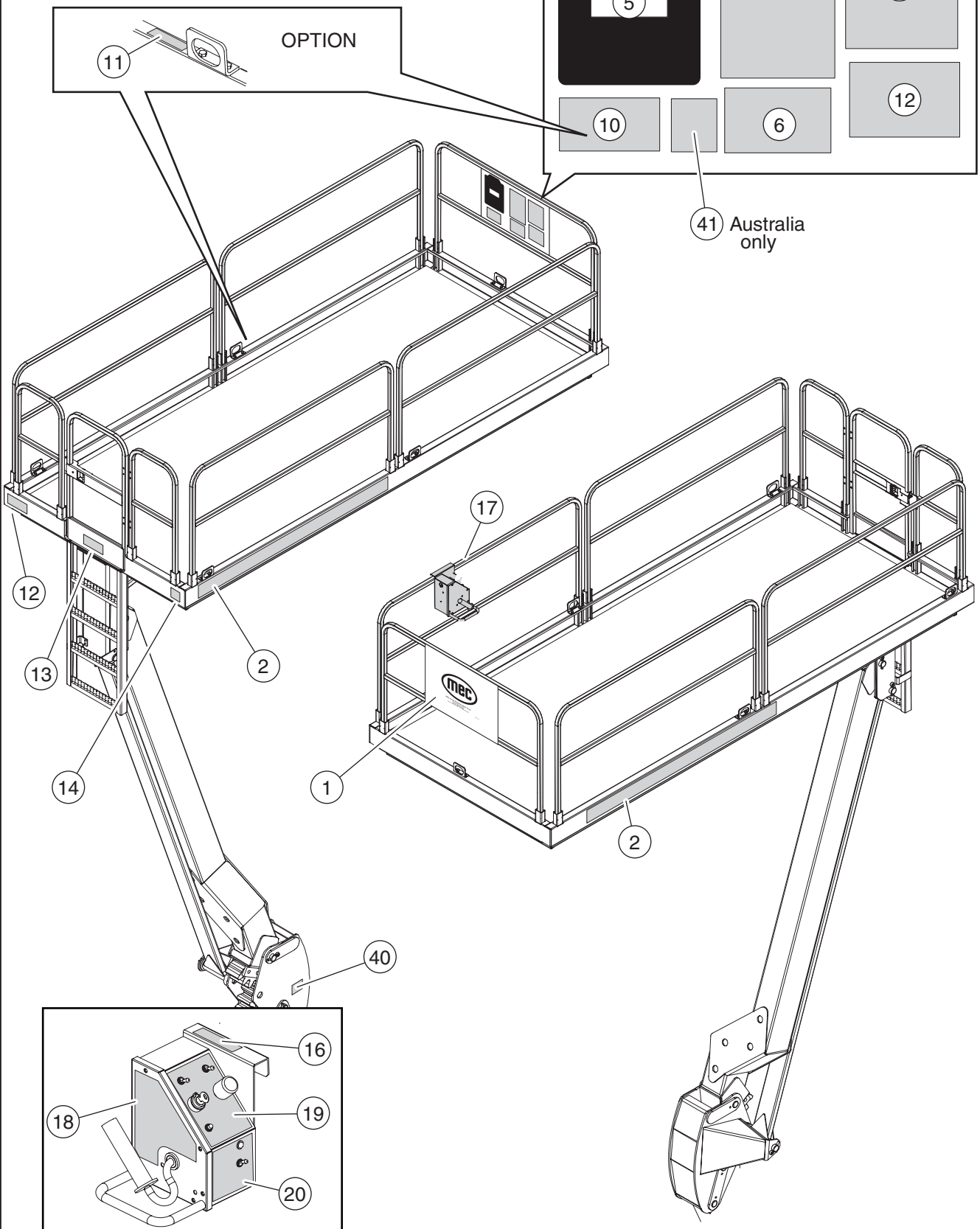


ILLUSTRATION No.
ART_3400

Sigma Level

CE Speed Level™ ES Models: Sheet 3 of 4

Decals

ES MODELS - CE

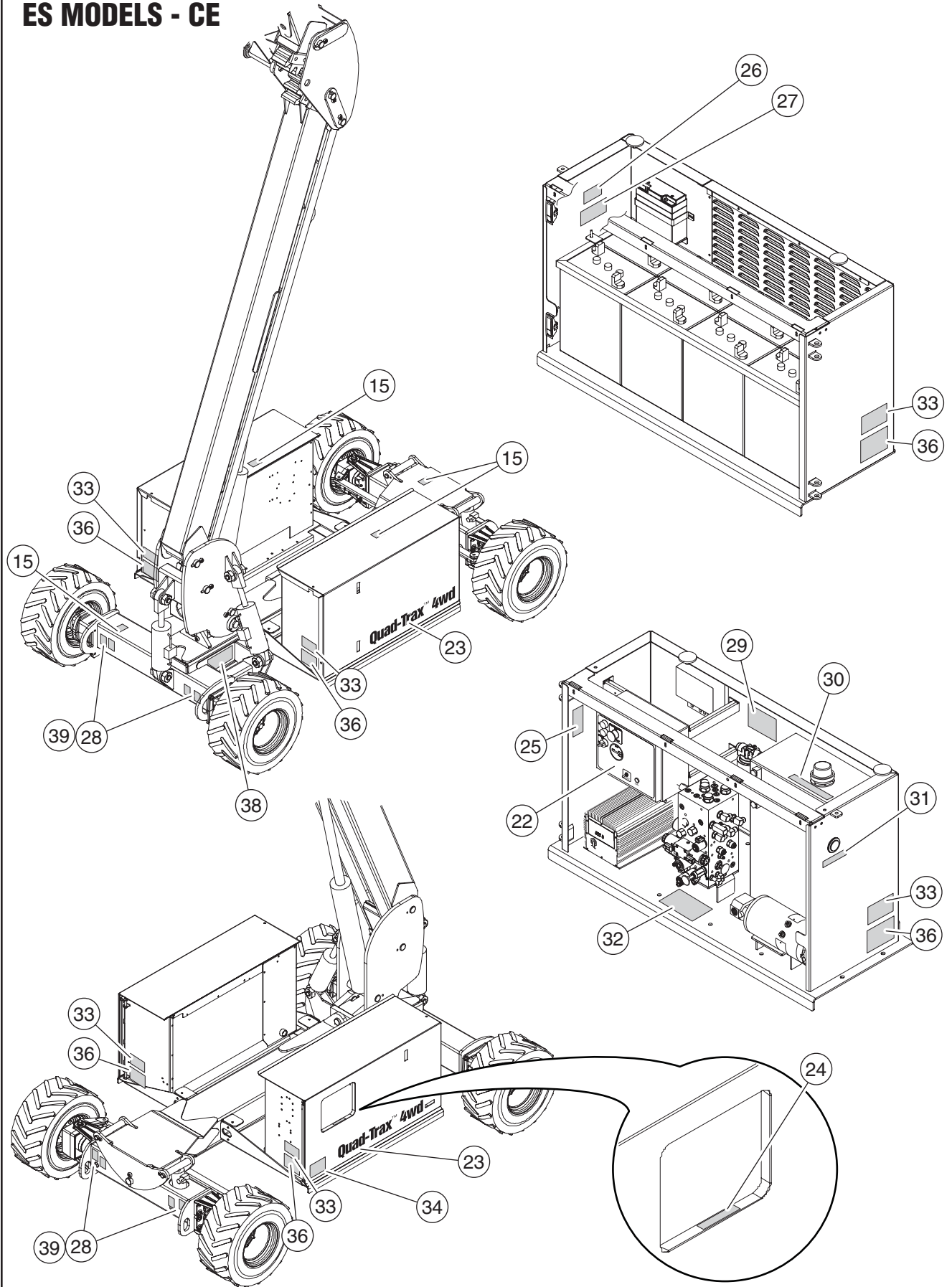


ILLUSTRATION No.
ART_3401

Sigma Level

CE Speed Level™ ES Models: Sheet 4 of 4

Decals

RT MODELS - CE

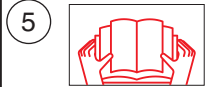


3084RT

mec 3084RT SPEED LEVEL™

2684RT

mec 2684RT SPEED LEVEL™



WARNING

- SHEET LOADING GATE MUST BE IN LOWERED LOCKED POSITION BEFORE OPERATING FROM PLATFORM.**
- PLATFORM ENTRANCE MUST BE PROPERLY CLOSED AND ALL GUARDRAILS PROPERLY IN PLACE AND SECURED BEFORE OPERATING FROM PLATFORM.**

FAILURE TO FOLLOW INSTRUCTIONS COULD CAUSE DEATH OR PERSONAL INJURY.

WARNING

INSPECT MACHINE AND MAKE SURE THAT IT IS OPERATING PROPERLY, THAT ALL NAME PLATE AND SAFETY AND CONTROL DECALS ARE IN PLACE AND LEGIBLE, AND THAT THE MACHINE IS IN ACCORDANCE WITH THE MANUFACTURER'S MAINTENANCE REQUIREMENTS CONTAINED IN THE OPERATION AND MAINTENANCE MANUAL AND THE DAILY SAFETY CHECKLIST.

OPERATE MACHINE WITH EXTREME CAUTION. WATCH FOR OBSTRUCTIONS WHICH MAY STRIKE PLATFORM, PERSONNEL, CONTROLS, OR MACHINE. OPERATE CONTROLS SLOWLY FOR SMOOTH PLATFORM MOTION.

FOR DRIVING WITH PLATFORM LOWERED:	OTHER HAZARDS
<ul style="list-style-type: none"> DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD LIMIT CAPACITY. LOAD TO BE UNIFORMLY DISTRIBUTED. PLACE LOAD NEAR CENTER OF PLATFORM WHEN POSSIBLE. DO NOT DRIVE ON SIDE SLOPE IF PLATFORM IS OVER 5% OFF LEVEL. DO NOT DRIVE UP OR DOWN A GRADE OF OVER 40%. 	<ol style="list-style-type: none"> DO NOT EXCEED PLATFORM LOAD CAPACITY. DO NOT EXCEED MAXIMUM SIDE FORCE AND MAXIMUM NUMBER OF OCCUPANTS. DO NOT USE WITHOUT GUARD RAILS IN PLACE, AND ENTRY GATE PROPERLY SECURED. DO NOT USE IF WORK PLATFORM IS NOT WORKING PROPERLY OR IF ANY PART IS DAMAGED OR WORN. DO NOT USE NEAR MOVING VEHICLES OR CRANES. DO NOT STAND OR SIT ON GUARDRAILS. ALL PERSONNEL SHALL ALWAYS MAINTAIN FIRM FOOTING ON PLATFORM FLOOR. DO NOT USE WHILE UNDER THE INFLUENCE OF ALCOHOL OR DRUGS. DO NOT OVERRIDE SAFETY DEVICES. DO NOT LEAVE MACHINE UNATTENDED WITH KEY IN THE SWITCH. DO NOT RAISE PLATFORM WHILE MACHINE IS ON A TRUCK, FORKLIFT, OR OTHER DEVICE OR VEHICLE. DO NOT USE LADDER, SCAFFOLDING, OR OTHER DEVICES TO INCREASE SIZE OR WORKING HEIGHT OF PLATFORM. DO NOT ENTER OR EXIT PLATFORM WHILE IN MOTION. DO NOT RECHARGE BATTERIES NEAR SPARKS OR OPEN FLAME. BATTERIES EMIT HIGHLY EXPLOSIVE HYDROGEN GAS. DO NOT PERFORM SERVICE ON THE MACHINE WITHOUT PROPERLY SUPPORTING ELEVATING ASSEMBLY. DO NOT ATTACH OVERHANGING LOADS OR INCREASE PLATFORM SIZE.

FOR DRIVING WITH PLATFORM ELEVATED:

- DRIVE ONLY ON A SMOOTH, FIRM, AND PLANAR SURFACE FREE OF OBSTRUCTIONS.
- DO NOT EXCEED MAXIMUM PLATFORM OR EXTENSION LOAD CAPACITY.
- LOAD MUST BE UNIFORMLY DISTRIBUTED.
- IF TILT WARNING LIGHT ILLUMINATES OR TILT ALARM SOUNDS LOWER PLATFORM AND RE-LEVEL.
- USE EXTREME CAUTION.

IMPROPER OPERATION OF THIS MACHINE COULD CAUSE DEATH OR SERIOUS INJURY.

DANGER

YOU MUST NOT OPERATE THIS MACHINE:
UNLESS YOU HAVE BEEN AUTHORIZED TO USE AND TRAINED IN THE SAFE OPERATION OF THIS MACHINE.
TRAINING INCLUDES COMPLETE KNOWLEDGE OF THE SAFETY AND OPERATION INSTRUCTIONS CONTAINED IN THE MANUFACTURER'S MANUAL, AND MANUAL OF RESPONSIBILITIES, YOUR EMPLOYER'S WORK RULES AND APPLICABLE GOVERNMENTAL REGULATIONS.
AN UNAUTHORIZED AND UNTRAINED OPERATOR SUBJECTS THEMSELF AND OTHERS TO DEATH OR SERIOUS INJURY.

TIP-OVER HAZARDS

- DO NOT DRIVE NEAR DROP-OFFS, HOLES, OPEN ELEVATOR SHAFTS, AND LOADING DOCKS.
- DO NOT ELEVATE PLATFORM ON UNEVEN OR SOFT SURFACES.
- DO NOT DRIVE ONTO UNEVEN OR SOFT SURFACES WHEN ELEVATED.
- DO NOT RAISE PLATFORM IN WINDY OR GUSTY CONDITIONS.

ELECTROCUTION HAZARD
THIS MACHINE IS NOT INSULATED.
MAINTAIN SAFE CLEARANCE FROM ELECTRICAL LINES AND APPARATUS. YOU MUST ALLOW FOR MACHINE SWAY, ROCK OR SAG AND ELECTRICAL LINES SWAYING.
THIS MACHINE DOES NOT PROVIDE PROTECTION FROM CONTACT WITH OR PROXIMITY TO AN ELECTRICALLY CHARGED CONDUCTOR.
YOU MUST MAINTAIN A CLEARANCE OF AT LEAST TEN (10) FEET BETWEEN ANY PART OF THE MACHINE OR ITS LOAD AND ANY ELECTRICAL LINE OR APPARATUS CARRYING UP TO 50,000 VOLTS. ONE FOOT OF ADDITIONAL CLEARANCE IS REQUIRED FOR EVERY ADDITIONAL 30,000 VOLTS OR LESS.

DEATH OR SERIOUS INJURY WILL RESULT FROM CONTACT OR INADEQUATE CLEARANCE

DEATH OR SERIOUS INJURY WILL RESULT FROM IMPROPER USE OF THIS EQUIPMENT

WARNING

USE OR OPERATION OF AN UNSPECTED WORK PLATFORM COULD CAUSE DEATH, PERSONAL INJURY

NEW	DO NOT OPERATE THIS WORK PLATFORM IF AN INSPECTION HAS NOT BEEN PERFORMED WITHIN 13 MONTHS OF THE LAST RECORDED INSPECTION DATE.	6TH YEAR
1ST YEAR	STAMP MONTH/DAY/YEAR NEXT TO APPROPRIATE YEAR AFTER EACH INSPECTION.	7TH YEAR
2ND YEAR		8TH YEAR
3RD YEAR	NOTICE CHANGE OF OWNERSHIP OF THIS WORK PLATFORM MUST BE REPORTED TO MANUFACTURER: MEC Aerial Platform Sales Corp. 4700 N. Jensen Avenue Palo Alto, California 94303 Phone: (650) 263-9626	9TH YEAR
4TH YEAR		10TH YEAR
5TH YEAR		

WARNING

- LANYARD ANCHORAGE POINTS ARE RECOMMENDED FOR WORK POSITIONING RESTRAINTS ONLY.

USE OF FALL ARREST SYSTEMS ATTACHED TO ANCHORAGE POINTS ON MOBILE EQUIPMENT MAY CAUSE MACHINE TO TIP, RESULTING IN SERIOUS INJURY OR DEATH.

CERTIFIED LANYARD ANCHORAGE POINT

2684

WARNING

MAXIMUM PLATFORM CAPACITY
EVENLY DISTRIBUTED

5 PERSONS
770 kg

2 PERSONS
320 kg

MAXIMUM WIND SPEED
12.5 MS
45 KMH

MAXIMUM SIDE LOAD
400 N

WARNING

DISTANCE FROM GROUND TO LADDER WILL VARY WITH GROUND VARIATIONS.
CHECK DISTANCE BEFORE LEAVING PLATFORM.



3084

WARNING

MAXIMUM PLATFORM CAPACITY
EVENLY DISTRIBUTED

680 kg

5-PERSONS

MAXIMUM WIND SPEED
12.5 MS
45 KMH

MAXIMUM SIDE LOAD
400 N

18

STEER

REVERSE UP

ENABLE BAR

FORWARD DOWN

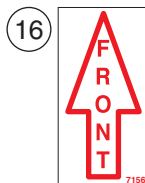
ENABLE BAR MUST BE DEPRESSED DURING ALL FUNCTIONS.

MEC Aerial Platform Sales Corp.
1775 Park Street, Suite 77
Sunnyvale, California 94086
Phone: (800) 367-6575 (559) 891-2488 Fax: 559-491-2490

19

STOP

MEC Aerial Platform Sales Corp.



17

LOCATE CONTROL BOX HERE
FOR NORMAL OPERATION OF THIS UNIT

20

AUTO

MEC Aerial Platform Sales Corp.

MEC
ILLUSTRATION No.
ART_3402

Sigma Level

CE Speed Level™ RT Models: Sheet 1 of 4

Decals

Decals, RT Models, CE Specification

ITEM	PART NO.	QTY	DESCRIPTION
1	90719	1	Decal, MEC Oval
2	91990	2	3084RT -- Decal, SPEED LEVEL
	92231	2	2684RT -- Decal, SPEED LEVEL
3	--	--	--
4	--	--	--
5	8911	1	Decal, Manuals Inside
6	91869	1	Decal, Warning, Sheet Loading
7	91846	1	Decal, Warning Panel
8	91845	1	Decal, Danger, Electric - Tipover - Wind Rating
9	90718	1	Warning, Inspection Report
10	8606	1	Warning, Lanyard
11	8605	5	Decal, Anchorage Point
12	91944	2	3084 - Decal, Capacity, 1500 LB
	92121	2	2684 - Decal, Capacity, 1700 LB
13	91849	1	Decal, Ladder Clearance
14	90739	1	Decal, Made in USA
15	91850	4	Decal, Crush Hazard
16	7156	1	Decal, Front
17	7155	1	Decal, Locate Control Box Here
18	90729	1	Decal, Upper Control Box, Side
19	91874	1	Decal, Upper Controls
20	91932	1	Decal, Level Controls
21	--	--	--

... continued



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

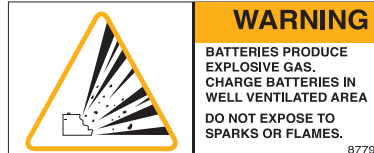
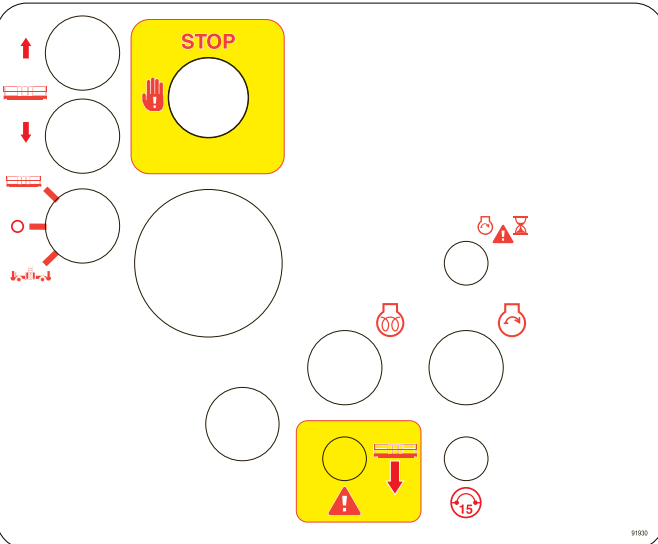
• REF: Reference only

RT MODELS - CE

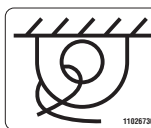
Quad-Trax™ 4wd

2684
PLATFORM CAPACITY
1700 LBs (770kg)

3084
PLATFORM CAPACITY
1500 LBs (680kg)

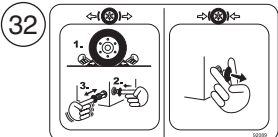


WARNING
BATTERIES PRODUCE
EXPLOSIVE GAS.
CHARGE BATTERIES IN
WELL VENTILATED AREA
DO NOT EXPOSE TO
SPARKS OR FLAMES.



WARNING
DO NOT POWERWASH OR
SPRAY ELECTRONIC
COMPONENTS OR
CONNECTORS.
MOISTURE MAY CAUSE
DAMAGE AND/OR
ERRATIC OPERATION

HYDRAULIC OIL



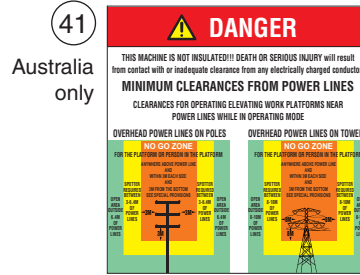
**INFLATE TO TIRE
MANUFACTURER'S MAX.
SPECIFICATIONS
OR SEE
SERVICE MANUAL**

WARNING
• REPLACE TIRES WITH MANUFACTURER'S
EQUIPMENT ONLY.
• FAILURE TO USE MANUFACTURER'S
TIRES MAY CAUSE MACHINE INSTABILITY.
• REFER TO MAINTENANCE MANUAL FOR
REPLACEMENT PART NUMBER.

MEC AERIAL PLATFORM SALES CORP.	SPSL DATE	MODEL NUMBER	SERIAL NUMBER	MODEL YEAR
XXXXX	XXXXX	XXXXX	XXXXXXXXXX	XXXXX
MAX. PLATFORM CAPACITY INCLUDING PERSONS XXX kg • X PERSONS • XXX kg EQUIPMENT XXX kg • X PERSONS • XXX kg EQUIPMENT	MAX. DRIVE HEIGHT X X FT X X m	MAX. WIND SPEED X X mph X X m/s	MAX. MANUAL FORCE XXX LBS XXX kg	MAX. GROUND PRESSURE PER WHEEL XXX PSI XXX kPa
MAX. PLATFORM HEIGHT X X FT X X m	MAX. DRIVE HEIGHT X X FT X X m	MAX. WIND SPEED X X mph X X m/s	MAX. MANUAL FORCE XXX LBS XXX kg	MAX. GROUND PRESSURE PER WHEEL XXX PSI XXX kPa

2684
MAX
2855 lbs
1295 kg

**GREASE
PORT**
(Slide to open)



3084
MAX
2965 lbs.
1345 kg

LWA
86
dB

**DIESEL
ONLY**

ILLUSTRATION No.
ART_3403

Sigma Level

CE Speed Level™ RT Models: Sheet 2 of 4

Decals

Decals, RT Models, CE Specification (continued)

ITEM	PART NO.	QTY	DESCRIPTION
22	91930	1	Decal, Lower Controls
23	91266	2	Decal, Quad Trax 4wd
24	91848	1	3084 - Decal, Platform Capacity, Small
	92122	1	2684 - Decal, Platform Capacity, Small
25	9052	1	Decal, Battery Disconnect And Lock
26	8779	1	Warning, Battery, Explosive Gas
27	--	--	--
28	11026730	1	Tie Down Point
29	90732	1	Decal, Warning, Pressure Wash
30	6873	1	Decal, Hydraulic Oil
31	--	--	--
32	92089	1	Decal, Brake Release
33	8502	4	Decal, Tire Inflation
34	--	--	--
35	--	--	--
36	8519	4	Decal, Warning, Tire Replacement
37	--	--	--
38	91775	1	Serial Plate
39	91945	4	3084RT - Decal, Wheel Load
	92227	4	2684RT - Decal, Wheel Load
40	91870	1	Decal, Grease Port
41	91325	1	Decal, Danger, Electrocution Hazard (AUS Only)
42	91388	1	Decal, Noise Level
43	9378	1	Decal, Diesel Only



• as req: as required

• INCL: Included with assembly

• NS: Not a Stock item

• REF: Reference only

RT MODELS - CE

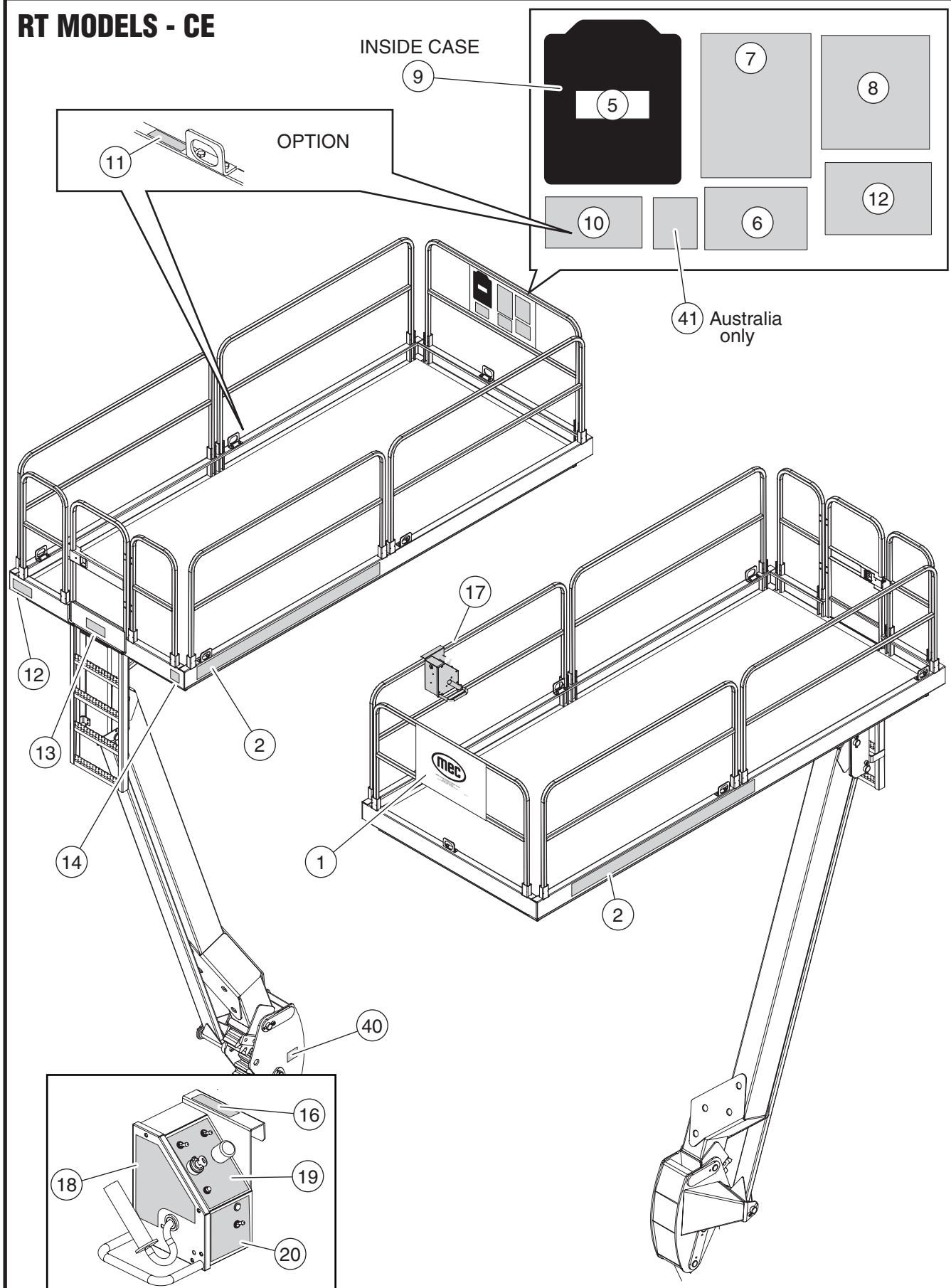


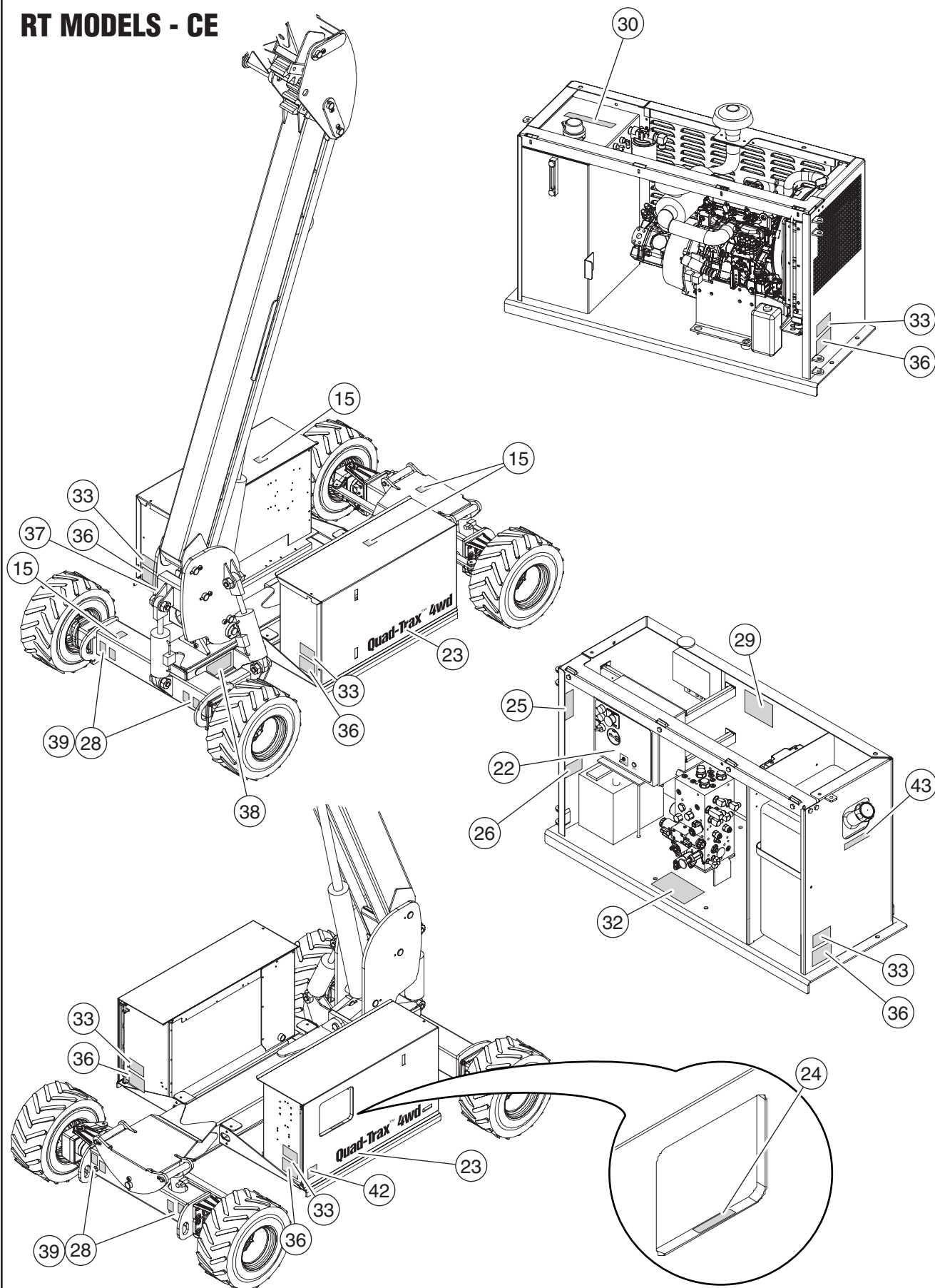
ILLUSTRATION No.
ART_3404

Sigma Level

CE Speed Level™ RT Models: Sheet 3 of 4

Decals

RT MODELS - CE



MEC
ILLUSTRATION No.
ART_3405

Sigma Level

CE Speed Level™ RT Models: Sheet 4 of 4

Decals

NOTES:





Service Parts Order Form

Fax to 559-263-9631

Please fill out completely

Date: _____

Ordered By: _____

Account: _____

Your Fax No.: _____

Bill to: _____

Ship to: _____

Purchase Order Number _____

Ship VIA _____

**All orders MUST have a Purchase Order Number

**Fed Ex shipments require Fed Ex account number

Part Number	Description	Quantity	Price

All backordered parts will be shipped when available via the same ship method as original order unless noted below:

- Ship complete order only - no backorders
- Ship all available parts and contact customer on disposition of backordered parts
- other (please specify)

NOTES:



Limited Owner Warranty

MEC Aerial Platform Sales Corp. warrants its equipment to the original purchaser against defects in material and/or workmanship under normal use and service for one (1) year from date of registered sale or date the unit left the factory if not registered. MEC Aerial Platform Sales Corp. further warrants the structural weldments of the main frame and scissor arms to be free from defects in material or workmanship for five (5) years from date of registered sale or date unit left the factory if not registered. Excluded from such warranty is the battery(s) which carries a ninety (90) day warranty from described purchase date. Warranty claims within such warranty period shall be limited to repair or replacement, MEC Aerial Platform Sales Corp.'s option, of the defective part in question and labor to perform the necessary repair or replacement based on MEC Aerial Platform Sales Corp.'s then current flat rate, provided the defective part in question is shipped prepaid to MEC Aerial Platform Sales Corp. and is found upon inspection by MEC Aerial Platform Sales Corp. to be defective in material and/or workmanship. MEC Aerial Platform Sales Corp. shall not be liable for any consequential, incidental or contingent damages whatsoever. Use of other than factory authorized parts; misuse, improper maintenance, or modification of the equipment voids this warranty. The foregoing warranty is exclusive and in lieu of all other warranties, express or implied. All such other warranties, including implied warranties of merchantability and of fitness for a particular purpose, are hereby excluded. No Dealer, Sales Representative, or other person purporting to act on behalf of MEC Aerial Platform Sales Corp. is authorized to alter the terms of this warranty, or in any manner assume on behalf of MEC Aerial Platform Sales Corp. any liability or obligation which exceeds MEC Aerial Platform Sales Corp.'s obligations under this warranty.



Aerial Platform Sales Corp.

1401 S. Madera Avenue • Kerman, CA 93630 USA
Ph: 1-800-387-4575 • 1-559-842-1510 • FAX 1-559-842-1520
E-mail: info@mecAWP.com • Web: www.mecAWP.com
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