

J1 Plug Pin Identification			
PIN #	WIRE #	SIGNAL	FUNCTION
1	10	INPUT	Drive Reverse
2	11	INPUT	Drive Forward
3	19	OUTPUT	Brake, Decel Valve signal
4	8	INPUT	Steer Left
5	18	OUTPUT	Steer signal to Sevcon
6	5	INPUT	Down signal
7	20	OUTPUT	Signal to Motion Alarm(s) (optional)
8	17	OUTPUT	Sevcon & Hour Meter (motor function requested)
9	15	INPUT	Battery Negative
10	7	INPUT	Steer Right
11	4	INPUT	Lift Up
12	2	INPUT	Limit Switch (24V = platform down)
13	3	OUTPUT	Enable, from lower Lift switch
14	21	OUTPUT	To Sevcon (for speed cutback)

ILLUSTRATION No.  
ART\_2181

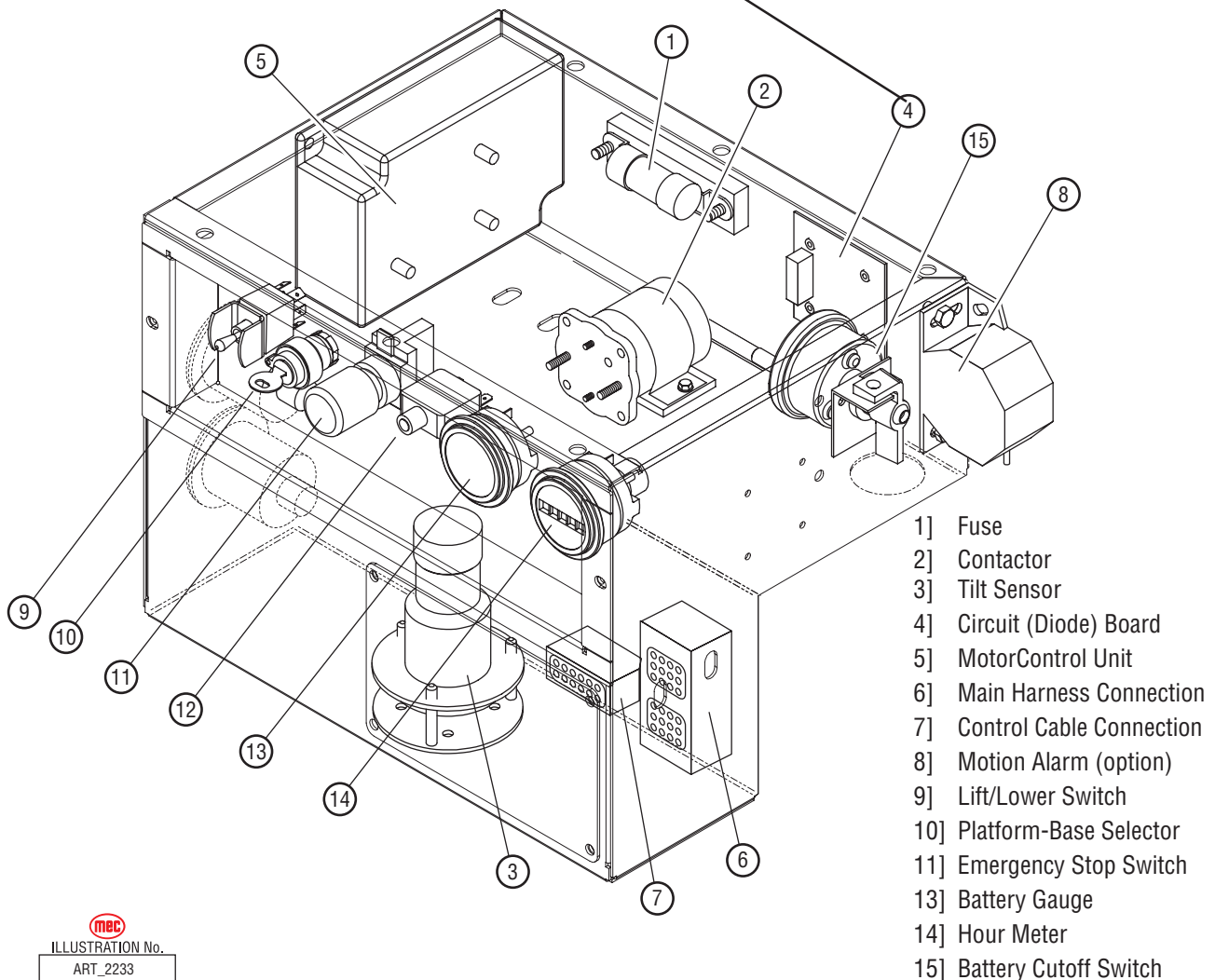


ILLUSTRATION No.  
ART\_2233



# SEVCON MOTOR SPEED CONTROLLER


The Sevcon Motor Speed Controller (MC-1) is a microprocessor designed with the express purpose of operating the D/C electric motor at varying speeds. The controller uses Pulse-Width Modulation (PWM) technology on the Ground side of the motor to control motor speed. Out of concern for operator safety and to prevent short-circuiting, the Controller monitors certain circuits for potential abnormalities. When the controller senses a problem it errs to the side of safety and stops all motor operation. The green LED will flash a code indicating the reason for the shutdown.

Refer to the *LED Diagnostics Definitions* and *Sevcon Motor Speed Controller - Connections* on the following pages.

The diagram shows the Sevcon Motor Speed Controller (MC-1) with terminal connections for B+, B-, and M2. A green LED is located between the B+ and B- terminals. Below the main unit, a plug with 12 pins is shown, with lines indicating the connection points for the B+, B-, and M2 terminals.

Cable Connection Identification	
B+	Battery Positive Cable from 250 AMP Fuse
B-	Negative Battery Cable and GROUND wire (15) connection
M2	Motor Ground (Pulse-Width Modulated [PWM] variable speed control)

MC-1 Plug Pin Identification		
PIN #	WIRE #	FUNCTION
1	22	B+ power input (power up)
2	17	Lift, Drive or Steer functions input (functions requiring motor)
3	18	Steer Requested (adds additional motor speed for steer)
4	3	Enable Switch signal input
5	21	Speed cut-back (24 Volts = full speed, 0 Volts = creep speed)
6	16	Motor Start Relay signal (GROUND signal to activate Motor Start Relay)
7	41	Lift Valve B- (provides GROUND signal to Lift Valve)
8	none	none
9	14	Accelerator reference signal (3.6 Volts to Potentiometer)
10	none	none
11	none	none
12	none	none

  
 ILLUSTRATION No.  
 ART\_2182

## LED Diagnostics Definitions (Flash Codes)

LED READING	DIAGNOSIS
<b>LED Steady On</b>	Controller is operational and detects no irregularities on monitored circuits.
<b>LED Off</b>	<p><b>No power-up</b></p> <ul style="list-style-type: none"> <li>• No power to pin # 1.</li> <li>• No ground to B- post.</li> <li>• LED failure or internal controller fault.</li> </ul>
<b>2 Flashes</b>	<p><b>Procedure fault.</b></p> <ul style="list-style-type: none"> <li>• Enable depressed at power up.</li> <li>• Enable depressed for more then 15 seconds without function request.</li> <li>• No signal on wire 17 pin # 2 when function requested.</li> <li>• No B- to diode board.</li> <li>• Failed diode/s.</li> <li>• Damaged wire harness.</li> <li>• Internal controller fault.</li> </ul>
<b>3 Flashes</b>	<p><b>Motor circuit low.</b></p> <p>Set with unit at rest and is the result of the voltage at M-2 dropping to approximately 4 volts or lower. Possible causes:</p> <ul style="list-style-type: none"> <li>• Short to ground in the motor circuit between the motor contactor and the M-2 terminal.</li> </ul>
<b>4 Flashes</b>	<p><b>Motor circuit high.</b></p> <p>Set with the unit at rest and is the result of the voltage at M-2 terminal rising above 21 volts. Possible causes:</p> <ul style="list-style-type: none"> <li>• Motor contactor points are welded shut</li> </ul>
<b>5 Flashes</b>	<p><b>Motor contactor circuit open.</b></p> <p>Set when a function is requested but no current can flow through the motor circuit to the M-2 terminal. Possible causes:</p> <ul style="list-style-type: none"> <li>• Blown 200 amp fuse</li> <li>• Malfunctioning motor contactor</li> <li>• Worn motor brushes</li> <li>• Incomplete circuit to the Sevcon pin #6</li> </ul> <p>If the motor and contactor circuits are diagnosed as working properly:</p> <ul style="list-style-type: none"> <li>• Sevcon internal fault</li> </ul>

continued...

## LED Diagnostics Definitions (continued)

LED READING	DIAGNOSIS
6 Flashes	<p><b>Accelerator fault.</b> Set with unit at rest, a 6 flash will result in an 80% cutback of motor speed. The Accelerator is the proportional control circuitry for the Sevcon. It works in conjunction with the potentiometer located in the upper control box, which is connected to the joystick handle through a gear arrangement.</p> <p><b>Measure voltage at terminals 14 and 15 on the platform terminal strip or at the potentiometer plug connection.</b></p> <ul style="list-style-type: none"><li>• With the joystick handle in neutral, 3.6 volts should be measured on the accelerator circuit (wire #14).</li><li>• Voltage proportionally decreases with the travel of the joystick, with 0 volts at full stroke.</li><li>• With the joystick centered, voltages lower than 3.1 or higher than 3.9 will trigger a (6 flash) code.</li></ul>
7 Flashes	<p><b>Battery voltage fault.</b></p> <ul style="list-style-type: none"><li>• This includes battery voltage below 12 volts or above 45 volts as measured on pin #1.</li><li>• This code will disable all functions.</li></ul>
8 Flashes	<p><b>Thermal cutback.</b></p> <ul style="list-style-type: none"><li>• Sevcon internal temperatures above 176 degrees F.</li><li>• Will limit motor speed in comparison with over temperature.</li><li>• Resets when cooled.</li></ul>
9 Flashes	<p><b>Battery voltage at or below 18 volts</b></p> <ul style="list-style-type: none"><li>• As measured on pin #1.</li><li>• This code will interrupt or prevent lift function but will allow drive and steer functions.</li></ul> <p>When lift is interrupted due to a 9 flash, the electric motor will still run.</p>

## Sevcon Motor Speed Controller - Connections

The following two pages describe the connections to the Sevcon Motor Speed Controller with a brief description of their function and the voltage measurements under normal conditions.

**Important: Batteries must be fully charged before troubleshooting!**  
**A fully charged battery set on a 24 V DC system will have a nominal voltage of 25.6 V DC**

FUNCTION	VOLTAGE READING
<b>PIN 1 – WIRE 22</b> (WIRE 9 ON EARLY UNITS)	
<b>Battery Positive Input</b>	Switched <b>5% less than battery voltage</b> <ul style="list-style-type: none"> <li>• Controller power-up and reference point for battery state-of-charge.</li> <li>• Green LED indicates controller power-up.</li> <li>• Power travels through the upper emergency-stop switch with upper controls selected.</li> <li>• 7-Flash code and 9-flash code indicate low voltage at this terminal.</li> </ul>
<b>Pin 2 Wire 17</b>	
<b>Lift, Drive or Steer functions requested</b>	Motorized function is requested <b>15%-18% less than battery voltage</b> <ul style="list-style-type: none"> <li>• Controller begins the motor run sequence with this signal but still requires a signal on pin 4 and a change on pin 9 before the motor will operate.</li> </ul>
<b>Pin 3 Wire 18</b>	
<b>Steer Function Requested</b>	When steering is operated <b>15%-18% less than battery voltage</b> <ul style="list-style-type: none"> <li>• Adds motor speed to compensate for addition of steer requirement during drive operation.</li> <li>• Provides a minimum motor speed for steer requirement when only steer is operated.</li> </ul>
<b>Pin 4 Wire 3</b>	
<b>Enable signal input</b>	When joystick trigger pulled <b>5% less than battery voltage.</b> <ul style="list-style-type: none"> <li>• Motor will not start without this input</li> <li>• A signal here longer then 15 seconds without a signal on pin-2 or pin-3 will result in a 2-flash code failure.</li> </ul>
<b>Pin 5 Wire 21</b>	
<b>Speed cutback signal from limit switch or Lift circuit</b>	Full speed: <b>24 V DC</b> Creep speed: <b>0 V DC.</b> <ul style="list-style-type: none"> <li>• Speed cutback is the elevated drive speed.</li> </ul>



Sevcon Motor Speed Controller - Connections (continued)

FUNCTION	VOLTAGE READING
<b>PIN 6 – WIRE 16</b>	
<b>Motor Start Relay ground signal</b>	<p>Idle: <b>24 V DC</b></p> <p>When function requested: <b>0 V DC</b>.</p> <ul style="list-style-type: none"> <li>• This is how the Controller maintains control over the motor circuit.</li> <li>• Sevcon controls the Motor Start Relay function ground signal.</li> <li>• Will not operate the motor start relay when 2, 3, 4 &amp; 7 flash codes occur.</li> </ul>
<b>PIN 7 – WIRE 41</b>	
<b>Ground signal to Lift solenoid valve</b>	<p><b>0 volts</b></p> <p>No ground presence until lift is requested.</p> <ul style="list-style-type: none"> <li>• By providing the ground signal, lift function can be prevented anytime battery voltage falls below 18 volts. This will result in a 9 flash code.</li> </ul>
<b>PIN 9 – WIRE 14</b>	
<b>Accelerator reference signal to the potentiometer (upper control box)</b>	<p>From <b>3.5 V DC</b> with joystick in the neutral to <b>0 V DC</b> at full stroke.</p> <ul style="list-style-type: none"> <li>• Controller uses this circuit to monitor joystick input after pins 2 &amp; 4 energize.</li> <li>• Controls motor speed in reference to the voltage on this circuit.</li> <li>• Voltages above 4.0 V DC or below 3.0 V DC will result in a 6 flash code.</li> </ul>
<b>POST B+</b>	
<b>Battery positive cable from 200 amp fuse</b>	<p>Full battery voltage.</p> <ul style="list-style-type: none"> <li>• No real diagnostic value.</li> </ul>
<b>POST B–</b>	
<b>Battery positive cable from 200 amp fuse</b>	<p>Battery ground cable connection</p> <p>Ground path for motor operation</p> <ul style="list-style-type: none"> <li>• All system ground wires (wire #s 15 &amp; 15A) terminate here.</li> <li>• Best place to connect ground lead from multimeter while troubleshooting.</li> </ul>
<b>POST M-2</b>	
<b>PWM controlled motor ground</b>	<p>Idle: <b>12 V DC – 13 V DC</b></p> <p>During operation, between <b>5 V DC &amp; 24 V DC</b>.</p> <ul style="list-style-type: none"> <li>• 12 – 13 volts is reference voltage used by the controller to monitor motor circuit irregularities at idle.</li> <li>• 0 volts at idle = 3 flash code</li> <li>• Above 20 volts at idle = 4 flash code</li> <li>• No voltage change after Motor Start Relay signal = 5 flash code.</li> </ul>



# SECTION 5: SCHEMATICS

**Hydraulic Schematics** ..... 5-2

- 2047ES - Serial # 9801000 - 9801099
- 2647ES - Serial # 9901000 - 9901199
- 3247ES - Serial # 10001000 - 10001199 ..... 5-2
- 2047ES - Serial # 9801100 - CURRENT
- 2647ES - Serial # 9901200 - CURRENT
- 3247ES - Serial # 10001200 - CURRENT ..... 5-4

**Electric Schematics** ..... 5-9

- 2047ES - Serial # 9801000 - 9801099
- 2647ES - Serial # 9901000 - 9901199
- 3247ES - Serial # 10001000 - 10001199 ..... 5-10
- 2047ES - Serial # 9801100 - CURRENT
- 2647ES - Serial # 9901200 - CURRENT
- 3247ES - Serial # 10001200 - CURRENT ..... 5-12



# HYDRAULIC SCHEMATICS

**2047ES - Serial # 9801000 - 9801099**

**2647ES - Serial # 9901000 - 9901199**

**3247ES - Serial # 10001000 - 10001199**

ITEM	DESCRIPTION	Location
CBV1	Counterbalance Valve	Main Manifold (MA-1)
CYL1	Steering Cylinder	Machine Base, Front
CYL2	Lift Cylinder, 2047, 2647	Scissor Assembly
CYL3	Lift Cylinder, Lower, 3247	Scissor Assembly
CYL4	Lift Cylinder, Upper, 3247	Scissor Assembly
FD1	Flow Divider	Main Manifold (MA-1)
FRR1		
HP1	Hand Pump, Brakes	Brake Release Manifold (MA-2)
MA-1	Main Manifold Assembly	Machine Base, Battery Compartment
MA-2	Brake Release Manifold	Battery Compartment
MA-3	Manifold Assembly	Lift Cylinder, 2047ES and 2647ES only
MA-4	Manifold Assembly	Lower Lift Cylinder, 3247ES only
MA-5	Manifold Assembly	Upper Lift Cylinder, 3247ES only
MP1	Manual Pump	Main Manifold (MA-1)
NV1	Needle Valve	Main Manifold
ORF1	Orifice Plug, Wheel Motors	Main Manifold (MA-1)
ORF3	Orifice, Down Valve	Lift Cylinder Manifold (MA-3), 2047ES and 2647ES only
ORF4	Orifice, Down Valve	Lower Lift Cylinder Manifold (MA-4), 3247ES only
ORF5	Orifice, Down Valve	Upper Lift Cylinder Manifold (MA-5), 3247ES only
P1	Pump	Pump Compartment
PCF1	Steering Relief Flow Control	Main Manifold (MA-1)
RV1	Relief Valve, Lift Relief	Main Manifold (MA-1)
RV2	Relief Valve, Main Relief	Main Manifold (MA-1)
RV3	Relief Valve, Steering	Main Manifold (MA-1)
RV4	Relief Valve, Lift Cylinder	Lower Lift Cylinder Manifold (MA-4), 3247ES only
RV5	Relief Valve, Lift Cylinder	Upper Lift Cylinder Manifold (MA-5), 3247ES only
SV1	Spool Valve, Steering	Main Manifold (MA-1)
SV2	Spool Valve, Lift	Main Manifold (MA-1)
SV3	Spool Valve, Drive	Main Manifold (MA-1)
SV4	Spool Valve, Decel	Main Manifold (MA-1)
SV5	Spool Valve, Torque	Main Manifold (MA-1)
SV6	Spool Valve, Torque	Main Manifold (MA-1)
SV7	Spool Valve, Brakes	Main Manifold (MA-1)
SV8	Poppet Valve, Down	Main Manifold (MA-1), 2047ES and 2647ES only
SV9	Spool Valve, Down	Lift Cylinder Manifold (MA-3), 2047ES and 2647ES only
SV10	Spool Valve, Down	Lower Lift Cylinder Manifold (MA-4), 3247ES only
SV11	Spool Valve, Down	Upper Lift Cylinder Manifold (MA-5), 3247ES only
TP1	Test Port	Main Manifold (MA-1)
WB1	Wheel Brake	Drive Wheel
WB2	Wheel Brake	Drive Wheel
WM1	Wheel Motor, Right Side	Machine Base
WM2	Wheel Motor, Left Side	Machine Base



**HYDRAULIC SCHEMATIC**

Model: / Serial #

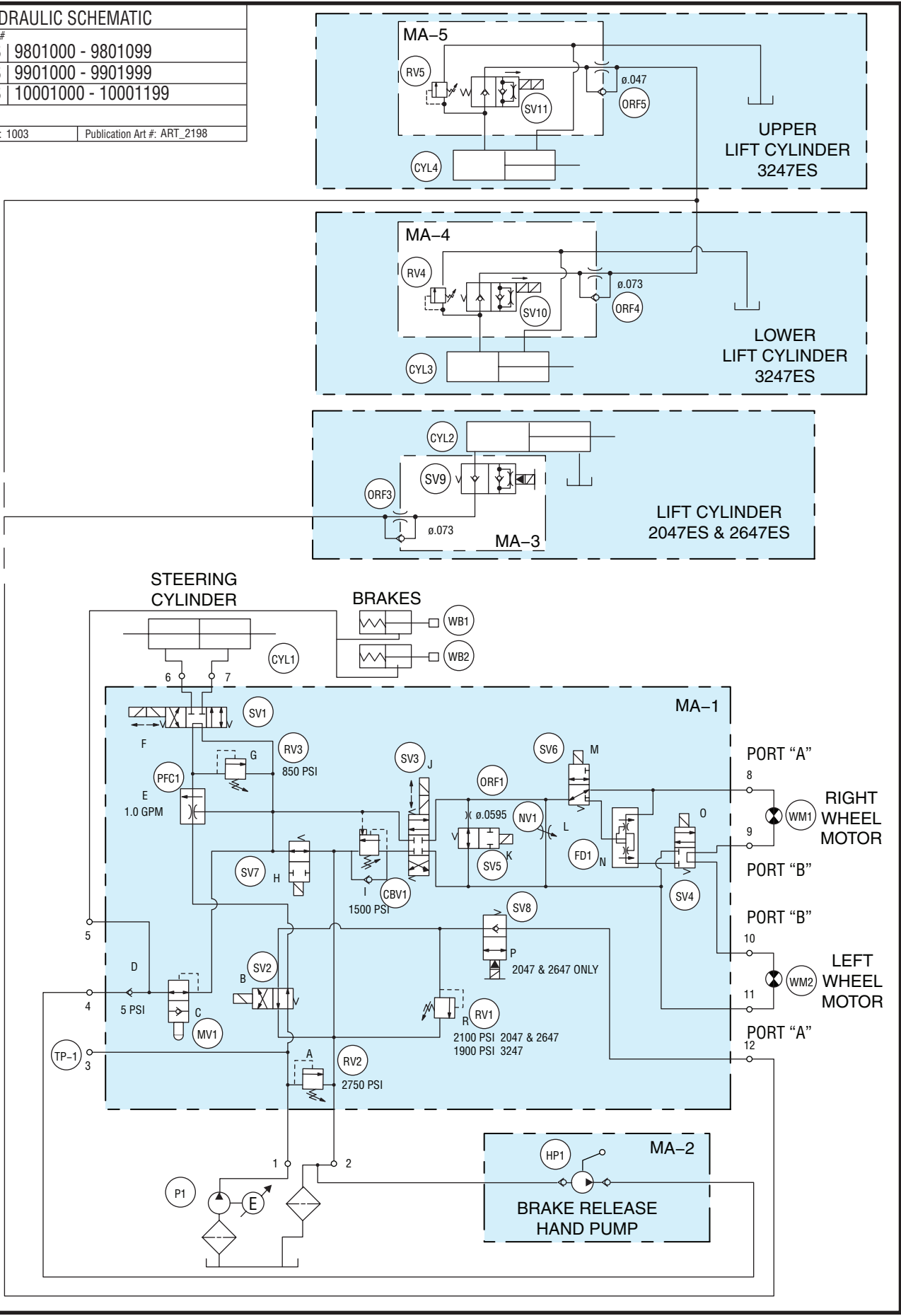
2047ES | 9801000 - 9801099

2647ES | 9901000 - 9901999

3247ES | 10001000 - 10001199

Reference Art #: 1003

Publication Art #: ART\_2198



**2047ES - Serial # 9801100 - CURRENT**

**2647ES - Serial # 9901200 - CURRENT**

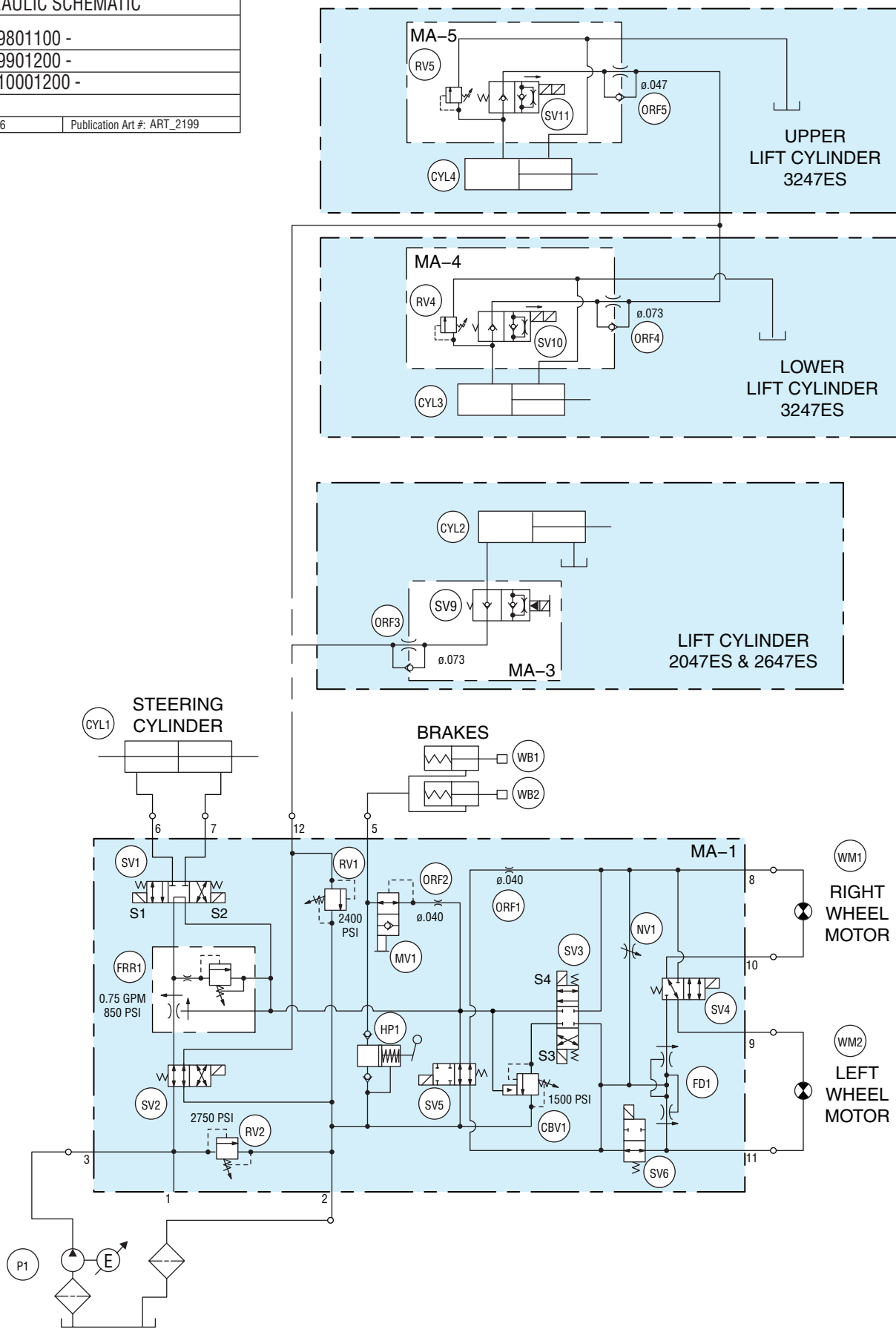
**3247ES - Serial # 10001200 - CURRENT**

ITEM	DESCRIPTION	Location
CBV1	Counterbalance Valve	Main manifold (MA-1)
CYL1	Steering Cylinder	Machine Base, Front
CYL2	Lift Cylinder, 2047, 2647	Scissor Assembly
CYL3	Lift Cylinder, Lower, 3247	Scissor Assembly
CYL4	Lift Cylinder, Upper, 3247	Scissor Assembly
FD1	Flow Divider	Main manifold (MA-1)
FRR1	Steering Relief Flow Control	Main manifold (MA-1)
HP1	Hand Pump, Brakes	Main manifold (MA-1)
MA-1	Main Manifold Assembly	Machine Base, Battery Compartment
MA-3	Manifold Assembly	Lift Cylinder, 2047ES and 2647ES only
MA-4	Manifold Assembly	Lower Lift Cylinder, 3247ES only
MA-5	Manifold Assembly	Upper Lift Cylinder, 3247ES only
MP1	Manual Pump	Main manifold (MA-1)
NV1	Needle Valve	Main manifold (MA-1)
ORF1	Orifice Plug, Wheel Motors	Main manifold (MA-1)
ORF2	Orifice Disc, Brake Release	Main manifold (MA-1)
ORF3	Orifice, Down Valve	Lift Cylinder Manifold (MA-3), 2047ES and 2647ES only
ORF4	Orifice, Down Valve	Lower Lift Cylinder Manifold (MA-4), 3247ES only
ORF5	Orifice, Down Valve	Upper Lift Cylinder Manifold (MA-5), 3247ES only
P1	Pump	Pump Compartment
RV1	Relief Valve, Lift Relief	Main manifold (MA-1)
RV2	Relief Valve, Main Relief	Main manifold (MA-1)
RV4	Relief Valve, Lift Cylinder	Lower Lift Cylinder Manifold (MA-4), 3247ES only
RV5	Relief Valve, Lift Cylinder	Upper Lift Cylinder Manifold (MA-5), 3247ES only
SV1	Spool Valve, Steering	Main manifold (MA-1)
SV2	Spool Valve, Lift	Main manifold (MA-1)
SV3	Spool Valve, Drive	Main manifold (MA-1)
SV4	Spool Valve, Brake/Decel	Main manifold (MA-1)
SV5	Spool Valve, Torque	Main manifold (MA-1)
SV6	Spool Valve, Torque	Main manifold (MA-1)
SV9	Spool Valve, Down	Lift Cylinder Manifold (MA-3), 2047, 2647
SV10	Spool Valve, Down	Lower Lift Cylinder Manifold (MA-4), 3247
SV11	Spool Valve, Down	Upper Lift Cylinder Manifold (MA-5), 3247
WB1	Wheel Brake	Drive Wheel
WB2	Wheel Brake	Drive Wheel
WM1	Wheel Motor, Right Side	Machine Base
WM2	Wheel Motor, Left Side	Machine Base



**HYDRAULIC SCHEMATIC**

Model / Serial #	
2047ES	9801100 -
2647ES	9901200 -
3247ES	10001200 -
Reference Art #: 966	Publication Art #: ART_2199



**mec** Hydraulic Manifold - early style

Model: / Serial #  
2047ES | 2641 | 3247ES

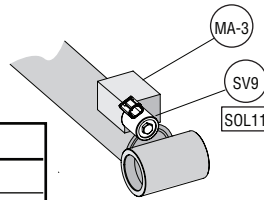
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NOTE: Early style manifold. Refer to Hydraulic Schematic for serial # break

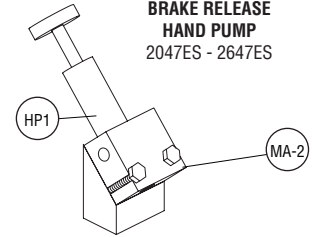
COMPONENTS	FUNCTION	PORTS	
CBV1	Relief Valve	Counter Balance	1 PUMP
CV1	Check Valve	Flow Control, Brakes	2 TANK
SOL1	Coil (SV1)	Steer Right	3 TEST PORT
SOL2	Coil (SV1)	Steer Left	4 BRAKE RELEASE
SOL3	Coil (SV5)	Drive/Decel	5 BRAKE
SOL4	Coil (SV2)	Lift	6 STEER
SOL5	Coil (SV4)	Torque	7 STEER
SOL6	Coil (SV6)	Torque	8 RIGHT A
SOL7	Coil (SV3)	Drive Forward	9 RIGHT B
SOL8	Coil (SV3)	Drive Reverse	10 LEFT B
SOL9	Coil (SV7)	Brakes	11 LEFT A
SOL10	Coil (SV8)	Down	12 LIFT
FD1	Flow Divider		
MP1	Manual Pump	Brake Release	
NV1	Needle Valve	Freewheel	
ORF1	Orifice Plug		
PFC1	Flow Control	Steer Relief	
RV1	Relief Valve	Lift Relief	
RV2	Relief Valve	Main Relief	
RV3	Relief Valve	Steering Relief	
SV1	Spool Valve	Steering Control	
SV2	Spool Valve	Lift Control	
SV3	Spool Valve	Direction Control	
SV4	Spool Valve	Torque	
SV5	Spool Valve	Drive Dump/Decel	
SV6	Spool Valve	Torque	
SV7	Spool Valve	Brakes	
SV8	Poppet Valve	Down	

MA1	SOL11	Coil (SV9)	Down, Lift Cylinder
MA2	HP1	Hand Pump	Brake Release
MA3	SOL12	Coil (SV10)	Down, Lift Cylinder
MA4	SOL13	Coil (SV10)	Down, Lift Cylinder
	SV10	Spool Valve	Down, Lift Cylinder
MA5	SOL14	Coil (SV11)	Down, Lift Cylinder
	SOL15	Coil (SV11)	Down, Lift Cylinder
	SV11	Spool Valve	Down, Lift Cylinder

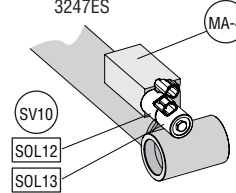
LIFT CYLINDER  
2047ES - 2647ES



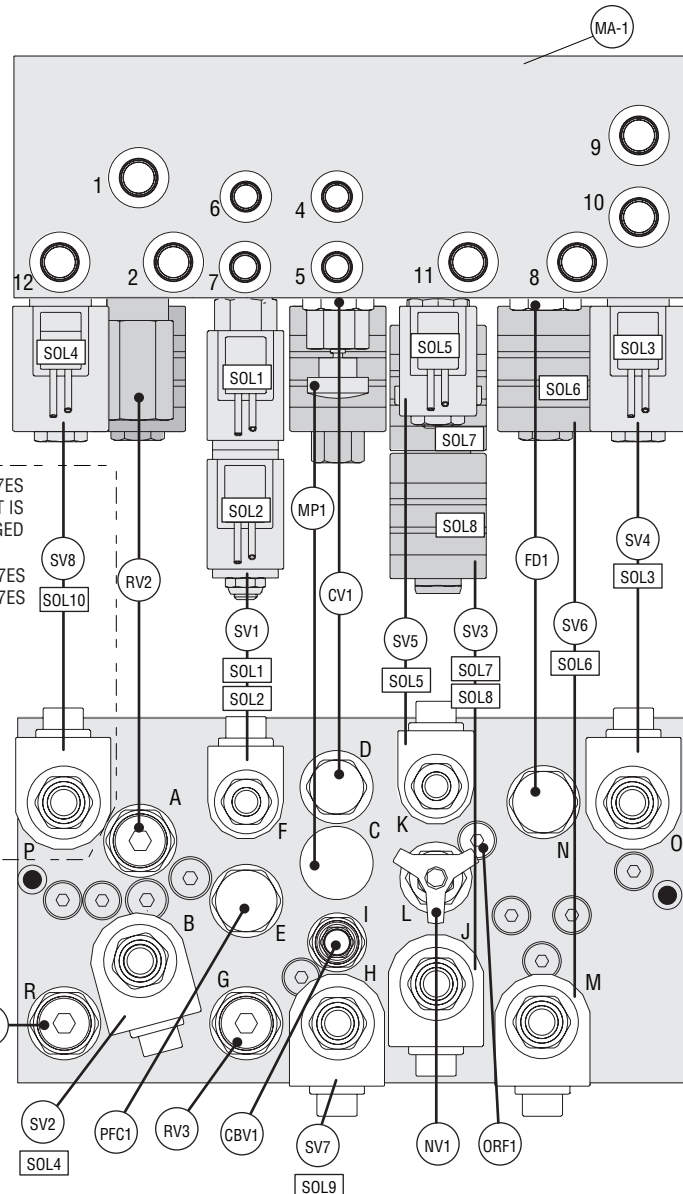
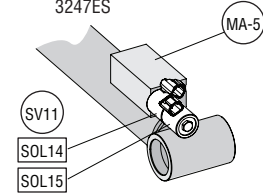
BRAKE RELEASE  
HAND PUMP  
2047ES - 2647ES



LOWER LIFT CYLINDER  
3247ES

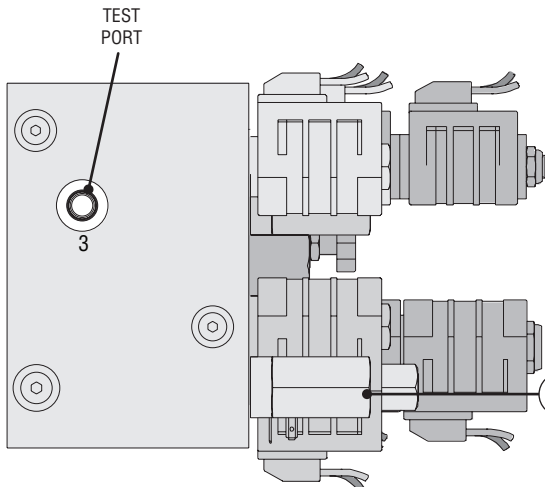


UPPER LIFT CYLINDER  
3247ES



3247ES  
PORT IS  
PLUGGED

2047ES  
2647ES



**mec** Hydraulic Manifold - current style

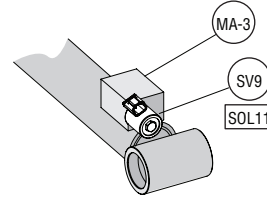
Model: / Serial #  
2047ES | 2647ES | 3247ES

Reference Art #: none | Publication Art #: ART\_2201

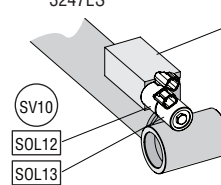
NOTE: Current style manifold. Refer to Hydraulic Schematic for serial # break

COMPONENTS	FUNCTION	PORTS	
CBV1 Relief Valve	Counter Balance	1	PUMP
SOL1 Coil (SV1)	Steer ?RIGHT?	2	TANK
SOL2 Coil (SV1)	Steer ?LEFT?	3	TEST PORT
SOL3 Coil (SV5)	Brake/Decel	4	N/A
SOL4 Coil (SV2)	Lift	5	BRAKE
SOL5 Coil (SV4)	Torque	6	STEER
SOL6 Coil (SV6)	Torque	7	STEER
SOL7 Coil (SV3)	Drive Forward	8	RIGHT B
SOL8 Coil (SV3)	Drive Reverse	9	LEFT A
FD1 Flow Divider		10	RIGHT A
FRR1 Flow Control	Steer Relief	11	LEFT B
HP1 Hand Pump	Brake Pump	12	LIFT
MP1 Manual Pump	Brake Release		
NV1 Needle Valve	Freewheel		
ORF1 Orifice Plug	Flow Restriction		
ORF2 Orifice Disc	Flow Restriction		
PP1 Pilot Piston	Counter Balance		
RV1 Relief Valve	Lift Relief		
RV2 Relief Valve	Main Relief		
SV1 Spool Valve	Steering Control		
SV2 Spool Valve	Lift Control		
SV3 Spool Valve	Direction Control		
SV4 Spool Valve	Torque		
SV5 Spool Valve	Drive Dump/Decel		
SV6 Spool Valve	Torque		
MA3 SOL11 Coil (SV9)	Down, Lift Cylinder		
MA3 SV9 Spool Valve	Down, Lift Cylinder		
MA4 SOL12 Coil (SV10)	Down, Lift Cylinder		
MA4 SOL13 Coil (SV10)	Down, Lift Cylinder		
MA4 SV10 Spool Valve	Down, Lift Cylinder		
MA5 SOL14 Coil (SV11)	Down, Lift Cylinder		
MA5 SOL15 Coil (SV11)	Down, Lift Cylinder		
MA5 SV11 Spool Valve	Down, Lift Cylinder		

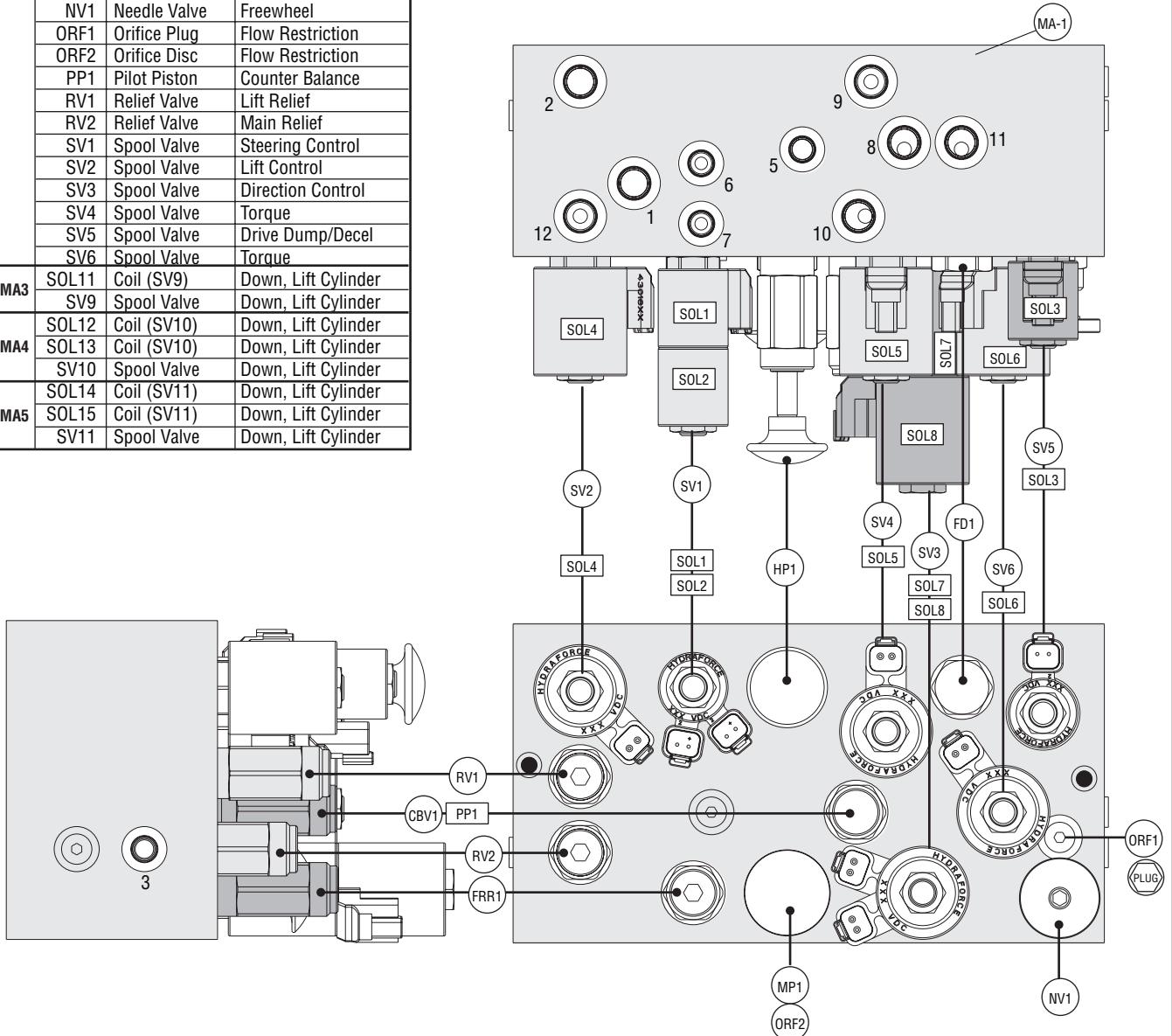
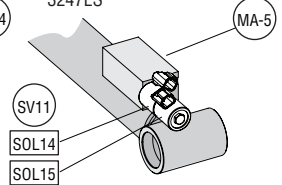
LIFT CYLINDER  
2047ES - 2647ES



LOWER LIFT CYLINDER  
3247ES



UPPER LIFT CYLINDER  
3247ES



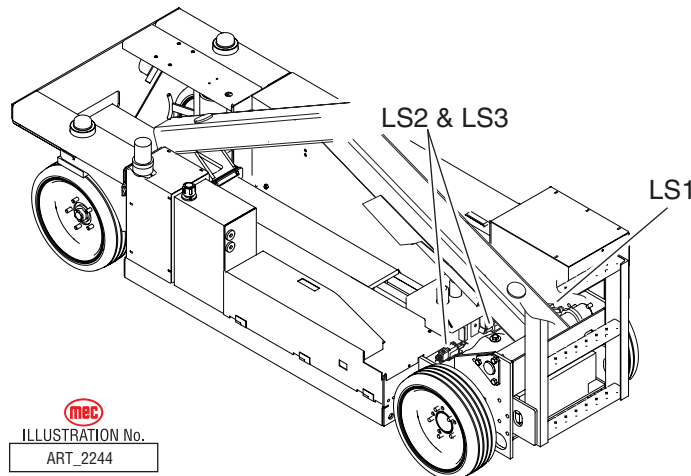
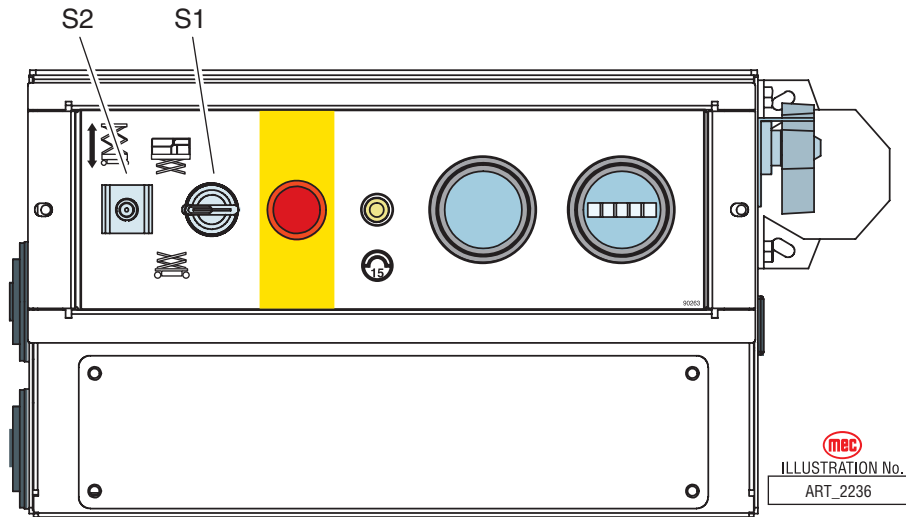
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# ELECTRIC SCHEMATICS

**NOTES:** (Unless otherwise specified)

1. Switch **S1 BASE/PLATFORM** makes contact from the CENTER to the LEFT position when placed in **BASE**.
2. Switch **S2 UP/DOWN** makes contact from the CENTER to the LEFT position when the switch is held in the CONTACT position and automatically returns to the CENTER position when released.
3. Switch **LS1** breaks the N/C set of contacts and makes the N/O set of contacts when the platform reaches approximately 7 feet.
4. Switch **LS2 and LS3** makes the N/C set of contacts when the Pothole Bars are down and locked in place.



**2047ES - Serial # 9801000 - 9801099**  
**2647ES - Serial # 9901000 - 9901199**  
**3247ES - Serial # 10001000 - 10001199**

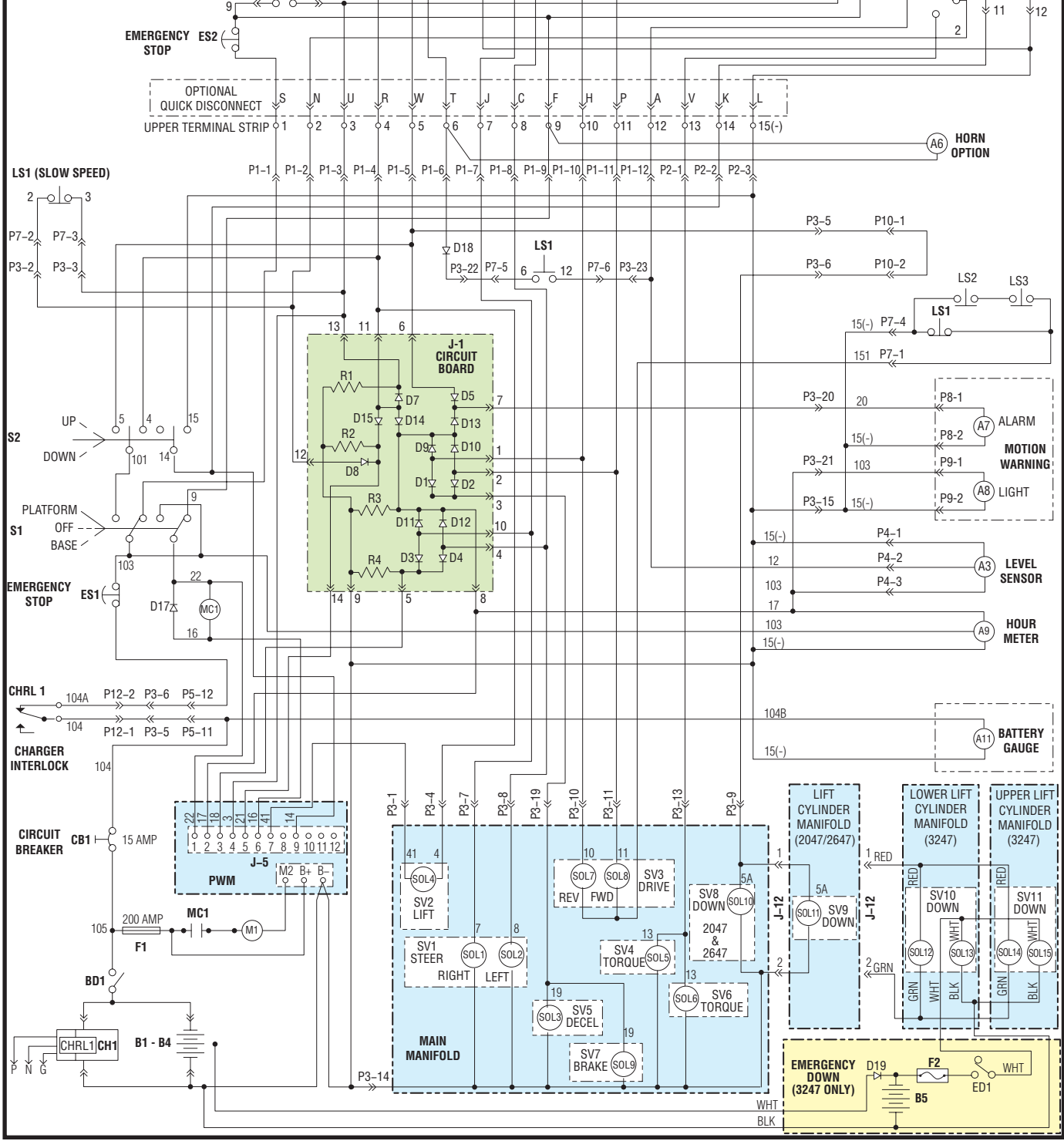
ITEM	DESCRIPTION	FUNCTION	LOCATION
A1	Tilt Light, 28V	Warn when Machine is Tilted	Upper Control Box
A3	Level Sensor	Activates Tilt Light	Inside Lower Control Box
A5	Push-Button Switch	Activates Horn	Upper Control Box
A6	Horn, 12V - 48V (option)	Activated by Operator	Under Platform
A7	Overload/Motion Alarm (option)	Warn of Movement	Outside Lower Control Box
A8	Motion Light (option)	Warn of Movement	Front Left Corner of Machine
A9	Hour Meter	Record Machine Usage Time	Lower Control Panel
A11	Battery Indicator	Show Battery Status	Lower Control Panel
B1-4	6-V Deep Cycle Battery	Power for Motor And Control Circuit	Inside Battery Compartment
B5	12-V Battery	Power for Emergency Down Circuit	Battery Compartment, 3247ES ONLY
BD1	Battery Disconnect Switch	Disconnect All Electrical Power	Lower Control Box
CB1	Circuit Breaker, 15AMP Manual	Control Circuit Protection	Lower Control Panel
CH1	Battery Charger	Recharges 24-VDC Battery Pack	Inside Pump Compartment
CHRL1	Charger Relay	Disconnect Electric when Charger ON	Inside Charger
D1 - D15	Circuit Board Diodes	Directs Signal to Proper Location	Inside Lower Control Box
D17	Diode w/Ring Terminals	Suppression Diode	Across Contactor Coil
D18			
D19	Diode w/Stud Base 10-32UNF-2A	Emergency Down Battery Charger	Battery Compartment
ED1	Switch, Emergency Down	Actuates Emergency Down Valves	Battery Compartment, 3247ES ONLY
ES1	Switch, Emergency Stop	Shut down All Moving Functions	Lower Control Panel
ES2	Switch, Emergency Stop	Shut down All Platform Functions	Upper Control Box
F1	Fuse, 200AMP	Main Line Fuse	Inside Lower Control Box
F2	Fuse, 8AMP	Emergency Down Fuse	Battery Compartment, 3247ES ONLY
LS1	Limit Switch, Double Pole	Enable Drive and High Speed	Right Rear Corner of Machine
LS2	Limit Switch, Single Pole	Drive Enable if Pothole Deployed	On pothole Linkage
LS3	Limit Switch, Single Pole	Enable Drive if Pothole Deployed	On Pothole Linkage
M1	Motor, 24V, 2HP	Turn the Hydraulic Pump	Pump Compartment
MC1	24-V Contactor	Connects Battery (+) to Motor	Inside Lower Control Box
PWM	Controller, DC 250AMP	Changes the Motor Speed	Inside Lower Control Box
POT1	Potentiometer, 20K Ohms	Senses Operator Input	Upper Control Box
R1 - R4	Circuit Board Resistors		Inside Lower Control Box
S1	Key Switch, N/O Contact Block	Select Lower or Upper Controls	Lower Control Panel
S2	Switch, Toggle	Lift/Lower at Lower Controls	Lower Control Panel
S3	Switch, Push Button	Enable Other Functions at Platform	Upper Control Box Handle
S4	Switch, Micro	Right Turn Switch	Upper Control Box Handle
S5	Switch, Micro	Left Turn Switch	Upper Control Box Handle
S6	Switch, Toggle	Select LIFT or DRIVE	Upper Control Box
S7	Switch, Micro	Reverse or Lift Switch	Upper Control Box
S8	Switch, Micro	Forward or Down Switch	Upper Control Box
S9	Switch, Toggle	TORQUE Switch	Upper Control Box
SOL1	Coil, Turn Right Solenoid	Activate Turn Right Valve (SV1)	Main Manifold
SOL2	Coil, Turn Left Solenoid	Activate Turn Left Valve (SV1)	Main Manifold
SOL3	Coil, Decel Solenoid	Activate Decel Valve (SV5)	Main Manifold
SOL4	Coil, Lift Solenoid	Activate Lift Valve (SV2)	Main Manifold
SOL5-6	Coil, Torque Solenoid	Activate Torque Valves (SV4) (SV6)	Main Manifold
SOL7	Coil, Reverse Solenoid	Activate Reverse Valve (SV3)	Main Manifold
SOL8	Coil, Forward Solenoid	Activate Forward Valve (SV3)	Main Manifold
SOL9	Coil, Brake Solenoid	Activate Brake Valve (SV7)	Main Manifold
SOL10	Coil, Down Solenoid	Activate Down Valve (SV8)	Main Manifold
SOL11	Coil, Down Solenoid	Activate Down Valve (SV9)	Lift Cylinder, 2047/2647 ONLY
SOL12	Coil, Down Solenoid	Activate Down Valve (SV10)	Lower Lift Cylinder, 3247 ONLY
SOL13	Coil, E-Down Solenoid	Activate Emergency Down Valve (SV10)	Lower Lift Cylinder, 3247 ONLY
SOL14	Coil, Down Solenoid	Activate Down Valve (SV11)	Upper Lift Cylinder, 3247 ONLY
SOL15	Coil, E-Down Solenoid	Activate Emergency Down Valve (SV11)	Lower Lift Cylinder, 3247 ONLY





<b>MEC ELECTRIC SCHEMATIC</b>	
Model / Serial #	2047ES   9801000 - 9801099
	2647ES   9901000 - 9901199
	3247ES   10001000 - 10001199
Reference Art #: 1004	Publication Art #: ART_2209

<b>SWITCH CONTACT POSITIONS</b>	
	N/C
	N/C HELD OPEN
	N/O
	N/O HELD CLOSED
<b>WIRE CONNECTOR LEGEND</b>	
	TERMINAL #
	MALE PIN
	FEMALE SOCKET



**2047ES - Serial # 9801100 - CURRENT**  
**2647ES - Serial # 9901200 - CURRENT**  
**3247ES - Serial # 10001200 - CURRENT**

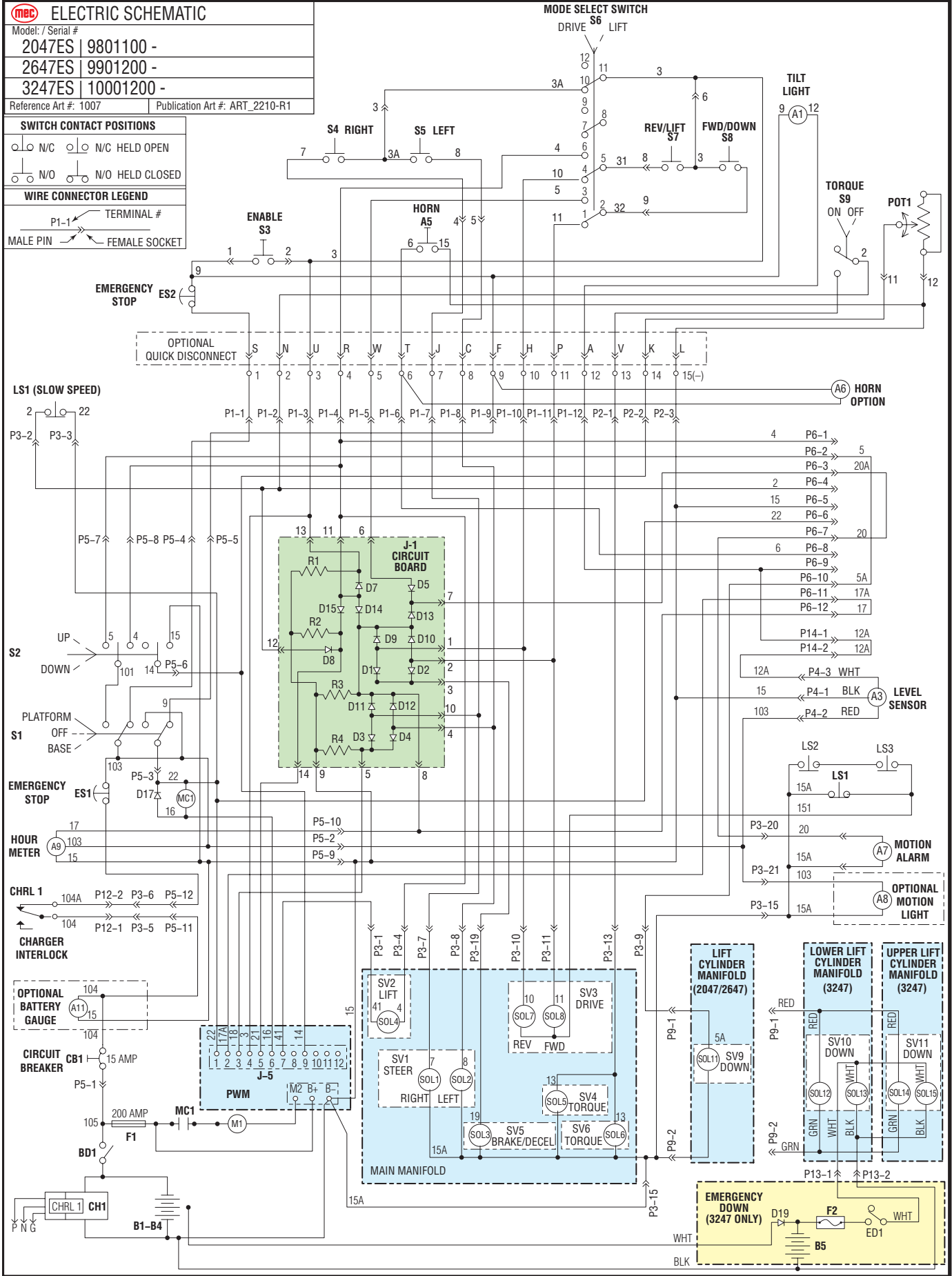
ITEM	DESCRIPTION	FUNCTION	LOCATION
A1	Tilt Light, 28V	Warn when Machine is Tilted	Upper Control Box
A3	Level Sensor	Activates Tilt Light	Inside Lower Control Box
A5	Push-Button Switch	Activates Horn	Upper Control Box
A6	Horn, 12V - 48V (option)	Activated by Operator	Under Platform
A7	Overload/Motion Alarm (option)	Warn of Movement	Outside Lower Control Box
A8	Motion Light (option)	Warn of Movement	Front Left Corner of Machine
A9	Hour Meter	Record Machine Usage Time	Lower Control Panel
A11	Battery Indicator	Show Battery Status	Lower Control Panel
B1-4	6-V Deep Cycle Battery	Power for Motor And Control Circuit	Inside Battery Compartment
B5	12-V Battery	Power for Emergency Down Circuit	Battery Compartment, 3247ES ONLY
BD1	Battery Disconnect Switch	Disconnect All Electrical Power	Lower Control Box
CB1	Circuit Breaker, 15AMP Manual	Control Circuit Protection	Lower Control Panel
CH1	Battery Charger	Recharges 24-VDC Battery Pack	Inside Pump Compartment
CHRL1	Charger Relay	Disconnect Electric when Charger ON	Inside Charger
MC1	24-V Contactor	Connects Battery (+) to Motor	Inside Lower Control Box
D1 - D15	Circuit Board Diodes	Directs Signal to Proper Location	Inside Lower Control Box
R1 - R4	Circuit Board Resistors		Inside Lower Control Box
D17	Diode w/Ring Terminals	Suppression Diode	Across Contactor Coil
D19	Diode w/Stud Base 10-32UNF-2A	Emergency Down Battery Charger	Battery Compartment, 3247ES ONLY
ED1	Switch, Emergency Down	Actuates Emergency Down Valves	Battery Compartment, 3247ES ONLY
ES1	Switch, Emergency Stop	Shut down All Moving Functions	Lower Control Panel
ES2	Switch, Emergency Stop	Shut down All Platform Functions	Upper Control Box
F1	Fuse, 200AMP	Main Line Fuse	Inside Lower Control Box
F2	Fuse, 8AMP	Emergency Down Fuse	Battery Compartment, 3247ES ONLY
LS1	Limit Switch, Double Pole	Enable Drive and High Speed	Right Rear Corner of Machine
LS2	Limit Switch, Single Pole	Drive Enable if Pothole Deployed	On pothole Linkage
LS3	Limit Switch, Single Pole	Enable Drive if Pothole Deployed	On Pothole Linkage
M1	Motor, 24V, 2HP	Turn the Hydraulic Pump	Pump Compartment
PWM	Controller, DC 250AMP	Changes the Motor Speed	Inside Lower Control Box
POT1	Potentiometer, 20K Ohms	Senses Operator Input	Upper Control Box
S1	Key Switch, N/O Contact Block	Select Lower or Upper Controls	Lower Control Panel
S2	Switch, Toggle	Lift/Lower at Lower Controls	Lower Control Panel
S3	Switch, Push Button	Enable Other Functions at Platform	Upper Control Box Handle
S4	Switch, Micro	Right Turn Switch	Upper Control Box Handle
S5	Switch, Micro	Left Turn Switch	Upper Control Box Handle
S6	Switch, Toggle	Select LIFT or DRIVE	Upper Control Box
S7	Switch, Micro	Reverse or Lift Switch	Upper Control Box
S8	Switch, Micro	Forward or Down Switch	Upper Control Box
S9	Switch, Toggle	TORQUE Switch	Upper Control Box
SOL1	Coil, Turn Right Solenoid	Activate Turn Right Valve (SV1)	Main Manifold
SOL2	Coil, Turn Left Solenoid	Activate Turn Left Valve (SV1)	Main Manifold
SOL3	Coil, Decel/Brake Solenoid	Activate Decel/Brake Valve (SV5)	Main Manifold
SOL4	Coil, Lift Solenoid	Activate Lift Valve (SV2)	Main Manifold
SOL5-6	Coil, Torque Solenoid	Activate Torque Valves (SV5)(SV6)	Main Manifold
SOL7	Coil, Reverse Solenoid	Activate Reverse Valve (SV3)	Main Manifold
SOL8	Coil, Forward Solenoid	Activate Forward Valve (SV3)	Main Manifold
SOL11	Coil, Down Solenoid	Activate Down Valve (SV9)	Lift Cylinder, 2047/2647 ONLY
SOL12	Coil, Down Solenoid	Activate Down Valve (SV10)	Lower Lift Cylinder, 3247 ONLY
SOL13	Coil, E-Down Solenoid	Activate Emergency Down Valve (SV10)	Lower Lift Cylinder, 3247 ONLY
SOL14	Coil, Down Solenoid	Activate Down Valve (SV11)	Upper Lift Cylinder, 3247 ONLY
SOL15	Coil, E-Down Solenoid	Activate emergency Down Valve (SV11)	Upper Lift Cylinder, 3247 ONLY



**MEC ELECTRIC SCHEMATIC**

Model / Serial #	2047ES   9801100 -
	2647ES   9901200 -
	3247ES   10001200 -
Reference Art #: 1007	Publication Art #: ART_2210-R1

SWITCH CONTACT POSITIONS	
	N/C
	N/C HELD OPEN
	N/O
	N/O HELD CLOSED
WIRE CONNECTOR LEGEND	
	TERMINAL #
	MALE PIN
	FEMALE SOCKET

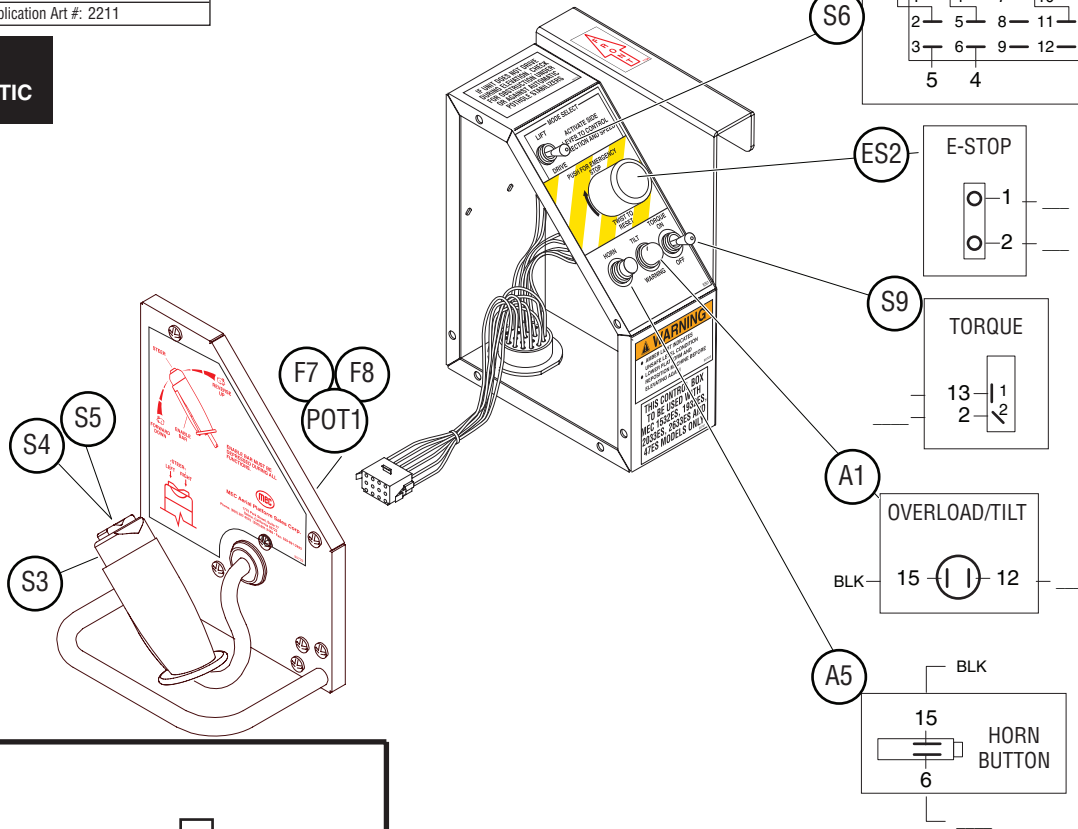


**Component Locations**

Model: / Serial #  
ES Models: all

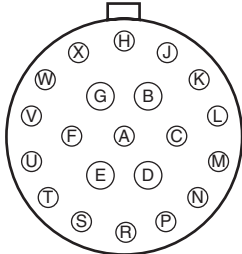
Reference Art #: none | Publication Art #: 2211

**REFER TO  
ELECTRIC SCHEMATIC**

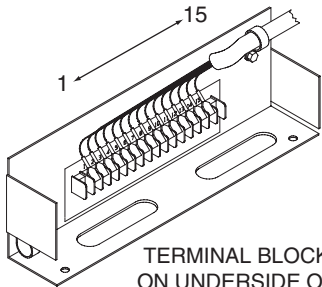


**REMOVABLE  
CONTROL  
HARNESS**

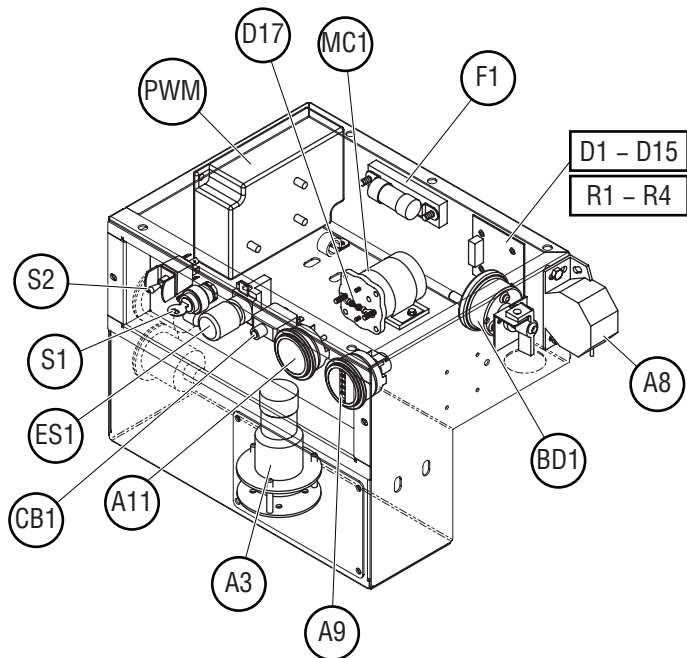
PIN #	WIRE #
S	1
F	9
W	5
R	4
V	13
A	12
H	10
P	11
U	3
T	6
J	7
N	2
C	8
K	14
M	16 (GND)
L	15



END VIEW OF  
REMOVABLE  
CONTROL HARNESS  
(OPTIONAL  
QUICK  
DISCONNECT)



TERMINAL BLOCK  
ON UNDERSIDE OF  
PLATFORM DECK

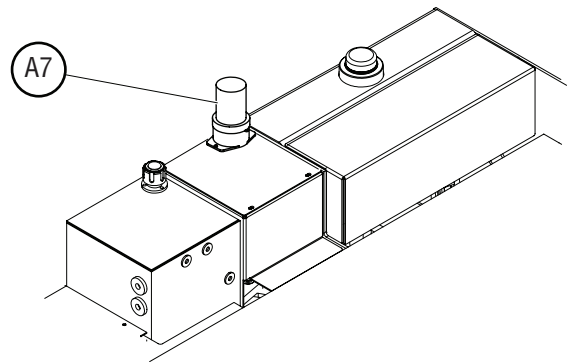
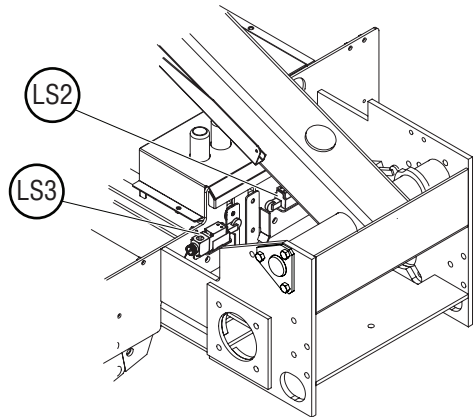
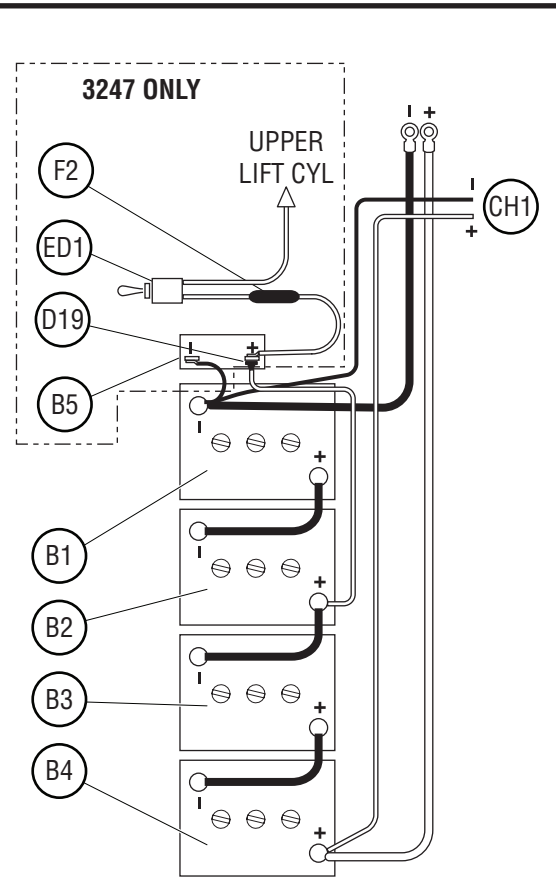
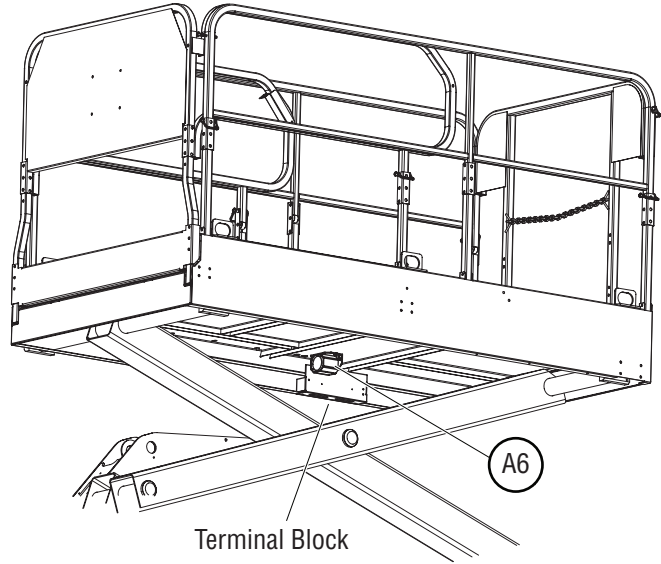


**Component Locations**

Model / Serial #  
2047ES - 2647ES - 3247ES: all

Reference Art #: none      Publication Art #: ART\_2216

**REFER TO  
ELECTRIC SCHEMATIC**



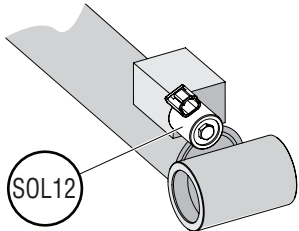
**MEC** Component Locations

Model: / Serial #  
ES Models: all

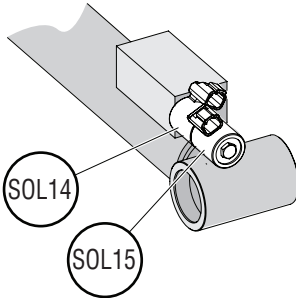
Reference Art #: none      Publication Art #: ART\_2214

**REFER TO  
ELECTRIC SCHEMATIC**

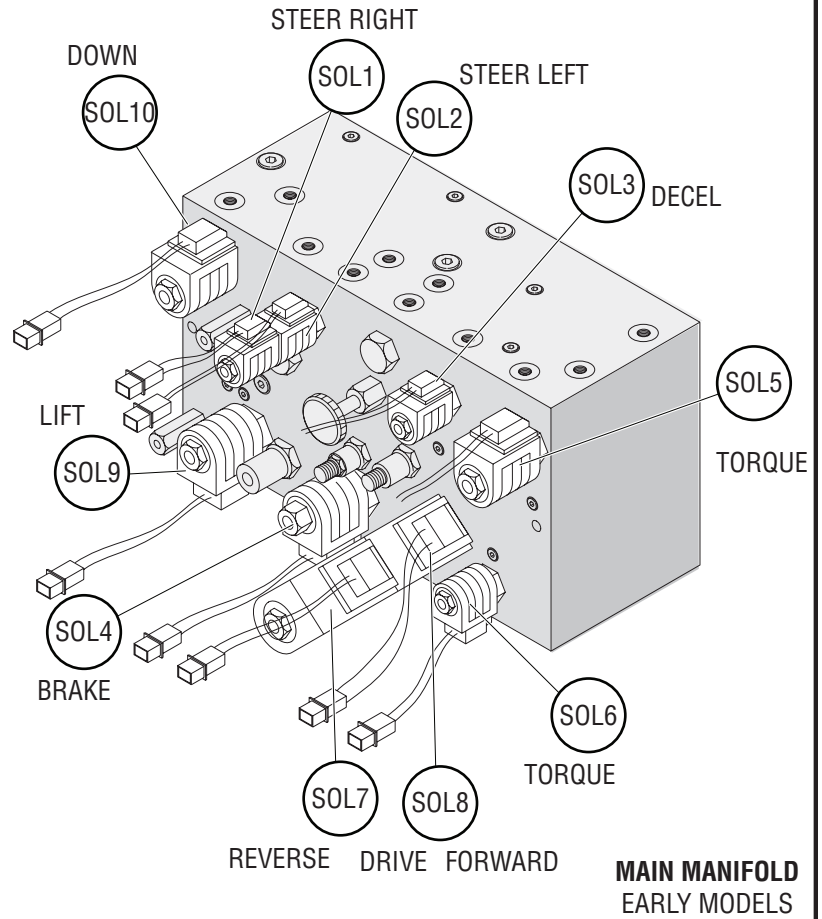
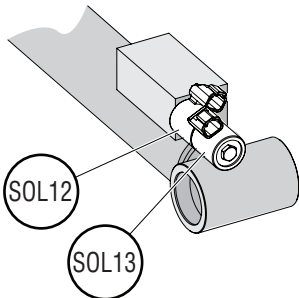
**LIFT CYLINDER  
2047ES - 2647ES**



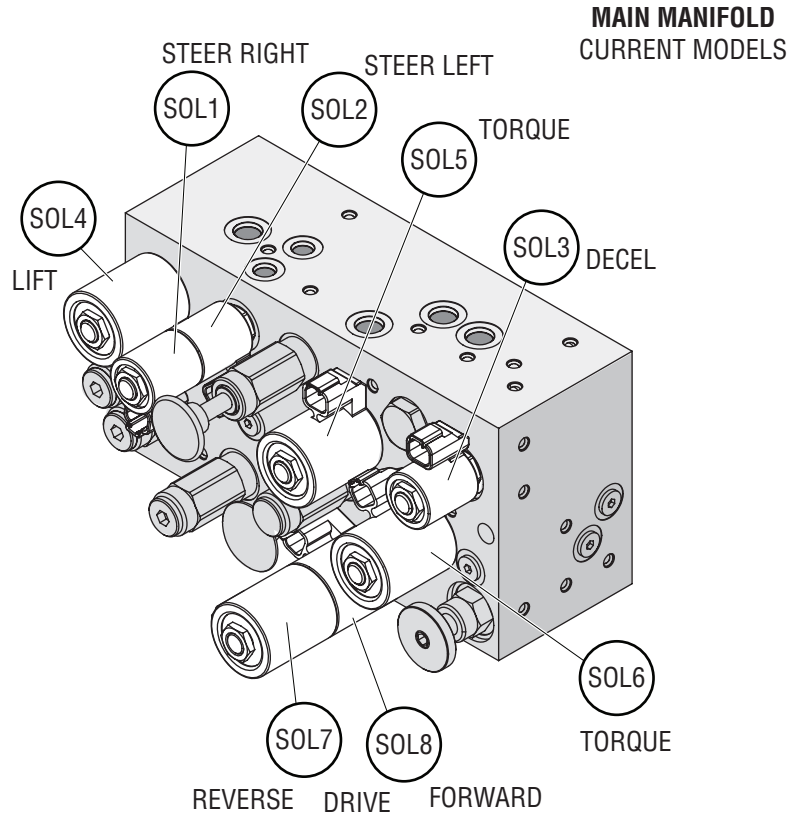
**UPPER LIFT CYLINDER  
3247ES**



**LOWER LIFT CYLINDER  
3247ES**



**MAIN MANIFOLD  
EARLY MODELS**



**MAIN MANIFOLD  
CURRENT MODELS**



<b>MEC Plug Pin Identification</b>	
Model: / Serial #	
ES Models : all	
Reference Art #: none	Publication Art #: 2217

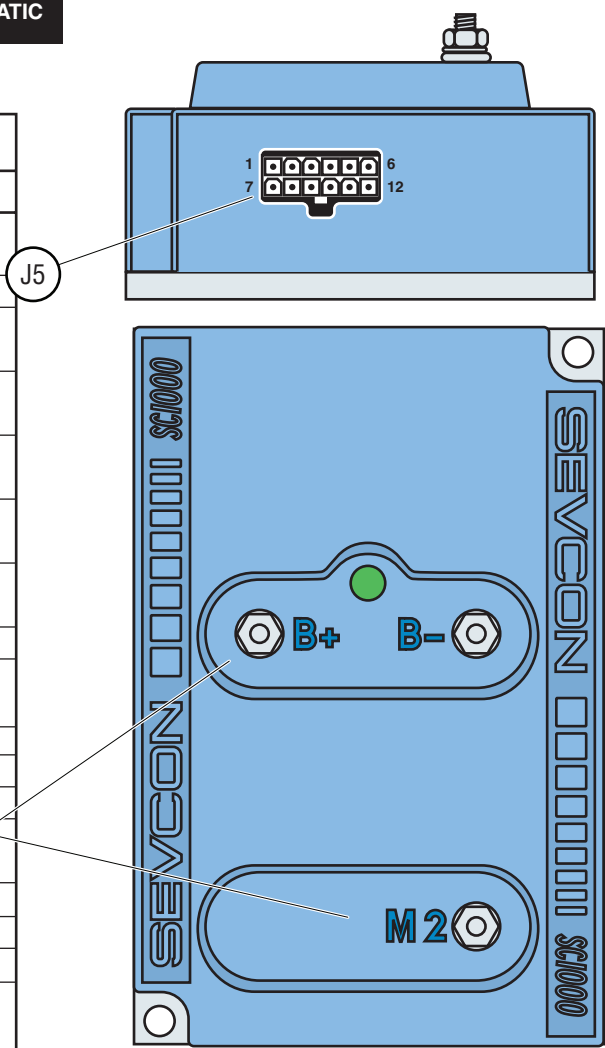
**REFER TO  
ELECTRIC SCHEMATIC**

PWM

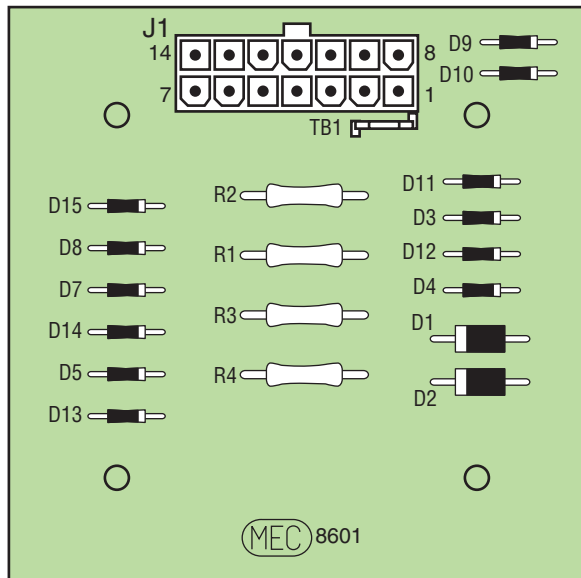
<b>J5 Pin Identification</b>		
PIN #	WIRE #	FUNCTION
1	22	B+ power input (power up)
2	17	Lift, Drive or Steer functions requested (functions requiring motor)
3	18	Steer Requested (adds additional motor speed for steer)
4	3	Enable signal input
5	21	Speed cut-back (24 Volts = full speed, 0 Volts = creep speed)
6	16	Motor Start Relay signal (GROUND signal to activate Motor Start Relay)
7	41	Lift Valve B- (provides GROUND signal to Lift Valve)
8	none	none
9	14	Accelerator reference signal (3.6 Volts to Potentiometer)
10	none	none
11	none	none
12	none	none

<b>Terminal Identification</b>	
POST	FUNCTION
B+	Battery Positive Cable from 200 AMP Fuse
B-	Negative Battery Cable and GROUND wire (15) connection
M2	Motor Ground (Pulse-Width Modulated [PWM] variable speed control)



### Circuit Board



### J1 Plug Pin Identification

PIN #	WIRE #	SIGNAL	FUNCTION
1	10	INPUT	Drive Reverse
2	11	INPUT	Drive Forward
3	19	OUTPUT	Brake, Decel Valve signal
4	8	INPUT	Steer Left
5	18	OUTPUT	Steer signal to Sevcon
6	5	INPUT	Down signal
7	20	OUTPUT	Signal to Motion Alarm(s) (optional)
8	17	OUTPUT	Sevcon & Hour Meter (motor function requested)
9	15	INPUT	Battery Negative
10	7	INPUT	Steer Right
11	4	INPUT	Lift Up
12	2	INPUT	Limit Switch (24V = platform down)
13	3	OUTPUT	Enable, from lower Lift switch
14	21	OUTPUT	To Sevcon (for speed cutback)

