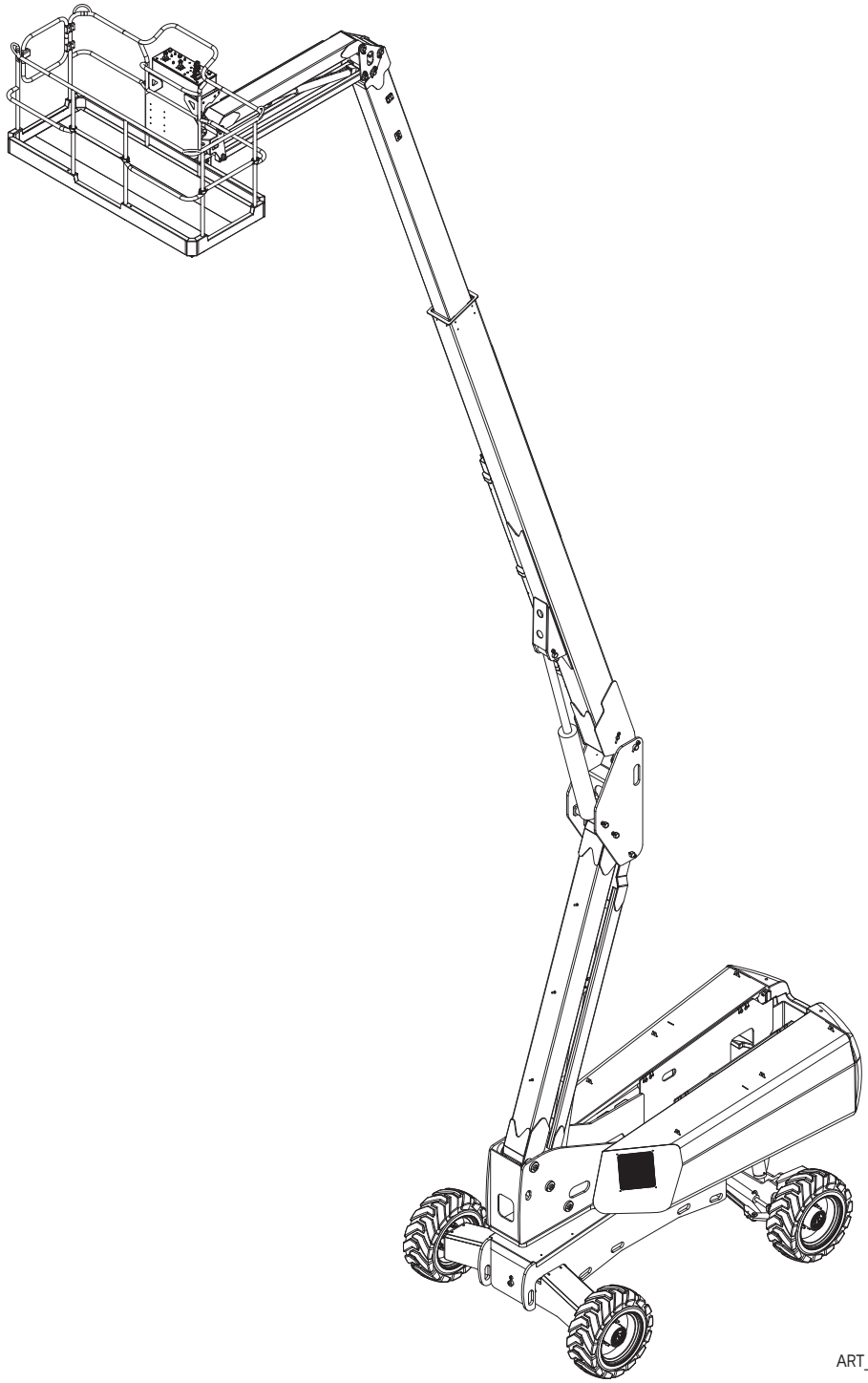
Service & Parts Manual

60-J Diesel



ART_4883

Serial Number Range
14400001 - Up

Part # 94047 R5
November 2019

Revision History

Date	Reason for Update
September 2015	New Release
April 2016	CE Revision
March 2018	Continuous Improvement Update
April 2019	Added Bracket to Main Boom Component
June 2019	Added harnesses 28869 and 28883
November 2019	Added 8456 to the Upper Control Box, Part 1

MEC Aerial Work Platforms

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Table of Contents

Service Introduction

This Service section 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 in this manual and the Operator's 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 Platforms, 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, and the Service and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs.

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.

DANGER

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 Platforms:

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Safety Symbols & General Safety Tips

MEC manuals and decals use symbols, colors and signal words to help you recognize important safety, operation and maintenance information.

RED and the word DANGER – Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

ORANGE and the word WARNING – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

YELLOW with alert symbol and the word CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

YELLOW without alert symbol and the word CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

GREEN and the word NOTICE – Indicates operation or maintenance information.

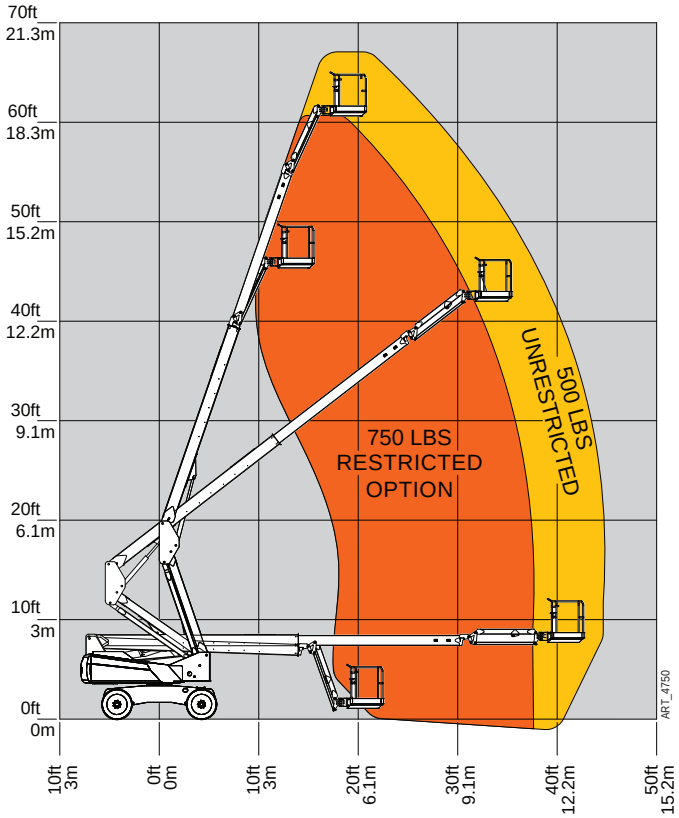
Regular inspection and constant maintenance is the key to efficient economical operation of your aerial work platform. It will help to assure that your equipment will perform satisfactorily with a minimum of service and repair.

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 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.

Specifications

60-J Diesel			
Working Height*		66 ft	20.1 m
Platform Height		60 ft	18.3 m
Maximum Drive Height		60 ft	18.3 m
Maximum Outreach		42 ft 8 in	13 m
Turntable Swing		Continuous	
Jib Range Of Motion		135°	
Platform Rotation		180° (90° each side)	
Machine Weight** (Unloaded)		17,900 lb	8,120 kg
Lift Capacity	Unrestricted Standard	500 lb	227 kg
	Restricted Option	750 lb	340 kg
Maximum Occupants		2	
Stowed Height		100 in	2.54 m
Overall Length		30 ft 6 in	9.3 m
Overall Width		96 in	2.44 m
Tailswing		47 in	1.19 m
Wheel Base		101 in	2.56 m
Platform Details	Width	96 in	2.44 m
	Depth	40 in	1 m
	Entry	1 End Swing Gate, 2 Slide Bar Entries	
Turning Radius, Inside		6 ft 6 in	2 m
Ground Clearance		13.5 in	34 cm
Lift Speed		50 sec	
Extend Speed		20 sec	
Jib Lift Speed		15 sec	
Drive Speed (Proportional)	Stowed	0 - 4.0 mph	0 - 6.4 km/h
	Raised or extended	0 - 0.5 mph	0 - 0.8 km/h
Gradeability	Stowed, downhill	45%/24.2°	
	Stowed, uphill	45%/24.2°	
Breakover Angle		40%/22°	
Axle Oscillation		10° (5° each side)	
Maximum Allowable Operating Wind Speed		28 mph	12.5 m/sec (45 km/h)
Engine		Kubota V1505T 44 hp Diesel	
Fuel Type		Diesel	
Fuel Capacity		32 gal	120 liter
Hydraulic Fluid Capacity		40 gal	150 liter
Maximum Vibration		Does not exceed 2.5 m/sec^2 at operator's position	
Ambient Operating Range		-20° F min	-29° C min
		120° F max	49° C max
Wheel Lug Nut Torque		150 lb-ft	203 Nm



Sound Pressure At Workstation	80 dB(A)
Sound Power Level	86 dB @ 1m
Ground Pressure/Wheel (Maximum)	4.86 kg/cm^2
Maximum Wheel Load	2662 kg

Meets applicable requirements of ANSI A92.5-2006 and CSA B354.4-2002.
Allowable ambient temperature range: -20° F to 120° F (-29° C to 49°C).
Consult with MEC for operation outside of this range.
*Working Height adds 6 feet (2 m) to platform height.
**Weight may increase with certain options.

Bolt Torque Specification - American Standard

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

American Standard Cap Screws								
SAE Grade	**5**				**8**			
Cap Screw Size (inches)								
	Torque				**Torque**			
	Ft. Lbs		**Nm**		**Ft. Lbs**		**Nm**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1/4 - 20	6.25	7.25	8.5	10	8.25	9.5	11	13
1/4 - 28	8	9	11	12	10.5	12	14	16
5/16 - 18	14	15	19	20	18.5	20	25	27
5/16 - 24	17.5	19	12	26	23	25	31	34
3/8 - 16	26	28	35	38	35	37	47.5	50
3/8 - 24	31	34	42	46	41	45	55.5	61
7/16- 14	41	45	55.5	61	55	60	74.5	81
7/16 - 20	51	55	69	74.5	68	75	92	102
1/2 - 13	65	72	88	97.5	86	96	116	130
1/2 - 20	76	84	103	114	102	112	138	152
9/16 - 12	95	105	129	142	127	140	172	190
9/16 - 18	111	123	150	167	148	164	200	222
5/8 - 11	126	139	171	188	168	185	228	251
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

Torque values apply to fasteners as received from the supplier, dry or when lubricated with normal engine oil.

If special graphite grease, molydisulphide grease, or other extreme pressure lubricants are used, these torque values do not apply.

Specific Torque Values for Selected Fasteners					
Location	**Torque**		**Location**	**Torque**	
Lug Nuts	150 lb/ft	203 Nm	Engine Tray / Battery Tray	140 lb/ft	190 Nm
Torque Hubs to Yokes, Front	180 lb/ft	244 Nm	Boom Wear Pads	30 lb/ft	41 Nm
Torque Hubs to Rear Axle, Rear	180 lb/ft	244 Nm	Level Cylinder Pin Retainer	20 lb/ft	27 Nm
Drive Motor to Torque Hub Bolts	60 lb/ft	81 Nm	Platform Rotator to Spacer/Load Cell	55 lb/ft	75 Nm
Swing Bearing Bolts on Chassis	180 lb/ft	244 Nm	Spacer/Load Cell to Platform Mount Weldment	95 lb/ft	129 Nm
Swing Bearing Bolts on Turret	180 lb/ft	244 Nm	Platform Rotator Through Bolt & Nut	420/450 lb/ft	569/610 Nm
Swing Drive Bolts	320 lb/ft	434 Nm	Platform Mount Weldment Bolts & Nuts	250/270 lb/ft	339/366 Nm

Bolt Torque Specification - Metric Standard

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

Metric Cap Screws								
Metric Grade	**8.8**				**10.9**			
Cap Screw Size (Millimeters)								
	Torque				**Torque**			
	Ft. Lbs		**Nm**		**Ft. Lbs**		**Nm**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
M6 × 1.00	6	8	8	11	9	11	12	15
M8 × 1.25	16	20	21.5	27	23	27	31	36.5
M10 × 1.50	29	35	39	47	42	52	57	70
M12 × 1.75	52	62	70	84	75	91	102	123
M14 × 2.00	85	103	115	139	120	146	163	198
M16 × 2.50	130	158	176	214	176	216	238	293
M18 × 2.50	172	210	233	284	240	294	325	398
M20 × 2.50	247	301	335	408	343	426	465	577
M22 × 2.50	332	404	450	547	472	576	639	780
M24 × 3.00	423	517	573	700	599	732	812	992
M27 × 3.00	637	779	863	1055	898	1098	1217	1488
M30 × 3.00	872	1066	1181	1444	1224	1496	1658	2027

Torque values apply to fasteners as received from the supplier, dry or when lubricated with normal engine oil.

If special graphite grease, molydisulphide grease, or other extreme pressure lubricants are used, these torque values do not apply.

Specific Torque Values for Selected Fasteners		
Location	**Torque**	
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Swing Drive Bolts	320 lb/ft	434 Nm
Engine Tray / Battery Tray	140 lb/ft	190 Nm
Boom Wear Pads	30 lb/ft	41 Nm
Level Cylinder Pin Retainer	20 lb/ft	27 Nm
Platform Rotator to Spacer/Load Cell	55 lb/ft	75 Nm
Spacer/Load Cell to Platform Mount Weldment	95 lb/ft	129 Nm
Platform Rotator Through Bolt & Nut	420/450 lb/ft	569/610 Nm
Platform Mount Weldment Bolts & Nuts	250/270 lb/ft	339/366 Nm

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	In. 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

Boom Support

Supporting The Boom Assembly

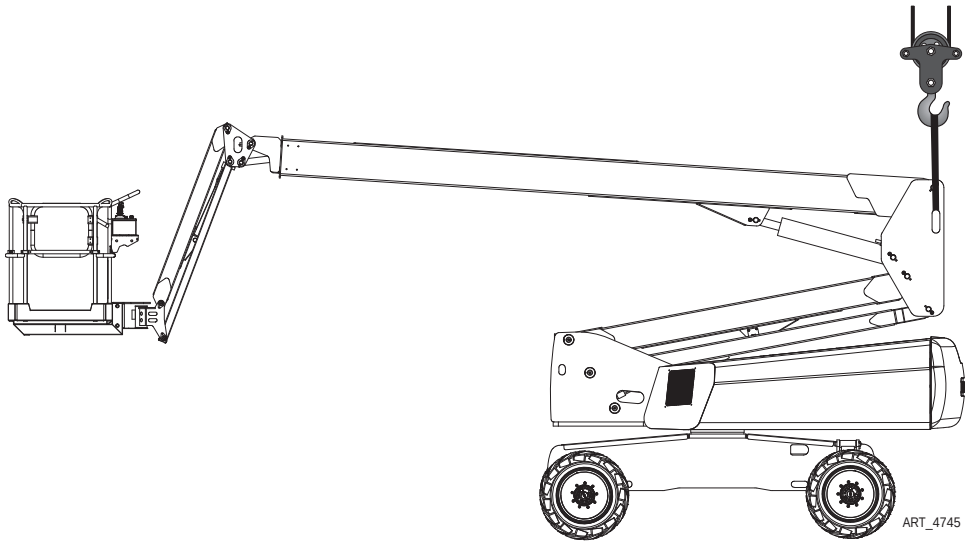
WARNING

NEVER PERFORM WORK UNDER THE BOOM ASSEMBLY WITH THE PLATFORM ELEVATED WITHOUT FIRST SUPPORTING THE BOOM ASSEMBLY.

DO NOT work beneath the boom assembly with the platform elevated unless the boom assembly is properly supported.

Use a sling and overhead hoist rated for 3 tons (2700 kg) or more.

Thread the sling through the opening in the boom post as shown below. Connect it to the overhead hoist, then lift enough that the weight of the boom assembly is being supported by the hoist.



Hydraulic, Electrical and Total System

Hydraulic System

WARNING

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

CORRECT LEAKS IMMEDIATELY.

CAUTION

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

CAUTION

To 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 electrical system damage, battery explosion, and personal injury.

Total System

WARNING

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.

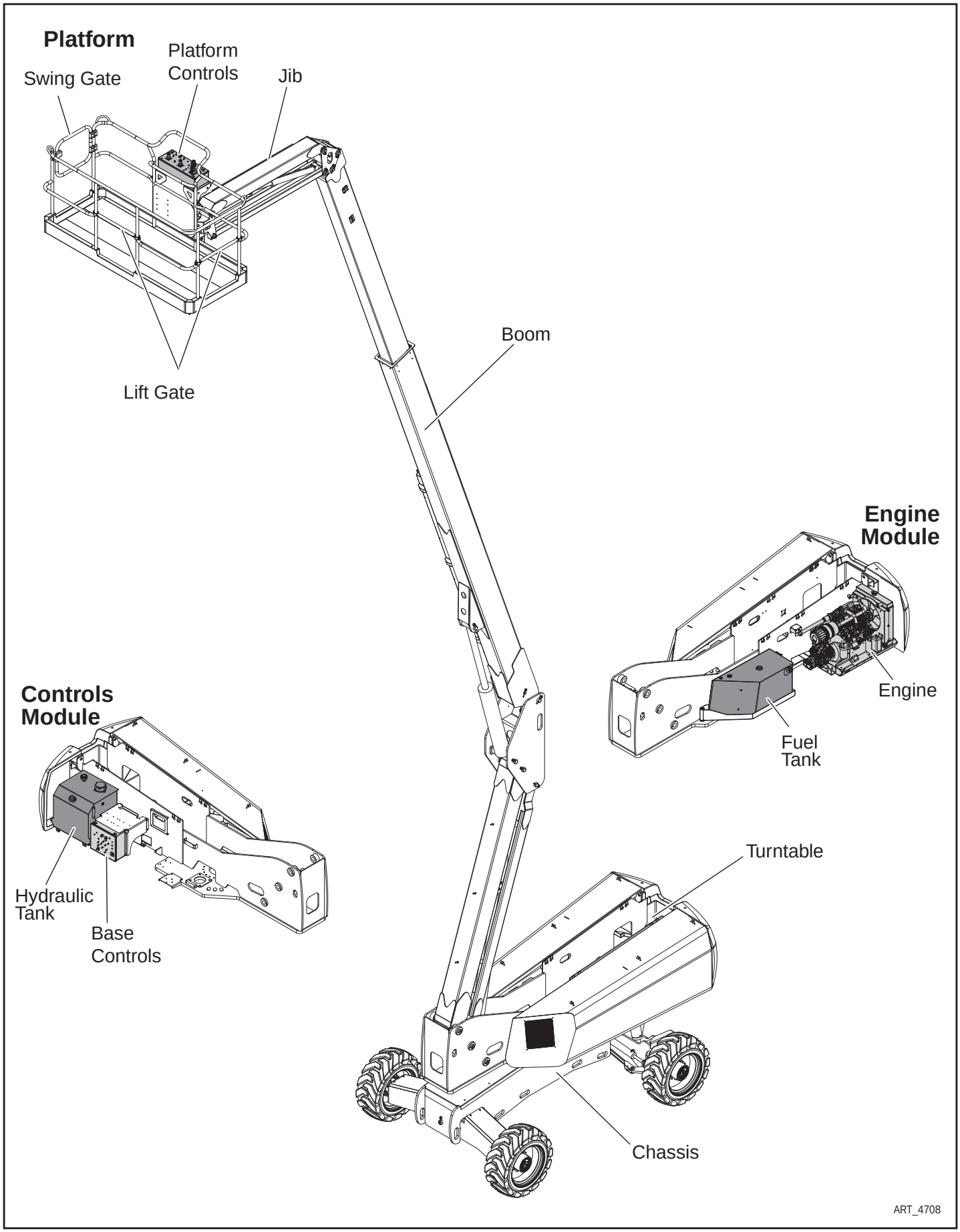
Failure to perform preventive maintenance at recommended intervals may result in the unit being operated with a defect that could result in injury or death of the operator.

CAUTION

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



Emergency Systems And Procedures

WARNING

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

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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

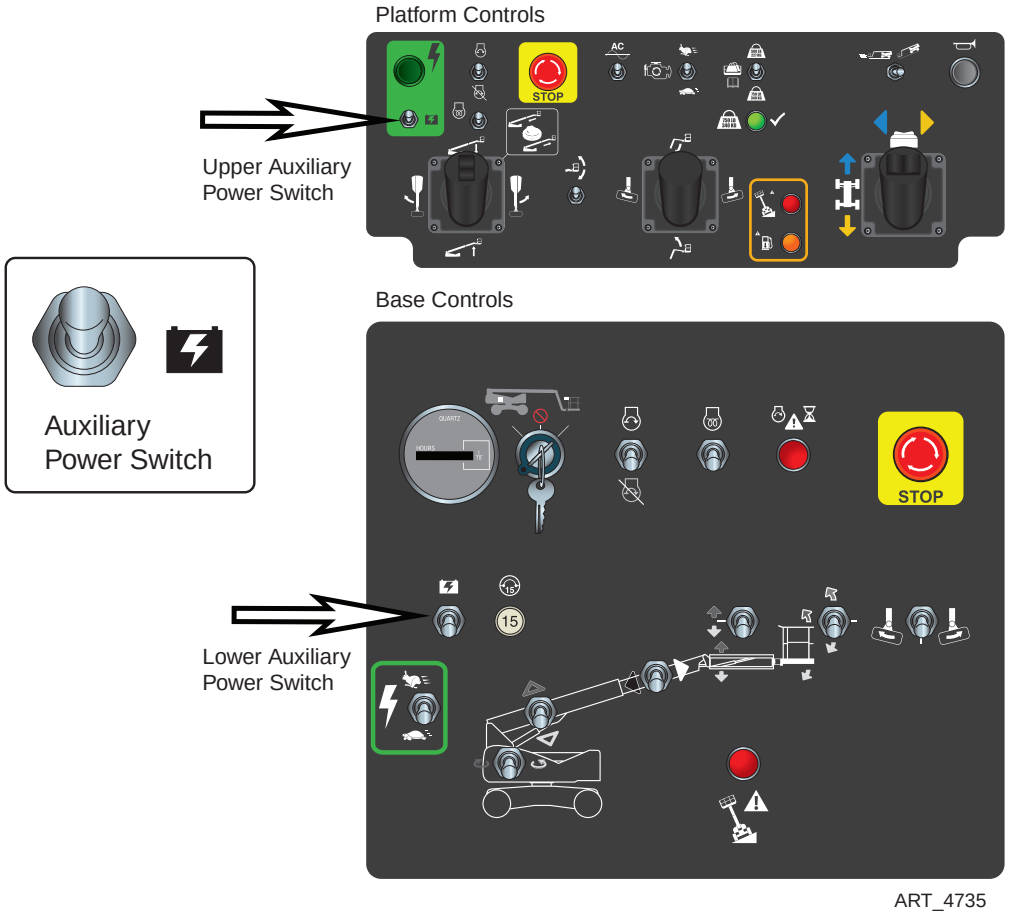
- The upper controls are locked out.
- The lower controls switch must be reset or the machine will not operate.
- The machine will operate from the lower controls if the upper controls switch is tripped.

Auxiliary Power System & Test

WARNING

IF PRIMARY POWER FAILS WHILE THE PLATFORM IS ELEVATED, USE THE AUXILIARY POWER SYSTEM TO SAFELY LOWER THE PLATFORM. DO NOT CLIMB DOWN THE BOOM ASSEMBLY OR EXIT THE PLATFORM WHILE ELEVATED.

ALWAYS CHECK OVER, UNDER AND AROUND THE MACHINE FOR PERSONNEL, STRUCTURES AND OBSTRUCTIONS BEFORE ACTIVATING ANY CONTROL FUNCTION AND CONTINUE TO WATCH FOR HAZARDS WHILE OPERATING THE MACHINE



The Auxiliary Power System is used to lower the platform in case of primary power failure. To lower the platform, activate the Auxiliary Power Switch to run the auxiliary hydraulic pump.

This function uses battery power from the auxiliary battery to lower the platform.

- Push and hold the Auxiliary Power Switch, then use the Boom Extend/Retract function to retract the boom.
- Continue to hold the Auxiliary Power Switch, then use the Boom Lift/Lower function to lower the boom.

Note: The Auxiliary Power System is disabled when the engine is running.

Note: The Auxiliary Power Switch serves as an enable switch. It is not necessary to use the primary function enable switch.

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.

DANGER

BE SURE THAT THE SURFACE BENEATH THE MACHINE IS CAPABLE OF SUPPORTING THE JACK AND JACK STANDS.

REMOVE ALL MATERIAL, TOOLS AND PERSONNEL FROM THE PLATFORM BEFORE LIFTING.

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

- A jack with a lifting capacity of five (5) tons or more.
- Jack stands with a rating of five (5) 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 the tires on the end of machine opposite the end to be raised.
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 lug nuts to hold the wheel snug to the hub. Do not torque the lug nuts at this time.
2. Raise machine slightly and remove jack stands.
3. Lower the machine and remove the jack.
4. Tighten lug nuts to proper torque (Refer to Specifications).
5. Remove chocks.

Transportation Instructions

Safety Information

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

WARNING

TRUCK 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).

ONLY PROPERLY TRAINED AND QUALIFIED OPERATORS SHALL LOAD AND UNLOAD THIS MACHINE.

Loading

Free-Wheel Configuration For Winching Or Towing.

RUNAWAY HAZARD!

DANGER

AFTER RELEASING THE BRAKES THERE IS NOTHING TO STOP MACHINE TRAVEL. MACHINE WILL ROLL FREELY ON SLOPES.

ALWAYS CHOCK THE WHEELS BEFORE MANUALLY RELEASING THE BRAKES.

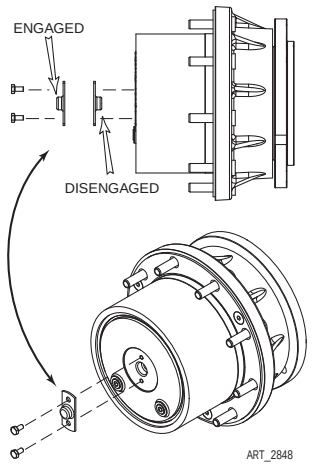
The machine can be winched or towed short distances at speeds not to exceed 5 MPH (8 km/h). Before towing or winching the machine, it is necessary to release the brakes. Reset the brakes after towing or winching.

Disengage Brakes Before Towing Or Winching

- Chock the wheels.
- Remove the Torque Engage Cap and reinstall with the bump facing inward on all four (4) hubs.

Engage Brakes Before Driving

- Remove the Torque Engage Cap and reinstall with the bump facing outward on all four (4) hubs.



Driving Or Winching Onto Or Off Of A Transport Vehicle

Before loading the machine, orient the turntable so that the platform is over the nonsteering wheels so that the Rotation Lock may be engaged later in the loading process.

WARNING

ONLY PROPERLY TRAINED AND QUALIFIED OPERATORS SHALL LOAD AND UNLOAD THIS MACHINE.

READ AND UNDERSTAND ALL SAFETY, CONTROL, AND OPERATING INFORMATION FOUND ON THE MACHINE AND IN THIS MANUAL BEFORE OPERATING THE MACHINE.

WHETHER WINCHING OR DRIVING THE MACHINE ON TO A TRUCK OR TRAILER, ALWAYS CHECK THE AREA FOR DANGEROUS SITUATIONS BEFORE MOVING THE MACHINE.

IF DRIVING THE MACHINE, ALWAYS USE A SECOND PERSON ACTING AS A SPOTTER TO MAKE SURE THE PERSON LOADING THE MACHINE AVOIDS DANGEROUS SITUATIONS.

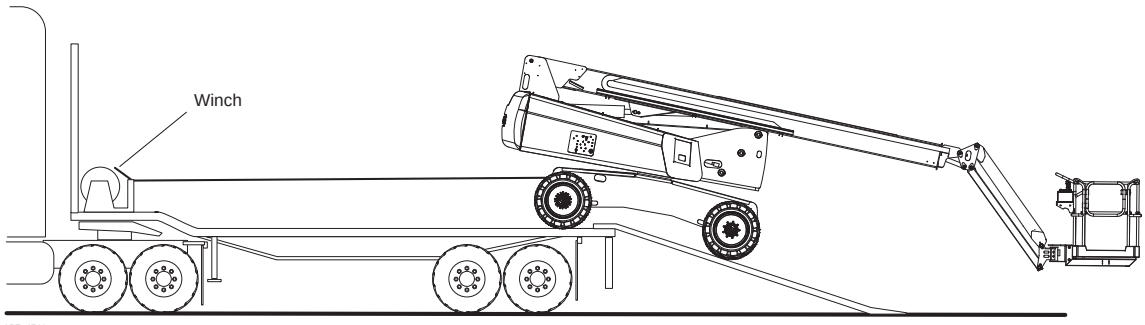
Driving

- Turn the Base Key Switch to PLATFORM. Check that the Emergency Stop Switch is reset by turning it clockwise.
- Enter the platform and reset the Platform Emergency Stop Switch.
- Test platform control functions.
- Raise the jib slightly for platform ground clearance.
- Carefully drive the machine off or on to the transport vehicle.
- Make sure you can see the second person giving guidance.

Note: The brakes are automatically released for driving and will automatically apply when the control lever is returned to neutral which causes the machine to stop.

Winching

- Chock the wheels, then disengage brakes (see Disengage Brakes before Towing or Winching on page 14).
- Carefully operate the winch to lower the machine down the ramp or pull the machine up the ramp.
- Chock the wheels and engage the brakes before disengaging the winch.



Securing To Truck Or Trailer For Transport

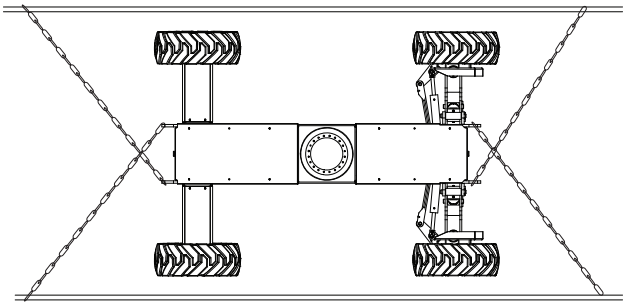
- Turn the key Selector Key Switch to OFF and remove the key before transport.
- Turn the Battery Disconnect Switch to OFF before transport.
- Inspect the entire machine for loose or unsecured items.
- Secure the chassis.
- Engage the Rotation Lock.
- Secure the platform.

Securing The Chassis

Make sure each of your chains is rated to hold the machine's weight (see serial number plate or Specifications). Use at least 4 chains.

Do not attach chain hooks directly to the machine. Loop the chain through the tie-down point and connect the chain hook to the chain.

Be sure chains are arranged so that they do not damage the machine.



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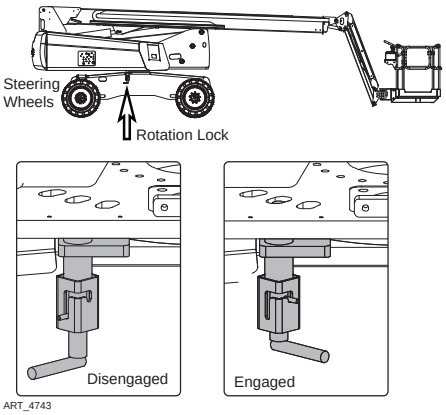
Engaging The Rotation Lock

Before transport, rotate the turntable so that one of the three locking holes aligns with the Rotation Lock located on the chassis. The lock holes are located on the bottom of the Controls Module. The Rotation Lock is located on the chassis behind the left front wheel.

Lift the Rotation Lock using the attached pin, then rotate to the right and lower it into the shallow depression to engage. See illustration.

Disengage the Rotation Lock before operation.



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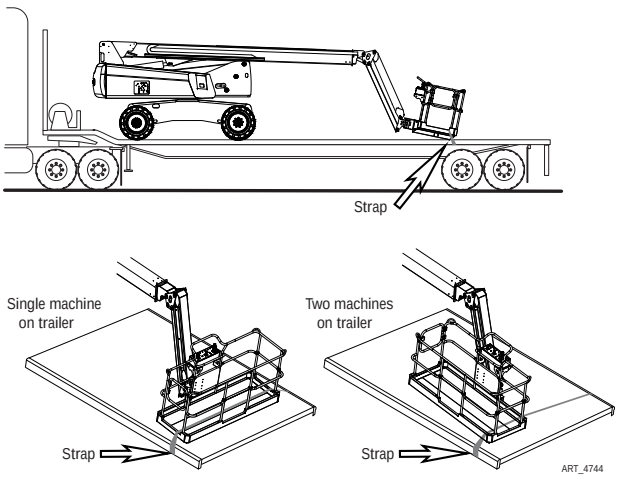
Securing The Platform

With the boom completely stowed, raise the jib slightly, then use the Platform Level function to lower the platform until the front of the platform touches the trailer surface.

Route the tie-down strap as shown through the width of the platform, over the toe boards of both side entry points. Tighten securely but do not overtighten.

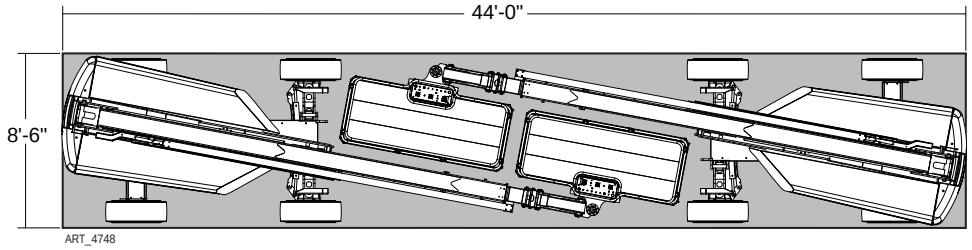
It may be necessary to turn the platform 90 degrees when loading two machines on the same trailer. In this case, route the strap over the toeboard and through the end of the platform as shown.



ART_4744

Loading Two Machines

Two machines may be loaded onto a single trailer by rotating the turntable of each machine and rotating the platforms as shown below.



Extend the boom of each machine approximately 15 inches (38 cm).

Arrange the machines as shown. The distance between the ends of the counterweights should be 44ft-45ft (13.4m-13.7m).

Secure the chassis of each machine as previously instructed on page 16.

Engage the Rotation Lock of each machine as previously instructed on page 16, using one of the side turntable locking holes.

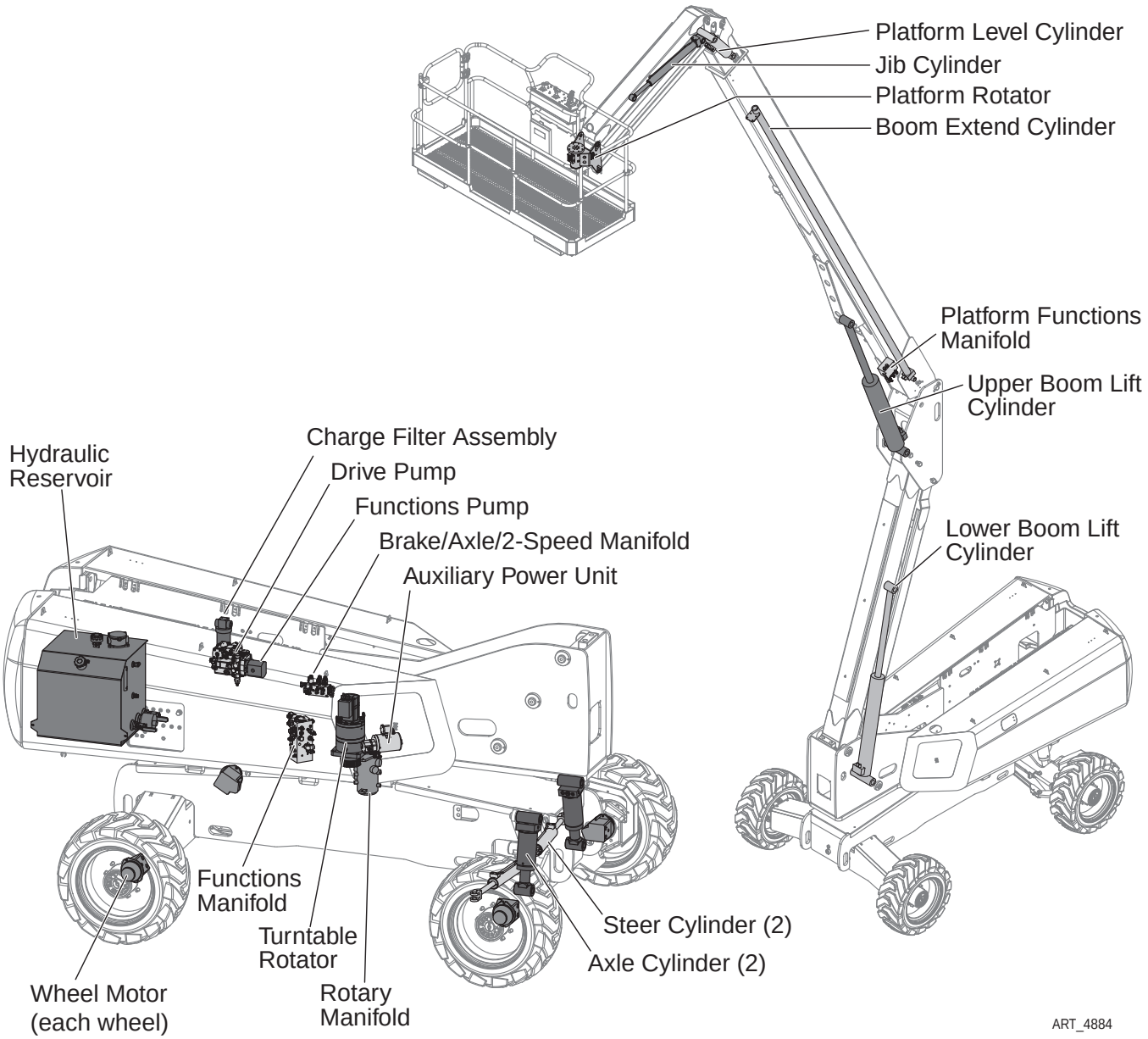
Secure the platform of each machine as previously instructed above.

Hydraulic System – General

The hydraulic system is designed to control all or part of machine functions by integrating various hydraulic cartridge valves into three manifolds to provide directional, pressure, flow, and load control.

The hydraulic system is a feedback, load-sensing type. Hydraulic fluid is provided by a variable displacement, axial piston-type Drive Pump coupled to the engine and a fixed displacement gear-type Functions Pump mounted to the back of the piston pump. As the engine turns, the hydraulic pumps draw fluid from the reservoir and pump this fluid to the wheel motors and valve manifolds.

Each function has a maximum pressure control limit set by pressure relief valves.



Hydraulic Roadmap

Hydraulic Reservoir

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

Drive Pump

- The closed-loop hydrostatic piston-type Drive Pump with infinitely variable proportional control delivers hydraulic fluid under pressure to the Wheel Motors.

Functions Pump

- The gear-type Functions Pump delivers hydraulic fluid under pressure to the Functions Manifold and provides pressure to the platform and turntable functions, in addition to controlling the axle cylinders and the brakes.

Functions Manifold

- The Functions Manifold directs the hydraulic fluid to the Boom Lift, Boom Extend and Steering Cylinders, as well as fluid flow to the Platform Functions Manifold, through the use of electronically-operated solenoid valves.

Brake/axle/2-speed Manifold

- The Brake/Axle/2-Speed Manifold directs the hydraulic fluid to the Axle Cylinders, the Brake Release function and the 2-Speed Pilot function through the use of electronically-operated solenoid valves.

Platform Functions Manifold

- The Auxiliary Manifold provides hydraulic control to the Platform Level, Platform Rotate and Jib functions.

Turntable Rotator

- One hydraulic motor turns the turntable, boom and platform in relation to the chassis.

Rotary Manifold

- The Rotary Manifold provides hydraulic connection between the turntable and chassis and allows continuous rotation of the turntable.

Wheel Motors/brake Hubs

- There are four 2-speed hydraulic wheel motors to provide power to all four wheels. The wheel motors turn planetary hubs with integral spring-applied, hydraulically-released brakes. The brakes are released by hydraulic pressure from the Brake/Axle/2-Speed Manifold. The drive system is hydrostatic; deceleration is provided by the drive motor.

Axle Cylinders

- Two hydraulic cylinders control angle of steering axle relative to the frame. The axle cylinders move freely and allow the axle to float when driving over rough terrain when the platform is stowed. When platform is elevated, the axle cylinders lock in place to increase machine stability. Each cylinder has an integral counterbalance valves for load-holding.

Steer Cylinders

- This machine has two Steer Cylinders that control the angle of the steerable wheels.
- Steering is not self-centering.

Boom Lift Cylinders

- Two hydraulic lift cylinders raise and lower the boom assembly.

Boom Extend Cylinder

- One hydraulic cylinder extends and retracts the upper boom.

Platform Level Cylinder

- One hydraulic cylinder levels the platform as needed as the boom is raised and lowered.

Platform Rotator

- One rotary hydraulic actuator rotates the platform 90° either side of the centered position.

Jib Cylinder

- One hydraulic cylinder raises and lowers the jib.

Auxiliary Power Unit

- The Auxiliary Power Unit provides hydraulic fluid power to lower the platform in the event of engine failure or emergency.

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.

WARNING

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 only the use of the Chevron hydraulic fluids listed in the chart below, and each only in the operating temperatures listed in the chart. Do not substitute other fluids as pump damage may result, and use only the fluid appropriate to the ambient operating temperature.

Recommended Hydraulic Fluid	
> 30° F (0° C)	Chevron 1000THF
0° F (-18° C) ~ 30° F (0° C)	Chevron Rando Premium MV
< 0° F (-18° C)	Chevron Rando Premium MV

System Flushing Procedure

1. With boom fully lowered and retracted, 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 filter elements.
4. Flush the hoses with clean hydraulic fluid.
5. Discard old filter elements 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. Use only the appropriate hydraulic fluid as recommended in “Fluid Recommendations” above.
9. Loosen the output hose fittings at the hydraulic pumps to flood with hydraulic fluid. Tighten fittings.
10. Disconnect the wiring harness lead to the Fuel Solenoid on the engine.
11. Crank the engine for 5 seconds, then stop for 30 seconds. Do this three times.
12. Reconnect the wiring harness lead to the Fuel Solenoid on the engine.
13. Start the engine and allow it to run for one minute, then briefly operate all functions. Two or three

complete cycles may be necessary to purge all air from Boom Lift and Boom Extend cylinder(s).

14. When the above procedures have been completed, lower the platform to the stowed position, then fill hydraulic reservoir to the full mark on sight gauge.
15. Check for leaks and correct as necessary. Machine is now ready to be placed into operation.

Hydraulic Fluid Reservoir

The Hydraulic Fluid Reservoir Assembly consists of the reservoir, a lockable 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.

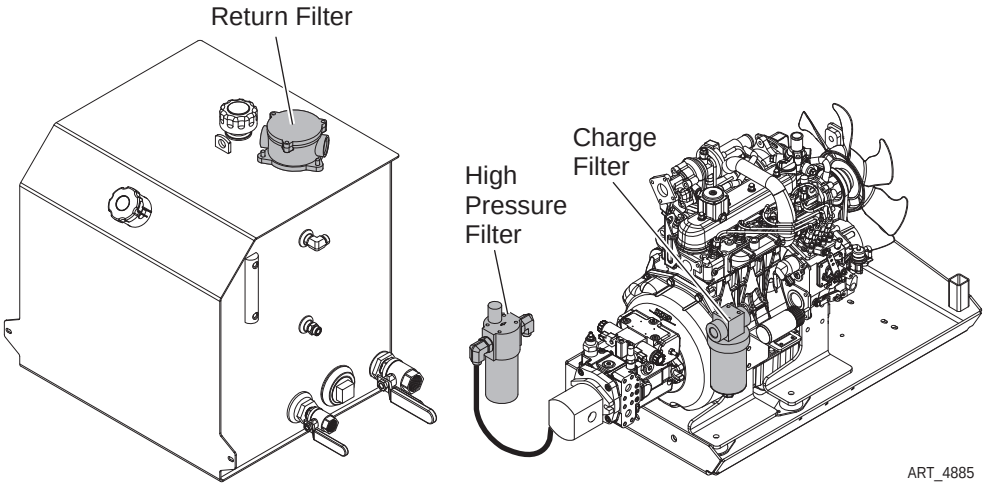
Hydraulic Filters

WARNING **BEWARE OF HOT FLUID. CONTACT WITH HOT FLUID MAY CAUSE SEVERE BURNS.**

The Hydraulic Fluid Reservoir contains a return filter. Additionally, all machines have a Charge Filter Assembly attached to the engine and a high pressure filter on the output side of the Functions Pump.

When the filter is clogged, hydraulic flow bypasses the filter element.

Replace all filter elements every six (6) months or 500 hours. Extremely dirty conditions may require that the filter be replaced more often.



Hydraulic Pumps

Note: Refer to Parts Section 25.

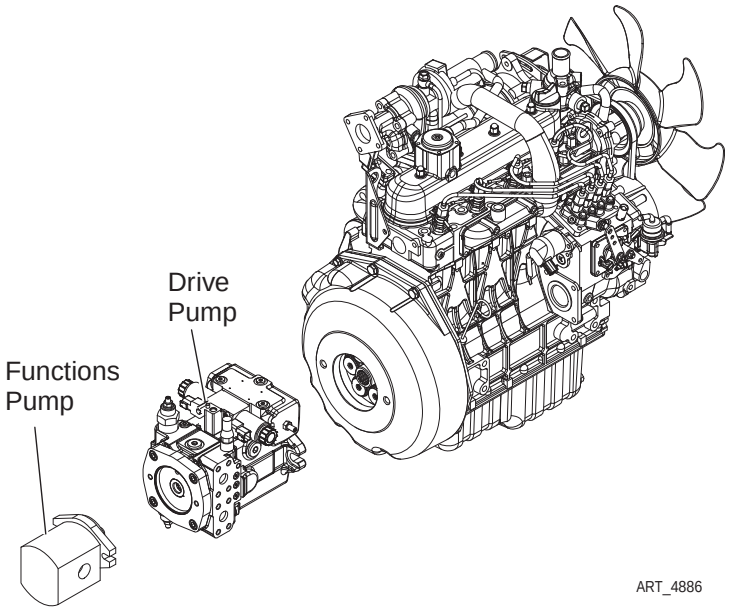
An internal combustion engine drives the Drive and Functions Pumps.

The Drive Pump is a variable displacement axial piston pump that provides hydraulic power to the Drive Motors. This is a hydrostatic drive system.

The Functions Pump is a gear pump that provides hydraulic power to the Functions Manifold.

Remove

1. Disconnect the battery.
2. Place a large container under the engine and pumps to catch fluid that will be lost during pump replacement. Dispose of used fluid properly.
3. Close the ball valve on the Hydraulic Tank to prevent fluid loss when the hoses are removed.
4. Tag and disconnect hydraulic hoses, and IMMEDIATELY cap or cover the openings to prevent contamination.
5. Remove the bolts that secure the Functions Pump. Remove the pump.
6. Remove the bolts that hold the Drive Pump to the engine. Remove the pump.
7. Installation is reverse of removal. Apply one (1) drop of Loctite® 242 or equivalent to each mounting bolt.
8. Open the ball valves on the Hydraulic Tank.
9. Loosen the output hose fittings at the hydraulic pumps to flood with hydraulic fluid. Tighten fittings.



CAUTION

Failure to open the ball valves on the Hydraulic Tank will result in damage to the pumps.

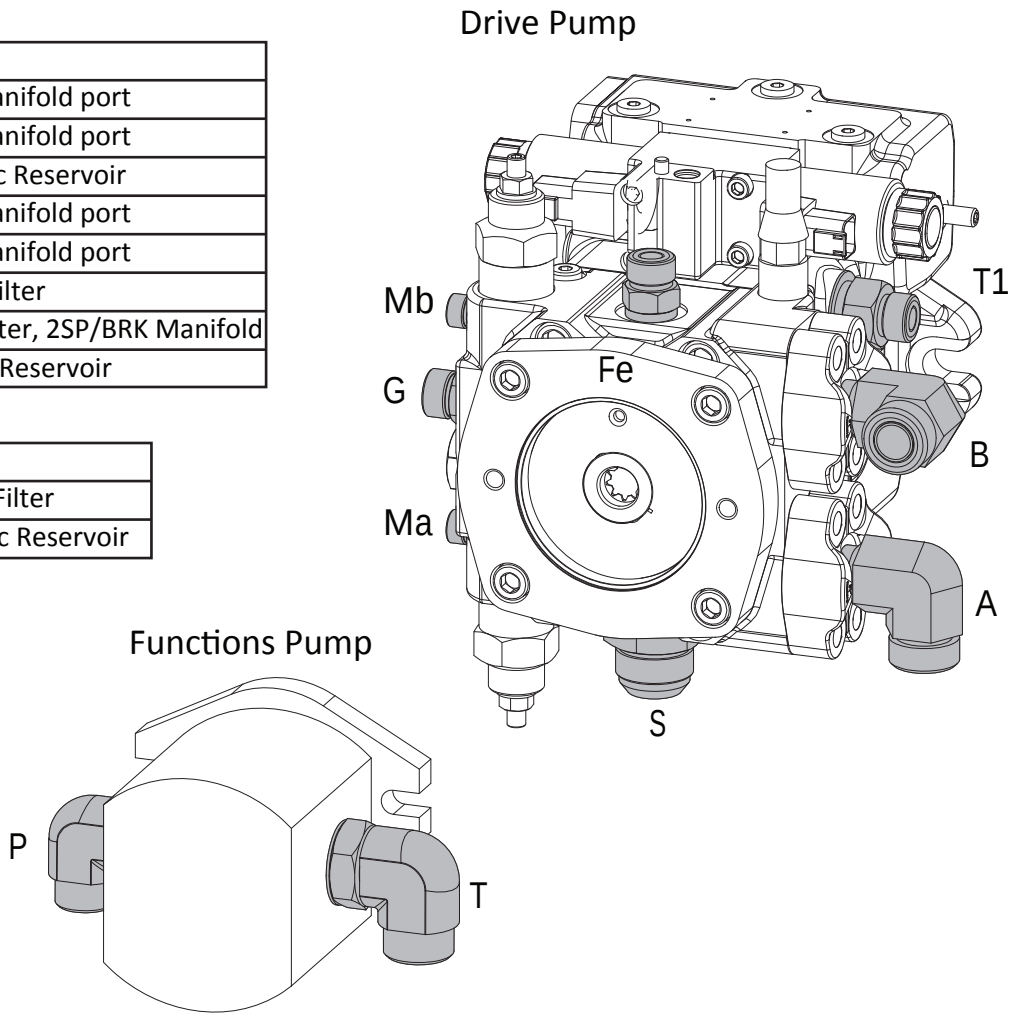
DO NOT operate the hydraulic pump until you have filled them with fluid and bled all air out of them. Severe damage will occur.

Drive Pump

Port	Connection
A	out to Rotary Manifold port
B	out to Rotary Manifold port
S	in from Hydraulic Reservoir
Ma	out to Rotary Manifold port
Mb	out to Rotary Manifold port
G	in from Charge Filter
Fe	out to Charge Filter, 2SP/BRK Manifold
T1	out to Hydraulic Reservoir

Functions Pump

Port	Connection
P	out to Pressure Filter
T	in from Hydraulic Reservoir



Drive Pump

The Drive Pump provides fluid to power the machine's Drive Function.

The Drive Pump must be filled with fluid and all air bleed out any time the pump is removed and re-installed, or drained of fluid for any reason. To prime the pump, loosen the output hose fittings at the hydraulic pumps to flood with hydraulic fluid. Tighten fittings.

Drive Pump Service

MEC does not recommend end-user maintenance or repair of the Drive Pump on the 60-J machines. Contact MEC or Rexroth for the nearest service provider.

Functions Pump

The Functions Pump is a fixed-displacement gear pump. Power to functions is controlled by the proportional valves, and unused pressure is returned to the tank.

The Functions Pump must be filled with fluid and all air bleed out any time the pump is removed and re-installed, or drained of fluid for any reason. To prime the pump, loosen the output hose fittings at the hydraulic pumps to flood with hydraulic fluid. Tighten fittings.

Hydraulic Manifolds

Note: Refer to Parts Section 25.

This machine has three hydraulic valve manifolds: the Main Functions Manifold, the Brake/Axle/2-Speed Manifold and the Boom Functions Manifold.

Additional hydraulic manifolds include the Brake and Steering junction blocks at the steering end of the chassis and the Rotary Manifold provides hydraulic connection between the turntable and chassis and allows continuous rotation of the turntable.

CAUTION

Clean all fittings before disconnecting hoses.

Tag all hoses and wiring for proper reassembly.

Plug all openings immediately to prevent contamination.

Replace any O-rings and inspect all hoses for crack and damage before reassembly.

REMOVAL

1. Disconnect the negative battery terminal.
2. Close the ball valves on the Hydraulic Tank to prevent fluid loss when the hoses are removed.
3. Tag and disconnect the solenoid valve electrical leads.
4. Tag and disconnect hydraulic hoses. Immediately cap the openings to prevent contamination.
5. Remove the bolts that hold the manifold to the mounting bracket.
6. 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 Orings, 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 242 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. Open the ball valves on the Hydraulic Tank.

CAUTION **Failure to open the ball valves on the Hydraulic Tank will result in damage to the pumps.**

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5. Connect the battery.
6. Operate each hydraulic function and check for leaks and for proper operation.
7. Adjust valve pressures.

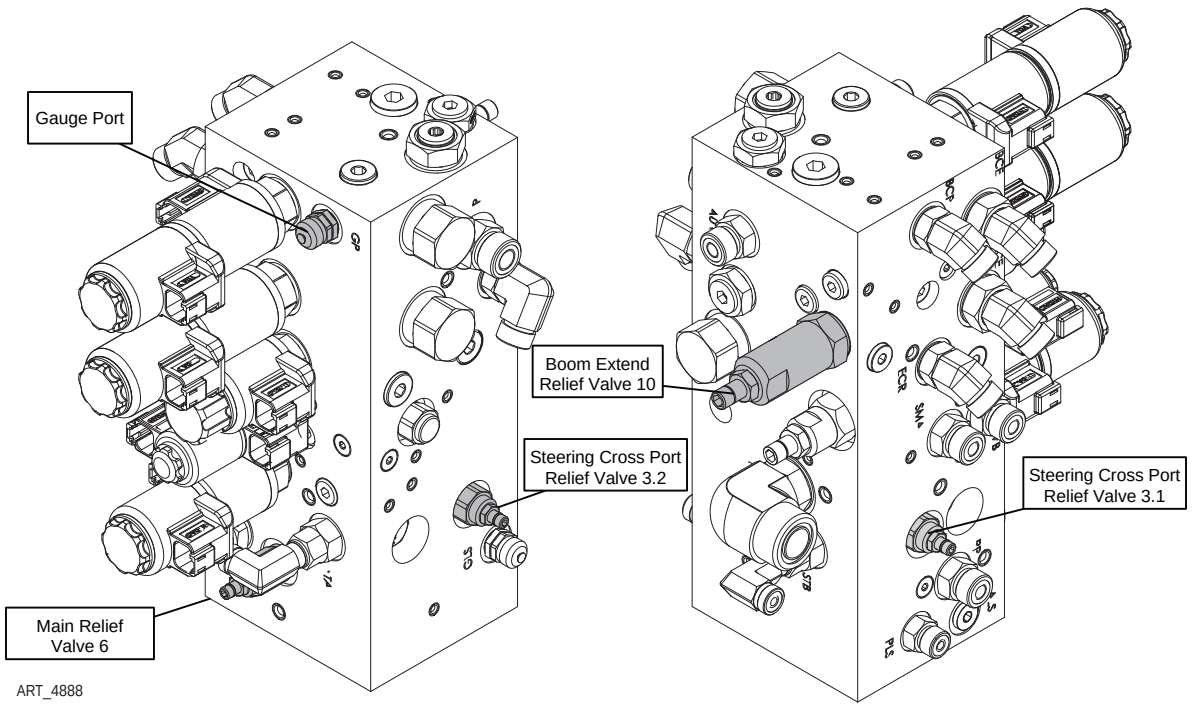
Hydraulic Pressure Adjustment

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 to normal operating temperature.

Insert a 0-5000 psi gauge onto the appropriate pressure test port GP using gauge adapter fitting MEC part no. 50974

60-J Diesel Pressure Settings				
System	**Setting**		**Adjustment**	**Gauge Port**
Main Functions Manifold Relief	3000 psi	207 bar	@ Primary Functions Pump	GP
Crossport Steering Relief	1500 psi	103 bar	@ Primary Functions Pump	
Extend Relief	1500 psi	103 bar	RV1	

Adjusting Relief Valves



System pressures should be checked and adjusted during routine maintenance to ensure proper machine performance

Counterbalance Valves

The counterbalance valves located on many of the cylinders are set by the manufacturer and should not be adjusted for any reason.

Replace any counterbalance valve that shows evidence of adjustment or tampering.

Main Relief Valve Pressure 6

Park the machine on a firm level surface free from overhead obstructions.

Primary Manifold Pressure should be set to 3000 psi (207 bar).

- Insert a 0-5000 psi gauge into the port GP of the Main Functions Manifold.
- Loosen the lock nut on the Main Relief Valve on the Main Functions Manifold.
- **With no load on platform**, use the Boom Retract function to retract the boom completely.
- Press and hold the Boom Retract 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.
- Tighten the lock nut on the valve.

Steering Cross Port Relief Valves 3.1, 3.2

Park the machine on a firm level surface free from obstructions.

The Steering Cross Port Relief Valves (3.1 and 3.2) should be set to 1500 psi (103 bar).

- Insert a 0-5000 psi gauge into the port GP of the Main Functions Manifold.
- Loosen the lock nuts on Steering Cross Port Relief Valves 3.1 and 3.2 on the Main Functions Manifold.
- Steer the wheels fully left. Hold the switch for 10 seconds. This is the reading for valve 3.1.
- If pressure is LOW, adjust Valve 3.1 ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust Valve 3.1 ¼ turn counterclockwise and recheck.
- Steer the wheels fully right. Hold the switch for 10 seconds. This is the reading for valve 3.2.
- If pressure is LOW, adjust Valve 3.2 ¼ turn clockwise and recheck.
- If pressure is HIGH, adjust Valve 3.2 ¼ turn counterclockwise and recheck.
- Tighten the lock nuts on the valves.

Boom Extend Relief 10

Park the machine on a firm level surface free from overhead obstructions.

The Boom Extend Relief Valve (10) should be set to 1500 psi (107 bar).

- Insert a 0-5000 psi gauge into the port GP1 of the Functions Manifold.
- Loosen the lock nut on the Boom Extend Relief Valve on the Main Functions Manifold.
- **With no load on platform, use the Boom Extend function to extend the boom completely.**
- Press and hold the Boom Extend 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.
- Tighten the lock nut on the valve.

Wheel Motor Startup Procedure

Follow this procedure when restarting a machine on which the Drive Motors have been:

- Removed and re-installed, or
- Drained of fluid for any reason.

WARNING

UNINTENDED MOVEMENT OF THE MACHINE OR MECHANISM MAY CAUSE INJURY. SECURE THE MACHINE BEFORE PERFORMING THIS PROCEDURE.

CAUTION

Clean all fittings before disconnecting hoses.

Tag all hoses and wiring for proper reassembly.

Plug all openings immediately to prevent contamination.

Replace any O-rings and inspect all hoses for crack and damage before reassembly.

Inspect each Drive Motor for damage prior to installation. Use only the appropriate hydraulic fluid as recommended in “Fluid Recommendations” on page 21.

1. Fill the reservoir with the appropriate hydraulic fluid as recommended in “Fluid Recommendations” on page 21. Always filter fluid through a 10 micron filter when pouring into the reservoir. Never reuse hydraulic fluid.
2. Fill the inlet line leading from the pump to the reservoir. Check the inlet line for properly tightened fittings and be certain it is free of restrictions and air leaks.
3. Reconnect all hoses.
4. Disconnect the wiring harness lead to the Fuel Solenoid on the engine.
5. Crank the engine for 5 seconds, then stop for 30 seconds. Do this three times.
6. Reconnect the wiring harness lead to the Fuel Solenoid on the engine.
7. Start the engine and allow it to run for one minute, then test the Drive Function for proper operation.

Repair

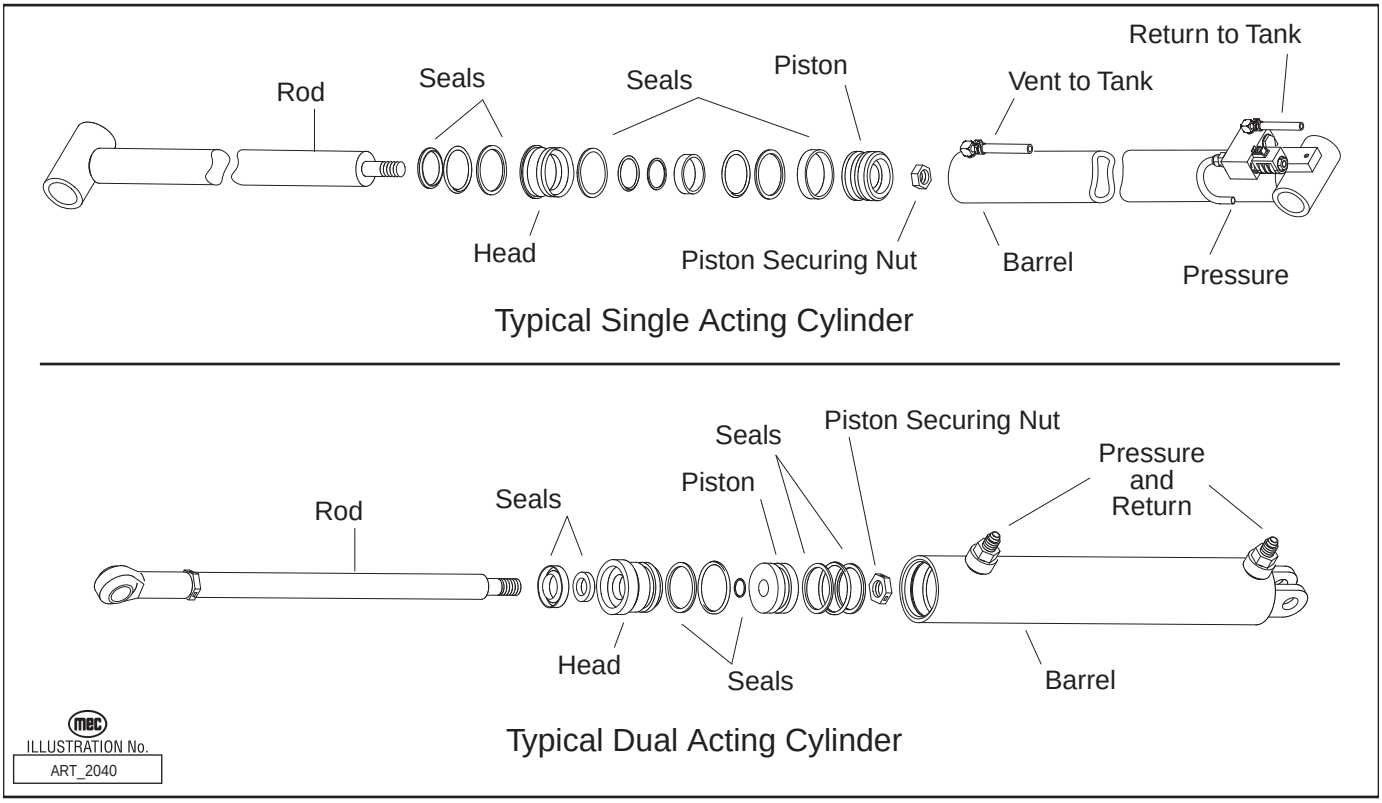
MEC does not recommend end-user maintenance or repair of the drive motors. Contact MEC for the nearest service provider or replacement.

General Cylinder Repair

WARNING

WHEN REMOVING ANY HYDRAULIC CYLINDER, ENSURE THAT THE COMPONENTS IT SUPPORTS ARE THEMSELVES SECURELY SUPPORTED PRIOR TO BEGINNING ANY REMOVAL.

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



Removal

Note: Refer to Section 18 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 18.

Preparation

CAUTION

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.

CAUTION **DO NOT overtighten the vise. Overtightening may damage the cylinder.**

Cylinder Disassembly

1. Remove solenoid valves or counterbalance valves, if the cylinder is equipped with them.
2. Remove the head from the cylinder body.
3. Remove the shaft assembly from the barrel, pulling in a straight line, so as not to scar the internal parts.
4. 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.
5. Remove nut at the end of the shaft and pull head and piston off of the rod.

Some pistons may be threaded onto the end of the rod and secured with a set screw. Remove the set screw before attempting to remove the piston to avoid damage to the rod and piston.

6. Remove all seals from the head and piston using a non-sharp seal tool. These tools are available from various seal suppliers.
7. Clean all fluid and debris off of the head, piston, shaft, collar and barrel using solvent, rags, and an air hose.
8. Inspect parts for scratches, pits or polishing. Check seal groves 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

To ensure 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.

CAUTION **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).

On pistons with set screws, tighten the set screw.

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. Reinstall any solenoid valves or counterbalance valve removed during disassembly.
10. 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.

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 located at each control station.

Lower Controls

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

Upper Controls

The upper controls operate all machine functions. A momentary bi-directional rocker switch on the drive control handle provides the steering function. The control system for operation of drive, steer, lift, and lower is electric-over-hydraulic type. The lift, turntable rotate, platform rotate, jib and drive functions are proportional and are controlled by position and direction of the upper controls joysticks.

Emergency Stop

ART_3353

There are two red Emergency Stop switches, one located on the upper controls and one on the lower controls. 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.

When operating from the lower controls station, only the lower Emergency Stop switch affects machine operation. Activation of the lower Emergency Stop switch in this situation will immediately cut electrical power to all controls and stopping all machine functions.

When operating from the upper controls, activation of either Emergency Stop switches will immediately cut electrical power to all controls and stopping all machine functions.

Note: Both switches must be set or the machine will not operate from the upper controls.

The electric Emergency Lowering switch will continue to function when the Emergency Stop switches are depressed.

Auxiliary Power System

The Auxiliary Power System is used to lower the platform in case of power failure. To lower the platform, activate the Auxiliary Power Switch to run the auxiliary hydraulic pump.

This function uses battery power from the auxiliary battery to lower the platform.

- Push and hold the Auxiliary Power switch, then use the Boom Extend/Retract function to retract the boom.
- Continue to hold the Auxiliary Power switch, then use the Boom Lift/Lower function to lower the boom.

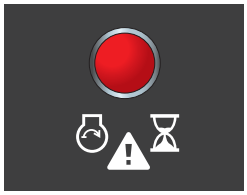
Note: The Auxiliary Power System is disabled when the engine is running.

The Auxiliary Power switch serves as an enable switch. It is not necessary to use the primary function enable switch.

Diagnostic LED & EZ-Cal Diagnostic Tool

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 19 for Troubleshooting. This section also contains instructions on the use of the EZ-Cal diagnostic tool.

Starter Circuit Cutout



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To protect the starter motor, power cuts off to the starter circuit when the starter motor has run continuously for 10 seconds without starting the engine. The Starter Circuit Cutout indicator light on the Lower Controls Box will turn on during this time. Power to the starter circuit reengages after 30 seconds.

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

BATTERIES UNDER CHARGE 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.

One 12 Volts DC battery supplies the electrical power required to start the engine and\ to operate the electrical circuits. An optional second may be present in machines to provide additional power for the Emergency Down power unit.

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 charged (100%) at 80°F (26.6°C)

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

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

During quarterly maintenance (after battery has been charged), 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.

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.**

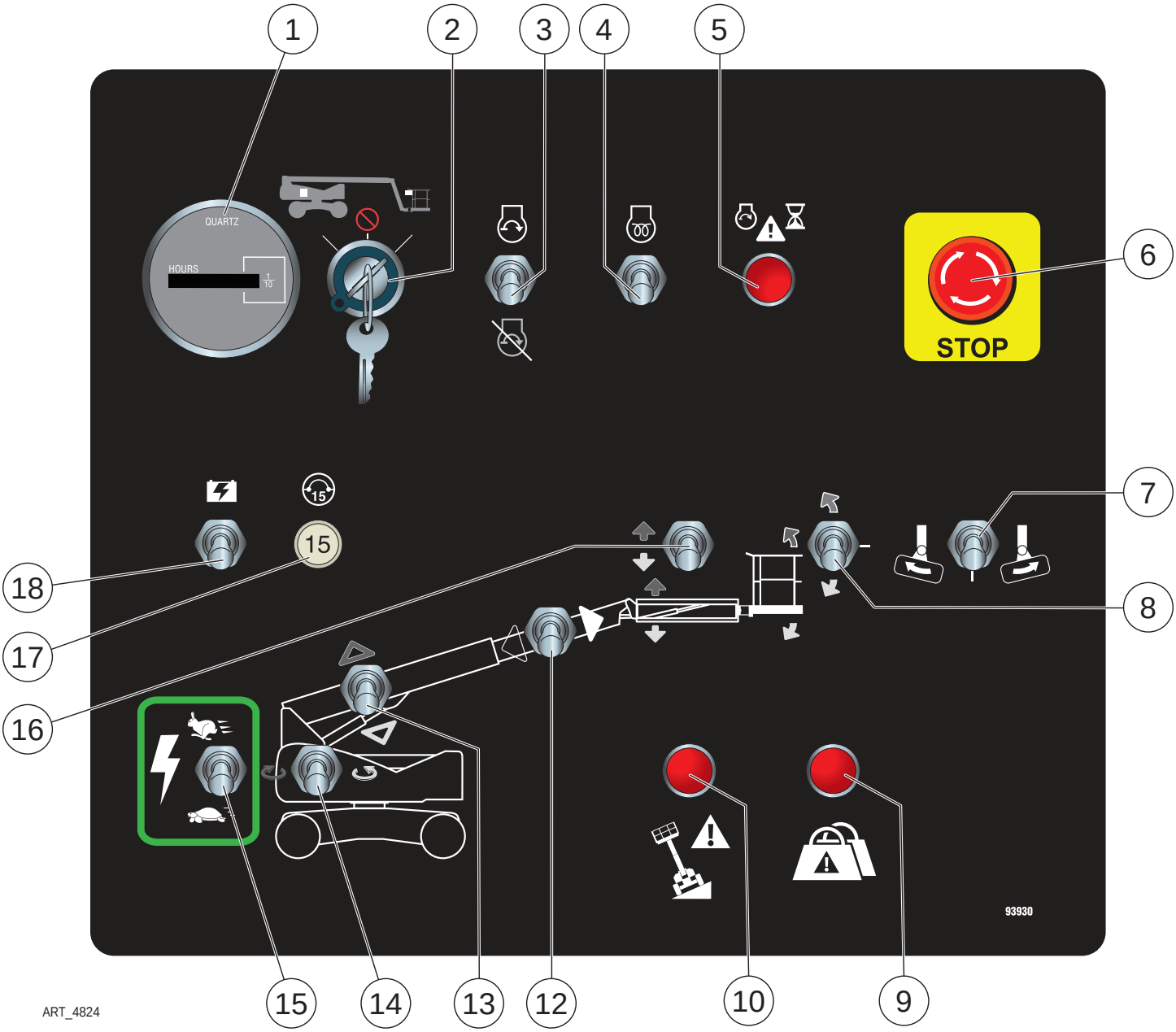
To Remove A Battery:

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.

Lower Controls

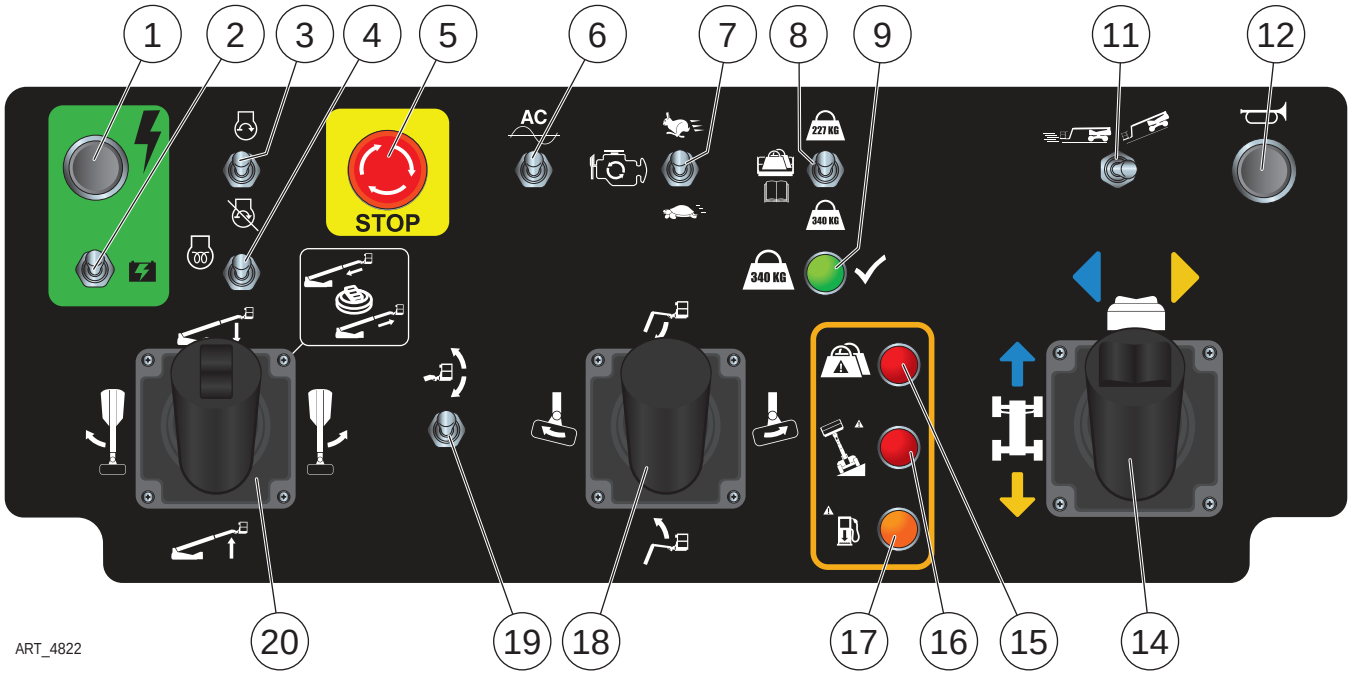


WARNING

ALWAYS CHECK OVER, UNDER AND AROUND THE MACHINE FOR PERSONNEL, STRUCTURES AND OBSTRUCTIONS BEFORE ACTIVATING ANY CONTROL FUNCTION AND CONTINUE TO WATCH FOR HAZARDS WHILE OPERATING THE MACHINE

#	CONTROL	DESCRIPTION	
1	Hour Meter	Indicates total elapsed time of machine operation.	
2	Selector Switch	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.
3	Start/Stop Switch	Push switch up to start engine. Push switch down to stop engine.	
4	Glow Switch	Press this switch up to activate glow plugs prior to starting.	
5	Starter Time-out Indicator	When this red light is illuminated, the starter circuit is temporarily disabled. The starter circuit times out if the starter is run continuously for 15 seconds without the engine starting. The starter functions resets after approximately 30 seconds.	
6	Emergency Stop Switch	Press the EMERGENCY STOP switch at any time to stop all machine functions. Turn switch clockwise to reset.	
7	Platform Rotate Switch	Press and hold the Function Enable Switch (#15), then move this switch left to rotate the platform clockwise. Press and hold the Function Enable Switch (#15), then move this switch right to rotate the platform counterclockwise.	
8	Platform Level Switch	Press and hold the Function Enable Switch (#15), then move this switch up to manually level the rear of the platform upward. Press and hold the Function Enable Switch (#15), then move this switch down to manually level the rear of the platform downward.	
9	Overload Indicator Light -- Optional Overload Sensing System Only	Light ON indicates too much weight on the platform. An audible alarm will sound and all machine function will stop. Remove weight from the platform to restore function and continue.	
10	Tilt Indicator Light	This light illuminates and an alarm sounds when the machine is not level. Follow the instructions in the operator's manual to safely lower the platform.	
11	--	--	
12	Boom Extend/ Retract	Press and hold the Function Enable Switch (#15), then move this switch right to extend the boom. Press and hold the Function Enable Switch (#15), then move this switch left to retract the boom.	
13	Boom Lift/Lower	Press and hold the Function Enable Switch (#15), then move this switch up to lift the boom. Press and hold the Function Enable Switch (#15), then move this switch down to lower the boom.	
14	Turntable Rotate	Press and hold the Function Enable Switch (#15), then move this switch left to rotate the turntable clockwise. Press and hold the Function Enable Switch (#15), then move this switch right to rotate the turntable counterclockwise.	
15	Function Enable Switch	Press and hold this switch to enable boom, turntable and platform operations. Press down to operate the controls at slow speed. Press up to operate the controls at higher speed.	
16	Jib Lift/Lower	Press and hold the Function Enable Switch (#15), then move this switch up to lift the jib. Press and hold the Function Enable Switch (#15), then move this switch down to lower the jib.	
17	Circuit Breaker	Trips when there is excessive electrical load. Push to reset.	
18	Auxiliary Power Switch	If normal power fails, press and hold while using boom retract and boom lower functions.	

Platform Controls



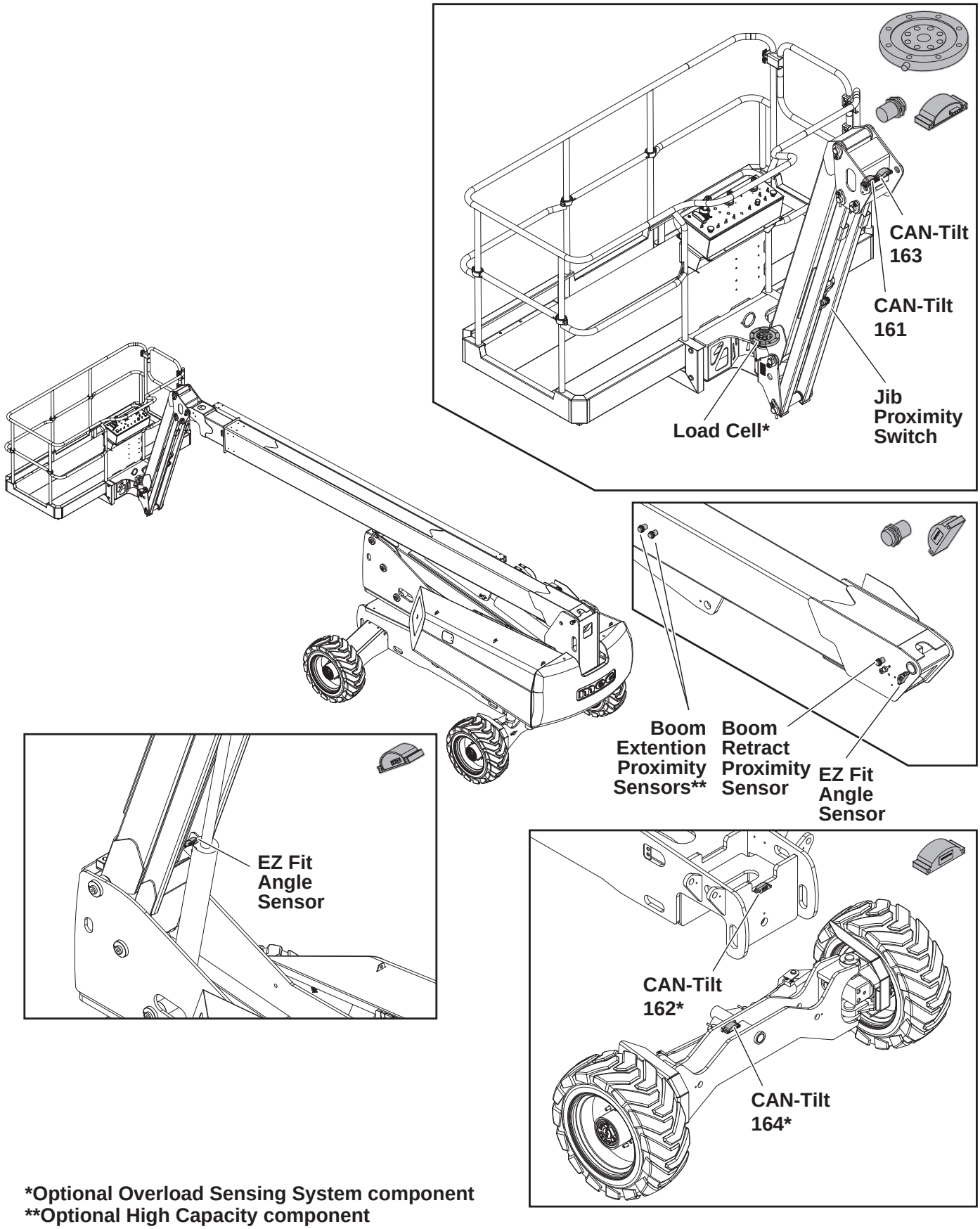
WARNING

ALWAYS CHECK OVER, UNDER AND AROUND THE MACHINE FOR PERSONNEL, STRUCTURES AND OBSTRUCTIONS BEFORE ACTIVATING ANY CONTROL FUNCTION AND CONTINUE TO WATCH FOR HAZARDS WHILE OPERATING THE MACHINE

#	Control	Description
1	Function Enable Button	Press and hold this button to enable boom and platform operations.
2	Auxiliary Power	If normal power fails, press and hold while using Boom Retract and Boom Lower functions.
3	Start/Stop Switch	Move this switch up to start engine. Press this switch down to stop engine.
4	Glow Switch	Move this switch up to activate glow plugs prior to cold starting the engine.
5	Emergency Stop Switch	Press the EMERGENCY STOP switch at any time to stop all machine functions. Turn switch clockwise to reset.
6	Generator Switch (Optional)	Turn switch ON to engage optional AC generator. Generator switches off when any other function is enabled.
7	Engine Speed Select Switch	Use this switch to set the engine speed when functions are enabled. Setting this switch to low idle speed allows the operator to move the machine slowly and precisely. Move this switch up for high idle speed and fast function speed. Move this switch down for low idle speed and slow function speed.
8	High Capacity Switch (Optional)	On machines equipped with the High Capacity option, use this switch to choose high or standard capacities. To set the machine to High Capacity (750 lb (340 kg)), retract the boom, then move the switch to the down position. The green High Capacity Indicator Light (#9) will illuminate when this option is properly engaged. This will restrict the Boom Extend function reach and will allow the machine to operate with more weight in the platform. Move this switch up for 500 lb (227 kg) capacity and full boom range. **DO NOT** exceed the 500 lb (227 kg) unrestricted capacity unless the green High Capacity Indicator Light (#9) is illuminated.

9	High Capacity Indicator Light (Optional)	Green light illuminates when the High Capacity setting is properly engaged. To engage the High Capacity setting, retract the boom, then move the switch to the down position. If the green light does not illuminate, move the switch up, retract the boom completely, then move the switch down. **DO NOT** exceed the 500 lb (227 kg) unrestricted capacity unless the green High Capacity Indicator Light (#9) is illuminated.	
10	--	--	
11	Speed/Torque Switch	Move this switch to the left for high speed drive. Push this switch to the right for high torque drive.	
12	Horn Button	Press to sound warning horn.	
13	--	--	
14	Drive/Steer Control Lever	Depending on the position of the turntable, the machine may move in unexpected directions when the Drive and Steer functions are activated. The color- and shape-coded arrows on the joystick decal correspond to similar arrow decals on the machine chassis. Be sure to check the arrows on the chassis before using the Drive or Steer functions.	
		Drive Function	Depress the enable bar on front of the control lever, then push the control lever forward or backward to drive the machine.
		Steer Function	Depress the enable bar on front of the control lever, then press the thumb switch on top of the control lever to steer left or right.
15	Overload Indicator Light -- Optional Overload Sensing System Only	Light ON indicates too much weight on the platform. An audible alarm will sound and all machine function will stop. Remove weight from the platform to restore function and continue.	
16	Tilt Indicator Light	This light illuminates and an alarm sounds when the machine is not level. Follow the instructions in the operator's manual to safely lower the platform.	
17	Low Fuel Indicator Light	If this amber light is illuminated, the fuel level is low. Refuel soon.	
18	Jib/Platform Control Lever	Jib Lift/Lower Function	Depress the enable bar on front of the control lever, then pull the control lever backward to lift the jib. Depress the enable bar on front of the control lever, then push the control lever forward to lower the jib.
		Platform Rotate Function	Depress the enable bar on front of the control lever, then push the control lever right to rotate the platform counterclockwise. Depress the enable bar on front of the control lever, then push the control lever left to rotate the platform clockwise.
19	Platform Level Switch	Press the Function Enable Button (#1) to enable this function, then press this switch up to manually level the platform upward or down to manually level the platform downward.	
20	Boom/Turntable Control Lever	Turntable Rotate Function	Depress the enable bar on front of the control lever, then push the control lever to the left to rotate the turntable clockwise or right to rotate the turntable counterclockwise.
		Boom Lift/Lower Function	Depress the enable bar on front of the control lever, then pull the control lever back to elevate the boom. Depress the enable bar on front of the control lever, then push the control lever forward to lower the boom.
		Boom Extend/ Retract Function	Depress the enable bar on front of the control lever, then push the thumb switch on top of control lever back to extend the boom. Depress the enable bar on front of the control lever, then push the thumb switch forward to retract the boom.

Sensors



***Optional Overload Sensing System component**
****Optional High Capacity component**

ART_4889

Platform Load Cell

On machines equipped with the optional Overload Sensing System, there is one Load Cell sensor located between the platform mounting bracket and the platform rotator. The Load Cell senses the weight of the platform contents and stops operation of the machine if the platform is overloaded.

Platform Level CAN-Tilt Sensors

There are two CAN-Tilt Sensors located on the Platform Level bell crank. These sensors detect the level state of the platform and communicate with the control system to keep the platform level during boom operation.

CAN-Tilt Angle Transducers **are not** interchangeable. Each is identified by number for communication with the GP400 Module. If removed, be sure that each returns to its original location. If replaced, be sure that the replacement has the same number as the original.

Jib Proximity Switch

The Jib Proximity Switch senses when the jib is close to its fully lowered position and slows down jib motion.

EZfit Angle Sensors

There are two EZfit Angle Sensors. One is located at the base of the main boom while the other is mounted on the lower boom.

The EZfit Angle Sensors measure the absolute angle of the boom sections relative to level.

Boom Retract Proximity Sensor

The Boom Retract Proximity Sensor detects when the boom is fully retracted.

Boom Extension Proximity Sensors

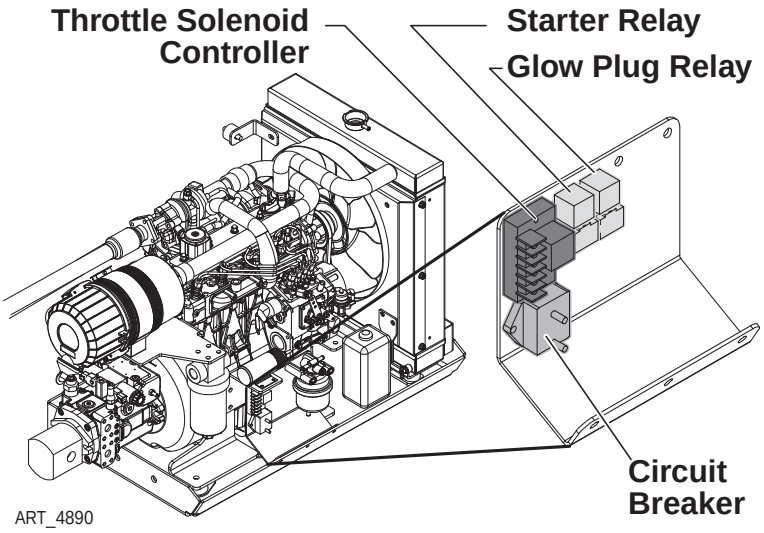
On machines equipped with the High Capacity option package, the Boom Extension Proximity Sensors are used to limit the extension range of the main boom when high capacity is selected.

Axle CAN-Tilt Angle Sensors

On machines equipped with the optional Overload Sensing System, there are two CAN-Tilt Angle Sensors on at the steering end of the machine base. One is mounted on the steering axle and the other on the machine chassis. These measure the angle of their relative to each other and to the GP400 module in the Base Controls Box.

CAN-Tilt Angle Transducers **are not** interchangeable. Each is identified by number for communication with the GP400 Module. If removed, be sure that each returns to its original location. If replaced, be sure that the replacement has the same number as the original.

Relays



Engine Relays

The Engine Relays are located beside the engine on the rear wall of the Engine Module. These relays reduce the current flow supplied by the GP400 Control Module. Refer to the Section 20 for relay functions and interconnect.

Start Relay

Provides power to the starter solenoid.

Glow Plug Relay

Provides power to the diesel engine glow plugs.

Throttle Solenoid Controller

Provides power to the electric throttle solenoid.

Circuit Breaker

Provides over-amperage protection for the Glow Plug wiring.

Alarms

Tilt Alarm

The Tilt Alarm is a dual-tone alarm that sounds at the Base Controls Box when the angle of the platform is outside of acceptable levels of operation (as measured by the GP400 inside the Base Controls).

To Correct: Retract and lower the boom until the platform is in the stowed position. Move the machine to a firm level surface before repositioning the platform.

Overload Alarm

On machines equipped with the optional Overload Sensing System, the Overload Alarm is a dual-tone alarm that sounds at the Base Controls Box when the control system senses an overload situation. The Overload Alarm is installed on machines equipped with the optional Overload Sensing System.

To Correct: Remove weight from the platform before operation can continue.

Alert Sounds

- The Platform Descent Alarm is optional but may be required in certain areas of operation. This alarm sounds from the Base Controls Box.
- The All-Motion Alarm is optional and sounds at the Base Controls Box.
- The Horn is activated by button from the Upper Controls Station and sounds from the Base Controls Box.

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.

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

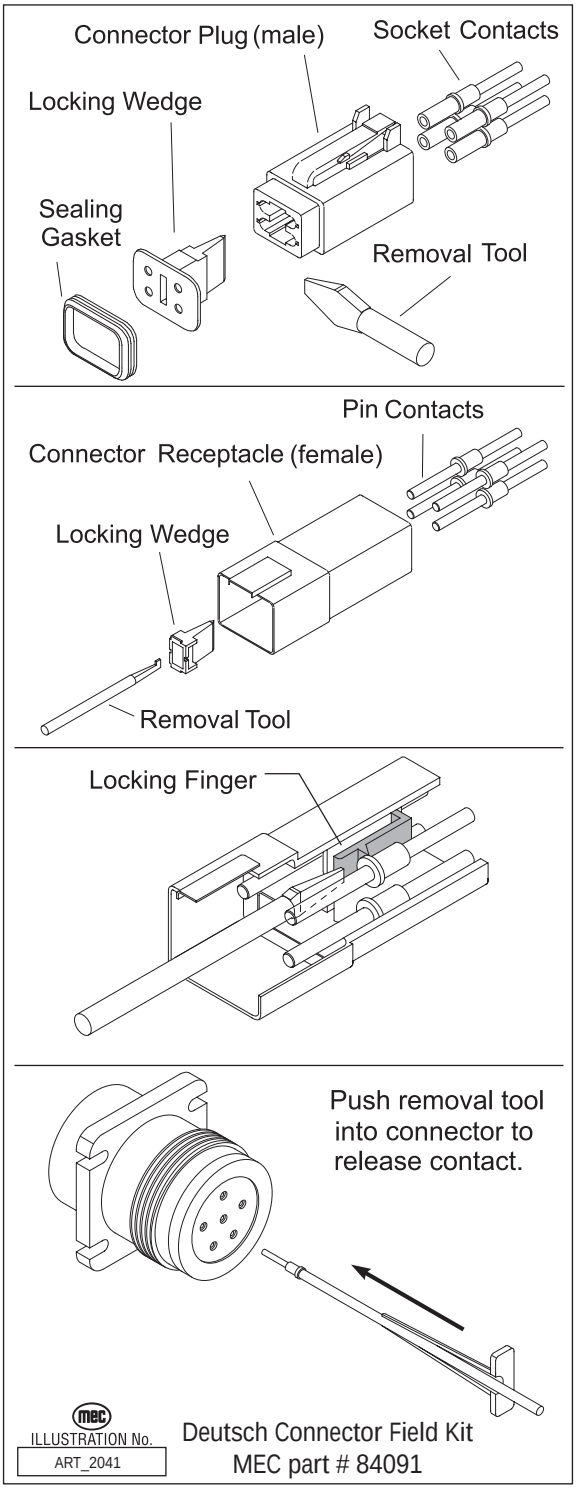
- Remove the locking wedge as outlined above.
- Using the removal tool or a flat blade screwdriver, push the Locking Fingers aside to release the contact.
- Pull the wire and contact out of the connector.

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

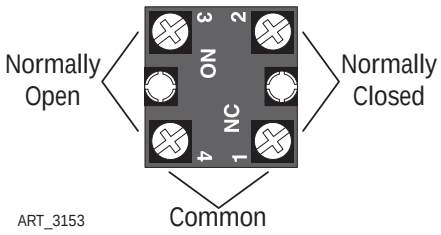
- Strip 1/4 in. (6 mm) insulation from the wire.
- Insert the contact into the crimping tool and insert the stripped wire into the contact making sure no wires are outside the contact barrel.
- Close the handles of the crimping tool, then release the handles to remove the crimped contact.



Continuity Checks

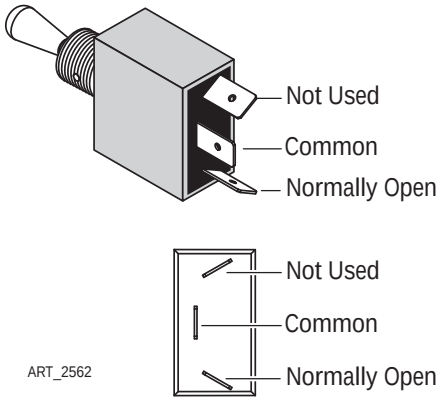
Selector Switch – On-Off

- 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 resistance reading.
- Repeat for each normally open terminal.



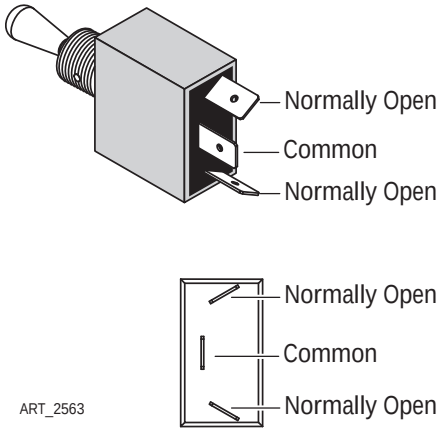
Toggle Switch – On-Off

- 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.



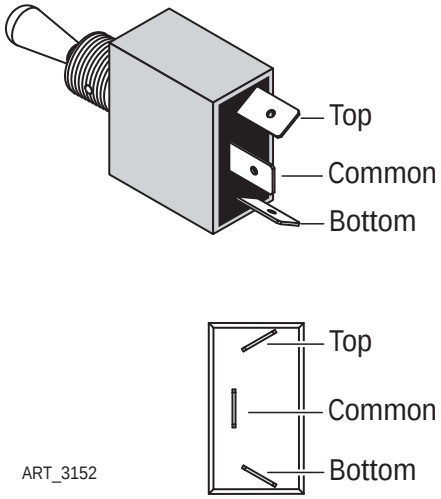
Toggle Switch – 1-Pole 2-Position

- 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.



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.



Toggle Momentary Switch

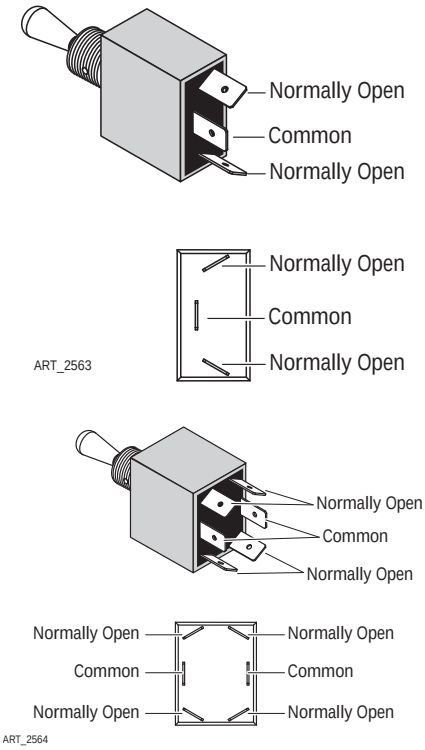
- Disconnect wires.
- Connect first probe of ohm meter to common terminal.

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.

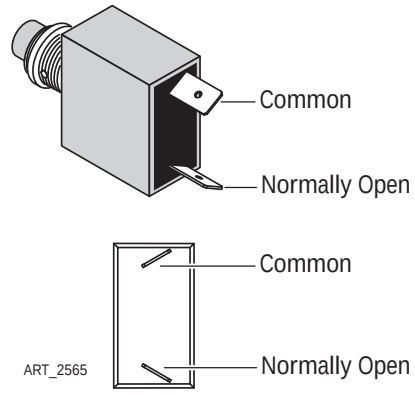
Test bottom position

- 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.



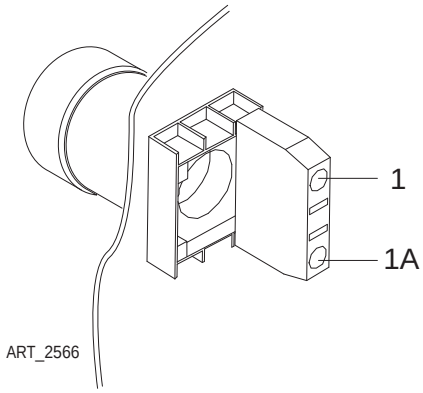
Momentary Button Switch

- 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



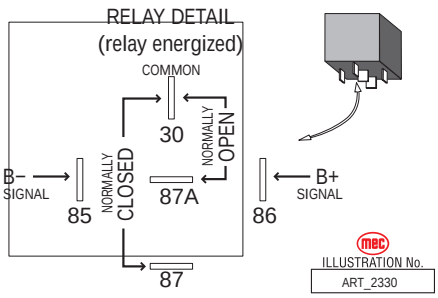
Emergency Stop Button

- 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.



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.



Control System

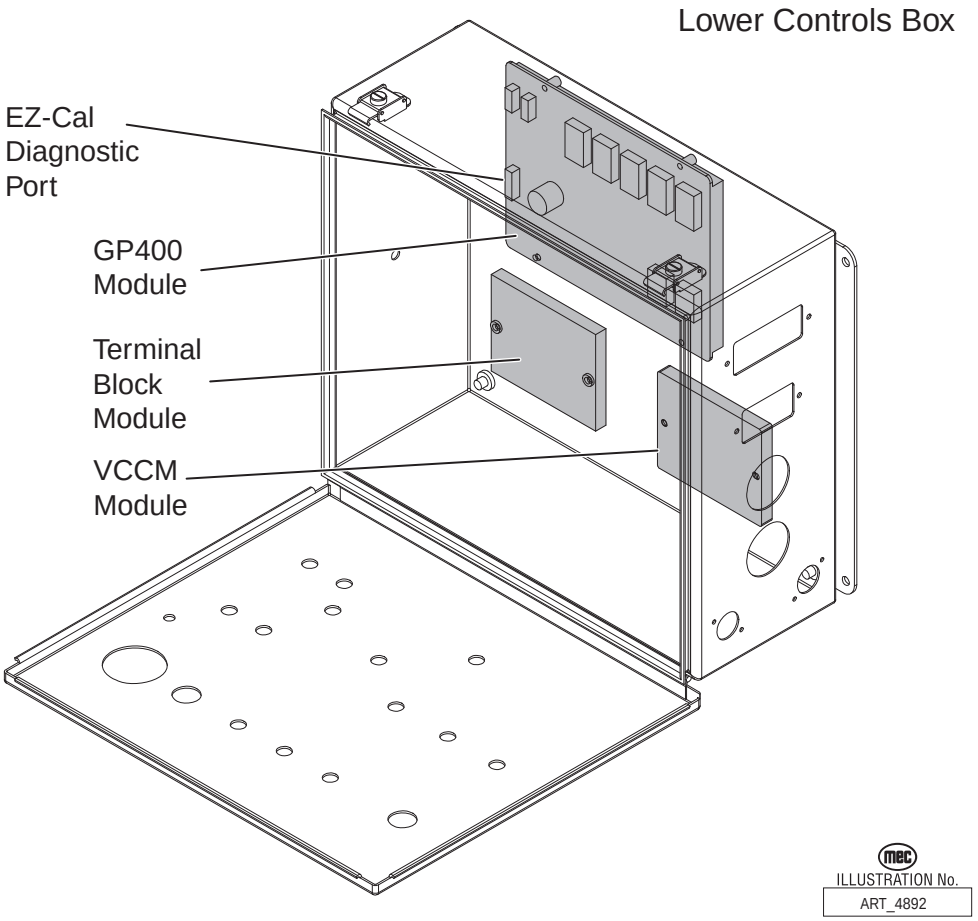
The GP400 Control System uses a variety of components and sensors to maintain proper and safe operation of the machine. This machine may be sold into many different countries that require a variety of monitoring equipment.

Components & Locations

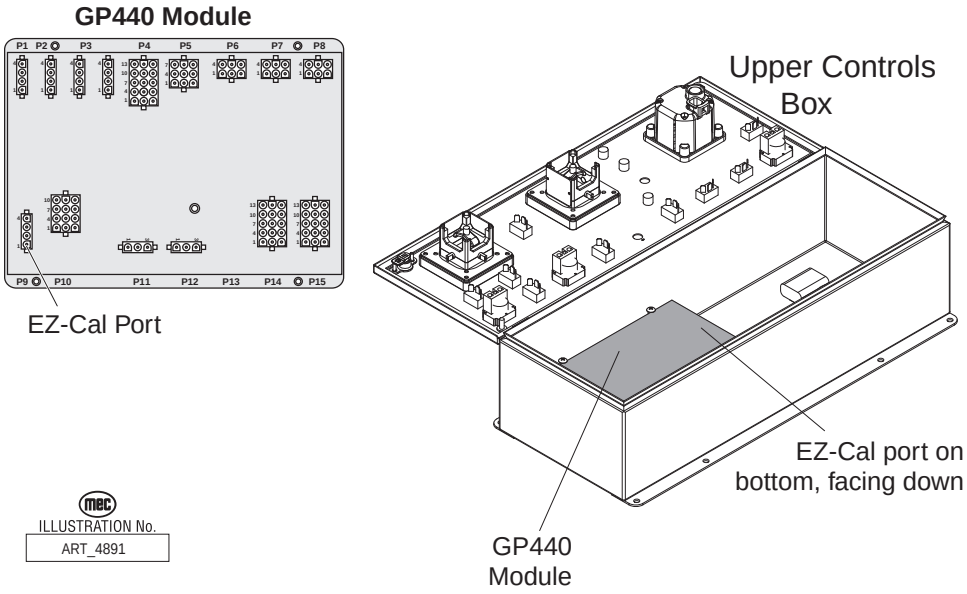
- GP400 Control Module processor -- Lower Controls Box
- GP440 Module -- Upper Controls Box
- Valve Current Control Module (VCCM) -- inside Lower Controls Box

Diagnostic information can be found in Section 19 for Troubleshooting.

Wiring information can be found in Section 20 for Schematics.



GP400 Calibration



The GP400 processor relies on angle sensor(s) to monitor platform elevation 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 platform elevation.

For example, the Angle Transducer, used to monitor platform elevation, varies its output between 1 and 4 volts through 140 degrees of rotation. During calibration the GP400 may learn that 1.8 volts (fictional number used for explanation) represents the fully lowered 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 displays a code that alerts to the need to recalibrate.

If the calibration procedure is performed incorrectly or if 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.

GP400 Calibration Procedure

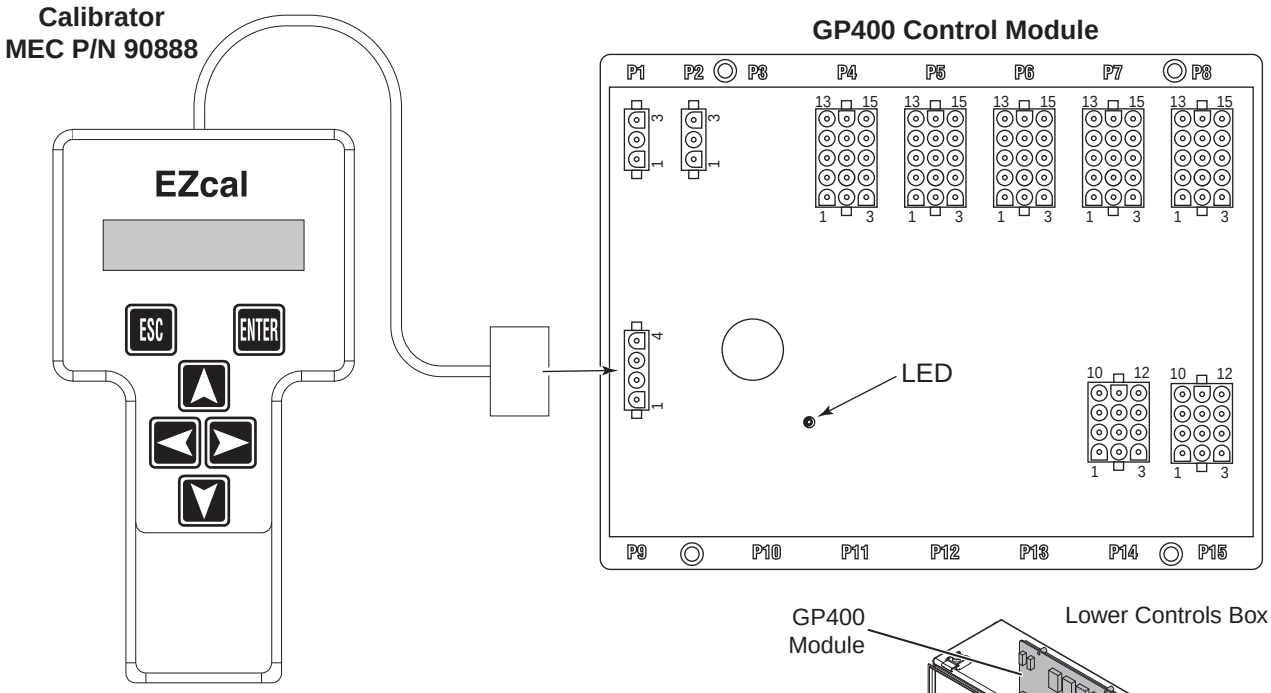
DANGER

IMPROPER CALIBRATION OF THE CONTROL SYSTEM CAN RESULT IN MACHINE INSTABILITY LEADING TO DEATH OR SERIOUS PERSONAL INJURY. THE FOLLOWING OPERATION MUST BE PERFORMED IN ITS ENTIRETY AS DESCRIBED HEREIN TO PREVENT IMPROPER MACHINE OPERATION.

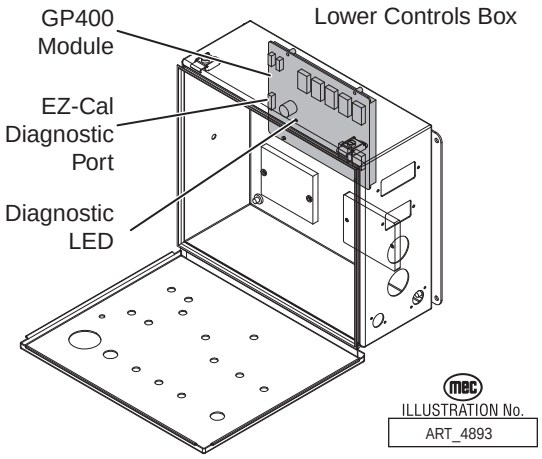
ONLY TRAINED AND AUTHORIZED PERSONNEL SHALL BE PERMITTED TO CALIBRATE THE PLATFORM OVERLOAD SENSING SYSTEM. READ ALL INSTRUCTIONS CLOSELY BEFORE ATTEMPTING EACH STEP OF THE CALIBRATION PROCEDURE.

In the event of a GP400 replacement, the GP400 must be calibrated before it will operate properly.

The following procedures and additional tasks detailed in Section 19 can only be performed using an EZ-Cal scan tool or optional on-board diagnostic display. If you do not have an EZ-Cal, please contact MEC to obtain one.



SYMBOL	KEY FUNCTIONS
ESC ENTER	**ESC/ENTER BUTTONS** To move back and forth between menu and sub-menu
◀ ▶	**LEFT/RIGHT BUTTONS** Select menus and setting to be adjusted
▲ ▼	**UP/DOWN BUTTONS** Adjust setting values



Two calibrations must be performed for all versions of this machine:

1. Level Sensor Calibration
2. Height Sensor Calibration
   a. Machines equipped with the optional Overload Sensing System or optional High Capacity package must perform the following calibration:
3. Load Calibration

Pre-Calibration Setup

Park the machine on an absolute flat and level surface free from overhead obstructions that will prevent full boom elevation. Lower the boom completely into its cradle.

Level Sensors calibration must be performed first. When calibrating the level sensors, be aware that the following sensors are all calibrated simultaneously:

- GP400 Control Module's Integral Level Sensor that measures chassis angles
- Two dual-axis CAN-Tilt Angle Transducers that measure platform angle; both mounted at the front of the Platform Level Bell Crank.
- On machines equipped with the optional Overload Sensing System: Two dual-axis CAN-Tilt Angle Transducers measuring axle position relative to the chassis; one is on the steering axle, the other on the chassis.

Therefore, before calibration can begin:

- Use a framers/spirit level to check that both the chassis and the steering axle are level both fore-and-aft and side-to-side.
- The PLATFORM must be leveled both fore-and-aft and side-to-side through the use of a framers/spirit level placed on the top or bottom side of the platform toe boards. Use the Platform Level toggle function to level the platform fore-and-aft.

After the platform has been confirmed to be absolutely level, proceed to the Level Sensors Calibration instructions.

The sensors used on the this machine are very sensitive and can detect even the slightest movement of the parts that they monitor. Therefore it is it is absolutely mandatory that the previous steps be performed with utmost care and precision before calibration.

Level Sensors Calibration

1. Park machine on flat level surface and ensure that the chassis, the steering axle and the platform are level, as described in Pre-Calibration Setup. Turn the engine off using the Start/Stop toggle switch.
2. Open the control module door, then open the lower control box door to access the GP400. Connect the EZ-Cal.
3. Power up the control system by turning the Key Switch on the lower controls to Base. The EZ-Cal display will read HELP PRESS ENTER.
4. Press the right arrow twice until the display reads, "ACCESS LEVEL 3". Press ENTER
5. Using the up arrow and right arrow, enter the numbers 1775, then press ENTER. The display should now read "ACCESS LEVEL 2"
6. Press the right arrow twice until the display reads "SETUPS". Press ENTER.
7. Press the right arrow once until the display reads "TILT SETUPS". Press ENTER.
8. The display will read "CALIBRATE LEVEL YES: ENTER NO: ESC"
9. Press ENTER, then press ENTER again. The State-of-Level indicator should now read 0.0 - 0.0 or within .1 degrees.

Level calibration is complete. Proceed to Height Calibration.

Height Sensor Calibration

1. If not already done, perform Pre-Calibration Set-up as described in the beginning of these instructions and the Level Sensors Calibration before proceeding.
2. With the EZ-Cal menu remaining in the Level Calibration, press ESC once until the display reads" TILT SETUPS" or to start from the beginning follow steps 1 - 6 above of the Level Sensors Calibration procedure.
3. Press the right arrow until the display reads "HEIGHT SETUPS" and press ENTER.
4. Press the right arrow once until the display reads "CALIBRATE HEIGHT". Press ENTER. You will be asked it the boom is fully lowered. Press ENTER when it is.
5. Follow the instructions on the display exactly and operate lift and lower only when the display instructs to do so. DO NOT interrupt lifting or lowering during calibration, as doing so will result in a bad calibration or possible fault. You will be instructed to operate Boom Up to full elevation then back down to fully stowed position. When the boom reaches full elevation and stops you must release the toggle switch before the calibration instructions can continue. This is also true when the boom reaches full stowed position. You will not be instructed to release the toggle switch.
6. After following the EZ-Cal instructions and Height Calibration is complete, you will be prompted to enter the calibration date. Use the up arrow and right arrow to enter the day's date.
7. Once the CAL DATE has been entered, calibration is complete. Press ESC 3 times and/or turn off the machine.

Height calibration is complete.

The following calibration procedure must and should only be performed on machines equipped with the optional Overload Sensing System and/or the optional High Capacity package.

Perform the previous calibration procedures before performing the following:

Load Calibration

Weight required for Load Calibration:

- (1) 227 kg (500 lbs) -- Machines equipped with optional Overload Sensing System **but not** the optional High Capacity package
- (1) 340 kg (750 lbs) -- Machines equipped with optional High Capacity package

1. If not already done, perform Pre-Calibration Set-up as described in the beginning of these instructions and the Level Sensors and Height Sensor Calibrations before proceeding with Load Calibration.
2. Place the machine on firm level ground.
3. Raise the boom so that the platform is approximately 12 inches (25 cm) off the ground.
4. Access the EZ-Cal by opening the Control Module door, then opening the Lower Control Box door. Attach the EZ-Cal as shown in page 51.
5. Power the system up. The EZ-Cal display will read HELP PRESS ENTER.
6. Press the right arrow twice until the display reads, "ACCESS LEVEL 3". Press ENTER.
7. Using the up arrow and right arrow, enter the numbers 1775 then press ENTER. The display

should now read “ACCESS LEVEL 2”

8. Press the right arrow twice until the display reads “SETUPS”. Press ENTER.
9. Press the right arrow until the display reads “LOAD SETUPS”. Press ENTER.
10. Press the right arrow until the display reads “CALIBRATE LOAD”. Press ENTER.
11. Follow the instructions on the EZ-Cal display through a series of lift lower cycles. At the end of each lift and lower the switch must be released for procedure to continue.
12. Press the right arrow until the display reads “PLATFORM LOADED”. Load the platform with the appropriate weight, then press ENTER.

- 227 kg (500 lbs) -- Machines equipped with optional Overload Sensing System **but not** the optional High Capacity package
- 340 kg (750 lbs) -- Machines equipped with optional High Capacity package

13. Press the right arrow until the display reads “PLATFORM EMPTY”. Remove all weight from the platform, then press ENTER.
14. Once the calibration is complete, a screen should appear to enter the date. Enter the date that the machine was successfully calibrated and hit ENTER. You should now see “FINISHED!” appear on the screen. The machine is now calibrated and ready to be used.

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:CANNOT RUN

- There is a shut-down fault on the controller. “EVERYTHING OK” does not show up when you try to calibrate.
- Check HELP message for more information.

F02:NOT GROUND MODE

- This message is given if the base/platform selector switch 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 Level Sensors 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.

F07:BAD HEIGHTS

- The two Height Sensors are not in agreement at the end of Height Calibration (only on machines equipped with the optional Overload Sensing System).

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 HEIGHT1
F09:BAD HEIGHT2

- This message is given if the height sensor output (P8-2) 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 / SYSTEM (2a-7) to see the output. This is usually due to a wiring problem.

F10:BAD HEIGHT1
F10:BAD HEIGHT2

- This message is given if the height sensor output (P8-2) 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
F11:NOT DOWN

- 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) 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 HEIGHT1

- This message occurs if EZfit#1 output 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. Check that the boom is fully retracted.

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. Check that the boom is fully retracted.

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. Check that the boom is fully retracted.

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. Check that the boom is fully retracted.

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. Check that the boom is fully retracted.

F20:HEIGHT1<>0%
F20:HEIGHT2<>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 DIAGOSTICS / SYSTEM to check the height.

F22:HEIGHT1<>100%
F22:HEIGHT2<>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.

F27:BAD HEIGHT

- This message indicates a problem with the height sensor output (P8-2) 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.

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 DOWN @
F40:REJECT DELTA UP @

- 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 is out of range at the start of calibration.
- The 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.

F49:TOO FEW
- The minimum number of static calibration points was not achieved.

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.

F60:BAD EXTENSION

- Extension has not been calibrated or is faulty at the start of Load Calibration.

F61:BAD EXTENSION

- Extension is out of range at the start of Extension Calibration.

F62:BAD EXTENSION

- Extension is out of range at the start of Extension Calibration.

F63:BAD EXTENSION

- Extension is out of range at the end of Extension Calibration.

F64:BAD EXTENSION

- Problem at the end of Extension Calibration -- not enough difference between start and end points

F65:BAD EXTENSION

- Use Boom Extend function to calibrate extension.

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: For the standard version of this machine, this is 500 lbs (227 kg). Option-equipped machines may be rated for 600 lbs (272 kg) or 750 lbs (340 kg). See machine's the serial plate for platform capacity.
- 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.

Mechanical Components

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

Base

CAUTION

When steam cleaning or pressure washing 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 & 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.

DANGER

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.

ON MACHINES WHERE FOAM FILLED TIRES WERE FITTED AS ORIGINAL EQUIPMENT, TIRES MUST BE REPLACED WITH EQUIVALENT SPECIFICATION TIRES AND FOAM-FILL WEIGHT. CONTACT MEC SERVICE.

Changing Tires

Refer to “Lift and Support The Machine” in Section 9 for instructions and safety precautions.

CAUTION

Always block the wheels before lifting the machine.

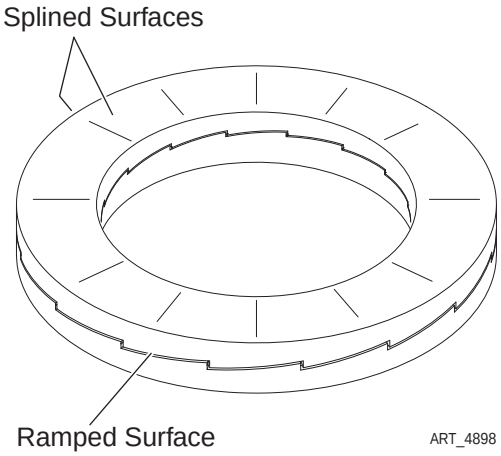
1. Chock tires on the end of machine opposite the tire to be changed.
2. Break loose but **do not remove** lug nuts before raising the machine.
3. Lift the end of machine requiring a tire change and support with jackstands of adequate capacity.
4. Remove lug nuts and pull the wheel off.
5. Install the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

Nordlock Washers

Nordlock-style lock washers are used in many places on this machine. These twopiece washers have a ramped surface in the center and a splined outer surface. Since the angle of the ramps is larger than the angle of a bolt's thread, and since the splined surfaces grip the material around them, these washers provide excellent bolt-holding capabilities.

Nordlock-style washers must be used anywhere they were originally installed on this machine. Take care during disassembly to collect both parts of each washer for later reuse.

During installation, be sure to assemble the pairs as shown, with the ramped surface in the middle and the radial splines facing out.



Platform Removal & Installation

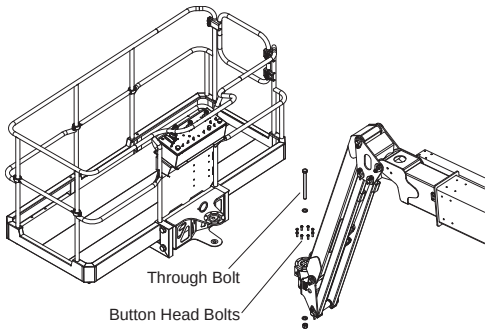
WARNING

THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

The Platform is normally removed only for replacement or as a step in a larger disassembly.

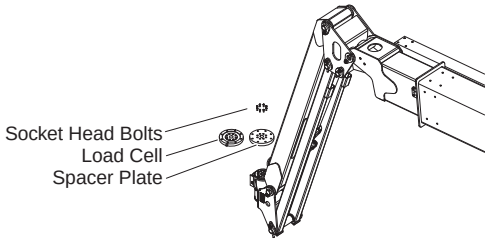
This procedure is also used to replace the Load Cell on machines equipped with the optional Overload Sensing System or optional High Capacity package.

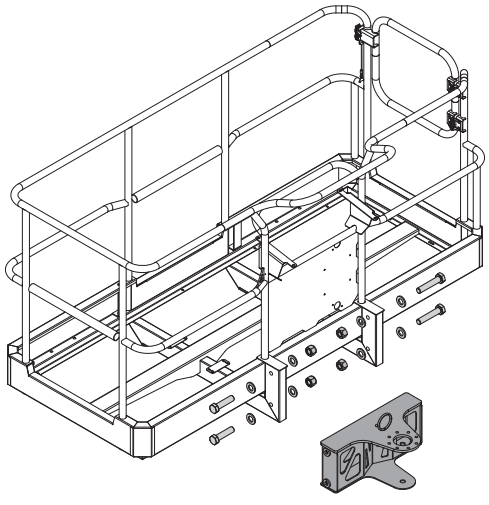
A fork lift and pallet are needed for this procedure.



Disassembly

1. Park the machine on a firm level surface.
2. Position the platform on a pallet so that the bottom of the through bolt is off the ground. Strap the platform to the pallet.
3. Disconnect the wiring harness from the Upper Controls box. Carefully pull the wiring harness back to the jib.
4. Remove the center through bolt.
5. Remove the eight button head bolts that secure the platform mount weldment to the load cell/spacer plate.
6. Use the forklift to move the platform and pallet away from the rest of the machine.
7. If necessary, remove the eight socket head bolts that secure the Load Cell/Spacer Plate to the platform rotator.
8. If necessary, remove the platform mount weldment from the platform.





Note: Load Cells are used on any machine equipped with the optional Overload Sensing System and/or the optional High Capacity Package. The Spacer Plate is used only if neither option is present.

Assembly

Assembly is reverse of disassembly. Tighten all fasteners to proper torque as shown below.

Location	Torque	
Platform Rotator to Spacer/Load Cell	55 lb/ft	75 Nm
Spacer/Load Cell to Platform Mount Weldment	95 lb/ft	129 Nm
Platform Rotator Through Bolt & Nut	420/450 lb/ft	569/610 Nm
Platform Mount Weldment Bolts & Nuts	250/270 lb/ft	339/366 Nm

Platform Rotator

WARNING

THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

The Platform Rotator is located between the Platform and the Jib.

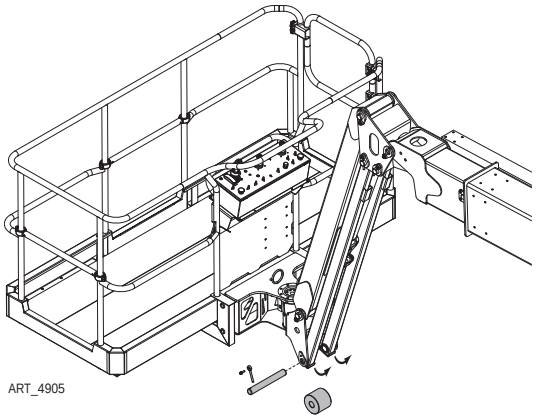
The Platform Rotator is normally removed only for repair or replacement.

This procedure differs from the Platform Removal procedure in that the platform is removed while still attached to the Platform Rotator. This reduces the possibility of injury when the jib pivot points are released.

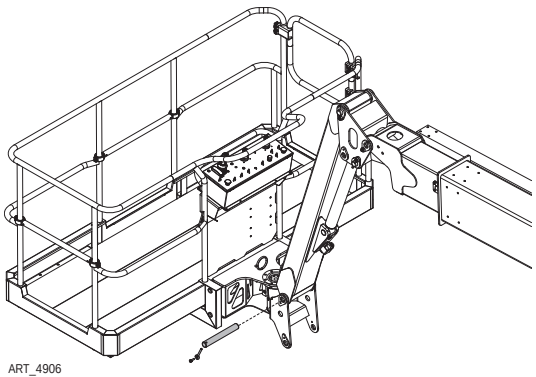
A fork lift and pallet are needed for this procedure.

Disassembly

1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Position the platform on a pallet so that the bottom of the through bolt is off the ground. Strap the platform to the pallet.
4. Disconnect the wiring harness from the Upper Controls box. Carefully pull the wiring harness back to the jib.
5. Disconnect all hydraulic hoses. Immediately plug and cap all openings to prevent contamination.
6. Remove bolt, pin retainer, lower pin and roller from the Platform Rotator lower pivot point. Swing the lower jib links out of the way.
7. Remove bolt, pin retainer and upper pin from the Platform Rotator upper pivot point.
8. Use a forklift to move the platform away from the machine.
9. Support the Platform Rotator. Remove the center through bolt.
10. Remove the eight button head bolts that secure the platform mount weldment to the load cell/spacer plate. The Platform Rotator is now detached from the platform.
11. If necessary, remove the eight socket head bolts that secure the Load Cell/Spacer Plate to the platform rotator.



ART_4905



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Note: Load Cells are used on any machine equipped with the optional Overload Sensing System and/or the optional High Capacity Package. The Spacer Plate is used only if neither option is present.

Assembly

Assembly is reverse of disassembly.

Examine all pins for signs of wear, surface imperfections, cracks or gray dust in the pivot area. Replace as necessary.

Tighten all fasteners to proper torque as shown below. Refer to Section 4 of this manual for torque specifications of fasteners not listed below.

Location	Torque	
Platform Rotator to Spacer/Load Cell	55 lb/ft	75 Nm
Spacer/Load Cell to Platform Mount Weldment	95 lb/ft	129 Nm
Platform Rotator Through Bolt & Nut	420/450 lb/ft	569/610 Nm

Jib Cylinder/Jib Components

WARNING

THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

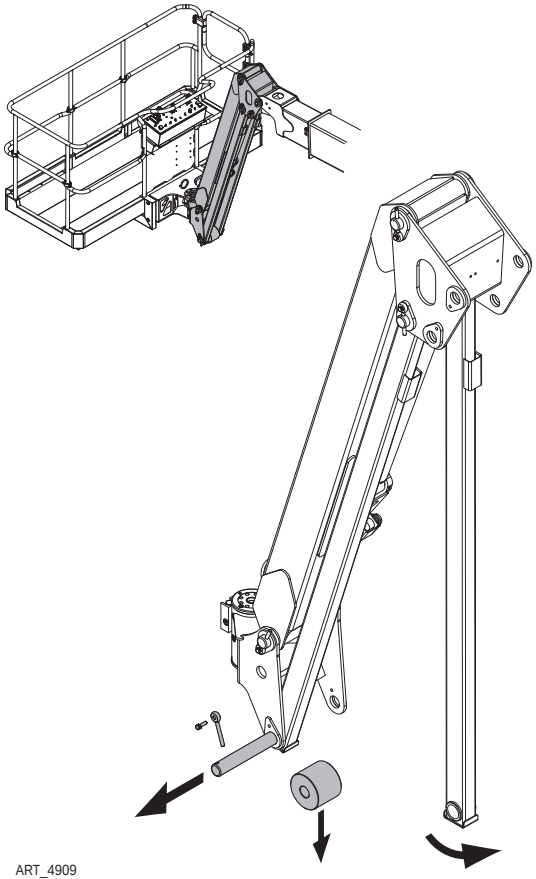
The Jib Cylinder is located within the Jib linkage assembly. Its purpose is to move the Jib up and down relative to the position of the Boom tip.

Disassembly

1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Lower the boom to the stowed position, so that the boom rests on the turntable.
4. Using the Jib Lift function, raise the jib high enough to position a pallet on the ground beneath the platform. Lower the platform onto the pallet, then strap the platform to the pallet.
5. Disconnect all hydraulic hoses. Immediately plug and cap all openings to prevent contamination.
6. Remove bolt and pin retainer for the lower pin at the Platform Rotator lower pivot point.

On the pin retainer side, pull the pin out just far enough to release the bottom of the further lower jib link and the jib roller.

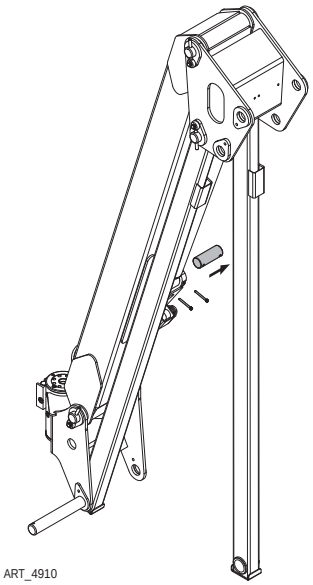
Swing the lower jib link out of the way as shown.



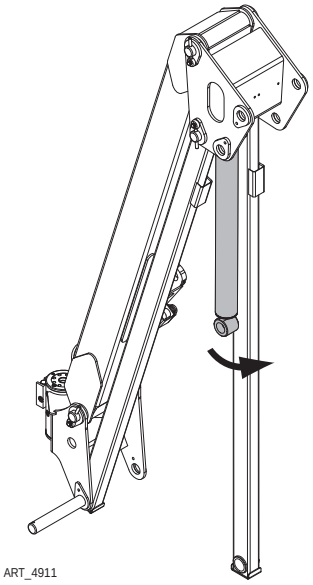
ART_4909

IMPORTANT! Leave the pin holding the nearer lower jib link in place. DO NOT pull the pin all the way out.

7. Remove the bolts that secure the Jib Cylinder pin to the jib. Support the end of the Jib Cylinder, then remove the pin.


ART_4910

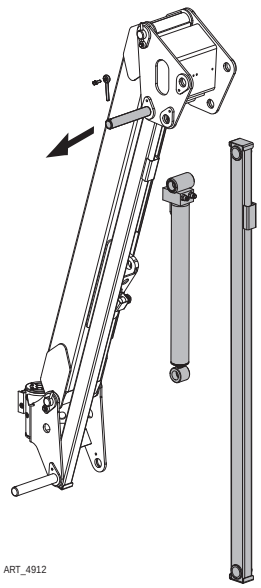
8. Swing the Jib Cylinder out as shown.


ART_4911

9. Remove bolt and pin retainer for the lower pin at the front lower pivot point of the bell crank weldment.

Support the Jib Cylinder and the lower jib link that are hanging straight down. On the pin retainer side, pull the pin out just far enough to release the link and the cylinder.

Remove the link and cylinder


ART_4912

IMPORTANT! Leave the pin holding the nearer lower jib link in place. DO NOT pull the pin all the way out.

Assembly

Assembly is reverse of disassembly.

Examine all pins for signs of wear, surface imperfections, cracks or gray dust in the pivot area. Replace as necessary.

Re-connect the hydraulic lines after the barrel end of the Jib Cylinder is secured. Use the Jib Lift/ Lower function to extend or retract the cylinder to proper length for assembly. Refer to Section 4 of this manual for torque specifications of fasteners.

Platform Level Cylinder

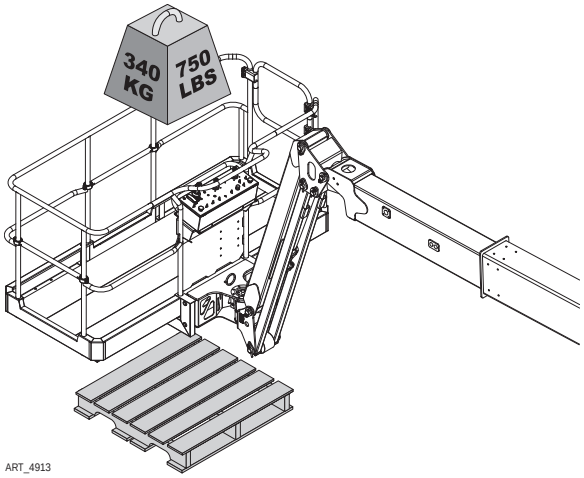
WARNING

THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

The Platform Level Cylinder is located at the end of the inner boom section. Its purpose is to keep the Platform level as the position of the Boom changes.

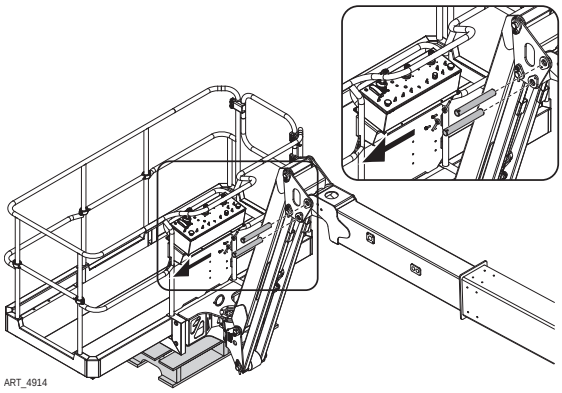
Disassembly

1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Use the Boom Lift/Lower function to raise the boom slightly.
4. Use the Jib Lift/Lower function to lower the jib completely.
5. Use the Boom Extend/Retract function to extend the boom approximately 5 feet (1.5 m).
6. Use the Boom Lift/Lower function to lower the platform onto the pallet, then strap the platform to the pallet.
7. Place 750 lbs (340 kg) of weight on the platform floor.



Note: This will prevent the Platform/Jib assembly from tipping when disconnected from the boom.

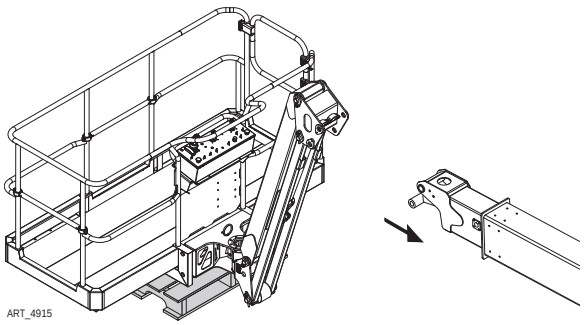
8. Remove the hose/cable cover from the side of the jib arm.
9. Clean all hydraulic fittings, then tag all hoses for proper reassembly.
10. Disconnect the hydraulic hoses that supply the Jib Lift/Lower Cylinder and the Platform Rotator. Immediately plug and cap all openings to prevent contamination.
11. Tag all electrical harness connections connecting the boom and the jib, then disconnect.
12. Remove the bolts securing the platform level bell crank pins that connect the bell crank to the boom. Secure the Lower Jib Links with a strap, then remove the pins.



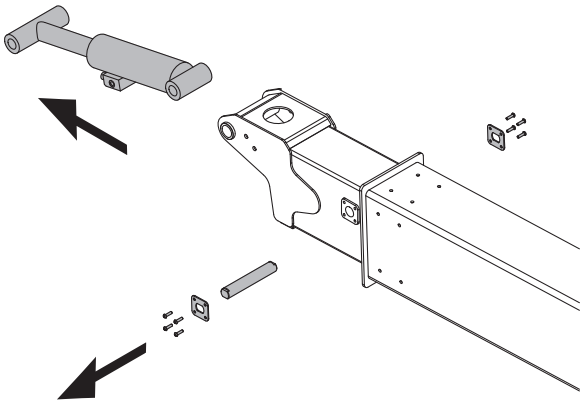
13. Use the Jib Extend/ Retract function to retract the boom away from the Platform/Jib Assembly.

IMPORTANT! Be sure the plates that secure the Platform Level Cylinder pin are exposed.

14. Disconnect the hydraulic hoses that supply the Platform Level Cylinder. Immediately plug and cap all openings to prevent contamination.



15. Support the Platform Level Cylinder, then remove bolts and pin retainer plates that secure the upper Platform Level Cylinder pin.
16. Remove the pin, then remove the Platform Level Cylinder.



ART_4916

Assembly

Assembly is reverse of disassembly.

Examine all pins for signs of wear, surface imperfections, cracks or gray dust in the pivot area. Replace as necessary.

Re-connect the hydraulic lines to the Platform Level Cylinder after the barrel end of the cylinder is secured. Use the Platform Level function to extend or retract the cylinder to proper length for assembly.

Refer to Section 4 of this manual for torque specifications of fasteners.

Boom Extend Cylinder

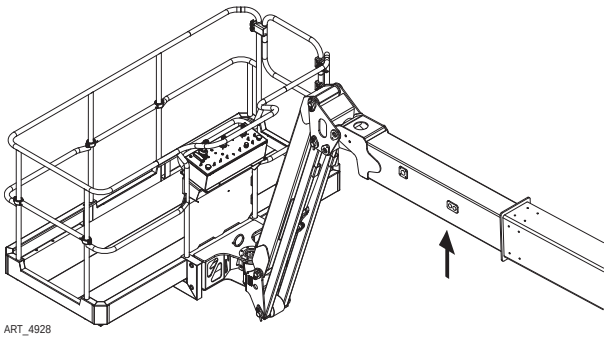
WARNING

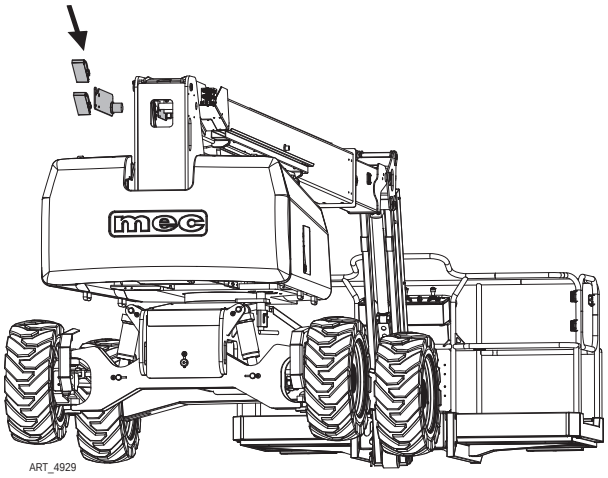
THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

The Boom Extend Cylinder is located within the Main Boom assembly. Its purpose is to extend the inner boom section.

Disassembly

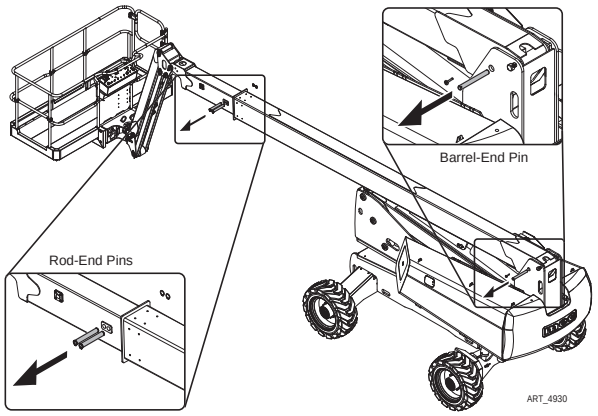
1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Lower the boom to the stowed position, so that the boom rests on the turntable.
4. Use the Boom Extend/Retract function to extend the boom approximately 5 feet (1.5 m) to expose the rod pins.
5. Disconnect all hydraulic hoses. Immediately plug and cap all openings to prevent contamination.
6. At the base end of the main boom assembly, tag and disconnect the wiring harness from the angle transducers and the Boom Extend proximity sensor. Remove the angle transducers and the proximity sensor and mounting plate.
7. Ensure that all hydraulic hoses and electrical wiring near the access hole are out of the path of removal.


ART_4928



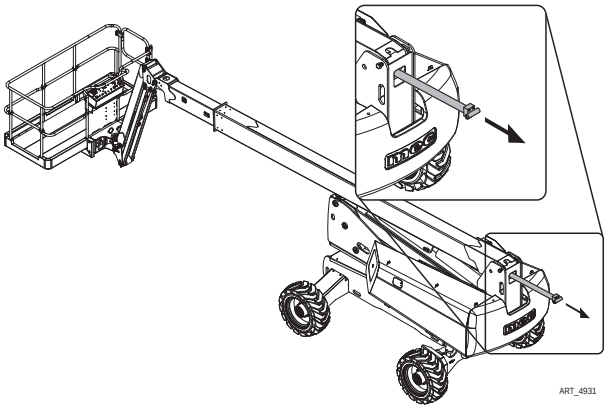
ART_4929

8. Remove the retainer rings from one side of the rod-end pins. Remove the pins using a soft metal drift. Remove bolt and pin retainer that secure the barrel-end pin at the rear end of the cylinder. Remove the pin using a soft metal drift.

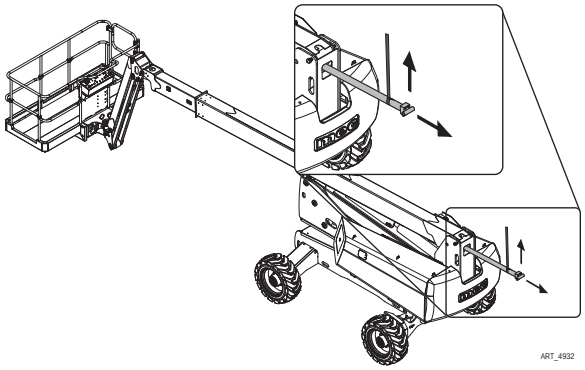


ART_4930

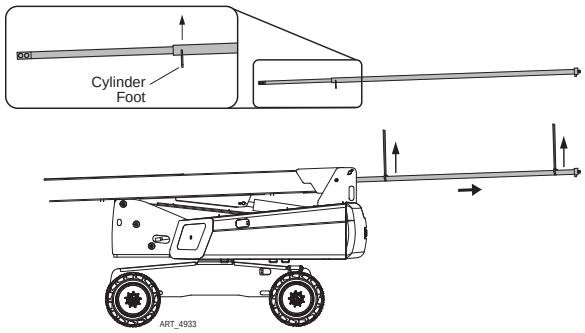
9. Wrap a sling around the cylinder base, then pull the end of the cylinder approximately 5 feet (1.5 m) out of the boom. Be careful as the end of the cylinder comes out through the access hole.



10. Attach a sling to the cylinder barrel and apply slight lifting pressure with a forklift or overhead crane. Use this sling to continue pulling the cylinder out of the boom.



11. Pull the cylinder out approximately 14.5 feet (4.5 m). Attach a second sling close to where the cylinder exits the machine. At this point, it is necessary to lift the rod end of the cylinder so that the cylinder foot and slide pad will clear the wearpad bolts inside the boom. Prior to this point, the weight at the front of the cylinder had been supported by this foot.
12. Carefully extract the cylinder completely from the boom.



IMPORTANT! Measure and record the length of the slightly-extended cylinder for easier reassembly.

Assembly

Assembly is reverse of disassembly.

Examine all pins for signs of wear, surface imperfections, cracks or gray dust in the pivot area. Replace as necessary.

Extend the cylinder to the length recorded previously to ease reassembly. Ensure that the pin holes at the rod end are in line with the pin hole at the barrel end.

If necessary, re-connect the hydraulic lines to the Boom Extend Cylinder after the cylinder is secured at the rear of the boom. Use the Boom Extend/Retract function to extend or retract the cylinder to proper length for assembly.

Install the pin at the barrel end of the cylinder. Use a pin alignment tool to position one rod end pin hole, then install the pin in the other hole. Install the second pin at the rod end.

Refer to Section 4 of this manual for torque specifications of fasteners.

Boom Lift Cylinders/Boom Linkage

WARNING

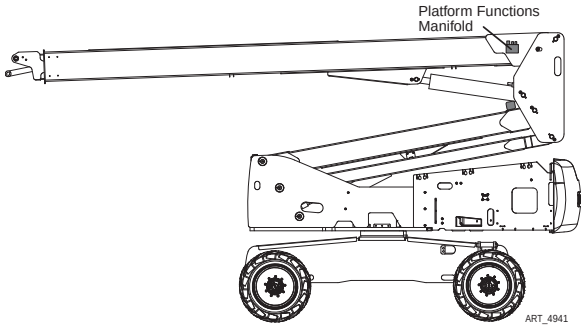
THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

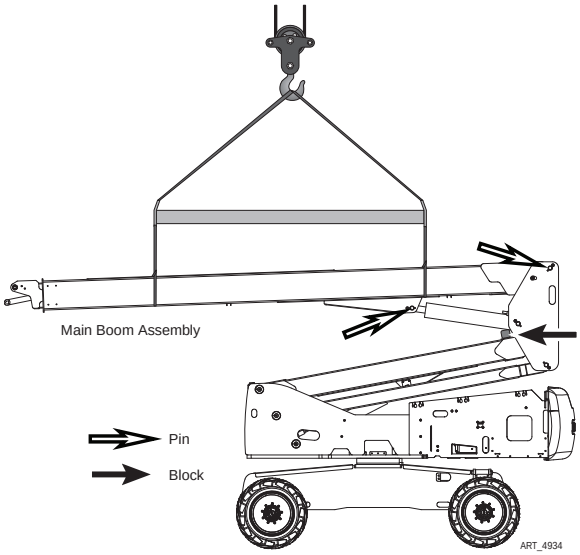
The Boom Lift Cylinders are located within the boom linkage near the turntable. Their purpose is to raise and lower the boom assembly.

Note: The module doors and module contents are omitted from the following illustrations to better show the disassembly process. It is not necessary to remove the doors or contents to perform this procedure.

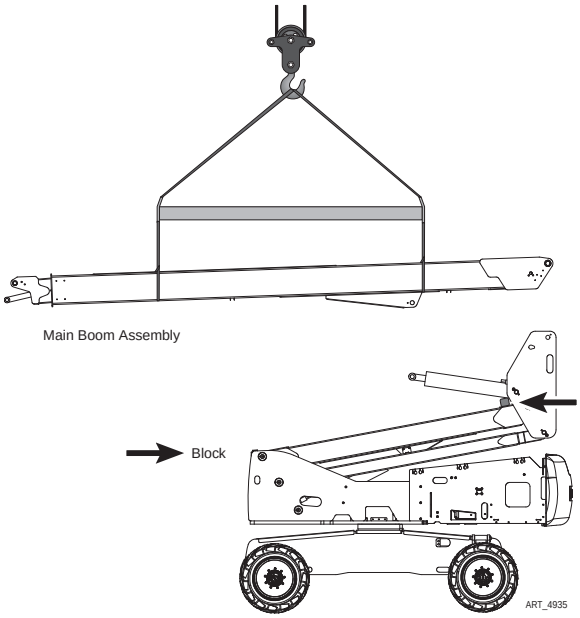
Disassembly

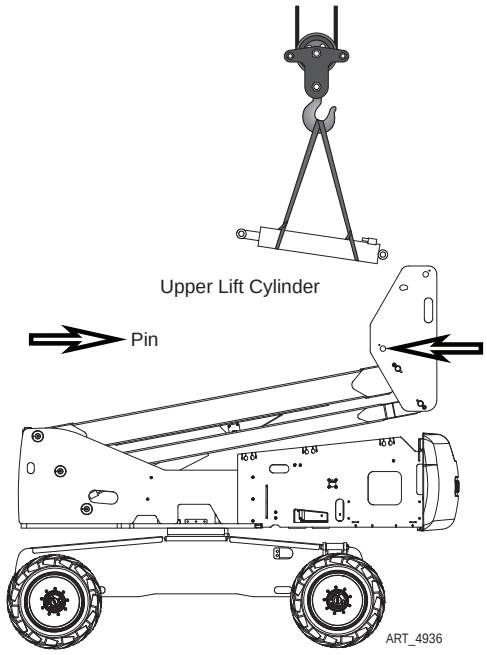
1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Remove the Platform/Jib assembly as described in steps 1 through 11 of the Platform Level Cylinder removal procedure on page 72.
4. Use the Boom Lift/Lower function to position the boom as shown at right.
5. Remove the hose and cable guards and coverings. It is not necessary to remove the cable track or its contents from the Main Boom Assembly.
6. Make note of all cable and hose routing from the turntable to the main boom assembly.
7. Disconnect the hoses and control cable connected to the Platform Functions Manifold, located at the base of the Main Boom Assembly. Pull these down through the linkage back to the turntable.
8. Disconnect the power-to-platform cable and the platform control cable from their connections in the turntable and the Control Module. Pull these up through the linkage to the Main Boom Assembly.





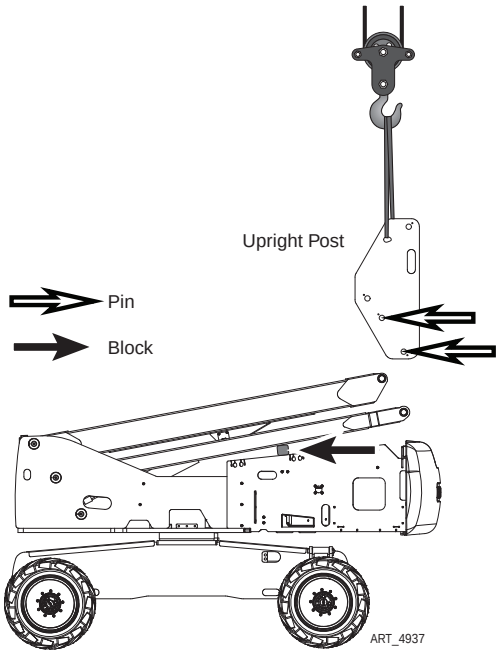
9. Rig slings and a spreader bar from the Main Boom Assembly to an overhead hoist as shown. Apply slight lifting pressure.
10. Place a 4x4 inch (10x10 cm) block between the Upper Lift Cylinder and Lower Boom as shown. Remove the pin and the rod end of the Upper Lift Cylinder.
11. Remove the pivot pin at the base of the Main Boom Assembly.
12. Remove the Main Boom Assembly.



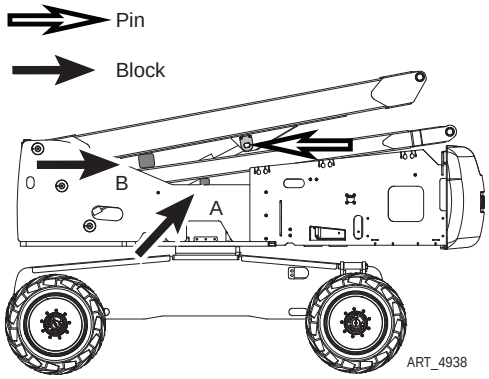


13. Rig slings from the Upper Lift Cylinder to an overhead hoist as shown.
14. Disconnect the hydraulic hoses and control wiring connected to the Upper Lift Cylinder.
15. Remove the pin at the barrel end of the Upper Lift Cylinder.
16. Remove the Upper Lift Cylinder.

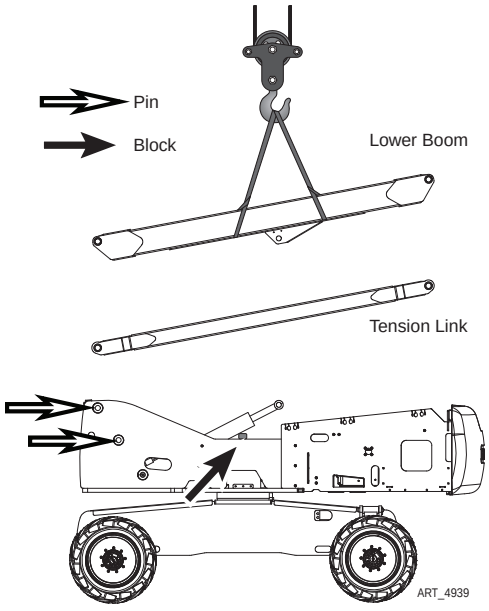
17. Place a 4x4 inch (10x10 cm) block between the Tension Link and the upper portion of the turntable weldment.
18. Rig a sling from the Upright Post to an overhead hoist through the tear-drop shaped hole as shown. Apply slight lifting pressure.
19. Remove the pin connecting the Tension Link to the Upright Post.
20. Remove the pin connecting the Lower Boom to the Upright Post.
21. Remove the Upright Post.



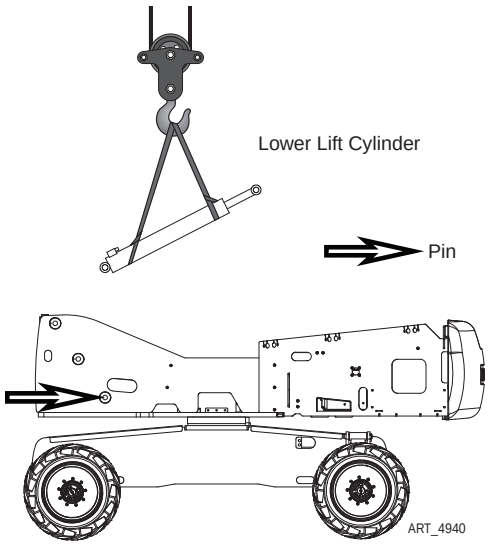
22. Place a 2x4 inch (5x10 cm) block between the Tension Link and the lower portion of the turntable weldment (A) and in position to support the Lower Boom Cylinder, then remove the 4x4 inch (10x10 cm) block placed earlier and carefully rotate the Tension Link down.
23. Place a 4x4 inch (10x10 cm) block between the Tension Link and the Lower Boom (B)
24. Remove the pin from the rod end of the Lower Lift Cylinder.



25. Rig slings from the Lower Boom to an overhead hoist as shown. Apply slight lifting pressure.
26. Remove the pin connecting the Lower Boom to the turntable.
27. Remove the Lower Boom.
28. Similarly rig and remove the Tension Link.



29. Rig slings from the Lower Lift Cylinder to an overhead hoist as shown. Apply slight lifting pressure.
30. Disconnect the hydraulic hoses and control wiring connected to the Upper Lift Cylinder.
31. Remove the pin at the barrel end of the Lower Lift Cylinder.
32. Remove the Lower Lift Cylinder.



Assembly

Assembly is reverse of disassembly.

Examine all pins for signs of wear, surface imperfections, cracks or gray dust in the pivot area. Replace as necessary.

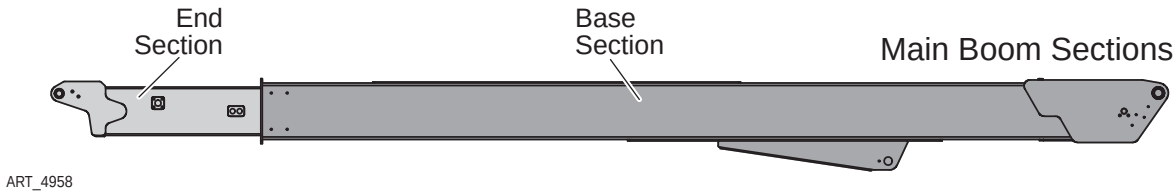
Refer to Section 4 of this manual for torque specifications of fasteners.

Main Boom Assembly

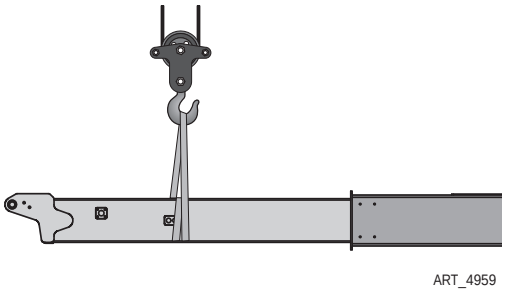
WARNING

THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

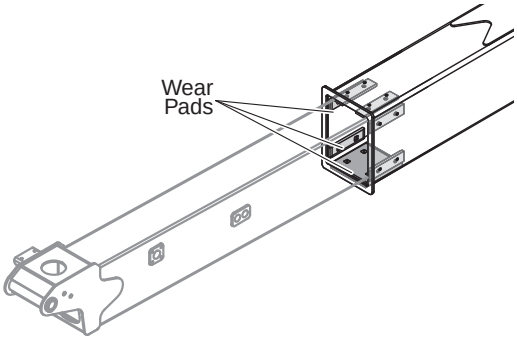
Disassembly



1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Remove the Platform/Jib Assembly and Platform Level Cylinder on page 72.
4. Remove the Boom Extend Cylinder on page 74.
5. Remove the Main Boom Assembly as described in steps 1 through 12 of the Boom Lift Cylinders/Boom Linkage disassembly procedure on page 76. Set the Main Boom Assembly on stands for further disassembly.
6. Remove the cable track and associated machine parts from the boom. Lay all cable and hoses out of the way to avoid damage.
7. Slide the End Section of the boom out approximately 6 feet (2 m). Position an overhead hoist over the End Section and attach a sling.



8. Remove the side and the top inner wear pads and shims from the front of the boom's Base Section.
9. Apply slight lifting pressure.
10. Remove the bottom inner wear pad from the front of the boom's Base Section.
11. Extract the End Section from the front of the boom by carefully pulling and lifting with the hoist or forklift. Once the End Section has been extracted approximately 90%, use a second hoist or fork lift to support the end of the End Section that remains inside the boom.
12. Carefully extract the boom End Section completely.
13. Remove the wear pads from the End Section



Assembly

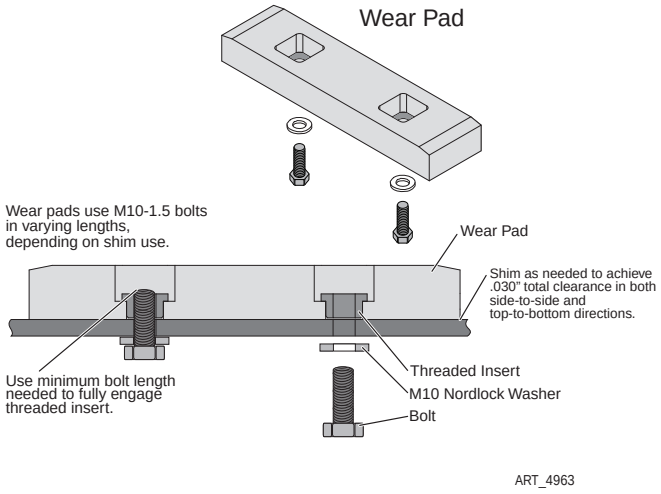
The boom must be properly shimmed to function correctly. Each boom section must be shimmed to a clearance no greater than 0.030” (0.762mm) at its tightest point of travel. It may be necessary to run each boom section in and out several times to properly identify the tightest point of travel, and to adjust the number of shims.

After the proper number of shims has been determined, tighten the mounting bolts for that set of wear pads before moving on to the next step. Apply one (1) drop of Loctite® 242 or equivalent to bolts securing wear pads and shims. See the Section 7 of this manual for proper torque specifications.

Shims are not used on the larger square wearpads located on the top of the End section and bottom of the Base Section.

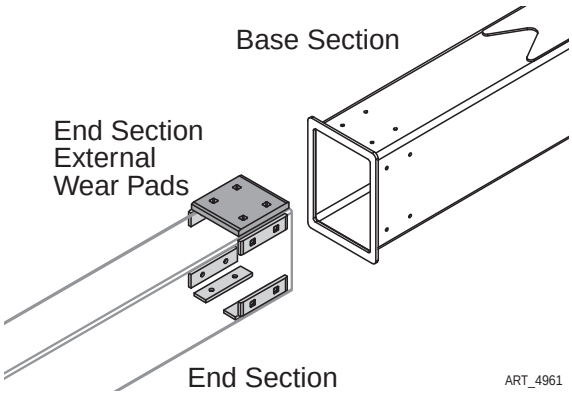
Standard Shims	
22224	Shim, .020” (0.5 mm)
11861977	Shim, .040” (1 mm)
11861981	Shim, .120” (3 mm)
11861982	Shim, .200” (5 mm)
11861983	Shim, .400” (10 mm)

Wear pads use M10-1.5 bolts in varying lengths, depending on shim use. Use minimum bolt length needed to fully engage threaded insert. Wear pad bolts must be installed with M10 Nordlock washers.

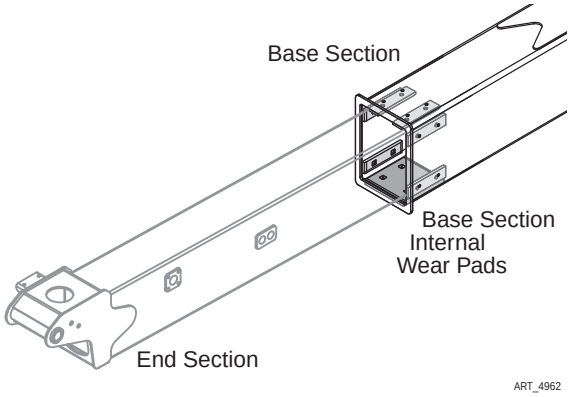


Bolts & Washers	
50033	Bolt, M10 x 25
50034	Bolt, M10 x 30
50332	Bolt, M10 x 35
50035	Bolt, M10 x 40
50036	Bolt, M10 x 50
50021	Bolt, M10 x 55
50006	Washer, M10 Nordlock

1. Use an overhead hoist of forklift to position the End Section of the boom in front of the Base Section.
2. With wearpads and shims in place, insert the End Section into the Base Section of the boom.
3. Keeping the sections as parallel as possible, slide the End Section into and out of the Base Section. Shim the End Section External Wearpads as needed to achieve proper clearance.
4. Tighten the wearpad mounting bolts. Apply one (1) drop of Loctite® 242 or equivalent per bolt. See Section 7 of this manual for proper torque specifications. Insert the End Section into the Base Section of the boom.



5. With the hoist still attached to the boom End Section, install the Base Section Internal Wear pads and shims. Use the hoist to position the End Section to provide clearance.



WARNING **DO NOT PLACE ANY PART OF YOUR BODY BETWEEN THE BOOM SECTIONS. USE TOOLS TO POSITION SHIMS AND WEARPADS.**

6. Keeping the sections as parallel as possible, slide the End Section into and out of the Base Section. Shim the Base Section Internal Wearpads as needed to achieve proper clearance.
7. Tighten the wearpad mounting bolts. Apply one (1) drop of Loctite® 242 or equivalent per bolt. See Section 7 of this manual for proper torque specifications. Push the End Section into the Base Section of the boom.
8. Install the Main Boom Assembly in reverse of steps 1 through 12 of the Boom Lift Cylinders/ Boom Linkage disassembly procedure on page 76.
9. Install the Boom Extend Cylinder on page 74.
10. Install the Platform/Jib Assembly and Platform Level Cylinder on page 72.

Swing Bearing/Turntable Components

WARNING

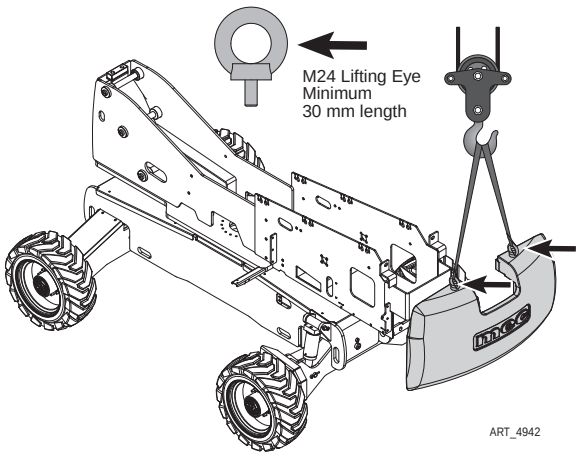
THIS PROCESS REQUIRES SPECIFIC REPAIR SKILLS AND EXPERIENCE, APPROPRIATE LIFTING EQUIPMENT AND A PROPER WORKPLACE. DEATH, SERIOUS INJURY OR SIGNIFICANT MACHINE DAMAGE COULD OCCUR IF YOU ATTEMPT THIS PROCESS WITHOUT THE APPROPRIATE SKILLS AND EQUIPMENT.

The Swing Bearing is located between the turntable and the machine chassis. It's purpose is to provide continuous turntable rotation.

Note: The module doors and module contents are omitted from some of the following illustrations to better show the disassembly process. It is not necessary to remove the doors or contents to perform this procedure unless stated.

Disassembly

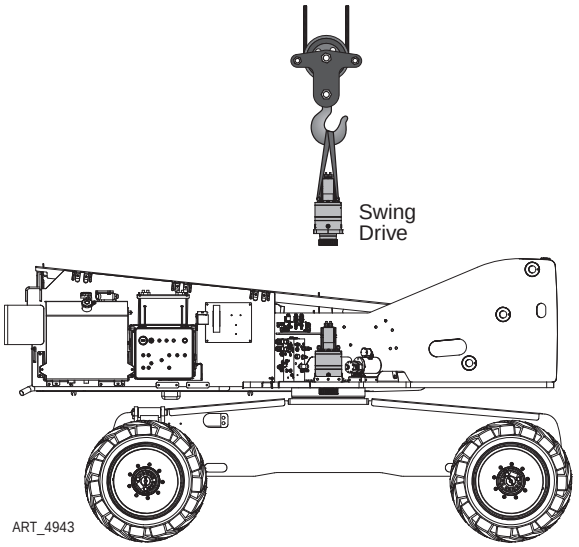
1. Park the machine on a firm level surface.
2. Throughout this procedure, thoroughly clean all hydraulic connections and tag all hoses for proper reassembly before disconnecting them. Immediately plug and cap all openings to prevent contamination. Tag electrical connections before disconnecting them.
3. Remove the Platform/Jib assembly as described in steps 1 through 11 of the Platform Level Cylinder removal procedure on page 72.
4. Disassemble the boom linkage as described in the Boom Lift Cylinders/Boom Linkage procedure on page 76.
5. Thread two M24 lifting eyebolts into the machine counterweight and rig slings as shown. Apply slight lifting pressure.
6. Remove the four bolts that secure the counterweight to the machine turntable.
7. Remove the counterweight.



Note: Counterweight Mass:
2600 LBS
1180 KG

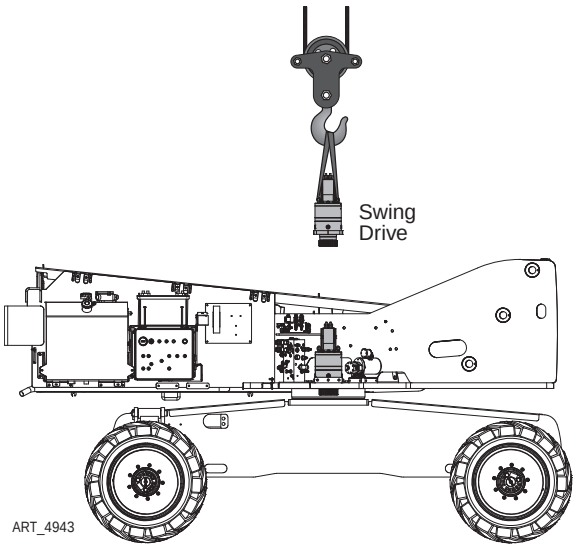
8. Disconnect the hydraulic hoses connected to the Swing Drive.
9. Rig slings from the Swing Drive to an overhead hoist as shown.
10. Remove the bolts securing the Swing Drive.
11. Remove the Swing Drive from the Control Module.

Note: Swing Drive Mass:
130 LBS
59 KG



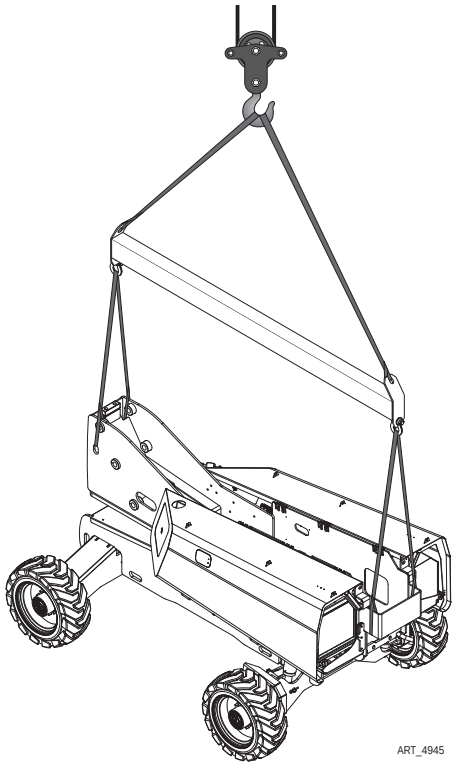
12. Tag and disconnect the hydraulic lines from the top of the Rotary Manifold.
13. Tag and disconnect the hydraulic lines from the bottom of the Rotary Manifold.
14. Support the Rotary Manifold from below, then remove the bolts securing the Rotary Manifold in place.
15. Remove the Rotary Manifold.

Note: Rotary Manifold Mass:
60 LBS
28 KG

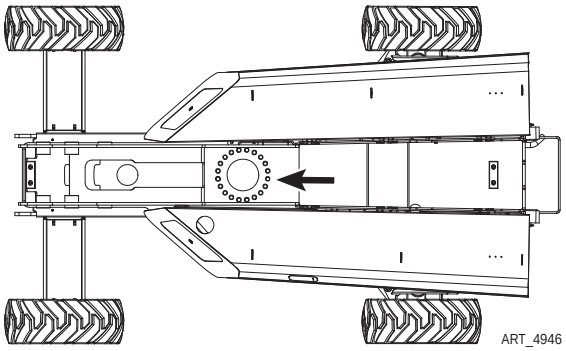


16. Rig slings and a spreader bar from the Turntable Assembly to an overhead hoist as shown. Use a separate sling for each lift point.

Apply slight lifting pressure.



17. Remove the bolts and washers holding the Turntable Assembly to the Swing Bearing.



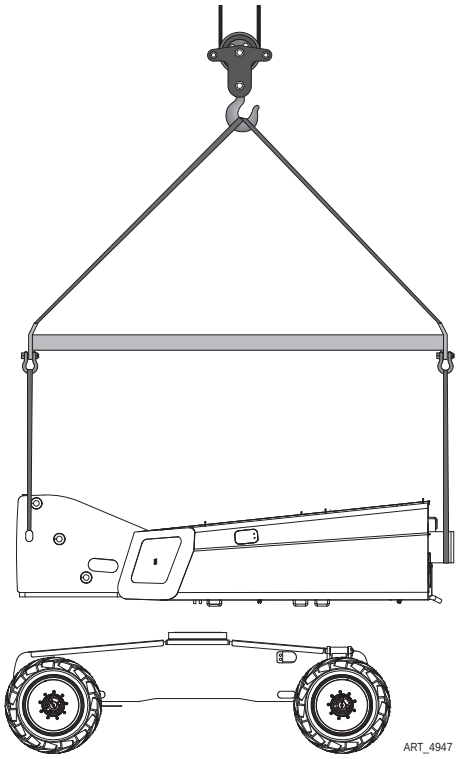
WARNING

THE WASHERS USED ON THESE BOLTS ARE HARDENED STRUCTURAL WASHERS.

REPLACE LOST OR DAMAGED WASHERS WITH MEC PART #50582 ONLY.

18. Carefully apply lifting pressure. Check the balance of the load before lifting and adjust the rigging as necessary.
19. Lift the Turntable Assembly off the Chassis.

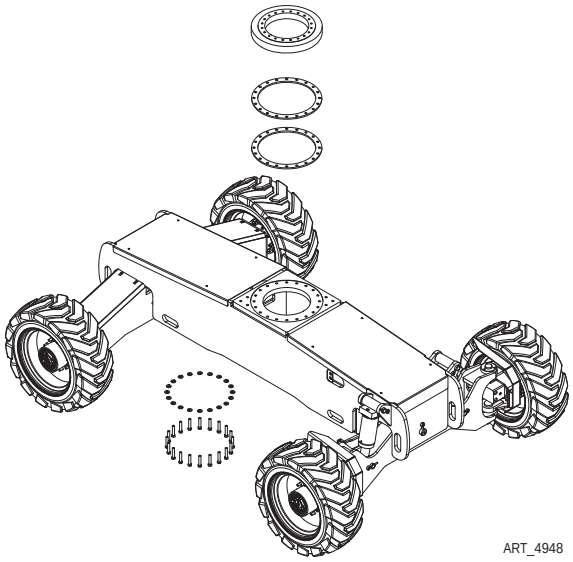
Note: Turntable Mass with Counterweight, Swing Drive and Rotary Manifold removed:
4350 LBS
1975 KG



20. Remove the bolts and washers holding the Swing Bearing to the Chassis.

WARNING

THE WASHERS USED ON THESE BOLTS ARE HARDENED STRUCTURAL WASHERS. REPLACE LOST OR DAMAGED WASHERS WITH MEC PART #50582 ONLY.



21. Remove the Swing Bearing and ring spacers from the Chassis.

Note: Ring Bearing Mass:
121 LBS
55 KG

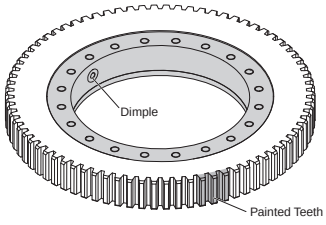
Assembly

Assembly is reverse of disassembly, with special instructions regarding Swing Bearing and Swing Drive installation below.

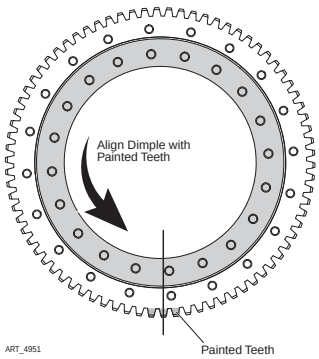
Tighten all fasteners to proper torque as shown below. Refer to Section 4 of this manual for torque specifications of fasteners not listed below.

Location	Torque	
Swing Bearing Bolts on Chassis	180 lb/ft	244 Nm
Swing Bearing Bolts on Turret	180 lb/ft	244 Nm
Swing Drive Bolts	320 lb/ft	434 Nm

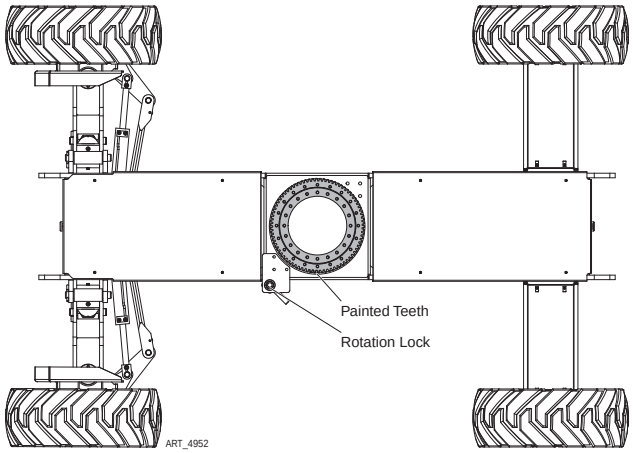
Swing Bearing/ Swing Drive Installation



Before attaching the Swing Bearing to the machine, align the dimple inside the inner ring of the bearing with the three painted teeth on the gear.



Install the Swing Bearing with the painted teeth placed on the same side of the chassis as the Rotation Lock. Due to the placement of the mounting holes in the Chassis, the teeth will be slightly forward from straight sideways.



Use an alternating criss-cross pattern to tighten the bolts securing the Swing

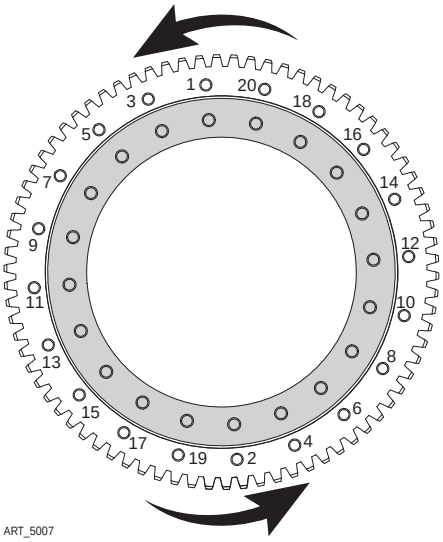
Bearing to the chassis. Tighten the bolts in three stages.

Tighten to 50 lb/ft (68 Nm) on the first pass.

Tighten to 100 lb/ft (136 Nm) on the second pass.

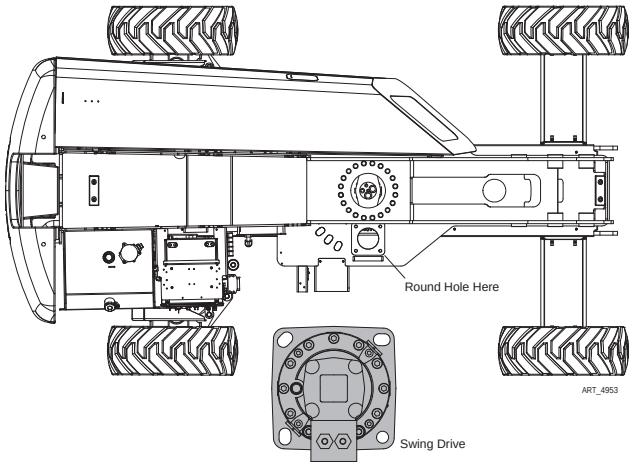
Tighten to 180 lb/ft (244 Nm) on the first pass.

Use the same pattern and stages later when securing the turntable to the Swing Bearing.



Set the Swing Drive in place after the Turntable is bolted down to the Swing Bearing. Rotate the Turntable slightly so that the Swing Drive engages the painted teeth on the gear.

The Swing Drive has three slotted mounting holes and one round hole to allow gear backlash adjustment. Arrange as shown, with the round hole at the near right.

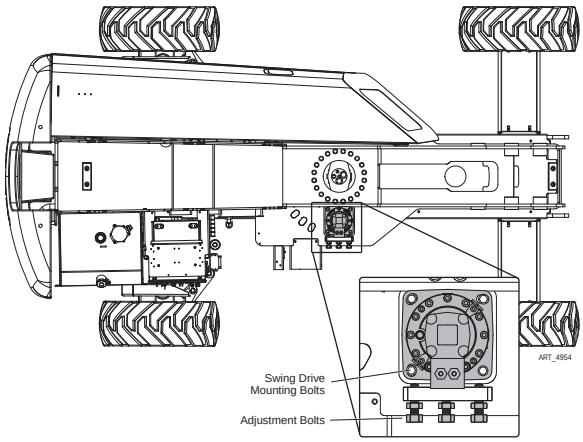


Install the swing Drive Mounting Bolts finger tight.

Ensure that the Swing Drive is engaging the painted teeth, then tighten the center Adjustment Bolt while manually moving the turntable back and forth to take out all play between the gears of the Swing Drive and the Swing Bearing.

Tighten the left and right Adjustment Bolts while continuing to move the Turntable back and forth.

Tighten the jam nuts on the Adjustment Bolts, then tighten the Swing Drive Mounting Bolts to the torque listed at the beginning of the Assembly section.



Drive Motors & Gear Hubs

Note: See Section 24 & Section 25 of the Parts portion of this manual for parts lists.

There is one hydraulic drive wheel motor and one gear hub located at each wheel.

CAUTION

Clean all fittings before disconnecting hoses.

Tag hoses for proper reassembly.

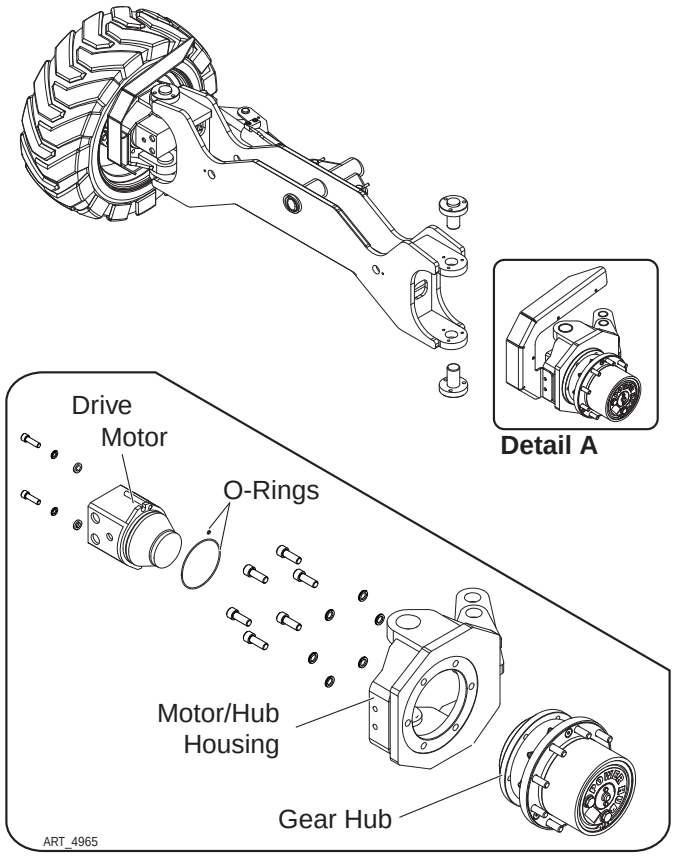
Immediately plug and cap all openings to prevent contamination.

Replace any O-rings and inspect all hoses for crack and damage before reassembly.

Refer to “Lift and Support The Machine” in Section 9 for instructions and safety precautions.

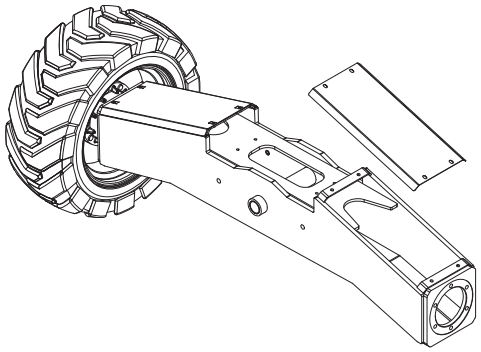
Removal - Steering Axle

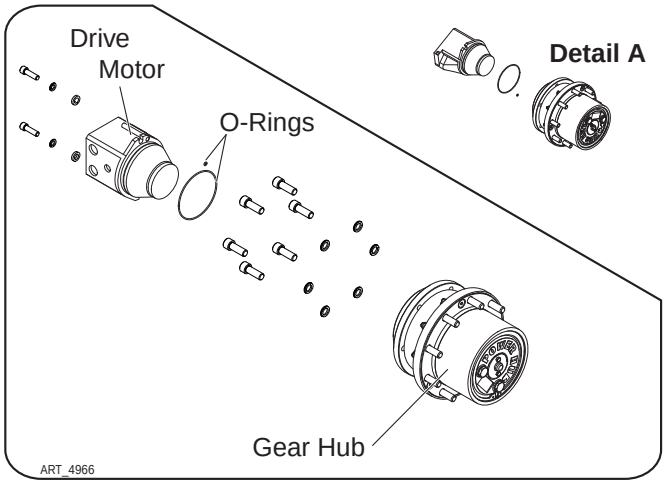
1. Raise and support the steering end of machine.
2. Remove the wheel and tire assembly.
3. Remove the retaining pins that secure the steer cylinder and the tie rod to the motor/hub housing. Rotate the housing to access the drive motor.
4. Clean all hydraulic fittings, then tag all hoses for proper reassembly.
5. Disconnect all hydraulic hoses. Immediately plug and cap all openings to prevent contamination.
6. Support the drive motor, then remove the two bolts connecting the drive motor to the gear hub. Remove the motor.
7. Support the gear hub, then remove the six bolts holding the gear hub to the motor/hub housing. Carefully remove the gear hub.
8. Installation is reverse of removal. Apply one (1) drop of Loctite® 242 or equivalent to mounting bolts. Replace the O-ring on the brake release port of the gear hub. Take great care that this O-ring is installed correctly. Use grease to hold the O-ring in place during installation.



Removal - Non-steering Axle

1. Raise and support the non-steering end of machine.
2. Remove the wheel and tire assembly.
3. Remove the axle weldment cover.
4. Clean all hydraulic fittings, then tag all hoses for proper reassembly.
5. Disconnect all hydraulic hoses. Immediately plug and cap all openings to prevent contamination.
6. Support the drive motor, then remove the two bolts connecting the drive motor to the gear hub. Remove the motor.
7. Support the gear hub, then remove the six bolts holding the gear hub to the motor/hub housing. Carefully remove the gear hub.
8. Installation is reverse of removal. Apply one (1) drop of Loctite® 242 or equivalent to mounting bolts. Replace the O-ring on the brake release port of the gear hub. Take great care that this O-ring is installed correctly. Use grease to hold the O-ring in place during installation.





Drive Motors

MEC does not recommend end-user maintenance or repair of the drive motors. Contact MEC or for the nearest service provider.

Gear Hubs

Lubrication

- Change the oil after the first 100 hours of operation
- Change the oil every 2500 hours or every 12 months thereafter.
- Use SAE 90 Multipurpose Hypoid Gear Oil, API Service Classification GL5

To change the oil in the gear hub:

1. Position the gear hub as shown at left.
2. Loosen and remove the both plugs and allow oil to drain.
3. Position the gear hub as shown at right.
4. Fill with oil until the level reaches the lower drain hole.
5. Replace the plugs, using new seals.

Engine Maintenance

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

Always wear protective eye-wear when working with fuel and oil.

CAUTION

Engine should be OFF when replacing filter elements.

Do not run the engine with the air filter element removed.

Oil And Oil Filter

Dispose of used oil and filters properly.

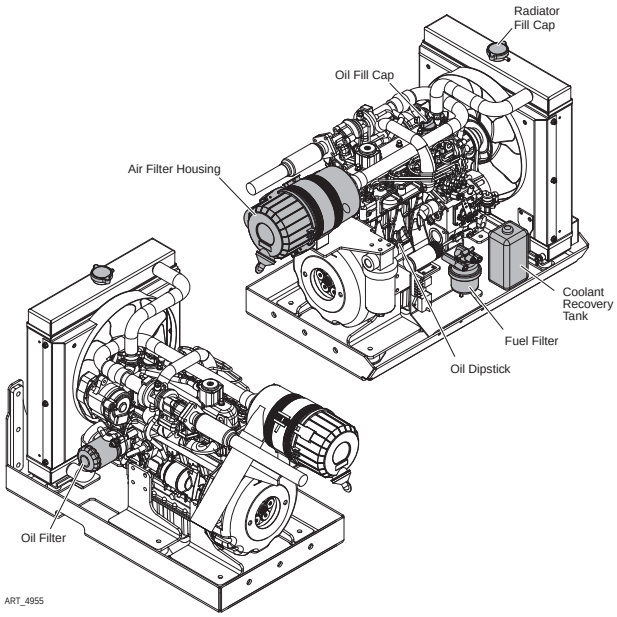
Engine oil should be checked daily prior to machine use. Oil should be changed after the first 50 hours of service, and every 500 hours thereafter.

Engine oil should be MIL-L-2104C or have properties of API classification CF or higher.

Oil used with this engine must have proper API and SAE Engine Oil classification according to ambient temperatures as shown below:

Above 77° F (25° C)	SAE30, SAE10W-30 or SAE10W-40
32° ~ 77° F (0 ~ 25° C)	SAE20, SAE10W-30 or SAE10W-40
Below 32° F (0° C)	SAE10W, SAE10W-30 or SAE10W-40

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.
3. Coat the seal on the new filter with clean oil, then install and tighten by hand.
4. Fill engine with appropriate motor oil until the dipstick indicates FULL. Capacity is 1.8 US gallons (6.7 L).
5. Recheck dipstick after running engine. Fill as necessary.

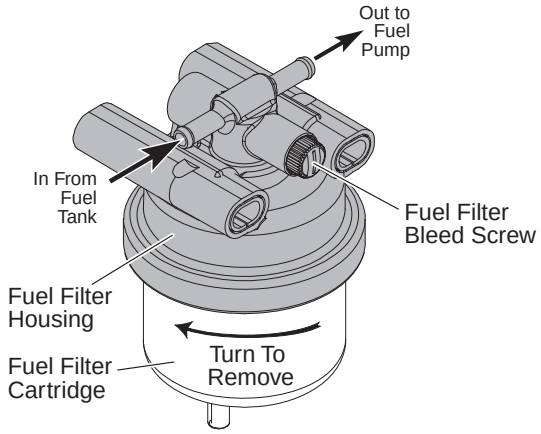


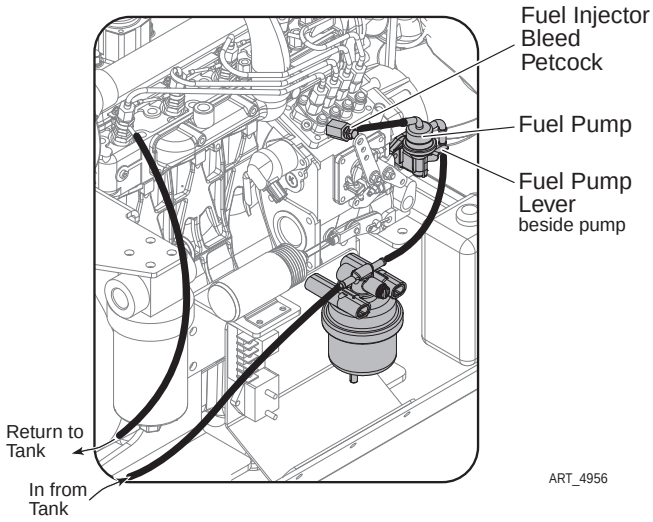
Air Filter Element

1. Clean the air filter housing before opening.
2. Remove the cap to the air filter canister.
3. Remove old filter and replace with a new filter.
4. Replace the cap to the air filter canister.

Fuel Filter

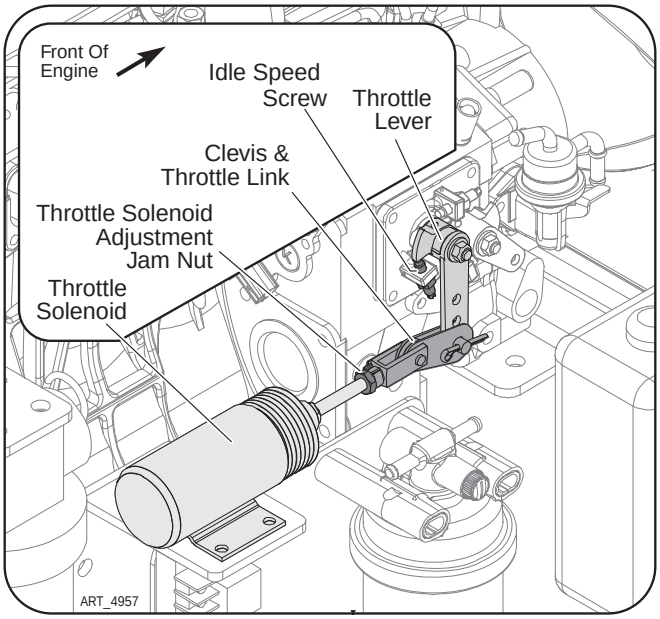
1. Turn OFF valve on bottom of fuel tank and clean the filter area before removing the filter.
2. Place a suitable container beneath the fuel filter assembly to catch spilled fuel.
3. Turn filter cartridge counterclockwise to remove. Wipe the filter seal contact surface with a clean towel
4. Coat the seal on the new filter with clean oil, then install and tighten by hand.
5. Open valve at fuel tank and check for leaks.
6. Purge the air from the fuel system as follows;
   - Fill fuel tank to the fullest extent. Open valve on bottom of fuel tank.
   - Loosen Fuel Filter Bleed Screw on top of fuel filter housing a few turns. Close the bleed screw when fuel flows steadily and there are no more bubbles.
   - Open the Fuel Injector Bleed Petcock on the fuel injector pump.
   - Crank the engine for about 10 seconds, then stop it, **or** move the fuel feed pump lever by hand.
   - Start the engine. Close the Fuel Injector Bleed Petcock when the engine idles smoothly.





Note: The engine will crank for up to 10 seconds before the starter is cut out for a mandatory 30-second starter cooldown cycle. A red light will illuminate on the Base Control Station during the cool-down cycle.

Throttle Adjustment



Idle Speed Adjustment

1. Bring engine to operating temperature.
2. Slow engine to complete idle.
3. Adjust the Idle Speed Screw until the RPM is 1800. Adjust slightly up or down to avoid vibrations.
4. Hold the Idle Speed Screw while tightening the jam nut to prevent change in adjustment.

Throttle Solenoid Adjustment

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, disconnect the Clevis from the Throttle Lever.
2. Manually retract the Throttle 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.

3. Have a second person rotate the Throttle Lever as far as it will go.
4. With the Throttle Solenoid piston fully retracted, adjust the Clevis until its hole lines up with the Throttle Link that is attached to the fully-rotated Throttle Lever. Reconnect the Clevis to the Throttle Link.
5. Tighten the Throttle Solenoid Jam Nut.

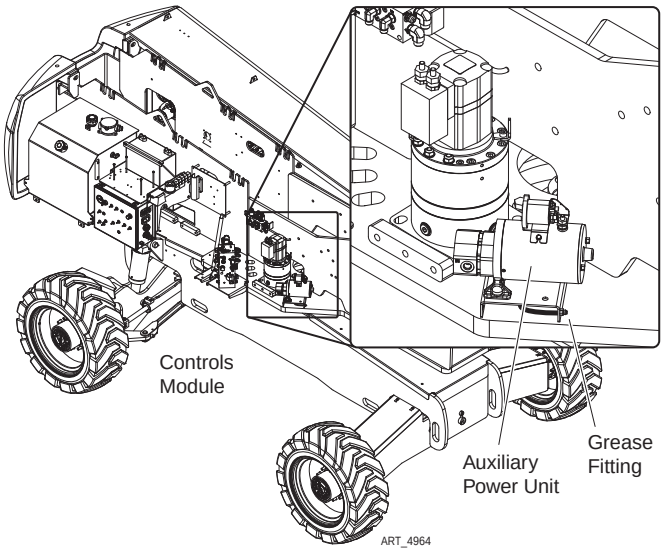
Lubrication Points

Boom Wear Pads

With the boom in the stowed position, raise the jib and extend the boom completely. Spread a thin, even coat of lithium-based grease on the areas where the wear pads rub -- top, bottom and sides of the internal sections of the boom.

Swing Bearing & Gear

1. Swing Bearing Gear: Apply small amounts of lithiumbased grease to approximately every 3rd tooth of the ring gear.
2. Swing Bearing: Open the Controls Module. Locate the grease fitting at the front surface of the Auxiliary Power Unit mounting bracket.



Cabinet Latches And Hinges

Apply spray lubricant to latches and hinges. Wipe off excess lubricant.

Engine

Apply spray lubricant to throttle solenoid linkage pivot points. See page 92.

General Troubleshooting Tips

Hydraulic Fluid Pump

The hydraulic Drive Pump and Primary Functions Pump used in this model are variable displacement, axial piston type pumps. Proper adjustment is critical for normal operation of the machine. Refer to Section 10 of this manual.

The Secondary Functions pump is a fixed-displacement gear-type pump attached to the rear of the Primary Functions Pump.

Common Causes of Electrical System Malfunctions:

- Battery switch is turned OFF (located at the front of the engine module).
- Battery connections are loose or corroded
- Battery is not fully charged.
- Emergency Stop buttons are pushed (OFF position).
- Circuit breaker is 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 a lower grade fluid will cause the machine to operate incorrectly and may lead to pump and drive motor failure. Refer to “Lubrication” in Section 10 of this manual.

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. Make sure all ports and cavities of the manifold and cylinders are properly covered/plugged during maintenance activities.

Electrical System Troubleshooting

The electronic control system used on this machine was designed for low maintenance and long, trouble-free operation. The system consists of two microprocessor based modules: the GP440 Module in the upper controls box and the GP400 Processor, located in the lower controls box. 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.

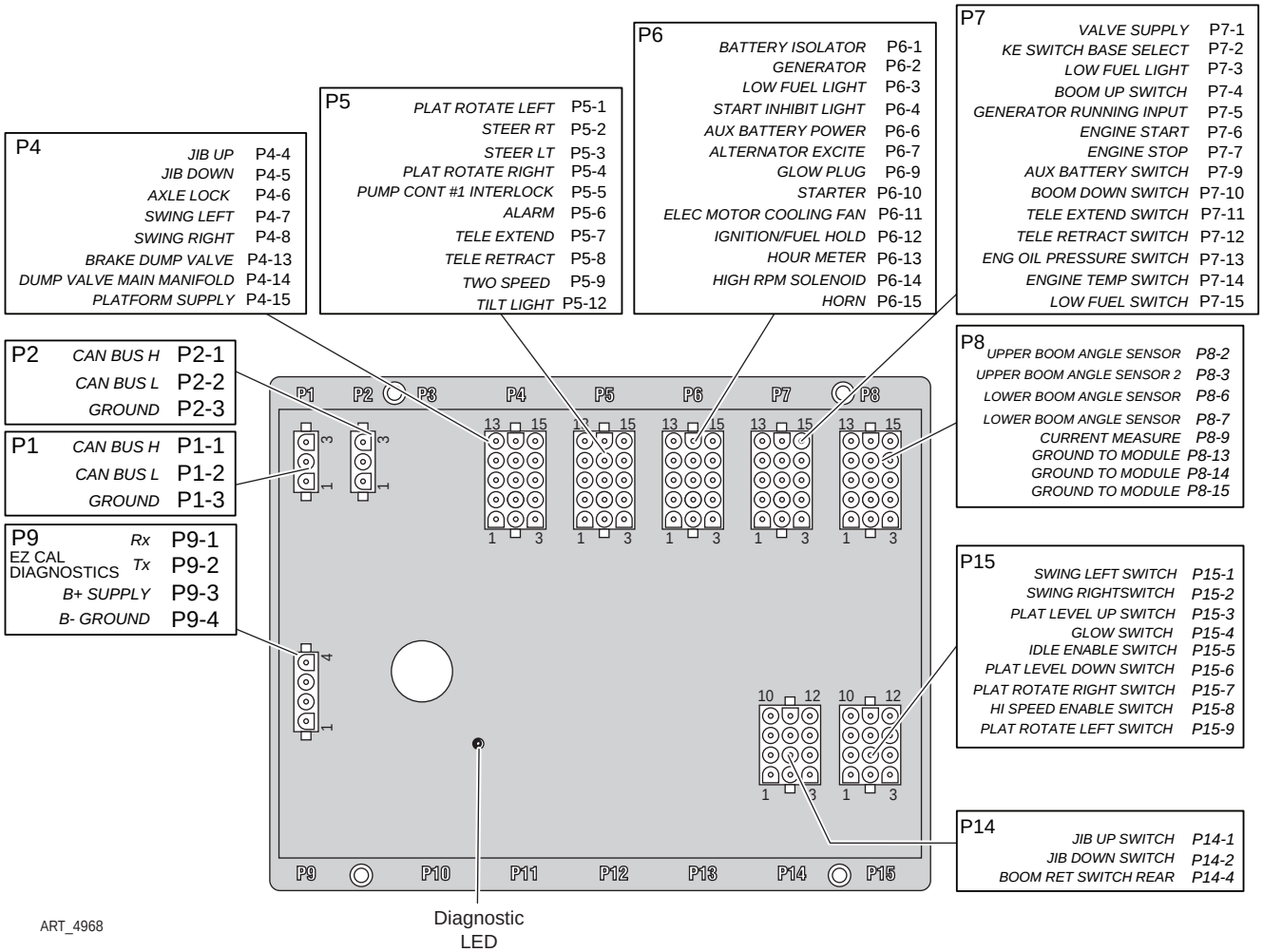
USE OF HIGH PRESSURE WASHING EQUIPMENT DIRECTLY ON THE MODULES CAN FORCE WATER INTO SEALED CONNECTION AND CAN CAUSE A TEMPORARY SYSTEM SHUT-DOWN. HIGH PRESSURE WASHING WITHIN THE VICINITY OF THE MODULES IS HIGHLY DISCOURAGED.

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 onboard 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.

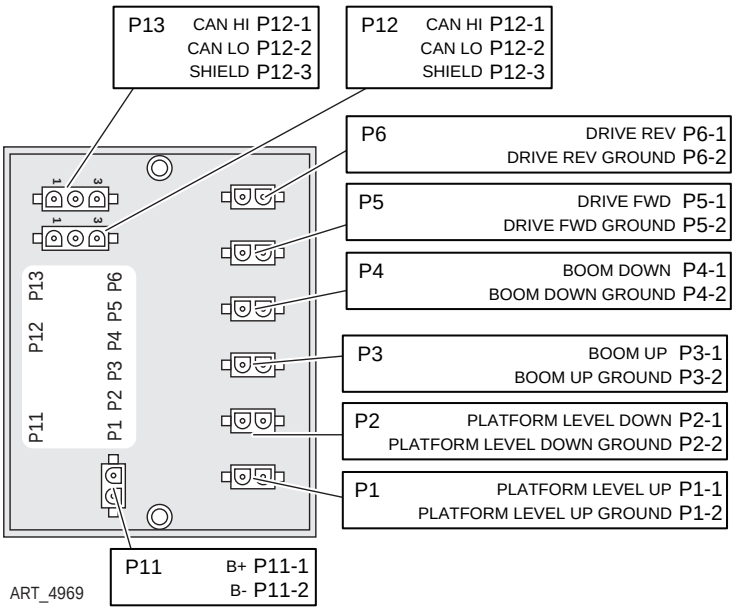
The GP400 operates on 12 volts DC and should never be probed or operated with voltage higher than 14 volts DC.



Valve Constant Current Module and Terminal Block Module

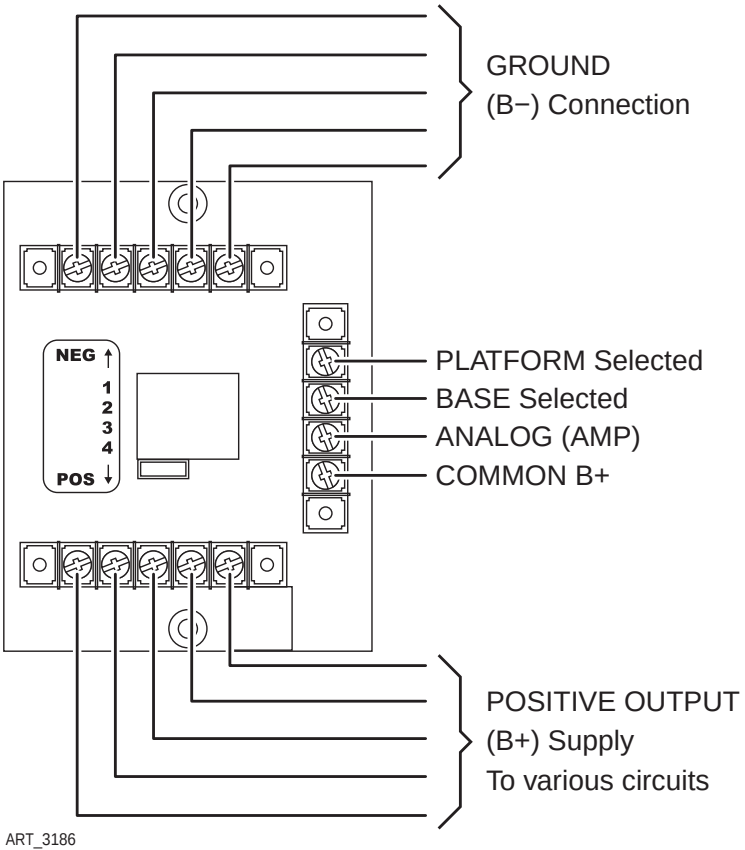
Valve Constant Current Modules (VCCM)

The Valve Constant Current Module is an auxiliary module located inside the lower control box. It controls certain proportional functions of the machine.



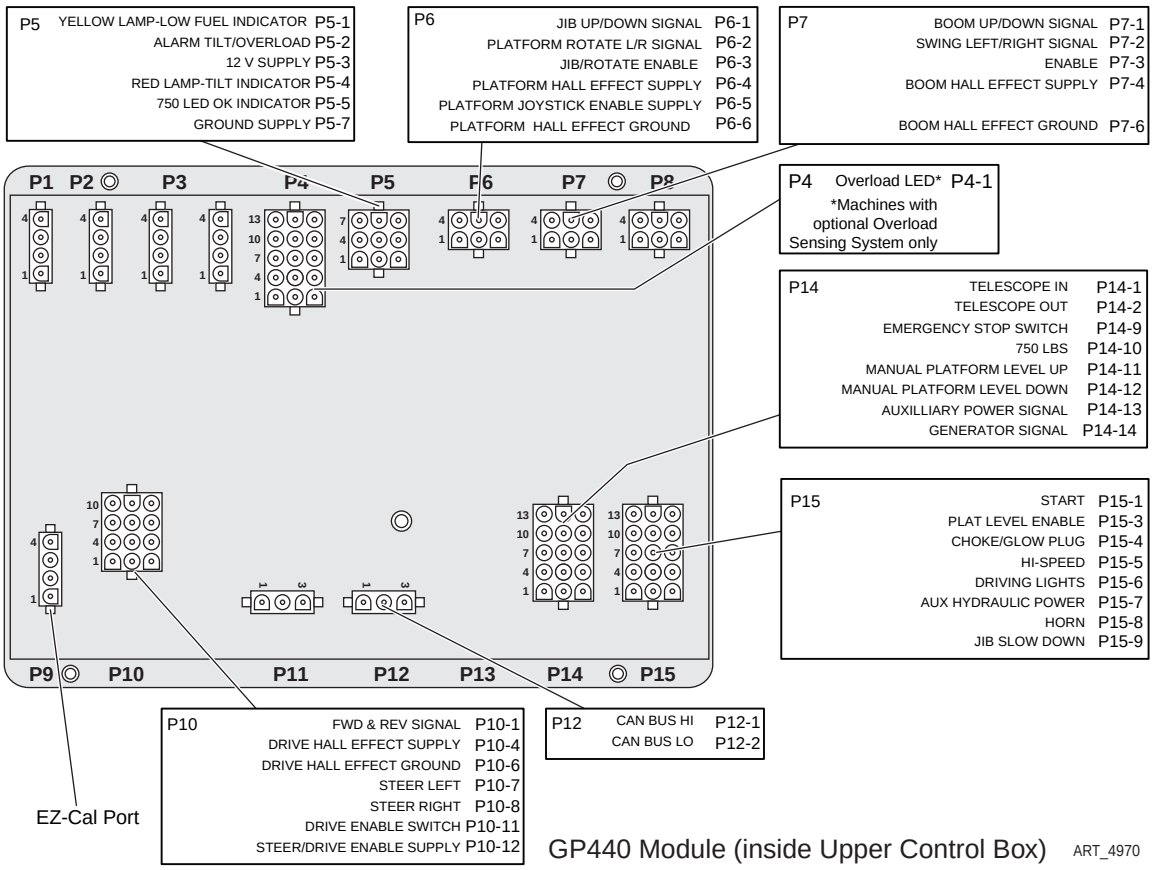
Terminal Block Module (TBM)

The Terminal Block Module (TBM) is a module inside the lower control box 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.



GP440 Module

The GP440 Module is the remote module located inside the upper control box. It received inputs from the operator and relays them to the GP400.



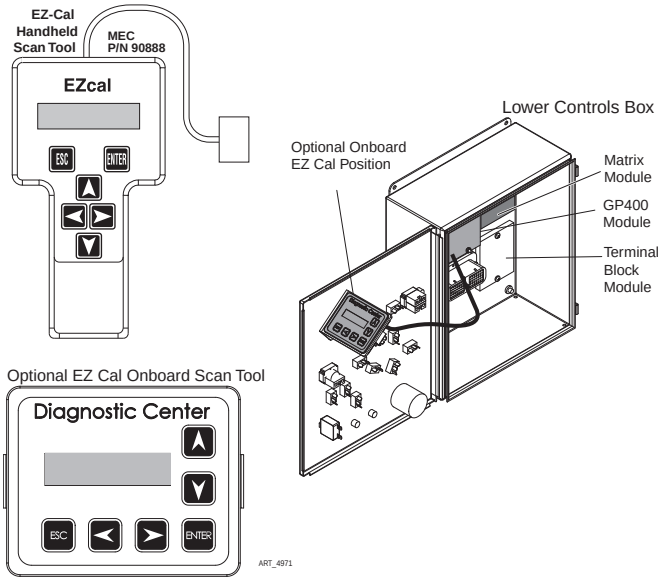
GP440 Module (inside Upper Control Box) ART_4970

EZ-Cal Scan Tools

The EZ-Cal Scan Tools interface with the machine's control system to provide system information and to allow adjustment. The EZ-Cal receives its power from the GP400 or GP440. The system must be powered up by closing the battery disconnect switch and pulling out both Emergency Stop Switches. You must also select Base or Platform depending on the station from which you will operate.

Onboard EZ-Cal Option -- Lower Controls Box

To use and operate the onboard EZ-Cal, set the Base/Platform Key switch to Base, then open the door to the Lower Controls Box. The onboard EZ-Cal scan tool provides the same functionality as the hand-held unit.

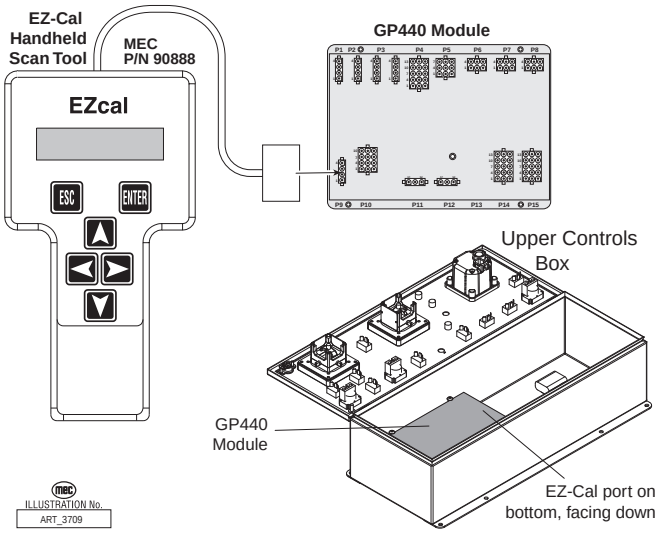


Handheld EZ-Cal -- Upper Controls Box

The handheld EZ-Cal is not provided with the machine and is available from the MEC parts department (part #90888).

To use and operate the handheld EZ-Cal at the upper controls station:

- Set the Base/Platform Key Switch to Platform
- Open the lid to the Upper Controls Box
- Plug the EZ-Cal into port P9 of the GP440 module. This plug is on the right side of the module, facing down.



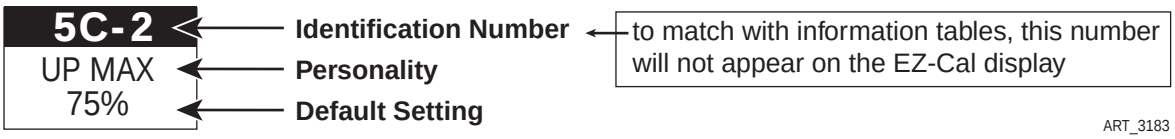
Using The EZ-Cal Scan Tool

- Once, powered 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, then press Enter again to choose a sub menu.
- The up/down arrows are used to change settings only.
- Press ESC to back up one level.

SYMBOL	KEY FUNCTIONS
ESC ENTER	**ESC/ENTER BUTTONS** To move back and forth between menu and sub-menu
◀ ▶	**LEFT/RIGHT BUTTONS** Select menus and setting to be adjusted
▲ ▼	**UP/DOWN BUTTONS** Adjust setting values

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.



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.

WARNING

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.

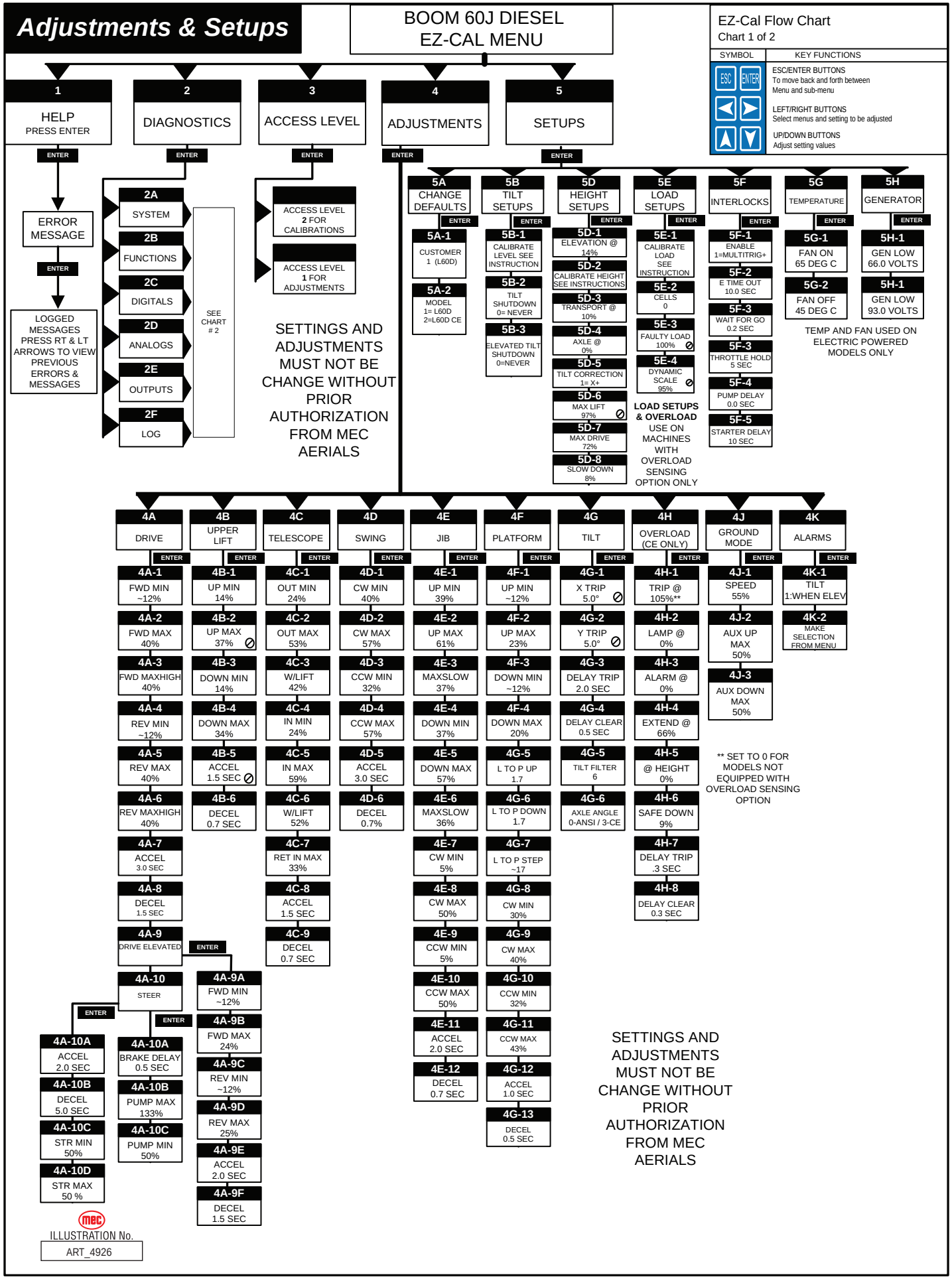
Error Messages

To obtain error messages from the EZ-Cal, access the EZ-Cal as mentioned above. The display will read, “HELP:PRESS ENTER”. Press Enter to display the current error message. If an error message is present, use the following list of error messages to better understand the fault. If an error message is not present, the display will show the last operation performed.

Pressing Enter twice will provide a log of previous errors and operations that may have occurred within recent operation. The first message will be the most recent.

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 Messages” on page 104 for flash coded error messages.


Adjustments & Setups
BOOM 60J DIESEL
EZ-CAL MENU
EZ-Cal Flow Chart
Chart 1 of 2
SYMBOL
KEY FUNCTIONS
ESC/ENTER BUTTONS
To move back and forth between Menu and sub-menu
LEFT/RIGHT BUTTONS
Select menus and setting to be adjusted
UP/DOWN BUTTONS
Adjust setting values
1 HELP PRESS ENTER
2 DIAGNOSTICS
3 ACCESS LEVEL
4 ADJUSTMENTS
5 SETUPS
ENTER
ERROR MESSAGE
LOGGED MESSAGES PRESS RT & LT ARROWS TO VIEW PREVIOUS ERRORS & MESSAGES
2A SYSTEM
2B FUNCTIONS
2C DIGITALS
2D ANALOGS
2E OUTPUTS
2F LOG
SEE CHART # 2
ACCESS LEVEL 2 FOR CALIBRATIONS
ACCESS LEVEL 1 FOR ADJUSTMENTS
SETTINGS AND ADJUSTMENTS MUST NOT BE CHANGE WITHOUT PRIOR AUTHORIZATION FROM MEC AERIALS
5A CHANGE DEFAULTS
5A-1 CUSTOMER 1 (L60D)
5A-2 MODEL 1= L60D 2=L60D CE
5B TILT SETUPS
5B-1 CALIBRATE LEVEL SEE INSTRUCTION
5B-2 TILT SHUTDOWN 0= NEVER
5B-3 ELEVATED TILT SHUTDOWN 0=NEVER
5D HEIGHT SETUPS
5D-1 ELEVATION @ 14%
5D-2 CALIBRATE HEIGHT SEE INSTRUCTIONS
5D-3 TRANSPORT @ 10%
5D-4 AXLE @ 0%
5D-5 TILT CORRECTION 1= X+
5D-6 MAX LIFT 97%
5D-7 MAX DRIVE 72%
5D-8 SLOW DOWN 8%
5E LOAD SETUPS
5E-1 CALIBRATE LOAD SEE INSTRUCTION
5E-2 CELLS 0
5E-3 FAULTY LOAD 100%
5E-4 DYNAMIC SCALE 95%
LOAD SETUPS & OVERLOAD USE ON MACHINES WITH OVERLOAD SENSING OPTION ONLY
5F INTERLOCKS
5F-1 ENABLE 1=MULTITRIG+
5F-2 E TIME OUT 10.0 SEC
5F-3 WAIT FOR GO 0.2 SEC
5F-3 THROTTLE HOLD 5 SEC
5F-4 PUMP DELAY 0.0 SEC
5F-5 STARTER DELAY 10 SEC
5G TEMPERATURE
5G-1 FAN ON 65 DEG C
5G-2 FAN OFF 45 DEG C
TEMP AND FAN USED ON ELECTRIC POWERED MODELS ONLY
5H GENERATOR
5H-1 GEN LOW 66.0 VOLTS
5H-1 GEN LOW 93.0 VOLTS
4A DRIVE
4A-1 FWD MIN ~12%
4A-2 FWD MAX 40%
4A-3 FWD MAXHIGH 40%
4A-4 REV MIN ~12%
4A-5 REV MAX 40%
4A-6 REV MAXHIGH 40%
4A-7 ACCEL 3.0 SEC
4A-8 DECEL 1.5 SEC
4A-9 DRIVE ELEVATED
4A-10 STEER
4A-10A ACCEL 2.0 SEC
4A-10B DECEL 5.0 SEC
4A-10C STR MIN 50%
4A-10D STR MAX 50 %
4A-10A BRAKE DELAY 0.5 SEC
4A-10B PUMP MAX 133%
4A-10C PUMP MIN 50%
4A-9A FWD MIN ~12%
4A-9B FWD MAX 24%
4A-9C REV MIN ~12%
4A-9D REV MAX 25%
4A-9E ACCEL 2.0 SEC
4A-9F DECEL 1.5 SEC
4B UPPER LIFT
4B-1 UP MIN 14%
4B-2 UP MAX 37%
4B-3 DOWN MIN 14%
4B-4 DOWN MAX 34%
4B-5 ACCEL 1.5 SEC
4B-6 DECEL 0.7 SEC
4C TELESCOPE
4C-1 OUT MIN 24%
4C-2 OUT MAX 53%
4C-3 W/LIFT 42%
4C-4 IN MIN 24%
4C-5 IN MAX 59%
4C-6 W/LIFT 52%
4C-7 RET IN MAX 33%
4C-8 ACCEL 1.5 SEC
4C-9 DECEL 0.7 SEC
4D SWING
4D-1 CW MIN 40%
4D-2 CW MAX 57%
4D-3 CCW MIN 32%
4D-4 CCW MAX 57%
4D-5 ACCEL 3.0 SEC
4D-6 DECEL 0.7%
4E JIB
4E-1 UP MIN 39%
4E-2 UP MAX 61%
4E-3 MAXSLOW 37%
4E-4 DOWN MIN 37%
4E-5 DOWN MAX 57%
4E-6 MAXSLOW 36%
4E-7 CW MIN 5%
4E-8 CW MAX 50%
4E-9 CCW MIN 5%
4E-10 CCW MAX 50%
4E-11 ACCEL 2.0 SEC
4E-12 DECEL 0.7 SEC
4F PLATFORM
4F-1 UP MIN ~12%
4F-2 UP MAX 23%
4F-3 DOWN MIN ~12%
4F-4 DOWN MAX 20%
4G-5 L TO P UP 1.7
4G-6 L TO P DOWN 1.7
4G-7 L TO P STEP ~17
4G-8 CW MIN 30%
4G-9 CW MAX 40%
4G-10 CCW MIN 32%
4G-11 CCW MAX 43%
4G-12 ACCEL 1.0 SEC
4G-13 DECEL 0.5 SEC
4G TILT
4G-1 X TRIP 5.0°
4G-2 Y TRIP 5.0°
4G-3 DELAY TRIP 2.0 SEC
4G-4 DELAY CLEAR 0.5 SEC
4G-5 TILT FILTER 6
4G-6 AXLE ANGLE 0-ANSI / 3-CE
4H OVERLOAD (CE ONLY)
4H-1 TRIP @ 105%**
4H-2 LAMP @ 0%
4H-3 ALARM @ 0%
4H-4 EXTEND @ 66%
4H-5 @ HEIGHT 0%
4H-6 SAFE DOWN 9%
4H-7 DELAY TRIP .3 SEC
4H-8 DELAY CLEAR 0.3 SEC
** SET TO 0 FOR MODELS NOT EQUIPPED WITH OVERLOAD SENSING OPTION
4J GROUND MODE
4J-1 SPEED 55%
4J-2 AUX UP MAX 50%
4J-3 AUX DOWN MAX 50%
4K ALARMS
4K-1 TILT 1:WHEN ELEV
4K-2 MAKE SELECTION FROM MENU
SETTINGS AND ADJUSTMENTS MUST NOT BE CHANGE WITHOUT PRIOR AUTHORIZATION FROM MEC AERIALS
ILLUSTRATION No.
ART_4926

DIAGNOSTIC

Use in conjunction with Diagnostic tables for Thorough explanation Of readout and values

60JD BOOM EZ-CAL MENU

2 DIAGNOSTICS

ENTER

EZ-Cal Flow Chart
Chart 2 of 2

SYMBOL	KEY FUNCTIONS
ESC ENTER	ESC/ENTER BUTTONS To move back and forth between Menu and sub-menu
◀ ▶	LEFT/RIGHT BUTTONS Select menus and setting to be adjusted
▲ ▼	UP/DOWN BUTTONS Adjust setting values

2A SYSTEM

ENTER

- **2A-1** ENABLED NO/YES — ENTER
- **2A-2** B+ SUPPLY ACTUAL INPUT VOLTAGE — ENTER
- **2A-3** TRACTION NOT USED ON DIESEL UNITS — ENTER
- **2A-4** PUMP NOT USED ON DIESEL UNITS — ENTER
- **2A-5** TILT STATE OF LEVEL IN DEGREES — ENTER
- **2A-6** AXLE ANGLE ACTUAL CE UNITS ONLY — ENTER
- **2A-7** TILTED YES or NO
- **2A-8** HEIGHT ACTUAL IN % — ENTER
- **2A-9** LOAD ACTUAL IN %
- **2A-10** OVERLOADED YES or NO — ENTER
- **2A-11** ELEVATED YES or NO
- **2A-12** EXTENDED YES or NO
- **2A-13** EXTENDED #2 YES or NO
- **2A-14** TRANSPORT YES or NO
- **2A-15** CURTIS NOT USED
- **2A-16** GEN STATE NOT USED

- **2A-1A** PLATFORM MODE ON or OFF
- **2A-1B** GROUND MODE ON or OFF
- **2A-1C** VALVE SUPPLY ON or OFF
- **2A-1D** OK to GO YES or NO
- **2A-2A** LOW BATTERY YES or NO
- **2A-2B** 12 VOLT SUPPLY ACTUAL
- **2A-2C** CAPBANK NOT USED
- **2A-5A** PLATFORM ACTUAL IN DEGREES LEVEL
- **2A-5B** GP400 ACTUAL IN DEGREES LEVEL
- **2A-5C** CAN TILT 151 ACTUAL IN DEGREES LEVEL
- **2A-5D** CAN TILT 153 ACTUAL IN DEGREES LEVEL
- **2A-5E** P ADJUST
- **2A-6A** AXLE ANGLE LOCKED YES or NO
- **2A-8A** HEIGHT 1 up ACTUAL IN %
- **2A-8B** HEIGHT 2 low ACTUAL IN %
- **2A-10A** OVERLOADED 0/L EXTEND YES OR NO

2B FUNCTIONS

ENTER

- **2B-1** DRIVE ACTUAL
- **2B-2** STEER ACTUAL
- **2B-3** LL(lower lift) ACTUAL
- **2B-4** UL (upper lift) ACTUAL
- **2B-5** JIB U-D ACTUAL
- **2B-6** JIB L-R ACTUAL
- **2B-7** BASKET U-D ACTUAL
- **2B-8** BASKET L-R ACTUAL
- **2B-9** TELE ACTUAL
- **2B-10** SWING ACTUAL
- **2B-11** INTERLOCK INFORMATION

2C DIGITALS

ENTER

2C-1 GP400 DIGITALS Lower control box INPUTS — ENTER

P7-1	(VALVE SUPPLY) POWER INPUT
P7-2	KEY SWITCH BASE SELECTED
P7-3	BOOM UP SWITCH
P7-4	KEY SWITCH PLATFORM SEL
P7-5	GENERATOR RUNNING (60JE)
P7-6	ENG START SWITCH
P7-7	ENGINE STOP SWITCH (L60E)
P7-9	AUX BATTERY POWER
P7-10	BOOM DOWN SWITCH
P7-11	TELE EXTEND SWITCH
P7-12	TELE RETRACT SWITCH
P7-13	ENGINE OIL PRESSURE SWITCH
P7-14	ENGINE TEMP SWITCH
P7-15	LOW FUEL SWITCH
P14-1	JIB UP SWITCH
P14-2	JIB DOWN SWITCH
P14-10	BOOM RETRACT PROX SWITCH
P15-1	SWING LEFT SWITCH
P15-2	SWING RIGHT SWITCH
P15-3	PLATFORM LEVEL UP SWITCH
P15-4	GLOW PLUG SWITCH
P15-5	IDLE ENABLE SWITCH
P15-6	PLATFORM LEVEL DOWN SWITCH
P15-7	PLATFORM ROT RIGHT SWITCH
P15-8	HIGH SPEED ENABLE SWITCH
P15-9	PLATFORM ROT LEFT SWITCH

2C-2 GP440 Upper control box INPUTS — ENTER

P10-7	STEER LEFT
P10-8	STEER RIGHT
P10-11	DRIVE ENABLE SWITCH
P14-1	TELE OUT SWITCH
P14-2	TELE IN SWITCH
P14-9	EMERGENCY STOP SWITCH
P14-10	750 LBS OPTION
P14-11	PLATFORM LEVEL UP
P14-12	PLATFORM LEVEL DOWN
P14-13	AUXILLIARY POWER SIGNAL
P14-14	GENERATOR SIGNAL
P15-1	START
P15-3	ENABLE, PLATFORM LEVEL
P15-4	GLOW PLUG/CHOKE
P15-5	HIGH SPEED
P15-6	DRIVING LIGHTS
P15-7	AUX HYDRAULIC POWER
P15-8	HORN
P15-9	JIB SLOW DOWN SWITCH

2C-3 MATRIX MODULE LOWER CONTROLS — ENTER

	NO MATRIX DIGITALS

2D ANALOGS

ENTER

2D-1 GP400 ANALOGS Lower control box INPUTS — ENTER

P8-2	UPR BOOM ANGLE TRNS
P8-6	LWR BOOM ANGLE TRNS 1
P8-9	TBM AMPERAGE
P8-13	GROUND TO MODULE
P8-14	GROUND TO MODULE
P8-15	GROUND TO MODULE

2D-2 GP440 Upper control box ANALOG INPUTS — ENTER

P6-1	JIB UP/DWN JSTK
P6-2	PLATFORM ROTATE L/R
P6-3	ENABLE JIB/ROTATE
P7-1	BOOM UP/DOWN
P7-2	TURRET SWING
P7-3	ENABLE BOOM/SWING
P10-1	DRIVE FWD/REV JSTK
P14-1	TELESCOPE OUT
P14-2	TELESCOPE IN

2D-3 MATRIX MODULE LOWER CONTROLS — ENTER

	NO MATRIX ANALOGS

NOTE: When viewing PROPORTIONAL outputs press ENTER for actual output %

2E OUTPUTS

ENTER

2E-1 GP400 OUTPUTS Lower control box OUTPUTS — ENTER

P4-4	JIB UP VALVE
P4-5	JIB DOWN VALVE
P4-6	AXLE LOCK VALVE
P4-7	SWING LEFT VALVE
P4-8	SWING RIGHT VALVE
P4-13	BRAKE DUMP VALVE
P4-14	DUMP VALVE MAIN
P4-15	PLATFORM SUPPLY
P5-1	PLATFORM ROTATE LEFT
P5-2	STEER RIGHT VALVE
P5-3	STEER LEFT VALVE
P5-4	PLATFORM ROTATE RIGHT
P5-5	PUMP CONT #1 INTERLOCK
P5-6	ALARM
P5-7	TELE OUT VALVE
P5-8	TELE IN VALVE
P5-9	2-SPEED VALVE
P5-12	TILT LIGHT
P6-1	BATTERY ISOLATOR
P6-2	GENERATOR
P6-3	LOW FUEL LIGHT
P6-4	START INHIBIT LIGHT
P6-6	AUX BATTERY POWER
P6-7	ALTERNATOR EXCITE
P6-8	GAS/PROPANE (FUTURE MODEL)
P6-9	GLOW PLUG (CHOKE)
P6-10	STARTER
P6-11	MOTOR COOLING FAN
P6-12	DIESEL STOP VALVE (IGN)
P6-13	HOUR METER
P6-14	HIGH RPM SOLENOID HOLD
P6-15	HORN

2E-2 GP440 OUTPUTS Upper control box OUTPUTS — ENTER

P4-1	OVERLOAD LIGHT (CE)
P4-7	BATERY CHARGE GAUGE (60JE)
P5-1	LOW FUEL INDICATOR LT
P5-2	TILT ALARM/OVERLOAD
P5-3	12 VOLT SUPPLY
P5-4	TILT INDICATOR LT
P5-5	750 LBS OK LT
P5-7	GROUND SUPPLY B-

2E-3 MATRIX MODULE LOWER CONTROLS — ENTER

NO MATRIX OUTPUTS

2F LOG

ENTER

- **2F-1** CALDATE CALIBRATION DATE
- **2F-2** SOFTWARE VERSION NUMBER
- **2F-3** MAX BATTERY HIGHEST VOLTAGE

ILLUSTRATION No. ART_4927

EZ-Cal Messages

“Help Messages” will appear on the EZ-Cal scan tool as a means of explaining operating and non-operating function(s) and system errors or interruptions that are accompanied by flash codes. It can also be used for verifying system operation. Refer to the EZ-Cal Instruction page for additional help with EZ-Cal operation.

To access messages, power the system up, (it is not necessary to have the engine running) the EZ-Cal display will illuminate and read “HELP - PRESS ENTER”. Press ENTER to view current message. Press ENTER a second time then use right and left arrow buttons to access up 30 logged messages from the memory. Many messages simply detail operations being performed by the GP400; other messages detail occurrences that also take place during operation either normal or may be symptomatic of a malfunction.

Operational Messages

The following messages appear as result of normal operation and usually do not represent a problem.

EVERYTHING OK_____ Flash Code: None
- All circuits performing properly, no current operation performed.

GROUND MODE ACTIVE_____ Flash Code: None
- Base/Platform selector switch set to base control station.

STARTUP_____ Flash Code: None
- GP400 performing start up procedure, normally a short sequence.

MOVING FRAME_____ Flash Code: None
- Chassis level in progress.

MOVING PLATFORM_____ Flash Code: None
- Platform level in progress

TELESCOPING_____ Flash Code: None
- Boom extend/retract (telescope) in progress

LIFTING_____ Flash Code: None
- Boom lift up in progress

LOWERING_____ Flash Code: None
- Boom Lower down in progress

DRIVING_____ Flash Code: None
- Drive forward or reverse in progress

VEHICLE TILTED_____ Flash Code: None
- Chassis is tilted beyond pre-set maximum. Use auto-level feature to level chassis or re-position the machine.

Can Bus Related Messages

CAN bus communication system is the network by which the control modules and CAN Tilt modules communicate with the GP400.

NO DATA FROM CAN TILT #1_____ Flash Code: None

- CAN Tilt module mounted to front of main boom (located behind panel, Left Module) has malfunctioned or wiring is damaged.

NO DATA FROM CAN TILT #2_____ Flash Code: None

- CAN Tilt module mounted to Front axle has malfunctioned or wiring is damaged.

NO DATA FROM CAN TILT #3_____ Flash Code: None

- CAN Tilt module mounted to front of main boom (located behind panel, Right Module) has malfunctioned or wiring is damaged.

NO DATA FROM CAN TILT #4_____ Flash Code: None

- CAN Tilt module mounted to Rear axle has malfunctioned or wiring is damaged.

FAULT: CAN BUS!_____ Flash Code: 6/6

- The CAN bus cable may be damaged or disconnected from one or more of the modules. All modules must be connected to the CAN bus for machine operation.

Calibration Related Messages

The following messages appear when the GP400 microprocessor has not been calibrated or was improperly calibrated.

FACTORY OVERRIDE_____ FAST FLASH

- GP400 is shipped in this condition to allow temporary operation of the machine without interruption from the safety system so that calibration procedures can be performed. The GP400 must be prepared for the machine to which it will be installed, including calibration and Customer/ model selection. See “GP400 Setup” for instructions. Once Calibrated, Factory Override is gone forever.

WARNING

ALL SAFETY SETTINGS ARE INACTIVE WHEN THE GP400 IS IN FACTORY OVERRIDE, NEVER OPERATE MACHINE IN FACTORY OVERRIDE EXCEPT TO CALIBRATE THE GP400.

NOT CALIBRATED_____ Flash Code: 1/1

- The GP 400 microprocessor has not been calibrated. Operation will be restricted until calibration is completed. Refer to “Set up procedures” in this section for calibration information and instructions.

HEIGHT NOT CALIBRATED_____ Flash Code: 1/1

- The Height portion of the calibration has not been completed. Operation will be restricted until calibration is completed. Refer to “Set up procedures” in this section for calibration information and instructions.

FUNCTIONS LOCKED - NOT CALIBRATED_____ Flash Code: 1/1

- The GP 400 microprocessor has not been calibrated. Operation will be restricted until calibration is completed. Refer to “Set up procedures” in this section for calibration instructions.

FAULT: CUSTOMER_____ Flash Code: 1/1

- Customer vs. Model settings not correct. Using the EZ-Cal, go to SETUPS/CHANGE DEFAULTS/CUSTOMER to correct. Changing customer or model will require access level 1 code. NOTE: all adjustments and settings return to default value when Customer or Model is changed, ensure proper settings and adjustments after changing Customer or Model.

Interlock Messages

The following messages appear as result of perceived improper operation, machine positioning, or other incorrect operation. Interlock messages may be the result of a part failure if the part in question provides incorrect information to the GP400.

FUNCTIONS LOCKED - LIMIT REACHED_____ Flash Code: 2/2

- Rotating platform not centered; Certain operations require centered platform Rotating platform at extreme CW or CCW; no further rotation possible in that direction

FUNCTIONS LOCKED - TEST MODE SELECTED_____ Flash Code: 2/2

- Calibration in progress or internal test mode active. Cycle EMS to clear.

FUNCTIONS LOCKED - OUTRIGGERS_____ Flash Code: 2/2

- Stabilizers must be set before operation is allowed.

FUNCTIONS LOCKED - OVERLOADED_____ Flash Code: 2/2

- Platform overloaded - reduce weight in platform until alarms stop (Overload option only)

FUNCTIONS LOCKED - UNDERLOADED_____ Flash Code: 2/2

- Overload system detects less then normal lift cylinder pressure. Platform resting atop a fixed object, possible pressure switch failure or not calibrated correctly.

FUNCTIONS LOCKED - TILTED_____ Flash Code: 2/2

- Platform sensors indicate platform out of level; level platform or chassis until alarm stops or re-position machine

FUNCTIONS LOCKED - AUTO PLATFORM LEVEL_____ Flash Code: 2/2

- Auto Platform Level operation running, wait until completed to operate other functions.

FUNCTIONS LOCKED - TOO HIGH_____ Flash Code: 2/2

- Elevation sensor indicating elevation beyond 98%. Height Calibration performed incorrectly; Angle Transducer loose or remounted incorrectly or extend proximity switch/s failure. Use EZCal in conjunction with EZ-Cal Flow Charts to identify GP400 or GP440 for sensor's inputs to check sensor readings.

FUNCTIONS LOCKED - EXTERNAL SHUTDOWN_____ Flash Code: 2/2

- Boom not retracted or axle/s off level. Boom must be retracted to allow frame level, drive or outrigger operation. Axles must be centered before drive is allowed when the platform is elevated. Also, drive will be interrupted if Stabilizer pressure sensor output is below 0.2 volts (possible sensor failure or sensor wiring issue).

CHECK DRIVE/STEER SWITCHES_____ Flash Code: 2/2

- Drive joystick output without enable or during power up. Check drive joystick analog output and steer switch digital output using the EZ-Cal.

CHECK LIFT SWITCHES_____ Flash Code: 2/2

- Lift joystick or toggle switch movement without enable or during power up. Check joystick analog output using the EZ-Cal.

CHECK PLATFORM SWITCHES_____ Flash Code 2/2

- Platform Rotate/slide joystick or toggle switch movement without enable or during power up. Check joystick analog output and switch digital outputs using the EZ-Cal.

CHECK TELE SWITCHES_____ Flash Code 2/2

- Telescope joystick or toggle switch movement without enable or during power up. Check joystick analog output and switch digital output using the EZ-Cal.

RELEASE ENABLE SWITCH_____ Flash Code 2/2

- One or more enable switches activated for extended period of time without corresponding function or during start up. Check enable switches digital outputs using the EZ-Cal.

Other Messages

The following messages are the result of various possible failures or occurrences which may result in machine interruption.

FUNCTIONS LOCKED - NO VALVE SUPPLY!_____ Flash Code 2/3

- GP400 detects no power on P7-1 of the GP400. Check wiring to plug connection; possible GP400 internal failure.

FAULT: ENERGIZED VALVE_____ Flash Code: 3/2

- Power on valve output wire at GP400 plugs P4, P5 or P6. Unplug these connectors and cycle e-stop switch to clear code. Plug in one-at-a-time until code reappears then isolate the circuit (with voltage) within that plug. If code does not clear, possible GP400 failure. EZ-Cal not useful for this procedure.

FAULT: VALVE FEEDBACK HIGH!_____ Flash Code: 3/2

- On start-up GP400 p-5 pin voltage incorrect, check P5-X wiring for voltage feed back. Possible GP400 internal fault

FAULT: BAD INTERNAL SAFETY SWITCH!_____ Flash Code: 3/4

- At startup, internal feedback of output incorrect, possibly failed output driver; check wiring to P6-12/13/14/15; possible GP400 internal failure

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

- Oil pressure switch opened during operation or time out. Check oil pressure, pressure switch, wiring. Message will appear if engine stops running for reasons other then normal shut down.

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

- Malfunction within the GP400 possibly caused by a short circuit in the wiring or high voltage surge. Replace GP400

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

- 5 volt circuit that provides voltage to sensors had failed. Possible short in the wiring or high voltage surge on supply.

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

- Charge battery and battery connections, check charging system and voltage source connections.

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

- GP400 input voltage should be 12 volts. Check battery and battery connections, alternator output.

FAULT: CHECK HEIGHT 2 SENSOR!_____ Flash Code 6/1

- Height 2 sensor output over 4.5 volts or under .5 volts. Check height 2 sensor output using the EZ-Cal (height 2 sensor on CE option only). Possible sensor failure or wire connection failure.

FAULT: CHECK HEIGHT 1 SENSOR!_____ Flash Code 6/1

- Height 1 sensor output over 4.5 volts or under .5 volts. Check height 1 sensor output using the EZ-Cal. Possible sensor failure or wire connection failure.

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

- Voltage from Height sensors out of range, should be .5 volts to 4.5 volts

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

- Voltage from Pressure sensor out of range, should be .5 to 4.5 volts (Overload option only).

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

- Check for incorrect GP 400 part.

FAULT: LOW OIL PRESSURE!_____ _ Flash Code 7/7

- Engine Start was pushed but engine did not start or oil pressure switch did not close.
- Engine Oil Pressure is low. Check oil level.

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

- A failure happened that has no message associated with it. This should never occur.

Troubleshooting Chart

The following chart describes the possible causes for inoperation of the different functions of this machine. The Causes and Solutions columns list various points of references that can be found in the Hydraulic, Electrical, Schematics and Troubleshooting sections of this manual.

The majority of electrical troubleshooting on this model will require the use of the onboard EZ-Cal scan tool, located inside the lower control box door. Please refer to “EZ-Cal Scan Tools” on page 100 for further instructions on the use of the EZ-Cal scan tool.

Perform a full assessment of machine operations prior to troubleshooting this model and using this chart. This model is operated by a Microprocessor Control System equipped with a variety of built-in safety interlocks to prevent continued operation in the event of a failure or misoperation. Some interlocks may only be detected through the use of the EZ-Cal.

Problem	Possible Cause	Remedy/Solution
General Power Issue		
No operation from upper or lower control station. No LEDs on modules.	Emergency stop switch pushed in or ignition switch turned off or faulty switches	Lower e-stop switch and ignition switch will cut all power. Upper e-stop will cut only upper power as will the ignition switch in platform 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. Look for short circuit and/or damage in wiring or high amperage draw at valve coils or engine actuators.
	Faulty Terminal Block Module (TBM)	Located inside the lower control box. Initiates all power when signaled by the key switch. Check for loose terminals. Terminal 4 is Common power from Circuit breaker. Terminals 1 and 2 are signals to close the relay.
No operation from upper or lower control station Module LEDs on or flashing	Flash codes are the GP400’s indication of a fault in the system.	Refer to flash code designation in this section of the manual or plug in an EZ-Cal scan for more relevant information relating to the failure. See EZ-Cal Instructions for more information.
	Starter Relay or Starter failure	Test for signal and Common power to Starter Relay. Check fuse for Common power to relay. Test Starter.
Operates from lower controls but not from upper controls. No LEDs when in Upper control position.	Base/Platform select switch not in Platform position or switch malfunction	Ensure that the switch is in the Platform position. Check switch function.
	Damaged or loose harness connections to upper control box	Check for power inside the upper control box on e-stop switch and at Buss Module. Check for presence of ground on the Ground Buss Module. Repair connections.
	Malfunctioning GP440 Module (Module inside the upper control box)	Check help messages using the EZ-Cal tool. Also check for joystick inputs (see 2C2 and 2D2 Diagnostic Chart for inputs from GP440).
	System interlock	Check EZ-Cal HELP messages for interlock

Problem	Possible Cause	Remedy/Solution
Engine Related Issues		
Starter will not crank from upper or lower stations	Battery discharged or faulty cables	Will receive 4-4 flash on GP400. Clean, service and charge battery. Repair cables.
	Malfunctioning start relay or fuse	Test/replace relay located on left hand side of engine and fuse located near starter
	Malfunctioning starter	Test/replace starter
	Faulty start switch either location	Test/replace as necessary
	Starter interrupt system initiated	Check for red “Start Disable” light on lower panel. Starter may be operated for 10 seconds before a 30 second “cool down” is initiated.

7-7 Flash code on GP400	Indicates an attempt to start was sent by the GP400 but the oil pressure switch did not close.	Check all the above
Starter cranks but engine will not start	Low fuel reservoir	Check/fill fuel reservoir. Fuel system requires air purge after loss of fuel.
	Air trapped in the fuel system	Purge air from the fuel system (see section 18 for instructions). Check fuel reservoir level or for leaks in the fuel hoses.
	Restriction in the fuel system	Replace Fuel Filter. Check fuel supply hoses
	Malfunctioning fuel solenoid	Check/replace fuel solenoid located on the top of the injection pump.
	Malfunctioning glow plugs (cold climates)	Test/ replace grid heater relay, fuse and grid heater
	Obstructed air filter	Clean/replace air filter.
	Contaminated fuel	Test/replace fuel
	Other engine issues	See engine manufacturers troubleshooting guide
No high throttle	Malfunctioning throttle controller, solenoid or blown fuse	Test/replace throttle controller and/or throttle solenoid and fuse
	Restriction in the fuel system	Replace Fuel Filter. Check fuel supply hoses
	Obstructed air filter	Clean/replace air filter.
	Other engine issues	See engine manufacturers troubleshooting guide

Problem	Possible Cause	Remedy/Solution
Boom Lift/Lower		
Platform will not raise	Excessive weight on platform	Reduce weight to within platform capacity
	Machine out of level (platform elevated above 10')	Indicator light will be illuminated and alarm will sound off. Reposition machine to level ground.
	Main relief valve (6) out of adjustment	Adjust Main relief valve (6) to rated platform capacity located on function manifold - see hydraulic section.
	Lift valve (8.1) not energized	Check wiring to lift valve. Check for EZ-Cal message or flash code
	Lift valve (8.1) not shifting	Clean debris. Check for damage/replace.
	Solenoid Valve (18) dump valve not energized	Check wiring to valve. Check EZ-Cal ref. P4-14 for output.
	Solenoid Valve (18) load sense dump not shifting	Clean debris. Check for damage/replace.
	Main system pressure inadequate	Check pump output flow and pressure
	Lift/Lower joystick inoperative	Check Joystick output using EZ-Cal ref. 2D-2
		P7-1 for analog joystick output signal
	Battery discharged - no charge output	Check battery voltage, alternator output (14.5 volts) Check GP400 for 4-4 flash code.
	System interlock	Check EZ-Cal HELP messages for interlock
Platform will not lower or lowers slowly	Lowering valve SV3 not energized	Check wiring to lowering valve located inside control module - see Hydraulic section for location.
	Lowering valve (8.2) not shifting	Clean debris. Check for damage/replace.
	System interlock	Check EZ-Cal HELP messages for interlock
	Main system pressure inadequate	Check pump output flow and pressure
Emergency lowering not working	Battery discharged, not charging	Check/charge battery. Check charge Isolator relay and fuse. Check alternator output (14.5 volts)
	Auxiliary power unit malfunction	Check APU located beside lower control box
	Emergency Down switch failure	Check/replace switch.
	Lowering valve (8.2) not shifting	See "Platform will not lower or lowers slowly"
	Counterbalance Valve (on lift cylinder) not adjusted correctly	Contact Factory Technical Support for instructions for counterbalance valve adjustment
	System interlock	Check EZ-Cal HELP messages for interlock

Problem	Possible Cause	Remedy/Solution
Boom Extend/Retract		
No boom extension	Excessive weight on platform	Reduce weight to within platform capacity
	Level sensor out of level (platform elevated above 10')	Indicator light will be illuminated and alarm will sound off. Reposition machine to level ground
	Main relief valve (6) out of adjustment	Adjust Main relief valve (6) to rated platform capacity located on function manifold - see hydraulic section.
	Solenoid Valve (18) (dump valve) not energized	Check wiring to valve. Check EZ-Cal ref. P4-14 for output
	Ext/Retract valve (8.2) not energized	Check wiring to lift valve. Check for EZ-Cal message or flash code.
	Extend/Retract valve (8.2) not shifting	Clean debris. Check for damage/replace.
	Ext/Retract joystick inoperative	Check Joystick output using EZ-Cal ref. 2D-2, P14-1 & P14-2 for upper control analog output signal
	Battery discharged - no charge output	Check battery voltage, alternator output (14.5 volts). Check GP400 for 4-4 flash code.
	System interlock	Check EZ-Cal HELP messages for interlock
Boom extends/retracts slow	Excessive weight on Platform	Reduce weight to within platform capacity
	Main relief valve (6) out of adjustment	Adjust Extend relief valve (see hydraulics section) located on function manifold.
	Extend/Retract valve (8.2) not shifting completely	Clean debris. Check for damage/replace.
	Extend Speed adjustment reduced in GP400 Processor	Use the EZ-Cal and check/adjust setting. See ADJUSTMENTS/TELESCOPE OUT MAX
No boom retract	Main relief valve (6) out of adjustment	Adjust Main relief valve (6) to rated platform capacity located on function manifold - see hydraulic section.
	Foreign debris stuck in boom slide pads	Inspect/ clean slide pads.
	Solenoid Valve (18) (dump valve) not energized	Check wiring to valve. Check EZ-Cal ref. P4-14 for output.
	Ext/Retract valve (8.2) not energized	Check wiring to lift valve. Check for EZ-Cal message or flash code.
	Extend/Retract valve (8.2) not shifting	Clean debris. Check for damage/replace.
	Ext/Retract joystick inoperative	Check joystick output using EZ-Cal ref. 2D-2, P14-1 & P14-2 for upper control analog output signal.
	Battery discharged - no charge output	Check battery voltage, alternator output (14.5 volts). Check GP400 for 4-4 flash code.
	System interlock	Check EZ-Cal HELP messages for interlock

Problem	Possible Cause	Remedy/Solution
Platform Auto-Level		
Platform will not remain level while elevating or lowering platform (level cylinder not moving at all)	Platform Level solenoid (19) valve not energized	Check wiring to valve. Check output from VCCM P-1.
	Platform Level solenoid valve (19) sticking	Remove valve and inspect for debris or damage. Replace valve located up on the side of the boom.
	Counterbalance valve faulty	Valve must not be tampered with. Replace valve.
	Flow Compensator valve (20) not shifting	Clean debris. Check for damage/replace.
Platform will not remain level while elevating or lowering platform (level cylinder moving too slow or fast)	Excessive weight on Platform	Reduce weight to within platform capacity
	Main relief valve (16) out of adjustment	Adjust main relief valve (see hydraulics section) located on function manifold.
	Platform Level solenoid valve (19) not shifting completely	Clean debris. Check for damage/replace.

Platform will not remain level while elevating or lowering platform (level cylinder moving too slow or fast)	Flow Compensator valve (22) not shifting completely	Clean debris. Check for damage/replace.
	Adjustments in GP400 incorrect	Refer to Adjustments Flow Chart column 4F for settings that will allow leveling to be close then make slight changes until operating correctly. Contact MEC Technical Support for assistance if needed.
	Pump faulty	Test/replace pump

Problem	Possible Cause	Remedy/Solution
Platform Manual Level		
Platform level operates automatically but not manually	Platform Level toggle switch inoperative	Check output from toggle using EZ-Cal. See I.D.# 2C-1, P15-3 (up) P15-6 (down) for lower control operation or 2c-2, P14-11 (up) or P14-12 (down) from upper controls.
	System Interlock	Check EZ-Cal HELP message for interlock

Problem	Possible Cause	Remedy/Solution
Turntable Rotate		
Turntable will not rotate either direction	Turntable Rotate joystick inoperative	Check joystick output using EZ-Cal. See 2D2 P7-2 for signal.
	Rotate Valve (11) not energizing.	Check wiring to valve Check GP400 output using EZ-Cal. See 2E1 P4-7 (left) and P4-8 (right).
	Rotate valve (11) not shifting.	Clean debris. Check for damage/replace.
	Internal damage or failure of rotator	Inspect/clean/repair
	System interlock	Check EZ-Cal HELP messages for interlock
Turntable will rotate in one direction only	Rotate Valve (11) not energizing	Check wiring to valve
	Rotate valve (11) not shifting	Clean debris. Check for damage/replace.
	Mechanical interference in rotator	Inspect, clean or repair
	System interlock	Check EZ-Cal HELP messages for interlock

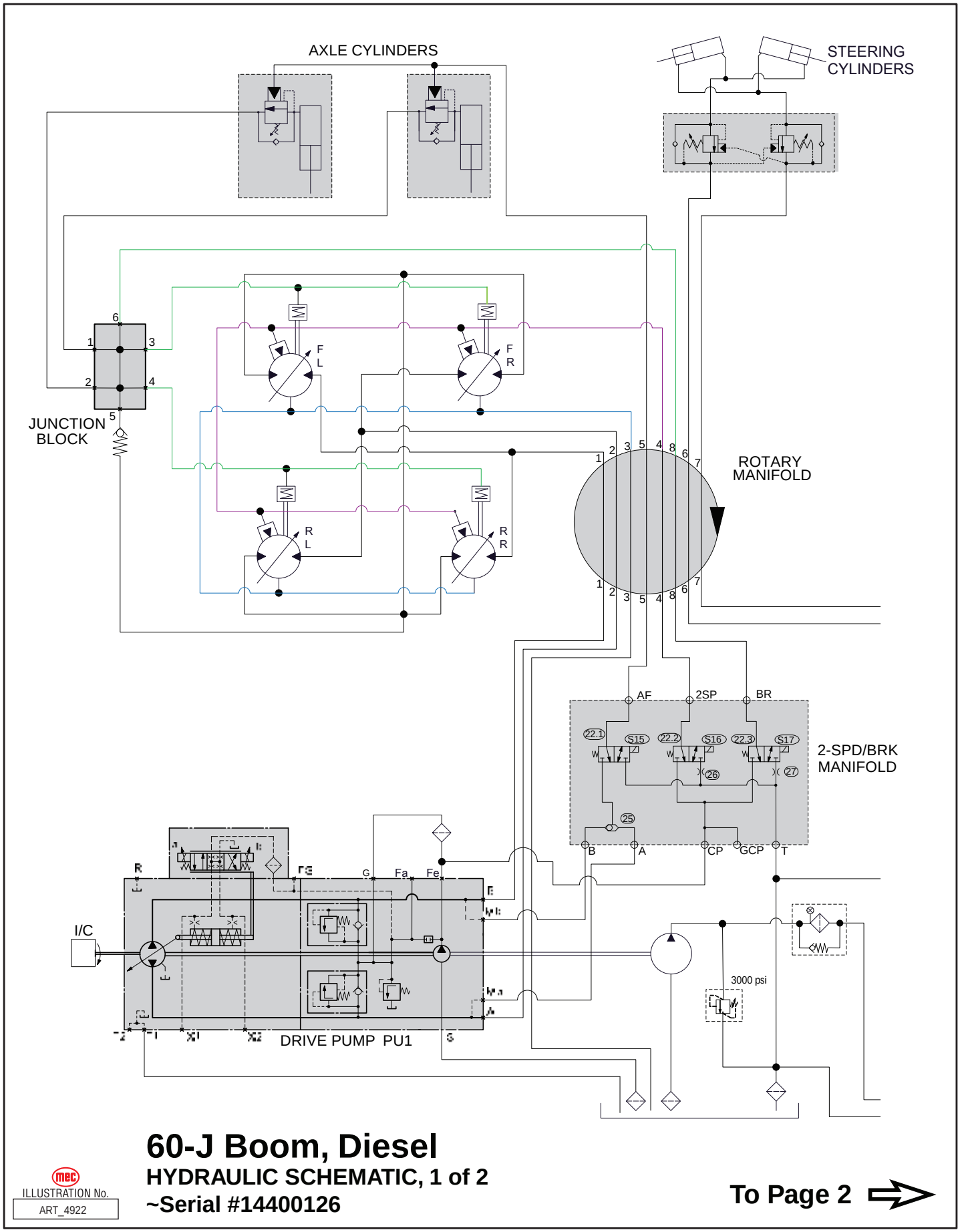
Problem	Possible Cause	Remedy/Solution
Platform Rotate		
Platform will not rotate either direction	Platform Rotate joystick inoperative	Check joystick output using EZ-Cal. See 2D2 P6-2 for signal.
	Rotate Valve (20-1) not energizing	Check wiring to valve Check GP400 output using EZ-Cal. See 2E1 P5-1 (left) and P5-4 (right)
	Rotate valve (20-1) not shifting	Clean debris. Check for damage/replace.
	Internal damage or failure of rotator	Inspect, clean or repair
	Flow Compensator valve (22) not shifting	Clean debris. Check for damage/replace.
	System interlock	Check EZ-Cal HELP messages for interlock
Platform will rotate in one direction only	Rotate Valve (20-1) not energizing	Check wiring to valve
	Rotate valve (20-1) not shifting	Clean debris. Check for damage/replace.
	Mechanical interference in rotator	Inspect, clean or repair
	System interlock	Check EZ-Cal HELP messages for interlock

Problem	Possible Cause	Remedy/Solution
Drive		
No drive operation	Planetary hub bypass engaged	Check bypass plates located in the center of each planetary hub. Should be convex. Turn over if not.
	System interlock	Check EZ-Cal HELP messages for interlock
	Hydraulic oil incorrect for severe low temperatures	Use hydraulic tank warmer if equipped. Operate drive continuously until drive begins to operate.

No drive operation	Drive Valve (on drive pump) not energized	Check Drive output from VCCM Module VP5 and VP6. Check for power at valve coils located on top of the drive pump.
	Drive Valve (on drive pump) not shifting	Check drive valve for contamination
	Brakes not releasing (system under pressure when drive attempted)	Check brake valve and brake pressure. See hydraulic diagram for location.
	Drive joystick output failure	Check drive joystick output from GP400 (see 2d2, P10-1) check joystick enable trigger operation, Check wire connections.
	Low pump stand-by pressure	Check at main manifold port GCP (see hydraulic Diagram). Adjust stand-by pressure to 300 PSI (21 bar).
	Incorrectly adjusted or worn hydraulic drive pump	See Hydraulics section for pump adjustment. Inspect or replace pump.
No drive with platform elevated **CE rated models	Unit out of level	Lower boom and operate on more level surfaces.
	FWD MIN, REV MIN setting incorrect	Reset drive speeds using EZ-Cal
	Hydraulic oil incorrect for severe low temperatures	Use hydraulic tank warmer if equipped. Operate drive continuously until drive begins to operate.
	Low pump stand-by pressure	Check at main manifold port GCP (see hydraulic Diagram). Adjust stand-by pressure to 300 PSI (21 bar).
	System interlock	Check EZ-Cal HELP messages for interlock
	Axles not parallel	Reposition machine on flat ground
Slow drive with platform in stowed position and boom retracted	Slow speed enabled	Check speed switch in platform box. Check 2-speed valve located on the main manifold (see hydraulic diagram).
	Hydraulic oil incorrect for severe low temperatures	Use hydraulic tank warmer if equipped. Operate drive continuously until drive begins to operate.
	Boom Retract proximity switch failure	Check for power ground & signal output to Proximity Switch located inside the rear of boom. Also check EZ-Cal 2C1, P14-10 for input.
	Low pump stand-by pressure	Check at main manifold port GCP (see hydraulic Diagram). Adjust stand-by pressure to 300 PSI (21 bar).
	FWD MAX, REV MAX setting incorrect	Reset drive speeds using EZ-Cal
	Wheel motor not functioning correctly	Inspect wheel motors for damage or wear.
Poor grade-ability or drive performance	High Speed enabled	Check Speed Switch
	Wheel motor not functioning correctly	Inspect wheel motors for excessive bypass or shift not working properly
	Hydraulic oil incorrect for severe low temperatures	Use hydraulic tank warmer if equipped. Operate drive continuously until drive begins to operate.
	Planetary hub bypass engaged	Check bypass plates located in the center of each planetary hub. Should be convex. Turn over if not.
	Low pump stand-by pressure	Check at Brake/Axle manifold, should be 300psi (21 bar). Adjust stand-by pressure to 300 PSI (21 bar).
	Incorrectly adjusted or worn hydraulic drive pump	See Hydraulics section for pump adjustment. Inspect or replace pump.
Drive in one direction only	Drive valve not energizing in one direction	Check 12 volts to coil. Check coil. Check valve function (located on top of drive pump).
	No output from VCCM Module	Check output from VCCM VP5 and VP6
	Drive joystick output failure	Check drive joystick output from GP400 (see 2d2, P10-1)
No High Speed	Speed selector switch inoperative	Check continuity through Speed Select switch with wires disconnected
	2-speed valve SV9 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# 2E1, P5-9).
	Boom Retract proximity switch failure	Check for power ground & signal output to Proximity Switch located inside the rear of boom. Also check EZ-Cal 2C1, P14-10 for input

Problem	Possible Cause	Remedy/Solution
Steer		
No steer in either direction	Joystick rocker switch inoperative	Check continuity through micro-switch inside joystick handle using wires outside the handle. Check output (see EZ-Cal 2C2, P10-7 and P7-8).
	Steering valve 5 inoperative	Check steering valve for power. Check for damage and contamination. Check output from GP400 (see EZ-Cal ID # 2E1 P5-2 and P5-3). Inspect/replace steering valve.
	Hoses connected incorrectly	See hydraulic section for correct connection.
	Steer cross-port relief valve(s) 3-1 and 3-2 set too low	Set steer relief valves to 1500 PSI (103 bar). See hydraulic diagram for relief valves location.
	System interlock	Check EZ-Cal HELP messages for interlock
Steer in one direction only	Joystick rocker switch inoperative	Check continuity through micro-switch inside joystick handle using wires outside the handle. Check output (see EZ-Cal 2C2, P10-7 and P7-8).
	Steering valve 5 inoperative	Check steering valve for power. Check for damage and contamination. Check output from GP400 (see EZ-Cal ID # 2E1 P5-2 and P5-3). Inspect/replace steering valve.
	No power to steering coil	Check for power and ground in both directions. Repair wiring. Check output from GP400 (see EZ-Cal I.D. #s 2F-11 right & 2F-12 left).
	System interlock	Check EZ-Cal HELP messages for interlock
Will steer but not fully or slow steering	One or both steering cylinder internal seal failure	Check/replace steering cylinder seals.
	Steer cross-port relief valve(s) 3-1 and 3-2 set too low	Set steer relief valves to 1500 PSI (103 bar). See hydraulic diagram for relief valves location.
	King pin/s seizing in the bore	Disassemble and inspect. Replace bushings.

Hydraulic Schematics ~Serial #14400126, Part 1



60-J Boom, Diesel

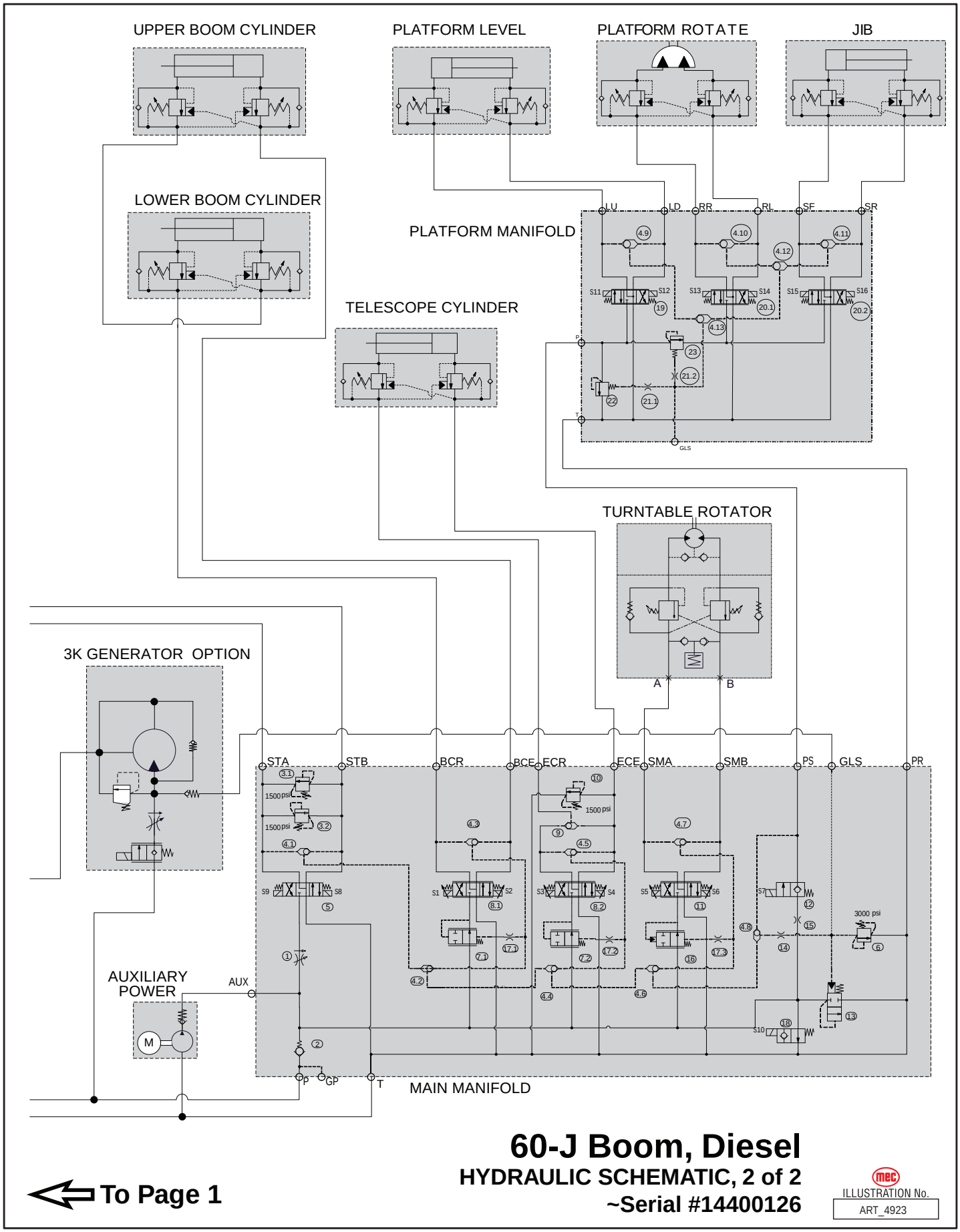
HYDRAULIC SCHEMATIC, 1 of 2

~Serial #14400126

ILLUSTRATION No.
ART_4922

To Page 2

Hydraulic Schematics ~Serial #14400126, Part 2



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60-J Boom, Diesel

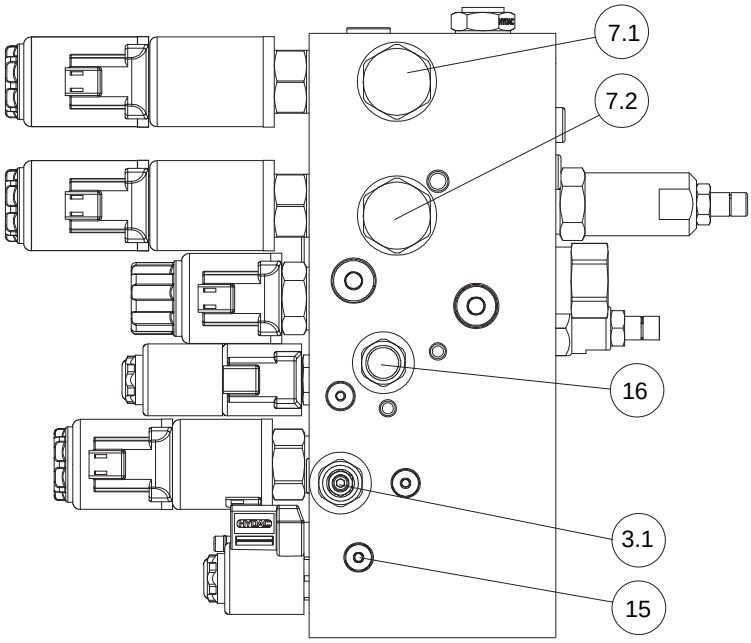
HYDRAULIC SCHEMATIC, 2 of 2

~Serial #14400126

ILLUSTRATION No.
ART_4923

Primary Functions Manifold, ~Serial #14400126, Part 1

Outward Faces



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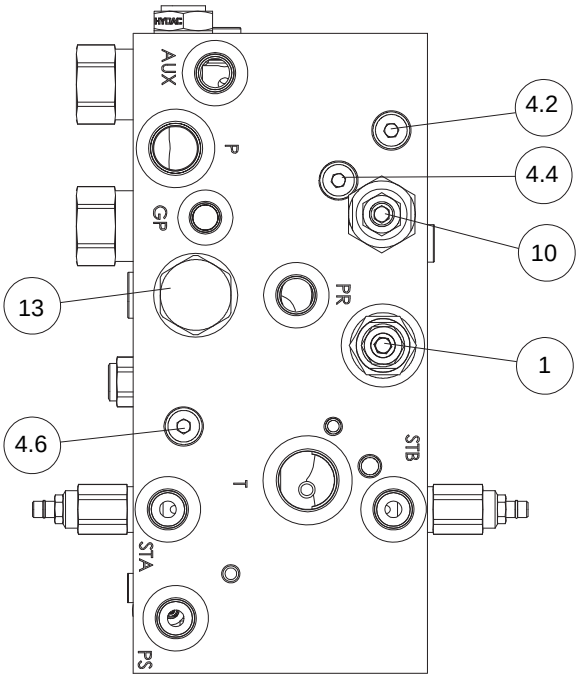

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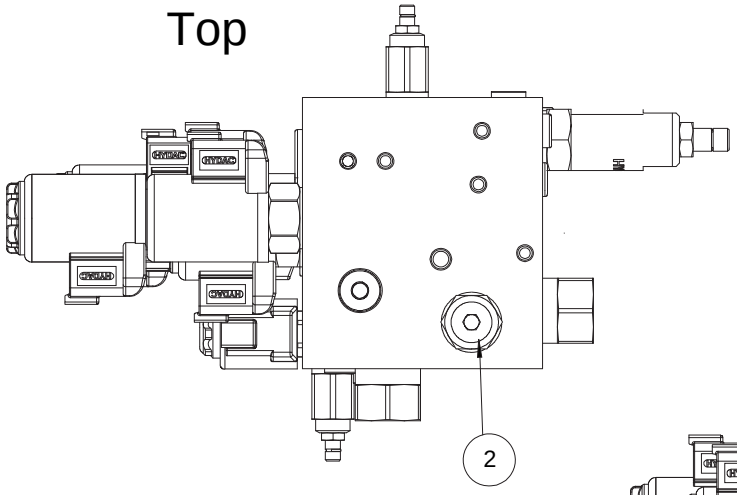

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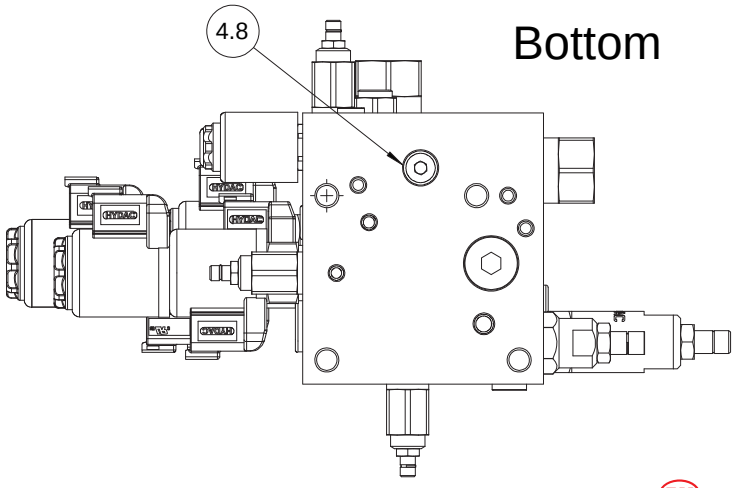
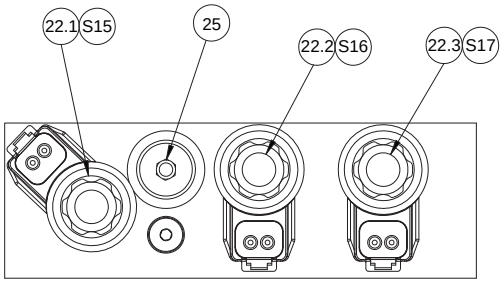


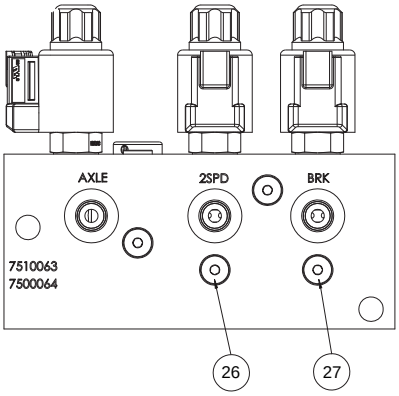
60-J Boom, Diesel
Functions Manifold Valves, 1 of 2
~Serial #14400126

ILLUSTRATION No.
ART_4924

Primary Functions Manifold, ~Serial #14400126, Part 2

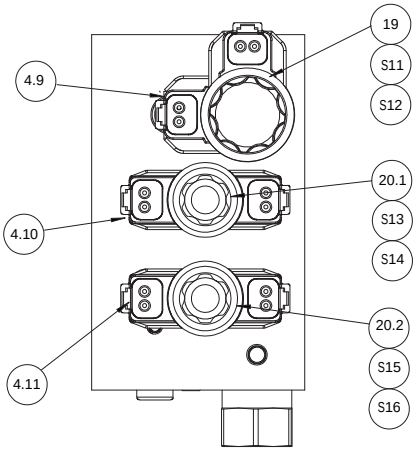
BRAKE/2-SPEED MAIFOLD

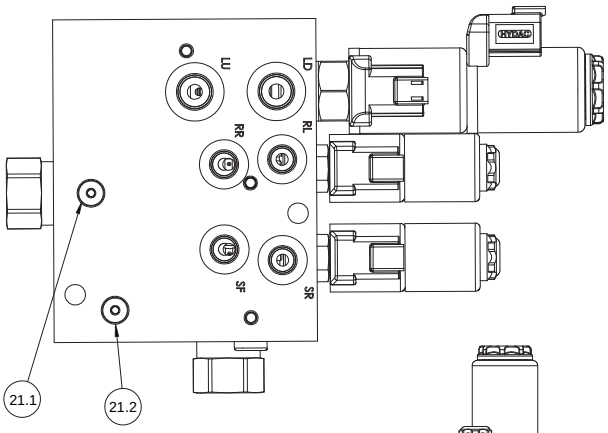


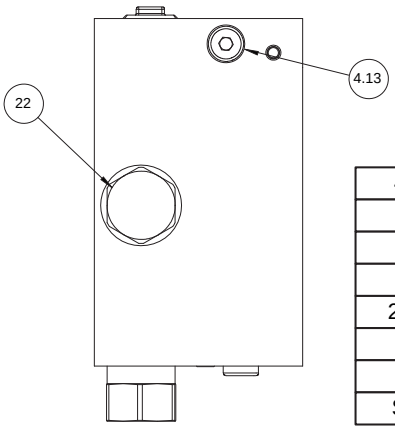


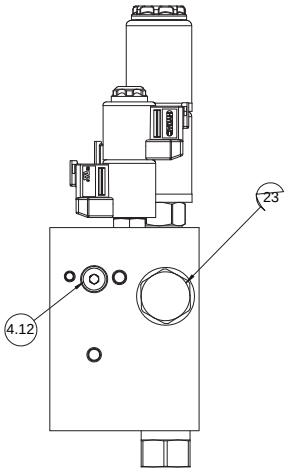
25	Shuttle Valve
22.1 - 22.3	Solenoid Valves Brake, Axle, 2 Spd
26, 27	Orifice 0.75mm
S15 – S17	Coil 12 Volt

PLATFORM MANIFOLD









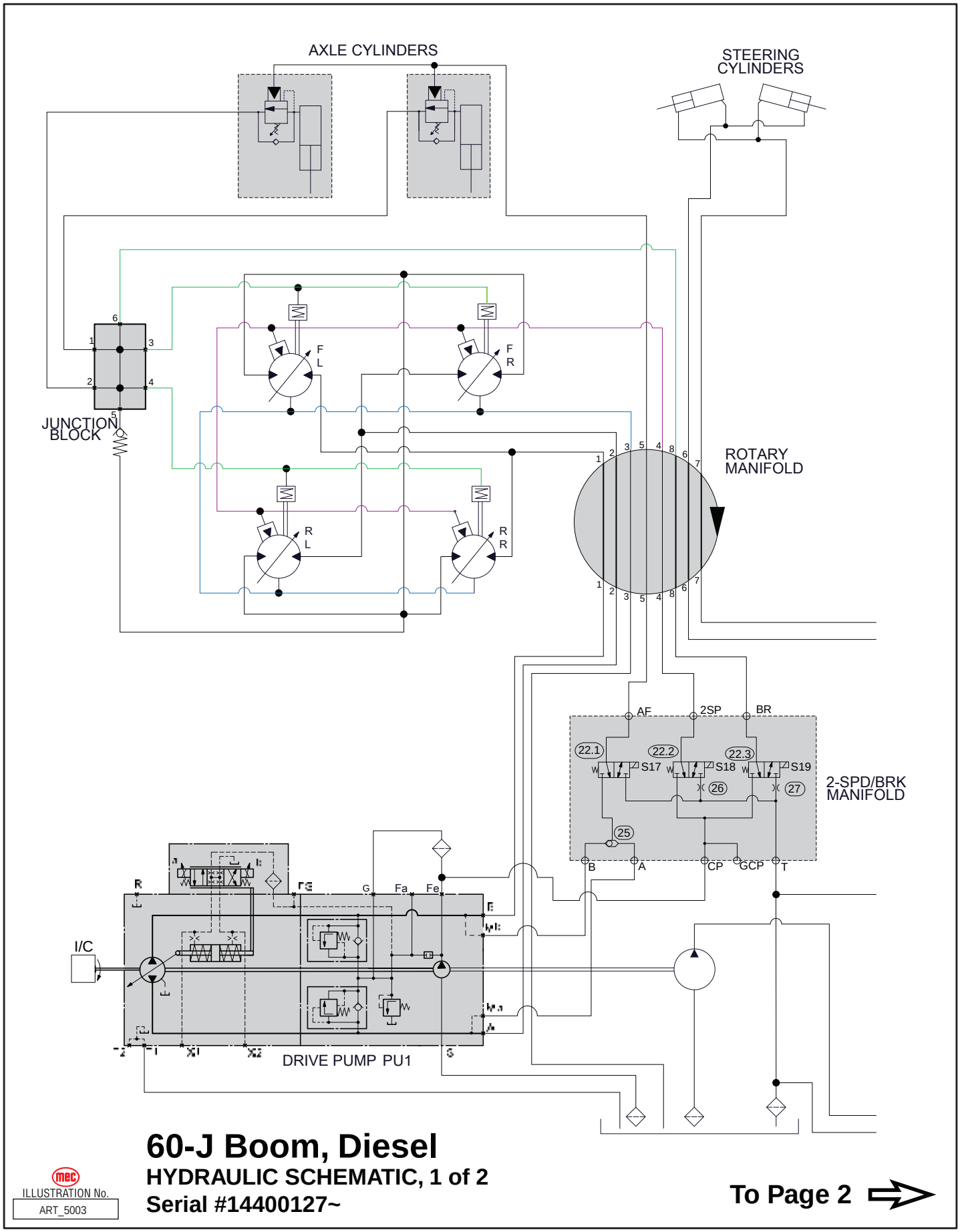
4.9 – 4.13	Shuttle Valve
19	Solenoid Valve, Platform Level
20.1	Solenoid Valve Platform Rotate
20.2	Solenoid Valve, Jib
21.1 – 21.2	Orifice
22	Flow Regulator Valve
23	Priority Flow Valve
S11 – S16	Coil 12 Volt

60-J Boom, Diesel

Additional Manifolds

ILLUSTRATION No.
ART_4925

Hydraulic Schematic, Serial #14400127~, Part 1



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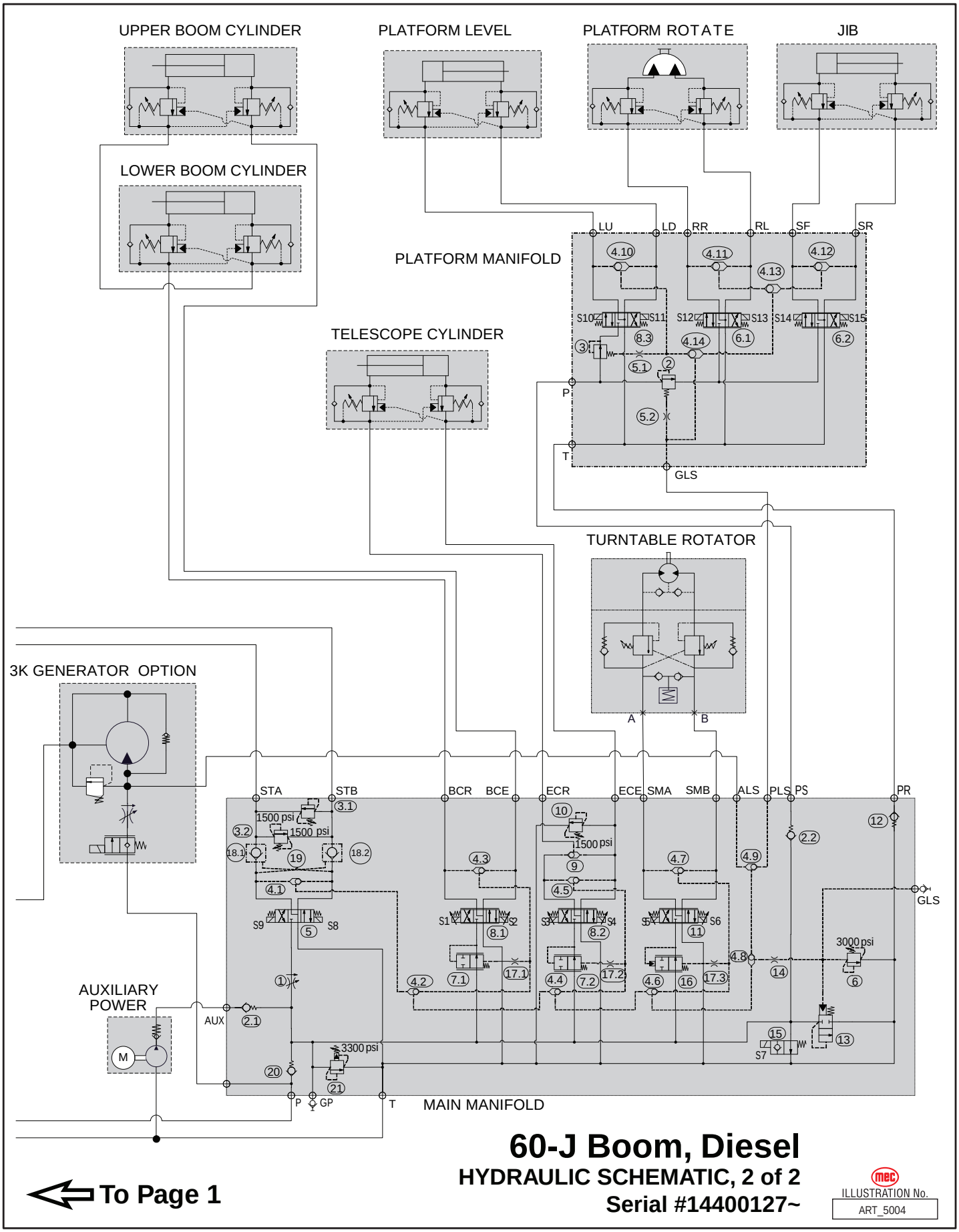
HYDRAULIC SCHEMATIC, 1 of 2

Serial #14400127~

ILLUSTRATION No.
ART_5003

To Page 2

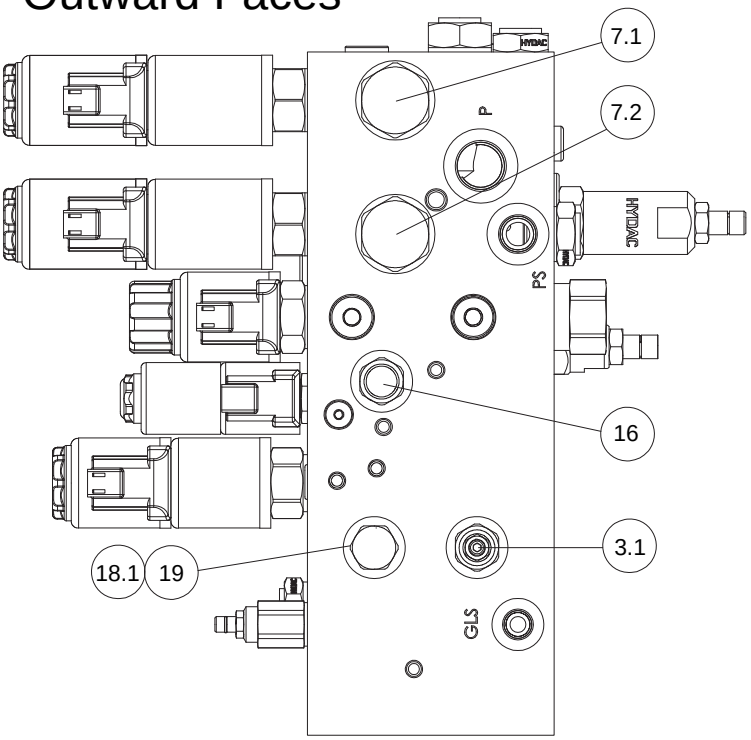
Hydraulic Schematic, Serial #14400127~, Part 2



To Page 1

Primary Functions Manifold, Serial #14400127~, Part 1

Outward Faces



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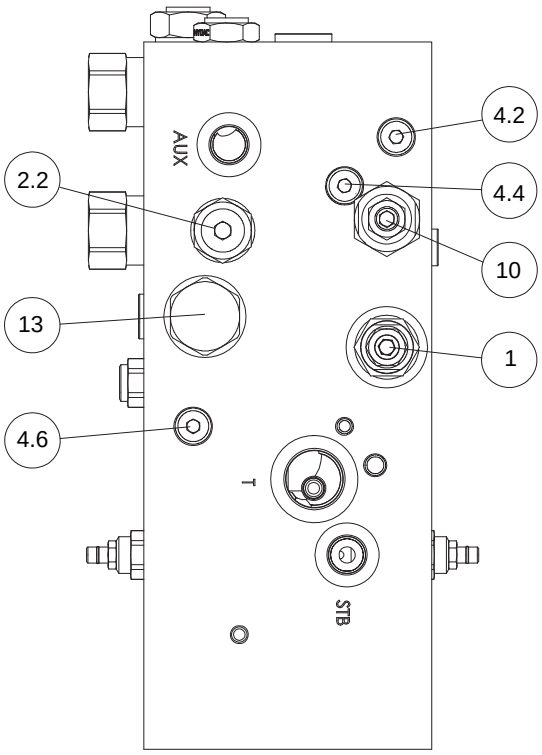

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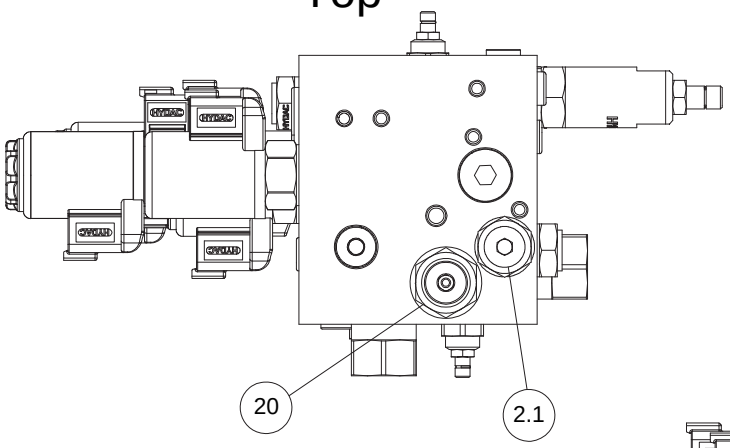

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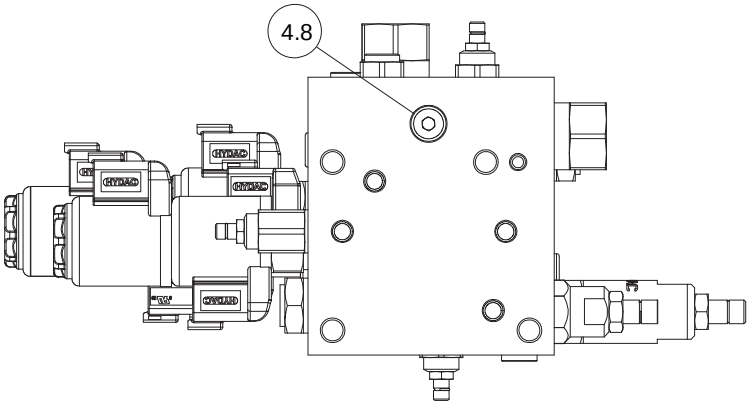


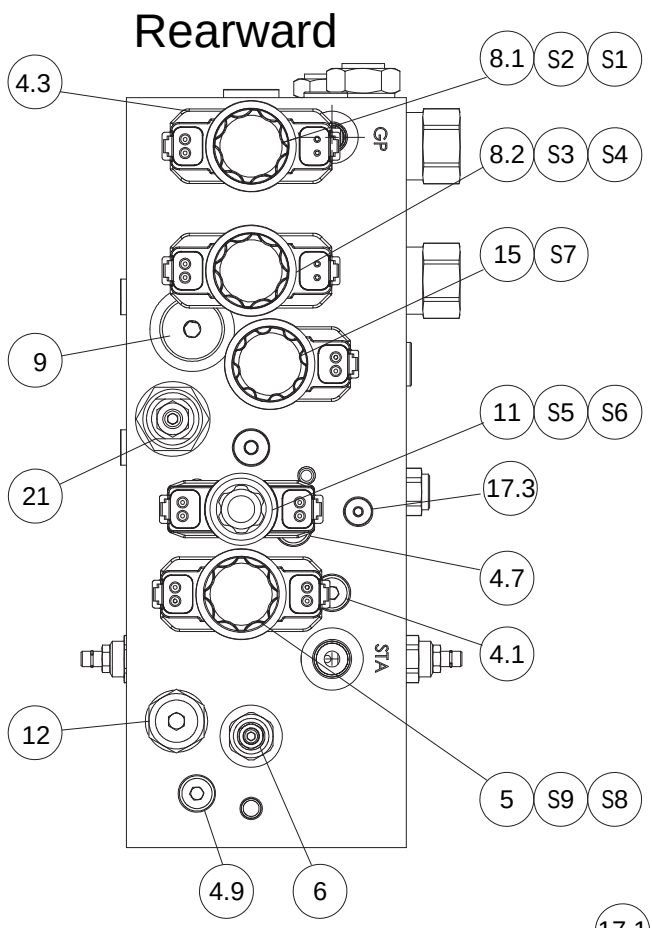
60-J Boom, Diesel

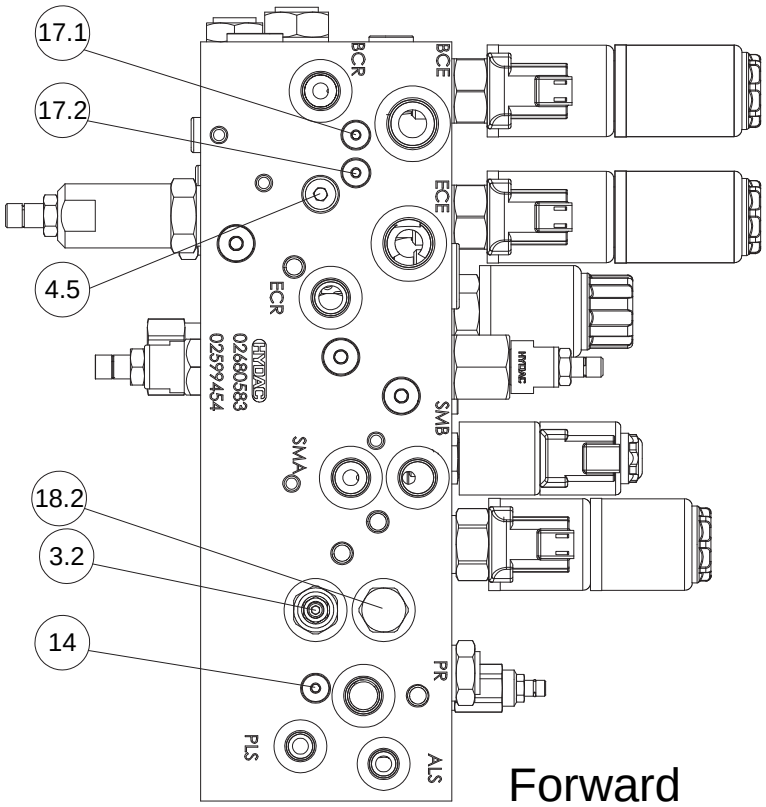
Functions Manifold Valves, 1 of 2

Serial #14400127~

ILLUSTRATION No.
ART_5005

Primary Functions Manifold, Serial #14400127~, Part 2





1	PRIORITY VALVE, STEER
2.1	CHECK VALVE, AUX PUMP
3.1 – 3.2	CROSS PORT RELIEF VALVES, STEER
4.1 – 4.9	SHUTTLE VALVE, LOAD SENSE
5	VALVE, 3-POS, 4 WAY, STEER
6	RELIEF VALVE, MAIN
7.1	FLOW SHARE VALVE
7.2	FLOW SHARE VALVE
8.1	3-POS, 4 WAY VALVE, BOOM UP/DOWN
8.2	3-POS, 4 WAY VALVE, BOOM EXT/RET
9	SHUTTLE VALVE, EXTEND REGENERATE
10	RELIEF VALVE, BOOM EXTEND
11	VALVE, 3-POS, 4-WAY, SWING
12	CHECK VALVE, PLATFORM RETURN
13	FLOW COMPENSATOR VALVE
14	ORIFICE, 0.5MM, LOAD SENSE
15	DUMP VALVE, MAIN
16	FLOW SHARE VALVE
17.7 – 17.3	ORIFICE, 0.5MM FLOW SHARE (¼-20 UNC)
18.1 – 18.2	CHECK VALVE, PILOT OPERATED, STEER
19	PILOT PISTON, STEER P/O CHECKS
20	CHECK VALVE, MAIN PUMP INLET
21	RELIEF VALVE, MAIN
S1 – S9	VALVE COILS 12 VOLT

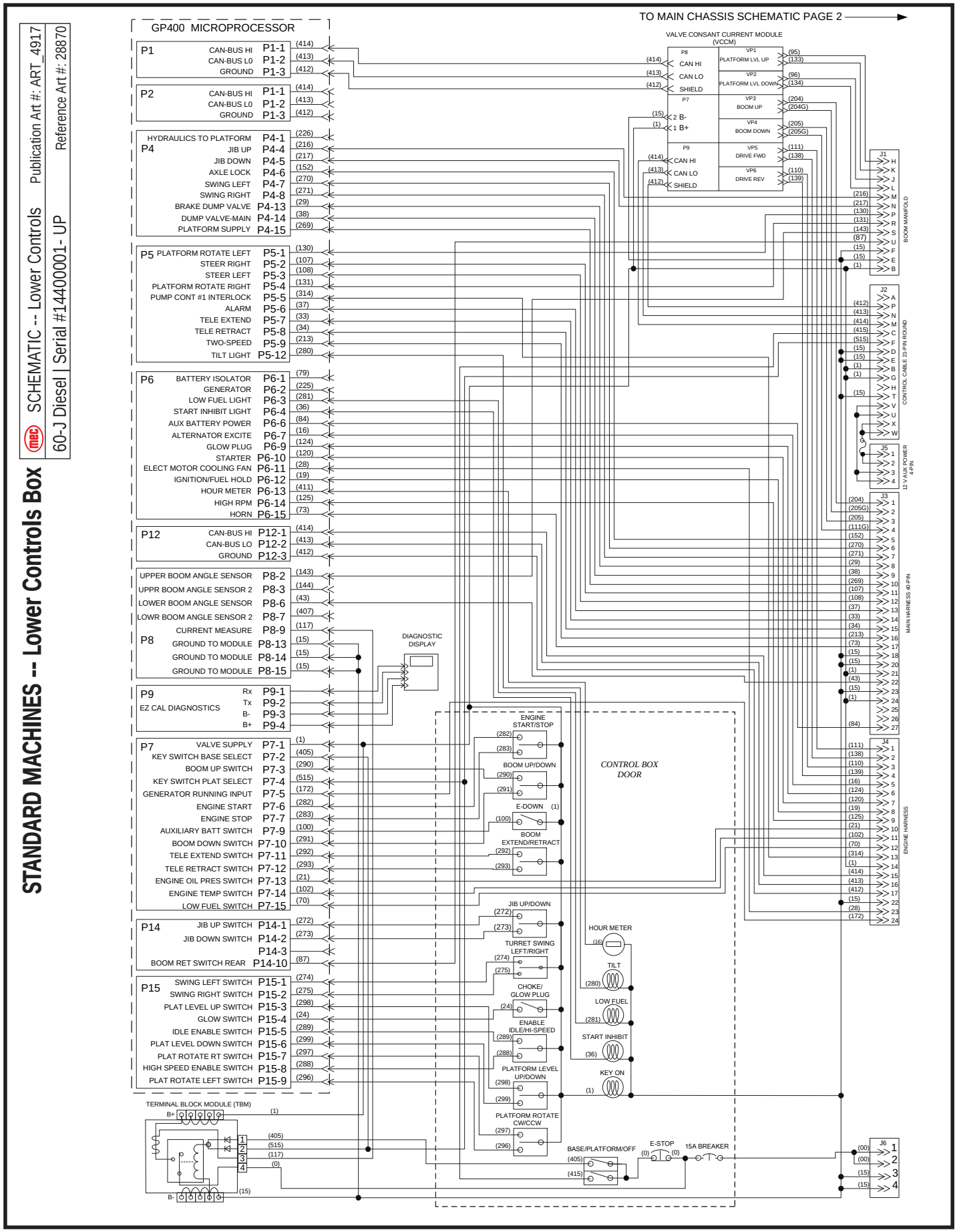
60-J Boom, Diesel

Functions Manifold Valves, 2 of 2

Serial #14400127~

ILLUSTRATION No.
ART_5006

Electric Schematic, Lower Control Box, Standard Machines

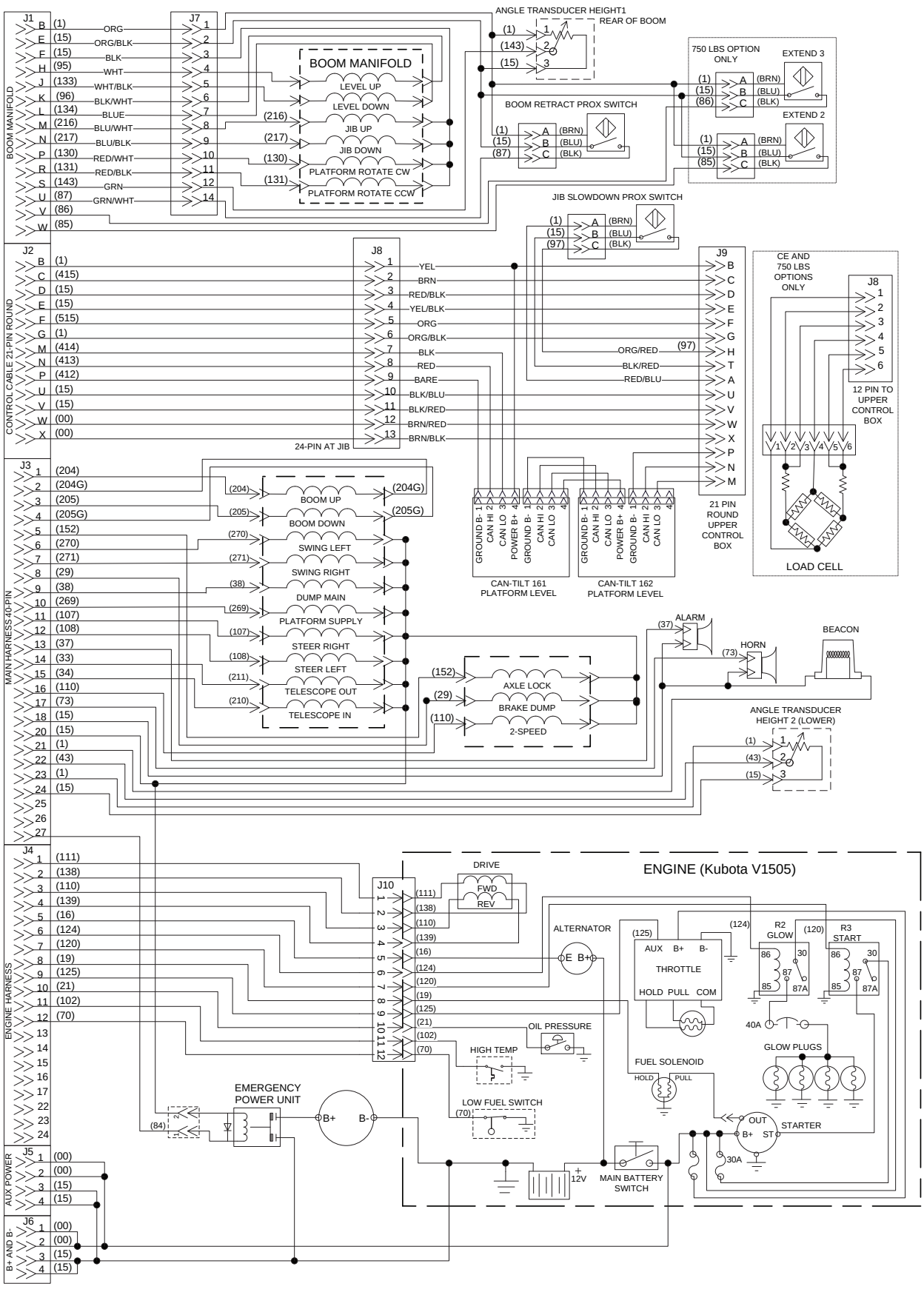


Electric Schematic, Chassis, Standard Machines

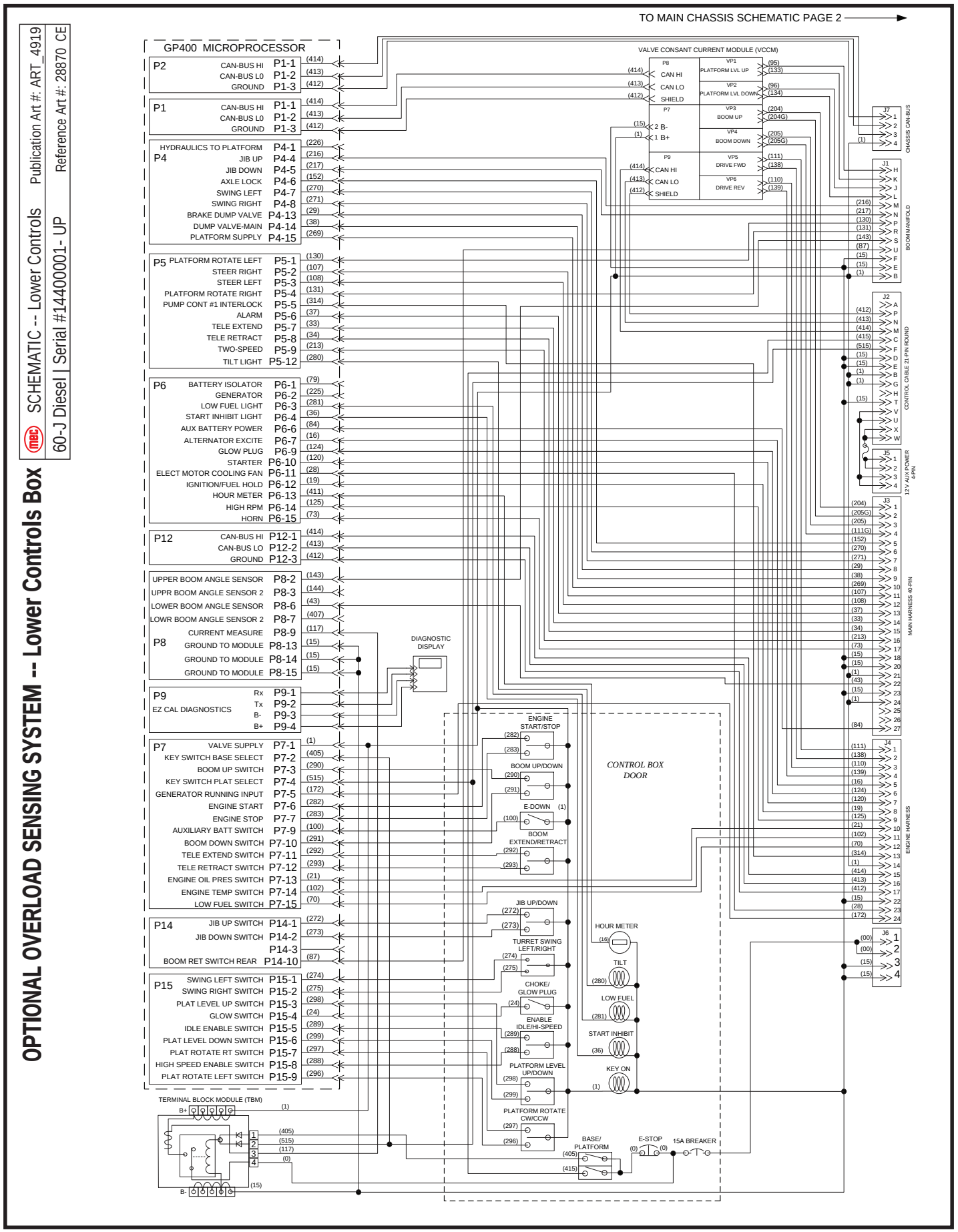
STANDARD MACHINES -- Chassis

SCHEMATIC -- Lower Controls | 60-J Diesel | Serial #14400001- UP

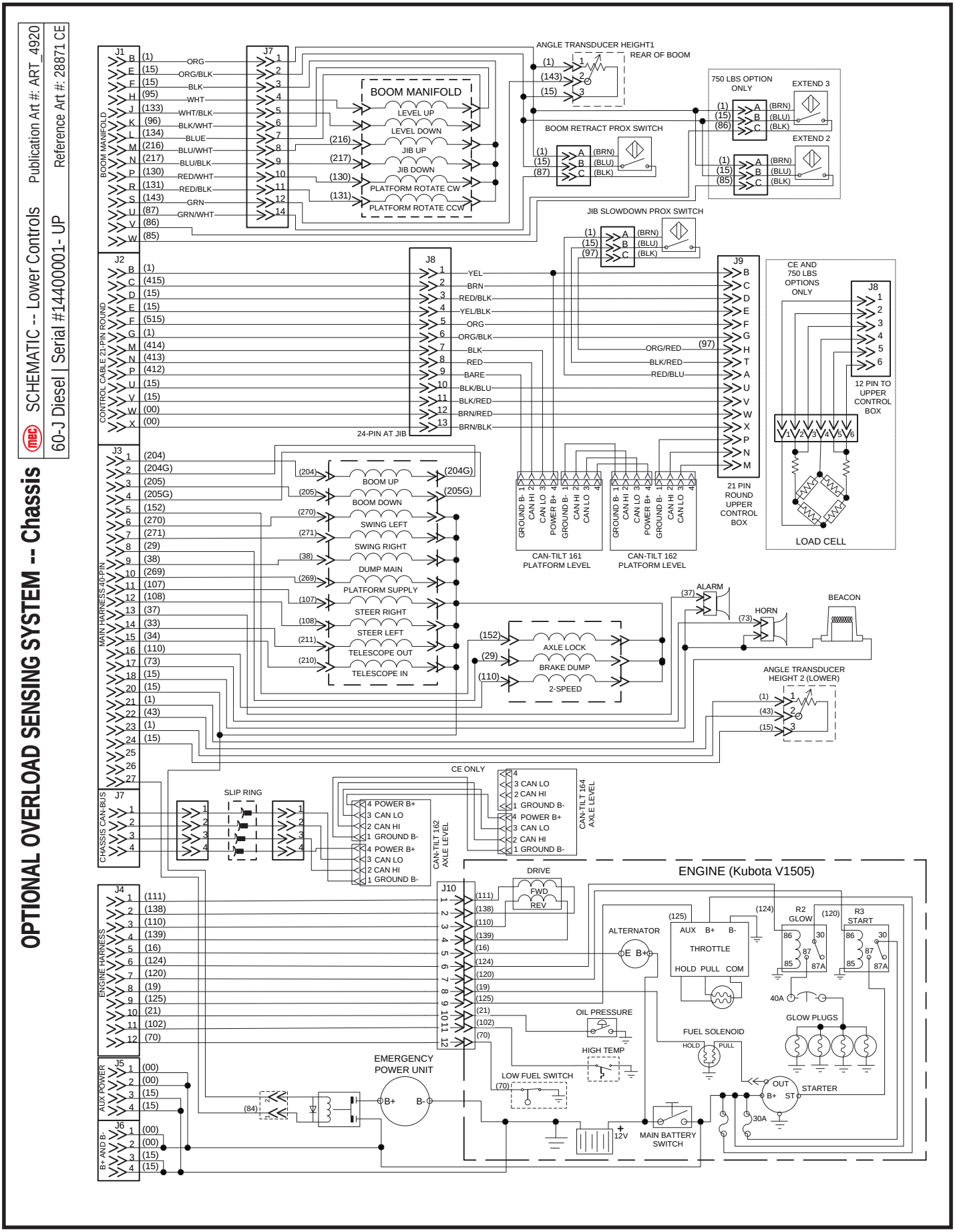
Publication Art #: ART_4918 Reference Art #: 28871



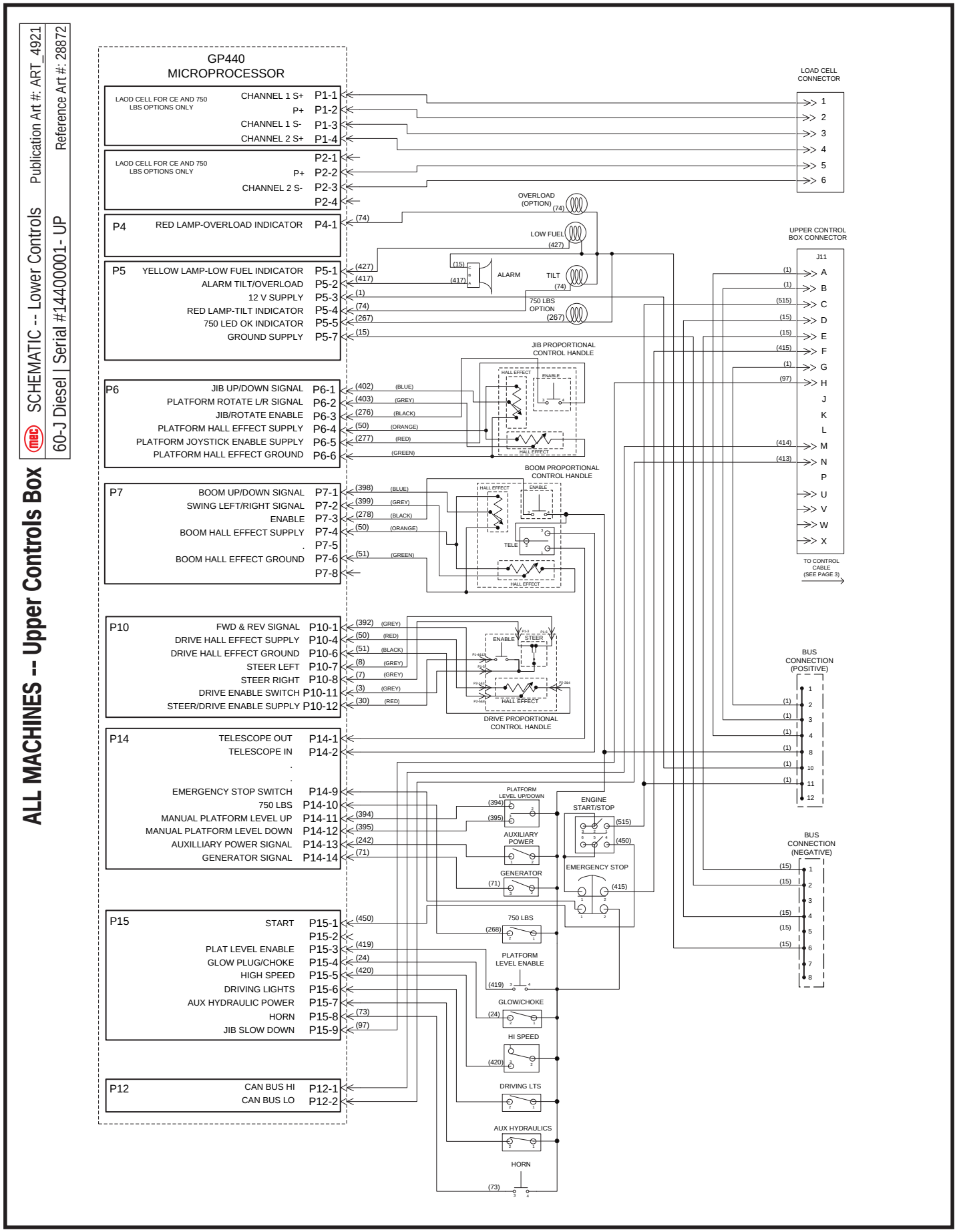
Electric Schematic, Lower Control Box, Optional Overload Sensing System



Electric Schematic, Chassis, Optional Overload Sensing System



Electric Schematic, Upper Controls Box, All Machines



Notes

Parts Introduction

This Parts sections consists of illustrated parts sections and is designed to provide you, the customer, with illustrations and the list of associated parts needed to properly maintain the MEC self-propelled aerial work platform. When used in conjunction with the Service section in this manual and the Operator's 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 Platforms, 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, and the Service and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs.

Upper Controls Box, Part 1

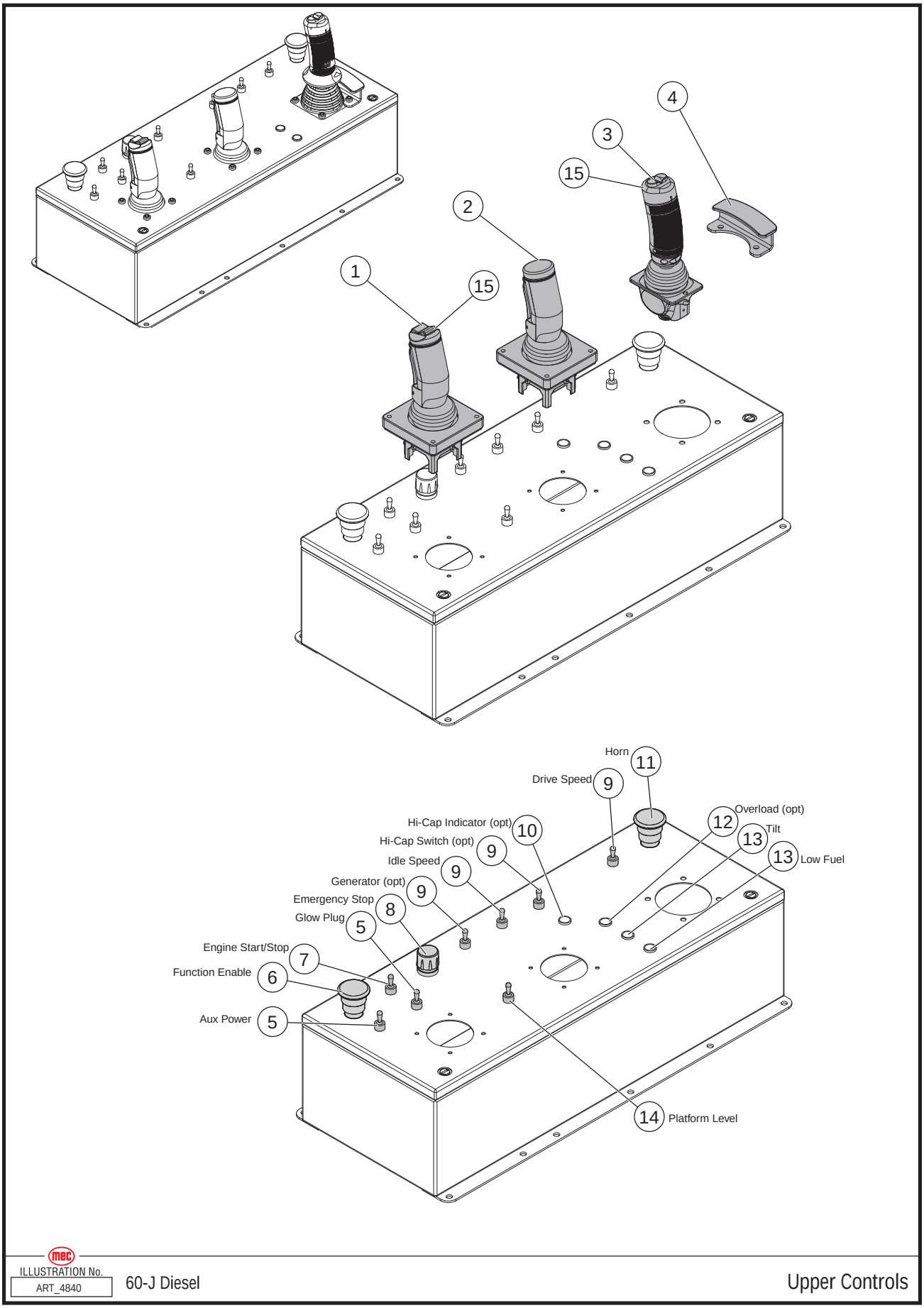


ILLUSTRATION No. ART_4840

60-J Diesel

Upper Controls

Item	Part Number	Description	Qty.
1	93772	To **Serial # 1440117** - J.R. Merritt - Boom Control Handle	1
	94685	From **Serial # 1440118** - PQ Controls - Boom Control Handle	1
--	28868	To **Serial # 14400150** - Adapter Harness	--
2	93773	To **Serial # 1440117** - J.R. Merritt - Platform Control Handle	1
	94686	From **Serial # 1440118** - PQ Controls - Platform Control Handle	1
3	92786	To **Serial # 1440117** - Penny & Giles - Drive Control Handle	1
	94188	To **Serial # 1440117** - J.R. Merritt - Drive Control Handle	1
	94687	From **Serial # 1440118** - PQ Controls - Drive Control Handle	1
4	18494	Palm Rest	1
5	7423	Switch, 2 Position Momentary	2
6	92422	Enable Button	1
7	92427	Switch, 3 Position, Single Momentary	1
8	7800	Emergency Stop Button	1
9	6234	Switch, 2 Position	4
10	90789	Light, Green	1
11	92421	Horn Button	1
12	92254	Light, Red	1
13	92253	Light, Amber	2
14	91954	Switch, 3 Position Momentary	1
15	8456	Boot, Steer Rocker	2

Upper Controls Box, Part 2

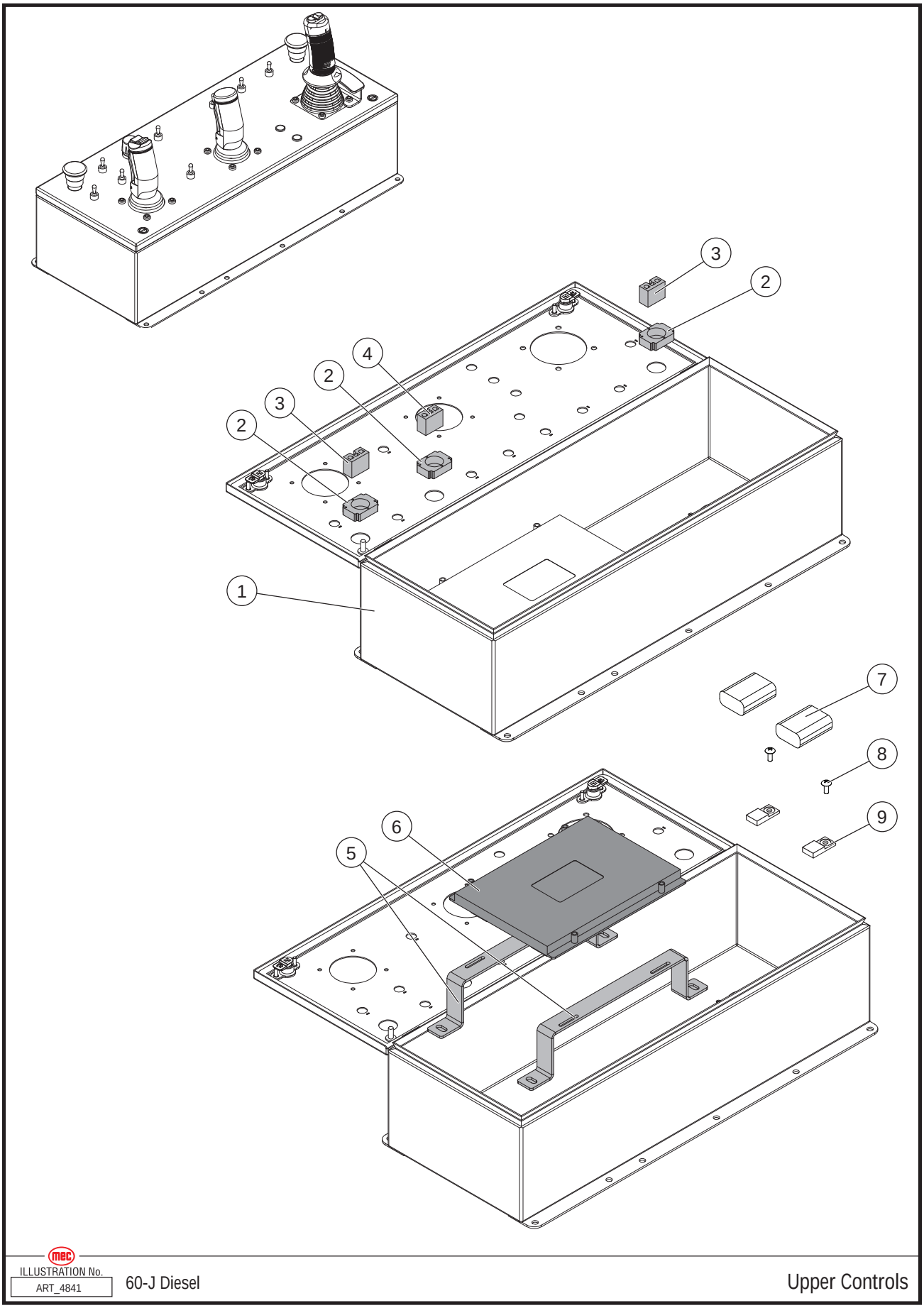


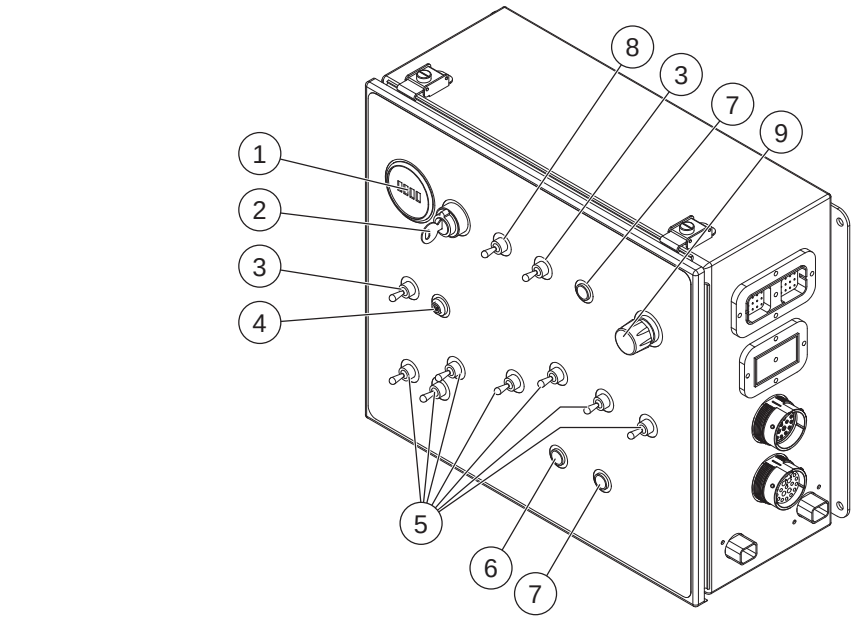
ILLUSTRATION No. ART_4841

60-J Diesel

Upper Controls

Item	Part Number	Description	Qty.
1	22208	Upper Controls Enclosure	1
2	90714	Switch Base	3
3	8082	Contact Block, Normally Closed	2
4	8083	Contact Block, Normally Open	1
5	22429	Bracket	1
6	92027	GP440 Module	1
7	92033	Buss Module	2
8	50191	Screw, THMS #10-32 x .5	2
9	91881	Bus Mount	2

Lower Controls Box



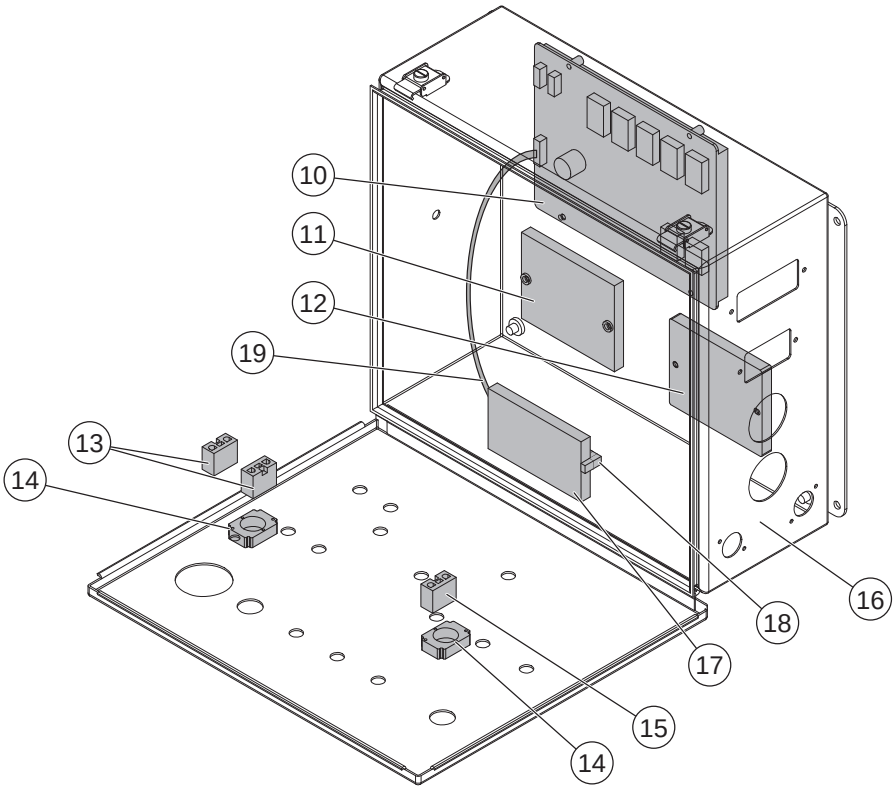


ILLUSTRATION No. ART_4842 60-J Diesel Lower Controls

Item	Part Number	Description	Qty.
1	91704	Hour Meter	1
2	9549	Key Switch	1
3	7423	Switch, 2 Position Momentary	2
4	7235	Circuit Breaker	1
5	91954	Switch, 3 Position Momentary	7
6	92253	Light, Amber	1
7	92254	Light, Red	2
8	92427	Switch, 3 Position, Single Momentary	1
9	7800	Emergency Stop Button	1
10	93900	GP400 Module	1
11	91838	Terminal Block Module	1
12	91950	VCCM Module	1
13	8082	Contact Block, Normally Closed	2
14	90714	Switch Base	2
15	8083	Contact Block, Normally Open	1
16	28696	Lower Controls Enclosure	1
17	92003	Diagnostic Display	1
18	26571	Bracket	1
19	22626	Cable	1

Platform Entries

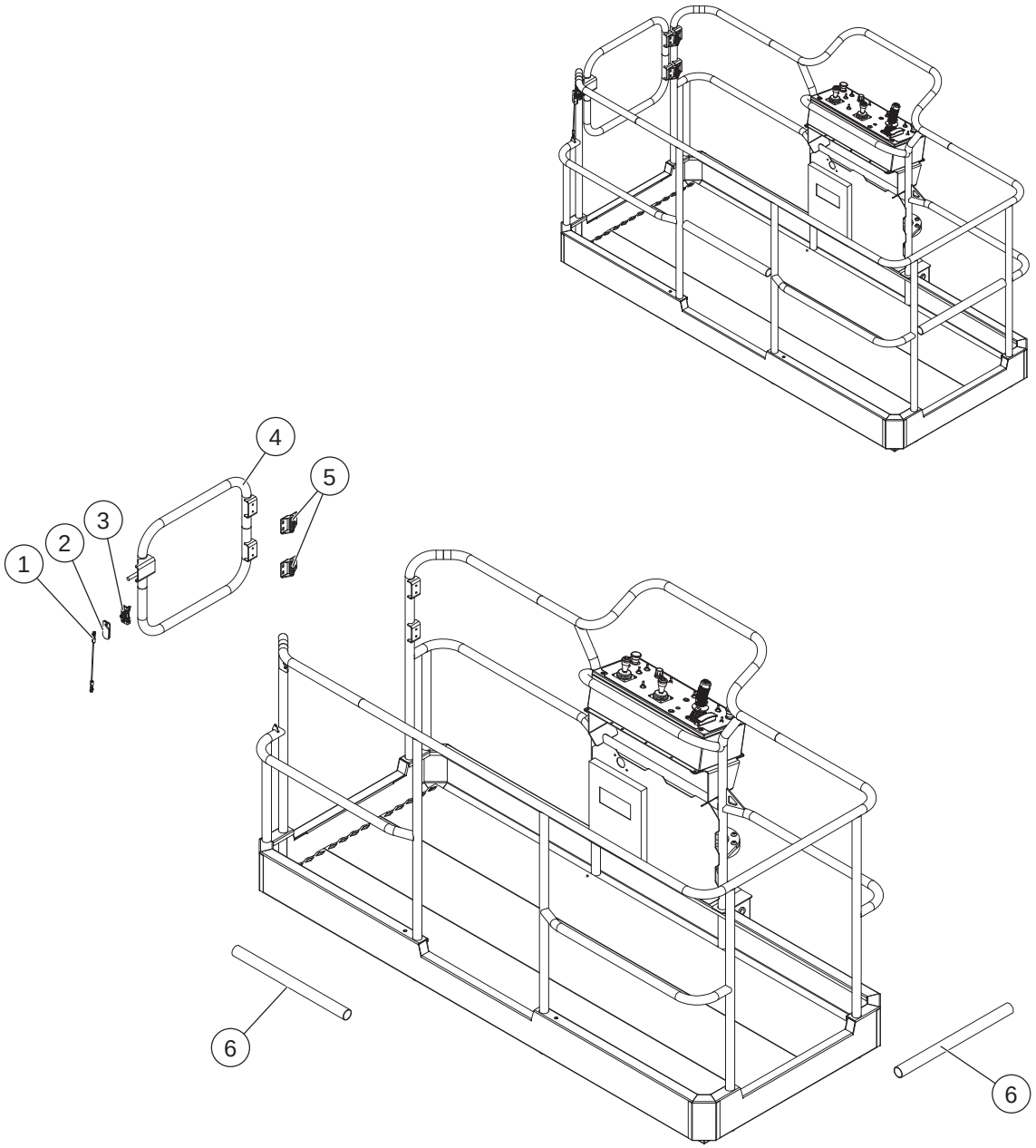


ILLUSTRATION No. ART_4843 60-J Platform Entries

Item	Part Number	Description	Qty.
1	28528	Lanyard	1
2	28530	**OPTION** -- Gate Latch Handle, lanyard alternative	1
3	92302	Gate Latch	1
4	28520	Gate Weldment	1
5	91888	Hinge	2
6	28521	Sliding Lift Gate	2
--	52674	Rail Slide Hose	--

Platform Components

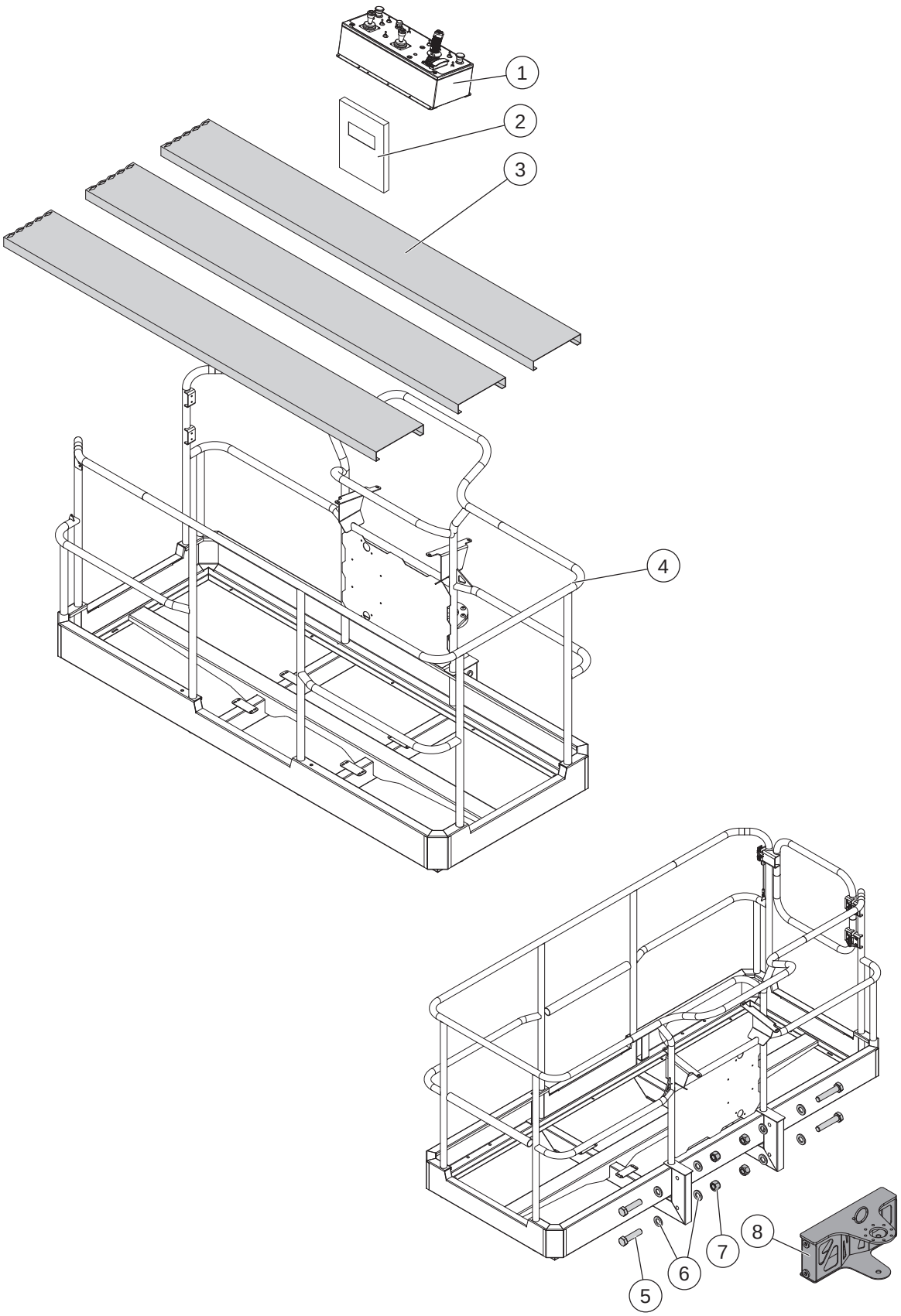


ILLUSTRATION No. ART_4844 60-J Platform Components

Item	Part Number	Description	Qty.
1	REF	Upper Controls -- See Section 21	--
2	8909	Manuals Case	1
3	28697	Floor Panel	3
--	50028	Bolt, M6 x 20	36
--	50000	Washer, M6 Flat	36
--	50047	Nut, M6 Nylock	36
4	28500	Platform Weldment	1
5	53001	Bolt, M20 x 110	4
6	50005	Washer, M20 Std	8
7	50052	Nut, M20 Nylock	4
8	18189	Platform Mount Weldment	1

REF – Reference

Jib Connection

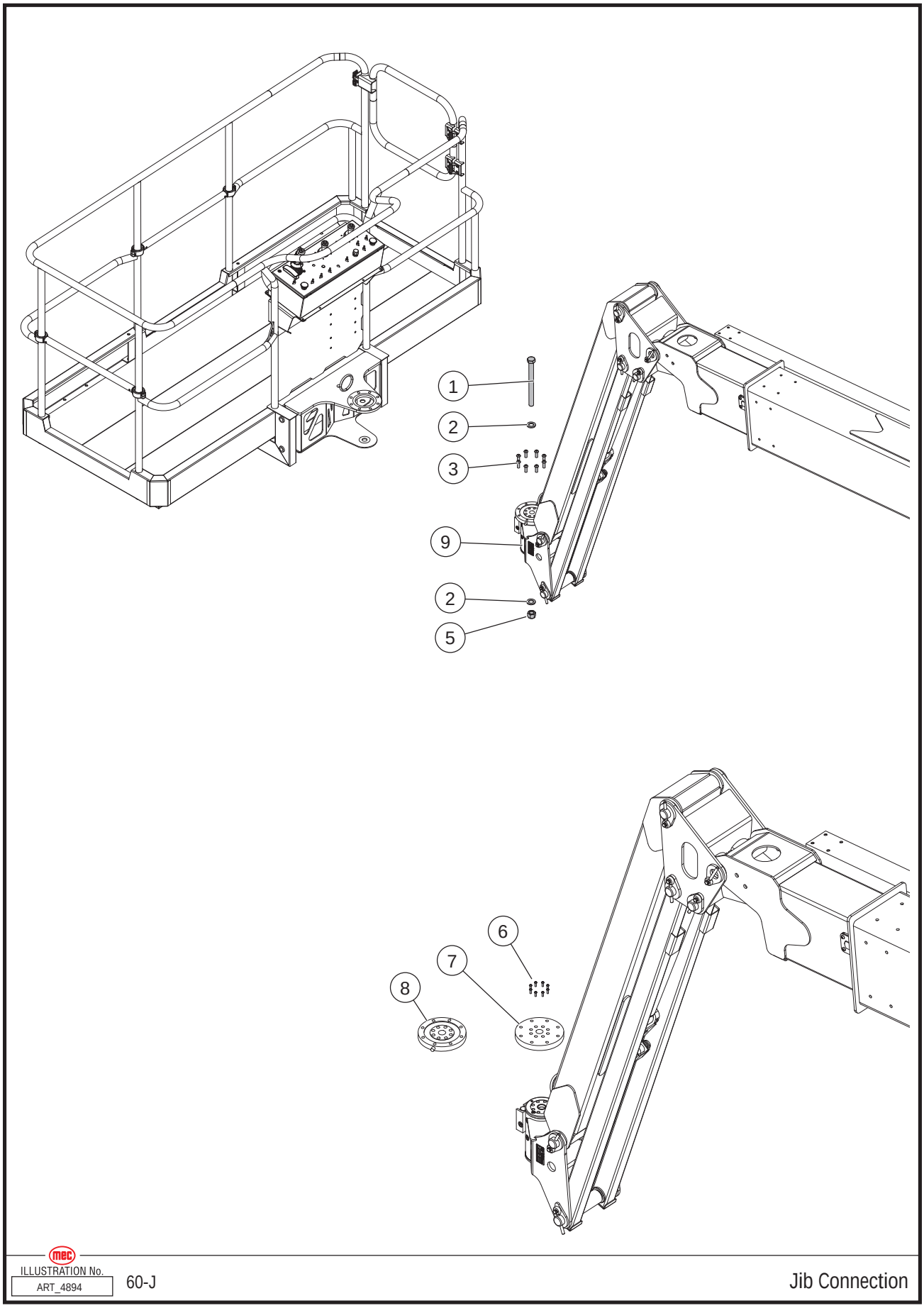


ILLUSTRATION No. ART_4894 60-J Jib Connection

Item	Part Number	Description	Qty.
1	50593	Bolt, M24 x 280	1
2	50255	Washer, M24 Flat	2
3	53013	Button Head Screw, M12 x 35	8
--	50007	Washer, M12 Nordlock	8
4	--	--	--
5	50256	Nut, M24 Nylock	1
6	50378	Socket Head Screw, M10 x 35	8
--	50006	Washer M10 Nordlock	8
All machines **use only** one of following:			
7	28698	**Standard Machines** -- Spacer Plate	1
8	93868	**Machines With High Capacity or Overload Sensing Option(s)** -- Load Cell	1
9	93944	Grommet	1

Platform Options

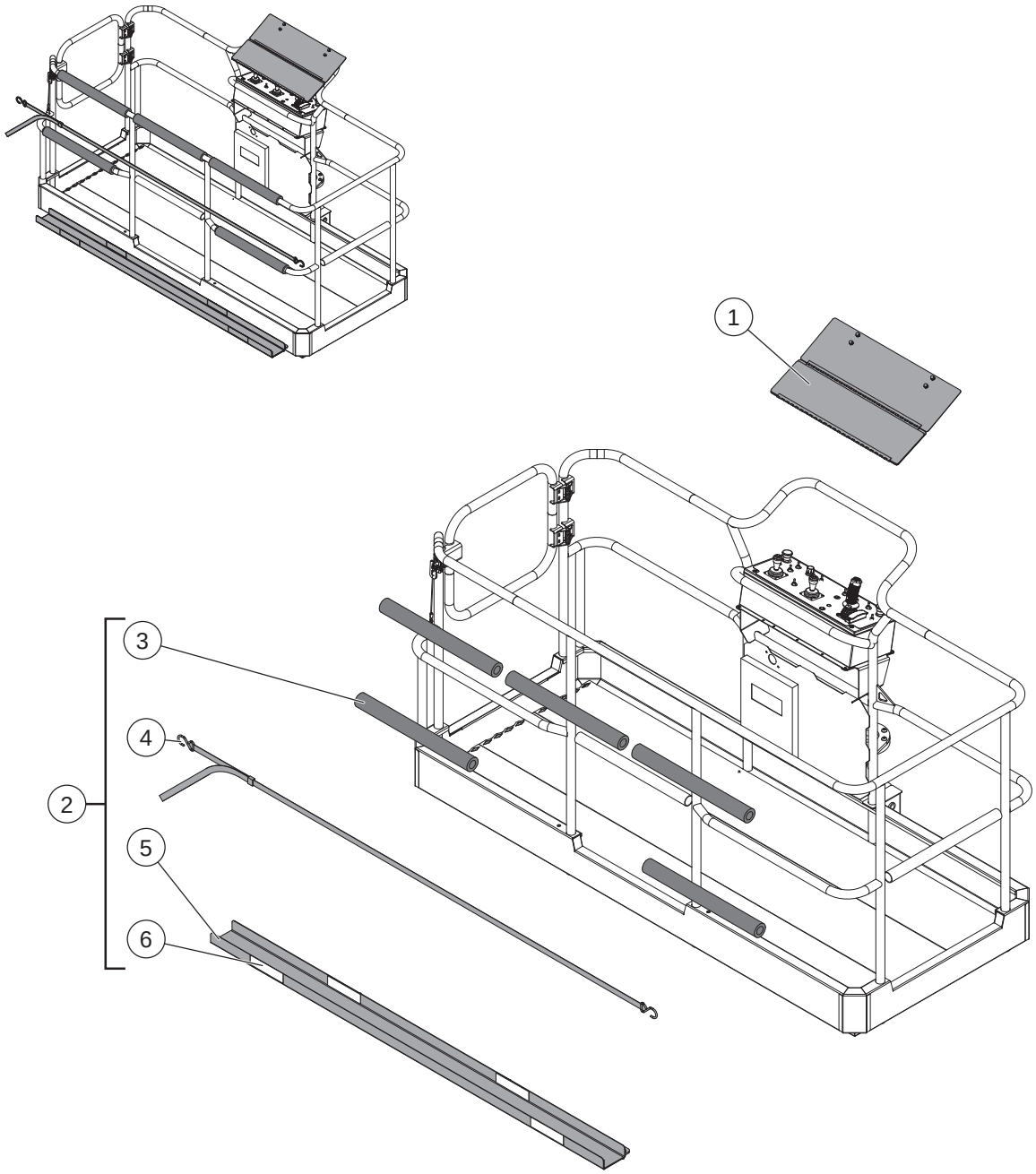


ILLUSTRATION No. ART_4845 60-J Platform Options

Item	Part Number	Description	Qty.
1	28960	Cover, Upper Controls	1
--	92665	U-Clamp, 5/16 x 1-3/8	2
--	50200	Washer, M8 Nordlock	4
--	53020	Nut, 5/16 Acorn	4
2	28950	Sheet Materials Rack Kit	--
3	28535	Guard Rail Pads	5
4	93963	Strap	1
5	28540	Sheet Materials Rack	1
6	93920	Decal, Warning, Sheet Material Rack Self Weight	4
--	28533	Bottom Wear Strip	1
--	28534	Front Wear Strip	1
--	50042	Bolt, M12 x 35	8
--	50003	Washer, M12 Std	16
--	50054	Nut, M12 Nylock	8

Boom/Chassis Installation

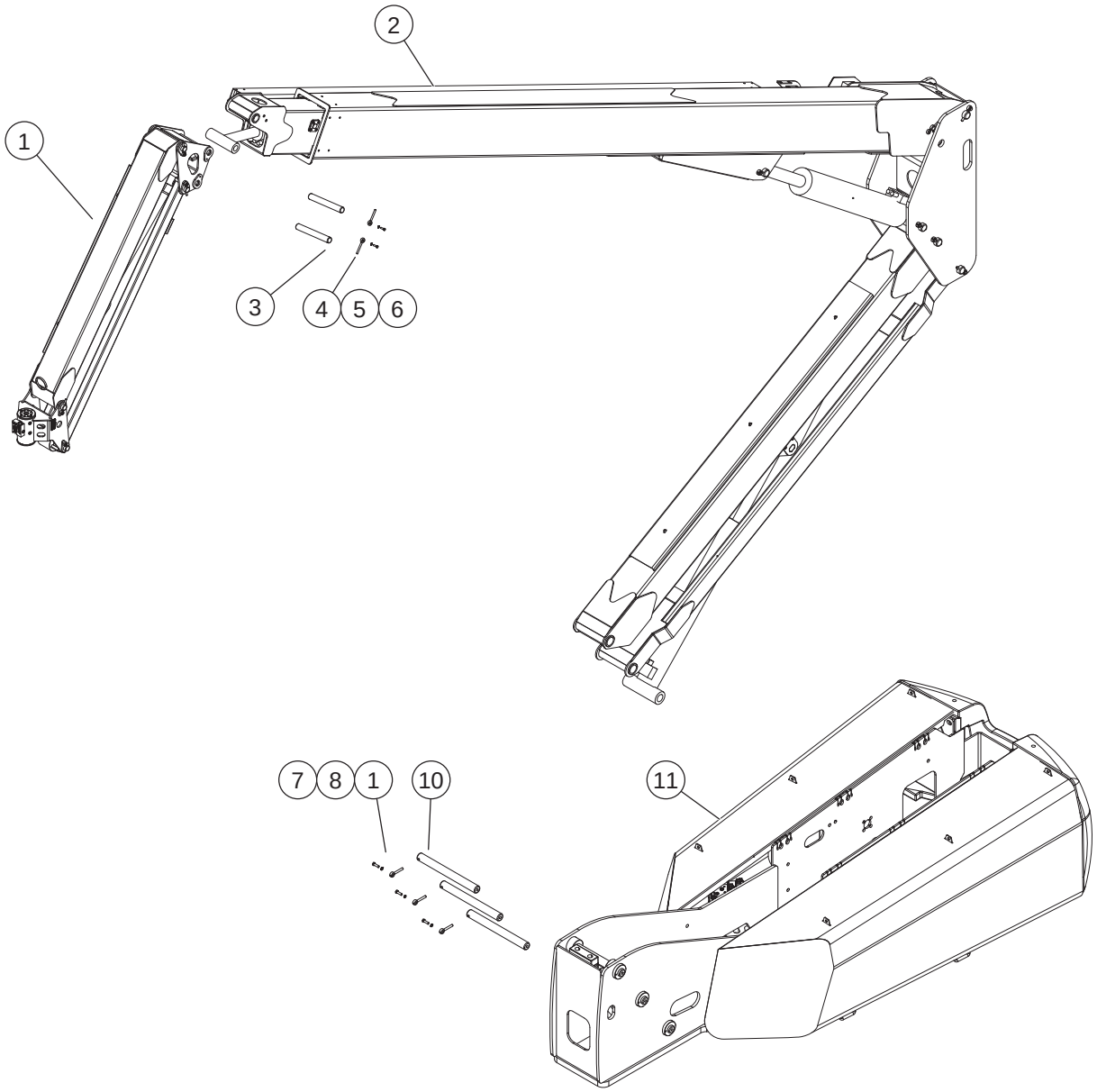


ILLUSTRATION No. ART_4846 60-J Boom Installation

Item	Part Number	Description	Qty.
1	28915	Jib Assembly	1
2	REF	Boom Assembly	--
3	28607	Pin	2
4	18151	Pin Retainer	2
5	50200	Washer, M8 Nordlock	2
6	50032	Bolt, M8 x 30	2
7	18152	Retainer Pin	3
8	50236	Bolt, M12 x 40	3
9	50007	Washer, M12 Nordlock	3
10	28601	Pin	3
11	REF	Turntable Assembly	--

REF – Reference

Boom & Riser

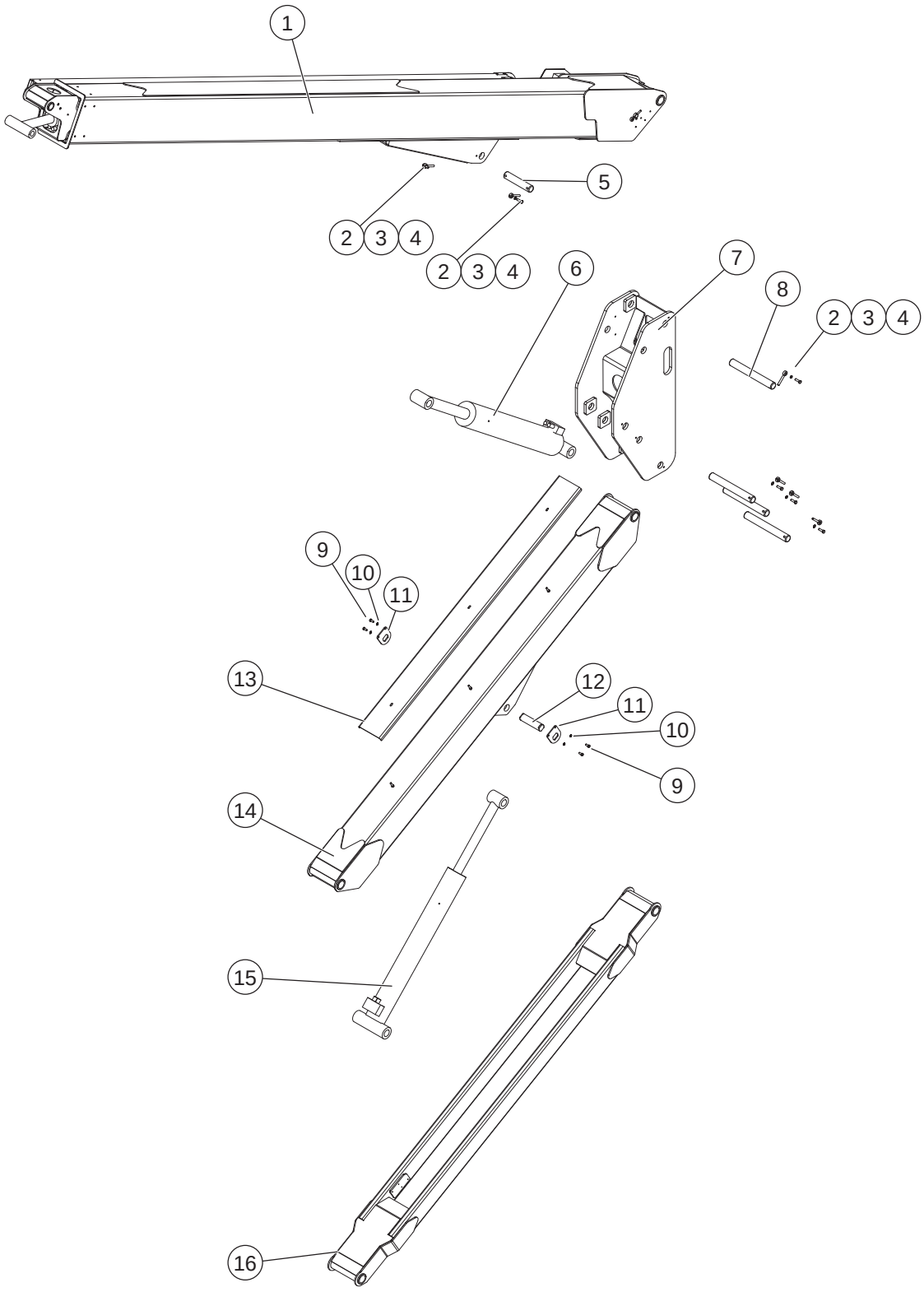


ILLUSTRATION No. ART_4847 60-J Boom & Riser

Item	Part Number	Description	Qty.
1	REF	Main Boom	--
2	18152	Retainer Pin	6
3	50236	Bolt, M12 x 40	6
4	50007	Washer, M12 Nordlock	6
5	28604	Pin	1
6	REF	Upper Lift Cylinder -- See Section 25	--
7	28300	Post Weldment	1
8	28603	Pin	4
9	50033	Bolt, M10 x 25	4
10	50006	Washer, M10 Nordlock	4
11	28647	Retainer Plate	2
12	28602	Pin	1
13	28637	Hose & Cable Cover	1
14	28370	Riser Boom Weldment	1
15	REF	Lower Lift Cylinder -- See Section 25	--
16	28380	Tension Link	1

REF – Reference

Main Boom Components

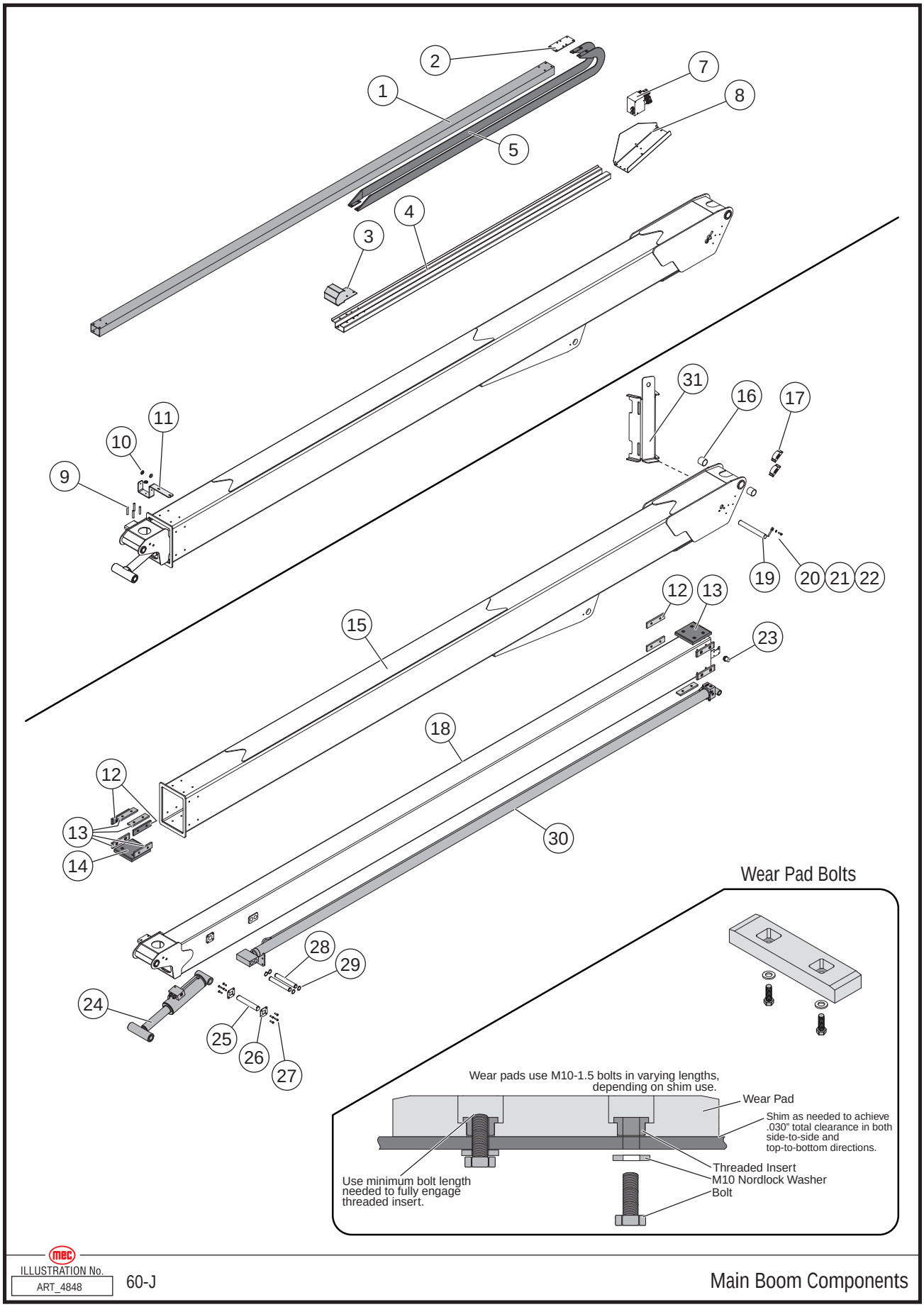


ILLUSTRATION No. ART_4848 60-J Main Boom Components

Item	Part Number	Description	Qty.
1	28642	Cable Track Tube	1
2	28749	Connector Plate	1
3	24379	Hose Wrap Forming	1
4	28641	Cable Track Forming	1
5	93658	Cable Track	1
6	--	--	--
7	REF	Platform Functions Manifold -- See Section 25	1
8	28694	Bracket	1
9	22386	Spacer	4
10	16788	Slide Bumper	3
11	28748	Bracket	1
Boom sections must be shimmed to a total clearance of .030 inch (.762mm) in both side-to-side and top to-bottom directions when the boom is in its tightest section.			
12	28772	Wearpad, Offset	2
13	11861979	Wearpad	10
--	22224	Wearpad Shim (0.02 in / .5mm)	As Req.
--	11861977	Wearpad Shim (0.04 in / 1mm)	As Req.
--	28775	Wearpad Shim (0.06 in / 1.5mm)	As Req.
--	11861981	Wearpad Shim (0.12 in / 3mm)	As Req.
--	11861982	Wearpad Shim (0.20 in / 5mm)	As Req.
--	11861983	Wearpad Shim (0.40 in / 10mm)	As Req.
Wear Pad Bolts Wear pads use M10-1.5 bolts in varying lengths, depending on shim use. Use minimum bolt length needed to fully engage threaded insert. Wear pad bolts must be installed with M10 Nordlock washers.			
--	50033	Bolt, M10 x 25	--
--	50034	Bolt, M10 x 30	--
--	50332	Bolt, M10 x 35	--
--	50035	Bolt, M10 x 40	--
--	50036	Bolt, M10 x 50	--
--	50021	Bolt, M10 x 55	--
--	50006	Washer, M10 Nordlock	32
14	28765	Wearpad, Wide	2
15	28330	Outer Boom Tube	1
16	92110	Bearing	2
17	90844	EZ-Fit Angle Transducer	1*
18	28360	Inner Boom Tube	1
19	19119	Pin	1
20	18151	Pin Retainer	4
21	50200	Washer, M8 Nordlock	4
22	50032	Bolt, M8 x 30	4
23	92032	Proximity Sensor	1
24	REF	Platform Level Cylinder -- See Section 25	1
25	28606	Pin, Platform Level Cylinder	1
26	28644	Pin Retainer Plate	2
27	50414	Button Head Screw, M8 x 30	8
28	28605	Pin, Extend Cylinder	2
29	93695	Retaining Ring	4
30	REF	Boom Extend Cylinder -- See Section 25	1
31	28347	Bracket, Cable Guide, Forming	1

*2 present on machines equipped with optional Overload Sensing System.
As Req. – As Required REF – Reference

Jib Components

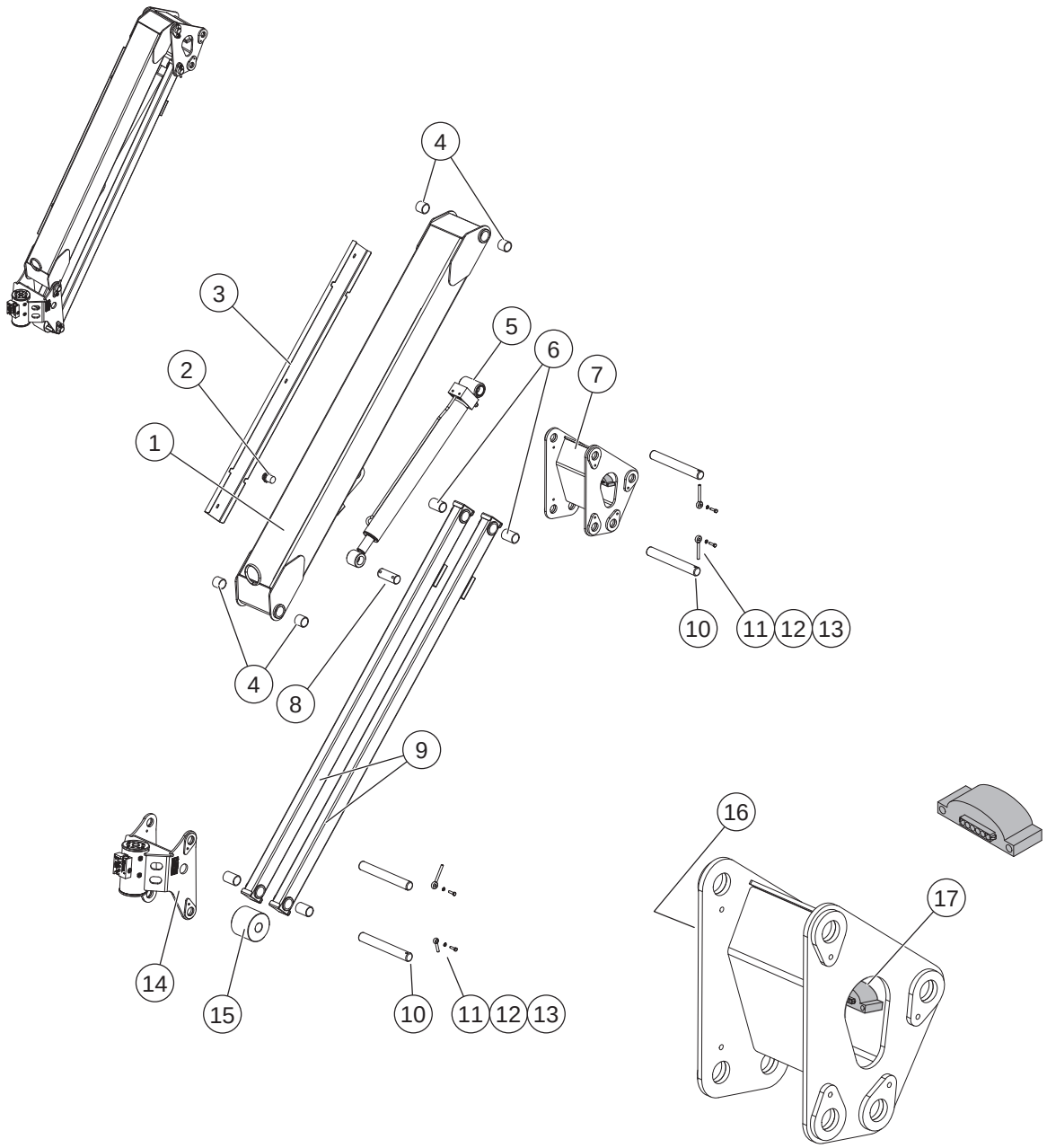


ILLUSTRATION No. ART_4849 60-J Jib Components

Item	Part Number	Description	Qty.
1	28400	Jib Tube Weldment	1
2	92032	Proximity Sensor	1
3	28646	Hose/Cable Cover	1
4	92360	Bearing	4
5	REF	Jib Cylinder -- See Section 25	1
6	93740	Bearing	4
7	28420	Jib Linkage Weldment	1
8	28608	Pin, Jib Cylinder	1
9	28410	Compression Link	2
10	28607	Pin, Bell Crank/Platform Rotator	4
11	18151	Pin Retainer	4
12	50200	Washer, M8 Nordlock	4
13	50032	Bolt, M8 x 30	4
14	REF	Platform Rotator -- See Section 25	1
15	28716	Roller /Spacer	1
16	92201	CAN-TILT 161	1
17	92203	CAN-TILT 163	1

REF – Reference

Front Axle Installation

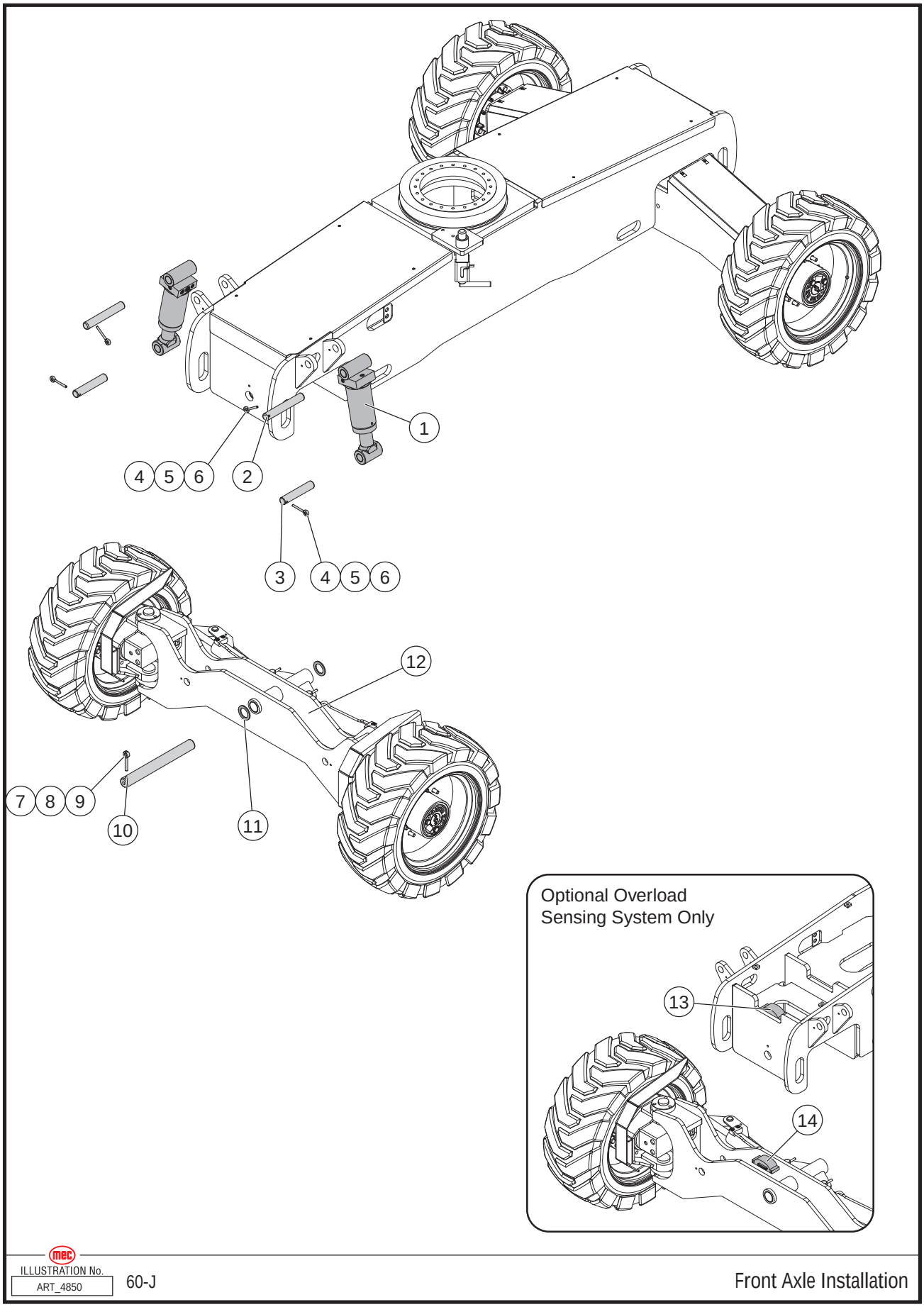


ILLUSTRATION No. ART_4850 60-J Front Axle Installation

Item	Part Number	Description	Qty.
1	REF	Axle Cylinder -- See Section 25	2
2	28600	Pin	2
3	18075	Pin	2
4	18151	Pin Retainer	4
5	50200	Washer, M8 Nordlock	4
6	50032	Bolt, M8 x 30	4
7	18152	Pin Retainer	1
8	50236	Bolt, M12 x 40	1
9	50007	Washer, M12 Nordlock (not shown)	1
10	18405	Pin	1
11	92039	Thrust washer	2
12	28903	Front Axle Assembly	1
Option Overload Sensing System only			
13	92202	CAN-TILT 162	1
14	92204	CAN-TILT 164	1
	50000	Washer, M6 Std	4
	50134	Bolt, M6 x 60	4

REF – Reference

Rear Axle Installation - To Serial #14400260

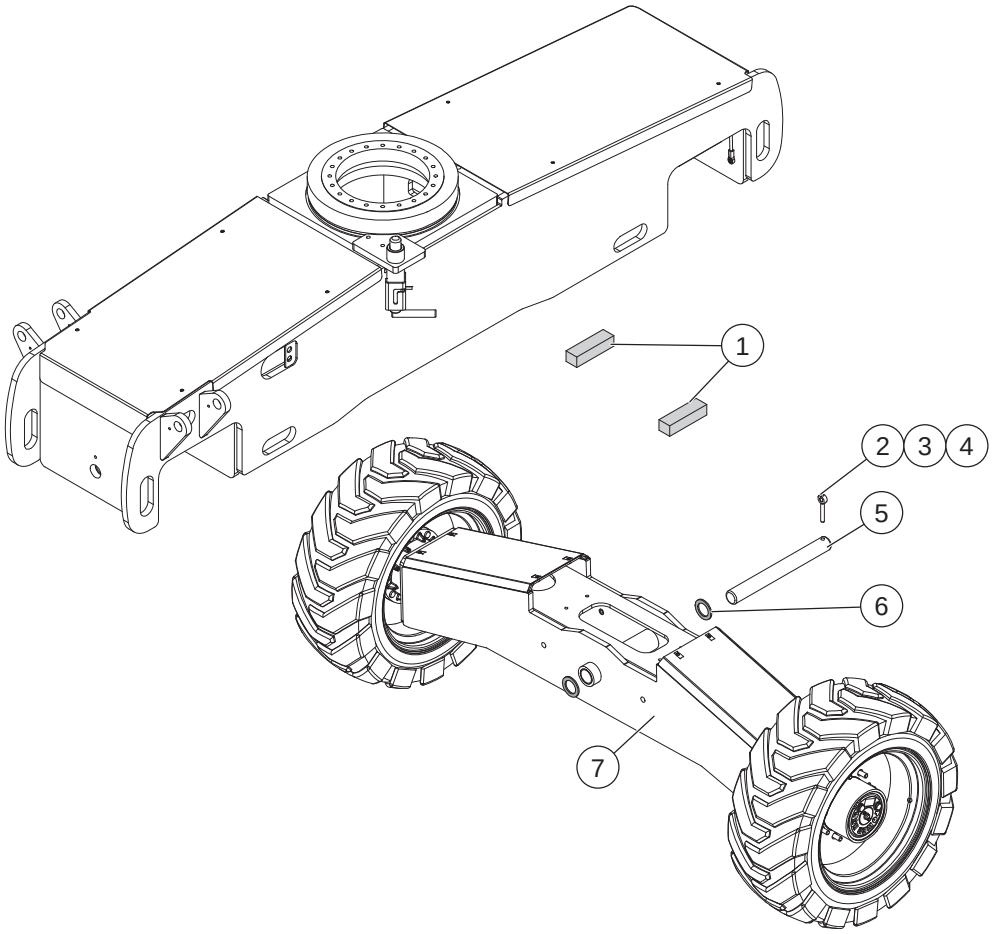


ILLUSTRATION No. ART_4851 60-J Rear Axle Installation

Item	Part Number	Description	Qty.
1	28612	Axle Stop Pad	2
--	50332	Bolt, M10 x 35	4
--	50006	Washer, M10 Nordlock	4
--	22225	Shim, .02 -- Equal numbers on each side until axle is tight against chassis	As Req.
2	18152	Pin Retainer	1
3	50236	Bolt, M12 x 40 (not shown)	1
4	50007	Washer, M12 Nordlock (not shown)	1
5	18045	Pin	1
6	92039	Thrust Washer	2
7	28904	Rear Axle Assembly	1

As Req. – As Required

Front Axle Components

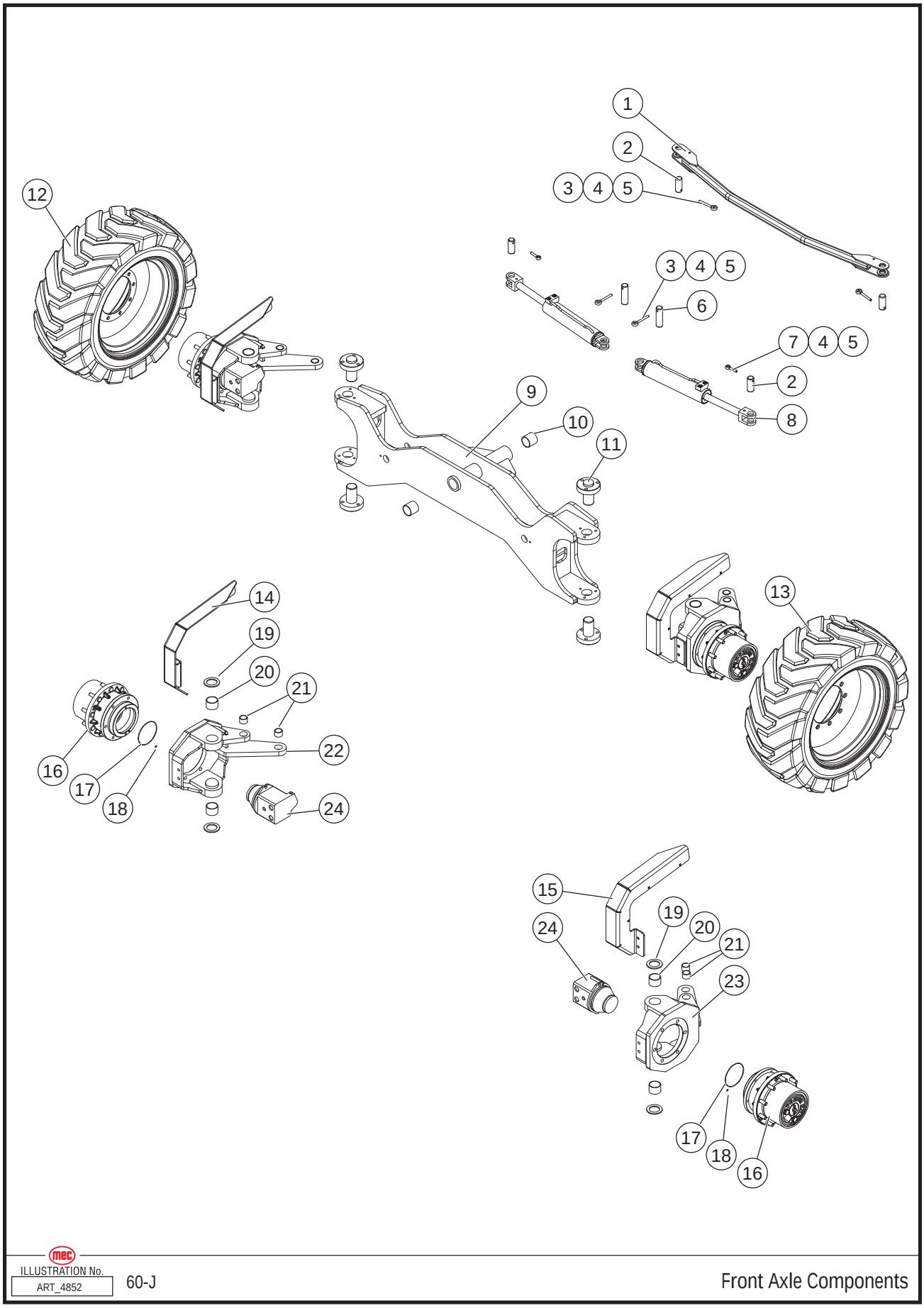


ILLUSTRATION No. ART_4852 60-J Front Axle Components

Item	Part Number	Description	Qty.
1	28140	Tie Rod	1
2	22215	Pin	4
3	18151	Pin Retainer	4
4	50200	Washer, M8 Nordlock	6
5	50032	Bolt, M8 x 30	6
6	18051	Pin	2
7	18165	Pin Retainer	2
8	REF	Steering Cylinder	2
9	28110	Front Axle Weldment	1
10	92110	Bearing	2
11	19124	Yoke Pin	4
12	93559	Wheel/Tire Assembly, Right Side, Foam Filled	1
13	93560	Wheel/Tire Assembly, Left Side, Foam Filled	1
14	22209	Hose Guard, Right Side	1
15	22210	Hose Guard, Left Side	1
16	93624	Planetary Gear Hub	2
17	92166	O-Ring	2
18	92042	O-Ring, Brake Port	2
19	92039	Thrust Washer	4
20	92018	Bearing	4
21	92019	Bushing	4
22	28130	Steering Yoke, Right Side	1
23	28120	Steering Yoke, Left Side	1
24	REF	Wheel Motor -- See Section 25	2

REF – Reference

Rear Axle Components

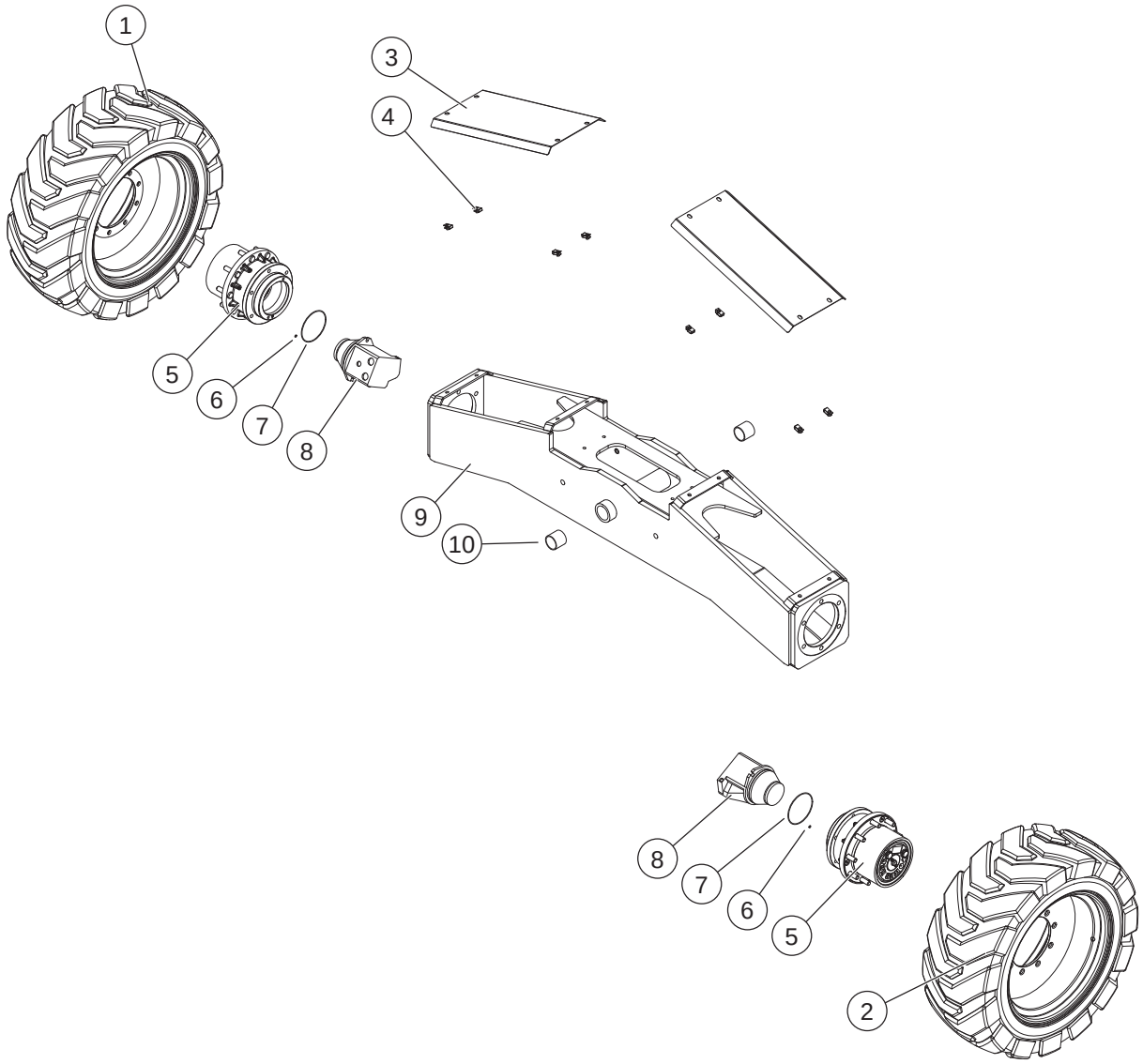


ILLUSTRATION No. ART_4853 60-J Rear Axle Components

Item	Part Number	Description	Qty.
1	93559	Wheel/Tire Assembly, Right Side, Foam Filled	1
2	93560	Wheel/Tire Assembly, Left Side, Foam Filled	1
3	28611	Cover Plate	2
4	92098	Clip Nut	8
5	93624	Planetary Gear Hub	2
6	92042	O-Ring, Brake Port	2
7	92166	O-Ring	2
8	REF	Wheel Motor -- See Section 25	2
9	28100	Rear Axle Weldment	1
10	92110	Bearing	2

REF – Reference

Hydraulic Components

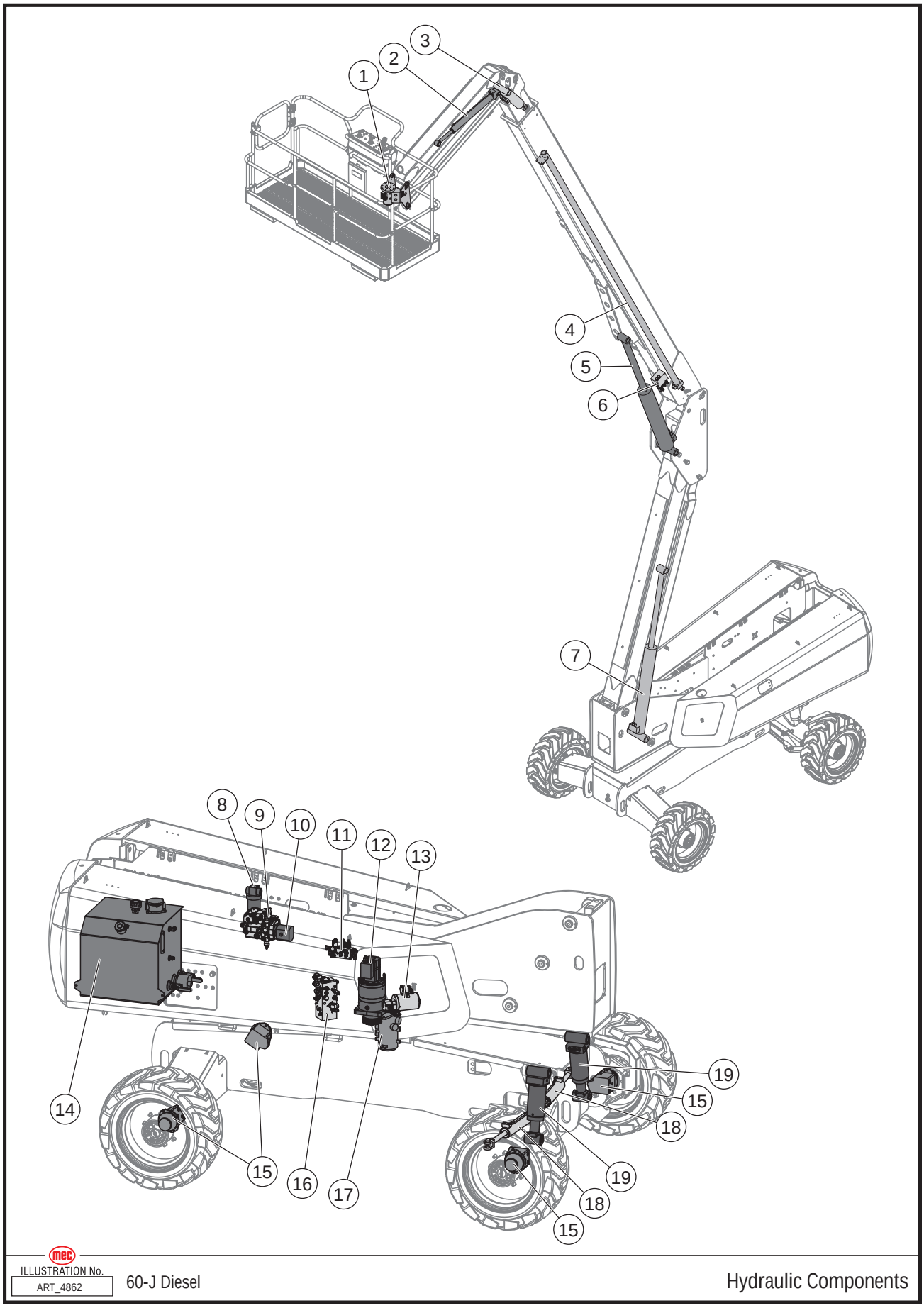


ILLUSTRATION No. ART_4862

60-J Diesel

Hydraulic Components

Item	Part Number	Description	Qty.
1	93830	Platform Rotator	1
2	93879	Jib Cylinder	1
3	28398	Platform Level Cylinder	1
4	28397	Boom Extend Cylinder	1
5	28396	Upper Boom Lift Cylinder	1
6	REF	Platform Functions Manifold	1
7	28395	Lower Boom Lift Cylinder	1
8	92072	Charge Filter Assembly	1
9	93339	Drive Pump	1
10	93232	Main Functions Pump	1
11	28923	Brake/Axle/2-Speed Manifold	1
12	93647	Turntable Rotator	1
13	17973	Auxiliary Power Unit	1
14	28909	Hydraulic Fluid Reservoir	1
15	92514	Wheel Motor	4
16	REF	Main Functions Manifold	1
17	93651	Rotary Manifold	1
18	18070	Steer Cylinder	2
19	22315	Axle Cylinder	2

Component Fittings not show or listed on this page.
REF – Reference

Main Functions Manifold Fittings -- ~Serial #14400126

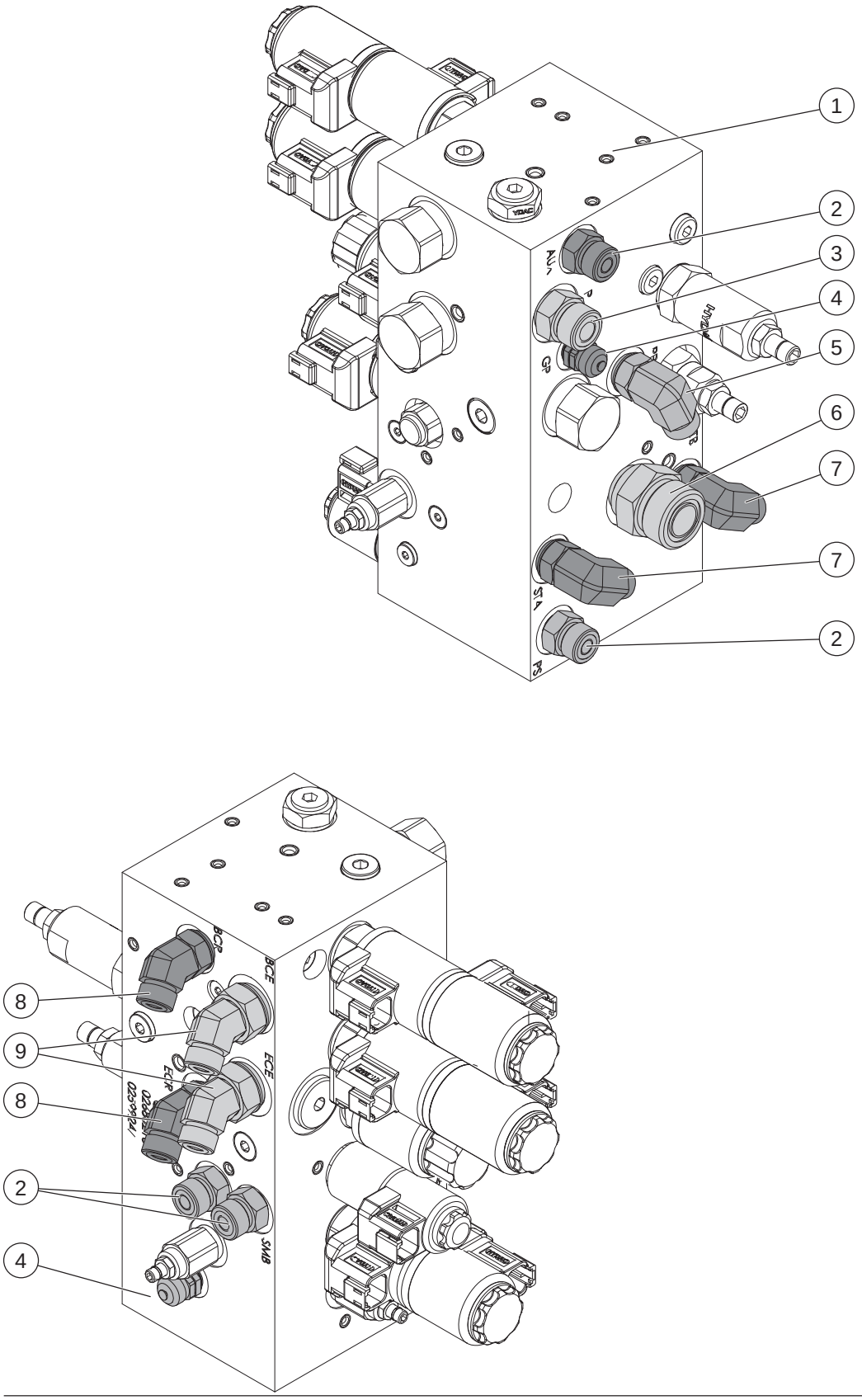


ILLUSTRATION No. ART_4864

60-J

Main Functions Manifold -- Fittings ~Serial #14400126

Item	Part Number	Description	Qty.
--	28920	Main Functions Manifold Assembly	--
1	93789	Main Functions Manifold, w/o fittings	1
2	50835	Fitting, MFFOR-MB-6-6	4
3	50676	Fitting, MFFOR-MB-8-8	1
4	50974	Fitting, TPO-4	2
5	50674	Fitting, MFFOR-MB90-6-6	1
6	50825	Fitting, MFFOR-MB-12-10	1
7	50656	Fitting, MFFOR-MB90-4-6	2
8	50676	Fitting, MFFOR-MB45-6-6	2
9	50816	Fitting, MFFOR-MB45-6-8	2

Main Functions Manifold Block Components -- ~Serial #14400126

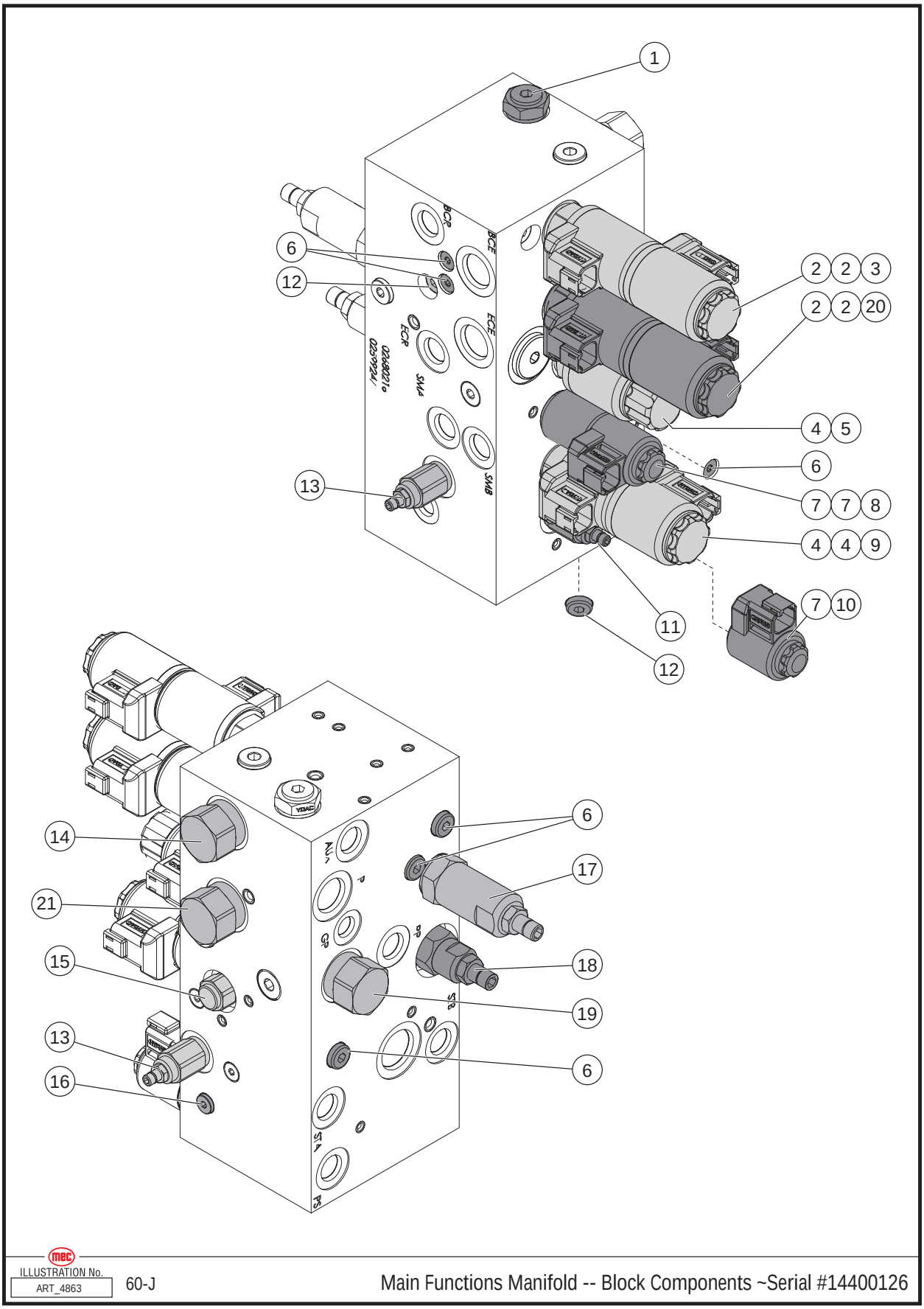
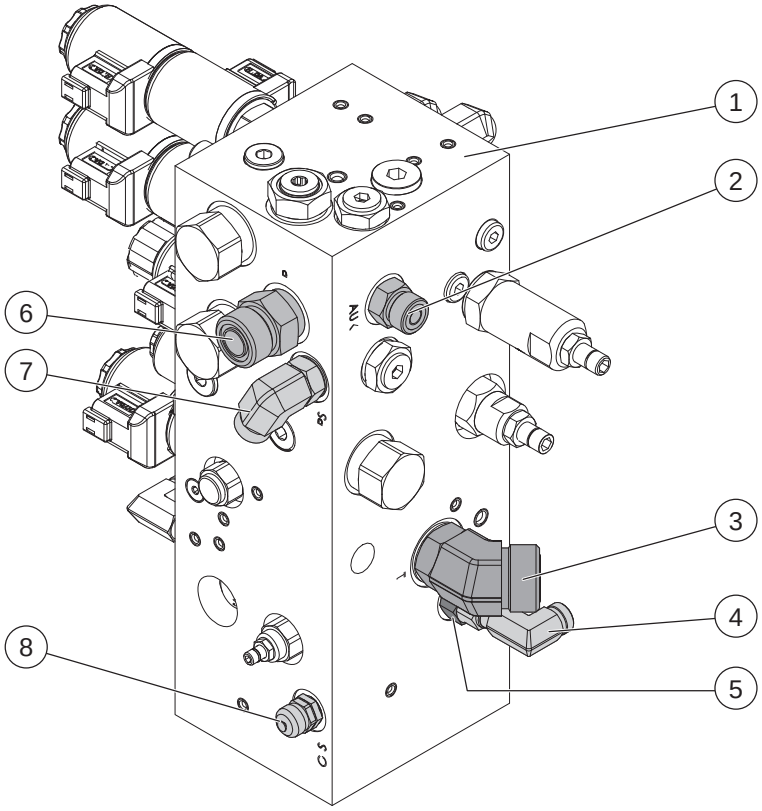


ILLUSTRATION No. ART_4863 60-J Main Functions Manifold -- Block Components ~Serial #14400126

Item	Part Number	Description	Qty.
--	93789	Main Functions Manifold, w/o fittings, including parts listed below	--
1	94067	Check Valve	1
2	94081	Coil	4
3	94031	Solenoid Valve	1
4	94083	Coil	3
5	94080	Solenoid Valve, Directional Control	1
6	94077	Orifice, .6mm	3
7	94082	Coil	3
8	94036	Solenoid Valve	1
9	94070	Solenoid Valve	1
10	94075	Solenoid Valve, Directional Control	1
11	94071	Relief Valve	1
12	94069	Shuttle Valve	2
13	94068	Relief Valve	2
14	94072	Pilot Valve	1
15	94079	Pilot Valve	1
16	94078	Orifice	1
17	94074	Relief Valve	1
18	94066	Priority Control Valve	1
19	94076	Pilot Valve	1
20	94540	Solenoid Valve	1
21	94290	Flow Compensator	1

Main Functions Manifold Fittings -- Serial #14400127~



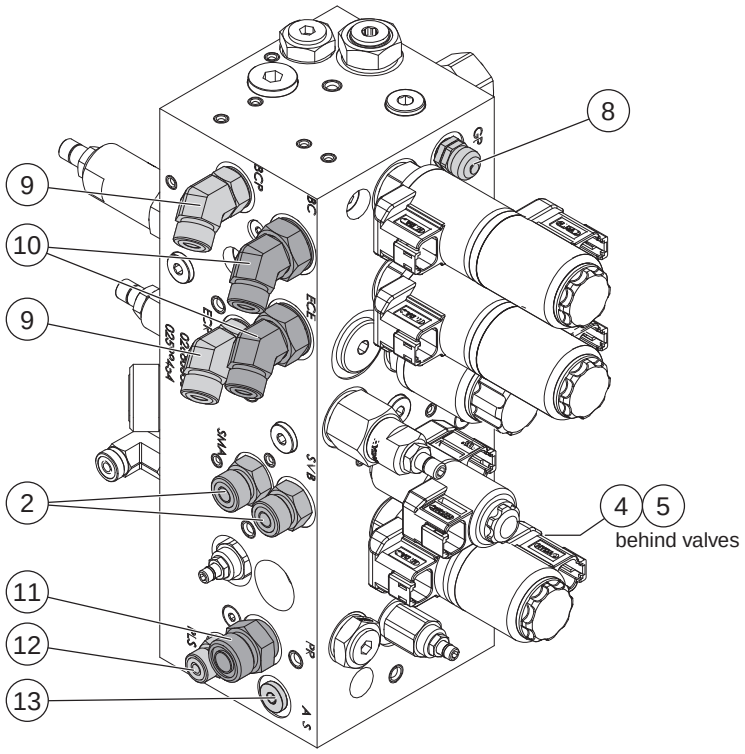
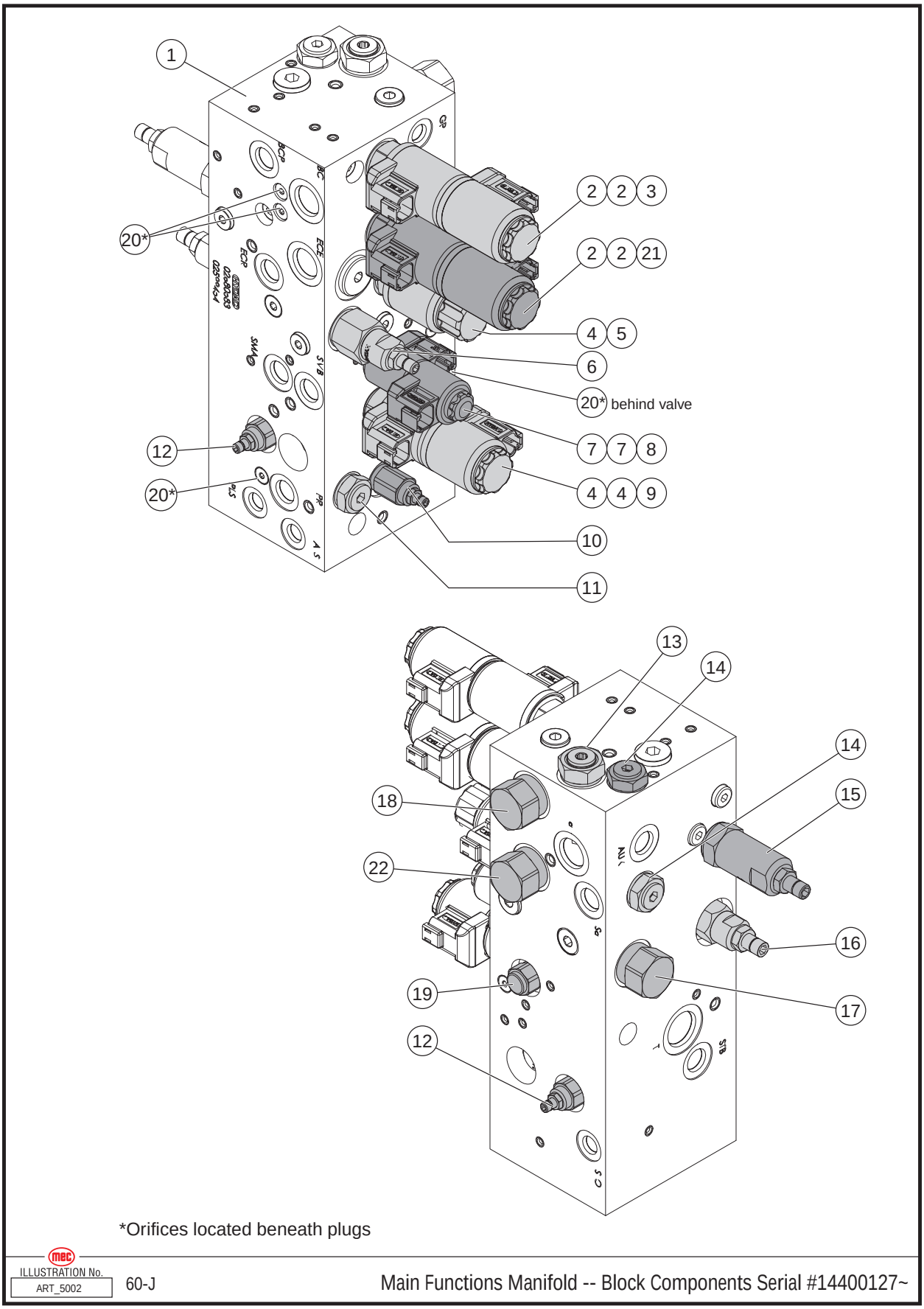


ILLUSTRATION No. ART_5001 60-J

Main Functions Manifold -- Fittings Serial #14400127~

Item	Part Number	Description	Qty.
--	28928	Main Functions Manifold Assembly	--
1	93902	Main Functions Manifold, w/o fittings	1
2	50835	Fitting, MFFOR-MB-6-6	3
3	51091	Fitting, MFFOR-MB45-12-10	1
4	50671	Fitting, MFFOR-FFORX90- 4-4	2
5	50832	Fitting, MFFOR-MB-4-6	2
6	50814	Fitting, MFFOR-MB-10-8	1
7	50674	Fitting, MFFOR-MB90-6-6	1
8	50974	Fitting, TPO-4	2
9	50676	Fitting, MFFOR-MB45-6-6	2
10	50816	Fitting, MFFOR-MB45-6-8	2
11	50840	Fitting, MFFOR-MB-8-6	1
12	50831	Fitting, MFFOR-MB-4-4	1
13	50961	Plug, MB-4	1

Main Functions Manifold Block Components -- Serial #14400127~



*Orifices located beneath plugs

ILLUSTRATION No. ART_5002 60-J Main Functions Manifold -- Block Components Serial #14400127~

Item	Part Number	Description	Qty.
1	93902	Main Functions Manifold, w/o fittings, including parts listed below	1
2	94081	Coil	4
3	94031	Solenoid Valve	1
4	94083	Coil	3
5	94080	Solenoid Valve, Directional Control	1
6	94223	Relief Valve	1
7	94082	Coil	2
8	94036	Solenoid Valve	1
9	94070	Solenoid Valve	1
10	94071	Relief Valve	1
11	94217	Check Valve	1
12	94068	Relief Valve	2
13	94222	Check Valve	1
14	94067	Check Valve	2
15	94074	Pilot Valve	1
16	94221	Priority Flow Valve	1
17	94076	Pilot Valve	1
18	94072	Pilot Valve	1
19	94079	Pilot Valve	1
20	94218	Orifice, 1/4-20, .6mm	4
21	94540	Solenoid Valve	1
22	94290	Flow Compensator	1

Brake/Axle/2-Speed Manifold

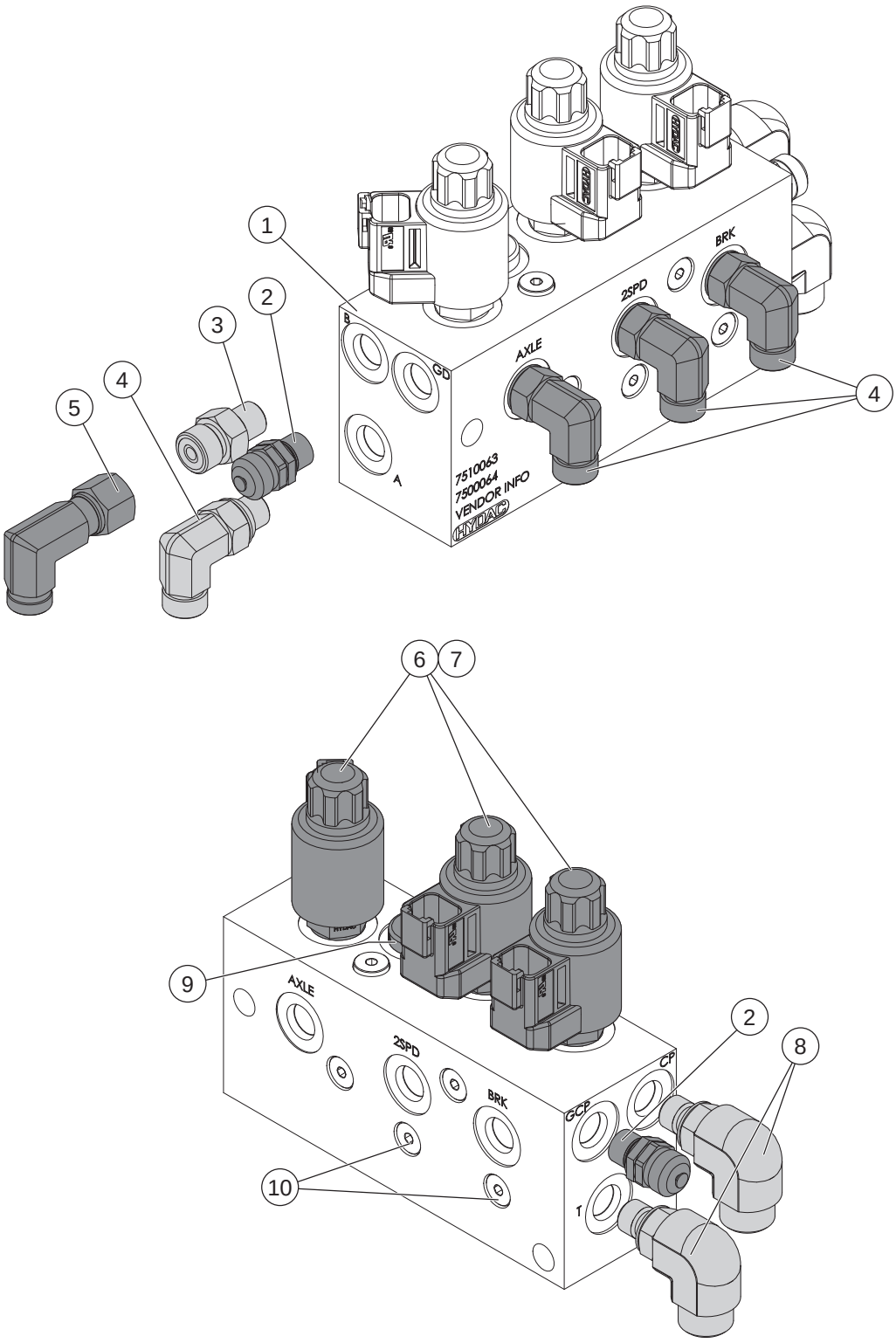


ILLUSTRATION No. ART_4865

60-J Diesel

Brake/Axle/2-Speed Manifold

Item	Part Number	Description	Qty.
1	93779	Brake/Axle/2-Speed Manifold, complete, without fittings	1
2	50974	Fitting, TPO-4	2
3	50831	Fitting, MFFOR-MB-4-4	1
4	50673	Fitting, MFFOR-MB90- 4-4	4
5	50671	Fitting, MFFOR-FFORX90- 4-4	1
6	94087	Solenoid Valve	3
7	94082	Coil	3
8	51083	Fitting, MFFOR-MB90-6-4	2
9	94086	Valve	1
10	94088	Orifice, .75mm	2

Platform Functions Manifold -- ~Serial #14400126

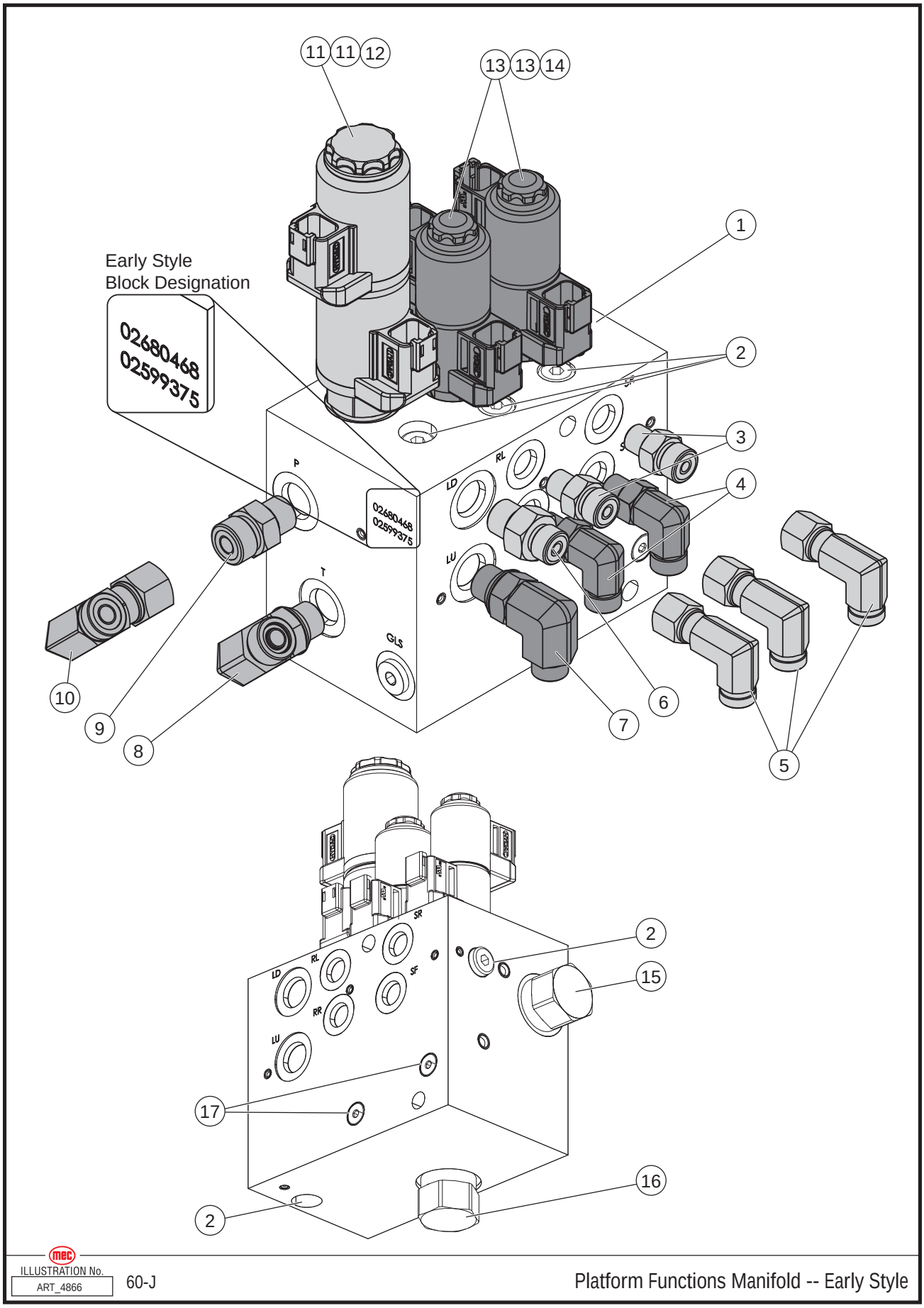


ILLUSTRATION No. ART_4866 60-J

Platform Functions Manifold -- Early Style

Item	Part Number	Description	Qty.
1	93780	Platform Function Manifold -- Early Style, complete, without fittings	1
2	94069	Shuttle Valve	5
3	50831	Fitting, MFFOR-MB-4-4	2
4	50673	Fitting, MFFOR-MB90 4-4	2
5	50671	Fitting, MFFOR-FFORX90- 4-4	3
6	50832	Fitting, MFFOR-MB-4-6	1
7	50656	Fitting, MFFOR-MB90-4-6	1
8	50674	Fitting, MFFOR-MB90-06-06	1
9	50835	Fitting, MFFOR-MB-6-6	1
10	50672	Fitting, MFFOR-FFORX90-06-06	1
11	94081	Coil	2
12	94031	Solenoid Valve	1
13	94082	Coil	4
14	94036	Solenoid Valve	2
15	94084	Pilot Valve	1
16	94085	Pilot Valve	1
17	94077	Orifice, .6mm	2

Platform Functions Manifold -- Serial #14400127~

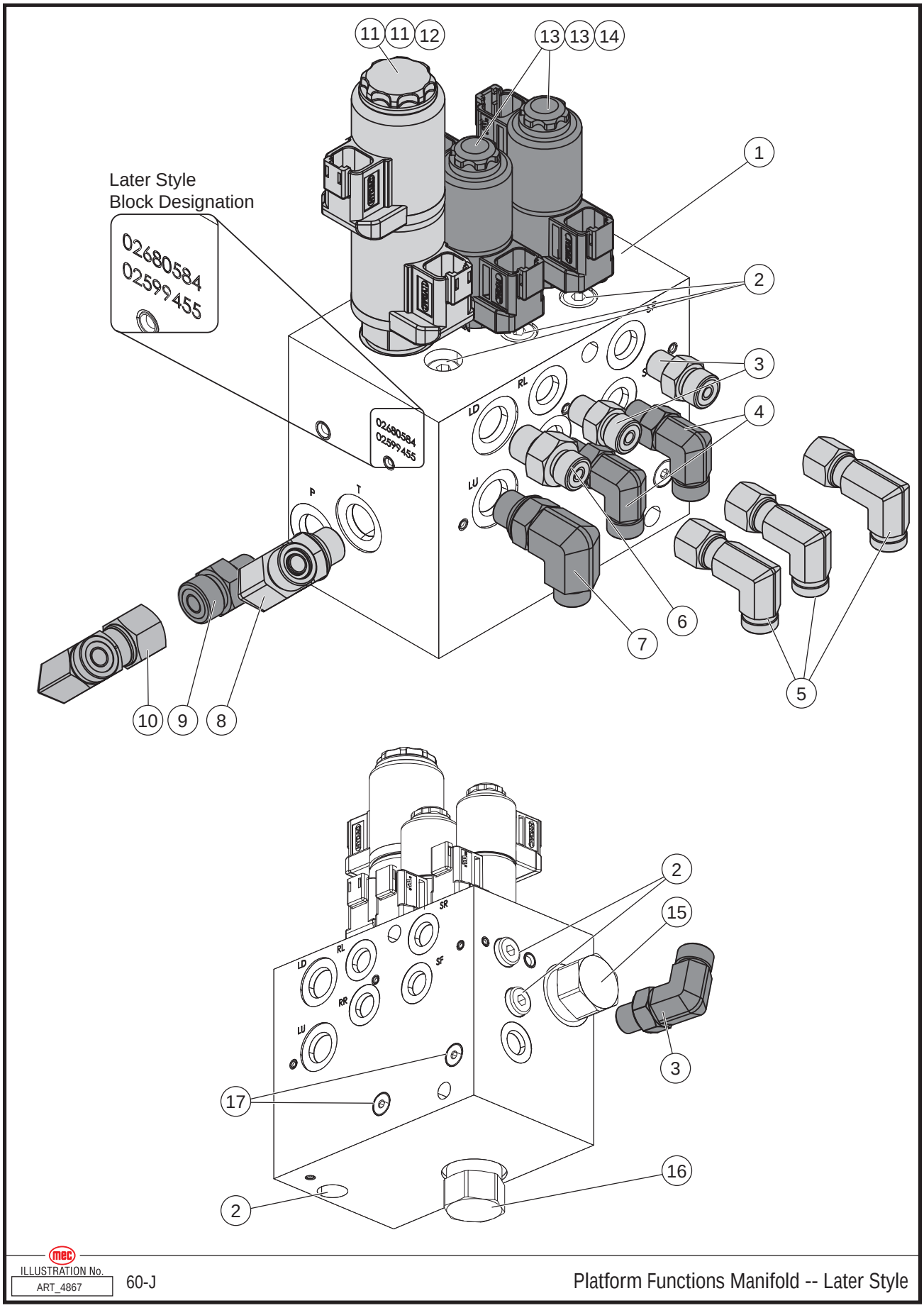


ILLUSTRATION No. ART_4867 60-J

Platform Functions Manifold -- Later Style

Item	Part Number	Description	Qty.
1	93903	Platform Function Manifold -- Late Style, complete, without fittings	1
2	94069	Shuttle Valve	5
3	50831	Fitting, MFFOR-MB-4-4	3
4	50673	Fitting, MFFOR-MB90 4-4	2
5	50671	Fitting, MFFOR-FFORX90- 4-4	3
6	50832	Fitting, MFFOR-MB-4-6	1
7	50656	Fitting, MFFOR-MB90-4-6	1
8	50674	Fitting, MFFOR-MB90-06-06	1
9	50835	Fitting, MFFOR-MB-6-6	1
10	50672	Fitting, MFFOR-FFORX90-06-06	1
11	94081	Coil	2
12	94031	Solenoid Valve	1
13	94082	Coil	4
14	94036	Solenoid Valve	2
15	94084	Pilot Valve	1
16	94072	Pilot Valve	1
17	94077	Orifice, .6mm	2

Chassis Blocks

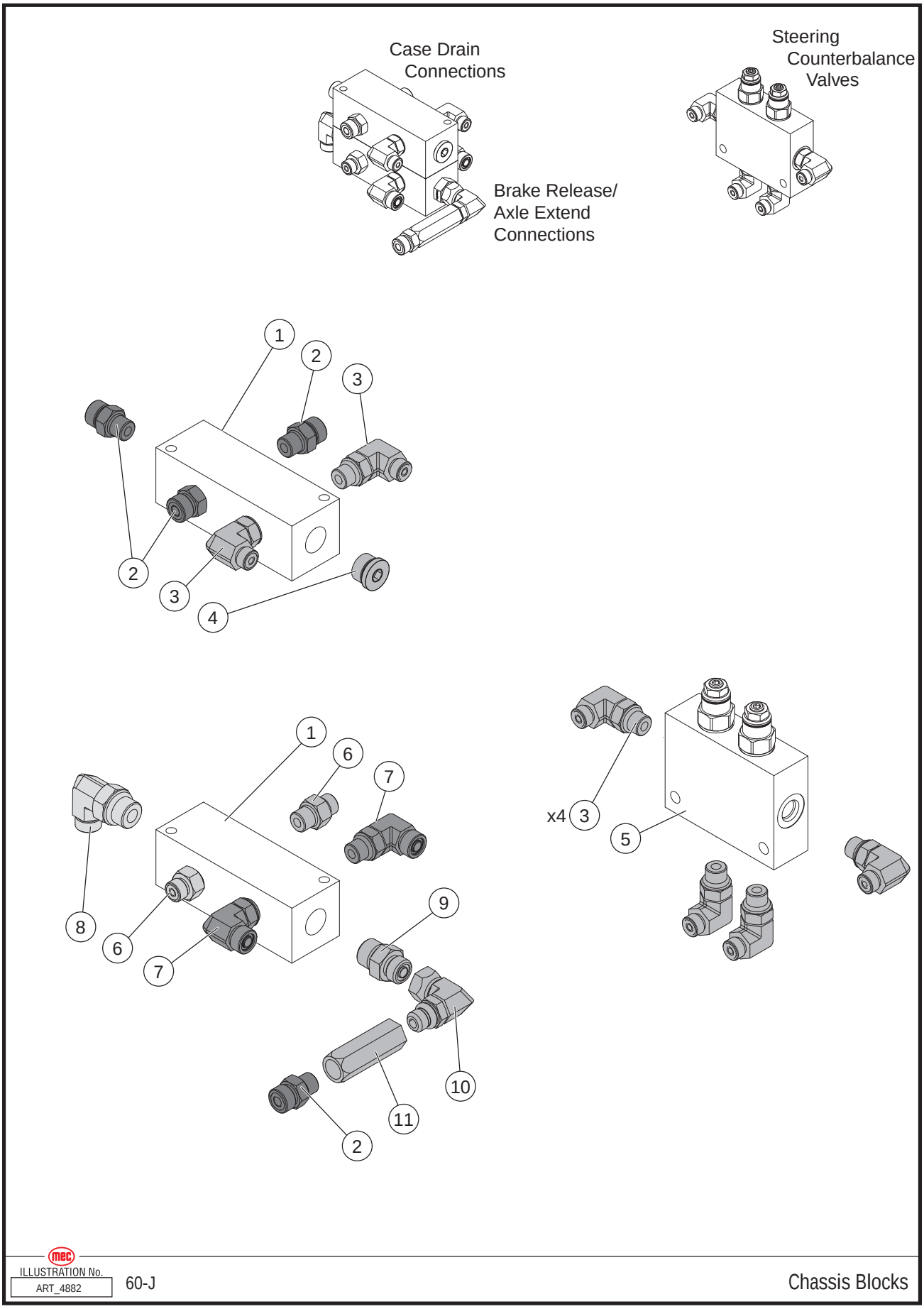


ILLUSTRATION No. ART_4882 60-J Chassis Blocks

Item	Part Number	Description	Qty.
1	93863	Connection Manifold	2
2	50835	Fitting, MFFOR-MB-6-6	4
3	50656	Fitting, MFFOR-MB90-4-6	6
4	51098	Fitting, MB-8 Plug	1
5	93932	**Serial #14400126** Counterbalance Valve Assembly not used on later machines	1
--	93910	Counterbalance Valve	--
6	50832	Fitting, MFFOR-MB-4-6	2
7	50674	Fitting, MFFOR-MB90-6-6	2
8	50847	Fitting, MFFOR-MB90-6-8	1
9	50836	Fitting, MFFOR-MB-6-8	1
10	51180	Fitting, FFORX-MB-6-6	1
11	93864	Check Valve	1

Rotary Manifold - To Serial # 14400334

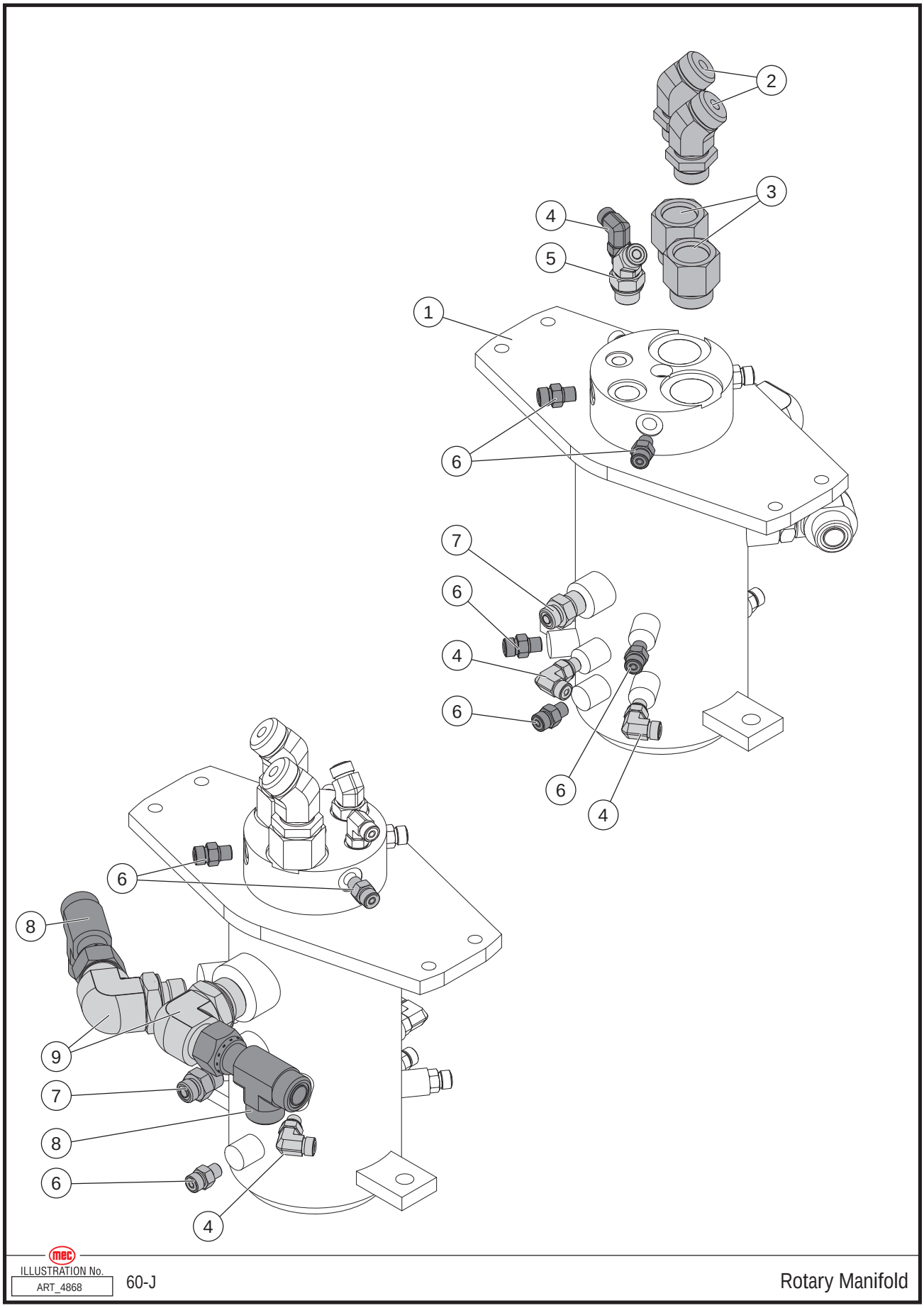


ILLUSTRATION No. ART_4868 60-J Rotary Manifold

Item	Part Number	Description	Qty.
1	93651	Rotary Manifold, without fittings	1
2	51063	Fitting, MFFOR-MB45-12-12	2
3	51101	Fitting, MB-FB-16-12	2
4	50673	Fitting, MFFOR-MB90 4-4	4
5	50816	Fitting, MFFOR-MB45-6-8	1
6	50831	Fitting, MFFOR-MB-4-4	8
7	50836	Fitting, MFFOR-MB-6-8	2
8	50979	Fitting, MFFOR-FFORX-MFFOR-12	2
9	50844	Fitting, MFFOR-MB90-12-16	2

Rotary Manifold - From Serial # 14400335

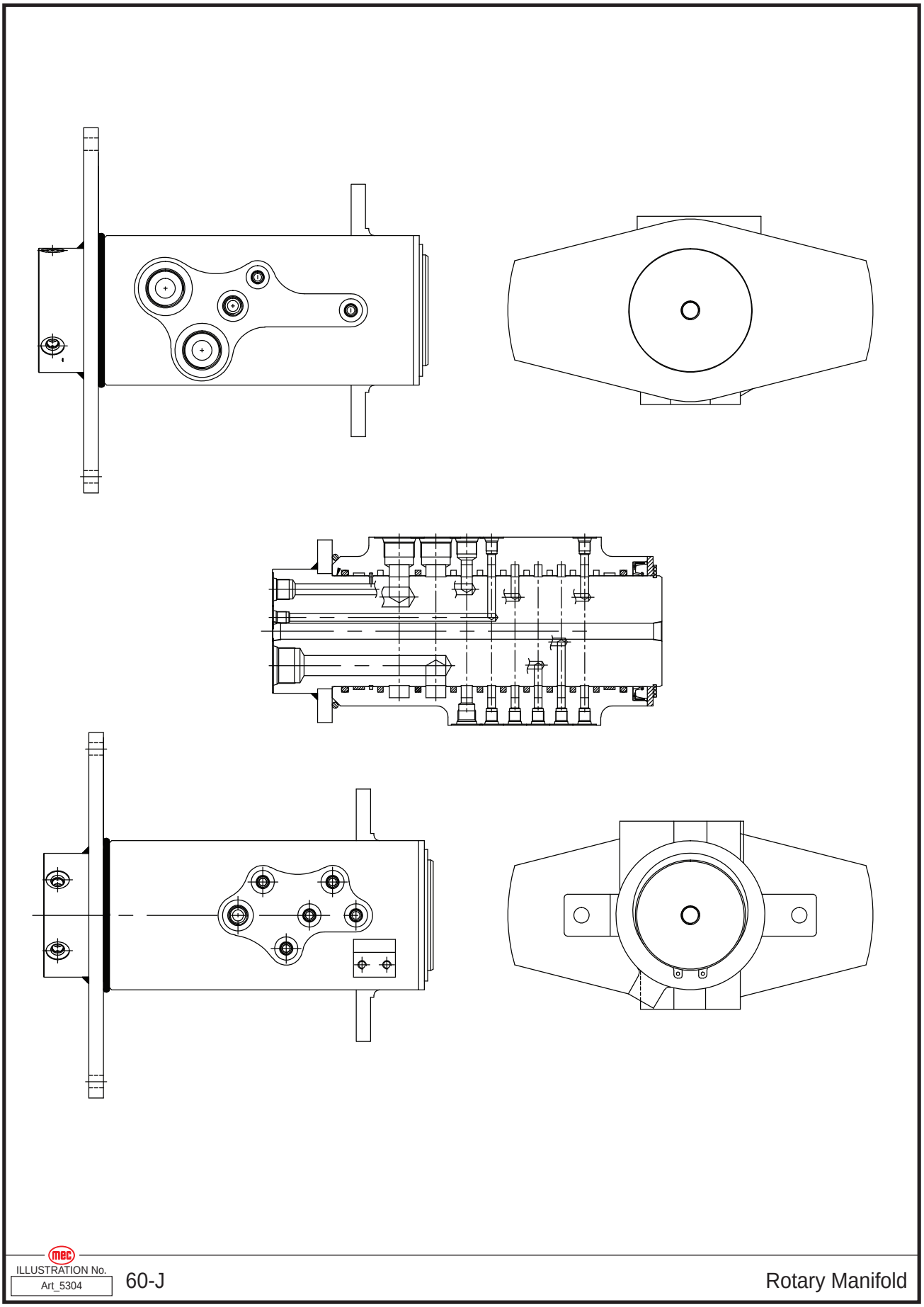


ILLUSTRATION No. Art_5304

60-J

Rotary Manifold

Item	Part Number	Description	Qty.
--	94681	HYDRAULIC ROTARY / SWIVEL MANIFOLD, 8 PORT (ALT FOR 93651)	--

Hydraulic Pumps

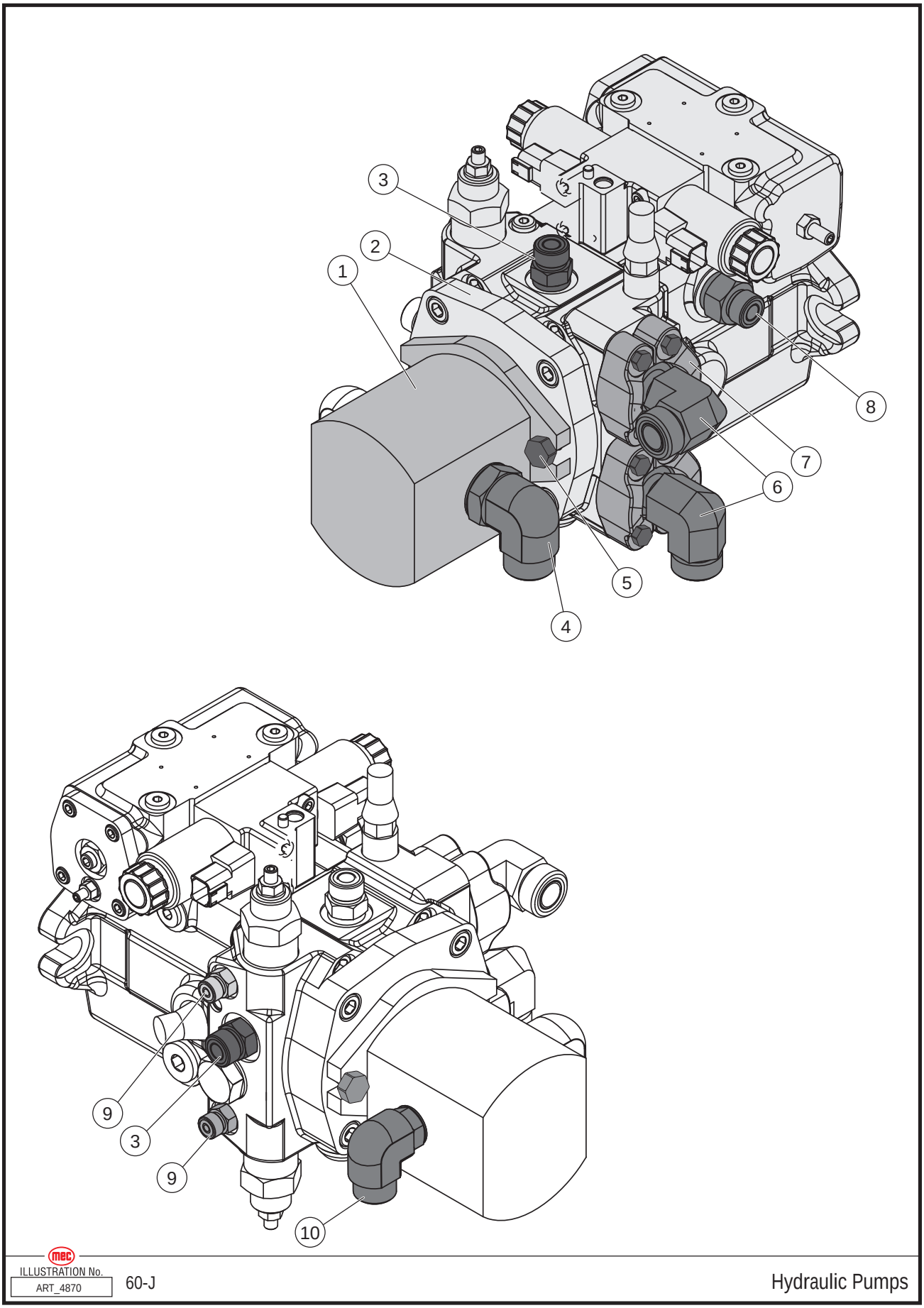


ILLUSTRATION No. ART_4870 60-J Hydraulic Pumps

Item	Part Number	Description	Qty.
1	93232	Functions Pump	1
2	93339	Drive Pump, without fittings	1
3	50841	Fitting, MFFOR-MB-8-8	2
4	50782	Fitting, MB-MJ90-12-12	1
5	5004	Bolt, 3/8 x 1	2
--	50006	M10 Nordlock	2
6	51163	Fitting, FL-MFFOR90-12-12	2
7	51133	#12 Flange Kit -- include 2 flanges and 4 bolts	2
8	50837	Fitting, MB-MFFOR-10-8	1
9	50831	Fitting, MB-MFFOR-4-4	2
10	51067	Fitting, MB-MFFOR45-10-8	1

7.5kw Gen Assembly

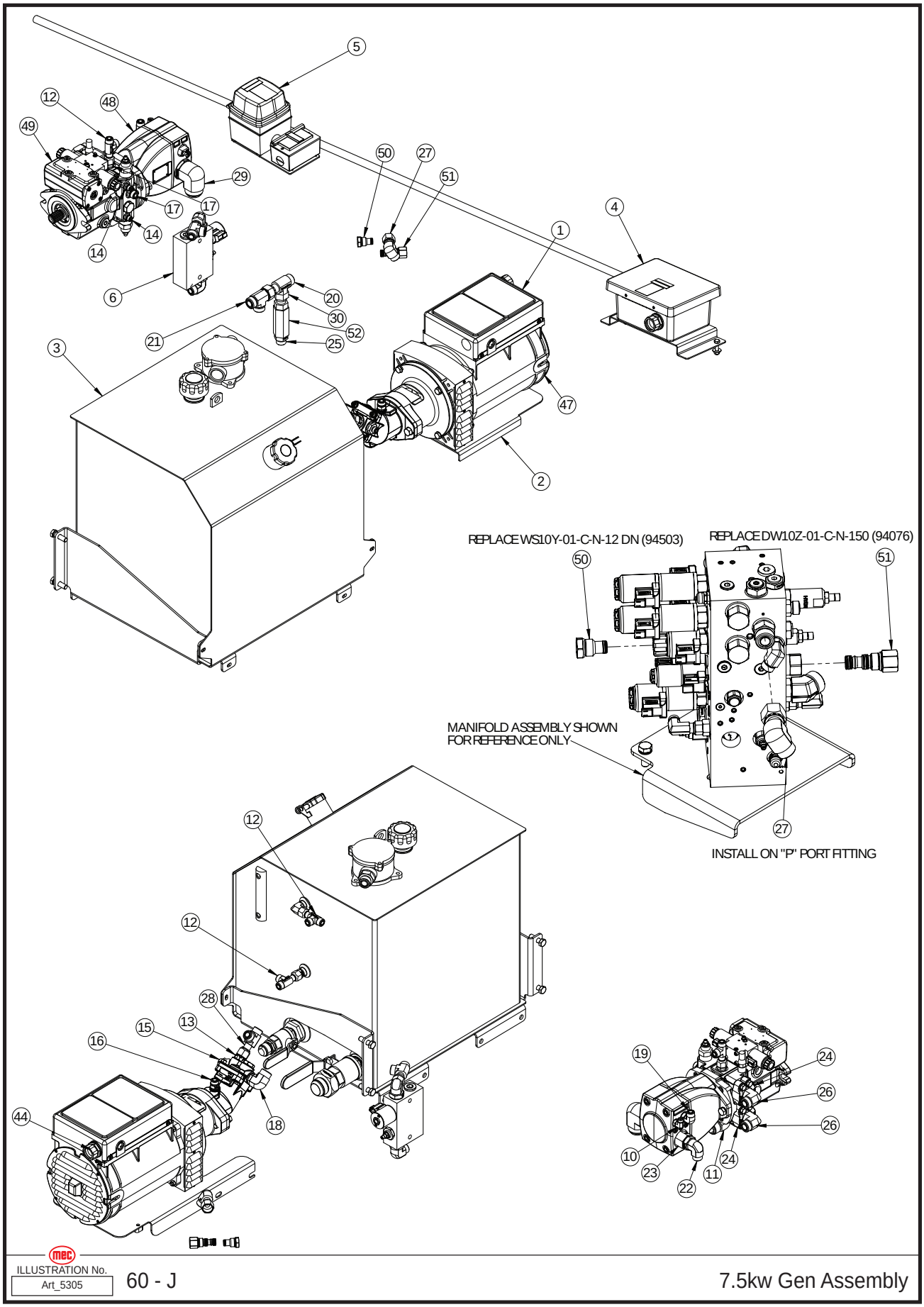


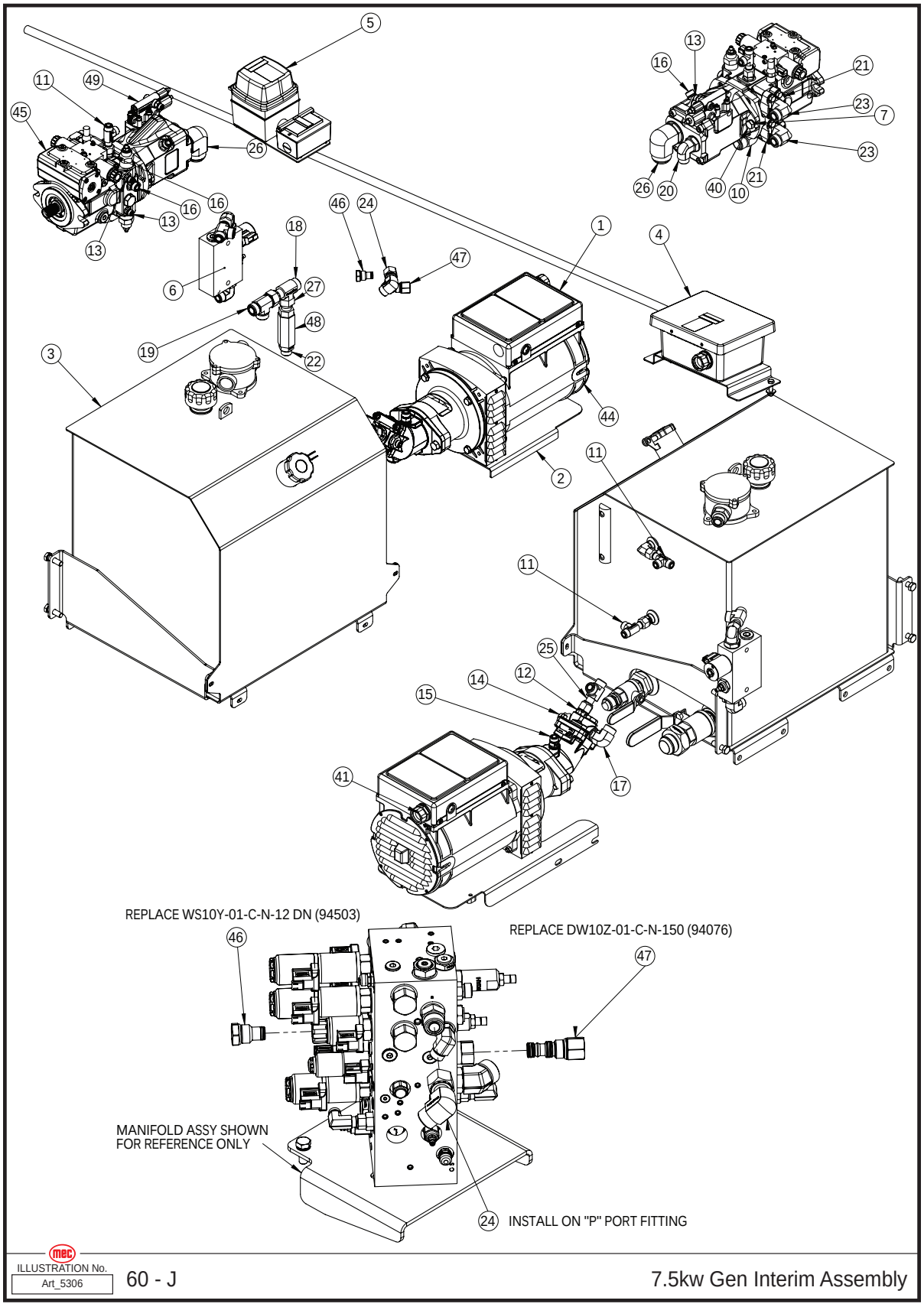
ILLUSTRATION No. Art_5305

60 - J

7.5kw Gen Assembly

Item	Part Number	Description	Qty.
1	28295	7.5KW GEN COVER FORMING HOLE CUTOUTS	1
2	28847	7.5KW GEN MOUNT WELDMENT	1
3	28974	7.5KW GEN HYD TANK ASSEMBLY	1
4	28984	SUBASSEMBLY, OPTION, 7.5KW BREAKER BOX	1
5	28985	SUBASSEMBLY, OPTION, 7.5KW OUTLET BOXES	1
6	28993	7.5KW GENERATOR MANIFOLD ASSEMBLY	1
7	50007	WSHR M12 ZP NORDLOCK	2
8	50049	NNYL M10X1.50 08 ZP NYLON INSE	1
9	50215	HHCS M10-1.50X020 08 ZP F	1
10	50673	HYFT MFFOR-MB90 4-4	1
11	50786	HYFT MB-MJ90-16-16 ; 6801-16-16-NWO	1
12	50811	HYFT MFFOR-FFORX-MFFOR-8 ; FS6602-08-08-08	3
13	50812	HYFT MFFOR-MB-10-10 ; FS6400-10-10-O	1
14	50831	HYFT MFFOR-MB-4-4 ; FS6400-04-04	2
15	50834	HYFT MFFOR-MB-6-10 ; FS6400-06-10-O	1
16	50840	HYFT MFFOR-MB-8-6 ; FS6400-08-06-O	1
17	50841	HYFT MFFOR-MB-8-8 ; FS6400-08-08-O	2
18	50842	HYFT MFFOR-MB90-12-10 ; FS6801-12-10-F	1
19	50850	HYFT MFFOR-MB90-8-8 ; FS6801-08-08-FG	1
20	50979	HYFT MFFOR-FFORX-MFFOR-12 FS6602-12-12-12	1
21	51062	MFFORT-12	1
22	51066	HYFT MFFOR-MB90-10-12	1
23	51101	HYFT MB-FB-16-12 ; 6410-16-12-O	1
24	51133	HYFT 12SFXO CODE 62 SPLIT FLANGE KIT	2
25	51152	HYFT MFFOR-MB-10-12; 6400-10-12	1
26	51163	HYFT FL-MFFOR90-12-12 Code 62	2
27	51198	HYFT MFFOR-FFORX90-10-10 FF6500-10-10	1
28	51199	HYFT MFFOR-FFORX-MFFOR-10 FF6602-10-10-10	1
29	51208	HYFT MB-MJ90-20-24 ; 6801-24-20	1
30	51216	HYFT FFORX-MB-12-12	1
31	52702	HOSE ASSEMBLY REL - RET T/FET-CFI/35CCRRCD-MIDTANKT	1
32	52772	HOSE ASSEMBLY GENINLET-ALS	1
33	52773	HOSE ASSEMBLY 35CCRR-GLS	1
34	52774	HOSE ASSEMBLY GENCD-MIDTANKT	1
35	52775	HOSE ASSEMBLY 35CCRR-AUXMANIFOLDT	1
36	52776	HOSE ASSEMBLY AUXMANIFOLDPORT4-GENINLET	1
37	52777	HOSE ASSEMBLY AUXMANIFOLDT-MMP	1
38	52778	HOSE ASSEMBLY GENINLET-INLETCHECKVALVE	1
39	52779	HOSE ASSEMBLY GENOUTLET-RFT	1
40	52780	HOSE ASSEMBLY RF-TFITTING	1
41	52781	HOSE ASSEMBLY 1”BV-28CCRR	1
42	52782	HOSE ASSEMBLY 1-1/2BV-35CCRR	1
43	53089	HHCS 01/02-13X01.25 08 ZP	2
44	93095	1” Liquidtight Strain Relief Cord Connector T&B 2546	1
45	93096	1” LIQUIDTIGHT SEALING GASKET T&B 5264	1
46	93097	1” STEEL LOCKNUT T&B 143	1
47	93829	HYD GENERATOR 7.5KW 208/120 60HZ 12CC HARRISON HU07.5DAG36J-US	1
48	94106	35CC PUMP REXROTH A1VO035DRS0C200/10BRVB2S5100000-0	1
49	94107	REXROTH AA10VG28EP3D1/10R-NSC60F045DP-S	1
50	94127	CAVITY PLUG VC10-2 ALL BLOCKED HYDRAFORCE CP10-20-N	1
51	94128	CAVITY PLUG VC10-S3 ALL BLOCKED HYDRAFORCE CP10-S30-N	1
52	94277	94277 CHECK VALVE HYDAC RV-16-01.X/12	1

7.5kw Gen Interim Assembly



Item	Part Number	Description	Qty.
1	28295	7.5KW GEN COVER FORMING HOLE CUTOUTS	1

2	28847	7.5KW GEN MOUNT WELDMENT	1
3	28974	7.5KW GEN HYD TANK ASSEMBLY	1
4	28984	SUBASSEMBLY, OPTION, 7.5KW BREAKER BOX	1
5	28985	SUBASSEMBLY, OPTION, 7.5KW OUTLET BOXES	1
6	28993	7.5KW GENERATOR MANIFOLD ASSEMBLY	1
7	50007	WSHR M12 ZP NORDLOCK	2
8	50049	NNYL M10X1.50 08 ZP NYLON INSE	1
9	50215	HHCS M10-1.50X020 08 ZP F	1
10	50786	HYFT MB-MJ90-16-16 ; 6801-16-16-NWO	1
11	50811	HYFT MFFOR-FFORX-MFFOR-8 ; FS6602-08-08-08	3
12	50812	HYFT MFFOR-MB-10-10 ; FS6400-10-10-O	1
13	50831	HYFT MFFOR-MB-4-4 ; FS6400-04-04	3
14	50834	HYFT MFFOR-MB-6-10 ; FS6400-06-10-O	1
15	50840	HYFT MFFOR-MB-8-6 ; FS6400-08-06-O	1
16	50841	HYFT MFFOR-MB-8-8 ; FS6400-08-08-O	3
17	50842	HYFT MFFOR-MB90-12-10 ; FS6801-12-10-F	1
18	50979	HYFT MFFOR-FFORX-MFFOR-12 FS6602-12-12-12	1
19	51062	MFFORT-12	1
20	51066	HYFT MFFOR-MB90-10-12	1
21	51133	HYFT 12SFXO CODE 62 SPLIT FLANGE KIT	2
22	51152	HYFT MFFOR-MB-10-12; 6400-10-12	1
23	51163	HYFT FL-MFFOR90-12-12 Code 62	2
24	51198	HYFT MFFOR-FFORX90-10-10 FF6500-10-10	1
25	51199	HYFT MFFOR-FFORX-MFFOR-10 FF6602-10-10-10	1
26	51208	HYFT MB-MJ90-20-24 ; 6801-24-20	1
27	51216	HYFT FFORX-MB-12-12	1
28	52702	HOSE ASSEMBLY REL - RET T/FET-CFI/35CCRRCD-MIDTANKT	1
29	52772	HOSE ASSEMBLY GENINLET-ALS	1
30	52773	HOSE ASSEMBLY 35CCRR-GLS	1
31	52774	HOSE ASSEMBLY GENCD-MIDTANKT	1
32	52775	HOSE ASSEMBLY 35CCRR-AUXMANIFOLDT	1
33	52776	HOSE ASSEMBLY AUXMANIFOLDPORT4-GENINLET	1
34	52777	HOSE ASSEMBLY AUXMANIFOLDT-MMP	1
35	52778	HOSE ASSEMBLY GENINLET-INLETCHECKVALVE	1
36	52779	HOSE ASSEMBLY GENOUTLET-RFT	1
37	52780	HOSE ASSEMBLY RF-TFITTING	1
38	52781	HOSE ASSEMBLY 1”BV-28CCRR	1
39	52805	HOSE ASSEMBLY 1-1/2BV-35CCRR	1
40	53089	HHCS 01/02-13X01.25 08 ZP	2
41	93095	1” Liquidtight Strain Relief Cord Connector T&B 2546	1
42	93096	1” LIQUIDTIGHT SEALING GASKET T&B 5264	1
43	93097	1” STEEL LOCKNUT T&B 143	1
44	93829	HYD GENERATOR 7.5KW 208/120 60HZ 12CC HARRISON HU07.5DAG36J-US	1
45	94107	REXROTH AA10VG28EP3D1/10R-NSC60F045DP-S	1
46	94127	CAVITY PLUG VC10-2 ALL BLOCKED HYDRAFORCE CP10-20-N	1
47	94128	CAVITY PLUG VC10-S3 ALL BLOCKED HYDRAFORCE CP10-S30-N	1
48	94277	CHECK VALVE HYDAC RV-16-01.X/12	1
49	94475	28CC Axial Piston Pump (Interim Replacement For 94106) Rexroth A10VO28DFR1/52R-PTC64N00	

7.5kw Gen Danfoss Assembly

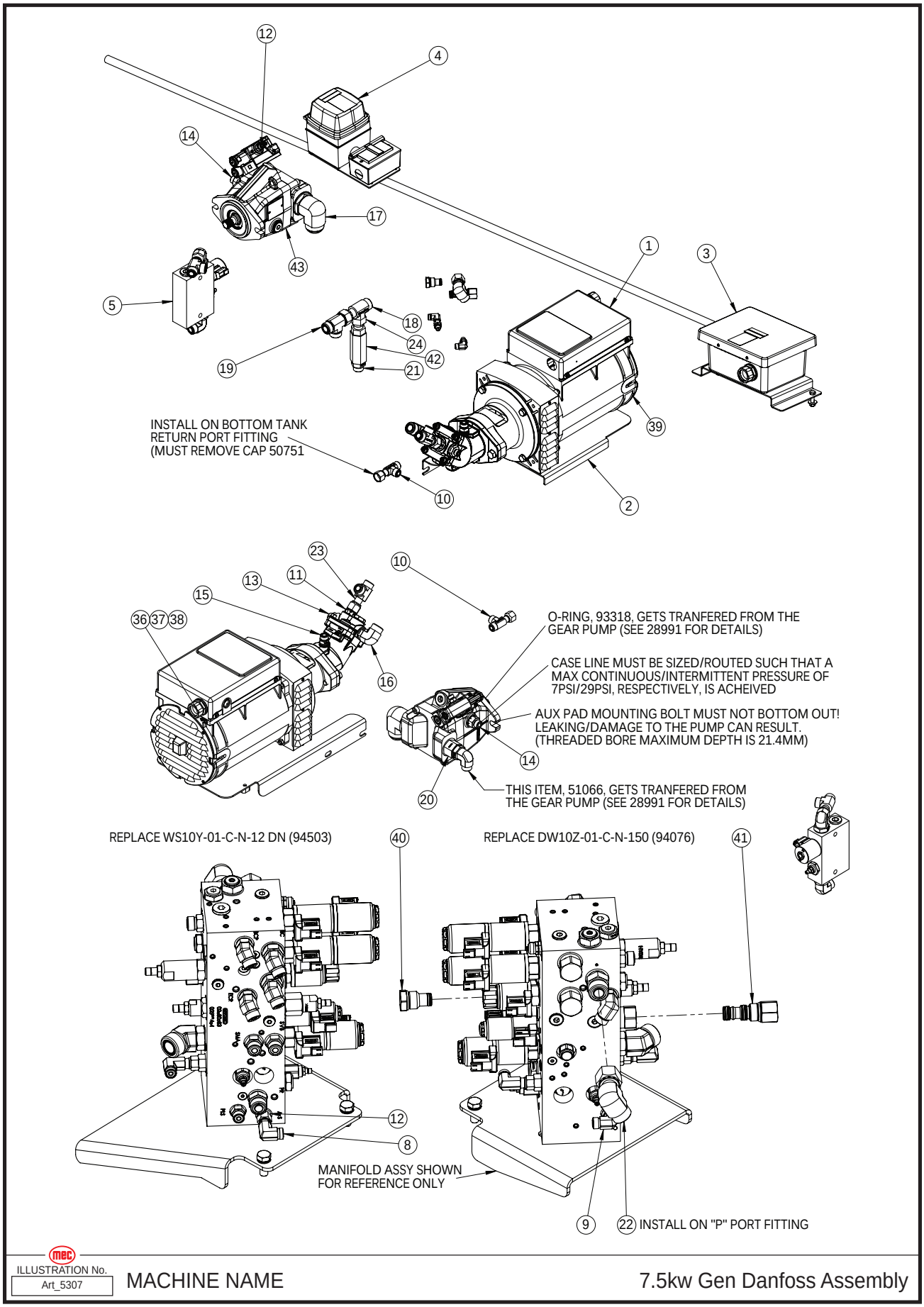
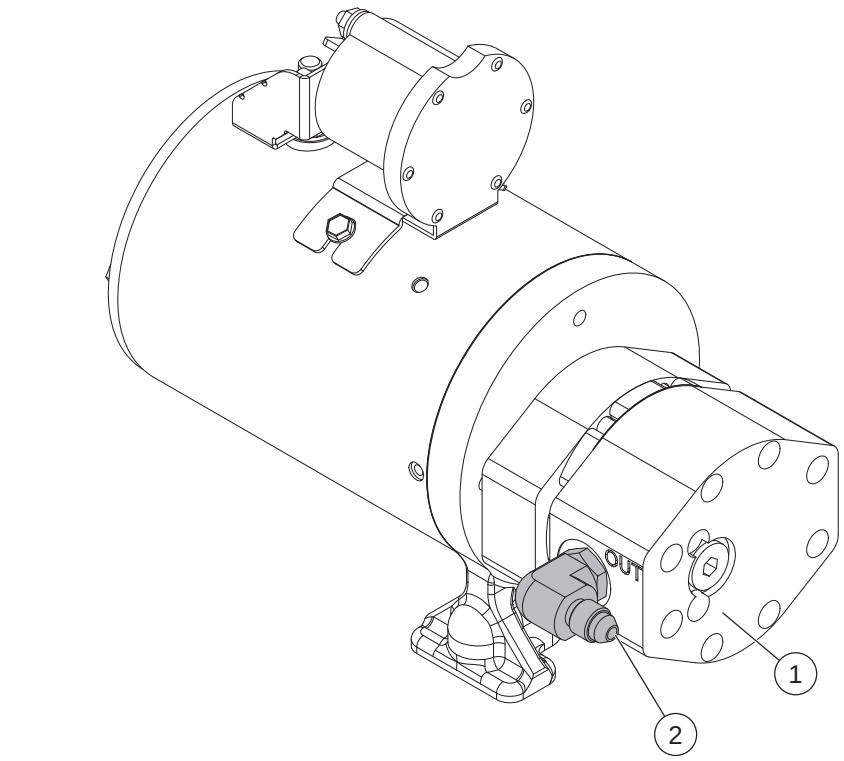


ILLUSTRATION No. Art_5307

MACHINE NAME 7.5kw Gen Danfoss Assembly

Item	Part Number	Description	Qty.
1	28295	7.5KW GEN COVER FORMING HOLE CUTOUTS	1
2	28847	7.5KW GEN MOUNT WELDMENT	1
3	28984	SUBASSEMBLY, OPTION, 7.5KW BREAKER BOX	1
4	28985	SUBASSEMBLY, OPTION, 7.5KW OUTLET BOXES	1
5	28993	7.5KW GENERATOR MANIFOLD ASSEMBLY	1
6	50049	NNYL M10X1.50 08 ZP NYLON INSE	1
7	50215	HHCS M10-1.50X020 08 ZP F	1
8	50671	HYFT MFFOR-FFORX90-04-04	1
9	50673	HYFT MFFOR-MB90 4-4	1
10	50811	HYFT MFFOR-FFORX-MFFOR-8 ; FS6602-08-08-08	1
11	50812	HYFT MFFOR-MB-10-10 ; FS6400-10-10-O	1
12	50831	HYFT MFFOR-MB-4-4 ; FS6400-04-04	2
13	50834	HYFT MFFOR-MB-6-10 ; FS6400-06-10-O	1
14	50837	HYFT MFFOR-MB-8-10	1
15	50840	HYFT MFFOR-MB-8-6 ; FS6400-08-06-O	1
16	50842	HYFT MFFOR-MB90-12-10 ; FS6801-12-10-F	1
17	50966	HYFT MB-MJ90-24-24 ; 6801-24-24	1
18	50979	HYFT MFFOR-FFORX-MFFOR-12 FS6602-12-12-12	1
19	51062	MFFORT-12	1
20	51101	HYFT MB-FB-16-12 ; 6410-16-12-O	1
21	51152	HYFT MFFOR-MB-10-12; 6400-10-12	1
22	51198	HYFT MFFOR-FFORX90-10-10 FF6500-10-10	1
23	51199	HYFT MFFOR-FFORX-MFFOR-10 FF6602-10-10-10	1
24	51216	HYFT FFORX-MB-12-12	1
--	--	--	--
26	52702	HOSE ASSEMBLY REL - RET T/FET-CFI/35CCRRCD-MIDTANKT	1
27	52772	HOSE ASSEMBLY GENINLET-ALS	1
28	52773	HOSE ASSEMBLY 35CCRR-GLS	1
29	52774	HOSE ASSEMBLY GENCD-MIDTANKT	1
30	52775	HOSE ASSEMBLY 35CCRR-AUXMANIFOLDT	1
31	52776	HOSE ASSEMBLY AUXMANIFOLDPORT4-GENINLET	1
32	52777	HOSE ASSEMBLY AUXMANIFOLDT-MMP	1
33	52778	HOSE ASSEMBLY GENINLET-INLETCHECKVALVE	1
34	52779	HOSE ASSEMBLY GENOUTLET-RFT	1
35	52780	HOSE ASSEMBLY RF-TFITTING	1
36	93095	1” Liquidtight Strain Relief Cord Connector T&B 2546	1
37	93096	1” LIQUIDTIGHT SEALING GASKET T&B 5264	1
38	93097	1” STEEL LOCKNUT T&B 143	1
39	93829	HYD GENERATOR 7.5KW 208/120 60HZ 12CC HARRISON HU07.5DAG36J-US	1
40	94127	CAVITY PLUG VC10-2 ALL BLOCKED HYDRAFORCE CP10-20-N	1
41	94128	CAVITY PLUG VC10-S3 ALL BLOCKED HYDRAFORCE CP10-S30-N	1
42	94277	CHECK VALVE HYDAC RV-16-01.X/12	1
43	94466	30CC AXIAL PISTON PUMP DANFOSS K2-R-030C LS 22 17 NN N 3 C2MG A6N PLB NNN NNN	1
--	--	--	--

Auxiliary Power Unit



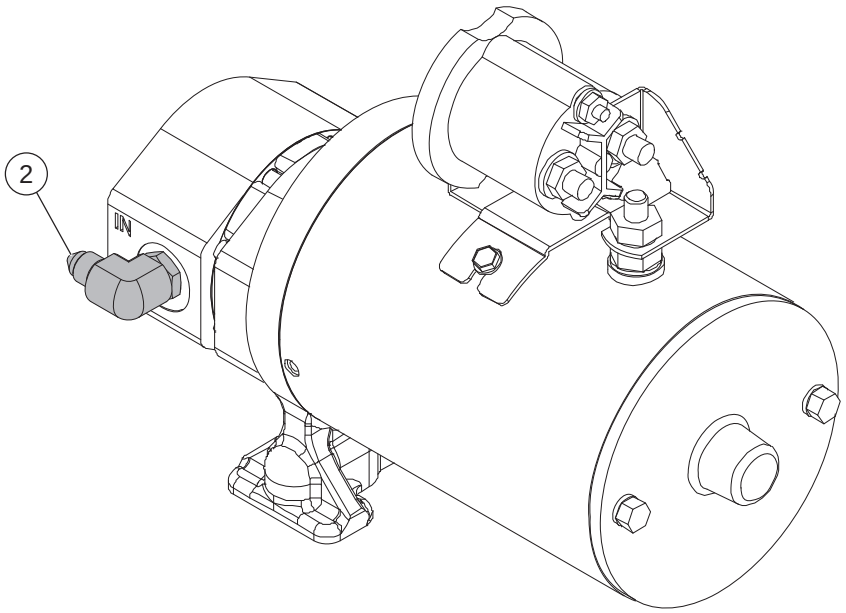


ILLUSTRATION No. ART_3491

92RT Series

AUXILLARY POWER UNIT, 5592RT, 3392RT-T

Item	Part Number	Description	Qty.
1	17973	Auxiliary Power Unit, without fittings	1
--	92534	Solenoid	--
2	50790	Fitting, MB-MJ90-6-6	2

Hydraulic Reservoir

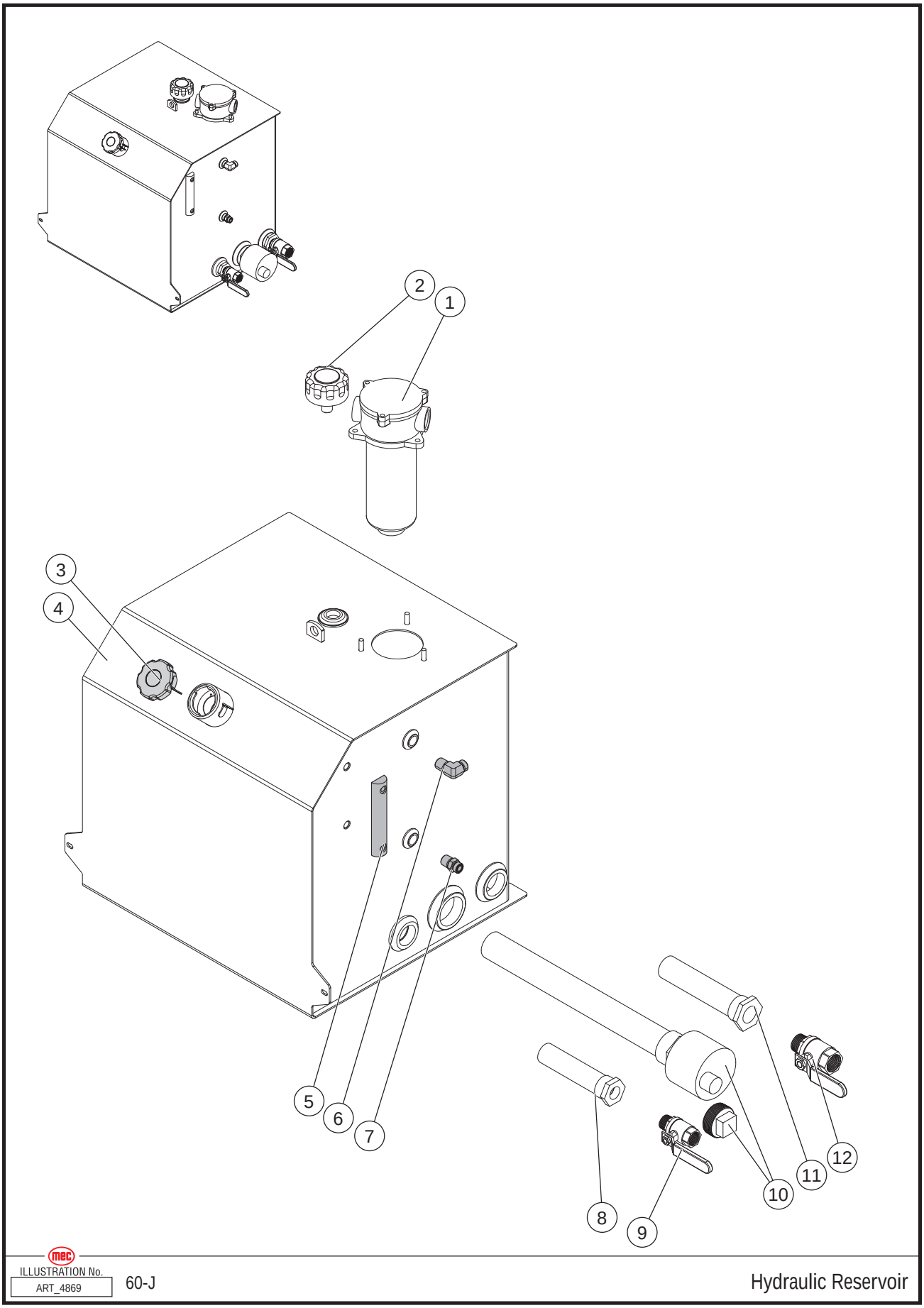


ILLUSTRATION No. ART_4869

60-J

Hydraulic Reservoir

Item	Part Number	Description	Qty.
1	92366	Return Filter Assembly	1
--	92397	Filter Element	--
2	92357	Breather Cap	1
3	92478	Filler Cap	1
4	28660	Fuel Tank Weldment	1
5	9370	Sight Gauge	1
6	51161	Fitting, MFFOR-MP90-8-8	1
7	50876	Fitting, MFFOR-MP-8-8	1
8	93167	**~Serial #1440070** -- Suction Strainer	1
	93706	**Serial #1440071~** -- Suction Strainer	1
9	93605	**~Serial #1440070** -- Ball Valve, 3/4”	1
	93123	**Serial #1440071~** -- Ball Valve, 1”	1
10	51003	Plug, 2”	1
	92508	**OPTION** -- Tank Heater	1
11	93706	Suction Strainer	1
12	93123	Ball Valve, 1”	1

Charge Filter Assembly

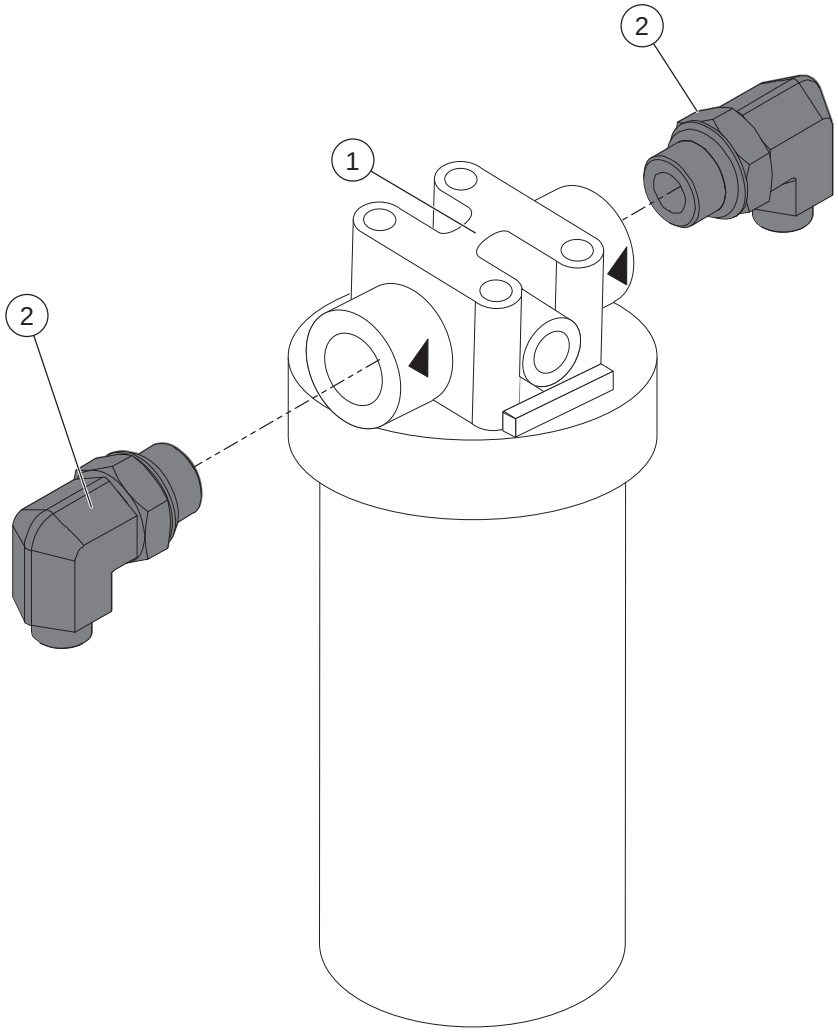


ILLUSTRATION No.
ART_3656

TITAN BOOM 40-S

Charge Filter Assembly

Item	Part Number	Description	Qty.
1	92072	Charge Filter Assembly, without fittings	1
--	92169	Filter Element	--
2	50849	Fitting, MFFOR-MB90-8-12	2

Pressure Filter Assembly -- ~Serial #14400126

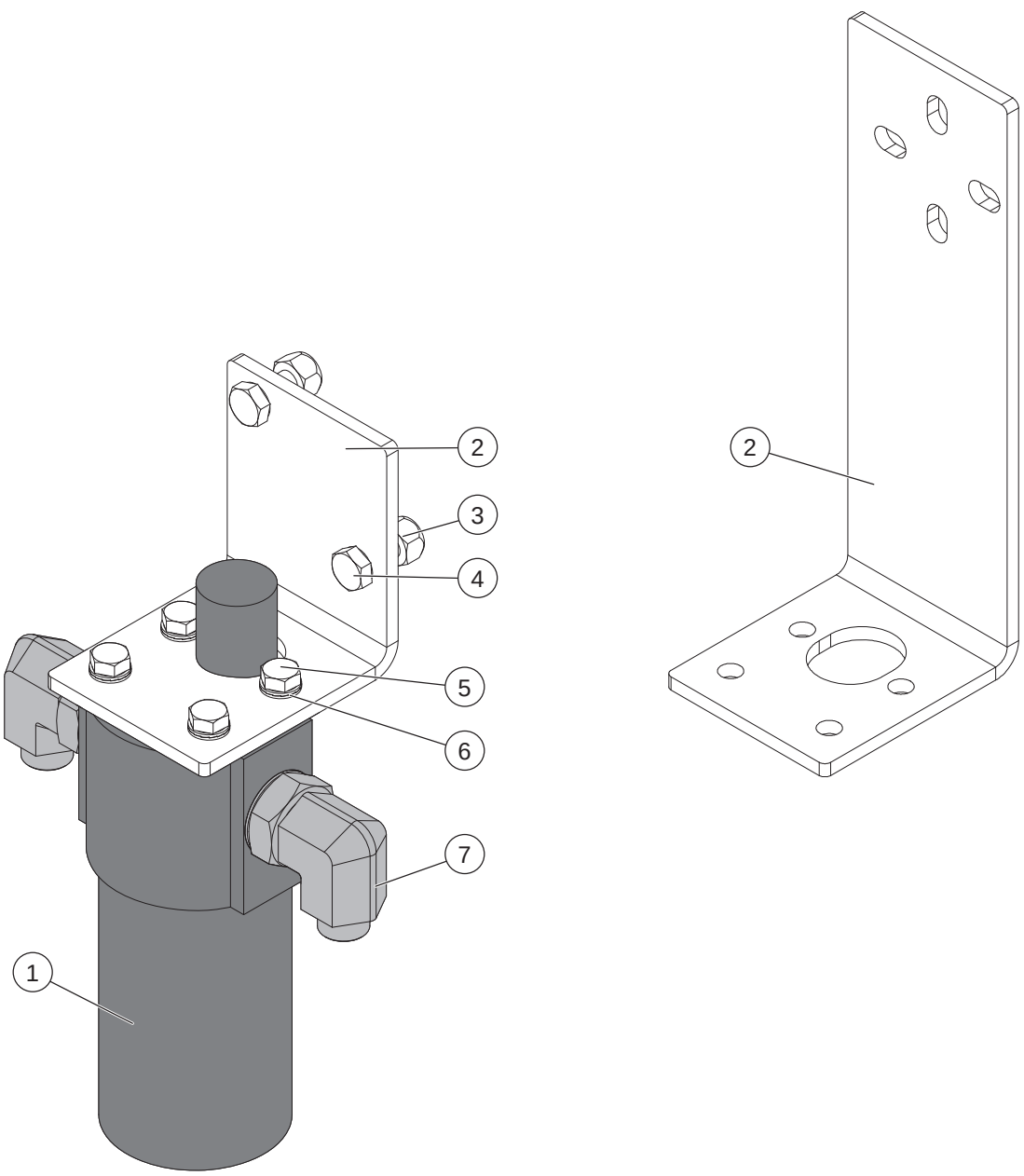


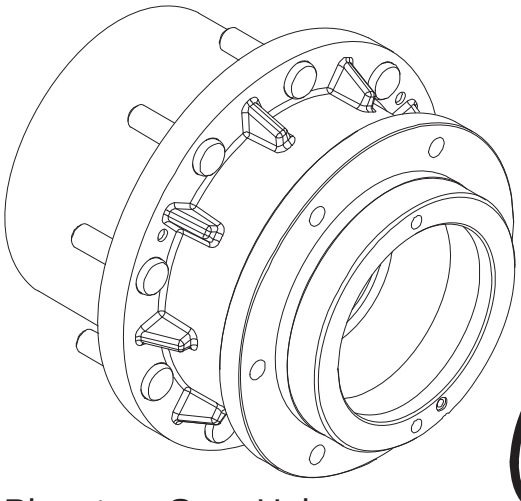
ILLUSTRATION No.
ART_4872

60-J

Pressure Filter Assembly

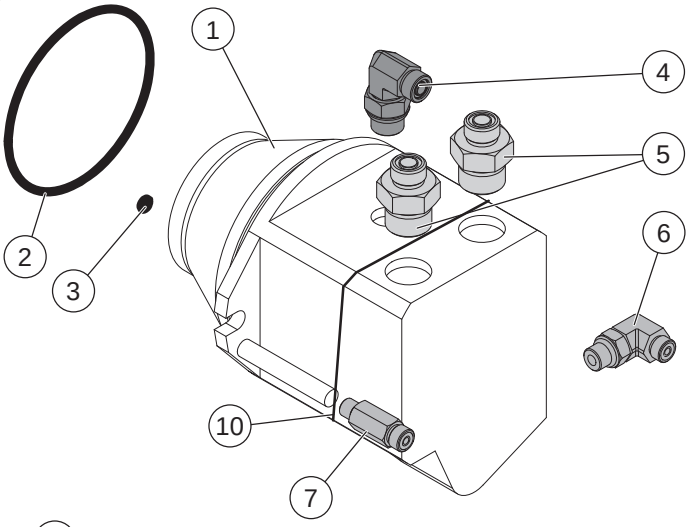
Item	Part Number	Description	Qty.
1	92785	High Pressure Filter	1
2	22657	Bracket	1
	28796	Bracket, Long -- Used on early machines	1
3	50049	Nut, M10 Nylock	2
4	50034	Bolt, M10 x 30	2
5	50219	Bolt, 3/8 x .75	4
6	50006	Washer, M10 Nordlock	4
7	50849	Fitting, MFFOR-MB90-8-12	2

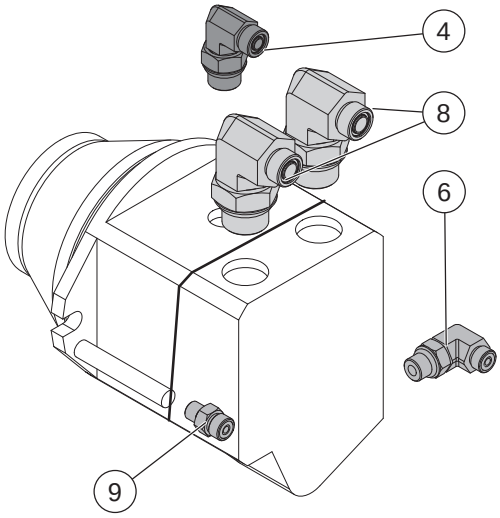
Wheel Motors



Planetary Gear Hub --
See Axles Section

Front (Steering) Wheels





Rear Wheels

ILLUSTRATION No. ART_4871 60-J Wheel Motors

Item	Part Number	Description	Qty. Per Wheel	Qty. Per Machine
1	92514	Wheel Motor	1	4
2	92166	O-Ring	1	4
3	92042	O-Ring, Brake Port	1	4
4	50847	Fitting, MFFOR-MB90-6-8	1	4
5	50838	Fitting, MFFOR-MB-8-12	2	4
6	50656	Fitting, MFFOR-MB90-4-6	1	4
7	51086	Fitting, MFFOR-MB-4-4	1	2
8	50849	Fitting, MFFOR-MB90-12-8	2	4
9	50831	Fitting, MFFOR-MB-4-4	1	4
10	93360	Gasket, Motor Housing	--	As Req.

Platform Rotator - To Serial # 14400334

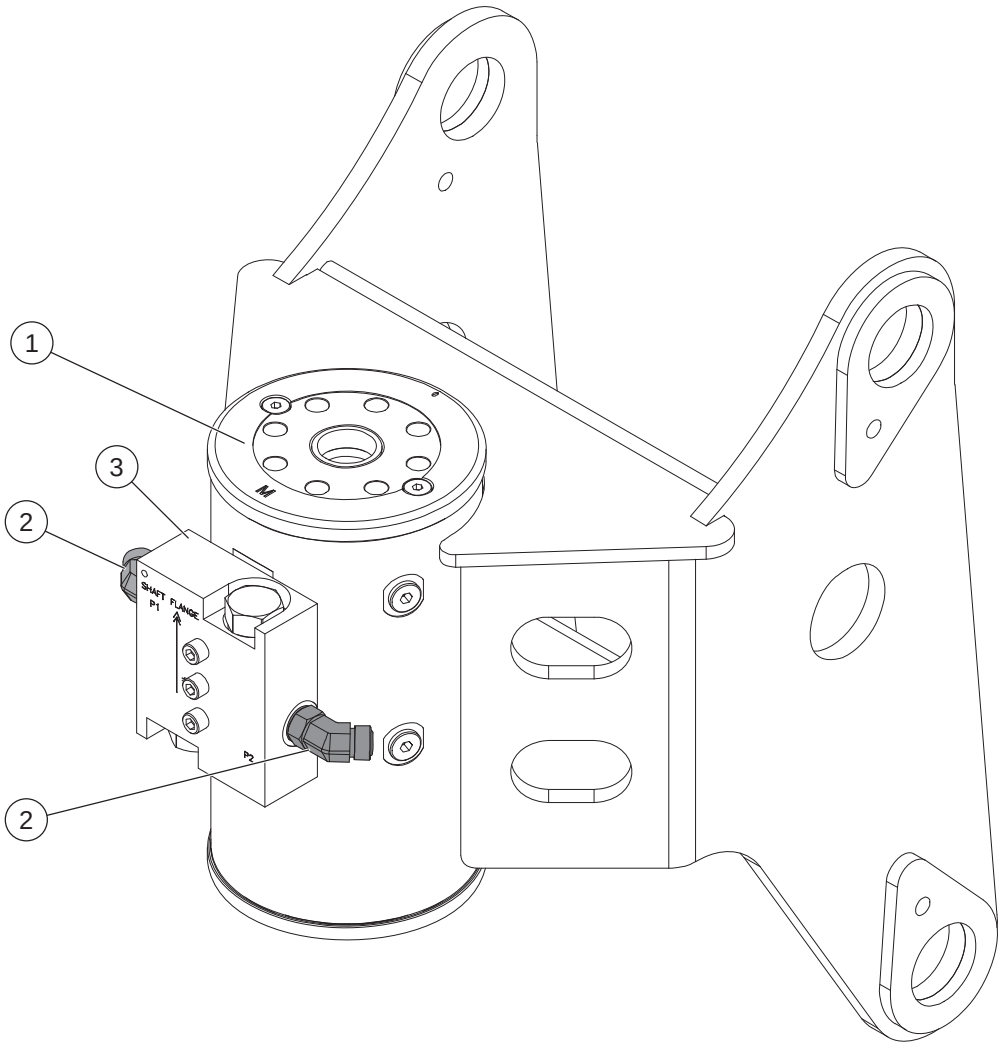


ILLUSTRATION No.
ART_4874

60-J

Platform Rotator

Item	Part Number	Description	Qty.
1	93830	Platform Rotator	1
2	50675	Fitting, MFFOR-MB45-4-4	2
3	94403	Manifold Assy	1

Platform Rotator - From Serial # 14400335

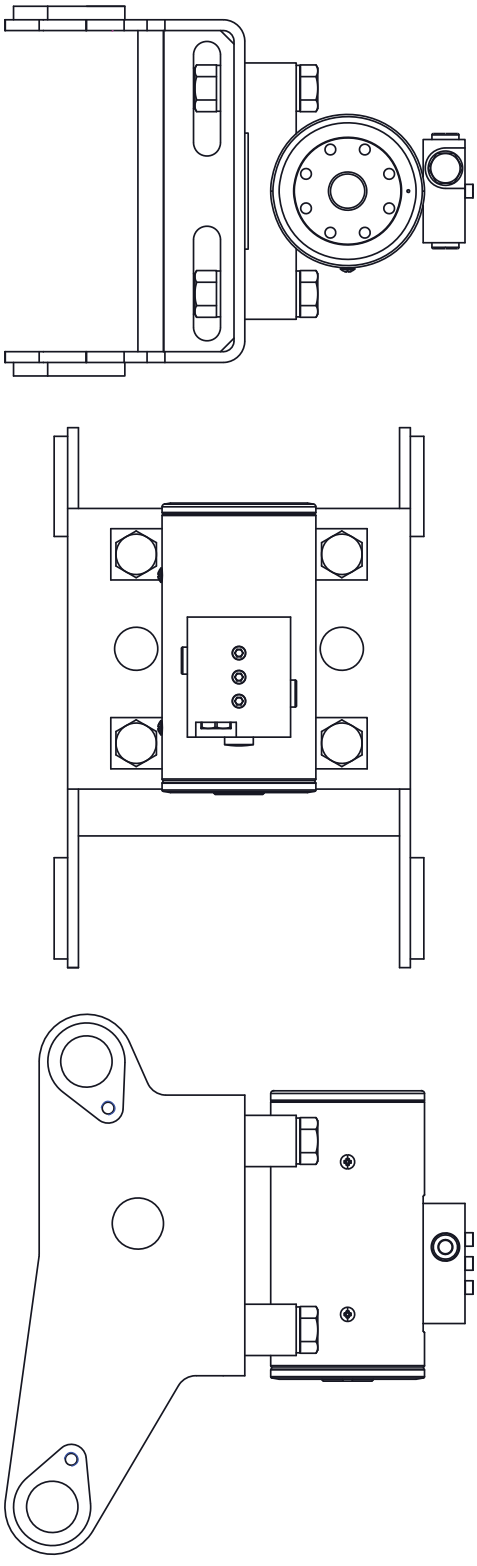


ILLUSTRATION No. Art_5308 60-J Platform Rotator

Item	Part Number	Description	Qty.
--	94682	Hydraulic Rotator, Platform (ALT for 93830)	1

Swing Drive

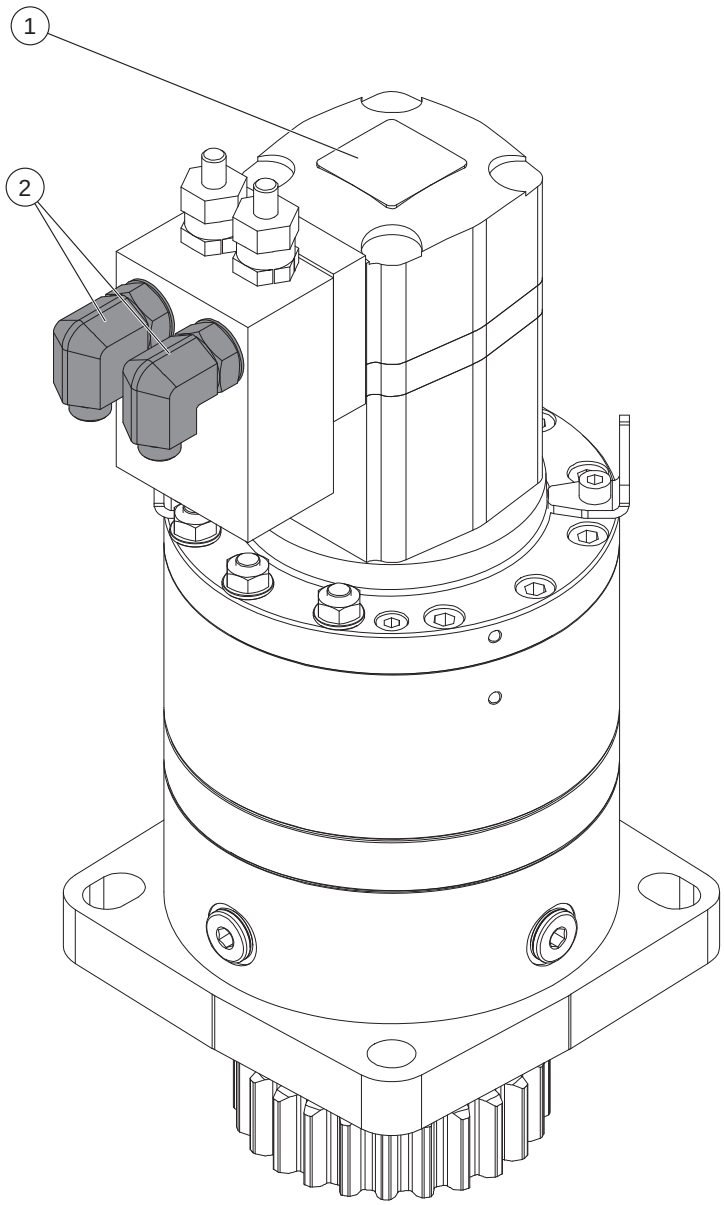
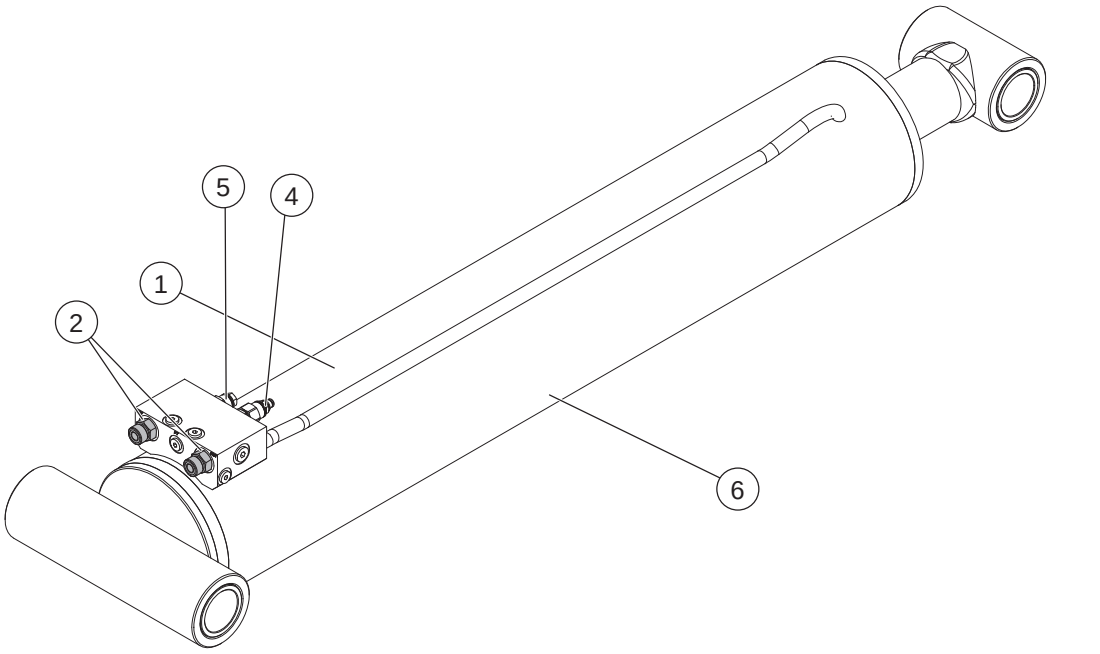


ILLUSTRATION No. ART_4875 60-J Swing Drive

Item	Part Number	Description	Qty.
1	93647	Turntable Rotator	1
2	51007	Fitting, MFFOR-MB90-6-10	2

Boom Lift Cylinders



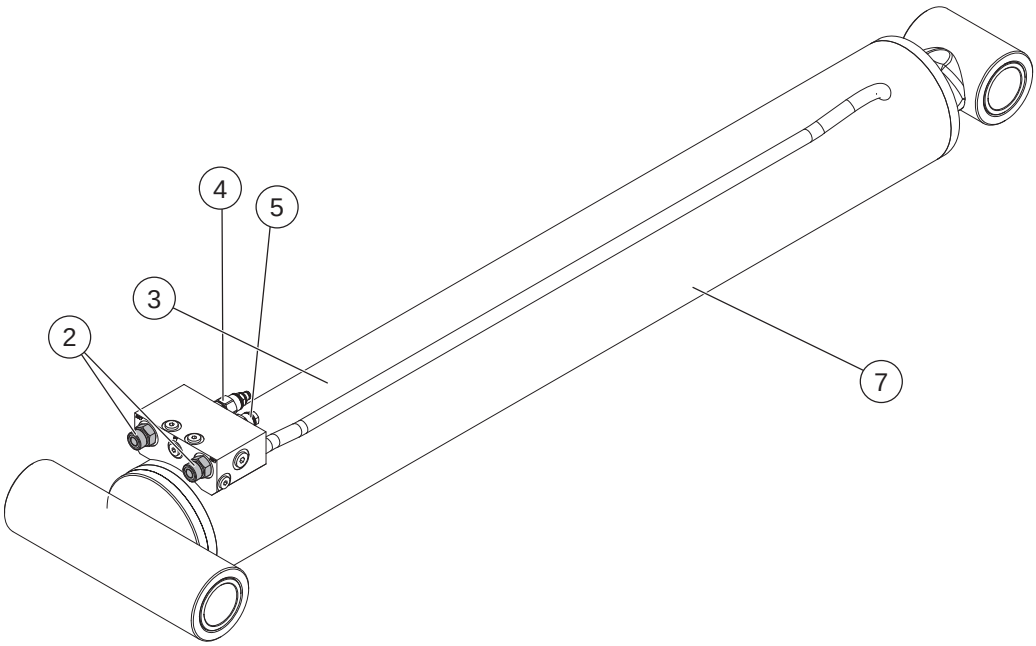


ILLUSTRATION No. ART_4876 60-J Boom Lift Cylinders

Item	Part Number	Description	Qty.
1	28396	Upper Boom Lift Cylinder	1
2	50841	Fitting, MFFOR-MB-8-8	4
3	28395	Lower boom lift cylinder	1
4	94427	Counterbalance valve	2
5	94033	Counterbalance valve	2
6	94324	Seal kit	1
7	94323	Seal kit	1

Boom Extend Cylinder

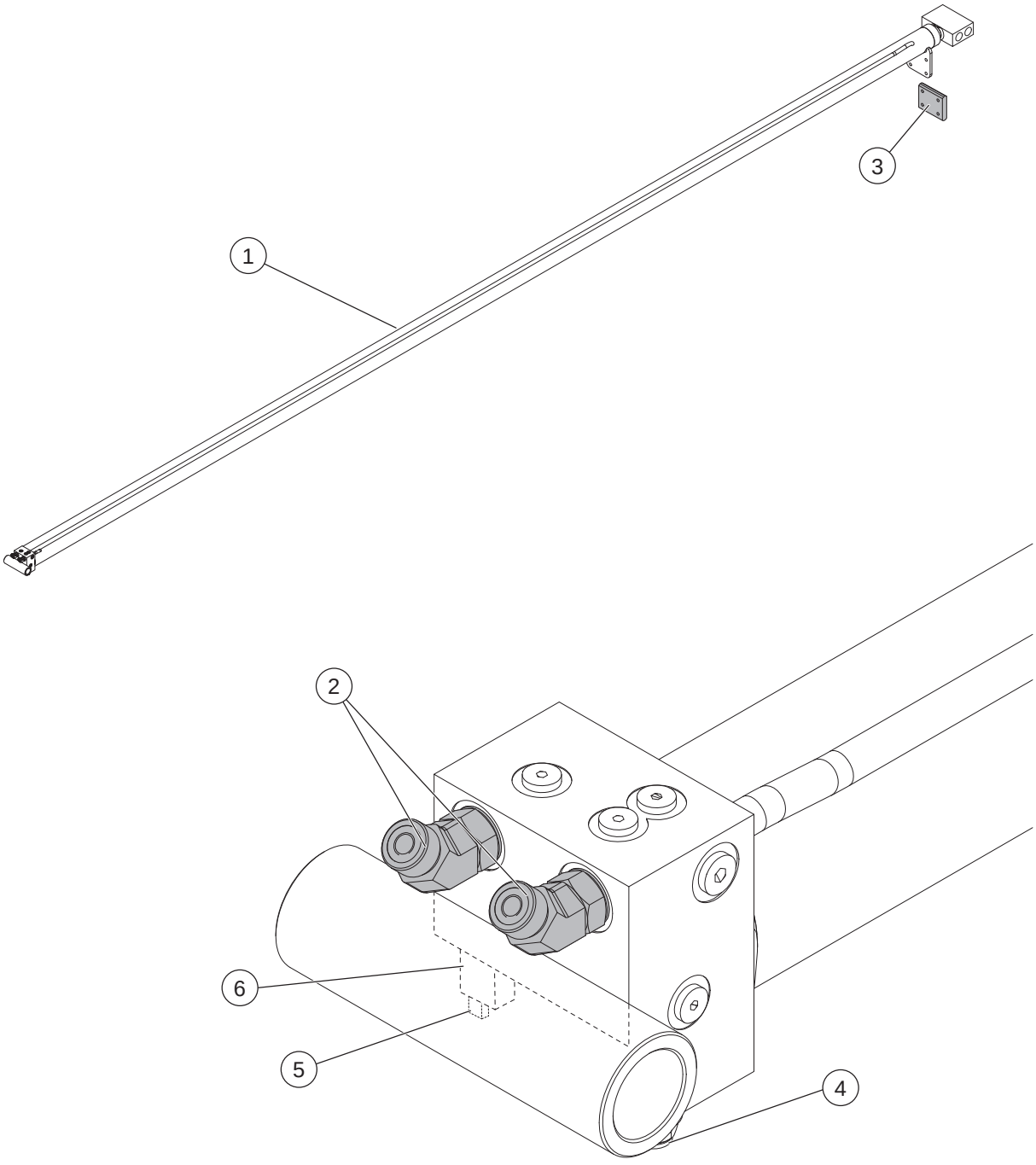


ILLUSTRATION No.
ART_4877

60-J

Boom Extend Cylinder

Item	Part Number	Description	Qty.
1	28397	Extend Cylinder	1
2	50676	Fitting, MFFOR-MB45-6-6	2
3	28643	Pad, UHMW	1
--	50020	Bolt, M10 x 50	4
--	50053	Nut, M10 Nylock	4
--	50002	Washer, M10 Flat	4
4	92020	Counterbalance Valve	1
5	94536	Counterbalance Valve	1
6	94325	Seal Kit	1

Platform Level Cylinder

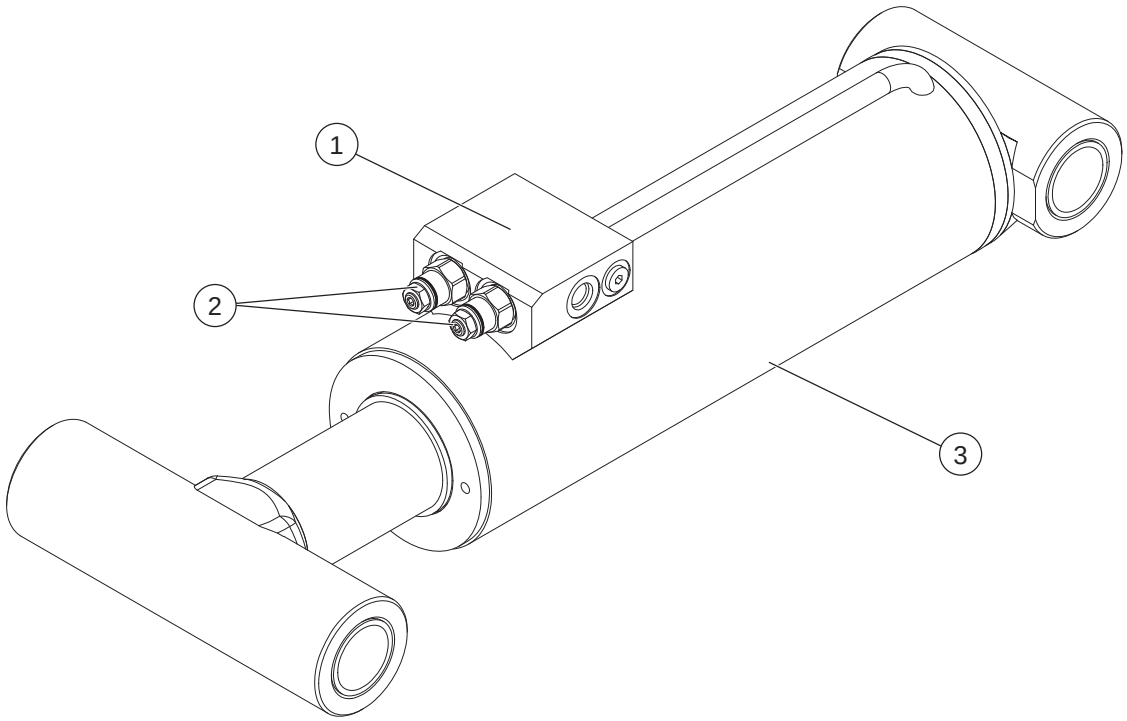


ILLUSTRATION No. ART_4878 60-J Platform Level Cylinder

Item	Part Number	Description	Qty.
1	28398	Platform Level Cylinder	1
2	94527	Counterbalance Valve	2
3	94326	Seal Kit	1

Jib Cylinder

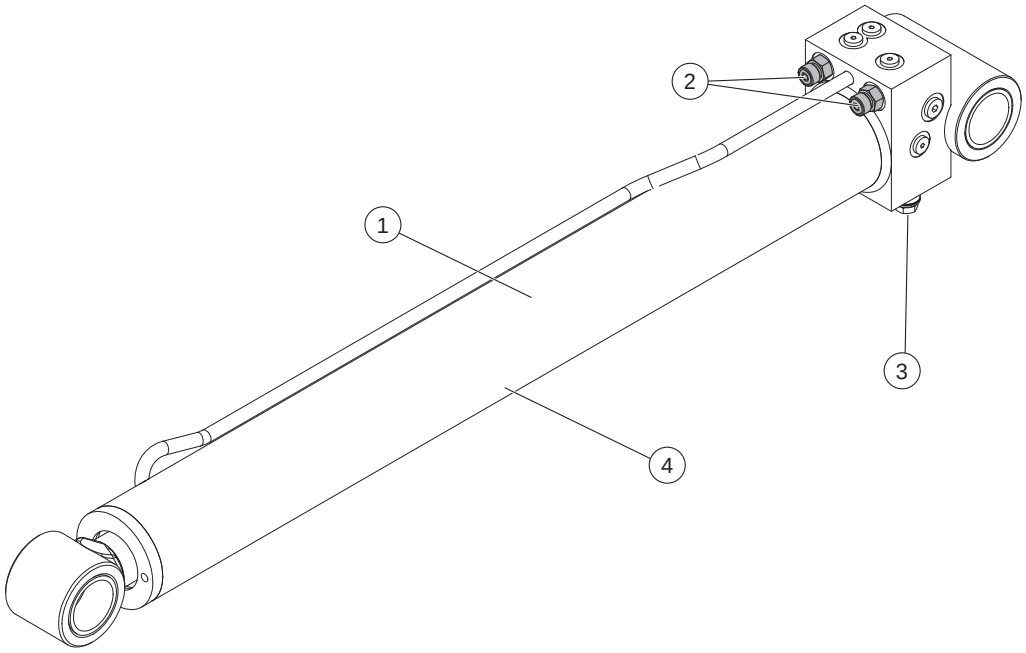
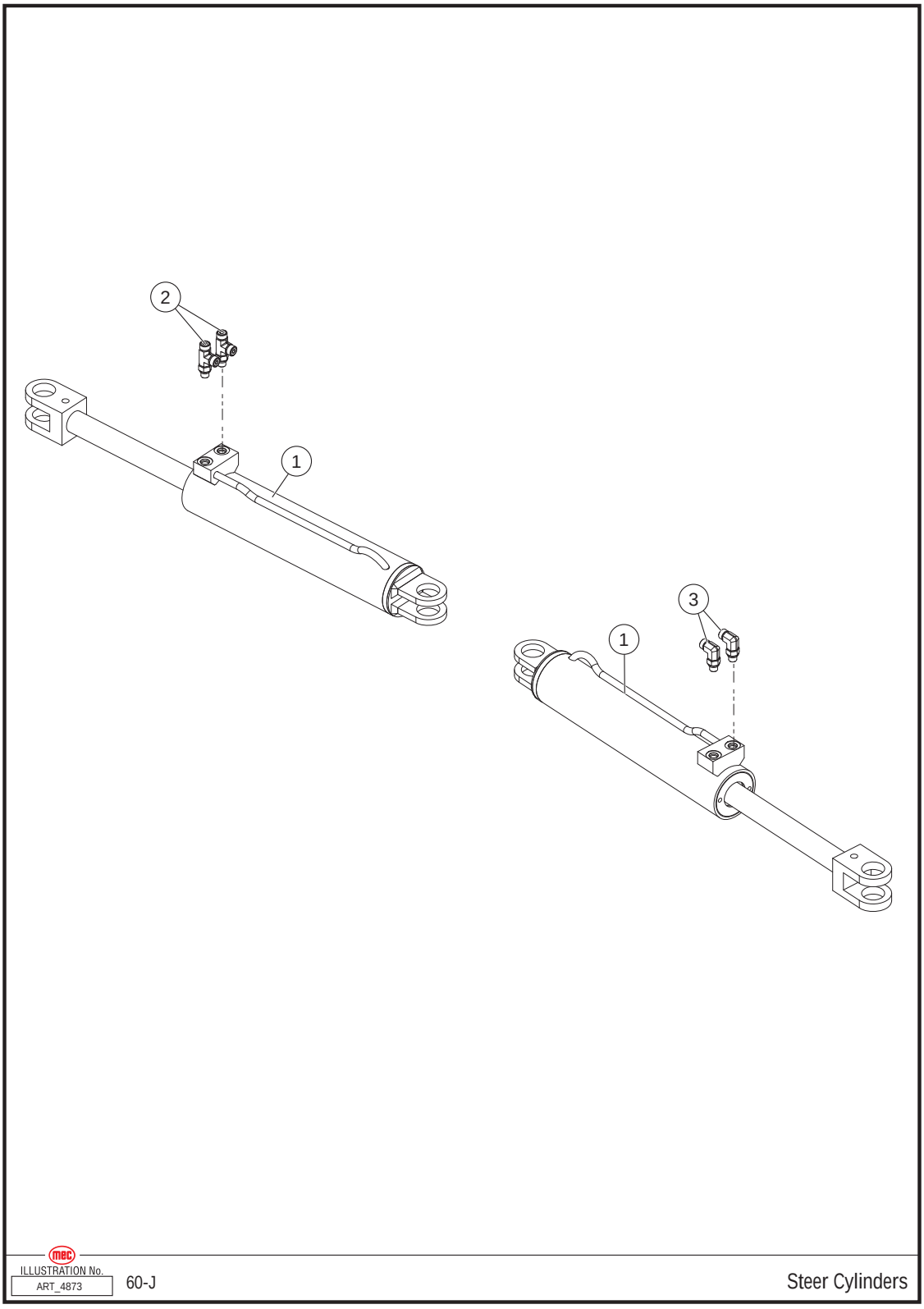


ILLUSTRATION No. ART_4879 60-J Jib Cylinder

Item	Part Number	Description	Qty.
1	28399	Jib Cylinder	1
2	50831	Fitting, MFFOR-MB-4-4	2
3	94408	Counterbalance Valve	2
4	94327	Seal Kit	1

Steer Cylinders



Item	Part Number	Description	Qty.
1	18070	Steer Cylinder, without fittings	2
--	92616	Seal Kit	2
2	50858	Fitting, MFFOR-MB-MFFORT-4	2
3	50673	Fitting, MFFOR-MB90-04-04	2

Axle Cylinders

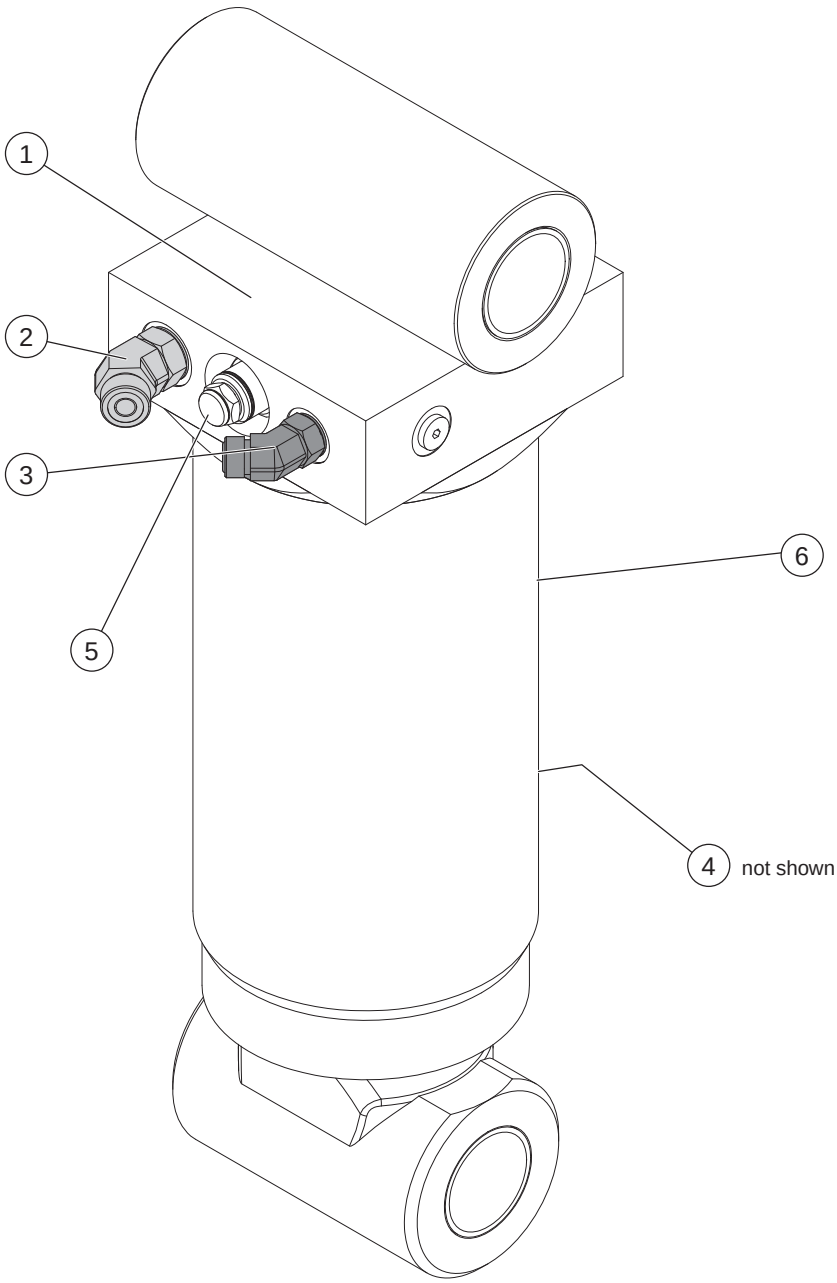


ILLUSTRATION No.
ART_4880

60-J

Axle Cylinders

Item	Part Number	Description	Qty.
1	22315	Axle Cylinder	1
2	50676	Fitting, MFFOR-MB45-6-6	1
3	50675	Fitting, MFFOR-MB45-4-4	1
4	51167	Fitting, MP-MFFOR-4-4	1
5	92622	Counterbalance Valve	1
6	94328	Seal Kit	1

Hydraulic Hoses

Part Number	Connections	Description	Qty.
52546	BRK-8/AXLE-5	Hose, Assembly, 1/4" x 36", 04G-04FFORX 04G-04FFORX90S	2
52547	2SPD-4	Hose Assembly, 1/4" x 32", 04G-04FFORX x 04G-04FFORX90S	1
52548	STB-7	Hose Assembly, 1/4" x 38", 04G-04FFORX x 04G-04FFORX90S	1
52549	STA-6	Hose Assembly, 1/4" x 42", 04G-04FFORX x 04G-04FFORX90S	1
52550	STRRET-STREXT	Hose Assembly, 1/4" x 38", 04G-04FFORX x 04G-04FFORX90S	2
52551	Various	Hose Assembly, 1/4" x 71 1/2" 04G-04FFORX x 04G-04FFORX90S	4
52552	PLLU-BHB/PLLD-BHT	Hose Assembly, 1/4" x 495", 04G-04FFORX x 04G-04FFORX	2
52553	SF/SR-BH	Hose Assembly, 1/4" x 503", 04G-04FFORX x 04G-04FFORX	2
52554	RL/RR-BH	Hose Assembly, 1/4" x 563", 04G-04FFORX x 04G-04FFORX	2
52555	Various	Hose Assembly, 1/4" x 37", 04G-04FFORX x 04G-04FFORX	4
52556	2SPDLR - 2SPDRRT	Hose Assembly, 1/4" x 60", 04G-04FFORX x 04G-04FFORX90S	1
52557	2SPEDT - 4A	Hose Assembly, 1/4" x 28", 04G-04FFORX x 4G-4FFORX 45	1
52558	BRKLR - BRKRRT	Hose Assembly, 1/4" x 62", 04G-04FFORX x 4G-4FFORX 45	1
52559	AXLR - T	Hose Assembly, 1/4" x 10", 04G-04FFORX x 4G-4FFORX 45	2
52560	AXLT - 5	Hose Assembly, 1/4" x 53", 04G-04FFORX x 04G-04FFORX90S	1
52561	RRBRKT - 8B	Hose Assembly, 1/4" x 83", 04G-04FFORX x 04G-04FFORX90S	1
52562	RR2SPD - 4B	Hose Assembly, 1/4" x 82", 04G-04FFORX x 4G-4FFORX 45	1
52563	6-STRRET/7-STREXT	Hose Assembly, 1/4" x 71", 04G-04FFORX x 4G-4FFORX 45	2
52564	CDABT - 3A	Hose Assembly, 3/8" x 23", 6G-6FFORX x 6G-6FFORX	1
52565	CDRRT - 3B	Hose Assembly, 3/8" x 83", 6G-6FFORX x 6G-6FFORX	1
52566	CDLR - CDRRT	Hose Assembly, 3/8" x 64", 6G-6FFORX x 6G-6FFORX 90S	1
52567	SMB-1/SMB-2	Hose Assembly, 3/8" x 18", 6G-6FFORX x 6G-6FFORX 45	2
52568	PS-P/PR-T	Hose Assembly, 3/8" x 312", 6G-6FFORX x 6G-6FFORX 45	2
52569	BCR - LCR	Hose Assembly, 3/8" x 80", 6G-6FFORX x 6G-6FFORX 45	1
52570	LCE - UPCR	Hose Assembly, 3/8" x 205", 6G-6FFORX x 6G-6FFORX 45	1
52571	BCE - UPCE	Hose Assembly, 3/8" x 260", 6G-6FFORX x 6G-6FFORX	1
52572	ECE-ECE/ECR-ECR	Hose Assembly, 3/8" x 290", 6G-6FFORX x 6G-6FFORX 45	2
52573	LFCD/RFCD-T	Hose Assembly, 3/8" x 66", 6G-6FFORX x 6G-6FFORX 90S	2
52574	LRCD -RRCD T	Hose Assembly, 3/8" x 64", 6G-6FFORX x 6G-6FFORX 90S	1
52575	AXLE LE/RE-8PORT	Hose Assembly, 3/8" x 22", 6G-6FFORX x 6G-6FFORX 45	2
52576	LBHUPERT-CHCK	Hose Assembly, 3/8" x 16", 6G-8FFORX x 6G-6FFORX 90S	1
52577	GP - P	Hose Assembly, 1/2" x 70", 8G-8FFORX x 8G-8FFORX 90L	1
52578	T - RF	Hose Assembly, 1/2" x 90", 8G-8FFORX x 8G-8FFORX 90	1
52579	3 - TANK	Hose Assembly, 1/2" x 74", 8G-8FFORX x 8G-8FFORX 90	1

52580	Various	Hose Assembly, 1/2” x 57", 8G-8FFORX x 8G-8FFORX	4
52581	RBHLWR-PORT 2T	Hose Assembly, 1/2” x 35", 8G-8FFORX x 8G-12FFORX90S	1
52582	LBHLWR-PORT 1T	Hose Assembly, 1/2” x 30", 8G-8FFORX x 8G-12FFORX	1
52583	RT-FT	Hose Assembly, 1/2” x 80", 8G-8FFORX x 8G-8FFORX	1
52584	LRB-PORT 1T	Hose Assembly, 1/2” x 89", 8G-8FFORX x 8G-12FFORX90	1
52585	LRA/RRA-T	Hose Assembly, 1/2” x 27", 8G-8FFORX x 8G-8FFORX	2
52586	RRB-PORT 2T	Hose Assembly, 1/2” x 85", 8G-8FFORX x 8G-12FFORX90	1
52587	RBHUPPR- LBHUPPR	Hose Assembly, 1/2” x 17", 8G-8FFORX45 x 8G-8FFORX45	1
52588	A-MA/B-MB	Hose Assembly, 1/4" x 68", 4G-4FFORX x 4G-4FFORX 45	2
52589	CP-FET	Hose Assembly, 3/8" x 70", 6G-6FFORX x 6G-6FFORX 45	1
52590	2SPDTPRT-EDOWN	Hose Assembly, 3/8" x 30", 6G-6FFORX x 6G-8FFORX 90	1
52591	EDOWNP-AUX	Hose Assembly, 3/8" x 39", 6G-6FFORX x 6G-6FFORX 90S	1
52592	G-CFO	Hose Assembly, 1/2” x 18", 8G-8FFORX x 8G-8FFORX 90L	1
52593	FET-CFI	Hose Assembly, 1/2” x 9", 8G-8FFORX x 8G-8FFORX 90	1
52594	BV-3/4T-EDOWN	Hose Assembly, 1/2” x 75", 8G-8FJX x 8G-8FFORX	1
52595	H1CD-TANK	Hose Assembly, 1/2” x 64", 8G-8FFORX x 8G-8FFORX 90L	1
52596	B-1	Hose Assembly, 3/4” x 63", 12G-12FFORX x 12G-12FFORX 90	1
52597	A-2	Hose Assembly, 3/4” x 60", 12G-12FFORX x 12G-12FFORX 90	1
52598	SGP-BV3/4	Hose Assembly, 3/4” x 50", 12G-12FJX x HYCR 12G-12FJX90	1
52599	SH1-BV1	Hose Assembly, 1” x 39", 16G-16FJX x 16G-16FJX90S	1
52600	8PRT MANIFLD-8A	Hose Assembly, 1/4" x 23", 4G-4FFORX x 04G-06FFORX90S	1
52674	SLIDE TUBE HOSE	Hose Assembly, 1/4" x 59", 4G-4FFORX x 4G-4FFORX	2
52675	FCDMF-AXLCD	Hose Assembly, 1/4" x 35", 4G-4FFORX x 4G-4FFORX 45	2
52676	P-GPP/GPH-T	Hose Assembly, 1/4" x 34", 08G-08FFORX x 08G-08FFORX90S	2
52677	GLS-LS	Hose Assembly, 1/4" x 34", 4G-4FFORX x 04G-04FFORX90S	1
52678	GCD-T	Hose Assembly, 1/4" x 34", 4G-4FFORX x 04G-06FFORX 90S	1
52710	CP-FET	Hose Assembly, 1/2" x 70" 8G-6FFORX-HYCR 08G x 8G-8FFORX45 GATES	1
52724	PF-P	Hose Assembly, 5/8" x 78", 10G-10FFORX x 10G-10FFORX90S	1
52725	GP-PF	Hose Assembly, 5/8" x 16", 10G-10FFORX x 10G-10FFORX	1
52726	PR-PMT	Hose Assembly, 1/2” x 312" 8G-8FFORX GATES x 8G-8FFORX45S GATES	1
52727	T-RF	Hose Assembly, 3/4” x 85", 12G-12FFORX x 12G-12FFORX 90	1
52728	PLS-GLS	Hose Assembly, 1/4" x 85", 4G-4FFORX x 04G-04FFORX90S	1
52729	BHUPPER-PLCEXT BHLOWER-PLCRET	Hose Assembly, 1/4" x 312" 4G-4FFORX x 04G-06MBX90BL GATES	2

Chassis

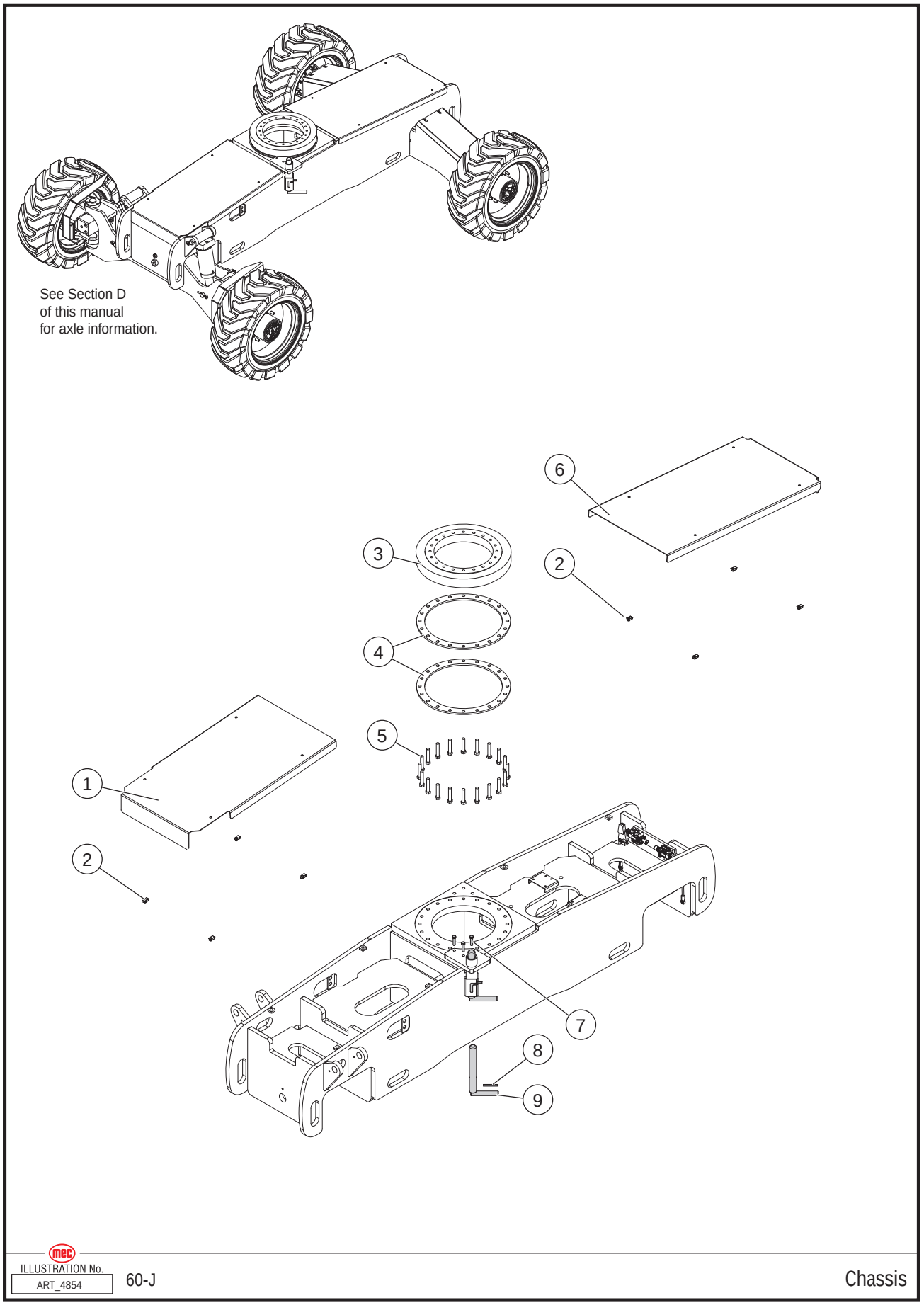


ILLUSTRATION No. ART_4854 60-J Chassis

Item	Part Number	Description	Qty.
1	28615	Front Chassis Cover	1
--	50332	Bolt, M10 x 35	8
--	50002	Washer, M10 Flat	8
2	92098	Clip Nut	8
3	93646	Swing Bearing	1
4	28617	Spacer	2
5	50580	Bolt, 5/8 x 3-1/4	20
--	50582	Washer, 5/8 x 1-5/16 x 3/16 Hardened Structural	20
6	28616	Rear Chassis Cover	1
7	50493	Bolt, M16 x 70	4
--	50597	Nut, M16 Nylock	4
8	93862	Spring Pin, 3/8 x 3	1
9	28730	Turret Lock Pin Weldment	1

Module Doors

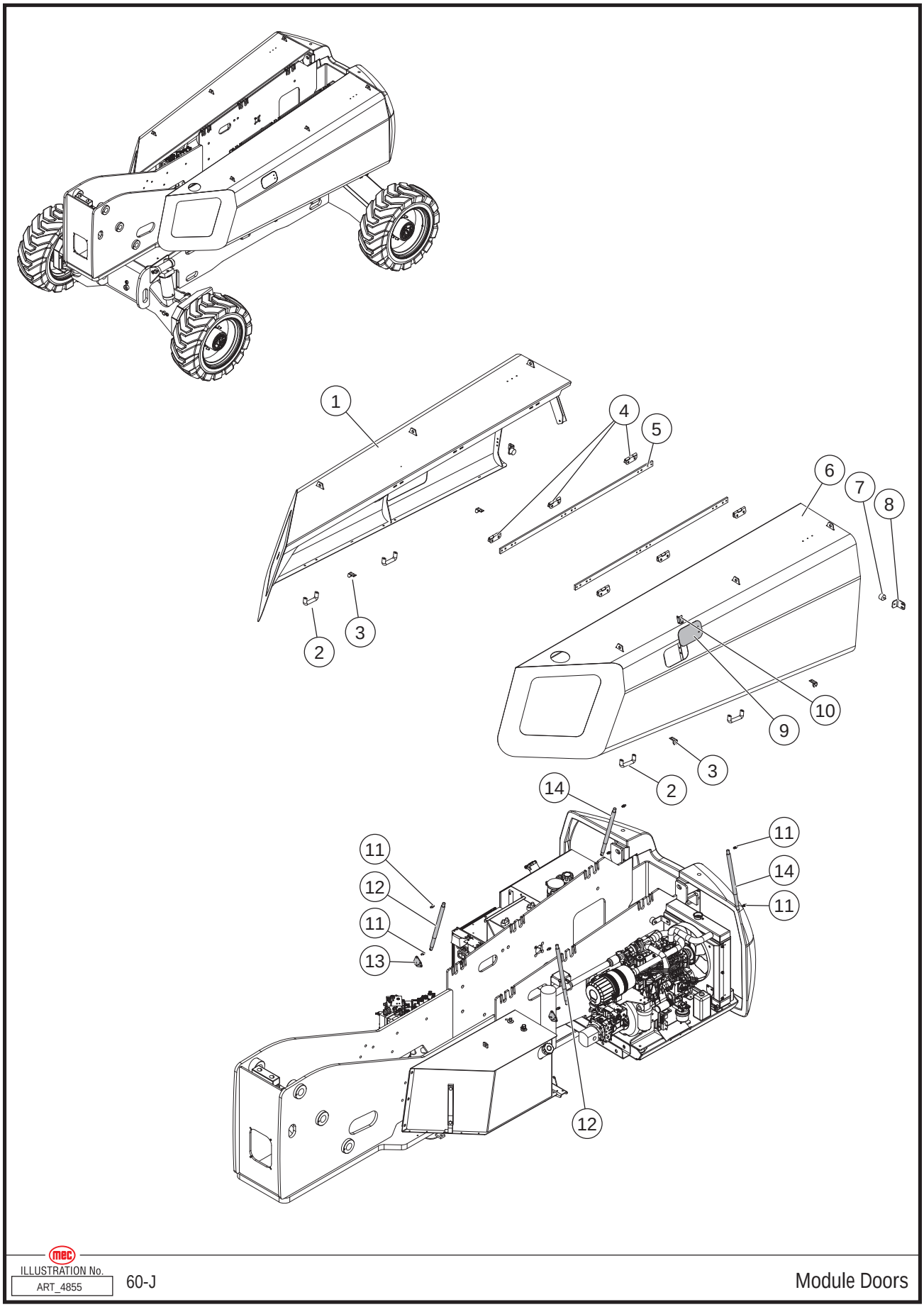


ILLUSTRATION No. ART_4855 60-J Module Doors

Item	Part Number	Description	Qty.
1	28226	Module Door, Controls Side	1
2	93821	Door Handle	4
3	93817	Door Latch	4
--	93817	Door Hold Down Strap (not shown)	--
4	93733	Hinge	6
5	28236	Hinge Spacer	2
6	28225	Module Door, Power Side	1
7	93845	Bumper	2
8	28728	Bracket	2
9	22400	Fuel Door	1
10	9221376	Hinge	1
11	93738	Ball Stud	8
12	94104	Gas Shock Locking	2
13	28719	Mount Plate	2
14	93952	Gas Spring	2

Engine Module

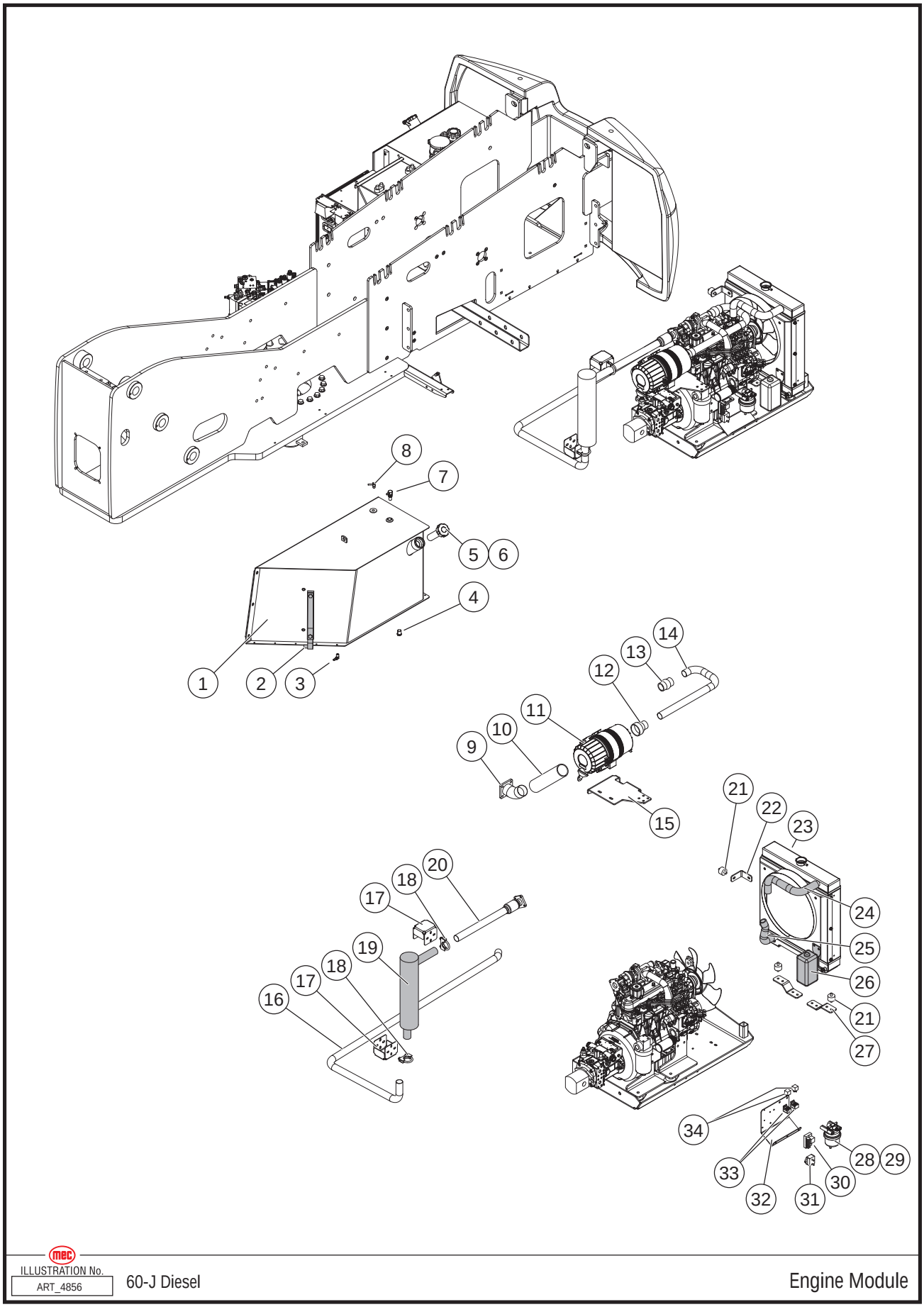


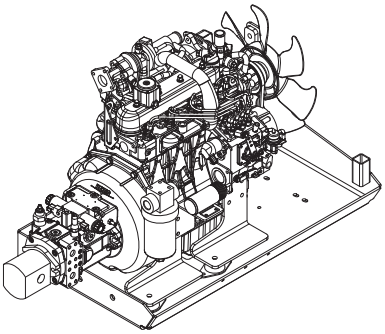
ILLUSTRATION No. ART_4856

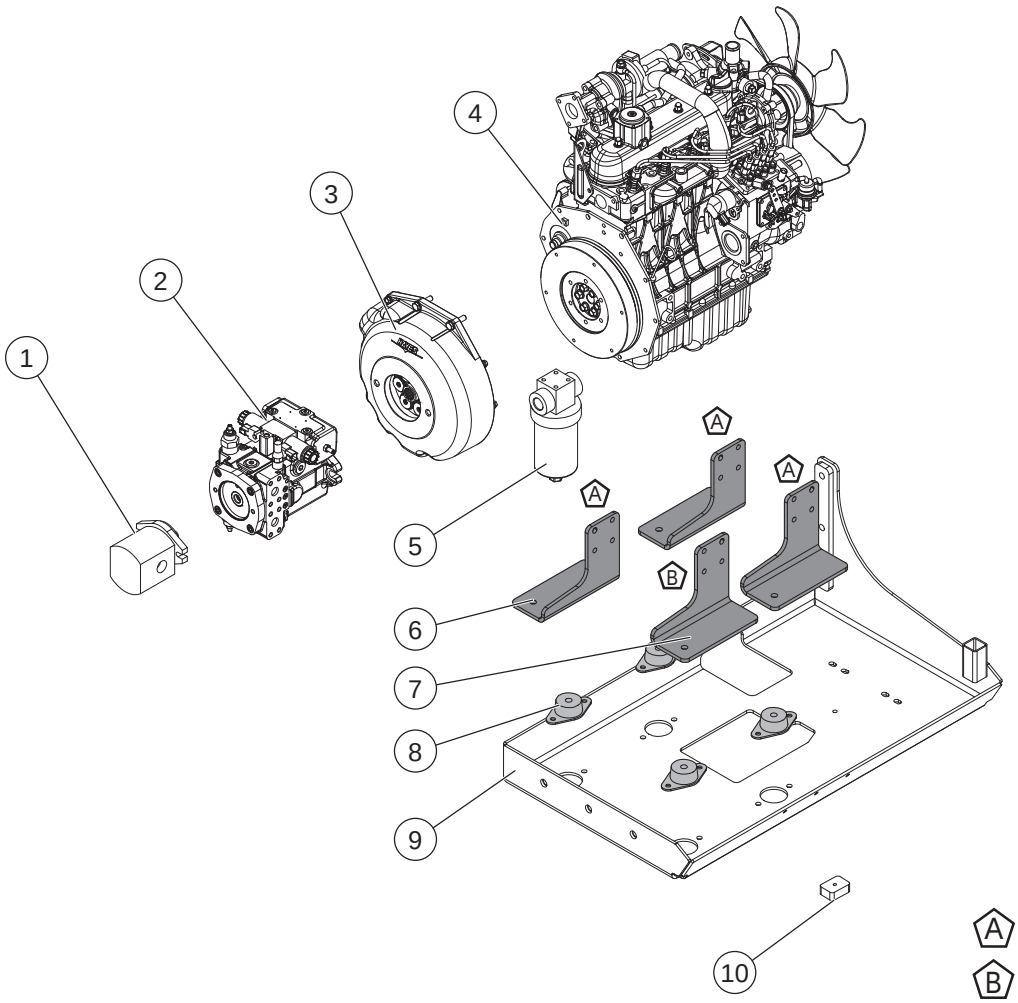
60-J Diesel

Engine Module

Item	Part Number	Description	Qty.
1	28670	Fuel Tank Weldment	1
2	93799	Sight Gauge	1
3	HDW6727	Fitting	1
4	51098	Drain Plug	1
5	92480	Filler Cap	1
6	92967	Filler Screen	1
7	92699	Fitting,	1
8	92488	Fitting	1
9	28671	Tube Flange	1
10	93758	Intake Tube	1
11	93737	Air Filter Assembly	1
--	93907	Filter Element	--
12	93757	Reducing Coupler	1
13	93756	Coupler	1
14	28665	Turbo Intake Tube	1
15	28663	Mount Plate	1
16	28672	Exhaust Tube	1
17	28664	Bracket	2
18	93267	Clamp	2
19	93832	Muffler	1
20	28669	Exhaust Tube Weldment	1
21	93728	Isolator	3
22	28662	Bracket	1
23	93644	Radiator	1
24	93794	Upper Radiator Hose	1
25	93793	Lower Radiator Hose	1
26	91127	Overflow Bottle	1
27	28661	Bracket	2
28	91116	Fuel Filter Assy	1
29	91123	Fuel Filter Element	1
30	92940	Throttle Solenoid Controller	1
31	92403	Circuit Breaker	1
32	28675	Mount Plate	1
33	92103	Relay Base	2
34	91375	Relay	2

Engine Assembly





A 4 x #50116

B 4 x #50392
Longer bolt to mount Throttle Solenoid bracket at this location. See next page.

ILLUSTRATION No. ART_4857

60-J Diesel

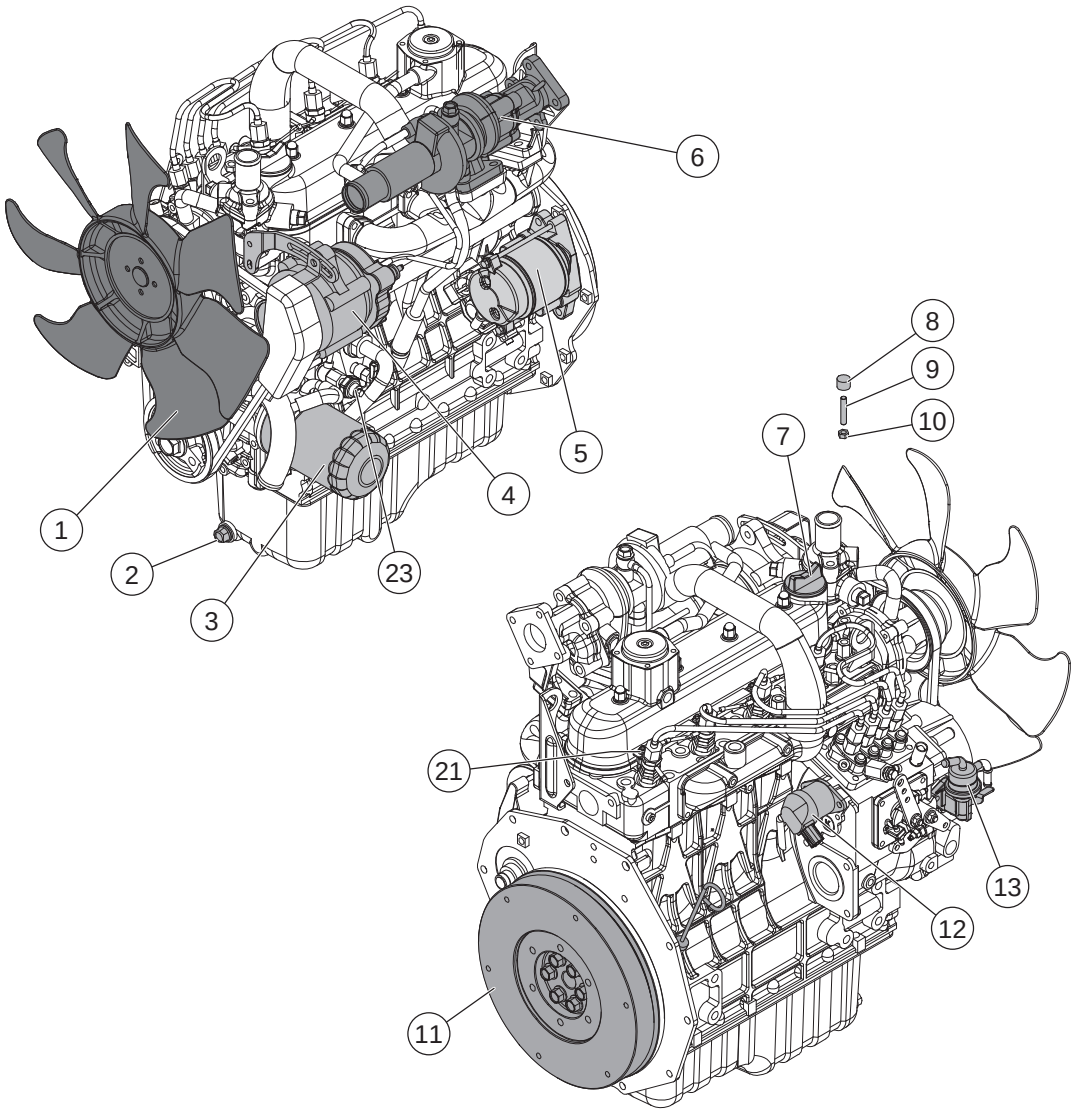
Engine Assembly

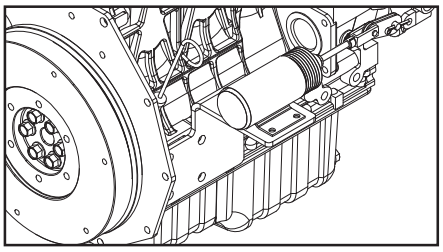
Item	Part Number	Description	Qty.
1	REF	Gear Pump -- See Section 25	1
2	REF	Piston Pump -- See Section 25	1
3	93470	Bell Housing	1
4	93505	Engine	1
5	REF	Charge Filter Assembly -- See Section 25	1
6	28652	Engine Bracket	2
7	28659	Engine Bracket	2
8	17969	Engine Mount	4
9	28640	Engine Tray	1
10	28249	Door Latch Mount	1

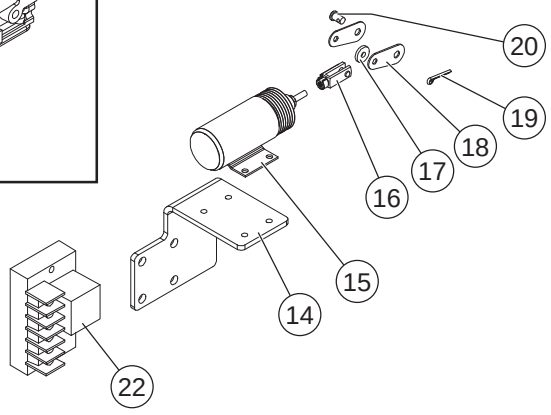
REF – Reference

Hardware on this page			
Gear Pump to Piston Pump			
--	5004	2	Bolt, 3/8 x 1
--	50006	2	M10 Nordlock
Piston Pump to Bell Housing			
--	50069	2	Bolt, 1/2 x 1.5
--	50007	2	Washer, M12 Nordlock
--	50003	2	Washer, M12 Flat
Location A			
--	50116	12	Bolt, M10 x 25
--	50006	12	Washer, M10 Nordlock
Location B			
--	50392	4	Bolt, M10 x 30
--	50006	12	Washer, M10 Nordlock
Engine Bracket/Engine Mount/Engine Tray			
--	50025	4	Bolt, M12 x 60
--	50207	8	Washer, 1/2 Flat
--	50050	4	Nut, M12 Nylock

Engine Components







See previous pages for Solenoid Mounting Bracket hardware.

ILLUSTRATION No. ART_4858 60-J Diesel Engine Components

Item	Part Number	Description	Qty.
1	94038	Fan	1
--	94040	V-Belt	1
2	94038	Oil Plug	1
3	8665	Oil Filter	1
4	90227	Alternator	1
5	8413	Starter	1
6	94060	Turbo	1
7	94056	Oil Filler Cap	1
8	93968	Turbo Tube Support	1
9	28776	Stud	1
10	53014	Nut, M8-1.25	1
11	94058	Flywheel	1
--	91360	Ring Gear	1
12	94057	Fuel Solenoid	1
13	93619	Fuel Pump	1
14	28653	Mounting Bracket	1
15	92939	Throttle Pull Solenoid	1
16	91117	Throttle Link Clevis	1
--	50296	Bolt, M6 x 15	4
--	50000	Washer, M6 Std	4
--	50047	Nut, M6 Nylock	4
17	91588	Washer	1
18	16347	Throttle Link	2
19	50178	Cotter Pin	1
20	50171	Clevis Pin	1
21	94059	Glow Plug	4
22	92940	Throttle Solenoid Controller	1
23	91175	Oil Pressure Switch	1

Controls Module

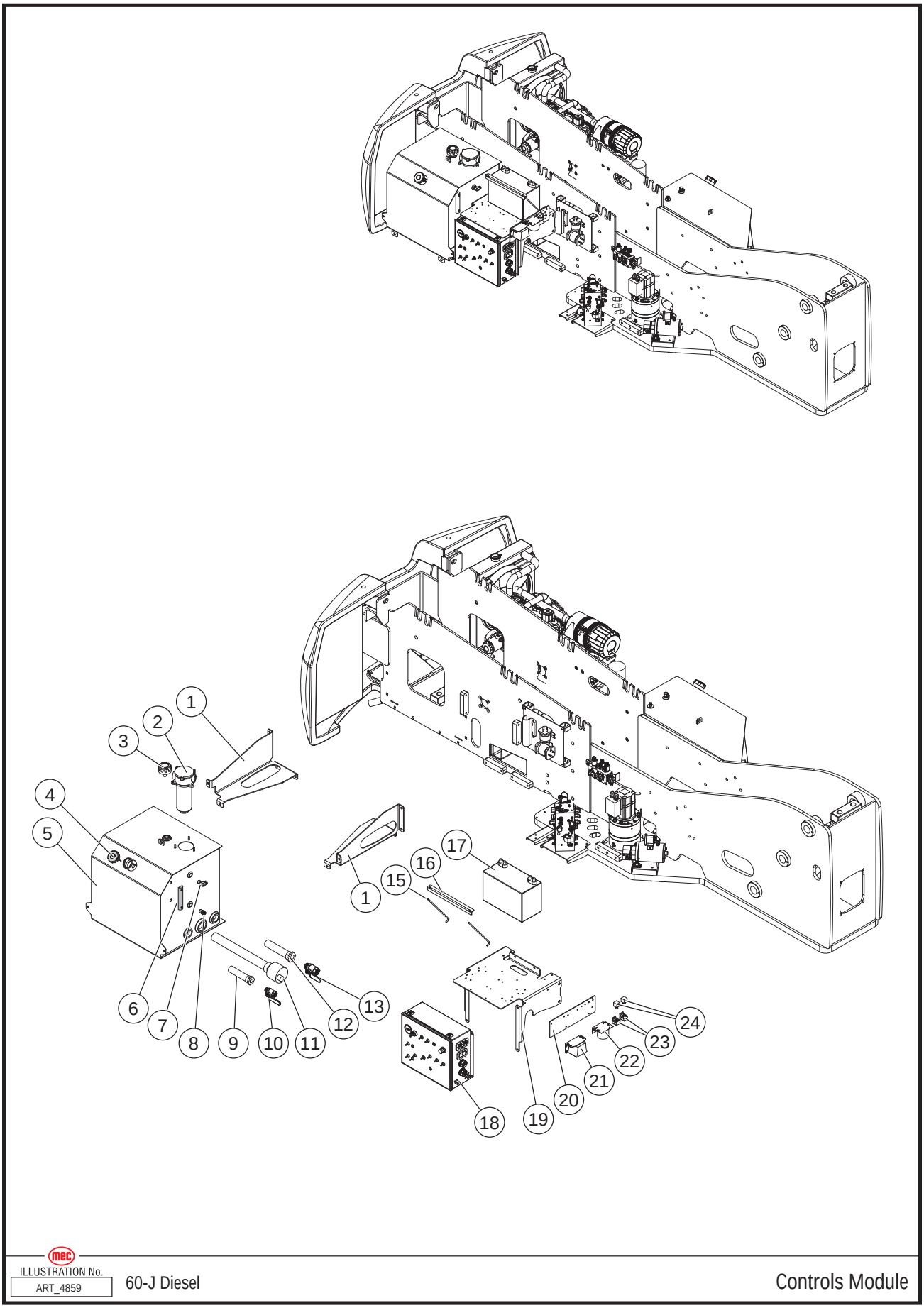


ILLUSTRATION No. ART_4859 60-J Diesel Controls Module

Item	Part Number	Description	Qty.
1	28628	Bracket	2
2	92366	Return Filter Assembly	1
--	92397	Filter Element	--
3	92357	Breather Cap	1
4	92478	Filler Cap	1
5	28660	Fuel Tank Weldment	1
6	9370	Sight Gauge	1
7	51161	Fitting, MFFOR-MP90-8-8	1
8	50876	Fitting, MFFOR-MP-8-8	1
9	93167	**~Serial #1440070** -- Suction Strainer	1
	93706	**Serial #1440071~** -- Suction Strainer	1
10	93605	**~Serial #1440070** -- Ball Valve, 3/4”	1
	93123	**Serial #1440071~** -- Ball Valve, 1”	1
11	92508	Tank Heater	1
12	93706	Suction Strainer	1
13	93123	Ball Valve, 1”	1
14	--	--	--
15	22563	Battery Hold-Down Bolt	2
16	17475	Battery Bracket	1
17	17966	Battery, 950 CCA Group 31	1
18	REF	Lower Controls Box -- See Section 21	1
19	28624	Controls Mounting Bracket	1
20	28627	Mounting Plate	1
21	9716	Horn	1
22	91539	Alarm	1
23	92103	Relay Base	2
24	91375	Relay	2

REF – Reference

Controls Module #2

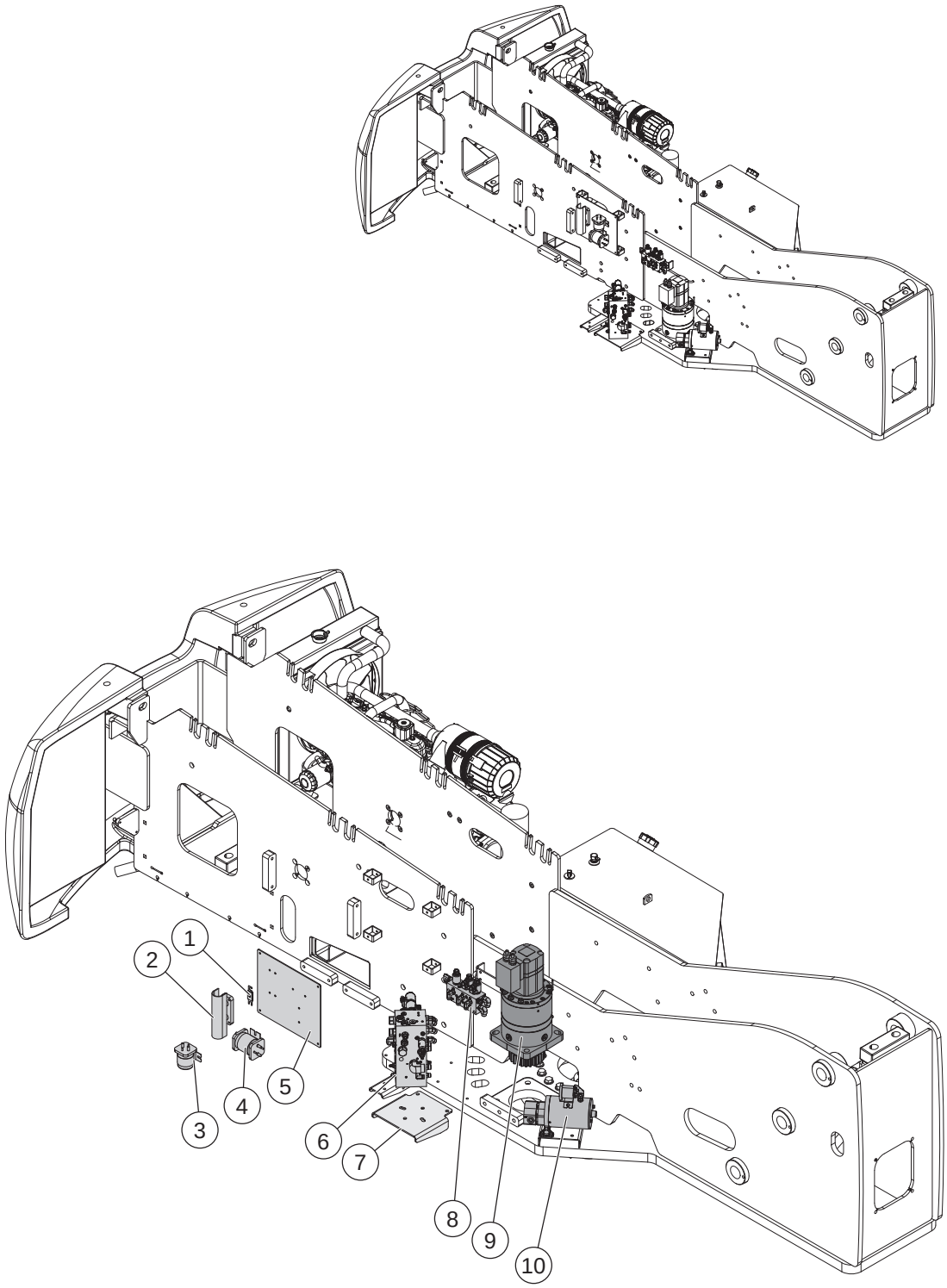


ILLUSTRATION No. ART_4860

60-J Diesel

Controls Module

Item	Part Number	Description	Qty.
1	93173	Fuse, 400A	1
2	93172	Fuse Holder	1
3	91745	Contactor, 12V	1
4	93169	Series/Parallel Switch -- 24v Auxiliary Power Option	1
5	28677	Mounting Plate	1
6	REF	Functions Manifold -- See Section 25	1
7	28622	Mounting Plate	1
8	REF	Brake/2Spd Manifold -- See Section 25	1
9	REF	Swing Drive -- See Section 25	1
10	REF	Aux Power Pump -- See Section 25	1

REF – Reference

Turntable Components

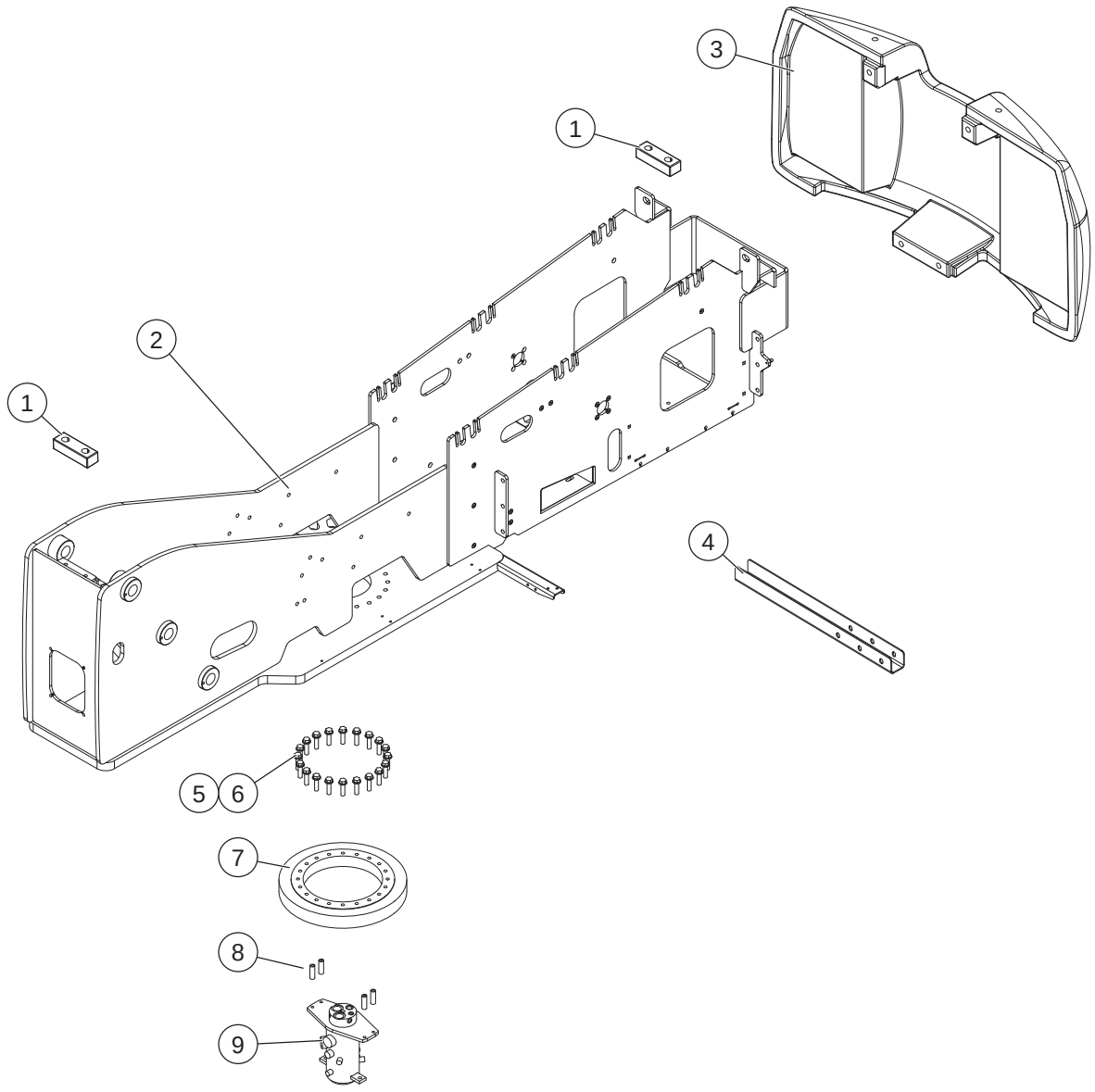


ILLUSTRATION No. ART_4861 60-J Turntable Components

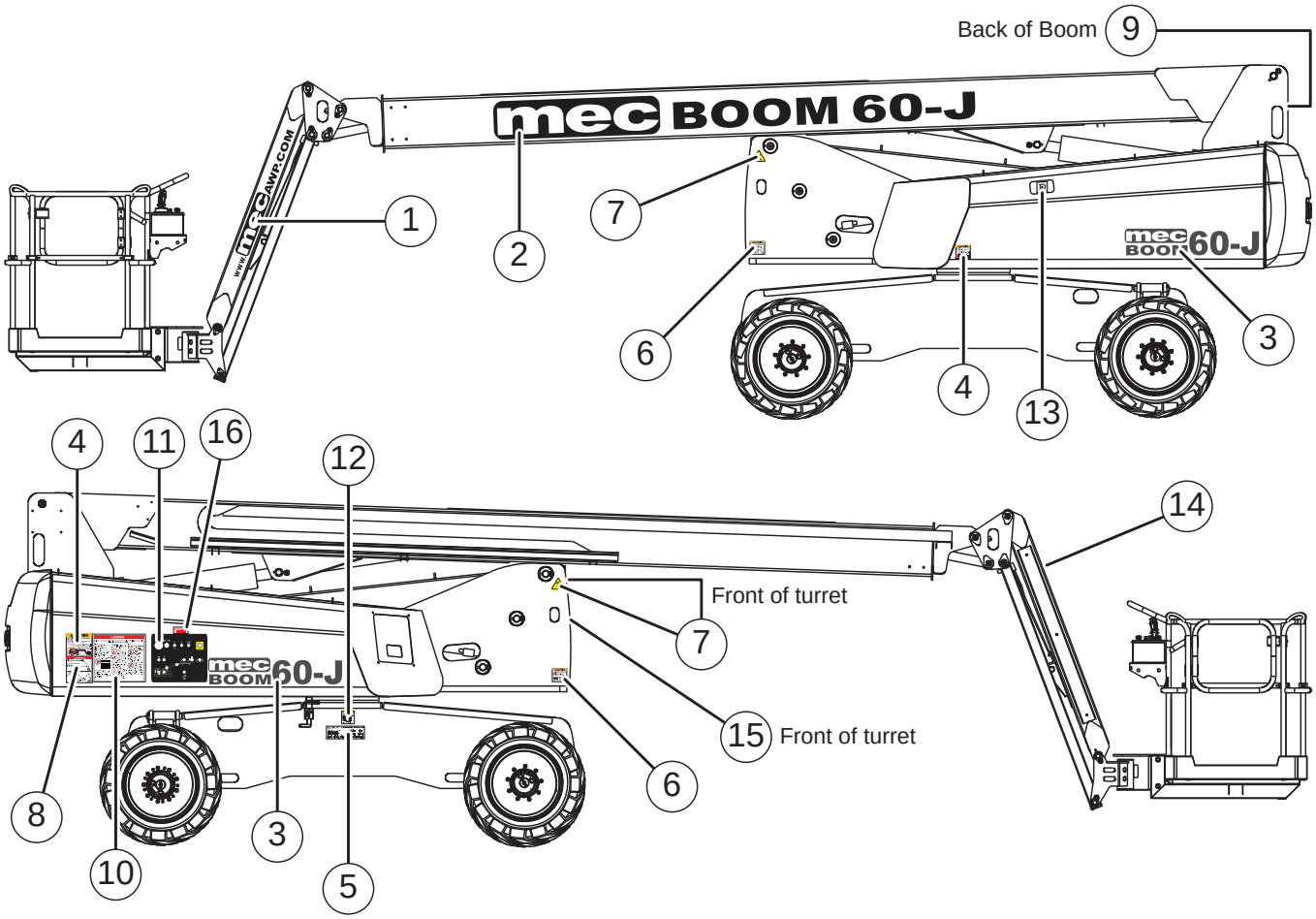
Item	Part Number	Description	Qty.
1	28343	Boom Rest Bumper	2
--	50025	Bolt, M12 x 60	4
--	50003	Washer, M12 Std	8
--	50054	Nut, M12 Nylock	4
2	28200	Turntable Weldment	1
3	18214	Counterweight	1
--	50585	Bolt, M24 x 60	4
--	50586	Washer, M24 Nordlock	4
--	50255	Washer, M24 Flat	4
4	28680	Diesel Tray Support	1
5	50354	Bolt, 5/8 x 2.5	20
6	50582	Washer, 5/8	20
7	93646	Swing Bearing	1
8	28619	Spacer	4
9	REF	Rotary Manifold -- See Section 25	1
--	50209	Bolt, M10 x 100	4
--	50006	Washer, M10 Nordlock	4

REF – Reference

Boom Harness

Part Number	Description
28850	Cable, Communication Lower Box To Jib 75’
28851	Cable, Platform Manifold 35’
28852	Cable, Communication, Jib To Upper Control Box
28853	Harness, Platform Valves
28854	Harness, Engine
28855	Harness, Motor Control
28856	Harness, Power To Lower Box
28857	Harness, Inside Upper Control Box
28858	Harness, Main Function Block
28859	Harness, Engine Extension
28860	Harness, Boom/Swing/Tele Joystick Update
28868	Harness, Lower Tensioner Angle Transducer
28869	Harness, CAN-Tilt Jumper
28883	Harness, Comm To CAN-Tilt

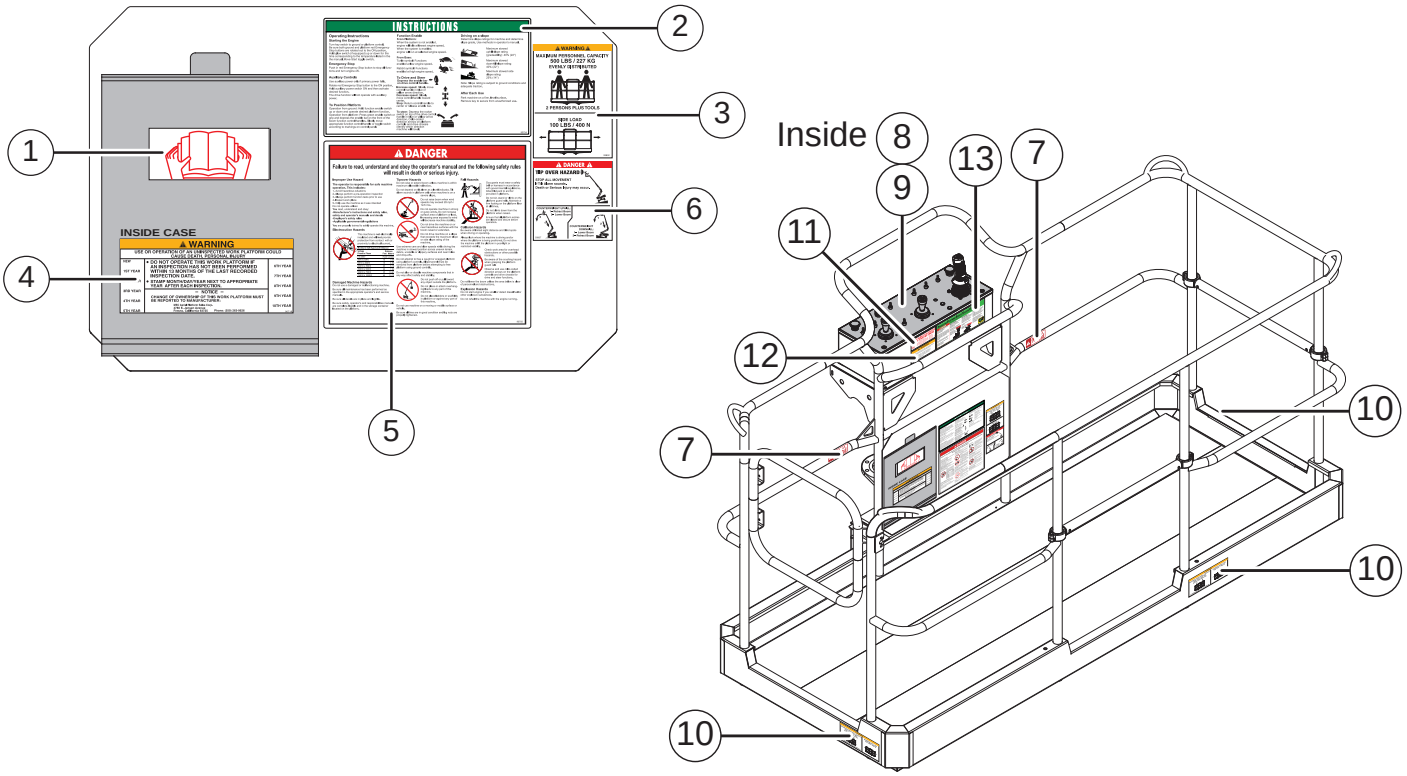
Decals, 60-J Diesel ANSI



1 92416 QTY - 1	2 93741 QTY - 1	3 93745 QTY - 2	4 93801 QTY - 2
5 93851 QTY - 1	6 93804 QTY - 2	7 91850 QTY - 3	8 93807 QTY - 1
9 90719 QTY - 1	10 93755 QTY - 1	11 93687 QTY - 1	12 93855 QTY - 1
13 91975 QTY - 1	14 94254 QTY - 1	15 90751 QTY - 1	16 93572 QTY - 1

Item	Part Number	Description	Qty.
1	92416	Decal, Website	1
2	93741	Decal, MEC Boom 60-J, Main Boom	1
3	93687	Decal, Lower Controls, 60J-D	1
4	93745	Decal, MEC Boom 60-J, Module Door	2
5	90751	Label, Power To Platform	1
6	93801	Decal, Compartment Access	2
7	93851	Decal, Serial Plate, 60-J Boom ANSI	1
8	93804	Decal, Crush Hazards	2
9	91850	Decal, Caution Triangle Overhead Clearance	3
10	93807	Decal, Danger Tipover	1
11	90719	Decal, MEC Oval	1
12	93755	Decal, Danger Panel	1
13	93855	Decal, Rotation Lock, 60-J	1
14	93572	Decal, Glow Plug, ANSI/CSA	1

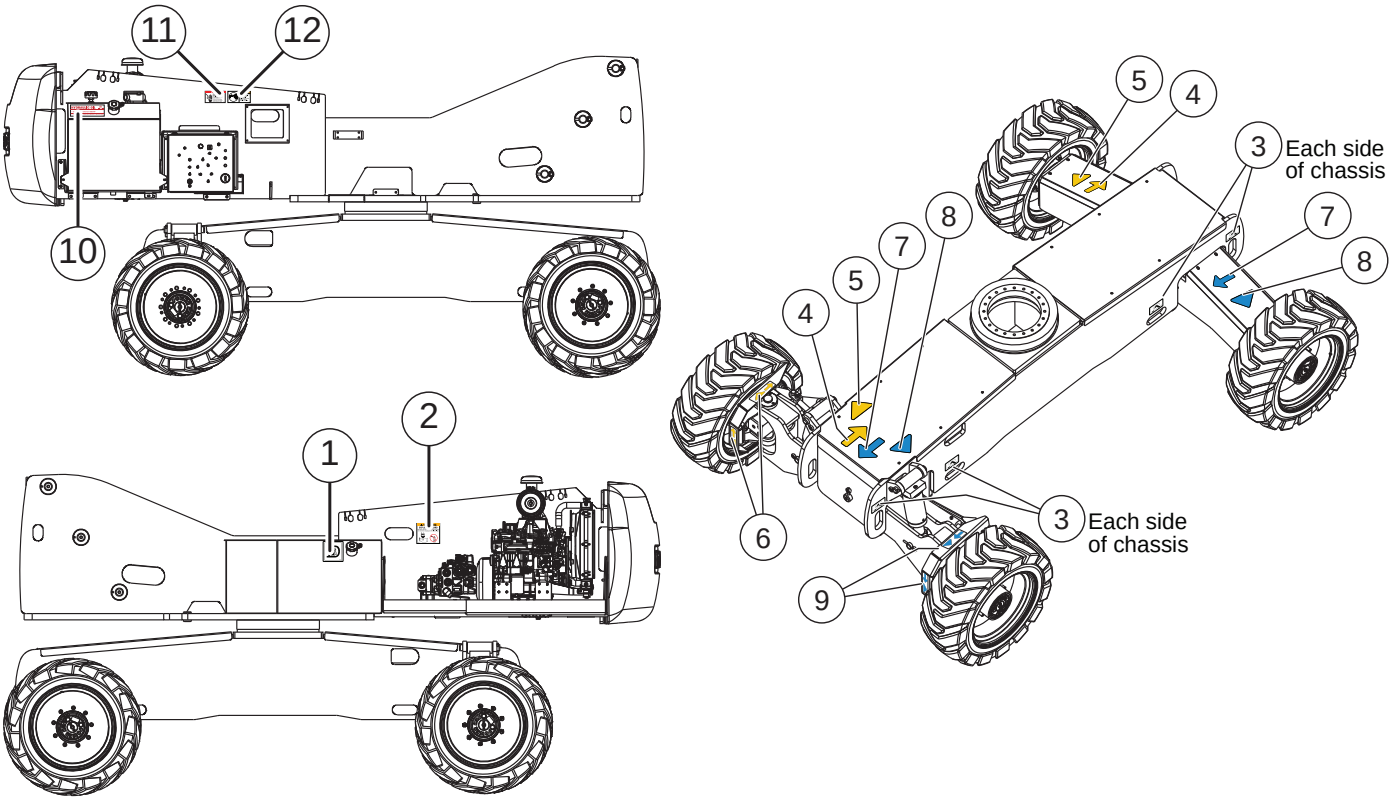
Decals, 60-J Diesel ANSI, Platform



1 8911 QTY - 1	2 93754 QTY - 1	3 93802 - Standard QTY - 1 500LB Capacity	3 93911 - Option QTY - 1 600LB Capacity	3 94050 - Option QTY - 1 600/750LBCapacity	4 90718 QTY - 1 Inside Case
5 93755 QTY - 1	6 93807 QTY - 1	7 91970 QTY - 2	8 92236 QTY - 1	9 93688 - Standard QTY - 1	9 93859 - Option QTY - 1 High Capacity
10 93803 - Standard QTY - 3 500LB Capacity	10 93857 - Option QTY - 3 600LB Capacity	10 94051 - Option QTY - 3 600/750LB Capacity	11 93572 QTY - 1	12 8606 QTY - 1	13 94262 QTY - 1

Item	Part Number	Description	Qty.
1	8911	Decal, Manuals Inside Icon	1
2	93754	Decal, Instructions Panel	1
3	93802	Decal, Platform Capacity Tall	1
	93911	Decal, 60-J Platform Capacity Tall, 600-LB option	1
	94050	Decal, Dual Capacity Tall ANSI	1
4	90718	Decal, Warning Annual Inspection	1
5	93755	Decal, Danger Panel	1
6	93807	Decal, Danger Tipover	1
7	91970	Decal, Boom Harness Attach Point	2
8	92236	Decal, EZ-Cal port	1
9	93688	Decal, Upper Controls, 60J-D	1
	93859	Decal, Upper Controls, 60-J Diesel, High Capacity Option	1
10	93803	Decal, Platform Capacity Wide	3
	93857	Decal, 60-J Platform Capacity, 600-LB option	3
	94051	Decal, Dual Capacity Wide ANSI	3
11	93572	Decal, Glow Plug, ANSI/CSA	1

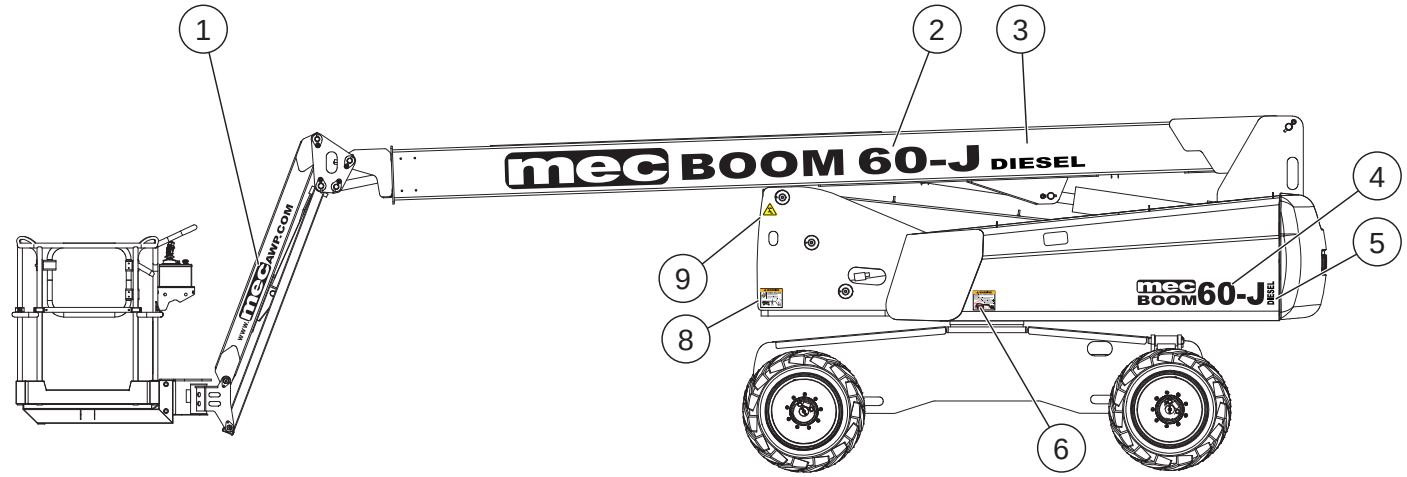
Decals, 60-J Diesel ANSI, Chassis & Turntable

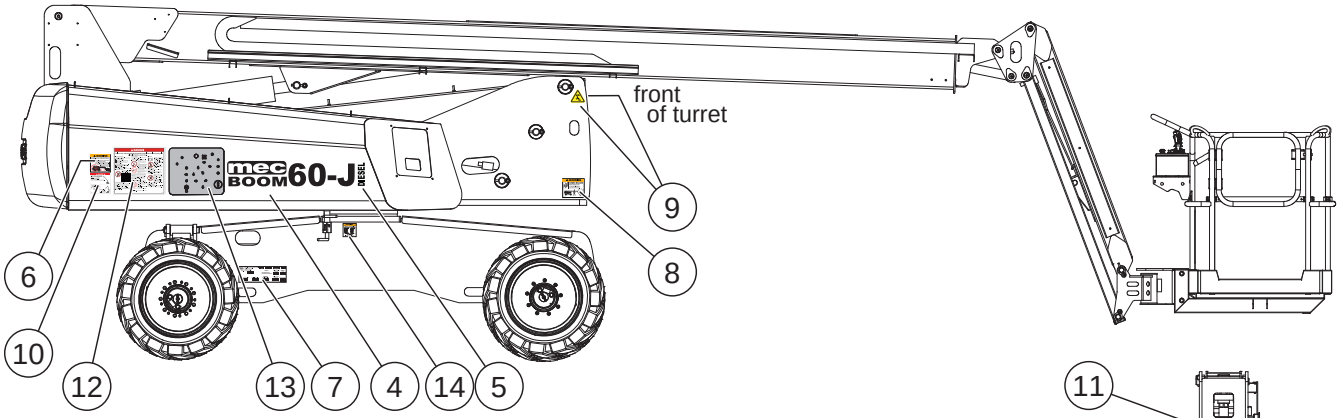


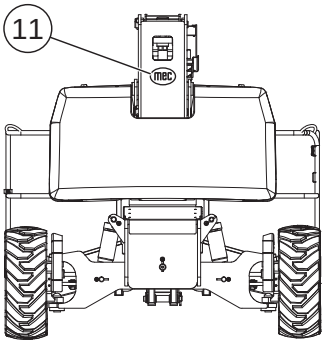
1 91975 QTY - 1	2 93806 QTY - 1	3 91973 QTY - 8	4 91972 QTY - 2
5 91982 QTY - 2	6 93815 QTY - 2	7 91971 QTY - 2	8 91981 QTY - 2
9 93814 QTY - 2	10 92117 QTY - 1	11 93805 QTY - 1	12 90732 QTY - 1

Item	Part Number	Description	Qty.
1	91975	Decal, Diesel	2
2	93806	Decal, Explosion Hazard	1
3	91973	Decal, Tie-Down Point	8
4	91972	Decal, Yellow Drive Arrow	2
5	91982	Decal, Yellow Turn Arrow	2
6	93815	Decal, Yellow Drive/Turn Arrows, Small	2
7	91971	Decal, Blue Drive Arrow	2
8	91981	Decal, Blue Turn Arrow	2
9	93814	Decal, Blue Drive/Turn Arrows, Small	2
10	92117	Decal, Hydraulic Oil	1
11	93805	Decal, Electrocution Hazard	1
12	90732	Decal, Warning No Powerwash	1

Decals, 60-J Diesel CE







1 92416 2 places
www.mecAWP.COM

2 93741
mec BOOM 60-J

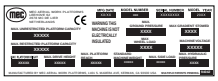
3 93742
DIESEL

4 93745 2 places
mec BOOM 60-J

5 93746 2 places
DIESEL

6 93801 2 places

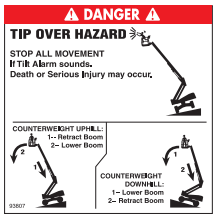
7 94042



8 93804 2 places

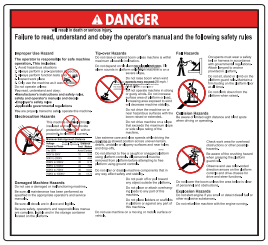
9 91850 3 places

10 93807

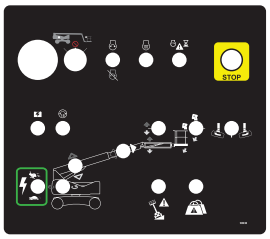


11 90719

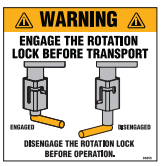
12 93755



13 93930



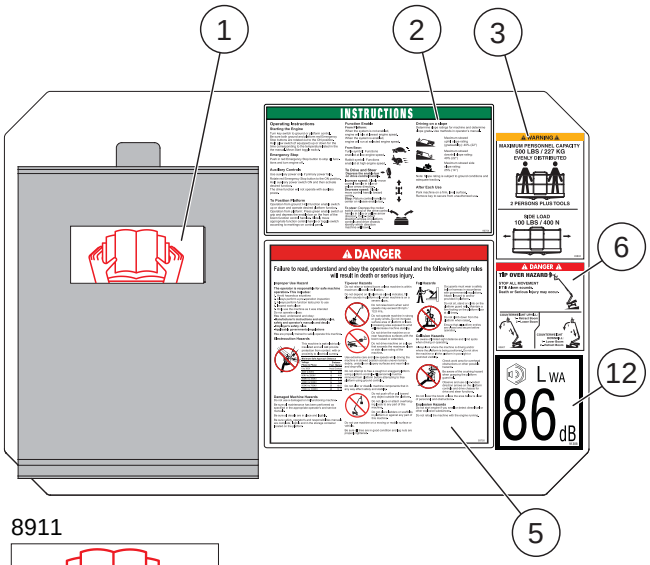
14 93855

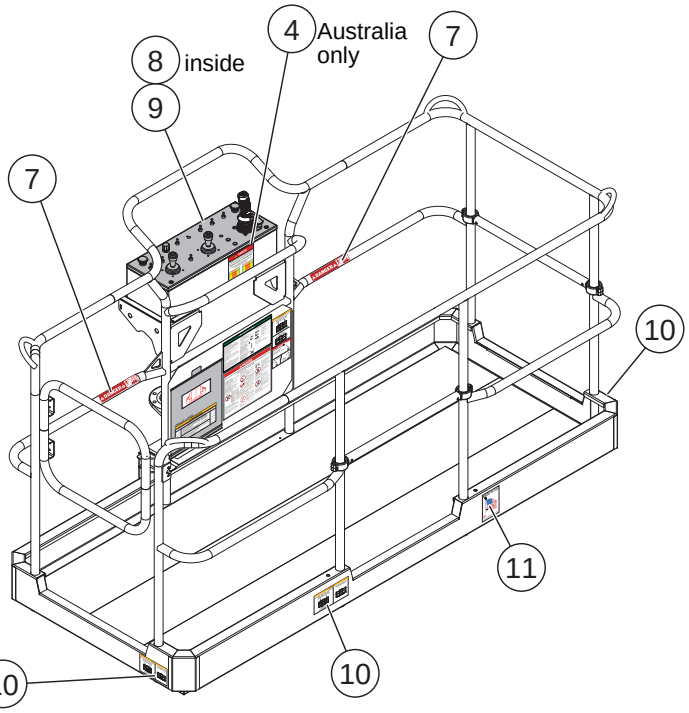


ART_4829

Item	Part Number	Description	Qty.
1	92416	Decal, Website	2
2	93741	Decal, 60-J, Main Boom	1
3	93742	Decal, Diesel, Main Boom	1
4	93745	Decal, 60-J, Module Door	2
5	93746	Decal, Diesel, Module Door	2
6	93801	Decal, Restricted Access	2
7	94042	Decal, Serial Plate CE	1
8	93804	Decal, Crush Hazard	2
9	91850	Decal, Crush Hazard	3
10	93807	Decal, Tip Over Hazard	1
11	90719	Decal, MEC Oval	1
12	93755	Decal, Danger Panel	1
13	93687	Decal, Base Controls	1
14	93855	Decal, Rotation Lock	1

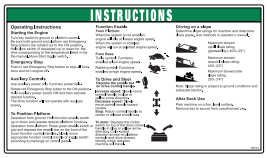
Decals, 60-J Diesel CE, Platform



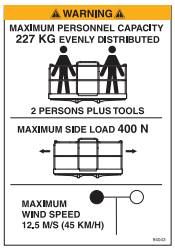


(1) 8911

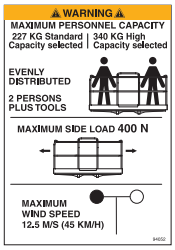
(2) 93754



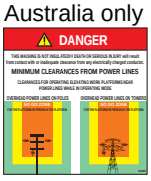
(3) 94043 -- Standard
227 KG Capacity



94052 -- Option
227/340 KG

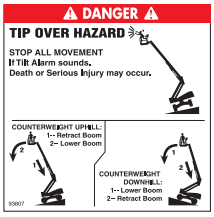


(4) 91325
Australia only



(5) 93755

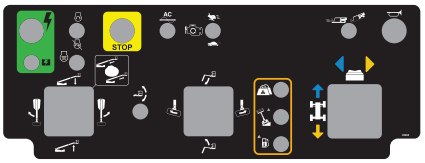
(6) 93807



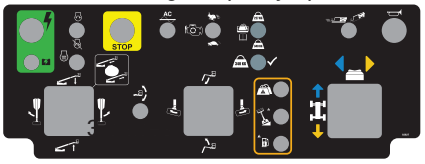
(7) 91970 2 places

(8) 92236

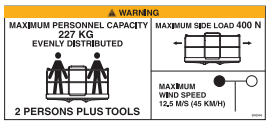
(9) 93926 -- Std. Machine



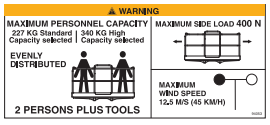
93927 -- with High Capacity option



(10) 3 Places
94044 -- Standard 227 KG Capacity

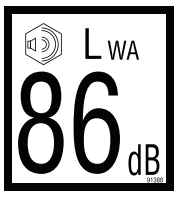


94053 -- Option 227/340 KG



(11) 90739

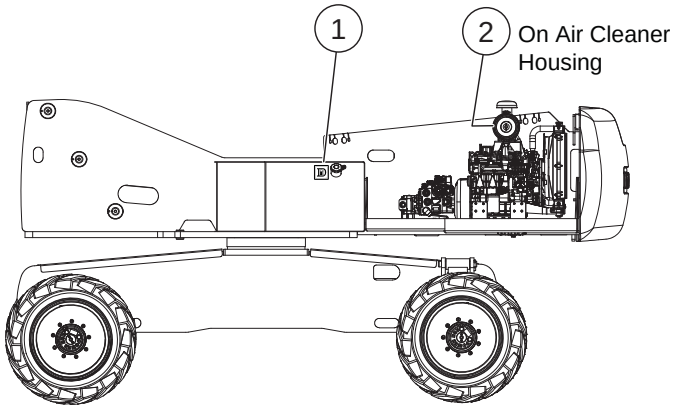
(12) 91388

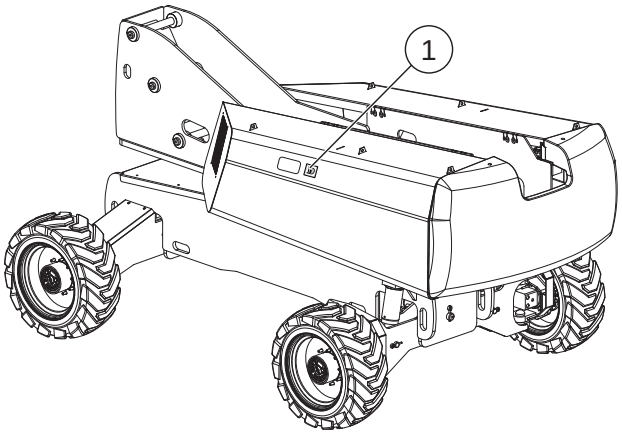


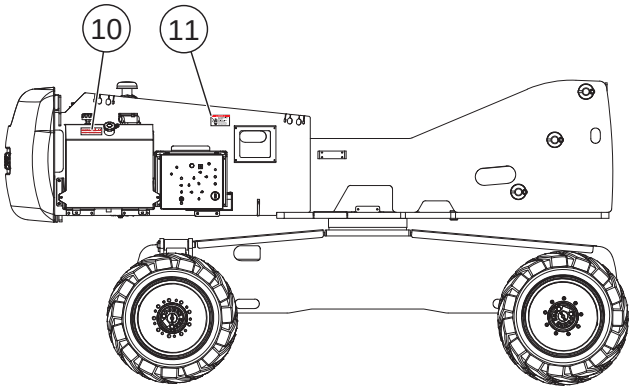
ART_4830

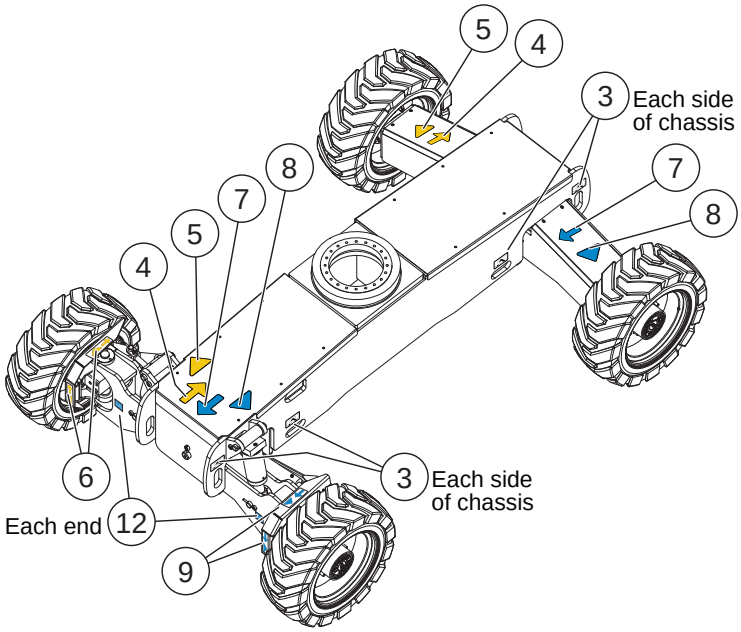
Item	Part Number	Description	Qty.
1	8911	Decal, Manuals Case	1
2	93754	Decal, Instructions	1
3	94043	Decal, Platform Capacity Tall, Standard 227 KG	1
	93052	Decal, Platform Capacity Tall, Option 227/340 KG	1
4	91325	Decal, Danger, Electrical -- Australia only	1
5	93755	Decal, Danger Panel	1
6	93807	Decal, Tip Over Hazard	1
7	91970	Decal, Lanyard	2
8	92236	Decal, EZ-Cal	1
9	93926	Decal, Upper Controls, Standard Machine	1
	93927	Decal, Upper Controls, High Capacity Option	1
10	94044	Decal, Platform Capacity Wide, Standard 227 KG	3
	93053	Decal, Platform Capacity Wide, Option 227/340 KG	3
11	90739	Decal, Made In USA	1
12	91388	Decal, 86dB	1

Decals, 60-J Diesel CE, Chassis & Turntable





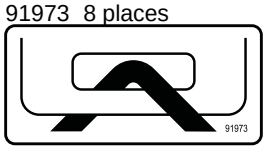




1 91975 2 places

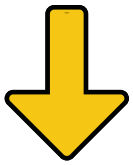
2 93806

3 91973 8 places

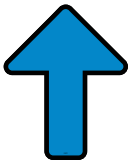


2 places each

4 91972



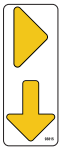
7 91971



5 91982

8 91981

6 93815

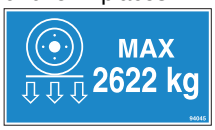


9 93814

10 92117

11 93805

12 94045 4 places



ART_4831

Item	Part Number	Description	Qty.
1	91975	Decal, Diesel	2
2	93806	Decal, Explosion Hazard	1
3	91973	Decal, Tie-Down Point	8
4	91972	Decal, Yellow Drive Arrow	2
5	91982	Decal, Yellow Turn Arrow	2
6	93815	Decal, Yellow Drive/Turn Arrows, Small	2
7	91971	Decal, Blue Drive Arrow	2
8	91981	Decal, Blue Turn Arrow	2
9	93814	Decal, Blue Drive/Turn Arrows, Small	2
10	92117	Decal, Hydraulic Oil	1
11	93805	Decal, Electrocution Hazard	1
12	94045	Decal, Wheel Load	4

Notes

MEC Parts Order Form

Phone: 559-842-1523
Fax: 559-400-6723
Email: Parts@mecawp.com

Please fill out completely

Date: _____

Account: _____

Bill to: _____

_____

_____

_____

Ordered By: _____

Your Fax No.: _____

Ship to: _____

_____

_____

_____

Purchase Order Number _____
** All orders MUST have a Purchase Order Number

Ship VIA _____
**Fed Ex shipments require Fed Ex account number

Part Number	Description	Quantity	Price

All back-ordered 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 back-ordered parts
___ Other (Please specify)

_____

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.

MEC Aerial Work Platforms

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